NONLINEAR LABS C15 Studio Package Keyboard User Manual

NONLINEARLABS

C15

User Manual
C15 Studio Package – Addendum

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Introduction

In the development of the C15, we first focused on human control and playability. We designed a self-contained instrument “for those who love to play keys”.
The implementation of a MIDI interface is now widening the spectrum of applications for the C15 – especially in the studio environment.
The second extension that is included in this software release is an internal digital recorder. It automatically stores the audio output signal of the last hours. Selected segments of the audio can be downloaded in a lossless digital format. It also allows for the restoration of the synth engine’s state at any point in time within the recorded audio.

The MIDI implementation of the C15

Since the Studio Package update, the C15 can receive and send MIDI messages. Received MIDI messages can control the C15 and affect the sound, similar to playing the instrument itself. When playing on the C15, MIDI messages can be sent, reflecting the performance. Note that received MIDI messages will never be sent, so there is no “MIDI Thru” or loopback functionality.
Receive and Send options include a Channel (Omni, 1 … 16) specifier, filtering events accordingly. When a Split Sound is loaded, a secondary (Split) Channel can be used in order to separate both Parts from each other.
As classical MIDI operates on 7-bit resolution (128 steps), there is a loss in accuracy (the C15 operates on much higher precision). Nevertheless, precision can be maintained by enabling “High Res.” options. When enabled, the resolution increases to 14 bit (16384 steps). Values are then encoded as a pair of MSB (coarse) and LSB (fine) components, effectively doubling the number of messages. This is still compatible with the classical resolution, as the LSB component is optional when receiving MIDI messages.
The C15 can send and receive MIDI messages for the following events:

Note On and Note Off

When enabled, the C15 will produce sounds when receiving MIDI Note messages. Likewise, the C15 will send MIDI Note messages when playing on the internal keybed, if enabled. Note On and Off velocities are supported and can optionally operate on high resolution, using an additional MIDI CC (Control Change) message on Control Number 88, encoding the LSB component.
When a Split Sound is loaded, Notes can be received and sent on both Parts, using the secondary (Split) Channel setting.

The eight Hardware Sources

Physical control elements of the C15 like a pedal or the bender are called Hardware Sources. They can be flexibly mapped to the Macro Controls, each of which can modulate up to 90 assignable parameters.
In the C15’s user interface the Hardware Sources are represented by eight sliders. Their positions can be sent and received via MIDI in the following way:

- Pedal 1/2/3/4 can be assigned to MIDI CCs 01…31 for the MSB while CC 33…63 can work as LSB for 14-bit resolution. CC 64…69 can be assigned in a 2-state switching mode.
- Ribbon 1/2 can be assigned to MIDI CC 01…31 for the MSB while CC 33…63 can work as LSB for 14-bit resolution.
- The Bender can be assigned to MIDI Pitchbend or to MIDI CC 01…31 for the MSB while CC 33…63 can work as LSB for 14-bit resolution.
- Aftertouch can be assigned to MIDI Channel Pressure or to MIDI CC 01…31 for the MSB while CC 33…63 can work as LSB for 14-bit resolution, or to one half of the range of MIDI Pitchbend (up or down).

Note that assignments are non-exclusive, so multiple Hardware Sources can be bound to the same received MIDI message, as well as being merged into indistinguishable MIDI messages when sent. This may be useful in certain scenarios, so there are no restrictions. However, it is up to the user to find a meaningful setting, apart from the provided default setting, consisting of distinct assignments.

When a Split Sound is loaded, Hardware Sources can be received and sent only on the primary Channel. The secondary (Split) Channel setting does not apply to Hardware Sources.

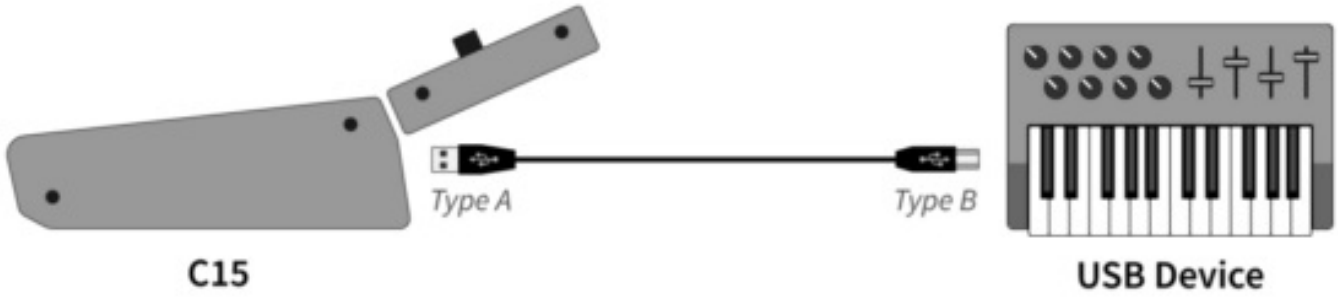
Preset Selection

One of the Preset Banks can be assigned to receive and send MIDI Program Changes. The Program Change numbers are mapped to the first 128 presets of this Bank. MIDI Program Change messages are only received and sent according to the primary Channel setting. The secondary (Split) Channel setting does not apply to Program Changes.

Connecting the C15 to a USB Device

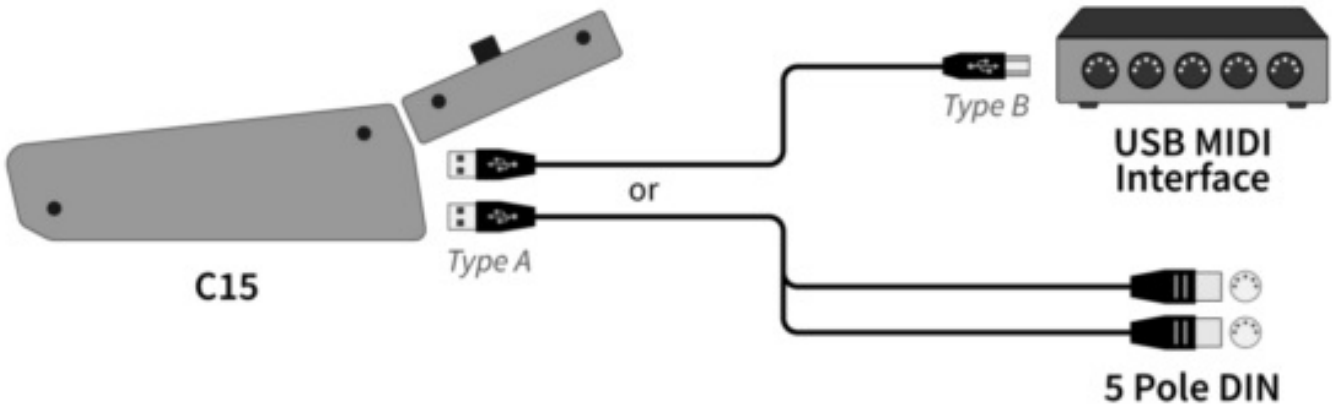
The C15 has a Type A connector for USB, and its embedded computer system works as a “USB host” for “USB devices” connected to this port. This means that you only need a standard USB cable to set up a MIDI communication with an instrument, a hardware sequencer, or a MIDI interface that has a USB Type B connector. You can connect the C15 to multiple USB MIDI devices via a USB hub.

Important: The USB port of the C15 can only supply a limited current to bus-powered devices. Devices that have a higher power consumption need to be run with their own power supply, or through a powered hub.



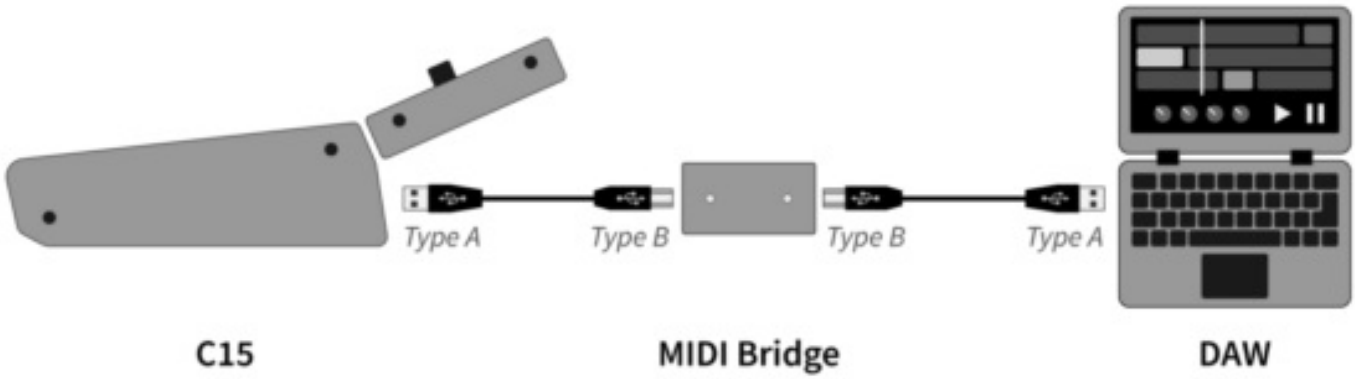
Connecting the C15 via 5-pole DIN Connectors

To use the classical MIDI cables and 5-pin DIN Ins and Outs a MIDI interface can be connected as a USB device directly to the USB port of the C15. The most convenient and cost-effective solution is cabled with an integrated USB-MIDI interface.



Connecting the C15 to a Computer

A computer running a DAW or similar is the center of many setups. It functions as a USB host and can only be connected to USB devices. Since the C15 is also a USB host we provide the “MIDI Bridge” that functions as a double-sided USB device with two Type B connectors. One of the ports is connected to the C15 and the second to your computer.
Our adapter will appear as “NLL-MIDI-Bridge” in the list of USB MIDI devices. The two LEDs on top of the box show the operation of the two USB Ports. If both are lit in green color the box is working normally. If one of the LEDs is not green, the connection to its side is interrupted. More information about the operation of the MIDI Bridge can be found in the “MIDI-Bridge-UserManual.pdf”.
Besides its function for the C15 the MIDI bridge can also be used for the MIDI connection between other USB hosts, like two computers.

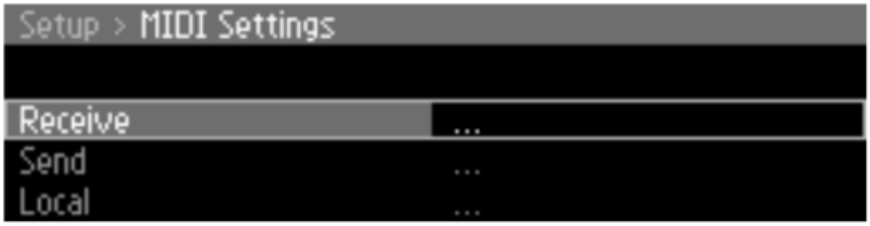


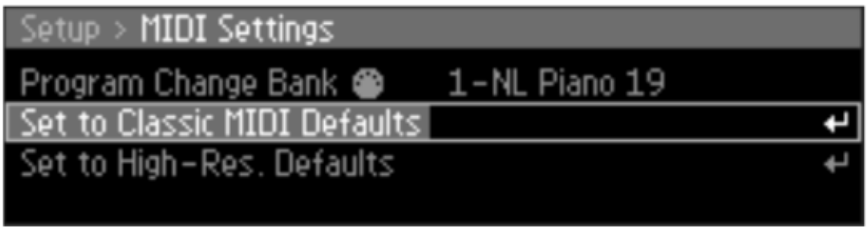
MIDI Settings

In the Setup (both in the graphical UI and on the hardware) you find a new page for “Midi Settings”. It is divided into the sections “Receive”, “Send”, “Local”, and “Mappings”.

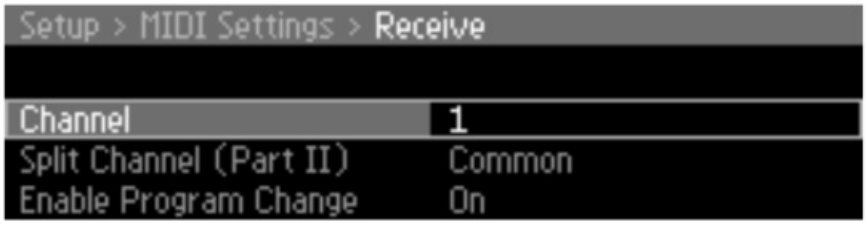

Setup
Device Settings
GUI Settings
MIDI Settings
Recorder
System Info
About
Receive
Channel
Omni
Split Channel (Part II)
Common
Enable Program Change
On
Off
Enable Notes
On
Off
Enable Hardware Sources
On
Off
Send
Channel
1
Split Channel (Part II)
Common
Enable Program Change
On
Off
Enable Notes
On
Off
Enable Hardware Sources
On
Off
Local
Enable Notes
On
Off
Enable Hardware Sources
On
Off
Mappings
Pedal 1
CC 20 (LSB: CC 52)
Pedal 2
CC 21 (LSB: CC 53)

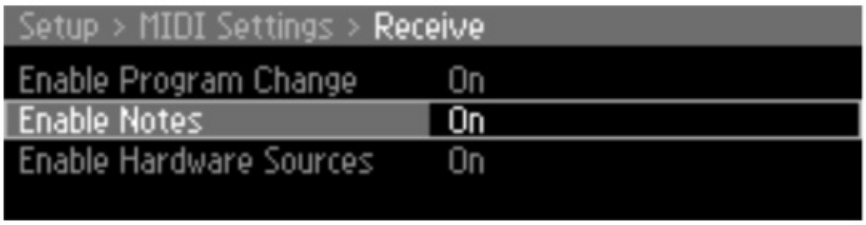

Setup
Hardware UI ...
MIDI Settings ...
Recorder Settings ...
System Info ...


Setup > MIDI Settings
Receive ...
Send ...
Local ...



MIDI Settings: Receive





Channel

Here you can select the MIDI channel that is used to receive MIDI messages. With Split Sounds it is the channel for Part I, and when “Split Channel Part II” is set to “Common” it will be used also for Part II. If you select “Omni”, messages from all 16 MIDI channels will be applied. “None” will block all incoming MIDI messages, except in Split mode with Part II set to its own channel.

Split Channel (Part II)

This setting applies to Split Sounds only. It controls the MIDI channel for Note messages received by Part II. If you choose “Common”, it is the same channel as it is set in the “Channel” menu. If you select “Omni”, messages from all 16 MIDI channels will be applied. “None” will block all incoming MIDI messages for Part II.
If the channel for Part II is not set to “Common”, the Split Point(s) are not applied to the received MIDI notes. Both Parts can be played over the full MIDI note range.

Enable Program Change

When set to “Off”, the received MIDI Program Change messages will be ignored.

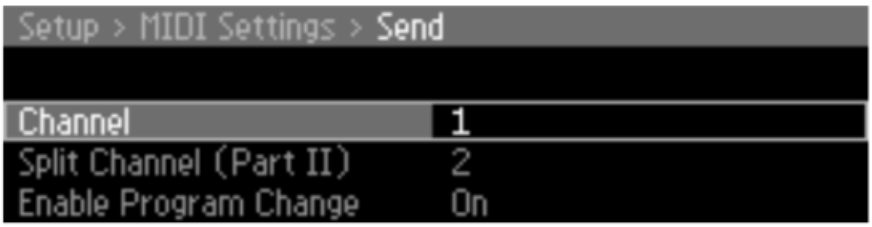
Enable Notes

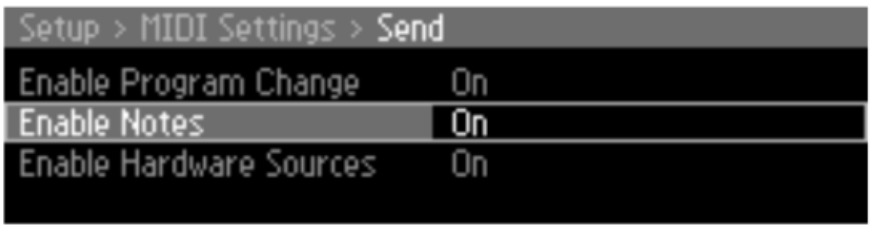
When set to “Off”, the received MIDI Note On/Off messages will be ignored.

Enable Hardware Sources

When set to “Off”, the eight Hardware Sources will not be controlled by MIDI Control Change, Pitchbend, or Aftertouch messages.

MIDI Settings: Send





Channel

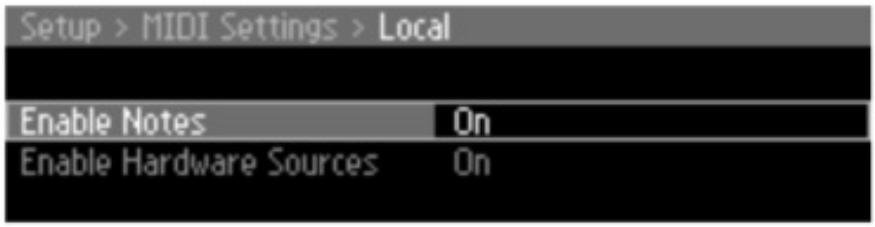
Here you can select the MIDI channel that is used to send MIDI messages. With Split Sounds it is the channel for Part I, and when “Split Channel (Part II)” is set to “Common” it will be used also for Part II. “None” will block all outgoing MIDI messages, except in Split mode with Part II set to its own channel.

Split Channel (Part II)

This setting applies to Split Sounds only. It controls the MIDI send channel for notes played in the key range of Part II. If you choose “Common”, it is the same channel as it is set in the “Channel” menu. “None” will block all outgoing MIDI messages for Part II.

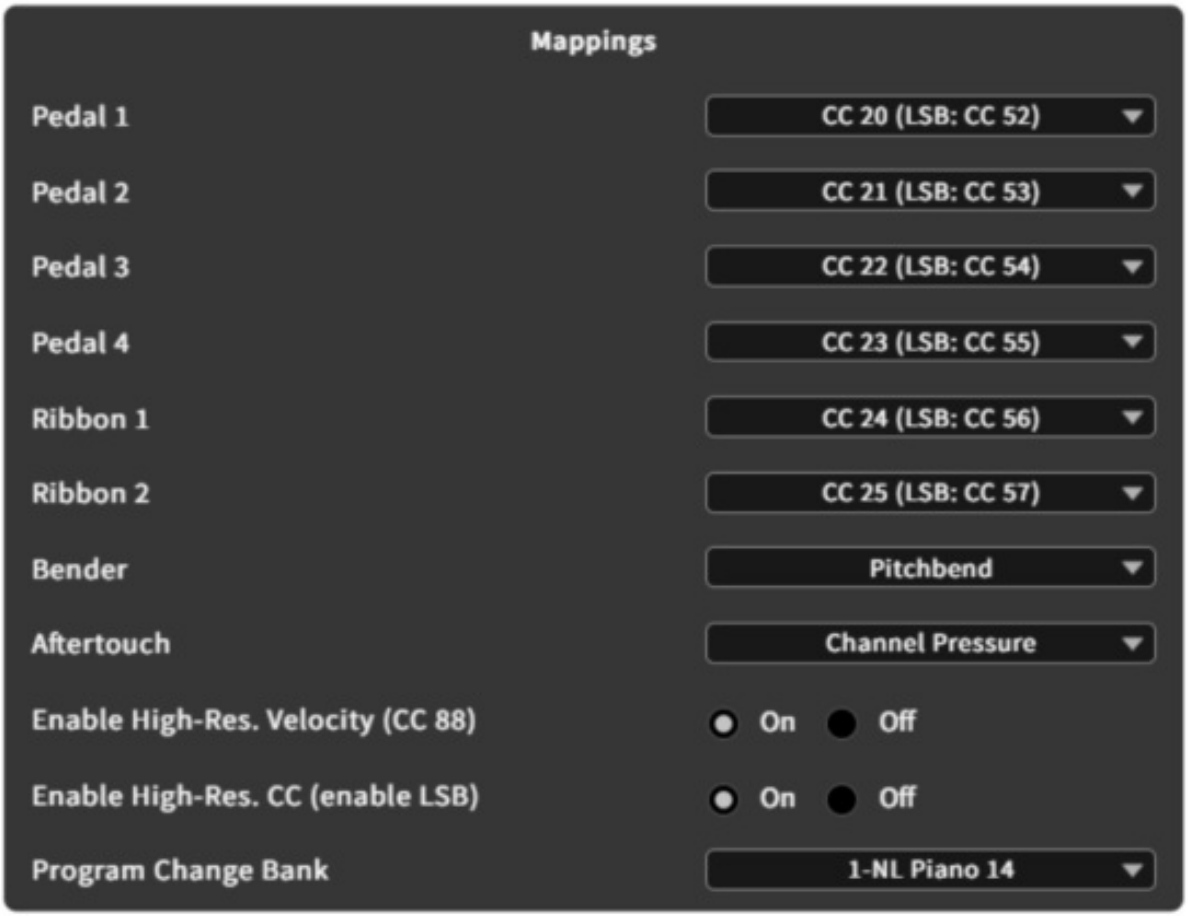
Enable Program Change
When set to “Off”, MIDI Program Change messages will not be sent.
Enable Notes
When set to “Off”, MIDI Note On/Off messages will not be sent.
Enable Hardware Sources
When set to “Off”, the eight Hardware Sources will not generate MIDI Control Change, Pitchbend, or Channel Pressure messages.

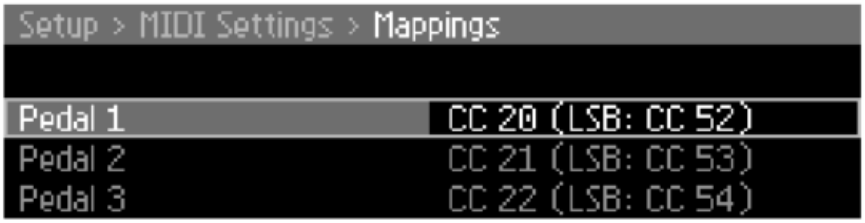
MIDI Settings: Local

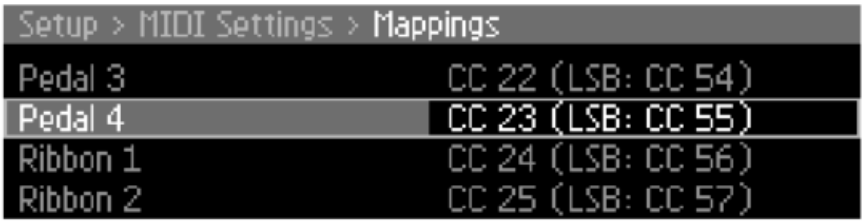


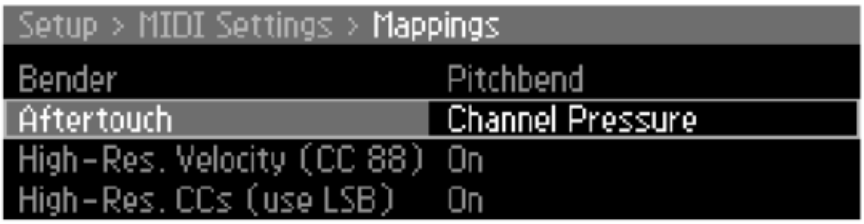
Enable Notes
When set to “Off” the C15’s keyboard is disconnected from the synth engine but still can be used to send MIDI to note messages.
Enable Hardware Sources
When set to “Off” the eight Hardware Sources are disconnected from the synth engine but still can be used to send MIDI Control Change, Pitchbend, or Channel Pressure messages. (In this mode the user interface displays, e.g. the LEDs of the ribbons, do not reflect the current positions of the Hardware Sources. This will be improved in a future update.)

MIDI Settings: Mappings









These settings determine which types and numbers of MIDI messages are assigned to the Hardware Sources. High-Resolution options for Velocities and Hardware Sources as well as a Bank selector for Program Changes are also provided. The Mappings apply to both MIDI Send and MIDI Receive.

Pedal 1, 2, 3, 4
Each pedal can be assigned to a MIDI Control Change. The CC numbers 1 to 31 are available for continuous operation in 7-bit and 14-bit (High-Res.) mode. In 14-bit mode, a second CC with a number between 33 and 63 is automatically assigned for the LSB.

In addition, the CC numbers 64 to 69 are available. They work as 2-state switches, as is typical for e.g. a MIDI sustain pedal. When the C15's pedal position rises above 50 %, a MIDI CC value of 127 is sent, when it falls below 50% a value of 0 is sent. A received MIDI CC value smaller than 64 sets the pedal position to 0 %. Values of 64 or larger set the pedal position to 100 %.
By selecting "None" the pedal is disconnected from MIDI.

Ribbon 1, 2

Each ribbon can be assigned to a MIDI Control Change. The CC numbers 1 to 31 are available in 7-bit and 14-bit (High-Res) modes. In 14-bit mode, a second CC with a number between 33 and 63 is automatically assigned for the LSB. By selecting "None" the ribbon is disconnected from MIDI.

Bender

In the typical application as a pitch bender, the Bender can be assigned to MIDI Pitchbend. This has 14 bits resolution by definition.
The Bender can also be assigned to a MIDI Control Change. The CC numbers 1 to 31 are available in 7-bit and 14-bit (High-Res) modes. In 14-bit mode, a second CC with a number between 33 and 63 is automatically assigned for the LSB. By selecting "None" the Bender is disconnected from MIDI.

Aftertouch

The most common assignment would be MIDI Channel Pressure. This has only 7 bits of resolution.
Aftertouch can also be assigned to a MIDI Control Change. The CC numbers 1 to 31 are available in 7-bit and 14-bit (High-Res) modes. In 14-bit mode, a second CC with a number between 33 and 63 is automatically assigned for the LSB. Two additional options are available to assign Aftertouch to one-half of the MIDI Pitchbend. "Pitchbend up" has a range from the center to the maximum while "Pitchbend down" goes from the center to the minimum. These ranges have 13 bits of resolution. By selecting "None" Aftertouch is disconnected from MIDI.

High-Res. Velocity (CC 88)

Note On and Note Off velocities can be transmitted with a resolution of 14 bit by sending a CC 88 message before each Note On or Note Off message. The value of the CC 88 represents the LSB that is providing additional 7 bits of resolution. To avoid conflicts with other applications of CC 88, its use as velocity LSB can be disabled ("Off").

High-Res. CCs (use LSB)

Control Changes can be transmitted with a resolution of 14 bit by using two CCs, one for coarse (MSB) values and one for fine (LSB) values. The LSB message has to be sent before the MSB message. The number of the CC for the LSB is derived from the number of the CC for the MSB by adding 32.
To avoid conflicts with other applications of the LSB CCs, their use can be disabled ("Off"). This setting applies to all assigned MIDI Control Changes.

Default Mappings

	Classic MIDI	High Resolution
Pedal 1	CC20	CC20 + CC52 (MSB + LSB)
Pedal 2	CC21	CC21 + CC53 (MSB + LSB)
Pedal 3	CC22	CC22 + CC54 (MSB + LSB)
Pedal 4	CC23	CC23 + CC55 (MSB + LSB)
Ribbon 1	CC24	CC24 + CC56 (MSB + LSB)
Ribbon 2	CC25	CC25 + CC57 (MSB + LSB)
Bender	MIDI Pitchbend	MIDI Pitchbend
Aftertouch	MIDI Channel Pressure	CC26 + CC58 (MSB + LSB)
High-Res. Velocity (CC88)	Off	On
High-Res. CCs (use LSBs)	Off	On

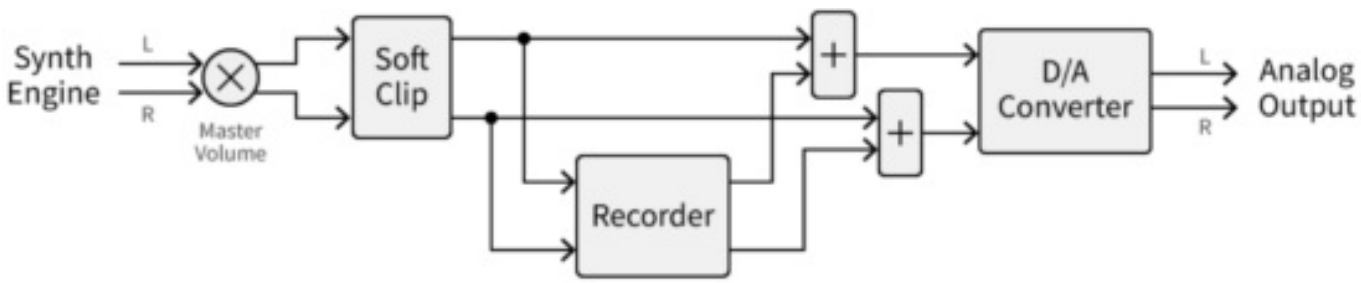
Choosing a Bank for MIDI Program Change:

To make use of MIDI Program Change messages one of the C15's preset banks has to be assigned as the source and target of Program Changes. A received Program Change would select the preset with the referring number in this bank and the selection of a new preset in the bank will send a MIDI Program Change with its number. Selecting a preset that has a higher number than 128 will not send a Program Change.
The "Direct Load" switch decides if the C15 only sends a MIDI Program Change when you select a preset, or if the preset is also loaded into the sound engine. Therefore it has a similar effect to a "Local Off" for Program Changes.

The header of the MIDI-assigned bank is marked by a symbol that looks like a 5-pole MIDI connector. The bank can be connected or disconnected in the following ways:

- In the graphical UI, you find the entry “Connect Bank to MIDI PC” or “Disconnect Bank from MIDI PC” in the context menu of the bank header.
- In the Preset Screen of the Hardware UI activate the “Bank” focus by pressing the Soft Button 1 (with a dual preset hold the button for a second). In the “Edit” menu you find the entry “MIDI PC: On” or “MIDI PC: Off”, which can be toggled by the “Enter” button. By connecting a bank to MIDI PC the previously connected bank will be disconnected. After disconnecting the currently connected bank, none of the banks will be connected. The currently assigned bank can also be found and changed in the “Program Change Bank” menu in the MIDI Settings.

The Digital Audio Recorder

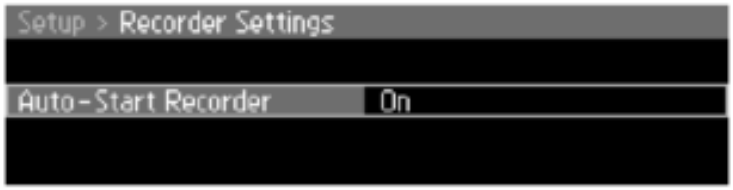


General Function

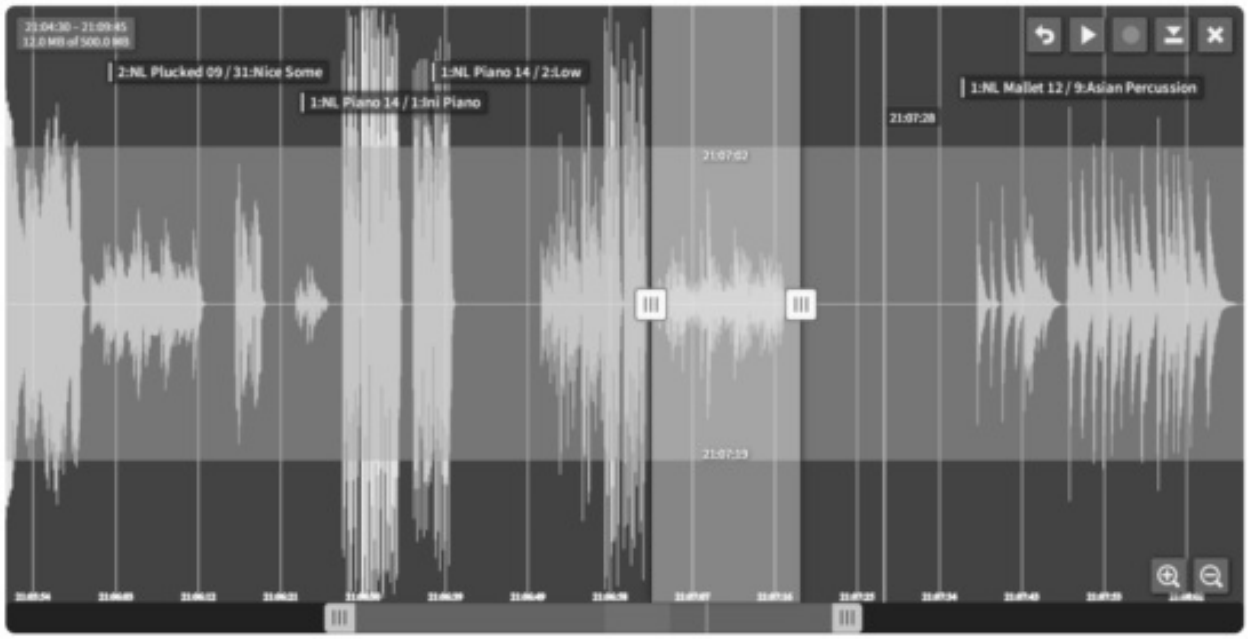
The internal recorder enables you to capture the C15’s output signal with the best possible audio quality at any

time, without connecting a soundcard.
The stereo signal behind the Soft Clipper and before the D/A converter is written to the RAM, using the lossless compression of the FLAC format (24 bits, 48 kHz).
A maximum of 500 MB can be stored in the RAM. Because of the FLAC compression this is enough for hours of permanent playing and for days of recording when there are pauses in the playing.
If the recorded amount of data exceeds the limit of 500 MB, the oldest data will be overwritten.
Therefore it works like a ring buffer that always contains the latest recording.
The content of the RAM will be lost, when you switch off the C15. You can select a segment of the recorded audio and download it to your computer to use it in your production environment.

Recorder Settings – Auto-Start
In the Setup, you find a new page for “Recorder” settings. With the option “Auto-Start Recorder” the user can decide if the audio recording starts automatically when the C15 is
switched on, or if the user has to start it by the Record button.



User Interface
The Recorder tab can be opened by the “Open Recorder” entry in the “View” menu. (The tab has the address http://192.168.8.2/NonMaps/recorder/index.html)



The recorder works independently from its browser tab being open or not.

Zoom and Scroll

At the bottom of the recorder display, you find a dark stripe representing the whole length of the audio recording that is in the memory. It is the frame for a bar that is used for scrolling and zooming. By holding the bar in its grey center area and dragging it, you shift the visible section of the recorded audio, which means that the display content is scrolled. By the two handles at the ends of the bar, you can change its length and therefore the zoom factor.
The two buttons with magnifier “+” and “-” icons and the mouse wheel can also be used to zoom in and out.

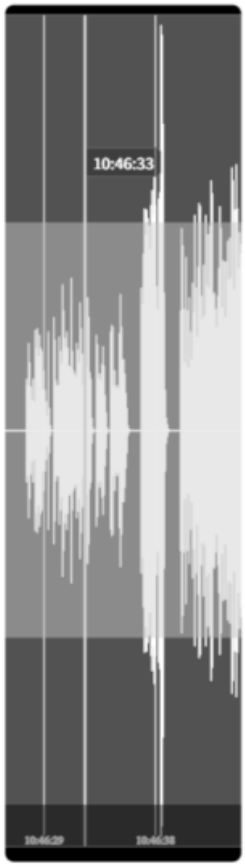
Control Buttons

Restore – Play/Pause – Record – Download – Delete

Computer Keyboard Shortcuts

Command	Shortcut
Play / Pause	space bar
Record	R
Restore	Z
Download	S
Zoom In / Out	+ / –
Scroll	left / right arrow keys
To Previous/Next Preset Marker	up / down arrow keys (coming soon)

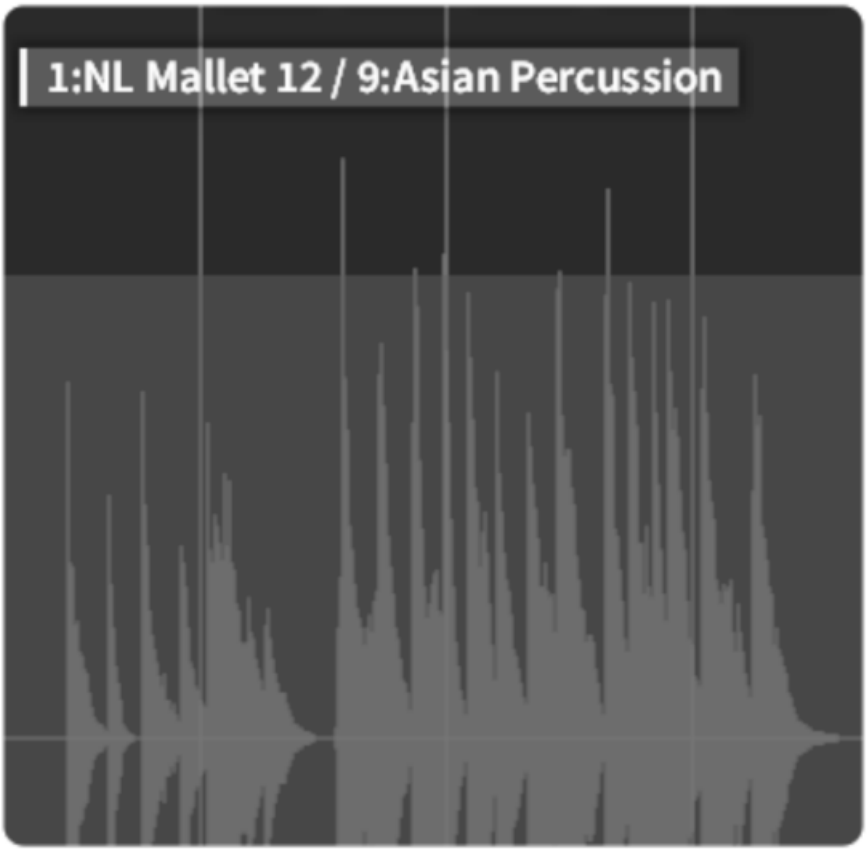
Playing Back Recorded Audio



The C15 can playback the recorded audio through its outputs. The playback start position is set by a click/touch in the darker outer lanes of the recorder display. A green line – the Play cursor – shows the position. A time label is attached.
When the Play button is pressed, the Play cursor starts to move and the recorded audio is played back. The button gets a “Pause” symbol and can be used to interrupt and continue the playback. Alternatively, you can press the space bar for toggling between Play and Pause.
You can play the C15 live while the playback is running, but please be aware that the sum of the two signals can cause clipping distortion.

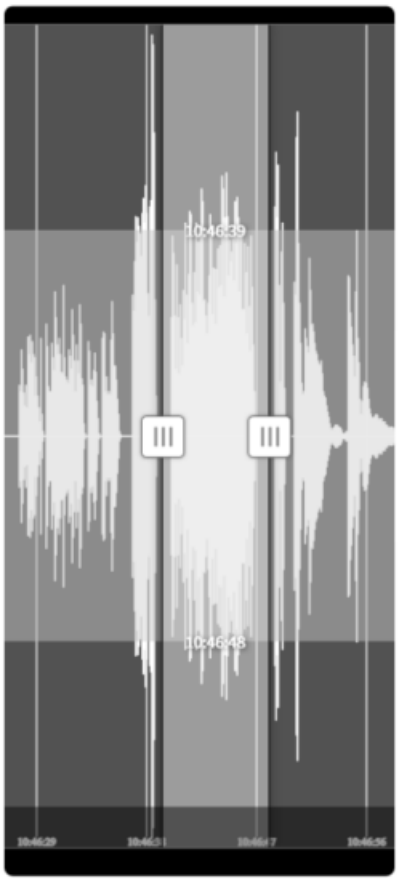
Restoring a Sound
The Undo system of the C15 memorizes every user action on parameters or presets. It allows going back to the state of the synth engine at any point in time since the start of the session. Therefore it is possible to restore the sound at a certain position on the timeline of the Recorder and to use the same state of the synth engine as it was at the time of recording. For this, you move the Play cursor to the point in time in which you want to restore the sound and press the Restore button or the Z key on your keyboard. The Undo System will go back to the state of the parameters at the selected point in time, takes a “snapshot” of them, and copies it into the edit buffer.

Preset Labels
Please note that the selection and load status of a preset cannot be restored because the preset might have been changed, moved, or deleted.



In order to not lose the information on which presets were used, the Recorder creates a label when a preset is loaded. The left end of the label is aligned to the loading time. The label contains the number and name of the bank and the preset. This might have changed in the meantime, but often it can still be found under the same name at the same place.
To be on the safe side we recommend creating copies of the banks that contain important presets by using the “Export” command.

Selecting a Segment for Download



By clicking/touch and dragging in the inner lane, you can select a time segment. The start and endpoints can be shifted by the two light-blue handles. Two labels are showing the times at the start and endpoints.
The selected part can be downloaded by pressing the Download button or “S” on the computer keyboard. If the browser is set to ask for the destination for the downloaded file, it will open the referring dialog now. Otherwise, it will store the file in the standard download folder.
(In a future version there will be a choice between the FLAC and the WAV file format.) The selection can be disabled by a single click/touch in the inner lane.

Starting and Stopping the Recording
If the “Auto-Start Recorder” option in the Recorder Settings is “On” the Record button will be shown as active from the beginning. You can use it to stop the recording. This might be desired to save memory or to focus on reviewing the recorded material. When you press the button again the recording will be continued.
If the “Auto-Start Recorder” option is “Off”, the Record button needs to be pressed to start recording.
The keyboard shortcut for starting or stopping the recording is R.

Deleting the Recorded Audio
When you press the Delete button the audio memory will be cleared and as a result, the timeline will be empty.

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C15 Studio Package – Addendum
Vers. 10 (2021-07-06)
Authors: Stephan Schmitt, Matthias Seeber

Documents / Resources

	NONLINEAR LABS C15 Studio Package Keyboard [pdf] User Manual C15 Studio Package Keyboard, C15, Studio Package Keyboard

References

- Startseite - UI Labs
- NONLINEAR LABS - Home
- NONLINEAR LABS - Home