CARBON

User Manual

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Manual Sections

Introduction

Thank you for buying CARBON, a unique and powerful sequencer. This manual will help get you started with the many features built into CARBON. Keep in mind that this is a living document and will be updated as new features are added, or to make corrections, clarifications or to add more detailed information.

Precautions

Please handle your CARBON sequencer with care. It is made to be used, but please don't spill your coffee into it or drop it on the floor. Treat it with care and it will last a long time. We offer service on all our products regardless of whether they are inside the warranty period or not, so if you have trouble at any time please ask us and we will do what we can to help you.

CARBON comes with a 24V power supply that has been specially selected for high quality. Please do not use any other

power supply with your unit. To replace a lost power supply or to upgrade a US model to one with interchangable plugs for many countries, please visit our online store.

Firmware Bugs

Every piece of software has bugs, and CARBON is no exception. We do our best to be responsive to customers, but your requests will go a long way if you are polite and give us all the info we need to reproduce your problem. Hardware issues should be dealt with via our support page.

CABON is an open source project, therefore bug reports and feature requests are handled exclusively through Github: https://github.com/kilpatrickaudio Sending clear and concise reports directly on GitHub is the best way to receive a timely response. Email requests will be added to the GitHub system, but we will unfortunately not be able to respond to individual issues this way.

USB Compatibility Policy

We have built CARBON from the ground up to act as both a class-compliant USB host and device. Both host and device code has been developed through use of the official USB MIDI specification as well as by testing and debugging with various USB devices as well as computers with different operating systems.

The USB implementation works well for us, but it might not work for you. If not, please file a bug report and describe which device, computer type or operating system is not working for you. Note that not all *class-compliant* devices are really 100% compliant and may not work with CARBON.

The following USB configurations may not work or could cause problems:

- **A device connected via a hub cannot be used** - This is a hardware limitation of CARBON. Please do not use USB hubs or devices that contain integrated hub chips. Many multi-function USB devices that contain a controller as well as sound card contain a USB hub.
- **A device that draws too much current cannot be used** - Some devices violate the USB power specification on startup or during running. The USB host port contains overcurrent protection to protect against short circuits. Devices which draw more than 500mA should not be used with CARBON.
- **Do not use CARBON to charge mobile phones or other devices** - The USB host port in CARBON is designed for low-power USB MIDI controller which draw less than 500mA. Do not attempt to use CARBON to power any other type of device or the unit may be damaged!

Getting Started

Settings

CARBON is designed to have most functions only a single button press away. No menus have submenus, and the most common functions are designed to be most easily accessible. Menu options are grouped by their type: MIDI functions, clock functions, tonality functions, and so on. Some settings are global to a song and some are specific to a scene / track combination.

Selecting Things

The buttons labeled 1 through 6 are used for selecting tracks and scenes. You can use them in the following ways:

- **selecting a track** - press to select a track
- **selecting multiple tracks** - press and hold to select a track, then press other tracks to select multiple
- **muting / unmuting a track** - hold **SHIFT** and select to mute / unmute tracks
- **changing scenes** - hold SCENE and select to change scenes
- **reset playback only on a single track** - hold a select button, hold **SHIFT** and press **RESET** to reset the playback on only one track

Whenever a setting affects a scene and/or track, the current scene and track will be displayed on the menu. You can quickly check the setting of each track by just choosing a different track. You can also perform the same operation on multiple tracks at the same time by multi-selecting tracks and then performing the operation. Not all operations make sense like this, but most track parameters can be edited on multiple tracks at the same time.

Note: When multiple tracks are selected at the same time only the first selected track is displayed

Powering Up

CARBON has three power modes: off, on and interface mode. When you plug in CARBON it will be off. Press the rear power button to turn it on. This is the normal mode for operating CARBON as a stand-alone sequencer. By pressing the power button again the screen will shut off and the encoders will light up purple. This is called interface mode. In this mode you can use CARBON as a CV/gate and MIDI interface for your computer. All functions are controlled via MIDI over the USB device port from the computer.

When you turn on CARBON it will load the last song that you were using, or a blank song if you are using CARBON for the first time. Before you can hear anything you need to set up some MIDI or CV/gate devices. Use the MIDI menu to select MIDI output settings, or CV/gate output settings for tracks. Once you have a synth connected you should be able to hear sound when playing back.

User Interface

Since most controls on CARBON directly access internal functions, it's best to start by describing each of the controls and what they do in various modes. If a button has a shifted function this name will be displayed inside round brackets () underneath the main function name.

Buttons

Below is a list of button functions in the normally (main screen) mode. In certain situations such as loading or saving a song, some of these functions may be disabled. Also, in the step edit and song edit modes some buttons are disabled or used for other functions as documented elsewhere in this manual.

Control	Normal Function	Shifted Function
SCENE (SONG)	hold and press buttons 1-6 to change scenes, or, hold, then press SHIFT and press buttons 1-6 to copy current scene	view / edit song list
ARP	turn on and off ARP mode on a track	enter ARP menu without changing arp state
LIVE	toggle LIVE mode on and off on a track	toggle keyboard transpose mode
Select 1-6	select one or more tracks / select scenes	mute / unmute a track
MIDI (SYS)	access MIDI functions for song / tracks	access system menu for global system settings
CLOCK (TAP)	access clock menu for adjusting track, clock and metronome	tap tempo
DIR (MAGIC)	flip the direction of playback on a track	seed the active region of a track with random notes
TONALITY (SWING)	adjust tonality / scale / note-related settings	adjust clock swing
LOAD (SAVE)	load or clear a song	save a song
RUN/STOP (RESET)	start or stop the sequencer	reset the playback position on all tracks
RECORD (CLEAR)	enable recording on a track	clear the active region on a track
STEP EDIT	edit notes on a track	edit notes on a track
SHIFT	double-tap to exit a menu or mode	
SONG MODE	enable or disable song mode	enable or disable song mode

Encoders

Encoders are used in the normal mode (main screen) and are also used in the step edit and song edit mode. The functions in each of these modes in shown below.

Control	Normal	Step Edit Mode	Song Edit Mode
SPEED	coarse adjust tempo fine adjust tempo (SHIFT)	adjust start delay of note	coarse adjust tempo fine adjust tempo (SHIFT)

GATE TIME	adjust gate time override on track	adjust gate time of note	[no action]
START [SELECT]	adjust track start pos adjust menu selection (menus) adjust step record pos (step record)	adjust step edit pos	adjust song mode cursor pos
LENGTH [VALUE]	adjust track length adjust menu value (menus) adjust track step length (SHIFT)	adjust step edit note velocity / CC value	adjust song mode playback length
PATTERN	adjust gate pattern on track	adjust ratchet mode	adjust scene
TRANSPOSE	adjust track transpose	adjust note / CC	adjust KB trans

GUI Display

The display on CARBON follows a uniform and consistent layout. The screen area is divided into four sections:

- Top Bar - shows song information and sequencer status
- Main Track Display - shows the current track, or first of multiple selected tracks
- Track Preview Displays - shows small previews of all tracks
- Track Status / Menu Display - shows information about the current track, or first of multiple selected tracks - also shows menu displays when a menu is active

Top Bar

The top bar shows the following information. If an item is drawn in a dim colour this means that the function is disabled.

- currently loaded song
- song tempo
- current scene
- run state of the sequencer
- record state of the sequencer
- internal / external clock sync status
- current keyboard transpose offset for voice tracks
- live status
- song mode playback status

Main Track Display

The main track display shows the current track, or the first of multiple selected tracks. This includes the selected active region, whether there are events on each step, and the currently selected pattern.

Track Preview Displays

The track preview displays show the same information as the main track display in a miniature form. Below these displays are shown the current selected track indicators, as well as a yellow bar which indicates the whether the arpeggiator is enabled on a specific track.

Track Status / Menu Display

The track status is normally shown in this portion. This includes most commonly needed parameters of a track and include:

- track number and whether a bias track is controlling this track
- the current track mute state
- the track transposition
- the active region start and length
- the playback direction
- the step length as it relates to the master clock
- the gate length master override
- the tonality scale setting
- the track type - either VOICE or DRUM

Sequencer

The sequencer is the heart of CARBON. At the core of the CARBON sequencer is a stable and accurate MIDI clock, and a step sequencer architecture with space for up to six MIDI events per step on six tracks. Sequences can be recorded in step-record mode, in real-time record mode, or directly entered or edited through the edit function. Editing can occur even when the sequencer is running.

There are a few key points about the CARBON sequencer:

- all sequences are essentially step sequences
- sequences are loop-based
- real-time recordings are quantized to the nearest step position
- each track can be of a different length

Song Data

CARBON can store 64 songs in its internal flash memory. Each song is the same size and has space pre-allocated for the maximum number of events, song list items and settings. Each song consists of six tracks each with 64 steps. A step can store up to six MIDI events (notes or CCs) and several other parameters. Each track stores a number of other parameters such as the step length, transposition, start position, length of playback, and more. Most of these parameters make up a scene. There are six scenes in each song, allowing quick changes of most track parameters while a song is playing. This enables quick changes between sections of a song. The notes on each step are common to all scenes.

In addition to the track parameters there are also a number of song-wide parameters such as MIDI and clock settings. These are stored per-song so you can have maximum flexibility to set up CARBON differently in different situations.

When you power up CARBON the previous song that was used will be loaded automatically. Because songs can only be saved while the sequencer is stopped, there is no auto-save function. You must manually save to the song or your changes will be lost if you turn off or unplug the unit.

Patterns

One of the key concepts of CARBON is that of *patterns*. This concept is drawn from the original K4815 Pattern Generator module which makes extensive use of patterns both as a visual as well as rhythmic element to make using the system fun and inspiring.

Imagine a sequence as a series of notes that have been recorded or somehow entered into a track. Normally each of the notes in the sequence will play as the sequencer advances to each step. But imagine if you could quickly mute some notes and play others. Using patterns you can quickly affect which steps will play and which will be muted. They are purposely pre-made and not easily edited to encourage quick experimentation.

Patterns are non-destructive meaning that underneath all steps still exist. A pattern simply temporarily mutes some steps so their events won't be generated. To return to the original sequence, dial in the highest numbered pattern. This pattern is called *as recorded* and it will activate all steps as per the original sequence.

Start and Length

Each track operates independently of the others with regards to the region of steps played back. This enables complex polyrhythms or other interesting effects since all tracks can run at their

Recording

Recording will store note and CC information into the steps of a track. Before recording choose which region you wish to record by using the **START** and **LENGTH** controls. If you wish to add notes to the existing recording, simply record normally. If you wish to record new events to a region, make sure you clear it first by holding down SHIFT and pressing **RECORD** to clear the region.

Step Recording

Step recording works when the sequencer is stopped. When you press record the record LED will blink indicating that the system is armed and ready to record. Pressing a note on your keyboard will start the recording process. You can record multiple notes on a step by pressing and holding multiple notes. Once all notes are released the sequencer will advance to the next step. The current record position is shown with a yellow box on the current step. You can change the record position during recording by using the **START** control.

Real-time Recording

Real-time recording mode works when the sequencer is running. In this mode recorded notes and CCs will be quantized to the nearest step. Lengths of notes can be recorded and can be any length. To start real-time recording mode press **RECORD** while the sequencer is running. The RECORD LED will blink until the next repeat of the selected region. As soon as the sequencer loops around the RECORD LED will be solidly lit and recording will be in progress. Once the region ends the recording will be stopped automatically. If a recording is cancelled by turning off recording before the region is ended or by stopping the sequencer the partially recorded section will be discarded and the previous step data maintained.

Editing Steps

Editing allows you to manually edit or enter notes and CCs into steps. You can clear individual steps or modify the contents of an existing step. By pressing the **STEP EDIT** button the current edit step is previewed. You can tap the **STEP EDIT** button multiple times to audition the current note. The following controls and actions are part of EDIT mode:

- SHIFT + CLEAR - clears the current step
- SPEED - adjusts the start delay of notes on a step
- GATE TIME - adjusts the length of notes on a step
- START - selects the step to edit
- SHIFT + START - adjusts the cursor to edit individual events on a step instead of the entire step
- [VALUE] - adjusts the velocity of notes or the value of CCs - hold SHIFT to enter a CC instead of a note
- PATTERN - adjusts the ratchet repeat for notes (1-8 times)
- TRANSPOSE - adjusts the note or CC for events on a step

Editing Individual Events on a Step

By holding **SHIFT** and adjusting the **START** control it is possible to individually select a single event on a step. This allows you to edit CCs or build up chords by entering multiple notes one at a time. The selected event will be shown in a highlight colour. To go back to modifying all events, turn the **START** control to unhighlight all steps.

Editing with a Keyboard

You can enter events quickly from a keyboard when in edit mode. Simply press a key or a chord when editing a step to replace the contents of the step with new data. This is the fastest way to manually enter notes and CCs.

Scenes

Scenes enable most track settings to be quickly altered. By using up to six scenes it is possible to quickly change between sections of your song, or variations using different parameters. Most sttings of a track are part of the scene. Exceptions are MIDI port settings, keyboard split settings and track type.

Changing Scenes

To change scenes hold down the **SCENE** button and use of the selector (1-6) buttons. The scene will be changed either immediately (when the sequencer is stopped) or at the next beat time. (when the sequencer is running) Scene changes are synchronized to musical time to make it possible to smoothly transition between different settings.

Copying Scenes

Once you have a scene going the way you like, you might want to copy it so you can make changes to some of the settings. To copy the current scene to a new scene simply hold down the **SCENE** button. Instead of just pressing a select button (1-6) to change scenes, hold down **SHIFT** and then press a select button to copy the current scene to the selected scene. All scene-specific settings will be duplicated to the new scene.

Song Mode

Song mode enables you to scedule a number of scene changes to be made automatically instead of by hand. You can store up to 64 entries in the list. If a song contains a valid song list, the song mode will be activated automatically when you load the song.

A song list is made up of entries, each containing:

- scene to play - which of scene 1-6 will be played
- number of beats to play scene - how many beats to play the scene

- keyboard transposition to apply - what transposition to add to voice tracks

Editing the Song List

To edit the song list press SHIFT + SONG to access the list. The list can be edited at any time, even when the song mode is disabled. Editing is performed as follows:

- **MOTION START** - adjust the cursor position in the list
- **SHIFT + MOTION START** - insert a blank entry in the list
- **LENGTH** - adjust the playback length for the scene
- **PATTERN TYPE** - adjust scene to play
- **TRANSPOSE** - adjust keyboard transpose for the scene
- **SHIFT + RECORD** - remove the current entry

Using Song Mode

Song mode is enabled and disabled by pressing the SONG MODE button. When enabled the song mode will be set to play from the beginning of the song list. As the song plays the current status and number of beats will be shown in the top bar.

When playback of the song list finishes the SONG MODE LED will go out and the sequencer will continue to play the settings from the last entry in the song list.

Arpeggiator

There are six arpeggiators in CARBON, one for each track. These can be used as part of live performance, or during playback of notes from the tracks. When playing multiple tracks at the same time in LIVE mode, each arpeggiator runs independently even if it is receiving the same keyboard notes as other tracks.

When playback on CARBON is stopped, arpeggiators can be used in LIVE mode. The arps will free-run based on the current song tempo. Notes will start playing as soon as keys are pressed down on the keyboard. When CARBON is running, the arpeggiators will be synchronized to the internal clock. Notes will start at the correct time based on the arp speed setting and current clock position.

To turn on or off the arp on a track, press the **ARP** button. The arp menu will be displayed when the arp is enabled. To access the menu after the arp is started without changing the arp enable state, hold down **SHIFT** while pressing **ARP** to call up the menu again.

The arpeggiators have the following settings which can be adjusted from the ARP menu:

- **Arp Type** - Selects the arp type. Choices include various program choices and different numbers of octaves.
- **Arp Speed** - Selects the arp step speed. The speed is based on the song tempo.
- **Arp Gate Length** - Selects the length of the note gate.

Loading and Saving Songs

There is internal space for 64 songs to be stored in CARBON. Songs can only be loaded and saved when the sequencer is stopped. To load a song, press the **LOAD** button and select the song to load. To confirm press **LOAD** again and the song will be loaded.

To save a song hold **SHIFT** and press **SAVE**. Select the song number to save to. To confirm hold **SHIFT** and press **SAVE** again.

To clear the currently loaded song back to defaults press **LOAD** and adjust the **SELECT** encoder until *Clear Current Song* is displayed. Press **LOAD** again to confirm.

Understanding CV/Gate Outputs

The CV/gate outputs are designed to be super flexible. This means that there are a few extra settings that you need to adjust for things to work the way you want.

CV/gate outputs are always assigned and used together. That is, CV 1 and gate 1 always have the same function. Think of CARBON as having four CV/gate outputs: CV/gate 1-4

Pairing Modes

It is possible to map CV/gate outputs into different pairing arrangements. This allows them to work together for duophonic or polyphonic playing. To distinguish between the actual CV/gate outputs and the various logical pairs, CV/gate outputs are numbered 1-4, and the pairs are named A-D.

By default the pairing mode is **ABCD**, meaning that each of the CV/gate outputs is independent of the others. Other possibilities are **AABC**, **AABB**, and **AAAA**. The table below explains what happens with each of CV/gate outputs in each of the modes, but it's actually pretty simple to figure it out as you go along. Control of the pairing modes is set up in the SYS menu.

Pairing Mode	Function	CV/Gate 1	CV/Gate 2	CV/Gate 3	CV/Gate 4
ABCD (default)	Each output independent	A pair	B pair	C pair	D pair
AABC	Duophonic + two independent	A pair (first voice)	A pair (second voice)	B pair	C pair
AABB	Two duophonic	A pair (first voice)	A pair (second voice)	B pair (first voice)	B pair (second voice)
AAAA	Polyphonic	A pair (first voice)	A pair (second voice)	A pair (third voice)	A pair (fourth voice)

When assigning the output mappings for CV/gate outputs from tracks, the pair letter names are used. It's important to check that the particular pair you want to use is actually assigned. For instance, in all but the **ABCD** mode, there is nothing connected to the D pair, so if a track selects it, nothing would happen.

CV Output Mode

In addition to pairing, it's also possible to select what kind of event is sent to each pair. In the SYS menu it's possible to assign an output pair to: note, velocity or CC. The table below explains how each output mode works.

CV Output Mode	Description	CV Function	Gate Function
Velocity	Key velocity is output.	Velocity as a proportional voltage.	Note gate.
Note	Pitch voltage is output.	Note (pitch) as a proportional voltage.	Note gate.
CC	A continuous controller (CC) value is output	CC value as a proportional voltage.	CC value as a threshold voltage. (0-63 = off, 64-127 = on)

CV Scaling / Span Calibrate

When notes (pitch) values are output from a CV jack, a voltage is chosen based on a particular voltage representation of the note. The two choices are 1V/octave and 1.2V/octave. The 1V/octave standard is the most common type used on most analog monosynths, Eurorack systems, Kilpatrick Format systems and so on. The 1.2V/octave standard is used on Buchla systems.

By selecting the correct scaling, the pitches should sound correct with properly calibrated oscillators on the system. To account for small differences between CARBON and a particular oscillator, it is possible to independently adjust the scale span using the CV Span Calibrate function in the SYS menu. Increasing the number will make the output scale larger, and vice versa.

MIDI Menu

The MIDI menu allows you to adjust MIDI settings related to each track as well as several options which affect the entire song.

Track Setting

When displaying track-specific MIDI settings, change tracks with the selector buttons to view and edit settings for each track.

CARBON can send MIDI to two different destinations simultaneously from each track. This enables you to send to multiple instruments on different MIDI channels or ports at the same time. The two outputs from each track are labeled: A and B

- **Program A** - Selects the MIDI program change to be sent to the A output on the track.
- **Program B** - Selects the MIDI program change to be sent to the B output on the track.
- **Out Port A** - Selects the destination MIDI port for track output A.
- **Out Port B** - Selects the destination MIDI port for track output B.
- **Out Chan A** - Selects the MIDI channel / CV pair for track output A.
- **Out Chan B** - Selects the MIDI channel / CV pair for track output B.
- **Key Split** - Affects how this track will be controlled in LIVE mode when multiple tracks are selected. The track can be set to *Left Hand*, *Right Hand* or *OFF*. The split point is factory set to middle-C. The middle-C note will be assigned to the right hand when the split mode is enabled.

Song Settings

The following settings affect the entire song:

- **Key Vel Scale** - Velocity scaling for the keyboard input. This is applied to live playing or recording to a track.
- **MIDI Rmt Ctrl** - Enables or disables MIDI remote control.

System Menu

The system menu is used to adjust settings related to the entire song, or to access system-wide settings.

- **Firmware Release** - The current firmware version is shown.
- **CV/Gate Pairs** - Allows the pairing mode of the CV/gate outputs to be adjusted. This affects whether CV/gate outputs operate in monophonic or polyphonic mode.
- **CV Bend Range** - Adjusts the number of semitones of pitch bend on the CV outputs.
- **CV Output Mode A-D** - Adjusts the output mode used for CV/gate outputs on each pair.
- **CV Output Scaling A-D** - Adjusts the output type for CV outputs. (1V/octave, 1.2V/octave)
- **CV Span Calibrate A-D** - Adjusts the scaling of the CV outputs. This can be used to adjust the scale span when used with analog oscillators.
- **Menu Timeout** - Adjusts how long menus are held on the screen before the main status display returns. Settings from 1s to 59s are possible, or SHIFT EXIT. Tapping SHIFT twice will cancel out of a menu regardless of the timeout setting.

Clock Menu

The clock menu is used to adjust the step length on a track as well as song-wide settings such as metronome settings and clock output settings on the various ports. Clock outputs on MIDI and the CV clock output port can be set to a number of pulse-per-quarter. (PPQ) The standard MIDI clock rate is 24 PPQ.

- **Step Length** - Adjusts the step length of a track. This can also be adjusted when the menu is not displayed by holding **SHIFT** and turning the **LENGTH** knob.
- **Metronome** - Selects the output for the metronome. The metronome is used during recording and has the following settings:
  - **OFF** - The metronome is not used.
  - **INTERNAL** - The internal speaker is used.
  - **CV Reset** - The **RESET** jack outputs pulses when the metronome should sound.
  - **Track 6** - A specific note is sent on track 6 when the metronome should sound.
- **Metronome Len** - Sets the length of the metronome sound. This can be used to affect the perceived volume of internal speaker or externally-controlled synth.
- **MIDI Clock OUT Settings**
  - **MIDI DIN 1** - Adjusts the clock rate to be sent on the MIDI DIN 1 port.
  - **MIDI DIN 2** - Adjusts the clock rate to be sent on the MIDI DIN 2 port.
  - **CV/GATE** - Adjusts the clock rate to be sent on the CV clock output port.

- **MIDI USB HOST** - Adjusts the clock rate to be sent on the USB host port.
  - **MIDI USB DEV** - Adjusts the clock rate to be sent on the USB device port.
- **MIDI Clock IN Settings**
  - **MIDI DIN** - Adjust whether MIDI clock can be received on MIDI DIN port.
  - **MIDI USB HOST** - Adjust whether MIDI clock can be received on USB host port.
  - **MIDI USB DEV** - Adjust whether MIDI clock can be received on USB device port.

Swing Menu

The swing menu allows the clock swing to be adjusted. When swing is set to a value other than 50%, playback will have a bouncy feel. This affects any notes that are on off-beats with respect to a 1/16th note count. The clock is automatically swung so that different steps sizes for tracks and arpeggiators will swing properly even if they are not set to 1/16th notes.

- **Swing** - The swing percentage from 50% = no swing, to 80% = maximum swing.

Tonality Menu

The tonality menu allows you to adjust settings that affect the tonality and transposition of tracks.

Track Types

A track can be one of two types: **VOICE** or **DRUM**. This setting affects how CARBON will treat each track. Specifically it affects the following:

- **Keyboard Transpose** - Affects how the track responds to keyboard transposing.
  - In voice mode a track will be transposed based on the keyboard transpose setting currently applied.
  - In drum mode a track will not be affected by the keyboard transpose setting.
- **Recording / Live Mode** - Affects how the track will behave during recording or live mode.
  - In voice mode, when recording, new notes will be added to the existing recording without change. When live mode is enabled the track playback will be muted.
  - In drum mode, when recording, new notes will replace any of the same existing notes in the recording. When live mode is enabled the track playback will not be muted.

Scale Quantizing

Scale quantizing allows the output notes to be fitted to a specific scale or mode. Quantizing is applied after keyboard transposition but before track transposition.

Bias Tracks

Bias tracks are used to enable one track to be transposed by another. This can be used instead of song mode to cause tracks to be transposed up and down and is equivalent to using the keyboard transposing function. To use a bias track, the track doing the biasing should be running at a step length longer than the track to be biased.

Note that bias track output values are computed before any tracks are played back so it is not possible to have a biased track affect another track.

Tonality Settings

- **Scale** - Selects the scale or mode to use for quantizing.
- **Transpose** - Allows the track to be transposed up or down. Note that this setting can be controlled when no menus are active by turning the **TRANSPOSE** encoder.
- **Bias Track** - Selects which track will bias the current track, or disables biasing.
- **Track Type** - Sets the track to be either VOICE or DRUM type.

MIDI Remote Control of CARBON

Many parameters of CARBON can be controlled via MIDI in real-time. This allows you to map your MIDI controller to

various functions for convenient use, or to control CARBON from MIDI software on a computer.

To use the MIDI control functions you must enable the **MIDI Rmt Ctrl** function in the **System** menu. With this mode enabled you can use your keyboard or computer to control various real-time functions of the sequencer.

MIDI Channels

MIDI channels 10-16 are for use with the MIDI remote control functions. Your keyboard or computer must be set to one of these channels. Many keyboards default to MIDI channel 1, which can only be used to control the live and transposing functions of CARBON, not the remote control functions. Refer to the manual for your keyboard on ways of adjusting the channel.

Channel	Remote Control Function
10	control the currently selected track(s)
11	track 1 contro
12	track 2 control
13	track 3 control
14	track 4 control
15	track 5 control
16	track 6 control

Note Control

Note on messages are received omni and can be sent on any channel from 10-16. These messages are used to control the running state of the sequencer.

Note Number	Note Name	Function
24	C1	trigger scene 1
26	D1	trigger scene 2
28	E1	trigger scene 3
29	F1	trigger scene 4
31	G1	trigger scene 5
33	A1	trigger scene 6
36	C2	reset track 1
37	C#2	run
38	D2	reset track 2
39	D#2	stop
40	E2	reset track 3
41	F2	reset track 4
42	F#2	reset
43	G2	reset track 5
45	A2	reset track 6
46	A#2	record
48-72	C3-C5	keyboard transpose -12 to +12 semitones

CC Control

All CC control messages are specific to a channel and thus it matters to which channel the messages are sent. When sent to channel 10, all currently selected tracks will be adjusted. When sent to tracks 11-16, track 1-6 (respectively) will be adjusted.

CC Number	Function	Value Range
16	step length	0-127 = 32nd to whole
17	track transpose	0-127 = -24 to +24 (0 at val 64)
18	track mute	0-63 = off, 64-127 = on
19	motion start	0-127 = position 1-64

20	motion length	0-127 = length 1-64
21	motion dir	0-63 = off, 64-127 = on
22	gate time	0-127 = 0-200%
23	pattern type	0-127 = type 1-32
24	arp enable	0-63 = off, 64-127 = on
25	arp type	0-127 = type 1-16
26	arp speed	0-127 = 32nd to whole
27	arp gate time	0-127 = min to max
80	run/stop	val: 0-63 = stop, 64-127 = run

Interface Mode

CARBON supports different types of configurations with its built-in USB, MIDI and analog ports. No matter what your setup looks like we are confident you will be able to connect your gear easily with CARBON.

There are two modes that you can use with CARBON: sequencer mode and interface mode. In sequencer mode all the built-in functions of CARBON can be used. You can use the sequencer, route live MIDI from your keyboard to your instruments, use the arpeggiators and so on. In this mode most of the USB ports presented are not used.

In interface mode you can use CARBON as a USB interface for your computer. You can route signals between the USB device connection and the MIDI ports, the analog CV/gate and clock ports, and the USB host port. This means you can leave CARBON connected when you want to use MIDI devices from your computer.

In both cases the USB device shows up as a number of MIDI ports when connected to a computer. Because not all operating systems can display unique port names from a class-compliant MIDI device, we present the ports in the order they appear on the device. These should match the list of devices presented on your computer.

USB Device MIDI Port Mapping

MIDI Port	Sequencer Function	Interface Function
USB OUT 1 (from PC)	- performance control (note, CC, etc.) - clock input - SYSEX input (song, config I/O)	CV/gate control
USB OUT 2 (from PC)	unused	out to USB host port
USB OUT 3 (from PC)	unused	out to DIN MIDI OUT 1
USB OUT 4 (from PC)	unused	out to DIN MIDI OUT 2
USB IN 1 (to PC)	- track output - clock output - SYSEX output (song, config I/O)	panel controls
USB IN 2 (to PC)	unused	in from USB host port
USB IN 3 (to PC)	unused	in from DIN MIDI IN

Interface Mode

The interface mode is a special mode that allows you to send and receive data between a computer and connected MIDI instruments while CARBON is not in use. To enter this mode press the power button once while CARBON is on. The screen will turn off and the encoders will show a purple color indicating that interface mode is active.

By using the table above you can select which ports to use to send and receive MIDI messages through CARBON to your various devices. You can even use the control panel and LEDs on CARBON with your own software. Buttons and encoders send CC messages. LEDs including the encoder backlight respond to CC messages so that you can set them via MIDI from your computer

Using the CV/Gate Outputs in Interface Mode

When using the CV and gate outputs in interface mode, the output modes and channel assignments are completely unrelated to any settings from songs within the CARBON sequencer. This enables you to use the CV and gate outputs completely independently when using them from a computer. Program change messages can be used to select different mode combinations. Several CC messages are also supported which allow the clock rate and pitch bend range to be adjusted. All of these settings are stored in the internal memory and recalled automatically each time the unit enters interface mode.

USB OUT 1 from the computer is used to control the CV/Gate outputs. Messages which affect the CV/gate settings can be sent to channels 1-4. When sending output messages like notes or CCs, MIDI channels 1-4 correspond to output pairs A-D respectively. Use the table below to determine which output configuration matches your needs and send the corresponding program change message to activate this setting.

The pairing modes (ABCD, AABC, etc.) are used to group outputs together to offer different effects like duophonic or polyphonic performance. When using ABCD mode each output is independent. When using a mode with two or more letters the same such as AABC, AABB or AAAA, notes and velocity outputs are assigned according to a polyphonic voice assignment scheme.

Actual CV and gate outputs are counted from 1-4 depending on the output mode. Each output pairing mode (i.e. ABCD or AABC) has four output assignments which correspond to the physical CV/gate outputs 1-4 in each configuration. For instance if you are using AABC mode, the physical CV/gate outputs would be assigned as follows:

- CV/gate 1 = A (first channel)
- CV/gate 2 = A (second channel)
- CV/gate 3 = B
- CV/gate 4 = C

CV and gate outputs are always assigned together. For notes and velocity outputs the gate will always act as the note gate control. For CCs the gate acts as an on/off output depending on the value of the CC. Values of 64 or higher will turn the gate output on, otherwise it will be off.

Program	Output Pairing	Output Assignments			
Program 1	ABDC	A = NOTE	B = NOTE	C = NOTE	D = NOTE
Program 2	ABDC	A = NOTE	B = VELO	C = NOTE	D = NOTE
Program 3	ABDC	A = NOTE	B = VELO	C = NOTE	D = VELO
Program 4	ABDC	A = VELO	B = VELO	C = VELO	D = VELO
Program 5	ABDC	A = NOTE	B = NOTE	C = CC 1	D = CC 16
Program 6	ABDC	A = NOTE	B = VELO	C = CC 1	D = CC 16
Program 7	ABDC	A = NOTE	B = CC 16	C = CC 17	D = CC 18
Program 8	ABDC	A = CC 1	B = CC 16	C = CC 17	D = CC 18
Program 9	AABC	AA = NOTE	B = NOTE	C = NOTE	
Program 10	AABC	AA = NOTE	B = NOTE	C = VELO	
Program 11	AABC	AA = VELO	B = NOTE	C = NOTE	
Program 12	AABC	AA = VELO	B = VELO	C = VELO	
Program 13	AABC	AA = NOTE	B = NOTE	C = CC 1	
Program 14	AABC	AA = NOTE	B = VELO	C = CC 1	
Program 15	AABC	AA = NOTE	B = CC 1	C = CC 16	
Program 16	AABC	AA = VELO	B = CC 1	C = CC 16	
Program 17	AABB	AA = NOTE	BB = NOTE		
Program 18	AABB	AA = NOTE	BB = VELO		
Program 19	AABB	AA = VELO	BB = VELO		
Program 20	AAAA	AAAA = NOTE			
Program 21	AAAA	AAAA = VELO			

MIDI Button, Encoders and LED Control

Pressing buttons and turning encoders on CARBON while in interface mode will send MIDI to the connected computer on USB IN 1. Sending CC outputs on USB OUT 1 (the CV/gate output port) can be used to control LEDs on the panel.

Panel Control Data Format:

- **ButtonsEncoders** - sends CC value on channel 16 - value: 1 = up, 127 = down
- **Single LEDs** - receives CC value on channel 16 - value: 0 = off, 127 = on
- **Encoder RGB Backlight** - receives CC value on channel 16 - value: bits 2:0 = RGB state

Control	CC #
Buttons	
SCENE	CC 0
ARP	CC 1
LIVE	CC 2
1	CC 3
2	CC 4
3	CC 5
4	CC 6
5	CC 7
6	CC 8
MIDI	CC 9
CLOCK	CC 10
DIR	CC 11
TONALITY	CC 12
LOAD	CC 13
RUN STOP	CC 14
RECORD	CC 15
STEP EDIT	CC 16
SHIFT	CC 17
SONG MODE	CC 18
Encoders	
SPEED	CC 19
GATE TIME	CC 20
MOTION START	CC 21
MOTION LENGTH	CC 22
PATTERN TYPE	CC 23
TRANSPOSE	CC 24

Control	CC #
LEDs	
ARP	CC 1
LIVE	CC 2
1	CC 3
2	CC 4
3	CC 5
4	CC 6
5	CC 7
6	CC 8
CLOCK	CC 10
DIR	CC 11
RUN STOP	CC 14
RECORD	CC 15
SONG MODE	CC 18
ENCODERS LEFT	CC 19
ENCODERS RIGHT	CC 24

Need Help?

Feel free to contact us for more information, to report errors or unclear sections, or to request specific information be added to this manual.