

Charts and appendices

LED Fingerboard Command Specification

Special MIDI-Note Functions on Channel 16 :

[Notice that the minimum velocity value available for your use is the number 1. Velocity = 0 is reserved for the Note-Off function.]

Command	#	Comments
CLEAR FRAME	127	Ignore velocity, clears to 0 unless clear to background mode set
INIT ZONES	126	ignore velocity
REFRESH	125	ignore velocity
ENABLE ZONE	124	velocity = ZONE 1 - 31, bit6 1 = enable 1 = disable (Displays Zone lighting. Bring to foreground)
LEFTRIGHT	123	velocity 2 = LEFT, 1 = RIGHT, mirror about the Y-axis
SHIFT RIGHT	122	velocity offset 0:no effect, =>1:Shift Right one position Bit6=0: Rotate (Wrap) image, Bit6=1: Do not wrap image. Rotate Right: vel<64; Shift Right: vel =>64D
SHIFT LEFT	121	velocity offset 0:no effect, =>1:Shift Left one position Bit6=0: Rotate (Wrap) image, Bit6=1: Do not wrap image. Rotate Left: vel<64; ShiftLeft: vel =>64D
SCROLL UP	120	velocity offset: 0:no effect, =>1:Shift Up one position Bit6=0: Rotate (Wrap) image, Bit6=1: Do not wrap image. Rotate Up: vel<64; Shift Up: vel =>64D
SCROLL DN	119	velocity offset: 0:no effect, =>1:Shift Down one position Bit6=0: Rotate (Wrap) image, Bit6=1: Do not wrap image. Rotate Down: vel<64; Shift Down: vel =>64D
BLINK ON(upper 16)	118	velocity + 128 = led#
BLINK ON(lower 128)	117	velocity = led#
BLINK OFF(upper 16)	116	velocity + 128 = led#
BLINK OFF(lower 128)	115	velocity = led#

BRIGHT(upper 16)	114	velocity + 128 = led#
BRIGHT(lower 128)	113	velocity = led#
DIM(upper 16)	112	velocity + 128 = led#
DIM(lower 128)	111	velocity = led#
RedBox Scroll Up	110	Velocity: Ignore - not used by ledfb firmware, output to Ableton
RedBox Scroll Down	109	Velocity: Ignore - not used by ledfb firmware, output to Ableton
RedBox Scroll Right	108	Velocity: Ignore - not used by ledfb firmware, output to Ableton
RedBox Scroll Left	107	Velocity: Ignore - not used by ledfb firmware, output to Ableton
- Unused -	106	- unused -
REVERSE LEDS	105	Velocity: 0-64 = Normal, 65-127 = Reverse
TABLE TOP GUITAR	104	Mirror about X-axis. Velocity 7F=Tabletop: body is low LED number Velocity 00=Guitar: head is low LED number
Set Char (lower 128)	103	velocity = text character in lower 128 of ASCII table
Set Char (upper 128)	102	velocity + 128 = text character in upper 128 of ASCII
SET CHAR DIRECTION	101	velocity sets the direction Chars scroll from, 0 from head, >0 from body
SELECT SCRIPT [Available scripts are listed in a table below.]	100	Velocity selects a Script, 0 aborts. A Script is an embedded macro that can display images, text, and/or lighting effects. The opening splash screen is a Script. Any script is aborted by asserting Select-Script with a value=0.
ENABLE BACKGROUND	99	Enable Background: velocity 1 = clear to black, velocity 2 = Enable background. When an LED is turned on, then turned off according to some dynamic function, the off-state may be either an image saved to the background or simply black.
SET COLOR MAP	98	velocity is color map number; Max = 4. <i>See Pg.18, Maps</i>
SELECT IMAGE	97	velocity is the number of the image to display. Image# 0-31 are RAM, images 32-128 are ROM based images
SET STRING 6	96	Set all LEDs on a string to the same color. Velocity = color index
SET STRING 5	95	Velocity = color index
SET STRING 4	94	Velocity = color index
SET STRING 3	93	Velocity = color index
SET STRING 2	92	Velocity = color index
SET STRING 1	91	Velocity = color index

Display Tuning Map	90	Velocity = zone number*
Send To Background	89	Send the foreground image to the background. Verlocity is ignored.
Set Tuning	88	Pre-defined Tuning Maps are stored in ROM. The full list is provided below. Velocity = Tuning map number. Guitar, Piano, etc. 1=ClearTuning, which clears the background. The full list is described on Page 11.
SCROLL-IMAGE	87	A selected image is scrolled over the short dimension of the fingerboard. Velocity = step timing for the Scroll delay.
SET FOREGROUND COLOR	86	Velocity = color map index# of the foreground color.
SET BACKGROUND COLOR	85	Velocity = color map index# of the background color.
Rotate RedBox 90°	84	Velocity: Ignore - not used by ledfb firmware, talks to Ableton. Rotates the Ableton RedBox
SYNC	83	Reset the Blink timer and other internal step-timers.

MIDI-Note Messages on Channel 16 continued:

OFFSET FOREGROUND COLOR INDEX	82	Velocity is added to all color selections for indexed-color pixels, i.e., foreground colors. If the resulting color-index exceeds the length of the color map, the value wraps around to the beginning of the table.
SET FRETMARKS OVERLAY COLOR	81	Velocity = color for the Fretmarks
ENABLE FRETMARKS OVERLAY	80	Velocity = 1 disables the Fretmarks. Velocity = 2 enables the Fretmarks

MIDI-CC Messages on Channel 16 (Channel 15- Unused):

Latch LEDs	64	Off < 65, On > 64; Once set, all LEDs will remain lit until the command is reset.
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MIDI-CC Messages used by the LED fingerboard. Only on channel 16

BRIGHTNESS	7	Scale global brightness from Master Volume, Channel 16
SCALE RED	20	Adjust the brightness for all Red LEDs on the
SCALE GREEN	21	Adjust the brightness for all Green LEDs on the
SCALE BLUE	22	Adjust the brightness for all Blue LEDs on the
SCALE SATURATION	23	0-127; Scales the intensity of all colors. Applies to images, tuning maps, and foreground colors.
VU String 1 *	24	Fires all of the LEDs on String #1 in sequence (Data value= length of the lit-string. All LEDs are lit from Fret1 to the scaled data-level) CC-data values of 0-127 scale from no lights to all 24 columns lit. All LEDs will light from Fret1 up to the scaled data-value. Each Fret (column) corresponds to a data increment of a little more than 5.
VU String 2	25	Fires all of the LEDs on String #2 (in sequence, value= length) lights sequential number of frets according to MIDI data 0-127
VU String 3	26	Fires all of the LEDs on String #3 (in sequence, value= length) lights sequential number of frets according to 0-127
VU String 4	27	Fires all of the LEDs on String #4 (in sequence, value= length) lights sequential number of frets according to 0-127
VU String 5	28	Fires all of the LEDs on String #5 (in sequence, value= length) lights sequential number of frets according to 0-127
VU String 6	29	Fires all of the LEDs on String #6 (in sequence, value= length) lights sequential number of frets according to 0-127
VU All Strings	30	Fires all of the LEDs on all Strings (in sequence, value= length) lights sequential number of frets according to 0-127
VU Fret 1 **	31	Lights LEDs sequentially up fret 1 like a VU meter. CC-data values of 0-127 scale from no lights to all 6 rows lit in 12 increments. From bottom to top: Rows 1-4= green, Row5=yellow, Row6=Red. Each key lights at half-brightness for the lower half of its own range. Any given data value will light all keys from the bottom to the scaled level. Each lighting increment corresponds to a data increment of about 10 and a half. For example, a datum110 (decimal) lights Row6 (Red) at half-brightness, Row5 (Yellow) full-brightness, and Rows4-1 (Green) full-brightness.
VU Fret 2	32	Lights LEDs sequentially up fret 2 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 3	33	Lights LEDs sequentially up fret 3 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 4	34	Lights LEDs sequentially up fret 4 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.

VU Fret 5	35	Lights LEDs sequentially up fret 5 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 6	36	Lights LEDs sequentially up fret 6 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 7	37	Lights LEDs sequentially up fret 7 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 8	38	Lights LEDs sequentially up fret 8 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 9	39	Lights LEDs sequentially up fret 9 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 10	40	Lights LEDs sequentially up fret 10 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 11	41	Lights LEDs sequentially up fret 11 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 12	42	Lights LEDs sequentially up fret 12 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 13	43	Lights LEDs sequentially up fret 13 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 14	44	Lights LEDs sequentially up fret 14 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 15	45	Lights LEDs sequentially up fret 15 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 16	46	Lights LEDs sequentially up fret 16 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 17	47	Lights LEDs sequentially up fret 17 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 18	48	Lights LEDs sequentially up fret 18 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 19	49	Lights LEDs sequentially up fret 19 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 20	50	Lights LEDs sequentially up fret 20 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 21	51	Lights LEDs sequentially up fret 21 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 22	52	Lights LEDs sequentially up fret 22 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
VU Fret 23	53	Lights LEDs sequentially up fret 23 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.

VU Fret 24	54	Lights LEDs sequentially up fret 24 like a VU meter. Value of 0-127 scales from no lights to all lit, fading in brightness and color.
LATCH MODE	64	(MIDI Sustain) When Latch Mode is On, incoming Note-Off messages will be ignored rather than turning off their intended LEDs. Velocity < 65 = Off, velocity > 64 = On.
FADE TIME	72	CC-data sets the duration the LEDs remain illuminated after being lit from a Note-On event. Similar to a synthesizer's ADSR Release time.
SET-SCRIPT-CLOCK-COARSE	75	Sets the coarse timing delay for clocked script-looping functions like the Swirl effect in 10 millisecond increments. Delay = velocity x .01 seconds.
SET-SCRIPT-CLOCK-FINE	76	Sets the fine timing for clocked script-looping functions like the Swirl effect in 0.1 millisecond increments. Delay = velocity x .0001 seconds. The coarse and fine values are additive.
STORE-RAM-IMAGE	77	The dynamic LED data frame buffer is copied to a RAM image location. Velocity = Image number (v = 0-9) The duration of the lights from pressed keys; similar to a synth "release time".

Clipper Setup Charts

Embedded lighting Scripts:

[Set-script command: Note 100]

- 0: Null script**
- 1: Abort Script.** Aborts any active script.
- 2: Grand Demo.** Combines several scripts and the Starr Labs sign-on screen.
- 3: Product_ID.** Current Clipper OS version#.
- 4: Null**
- 5: Spiral Effect.** Single shot event.
- 6: Spiral Script.** Loops the spiral effect.
- 7: Swirl Effect.** Single shot event.
- 8: Swirl Script.** Loops the swirl effect.
- 9: Boustrofedon.** Serpentine effect.
- 10: Boustrofedon Script.** Loops the single shot event.
- 11: Show current color map.**
- 12: Scroll RAM Images.**
- 13: Scroll ROM images.**
- 14: Cylon script**

Embedded Color Maps:

[One of these Color Maps is loaded into the default 127-location Color Map table. When you apply a MIDI note to light up a location on the fingerboard, the velocity selects a color from the default table.]

- 0: Null Map, blank**
- 1: Ableton Live color map.** 60 colors. Duplicated to (mostly) fill the 127 location map.
- 2: Spectral color map.** Full color in the traditional rainbow sequence.
- 3: Tertiary color map.** The basic 12 colors resulting from the simple combinations of the R,G, and B LEDs.
- 4: Velocity color map.** A four-color map to clearly distinguish MIDI velocity levels.

TUNING MAPS: [maps of 7/7/17]

1. Clear: No background lighting.
2. Fret Marks: shows guitar fret marks at the standard fret locations.
3. Spectral fourths: 7 colors are assigned to the natural-notes, the white keys of the piano. The piano's black keys are defaulted to OFF. Straight Fourths tuning.
4. Spectral fourths/Minus-6 : 7 colors are assigned to the natural-notes, the white keys of the piano. The piano's black keys are defaulted to OFF. Straight Fourths tuning. Expands the range of the 12-string Clipper.
5. WhiteBlack Fourths: Two colors as on the Piano. Straight Fourths tuning starting at a low F natural.
6. WhiteBlack Fourths/Minus-6: Two colors as on the Piano. Straight Fourths tuning starting at a low B natural.

Using the MIDI command Note 88/velocityN, select the desired Tuning Map and then use the SetToBackground command. DisplayTuningMap Note- 90 (only needed one time)

Here is an example to set up a 12-string Clipper with a Spectral Tuning (rainbow colors for the natural notes.).

Refer to the manual to see the command chart where these commands reside.

Low 6 strings:

Set the Tuning map to Spectral 4ths/ -6 (Low B):

Go to an unused Sensor-Pad.

Set the Pad to Notes-Basic or -All.

In Event #1 set it to Channel 14, Note 88 and for the velocity, instead of "PAD" set it to 4.

In the Output screen, set it to MIDI: R

Press the Pad.

If it doesn't take at first try setting the pad to Note 90 and press the Pad..

Repeat if necessary.

For the high 6 strings:

Do the exact same thing as for the Lower 6 strings, but for two changes:

1)change the MIDI channel to 16.

2)change the TuningMap selection to Note88-Velocity 3.

Your Clipper may have an alternative Map table like this due to different firmware revisions:

- 1) Fret Marks: shows guitar fret marks at the standard fret locations.
- 2) Tertiary guitar: 12 colors, 1 per chromatic scale note-name. Guitar tuning.
- 3) WhiteBlack (2 color): The fingerboard is tuned to standard Guitar tuning and the keys are coded according to the Black and White leys of the piano
- 4) Tertiary fourths: 12 color, 1 per chromatic scale note-name. Straight Fourths tuning.
- 5) WhiteBlack Fourths: Two colors as on the Piano. Straight Fourths tuning starting at a low Open E natural.

LIGHTING SETUPS

These are a few things you can set up for your Clipper to create some interesting lighting effects. You can create these setups in the Sensor menu or if you have an external MIDI controller or sequencer sending commands to the Clipper you can have virtually unlimited variety in the effects you choose.

Spread the lights up the length of the fingerboard with the velocity from a Pad:

Here's a cool thing you can do with a Drum Pad that you can link to the sound or not as you prefer. You're going to set a pad -hit to blast the lights up the fingerboard

Set Pad1:

SENSORS/EVENTS menu

Pad1

PlayFunction: All

Event1: ControlChange, Channel 15:CC#24 - (VU String #1)

Event2: ControlChange, Channel 15:CC#25 - (VU String #2)

Event3: ControlChange, Channel 15:CC#26 - (VU String #3)

Event4: ControlChange, Channel 15:CC#27 - (VU String #4)

Event5: ControlChange, Channel 15:CC#28 - (VU String #5)

Event6: ControlChange, Channel 15:CC#29 - (VU String #6)

Sensors/Output Screen: Set the Right Port [Lights]

TIMING screen options:

If HitMode= TOUCH the harder you hit the Pad, the farther the Lights travel up the fingerboard.

If HitMode= TIMED, you can set it to Loop-repeat a few times for more effect.

You can change the Pad's curve or simply give the Pad-hit a fixed velocity value if you want to always light up a fixed amount of LEDs. For instance, always lighting all the LEDs on a string would be done with a velocity Fixed at 127.

Use this same idea to light up an entire fret by using the VU Fret commands 1-24 (Ch 16: CC#31-54)

This is a cool effect using a pitchwheel or joystick too.

LIGHT UP an entire string at once:

This is similar to the VUFret command but differs in that the entire string always lights and the velocity now modifies the color value.

Light the entire fingerboard with one command from a Pad-hit.

PlayFunction: Basic

Event1: Note Channel16; Note 86; Velocity = Color (1 = Red)

SETUP a Pad to cycle between various effects:

PlayFunction: ALT-UP (a Step-sequence of up to 8 events. Each time you hit the Pad, you step to a new Event)

Event1: **Load image**; Note: Ch.16; Note#97; Velocity = image number

Event2: **Load image**; Note: Ch.16; Note#97; Velocity = image number

Event3: **Full Fingerboard Color**; Note Channel16; Note 86; Velocity = Color (1 = Red)

Event4: **Full Fingerboard Color**; Note Channel16; Note 86; Velocity = Color (2 = Orange)

Event5: **Full Fingerboard Color**; Note Channel16; Note 86; Velocity = Color (3 = Purple)

Event6: **Full Fingerboard Color**; Note Channel16; Note 86; Velocity = Color (4 = Cyan)

Event7: **Full Fingerboard Color**; Note Channel16; Note 86; Velocity = Color (5 = Green)

Event8: **Clear Fingerboard**; Note Channel16; Note 127; Velocity is ignored

Create a Dancing Pattern:

PlayFunction: Notes sequential (a Step-sequence of up to 8 events. Each time you hit the Pad, to fire all of the events in the sequence. Hit the Pad again to toggle it OFF)

Event1: **Shift Right 2 spaces**; Note; Ch.16; Note 122; Velocity = 2

Event2: **Scroll Up 1 space**; Note; Ch.16; Note 120; Velocity = 1

Event3: **Shift Left 1 spaces**; Note; Channel16; Note 121; Velocity = 1

Event4: **Scroll Down 1 space**; Note; Channel16; Note 119; Velocity = 2

TIMING menu: HitMode= Timed; LOOP=ON

SCROLL the Lights down the fingerboard in streaming fashion:

SENSORS/EVENTS menu

Pad1

PlayFunction: All

Event1: Note, Channel 16:Note#122- (Shift Right; Velocity=1 shifts one space)

TIMING menu: Set HitMode = Timed; LOOP=ON.

Run a Lighting Script, chase the LEDs around the fingerboard:

SENSORS/EVENTS menu

Pad1

PlayFunction: All

Event1: Channel 15 (also 13 for the 12string) Note 100, velocity 6. This loops the Spiral Effect.

In the SENSOR/Events menu set up two knobs or pedals (breath, etc...) with Channel 16 MIDI CC-numbers 75 and 76 which are the Coarse and Fine settings for the Script-Clock rate, or the speed of the Lighting effect.

Abort the script with a Note 100/Velocity-0 command.