welcome to

structure

v3.3 firmware

CV Inputs & Control　　　　　**Screen and Interface Control Buttons**

structure　　　　　　erogenous tones

| IN | AUDIO/CV | | | UI | | MACRO |

- LZX 1V Input
- NTSC/PAL Input
- NTSC/PAL Outputs (Mirrored)

- OUT Macro Controls
- USB Port

IN — R, G, B, CVBS
OUT — CVBS, CVBS

AUDIO/CV — 1/X, 2/Y — SCALE — OFFSET — 1V 5V
CV — 3, 4, 5 — SCALE — OFFSET — 1V 5V
INPUT SELECT

GATE — OUT, IN 1, IN 2, IN 3

UI — NODE SET
DISPLAY   RANDOM
SDCARD
JOYSTICK
MOTION
NEXT >

GEN1, GEN2, MIX1, EFX1, OUT
MODULATORS
CV1/X, CV2/Y, CV3, CV4, CV5
G1, G2, G3, Gout, XY, ABS
CLR < PREV NEXT > LIST

PRESETS	ACTIONS	MOD SOURCES	MACRO
SAVE	STATES	MOD MATRIX	USER
PERF	PARAMS	MOD VIEWER	SYSTEM

SELECT
USB
ENTER

Gate Section　　　**Joystick**　　　**Encoder**

erogenous tones

about structure

Welcome to STRUCTURE, a NODE based GLSL visual generation platform realized in the Eurorack format. The concept behind STRUCTURE was to build a module that simplified the creation of interesting visuals while also providing a deep set of features for those who want to go further.

STRUCTURE is based on the concept of a *"living"* code-base, which means, we are continuously developing the firmware and providing free updates that are easy to install, from the website.

We didn't just design and manufacture STRUCTURE, we also perform with it, which is where many of our ideas for it originated. With that said, if you have any interesting ideas for STRUCTURE, reach out and let us know and we'll take those ideas into consideration!

Given the nature of the evolving firmware, we've decided to focus mostly on instructional videos posted online. That said, here is a nice quick start to get you going. Be sure to check the website for the latest online manual, instructional videos, and firmware!

https://erogenous-tones.com/modules/structure/

a few words on power

STRUCTURE pulls ~400mA with no devices connected to the USB port. If you are worried about pulling too much current, you can use a powered hub, or, an external power brick to bring +12V into the power jack on the back of STRUCTURE. The website has a recommended power supply for this. STRUCTURE **requires** a Eurorack power supply and can NOT run on +12V only.

and so it begins

When you power on STRUCTURE, there will be a few seconds pause as the system boots up. Next you will see a quick flash, followed by the "WELCOME TO STRUCTURE" intro message. At this time, you will be able to see output from both of the CVBS output jacks (RCA composite). If you need PAL output, press the SYSTEM button, and then change the Output Video Format to PAL. STRUCTURE will need to restart to switch output video modes

Note: STRUCTURE auto-detects a PAL/NTSC input source and converts to whatever output format you are using.

The first thing we always recommend to people is to push the RANDOM button near the bottom left of the screen! Press it a few more times. You've done it now, you've created your own visuals! You know you want to keep pressing it, so we'll wait while you have fun.

What you see on the left side of the screen is referred to as a NODE SET, a series of interconnected visual NODES. In a way, this is similar to how FM synths are typically shown. The connectivity you see for each-NODE SET is predefined at this time. The system starts up with the first NODE SET selected, which is GEN1 -> OUT. The video path starts at the top node and goes downward. The white line from GEN1 to the red dot on the OUT node shows the signal path. The OUT NODE always exists as the last part of every NODE SET.

If you rotate the ENCODER at the bottom right one click clock wise, you'll get the next NODE SET which is GEN1->EFX1->OUT. Now your GEN1 generated visuals are being passed through an EFX1 effects node, then to OUT. The number after the NODE type is used for nodes that can have multiple instances of the same type. So if you rotate the ENCODER again, you'll see an EFX2 is now inserted after EFX1.

node types

STRUCTURE has the following NODES (v3.3):

GEN: *Generator Node,* Generates visuals from GLSL SHADER code.

EFX: *Effects Node,* Processes incoming visuals through GLSL SHADER code.

IMG: *Image Node,* up to 1024x768 .png file, 24 bit color.

MIX: *Mixer Node,* mix two NODE types using GLSL SHADER code.

3D: *3D Node,* Generates a 3D object, takes .obj files, and two types of SHADERS.

VID: *Video Input Node,* either CVBS or LZX 1V (NTSC or PAL).

AUD: *Audio Visualizer Node,* audio in from CV1X, visualized with GLSL SHADER code.

AUFX: *Audio Based Effects Node,* audio in from CV1X, as a parameter to effect visuals.

XY: *XY Visualizer Node,* two channels of audio used to generate visuals in GLSL.

VXY: *VXY Visualizer Node,* two channels of audio generate visuals in GLSL with vector effect.

FBK: *Feedback Node,* OUT node redirected as an input to the node set.

CLIP: *Video Clip Player Node,* plays MPEGA 640x480 or 320x240 video clips.

FREQ: *Frequency Visualizer Node,* audio in to CV1X uses nine FFT bands to modulate visual effects.

TXT: *Text Node,* load .txt files and use .fft fonts to display on screen. plug USB keyboard to enter text real-time.

DLY: *Delay Node,* continually sampling the last 20 frames to create a visual echo effect.

WIPE: *Wipe Node,* key between two nodes with a third node controlling the key.

RAST: *Raster Node,* scan line effect (similar to Rutt-Etra).

2D: *2D Node,* Python3+Pycairo program as a node.

Continue rotating the ENCODER to go through the 100+ NODE SETS available. As STRUCTURE gets updated, more NODE SETS will be added to this list. To jump to a certain NODE type, you can press the NODE SET button to scroll through the list without loading each NODE SET until you press the SELECT button. You can also choose which nodes types are displayed (or not displayed) by pressing FILTER and using the 4x4 grid to show nodes (green) or hide nodes (red).

cv modulation

STRUCTURE has five CV input lanes. Each lane of CV has two knobs, a jack, and a switch. The switch allows you to set the voltage range of the CV input. 1V (up) for when working with modulation sources generated for video CV , or 5V (down) for working with modulation sources used in audio CV.

CV3-CV5 are for LOW FREQUENCY inputs, things that would modulate at some speed equal to or less than video frame rates. Running high speed inputs into these CV will be sampled at the lower frame rates and

does generate neat effects (for audio, it can mimic an envelope follower!)

CV1X and CV2Y are dual purpose. First, they can be used at audio rate when your NODE SET contains audio NODES (AUD, AUFX, FREQ, 2D (emod)) Second, They can also always be used as regular LOW FREQUENCY CV just like CV3-CV5.

Each NODE SET comes with a predefined modulation matrix, meaning, what modulation sources controls which NODE parameters. To see what those are, you can press the DISPLAY button (to the left of the RANDOM button) until you are on the page that says PARAMETERS at top of the screen. The page order cycles through: PREVIEW, MODULATORS, FILES, PARAMETERS, and then back to PREVIEW. You'll see in the GEN1->OUT NODE SET that CV1X, CV2Y and CV3 are mapped to the 3 parameters of the GEN1 NODE. You'll also see the name of the parameters listed in the same box. If you move CV1X, CV2Y or CV3 OFFSET control, you'll see the little gray bar behind the names indicate the values.

OFFSET sends a voltage into the CV input, from 0 to 5V. With no CV coming in, this is what you use to control the current setting if you have a CV assigned to a PARAMETER. The SCALE knob is used to attenuate an incoming CV signal. Typically you use these knobs together to tune an incoming CV to where it works the best.

modulation display

Press the DISPLAY button until you get to the MODULATORS screen. Here you can see the level of the CV coming in. The first two have an audio backdrop for when they are being used in audio mode. If you move the OFFSET values up and down, you can watch the values change. This is invaluable when you are trying to fit a CV source within the usable voltage window.

The JOYSTICK monitor can also be seen on this page. Press and hold the RED button (above and to the right of the joystick), while moving the JOYSTICK to record the joystick movements and play them back in a loop. Even if you change NODE SETS, the JOYSTICK motion recorder will continue to play. Quickly tapping the RED button once will erase the stored modulation. The JOYSTICK motion (live or recorded) can be assigned to

any PARAMETERS. If you press the BLACK button (below the RED button, next to the JOYSTICK) you can switch the JOYSTICK from ABS (absolute) position to REL (relative) position. This is useful when you want to move to a spot and have the value held.

G1/G2/G3 show the current state of the GATE inputs (or the associated buttons). Go (for Gate Out) sends a single pulse from the OUT jack (to the left of IN1) after a video frame is rendered. The rate will vary based on which shaders and node sets are chosen.

NTE shows the last MIDI NOTE value received and CC shows the LAST MIDI CC channel received. Their boxes will blink orange after receiving a MIDI message.

audio modulation

AUDIO based nodes are AUD, AUFX, FREQ, VXY, 2D (emod), and XY. When you are using AUD and AUFX, CV1X is used for AUDIO in. CV1X will still be available to map to modulation destinations, but, it will ALWAYS be linked to any AUDIO NODES in the current NODE SET. For XY and VXY, this is true of both CV1X and CV2Y. Remember, you can fine tune the incoming values by pressing DISPLAY until you are at the MODU-LATORS screen, then adjust the SCALE and OFFSET values. Set the input switch to 5V. Audio can routed to NODE parameters in the PARAM menu by selecting FREQ H, FREQ M, and FREQ L.

video input

On the left side of STRUCTURE you will see 2 input sections, LZX 1V RGB (top section) and CVBS (Component RCA connector). Use the INPUT SELECT switch (to the right of the CVBS IN) to select which is active. If you are using LZX 1V RGB in, you will need to attach a SYNC cable (also RCA) to the back of STRUCTURE. If this is the LAST connection in the SYNC chain, be sure to turn on the TERMINATOR switch on the back for proper line termination. The SYNC signal comes from an LZX source, like Visual Cortex or Memory Palace.

The VID NODE is used for bringing in NTSC or PAL video into STRUCTURE. There are multiple VID shaders that allow for different processing of the video (like rotations, scales, flip along axis, etc). Coupled with other NODES like FX1, MIX and FBK you can get some

crazy results ! If your video in does not look correct, press the PARAMS button and make sure VID-FILES-FRAG is set to 'standard'.

main interface page

Before we get a little deeper, a few other quick tips on the main interface page.

At the bottom of the main screen, you will see CLR, <PREV, NEXT> and LIST. These are used to control the currently loaded files for the NODES in the NODE SET. These labels refer to the buttons just below them (which are context sensitive).

If you press a NODE button (to the left of a NODE), the NODE will be highlighted in YELLOW. This means any ACTION (random, <PREV, NEXT>) will work on that NODE alone. If no NODES are highlighted, those functions are applied to ALL NODES. Some nodes have many parameters, like 3D or TXT, and you can set which parameters respond to the action in the PARAMS menu.

To see what files are being loaded, press the DISPLAY button until you get to the FILES page. For GEN1, it will be a FRAG file (which stands for FRAGMENT SHADER, which is how visuals are generated). Push RANDOM, < PREV, or NEXT > to see different files loaded.

If you LONG HOLD a NODE button, the border color goes to RED. RED means that the settings of the NODE are locked and do not change if you use any of the previously mentioned controls. This is so you can switch NODE SETS and keep the same settings when that NODE is used in another NODE SET.

Pressing a NODE button when it is selected or locked, will unselect the NODE. The CLR button will unselect all selected NODES.

Press the LIST button to scroll through the list of files for a particular NODE. If multiple NODES are selected (or if no NODE is selected) you will need to select a node before the file list will appear. You can now use the ENCODER to scroll and select a file to load. If you hold the JUMP button and rotate the ENCODER it will jump through the list by first letter of the filename.

If a NODE has more than one file associated with it (like 3D, IMG, TXT), you can use the FILE SET soft key in the LIST sub-menu to select which file type you want to change.

Whew, that was a lot to cover, and really, we are just scratching the surface.

macro knobs

The three knobs on the top right are called the MACRO knobs. These knobs control global parameters that you can assign to the OUT node. The default setup for STRUCTURE is:

MACRO1: Brightness (so at zero setting becomes a blackout control)
MACRO2: Hue - shift hue a full 360 degrees
MACRO3: Saturation - full color to grayscale

If you want to change the assigned MACRO settings, press the MACRO button below the display. Use the ENCODER to choose which MACRO you want to change. Press EDIT MACRO to change what the MACRO will do. Press EDIT MOD to assign a modulator (like CV1X, FREQ H, CC S#1, etc) to the MACRO. The incoming value will be added to the value of the MACRO knob. If you want to have these settings be recalled when you start up STRUCTURE again, press the PERF button and then press SAVE PERF. (These settings are saved to the PERFORMANCE).

presets

The SAVE button allows you to ADD, INSERT, REPLACE, MOVE or DELETE PRESETS from the PERFORMANCE. You can use the ENCODER knob to move around the current list of PRESETS. When you SAVE a PRESET, a snapshot will be captured of what is currently being displayed (So be sure you are not in BLACKOUT, which would make a black image). The menu at the bottom of the screen will change to reflect the current options for the preset. STRUCTURE also allows 'empty' presets, so the preset can be saved to any of the 64 preset positions.

To recall PRESETS, use the PRESETS button. This brings up the PRESET GRID. The 4x4 grid of buttons (with PERF as the bottom-left corner and NEXT> as the top right) will recall the preset for the associated spot. The 4 NODE buttons to the left of the screen will change between BANK 1 to 4. Each BANK has 16 PRESETS. There is also an EXIT button mapped to the left of the grid to exit the PRESET view.

You can have 64 PRESETS in your PERFORMANCE. Starting with firmware version 3.0 you can have multiple PERFORMANCES as well.

the performance

As mentioned, a PERFORMANCE has four banks of 16 (64 total) PRESET slots, and each PRESET is saved immediately to a PERFORMANCE when you use the SAVE menu. The PERFORMANCE is stored on the front SDCARD.

Also stored with the PERFORMANCE are the EVENT MAP, MACRO SETTINGS, MOD SOURCE SETTINGS, and MODULATION SETS. These allow you to have different settings for these with each performance.

When you change any of the above settings, a small asterisk will show up at the top left of the screen to indicate those changes need to be saved to the PERFORMANCE. To save these changes, press the PERF button to go to the PERFORMANCE page. Select SAVE PERF from the context sensitive menu. If you do not save them before you power off your changes will be lost!!

You'll also notice in this menu two more options, SAVE MODSET and REVERT MODSET. MODSET is short for MODulation SETup. We will cover more details on modulations later, however, know that by default every NODE SET has it's own modulation setup. Use SAVE MODSET to save the modulation settings for the selected NODE SET as default. Every time you select that NODE SET in the future, it will recall the default modulation MODSET.

The important part to understand is that when you change NODE SETS, it always loads up the default modulators (either system default or what you have saved) to begin at a known state. In addition, whatever modulation set you have when you write a PRESET to disk, will be BAKED into that PRESET and ALWAYS be

recalled (unless you are using NODE lock or NODE overrides).

actions / states

ACTIONS and STATES are very similar. An ACTION is something you trigger, like randomizing something or loading a preset. A STATE is something that can hold in one position until released, like INVERT.

When using either the ACTIONS or STATES button, if you have no NODES selected, then the possible ACTIONS or STATES for every NODE in the currently selected NODE SET will be listed, with PERFORMANCE specific ACTIONS and STATES listed at the end.

ACTIONS and STATES are referred to as EVENTS and are stored when you save the PERFORMANCE. (Remember, if you do not save them, they will be lost on POWER off).

There are 3 different sources you can assign to ACTIONS and STATES:

MIDI: Used for any USB MIDI device that is plugged in to the USB port. All attached devices are merged into one MIDI device, one channel. Devices must be class compliant.

GATE: Used for the 3 gate inputs on the front panel. This can be triggered by the button or CV GATE input.

KB: Used for a USB attached keyboard. This could be a standard PC keyboard, a numeric keypad, or even a custom keypad that works like a generic keyboard device.

Use the ENCODER knob to scroll through different ACTION/STATE settings. To the right of each line, you will see the currently assigned mappings:

>**BLUE** for MIDI
>**MAGENTA** for GATE
>**GREEN** for KB.

parameters

This is probably the most complex part of working with STRUCTURE. This is where you can make changes that affect the behavior of the NODES. Like ACTIONS and STATES, if you have NODES selected, only they will be shown in the PARAMETER list when you press the

PARAMS button, with PERFORMANCE-centric items at the end of the list.

When you select a line using the ENCODER, the menu at the bottom of the screen will change context to show the setting's options. Let's look at the different sections of the PARAMETERS menu. Sections like FILES, CONTROLS, and SETTINGS are highlighted in purple.

In the FILES section, you can press the SELECT FILE soft key to bring up a list of files for the NODE. This works like the main page LIST soft key.

The CONTROLS section contains the MODULATION sources and destinations we mentioned earlier. Each line shows you; modulation source (CV,MIDI,KB), option joystick X/Y, control name (derived from the loaded file) and finally the modulation range and default value overview. The green brackets indicate the minimum (MIN) and maximum (MAX) range of the value. The magenta line shows the default value for the control and the thicker green horizontal line shows the current value being applied to that modulation destination.

The initial modulation mode settings only use the default value if no modulation source is assigned to a destination. We'll cover these more as we talk about how these settings are changed. Let's look at the menu options.

Pressing the MOD SOURCE button allows you to assign a modulation source to a parameter. Use the ENCODER knob to choose the source modulation from the list. CV and MACRO refer to the front panel inputs, FREQ L/M/H is from an audio signal going in to CV1X , and CC S#1 to CC S#32 are STRUCTURE controllers mapped in the MOD MATRIX screen (where you can assign MIDI CCs to STRUCTURE's CC SLOTS). Press the SET soft key to make the change immediately, press CLOSE to exit the list.

Pressing the JOY X/Y soft key cycles between X value, Y value, or no joystick value. When this is set, moving the joystick applies the values to the modulation destination parameter. Remember, you can toggle JOYSTICK behavior between REL (relative) and ABS (absolute) modes. the by pressing DISPLAY until you get to the MODULATORS menu and pressing the black button at

the upper right of the joystick. ABS always snaps back to the center, whereas REL 'moves' to a position and stays there.

Pressing the VAL RANGE button opens the Parameter Values: windows. Here you can you can set the range of the modulation source or to change the DEFAULT VALUE. Once VAL RANGE has been selected. the MIN MAX button allows you to toggle between the START/STOP point. Use the ENCODER to move the bracket positions. This is useful when you want to make sure a modulation doesn't go above or below a certain point. Like trying to tune a parameter for a specific effect. The SET DEFAULT button can be used to toggle changing the DEFAULT value with the ENCODER.

NOTE: The ENTER or NEXT> button can be HELD IN for fine control of the values while rotating the ENCODER knob.

The RESET soft key will return the MIN, MAX and DEFAULT values to their default settings.

NOTE: The QUICK CHANGE button, when visible, allows you to make quick changes to a selected PARAMETER. QUICK CHANGE must be HELD IN while using the ENCODER. The NEXT> button, also HELD IN, is used for fine tune while in QUICK CHANGE mode.

Once you are happy with your settings, you can use the CLOSE button to exit out of the VAL RANGE sub-menu.

The VAL MODE button controls how the DEFAULT VALUE and an ASSIGNED modulator work together:
AUTO(default): ignores the DEFAULT value if a MODULATOR is assigned to the CONTROL. If the MODULATOR is NONE, then it will use the DEFAULT value.
DEF: uses JUST the DEFAULT value and ignores any MODULATOR you have assigned.
DEF+MOD: is the SUM of both DEFAULT and MODULATOR, clamped at range of 0 and 1.
DEF-MOD: is the difference between DEFAULT and MODULATOR, also clamped at between 0 and 1
MOD: uses the MODULATION source only, the DEFAULT value is always ignored.

NOTE: If you have AUTO set, then the DEFAULT value is ignored when a MODULATION source is selected for a CONTROL. This setup allows you to have a DEFAULT value for NODES where a MODULATION source is not selected. This normally occurs when you have a lot of NODES in a NODE SET and want to spread out the MODULATION sources to all the different NODES. DEFAULT values default to 0.5 for most CONTROLS.

For the SETTINGS section of the PARAMETERS, these are not fractional values like the CONTROLS (other than the TIME ADJ setting) but are fixed values or enumerations (in other words a selectable list of settings). You can use the SETTING button to change them when they are selected. The 3D node has the largest collection of settings.

TIME ADJ allows you to create a local modifier for a node to have a different timing relative to the system global time. DECOUPLE TIME disconnects from the system time. This is useful if you assign TIME CONTROL to one of the MACRO knobs, but do not want that to change the time for a specific NODE.

All parameter settings are stored in the PRESET that you save.

NOTE: If you change your NODE SET, the PARAMETER settings will be lost. To avoid these you have a few options. First, you can LOCK any NODES with a long hold to prevent loading up the default MODULATION SET for the NODE SET NODE. Second, you could save that NODE SET MOD SET as the new current DEFAULT. This would only allow you to recall those setting for that NODE SET. The third option is using the NODE OVERRIDE which is covered later.

mod matrix

Currently, the MOD MATRIX page is used to map MIDI CC messages to CC SLOTS that can be used to modulate STRUCTURE. QUICK CHANGE (held down) allows you to quickly cycle through CC numbers on a currently selected line. Pressing CHANGE will bring up a dialog that can be used to detect incoming CC messages. IGNORE MIDI and LISTEN MIDI can be used to change that behavior (in case you have a bunch of different CC sources transmitting at once).

NOTE: ALL channels and interfaces are merged, so be sure to move to different CC lanes for different MIDI

devices.

NOTE: MOD Matrix settings are stored with the PERFORMANCE.

mod source/override

If you do not want to use the NODE SET modulators for a particular NODE, you can OVERRIDE a NODE to ALWAYS USE a set of modulators you setup. When using OVERRIDE it also means when you recall a PRESET, the NODE MODULATION settings from the PRESET will be ignored for that NODE. You bring up the OVERRIDE settings by pressing the MOD SOURCE button.

Using OVERRIDES is great for when you are creating new PRESETS, or, if you are performing LIVE and want to quickly set up some MODULATIONS that you want to stay persistent no matter what NODE SET you switch to or which you recall through PRESETS.

Each of the NODE OVERRIDES can be toggled individually, or use the ALL button to enable override on all nodes. When OVERRIDE is active for a NODE, the line describing the NODE in the OVERRIDE menu will turn magenta. In addition, the NODE shown in the NODE SET graph in the main window will also have a magenta background.

When STRUCTURE starts, any saved OVERRIDES are loaded into memory BUT NOT ACTIVATED. When you enable an OVERRIDE, those settings will be used. By default, STRUCTURE doesn't come with any OVERRIDES defined, so whatever the current NODE settings are will be used the first time you activate an OVERRIDE.

When you make changes to the OVERRIDE settings (by modifying the PARAMETERS of a NODE after OVERRIDE has been enabled for that NODE), an asterisk will appear after the NODE indicator in the MODSRC menu to indicate the current changes have NOT been saved yet.

You can use SAVE OVERRIDE to save the currently selected settings. As mentioned earlier, these saved settings will be used as the default OVERRIDE settings

when STRUCTURE is powered up, but they will NOT be active by default. You must enable the OVERRIDE for a node in the MODSRC menu. When a node is overridden its background will be magenta.

The next page of the MODSRC menu is accessed with the NEXT> button to the bottom right of the LCD screen.

On this page of the menu, REVERT OVERRIDE is used to restore the default OVERRIDE settings and discard any changes you've made to the OVERRIDE settings on the selected NODE.

ui functionality

When you are in any menu other than the PRESETS menu, you can press any other menu button to switch into that menu or you can press in the ENCODER knob to exit out of a menu.

Any menu context sensitive button item with an underscore (_) under the description is known as the menu default. The WHITE ENTER button to the right of the ENCODER can be used to trigger the button function when in a menu that has a default button.

Any menu with an arrow at the bottom right of the STRUCTURE LCD indicates that another page of the menu exists. Press the NEXT> button to access other pages. Additionally, the top right of the screen will let you know how many pages of menus you have for the current screen. For example (1/2) means you are on page 1 of a menu with 2 pages.

the usb port

Without anything attached to the USB port, STRUCTURE will pull ~400ma during the heaviest NODE SET computation operations. This number grows when you insert USB devices into the USB port. With a few MIDI devices, it is not uncommon for that value to rise to ~650mA total current on the +12V rail. If you are worried about power usage in your case, it is recommended you either use a powered hub to offload the power consumption from the USB port or you use an external +12 supply into the back of STRUCTURE. See the website for more details.

NOTE: If you use too much power from your case power supply, it is possible that STRUCTURE could spontaneously reboot from being current starved. We've tested STRUCTURE in some heavily loaded cases and it has never rebooted on us yet, but be aware if you have a really low power case.

the front sdcard

This is where PERFORMANCES, your own GLSL files, .png images, .move file, 3D .obj files, .ttf fonts, .txt files, 2dpy programs, and other configuration information is stored. If you remove the SDCARD (or start without one) saving will be disabled. If you insert the SDCARD after you've removed it (or started STRUCTURE), it will ask you about restarting the system so it can reset everything. This is normal.

When you save a PERFORMANCE or PRESET, STRUCTURE will make sure you have the necessary directory structure on the SDCARD. If the directory structure is missing, it will be created. The created directories are where you will install your own files. From the root of the SDCARD, these are the directories:

images/ directory where you can put 24-bit Color PNG files up to 1024x768 px. Other formats are not currently supported.

obj/ directory where you can put OBJ files. These files need normals and UV coordinates.

2dpy/ directory for 2d Python programs.

glsl/gen directory where you can put your GLSL fragment generator SHADERS that follow our guidelines (see ET GLSL SANDBOX section).

glsl/fx directory where you can put GLSL fragment effects SHADERS.

Other subdirectories in **glsl/** are for node specific shaders :
glsl/

3d	- 3D shaders
3d_vert	- 3D vert shaders
dly	- DLY shaders
efx_audio	- EFX shaders
fb	- FBK shaders
freq	- FREQ shaders
fx	- FX1, FX2 shaders
gen	- GEN1, GEN2 shaders
img	- IMG shaders
mix	- MIX shaders
rast	- RAST shaders
rast_vert	- RAST vert shaders
single_audio	- AUD shaders
video	- VID shaders
vxy	- VXY shaders
wipe	- WIPE shaders
xy	- XY shaders

text/ directory for .txt files used by the TXT node

fonts/ True Type Fonts (.ttf) fonts used by the TXT node

clips/ directory for .mov files for VID node:

Resolution	: 640×480 or 320×240
Container	: MOV
Compression	: Motion JPEG A
Number of fields	: One (NO INTERLACE, TURN OFF ALL INTERLACING SETTINGS)
Sound	: No Sound (CANNOT HAVE SOUND TRACK IN IT AT ALL)

In addition, the front SDCARD is where you put new FIRMWARE files to be loaded. This process can be accessed in the SYSTEM menu and selecting the associated FIRMWARE function from the menu.

Note: You can also start STRUCTURE with the SYSTEM button held down to enter the FIRMWARE LOADER and TEST menu.

the back sdcard

This is the operating system for STRUCTURE. You should not need to do anything with this card, just leave it plugged in. Stop touching it!

the fan

STRUCTURE ships with the fan disabled in software. The HEATSINK on STRUCTURE's CPU board is VERY effective at cooling the CPU, as we've tested it in some very hot environments. The SYSTEM menu will show you the current temperature in the top menu bar.

If STRUCTURE overheats, the CPU will throttle the performance so the system is not damaged. This will not hurt the CPU but it may create visual slowdowns. Thermal throttling kicks in at 85 degrees.

If you know you are going to use STRUCTURE in a very hot environment, you might want to turn the fan on in the SYSTEM menu.

the et glsl sandbox

The SHADERS in STRUCTURE have been written by us or converted from various sources across the internet. This means that most SHADERS have a Creative Commons license or are released into the public domain. Every attempt has been made to keep original ownership and licensing intact. URL links to the original code are included in the SHADER code whenever possible. Because of this, all SHADER code (including our own) has been released to our fork of the GLSL SANDBOX where you can view the SHADER source or make your own to download to the front SDCARD.

The STRUCTURE GLSL SHADER editor is located at:

http://glsl.erogenous-tones.com

On this website you can view and modify the source code of the GLSL SHADERS included with STRUCTURE. You can browse the SHADERS or search for all or part of the SHADER name. Single clicking the thumbnail of the SHADER will open a running instance of the SHADER and allow you to view and modify the source code realtime! You can copy/paste the updated SHADER code from the website and save it in a file with the suffix .glsl to the front SDCARD to use with STRUCTURE. More detailed information and examples are provided on the website.

going forward

As mentioned earlier, STRUCTURE is based on the concept of a living code base. We will continue to be incredibly active in the firmware's development. As of this firmware release (v3.3) the MOD VIEWER is not yet active.

For the latest versions of the Firmware, links to videos, and links to newer versions of this information (and more), be sure to checkout the website for further details at:

http://erogenous-tones.com

thank you

in 2016, the journey of STRUCTURE began on a nine hour road trip back from Machines in Music in NYC. Through concepts, prototypes, and our introduction to Lars Larson at Moogfest the following year, the wheels of this project were well underway.

Three years later we brought STRUCTURE to market. We want to give a huge thanks to Lars and his constant support from LZX. We couldn't have done this without him. Another huge thanks to KnobCon, and specifically STG, who let us perform with our STRUCTURE prototypes. Last but not least, a huge thanks to our beta testers! You know who you are! Thanks to everyone who has supported this ambitious project, and thanks to you, who is still reading this. In fact, why are you still reading this? You should be hitting that random button some more! You're still here? It's over. Go home. Go.

Rick Burnett, James Clark, and Chris Burnett