empress effects

ECHO SYSTEM

DUAL ENGINE DELAY

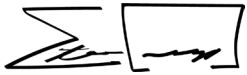
user manual

version 2.04

INTRODUCTION

We're stoked you've chosen to make the Empress Echosystem part of your sound! We hope you use it to create new and amazing sonic textures. In time, those sounds may make you a superstar. At which point, we hope you remember us and invite us back stage so we can impress our wives and children.

Jason Fee - Designer

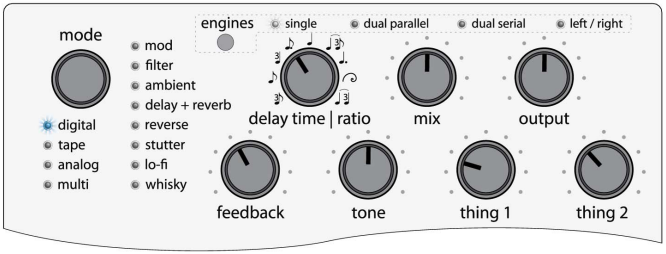


Steve Bragg – Designer

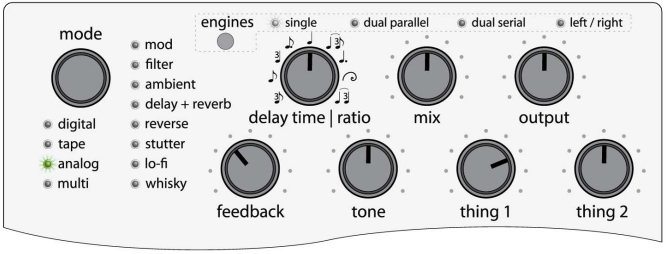
QUICKSTART

All modes are designed to sound good with all knobs at 12 o'clock. Start there and then tweak to taste. Here's a few others to try too.

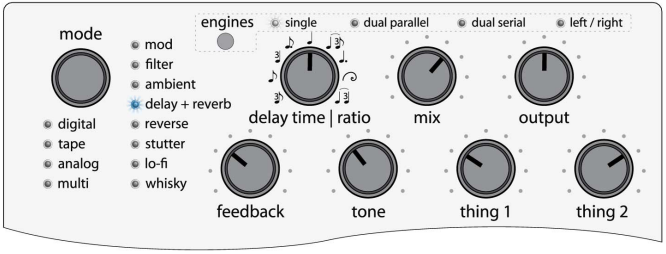
Clean Digital Delay – Dotted Eighths



Warm Analog Delay

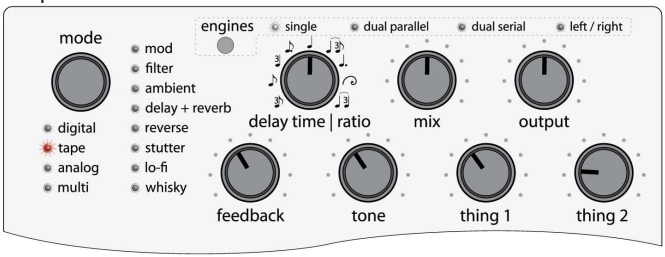


Delay and Reverb

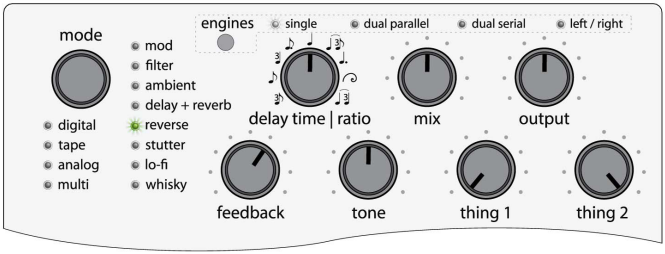


QUICKSTART

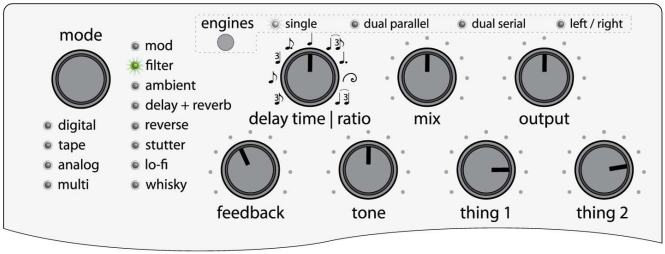
Echoplex



Reverse Dual Pitch



Warp Filter



MODE REFERENCE CHART

Mode	Description	Thing 1	Thing 2
Digital			
Pristine	Clean and pristine	Modulation Depth	Modulation Rate
Short Stuff 1980	Divides tap time by 4 for really short sounds. Perfect for slap-back	Mod Depth	Bandwidth
Ping Pong	Classic ping pong delay	Modulation Depth	Modulation Rate
Dynamic Duck	Wet signal gets turned down when guitarist plays louder, turns back up for trails	Duck Amount	Release Speed
Dynamic Feedback	Feedback signal gets compressed by the input signal	Duck Amount	Duck Threshold
Tape			
New Tape	Good bandwidth with some wow and flutter	Modulation Depth	Modulation Rate
Old Tape	The warm awesomeness of old tape	Modulation Depth	Modulation Rate
Echoplex	Echoplex emulation	Saturation	Modulation Width
Space Echo	RE-201 single tap emulation	Input Drive	Modulation Width
Analog			
BBD	Bucket brigade delay	Saturation	Modulation
Tube BBD	Like above but tubey to the max	Saturation	Modulation
Deluxe Memory Boy	Classic emulation. Allows you to stack the vibrato and chorus	Vibrato Amount	Chorus Amount
Echorec	Classic Echorec emulation with four playback heads and one record head.	Playback heads to send to output	Playback heads to send to record head

Multi			
Digital Multi	Multitaps	Intensities (one per dot)	Intensity Depth and pan width.
Tone Taps	The tone of each tap is different	Tone Variations (one per dot)	Intensity Depth and Pan Width.
Preset Pattern Mode	It takes a single tap and uses a selectable pattern of multi-taps	Delay Time Pattern (one per dot)	Volume and Pan Variation (one per dot)
Mod			
Panning Delay	Delay line pans back and forth	Pan Width	Pan Speed
Trem Delay	Tremolo on the output	Trem Depth	Trem Speed
Waveform	Modulation shapes	Waveform (one per dot)	Modulation
Filter			
Filter Pulse	Moving filter on delay signal	Pulse Center Frequency	Pulse Speed
Filter Warp	Filter on wet output moves around depending on volume of the delay	Filter Sensitivity	Response Speed
Swoosh Echo	Filtered delays that swoosh down in tone	Modulation	Swoosh Speed
Ambient			
Drunk Ewok (lost in space)	Somewhere between multitap delay and reverb	Delay Pattern (one per dot)	Diffusion
Triggered Swell	Input to delay line is ducked when it detects the onset of a note	Swell Time	Modulation
Triggered Multi Swell	Like previous mode, but multi-tap	Swell Time	Flanger Amount (which provides stereo width)
Long Delay	Knob time goes up to 8 seconds	Modulation Depth	Modulation Rate
Input Rider	Utility mode to ride delay input via expression pedal.	Level Into Delay Line	All-pass Filter Amount

Delay + Reverb

Hall	Delay and hall reverb	Mix of Delay to Reverb	Reverb Decay
Plate	Delay and plate reverb	Mix of Delay to Reverb	Reverb Decay

Reverse

Reverse Delay	Chops the input signal up and plays it backwards	High Frequency Roll-Off	Compression Amount
Reverse Dual Pitch	Has two pitch shifted reverse delays (unity, +-10cents, +-4th, +-5th, +-octave)	Sets pitch of delay 1	Sets pitch of delay 2
Triggered Reverse	When a trigger is detected it resets the reverse counter, and triggers a swell	Swell Time	Chorus Level

Stutter

Chop Mode	Signal gets chopped up before feeding the delay	Chop Speed	Modulation
Auto Stutter	Delay source sets functionality. **Local:** Detects a note then stutters on that note. **Global:** tap to trigger **Knob:** hold for stutter *Feedback knob adds distortion.*	Filter sequence (one per dot)	Filter Aggressiveness

Lo-Fi

Old Timer	Lo-fi with resonant filters	Oldness	Break-up amount
Digital Death	Robot alias	Aliasing Freq	Alias Blend
Distorted Swells	Turns high feedback swells into nasty distortion	Drive Amount	Compressor threshold on output

Whisky

Knobs' Seesaw	Two pitched delay lines. When input signal gets above a threshold it switches from one line to the other.	Sets pitch when playing quiet	Sets pitch when playing gets louder
Christopher Glitchens	Two pitched delays that have fully variable pitch control -1 octave to +1 octave.	Sets pitch of delay 1	Sets pitch of delay 2
Shimmery Fixed Pitch Shift	Pitches the delay line to a constant pitch up or down.	Pitch shift in semitones	Modulation amount

This manual only lists modes that were available at the time of printing.

For the most up-to-date firmware and manual refer to empresseffects.com

SETTING DELAY TIME

To change the delay time source, hold the **shift** button and press the **tap** stompswitch.

DELAY TIME SOURCES

Local Tap (Tap LED shines Red): When the user taps in a tap time, it gets scaled by the **ratio** knob, and is saved with the preset.

Global Tap (Tap LED shines Blue): When the user taps in Global Tap, it sets the global tap time. This Global Tap propagates to any other modes running with Global Tap. If you load a new preset that has Global Tap, it will use this time. Each preset and engine applies its own ratio setting to the global tap time making it easy to sync delays at musical ratios.

Knob (Tap LED shines Green): Turning the knob adjusts the delay time from 20ms to 1.2s (in most modes).

MULTI-TAP

Multi-tap modes allow you to tap in a sequence of up to 5 taps. The tap LED will blink the sequence tapped, with the ratio applied, and then pause for 2 seconds. Multi-tap modes have their own global tap.

USING DUAL DELAY ENGINES

The Echosystem has two engines which can each run any mode. You can route these engines in parallel, serial, or split left/right.

When using dual engines, two mode LEDs light up. The bright one is the mode whose controls are active. Press down on the **mode** knob to toggle which mode is active.

SYNC DELAY TIMES BETWEEN ENGINES

Hold the **tap** stomp and press the **engines** button, and the delay time from the bright mode will be sent to the dimmed mode. Note: The delay time sent to the other mode is the time you tapped (pre-ratio) and the dimmed mode will apply its ratio to that tapped time. This makes it easy to have the modes in sync at different ratios. Both modes must be set to tap tempo to sync delay times.

SOLO AN ENGINE

When getting sounds while using dual engines, it can help to mute the dimmed mode temporarily. Hold the **shift** button and press down on the **mode** knob to solo the active mode. The active mode LED will blink while solo'd. To return to normal operation press the **mode** knob again.

PRESETS

The Echosystem has two types of preset systems: the scrolling preset system, and the bank preset system. Read about each preset system to find which one will work best for you. Select which preset system to use in *Advanced Configuration.*

SCROLLING PRESET SYSTEM

Preset Organization

In *Advanced Configuration* you can select the number of presets you wish to use. The presets are represented by a series of five LEDs located just below the knobs. Press the **scroll** stompswitch to scroll through the presets. The preset LEDs will blink. When cycling through the presets, after every five presets, the preset LED colors will change to another color to indicate you're in the next bank and will start counting again from left to right.

When cycling through the presets, after your final preset, all the preset LEDs will flash very quickly. This represents the manual preset. If you recall this preset, the Echosystem will get its settings from the current knob positions. In the manual preset, no preset LEDs are lit.

You can scroll backwards through the presets by pressing the **tap** and **scroll** stompswitches simultaneously.

Saving a Preset

To save the current settings to a preset, press the **scroll** stompswitch until you reach the preset location where you want to write. While the lights are flashing, hold down the **shift** button and press the **scroll** stompswitch. Your preset is now saved.

Recalling a Preset

To recall a preset simply press the **scroll** stompswitch until the preset you'd like to recall is flashing, then press the **tap** stompswitch to load the preset. The presets LEDs should now be solid and bright.

BANK PRESET SYSTEM

Preset Organization

In *Advanced Configuration* you'll select the number of banks you wish to use. The preset LEDs display which bank is selected by changing color. The middle and right stompswitches each represent a preset. So there are two presets per bank.

Recalling a Preset and Bypassing the Pedal

To recall a preset, press on the middle or right stompswitch. The light above that stompswitch and the bypass LED will illuminate. To load another preset, simply press the other stompswitch. To bypass the pedal, press the stompswitch corresponding to the active preset, and the bypass LED will turn off. The pedal is now bypassed.

Changing Banks

To bank up, press the right and middle stompswitches simultaneously. To bank down, press the left and middle stompswitches simultaneously. The LEDs will flash indicating the target bank, then you can press any of the stompswitches to load a preset within that bank.

Saving a Preset

To save a preset, set the knobs to the sound you would like to save, then navigate to the target bank. While the lights are blinking, press and hold the **shift** button and select the target preset location by pressing the corresponding stompswitch.

BANK PRESET SYSTEM - WITH EXTERNAL TAP

If you'd like three presets per bank, you can use an external tap switch. By setting the pedal's *Advanced Configuration* to bank presets and the control port setting to either *normally-open tap* or *normally-closed tap* you will get 3 presets available per bank. (Changing the delay time source is done by holding the **shift** button and pressing the external tap in this configuration.)

What settings are saved in my preset?

If you change the position of a knob or switch after a preset is loaded, the preset LEDs will dim to indicate that the preset has been modified, but not saved. If you move the knob or switch back to the position it was in when the preset was saved, the preset's LED indicators will brighten again. This lets you find the positions of all the knobs and switches as saved in the preset.

SAVING/LOADING PRESETS TO/FROM SD CARD

To save presets to an SD card, make a directory in the root directory of the SD card called “from_echosystem”. On startup, the Echosystem will populate this directory with all the current presets and the advanced config settings.

To load presets to an SD card, make a directory in the root directory of the SD card called “to_echosystem”. Presets that are named “xx_echosystem.bin”, where “xx” is a number between 0 and 35 inclusive, will be loaded into the corresponding Echosystem preset slots.

V30 LOOPER

The Echosystem contains a multitrack looper which can record loops up to 10 minutes. The looper is available in firmware version 2.03 and up. The latest firmware can be found on our website at www.empresseffects.com/echosystem-firmware

The looper requires an SD card that says V30 on it. Numbers larger than V30 (V60, V90, etc.) are ok too.

An SD card must be inserted into the Echosystem to operate the looper.

WARNING! The V30 looper will corrupt any data on the SD card, so don't use a card with important stuff on it!

ENABLING THE LOOPER

To enable the looper, enter Advanced Configuration *(see Advanced Configuration).* Turn the **mode** knob until the Tape Green LED is lit, then turn the **delay time** knob clockwise until the second preset LED is lit. The looper will be enabled upon exiting Advanced Configuration.

Effects Routing (making looper pre or post effect)

While still in Advanced Configuration, turn the **mode** knob until the Analog Green LED is lit, and then turn the **delay time** knob to select either looper pre (preset LED 1) or post (preset LED 2) effect. Exit Advanced Configuration to save your settings.

mode selector: selects which mode is active. Each mode can have many submodes which are indicated by different color LEDs.

when using dual engines, press to switch active engine.

engines: press to cycle through the 4 different routing modes.

hold **tap** and press **engines** to send current tempo from the active delay to the other delay

feedback: controls how long the delay takes to decay.

tap: tap to enter a delay time.

also used to engage a preset that has been scrolled to with the scroll stompswitch.

hold **tap** to temporarily set infinite repeats (in most modes). release to return to knob setting.

shift +

- **engine** - switch engine order
- **mode button** - solo active engine
- **knob(s)** - assign expression pedal
- **tap** - select delay time source
- **scroll** - save preset

scroll: press to scroll through presets, then engage the preset with the tap switch.

scroll + tap: will scroll backwards through presets.

t a Glance

delay time | ratio: controls the delay time. in tap mode, it controls the ratio of the delay time relative to the tempo that is tapped.

mix: sets the ratio of wet signal (delay) to dry signal (unaffected). Counterclockwise is 100% dry, clockwise is 100% wet, with 50/50 being somewhere around 2 o'clock.

output: controls the overall output volume for the pedal. 12 o'clock is unity.

thing 1 & thing 2: these two controls take on different functions depending on the mode. They control things like modulation depth and speed, saturation, panning, filter, and reverb controls

Check the ***mode reference chart*** to see which function they perform in a given mode.

tone: use to apply EQ to the delay line. center is neutral.

bypass: engage or bypass the pedal. Can be set for true bypass or buffered bypass in advanced configuration.

USING THE MULTITRACK LOOPER

Entering/Exiting Looper User Interface – press and hold middle and right stompswitches together for 1 second. Now, the stompswitches will control the looper as outlined below, and the preset leds will show the looper state. To exit the looper UI, hold middle and right stompswitches again for 1 second, and you can use the stompswitches to control the pedal as normal while the looper continues to play.

Move Active Track Right – press middle and right stompswitches together.

Move Active Track Left – press middle and left stompswitches together.

Start/Stop Recording – press left stompswitch

Play/Stop – press right stompswitch

Mute/Unmute Active Track – press middle stompswitch

Clear Active Track – press and hold middle and left stompswitches together for 1 second.

Clear All Tracks – move to an empty track and press and hold middle and left stompswitches together for 1 second.

Adjust Looper Playback Volume – adjust the **output** knob while the looper UI is active.

LOOPER LED COLORS

The state of any given track is represented by the color of its corresponding LED. The bright LED is the active track.

Green	Track is currently playing
Blue	Track is active but doesn't contain any audio
Red	Track is currently recording
Aqua	Track contains audio, but looper is stopped
Yellow	Track is muted
Purple	Track is recording but is muted

Additional Looper Notes:

While in looper UI mode, the knobs still affect the delay sound, so you can change up the modes or the parameters while in the looper UI.

Any audio tracks that are playing will still play when you exit looper UI mode.

The looper will still play when the pedal is bypassed, unless you have the pedal set to true bypass.

CONTROL PORT

The control port jack allows the Echosystem to be controlled by a multitude of devices. The pedal ships configured to accept an expression pedal. Please see the *Advanced Configuration* section on how to configure the control port for the device you plan to use.

EXPRESSION PEDAL

Each parameter, with the exception of the **mode** knob, can be controlled simultaneously via the expression pedal.

To control a parameter with the expression pedal, move the parameter's knob to the desired heel setting, then hold down the **shift** button and move the knob to the desired toe setting, then release the **shift** button. Multiple parameters can be assigned for expression pedal control simultaneously by repeating this process for each parameter to be assigned. Each parameter can be set with independent heel and toe settings.

To release a parameter from the expression pedal's control, move the knob that controls that parameter.

Any expression pedal used with the Echosystem should have the following pinout: tip to signal, ring to power, and sleeve to ground.

CONTROL VOLTAGE (CV)

With CV control, the Echosystem responds to CV signals from 0 to 5 volts. Otherwise, the CV configuration works exactly like the expression pedal configuration.

EXTERNAL TAP SWITCH

The Echosystem can be used with either a normally-open or a normally-closed external switch. This switch operates like the **tap** stompswitch, with the exception of loading presets.

MIDI

All the parameters of the Echosystem can be controlled via control change messages. Its presets can be selected with program change messages, and its tempo can be controlled with MIDI clock messages.

To use MIDI with your Echosystem, you'll have to:

1. Connect the Empress Midibox (not included with the Echosystem) using a ¼" patch cable to the control port. A TRS cable is required to send MIDI out messages if you're using the Echosystem to control other pedals.
2. Configure the pedal for MIDI control and set the MIDI channel. See *Advanced Configuration* for instructions. Choose a MIDI channel that won't conflict with other devices in your MIDI rig.

Recalling a preset via MIDI (Program Change Messages)

You can activate a preset by sending a MIDI program change message. For example, sending a program change message of 7 activates preset 7.

Midi with Preset Out

The Echosystem can send out MIDI program changes on the ring of the control port jack whenever a preset is loaded on the Echosystem. The Echosystem will send out these program changes on the 4 channels above the Echosystem's current MIDI channel.

For example, if the Echosystem is set to MIDI channel 5 and preset 3 is loaded, the Echosystem will send out MIDI program change 3 on MIDI channels 6, 7, 8 & 9.

Midi Beat Clock

Modes that accept a tap tempo input will respond to MIDI clock messages. MIDI clock specifies quarter notes, subdivided into 24 MIDI messages. The Echosystem's delay time gets set to a quarter note. *Note that MIDI clock is only functional in Global Tap so that presets can be set to either Local Tap or Knob and ignore the MIDI clock.*

Midi Control Changes

The Echosystem can be controlled with MIDI control change messages. Opposite is a table that shows which MIDI control change number controls each Echosystem parameter.

MIDI CONTROL CHANGE MESSAGES REFERENCE

Echosystem Parameter	CC#		Note:
	Engine A	Engine B	
Modes	100	109	The modes and sub-modes are numbered starting from 0 (Digital = 0, Tape = 1, etc.) To translate the modes and sub-mode to a single number you apply the following equation: MIDI message value = (mode x 8) + sub-mode Example: To load the 2nd tape mode, you'd send a value of 9 with the CC message. (1x8) + 1.
Delay Time / Ratio	101	110	Sending a value 0 would be equivalent to the knob completely counterclockwise, sending 127 is equivalent to fully clockwise.
Mix	102	111	Sending a value 0 would be equivalent to the knob completely counterclockwise, sending 127 is equivalent to fully clockwise.
Volume	103	112	
Feedback	104	113	
Tone	105	114	
Thing 1	106	115	
Thing 2	107	116	
Delay Source	108	117	0 - Global, 1 - Local, 2 - Knob
Engage / Bypass	60		0 to bypass, 127 to engage
Recall Preset	11		Send preset # to load that preset.
Simulate Expression Pedal	10		0 to 127 as the sweep of the expression pedal from heel to toe.
Routing Mode	118		0 - Trails, 1 - Parallel, 2- Serial, 3 - Left/Right

Left Stomp – Tap	35		Sending a value of 64 simulates a quick tap. Sending a value of 127 simulates the switch being pressed and held until a value of zero is sent, simulating releasing the switch.
Middle Stomp – Scroll	36		
Right Stomp – Bypass	37		
Shift Button	38		
Save Preset	39		0-35 selects which preset the current settings get saved to. *In Bank mode the presets that appear are (1,3,5), (6,8,9), etc.*
Engine Order Swap (dual mode only)	40		Sending any value will swap delay engine order. Most useful in dual serial mode.
Solo Engine	41	42	0 un-solos engine. Any other value solos the engine.
MIDI Clock Listener	51	52	Sending a value of 0 causes the engine to ignore MIDI clock messages. Sending a value of 127 causes the engine to listen for MIDI clock messages. (by default, the pedal listens for MIDI clock messages)

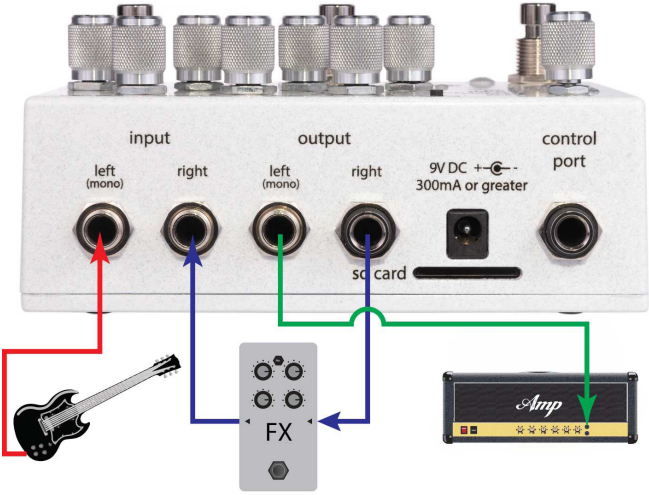
Additional MIDI Control Change Notes

- MIDI switching cannot be done while in A*dvanced Configuration*.

- the manual preset cannot be used while using the bank preset system.

USING HARDWARE INSERT

External effects can be inserted into the delay line using hardware insert. You'll need to enable this mode in advanced configuration. Then, connect as below:



In this configuration the unit operates in mono. Left/right routing won't function as expected.

If using dual delays, the hardware insert goes on engine 0 (the first delay when in series).

ADVANCED CONFIGURATION

The advanced configuration customizes how your pedal operates. The options are listed in the table that follows.

Entering Advanced Configuration

While holding down the **tap** and **bypass** stompswitches, press the **shift** button. All the preset LEDs will blink yellow twice to confirm you're in.

While in Advanced Configuration

Each mode LED represents a different configuration item you can change. Look up the item you'd like to change from the table on the right, then turn the **mode** knob to select it.

Turn the **delay time** knob to modify the value of the advanced configuration setting. The preset LEDs will illuminate to show you the current value. For example, if the blue digital mode LED is lit and the 2nd preset LED is lit, you've configured the pedal for buffered bypass operation.

Exiting Advanced Configuration

Hold down **tap** and **bypass** stompswitches while in advanced configuration. Preset LEDs will blink yellow twice and the pedal will reboot.

ADVANCED CONFIGURATION REFERENCE

Option	Set mode LED to:	preset LEDs indicate:
Bypass operation	Digital	1. True hardwire bypass*** 2. Buffered bypass* 3. Buffered bypass with isolation transformer on right output (Note: when transformer is engaged the pedal assumes stereo output operation)
Control port configuration	Tape	1. Expression pedal* 2. Control voltage input 3. Normally-open switch 4. Normally-closed switch 5. MIDI 6. MIDI with preset out
Input pad	Analog	1. No pad (0dB) 2. -6dB pad* 3. -12dB pad
Preset system	Multi	1. Scrolling preset system* 2. Bank preset system
Number of presets for scrolling preset system	Mod	As you turn clockwise, the LEDs will illuminate in order to indicate the last preset.
Number of banks for the bank preset system	Filter	As you turn clockwise, the colors will indicate the last bank.
MIDI channel the pedal will respond to (when control port is configured for MIDI).	Ambient	As you turn from left to right the LEDs will illuminate in order to indicate the MIDI channel. (ex. If the 3rd LED is lit, it's going to listen on MIDI channel 3).
Knob Lock - lock the presets so they don't change accidentally on stage.	Delay + Reverb	1. Unlocked* 2. Locked - knobs are locked in presets (not manual preset) so that they don't get nudged by mistake if using presets.

Cabinet Simulator puts a cabinet simulation algorithm on the output, useful if you don't have an amp.	Reverse	1. Cab sim is off* 2. Bright 4x12 cab 3. Dark vintage cab 4. Balanced modern cab
Signal Configuration	Stutter	1. stereo in/stereo out* 2. wet/dry: dry out left, and wet out right. (**mix** controls wet volume, **output** controls dry) ** 3. hardware insert mode**
Startup State	Lo-Fi	1. Startup bypassed* 2. Startup engaged and load preset 1
Stereo Widening	Whisky	1. Regular stereo width* 2. Stereo width 2dB wider 3. Stereo width 4dB wider
Mix Knob Taper	Digital	1. Wetter* 2. Dryer
Looper	Tape	1. Disabled* 2. Enabled
Looper - Effects Routing	Analog	1. Looper pre effect* 2. Looper post effect

*denotes the factory default setting

** left-right routing doesn't work with these configs.

*** In signal configuration wet/dry and hardware insert true bypass isn't available.

FIRMWARE UPDATES

This pedal has firmware that can be updated with an SD card.

Performing A Firmware Update

1) download the firmware file off the website

www.empresseffects.com/echosystem-firmware

2) copy the file to the root directory of the SD card

(a high-capacity SD card that's been formatted FAT32)

3) insert the SD card then power on the pedal.

4) The preset LEDs should marquee yellow for a bit, then all

turn green when the update is complete.

5) remove SD card, cycle the pedal's power, and you're good!

SD Card Constraints

There should only be one partition on the SD card because the pedal only looks at the first partition on the disk. SD card must be V2 high speed. Nowadays this is the most common type.

Firmware Update Error Codes

The preset LEDs will blink to signal an error:

1. unusable card
2. V1 card
3. V2 standard card
4. unable to read disk
5. valid FAT volume not found on SD card.

FACTORY RESET

WARNING! This will overwrite your current presets and advanced config settings and replace them with the factory presets and default advanced config settings!

To restore the Echosystem to its factory settings, do the following: while in the advanced configuration (see *Entering Advanced Configuration*): press and release the stompswitches in this order: **Tap**, **Bypass**, **Tap**, **Bypass**. Then the LEDs do a dance. Now you can exit advanced configuration (see *Exiting Advanced Configuration*).

POWERING THE ECHOSYSTEM

Go to www.empresseffects.com/power for a full list of compatible power supplies.

Please Note: The Echosystem requires at least 300mA of current to function properly. Any power supply rated at 9V DC, supplying negative tip polarity () and at least 300mA of current should work.

THANK YOU

Paul Uhl, Gabriel Tanaka, Patrick Zdunich, Knobs, Matt Cyr, Steve Foley.

LEGAL STUFF

FCC Compliance

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules

SPECIFICATIONS

Input Impedance:	1MΩ
Output Impedance:	100Ω
Output Impedance (transformer):	600Ω
Frequency Response (-3dB, dry):	10Hz – 50kHz
Frequency Response (-3dB, wet):	10Hz – 23.4kHz
Total Harmonic Distortion (dry):	0.09%
Total Harmonic Distortion (wet):	0.22%
Dynamic Range (dry):	106.9 dBA
Dynamic Range (wet):	105.5 dBA
Input Headroom (dry):	+10.0 dBu
Input Headroom (wet, no pad):	+0.5 dBu
Input Headroom (wet, 6dB pad):	+5.7 dBu
Input Headroom (wet, 12dB pad):	+10.8 dBu
Output Headroom:	+16.2dBu
Power Voltage:	9V DC (center negative)
Power Input Connector:	2.1mm Barrel Connector
Required Current:	300mA
Height (enclosure only):	1.75”
Height (including controls):	2.25”
Length:	5.7”
Width:	3.75”
Weight:	1.5lbs

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