



Phaser

Operating Instructions

Check out www.empresseffects.com for instructional videos!



To prevent fire or shock hazard, do not expose unit to rain, swimming pools, or any other moisture.




The unit requires a 9V-18V DC negative tip  power supply which connects on the back side of the unit. The supply must have a current rating of 120mA or greater. The Standard Boss PSA-120 is a popular choice and works well.

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Introduction

The Empress Phaser gives you maximum control in a small, manageable package. We've combined features that enable you, dear musician, to realize your phasing dreams. From a heavily effected 4-pole setting or a milder 2-pole setting, the Empress Phaser can take you there.

You'll recognize the cool tap features from our other pedals. And with the Empress Phaser pedal we've also introduced the universal control port. Now you can control your phaser from a control voltage (CV), an expression pedal, an external audio input, external tap switch, or via MIDI.

The auto modes allow you to shape the effect to your playing, rather than having to limit your playing to the effect.

Under the hood we've included a couple switches which will allow you to change the pedal's configuration. There's a switch to enable a vibrato mode and a switch that adds some pleasing harmonics to the signal if clean and pristine isn't your thing.

To help you get the most out of this pedal we've put some brief instructional videos on our website that cover most aspects of this pedal: www.empresseffects.com.

Thanks for purchasing the Empress Phaser!

Enjoy,

Steve Bragg

Thank You

Ian Chesal for editing this manual.

Ian Chesal, Matt Coburn, Wayne Eagles, James Lang, Jordan Allen, Allan Gauthier and Chris Breitner for beta testing.

The Basics of the Phaser Effect

The phaser effect operates by blending the instrument's input signal with a phase-shifted copy of itself. Doing this filters the audio and causes cancellations at various frequencies depending on the amount of phase shift. As the degree of phase-shift changes, the cancellations and filtering sound shifts up and down the frequency spectrum. This moving filter 'whooshing' through the signal is what our ears hear as the phaser effect.

Quick Start



Set the knobs and switches to match the picture above. If the blue bypass LED is not already lit, press the **bypass** switch to engage the phaser. Twiddle away!

Operating Modes

The phaser has three modes: knob mode, tap mode, and auto mode.

knob mode

The speed of the phaser is set with the **speed** knob and the **speed range** switch. The fastest speed range will give you ring modulator type sounds.

tap mode

The speed is set by tapping in a tempo with the **tap** switch. The speed of the effect will be the tempo tapped multiplied by the ratio set using the **ratio** knob. For example: if you have the **ratio** knob at 1:2, the speed of the phasing effect will be twice as fast as the tempo tapped.

auto mode

In auto mode, effect parameters change based on how you are playing. We've set out an entire section in this manual just to handle this very cool and deep mode. Check it out on page 9. You will also find a handy mode quick reference printed on the front of the pedal.

Controls

You'll notice many knobs serve two functions. The green text on black background apply when the pedal is in auto mode. The black text on green background applies when the pedal is in knob or tap mode.

Knob Mode and Tap Mode Controls

blend – controls the amount of the original signal and the phase-shifted signal that appears at the output. When set completely counter-clockwise all you hear is the original, dry signal; set completely clockwise is an equal amount of the original, dry signal and the wet, phase shifted signal – this is where you'll hear the most prominent signal cancellations.

The **blend** knob can be configured internally to act as a traditional mix knob. Mix mode allows you to obtain a 100% wet signal when you turn the knob all the way counter-

clockwise. For more details see the Mix/Blend section on page 15.

speed/ratio – with the **mode** switch set to tap, this knob sets the multiplication ratio for the tapped in tempo. For example, set at 1:2, the phasing rate will sound twice as fast as the rate tapped.

When the **mode** switch is set to knob, the **ratio/speed** knob sets the speed of the phaser.

width – determines how far the phase shift varies from the center position in tap and knob modes. The higher you set this the more pronounced the phasing effect will be.

waveform – selects the phasing waveform. The available waveforms are:



1. Sine Wave
2. Triangle Wave
3. Asymmetrical Sine Wave
4. Swung Sine Wave
Fast, then slow with the second half the sine period taking twice as long as the first.
5. Saw Wave
6. Reverse Saw Wave
7. Square Wave
8. Super-Crazy-Random
Random steps. Try it with a fast speed setting!

gain – controls the output gain. The point where unity gain is achieved varies and depends on the other settings you have made on the pedal.

mode – sets the operating mode of the pedal. In tap mode the speed of the effect is set by tapping the **tap** switch. In knob mode the speed of the effect is set by the **speed/ratio** knob. The auto mode is described in detail on page 9.

speed range – controls the range of available speeds that can be swept through with the **speed/ratio** knob when the pedal is in knob mode.

stages – selects the number of all-pass poles used in the wet signal. The 2-pole setting sounds the least effected, 4-pole is the setting you'll find in most one-knob phasers, and 3-pole sounds quite different from both.

resonance – selects the amount of feedback applied to the wet signal. Feedback creates a resonance peak in between the valleys in the frequency response when the phase shifted signal is added back with the original signal.

expression – selects what parameter is controlled by any expression pedal or control voltage (CV) device attached to the **control port** on the pedal. More details can be found on page 16.

tap – in **tap** mode this switch is used to set the tempo, or speed, of the phasing effect by repeated tapping.

In **knob** mode this switch restarts the phasing effect at the beginning of the wave form when tapped. When held down in **knob** mode it acts as a brake, gradually reducing the speed of the effect to the minimum value for the selected **speed range**.

Auto Mode Controls

sensitivity – Sets how sensitive envelope follower and trigger detector is to dynamic changes in the audio coming into the pedal. See the Auto mode section on page 9 for a detailed description.

attack - Sets the attack time for the envelope and trigger responses. Please see page 9 for a detailed description.

release – Sets the release time for the envelope and trigger responses. See page 9 for a detailed description.

submode – selects the submode. The submodes are described in detail on page 11.

tap – reverses the action of the phase shifting effect. For example, in a speed-follows-envelope mode, the phasing

effect speeds up as the input signal gets louder. Pressing the **tap** switch in this situation would cause the speed to get slower as the signal got louder.

Controls Common to All Modes

bypass – puts the pedal in true bypass. Bypassing is implemented with a relay, which has conductivity and isolation as good as a traditional mechanical switch, but is more reliable.

input – a high impedance (Hi-Z) instrument input jack.

output – output jack. Sound appears here.

blend exp – allows you to connect an expression pedal to control the blend. When an expression pedal is attached to this jack the **blend** knob setting is ignored. We recommend turning down your amplifier before connecting or disconnecting an expression pedal.

control port – allows you to connect an expression pedal, control voltage device or external audio signal to control an assignable parameter on the pedal. For more information please see page 16.

power – the Empress Phaser requires a 9V DC, 2.1mm, negative tip power supply. Any 9V DC supply that has a current rating of 120 mA or greater will work. The Boss PSA-120 is a popular choice and works well.

Auto Mode

In auto mode, effect parameters change based on how you are playing. The changes follow the envelope of the input signal, increasing or decreasing as the input signal gets louder or quieter or are triggered by sudden changes in the signal volume.

Effect parameters are changed in one of two ways when you use auto mode:

1. **Envelope Follow**
When following an envelope in auto mode, the pedal tracks the input volume and moves a parameter to follow the changes in the volume level. The envelope follow approach is used in submodes 1 through 4.
2. **Trigger Detection**
When detecting a trigger in auto mode, the pedal tracks the signal and when a sudden, rapid increase in volume occurs it changes a parameter from a low value to a high value and then back down to a low value. The kind of actions that would set off a trigger might be an aggressive strum on a guitar or a chord hit on a Rhodes. The trigger detection approach is used in submodes 5 and 6.

The Attack and Release Controls

When using a submode that employs envelope detection, the **attack** switch determines how quickly the pedal reacts to a increase in input signal volume.

For example: with **submode 2** selected and the **attack** set to fast, when a sudden increase in volume occurs the unit will change to a faster speed almost instantly. With the **attack** set to slow it takes much longer for the speed of the effect to increase.

The **release** knob controls how quickly the pedal reacts to a decrease in input signal volume. Set fully counter-clockwise the release time is the fastest, set fully clockwise it is slowest.

A slower release time generally sounds a bit smoother and a faster release time, more abrupt and jarring.

When using a submode that employs trigger detection, the **attack** switch sets the speed at which the pedal moves the parameter from its minimum to maximum values. The **release** knob sets the speed at which the parameter returns back to its starting value.

We recommend you start with the **attack** switch and **release** knob both set to their fastest settings when starting out with auto mode. With these settings it's most apparent what each submode is controlling and how it sounds when you vary your input signal. Once you've got a feel for what's happening in the submode, slow things down to taste.

Setting the expression switch to 'width' will allow you to control the release with an expression pedal.

Sensitivity

The **sensitivity** knob controls how the pedal listens to your input signal when in auto mode. For quieter, softer input signals or quieter passages you should set the sensitivity to a higher value. For louder input signals or passages it should be turned down.

The red LED above the **tap** switch turns on when the pedal detects a trigger threshold in your input signal when it's in a submode that uses trigger detection. If you find that auto mode is missing some of the triggers, increase the sensitivity. If you find that auto mode is triggering when it shouldn't be then decrease the sensitivity.

When the pedal is in a submode that uses envelope detection the red LED above the **tap** switch will light up red when it is detecting maximum volume. Ideally, in envelope based submodes, the LED will only light up when you're playing your absolute loudest. This will ensure you are experiencing the full range of the parameter sweep.

Setting the expression switch to 'speed' will allow you to control the sensitivity with an expression pedal.

The pedal can also track an external audio signal input using the **control port** instead of tracking the signal at the input jack. See page 16 for details.

The Submodes

There are eight submodes available in auto mode.

Submode 1: Phase Shift Follows Envelope

The center of the phase shift changes according to how loud you play. Hitting the **tap** switch inverts the phasing motion for a different tone.

Try the **attack** and **release** set fairly quick, close to fully counter-clockwise, so that it tracks the envelope tightly.

Example Setting- the funk:



Submode 2: LFO On Envelope

The speed and the center of the phasing effect are both increased as the input signal grows louder. The **tap** switch reverses the changes as the signal grows louder.

Example Setting- milder setting for clean playing:



Submode 3: Speed Follows Envelope, Sine Waveform

As the instrument signal gets louder the speed of the phasing effect increases. The waveform selected for this mode is a sine wave with a width of 50%. Press the **tap**

switch to change the operation and have speed slow down as the instrument volume increases.

Try the attack and release set fast so envelope tracking is very tight. The sensitivity controls the fastest speed that will be reached when the signal is loudest.

Example Setting- musical slow down with chord decays:



Submode 4: Speed Follows Envelope, Random Waveform

Similar to submode 3 but using a random step waveform. The louder the input signal the more frequently a new speed value is chosen at random for the effect. Hitting the tap switch reverses the action so that a louder signal causes the waveform to slow down.

Example Setting- crazy insanity:



Submode 5: Follow Trigger

A peak in the volume of the input signal will trigger the effect to shift from maximum phasing to minimum phasing. Hitting the **tap** switch inverts the phasing motion for a different tone.

Try adjusting the sensitivity knob so the trigger light above the **tap** switch only turns red when your input volume peaks. The attack and release settings can have a huge impact on the sound of this mode so play around with them. For special effects try high depth and resonance settings.

Example Setting- funky pick attacks:



Submode 6: Trigger Random Level Mode

When a trigger is detected the amount of phase is shifted to a new, random amount. This mode sounds close to a random waveform but the changes can be controlled and triggered by how loud you make your instrument input. In this mode the release knob determines how quickly it shifts from the current random level to the next. The attack knob has no effect.






Example Setting- smooth shift with each note played:



Submode 7: Rhythm Mode

Cycle through preset rhythm patterns by turning the **ratio knob**, each ratio represents a different pattern. You change the speed of the rhythm pattern by hitting the tap stomp switch. There are five different rhythms available for you to explore. Like submode 6, the release knob determines how quickly it shifts from the current random level to the next random level in the rhythm.

(The rhythms are listed on the next page.)

Position on ratio knob	Time Signature	Rhythm
1:1	3/4	
2:3	2/4	
1:2	5/4	
1:3	6/8	
1:4	4/4	

Example Setting-



Submode 8: Direct Control Mode

Without an expression pedal plugged in to the control port, this mode operates like submode 5, audio sweep, except that it triggers only when you hit the tap stomp switch. Hold down the tap stomp switch and the sweep will keep rising to its maximum value. Releasing the tap stomp switch will cause it to return to the starting value.

With an expression pedal plugged in to the **control** port on the pedal this submode lets you control the degree of phase shift with the expression pedal. (The speed knob, width knob, and expression switch are ignored in this mode).

Explore the mix and the poles setting to find your desired state of controlled phasing bliss.

Example Setting- slow decay shift down with every tap stomp hit:



Mix/Blend and Vibrato Configuration

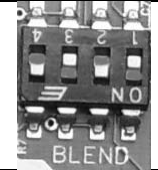
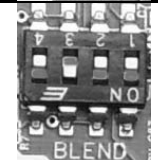
The Empress Phaser allows the **blend** knob to be configured as a **blend** knob or a **mix** knob.

It ships configured as a **blend** knob. In this configuration there is a constant amount of dry signal. As you turn the **blend** knob clockwise more wet signal is added.

In ‘mix knob’ mode, with the knob turned 100% clockwise, you hear only phased signal. When the knob is in this position there is no dry signal being added to the wet signal so you’ll get a **vibrato** type effect – it becomes more pronounced as you increase the width and speed of the effect. To get a regular phaser sound when the pedal is in the mix configuration set the knob to the 12:00 position – this adds the dry and wet signal at equal volumes giving you maximum phase cancellation.

Changing the Mix/Blend Configuration

To change the mix/blend configuration open up the pedal and locate the DIP switches label ‘BLEND’ as pictured below:

Configuration	DIP2	DIP3	DIP4	
Blend (default)	ON	OFF	ON	
Mix	OFF	ON	OFF	

Harmonic Enhancement Circuit

The Empress Phaser is clean and pristine sounding by design. In some instances, with certain styles of music and performance, a dirtier sounding phaser may be desired. To accomplish this we've included a circuit which adds subtle, yet pleasing, even harmonics to the wet signal. You can engage and disengage this circuit by flipping a DIP switch inside the pedal.

Engaging the Harmonic Enhancement Circuit

Engaging the circuit can be done by opening up your phaser and locating the 'BLEND' dip array. Switching DIP1 on or off turns the harmonic enhancement circuit on and off accordingly.

Universal Control Port


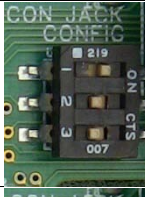
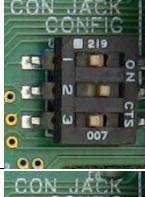




With the Empress Phaser pedal we've introduced our new universal control port. It is a single ¼" jack which can accept:

- An expression pedal
- A CV (control voltage) signal
- An external tap switch
- An external audio input (used by the auto modes)
- MIDI

Configuring the Control Port

The control port configuration is set using the dip-switch array inside the unit. Power off the unit and remove the back plate of the pedal by removing the 4 bottom screws. Beside the processor you'll see a set of 3 dip-switches you can toggle labeled CON JACK CONFIG . On power-up the configuration will be changed to the new setting.

Here's a table of the dip settings for the various configurations:

MODE	DIP1	DIP2	DIP3	
Expression	OFF	OFF	OFF	
Control Voltage	ON	OFF	OFF	
External Tap - Latching	OFF	ON	OFF	
External Tap – Momentary (normally open)	OFF	OFF	ON	
External Tap – Momentary (normally closed)	ON	ON	OFF	
Audio Input	ON	OFF	ON	
Midi	OFF	ON	ON	

Expression Pedal Configuration

The pedal ships in this configuration. Plug an expression pedal in to the control jack on the right side of the phaser and use the expression switch to select which parameter you'd like to control with the pedal. You can select speed or width when using knob and tap modes. In auto mode the speed and width switch positions will control sensitivity and release, respectively. The expression pedal varies the parameter between zero (or fully counter-clockwise) and the setting on the knob. In other words, **the knob sets the maximum setting.**

The phaser will work with most Tip-Ring-Sleeve (TRS) expression pedals. It has been tested with the following pedals:

M-Audio EXP
Moog
Boss FV-500L
Mission Engineering EP-1
Roland EV-5

Any expression pedal used with the Phaser should have:

Tip – signal
Ring – power
Sleeve – ground

Control Voltage Configuration

In this configuration the Empress can have its width and speed parameters with an external control voltage. The Empress works with control voltages which sweep between 0V and 5V.

External Tap Switch Configuration

In this configuration you can plug an external tap switch into the control port to set the tap time. This is useful if you have more than one tap-tempo pedal so that you can set them all with one switch.

The Empress Phaser is able to accept external tap switches which are latching and momentary (both normally open and normally closed).

Midi Configuration

See the section labeled 'Midi Control' on page 19 for a complete explanation of this configuration.

External Audio Configuration

In this configuration you can plug an audio signal into the control port to override the normal input. The auto modes will use the external audio signal to detect triggers or generate the envelope rather than the signal at the input. Try connecting a drum machine to this input.

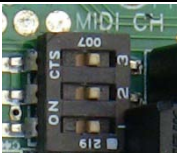
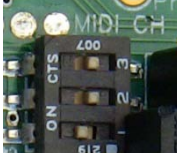
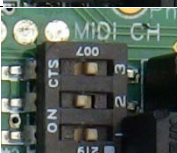
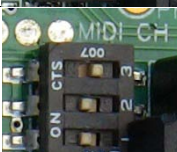
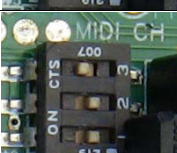
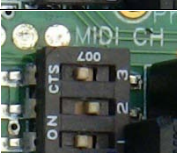
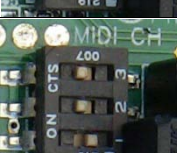
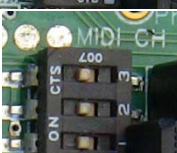
In some cases plugging in an external audio source may create a ground loop. If you hear a hum introduced in the output signal when an external audio signal is plugged in you should lift the ground of the incoming signal.

Midi Control

The Empress Phaser allows all of its digital parameters to be controlled via midi control change messages and to have its tempo changed with midi clock messages. To use midi with your Empress Phaser you'll have to:

- 1- Attach the Empress Midibox using a ¼" patch cable to the control port. This is a simple device which converts the signal on a standard midi cable to a quarter-inch cable you can plug into your phasers control port. (not included with the phaser)
- 2- Configure the pedal for midi control by setting the internal dip switches to the midi mode. This was explained in the control port section on page 17.
- 3- Configure the unit's midi channel by switching dip switches inside the back of the unit. Open the unit by removing the four screws on the bottom and remove the lid. Next to the output jack you'll see a set of 3 DIP switches labeled 'MIDI CH'. You'll use these to select the midi channel. Select a channel that won't conflict with the other devices in your midi rig.

Midi Channel Dip Configuration

Channel	DIP1	DIP2	DIP3	
1	OFF	OFF	OFF	
2	ON	OFF	OFF	
3	OFF	ON	OFF	
4	ON	ON	OFF	
5	OFF	OFF	ON	
6	ON	OFF	ON	
7	OFF	ON	ON	
8	ON	ON	ON	

Control Change Messages

The Empress Phaser is controlled with midi control change messages. Almost all midi controllers or digital audio workstation software will be able to output these messages. Refer to your product's documentation for help on how to do this. Below is a table that shows which midi control change channel controls each phaser parameter:

Phaser Parameter	CC #:	Note:
Speed/Ratio/Sensitivity	20	Sending a value 0 would be equivalent to the knob completely counter clock-wise, sending 127 is equivalent to fully clock-wise.
Width/Release	21	
Waveform/AutoMode	22	Sending a value 1 will set it to waveform/auto-mode 1; sending 2 waveform/auto-mode 2, etc.
Mode	23	Sending 1 will set it to tap mode, 2 knob mode, and 3 auto mode.
Speed Range/Attack	24	Sending 1 will set it to slow, 2 medium, 3 fast.
Tap Switch	35	Sending a value of 127 simulates the switch being pressed. Sending a value of zero simulates releasing the switch.
Bypass Switch	36	
Direct Control	40	<p>Sending this message overrides all other digital settings (speed, width, waveform, mode) and lets you set the amount of phase shift directly with midi values. Sending a value of zero would correspond to minimum phase shift and 127 the maximum.</p> <p>This mode would allow you to draw your own waveforms in a digital audio workstation and send them to the phaser.</p>

Exit Direct Control	50	Sending this message with any value will cause the pedal to exit direct control
Midi Clock Listener	51	Sending a value of 0 causes the pedal to ignore Midi Clock messages. Sending a value of 127 causes the pedal to listen for Midi Clock messages. By default, the pedal listens for Midi Clock messages.

Midi Clock (aka Midi Beat Clock)

The Empress Phaser will respond to Midi Clock messages when it is in tap and normal mode. Midi Clock specifies quarter notes, subdivided into 24 Midi Messages. Each quarter note corresponds to 1 period of the phaser's waveform.

Warning: Changing the speed/ratio knob when midi clock is being sent will confuse the phaser. It will momentarily switch to the knob setting, and then switch back to the midi clock setting causing general chaos.

User Setting Templates

Diagram illustrating five identical User Setting Templates, each labeled "Preset:" at the top. Each template contains five control knobs with various settings and labels:

- mode:** tap/knob/auto
- speed range:** slow/med/fast
- stages:** 2/4/3
- resonance:** little/none/lots
- expression:** speed/none/width

The knobs are labeled as follows:

- blend:** Knob with 8 positions (1-8).
- speed/ratio:** Knob with 4 positions (1:1, 1:2, 1:3, 1:4). Below it is a "sensitivity" label.
- width:** Knob with 3 positions (2, 4, 3).
- waveform:** Knob with 8 positions (1-8). Below it is a "submode" label.
- gain:** Knob with 8 positions (1-8).

Each template also features a "Preset:" label at the top and navigation arrows at the bottom.

Specifications

Input Impedance: 1Mohms.

Output Impedance: <510 ohms.

Frequency Response (-3dB): 35Hz – 17kHz.

Distortion (All dry-signal): <0.03%.

Headroom : Max input voltage before clipping 11 volts peak-to-peak.

Noise (SNR+THD) (4-pole, Full Mix): -104.1dB

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