

# FEBER

FEBER explores the intersection of single sideband modulation, ring modulation, phasing and tremolo. The bell-like, inharmonic timbre associated with ring modulation is due to linear frequency shifting. When ring modulation is applied to a signal it's frequency content is shifted linearly into an upper and lower sideband. While ring modulation makes an upper *and* lower sideband, single sideband modulation/linear pitch shifting yields either the upper *or* lower. Our human perception favors logarithmic pitch intervals for melodic harmony. Combine 400 and 800 Hz and you have a perfect octave interval. Introduce a 100 Hz linear frequency shift and the octave interval is turned into a 500 - 900 Hz inharmony. Fun, destructive stuff. FEBER also has a mellow side offering various flavors of phasing/filtering effect.

FEBER combines a ring modulator pair, a Hilbert transform approximation, feedback and a random value sample/hold generator into a feature rich tool for exploring amplitude- and phase-based modulation at both high and low frequencies. The pedal utilizes the Spin FV1 signal processor.

*For tidiness the effect will mainly be referred to as ring modulation in the context of this manual.*

## PARAMETERS

**HI/SUB:** Sets the frequency range of the ring modulation. HI gives 20 to 1600 Hz. The unlabeled middle position gives 0.3 to 30 Hz. SUB gives 0 to 5 Hz. At 0 Hz the modulation waveform is frozen in it's track.

**FREQ:** Sets the ring modulation frequency when the sample/hold function is inactive.

**BAND:** Sets the sideband balance for single sideband modulation (SSB). At noon the pedal produces standard ring modulation (both sidebands). Turning the knob ccw or cw isolates either the lower or upper sideband. FEBER uses a Hilbert transform approximation to achieve these effects. For low frequency modulation sideband isolation can be used to produce different flavors of phasing movement. Experiment together with the FEED parameter.

**FEED:** Sets the amount of feedback across the modulator and the low pass filter. Self-oscillation is possible at high feedback settings so be careful. For high frequency modulation feedback alters the voice of the effect, producing a more loaded, wet sounding timbre. For low frequency modulation feedback will pronounce phasing effects. Experiment together with the BAND parameter.

**MIX:** Sets the dry/wet balance from 100% dry to 100% processed audio. For low frequency modulation mixing dry and processed audio will create phasing effects reminiscent of a harmonic tremolo. This is due to the Hilbert transform necessary for the sideband separation function.

**VOL:** Sets the master volume for the pedal. Unity gain is at 12 o'clock. Max gain is +16dB.

**TONE:** Sets the cutoff frequency of a second order low pass filter from 500 to 15k Hz. The filter affects only the processed audio.

**Left footswitch:** This footswitch activates/bypass the sample/hold function. Holding the switch longer than 500 ms will only momentarily activate/bypass the function.

**RATE:** Sets the rate of the sample/hold function from 0 to 20 Hz. This function skips between random ring modulator frequency settings. If RATE is set to minimum (0Hz) the associated footswitch will skip to a new, stable random frequency setting every time the sample/hold function is activated.

**DEPTH:** Sets the depth of the sample/hold function. At min the ring modulator frequency is completely dictated by the **FREQ** knob. At max the ring modulator frequency is completely random given that the sample/hold function is active.

**INT/STEP:** Chose between stepped or interpolated sample/hold. **STEP** instantaneously jumps between the sample/hold values while **INT** will continuously glide from one value to the next.

**Right Footswitch:** This is your bypass switch. Holding the switch longer than 500 ms will only momentarily change its status.

**CTRL socket:** Connect an expression pedal or a control voltage source (0 to 3.3V) to control the **FREQ** parameter. The function is protected against voltages 12V beyond the intended operating range (-12 to 15.3V). Connecting to the **CTRL** socket renders the **FREQ** knob inactive. For stable operation the socket should be connected before powering the pedal.

*Design note:*

*The parameters **MIX**, **FEED**, **BAND** and **TONE** may feel related when exploring phasing effects. **MIX** combines the dry, shift-free signal with the wet signal that has been passed through both the Hilbert transform and the low pass filter; **FEED** regenerates the transform, the ring modulators and the low pass filter; **BAND** alters the product of the transform itself and **TONE** obviously alters the low pass filter. Thus all four parameters in their own way modifies parameters related to signal phase.*

## INTERNAL PARAMETERS

There are two internal miniature switches. **Z/100** reduces the input impedance to 10kOhm. **-9dB** adds a -9dB input pad (damping). These may be useful when running line level signals through the pedal. Note that this will change the unity position of the volume knob. There are two internal trimpots. The one labeled **FEEDBACK** adjusts the maximum amount of available feedback. The unlabeled trimpot is associated with the expression input and should not be adjusted (nothing interesting will happen if you do).

## TECHNICAL SPECIFICATIONS

|                  |   |
|------------------|---|
| Input Impedance  | 1M $\Omega$   |
| Output Impedance | <1k $\Omega$  |
| Voltage          | 9 VDC center negative (normal BOSS/Ibanez/1Spot power supply)<br>Does not support battery operation |
| Current Draw     | 100 mA  |
| Dimensions       | 125 x 95 x 57 mm  |
| Weight           | 450 g   |