

# INSTRUCTION MANUAL



# ***XERXES***

**8 VOICE POLYPHONIC ANALOG SYNTHESIZER  
BY BLACK CORPORATION**

**BLACK  
CORPORATION**

## TABLE OF CONTENTS

|                                      |    |
|--------------------------------------|----|
| INTRODUCTION.....                    | 2  |
| FEATURES AND SPECIFICATIONS.....     | 2  |
| FRONT PANEL.....                     | 3  |
| OSCILLATOR 1 AND 2 .....             | 4  |
| MULTIMODE FILTER.....                | 6  |
| LFO .....                            | 7  |
| TUNING .....                         | 9  |
| DRIFT .....                          | 10 |
| OSC 2 SYNC.....                      | 11 |
| NOISE .....                          | 12 |
| EG CONTROLS .....                    | 12 |
| PORTAMENTO / GLIDE.....              | 13 |
| CHORUS EFFECTS .....                 | 13 |
| DYNAMICS.....                        | 14 |
| AMPLIFIER ENVELOPE.....              | 15 |
| FILTER ENVELOPE.....                 | 16 |
| VOLUME.....                          | 16 |
| SYSTEM MEMORY AND CONTROL PANEL..... | 17 |
| SELECTING BANKS.....                 | 17 |
| RECALLING PATCHES.....               | 17 |
| SAVING PATCHES .....                 | 18 |
| SETTINGS MENU.....                   | 18 |
| REAR PANEL .....                     | 20 |
| TROUBLESHOOTING.....                 | 21 |
| LIMITED WARRANTY .....               | 21 |

## INTRODUCTION

The XERXES is an 8-voice polyphonic synthesizer with two hybrid digitally controlled analog oscillators (Hybrid DCOs) per voice. Its analog voice architecture is modeled after an Italian polyphonic synthesizer from the 1980s, made famous by Jean Michel Jarre, Stevie Wonder, Tangerine Dream, Nick Rhodes, and many other artists. While Xerxes can potentially produce similar sounds, its sonic palette and capabilities have been significantly improved. It has additional modulation options such as oscillator sync with variable phase control, pulse amplitude cross modulation (PAM), two independent LFOs with added waveforms, greatly extended fundamental frequency range, and it is compatible with polyphonic aftertouch (pAT) and MIDI polyphonic expression (MPE) controllers. Xerxes has 16 stable digitally-controlled analog oscillators that can be independently and precisely controlled, and they always stay in tune and never need to be tuned or calibrated.

Xerxes synthesizer comes in a convenient 4U 19" rack-mount format. Factory pre-built models can also be converted into a table-top format with removable rack ears and an optional stand.

## FEATURES AND SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Polyphony:                       | 8 voices  |
| Voice Layers:                    | 1 (monotimbral)   |
| Fundamental Frequency Range:     | 0.1Hz to 20kHz  |
| Oscillators:                     | 16 (2 per voice)  |
| Oscillator Type:                 | Hybrid digitally controlled analog oscillators (Hybrid DCOs)                            |
| Oscillator Waveforms:            | Triangle, Saw, Square, Pulse with additional modulations                                |
| Oscillator Controls:             | Octave (1'-16'), Transpose, Pulse Width, Volume   |
| Oscillator Modulations:          | Pulse Width (PWM), Pulse Amplitude (PAM), Digital Ring Mod                              |
| Low Frequency Oscillators (LFO): | 2 with Frequency synchronization  |
| LFO Waveforms:                   | Sine, Triangle, Saw, Ramp, Square, Random   |
| LFO Destinations:                | Osc 1/2 pitch, Filter, Amplifier, Pulse Width 1/2, Osc 2 Sync Phase                     |
| LFO Controls:                    | Frequency (independent or synced), Depth, Delay, Aftertouch                             |
| Filter:                          | 1 multi-mode filter per voice   |
| Filter Options:                  | 24db/oct Low Pass, 6db/oct Band Pass, 12db/oct Band Pass, 12db/oct High Pass selections |
| Filter Modulations:              | LFO 1 and 2, Velocity, Aftertouch, Envelope, Keyboard tracking                          |
| Preset Memory:                   | 1320 Total – 128 in Factory Bank, 40 in Vintage Bank, 9 User Banks of 128 Patches each  |
| Keyboard Touch Response:         | Velocity, Aftertouch (Channel and Polyphonic), MPE                                      |
| Connections:                     | MIDI IN/OUT/THRU, AUDIO L+R, USB (isolated), Headphones                                 |
| Power:                           | +12VDC, 2.5A  |
| Dimensions:                      | 440 W, 180 H, 70 D (mm)   |
| Weight:                          | xx kg   |

## FRONT PANEL

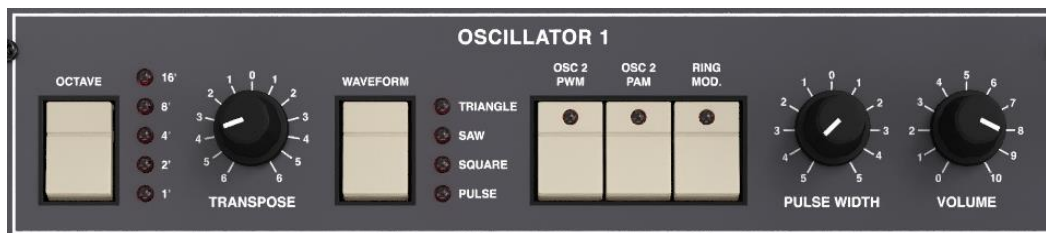
Xerxes synthesizer is designed for maximum ease-of-use. Most of the functionality can be easily controlled in real time using the buttons and knobs on the front panel. On some buttons, the current selection is indicated with a row of lights next to the button. Others serve multiple functions as indicated by a combination of lights on that button. Pressing the same button multiple times will cycle thru the available combinations. The functionality for each control is described in the following sections.




The panel controls are grouped together into logical sections:

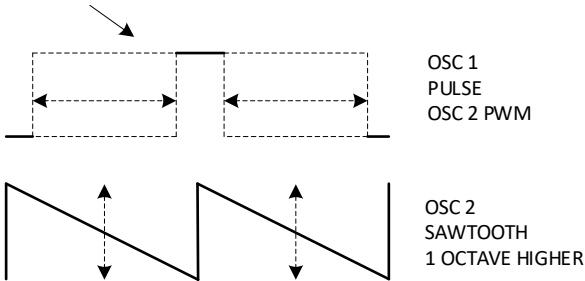
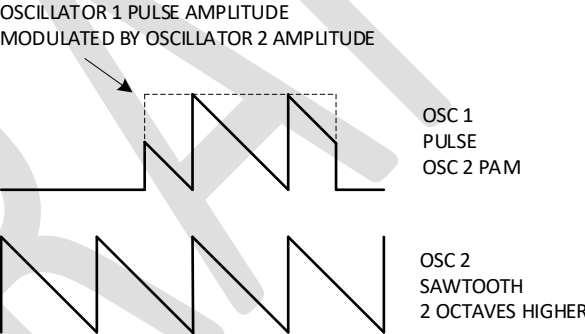
- **LFO:** Controls the Low Frequency Oscillator, which is used to slowly change various parameters in the oscillator and filter circuits. There are two independent LFOs selected by the A/B switch, and their frequencies can be either independent or synchronized with the Sync button.
- **TUNING:** Adjusts tuning of the entire instrument and allows oscillator 2 to be detuned separately.
- **DRIFT:** Introduces very small changes to individual oscillator frequencies over time.
- **OSC 2 SYNC:** Synchronizes oscillator 2 to oscillator 1, with separate phase control.
- **NOISE:** Allows white or pink noise to be added to the oscillators before the filter circuit.
- **OSCILLATOR 1 and 2:** Selects the frequencies, waveforms, modulations, and volume for oscillators.
- **MULTIMODE FILTER:** Selects the type of filter, controls its frequency, resonance, and modulation.
- **EG CONTROLS:** Enables/disables note hold and release envelope functions.
- **PORTAMENTO / GLIDE:** Controls note pitch movement at the beginning or from note to note.
- **CHORUS EFFECTS:** Selects 3 different types of chorus effects that are applied to the audio output.
- **DYNAMICS:** Controls how note velocity and aftertouch affects the volume and filter settings.
- **AMPLIFIER ENVELOPE:** Controls attack, decay, sustain, and release parameters for volume envelope.
- **FILTER ENVELOPE:** Controls attack, decay, sustain, and release parameters for filter envelope.
- **OLED DISPLAY:** Allows access to patch memory, settings, and additional parameters.
- **VOLUME:** This section contains the master volume control, headphones output, and a power switch.

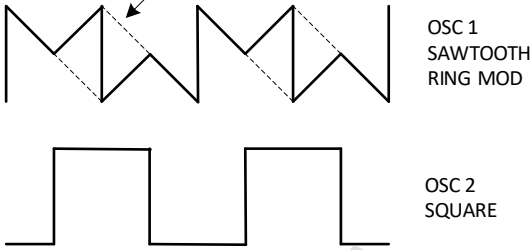
**OSCILLATOR 1 AND 2**



Oscillators are electronic circuits that generate the audio waveforms for the synthesizer. Xerxes contains a total of 16 digitally controlled analog oscillators, two of which are used for each note. These two oscillators can have different waveform shapes, and they can also be combined in various ways through cross modulation, providing a large number of possible waveforms. Certain modulation combinations can also cause self-resonance, when additional high resonant frequencies are generated within a single waveform cycle via electronic feedback in the circuit. Oscillator self-resonance, created purely in analog hardware, is one of the unique features responsible for the special sound of this instrument.

|   |  |
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| OCTAVE  | Selects the octave in feet (16', 8', 4', 2', 1'), which transposes the keyboard up or down in octaves. The smaller the number the higher the pitch on the keyboard.  |
| TRANSPOSE   | Transposes the oscillator pitch from -7 (down) to +7 (up) in semitone steps, allowing for quick interval changes between the oscillators. A setting of 0 is neutral and does not transpose the pitch.  |
| <p data-bbox="181 1108 384 1138">WAVEFORM</p>  | <p data-bbox="397 1108 1422 1176">Selects the oscillator waveform. Each waveform has a different timbre, which depends on the harmonic content in the waveform:</p> <ul data-bbox="397 1182 1422 1537" style="list-style-type: none"> <li>• <b>Triangle</b> wave contains very few odd harmonics, containing a very pure sound with few overtones.</li> <li>• <b>Sawtooth</b> wave contains all the integer harmonics (both even and odd), making it useful for producing tones that are very rich in overtones.</li> <li>• <b>Square</b> wave only contains odd harmonics. It can produce flute-like sounds with certain oscillator frequency combinations.</li> <li>• <b>Pulse</b> wave contains harmonics that are dependent on the selected pulse width. Pulse width can be controlled with the Pulse Width knob, and it can also change at audio rates when Pulse Width Modulation (PWM) is enabled. Pulse amplitude can vary at audio rates when Pulse Amplitude Modulation (PAM) is enabled.</li> </ul> |
| OSC x PWM   | Selects Pulse Width Cross-Modulation, where the pulse width of the current oscillator is modulated by the waveform amplitude of the other oscillator. If this button is pressed, Pulse waveform is automatically selected. PWM can produce very rapid change in overtones that depends on the frequency and waveform settings on the other oscillator. In this modulation setting the pulse width can still be adjusted using the Pulse Width knob. LFO can also automatically vary the pulse width when selected.   |

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|                  | <p style="text-align: center;">OSCILLATOR 1 PULSE WIDTH<br/>MODULATED BY OSCILLATOR 2 AMPLITUDE</p>  <p style="text-align: right;">OSC 1<br/>PULSE<br/>OSC 2 PWM</p> <p style="text-align: right;">OSC 2<br/>SAWTOOTH<br/>1 OCTAVE HIGHER</p>   |
| <p>OSC x PAM</p> | <p>Pulse Amplitude Modulation (PAM) is a unique feature to the Xerxes synthesizer. The pulse amplitude (height) of the current oscillator is modulated by the waveform amplitude of the other oscillator. If this button is pressed, Pulse waveform is automatically selected. PAM can “clean up” a waveform, making it more defined at the upper frequency ranges, and giving it more pronounced low frequency content at lower ranges depending on the frequency and waveform settings on the other oscillator. In this modulation setting the pulse width can still be adjusted using the Pulse Width knob, and PWM can also be used at the same time to produce very rich textures of sound.</p> <p style="text-align: center;">OSCILLATOR 1 PULSE AMPLITUDE<br/>MODULATED BY OSCILLATOR 2 AMPLITUDE</p>  <p style="text-align: right;">OSC 1<br/>PULSE<br/>OSC 2 PAM</p> <p style="text-align: right;">OSC 2<br/>SAWTOOTH<br/>2 OCTAVES HIGHER</p> <p><b>NOTE:</b> Turning on PAM for both oscillators at the same time is not recommended. It will generally produce silence from both oscillators, or if there is any sound, the volume from each voice card may not be consistent. There may be sound present on lower frequency range only where it can produce some interesting sound effects.</p> |
| <p>RING MOD.</p> | <p>Selects Ring Modulation, which inverts the waveform of the current oscillator with the amplitude of the other oscillator. This is especially useful when used in combination with the Oscillator 2 Sync and Glide functions where it can generate sounds with harsh overtones that vary over time, such as metallic, laser, and bell-like sounds.</p>  |

|                    |  |
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|                    | <p>OSCILLATOR 1 WAVEFORM<br/>RING MODULATED BY OSCILLATOR 2 AMPLITUDE</p>  <p>OSC 1<br/>SAWTOOTH<br/>RING MOD</p> <p>OSC 2<br/>SQUARE</p> <p><b>NOTE:</b> Turning on Ring Mod for both oscillators at the same time, or when combined with PWM or PAM settings, can produce harsh distortion-like noise that may not track the keyboard very well from note to note. Use the Pulse Width knobs to fine tune the resulting sound in this case and test each note before using.</p>  |
| <p>PULSE WIDTH</p> | <p>Adjusts the pulse width from 0% to 100% of the currently selected Pulse waveform only. It has no function for other waveforms. At 50% the waveform is a square wave with only odd harmonics, with more harmonic content being added towards the extremes. Pulse width can be controlled automatically at audio rates from the other oscillator by either the Pulse Width Cross-Modulation (PWM) setting, or with the Low Frequency Oscillator (LFO) which can be used to change the timbre slowly over time.</p> <p><b>NOTE:</b> When PWM is not active, there is no sound at either extreme of the knob setting, at 0% and 100%.</p> |
| <p>VOLUME</p>      | <p>Adjusts the output volume of the oscillator before it's mixed with the other oscillator and sent to the filter circuit. It's recommended that the volume is used in the middle setting (4-6) unless the patch itself has lower than normal volume. Using it at the maximum 10 setting may produce distortion at the output on some modulation settings, especially when using chords.</p>   |

**MULTIMODE FILTER**



The filter controls the harmonic content of the raw audio output from the oscillators by changing the frequency ranges of the audio signal. The filter contains four modes that define which frequency bands

are being controlled. Additionally, the note envelope and keyboard tracking can be changed dynamically based on velocity and keyboard position.

|              |   |
|--------------|---|
| FREQUENCY    | Adjusts the filter cutoff point across the frequency spectrum. The lower the knob setting, the lower the cutoff point.  |
| RESONANCE    | Resonance amplifies a narrow range of frequencies at the filter cutoff point. When increasing the resonance knob, it intensifies the effect up to about 7, at which point the filter starts oscillating independently with a feedback frequency that is not related to the oscillator output. This can produce sound effects when used with a frequency envelope.   |
| FILTER TYPES | <ul style="list-style-type: none"> <li>• <b>Lowpass:</b> Allows lower frequencies to pass below the filter cutoff point. Frequencies above the filter cutoff point are being blocked at a rate of 24db/octave.</li> <li>• <b>Bandpass 1:</b> When left LED is on, only a narrow band of frequencies close to the filter cutoff point are passing the filter. Frequencies above and below the cutoff are attenuated at a rate of 6dB/octave.</li> <li>• <b>Bandpass 2:</b> When right LED is on, only a narrow band of frequencies close to the filter cutoff point are passing the filter. Frequencies above and below the cutoff are attenuated at a rate of 12dB/octave. BP2 filter band is narrower than BP1.</li> <li>• <b>High Pass:</b> Allows higher frequencies to pass above the filter cutoff point. Frequencies below the filter cutoff point are being blocked at a rate of 12db/octave.</li> </ul> |
| ENVELOPE     | Envelope knob adjusts the amount a filter envelope will modify the filter cutoff point at the beginning of each note. Turning the envelope clockwise from 0 causes the filter envelope to increase the filter cutoff point, resulting in a brighter attack. Turning it counter-clockwise from 0 has the opposite effect. The filter envelope decreases the filter cutoff point, resulting in a more muted attack at the beginning of the note. It is best to modify the Envelope Amount together with the filter cutoff point to find the best balance for a desired effect.  |
| KEYBOARD     | Keyboard knob allows the filter cutoff to track the note's pitch played on the keyboard. When it is turned clockwise from 0, higher pitches have a higher cutoff frequency, and lower pitches have lower cutoff. This results in higher notes on the keyboard having a brighter timbre than lower notes. When it is turned counter-clockwise from 0, the filter cutoff tracks the keyboard position in reverse – lower notes on the keyboard will have brighter timbre than higher notes.   |

## LFO

Low Frequency Oscillator is used to change various parameters such as pitch, filter, amplifier, pulse width, and oscillator 2 sync phase with adjustable speed, intensity, and delay. There are two independent LFOs selected by the A/B switch, and their frequencies can be either independent or



synchronized with the Sync button. Aftertouch can also have 3 levels of how strongly it affects the LFO Depth.



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| FREQUENCY | Adjusts the speed for the selected LFO A or B from about 0.02Hz to 40Hz. When SYNC is selected, frequency adjusts both A and B LFO at the same time.   |
| SYNC      | When enabled, the frequency for both A and B LFO is the same, and the Frequency knob will affect both at the same time regardless if LFO A or B is selected.   |
| DEPTH     | Adjusts the intensity (amplitude) of the waveform for a selected LFO A or B. Depth control remains independent for each LFO even if SYNC is enabled. Depth can also be modulated by Aftertouch Amount setting.   |
| DELAY     | Adjusts the delay for the LFO effect, during which the LFO depth is gradually increased to each note up to the depth set by the DEPTH knob. When Delay is 0, the modulation is applied immediately. When Delay is 10, there is an 8-second delay, after which the LFO depth is slowly increased over a 30 second interval. If Delay is higher than 1, the first note also restarts the LFO wave; from 0-1 the wave is not restarted. When used with Saw or Ramp LFO waveforms, a short delay will cause a quick ramp-up to the |

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|                   | maximum depth value, which sounds like an attack envelope being applied, or glide if the LFO destination is an oscillator.  |
| WAVEFORM          | <p>Selects a waveform for the selected LFO A or B:</p> <ul style="list-style-type: none"> <li>• SINE: Sinusoidal waveform</li> <li>• TRIANGLE: Wave ramps up and down</li> <li>• SAW: Wave ramps down and resets to high level</li> <li>• RAMP: Wave ramps up and resets to low level</li> <li>• SQUARE: Oscillates between two levels only</li> <li>• RND.: Oscillates between random levels</li> </ul>  |
| A/B               | Selects which LFO, A or B, is currently selected for the panel controls. All controls and switches are independent for each LFO, except for Frequency control if the SYNC button is enabled. Both LFOs can be active at the same time, modulating the same destinations.  |
| OSC 1/2           | Selects which oscillator pitch the selected LFO modulates. You can select none, 1, 2, or both oscillators. Depth is applied polyphonically and affects each note independently when being controlled with polyphonic aftertouch.  |
| VCF/VCA           | Selects whether the selected LFO modulates the Filter (VCF) or Amplifier (VCA, Volume) for the voice. You can select none, VCF, VCA, or both. This effect is polyphonic and applies to each note independently with polyphonic aftertouch.  |
| PW 1/2            | Selects which oscillator's pulse width the selected LFO modulates. Pulse Waveform must be turned on for the oscillator for this to have any effect. You can select none, 1, 2, or both oscillators.   |
| PHASE             | Selects whether the selected LFO modulates the oscillator 2 sync phase. Phase control must be enabled in OSC 2 SYNC section for this to have any effect.  |
| AFTERTOUCH AMOUNT | Keyboard aftertouch (either channel or polyphonic) can be used to control the Depth of the currently selected LFO A or B. There are 3 levels of control (left LED, right LED, and both on), and an OFF setting when both LEDs are off. A setting of 1 will increase the Depth control by about 5% from the Depth knob's current position to the knob's maximum with a full range of aftertouch data. A setting of 2 increases Depth by about 25% of the maximum, and a setting of 3 by about 50% of the maximum. If the Depth knob is already at maximum then aftertouch will have no additional effect. When polyphonic aftertouch is enabled, this effect is polyphonic when applied to the oscillator's pitch, VCF, or VCA. If PW 1/2 or Phase is selected, the note with the largest received polyphonic aftertouch data value will control the effect. |

## TUNING

Tuning section is used to control the master tuning for the entire instrument.



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| <p>MASTER</p> | <p>Adjusts the global tuning for the entire instrument with a continuous range of 2 semitones up or down, with 0 setting representing a perfectly tuned instrument where A4 = 440Hz thanks to its digitally controlled oscillators. Master tune is not memorized in any saved patch memory; it always reflects the current panel knob setting. If the instrument is out of tune with the 0 setting, ensure that the knobs are calibrated to their center positions (see later in Calibration section).</p>  |
| <p>DETUNE</p> | <p>Adjusts the pitch of oscillator 2 apart from oscillator 1 with a continuous range of 1 semitone up or down. When Detune is 0, both oscillators maintain the same frequency multiple indefinitely. Since the oscillators are always free-running (unless oscillator 2 is turned on), this can result in different voice cards having the oscillator frequencies locked at different phases that do not change, which will make each voice sound consistently different. To remedy that, turn the Detune button ever so slightly to make the oscillators slightly beating, or use the Drift functionality described below.</p> |

**DRIFT**

This feature is unique to the Xerxes synthesizer. While the Xerxes synthesizer is using analog oscillators, they are controlled digitally and never drift or go out of tune, and they will maintain the same tuning all the time. While this is certainly an advantage when producing sharp or metallic sounds, it can also be a disadvantage as the tone can sound too static with some patches, and using the LFO can sound too regular. The controls in the Drift section can be used to simulate pure analog oscillators by introducing tiny amounts of random but continuous pitch changes independently to each oscillator. This functions like a separate, random LFO for each oscillator slightly affecting the note’s pitch randomly like a vintage voltage controlled analog oscillator. Note that both Speed and Density must be higher than 0 to have any effect.



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| <p>SPEED</p> | <p>Adjusts how fast the frequency changes are being applied to each note as the note is held down. There is no correction with 0 setting. At 10, the random changes become more audible and are applied more often at 2 times per second.</p> |
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| DENSITY | Adjusts how far apart each individual note is being detuned, in cents. With a setting of 0 there is no detune and the note frequencies are extremely precise. With a setting of 10 the notes are being detuned to a random value from 0 up to 20 cents maximum with a regularity selected with the Speed knob. |
|---------|--|

### OSC 2 SYNC

The controls in this section can be used to precisely synchronize oscillator 2 with oscillator 1. When enabled, oscillator 2 waveform will restart at a precise time when oscillator 1 waveform is restarting. Variable phase control is a unique feature to the Xerxes synthesizer. It allows adjusting the phase of the oscillator 2 waveform against oscillator 1 by introducing a delay to the oscillator 2 phase starting point with respect to oscillator 1. Phase control is most effective if both oscillators are using the same octave settings; if the octaves are further apart it will have a smaller effect. When the LFO is set modulate the phase, it can be used to produce small pitch changes to oscillator 2 without changing the actual pitch of the oscillator.



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| <p>SYNC ON</p> <p>PHASE</p> | <p>When set to ON (left LED), oscillator 2 is precisely synchronized with oscillator 1, at 0 degrees phase difference. Oscillator 2 waveform always restarts every time oscillator 1 waveform is restarting, regardless of what waveform or modulation is selected.</p> <p>When set to PHASE (left and right LEDs on), oscillator 2 is synchronized with oscillator 1, but the synchronization phase can be adjusted using the DEGREES knob. This can also be modulated by the LFO Phase destination. This can produce very rich sound textures, especially when combined with other LFO modulation settings.</p> <p>When Sync is OFF, oscillator 2 is always free-running with respect to oscillator 1.</p>   |
| DEGREES                     | <p>When PHASE is enabled, the Degrees knob adjusts the oscillator 2 synchronization to a specific phase in oscillator 1 waveform over a range from 0 degrees to almost 360 degrees. If both oscillators are using the same frequency, a mid-point in the knob represents the oscillator frequencies 180 degrees out of phase.</p> <p><b>NOTE:</b> When the knob is set close to minimum 0, or maximum 360 degrees, the oscillator will lose the synchronization lock until the knob is turned back slightly. This is also more pronounced in upper keyboard ranges, so test the entire keyboard range when designing sounds. This feature can be used to produce interesting sound textures when an LFO is set to control the phase, as oscillator 2 will sync and lose sync</p> |

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|  | periodically with the LFO frequency, making it sound like a delay or trill effect. |
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**NOISE**

Noise can be added and mixed with the oscillator outputs before they are mixed and routed into the filter section. Two types of noise are available with a level control.



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| WHITE/PINK | Selects the type of noise. White noise is contains a full spectrum from lowest to highest audible frequencies. Pink noise is filtered slightly with a low pass filter and does not sound as “bright.” Noise is turned off when no LEDs are lit. |
| LEVEL      | Adjusts the level of noise being routed into the filter.  |

**EG CONTROLS**

This section allows the user to override the note envelope generator stages. It is used to hold a note or turn on/off the release tail of the note.



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| HOLD    | Selecting this will cause all notes to be held indefinitely with envelopes at the sustain level until the Hold button is turned off. This can be used to hold the notes in memory and then play with the panel controls using both hands.   |
| RELEASE | Enables the release envelope to function normally when selected. If this button is turned off, release section of the note’s envelope does not function and the sound is turned off immediately when a note is released regardless of the Release knob setting in the Amplifier Envelope section. |

## PORTAMENTO / GLIDE

This section assigns glide, portamento, and glissando functionality to one or both oscillators.



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| OSC 1/2              | Selects the oscillator(s) that will be affected by Glide, Portamento, or Glissando. You can select OFF, Oscillator 1, Oscillator 2, or both 1 and 2.   |
| GLIDE                | Selects the Glide effect. When enabled, each note starts the pitch higher or lower, smoothly reaching the actual note pitch. The position and speed of the glide is controlled by Speed and Glide Amount knobs.  |
| PORT<br>(left LED)   | Selects the Portamento effect. When enabled, the oscillator pitch moves smoothly from note to note.  |
| GLISS<br>(right LED) | Selects the Glissando effect. When enabled, the oscillator pitch moves from note to note in discrete semitone steps.   |
| SPEED                | Controls the rate for the Glide, Portamento, or Glissando effect.<br><br><b>NOTE:</b> In Performance Legato mode (Mono mode), this controls the slowest rate when notes are played with minimum velocity in legato. When played with maximum velocity, the speed is instantaneous.   |
| GLIDE AMOUNT         | Selects the interval where the pitch starts the glide from. The range is -32 to +31 semitones. Turning the knob counterclockwise starts the glide from below the note, clockwise starts from above. If the knob is set to center (0) there is no glide effect as the note starts with the actual pitch. This knob has no effect on Portamento or Glissando, which start the pitch from the last played note. |

## CHORUS EFFECTS

The Xerxes synthesizer has a stereo analog Bucket Brigade Device (BBD) chorus circuit built-in with 3 different fixed chorus settings. When enabled, this effect is added to the sound before the final output. A single button controls all 3 settings, plus an OFF setting when both LEDs are off. The stereo effect is accomplished with 3 analog BBD delay lines, with two lines routed independently to L and R channels.



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| No LEDs lit  | No chorus effect is active. Sound is unchanged from the filter section.   |
| Left LED on  | Chorus effect 1: Two slightly delayed sounds are added to the original sound, one with a smaller amplitude, adding a slight interference, producing a slow Leslie effect. |
| Right LED on | Chorus effect 2: Two slightly delayed sounds are added to the original sound, creating a large acoustic space feeling. This sounds more “wet” than effect 1.              |
| Both LEDs on | Chorus effect 3: Two slightly different delayed sounds with differently varying frequency are added to the original sound, creating a string ensemble effect.             |

**DYNAMICS**

Dynamics knobs adjust the effect of note velocity and aftertouch on the oscillator volume and filter settings. If the synthesizer is in polyphonic aftertouch or MPE mode, all of these effects are applied polyphonically, affecting both oscillator volume and filter for individual notes. If channel aftertouch is used, the effect is being applied to all notes simultaneously. All knobs are bipolar, meaning that the effect can be either positive or negative depending on the knob’s direction from the center point.

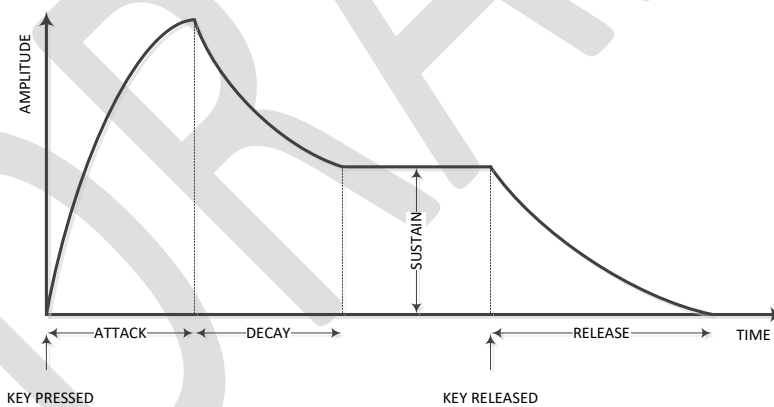


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| VELOCITY<br>FILTER    | Adjusts how note velocity affects the filter envelope. Turning the knob clockwise from 0 will produce a positive effect; when note is struck faster it causes the filter envelope to have a sharper, brighter tone than slower notes. Turning the knob counterclockwise from 0 will have the opposite effect; notes pressed slower cause the filter envelope to have a sharper, brighter tone than notes pressed faster.  |
| VELOCITY<br>AMPLIFIER | Adjusts how note velocity affects oscillator volume. Turning the knob clockwise from 0 causes a note struck faster to make it louder and slower notes softer. Turning it counterclockwise from 0 will have the opposite effect.<br><br><u>NOTE:</u> The default volume level that applies to MIDI velocity data=64 is set in Voice > VCA LEVEL in settings menu. If this is set to 100%, volume will not increase if MIDI |

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|-----------------------|---|
|                       | velocity data of higher than 64 is received. For velocity to have any effect on volume, reduce the VCA LEVEL to less than 100%.   |
| AFTERTOUCHE FILTER    | Adjusts how aftertouch data affects filter cutoff. Turning the knob clockwise from 0 will produce a positive effect; when note is pressed harder it causes the filter cutoff to have increase, making the note brighter. Turning the knob counterclockwise from 0 will have the opposite effect; notes pressed harder cause the filter cutoff to decrease, making the note more muted.  |
| AFTERTOUCHE AMPLIFIER | Adjusts how aftertouch data affects oscillator volume. Turning the knob clockwise from 0 causes a note pressed harder to make it louder. Turning it counterclockwise from 0 will have the opposite effect.<br><br><u>NOTE:</u> The default volume level that applies to minimum MIDI aftertouch data is set in VOICE > VCA LEVEL in settings menu. If this is set to 100%, volume will not increase further with aftertouch. For aftertouch to have any effect on volume, reduce the VCA LEVEL to less than 100%. |

### AMPLIFIER ENVELOPE

Amplifier Envelope knobs adjust the amplitude and timing of individual sections of the volume curve from the moment each note is played.



|        |  |
|--------|--|
| ATTACK | Adjusts the time it takes for the note's volume to reach a full level after a note is struck. A setting of 10 takes about 7 seconds. |
|--------|--|



|         |  |
|---------|--|
| DECAY   | Adjusts the time it takes for the note's volume to drop from maximum level to a level set by the sustain knob. A setting of 10 takes about 23 seconds.   |
| SUSTAIN | Adjusts the level to which the note's decay stops if the key is being held or the Hold button is ON in the EG Controls section. Clockwise rotation of the knob increases the level from 0 to 100% of full level.   |
| RELEASE | Adjusts the time it takes for the note's volume to drop from sustain level to zero after a note is released. A setting of 10 takes about 10 seconds. This knob is active only if the Hold button is OFF and the Release button is ON in the EG Controls section. |

## FILTER ENVELOPE

Similar to the Amplifier Envelope section, the Filter Envelope knobs adjust the filter cutoff and timing of individual sections of the filter cutoff curve from the moment each note is played.



|         |   |
|---------|---|
| ATTACK  | Adjusts the time it takes for the note's filter cutoff frequency to reach maximum after a note is struck. A setting of 10 takes about 7 seconds.  |
| DECAY   | Adjusts the time it takes for the note's filter cutoff frequency to drop from maximum to a setting set by the sustain knob. A setting of 10 takes about 23 seconds.   |
| SUSTAIN | Adjusts the filter cutoff frequency to which the note's decay stops if the key is being held or the Hold button is ON in the EG Controls section. Clockwise rotation of the knob increases the filter cutoff frequency from 0 to 100% to a level set by the Frequency knob in the Multimode Filter section. |
| RELEASE | Adjusts the time it takes for the note's filter cutoff frequency to drop from sustain level to minimum after a note is released. A setting of 10 takes about 10 seconds. This knob is active only if the Hold button is OFF and the Release button is ON in the EG Controls section.                        |

## VOLUME

The Volume section contains Master volume control, headphones jack, and a power switch. Master volume control is not memorized in any saved patch memory; it always reflects the current panel knob setting.



## SYSTEM MEMORY AND CONTROL PANEL

All Xerxes functions can be memorized and recalled. This section allows patch saving and recall, system settings changes, setup and calibration functions. The Enter, Back, and Shift buttons together with the scroll knob allow for easy navigation. Depending on function, the display will show the current functionality for each button as applicable.



## PANEL MODE

The Panel Mode produces sound based on all the currently selected panel knob and switch positions. This is indicated with **PNL** on the display. To toggle Panel Mode on or off, press the encoder button.

## SELECTING BANKS

Xerxes has 11 built-in memory banks, 10 with 128 patch locations, and a special Vintage Bank with 40 patch locations. To select a new bank, press and hold Shift, then press the Enter key (shows **BANK** on the display button image). With each press, you can cycle between banks. The selected bank is shown on the display directly above the patch number. Only the user banks 1-9 are editable.

- **FCTR** – Factory bank, patches numbered 1-128
- **VNT** – Vintage bank containing Elka Synthex original factory sounds, numbered 10-49
- **BNKx** – User banks 1 to 9, each holding patches numbered 1-128

NOTE: The Factory bank and Vintage bank are read-only and cannot be modified.

## RECALLING PATCHES

To select a patch in the selected bank, turn the scroll knob clockwise or counterclockwise. The selected patch number is shown in the display.

To select a certain patch without scrolling thru all patches, press the Back button (shows **LOAD** on the display button image), use the scroll wheel to select the patch, then press the Back button again.

**SAVING PATCHES**

To save the current sound to the currently selected patch number, press the Enter button TWICE.

To save the current sound to a different location within the same bank, press the Enter button ONCE, use the scroll wheel to select the target patch number, then press the Enter button again. Note that it will permanently overwrite any previously saved sound in that location.

To save the current sound to a different location in a different bank, press the Enter button ONCE, press and hold Shift and press Enter to select a different bank, use the scroll wheel to select a target patch number, then press the Enter button again. Note that it will permanently overwrite any previously saved sound in that location.

**SETTINGS MENU**

Xerxes synthesizer contains internal settings which are accessible via the settings menu. These contain MIDI settings, additional settings for voices that are not available on the panel, system setup and calibration functions, and system reset and firmware upgrade functionality.

To enter the Settings, press and hold Shift button and press the Back button (shows STNG on the display button image). Use the scroll wheel to select an item in the list, press the Enter button as required to enter a new setting, and press the Back button to navigate out from the menu tree.

**MENU STRUCTURE:**

|   |   |
|---|---|
| <ul style="list-style-type: none"> <li>▪ MIDI             <ul style="list-style-type: none"> <li>○ MODE                 <ul style="list-style-type: none"> <li>▪ CHANNEL PRESSURE</li> <li>▪ POLY AFTERTOUCH</li> <li>▪ MPE</li> </ul> </li> <li>○ CHANNEL (All, 1-16)</li> <li>○ CC RECEIVE (ON/OFF)</li> <li>○ CC74 REPLACE                 <ul style="list-style-type: none"> <li>▪ NONE</li> <li>▪ LFO FREQ</li> <li>▪ LFO DEPTH</li> <li>▪ OSC2 SYNC</li> <li>▪ VCF FREQ</li> <li>▪ VCF RESO</li> </ul> </li> <li>○ KNOBS                 <ul style="list-style-type: none"> <li>▪ PICK UP</li> <li>▪ MERGE</li> <li>▪ IMMEDIATE</li> </ul> </li> <li>○ MODWHEEL DESTINATION*                 <ul style="list-style-type: none"> <li>▪ LFO1 SPEED</li> <li>▪ LFO1 DEPTH</li> <li>▪ LFO2 SPEED</li> <li>▪ LFO2 DEPTH</li> </ul> </li> </ul> </li> </ul> | <p>Selects the type of keyboard controller used</p> <p>Selects MIDI Channel</p> <p>Enables/Disables incoming MIDI CC messages</p> <p>Lets MIDI CC #74 modulate the selected parameter</p> <p>Selects how knobs will react when turning</p> <p>Knob value must reach saved value first</p> <p>Knob value gradually reaches saved value</p> <p>Knob responds immediately from saved value</p> <p>Selects the parameter controlled by incoming modulation wheel data (MIDI CC#1)</p> |
|---|---|

|   |  |
|---|--|
| <ul style="list-style-type: none"> <li>▪ FILTER FREQ</li> <li>▪ FILTER RESO</li> <li>▪ PULSE WIDTH 1</li> <li>▪ PULSE WIDTH 2</li> <li>▪ OCTAVE 1</li> <li>▪ OCTAVE 2</li> <li>▪ SYNC PHASE</li> <li>▪ GLIDE SPEED</li> <li>▪ AMPL+FILTER</li> <li>▪ NONE</li> <li>○ MODWHEEL POLARITY*             <ul style="list-style-type: none"> <li>▪ POSITIVE</li> <li>▪ NEGATIVE</li> </ul> </li> <li>○ PITCHBEND RANGE* (1-99 semitones)</li> <li>○ KBRD TRCKNG CENTER (MIDI Note 48-72)</li> <li>○ TRANSPOSE (-24 to +24 semitones)</li> <li>○ VELOCITY CURVE*             <ul style="list-style-type: none"> <li>▪ LINEAR</li> <li>▪ LOGARITHMIC</li> <li>▪ EXPONENTIAL</li> <li>▪ S TYPE</li> <li>▪ N TYPE</li> </ul> </li> </ul>  | <p>Selects the polarity for modwheel data</p> <p>Selects the semitone range for MIDI pitch bend</p> <p>Sets center key for filter keyboard tracking</p> <p>Global transpose of all incoming MIDI notes</p> <p>Selects the velocity curve for incoming MIDI velocity data</p>   |
| <ul style="list-style-type: none"> <li>▪ VOICE             <ul style="list-style-type: none"> <li>○ MODE*                 <ul style="list-style-type: none"> <li>▪ MONOPHONIC</li> <li>▪ POLYPHONIC</li> <li>▪ UNISON</li> </ul> </li> <li>○ CARDS PER VOICE* (1, 2, 4)</li> <li>○ NUMBER OF VOICES (1 to 8)</li> <li>○ VCA LEVEL* (10-100%)</li> <li>○ FILTER VELOCITY*                 <ul style="list-style-type: none"> <li>▪ FREQUENCY</li> <li>▪ ENVELOPE</li> </ul> </li> <li>○ PLAYBACK (Polyphonic mode only)                 <ul style="list-style-type: none"> <li>▪ SUSTAIN I</li> <li>▪ SUSTAIN II</li> <li>▪ SUSTAIN III</li> </ul> </li> <li>○ MONO MODE*                 <ul style="list-style-type: none"> <li>▪ LEGATO</li> <li>▪ STACCATO</li> <li>▪ PERF LEGATO</li> </ul> </li> <li>○ LEGATO SETTINGS*                 <ul style="list-style-type: none"> <li>▪ EG RETRIG (ON/OFF)</li> <li>▪ NOTE PRIORITY (NO/LOW/HIGH)</li> </ul> </li> </ul> </li> </ul> | <p>Only one note plays at any one time</p> <p>Multiple notes (chords) can be played</p> <p>All voices play in unison with every note</p> <p>1=two oscillators per voice, 8 voice polyphony</p> <p>2=four oscillators per voice, 4 voice polyphony</p> <p>4=eight oscillators per voice, 2 voice polyphony</p> <p>Selects how many voice cards are active</p> <p>Initial voice volume before velocity and aftertouch data is applied to the volume</p> <p>How velocity affects the filter ADSR</p> <p>Velocity affects entire filter envelope</p> <p>Velocity affects only attack/decay portion</p> <p>Sets key assigner mode, affects sustained notes</p> <p>Round-robin key assignment with each note</p> <p>CS-80 style Sus-II mode</p> <p>Synthex style – notes retrigger same voice</p> <p>How note transitions affect the ADSR</p> <p>ADSR does not retrigger on connected notes</p> <p>ADSR always retriggers with every note</p> <p>Same as legato mode but portamento/gliss is based on new note’s velocity if played in legato</p> <p>How system handles legato in mono mode</p> <p>Controls if ADSR retriggers on legato or not</p> <p>Controls which note in a chord sounds in mono</p> |

|   |   |
|---|---|
|   | mode (NO=last note, Low, or High)   |
| <ul style="list-style-type: none"> <li>▪ PRESET VOLUME* (-6 to +6 dB)</li> </ul>  | Adjusts the volume for current patch  |
| <ul style="list-style-type: none"> <li>▪ AMOUNT MODE                             <ul style="list-style-type: none"> <li>○ COMMON</li> <li>○ INDIVIDUAL</li> </ul> </li> </ul>   | LFO Destination Amount mode<br>Amount knob affects all destinations equally<br>Amount knob can be customized for each LFO destination by holding down the destination button while adjusting the Amount knob  |
| <ul style="list-style-type: none"> <li>▪ CALIBRATION                             <ul style="list-style-type: none"> <li>○ KNOBS                                     <ul style="list-style-type: none"> <li>▪ SETS CENTER DETENT</li> <li>▪ SET MAX</li> </ul> </li> <li>○ FILTERS                                     <ul style="list-style-type: none"> <li>▪ TUNE ALL VOICES</li> <li>▪ TUNE VOICE 1-8</li> </ul> </li> <li>○ LED TEST</li> <li>○ MICROTUNING (OFF/ON)</li> <li>○ DEBUG                                     <ul style="list-style-type: none"> <li>▪ PANEL KNOB VALUES</li> </ul> </li> <li>○ TUNING PROGRAM (1-128)</li> </ul> </li> </ul> | Sets the center detents for bipolar knobs only<br>Sets knob maximum for all knobs<br><br>Tunes the filter for all voices<br>Enables filter calibration for selected voice<br>Turns on all LEDs for inspection<br>Enables microtuning functionality<br>Displays the actual knob values as they are read from the front panel<br>Selects uploaded microtuning program |
| <ul style="list-style-type: none"> <li>▪ TIME                             <ul style="list-style-type: none"> <li>○ LFO MAX (1-100 Hz)</li> <li>○ LFO MIN (0.01-0.1 Hz)</li> <li>○ LFO MODE                                     <ul style="list-style-type: none"> <li>▪ MONO</li> <li>▪ POLY</li> </ul> </li> <li>○ GLIDE TIME MAX (1-10 seconds/octave)</li> <li>○ ADSR MULT (1-4x)</li> </ul> </li> </ul>   | Sets maximum LFO frequency (40 Hz default)<br>Sets minimum LFO frequency (0.02 Hz default)<br><br>LFO affects all notes equally at the same time<br>LFO affects all notes independently<br>Maximum glide time for Glide knob (2s default)<br>Lengthens the time of ADSR envelope  |
| <ul style="list-style-type: none"> <li>▪ ABOUT</li> </ul>   | Displays system information   |

\* NOTE: Settings that are saved with each patch are marked with an asterisk (need to review)

## REAR PANEL

Rear panel contains the power, MIDI, and audio connections.



(TODO: Need updated graphic)

POWER: External power supply input, rated 9-24 VDC, 4 Amps

USB: USB connection for additional MIDI connectivity

MIDI IN: MIDI input port

MIDI THRU: MIDI data is passed from IN to THRU port unchanged

MIDI OUT: Midi output port

AUDIO OUT: Left and Right audio line output connections

## TROUBLESHOOTING

ToDo

## LIMITED WARRANTY

ToDo

DRAFT

**BLACK**  
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