

pro-waveTM

User Guide

Version 1.1



By John Bowen

with Brent Garlow



ZARG MUSIC

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Getting Started

Introduction

Hello, and thank you for purchasing Pro-Wave! This synth combines all of the functions of my [Proph@t Plus](#) synthesizer with the most important elements of another Zarg Music product, the Quantum Wave. (In fact, the Pro-Wave can load [Proph@t Plus](#) preset lists directly). It also expands on my original concept for the Prophet 5's PolyMod section, allowing for much greater flexibility in the modulation sources.

I hope you enjoy the additional capabilities provided by Pro-Wave, and that it inspires you in your musical creative process.

John Bowen

John Bowen
SYNTH DESIGN

Installation

To install Pro-Wave:

1. copy the App folder into your Scope main folder (if asked, press 'Yes' to continue)
2. copy the .dev file into the /devices folder in your Scope installation
3. If you are using XTC Mode, put the .dll file in your /vstplugins/Xtc/ folder
4. copy the .pre files into the /presets folder in your Scope installation
5. restart Scope

Pro-Wave Overview



The Zarg Pro-Wave represents a combination of two classic, groundbreaking synthesizers: the Sequential Circuits Prophet 5 and the Waldorf Wave. The Pro-Wave starts with the Zarg Proph@t Plus*—a recreation of the Prophet 5 that is faithful to the original while providing additional functionality such as expanded modulation routing and on-board effects—and adds features from the Zarg Quantum Wave. Wavetable synthesis, a looping wave envelope, and sidechain modulation features from the Quantum Wave bring digital tones and unique modulation possibilities to a classic analog synth.

*Pro-Wave is fully compatible with existing [Proph@t](#) Plus preset lists. Since there are additional parameters not addressed in those presets, you should re-save any [Proph@t](#) Plus presets used as Pro-Wave presets.

Pro-Wave Architecture

Oscillator Section

The Oscillator section—located on the top center of the Main page—contains multiple pages for Oscillators A and B. Each Oscillator can function as one of 4 different types of Oscillator, which can be selected by using the drop-down list in the Oscillator section. Both Oscillators can function as: a CEM Oscillator that is modeled after the original Prophet 5 (with the addition of a triangle waveshape), a WAV Oscillator for playing back samples, an RD slot that can accept any Red Dwarf-compatible modules (see *Expanding Pro-Wave with RD Modules*) and a Wavetable Oscillator derived from Creamware's Waldorf Oscillator, which contain most of the original wavetables from the Waldorf series synthesizers.

OSCILLATOR A



The distinction between OSCILLATOR A and OSCILLATOR B is most obvious when both Oscillators are using CEM Oscillators. In this configuration, Pro-Wave emulates the original Prophet design; OSCILLATOR A frequency is always determined by the keyboard, while OSCILLATOR B can track the keyboard or not (acting instead as a drone Oscillator), or act as a Low Frequency Oscillator (see *OSCILLATOR B for details*).

OSCILLATOR B



As mentioned above, OSCILLATOR B offers key features over those of OSCILLATOR A: 1) OSCILLATOR B can operate as an LFO (see *PMod* section for details), and 2) OSCILLATOR B can be disconnected from keyboard control. OSCILLATOR B also has a fine tune control that allows it to be detuned from OSCILLATOR A continuously over a semitone. This is true for all Oscillator types.

The following controls are available to OSCILLATOR B for all Oscillator types except WAV:

LO FREQ	When enabled, OSCILLATOR B oscillates below audio rate, and can be used as an additional LFO modulation source in the PMod section.
KYBRD	When disabled, OSCILLATOR B frequency is not under control of the keyboard and the Oscillator will drone at the frequency set by its tuning knobs no matter what key is pressed.
MIDI SYNC	When enabled, OSCILLATOR B operates as an LFO that oscillates at a specified time-division of the incoming midi tempo.

CEM Oscillator



The CEM Oscillator is based on the Oscillator found in Revision 3 of the original Prophet, which used Curtis Electro Music (CEM) chips. Oscillators A and B operate as on the original with two exceptions; OSCILLATOR A in Pro-Wave can generate a triangle wave, and OSCILLATOR B, when operating as an LFO, can be synced to MIDI. As with the original, the CEM Oscillator can produce three different waveshapes, individually or in any combination, by simply clicking on the corresponding button.

The CEM Oscillators can be completely disabled to conserve DSP and increase polyphony when using the other Oscillator types. Simply turn off all waveshapes for both OSCILLATOR A and OSCILLATOR B.

The following controls are available for CEM Oscillators:

Course tuning LEDs	There are 5 LEDs that control the course tuning of the Oscillator in one octave increments.
Frequency control	The Frequency knob adjusts the Oscillator's frequency in semitone increments.
Waveshape Selector	The Oscillator can produce sawtooth, triangle and pulse waveforms, individually or in any combination. When multiple waveshapes are selected, the selected waveforms are mixed at full level.
Pulse Width (PW)	The PW knob controls the width of the Pulse waveshape. It has no affect on the other waveshapes. The pulse waveform can be set to a square wave by double-clicking the PW knob.
SYNC	<p>Oscillator sync causes the cycle of the slave Oscillator (OSCILLATOR A) to be restarted whenever the cycle of the master Oscillator (OSCILLATOR B) restarts. The pitch of the slave Oscillator becomes locked to the pitch of the master Oscillator. Changing the pitch (course or fine tuning) of the slave Oscillator will cause a change in the timbre of the Oscillator's output as additional frequency components are added to the signal. Changing the pitch of the master Oscillator will change the pitch of the slave Oscillator.</p> <p>Note: the SYNC function appears only when OSCILLATOR A is hosting the CEM Oscillator.</p>

WAV Oscillator



WAV Oscillators allow the loading and playback of sample files. Formats are Akai .s, AIFF, and .wav. The slots load single, monophonic samples, and the two WAV Oscillators cannot be phase locked, so true stereo phase coherent sample playback is not possible.

Load Sample	clicking this button will bring up a load dialog; sometimes this window is not visible, as it does not come up 'on top' of some SFP windows.
Clear Sample	clicking on this removes the sample file
RKey	Root Key. This sets the base pitch of the sample playback. This is ignored if 'Fixed' is ON
Fixed Tune	When this switch is ON, the root key setting is ignored, and playback is at the originally sampled pitch
Frequency control	In OSCILLATOR A and B, the pitch is adjusted by the root key. In OSCILLATOR B, the Fine knob can be used to fine-tune the Oscillator, i.e., detune the Oscillator from OSCILLATOR A.

RD Slot



The RD Slot Oscillators can accept any Red Dwarf (RD) Oscillator from Zarg Music, or any RD compatible Oscillator from third-party developers, most notably SpaceF. Red Dwarf modules are available for purchase separately. See *Expanding Pro-Wave with RD Modules* for more details.

Wavetable Oscillator

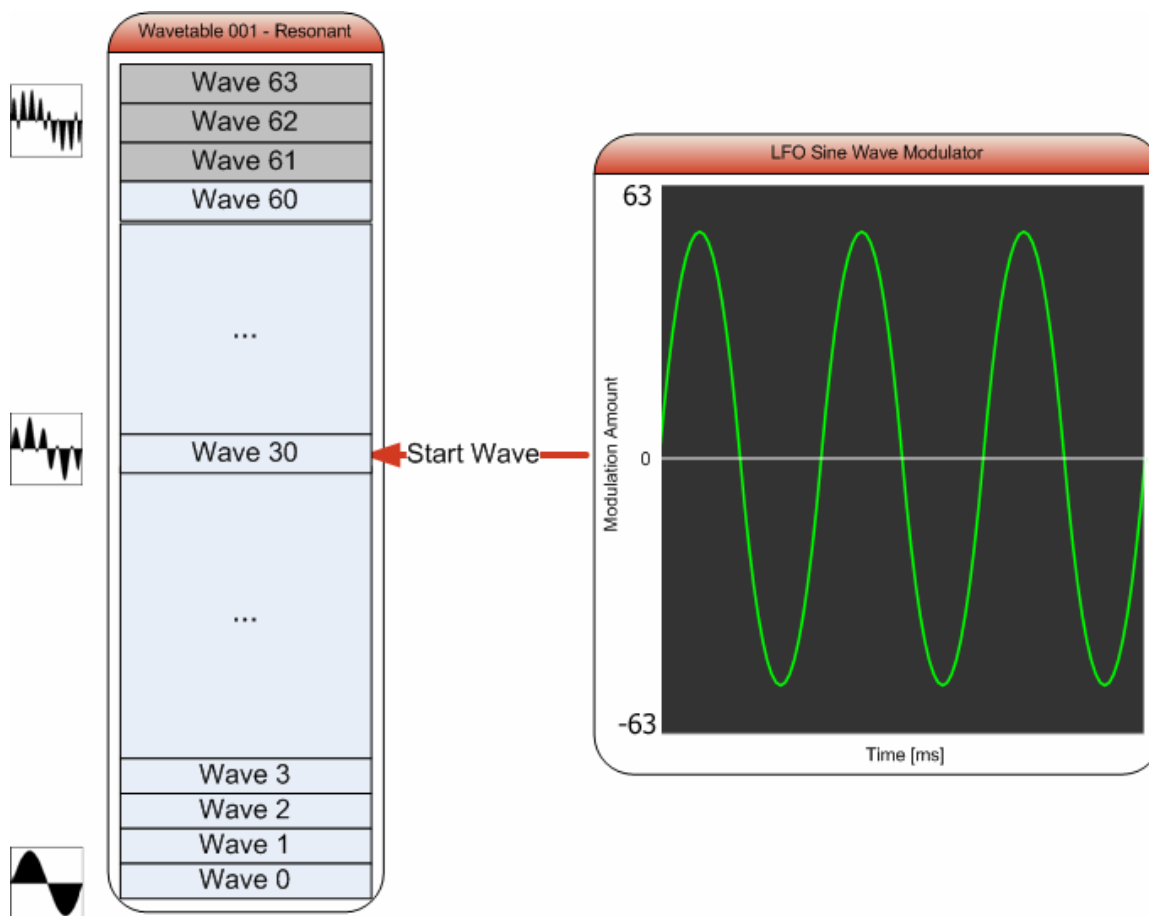


Wavetable Synthesis

Wavetable synthesis was first pioneered by PPG with the PPG Wave synthesizers. The technology was further refined by Waldorf with their Wave series synthesizers. Instead of employing traditional oscillators that generate fairly static waveforms—square, sawtooth, etc.—wavetable synthesizers generate sound by playing back very short samples of waveforms stored in a wavetable. The wave samples themselves are only 1 cycle long, so the synthesizer relies on various techniques for ‘sweeping’ through the waves in a wavetable to achieve a dynamic, evolving sound.

A wavetable consists of 64 slots, in which waves are stored. Figure 1 illustrates how an LFO might be used to modulate a wavetable oscillator. In this case, Wavetable 1 (Resonant) is selected, and the *Wave* is set to 30. As the LFO’s sine wave increases in amplitude, the wavetable oscillator will sweep upward through the wavetable, playing back waves in higher slots, up to $Wave + Mod\ Amt$ (approximately +60 in this case). Whenever $Wave + Modulation$ hits the upper or lower bounds of the wavetable, the oscillator will ‘clip’ and stop sweeping at the last slot. As the sine wave amplitude decreases, the wavetable oscillator will sweep downward through the wavetable. Note that the LFO used in the figure below is bipolar.

Wavetable Synthesis



The controls available for the Wavetable Oscillator are:

Octave LEDs	There are 5 LEDs that control the course tuning of the Oscillator in 1 octave increments.
Course control	The Course knob adjusts the Oscillator's frequency in semitone increments.
Fine control	The Fine knob adjusts the Oscillator's frequency in the range +/- 100 cents.
Wave control	The Wave knob determines which waveform from the selected wavetable will be played. The numeric value indicated below the Wave knob indicates the index into the wavetable's 64 individual waves. When sweeping the wavetable by a modulation source, the Wave knob indicates the position in the wavetable where the sweep will start. Note that the knob is bipolar; so that the wavetable can be swept across all 64 waves in both directions. The most effective use of the wavetable Oscillators is made stepping through the waves in the wavetable by modulating the Wave position via the PMod section with the Looping Envelope.

When using a Wavetable Oscillator in OSCILLATOR B, the Low and No Trk buttons can be used as described in the *Oscillator B* section above. By modulating the wavetable in OSCILLATOR B when it is set in LFO mode, and using OSCILLATOR B as a source in the PMod Section, some very interesting cross-modulated sounds can be created.

Velocity, Release and Master Level Section



This section houses the following controls:

VEL	When activated, the synthesizer responds to velocity messages from the keyboard.
REL	Enables/disables the Release portion of the Amp and Filter Envelopes.
Master Level	Controls the master output level of the synthesizer
Polyphony	The Pro-Wave has the ability to store a polyphony value with each preset. When the gray LED button in this section is Off, the synth will use the polyphony value set in the Live Bar. When enabled, the polyphony selected from the dropdown list sets the polyphony stored with each preset, overriding the value in the Live Bar. A value of '----' will default to the value in the Live Bar.



Preset Polyphony select list

Mixer Section



There are 3 inputs to the Pro-Wave's Mixer: OSCILLATOR A, OSCILLATOR B, and a third which is selectable between White Noise, Pink Noise and External Input. The mixer levels range from 0 to 127. The 3rd input is selectable between White Noise, Pink Noise, and the external input by using the popup menu. The external input signal can be processed through the filter, effects, etc., and used as a modulation signal in the PolyMod section.

Filter Section



Pro-Wave's filter section provides 5 different filter types—all of which are resonant, and have a 24 dB slope—as well as an RD slot and Bypass mode. The filter section also contains a 4-segment ADSR envelope generator. The filter settings available in Pro-Wave are:

Filters

Bypass	When selected, no filtering is performed and the raw signal from the mixer is passed to the AMP stage
CEM LP	An emulation of the CEM Lowpass Filter used in the rev. 3 Prophet 5
Vintage LP	A 24 db Lowpass with no gain compensation
Retro LP	A 24 db Lowpass with gain compensation
Highpass	Passes higher frequencies, filters out lower ones as cutoff is increased
Bandpass	Passes frequencies in a narrow band, filtering out both lows and highs
RD Slot	Accepts any Red Dwarf compatible filter module



For each filter type, the following controls are available:

Cutoff	Sets the frequency at which the filter attenuates harmonics.
Res	Controls the resonance of the filter by emphasizing frequencies near the cutoff frequency.
Env Amount	Determines how much the <i>Filter Envelope</i> affects the filter's cutoff frequency.
KeyTrack	Allows control of the filter's cutoff frequency over the keyboard range,

	in relation to a fixed Key Center. This allows the cutoff frequency to scale in relation to the note played; so that higher notes don't become muddy as the keyboard frequency approaches the cutoff frequency.
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Filter Envelope

The Filter Envelope is a unipolar ADSR envelope that controls the cutoff frequency of the selected filter. The Attack, Decay, Sustain, Release (ADSR) segment times of the Filter Envelope are set by the controls for each segment. It is possible to use the Looping Envelope to control the cutoff frequency of the filter by selecting *Loop Env* as a source in the PMod section and applying it to the filter's cutoff frequency. This allows you to modulate the filter using the 8-stage looping envelope derived from the Waldorf Wave synthesizer.

Note: when used as a modulation source in PMod 1, the Filter Envelope can be inverted by selecting a negative modulation amount.

PMod (Polyphonic Modulation) Section



The PMod section of the Pro-Wave is based on the Polyphonic Modulation section of the original Prophet synthesizer. PMod is essentially a modulation matrix that allows you to define two separate modulation sources and apply them to 5 different destinations in any combination. The PMod section of Pro-Wave borrows another feature from the Quantum Wave, sidechain modulation of the two modulation sources.

PMod 1

PMod 1 provides bipolar level control over the modulation amount applied to the destination(s). By setting the modulation amount to -63, it is possible to fully invert envelopes used as modulation sources. The red LED button enables sidechain modulation. When enabled, the output of PMod2 modulates the amount of PMod1. The amount of modulation is controlled by the PMod knob amounts.

PMod 2

PMod 2 is a unipolar modulation source. The red LED button enables sidechain modulation. When enabled, the output of PMod1 modulates the amount of PMod2. The amount of modulation is controlled by the PMod knob amounts.

Modulation Sources



The PMod section allows you to select any of the following as modulation sources:

Off	No modulation is applied
Filt Env	Applies the contour of the filter envelope to the parameter(s) selected in the corresponding row of modulation destinations
Loop Env	Applies the contour of the 8-stage looping envelope to the modulation destination parameter(s)
Amp Env	Applies the contour of the amplifier envelope to the modulation destination(s)
OSCILLATOR A	Oscillator A modulates the selected destination parameter(s)

OSCILLATOR B	Oscillator B modulates the selected destination parameter(s)
LFO	The LFO modulates the selected destination parameter(s)
Noise/Ext	The selected source (White, Pink, or External Input) modulates the selected destination parameter(s)
Pressure	Keyboard aftertouch (pressure) modulates the selected destination parameter(s)
Velocity	Keyboard velocity modulates the selected destination parameter(s)
Note	Note provides a modulation source that tracks the keyboard.
Mod Whl	The Mod Wheel is used as a direct controller for modulation. If used here, you most likely will want to Disable the Mod Wheel from the LFO.

The amount of modulation is controlled by the PMod 1 and PMod 2 knobs. These controls determine how much modulation will be applied to all selected destinations.

Modulation Destinations



F-A	OSCILLATOR A Frequency
F-B	OSCILLATOR B Frequency
PWA	OSCILLATOR A Pulse Width / OSCILLATOR A Wave
PWB	OSCILLATOR B Pulse Width / OSCILLATOR B Wave
FIL	Filter Cutoff Frequency

There are two rows of modulation destinations. The top row, designated by -----1-----, are affected by the modulation source and amount selected in PMod1. The bottom row, designated by -----2-----, are affected by the modulation source and level selected by PMod2.

Note: when OSCILLATOR A or OSCILLATOR B is hosting a Wavetable oscillator, the PWA and PWB modulation destinations actually target the waveshape of the wavetable oscillator, i.e. the index into the wavetable is modulated.

Amplifier Section



The Amplifier section consists of a standard ADSR envelope,

LFO Section



Pro-Wave includes 10 different types of low frequency oscillator, all of which can be synched to MIDI. The operation frequency of all LFO types—when not synched to MIDI—is 0-150Hz.

Off	The LFO provides no control signal
CEM	The CEM LFO is basically a CEM oscillator operating below audio frequencies. All three CEM wave shapes can be selected individually or in any combination. When more than one waveshape is selected, the active waveshapes are mixed at full level.
Sine	The LFO produces a sine wave
Square	The LFO produces a square wave
Saw Up	The LFO produces a saw up wave
Saw Down	The LFO produces a saw down wave
Triangle	The LFO produces a triangle wave
Random	The LFO produces a 'stepped' random signal
Rnd DC	The LFO produces a slewed random signal
Rnd Tri	The LFO produces a triangle wave at the specified frequency, but with random changes to amplitude
Rnd Sine	The LFO produces a sine wave at the specified frequency, but with random changes in amplitude



With the exception of the CEM LFO, all LFO types have the following controls:

Rate	The frequency of the LFO, from 0-150Hz (when not synched to MIDI).
Hold	The time (0-3 sec) between the time the gate signal is received and the LFO starts to oscillate.
Fade In	The time (0-3 sec) from when the LFO begins to oscillate and the time it reaches full amplitude. The oscillator's amplitude starts at 0 and increases linearly through the time specified by Fade In.
Fade Out	The time (0-3 sec)
Phase	Allows you to set exactly where in the progression of the LFO's

	waveshape the oscillator will start (only functional when Retrigger is on)
Retrigger	When Retrigger is 'On', the LFO will start its modulation from the same point in the waveshape every time a gate signal is received.
MIDI sync	Replaces the Rate control with the BPM control, which has a popup table of note values/divisions. See the MIDI Implementation section for a description of the values.



Note: although the controls for Rate, Hold, Fade In and Fade Out have the maximum values listed in the table above, it is possible to override those maximums by clicking on the display area of the control and typing in the desired value.

Wheel-Mod Section



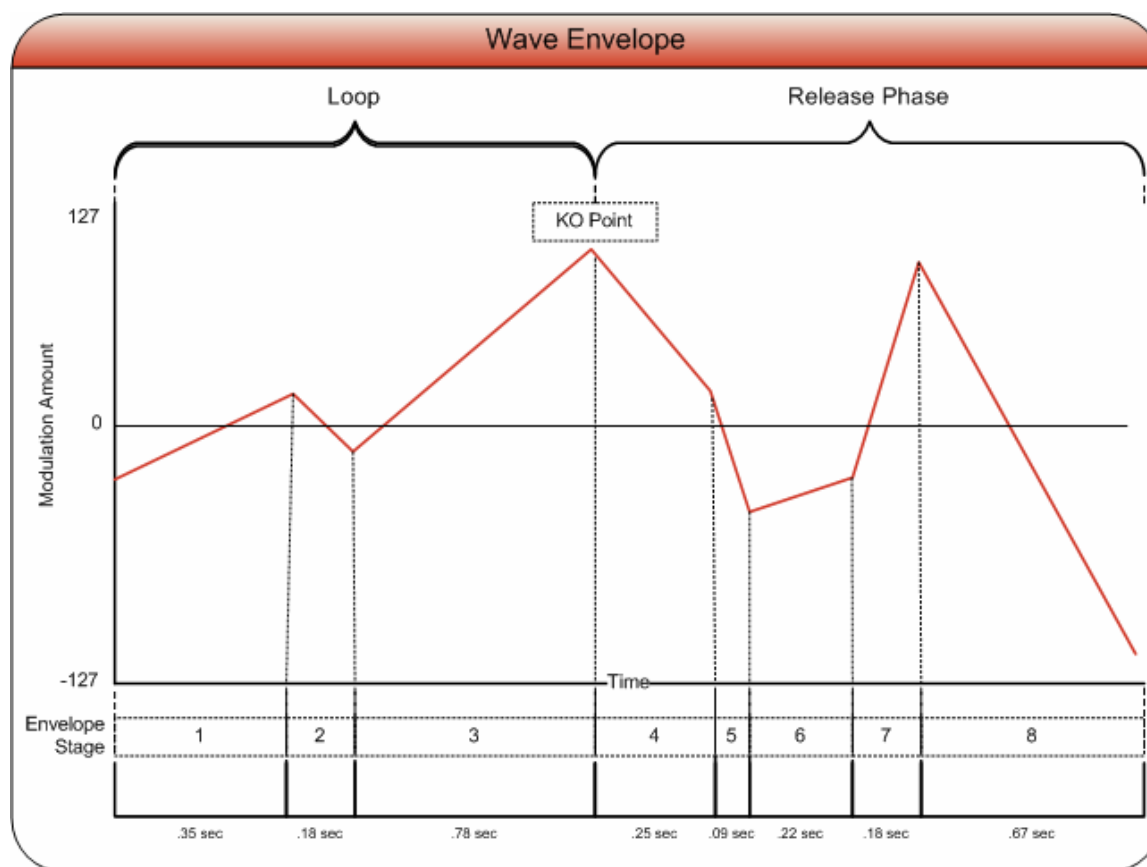
The Pro-Wave provides an additional modulation matrix specifically for use with the modulation wheel, just like the original Prophet 5. This modulation matrix has a single source, which is a mix of the LFO signal and the Pink Noise source. The matrix has the following destinations:

FREQ A	OSCILLATOR A Frequency
FREQ B	OSCILLATOR B Frequency
PW A	OSCILLATOR A Pulse Width / OSCILLATOR A Wave
PW B	OSCILLATOR B Pulse Width / OSCILLATOR B Wave
FILTER	Filter Cutoff Frequency

The LFO/NOISE knob controls the mix between the LFO and pink noise signals. The far left detent gives LFO signal only, the 0 position provides a 50/50 mix of LFO and noise source, and the far right detent gives noise signal only. Note that the range of the knob is actually -63 to +63 to allow easy use with a bipolar MIDI controller. The LFO used by the WHEEL-MOD section is whatever LFO is currently active in the LFO section. All of the LFO's settings are applied, including rate, hold time, etc.

The modulation amount is, naturally, controlled by any modulation wheel signal coming in over MIDI. However, you can also set an **initial** modulation amount using the display below the Mod Wheel (either by clicking in the display and dragging the mouse, or typing in a value directly).

Looping Envelope Section



The Looping Envelope is an 8-stage bipolar envelope with looping capability, based on the wave envelope used in the Zarg Quantum Wave synthesizer. The Looping Envelope is designed specifically to allow for complex, evolving modulation of the wavetables, though it can be selected as a modulation source for any other modulation destination.

Time1 – Time8	These controls determine the length of each of the 8 segments of the envelope. The default range of the time controls is .004 sec – 5 sec, but these values can be overridden by clicking in the field and typing a number. Much longer envelope segment times can be entered in this way.
Level1 – Level8	These controls determine the amount of modulation applied to the modulation destination by each segment of the envelope. Since this is a bipolar envelope, the range of these controls is -/+ 127.
Loop Mode On	This button enables/disables the looping feature of this envelope. When enabled, the envelope will loop between the segments specified by the <i>Loop Start</i> and <i>KO Point</i> controls.
Loop Start	When <i>Loop Mode</i> is enabled, this control determines the starting point of the loop. The envelope will play as normal up until the <i>KO Point</i> , then loop back to the segment indicated by this control. The loop will continue until the key is released, at which point the release phase of the loop is activated, from <i>KO Point</i> through segment 8.
MIDI Timing On	This replaces the Time values with MIDI clock ratios (see MIDI clock division list in the MIDI Implementation section below). The MIDI Clock settings are on the Controls/FX page.
KO Point	This control serves two purposes. When <i>Loop Mode</i> is active, <i>KO Point</i> (Key Off Point) determines the last segment in the loop. <i>KO Point</i> also defines the

beginning of the release stage of the envelope. If *Loop Mode* is off, segments 1 to *KO Point* represent the attack and decay portions of the envelope. The *KO Point* represents the Sustain portion. Segments following the *KO Point* represent the release phase of the envelope. When *Loop Mode* is on, the envelope behaves as described above.



The Looping Envelope has its own preset list that allows envelope presets to be reused among synth presets. The preset list is the same as in the Zarg Quantum Wave, therefore the list is named 'Wave Envelope Preset List', instead of the 'Looping Envelope Preset List' you might expect.



When MIDI Timing is On, you will see the normal parameter displays replaced with these popup lists. Each is the same, allowing you to set a MIDI clock division for each envelope point. Generally it's best to set them all to the same values if you are using Loop Mode On. If you want to have some values shorter than others, then just make sure the total time within the loop is of a length that adds up to a matching length for the loop timing (if that is your intention).

Note: The Looping Envelope has a blue "on/off" LED that allows it to be disabled when not in use to save DSP resources.

Unison Settings Section



The original Prophet 5 had the ability to “stack” all 5 of its voices on a single note, effectively making it a 5 oscillator monophonic synth. Pro-Wave can also layer its voices on a single note in unison mode. Unlike the original, however, you can specify how many of the voices you have allocated to Pro-Wave should be layered. It is possible to create some very fat sounds using this feature. If you select more voices than you have allocated to the synth, the maximum number of voices is set to the number of voices you set in the Live Bar.



The Detune control allows you to detune the layered oscillators relative to each other, increasing the depth of the sound created in unison mode.

The Glide control is not really a function of Unison, as it also can affect polyphonic play, however, the Voice Assign settings (see *Controls&FX* page) can affect the apparent consistency of glide, and using Unison Mode guarantees consistent glide performance. Glide introduces a portamento effect between notes played on the keyboard by delaying the time it takes for the oscillators and filters to track to the next note played.

The Poly Level should be adjusted lower as the number of polyphonic voices increases. So, if you are set to use 1 voice, you can set the Poly Level to 127; if you select 4 voices, you probably want to adjust the level to 70 or so. The idea is to adjust it to the point just before clipping, or to where you feel is good for your system. Since this is a variable unknown by any preset creators, this parameter is not stored in the Preset List.

Pitch and Mod Wheels



The Pitch and Mod Wheel controls on the front panel of Pro-Wave are included to provide a means of automating the movement of these controllers via MIDI. The Mod Wheel is preset to respond to CC1. The displays below each wheel each control different settings; the one below the Pitch Wheel determines the range in semi-tones that the Pitch Bend will function, and the one below the Mod Wheel is an Initial Wheel-Mod amount setting. (Neither react to wheel movement.) Both are stored per preset.

The toggle switch between the pitch and mod text is the Mod Wheel Enable/Disable switch. (As pictured, the switch is in the OFF position.) If you are using the Mod Wheel as a modulation source in the PolyMod section, it's very likely you will not want it to also introduce any LFO modulation, so disabling the Mod Wheel here is recommended in that case.

To the right of the wheels are 3 parameters that are not stored per preset (hence their silver knob tops). The MOD WH SENS is a Sensitivity setting for the Mod Wheel, and adjusts the total maximum range for any incoming MIDI Mod Wheel signal.

Poly Level

The Poly Level is not stored in presets, but should be adjusted depending on the number voices of polyphony you have selected to play. This circuit controls the maximum amount of 'headroom' available for all voices, so to ensure that clipping is kept to a minimum, reduce the Poly Level as the number of voices is increased. (If too high a level is used for the polyphony settings, you will hear a 'distorted' sound, or a sound as if the system is being heavily overdriven.)

Master Tune

The original Prophet 5 also had a master tune control that could be used to tune the synthesizer to another instrument, such as a piano. Pro-Wave's Master Tune control can tune the entire synthesizer +/- 100 cents. This parameter is NOT stored in presets.

Controls & FX Page



Pressure-Mod (Aftertouch)



The Pressure-Mod section provides extensive aftertouch modulation possibilities, inspired by the aftertouch controls of another famous synth, the Prophet T-8. All of the Pressure-Mod modulation amounts are bipolar. The following modulation destinations are provided:

FREQ A	Modulates the frequency of OSCILLATOR A
FREQ B	Modulates the frequency of OSCILLATOR B
PW A	Modulates the pulse width/waveshape of OSCILLATOR A
PW B	Modulates the pulse width/waveshape of OSCILLATOR B
FILTER	Modulates the filter cutoff frequency
AMP	Modulates the amplifier's level
LFO AMT	Affects the amount of modulation applied by the LFO. Extreme negative amounts will reverse the waveshape of the LFO, e.g. converting a saw up into a saw down.
LFO FREQ	Affects the frequency of the LFO
PMOD1 AMT	Affects the amount of modulation applied by PMod 1. A negative amount works the same as the PMod1 Amt, inverting the control signal.
PMOD2 AMT	Affects the amount of modulation applied by PMod 2. A negative amount does nothing unless the front panel PMod 2 Amount is greater than 0 – then using a negative amount will decrease the PMod 2 Amount as aftertouch is applied.

Velocity Sensitivity



The Velocity Sensitivity section allows you to modulate various parameters based on the velocity with which keys are pressed. **NOTE:** The VEL switch *must* be switched ON for this section to function! For convenience there is a VEL switch on the main page as well as this page.

This section is divided into 3 areas:

Loop Env



This section contains controls for Time and Level, both of which are bipolar. The Time control controls how velocity affects the timing of the segments in the Looping Envelope. When set to high positive values, the harder a key is struck, the faster the envelope cycles. With very large negative values, harder key strikes cause the envelope to slow down. The Level control determines how much effect velocity has on the timing of the envelope's segments. With large negative Level values, it is possible to invert the shape of the Looping Envelope.

Envelope Select Button



The push button beneath the ADR controls in the Velocity Sensitivity section is a 3-way toggle that is used to select which envelope generator is the destination for modulation by velocity. Possible values for the button are: AMP (the amplifier envelope), Filter (the filter envelope), and Filt+Amp (both envelopes). Modulation settings made to the ENV RATE and ENV PEAK sections below will affect the selected modulation destination.

Env Rate



The Attack, Decay and Release segments of the selected envelope(s) can be modulated by the velocity of keys pressed by using the corresponding knobs. All three knobs are bipolar.

Env Peak

The FILTER and AMP knobs in the ENV PEAK section control the overall amount of the envelopes' affect on each destination.

Transpose



The Transpose control allows the entire synthesizer to be transposed up or down 36 semitones.

Effects

Unlike the original Prophet 5, the Pro-Wave provides basic onboard effects and the capacity to add up to 6 additional insert effects into the signal path.

Distortion



Pro-Wave's distortion effect provides a hard and soft clipping option and a gain control.

Chorus/Flanger->Delay

Pro-Wave's Chorus/Flanger allows you to choose between a classic chorus and flanger effect (a flanger is basically a chorus with a feedback circuit). The toggle switch determines which effect to use and the red Bypass LED allows you to remove the effect from DSP.



The Chorus effect has the following controls:

Delay	The time (in milliseconds) between the original sound and the first effect sound
Rate	The speed of modulation
Depth	The depth of the chorusing effect
L/R Phase	Controls the phase of each chorus relative to the other. The chorus circuits can be set from minus 90 to 90 degrees out of phase.
Dry	The amount of original, unaffected signal passed to the output
Wet	The amount of effect sound passed to the output

The flanger effect has the following controls:



Delay	The time (in milliseconds) between the original sound and the first effect sound
Rate	The speed of modulation
Depth	The depth of the flanging effect
L/R Phase	Controls the phase of each flanger relative to the other. The flanger can be set from minus 90 to 90 degrees out of phase.
FB	The amount of feedback applied to the flanger
Dry	The amount of original, unaffected signal passed to the output
Wet	The amount of effect sound passed to the output
Cross	When selected, signal from the left flanger circuit is fed back into the right circuit, and vice versa

Delay



The Delay effect in Pro-Wave has two different delay effects, a 'normal' stereo delay and a cross delay. The standard stereo delay consists of two delay circuits (left and right) that have feedback loops into their own inputs. The cross delay switches the feedback circuits into their opposite sides, creating interesting panoramic effects.

The Delay has the following parameters:

Time L	The time (in milliseconds) between the initial input sound and the first delayed output of the left channel
Time R	The time (in milliseconds) between the initial input sound and the first delayed output of the right channel
FB	The amount of feedback
HDamp	The amount of high frequency damping applied. Higher values dampen high frequencies more quickly, more closely approximating the natural decay of high frequencies in a room.
Dry	The amount of original, unaffected signal passed to the output
Wet	The amount of effect sound passed to the output
MIDI SYNC	MIDI Sync allows the delay effect to be synchronized to the MIDI Clock. Clock division selectors replace the millisecond delay times for the right and left channel.

The Cross LED toggles between normal stereo and cross delay modes.

Delay->Chorus/Flanger



This toggle switch determines the order in which the chorus/flanger and delay effects are placed in the signal chain.

Stereo Insert Rack



The Stereo Insert Rack allows up to 6 additional insert effects to be placed in the signal path of Pro-Wave. To use an insert effect, right-click in an empty slot and insert the desired effect. The Wet and Dry knobs determine the wet and dry mix of the effect, and the LED button allows you to remove a slot from DSP. The signal path of the effects rack flows from top down.

MIDI Clock



This control selects between the internal MIDI clock of the synth and an external clock signal, and sets the BPM when using the internal clock. Please refer to the *MIDI Implementation* section below for more details.

Pan

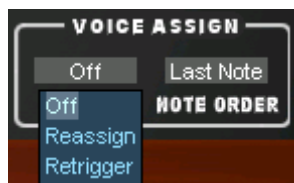


The Pro-Wave's pan controls allow you to set an Initial Pan setting, and modulate it from the default modulation list. Modulation Amount and Initial Pan settings are bi-polar, so that you can invert modulation signals to move the pan position as desired.

Since using the Pan circuit reduces the overall apparent signal level by approximately 6 dB, a BYPASS switch is included to return the Pro-Wave to normal (pre-pan circuit version) levels.

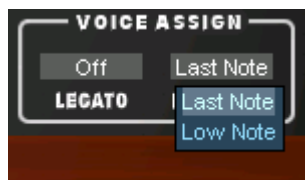
Voice Assign

Legato



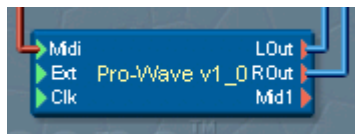
Determines if a voice is retriggered when it is stolen for use in legato mode or not. When Legato mode is Off, only the most recently pressed key will sound. In Legato mode (reassign or retrigger), a key that is held down will resound after another key is played and released. Reassign mode reassigns the voice to the original note, resulting in a legato effect. Retrigger mode retriggers the original note.

Note Order (priority)



Note Order determines which key pressed will have priority, i.e., which note will be sounded. In *Low Note* mode, the lowest note played on the keyboard will sound (for as many notes as there are voices of polyphony). In *Last Note* mode, the most recently pressed keys will have priority. The original Prophet 5 used Last Note priority (and then, only in Unison Mode).

Pro-Wave Connections

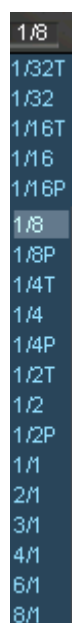


Pro-Wave has a MIDI input, an external (Ext) input that can be used as a modulation source when selected as a noise source—or simply routed through the Pro-Wave's filter section—a clock input (Clk), a stereo output pair, and a MIDI output.

MIDI Implementation

MIDI Clocks are derived from the incoming MIDI signal. Most software sequencers provide a stream of MIDI Clock 'ticks' along with the standard MIDI events. To use an external clock source of a software sequencer, you must first switch the MIDI Clock control in the Global page or Main Sequencer section. The Int Clock switch must be off to use external MIDI clocks.

There are 24 'ticks' per quarter-note. Whenever you see the option to set rate or tempo by MIDI Clock, you will also get a popup list of different timing resolutions.



Divisions for LFOs:

8/1	1 cycle every 8 measures
6/1	1 cycle every 6 measures
4/1	1 cycle every 4 measures
3/1	1 cycle every 3 measures
2/1	1 cycle every 2 measures
1/1	Whole notes
1/2P	1.5 Half note (3 quarter notes)
1/2	Half notes
1/2T	Half note triplets

1/4P	1.5 Quarter note (3 eighth notes)
1/4	Quarter notes
1/4T	Quarter note triplets
1/8P	1.5 Eighth note (3 sixteenth notes)
1/8	Eighth notes
1/8T	Eighth note TRIPLETS
1/16P	1.5 Sixteenth note (3 32nd notes)
1/16	Sixteenth notes
1/16T	Sixteenth note triplets
1/32	Thirty-second notes
1/32T	Thirty-second note triplets

Expanding Pro-Wave with RD Modules

Overview

The RD concept provides a basic 'synthesizer shell', into which the same variety of Oscillators, filters, and effects modules as mentioned above can be put together by the user, within certain structural limitations. The first device in the series (called the Red Dwarf), is basically taken from an earlier Zarg Music synthesizer design, the CombPlusPro. Using the modulation and signal routing from that device as the basic 'shell', the user can insert any two sound source modules and any two filter modules in the SLOTS provided to create a 'custom' design. Even more important, EACH preset can contain different modules for these slots, as well as for the effects, providing for a much more flexible device. It's even possible to obtain some unusual routings, such as placing an Oscillator block into a Filter slot, using the Oscillator slots as sources of modulation, etc., or for the ultimate in flexibility, use a Modular insert to 'drop in' your own custom configuration of oscillators or filters, using the Modular 2 or 3 modules. Some 77 of these 'modules' are available separately in the RD series II module set.

Instructions

For editing, you will want to double-click on the name of the module once you've loaded it in a slot. This brings up a 'mini' control panel, which contains all parameters that could not be accounted for on the main synthesizer front panel. (The 'mini' control panel should appear when the module is first loaded in the RD Slot. Double-clicking on the Insert Slot should put away the panel; repeated clicking should toggle the display of the panel.) A few modules do not have a control panel. For these, there is a special "Offset Module", which you can then use to change the frequency of an Oscillator or filter. You first load the Offset Module, then load the desired module into the Offset's insert slot.

Each module will have different parameters, although there are similarities in the dual OSCILLATOR pairs, etc. Since all Oscillators need an initial frequency, and most all of them need some waveshape control (except the dedicated sine or saws), these parameters have been located on the main synth surface. Special 'Oscillator pairs' have provisions for offsetting the initial pitch or shape settings, and also, one of the two oscillators usually have a switch that shuts off waveshape modulation completely.

Likewise for the filter slot, all filters have a cutoff (frequency) parameter, so you adjust this via the main synth surface. Most filters also have a resonance control, but this parameter has been put on the individual 'mini' control panels for each RD filter module. If you double-click on the inserted filter module and get nothing, then there is no control surface needed for that module (for example, the 18 dB Lowpass has no resonance, so no control panel).

You will need to adjust the main synth's controls and the 'mini' control panel settings together to get the most out of the many of the RD modules. Just be aware that the main Coarse and Fine tuning controls interact with the mini-control panel settings, as do the Initial Shape and Shape Mod controls on the synth's main panel.

Special note to RD II users:

The two special case modules - the Y Connector, and the Series/Parallel - allow you to greatly expand the capabilities of the different slots. These can be placed in slots to expand the number of objects available within a slot. For example, you may want to have four Oscillators in a single slot. By using the Y Connector, you can drop in two 'Oscillator pair' modules, one for each insert slot in the Y Connector. The only thing you should be aware of is the level; it's easy to clip audio levels when using this approach.

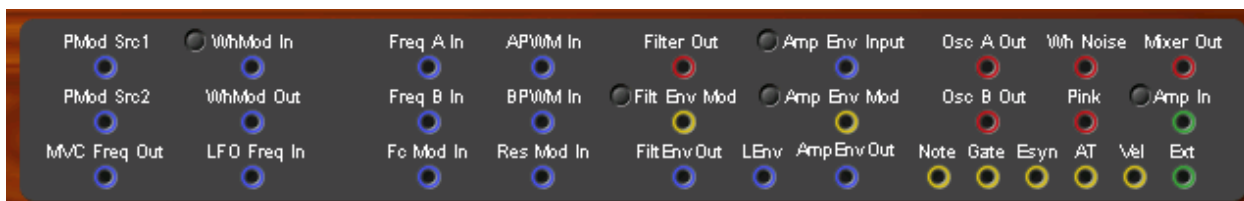
And, as already mentioned, you can also use these special modules within themselves, i.e., you can insert a second and third Y Connector into both Y Connector slots, etc., which I have called 'stacking'.

Pro-Wave Modular



The Pro-Wave Modular Shell is a full-featured version of Pro-Wave designed to be used as a *Module* in a standard Creamware Modular system. The Pro-Wave Modular Shell includes a patch bay that allows you to patch into various signal paths, and replace components of the synthesizer with other modular components.

Modular Patchbay



PMod Src1, PMod Src2 MVC Freq Out	These appear as added entries to the PMod source lists, allowing more choices for modulation internal to Pro-Wave. The Pro-Wave has a Midi Voice Control module (MVC), and if the user is going to have it as his main MVC for the modular patch, there's a number of these MVC outs, this being for oscillator frequency control.
WhMod In	Replaces the LFO signal used for the Wheel Mod source, when the green LED switch is on.
WhMod Out	This is the combined Wheel Mod Output (position of LFO/noise panning)
LFO Freq In	This is an external control value for the LFO rate. It is just added to the Rate, whether under MIDI Clocks or not.
Freq A In, Freq B In Fc Mod In	Direct inputs to modulate the OSCILLATOR A & B frequencies. Input to modulate the Filter Cutoff. Added to the filter's cutoff.
APWM In, BPWM In Res Mod In	Direct modulation inputs to the Pulse Width/wave settings for both oscillators. Modulation input to the filter resonance. Added to the knob setting.
Filter Out	Audio signal path tapped after the filter section. Use this if you want external series or parallel filter setups.
Filt Env Mod	An external input to control the Filter Envelope. Replaces Velocity in every place

that Velocity modulates the filter envelope, when the green LED is on.

FiltEnvOut	Direct output of the filter envelope.
LEnv	Direct output of the Looping Envelope.
Amp Env	Replaces the internal Amp envelope when LED is on.
Input	
Amp Env Mod	an external input to control the Amp Envelope. Replaces Velocity in every place that Velocity modulates the amp env, when the green LED is on
AmpEnvOut	Direct output of Amp Envelope
Osc A Out	Direct output
B Out	Direct output
Wh Noise	Direct output
Pink	Direct output
Mixer Out	Direct output
Amp In	Replaces the normal input to the Amp section when LED is on. If you have used the Filter Out to an external filter for series use, then feed the signal back in here
Ext	the External Input source
Esyn	Control input to the internal MVC
Note	Control output from the internal MVC
Gate	Control output from the internal MVC
AT	Control output from the internal MVC
Vel	Control output from the internal MVC

The direct Velocity output may need conversion from async to sync, and a smoothing before that with the Interpolate module. Pro-Wave ships with the following modules:

Async to Sync Converter.MDL	Converts async signals to synchronous
Sync to Async converter.MDL	Converts sync signals to async
Interpolate.MDL	The Interpolate is an asynchronous module that 'slews' or smoothes out async control signals, such as aftertouch, or velocity. (If used with velocity to frequency control, for example, you will hear the pitches 'slide' slightly from one velocity to another). It's similar to a Dezip module, but is a bit more efficient, and with slightly better results.
	For synchronous signals, Creamware recommends using a 6 dB Lowpass filter module to smooth things out, if needed.
Dual Converter.MDL	Contains a sync-to-async converter and an async-to-sync converter in one module

Note: I tried to keep with the color scheme of the connection points - red is audio out, green is audio in, gold/yellow is asynchronous in/out, blue is synchronous in/out. Therefore, you will see that the Interpolate is async for both in and out. If you want to use the aftertouch to control a frequency input directly, it's best to first use the Interpolate, then convert the async signal to synchronous, then into a frequency mod input.

Note: The green LED buttons are used to enable some connections. This was necessary for a few of the connections in order to interrupt the signal path.

Sample Modular Patch



This screenshot shows the following arrangement:

The MultiSegment Env B is set as a looping envelope connected as the modulation source in the Poly-Mod section that normally is Osc B (so, PMod Src2 replaces Osc B as a source). Remember that the green LED must be *on* for this patch to work.

The normal Amp Envelope is being replaced by the AHD vintage module.

The Flexor LP-8 Butter filter is replacing the Pro-Wave's internal filter - the patch point connected is the Mixer output, though you could take the oscs or noise directly out into the LP-8. A Flexor HP-8 Knife high-pass filter is used in series with the LP-8 Butter. Then the out of the HP-8 is fed back into the Pro-Wave's Amp Input, with the Active LED ON.

The Pro-Wave's Filter Envelope (FiltEnv Out) is coming out and modulating the LP-9's cutoff through its Mod input.