Evolver Operation Manual

Dave Smith Instruments

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Tested To Comply
With FCC Standards
FOR OFFICE USE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe B respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

For Technical Support, E-mail to: **help@davesmithinstruments.com**

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Welcome…

Thanks for purchasing Evolver! Listen to the sounds, twiddle some knobs, have some fun!

Register

If you purchased Evolver directly from us, there is no need to register – we already have your contact information. If you purchased Evolver from a music dealer, please go to www.davesmithinstruments.com and register.

Version 2.0 Notes

Your Evolver has the latest 2.0 features installed. A nice feature of Evolver is that it's operating system can be updated with a MIDI file, so all version 1 Evolvers can be updated to version 2.0. Likewise, your 2.0 Evolver can be updated in the future with any new releases.

These features were added in such a way to have no effect on programs made on version 1 Evolvers for backwards compatibility. This means that in some cases parameters may not be in a logical order, or additional functions were added by increasing values at the end of their range.

Quick Start

If you are like me, you've already been playing with Evolver for a while, and later decided to check the manual. If not, here's the standard short manual to get started.

First, plug in the power supply. If you need to use one of the alternate AC prongs, first remove the installed prongs by pushing the button and sliding off the prongs. Then slide on the desired prongs, and you're ready to go.

Inside the box with the power supply is a special ferrite component. For optimum reduction of radio frequency noise, this should be placed on the end of the power supply cable. To install, open the ferrite by releasing the two small clips. Then wind the cable around the core a single time, as shown in the photo below. Then simply snap the ferrite closed again. There will be no difference in sound quality or audio noise levels with this procedure; it only reduces very high frequencies.

Next, plug Evolver's signal outputs to your mixer/sound system.

Hit the START button in the lower left corner to play a sequence. Listen to other Programs by turning the Program knob (top Main LED must be on), and keep the sequencer running if you want. When shipped, Bank 1 has sequencer-oriented Programs in locations 1 through 69. A complete description of Evolver's 512 Programs can be found in the Program Notes section following.

You can play around with the sounds of the current Program by simply selecting a parameter in the programming matrix. Example – hit the button to select the third row, and grab knob 1 to adjust the Filter Cutoff Frequency. Note that you can access eight knobs in the selected row for fast tweaking. To get to the second (lower) set of parameters in any row, simply hold the SHIFT button down while turning the knob.

To edit the sequence steps, hit the SEQUENCER button. The programming matrix now changes to sequencer mode to adjust the 16 x 4 sequencer. Row 1 controls steps 1 – 8 and row 2 steps 9 – 16 for Sequence 1. Likewise rows 3 and 4 control sequence 2, etc. The SHIFT button has no effect in sequence mode.

> Note - though the sequences are named 1-4, there is really only one sequence that has four different controls, each of which can be routed to a different destination via the four Sequence Destination parameters (bottom left corner). In other words, one sequencer with four individual outputs that act in parallel. Each of the four can be a different length. Sequence 1 (rows 1 and 2) controls whether a step acts as a rest (by not triggering the envelopes). Check page 18 for more information on the sequencer.

Using Evolver with a MIDI Keyboard

Evolver is quite often used without a keyboard, just using the internal sequencer. Other times, it is used solely from a keyboard. It can also be used in combination, with the keyboard gating the sequencer, for example. To accommodate these different uses, there are a couple Program parameters to select triggering modes and oscillator frequency ranges.

The Trigger Select parameter selects the source for triggering the envelopes. It is usually set to ALL to allow triggers from either the sequencer or from MIDI. The Key Off/Transpose parameter provides an easy way to turn off the MIDI notes for use with the sequencer only. So, to use a MIDI source, you must make sure this parameter is not off! The same parameter provides MIDI transposing plus/minus three octaves. See page 33 for more information on these two parameters. Programs 70 through 127 in Bank 1 are sequences that are set up to play with MIDI notes. All Programs in Bank 2 are meant to play from a keyboard, with Pitch and Mod wheel and Pressure all enabled, and no sequences.

> Note - the right decimal point in the display flashes whenever anything comes in MIDI input jack. Note that it flashes even when MIDI input is disabled.

Using Evolver as a Signal Processor

Simply plug your sound source into the External Inputs. If you are using a mono signal, you will need to select single channel operation with the External Input

Mode parameter (Row 8, knob 7). You may also need to adjust the input gain – select the second Main row by hitting the MAIN button once, and select 0 to 24 db of gain using the Input Gain knob. Note that the row and column LEDs act as a very simply VU meter when adjusting the gain; this helps set the optimum levels. Ideally you want the clip LED to come on occasionally.

Summary

You should be up and running now; for more operation information, read on. Or, just look up specific parameters for detailed notes, or to decipher some of the more convoluted displays. Pages 38 through 40 contain a handy reference for mod destinations and sources. At some point you should read through the manual to discover all the little features that you might not notice at first.

I should mention that this manual does not include explanations of basic synthesizer functions. It assumes you already know what an oscillator is, how a lowpass filter affects the sound, what an ADSR envelope looks like, etc.

Fortunately, these days it is quite easy to find such resources on the Internet. If you want to learn the lingo and the basics, just try a search in Google (or the search engine of your choice), something like “analog synthesizer tutorial”. You’ll find plenty of good reading material.

Have fun!

Dave Smith

Program Notes

Following is a brief description of the 512 sounds in your Evolver. The factory sound set is on the website if you ever need to refresh it. Remember to save your sounds via program dumps occasionally.

Bank 1

Programs 1 – 69 are sequence programs; all you need to do is hit the START button. Feel free to play around with parameters while the sequences play to get a feel of the instrument. This group of programs is set to ignore MIDI notes coming in, i.e. they are set at the optimum pitch and will not transpose. You can always change the Key/OFF/Xpose parameter to enable MIDI notes if you wish (details in manual).

Programs 70 – 127 are sequences that do respond to MIDI notes. These will sound different depending on what notes you hit on your keyboard. Many of these sequences will be too low in pitch if you listen without a keyboard to transpose them up. Experiment with different playing styles.

Program 128 is a test program – you'll likely want to trash it.

Bank 2

Programs 1 – 127 are sounds meant to played from a keyboard, and have no sequences programmed. They all respond in different ways to keyboard pressure and mod wheel.

Program 128 is a basic keyboard program, with most parameters off. Velocity is routed to VCA Envelope Amount, pressure goes to the filter, mod wheel goes to LFO 1 Amount, with LFO 1 controlling Oscillator Frequency. This can be handy as a starting point, without having to worry about obscure parameters being set. On the other hand, at first you may find it easier to make new programs by editing existing Programs.

Bank 3

Programs 1 – 19 are droning sounds; they always play while selected. A couple have simple sequences that alter the playback to varying degrees.

Programs 20 – 29 are signal processing programs meant to be used with a guitar plugged into the Left Input jack. Or, any mono audio source can be used, but with liberal use of distortion, they lean heavily towards guitar use.

Programs 30-39 are signal processing programs meant to be used with stereo audio inputs plugged into the Left and Right Input jacks. Try playing a CD through Evolver with these programs.

Programs 40 - 79 are an assortment of sequence sounds. Some will respond to a MIDI keyboard, some will not.

Programs 80 - 127 are more sounds meant to played from a keyboard, and have no sequences programmed. They all respond in different ways to keyboard pressure and mod wheel.

Program 128 is a test program – you'll likely want to trash it.

Bank 4

Programs 1 – 79 are a newer set of sequence programs; all you need to do is hit the START button.

Programs 80 – 128 are sounds meant to played from a keyboard; some have sequences programmed, and some do not. Most respond in different ways to keyboard pressure and mod wheel.

Special thanks to Program contributors, including:

Tin Ande
Ricardo Coen
Don Gothard
Gary LaRocco
Mario Lavin
Paul Nagle
Kevin Paisley
Robert Shanks
Ravi Sharma
Saul Stokes
John Swana
Stefan Trippler
Mark Vann
Craig Wiper

Basic Operation FAQs

Evolver is a very flexible instrument. While this provides a wide range of operational possibilities, it also means that you can put Evolver into a state where it doesn't seem to work. Here are some hints:

1) **How do I save a Program?** Hold the MAIN button down; its LED will start blinking. Hit the button a second time, and the Program will be stored. While blinking, you can change the Program and/or Bank to store in a different location.

2) **When I play a MIDI keyboard, it triggers the envelopes but the oscillator pitch doesn't change.** Check Key Off/Xpose (Row 7, knob 8). If it is OFF, MIDI notes will not affect the oscillator pitch. This knob also transposes the MIDI range by +/- 3 octaves.

3) **MIDI affects the note pitch, but will not trigger the envelopes.** Check Trigger Select (Row 7, Knob 7). It must be set to ALL or MIdI for basic MIDI triggering. It can also be set MdrM, MS, or MSr when using MIDI and the sequencer together – see page 33.

4) **After playing on a MIDI keyboard, I change Programs and the sounds are transposed too high.** The quick fix is to hit the RESET button when the sequencer is stopped; it acts as a MIDI all-notes-off, and resets all MIDI controllers. In general, you usually want to set up Programs as sequencer-driven, MIDI-driven, or both. When you try to play a sequence-based Program with MIDI, or sequence a MIDI-based sound, you will likely have to change a couple parameters (see 1 and 2 above).

5) **I hit the Sequence Start button; the LEDs advance, but the envelopes don't trigger.** This is the opposite problem of 2 above; check Trigger Select (Row 7, Knob 7) - it should be set to ALL or SEQ for the sequencer to trigger the envelopes.

6) **When I change Programs, the Sequencer speed always stays the same.** Check Use Prgm Tempo – if it is OFF, then the speed is not updated when Programs change. Set it to On.

7) **How do I copy Sequences from one Program to another?** First, turn Lock Seq off, and select the Program with the sequence that you want to copy. Second, turn Lock Seq On – now when you change Programs the sequence will not change, so select the destination Program. Third, do a normal save, and the Sequence will be saved in the new location.

8) **I can't get the filter to oscillate.** Check the 2 pole/4 pole switch (Row 3, Knob 1, Shift) – the filter only oscillates when 4 poles are used.

9) **I seem to be getting some distortion in my output.** Assuming that the Distortion is off, you are likely just overloading the signal somewhere. There are many signal sources in Evolver, and many sources of gain. If too many are used at levels that are too high, you will likely get some distortion. For example, if you are using all four oscillators, you should have the levels lower, in the 40 – 60 range. Likewise, if using all three delay taps, lower the levels of each.

Inside Evolver

Before going through the individual parameters, following is a brief description of Evolver's architecture. The signal flow diagram on the next page is a good starting point for understanding how Evolver works.

The Analog Side

Evolver's analog electronics consist of two identical (Left/Right) synth sections, each with an analog waveshape oscillator, a 2/4 pole resonant lowpass filter, and a Voltage Controlled Amplifier (VCA). Control voltages are generated by the processors to control the analog components.

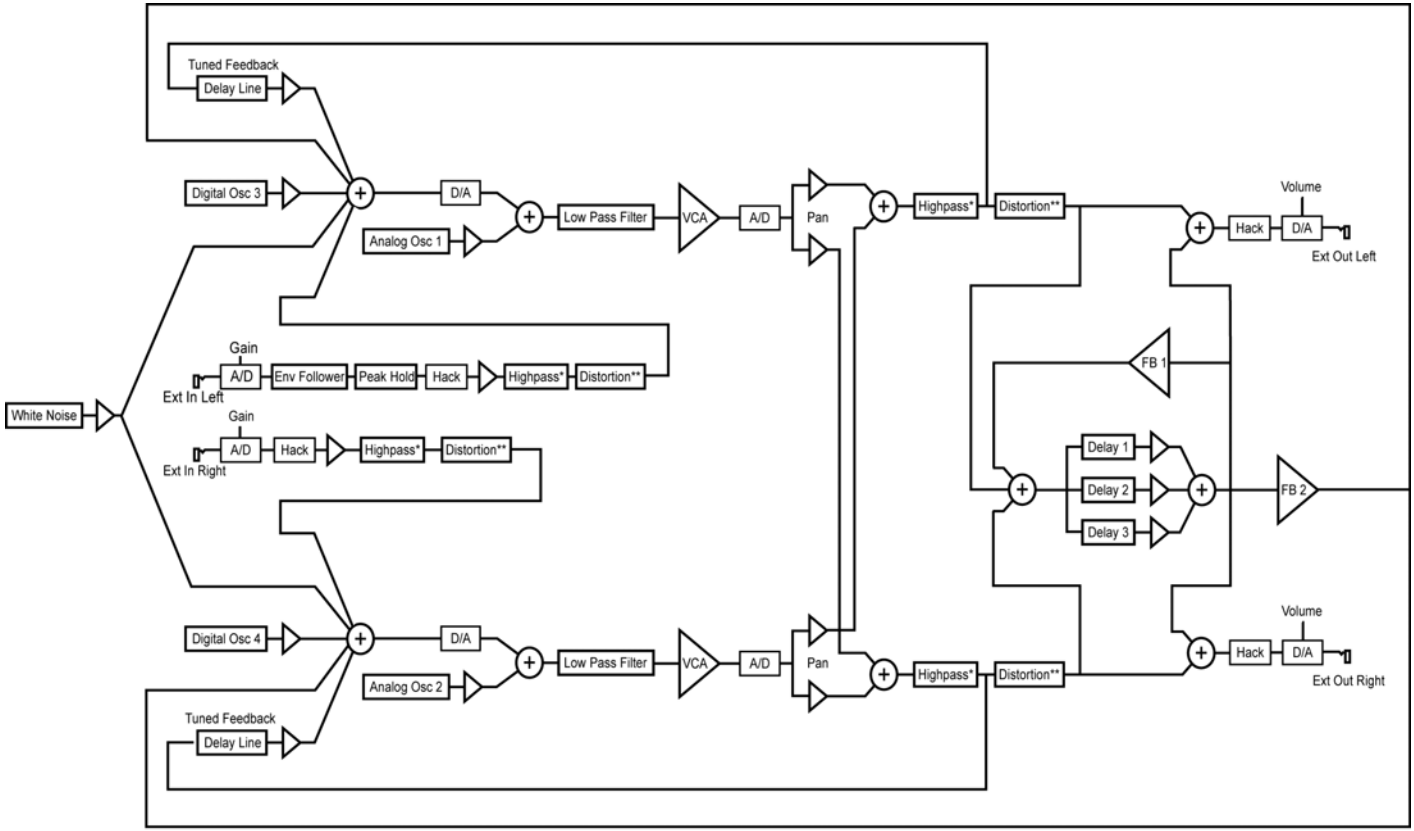
The Digital Side

Surrounding the Analog electronics is a high-speed Digital Signal Processor (DSP) that both pre- and post-processes the audio signal. Since the DSP also computes the control voltages for the analog circuitry, it can handle a wide range of modulation with high precision.

The DSP provides audio functions such as the Digital Oscillators, Envelope Follower, the Peak/Hold detector (and associated external trigger generator), Highpass filter, Distortion (with noise gate), Pan, Delay, and Hack. It also handles the tuned feedback, as well as the additional Delay feedback paths. And all the modulation calculations (envelopes, LFOs, routing, etc).

Analog-to-Digital (A/D) and Digital-to-Analog (D/A) converters are used to connect the analog and digital. As can be seen, there are two sets of stereo converters; they run at 48 kHz sampling rate with 24 bits of precision for minimum impact on the analog sound.

This architecture allows a great deal of flexibility in defining the feature set of the synth. The analog circuitry is fixed, but all other features are software defined in Evolver's two processors.



* Highpass can be placed either before or after analog filter

** Distortion can be placed either before or after analog filter

Evolver Signal Path

Main Parameters

There are two rows of Main, or global, parameters. Hitting the MAIN button repeatedly will toggle between the first row and the second. All Main parameters are saved when power is removed.

Program Save: If you hold the MAIN button, its LED will start blinking, which indicates that it is ready to store a program. Hitting the MAIN button a second time will store the program. You can change the Bank and Program number while it is blinking to move programs between locations and banks. Hitting any other button or turning a knob (other than Program/Bank) will stop the blinking and abort the save.

Main Row 1

1 Program: ***1…128*** Select Program in the currently selected bank. If you hold the SHIFT button while changing the Program, the sound will not change until you release the SHIFT button. If you hold the SHIFT button while changing the Program and the sequencer is running, when the SHIFT button is released the sequence will complete (according to the length of Sequence 1) before synchronously changing to the new program and it's sequence.

2 Bank Select: ***1…4*** Select Bank. Each bank has 128 Programs, for a total of 512 Programs. If you hold the SHIFT button while changing the Bank, the sound will not change until you release the SHIFT button. If you hold the SHIFT button while changing the Bank and the sequencer is running, when the SHIFT button is released the sequence will complete (according to the length of Sequence 1) before synchronously changing to the new program and it's sequence.

3 Volume: ***0…100*** Master Volume control

4 Transpose: ***-36…+36*** Master Transpose control, 0 is centered. Steps in semitones.

5 BPM: ***30…250*** Basic speed for the sequencer in BPM. Actual speed also depends on the Clock Divide setting (see below). If using MIDI clock, it will display the BPM of the incoming MIDI clocks.

6 Clock Div: ***see table*** Used as a clock divider to provide a wider range of sequencer speeds. When set to ♩ (quarter notes), the BPM setting is exact, i.e. 120 BPM = 120 BPM. If set to 𝅗𝅥 (half note), the actual speed is half, so a setting of 120 BPM will actually play at 60 BPM.

Swing settings add a delay to every the odd steps (1, 3, 5, etc.), while shortening the even steps by the same amount, for a swing feel to the timing. Half swing is the same with less delay.

Here are all the possible settings, with the effect on the overall tempo:

Display	Tempo	Timing Division
2n	BPM/2	Half note
4n	BPM	Quarter note
8n	BPM x 2	Eighth note
8H	BPM x 2	Eighth note, half swing timing
8S	BPM x 2	Eighth note, full swing timing
8t	BPM x 3	Eighth note triplets
16n	BPM x 4	Sixteenth note
16H	BPM x 4	Sixteenth note, half swing timing
16S	BPM x 4	Sixteenth note, full swing timing
16t	BPM x 6	Sixteenth note triplets
32n	BPM x 8	Thirty-second note
32n	BPM x 12	Thirty-second note triplets
64n	BPM x 24	Sixty-fourth note triplets

7 Use Prgm Tempo: ***Off, On*** Use Program Tempo – when set to OFF, changing a Program will not change the tempo- this is useful for keeping a constant tempo but using different sounds. If set to On, a Program change will change the tempo to the BPM and Clock Divide values saved with the Program. When on, changing the main BPM will also change the Program BPM, and vice-versa. When off, changing one has no effect on the other.

8 MIDI Clock: ***see table*** Selects the MIDI clock status, and enables External sequencer triggers, as follows:

Display	MIDI Clock Setting
OFF	MIDI clock is neither sent nor received
OUt	MIDI clock is sent
In	MIDI clock is received
I-O	MIDI clock is received and transmitted
E1	Left External Input is used to clock the sequencer. When the signal goes above a fixed threshold, the sequencer steps once. Note that internal functions do not sync up when this mode is used, and the Clock Divide and BPM knob are ignored.
nOt	Each incoming MIDI note on will advance the sequencer one step.
In-	MIDI clock is received, but MIDI start/stop/continue messages are ignored.

Main Row 2

1 Lock Seq: ***Off, On*** When set to OFF, sequencer operation is normal, and each Program plays its own sequence. If set to On, the sequence does not change when changing a Program. This provides an easy way to hear the same sequence with different sounds. Note that Lock Sequence can be used to copy a sequence from one Program to another.

2 Poly Chain: ***see table*** Poly Chain is used to link multiple Evolvers into a polyphonic system by selectively passing MIDI data through to the MIDI out jack where it can be routed to another Evolver. Note that MIDI clocks are handled separately per the MIDI Clock parameter. Settings:

Display	Poly Chain Status
OFF	MIDI operation is normal.
ALL	All MIDI information is passed through to the MIDI out jack
not	Only MIDI note data is passed through to the MIDI out jack.

3 Input Gain: ***0db… 24d*** Provides extra gain on the Left and Right External Inputs. You can select no gain (0db), or a gain in steps of 3db up to 24d (24db). Note that when the Input Gain knob is active, the row and column LEDs become a simple VU meter, with the rows showing the left channel, and the columns showing the right. The Clip LED is always active.

The Clip LED has a dual purpose – it lights when either the left or right External Inputs clip, and it also lights when there is a clip on the internal A/D, which follows the analog circuitry (see signal flow diagram on page 13). This helps set internal levels and prevent clipping and distortion (unless of course you want it to clip/distort!).

4 Fine Tune: ***-50…+50*** Master Fine Tune control; 0 centered. Steps in cents (50 cents = ½ semitone).

5 MIDI Rec: ***see table*** MIDI Receive – determines what MIDI data to receive. Used to disable MIDI completely, or to filter out program changes or parameter changes.

Display	MIDI Receive Operation
OFF	No MIDI data received
ALL	All MIDI data received
Pro	Only MIDI program changes received (along with note/controller data)
PAr	Only MIDI parameters received (along with note/controller data)

6 MIDI Xmit: ***see table*** MIDI transmits – determines what MIDI data to send. If enabled Evolver will send out changes for all 128 Program Parameters in System Exclusive (SysEx) format – see the MIDI Implementation section starting on page 41 for more information.

Display	MIDI Transmit Operation
OFF	No MIDI data sent
ALL	All MIDI data sent
Pro	Only MIDI program changes sent
PAr	Only MIDI parameters sent

7 MIDI Channel: ***ALL, 1…16*** Select which MIDI channel to send and receive data, 1 to 16. ALL receives on any channel.

8 MIDI Dump: ***see table*** Allows transmission of Programs over MIDI as follows:

Display	MIDI Transmit Operation
OnE	Send current program
bAn	Send all 128 programs in current bank
ALL	Send all programs in all three banks

When this knob is active, the sequencer START/STOP LED will start blinking. When the START/STOP button is hit, the transmission will start. Handy for saving Programs on a computer or sending to another Evolver. Evolver's Program dumps include Program and Bank numbers, so when received it will be stored in same location.

Sequencer Operation

Evolver has a 4 x 16 “analog” style step sequencer. Imagine four rows of 16 knobs. It is really a single sequencer with four controls per step, though the convention in Evolver is to call the four rows sequence 1 through 4.

When you hit the START button, the sequence will start playing. The column LEDs will light in sequence to show which step is playing; remember that each sequence is two rows, so the LEDs repeat.

Each of the four sequences is basically a modulation source; it can be routed to any of the normal modulation destinations (see table on page 38) using the Seq Dest knobs (last row). Usually at least one of the sequences is routed to an oscillator to control pitch. Using VCA Envelope as a destination allows setting the volume of each step; likewise you can go to the Filter or Filter Envelope Amount to have different filter settings per step.

Beyond this, you can really have some fun with other destinations; go to Delay amount to have the delay level change; or feedback amount, to drastically change the sound every step. FM and Ring Mod are fun to change – you get the idea. With four sequences, you can program a very dynamic sequence.

> Note – another very useful way to modulate a sequence is using LFOs with sync; LFO frequency runs 0 – 150, after which you can select the sync settings. A setting of 5 16 on an LFO with a Triangle wave selected and routed to the filter will provide a clean filter sweep over a 16 step sequence, perfectly in sync! This is much easier (and smoother) than programming a filter sweep using sequence steps.

The sequencer can also be routed to MIDI output destinations, including Note Number, Velocity, Mod Wheel, Pressure, Breath, and Foot Controller. Velocity is a special case – it only works if selected as the destination for Sequence 2 when Sequence 1’s destination routed to Note Number. The same for Sequence 3 and 4 (Sequence 4 can be velocity for Sequence 3). If velocity is not used as a destination, the velocity output is 120. So, it is possible to have up to 4 note sequences sent out over MIDI.

Another sequencer destination is Clock Mod. It works via a multiplier based on a step value of 40. If a sequencer step is set to 40, the clock speed stays as set. If set to 20, (half of 40), the clock will be twice as fast for that step. Likewise, a step value of 80 will be twice as slow as normal, and 10 would be 4 times faster.

Note that overall limits of 30 to 250 BPM still apply; for example, if you have a BPM of 120, and a sequencer step of 10, it will try to go four times faster than 120, which is 480. Since it is greater than 250, it will clamp at 250. With clever choices of BPM (using Clock Divide as necessary) you can develop a pretty wide range of timing possibilities. Also, with sequences of different lengths, it can really get quite wild.

The actual MIDI note transmitted is the sequence step value plus one (since MIDI note on of zero = note off). Note that this is different than the half-semitone when driving the internal oscillators – this was done to provide a wider range of notes. Also, the main Transpose is added/subtracted to the MIDI note output. Velocity and the other controllers are converted from 0 – 100 range to 0 – 127 range for MIDI.

To program the sequencer, hit the SEQUENCER button; the SEQUENCER LED will light indicating that the program matrix is now active for editing the sequences. Row 1 has positions 1-8 of Sequence 1, and Row 2 has positions 9-16 of Sequence 1. Likewise the remaining rows cover Sequences 2 – 4.

You can easily switch the matrix back and forth between normal Program edit mode and sequence mode by hitting the SEQUENCER button. Assuming you have the sequence destinations set, you can simply start a sequence (hit the START/STOP button), and hear the result as you change the sequence step values, which range from 0 to 100.

> Note - when routing a sequencer to an oscillator, a sequence value of 24 corresponds to one octave, i.e. each step is one half a semitone.

You may find it easier at first to stop the sequence before adjusting each step. On each “click” of the knob, it will trigger the envelopes so you can hear the current setting of the knob. Once you go through all steps, then you can start the sequence to hear the result, and make fine tuning changes while running.

All four sequences can have separate lengths. This is done by selecting rSt (at the end of the range after 100) as the step value. When this step is reached, the sequence will reset to step one. For example, if you want a four step sequence, simply set step 5 to rSt.

Each sequence can have its own reset, so you will need to set the reset for all four sequences if you want all of them to be the same length. And, if each is a different length, the rests (see below) and clock swing settings will follow sequence 1, as will the LEDs. In other words, the envelopes are always triggered from one sequence and can’t be separately handled by each of the 4 sequences, which makes sense on a monophonic instrument if you think about it.

Sequence 1 (rows 1 and 2) controls rests. If set to oFF (after rSt at the end of the range) there will not be a trigger to the envelopes on that step. As mentioned above, the rests will end up in different places on other sequences if they are a different length.

Using rests, resets, and different Clock Divides (half swing, swing, etc.) you can achieve very complex sequences.

Another method of programming of pitched sequences is via a MIDI keyboard. Hold the SEQUENCER button, and its LED will start blinking, indicating that the currently selected sequence will accept key information over MIDI. Each MIDI note-on will be saved in the current sequence location, and will automatically step to the next. It will loop around from step 16 to 1 if you keep playing notes. MIDI notes below C2 (48) act as rests. Note C2 will program a zero, C#2 a 2, etc.

Timing is not recorded when programmed from a keyboard; it is simply a convenience feature for entering note values.

START/STOP starts and stops the sequencer; the RESET button will reset the sequence to step one if the sequencer is running or not running.

> Note – the RESET button also acts as a MIDI all-notes-off, and resets all MIDI controllers when hit while the sequencer is not running.

While the sequencer is running, if you hold the SHIFT button when you hit the STOP button, the sequence will continue running until finished (according to the length of Sequence 1), and will stop after playing step 1.

Also, If you hold the SHIFT button while changing the program or bank and the sequencer is running, when the SHIFT button is released the sequence will complete (according to the length of Sequence 1) before synchronously changing to the new program and it's sequence.

A simple "tap tempo" feature is available. With the sequencer off, hold the RESET button, and then hold the START/STOP button for a count of four; then lift up the START/STOP button in time. The sequencer will start with the new tempo. Note – the actual speed will depend on the Clock Divide setting. The count will match if Clock Divide is set to 4n. If set to 8n, it will play twice as fast as your "tap", and so forth.

Program Parameters

There are eight rows of Program parameters. In addition, holding the SHIFT button gives access to an additional 64 parameters. The SHIFT button operates two different ways. While held, it always selects the alternate parameter (in yellow). The selected row LED blinks to indicate that SHIFT is selected. Alternatively, you can hit the SHIFT button twice quickly, and now the matrix will be in shift mode – the row LED will blink, and the alternate parameter is selected, but you do not have to hold the button down. This is handy when tweaking while playing a keyboard with your other hand. Hit SHIFT once more and it returns to normal.

> Note - sometimes the shifted parameter is related to the unshifted parameter above it, but other times they are unrelated. The panel artwork shows the grouping to make it more obvious.

To select a row to edit, simply hit the desired row button, and you can turn any of the eight knobs to change a parameter in that row.

> Note - you first select a knob and turn it one click, it selects and displays the parameter but does not change the programmed parameter value. Any further turning will then modify the value up or down. This makes it easy to check the value of a parameter without changing it.

The following parameter details are grouped by function, with row and column as indicated in the boxes: 5 2. Would be Row 5 Column 2 (the Grunge parameter, in this case). An S denotes the SHIFT button is held down to access the parameter.

Oscillator 1

Oscillator 1 is an analog oscillator, and is hardwired to the Left channel. Following are the main controls for Oscillator 1. Note that there are some additional modulation controls that will affect Oscillator 1 – these are found in different sections of the Parameter definitions.

Frequency: 1 1 ***C…C8*** Selects base frequency over a 10 octave range, from 8 Hz to 8KHz, stepping in semitones. C3 is middle C, the first octave has no number (c , db , d …), the second octave is –1 (c -1, db-1, d -1…), the third is zero (c 0, db0, d 0 …), etc.

Fine: 1 2 ***-50…+50*** Fine Tune control; 0 centered. Steps in cents (50 cents = ½ semitone).

Shape/PW: 1 3 ***see table*** Selects the analog waveshape as follows:

Display	Waveshape
SAt	Sawtooth
tr i	Triangle
S-t	Sawtooth – triangle mix
P 0 **to** P99	Pulse Wave, with pulse width ranging to minimum (0) to maximum (99). The pulse width will turn off at the two extremes – this allows some interesting modulation possibilities. A square wave will be around P50.

Level: 1 4 ***0…100*** Sets the volume of Oscillator 1.

Glide: 1 1 S ***0…100; F02…F99; OFF*** The oscillator 1 Glide rate; low numbers are faster. Normal Glide covers the range from 1 to 100 (0 is no glide). A "fingered" mode that only glides when more than one note is held down is selected by setting glide over 100, where it ranges from F02 to F00 (equivalent to glides of 2 to 100).

Thought not quite Glide related, if you set glide all the way to maximum, it goes to OFF, which has the effect of disconnecting oscillator 1 from MIDI.

Sync 2->1: 1 2 S Turns oscillator hard sync on or off. Whenever oscillator 2 resets, it will also reset oscillator 1 for the classic hard sync sound.

Oscillator 2

Oscillator 2 is also an analog oscillator, and is hardwired to the Right channel. Following are the controls for Oscillator 2:

Frequency: 1 5 ***C…C8*** Selects base frequency over a 10 octave range, from 8 Hz to 8KHz, stepping in semitones. C3 is middle C, the first octave has no number (c , db , d …), the second octave is –1 (c -1, db-1, d -1…), the third is zero (c 0, db0, d 0 …), etc.

Fine: 1 6 ***-50…+50*** Fine Tune control; 0 centered. Steps in cents (50 cents = ½ semitone).

Shape/PW: 17 ***see table*** Selects the analog waveshape as follows:

Display	Waveshape
SAt	Sawtooth
tr i	Triangle
S-t	Sawtooth – triangle mix
P 0 **to** P99	Pulse Wave, with pulse width ranging to minimum (0) to maximum (99). The pulse width will turn off at the two extremes – this allows some interesting modulation possibilities. A square wave will be around P50.

Level: 18 ***0…100*** Sets the volume of oscillator 2.

Glide: 15S ***0…100; F02…F99; OFF*** The oscillator 2 Glide rate; low numbers are faster. Normal Glide covers the range from 1 to 100 (0 is no glide). A "fingered" mode that only glides when more than one note is held down is selected by setting glide over 100, where it ranges from F02 to F00 (equivalent to glides of 2 to 100).

Thought not quite Glide related, if you set glide all the way to maximum, it goes to OFF, which has the effect of disconnecting oscillator 3 from MIDI.

Oscillator 3

Oscillator 3 is a digital waveshape oscillator, and is hardwired to the Left channel. Like the Prophet VS, the digital oscillators in Evolver get quite trashy at higher frequencies. Following are the controls for Oscillator 3:

Frequency: 2 1 ***C…C8*** Selects base frequency over a 10 octave range, from 8 Hz to 8KHz, stepping in semitones. C3 is middle C, the first octave has no number (c , db , d …), the second octave is –1 (c -1, db-1, d -1…), the third is zero (c 0, db0, d 0 …), etc.

Fine: 2 2 ***-50…+50*** Fine Tune control; 0 centered. Steps in cents (50 cents = ½ semitone).

Shape/PW: 2 3 ***1…128*** Selects a digital waveshape. Waveshapes 1 - 95 correspond to ROM (preset) Waveshapes 32 – 125 in the Prophet-VS. Waveshapes 96 – 128 are user programmable in Evolver via MIDI, assuming someone builds an editor of some sort some day. In the VS, the user waves were 0 - 31, and wave 127 was noise, which is not included on Evolver since the noise source is separate from the oscillators. Wave 95 (126 on the VS) is a "blank" wave, which can give some options while sequencing waves. Evolver is shipped with waves 96 – 128 the same as 1 – 31.

Level: 2 4 ***0…100*** Sets the volume of oscillator 3.

Glide: 2 1 S ***0…100; F02…F99; OFF*** The oscillator 3 Glide rate; low numbers are faster. Normal Glide covers the range from 1 to 100 (0 is no glide). A "fingered" mode that only glides when more than one note is held down is selected by setting glide over 100, where it ranges from F02 to F00 (equivalent to glides of 2 to 100).

Thought not quite Glide related, if you set glide all the way to maximum, it goes to OFF, which has the effect of disconnecting oscillator 3 from MIDI.

FM 4->3: 2 2 S ***0…100*** The amount of Frequency Modulation of Oscillator 3 from Oscillator 4. Note that each digital oscillator can FM the other at the same time for some wild results.

Shape Seq: 2 3 S ***Off, SE1..4*** This parameter allows sequencing Waveshapes. OFF if not in use, otherwise select one of the four sequences SE 1, SE2, SE3, or SE4 to change the waveshape on every sequence step. In other words, if sequence 1 is selected, with step 1 = 10 and step 2 = 5, then waveshape 10 will play in the first step, and waveshape 5 will play in the second.

Ring Mod 4->3 : 2 4 S ***0…100*** The amount of Ring (Amplitude) Modulation of Oscillator 3 from Oscillator 4. Note that each digital oscillator can Ring modulate the other at the same time.

Oscillator 4

Oscillator 4 is a digital waveshape oscillator, and is hardwired to the Right channel. Like the Prophet VS, the digital oscillators in Evolver get quite trashy at higher frequencies. Following are the controls for Oscillator 4:

Frequency: 25 ***C…C8*** Selects base frequency over a 10 octave range, from 8 Hz to 8KHz, stepping in semitones. C3 is middle C, the first octave has no number (c , db , d …), the second octave is –1 (c -1, db-1, d -1…), the third is zero (c 0, db0, d 0 …), etc.

Fine: 26 ***-50…+50*** Fine Tune control; 0 centered. Steps in cents (50 cents = ½ semitone).

Shape/PW: 27 ***1…128*** Selects a digital waveshape. Waveshapes 1 - 95 correspond to ROM (preset) Waveshapes 32 – 125 in the Prophet-VS. Waveshapes 96 – 128 are user programmable in Evolver via MIDI, assuming someone builds an editor of some sort some day. In the VS, the user waves were 0 - 31, and wave 127 was noise, which is not included on Evolver since the noise source is separate from the oscillators. Wave 95 (126 on the VS) is a "blank" wave, which can give some options while sequencing waves. Evolver is shipped with waves 96 – 128 the same as 1 – 31.

Level: 28 ***0…100*** Sets the volume of oscillator 4.

Glide: 25S ***0…100; F02…F99; OFF*** The oscillator 4 Glide rate; low numbers are faster. Normal Glide covers the range from 1 to 100 (0 is no glide). A "fingered" mode that only glides when more than one note is held down is selected by setting glide over 100, where it ranges from F02 to F00 (equivalent to glides of 2 to 100).

Thought not quite Glide related, if you set glide all the way to maximum, it goes to OFF, which has the effect of disconnecting oscillator 4 from MIDI.

FM 3->4: 26S ***0…100*** The amount of Frequency Modulation of Oscillator 4 from Oscillator 3. Note that both digital oscillators can FM the other at the same time for some wild results.

Shape Seq: 27S ***Off, SE1..4*** This parameter allows sequencing Waveshapes. OFF if not in use, otherwise select one of the four sequences SE 1, SE2, SE3, or SE4 to change the waveshape on every sequence step. In other words, if sequence 1 is selected, with step 1 = 10 and step 2 = 5, then waveshape 10 will play in the first step, and waveshape 5 will play in the second.

Ring Mod 3->4 : 28S ***0…100*** The amount of Ring (Amplitude) Modulation of Oscillator 4 from Oscillator 3. Note that both digital oscillators can modulate the other at the same time.

Lowpass Filter

The analog (*real* analog!) lowpass filter is actually two different filters; one for the Left channel and one for the Right channel. This allows true stereo processing of external audio signals run through Evolver. However, for simplicity and consistency the two filters are driven together in tandem, so they normally respond the same way. Exceptions are when using the Spilt parameter as noted below, and when using the separate filter cutoff and resonance modulation destinations, which allow the two filters to be modulated independently. Note that though they are normally controlled together, since they are analog there will always be some subtle differences between the two filters, which gives Evolver a more natural sound.

Frequency: 3 1 ***0…164*** Selects base filter cutoff frequency over more than 13 octaves. There is special smoothing on the operation of the filter knob to eliminate stepping as you turn the knob for clean manual filter sweeps.

Env Amt: 3 2 ***-99…+99*** Amount of filter envelope to the cutoff frequency. This can be positive or negative, allowing inverted envelope control of the filter.

Attack: 3 3 ***0…110*** Attack time of the filter ADSR envelope generator

Decay: 3 4 ***0…110*** Decay time

Sustain: 3 5 ***0…100*** Sustain Level

Release: 3 6 ***0…110*** Release time

Resonance: 3 7 ***0…100*** Sets the Resonance level of the filter; at high settings the filter will self-oscillate in 4-pole mode. If the filter does not oscillate, make sure that 4 pole mode is selected.

Key Amt: 3 8 ***0…100*** Amount of keyboard (MIDI note) to the filter cutoff. A setting of 72 will step the filter one semitone for each MIDI note, 36 would be half-semitones, etc. Also, the MIDI note is derived using Oscillator 1 Glide, allowing Glide tracking.

2/4 Pole: 3 1 S ***2 P, 4 P*** Selects either 2 or 4 pole operation for the filter.

Velocity: 3 2 S ***0…100*** Amount of MIDI velocity controlling the level of the filter envelope.

Audio Mod: 3 3 S ***0…100*** Amount of audio modulation from the analog oscillator to the filter, separate in left and right channels.

Split: 3 4 S ***0…100*** Split separates the cutoff of the left and right filters by raising the left and lowering the right. Normally the filters track in both channels; this allows a way to unlock them.

Highpass Filter

Highpass: 3 5 S ***o0…99, i0…99*** Sets the cutoff frequency of the four-pole highpass filter. If set to o00 to o99, the filter is placed after the analog lowpass filter and VCA, before the Delay. If set to i00 to i99, the highpass filter is inserted before the analog lowpass filter, and only affects external input. Refer to the Signal Flow diagram on page 13. There are two separate highpass filters, one for each channel, that are controlled in tandem.

Remember that any of the modulation sources can be routed to the Highpass Filter; for example Envelope 3 can be dedicated to the Highpass.

Amplifier (VCA)

VCA Level: 4 1 ***0…100*** Sets a base level for the VCA (Voltage controlled Amplifier). This allows the VCA to be essentially bypassed, which may be necessary for processing external audio signals, or for Programs that drone.

Note – if VCA Level is on full, then the Envelope Amount will have no effect.

Env Amt: 4 2 ***0…100*** Amount of VCA envelope to the VCA level.

Attack: 4 3 ***0…110*** Attack time of the VCA ADSR envelope generator

Decay: 4 4 ***0…110*** Decay time

Sustain: 4 5 ***0…100*** Sustain Level

Release: 4 6 ***0…110*** Release time

Velocity: 4 2 S ***0…100*** Amount of MIDI velocity controlling the level of the VCA envelope.

Output Pan: 4 7 ***see table*** pan settings as below. This affects the feedback; it allows signal from one channel to feedback into the other, for example.

Display	Output Pan Selection
St 1	Stereo 1 – Left channel panned fully left, Right fully to the right
St2	Stereo 2 – Left channel panned mostly left, Right mostly to the right
St3	Stereo 3 – Left channel panned somewhat left, Right somewhat to the right
Mon	Mono – Both channels mixed to the center – also useful when only using one output

rS1	Reverse Stereo 1 – Right channel panned somewhat left, Left somewhat to the right
rS2	Reverse Stereo 2 – Right channel panned mostly left, Left mostly to the right
rS3	Reverse Stereo 3 – Right channel panned fully left, Left fully to the right

Volume: 48 ***0…100*** Sets the voice volume; usually used for matching volumes between Programs.

Feedback

Feedback is implemented via two identical tuned delay lines, one for each channel – see the diagram on page 13. Since the delay is tuned, it can be played by modulating the feedback frequency, from the sequencer or other sources.

> Note – Feedback can also be used to implement plucked string physical models – use Envelope 3 with Noise as a destination (all oscillators off). Assign a sequence to Feedback Frequency, play around with different Feedback Levels, and adjust the filter cutoff frequency.

Frequency 51 ***0…48*** Sets the base frequency of the main feedback loop. It steps in semitones from C0 to C4 (0 – 48) for a four octave range. The exact frequency is influenced by other factors, such as the filter frequency and number of poles, which can drive it slightly sharp or flat.

Level 52 ***0…100*** Level of feedback. As the level goes up the feedback will eventually oscillate at the set Frequency. Medium levels of feedback add depth and movement to the sound.

Grunge 53 ***OFF…On*** When on, it enables nasty feedback at higher levels – it will not have any effect at lower levels of feedback.

Delay

The delay takes a mix of both channels as input, and provides up to three independent taps, each which can be separately time or level modulated. The output of the three taps is mixed and summed with the Left and Right channels. The delay output also can be mixed back to the input of the delay for more ambience, repeating delays, or tuned feedback if the feedback level is set high.

A second feedback path takes the delay output and routes it back to the input of the analog filter; this path can be used for more extreme feedback effects.

Note – if all three Delay taps are in use, the Levels of each should be set to lower amounts to prevent overload distortion.

Time 1: 5 4 ***0…150, sync*** Sets the delay time of the first delay tap. 0 – 150 will adjust the delay from zero to 1 second (at 16 bits 48KHz sampling), no compression. The middle range steps are in tuned semitones (noticeable with Feedback 1 turned up high). Since delay is a time measurement, higher delay numbers are lower frequencies. Step 22 corresponds to C7 (2,093 Hz), down to step 94 which is tuned to C1 (32.7 Hz).

After 150 are the sync delay times as shown in the table below. The delay time can be set in multiples of a single sequencer step, or exact divisions of a step.

Note - depending on the current sequence speed, the longer sync delays may not be reachable. For example, at sequence speed of 60 BPM / 4n (quarter note) each beat takes one second, so if you set it to S 2 (Delay is 2 steps in length), the delay should be two seconds. But, there is only enough memory for one second of delay, so it will not work. When too slow, simply clamping it at one second which would not likely be a multiple of the step time, would be the wrong approach. In Evolver if the requested time is too long, it divides the time in half until it fits within the one second of available memory. So, don't be surprised if changing longer sync delay times do not make any difference to the sound.

Display	Timing Sync
S32	Delay is 32 steps in length
S 16	Delay is 16 steps in length
S 8	Delay is 8 steps in length
S 4	Delay is 4 steps in length
S 2	Delay is 2 steps in length
S 1	Delay is 1 step in length
St2	Delay is one-half step in length
St4	Delay is one-quarter step in length
St8	Delay is one-eighth step in length
S 16	Delay is one-sixteenth step in length
S 6	Delay is 6 steps in length
S 3	Delay is 3 steps in length
S 15	Delay is one and a half steps in length
S05	Delay is one half of a step in length
St3	Delay is one-third step in length
St6	Delay is one-sixth step in length

Level 1: 5 5 S ***0…100*** Sets the delay amount of the first delay tap. The left and right channels are mixed into a single delay.

Feedback 1: 5 6 ***0…100*** Amount of feedback from the summed output of all the delay taps to the input of the delay.

Feedback 2: 57 ***0…100*** Amount of feedback from the summed output of all the delay taps to the input of the filter for more extreme effects.

Time 2: 54S ***0…150, sync*** Sets the delay time of the second delay tap, same ranges as Time 1.

Level 2: 55S ***0…100*** Sets the delay amount of the second delay tap.

Time 3: 56S ***0…150, sync*** Sets the delay time of the third delay tap, same ranges as Time 1.

Level 4: 57S ***0…100*** Sets the delay amount of the third delay tap.

LFOs

There are four identical Low Frequency Oscillators (LFOs) in Evolver. Following is the description of LFO 1; the other three are the same, but obviously in different matrix locations.

Frequency: 61 ***0…150, sync*** Selects the frequency of LFO. Range 0 – 150 for unsynced LFO; speed ranges from slow (30 seconds) to very fast – at 90 (8 HZ, C-2) and above the speed steps in semitones, up to 150 (261 Hz, middle C).

> Note - some of the analog functions can't respond very well to the fastest LFO speeds, due to speed limitations of the control voltages; but it will certainly generate some interesting sounds.

Above 150 are the sync speeds as follows:

Display	Timing Sync
S32	Sequence speed divided by 32; i.e. one LFO cycle takes 32 steps
S 16	Sequence speed divided by 16
S 8	Sequence speed divided by 8
S 4	Sequence speed divided by 4
S 2	Sequence speed divided by 2
S 1	One cycle per step
St2	Two cycles per step
St4	Four cycles per step
St8	Eight cycles per step
S 16	Sixteen cycles per step

Shape: 6 2 ***see table*** Selects the LFO waveshape:

Display	LFO Shape
tri	Triangle
rSA	Reverse Sawtooth
SAt	Sawtooth
PUL	Pulse (square wave)
rnd	Random – changes once per cycle for sample-and-hold effects

Amount: 6 3 ***0…100*** Sets the amount of LFO.

Destination: 6 4 ***see table*** LFO 1 destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Envelope 3

Envelope 3 is a general purpose envelope for modulation purposes.

Amount: 7 1 ***-99…+99*** Amount of envelope 3

Destination: 7 2 ***see table*** Envelope 3 destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Delay: 7 1 S ***0…100*** Delay time of Envelope 3, prior to Attack

Attack: 7 3 ***0…110*** Attack time of ADSR envelope generator 3

Decay: 7 4 ***0…110*** Decay time

Sustain: 7 5 ***0…100*** Sustain Level

Release: 7 6 ***0…110*** Release time

Velocity: 7 2 S ***0…100*** Amount of MIDI velocity controlling the level envelope 3.

Miscellaneous Audio Parameters

Output Hack: 58 ***0…14*** Trashes the output signal, quite rudely.

Distortion: 58S ***o0…99, i0…99*** Amount of distortion. If set to o00 to o99, the distortion is after the analog filter and VCA, before the Delay. If set to i00 to i99, the distortion is before the analog filter, and only affects external input. There are two separate distortions, one for each channel.

Note - there is a built-in noise gate that is enabled when distortion is not zero. If you want to use the noise gate but without distortion, use a distortion setting of i01 (noise gate on input signal), or o01 for a noise gate after the analog electronics. The noise gate uses the Left channel signal level to gate both channels.

Noise Vol: 85 ***0…100*** The volume of white noise mixed into the filter. The same amount goes into both channels.

Ext In Vol: 86 ***0…100*** The volume of external audio input connected to Left In and/or Right In.

Ext In Mode: 87 ***see table*** Selects the external input mode:

Display	External Audio Input Mode
St	Stereo – the left channel in goes to the left channel, right to right.
L	Left – the left channel in goes to both channels (mono in).
r	Right – the right channel in goes to both channels (mono in).
SPL	Split - A mono audio signal is input on the Left Input; a separate control audio signal (for envelope follower, peak hold, and clock source) into the Right Input.

Input Hack: 88 ***0…14*** Trashes the external input signal, quite rudely. But, the analog filter tames it nicely. A good way to mess up a clean stereo signal.

Trigger/Interface Parameters

There are different ways to control Evolver; using the internal sequencer, using external MIDI controllers (keyboards, computers, etc), or using external audio sources. And, there are ways of combining these, such as gating the sequencer from a keyboard.

Control consists mainly of triggers for the envelopes, and note numbers for the oscillators. Beyond that there are all the additional modulation sources/destinations and MIDI controls. Following are the parameters used to select the different control modes.

Trigger Sel: 77 ***see table*** Selects the source of triggers/gates for the envelope generators.

Display	Envelope Trigger Selections
ALL	The envelopes will be triggered by either the sequencer or MIDI notes. When triggered by the sequencer, the gates are on for half the step time. Simply adjust the envelope parameters (ADSR) for the desired effect.
SEQ	The envelopes will be triggered by the sequencer only.
MIdI	The envelopes will be triggered by MIDI notes only.
MdrS	The envelopes will be triggered by MIDI, and the sequencer will be reset on every note (if it is running). The sequencer will not trigger the envelopes.
MS	Combo mode – the envelopes will only be triggered when a MIDI note is held and the sequencer is running; in other words the MIDI notes will gate the sequencer
MSr	Combo mode 2 – same as Combo, except every time a MIDI note is hit, the sequencer is reset to step 1.
E.I	The envelopes are gated by the Left external audio input signal level, in other words, when the signal gets above a fixed threshold, the envelopes start. The envelopes then go into the phase when the signal level drops below a second fixed threshold.
E.Ir	Same as external in, but also resets the sequencer to step 1.
E.IS	External In signal will gate the sequencer (sequencer must be on).
ESr	External In signal will gate the sequencer (sequencer must be on). And also resets the sequencer to step 1 on each new gate.
MS1	Plays a sequence once (according to the length of Sequence 1) when a new MIDI note is received. The sequence is not restarted on multiple MIDI notes until it finishes and stops.
M1r	Also plays a MIDI sequence once, but will re-start the sequence on each MIDI note.

Key Off/Xpose: 7 8 ***Off, -36…+36*** Enables and transposes MIDI notes. If **OFF**, MIDI notes are ignored. Otherwise, it transposes midi notes from –36 to +36 semitones (+/- 3 octaves).

Note – this is an important parameter! When this is off, MIDI notes will not work. This parameter, with the Trigger Select (above) are the main controls for selecting how Evolver plays.

Another note – you will find that there are other interactions between the sequencer and MIDI. For example, if you make a Program using the sequencer, you will likely set the Oscillator frequencies up to the desired pitch range. But, if you then try to play this Program from a keyboard, the pitches will likely be too high. Rather than lowering all the oscillator frequencies (which would mess up the sequence!) you can simply use the transpose here.

Key Mode: 1 8 S ***see table*** Selects the key mode when playing from a MIDI keyboard:

Display	MIDI input mode
LO	Low note priority
LOr	Low note priority, re-trigger envelopes
hi	High note priority
hir	High note priority, re-trigger envelopes
LA	Last note hit priority
LAr	Last note hit priority, re-trigger envelopes

P Bend Range: 1 7 S ***0…12*** Pitch Bend Range, in semitones.

Miscellaneous Timing Parameters

BPM: 1 3 S ***30…250*** The Programmed basic speed for the sequencer in BPM. Works the same as the BPM in Main, but is only active when “Use Preset Tempo” is on. When Use Preset Tempo is on, changing this parameter also changes the main BPM, and vise-versa. When off, changing this parameter has no effect.

Clock Div: 1 4 S ***see table*** Used as a clock divider to provide a wider range of sequencer speeds. Works the same as the BPM in main, but is only active when “Use Preset Tempo” is on. When on, changing this parameter also changes the main Clock Divide (see page 14), and vise-versa. When off, changing this parameter has no effect.

Miscellaneous Modulation Parameters

Seq 1 Dest: 8 1 ***see table*** Sequence 1 Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Seq 2 Dest: 8 2 ***see table*** Sequence 2 Destination

Seq 3 Dest: 8 3 ***see table*** Sequence 3 Destination

Seq 4 Dest: 8 4 ***see table*** Sequence 4 Destination

Osc Slop: 1 6 S ***0…5*** The amount of random oscillator frequency slop. The analog and digital oscillators in Evolver are very accurate, and will not drift. This works great for accurate sounds, and allows precise de-tuning. The Oscillator Slop parameter allows subtle amounts of frequency drift. For larger amounts, use a random LFO or white noise mod.

Exp/Lin Env: 4 1 S ***Exp, Lin*** Selects whether all three envelopes have a linear (straight line) shape, or exponential (curved). Exponential is the more natural of the two.

Mod 1 Source: 3 6 S ***see table*** General purpose modulation source select – see list on page 40 for possible sources. Since all mod sources in Evolver have a single destination, the four general purpose Mods allow a method to send a mod source (such as a sequence or LFO) to another destination, with a different amount. Also, there are some additional mod sources such as noise and the digital oscillators available, allowing audio-rate modulation. As mentioned above, there are some destinations that are not able to keep up with audio mod, but it's fun anyway.

> Note - these mod sources are not filtered, so a MIDI controller going through this route will react quicker, but may produce stepping noise, depending on the controller. For filtered (smoothed) MIDI controller operation, use the direct Pressure, Mod Wheel, Breath Control, or Foot Control parameters.

Mod 1 Amt: 3 7 S ***-99…+99*** Amount of Mod 1 modulation.

M1 Destination: 3 8 S ***see table*** Mod 1 Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Mods 2 – 4: Same as Mod 1

In Peak Amt: 7 3 S ***-99…+99*** Amount of Peak Hold modulation. Takes the momentary peak of the left external audio input, and uses it as a modulation signal.

Destination: 7 4 S ***see table*** Peak Mod Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Env Fol Amt: 7 5 S ***-99…+99*** Amount of Envelope Follower modulation. Generates an envelope from the Left external audio input, and uses it as a modulation signal.

Destination: 7 6 S ***see table*** Envelope Follower Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Velocity Amt: 7 7 S ***-99…+99*** Amount of MIDI Velocity modulation. The Velocity of the most recent MIDI note is used.

Destination: 7 7 S ***see table*** Velocity Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Mod Wheel Amt: 8 1 S ***-99…+99*** Amount of MIDI Mod Wheel modulation. This parameter has a smoothing filter, which will clean up messy MIDI controller data into a clean response. If you want to bypass the filtering, use one of the four General Purpose Modulation sets, which are unfiltered.

Destination: 8 2 S ***see table*** Mod Wheel Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Pressure Amt: 8 3 S ***-99…+99*** Amount of MIDI Pressure modulation, either poly or channel pressure. This parameter has a smoothing filter, which will clean up messy MIDI controller data into a clean response. If you want to bypass the filtering, use one of the four General Purpose Modulation sets, which are unfiltered.

Destination: 8 4 S ***see table*** Pressure Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Breath Amt: 8 5 S ***-99…+99*** Amount of MIDI Breath controller modulation. This parameter has a smoothing filter, which will clean up messy MIDI controller data into a clean response. If you want to bypass the filtering, use one of the four General Purpose Modulation sets, which are unfiltered.

Destination: 8 6 S ***see table*** Breath controller Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Foot Amt: 8 7 S ***-99…+99*** Amount of MIDI Foot controller modulation. This parameter has a smoothing filter, which will clean up messy MIDI controller data into a clean response. If you want to bypass the filtering, use one of the four General Purpose Modulation sets, which are unfiltered.

Destination: 8 8 S ***see table*** Foot controller Destination - see the Modulation Destination table on page 38 for a list of possible destinations.

Modulation Destinations

Display	Destination
OFF	No destination selected
O1F	Oscillator 1 Frequency
O2F	Oscillator 2 Frequency
O3F	Oscillator 3 Frequency
O4F	Oscillator 4 Frequency
OAF	Oscillator All Frequency – goes to all four
O1L	Oscillator 1 Level
O2L	Oscillator 2 Level
O3L	Oscillator 3 Level
O4L	Oscillator 4 Level
OAL	Oscillator All Level
noL	Noise Level
E1L	External In Level
O1P	Oscillator 1 Pulse width
O2P	Oscillator 2 Pulse width
OAP	Oscillator All Pulse width
F43	Frequency Mod (FM) Amount; Osc 4 -> 3
F34	Frequency Mod (FM) Amount; Osc 3 -> 4
r43	Ring Mod (Amplitude) Amount; Osc 4 -> 3
r34	Ring Mod (Amplitude) Amount; Osc 3 -> 4
F1L	Lowpass filter frequency
FLS	Filter Split –separation between left / right
rES	Resonance
h1P	Highpass filter
UcA	VCA amount
PAn	Pan
FbF	Feedback frequency
FbA	Filter Amount
dt1	Delay 1 Time
dt2	Delay 2 Time
dt3	Delay 3 Time
dtA	Delay All Time
dA1	Delay 1 Amount
dA2	Delay 2 Amount
dA3	Delay 3 Amount
dAA	Delay All Amount
dF1	Delay Feedback 1
dF2	Delay Feedback 2

L 1F	LFO 1 Frequency
L2F	LFO 2 Frequency
L3F	LFO 3 Frequency
L4F	LFO 4 Frequency
LAF	LFO All Frequency
L 1A	LFO 1 Amount
L2A	LFO 2 Amount
L3A	LFO 3 Amount
L4A	LFO 4 Amount
LAA	LFO A Amount
E 1L	Envelope 1 Amount (Level)
E2L	Envelope 2 Amount (Level)
E3L	Envelope 3 Amount (Level)
EAL	Envelope All Amount (Level)
E 1A	Envelope 1 Attack Rate
E2A	Envelope 2 Attack Rate
E3A	Envelope 3 Attack Rate
EAA	Envelope All Attack Rate
E 1d	Envelope 1 Decay Rate
E2d	Envelope 2 Decay Rate
E3d	Envelope 3 Decay Rate
EAd	Envelope All Decay Rate
E 1r	Envelope 1 Release Rate
E2r	Envelope 2 Release Rate
E3r	Envelope 3 Release Rate
EAr	Envelope All Release Rate
F 1F	Filter 1 (Left) lowpass filter cutoff frequency
F2F	Filter 2 (Right) lowpass filter cutoff frequency
F 1r	Filter 1 (Left) lowpass filter resonance
F2r	Filter 2 (Right) lowpass filter resonance
d 15	Distortion - will not work if distortion is set to 0 (off) or 1 (noise gate select)

Additional Sequencer-Only Modulation Destinations

Display	Destination
cL0	Sequencer clock (BPM) multiplier
nn0	MIDI note number
UEL	MIDI Velocity
nMd	MIDI Mod Wheel
nPr	MIDI Pressure
nbr	MIDI Breath Controller
nFt	MIDI Foot Controller

Modulation Sources

Display	Source
OFF	No Source selected
SE 1	Sequence 1
SE2	Sequence 2
SE3	Sequence 3
SE4	Sequence 4
LF 1	LFO 1
LF2	LFO 2
LF3	LFO 3
LF3	LFO 4
FEn	Filter Envelope
AEn	Amp (VCA) Envelope
En3	Envelope 3
E iP	External Audio Input Peak
E iE	External Audio Envelope Follower
MPb	Midi - Pitch Bend
MMU	Midi - Mod Wheel
MPr	Midi - Pressure
Mbr	Midi - Breath Controller
MFt	Midi - Foot Controller
MUE	Midi – Note Velocity
Mno	Midi – Note Number
MEP	Midi – Expression
no i	Noise
053	Oscillator 3
054	Oscillator 4

MIDI Implementation

Evolver Receives MIDI data according to the mode controls in the Main Section. There is interaction between some of the controls to determine the overall response of Evolver to MIDI data; these controls are repeated below:

MIDI Channel Select which MIDI channel to send/receive data, 1 to 16. ALL receives on any channel.

MIDI Rec: MIDI Receive – determines what MIDI data to receive.

Display	MIDI Receive Operation
OFF	No MIDI data received
ALL	All MIDI data received
Pro	Only MIDI program changes received (along with note/controller data)
PAr	Only MIDI parameters received (along with note/controller data)

MIDI Xmit: MIDI transmits – determines what MIDI data to send.

Display	MIDI Transmit Operation
OFF	No MIDI data sent
ALL	All MIDI data sent
Pro	Only MIDI program changes sent
PAr	Only MIDI parameters received

Poly Chain: Poly Chain is used to link multiple Evolvers into a polyphonic system by selectively passing MIDI data through to the MIDI out jack where it can be routed to another Evolver. Note that MIDI clocks are handled separately per the MIDI Clock parameter. Settings:

Display	Poly Chain Status
OFF	MIDI operation is normal.
ALL	All MIDI information is passed through to the MIDI out jack
not	Only MIDI note data is passed through to the MIDI out jack.

MIDI Clock: Selects the MIDI clock status, and enables External sequencer triggers, as follows:

Display	MIDI Clock Setting
OFF	MIDI clock is neither sent nor received
OUt	MIDI clock is sent
In	MIDI clock is received
I-O	MIDI clock is received and transmitted
E1	Left External Input is used to clock the sequencer. When the signal goes above a fixed threshold, the sequencer steps once. Note that internal functions do not sync up when this mode is used, and the Clock Divide and BPM knob are ignored.
nOt	Each incoming MIDI note on will advance the sequencer one step.
in-	MIDI clock is received, but MIDI start/stop/continue messages are ignored.

Trigger Sel Selects the source of triggers/gates for the envelope generators.

Display	Envelope Trigger Selections
ALL	The envelopes will be triggered by either the sequencer or MIDI notes. When triggered by the sequencer, the gates are on for half the step time. Simply adjust the envelope parameters (ADSR) for the desired effect.
SEQ	The envelopes will be triggered by the sequencer only.
MId	The envelopes will be triggered by MIDI notes only.
Mdr	The envelopes will be triggered by MIDI, and the sequencer will be reset on every note (if it is running). The sequencer will not trigger the envelopes.
MS	Combo mode – the envelopes will only be triggered when a MIDI note is held and the sequencer is running; in other words the MIDI notes will gate the sequencer
MSr	Combo mode 2 – same as Combo, except every time a MIDI note is hit, the sequencer is reset to step 1.
E1	The envelopes are gated by the Left external audio input signal level, in other words, when the signal gets above a fixed threshold, the envelopes start. The envelopes then go into the phase when the signal level drops below a second fixed threshold.
E1r	Same as external in, but also resets the sequencer to step 1.
E1S	External In signal will gate the sequencer (sequencer must be on).
ESr	External In signal will gate the sequencer (sequencer must be on). And also resets the sequencer to step 1 on each new gate.
MS1	Plays a sequence once (according to the length of Sequence 1) when a new MIDI note is received. The sequence is not restarted on multiple MIDI notes until it finishes and stops.
M1r	Also plays a MIDI sequence once, but will re-start the sequence on each MIDI note.

Key Off/Xpose Enables and transposes MIDI notes. If **OFF**, MIDI notes are ignored. Otherwise, it transposes midi notes from –36 to +36 semitones (+/- 3 octaves).

Key Mode Selects the key mode when playing from MIDI:

Display	MIDI input mode
LO	Low note priority
LOr	Low note priority, re-trigger envelopes
hi	High note priority
hir	High note priority, re-trigger envelopes
LA	Last note hit priority
LAr	Last note hit priority, re-trigger envelopes

RESET button: Acts as a MIDI all-notes-off, and resets all MIDI controllers when hit while the sequencer is not running.

MIDI Messages

Received Channel Messages

Status	Second	Third	Description
1000 nnnn	0kkkkkkk	0vvvvvvv	Note Off. Velocity is ignored
1001 nnnn	0kkkkkkk	0vvvvvvv	Note On. Note off if vvvvvvv = 0
1010 nnnn	0kkkkkkk	0vvvvvvv	Polyphonic Key Pressure
1011 nnnn	0vvvvvvv	0vvvvvvv	Control Change; see “Received Controller Messages” table following
1100 nnnn	0ppppppp		Program change, 0 – 127 for Programs 1 – 128 within current Bank
1101 nnnn	0vvvvvvv		Channel Pressure
1110 nnnn	0vvvvvvv	0vvvvvvv	Pitch Bend LS Byte then MS Byte

Notes:

0kkkkkkk	Note number 0 - 127
nnnn	Channel number 0 to 15 (MIDI channel 1-16). Ignored if MIDI channel set to ALL
0vvvvvvv	Value

Received Controller Messages

Status	Second	Third	Description
1011 nnnn	0000 0001	0vvvvvvv	Mod Wheel – directly assign-able controller
1011 nnnn	0000 0010	0vvvvvvv	Breath Controller – directly assign-able controller
1011 nnnn	0000 0100	0vvvvvvv	Foot Controller – directly assign-able controller
1011 nnnn	0000 0111	0vvvvvvv	Volume – Combined with Master Volume and Program Volume
1011 nnnn	0000 1101	0vvvvvvv	Expression Controller – directly assign-able controller
1011 nnnn	0010 0000	0vvvvvvv	Bank Select – 0 to 3 selects banks 1 to 4; others ignored
1011 nnnn	0100 0000	0vvvvvvv	Damper pedal – holds envelopes in Sustain if > 0100 0000
1011 nnnn	0111 1101	0vvvvvvv	All Notes Off – clear all MIDI notes
1011 nnnn	0111 1011	0vvvvvvv	Reset All Controllers – clears all MIDI controllers to 0, MIDI volume to maximum

System Common Messages

Status	Second	Third	Description
1111 0010	0vvvvvvv	0vvvvvvv	Song Position Pointer – LS Byte then MS Byte. Positions depends on Clock Divide. For example, if Clock Divide is set to 4ṇ (quarter note), then the sequence is 4 measures of 4/4 in length. The Song Position will calculate correctly within the four bars.

System Real-time Messages

Status	Description
1111 1000	Timing Clock
1111 1010	Start – starts the sequencer from step 1
1111 1011	Continue – re-starts the sequencer from the current step
1111 1100	Stop – Stops the sequencer

Universal System Exclusive Message (Device Inquiry)

Status	Description
1111 0000	System Exclusive (SysEx)
0111 1110	Non-realtime message
0vvv vvvv	If MIDI channel is set to 1-16, 0vvvvvvv must match (unless MIDI Channel = ALL); always responds if 0vvvvvvv = 0111 1111.
0000 0110	Inquiry Message
0000 0001	Inquiry Request
1111 0111	End of Exclusive (EOX)

Evolver responds with:

Status	Description
1111 0000	System Exclusive (SysEx)
0111 1110	Non-realtime message
0vvv vvvv	If MIDI Channel = ALL, 0vvvvvvv = 0111 1111. Otherwise 0vvvvvvv = Channel Number 0-15.
0000 0110	Inquiry Message
0000 0010	Inquiry Reply
0000 0001	DSI ID
0010 0000	Evolver ID (Family LS)
0000 0000	Family MS
0000 0000	Family Member LS
0000 0000	Family Member MS
0vvv vvvv	PIC Software version
0000 0000	
0vvv vvvv	DSP Software version
0000 0000	
1111 0111	End of Exclusive (EOX)

System Exclusive Messages

Program Parameters

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 0001	Program Parameter
0vvv vvvv	Parameter Number 0 – 127. Parameters are in the order of the front panel, with the 64 shift parameters following the non-shift parameters. The Parameter data starts on page 54.
0000 vvvv	Parameter value, LS Nibble
0000 vvvv	Parameter value, MS Nibble
1111 0111	End of Exclusive (EOX)

Sequencer Parameters

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 1000	Sequence Parameter
00vv vvvv	Sequence step 0 – 63. 0 – 15 are sequence 1 steps, 16- 31 for sequence 2, etc.
0000 vvvv	Step value, LS Nibble
0000 vvvv	Step value, MS Nibble
1111 0111	End of Exclusive (EOX)

Main Parameters

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 1001	Main Parameter
0000 vvvv	Main Parameter Number 0 – 14. Main Parameters are listed starting on page 53.
0000 vvvv	Parameter value, LS Nibble
0000 vvvv	Parameter value, MS Nibble
1111 0111	End of Exclusive (EOX)

Program Data Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 0010	Program Data
0000 00vv	Bank Number, 0 - 3
0vvv vvvv	Program Number, 0 - 127
0vvv vvvv	220 bytes in “packed MS bit” format (see below). Includes 128 bytes of Program parameters and 64 bytes of Sequence data.
1111 0111	End of Exclusive (EOX)

Edit Buffer Data Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 0011	Edit Buffer Data
0vvv vvvv	220 bytes in “packed MS bit” format (see next page). Includes 128 bytes of Program parameters and 64 bytes of Sequence data.
1111 0111	End of Exclusive (EOX)

Waveshape Data Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 1010	Waveshape Data
0vvv vvvv	Waveshape number, 0 – 127, corresponds to Waveshapes 1 – 128. Only Waveshapes 96 – 127 can be sent to Evolver and saved as user programmable; others will be ignored.
0vvv vvvv	293 bytes in “packed MS bit” format (see next page). The 293 bytes = 256 data bytes, in the format of LS byte/MS byte, for the 128 16-bit words that make up a waveshape. The ROM Waveshapes are 12 bit two’s complement (to match the VS), but the User Waveshapes (97 – 128) can be a full 16 bits.
1111 0111	End of Exclusive (EOX)

Program Name Data Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0001 0001	Program Name Data
0000 00vv	Bank Number, 0 - 3
0vvv vvvv	Program Number, 0 - 127
0vvv vvvv	16 name data bytes. Note that Evolver stores the basic 7 bit data. The assumption is that the data is ACSCII
1111 0111	End of Exclusive (EOX)

Main Parameters Data Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 1111	Main Parameter Data
0vvv vvvv	32 nibbles (LS then MS) for 16 Main parameters. Main Parameters are listed starting on page 53.
1111 0111	End of Exclusive (EOX)

Start/Stop Button

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0001 0010	Start/Stop button
1111 0111	End of Exclusive (EOX)

Reset Button

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 0100	Reset Button
1111 0111	End of Exclusive (EOX)

Shift Button On

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0001 0011	Shift Button On
1111 0111	End of Exclusive (EOX)

Shift Button Off

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0001 0100	Shift Button Off
1111 0111	End of Exclusive (EOX)

Packed Data Format

Data is packed in 8 byte “packets”, with the MS bit stripped from 7 parameter bytes, and packed into an eighth byte, which is sent at the start of the 8 byte packet.

Example:

Input Data

```
1 A7 A6 A5 A4 A3 A2 A1 A0
2 B7 B6 B5 B4 B3 B2 B1 B0
3 C7 C6 C5 C4 C3 C2 C1 C0
4 D7 D6 D5 D4 D3 D2 D1 D0
5 E7 E6 E5 E4 E3 E2 E1 E0
6 F7 E6 E5 E4 E3 E2 E1 E0
7 G7 G6 G5 G4 G3 G2 G1 G0
```

Packed MIDI data

```
1   00 G7 F7 E7 D7 C7 B7 A7
2   00 A6 A5 A4 A3 A2 A1 A0
3   00 B6 B5 B4 B3 B2 B1 B0
4   00 C6 C5 C4 C3 C2 C1 C0
5   00 D6 D5 D4 D3 D2 D1 D0
6   00 E6 E5 E4 E3 E2 E1 E0
7   00 E6 E5 E4 E3 E2 E1 E0
8   00 G6 G5 G4 G3 G2 G1 G0
```

This is why it takes 220 MIDI bytes to transmit 192 Program/Sequence data bytes, and 293 bytes to send 256 Waveshape bytes.

Request Program Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 0101	Request Program Transmit
0000 00vv	Bank Number, 0 - 3
0vvv vvvv	Program Number, 0 - 127
1111 0111	End of Exclusive (EOX)

Evolver will respond by sending out the Program Data in the format described in the Program Data Dump on page 47.

Request Edit Buffer Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 0110	Request Edit Buffer Transmit
1111 0111	End of Exclusive (EOX)

Evolver will respond by sending out the current edit buffer in the format described in the Edit Buffer Dump on page 47

Request Waveshape Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 1011	Request Waveshape Transmit
0vvv vvvv	Waveshape number, 0 - 127
1111 0111	End of Exclusive (EOX)

Evolver will respond by sending out the requested Waveshape data, in the format described in the Waveshape Data Dump on page 47.

Request Main Parameter Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0000 1110	Request Main Parameter Transmit
1111 0111	End of Exclusive (EOX)

Evolver will respond by sending out the current edit buffer in the format described in the Main Parameter Dump on page 47

Request Program Name Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0010 0000	Evolver ID
0000 0001	File Version
0001 0000	Request Program Name Transmit
0000 00vv	Bank Number, 0 - 3
0vvv vvvv	Program Number, 0 - 127
1111 0111	End of Exclusive (EOX)

Evolver will respond by sending out the Program Data in the format described in the Program Name Data Dump on page 47.

Main Parameter Data

Parameter	Range	Description
0	0 - 127	Program Number 1 - 128
1	0 - 3	Bank Number 1 - 4
2	0 - 100	Master Volume 0 - 100
3	0 - 72	Master Transpose; 0 = -36 semitones (- 3 octaves), 36 = 0 (no transpose), and 72 = +36 semitones.
4	30 - 250	BPM
5	0 - 12	Clock Divide: 0 Half Note 1 Quarter Note 2 Eighth Note 3 Eighth Note half swing 4 Eighth Note full swing 5 Eighth Note triplets 6 Sixteenth Note 7 Sixteenth Note half swing 8 Sixteenth Note full swing 9 Sixteenth Note triplets 10 Thirty-second Notes 11 Thirty-second Notes triplets 12 Sixty-Fourth Notes triplets
6	0 - 1	Use Program tempo; 0 = Off, 1 = On
7	0 - 6	MIDI clock select 0 Use Internal clock, don't send MIDI clock 1 Use Internal clock, send MIDI clock 2 Use MIDI clock In 3 Use MIDI clock In, and retransmit MIDI clock out 4 External In signal steps the sequencer 5 MIDI notes advance sequencer 6 Use MIDI clock In, but ignore MIDI Start/Stop
8	0 - 1	Lock Sequence; 0 = Off, 1 = On
9	0 - 2	Poly Chain 0 Normal MIDI operation 1 All MIDI control data is echoed 2 Only MIDI note data is echoed
10	0 - 8	Input Gain 0 No gain 1 + 3 db 2 + 6 db 3 + 9 db 4 + 12 db 5 + 15 db 6 + 18 db 7 + 21 db 8 + 24 db
11	0 - 100	Master Fine Tune; 0 = -50 cents, 50 = 0 (centered), 100 = + 50 cents
12	0 - 3	MIDI Receive 0 Off; no MIDI is received

		1 All MIDI received 2 Only MIDI program changes received (along with note/controller data) 3 Only parameters received (along with note/controller data)
13	0 - 3	MIDI Transmit 0 Off; no MIDI is transmitted 1 All MIDI is transmitted 2 Only Program Changes transmitted 3 Only parameters are transmitted
14	0 - 16	MIDI Channel; if = 0, data received on all MIDI channels. Otherwise = channel number 1 – 16.

Note: Parameter 15 not available, since MIDI dump requests are already defined, see Program Dump Request on page 51.

Program Parameter Data

Parameter	Range	Description
0	0 - 120	Oscillator 1 Frequency, 0 – 120 in semitones (10 octave range)
1	0 - 100	Oscillator 1 Fine Tune; 0 = -50 cents, 50 = 0 (centered), 100 = + 50 cents
2	0 - 102	Oscillator 1 Shape 0 Sawtooth 1 Triangle 2 Sawtooth/triangle mix 3 – 102 Pulse Wave, Pulse width 0 - 99
3	0 - 100	Oscillator 1 Level
4	0 - 120	Oscillator 2 Frequency, 0 – 120 in semitones (10 octave range)
5	0 - 100	Oscillator 2 Fine Tune; 0 = -50 cents, 50 = 0 (centered), 100 = + 50 cents
6	0 - 102	Oscillator 2 Shape 0 Sawtooth 1 Triangle 2 Sawtooth/triangle mix 3 – 102 Pulse Wave, Pulse width 0 - 99
7	0 - 100	Oscillator 2 Level

Parameter	Range	Description
8	0 - 120	Oscillator 3 Frequency, 0 – 120 in semitones (10 octave range)
9	0 - 100	Oscillator 3 Fine Tune; 0 = -50 cents, 50 = 0 (centered), 100 = + 50 cents
10	0 - 127	Oscillator 3 Shape 1 - 128
11	0 - 100	Oscillator 3 Level
12	0 - 120	Oscillator 4 Frequency, 0 – 120 in semitones (10 octave range)
13	0 - 100	Oscillator 4 Fine Tune; 0 = -50 cents, 50 = 0 (centered), 100 =

		+ 50 cents
14	0 - 127	Oscillator 4 Shape 1 - 128
15	0 - 100	Oscillator 4 Level

Parameter	Range	Description
16	0 - 164	Filter Frequency, steps in semitones
17	0 - 198	Filter Envelope Amount; -99 to +99
18	0 - 110	Filter Envelope Attack
19	0 - 110	Filter Envelope Decay
20	0 - 100	Filter Envelope Sustain
21	0 - 110	Filter Envelope Release
22	0 - 100	Resonance
23	0 - 100	Filter Keyboard Amount

Parameter	Range	Description
24	0 - 100	VCA Level
25	0 - 100	VCA Envelope Amount
26	0 - 110	VCA Envelope Attack
27	0 - 110	VCA Envelope Decay
28	0 - 100	VCA Envelope Sustain
29	0 - 110	VCA Envelope Release
30	0 - 6	Output Pan 0 Left channel panned fully left, Right fully to the right 1 Left channel panned mostly left, Right mostly to the right 2 Left channel panned somewhat left, Right somewhat to the right 3 Mono 4 Right channel panned somewhat left, Left somewhat to the right 5 Right channel panned mostly left, Left mostly to the right 6 Right channel panned fully left, Left fully to the right
31	0 - 100	Program Volume

Parameter	Range	Description
32	0 - 48	Feedback Frequency – steps in semitones
33	0 - 100	Feedback Amount
34	0 - 1	Grunge; 0 = off, 1 = on
35	0 - 166	Delay 1 Time
36	0 - 100	Delay 1 Level
37	0 - 100	Delay sum feedback to Delay input
38	0 - 100	Delay sum feedback to filter input
39	0 - 14	Output hack amount

Parameter	Range	Description
40	0 - 160	LFO 1 Frequency; 0 – 150 unsynced frequency 151 Sequence speed divided by 32 152 Sequence speed divided by 16 153 Sequence speed divided by 8 154 Sequence speed divided by 4 155 Sequence speed divided by 2 156 One cycle per step 157 Two cycles per step 158 Four cycles per step 159 Eight cycles per step 160 Sixteen cycles per step
41	0 - 4	LFO 1 Shape 0 Triangle 1 Reverse Sawtooth 2 Sawtooth 3 Pulse (square) 4 Random
42	0 - 100	LFO 1 Amount
43	0 - 68	LFO 1 Destination (see destination table on page 60)
44	0 - 160	LFO 2 Frequency (same as LFO 1)
45	0 - 4	LFO 2 Shape (same as LFO 1)
46	0 - 100	LFO 2 Amount
47	0 - 68	LFO 2 Destination (see destination table on page 60)

Parameter	Range	Description
48	0 - 198	Envelope 3 Amount; -99 to +99
49	0 - 68	Envelope 3 Destination (see destination table on page 60)
50	0 - 110	Envelope 3 Envelope Attack
51	0 - 110	Envelope 3 Envelope Decay
52	0 - 100	Envelope 3 Envelope Sustain
53	0 - 110	Envelope 3 Envelope Release
54	0 - 11	Trigger Select 0 All - The envelopes will be triggered by either the sequencer or MIDI notes 1 Seq – The envelopes will be triggered by the sequencer only. 2 MIDI – The envelopes will be triggered by MIDI notes only. 3 MIDI Reset– Same, with sequencer reset on Note On 4 Combo - Envelopes will only be triggered with both a MIDI note and the sequencer is running 5 Combo Reset – same, with sequencer reset on Note On 6 External Input gates the envelopes 7 External Input gates the envelopes and resets the sequencer 8 External Input gates the sequencer 9 External Input gates the sequencer and resets the sequencer 10 Midi note plays sequence once 11 Midi note plays sequence once, resetting on mulitple notes

55	0 - 73	Key Off / Transpose – 0 = MIDI notes ignored. 1 = -36 semitones MIDI transpose, 37 = no transposing, 73 = +36 semitones

Parameter	Range	Description
56	0 - 75	Sequencer 1 Destination (see destination table on page 60)
57	0 - 75	Sequencer 2 Destination (see destination table on page 60)
58	0 - 75	Sequencer 3 Destination (see destination table on page 60)
59	0 - 75	Sequencer 4 Destination (see destination table on page 60)
60	0 - 100	Noise Volume
61	0 - 100	External Input Volume
62	0 - 2	External Input Mode 0 Stereo 1 Left Input channel goes to both channels 2 Right Input channel goes to both channels 3 Left channel audio, Right channel control
63	0 - 14	Input Hack Amount

Parameter	Range	Description
64	0 - 200	Glide, Oscillator 1; 101 – 199 = Fingered; 200 = osc midi off
65	0 - 1	Sync; 0 = off, 1 = on
66	30 - 250	Program tempo
67	0 - 12	Program Clock Divide (see Master Clock Divide for selections)
68	0 - 200	Glide, Oscillator 2; 101 – 199 = Fingered; 200 = osc midi off
69	0 - 5	Oscillator Slop
70	0 - 12	Pitch Bend Range, in semitones
71	0 - 5	Key Mode 0 Low note priority 1 Low note priority with re-trigger 2 High note priority 3 High note priority with re-trigger 4 Last note hit priority 5 Last note hit priority with re-trigger

Parameter	Range	Description
72	0 - 200	Glide, Oscillator 3; 101 – 199 = Fingered; 200 = osc midi off
73	0 - 100	FM, Oscillator 4 to Oscillator 3
74	0 - 4	Shape Mod Oscillator 3; 0 = Off, 1 = Sequence 1, etc.
75	0 - 100	Ring Mod, Oscillator 4 to Oscillator 3
76	0 - 200	Glide, Oscillator 4; 101 – 199 = Fingered; 200 = osc midi off
77	0 - 100	FM, Oscillator 3 to Oscillator 4
78	0 - 4	Shape Mod Oscillator 4; 0 = Off, 1 = Sequence 1, etc
79	0 - 100	Ring Mod, Oscillator 3 to Oscillator 4

Parameter	Range	Description
80	0 - 1	2/4 Pole Select; 0 = 2 Pole, 1 = 4 Pole
81	0 - 100	Filter Envelope Velocity
82	0 - 100	Filter Audio Modulation
83	0 - 100	Filter Split
84	0 – 199	Highpass Filter cutoff. 0-99 for filter on output; 100 – 199 for levels 0-99 with filter on input
85	0 - 24	Modulation 1 Source (see Source Table on page 62)
86	0 - 198	Modulation 1 Amount; -99 to +99
87	0 - 68	Modulation 1 Destination (see destination table on page 60)

Parameter	Range	Description
88	0 - 1	Linear/Exponential envelopes 0 = Exponential, 1 = Linear
89	0 - 100	VCA Envelope Velocity
90	0 - 24	Modulation 2 Source (see Source Table on page 62)
91	0 - 198	Modulation 2 Amount; -99 to +99
92	0 - 68	Modulation 2 Destination (see destination table on page 60)
93	0 - 24	Modulation 3 Source (see Source Table on page 62)
94	0 - 198	Modulation 3 Amount; -99 to +99
95	0 - 68	Modulation 3 Destination (see destination table on page 60)

Parameter	Range	Description
96	0 - 24	Modulation 4 Source (see Source Table on page 62)
97	0 - 198	Modulation 4 Amount; -99 to +99
98	0 - 68	Modulation 4 Destination (see destination table on page 60)
99	0 - 166	Delay 2 Time
100	0 - 100	Delay 2 Level
101	0 - 166	Delay 3 Time
102	0 - 100	Delay 3 Level
103	0 - 199	Distortion; 0-99 for distortion on output; 100 – 199 for levels 0-99 with distortion on input

Parameter	Range	Description
104	0 - 160	LFO 3 Frequency (same as LFO 1)
105	0 - 4	LFO 3 Shape (same as LFO 1)
106	0 - 100	LFO 3 Amount
107	0 - 68	LFO 3 Destination (see destination table on page 60)
108	0 - 160	LFO 4 Frequency (same as LFO 1)
109	0 - 4	LFO 4 Shape (same as LFO 1)
110	0 - 100	LFO 4 Amount
111	0 - 68	LFO 4 Destination (see destination table on page 60)

Parameter	Range	Description
112	0 - 100	Envelope 3 Delay
113	0 - 100	Envelope 3 Velocity
114	0 - 198	External Input Peak Amount; -99 to +99
115	0 - 68	External Input Peak Destination (see destination table on page 60)
116	0 - 198	External Input Envelope Follower Amount; -99 to +99
117	0 - 68	External Input Envelope Follower Destination (see destination table on page 60)
118	0 - 198	Velocity Amount; -99 to +99
119	0 - 68	Velocity Destination (see destination table on page 60)

Parameter	Range	Description
120	0 - 198	Mod Wheel Amount; -99 to +99
121	0 - 68	Mod Wheel Destination (see destination table on page 60)
122	0 - 198	Pressure Amount; -99 to +99
123	0 - 68	Pressure Destination (see destination table on page 60)
124	0 - 198	Breath Controller Amount; -99 to +99
125	0 - 68	Breath Controller Destination (see destination table on page 60)
126	0 - 198	Foot Controller Amount; -99 to +99
127	0 - 68	Foot Controller Destination (see destination table on page 60)

Modulation Destinations

0	No destination selected
1	Oscillator 1 Frequency
2	Oscillator 2 Frequency
3	Oscillator 3 Frequency
4	Oscillator 4 Frequency
5	Oscillator All Frequency – goes to all four
6	Oscillator 1 Level
7	Oscillator 2 Level
8	Oscillator 3 Level
9	Oscillator 4 Level
10	Oscillator All Level
11	Noise Level
12	External In Level
13	Oscillator 1 Pulse width
14	Oscillator 2 Pulse width
15	Oscillator All Pulse width
16	Frequency Mod (FM) Amount; Osc 4 -> 3
17	Frequency Mod (FM) Amount; Osc 3 -> 4
18	Ring Mod (Amplitude) Amount; Osc 4 -> 3
19	Ring Mod (Amplitude) Amount; Osc 3 -> 4
20	Filter frequency
21	Filter Split –separation between left / right
22	Resonance
23	Highpass Frequency
24	VCA amount
25	Pan
26	Feedback frequency
27	Feedback Amount
28	Delay Time 1
29	Delay Time 2
30	Delay Time 3
31	Delay Time All
32	Delay Amount 1
33	Delay Amount 2
34	Delay Amount 3
35	Delay Amount All
36	Delay Feedback 1
37	Delay Feedback 2
38	LFO 1 Frequency
39	LFO 2 Frequency
40	LFO 3 Frequency
41	LFO 4 Frequency
42	LFO All Frequency
43	LFO 1 Amount
44	LFO 2 Amount

45	LFO 3 Amount
46	LFO 4 Amount
47	LFO A Amount
48	Envelope 1 Amount
49	Envelope 2 Amount
50	Envelope 3 Amount
51	Envelope A Amount
52	Envelope 1 Attack
53	Envelope 2 Attack
54	Envelope 3 Attack
55	Envelope A Attack
56	Envelope 1 Decay
57	Envelope 2 Decay
58	Envelope 3 Decay
59	Envelope A Decay
60	Envelope 1 Release
61	Envelope 2 Release
62	Envelope 3 Release
63	Envelope A Release
64	Filter 1 (left) Cutoff Frequency
65	Filter 2 (right) Cutoff Frequency
66	Filter 1 (left) Resonance
67	Filter 2 (right) Resonance
68	Distortion

Sequencer only destinations

69	Tempo Clock multiplier
70	MIDI Note Out
71	MIDI Velocity Out
72	MIDI Mod Wheel Out
73	MIDI Pressure Out
74	MIDI Breath Controller Out
75	MIDI Foot Controller Out

Modulation Sources

0	No Source selected
1	Sequence 1
2	Sequence 2
3	Sequence 3
4	Sequence 4
5	LFO 1
6	LFO 2
7	LFO 3
8	LFO 4
9	Filter Envelope
10	Amp (VCA) Envelope
11	Envelope 3
12	External Audio Input Peak
13	External Audio Envelope Follower
14	Midi - Pitch Bend
15	Midi - Mod Wheel
16	Midi - Pressure
17	Midi - Breath Controller
18	Midi - Foot Controller
19	Midi – Note Velocity
20	Midi – Note Number
21	Midi – Expression
22	Noise
23	Oscillator 3
24	Oscillator 4

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