SOLARIS

User Guide

Version 1

John Bowen
SYNTH DESIGN

For the latest revision of this manual, visit our website:
www.johnbowen.com.

Special thanks to:

Marcos Paris, sound design Bank 1-MP
Carl Lofgren, sound design Bank 2-CL
Howard Scarr (HS), Kurt Ader (KA), and Stephen Hummel (SH), sound design Bank 3

Brent Garlow, Solaris User Guide
Scofield Kid, Solaris Signal Path diagram

And an extra special “Thank You So Much!” to Stefan Stenzel and the directors at Waldorf for their generosity in allowing me to use the Waldorf wavetables in Solaris!

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Introduction

Welcome to the world of Solaris!

Thank you for purchasing the Solaris keyboard! I’ve worked for years on this design, following my desire to merge the benefits of digital technology with a bit of “old school” layout and control. This approach intends to provide fairly quick access to a very large number of parameters (over 1250!), due to the flexible approach I decided to implement, however, as with any complex system, work flow and understanding can take time, depending on your experience and interest.

Please register your purchase of the Solaris with me at info@johnbowen.com. Once I have your name and email and serial number, I will send you links to some video tutorials to get you started. It is my hope that Solaris will provide you with many hours of exploration and enjoyment. Please let me know if you have questions or need clarification on any subjects that are not clearly explained, and I will do my best to answer.

Regards,
John Bowen

Dedication

I’d like to dedicate the Solaris project to the memory of my late mom and dad. They were always supportive and encouraging to me throughout my music career.

I’d also like to thank my wife and family for their patience and understanding, Hans Zimmer for his early enthusiasm and support of my plugins for the Scope platform, and Goffe Torgerson for having the faith and confidence in Solaris to help it along, and whose assistance in additional graphics design and mechanical engineering we could not have done without.

Also for my colleagues at Sonic Core, Holger Drenkelfort and Juergen Kindermann. It was their early efforts that enabled my dream to begin taking shape, and I will forever be grateful for their friendship and the many hours of unselfish dedication they contributed to bring the Solaris into the world. “Thank You” a million times over!

As well, all of the Sonic Core team who have worked so tirelessly to bring Solaris to life - Klaus Piehl, Julian Schmidt, Ralf Dressel, Alex Zielke, Nadia Haubrich and Adriana Leonhard.

Finally, I need to express my thanks to all those initial pre-order customers who “put their money where their mouth is” - for your unfailing faith and confidence that the Solaris would be a product worth waiting for....and having the patience for waiting! (And for much longer than any of us ever expected.) Without your support, the Solaris would have never happened.

A heartfelt “Thank You” to you all!

Table of Contents

Safety Precautions

- ➲ Avoid exposing your Solaris to moisture, dust or dirt. Do not place open liquids anywhere near the unit. If any substances get into the Solaris housing, you should switch it off, disconnect the power supply and contact a qualified service technician.
- ➲ Avoid exposing the unit to excessive heat or direct sunlight. Ensure that relatively cool air can circulate freely around the unit.
- ➲ Avoid exposing the unit to physical shock or vibrations. Make sure it is placed firmly on a flat surface.
- ➲ Only use the external power supply that was included with the unit. Never connect the Solaris to a power outlet that does not fully comply with national safety regulations. Never use an external power supply which wasn't designed to match the local voltage requirements.
- ➲ Disconnect the power whenever you are unlikely to use the Solaris for a long period of time. Always pull on the plug itself, not on the cord. Never touch the mains plug with wet hands.
- ➲ The Solaris is capable of generating levels that can cause irreversible damage to your ears, either via an external amplifier or when using headphones connected directly to the unit. Please keep levels reasonable at all times! Make sure that the equipment you connect the Solaris to matches the Solaris's requirements.

About this Manual

Typographical Standards

The following typographical standards are used in this manual:

- When referring to a physical button or other control on the Solaris's front panel, the name of the control is formatted like **this**.
- When referring to a parameter, the name of the parameter is formatted like this.
- When referring to the value of a parameter, the value is formatted like *this*.
- When referring to a panel's Main mode versus Mod(ulation) mode, the mode name is formatted like this.
- Sidebar notes, hints, etc. are formatted like this:

This is a sample of how hints and notes are formatted.

- When describing one of Solaris's panels or soft menus, the name of the parameters are often used as section headings. In those cases, the name of the parameter is formatted like this.

This is a sample parameter heading

Getting Started

Quick Start

This section is designed to get you up and running with Solaris as quickly as possible. However, Solaris is a very sophisticated device, and I highly recommend you spend the time to thoroughly read the entire user guide. The Getting Started section is especially important, as it introduces some concepts that are unique to Solaris, as well as familiarizing you with the general layout of the synthesizer and tips and tricks for navigating its user interface.

A few things to keep in mind:

➲ Unlike every other synth on the market, there are no presets or preset memory inside the Solaris! What this means is that ALL preset data (as well as the OS, samples, factory patterns, and the Global init file) reside on your CompactFlash (CF) card. DO NOT LOSE YOUR CF CARD! It is highly recommended you get a CF card reader and back up your card to a computer. You do not need a CF card to get sound from the Solaris; without a CF card inserted, a simple default patch using a Square wave should sound.

➲ For most listening applications, Outputs 1 & 2 or the headphone out are all you need. The factory presets are designed for listening from Outputs 1 & 2, or the headphone out. Outputs 1 & 2 act as Left & Right as well. If you want to use the S/PDIF output, you must change a System setting.

➲ Yes, the power supply is outside of the synth. This avoids noise in the audio, and makes things simpler in the design.

So, to get started, plug in the power supply and audio cables, insert your CF card, and turn on the Solaris. Also, it's always a good idea to have you system volume down when turning on gear. The five text displays should say, "Booting...", and the graphics (gfx) display will eventually also show a number of 'opening credits' screens, the last of which is the gracious support message from Waldorf Music, giving permission to use their Wavetables.

Your keyboard comes with a CompactFlash card that provides organization and editing of presets, arpeggiator and sequencer patterns, storage of samples, and several other basic setup files. In addition, there are a few 'hidden' commands to call up system diagnostics and calibration.

Updating the Operating System

There are two ways to update Solaris's operating system (OS).

1. There is a file in the OS folder of the CompactFlash card that came with Solaris, called, "doFlash.txt". There is a single value in the text file, either a 1 or a 0. A value of "1" will cause Solaris to automatically load the OS file in the same folder. Once the operating system is loaded, the value doFlash.txt file is rewritten as a 0, preventing Solaris from updating the OS every time you turn it on. You will see a progress screen, and a message to reboot Solaris when the OS is finished loading.
2. If you hold down **Enter** during boot up when the graphics screen first shows an image, you get a special menu that offers a menu option to load the OS from the card.

Calibration Routines

You can re-initialize the Joystick, wheels, ribbon, and aftertouch sensing by accessing Solaris's Self Test menu. Press 1, 3 and 8 on the numeric keypad simultaneously and follow the instructions shown in the main display. See "Appendix 6- Self Test Menu" on page 59 for details about the Self Test menu.

Loading samples

Samples can be in .raw or .wav format, and have a text file that describes each sample in a group (sample pool). Refer to "Appendix 5- Sample Specifications" on page 58 for details about creating sample pools. To load an existing sample pool from the CompactFlash card, access the System soft menu on the Graphic Display. Press the **Enter** button, and select from the available sample pools, as shown in Figure 1.

Samples are loaded into RAM, so the CF card can be removed while Solaris is on.

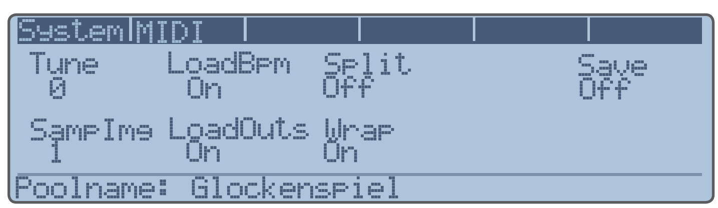

Figure 1. Loading a Sample Pool

Rotate the knob beneath the Poolname parameter to select a sample pool, then press **Enter** again to load. You will see a progress menu as samples are loaded.

Move off of the System soft menu to avoid reloading the sample pool if you hit the Enter key inadvertently.

Selecting Presets

About 30 seconds after the system is turned on, the Preset screen should be shown on the graphic display. You should get a short message about the CF card, and the Preset LED should be lit, as shown in Figure 2. If it isn't, press the

Preset button.

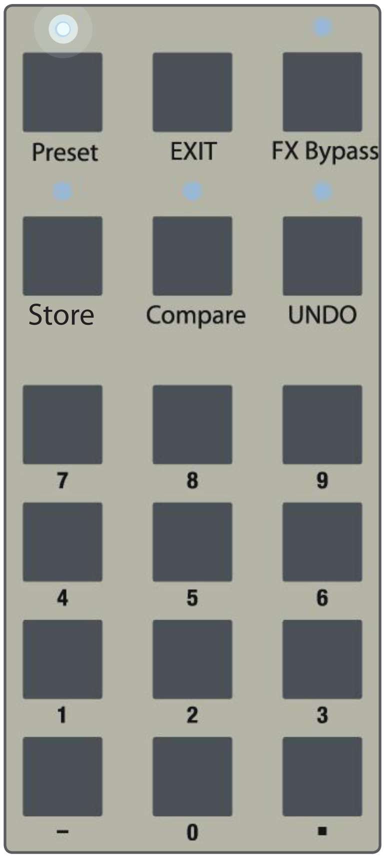

Figure 2. Numeric Keypad

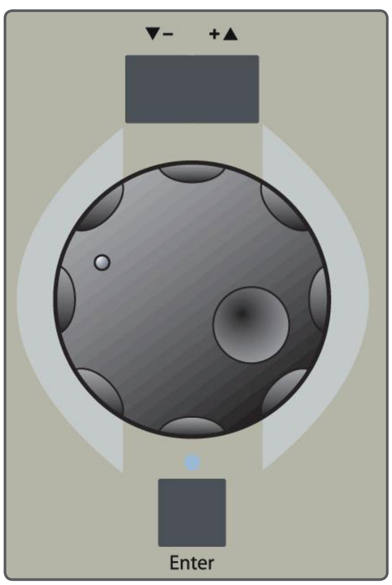

Figure 3. Data Wheel

There are several ways to select presets:

3. Use the **Inc/Dec** buttons right above the **Data Wheel** as shown in Figure 3. This automatically loads each preset as you step one by one through the bank.
4. Use the **Data Wheel** to scroll through presets. When you see the one you want, press **Enter** to load.
5. Use the keypad to directly enter a Preset number. You must press **Enter** to load the preset.
6. Use the knobs below the Graphic Display to dial up different Presets or Banks. You must then press **Enter** to load the preset.

A more convenient way to select various Banks is to use the keypad, as follows:

Any number pressed on the keypad that is followed by the decimal point button (dot) will be used as the selected Bank number. Any number following that will be used to select the Program number. If no new bank number is entered, i.e., you do not press the dot, then any number entered will be used as a Program number for the current bank. So, for example, to select Bank 3, Program 12, you would press **3.12** then **Enter**.

Preset Mode: Graphic Display

Preset Mode is enabled when you press the **Preset** button (above the numeric keypad) on, so that its LED is lit. This must be on to select any presets. As soon as an edit is made anywhere on the front panel, the Solaris will automatically leave Preset Mode to allow for editing, so when you want to play through the presets, make sure this **Preset** button is lit.

You must have a CompactFlash (CF) card inserted to select presets!

For most all of the Graphic Display functions there will be a pair of numbers on the lower right-hand corner. These indicate which page of the current functional group you are on, out of how many total pages there are for that functional group. For Preset Mode, there are 3 such pages, shown as 1/3, 2/3, and 3/3. (You can read these as page 1 of 3, page 2 of 3, page 3 of 3.) You use the up/down buttons to the left of the display to access these pages. Note: these are always working in 'wrap around' mode.

Figure 4. Preset Mode, page 1

The first page of Preset Mode, as shown in Figure 4, displays the preset name, MIDI Bank and Program number, and the Category logic and Filtering. The bottom line of the Graphic Display will always show you current information when any knob is selected. The initial data displayed when selecting a Preset is the preset name and the two programmed categories (if there are any programmed), shown as C1: and C2:

Figure 5. Preset Mode, page 2

The second page, shown in Figure 5, allows you to assign 5 knobs as Performance Knobs for any preset parameter in the synth. The third page, shown in Figure 6, allows you to view 10 presets at a time, to get a better overview of where you are in the bank. Use the **Data Wheel** to scroll through the preset names here. Note that the example shown has category filtering enabled, so the list of presets displayed on page 3 is limited to those that match the selected criteria of C1:Arpeggio OR C2:Bright.

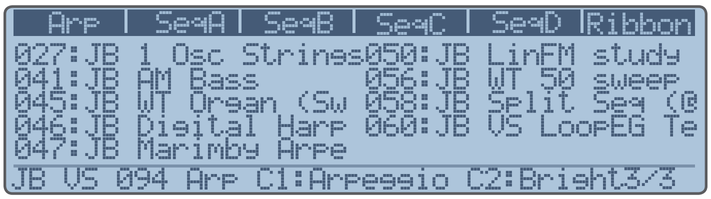

Figure 6. Preset Mode, page 3 with Category Filtering on

About Preset Categories

When you save (store) a preset, you have the option of assigning two categories to the sound. These categories allow you to search for matching presets when you use the Category logic on the Preset Mode's page 1. When you set the logic to one of the three choices, scrolling though presets will be limited to only those that satisfy the conditions of the search. The categories are:

Category 1: Arpeggio, Bass, Drum, Effect, Keyboard, Lead, Pad, Sequence, and Texture

Category 2: Acoustic, Aggressive, Big, Bright, Chord, Classic, Dark, Electric, Moody, Soft, Short,
Synthetic, and Upbeat.

More categories will be available in the future!

If the Category logic is set to *AND*, both categories must be valid to select a preset. If the Category logic is set to OR, either category will be used to select a preset. If the Category logic is set to NOT, all presets that do NOT have the 2 categories listed will be available to select. If the logic is blank, then all presets are available.

Storing Presets

As soon as you edit any parameter, the Preset LED will go off, putting you in live edit mode. Once you have made changes that you want to keep, press the **Store** button above the numeric keypad.

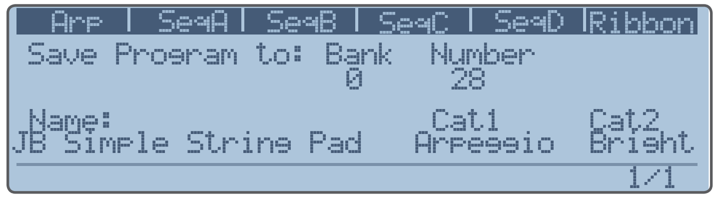

Figure 7. Storing Presets, page 1

This gives you the first Store screen, as shown in Figure 7, and lets you select a new bank and preset location in which to store your preset. If you just want to store it in the same location, you don't need to change anything. If, however, you want to listen to the new location to see if you don't want to keep what's there, you can press **Compare**, which will load the new location's preset and allow you to play it. **Compare** will stay lit when you are listening to the Compare buffer. Turn it off when you are ready to store your edited preset. You can also select category types here. Simply scroll through both categories using the knobs below the Cat1 and Cat2 soft labels to select.

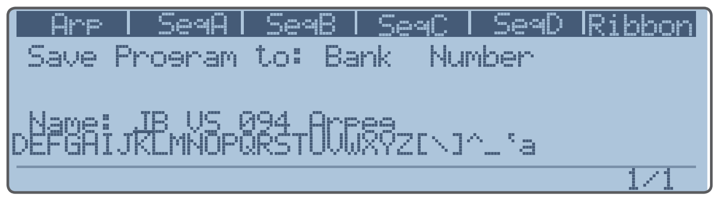

Figure 8. Storing Presets, page 2

Press **Store** a second time, and now you will be taken to the Naming page, as shown in Figure 8. Each Preset name can be 25 characters long, and you must use the **Data Wheel** and the **Inc/Dec** buttons above it to select the position and character you want to use. Using the **Inc/Dec** will shift the current letter position left or right through each of the 25 positions, and scrolling the wheel will select through the entire character list. Press **Store** a third time, and this time, you are done! Turn on the Preset LED and **Inc/Dec** the preset, then go back to your newly edited preset, to check and make sure all is saved as you wanted.

Loading Samples

The factory CF card comes with a folder in it labeled, "Samples". Inside here you will find 9 glockenspiel samples and one harpsichord sample in .raw format, and two text files called SamplePool-001.txt and SamplePool-002.txt. These text files describe the name of the sample set, the number and name of each sample in the set, and various other aspects, such as root key, fine tuning, and low/high key mapping.

Any new SamplePool must be numbered in the next available ascending number, otherwise the Solaris will not recognize it! So, for the current factory CF card, one would need to create a SamplePool[b]-003[/b].txt to describe the next set of custom samples to be used. (You can, however, re-number the factory SamplePools, so that the glockenspiel would be numbered -003, and your new file -001, for example). Subsequent SamplePools would have to be -004, -005, -006, etc.

And finally, the SamplePools will not automatically load when you turn on the Solaris, or plug in the CF card! You must go to your **SYSTEM** soft key group (in the center graphics display), and activate the process by turning the lower left most knob (for the parameter labeled "SampImg"). Once you turn the knob, you should see a message in the bottom line that says, "Press Enter to select image file." You then press **Enter**, and the Solaris will go out to the CF card and look for any SamplePool text files in the Samples folder to load in the Sample Pool names. Once it has all of the names loaded from the card, you can turn the same lower left knob and now see a number and a name of each SamplePool that is on the card. Once you see the one you want to load, you press **Enter** again, and wait until the Solaris is finished loading the samples, at which point you should see the message, "Finished sample transfer...".

To avoid any accidental reloading of the SamplePool names and/or samples themselves, it's best to move off of the **SYSTEM** screen to some other screen (you can go to the MIDI screens, or any other soft key group).

Now you can go to any Oscillator, select the WAV type, and you should be able to hear your loaded samples as you scroll through the Wave numbers.

The first time you load a brand new sample pool into your Solaris, a special 'map' file is created from the SamplePool.txt file. This will take a little bit of time, depending on how many samples are in the Sample Pool, and you will find that, when trying to select the new pool, you will not see it immediately in the screen. You do need to attempt to select it, however, to tell the Solaris to 'build' the .map file. Once it's done, you will have the SamplePool number available to load.

The format of SamplePool files is described in "Sample Specifications" on page 58.

User Interface and Navigation

General Navigation

This section introduces some very important concepts that will help you easily dive into the depths of Solaris. It's well worth your time to read this chapter!

The Solaris is organized so that you can get to a number of parameters rather quickly. That's why I've decided to use six displays: five text displays and one Graphic Display. Even so, with over 1200 parameters, inevitably there is going to be the need to 'page' the displayed parameters. All synthesizers have several basic sections to create sound; the five text displays are used to handle the parameters for seven of these sections (2 of the 5 displays are 'shared'). These sections are: Oscillators, LFOs, Mixers/InsertFX, Filters/VCAs, and Envelopes. The sixth display is called the graphics (gfx) display, and is used to handle all remaining parameters of the instrument.

Text Displays (x5)

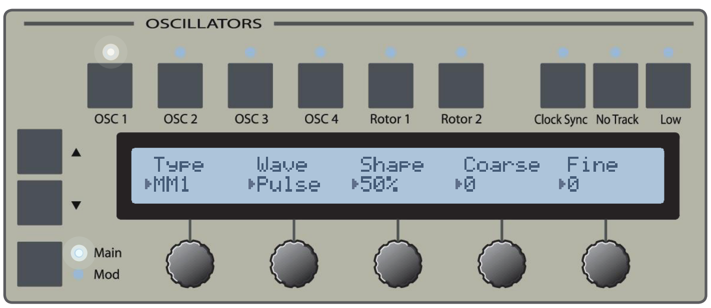

Figure 9. Typical Text Display

Main Mode and Mod Mode

Figure 9 shows the layout of a text display, this one from the Oscillators section. For each of the text display sections, you have 1 pair of buttons stacked vertically. The pair of buttons to the left of the displays are **Inc/Dec** buttons. Below those is the sub-group toggle button. The upper subgroup is called Main, the lower one Mod. For each section, you will find general settings under the Main pages, and all possible modulation to that group under the Mod pages. Typically there are 2 Main pages and 4 Mod pages per group, although this does vary a bit.

Throughout this manual, we will refer to a panel's Main Mode and Mod Mode. Those modes, or sets of menus, are access by the sub-group toggle button (or by using Wrap, as described below).

There are several ways to step through the pages. The user can decide to step through all pages with the **Inc/Dec** buttons, and then stop at the end, or to be able to continuously 'wrap around' from the last to the first page.

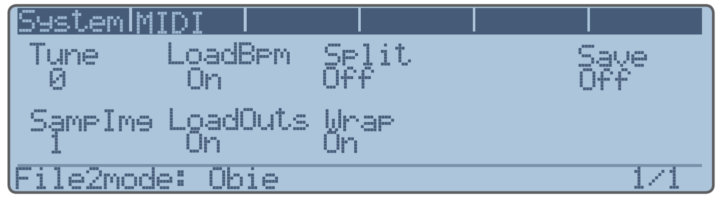

Figure 10. System Tab in Graphic Display

This function is called Wrap, and is set on the System tab, as shown in Figure 10. The System tab is found in the softkeys sets on the graphic display by pressing the **More** button a few times. Also here is Split, which allows you to stay within the boundaries of either the Main or the Mod sub-group. This is handy when you want to switch quickly back and forth between two related pages, say Shape in the Main pages and a modulation of Shape in the Mod pages.

If you want to quickly reach the topmost page of any object (Oscs, LFOs, Mixers, Filters, VCAs, Envelopes), just quickly 'double click' that object's select button. You can also use the object select buttons to do a "copy & paste" operation - simply hold down the button of the object you want to copy until it starts blinking, and then select the button where you want to paste the data. Of course, this only works with like objects - LFOs to other LFOs, Filters to Filters, etc.

Graphic Display

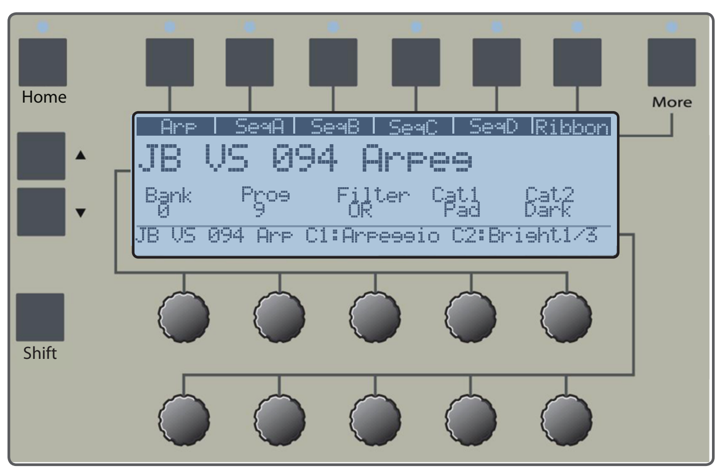

Figure 11. Graphic Display

The center section with the graphic display is the softkey functional display area. It also has a Preset Mode when the Preset switch is on (at the top of the numeric keypad panel). Other functional buttons located here are Home and More. The graphic display handles all of the remaining parameters that are not covered in the dedicated text display sections. There are 6 soft key buttons, whose labels change depending on which functional group is selected. The top row of knobs operate the upper line of parameters; the bottom row, the lower line. Sometimes either the upper or lower knob will adjust the same value (only for the BPM at this time). You may find yourself at times operating a knob that is not the correct one for the parameter line you are wanting to adjust - something you have to learn to watch!

The bottom line of the graphic display will always show the active parameter, i.e., the last knob touched. It will show the current parameter value, waveshape names, sample names, etc. The **Data Wheel** will always affect the active parameter.

The bottom row of the graphic display shows the active parameter, i.e., the last knob touched. This is especially handy when working with the wavetable and VS oscillators, since you can see the full wavetable or waveshape name, respectively, in the graphic display.

Function Group Shortcut

There are currently five functional groups, which are selected by repeatedly pressing the **More** button. For direct access to these 5 groups, you can also hold down the **More** button for 2 seconds to change the soft key labels to display the 5 functional groups, as shown in Figure 12. Pressing one of these will take you to the associated set of soft key labels. LED above the **More** button will flash when you are viewing the Function Group Shortcuts.

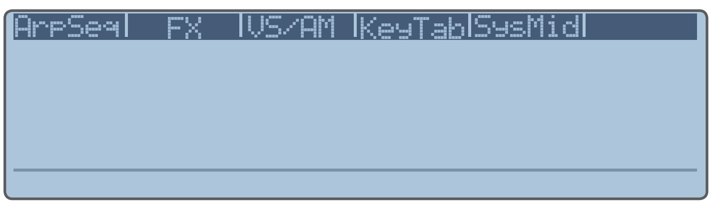

Figure 12. Function Groups shown in Graphic Display

Arp/Seq

The controls for the arpeggiator, sequencer, and ribbon are here.

FX

The output assignment, effects bussing, and effects controls are here.

VS/AM

This page has 2 each of Amplitude Mod and Vector Mixer sections; also Looping EG.

KeyTab

The 4 Key Tables and 4 Lag processors are here; also the Env Follower.

SysMid

All other system parameters and MIDI controls are here. This data is not stored in a preset, but as a glo.ini file.

You can tell how many pages of information are available for each section of the Graphic Display by referring to the bottom right corner of the display.

For each of the soft key graphic displays, there may be more than one page of information. You can tell by the small numbers in the lower right of the gfx display if there are additional pages. For example, if you see 1/4, this means you are looking at page 1 out of 4 possible pages. Use the up /down buttons to the left of the gfx display to move through the pages.

Performance Controls

Solaris provides a number of performance-oriented controls that give you tremendous control over the expressiveness of your playing. These controls are described below at a high level. For further details about how to configure and customize these controls, please refer to the appropriate sections in the Solaris User Guide.

Performance Buttons

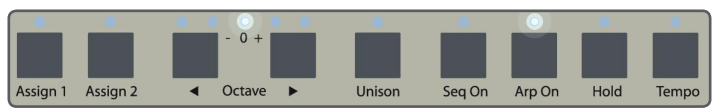

Figure 13. Performance Buttons

On the left side of the unit, between the LFOS panel and the **Ribbon Controller** there are 9 performance-oriented buttons.

Assign 1 and 2

These buttons can be set to momentary or toggle mode. This is done in the Home menu, page 2, as shown in Figure 14. You also can assign the desired function for each button on this page. The choices are: Keyboard Glide on/off, Oscillator Glide on/off (for an individual oscillator or for all of them), start/stop Seq, start/stop Arpeg, and Arpeg Transpose. When selected in the Mod Source list, the assignable buttons generate full value (+Max value) when pressed, and a zero value when not. For details, refer to "Figure 85. MIDI Menu, page 2 of 2" on page 45.

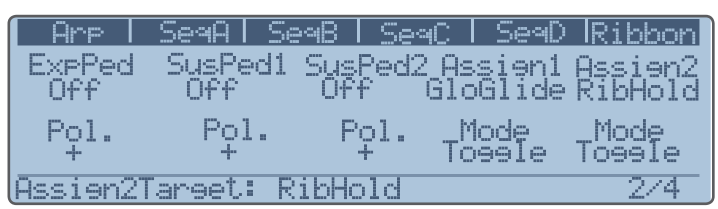

Figure 14. Assignable Button setup

Octave (Transpose) Up/Down

These buttons should be self explanatory. They change the range of the keyboard, but must be pressed before you play to get the transposed values. They will not transpose keys currently held.

Unison

Activates Unison mode, which is configured in the Home menu, page 4.

Seq On

Activates the Sequencer, which is configured in the four sequencer tabs (SeqA, SeqB, SeqC, and SeqD) on the graphic display.

Arp On

Activates the Arpeggiator, which is configured on the Arp tab on the graphic display.

Hold

Has the function of a sustain switch. It does not work with the sequencer, as this is a 'gated' sequencer, which only works when keys are held down. This control can be used to "latch" the arpeggiator on.

Tempo

This button is actually a Tap Tempo button as well. Holding it down will allow a pop-up on the screen to show the current BPM, and allow you to change it with either left most knob of the Graphic Display. Tapping the Tempo button will determine an average BPM after 2 taps, and will continue to average the tempo for subsequent taps. Tempo is stored with the preset, but can be overridden (ignored) by setting this in the System page. Select 'Load BPM - ON' if you want the presets to load their programmed tempos.

Enable Part Buttons

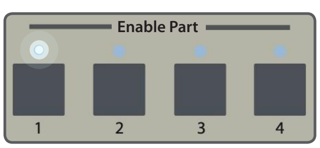

Figure 15. Enable Part Buttons

These buttons allow you to disable, or mute, the signal coming from each of the four mixers. A lit LED above any of the buttons means that mixer's output will be heard. Enable Part settings are stored with presets.

A number of Solaris's presets have been programmed to take advantage of the Enable Part buttons to alter the preset in a desirable way. When creating your own presets, experiment with using the Enable Part buttons to allow you to alter your sounds on the fly, without having to select a different preset.

Assignable Performance Knobs

Even though you have five text screens to edit parameters, doing so will immediately take you out of Preset Mode. Also, there are parameters in the graphic display for many different functional groups, and you might want to have access to these. To give you quick access to any parameter in the system, the bottom five knobs below the graphic display can be assigned. You use the **Shift** button (to the left side of the lower row of knobs) to assign these knobs.

Figure 16. Performance Knob Assignment

1. Holding down the **Shift** button, select which of the 5 Performance Knobs you want to assign by giving it a turn.
2. Continue to hold down **Shift**, and select the parameter you wish to associate with the Performance Knob.
3. Release the **Shift** button. You should see a descriptive text string for the assigned knob at the bottom of the screen.

As shown in Figure 16, you will also see a +/- % value. The Performance Knobs are relative to the programmed value. They can add or subtract from the parameter value. Only a one-to-one assignment is allowed (one parameter per knob). Since the parameters in the text displays are fairly easy to reach, usually these Performance Knobs will be selected from one of the many soft key pages, but they can be any stored Preset parameter you want, to provide quick access, and keep the synth in Preset Mode. Performance Knob assignments are stored with presets.

Pitch and Modulation Wheels

These function as you might expect. The range of the pitch wheel--both up and down--can be set independently using the parameters PW Up and PW Down in the Home section, page 3. Note that since these parameters are bipolar, the pitch ranges for up and down movement can be independently adjusted and reversed.

Joystick

The **Joystick** is a springless controller designed to be used with vector synthesis types of sounds. Its X and Y position are available in most modulation source lists, so it can be used as a real-time controller for most of Solaris's parameters.

Ribbon Controller

The **Ribbon Controller** outputs 2 separate control signals. If you use a single finger, the output signal for **Rib1** and

Rib2 are the same. If you use two fingers, the control signal associated with the right most finger is output as **Rib2**. More details can be found in “Figure 61. Sequencer Menu, page 2 of 3” on page 37.

Knob Acceleration

Due to the enormously flexible nature of Solaris’s design, there are often times when the physical knobs will control parameters with greatly differing value ranges. For example, the 4th knob in the Oscillators section controls the oscillator frequency either in semitones (-60 to +60), MIDI clock divisions, or absolute frequency, from 0Hz to 20kHz. A sort of “acceleration” scheme has been implemented that ensures the user is able to interact with a given parameter in a way that makes the most sense for the parameter--providing fine adjustment for an LFO’s rate, for example--while still allowing the full range of values to be accessed without endlessly turning the knob. In order to accomplish this, several default knob behaviors have been developed. For example, the range of the Cutoff frequency of a filter is 10 octaves 6 semitones. This is listed in the Cutoff parameter as 0.0 to 126 semitones. The default knob behavior applied to Cutoff is to increase or decrease the frequency by 1 semitone as the knob is turned. There is a small amount of acceleration programmed in, to ensure the entire range is available with only a couple of full turns. In this case, the default knob behavior is to compress the range of values, which allows faster access to the range of values, but by making larger “steps” along the way. In contrast, the LFO Rate parameter uses the opposite scheme. In order to allow fine adjustment of LFO Rate, the knob is programmed to increase or decrease in steps of 1/100th of 1Hz as the knob is turned. Clearly, this scheme would require many full rotations of the knob to reach 500Hz.

Knob Acceleration and the Shift Button

Pressing and holding down the Shift button as you turn a knob will invert its default acceleration scheme. Holding down the Shift button while turning the LFO Rate knob will cause the value to jump by 1Hz, making it much quicker to access values at either end of the range. The exact opposite happens for Cutoff, allowing for very fine control over the frequency.

The **Data Wheel** *is not affected by the* **Shift** *button. It always scrolls at the finest resolution available for the parameter.*

Rear Panel Connections

The illustrations below show the rear panel connections of the Solaris. The illustration is too long to fit on a single page of the manual, so it is represented by Figure 17, which shows the leftmost connections on the rear of the unit, and Figure 18, which shows the rightmost connections.

PEDALS: Exp Sus
SPDIF: Out In
ANALOG OUT: Right/8 Left/7 Right/6 Left/5 Right/4 Left/3 Right/2 Left/1
ANALOG IN: 4 3 2 1

Figure 17. Leftmost rear panel connections

MIDI: Thru Out In
COMPUTER: USB
CF CARD
POWER: Switch
POWER: Plug

Figure 18. Right most rear panel connections

PEDALS	The pedal inputs are described in “Home Menu” on page 45.
SPDIF	Optical S/PDIF capable of 48kHz in/out when in Master mode. Solaris will operate at 96kHz in Slave mode.
ANALOG OUT	The analog outputs are described in “Output” on page 38.
ANALOG IN	See “Processing External Signals” on page 23 for more information about the analog inputs.
MIDI	Solaris provides standard MIDI In, Out, and Thru connectors. MIDI configuration is covered in “MIDI Menu” on page 44.
COMPUTER	Solaris can transmit and receive MIDI signals over the USB port.
CF CARD	CompactFlash port. See “Quick Start” on page 9 for more information about the CF card.
POWER	Power Switch.
POWER	Jack for the external power supply. The power supply that ships with Solaris has the following specs: Input: 100-240V ~1.0A max 50-60Hz (groundless) Output: +12V DC 2.5A, 30W max (2.5 x 5.5 x 11.0)mm center positive

Table 1. Rear panel connections

Modulation Basics

Modular-style Modulation

Destination-based Modulation

Unlike many hard wired synthesizers which use a modulation matrix to select a modulation source, and assign where to send it, Solaris uses a destination-based scheme just like a big modular synthesizer. In Solaris, you start with a destination--oscillator pitch, for example--and select which modulation source you want to use to modulate that parameter. Solaris provides four modulation sources for each major component (each oscillator, filter, etc.), except for the LFOs, which have three. These modulation sources can be accessed by pressing the **Mod** button--or pressing the Inc/Dec buttons if Split and Wrap are set appropriately in the System menu--to the left side of the module you want to modulate.

Let's use Solaris's Oscillators section as an example. Imagine that each of Solaris's oscillators is an oscillator module in a large modular system. Figure 19 depicts Solaris oscillator 1, which currently holds a Multimode Oscillator, as an imaginary oscillator module in a modular synth. The typical oscillator controls, waveform, shape, coarse and fine tuning, map 1:1 to our imaginary modular oscillator.

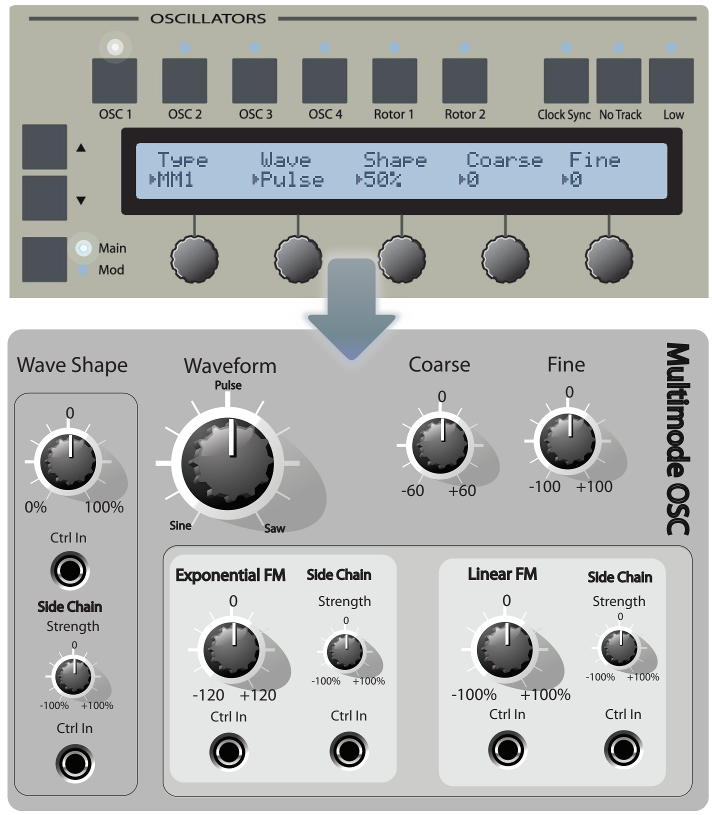

Figure 19. Solaris Oscillator imagined as a modular synthesizer oscillator module.

Next, let's modulate the wave shape of the oscillator using some modulation source, such as LFO1. If we were to do this on our modular system, we would connect a patch cable from the output of our LFO module to the oscillator's wave shape control input. To see what is modulating any particular parameter on any particular module of a modular system, you simply follow the patch cable back to its source. On Solaris, all you need to do is look at the Mod mode pages for that module.

Figure 20. Solaris oscillator mod source 1 (LFO1) controlling wave shape

Figure 20 shows the Mod mode display of our Solaris oscillator, directly beneath the imaginary modular oscillator. The Mod window is currently displaying modulation source 1, one of four modulation source slots available for the oscillator. We can see that modulation Source1 is set to LFO1, and modulation Dest is set to Shape. This means that LFO1 will modulate the oscillator's wave shape parameter with an Amount of *56%*. Follow the green "patch cable" in Figure 20. You can imagine that the current setting of Source1 is the modular equivalent of patching the control output of LFO1 to the control input for wave shape on our modular oscillator.

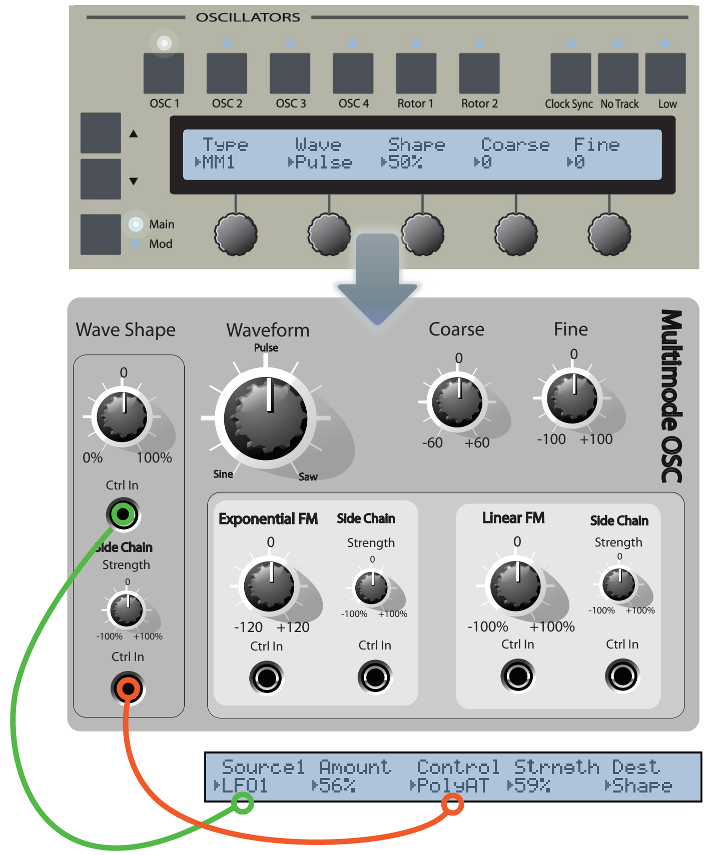

Figure 21. Solaris oscillator mod source 1 (LFO1) controlling wave shape, and Poly Aftertouch providing sidechain modulation.

All of Solaris's modulation sources have an additional Control, or "sidechain" circuit. This allows a modulation source to itself be modulated by another control signal, resulting in very interesting and complex control signal shapes. Figure 21 expands on our previous example by adding a Control signal to modulate the LFO signal coming in as modulation Source1. In this case, we have a virtual patch chord running from the output of the PolyAT module on our modular synth into the sidechain control input of our modular oscillator's wave shape parameter.

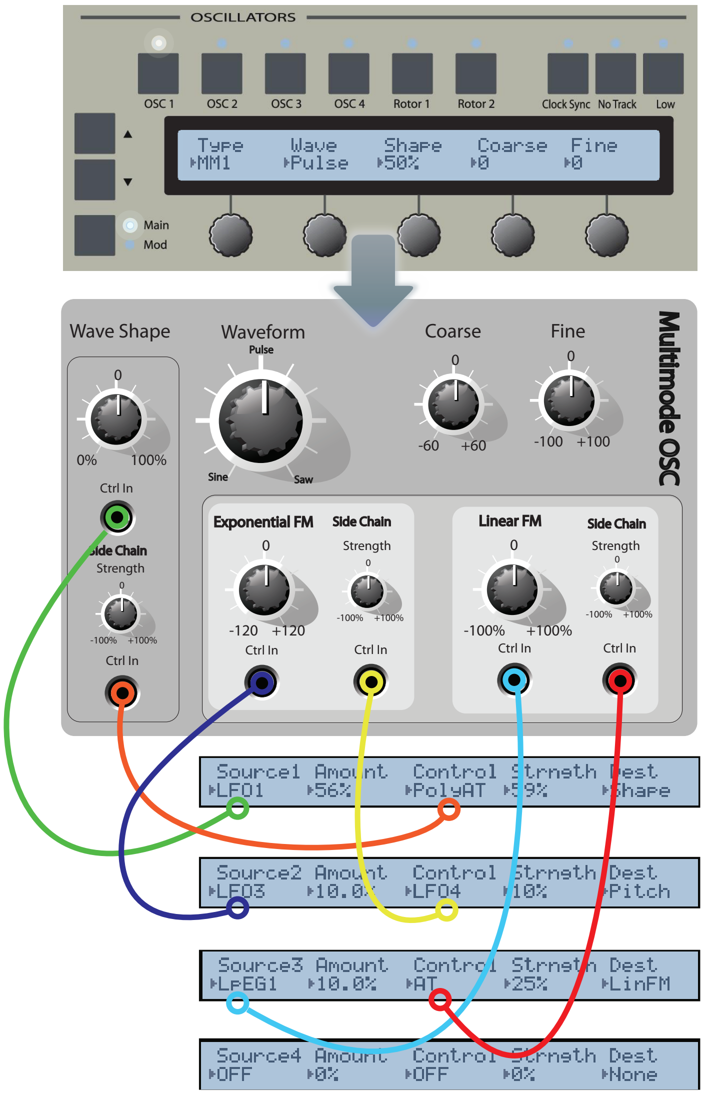

Figure 22. Solaris oscillator with 3 of 4 available modulation sources active and "wired" to the oscillator.

Figure 22 further expands on our example by activating three of the four available modulation sources for Osc1. Source1 and its Control signal modulate the oscillator's wave shape. Modulation Source2, LFO3, is providing exponential (Pitch) modulation of the oscillator, and LFO4 is providing the sidechain Control signal to modulate the signal from LFO3. Modulation Source3, LpEG1 (Looping Envelope), is modulating the LinFM (Linear Frequency Modulation) parameter of the oscillator, and sidechain modulation is coming from AT (Aftertouch).

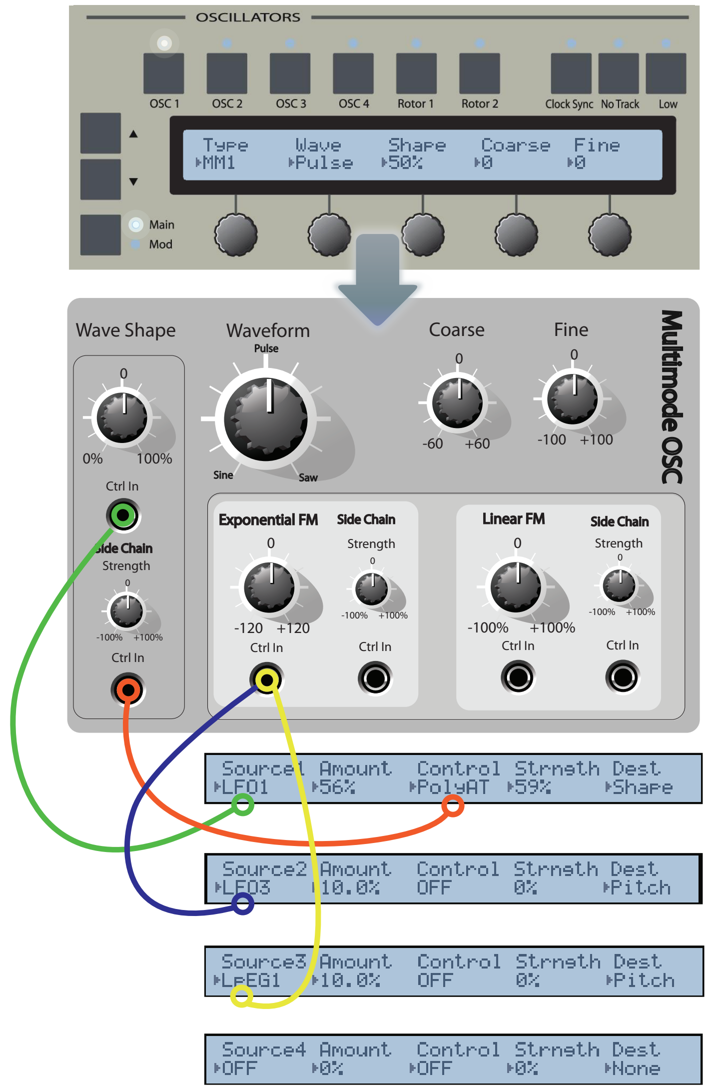

Figure 23. Modulation Sources 2 and 3 modulating oscillator pitch

Figure 23 shows an example of two modulation sources modulating the same parameter. In this case, both Source2 (LFO3) and Source3 (LpEG1) are connected to the oscillator's Exponential Frequency (Pitch) input.

Finally, in all of these examples, the oscillator's modulation Source4 slot is empty, meaning we could create even more chaos with this oscillator by maybe adding a third modulation source to the exponential Pitch control input, or Dest.

Signal Path

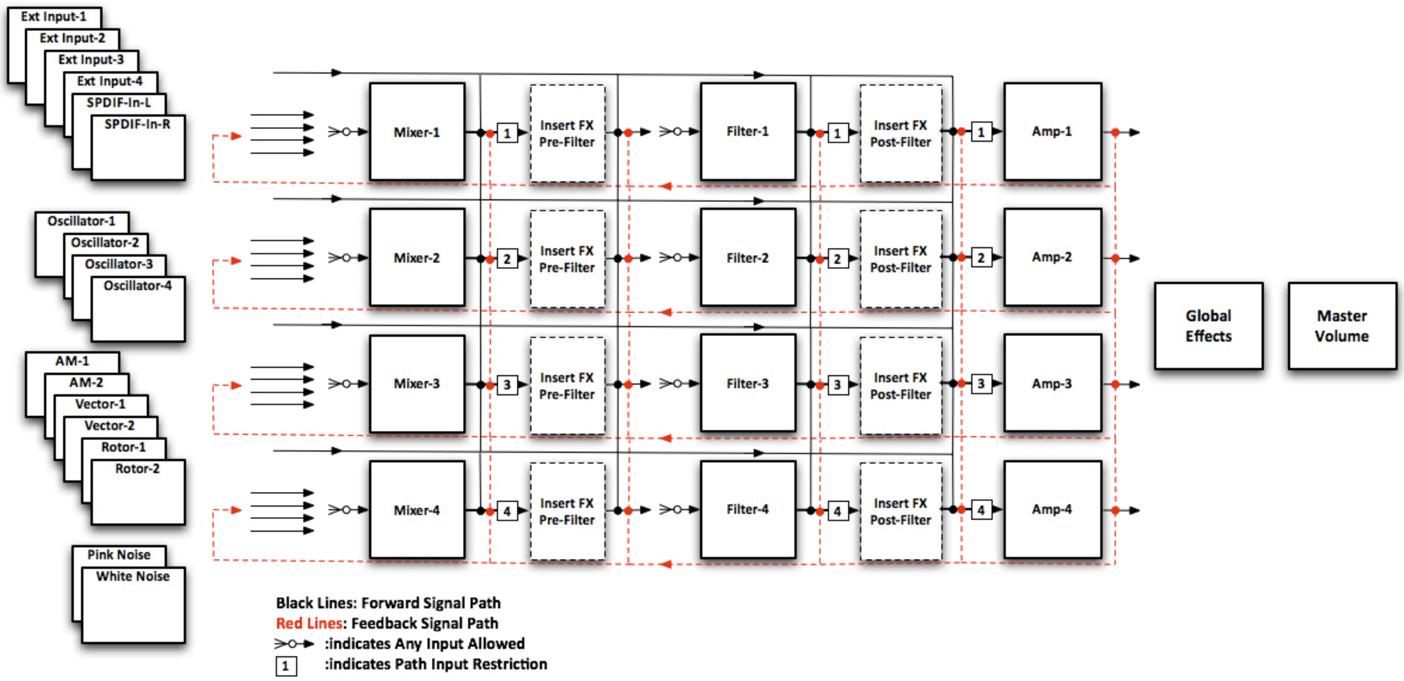

Figure 24. Solaris Signal Path

As Figure 24 illustrates, Solaris has a very flexible signal path.

Flexible Signal Path

The best way to understand how any particular patch is working is to start with the VCA, and work your way backward. The VCA's only have 2 possible inputs: either the same-numbered filter, or the same-numbered Insert FX. Working backwards from there can help you understand the rest of the signal path, back to the sound source.

Because the signal path of Solaris is so modular, we'll use this section to describe some techniques you might find useful.

Boosting the signal of each oscillator by 6dB

You can increase the signal of an oscillator by assigning it to more than one input on a single mixer. For example:

Osc 1 ⇨ Mixer 1 input 1
Osc 2 ⇨ Mixer 1 input 2
Osc 1 ⇨ Mixer 1 input 3
Osc 2 ⇨ Mixer 1 input 4

Or

Osc 1 ⇨ Mixer 1 input 1
Osc 1 ⇨ Mixer 1 input 2
Osc 1 ⇨ Mixer 1 input 3
Osc 1 ⇨ Mixer 1 input 4

Classic synthesizer configuration

The most standard configuration, like the Minimoog and most other synthesizers:

Osc 1 ⇨ Mixer 1 input 1
Osc 2 ⇨ Mixer 1 input 2
Osc 3 ⇨ Mixer 1 input 3
Osc 4 ⇨ Mixer 1 input 4

Insert FX before the filters (Mixer → Insert FX → Filter)

1. Set VCA 1's VCA1In to *Filter*
2. Set Filter 1's Input1 to *InsFX1*
3. Set InsFX1's Input1 to *Mixer*

Insert FX after the filters (Mixer → Filter → Insert FX)

4. Set VCA 1's VCA1In to *InsFX*
5. Set Filter 1's Input1 to *Mixer1*

6. Set InsFX 1's Input1 to *Filter*

The Decimation and Bit Chop effects are even more noticeable when using them after the filter. Set the Insert FX and play with the filter's cutoff frequency.

Feedback loop in mixer

Mixer 1 can be routed to Mixer 1, and will have a feedback effect if there are other signals also coming into the Mixer. This can be really effective; try this:

Osc1 ⇨ Mixer 1 input 1
Mixer 1 ⇨ Mixer 1 input 2

As you adjust the Level of Input 2, you can control the overdriven sound of Osc 1, prior to the signal going into the Filter or InsFX. This can give you a real fat sound when used judiciously. You can also modulate the level of Input2 with an envelope or other controller such as Aftertouch, **Mod Wheel**, LFO, Note, etc., so this approach can provide for some nice controlled feedback.

Processing External Signals

External Signals

Solaris provides extensive processing capabilities for external signals routed through the synthesizer. External signals can be routed in via one of the four analog inputs or the S-PDIF jacks on the rear panel. These inputs appear in source lists as Input1, Input2, Input3, Input4, SPdifL and SPdifR, respectively.

Processing External Audio Signals

External audio signals are essentially played “through” the Solaris. Though you can process them as you would the oscillators, it’s important to remember that the external inputs are not polyphonic. No sampling or pitch shifting or resynthesis is involved. Just holding down one key (or using the **Hold** button and playing one key) will be all you need to hear external audio as it is routed through the synth. Pressing multiple keys will just give you the same signal, but louder, for each key pressed.

The external inputs are on the Audio Source List, and therefore can be routed just like the oscillators. You can filter them (in parallel or in series with the 4 filters), use the insert FX with them (pre- or post-filter), even use them as inputs to the Rotors, Vector Mixers, or AM sections. Plus, you can derive an envelope with the envelope follower (see “Envelope Follower (EGFoll)” on page 43) for any of the external ins to sweep the filter cutoff or modulate other parameters. You can even use them with the lag processors for simple 1-pole filtering, as described in “Lag Processor” on page 43.

Using external ins with the Vector Mixers allows you to quad mix 4 inputs with the **Joystick**. Using them with the AM sections (such as the Ring Mod algorithm) allows the external ins to interact more with the oscillators, and vice versa. Or, you can just use them as Mod Sources to control an oscillator’s frequency directly.

An additional comment about using external audio signals with the Rotors: because the Rotors can run at audio rates like oscillators do, you can use the Rotor to give a “pitch” to external audio signals, and play them polyphonically that way. The source material doesn’t even have to be pitched. You could use traffic sounds, crowd noises, or strange electronic blips and beeps, and then just run the Rotor as an oscillator. The external inputs will provide the raw material for the Rotor’s timbre, and the Rotor’s tuning controls and the keyboard will control the pitch or frequency.

Processing External Control Signals

Control signals from external synthesizer gear, such as a modular LFO module, can be passed in to Solaris via one of the four analog inputs. This signal can then be used as a control source within Solaris to modulate other parameters, thus providing a way to easily synchronize parameters in Solaris to external analog gear.

Oscillators

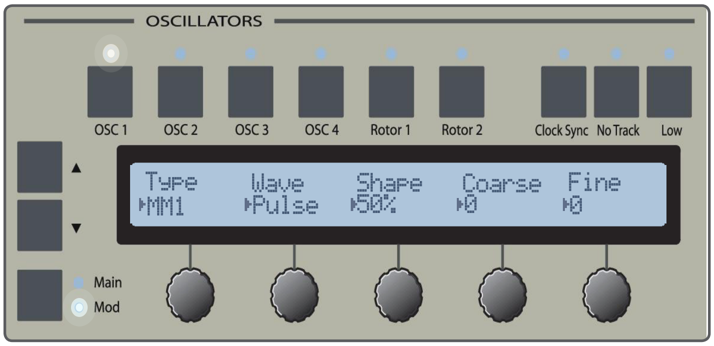

Figure 25. Oscillators Panel

Solaris has four oscillators, as well as several special sound sources including Rotors, AM and Vector Synthesis.

Oscillators Osc 1-4

Osc1-4 represent 4 “slots”, each of which supports a variety of different oscillator types. Table 2 lists the oscillator types available for each of Solaris’s 4 oscillators.

OFF	The oscillator slot is empty
MM1	MultiMode oscillator supporting a wide range of common waveforms, as well as 2 morphing waveforms (sine to saw and sine to square) and a special “stacked” sawtooth waveform, called Jaws.
WT	Wavetable oscillator using the same wavetables as the Waldorf microwave. Contains 63 wavetables each with 64 sweepable waveshapes.
CEM	Based on the Curtis Electromusic oscillators found in classic Sequential Circuits analog synthesizers. Capable of generating single waveforms, or any combination of Saw, Triangle and Pulse waveforms.
WAV	Sample playback oscillators that plays files loaded from a CompactFlash card.
VS	Based on the Prophet VS, containing 94 single-cycle waveshapes.
Mini	Based on the Minimoog, supporting the same 6 single and combination waveforms.

Table 2. Oscillator types available for Osc 1-4

Oscillator Parameters (Main Mode)

Oscillator Main mode is active when the LED next to the Main label is lit. Main mode loads the Oscillator’s panel with the parameters associated with the type of oscillator loaded into the active oscillator slot, as indicated by the LED above the oscillator selection buttons. The parameters associated with Osc 1-4 are displayed in the Oscillator text display, grouped into 2 pages which can be accessed by pressing the up/down arrows to the left of the text display, as shown in Figure 25. The parameters displayed in the text display will vary, based upon the type of oscillator selected.

Page 1 Parameters

Figure 26. Oscillator Main Mode, page 1

Figure 26 shows page 1 of the Multimode oscillator’s parameters. The actual parameters and their values varies across the oscillator types. This section describes the parameters at a high level. For a detailed description of the parameters and values available for each oscillator type, please refer to “Appendix 1- Oscillator Parameters” on page 48.

Type

This control allows you to select which type of oscillator occupies the currently active oscillator slot (Osc 1-4).

Wave

Determines the waveform generated by the oscillator.

Shape

For variable-shape waveforms, such as Pulse and MorphSaw, this control determines the shape of the waveform across its continuum. For a Pulse wave, for example, 0% and 100% will actually make no sound at all, while 50% will generate a perfect square wave.

Coarse

Coarse tuning of the oscillator, from -60 to +60 semitones.

Fine

Fine tuning of the oscillator, over a range of -100 to +100, which represents 1 semitone.

Clock Sync, No Track and Low

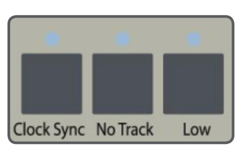

Figure 27. Clock Sync, No Track and Low buttons

The three buttons shown in Figure 27 provide special control over the frequency of the selected oscillator. Clock

Sync allows you to synchronize the frequency of the oscillator to divisions of the MIDI clock signal. The range is from 1/128 of a beat, to 8 beats. No Track turns off keyboard tracking, and allows you to specify the oscillators fixed frequency from 0 Hz to 20 kHz. Low simply lowers the frequency of the oscillator by 60 semitones, as a means to quickly switch the oscillator into sub-audio rates.

Page 2 Parameters

Figure 28. Oscillator Main Mode, page 2

Figure 28 shows page 2 of the Main mode controls for the Multimode oscillator. The following section describes the page 2 parameters at a high level. For a detailed description of the parameters and values available for each oscillator type, please refer to “Appendix 2- Modulation Sources” on page 54.

Sync

This control can be used to synchronize the selected oscillator to another oscillator, which causes the selected oscillator (the slave) to restart its waveform every time the master oscillator cycles its waveform. The pitch of the slave oscillator is locked to that of the master oscillator, and the Coarse and Fine frequency controls of the slave oscillator affect only how many cycles the slave plays relative to the master. Sweeping the frequency of the slave oscillator creates the classic hard sync sound. Synchronizing the oscillator to Gate causes the oscillator to restart with each note on event. Note that an oscillator cannot be synchronized to itself.

Phase

Phase controls the start point of the waveform when it receives a sync’ed signal. If **Gate** is the sync source, adjusting the **Phase** will allow you to force the oscillator to start from that phase point for every time a key is pressed. (This is the same as for the Rotor’s **Phase** control). This is useful when you wish to guarantee that the phase of the oscillator will always restart at the same place when working on creating kick drum sounds, for example; otherwise, repeated note events would sound different for each key if no **Gate** sync is used. Another use would be if you want to use the Osc as an LFO, and need the modulation to always start at a specific point (say with a square wave, at the ‘bottom’ of the square).

For the LFO section, Gate Sync is called Retrigger, and is accessible via the rightmost button on the LFO panel.

Glide (rate)

Exponential glide setting for the selected oscillator, in the range 0.0ms-20.0sec. Produces a smooth transition in pitch between two notes.

Glide (on/off)

Enables or disables oscillator glide for the selected oscillator.

Oscillator Parameters (Mod Mode)

Oscillator Mod mode is active when the LED next to the Mod label is lit. Mod mode loads the text display of the Oscillators panel with the modulation controls of the selected oscillator. Each oscillator can have up to four modulation sources assigned to affect various parameters.

Refer to “Modular-style Modulation” on page 18 for further explanation of Solaris’s destination-based modulation.

The section below describes the parameters available in each of the four oscillator Mod mode pages. Please refer to “Appendix 2- Modulation Sources” on page 54 for a full description of the oscillator modulation parameters.

Source 1-4

This control allows you to select a modulation source from the comprehensive list of modulation sources available within Solaris. Signal from the selected modulation source is applied to the selected modulation destination (Dest).

Amount

This control determines the amount the control signal from the modulation source affects the destination parameter. When oscillator Pitch is selected as the destination, the range of this control is -120 to + 120 semitones. When the destination parameter is linFM or Shape, the range is -100% to 100%.

Control

Control allows you to select another control signal to act as a sidechain input that affects the amount of modulation source signal that is applied to the modulation destination. The Control signal is applied to the Amount control of the modulation source. The Strngth parameter determines amount of Control signal to apply, in the same way that the Amount control determines how much of the Source signal to apply to the destination.

Strngth

Determines the amount of the Control (sidechain) signal to apply to the Source control signal.

Dest

The destination parameter, i.e., the oscillator parameter that will be affected by the incoming control signal from the modulation source. The destination parameters include:

Parameter	Description
None	No parameter will be modulated
Pitch	Exponential frequency modulation of the oscillator, in semitones.

Parameter	Description
LinFM	Linear frequency modulation of the oscillator, in percentage.
Shape	Shape of the oscillator waveform (or detuning spread of the Jaws waveform), in percentage.

Table 3. Oscillator 1-4 Modulation Destinations

Rotors 1-2

Solaris has 2 Rotor processors. There are four inputs to each Rotor. Each is presented at the Rotor's output in series, one after the other. You can think of it as a four-step wave sequence, where each step's sound comes from one of the many sound sources in Solaris. The X-Fade (cross fade) control 'smooths' the transition from one step to the next, and does it uniformly for all four inputs. If the X-Fade amount is zero, then the transition from one step to the next will be abrupt; at full amount (127), each step is cross faded with the next, providing smooth but constant changes in the output. When the Rotor runs at audio rates, the transitions happen so quickly that we hear the results as a unique waveshape itself – one can change either the coarse and fine tunings of each input, or the source material itself to create timbre changes. You will also find that at audio rates, the X-fade amount makes the waveform less bright as you move from zero to max amount, as the smoothing function takes off the 'rough edges' of the resultant as it is increased. One unusual way of generating new harmonic structures is to run the Rotor at audio rates, tracking the keyboard. This is almost like a granular approach in that you will hear small bits of each input at a rapid rate.

Rotor Parameters (Main Mode)

Rotor Main mode comprises three pages of parameters, accessed by pressing the Inc/Dec buttons to the left of the text display.

Page 1 Parameters

Figure 29. Rotor Main Mode, page 1

Coarse

Coarse tuning of the Rotor, between -60 and 60 semitones. This control allows the Rotor to operate as an audio-rate oscillator.

The Clock Sync, No Track and Low buttons on the Oscillators panel have the same effect on the Rotors as the do on the standard Oscillators Osc 1-4. Refer to that section for an explanation of how these buttons affect the oscillator's frequency.

Fine

Fine tuning amount of the Rotor. Allows fine adjustments of the Rotor's pitch over the range or +/- 1 semitone.

X-Fade

This parameter controls the amount of cross fade applied between each of the four steps of the Rotor processor. The higher the value, the greater the amount of cross fade.

Sync

When Sync is set to Gate, the Phase parameter can be used to determine at which step in the Rotor's cycle it will reset with each new note on event.

Phase

When Synch is set to Gate, the Phase parameter can be used to control the starting point of the Rotor processor when new note on events are received.

Page 2 Parameters

Figure 30. Rotor Main Mode, page 2

Inputs 1 - 4

Page 2 of the Rotors Main mode controls allows you to assign the inputs to the Rotor's four inputs. Typically, these inputs will be assigned to sound sources such as oscillators, but they can be assigned to control signals as well, opening the doors to expansive new modulation possibilities.

Page 3 Parameters

Figure 31. Rotor Main Mode, page 3

Rotor Parameters (Mod Mode)

The Rotors also have four independent modulation sources available, but the destination parameters are specific to the Rotor processors. The **Dest** options are Pitch and XFade (cross fade amount).

Parameter	Description
None	No parameter will be modulated
Pitch	Exponential frequency modulation of the oscillator, in semitones.
XFade	Crossfade amount.

Table 4. Rotor Processor 1-2 Modulation Destinations

Clock Sync, No Track and Low

These buttons have the same function as they do with OSC 1-4. Please refer to "Clock Sync, No Track and Low" on page 24.

Mixers

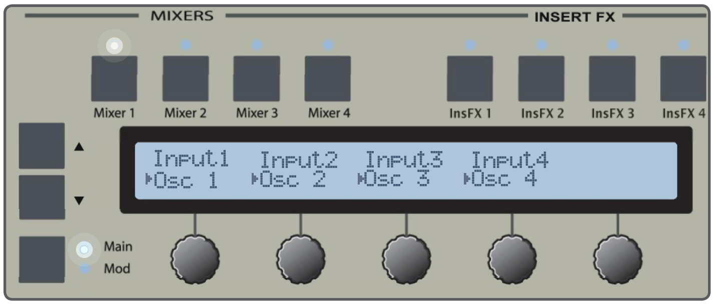

Figure 32. The Mixer Panel

Mixers 1-4

Solaris provides four separate mixers, each with fully user-assignable inputs and master output level.

Mixer Parameters (Main Mode)

Page 1 Parameters

Figure 33. Mixer Main Mode, page 1

Page 1 in the Mixer's Main mode allows you to specify the input signals to the mixer. See "Signal Path" on page 21 for examples of how signals can be routed within the Solaris.

Page 2 Parameters

Figure 34. Mixer Main Mode, page 2

Page 2 allows you to set the individual levels of the mixer's inputs. You can also set the overall mix level.

Mixer Parameters (Mod Mode)

The level of each mixer input, as well as the overall mix level, can be modulated separately. The mixer's Mod mode pages allow you to specify the modulation source and modulation amount for each. The selected modulation source affects the level of the mixer channel (or output level) you are working with.

Page 1 Parameters

Figure 35. Mixer Mod Mode, page 1

Page 2 Parameters

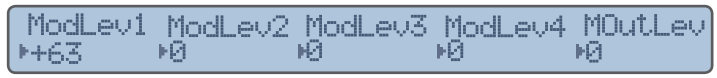

Figure 36. Mixer Mod Mode, page 2

Insert FX

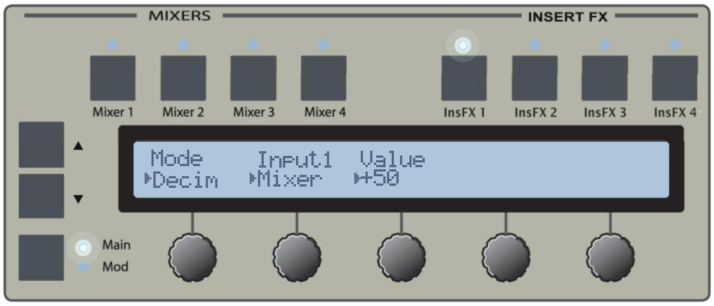

Figure 37. Insert FX Panel

Insert FX 1-4

Solaris provides four Insert FXs that can be placed in the signal path between the mixers and filters, or between the filters and the VCAs. See “Signal Path” on page 21 for examples.

Insert FX Parameters (Main Mode)

Figure 38. Insert FX Main Mode

Mode

Parameter	Description
Decim(ator)	Reduces the sample rate of the playback system. The range is +/- 63, with lower values increasing the decimation effect.
BitChop	A “bit crusher” effect that allows you to reduce the bit length of the playback signal from 16 to 1. There are 16 discrete steps, though the parameter value shows a range of +/- 63.
Distort	A soft distortion effect.

Table 5. Insert FX Modes

Input

The input signal.

Value

The “setting” of the Insert FX, in the range +/- 63.

Insert FX Parameters (Mod Mode)

Figure 39. Insert FX Mod Mode

Each Insert FX has one available modulation source (with sidechain modulation), which directly affects the Value parameter, i.e., it affects the Insert FX’s setting.

Filters

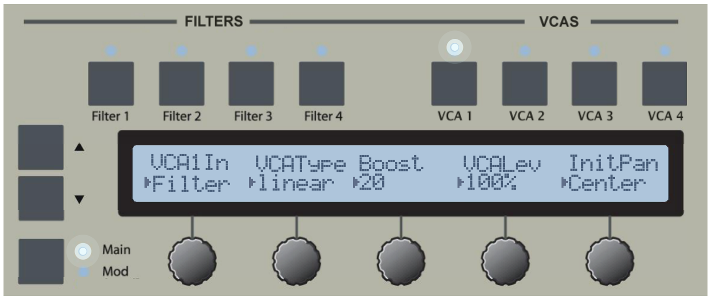

Figure 40. Filter Panel

Filters 1-4

Solaris has four filters that can be routed in parallel or series. Any signal can be passed to a filter, though a typical configuration might have a mixer output routed to a filter input.

To route 2 or more filters in series, simply select the first filter in the series as the input to the next filter, and so on.

The signal for each filter is sent to its own dedicated VCA, where its pan position and level can be set. Each VCA can be controlled by a different envelope, but the EG6 (VCA) has the final "say" for the overall output. Using separate envelopes, you can create articulated shapes for each filter's output; almost a "multi-timbre" approach to the sound, enhanced by the fact that each can also have its own envelope and pan position.

With the filter outputs as possible signal inputs to other filters, you can create feedback loops within each filter section, or place multiple filters in series. You also can get some useful and strange distortion of the filters if desired, among many, many other things!

Filter Parameters (Main Mode)

Page 1 Parameters

Figure 41. Filter Main Mode, page 1

Type

Type of filter. Refer to "Appendix 3- Filter Types" on page 56 for a comprehensive list of the filter types available in Solaris.

Mode

Several of Solaris's filter types support multiple modes of operation, such as lowpass, highpass, bandpass, band reject (notch), or combinations of those in series. Some filter types also support different pole configurations. Refer to "Filter Types" on page 56 for details.

Cutoff

The filter's cutoff frequency, in semitones from 0.0 to 126.0. Recall from "Knob Acceleration and the Shift Button" on page 16, that the **Cutoff** knob is designed to sweep quickly through its values. For fine control over cutoff frequency, use the **Data Wheel** (or press and hold the Shift button while turning the **Cutoff** knob) to make adjustments in 1/10 semitone increments.

Resonance

Resonance control. Each filter type will have a different resonance characteristic, so you will need to adjust this as you change the filter type.

Damp

If you are working with a Comb Filter, this parameter adjusts a 6 dB LP filter in the feedback circuit.

X-Fade

If Vocal filter type is selected, this parameter adjusts the position of the signal in the five vowel field.

Page 2 Parameters

Figure 42. Filter Main Mode, page 2

Typically, the input to a filter will be a sound source such as a mixer output or the output directly out of an oscillator or Insert FX. Because Solaris's filter can take almost any signal as an input, very interesting effects can be created by routing control signals through the filters as well.

KeyTrk

Keyboard tracking causes the filter to "open" in relation to the note number played. With large positive values, notes played higher on the keyboard will sound brighter because the filter's cutoff frequency has been increased relative to the KeyTrk parameter's value and the KeyCntr.

KeyCntr

The key center parameter determines which MIDI note number is considered the center of the keyboard, which affects how keytracking is applied.

Filter Parameters (Mod Mode)

Figure 43. Filter Mod Mode

Each filter has 4 modulation source slots. A filter's Cutoff (cutoff frequency) or Reso (resonance) can be modulated by any of the four modulation sources. Other modulation sources are available for some filter models, for example case Damping for the Comb filter and X-Fade (crossfade) for the Vocal filter.

VCAs

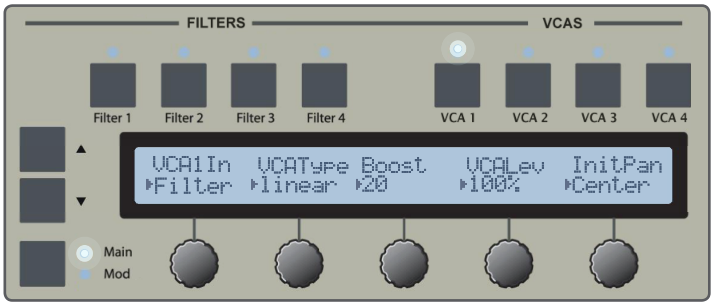

Figure 44. VCA Panel

VCAs 1-4

Solaris has four VCAs, each hardwired to accept an input signal from either its corresponding filter or Insert FX module (filter or Insert FX with the same number).

VCA Parameters (Main Mode)

Figure 45. VCA Main Mode

The VCA type can be set to *linear*, *logarithmic*, or *sigma* (s-curve, used on the Minimoog). The VCA type controls the response of the amplifier to control signals.

The Boost control is an emulation of an OTA circuit, or “soft distortion”, taken from the original Minimoog filter emulation. It was moved into the amplifier section so that is could be used with any filter type. Setting its value at around *70* or more will result in a more “analog” sound.

VCA Parameters (Mod Mode)

Figure 46. VCA Mod Mode

The VCA modules have two modulation inputs. Source1 on Mod Mode, page 1 modulates the amplifier’s level, and Source2 on Mod Mode, page 2 modulates the amplifier’s pan position.

LFOs

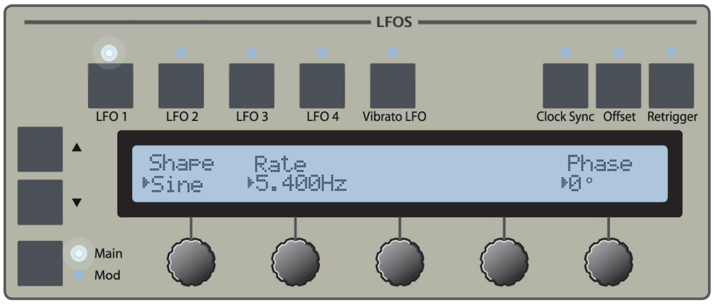

Figure 47. LFO Panel

LFOs 1-4 and Vibrato LFO

Solaris has 5 LFOs, including a special Vibrato LFO, all of which are available as modulation sources.

Button	Description
Clock Sync	Synchronizes the LFO with the MIDI clock and changes rate to a MIDI clock-related table of values.
Offset	Offset reduces the signal and shifts it all into the positive quadrant. (Useful particularly with some Shape modulations.)
Retrigger	This restarts the waveshape at the selected Phase point for every note-on event.

Table 6. LFO panel buttons

LFO 1-4 Parameters (Main Mode)

Page 1 Parameters

Figure 48. LFO Main Mode, page 1

Each LFO supports sine, triangle, ramp, saw, square, and sample-and-hold (S/H) or random wave shapes. Frequency is adjustable between 0.000Hz and 500.000Hz. The LFOs can be synced to the MIDI clock by pressing the **Clock Sync** button above the LCD screen. When synced to MIDI clock, the LFO's frequency is displayed as a division of one beat.

Recall from "Knob Acceleration and the Shift Button" on page 16 that the LFO **Rate** knob is configured for fine control over frequency. To increase the speed at which the knob sweeps through frequency values, press and hold the **Shift** button while turning the **Rate** knob.

Page 2 Parameters

Figure 49. LFO Main Mode, page 2

Parameter	Description
DelStrt	0.0 ms to 10.0 seconds. Delays the output of the LFO based on the note-on gate.
FadeIn	0.0 ms to 10.0 seconds. The time it takes to fade in the LFO output, after the Delay Start is finished.
FadeOut	0.0ms to 10.0 seconds. The time it takes to fade out the LFO output after a note/key is released.
Level	Controls the initial output level of the LFO.

Table 7. LFO Main Mode, page 2 parameters

Vibrato LFO Parameters (Main Mode)

The Vibrato LFO is hard-wired to the vibrato effect (Pitch mod) of all 4 oscillators. The Vibrato LFO in Solaris is a multimode LFO, with the same parameters that come with the other four LFOs. Added are parameters to disconnect the **Mod Wheel**, and set a maximum mod amount for the **Mod Wheel** (ModWMax).

Page 1 Parameters

Figure 50. Vibrato LFO Main Mode, page 1

By default, the Vibrato LFO is connected to the **Mod Wheel**. The ModWhl parameter allows the Vibrato LFO to be disconnected from the **Mod Wheel**. When ModWhl is Off, the Vibrato LFO affects all 4 oscillators' pitch with full strength. When ModWhl is On, the ModWMax parameter controls how much the Vibrato LFO affects oscillator pitch, relative to the position of the **Mod Wheel**. The output of any LFO is controlled overall by the Level parameter, Main Mode page 2.

If the Level is 0, there will be no output of the LFO, regardless of any other settings.

Page 2 Parameters

Figure 51. Vibrato LFO Main Mode, page 2

LFO Parameters (Mod Mode)

Figure 52. LFO Mod Mode

All of the LFOs have 3 modulation source slots. An LFO's Rate or Level can be modulated by any of the three modulation sources.

Envelope Generators

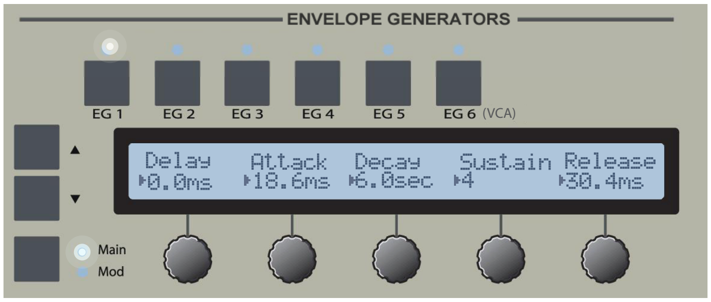

Figure 53. Envelope Generator Panel

Envelope Generators 1-6

Solaris has six DADSR envelope generators that are fully assignable and available in the modulation source lists. There is also a looping envelope generator (see “Looping Envelope (LoopEG)” on page 41). Each segment can be separately modulated. Each has variable attack, decay, and release slopes. Sustain also has a ‘slope’ control, however in the case of Sustain, this control allows you to set up an additional segment that either goes to zero value (with a negative slope), or to the maximum sustain level (with positive slope). Envelope segment values are show in time increments, from 0.0 ms to 20.0 seconds.

EG 6 (VCA) is the final envelope controlling the output of Solaris’s four VCAs.

EG Parameters (Main Mode)

Page 1 Parameters

Figure 54. Envelope Generator Main Mode, page 1

The delay segment delays the onset of the attack segment by the time interval specified.

Page 2 Parameters

Figure 55. Envelope Generator Main Mode, page 2

The Slope parameter controls the shape of the segment. A value of zero is a linear slope, while 127 is exponential. The sustain slope of Solaris’s envelope generators is actually a second decay segment that ramps down to 0, or up to 127, depending on the value. The sustain slope range is in seconds and ms. In addition, there is a small custom graphic character to the left of the value – either a “down” arrowhead if a negative value, or an “up” arrowhead for a positive value. This is to help describe that any negative value eventually ends up taking the EG output ‘down’ to 0, while any positive value takes it ‘up’ to 127 (full +) value.

EG Parameters (Mod Mode)

Page 1 Parameters

Figure 56. Envelope Generator Mod Mode, page 1

The modulation source list for the envelope generators is limited to: velocity, key tracking, modulation wheel, and assignable continuous controllers 1-4.

When using Velocity as a modulation source for a segment, a negative amount will cause shorter time values with higher velocities; a positive value will cause longer values with higher velocities. Careful adjustment and balance between the initial segment’s settings and the mod amount is usually needed to obtain desired results. Shorter time values will limit the noticeable effect of velocity modulation.

Page 2 Parameters

Figure 57. Envelope Generator Mod Mode, page 2

The Velocity parameter controls the overall amount of the envelope to its destination. Higher values require a greater velocity to reach their maximum value.

When a segment’s modulation amount is set at zero, the actual segment time/level is heard. With the amount at +127, maximum velocity will give results equal to the actual (original) time/level setting. If time values longer than the initial setting are desired, you must first set the velocity mod amount, and then adjust the initial setting to achieve desired results. Likewise for amounts of negative value, minimum velocity will yield the original settings, and higher values will be ‘shorter’ than the initial setting.

Graphic Display Functions

Graphic Display

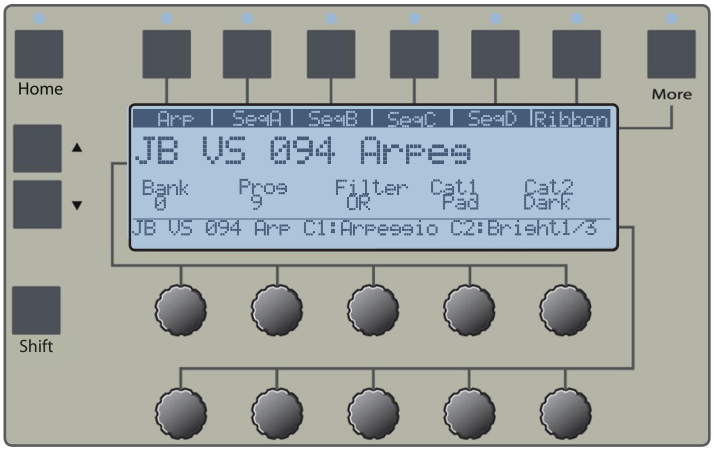

Figure 58. Graphic Display Panel

Solaris uses 5 text display panels with dynamic LCD panels and hardware controls to provide fast, intuitive access to common synthesizer modules, such as oscillators, LFOs, and filters. While those panels are excellent for hands-on tweaking, much of Solaris's functionality is too complex to be represented this way. The graphic display panel, shown in Figure 58, provides a highly visual means for interacting with Solaris's deeper capabilities.

Soft Menus

The Graphic Display provides access to 25 different menus, many with multiple pages of parameters. Each menu is represented at the top of the Graphic display as a "soft" tab. The display shows up to 6 menus at a time, with other menus accessible by pressing the **More** button, or by using the fast access technique described in "Function Group Shortcut" on page 14. A menu is selected by pressing the physical button above its soft menu label. The LED for that button for the active menu will light.

*The soft tab menus will wrap around to the first menu, if you continue to press the **More** button.*

*The LED above the **More** button will be off when you are on the first, or top, group of menus in the Graphic Display.*

While the soft tabs are always displayed across the top of the Graphic Display, the contents of the rest of the window is dependent upon which menu is selected. As described in "General Navigation" on page 13, multiple pages of parameters can be accessed by pressing the Inc/Dec buttons to the left of the display.

Soft Menu Group Organization

As mentioned earlier, the Graphic Display shows six soft menus at a time, and pressing the **More** button will bring up the next "group" of 6 soft menus. We will refer to those groups of six soft menus as Soft Menu Groups. Table 8 describes the general organization of these groups of menus.

Group 1	For live performance, or things that you might want to adjust while playing, related to the arpeggiator or sequencers. The Ribbon Controller occupies the last spot, since it is also a real-time controller that you might want to adjust during performance.
Group 2	Group 2 has to do with the Effects and Output bussing, since that is all related.
Group 3	Functional groups related to oscillator-like functionality, as well as the looping envelope.
Group 4	Individual soft menus for the 4 Key Tables (to avoid deep menus), lag processors (which all fit into a single soft menu), and envelope follower.
Group 5	System and MIDI settings that are not stored with the preset.

Table 8. Soft Menu Group Organization

The following sections describe each soft menu in detail.

Arpeggiator (Arp)

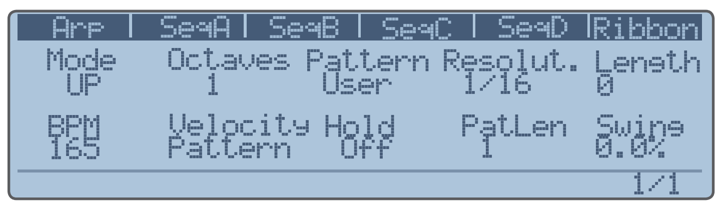

Figure 59. Arp Menu, page 1 of 1

Solaris provides an arpeggiator with performance-oriented controls accessible directly on the front panel. The **Arp On** button activates the arpeggiator. The **Hold** button holds the notes of any keys currently being pressed. This allows the arpeggiator to be "latched" on. When the Solaris is using its internal MIDI clock, the **Tempo** button can be used to set the arpeggiator's playback tempo. See "Tempo" on page 15.

Mode

Controls the direction in which the arpeggiator will play a sequence of notes held by the player. The modes are *Up*, *Down*, *Up/Down*, *AsPlayed*, and *Random*. *AsPlayed* plays the series of notes in the order that one presses keys (and holds down) on the keyboard. There is a buffer limit of 61 notes. A good way to use this is to turn on the Arpeggiator and the Hold button, then while holding down the first note you want with the left hand, play any series of notes with your right hand (even repeating note selections) to create a long series of a 'custom' pattern. *Random* randomly selects the next note to play from the notes being held.

Octaves

Determines the number of octaves (1-4) over which to play the arpeggiator pattern.

Pattern

Solaris can store 64 arpeggiator patterns. The values are 1-63, and User. Arpeggiator patterns are stored on the Solaris CF card, in the Factory/Arp folder. Only 5 patterns are currently shipped with the Solaris CF card.

A software editor for sequencer and arpeggiator patterns is planned. Please refer to the website for more information.

Resolut.

The MIDI clock division that determines the length of each step in the arpeggiator pattern.

Length

Adjusts the gate length, or duration of each note played in the sequence.

BPM

When Solaris is using its own MIDI clock, the **BPM** knob can be used to change the playback speed of the arpeggiator. When synced to an external MIDI source, this value will show the BPM of the incoming clock.

Velocity

The velocity of each note played in the arpeggiator pattern can be controlled by the velocity values stored in the arpeggiator *Pattern*, by the velocity at which the notes were played on the *Keyboard*, or *Both*.

Hold

Allows the arpeggiator to be latched on.

PatLen

Sets the number of notes (1-32) used in the arpeggiator pattern.

Swing

Introduces a delay of every other (or every even) note triggered, evoking a swinging or rhythmic feel to the playback.

Sequencer (Seq)

Solaris's Step Sequencer allows you to develop complex, pattern-based sequences that can be used to control the vast modulation possibilities of the synthesizer. The Step Sequencer comprises four separate rows (SeqA, SeqB, SeqC, and SeqD), each programmable with up to 16 steps, and parameters that determine how the rows are triggered and synchronized, and what pattern the row will play. Solaris's sequencer is essentially one step sequencer with four rows of parallel control outputs, or four "layers". Each row can have a different loop point (step length), but the overall timing is controlled by the first row (SeqA), and everything retains the overall feel of the timing, or "reset" intervals, are set on SeqA.

Note that the sequencer in Solaris is not hardwired to control the pitch of the oscillators, though that is a common use. Solaris's Step Sequencer can be used as a modulation source for any other parameter in the synthesizer, which allows very complex, evolving, and/or rhythmic manipulation of sounds.

The INIT patch that ships with Solaris is designed to make it very easy to set up a typical patch in which the step sequencer(s) control the pitch of the oscillators. Check the modulation sources for each oscillator in the INIT patch. One of the sources should be set to one of the four sequencer rows (probably SeqA for Oscillator 1, SeqB for Oscillator 2, etc.). Note that the Amount of the modulation source is set to the maximum value of 120.00 semitones. This setting makes the pattern step values correspond to semitones. Using values less than 120 will cause the steps in the pattern to translate to less than full semitone values.

Solaris has 4 exponential lag processors that can be used to produce a slowing or "gliding" effect on the sequencer's control signal. See "Lag Processor" on page 43.

All four sequencer rows are activated by pressing the **Seq On** button below the LFO control panel. When the sequencer is synchronized to Solaris's internal MIDI clock, the **Tempo** button can be used to set the sequencer's playback tempo. See "Tempo" on page 15.

Figure 60. Sequencer Menu, page 1 of 3

Mode

Normal	Each step in the sequence retriggers the envelopes. Each new key press restarts the sequencer from the first step, and retriggers the envelopes.
No Reset	The sequencer is free running in the background. A key press will retrigger envelopes, but the sequencer will not restart from the first step. It will play whatever step it is currently active. Each step retriggers the envelopes.

No Gate	Only the first step in the sequence triggers the envelopes. Subsequent steps do not. The sequencer does reset with each new key press, so it will always start with the first step.
NG/NR (No Gate/No Reset)	Like No Gate, only the first step in the sequence triggers the envelopes, however the sequencer does not reset with new key presses. Each new key press will start with whatever sequencer step is active.
Key Step	Each key press plays the next active step in the sequence and retriggers the envelopes. Steps are only triggered by key press.

Table 9. Sequencer Modes

Division

The division of the MIDI clock that determines the timing of each sequencer step.

SeqA controls the MIDI clock division and swing for the other three sequencers. The other sequencers will use whatever settings are made for SeqA.

Pattern

Solaris can store 64 sequencer patterns. The values are 1-63, and User. Like the Arp Patterns, these are stored on the CF card in the Factory/Seq folder. The Solaris only ships with one pattern.

A software editor for sequencer and arpeggiator patterns is planned. Please refer to the website for more information.

Swing

Introduces a delay of every other (or every even) note triggered, evoking a swinging or rhythmic feel to the playback.

BPM

The step sequencer can be synchronized to Solaris' internal MIDI clock by setting the ClkSrc parameter in the MIDI menu to Int. You can then specify the BPM, clock division, and swing amount for the steps in the sequencer. The step sequencer can also be set to synchronize to an incoming MIDI clock signal by setting the ClkSrc parameter to Ext in the MIDI menu. See "MIDI Menu" on page 44.

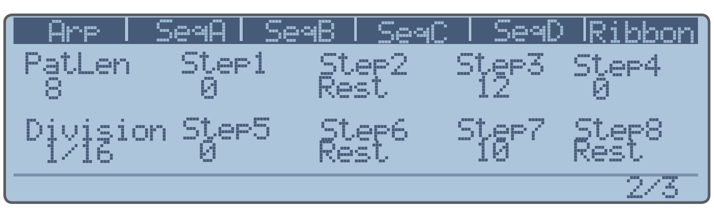

Figure 61. Sequencer Menu, page 2 of 3

PatLen

Specifies the length of the sequencer row's pattern. Each of the 4 rows can have a different pattern length.

Step1-Step8

Allows the first 8 steps of the row's pattern to be set. If the Amount parameter in the destination is set to 120.00 semitones, the values of each step correspond to 1 semitone.

Division

MIDI clock division that determines the length of each step. All rows are controlled by the **Division** setting of SeqA.

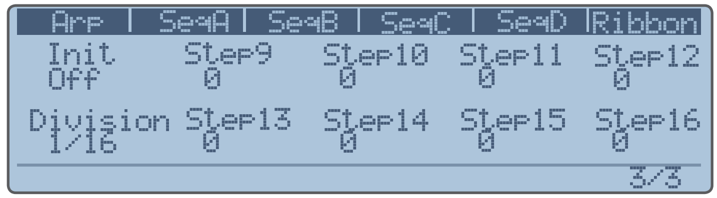

Figure 62. Sequencer Menu, page 3 of 3

Init

Init provides a convenient way to clear the row's step settings. Change the Init parameter to Active. The LED above the **Enter** button will flash. Pressing the **Enter** button will zero out all of the row's step values. Press **Exit** to cancel without clearing the values.

Step9-Step16

Allows steps 9-16 of the row's pattern to be edited.

Division

MIDI clock division that determines the length of each step. All sequencer rows are controlled by the Division setting of SeqA. The parameter is simply listed on all 3 menu pages for convenience.

Ribbon Controller

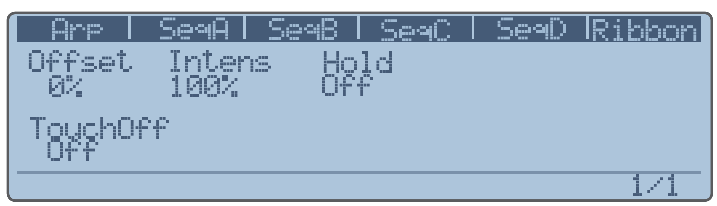

Figure 63. Ribbon Controller Menu, page 1 of 1

As mentioned in "Ribbon Controller" on page 15, the **Ribbon Controller** outputs 2 control signals. If only one finger is used, both signals are identical. If two are used, the upper finger controls the Ribbon 2 output.

Offset

This parameter moves the zero point of the ribbon to the right from the left most edge. It currently affects the output whether the ribbon is touched or not. This will be addressed in an upcoming OS update.

Intens

Scales the ribbon output from 0-200%. The most common usage is 100%.

Hold

Hold the last touched ribbon position.

TouchOff (Touch Offset)

Resets the zero point to wherever you first touch the ribbon. This allows very long sweeps down if you touch the rightmost edge of the ribbon. This mode is similar to how the ribbon controller on the classic Yamaha CS-80 synthesizer worked.

Output

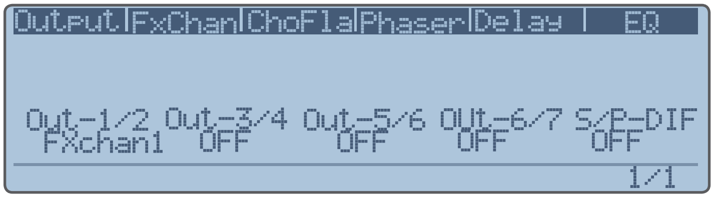

Figure 64. Output Menu, page 1 of 1

The Solaris's analog outputs are configured as 4 pairs of "stereo" outputs. Also available is the S/PDIF stereo output. For each of these stereo outputs, you can decide the source of the audio signal. The choices are: *Off*, *Synth*, *EXT-1/2*, *EXT-3/4*, *S/PDIF*, and *FXchan1-4*.

Synth	Sends the direct output of the Solaris prior to any of the FX.
EXT-1/2, EXT-3/4, or S/PDIF	Routes the signals directly from their input to the outputs, as a 'pass-thru' function (no processing of the External or S/PDIF signals will occur).
FXchan1-4	Outputs routes the sum total of that FX channel to the assigned output.

Table 10. Audio output sources

This system provides the maximum in flexibility for FX bussing, but can be a bit confusing. Combined with the FX Channel input options, several variations of routing are possible. For example:

You want to process the dry synth with 4 effects, each one having its own direct output assigned. In this case, you would have a screen like this:

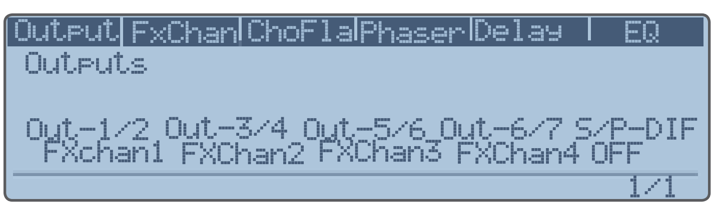

Table 11. Sample output routing

You would then set up each of the Effects Channels (see below) with the dry Synth as input, and only one effect selected for each FX Channel.

You want the dry synth to have a Flanger effect, and send that to one output, and then send the flanged synth into a Delay, and have that come out a different output. For the Output page, you would have something like this:

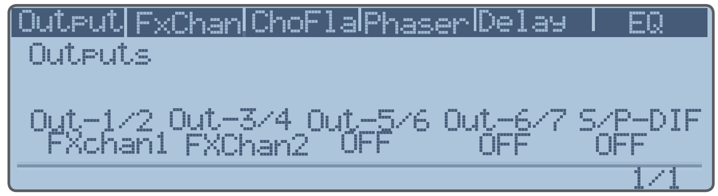

Figure 65. Sample output routing

You would then set up FXchan1 to take the Synth as input, and select the Chorus/Flanger only. Then you would set up FXchan 2 to take FXchan1 as Input, and select the Delay effect only. With this example, you have 2 FX channels in series, coming out of analog outs 3/4.

Effects Channel (FXChan)

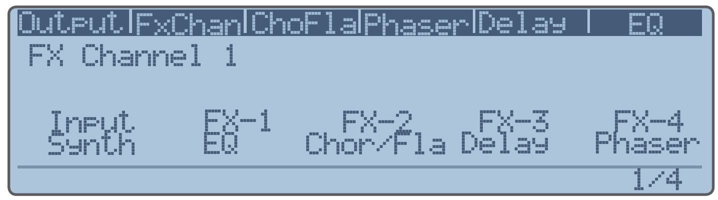

Figure 66. Effects Channel Menu, page 1 of 4

Solaris provides four separate effect channels, each with four effect slots. There are four effect modules (Chorus/Flanger, Phaser, Delay and EQ) that can be plugged in to these slots. There is only one of each effect module, but they can be applied to any slot in any of the four effect channels. The effect modules are described in the next section.

FX Channels are different from FX Slots. Each Channel (or FX buss) has room for up to 4 possible effects, however, the four effects can only be selected once, because of the 'Effects Pool' concept - any FX Slot can select from the available effects in the 'pool', but once an effect is selected somewhere, it is removed from the pool, and no longer available to any other FX slot.

To navigate between the four effect channels, press the Inc/Dec buttons beside the Graphic Display while in the FxChan soft menu.

Each of the four effect channels has the following parameters:

Input

Synth	The audio signal directly from the VCA.
Ext-1/2	External audio inputs 1 and 2
Ext-3/4	External audio inputs 3 and 4
S/P-DIF	S/PDIF input
FXchan(N)	Output of any of the other three effects channels.

Table 12. Effects Channel Inputs

FX-1, FX-2, FX-3, FX-4

These are the four effect slots available in each effect channel. Select from the four available effect modules.

Chorus/Flanger (ChorFla)

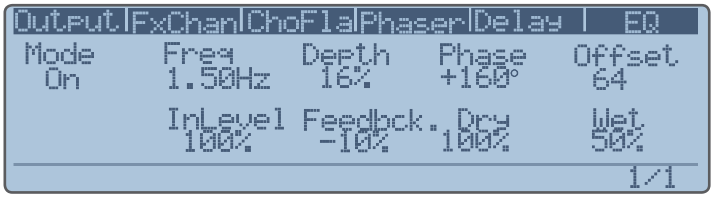

Figure 67. Chorus Flanger Menu, page 1 of 1

This module is a chorus and flanger effect. The flanging effect is achieved by adding positive or negative feedback into the signal via the Feedbck parameter.

Mode

Bypass or enable the effect.

Freq

Speed of the modulation, from 0.00Hz to 50.0Hz.

Depth

Depth of the modulation effect, from 0% to 100%.

Phase

Phase, +/- 180 degrees.

Offset

Shifts the center point of the frequency being swept, from 0-127.

InLevel

Gain of the input signal.

Feedbck.

Amount of feedback to be applied, from 0%-100%.

Dry

The amount of original, unaffected signal passed to the output.

Wet

The amount of effect sound passed to the output.

Phaser

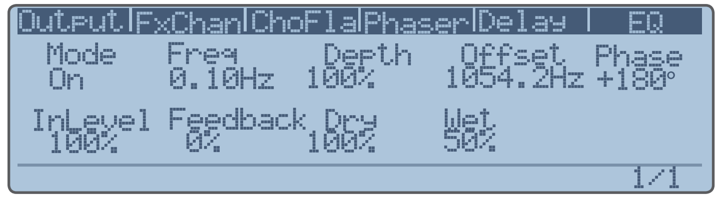

Figure 68. Phaser Menu, page 1 of 1

Mode

Bypass or enable the effect.

Freq

Speed of the modulation, from 0.00Hz to 50.0Hz.

Depth

Depth of the modulation effect, from 0% to 100%.

Phase

Phase, +/- 180 degrees.

Offset

Allows you to specify the center point of the frequency being swept, in Hertz. The range is 0.00Hz to 20000.0Hz.

InLevel

Gain of the input signal.

Feedbck.

Amount of feedback to be applied, from 0%-100%.

Dry

The amount of original, unaffected signal passed to the output.

Wet

The amount of effect sound passed to the output.

Delay

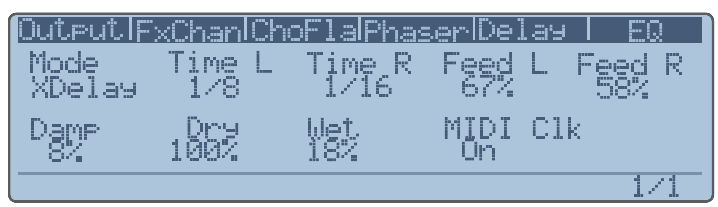

Figure 69. Delay Menu, page 1 of 1

The Delay effect in Solaris is actually 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 features two delay circuits whose feedback circuits are ‘crossed over’ into the inputs of the other delay, creating interesting panoramic effects. Both delay types have the following parameters:

Mode

Allows you to *Bypass* the effect, or operate it as a standard *Delay*, or *XDelay* (cross delay).

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.

Feed L

The amount of feedback for the left channel

Feed R

The amount of feedback for the right channel

Damp

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 Clk

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.

EQ

Figure 70. EQ Menu, page 1 of 1

The EQ effect module is a 3-band EQ, each band with an assignable center frequency between 0.00Hz and 20000.0Hz. A Gain cut or boost of 12 dB per band is available. Q controls the bandwidth of the cut or boost; 0.7 is the minimum Q setting, and allows the widest bandwidth around the center frequency. 20.00 is the maximum, giving the narrowest bandwidth.

Vector Synthesis (VS)

The Vector Synthesis section allows four different sound sources to be mixed/morphed dynamically based on a 2 dimensional x/y vector graph. Vector Synthesis allows Solaris to achieve swirling, moving dynamic sounds reminiscent of the Sequential Circuits Prophet VS. Solaris has 2 vector synthesis modules.

The Prophet VS introduced the idea of changing the harmonic structure of the 'raw material' to be filtered and shaped by using a 2-dimensional mixer. We called it Vector Synthesis. You can also program this with one of the regular Mixers, but to make things easier, I put in two of these 'Vector Mixers' (essential quad panners) to simplify programming. The VS1 mixer has 4 signal inputs, each with an initial Level. The X-axis (controlled by SourceX) will crossfade between inputs 1 and 2; the Y-axis (controlled by SourceY) between inputs 3 and 4. The 'factory default' for Source X & Y are the 2 outputs from the **Joystick**, but you could program anything you want.

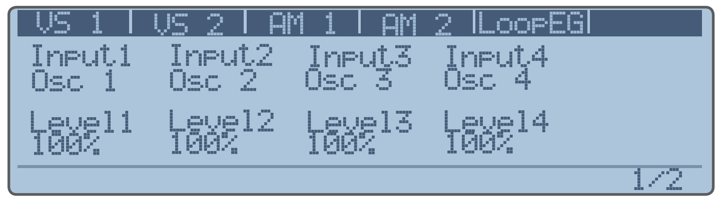

Figure 71. Vector Synthesis Menu, page 1 of 2

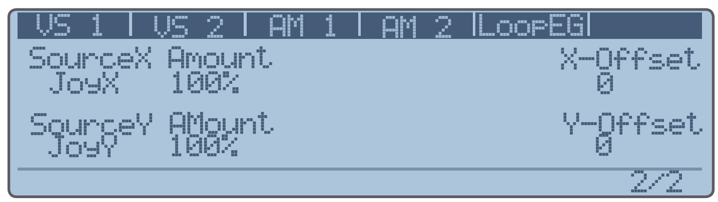

Figure 72. Vector Synthesis Menu, page 2 of 2

The X/Y "motion" of the vector synthesis module can be assigned to the hardware **Joystick**, or modulated by any of Solaris' extensive modulation sources. When assigned to the **Joystick**, each corner of the control represents the full level of one of the four input sources. X-Offset and Y-Offset shift the value of the x/y control, moving the "center" of the **Joystick** away from 0,0.

If you take a look at the factory setting (default patch when you switch on the Solaris without any CF card), you can see that Input1-Input4 are set to *Oscs 1*-*Osc 4*, all at full Level. Moving to the next VS 1 page, you will see *JoyX* for SourceX, and *JoyY* for SourceY, both at 100%, with no offsets. If you now set the tuning for each oscillator at obvious different intervals, you can use the **Joystick** to isolate each oscillator, and crossfade between the 4 oscillator outputs, with the center **Joystick** position being an equal mix of all 4 inputs.

Amplitude Modulation (AM)

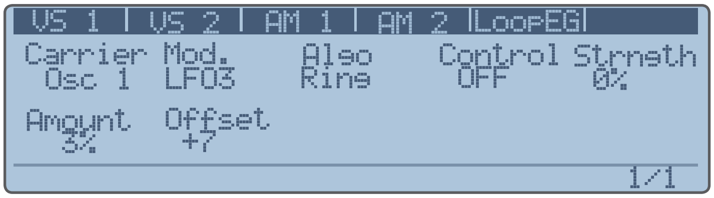

Figure 73. Amplitude Modulation Menu, page 1 of 1

Amplitude Modulation (AM) is a process of varying the amplitude of one sound (the carrier) by the amplitude of another (the modulator). If the frequency of the modulator is sub-audio, AM results in a tremolo effect. If the modulator's frequency is above around 10hz, the timbre of the carrier is affected by the introduction of additional partials to the output. When two sine waves are used, AM results in two additional sidebands equally spaced around the carrier's fundamental frequency. The frequency of the sidebands is the sum and difference of the carrier and modulator's frequencies, and the amplitude of the new partials is half the amplitude of the carrier.

Solaris has 2 AM modules. Any source can be used as the carrier or modulator, though a classic AM synthesis technique is to modulate the amplitude of one oscillator with another oscillator. The following algorithms are available:

Shift	Typical AM that produces two sidebands around the carrier
Clip	Multiplies the two input signals and clips the result. Creates two strong sidebands (stronger than those generated by Shift) around the carrier's frequency, and on strong sideband at a much lower frequency. Phase cancellation eliminates the original carrier.
Abs (absolute)	Outputs the absolute value of multiplying the two input signals without clipping. Creates two weak sidebands widely spaced around the carrier.
Ring	Classic ring modulation that creates two strong sidebands around the carrier and eliminates the carrier completely due to phase cancellation.

Table 13. AM Algorithms

The AM section can be side chain modulated by selecting a modulation source for the Control parameter.

Amount

This is a bipolar mixer for the output of the algorithm. Using *Ring Mod* as an example: if you have the Offset at *0*, the Amount will seem just like a bipolar mixer (with negative values just producing an inverted phase signal), and when the Amount is at 0, you won't hear anything. However, if you then adjust the Offset to some other value, you will hear some of the original *Carrier* input, and then by adjusting the Amount, you can hear the Ring Modulated output increase.

Offset

Shifts the Carrier input above or below (or around) zero.

Looping Envelope (LoopEG)

The Looping Envelope is a two dimensional, 8-stage bipolar envelope with looping capability. This envelope can be selected as a modulation source for any other modulation destination.

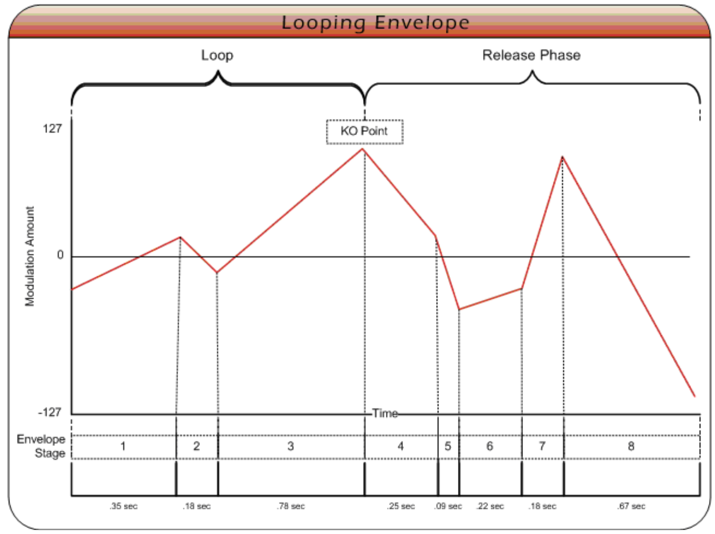

Figure 74. Looping Envelope diagram

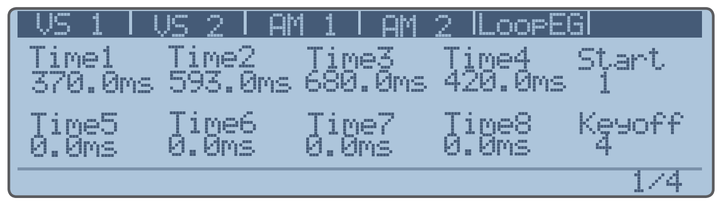

Figure 75. Looping Envelope Menu, page 1 of 4

Parameter	Description
Time1 – Time8	These controls determine the length of each of the 8 segments of the envelope. The default range of the time controls is 1.0 ms – 20.0 seconds. The Looping Envelope can also be synced to the MIDI clock by setting the **Sync** parameter on menu page 4. When synced to MIDI clock, the time values for each segment are shown in time divisions.
Start	When Loop is enabled, this control determines the starting point of the loop. The envelope will play as normal up until the KeyOff Point, 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 KeyOff Point through segment 8.

Parameter	Description
KeyOff	This control serves two purposes. When Loop Mode is active, KeyOff Point determines the last segment in the loop. KO Point also defines the beginning of the release stage of the envelope. If Loop Mode is off, segments 1 to KeyOff Point represent the attack and decay portions of the envelope. The KeyOff Point represents the Sustain portion. Segments following the KeyOff Point represent the release phase of the envelope. When Loop Mode is on, the envelope behaves as described above.

Table 14. Looping Envelope Main mode, page 1 parameters

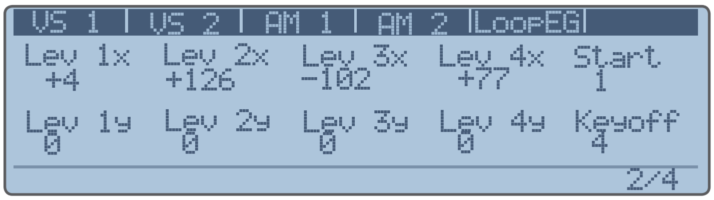

Figure 76. Looping Envelope Menu, page 2 of 4

Parameter	Description
Level 1x – Level 4x	These controls determine the output level for the X dimension of each segment of the envelope. Since this is a bipolar envelope, the range of these controls is -/+ 127.
Level 1y – Level 4y	These controls determine the output level for the Y dimension of each segment of the envelope. Since this is a bipolar envelope, the range of these controls is -/+ 127.

Table 15. Looping Envelope Main mode, page 2 parameters

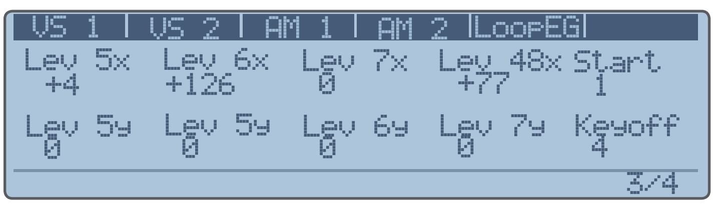

Figure 77. Looping Envelope Menu, page 3 of 4

Page 3 displays the X and Y levels for the remaining 4 segments.

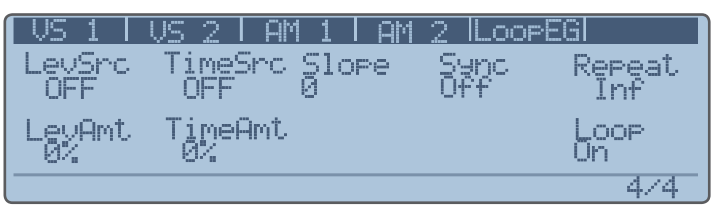

Figure 78. Looping Envelope, page 4 of 4

Parameter	Description
LevSrc, TimeSrc	These parameters select from a list of modulation sources to modulate all segments' levels or times.
LevAmt, TimeAmt	These parameters select from a list of controller values to modulate all segments' levels or times.
Slope	Adjusts the slope of each segment; 0 is linear, 127 is exponential
Sync	Allows use of MIDI Clocks to set the timing values
Repeat	Sets the number of times the loop will repeat. Range is Off, 1-9, Inf(inite).
Loop	This enables/disables the looping feature of this envelope. When enabled, the envelope will loop between the segments specified by the Loop Start and KO Point controls.

Table 16. Looping Envelope Main mode, page 4 parameters

Key Tables

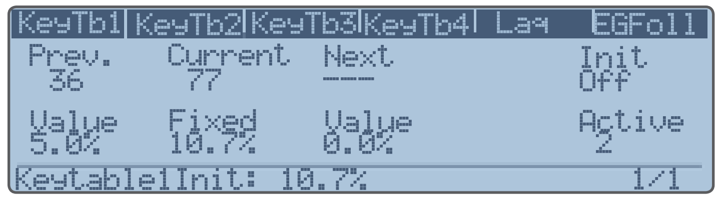

Figure 79. Key Table Menu, page 1 of 1

Solaris provides 4 key tables for use as modulation sources. The key tables take a normal note input and scale it across the table as an output signal. Each key table is represented by a separate soft menu.

The key tables allow you to set any value from 0.0%-100.0% for each key, by using keyboard entry. Simply select the key you want to adjust by playing it on the keyboard. You will see the current number appear in the Current column in the display. Using the Data Wheel (or lower row knob), you can adjust this value, changing it from Interpol(ated) to a Fixed value. Values for keys in between the ones you set are calculated using linear interpolation. A Previous field and Next field are provided to show you the values that you have assigned (Fixed).

The Key Tables do not yet have a graphic to show you the table scaling, so instead we have provided a number of parameters to define the table's output, and to show what is going on as best as possible. There are three parameters that determine the table values. These are: Previous, Current and Next, as shown in Figure 79. The numbers shown below each of these are MIDI note numbers. If the key table is empty, then you will see dashes below Previous and Next, and whichever key you are pressing as the Current parameter value.

Below these three parameters are: Value, Interpol, and Value. Again, if the key table is empty, these parameters will each have a value of 0.0% showing. If there is a valid key table, the display will show percentage values for any note played on the keyboard, with Interpolated or Fixed values being adjustable by the user. Notes that have been set in the table and which are above or below the current note being played will appear, with their % values, in the Prev. and Next fields.

Example: Let's select note 36 (lowest C on the Solaris), and change the Interpol value to *5.0%* (adjust the knob below Interpol). This label changes to '*Fixed*', signifying that note 36 now as a fixed value of *5.0%*. Figure 79 shows the current state of the graphic display. Now select note 77 (F5). Set its Value to 10.7%. Now play note 55 (G3). You will see the following in the display:

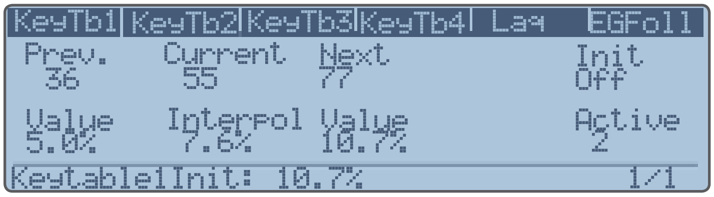

Figure 80. Key Table example

Note in the lower right corner a parameter that says Active, with a value of *5.0%*. This tells you that 2 notes have had their values assigned in the key table. They are now fixed. The display tells us that there is a fixed table value below the current key at note 36 (the Previous note to the current one that's assigned a fixed value), and another fixed value at note 77 (the 'Next' note above the current one that has a fixed value). For all values in between the two fixed notes, the Solaris will interpolate or calculate a value, so for note 55, we are getting an output of *7.6%*.

You can assign fixed values for every note in the MIDI scale. Custom tunings or scales can be crafted this way. Or, the interpolated values output by the key table can be used as modulation sources for parameters other than oscillator pitch.

The Active parameter tells you how many points you have assigned, and the Init parameter allows you to clear the key table. Just set it to Active, then press **Enter**. Press **Exit** to cancel.

Lag Processor

Figure 81. Lag Processors Menu, page 1 of 1

There are four lag processors that can be used to "smooth" any signal, either control signals or audio (though mostly used with control signals). The lag processors are essentially single pole (6 dB) lowpass filters. Some examples of their use follow:

The output of the step sequencer - say you want to have a filter cutoff opening and closing gradually, not abruptly, by using one of the sequence rows. Just feed a SeqA, SeqB, SeqC, or SeqD output into a lag processor, and then route the lag processor to control the filter cutoff.

You want to use the S/H output of an LFO on the oscillator pitch, but don't want abrupt pitch changes. Maybe you are running the LFO at an extremely slow rate to give random subtle pitch variations (like the drift of an unstable analog osc). If you use a slow lag time, you can have very small and gradual pitch changes - route the LFO into the lag processor, then the lag processor into the Pitch *modulation of the osc.*

You are modulating the frequency of one oscillator by another at audio rates. Putting the modulation source through the lag processor can take the "edge" off the waveshape by lowpass filtering it, giving a bit less harsh frequency modulation results.

You have a controller signal (either an internal one like the ribbon or ***Joystick*** *or* ***Mod Wheel****, or an external one like Breath or one of the CC assignables) and it is being used for pitch control...but you are hearing some 'zippering' or small discreet stepping of the pitch. Use a Lag processor to smooth these out - and you usually don't need much; just a few ms.*

You want to use one of the assignable switches (lower left front panel) to move pitch or cutoff (or whatever) up a specific amount (like an octave jump up and back), but you want it to 'glide' on the way. Since the output of the assignable switches is either 0 or max +, you can set the Amount of pitch or cutoff change in the Mod *mode pages, and then feed the switch through a lag processor to give you an exponential glide affect when you use the switch.*

Envelope Follower (EGFoll)

Figure 82. Envelope Follower Menu, page 1 of 1

The Envelope Follower allows you to derive an envelope based on the amplitude envelope of the Input signal. The resulting envelope could be used to control the cutoff frequency of a filter, for example, allowing a classic "wah" effect to be created based on the envelope of the incoming audio signal.

Input

The input signal whose amplitude envelope will be used to derive a control envelope.

Attack

The length, in milliseconds, of the attack portion of resulting envelope. Increasing this value will “smooth” the resulting envelope, by ignoring peaks in the incoming signal’s amplitude envelope that are shorter than this value.

Release

The length, in milliseconds, of the release stage of the resulting envelope. Increasing this value will “smooth” the resulting envelope, by ignoring amplitude peaks in the incoming signal that are shorter than the release phase of the envelope.

InLevel

The gain level of the incoming signal. Increasing this value increases the envelope follower’s sensitivity to the input signal.

OutLevel

The output gain of the resulting control signal. Increasing this value increases the depth of the output signal.

System Menu

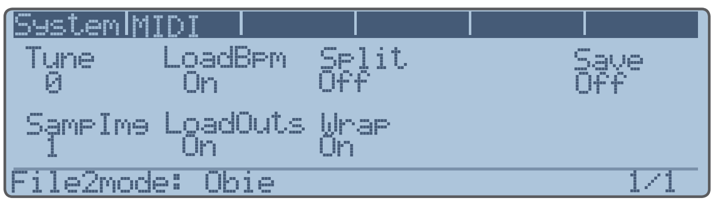

Figure 83. System Menu, page 1 of 1

Tune

Applies +/- 100 cents tuning to the entire synthesizer. This is because you may want to play the Solaris along with an acoustic instrument that is not at concert pitch, and cannot be retuned easily (such as an old piano). You can set the Fine Tune as needed, and still select through the presets without resetting this parameter.

Load BPM

Allows you to override the stored preset values for BPM. If LoadBPM is *Off*, the programmed BPM will be ignored, and the current BPM setting will be used for all presets

Load Outs

Allows you to override the stored preset values for the output assignments. If LoadOuts is *Off*, all programmed signal routings in the Output section (see “Output” on page 38), including FX routings, will be ignored. The current Output selection and FX bussing will be used for all Presets.

This will adversely affect many of the presets which have specific effects designed as an integral part of the sound. This function is provided if for some reason you wish to have the Solaris audio coming from output jacks that are not normally programmed in the factory Presets

Split

Limits the **Inc/Dec** buttons to select pages only from the Main or Mod group. The most recent displayed page is stored for each section, allowing one to go between a Main page and a Mod mode page.

Wrap

Allows continuous cycling of the parameter pages. If Wrap is *Off*, page selection will stop at the final page, whether incrementing or decrementing.

System parameters are not stored in presets.

Save

Certain parameters in the Solaris make more sense to be stored once, for overall use in the synth, instead of per preset. These parameters are stored in the Global Init file, abbreviated in the Factory folder on your CF card as ‘glo.ini’.

This file is created when you set the Save parameter on the System page to Active, and then press Enter. The Global init file contains all of the parameters on the System and MIDI pages, as well as the polarity settings for the foot switches (set on page 2 of the Home parameters).This glo.ini file is loaded into the synth for use when you first turn on your Solaris.

MIDI Menu

Figure 84. MIDI Menu, page 1 of 2

Channel

MIDI channel the Solaris sends and receives on.

PrgChng

When On, Solaris will respond to program change messages over MIDI.

SendArp

When On, Solaris will send the notes played by the internal arpeggiator to the MIDI Out port.

Omni

Turns MIDI Omni mode *On* or *Off*.

LocalOff

When On, Solaris does not respond to MIDI messages from the physical keyboard.

Tx-NRPN

When On, Solaris will transmit Non-Registered Parameter Numbers over MIDI.

Rx-NRPN

When On, Solaris will receive Non-Registered Parameter Numbers over MIDI.

MIDICtrl

This parameter determines whether or not Solaris will send or receive MIDI signal. It should be defaulted to *On*.

ClkSrc

Determines whether the Solaris will use its internal MIDI clock, or sync to an external MIDI clock source. When set to *Ext*, Solaris will sync to an external clock. When set to *Send*, Solaris will sync to its internal clock and also send clock signal out over MIDI out.

Volume

When *On*, Solaris will respond to volume change messages over MIDI.

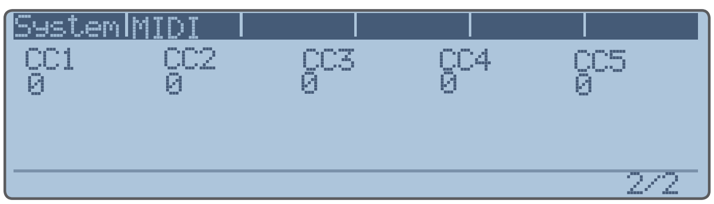

Figure 85. MIDI Menu, page 2 of 2

There are five assignable MIDI Control “inputs”, labeled CC 1-5. The value that appears below each of these labels is the actual MIDI Control number that the user wants to assign to the CC input. That input is then available as a Mod Source in all the Mod Lists. This provides for a way to use a MIDI Controller that wasn’t included in the standard Mod List. Here’s how it works:

Let’s say you have an external MIDI controller box, such as the Kawai K5000 Macro Control. This box has some dedicated knobs that put out specific controller values, such as Release (72), Attack (73), and Cutoff (74). This means, when you turn the knob that is called ‘Cutoff’, it will send its knob output as MIDI Control 74.

Now, let’s say you wanted to use this knob as a source for modulation in the Solaris. On page 2 of the **MIDI** menus, you can assign up to 5 control numbers, and in this example, we are going to select a value of 74 for CC 1.

If I plug the Macro Control box into the MIDI input of the Solaris, when I turn the ‘cutoff’ knob on the box, it will send a value to wherever CC 1 is programmed to go. When you select Modulation Sources, you will see that CC1 is one of the choices, so you could go into a Filter modulation source, set the Destination for *Cutoff*, and then select CC 1 as the Mod Source with a full Amount, and you would have the knob from the box controlling the filter cutoff of the Solaris.

The other thing to know about this is that these CC values are usually 0-127, so they may sound ‘stepped’ when you use them, especially on frequency controls. In that case, you would want to route the CC 1 through a Lag processor first, and then select that Lag processor as your Mod Source, using a small amount of lag to ‘smooth out’ the control signal.

Home Menu

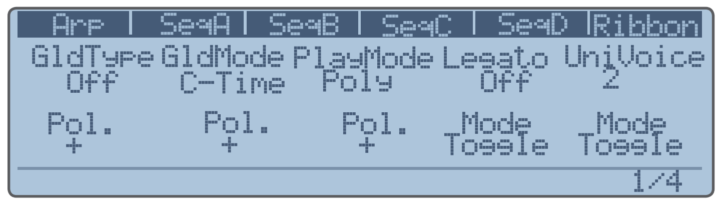

Figure 86. Home Menu, page 1 of 4

GldType

The global glide type setting: portamento (*Porta*), glissando (*Gliss*), fingered portamento (*FingPort*) and fingered glissando (*FingGlis*). Glissando is “quantized portamento”. It is as if you were sliding your finger up a guitar neck, with discreet semitone intervals being played as you slide. “Fingered” means it only glides when legato notes are played (you play a new note before lifting off the old note).

GldMode

Parameter	Description
C-Time	Constant Time. Allows you to specify the time of the glide using the GldTime parameter.
C-Rate	Constant Rate. 0% to 100%, with 100% being the shortest glide time.
Exp	Exponential.

Table 17. Glide Modes

GldRange

Describes the range of the glide between two notes. When set to 100%, you get the full range expected. If you are in Gliss mode, for example, you will hear each discrete semitone played between the two notes. For example, if you play C2, then C4. At 100%, you hear the full range gliding. If you set the Range to 50%, the Glide will start from C3 up to C4.

It is best to set PlayMode *to Mono to hear the effect* *of glide settings.*

GldTime

Duration of the glide from 0.0ms to 10.0sec (or 0% to 100% for Constant Rate glide mode).

Playmode

Determines if the Solaris will play in polyphonic or monophonic mode.

The ***Unison*** *button on the front panel (under the LFOs panel) will override the* ***PlayMode*** *setting, unless the* UniVoice *setting is Chord.*

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 frequently pressed key will sound. In Legato mode (reassign or retrigger), a key that is held down will re-sound after another key is played and released. *Reassign* mode reassigns the voice to the original note, resulting in a legato effect. *Retrig.* mode retriggers the original note.

EgReset

Shutdwn mode forces the envelopes to be reset to zero for each new note-on event. In *Running* mode, the envelopes continue running from wherever they are currently when a new key is pressed.

NotePri(ority)

When PlayMode is set to *Mono* mode, note priority determines which key pressed will have priority, i.e., which note will be sounded. In *Low* mode, the lowest note played on the keyboard will sound. In *High* mode, the highest note played on the keyboard will sound. In *Last* mode, the most recently pressed key will have priority. The early Minimoogs had a low note priority; most synths now use last priority.

UniVoice

This parameter determines how many of Solaris's voices should be assigned to a single note. The more voices assigned, the thicker and punchier the sound will be, though polyphony will be affected if you are using PlayMode set to *Poly*. There is an "intelligent assignment" that will allow you want to stack unison voices in polyphonic mode, however. By setting UniVoice to *3*, for example, each note you play will have 3 voices assigned to it. The more voices you assign, the lower your polyphony will be. The current OS supports 10 voices, so in this configuration you would have 3 voices of polyphony.

The UniTune *parameter can be applied to in either mono or poly mode.*

If you want to play a chord stack on one note, set this parameter to *Chord*, ensure that PlayMode is set to *Poly* and the **Unison** button on the front panel is off. Press and hold a chord, then press the **Unison** button. As long as the **Unison** button is on (LED lit), any notes you play will play back your stacked chord.

UniTune

This parameter acts as a tuning spread (+/- 100 cents) between the voices specified in UniVoice. The larger the value, the more detuned from each other the voices will become. This can result in an extremely "fat" sound.

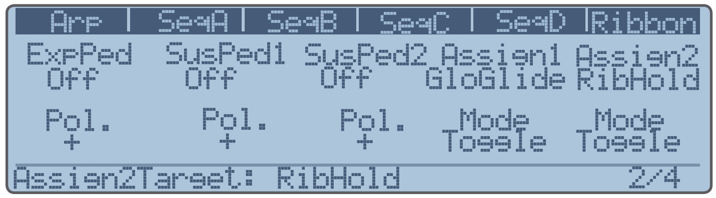

Figure 87. Home Menu, page 2 of 4

ExpPed

Expression Pedal. A continuous value. Can be assigned to control Expr (volume level) or overall Pan position, relative to the initial pan setting of each part.

SusPed1 and SusPed2

Sustain Pedals (switches). Values for both pedals can be: *Sostenuto, Sustain* (interacts with the front panel **Hold** button), *Ribbon Hold, Sequencer On, Arpeggiator On, Arpeggiator Hold, Arpeggiator Transpose*. Refer to Table 18 for details about *Arpeggiator Transpose*.

Pol.

Each pedal has this parameter. It allows you to set the polarity of the pedal. Pedals can also be completely disabled by selecting a value of *Off*. This value is stored as a global value.

Assign1 and Assign2

These are the assignable switches on the front panel, to the left of the **Octave** switches. Possible values are:

Parameter	Description
GloGlide	This turns Glide Type from Off to whatever is programmed for global GldType.
Glide 01-Glide 04	This turns on/off the individual oscillator glides, as programmed on page 2 of the oscillator's Main Mode. See "Oscillator Parameters (Main Mode)" on page 24.
GlideAll	This affects all 4 oscillator glides.
RibHold	When *On*, this keeps the most recent value "touched" on the ribbon (so you don't need to keep holding down the ribbon).
ArpTrans	Allows you to transpose the active arpeggiator pattern. Start the arpeggiator and press the **Hold** button. Now, press the assignable button that is configured for *ArpTrans*. Playing C4 on the Solaris keyboard will play the pattern in its original key. Playing any other note on the keyboard will transpose the pattern. Press the assignable button again (turn it off) to play a new arpeggiator pattern.

Table 18. Assignable Button modes

Mode

Each of the assignable buttons can be configured to function as *Toggle* buttons, or *Moment*(ary) buttons.

Figure 88. Home Menu, page 3 of 4

Transp(ose)

Transposes Solaris +/- 63 semitones.

PW Up

Defines the range that the pitch wheel outputs in the upper half of its travel, +/- 63 semitones.

PW Down

Defines the range that the pitch wheel outputs in the lower half of its travel, +/- 63 semitones.

BPM

Beats Per Minute. When not synced to an external MIDI clock, this parameter can be used to set the internal tempo between 1 and 255 BPM.

VTIntens

Velocity Table Intensity, (0-100%). For the table shapes at 50%, the table shape is linear. At 0% it is logarithmic, and at 100% it is exponential.

VTOff

Velocity Table Offset. This parameter is an offset, which allows you (at larger values) to shift the zero point of the control signal from velocity.

ATIntens

Aftertouch Table Intensity, (0-100%). For the table shapes at 50%, the table shape is linear. At 0% it is logarithmic, and at 100% it is exponential.

ATOff

Aftertouch Table Offset. This parameter is an offset, which allows you (at larger values) to shift the zero point of the control signal from aftertouch.

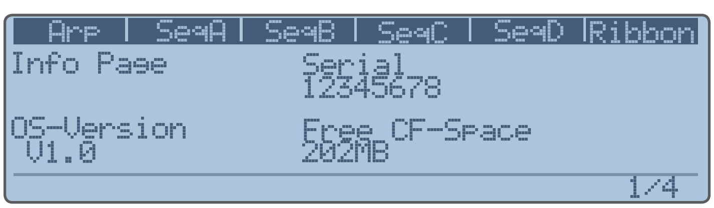

Figure 89. Home Menu, page 4 of 4

Serial

Internal serial number of the Solaris unit.

OS-Version

Currently loaded operating system version.

Free CF-Space

Free storage space on the inserted CompactFlash card.

Appendix 1- Oscillator Parameters

MM1 Multimode Oscillator

Parameter	Parameter Description	Values	Description
Main mode, page 1 parameters			
Type	Type of oscillator	MM1	Multimode oscillator
Wave	Waveform generated by the oscillator	Sine	Sine wave
		Tri	Triangle wave
		Ramp	Sawtooth with upward ramp
		Saw	Sawtooth with downward ramp
		Pulse	Pulse waveform, which produces a square wave when the Shape parameter is 50%. 0% and 100% Shape produce no sound.
		Noise	White noise
		S/H	Tunable noise
		MorphSaw	A morphing waveform that starts as a sine wave when the Shape parameter is 0%, and gradually changes into a sawtooth waveform when the Shape parameter reaches 100%.
		MorphSquare	A morphing waveform that starts as a sine wave when the Shape parameter is 0%, and gradually changes into a square waveform when the Shape parameter reaches 100%.
		Jaws	A special waveform comprising 7 stacked sawtooth waves, whose tuning spread is controlled by the Shape parameter.
Shape	For waveforms that have variable shapes, i.e., pulse, morphing, and Jaws types of waveforms, this parameter determines the shape of the waveform the oscillator will generate.	0% to 100%	Note that this parameter doesn't affect all waveforms. When the Jaws waveform is selected, the Shape parameter affects the tuning spread between the 7 stacked sawtooth waves.
Coarse	Parameter controls the pitch of the oscillator, in semitones	-60 to +60	
Fine	Fine tuning of the oscillator, in percentage of one semitone	-100% to 100%	
Main mode, page 2 parameters			
Sync	Specifies the master oscillator this oscillator will be synchronized with	OFF	The oscillator is not synced with another oscillator
		Gate	The oscillator's waveform phase will be reset with each note-on event.
		Osc 1-Osc 4	The oscillator will be hard synced with the oscillator selected by this parameter. Note that an oscillator cannot be synchronized to itself.
Phase	The phase the slave oscillator will start from when its cycle is reset by the master oscillator.	-180° to +180°	For this oscillator, only the Sine, Tri, Ramp, Saw, & Pulse waveforms can be synced.
Glide	Exponential glide time for this oscillator	0.0 ms to 20.0 sec	
Glide	Turns oscillator glide on and off	On, Off	

Table 19. Parameter Table for Multimode (MM1) Oscillator

WT Wavetable Oscillator

Parameter	Parameter Description	Values	Description
Main mode, page 1 parameters			
Type	Type of oscillator	WT	Wavetable oscillator
Wave	The wavetable the oscillator will play	1-64	There are 64 different wavetables, each with 60+ individual waveshapes that can be swept using various modulation sources. The wavetables in Solaris are the original Waldorf Microwave wavetables, used with special permission from Waldorf. See Table 21 for the full list of wavetables. The **Wave** parameter corresponds 1:1 with the wavetables listed in the table, i.e., Wave 33 in the Wavetable oscillator is the SawSync 1 wavetable.
Shape	Determines which of the 64 waveshapes to play from the wavetable chosen in the Wave parameter.	0% to 100%	
Coarse	Parameter controls the pitch of the oscillator, in semitones	-60 to +60	
Fine	Fine tuning of the oscillator, in percentage of one semitone	-100% to 100%	
Main mode, page 2 parameters			
Glide	Exponential glide time for this oscillator	0.0 ms to 20.0 sec	
Glide	Turns oscillator glide on and off	On, Off	

Table 20. Parameter Table for Wavetable (WT) Oscillator

Wavetables

1	Resonant	17	Formant 1	33	SawSync 1	49	K+Strong2
2	Resonant 2	18	Polated	34	SawSync 2	50	K+Strong3
3	MalletSyn	19	Transient	35	SawSync 3	51	1-2-3-4-5
4	Sqr-Sweep	20	ElectricP	36	PulSync 1	52	19/twenty
5	Bellish	21	Robotic	37	PulSync 2	53	Wavetrip1
6	Pul-Sweep	22	StrongHrm	38	PulSync 3	54	Wavetrip2
7	Saw-Sweep	23	PercOrgan	39	SinSync 1	55	Wavetrip3
8	MellowSaw	24	ClipSweep	40	SinSync 2	56	Wavetrip4
9	Feedback	25	ResoHarms	41	SinSync 3	57	MaleVoice
10	Add Harm	26	2 Echoes	42	PWM Pulse	58	Low Piano
11	Reso 3 HP	27	Formant 2	43	PWM Saw	59	ResoSweep
12	Wind Syn	28	FmntVocal	44	Fuzz Wave	60	Xmas Bell
13	High Harm	29	MicroSync	45	Distorted	61	FM Piano
14	Clipper	30	Micro PWM	46	HeavyFuzz	62	Fat Organ
15	Organ Syn	31	Glassy	47	Fuzz Sync	63	Vibes
16	SquareSaw	32	Square HP	48	K+Strong1	64	Chorus 2

Table 21. Original Waldorf Wavetables

CEM Curtis Electromusic Oscillator

Parameter	Parameter Description	Values	Description
Main mode, page 1 parameters			
Type	Type of oscillator	CEM	Curtis Electromusic oscillator emulation
Wave	Waveform generated by the oscillator	OFF	No waveform is generated
		Saw	Sawtooth waveform
		Tri	Triangle waveform
		Pulse	Pulse waveform, which produces a square wave when the Shape parameter is 50%. 0% and 100% Shape produce no sound.
		Saw+Tri	The oscillator generates a sawtooth and a triangle wave simultaneously
		Saw+Pulse	The oscillator generates a sawtooth and pulse wave simultaneously
		Tri+Pulse	The oscillator generates a triangle and pulse wave simultaneously
		S+T+P	The oscillator generates a sawtooth, triangle and pulse wave simultaneously
Shape	For waveforms what have variable shapes, i.e., pulse, morphing, and Jaws types of waveforms, this parameter determines the shape of the waveform the oscillator will generate.	0% to 100%	For the CEM Oscillator, only the Pulse waveform is affected by the Shape parameter. Pulse width is affected in any of the waveshape combinations that include the Pulse waveform.
Coarse	Parameter controls the pitch of the oscillator, in semitones	-60 to +60	
Fine	Fine tuning of the oscillator, in percentage of one semitone	-100% to 100%	
Main mode, page 2 parameters			
Sync	Specifies the master oscillator this oscillator will be synchronized with	OFF	The oscillator is not synced with another oscillator
		Gate	The oscillator’s waveform phase will be reset with each note-on event.
		Osc 1-Osc 4	The oscillator will be hard synced with the oscillator selected by this parameter. Note that an oscillator cannot be synchronized to itself.
Glide	Exponential glide time for this oscillator	0.0 ms to 20.0 sec	
Glide	Turns oscillator glide on and off	On, Off	

Table 22. Parameter Table for CEM Oscillator

Wav Sample Playback Oscillator

Parameter	Parameter Description	Values	Description
Main mode, page 1 parameters			
Type	Type of oscillator	Wav	Sample playback oscillator
Wave	This parameter selects a sample from the sample set the user has uploaded to Solaris	1-N	
Shape	No effect	0% to 100%	
Coarse	Parameter controls the pitch of the oscillator, in semitones	-60 to +60	
Fine	Fine tuning of the oscillator, in percentage of one semitone	-100% to 100%	
Main mode, page 2 parameters			
Glide	Exponential glide time for this oscillator	0.0 ms to 20.0 sec	
Glide	Turns oscillator glide on and off	On, Off	

Table 23. Parameter Table for Sample Playback (WAV) Oscillator

VS Vector Synthesis Oscillator

Parameter	Parameter Description	Values	Description
Main mode, page 1 parameters			
Type	Type of oscillator	VS	Vector synthesis oscillator
Wave	This parameter selects among the 94 single-cycle waveforms to play	1-94	Number of the single-cycle waveform to play
Shape	No effect	0% to 100%	
Coarse	Parameter controls the pitch of the oscilla-tor, in semitones	-60 to +60	
Fine	Fine tuning of the oscillator, in percentage of one semitone	-100% to 100%	
Main mode, page 2 parameters			
Glide	Exponential glide time	0.0ms to 20.0sec	
Glide	Turns oscillator glide on and off	On, Off	

Table 24. Parameter Table for Vector Synthesis Oscillator

1	SineWave	33	High Pipe	65	Pure
2	Sawtooth	34	Mass Organ	66	Medium Pure
3	Square	35	Reed Organ	67	High Harmonic 2
4	Warm Bell	36	Organ Ahh	68	Full Bell
5	Random Bell	37	Mellow Organ	69	Bell 1
6	Random Bell 2	38	Formant Organ	70	Pinched 2
7	Warm Bell 2	39	Clarinet	71	Cluster
8	Formant Bell	40	Ahh Female	72	Medium Pinched
9	Fuzzy Reed	41	Ahh Homme	73	Vox Pinched
10	Formant Aoh	42	Ahh Bass	74	Organ Pinched
11	Formant Ahh	43	Reg Vox	75	Ahh Pinched
12	TriPlus	44	Vocal 1	76	Piano Organ
13	Dissonant Bell	45	Vocal 2	77	Bright Reed
14	Pulse 1	46	High Ahh	78	No Fundamental
15	Pulse 2	47	Bass	79	Reed Harmonic
16	Square Reed	48	Guitar	80	Light Fundamental
17	Oohh	49	Nice	81	Mellow Organ
18	Eehh	50	Woodwind	82	Bell 2
19	Feedback	51	Oboe	83	Bell 3
20	Piano 1	52	Harp	84	Saw 3rd & 5th
21	E. Piano	53	Pipe	85	Sine 5ths
22	Medium Harmonic	54	Hack 1	86	Sine 2 Octaves
23	HiTop	55	Hack 2	87	Sine 4 Octaves
24	Warm Reed	56	Hack 3	88	Saw 5ths
25	3rd & 5th Harmonic	57	Pinched 1	89	Saw 2 Octaves
26	Hollow	58	Bell Harmonic	90	Square 5ths
27	Heavy 7	59	Bell Vox	91	Square Octave & 5th
28	Bell Organ	60	High Harmonic 1	92	Square 2 Octaves
29	Bass Bell	61	High Reed	93	Warm Low
30	Tine 1	62	Bell Reed	94	Bells
31	Phase Square	63	Warm Whistle		
32	Orient	64	Wood		

Table 25. Original Prophet VS waveshapes

Mini Oscillator

Parameter	Parameter Description	Values	Description
Main mode, page 1 parameters			
Type	Type of oscillator	Mini	Minimoog emulation from the Sonic Core Mini-max.
Wave	Waveform generated by the oscillator	Tri	Triangle wave
		Saw+Tri	The oscillator generates a sawtooth and triangle waveform simultaneously
		Saw	Sawtooth with downward ramp
		Pulse1	The oscillator generates a pulse wave of a preset shape
		Pulse2	The oscillator generates a pulse wave of a preset shape
		Pulse3	The oscillator generates a pulse wave of a preset shape
Shape	The Shape parameter has no effect. The Minimoog had three preset pulse waveform shapes.	0% to 100%	
Coarse	Parameter controls the pitch of the oscilla-tor, in semitones	-60 to +60	
Fine	Fine tuning of the oscillator, in percentage of one semitone	-100% to 100%	
Main mode, page 2 parameters			
Glide	Exponential glide time for this oscillator	0.0 ms to 20.0 sec	
Glide	Turns oscillator glide on and off	On, Off	

Table 26. Parameter Table for Mini Oscillator

Appendix 2- Modulation Sources

Modulation Sources List 1

Table 27 shows the modulation list we will refer to as Modulation Source List 1. This modulation source list is used by the following components: Oscillators, Mixers, Insert FX, Filters, VCAs, and LFOs.

Source	Name
OFF	
LFO1 - LFO4	LFO 1 through 4
V-LFO	Vibrato LFO
EG1 - EG5	Envelope Generators 1 through 5
EG6	Envelope Generator 6 (amplitude envelope)
LpEG1 X	Looping Envelope’s X axis
LpEG1 Y	Looping Envelope’s Y axis
Vel	Velocity
AT	Aftertouch
Note	MIDI note number. The center (zero) point is E4 when using for key tracking, etc.
ModWh	Modulation Wheel
AT+MW	Aftertouch and Modulation Wheel summed
Rib1	**Ribbon Controller** signal 1
Rib2	**Ribbon Controller** signal 2 (higher of 2)
JoxX	**Joystick** X position
JoyY	**Joystick** Y position
CC1 - CC5	User-assignable controllers. Refer to “MIDI Menu” on page 44 for details.
Seq A - D	Step sequencers A through D
Ped1	Pedal 1
Ped2	Pedal 2
Btn1	Assignable Button 1
Btn2	Assignable Button 2
EnvFol	Envelope Follower
KeyTab1 - KeyTab4	Key Tables 1 through 4
PolyAT	Polyphonic Aftertouch
Lag1 - Lag4	Lag processors 1 through 4
Breath	Breath controller
MaxVal	Maximum value for that parameter
Osc1 - Osc4	Oscillators 1 through 4
Rotor 1 - Rotor 2	Rotor processors 1 and 2
AM1 - AM2	Amplitude Modulation sources 1 and 2
Vector1 - Vector2	Vector synthesis sources 1 and 2
Mixer1 - Mixer 4	Mixers 1 through 4
Filter1 - Filter4	Filters 1 through 4
InsFX1 - InsFX4	Insert effects 1 through 4
VCA1 - VCA4	VCAs 1 through 4
W Noise	White noise source
P Noise	Pink noise source
Ext1 - Ext4	External inputs 1 through 4
SPdifL	S/PDIF output (left)
SPdifR	S/PDIF output (right)

Table 27. Modulation Source List 1

By adding pink and white noise sources to the modulation source list, we have freed up the MM1 oscillator type from having to provide the noise sources.

Modulation Source List 2

Table 28 shows the modulation source list used by the Envelope Generator (EG) components. We will refer to this list as Modulation Source List 2.

Source	Name
OFF	
Vel	Velocity
KeyTrk	Key tracking
ModWh	Modulation wheel
CC1 - CC4	Continuous controllers 1 through 4

Table 28. Modulation Source List 2

Appendix 3- Filter Types

Table 29 shows the filter types available in Solaris.

LP = Lowpass, HP = Highpass, BP = Bandpass, BR = Band Reject (Notch), AP = Allpass.

The numbers describe the pole count for each, a pole providing 6 dB of filtering. There are several series filter combinations.

Type	Description
MM1 (Multimode)	23 filter variations are selectable. The 24 dB Lowpass (LP4) is very similar to the CEM LP filter of the Rev 3 Prophet 5s. Available modes include: LP4, LP3, LP2, LP1, HP4, HP3, HP2, HP1, BP4, BP2, BP2+LP1, BP2+LP2, BP2+HP1, BP2+HP2, BR4, BR2, BR2+LP1, BR2+LP2, BR2+HP1, BR2+HP2, AP3, AP3+LP1, AP3+HP1
SSM	Emulation of the Solid State Music chip used in the Rev.1 and Rev.2 Prophet synths. A 4-pole, 24 dB slope filter.
Mini	Emulation of the filter used in the Minimoog. A 4-pole, 24 dB slope filter. Input levels easily distort.
Obie	A 2 pole 12 dB state variable filter based on an Oberheim design. Includes: LB, HP, BP, and BR.
Comb	The comb filter adds a delayed copy of a signal to itself, in either a feed-forward or feedback loop. Both cause interference with the original signal, resulting in a frequency response that looks much like a comb. Solaris's comb filter can operate in two modes: *Tube* or *Comb*. *Tube* mode is a feedback loop, which produced higher levels of resonance, making it better for modelling Karplus-Strong "plucked string" algorithm. *Comb* mode is a feed-forward design. The delay length is limited to onboard chip memory, so this affects how low the cutoff frequency can go.
Vocal	A format filter with five vowels that can be morphed using the **X-Fade** control.

Table 29. Solaris Filter Types

Appendix 4- MIDI Implementation

Clock Division	Description
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
1/64	Sixty-fourth notes
1/64T	Sixty-fourth note triplets
1/128	One hundred-twenty eighth notes

Table 30. MIDI Clock Divisions

Appendix 5- Sample Specifications

Sample Pools

Solaris loads samples from the CompactFlash card into the RAM on its DSP chips. Solaris has a total of 32MB of sample RAM. The samples are stored as mono 16 bit signed headerless (‘raw’) audio files on the CompactFlash card. .Wav files will work as well. The current OS version looks for a folder named ‘Samples’ to find the samples. A sample pool consists of audio sample files and a text file defining how to load and play them. The definition of a sample pool is done with a simple text file in the same folder (use a naming like ‘SamplePool-001.txt’, ‘SamplePool-002.txt’, etc.).

```
[Pool]
name = Glockenspiel
[Sample]
sampleindex = 1
filename = Glockenspiel B3.raw
samplerate = 44100
samplelength = 43753
loopstart = 43042
loopend = 43753
rootkey = 59
finetune = 0
lowkey = 0
highkey = 127
[Sample]
sampleindex = 2
filename = Glockenspiel B5.raw
samplerate = 44100
samplelength = 40628
loopstart = 39628
loopend = 40628
rootkey = 83
finetune = 0
lowkey = 0
highkey = 127
```

Figure 90. Example SamplePool text file

The sample pool file shown in Figure 90 contains two individual samples. These two samples will show up as samples 1 and 2 in the Wave parameter of any oscillator slot running a sample playback (Wav) oscillator type. It is possible to create multi-samples for use with Solaris, by editing the lowkey and highkey values of each sample, to indicate over which MIDI note range they should each play.

Each new note will play the sample currently selected by the active oscillator(s). You could play and hold sample 1 from the example above (using the sustain pedal or **Hold** *button), change the oscillator’s* Wave *parameter to the second sample, and press another key. The new note-on event will cause the oscillator to play the second sample, even though the first sample may still be playing.*

Appendix 6- Self Test Menu

To access the Self Test Menu, press and hold the 1, 8 and 3 buttons on the numeric keypad simultaneously. Follow the on-screen instructions to perform various diagnostic tests or to calibrate the analog controls, such as the **Joystick**, **Ribbon Controller**, and wheels.

Figure 91. Self Test Menu - page 1

Figure 91 shows the main menu of the Self Test Menu. In this case, you can see that the DSP diagnostic test has been run. Figure 92 shows the second page of self-test menu options. Press **Exit** to leave the Self Test Menu.

Figure 92. Self Test Menu - page 2

The menu you are most likely to use is the *Analog Ctrls* menu. Access this menu by pressing 4 on the numeric keypad when you are on the main Self Test menu page. The *Analog Ctrls* menu allows you to re-calibrate the physical controls on Solaris.

Figure 93. Self Test Menu - Analog Ctrls menu

Appendix 7- Warranty

Warranty Regulations

Warranty Regulations

Zarg Music LLC warrants, that the described product has been free of failures within parts or components of the hardware and was found to be fully functional. Please carefully read the following information, which is important in the case of probable damages or malfunctions:

If goods are being found defective, missing features described within the present documentation or becoming defective due to eventual fabrication deficiency or material defects within the first twelve months after purchase, then Zarg Music LLC shall at its sole discretion and evaluation replace or repair the defective parts or goods at no cost. Multiple repairs shall be permissible. In case the malfunction or physical failure can not be fixed, customer receives the right to cancel the purchase with refund of the amount originally paid for the defective product. In case testing shows no physical damages, customer will be charged for testing procedure and services.

Any deficiencies caused by transportation have to be declared within a 14 days period after receipt of goods by written notice. Please note, that any warranty repair at no cost ruled by the above regulations requires registration of name and address by sending the proof of purchase together with the defective product.

To return defective goods, please contact the retailer where you purchased the product. As an alternative you can also contact Zarg Music LLC directly to receive a RMA number for the defective product. PLEASE NOTE: It is mandatory to return the product with the referring RMA number to avoid delays in repair. If possible, please also add a description of the failure occurred to enable us executing the repair as soon as possible.

Zarg Music, LLC.
phone 1-425-210-3270
sales@johnbowen.com

The hardware described within this documentation is herewith certified to conform to the requirements set forth in the guidelines for electromagnetic acceptability (89/336/EWG)

Dipl. Inform. Jürgen Kindermann
SONIC CORE DSP Audio Technology GmbH, March 2009

Appendix 8- NRPN Table

None0 0 - 0
None0 0 - 1
None0 0 - 2
Master0PitchWheelRange1 - 5
None0 0 - 8
None0 0 - 9
Env1Delay0 - 10
Env1Att0 - 11
Env1Dec0 - 12
Env1Sus0 - 13
Env1Rel0 - 14
Env1ASlope0 - 15
Env1DSlope0 - 16
Env1SSlope0 - 17
Env1RSlope0 - 18
Env1LvlVel0 - 19
Env1AMod0 - 20
Env1DMod0 - 21
Env1SMod0 - 22
Env1RMod0 - 23
Env1ATMSrc0 - 24
Env1DTMSrc0 - 25
Env1SLMSrc0 - 26
Env1RTMSrc0 - 27
Env2Delay0 - 28
Env2Att0 - 29
Env2Dec0 - 30
Env2Sus0 - 31
Env2Rel0 - 32
Env2ASlope0 - 33
Env2DSlope0 - 34
Env2SSlope0 - 35
Env2RSlope0 - 36
Env2LvlVel0 - 37
Env2AMod0 - 38
Env2DMod0 - 39
Env2SMod0 - 40
Env2RMod0 - 41
Env2ATMSrc0 - 42
Env2DTMSrc0 - 43
Env2SLMSrc0 - 44
Env2RTMSrc0 - 45
Env3Delay0 - 46
Env3Att0 - 47
Env3Dec0 - 48
Env3Sus0 - 49
Env3Rel0 - 50
Env3ASlope0 - 51
Env3DSlope0 - 52
Env3SSlope0 - 53
Env3RSlope0 - 54
Env3LvlVel0 - 55
Env3AMod0 - 56
Env3DMod0 - 57
Env3SMod0 - 58
Env3RMod0 - 59
Env3ATMSrc0 - 60
Env3DTMSrc0 - 61
Env3SLMSrc0 - 62
Env3RTMSrc0 - 63
Env4Delay0 - 64
Env4Att0 - 65
Env4Dec0 - 66
Env4Sus0 - 67
Env4Rel0 - 68
Env4ASlope0 - 69
Env4DSlope0 - 70
Env4SSlope0 - 71
Env4RSlope0 - 72
Env4LvlVel0 - 73
Env4AMod0 - 74
Env4DMod0 - 75
Env4SMod0 - 76
Env4RMod0 - 77
Env4ATMSrc0 - 78
Env4DTMSrc0 - 79
Env4SLMSrc0 - 80
Env4RTMSrc0 - 81
Env5Delay0 - 82
Env5Att0 - 83
Env5Dec0 - 84
Env5Sus0 - 85
Env5Rel0 - 86
Env5ASlope0 - 87
Env5DSlope0 - 88
Env5SSlope0 - 89
Env5RSlope0 - 90
Env5LvlVel0 - 91
Env5AMod0 - 92
Env5DMod0 - 93
Env5SMod0 - 94
Env5RMod0 - 95
Env5ATMSrc0 - 96
Env5DTMSrc0 - 97
Env5SLMSrc0 - 98
Env5RTMSrc0 - 99
Env6Delay0 - 100
Env6Att0 - 101
Env6Dec0 - 102
Env6Sus0 - 103
Env6Rel0 - 104
Env6ASlope0 - 105
Env6DSlope0 - 106
Env6SSlope0 - 107
Env6RSlope0 - 108
Env6LvlVel0 - 109
Env6AMod0 - 110
Env6DMod0 - 111
Env6SMod0 - 112
Env6RMod0 - 113
Env6ATMSrc0 - 114
Env6DTMSrc0 - 115
Env6SLMSrc0 - 116
Env6RTMSrc0 - 117
Lfo1ModCMix1 - 118
Lfo1ModAmount1 - 119
Lfo1ModCMix2 - 120
Lfo1ModAmount2 - 121
Lfo1ModCMix3 - 122
Lfo1ModAmount3 - 123
Lfo1ModSource1 - 126
Lfo1ModSource2 - 127
Lfo1ModSource3 - 128
Lfo1ModControl1 - 130
Lfo1ModControl2 - 131
Lfo1ModControl3 - 132
Lfo1ModDest1 - 134
Lfo1ModDest2 - 135
Lfo1ModDest3 - 136
Lfo1Frequency0 - 138
Lfo1WaveSel0 - 139
Lfo1Phase0 - 140
Lfo1KeySyncSw0 - 141
Lfo1FadeInTime0 - 142
Lfo1FadeOutTime0 - 143
Lfo1DelayTime0 - 144
Lfo1OffsetSw0 - 145
Lfo1Level0 - 147
Lfo2ModCMix1 - 148
Lfo2ModAmount1 - 149
Lfo2ModCMix2 - 150
Lfo2ModAmount2 - 151
Lfo2ModCMix3 - 152
Lfo2ModAmount3 - 153
Lfo2ModSource1 - 156
Lfo2ModSource2 - 157
Lfo2ModSource3 - 158
Lfo2ModControl1 - 160
Lfo2ModControl2 - 161
Lfo2ModControl3 - 162
Lfo2ModDest1 - 164
Lfo2ModDest2 - 165
Lfo2ModDest3 - 166
Lfo2Frequency0 - 168
Lfo2WaveSel0 - 169
Lfo2Phase0 - 170
Lfo2KeySyncSw0 - 171
Lfo2FadeInTime0 - 172
Lfo2FadeOutTime0 - 173
Lfo2DelayTime0 - 174
Lfo2OffsetSw0 - 175
Lfo2Level0 - 177
Lfo3ModCMix1 - 178
Lfo3ModAmount1 - 179
Lfo3ModCMix2 - 180
Lfo3ModAmount2 - 181
Lfo3ModCMix3 - 182
Lfo3ModAmount3 - 183
Lfo3ModSource1 - 186
Lfo3ModSource2 - 187
Lfo3ModSource3 - 188
Lfo3ModControl1 - 190
Lfo3ModControl2 - 191
Lfo3ModControl3 - 192
Lfo3ModDest1 - 194
Lfo3ModDest2 - 195
Lfo3ModDest3 - 196
Lfo3Frequency0 - 198
Lfo3WaveSel0 - 199
Lfo3Phase0 - 200
Lfo3KeySyncSw0 - 201
Lfo3FadeInTime0 - 202
Lfo3FadeOutTime0 - 203
Lfo3DelayTime0 - 204
Lfo3OffsetSw0 - 205
Lfo3Level0 - 207
Lfo4ModCMix1 - 208
Lfo4ModAmount1 - 209
Lfo4ModCMix2 - 210
Lfo4ModAmount2 - 211
Lfo4ModCMix3 - 212
Lfo4ModAmount3 - 213
Lfo4ModSource1 - 216
Lfo4ModSource2 - 217
Lfo4ModSource3 - 218
Lfo4ModControl1 - 220
Lfo4ModControl2 - 221
Lfo4ModControl3 - 222
Lfo4ModDest1 - 224
Lfo4ModDest2 - 225
Lfo4ModDest3 - 226
Lfo4Frequency0 - 228
Lfo4WaveSel0 - 229
Lfo4Phase0 - 230
Lfo4KeySyncSw0 - 231
Lfo4FadeInTime0 - 232
Lfo4FadeOutTime0 - 233
Lfo4DelayTime0 - 234
Lfo4OffsetSw0 - 235
Lfo4Level0 - 237
Lfo5ModCMix1 - 238
Lfo5ModAmount1 - 239
Lfo5ModCMix2 - 240
Lfo5ModAmount2 - 241
Lfo5ModCMix3 - 242
Lfo5ModAmount3 - 243
Lfo5ModSource1 - 246
Lfo5ModSource2 - 247
Lfo5ModSource3 - 248
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Lfo5ModControl3 - 252
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Lfo5ModDest2 - 255
Lfo5ModDest3 - 256
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Lfo5Phase0 - 260
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Lfo5FadeInTime0 - 262
Lfo5FadeOutTime0 - 263
Lfo5DelayTime0 - 264
Lfo5OffsetSw0 - 265
Lfo5Level0 - 267
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Osc1ModCMix2 - 270
Osc1ModAmount2 - 271
Osc1ModCMix3 - 272
Osc1ModAmount3 - 273
Osc1ModCMix4 - 274
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glo: Chorus0Offset0 - 2009
glo: Chorus0InLevel0 - 2010
glo: Chorus0Feedback0 - 2011
glo: Chorus0DryLevel0 - 2012
glo: Chorus0WetLevel0 - 2013
glo: Chorus0Phase0 - 2014
glo: Chorus0InSrc0 - 2015
glo: Phaser0Frequency0 - 2016
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Appendix 9- Legal Declarations

COMPLIANCE
FCC INFORMATION (U.S.A)
IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT! This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by ZARG MUSIC LLC may void your authority, granted by the FCC, to use this product. IMPORTANT: When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product MUST be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorisation to use this product in the USA.
NOTE: This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class „B“ digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in residential environment will not result in harmful interference with other electronic devices. This equipment generates/ uses radio frequencies and, if not installed and used according to the instructions found in the user manual, may cause interference harmful to the operation of other electronic devices, Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determinated by turning the unit „OFF“ and „ON“, please try to eliminate the problem by using one of the following measures: Relocate either this product or the device that is being affected by the interference. Utilise power outlets that are on branch (Circuitbreaker or fuse) circuits or install AC line filter/s. In the case of radio or TV interference, relocate/ reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the leadin to coaxial type cable. If these corrective measures do not produce satisfactory results, please contact the local retailer authorised to distribute this type of product. The statements above apply ONLY to products distributed in the USA.

SOLARIS Version 1. 191 FCC Information (CANADA)
FCC INFORMATION (CANADA)
The digital section of this apparatus does not exceed the „Class B“ limits for radio noise emmissions from digital apparatus set out in the radio interference regulation of the Canadian Department of Communications. Le present appareil numerique n’emet pas debruit radioelectriques depassant les limites applicables aux appareils numerique de la „Class B“ prescrites dans la reglement sur le brouillageradioelectrique edicte par le Ministre Des Communication du Canada.This only applies to products distributed in Canada. Ceci ne s’applique qu’aux produits distribues dans Canada

OTHER STANDARDS (REST OF WORLD)
This product complies with the radio frequency interference requirements of the Council Directive 89/336/EC.
Cet appareil est conforme aux prescriptions de la directive communitaire 89/336/EC. Dette apparat overholder det gaeldenda EF-direktivvedrorendareadiostoj. Dieses Gerät entspricht der EG-Richtlinie 89/336/EC.192

DECLARATION OF CONFORMITY
The following devices
Solaris keyboard
are hereby declared to conform with the requirements of Council Directive 89/336/FWG for radio frequency interference.
They also comply with regulations dated August 30th, 1995 concerning radio interference generated by electronic devices. The following standards have been applied: EM 50 082-1 : 1992 , EN 50 081-1 : 1992 , EN60065 : 1993
This declaration has been given responsibly on behalf of the manufacturer:
Zarg Music LLC
6012 Championship Cir
Mukilteo, WA 98275
USA

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