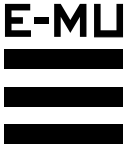
ORBIT
OPERATION MANUAL



E-mu Systems, Inc.



Operation Manual

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• FI517 Rev. A

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Important Notice:
In order to obtain warranty service on your Orbit unit, the serial number sticker must be intact and you must have a sales receipt or other proof of purchase. If there is no serial number sticker on Orbit, please contact E-mu Systems at once.

This product is covered under one or more of the following U.S. patents: 4,404,529; 4,506,579; 4,699,038; 4,987,600; 5,013,105; 5,072,645; 5,111,727; 5,144,676; 5,170,367; 5,248,845; 5,303,309; 5,317,104; 5,342,990; 5,430,244 and foreign patents and/or pending patents. Orbit is a registered trademark of E-mu Systems, Inc.

PRINTED AND MADE IN THE USA

IMPORTANT SAFETY INSTRUCTIONS

Use in countries other than the U.S.A. may require the use of a different line cord or attachment plug, or both. To reduce the risk of fire or electric shock, refer servicing to qualified service personnel. To reduce risk of fire or electric shock do not expose this product to rain or moisture.

GROUNDING INSTRUCTIONS

This product must be grounded. If it should malfunction or break down, grounding provides a path of least resistance for electric current, reducing the risk of electric shock. This product is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet properly installed and grounded in accordance with all local codes and ordinances.

DANGER

Improper connection of equipment grounding conductor can result in the risk of electric shock. Check with a qualified electrician or service personnel if you are in doubt as to whether the product is properly grounded. Do not modify the plug provided with this product — if it will not fit the outlet, have a proper outlet installed by a qualified technician.

CAUTION

If the 9090, Orbit is rack mounted, a standard 19-inch open frame rack must be used.

USER-MAINTENANCE INSTRUCTIONS

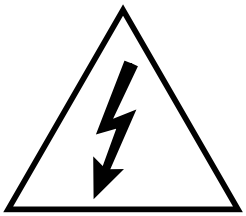
1. Orbit should be kept clean and dust free. Periodically wipe the unit with a clean, lint free cloth. Do not use solvents or cleaners.

2. There are no user lubrication or adjustment requirements.

3. Refer all other servicing to qualified service personnel.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



This symbol is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS

WARNING; When using electric products, basic precautions should always be followed, including the following:

1. Read all instructions before using Orbit.

2. To reduce the risk of injury, close supervision is necessary when Orbit is used near children.

3. Do not use Orbit near water — for example near a bathtub, washbowl, kitchen sink, in a wet basement, on a wet bar, or near or in a swimming pool.

4. Orbit should be situated so that its location or position does not interfere with its proper ventilation.

5. Orbit should be located away from heat sources such as radiators, heat registers, fireplaces, stoves, or ovens.

6. Orbit should only be connected to a power supply of the type described in the operating instructions and as marked on the product.

7. This product, in combination with an amplifier, headphones, and speakers, may be capable of producing sound levels that could cause full or partial hearing loss or damaged equipment. Do not operate for long periods of time at high volume levels or at a level that is uncomfortable. Additionally, care must be taken when programming any of the filters contained herein using extreme operating parameters. This action could also produce signals which result in unacceptable high sound levels as noted previously. If you experience any hearing loss or ringing of the ears consult your physician.

8. Orbit may be equipped with a polarized line plug (one blade wider that the other). This is a safety feature. If you are unable to insert this plug into the outlet, do not defeat the safety purpose of the plug. Contact an electrician to replace your obsolete outlet.

9. The power supply cord of Orbit should be unplugged from the outlet when left unused for a long period of time.

10. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure of Orbit through openings.

11. The product should be serviced by qualified service personnel when:

    A. The power supply cord has been damaged; or

    B. Objects have fallen, or liquid has been spilled into the product; or

    C. The product has been exposed to rain; or

    D. The product does not appear to operate normally or exhibits a marked change in performance; or

    E. The product has been dropped or the enclosure damaged.

12. All servicing should be referred to qualified service personnel.

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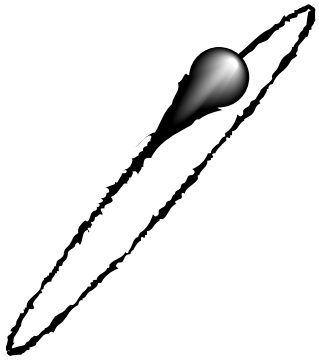
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INTRODUCTION & BASIC SETUP



ORBITING THE DANCE PLANET

The Dance Planet is a cool place to be. With over 600 of the earth's most cutting edge samples and the introduction of new rhythmic features, Orbit blasts its way to the forefront as *the* dance music machine.

Orbit features 32 voices of polyphony, 512 presets (256 ROM, 256 RAM), and is 16 part multi-timbral. Edit and tweak Orbit's sounds the way you like them by using its powerful filters, MIDI synced LFO's, and MIDIpatch modulation system. If that's not enough, Orbit is equipped with plenty of user-editable "beats". These drum loops aren't going to sound like everybody else, Orbit gives you the flexibility to alter them to fit your style.

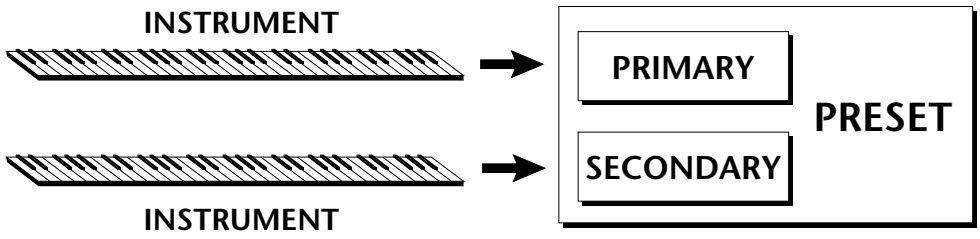
Orbit also gives you the ability to literally take these sounds apart and reassemble them into a limitless number of entirely new sounds, combining parts of one sound with another or with any of a selection of digital waveforms also stored in ROM. The dynamic multimode and morphing filters allow you to shape and mold your sound into new dimensions. And creating your own sounds is easy, thanks to Orbit's logical user interface.

Other features include 3 stereo outputs for individually processing sounds (also configurable as 6 polyphonic submixes with fully programmable dynamic panning), integral sends and returns to allow the addition of external effects units without the need for a separate mixer, user definable alternate tuning, and of course, an extensive MIDI implementation.

In addition, when coupled with E-mu's *Launchpad Performance Controller,* Orbit becomes a self-contained interactive groove machine for the stage or studio. So check it out.

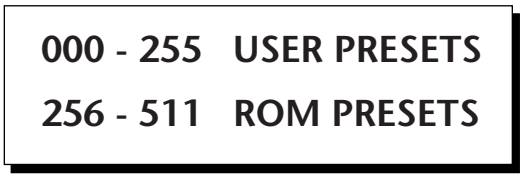
We at E-mu, hope you have as much fun making music with Orbit as we had making it. And *we* can't wait to hear the music YOU make using it.

Orbit is organized as shown in the diagram below.



The *Preset* is a complete set of all program parameters for a complete Orbit sound. The fully programmable user presets and the unalterable ROM presets are organized as shown below.

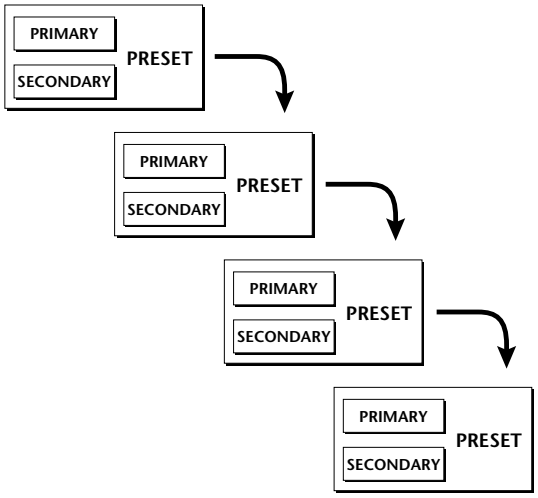
- ***User Presets*** *can be moved, erased or modified as desired.*
- ***ROM Presets*** *cannot be moved or altered unless they are first copied to a user location.*



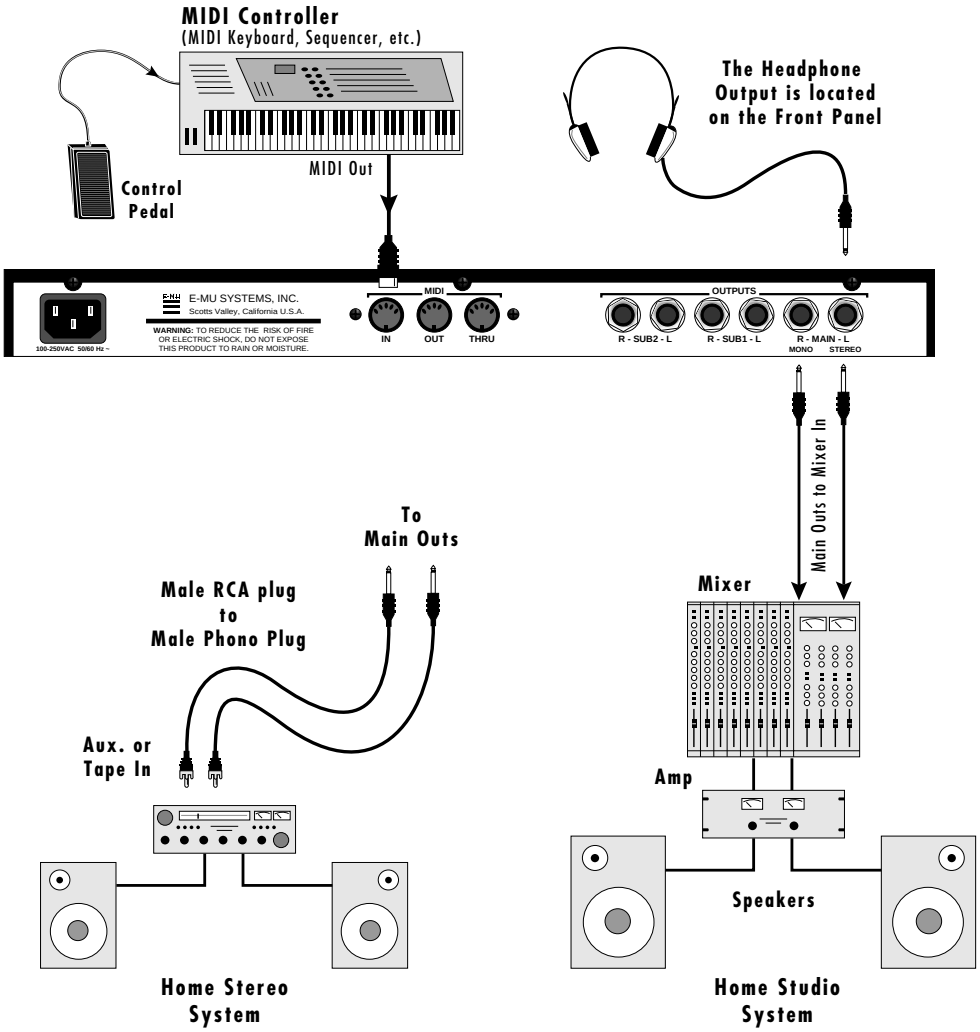
Each preset consists of one or more instruments. An instrument is a complete set of samples or a digital waveform which covers the entire keyboard range. An instrument can be assigned to each of the *Primary* and *Secondary* layers of the preset.

The primary and secondary layers are essentially two complete sounds stacked or placed adjacent to each other, and can be switched or crossfaded together in various ways.

Up to four presets can be *Linked* in order to have more than one preset on the keyboard at a time. The linked presets may overlap each other for layered sounds or be adjacent to each other to create keyboard "splits".



SETUP #1 BASIC SETUP



▼ *The headphone output monitors the main outputs only.*
The submix outputs do NOT feed into the headphone output.

• • • *If Orbit does not seem to be responding correctly, make sure that both Orbit and your MIDI controller are set to the same MIDI channel.*

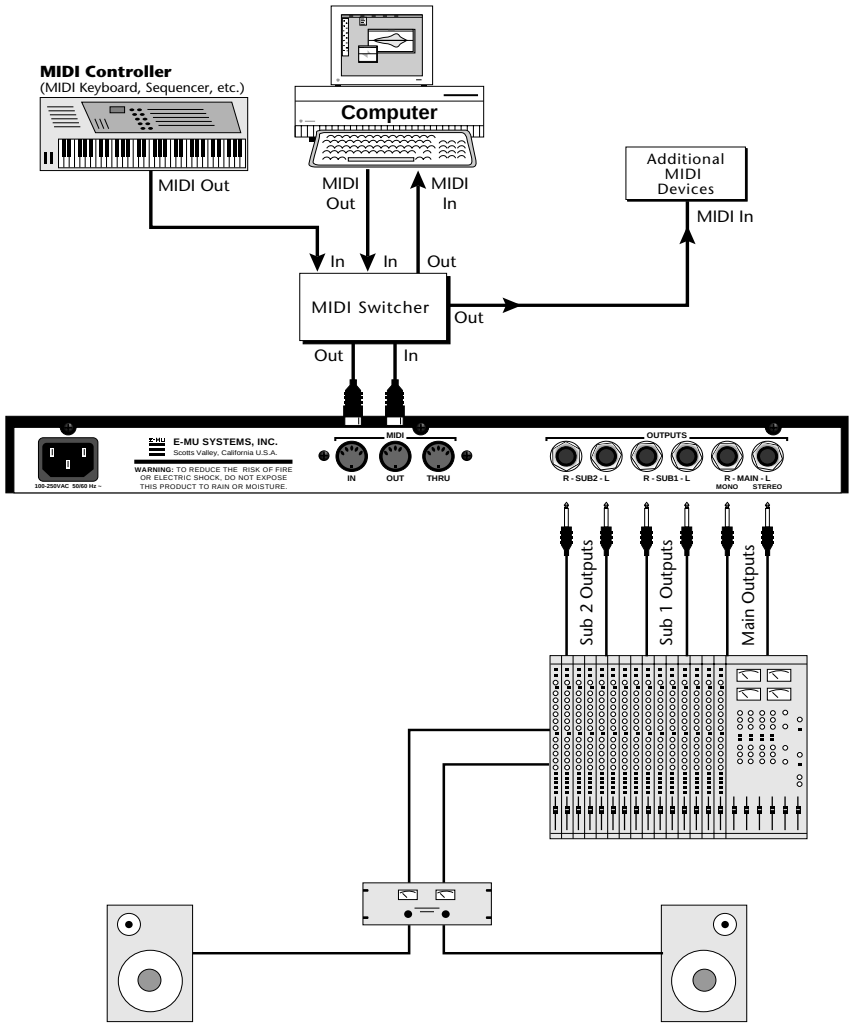
MIDI In

Orbit is controlled by MIDI messages received at the MIDI In connector. Connect the MIDI In of the Orbit to the MIDI Out connector of a MIDI controller such as a MIDI keyboard, MIDI wind controller or MIDI guitar controller.

Outputs

Orbit is a high quality, stereo audio device. In order to reproduce its wide dynamic range and frequency response, use a high quality amplification and speaker system such as a keyboard amplifier or home stereo system. A stereo setup is highly desirable because of the added realism of stereophonic sound. Headphones can be used if an amplifier and speaker system is not available. Plug stereo headphones into the headphone jack located on the left side of the front panel. The Right Main output jack serves as a mono output when the Left Main plug is not plugged in.

SETUP #2 STUDIO SETUP



MIDI In

In this setup, Orbit is controlled by MIDI messages received at the MIDI In connector which have been routed by a MIDI switcher. The MIDI switcher allows any MIDI controller such as a MIDI keyboard, MIDI wind controller or a computer to be easily connected.

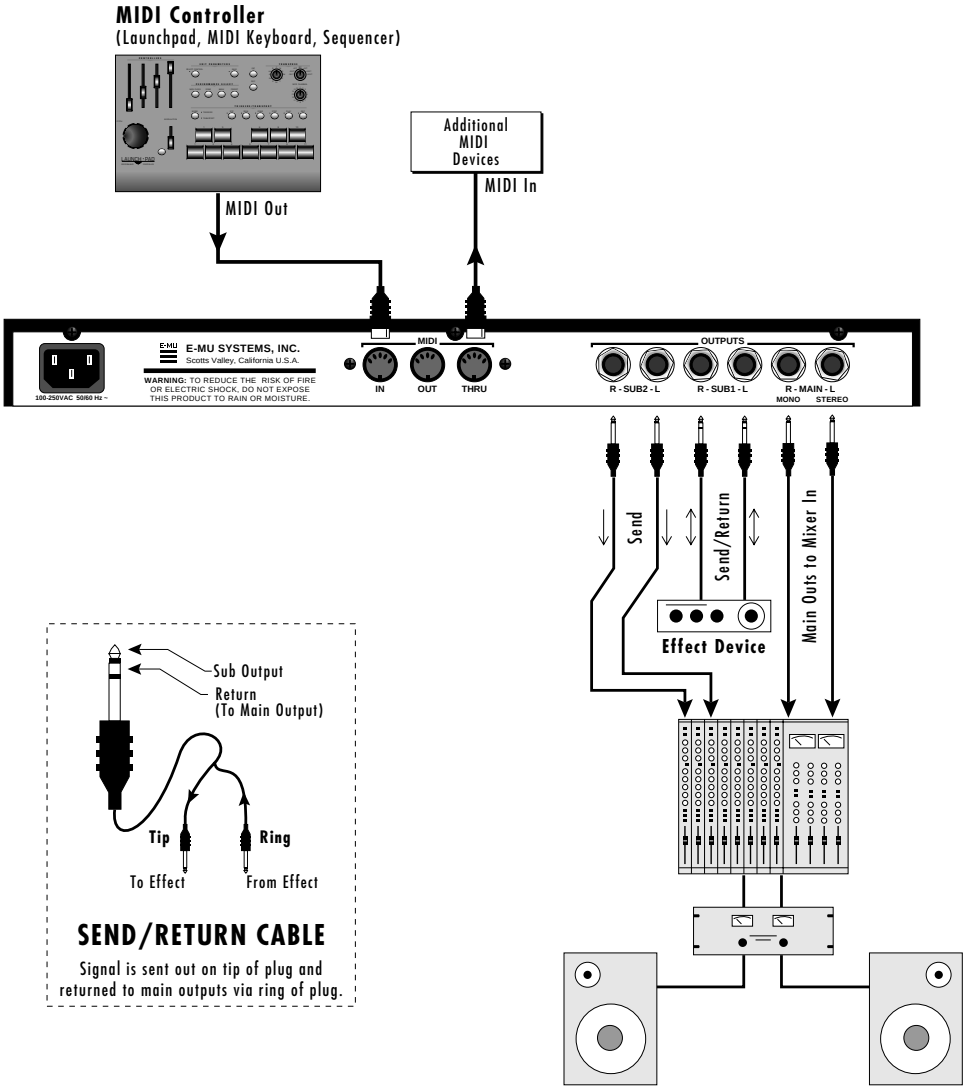
MIDI Out

The MIDI Out jack is normally used to transmit program data to a computer or other device.

Outputs

Orbit has three sets of programmable stereo outputs; Main, Sub 1, and Sub 2. Specific Orbit presets (or MIDI channels) can be routed to one of these stereo pairs in order to be further processed or mixed separately.

SETUP #3 PERFORMANCE SETUP



MIDI In

Orbit is controlled by MIDI messages received at the MIDI In connector. Connect the MIDI In of Orbit to the MIDI Out connector of a MIDI controller such as E-mu's Launchpad, a MIDI keyboard, MIDI drum pads or a MIDI sequencer.

MIDI Thru

The MIDI Thru jack is used to connect additional MIDI devices onto the MIDI chain. MIDI Thru transmits an exact copy of the messages received at the MIDI In jack.

Outputs

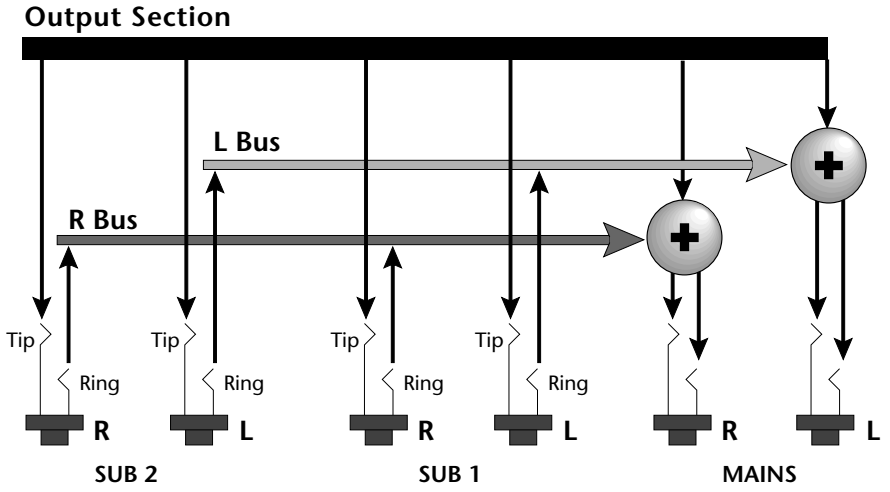
The Sub 1 and Sub 2 output jacks on Orbit are stereo jacks. The tip of each jack (accessed when a standard phone plug is inserted) connects to the left or right output of that group.

If a stereo plug is inserted, the Ring of the stereo plug serves as a signal Return which sums into the Main outputs.

Therefore, the Sub 1 and Sub 2 jacks can serve as effect sends and returns in order to further process selected instruments and then return them to the main mix.

••• *Inserting a standard mono phone plug* ***halfway*** *into the jack allows you to sum into the main outputs without a special cable.*

The diagram shows the Sub 1 and Sub 2 jacks being used as send/returns in order to further process selected Orbit presets without using the effects bus on the mixing board. In a pinch, the effect returns could also be used to sum additional instruments into the main outputs.

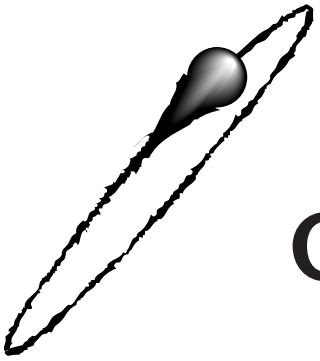


The Sub 1 and Sub 2 jacks can be used as effect returns to the Main Outputs.

POWER UP!

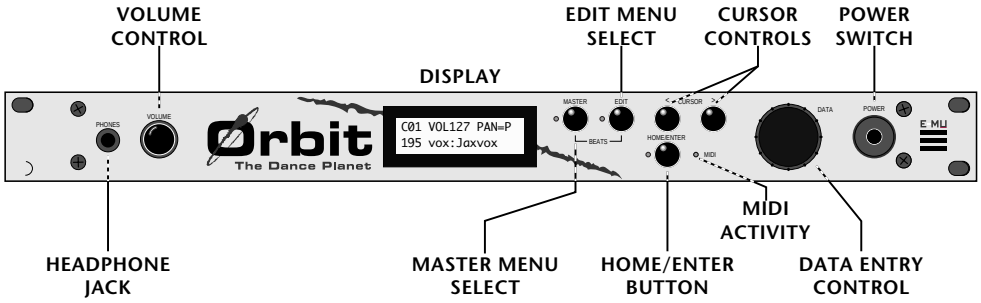
The power switch is located on the right side of the front panel. Orbit and its MIDI controller may be turned on in any order. When power is applied, the liquid crystal display will light, indicating that Orbit is operating. You may have noticed that there is no 110/220 Volt power selector switch on Orbit.

ORBIT AUTOMATICALLY SWITCHES ITSELF TO THE PROPER LINE VOLTAGE.



BASIC OPERATION

MAIN CONTROLS



Power Switch

Switches AC power to Orbit On and Off.

MIDI Activity LED

Indicates that MIDI data is being received.

Master Menu Select Button

The Master menu contains parameters that affect the entire machine, not just certain presets. An illuminated LED to the left of the button indicates that you are in the Master menu.

Edit Menu Select Button

The Edit menu is used when you want to change parameters of a preset. An illuminated LED to the left of the button indicates that you are in the Edit menu.

Home/Enter Button

The Home/Enter button is used to initiate a particular operation. The red LED to the left of the enter button flashes to let you know that Orbit is waiting for your response.

Cursor Controls

These buttons move the cursor to the next parameter on the display. (The cursor is a little flashing line underneath one of the parameters in the display.) Press either cursor control repeatedly until the cursor is underneath the desired parameter. The cursor can also be moved bi-directionally using the data entry control while the cursor select button is being held down (i.e. Press and hold the cursor button and turn the data entry knob).

Data Entry Control

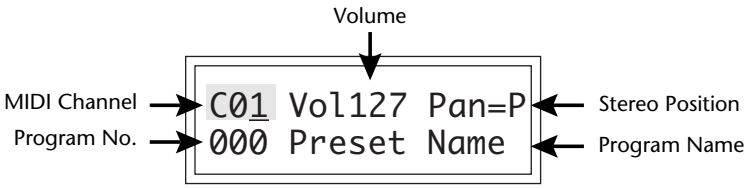
The data entry control is a stepped, variable control which is used to change parameter values. The control increments or decrements the current value one unit with each click. This control incorporates acceleration (values advance faster if the control is turned quickly).

Volume Control

This is the master volume control for all audio outputs. Note: For maximum dynamic range, set this control at full level.

MIDI CHANNEL SELECTION

Press the cursor key repeatedly until the cursor is underneath the channel number. (The cursor is a little flashing line underneath one of the parameters in the display.) Rotate the data entry control to select MIDI channel 01-16. As the channel is changed, the display will change to show the preset, volume and pan associated with the displayed channel.

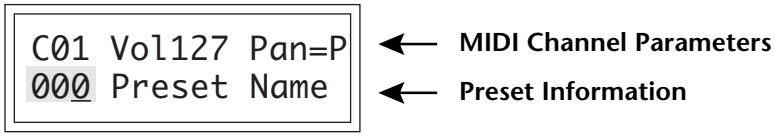


• • • If Orbit is not responding properly or plays the wrong preset, make sure that both Orbit and your MIDI controller are set to the same MIDI channel and that the MIDI Volume is turned up.

For more information about MIDI, see MIDI Realtime Controls on page 46.

PRESET SELECTION

Press the cursor key repeatedly until the cursor is underneath the program number. (The cursor is a little flashing line underneath one of the parameters in the display.) As the data entry control is rotated, the preset number and name will change. The displayed preset will be assigned to the displayed MIDI channel. Preset numbers range from 000 to 511.



CHANNEL VOLUME

Press the cursor key repeatedly until the cursor is underneath the volume value. Rotate the data entry control to select volume 000-127. (This is the same parameter as MIDI volume control #7, and changes made over MIDI will be shown in the display.)

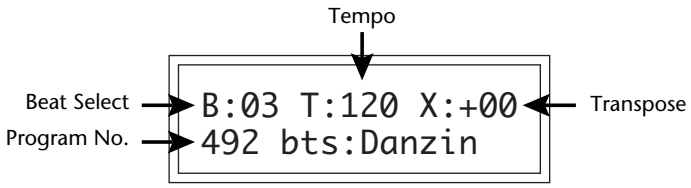
CHANNEL PAN

••• Channel Pan should normally be set to "P" unless realtime control of panning is desired. This will allow the programmed pan setting for each preset to be used.

Press the cursor key repeatedly until the cursor is underneath the pan value. Rotate the data entry control to select pan values -7 to +7 or "P". When "P" is selected, the pan value specified in the preset is selected. Any other value will override the pan parameter in the preset. (This is the same parameter as MIDI pan control #10, and changes made over MIDI will be shown in the display.)

BEATS MODE

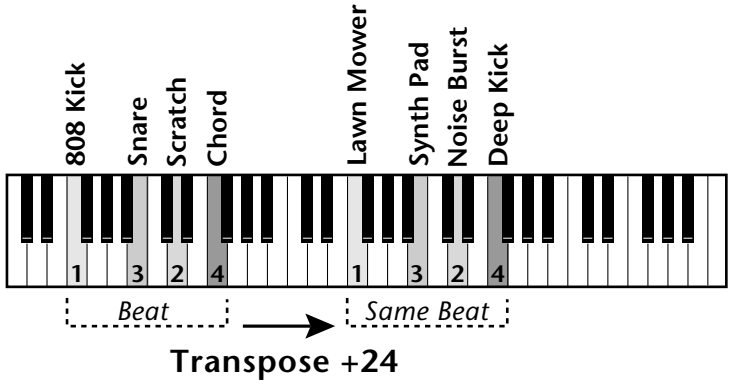
Orbit contains a play-only beats sequencer containing 55 pre-programmed beats. To enter Beats mode, press and hold both the Master button and the Edit button. The Beats menu shown below will appear and the Enter LED will be flashing. Press the Enter button to start the sequence. Press either cursor button and use the data entry control to select a new beat, change the tempo, transpose the sequence or change the preset. Press and hold both the Master button and the Edit button again to return to the main screen. Beats mode plays the preset assigned to MIDI channel 16 if in Multi-mode. You can play along with beats mode on any of the MIDI channels.



B: Selects the beat number. There are 55 different beats to choose from. If Orbit is in "Factory" mode, the preset will change when you change the beat.

T: Sets the Tempo of the sequence. The tempo is variable from 5 beats-per-minute to 240 bpm. Turning the tempo all the way down selects External Clock mode (Ext). In external clock mode, the tempo is derived from incoming MIDI clock pulses.

X: Selects the transposition interval. Rather than change the pitch of the instruments, transposition shifts the keyboard position up and down. On "Beats" presets this has the effect of changing the instruments on each beat. By combining the various beats, presets and transpositions, you can create literally hundreds of thousands of different grooves. On presets where there is one sound stretched across the entire keyboard, transpose will transpose the pitch.



Transposing a "beats" preset shifts the keyboard and changes the sounds assigned to each beat.

• • • The Beat number can be selected remotely by using a MIDI Song Select command. Beats mode can also be started and stopped via a MIDI Song Start and Stop command.

• • • Song Start/Stop in Beats mode:

Song Start - Send Note #126 on MIDI channel 16.

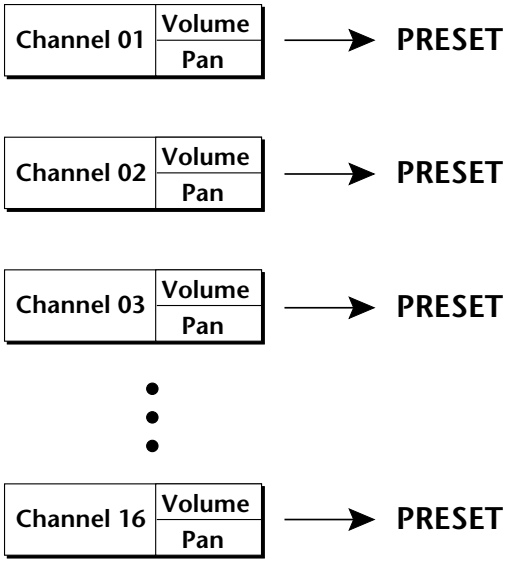
Song Stop - Note #127 on MIDI channel 16.

• • • There are three different Beats modes: Demo and User. In Demo mode, the preset will change whenever the beat is changed. See page 28 for details.

MULTI-TIMBRAL OPERATION

Multi-timbral operation means that Orbit can play more than one sound at the same time. To access multiple presets on different MIDI channels simultaneously, follow these instructions:

1. Set the MIDI mode to MULTI-Mode, using the MIDI mode function in the Master menu (page 22).
2. Decide which MIDI channels you wish the Orbit to receive, and turn all other channels OFF using the MIDI Enable function in the Master menu (page 23). ***Up to 16 channels can be selected simultaneously!***
3. Select the desired preset for each of the MIDI channels you wish the Orbit to receive using the MIDI Channel/Preset selection screen (see previous instructions).
4. Orbit will now respond multi-timbrally on the MIDI channels you have specified. The volume and pan position parameters can be adjusted over MIDI (for each MIDI channel) or using the Cursor and Data Entry control in the MIDI Channel/Preset selection screen.



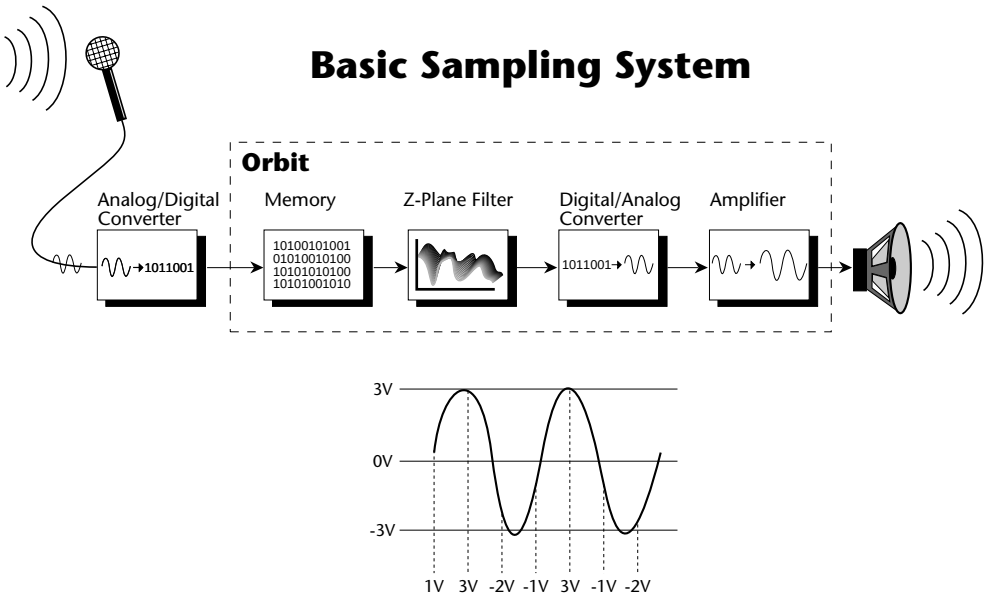
Each of the 16 MIDI channels can be assigned to play a specific Orbit preset.

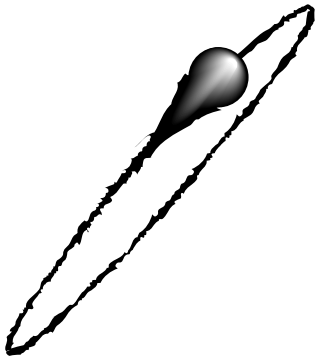
ABOUT ORBIT

Orbit utilizes digital recordings of real instruments for the basis of its sound. This is similar to a tape recorder except that inside the Orbit, the sounds are permanently recorded on digital memory chips.

To perform this modern miracle, sounds and instrument waveforms are first digitally recordered or "sampled". After the sounds and waveforms have been truncated, looped and processed, they are "masked" into the Orbit ROM (Read Only Memory) chips.

Conceptually, the sampling process is very simple, as shown in the Basic Sampling System diagram. As a sound wave strikes the diaphragm of a microphone, a corresponding voltage is generated. To sample the sound, the voltage level is repeatedly measured at a very high rate and the voltage measurements are stored in memory. To play the sound back, the numbers are read back out of memory, converted back into voltages, then amplified and fed to a speaker which converts the voltage back into sound waves. Of course, playing back 32 channels at different pitches tends to complicate matters, but this is basically how it works. In Orbit, we have left out the Analog/Digital converter stage since the sounds are already sampled for you.





MASTER MENU

The Master menu contains functions that affect the overall operation of Orbit. For example, changing the Master Tune will change the tuning of all the presets, not just the one currently displayed.

To enable the Master menu

Press the Master key, lighting the LED. The current screen will be the one most recently selected since powering up Orbit. The cursor will appear underneath the first character of the screen heading on line one.

To select a new screen

Press the cursor key repeatedly (or hold the cursor key while turning the data entry control) until the cursor is underneath the screen title heading. Rotate the data entry control to select another screen.

To modify a parameter

Press the cursor key repeatedly (or hold the cursor key while turning the data entry control) until the cursor is underneath the parameter value. Rotate the data entry control to change the value.

To return to Preset Select mode

Press the Master key, turning off the LED.

MASTER MENU FUNCTIONS

• *Master Tune*

Master Tune adjusts the overall tuning of all presets so that Orbit can be tuned to other instruments. The master tuning range is ± 1 semitone in 1/64th semitone increments. A master tune setting of "00" would indicate that the Orbit is perfectly tuned to concert pitch (A=440 Hz).



• ***Transpose***
This function transposes the key of Orbit in half-step intervals. The transpose range is ± 12 semitones or one octave.



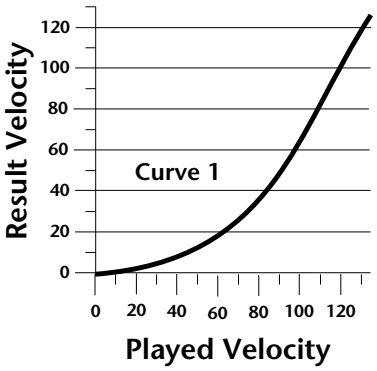
• ***Global Bend***
This function sets the range of the pitch wheel *only* when it is routed to control pitch. The maximum pitch bend range is ± 12 semitones. This function only affects presets which have their individual pitch bend range set to global.

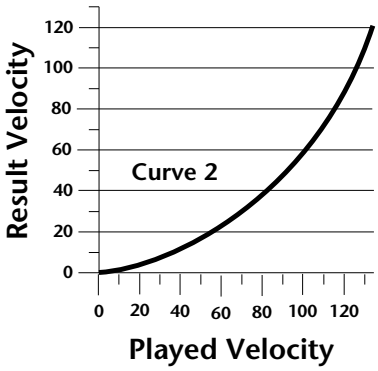


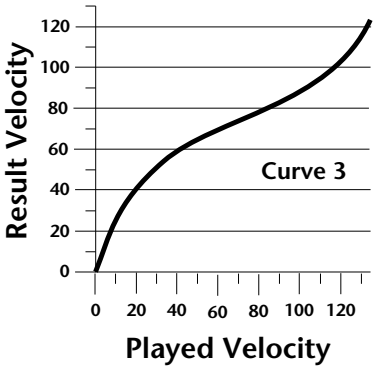
• ***Global Velocity Curve***
Incoming velocity data can be modified by a velocity curve in order to provide different types of dynamics in response to your playing or to better adapt to a MIDI controller. This function allows you to select one of eight global velocity curves or leave the velocity data unaltered (off). Global velocity curve only affects presets which have their individual velocity curve set to global.

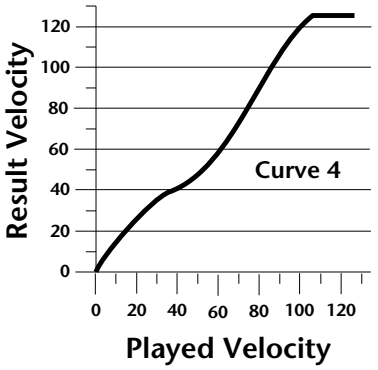


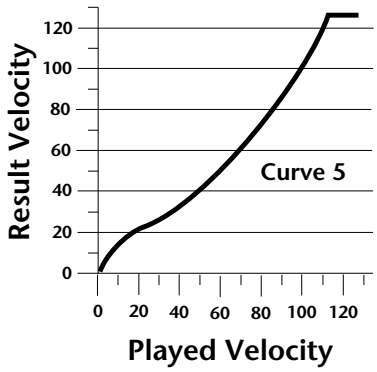
GLOBAL VELOCITY CURVES

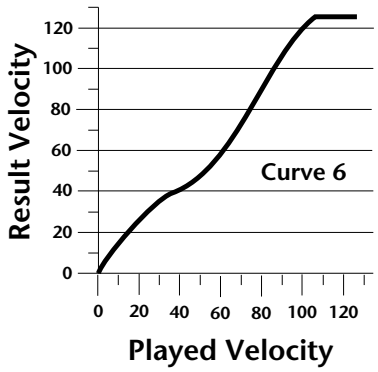


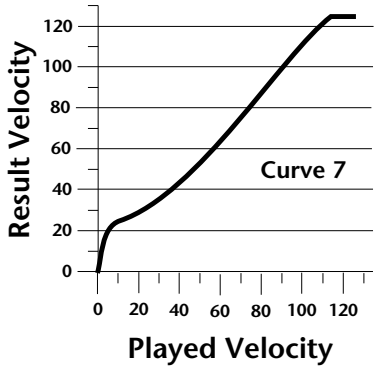


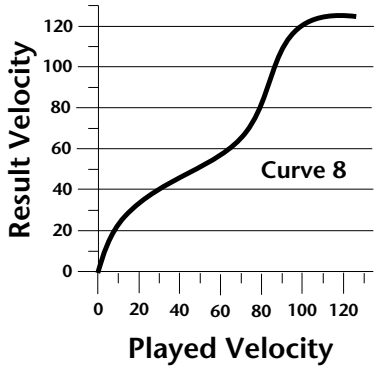








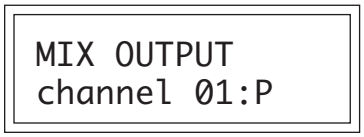




••• *This function is useful when sequencing because it allows you route specific MIDI channels to the Submix outputs. From there they can be externally processed with reverb or other effects.*

• *Mix Output*

This function allows you to override the output assignments made in each preset and instead assign the outputs according to MIDI channel. This also allows you to change the output assignment of the factory presets. For each of the 16 MIDI channels, you can select the Main, Sub 1, or Sub 2 outputs, or "P". When "P" is selected, the output assignment selected in the preset is used. If no plugs are inserted into the sub outputs, the audio will be automatically directed to the main outputs.



• *MIDI Mode*

This function selects one of the four MIDI modes and the MIDI system exclusive ID number.

Omni mode

Orbit responds to note information on all MIDI channels and plays the preset currently displayed in the main screen.

Poly mode

Orbit only responds to note information received on the currently selected MIDI channel (on the preset selection screen) and plays that channel's associated preset.

Multi mode

Orbit responds to data on any combination of MIDI channels and plays the specific preset associated with each of the MIDI channels.

Mono mode

Orbit responds to data on any combination of MIDI channels but plays each channel monophonically. If a new note on a channel is played before the last note is released, the envelopes will not be retriggered (legato).

ID number

▼ *Warning: Presets will not be transferred between two Orbit units unless the ID numbers of both units match.*

This function allows an external programming unit to distinguish between multiple Orbit units. In the case of multiple Orbit units, each unit should have a different ID number.



• *MIDI Mode Change*

This function selects whether or not MIDI mode change commands are accepted or ignored when received over MIDI (see MIDI Mode).

```
MIDI MODE CHANGE
Disabled
```

• *MIDI Overflow*

When on, if you play more notes than Orbit has channels (32), the additional note data will be directed out the MIDI Out port to a second Orbit or other MIDI device, thus doubling the number of available channels. MIDI Overflow can be turned On or Off.

```
MIDI OVERFLOW
Off
```

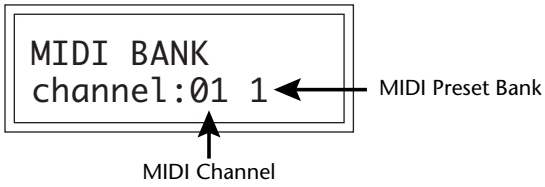
• *MIDI Enable*

When in MIDI Multi mode, this function lets you turn each MIDI channel On or Off. This is useful when you have other MIDI devices connected and do not want the Orbit to respond to the MIDI channels reserved for the other devices. MIDI Enable only operates in Multi Mode.

```
MIDI ENABLE
channel:01  On
```

• *MIDI Bank Select*

The MIDI specification only allows for 128 presets per MIDI channel. This function selects which bank of 128 presets will be used for incoming MIDI program change commands. Banks can be set for each MIDI channel. This function allows you to access all 512 presets in Orbit without using a MIDI bank select command.



••• ***MIDI Bank Select:***

Bn 00 00 20 ll

n *= MIDI chan. number (0-F)*

ll *= Bank number (00-03)*

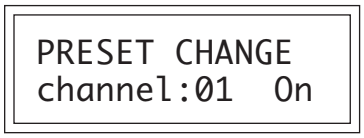
••• ***MIDI Bank Selection***

Bank	*Preset*
0	*0-127*
1	*128-255*
2	*256-383*
3	*384-511*

••• ***Example:*** *With the bank set to 0, a program change of 1 will call up program 1. With the bank set to 1, the same program change will call up program 129.*

• *Preset Change*

This function lets the Orbit utilize or ignore incoming MIDI preset change or Bank Select commands for each channel. Note that MIDI can only select presets 000-127. Presets 128-511 can be selected manually, by changing the MIDI bank, by using a MIDI bank select command, or by using the mapping function "MIDI PROGRAM → PRESET".



••• A few of the standardized MIDI Controller numbers are listed below.

1 - Modulation Wheel
2 - Breath Controller
3 - Aftertouch
4 - Foot Pedal
5 - Portamento Time
6 - Data Entry
7 - Volume
8 - Balance
9 - Undefined
10 - Pan
11 - Expression

• *MIDI Controller Assign*

Orbit allows you to assign up to four realtime control sources from your MIDI controller. These control sources could be modulation wheels, data sliders or whatever. In this screen, you set up which controllers will be received by the Orbit. What effect the controller will have is programmed separately for each preset. The Orbit MIDI controllers are each assigned a letter, A-D. Each controller letter can be assigned to a MIDI realtime controller from 00-31. Note: If controller numbers 7 or 10 are selected, they will override the standard MIDI volume and pan control routings. For more information, see MIDI Realtime Controls in the Programming Basics section.



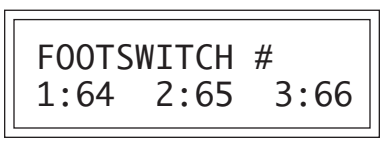


••• A few of the standardized MIDI switch numbers are listed below.

64 - Sustain Switch (on/off)
65 - Portamento (on/off)
66 - Sostenuto (on/off)
67 - Soft Pedal (on/off)
69 - Hold Pedal 2 (on/off)

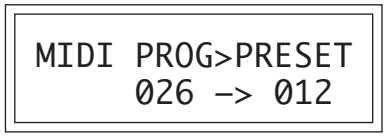
• *MIDI Footswitch Assign*

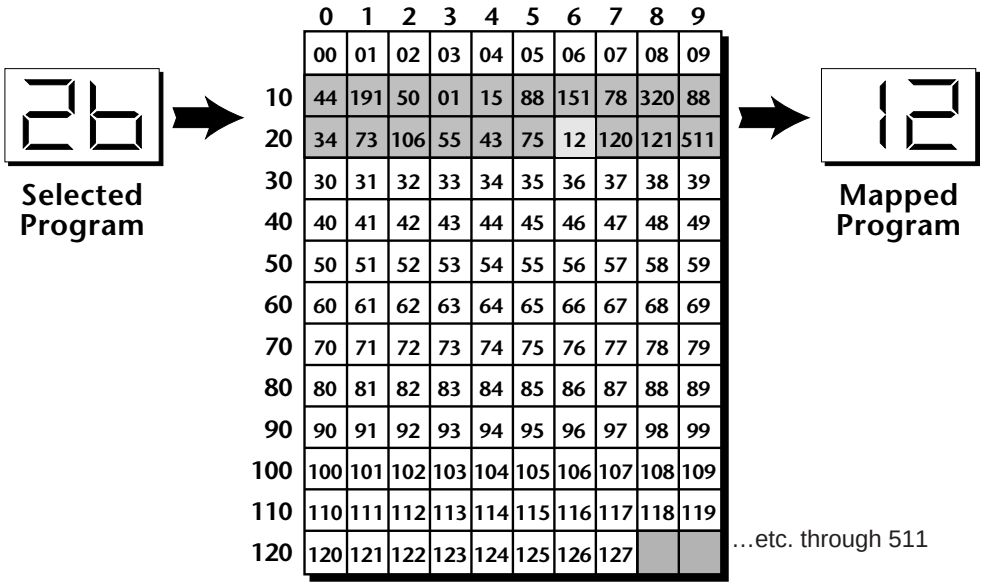
Like the MIDI Controllers, 3 MIDI footswitches can be assigned to MIDI footswitch numbers. Footswitches can be assigned numbers from 64-79. Destinations for the footswitch controllers are programmed in the Edit menu.



• *MIDI Program ➔ Preset*

Incoming MIDI program changes can be "mapped" to call a different numbered preset. This is a handy feature when you want a specific preset number sent from the master synth to be linked with a specific preset on Orbit. For example, the Program ➔ Preset Map could be set to call up preset 12 whenever Orbit receives program change number 26. Any of the presets in Orbit can be mapped to any incoming MIDI program change number. This feature also allows you to select presets 128-511, which are not normally accessible over MIDI without sending bank change commands *(see sidebar)*. Note: The MIDI Program->Preset Map only works when you are in Bank 0.





	0	1	2	3	4	5	6	7	8	9
	00	01	02	03	04	05	06	07	08	09
10	44	191	50	01	15	88	151	78	320	88
20	34	73	106	55	43	75	12	120	121	511
30	30	31	32	33	34	35	36	37	38	39
40	40	41	42	43	44	45	46	47	48	49
50	50	51	52	53	54	55	56	57	58	59
60	60	61	62	63	64	65	66	67	68	69
70	70	71	72	73	74	75	76	77	78	79
80	80	81	82	83	84	85	86	87	88	89
90	90	91	92	93	94	95	96	97	98	99
100	100	101	102	103	104	105	106	107	108	109
110	110	111	112	113	114	115	116	117	118	119
120	120	121	122	123	124	125	126	127		

This chart shows how MIDI preset changes can be re-mapped. In this example, program changes 10-29 have been re-mapped. All other programs will be selected normally.

••• ***MIDI Bank Select:***
Bn 00 00 20 ll

n = *MIDI chan. number (0-F)*

ll = *Bank number (00-03)*

• *Send MIDI Data*

This function will send MIDI System Exclusive data to the MIDI Out port of Orbit. The MIDI data can either be sent to a computer/sequencer or to another Orbit. Using the cursor key and the data entry control, select the type of MIDI data you wish to transmit.

••• *The Preset, Volume, and Pan information for all 16 channels is included when the Master settings are transmitted or received.*

Master Settings

Transmits all parameters in the Master menu except tuning table, program/preset map and viewing angle.

Program/ Preset Map

Transmits only the program/preset map.

Tuning Table

Transmits only the user tuning table.

Factory Presets

Transmits all the factory ROM presets.

User Presets

Transmits all the user presets.

Any Individual Preset

Transmits only the selected preset.

▼ ***Warning:*** *When transferring SysEx data from one Orbit to another, the ID numbers of both units must match.*

The Enter LED will be flashing. Press the Enter button to confirm the operation. To receive MIDI data, simply send the MIDI data into Orbit from another Orbit or your sequencer.



To Record MIDI Data into a Sequencer:

1. Setup sequencer to receive system exclusive data.

2. Place sequencer into record mode, then Send Preset Data.

To Receive MIDI Data from a Sequencer:

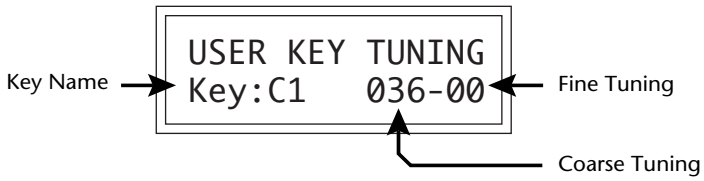
1. Simply play back the sequence into Orbit.

▼ ***Warning:*** Send data as you would a regular sequence. Sending data in one huge chunk may clog the MIDI input buffer on Orbit.

• *User Key Tuning*

In addition to standard twelve tone equal temperament, Orbit contains four additional preset tuning tables (Just C, Vallotti, 19 tone, and Gamelan) and one user definable tuning. User Key Tuning allows you to alter the parameters of the user definable tuning. The pitch of every key can be individually tuned, facilitating the creation of alternate scales. Using the cursor key and the data entry control, select the key name, the MIDI key number and the fine tuning. The key name is variable from C-2 to G8. MIDI key number is variable from 0 to 127. The fine tuning is variable from 00 to 63 in increments of 1/64 of a semitone (approx. 1.56 cents). For each preset, the specific tuning table is selected in the Edit menu.

••• ***Application:*** *The user key tuning can be used to tune individual percussion instruments.*



• *Song Start/Stop*

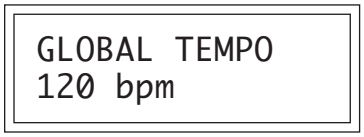
This function enables or disables MIDI Song Start/Stop for Beats mode. In some cases you may want to start Beats mode along with an external sequencer. In other cases you may want to start Beats mode independently. This control allows you either option.

Song Select or MIDI clocks are not affected by this function. You can also use note number 126/127 (on channel 16) to control Song Start/Stop even when this function is disabled.



• *Global Tempo*

This function sets the tempo for Beats mode and for the synced LFOs. This tempo setting is the same as shown in Beats mode and any changes you make will be shown in either window. The global tempo is variable from 5 beats-per-minute (bpm) to 500 bpm. Turning the tempo down below 5 bpm sets the tempo to "External" mode. In external mode, the tempo is determined by incoming MIDI clocks.



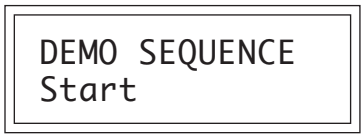
• ***Beat Mode***

There are three options when in Beats mode; Factory, User 1 and User 2 modes. In Factory mode, a factory selected preset and tempo will be called up whenever the beat number is changed and Transpose will be set to +00. In User 1 mode, the preset will change and transpose will be returned to +00 whenever a new beat is selected, but the Tempo will not change. In User 2 mode, changing the beat does not change any of the other parameters.



• ***Demo Sequence***

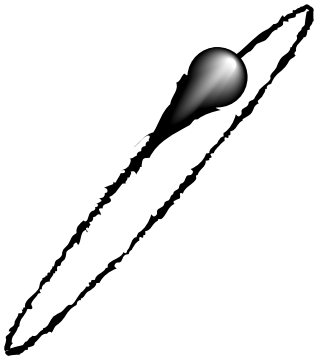
Orbit contains a play-only demo sequence in order to give you an idea of what is possible using this fantastic machine. Press the cursor key to move the cursor to the lower line of the display. The Enter LED will begin flashing. Press the Enter button to start the sequence. The Enter LED will be lit and the lower line of the display will change to “Stop”. Pressing the Enter button again will stop the sequence.



• ***Viewing Angle***

This function allows you to change the viewing angle of the display so that it may be easily read from either above or below. The angle is adjustable from +7 to -8. Positive values will make the display easier to read when viewed from above. Negative values make the display easier to read from below.





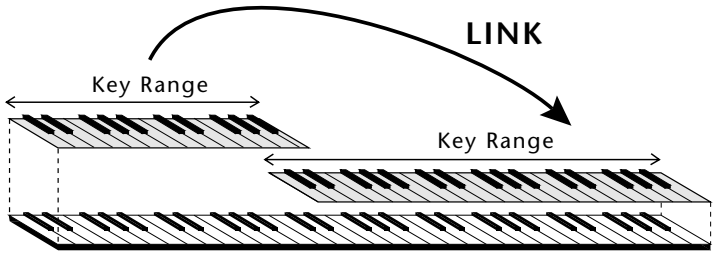
PROGRAMMING BASICS

This chapter explains how Orbit sounds are constructed and contains important background information on how to create your own custom presets.

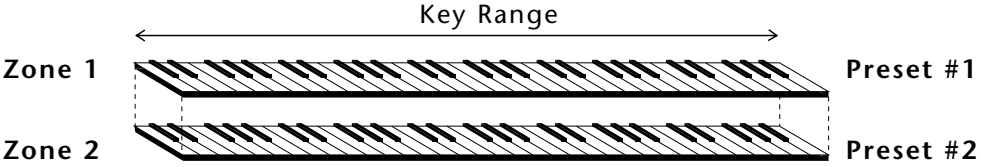
Your initial involvement with Orbit will most likely consist of using the existing presets and selecting MIDI channels. While the factory presets are very good, there are probably some things you would like to change, perhaps the LFO speed, the filter cutoff or the attack time. You may also want to make your own custom presets using complex modulation routings. There are 256 user locations (000-255) available to store your own creations or edited factory presets. Best of all, it's easy to edit or create new presets using the edit menu.

Presets can be made up of both a primary and secondary instrument. Presets can also be "linked" with up to 3 additional presets to create layering or splits.

One way to create a keyboard split is assign an instrument to a specific range and then link it to other presets which fill in the empty keys. Using a combination of 4 linked presets and the primary and secondary instrument ranges, up to 8 keyboard splits can be produced. If linked presets overlap on the same keyboard range, the presets will be doubled or stacked.



CREATING A SPLIT KEYBOARD



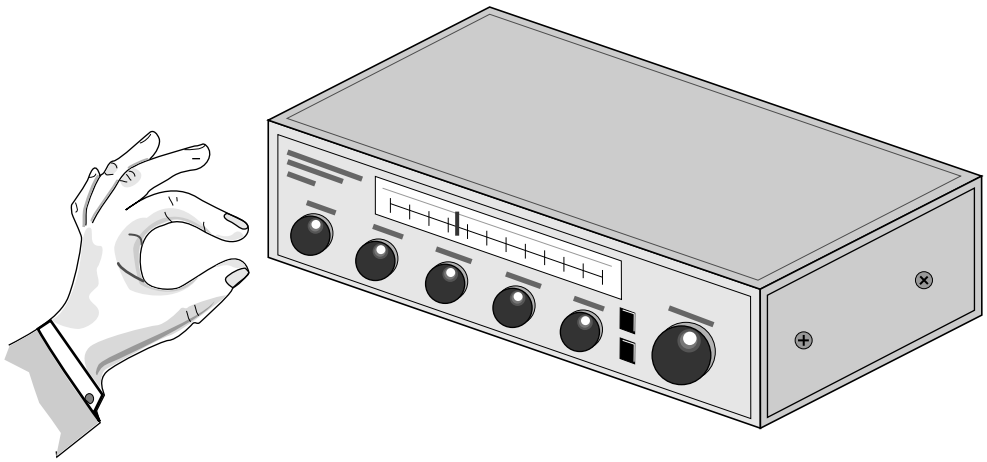
LAYERING TWO PRESETS

These diagrams show how keyboard splits and layers can be created by linking presets. Remember that each preset can consist of both a primary and secondary instrument.

Orbit has an extensive modulation implementation using two multi-wave LFO's (Low Frequency Oscillators), two envelope generators and the ability to respond to multiple MIDI controllers. You can simultaneously route any combination of these control sources to multiple destinations.

MODULATION

Modulation means to *dynamically change* a parameter, whether it be the volume (amplitude modulation), the pitch (frequency modulation), or whatever. Turning the volume control on your home stereo rapidly back and forth would be an example of amplitude modulation. To modulate something we need a modulation *source* and a modulation *destination.* The source is your hand turning the knob, and the destination is the volume control. If we had a device that would automatically turn the volume control, we would also call that device a modulation source. The Orbit is designed so that for each of the variable parameters, such as the volume, there is an initial setting which can be changed by a modulation source. Therefore in the case of volume, we have an initial volume and we can change or modulate that volume with a modulation source. Two main types of modulation sources on Orbit are *Envelope Generators* and *Low Frequency Oscillators*. In the example above, an envelope generator could be routed to automatically turn the volume control as programmed by the envelope. Or, a low frequency oscillator could be routed to automatically turn the volume control up and down in a repeating fashion.



Turning the volume control back and forth on your home stereo is an example of Amplitude Modulation.

MODULATION SOURCES

Orbit uses three kinds of modulation sources.

• KEYBOARD AND VELOCITY MODULATION

Values which are generated at the start of a note and do not change during the note.

Keyboard Key
Which key is pressed.

Key Velocity
How hard the key is pressed.

• REALTIME MODULATION

Values which can be continuously changed during the entire duration of the sound.

Pitch Wheel
A synthesizer pitch bend wheel.

Miscellaneous Controllers (4)
Any type of MIDI controller data.

Keyboard Pressure (mono aftertouch)
Key pressure applied after the key is initially pressed.

Polyphonic Key Pressure
Pressure from a controller capable of generating polyphonic pressure data.

Low Frequency Oscillators (2)
Generate repeating waves.

Envelope Generators (3)
Generate a programmable "contour" which changes over time when a key is pressed.

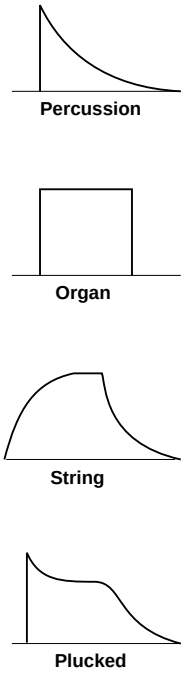
• FOOTSWITCH MODULATION

Changes a parameter when one of the three footswitches are pressed. The footswitches can be programmed to switch: Sustain (pri/sec/both), Alternate Volume Envelope (pri/sec/both), Alternate Volume Release (pri/sec/both), or Cross-Switch between the primary and secondary instruments.

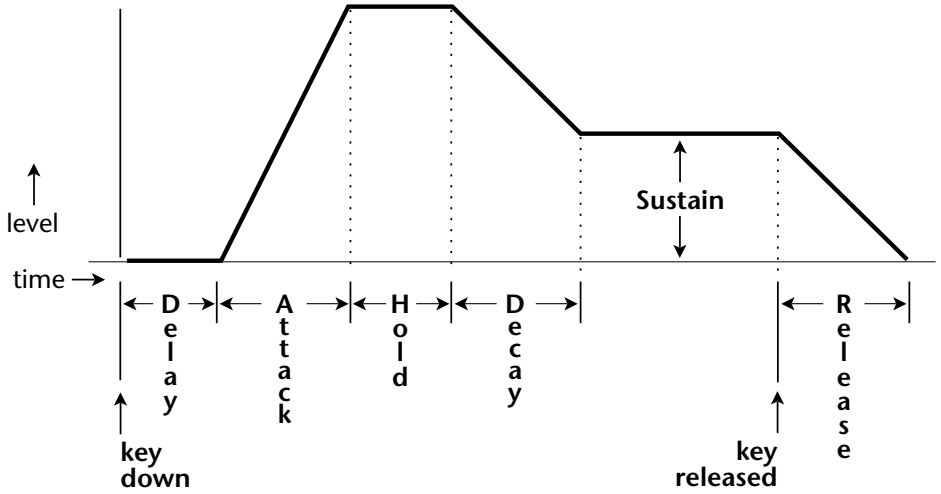
ENVELOPE GENERATORS

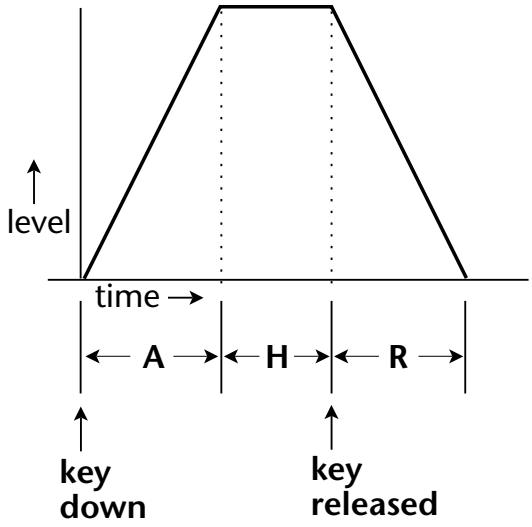
An envelope can be described as a "contour" which can be used to shape the sound in some way over time. Each channel of the Orbit contains two envelope generators. One of the envelope generators, the Alternate Volume Envelope, controls the volume of the primary or secondary instrument over time and has 5 stages, Attack, Hold, Decay, Sustain, and Release. The other envelope, the Auxiliary Envelope, can be routed to any realtime control destination and is a general purpose envelope. The Auxiliary Envelope has 6 stages: Delay, Attack, Hold, Decay, Sustain, and Release. The time of each stage can be adjusted to create myriad envelope shapes, which in turn shape the sound. The Envelope parameters can be described as follows:

- ***Delay***
  The time between when a key is played and when the attack phase begins.
- ***Attack***
  The time it takes to go from zero to the peak (full) level.
- ***Hold***
  The time the envelope will stay at the peak level before starting the decay phase.
- ***Decay***
  The time it takes the envelope to go from the peak level to the sustain level.
- ***Sustain***
  The level at which the envelope remains as long as a key is held down.
- ***Release***
  The time it takes the envelope to fall to the zero level after the key is released.



••• *The generalized envelope shapes of a few types of sounds are shown above.*



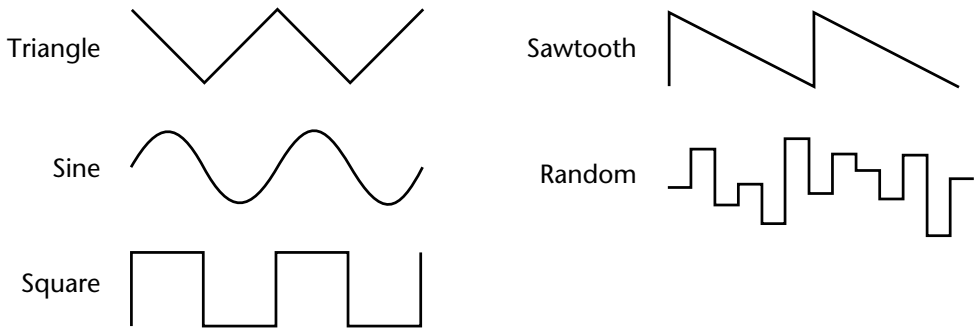


If the key is released during the Hold (H) phase, the Release phase begins.

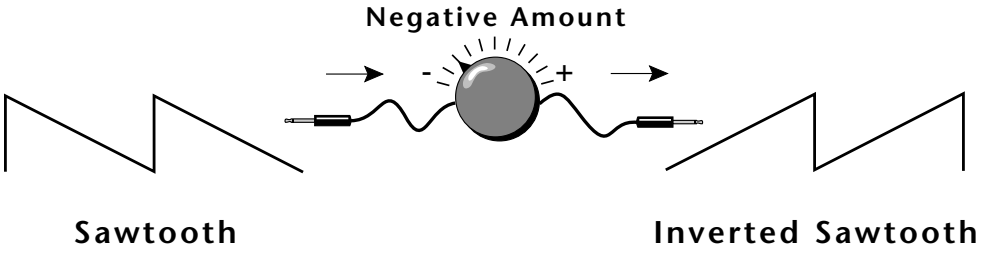
LOW FREQUENCY OSCILLATORS (LFOS)

A Low Frequency Oscillator is simply a wave which repeats at a slow rate. The Orbit has two multi-wave LFOs for each of its 32 channels. The LFO waveforms are: Triangle, Sine, Square, Sawtooth, and Random, which is a random "sample and hold" type of wave. Other LFO waves are "Synced" which means that their rates will follow the tempo as set in Beats mode.

By examining the diagram of the LFO waveforms, you can see how the LFO will affect a modulation destination. Suppose we are modulating the pitch of an instrument. The sine wave looks smooth, and will smoothly change the pitch. The square wave changes abruptly, and will abruptly change the pitch from one pitch to another. The sawtooth wave smoothly decreases, then abruptly changes back up. The sound's pitch will follow the same course. Controlling the pitch of an instrument is an easy way to hear the effects of the LFO waves.



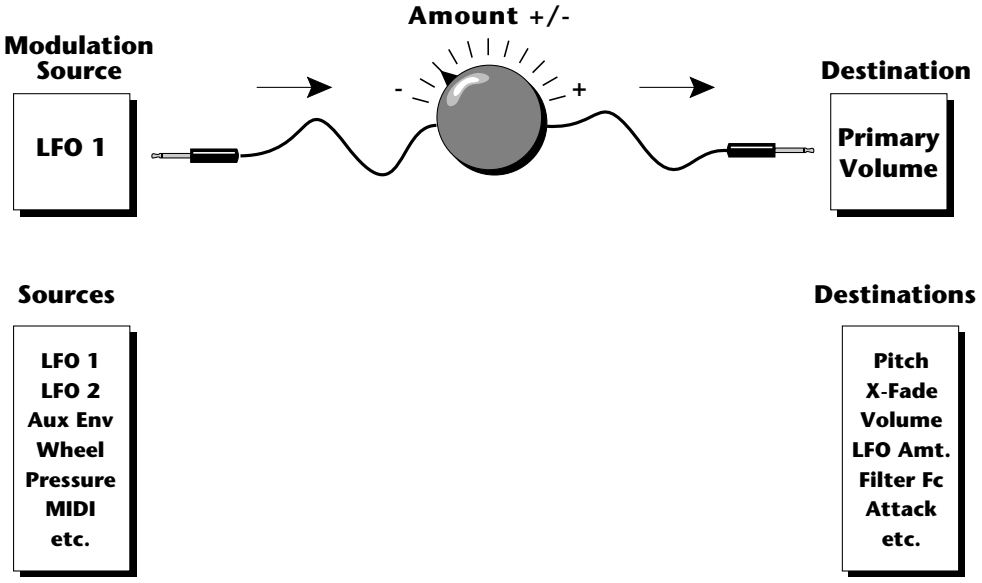
When the amount of an LFO is a negative value, the LFO shape will be inverted. For example, inverting the sawtooth wave produces a wave that smoothly increases, then instantly resets down.



The LFO can also be **Synced** the tempo programmed in the beats menu. When synced, the LFO rate will increase or decrease to follow the beats/global tempo.

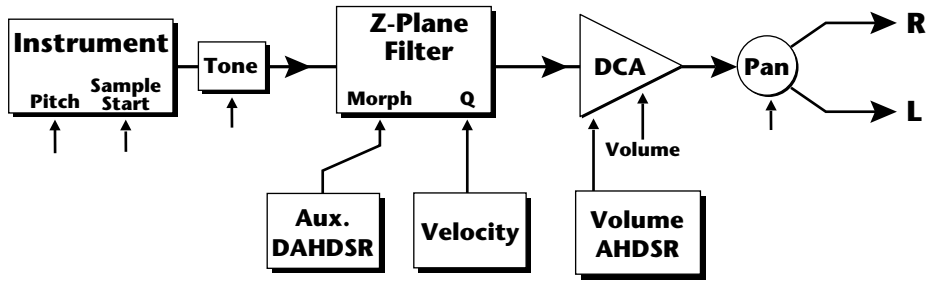
MIDIPATCH

Connecting a modulation source to a destination is called a *patch*. Orbit lets you connect the modulation sources in almost any possible way to the modulation destinations. You can even modulate other modulators. Each patch also has an amount parameter which determines "how much" modulation is applied to the destination. The modulation amount can be positive or negative and will either add or subtract from the initial value. Keyboard and velocity sources can be simultaneously patched to any 6 of the 42 destinations for each preset. Realtime modulation sources can be simultaneously patched to any 8 of the 33 destinations for each preset.



FILTER MODULATION

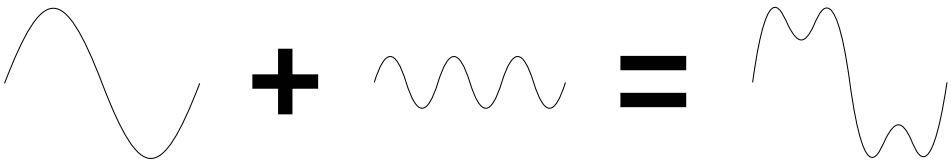
Orbit contains a Z-plane filter for each of its 32 channels. The block diagram of a single channel is shown below.



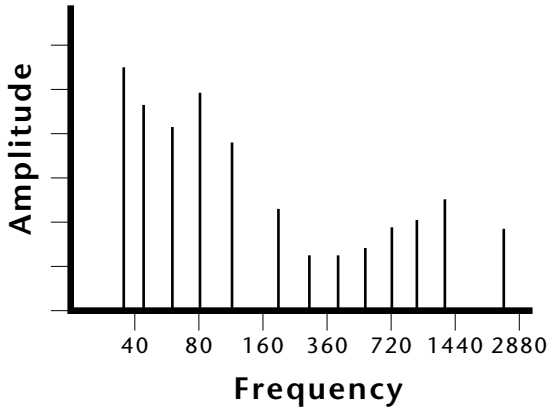
The **Tone** filter is a simple tone control and can be used to brighten or darken the tone of an instrument. each of the 17 **Z-plane** filters is a powerful synthesizer filter which can dramatically alter the sound of an instrument.

WHAT IS A FILTER?

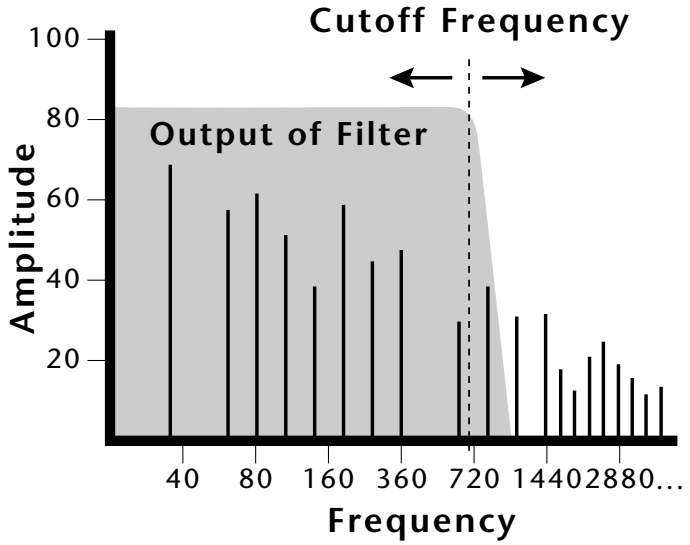
To understand how a filter works we need to understand what makes up a sound wave. A sine wave is the simplest form of sound wave. Any waveform except a sine wave can be analyzed as a mix of sine waves at specific frequencies and amplitudes.



One way to represent complex waveforms is to use a chart with frequency on one axis and amplitude on the other. Each vertical line of the chart represents one sine wave at a specific amplitude.



Most of the instruments in Orbit are complex waves containing many sine waves of various amplitudes and frequencies. **A filter is a device which allows us to remove certain components of a sound depending on its frequency.** For example, a Low Pass Filter, one of the Z-plane filters in Orbit, lets the ***low frequencies pass*** and removes only the high frequencies.



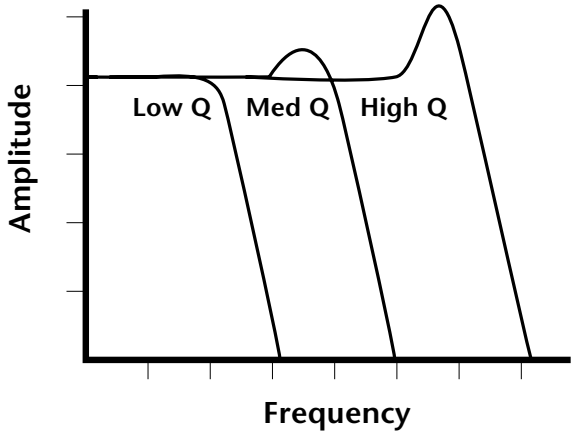
••• *The initial filter Fc and all Fc modulators ADD algebraically to determine the actual Fc. If you are not getting sound, adjust the initial Fc or reduce the amount of modulation. Careful adjustment of all the filter parameters is the secret to getting great sounds.*

The point at which the frequencies begin to be cut is called the **Cutoff Frequency** (or Fc for short). A filter that let only the high frequencies pass would be called a High Pass filter. Using a filter, we now have a way to control the harmonic content of a sampled sound. As it turns out, a low pass filter can simulate the response of many natural sounds.

For example, when a piano string is struck by its hammer, there are initially a lot of high frequencies present. If the same note is played softer, there will be fewer of the high frequencies generated by the string. We can simulate this effect by routing the velocity of the keyboard to control the amount of high frequencies that the low pass filter lets through. The result is expressive, natural control over the sound.

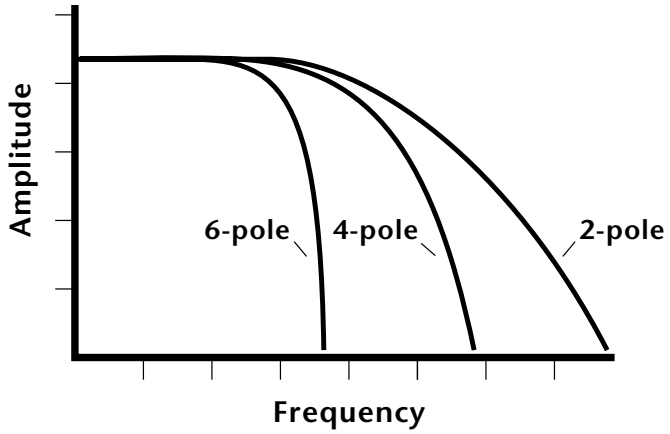
The auxiliary envelope generator is commonly used to control the cutoff frequency of the Z-plane filter. This allows the frequency content to be varied dynamically over the course of the note. Dynamic filtering coupled with all the different instruments available, makes for almost endless possibilities in the final sound. Any modulation source can be used to modulate the filter.

Another control on the filter is called Q or resonance. On a lowpass or highpass filter, turning up the Q of the filter emphasizes the frequencies around the cutoff frequency. The chart below shows how different amounts of Q affect the lowpass filter response. In terms of sound, frequencies around the cutoff will tend to "ring" with high Q settings. If the filter is swept back and forth slowly with a high Q, various overtones will be "picked out" of the sound and amplified as the resonant peak sweeps over them. Bells and gongs are real world examples of sounds which have a high Q.



Turning up the "Q" will emphasize the frequencies around the cutoff point.

Another important feature of a filter is the number of poles it contains. The lowpass filters on Orbit can be either 2-pole, 4-pole or 6-pole filters. The highpass and bandpass filters can be either 2nd or 4th order filters another way to describe the number of filter sections they contain. The number of poles in a filter describes the steepness of its slope and the more poles the steeper the slope, which in turn affects the sound. In general, the 2-pole filter will have a buzzier sound and the 4-pole filter has the classic low pass resonant filter sound. Orbit's 6-pole low pass filters have a tight, modern sound.



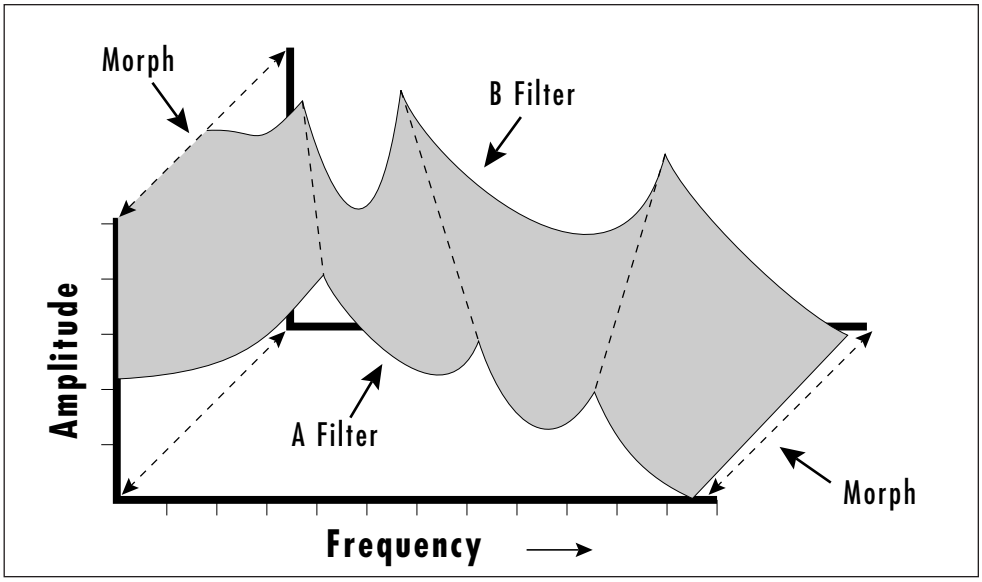
PARAMETRIC FILTERS

A more complex type of filter is called a parametric filter or Swept EQ. A parametric filter allows control over three basic ***parameters*** of the filter. The three parameters are: *Frequency, Bandwidth*, and Boost/Cut. The Frequency parameter (Fc on Orbit filters) allows you to select a range of frequencies to be boosted or cut, the Bandwidth parameter allows you to select the width of the range, and the Boost/Cut parameter (Q on Orbit filters) either boosts or cuts the frequencies within the selected band by a specified amount. Frequencies not included in the selected band are left unaltered. This is different from a band pass filter which attenuates (reduces) frequencies outside the selected band.

The parametric filter is quite flexible. Any range of frequencies can be either amplified or attenuated. Often times, several parametric sections are cascaded (placed one after another) in order to create complex filter response curves.

THE Z-PLANE FILTER

The Z-plane filter can change its function over time. In a simple Z-plane filter, we start with two complex filter types and interpolate between them using a single parameter. Refer to the diagram on the following page. Filters A and B represent two different complex filters. By changing a single parameter, the ***Morph***, many complex filter parameters can now be changed simultaneously. Following along the Morph axis you can see that the filter response smoothly interpolates between the two filters. This is the essence of the Z-plane filter. Through the use of interpolation, many complex parameters are condensed down into one manageable entity.



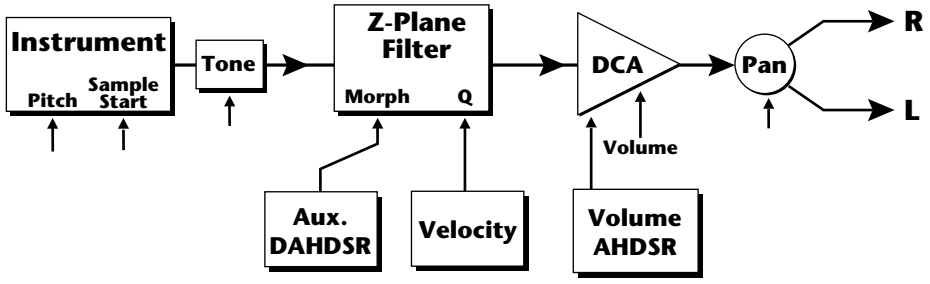
The Z-plane filter has the unique ability to change its function over time.

Consider, as an example, the human vocal tract, which is a type of complex filter or resonator. There are dozens of different muscles controlling the shape of the vocal tract. When speaking, however, we don't think of the muscles, we just remember how it feels to form the vowels. A vowel is really a configuration of many muscles, but we consider it a single object. In changing from one vowel to another, we don't need to consider the frequencies of the resonant peaks! You remember the shape of your mouth for each sound and **interpolate** between them.

Filter morphing can be controlled by an envelope generator, an LFO, modulation wheels or pedals, keyboard velocity, key pressure, etc. The filter **Fc** parameter controls morphing on certain Orbit filters. The **Q** parameter on the Orbit filters can only be changed at note-on time but can control various parameters such as boost/cut and mouth cavity size and of course, resonance or Q.

ORBIT SIGNAL FLOW

Going back to the block diagram for a single channel we can re-examine the complete signal path.



Instrument

This is the sampled sound wave. The pitch of the instrument can be modulated by any modulation source. The sample start point can only be modulated by a velocity or key source (see the next page).

Tone

Tone is a simple tone control which can be used to brighten or mute the sound. Tone can only be modulated by a velocity or key source (see the next page). Key velocity is commonly used to modulate the tone so that the harder you play, the brighter the sound becomes.

Morphing Filter

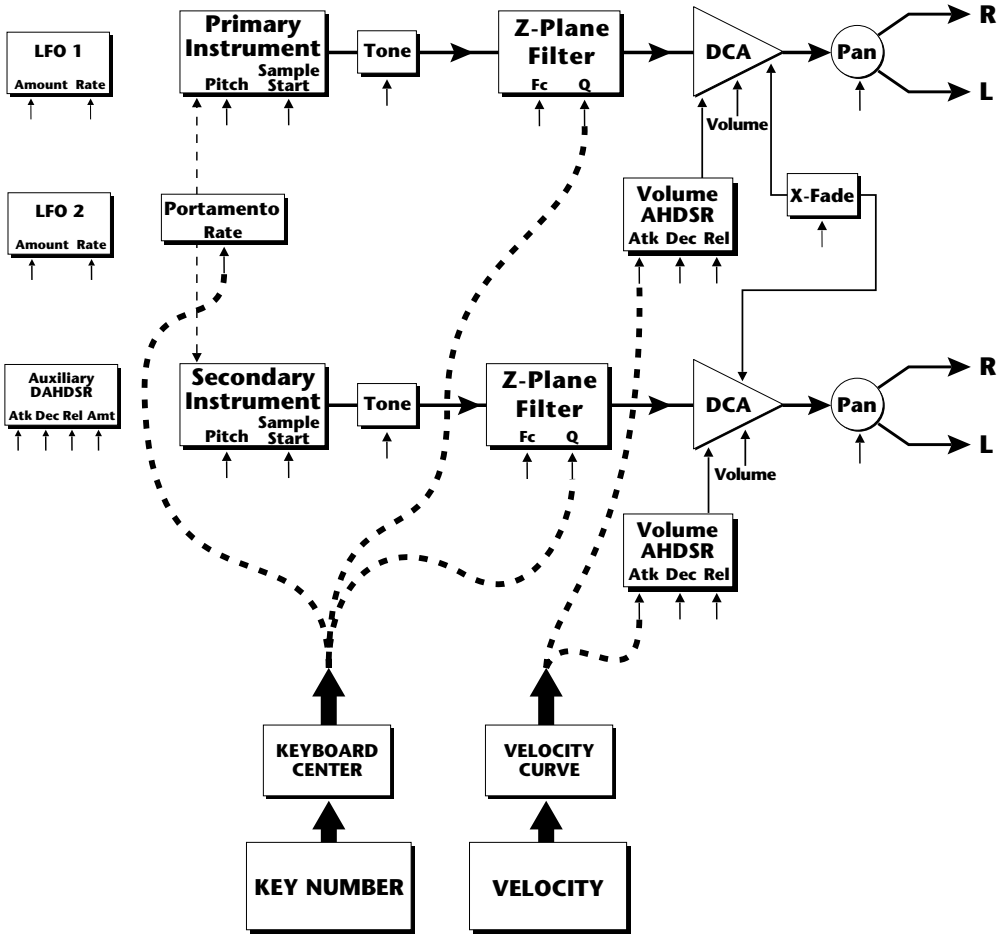
The Morphing Filter is used to shape the harmonic content of an instrument. The Fc can be modulated by any source. The auxiliary envelope is commonly used to dynamically shape the harmonic content over time. The Q parameter can only be modulated by a velocity or key source. There are 17 types of filters available. See page 61 for complete descriptions of each filter type.

DCA

Digitally **C**ontrolled **A**mplifier. Together with the Volume AHDSR, the DCA is used to shape the volume contour of a sound. The DCA can be controlled by any modulation source. Key Velocity is often used as a modulation source for the DCA so that the harder you play, the louder the sound becomes.

Pan

Adjusts the balance of sound to the left and right channels. Pan can be modulated by any realtime or note-on modulation source.



Keyboard and Velocity Modulation Sources

Keyboard Modulation Sources
Key Number, Key Velocity

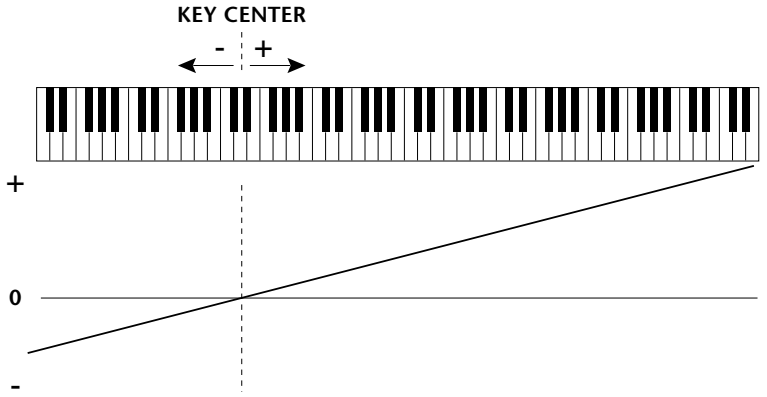
Destinations
Off, Pitch, Primary Pitch, Secondary Pitch, Filter Fc, Primary Filter Fc, Secondary Filter Fc, Filter Q, Primary Filter Q, Secondary Filter Q, Volume, Primary Volume, Secondary Volume, Attack, Primary Attack, Secondary Attack, Decay, Primary Decay, Secondary Decay, Release, Primary Release, Secondary Release, Crossfade, LFO 1 Amount, LFO 1 Rate, LFO 2 Amount, LFO 2 Rate, Auxiliary Envelope Amount, Auxiliary Envelope Attack, Auxiliary Envelope Decay, Auxiliary Envelope Release, Sample Start, Primary Sample Start, Secondary Sample Start, Pan, Primary Pan, Secondary Pan, Tone, Primary Tone, Secondary Tone, Portamento Rate, Primary Portamento Rate, Secondary Portamento Rate

KEYBOARD AND VELOCITY MODULATION

The Keyboard and Velocity Modulation diagram shows the possible routing of Key Number (which key is pressed), and Velocity (how hard the key is pressed). These modulation sources can control any of the destinations indicated by the small arrows. Up to six key and velocity modulation routings can be programmed for each preset. Keyboard and velocity modulation routings are completely flexible as shown in the example above.

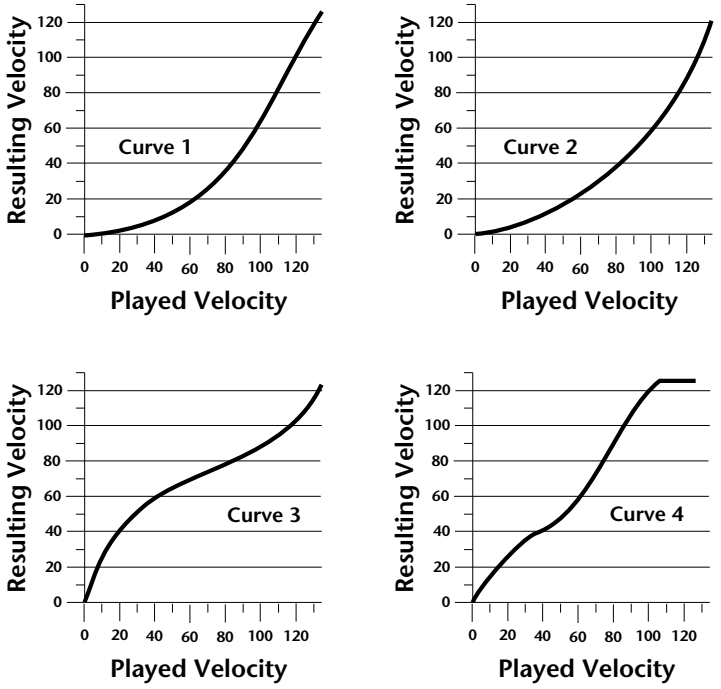
KEY NUMBER

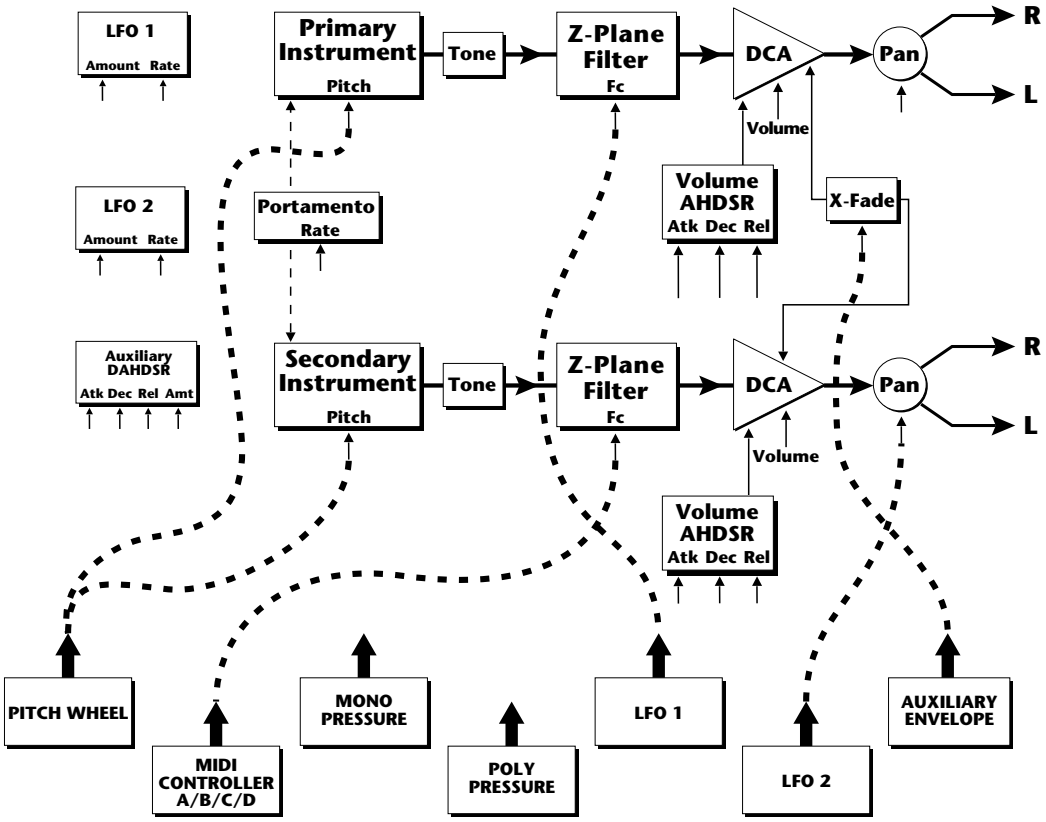
The Key Number is affected by the Keyboard Center parameter which can be set to any key from A-2 to G8. The keyboard center establishes a reference point for keyboard modulation; keys above this point will have a positive value, while keys below it will be negative. For example, if we wished to change the volume of an instrument using key number and the key center were set to middle C, the instrument would get progressively louder above middle C and progressively softer below middle C.



VELOCITY CURVES

Incoming velocity values can be scaled by one of the velocity curves in order to match your playing style or better adapt to the MIDI controller. Experiment with the curves to find the one that works best for your style and MIDI controller.





Realtime Modulation Sources

REALTIME MODULATION

In addition to keyboard and velocity modulation, Orbit has multiple realtime modulation sources. Realtime modulation sources are parameters which can be continuously varied over time. The velocity and keyboard modulations, in comparison, are set at the key depression. The realtime modulation sources can control any of the destinations except sample start, Q, and tone, as indicated by the small arrows. Up to eight modulation routings can be programmed for each preset. The realtime modulation routings are completely flexible as shown in the example above.

Realtime Modulation Sources

Pitch Wheel, MIDI Control A, MIDI Control B, MIDI Control C, MIDI Control D, Mono Pressure, Polyphonic Pressure, LFO 1, LFO 2, Auxiliary Envelope

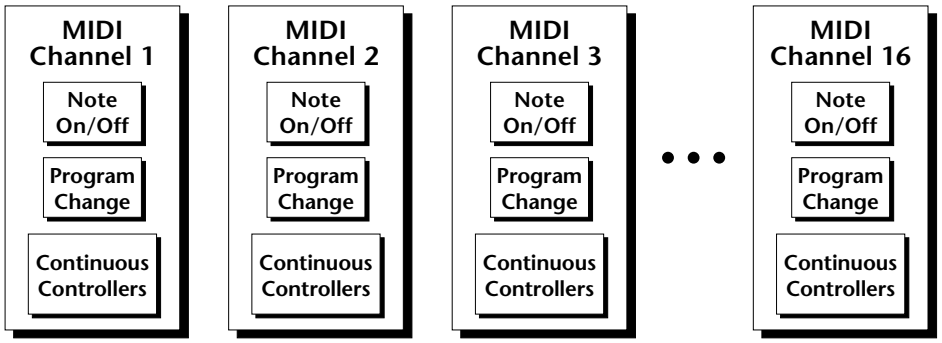
Destinations

Off, Pitch, Primary Pitch, Secondary Pitch, Filter Fc, Primary Filter Fc, Secondary Filter Fc, Volume, Primary Volume, Secondary Volume, Attack, Primary Attack, Secondary Attack, Decay, Primary Decay, Secondary Decay, Release, Primary Release, Secondary Release, Crossfade, LFO 1 Amount, LFO 1 Rate, LFO 2 Amount, LFO 2 Rate, Auxiliary Envelope Amount, Auxiliary Envelope Attack, Auxiliary Envelope Decay, Auxiliary Envelope Release, Portamento Rate, Primary Portamento Rate, Secondary Portamento Rate Pan, Primary Pan, Secondary Pan

MIDI REALTIME CONTROLS

The MIDI realtime controllers may seem confusing at first, but they are really very simple to understand. You probably already know that there are 16 MIDI channels that can be used. Each of the 16 MIDI channels uses basically 3 types of messages; *note on/off*, *program changes*, and *continuous controller* messages. Your MIDI keyboard, in addition to telling Orbit which note was played, may also send *real-time control* information, which simply means occurring in real time or live. (You may be using a MIDI device other than a keyboard, but for simplicity's sake we'll presume that you're using a keyboard.) Realtime control sources include such things as pitch wheels or levers, modulation wheels or levers, control pedals, aftertouch, etc. and are used to add more expression or control. Your MIDI keyboard sends out realtime controller information on separate channels called *continuous controller channels*. There is a set of 32 continuous controller channels for each of the 16 MIDI channels. Some of the controller channels, such as pitch wheel, volume, and pan have been standardized. For example, volume is usually sent on continuous controller channel #7.

••• *MIDI wind controllers may work better if you assign one of the MIDI A, B, C, D controllers to control volume. This will allow the MIDI volume to be* ***added*** *to the current volume.*



Common realtime controllers such as the pitch wheel, volume, pan and pressure are pre-programmed to their proper destinations. Your keyboard may have other realtime controls such as a control pedal or data slider which can also be programmed to control most of the parameters on Orbit.

Orbit is equipped with a sophisticated *MidiPatch™ system*, which allows you to route any continuous controller to any realtime modulation destination. The MidiPatch system is also very easy to use. First, you must know which controller numbers your keyboard can transmit.

Let's say for example, that you are using a Yamaha DX7 as your master keyboard. The DX has pitch and mod. wheels, a breath controller, a data slider and a foot pedal, all of which transmit their values over MIDI. The standard MIDI controller numbers for the controls are listed below (the pitch wheel has a dedicated controller, PWH). First, we would go to the Master menu, MIDI Controller Assign and define the 4 MIDI controllers that we wish to use. Assign each controller number to one of the letters A-B-C-D.

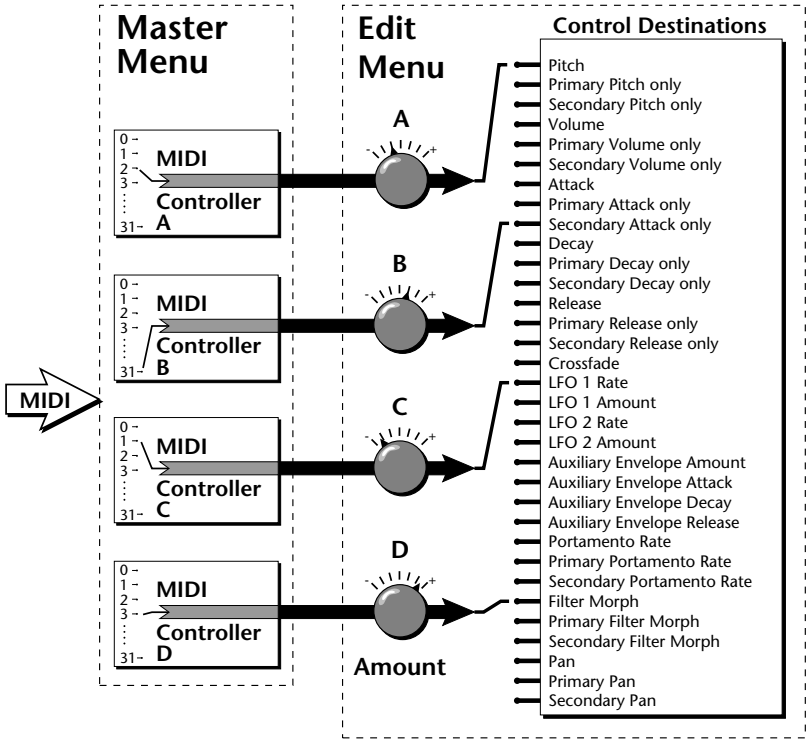
01 - Modulation Wheel **A**

02 - Breath Controller **B**

04 - Foot Pedal **C**

06 - Data Entry **D**

To complete the connections for a particular preset, go to the Edit menu, Realtime Control, and route the MIDI A, B, C, D to the desired destinations. These could be patched to any 4 destinations or even to the same destination. The MIDI Controller Amount menu, (in the Edit menu) allows you to scale the amounts of each of the controllers by a positive or negative value. The signal flow is shown in the diagram below.



The MIDI controllers A-B-C-D must have both a source (0-31), and a destination assigned.

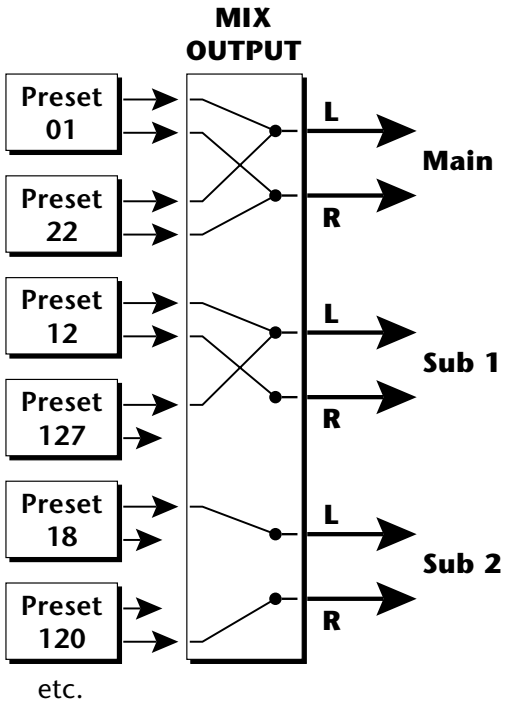
Standard MIDI Controller Numbers

1 Modulation Wheel
2 Breath Controller
3 Pressure Rev 1 DX7
4 Foot Pedal
5 Portamento Time
6 Data Entry
7 Volume
8 Balance
9 Undefined
10 Pan

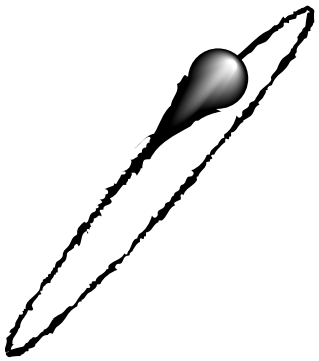
STEREO MIX OUTPUTS

Orbit has three sets of polyphonic stereo outputs (Main, Sub 1, Sub 2). The channels used by a particular preset may be directed to appear at any one of these three stereo outputs. This feature is useful for signal processing (EQ, reverb, etc.) of individual sounds prior to final mixdown. By panning a preset completely left or right, it can be routed to a single output jack.

Note: All presets will be automatically routed to the Main outputs unless plugs are inserted into the Sub 1 or Sub 2 outputs.



Each preset can be routed to one (and only one) set of stereo outputs.



EDIT MENU

The edit menu contains functions that can be modified by the user and then saved as preset information in one of the user presets. For example, the LFO speed or other parameter can be edited, then the preset can be saved to a user location (0-255).

WARNING

Changes made in the Edit menu will be forever lost unless the preset is "saved" using the Save Preset function (page 73) before changing the preset.

To enable the Edit menu

Press the Edit key, lighting the LED. The current screen will be the one most recently selected since powering up the machine. The cursor will appear underneath the first character of the screen heading on line one.

••• While the Edit menu is activated, incoming MIDI preset changes are ignored. This is a quick and easy way to temporarily turn MIDI Preset Change OFF.

To select a new screen

Press the cursor key repeatedly (or hold the cursor key while turning the data entry control) until the cursor is underneath the parameter name. Rotate the data entry control to select the screen.

To modify a parameter

Press the cursor key repeatedly (or hold the cursor key while turning the data entry control) until the cursor is underneath the parameter value. Rotate the data entry control to change the value.

To return to Preset Select mode

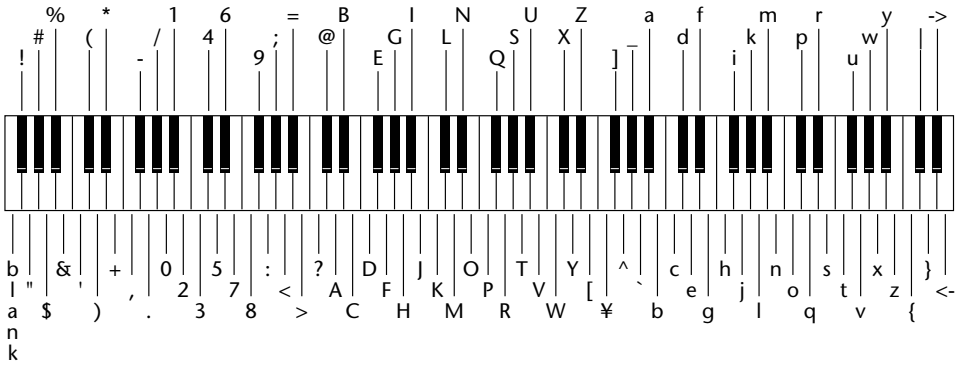
Press the Edit button, turning off the LED.

EDIT MENU FUNCTIONS

• ***Preset Name***

Preset Name allows you to name each of the user presets with a name of up to 12 characters. Position the cursor under the character location and use the data entry control to change the character. The keyboard can also be used to select characters. The charts below show the keyboard character assignment.





	C	C#	D	D#	E	F	F#	G	G#	A	A#	B	Pitch
-2						blank	!	"	#	$	%	&	
-1	'	(	)	*	+	,	-	.	/	0	1	2	
0	3	4	5	6	7	8	9	:	;	<	=	>	
1	?	@	A	B	C	D	E	F	G	H	I	J	
2	K	L	M	N	O	P	Q	R	S	T	U	V	
3	W	X	Y	Z	[	¥	]	^	_	`	a	b	
4	c	d	e	f	g	h	i	j	k	l	m	n	
5	o	p	q	r	s	t	u	v	w	x	y	z	
6	{	|	}	→	←								

Octave No.

• *Primary Instrument*

This function allows you to select which of the available instrument sounds (or none) will be placed on the primary layer of the current user preset.

```
INSTRUMENT pri
I002 Below Sub
```

• *Secondary Instrument*

This function allows you to select which of the available instrument sounds (or none) will be placed on the secondary layer of the current user preset.

```
INSTRUMENT sec
I001 Super Sub
```

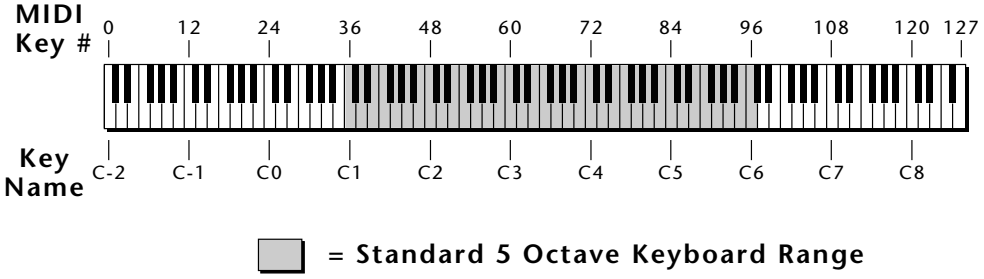
••• *Simply changing the instrument creates a new sound while retaining all other parameters of the preset.*

• *Key Range*

Key range sets the keyboard range of both primary and secondary instruments. This sets the keyboard range for the entire preset and will further limit the primary and secondary keyboard ranges. The key range can be set anywhere from C-2 to G8.

```
KEY RANGE
C-2 -> G8
```

Orbit Keyboard Range



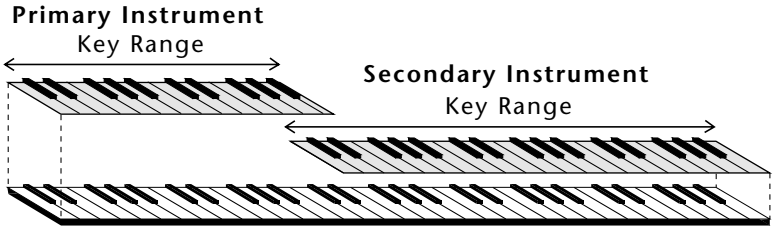
= Standard 5 Octave Keyboard Range

• ***Primary Key Range***
Key range sets the keyboard range of the primary instrument. This is useful for creating positional crossfades and keyboard splits between the primary and secondary layers. The key range can be set anywhere from C-2 to G8.

```
KEY RANGE pri
C-2 -> G4
```

• ***Secondary Key Range***
Key range sets the keyboard range of the secondary instrument. The key range can be set anywhere from C-2 to G8.

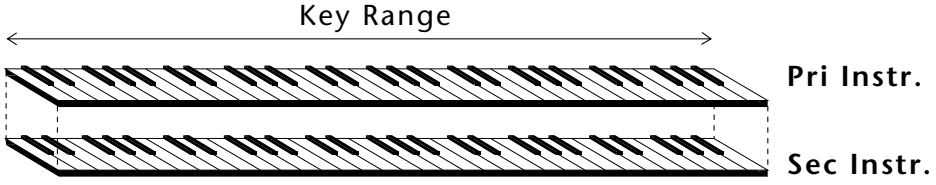
```
KEY RANGE sec
G#4 -> G8
```



SPLIT KEYBOARD

This diagram shows how a "split" keyboard can be programmed using the primary and secondary instruments.

••• *Entire presets can also be Linked to form split or layered keyboards.*



LAYERING TWO INSTRUMENTS

This diagram shows how instruments can be layered or "stacked" using the primary and secondary instruments.

• *Coarse Tuning*

This function allows you to change the tuning of the primary and secondary instruments in semitone intervals. The coarse tuning range is -36 to +36 semitones. A coarse tuning setting of "00" would indicate that the instrument is tuned to concert pitch (A=440 Hz).



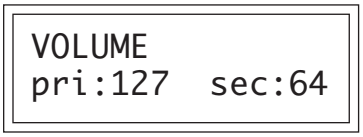
• *Fine Tuning*

This function allows you to change the tuning of the primary and secondary instruments in 1/64 semitone intervals (approx. 1.56 cents). The fine tuning range is ± 1 semitone.



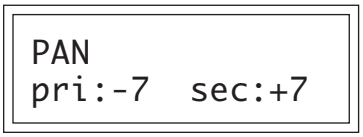
• *Volume*

Volume sets the amplitude of the primary and secondary instruments. This function also allows you to compensate for the relative volume differences between instruments.



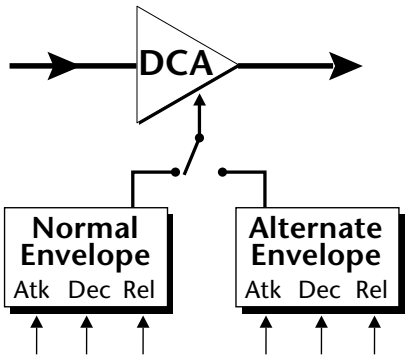
• *Pan*

Pan allows you to independently set the initial pan position of the primary and secondary instruments. A value of -7 pans the instrument hard left and a value of +7 pans the instrument hard right. This pan setting is only valid if "P", for preset pan, is selected in the main display.



• ***Alternate Volume Envelope On/Off***
Each instrument has its own factory preset AHDSR volume envelope which is normally employed. If a programmable volume envelope is desired, the alternate envelope is used.

```
ALT VOL ENVELOPE
pri:Off  sec:On
```



• ***Primary Alternate Envelope Parameters***
This function allows you to adjust the alternate volume envelope parameters for the primary instrument. The parameters are Attack time, Hold time, Decay time, Sustain level, and Release time and are adjustable from 00 to 99.

```
P: A  H  D  S  R
  00 00 00 99 16
```

• ***Secondary Alternate Envelope Parameters***
This function allows you to adjust the alternate volume envelope parameters for the secondary instrument. The parameters are Attack time, Hold time, Decay time, Sustain level, and Release time and are adjustable from 00 to 99.

```
S: A  H  D  S  R
  00 00 00 99 16
```

• *Delay*

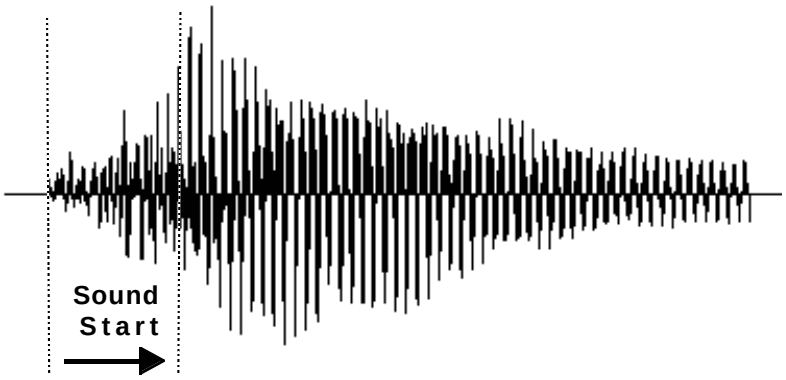
Delay varies the time between when a MIDI Note On message is received and the onset of a note. The delay time is adjustable from 0 to 13 seconds (000-127).

```
DELAY
pri:000  sec:000
```

• *Sound Start*

This function allows you to set where a sample begins playing when you hit a key. A setting of 000 plays a sound from the beginning, higher values move the sample start point toward the end of the sound.

```
SOUND START
pri:000  sec:000
```



The Sound Start parameter allows you to cut off the beginning of the sound. Higher values move the start point toward the end of the sound.

• *Reverse Sound*

When reverse sound is turned On, the instrument will be played backwards. When an instrument is reversed, any loops in the sound will be ignored, which means that the sound will not sustain indefinitely.

```
REVERSE SOUND
pri:Off  sec:On
```

• *Solo Mode*

Solo mode provides the playing action of a monophonic instrument. This mode does not allow you to play a chord. Two types of solo mode are provided: wind controller mode and synth mode. Both modes have single triggering and last-note priority. In either solo mode, if a new note is played while another is being held, the envelope generators will not retrigger. This allows a legato playing technique to be used. Wind controller mode, as its name suggests, provides more realistic effects when working with wind controllers.

Wind mode

The envelope generator attack always begins at the start of the attack phase.

Synth mode

The envelope generator attack begins at whatever point in the release phase the envelope is in when a new key is pressed.



• *Portamento Rate*

Portamento is a smooth gliding between notes instead of the normal instantaneous change in pitch when a new key is pressed. The portamento rate is the time it takes to glide to the new pitch. The larger the value, the slower the glide rate. The rate is adjustable from 1-127 or it can be turned Off. Portamento glides at a linear rate between notes and can be set separately for the primary and secondary layers. Portamento works both in and out of Solo Mode.



• *Chorus*

Chorus "thickens" the sound by doubling the sound and then detuning it. The chorus amount is variable over a range of 1 to 15. When Chorus is on, the number of channels used by an instrument will be doubled.



• *Crossfade Mode*

This function determines which of the following crossfade modes will be selected: Off, Crossfade, or Cross-Switch.

Off

When "Off" is selected, none of the crossfade parameters will have any effect.

Crossfade

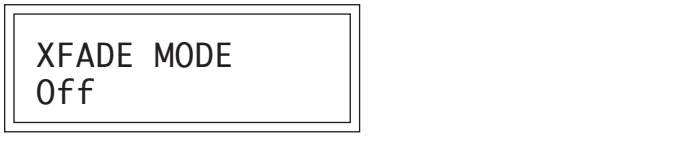
When "Xfade" is selected, a control input is used to fade between the primary and secondary. Any modulation source may be used as an input (velocity, wheel, etc.).

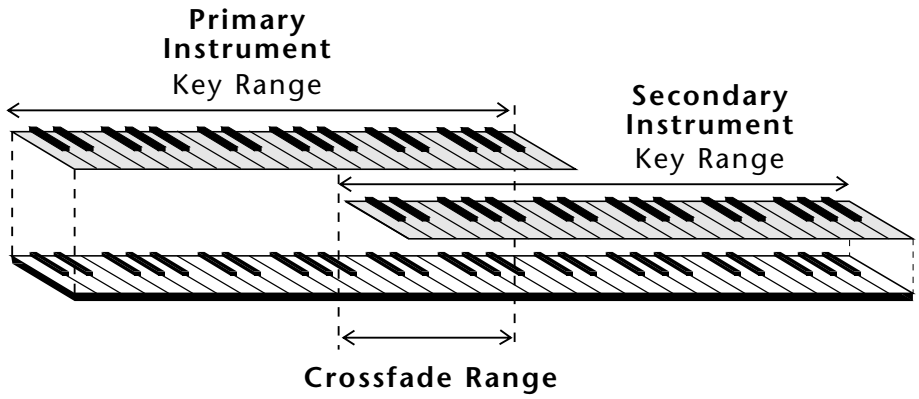
Cross-switch

When "Xswitch" is selected, the switched layer is selected if the input crosses a certain threshold or if a footswitch controlling cross-switch is activated. The switch occurs only at the start of the note; no further switching takes place while the key is held down.

If key position or velocity is routed to cross-switch, the threshold is the *switch point*. Realtime controllers do not have any effect when routed to cross-switch. For more information, see Cross-Switch Point on page 61.

••• For more information, see Cross-switch Point on page 61.





By overlapping the primary and secondary instruments, you can crossfade or cross-switch between the layers.

••• To use the keyboard for crossfade, set the Crossfade Balance to 64 and the Key Center to the split point.

• *Crossfade Direction*

This function determines the polarity of the crossfade or cross-switch. The direction is either primary → secondary, or secondary → primary.

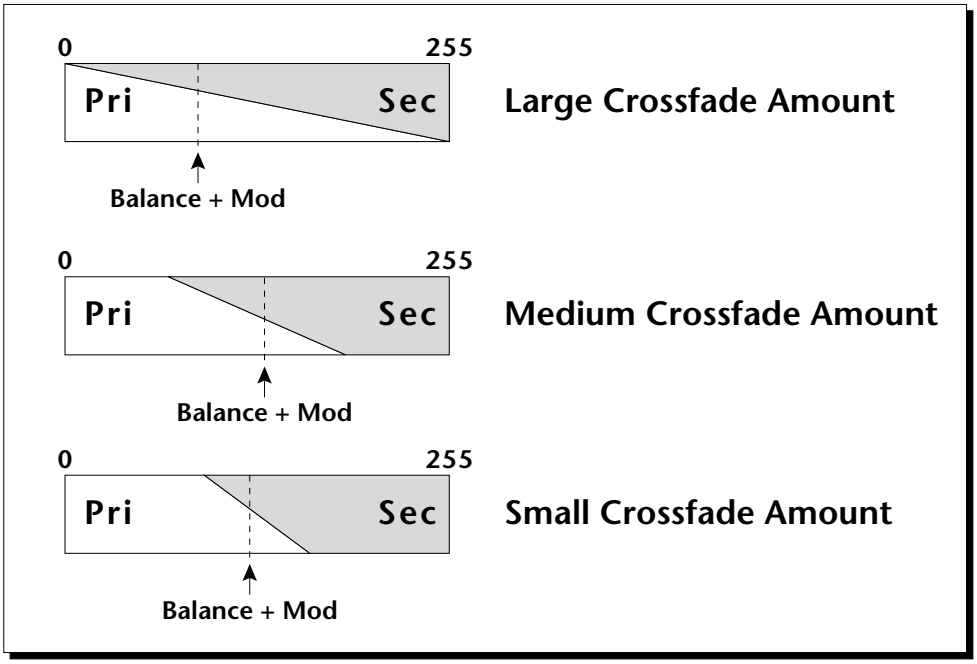
```
XFADE DIRECTION
Pri -> Sec
```

• *Crossfade Balance*

••• *A Crossfade Balance setting of 000 would be appropriate with a source such as a modulation wheel or footpedal, either of which can only change the value in a positive direction.*

The crossfade balance parameter determines the initial balance between the primary and secondary layers. Higher values shift the balance to the secondary instrument. When the Crossfade Direction is Pri->Sec, Modulation subtracts from the primary volume and adds to the secondary volume. When crossfade modulation and balance equal 64, the two instruments are at equal volume.

```
XFADE BALANCE
064
```

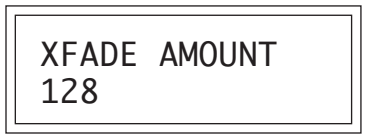


▼ *Crossfade must be assigned to a modulation source in the Realtime or Key/Velocity modulation screens.*

*Modulation and Crossfade Balance are **added** together to determine the mixture of primary and secondary instruments. Higher values increase the secondary volume.*

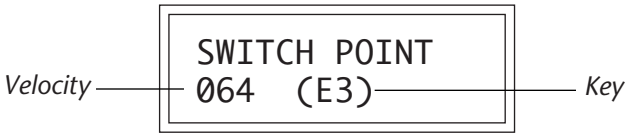
• *Crossfade Amount*

The crossfade amount parameter determines the range over which crossfading will occur. Crossfade amount is variable from 000 to 255. The larger the value, the more modulation will be required to effect a complete crossfade.



• *Cross-switch Point*

The cross-switch point determines the point at which cross-switching will occur when key position or velocity is controlling cross-switch.



▼ *To enable the cross-switch function, you must assign* ***Crossfade*** *to a modulation source in the Realtime or Key/Velocity Modulation screen.*

• *Primary Filter Type*

This function selects the type of filter for the primary layer. 17 different filter types are provided. If no filtering is desired, you can bypass the filter by turning it Off.



FILTER TYPES

2-pole Lowpass
Lowpass filter with 12dB/octave rolloff and Q control.

4-pole Lowpass
Lowpass filter with 24dB/octave rolloff and Q control.

6-pole Lowpass
Lowpass filter with 36dB/octave rolloff and Q control.

2nd Order Highpass
Highpass filter with 12dB/octave rolloff and Q control.

4th Order Highpass
Highpass filter with 24dB/octave rolloff and Q control.

2nd Order Bandpass
Bandpass filter with 6dB/octave rolloff on either side of the passband and Q control.

4th Order Bandpass
Bandpass filter with 12dB/octave rolloff on either side of the passband and Q control.

Swept EQ, 1-octave
Parametric filter with 24 dB of boost or cut and a one octave bandwidth. Fc controls center frequency and Q controls boost or cut.

Swept EQ, 2->1-octave
Parametric filter with 24 dB of boost or cut. The bandwidth of the filter is two octaves wide at the low end of the audio spectrum, gradually changing to one octave wide at the upper end of the spectrum. Fc controls center frequency and Q controls boost or cut.

Swept EQ, 3->1-octave
Parametric filter with 24 dB of boost or cut. The bandwidth of the filter is three octaves wide at the low end of the audio spectrum, gradually changing to one octave wide at the upper end of the spectrum. Fc controls center frequency and Q controls boost or cut.

Phaser 1
Recreates a comb filter effect, typical of phase shifters. Filter Fc moves the position of the notches. Q varies the depth of the notches.

Phaser 2
Comb filter with slightly different notch spacing than Phaser 1. Filter Fc moves the position of the notches. Q varies the depth of the notches.

Bat-Phaser
Phase shifter with peaks as well as notches.

Flanger Lite
Contains three notches. Filter Fc moves frequency and spacing of notches. Q increases flanging depth.

Vocal Ah-Ay-Ee
Vowel formant filter which sweeps from the “Ah” sound, through “Ay” sound to “Ee” sound at maximum Fc. Q varies the apparent size of the mouth cavity.

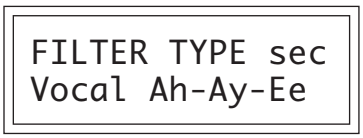
Vocal Oo-Ah
Vowel formant filter which swepps from the "Oo" sound, through "Oh" sound to "Ah" sound at maximum Fc. Q varies the apparent size of the mouth cavity.

Bottom Feeder
This is a specialized distortion filter which is quite useful for adding punch and drive to low frequency sounds such as bass and drums. Set the Fc low (less than 45). Q has no effect on this filter.

• *Primary Filter Cutoff & Q*
This function allows you to set the cutoff frequency (the frequency at which filtering begins) and the Q or resonance for the lowpass and highpass filters. On a lowpass or highpass filter, turning up the Q causes the frequencies near the cutoff to be emphasized. On the other filter types, Fc and Q control various other parameters. See the filter descriptions of these functions.



• *Secondary Filter Type*
Selects the filter type for the secondary instrument or the filter can be turned Off. See Primary Filter Type.



• *Secondary Filter Cutoff & Q*
This is the same as the Primary Cutoff and Q for the secondary filter.

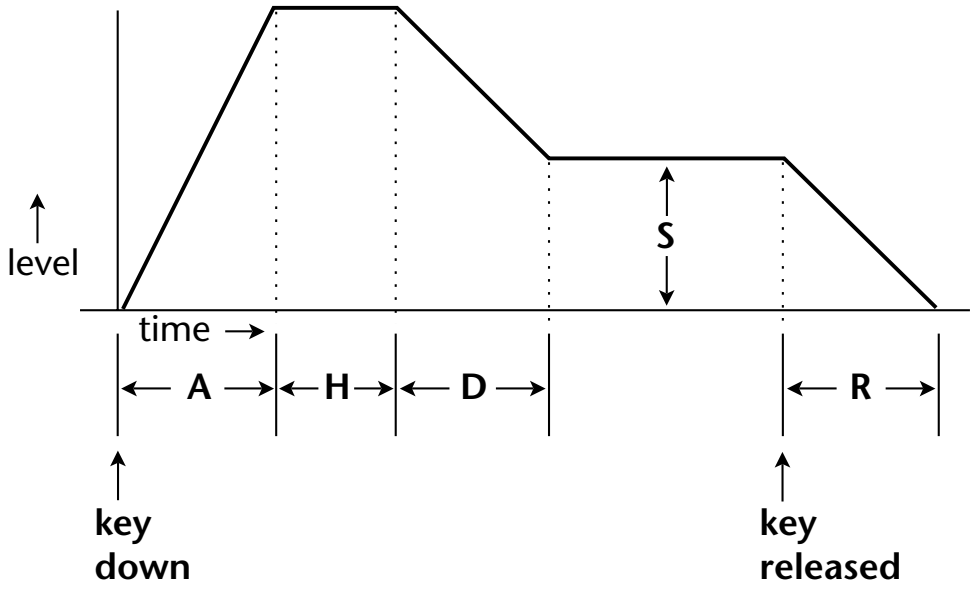


• ***Auxiliary Envelope***

This is a supplementary, utility envelope that can be routed to any realtime control destination including the lowpass filter. The auxiliary envelope parameters are: Envelope Amount, Delay, Attack Time, Hold Time, Decay Time, Sustain Level, and Release Time. The delay time is variable from 0 to 13 seconds (000-127). The envelope amount is variable from -128 to +127. Negative values will produce inverted envelopes.

```
AUX ENV  AMT DLY
         +127 000
```

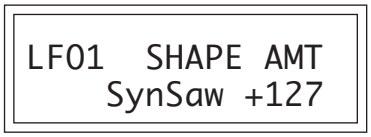
```
A: A  H  D  S  R
  00 00 00 99 20
```

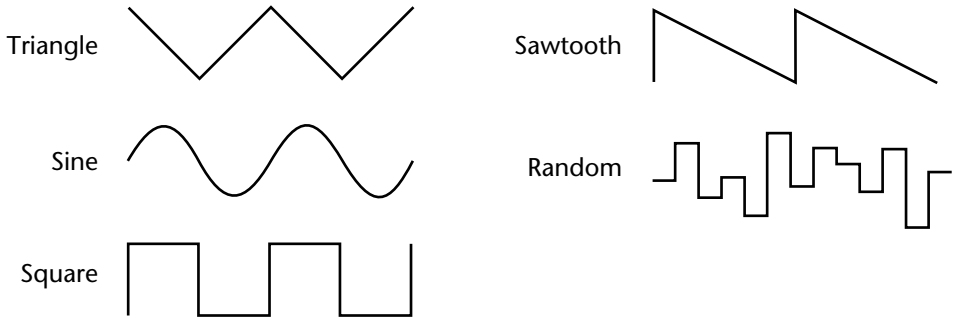


This diagram shows the six stages of the Auxiliary Envelope Generator.

• *LFO 1 - Shape & Amount*

This screen controls the waveshape and amount of Low Frequency Oscillator 1. The LFO can be used to produce vibrato (when routed to pitch), or tremolo (when routed to volume). The five LFO waveshapes are: Triangle, Sine, Square, Sawtooth, and Random. The amount can be varied from -128 to +127. Negative values will produce inverted waveshapes.





The Triangle, Sine, Sawtooth and Square LFO shapes can also be **Synced** to the Beats tempo or to external MIDI clock. The LFO waveforms preceded by "Syn" are synced LFO's. With the LFO synced to the beats tempo, the LFO rate will follow any changes in the beats tempo.

• *LFO 1 - Rate, Delay & Variation*

This screen controls the rate, delay and variation of LFO 1.

LFO Rate

Varies the LFO speed from 0.052 Hz to 25 Hz (000-127).

- Certain LFO rates are marked on Synced LFOs to show you that they correspond to various note values when synced to the Beats tempo.

LFO Delay

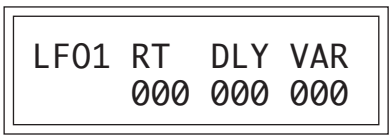
Sets the amount of time between hitting a key and the onset of modulation. This can be used to simulate an effect often used by acoustic instrument players, where the vibrato is brought in only after the initial note pitch has been established. The delay range is variable from 0 to 13 seconds (000-127).

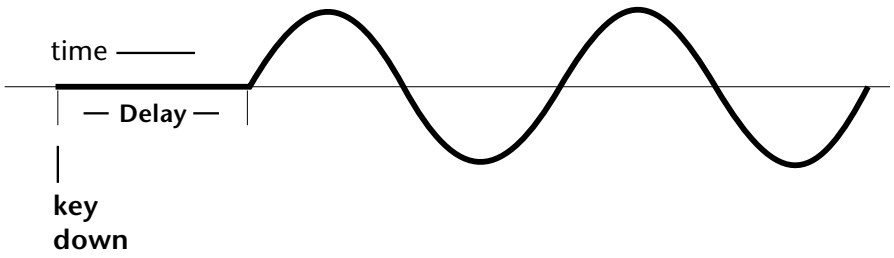
••• LFO Rates to Beats:

004 ..... Double Whole Note
006 ..... Double Whole Trip.
013 ..... Whole Note Triplet
016 ..... Half Note
024 ..... Half Note Triplet
030 ..... Quarter Note
042 ..... Quarter Note Triplet
051 ..... Eighth Note
066 ..... Eighth Note Triplet
077 ..... 16th Note
095 ..... 16th Note Triplet
109 ..... 32nd Note

LFO Variation

Sets the amount of random variation of an LFO each time a key is pressed. This function is useful for ensemble effects, where each note played has a slightly different modulation rate. The higher the number, the greater the note to note variation in LFO rate. LFO variation is variable from 000-127.





The LFO wave begins after the specified delay time has elapsed.

• LFO 2 - Shape & Amount

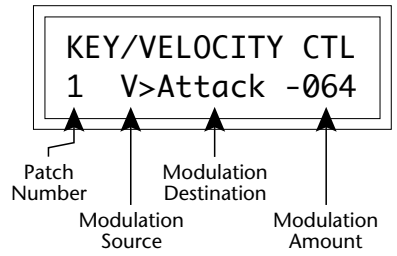
LFO 2 is functionally identical to LFO 1.

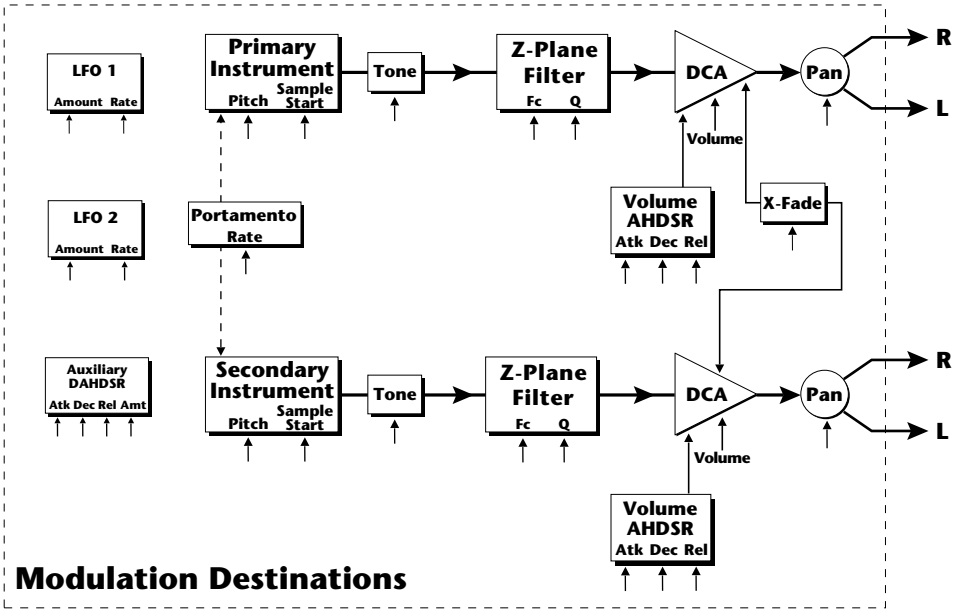
• LFO 2 - Rate, Delay & Variation

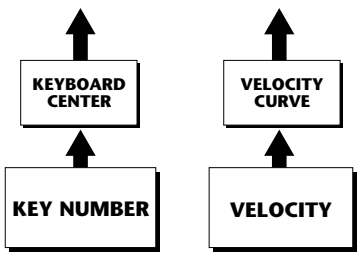
LFO 2 is functionally identical to LFO 1.

• *Keyboard & Velocity Modulation Control*

These functions allow you to route keyboard and velocity information to any of the modulation destinations. Up to 6 simultaneous paths or "patches" may be programmed. For each modulation patch, there is a source (keyboard or velocity), and a corresponding amount parameter which is variable from -128 to +127. **Place the cursor under the appropriate parameter and change the patch number, modulation source, modulation destination, or the amount using the data entry control.** If a parameter is not labeled either primary or secondary, it affects both.







Keyboard and Velocity Modulation Sources

Keyboard Modulation Sources
Key Number, Key Velocity

Destinations
Off,
Pitch, Primary Pitch,
Secondary Pitch,
Filter Fc, Primary Filter Fc,
Secondary Filter Fc,
Filter Q, Primary Filter Q,
Secondary Filter Q,
Volume, Primary Volume,
Secondary Volume,
Attack, Primary Attack,
Secondary Attack,
Decay, Primary Decay,
Secondary Decay,
Release, Primary Release,
Secondary Release,
Crossfade,
LFO 1 Amount, LFO 1 Rate,
LFO 2 Amount, LFO 2 Rate,
Auxiliary Envelope Amount,
Auxiliary Envelope Attack,
Auxiliary Envelope Decay,
Auxiliary Envelope Release,
Sample Start,
Primary Sample Start,
Secondary Sample Start,
Pan, Primary Pan,
Secondary Pan,
Tone, Primary Tone,
Secondary Tone,
Portamento Rate,
Primary Portamento Rate,
Secondary Portamento Rate

When Modulating Envelope Attack, Decay or Release Times:

*Positive amounts of modulation **increase** the time.*

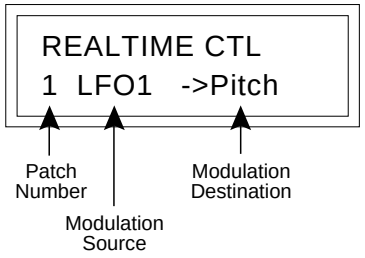
*Negative amounts of modulation **decrease** the time.*

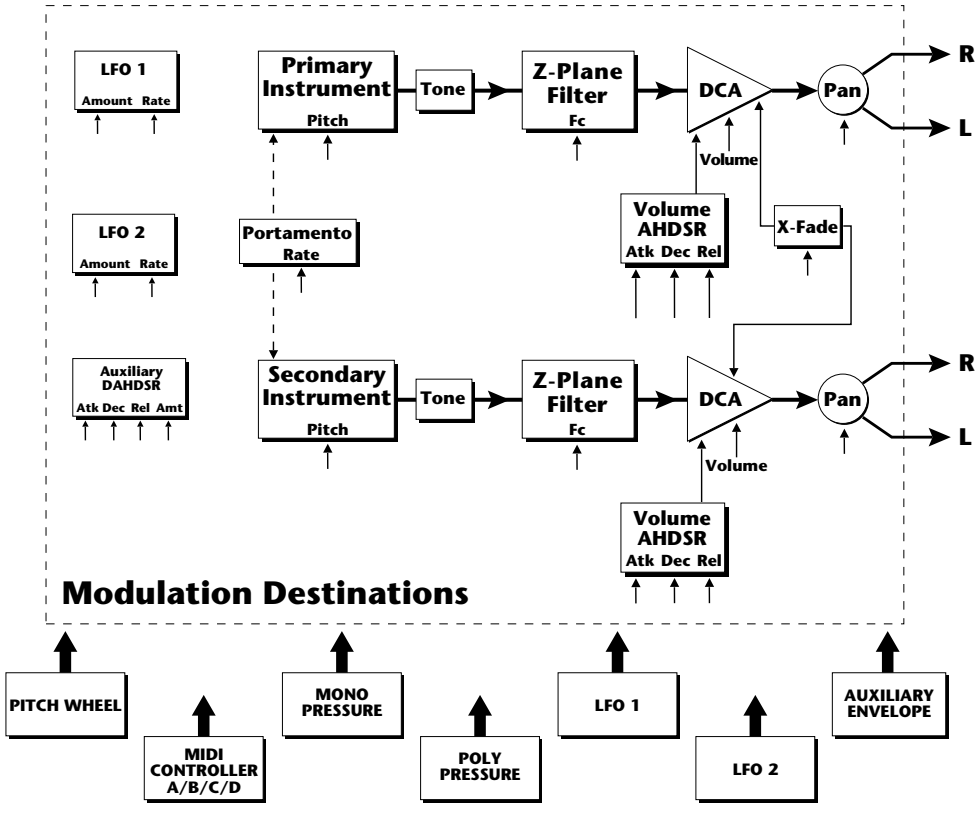
Realtime Modulation Sources
Pitch Wheel,
MIDI Control A,
MIDI Control B,
MIDI Control C,
MIDI Control D,
Mono Pressure,
Polyphonic Pressure,
LFO 1, LFO 2,
Auxiliary Envelope

Destinations
Off,
Pitch, Primary Pitch,
Secondary Pitch,
Filter Fc, Primary Filter Fc,
Secondary Filter Fc,
Volume, Primary Volume,
Secondary Volume,
Attack, Primary Attack,
Secondary Attack,
Decay, Primary Decay,
Secondary Decay,
Release, Primary Release,
Secondary Release,
Crossfade,
LFO 1 Amount, LFO 1 Rate,
LFO 2 Amount, LFO 2 Rate,
Auxiliary Envelope Amount,
Auxiliary Envelope Attack,
Auxiliary Envelope Decay,
Auxiliary Envelope Release,
Portamento Rate,
Primary Portamento Rate,
Secondary Portamento Rate,
Pan, Primary Pan,
Secondary Pan

• *Realtime Modulation Control*

These functions allow you to route realtime controllers to any of the modulation destinations on except Tone, Sample Start, Q and Pan. Up to 8 simultaneous patches may be programmed. For each modulation patch, there is a source and a destination parameter. **Place the cursor under the appropriate parameter and change the patch number, modulation source or modulation destination using the data entry control.** If a parameter is not labeled either primary or secondary, it affects both.





Realtime Modulation Sources

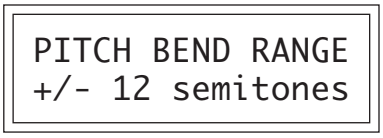
• *Footswitch Control*

This function allows you route the 3 footswitch controllers (1, 2 or 3) to any of the footswitch destinations. The footswitches can be routed to switch: Sustain (pri/sec/both), alternate volume envelope (pri/sec/both), alternate volume release (pri/sec/both), or cross-switch between the primary and secondary instruments.



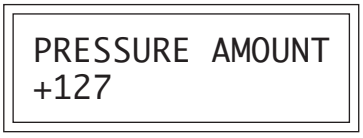
• *Pitch Bend Range*

This function allows you to specify the pitch wheel range for the current preset or it can be set to be controlled globally (set in the Master menu). Pitch bend range is only applied when the pitch wheel is used to control pitch.



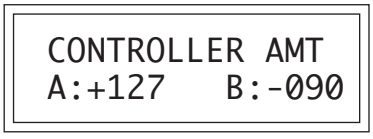
• *Pressure Amount*

This function allows you to specify an amount parameter for mono or poly keyboard pressure data. The pressure amount is variable from -128 to +127.



• *MIDI Controller Amount*

This function allows you to specify an amount parameter (variable from -128 to +127) for each of the MIDI controllers.

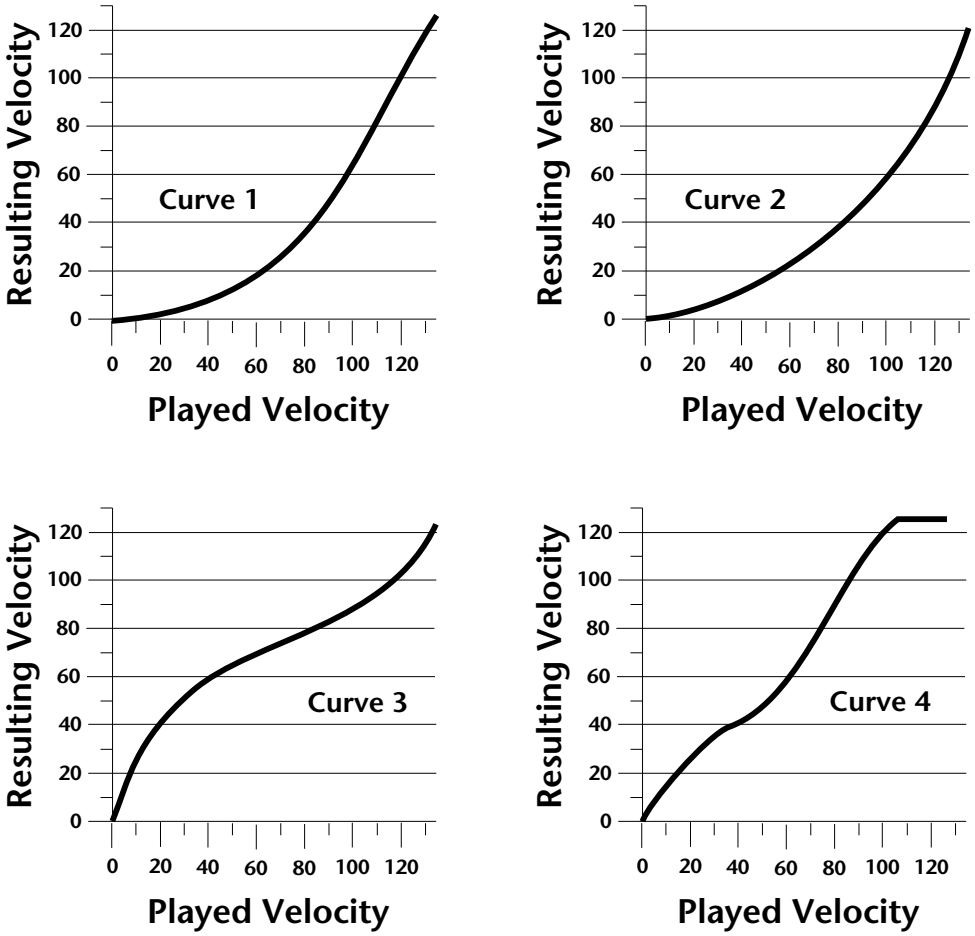




• ***Velocity Curve***

Incoming velocity data can be modified by a velocity curve in order to provide different types of dynamics in response to your playing or better adapt to the MIDI controller. This function allows you to select one of the four velocity curves or leave the velocity data unaltered (Off). In addition, the velocity curve can be set to "Global", which means that the global velocity curve (programmed in the Master menu) is used.

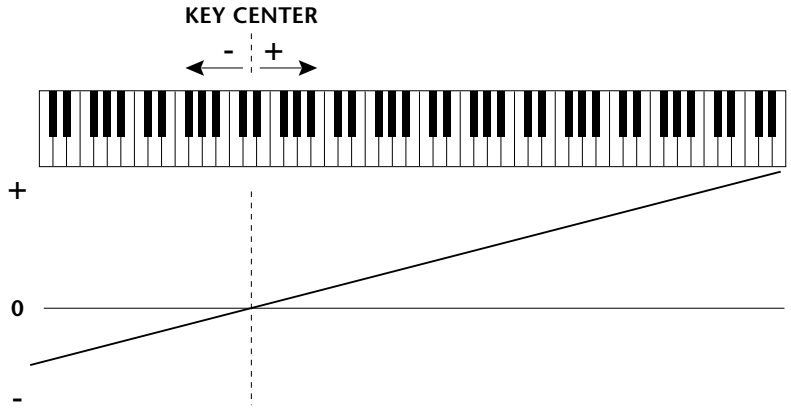
```
VELOCITY CURVE
Global
```



• *Keyboard Center*

The Keyboard Center parameter establishes a reference point for keyboard modulation. Keys above this point will have a positive value and keys below it will be negative. The keyboard center can be set to any key within the range C-2 to G8.





• *Keyboard Tuning*

In addition to the standard equally divided octave tuning, Orbit contains three other types of scale tuning and one user-definable tuning. This function selects which tuning will be used in the current preset. The choices of keyboard tunings are:

Equal tuning (12 tone equal temperament)
Standard Western tuning.

Just C tuning (just intonation)
Based on small interval ratios. Sweet and pure, non-beating intervals.

Vallotti tuning (Vallotti & Young non-equal temperament)
Similar to 12 tone equal temperament. For a given scale, each key has a different character

19 Tone tuning (19 tone equal temperament)
19 notes per octave. Difficult to play, but works well with a sequencer.

Gamelan (Javanese) tuning (5 tone Slendro and 7 tone Pelog)
Pelog-white keys, Slendro-black keys. Exotic tunings of Gamelan flavor.

User Tuning
Defined in the Master menu.

• ***Mix Output***

This function allows you to direct the channels used by a particular preset to appear at one of these three stereo outputs (Main, Sub 1, Sub 2).

```
MIX OUTPUT
Main
```

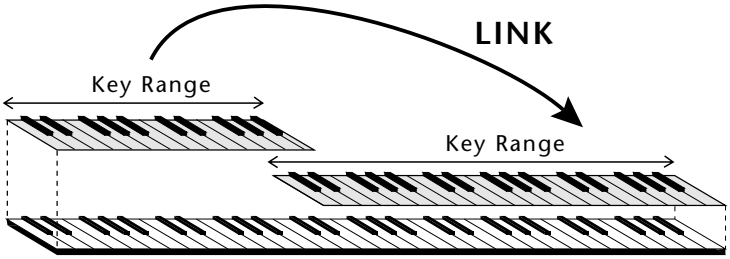
• ***Preset Links***

Presets may be linked to other presets in order to create layering or keyboard splits. The current preset can be linked with up to three other presets. Each linked preset can be assigned to a specific range in order to easily create keyboard splits. The modulation parameters specified in each preset remain in effect for each preset in the link.

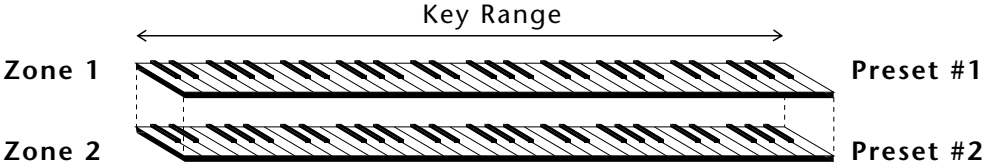
```
LINK 1 C#1->F#4
000 Preset Name
```

```
LINK 2 C#1->F#4
383 Preset Name
```

```
LINK 3
Off
```



CREATING A SPLIT KEYBOARD



LAYERING TWO PRESETS

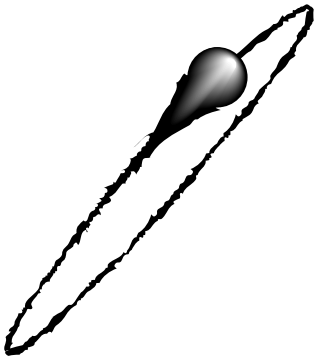
• *Save Preset*

Changes made to a preset in the Edit menu are not made permanent until the preset is *Saved*. To save a preset, move the cursor to the bottom line and select the location for the new preset with the data entry control. The Enter LED will be flashing. Pressing the Enter switch will confirm the operation. Any user preset (000-255) may be selected using the data entry control. Writing to a user preset erases the existing preset in that location. Make sure that the destination preset does not contain information that you want to keep.



To Save a Preset

1. Select the new location.
2. Press Enter.



STEP-BY-STEP

This section contains step-by-step instructions on how to get started in programming your own custom sounds. It is recommended that you actually try each example on the Orbit unit, rather than just reading through. The best way to learn something is by actually doing it.

LINKING PRESETS

Linking presets is a quick and easy way to create new sounds by "layering" presets and also to "split" a keyboard into sections containing different sounds.

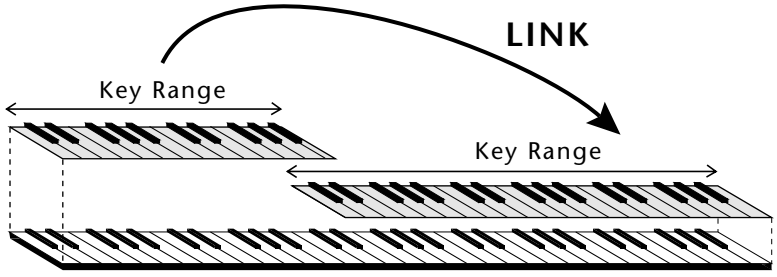
••• To get the most out of this section, please read Chapter 3, Programming Basics first.

• *Layering Two Presets*

1) Select the first preset you wish to layer.
2) Press the Edit button.
3) Use the data entry control to move through the screens until you find one of the "LINK" screens.
4) Move the cursor to the second line of the display, then select the preset that you want to be linked with this preset. You may want to play the keyboard as you scroll through the various presets in order to hear the results.
5) If you want the link to be a permanent part of the preset, be sure to "SAVE PRESET". Otherwise, simply change the preset to erase your work.

• *Create a Split Keyboard Using Links*

1) Follow steps 1 through 4 above.
2) Now set the range of the linked preset while still in the LINK menu.
3) Save the preset.
4) Now go back to the first preset, press the Edit button and use the data entry control to move through the screens to KEY RANGE.
5) Set the range of this preset so that it fills the remaining range of your keyboard.
6) Save the preset.



CREATING A SPLIT KEYBOARD

EDITING PRESETS

The easiest way to make a new preset is to edit an existing preset. This is also an excellent way of becoming familiar with Orbit. If you don't like what you hear, simply change the preset and Orbit reverts back to the original sound. Changes are not made permanent until you ***Save*** them using the "SAVE PRESET" function, which is the last screen in the Edit menu. Let's experiment and modify a few parameters of an existing preset. We'll start with functions that have an obvious effect on the sound: Instrument Select, Coarse Tuning, Chorus and Reverse Sound. First, choose any cool preset and press the Edit button.

• *Changing the Instrument*

This is probably the easiest and most dramatic way to modify an existing preset. Scroll through the Edit menu functions until you come to:



Move the cursor down to the bottom line (using the cursor button) and change the primary instrument with the data entry control. Play the keyboard as you scroll through the various instruments. When you find an interesting instrument, move the cursor back up to the first line and select:



Repeat the process for the secondary instrument. Find an instrument that sounds good when combined with the first one you selected. You can probably see that with all these great instruments to work with, you really can't go wrong. Now let's play with the tuning.

CHANGING THE TUNING OF AN INSTRUMENT

Scroll through the Edit menu functions until you come to:

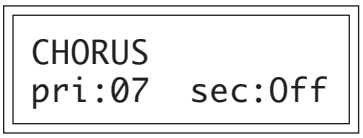


If the numbers are “00” as in the previous screen, it means that the instruments are tuned to concert pitch (A=440 Hz). Each whole number in coarse tuning represents a semitone interval. To tune one or both of the instruments up an octave, move the cursor to the number (using the cursor button) and set the number to +12 using the data entry control. Try tuning one of the instruments to a perfect fifth above the other. Simply set the coarse tuning to +7.

Tuning an instrument far out of its normal range will completely change the character of the sound. For example, if you tune a bass guitar up 2 octaves, it's going to sound rather petite. On the other hand, if you tune it down 2 octaves, you can probably rattle plaster off the walls! Experiment with radical pitch shifting. You'll be surprised at the results.

CHORUS

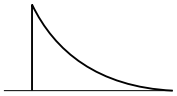
This is an easy one. With the cursor on the top line of the display, turn the data control until you find CHORUS. Various amounts of chorusing can be selected for each of the primary and secondary instruments. Chorus works by doubling the instruments and detuning them slightly. The larger the number, the more detuning will occur. *Warning: Since it works by doubling the instruments, chorus halves the number of notes you can play on Orbit.* Chorus is useful when you want to “fatten up” a part quickly and easily. Just turn chorus on! (The single cycle waves love chorus.)



REVERSING THE INSTRUMENT

A simple concept. The instrument sounds can be played in reverse. This will normally make an instrument sound quite a bit different. It also virtually doubles the number of raw instruments you have to work with, and it’s fun.





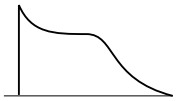
Percussion



Organ



String



Plucked

••• *The generalized volume envelope shapes of a few types of sounds are shown above.*

ALTERNATE VOLUME ENVELOPE

Every sound you hear, be it a piano note, a drum, a bell or whatever, has a characteristic volume curve or envelope, which grows louder or softer in various ways during the course of the sound. The volume envelope of a sound is one of the clues that our brain uses to determine what type of sound is being produced.

Every instrument in Orbit has it's own volume envelope which is used when the Alternate Envelope parameter is turned Off. By turning the Alternate Envelope On, we can re-shape the instrument's natural volume envelope any way we want. By reshaping the volume envelope of a instrument, you can dramatically change the way the sound is perceived. For example, by adjusting the envelope parameters, you can make "bowed" pianos or backwards gongs. The diagrams at the left show the volume envelopes of a few common sounds.

In preparation for this experiment choose a fairly "normal" preset (like an organ or synth) which continues to sustain when the key is held down. Go to the Secondary Instrument screen and set it to "None".

Next go to the Alt. Volume Envelope screen and turn the Primary Volume Envelope On.

```
ALT VOL ENVELOPE
pri:On   sec:Off
```

Now move on to the next screen:

```
P: A  H  D  S  R
  00 00 10 99 10
```

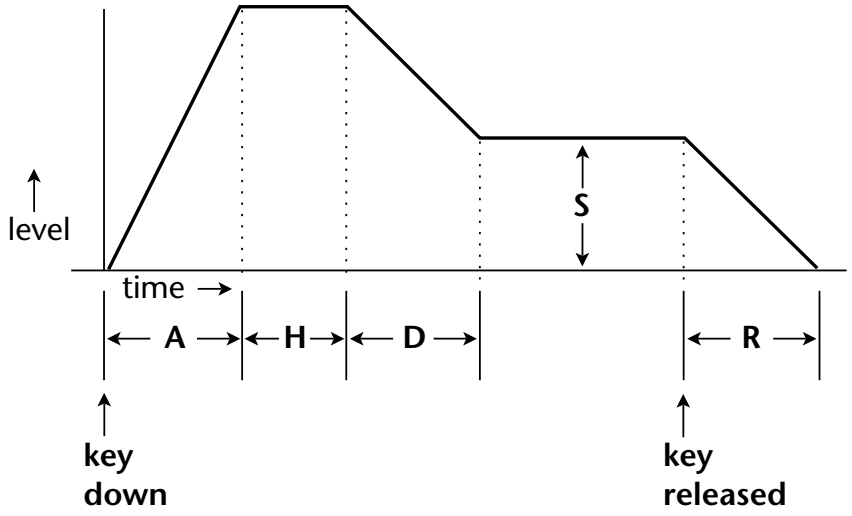
Increase the Attack time and play a note. The attack controls the time it takes for the sound to reach full volume when a key is pressed and held.

Now increase the Release time and note the effect as you release the note. The Release time controls the time it takes for the sound to die away when a note is released.

• *Anatomy of an Envelope*

When a key is pressed, the envelope generator starts increasing at the *Attack* rate. When it reaches full level, it Holds at that level for the *Hold* time. After the Hold time has elapsed, the envelope begins to *Decay* back down at the specified Decay rate until it reaches the *Sustain* Level. Note that all the other parameters are *Times*, but the Sustain is a *Level*.

The envelope will stay at the Sustain level for as long as the key is held. When the key is released, the envelope falls back down to zero at the *Release* rate.



WORKING WITH THE FILTER

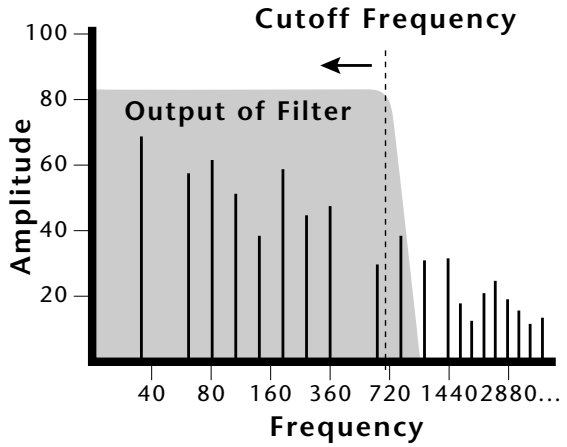
The low pass filter makes it possible to remove certain components of the sound. A low pass filter removes the high frequency components or put another way, it "lets the lows pass". In preparation for this experiment choose a fairly "normal" preset (like an organ or synth). Go to the Secondary Instrument screen and set it to "None", then set the Primary Instrument to one which is rich in harmonics, such as Instrument #140 - Pad Classic. (Since filters work by removing or accentuating certain frequencies, we want to make sure that we have a lot of frequencies to start with.) Set the parameters as listed in the chart below in order to "clean the slate" for your filter investigation.

Go to the primary filter cutoff and Q screen shown on the following page and position the cursor below the Fc value.

```
FILTER      pri
Fc:255      Q:00
```

Primary
Instrument: 140 Pad Classic
Tuning course: +00
Volume: +127
Alt. Vol. Envelope: Off
Realtime CTL: 1-8 -> All Off
Filter Type Pri: 4 Pole Lowpass
Filter Fc: 255
Filter Q: 00
Aux Envelope Amt: +100
Aux Env: A H D S R 28 00 33 00 16

Playing the keyboard now, you should hear the raw Pad Classic sound. Slowly decrease the filter Fc as you play the keyboard. The sound will get duller and duller as more and more high frequencies are filtered out until at some point the sound will completely disappear. (You have filtered out everything.) The chart below illustrates what you just did. You moved the cutoff frequency down.



Open the filter back up to 255, then move the cursor underneath the Q. Set the Q to 10, then move the cursor back under the Fc. As you change the Fc, notice that the sound now has a sharp, nasal quality. With a high Q, frequencies at the cutoff frequency (Fc) are being boosted or amplified.

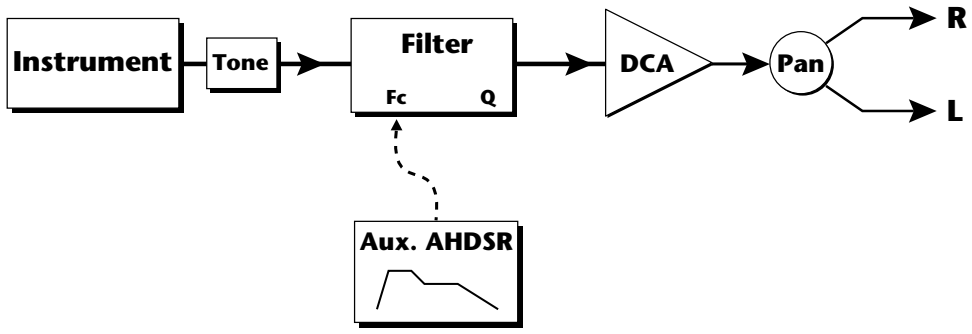
Now let's modulate the filter Fc with the Auxiliary envelope generator. The envelope generator is a device that can automatically change the filter Fc during the course of the note. Set the Fc way down until you can just hear the sound (about 60), then press Enter and go to the REALTIME CTL screen.

```
REALTIME CTL
1 PWhl -> Off
```

Move the cursor down underneath the source and set it to Aux (for Auxiliary Envelope). Next move the cursor underneath the destination and set it to Filter Fc. The screen should look like this:

```
REALTIME CTL
1 Aux -> FiltFc
```

You have just connected the Auxiliary Envelope Generator to the Filter Cutoff as shown in the diagram below.



Now go back to the Aux Envelope screen.

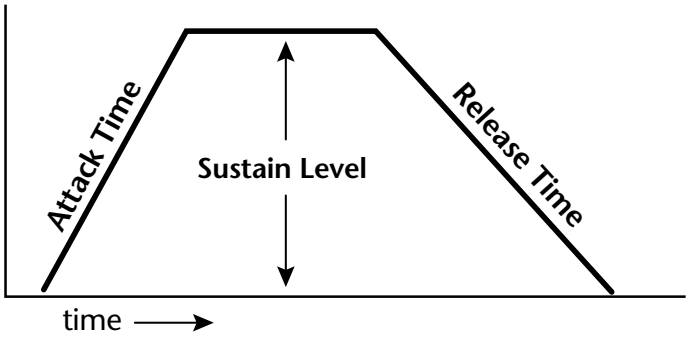
```
AUX ENV  AMT DLY
        +100 000
```

Move the cursor underneath the envelope amount and change the value to about +100. Now when you press a key the filter will slowly sweep up. Because the filter Q is set high, you can hear the different harmonics of the sound being accentuated as the filter cutoff sweeps past.

Now, scroll back to the Auxiliary Envelope parameter screen.

```
A: A  H  D  S  R
  15 00 00 99 50
```

Change the attack rate and note the change in the sound. The diagram below shows approximately how the envelope looks when the parameters are set as shown above.

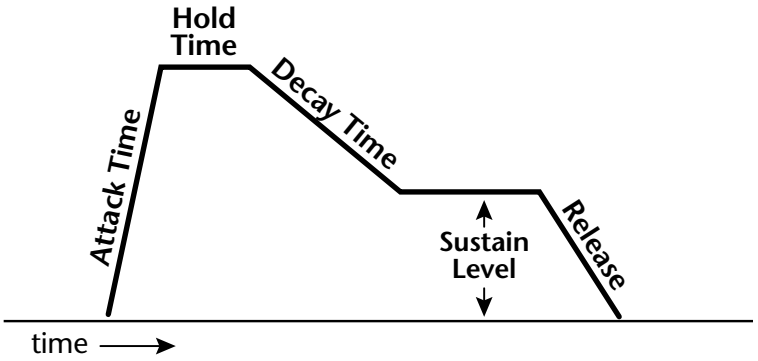


••• *Note that all the envelope parameters are **Rates** except for **Sustain**, which is a **Level**.*

Because the Sustain level is set to maximum, the decay parameter has no effect. Set the parameters as shown below.

```
A: A  H  D  S  R
  03 06 24 36 12
```

Now the filter sweeps up, ***Holds*** there for a bit, then ***Decays*** back down to the ***Sustain*** Level until you release the key. Then it sweeps down at the ***Release*** rate. Play with the envelope parameters for awhile to get a feel for their function. (If you're having trouble understanding the Envelope Generators, please refer to the Programming Basics section in this manual.)



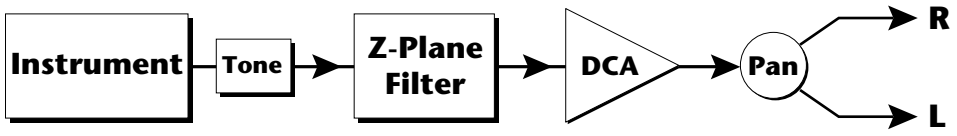
Go back to the Primary Filter Type screen shown below and move the cursor down the lower line of the display. Change the filter type while playing the keyboard.

```
FILTER TYPE pri
2nd Ord Hipass
```

These filters are extremely powerful and have been carefully crafted to offer maximum flexibility and musical control. You may want to change the **Envelope Amount**, **Q** and/or the **Filter Cutoff** to get the right sound for each filter and instrument. These three controls, coupled with the Aux. Envelope, are perhaps the most important controls on Orbit. Take the time to learn how they interact with each other and you will be able to create just about any type of sound you can imagine.

• *Troubleshooting*

A common source of confusion when working with the filter envelope is that the Attack or Release parameter might not seem to be working correctly. Referring to the diagram below which shows the Orbit signal flow, you will notice that the DCA comes ***after*** the Filter. The DCA controls the final volume of the sound, so if the filter's release is longer than the release for the DCA, you won't hear it, because the DCA has already shut off the sound.



This is just an example of why troubleshooting is important. If you are not getting the expected result, try to analyze the situation. There will be many times when you will have to stop for a minute and think, "What am I trying to do and why isn't it working?" When this happens *(and it will),* don't panic. Troubleshooting is a normal part of the synthesis process. Simply examine the various parameters and try to be as analytical as possible as you solve the problem. Usually the solution will be simple. (The filter is already wide open and can't open any more.) Learning to play an instrument takes… Practice.

You're probably getting the general idea by now. Remember not to change presets or the preset will return to normal. If you want to save your creation, select the last screen in the Edit menu and select a destination preset location for your masterpiece, then press Enter.

Practice Modulating

- Try modulating the pitch with the Aux. Envelope generator
- Use velocity to modulate the Aux Envelope Amount or the filter Fc. (Key/Vel. screen). This will brighten the sound as you play harder.
- Program the LFO to modulate filter Fc and volume (Realtime modulation screen).
- Modulate the LFO with the other LFO, with velocity, and with the modulation wheel.
- Think of ten different modulation routings, then try them out. The key to learning about Orbit is to experiment.

••• *Presets can be stored in any of the non-volatile RAM locations (0-255).*

USING ORBIT WITH A SEQUENCER

We thought you'd never ask. Orbit was designed from its conception with multi-timbral sequencing in mind. Just take a look at the main screen.



The preset for each MIDI channel is selected from the main screen. Press the cursor button to move the cursor up so that it is underneath the channel number.



Turn the data entry control and you will see that every MIDI channel has a preset assigned to it. Just select a preset for each of the MIDI channels. It's simple! In order to respond to multiple MIDI channels, Orbit must be in Multi-Mode. Multi-Mode is selected in the Master menu. Press the Master menu button and use the data entry control to scroll through the screens until you find MIDI MODE.



Move the cursor down to the second line and change the mode to **Multi** as shown. Orbit will now respond to multiple MIDI channels.

MORE ADVANCED SEQUENCING

• *Pre-Sequence Setup*

Suppose that you want to have your sequencer set up everything for you before the start of the song. Good idea. This will make the Orbit setup procedure automatic and prevent the wrong presets from playing.

The basic idea of a pre-sequence setup is to send out MIDI information just before the start of the song. This MIDI information will select all the proper presets, adjust the mix, and pan positions of each preset.

Note: Orbit setup information should be transmitted from the sequencer *before* the song actually starts, perhaps during a lead-in measure or countdown. DO NOT send setup information just before the first beat of the song or MIDI timing errors could result.

• *Initial Setup*

In the Master menu:

1) Turn ON Multi-Mode
2) Turn ON Preset Change enable for each channel.
3) Turn OFF MIDI Enable on MIDI channels that are to be used for other synthesizers.

••• *The Preset, Volume and Pan information for all 16 channels is included when the Master Settings are transmitted or received over MIDI.*

• *Preset, Volume & Pan Setup*

Program your MIDI sequencer to transmit the following information before the song starts.

1) Select the proper presets for each MIDI channel used on Orbit.
2) Send MIDI volume information (controller #7) for each MIDI channel used on Orbit.
3) Send MIDI pan information (controller #10) for each MIDI channel used on Orbit.

Now your song will play perfectly every time using the proper presets, volumes and pan positions. In addition, presets, volumes and pan positions (or anything else for that matter) can be adjusted in realtime during the song. Note: If the wrong presets are being selected, check the MIDI Program -> Preset map.

To carry the pre-sequence setup even further, you can even include preset data for each preset used in the sequence. See page 26 for details.

• *Using the 32 Channels*

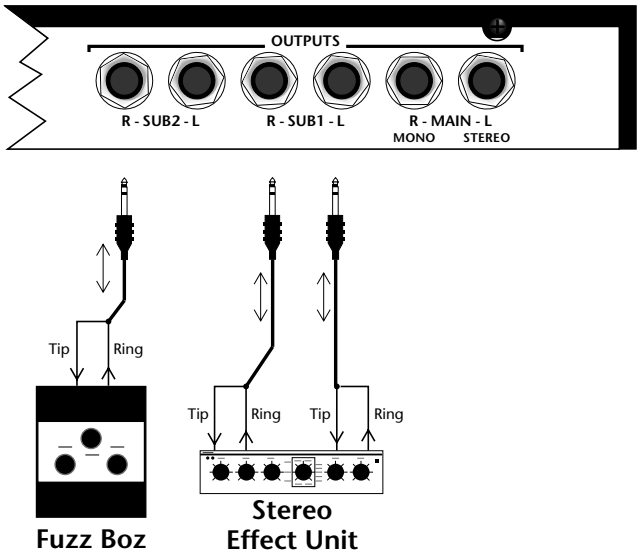
As stated earlier, Orbit has 32 independent audio channels which are utilized dynamically. With 32 channels and 512 presets, you have a universe of sonic textures at your disposal. You may have noticed that some of the very big sounding presets in Orbit are *linked* with other presets or they have *chorus* applied to them. While this is fine when the preset is played solo, you may begin to run out of channels when Orbit is played multi-timbrally. Linking and chorusing cause twice as many channels to be used by the preset. Learn to “budget” your output channels for maximum efficiency.

• *Channel Ripoff*

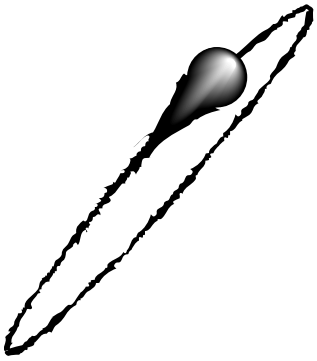
When Orbit uses up all its 32 channels and needs more, it steals a channel from the key that has been in the release phase longest. This is commonly known as “channel rip-off”. You will most commonly encounter this “rip-off” when using Orbit in multi-timbral mode or when using massive preset links. Since Orbit dynamically allocates channels as needed, to eliminate rip-off you must either, play fewer notes, use simpler sounds, turn off doubling (pri/sec, chorus, or linked presets), or use MIDI overflow to another Orbit unit.

• *Using External Processing*

Don't be afraid to use external processing on specific sounds if you feel the urge. The submix sends and returns on Orbit are there for a reason. In many instances a bit of reverb or EQ will be just the thing an instrument needs to give it a distinct identity. Incidentally, an external fuzz box can work wonders on otherwise harmless sounds. By dedicating one of your old fuzz boxes to a submix out/in, you can have programmable distortion for use on basses, organs or whatever.



Using the programmable outputs and returns, specific presets can be routed through your favorite effects without using up precious mixer channels.



REFERENCE SECTION

Orbit
Presets
0-255 **RAM**
256-511 **ROM**

••• Preset Categories:
bas: *.. Bass*
syn: *.. Synthesizer*
pad: *. Thick sustained sound*
org: *.. Organ*
led: *.. Lead instrument*
hit: *... Orchestra hit*
vox: *.. Human voice*
sfx: *... Sound effect*
scr: *... Record scratch*
drm: *. Drum*
bts: *.. Used in beats preset*
seq: *.. Used in demo sequence*
lnk: *.. Preset link*

0. *bas:Membrace*
1. *syn:Raunch*
2. *pad:AmbiWind*
3. *org:OrgyOrg*
4. *led:SqurAnim*
5. *hit:Da Hits*
6. *vox:Jaxvox*
7. *sfx:LFOrbit*
8. *scr:SkrachIt*
9. *drm:YinYank*
10. *bas:Rounder*
11. *bas:Chirp*
12. *bas:Phazy*
13. *bas:MuthaFun*
14. *bas:Subking*
15. *bas:Juno 1*
16. *bas:Juno 2*
17. *bas:Sawzy*
18. *bas:TeeBee 1*
19. *bas:TeeBee 2*
20. *bas:Orbiting*
21. *bas:CZish*
22. *bas:Squinky*
23. *bas:Bottomer*
24. *bas:Housed*
25. *bas:Add Dist*
26. *bas:Lowdown*
27. *bas:Phlappy*
28. *bas:Quaked*
29. *bas:Funk Up*
30. *bas:Upwrong*
31. *bas:DB9 And*
32. *bas:SuperSub*
33. *bas:Thick Q*
34. *bas:Punch*
35. *bas:Dualrezz*
36. *syn:303 Love*
37. *syn:Modestal*
38. *syn:Wheely 1*
39. *syn:Wheely 2*
40. *Syn:Wheely 3*
41. *Syn:Wheely 4*
42. *syn:Wheely 5*
43. *syn:CZisms*
44. *syn:5 Oclock*
45. *syn:Air Head*
46. *syn:Dig-it-o*
47. *syn:Q-Rex*
48. *brs:SynBrass*
49. *brs:BrssSwll*
50. *syn:Whiziwig*
51. *syn:1KeyRush*
52. *syn:1KeyStak*
53. *syn:StarCykl*
54. *syn:1KeyBobi*
55. *syn:Lo NaNa*
56. *syn:Hard*
57. *syn:Numb*
58. *syn:D-struct*
59. *syn:Technal1*
60. *syn:Technal2*
61. *syn:Technal3*
62. *syn:Technal4*
63. *syn:Technal5*
64. *syn:Technal6*
65. *syn:Technal7*
66. *syn:Technal8*
67. *syn:Technal9*
68. *syn:Technl10*
69. *syn:Droopers*
70. *syn:Galladme*
71. *syn:Grungorg*
72. *syn:Vowler*
73. *syn:Lowdown*
74. *syn:Nostril*
75. *syn:Alienar*
76. *syn:SkitchMe*
77. *syn:Toxen*
78. *syn:Excapes*
79. *syn:Motion*
80. *syn:Meltdown*
81. *syn:Pizzaz*
82. *syn:Algy*
83. *syn:Lazerine*
84. *syn:Tracklin*
85. *syn:Bewitchd*
86. *syn:PianoSax*
87. *syn:Bigpoly*
88. *syn:Syntuari*
89. *syn:LogBlock*
90. *syn:OB,Oh My*
91. *syn:SweptSaw*
92. *syn:OB Padd*
93. *syn:SquareHi*
94. *syn:JunPhase*
95. *syn:Cyberan*
96. *syn:BatPhaze*
97. *syn:Whoolva*
98. *syn:PowerJP6*
99. *syn:WizBrass*
100. *syn:Reckers*
101. *syn:Blip*
102. *syn:Arpleed*
103. *syn:CZsyncer*
104. *pad:Falling*
105. *pad:Swirls*
106. *pad:JP Pad*
107. *pad:Padjump*
108. *pad:Chordal*
109. *pad:Qxtenu*
110. *pad:Zayer*
111. *pad:Histeria*
112. *pad:Swipe*
113. *pad:Oh Yes*
114. *pad:Ican*
115. *pad:SawEkoes*
116. *pad:Twilight*
117. *pad:Classico*
118. *pad:BetaBlok*
119. *pad:CybaQlok*
120. *pad:Krystals*
121. *pad:WispaSor*
122. *pad:Fizzikal*
123. *pad:Cellular*
124. *pad:CloudsHi*
125. *pad:Globules*
126. *pad:Glimmers*
127. *pad:Squarz*

128. pad:KoolMoov
129. org:Cheezoid
130. org:OtherOrg
131. org:QpidsOrg
133. org:Stroller
134. org:FatPumps
135. org:AirRotor
136. org:Synorgy
137. org:Orby O
138. cmp:Slap Org
139. cmp:DigiLog
140. cmp:At U
141. cmp:P Wave
142. cmp:Klavit
143. cmp:Danscomp
144. led:Asidic
145. led:5th Leed
146. led:OrbiTar
147. led:FazeWarp
148. led:Squeege
149. led:Ekophase
150. led:Hiweed
151. led:M12Lead
152. led:Blipee
153. led:SynkOsci
154. led:5Brass
155. led:Crunched
156. led:DancTalk
157. led:SquareJn
158. led:Realsyn
159. led:Nervosa
160. led:OBe Lead
161. led:Saxxen
162. led:Jawzer
163. led:Syntuar
164. led:Avalanch
165. led:Dig In
166. led:DistFuel
167. led:Raze
168. led:PulzHard
169. led:SawzHard
170. hit:BadBreth
171. hit:AmString
172. hit:Big Hits
173. hit:Crashed
174. hit:Suspense
175. hit:VoxFinal
176. hit:StringIt
177. hit:HornyHit
178. hit:Honk
179. hit:Carhorn
180. hit:HomeVox
181. hit:DanceHit
182. hit:Cluster
183. hit:Airz Eez
184. hit:WiggleIt
185. hit:RazzyHit
186. hit:BlipWhip
187. hit:Thataboy
188. hit:Pan'dVox
189. hit:FrettedQ
190. hit:X Hit
191. hit:PJChaos
192. hit:String
193. hit:Techyes
194. hit:Volt
195. hit:Wazzer
196. hit:Mell
197. hit:Smoky
198. hit:Zapt
199. hit:StatU
200. hit:Parade
201. hit:WoodShed
202. hit:Krytal
203. vox:StarFall
204. vox:Dweller
205. vox:Alanis
206. vox:Voxerize
207. vox:MoonKiss
208. vox:BreathIt
209. vox:Chiffons
210. vox:Hissvox
211. vox:Gotham
212. vox:Wahvox
213. sfx:ChaosHit
214. sfx:ScrapHit
215. sfx:Orbifone
216. sfx:Rainman
217. sfx:Quixotic
218. sfx:Zipup
219. sfx:Vinylist
220. sfx:FeelnDwn
221. sfx:Iklesal
222. sfx:Metadump
223. sfx:Qwhipper
224. drm:Split 1
225. drm:Split 2
226. drm:Split 3
227. drm:Randhous
228. drm:LayaBeat
229. drm:LayaHipz
230. drm:Skratcha
231. drm:ToneItUp
232. drm:WeirdKit
233. drm:Itchinz
234. drm:F Drum
235. drm:NoyzSlap
236. drm:Clavfone
237. drm:Electro
238. drm:Javava
239. drm:SnareGun
240. drm:WhlRollz
241. drm:CongaGun
242. drm:CongaWhl
243. drm:Rollz
244. drm:SpltRoll
245. drm:Raw Tomz
246. drm:Raw Timz
247. drm:RawCongz
248. drm:Raw Hatz
249. drm:Raw Cymz
250. drm:RawClapz
251. drm:RawRacaz
252. drm:Raw Kick
253. drm:RawSnare
254. drm:Raw Tom
255. drm:RawSplit0

Orbit
Presets
0-255 **RAM**
256-511 **ROM**

••• Preset Categories:
bas: *.. Bass*
syn: *.. Synthesizer*
pad: *. Thick sustained sound*
org: *.. Organ*
led: *.. Lead instrument*
hit: *... Orchestra hit*
vox: *.. Human voice*
sfx: *... Sound effect*
scr: *... Record scratch*
drm: *. Drum*
bts: *.. Used in beats preset*
seq: *.. Used in demo sequence*
lnk: *.. Preset link*

256. *bas:Membrace*
257. *syn:Raunch*
258. *pad:AmbiWind*
259. *org:OrgyOrg*
260. *led:SqurAnim*
261. *hit:Da Hits*
262. *vox:Jaxvox*
263. *sfx:LFOrbit*
264. *scr:SkrachIt*
265. *drm:YinYank*
266. *bas:Sweepy*
267. *bas:Peaker*
268. *bas:Wheely*
269. *bas:Rahleese*
270. *bas:2600Down*
271. *bas:Detuner*
272. *bas:Q Bass*
273. *bas:Hybrid*
274. *bas:PPG*
275. *bas:Wetnick*
276. *bas:Closer*
277. *bas:Buttnick*
278. *bas:Organic*
279. *bas:Funkt Up*
280. *bas:SpaceOut*
281. *bas:Spikehed*
282. *bas:Grunger*
283. *bas:DB Wow*
284. *bas:Place*
285. *bas:Gruz*
286. *bas:Krypton*
287. *bas:Attacker*
288. *bas:Shandar*
289. *bas:Subelube*
290. *bas:Tapistry*
291. *bas:Sighn*
292. *bas:Piggy*
293. *bas:Tap*
294. *bas:Fazinate*
295. *bas:Hurt*
296. *bas:FM Bass*
297. *bas:Oddman*
298. *bas:Stonker*
299. *bas:KinElSqr*
300. *bas:FinkSink*
301. *bas:Spank Me*
302. *bas:CeeZeeIt*
303. *bas:SpiceGut*
304. *syn:Zoomwave*
305. *syn:Synthi 1*
306. *syn:Synthi 2*
307. *syn:Synthi 3*
308. *syn:Synthi 4*
309. *syn:Synthi 5*
310. *syn:Synthi 6*
311. *syn:Synthi 7*
312. *syn:Synthi 8*
313. *syn:Synthi 9*
314. *syn:SnSplt 1*
315 *syn:SnSplt 2*
316. *syn:SnSplt 3*
317. *syn:SnSplt 4*
318. *syn:SnSplt 5*
319. *syn:SnSplt 6*
320. *syn:Cheziano*
321. *syn:Starlett*
322. *syn:Catapila*
323. *syn:Rezeler*
324. *syn:Clusterd*
325. *syn:Orgawine*
326. *syn:Gringe*
327. *syn:Classic*
328. *syn:SevenSaw*
329. *syn:Raunch 1*
330. *syn:Raunch 2*
331. *syn:Raunch 3*
332. *syn:Raunch 4*
333. *syn:Raunch 5*
334. *syn:Raunch 6*
335. *syn:Raunch 7*
336. *syn:Raunch 8*
337. *syn:Raunch 9*
338. *syn:Seq Me*
339. *syn:Grunted*
340. *syn:NoizeWhl*
341. *syn:Echos*
342. *syn:Voxsweep*
343. *syn:Rasty*
344. *syn:RezFeast*
345. *syn:Squelchy*
346. *syn:Sintexx*
347. *syn:Bladez*
348. *syn:Alien*
349 *syn:Danzo*
350. *syn:Flarts*
351. *syn:SH Flnge*
352. *syn:Core*
353. *syn:SOS*
354. *syn:Omega*
355. *syn:Sawdust*
356. *syn:SkrcthMC*
357. *syn:JunkyFnk*
358 *syn:Monster*
359. *syn:Hot Top*
360. *syn:Plosion*
361. *syn:Zingez*
362. *syn:WealBlip*
363. *syn:Formants*
364. *syn:Drange*
365. *syn:Cheapnes*
366. *syn:Syn Sect*
367. *syn:Syn Nock*
368. *syn:Metalman*
369. *syn:Reztick*
370. *syn:Hot Wind*
371. *syn:DepechIt*
372. *syn:Synclav*
373. *cmp:PnoSynth*
374. *cmp:RubberJ*
375. *cmp:Dive*
376. *cmp:CWestern*
377. *cmp:Poly O*
378. *cmp:DigiPno*
379. *pad:Brand Y*
380. *pad:JustSqr*
381. *pad:Buzzie*
382. *pad:Co Ordal*
383. *pad:Icykalls*
384. *pad:PulsTrip*

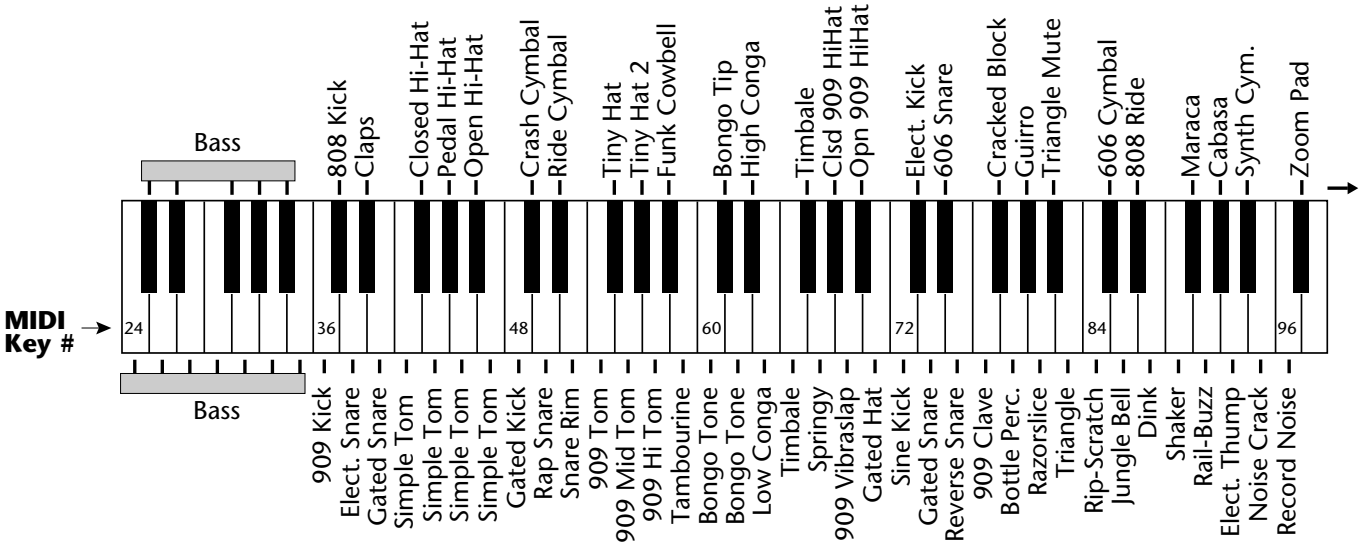
385. *pad:ChillROM*
386. *pad:SplitZip*
387. *pad:Melting*
388. *pad:MetaMelt*
389. *pad:TrueBlue*
390. *pad:Orged*
391. *led:HevyHiss*
392. *led:MonoDMDM*
393. *led:Buzztard*
394. *led:Higher*
395. *led:Arplead*
396. *led:Rad Life*
397. *hit:Liquid*
398. *hit:Kit Hitz*
399. *hit:Minoring*
400. *hit:NiceShot*
401. *hit:Not Five*
402. *hit:Morn*
403. *hit:Stabber*
404. *hit:Rip Hit*
405. *vox:EerieVox*
406. *vox:AirKolum*
407. *vox:RoboLung*
408. *vox:HissHalo*
409. *sfx:FazdVynl*
410. *sfx:Squeel*
411. *sfx:Visualiz*
412. *sfx:Get Off*
413. *sfx:NarowdIn*
414. *sfx:MindWarp*
415. *sfx:Klingons*
416. *sfx:KrazyGog*
417. *sfx:LFOut*
418. *sfx:PhatCrwd*
419. *sfx:Groovlng*
420. *sfx:Strobe*
421. *sfx:Ah Ow*
422. *sfx:Winder*
423. *drm:Wetdrums*
424. *cmb:Split It*
425. *drm:Glider*
426. *cmb:Logger*
427. *drm:Metaling*
428. *drm:PrahsPrk*
429. *bts:Redux*
430. *bts:Mod Bak*
431. *bts:Lost*
432. *bts:Missing*
433. *bts:Bizarre*
434. *bts:Fazer*
435. *bts:PhazeOut*
436. *bts:Massive*
437. *bts:Wicked*
438. *bts:Drmz&Bss*
439. *bts:Hyper*
440. *bts:Danzin*
441. *bts:Clubbin*
442. *bts:Deep*
443. *bts:Deeper*
444. *bts:Jungle*
445. *bts:Hardkore*
446. *bts:Break*
447. *bts:House*
448. *bts:E Beat*
449. *bts:RecrdHop*
450. *bts:NRG*
451. *bts:More*
452. *bts:Working*
453. *bts:Phat*
454. *bts:Industry*
455. *bts:DblFuzz*
456. *lnk:Deep1b*
457. *lnk:Deep2*
458. *lnk:Echos*
459. *lnk:Rad Life*
460. *lnk:Visualiz*
461. *seq:Klavit*
462. *seq:Kicker*
463. *seq:GruzTek*
464. *seq:CMIstepx*
465. *seq:Rezswime*
466. *seq:Voxall*
467. *seq:GruzBlip*
468. *seq:BackForm*
469. *seq:Roamans*
470. *seq:WindSong*
471. *seq:Sweltert*
472. *seq:Synthi*
473. *seq:NuttrVox*
474. *seq:DncSyn1*
475. *seq:DncSyn2*
476. *seq:Deepest*
477. *seq:Hipity*
478. *seq:Sub Bass*
479. *seq:Perkoid*
480. *seq:Simpler*
481. *seq:DncSyn3*
482. *seq:DncSyn4*
483. *seq:RiffTrip*
484. *seq:Hardkore*
485. *seq:House*
486. *seq:GoldnPad*
487. *seq:Bassssin*
488. *seq:Q-Rex*
489. *seq:Pharfees*
490. *seq:Clave*
491. *seq:DanceTrx*
492. *seq:Realize*
493. *seq:DanceHit*
494. *seq:Vokalia*
495. *seq:Raga Dub*
496. *seq:Org Day*
497. *seq:Alienorg*
498. *seq:Key FX*
499. *seq:Kicks*
500. *seq:Snares*
501. *seq:Syn Splt*
502. *seq:Arp*
503. *seq:303*
504. *seq:Wacked*
505. *seq:Dream*
506. *seq:Subbed*
507. *seq:Xelite*
508. *seq:SplitSyn*
509. *seq:Tomohiro*
510. *seq:DancPlan*
511. *-default-*

001. Super Sub
002. Below Sub
003. Bass Hum
004. BassLowness
005. Bass Sonics
006. Bassss ic
007. Sub Bass 1
008. Sub Bass 2
009. Sub Bass 3
010. Juno Sub
011. Sub Bass 4
012. Sub Bass 5
013. LoSnthBass1
014. LoSnthBass2
015. Moog Tri
016. Analow Bass
017. Bass End
018. SynthBass 3
019. SynthBass 4
020. SynthBass 5
021. SynthBass 6
022. Q Bass
023. PPG Bass
024. SynthBass 7
025. SynthBass 8
026. SynthBass 9
027. SynthBass10
028. SynthBass11
029. SynthBass12
030. SynthBass13
031. SynthBass14
032. SynthBass15
033. SynthBass16
034. TB303 1
035. TB303 2
036. TB303 3
037. TB303 4
038. Bass 2600
039. CZ101 Bass
040. DX Bass 1
041. DX Bass 2
042. DX Bass 3
043. JP4 Bass
044. Moog Bass
045. DB9 Bass 1
046. DB9 Bass 2
047. Analog Bass
048. Organ Bass
049. Tap Bass
050. Bass 1
051. Bass 2
052. Fat Sunbass
053. Bass 3
054. UprightBass
055. Perco
056. Bass 4
057. MemMoogBass
058. Bass Hit 1
059. Bass Hit 2
060. Syn Tone 1
061. Syn Tone 2
062. SynthBass17
063. SynthBass18
064. Micro Moog
065. Funk Bass
066. CZ101 Digi
067. Farfisa
068. Farfisa Low
069. Vox Org Low
070. CZSynstring
071. SynthCheeze
072. SynthCheezH
073. LeadSynth 2
074. Syn Tone 3
075. Uroborus
076. Hollow Deep
077. Pure H20
078. Echo Synth
079. SynthLead 1
080. SynthLead 2
081. SynthLead 3
082. SynthLd3Wkd
083. AnotherLead
084. Dance Blip
085. Rast
086. Sax Wave
087. P5 Brass
088. M12 Lead
089. Arp 1
090. Arp 2
091. Synth Gtr 1
092. Synth Gtr 2
093. Synth Gtr 3
094. Whine
095. DanceSynth1
096. DanceSynth2
097. Sine Wave
098. CZ Saw
099. SawnicTooth

100. Juno Saw
101. OBX Saws
102. SquareLead1
103. SquareLead2
104. SqrAttkLead
105. Juno Square
106. Square Chrs
107. CZ square
108. Juno Pulse
109. Sync Wave 1
110. Sync Wave1b
111. Sync Wave 2
112. Sync Wave 3
113. Sync Wave 4
114. Sync Wave 5
115. Spacey Key
116. Log Hit
117. Organ 1
118. Organ 2
119. Bass Organ
120. BreathyOrgn
121. Pipe Organ
122. Organ 3
123. Organ 4
124. Org Day
125. Org Nod
126. Tone Org
127. Org Lite
128. Piano Wave
129. DanceSynth3
130. HiOct Synth
131. JP6 Pad
132. Rezzy Wave
133. Rez Synth
134. Synth Brass
135. Brazz
136. DanceSynth4
137. DanceSynth5
138. Synth Pad
139. Pad Life
140. Pad Classic
141. Dream Pad 1
142. Paddy
143. Dream Pad 2
144. Sound Track
145. Zoom
146. Heavy
147. Keyngdom
148. Dance Chord
149. CW Type
150. Lawn Mower
151. Riff Trip
152. Cyber Pan
153. GrooveThing
154. Sci Fi
155. Synth Siren
156. Metal Noise
157. CMI Breath
158. Breathy
159. Vox Tarzana
160. Vox Gothic
161. Slow Goth
162. Vox Synth 1
163. Vox Synth 2
164. Jax Breath
165. Crowd
166. Crowd NTP
167. Seq Delay
168. CMI Hot Air
169. Dance Hits
170. String Hits
171. Horn Hits
172. StrHitBbmin
173. TechnoHitAm
174. StrHitAmin
175. OrkHitCmin7
176. StringHit D
177. DanceStabC7
178. BrassHitAbM
179. HouseStabBm
180. Classic 7x9
181. BigHitAugb9
182. DanceStabb9
183. ScreamingDM
184. HitMe Csus7
185. ClusterGbm9
186. Honk Hit C
187. PurpleDbm7
188. Laser Hit C
189. OrganHitAm7
190. SyntHitDbM7
191. Warm Hit Em
192. HouseHit Am
193. DanzChrdCm7
194. Dance Hit G
195. Purple Amin
196. CarHorn Hit
197. Disco Horn
198. Quack Ahhh

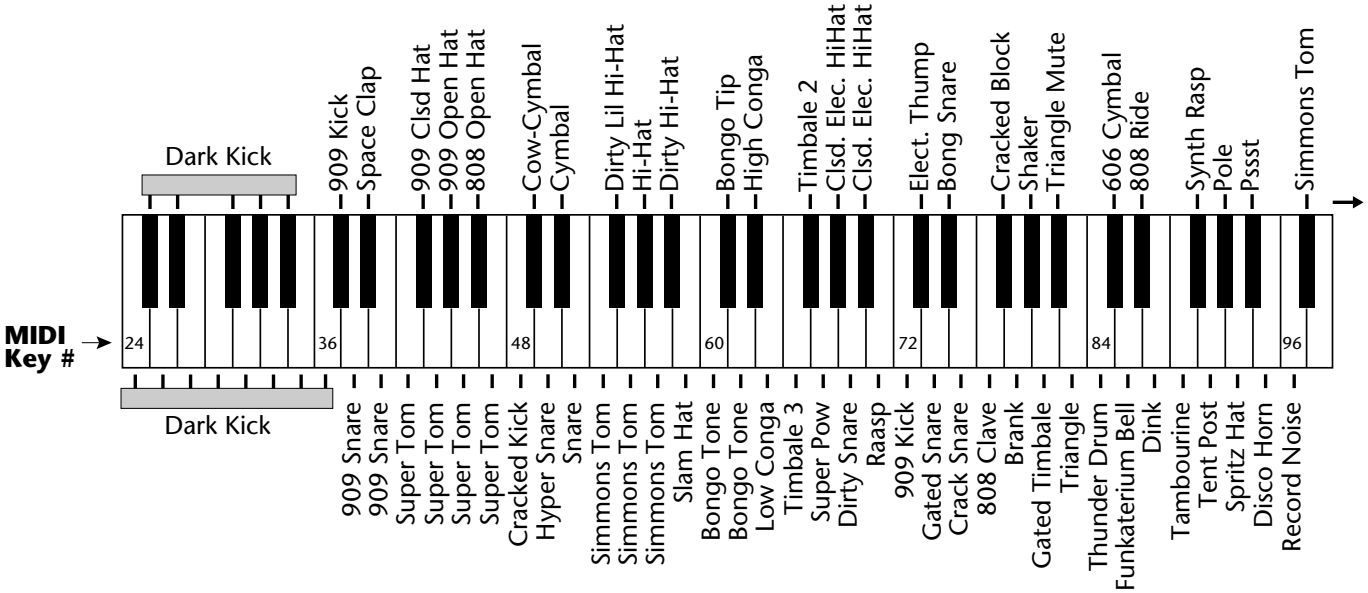
199. BizarreGbm7
200. HowsHornDm7
201. Short Hit C
202. OrgChordDm7
203. OrgStab Dm7
204. OrgClassicD
205. KleanHit Em
206. KlangHit F7
207. Metal Hit
208. Game Hit
209. Buzz Blip
210. Blamp Hit D
211. Short Quack
212. Space Whip
213. SpaceWiggle
214. Sqweel Rev
215. Comon Vox
216. Odd Vox Am
217. Drum Stall
218. Wind Down
219. Wind Down 2
220. Hip Hop Hit
221. Diss Hit
222. Drum Stab
223. Key FX
224. L9000 Noise
225. Pink Noise
226. Pink NTP
227. White Noise
228. White NTP
229. StringsDark
230. Horns Dark
231. Short Hits
232. Short Strgs
233. Short Horns
234. Dark Dance
235. DrkrStrings
236. DrkrHorns
237. DrkShrtHits
238. DrkShrtStgs
239. Scratches
240. Kicks
241. Snares
242. Toms
243. Timbales
244. Congas etc
245. Hats
246. Cymbals etc
247. Claps
248. Tambourine
249. Clave
250. Cowbell
251. Maracas
252. Agogos
253. Vibraslap
254. Guiro
255. Blocks
256. Bells
257. Misc Perc
258. Dance Kit 1
259. Dance Kit 2
260. BeatsGMStnd
261. BeatsFlava
262. BeatsHipHop
263. BeatsHpHp 2
264. BeatsHpHp 3
265. BeatsJungle
266. BeatsJngl 2
267. BeatsJngl 3
268. BeatsHrdcre
269. BeatsHrdcr2
270. BeatsHrdcr3
271. BeatsHouse
272. BeatsHouse2
273. BeatsHouse3
274. More Kits 1
275. More Kits 2
276. More Kits 3
277. More Kits 4
278. BeatsHrdFlr
279. Fun Scratch
280. MC Scratch
281. FastScratch
282. SSSSystem 1
283. SSSSystem 2
284. ScratchHere
285. ScratchOnIt
286. ScratchDiss
287. Bow Wow
288. DivaScratch
289. OrganBlippr
290. ClassicTape
291. ScratchOut!
292. Chiffin
293. Bowser Bark
294. Stalled
295. Punch It
296. Vinyl
297. Vinyl NTP

298. Kick #1
299. Kick #2
300. Kick #3
301. Kick #4
302. Kick #5
303. Kick #6
304. Kick #7
305. Kick #8
306. Kick #9
307. Kick #10
308. Kick #11
309. Kick #12
310. Kick #13
311. Kick #14
312. Kick #15
313. Kick #16
314. Kick #17
315. Kick #18
316. Kick #19
317. Kick #20
318. Kick #21
319. Kick #22
320. Kick #23
321. Kick #24
322. Kick #25
323. Kick #26
324. Kick #27
325. Snare #1
326. Snare #2
327. Snare #3
328. Snare #4
329. Snare #5
330. Snare #6
331. Snare #7
332. Snare #8
333. Snare #9
334. Snare #10
335. Snare #11
336. Snare #12
337. Snare #13
338. Snare #14
339. Snare #15
340. Snare #16
341. Snare #17
342. Snare #18
343. Snare #19
344. Snare #20
345. Snare #21
346. Snare #22
347. Snare #23
348. Snare #24
349. Snare #25
350. Snare #26
351. Snare #27
352. Snare #28
353. Snare #29
354. Snare #30
355. Snare #31
356. Snare #32
357. Snare #33
358. Snare #34
359. Snare #35
360. Snare #36
361. Snare #37
362. Snare #38
363. Snare #39
364. Snare #40
365. Snare #41
366. Snare #42
367. Snare #43
368. Tom #1
369. Tom #2
370. Tom #3
371. Tom #4
372. Tom #5
373. Tom #6
374. Tom #7
375. Tom #8
376. Tom #9
377. Tom #10
378. Tom #11
379. Tom #12
380. Tom #13
381. Tom #14
382. Tom #15
383. Tom #16
384. Tom #17
385. Snare Loops
386. Conga Loops



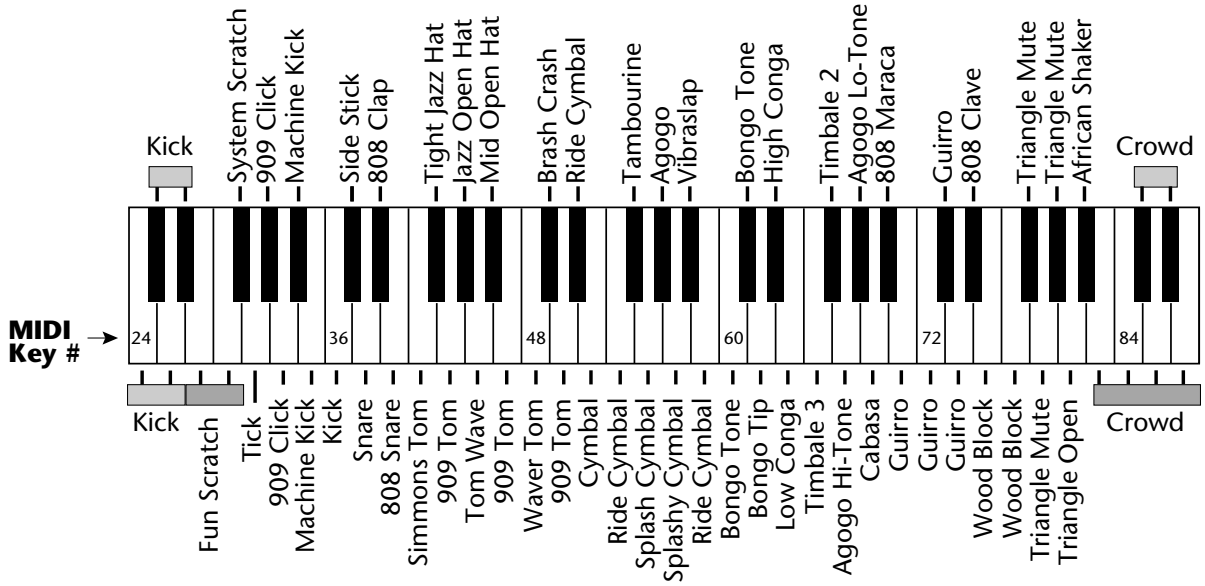
Dance Kit 1

Instrument 256



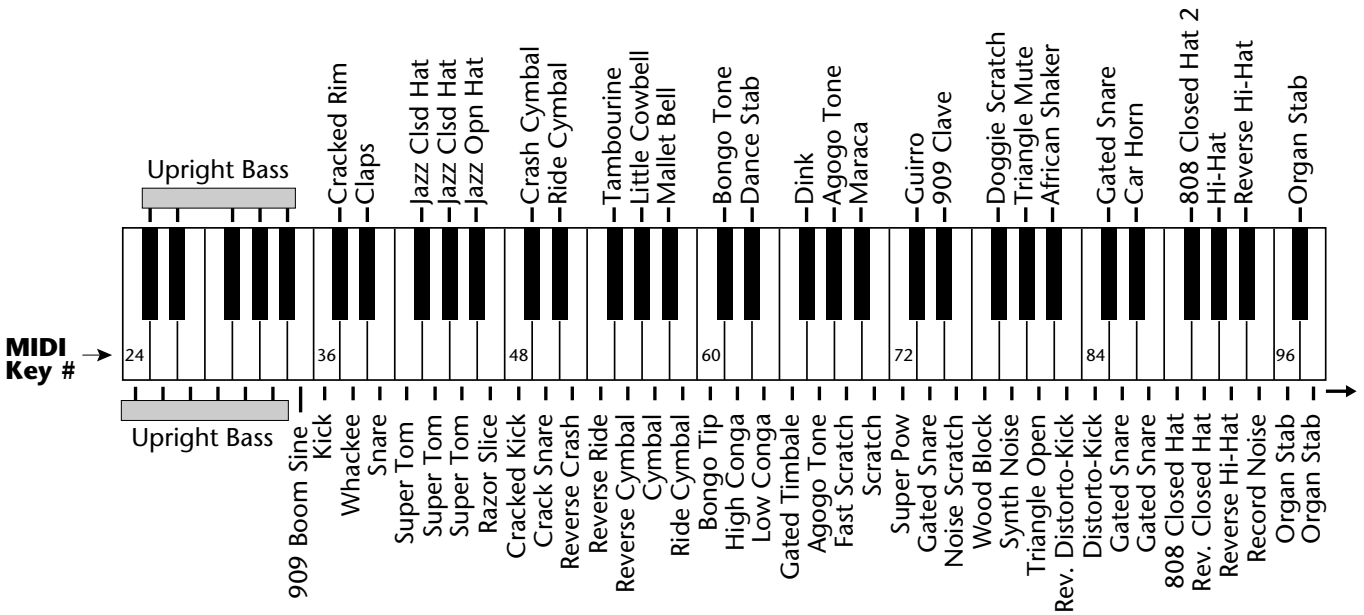
Dance Kit 2

Instrument 257



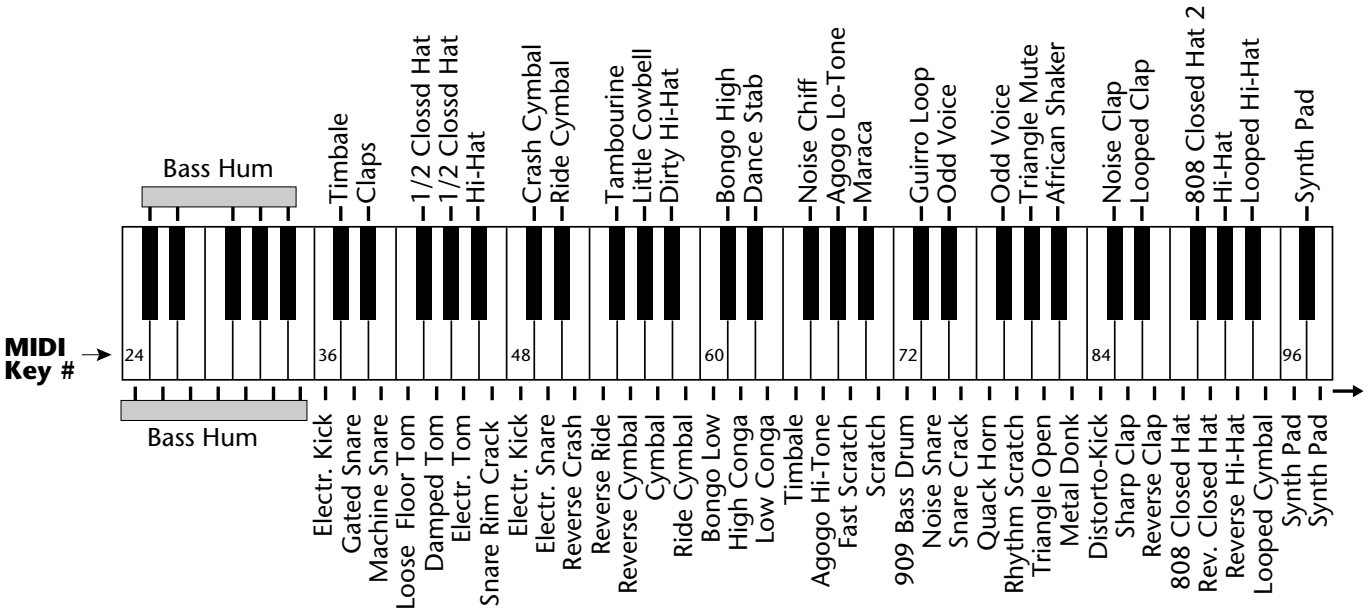
Beats GM Standard

Instrument 258



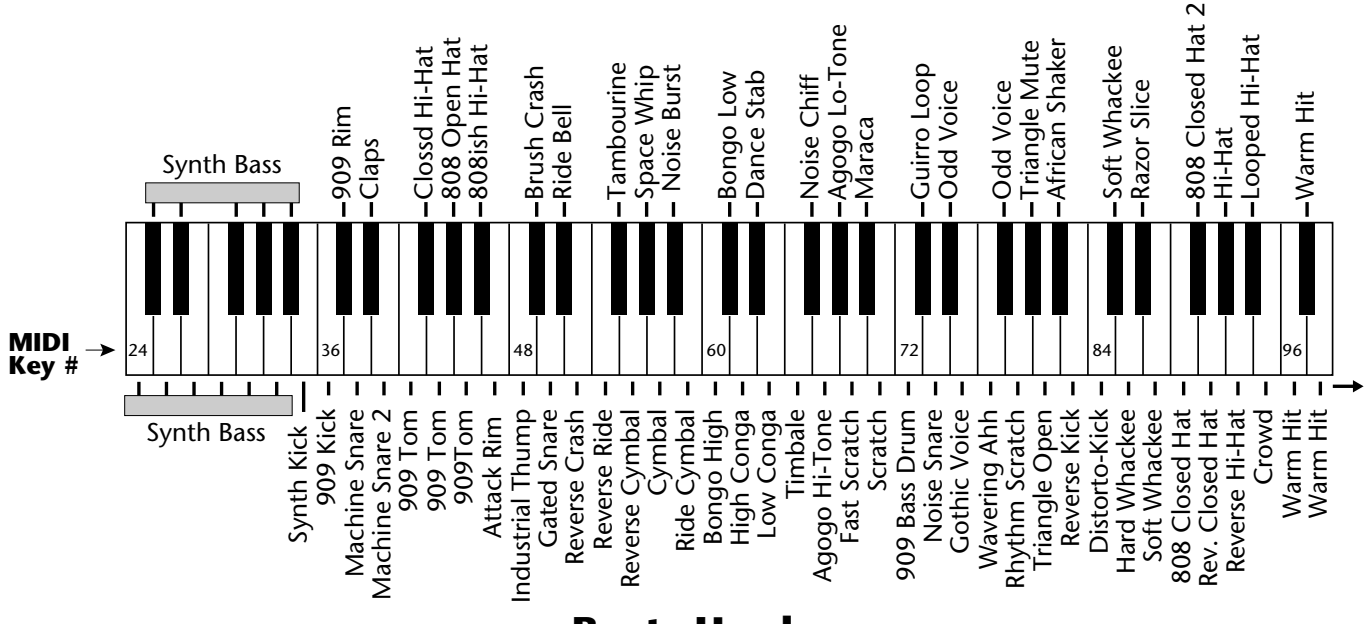
Beats Hip Hop

Instrument 260



Beats Jungle

Instrument 263



Beats Hardcore

Instrument 266

Audio Channels: 32

Audio Outputs: ..... 6 (2 main, 4 submix)

Submix Inputs: 4

Max. Output Level: ..... +4 dB into 600Ω

Output Impedance: 1KΩ

MIDI: ..... In, Out, Thru

Data Encoding: ..... 16 bit Linear

Sample Playback Rate: ..... 39 kHz

Signal to Noise: ..... >90 dB

Dynamic Range: ..... >90 dB

Frequency Response: ..... 20 Hz-15 kHz

THD +N: ..... <.05%

IMD: ..... <.05%

Stereo Phase: ..... Phase Coherent ±1˚ at 1 kHz

Power Requirements: ..... 25 watts

Dimensions: ..... H: 1.75" W: 19" L: 8.5"

Weight: ..... 6 lb, 14 oz (3.1 Kg)

Function…	Transmitted	Recognized	Remarks
Basic Default Channel Changed	No No	1 1-16	Memorized
Mode Default Messages	No	Mode 1, 3, 4 MONO, POLY OMNI, ON/OFF	Memorized
Note Number True Voice	No No	0-127 0-127	
Velocity Note ON Note OFF	No No	Yes v=1-127 No	
After Keys Touch Channels	No No	Yes Yes	
Pitch Bender	No	Yes	
Control Change	No	Yes	0-31 64-79
Bank Select	No	Yes	
Program Change True Number	No No	Yes 0-127 Yes 0-127	
All Sound Off	No	Yes	
All Notes Off	No	Yes	
Reset All Controllers	No	Yes	
System Exclusive	Yes	Yes	
System :Song Pos Common :Song Sel :Tune	No No No	No Yes No	Beats Mode Only
System :Clock Real Time :Commands	No No	Yes Yes	Beats Mode Only
Aux :Local On/Off Messages :Active Sense :Reset	No No No	No No No	

Notes: Pan 0=hard left 127=hard right

Mode 1: OMNI ON, POLY Mode 2: OMNI ON, MONO
Mode 3: OMNI OFF, POLY Mode 4: OMNI OFF, MONO

GENERAL INFORMATION FOR ORBIT SYSEX

• Product ID for Orbit is **0A**.

• Device ID is [00-0F] (0-15 decimal).

• Parameter Number and Parameter Value are 2 bytes each.

• Since MIDI data bytes cannot be greater than [7F] (127 decimal), the data values are “nibble-ized” to a 14-bit signed 2's complement format.

• There is only one edit buffer which is for the current preset (the preset shown in the display). Only one preset at a time can be edited via SysEx commands and changing the current preset erases the edit buffer.

RECEIVED CHANNEL COMMANDS

Channels number (n) = 0-15. Message bytes are represented in hex. All other numbers are decimal. Running Status is supported.

Command	*Message*	*Comments*
Note Off	8n kk vv	release velocity is ignored
Note On †	9n kk vv	velocity 0 = note off
Key Aftertouch	An kk vv	kk = 0-127 vv = 0-127
Program Change	Cn vv	0-127
Channel Aftertouch	Dn vv	0-127
Pitch Bend	En ll mm	l = lsb, m = msb
Realtime Controller	Bn cc vv	cc = 00-31
Footswitch	Bn cc vv	cc = 64-79, vv ≥ 64 = on
Volume	Bn 07 vv	0-127
Pan	Bn 0A vv	0=left, 127=right, 64=center
All Sound Off	Bn 78 00	turns all sound off
Reset All Controllers	Bn 79 00	ignored in omni mode
All Notes Off	Bn 7B 00	ignored in omni mode
Omni Mode Off*	Bn 7C 00	forces all notes & controls off
Omni Mode On*	Bn 7D 00	forces all notes & controls off
Mono Mode On (Poly Off)*	Bn 7E 00	forces all notes & controls off
Poly Mode On (Mono Off)*	Bn 7F 00	forces all notes & controls off

† Note-0n key number 126, Channel 16 = **Song Start** in Beats mode.
Note-0n key number 127, Channel 16 = **Song Stop** in Beats mode.

••• *Velocity must be non-zero for Song Start/Stop*

* Special Notes:

From Omni Mode ... Omni Off turns Poly On.
From Poly Mode ..... Omni On turns Omni On; Mono On turns Mono On.
From Mono Mode ... Mono Off turns Poly On; Omni On turns Omni On.
From Multi Mode ... Omni On turns Omni On; Omni Off or Mono Off turns Poly On; Mono On turns Mono On.

All other changes have no effect.

MIDI SYSEX COMMANDS

For system exclusive commands, the following format is used:

F0	system exclusive status byte
18	E-mu ID byte
0A	product ID byte *(will also respond to ID 04 - Proteus)*
dd	device ID byte
cc	command byte
...	data bytes
F7	EOX

••• *Orbit will receive Proteus presets, but will fill in the extra parameters with default values and set instruments to "None".*

SysEx Editing

••• *Running Status is supported in Orbit.*

Preset and setup parameters may be edited individually using system exclusive commands. The preset being edited is the active preset (the preset on the basic or global channel and the one which is shown in the LCD). The value of a given parameter may be changed by sending a *parameter value* command. The value of a parameter may be read by sending a *parameter value request*, to which the machine will respond by sending back the parameter value.

Two MIDI bytes (lsb, msb) are required for each 14 bit data word. Bits 0-6 are sent first, followed by bits 7-13 in the next MIDI byte. All data words are signed 2's complement values with sign-extension out to the most significant bit (bit 13). This convention applies to all data words, regardless of the parameter's value range.

▼ *There is only one edit buffer which is for the current preset (the preset shown in the display). Only one preset at a time can be edited via SysEx commands and changing the current preset erases the edit buffer.*

Preset data may also be transmitted or received in a single block (one complete preset) using system exclusive commands. A *preset data request* may be issued by a host computer, to which the machine will respond sending the data block for the requested preset. Conversely, the computer may send new preset data which will replace the specified preset currently in the machine. Additionally, a front panel command will transmit one or all user presets for backup onto an external sequencer. These presets may be restored by simply playing back the sequence into the machine.

Warning: When transferring preset banks and tuning table data back and forth from Orbit to a computer, the data should be recorded as you would a regular sequence. Sending the data in one huge chunk will clog the input buffer on Orbit unless a time period of approximately 100 mS is inserted between each preset.

RECEIVED SYSTEM EXCLUSIVE COMMANDS

Command	*Message*	*Comments*
Preset Data Request	F0 18 0A dd **00** ll mm F7	*ll= preset # lsb* *mm = msb* ***see note 6***
Preset Data	F0 18 0A dd **01** ll mm … ... cs F7	*cs=checksum*
Parameter Value Request	F0 18 0A dd **02** pl pm F7	*pl = parameter # lsb pm = msb*
Parameter Value	F0 18 0A dd **03** pl pm vl vm F7	*pl = parameter # lsb pm = msb* *vl = value lsb vm = msb*
Tuning Table Request	F0 18 0A dd **04** F7	***see note 7***
Tuning Table	F0 18 0A dd **05** F7	*262 bytes*
Program Map Request	F0 18 0A dd **06** F7	***see note 8***
Program Map Data	F0 18 0A dd **07** F7	*262 bytes*
Master Setting Request	F0 18 0A dd **08** F7	
Version Request	F0 18 0A dd **0A** F7	***see note 1***
Configuration Request	F0 18 0A dd **0C** F7	***see note 2***
Instrument List Request	F0 18 0A dd **0E** F7	***see note 3***
Preset List Request	F0 18 0A dd **12** F7	***see note 4***
MMA Tuning Dump	F0 **7E** dd **08 01** tt <name (16 ascii)> … F7	***see note 5***

••• *281 bytes per preset (272 data + 9 MIDI header)*

TRANSMITTED SYSTEM EXCLUSIVE COMMANDS

Command	*Message*	*Comments*
Preset Data	F0 18 0A dd **01** ll mm ... ... CS F7	*ll= preset # lsb* *mm = msb* *cs = checksum*
Parameter Value	F0 18 0A dd **03** pl pm vl vm F7	*pl = parameter # lsb pm = msb* *vl = value lsb vm = msb*
Tuning Table	F0 18 0A dd **05** F7	*TT data = 256 bytes*
Program Map Data	F0 18 0A dd **07** F7	***see note 8***
Configuration Message	F0 18 0A dd **0D** pl pm s1 l1 m1 s2 l2 m2 F7	***see note 2***
Instrument List	F0 18 0A dd **0F** (14 bytes per instr.) F7	***see note 3***
Preset List	F0 18 0A dd **13** (13 bytes per preset) F7	***see note 4***

• *Note 1 - Version Request*

This command allows identification of machine type and software revision. Orbit will respond to the request with the version data:
F0 18 0A dd **0B** 02 r1 r2 r3 F7
r1, r2, r3 = software revision # in ascii (decimal point between r1 & r2).

• *Note 2 - Configuration Message*

This MIDI command is used to identify the sound sets in a given Orbit. The configuration request command is: F0 18 0A dd **0C** F7

Orbit will respond to this command with the configuration message:
F0 18 0A dd **0D** pl pm 0B l1 m1 0C l2 m2 F7

where pl and pm are the lsb and msb of the total number of presets, s1 and s2 are the ID numbers of the sound sets contained in this unit, and n1=l1, m1 and n2=l2, m2 represent the lsb and msb of the number of instruments in each sound set. If no expansion set is present, s2 will be 7F and n2 will be zero. **Orbit Sound Set IDs = 11 & 12**

• *Note 3 - Instrument List*

This MIDI command allows external software to upload the instrument list as an array of ASCII strings. The instrument list request command is:

F0 18 0A dd **0E** F7

Orbit will respond to this command with the instrument list message:

F0 18 0A dd **0F** (14 bytes per instrument) F7

The instruments are transmitted in the same order they appear to the user on Orbit. Note that a given instrument's position in this list may be different from its actual number within the sound set.

instrument entry: il im (11 ascii bytes) 00

Each instrument entry in the list consists of the actual instrument number (as defined in "Sound Sets" - note 9) in lsb, msb format, followed by the instrument name (11 ascii characters plus a zero terminator) for a total of 14 (decimal) bytes. The first instrument is #1 as displayed on Orbit. The total number of instrument names is equal to (n1+n2) in the configuration message above.

Note that there are less than 255 instruments in the first sound set, therefore there will be a 'hole' in the instrument numbering.

• *Note 4 - Preset List*

This MIDI command allows external software to upload all preset names as an array of ASCII strings. The preset list request command is:

F0 18 0A dd **12** F7

Orbit will respond to this command with the preset list message:

F0 18 0A dd **13** (13 bytes per preset) F7

Each preset name is 12 ascii characters, plus a zero terminator, for a total of 13 (decimal) bytes. The first preset is #0. The total number of preset names is equal to pp in the configuration message above.

• *Note 5 - Bulk Tuning Dump*

Orbit can receive MIDI Tuning Standard dumps in addition to its own SysEx tuning table dumps. Orbit will *only* transmit in it's own SysEx tuning format. The MIDI Tuning Standard is as follows:

F0 7E **dd** 08 01 **tt** <**tuning name** (16 ascii)> … F7

dd= device ID **tt**= tuning prog # (ignored) **tuning name** = (ignored)

… = data (xx yy zz) *frequency data for one note repeated 128x*

xx yy zz = 0xxxxxxx 0abcdefg 0hijklmn

xxxxxxx = semitone **abcdefghijklmn** = fraction of semitone in .0061 cent units. **Examples:** Middle C = 3C 00 00 A-440 = 45 00 00

• *Note 6 - Preset Data Request*

Orbit presets are organized into banks. Each bank consists of 64 presets. Orbit has eight banks of presets (0-511). Banks may be requested using the preset request command and the appropriate preset code listed below.

Bank	*Preset Range*	*Preset Code*	*MIDI Message*
0	0-63	1024	F0 18 0A dd 00 **00 08** F7
1	64-127	1025	F0 18 0A dd 00 **01 08** F7
2	128-191	1026	F0 18 0A dd 00 **02 08** F7
3	192-255	1027	F0 18 0A dd 00 **03 08** F7
4	256-319	1028	F0 18 0A dd 00 **04 08** F7
5	320-383	1029	F0 18 0A dd 00 **05 08** F7
6	384-447	1030	F0 18 0A dd 00 **06 08** F7
7	448-511	1031	F0 18 0A dd 00 **07 08** F7
1	64-127	-1	F0 18 0A dd 00 **7F 7F** F7
0	0-63	-2	F0 18 0A dd 00 **7E 7F** F7
0-3	0-255	-3	F0 18 0A dd 00 **7D 7F** F7
4-7	256-511	-4	F0 18 0A dd 00 **7C 7F** F7

• *Note 7 - Alternate Tuning*

The "user tuning table" allows any key to be tuned to an arbitrary pitch over an 8 octave range. If selected in the preset, an alternate tuning may be achieved by modifying the tuning values from the front panel or downloading a new table into the machine. The table consists of 128 words, corresponding to the MIDI key range, kept in non-volatile memory. Each word is a pitch value expressed in 1/64 semitones, offset from key number 0 (c-2). Therefore, for equal temperament, each entry in the table would be equal to its key number times 64.

• *Note 8 - Program Mapping*

MIDI program changes will normally correspond to internal preset numbers 0-127. However, the user may "re-map" any MIDI program number, assigning it to an arbitrary internal preset. This feature allows any of the internal presets to be selected from a MIDI keyboard controller.

See Program ➔ Preset on page 21.

PRESET DATA FORMAT

Preset data is transmitted and received using the following format: The standard system exclusive header is followed by the preset number (lsb, msb), a 14 bit word for each preset parameter value (lsb, msb) starting at parameter #0 and continuing upward, a one-byte checksum, and the end-of-exclusive byte (F7). The checksum is the modulo 128 sum of all the parameter value bytes; that is, all of the data bytes following the preset number and before the checksum.

PRESET PARAMETERS

Parameter No.	*Parameter Name*	*Range*	
0-11	preset name (12 ascii characters)	32-127	
12-14	preset link 1-3	0-511	*A value of -1 = "Off"*
15-18	preset, link 1-3 low key	0-127	
19-22	preset, link 1-3 high key	0-127	
23	pri instrument	- - -	***See Note 9***
24	pri sound start offset	0-127	
25	pri tuning (coarse)	-36 to +36	
26	pri tuning (fine)	-64 to +64	
27	pri volume	0-127	
28	pri pan	-7 to +7	
29	pri delay	0-127	

	Parameter No.	Parameter Name	Range
	30	pri low key	0-127
	31	pri high key	0-127
	32	pri alt. volume attack	0-99
	33	pri alt. volume hold	0-99
	34	pri alt. volume decay	0-99
	35	pri alt. volume sustain	0-99
	36	pri alt. volume release	0-99
	37	pri alt. volume envelope on	0-1
	38	pri solo mode	0-2
	39	pri chorus	0-15
	40	pri reverse sound	0-1
See Note 9	41	sec instrument	- - -
	42	sec sound start offset	0-127
	43	sec tuning (coarse)	-36 to +36
	44	sec tuning (fine)	-64 to +64
	45	sec volume	0-127
	46	sec pan	-7 to +7
	47	sec delay	0-127
	48	sec low key	0-127
	49	sec high key	0-127
	50	sec alt. volume attack	0-99
	51	sec alt. volume hold	0-99
	52	sec alt. volume decay	0-99
	53	sec alt. volume sustain	0-99
	54	sec alt. volume release	0-99
	55	sec alt. volume envelope on	0-1
	56	sec solo mode	0-2
	57	sec chorus	0-15
	58	sec reverse sound	0-1
	59	crossfade mode	0-2
	60	crossfade direction	0-1
	61	crossfade balance	0-127
	62	crossfade amount	0-255

Parameter No.	*Parameter Name*	*Range*	
63	switch point	0-127	
64	LFO 1 shape	0-8	
65	LFO 1 rate	0-127	
66	LFO 1 delay	0-127	
67	LFO 1 variation	0-127	
68	LFO 1 amount	-128 to +127	
69	LFO 2 shape	0-8	
70	LFO 2 rate	0-127	
71	LFO 2 delay	0-127	
72	LFO 2 variation	0-127	
73	LFO 2 amount	-128 to +127	
74	aux. envelope delay	0-127	
75	aux. envelope attack	0-99	
76	aux. envelope hold	0-99	
77	aux. envelope decay	0-99	
78	aux. envelope sustain	0-99	
79	aux. envelope release	0-99	
80	aux. envelope amount	-128 to +127	
81-86	key/vel source 1-6	0-1	***See Note 10***
87-92	key/vel dest 1-6	0-42	
93-98	key/vel amount 1-6	-128 to +127	
99-106	realtime source 1-8	0-9	***See Note 10***
107-114	realtime dest 1-8	*See list*	
115-117	footswitch dest 1-3	0-10	
118-121	controller amount A-D	-128 to +127	
122	pressure amount	-128 to +127	
123	pitch bend range	0-13	*A value of 13 = "Global"*
124	velocity curve	0-5	*A value of 5 = "Global"*
125	keyboard center	0-127	
126	submix	0-2	
127	keyboard tuning	0-5	
128	pri portamento rate	0-127	
129	sec portamento rate	0-127	

Parameter No.	Parameter Name	Range
130	pri filter type	0-17
131	pri filter Fc	0-255
132	pri filter Q	0-15
133	sec filter type	0-17
134	sec filter Fc	0-255
135	sec filter Q	0-15

GLOBAL/SETUP PARAMETERS

Parameter No.	Parameter Name	Range
256	MIDI basic channel	0-15
257	MIDI volume *(basic channel)*	0-127
258	MIDI pan *(basic channel)*	-8 to +7
259	current preset *(basic channel)*	0-511
260	master tune	-64 to +64
261	transpose	-12 to +12
262	global pitch bend range	0-12
263	global velocity curve	0-4
264	MIDI mode	0-3
265	MIDI overflow	0-1
266-269	controller A-D numbers	0-31
270-272	footswitch 1-3 numbers	64-79
273	mode change enable	0-1
274	device ID number	0-15
336	Global Tempo	0, 5-240
337	Song start/stop enable	0-1
338	Song number	0-Max
339	Song transpose	±36
340	Song mode	0-2
367-383	MIDI channel bank	0-3
384-399	MIDI channel enable	0-1
400-415	MIDI program change enable	0-1
416-431	mix out	0-3
512-639	MIDI program/preset map	0-511

A value of -8 = "P"

Entire message to set pan to P:

F0 18 0A dd 03 02 02 78 7F F7

A value of 0 = External Clock

Per MIDI Channel

• *Note 9 - Sound Sets*

A Orbit sound set consists of sample data (sound ROMs), plus additional instrument data in the program ROMs. Each sound set has a unique ID number. The sound sets for Orbit are #11 & #12.

It is necessary to include the sound set number as part of the instrument number when exchanging data. The complete instrument number contains two fields: bits 8-12 specify the sound set (0-31) and bits 0-7 specify the instrument within the sound set (0-255).

Instrument Bit Fields:

12 8 7 0

<— sound set —> <——— instrument # ———>

(5 bits) (8 bits)

Within any given sound set, the first instrument is #1 and #0 selects "None".

The "magic numbers" **2816 & 3072** represents the start number for the two banks of Orbit instruments. To calculate the complete instrument number follow the instructions below.

••• *Magic Numbers*

2816 *= Instruments 1-236*

3072 *= Instruments 237-384*

SysEx Instr. No. (Bank 1) **= 2816 + Orbit Instr. No.**

Next you must convert the SysEx instrument number to a 14-bit MIDI number. See the information on the following pages.

Example:
Suppose we want to change the instrument to **I003** Bass Hum

1) 2816 + 3 = **2819** *(2816 + Instr. No.)*
2) 2819 ÷ 128 = 22 r-3 = **22** (ignore remainder)
3) 22 in Hex = **16** = msb
4) remainder 3 in Hex = **03** = lsb
5) SysEx Instrument Number = | lsb **03** | | msb **16** |

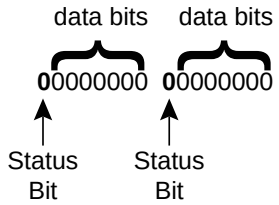
The complete message to change the primary instrument to #03:
F0 18 0A dd 03 17 00 03 16 F7

• *14-bit Signed 2's Complement Numbers*

If the data value is negative, you must first take the 2's complement of the number: In the case of a 14-bit number this is equivalent to adding 16384 to the original negative value.

To fit the 7-bit MIDI protocol, numbers must be "nibble-ized".

Status Bit MUST be "0" in MIDI data bytes.



To get the 14-bit nibble-ized value (of a positive value or a 2's complemented negative value):

msb = value DIV 128 (divide and ignore the remainder)

lsb = value MOD 128 (divide and use only the remainder)

To go the other way (convert 14 bit signed 2's complement to a signed real number)

raw Value = (msb*128) + lsb (gives you the unsigned raw value)

if raw Value ≥ 8192 (8192 = 2^13)

then signed Value = raw value - 16384 (16384 = 2^14)

Example: To find the "nibble-ized" Hex value of -127:

1) -127 + 16384 = **16252**
2) 16252 ÷ 128 = **126 r-124**
3) 126 in Hex = **7E** = msb
4) 124 in Hex = **7C** = lsb
5) Parameter value would be transmitted as **7C 7E**

Example: To find the "nibble-ized" Hex value of parameter number 257:

1) 257 ÷ 128 = **2 r-1**
2) 2 in Hex = **02** = msb
3) 1 in Hex = **01** = lsb
4) Parameter number would be transmitted as **01 02**

• *Note 10 - Patchcord Destinations*

The order in which patchcord destinations appear on the screen does not necessarily match the SysEx ordering. This is necessary for various reasons, one being to maintain Proteus compatibility.

Key/Velocity Controllers

MIDI value	Destination
0	Off
1	Pitch
2	Pri. Pitch
3	Sec. Pitch
4	Volume
5	Pri. Volume
6	Sec. Volume
7	Attack
8	Pri. Attack
9	Sec. Attack
10	Decay
11	Pri. Decay
12	Sec. Decay
13	Release
14	Pri. Release
15	Sec. Release
16	Crossfade
17	LFO 1 Amount
18	LFO 1 Rate
19	LFO 2 Amount
20	LFO 2 Rate
21	Aux. Envelope Amount
22	Aux. Envelope Attack
23	Aux. Envelope Decay
24	Aux. Envelope Release
25	Sound Start
26	Pri. Sound Start
27	Sec. Sound Start
28	Pan
29	Pri. Pan
30	Sec. Pan
31	Tone
32	Pri. Tone
33	Sec. Tone

Key/Velocity Controllers (cont)

MIDI value	Destination
34	Filter Fc
35	Pri. Filter Fc
36	Sec. Filter Fc
37	Filter Q
38	Pri. Filter Q
39	Sec. Filter Q
40	Portamento Rate
41	Pri. Portamento Rate
42	Sec. Portamento Rate

Realtime Controllers

MIDI value	Destination
0	Off
1	Pitch
2	Pri. Pitch
3	Sec. Pitch
4	Volume
5	Pri. Volume
6	Sec. Volume
7	Attack
8	Pri. Attack
9	Sec. Attack
10	Decay
11	Pri. Decay
12	Sec. Decay
13	Release
14	Pri. Release
15	Sec. Release
16	Crossfade
17	LFO 1 Amount
18	LFO 1 Rate
19	LFO 2 Amount
20	LFO 2 Rate
21	Aux. Envelope Amount
22	Aux. Envelope Attack
23	Aux. Envelope Decay
24	Aux. Envelope Release

Realtime Controllers (cont)

MIDI value	Destination
28	Pan
29	Pri. Pan
30	Sec. Pan
34	Filter Fc
35	Pri. Filter Fc
36	Sec. Filter Fc
40	Portamento Rate
41	Pri. Portamento Rate
42	Sec. Portamento Rate

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