# WAVESTATION

## ADVANCED VECTOR SYNTHESIS • WAVE SEQUENCING

# Reference Guide

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KORG®

AV Synthesis System

# TABLE OF CONTENTS

# ABOUT THIS MANUAL

The Wavestation Reference manual is intended for those who have read the accompanying Player's Guide, or who have some experience with professional synthesizers. It is not organized to be read from cover to cover, but as an extended "Help" system for those occasions when you may need more information about what is displayed on the Wavestation screen.

The Wavestation's operating system is organized into over 40 display *pages*. For easy reference, this manual corresponds as closely as possible to the pages displayed. Each display page has a corresponding section here. The page reference sections are arranged alphabetically by page title.

See the figure below. For each page you will find:

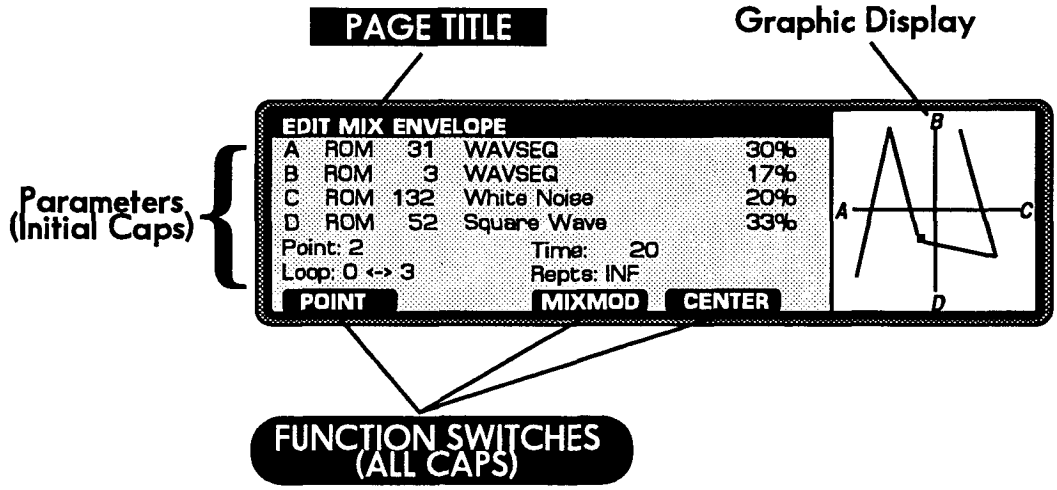
the path describing how to get there,

a picture of the page (except for the simplest pages),

an entry for each parameter (in Initial Caps), and

an entry for each function switch (in ALL CAPS).

**Path: EDIT - PATCH - WAVES - MIXEV**



# COPY EFFECTS - ALL

**Paths: EDIT - EFFECTS - COPY**

**MIDI - MULTISET - EFFECTS - COPY**

Use this function to copy all effects programming between Performances. Specifically, this includes the two effects choices for FX1 and FX2, up to 14 parameters for each choice, the Routing, and effects mix (FX MIX) parameters.

## Source

Source can be either a Performance or a MULTI MODE Setup.

The default source is the current Performance or MULTI MODE Setup.

## Routing

Shows the current SERIES or PARALLEL effects routing configuration.

## Effect 1

Shows the source effect selected for Effect 1.

## Effect 2

Shows the source effect selected for Effect 2.

## Destination

Destination can be either a Performance or a MULTI MODE Setup.

## EXECUTE

Starts the operation.

# COPY EFFECTS - MIX

**Paths: EDIT - EFFECTS - FX MIX - COPY**

**MIDI - MULTISET - EFFECTS - FX MIX - COPY**

Use this function to copy the Routing and FX MIX parameters between Performances or MULTI MODE Setups.

## Source

Source can be either a Performance or a MULTI MODE Setup.

The default source is the current Performance or MULTI MODE Setup.

## From Routing

Shows the current SERIES or PARALLEL effects routing configuration.

## Destination

Destination can be either a Performance or a MULTI MODE Setup.

## To Routing

Shows the current destination routing that will be overwritten.

## EXECUTE

Starts the operation.

# COPY EFFECTS - PARAMETERS

**Paths: EDIT - EFFECTS - FX1 (2) - COPY**

**MIDI - MULTISET - EFFECTS -FX1 (2) - COPY**

Use this function to copy the program and all parameters between effects, or between Performances or MULTI MODE Setups.

## Source

Source can be either a Performance or a MULTI MODE Setup.

The default source is the current Performance or MULTI MODE Setup.

## From Effect 1 or 2

Select the desired source effect number.

The default effect is determined by the page from which you came.

## Destination

Destination can be either a Performance or a MULTI MODE Setup.

## To Effect 1 or 2

Select the desired destination effect number.

## EXECUTE

Starts the operation.

# COPY MODULES

**Path: EDIT - PATCH - MACROS - COPY**

This function allows you to copy by module any parameters from ALL or any wave from one Patch to another.

You can duplicate any user macro you have created.

Examples of how to use this function would be to initialize new Patches to a specific modulation configuration of your choice, or to impose a uniform envelope over different percussion waves in a Patch.

## Source Module

Module values are: ALL, PITCH, FILTER, AMP ENV, AMP MOD, PAN, LFO 1, LFO 2, ENV1, ENV1 MOD, MIX ENV, MIX MOD, FX-BUS.

## Source Wave

ALL, A, B, C, D. If the Source wave is ALL, Destination wave must be ALL.

## Source Patch

The Patch to copy from.

## Destination Module

Module values are the same as for the source.

The Source selection limits the Destination. For example, if the source is LFO1, then the destination can only be LFO1 or LFO2.

## Destination Wave

The wave(s) to receive the modules.

## Destination Patch

The Patch to receive the modules.

## EXECUTE

Starts the operation.

# COPY PART

**Path: EDIT - DETAIL - COPY**

COPY PART allows you to copy one Part's parameters to another.

## Source Performance / Part

The Part to be copied.

## Destination Performance / Part

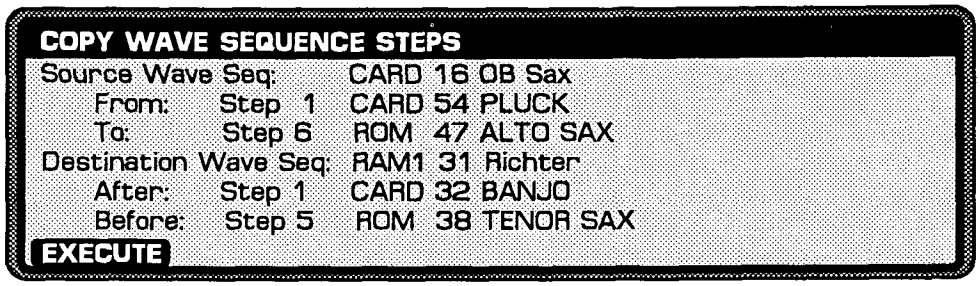
The Part to be copied over.

## EXECUTE

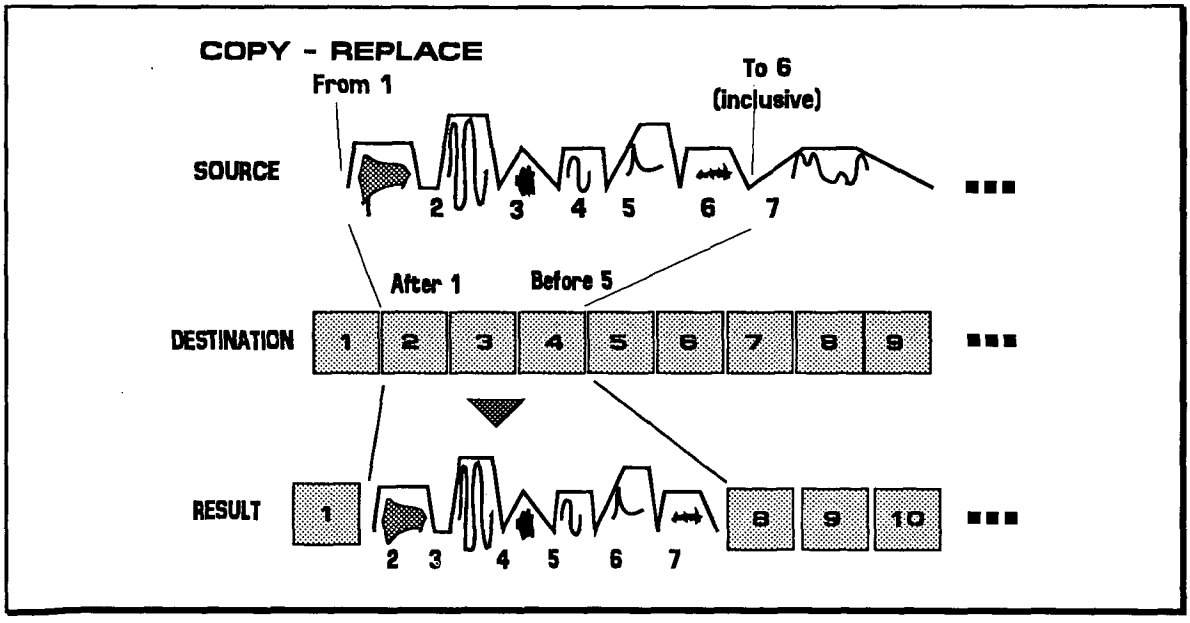
Starts the operation.

# COPY WAVE SEQUENCE STEPS

Path: EDIT - PATCH - WAVES - WAVSEQ - UTILS - COPY

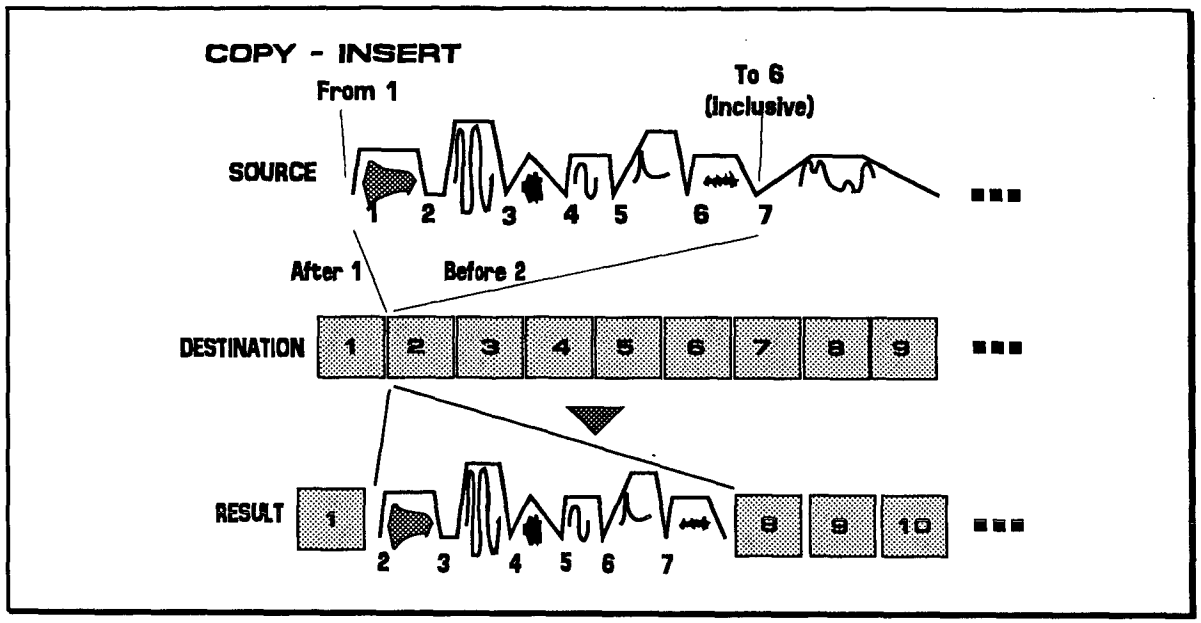



Copying can *replace* steps in the Destination sequence with new steps. For example, copying From step 1, To step 6 (inclusive) to After step 1, Before step 5 would replace steps 2, 3, and 4 in the Destination Wave Sequence with steps 1-6 from the Source Wave Sequence.




You can also use copying to clear a Wave Sequence, by copying a blank step sequence over its entire range.

Copying can also *insert* multiple steps into a Destination sequence. For example, copying From step 1, To step 6 (which is inclusive) to After step 1, Before step 2 would insert steps 1-6 from the Source Wave Sequence between steps 1 and 2 in the Destination Wave Sequence:




## Source

Bank, number, and name of the Wave Sequence containing the range to be copied.

## Source From

First step of range to be copied.

## Source To

Last step of the desired source range to be copied.

## Destination

Selects the Bank, number, and name of the destination.

## Destination After

In the destination sequence, the step that the copied steps will follow.

After step is always one less than Before step.

If the Destination is an empty Wave Sequence or the Before step is set to END, the After step shows "---".

Setting the Destination After step to END *appends* the Source steps.

## Destination Before

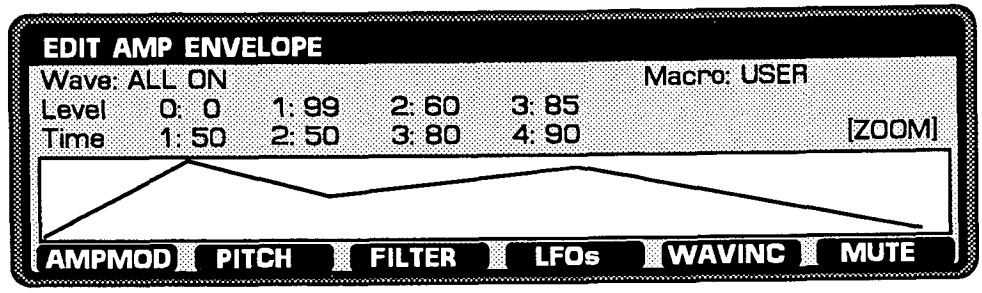
The step that follows the copied steps.

## EXECUTE

Starts the operation.

# EDIT AMP ENVELOPE

**Path: EDIT - PATCH - MACROS - AMP**




The amplifier shapes the voice output according to this envelope.

## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Macro

Any edits made to this page change the Macro label to USER. To cancel your edits, just re-select any internal macro. Specific Macro selections are listed under PATCH MACROS.

## Levels 0 - 3

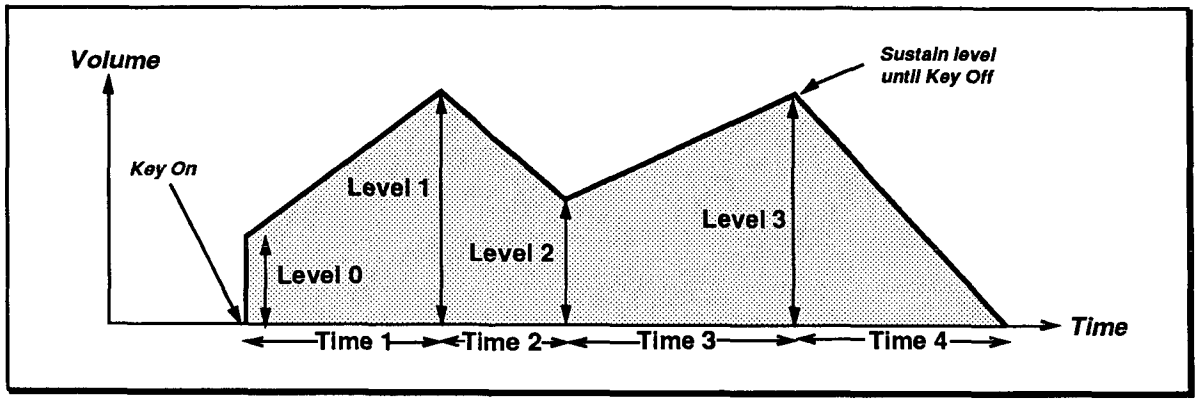
0 - 99. The levels of the breakpoints in the envelope determine its shape.

Level 0 is the initial level initiated by a Key On.

Level 1 is the attack level.

Level 2 is the decay level.

Level 3 is the sustain level.




## Times 1 - 4

The duration of the selected envelope segment. The envelope times adjust the rate at which the note develops. Longer times mean slower envelopes.

Time 1 is the attack time.

Time 2 is the decay time.

Time 3 is the slope time. (The time between Level 2 and Level 3.)

Time 4 is the release time.

## ZOOM

When you raise the combined time values sufficiently, the screen will automatically zoom out to maintain the overall view. The ZOOM indicator reminds you that you are viewing a compressed envelope rather than a short one.

## AMPMOD

Goes to EDIT AMP MOD.

## PITCH

Goes to EDIT PITCH.

## FILTER

Goes to EDIT FILTER.

## LFOs

Goes to EDIT LFO 1.

## WAVINC

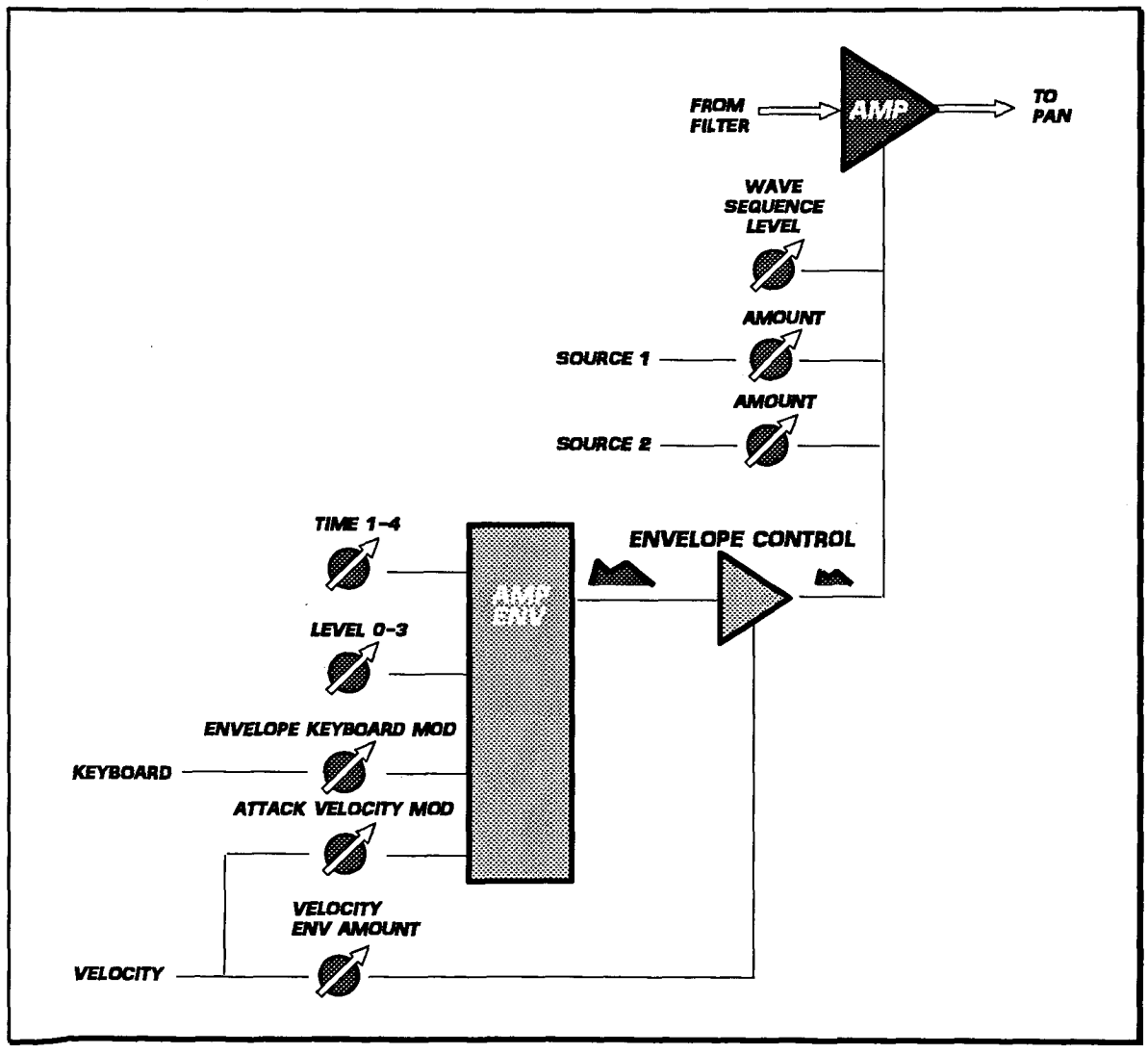
Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

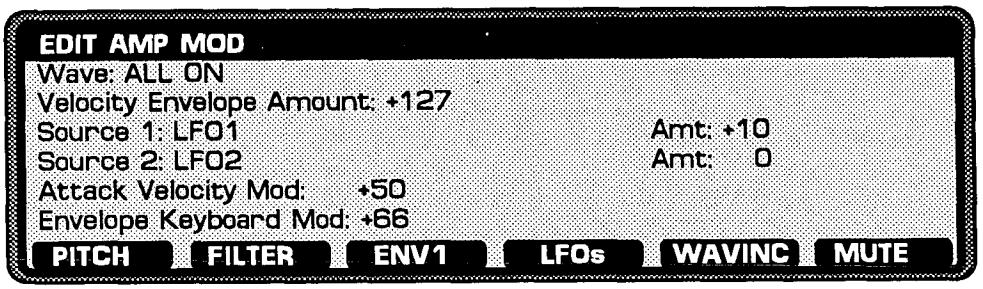
If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

## Amplifier Module Block Diagram



# EDIT AMP MOD

Path: EDIT - PATCH - MACROS - AMP - AMPMOD




Please see figure under EDIT AMPLIFIER.

## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Velocity Env Amount

+/- 127. Raising this control from 0 makes the envelope level increasingly dependent on velocity. Positive values convert harder playing into louder notes, as is normal. Negative values soften the Patch as you play harder.

By using less than maximum velocity sensitivity, you can achieve a form of compression which can actually make mixing easier.

## Source / Amount 1, 2

The modulation sources can be any of those listed in the discussion of the PATCH MACRO page.

Each modulator can have its own level and a normal or inverted (+/- 127) effect.

For example, when applied to the amp, the LFOs can create a tremolo.

## Attack Velocity Modulation

+/- 127. Controls the influence of velocity on the envelope Time 1 only.

Positive values mean that playing harder speeds up the envelope attack time, and playing more softly slows it. Negative values mean the opposite.

## Envelope Keyboard Modulation

+/- 127. Controls the influence of the keyboard (note position) on envelope Times 2 and 4 only.

Positive values mean that higher notes have faster envelope times than lower ones. Negative values mean the opposite.

## PITCH

Goes to EDIT PITCH.

## FILTER

Goes to EDIT FILTER.

## ENV1

Goes to EDIT ENVELOPE 1.

## LFOs

Goes to EDIT LFO 1.

## WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

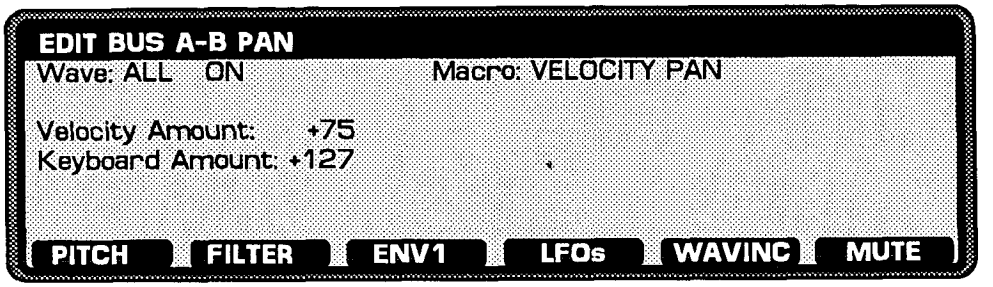
## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

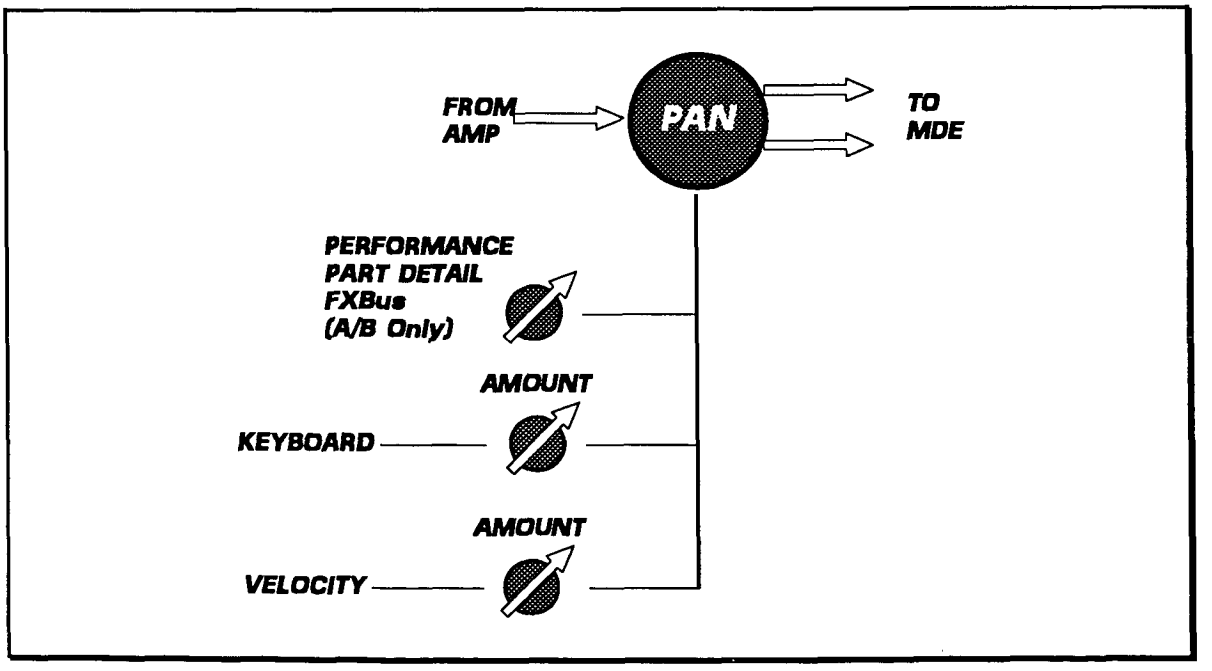
# EDIT BUS A-B PAN

Path: EDIT - PATCH - MACROS - PAN




The PAN module sets the modulation of the Pan position. The initial Pan position itself is set on the PERFORMANCE PART DETAILS page, with the FX Bus parameter.

## Pan Block Diagram




## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Macro

Any edits made to this page change the Macro label to USER. To cancel your edits, just re-select any internal macro. Specific Macro selections are listed under PATCH MACROS.

## Velocity Amount

+/- 127. 0 means no velocity effect on pan.

Positive values play soft notes to the left and louder notes to the right.

## Keyboard Amount

+/- 127. Controls the spread of the keyboard across the stereo image.

Positive values play low notes to the left and higher notes to the right.

## PITCH

Goes to EDIT PITCH.

## FILTER

Goes to EDIT FILTER.

## ENV1

Goes to EDIT ENVELOPE 1.

## LFOs

Goes to EDIT LFO 1.

## WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

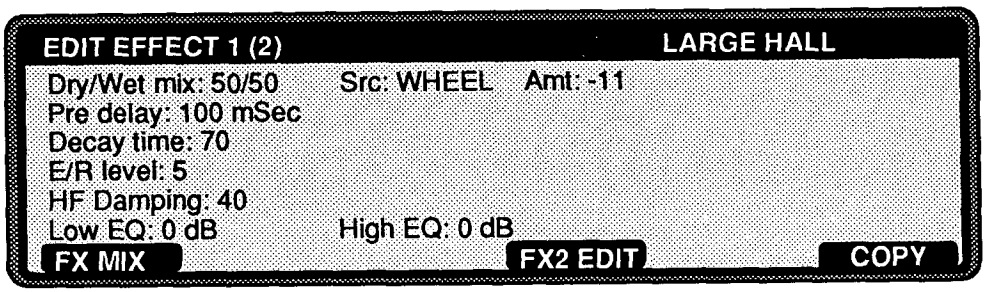
## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

# EDIT EFFECT 1 (2)

**Paths:** **EDIT - EFFECTS - FX1 EDIT (or FX2 EDIT)**
**MIDI - MULTISET - EFFECTS - FX1 EDIT (or FX2 EDIT)**




For an introduction to the effects system, please see Chapter 7, "Effects Tour," in the Player's Guide.

**NOTE**: Performance effects may only be edited when the MIDI mode is set to OMNI or POLY; MULTI MODE Setup effects may only be edited when the MIDI mode is set MULTI or MONO.

## Title

In the top line, the effects macro currently selected.

## Parameters per Effect

The specific parameters on the page vary with the 21 different effects types. See below.

## FX MIX

This switch takes you to the Routing EFFECTS MIX page.

## FX1 / 2 EDIT

This switch takes you to the other FX module.

## COPY

Goes to COPY EFFECTS - PARAMETERS.

# WAVESTATION MDE EFFECTS

Here is a descriptive list of the Wavestation's effects programs. There are 46 programs, which are variations upon approximately 21 basic effects types. Each effect type has its own set of parameters. (The effects programs are, in effect, macros for each of the 21 effect types.)

Here is a list of the Effect modulation sources.

| SYMBOL | Modulation Source |
|---|---|
| NONE | No modulation |
| WHEEL | Mod wheel |
| AT | Channel aftertouch |
| VEL | Last Note-On velocity (Not gated by Note-Off) |
| KEY | Highest key number; if none down, then last key |
| ENV | Summed amplitude envelopes of all buses |
| KEYDN | Key down gate |
| FSW | Footswitch momentary, push-on/release-off (Set FOOT ASSIGN |
| FSWTOG | Footswitch toggle, push-on/push-off to EFFECTS SWITCH) |
| PEDAL | Footpedal (Set FOOT ASSIGN to MODULATION) |
| XMIDI1 | MIDI Controller 1 |
| XMIDI2 | MIDI Controller 2 |
| WH+AT | Sum of mod wheel and chan aftertouch |
| JOY-X | Horizontal axis Joystick controller |
| JOY-Y | Vertical axis Joystick controller |

## NO EFFECT

### 00 No Effect

Use this setting when no effect is desired for either FX1 or FX2.

## REVERB - EQ

These effects simulate reverberation, adding ambience or spaciousness to a sound.

The inputs are summed, equalized, and sent to the reverb. Reverb output mixes with the dry input.

In general, use reverb in moderation; excessive wetness tends to blur the sound.

### 01 Small hall reverb - EQ

The tight, well-defined reverberation patterns of a light, spatial hall.

### 02 Medium hall reverb - EQ

Short and emphasized early reflections characteristic of a warm, spatial hall.

### 03 Large hall reverb - EQ

The natural, spacious and dense ambience characteristic of a concert hall.

### 04 Small room reverb - EQ

A light, tight room good for thickening.

### 05 Large room reverb - EQ

A warm, tight room.

**06 Live stage - EQ**
A dense, tight room.

**07 Wet plate reverb - EQ**
A dense, open plate.

**08 Dry plate reverb - EQ**
A light, open plate.

**09 Spring reverb - EQ**
Resonant springs.

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 99/1, . . .1/99, WET***<br>Output balance of processed and unprocessed sound. |
| ***Dry/Wet mix mod source*** | ***Mod source*** |
| ***Dry/Wet mix mod amount*** | ***-15 to +15*** |
| ***Pre delay*** | ***0 to 500 ms***<br>Time delay between the direct sound and the first early reflections. To lengthen the hall, increase this parameter. |
| ***Decay time*** | ***0 to 100***<br>Time before reverberation decays. The lower the value, the shorter the decay time. |
| ***Early reflection level*** | ***0 to 100***<br>Level of early reflections. |
| ***High frequency damping*** | ***0 to 100***<br>0 gives you the "liveliest" room. The larger the value, the faster the high frequencies are damped. (In other words, the deader the room.) |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies.<br>EQ affects reverb only, not direct signal. |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies.<br>EQ affects reverb only, not direct signal. |

## *EARLY REFLECTIONS*

Early Reflection is an effect that allows you to adjust only the early reflections, which are crucial in determining the realism of the reverb sound as it would be heard in an actual room, separate from the reverberant "wash." Adjustment of the Decay Time permits a wide range of effects, such as adding density to the sound or achieving a "live" room sound with more discrete echoes and reflections.

Following an Early Reflections program with reverb (in series Routing), gives especially high-quality reverberation.

**10 Early reflections - EQ 1**
Dense E/R.

**11 Early reflections - EQ 2**
Modulated E/R.

### 12 Early reflections - EQ 3

This effect uses a reverse envelope on the early reflections. The reverse effect (similar to a tape recorder being played backwards) can be applied to sounds which have strong attack characteristics, such as cymbals, or to produce "new age" drones.

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 99/1, . . .1/99, WET***<br>Output balance of processed and unprocessed sound. |
| ***Dry/Wet mix mod source*** | ***Mod source*** |
| ***Dry/Wet mix mod amount*** | ***-15 to +15*** |
| ***Pre delay*** | ***0 to 500 ms***<br>Time between the direct sound and the first early reflections. |
| ***Decay time*** | ***10 - 800 ms***<br>Decay time for the early reflections. |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies.<br>EQ affects effect only, not direct signal. |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies.<br>EQ affects effect only, not direct signal. |

## *GATED REVERB - EQ*

In these effects, an early reflections reverb is gated by a modulation source. The gate hold time is adjustable.

### 13 Forward gated reverb - EQ

### 14 Reverse gated reverb - EQ

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 99/1, . . .1/99, WET***<br>Output balance of processed and unprocessed sound. |
| ***Gate hold time*** | ***0 to 500 ms***<br>The time the gate will remain open after the modulation source goes below the threshold. |
| ***Gate key source*** | ***Mod source*** |
| ***Gate threshold*** | ***0 - 100***<br>The level at which the gate will open. |
| ***Pre delay*** | ***0 to 500 ms***<br>Time between the direct sound and the first early reflections. |
| ***Decay time*** | ***10 - 800 ms***<br>Decay time for the early reflections. |

## *STEREO DELAY*

A stereo delay where the delay times for the left and right channels are synchronized to fixed ratios. The input level can be modulated for swell-in/out delay effects.

All parameters except delay time are set to the same value for the two delays. The relationship between the left and right channel delay times can be set to one of 43 different ratios.

### 15 Stereo delay

A stereo delay effect having two delay systems, each of which has a feedback circuit that sends part of the sound back to the delay again.

### 16 Ping-pong delay

A stereo delay in which the feedback signal of each delay crosses over to the other so that the delayed sound alternates left-right.

***Parameters***

***Dry/Wet mix***
***DRY, 99/1, . . .1/99, WET***
Output balance of processed and unprocessed sound.

***Dry/Wet mix mod source***
***Mod source***

***Dry/Wet mix mod amount***
***-15 to +15***

***Input level mod source***
***Mod source***
Positive-going modulation swells effect in; negative-going modulation swells effect out.

***Input level mod amount***
***-15 to +15***
Determines depth of input level modulation. Negative values invert modulation so that positive-going modulation swells effect out.

***Delay time***
***0 to 500 ms***

***Delay time mod source***
***Mod source***

***Delay time mod amount***
***-15 to +15***

***Left/right delay factor***

The left/right delay factor sets the ratio of the left side delay to the right side delay. For example, the factor 3:5 equals the fraction 3/5 or .6, so the relationship of the delay times is: left X 0.6, right X 1. Conversely, 5:3 means the relationship is: left X 1, right X 0.6.

The 43 ratios are listed below (each ratio has a reciprocal, except 1:1):

1 : 1, 2, 3, 4, 5, 6, 7, 8

2: 3, 5, 7

3: 4, 5, 7, 8

4: 5, 7

5: 6, 7, 8

6: 7

7: 8

***Feedback***
***-100 to +100***
Amount of feedback (negative values produce inverted phase).

## *DUAL MONO DELAY*

**17 Dual mono delay**

Two separate, parallel delays.

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix left*** | ***DRY, 9/1, . . .1/9, WET*** |
| ***Delay time left*** | ***0 to 500 ms***<br>Time between processed and unprocessed sound. |
| ***Feedback left*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). In effect, this is the number of delay repeats. |
| ***Dry/Wet mix right*** | ***DRY, 9/1, . . .1/9, WET*** |
| ***Delay time right*** | ***0 to 500 ms***<br>Time between processed and unprocessed sound. |
| ***Feedback right*** | ***-100 to +100*** |

## STEREO MULTI - TAP DELAY - EQ

Each effect input is equalized then delayed by two independent series delays. The output of the second delay is fed-back to the input. The input level can be modulated for swell-in/out delay effects.

**18 Multi-tap delay - EQ 1**

Two multi-repeat, parallel delays.

**19 Multi-tap delay - EQ 2**

Two multi-repeat, parallel delays with cross panning.

**20 Multi-tap delay - EQ 3**

Two multi-repeat, parallel delays with crossover feedback.

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 99/1, . . .1/99, WET***<br>Output balance of processed and unprocessed sound. |
| ***Dry/Wet mix mod source*** | ***Mod source*** |
| ***Dry/Wet mix mod amount*** | ***-15 to +15*** |
| ***Input level mod source*** | ***Mod source*** |
| ***Input level mod amount*** | ***-15 to +15*** |
| ***Delay time 1*** | ***0 to 500 ms*** |
| ***Delay time 2*** | ***0 to 500 ms*** |
| ***Feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies. EQ affects both the wet and dry signals. |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies. EQ affects both the wet and dry signals. |

## *STEREO CHORUS - EQ*

A chorus is a medium-range delay line (20 - 50 ms), with slight modulation of the delay time.

This stereo effect combines two chorus circuits and imparts a natural, warm, and "fat" sound to any instrument sound and is particularly effective with piano, strings, and brass.

### 21 Stereo chorus - EQ

A stereo effect that combines two parallel chorus circuits using LFOs which have an inverted phase relationship.

### 22 Quadrature chorus - EQ

Two parallel chorus circuits using quadrature-phased LFOs. Quadrature-phased LFOs can be described as "phase offset" LFOs.

### 23 Crossover chorus - EQ

Two parallel chorus circuits using quadrature-phased LFOs and crossover output mixture.

***Parameters***

| | |
|---|---|
| ***Footswitch*** | ***On/off***<br>Enables or disables use of EFFECTS SWITCH to turn effect on or off. |
| ***Delay time left*** | ***0 to 500 ms***<br>Time between processed and unprocessed sound. |
| ***Delay time right*** | ***0 to 500 ms***<br>Time between processed and unprocessed sound. |
| ***LFO rate*** | ***0.03-30 Hz***<br>Speed of modulation (frequency) |
| ***LFO rate mod source*** | ***Mod source*** |
| ***LFO rate mod amount*** | ***-15 to +15*** |
| ***LFO depth*** | ***0 to 100*** |
| ***LFO shape*** | ***SIN, TRI, -10 to +10***<br>Selection of modulation waveform. Numeric values determine wave symmetry. |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies.<br>EQ affects the wet signal only. |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies.<br>EQ affects the wet signal only. |

## *STEREO HARMONIC CHORUS*

### 24 Stereo Harmonic chorus

The harmonic chorus is a stereo chorus with quadrature-phased LFOs and a special frequency splitter. The splitter routes high frequencies to the chorus. Low frequencies are routed around the effect, thus excluded. This is especially effective for bass and other low frequency sounds.

***Parameters***

| | |
|---|---|
| ***Footswitch*** | ***On/off***<br>Enables or disables use of EFFECTS SWITCH to turn effect on or off. |
| ***Delay time left*** | ***0 to 500 ms***<br>Time between processed and unprocessed sound. |
| ***Delay time right*** | ***0 to 500 ms***<br>Time between processed and unprocessed sound. |
| ***LFO rate*** | ***0.03-30 Hz***<br>Speed of modulation (frequency). |
| ***LFO rate mod source*** | ***Mod source*** |
| ***LFO rate mod amount*** | ***-15 to +15*** |
| ***LFO depth*** | ***0 to 100*** |
| ***LFO depth mod source*** | ***Mod source*** |
| ***LFO depth mod amount*** | ***-15 to +15*** |
| ***Split point*** | ***100 Hz to 10 kHz*** |

## STEREO FLANGER - EQ

This effect is achieved by using shorter delay times and adding feedback and output mix phase inversion to the chorus. Since its pronounced swirling adds color and motion, it is most effective with sounds that have many harmonics, such as lead sounds.

### 25 Stereo flanger - EQ 1

A stereo effect combining two flanger circuits, with phase-synchronous LFOs.

### 26 Stereo flanger - EQ 2

The swirling and swishing effect that moves expansively between the stereo outputs is enhanced by phase-inversion of the two flanger circuits. Flanger 2 uses phase-inverted LFOs.

### 27 Crossover flanger - EQ

A flanger effect in which the feedback signal of each flanger circuit crosses over and is routed to the other flanger.

Crossover flanger uses phase-synchronous LFOs.

***Parameters***

| | |
|---|---|
| ***Footswitch*** | ***On/Off***<br>Enables or disables use of EFFECTS SWITCH to turn effect on or off. |
| ***Output mix*** | ***-10 to +10***<br>Output balance of direct and delayed sound. Negative values produce inverted phase. |
| ***Delay time*** | ***0 to 50 ms*** |
| ***Range*** | ***1 to 100***<br>LFO sweep range. |
| ***Ramp speed*** | ***Manual, 1 to 100***<br>If set to Manual, the mod source directly controls the flanger. |

| | |
|---|---|
| ***Ramp speed mod source*** | ***Mod source*** |
| ***Ramp speed mod amount*** | ***-15 to +15*** |
| ***Resonance*** | ***-100 to +100***<br>Amount of flanger feedback. |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies.<br>EQ affects the effect signal only. |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies.<br>EQ affects the effect signal only. |

## *STEREO ENHANCER - EXCITER - EQ*

This effect offers two parallel exciters with spatial delays. The exciter increases the clarity of the sound, gives it greater definition and presence, and helps bring the sound to the forefront.

**28 Stereo enhancer - exciter - EQ**

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |
| ***Harmonic density*** | ***1 to 100***<br>Amount of excitation. |
| ***Hot spot*** | ***1 to 20***<br>Central frequency emphasized by exciter |
| ***Stereo Width*** | ***0 to 100***<br>Level of inverted delay crossover. |
| ***Delay*** | ***1 to 100***<br>Crossover delay time. |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies.<br>EQ affects both the wet and dry signals |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies.<br>EQ affects both the wet and dry signals |

## *DISTORTION - FILTER - EQ*

**29 Distortion - filter - EQ**

This effect has a "dirty" sound and "wah" effect. It is effective for solos.

**30 Overdrive - filter - EQ**

This is an effect that simulates the overdrive generally used by guitars, and is particularly effective when applied to organs and electric pianos to create guitar-like lines and solos.

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |

***Footswitch*** — ***On/off***
Enables or disables use of EFFECTS SWITCH to turn effect on or off.

***Edge*** — ***1 to 111***
Amount of drive.

***Hot spot*** — ***1 to 100***
Controls the center frequency of the "wah" filter.

***Hot spot mod source*** — ***Mod source***

***Hot spot mod amount*** — ***-15 to +15***

***Resonance*** — ***0 to 100***
Filter "Q" factor. This controls the amount of "wah" effect.

***Level*** — ***1 to 100***
Output level of distortion.

***EQ low*** — ***-12 to +12 dB***
Control for cutting or boosting the low frequencies.
EQ affects the effect output only; the direct signal is unaffected.

***EQ high*** — ***-12 to +12 dB***
Control for cutting or boosting the high frequencies.
EQ affects the effect output only; the direct signal is unaffected.

## *STEREO PHASER*

The stereo phase shifter programs offer two parallel phasers. These use both time delay and phase shifting to create a more pronounced swirling and swishing sound than either chorus or flanger. They are most effective on electronic piano and guitar sounds.

**31 Stereo phaser 1**
Phaser 1 uses phase-synchronous LFOs.

**32 Stereo phaser 2**
Phaser 2 uses phase-inverted LFOs.

***Parameters***

***Dry/wet mix*** — ***-WET, -1/9, . . . ,-9/1, DRY, 9/1, . . .1/9, WET***
Output balance of processed and unprocessed sound.
Negative values produce inverted phase.

***Footswitch*** — ***On/off***
Enables or disables use of EFFECTS SWITCH to turn effect on or off.

***Center*** — ***0 to 99***
Center frequency which is affected by the phase shift.

***LFO rate*** — ***FIXED, 0.03-30 Hz***
Speed of modulation (frequency).
When LFO rate is set to FIXED, the LFO depth is disabled (set to zero internally) and the LFO rate mod controls the phaser center. This lets you manually sweep the phase shifter center point.

| | |
|---|---|
| ***LFO rate mod source*** | ***Mod source*** |
| ***LFO rate mod amount*** | ***-15 to +15*** |
| ***LFO depth*** | ***0 to 100*** |
| ***LFO depth mod source*** | ***Mod source*** |
| ***LFO depth mod amount*** | ***-15 to +15*** |
| ***Feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |

## *STEREO ROTARY SPEAKER*

This effect duplicates the rotational speaker effect popular for organ sounds.

### 33 Stereo rotary speaker

The "speaker" is modulated by a free running LFO. The slow and fast speed switch is chosen by the acceleration mod source. Continuous controllers are filtered by the acceleration amount. In other words, if the controller is moved suddenly, the rotors change their speed to the new setting by the acceleration rate.

The footswitch can be set to turn the effect on or off, or it can be used to control the mode of the fast/slow rotor speed select (by selecting the footswitch as the rotor speed mod source).

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |
| ***Footswitch*** | ***On/off***<br>Enables or disables use of EFFECTS SWITCH to turn effect on or off. |
| ***Depth*** | ***1 to 15***<br>Depth of vibrato effect. This is equivalent to selecting top rotor horn sizes. |
| ***Acceleration*** | ***1 to 15***<br>The rate of change between two different speeds. |
| ***Rotor speed mod source*** | ***Mod source*** |
| ***Rotor slow speed*** | ***0.03-30 Hz*** |
| ***Rotor fast speed*** | ***0.03-30 Hz*** |

**NOTE:** Setting Rotor fast speed slower than Rotor slow speed produces a nice distortion similar to FM.

## *MOD - PAN - EQ*

These effects dynamically pan the inputs in the stereo output mix. The effect output is the mix between the panned outputs and the equalized effect inputs.

**NOTE:** This effect requires different left and right inputs for it to work.

### 34 Stereo mod - pan - EQ

Two parallel dynamic pan effects with phase-inverted LFOs. The two inputs alternate in the stereo mix.

### 35 Quadrature mod - pan - EQ

Two parallel dynamic pan effects with quadrature-phased LFOs. The two inputs "chase" each other in the stereo mix.

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |
| ***Dry/Wet mix mod source*** | ***Mod source*** |
| ***Dry/Wet mix mod amount*** | ***-15 to +15*** |
| ***LFO rate*** | ***0.03-30 Hz***<br>Speed of modulation (frequency). |
| ***LFO depth*** | ***0 to 100***<br>The amount of crossover to the opposite side. |
| ***LFO depth mod source*** | ***Mod source*** |
| ***LFO depth mod amount*** | ***-15 to +15*** |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies.<br>EQ affects both the wet and dry signals. |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies.<br>EQ affects both the wet and dry signals. |

## *EQUALIZATION*

This is a three-band parametric equalizer. The midrange frequency can be modulated for "wah" type effects.

### 36 Stereo parametric equalizer

***Parameters***

| | |
|---|---|
| ***Low frequency*** | ***32 Hz to 1 kHz***<br>Low EQ shelving cutoff frequency. |
| ***Low level*** | ***-12 to +12 dB***<br>Low EQ level. |
| ***Mid frequency*** | ***1 to 100***<br>Midrange filter center frequency. |
| ***Mid frequency mod source*** | ***Mod source*** |
| ***Mid frequency mod amount*** | ***-15 to +15*** |
| ***Mid level*** | ***-12 to +12 dB*** |
| ***Mid width*** | ***1 - 100***<br>Mid frequency filter resonance. |
| ***High frequency*** | ***1 kHz to 16 kHz***<br>High shelving cutoff frequency. |
| ***High level*** | ***-12 to +12 dB***<br>High EQ level. |

## *STEREO COMBINATION MODULATED/FIXED DELAY - EQ*

In these effects, a mono-in/stereo-out chorus or flanger drives a stereo delay line which includes a sample/hold feature for capturing and recirculating the delay line contents.

**37 Chorus - stereo delay - EQ**

A mono-input/stereo-output chorus with quadrature-phased LFOs drives a stereo delay with a sample/hold feature.

**38 Flanger -stereo delay - EQ**

A mono-input/stereo-output flanger with quadrature-phased LFOs drives a stereo delay with a sample/hold feature.

***Parameters***

| | |
|---|---|
| ***Flanger/chorus delay time*** | ***0 to 50 ms*** |
| ***LFO rate*** | ***0.03-30 Hz***<br>Speed of modulation (frequency). |
| ***LFO depth*** | ***0 to 100*** |
| ***Flanger Feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |
| ***Dry/Wet mix*** | ***DRY, 99/1, . . .1/99, WET***<br>Output balance of processed and unprocessed sound. |
| ***Echo delay time*** | ***0 to 450 ms*** |
| ***FTSW sample*** | ***On/off***<br>Enables use of EFFECTS SWITCH to sample and recirculate the delay line. A crossfade sample technique is used to minimize glitches. |
| ***Delay Feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |
| ***EQ low*** | ***-12 to +12 dB***<br>Control for cutting or boosting the low frequencies.<br>EQ affects wet signal only, the direct signal is unaffected. |
| ***EQ high*** | ***-12 to +12 dB***<br>Control for cutting or boosting the high frequencies.<br>EQ affects wet signal only, the direct signal is unaffected. |

## *DUAL MONO DELAY - REVERB*

**39 Delay/hall**

A monophonic delay in parallel with a monophonic hall reverb.

**40 Delay/room**

A monophonic delay in parallel with a monophonic room reverb.

***Parameters***

***Ch A***

***Dry/Wet mix*** — ***DRY, 9/1, . . .1/9, WET***
Output balance of processed and unprocessed sound.

***Delay time*** — ***0 to 500 ms***

***Delay Feedback*** — ***-100 to +100***
Amount of feedback (negative values produce inverted phase).

***Ch B***

***Dry/Wet mix*** — ***DRY, 9/1, . . .1/9, WET***
Output balance of processed and unprocessed sound.

***Pre delay*** — ***0 to 500 ms***
Time between the direct sound and the first early reflections.

***Decay time*** — ***100 - 800 ms***
Reverb decay time after pre delay.

***High frequency damping*** — ***0 to 100***
The larger the value set, the faster the high frequencies are damped.

## *DUAL MONO FIXED/MOD DELAY*

**41 Delay/chorus**

A monophonic delay in parallel with a monophonic chorus.

**42 Delay/flanger**

A monophonic delay in parallel with a monophonic flanger.

***Parameters***

***Ch A***

***Dry/Wet mix*** — ***DRY, 9/1, . . .1/9, WET***
Output balance of processed and unprocessed sound.

***Delay time*** — ***0 to 500 ms***

***Delay feedback*** — ***-100 to +100***
Amount of feedback (negative values produce inverted phase).

***Ch B***

***Delay time*** — ***0 to 500 ms***

***LFO rate*** — ***0.03-30 Hz***
Speed of modulation (frequency).

***LFO depth*** — ***0 to 100***

***Feedback*** — ***-100 to +100***
Amount of feedback (negative values produce inverted phase).

## *DUAL MONO DELAY - OVERDRIVE - DISTORTION*

**43 Delay/distortion-filter**

A monophonic delay in parallel with a distorted "wah" effect.

**44 Delay/overdrive-filter**

A monophonic delay in parallel with an overdrive "wah" effect.

***Parameters***

| | |
|---|---|
| ***Ch A*** | |
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |
| ***Delay time*** | ***0 to 500 ms*** |
| ***Delay feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |
| ***Ch B*** | |
| ***Edge*** | ***1 to 111***<br>Distortion drive amount. |
| ***Hot spot*** | ***1 - 100***<br>"Wah" filter frequency. |
| ***Resonance*** | ***0 to 100***<br>"Wah" effect depth. |
| ***Level*** | ***1 to 100***<br>Distortion output level. |

## *DUAL MONO DELAY - PHASER*

**45 Delay/phaser**

A monophonic delay in parallel with a monophonic phaser.

This phaser has more phase shift than the stereo phaser.

***Parameters***

| | |
|---|---|
| ***Ch A*** | |
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |
| ***Delay time*** | ***0 to 500 ms*** |
| ***Delay feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |
| ***High frequency damping*** | ***0 to 100***<br>The larger the value set, the faster the high frequencies are damped. |
| ***Ch B*** | |
| ***Center*** | ***0 to 99***<br>Center frequency which phase shift affects. |
| ***LFO rate*** | ***0.03-30 Hz***<br>Speed of modulation (frequency). |

| | |
|---|---|
| ***LFO depth*** | ***0 to 100*** |
| ***Feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |

## *DUAL MONO DELAY - ROTARY*

### 46 Delay/rotary

A monophonic delay in parallel with a monophonic rotary speaker simulator.

This rotary speaker has more tremolo than the stereo rotary speaker.

***Parameters***

| | |
|---|---|
| ***Ch A*** | |
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |
| ***Delay time*** | ***0 to 500 ms*** |
| ***Delay feedback*** | ***-100 to +100***<br>Amount of feedback (negative values produce inverted phase). |
| ***Ch B*** | |
| ***Slow rotor speed*** | ***0.03-30 Hz*** |
| ***Fast rotor speed*** | ***0.03-30 Hz*** |
| ***Acceleration*** | ***1 to 15*** |
| ***Acceleration mod source*** | ***Mod source*** |

## *STEREO PITCH SHIFTER/DELAY*

### 47 Pitch Shifter

A stereo pitch shifter with the left channel shifted up and the right channel shifted down. The shifted signals can also be delayed with respect to the original signal.

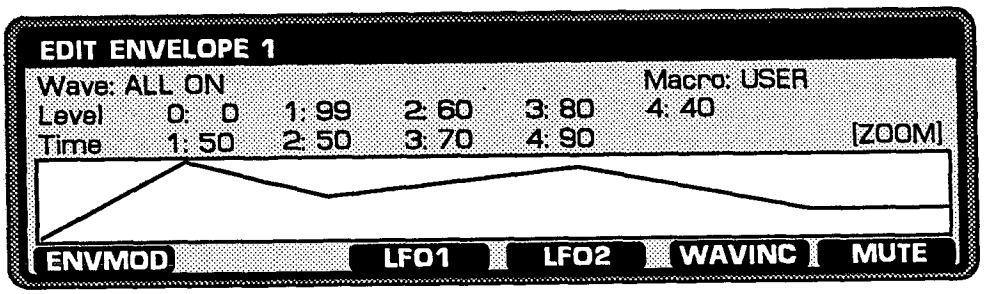
This effect makes an excellent stereo chorus when used with small amounts of shift, and is especially useful on strings and ensemble sounds when placed after a reverb.

***Parameters***

| | |
|---|---|
| ***Dry/Wet mix*** | ***DRY, 9/1, . . .1/9, WET***<br>Output balance of processed and unprocessed sound. |
| ***Dry/Wet mix mod source*** | ***Mod source*** |
| ***Dry/Wet mix mod amount*** | ***-15 to +15*** |
| ***Delay left*** | ***0 to 500 ms*** |
| ***Delay right*** | ***0 to 500 ms*** |
| ***Shift*** | ***1 to 100*** |

# EDIT ENVELOPE 1

**Path: EDIT - PATCH - MACROS - (Module) - ENV1**




The modulation sources are more or less distributed and available from menus under their destinations. For example, ENV1 and the LFOs can only be reached through their destinations.

This envelope is exactly like the AMP ENV, except that Level 4 is adjustable (rather than always 0).

## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Macro

Any edits made to this page change the Macro label to USER. To cancel your edits, just re-select any internal macro. Specific Macro selections are listed under PATCH MACROS.

## Levels 0 - 4

0 - 99. The levels of the breakpoints in the envelope determine its shape.

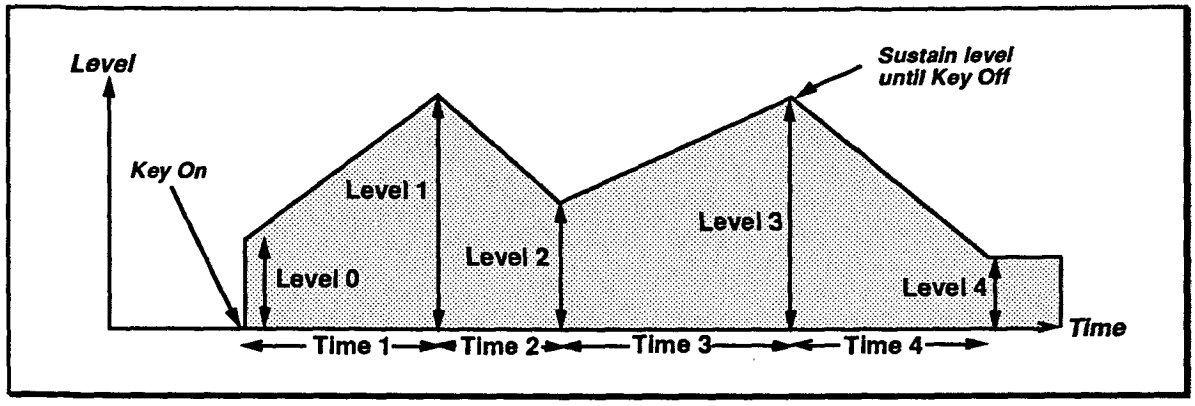
Level 0 is the initial level initiated by a Key On.

Level 1 is the attack level.

Level 2 is the decay level.

Level 3 is the sustain level.

Level 4 is the release level. Note that Envelope 1 differs slightly from the Amp Envelope by having an adjustable Level 4.




## Times 1 - 4

The duration of the selected envelope segment. The envelope times adjust the rate at which the note develops. Longer times mean slower envelopes.

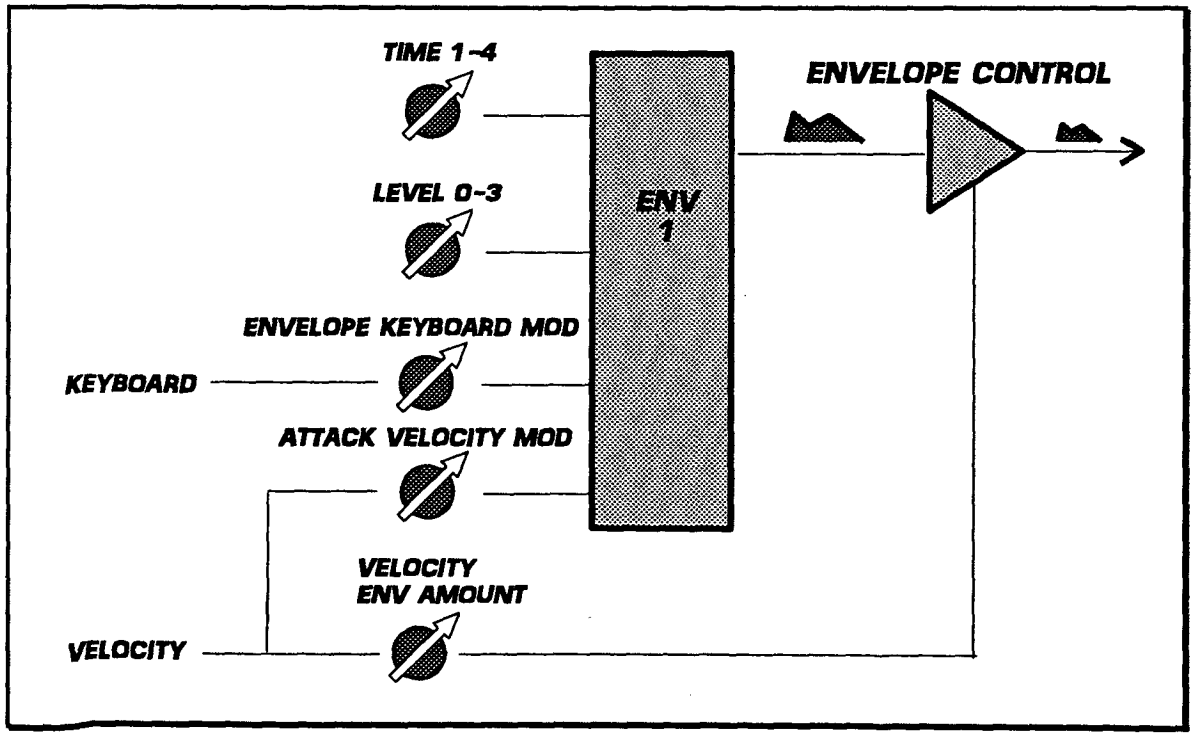
Time 1 is the attack time.

Time 2 is the decay time.

Time 3 is the slope time. (The time between Level 2 and Level 3.)

Time 4 is the release time.

## Envelope 1 Block Diagram



### *ZOOM*

When you raise the combined time values sufficiently, the screen will automatically zoom out to maintain the overall view. The ZOOM indicator reminds you that you are viewing a compressed envelope rather than a short one.

### ENVMOD

Goes to EDIT ENV MOD.

### LFO1 / LFO2

Goes to EDIT LFO 1 or EDIT LFO 2.

### WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

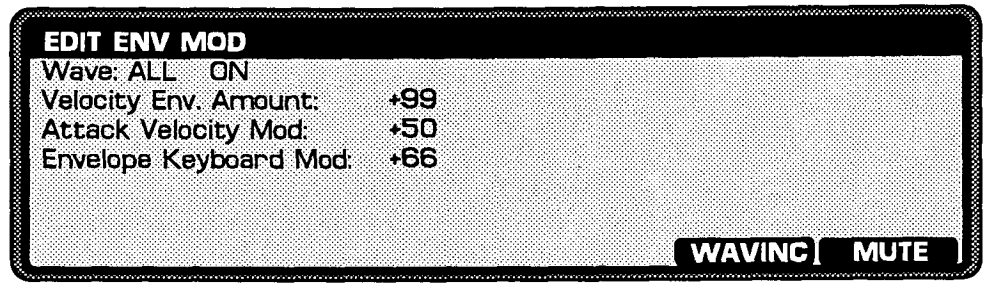
### MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

# EDIT ENV MOD

**Path: EDIT - PATCH - MACROS - (Module) - ENV1 - ENV MOD**




Please see figure under EDIT ENVELOPE 1.

## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Velocity Env Amount

+/- 127. Raising or lowering this control from 0 makes the envelope level increasingly dependent on velocity. Positive values convert harder playing into deeper modulation. Negative values do the opposite.

## Attack Velocity Modulation

+/- 127. Controls the influence of velocity on the envelope Time 1 only.

Positive values mean that playing harder speeds up the envelope attack times, and playing more softly slows it. Negative values mean the opposite.

## Envelope Keyboard Modulation

+/- 127. Controls the influence of the keyboard (note position) on envelope Times 2 and 4 only.

Positive values mean that higher notes have faster envelope times than lower ones. Negative values mean the opposite.

## WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

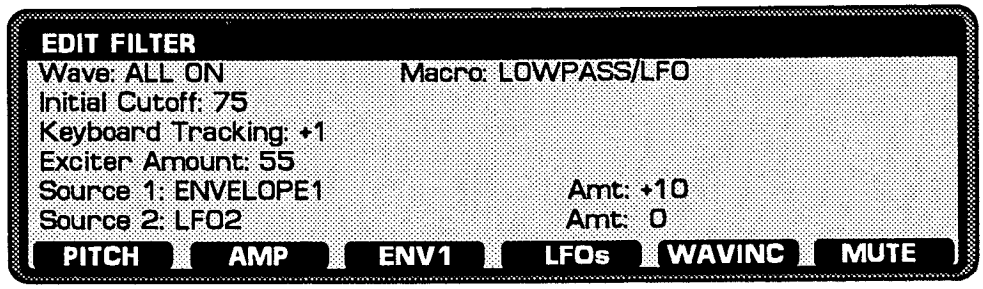
## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

# EDIT FILTER

**Path: EDIT - PATCH - MACROS - FILT**




The classic 24 db/octave low-pass filter sets the basic Patch timbre or shapes it over time in response to physical or electrical controllers.

For many instrumental sounds, you will usually use ENVELOPE 1 for Source 1.

## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Macro

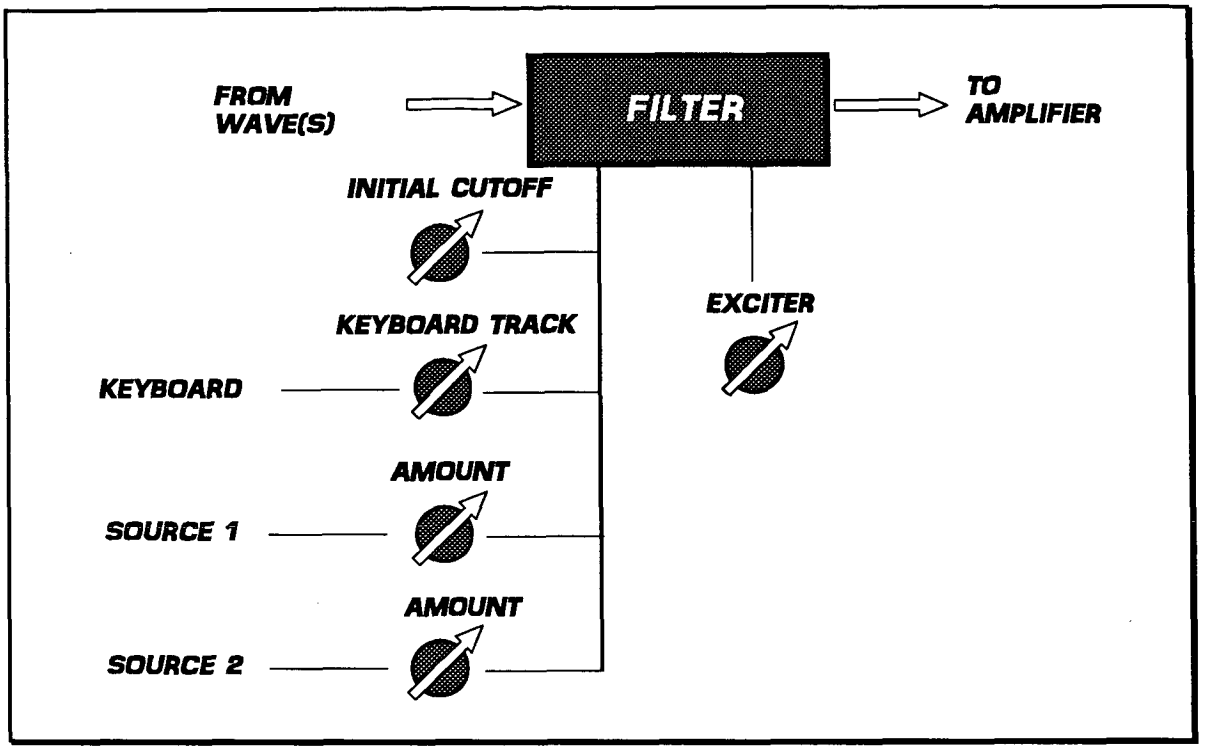
Any edits made to this page change the Macro label to USER. To cancel your edits, just re-select any internal macro. Specific Macro selections are listed under PATCH MACROS.

## Initial Cutoff

The basic tone control for subtractive synthesis.

0 - 99. Higher values set a higher cutoff, therefore a brighter timbre.

## Filter Block Diagram




## Keyboard Tracking

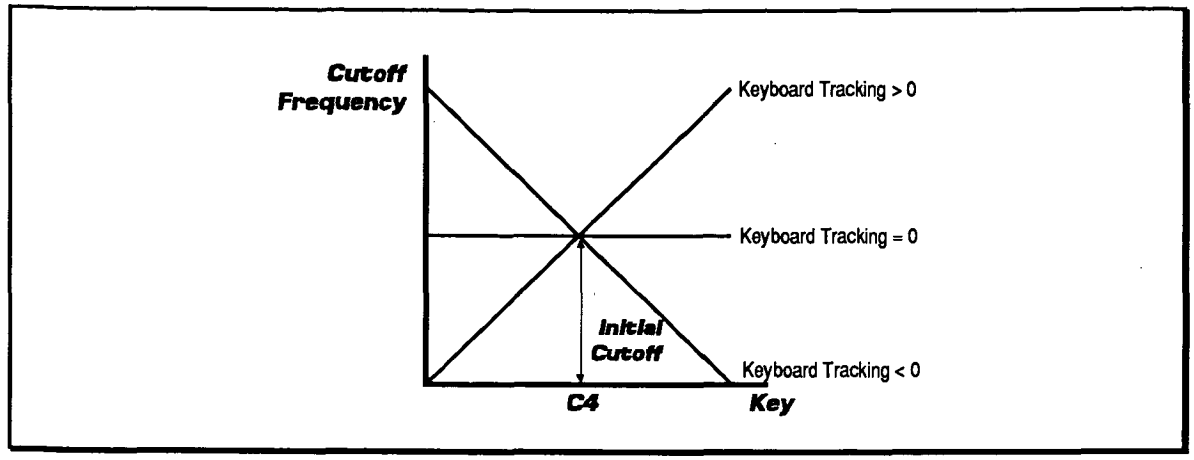
This controls how key position affects the filter cutoff.

+/- 127. You often want the cutoff frequency to track the keyboard so that the timbre remains consistent.

Positive values cause the Patch to get brighter as you play higher. This is a good effect to make use of in solo Patches.

If you are attempting to simulate acoustic instruments, you may find negative settings to be more useful. These make the lower pitches have a brighter timbre than the higher pitches.

The Keyboard Tracking is centered around C4. (This is the same as selecting CENTERED KEYBOARD as a modulation source.)




## Exciter Amount

0 - 99

Increasing the exciter amount extends and clarifies the higher frequencies.

## Source / Amount 1, 2

The modulation sources can be any of those listed in the discussion of the PATCH MACRO page.

Each modulator can have its own level and a normal or inverted (+/- 127) effect.

## PITCH

Goes to EDIT PITCH.

## AMP

Goes to EDIT AMPLIFIER ENVELOPE.

## ENV1

Goes to EDIT ENVELOPE 1.

## LFOs

Goes to EDIT LFO 1.

## WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

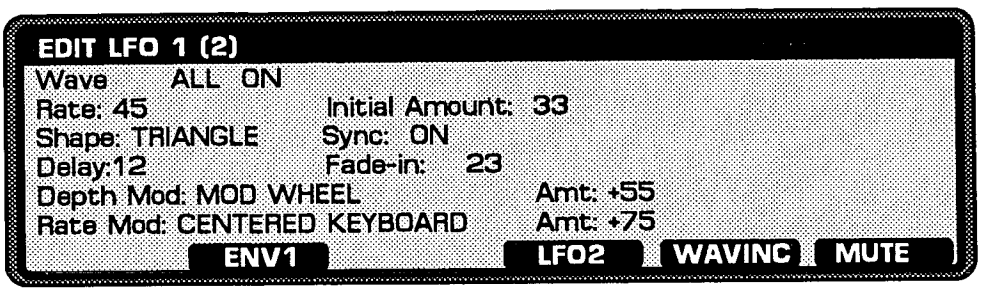
## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

# EDIT LFO 1 (2)

**Path: EDIT - PATCH - MACROS - (Module) - LFO1**




## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Rate

0-99. Speed of LFO.

## Initial Amount

0-127. Basic depth of LFO.

## Shape

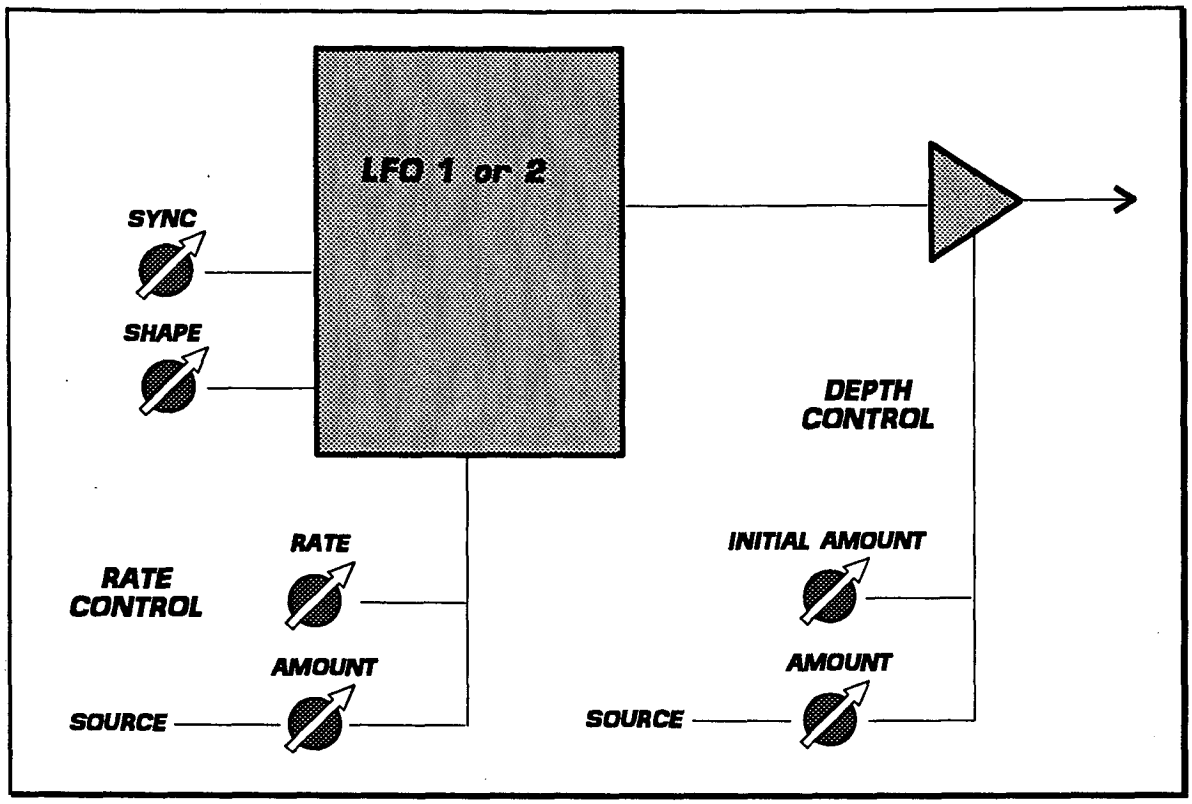
LFO shapes are TRIANGLE, SQUARE, SAWTOOTH and RAMP.

## Sync

DISABLE. LFOs are free-running.

ENABLE. The LFOs can be synchronized to start at Key On. This way, the modulation always starts on a positive phase. This is useful for preventing the attack of note from being swallowed by the negative modulation phase.

## LFO Block Diagram




### Delay

Time from key down to start of LFO fade-in.

### Fade-in

After initial delay, the duration of the LFO fade-in.

The time it takes the LFO to fade in to the initial amount.

### Depth Mod Amt

+/- 127. Source control for modulation of the LFOs output.

### Rate Mod Amt

+/- 127. Source control for modulation of the LFOs rate.

### ENV1

Goes to EDIT ENVELOPE 1.

### LFO1 / LFO2

Goes to EDIT LFO 1 or EDIT LFO 2.

## WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

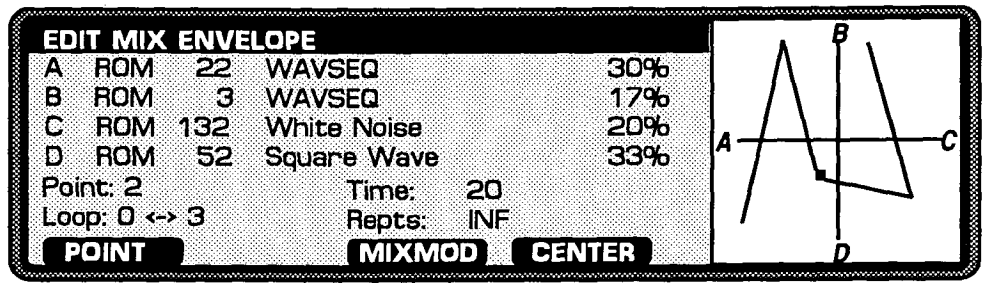
## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

# EDIT MIX ENVELOPE (VECTOR SYNTHESIS)

Path: EDIT - PATCH - WAVES - MIXEV




If the Patch is in 2 oscillator mode, the B-D axis (Y-AXIS) disappears. You are left with a one-dimensional dynamic synthesis.

If you have selected a 1-oscillator Structure, you can't access this page.

All three envelopes in the Wavestation (Amplifier, Mix, and Envelope 1) have four segments. The Mix envelope can be set to loop over a range of points (which is, in effect, a miniature form of Wave Sequencing).

## Wave

Waves 0-31 in each bank are Wave Sequences.

Waves 32 and up are ROM waves -- single cycles, multi-samples, attack transients.

PCM ROM cards hold waves numbered from 32 up.

## Mix Percentages

Use the joystick to adjust the mix percentages of the currently selected point. The total is always 100%.

## Point

The current point number. Pressing the POINT switch repeatedly increments the point number. On the envelope graph, the current point is marked with a square.

## Times

The duration of the selected envelope segment. The envelope times adjust the rate at which the note develops.

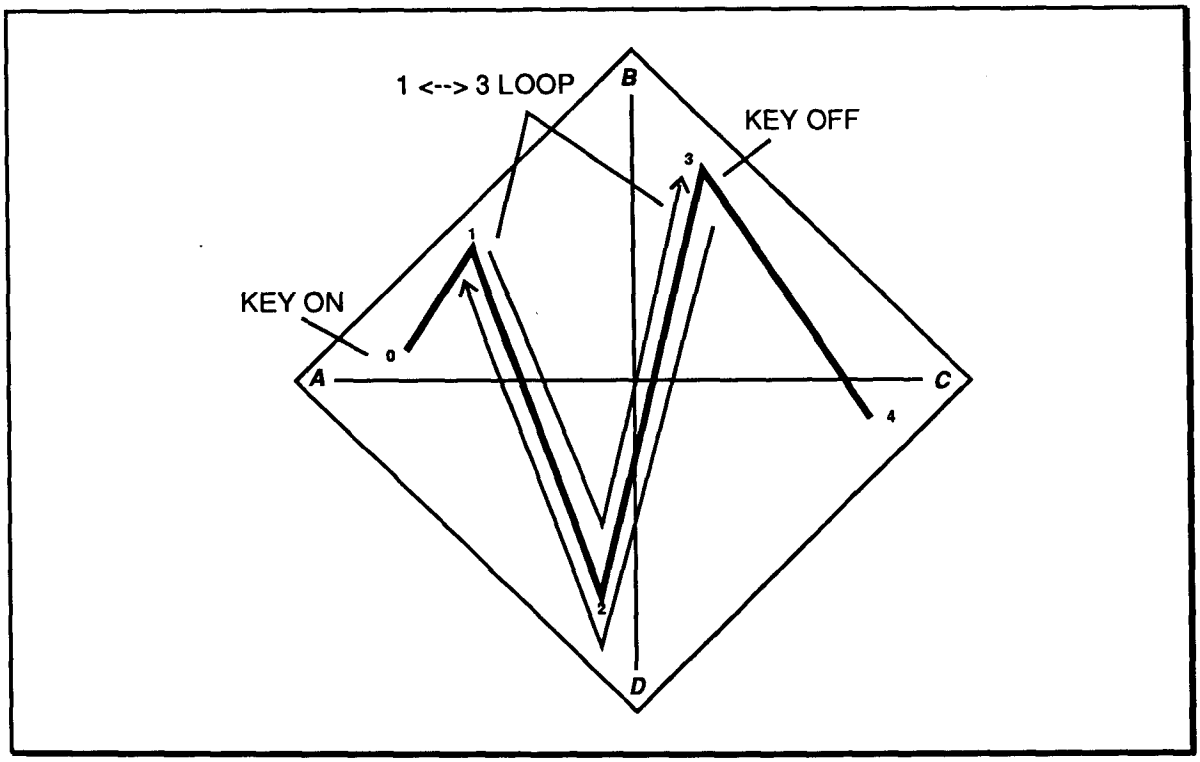
## Loop

Normally, when the key is held, the oscillator mix stays at point 3. However, you can set a loop so that while the key is held, the mixture moves between point 3 and any of the previous points.

OFF is the default.

Forward
0 --> 3
1 --> 3
2 --> 3
Bidirectional
0 <--> 3
1 <--> 3
2 <--> 3

## BIDIRECTIONAL 1 <--> 3 example:




## Repeats

This parameter only matters if envelope looping is on.

OFF means the loop does not repeat.

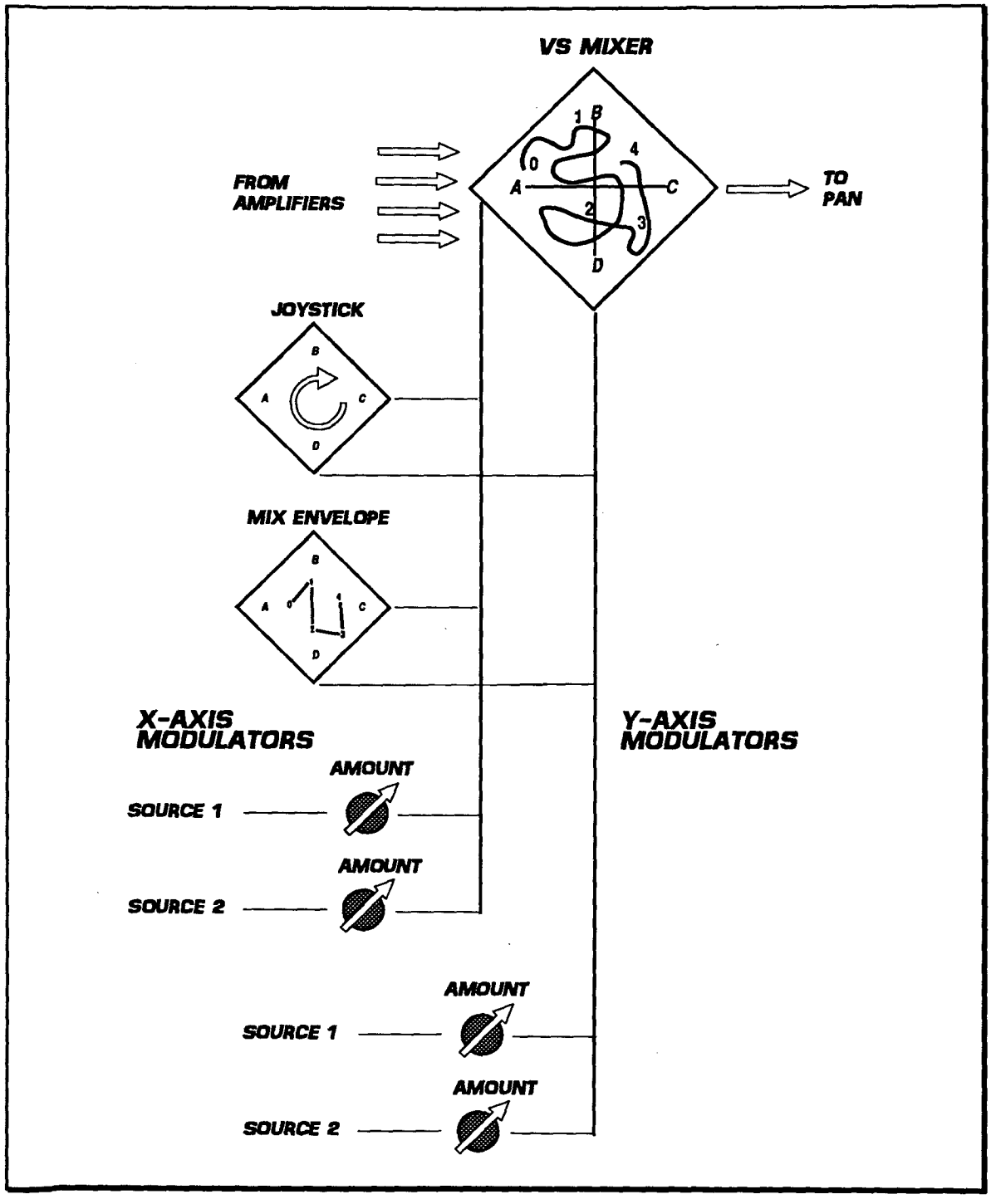
1 - 126 limit the looping to a specific number.

INF repeats continue through the amp envelope release phase.

## POINT

Increments the Point parameter. On the envelope graph, a small square indicates the current point.

## Mix Block Diagram




### MIXMOD

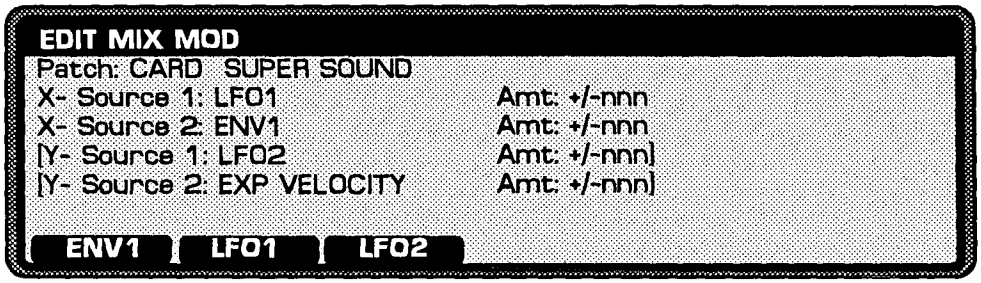
Goes to EDIT MIX MODULATION.

### CENTER

Centers the current point. In other words, sets all mix percentages equal.

# EDIT MIX MOD

Path: EDIT - PATCH - WAVES - MIXEV - MIXMOD




Either of the two mixer dimensions can have two modulating sources in addition to the mixer envelope (and joystick).

The Y-Axis source lines appear only when the Structure is four oscillators.

If Structure is 1 oscillator, you can't get here.

Please see the Mix Block Diagram in the EDIT MIX ENVELOPE section.

## Patch

The current Patch being edited.

## Source / Amount 1, 2

The modulation sources can be any of those listed in the discussion of the PERFORMANCE MACRO page.

Each modulator can have its own level and a normal or inverted (+/- 127) effect.

## ENV1

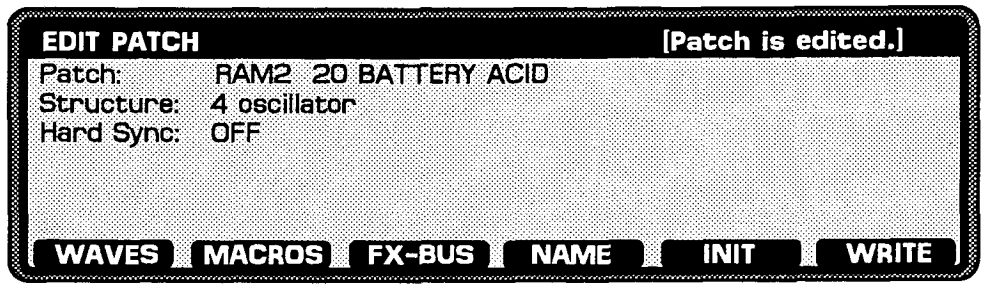
Goes to EDIT ENVELOPE 1.

## LFOs

Goes to EDIT LFO 1 or EDIT LFO 2.

# EDIT PATCH

**Path: EDIT - PATCH**




For an introduction to Patches, please see Chapter 8, "Patch Tour," in the Player's Guide.

Patches are the sonic backbone of the Wavestation. There can be up to eight Patches in a Performance. You can draw these from 35 Patches per bank.

## Patch

Desired Bank and Patch Number/Name.

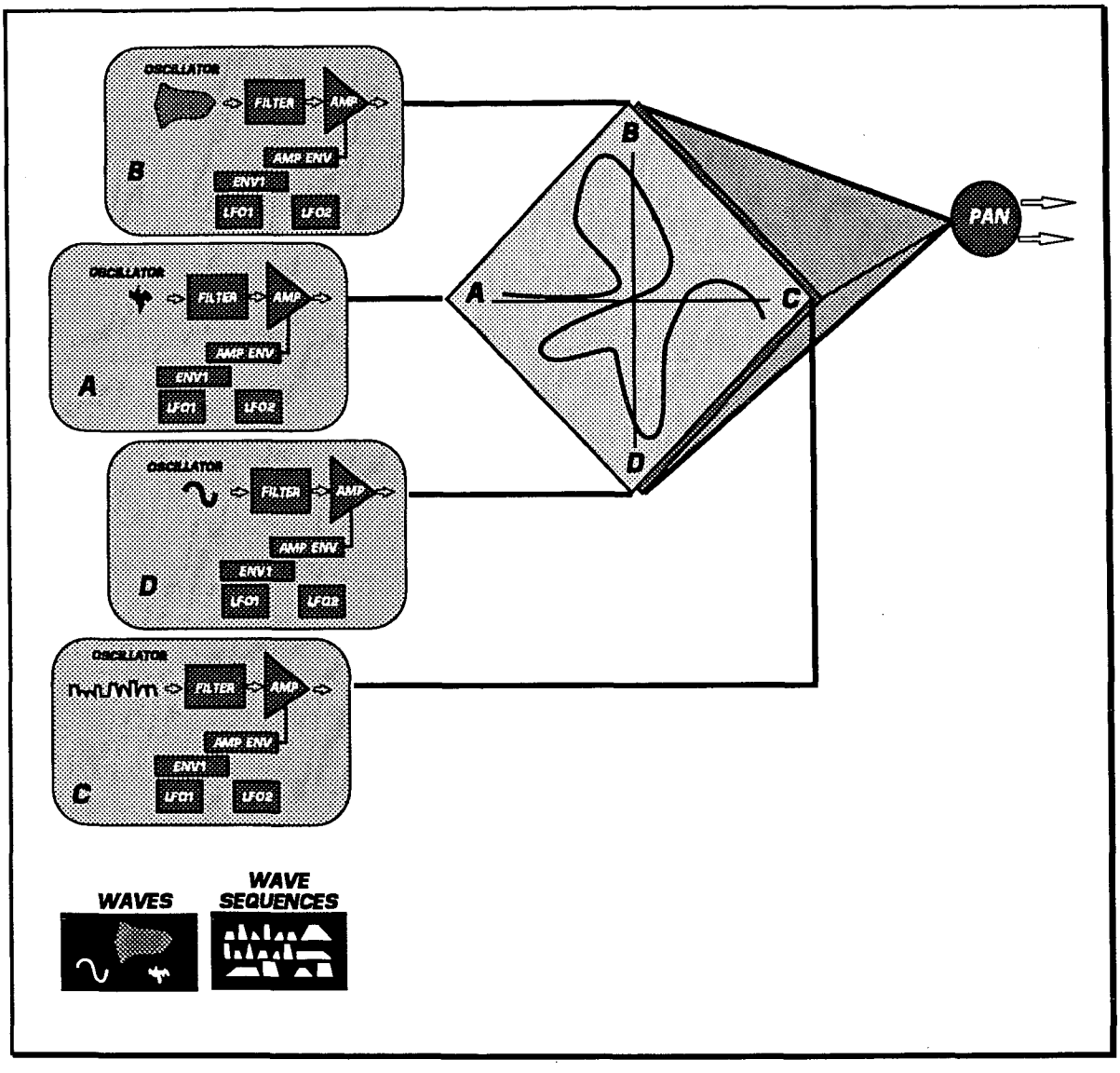
**NOTE**: Selecting a different Patch changes the Patch pointed to by the currently selected Part. This causes the current Performance to be edited.

## Structure

There are 32 oscillators, and this parameter is how you allocate them to Patches. Four, two, or one oscillator Structures may be selected.

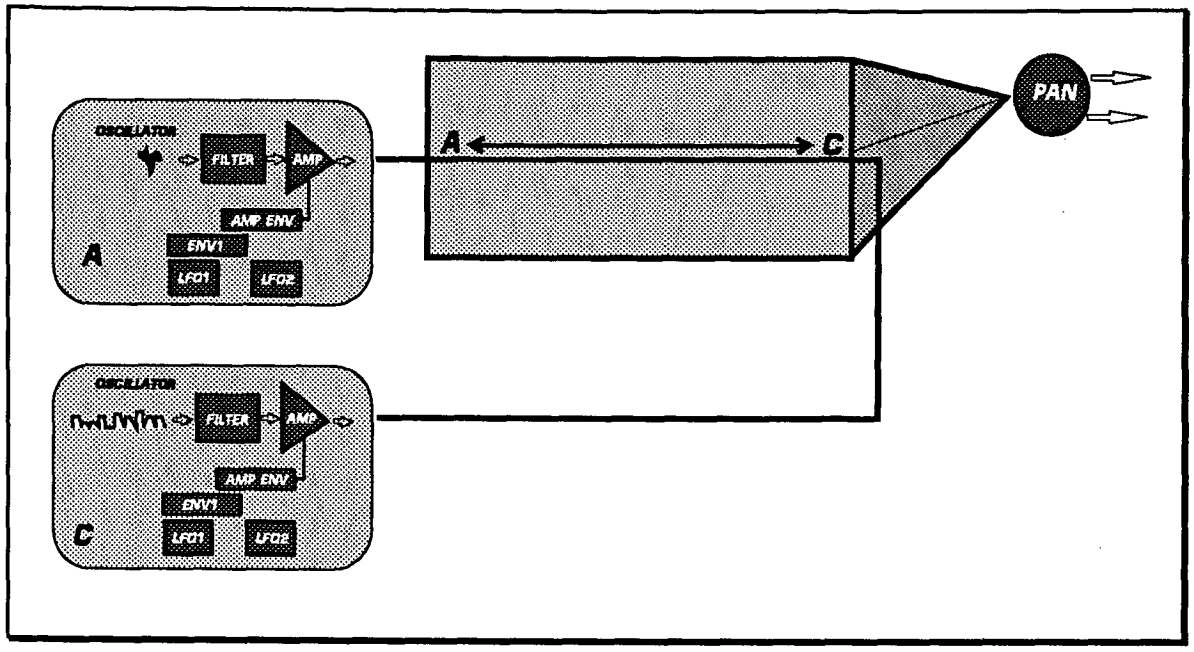
## 4-Oscillator Structure

Four-oscillator Patches have the richest sound. They also qualify for Vector Synthesis treatment through the two-dimensional dynamic mixer. Any oscillator can use Waves or Wave Sequences.



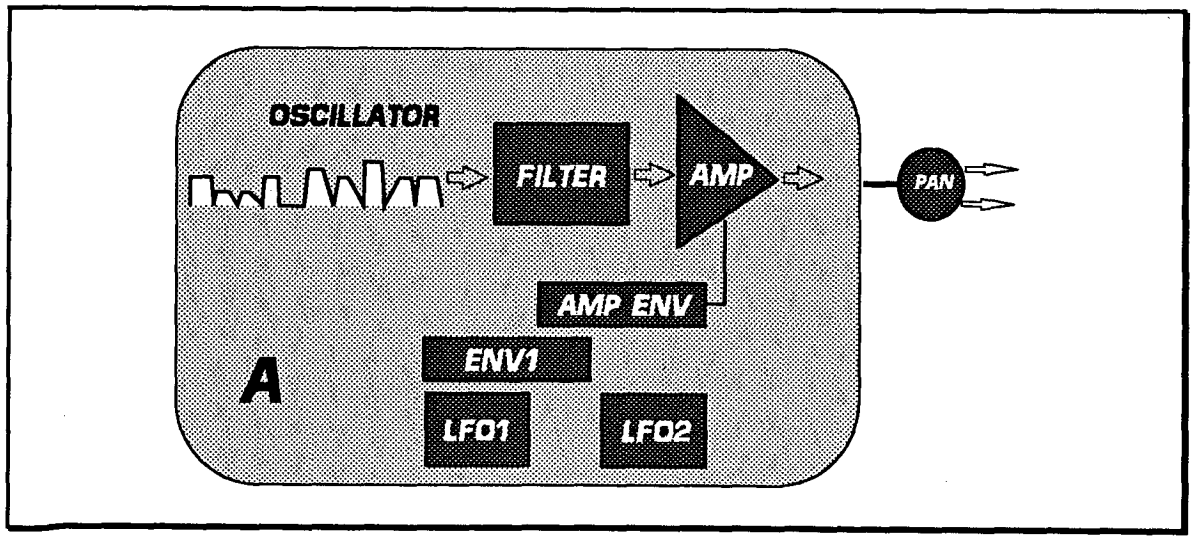
## 2-Oscillator Structure

Two-oscillator Patches allow one-dimensional, linear mixing.




## 1-Oscillator Structure

Single-oscillator Patches do not offer any dynamic mixing or hard sync. But since the oscillator can use Wave Sequences, single-oscillator Patches are still capable of interesting sounds.



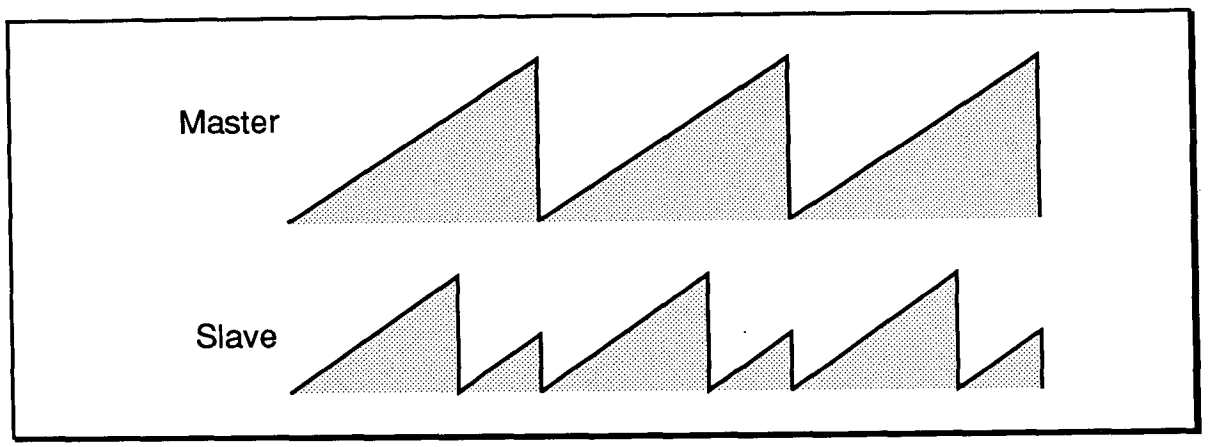
## Hard Sync

The "hard sync" function is only available if the Patch has a Structure of two or more oscillators.

OFF is the default. The oscillators are free-running.

ON means that oscillator C (and B/D, if four-oscillator) is synced to A.

Hard sync means that whenever oscillator A starts a new cycle, all the other oscillators start their cycles as well. But since the *periods* of the "slave" oscillators are usually different than the master's (because they are playing different pitches), the waves of the slave oscillators are re-shaped "in sync" with the master. The abrupt cutoff of the slave waves creates a new, harmonically-rich timbre.




Since the overall timbre depends upon the pitch relationship between the slaves and the master oscillator, you can vary the timbre by modulating the pitch of the slaves. The pitch shift can be subtle (usually by LFO) or extreme (usually by envelope), as in the case of the classic "swept-sync" patch.

## WAVES

Goes to WAVES.

## MACROS

Goes to PATCH MACROS.

## FX-BUS

Goes to PATCH BUS ASSIGNMENT.

## NAME

Goes to NAME PATCH.

## INIT

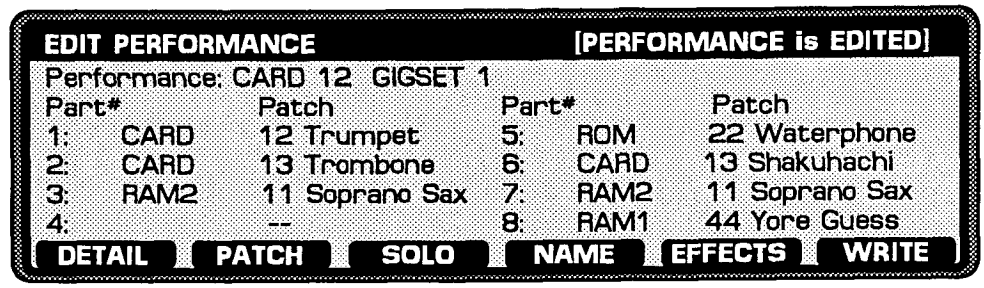
Goes to INITIALIZE PATCH.

## WRITE

Goes to WRITE PATCH.

# EDIT PERFORMANCE

**Path: EDIT**




For an introduction to Performances, please see Chapter 6, "Performance Tour," in the Player's Guide.

Performances have no sound of their own. Instead, Performances "point to" Patches which are the basic instrumental unit of sound, and organize them in various ways.

Each of eight Parts in a Performance contain a Patch. In addition, Parts can customize Patches in a variety of ways, through the KEY and VELOCITY ZONES and PERFORMANCE PART DETAILS pages (and EFFECTS).

Changing the Patches which are assigned to its Parts is one way to change the sound of a Performance. The other way is to edit the Patches themselves.

## Performance

The number and name of the Performance being edited.

## Part

There are eight Parts in a Performance. Unused Parts can be assigned an "empty" Patch (--).

## Patch

You can add or change a Part's Patch simply by scrolling the desired Number or Bank.

If no Patch is desired, select "--", by dialing the Patch number field fully counter-clockwise.

To add a Patch, cursor to "--" and press INC, dial, or enter the number from the keypad.

## DETAIL

Goes to PERFORMANCE PART DETAIL.

## PATCH

Goes to EDIT PATCH and allows editing of the Patch in the currently selected Part.

## SOLO

SOLO allows the current Part to be heard by itself.

## NAME

Goes to NAME PERFORMANCE.

## EFFECTS

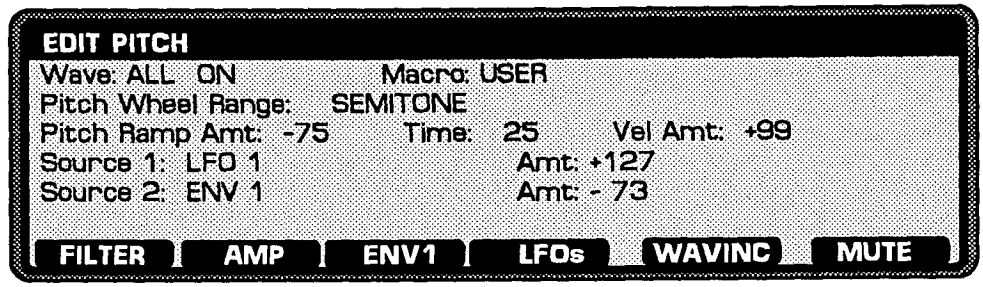
Goes to EFFECTS.

## WRITE

Goes to WRITE PERFORMANCE.

# EDIT PITCH

Path: EDIT - PATCH - MACROS - PITCH




The Pitch module controls the frequency modulation of the Patch waves.

A Pitch Ramp is included, which lets you start the note a bit flat or sharp, at an amount controlled by velocity. Subtle nuance and inflections such as these contribute expressiveness to synthesized sounds.

## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

## Macro

Any edits made to this page change the Macro label to USER. To cancel your edits, just re-select any internal macro. Specific Macro selections are listed under PATCH MACROS.

## Pitch Wheel Range

GLOBAL means that the Patch's bend range will be set by the Pitch Wheel Range parameter on the GLOBAL page. (See the Player's Guide.)

OFF, SEMITONE, WHOLETONE, MINOR 3RD, MAJOR 3RD, PERFECT 4TH, DIMINISHED 5TH, PERFECT 5TH, MINOR 6TH, MAJOR 6TH, MINOR 7TH, MAJOR 7TH, OCTAVE. These values override the GLOBAL settings.

### Pitch Ramp Amt

+/- 127. The difference between initial and base pitch.

### Pitch Ramp Time

0 - 99, ON. Time for pitch to change from initial pitch to base pitch.

ON keeps the pitch at the initial pitch value infinitely.

### Pitch Ramp Vel Amt

+/- 127. This controls the sensitivity of the pitch ramp time to velocity.

0 means there is no effect. Positive values convert harder playing into faster ramps. Negative values create slower ramps from harder playing.

### Source / Amount 1, 2

The modulation sources can be any of those listed in the discussion of the PATCH MACRO page.

Each modulator can have its own level and a normal or inverted (+/- 127) effect.

### FILTER

Goes to EDIT FILTER.

### AMP

Goes to EDIT AMPLIFIER ENVELOPE.

### ENV1

Goes to EDIT ENVELOPE 1.

### LFOs

Goes to EDIT LFO 1.

### WAVINC

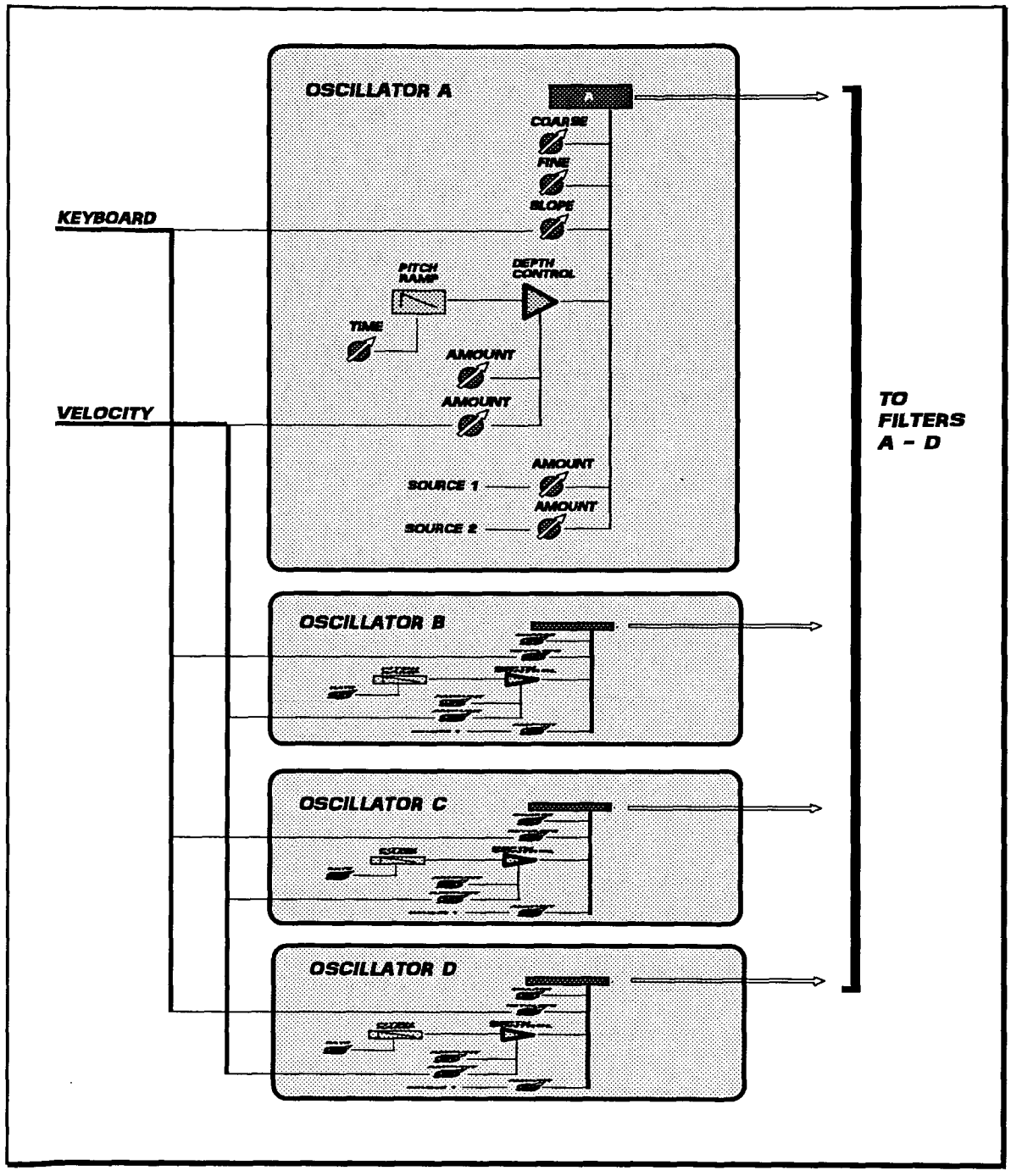
Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

### MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

## Pitch Block Diagram



# EDIT SCALE

**Path: GLOBAL - SCALE**

The PERFORMANCE PART DETAIL page includes a Scale field which allows you to select a different intonation for each Part.

There are 16 tuning tables; four in ROM and 12 user-defined in RAM.

Scales are in non-volatile internal RAM only. They cannot be saved on cards.

## Scale Type

The ROM tables are:

EQUAL TEMPERAMENT 1. Normal Default. Widely used keyboard tuning.

EQUAL TEMPERAMENT 2. This includes random detuning good for acoustic simulations.

PURE MAJOR and PURE MINOR, both of which produce *justly intoned* diatonic chords relative to a specific tonic key. If Scale Type is Pure Major or Pure Minor, a Tonic key also needs to be selected on the PERFORMANCE PART DETAIL page. (To the extent you play in keys unrelated to this tonic, the keyboard may sound out of tune.)

There are also USER 1 - 12.

## Step Adjustment

The fine-tuning parameters for each of the twelve keys in an octave are laid out on the page somewhat like a keyboard. Cursor to the desired "key" and adjust its tuning offset. This offset is repeated for all octaves of that step.

For each USER scale you can offset each step by +/- 99 cents. There is a "USER SCALE is EDITED" notice in the top line.

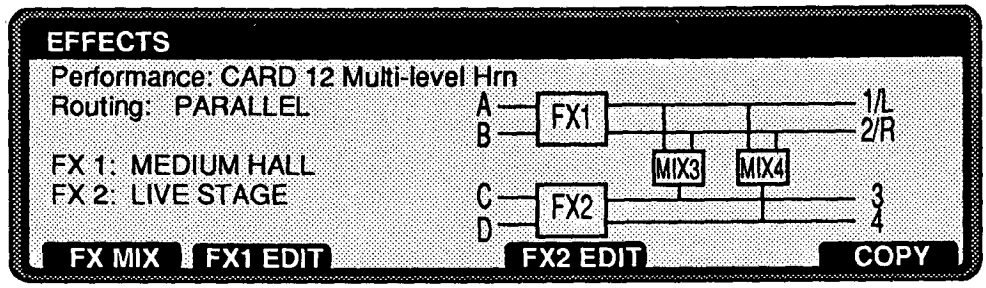
## WRITE

Goes to WRITE SCALE.

# EFFECTS

**Paths: EDIT - EFFECTS**

**MIDI - MULTISET - EFFECTS**




For a general discussion of the effects system, please see Chapter 7, "Effects Tour," in the Player's Guide.

**NOTE**: Performance effects may only be edited when the MIDI mode is set to OMNI or POLY; MULTI MODE Setup effects may only be edited when the MIDI mode is set MULTI or MONO.

## Performance

The current Performance (or MULTI MODE Setup) to which the effects parameters belong.

## Routing

PARALLEL or SERIES, as explained in the Player's Guide.

## FX 1/2

These are the effects program selectors for each FX. A complete list of the effects programs is under EDIT EFFECTS 1/2.

## FX MIX

Goes to EFFECTS MIX.

## FX1 / 2 EDIT

Goes to EDIT EFFECTS 1/2.

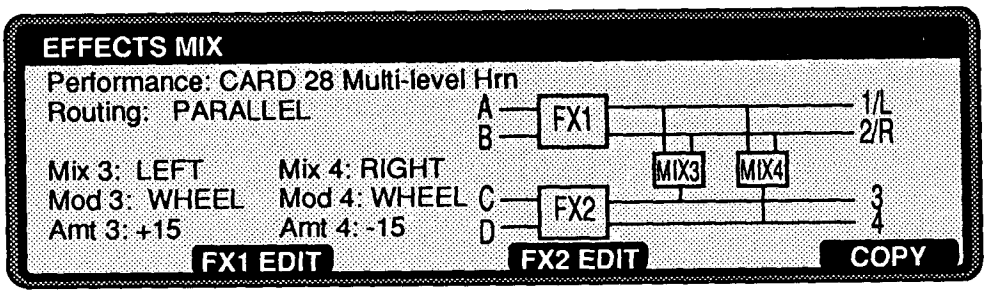
## COPY

Goes to COPY EFFECTS - ALL.

# EFFECTS MIX

**Paths: EDIT - EFFECTS - FX MIX**

**MIDI - MULTISET - EFFECTS - FX MIX**




**NOTE**: Performance effects may only be edited when the MIDI mode is set to OMNI or POLY; MULTI MODE Setup effects may only be edited when the MIDI mode is set MULTI or MONO.

## Performance

The current Performance (or MULTI-MODE Setup), to which the effects parameters belong.

## Routing

SERIES or PARALLEL operation.

## Mix 3/4

Both configurations include Mix 3/4 parameters. In both cases, the Mix 3 and Mix 4 parameters control the initial mixture levels. The parallel mix is a stereo pan. The series mix is a wet/dry assignment to effect 2 with Bus C panned hard left, and Bus D hard right. The configuration diagrams (in the Player's Guide) show how the mixture function changes with the configuration.

## Mod 3/4

The Mod parameters allow you to achieve dynamic control over the MDE mix in the configuration. For example, you can easily control reverb or flanging depth from a footpedal.

Mod 3 and 4 allow you to pick a controller for varying the initial levels set by Mix 3 and Mix 4. The controller choices include:

| SYMBOL | Modulation Source |
|---|---|
| NONE | No modulation |
| WHEEL | Mod wheel |
| AT | Channel aftertouch |
| VEL | Last Note-On velocity (Not gated by Note-Off) |
| KEY | Highest key number; if none down, then last key |
| ENV | Summed amplitude envelopes of all buses |
| KEYDN | Key down gate |
| FSW | Footswitch momentary, push-on/release-off (Set FOOT ASSIGN |
| FSWTOG | Footswitch toggle, push-on/push-off to EFFECTS SWITCH) |
| PEDAL | Footpedal (Set FOOT ASSIGN to MODULATION) |
| XMIDI1 | MIDI Controller 1 |
| XMIDI2 | MIDI Controller 2 |
| WH+AT | Sum of mod wheel and chan aftertouch |
| JOY-X | Horizontal axis Joystick controller |
| JOY-Y | Vertical axis Joystick controller |

## Amt 3/4

These are the depth of the modulation controller (Mod 3 or 4).

Positive amounts move the mix from left to right or from dry to wet. Negative amounts do the opposite.

## FX1 / 2 EDIT

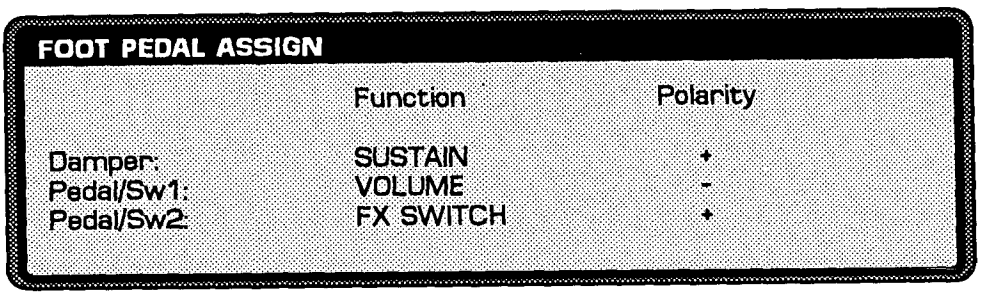
This switch takes you to the EDIT EFFECT 1(2) parameter pages.

## COPY

Goes to COPY EFFECTS - MIX.

# FOOT PEDAL ASSIGN

**Path: GLOBAL - FOOT**




Here is where you program the three foot control inputs. For the desired input, set the function and polarity, as follows.

The DAMPER input is a switch, and any switch function can be selected.

The ASSIGNABLE jacks accept either a switch or a pedal.

## Function

VOLUME allows the pedal to control the Part volume level as well as transmit MIDI Controller 7.

MOD PEDAL allows the pedal to be a modulation source transmitting as MIDI Controller 4 (Foot Controller). This is the "PEDAL" mod source on the EFFECTS MIX and EDIT EFFECT 1 (2) pages.

SUSTAIN is the default choice for the Damper footswitch, simulating a piano pedal (and transmitted as MIDI Controller 64).

EFFECTS SWITCH transfers the pedal for use by the Effects section. This is the FSW and FSWTOG Mod sources on the EFFECTS MIX and EDIT EFFECT 1/2 pages.

PERF ADVANCE means that stepping on the footswitch selects the next Performance.

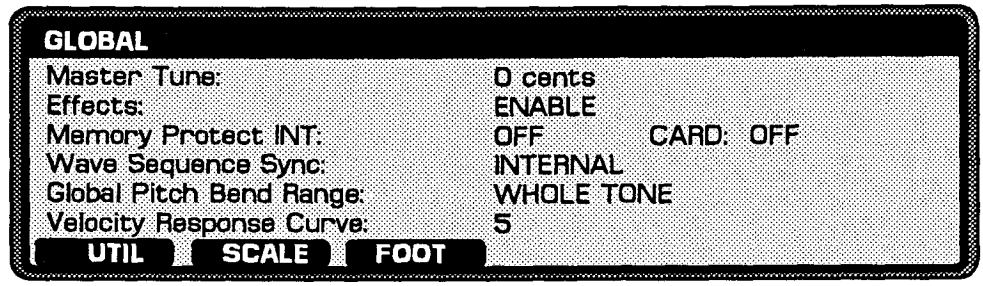
DISABLE ignores the input.

## Polarity

This field changes the polarity of the switch or pedal.

# GLOBAL

Path: GLOBAL




The specific parameters are explained below. In general, to adjust any of these parameters:

## Master Tuning

For a discussion of this parameter, please see section 4.12 in the Player's Guide.

## Effects

This Effects setting overrides all Performance Effect programming by disabling the Multi Digital Effect (MDE) processor.

ENABLE, the default, means that the effects are programmed by the Performance. This is the normal mode of operation.

DISABLE means that the MDE effects are disabled. (Routing is disabled as well; Buses A - D go to outputs 1 - 4.) Two examples of why you might to use this mode are 1) during programming, to ensure that effects aren't added to Performances under construction, and 2) in performance in reverberant rooms or with large groups, you might want to quickly strip out your processing in favor of a "dry" sound, without having to edit and save Performances.

## Memory Protect Internal

ON, the default, means that protection is enabled; therefore, saving is prohibited. When learning your way around, or if a stranger passes through, this setting will allow any parameter changes without fear that you will lose the factory settings.

OFF means that saving is allowed.

Another way to arrange for memory protection, in the form of back-up, is to send MIDI System Exclusive data dumps to an external device.

For convenience, this parameter is also available on the WRITE page.

## Memory Protect Card

This protection applies only to Performance RAM cards. (ROM cards don't need it.)

ON, the default, means that protection is on; therefore, saving is prohibited.

OFF means that saving is allowed.

In addition, RAM cards have their own Protect On/Off switches. To preserve card battery life, leave this hardware protection switch on when not saving.

For convenience, this parameter is also available on the WRITE page.

## Wave Sequence Sync

INTERNAL is normal. This means that Wave Sequences sync to an internal clock. MIDI clocks are ignored.

MIDI means that Wave Sequences sync to MIDI clocks. The number of MIDI clocks for each step is taken from the Step Duration parameter.

## Global Pitch Bend Range

Each Patch can select this global setting or use its own bend depth parameter.

The Range is OFF, SEMITONE, WHOLETONE, MINOR 3RD, MAJOR 3RD, PERFECT 4TH, DIMINISHED 5TH, PERFECT 5TH, MINOR 6TH, MAJOR 6TH, MINOR 7TH, MAJOR 7TH, OCTAVE.

Set the Pitch bend range for the maximum depth you like.

## Velocity Response Curve

Velocity Response Curve matches your playing style to the keyboard. Eight curves can be selected. (MIDI input to the Wavestation is unaffected by this setting.)

Start with curve 4 and adjust up or down to achieve the desired feel, as well as to match the response of other sound sources which may be MIDI'd together. Experiment with different settings for a few days before deciding which one works best.

## UTIL

Goes to UTILITIES.

## SCALE

Goes to EDIT SCALE

## FOOT

Goes to FOOT PEDAL ASSIGN.

# INITIALIZE (PART, PATCH)

Paths: *Part* EDIT - DETAIL - INIT

*Patch* EDIT - PATCH - INIT

The INITIALIZE function operates similarly on both Parts and Patches. It sets neutral, default parameters for building an object from scratch.

If INIT is selected, an "Are you sure. . .?" warning message appears. Pressing YES confirms the operation.

## Type and Item

The Data Type field depends on what object was selected when you pressed INIT.

Exiting the INIT page returns to the page active prior to entering INIT.

Data Type cannot be edited from this page.

## YES

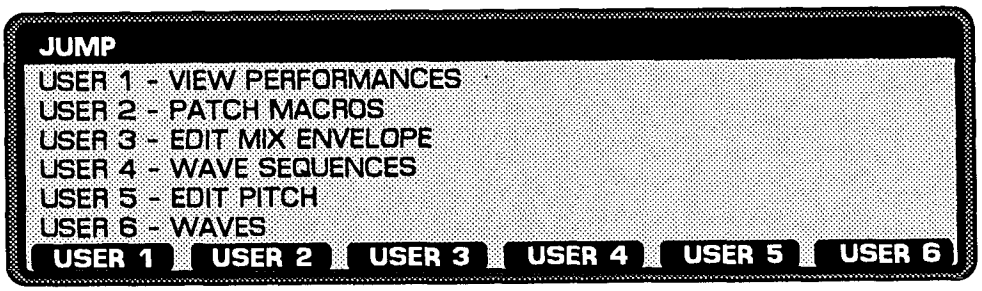
Starts the operation.

## NO

Stops the operation and exits.

# JUMP

**Path: Click the JUMP/MARK switch.**




This page shows the current assignment of each MARK key.

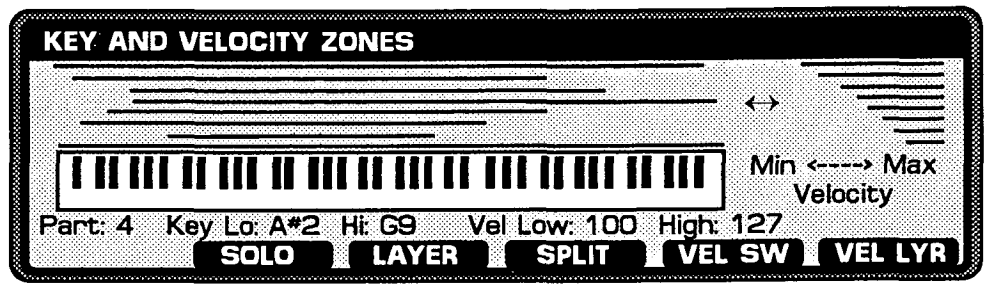
To immediately go to the page listed, press the desired key.

Double clicking the JUMP/MARK switch goes to the MARK page.

EXIT returns to the previous page.

# KEY AND VELOCITY ZONES

Path: EDIT - DETAIL - ZONES




For an introduction to Performances, please see Chapter 6, "Performance Tour," in the Player's Guide.

## Part

Dial the selected Part here. The double arrow moves up and down to show you which line contains the current settings.

## Key Low - High

The note range defaults to the extremes of C-1 and G9.

The key limits can be entered by the keyboard or with the scroll knob.

## Velocity Low - High

The velocity range defaults to the extremes of 0 and 127.

The velocity limits can be entered by the keyboard or with the scroll knob.

## SOLO

SOLO allows the current Part to be heard by itself.

## LAYER

This switch sets the key and velocity ranges for each Part to their limits.

## SPLIT

The SPLIT function creates zones of equal ranges, depending on how many Parts aren't empty. For example, if there are four non-empty Parts, each gets a quarter of the keyboard. The lowest Part number is the bass-most range, and the highest Part number is the treble-most range.

SPLIT assumes a five-octave keyboard.

## VEL SW

If Velocity Switch is pressed, the current Parts will be distributed over the velocity range of 0-127. If there are only two active Parts, the Velocity Switch point defaults to 100.

## VEL LYR

This is similar to VEL SW, except that instead of forming discrete velocity zones, the zones overlap.The PERFORMANCE PART DETAIL page sets the sound of the Part. But the ZONE page determines where and how the Part plays from the controller.

Automatic adjustments for layer, velocity switch, etc., are also done on the ZONES page.

This page has a double-arrow pointer that is moved vertically by the up/down cursors or by scrolling the Part field, selecting the current part for editing. The key and velocity limits can be entered by the keyboard, or with the scroll knob.

The traditional keyboard modes of single, layered, split, and the sampler-inspired velocity-controlled modes have evolved into a general-purpose system that permits any combination of key and velocity voicings.

For example, the former single mode is now a Performance with one Part, whose Key Limits are at the extremes C-1 and G9, with a Velocity Range of 0-127.

Double, Dual, or Layer mode is now a two-Patch Performance with similar zoning.

Split mode would be a two-Part Performance, with one Part zoned C-1 to B4 and the other zoned C5 - G9. In addition you might use the Transpose parameter (Part Detail) to move both Patches into the center of their playable ranges.

Since eight layers are available, though, virtually any arrangement of layering and splitting is possible.

The same is true of Velocity. You can arrange for complex velocity switching by thinking of each Part in velocity "splits," or for velocity layering by overlapping zones.

## *A ZONE EXAMPLE*

For example, the following figure is an example of a Performance in which the player can alter the instrumental mixture by range and by touch.

To make sure we understand this, let's look at the example from the point of view of each Part.

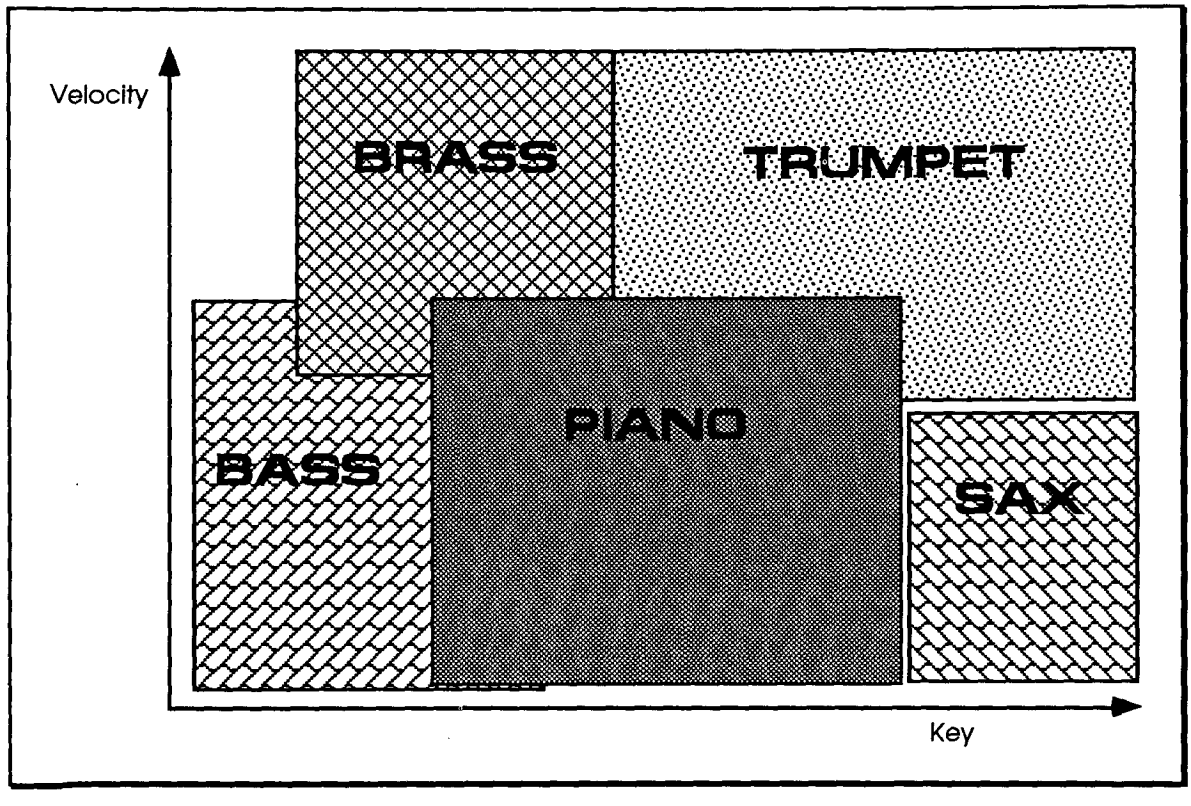
The Bass Patch plays on the bottom quarter of the keyboard, with a soft to medium touch.

The Piano plays across the middle half of the keyboard, also with a soft to medium touch.

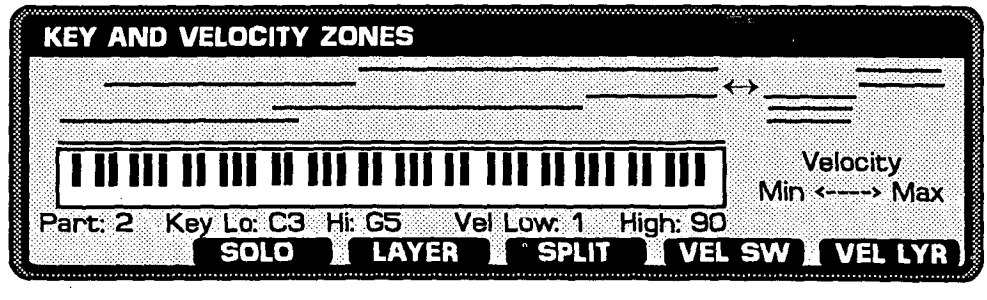
Sax plays at the high end of the keyboard, with low velocity.

As you play medium-loud in the bass end, the Brass part is layered with bass and piano, and with the Trumpet Part next to it.

The Trumpet Part takes over on loud notes played from the center and upwards.

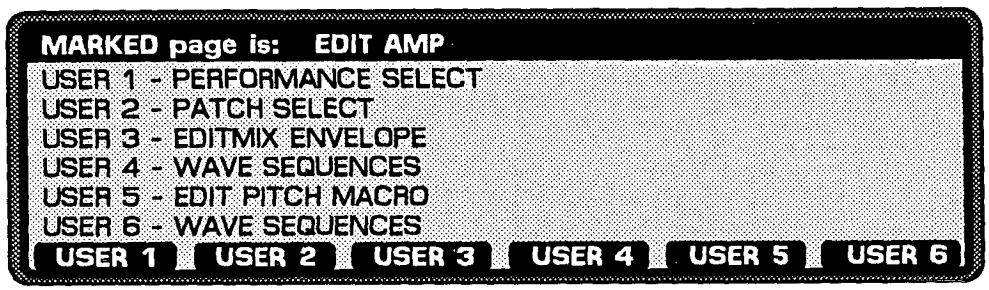



Assuming the Trumpet is Part 1 and the Bass is Part 5, setting up this example on the KEY AND VELOCITY ZONES page would produce a zone chart resembling this:



# MARK

**Path: Double-click the JUMP/MARK switch.**




You can use the MARK switch to set "bookmarks" on a display page.

The name of the marked page appears on the top parameter line. The page names are taken from the top line of each page.

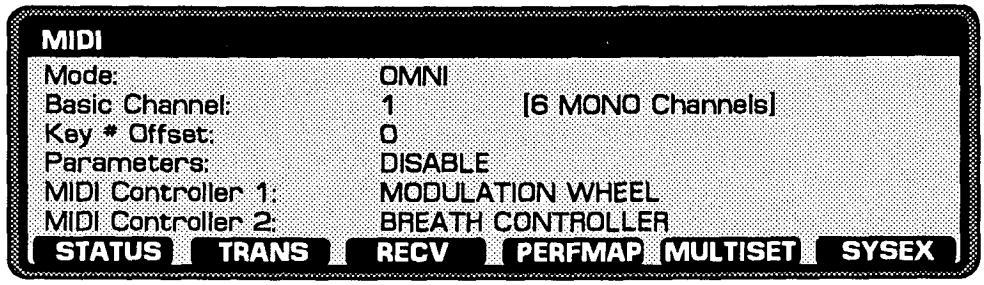
Pressing one of USER 1 - 6 assigns the marked page to that function switch. (No warning is given if you overwrite a location with a new one.)

JUMP/MARK goes to the JUMP page (toggles).

EXIT returns to the previous page, without marking.

# MIDI

**Path: MIDI**




For basic information on the MIDI page, please see Chapter 5, "Using MIDI," of the Player's Guide. See also MIDI RECEIVE and MIDI TRANSMIT.

## Mode

OMNI, POLY, MONO, MULTI. If Multi-Mode is selected, playback will be determined by the current MULTI MODE Setup (MULTISET).

## Basic Channel

This is the main channel select parameter.

If the Mode is MONO, an additional "Number of MONO Mode Channels" field appears. If using a guitar controller, you might set this to 6. The Channels reserved begin with the current Base Channel, up to the number of mono channels requested, to the limit of 16. For example, if 6 channels are requested and the base channel is set to 13, only channels 13, 14, 15, and 16 could be used. In other words, to use six MONO channels, you must set a Base Channel no higher than 11 (11, 12, 13, 14, 15, 16).

If Mode is MULTI, the basic channel is ignored in favor of the Multi-Mode Setups.

The basic channel is the channel number used to transmit and receive System Exclusive messages.

## Key# Offset

MIDI key numbers received or transmitted by the Wavestation will be transposed by this amount.

This has no effect on the local keyboard.

## Parameters

DISABLE. The Wavestation's parameters are not transmitted nor received. This is the default.

RECOGNIZE, TRANSMIT, RECOG & TRANS are options.

## MIDI Controllers 1 and 2

As explained in the Player's Guide, these parameters define the MIDI controllers available for the modulation matrix and effects modulation.

## STATUS

Goes to MIDI STATUS, an input indicator page. Please see section 5.4 in the Player's Guide.

## TRANS

Goes to MIDI TRANSMIT.

## RECEIVE

Goes to MIDI RECEIVE.

## PERFMAP

Goes to PERFORMANCE SELECT MAP. Please see section 5.11 in the Player's Guide.

## MULTISET

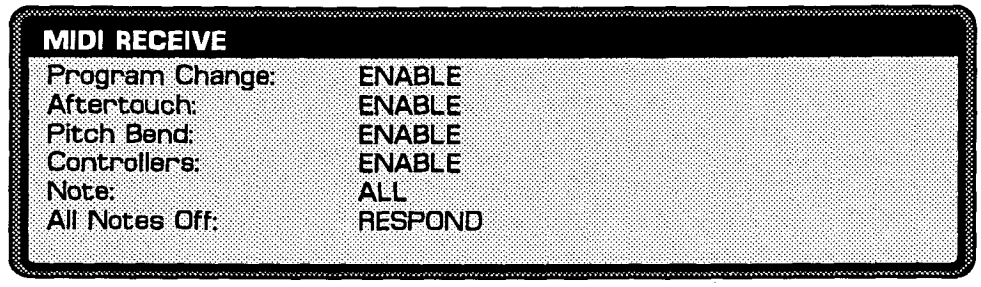
Goes to MULTI-MODE SETUP.

## SYSEX

Goes to SYSEX DATA TRANSMIT.

# MIDI RECEIVE

Path: MIDI - RECEIVE




The first four parameters all have the same possible values: DISABLE or ENABLE.

DISABLE means that the message type is ignored.

ENABLE means that the message type is recognized.

## Program Change

This parameter controls the reception of Program Change messages.

## Aftertouch

This parameter controls the reception of key or polyphonic aftertouch.

## Pitch Bend

This parameter controls the reception of Pitch Bend messages.

## Controllers

This parameter controls the reception of MIDI controller messages.

## Note

This parameter allows you to use two Wavestations side-by-side with the resulting doubled voice capacity. You simply set one to respond to even numbered notes, and set the other to respond to odd-numbered notes.

In such applications the two Wavestations would typically be programmed identically. (A MIDI bulk data dump command allows you to easily copy an entire machine's memory.) However, interesting results could be obtained by programming them differently.

ALL is normal. It means that the Wavestation recognizes all Note messages.

EVEN means that only the even note numbers are played.

ODD means that only the odd note numbers are played.

### All Notes Off

This parameter allows you to ignore the All Notes Off message, which is sent by some controllers to prevent undesired release of notes.

RESPOND means that when an All Notes Off message is received, all voices are immediately turned off (with release, just as if a Note Off was received).

IGNORE means that key events will be uninterrupted by All Notes Off messages.

## *MIDI RECEIVING*

The figure on the next page shows how you might use the Wavestation in a sequencer environment. In this setup, the Wavestation is programmed Multi-timbrally to simultaneously play several parts from the sequencer. In addition, you can play along with the sequence live from the keyboard.

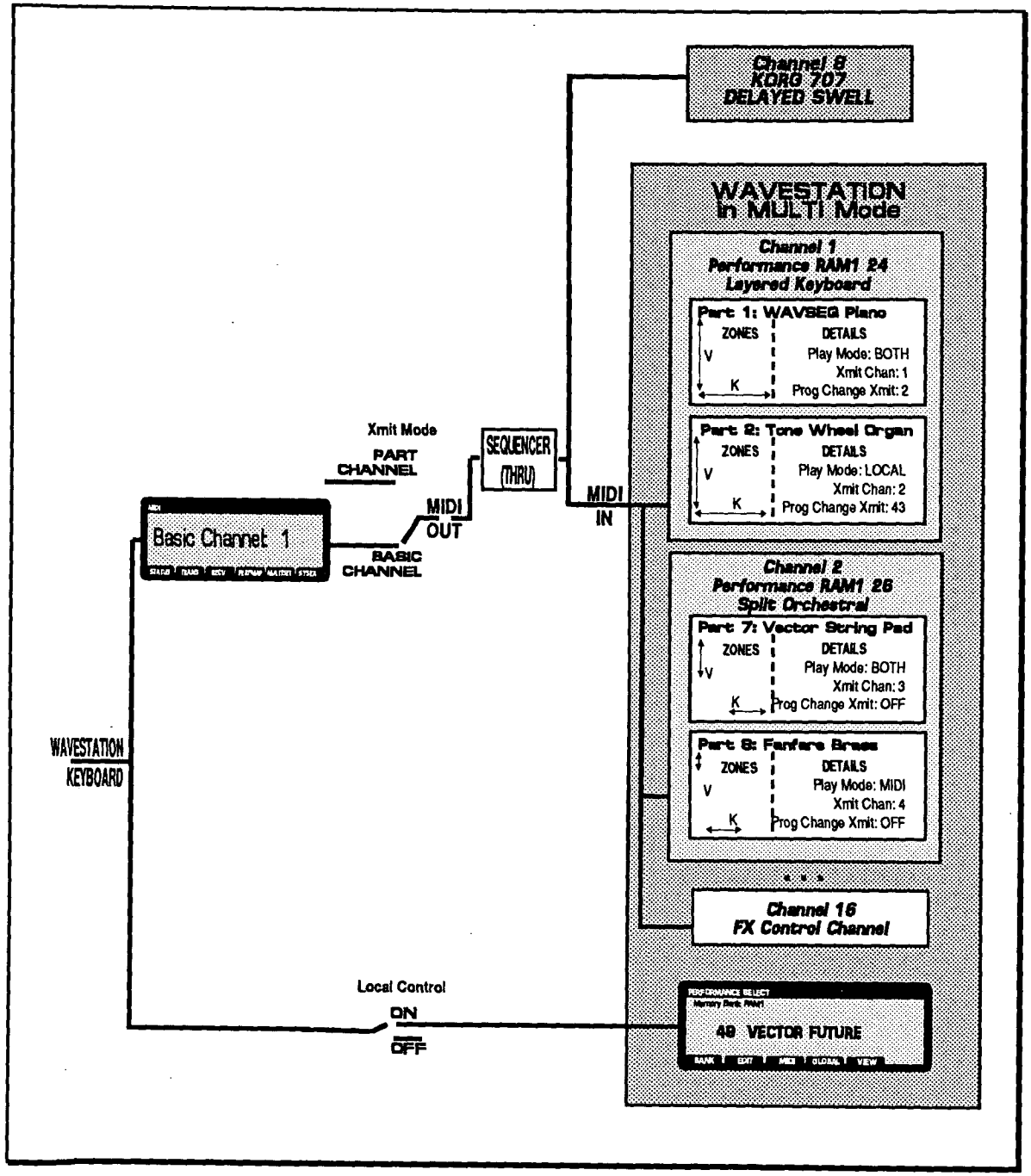
To create the sequence, you switched Local Control off, and routed Wavestation MIDI output through the sequencer. When recording, you selected each of the multiple timbres on the bus either by changing the Wavestation's Basic Channel setting, or letting the sequencer do it for you (if it is so equipped).

MIDI IN functions just like the local keyboard: it only plays Performances which have a Play mode of LOCAL or BOTH. Specifically, MIDI IN is not re-transmitted from Parts whose Play mode is MIDI. (Otherwise MIDI feedback could be created in the system.)

In the figure, Local Control is on, so the Wavestation plays whatever Performance is on the Performance Select page in addition to sequencer data. Since you do not want to pass keyboard data to the Multi-timbral input, you either switch the sequencer's THRU function off, or make sure that the Wavestation's Basic Channel is set to a channel other than one being played by the sequencer.

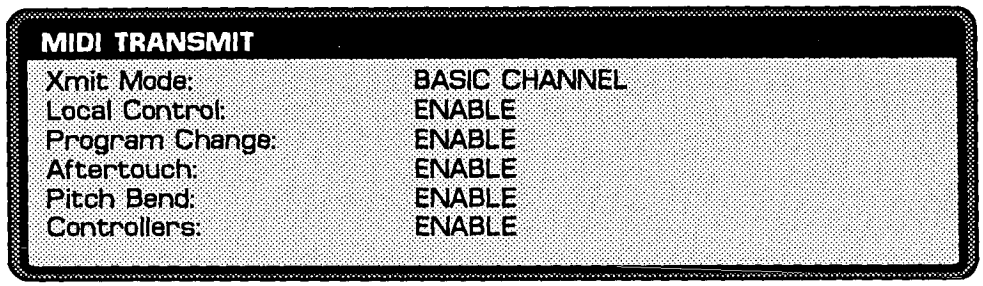
Since the local keyboard is functioning normally, all MIDI TRANSMIT functions are available, which means that local playing can still control an external sound rack. (See MIDI TRANSMIT.)

## MULTI-TIMBRAL EXAMPLE



# MIDI TRANSMIT

Path: MIDI - TRANSMIT




Except for Xmit Mode, the parameters all have the same parameter values: ENABLE, DISABLE.

DISABLE means that the message type is not transmitted.

ENABLE means that the message type is transmitted.

## Xmit Mode

This parameter controls normal or multi-channel output.

BASIC CHANNEL is normal and means that the same channel number is used as set above (under receive mode). This is the normal mode.

PART CHANNEL means that instead of the Basic Channel, the Part channel numbers in the current Performance are used. The keyboard output from the Wavestation is then zoned and channeled according to the Part definitions contained in the Performance. This makes it possible to use external modules to reinforce any specific Part.

## Local Control

ENABLE - Internal voices are played from the keyboard.

DISABLE - The keyboard does not play internal voices.

## Program Change

This parameter controls the transmission of Performance selections as MIDI Program Changes.

## Aftertouch

This parameter controls the transmission of aftertouch from the Wavestation's keyboard.

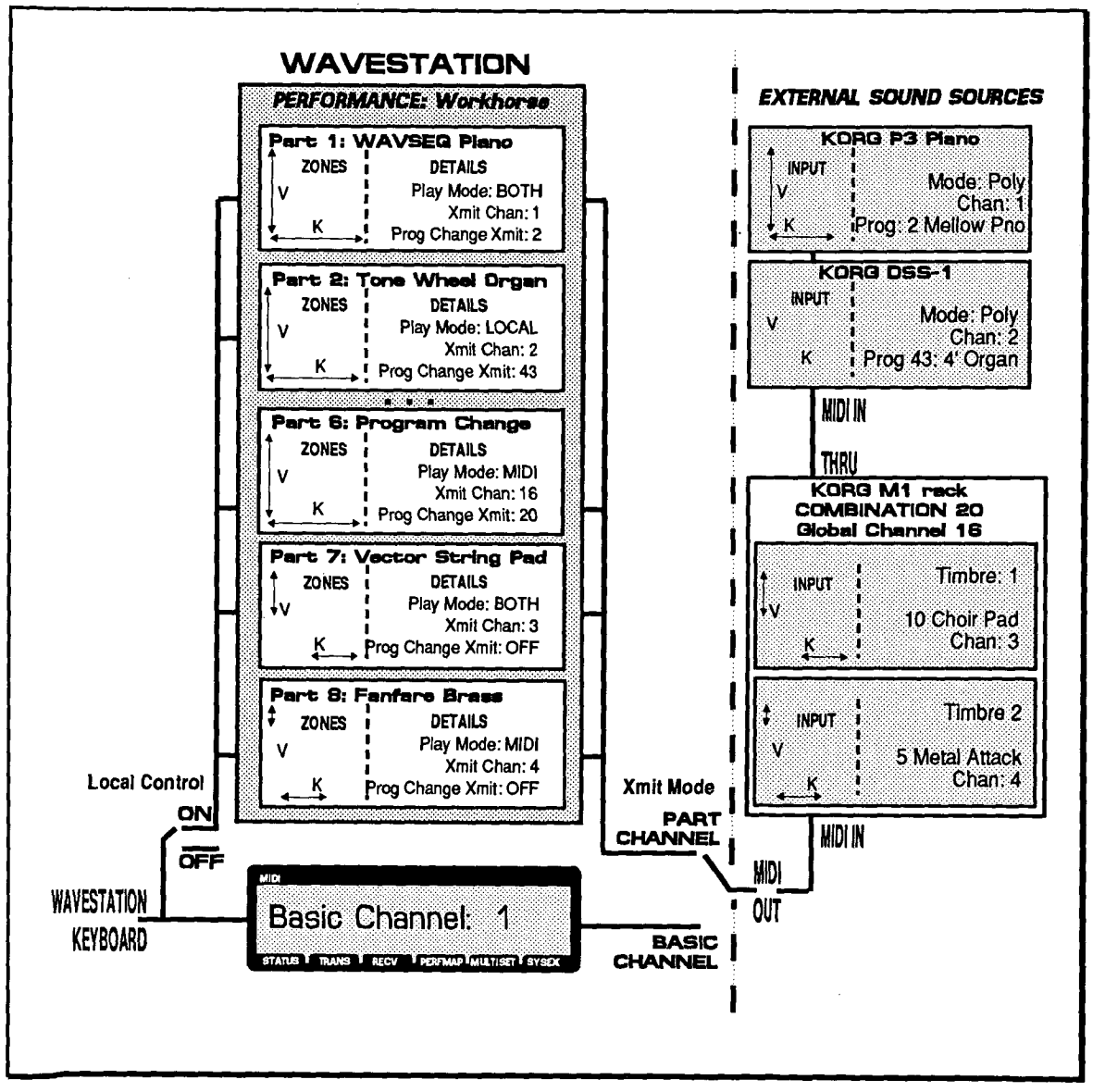
## Pitch Bend

This parameter controls the transmission of Pitch Bend data from the Wavestation's pitch wheel.

## Controllers

This parameter controls the transmission of all controller data from the Wavestation.

## MASTER KEYBOARD EXAMPLE




The figure shows the general features of the MIDI transmit section and an example of how someone might use the Wavestation as a master MIDI controller.

The most important setting is Xmit Mode (on the MIDI TRANSMIT page). It determines the source of MIDI output. The simpler choice is Basic Channel, which means that the keyboard plays out on the Basic Channel (as set on the MIDI page).

Instead, since this is a multi-timbral example, you select Part Channel. This lets you use a Part's zone and MIDI parameters to process the Wavestation's MIDI output. As shown on the diagram, the Local Control parameter must be on, otherwise the Performance gets nothing to process.

In this system setup the Wavestation provides the basic sounds, but these are accented and enhanced by external modules. Part 1 of this Performance holds a modern Piano Patch based on Wave Sequences, and is doubled by an external sampled piano module. How is this done? The Part's key and velocity zones are wide open and its Play Mode is BOTH. So it plays all notes played from the Wavestation keyboard, and sends them all out channel 1 (the Xmit Chan). Also, when the Performance is selected, this Part sends a MIDI Program Change message 2 which selects preset #2 on the P3 module.

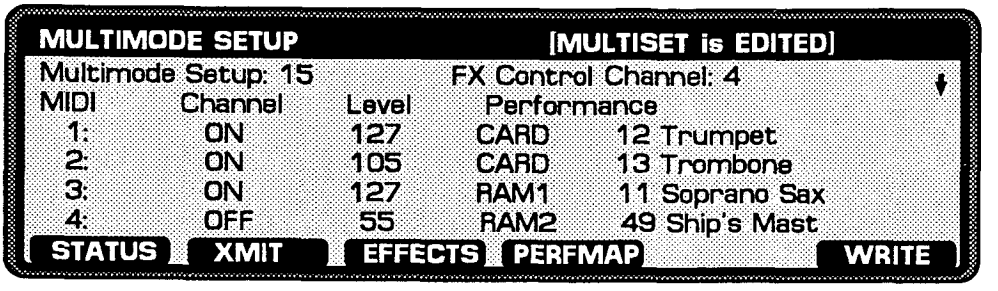
Part 2 has a corresponding external partner prepared on MIDI channel 2. But notice that this particular Performance switches Part 2's Play Mode to LOCAL. So, no notes transmit from this part. To easily switch the external octave doubling on and off while playing, you can copy this Performance and change this parameter to BOTH (or MIDI only).

The third piece of gear is an M1 rack set up to operate multi-timbrally. From Part 6 on the Wavestation a MIDI program change on the M1's global channel of 16 selects its Combination 20. (Program changes can be used on external effects devices as well.)

The M1 combination in turn selects the programs for its Timbres 1 and 2. Since it is not necessary for the Wavestation to send program changes from Parts 7 and 8, their Prog Change Xmits are OFF. Notice the zoning of Part 7. It kicks-in with louder velocities, and above the mid-point of the keyboard. Only notes that meet this criteria are sent out channel 3 to Timbre 1, the backing choir. Part 8 does not play locally, but the loudest velocities and lower notes play its external mate, Timbre 2.

# MULTIMODE SETUP

Path: MIDI - MULTISET




**NOTE**: To use this mode you must first, on the MIDI page, set MIDI Mode to MULTI.

MULTI mode enables the Wavestation to receive multi-timbrally, one Performance per channel. And the MULTIMODE SETUP page provides a table assigning any Performance to any MIDI channel. (And any channel can be ignored).

Normally, each Performance has its own Effects programming. However, in MULTIMODE you can have 16 Performances -- but you can't have 32 effects! So, the Wavestation ignores all of its Performance Effect programming, and instead each of 16 Setups can have its own Effects assignments. These effects have exactly the same power as the Performance Effects Selections, Effects Parameters, and Routing.

The MULTIMODE SETUP serves to select an initial set of Performances, with effects settings. These setups allow you to try various sound combinations without having to specifically program those selections from the sequencer. It is not always necessary to switch Setups via MIDI because they do not prevent you from using program change messages within each channel. In MULTI mode the Wavestation responds to Performance selections *in each channel.* It functions as up to 16 independent synthesizers.

MULTISETS are stored in internal nonvolatile RAM and can be dumped via MIDI System Exclusive.

## Multimode Setup

This displays the number of the current MULTIMODE Setup (0-15). Changing this number sends a MIDI System Exclusive command, which may be recorded and played back to the Wavestation by an external sequencer. This enables you to automate the selection of different MULTIMODE Setups for different songs, to change effects, MIDI channel on/off configurations, and so on.

## FX Control Channel

This is the MIDI channel that will receive controller data for effects modulation sources.

If set to KBD, the local keyboard controls effects modulation.

### MIDI

MIDI Channel number. Note that this channel list scrolls downwards.

### Channel

Ignore or recognize the channel.

### Level

To allow you to easily balance the set, this parameter is a relative level scaling. Its function is equivalent to a MIDI Volume Control (7).

### Performance Bank, Number

Performance assigned to the channel.

### STATUS

Please see section 5.4 in the Player's Guide.

### XMIT

Dumps Multi-Mode setup data over MIDI System Exclusive

### EFFECTS

Goes to EDIT EFFECTS.

Each MULTI setup has its own Effects section, which overrides all PERFORMANCE Effects.

### PERFMAP

Please see section 5.11 in the Player's Guide.

### WRITE

WRITE goes to WRITE MULTI MODE SETUP.

# NAME (PERFORMANCE, PATCH, WAVE SEQUENCE, CARD)

**Paths:**

| | |
|---|---|
| *Performance* | EDIT - NAME |
| *Patch* | EDIT - PATCH - NAME |
| *Wave Sequence* | EDIT - PATCH - WAVES - WAVSEQ - UTILS - NAME |
| *Card* | GLOBAL - UTIL - NAME |


The NAME page functions identically in all places it is used. The table of characters always displays your current character selection.

## Type and Item

The first line tells you what you are naming. This will be either a Performance, Patch, Wave Sequence, or Card, depending on what you were editing when you pressed NAME.

## Character Position

The left/right cursor highlights the character *position* in the item's name.

☛ To select the character position, use the left/right cursor keys.

Each name can have 15 characters (seven for Wave Sequences). On some pages, the full name may be abbreviated to allow for data.

## Character Field (Value)

☛ To select a character value use the dial, or cursor up/down.

☛ To select a number character you can also use the keypad.

You can use the scroll knob to move through all three lines in the table continuously. Or, you can jump from line to line by using the up/down cursors. As you scroll, the current character position in the name field duplicates the current character selected by the scroll knob.

## WRITE

Goes to the WRITE page, if naming a Patch or Performance.

### CLEAR

This sets the name to all spaces, which is especially useful before naming something for the first time.

### SPACE

This is a shortcut for writing a space.

### RESET

This clears your edits, restoring the original name, without leaving the page.

### CANCEL

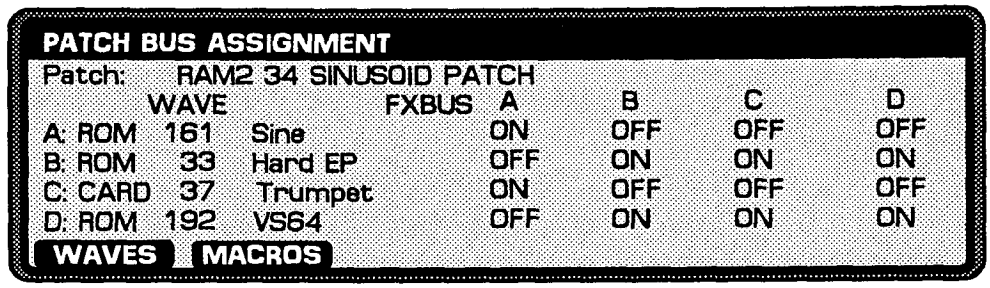
Exits the page, leaving the name unchanged. This is the same as pressing RESET, then EXIT.

### The EXIT switch

Exiting leaves the edited name in the edit buffer.

# PATCH BUS ASSIGNMENT

**Path: EDIT - PATCH - FXBUS**




For an introduction to Patches, please see Chapter 8, "Patch Tour," in the Player's Guide.

## Patch

The Patch to which these waves selections belong.

## Wave

Waves are ROM or CARD only. (There is no RAM for waveshapes.)

In each bank, waves 0-31 are actually Wave Sequences.

Waves 32 -and up are ROM waves - cycles, multi-samples, attack transients.

## FXBUS A, B, C, D

ON means that the wave is routed to this effects bus.

OFF menas that the wave is not routed to this effects bus.

## WAVES

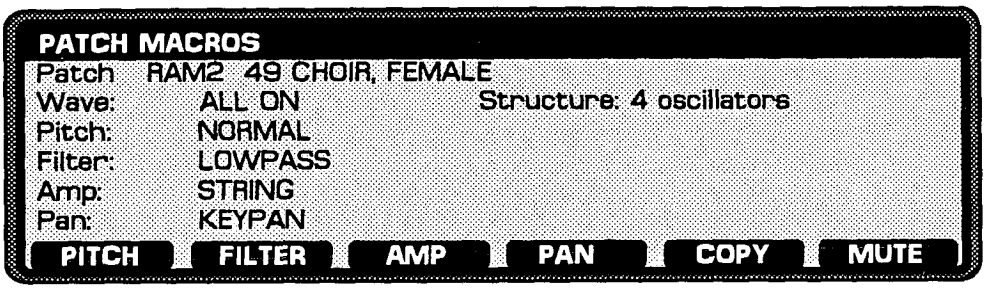
Goes to WAVES.

## MACROS

Goes to PATCH MACROS.

# PATCH MACROS

**Path: EDIT - PATCH - MACROS**




For an introduction to Patches, please see Chapter 8, "Patch Tour," in the Player's Guide.

The Patch has a sub-level of Macros that give you a quick and easy grasp of the parameters in each of its synthesis modules (oscillators, filter, amp, and pan).

The macros are a great way to quickly try different processing ideas. For the hard-core sound editor, they also serve to initialize all of the parameters in the module to useful combinations which serve as starting points for custom editing.

To see what specific parameters comprise each macro, select one of the four modules (PITCH, FILTER, AMP, PAN).

This will show the current parameter values which comprise the macros. For example, in the case of the amplifier envelope, you'll see a graph of the current envelope shape.

When you edit a macro at the parameter level, the macro description for that module becomes "USER".

## Patch

The current Patch being edited.

## Wave

The current wave being edited.

Selecting ALL allows you to edit all oscillators at once.

If A, B, C, or D is selected, the individual oscillator patch is modified.

## Mute

ON or MUTED is displayed next to the Wave selection. To mute or un-mute a wave, select the wave and then press MUTE, or cursor to the field and scroll.

If a multi-oscillator Patch is selected and some of the oscillators are muted then "---" will appear.

If Structure is 2 oscillator, Wave is either A , C, or ALL (no B or D).

If Structure is 1 oscillator, Wave is A only, and can not be edited.

### Structure

The number of oscillators is determined by the Structure setting, as explained under EDIT PATCH.

If the structure is two oscillators, oscillators B and D aren't available.

### Pitch

The Pitch macros perform various modulations on the oscillators. Choices include:

DEFAULT, ENV1 BEND, DESCENDING SWEEP, ASCENDING SWEEP, AFTERTOUCH BEND, MIDI BEND, AFT + MIDI BEND.

### Filter

The filter macro sets a basic tone and may include modulation. You can select:

BYPASS, LOWPASS, LOWPASS/LFO, AFTERTOUCH SWEEP.

### Amp

The Amp Macro is generally the first place to turn when beginning to edit a Patch. You can quickly hear what any preset sounds like with different instrumental envelopes.

Amp Macros are:

DEFAULT, PIANO, ORGAN, ORGAN RELEASE, BRASS, STRING, CLAV, DRUM, RAMP, ON, OFF (can serve as a programmable mute).

Remember that this macro can only do its work if the filter output contains enough sound material in the first place. For example, if the sound has a slow attack, the percussive amplifier macros won't be very effective.

### Pan

The Pan Macros control the modulation of the initial Pan position, which is set using the PERF PART DETAIL FXBus parameter.

Pan Macros include: KEYBOARD-PAN, VELOCITY PAN, KEY + VELOCITY, OFF.

### PITCH

Goes to EDIT PITCH.

### FILTER

Goes to EDIT FILTER.

### AMP

Goes to EDIT AMPLIFIER ENVELOPE.

## PAN

Goes to EDIT PAN.

## COPY

Goes to COPY MODULES.

## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

## Modulation Sources

In addition to the basic "analog" patch resources mentioned above, the Patch has an extensive modulation system. Each oscillator voice contains ENV 1, LFO 1 and LFO 2, which are only reached by moving down to the level of individual Patch details.

**NOTE:** Since the three modulators (ENV1, LFO 1/2) are separate from the Pitch, Filter, Amp and Pan modules, they are not controlled by Macros. For example, you might choose a tremolo or vibrato macro which uses an LFO. But the speed of the modulation is not controlled by the macro. Instead, it depends on which LFO 1 (or 2) happens to be set.

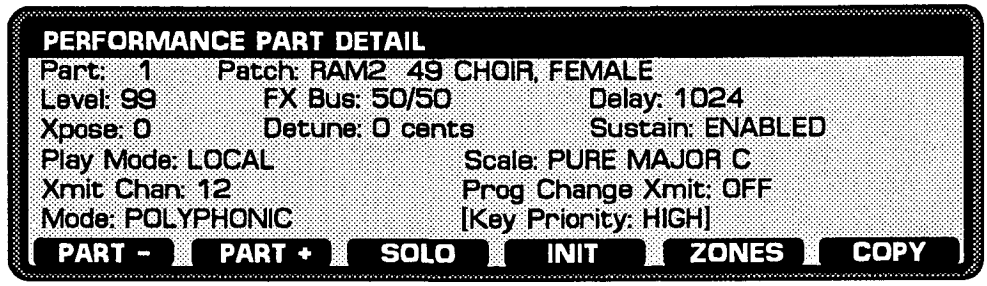
Modulation sources include:

LINEAR KEYBOARD
CENTERED KEYBOARD (centered around middle C (C4))
LINEAR VELOCITY
EXPONENTIAL VELOCITY
AFTERTOUCH
MOD WHEEL
LFO 1, LFO 2
ENV 1
AFTERTOUCH + MOD WHEEL (aftertouch/mod wheel combination)
MOD PEDAL
MIDI 1 and 2

There are also a number of traditional fixed modulation paths, such as keyboard to pitch and velocity to envelope amount.

# PERFORMANCE PART DETAIL

Path: EDIT - DETAIL




For an introduction to Performances, please see Chapter 6, "Performance Tour," in the Player's Guide.

After assigning a Patch to a Part, you can further customize it by way of this page, and KEY AND VELOCITY ZONES.

As you can see, a Part has a lot to it. One basic Patch can produce a variety of effects within a Part, without your having to keep separate, slightly different versions of the Patch.

## Part

The Part number, 1-8. Adjust with the PART + or PART - switches.

## Patch

The Patch currently assigned to the Part.

## Level

Volume level of the Part.

## FX Bus

This parameter controls the routing of the Patch to the MDE. (The MDE controls the routing to the back panel.) See EDIT EFFECTS.

FX (Effects) Bus values are:

BUS-A, 99/1 ~ 1/99, BUS-B, BUS-C, C+D, BUS-D, ALL, and PATCH.

Note that the actual pan amount is set on the EDIT BUS A-B PAN page. Panning is also affected by modulators which can be found under EDIT PAN.

If PATCH is selected, the mix envelope and the joystick can affect the pan position.

### Delay

Time from Key on to the voicing of the Part.

### Xpose

Semitone transposition of the Part, with a range of +/- 24 steps.

### Detune

Fine tuning of the Part in cents.

### Sustain

DISABLE/ENABLE. Chooses whether the Part responds to the Sustain.

### Play Mode

This parameter allows the Part to determine what plays it.

LOCAL means that the Part responds to keyboard or MIDI input only. The Part does not transmit notes.

MIDI means that the Part transmits notes fitting within the Part's zone parameters. Only local keyboard playing is transmitted: MIDI input is not re-transmitted.

BOTH mode is normal.

### Scale

Normally, this will be equal-tempered. If the selection is pure major or minor, an additional field for the tonic key appears.

See the EDIT SCALE page.

### Xmit Chan

Transmit channel applying to the sending of MIDI data when the Play mode is MIDI or BOTH.

### Prog Change Xmit

Prog Change Transmit concerns the sending of MIDI data when Play mode is MIDI or BOTH. In addition, to enable multi-timbral output, on the MIDI TRANSMIT page, Xmit Mode must be set to PART CHANNEL.

If you are in either of those modes, selecting a Performance transmits this Program Change on the Xmit Channel set above. This is useful when using the Wavestation to control a multi-channel sound module array.

### Mode

The Part Mode controls the voice response from the keyboard.

POLYPHONIC mode plays voices up to the maximum number of voices.

UNISON LEGATO: All voices in this Part are stacked on one key. If you play legato, notes are not re-triggered. This is good for imitating the phrasings of wind instruments, for example.

UNISON RETRIG: All available voices are stacked on one key. Each new note re-triggers the envelopes.

## Key Priority

This only appears when Mode is either UNISON LEGATO or UNISON RETRIG. These modes mean that you can only play one key at a time. The Priority parameter tells the keyboard what to do when more than one key is held down.

LAST means play the most recent key.

LOW means play the lowest key.

HIGH means play the highest key.

## PART -/+

PART - and PART + inc/decrement the current Part number.

## SOLO

SOLO allows the current Part to be heard by itself.

## INIT

Goes to INITIALIZE PART.

## ZONES

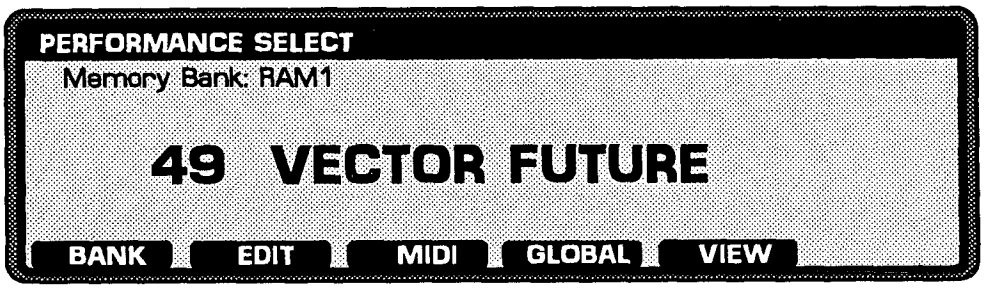
Goes to KEY AND VELOCITY ZONES.

## COPY

Goes to COPY PART.

# PERFORMANCE SELECT

**Path: None -- this is the starting point of all paths.**




The PERFORMANCE SELECT page is the highest menu. It appears when you switch power on or after you press the EXIT switch a sufficient number of times.

Using this page is the subject of Chapter 4, "Basic Operation," in the Player's Guide, so we won't repeat that information here.

## Memory Bank

The current memory Bank is the first field on the page. You can press the BANK function switch to cycle through the banks.

Switching the bank selects a new Performance. The current number in the new bank is heard immediately.

A Performance in RAM1 can simultaneously use Patches from ROM, RAM2, and a card. Likewise, a RAM2 Patch can use ROM or card waves.

### *ROM*

There has to be a place were you can get some known sounds to start with. The ROM bank fills this role. ROM Performances use only ROM Patches and ROM waves.

### RAM1/RAM2

These banks are the user's work area, although they are initially filled with additional Factory Performances, Patches, and Wave Sequences.

### CARD

This selection uses the PROG DATA card slot. This can be a RAM or ROM card.

## Current Performance

Each bank contains 50 performances. Select them with dial or keypad, or the INC/DEC switches.

## BANK

BANK cycles through the four bank choices (ROM, RAM1, RAM2, and CARD- if inserted).

## EDIT

Goes to EDIT PERFORMANCE.

## MIDI

Goes to MIDI. See Chapter 5, "USING MIDI," of the Player's Guide.

## GLOBAL

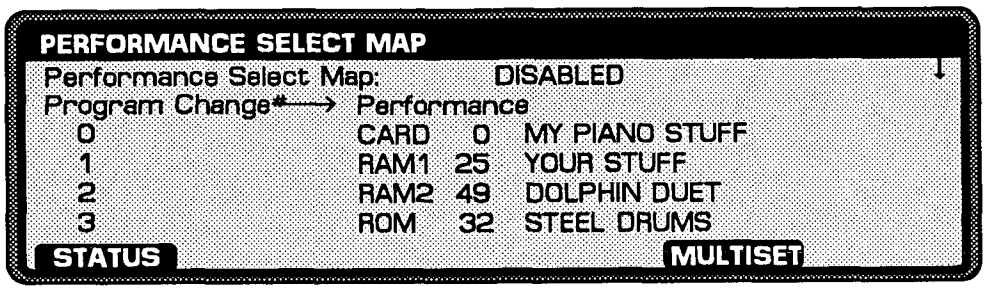
Goes to GLOBAL Settings. See Section 4.11 of the Player's Guide.

## VIEW

Goes to VIEW PERFORMANCES.

# PERFORMANCE SELECT MAP

**Path: MIDI - PERFMAP**




Please see the Player's Guide section 5.11, which discusses this page in depth.

# SYSEX DATA TRANSMIT

**Path: MIDI - SYSEX**

**The System Exclusive data is transmitted on the Basic Channel.**

The System Exclusive (SysEx) page is generally used for sending Wavestation data to another Wavestation or to a MIDI bulk storage device. The Wavestation also responds to dump requests.

A complete System Exclusive implementation allows convenient remote operation with a computer-based editor.

**NOTE**: For more details please refer to Appendix 3, "MIDI System Exclusive Format."

The following transferable data types are available.

### All

Everything. (In other words, all data -- except card information -- needed to duplicate your Wavestation environment on another Wavestation.)

### Patch

Bank, number 00 - 34 or ALL.

### Performance

Bank, number 00 - 49 or ALL.

### Wave Sequences

Bank only.

### Global Data

There is one set of global data.

### Scales

There is one set of twelve user scales.

### Multi-Mode Setups

There is one set of 16 Multi-Mode Setups.

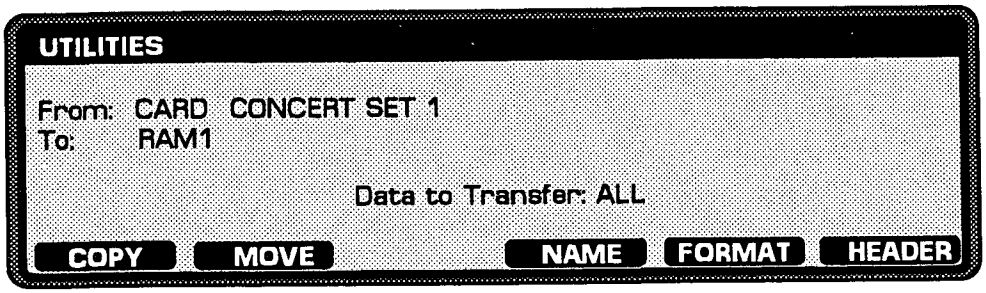
### EXECUTE

Starts the dump operation.

Success, or any problem with the SysEx transfer, is reported.

# UTILITIES

**Path: GLOBAL - UTIL**




This page lets you quickly transfer complete sets of Performances, Patches, and Wave Sequences between cards and internal memory. (For transferring individual Performances and Patches, use WRITE.)

If the COPY, MOVE, and NAME functions disappear, then the card is unformatted.

## From

ROM, RAM1, RAM2, or CARD are possible.

## To

RAM1, RAM2, or CARD are possible.

## Data to Transfer

All, Performances, Patches, or Wave Sequences are possible.

## COPY

Starts the transfer. Makes an identical copy of the "From" bank and puts it in the "To" bank.

## MOVE

Copies the Bank. However, MOVE also changes all source Bank references to the Bank destination, as well.

For example, suppose that in RAM1 you have Performances which call for Patches and Wave Sequences in various banks. If you then MOVE RAM1 to CARD, all references to RAM1 Patches and Wave Sequences are converted to CARD Patches and Wave Sequences (because these Patches and Wave Sequences have indeed been copied to the card).

This way, to the extent a bank of Performances is self-contained, you can just take the card to another Wavestation and have it sound exactly right. You won't have to worry about first installing Performances into RAM1.

## NAME

Goes to NAME CARD.

## FORMAT

If inserting a card, invokes one of the following messages:

CARD IS NOT FORMATTED

KORG CARD FORMAT MISMATCH

then to use the card in the Wavestation you must first format it.

Pressing FORMAT formats the card (after an "Are you sure?" page) and then goes to the NAME page, which allows you to name the card.

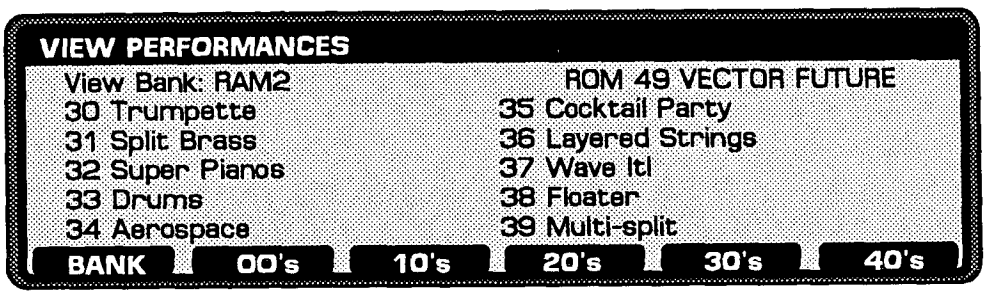
## HEADER

Occasionally, RAM cards which are improperly handled or lose power momentarily during a battery change may lose data. This causes the CARD IS NOT FORMATTED or KORG CARD FORMAT MISMATCH messages to appear when the card is inserted.

The card may be unrecognizable but still usable. Use this function to rewrite the card header only. It does not erase or interfere with the card data in any way.

# VIEW PERFORMANCES

**Path: VIEW**




## View Bank

Select Bank to be viewed by pressing BANK.

## Current Performance

Shows the Performance that is currently selected.

## Performance Set

The numbers and names of the 10 Performances in this decade.

## BANK

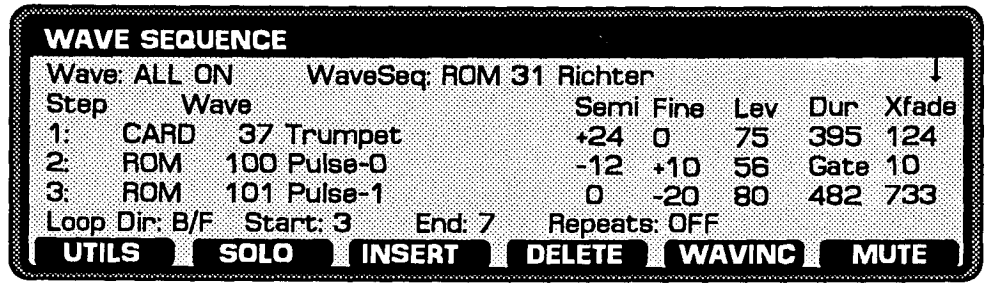
BANK cycles through the four bank choices (ROM, RAM1, RAM2, and CARD- if used).

## DECADE (00 - 40)

Selects the group of ten Performances to be viewed.

# WAVE SEQUENCE

**Path: EDIT - PATCH - WAVES - WAVSEQ**




For an introduction to Wave Sequences, please see Chapter 9, "Wave Sequence Tour," in the Player's Guide.

There is a special type of source material called Wave Sequences. These are a series of waves linked together and are capable of creating very sophisticated dynamic harmonic textures.

Take four waves. Now, besides mixing them, switch them each in succession so that each oscillator plays virtually any transient or tone that you like.

There is no separate buffer for Wave Sequence edits. All Wave Sequence edits are always saved. Therefore WRITE and COMPARE do not apply.

Wave Sequence Step memory is 500 steps per bank. One sequence can be 255 steps maximum. Typically a sequence will have 10 - 20 steps.

To make more efficient use of step memory, you can set loops over any range of steps.

To clear a Wave Sequence, copy a blank one over it using the COPY WAVE SEQUENCE function which can be selected from the UTILS (WAVE SEQUENCE UTILITIES) page.

## Wave

Oscillator to which this wave sequence is assigned.

This field cannot be ALL.

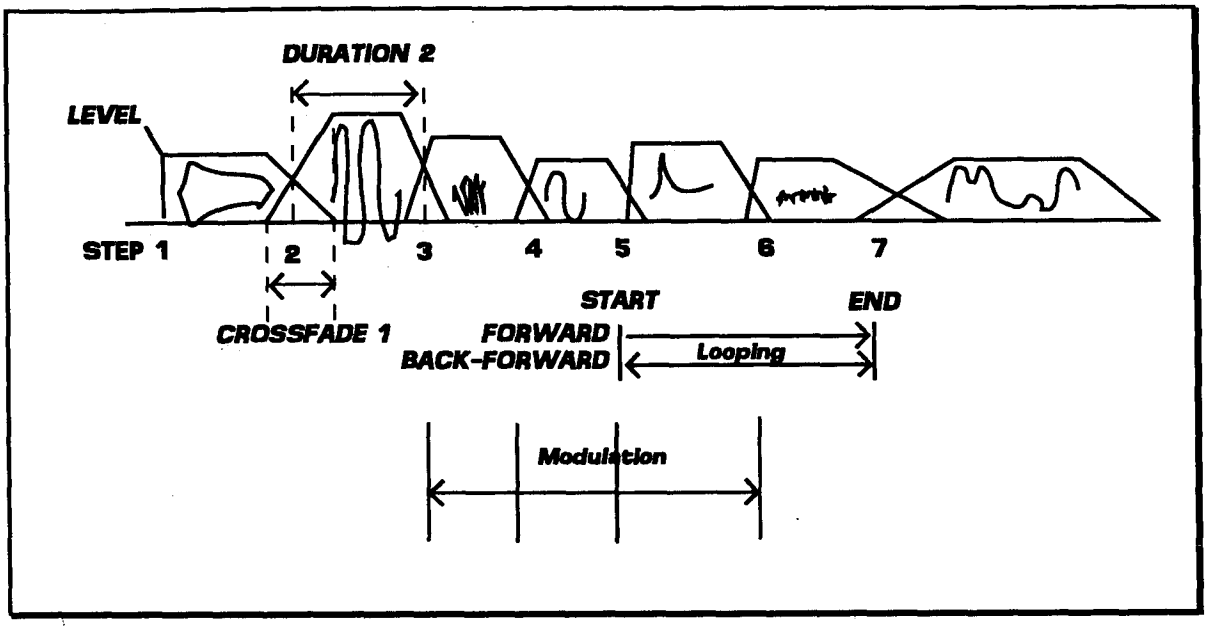
## Wave Sequence

Bank and number.

If the Wave Sequence bank is ROM, no editing is allowed.

Wave Sequences are always selected from the first 32 "wave locations" in each bank.

## Wave Sequence Diagram




### Step

The number of steps per Wave Sequence is variable; the last step in each Wave Sequence is the END.

The number of steps available per sequence is 256 (to a total of 517 per bank).

### Wave

The wave to be played during this step.

### Semi

+/- 24. The oscillator base pitch in semitones.

0 = A-440 tuning

12 = one octave up, and so on.

### Fine

Offsets the base pitch in cents (1/100 semitone).

### Level

The step loudness.

### Duration

The length of time for the step to play.

1 - 499, or GATE. (*GATE* means "while the key is held.")

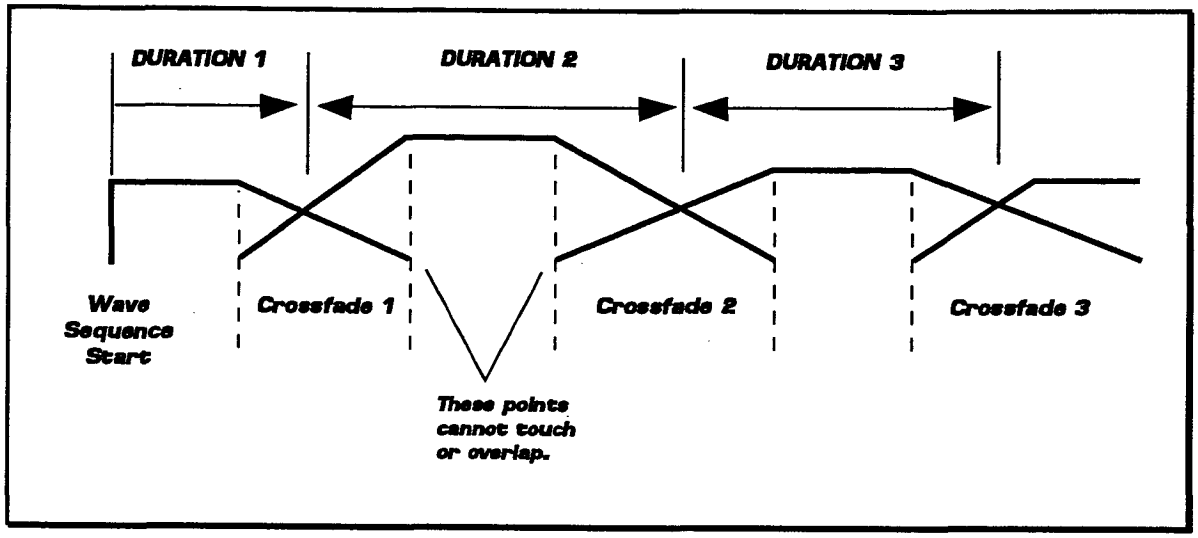
If the duration exceeds the actual length of a sampled transient, there will be silence during the end.

If the duration is set to Gate, sequence does not proceed beyond that step until key-off occurs.

If (GLOBAL page) Wave Sequence Sync is set to MIDI, the duration is controlled by MIDI clocking. In other words, this parameter sets the number of MIDI clocks per step.

## Xfade (Crossfade)

0 - 999. The amount of overlap between the end of this step and the start of the next step.




## Loop Dir

You can set a loop over a range of steps so that it plays continuously while the note is held.

FOR means that the loop restarts from its start point for the set number of repeats. In this case, the first step crossfades with the end of the loop.

B/F or Backward/Forward looping starts when loop end step is reached and goes in the reverse direction through the steps.

## Start

The loop start cannot be past the loop end.

## End

The last step of the Wave Sequence loop cannot exceed the number of steps in sequence.

## Repeats

If repeats are OFF, the sequence plays as programmed.

1 - 126. If there is a set number of repeats, the loop repeats until count is finished and then plays as programmed, even if the key has been released.

If repeats are INF, the sequence loops throughout the amp envelope's release phase.

## UTILS

Goes to WAVE SEQUENCE UTILITIES.

## SOLO

Pressing SOLO allows playing of only the highlighted step, if any.

## INSERT

To add a step, press INSERT. The default Wave for the new step is same as the last highlighted step.

A special feature is included to make it easy to insert waves that have consecutive numbers. This is useful for the sets of "time-sliced" ROM waves that are included. Cursoring to the END and pressing INSERT increments the number of the wave as it is inserted.

If there is no more step memory, a message appears, "no more step memory available".

## DELETE

Deletes the highlighted step.

## WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

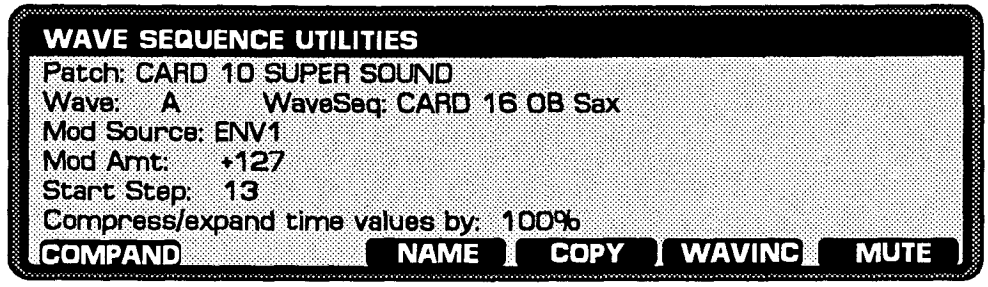
## MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted).

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

# WAVE SEQUENCE UTILITIES

**Path: EDIT - PATCH - WAVES - WAVSEQ - UTILS**




Dynamic modulation of the Wave Sequences is possible. This means that increased modulation varies the start step of the sequence, around any desired step. (See below.)

## Patch

Bank and number.

## Wave

Wave sequence to be modulated.

## Wave Sequence

Bank and number.

If the Wave Sequence bank is ROM, no editing is allowed.

Wave Sequences are always selected from the first 32 "wave locations" in each bank.

## Mod Source

Any normal modulation source. (See PATCH MACROS).

Your choice of modulation sources affects the way in which the Wave Sequence is actually modulated.

Looking more closely at the modulation sources, we should first distinguish between *static* and *dynamic* controllers. The static controllers are Keyboard Note and Velocity. These are specific values which describe the beginning of the note and do not change through the duration of the note. For these modulation sources, the actual start step with each Note On jumps around the set Start Step according to the depth and polarity of the Modulation Amount. Once started, the Wave Sequence then plays normally until its end or Note Off.

In contrast, dynamic controllers *do* change values through the duration of the note: ENV1, the LFOs, MIDI Controller 1 and 2, Foot Mod, and Mod wheel.

When using these controllers the normal progress of the Wave Sequence (as set by its step Durations), is suspended. Instead, the Wave Sequence stays at the Start Step until it is moved by the modulation controller. *You* control the durations at each step by how fast and in what direction you move the controller.

For example, assume that the Start Step is 13 and you have selected the Mod wheel for modulation. The Mod wheel is fully lowered (off). You play a key and hear the wave assigned to step 13 for as long as you hold the key. (If step 13 happened to be a transient, you would hear only that single event.) Raise the Mod wheel, and the first change message detected causes the wave sequence to go to step 12 (assuming negative modulation -- see below). The next changes increment or decrement the step number.

So that you can spontaneously adjust the start step for each note, controller movement before a Note On is recognized. For example, with notes off you can move the mod wheel up all the way and the next Note On starts the sequence from either its first or last step, again, depending on the polarity of the modulation amount.

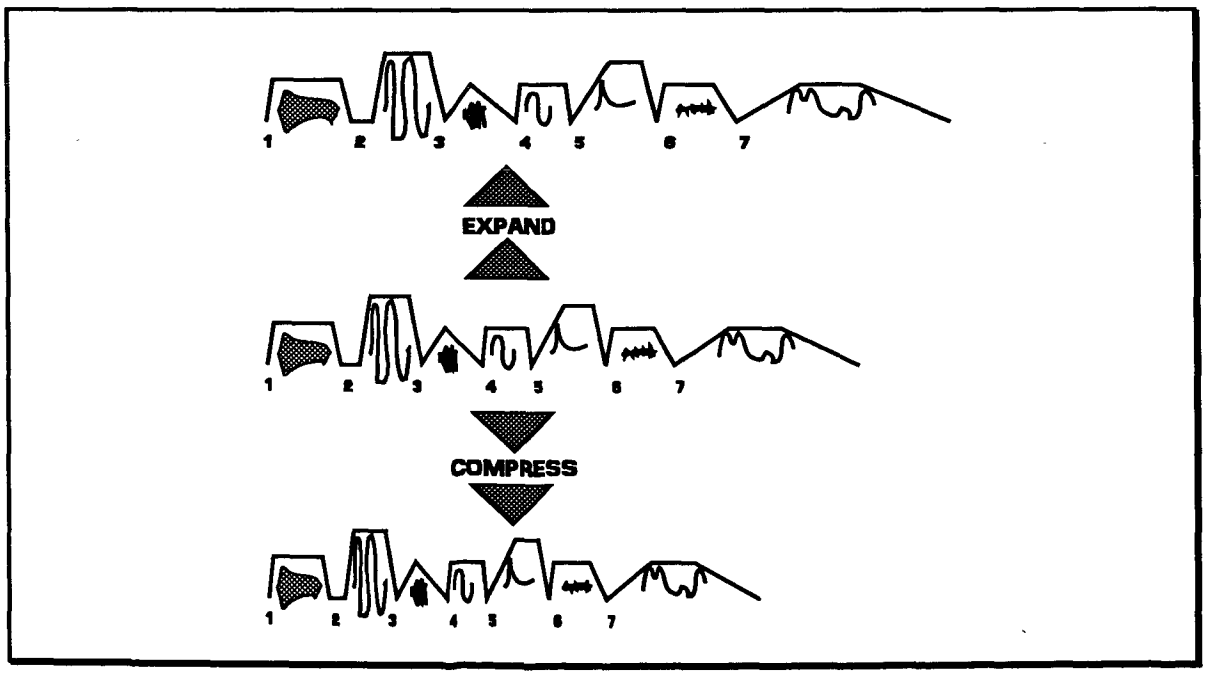
## Mod Amt

Depth of modulation. In other words the distance from the original step.

Positive modulation increments the step number while negative modulation decrements it.

In practice you may most often use negative modulation. The idea is similar to the Sample Start Point Modulation feature found on some samplers. Normal playing occupies the middle, more-or-less stable range of the sample or wave sequence. Increased expression moves the playing range towards the beginning of the Wave Sequence, where the loud and bright attacks are. This technique is an efficient way to achieve realistic expression.

## Wave Sequence Time Scaling Illustration



### Start Step

Initial location in sequence of modulation effect.

### Compress/Expand

Scales all time values by 0 - 200%. The overall time adjustment is much easier to use than having to individually adjust all of the times.

Values below 100% compress all times. Values above 100% expand them.

Press COMPAND to apply this function.

Note that the compression or expansion applies only to Wave Sequence time parameters. It has no affect on the envelope of any sampled transients in use.

### COMPAND

Starts the operation.

### NAME

Goes to NAME.

### COPY

Goes to COPY WAVE SEQUENCE STEPS.

### WAVINC

Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

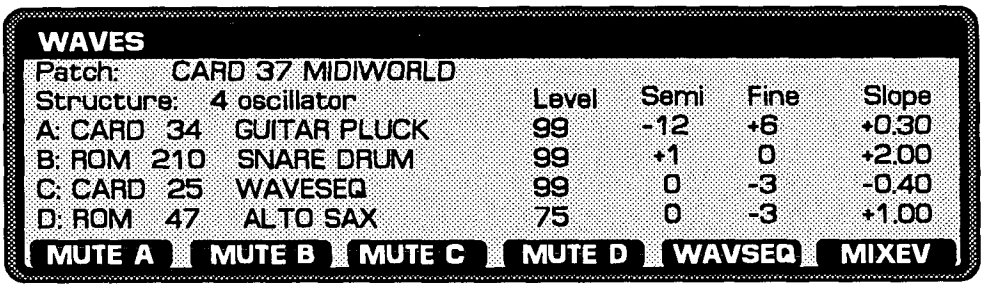
### MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave. (For example, if Wave is set to ALL and you press MUTE, all are muted.)

If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

# WAVES

**Path: EDIT - PATCH - WAVES**




Waves are the source material for instruments created by Patches.

There can be up to four Waves in a Patch. Waves can be short transients, multi-sampled sounds, single (or several) cycle waveshapes, or even Wave Sequences.

All complex sounds are made of simple tones. Rather than synthesize all those sine waves directly, the Wavestation uses four oscillators, to which a variety of harmonically-rich timbres can be assigned. Each oscillator contributes a complex sound, be it a sawtooth, or PCM sample.

## Patch

The Patch to which these waves selections belong.

## Structure

The number of oscillators is determined by the Structure setting, as explained under EDIT PATCH.

If the structure is two oscillators, oscillators B and D aren't available.

## Wave

Waves are ROM or CARD only. (There is no RAM for waveshapes.)

In each bank, waves 0-31 are actually Wave Sequences.

Waves 32 -and up are ROM waves - cycles, multi-samples, attack transients.

## Semi

+/- 24. The oscillator base pitch in semitones.

0 = A-440 tuning

12 = one octave up, and so on.

### Fine

Offsets the base pitch in cents (1/100 semitone).

### Slope

A slope of +1.00 is the standard octave intonation.

2.00 means the pitch changes two octaves over a range of one octave of keyboard or MIDI input.

A 0.00 slope plays all notes at middle C (C4).

A negative slope inverts the keyboard.

### MUTE A - D

These allow you to selectively disable each oscillator so that you can easily hear the one(s) you are working on.

MUTE switches do not appear for any oscillator that is unused by the current Structure.

### WAVSEQ

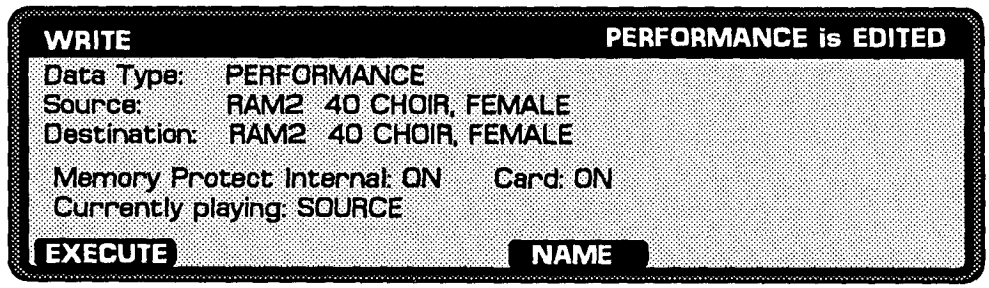
Goes to EDIT WAVE SEQUENCE. (Only appears if Wave Sequences are selected for at least one oscillator.)

### MIXEV

Goes to EDIT MIX ENVELOPE.

# WRITE (PERFORMANCE, PATCH, MULTI MODE SETUP, SCALE)

| Path: | *Performance* | EDIT - WRITE |
|---|---|---|
| | *Patch* | EDIT -- PATCH - WRITE |
| | *Scale* | GLOBAL -- SCALE - WRITE |
| | *Multi-Setup* | MIDI -- MULTISET - WRITE |




So that a new destination can be auditioned, you can select through other Performances or Patches without losing edited data.

## Type and Item

The Data Type field is the same type as was being edited prior to entering the WRITE page. (WAVE SEQUENCES are not written.)

Exiting the WRITE page returns to the page active prior to entering WRITE.

Data Type cannot be edited from this page.

## Source

Source fields cannot be edited from this page.

## Destination

The default destination is the same number as the source.

After writing, this destination becomes the new SOURCE.

## Memory Protection

Located here for convenience.

## Currently Playing

Initially this is set to SOURCE. Changing it to DESTINATION allows you to audition different destinations to write over.

## EXECUTE

Starts the operation.

## NAME

Goes to NAME (data type) for Performances or Patches only.

# APPENDIX 1: MIDI RECEIVED DATA

## 1. Channel Messages

### 1.1. Key off

| | | |
|---|---|---|
| Status | 1000nnnn (8n) | n=channel number |
| Note No. | 0kkkkkkk | k=0 ~ 127 |
| Velocity | 0vvvvvvv | Ignored |

### 1.2. Key on/off

| | | |
|---|---|---|
| Status | 1001nnnn (9n) | n=channel number |
| Note No. | 0kkkkkkk | k=0 ~ 127 |
| Velocity | 0vvvvvvv (v≠0) | Key on |
| | 00000000 (v=0) | Key off |

### 1.3. Control Change

| | | |
|---|---|---|
| Status | 1011nnnn (Bn) | n=channel number |
| Controller no. | 0ccccccc | |
| Controller Value | 0vvvvvvv | |

| | |
|---|---|
| c=1 Modulation Wheel | v= 0 ~ 127 |
| c=4 Foot Control | v= 0 ~ 127 |
| c=6 Data Entry (msb) | v= 0 ~ 127 Note 1, 2 |
| c=7 Volume | v= 0 ~ 127 |
| c=16 Joy stick (X-axis) | v= 0 ~ 127 |
| c=17 Joy stick (Y-axis) | v= 0 ~ 127 |
| c=38 Data Entry (lsb) | v= 0 ~ 127 Note 1, 2 |
| c=64 Sustain Switch | v= 0 - 63: off,<br>64 - 127: on |
| c=100 Registered Parameter # lsb | v= 0 ~ 1 Note 2, 3 |
| c=101 Registered Parameter # msb | v= 0 Note 2, 3 |

Note 1: Only received with registered parameter select

Note 2: Only received on the basic channel if in MULTI mode.

Note 3: Pitch bend range, Master fine tune.

### 1.4. Program Change

| | | |
|---|---|---|
| Status | 1100nnnn (Cn) | n=Channel no |
| Patch Number | 0ppppppp | p= 0 ~ 127 Program number within current bank. |

### 1.5. Program Bank Select

| | | |
|---|---|---|
| Status | 1011nnnn (Bn) | n=Channel no. |
| Controller no. | 20H | Bank Select LSB |
| Controller Value | 0 - 1 | 0 = RAM1/RAM2 |
| | | 1 = ROM/CARD |

### 1.6. Channel (mono) Pressure (After Touch)

| | | |
|---|---|---|
| Status | 1101nnnn (Dn) | n=Channel number |
| Value | 0vvvvvvv | v=0 ~127 |

### 1.7. Polyphonic Key Pressure / After Touch

| | | |
|---|---|---|
| Status | 1010nnnn (An) | n=Channel Number |
| Note No. | 0kkkkkkk | k=0~127 |
| Value | 0vvvvvvv | |

### 1.8. Pitch Bend Change

| | |
|---|---|
| Status | 1110nnnn (En) |
| Value LSB | 0uuuuuuu |
| Value MSB | 0vvvvvvv |

### 1.9. All notes off

| | | |
|---|---|---|
| Status | 1011nnnn (Bn) | n=channel number |
| | 01111011 (7B) | All notes off |
| | 00000000 | |

Note: Only recognized if not in OMNI mode and the All Notes Off parameter is enabled.

### 1.10. Reset All Controllers

| | | |
|---|---|---|
| Status | 1011nnnn (Bn) | n=channel number |
| | 01111001 (79) | Reset All Controllers |
| | 00000000 | |

Note: Only recognized if not in OMNI mode and the All Notes Off parameter is enabled.

## 2. System Messages

### 2.1. Real Time Messages

Real time messages

Timing Clock

| | |
|---|---|
| Status | 11111000 (F8) |

Used for Wave Sequence Sync function.

Active Sensing

| | |
|---|---|
| Status | 1111110 (FE) |

If active sense is ever received, then a data byte must be received every 300 ms. Otherwise all voices will be turned off.

### 2.2. System Exclusive Messages

Please refer to SYSEX DATA TRANSMIT section.

# APPENDIX 2: MIDI TRANSMITTED DATA

Note that messages are transmitted using running status whenever possible. If the status has not changed within 500 milliseconds then the next message that is transmitted will be sent with a status byte.

## 1. Channel Information

Note that messages may be sent on multiple channels concurrently depending on the MIDI TRANSMIT MODE parameter and the current Performance.

### 1.1. Key on/off

| | | |
|---|---|---|
| Status | 1001nnnn (9n) | n=channel number |
| Note No. | 0kkkkkkk | k= 0 ~ 127 |
| Velocity | 0vvvvvvv (v≠0) | Key on |
| | 00000000 (v=0) | Key off |

### 1.2. Control Change

| | | |
|---|---|---|
| Status | 1011nnnn (Bn) | n=channel number |
| Controller no. | 0ccccccc | |
| Controller Value | 0vvvvvvv | |

Controller no.

| | |
|---|---|
| c=1 Modulation Wheel | v= 0 ~ 127 |
| c=4 Foot Control | v= 0 ~ 127 |
| c=6 Data Entry (msb) | v= 0 ~ 127 Note 1, 2 |
| c=7 Volume | v= 0 ~ 127 |
| c=16 Joy stick (X-axis) | v= 0 ~ 127 |
| c=17 Joy stick (Y-axis) | v= 0 ~ 127 |
| c=38 Data Entry (lsb) | v= 0 ~ 127 Note 1, 2 |
| c=64 Sustain Switch | v= 0:off, 127: on |
| c=100 Registered Parameter # lsb | v= 0 ~ 1 Note 2, 3 |
| c=101 Registered Parameter # msb | v= 0 Note 2, 3 |

Note 1: Only sent with registered parameter select

Note 2: Only sent on the basic channel

Note 3: Pitch bend range, Master fine tune.

### 1.3. Program Change

| | | |
|---|---|---|
| Status | 1100nnnn (Cn) | n=Channel no. |
| Program Number | 0ppppppp | p= 0 ~ 127 Program number within current bank. |

### 1.4. Program Bank Select

| | | |
|---|---|---|
| Status | 1011nnnn (Bn) | n=Channel no. |
| Controller no. | 0 | Bank Select MSB |
| Controller Value | 0 | Always 0 |
| Controller no. | 20H | Bank Select LSB |
| Controller Value | 0 - 1 | 0 = RAM1/RAM2 |
| | | 1 = ROM/CARD |

### 1.5. Channel Pressure/After Touch

| | | |
|---|---|---|
| Status | 1101nnnn (Dn) | n=Channel number |
| Value | 0vvvvvvv | v=0 ~ 127 |

### 1.6. Pitch Bend Change

| | |
|---|---|
| Status | 1110nnnn (En) |
| Value LSB | 0uuuuuuu |
| Value MSB | 0vvvvvvv |

## 2. System Messages

### 2.1. System Real Time Messages

Active Sensing

| | | |
|---|---|---|
| Status | 11111110 (FE) | Sent when idle every 300 ms |

### 2.2. System Exclusive Messages

Please refer to SYSEX DATA TRANSMIT page.

# APPENDIX 3: SYSTEM EXCLUSIVE FORMAT

## 1.0 Header Format

The following is a description of the Wavestation system exclusive header.

This format is common for all Wavestation system exclusive messages.

```
11110000  (F0)          System Exclusive Status byte
01000010  (42)          Korg Id
0011nnnn  (3N)          Format Id N = Channel Number.
00101000  (28)          Wavestation Device Id
0mmmmmmm                Message type
```

### 1.1 Message Type Codes

The following table contains a list of the message types in hex.

```
41   Parameter change message
49   Single Performance Data Dump
40   Single Patch Data Dump
4C   All Patch Data Dump (within bank)
4D   All Performance Data Dump (within Bank)
50   All Data (system, patch, perf, wave seq) Dump
54   All Wave Sequence Data Dump
51   System and Setup Data Dump
55   Multi-Mode Setup Data Dump
5A   Micro-Tune Tables
23   Data Load Completed
24   Data Load Error
1A   Performance Write Command
11   Patch Write Command
21   Write Complete Message
22   Write Error Message
5B   Multi Mode setup select

0E   System and Setup Data Dump Request
0F   All Data Dump Request
10   Single Patch Data Dump Request
19   Single Performance Dump Request
1C   All Patch Data Dump Request
1D   All Performance Data Dump Request
0C   Wave Sequence Dump Request
```

### 1.2 Binary data format

All 8 bit binary data is transmitted as two bytes in the following format:

```
0000LLLL          Low 4 bits of the data
0000HHHH          High 4 bits of the data
```

So that a byte is reconstructed as follows:

```
HHHHLLLL
```

This is referred to as `nybble data`.

# 2.0 Transmit and Receive Messages

The following messages are both transmitted from the Wavestation and received by the Wavestation.

## 2.1 Data Messages

### 2.1.1 Single Patch Data

The following message contains a dump of a single patch.

On reception the patch is placed in the edit buffer. To transfer a patch to a RAM location use the patch write command.

```
Wavestation Sysex Header
01000000 (40)          Single Patch Dump
000000xx               Bank Number
0xxxxxxx               Patch number.
0000LLLL               Least significant nybble of byte data
0000mmmm               Most significant nybble of byte
     .                 Byte data for entire patch
     .                 Refer to section 5.2.
     .
0ccccccc               Checksum of patch not including header.
11110111 (F7)          End of exclusive.
```

### 2.1.2 Single Performance Data

The following message contains a dump of a single performance. On reception the performance is placed in the edit buffer. To place the performance in memory use the performance write command.

```
Wavestation Sysex Header
01001001 (49)          Single Performance Dump
000000xx               Bank Number
0xxxxxxx               Performance number.
Nybble Data            Refer to section 5.1
0ccccccc               Checksum of patch not including header.
11110111 (F7)          End of exclusive.
```

### 2.1.3 All Patch Data

This message contains all 35 patches within the bank specified.

```
Wavestation Sysex Header
01001100 (4C)          All Patch Dump
000000xx               Bank Number
 'bble Data            35 * the patch data structure refer to
                       section 5.2
0ccccccc               Checksum
11110111 (F7)          End of exclusive.
```

### 2.1.4 All Performance Data

This message contains all 50 performances within the bank specified.

```
Wavestation Sysex Header
01001101 (4D)          All Performance Dump
000000xx               Bank Number
Nybble Data            50 * the performance data structure
                       refer to section 5.1
0ccccccc               Checksum
11110111 (F7)          End of exclusive.
```

### 2.1.5 System and Setup Parameter Data

```
Wavestation Sysex Header
01010001 (51)          System Data Dump
Nybble Data            Refer to section 5.6
0ccccccc               Checksum of patch not including header.
11110111 (F7)          End of exclusive.
```

### 2.1.6 Wave Sequence Data

```
Wavestation Sysex Header
01010100 (54)          Wave Sequence Data dump
000000xx               Bank number
Nybble data            Refer to section 5.4
0ccccccc               Checksum
11110111 (F7)          End of exclusive
```

### 2.1.7 Multi-Mode Setup Data

```
Wavestation Sysex Header
01010101 (55)          Multi mode setup data
Nybble data            Refer to section 5.3
0ccccccc               Checksum
11110111 (F7)          End of Exclusive
```

### 2.1.8 Micro Tune Tables

```
Wavestation Sysex Header
01011010 (5A)          Micro Tune Tables
Nybble data            Refer to section 5.5
0ccccccc               Checksum
11110111 (F7)          End of exclusive
```

### 2.1.9 All Data

```
Wavestation Sysex Header
01010000 (50)          All data
Nybble data            Refer to section 5.7
0ccccccc               Checksum
11110111 (F7)          End Of Exclusive
```

### 2.10 Parameter Change Messages

```
Wavestation Sysex Header
01000001 (41)          Parameter change message
0LLLLLLL               LSB of Parameter number (Ref. section 5.8)
0mmmmmmm               MSB of parameter number
     .                 Parameter value in ASCII (Max of 16 characters.)
     .
00000000 (00)          ASCII Null termination.
11110111 (F7)          End of exclusive
```

### 2.11 Multi-Mode Setup Select

Sent whenever the current multi set is changed. On reception it will change the current multi setup.

```
Wavestation Sysex Header
01011011 (5B)          Multi setup select
0xxxxxxx               Multi mode setup number
11110111 (F7)          End of Exclusive
```

## 2.2 Status messages

Status messages are transmitted after reception of data messages. They indicate the recive status of the data. When received they will display an appropriate message.

### 2.2.1 Data Load Error

This message is transmitted whenever a message is received and the checksum failed.

```
Wavestation Sysex header
00100100 (24)          Data load error message type
11110111 (F7)          End of exclusive
```

### 2.2.2 Data Load Complete

This message is transmitted whenever a data message is received successfully.

```
Wavestation Sysex header
00100011 (23)          Data load complete message type
11110111 (F7)          End of exclusive
```

# 3.0 Transmit Only Messages

## 3.1 Status messages

Status messages are transmitted after reception of data messages. They indicate the receive status of the data.

### 3.1.1 Write Complete

```
Wavestation Sysex Header
00100001 (21)          Write complete status message
11110111 (F7)          End of exclusive
```

### 3.1.2 Write Error

```
Wavestation Sysex Header
00100010 (22)          Write error message
11110111 (F7)          End of exclusive
```

## 3.2 Device ID Message

```
11110000 (F0)          System Exclusive
01111110 (7E)          Non Real Time Message
0000xxxx (0X)          Channel Number
00000110 (06)          Inquiry Message
00000010 (02)          Id Reply
01000010 (42)          KORG ID
00101000 (28)          Wavestation Family Code (LSB)
00000000 (00)          (MSB)
00000000 (00)          Member code (LSB)
00000000 (00)          (MSB)
0xxxxxxx (0x)          Minor Software version (LSB)
0xxxxxxx (0x)          (MSB)
0xxxxxxx (0x)          Major Software version(LSB)
0xxxxxxx (0x)          (MSB)
11110111 (F7)          End of exclusive
```

# 4.0 Receive Only Messages

## 4.1 Request Messages

### 4.1.1 Single Patch Dump Request

```
Wavestation Sysex header
00010000 (10)          Single Patch Dump Request
000000xx (0x)          Bank Number
0xxxxxxx               Patch Number
11110111 (F7)          End of exclusive
```

### 4.1.2 Single Performance Dump Request

```
Wavestation Sysex Header
00011001 (19)          Single Performance Dump Request
000000xx (0x)          Bank Number
0xxxxxxx               Performance Number
11110111 (F7)          End of Exclusive
```

### 4.1.3 All Patch Dump Request

```
Wavestation Sysex Header
00011100 (1c)
000000xx (0x)          Bank Number
11110111 (F7)
```

### 4.1.4 All Performance Dump Request

```
Wavestation Sysex Header
00011101 (1d)          Perf dump request
000000xx               Bank number
11110111 (F7)          End of Exclusive
```

### 4.1.5 All Data Request

```
Wavestation Sysex Header
00001111 (0F)          All data request
11110111 (F7)          End of Exclusive
```

### 4.1.6 System Dump Request

```
Wavestation Sysex header
00001110 (0e)          System dump request
11110111 (F7)          End of exclusive
```

### 4.1.7 Wave Sequence Dump Request

```
Wavestation Sysex Header
00001100 (0C)          Wave sequence dump request
000000xx (0x)          Bank number
11110111 (F7)          End of Exclusive
```

## 4.2 Commands

### 4.2.1 Patch Write Command

```
Wavestation Sysex Header
00010001 (11)          (patch Write Command)
000000xx (0x)          Bank Number
0ppppppp (pp)          Patch Number 0-34
11110111 (F7)          End of Exclusive
```

### 4.2.2 Performance Write Command

```
Wavestation Sysex header
00011010 (1a)          Performance write request
000000xx (0x)          Bank number
0ppppppp (pp)          Performance number
11110111 (F7)          End of exclusive
```

## 4.3 Device Inquiry Message

```
11110000  (F0)          System Exclusive
01111110  (7E)          Non Real Time
0xxxxxxx  (0x)          Channel number
00000110  (06)          Inquiry message
00000001  (01)          Inquiry Request
11110111  (F7)          End of Exclusive
```

# 5.0 Data Structure Tables

```
typedef     char              byte;     /*8 bits, signed. */
typedef     short             word;     /* 16 bits, signed. */
typedef     unsigned char     ubyte;    /* 8 bits, unsigned. */
typedef     unsigned short    uword;    /* 16 bits, unsigned. */
typedef     unsigned long     ulong;    /* 32 bits, unsigned. */
typedef     unsigned char     boolean;  /* Boolean TRUE or FALSE. */
```

## 5.1 Performance Data Structure

```
typedef  struct
{
      char  Prerf_Name[NAME_SIZE];      /* Performance name - up to 16
                                        characters */

      byte  Fx_Perf_Block[21];          /*Leave space for effects
                                        parameters*/

      part  Parts[8];             /* This is where the PART blocks start,
                                  of which 8 can be appended to the
                                  performance */
} perf;


typedef  struct
{
      byte   Bank_Num;          /* Bank Number this PART is playing */
      byte   Patch_Num;         /* Patch number this PART is playing */
      ubyte  Level;             /* Volume for this part */
      byte   Output;            /* OUTPUT CHAN FOR THIS Part
                                  (-1 = stereo) */
      ubyte  Part_Mode;         /* KEYBOARD ASSIGN MODE
                                  (Polyphonic,UNI) */

                                  /* bit 5-4 */
                                  /* 00= **** */
                                  /* 01= Local play mode*/
                                  /* 10= MIDI play mode*/
                                  /* 11 = Both */

                                  /* bit 3-2 */
                                  /* 00= **** */
                                  /* 01= polyphonic*/
                                  /* 10= unison re-trigger*/
                                  /* 11= unison legato*/

                                  /* bit 1-0 */
                                  /* 00= low note*/
                                  /* 01= high note*/
                                  /* 10= last note*/
                                  /* 11 = **** */
```

```
        ubyte  Lo_Key;          /* Lower note of keyboard range*/
        ubyte  Hi_Key;          /* Upper note of keyboard range*/
        ubyte  Lo_Vel;          /* Lower limit of velocity range*/
        ubyte  Hi_Vel;          /* Upper limit of velocity range */
        byte   Trans;           /* Transpose value in semitones */
        byte   Detune;          /* Detune value in cents*/
        ubyte  Tunetab;         /* Micro tuning table for this PART */
        ubyte  Micro_Tune_Key;  /* Root key for pure major/minor scales */
        ubyte  Midi_Out_Chan;   /* MIDI transmit channel for this PART */
        byte   Midi_Prog_Num;   /* MIDI prog# to xmit when PART selected
                                   1 =off) */
        uword  Sus_Enable;      /* Sustain Pedal Enable/disable */
        uword  Delay;           /* Delay value in milliseconds */
} part;
```

## 5.2 Patch Data Structure

```
/*          Individual Patch data Structure */
/* This is the structure for data that is individual to the */
/* 1, 2, or 4 oscillators that make up a Patch.*/
/* Four of these structures are included in a Patch.*/

typedef  struct
{
       byte   Wave_Coarse;      /* Wave detuning in Semitones*/
       byte   Wave_Fine;        /* Wave detuning in cents */
       ubyte  Wave_Bank;        /* Wave Bank */
       uword  Wave_Num;         /* Wave number*/
       byte   Wave_Scale;       /* Wave pitch scaling slope */
       ubyte  Lfo1_Rate;        /* LFO 1 Rate */
       ubyte  Lfo1_Amt;         /* LFO 1 Amount*/
       ubyte  Lfo1_Delay;       /* LFO 1 Delay*/
       ubyte  Lfo1_Fade;        /* LFO 1 Fade in*/
       ubyte  Lfo1_Shape;       /* LFO 1 Shape (bits 0-6)1-127*/
                                /* LFO 1 Sync (bit 7) */
                                      /*1 = Sync on */
                                      /*0 = Sync off*/
       byte   S1_Lfo1_R;        /* Mod Source to LFO 1 Rate pointer*/
       byte   S1_Lfo1_R_Amt;    /* Mod Source to LFO 1 Rate amount*/
       byte   S1_Lfo1_A;        /* Mod Source to LFO 1 Amt pointer*/
       byte   S1_Lfo1_A_Amt;    /* Mod Source to LFO 1 Amt amount*/
       ubyte  Lfo2_Rate;        /* LFO 2 Rate*/
       ubyte  Lfo2_Amt;         /* LFO 2 Amount*/
       ubyte  Lfo2_Delay;       /* LFO 2-Delay*/
       ubyte  Lfo2_Fade;        /* LFO 2-Fade in*/
       ubyte  Lfo2_Shape;       /* LFO 2-Shape (bits 0-6)1-127*/
                                /* LFO 2 Sync (bit 7) */
                                      /* 1 = Sync on */
                                      /* 0 = Sync off*/
       byte   S1_Lfo2_R;        /* Mod Source to LFO 1 Rate pointer*/
       byte   S1_Lfo2_R Amt;    /* Mod Source to LFO 2 Rate amount*/
       byte   S1_Lfo2_A;        /* Mod Source to LF0 2 Amt pointer*/
       byte   S1_Lfo2_A Amt;    /* Mod Source to LFO 1 Amt amount*/
       ubyte  EG_Rate1;         /* Envelope 1 Rate 1 */
       ubyte  EG_Rate2;         /* Envelope 1 Rate 2 */
       ubyte  EG_Rate3;         /* Envelope 1 Rate 3 */
       ubyte  EG_Rate4;         /* Envelope 1 Rate 4 */
       ubyte  EG_Level0;        /* Envelope 1 Level 0 */
       ubyte  EG_Level1;        /* Envelope 1 Level 1 */
       ubyte  EG_Level2;        /* Envelope 1 Level 2 */
```

```
        ubyte  EG_Level3;       /* Envelope 1 Level 3 */
        ubyte  EG_Level4;       /* Envelope 1 Level 4 */
        byte   Vel_EG_A;        /* Velocity to Env1 Amount Amt */
        ubyte  AEG_Rate1;       /* Amplitude Envelope Rate 1 */
        ubyte  AEG_Rate2;       /* Amplitude Envelope Rate 2 */
        ubyte  AEG_Rate3;       /* Amplitude Envelope Rate 3 */
        ubyte  AEG_Rate4;       /* Amplitude Envelope Rate 4 */
        ubyte  AEG_Level0;      /* Amplitude Envelope Level 0 */
        ubyte  AEG_Level1;      /* Amplitude Envelope Level 1 */
        ubyte  AEG_Level2;      /* Amplitude Envelope Level 2 */
        ubyte  AEG_Level3;      /* Amplitude Envelope Level 3 */
        byte   Pitch_Mac;       /* Pitch Macro Number*/
        byte   Fil_Mac;         /* Filter Macro Number*/
        byte   Amp_Mac;         /* Amplitude Envelope Macro Number*/
        byte   Pan_Mac;         /* Pan Macro Number*/
        byte   Env_Mac;         /* Envelope 1 macro number*/
        byte   Pw_Range;        /* Pitchwheel Range */
        byte   S1_Pitch;        /* Modulation Source 1 to Pitch pointer*/
        byte   S1_Pitch_Amt;    /* Modulation Source 1 to Pitch Amount*/
        byte   S2_Pitch;        /* Modulation Source 2 to Pitch pointer*/
        byte   S2_Pitch_Amt;    /* Modulation Source 2 to Pitch Amount*/
        byte   Key_Filter;      /* Keyboard to Filter Cutoff Amount*/
        byte   S1_Filter;       /* Modulation Source 1 to Filter pointer*/
        byte   S1_Filter_Amt;   /* Modulation Source 1 to Filter Amount*/
        byte   S2_Filter;       /* Modulation Source 2 to Filter pointer*/
        byte   S2_Filter_Amt;   /* Modulation Source 2 to Filter Amount*/
        byte   Vel_AEG_A;       /* Velocity to Amp Env Amount Amount*/
        ubyte  Vel_AEG_R;       /* Velocity To Amp Env Attack Rate Amt*/
        ubyte  Key AEG_R;       /* Keyboard to Amp Env Decay Rate Amt*/
        byte   S1_Amp;          /* Modulation Source 1 to Amp pointer*/
        byte   S1_Amp_Amt;      /* Modulation Source 1 to Amp Amount*/
        byte   S2_Amp;          /* Modulation Source 2 to Amp pointer*/
        byte   S2_Amp_Amt;      /* Modulation Source 2 to Amp Amount*/
        byte   Key_Pan_Amt;     /* Keyboard to Pan Amount*/
        byte   Vel_Pan_Amt;     /* Velocity to Pan Amount*/
        ubyte  Cutoff;          /* Filter Cutoff value */
        ubyte  Filter_Exciter;  /* Filter exciter value */
        byte   Vel_EG_R;        /* Velocity to ENV1 rate amount*/
        byte   Key_EG_R;        /* Keyboard to ENV1 rate amount*/
        byte   PEG_Amt;         /* Pitch Ramp amount*/
        ubyte  PEG_Rate;        /* Pitch Ramp rate*/
        byte   Vel_PEG_A;       /* Velocity to pitch ramp amount amount*/
        byte   Indiv_Level;     /* Velocity to pitch ramp rate amount*/
        long   Lfo1_Inc;        /* Lfo fade in amount increment*/
        long   Lfo2_Inc;        /* Uo fade-n amount increment*/
        byte   Dummy144;        /* Reserved for future use */
        byte   Dummy145;

} indiv;

            /*      Patch data structure      */

typedef  struct
{
        char   Patch Name[NAME SIZE];/* Patch name up to 16 characters*/
        ubyte  Mix_Rate1;       /* Mix envelope rate for segment 1 */
        ubyte  Mix_Rate2;       /* Mix envelope rate for segment 2 */
        ubyte  Mix_Rate3;       /* Mix envelope rate for segment 3 */
        ubyte  Mix_Rate4;       /* Mix envelope rate for segment 4 */
        uword  Mix_Count1;      /* Number of update cycles for env seg*/
        uword  Mix_Count2;      /* Number of update cycles for env seg*/
```

```
        uword  Mix_Count3;       /* Number of update cycles for env seg*/
        uword  Mix_Count3B;      /* Number of update cycles for env seg*/
        uword  Mix_Count2B;      /* Number of update cycles for env seg*/
        uword  Mix_Count1B;      /* Number of update cycles for env seg*/
        uword  Mix_Count4;       /* Number of update cycles for env seg*/
        long   Mix_XSlope1;      /* Increment size for env seg 1 */
        long   Mix_XSlope2;      /* Increment size for env seg 2 */
        long   Mix_XSlope3;      /* Increment size for env seg 3 */
        long   Mix_XSlope4;      /* Increment size for env seg 4 */
        long   Mix_YSlope1;      /* Increment size for env seg 1 */
        long   Mix_YSlope2;      /* Increment size for env seg 2 */]
        long   Mix_YSlope3;      /* Increment size for env seg 3 ~/
        long   Mix_YSlope4;      /* Increment size for env seg 4 */
        ubyte  Mix_X0;           /* Mix Envelope Point 0 level */
        ubyte  Mix_X1;           /* Mix Envelope Point 1 level */
        ubyte  Mix_X2;           /* Mix Envelope Point 2 level */
        ubyte  Mix_X3;           /* Mix Envelope Point 3 level */
        ubyte  Mix_X4;           /* Mix Envelope Point 4 level */
        ubyte  Mix_Y0;           /* Mix Envelope Point 0 level */
        ubyte  Mix_Y1;           /* Mix Envelope Point 1 level */
        ubyte  Mix_Y2;           /* Mix Envelope Point 2 level */
        ubyte  Mix_Y3;           /* Mix Envelope Point 3 level */
        ubyte  Mix_Y4;           /* Mix Envelope Point 4 level */
        ubyte  Mix_Repeats;      /* Number of repeats of mix envelope*/
        ubyte  Mix_Env_Loop;        /* Start segment of Mix Envelope loops*/
        ubyte  S1_MixAC;         /* Modulation Source 1 to MixAC pointer*/
        byte   S1_MixAC_Amt;     /* Modulation Source 1 to MixAC Amount*/
        ubyte  S2_MixAC;         /* Modulation Source 2 to MixAC pointer*/
        byte   S2_MixAC_Amt;     /* Modulation Source 2 to MixAC Amount*/
        ubyte  S1_MixBD;         /* Modulation Source 1 to MixBD pointer*/
        byte   S1_MixBD_Amt;     /* Modulation Source 1 to MixBD Amount*/
        ubyte  S2_MixBD;         /* Modulation Source 2 to MixBD pointer*/
        byte   S2_MixBD_Amt;     /* Modulation Source 2 to MixBD Amount*/
        byte   Number_Of_Waves; /* Number of WAVES/WAVESEQS in Patch*/
        ubyte  Hard_Sync;        /* Hard Sync Flag*/
        byte   Dummy140;         /* Extra for future use */
        byte   Dummy141;         /* Extra for future use */
        indiv  waveA;            /* Individual parameters for WAVE A */
        indiv  waveB;            /* Individual parameters for WAVE B */
        indiv  waveC;            /* Individual parameters for WAVE C */
        indiv  waveD;            /* Individual parameters for WAVE D */
} patch;
```

## 5.3 Multi Mode Setup Data Structure

```
/*          Data structures of the multi-set map which      */
/*          specifies the initial program on each track.    */
/*          There are 16 setups. Each one holds bank/prog */
/*          numbers for each MIDI channel. */

typedef  struct
{
        ubyte  Multimap_Chan_Enable;      /* MIDI channel enable/disable */
        ubyte  Multimap_Bank;             /* Bank number of this program */
        ubyte  Multimap_Prog;             /* Program number of this program */
} multimap;

typedef  struct
{
        ubyte     Multiset_FX_Chan;       /* Effects control channel number*/
```

```
        ubyte     Fx_Multi_Block[21];      /* Space for effects parameters*/
        multimap  Multiset_Map[16];        /* Bank and program numbers */
} multiset;
```

## 5.4 Wave Sequence Data Structure

/* This is repeated for the number of wave sequences in the bank. */

```
typedef  struct
{
        uword  WS_Link;           /* Pointer to Wave Sequence Start Step */
        uword  WS_Slink;          /* Pointer to Startmod Start Step */
        ubyte  WS_Loop_Start;     /* Step number of WAVESEQ Loop Start Point step*/
        ubyte  WS_Loop_End;       /* Step number of WAVESEQ Loop End Point step*/
        ubyte  WS_Loop_Count;     /* - Loop repeat count
                                     (bits  0-6)1-127*/
                                          /* O=OFF      */
                                          /~ 127=1NF  */
                                  /*Loop Direction (bit 7)*/
                                          /* O = FOR */
                                          /* 1 = B/F       */
        ubyte  WS_Start_Step,     /* Startmod starting step number*/
        ubyte  WS_Mod_Src;        /* Controller number to use for startmod */
        byte   WS_Mod_Amt;        /* Startmod sensitivity */
        byte   WS_Dyno_Mod;       /* (Total_Time * Mod_Amt)/255 */
        ulong  WS_Start_Time;     /* Cumulative time up to start step */
        uword  WS_Time;           /* Total time of Wave Sequence */
} wavesequence;
```

/* WAVE SEQUENCE STEP data structures */

/* Data structure of the STEP in a WAVE SEQUENCE */

```
typedef  struct
{
     uword  WS_Flink;   /* Step number of step in WAVSEQ after this one */
     uword  WS_Blink;   /* Step number of step in WAVSEQ before this one */
     uword  WS_Llink;   /* Pointer to loop start (0xFFFF except last step) */
     uword  WS_Wave_Num;       /* Wave number of this step in wave sequence */
     byte   WS_Coarse          /* Coarse tuning of wave */
     byte   WS_Fine;           /* Fine tuning of wave */
     uword  WS_Xfade;          /* Crossfade time of wave */
     uword  WS_Duration;       /* Duration of wave */
     uword  WS_Level;          /* Level of wave */
     uword  WS_Mod_Index;      /* Modulation Index */
} wavestep;

typedef  struct
{
        char Wave_Seq_Name[8];
} ws_name;

/* This is the entire structure which is transmitted */

typedef  struct
{
        waveseq     waveseq_block[32];    /* 32 wavseq locations */
        wavstep     wavstep_block[501];   /* 501 wave seq steps */
        ws_name     ws_name_block[32];    /* 32 wave seq names */
} ws_block;
```

## 5.5 Micro Tune Data Structure

```
typedef struct
{
        byte c key;   /* Offset from equal tempered for C note */
        byte cs key;  /* Offset from equal tempered for C# note */
        byte d key;   /* Offset from equal tempered for D note */
        byte ds key;  /* Offset from equal tempered for D# note */
        byte e key;   /* Offset from equal tempered for E note */
        byte f key;   /* Offset from equal tempered for F note */
        byte fs key;  /* Offset from equal tempered for F# note */
        byte g key;   /* Offset from equal tempered for G note */
        byte gs key;  /* Offset from equal tempered for G# note */
        byte a key;   /* Offset from equal tempered for A note */
        byte as key;  /* Offset from equal tempered for A# note */
        byte b key;   /* Offset from equal tempered for B note */
} mtune;
```

## 5.6 System Setup Data Structure

```
typedef struct
{
        ubyte  current_multi;       /* CURRENT MULTISET */
        ubyte  current_tune;        /* CURRENT MULTISET* /
        byte   master_tune;         /* MASTER TUNE */
        byte   effects_enable;      /* EFFECTS ENABLE */
        ubyte  pitch_bend_range;    /* PITCH BEND RANGE */
        ubyte  velocity_response;       /* VELOCITY RESPONSE*/
        byte   midi_mode;               /* MIDI MODE */
        ubyte  midi_base;               /* MIDI BASE CHAN */
        ubyte  num_mono_chans;          /* NUM MONO CHANS */
        byte   key_num_offset;          /* KEY NUM OFFSET */
        byte   param_enable;            /* MIDI PARAM ENABLE */
        byte   midi_1;                  /* CONTROLLER 1 */
        byte   midi_2;                  /* CONTROLLER 2*/
        byte   xmit_mode;               /* XMIT MODE */
        byte   local_kd;                /* LOCAL_KBD */
        byte   xmit_program_enable;     /* XMIT PROG CHANGE */
        byte   xmit_pressure_enable;    /* XMIT AFTERTOUCH */
        byte   xmit_pitch_enable;       /* XMIT PITCH BEND */
        byte   xmit_control_enable;     /* XMIT CONTROLLERS*/
        byte   rec_program_enable;      /* REC PROG CHANGE */
        byte   rec_pressure_enable;     /* REC AFTERTOUCH */
        byte   rec_pitch_enable         /* REC PITCH BEND */
        byte   rec_control_enable;      /* REC CONTROLLERS*/
        byte   note_enable;             /* REC NOTE ON OFF*/
        byte   alloff_enable;           /* REC ALL NOTES OFF*/
        byte   progmap_enable;          /* PROGMAP ENABLE */
        ubyte  foot_damper_function;
        ubyte  foot_damper_polarity;
        ubyte  foot_assign_1_function;
        ubyte  foot_assign_1_polarity;
        ubyte  foot_assign_2_function;
        ubyte  foot_assign_2_polarity;
        ubyte  ws_midi_clock;
} system;
```

## 5.7 All Data Data Structure

```
typedef  struct
{
        system              system_all;
        multiset            multiset_all;
        mtune               mtune_all;
        perf                perf_ram1;
        perf                perf_ram2;
        patch               patch_ram1;
        patch               patch_ram2;
        ws_block            ws_ram1;
        ws_block            ws_ram2;
}all  data;
```

## 5.8 Parameter Number Table

```
enum /* Parameter numbers. */
/* parameter numbers shown
for convenience */

{
 0        CURRENT_BANK,
 1        CARD_NAME,
 2        CURRENT_PROG,
 3        PROG_NAME,
 4        MIDI_MODE,
 5        MIDI_BASE_CHAN,
 6        NUM_MONO_CHANS,
 7        KEY_NUM_OFFSET,
 8        MIDI_PARAM_ENABLE,
 9        CONTROLLER_1,
10        CONTROLLER_2,
11        XMIT_MODE,
12        LOCAL_KBD,
13        XMIT_PROG_CHANGE,
14        XMIT_AFTERTOUCH,
15        XMIT_PITCH_BEND,
16        XMIT_CONTROLLERS,
17        REC_PROG_CHANGE,
18        REC_AFTERTOUCH,
19        REC_PITCH_BEND,
20        REC_CONTROLLERS,
21        REC_NOTE_ON_OFF,
22        REC_ALL_NOTES_OFF,
23        PROGMAP_ENABLE,
24        PROGMAP_CHANGE_NUM,
25        PROGMAP_PROG_BANK,
26        PROGMAP_PROG_NUM,
27        PROGMAP_PROG_NAME,
28        CURRENT_MULTISET,
29        MULTISET_FX_CONTROL_CHAN,
30        MULTISET_CHAN,
31        MULTISET_CHAN_ENABLE,
32        MULTISET_LEVEL,
33        MULTISET_PROG_BANK,
34        MULTISET_PROG_NUM,
35        MULTISET_PROG_NAME,
36        SYSEX_PATCH_BANK,
37        SYSEX_PATCH_NUM,
38        SYSEX_ALL_BANK,
39        SYSEX_WAVESEQ_BANK,
40        SYSEX_PROG_BANK,
41        SYSEX_PROG_NUM,
42        MASTER_TUNE,
43        EFFECTS_ENABLE,
44        MEM_PROTECT_INTERNAL,
45        MEM_PROTECT_CARD,
46        PITCH_BEND_RANGE,
47        VELOCITY_RESPONSE,
48        SAVE_DATA_TYPE,
49        SAVE_SOURCE_BANK,
50        SAVE_SOURCE_NUM,
51        SAVE_SOURCE_NAME,
52        SAVE_DEST_BANK,
53        SAVE_DEST_NUM,
54        SAVE_DEST_NAME,
55        SAVE_PLAY,
56        CURRENT_PART,
57        PART_PATCH_BANK,
58        PART_PATCH_NUM,
59        PART_PATCH_NAME,
60        PART_MODE,
61        PART_VOLUME,
62        PART_OUTPUT,
63        PART_KEY_LIMIT_LOW,
64        PART_KEY_LIMIT_HIGH,
65        PART_VEL_LIMIT_LOW,
66        PART_VEL_LIMIT_HIGH,
67        PART_TRANSPOSE,
68        PART_DETUNE,
69        PART_SUS_ENABLE,
70        PART_DELAY,
71        PART_UNI_NOTE_PRIORITY,
72        PART_MTUNE_TAB,
73        PART_MTUNE_KEY,
74        PART_MIDI_XMIT_CHAN,
75        PART_PLAY_MODE,
76        PART_PROG_CHANGE_XMIT,
77        PATCH_STRUCTURE,
78        PATCH_HARD_SYNC,
79        CURRENT_WAVE,
80        PATCH_PITCH_MACRO,
81        PATCH_FILTER_MACRO,
82        PATCH_AMP_MACRO,
83        PATCH_PAN_MACRO,
84        PATCH_ENV_MACRO,
85        PATCH_PITCH_BEND_RANGE,
86        PATCH_PITCH_RAMP_AMT,
87        PATCH_PITCH_RAMP_RATE,
88        PATCH_PITCH_VEL_AMT,
89        PITCH_SOURCE_1,
90        PITCH_SOURCE_1_AMOUNT,
91        PITCH_SOURCE_2,
92        PITCH_SOURCE_2_AMOUNT,
93        FILTER_MOD_CUTOFF,
94        FILTER_MOD_TRACKING,
95        FILTER_EXCITER_AMOUNT,
96        FILTER_MOD_SOURCE1,
97        FILTER_MOD_SOURCE1_AMT,
98        FILTER_MOD_SOURCE2,
99        FILTER_MOD_SOURCE2_AMT,
100       GP_ENV_LEVEL_0,
101       GP_ENV_LEVEL_1,
102       GP_ENV_LEVEL_2,
103       GP_ENV_LEVEL_3,
104       GP_ENV_LEVEL_4,
105       GP_ENV_RATE_1,
106       GP_ENV_RATE_2,
107       GP_ENV_RATE_3,
108       GP_ENV_RATE_4,
109       GP_VEL_ENV_AMT,
110       AMP_ENV_LEVEL_0,
111       AMP_ENV_LEVEL_1,
112       AMP_ENV_LEVEL_2,
113       AMP_ENV_LEVEL_3,
```

```
114         AMP_ENV_RATE_1,
115         AMP_ENV_RATE_2,
116         AMP_ENV_RATE_3,
117         AMP_ENV_RATE_4,
118         AMP_MOD_VEL_ENV_AMOUNT,
119         AMP_MOD_SOURCE_1,
120         AMP_MOD_SOURCE_1_AMOUNT,
121         AMP_MOD_SOURCE_2,
122         AMP_MOD_SOURCE_2_AMOUNT,
123         AMP_MOD_VEL_ATTACK_RATE,
124         AMP_MOD_KBD_DECAY_RATE,
125         LFO1_RATE,
126         LFO1_INITIAL_AMOUNT,
127         LFO1_SHAPE,
128         LFO1_SYNC,
129         LFO1_DELAY,
130         LFO1_FADE_IN,
131         LFO1_DEPTH_MOD_SOURCE,
132         LFO1_DEPTH_MOD_SRC_AMT,
133         LFO1_RATE_MOD_SOURCE,
134         LFO1_RATE_MOD_SRC_AMT,
135         LFO2_RATE,
136         LFO2_INITIAL_AMOUNT,
137         LFO2_SHAPE,
138         LFO2_SYNC,
139         LFO2_DELAY,
140         LFO2_FADE_IN,
141         LFO2_DEPTH_MOD_SOURCE,
142         LFO2_DEPTH_MOD_SRC_AMT,
143         LFO2_RATE_MOD_SOURCE,
144         LFO2_RATE_MOD_SRC_AMT,
145         PAN_VELOCITY_AMOUNT,
146         PAN_KEYBOARD_AMOUNT,
147         WAVEA_BANK,
148         WAVEA_NUM,
149         WAVEA_NAME,
150         WAVEA_LEVEL,
151         WAVEA_TUNE_COARSE,
152         WAVEA_TUNE_FINE,
153         WAVEA_TUNE_SLOPE,
154         WAVEB_BANK,
155         WAVEB_NUM,
156         WAVEB_NAME,
157         WAVEB_LEVEL,
158         WAVEB_TUNE_COARSE,
159         WAVEB_TUNE_FINE,
160         WAVEB_TUNE_SLOPE,
161         WAVEC_BANK,
162         WAVEC_NUM,
163         WAVEC_NAME,
164         WAVEC_LEVEL,
165         WAVEC_TUNE_COARSE,
166         WAVEC_TUNE_FINE,
167         WAVEC_TUNE_SLOPE,
168         WAVED_BANK,
169         WAVED_NUM,
170         WAVED_NAME,
171         WAVED_LEVEL,
172         WAVED_TUNE_COARSE,
173         WAVED_TUNE_FINE,
174         WAVED_TUNE_SLOPE,
175         WAVE_SEQ_NUM,
176         WAVE_SEQ_BANK,
177         WAVE_SEQ_NAME,
178         WAVE_SEQ_STEP,
179         WAVE_SEQ_WAVE_BANK,
180         WAVE_SEQ_WAVE_NUM,
181         WAVE_SEQ_WAVE_NAME,
182         WAVE_SEQ_COARSE,
183         WAVE_SEQ_FINE,
184         WAVE_SEQ_LEVEL,
185         WAVE_SEQ_DURATION,
186         WAVE_SEQ_XFADE,
187         WAVE_SEQ_LOOP_START,
188         WAVE_SEQ_LOOP_END,
189         WAVE_SEQ_REPEATS,
190         WAVE_SEQ_START_STEP,
191         WAVE_SEQ_MOD_SRC,
192         WAVE_SEQ_MOD_AMT,
193         MIX_ENV_POINT,
194         MIX_ENV_RATE,
195         MIX_ENV_X,
196         MIX_ENV_Y,
197         MIX_PERCENT_A,
198         MIX_PERCENT_B,
199         MIX_PERCENT_C,
200         MIX_PERCENT_D,
201         MIX_ENV_LOOP,
202         MIX_ENV_REPEATS,
203         MIX_MOD_X_SOURCE1,
204         MIX_MOD_X_SRC1_AMT,
205         MIX_MOD_X_SOURCE2,
206         MIX_MOD_X_SRC2_AMT,
207         MIX_MOD_Y_SOURCE1,
208         MIX_MOD_Y_SRC1_AMT,
209         MIX_MOD_Y_SOURCE2,
210         MIX_MOD_Y_SRC2_AMT,
211         COPY_MACRO_MODULE,
212         COPY_MACRO_SOURCE_WAVE,
213         COPY_MACRO_SOURCE_BANK,
214         COPY_MACRO_SOURCE_NUM,
215         COPY_MACRO_SOURCE_NAME,
216         COPY_MACRO_DEST_MODULE,
217         COPY_MACRO_DEST_WAVE,
218         COPY_MACRO_DEST_BANK,
219         COPY_MACRO_DEST_NUM,
220         COPY_MACRO_DEST_NAME,
221         COPY_DEST_PART,
222         COPY_DEST_PART_PATCH_BLANK,
223         COPY_DEST_PART_PATCH_NUM,
224         COPY_DEST_PART_PATCH_NAME,
225         COPY_WS_SOURCE_FROM_STEP,
226         COPY_WS_SOURCE_FROM_BANK,
227         COPY_WS_SOURCE_FROM_NUM,
228         COPY_WS_SOURCE_FROM_NAME,
229         COPY_WS_SOURCE_TO_STEP,
230         COPY_WS_SOURCE_TO_BANK,
231         COPY_WS_SOURCE_TO_NUM,
232         COPY_WS_SOURCE_TO_NAME,
233         COPY_WS_DEST_BANK,
234         COPY_WS_DEST_NUM,
235         COPY_WS_DEST_NAME,
```

```
236         COPY_WS_DEST_AFTER_STEP,
237         COPY_WS_DEST_AFTER_BANK,
238         COPY_WS_DEST_AFTER_NUM,
239         COPY_WS_DEST_AFTER_NAME,
240         COPY_WS_DEST_BEFORE_STEP,
241         COPY_WS_DEST_BEFORE_BANK,
242         COPY_WS_DEST_BEFORE_NUM,
243         COPY_WS_DEST_BEFORE_NAME,
244         MTUNE_C,
245         MTUNE_CS,
246         MTUNE_D,
247         MTUNE_DS,
248         MTUNE_E,
249         MTUNE_F,
250         MTUNE_FS,
251         MTUNE_G,
252         MTUNE_GS,
253         MTUNE_A,
254         MTUNE_AS,
255         MTUNE_B,
256         CURRENT_MTUNE,
257         FX_PLACEMENT,
258         FX1_PROG,
259         FX2_PROG,
260         FX_MIX_3,
261         FX_MIX_4,
262         FX_MOD_3,
263         FX_MOD_4,
264         FX_MOD_AMT_3,
265         FX_MOD_AMT_4,
266         CURRENT_FX,
267         FX_PROG,
268         FX_FOOTSWITCH_ENABLE1,
269         FX_FOOTSWITCH_ENABLE6,
270         FX_LFO_SHAPE,
271         FX_MOD1,
272         FX_MOD2,
273         FX_MOD4,
274         FX_MOD5,
275         FX_MOD6,
276         FX_MOD7,
277         FX_MOD8,
278         FX_MOD10,
279         FX_LFO_RATE1,
280         FX_LFO_RATE3,
281         FX_LFO_RATE4,
282         FX_LFO_RATE5,
283         FX_LFO_RATE6,
284         FX_LFO_RATE7,
285         FX_SPLIT_POINT2,
286         FX_SPLIT_POINT3,
287         FX_SPLIT_POINT10,
288         FX_DELAY_FACTOR7,
289         FX_TOP_DELAY3,
290         FX_WG_JUCT_MIX10,
291         FX_EQ_FREQ_LOW0,
292         FX_EQ_FREQ_MID2,
293         FX_EQ_FREQ_HIGH7,
294         FX_EQ_WIDTH6,
295         FX_100_WET_DRY0,
296         FX_100_WET_DRY3,
297         FX_100_WET_DRY4,
298         FX_10_WET_DRY0,
299         FX_10_WET_DRY3,
300         FX_10_WET_DRY4,
301         FX_UPARAM0,
302         FX_UPARAM1,
303         FX_UPARAM2,
304         FX_UPARAM3,
305         FX_UPARAM4,
306         FX_UPARAM5,
307         FX_UPARAM6,
308         FX_UPARAM7,
309         FX_UPARAM8,
310         FX_UPARAM9,
311         FX_UPARAM10,
312         FX_UPARAM11,
313         FX_UPARAM12,
314         FX_UPARAM13,
315         FX_PARAM0,
316         FX_PARAM1,
317         FX_PARAM2,
318         FX_PARAM3,
319         FX_PARAM4,
320         FX_PARAM5,
321         FX_PARAM6,
322         FX_PARAM7,
323         FX_PARAM8,
324         FX_PARAM9,
325         FX_PARAM10,
326         FX_PARAM11,
327         FX_PARAM12,
328         FX_PARAM13,
329         FX_DEST_TYPE,
330         FX_DEST_PROG,
331         FX_DEST_FX_NUM,
332         FX_DEST_PLACEMENT,
333         FX_DEST_FX1,
334         FX_DEST_FX2,
335         WAVE_MUTE,
336         WAVESEQ_WAVE,
337         WAVE_SEQ_LOOP_DIR,
338         WAVESEQ_COMPAND_SCALE,
339         FOOT_DAMPER_FUNCTION,
340         FOOT_DAMPER_POLARITY,
341         FOOT_ASSIGN_1_FUNCTION,
342         FOOT_ASSIGN_1_POLARITY,
343         FOOT_ASSIGN_2_FUNCTION,
344         FOOT_ASSIGN_2_POLARITY,
345         BANK_COPY_TYPE,
346         RESERVED,
347         ENV1_MOD_VEL_RATE,
348         ENV1_MOD_KBD_RATE,
349         WS_MIDI_CLOCK,
350         VIEW_BANK,
351         VIEW_PERF_NUM,
352         VIEW_PERF_NAME,
353         PARAM_END /* Must be last */
            };
```

**NOTICE**

KORG products are manufactured under strict specifications and voltages required by each country. These products are warranted by the KORG distributor only in each country. Any KORG product not sold with a warranty card or carrying a serial number disqualifies the product sold from the manufacturer's/distributor's warranty and liability. This requirement is for your own protection and safety.

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