WAVESTATION

ADVANCED VECTOR SYNTHESIS • WAVE SEQUENCING

Reference Guide

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②

AV Synthesis System

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ABOUT THIS MANUAL

The Wavestation Reference Guide 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 soft key (in ALL CAPS).

Path: EDIT - PATCH - WAVES - MIXEV

PAGE TITLE   **Graphic Display**

Parameters (Initial Caps)

```
EDIT MIX ENVELOPE
A    ROM    31  WAVSEQ              30%
B    ROM     3  WAVSEQ              17%
C    ROM   132  White Noise         20%
D    ROM    52  Square Wave         33%
Point: 2                 Time:    20
Loop: 0 <-> 3            Repts: INF
POINT              MIXMOD  CENTER
```

SOFT KEYS (ALL CAPS)
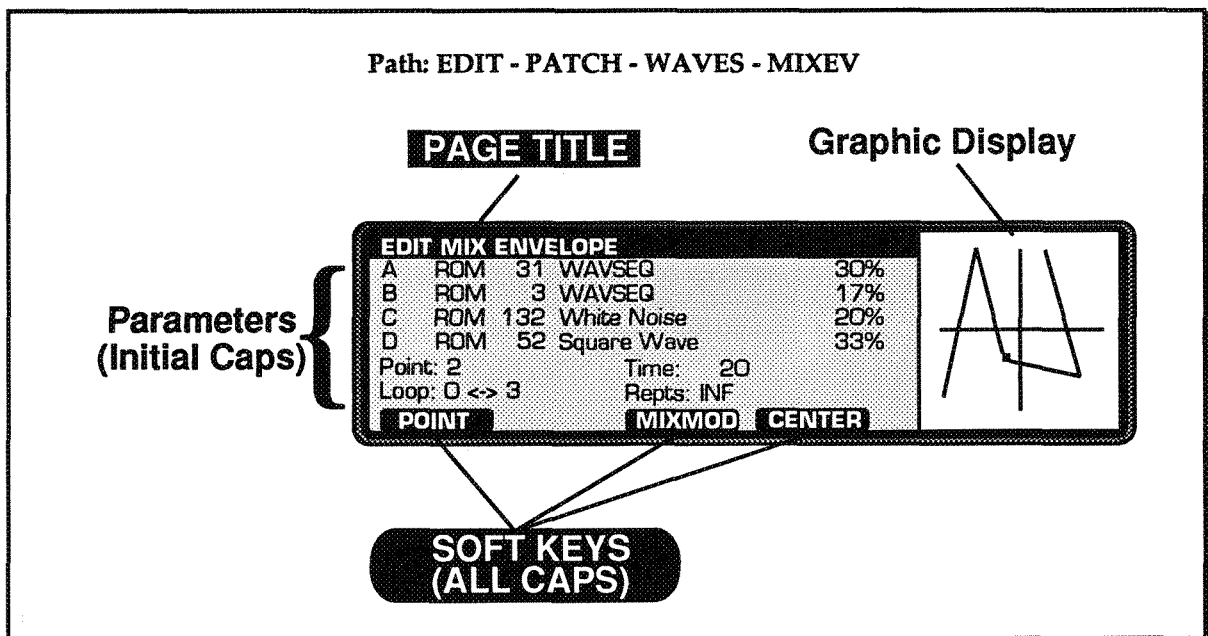
COPY EFFECTS - ALL

Paths:

Performance   EDIT - EFFECTS - COPY

Multiset   MIDI - MULTISET - EFFECTS - COPY

Use this function to copy all effects programming between Performances or Multisets. 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:

Performance   EDIT - EFFECTS - FX MIX - COPY

Multiset   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:

Performance EDIT - EFFECTS - FX1 (2) - COPY

Multiset 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 Patch parameter modules from any or ALL waves of 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, 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 STEP

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

```
COPY WAVE SEQUENCE STEP
Source Wave Sequence:  CARD 16 OB Sax
    From     Step: 1    CARD 54 PLUCK
    To       Step: 6    ROM  47 ALTO SAX
Dest Wave Sequence:     RAM1 31 Richter
    After    Step: 1    CARD 32 BANJO
    Before   Step: 5    ROM  38 TENOR SAX
EXECUTE
```

NOTE: During the copy operation, both the original and new versions of the destination wave sequence are remembered. The new version is temporarily stored in the available wave sequence step memory. To leave room for this, the number of steps that the destination will contain after the copy operation cannot exceed that of the available steps in the destination bank.

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.
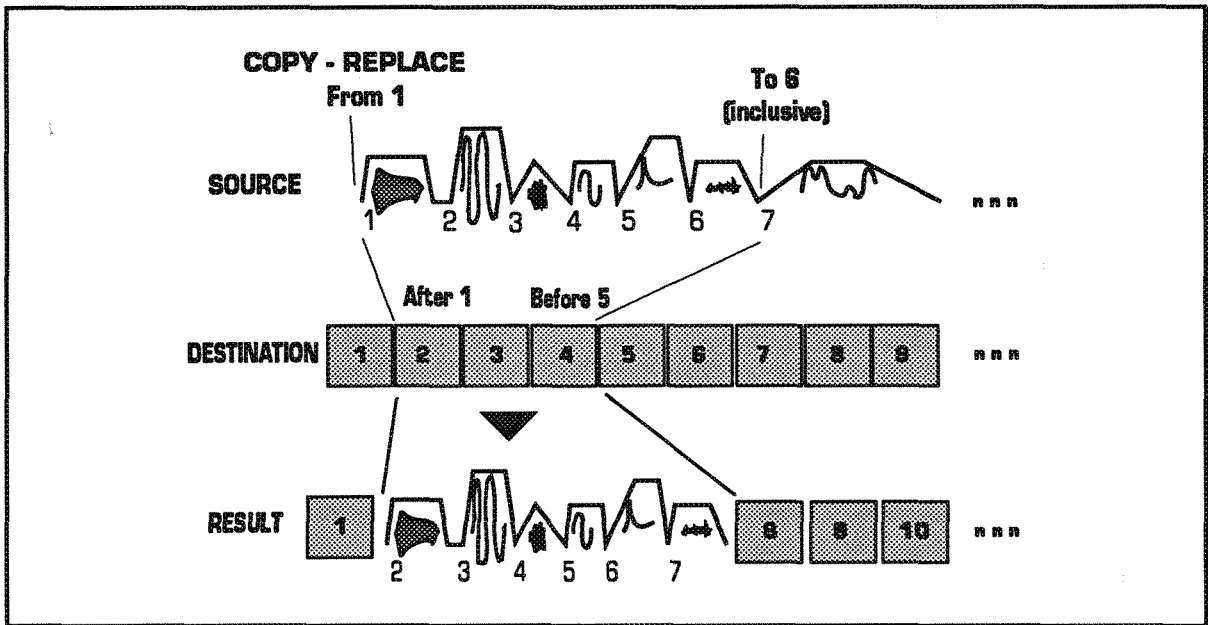
You can also use copying to clear a Wave Sequence, by copying an empty sequence over its entire range (from BEG to END).

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, as shown below.
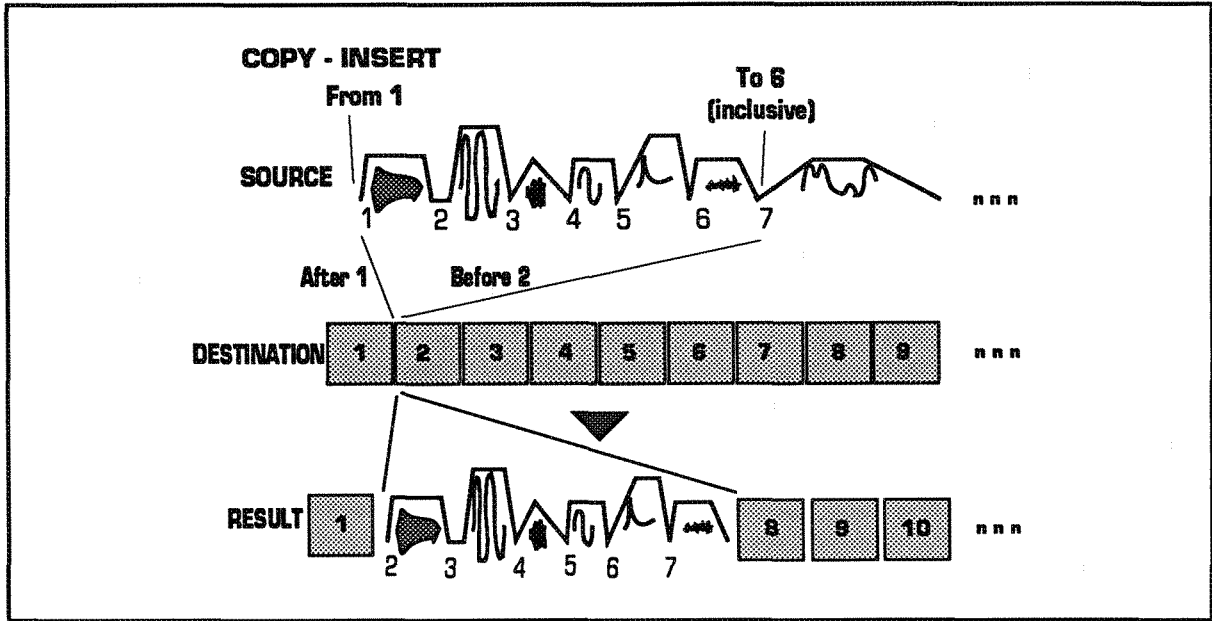
Source

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

```
EDIT AMP ENVELOPE
Wave: ALL ON                         Macro: USER
Level   0: 0    1: 99    2: 60    3: 85
Time    1: 50   2: 50    3: 80    4: 90              [ZOOM]

AMPMOD   PITCH   FILTER   LFOs   WAVINC   MUTE
```
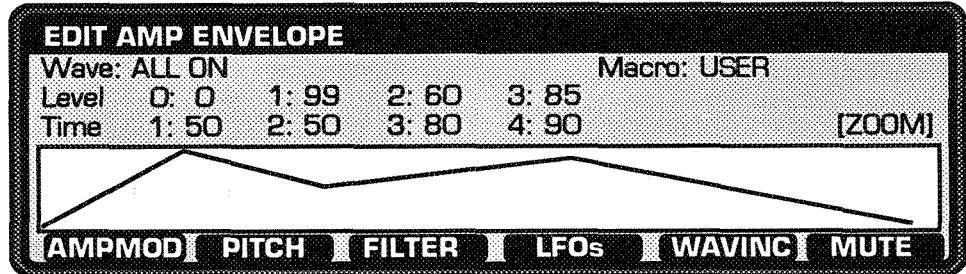
The amplifier shapes the loudness of the voice according to this envelope.

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's macro is modified.

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.
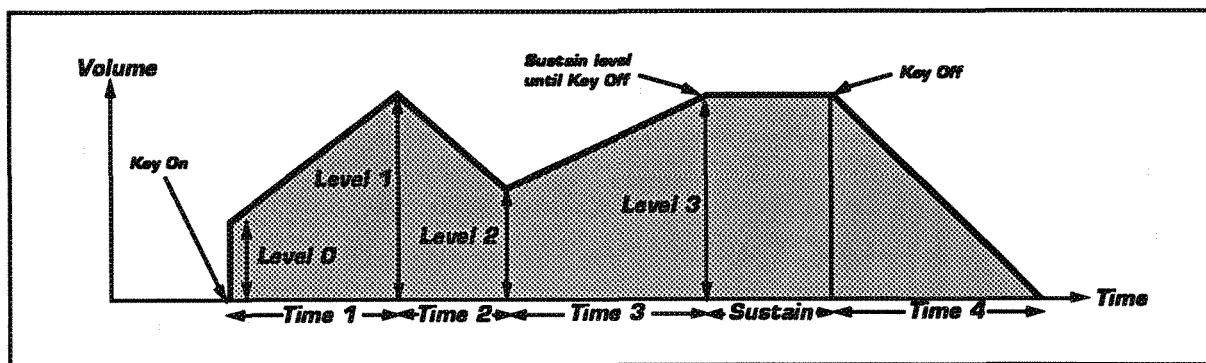
Level 2 is the decay level.

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 one of normal scale.

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

```
EDIT AMP MOD
Wave: ALL ON
Velocity Envelope Amount: +127
Source 1: LFO1                          Amt: +10
Source 2: LFO2                          Amt:   0
Attack Velocity Mod:       +50
Envelope Keyboard Mod:  +66
   PITCH      FILTER      ENV 1      LFOs     WAVINC   MUTE
```

Please see figure under EDIT AMP 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.

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 makes it slower (down to the original value of Time 1). 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
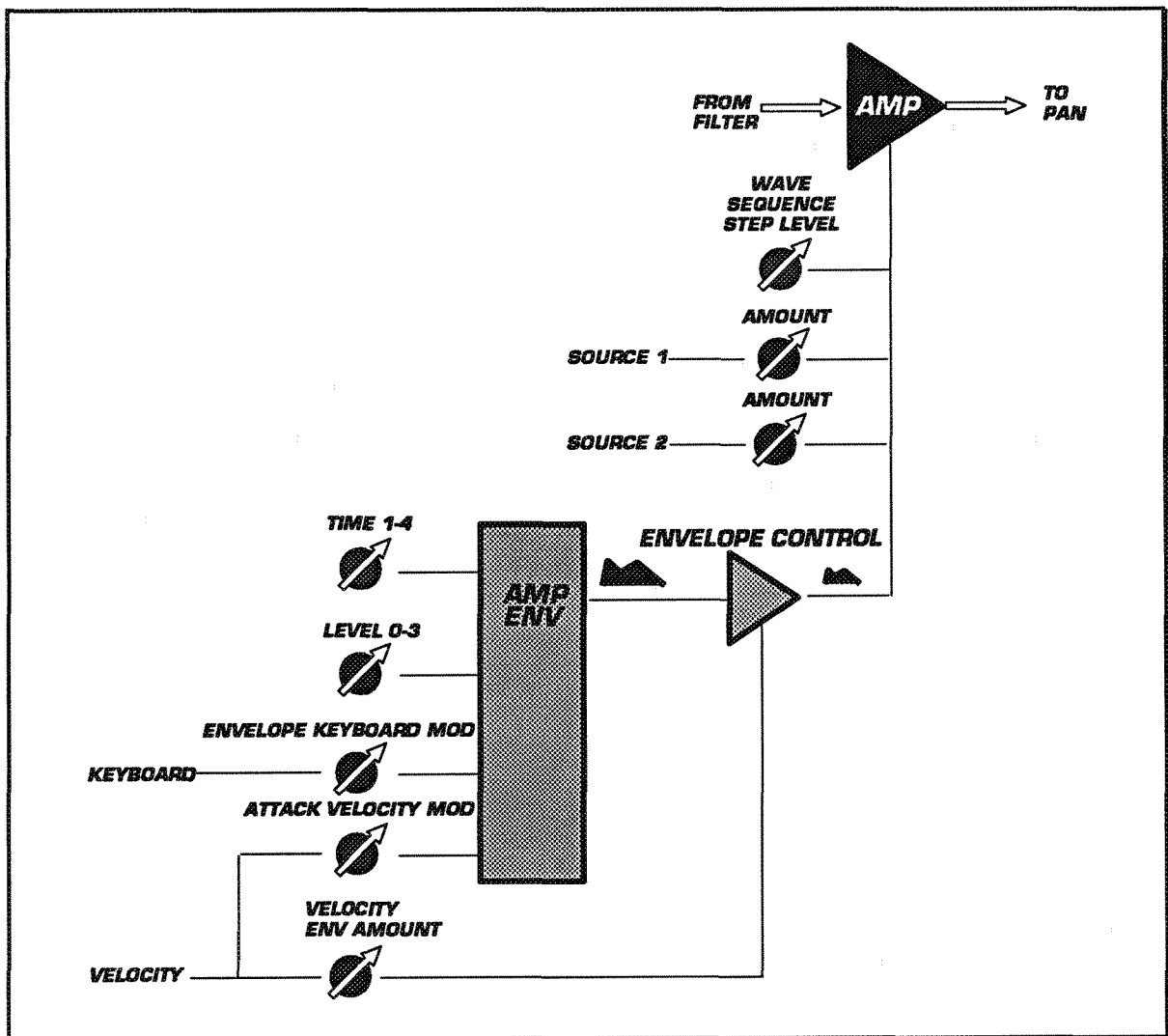
Goes to EDIT LFO 1.

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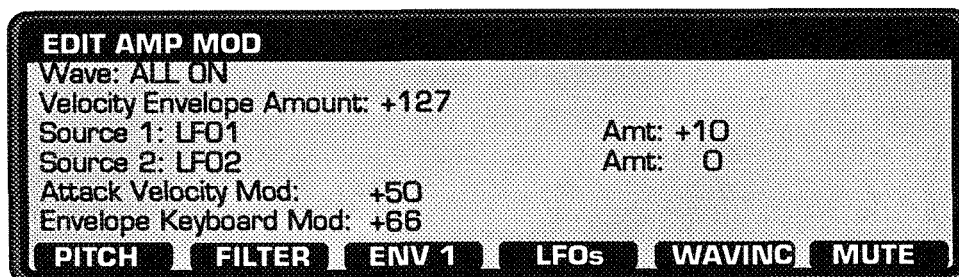
If you leave the EDIT PATCH level either by EXITing or by using a JUMP, the mutes are automatically disabled.

EDIT BUS A-B PAN

Path: EDIT - PATCH - MACROS - PAN

```
EDIT BUS A-B PAN
Wave: ALL  ON              Macro: VELOCITY PAN


Velocity Amount:    +127
Keyboard Amount:      0


  PITCH    FILTER    ENV1    LFOs    WAVINC    MUTE
```

This page sets the modulation of the Pan position, the left-right orientation of the sound within the stereo field. Pan may be modulated by velocity and keyboard position.

The initial Pan position is set on the PERFORMANCE PART DETAILS page, with the FX Bus parameter. To use the modulation routings on this page, the FX Bus parameter must be set to BUS - A, BUS - B, or one of the 99 intermediate values (99/1...1/99). If the FX Bus parameter is set to PATCH, BUS - C, BUS - D, or C + D, these modulators have no effect.

Pan Block Diagram
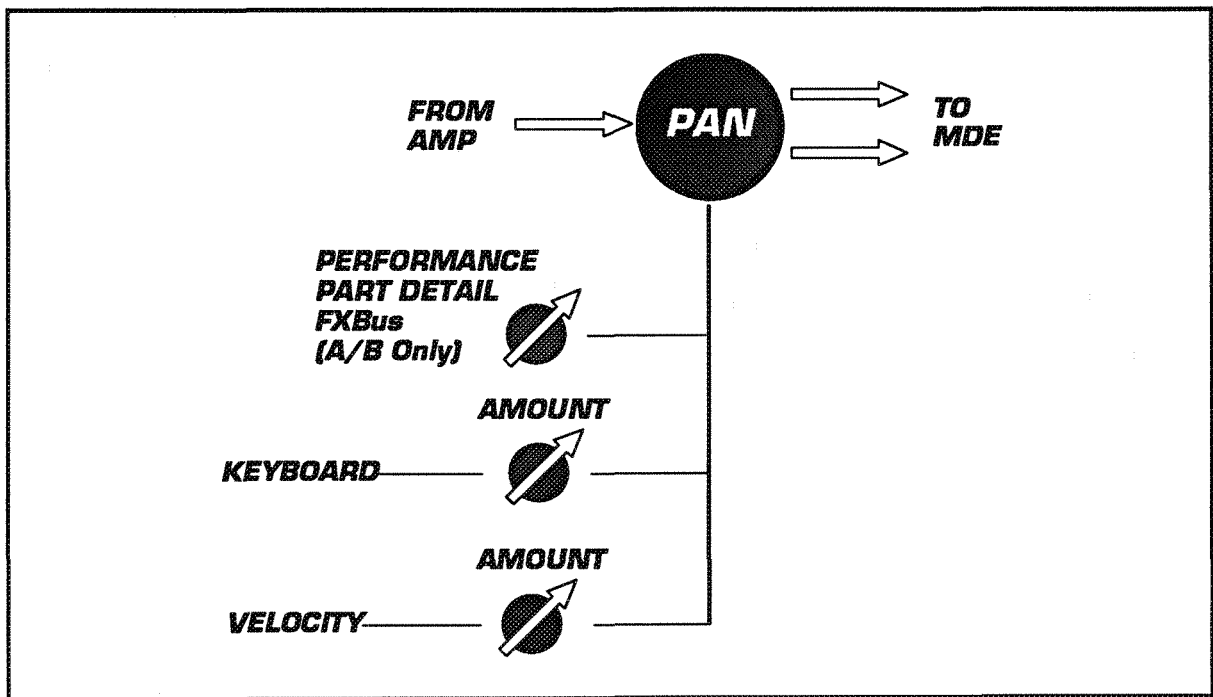
Wave

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.

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. A value of 0 means that velocity has no effect on pan.

A velocity of 1 (very low) will always place the note at the pan position set in the FX Bus parameter (PERFORMANCE PART DETAIL page). Greater velocities will affect the pan as discussed below.

With positive values, greater velocities will pan notes further to the right. For rightward panning across the entire stereo field, set the FX Bus parameter (PERFORMANCE PART DETAIL page) to BUS - A.

With negative values, greater velocities will pan notes further to the left. For leftward panning across the entire stereo field, set the FX Bus parameter (PERFORMANCE PART DETAIL page) to BUS - B.

Keyboard Amount

+/- 127. A value of 0 means that keyboard position has no effect on pan.

This parameter controls the spread of the keyboard across the stereo image. For stereo panning which directly relates to keyboard position, set the FX Bus parameter (PERFORMANCE PART DETAIL page) to 50/50.

Positive values pan lower notes to the left and higher notes to the right.

Negative values pan lower notes to the right and higher notes to the left.

Keyboard pan modulation is especially effective in simulations of acoustic keyboards, such as pianos and harpsichords.

PITCH

Goes to EDIT PITCH.

FILTER

Goes to EDIT FILTER.

ENV1

Goes to EDIT ENVELOPE 1.

LFOs

Goes to EDIT LFO 1.

WAVINC

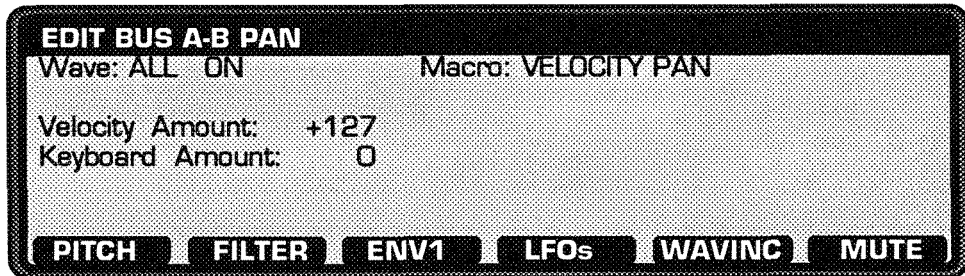Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

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.

NOTE: For other ways to set and modulate Pan, see:

the PERFORMANCE PART DETAIL page, FxBus parameter;

the PATCH BUS ASSIGNMENT page;

the EFFECTS MIX page, Mix 3/4 parameters using Parallel routing;

and the Stereo Mod-Pan effect.

EDIT EFFECT 1 (2)

Paths:

Performance EDIT - EFFECTS - FX1 EDIT (or FX2 EDIT)

Multiset MIDI - MULTISET - EFFECTS - FX1 EDIT (or FX2 EDIT)

```
EDIT EFFECT 1 (2)                          LARGE HALL - EQ
Dry/Wet Mix: 50/50       Src: WHEEL   Amt: -11
Pre Delay: 100 mSec
Decay Time: 70
E/R Level: 5
HF Damping: 40
Low EQ: 0 dB            High EQ: 0 dB
FX MIX                              FX2 EDIT          COPY
```
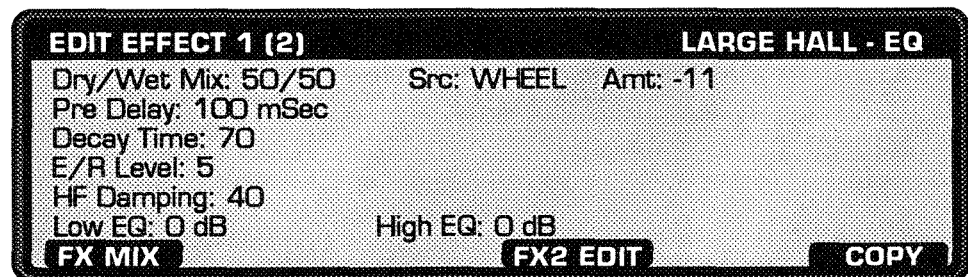
For an introduction to the effects system, please see Chapter 7, "Effects Tour," in the Player's Guide.

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

At the right of the top line, the current FX macro is displayed. This field may be changed.

Parameters per Effect

The specific parameters on the page vary with the 22 different effects types. See below.

FX MIX

This soft key takes you to the Routing EFFECTS MIX page.

FX1 / 2 EDIT

This soft key 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 47 programs, which are variations upon approximately 22 basic effects types. Each effect type has its own set of parameters. (The effects programs are, in effect, macros for each of the 22 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	I (Set FOOT PEDAL ASSIGN I
FSWTOG	Footswitch toggle, push-on/push-off	I to EFFECTS SWITCH) I
PEDAL	Footpedal	(Set FOOT PEDAL ASSIGN to MOD PEDAL)
XMIDI1	MIDI Controller 1	
XMIDI2	MIDI Controller 2	
WH+AT	Sum of mod wheel and 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* 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 400 ms* Time delay between the direct sound and the first early reflections. To lengthen the hall, increase this parameter.
Decay Time	*0 to 99* Time before reverberation decays. The lower the value, the shorter the decay time.
Early Reflection Level	*0 to 10* Level of early reflections.
High Frequency Damping	*0 to 99* 0 gives you the "liveliest" room. The larger the value, the faster the high frequencies are damped. (In other words, the deaden the room.)
Low EQ	*-12 to +12 dB* Control for cutting or boosting the low frequencies. EQ affects reverb only, not direct signal.
High EQ	*-12 to +12 dB* Control for cutting or boosting the high frequencies. 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
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 200 ms
Time between the direct sound and the first early reflections.

Decay Time

10 - 800 ms (in 10 ms steps)
Decay time for the early reflections.

Low EQ

-12 to +12 dB
Control for cutting or boosting the low frequencies.
EQ affects effect only, not direct signal.

High EQ

-12 to +12 dB
Control for cutting or boosting the high frequencies.
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
Output balance of processed and unprocessed sound.

Pre Delay

0 to 200 ms
Time between the direct sound and the first early reflections.

Decay Time

10 - 800 ms (in 10 ms steps)
Decay time for the early reflections.

Gate Hold Time	*0 to 800 ms (in 10 ms steps)* The time the gate will remain open after the modulation source goes below the threshold.
Gate Key Source	*Mod source*
Gate Threshold	*0 - 100* The level at which the gate will open.

STEREO DELAY

A stereo delay in which 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 mod amount values invert modulation so that positive-going modulation swells effect out, and vice-versa.
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, relative to the Delay Time set above. For example, the factor 3:5 equals the fraction 3/5 or .6, so the relationship of the delay times is: left = (Delay Time) x 0.6, right = (Delay Time) x 1. Conversely, 5:3 means the relationship is: left = (Delay Time) x 1, right = (Delay Time) 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 CH A (left)	*DRY, 9/1, . . .1/9, WET*
Delay Time CH A (left)	*0 to 500 ms* Time between processed and unprocessed sound.
Feedback CH A (left)	*-100 to +100* Amount of feedback (negative values produce inverted phase). In effect, this is the number of delay repeats.
Dry/Wet Mix CH B (right)	*DRY, 9/1, . . .1/9, WET*
Delay Time CH B (right)	*0 to 500 ms* Time between processed and unprocessed sound.
Feedback CH B (right)	*-100 to +100*

MULTI - TAP DELAY - EQ

Each effect input is equalized and then delayed by two independent, stereo 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** 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** Amount of feedback (negative values produce inverted phase).
Low EQ	**-12 to +12 dB** Control for cutting or boosting the low frequencies. EQ affects both the wet and dry signals.
High EQ	**-12 to +12 dB** 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" character to any instrument sound. It 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	**DISABLE/ENABLE** Enables or disables use of EFFECTS SWITCH to turn effect on or off.

Delay Time Left	*0 to 500 ms* Time between processed and unprocessed sound.
Delay Time Right	*0 to 500 ms* Time between processed and unprocessed sound.
LFO Rate	*0.03-30 Hz* Speed of modulation (frequency).
LFO Rate mod source	*Mod source*
LFO Rate mod amount	*-15 to +15*
LFO Depth	*0 to 100*
LFO Shape	*TRI, SIN, -10 to +10* Selection of modulation waveform. Numeric values determine wave symmetry.
Low EQ	*-12 to +12 dB* Control for cutting or boosting the low frequencies. EQ affects the wet signal only.
High EQ	*-12 to +12 dB* Control for cutting or boosting the high frequencies. EQ affects the wet signal only.

HARMONIC CHORUS

24 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	*DISABLE/ENABLE* Enables or disables use of EFFECTS SWITCH to turn effect on or off.
Delay Time Left	*0 to 500 ms* Time between processed and unprocessed sound.
Delay Time Right	*0 to 500 ms* Time between processed and unprocessed sound.
LFO Rate	*0.03-30 Hz* 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	*160 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

In this program, the expansive stereo swirling and swishing effect is enhanced by the two flanger circuits' 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	*DISABLE/ENABLE* Enables or disables use of EFFECTS SWITCH to turn effect on or off.
Top Delay	*0 to 200 ms*
Range	*0 to 100* LFO sweep range.
Ramp Speed	*Manual, 1 to 100* If set to Manual, the mod source directly controls the flanger.
Ramp Speed mod source	*Mod source*
Ramp Speed mod amount	*-15 to +15*
Output Mix	*-10 to +10* Output balance of direct and delayed sound. Negative values produce inverted phase.
Resonance	*-100 to +100* Amount of flanger feedback.
Low EQ	*-12 to +12 dB* Control for cutting or boosting the low frequencies. EQ affects the effect signal only.

High EQ	-12 to +12 dB
	Control for cutting or boosting the high frequencies.
	EQ affects the effect signal only.

ENHANCER - EXCITER - EQ

This stereo 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 effected sound to the forefront.

28 Enhancer - Exciter - EQ

Parameters

Dry/Wet Mix	DRY, 9/1, . . .1/9, WET
	Output balance of processed and unprocessed sound.
Harmonic Density	0 to 100
	Amount of excitation.
Hot Spot	1 to 20
	Central frequency emphasized by exciter.
Stereo Width	0 to 100
	Level of inverted delay crossover.
Delay	1 to 100
	Crossover delay time.
Low EQ	-12 to +12 dB
	Control for cutting or boosting the low frequencies.
	EQ affects both the wet and dry signals.
High EQ	-12 to +12 dB
	Control for cutting or boosting the high frequencies.
	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. It also has a "wah" effect.

Parameters

Dry/Wet Mix	DRY, 9/1, . . .1/9, WET
	Output balance of processed and unprocessed sound.
Footswitch	DISABLE/ENABLE
	Enables or disables use of EFFECTS SWITCH to turn effect on or off.
Edge	1 to 111
	Amount of drive.

Hot Spot	***0 to 100*** Controls the center frequency of the "wah" filter. Try modulating this parameter with a pedal or mod wheel for the classic"wah-wah" effect.
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	***0 to 100*** Output level of distortion.
Low EQ	***-12 to +12 dB*** Control for cutting or boosting the low frequencies. EQ affects the effect output only; the direct signal is unaffected.
High EQ	***-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	***DISABLE/ENABLE*** Enables or disables use of EFFECTS SWITCH to turn effect on or off.
Center	***0 to 100*** 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 source 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* Amount of feedback (negative values produce inverted phase).

ROTARY SPEAKER

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

33 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 acceleration rate determines how long it takes the rotors to reach their new speed.

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* Output balance of processed and unprocessed sound.
Footswitch	*DISABLE/ENABLE* Enables or disables use of EFFECTS SWITCH to turn effect on or off.
Depth	*0 to 15* Depth of vibrato effect. This is equivalent to selecting top rotor horn sizes.
Acceleration	*1 to 15* 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.

STEREO 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 sources to be sent to the 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* 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* Speed of modulation (frequency).
LFO Depth	*0 to 10* The amount of crossover to the opposite side.
LFO Depth mod source	*Mod source*
LFO Depth mod amount	*-15 to +15*
Low EQ	*-12 to +12 dB* Control for cutting or boosting the low frequencies. EQ affects both the wet and dry signals.
High EQ	*-12 to +12 dB* Control for cutting or boosting the high frequencies. EQ affects both the wet and dry signals.

STEREO PARAMETRIC EQ

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

36 Stereo parametric EQ

Parameters

High Frequency	*1 kHz to 16 kHz* High shelving cutoff frequency.
High Level	*-12 to +12 dB* High EQ level.
Mid Frequency	*1 to 100* Midrange filter center frequency.

Mid Level	*-12 to +12 dB*
Mid Width	*1 - 100* Mid frequency filter resonance.
Mid Frequency mod source	*Mod source*
Mid Frequency mod amount	*-15 to +15*
Low Frequency	*32 Hz to 1 kHz* Low EQ shelving cutoff frequency.
Low Level	*-12 to +12 dB* Low 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* Speed of modulation (frequency).
LFO Depth	*0 to 100*
Flanger Feedback	*-100 to +100* Amount of feedback (negative values produce inverted phase).
Dry/Wet Mix	*DRY, 99/1, . . .1/99, WET* Output balance of processed and unprocessed sound.
Echo Delay Time	*0 to 450 ms*
FTSW Sample	*ENABLE/DISABLE* 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* Amount of feedback (negative values produce inverted phase).
Low EQ	*-12 to +12 dB* Control for cutting or boosting the low frequencies. EQ affects wet signal only, the direct signal is unaffected.

High EQ	*-12 to +12 dB*
	Control for cutting or boosting the high frequencies.
	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 (Delay)

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 (Reverb)

Dry/Wet Mix	*DRY, 99/1, . . .1/99, WET*
	Output balance of processed and unprocessed sound.
Pre Delay	*0 to 250 ms*
	Time between the direct sound and the first early reflections.
Decay Time	*0-99*
	Reverb decay time after pre delay.
High Frequency Damping	*0 to 99*
	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 (Delay)

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 (Chorus/Flanger)

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 (Delay)

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 (Overdrive/Distortion)

Edge	*1 to 111* Distortion drive amount.
Hot Spot	*1 - 100* "Wah" filter frequency.
Resonance	*0 to 100* "Wah" effect depth.
Level	*0 to 100* 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 (Delay)

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 (Phaser)

Center	**0 to 100** Center frequency which phase shift affects.
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 - ROTARY SPEAKER

46 Delay/rotary speaker

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 (Delay)

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 (Rotary Speaker)

Acceleration	*1 to 15*
Slow Rotor Speed	*0.03-30 Hz*
Fast Rotor Speed	*0.03-30 Hz*
Rotor Speed mod source	*Mod source*

STEREO PITCH SHIFTER/DELAY

47 Stereo 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* 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

Paths:

Patch Macros   EDIT - PATCH - MACROS - (Module) - ENV 1

Patch Waves   EDIT - PATCH - WAVES - MIXEV - MIXMOD - ENV 1

```
EDIT ENVELOPE 1
Wave: ALL ON                        Macro: USER
Level    0:  0    1: 99    2: 60    3: 80    4: 40
Time     1: 50    2: 50    3: 70    4: 90              [ZOOM]

ENVMOD            LFO 1    LFO 2    WAVINC    MUTE
```
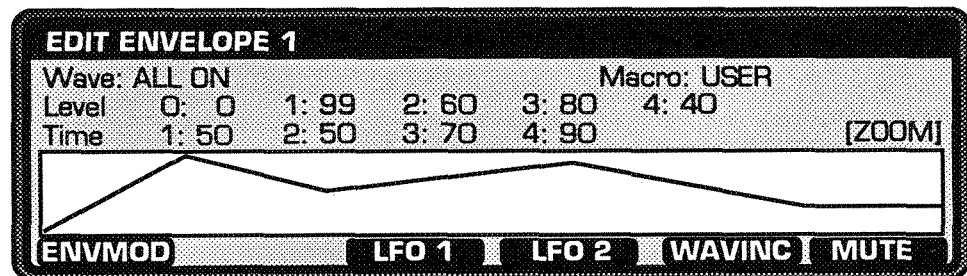
Since ENV 1 can be a modulation source for many of the Wavestation's parameters, EDIT ENVELOPE 1 is accessible through a number of pages. These include the EDIT AMP MOD, EDIT FILTER, EDIT LFO 1 (2), EDIT PAN, and EDIT PITCH pages under PATCH MACROS, and the EDIT MIX MOD page under WAVES.

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.

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 after 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.
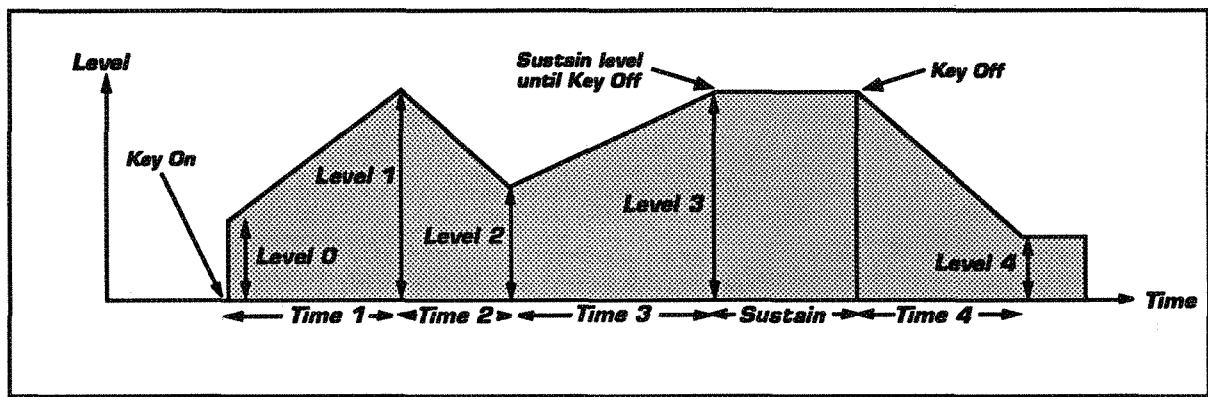
Times 1 - 4

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.

ZOOM

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

Envelope 1 Block Diagram
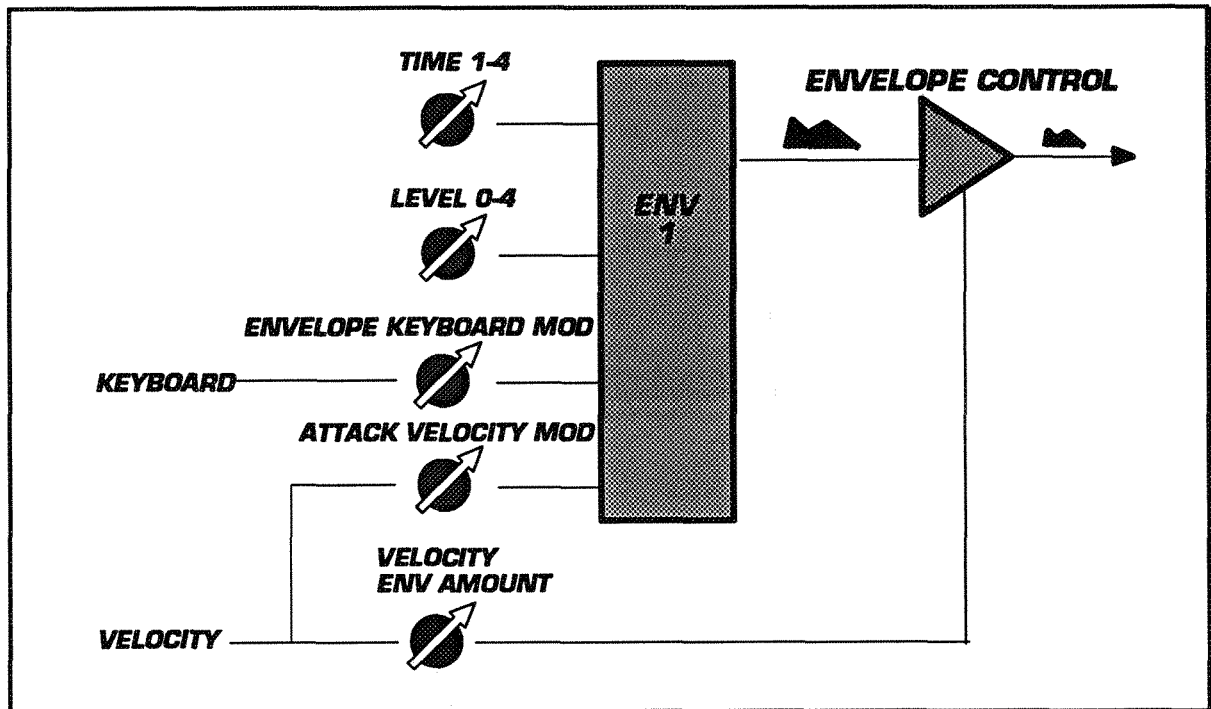
ENVMOD

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

Paths:

Patch Macros   EDIT - PATCH - MACROS - (Module) - ENV1 - ENV MOD

Patch Waves   EDIT - PATCH - WAVES - MIXEV - MIXMOD - ENV1 -
ENV MOD

```
EDIT ENV MOD
Wave: ALL   ON
Velocity Env. Amount:      +99
Attack Velocity Mod:       +50
Envelope Keyboard Mod:     +66


                                        [WAVINC] [MUTE]
```

Please see figure under EDIT ENVELOPE 1.
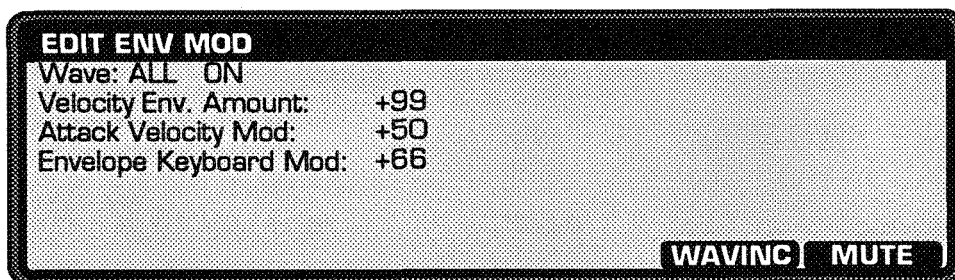
Wave

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.

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 time,
and playing more softly makes it slower (down to the original attack time value).
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

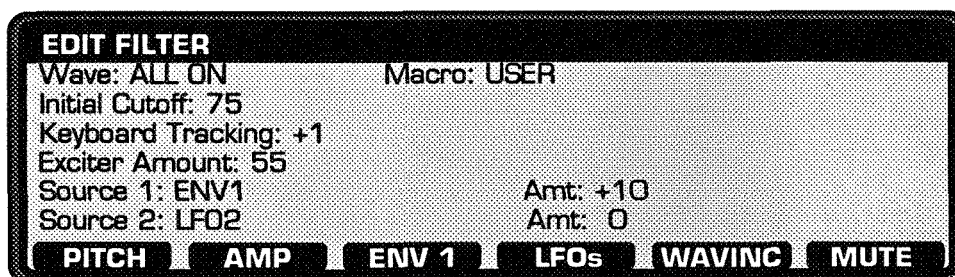Increments the Wave selection in order: ALL, A, B, C, D, ALL . . .

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 - FILTER

```
EDIT FILTER
Wave: ALL ON          Macro: USER
Initial Cutoff: 75
Keyboard Tracking: +1
Exciter Amount: 55
Source 1: ENV1                        Amt: +10
Source 2: LFO2                        Amt:  0
   PITCH      AMP      ENV 1      LFOs    WAVINC    MUTE
```

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

For most sounds, you will probably use ENVELOPE 1 as 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.

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.

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.)
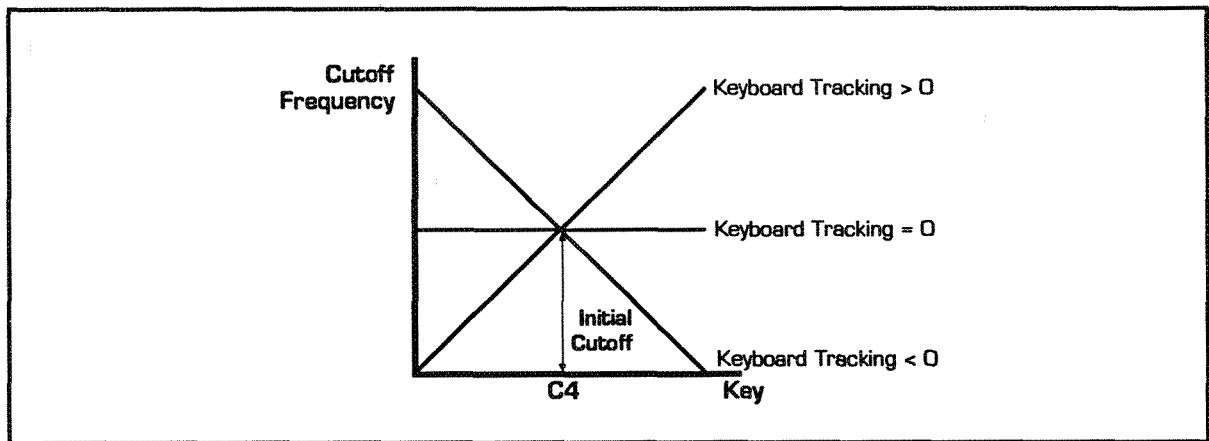
Exciter Amount

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 MACROS page.

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

PITCH

Goes to EDIT PITCH.

AMP

Goes to EDIT AMP 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.

Filter Block Diagram
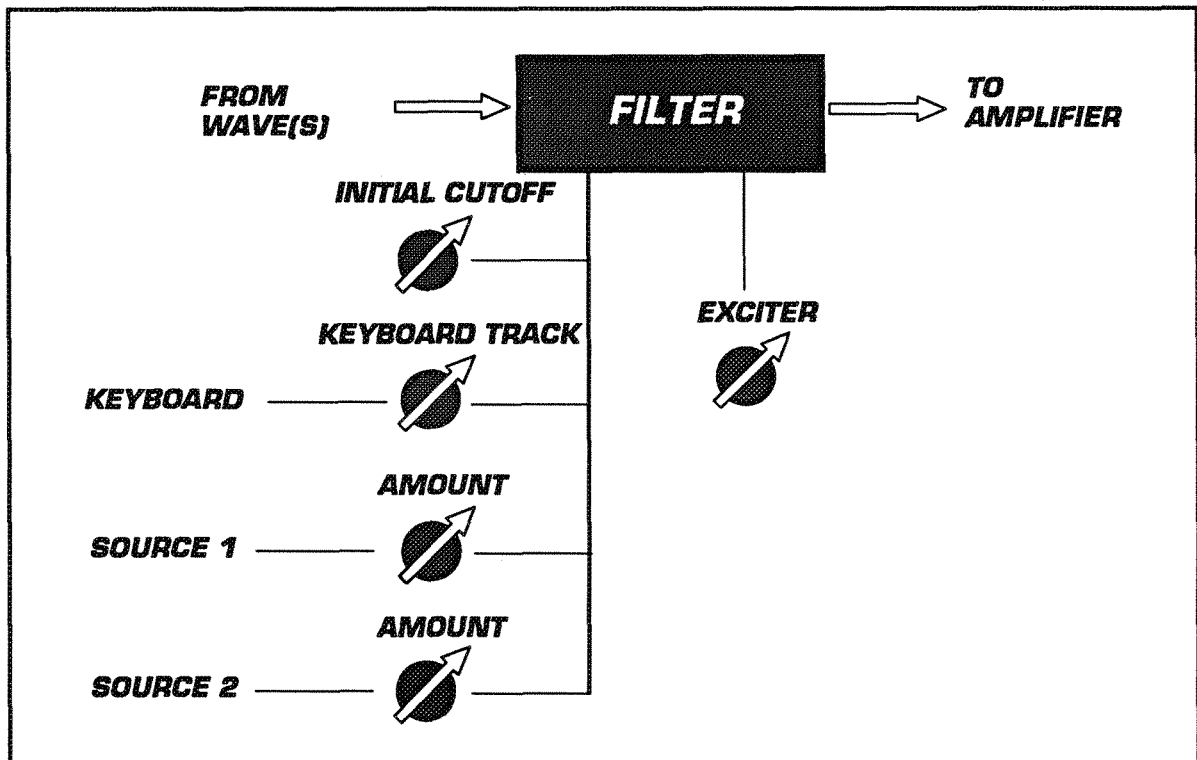
EDIT LFO 1 (2)

Paths:

Patch Macros   EDIT - PATCH - MACROS - (Module) - LFOs

Patch Waves   EDIT - PATCH - WAVES - MIXEV - MIXMOD - LFOs

```
EDIT LFO 1 (2)
Wave      ALL  ON
Rate: 45                  Initial Amount:  33
Shape: TRIANGLE           Sync:  ON
Delay: 12                 Fade-in:   23
Depth Mod:  MOD WHEEL           Amt: +55
Rate Mod:  CENTERED KEYBOARD    Amt: +75
              ENV1              LFO2   WAVINC   MUTE
```

Since the LFOs can be modulation sources for so many of the Wavestation's parameters, EDIT LFO 1 (2) is accessible through a number of pages. These include the EDIT AMP ENVELOPE, EDIT AMP MOD, EDIT ENVELOPE 1, EDIT FILTER, EDIT PAN, and EDIT PITCH pages under PATCH MACROS, and the EDIT MIX MOD page under WAVES.

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.

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, RAMP, and RANDOM.

Sync

OFF. LFOs are free-running.

ON. The LFOs are 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
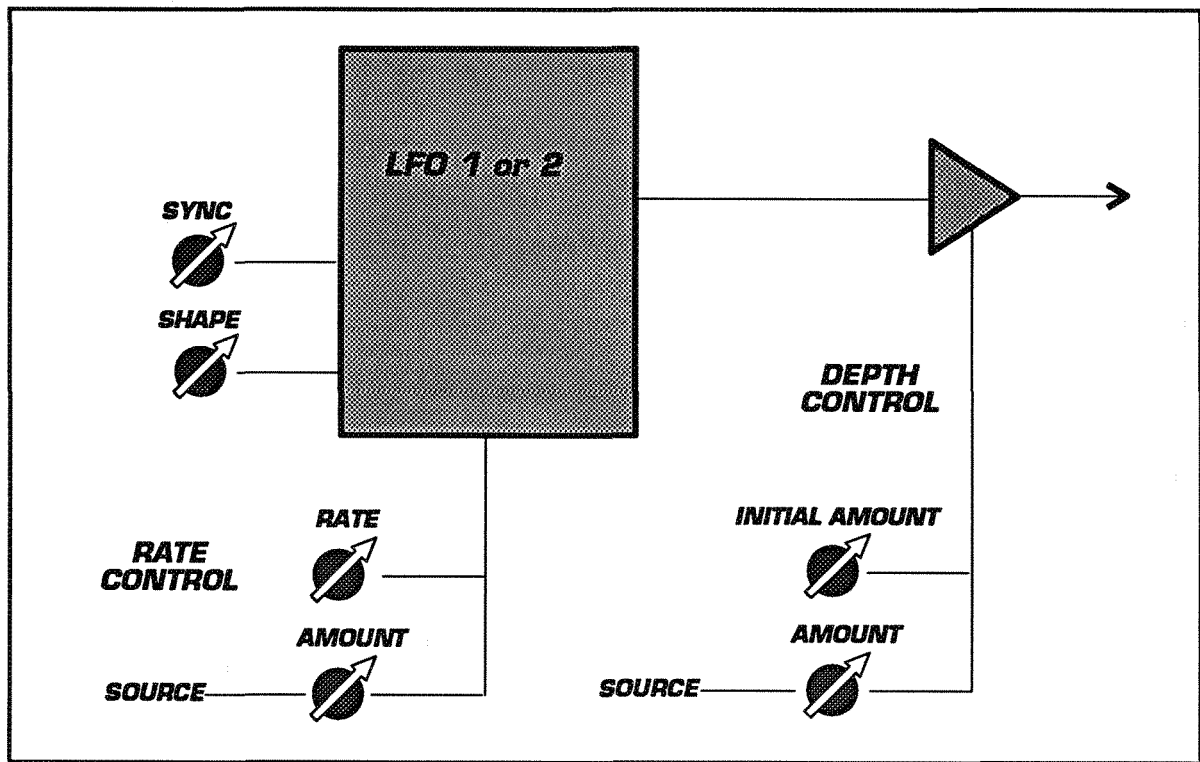
Delay

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

Fade-in

The time it takes the LFO to fade in to the initial amount after the initial delay has elapsed.

LFO Delay/Fade-in
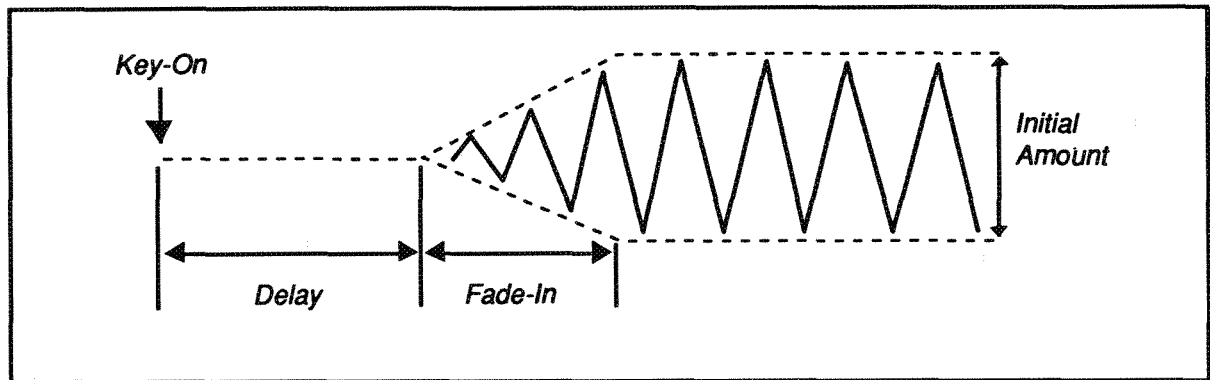
Depth Mod, Amt

+/- 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 . . .
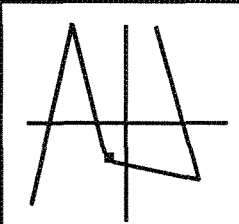
MUTE

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

```
EDIT MIX ENVELOPE
A - ROM 12    *WAVSEQ              30%
B - ROM 31    *WAVSEQ              17%
C - ROM 76    White Noise         20%
D - ROM 84    Square Wave         33%
Point: 2              Time:   20
Loop: Off             Repts: INF
   POINT              MIXMOD   CENTER
```

If the Patch is in 2 oscillator mode, the B-D axis (Y-AXIS) disappears. Waves A and C continue to be affected by the Mix Envelope.

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, identified by an asterisk (*) before their names.

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 each Wave at the currently selected point. The total is always 100%.

Point

The current point number. Pressing the POINT soft key 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, while the key is held, the oscillator mix will progress to and remain at point 3 (the sustain point). 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 Loops

0 --> 3

1 --> 3

2 --> 3

Bidirectional Loops

0 <--> 3

1 <--> 3

2 <--> 3

BIDIRECTIONAL 1 <--> 3 example:
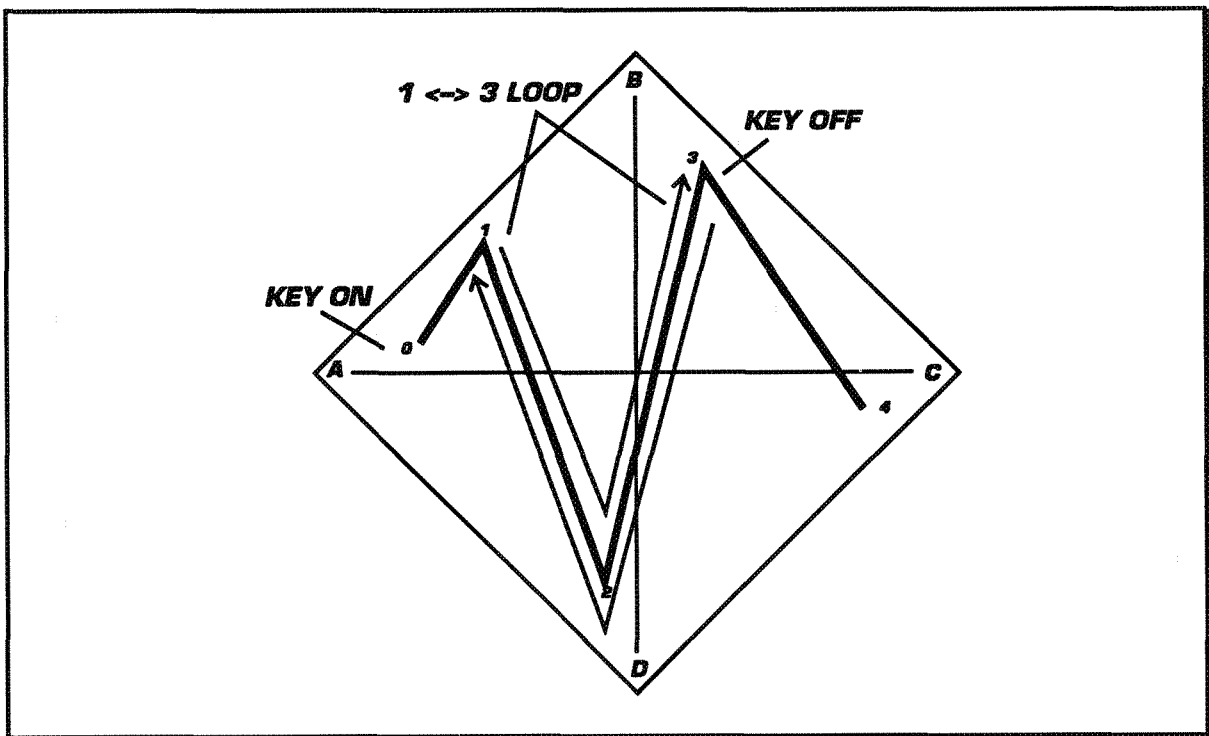
Repeats

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
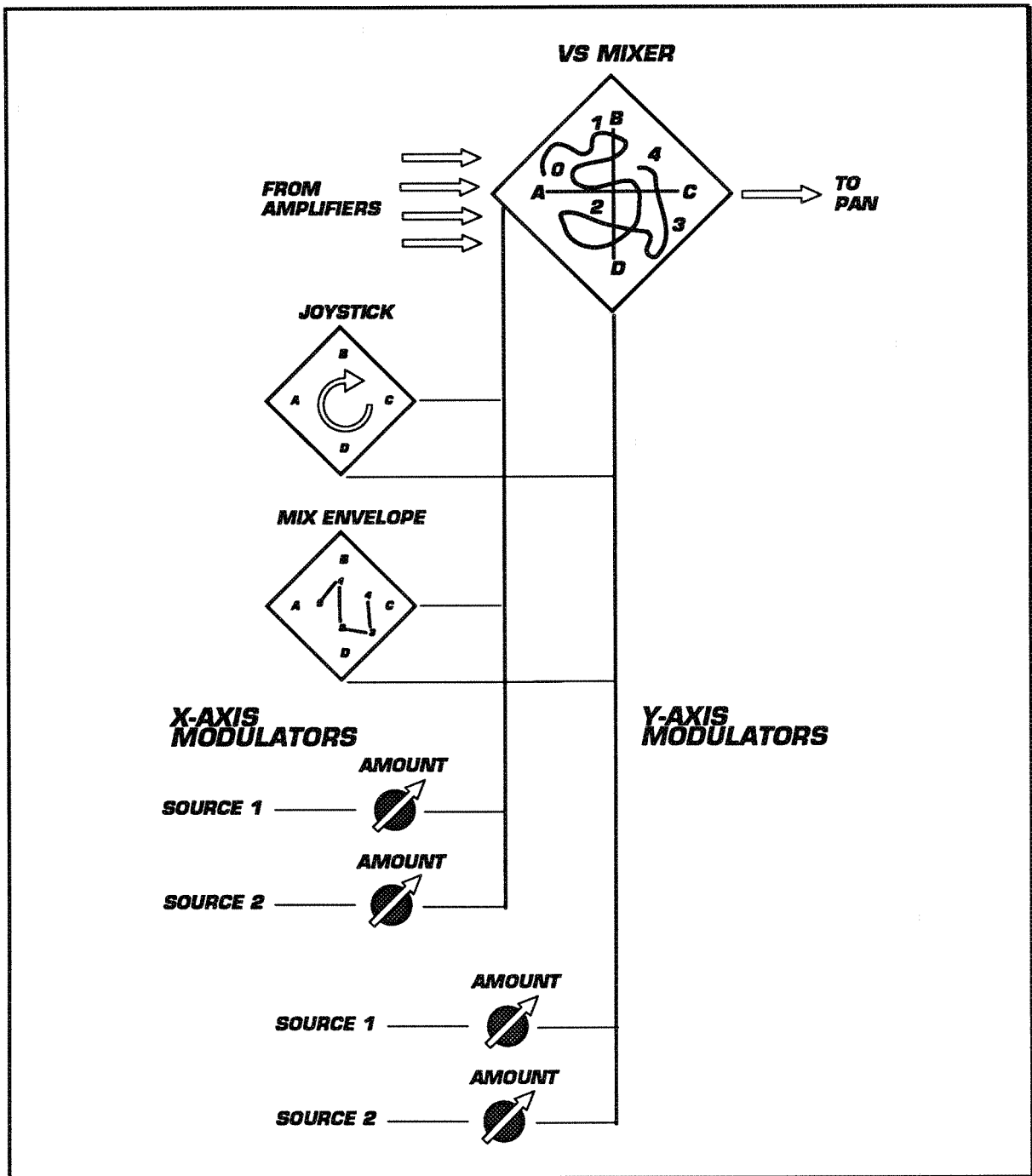
MIXMOD

Goes to EDIT MIX MOD.

CENTER

Sets the mix at the current point to equal amounts of each wave.

EDIT MIX MOD

Path: EDIT - PATCH - WAVES - MIXEV - MIXMOD

```
EDIT MIX MOD
Patch: CARD 22  SUPER SOUND
X  Source 1: LFO1                    Amt: +15
X  Source 2: ENV1                    Amt: -23
[Y  Source 1: LFO2                   Amt: -52]
[Y  Source 2: LINEAR VELOCITY        Amt: +85]

    ENV1         LFO1         LFO2
```
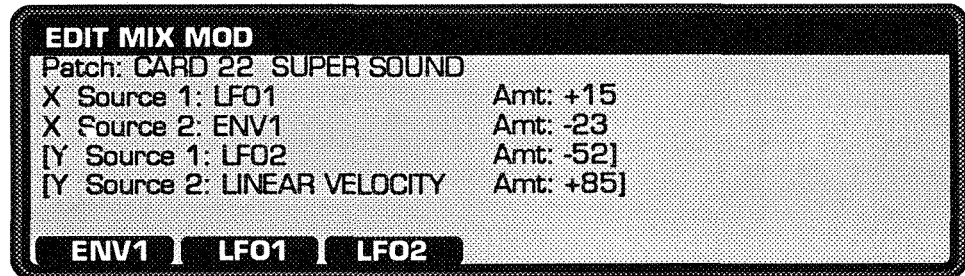
Each of the two mixer dimensions can have two modulating sources in addition to the mixer envelope (and joystick).

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

If Structure is 1 oscillator, you can't access this page.

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

```
┌───────────────────────────────────────────────────────────┐
│ EDIT PATCH                          [Patch is edited.]     │
│ Patch:       RAM2  20 BATTERY ACID                         │
│ Structure:   4 oscillator                                  │
│ Hard Sync:   OFF                                           │
│                                                           │
│  [ WAVES ] [ MACROS ] [ FX-BUS ] [ NAME ] [ INIT ] [ WRITE ] │
└───────────────────────────────────────────────────────────┘
```
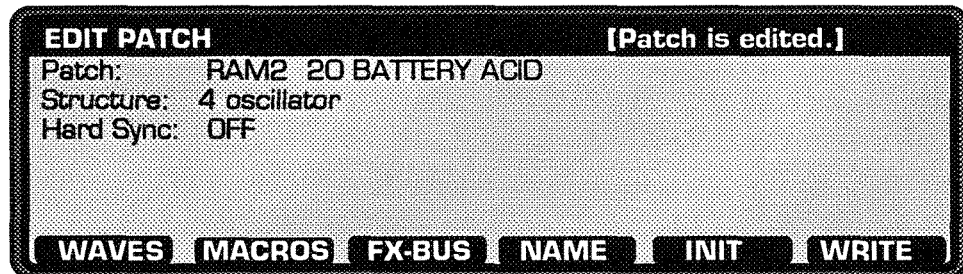
For an introduction to Patches, please see Chapter 8, "Patch Tour," in the Player's Guide.

Patches are the sonic backbone of the Wavestation. There can be up to eight Patches in a Performance. You can save 35 patches in each bank of RAM, and an additional 35 on a RAM Card. The 35 patches in ROM may be edited and saved to RAM banks or Cards.

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.
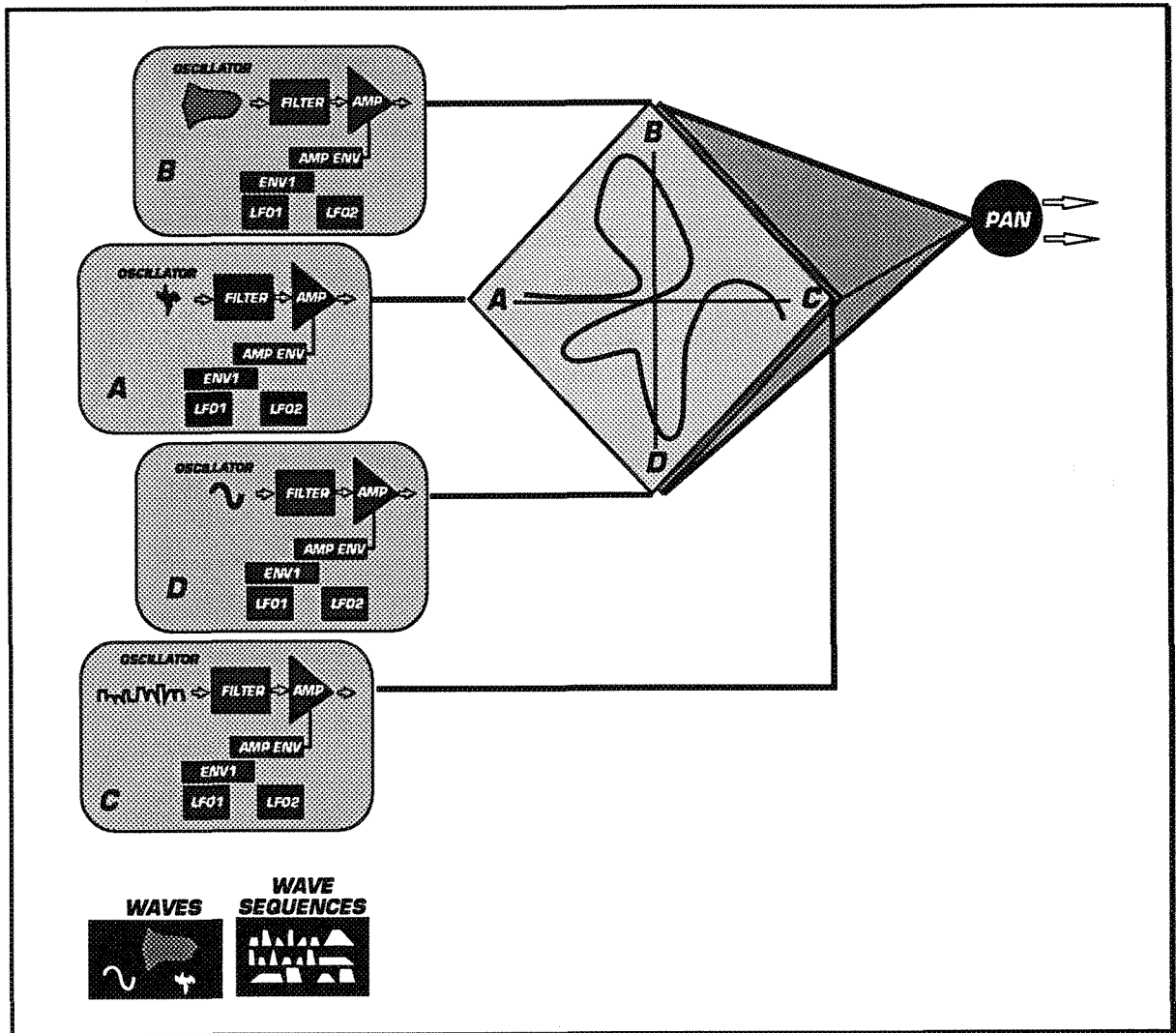
2-Oscillator Structure

Two-oscillator Patches allow one-dimensional, linear mixing.
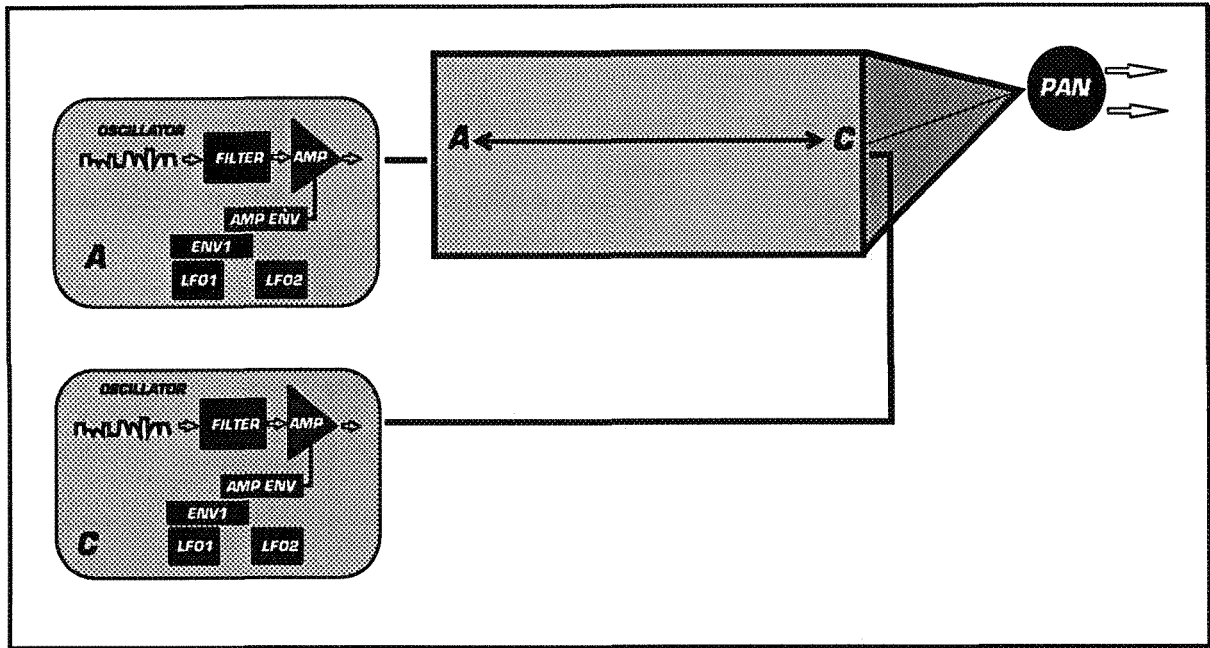
1-Oscillator Structure

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.
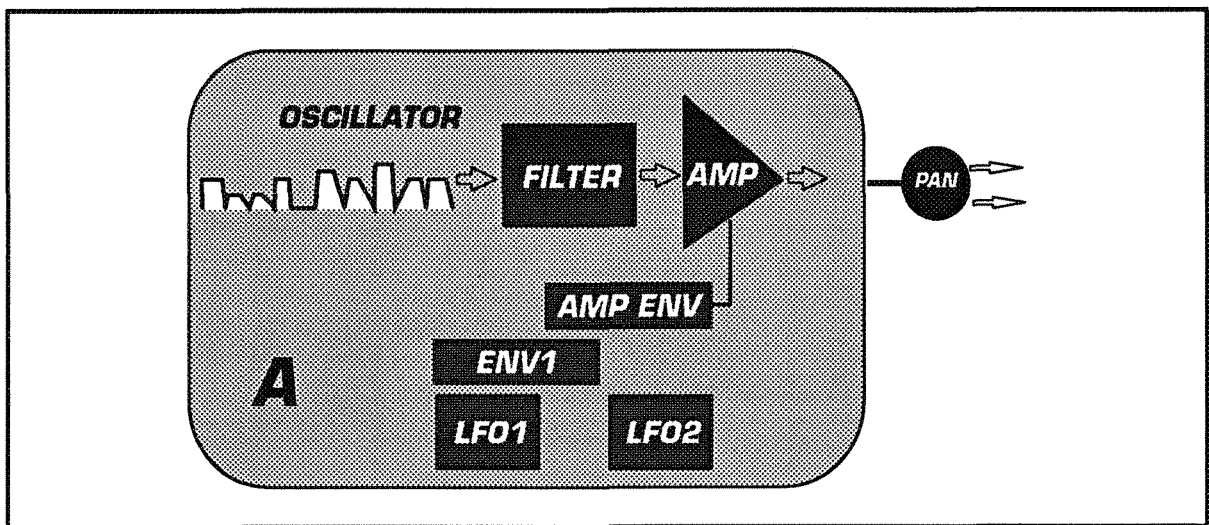
Hard Sync

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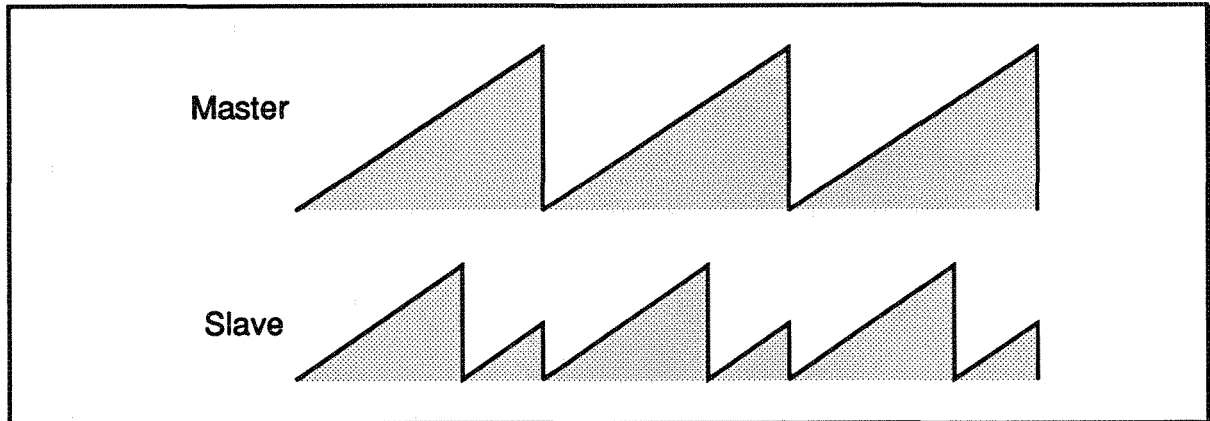
Since the overall timbre depends upon the pitch relationship between the slaves and the master oscillator, you can vary the timbre by modulating the pitch of the slaves. The pitch shift can be subtle (usually by LFO) or extreme (usually by envelope), as in the case of the classic "swept-sync" patch.

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

```
EDIT PERFORMANCE                    [PERFORMANCE is EDITED]
Performance: CARD 12 GIGSET 1
PART#         PATCH          PART#         PATCH
  1:   CARD   12 Trumpet       5:   ROM    22 Waterphone
  2:   CARD   13 Trombone      6:   CARD   27 Shakuhachi
  3:   RAM2   14 Soprano Sax   7:   RAM2   14 Soprano Sax
  4:          --               8:   RAM1   34 Yore Guess
 DETAIL   PATCH   SOLO   NAME   EFFECTS   WRITE
```

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 bank, number, and name of the Performance being edited.

Part

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

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

```
EDIT PITCH
Wave: ALL  ON            Macro: USER
Pitch Wheel Range:   SEMITONE
Pitch Ramp Amt:  -75     Time:  25      Vel Amt:  +99
Source 1:  LFO 1                        Amt:  +127
Source 2:  ENV 1                        Amt: - 73

  FILTER    AMP    ENV1    LFOs    WAVINC    MUTE
```
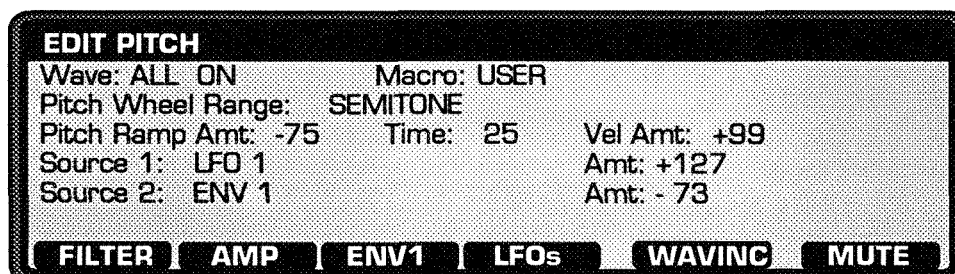
The Pitch module controls the frequency modulation of the Patch waves.

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.

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, DOMINANT 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 indefinitely.

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 AMP 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
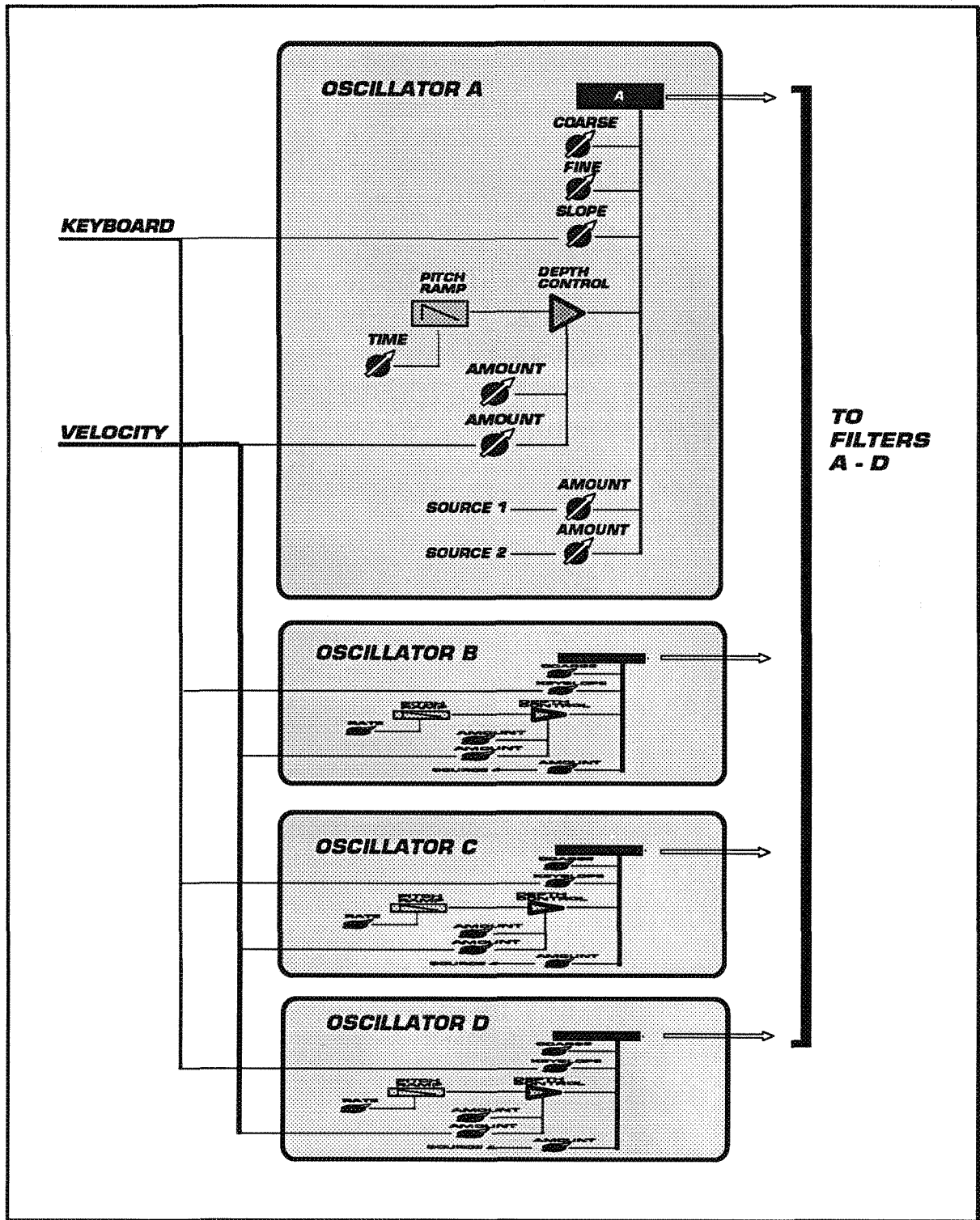
EDIT SCALE

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. The User scales may be saved to an external librarian via MIDI Sysex (see Sysex Data Transmit).

Scale Type

The ROM tables are:
EQUAL TEMPERAMENT 1. The default, most widely used keyboard tuning.
EQUAL TEMPERAMENT 2. Similar to EQUAL TEMPERAMENT 1, this scale includes random detuning useful for simulations of acoustic instruments.
PURE MAJOR and PURE MINOR. Both produce a modified just intonation.

The 12 User scales may be modified and overwritten. Some of them have already been set to useful intonations by the factory.

In the Part Detail page, in addition to setting the Scale to be played, it is possible to select a tonic Key. Many temperament systems are designed to produce "pure," beatless intervals for the most commonly used chords in a given key, which is usually only possible by making other, less common chords correspondingly less "pure." Thus, chords not diatonic to the selected Key will often sound out of tune. The Key setting does not affect the EQUAL TEMPERAMENT scales, except when they are currently being edited.

Step Adjustment

The fine-tuning parameters for each of the twelve steps in a scale are laid out on the page somewhat like a keyboard. It is important to remember, however, that this is a relative display of scale degrees, related to the Scale Key which has been set in the Part Detail page. The "C" key in the display represents the tonic note of that Scale Key. If the Part Detail Scale Key were set to F, for instance, the display's C would represent the Scale's tonic note F, the display's D would represent the Scale's G, and so on.

Each scale degree may be offset by +/- 99 cents (one equal-tempered semitone is defined as 100 cents). When a Scale has been edited, the message, "USER SCALE is EDITED," appears at the top of the page.

Although you may always edit any of the Scales, you will only hear the immediate results of your editing if a Part in the current Performance is set to play the Scale to be edited. It is possible to set different Parts to play different Scales, but to avoid confusion during editing it is advisable to set all Parts to play the Scale to be edited.

WRITE

Goes to WRITE SCALE.

EFFECTS

Paths:

Performance   EDIT - EFFECTS

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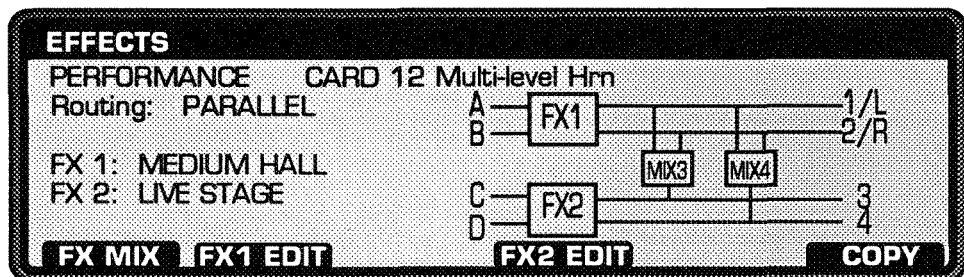
For a general discussion of the effects system, please see Chapter 7, "Effects Tour," in the Player's Guide.

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:

Performance   EDIT - EFFECTS - FX MIX

Multiset   MIDI - MULTISET - EFFECTS - FX MIX
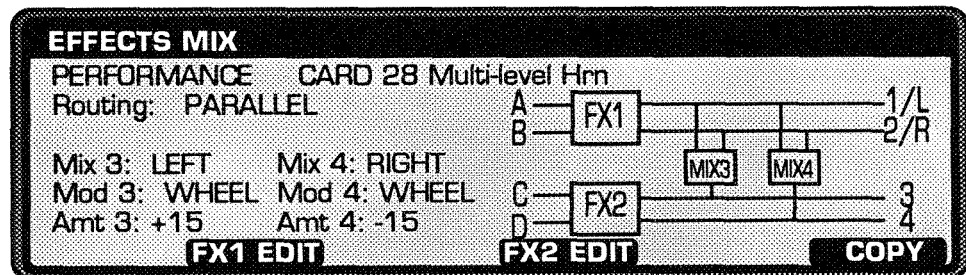
```
┌──────────────────────────────────────────────────────────┐
│ EFFECTS MIX                                                │
│ PERFORMANCE    CARD 28 Multi-level Hrn                     │
│ Routing:  PARALLEL              A──┤FX1├──────────────1/L  │
│                                 B──┤   ├──────────────2/R  │
│ Mix 3:  LEFT      Mix 4: RIGHT              [MIX3] [MIX4]   │
│ Mod 3:  WHEEL    Mod 4: WHEEL   C──┤FX2├──────────────3    │
│ Amt 3: +15       Amt 4: -15     D──┤   ├──────────────4    │
│         FX1 EDIT          FX2 EDIT              COPY        │
└──────────────────────────────────────────────────────────┘
```

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 section 7.2 of 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	I	(Set FOOT PEDAL ASSIGN I
FSWTOG	Footswitch toggle, push-on/push-off	I	to EFFECTS SWITCH) I
PEDAL	Footpedal	(Set FOOT PEDAL ASSIGN to MOD PEDAL)	
XMIDI1	MIDI Controller 1		
XMIDI2	MIDI Controller 2		
WH+AT	Sum of mod wheel and 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 soft key takes you to the EDIT EFFECT 1(2) parameter pages.

COPY

Goes to COPY EFFECTS - MIX.

FOOT PEDAL ASSIGN

Path: GLOBAL - FOOT

FOOT PEDAL ASSIGN

	Function	Polarity
Damper:	SUSTAIN	+
PEDAL/SW 1:	VOLUME	-
PEDAL/SW 2:	EFFECTS SWITCH	+

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 (on/off), and any switch function can be selected.

The PEDAL/SW 1 (2) jacks accept either a switch or a continuous 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 allows you to adjust to the polarity of the footswitch or pedal, so that both normally open and normally closed designs will work properly. If your pedal seems to be functioning oppositely from what you would expect (sustaining when it is not depressed, and damping when it is depressed, for example) try changing this parameter.

GLOBAL

Path: GLOBAL

```
GLOBAL
Master Tune:                    0 cents
Effects:                        ENABLE
Memory Protect Internal:        OFF         Card:  OFF
Wave Sequence Sync:             INTERNAL
Global Pitch Bend Range:        WHOLETONE
Velocity Response Curve:        5
     UTIL        SCALE        FOOT
```

This page contains system settings for the Wavestation as a whole.

Master Tuning

Master tuning adjusts the global pitch of the Wavestation within a range of +/- 99 cents. A cent is 1/100 of a semitone.

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

Effects

This Effects setting allows you to override 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 your program settings.

OFF means that saving is allowed.

An even better way to protect your data is to back it up by saving it to a RAM Card, or by sending 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, DOMINANT 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 page you were on (PERFORMANCE PART DETAIL or EDIT PATCH) 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

Cancels the operation and exits.

JUMP

Path: Click the JUMP/MARK switch.

```
JUMP
USER 1 - GLOBAL
USER 2 - EDIT PERFORMANCE
USER 3 - WAVES
USER 4 - EDIT FILTER
USER 5 - EDIT AMP ENVELOPE
USER 6 - EFFECTS
  USER 1   USER 2   USER 3   USER 4   USER 5   USER 6
```
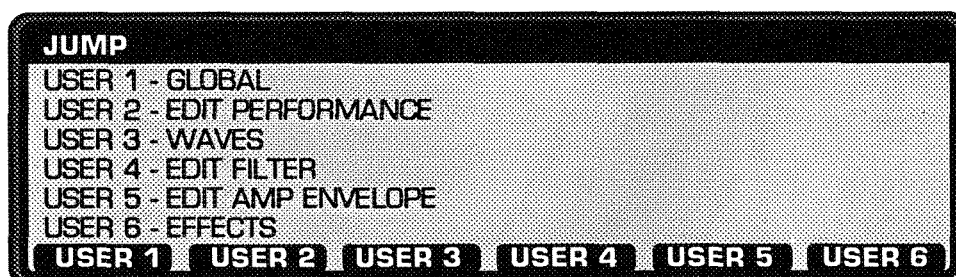
This page shows the current assignment of each MARK key.

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.

Jump functions in a special way with the Effects, Effects Mix, Copy Effects (All, Mix, and Parameters), and Write pages. These pages can all be reached by multiple paths (eg. Copy Effects, which may be accessed from both Performances and Multimode Setups). In Marking one of these pages, you will notice that the "Marked Page" display at the top of the screen shows only the page title (eg. Copy Effects) and not the current editing mode (eg. Performance or Multimode Setup).

When you set such a Marker, and Jump to it later, the Wavestation will determine your current editing mode, and send you to the appropriate page. For instance, you might set a Marker while editing Effects in a Multiset. When you next Jump to that Marker, the Wavestation will look at your current position in the page hierarchy. If you are in the pages under Multimode, the Jump will take you to Multimode Effects. If you are in the pages under Edit Performance, it will take you to Performance Effects.

When you exit one of these pages after Jumping to it, the Wavestation takes you out by the path from which you last manually entered that page. This is not necessarily the path from which it was initially Marked, nor necessarily the path of your current editing mode.

Jump is not active in the Name or Init pages.

KEY AND VELOCITY ZONES

Path: EDIT - DETAIL - ZONES
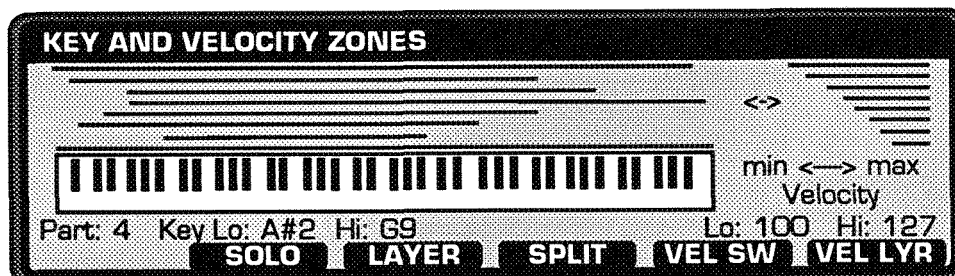
For an introduction to Performances and Key and Velocity Zones, please see Chapter 6, "Performance Tour," in the Player's Guide.

The PERFORMANCE PART DETAIL page sets the sound of the Part. But the ZONE page determines where and how the Part is played by 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 1-127.

Double, Dual, or Layer mode is now a two-Part 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 (in Performance 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.

Part

Select the current Part here. The double arrow moves up and down to show you which line displays 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 1 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 in the current Performance have Patches assigned to them. For example, if there are four 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 1-127. The lowest numbered Part will be assigned to the lowest velocity range, and the highest numbered Part to the highest velocity range. 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. All Parts are set to a maximum velocity of 127, so that only the minimum values are different. The lowest numbered Part is assigned to the entire velocity range, and subsequent Parts are assigned increasingly higher minimum velocities. This allows you to quickly set a basic timbre (such as a pad) to always sound, with other timbres (such as attack transients) being added to the basic sound when the keyboard is played harder. The harder you play, the more layers are heard.

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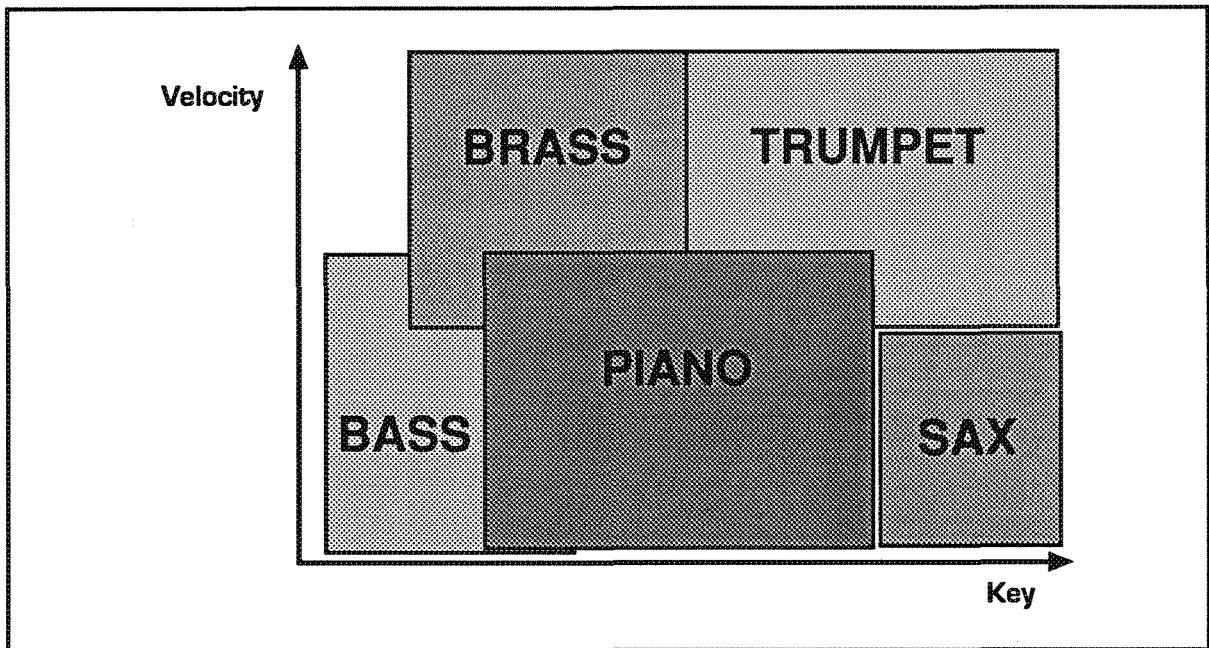
Assuming the Trumpet is Part 1 and the Bass is Part 5, setting up this example on the KEY AND VELOCITY ZONES page would produce a zone chart resembling this:
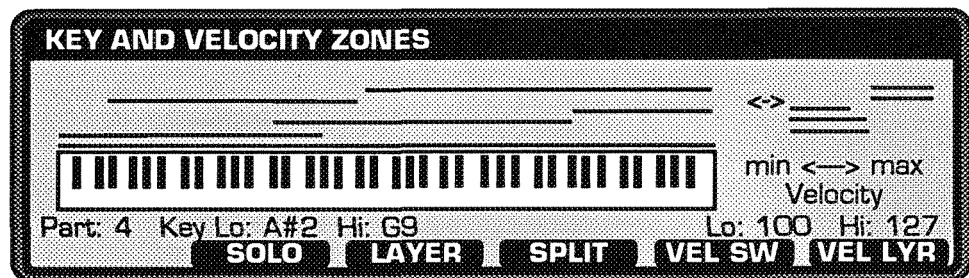
MARK

Path: Double-click the JUMP/MARK switch.

MARKED page is: PATCH MACROS
```
USER 1 - GLOBAL
USER 2 - EDIT PERFORMANCE
USER 3 - WAVES
USER 4 - EDIT FILTER
USER 5 - EDIT AMP ENVELOPE
USER 6 - EFFECTS
[ USER 1 ][ USER 2 ][ USER 3 ][ USER 4 ][ USER 5 ][ USER 6 ]
```
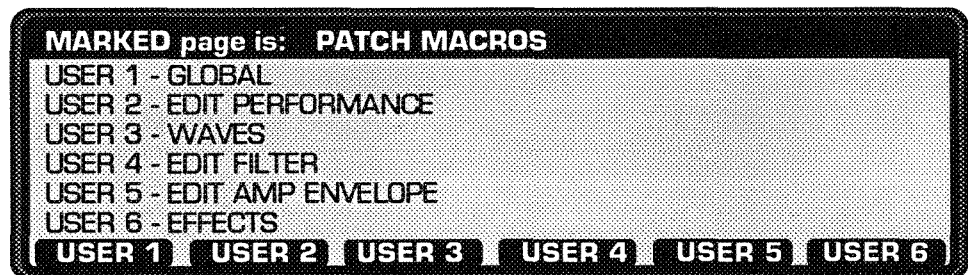
MARK sets a "bookmark" on a display page, so that you can then use JUMP to return to it quickly.

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 soft key. No warning is given if you overwrite an assignment.

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

EXIT returns to the previous page, without marking.

Mark functions in a special way with the Effects, Effects Mix, Copy Effects (All, Mix, and Parameters), and Write pages. These pages can all be reached by multiple paths (eg. Copy Effects, which may be accessed from both Performances and Multimode Setups). In Marking one of these pages, you will notice that the "Marked Page" display at the top of the screen shows only the page title (eg. Copy Effects) and not the current editing mode (eg. Performance or Multimode Setup).

When you set such a Marker, and Jump to it later, the Wavestation will determine your current editing mode, and send you to the appropriate page. For instance, you might set a Marker while editing Effects in a Multiset. When you next Jump to that Marker, the Wavestation will look at your current position in the page hierarchy. If you are in the pages under Multimode, the Jump will take you to Multimode Effects. If you are in the pages under Edit Performance, it will take you to Performance Effects.

When you exit one of these pages after Jumping to it, the Wavestation takes you out by the path from which you last manually entered that page. This is not necessarily the path from which it was initially Marked, nor necessarily the path of your current editing mode.

Mark is not active in the Name or Init pages.

MIDI

Path: MIDI

```
MIDI
Mode:                 OMNI
Basic Channel:        1          [6  MONO Channels]
Key offset amount:    0
Parameters:           RECOGNIZE
MIDI Controller 1:    MODULATION WHEEL
MIDI Controller 2:    BREATH CONTROLLER
 STATUS   TRANS     RECV    PERFMAP MULTISET  SYSEX
```

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, MULTI, MONO. If MULTI or MONO 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 used for MONO Mode begin with the current Basic 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 Basic 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 also enclosed in System Exclusive messages. SysEx messages will only be accepted if the Basic Channel enclosed in the data matches that of the Wavestation itself.

Key Offset Amount

MIDI key numbers received or transmitted by the Wavestation will be transposed by this amount. To be consistent with transmitted data, key numbers received by the Wavestation will be transposed in the opposite direction. Setting this amount to +4, for instance, will transpose incoming MIDI data down by 4 semitones.

This has no effect on the local keyboard.

Parameters

This controls the reception and transmission of SysEx parameter changes. When any parameter is edited (ENV 1 level one, for instance, or LFO 2 rate), the Wavestation can send out SysEx messages to be recorded by a sequencer or received by another Wavestation. This allows yet another way to automate real-time timbre changes. A large amount of data is sent out by this feature, and so if you aren't using it, it's best to keep it set to DISABLE. This setting has no effect on Sysex data dumps.

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

RECOGNIZE. The Wavestation will respond to, but not transmit, parameter changes.

TRANSMIT. The Wavestation will transmit, but not respond to, parameter changes.

RECOG & TRANS The Wavestation will both transmit and respond to parameter changes.

MIDI Controllers 1 and 2

As explained in section 5.8 of 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 5.10 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

MIDI RECEIVE

Program Change:	ENABLE
Aftertouch:	ENABLE
Pitch Bend:	ENABLE
Controllers:	ENABLE
Note on/off:	ALL
All Notes Off:	IGNORE

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 Channel 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 to double the number of available voices. 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. (The SYSEX DATA TRANSMIT "ALL" 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 when no keys are being held down. If you are using another keyboard to control the Wavestation, and have been noticing notes cutting off unexpectedly, check to see that this parameter is set to IGNORE.

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's MIDI Mode is set to MULTI, so that it can 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 the MIDI output through the sequencer and back into the Wavestation. 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
IN

Channel 8
KORG 707
DELAYED SWELL

WAVESTATION
in MULTI Mode

Channel 1
Performance RAM1 24
Layered Keyboard

Part 1: WAVSEG Piano

ZONES	DETAILS
V	Play Mode: BOTH
	Xmit Chan: 1
K	Prog Change Xmit: 2

Part 2: Tone Wheel Organ

ZONES	DETAILS
V	Play Mode: LOCAL
	Xmit Chan: 2
K	Prog Change Xmit: 43

Channel 2
Performance RAM1 26
Split Orchestral

Part 7: Vector String Pad

ZONES	DETAILS
V	Play Mode: BOTH
	Xmit Chan: 3
K	Prog Change Xmit: OFF

Part 8: Fanfare Brass

ZONES	DETAILS
V	Play Mode: MIDI
	Xmit Chan: 4
K	Prog Change Xmit: OFF

Xmit Mode

PART
CHANNEL

SEQUENCER
(THRU)

MIDI
IN

Basic Channel: 1

STATUS TRANS RECV PERNAP MULTISET SYSEX

MIDI
OUT

BASIC
CHANNEL

Channel 16
FX Control Channel

WAVESTATION
KEYBOARD

Local Control

ON

OFF

PERFORMANCE SELECT
Memory Bank: RAM1

48 VECTOR FUTURE

BANK LB EDIT A MIDI GLOBAL VIEW

MIDI TRANSMIT

Path: MIDI - TRANSMIT

MIDI TRANSMIT

Xmit Mode:	BASIC Channel
Local Control:	ENABLE
Program Change:	ENABLE
Aftertouch:	ENABLE
Pitch Bend:	ENABLE
Controllers:	ENABLE

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 means that MIDI is transmitted on the Basic Channel, as set on the MIDI page. 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
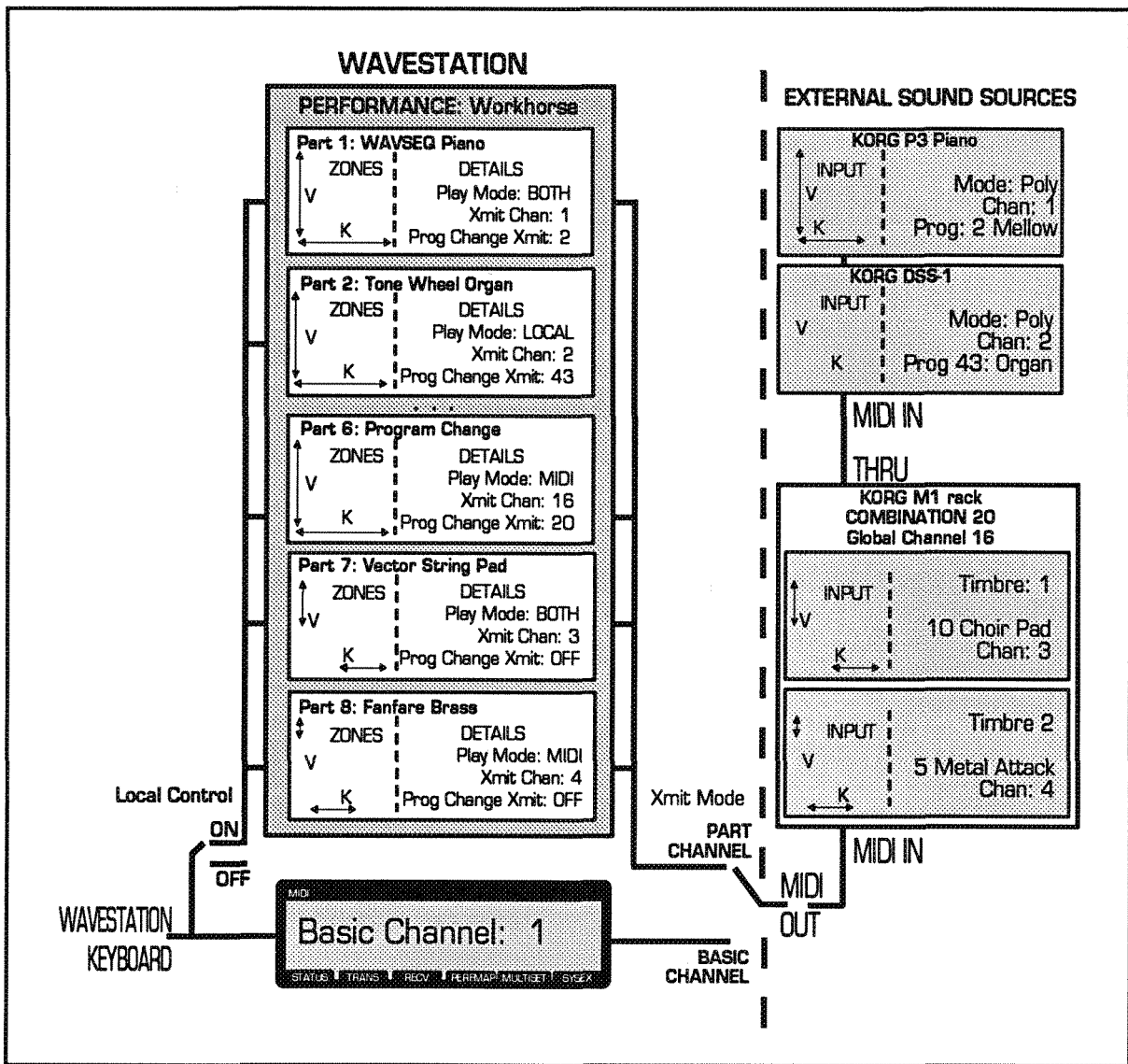
The figure shows the general features of the MIDI transmit section and an example of how someone might use the Wavestation as a master MIDI controller.

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).

Since this is a multi-timbral example, you select Part Channel instead. 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. Part 6 sends a MIDI program change on channel 16 to select this M1's Combination 20. The M1 combination in turn selects the programs for its Timbres 1 and 2, which will be played by the Wavestation's Parts 7 and 8.

Since it is not necessary for the Wavestation to send program changes from Parts 7 and 8 (the M1 combination has already set these channels up), 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

MULTIMODE SETUP			[MULTISET is EDITED]	
Multimode Setup: 15		FX Control Chan: 4		↓
MIDI	CH	Level	Performance:	
1	ON	127	CARD	12 Trumpet
2	ON	105	CARD	13 Trombone
3	ON	127	RAM1	11 Soprano Sax
4	OFF	55	RAM2	49 Ship's Mast

STATUS   **XMIT**   **EFFECTS** **PERFMAP**   **WRITE**

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

MULTI and MONO modes enable 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 has 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. Although it is
possible to send and receive Multimode Setup changes via MIDI System Exclusive
commands, this is not always necessary - because each channel of a Multimode
Setup responds to MIDI Program Changes *independently*. This means that, in
MULTI and MONO modes, the Wavestation functions as up to 16 discrete
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, etc.

Note that this message, like MIDI Program Changes, sends only the number of the Multiset, and not the Multiset data. To send the actual data (Performances selected for each channel, levels, etc.), use the XMIT button.

FX Control Channel

Various parameters of the effects can be controlled through the modulation matrix. Since there are 17 complete modulation matrixes in MULTI Mode (one for each of 16 MIDI channels, in addition to the local keyboard), it is necessary to designate which one's controllers will be routed to effects modulation.

This parameter sets 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

On causes the channel to be recognized.

Off causes the channel to be ignored.

If your sequencer addresses only 16 MIDI channels (or less), try turning some of the Multiset's channels Off to free up channels for other instruments in your setup.

Level

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

Performance Bank, Number

Performance assigned to the channel.

STATUS

Goes to STATUS. Please see section 5.10 in the Player's Guide.

XMIT

Dumps the Multi-Mode setup data over MIDI System Exclusive. This duplicates the MULTIMODE SETUPS command on the SYSEX DATA TRANSMIT page.

EFFECTS

Goes to EFFECTS.

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

PERFMAP

Goes to PERFORMANCE SELECT MAP. 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

```
NAME
PATCH   RAM2  49 CHOIR, FEMALE

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9 ! " # $ % & ' ( ) * + , - . / : ; < = > ? [ \ ] ^ _ { | }
  WRITE    CLEAR    SPACE              RESET   CANCEL
```
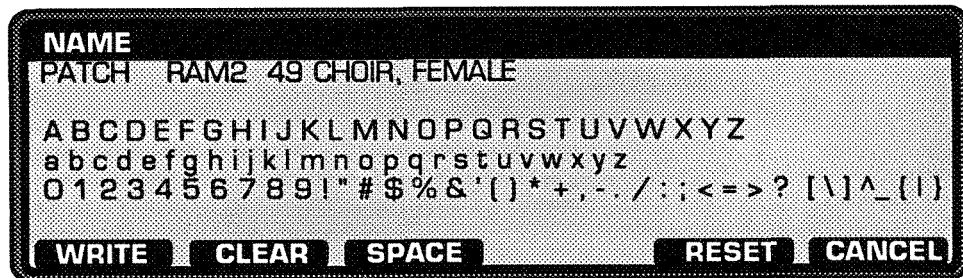
The NAME page functions identically in all places it is used. The table of characters always displays your current character selection.

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 - FX-BUS

```
PATCH BUS ASSIGNMENT
Patch:     RAM2 34 SINUSOID PATCH
           WAVE              FXBUS    A      B      C      D
A: ROM 161  Sine                     ON     OFF    OFF    OFF
B: ROM  33  Hard EP                  OFF    ON     ON     ON
C: CARD 37  Trumpet                  ON     OFF    OFF    OFF
D: ROM 192  VS64                     OFF    ON     ON     ON
  WAVES   MACROS
```

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

PATCH must be selected as the FX BUS setting in PERFORMANCE PART DETAIL if the Part is to use the bus settings made on this page. Otherwise, settings made here will be superceded.

By assigning each wave of a 2 or 4 oscillator patch to a separate bus, it is possible to use the mix envelope and the joystick to affect the pan position. With 4 oscillators, it is even possible to have quadraphonic panning, useful for film and multimedia applications.

Patch

The Patch to which these waves selections belong.

Wave

Waves are ROM or CARD only.

In each bank, waves 0-31 are actually Wave Sequences. These are identified by an asterisk (*) before their names.

Waves #32 and up are ROM waves, including multi-samples, attack transients, and single- and few-cycle loops.

FXBUS A, B, C, D

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

OFF means 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

```
PATCH MACROS
Patch:    RAM2  49 CHOIR, FEMALE
Wave:     ALL ON            Structure: 4 oscillator
Pitch:    USER
Filter:   LOWPASS
Amp:      STRING
Pan:      KEYBOARD PAN
[ PITCH ] [ FILTER ] [ AMP ] [ PAN ] [ COPY ] [ MUTE ]
```
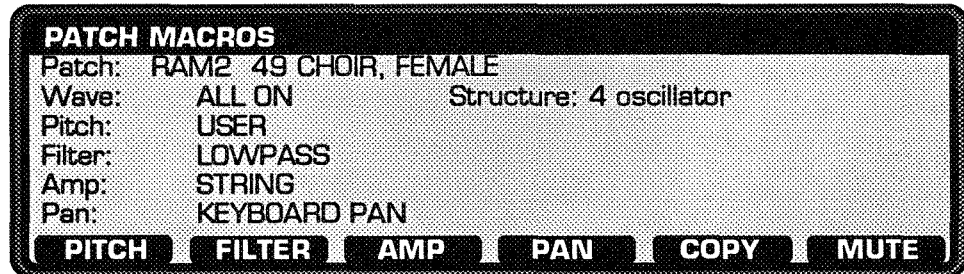
For an introduction to Patches, please see Chapter 8, "Patch Tour," in the Player's Guide.

The Macros page gives you a quick and easy grasp of the parameters in each of a Patch's synthesis modules (pitch, 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.

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

If Structure is 1 oscillator, Wave is always A.

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.

Structure

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

Pitch

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

DEFAULT, ENVELOPE1 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 the volume (Amp) envelopes of different instruments.

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: OFF, KEYBOARD PAN, VELOCITY PAN, KEY + VELOCITY.

PITCH

Goes to EDIT PITCH.

FILTER

Goes to EDIT FILTER.

AMP

Goes to EDIT AMP ENVELOPE.

PAN

Goes to EDIT BUS A-B 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 the settings of LFO 1 (or 2).

Modulation sources include:

LINEAR KEYBOARD

CENTERED KEYBOARD (centered around middle C (C4))

LINEAR VELOCITY

EXPONENTIAL VELOCITY

LFO 1, LFO 2

ENV 1

AFTERTOUCH

AFTERTOUCH + MOD WHEEL (the sum of the values of aftertouch and mod wheel)

MOD WHEEL

MIDI 1 and 2

FOOT CONTROLLER

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

```
PERFORMANCE PART DETAIL
Part:   1      Patch: RAM2  49 CHOIR, FEMALE
Level: 99          FX Bus: 50/50           Delay: 1024
Xpose: 0        Detune: 0               Sustain: ENABLED
Play Mode: LOCAL             Scale: PURE MAJOR C
Xmit Chan: 12                Prog Change Xmit: OFF
Mode: POLYPHONIC             [Key Priority: HIGH]
   PART -    PART +    SOLO     INIT     ZONES    COPY
```

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 number of the current Part, 1-8. Adjust with the PART + or PART - soft keys.

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 EFFECTS.

FX (Effects) Bus values are:

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

Panning is also affected by modulators which can be found under EDIT BUS A-B PAN.

If PATCH is selected, the Part uses the bus settings made in the PATCH BUS ASSIGNMENT page. By assigning each wave of a 2 or 4 oscillator patch to a

separate bus, it is possible to use the mix envelope and the joystick to affect the pan position.

Delay

Delay between the time that a key is depressed and the time that the Part sounds, in milliseconds.

Xpose

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

Detune

Fine tuning of the Part in cents. A cent is 1/100 of a semitone.

Sustain

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

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, and does not play any sounds on the Wavestation. Only local keyboard playing is transmitted: MIDI input is not re-transmitted.

BOTH mode is normal. The keyboard both plays local sounds and transmits MIDI data.

Scale

This parameter determines the intonation of the Part.

EQUAL TEMPERAMENT 1. This is the default, most widely used keyboard tuning.

EQUAL TEMPERAMENT 2. Similar to EQUAL TEMPERAMENT 1, this scale includes random detuning useful for simulations of acoustic instruments.

PURE MAJOR and PURE MINOR. Both produce a modified just intonation.

USER 1-12. These may be modified and overwritten. Some of them have already been set to useful intonations by the factory.

To the right of the scale name is the tonic key parameter. This setting affects the PURE MAJOR, PURE MINOR, and USER scales, but does not affect EQUAL TEMPERAMENT 1 or 2.

See the EDIT SCALE page.

Xmit Chan

This is the channel on which MIDI data will be sent when the Part Detail Play Mode is MIDI or BOTH, and the Xmit Mode on the MIDI TRANSMIT page is set

to PART CHANNEL. This feature is helpful when using the Wavestation as a master keyboard to control a number of sound modules.

See the Master Keyboard section under MIDI TRANSMIT.

Prog Change Xmit

This is the MIDI Program Change number which will be sent when the Part Detail Play Mode is MIDI or BOTH, and the Xmit Mode on the MIDI TRANSMIT page is set to PART CHANNEL. If the Xmit Mode on the MIDI TRANSMIT page is set to BASIC CHANNEL, the Wavestation will simply send a MIDI Program Change equal to the number of the current Performance.

If the Play Mode and Xmit modes have been set appropriately, 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.

See the Master Keyboard section under MIDI TRANSMIT.

Mode

The Part Mode controls the number of voices that the part will play simultaneously, and how it will play them.

UNI LEGATO mode is monophonic, so that only one key is played at a time. If you play legato, notes are not re-triggered. This is good for imitating the phrasings of wind instruments, or analog lead synthesizers.

UNI RETRIG mode is also monophonic, so that only one key is played at a time. Each new note re-triggers the envelopes.

POLYPHONIC mode plays voices up to the maximum number of voices. This is the normal mode.

Key Priority

This only appears when Mode is either UNI LEGATO or UNI 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.

LOW means play the lowest key.

HIGH means play the highest key.

LAST means play the most recent key. This is the most commonly used setting.

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.

```
PERFORMANCE SELECT
  Memory Bank: RAM1

     49 VECTOR FUTURE

  BANK    EDIT    MIDI   GLOBAL   VIEW
```
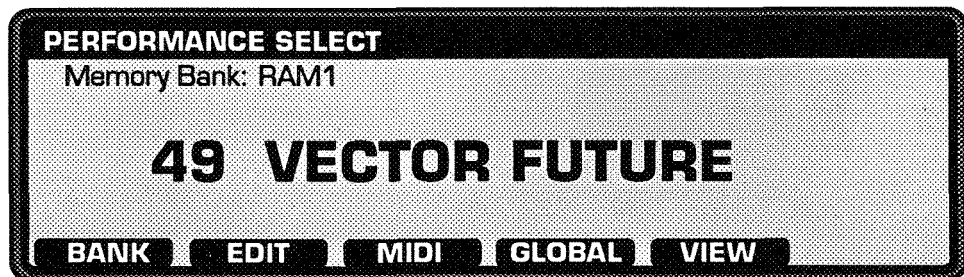
The PERFORMANCE SELECT page is the highest level of the Wavestation's menu system. It appears when you switch power on or after you press the EXIT switch a sufficient number of times.

Using this page is the subject of Chapter 4, "Basic Operation," in the Player's Guide.

Memory Bank

The current memory Bank is the first field on the page. You can press the BANK soft key 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 PCM waves, or Wave Sequences from all four banks.

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).

MIDI has been enhanced with a Bank Select message, which the Wavestation is one of the first instruments to implement. When you change Performances, both a Program Change and a Bank Select message are transmitted. The Wavestation has two banks, represented by MIDI Controller #32, values 0 (RAM1/2) and 1 (ROM/CARD), respectively.

See Section 5.9 of the Player's Guide.

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

```
PERFORMANCE SELECT MAP
Performance Select Map:       DISABLED                    ↓
Program Change#——→ Performance
    0                   CARD  0   MY PIANO STUFF
    1                   RAM1  25  YOUR STUFF
    2                   RAM2  49  DOLPHIN DUET
    3                   ROM   32  STEEL DRUMS
  STATUS                                      MULTISET
```
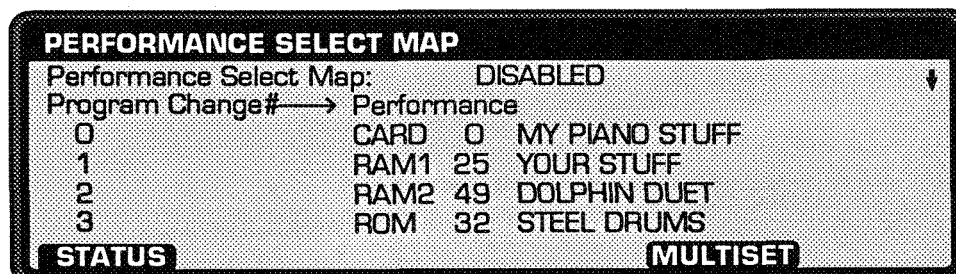
Please see the Player's Guide section 5.11, which discusses this page in depth.

The Performance Select Map allows you to assign a different Wavestation Performance to be called up by each of 128 incoming MIDI program changes. This can be useful in configuring the Wavestation as a sound module in a system under the control of another master keyboard.

This also makes it easy to select programs from the ROM and CARD banks, even if your controller doesn't send MIDI Bank Select.

Performance Select Map

This parameter switches the Performance Select Map on and off.

DISABLED is normal and the default. This means that the map is not used, so Performances are selected as explained under section 5.11 of the Player's Guide.

ENABLE means that the Performance Select Map is used.

Program Change

This is the MIDI Program Change number to be mapped to the Performance on the right. This is a list; it may be scrolled through with the dial, keypad, or inc/dec.

Performance

This is the bank, number, and name of the Performance that will be selected by the MIDI Program Change on the left. The same Performance may be selected by multiple MIDI Program Changes.

SYSEX DATA TRANSMIT

Path: MIDI - SYSEX

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

NOTE: The Basic Channel number is embedded in the System Exclusive data. For SysEx dumps to work properly between two Wavestations, they must be set to the same Basic Channel. For bulk dumps from a computer or other MIDI storage device to work properly, the Wavestation's Basic Channel must be the same as when the dump was originally made.

If you are using two or more Wavestations in the same setup, you may wish to maintain different sets of Performances on each instrument. In this case, giving each of the Wavestations its own Basic Channel will make sure that it only receives its own SysEx messages, and not those meant for any other unit.

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.

The Wavestation's complete System Exclusive implementation also allows convenient remote operation with a computer-based editor.

The following transferable data types are available. The data type currently selected to be transmitted is indicated by reverse video.

All

Sends all data in the Wavestation's internal RAM, including all the data types listed below in addition to the Performance Select Map. To send RAM Card data, you must use the separate Patch, Performance, and Wave Sequences commands.

Patch

Selecting ALL will send the entire selected Bank of Patches. Selecting a number (00-34) will send only that Patch from the selected Bank.

Performance

Selecting ALL will send the entire selected Bank of Performances. Selecting a number (00-34) will send only that Performance from the selected Bank.

Wave Sequences

Select the Bank of Wave Sequences to be transmitted.

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

Sends the selected data type (indicated by reverse video). While the Wavestation is transmitting, it displays the flashing message, "TRANSMITTING MIDI SYSEX."

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

RECEIVING SYSEX: The Wavestation does not have to be on any particular page to <u>receive</u> MIDI System Exclusive dumps. As soon as it begins to receive a SysEx dump, all notes are turned off, and the screen displays the message, "RECEIVING MIDI SYSEX." SysEx dumps can take a little while - the ALL dump, which contains the largest amount of data, takes about 45 seconds. If all goes well, the screen will briefly display the message, "SYSEX TRANSFER SUCCESSFUL."

To receive dumps of ALL, PATCHES ALL, PERFORMANCES ALL, or WAVE SEQUENCES, memory protect must be turned off for the relevant banks (Internal and/or Card, as appropriate). If a memory protect setting prevents a SysEx transfer, the message, "SYSEX WRITE PROTECT ERROR" will appear. All other data types (including single Patches or Performances) will work regardless of the memory protect setting.

If a message is not received correctly, the screen will display the message "SYSEX CHECKSUM ERROR." This message will remain on the screen until you press the CONT softkey. SysEx dumps contain a large amount of data, and it is possible for small parts of it to become garbled. Normally, simply re-transmitting the data is all that is needed. If this does not work, try using another MIDI cable, as the first one might be faulty. It is also possible that the stored data itself has become corrupted...which is why it's always good to keep <u>several</u> backups of all important data.

UTILITIES

Path: GLOBAL - UTIL

```
UTILITIES

From:  CARD  CONCERT SET 1
To:    RAM1

Data to Transfer: ALL

  COPY    MOVE           NAME   FORMAT
```

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.)

NOTE: To back up an entire Bank of memory (RAM 1 to CARD, for instance) use the MOVE function with Data to Transfer set to ALL.

From

RAM1, RAM2, ROM, or CARD are possible.

To

RAM1, RAM2, or CARD are possible.

Data to Transfer

Performances, Patches, Wave Sequences or All are possible.

COPY

Starts the transfer. Makes an identical copy of the selected data type in the "From" bank and puts it in the "To" bank. For transferring data to and from a RAM Card, it is generally better to use the MOVE function (see below).

MOVE

Copies the selected data, and also changes all source Bank references to the destination Bank.

For example, suppose that in RAM1 you have Performances which call for Patches and Wave Sequences in various banks. If you set the Data to Transfer to ALL and 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). All references to banks other than RAM1 will remain unchanged.

This way, to the extent that 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 Patches or Wave Sequences into RAM1.

MOVE is generally most useful with the Data to Transfer parameter set to ALL.

If you use the MOVE function with PERFORMANCES selected as the Data to Transfer, the Patch *references* will be changed to the destination bank, but the actual Patch data will not be copied.

As an example, assume that you select PERFORMANCES as the Data to Transfer, and use MOVE to transfer them from RAM 1 to CARD. The card currently contains Patch data - specifically, CARD Patch #33 is named Bubble. If one of the Performances had called on RAM 1 Patch #33 (Blowhorn), after the move it will call on CARD Patch #33. Since the Patch data has not been transferred from RAM 1 to the CARD, this will result in the Performances playing Bubble instead of Blowhorn.

Similarly, using the MOVE function with PATCHES selected causes the references to Wave Sequences to change, but does not copy the actual Wave Sequence data.

With Wave Sequences, there is no difference between MOVE and COPY.

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 brings up the message, "ARE YOU SURE?" Since formatting will erase all of the data on the card, you should be certain that it contains no important data. Pressing NO or EXIT returns you to the UTILITIES page. Pressing YES formats the card and then brings up the NAME CARD page, which allows you to name the card.

Attempting to format a ROM Card or write-protected RAM Card will cause the Wavestation to ignore the Card until it is reinserted.

NOTE: Formatting a card which displays a KORG CARD FORMAT MISMATCH message will erase any other data, such as M- or T-series voices, which might be on the card. Make sure that you are not destroying important data!

VIEW PERFORMANCES

Path: VIEW

```
VIEW PERFORMANCES
View Bank: RAM2              ROM 49 VECTOR FUTURE
30 Trumpette                 35 Cocktail Party
31 Split Brass               36 Layered Strings
32 Super Pianos              37 Wave It!
33 Drums                     38 Floater
34 Aerospace                 39 Multi-split
  BANK     00's     10's     20's     30's     40's
```
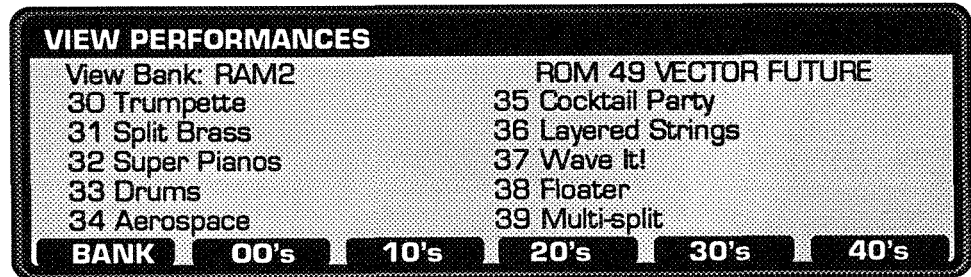
View Performances allows you to look at Wavestation Performances in groups of ten at a time, so that you can quickly find a particular sound.

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 (RAM1, RAM2, ROM, and CARD).

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.

Wave Sequences are a special type of sound source material for Patches. These are a series of waves linked together and played sequentially, and are capable of creating very sophisticated dynamic textures.

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 WAVE SEQUENCE UTILITIES page.

Wave

Oscillator to which this wave sequence is assigned.

On means that the selected Wave is sounding.

Mute means that the selected Wave is not sounding.

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 PCM "wave locations" in each bank, and appear in Waves lists with an asterisk (*) before their names.

Wave Sequence Diagram
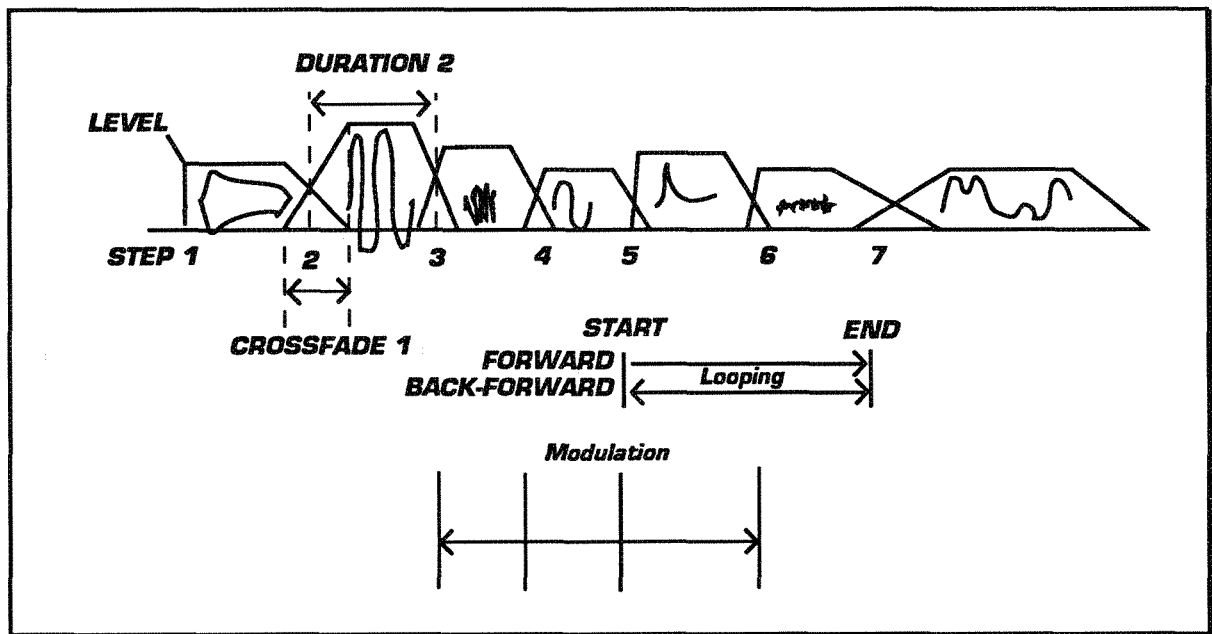
Step

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 255 (to a total of 500 per bank).

Wave

The PCM 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).

Lev

The step loudness.

Dur

The length of time that the step will 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, and this parameter sets the number of MIDI Clocks that the step will be played. There are 24 MIDI Clocks per quarter note, so an eighth-note duration is equal to 12 steps, a sixteenth note 6 steps, and so on.

Xfd (Crossfade)

0 - 998. The amount of overlap between the end of this step and the start of the next step.
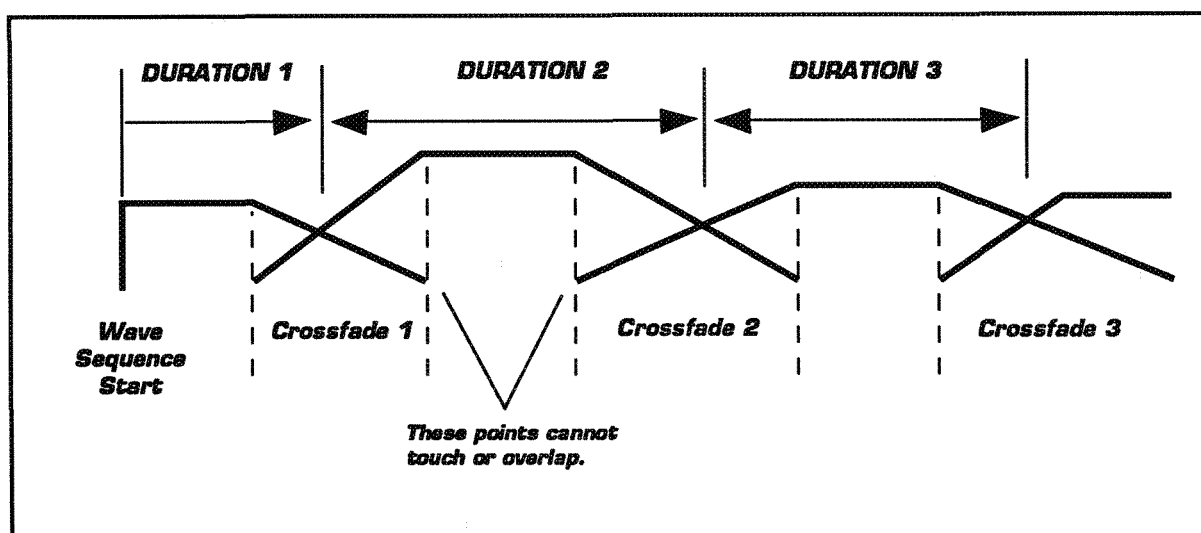
Loop Dir

You can set a loop over a range of steps so that it plays continuously while the note is held. The actual number of times that the loop plays is set at Repeats (discussed below).

FOR means that the loop restarts from its start point each time that it repeats. In this case, the first step crossfades with the end of the loop.

B/F (Backward/Forward) causes the loop to play from the first step to the last step, and then to turn around and proceed through the steps in reverse direction, from the last step back to the first step.

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, except for insertions to the first step or the END (see below). Steps are added before the selected step.

A special feature is included to make it easy to insert waves that have consecutive numbers. If you INSERT at the first step of the Wave Sequence, the inserted PCM wave's number will be one less than that of the old first step. Also, if you INSERT at the END, the inserted PCM wave's number will be one greater than that of the old last step.

These shortcuts are useful for working with the sets of "time-sliced" ROM waves that are included in the Wavestation, such as the Sax series, waves 364-379. For instance, to INSERT a string of time-sliced PCM waves, you might begin by inserting the last wave of the time-slice as the first step in the Wave Sequence. Then, you would simply press INSERT repeatedly, until the entire string has been entered.

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: A, B, C, D, A . . .

MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave.

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

```
WAVE SEQUENCE UTILITIES
Patch: CARD 10 SUPER SOUND
Wave:    A   ON    Wave Seq: CARD 16 OB Sax
Mod Source: ENV 1
Mod Amount:   +127
Start Step:   13
Compress/expand time values by   100%
[COMPAND]              [ NAME ][ COPY ][WAVINC][ MUTE ]
```

The number of the step on which the Wave Sequence starts, and the progression from step to step within the sequence, may be controlled by various modulation sources.

Patch

Bank and number.

Wave

Oscillator to which this Wave Sequence is assigned.

On means that the selected Wave is sounding.

Mute means that the selected Wave is not sounding.

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.

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 Controller, Aftertouch, Aftertouch + Mod Wheel, 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. The value of the modulator then directly controls which step of the Wave Sequence is played, and the durations of each step are thus determined by the modulator's rate of change. Using physical controllers, such as Aftertouch or the Mod wheel, you can manually step through the sequence in real time.

For example, assume that the Start Step is 13 and you have selected the Mod wheel for modulation, using a negative Mod Amount. 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 . 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 no keys held down, you can move the mod wheel up all the way. The next Note On will play the new, modulated point.

Remember that dynamic modulation sources halt the normal progression of the Wave Sequence (even if the Mod Amount is set to 0). Because of this, if you are not using dynamic modulation it is best to keep this field set to the static controllers, Keyboard Note or Keyboard Velocity.

Mod Amount

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 modulation 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.

If the Mod Source is set to a dynamic controller, and this field is set to 0, only the start step of the Wave Sequence will be played.

Wave Sequence Time Scaling Illustration
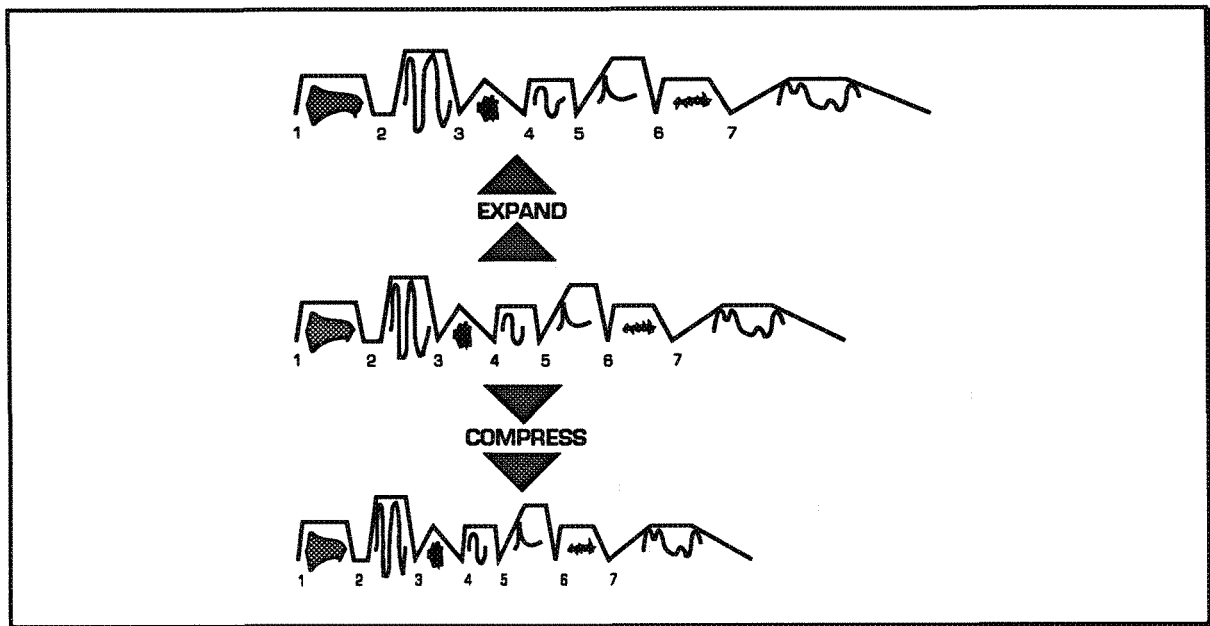
Start Step

The Wave Sequence step on which playback will normally start.

Compress/Expand

Scales all time values by 1 - 200%. Using this overall time adjustment is much easier than having to individually adjust all of the step durations.

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 envelopes of any sampled transients in use.

COMPAND

Starts the operation.

NAME

Goes to NAME WAVE SEQUENCE.

COPY

Goes to COPY WAVE SEQUENCE STEP.

WAVINC

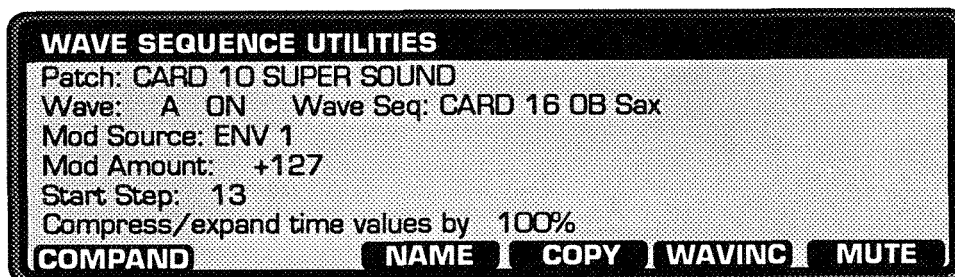Increments the Wave selection in order: A, B, C, D, A . . .

MUTE

Pressing MUTE silences the current Wave selection and displays the word MUTED next to the current Wave.

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
Patch:    CARD 37 MIDIWORLD
Structure:  4 osc            Lev    Semi   Fine   Slope
A - CARD  34   GUITAR PLUCK  99     -12    +6     +0.30
B - ROM   210  SNARE DRUM    99     +1     0      +2.00
C - CARD  25   WAVESEQ       99     0      -3     -0.40
D - ROM   47   ALTO SAX      75     0      -3     +1.00
MUTE A   MUTE B   MUTE C   MUTE D   WAVSEQ   MIXEV
```

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. The large number of PCM sounds available, and the dynamic nature of Wave Sequences, allow a variety of harmonically rich timbres far beyond the capabilities of old-style analog synthesis.

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. These appear with an asterisk (*) before their names.

Waves #32 and up are ROM waves, including multi-samples, attack transients, and single- or few-cycle loops.

Lev

Sets the master level for the wave selection. This amount scales the settings made under Edit Amp Envelope.

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 intonation, with 12 divisions per octave.

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

0.50 means that an octave of pitch is spread out over two octaves of keyboard. This allows you to play the quarter-tone scale.

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. If the Structure is 1 oscillator, this soft key doesn't appear.

WRITE (Performance, Patch, Multi Mode Setup, Scale)

Path:

Performance	EDIT - WRITE
Patch	EDIT – PATCH - WRITE
Scale	GLOBAL – SCALE - WRITE
Multi-Setup	MIDI – MULTISET - WRITE

```
┌─────────────────────────────────────────────────────┐
│ WRITE                          PERFORMANCE is EDITED  │
│ Data Type:   PERFORMANCE                              │
│ Source:      RAM2  40 CHOIR, FEMALE                   │
│ Destination: RAM2  40 CHOIR, FEMALE                   │
│                                                       │
│ Memory Protect Internal: ON    Card: ON               │
│ Currently playing: SOURCE                             │
│ [EXECUTE]                          [NAME]             │
└─────────────────────────────────────────────────────┘
```
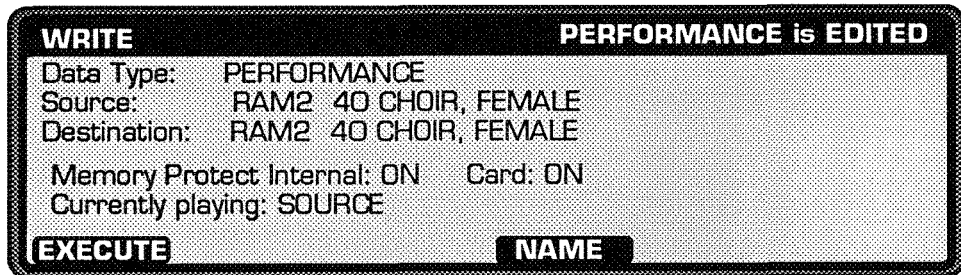
Potential destination Patches and Performances may be auditioned, so that you can avoid overwriting important voice data.

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, this duplicates the settings on the GLOBAL page.

To WRITE to RAM1 or RAM2, Memory Protect Internal must be Off.

To WRITE to CARD, Memory Protect Card must be Off.

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

1.0 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,	
	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.	00100000	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 transmitted will be sent with a status byte.

1.0 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
	00C00000 (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.	00000000	Bank Select MSB
Controller Value	0	Always 0
Controller no.	00100000	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

2.0 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: MIDI SYSTEM EXCLUSIVE FORMAT

This system exclusive format contains data for the entire Wavestation
product family, including the Wavestation SR, the Wavestation A/D,
the Wavestation EX, and the original Wavestation keyboard. Data used
for the Wavestation A/D or keyboard versions, but not referenced by
the Wavestation SR, is printed in *italic* type.

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.

These bytes are excluded from the computation of the checksum.

```
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
42	Parameter Change Message Expanded
43	Parameter Change Message SR Expanded
40	Single Patch Dump
49	Single Performance Dump
4C	All Patch Dump (within bank)
4D	All Performance Dump (within bank)
50	All Data Dump (system, patch, performance, wave sequence, multisets, performance map, scales)
51	System Setup Dump
54	All Wave Sequence Dump
5A	Micro Tune Scales Dump
5C	System Setup Dump Expanded
55	Multi Mode Setup Dump
5D	Performance Map Dump
5E	Multi Mode Setup Dump Expanded
5F	Performance Map Dump Expanded
60	Performance Map Dump SR Expanded
61	System Setup Dump SR Expanded
62	Multi Mode Setup Dump SR Expanded
23	Data Load Completed
24	Data Load Error
11	Patch Write Command
1A	Performance Write Command
21	Write Complete Message
22	Write Error Message

```
5B              Multi Mode Setup Select
63              Multi Mode Setup Select SR Expanded

06              Multi Mode Setup Dump Request
07              Performance Map Dump Request
08              Micro Tune Scales Dump Request
0C              Wave Sequence Data Dump Request
0E              System Setup Dump Request
0F              All Data Dump Request
10              Single Patch Dump Request
19              Single Performance Dump Request
1C              All Patch Dump Request
1D              All Performance 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 Nibble 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.

```
F0 42 3n 28             Wavestation sysex header
01000000 (40)           Single Patch Dump
0000xxxx (0x)           Bank number (0..11)
0xxxxxxx                Patch number
Nibble data             Patch structure (section 5.2)
0ccccccc                Checksum
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.

```
F0 42 3n 28          Wavestation sysex header
01001001 (49)        Single Performance Dump
0000xxxx (0x)        Bank number (0..11)
0xxxxxxx             Performance number
Nibble data          Performance structure (section 5.1)
0ccccccc             Checksum
11110111 (F7)        End of exclusive
```

2.1.3 All Patch Data

This message contains all 35 patches within the bank specified.

```
F0 42 3n 28          Wavestation sysex header
01001100 (4C)        All Patch Dump
0000xxxx (0x)        Bank number (0..11)
Nibble data          35 patch structures (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.

```
F0 42 3n 28          Wavestation sysex header
01001101 (4D)        All Performance Dump
0000xxxx (0x)        Bank number (0..11)
Nibble data          50 performance structures
                     (section 5.1)
0ccccccc             Checksum
11110111 (F7)        End of exclusive
```

2.1.5 System Setup Parameter Data

This message is always accompanied by the System Setup Expanded and System Setup SR Expanded data (as described below).

```
F0 42 3n 28          Wavestation sysex header
01010001 (51)        System Setup Dump
Nibble data          System structure (section 5.8)
0ccccccc             Checksum
11110111 (F7)        End of exclusive
```

2.1.6 System Setup Parameter Expanded Data

This message always accompanies the System Setup data (as described above).

```
F0 42 3n 28          Wavestation sysex header
01011100 (5C)        System Setup Expanded Dump
Nibble data          System Expanded structure
                     (section 5.9)
0ccccccc             Checksum
11110111 (F7)        End of exclusive
```

2.1.7 System Setup Parameter SR Expanded Data

This message always accompanies the System Setup data (as described above).

```
F0 42 3n 28            Wavestation sysex header
01100001 (61)          System Setup SR Expanded Dump
Nibble data            System Setup SR Expanded Structure
                       (section 5.10)
0ccccccc               Checksum
11110111 (F7)          End of exclusive
```

2.1.8 Wave Sequence Data

```
F0 42 3n 28            Wavestation sysex header
01010100 (54)          Wave Sequence Dump
0000xxxx (0x)          Bank number (0..11)
Nibble data            Ws_block structure (section 5.6)
0ccccccc               Checksum
11110111 (F7)          End of exclusive
```

2.1.9 Multi Mode Setup Data

In this data, references to RAM3 and ROM 4-10 are changed to ROM11 for compatability with the keyboard. This message is always accompanied by the Multi Mode Setup Expanded and Multi Mode Setup SR Expanded data (as described below).

```
F0 42 3n 28            Wavestation sysex header
01010101 (55)          Multi Mode Setup Dump
Nibble data            Multiset_block structure
                       (section 5.3)
0ccccccc               Checksum
11110111 (F7)          End of exclusive
```

2.1.10 Multi Mode Setup Expanded Data

In this data, references to RAM3 are allowed, but references to ROM 4-10 are changed to ROM11 for compatability with the Wavestation A/D. This message always accompanies the Multi Mode Setup and Multi Mode Setup SR Expanded data (as described above).

```
F0 42 3n 28            Wavestation sysex header
01011110 (5E)          Multi Mode Setup Expanded Dump
Nibble data            Multi Mode Setup Expanded structure
                       (section 5.4)
0ccccccc               Checksum
11110111 (F7)          End of exclusive
```

2.1.11 Multi Mode Setup SR Expanded Data

In this data, references to RAM3 and ROM 4-10 are allowed. This message always accompanies the Multi Mode Setup and Multi Mode Setup Expanded data (as described above).

```
F0 42 3n 28            Wavestation sysex header
01100010 (62)          Multi Mode Setup SR Expanded Dump
Nibble data            multiset_sr_extended_block structure
                       (section 5.5)
0ccccccc               Checksum
11110111 (F7)          End of exclusive
```

2.1.12 Performance Map Data

In this data, references to RAM3 and ROM 4-10 are changed to ROM11 for compatability with the keyboard. This message is always accompanied by the Performance Map Expanded and Performance Map SR Expanded data (as described below).

```
F0 42 3n 28              Wavestation sysex header
01011101 (5D)            Performance Map Dump
Nibble data              Performance Map_block structure
                         (section 5.11)
0ccccccc                 Checksum
11110111 (F7)            End of exclusive
```

2.1.13 Performance Map Expanded Data

In this data, references to RAM3 are allowed, but references to ROM 4-10 are changed to ROM11 for compatability with the Wavestation A/D. This message always accompanies the Performance Map Data(as described above).

```
F0 42 3n 28              Wavestation sysex header
01011111 (5F)            Performance Map Dump Expanded
Nibble data              Performance Map_block structure
                         (section 5.12)
0ccccccc                 Checksum
11110111 (F7)            End of exclusive
```

2.1.14 Performance Map SR Expanded Data

In this data, references to RAM3 and ROM 4-10 are allowed. This message always accompanies the Performance Map Data (as described above).

```
F0 42 3n 28              Wavestation sysex header
01100000 (60)            Performance Map SR Expanded Dump
Nibble data              Performance Map_block structure
                         (section 5.13)
0ccccccc                 Checksum
11110111 (F7)            End of exclusive
```

2.1.15 Micro Tune Scale Data

```
F0 42 3n 28              Wavestation sysex header
01011010 (5A)            Micro Tune Scale Dump
Nibble data              Mtune_block structure (section 5.7)
0ccccccc                 Checksum
11110111 (F7)            End of exclusive
```

2.1.16 All Data

This message is always accompanied by the Multi Mode Setup Expanded and Multi Mode Setup SR Expanded data, the Performance Map Expanded and Performance Map SR Expanded data, the System Setup Expanded and System Setup SR Expanded data, and the RAM3 Performance, Patch, and Wave Sequence data.

```
F0 42 3n 28              Wavestation sysex header
01010000 (50)            All Data Dump
Nibble data              All_data structure (section 5.14)
0ccccccc                 Checksum
11110111 (F7)            End Of exclusive
```

2.1.17 Parameter Change Messages

The normal parameter change messages include parameters numbered 0 - 379.

```
F0 42 3n 28              Wavestation sysex header
01000001 (41)            Parameter Change Message
0LLLLLLL                 LSB of parameter number
                         (section 5.12)
0HHHHHHH                 MSB of parameter number
0xxxxxxx                 Parameter value in 7 bit ASCII
       .                 (16 characters max) (7F = space)
       .
00000000 (00)            ASCII null termination
11110111 (F7)            End of exclusive
```

2.1.18 Parameter Change Messages Expanded

The expanded parameter change messages include parameters numbered 380 - 406. They are otherwise completely the same as the normal parameter change messages.

```
F0 42 3n 28              Wavestation sysex header
01000010 (42)            Parameter Change Message Expanded
0LLLLLLL                 LSB of parameter number
                         (section 5.12)
0HHHHHHH                 MSB of parameter number
0xxxxxxx                 Parameter value in 7 bit ASCII
       .                 (16 characters max) (7F = space)
       .
00000000 (00)            ASCII null termination
11110111 (F7)            End of exclusive
```

2.1.19 Parameter Change Messages SR Expanded

The SR expanded parameter change messages include parameters numbered 407 and greater. They are otherwise completely the same as the normal parameter change messages.

```
F0 42 3n 28              Wavestation sysex header
01000011 (43)            Parameter Change Message SR Expanded
0LLLLLLL                 LSB of parameter number
                         (section 5.12)
0HHHHHHH                 MSB of parameter number
0xxxxxxx                 Parameter value in 7 bit ASCII
       .                 (16 characters max) (7F = space)
       .
00000000 (00)            ASCII null termination
11110111 (F7)            End of exclusive
```

2.1.20 Multi-Mode Setup Select

Sent whenever the current Multiset is changed between 0-15 (use SR Expanded for 16-31). On reception it will change the current multi setup.

```
F0 42 3n 28              Wavestation sysex header
01011011 (5B)            Multi Mode Setup Select
0xxxxxxx                 Multi Mode Setup number
11110111 (F7)            End of exclusive
```

2.1.21 Multi-Mode Setup Select SR Expanded

Sent whenever the current Multiset is changed between 16-31 (use normal select for 0-15). On reception it will change the current multi setup.

```
F0 42 3n 28           Wavestation sysex header
01100011 (63)         Multi Mode Setup Select SR Expanded
0xxxxxxx              Multi Mode Setup number (true number)
11110111 (F7)         End of exclusive
```

2.2 Status messages

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

```
F0 42 3n 28           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.

```
F0 42 3n 28           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

```
F0 42 3n 28           Wavestation sysex header
00100001 (21)         Write Complete message type
11110111 (F7)         End of exclusive
```

3.1.2 Write Error

```
F0 42 3n 28           Wavestation sysex header
00100010 (22)         Write Error message type
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)
00000010 (02)          Member code (LSB)
00000000 (00)          (MSB)
0xxxxxxx (xx)          Minor software version (LSB)
0xxxxxxx (xx)          (MSB)
0xxxxxxx (xx)          Major software version(LSB)
0xxxxxxx (xx)          (MSB)
11110111 (F7)          End of exclusive
```

4.0 Receive Only Messages

4.1 Request Messages

4.1.1 Single Patch Dump Request

```
F0 42 3n 28            Wavestation sysex header
00010000 (10)          Single Patch Dump Request
0000xxxx (0x)          Bank number (0..11)
0xxxxxxx               Patch number
11110111 (F7)          End of exclusive
```

4.1.2 Single Performance Dump Request

```
F0 42 3n 28            Wavestation sysex header
00011001 (19)          Single Performance Dump Request
0000xxxx (0x)          Bank number (0..11)
0xxxxxxx               Performance number
11110111 (F7)          End of exclusive
```

4.1.3 All Patch Dump Request

```
F0 42 3n 28            Wavestation sysex header
00011100 (1C)          All Patch Dump Request
0000xxxx (0x)          Bank number (0..11)
11110111 (F7)          End of exclusive
```

4.1.4 All Performance Dump Request

```
F0 42 3n 28            Wavestation sysex header
00011101 (1D)          All Performance Dump Request
0000xxxx (0x)          Bank number (0..11)
11110111 (F7)          End of exclusive
```

4.1.5 All Data Request

```
F0 42 3n 28            Wavestation sysex header
00001111 (0F)          All Data Dump Request
11110111 (F7)          End of exclusive
```

4.1.6 System Setup Dump Request

```
F0 42 3n 28            Wavestation sysex header
00001110 (0E)          System Setup Dump Request
11110111 (F7)          End of exclusive
```

4.1.7 Wave Sequence Data Dump Request

```
F0 42 3n 28            Wavestation sysex header
00001100 (0C)          Wave Sequence Dump Request
0000xxxx (0x)          Bank number (0..11)
11110111 (F7)          End of exclusive
```

4.1.8 Performance Map Dump Request

```
F0 42 3n 28            Wavestation sysex header
00000111 (07)          Performance Map Dump Request
11110111 (F7)          End of exclusive
```

4.1.9 Multi Mode Setup Dump Request

```
F0 42 3n 28            Wavestation sysex header
00000110 (06)          Multi Mode Setup Dump Request
11110111 (F7)          End of exclusive
```

4.1.10 Micro Tune Scales Dump Request

```
F0 42 3n 28            Wavestation sysex header
00001000 (08)          Micro Tune Scales Dump Request
11110111 (F7)          End of exclusive
```

4.2 Commands

4.2.1 Patch Write Command

```
F0 42 3n 28            Wavestation sysex header
00010001 (11)          Patch Write Command
0000xxxx (0x)          Bank number (0..11)
0ppppppp (pp)          Patch number (0-34)
11110111 (F7)          End of exclusive
```

4.2.2 Performance Write Command

```
F0 42 3n 28            Wavestation sysex header
00011010 (1A)          Performance Write Command
0000xxxx (0x)          Bank number (0..11)
0ppppppp (pp)          Performance number (0-49)
11110111 (F7)          End of exclusive
```

4.3 Device Inquiry Message

```
11110000 (F0)          System Exclusive
01111110 (7E)          Non Real Time
0000xxxx (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 Perf_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 */

} performance;

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      0utput;         /* OUTPUT CHAN FOR THIS Part */
    ubyte     Part_Mode;      /* KEYBOARD ASSIGN MODE
                                 (Polyphonic,UNI) */

                              /* bit 6-7 */
                              /* Bank Expansion */
                              /* 00= Use normal bank num */
                                      if Bank_Num = 0 --> RAM1
                                      if Bank_Num = 1 --> RAM2
                                      if Bank_Num = 2 --> ROM11
                                      if Bank_Num = 3 --> CARD */
                              /* 01= Use expanded banks as below:
                                      if Bank_Num = 0 --> ROM4
                                      if Bank_Num = 1 --> ROM5
                                      if Bank_Num = 2 --> RAM3
                                      if Bank_Num = 3 --> ROM6 */
                              /* 10= Use expanded banks as below:
                                      if Bank_Num = 0 --> ROM7
                                      if Bank_Num = 1 --> ROM8
                                      if Bank_Num = 2 --> ROM9
                                      if Bank_Num = 3 --> ROM10 */
                              /* 11= **** reserved for future use */

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

                              /* bit 3-2 */
```

```
                                     /* 00= **** reserved for future use */
                                     /* 01= polyphonic*/
                                     /* 10= unison re-trigger*/
                                     /* 11= unison legato*/

                 /* bit 1-0 */
                                     /* 00= low note*/
                                     /* 01= high note*/
                                     /* 10= last note*/
                                     /* 11 = **** reserved for future use */

    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 and
                                        USER scales */
    ubyte      Midi_Out_Chan;  /* MIDI transmit channel for this
                                        PART */
    byte       Midi_Prog_Num;  /* MIDI prog# to xmit when PART
                                        selected, -1 =off) */
    byte       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 LFO 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*/
byte       Vel_AEG_R;        /* Velocity To Amp Env Attack Rate Amt*/
byte       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 */
        byte      Indiv_Level;   /* Velocity to pitch ramp rate amount*/
        long      Lfo1_Inc;      /* Lfo fade in amount increment*/
        long      Lfo2_Inc;      /* Lfo fade in amount increment*/
        byte      Patch_Output;  /* Individual output routing */
        byte      Wave_Num_Exp;  /* Wave number expansion to access
                                 Expansion PCM data (Waves numbered
                                 397 and over). This number is added
                                 to the value of Wave_Num to determine
                                 the actual wave number.*/
    } indiv;

    /* Patch data structure*/

    typedef struct
    {
        char      Patch Name[16];/* 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    Bank_Exp;           /* Bit 7 = 1; Second Exp Bit set for Wave D
                                       if Wave_Bank = 0 --> Wave D uses ROM7 wseq
                                       if Wave_Bank = 1 --> Wave D uses ROM8 wseq
                                       if Wave_Bank = 2 --> Wave D uses ROM9 wseq
                                       if Wave_Bank = 3 --> Wave D uses ROM10 wseq*/
                                /* Bit 6 = 1;  Second Exp Bit set for Wave C
                                       if Wave_Bank = 0 --> Wave C uses ROM7 wseq
                                       if Wave_Bank = 1 --> Wave C uses ROM8 wseq
                                       if Wave_Bank = 2 --> Wave C uses ROM9 wseq
                                       if Wave_Bank = 3 --> Wave C uses ROM10 wseq*/
                                /* Bit 5 = 1;  Second Exp Bit set for Wave B
                                       if Wave_Bank = 0 --> Wave B uses ROM7 wseq
                                       if Wave_Bank = 1 --> Wave B uses ROM8 wseq
                                       if Wave_Bank = 2 --> Wave B uses ROM9 wseq
                                       if Wave_Bank = 3 --> Wave B uses ROM10 wseq*/
                                /* Bit 4 = 1;  Second Exp Bit set for Wave A
                                       if Wave_Bank = 0 --> Wave A uses ROM7 wseq
                                       if Wave_Bank = 1 --> Wave A uses ROM8 wseq
                                       if Wave_Bank = 2 --> Wave A uses ROM9 wseq
                                       if Wave_Bank = 3 --> Wave A uses ROM10 wseq*/
                                /* Bit 3 = 1;  First Exp Bit set for Wave D
                                       if Wave_Bank = 0 --> Wave D uses ROM4 wseq
                                       if Wave_Bank = 1 --> Wave D uses ROM5 wseq
                                       if Wave_Bank = 2 --> Wave D uses RAM3 wseq
                                       if Wave_Bank = 3 --> Wave D uses ROM6 wseq */
                                /* Bit 2 = 1;  First Exp Bit set for Wave C
                                       if Wave_Bank = 0 --> Wave C uses ROM4 wseq
                                       if Wave_Bank = 1 --> Wave C uses ROM5 wseq
                                       if Wave_Bank = 2 --> Wave C uses RAM3 wseq
                                       if Wave_Bank = 3 --> Wave C uses ROM6 wseq*/
                                /* Bit 1 = 1;  First Exp Bit set for Wave B
                                       if Wave_Bank = 0 --> Wave B uses ROM4 wseq
                                       if Wave_Bank = 1 --> Wave B uses ROM5 wseq
                                       if Wave_Bank = 2 --> Wave B uses RAM3 wseq
                                       if Wave_Bank = 3 --> Wave B uses ROM6 wseq */
                                /* Bit 0 = 1;  First Exp Bit set for Wave A
                                       if Wave_Bank = 0 --> Wave A uses ROM4 wseq
                                       if Wave_Bank = 1 --> Wave A uses ROM5 wseq
                                       if Wave_Bank = 2 --> Wave A uses RAM3 wseq
                                       if Wave_Bank = 3 --> Wave A uses ROM6 wseq */

    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

This data includes the first 16 of the 32 multisets in a stripped-down version
compatible with the Wavestation keyboard. Multiset names and channel panning are
not included, and references to RAM3 and ROM 4-10 are changed to ROM11.

```
    /*        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 */
       ubyte   Multimap_Level;  /* Performance level */
    } 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;

    typedef struct
    {
       multiset                multisets[16];
       byte                    spare_multiset_byte;
    } multiset_block;
```

5.4 Multi Mode Setup Expanded Data Structure

This data includes the first 16 of the 32 multisets in a stripped-down version
compatible with the Wavestation A/D. References to ROM4-10 are changed to ROM11,
as in the normal Multi Mode Setup structure above, but references to RAM3 are
allowed.

5.5 Multi Mode Setup SR Expanded Data Structure

This data includes all 32 Multisets, along with names and channel panning. Refer-
ences to RAM3 and ROM 4-10 are allowed.

```
    typedef struct
    {
       multiset  multisets[16];            /* Original Multisets */
       multiset  multisets[16];            /* Expanded Multisets */
       ubyte     Multi_Names[16][32];      /* 15 Char Multiset Names + NULL*/
       ubyte     Multi_Output[16][32];     /* 16 Channels of Multiset Pan */
       byte      spare_multiset_byte;
    } multiset_sr_extended_block
```

5.6 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 */
    word    WS_Dyno_Mod;    /* (Total_Time * Mod_Amt)/255 */
    uword   WS_Start_Time;  /* Cumulative time up to start step */
    uword   WS_Time;        /* Total time of Wave Sequence */
} waveseq;

/* Data structure of each 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       /* -24 to 24: Coarse tuning of wave */
                               25 to 47: illegal values
                               48 to 96: subtract 72 for actual coarse
                               tuning and use expanded PCM, adding 365
                               to WS_Wave_Num value for actual PCM wave
                               number. */
    byte    WS_Fine;        /* Fine tuning of wave */
    uword   WS_Xfade;       /* Crossfade time of wave */
    uword   WS_Duration;    /* Duration of wave */
    ubyte   WS_Level;       /* Level of wave */
    ubyte   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;
```

5.7 Micro Tune Scale Data Structures

```
    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;

    typedef struct
    {
        mtune     mtunes[12];
        byte      spare_mtune_byte;
    } mtune_block;
```

5.8 System Setup Data Structure

```
    typedef struct
    {
        ubyte   current_multi;        /* CURRENT MULTISET */
        ubyte   current_tune;         /* CURRENT _MTUNE* /
        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_kbd;            /* LOCAL_KBD */
        byte    xmit_program_enable;  /* XMlT PROG CHANGE */
        byte    xmit_pressure_enable; /* XMIT AFTERTOUCH */
```

```
        byte    xmit_pitch_enable;     /* XMlT 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;
        byte    spare_system_byte;
    } system;
```

5.9 System Setup Expanded Data Structure

This contains data not supported by the original Wavestation keyboard, including various MIDI remapping features, local transpose, and analog inputs parameters for the Wavestation A/D.

```
    typedef struct
    {
    ubyte               prog_to_multi_fx;
    ubyte               change_multi_with;
    ubyte               remap_to_joy_x;
    ubyte               remap_to_joy_y;
    ubyte               remap_to_fx_switch;
    ubyte               local_xpose;
    ubyte               analog_setup_number;
    byte                analog_bus_macro;
    ubyte               analog_lev_1;
    ubyte               analog_lev_2;
    byte                analog_chan_1;
    byte                analog_chan_2;
    ubyte               analog_1_bus;
    ubyte               analog_2_bus;
    ubyte               analog_1_filter;
    ubyte               analog_2_filter;
    ubyte               analog_1_exciter;
    ubyte               analog_2_exciter;
    ubyte               analog_input_disable;
    byte                spare_system_byte;
    }system_ext;
```

5.10 System Setup Expanded SR Data Structure

This contains data specific to the Wavestation SR.

```
    typedef struct
    {
    ubyte       sysex_xmit_type;   /* Type of System Exclusive Transfer */
    ubyte       perf_midi_mode;    /* MIDI Mode when in Performance mode */
```

```
       ubyte          multi_midi_mode;    /* MIDI Mode when in Multi mode */
       ubyte          current_demo;       /* The Demo sequence number */
       ubyte          perf_mode;          /* 1=Perfomance Mode 0=Multi Mode */
       ubyte          num_multi_chans;    /* Like num_mono_chans for Multi Mode */
       ubyte          reset_act_sens_control; /* 1=NOTES OFF 0=Notes + Contlrs */
       ubyte          rec_bank_enable; /* 0=OFF, 1=ON */
       byte           spare_system_byte;
   }system_ext_sr;
```

5.11 Performance Map Structures

In this data, references to RAM3 and ROM 4-10 are changed to ROM11 for compatability with the keyboard.

```
   typedef struct
   {
      ubyte    Perfmap_Bank;   /* Bank number of this performance */
      ubyte    Perfmap_Prog;   /* MIDI Program Change number of this
                                  performance */
   } perfmap;

   typedef struct
   {
      perfmap   perfmaps[128];
      byte      spare_perfmap_byte;
   } perfmap_block;
```

5.12 Performance Map Expanded Structures

In this data, references to RAM3 are allowed, but ROM 4-10 are changed to ROM11 for compatability with the Wavestation A/D. It is otherwise the same as the normal Performance Map structure above.

5.13 Performance Map SR Expanded Structures

In this data, references to RAM3 and ROM 4-10 are allowed. It is otherwise the same as the normal Performance Map structure above.

5.14 All Data Structure

```
   typedef struct
   {
      system                    system_all;
      multiset_block            multiset_all;
      mtune_block               mtune_all;
      perfmap_block             perfmap_all;
      performance               perf_ram1[50];
      performance               perf_ram2[50];
      patch                     patch_ram1[35];
      patch                     patch_ram2[35];
      ws_block                  ws_ram1;
      ws_block                  ws_ram2;
   } all_data;
```

5.15 Parameter Number Table

```
enum /* Parameter numbers. */
{
/* 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_MOD3,
/* 274 */    FX_MOD4,
/* 275 */    FX_MOD5,
/* 276 */    FX_MOD6,
/* 277 */    FX_MOD7,
/* 278 */    FX_MOD8,
/* 279 */    FX_MOD10,
/* 280 */    FX_LFO_RATE1,
/* 281 */    FX_LFO_RATE3,
/* 282 */    FX_LFO_RATE4,
/* 283 */    FX_LFO_RATE5,
/* 284 */    FX_LFO_RATE6,
/* 285 */    FX_LFO_RATE7,
/* 286 */    FX_SPLIT_POINT2,
/* 287 */    FX_SPLIT_POINT3,
/* 288 */    FX_SPLIT_POINT10,
/* 289 */    FX_DELAY_FACTOR7,
/* 290 */    FX_TOP_DELAY3,
/* 291 */    FX_WG_JUCT_MIX10,
/* 292 */    FX_EQ_FREQ_LOW0,
/* 293 */    FX_EQ_FREQ_MID2,
/* 294 */    FX_EQ_FREQ_HIGH7,
/* 295 */    FX_EQ_WIDTH6,
/* 296 */    FX_100_WET_DRY0,
/* 297 */    FX_100_WET_DRY3,
/* 298 */    FX_100_WET_DRY4,
/* 299 */    FX_10_WET_DRY0,
/* 300 */    FX_10_WET_DRY3,
/* 301 */    FX_10_WET_DRY4,
/* 302 */    FX_UPARAM0,
/* 303 */    FX_UPARAM1,
/* 304 */    FX_UPARAM2,
/* 305 */    FX_UPARAM3,
/* 306 */    FX_UPARAM4,
/* 307 */    FX_UPARAM5,
/* 308 */    FX_UPARAM6,
/* 309 */    FX_UPARAM7,
```

```
/* 310 */    FX_UPARAM8,
/* 311 */    FX_UPARAM9,
/* 312 */    FX_UPARAM10,
/* 313 */    FX_UPARAM11,
/* 314 */    FX_UPARAM12,
/* 315 */    FX_UPARAM13,
/* 316 */    FX_PARAM0,
/* 317 */    FX_PARAM1,
/* 318 */    FX_PARAM2,
/* 319 */    FX_PARAM3,
/* 320 */    FX_PARAM4,
/* 321 */    FX_PARAM5,
/* 322 */    FX_PARAM6,
/* 323 */    FX_PARAM7,
/* 324 */    FX_PARAM8,
/* 325 */    FX_PARAM9,
/* 326 */    FX_PARAM10,
/* 327 */    FX_PARAM11,
/* 328 */    FX_PARAM12,
/* 329 */    FX_PARAM13,
/* 330 */    FX_DEST_TYPE,
/* 331 */    FX_DEST_PROG,
/* 332 */    FX_DEST_FX_NUM,
/* 333 */    FX_DEST_PLACEMENT,
/* 334 */    FX_DEST_FX1,
/* 335 */    FX_DEST_FX2,
/* 336 */    WAVE_MUTE,
/* 337 */    WAVESEQ_WAVE,
/* 338 */    WAVE_SEQ_LOOP_DIR,
/* 339 */    WAVESEQ_COMPAND_SCALE,
/* 340 */    FOOT_DAMPER_FUNCTION,
/* 341 */    FOOT_DAMPER_POLARITY,
/* 342 */    FOOT_ASSIGN_1_FUNCTION,
/* 343 */    FOOT_ASSIGN_1_POLARITY,
/* 344 */    FOOT_ASSIGN_2_FUNCTION,
/* 345 */    FOOT_ASSIGN_2_POLARITY,
/* 346 */    BANK_COPY_TYPE,
/* 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 */    COPY_FX_SOURCE_BANK,
/* 354 */    COPY_FX_SOURCE_NUM,
/* 355 */    COPY_FX_SOURCE_NAME,
/* 356 */    FX_11_WET_DRY0,
/* 357 */    FX_11_WET_DRY3,
/* 358 */    FX_11_WET_DRY4,
/* 359 */    FX_RAMP5,
/* 360 */    SOURCE_CARD_NAME,
/* 361 */    DEST_CARD_NAME,
/* 362 */    WAVEA_BUS_A,
/* 363 */    WAVEA_BUS_B,
/* 364 */    WAVEA_BUS_C,
/* 365 */    WAVEA_BUS_D,
/* 366 */    WAVEB_BUS_A,
/* 367 */    WAVEB_BUS_B,
/* 368 */    WAVEB_BUS_C,
/* 369 */    WAVEB_BUS_D,
/* 370 */    WAVEC_BUS_A,
/* 371 */    WAVEC_BUS_B,
/* 372 */    WAVEC_BUS_C,
```

```
/* 373 */    WAVEC_BUS_D,
/* 374 */    WAVED_BUS_A,
/* 375 */    WAVED_BUS_B,
/* 376 */    WAVED_BUS_C,
/* 377 */    WAVED_BUS_D,
/* 378 */    COPY_PART_SOURCE_BANK,
/* 379 */    GLOBAL_UTIL_DEST_BANK,
```

Parameter numbers 380 - 406 are sent as Parameter Change Messages Expanded. Param-
eters 380-404 are ignored by the Wavestation EX keyboard.

```
/* 380 */    REMAP_TO_JOY_X,
/* 381 */    REMAP_TO_JOY_Y,
/* 382 */    REMAP_TO_FX_SWITCH,
/* 383 */    PROG_TO_MULTI_FX,
/* 384 */    CHANGE_MULTI_WITH,
/* 385 */    ANALOG_LEV_1,
/* 386 */    ANALOG_LEV_2,
/* 387 */    ANALOG_CHAN_1,
/* 388 */    ANALOG_CHAN_2,
/* 389 */    ANALOG_1_BUS_A,
/* 390 */    ANALOG_1_BUS_B,
/* 391 */    ANALOG_1_BUS_C,
/* 392 */    ANALOG_1_BUS_D,
/* 393 */    ANALOG_2_BUS_A,
/* 394 */    ANALOG_2_BUS_B,
/* 395 */    ANALOG_2_BUS_C,
/* 396 */    ANALOG_2_BUS_D,
/* 397 */    FX_BUS0,
/* 398 */    FX_BUS2,
/* 399 */    ANALOG_BUS_MACRO,
/* 400 */    ANALOG_1_FILTER,
/* 401 */    ANALOG_2_FILTER,
/* 402 */    ANALOG_1_EXCITER,
/* 403 */    ANALOG_2_EXCITER,
/* 404 */    ANALOG_INPUT_DISABLE,
/* 405 */    COMP_CONTROL0,
/* 406 */    LOCAL_XPOSE,
```

Parameter numbers 407 and greater are sent as Parameter Change Messages SR Expanded.
These are ignored by the Wavestation keyboard and A/D.

```
/* 407 */    SYSEX_XMIT_TYPE,
/* 408 */    SYSEX_XMIT_BANK,
/* 409 */    SYSEX_XMIT_NUM,
/* 410 */    WAVE_BANK,
/* 411 */    WAVE_NUM,
/* 412 */    WAVE_NAME,
/* 413 */    WAVE_LEVEL,
/* 414 */    WAVE_TUNE_COARSE,
/* 415 */    WAVE_TUNE_FINE,
/* 416 */    WAVE_TUNE_SLOPE,
/* 417 */    WAVE_BUS_A,
/* 418 */    WAVE_BUS_B,
/* 419 */    WAVE_BUS_C,
/* 420 */    WAVE_BUS_D,
/* 421 */    MIX_ENV_RATE_1,
/* 422 */    MIX_ENV_RATE_2,
/* 423 */    MIX_ENV_RATE_3,
/* 424 */    MIX_ENV_RATE_4,
/* 425 */    PART_SOLO_STATUS,
/* 426 */    WS_STEP_SOLO_STATUS,
```

```
/* 427 */   PERF_MIDI_MODE,
/* 428 */   MULTI_MIDI_MODE,
/* 429 */   CURRENT_DEMO,
/* 430 */   CURRENT_DEMO_NAME,
/* 431 */   WAVE_WAVE,
/* 432 */   MULTISET_NAME,
/* 433 */   MULTISET_OUTPUT,
/* 434 */   NUM_MULTI_CHANS,
/* 435 */   RESET_ACT_SENS_CONTROL,
/* 436 */   REC_BANK_CHANGE
/* 437 */   KSD_ENABLE,
/* 438 */   VERSION_NUM,
/* 439 */   VERSION_DATE,
/* 440 */   ERROR_NUMBER,
/* 441 */   TASK_NUMBER,
/* 442 */   STATUS_REGISTER,
/* 443 */   CRASH_LEVEL,
/* 444 */   PROGRAM_COUNTER,
/* 445 */   C_PROGRAM_COUNTER,
/* 446 */   STACK_POINTER,
/* 447 */   USER_STACK_POINTER,
/* 448 */   POOL_LEVEL,
/* 449 */   POOL_LEVEL_MAX,
/* 450 */   BOGUS_PARAM,
/* 451 */   EXECUTE_PLAY_DEMO,
/* 452 */   EXECUTE_SOLO_PART,
/* 453 */   EXECUTE_INIT_PART,
/* 454 */   EXECUTE_COPY_PART,
/* 455 */   EXECUTE_COPY_MODULES,
/* 456 */   EXECUTE_COPY_FX_ALL,
/* 457 */   EXECUTE_COPY_FX_PARAMS,
/* 458 */   EXECUTE_COPY_FX_MIX,
/* 459 */   EXECUTE_INSERT_WS_STEP,
/* 460 */   EXECUTE_DELETE_WS_STEP,
/* 461 */   EXECUTE_ZONE_KEY_LAYER,
/* 462 */   EXECUTE_ZONE_KEY_SPLIT,
/* 463 */   EXECUTE_ZONE_VEL_SWITCH,
/* 464 */   EXECUTE_ZONE_VEL_LAYER,
/* 465 */   EXECUTE_SOLO_WS_STEP,
/* 466 */   EXECUTE_WRITE,
/* 467 */   EXECUTE_COMPARE,
/* 468 */   EXECUTE_INIT_PATCH,
/* 469 */   EXECUTE_CENTER_POINT,
/* 470 */   EXECUTE_SYSEX_XMIT,
/* 471 */   EXECUTE_SYSEX_MULTI_DUMP,
/* 472 */   EXECUTE_BANK_MOVE,
/* 473 */   EXECUTE_FORMAT_CARD,
/* 474 */   EXECUTE_WAVESEQ_COMPAND,
/* 475 */   EXECUTE_WAVESEQ_INIT,
/* 476 */   EXECUTE_WAVESEQ_COPY,
/* 477 */   EXECUTE_WAVESEQ_STEP_COPY,
/* 478 */   EXECUTE_ENABLE_SHOW,
/* 479 */   EXECUTE_INIT_RAM,
/* 480 */   EXECUTE_LOAD_DIAG,
/* 481 */   EXECUTE_SAVE_DIAG,
/* 482 */   EXECUTE_EXIT_LEVEL,
/* 483 */   EXECUTE_INIT_PERF,
/* 484 */   PARAM_END     /* Must be last */
              };
```