



POWER PLAY VZ!

THE ESSENTIAL GUIDE TO PRACTICAL APPLICATIONS.

CASIO

VZ - 1
VZ - 10M
VZ - 8M



By
STEVE DE FURIA
and
JOE SCACCIAFERRO

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by **STEVE DE FURIA and
JOE SCACCIAFERRO**

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The fact that you have taken this book off the shelf means that you are already involved in music technology or are considering taking the plunge. In either case, we're sure the deeper your involvement, the more questions you will have. We've produced the **Ferro Music Technology Series** to answer those questions.

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No single book could cover the musical uses of synthesis, digital drums, sampling, MIDI, and computers in sufficient detail to be useful, so we've dedicated one or more books to each technology. There are, however, many instances where the technologies overlap. The books in our series were written to be used together. You'll find that when your interest in VZ instruments leads you towards synthesis, sampling, MIDI, or computers, Ferro has the bases covered!



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Foreword

CASIO created an entire new market for electronic keyboards in 1979, with the introduction of the CT-210, followed in 1980, by the first mini-keyboard, the M-10. Many classic models followed those early releases — remember the MT-40? How about the CT-101, with that great Frog sound, and the CT-701, with bar code reader, and the CT-7000, which had a 3-track digital sequencer back in 1983?.

In those days, many thought of CASIO as a manufacturer of “toy keyboards”, despite the tremendous amount of ingenuity that went into those “toys”. Even when the CZ series was introduced in 1984, people said, “Toy *synthesizers* — how cute!” — but 80,000 or so CZ owners worldwide proved that CASIO had arrived in the pro audio market. (The CZ-101, in fact, is still among the most popular synthesizers ever.)

Ten years (and over 10 million CASIO keyboards sold) later, the synthesizer market is a crowded one. Technology has grown by leaps and bounds (occasionally by fits and starts), and sounds that weren’t conceived of two or three years ago have been rendered “classics” (or done to death). Sometimes it has even seemed that, despite the growing power of the tools, the availability of ready-made sounds would replace the original creation by artists of innovative and unique sounds. It has, therefore, been encouraging for us at CASIO to watch the amount of end-user support, sharing of information, enthusiasm and creativity that has been generated by and for the entire CZ — and now the VZ — series.

The VZ synthesizers (as well as the PG guitar) are powerful sound creation devices. They offer a unique timbral alternative to many of the hybrid-sounding machines now on the market. They can sound meaty or mellow, old-style or new, digital or analog. They are true synthesizers, offering a formidable toolbox with which to create your own soundscapes. Joe and Steve have laid some concise groundwork here to introduce you to the multitude of sonic options you have before you — we at CASIO encourage you to use this information as a springboard for your own innovation. Don’t limit yourself to preset configurations and sounds. Simply reworking the configurations and detuning (especially pitch fix) can radically alter a normal mode sound; working with delay trigger, velocity inversion, and detuning in menu 2 can make your combinations striking and impressive.

On behalf of CASIO, I wish to thank you for going with a VZ or PG, and wish you the best in making music with it. To all those who are striving to genuinely *create*, we at CASIO salute you. Thanks to Joe and Steve for an informative and enlightening look into a marvelous musical instrument.

Ed Alstrom
Marketing Manager
CASIO Professional Musical Products

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Part 1:

Overview of VZ Instruments

Part 1: Overview of VZ Instruments

Power Play VZ! is a guide to playing and programming Casio's VZ-1, VZ-10M and VZ-8M digital synthesizers. Our goal is to help you learn how to create and modify sounds on your VZ, and also to help you to understand and take advantage of the VZ's powerful MIDI features. Not only do we cover all the details of playing the VZ from a keyboard player's point of view, we present a lot of information of special interest to guitarists and wind players. We give you many specific tips on using the VZ with Casio's PG-380 MIDI guitar and DH-200 MIDI horn, as well as showing you how to "customize" your VZ to be a tone module for any MIDI guitar or wind controller. There are three major sections in this book.

In **Part 1: Overview of VZ Instruments**, we give you an overview of the features of each instrument, and the ways they can be used together in a MIDI system. Special attention is given to the use of VZ synthesizers with MIDI guitar and wind controllers. At the end of this section (*Getting Around on the VZ*), we present a complete "road-map" to all of the voice, effect, and system parameters of the VZ-1, VZ-10M and VZ-8M.

In **Part 2: Exploring IPD Synthesis**, we demonstrate all of the main iPD synthesis parameters through a series of hands-on experiments. This series is designed give you a practical understanding of iPD synthesis, with each experiment focused on a specific iPD concept. Since we believe that a sound, like a picture, can be worth a thousand words, our experiments will let you learn by listening to sounds and looking at pictures. You won't have to read thousands of words to gain a thorough understanding of how your VZ works. In a special section, *Finding your way around a VZ sound* we show you how to quickly isolate and identify the function of each of the eight modules in any VZ sound.

In **Part 3: Editing Examples**, we give you many examples, tips and techniques for creating performance effects for your VZ. All of the examples use a step-by-step approach that shows how to add the effect either to existing presets or to sounds you make from scratch. You'll learn how to add "must have" performance effects like velocity dynamics, vibrato, tremolo and after touch, as well as methods to create keyboard splits and positional cross-fades. The final examples demonstrate several ways to create dramatic echo and stereo effects.

Much of the information and many of the programming techniques presented in **Power Play VZ!** are not available anywhere else. To get the most out of the book, keep your VZ owner's manual handy as a reference and, of course, have your VZ powered up and ready to play.

The VZ Family

The VZ-1 keyboard synthesizer, VZ-10M and VZ-8M synthesizer tone modules, along with the PG-380 MIDI guitar and DH-200 MIDI horn, are the newest members of Casio's professional musical instrument line. The VZ synthesizers use Casio's proprietary *iPD* (interactive phase distortion) technology to generate sounds. These powerful synthesizers offer many exciting features to anyone making music with MIDI:

Unique iPD Synthesis Technology

- A single VZ voice can consist of as many as eight independent sounds! Each voice is made up of four pairs of modules called lines. Each of the two modules within a line can be used as an independent additive synthesis or ring modulation sound source, with its own pitch, waveform and envelope; or one module can interact with the other to produce unique iPD timbres.
- All of the key parameters in any single VZ voice can be controlled during real-time performance to produce dramatic realism or stunning effects. Key-follow functions allow you to create split keyboards, positional cross-fades, layered voices, and envelope rate and level scaling. Velocity functions allow you to control splits and cross-fades, as well as expressive dynamics, with your keyboard "touch." Vibrato, tremolo, pitch bend, and other effects can be controlled by after touch, foot controller, mod wheel, or any MIDI controller you choose.
- Voices are compatible on all VZ synthesizers as well as the PG-380 MIDI guitar's built-in synthesizer.

MIDI Flexibility

- The VZs have all of the standard MIDI features: MIDI controllers, Program Change, MIDI Velocity, Pitch Bend, After touch, and independently selectable Send and Receive channels.
- The VZs also have many additional MIDI features that are especially useful if you plan to use your VZ with a sequencer, guitar controller, or wind controller. They support both "mono mode" and "poly mode" MIDI guitars. A unique multi-mode feature allows the VZ to respond to as many as eight separate MIDI "areas." You can set the voice, polyphony, and channel number for each MIDI area.

Dynamic stereo Effects

- You can use Line 1 and Line 2 audio outputs as left and right stereo outputs, or to send different sounds to separate effects and mixer channels.
- The VZ-8M has three built-in pan modes for dynamic stereo effects.
- You can create additional stereo effects like auto, velocity, and keyboard panning on any VZ synthesizer.

Powerful Play Modes

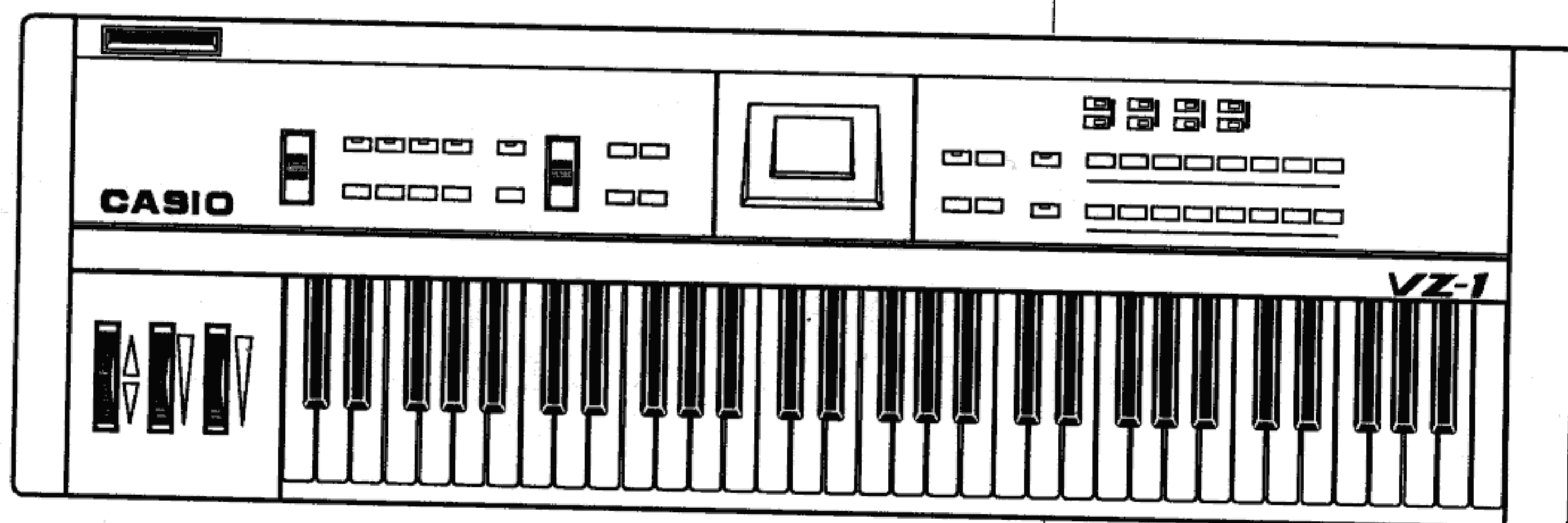
- The Combination mode allows you create split and layered keyboard set-ups, and assign up to four different voices to each set-up.
- Each of the voices in a Combination mode set-up can have an independent response to pitch bend, after touch, vibrato and other real-time effects.
- You can program positional cross-fades as well as velocity splits and layers into Combination mode set-ups.
- A delay trigger function allows you to create digital delay and echo effects in the Combination mode.

Expandable Polyphony

- The VZ-8M's MIDI overflow feature allows you to expand the polyphony of your VZ system in blocks of eight notes. You can expand the polyphony to a total of 64 voices.

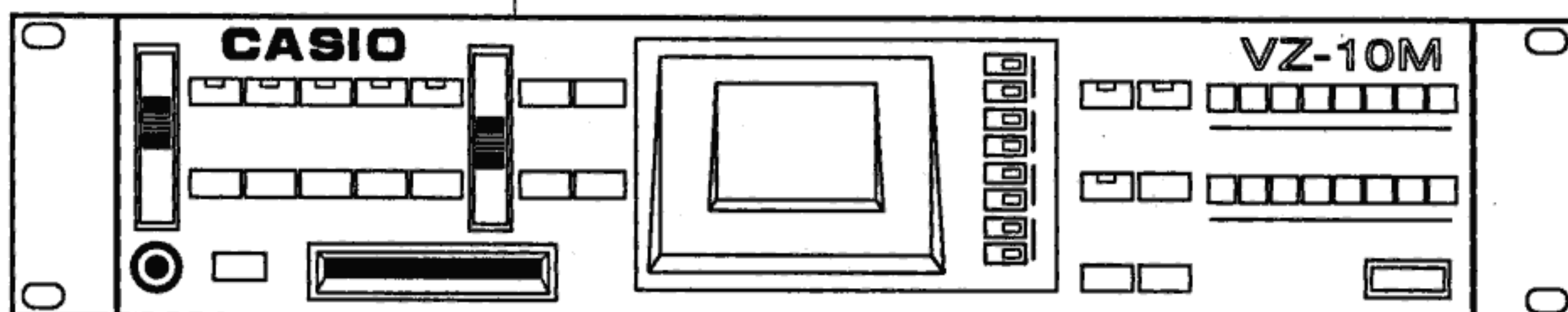
VZ-1 Keyboard Synthesizer

The VZ-1 is a programmable keyboard synthesizer. The VZ-1 can function as a 16-voice MIDI keyboard synthesizer or as a multi-timbral MIDI tone module. The VZ-1 can also be used to create or customize RAM card voices to be played from the PG-380's internal synthesizer. The high-resolution graphics display greatly simplifies voice editing. Extensive MIDI features make the VZ-1 a powerful master controller, flexible enough to be the heart of any MIDI performance or studio system. You can even control the VZ-1 simultaneously from its built-in keyboard *and* from a MIDI guitar or wind controller.



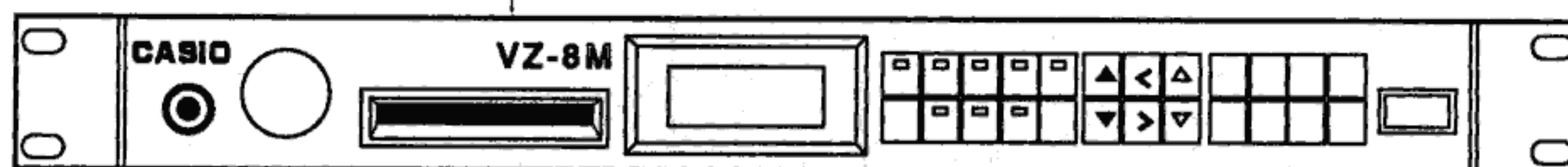
VZ-10M MIDI Tone Module

The VZ-10M is a programmable multi-timbral, 16-voice MIDI tone module. Its synthesis capabilities are identical to those of the VZ-1. It can be used as a slave to the VZ-1, PG-380, MIDI Horn or any MIDI controller. Like the VZ-1, the VZ-10M can also be used to create or customize RAM card voices to be played from the PG-380's internal synthesizer.



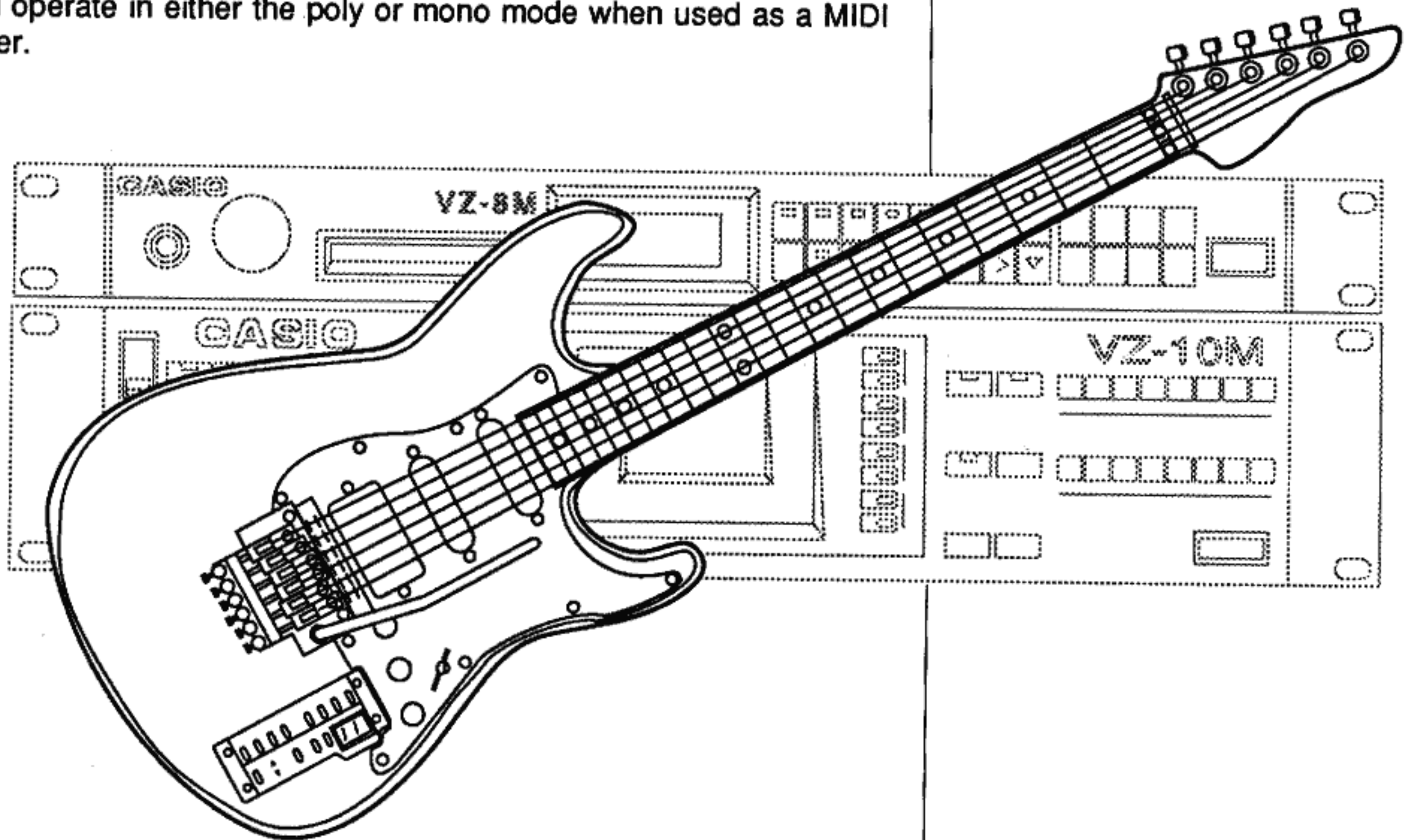
VZ-8M MIDI Tone Module

The VZ-8M is a programmable multi-timbral, 8-voice MIDI tone module. It also can be used as a slave to the VZ-1, PG-380, MIDI Horn or any MIDI controller. The VZ-8M's unique overflow mode allows it to be used as a polyphony expander for other VZ synthesizers. Using the overflow mode, each VZ-8M expands the polyphony of a VZ MIDI system by eight voices. As many as eight VZ-8Ms may be combined to create up to 64 note polyphony. The VZ-8M offers several enhancements to the VZ-1 and VZ-10M, such as performance modes for keyboard, guitar and wind controllers, and stereo panning effects.



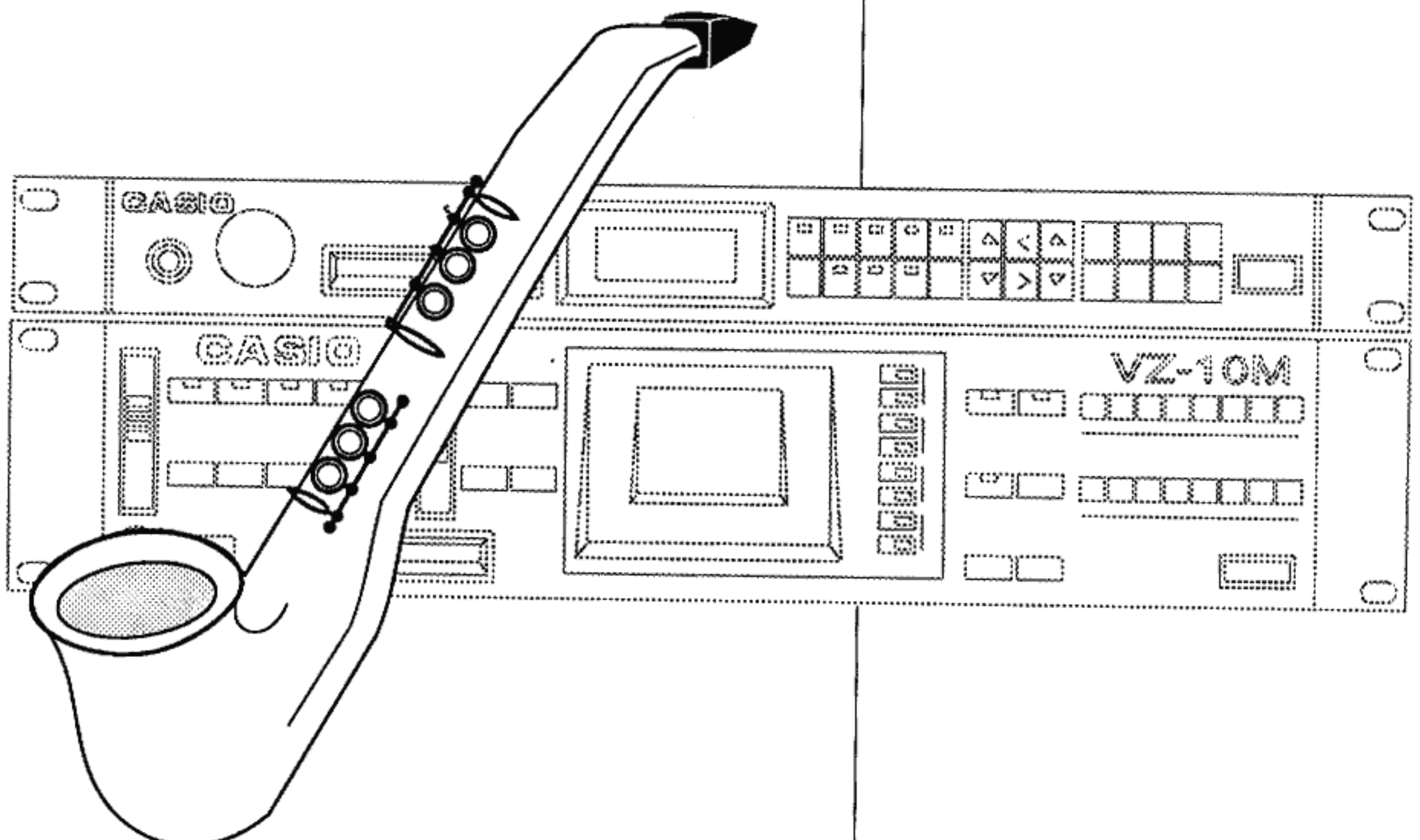
PG-380 MIDI Guitar

The PG-380 is a MIDI Guitar with built-in VZ non-programmable synthesizer that can play any "Normal" voices created on any VZ synthesizer from inserted VZ RAM or ROM cards. The PG-380 can also be used as a MIDI controller, controlling any MIDI synthesizer from its guitar strings. The PG-380 will operate in either the poly or mono mode when used as a MIDI controller.



DH-200 MIDI Horn

The DH-200 is a MIDI wind controller with a built-in sound generator. It can control any synthesizer via MIDI. Notes can be triggered by fingering the keys, or by a combination of breath pressure and fingering.



Differences between VZ-1/VZ-10M and VZ-8M

All three VZ synthesizers are compatible with each other in terms of general operation and voice data. You can use the same RAM and ROM voice cards to transfer voices between any of the VZs. There are, however, some basic differences. The VZ-1 is a stand alone MIDI instrument with a built-in keyboard, while the VZ-10M and the VZ-8M are MIDI tone modules. The VZ-1 and VZ-10M have large LCD graphic displays that allow you to see and program such parameters as envelopes and velocity curves graphically. The VZ-8M has built-in performance modes that optimize it for use with guitar and wind controllers. In the following section, we'll outline the major differences between the VZ-1, VZ-10M and VZ-8M.

Polyphony

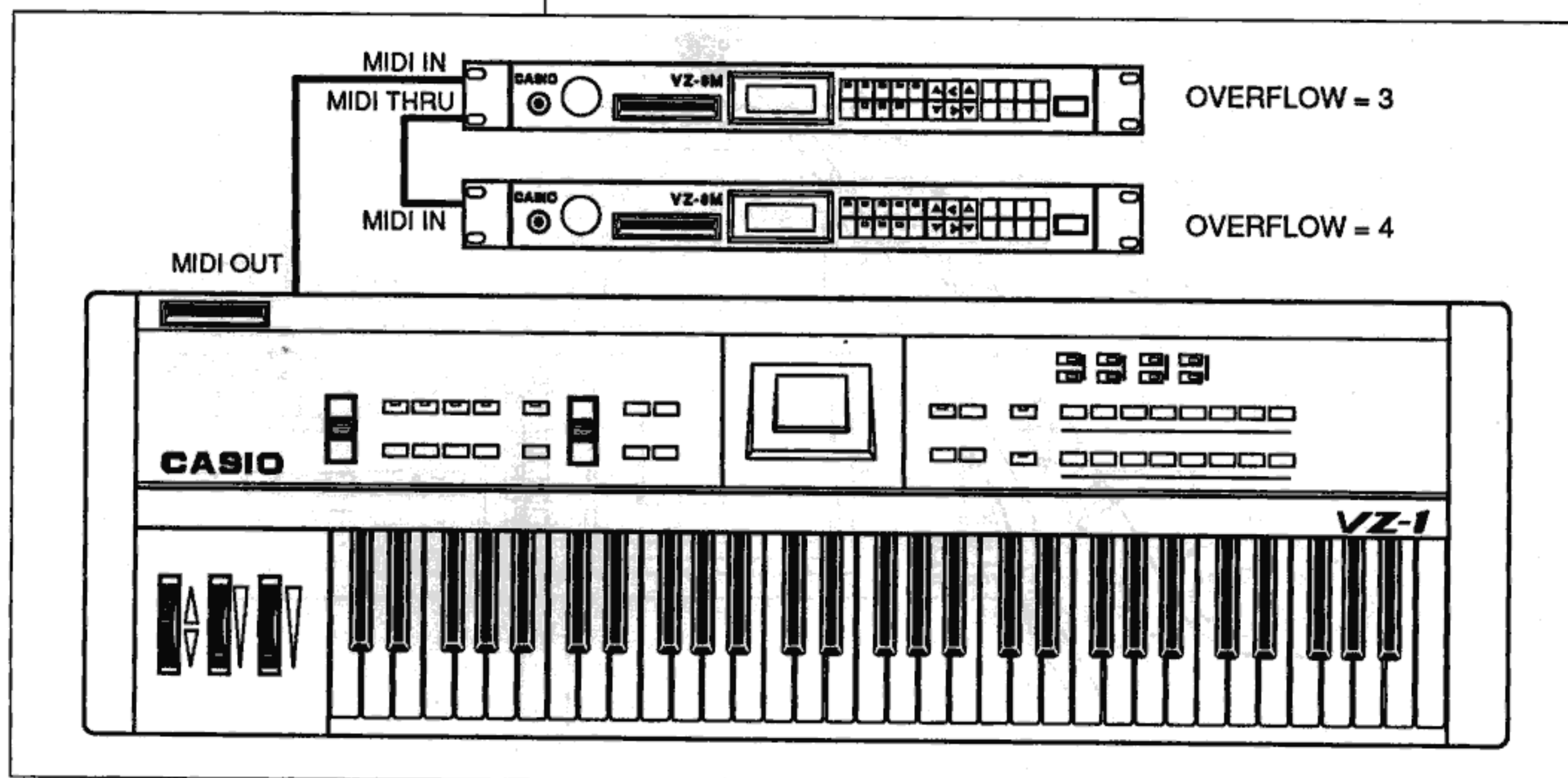
The total number of notes that can sound simultaneously on a VZ synthesizer will vary, depending on the type of voice memory — Normal, Combination, or Multi. The VZ-1 and VZ-10M may sound up to sixteen notes simultaneously, while the VZ-8M can sound up to eight. The following chart shows the maximum number of notes that can be played on each instrument for each type of voice memory.

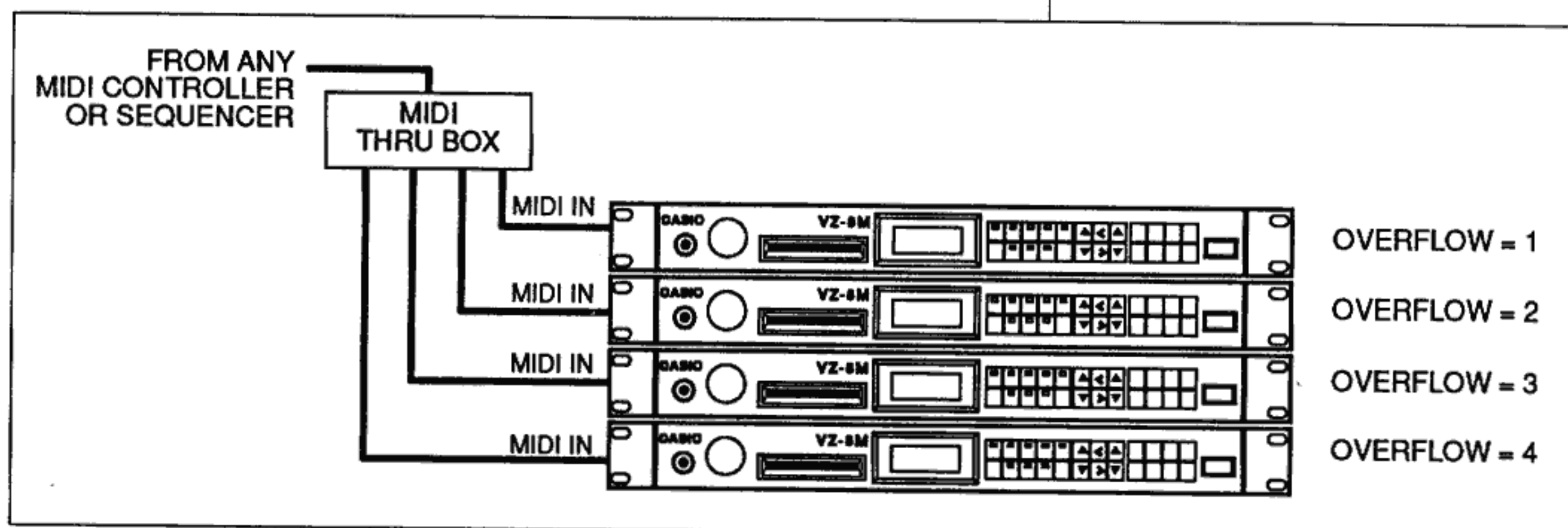
KEY ASSIGN	POLYPHONY	
	VZ-1 & VZ-10M	VZ-8M
1 VOICE	16	8
2 VOICE	8	4
3 VOICE	4	2
4 VOICE	4	2
8 VOICE	—	1
MULTI	16	8

MIDI Overflow

Although a single VZ-8M is limited to eight-note polyphony, you can use its overflow mode to extend the polyphony of a VZ-1, VZ-10M, or other VZ-8Ms when they are linked in a MIDI system. Each VZ-8 can add eight additional voices to the total polyphony of a system. The maximum extended polyphony is 64 voices.

32-note polyphony for VZ-1 or VZ-10M





32-note polyphony for VZ-8M

In order to get the best results with the overflow mode, follow these simple steps:

- Be sure to have the same voice and operation data in each instrument. If you are using RAM or ROM cards, you can load the contents of the card into the internal memory of each instrument, or use the MIDI *Load* and *Save* functions to transfer the desired voices and operation memories.
- If the system consists of two or three VZs, you can connect them via their built-in THRU ports. If you have four or more VZs, you'll get the best results by routing MIDI data through a MIDI THRU box.
- Since the VZ-1 and VZ-10M don't have an overflow mode, they should be first in the polyphony "chain." Set the overflow value of the first VZ-8 in the system to "3", set additional VZ-8Ms starting at "4".
- If the system consists of only VZ-8Ms, set the overflow value of each starting with "1".

Voice Functions

Although there is a slight difference in the organization of the voice parameter menus of the VZ-8M and the VZ-1/VZ-10M, the actual parameters are identical for each, and they are 100% compatible when transferred via the card and MIDI *Save/Load* functions. The VZ-8M's voice parameter menu has one item not found on the VZ-1/VZ-10, "init voice". This allows you to create a "blank" initialized voice with a single button push. (On a VZ-1 or VZ-10M, you can create an initialized voice by making a copy of ROM memory H-8, "INIT VOICE".)

Effect Functions

There are several effect menu functions on the VZ-8M that are not available on either the VZ-1 or VZ-10M. The settings of these functions are stored as part of a VZ-8M operation memory.

- **MIDI Channel:** It is possible to store MIDI channel assignments as part of an operation memory. Wind mode and Keyboard mode operation memories store a single channel value. Guitar mode operation memories store a range of six channels (one for each string). Multi mode operation memories store eight channels (one for each area).
- **Velocity Table Select:** The VZ-8M has eight global velocity curves, in addition to the individual curves for each module in a voice. These global curves help to optimize the unit's response to velocity from different types of wind, guitar and keyboard controllers.
- **Pan:** The VZ-8M has three stereo panning functions not found on the VZ-1/VZ-10M: fix, control, and auto. (We'll show you how to simulate these on your VZ-1 or VZ-10M, as well as how to setup many other stereo effects on any VZ synthesizer. Be sure to read *Stereo Effects* in Part 3.)
- **Total Vibrato:** The VZ-8M has a separate set of vibrato parameters (wave, depth, rate, delay and multi) that can be applied globally to all voices in a layered combination.
- **Total Tremolo:** The VZ-8M has a separate set of tremolo parameters (wave, depth, rate, delay and multi) that can be applied globally to all voices in a layered combination.
- **Operation Tune:** The VZ-8M can store a separate tuning/transposition with each operation memory.

Eight Layer Key Assign

The VZ-8M has one more key assign configuration than the eight found on the VZ-1 and VZ-10M. This additional configuration allows eight voices to be layered to a single note. This can be particularly useful when controlling the VZ-8M from a wind controller.

Performance Modes

The VZ-8M has three performance modes used to match its response to different types of MIDI controllers: Keyboard, Wind and Guitar. The VZ-1 and VZ-10M have only the Keyboard mode.

- **Keyboard mode:** This is the "Normal" performance mode, most useful when controlling the VZ-8M from a keyboard or sequencer.
- **Wind mode:** This mode is designed for use with wind controllers. The VZ-8M's response to after touch (breath pressure) is modified to be more sensitive to pressure changes at the low end of the scale. This ensures that notes will be heard even when very little breath pressure is used – minimizing delays on the beginning of notes.
- **Guitar mode:** This mode is designed for use with MIDI guitar controllers that utilize MIDI mode 4, omni off/mono (or just "mono"). In this mode, each string transmits on a separate MIDI channel, making it possible to have independent pitch bend on each string. You can play in Combination or Normal mode on the VZ-1 and VZ-

10M with a MIDI guitar that uses MIDI mode 3, omni off/poly (or just "poly"). In this case, however, pitch bend will be global. The PG-380 MIDI guitar can operate in either mode.

Memory Compatibility

Voice and operation memory data may be transferred freely between the three types of VZ synthesizers using the save/load functions of the effects menu. The data may be saved or loaded using RAM cards, transferred directly between two VZs via MIDI, or transferred to and from a computer by using appropriate MIDI software. In all three types of VZs, the voice data is 100% compatible. A voice created on one will be exactly the same when transferred to any of the others. The VZ-8M has more effect menu functions than the VZ-1 and VZ-10M. The settings for these additional functions are saved and recalled only as part of the operation memory of the VZ-8M. When an operation memory created on a VZ-1 or VZ-10M is loaded into to a VZ-8M the additional functions are automatically initialized to the factory default values. The additional functions are not transferred when an operation memory created on a VZ-8M is loaded into to a VZ-1 or VZ-10M.

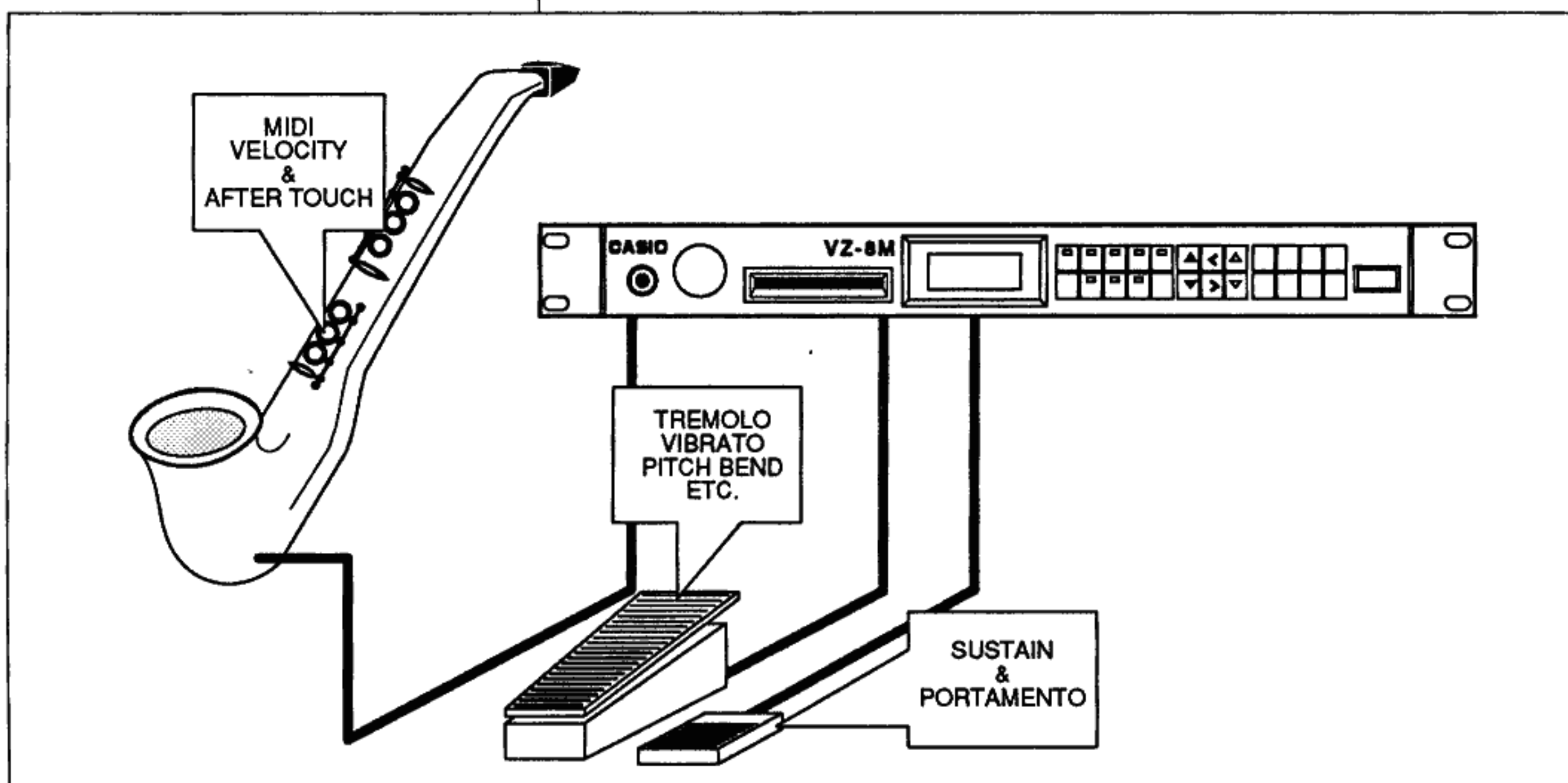
Using VZ Synthesizers with the MIDI Horn and Other MIDI Wind Controllers

VZ synthesizers were designed with more than keyboard control in mind. Such features as flexible routing of MIDI velocity, after touch, and MIDI controllers, combination mode split and layered keyboards, and iPD sounds make any VZ an excellent choice as a MIDI tone module for any wind controller. Several VZ-8M voices were designed specifically for wind control. (These sounds show a "W" in the performance mode display.) Although most of the preset VZ sounds were designed to be played from a standard keyboard, it's not difficult to edit any sound to respond musically to a wind controller. In the following section, we'll show you how to customize sounds for wind control on all VZ synthesizers, as well as how to set up the VZ-8Ms special wind performance mode.

Adding Wind Controller Dynamics to VZ Sounds

MIDI wind controllers, like the DH-200, translate breath pressure into two sources of dynamic control — velocity and after touch. For example, on the DH-200 velocity is determined by how hard you are blowing at the instant you play a new note, and after touch is determined by the amount of breath pressure you use as you continue to blow into the mouth piece of the controller. The trick to creating dynamic wind controller voices is to use velocity and after touch to control the loudness / timbre of a sound.

Use velocity alone to control loudness and timbre changes for non-wind instrument sounds like piano, vibes or guitar with natural dynamics. Use after touch to control effects like pitch bend, vibrato, or tremolo. Use after touch alone to control loudness and timbre for wind instrument sounds like sax, flute or trumpet with natural dynamics.

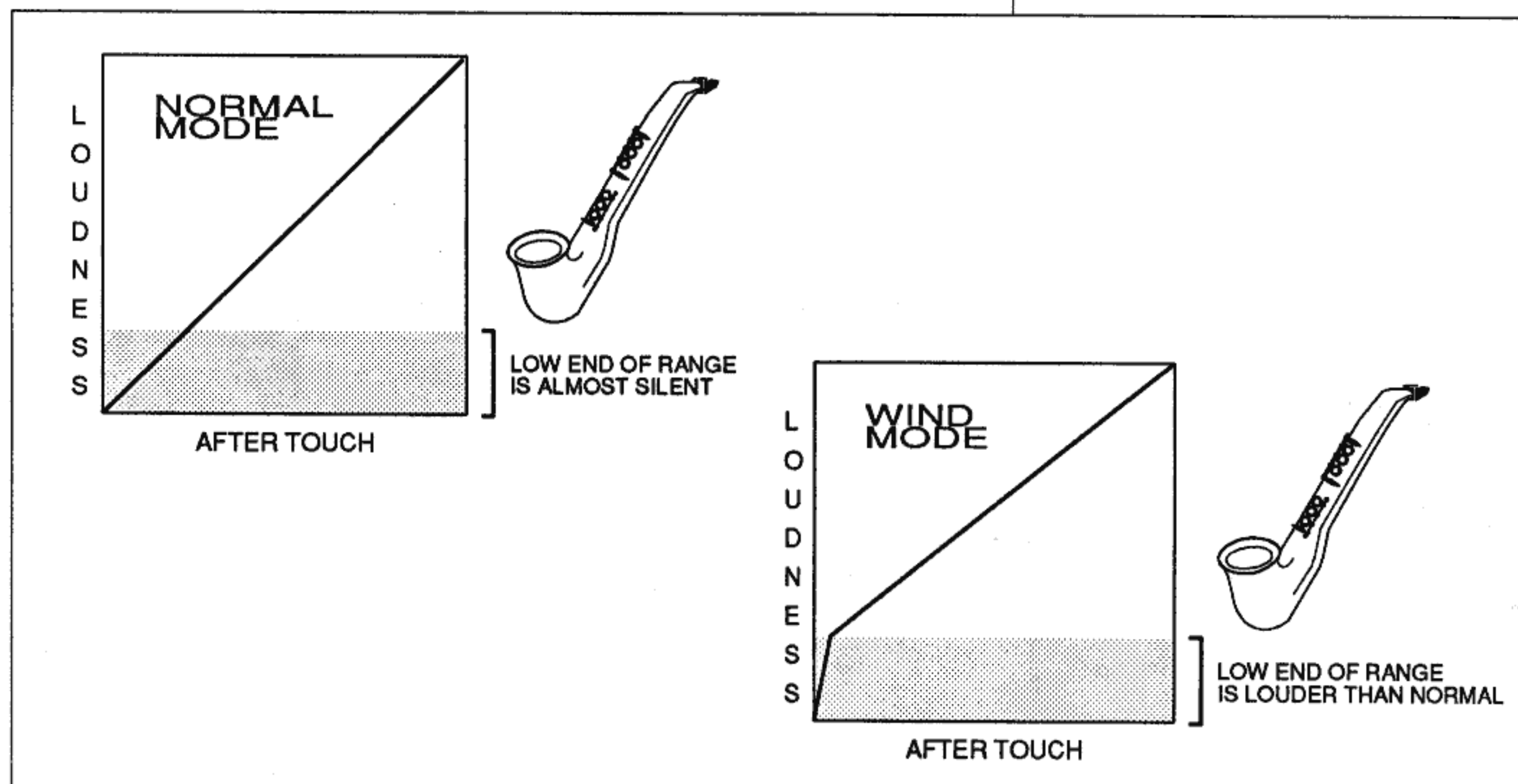


Here are guidelines for customizing voices for dynamic wind controller performances.

- If you want to control the dynamics of the sound with breath pressure, you must use after touch to control loudness or timbre. For the smoothest dynamics Casio recommends setting the AFTER TOUCH sensitivity values between "92" and "99". Set A ENV BIAS to "on" and all other after touch options to "off".
- The AMP SENS parameter determines which modules will respond to after touch (breath pressure). This parameter acts like a "balance control" between velocity and pressure changes. The range for this parameter is 0-7. At "0", velocity has maximum effect; after touch has none. At "7", after touch has maximum effect; velocity has none. The higher the value, the more the output of the module will change with after touch. For the widest possible dynamics use "7". If you don't want a module to change with after touch, use "0". (See Part 2: *Finding Your Way Around a VZ Sound* to determine which modules to control for loudness or timbre changes.)
- Solo: If the voice has any kind of release (it continues to "ring" after you stop playing a note), set the solo function to "on". This makes the sound monophonic (only one note will sound at a time). If you leave the solo function off, notes with long release will overlap.
- You can control effects like vibrato, tremolo, and pitch bend with the VZ's Foot VR pedal.

Using the VZ-8M Wind Performance Mode

The VZ-8M has a Wind performance mode, designed to get the most out of MIDI wind controllers that translate breath pressure to MIDI after touch. When the VZ-8M is in Wind performance mode, its response to after touch is scaled differently than for keyboard-generated after touch. This scaling makes the VZ-8M more sensitive to changes on the low end of the after touch scale. This makes it possible to produce tones with very little breath pressure, while still retaining a wide range of dynamic expression.



Here's how to activate the Wind mode on the VZ-M:

1. Make sure that the wind controller is set to transmit breath pressure as after touch.
2. Be sure the VZ-8M is set to the same MIDI channel as your wind controller.
3. When playing the VZ-8M in Normal mode, use the VALUE button to set the mode value to "W".

When playing the VZ-8M in Combination mode, use the CURSOR button to select the mode value; use the VALUE button to set the value to "W".

Changing Operation Memories to the Wind Performance Mode

If you are using a wind controller to play your VZ-8M, you'll want to change the performance mode of many of its operation memories to the Wind mode. The performance mode is saved as part of the operation memory data. You can change the existing performance mode of an internal, or card operation, memory to Wind mode with some simple editing. You can re-save the operation memory with the Wind mode.

Here's how:

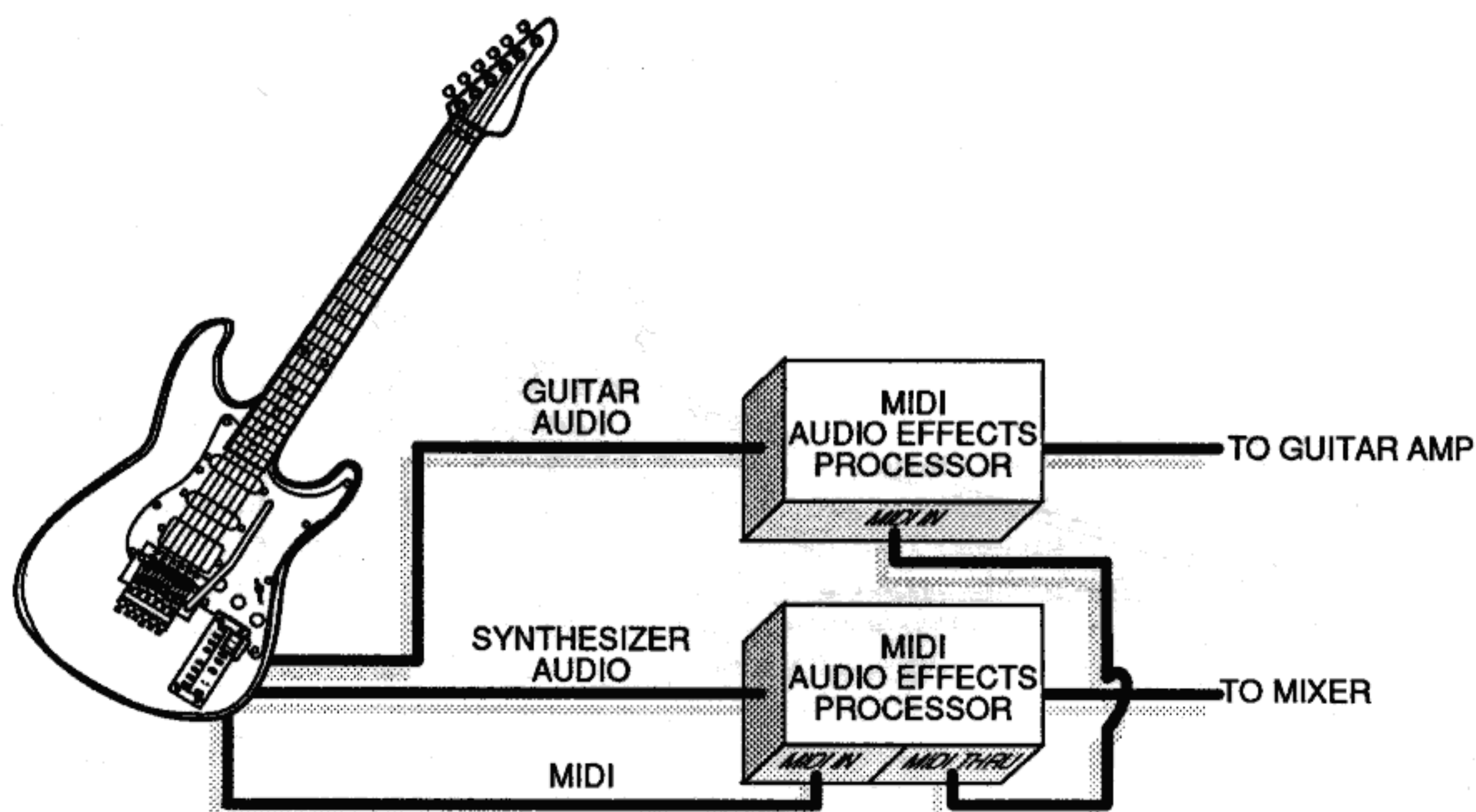
1. Select the operation memory you want to change.
2. Transfer it to the combination work area by holding down the WRITE button and pushing the COMBINATION button.
3. Use the CURSOR button to select the mode value.
4. Use the VALUE button to set the value to "W".
5. Save the edited combination to an internal or RAM card operation memory.

Using VZ Synthesizers with the PG-380 and other MIDI Guitar Controllers

Casio's PG-380 is a stand-alone guitar synthesizer. It has a complete VZ synthesizer built into the guitar. In addition to the audio outputs for the guitar and synthesizer, it has a MIDI OUT jack that allows you to use it as either a "mono mode" or "poly mode" guitar. Any VZ synthesizer can be used effectively as a MIDI tone module for the PG-380, or any other MIDI guitar. Since voices created on any VZ can be loaded into the PG-380's internal synthesizer via RAM Cards, they also make excellent "sound design labs" for the PG-380. Before we get into the use of VZs as MIDI tone modules, let's check out the PG-380.

Using the PG-380 as a MIDI Effects Controller

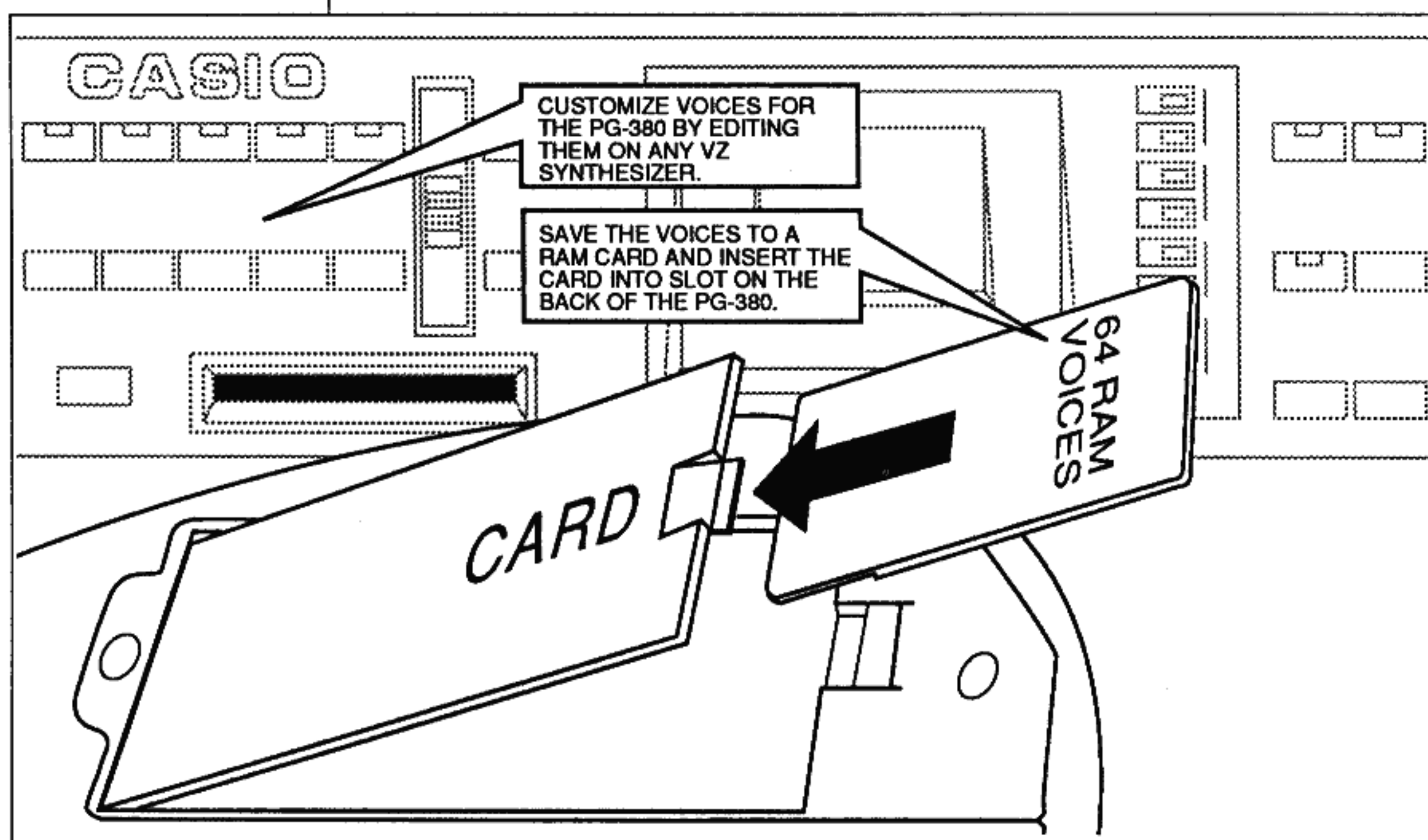
The PG-380 is a full featured electric guitar with a built-in VZ synthesizer. There is no need to connect to an external MIDI module to produce synthesized sounds from the guitar. If you use the PG-380 as a stand alone guitar/synthesizer, you can use its MIDI output to control programmable MIDI audio effects. For example, you can use the program keys to select different setups on a MIDI controlled guitar effects device, or to select different reverb/delay effects for synthesizer voices.



Customizing RAM Card Voices for the PG-380

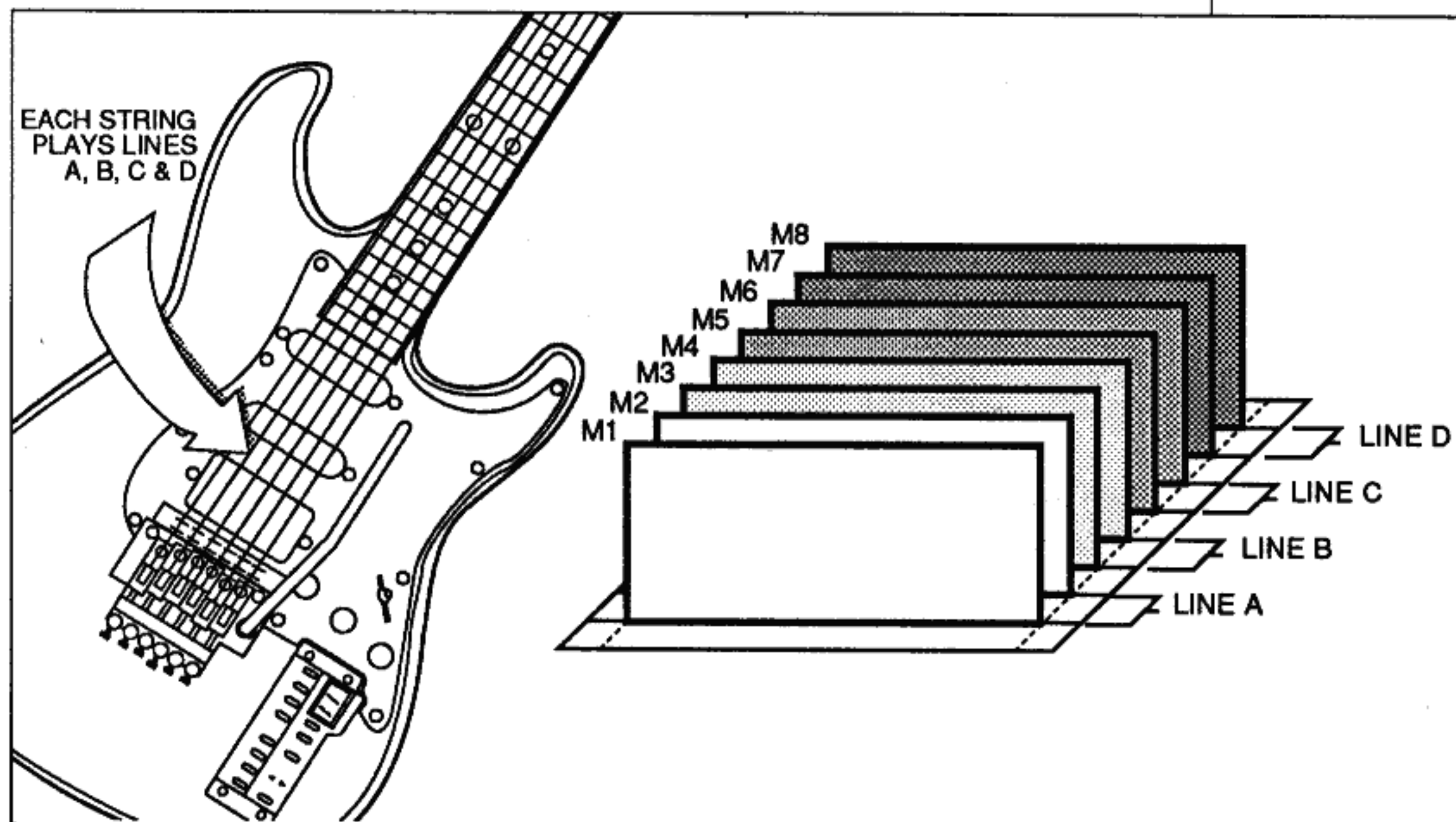
You cannot alter or edit the internal sounds in the PG-380's internal synthesizer. You can, however, create any number of new sounds for the PG-380 with a VZ-1, VZ-10M or VZ-8M. You can play these new sounds with the PG-380 by saving them to a RAM card, and then inserting the card into the slot in the back of the guitar. You'll find that the internal synthesizer tracks guitar playing slightly faster than a MIDI tone module does — so for things like intricate finger picking and flashy leads, you may want to load your VZ voices into the PG-380 and play them from its internal synthesizer.

Even though the internal synthesizer can only play "normal" VZ patches (a single synthesizer voice consisting of eight iPD modules), with some careful editing you can create sounds with many of the effects used in combination patches. For example, you can create positional splits, layers (more than one sound per note) and cross-fades (independent sounds assigned to separate pitch areas), and velocity splits, layers and cross-fades (independent sounds assigned to different picking velocities). We'll give you several specific examples showing you how to create these effects and more in Part 3, but right now we'll show you the basic concepts behind creating customized PG-380 voices with a VZ.



Layered Sounds within a Single Voice

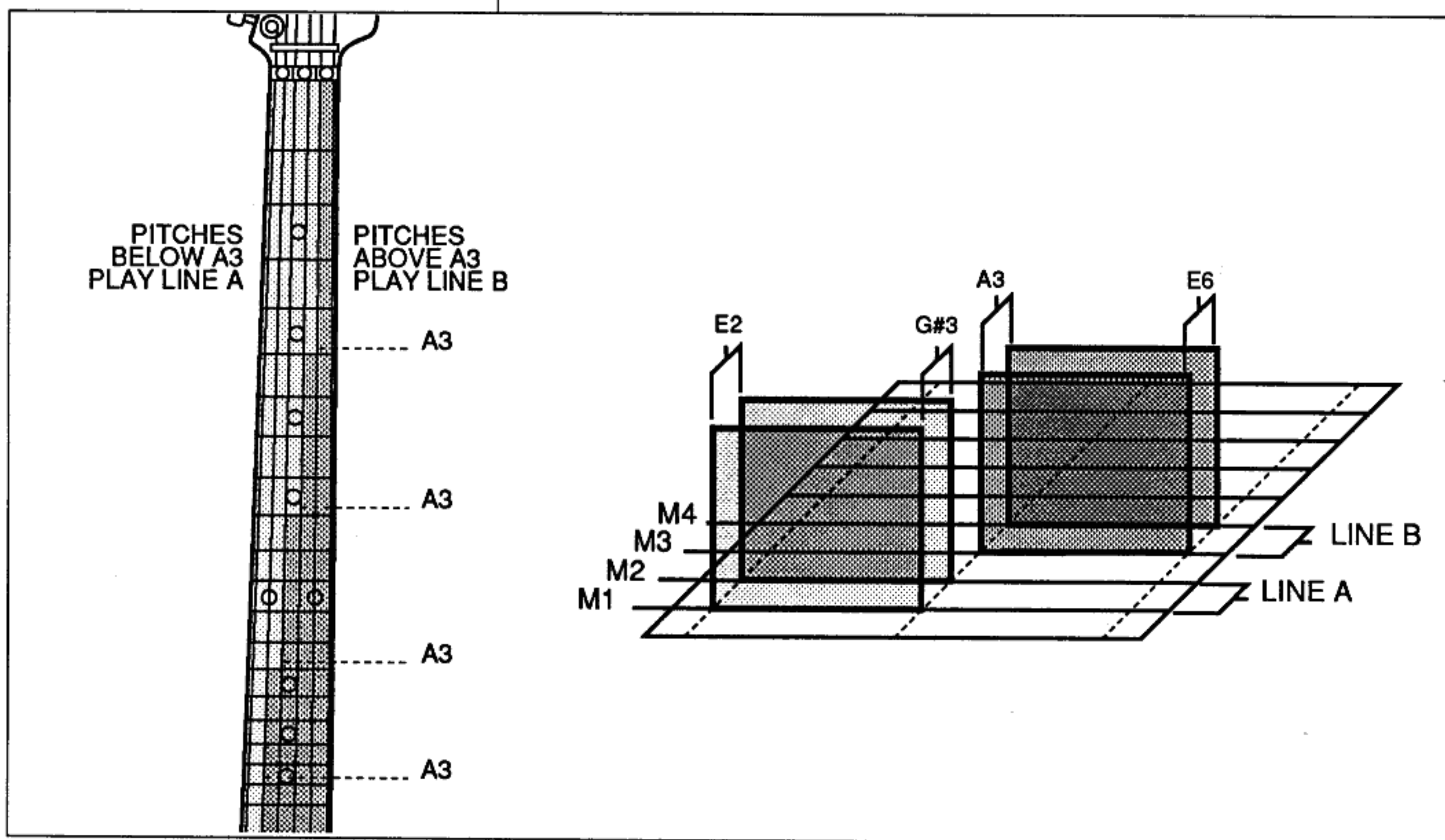
A VZ synthesizer voice is made up of four pairs of sound modules called *lines*. Each line can be programmed to produce a completely different sound from the others. This makes it possible to create a voice on the PG-380 with four totally different sounds *on each string*. You could, for example, create a voice with organ, flute, vibes, and synth lead sounds layered together. To create layered sounds with a single VZ voice, program two or more lines so that each produces a completely different type of sound. We'll show you how in the next two sections of this book.



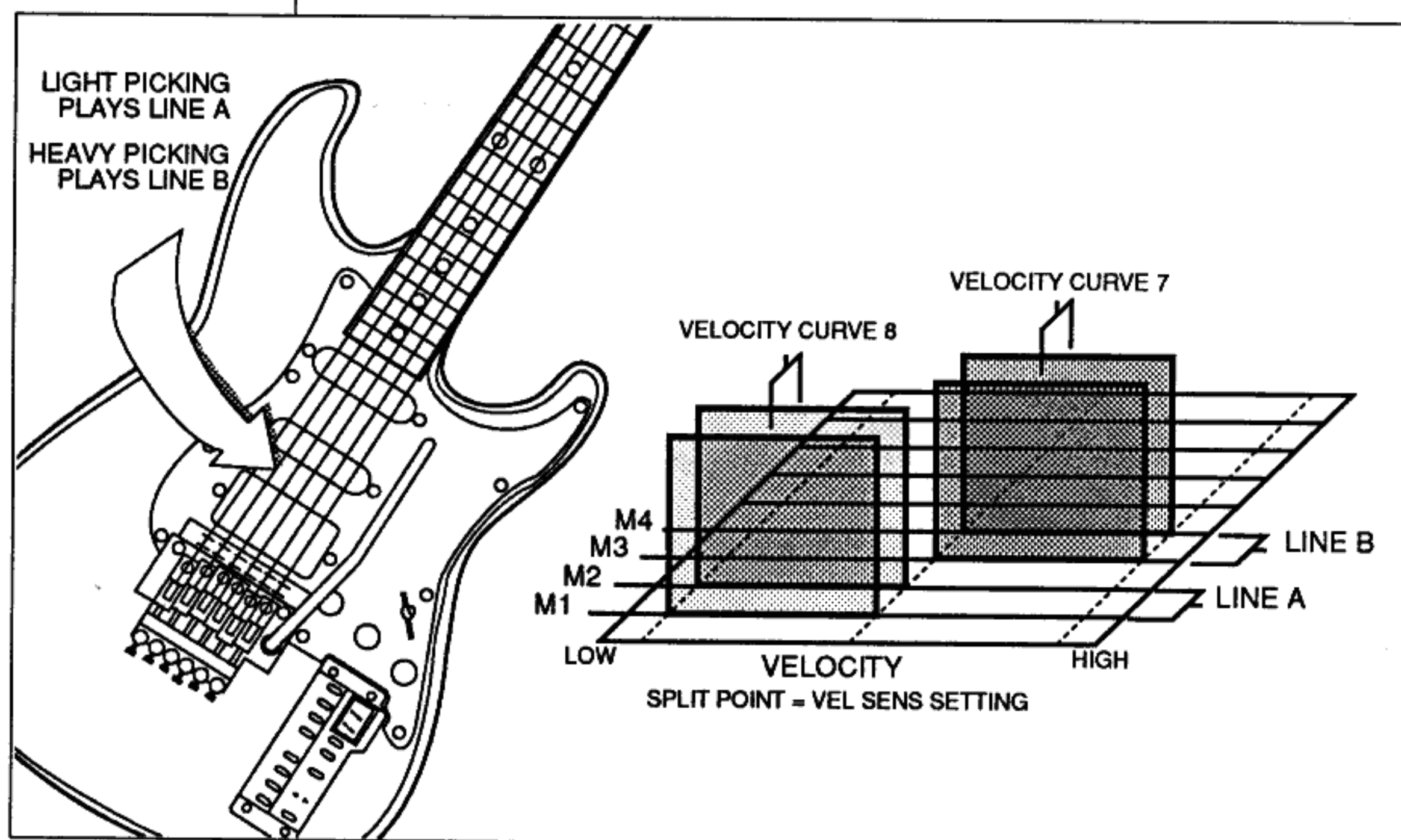
Split and Cross-fade Sounds within a Single Voice

Not only can you create voices with two or more layered sounds, you can set up splits and cross-fades for the sounds in the layer. You can create two types of splits: pitch split or velocity split. (See illustrations on the following page.) In a pitch split sound, the pitch you play determines which sound you hear. For example, notes below middle C play bass, and those above middle C play flute. In a velocity split sound, the velocity of your picking determines the sound you will hear. For example, low velocities play jazz guitar, and high velocities play distortion guitar. You can set up a cross-fade with both pitch and velocity splits. This allows the two sounds to blend together near the split point. We'll go over these programming techniques in detail in Parts 2 and 3. Here are some guidelines for these effects.

- To create split sounds with a single voice, program two or more lines to produce different sounds (the same idea as layering), then use "KF level (DCA)" to create pitch zones for each sound in the split.
- Depending on how you set the level parameter, you can create either hard splits (an abrupt change from sound to adjacent sound) or cross-fades (adjacent sounds overlap).
- To create velocity splits use "Vel level (DCA)" to setup inverse curves for the different voices in the split. For hard splits, use curves 7 and 8. For velocity cross-fades, use curves 3 and 4.



Single Voice Pitch Split



Single Voice Velocity Split

Modulation and Portamento Effects for PG-380 Voices

Modulation effects like vibrato and tremolo can really add life to many synthesizer sounds. In sounds designed for keyboard performance, the strength of these effects are usually controlled with a wheel, after touch or foot pedal. This allows the performer to bring the effect in and out freely while playing.

No modulation effects will be heard in voices that use wheels or pedals to control their strength when they are played by the PG-380's internal synthesizer. With some careful editing, however, you can customize any voice to produce modulation effects when played by the internal synthesizer.

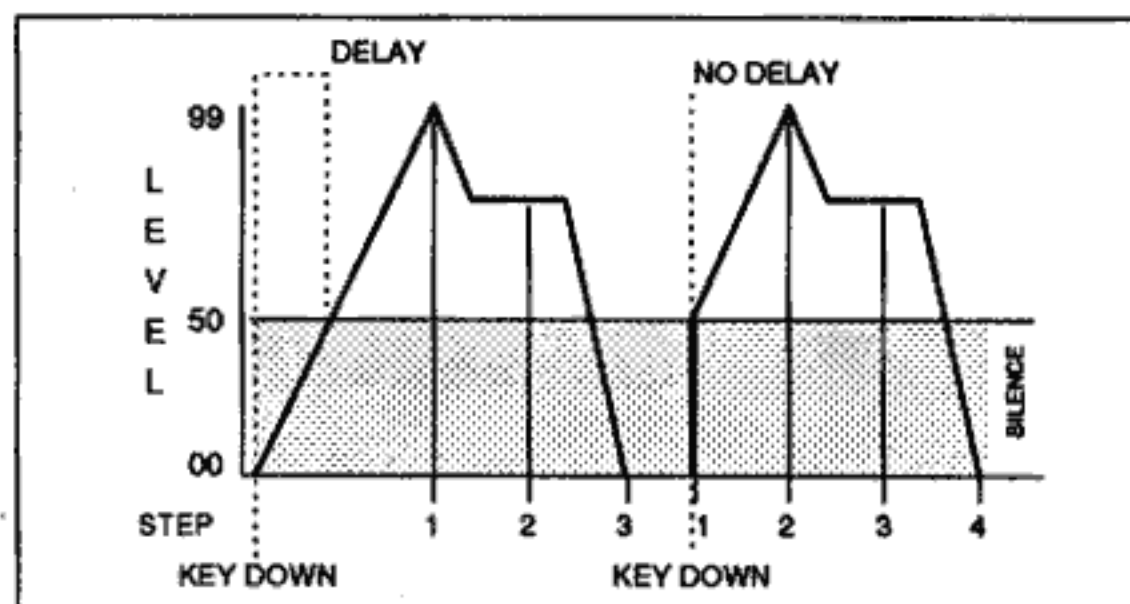
- **Vibrato:** To hear vibrato effects when you play the PG-380, set the vibrato depth parameter to a value greater than "0". (Higher values create stronger modulation effects — try values between "10" and "35".) Unless you want the effect to be constant, and heard for the entire duration of each note, use the vibrato delay parameter to slowly fade-in the vibrato of each note.
- **Tremolo:** To hear tremolo effects when you play the PG-380, set the tremolo depth parameter to a value greater than "1". (Higher values create stronger modulation effects — try values between "10" and "35".) Unless you want the effect to be constant, and heard for the entire duration of each note, use the tremolo delay parameter to slowly fade-in the tremolo of each note.

The portamento effect, a smooth sliding pitch change from note to note, is generally turned on and off with a footswitch on a keyboard synthesizer. If you want to create portamento effects for PG-380 voices, you must edit the portamento time parameter to a value greater than "0". (Higher values create slower portamento rates.) When the voice is played by the internal synthesizer, the portamento effect will be active all of the time. There is a much more natural way to produce portamento effects with the PG-380 — simply play the guitar with a slide or bottle neck. You'll find that the internal synthesizer tracks the sliding notes perfectly!

Optimizing Envelopes for Improved Tracking

Guitar control of synthesizer voices will feel most natural if you hear sound as soon as you pick a string. Many sounds with soft attacks — strings, flutes, etc. have a slight delay built into their envelope settings. To optimize the playability of sounds with slow attacks, follow these guidelines:

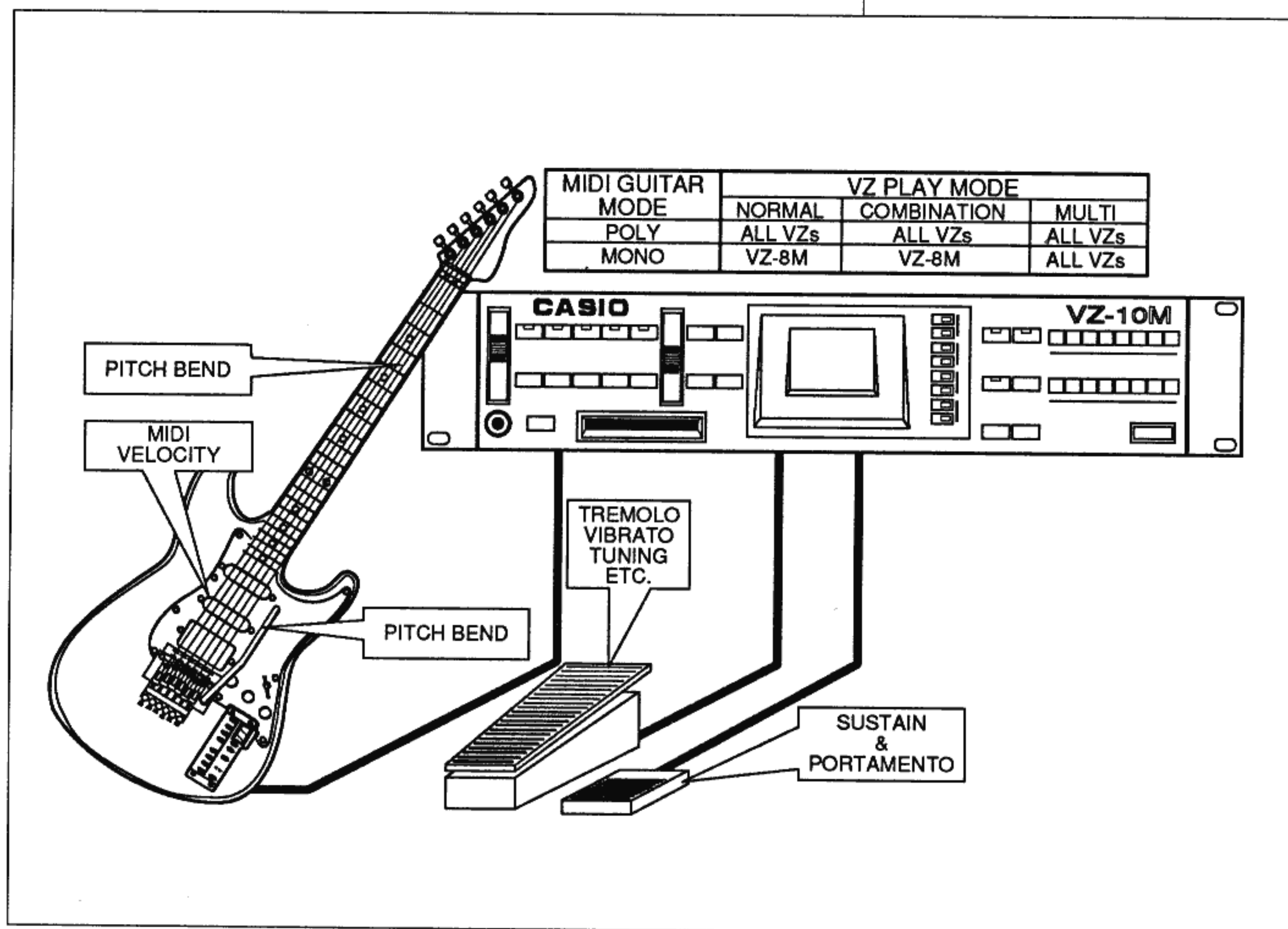
- Find the loudness modules in the sound.
- Shift the slow attack portion of the envelopes for these modules from step 1 to step 2 of the envelope.
- Set the rate for step 1 for the quickest attack (99).
- Set the level for step 1 to a point where you can just barely hear the sound when it is triggered (approximately 50).



Playing VZ Synthesizers with a PG-380 or other MIDI Guitar

The powerful MIDI features built into the VZ line of synthesizers make them ideal as tone modules for MIDI guitar controllers like the PG-380. There are two MIDI modes commonly used by guitar controllers. "Poly" mode controllers transmit note messages for all of the strings on one MIDI channel. "Mono" mode controllers transmit each string on a separate MIDI channel. All VZ synthesizers can function in either mode. What's more, the VZ-8M also has a special guitar performance mode that further enhances its capabilities as a MIDI guitar tone module. Here are some of the things that are possible with a VZ/MIDI guitar system.

- Each string of a mono mode controller can independently control a different voice by using the VZ's Multi mode. (The voice for each string can, in turn, be a composite sound with its own splits, layers and cross-fades.)
- Unlike many synthesizers, the pitch bend range of VZ synthesizers can be set to two or more octaves. This allows a VZ to accurately track slide or bottle-neck glides of more than 12 frets, as well as even the most radical use of the tremolo bar.
- The outputs of areas 1-4 are sent to the left output jack; areas 5-8 are sent to the right output jack. This makes several different stereo "mixes" and effects possible.
- Since the Multi mode is made up of eight separate MIDI areas, it's possible to use the two extra areas to "double up" on one or two strings, or even to use them to play back sequencer tracks to accompany your guitar playing in real-time.
- You can play the keyboard of a VZ-1 with ten-note polyphony (in stereo) *at the same time* it is being used as a guitar tone module.
- Poly mode guitar controllers can play the VZ's Normal and Combination sounds with all six strings. This gives the guitarist access to advanced VZ sound features like stereo effects, combination patches, velocity switch and cross-fades, and more.
- The guitar performance mode of the VZ-8M allows mono mode controllers to play Normal and Combination voices with all six strings, while retaining independent pitch bend for each string.
- You can add modulation and other dynamic effects with the VZ's VR foot pedal.
- Sustain and portamento effects can be controlled with the VZ's footswitch.

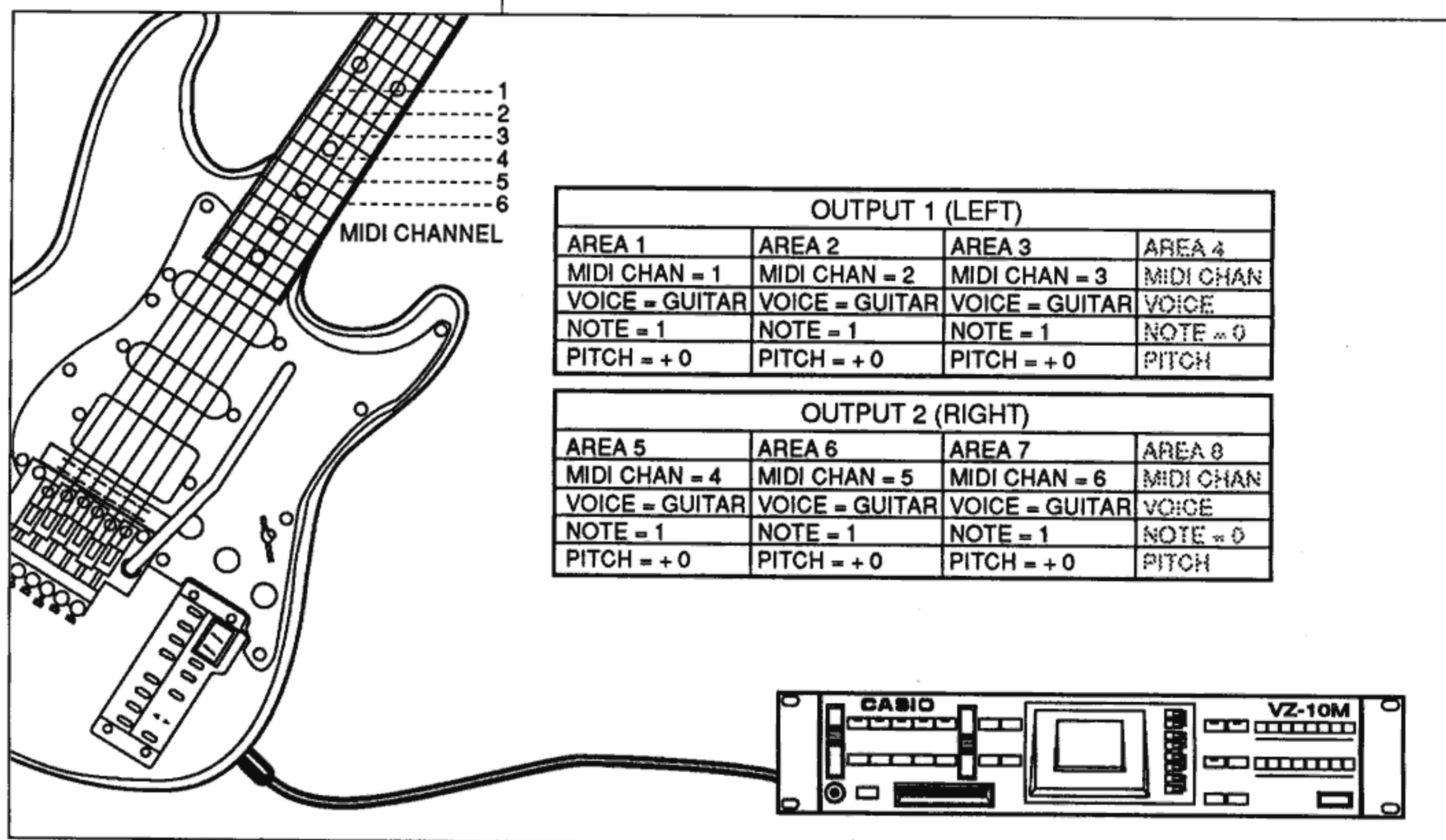


About Pitch Bend

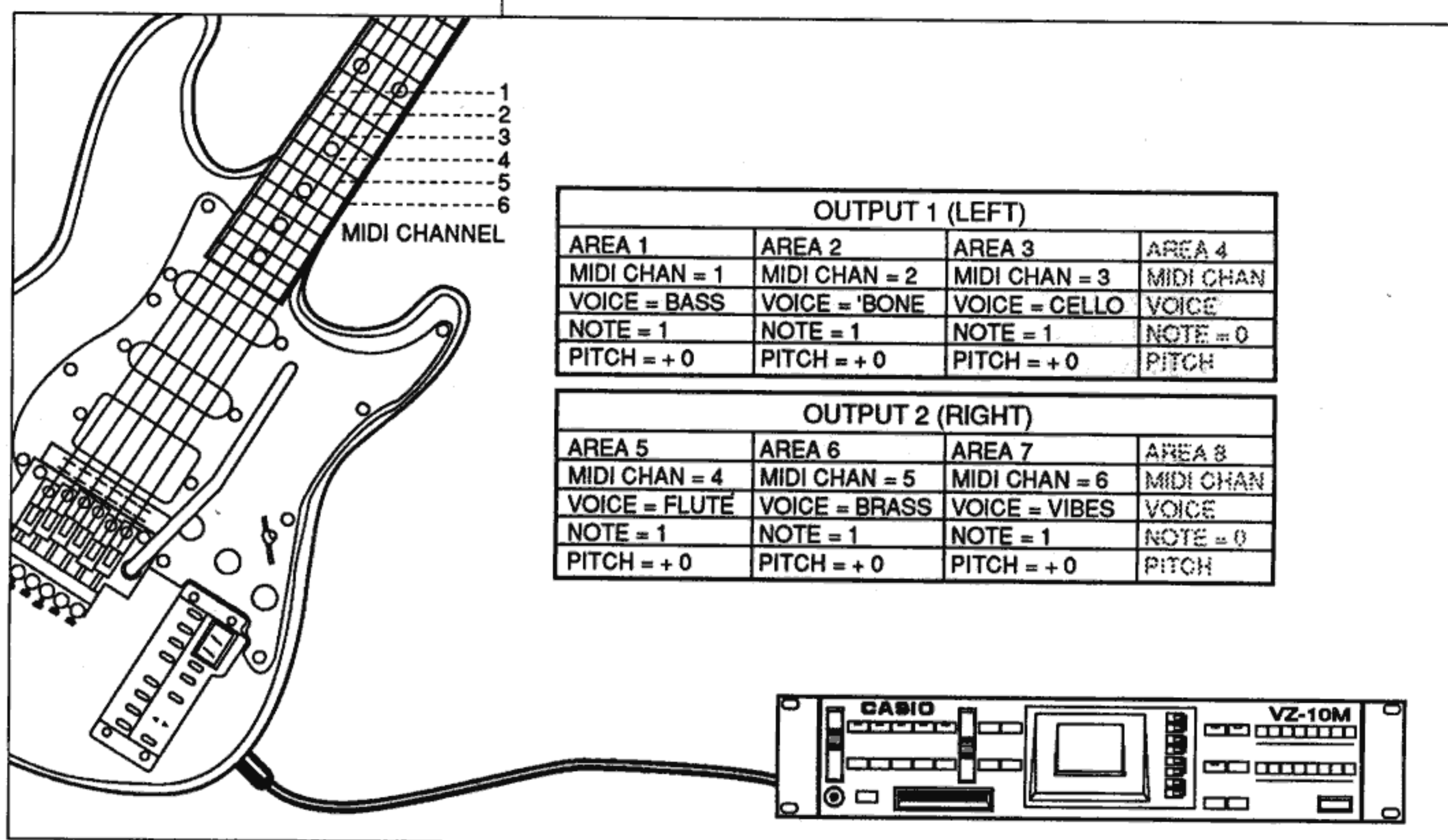
If you plan to use a slide, bottle-neck, or tremolo bar when playing a PG-380 or other guitar controller, set the pitch bend range parameter to "24". This will allow the VZ to track the pitch changes even if you slide the entire length of the neck, or depress the tremolo bar to its limit. Note that when the PG-380 is in the poly mode, pitch bending will track slides only when a single string is sounding. When more than one string is sounding, pitch bend will track in half-steps. When the PG-380 is set to the mono mode, pitch bending will always track slides no matter how many strings are sounding.

Using the Multi mode with Mono mode Guitar Controllers

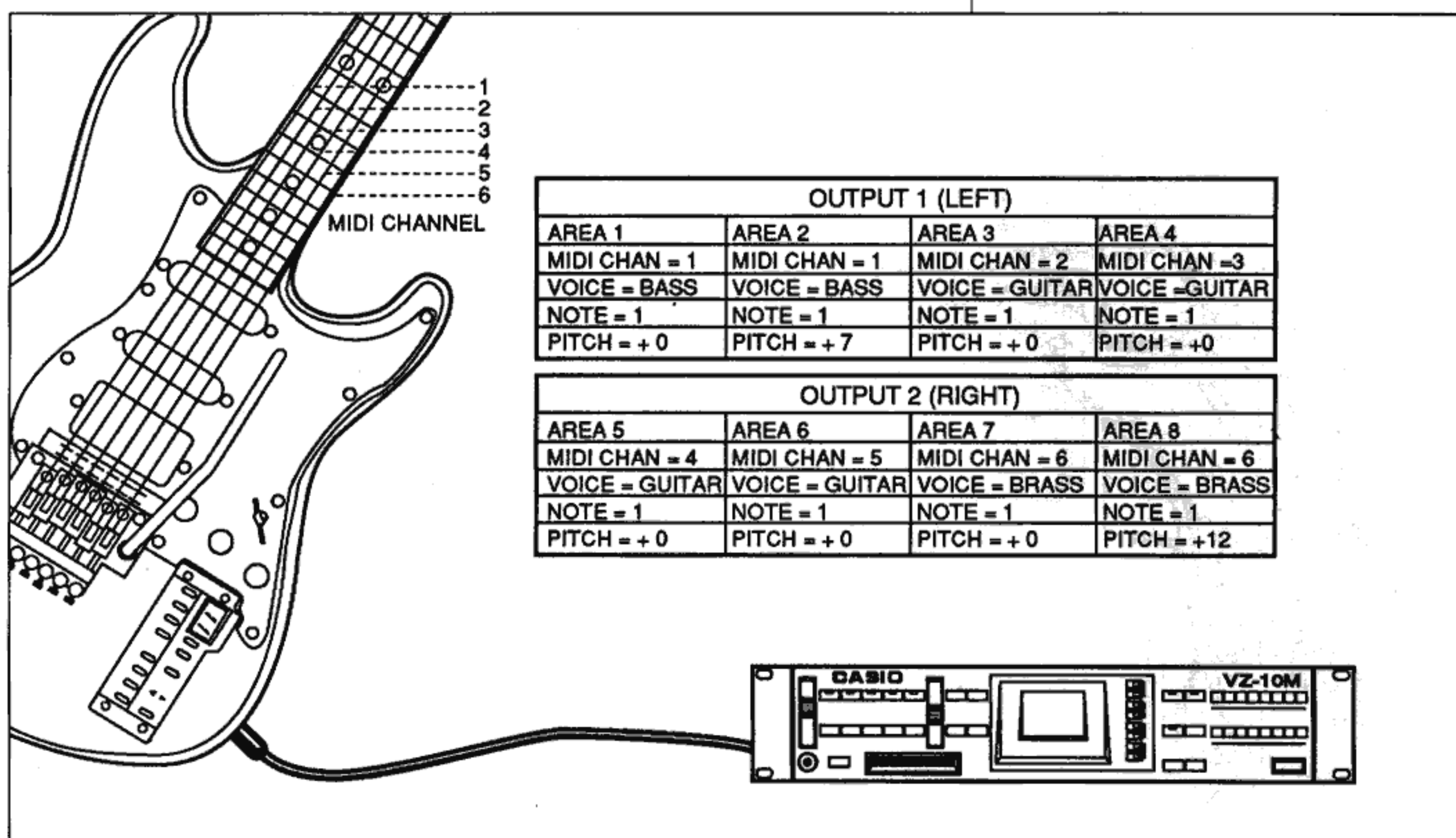
The VZ's multi mode, with its eight separate MIDI areas, is ideal for use with mono mode guitar controllers. The following diagrams show examples of different ways to use the multi mode with a guitar controller



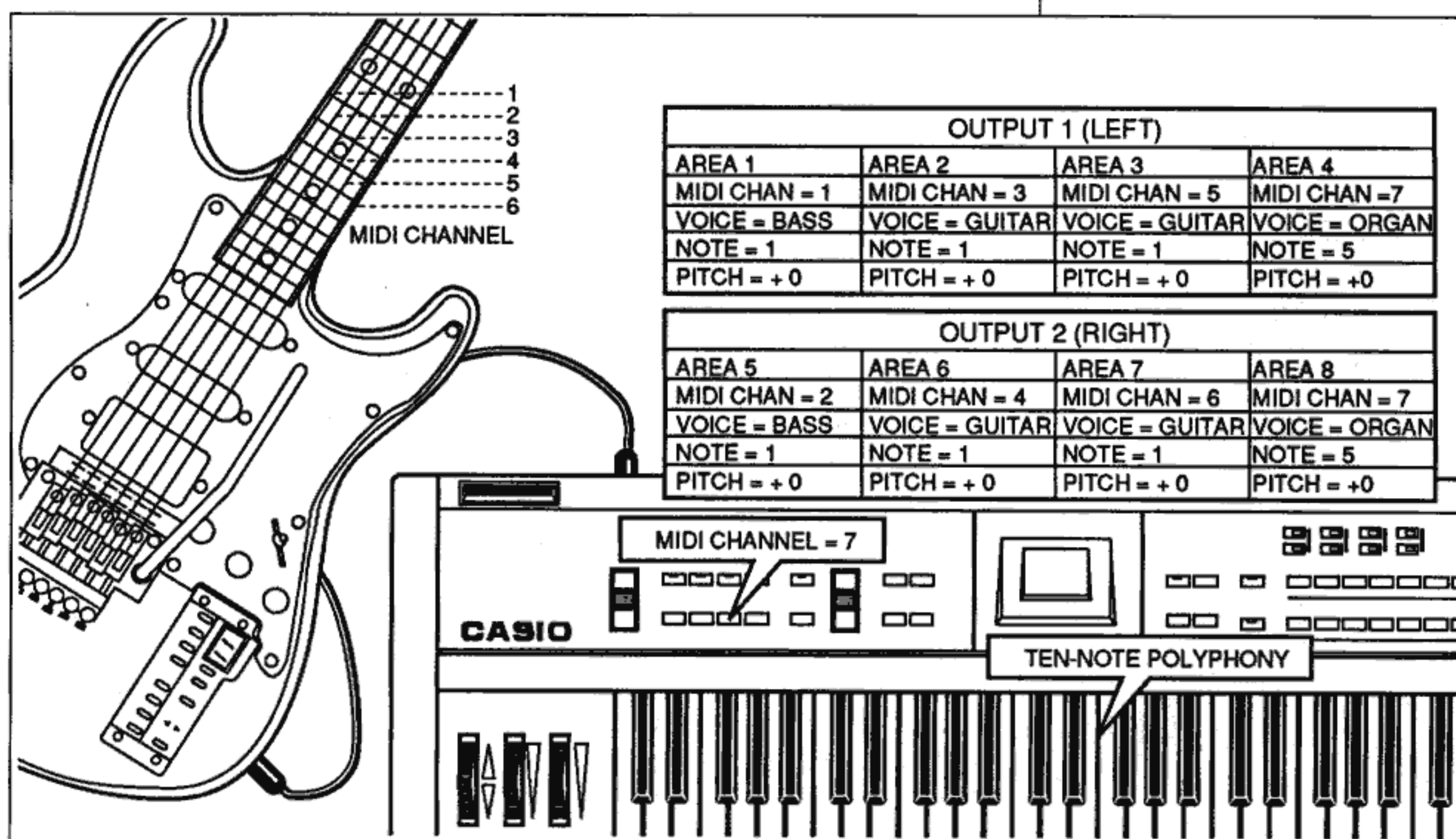
Stereo Assignment of One Voice



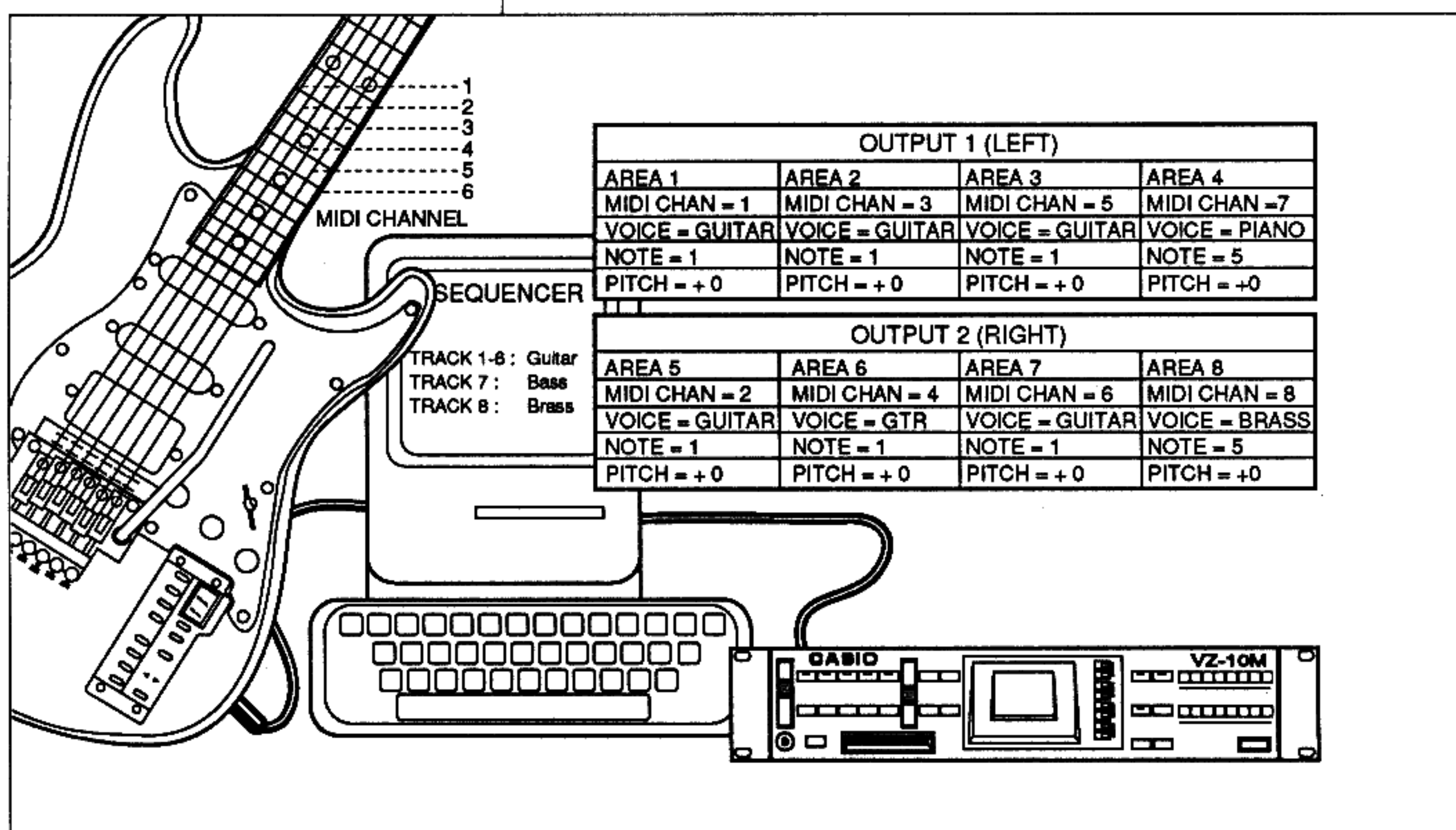
One Voice per String



**Doubled Voices on Top
and Bottom String**



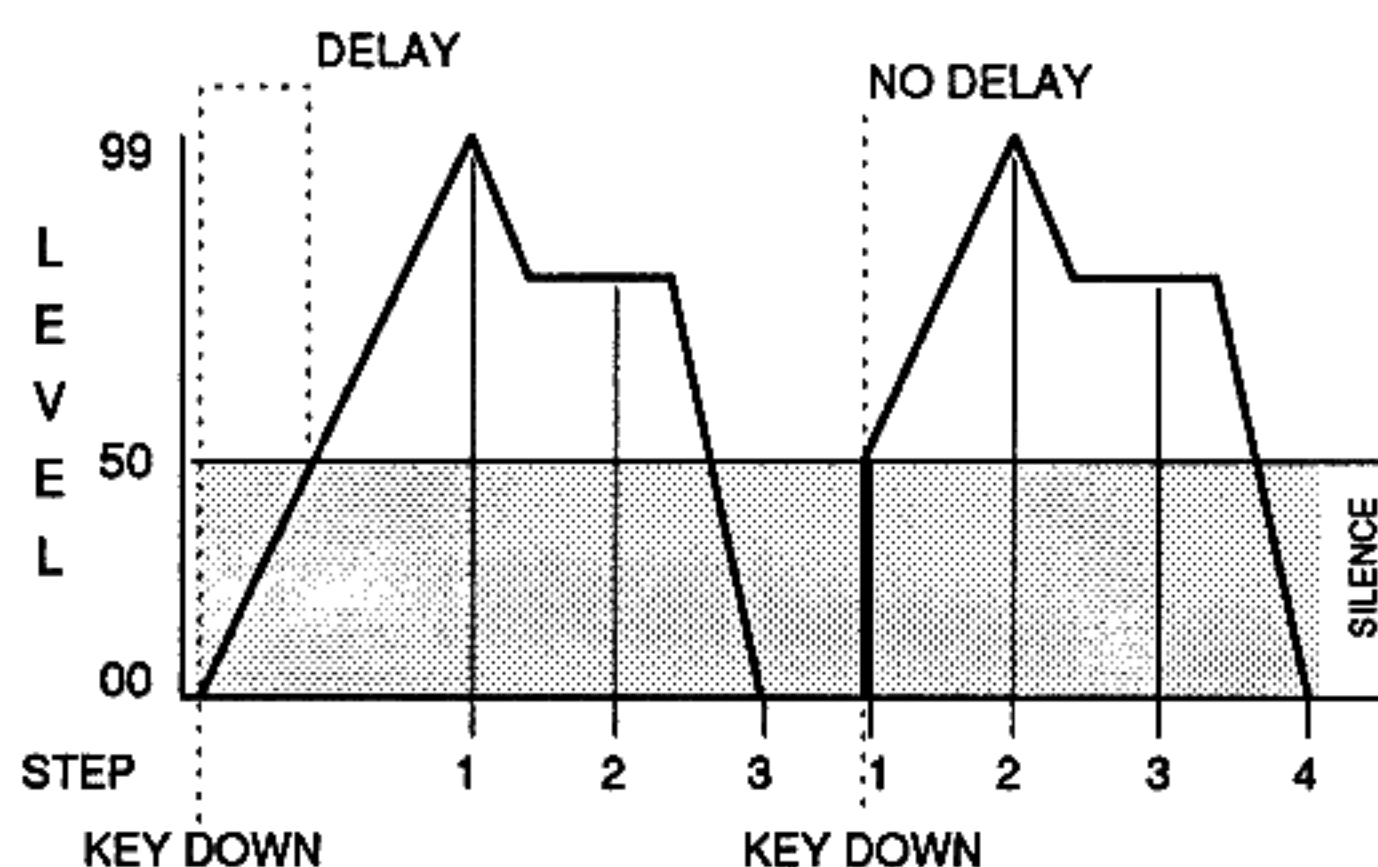
Guitar and Keyboard Control



Guitar and Sequencer Control

Optimizing envelopes for Improved Tracking

The same points we mentioned earlier in *Optimizing Envelopes* for PG-380 voices hold true for any VZ voices controlled by a MIDI guitar.

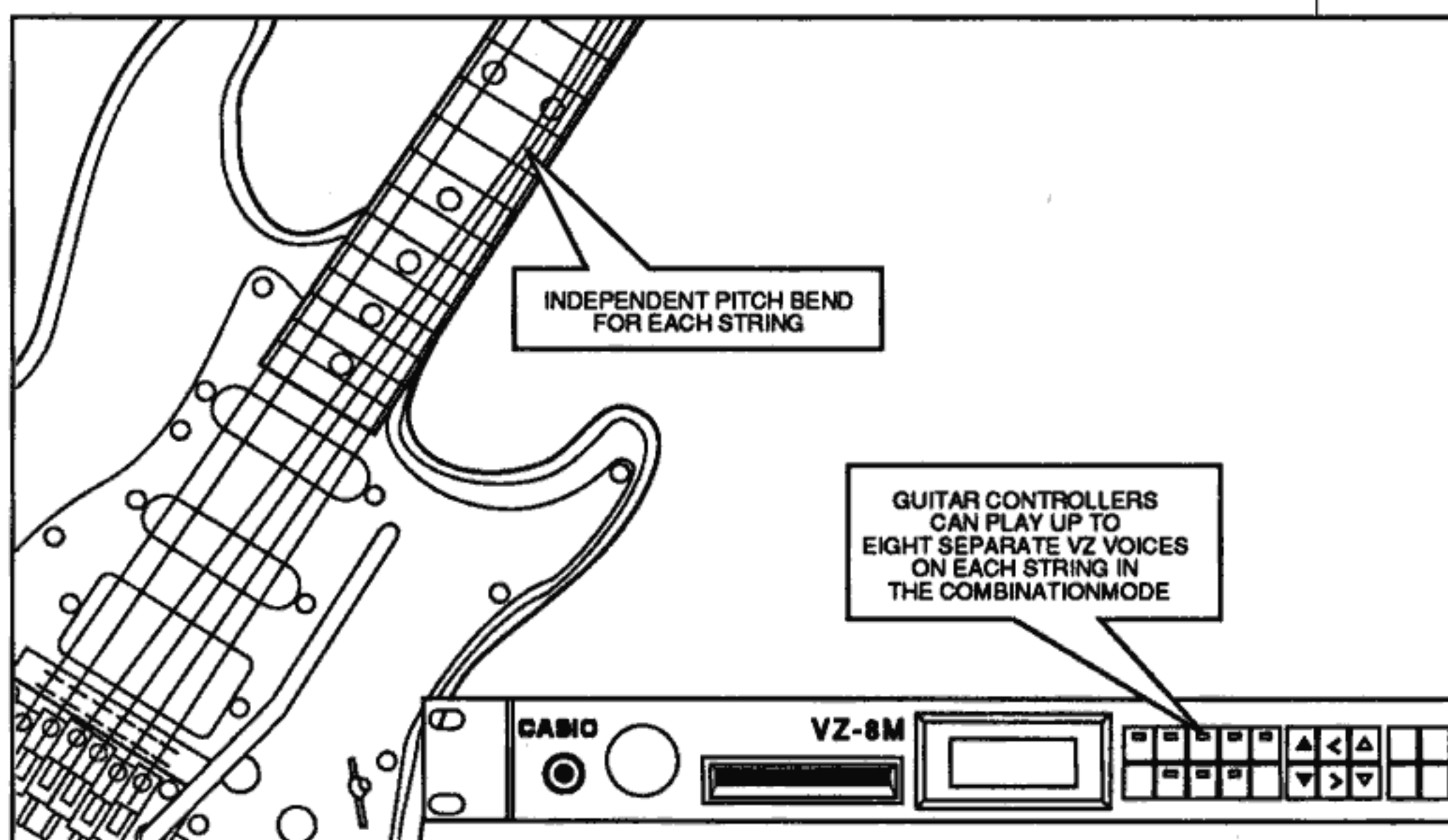


Re-tuning to Optimize Tracking

On most MIDI guitars, when you use a VZ as a tone module you'll notice that the lower strings track a bit slower than the upper strings. This delay is caused by the pitch-to-MIDI conversion, and is a function of the controller, not the tone module. You can minimize the delay by picking melodies and bass lines on the upper four strings. For bass sounds, you may want to transpose the controller or the sound down an octave. This way you can still play low notes without picking them on the low strings.

Using the VZ-8M Guitar Performance Mode

The VZ-8M's guitar performance mode allows you to play Normal and Combination mode sounds with mono mode guitar controllers. (A mono mode guitar controller transmits the note information for each string on a separate channel.) Some controllers, like the PG-380, let you select either the mono or poly mode. The main advantage of the mono mode is that the VZ can track pitch bending for each string, allowing you to slide chords, etc.



Follow these steps to use the guitar performance mode with your VZ-8M:

1. Make sure that the guitar controller is set to mono mode. On the PG-380 set the "poly/mono" micro switch on the back of the guitar to "mono".
2. When playing the VZ-8M in the normal mode, use the VALUE button to set the mode value to "G".
When playing the VZ-8M in the combination mode, use the CURSOR button to select the mode value, and use the VALUE button to set the value to "G".

Be sure the VZ-8M is set to the same MIDI channel as the base channel of the guitar controller.

Changing Operation Memories to the Guitar Performance Mode

The VZ-8M stores the performance mode as part of its operation memory data. You can change the performance mode of an internal or card operation memory with some simple editing:

1. Select the operation memory you want to change.
2. Transfer it to the combination work area by holding down the WRITE button and pushing the COMBINATION button.
3. Use the CURSOR button to select the mode value.
4. Use the VALUE button to set the value to "G".
5. Save the edited combination to an internal or RAM card operation memory.

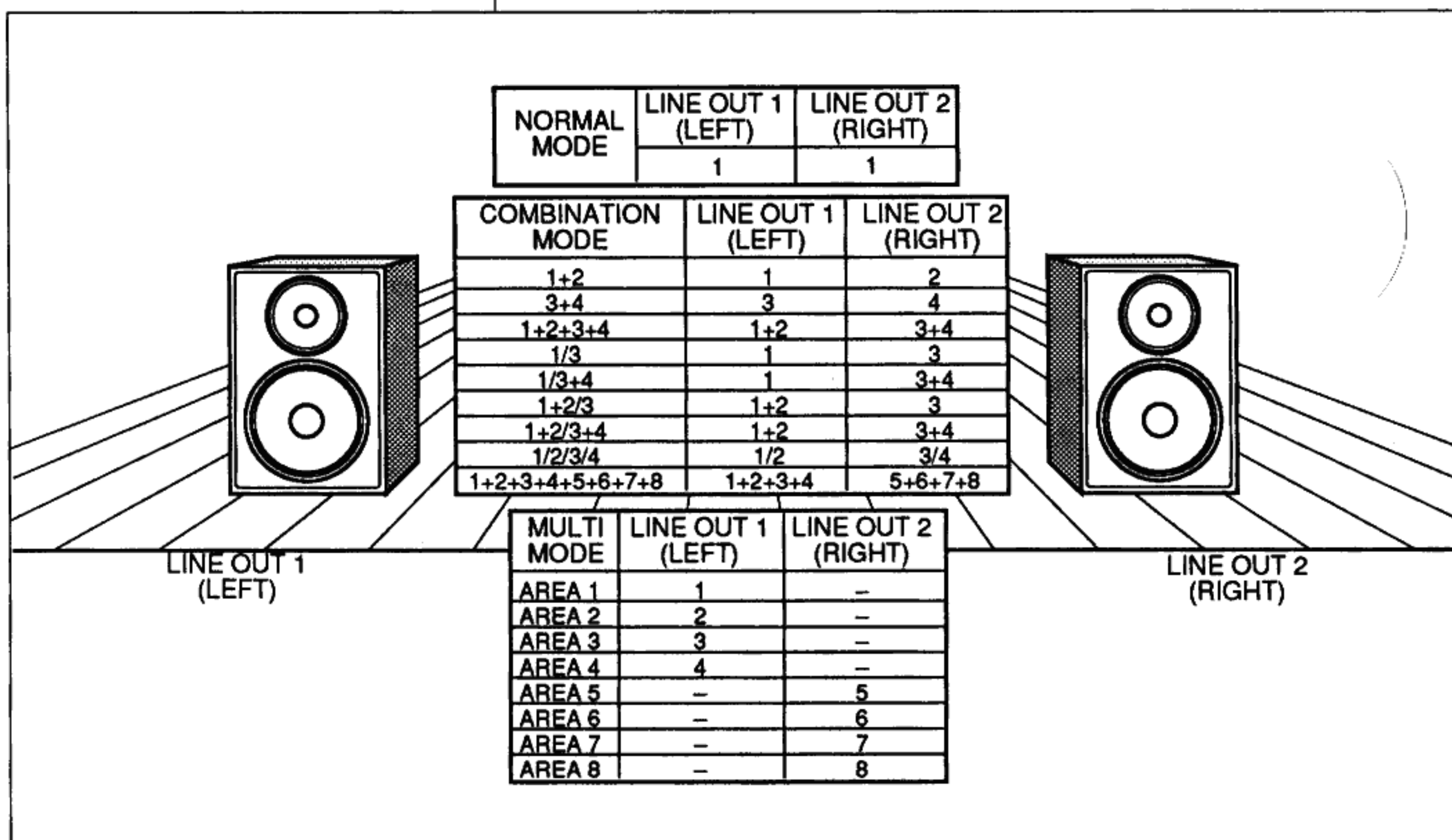
Getting Around on the VZ

Your VZ is a very powerful, full-featured MIDI instrument. It has multiple audio, MIDI and controller jacks, banks of internal voice and operations memories, and literally hundreds of parameters that you can edit. Furthermore, you can configure your VZ in one of three different "play modes" each with different voicing and MIDI features. In this section, we'll give you the big picture of how the features and functions of the VZ are laid out, how to get around its various menus, and how to connect the VZ to a variety of different MIDI systems.

Making Connections

Audio

The VZ synthesizers have two separate audio outputs. You can use these to create stereo effects, or to send different voices to different channels of a mixer. Audio routing is determined by the active play mode: Normal, Combination, or Multi. The following chart shows how voices are assigned in each mode.



Stereo Voice Assignments

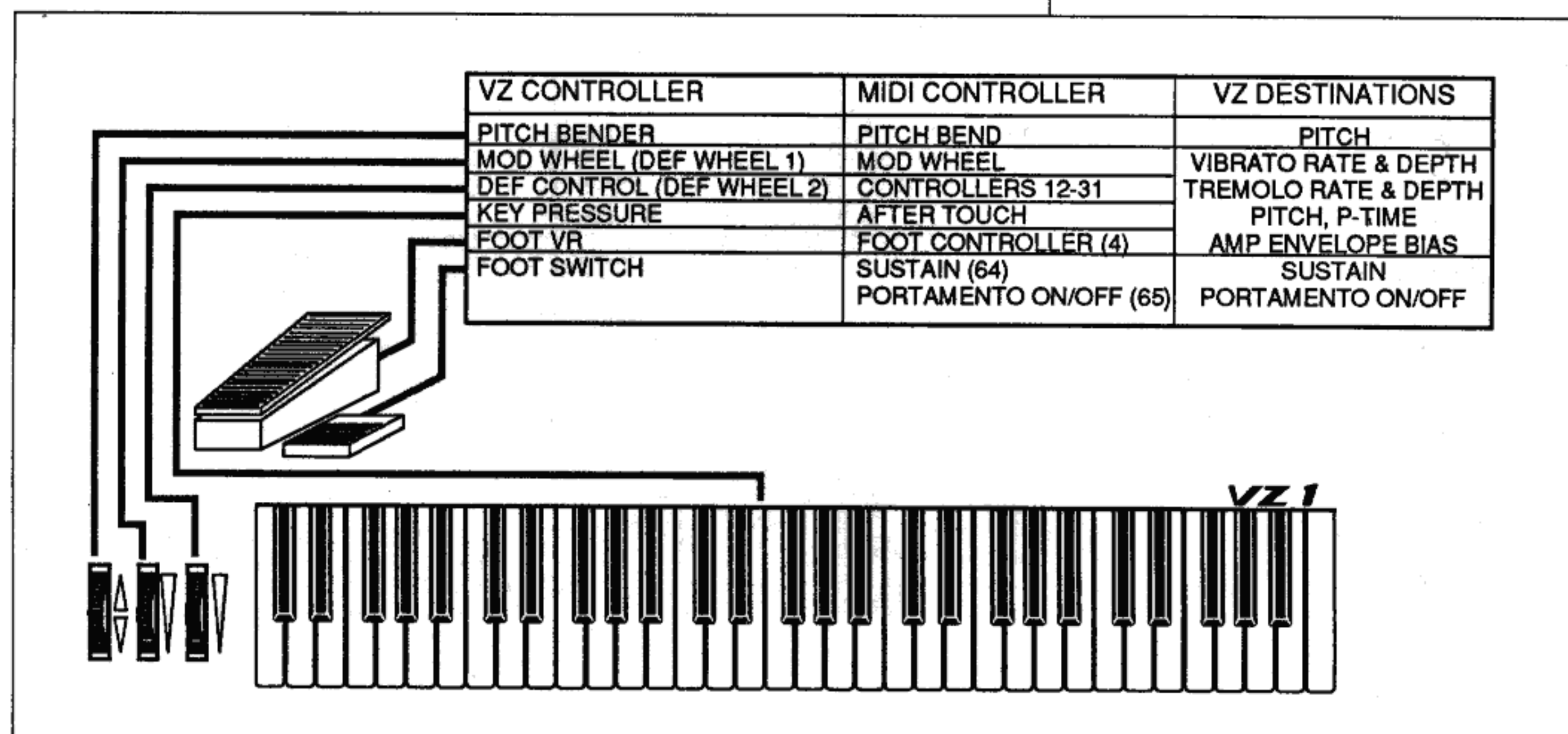
MIDI

The VZ synthesizers have versatile MIDI implementations which make them ideal for use within different types of MIDI systems. During the Normal or Combination modes of operation the VZs function in MIDI Mode 4 (Omni Off/Poly). (Note: this corresponds to the VZ-8M's Keyboard performance mode). Mode 4 is most useful when the VZ is played by a keyboard, "poly mode" guitar controller, wind controller, or a single channel of a MIDI sequencer. In this mode chords can be played, and each note of the chord will be assigned to the same Normal or Combination sound. The Guitar performance mode of the VZ-8 allows mono mode guitar controllers to play it in the Normal or Combination modes.

The VZ's Multi channel mode allows it to respond to multiple MIDI channels simultaneously. You can select up to eight different MIDI areas. Each area can be assigned to play any Normal VZ voice, on any one of the sixteen MIDI channels, with up to eight-note polyphony. This mode is most useful when controlling the VZ with several polyphonic tracks from a MIDI sequencer, or with a mono mode guitar controller. In the case of the VZ-1, the Multi channel mode allows you to play the VZ with its built-in keyboard, and an external MIDI controller (keyboard, guitar, wind, sequencer) at the same time, with each controller playing different sounds.

Controllers

VZ voices can be controlled in real-time with a variety of MIDI controllers, as well as with the built-in foot pedal, footswitch, and — in the case of the VZ-1 — with wheels. The following diagram shows different controllers and the possible destinations.



Controller Assignments

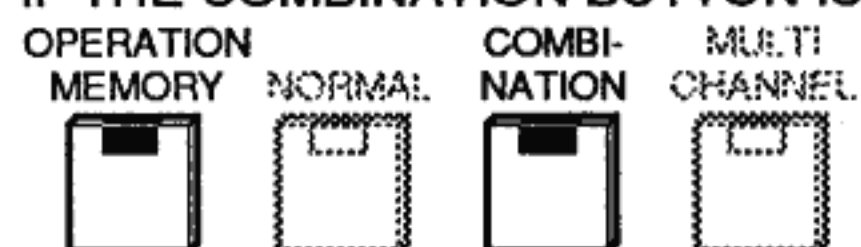
Menu Organization

When you play a VZ instrument, the sound and effects you hear are created by a combination of three independent sets of parameters. These sets of parameters correspond to the three VZ menus: voice parameter, effect, and total control. Voice parameters are the settings for the eight iPD modules that make up a single VZ voice. Effect parameters are the settings of controllers (like after touch, wheels and the foot pedal) and effects (like velocity split and delay trigger). Total control parameters are the settings of "system" functions (like memory protect and master tune). The following groups of illustrations show the menu organization for the VZ-1/VZ-10M and the VZ-8M.

Getting to the Voice and Effect Menus on the VZ-1 or VZ-10M

HOW TO GET TO THE VOICE MENU FROM THE OPERATION MEMORY MODE

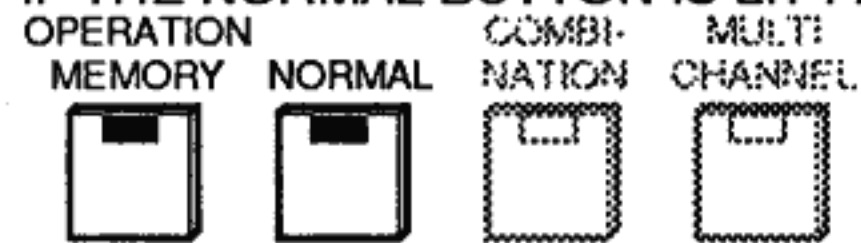
IF THE COMBINATION BUTTON IS LIT . . .



1. PUSH WRITE AND COMBINATION KEYS
2. USE CURSER KEY TO SELECT DESIRED VOICE
3. PUSH MENU 1 KEY TO ENTER VOICE MENU

WRITE

IF THE NORMAL BUTTON IS LIT . . .



1. PUSH WRITE AND NORMAL KEYS
2. PUSH MENU 1 KEY TO ENTER VOICE MENU

WRITE

HOW TO GET TO THE EFFECT MENU FROM THE OPERATION MEMORY MODE

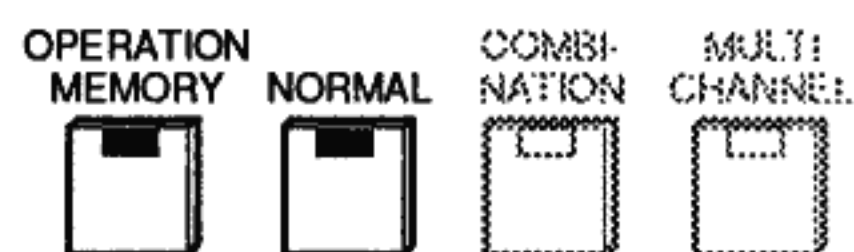
IF THE COMBINATION BUTTON IS LIT . . .



1. PUSH WRITE AND COMBINATION KEYS
2. PUSH MENU 2 KEY TO ENTER MENU
3. USE VALUE KEYS TO SELECT DESIRED FUNCTION
4. PUSH MENU 2 KEY TO ENTER FUNCTION
5. USE M1-M4 KEYS TO SELECT DESIRED VOICE

WRITE

IF THE NORMAL BUTTON IS LIT . . .



1. PUSH WRITE AND NORMAL KEYS
2. PUSH MENU 1 KEY TO ENTER MENU
3. USE VALUE KEYS TO SELECT DESIRED FUNCTION
4. PUSH MENU 1 KEY TO ENTER FUNCTION

WRITE

**VZ-1/VZ-10M Menu 1:
Voice Parameters**

FUNCTION	PARAMETERS
LINE	INT LINE
WAVEFORM	EXT PHASE
	FORM
DETUNE	PITCH FIX
	RANGE
	HARMONIC
	TUNE
PITCH ENV	R1~R8
	L1~L8
	SS
P ENV DEPTH	ED
	DEPTH
P KF LEVEL	RANGE
	KEY 1~KEY 6
P VEL LEVEL	L1~L6
	SENS
VIBRATO	CURVE
	WAVE
	DEPTH
	RATE
	DELAY
OCTAVE	MULTI
	OCTAVE
AMP ENV	R1~R8
	L1~L8
	SS
ENV DEPTH	ED
	ENV DEPTH
KF LEVEL	KEY 1~KEY 6
	L1~L6
VEL LEVEL	SENS
	CURVE
TREMOLO	WAVE
	DEPTH
	RATE
	DELAY
AMP SENS	MULTI
	SENS
TOTAL LEVEL	LEVEL
KF RATE	KEY 1~KEY 6
	R1~R6
VEL RATE SENS	SENS
P VEL RATE	ENA
A VEL RATE	ENA
VOICE NAME	NAME

**VZ-1/VZ-10M Menu 2:
Effect Parameters**

FUNCTION	PARAMETERS
OPERATION NAME	NAME
PORTAMENTO/SOLO	PORTAMENTO
	PORTM TIME
	PORTM MODE
	SOLO
	POLY/MONO
PITCH BEND	RANGE
	RELEASE
AFTER TOUCH	SENSITIVITY
	VIB DEPTH
	VIB RATE
	PITCH
	PORTM TIME
	TREM DEPTH
	TREM RATE
	A ENV BIAS
	SENSITIVITY
	VIB DEPTH
DEF WHEEL 1	VIB RATE
	PITCH
	PORTM TIME
	TREM DEPTH
	TREM RATE
	A ENV BIAS
	SENSITIVITY
	VIB DEPTH
	VIB RATE
	PITCH
DEF WHEEL 2	PORTM TIME
	TREM DEPTH
	TREM RATE
	A ENV BIAS
	SENSITIVITY
	VIB DEPTH
	VIB RATE
	PITCH
	PORTM TIME
	TREM DEPTH
FOOT VR	TREM RATE
	A ENV BIAS
	SENSITIVITY
	VIB DEPTH
	VIB RATE
	PITCH
	PORTM TIME
	TREM DEPTH
	TREM RATE
	A ENV BIAS
LEVEL	FIX
	CONTROL
PITCH	AUTO
	POLARITY
	OCTAVE
	NOTE
SPLIT POINT	FINE
	POINT
SUSTAIN PEDAL	SUSTAIN
VEL SPLIT	RANGE
VEL INVERSE	INVERSE
POS CROSSFADE	X-FADE
	POS
DELAY TRIGGER	X-FADE
	POS
VIBRATO INVERSE	INVERSE
TREMOLO INVERSE	INVERSE
COMBI COPY	COPY
PITCH	POLARITY
	OCTAVE
	NOTE
	FINE

**VZ-1/VZ-10M Menu 3:
Total Control**

FUNCTION	PARAMETERS
TUNE/TRANPOSE	TUNE
	TRANPOSE
MEMORY PROTECT	INTERNAL
	CARD
SAVE/LOAD	SAVE/LOAD
	CARD/MIDI
MIDI CHANNEL	DATA
	CHANNEL
MIDI DATA	TOTAL
	PROGRAM
	EXCLUSIVE
	DEF CONTROL
	VOLUME
PITCH BEND	OVERFLOW
	TOTAL BEND
	RANGE
CARD FORMAT	RELEASE
	EXECUTE
PRESET CALL	NUMBER

Getting to the Voice and Effect Menus on the VZ-8M

HOW TO GET TO THE VOICE MENU FROM THE OPERATION MEMORY MODE

IF THE COMBINATION BUTTON IS LIT ...

OPERATION MEMORY NORMAL COMBI-NATION MULTI-CHANNEL

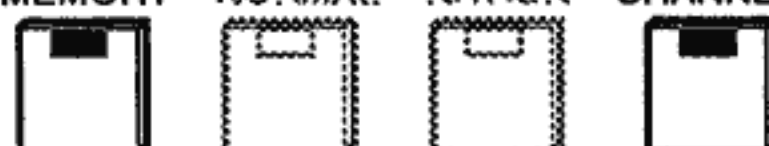


WRITE

1. PUSH WRITE AND COMBINATION KEYS
2. USE CURSER KEY TO DISPLAY VOICE NUMBER
3. PUSH NORMAL KEY
4. RECALL VOICE NUMBER
5. PUSH EDIT KEY
6. PUSH PAGE-DOWN KEY TO ENTER VOICE MENU

IF THE MULTI-CHANNEL BUTTON IS LIT ...

OPERATION MEMORY NORMAL COMBI-NATION MULTI-CHANNEL



WRITE

1. PUSH WRITE AND MULTI-CHANNEL KEYS
2. USE CURSER KEY TO DISPLAY VOICE NUMBER
3. PUSH NORMAL KEY
4. RECALL VOICE NUMBER
5. PUSH EDIT KEY
6. PUSH PAGE-DOWN KEY TO ENTER VOICE MENU

IF THE NORMAL BUTTON IS LIT ...

OPERATION MEMORY NORMAL COMBI-NATION MULTI-CHANNEL



WRITE

1. PUSH WRITE AND NORMAL KEYS
2. PUSH EDIT KEY
3. PUSH PAGE-DOWN KEY TO ENTER VOICE MENU

HOW TO GET TO THE EFFECT MENU FROM THE OPERATION MEMORY MODE

IF THE COMBINATION BUTTON IS LIT ...

OPERATION MEMORY NORMAL COMBI-NATION MULTI-CHANNEL



WRITE

1. PUSH WRITE AND COMBINATION KEYS
2. USER CURSER KEY TO DISPLY THE DESIRED VOICE
3. PUSH EDIT KEY TO ENTER MENU

IF THE MULTI-CHANNEL BUTTON IS LIT ...

OPERATION MEMORY NORMAL COMBI-NATION MULTI-CHANNEL



WRITE

1. PUSH WRITE AND MULTI-CHANNEL KEYS
2. USER CURSER KEY TO DISPLY THE DESIRED VOICE
3. PUSH EDIT KEY TO ENTER MENU

IF THE NORMAL BUTTON IS LIT ...

OPERATION MEMORY NORMAL COMBI-NATION MULTI-CHANNEL



WRITE

1. PUSH WRITE AND NORMAL KEYS
2. PUSH EDIT KEY TO ENTER MENU

VZ-8M Voice Parameter Menu

FUNCTION	PARAMETERS
LINE	INT LINE
WAVEFORM	EXT PHASE FORM
DETUNE	PITCH FIX RANGE HARMONIC TUNE
PITCH ENV	R1~R8 L1~L8 SS ED
P ENV DEPTH	DEPTH RANGE
P KF LEVEL	KEY 1~KEY 6 L1~L6
P VEL LEVEL	SENS CURVE
VIBRATO	WAVE DEPTH RATE DELAY MULTI
OCTAVE	OCTAVE
AMP ENV	R1~R8 L1~L8 SS ED
ENV DEPTH	ENV DEPTH
KF LEVEL	KEY 1~KEY 6 L1~L6
VEL LEVEL	SENS CURVE
TREMOLO	WAVE DEPTH RATE DELAY MULTI
AMP SENS	SENS
TOTAL LEVEL	LEVEL
KF RATE	KEY 1~KEY 6 R1~R6
VEL RATE SENS	SENS
P VEL RATE	ENA
A VEL RATE	ENA
VOICE NAME	NAME
INIT VOICE	EXECUTE

VZ-8M Effect Parameter Menu

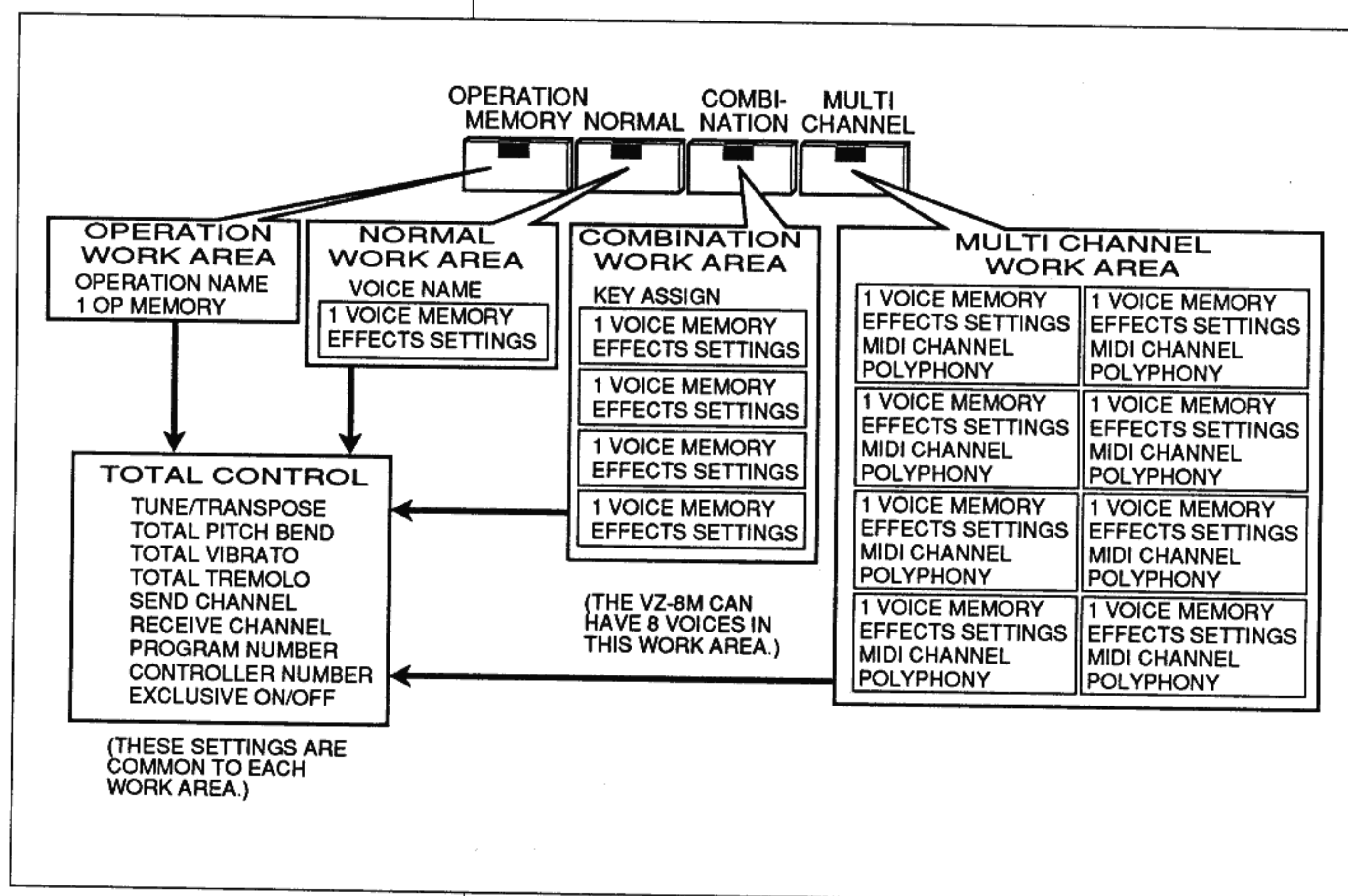
FUNCTION	PARAMETERS
MIDI CHANNEL	CHANNEL
PORTAMENTO/SOLO	PORTAMENTO PORTM TIME PORTM MODE SOLO POLY/MONO
PITCH BEND	RANGE RELEASE
AFTER TOUCH	SENSITIVITY VIB DEPTH VIB RATE PITCH PORTM TIME TREM DEPTH TREM RATE A ENV BIAS
MOD WHEEL	SENSITIVITY VIB DEPTH VIB RATE PITCH PORTM TIME TREM DEPTH TREM RATE A ENV BIAS
DEF CONTROL	SENSITIVITY VIB DEPTH VIB RATE PITCH PORTM TIME TREM DEPTH TREM RATE A ENV BIAS
FOOT VR	SENSITIVITY VIB DEPTH VIB RATE PITCH PORTM TIME TREM DEPTH TREM RATE A ENV BIAS
FOOT SW	SUSTAIN SOSTENUTO
VEL TABLE SELECT.	TABLE NO.
PAN	FIX CONTROL AUTO
LEVEL	FIX CONTROL AUTO
PITCH	POLARITY OCTAVE NOTE FINE
SPLIT POINT	POINT
VEL SPLIT	RANGE
VEL INVERSE	INVERSE
POS CROSSFADE	X-FADE POS
DELAY TRIGGER	X-FADE POS
TOTAL VIBRATO	TOTAL
VIBRATO INVERSE	INVERSE
TOTAL TREMOLO	TOTAL
TREMOLO INVERSE	INVERSE
COMBI COPY	COPY
OPERATION NAME	NAME
OPERATION TUNE	POLARITY OCTAVE NOTE FINE

VZ-8M Total Control Menu

FUNCTION	PARAMETERS
MASTER TUNE	TUNE
TRANSPOSE	TRANSPOSE
MEMORY PROTECT	INTERNAL CARD
SAVE/LOAD	SAVE/LOAD CARD/MIDI DATA
MIDI CHANNEL	CHANNEL TOTAL
MIDI DATA	PROGRAM EXCLUSIVE DEF CONTROL VOLUME OVERFLOW
CARD FORMAT	EXECUTE

Play Modes

VZ synthesizers have four play modes: Normal, Combination, Multi channel, and Operation. Each play mode has an independent "work area" in the VZ's memory that becomes active whenever a play mode is selected. The settings of the active play mode can be edited from the front panel. The latest settings of each work area are held in memory when you switch to a different mode or turn off the VZ.



Normal Mode

The Normal mode is used to play, edit and create VZ voices. From this mode, you can select and play any single voice from the internal or card memories. You can edit any of the items from the voice parameter or effects menus, change the current voice or its parameters without affecting the active effects settings, or change effects settings without affecting the current voice.

There are two ways to save the contents of the Normal mode work area. You can save only the voice parameters to an internal or card voice memory, or you can save both the voice parameters and effect settings to an internal or card operation memory.

Combination Mode

The Combination mode is used to configure and play multiple voice "patches." From this mode you can select any of the key-assign configurations. Each assign mode allows up to four different voices to be played in a variety of split or layered combinations. (On the VZ-M, there is also an eight-voice configuration.) After selecting a key-assign mode, you can assign internal or card memory voice locations to each patch in the configuration (Internal A-1, for example). You can also edit the related effect menu items for each patch in the configuration. Changes made to voice selections and effect settings are independent of each other.

The VZ-8M can't edit voice parameters directly from the Combination mode. You must enter the Normal mode and select the voice you want to edit. Make the desired changes and re-save the voice to the same internal or card location. Return to the Combination mode to hear the edited voice in the Combination patch.

The contents of the Combination mode work area can be saved to an internal or card operation memory. This includes the current key assign configuration, the voice location for each patch and the effects settings for each patch.

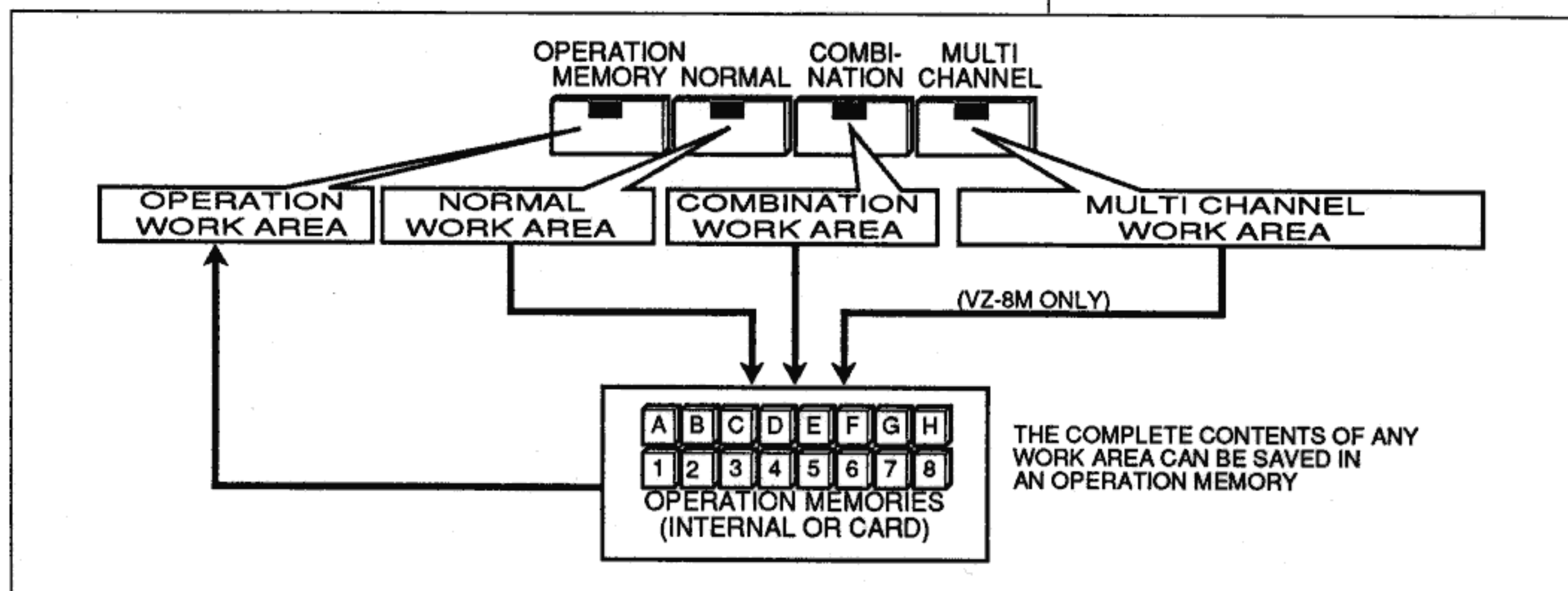
Multi Channel Mode

The Multi channel mode is used to configure and play the VZ from multiple MIDI channels. Up to eight "MIDI areas" can be set up. For each area you can assign a different internal or card voice location, MIDI channel and polyphony value. You can also edit the related effect menu items for each area. Changes made to voice selections and effect settings are independent of each other.

The VZ-8M can save the Multi channel work area to an internal or card operation memory. The VZ-1 and VZ-10M cannot save the contents of the Multi channel work area.

Operation Memory Mode

The Operation memory play mode is used to play combined voice and effect settings saved previously from a Normal, Combination, or Multi channel (VZ-8M only) work area. The voice parameters and effect settings in an Operation memory can not be edited in the Operation mode. They must first be transferred to the work area for the mode in which they were saved. This is easy to do.



If you only want to edit voice parameters, simply enter the Normal mode and make the desired changes. When you're done, re-save the voice to the same internal or card memory location.

If you want to edit the effects settings of an Operation, follow these steps:

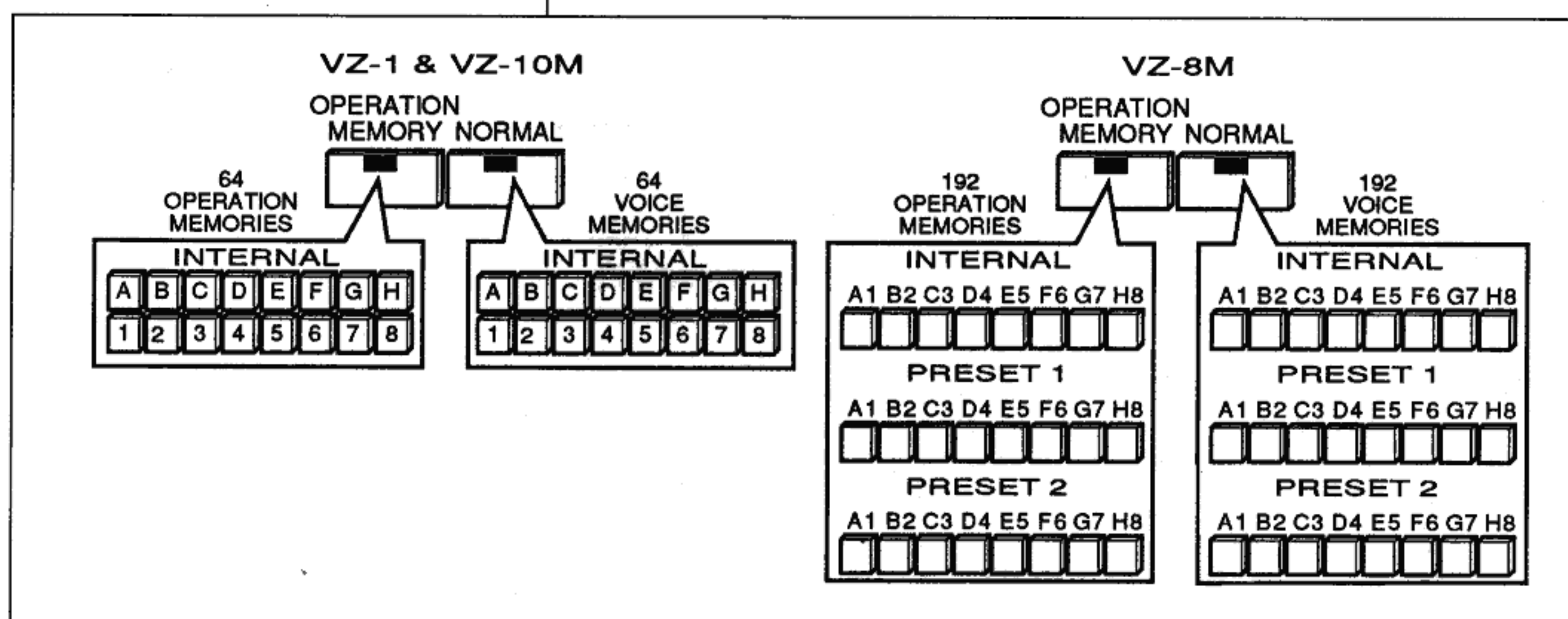
1. While in the Operation memory mode, select the memory you want to edit.
2. Hold down the WRITE button. The appropriate mode button (Normal, Combination, or Multi) will light.
3. While still holding the WRITE button, press the lit mode button.
4. Edit the desired items and, if you wish, save your changes into an internal or card operation memory.

Memory Organization

Internal Memories

The VZ-1 and VZ-10M have 64 internal voice memories and 64 internal operation memories. These memories are filled with presets when the VZ arrives from the factory. You can replace them with voices and operation memories of your own by editing them or loading voices from cards or other VZs. You can re-install the factory presets by performing the following initialization procedure:

1. Turn off the VZ.
2. Hold down the WRITE button and turn on the VZ.
3. When you see the "YES?" prompt press the YES button.

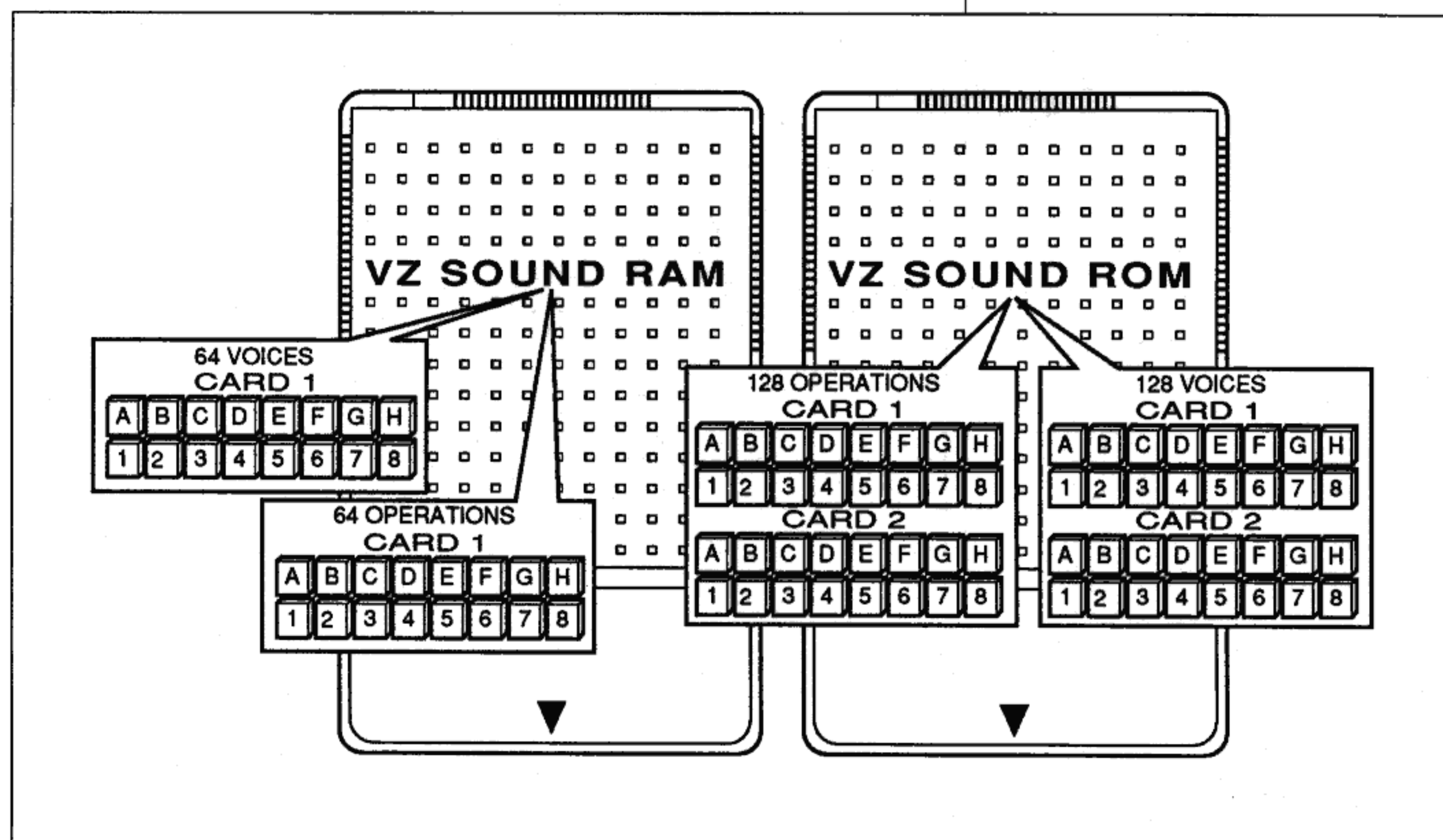


The VZ-8M has internal and preset memories. The internal memories can be changed or replaced. The presets are "read only" memories, so the contents of a preset memory location can't be changed. (To create an edited version of a preset, select and edit it in the normal manner, then save it to an internal or RAM card memory.) There are 64 internal voice memories and 128 preset voice memories, as well as 64 internal operation memories and 128 preset operation memories in the VZ-8M.

Card Memories

VZ synthesizers can access voices and operation memories from RAM and ROM cards. The internal VZ synthesizer in the PG-380 can access voice memories from RAM and ROM cards. RAM cards hold 64 voice and 64 operation memories. The voice and operation memories of a RAM card may be replaced using the different "save" options. ROM cards hold 128 voice and 128 operation memories. Their contents cannot be changed.

You can purchase additional ROM and RAM cards already filled with voice and operation memories directly from CASIO, or from third party sound developers. You can also get blank RAM cards from CASIO and fill them with voices and operation memories of your own creation.



Part 2:

Exploring iPD Synthesis

Part 2:

Exploring iPD Synthesis

In this section of the book, we'll explore the unique technology employed by VZ instruments, iPD synthesis. iPD stands for *interactive phase distortion*. Phase distortion (PD) is a method of producing sounds by modulating (distorting) a DCO (oscillator) waveform in real-time. (PD technology is used in Casio's popular line of CZ instruments.) Unlike PD synthesis, iPD utilizes multiple DCOs. These DCOs are *interactive*. The output of one DCO can be used to modulate the phase of another DCO which can, in turn, modulate the phase of still another DCO. In fact, as many as eight DCOs can be linked together in this manner. The result is a very flexible new form of synthesis that can create a wide variety of sounds and effects. Rather than launch into a long theoretical discussion of iPD synthesis, we're going to give you a series of hands-on experiments. These experiments are designed to let you hear iPD synthesis in action. Once you've gone through each of the experiments with your VZ, you'll have a solid, *practical* understanding of what the main voice parameters do and how they can affect the overall sound of a voice. The examples in the next section will show you how the voice and effect parameters of the VZ can be used together to create many kinds of sounds and effects.

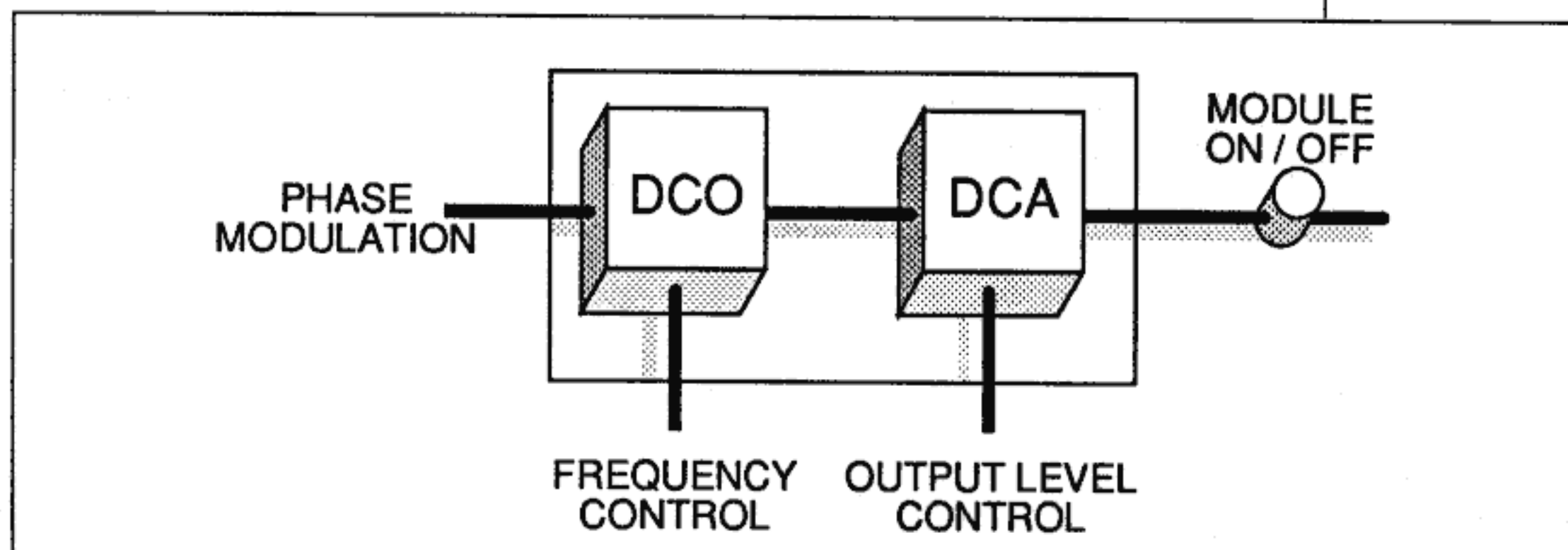
If you'd like to learn more about synthesis and sound, be sure to check out our book, **The Secrets of Analog and Digital Synthesis**.

Experimenting With Modules

The *module* is the basic element of an iPD sound. A single voice is made up of eight modules. Each individual module can be a sound source, or it can interact with other modules to produce timbre (tone color) changes in a sound. Although it is difficult to explain these interactions in words, they're easy to understand when you hear the timbre changes they produce. Later on in this section, we'll show you how to set up and listen to interactions between two or more modules. Right now, however, we'll begin our exploration of iPD synthesis by looking at and listening to a single module.

A module is made up of two components, a DCO, and DCA. When used as a sound source, DCO settings will determine the pitch and timbre (tone color) of the sound coming from the module; DCA settings will determine the loudness. When used to modify the sounds produced by other modules, DCO settings will determine the overall tone color of the sound, and DCA settings will determine the overall brightness of the sound.

The Module

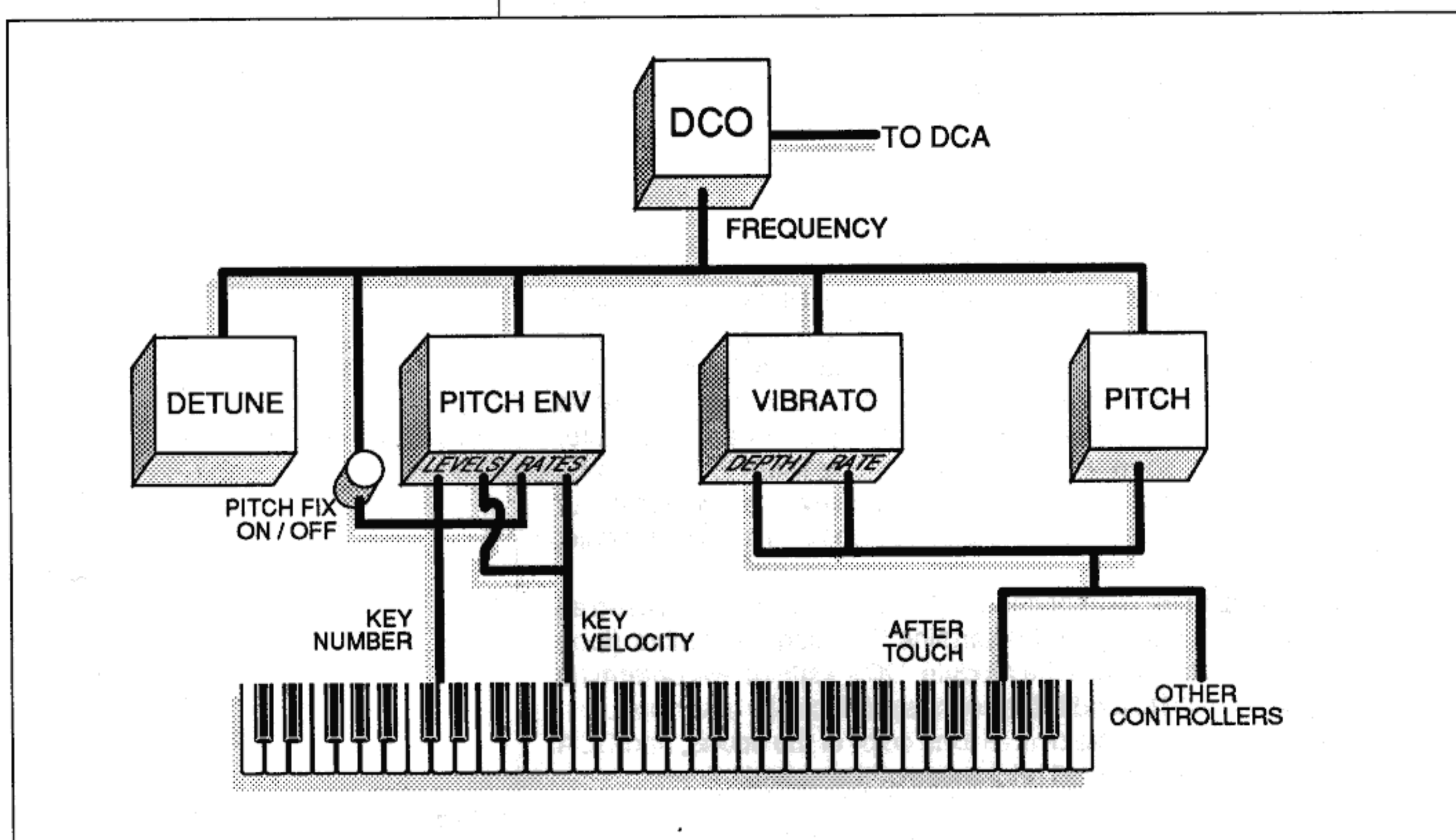


DCO Parameters

Here's a summary of the voice parameters associated with the DCO:

- **WAVEFORM:** Selects one of eight different waveforms for each module. Each waveform has a different tone color.
- **DETUNE :** Sets the basic tuning of each module.
- **PITCH ENV:** Creates a pitch envelope that will affect all modules.
- **P ENV DEPTH:** Sets the overall depth of the pitch envelope.
- **P KF LEVEL:** Varies the pitch envelope depth according to which keys are played.
- **P VEL LEVEL :** Varies the pitch envelope depth according to the velocity used to play a note.
- **KF RATE:** Varies pitch envelope rates according to which keys are played.
- **VEL RATE:** Varies pitch envelope rates according to the velocity used to play a note.
- **VIBRATO:** Creates pitch modulation effects.
- **OCTAVE:** Transposes all modules up or down one or two octaves.

DCO Parameters



The following experiments will guide you through the different DCO parameters on the VZ.

Waveform

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

WAVEFORM							
SINE	SAW1	SAW2	SAW3	SAW4	SAW5	NOISE1	NOISE2

1. Start with "Init Voice".
2. Enter the WAVEFORM parameter.
3. The display should read "SINE". Play middle C and listen to this waveform.
4. Use the VALUE key to select the next waveform, "SAW 1". Play middle C and listen to this waveform.
5. Repeat the previous step until you've listened to all eight waveforms.

As you can hear, each waveform has its own distinctive timbre. Keep in mind that, when a module is used for phase modulation, each waveform will also have a distinct effect on the phase-modulated sound.

Pitch Envelope

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

PITCH ENV								P ENV DEPTH	
STEP	1	2	3	4	5	6	7	8	DEPTH
RATE	99	0	99	0	99	0	99	0	NARROW
LEVEL	4	5	8	9	12	13	16	17	RANGE
SS/ED	-	-	-	-	-	-	-	ED	63

1. Start with "Init Voice".
2. Enter the P ENV DEPTH parameter.
3. Set the depth and range values as shown.
4. Enter the PITCH ENV parameter.
5. Set the rates and levels as shown.
6. Play middle C and hold it. You will hear an ascending four-note melody. Each note is about one semitone higher than the one before it.
7. Enter the P ENV DEPTH parameter and change the range to "WIDE".
8. Play middle C and hold it. Again, you will hear a four-note melody, but this time each note is about four semitones higher than the one before it.

The pitch envelope was used to "play" both melodies. The levels determined the pitches and the rates determined the time between notes. The range parameter of P ENV DEPTH determines the amount of pitch change. When it is set to "WIDE", each level-unit equals one semitone. When it is set to "NARROW", each level-unit equals one-quarter of a semitone.

The overall amount of the pitch envelope effect is set with the depth parameter. However, it is possible to control the pitch envelope depth value with the P KF LEVEL and P VEL LEVEL functions.

Pitch Key Follow Level**NORMAL MODE**

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

PITCH ENV								P ENV DEPTH	
STEP	1	-	-	-	-	-	-	DEPTH	WIDE
RATE	25	-	-	-	-	-	-	RANGE	63
LEVEL	24	-	-	-	-	-	-		
SS/ED	ED	-	-	-	-	-	-		

P KF FOLLOW							
POINT	1	2	3	-	-	-	-
KEY	C2	F4	C7	-	-	-	-
LEVEL	40	63	40	-	-	-	-

1. Start with "Init Voice".
2. Enter the P KF LEVEL parameter.
3. Set the key numbers and levels as shown.
4. Play F4 and hold it. You will hear the pitch slide up two octaves.
5. Play C7, and then C2. You will hear no pitch change for either note.
6. Play and listen to other keys above and below F4. As you play keys farther and farther from F4, the pitch will change less and less.

This voice parameter allows you to scale the pitch envelope depth to the keyboard. Remember that the overall amount of pitch envelope effect is determined by the P ENV DEPTH setting.

Key Follow Rate

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

PITCH ENV								P ENV DEPTH	
STEP	1	-	-	-	-	-	-	DEPTH	WIDE
RATE	25	-	-	-	-	-	-	RANGE	63
LEVEL	24	-	-	-	-	-	-		
SS/ED	ED	-	-	-	-	-	-		

KF RATE							
POINT	1	2	3	-	-	-	-
KEY	C2	F4	C7	-	-	-	-
LEVEL	0	10	20	-	-	-	-

1. Start with "Init Voice".
2. Enter the KF RATE parameter.
3. Set the key numbers and levels as shown.
4. Play the keys between C2 and C7. The pitch envelope rates will speed up as you play higher keys.

This voice parameter allows you to scale the pitch envelope rates to the keyboard. Keep in mind that KF RATE makes rates quicker, not slower than the current rate values set in PITCH ENV. If you plan on using KF RATE to change envelope rates, start off by programming the rates of PITCH ENV to the *slowest* values you want. Then use KF RATE to speed them up.

Pitch Velocity Level

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

PITCH ENV								P ENV DEPTH	
STEP	1	-	-	-	-	-	-	DEPTH	WIDE
RATE	99	-	-	-	-	-	-	RANGE	63
LEVEL	24	-	-	-	-	-	-		
SS/ED	ED	-	-	-	-	-	-		

P VEL LEVEL	
SENS	31
CURVE	1

1. Start with "Init Voice".
2. Enter the P VEL LEVEL parameter.
3. Set the sensitivity and curve values as shown.
4. Play a single key repeatedly, using different velocities. Even though you are playing the same key over and over, you will hear a series of different pitches. The more velocity you use, the higher the pitch.
5. Repeat the previous step, but change the velocity curve value each time.

This voice parameter allows you to control the pitch envelope depth with the velocity with which you play the keys. Remember that the overall amount of pitch envelope effect is determined by the P ENV DEPTH settings.

Velocity Rate (DCO)**NORMAL MODE****MODULE ON/OFF**

M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

PITCH ENV								
STEP	1	2	3	4	5	6	7	8
RATE	99	0	99	0	99	0	99	0
LEVEL	4	5	8	9	12	13	16	17
SS/ED	-	-	-	-	-	-	-	ED
E/*	*	E	*	E	*	E	*	E

P ENV DEPTH	
DEPTH	WIDE
RANGE	63

VEL RATE	
SENS	10
CURVE	1

1. Start with "Init Voice".
2. Enter the VEL RATE parameter.
3. Set the values as shown.
4. Play a single key repeatedly, using different velocities. The pitch envelope rates get quicker as you play with greater velocity.
5. Repeat the previous step, but experiment by enabling different steps in the envelope.
6. Reset to the original settings. Now, play and listen to each of the velocity curves.

This voice parameter allows you to scale the rates of any steps in the pitch envelope to velocity.

Vibrato

NORMAL MODE							
MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
VOICE PARAMETER MENU							
LINE							
MIX							
VIBRATO							
WAVE	DEPTH	RATE	DELAY	MULTI			
TRIANGLE	25	75	0	OFF			

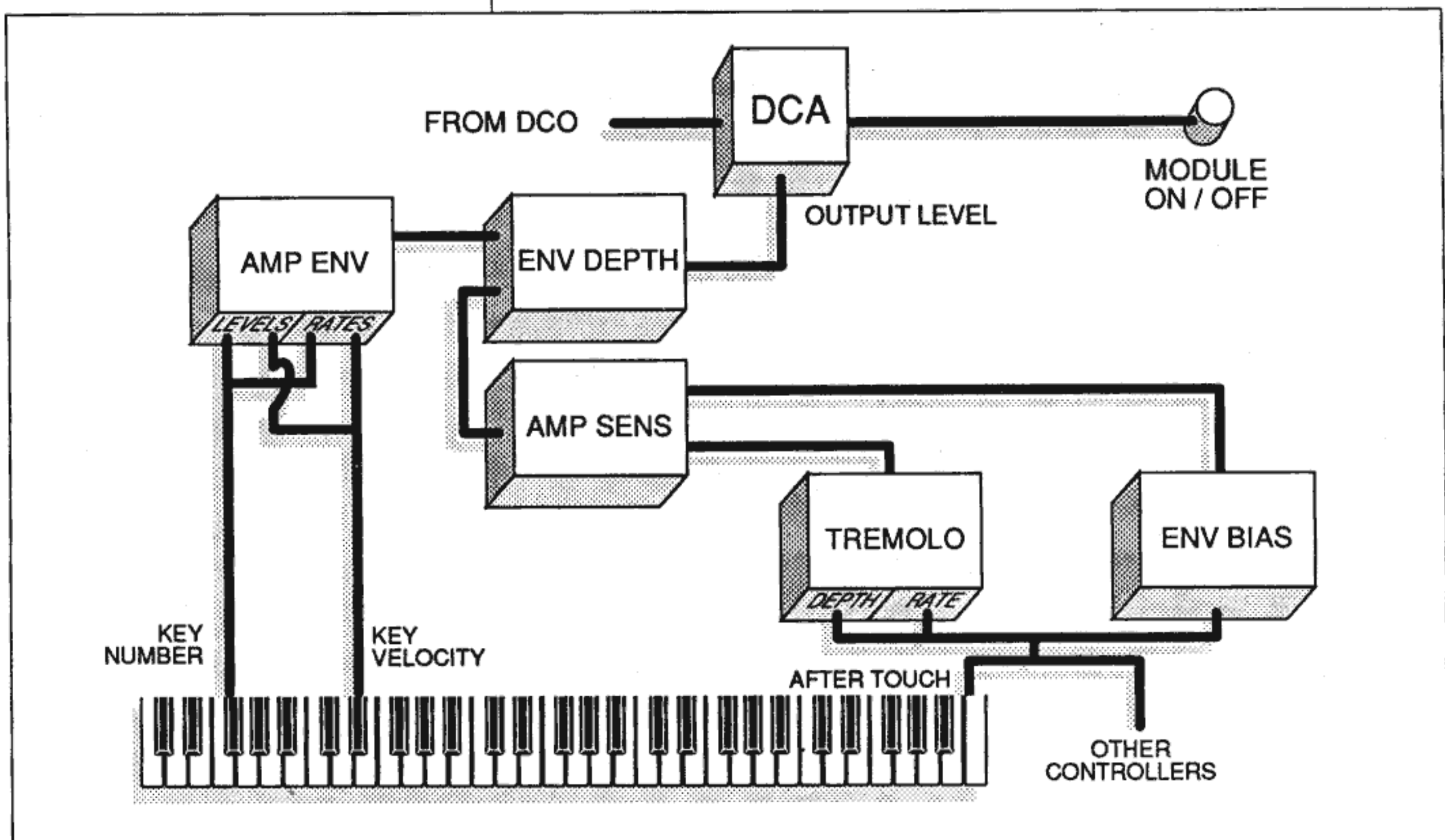
1. Start with "Init Voice".
2. Set the values as shown.
3. Play any key and listen. You will hear a steady vibrato.
4. Play each of the four vibrato waves. Each wave gives the vibrato a characteristic shape. Reset the wave value to "TRIANGLE".
5. Play and listen to different depth settings. The higher the depth value, the greater the pitch change. Reset the depth to its original value. Vibrato depth can be controlled by any of the VZ's controllers: wheels, after touch, foot pedal. If you want to hear vibrato only when you move a controller, be sure to set this depth value to zero. For now, set the depth to 50.
6. Set the rate to 35. Play some chords by holding down one finger at a time, until you are playing five keys at once. Notice that, no matter how you play them, the vibrato is synchronized for all the notes.
7. Set the multi value to "ON" and repeat the previous step. This time, the vibrato is not synchronized.
8. Until now, vibrato was heard as soon as you pressed a key. Play and listen to different delay settings. The higher the depth value, the longer you must hold down a key before you hear the vibrato effect fade in. The delay setting has no effect on vibrato depth, which is controlled by wheels, after touch or the foot pedal.

DCA Parameters

Here's a summary of the voice parameters associated with the DCA:

- **AMP ENV:** Creates an amp envelope that changes the output level of each module when notes are played.
- **ENV DEPTH:** Sets the overall depth of the amp envelope of each module.
- **KF LEVEL:** Varies amp envelope depth according to which keys are played.
- **VEL LEVEL:** Varies amp envelope depth according to the velocity used to play the note.
- **KF RATE:** Varies amp envelope rates according to which keys are played.
- **VEL RATE:** Varies amp envelope rates according to the velocity used to play the note.
- **TREMOLO:** Creates amplitude modulation effects.
- **AMP SENS:** Controls the overall depth of ENV BIAS and TREMOLO effects.
- **TOTAL LEVEL:** Acts as a "master volume" to control overall amplitude of all eight modules.

DCA Parameters



The following experiments will guide you through the different DCA parameters on the VZ.

Amp Envelope

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

AMP ENV									ENV DEPTH
STEP	1	2	3	4	5	6	7	8	DEPTH 99
RATE	50	50	50	50	50	50	50	50	
LEVEL	99	0	99	0	99	0	99	0	
SS/ED	-	-	-	-	-	-	-	ED	

1. Start with "Init Voice".
2. Enter the ENV DEPTH parameter. Set the depth value to "99".
3. Enter the AMP ENV parameter.
4. Set the rates and levels as shown.
5. Set step 2 to "end".
6. Play any key. You will hear a note that begins with a slow attack and ends with a slow fade to silence.
7. Play and listen to notes with different rate settings for step 1 and 2. The higher the rate value, the faster the loudness change.
8. Reset both rates to 50. Play and listen to notes with different level settings for step 1 and 2. The higher the level value, the louder the sound.
9. Reset level 1 to 99 and level 2 to 0. Set step 8 to be the end step. Play any key and hold it. You will hear a note with four attacks, then the note fades to silence.
10. Play any key, but this time release the key as soon as you hear the first attack. Play it again, but this time release the key as soon as you hear the second attack. Play it once more, releasing the key as soon as you hear the third attack. In each case, the note starts to fade to silence as soon as the key is lifted. When a key is released, the envelope jumps directly to the end step if there is no sustain step.
11. Repeat the previous instruction, but each time move the location of the end step (from step 8, to step 7, to step 6, and so on). Notice that an envelope can end in silence or a held tone.
12. Reset the end step to step 8. Set the sustain step to step 1. Play any key and hold it. Now you will hear a single attack and a sustaining tone. Release the key and you will hear three attacks before the note fades out. When there is a sustain step, all of the steps between the sustain and end step are played when a key is released.
13. Repeat the previous instruction, but each time move the location of the sustain step (from step 1 to step 2, and so on). Notice that a note can sustain silence or a held tone.

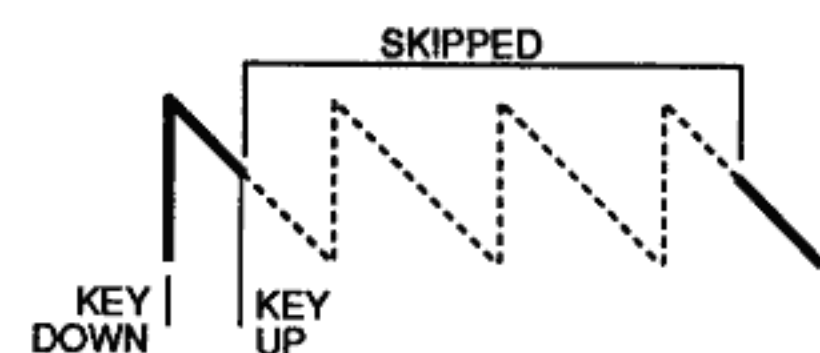
The overall amount of the amp envelope effect is set with the depth parameter. It acts like a volume control for the module. If it is set to "0", no sound will be heard from the module, regardless of any other settings.

It is possible control the envelope depth value with the KF LEVEL and VEL LEVEL.

WITH SUSTAIN STEP								
STEP	1	2	3	4	5	6	7	8
RATE	99	50	99	50	99	50	99	50
LEVEL	99	00	99	00	99	00	99	00
SS / ED	SS	-	-	-	-	-	-	ED



WITHOUT SUSTAIN STEP								
STEP	1	2	3	4	5	6	7	8
RATE	99	50	99	50	99	50	99	50
LEVEL	99	00	99	00	99	00	99	00
SS / ED	-	-	-	-	-	-	-	ED



Key Follow Level

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

AMP ENV								
STEP	1	2	3	4	5	6	7	8
RATE	50	50	50	50	50	50	50	50
LEVEL	99	0	99	0	99	0	99	0
SS/ED	SS	-	-	-	-	-	-	ED

ENV DEPTH	
DEPTH	99

KF LEVEL								
POINT	1	2	3	4	-	-	-	-
KEY	C2	F4	F5	C9	-	-	-	-
LEVEL	99	99	1	0	-	-	-	-

1. Start with "Init Voice".
2. Enter the ENV DEPTH parameter. Set the depth value to "99".
3. Enter the AMP ENV parameter.
4. Set the rates and levels as shown.
5. Enter the KF LEVEL parameter.
6. Set the key numbers and levels as shown.
7. Play F4 and hold it. You will hear a note with four attacks.
8. Play and listen to keys below F4. They will all be of equal loudness.
9. Play and listen to keys between F4 and F5. The notes will become progressively softer as you play higher keys.
10. Play and listen to keys above F5. No sound will be heard.

This voice parameter allows you to scale the loudness of each module to the keyboard. This lets you create key splits or positional cross-fades within a single voice. (Be sure to read *Single Voice Key Splits and Cross Fades* in Part 3.). Remember, the overall loudness of a module is determined by the value of the amp envelope depth parameter.

Velocity Level

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

AMP ENV								
STEP	1	2	3	4	5	6	7	8
RATE	50	50	50	50	50	50	50	50
LEVEL	99	0	99	0	99	0	99	0
SS/ED	SS	-	-	-	-	-	-	ED

ENV DEPTH	
DEPTH	99

VEL LEVEL	
SENS	31
CURVE	3

1. Start with "Init Voice".
2. Enter the ENV DEPTH parameter. Set the depth value to "99".
3. Enter the AMP ENV parameter.
4. Set the rates and levels as shown.
5. Enter the VEL LEVEL parameter.
6. Set the sensitivity and curve values as shown.
7. Play a single key repeatedly, using different velocities. The more velocity you use, the louder the note.
8. Change the curve value to "4" and repeat the previous step. Now notes will get softer with greater velocity.
9. Play and listen to each of the different curves.

This voice parameter allows you to control the output level of each module with velocity. This lets you set up realistic piano-like dynamics, and effects like velocity cross fades.

Key Follow Rate

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

AMP ENV								ENV DEPTH	
STEP	1	2	3	4	5	6	7	8	DEPTH
RATE	50	50	50	50	50	50	50	50	99
LEVEL	99	0	99	0	99	0	99	0	
SS/ED	SS	-	-	-	-	-	-	-	ED

KF RATE							
POINT	1	2	3	-	-	-	-
KEY	C2	F4	C7	-	-	-	-
LEVEL	0	18	36	-	-	-	-

1. Start with "Init Voice".
2. Enter the ENV DEPTH parameter. Set the depth value to "99".
3. Enter the AMP ENV parameter.
4. Set the rates and levels as shown.
5. Enter the KF RATE parameter.
6. Set the key numbers and levels as shown.
7. Play and listen to keys between C2 and C7. The notes become more percussive as you play higher keys.

This voice parameter allows you to scale the amp envelope rates to the keyboard.

Velocity Rate (DCA)**NORMAL MODE**

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

AMP ENV								
STEP	1	2	3	4	5	6	7	8
RATE	50	50	50	50	50	50	50	50
LEVEL	99	0	99	0	99	0	99	0
SS/ED	SS	-	-	-	-	-	-	ED
	E*	*	E	*	E	*	E	*

ENV DEPTH
DEPTH 99

VEL RATE
SENS 20
CURVE 1

1. Start with "Init Voice".
2. Enter the ENV DEPTH parameter. Set the depth value to "99".
3. Enter the AMP ENV parameter.
4. Set the rates and levels as shown.
5. Enter the VEL RATE parameter.
6. Set the values as shown.
7. Play a single key repeatedly, using different velocities. The more velocity you use, the more percussive the attacks of the notes become.
8. Repeat the previous step, but experiment by enabling different steps in the envelope.
9. Reset to the original settings. Now, play and listen to each of the velocity curves.

This voice parameter allows you to scale the rates of any steps in the amp envelope of each module to velocity.

Tremolo**NORMAL MODE**

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

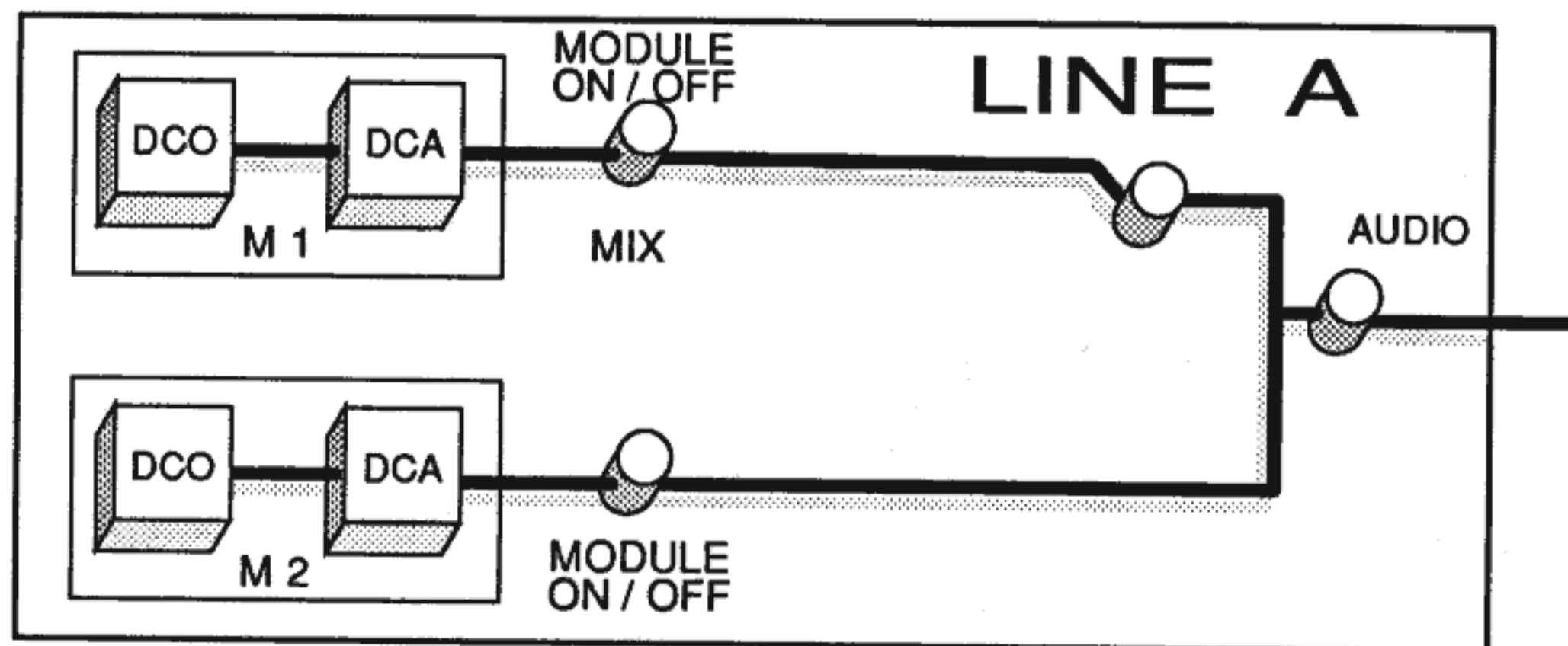
TREMOLO				
WAVE	DEPTH	RATE	DELAY	MULTI
TRIANGLE	50	50	0	OFF

1. Start with "Init Voice".
2. Enter the AMP SENS parameter and set the value to 7.
3. Enter the TREMOLO parameter.
4. Set the values as shown.
5. Play any key and listen. You will hear a steady tremolo.
6. Play and listen to each of the four tremolo waves. Each wave gives the tremolo a characteristic shape. Reset the wave value to "TRIANGLE".
7. Play and listen to different depth settings. The higher the depth value, the greater the loudness change. Reset the depth to the original value. Tremolo depth can be controlled by any of the VZ's controllers: wheels, after touch, foot pedal. If you want to hear tremolo only when you move a controller, be sure to set this depth value to "0".
8. Play some chords by holding down one finger at a time, until you are playing five keys at once. Notice that, no matter how you play them, the tremolo is synchronized for all the notes.
9. Set the multi value to "ON" and repeat the previous step. This time, the tremolo is not synchronized.
10. Until now, tremolo was heard as soon as you pressed a key. Play and listen to different delay settings. The higher the depth value, the longer you must hold down a key before you hear the tremolo effect fade in. The delay setting has no effect on tremolo depth controlled by wheels, after touch or the foot pedal.

Experimenting With Lines

A single VZ voice is made up of four *lines*. Each line is made up of two modules. The modules in a line can each be heard independently, or one module may modify the sound of another depending on the value of the LINE parameter. Here is a brief summary of the three different line values. (We use Line A, which consists of modules M1 and M2, for our examples here. Each line is identical except for their respective module numbers.)

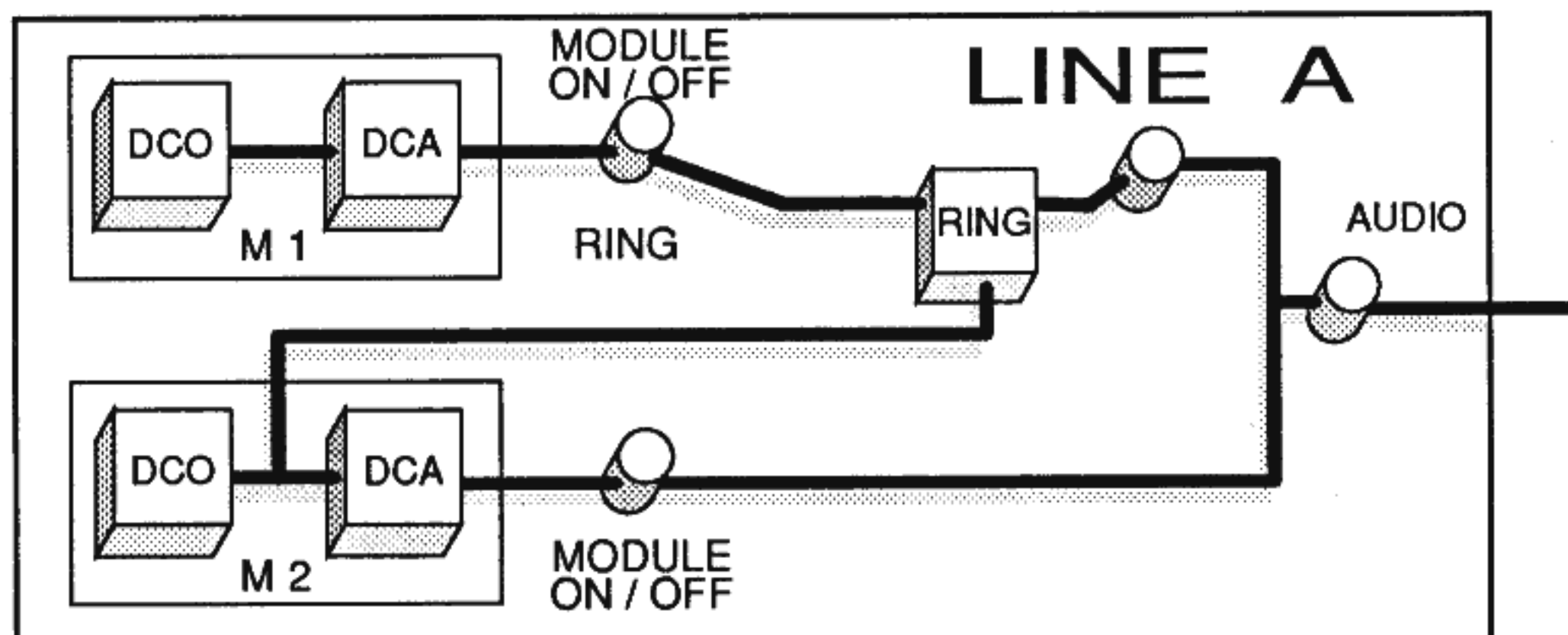
Mix



- The waveform, tuning and output level of each module is independent.
- Both modules are sound sources.

The modules don't interact with each other. M1 and M2 are both routed directly to the audio outputs of the VZ

Ring

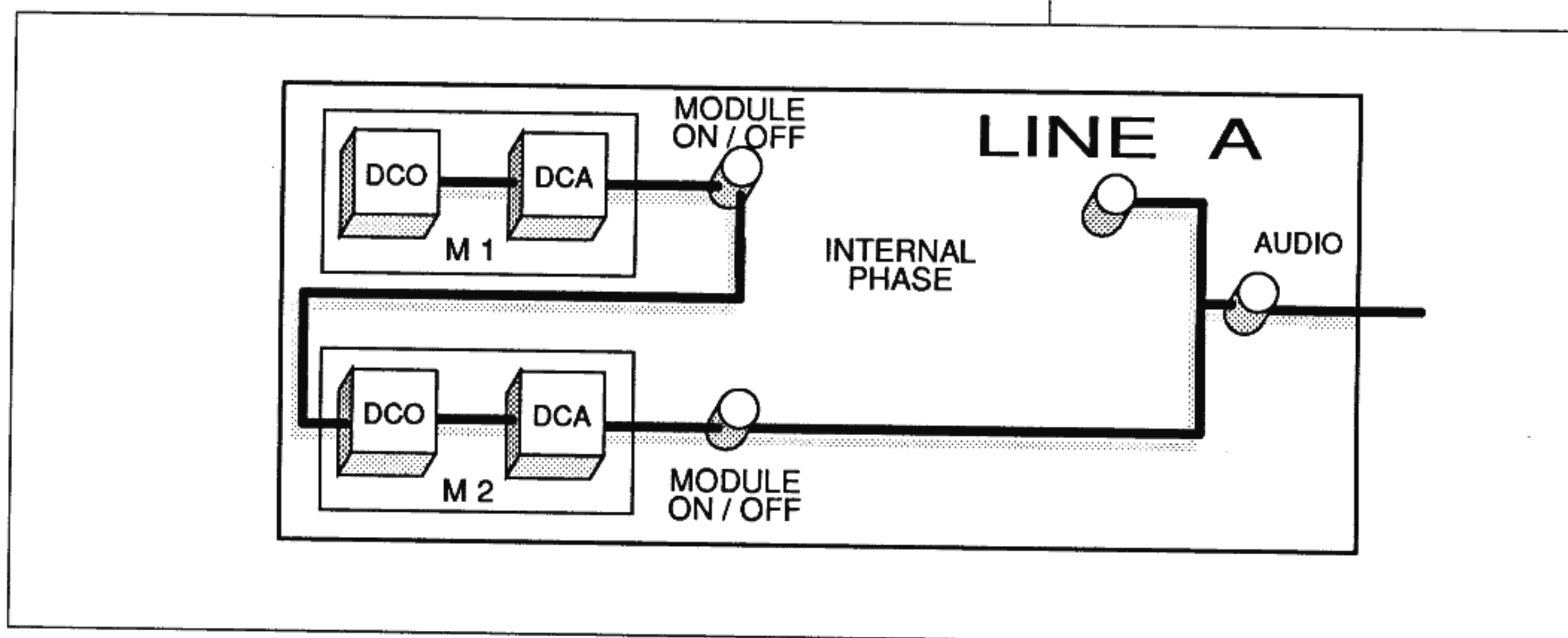


- The waveform, tuning and output level of each module is independent.
- M2 is a sound source *and* a modulator. It is routed directly to the audio outputs and its DCO is also routed to the ring modulator. M1 is routed directly to the ring modulator. The ring modulator is routed to the audio outputs.
- Listen to M1 alone to hear just the ring modulated sound. Listen to both to hear the ring modulated sound, and the unmodulated sound of M2 mixed together.

The modules interact as follows:

- The output of the DCO of M2 ring-modulates M1.
- The modulation level of this DCO is fixed and always on. It is unaffected by the amp envelope depth or the M2 on/off button.
- Changing the detune values of either M1 or M2 produce drastic changes to the timbre of the ring-modulated sound.
- Changing the waveform values of either M1 or M2 will produce subtle changes to the timbre of the ring-modulated sound.

Internal Phase



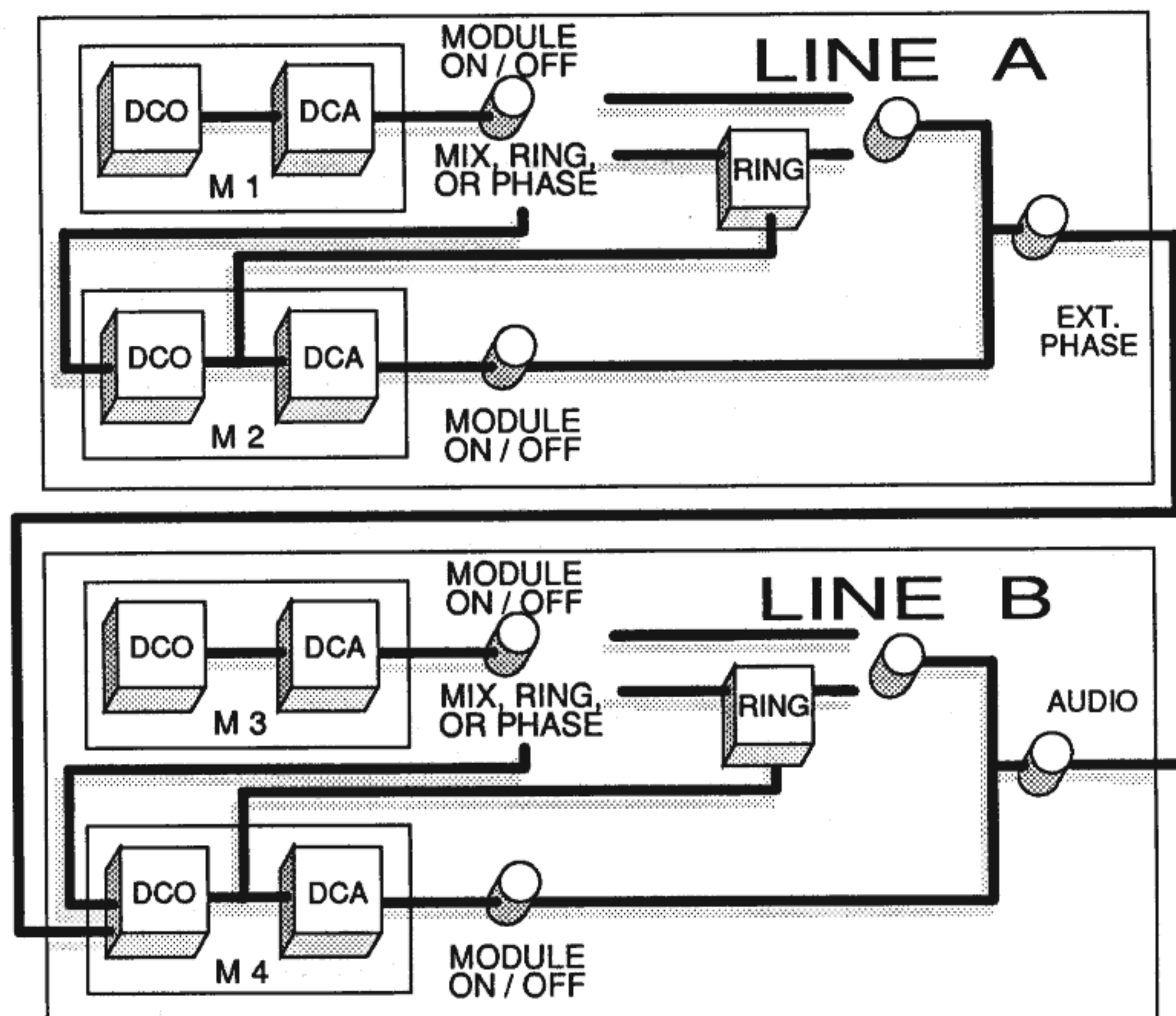
- The waveform and output level of each module is independent. Both modules are tuned to the current settings of the M1 DETUNE parameters. (M2 DETUNE settings have no effect when the line is set to phase.)
- M2 is a sound source. It is routed directly to the audio outputs. M1 is a modulator.
- You can't hear M1 directly, but you can hear its effect on the timbre of M2.
- Both modules must be on for you to hear the phase modulation effect.

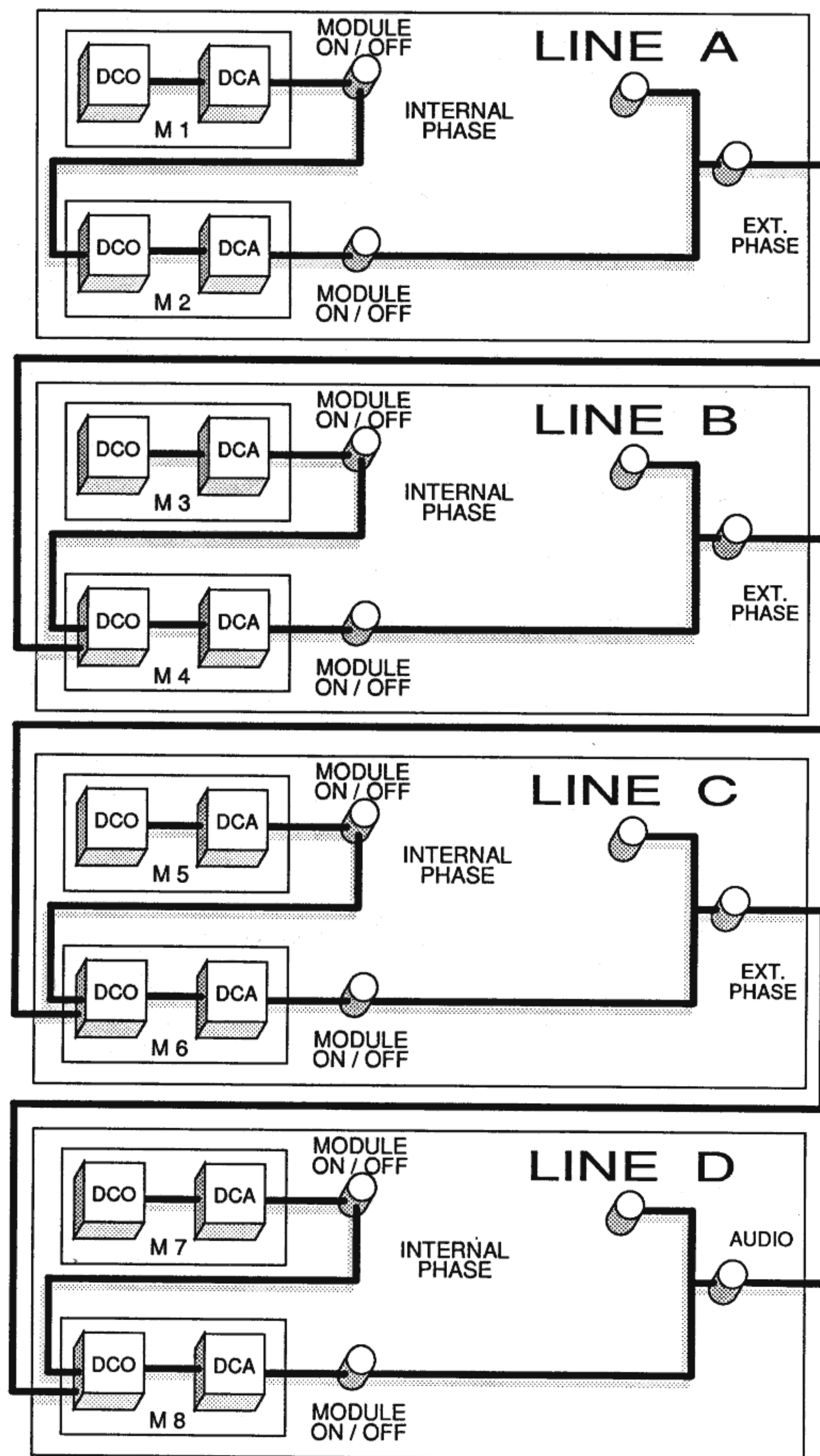
The modules interact as follows:

- The output of M1 phase modulates the DCO in M2.
- The modulation level is variable. It is determined by the output level of M1. The output level is controlled by all of the DCA voice parameters of M1.
- Changing the output level of M1 with the amp envelope, tremolo, or envelope bias functions, will change the timbre of the sound of M2. The higher the output level, the brighter the timbre.
- Changing the waveform values of either M1 or M2 will produce subtle changes in overall timbre.

External Phase

Lines B, C, and D have one additional configuration. The DCO of one module in each of these lines may be phase-modulated by the output of the line above it.





The following experiments will demonstrate each of the different line configurations on the VZ.

Mix

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
MIX

DETUNE						
	FIX	HARMONIC	POLARITY	OCT	NOTE	FINE
M1	OFF	1/2	-	1	0	0
M2	OFF	1	+	0	0	0

AMP SENS							
M1	M2	M3	M4	M5	M6	M7	M8
7	0	-	-	-	-	-	-

EFFECT MENU

MOD WHEEL (DEF WHEEL 1)				
	1	2	3	4
SENSITIVITY	99	-	-	-
VIB DEPTH	OFF	-	-	-
VIB RATE	OFF	-	-	-
PITCH	OFF	-	-	-
PORTM TIME	OFF	-	-	-
TREM DEPTH	OFF	-	-	-
TREM RATE	OFF	-	-	-
A ENV BIAS	ON	-	-	-

1. Start with "Init Voice" and set the parameters for M1 and M2 as shown. The output level of M1 can now be controlled by moving the mod wheel.
2. Hold down any key and move the mod wheel back and forth. You will hear the sound of M1 fade in and out with the motion of the wheel.
3. While listening to both modules, experiment with changing the WAVEFORM, DETUNE, and AMP ENV DEPTH settings of M1. Note that changes you make to the sound of M1 don't affect the sound of M2.
4. Repeat the previous step, but this time change the settings of M2. Note that changes you make to the sound of M2 don't affect the sound of M1.

Ring

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
RING

DETUNE						
	FIX	HARMONIC	POLARITY	OCT	NOTE	FINE
M1	OFF	1	+	0	0	0
M2	OFF	1	+	0	0	0

AMP SENS							
M1	M2	M3	M4	M5	M6	M7	M8
0	7	-	-	-	-	-	-

EFFECT MENU

MOD WHEEL (DEF WHEEL 1)				
	1	2	3	4
SENSITIVITY	99	-	-	-
VIB DEPTH	OFF	-	-	-
VIB RATE	OFF	-	-	-
PITCH	OFF	-	-	-
PORTM TIME	OFF	-	-	-
TREM DEPTH	OFF	-	-	-
TREM RATE	OFF	-	-	-
A ENV BIAS	ON	-	-	-

1. Start with "Init Voice" and set the parameters for M1 and M2 as shown. The output level of M2 can now be controlled by moving the mod wheel.
2. Hold down any key and move the mod wheel back and forth. You will hear the sound of M2 fade in and out with the motion of the wheel.
3. Turn M2 off by moving the mod wheel to its minimum position. When you play, you will hear only the output of the ring modulator.
4. Enter the DETUNE parameter.
5. Play one key repeatedly and change the value of the M2's NOTE parameter from "0" to "11" as you play. Use the mod wheel to turn M2 on and off. You will hear the timbre change as you change the tuning of M2. Reset the value to "0". Next, change the value of M1's NOTE parameter from "0" to "11" as you play. You will hear the timbre change as you change the tuning of M1. Note that the sound of M2 doesn't change. Reset the value to "0".
6. Experiment with changing the WAVEFORM, AMP ENV DEPTH, and remaining DETUNE settings of M1. Use the mod wheel to turn M2 on and off. Note that all of these changes affect only the ring-modulated sound of M1.
7. Repeat the previous step, but this time change the settings of M2. Note that the AMP ENV DEPTH settings of M2 have no effect on the ring modulated sound of M1, but all of the changes affect the sound of M2.

Internal Phase

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE
PHASE

DETUNE						
	FIX	HARMONIC	POLARITY	OCT	NOTE	FINE
M1	OFF	1	+	0	0	0
M2	OFF	1	+	0	0	0

AMP SENS							
M1	M2	M3	M4	M5	M6	M7	M8
7	0	-	-	-	-	-	-

EFFECT MENU

MOD WHEEL (DEF WHEEL 1)				
	1	2	3	4
SENSITIVITY	99	-	-	-
VIB DEPTH	OFF	-	-	-
VIB RATE	OFF	-	-	-
PITCH	OFF	-	-	-
PORTM TIME	OFF	-	-	-
TREM DEPTH	OFF	-	-	-
TREM RATE	OFF	-	-	-
A ENV BIAS	ON	-	-	-

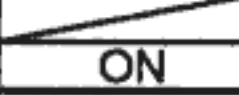
1. Start with "Init Voice" and set the parameters for M1 and M2 as shown. The output level of M1 can now be controlled by moving the mod wheel.
2. Hold down any key and move the mod wheel back and forth. You will hear the timbre of M2 grow brighter as the mod wheel is moved from minimum to maximum. Be aware that this timbre change can be produced by *any* voice parameters that affect the output level of M1. In other words, each of the DCA voice parameters can be used to control timbre changes.
3. Move the mod wheel to the maximum position. Turn M2 off with the module on/off key. Play any key. Note that you hear no sound even though M1 is on. Turn M2 back on. Remember, when set to phase, you cannot hear M1 directly — you can only hear its effect on the timbre of M2.
4. Enter the DETUNE parameter.
5. Play one key repeatedly and change the value of the of M1's NOTE parameter from "0" to "11" as you play. Note that the timbre of the sound doesn't change. The pitch of the sound moves up in half-steps. Reset the value to "0". Next, change the value of M2's NOTE parameter from "0" to "11" as you play. Nothing happens. Remember, when set to phase, the DETUNE values of M1 control the tunings of both modules in the line. The detune values of M2 have no effect on the sound. Reset the value to "0".
6. Experiment with changing the WAVEFORM and AMP ENV DEPTH settings of M1. Changing the waveform of M1 will change the overall timbre quality of the phase-modulated sound of M2. Changing the output level of M1 changes the overall depth (brightness) of the phase modulation effect.
7. Repeat the previous step, but this time change the WAVEFORM and AMP ENV settings of M2. The waveform setting changes the overall timbre of the phase-modulated sound of M2. The envelope depth changes the loudness of the phase modulated sound of M2.

External Phase

NORMAL MODE

MODULE ON/OFF							
M1	M2	M3	M4	M5	M6	M7	M8
ON	OFF	OFF	ON	OFF	OFF	OFF	OFF

VOICE PARAMETER MENU

LINE			
INT LINE		EXT PHASE	
M1 M2	MIX		
M3 M4	MIX		
		ON	

DETUNE						
	FIX	HARMONIC	POLARITY	OCT	NOTE	FINE
M1	OFF	1	+	0	0	0
M2	OFF	1	+	0	0	0

AMP SENS							
M1	M2	M3	M4	M5	M6	M7	M8
7	0	0	0	-	-	-	-

EFFECT MENU

MOD WHEEL (DEF WHEEL 1)				
	1	2	3	4
SENSITIVITY	99	-	-	-
VIB DEPTH	OFF	-	-	-
VIB RATE	OFF	-	-	-
PITCH	OFF	-	-	-
PORTM TIME	OFF	-	-	-
TREM DEPTH	OFF	-	-	-
TREM RATE	OFF	-	-	-
A ENV BIAS	ON	-	-	-

1. Start with "Init Voice" and set the parameters for M1 through M4 as shown. The output level of M1 can now be controlled by moving the mod wheel.
2. Move the mod wheel to its minimum position and play any key. You will hear the sound of M4.
3. While holding down a key, slowly turn the mod wheel to its maximum position. You will hear the sound of the output of Line 1 phase modulating M4. (At this point, the output of Line 1 is only M1.)
4. When using external phase modulation, it is possible to use different tunings for the modulator and the sound source. Enter the DETUNE parameter for M1.
5. Play one key repeatedly and change the value of the of M1's HARMONIC parameter from "1" to "8" as you play. Note that the timbre of the sound changes drastically. Experiment with the other detune values, then reset the HARMONIC value to "1".
6. Repeat the previous step. This time change the DETUNE parameter for M4. Once again, the timbre of the sound will change drastically as the values are changed.

This experiment shows the basics of using external phase modulation. There are many variations left to try. For example, since M4 is modulated by the output of Line A you can turn on M2 and use *both* M1 and M2 to phase modulate M4. You will also get different results if you change Line A from MIX to RING, or PHASE. You can also set LINE B to MIX, RING or PHASE while M4 is modulated by Line 1. In addition, you can use external phase to link as many as four lines together in a phase modulation "chain". (See page 59.) The ability to set up these configurations shows one reason iPD is such a flexible and powerful means of sound synthesis.

Finding Your Way Around a VZ Sound

As we have seen, the eight modules in single VZ voice can be configured in many different ways. For almost all voices, a module will either affect the loudness or timbre of the overall sound. When you want to edit a sound to add in an effect like after touch control of loudness, or foot pedal control of timbre, you'll need to be able to determine which modules to control. Here's a quick and simple way to determine what each of the different modules is contributing to the overall sound of a voice.

For the VZ-1 and VZ-10M

- Push the MENU 1 button, and make a note of the active modules in the voice. Active modules are indicated by a red LED.
- Turn off all of the modules in the voice.
- Starting with module 1, turn on a module, play a key and listen. If you hear anything, that module is a loudness module (jot down the number if you want). Turn it off. Turn on the next module and listen again. Continue in this manner until you have "auditioned" all of the active modules. Modules that you heard when turned on, are loudness modules. Changing the output of these modules, either with their EGs, or with controllers (via the AMP SENS parameter) will affect the loudness of the sound. (These are the modules that you will want to control with after touch from a wind controller for dynamic expression.)
- Active, but silent, modules are phase, or ring modulators. These modules are "on", but produce no sound when auditioned with the above procedure. Changing the output of these modules, either with their EGs, or with controllers (via the AMP SENS parameter) will affect the timbre of the sound.

For the VZ-8M

- Enter the Voice Parameter menu.
- Push the "on/off" key. Loudness modules are displayed as reverse-type numbers; timbre modules are displayed in normal type; inactive modules are indicated by a dot.