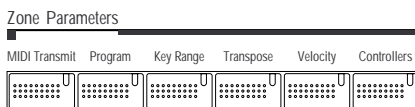


Chapter 5

Zone Parameters

This chapter describes all of the menus you can access from the top row of **Zone Parameter** buttons. These include: **MIDI Transmit**, **Program**, **Key Range**, **Transpose**, **Velocity**, and **Controllers**.



Before we dig into the Zone Parameters, let's review a few things that, if you keep in mind, will make your life easier.

First, *Zones*:

- You select which Zone you are working on with the four **Zone** buttons — press a button once to make it current. The current Zone number will be shown at the upper left of the display.
- If a button is showing green, and no other button is red, then it is playing — i.e., you can hear it. If it is orange, it is muted. To mute the current Zone, press its button. To mute a Zone that's not current, press its button *twice*.
- You can solo the current Zone (mute all the others) by pressing the **Solo** button. The current Zone's button turns red. Pressing any other **Zone** button will solo its Zone. Pressing **Solo** again turns the other Zones back on. Zones that are not Soloed will still transmit non-note information.
- A Zone that has been turned off will have a dark button, and will show "Off" in the display. (If you Solo a dark Zone, you will hear nothing.)

Second, *Data Entry*:

Remember there are two methods of entering data for most parameters:

- *Direct Entry*, using the Alpha wheel, decrement/increment buttons, or the numeric keypad, and
- *Intuitive Entry*, using sliders, pedals, wheels, buttons, or notes.

Also remember that most of the Parameter buttons access menus of two or more parameters, so don't get confused if you don't see the parameter you want immediately after pressing a button. Pressing a Parameter button always goes to the *first* item on its menu — even if you're already *in* the menu. To get to other parameters in the menu, use the left and right cursor buttons directly underneath the display.

Information about storing Zone parameters to a Setup is on page 5-19. The section below discusses storing Zone parameters with the PC88's Internal Voices.

Zone Parameters and Internal Voices

The PC88's Internal Voices have only one active Zone: Zone 1. Saving Zone parameters to Internal Voices is a little different than saving to a Zone in a Setup, since any parameter you change will affect all Internal Voices; you cannot change parameters for just a single voice. To change one of the parameters of the **Internal Voices**, first choose the parameter you want to change (for example, "Transposition: -12"). Then, press the **Store** button, followed by the **Internal Voices** button at the "Save Setup xx?" prompt. When the display says "Save to Internal Voices?" you can either press the **Enter** button to confirm the change, or return to Internal Voices mode without making any changes by pressing **Internal Voices** followed by a Sound Select button. See "Customizing the Internal Voices Mode" in Chapter 3 for some examples of this.

MIDI Transmit

Parameter	Values
MIDI Channel	Off, 1-16
Dest	Local, MIDI, Local+MIDI
BndRng (ST)	0-127
BndRng (ct)	0-127

MIDI Channel

The first parameter you see after pressing this button is the MIDI channel that the Zone will send data on. Setting this to “Off” turns the Zone off completely: no MIDI data and no local sound either. A Zone that is off will have a dark **Zone** button.

Destination

The second parameter (press the right cursor button) is the destination (**Dest**) of the data being generated in the Zone. Data can be sent either to the PC88’s sounds (**Local** — which includes the VGM sounds if the board is installed); out the MIDI Out jack (**MIDI**); or both (**Local+MIDI**). Note that if MIDI is *not* selected, and you play the PC88 into a sequencer, you may hear nice sounds, but the sequencer won’t record anything from this Zone.

Generally speaking, each Zone will have its own MIDI channel. This is necessary if you want to layer sounds on the PC88. If two Zones have the same MIDI channel (and destination), but they have different Program settings, there will be conflicts: no MIDI device, including the PC88, can respond correctly to two different simultaneous Program Change commands on one channel. The result will be that only one Program Change will be recognized, but every note played will sound double. This can create unpredictable odd timing effects, and will reduce polyphony by 50%.

There will, however, be occasions when “stacking” Zones on the same MIDI channel might come in handy. One such situation would be if you would like a physical controller on the PC88 to send data out on two *different* numbered MIDI controllers on the *same channel*. In this case, you must create two Zones assigned to the same channel, but with different controller assignments. If a receiving synth is using Controller #1 for modulation depth and Controller #13 for modulation speed, for example, you can increase both the depth and the speed with one slider by assigning that slider in Zone 1 to #1 and in Zone 2 to #13, and assigning both zones to the same MIDI channel. (You will probably want to do something to make sure you aren’t sending doubled notes. Use the **Key Range** parameter to make sure the two zones aren’t set to the same note range.)

Another example: create two or more Zones that are identical except for their transposition settings. Now you can play parallel intervals (or chords) with single keystrokes.

Pitchbend Range

The third and fourth parameters in this menu, **BndRng (ST)** and **BndRng (ct)**, set the pitchbend range. This is the interval that the pitch wheel will change the pitch at the end of its travel, both top (up) and bottom (down). The first parameter is coarse, which sets the range in semitones (“ST”). The second is fine, which sets it in cents, or 1/100ths of a semitone (“ct”). Since both values are positive, they add to each other: If you want to set the range to just under 3 semitones, you would set ST to 2 and ct to 99. The maximum value for both parameters is 127.

Whenever this parameter is set (or the Setup containing it is called up), a pair of MIDI Controller Messages known as Registered Parameters are sent on the MIDI channel assigned to this Zone. These messages will set the coarse and fine pitchbend range of *any* MIDI instrument receiving data on this channel from the PC88, as long as that instrument recognizes the messages. It will set itself to respond to pitchbend commands exactly the same way as the Zone on the PC88. Since this a relatively recently-adopted addition to the MIDI specification, there are plenty of instruments that don't recognize Registered Parameters — if you want to adjust the pitchbend range on one of those, you'll have to do it by hand. The PC88 not only sends them, it also recognizes them, so if you send the PC88 these commands from an external source (like another PC88), it will respond accordingly. (See Appendix F for more information about Registered Parameters.)

Program

Parameter	Values
(Program)	0 - 127 + name
Bank (press <<<)	0:Internal Voices - 16383(127/127)
Entry Transmit	Off - On
Bank Mode	None, Ctl 0, Ctl 32, Ctl 0/32, K2000, K1000
PNumDisp	0-127, 1-128, 11-88, A1-H8
PNameDisp	Off, Internal, Gen. MIDI

The first parameter under this button selects the program assigned to the Zone. When you first enter this menu, you have the choice of selecting among the 64 Internal Voices. Use the **Sound Select** and **Previous** or **Next Group** buttons just as you would in Internal Voices mode, or use the wheel and buttons in the **Data Entry** section, or use Intuitive Entry with any controller. (Don't press the **Internal Voices** button or you will leave Setups mode and lose everything you've done on this Setup!) If the Zone has been turned off, the program name will be "Zone Off". Setting a program selects a voice for the Zone, and also sends a Program Change command out the MIDI cable, on the channel assigned to the Zone. This is how you use the PC88 to select programs on your other instruments.

Bank



As we saw in the last chapter, if the VGM board is installed, you can use sounds from Banks other than the Internal Voices. The Internal Voices are in Bank 0; VGM sounds are in Banks 1-3.

There are two ways to access Banks from the **Program** menu. One is to use the numeric keypad: Press the **Program** button, enter the number of the Bank, and then press the "+/-" button (next to the "0" button). Then enter the Program number, and press **Enter**. The +/- button creates a colon (":") in the display, which separates the Bank number from the Program number.

The second method uses a special Bank parameter. From the Program display, press the *left* cursor button (<<<). Now the display says "Bank:" and the name, if there is one, of the Bank.

(If there isn't one, it just shows a number.) Here's an example of the PC88's display when you press the <<< key while an internal voice is active:

```

      Zone      Bank      Program
      number    number    number
Zone:1         0:001
Bank:Internal  Voices
-----
                Bank name

```

You can set the Bank by any of the usual data entry methods, Direct or Intuitive. Like Programs, any Bank can appear in any Zone. For example, turn the alpha wheel one notch clockwise while the above is displayed to see:

```

Zone:1         1:001
Bank:General  MIDI

```

Notice that the Bank number and name change, but the Zone number and program number don't.

Sending Bank Select Messages to External MIDI Devices

Bank Select messages can go to external MIDI devices as well, if the Destination is set accordingly. Some instruments have more banks than the PC88: the Kurzweil K2000, for example, has 10. The MIDI Specification says a device can have up to 16,384(!) Banks, and the PC88 gives you access to every single one of them. Bank switching over MIDI makes it easy for the PC88 user to scroll through sounds on external instruments, no matter how many Banks they might have.

If you select an empty Bank (like Bank 1 if you don't have the VGM board; Bank 4 if you do), the Zone will produce no sound on the PC88, but will still send MIDI data out. The Program display will say "External Program," indicating that any sounds produced will be created by an external device. If the Bank parameter is showing on the display, instead of a name you will see some numbers, in the display below, for example: "292 (2/36)".

```

Zone:1         292:049
Bank:292      (2/36)

```

The first number is the Bank number and the ones in parentheses show the Bank number in the two-byte form (Most Significant Byte (MSB) followed by the Least Significant Byte (LSB)) prescribed by the MIDI Specification. The Bank number is the MSB multiplied by 128, plus the LSB. If this is confusing, don't worry — we'll discuss what it means shortly.

Press the right cursor (>>>) to return to the Program menu's program display. From the above display, for example, pressing >>> would change the display to this:

```

Zone:1         292:049
049 External Prog

```

From this display, use any data entry method to change the program number.

Entry Transmit

The next parameter on the Program menu (press the right cursor button, twice if you have to) is **Entry Transmit**. If it is set to **On**, then whenever you select this Setup, the program number assigned to the Zone will immediately be sent out as a Program Change command on the Zone's MIDI channel (assuming that MIDI is one of the destinations). When it is **Off**, no program change is sent from the Zone when the Setup is called. A Bank Select command may or may not accompany the Program Change, as we're about to see.

Bank Mode

Bank Mode determines if bank numbers will be sent over MIDI when the Setup is selected, and in what format.

None means no bank number is sent, just the program number. **Ctl 0** means that the bank number is sent as a MIDI Controller #0 message. **Ctl 32** means it is sent as MIDI Controller #32. **Ctl 0/32** means it is sent as a dual-controller (two-byte) message, with the MSB of the bank number sent as Controller #0 and the LSB as Controller #32. Single-byte Bank Select messages (either 0 or 32) allow you to specify banks numbered 0-127. Two-byte messages allow you to specify banks numbered 0-16,383. With 128 programs per bank, this allows you to access 2,097,152 different programs on one instrument. Have a good time, and call us when you're done.

Seriously, if all this seems bizarre to you, you're not alone. The MIDI Specification is a little ambiguous when it comes to Bank Select messages, as to whether they should be only Controller 0, only Controller 32, or both Controllers sent as a pair. Different manufacturers design their instruments to respond to different schemes, and if you send Bank Select in a form an instrument doesn't like, it may ignore it or interpret it wrong. This PC88 parameter is designed to allow the greatest flexibility in addressing other MIDI instruments. Usually you can look on the MIDI Implementation chart in the user's manual of an instrument to determine how it likes to receive Bank Select messages, and then set this parameter for each Zone to suit the instrument that is receiving data from it. The default setting, which will work with the largest number of other instruments, is **Ctl 0/32**.

There are two other options, which will be of special interest to owners of other Kurzweil instruments. Setting Bank mode to **K2000** takes advantage of that instrument's "Extended" mode. The Bank Select message is sent as Controller #32, with a value between 0 and 9 (remember the K2000 only supports 10 banks). The K2000 only supports 99 programs per bank, so Program Changes 100 or higher are sent as Bank Select 1, followed by the last two digits as a Program Change. For example, if Program 124 is assigned to the Zone, this will be sent out the MIDI jack as Bank Select (Controller #32) 1, and then Program Change 24.

K1000 is used with any of the 1200-series keyboards or modules, or any of the 1000-series instruments that have version 5 software installed. Those instruments pre-date the adoption of standard Bank Select messages; instead, they use Program Changes 100-109 as Bank Selects. If you select Bank 5: Program 42 for a PC88 Zone, for example, it will send out Program Change 105 followed by Program Change 42. PC88 program numbers over 99 are not sent.

Program Number Display

PNumDisp is useful because different MIDI instruments and sequencers refer to program numbers differently — another ambiguity in the MIDI Spec. Some start counting at 0, while others start at 1. Still others arrange them in groups of 8, with the first digit (or a letter) denoting the group, and the second digit denoting the number within the group.

This parameter allows you to display the program numbers on the PC88 so that they agree with the way your receiving instruments display them. It *changes nothing* in the outgoing MIDI data: it's merely a convenience to you, so that you aren't constantly adding or subtracting 1 or doing base-8 arithmetic to figure out how to get to specific sounds on your other synths. Whenever a program is displayed for this Zone, its number will follow the format you choose here. The choices are:

- **0-127** for those devices that believe life starts at zero
- **1-128** for those who start at one
- **11-88** for instruments that use this scheme (primarily Roland)
- **A1-H8** for other instruments that like this way of doing things

When using this last format, don't get confused with the Internal Voice mode's Groups: they each contain 16 programs, not 8.

Program Name Display

The final parameter under **Program** is **PNameDisp**, which determines how the program name will be shown in the display when you select the Zone but like **PNumDisp** has no effect on anything else, either the choice of program or the outgoing MIDI data.

If you set this to **Internal Voices**, the program name will show up as the name of the current PC88 sound from the Internal Voices bank or (if there is one) the VGM board. A program for which there is no internal sound (for example, in an empty bank) will be called “External Prog”. If **Dest** (MIDI Transmit Menu) is set to **MIDI**, then the display will read “External Prog.”

Set it to **General MIDI**, and the PC88’s display will show the General MIDI program list (the VGM board does *not* have to be installed for this.) This is helpful if you are driving an external General MIDI synth and would like to see those names displayed.

Set it to **Off** and the display says “External Prog” for all programs. Use this setting if you are using neither the internal sounds nor a General MIDI synth, to avoid possible confusion.

Key Range

Parameter	Values
Low:	C-1 to G9
Hi:	C-1 to G9
Note Map:	Off, Linear, 1 of 2, 2 of 2, 1 of 3, 2 of 3, 3 of 3, 1 of 4, 2 of 4, 3 of 4, 4 of 4, Invs, Const

Low, Hi

There are three parameters under the **Key Range** button. The first two, both of which appear on the initial display, set the lower and upper note limits of the Zone. Use the cursor buttons to move between the low and high settings. Intuitive entry is useful here: after you’ve chosen which limit to set, press and hold **Enter** and hit the note you want.

The limits of MIDI are C-1 to G9. The normal 88-key range is A0 to C8.

You can create “negative” ranges by setting the high limit *lower* than the low limit. This results in the Zone being active at the top and bottom of the keyboard, but being silent in the range between the two limits. This lets you create a layer with a “hole” in the middle, which you can then fill with a different sound on another zone (either internal or on an external synth).

Note Map

Note Map lets you change the way notes are sent from the PC88, which can be useful in a number of situations. The default setting is **Linear**: all notes go out as played. Moving decrementally takes you to **Off**: no notes are sent, but controllers and other non-note data are. Moving back up takes you through the “alternating” maps, which we’ll skip over for just a second.

After them comes **Inverse**, which turns the keyboard upside-down, with the highest key being A 0 and the lowest C 9. Finally, if you set it to Constant (**Const**) all of the keys on the keyboard will play the same note. The note defaults to C4, but you can change this with the **Transpose** parameter.

Alternating Maps

Alternating maps can be used when you are addressing multiple synthesizers that can play the same sound, to increase the apparent polyphony of your system.



An obvious use of alternating note maps is with the “64-Note Poly” instruments on the VGM board. The instruments in this Bank are exact duplicates of some of the sounds in the Internal Voices bank. By assigning all of the odd-numbered notes to the Internal Voices, and all of the even-numbered notes to the duplicates on the VGM board (which have the same names, preceded by “v”), you can achieve 64-voice polyphony within the PC88.

An example of how this is done is found in Setup #49 “64-note Piano”. The MIDI channel of Zone 1 is 1. Its Bank is Internal Voices and its Program is 000, “Classical Piano”. Look at its **Key Range** map: it is set to **1 of 2**. Only odd-numbered notes played on the keyboard will play sounds from the Internal Voices bank. Now go to Zone 2. Its MIDI channel is 2, its Bank is 64-Note Poly and its program is also 000, “vClassical Piano”, which is an exact copy of the sound in the Internal Voices bank. Its **Key Range**, however, is **2 of 2**. Only *even*-numbered notes will play the sounds on this Bank in the VGM board. Since each Bank can support 32 voices by itself, combining them in this way gives you 64 voices — unless you happen to play more than 32 odd or 32 even notes at a time!

This mapping of the keyboard is also applied to outgoing MIDI data: odd-numbered notes are sent out channel 1, and even-numbered ones channel 2. If you have two identical synths receiving on the two channels, say each with 16-voice polyphony, you can set one to channel 1 and the other to channel 2, and thereby combine them to create a single 32-voice instrument (and you don’t need the VGM board to do this).

You can use three Zones this way (**1 of 3**, **2 of 3**, **3 of 3**) or even, if you’re really ambitious, all four Zones (**1 of 4**, etc.). These maps won’t accomplish much on the PC88, but they can come in handy with external synths.

Transpose

Parameter	Values
Transposition:	-127 to 127

This is a simple menu: it has but one item. This parameter changes the pitch of the Zone, without changing its position on the keyboard. It also changes the MIDI note numbers generated by the keys in the Zone, without physically shifting the Zone. The range is ± 127 semitones. Since there are 12 semitones (or half steps) to an octave, you can transpose up or down over ten octaves. If you transpose out of the range of the active voice, however, no notes will sound; beyond MIDI note numbers, no notes will transmit.

If the Note Map is set to **Const**, then this parameter determines what note will be transmitted over the Zone — the sort of thing that comes in handy when you’re laying a ride cymbal over a bass, or a wood block over a flute. Intuitive Entry can be used with the keyboard to set this parameter, holding the **Enter** button and playing a note. C4 is no transposition; above that is up and below it is down. To enter negative numbers on the numeric keypad, use the +/- button any time before you press **Enter**: e.g., to enter -100, you can press +/-, **1**, **0**, **0**, **Enter**; or **1**, +/-, **0**, **0**, **Enter**; or **1**, **0**, **0**, +/-, **Enter**; etc.

Velocity

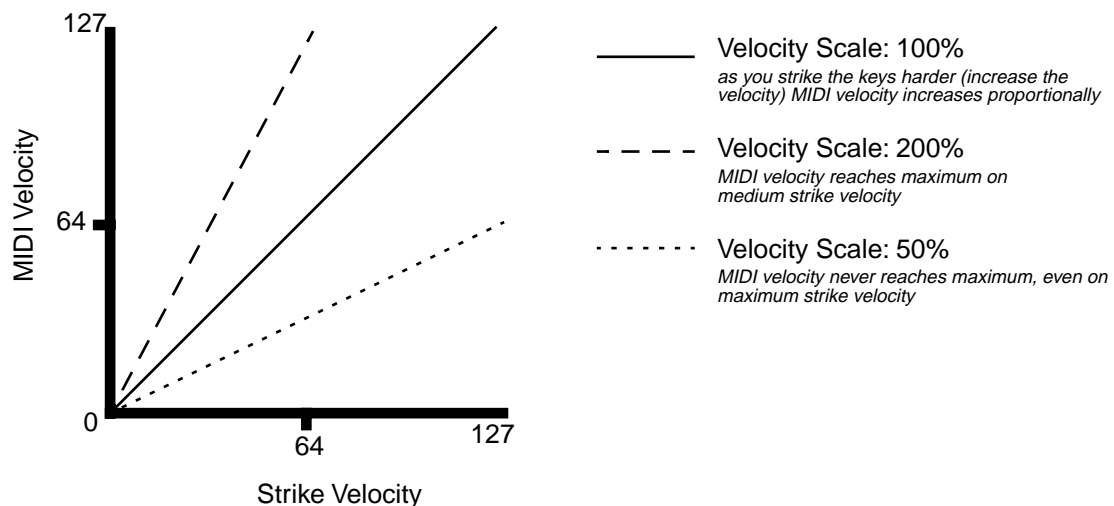
Parameter	Values
Vel Scale:	-300% to 300%
Vel Offset:	-127 to 127
Vel Curve:	Linear, Sin+, Cos+
Vel Min:	1 to 127
Vel Max:	1 to 127

The PC88 can respond to keyboard velocity — how hard you play the keys — in a variety of ways. Each Zone can have its own velocity response settings, and any change you make in a Zone affects both local sounds and outgoing MIDI data. Variations in velocity response are useful if you want to customize the feel of the keyboard, or if you are working with a synthesizer or patch that responds strangely to velocity, or for special dynamic effects. You can design a Setup, for example, where certain instruments, perhaps horns or strings, only play when you strike the keys with a high velocity.

Velocity Scale

Vel Scale lets you amplify or diminish velocity response. Normal response is “100%”. Higher values make the keyboard more sensitive (you don’t need to play as hard to get more sound) while lower values make it less sensitive (playing harder doesn’t change the sound as much). You can also set the scale to a negative number, in which case the velocity response is turned upside-down: playing harder produces a softer sound and vice versa. See the following section on Velocity Offset for ideas about negative scaling. A neat thing to try is to set up two Zones with opposite scale factors so that key velocity acts as a crossfade between the two sounds. Maximum scale values are +300% and -300%.

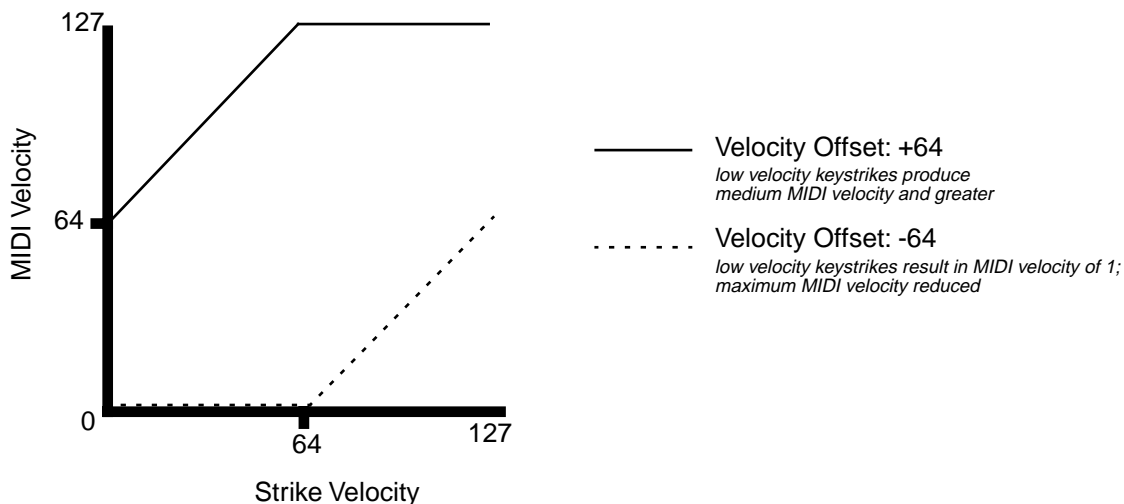
The illustration that follows shows what happens when you change Velocity Scale. Note that Velocity Scale is the only parameter changed in this example; the other parameters are set to their defaults (offset = 0, curve = linear, min = 1, max = 127).



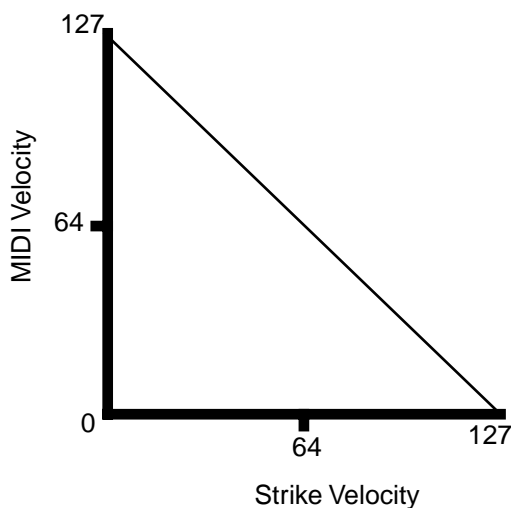
Velocity Offset

Vel Offset also changes the response, but in a more direct way, by adding or subtracting a constant to the key velocity. For example, if this is set to 25 (assuming a scale of 100%), then 25 is added to the velocity of every keystroke, making the sound that much louder. The softest possible keystroke will have a value of 25, while a keystroke with velocity of 102 will produce the same sound as a note with velocity 127 ($102+25=127$). Negative values diminish the response: a setting of -25 means the loudest velocity available will be 102, while any keystroke 25 or below will produce a velocity of 1 (a velocity value of zero has a special meaning in MIDI

and cannot be used for note-ons). You can think of Scale as being a proportional change to the velocity, while Offset is a linear change. The maximum values for Offset are ± 127 . The illustration below shows the effects of Velocity Offset. Note that Velocity Offset is the only parameter changed in this example; the other parameters are set to their defaults (scale = 100%, curve = linear, min = 1, max = 127).



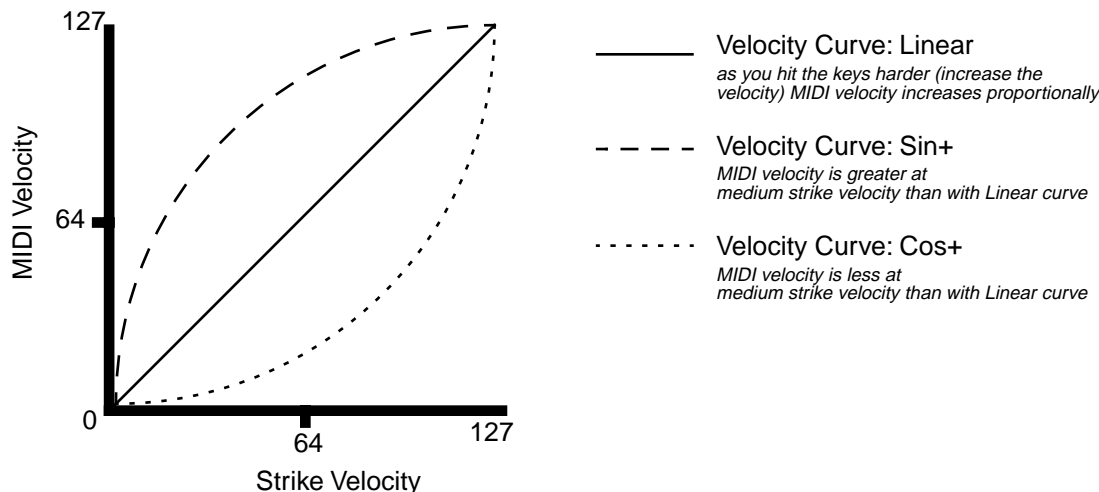
Offset and Scale work together. If scaling takes the velocity out of the ballpark — for example, you want to set it to 300% but that puts *all* of your notes at maximum velocity — using a negative offset, say around -60, can make it possible to still play at different volumes, although your curve will still be a lot steeper than normal. If you use a negative scaling, then you must use an offset: otherwise all of your velocities will end up as zeroes (well, ones actually, since a MIDI note-on with velocity zero is something else). So to get true inverse scaling (that is, -100%), you must set an offset of 127 to get the full range of velocities. Setting the offset to 127 and the scale to -100% produces a slope like this:



Velocity Curve

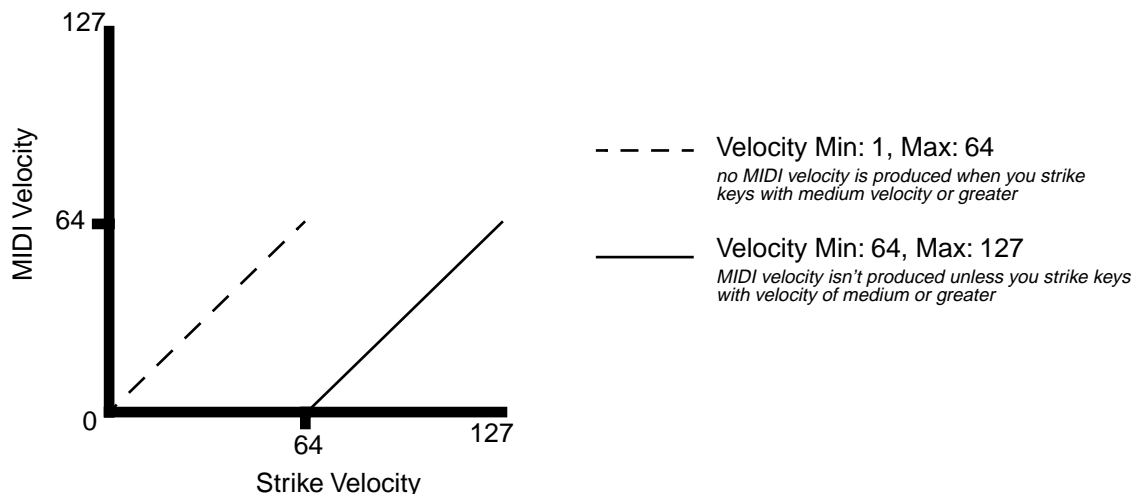
Vel Curve lets you taper the velocity response. The default setting is “Linear”, which means that the output velocity changes directly proportionally to the played velocity. “Sin+” sets the taper to resemble the first quarter-cycle of a sine wave, in which there is a “bulge” as the velocity increases from 1 to 64. If you start playing softly, and then progressively louder, the response will increase more quickly than normal until you reach the middle of the velocity

range. If you keep playing harder, the sound will continue to get louder, but the increase will be less than it would be normally. “Cos+” sets the taper to resemble a cosine wave, in which the “bulge” goes the other way: the change in response is *slower* than normal as you approach the velocity midpoint, and then increases faster than normal as you play harder.



Velocity Minimum, Velocity Maximum

Vel Min and **Max** set minimum and maximum velocity values that the Zone will respond to. A keystroke whose velocity — *after* it has been scaled and offset — is below the minimum will not make a sound in the Zone. Similarly, a keystroke whose velocity after processing is above the maximum will not play the Zone. These parameters are important for “velocity switching” — having a note play different sounds depending on how hard you strike it. The values can be anywhere from 1 to 127. As with other parameters, Zones can overlap or be totally discrete, or be identical. Intuitive Entry gives us a special way to set these parameters: hold the **Enter** key and play a note, and the current parameter changes to the actual velocity of the note you’ve played.



Controllers

Continuous Controllers

Physical Controller	Parameter:Values
Wheel 1 Up	Ctrl Num: None, 0 - 127, Pitch Up/Down, Pressure, Tempo, special functions
	Ctrl Scale: -300% to 300%
	Ctrl Offset: -127 to 127
	Ctrl Curve: Linear, Sin+, Cos+
	Entry Value: None, 0 - 127
	Exit Value: None, 0 - 127
Wheel 1 Down	<i>(same as Wheel 1 Up)</i>
Wheel 2	<i>(same as Wheel 1 Up)</i>
MPressure	<i>(same as Wheel 1 Up)</i>
Sliders A, B, C, D	<i>(same as Wheel 1 Up)</i>
Pedals 1, 2, 3, 4	<i>(same as Wheel 1 Up)</i>

Switch Controllers

Physical Controller	Parameter:Values
Buttons E, F, G	SwType: Toggle, Momentary
	On Ctrl: None, 0 - 127, Pitch Up/Down, Pressure, Tempo, special functions
	On Value: None, 0 - 127
	Off Ctrl: None, 0 - 127, Pitch Up/Down, Pressure, Tempo, special functions
	Off Value: None, 0 - 127
	Entry State: None, Off, On
	Exit State: None, Off, On
SwitchPdl 1, 2	<i>(same as Buttons E,F,G)</i>

Controller editing is one of the strongest aspects of the PC88's usefulness as the main controller for a sophisticated MIDI studio. In this chapter, we'll talk about two different types of "controllers" as they apply to the PC88. One is the *physical* controllers: the wheels, buttons, pedals, etc. that you move with your fingers or feet. The other is *MIDI* Controllers, which are MIDI commands sent by the PC88. For our purposes, "MIDI Controllers" includes the complete set of Controllers defined by the MIDI Specification, as well as pitchbend, aftertouch, and a few other useful MIDI commands. To fend off confusion, we'll refer to the PC88's physical controllers with a lower-case "c", and MIDI Controllers with an upper-case "C".

Any of the *physical* controllers, in any of the Zones, can take on the identity of any *MIDI* Controllers. In addition, each controller in each Zone can be tweaked just like keyboard velocity. You see that controller editing on the PC88 can be very complex, but also very rewarding.

The PC88's physical controllers include (in the order they appear in the menu):

- the pitch wheel, which is actually split into *two* controllers, one for movement up from the center (**Wheel 1 Up**) and the other for movement down (**Wheel 1 Dn**)
- the second wheel, often referred to as the modulation wheel (**Wheel 2**)
- keyboard aftertouch, or Mono Pressure (**MPressure**)
- the four sliders (**A**, **B**, **C**, and **D**) in the **Assignable Controllers** section
- the four continuous control pedals (**1**, **2**, **3**, and **4**)
- the three buttons (**E**, **F**, and **G**) in the **Assignable Controllers** section, and
- the two footswitch pedals (**1** and **2**).

Getting Around

As usual, the cursor buttons select the various parameters associated with the physical controllers. You must scroll through all of the parameters for one physical controller before you get to the parameters for the next physical controller. For example, if you are looking at **Wheel 1 Up** and you want to jump to **Slider A**, you have to scroll through the rest of **Wheel 1 Up**'s parameters, all of **Wheel 1 Down**'s, all of **Wheel 2**'s, and all of **MPressure**'s before you get to **Slider A**. The cursor buttons have an "auto-repeat" function: hold one down and it keeps scrolling. Each controller has either 6 or 7 parameters, so even with auto-repeat this can get pretty tedious. Therefore, two special ways of accessing controller parameters are available.

One is "jump selection": if you press *both* cursor buttons simultaneously, the display will jump to the same parameter of the *next* controller. So if you are working on the scaling of **Slider A**, as shown here:

```
Zone 1:   Slider A
Ctrl Scale: 133%
```

and you want to check the scaling of **Slider B**, press both cursor buttons (<<< and >>>) and you'll get **Slider B**'s Scale setting:

```
Zone 1:   Slider B
Ctrl Scale: 75%
```

The other quick method of getting around is a special Controllers Intuitive Entry mode: when you're in Controllers mode, press and hold the **Controllers** button and then make a movement of any kind with the physical controller you want to adjust. The display will change to show the controller you've selected and its initial parameter ("Ctrl Num"). Pressure can also be selected this way: hold the **Controllers** button and play any note, adding a little extra weight at the bottom of the downstroke.

To get back to the very beginning of the Controllers menu (**Wheel 1 Up**'s number), just press the **Controllers** button.

Intuitive Entry also works in the normal way when setting the value of a parameter: hold the **Enter** key while you move any slider, wheel, or pedal, or play a note, and the value will change accordingly. To quickly set a parameter to its default value (scale: 100%, offset: 0, curve: linear) press the decrement (-) and increment (+) buttons simultaneously.

The Continuous Controllers

The continuous (physical) controllers are those that have a *range* of values: the two wheels, four sliders, and four pedals, and also pressure. As the table above shows, all of them use the same parameters.

A word about pressure. Key Range in a Zone does *not* define which notes will generate pressure in that Zone. If pressure is enabled in a Zone, playing with aftertouch *anywhere* on the

keyboard will produce data. For example, if Zone 1's Key Range is C3-C5 and you play C2 and push down on the note, pressure messages will be sent from Zone 1. As with any other physical controller, however, you can disable pressure in any Zone, or scale it or offset it differently in the various Zones. It might help to think of pressure as a "third wheel" — wheels operate in a Zone regardless of Key Range, and so does pressure.

MIDI Controllers and Other Parameters

After you've selected which Zone and which physical controller to work with (using the cursor buttons or Intuitive Entry), use the **Ctrl Num** parameter to choose what this controller will do. Some of the controllers have default settings that are pre-programmed in all of the factory Setups (of course, you can change them). You can select from the entire list of numbered MIDI controllers, as well as other MIDI commands and some "special functions". To move through the list, you can use the Alpha wheel, or Intuitive Entry with any continuous controller, or call up the Controller's number with the numeric keypad.

Here are some of the common "targets" for each controller, in scrolling order:

- None (the controller does nothing)
- MIDI Controller messages 0-127. The most commonly used Controllers are:
 - **1 Modulation** (the default assignment on factory Setups for Wheel 2)
 - **2 Breath Controller**
 - **4 Foot Control** (the default for Pedal 2 and Slider C)
 - **6 Data Entry Slider**
 - **7 Volume**
 - **10 Pan** (stereo position) — Pan messages on the PC88's internal sounds only affect the beginnings of notes, and do not change notes that are being sustained.
 - **11 Expression** — an attenuator for fading in and out (the default for Pedal 1)
 - **64 Sustain** (the default for Switch Pedal 1)
 - **65 Portamento**
 - **66 Sostenuto** — it holds notes that are currently down, but not notes played subsequently (the default for Switch Pedal 2)
 - **67 Soft** — lowers the volume by a pre-set amount and may softens the timbre as well
 - **69 Hold 2 or Freeze** — it freezes a synth envelope at its current state
 - **72 Envelope Control** (also called **Sound Controller 3**) — shortens or lengthens the envelope of a sound
 - **91 Reverb Depth** — (the default for Slider A)
 - **93 Effects Depth** — (the default for Slider B)
- The PC88 uses some MIDI Controllers in unique ways to edit effects (**83, 90, 92, and 94**) and operate the Arpeggiator (**116-119**): see Chapters 6 and 7 for more. A detailed list of the entire set of MIDI Controller messages appears in Appendix F.
- A number of Controllers can cause trouble if not used carefully, such as **0 (Bank Select)**, and all of the ones above **119**, which include **All Sound Off (120)**, **Reset All Controllers (121)**, etc. Be warned.
- **Pitch Up (128 on the numeric keypad)** — pitchbend commands of 64 and above. This is the default assignment for Wheel 1 Up.
- **Pitch Down (129 on the numeric keypad)** — pitchbend commands below 64, going negatively. The default for Wheel 1 Down. Since Wheel 1 Up and Wheel 1 Down are configured separately, you can have all sorts of wild pitchbend combinations going in various directions over the four Zones.
- **Pressure** (the MIDI command) (**130**)
- **Tempo (131)**. You can use the PC88 to clock an external sequencer, and this parameter sets the tempo by determining the speed of outgoing MIDI Clock messages. It can also set the tempo of the internal Arpeggiator. The range is 20-300 beats per minute.

The rest of the Controllers, which we'll refer to as "Special Functions", are usually controlled by the PC88's Switch controllers, which we'll get to momentarily:

- **Program Increment** (Prog Inc) (132). Moving the controller takes the Zone to the next highest Voice, and sends out the next highest Program Change number.
- **Program Decrement** (Prog Dec) (133) takes the Zone to the next lowest Voice and sends out the next lowest Program Change.
- **Goto Program** (Goto Prog) (134). Selects an entirely different Voice for the Zone. The Voice number is the On value.
- **Setup Increment** (Setup Inc) (135) takes the PC88 to the next highest Setup, and sends out all of the appropriate Exit and Entry values. When you change Setups, it's quite possible that the Setup you go to won't have the same controller configuration as the current Setup, and that this command won't be in the same place (or even present at all) in the next Setup. Therefore you may only be able to use this controller once before it turns itself off or turns into something else!
- **Setup Decrement** (Setup Dec) (136) takes the PC88 to the next lowest Setup.
- **Goto Setup** (137). Selects a specific Setup. In this special case, the controller values are 1-128, to match the Setup numbers.
- **Sequence Start** (Seq Start) (138) sends out a MIDI "Start" command, which will set an external sequencer connected to the PC88 to the beginning of its sequence and start it. (If the sequencer is set up to accept external sync.) The tempo of the external sequence will be determined by the settings of the clock parameters in the **Global** menu and the Tempo setting.
- **Sequence Stop** (Seq Stop) (139) stops any external sequencer.
- **Sequence Continue** (Seq Cont) (140) starts an external sequencer from wherever it happens to be. This is either where it was stopped by a Stop command, or where it was sent by a MIDI Song Position Pointer message. The PC88 doesn't transmit Song Position Pointers, but most sequencers do.
- **Transpose Up** (Trans Up) (141) raises the pitch of the Voice, and also raises the MIDI note numbers generated by the Zone. The amount of transposition is variable from 1 to 127.
- **Transpose Down** (Trans Down) (142) lowers the pitch of the Voice and lowers the MIDI note numbers.

Scaling

After you've selected the MIDI command associated with a continuous physical controller, you can modify the controller's response similarly to the ways you can modify velocity response. Refer to the graphs beginning on page 5-8 for illustrations of the velocity scaling parameters.

Ctrl Scale lets you amplify or diminish the action of the controller. Full scale (0-127) is 100%. Higher values will make the controller more sensitive, and lower values will make it less so. Setting the scale to a negative number makes the controller action work in reverse. As with velocity, you can use a controller to crossfade between two Zones by setting the scaling for one Zone positive and the other negative. Maximum scale values are +300% and -300%.

Ctrl Offset adds or subtracts a constant to the controller, and at the same time sets minimum or maximum values (there's no need for separate Max and Min parameters). If the offset is 25, the minimum value of the controller will be 25. If it is -25 (and scale is 100%) the first one-fifth of the controller's movement ($25/127 = \text{about } 1/5$) won't do anything, and the maximum value of the controller will be 102 ($= 127-25$). As with velocity, Scale is a proportional change to the controller, while Offset is a linear change. The maximum values for Offset are ± 127 .

Ctrl Curve lets you taper the controller response. The default setting is Linear, which means that the response follows a straight line as you move the controller. Sin+ sets the taper to resemble the first quarter-cycle of a sine wave, in which there is a "bulge" as the response

increases. As you move the controller up from the bottom of its travel, the output will increase faster than normal until you reach its midpoint, at which point it will start to increase slower than it would normally. Cos+ sets the curve to resemble a cosine wave, in which the “bulge” goes the other way: the response is less than normal as you approach the controller’s midpoint, and then increases faster than normal as you move higher.

Entry and Exit Values

Entry value allows you to specify an initial value for a controller in a Setup that will be sent whenever you select that Setup. For example, if you want to make sure that a voice in a Zone is panned to the center whenever you select the Setup, you would assign MIDI Controller 10 to one of the physical controllers, and then set an Entry Value of 64. Or perhaps you want to make sure that all of the modulation in a Zone is turned off when you select a Setup. Assign MIDI Controller 1 to a physical controller and set its Entry Value to 0.

Entry values ignore the current position of the physical controller when the Setup is selected. In fact, if the physical controller is above or below the Entry Value when the Setup is selected (which it often is), moving the controller will have no effect until it is past its entry value. In the modulation example, moving the assigned controller won’t turn on any modulation until it’s pushed all the way *down*, and then up again.

An Entry Value of **None** is quite different from a value of “0”. “None” means that there will be no initial controller command when the Setup is selected, and any subsequent movement of the physical controller will be effective. (The *position* of the physical controller when the Setup is first selected, however, is still ignored.)

Exit Value tells the PC88 to send a value for that controller whenever you leave the Setup, either by selecting another Setup or by switching to Internal Voices mode. It can be very useful when a controller is doing something special to the sound which you don’t want to continue after you leave the Setup. For example, if you want to make sure a Zone’s pan position is centered whenever you leave a Setup, you would give an Exit Value of 64 to any controller assigned MIDI Controller 10. Or, if you wanted to make sure a channel was playing at full volume when you left a Setup, you would give an Exit Value of 127 to a controller assigned MIDI Controller 7. Again, “None” means no command is sent.

The Switch Controllers

Switch (physical) controllers have only two states: on and off. They are found after the Continuous controllers when you are scrolling the menu. They are:

- Buttons E, F, and G
- Switch Pedals (“SwitchPdl”) 1 and 2

The parameters for Switch controllers are slightly different from those for continuous controllers. The first parameter is Switch Type (**SwType**). The choices available are **Momentary** in which a switch’s action lasts only as long as you are pushing it, and **Toggle**, in which the switch’s action lasts until you press it again. The Momentary mode is used for functions like sustain or portamento, while the Toggle mode is used for functions such as arpeggiator start and stop or latch, program Goto’s, and transpositions. The buttons show which mode they are in by the behavior of their lights: if a button is in Momentary mode, its light glows only as long as you are holding it, while if it is in Toggle mode, the light stays on until you press it again. Bear in mind that button assignments are independent per zone, and since there’s just a single light per button, the light only shows the state of the button for the current zone. When you press the button, however, it executes its assignments for all four zones.

The next parameter for the Switch controllers is On Controller (**On Ctrl**). This determines what MIDI Controller or other message will be sent when the switch is “on” — either pressed or

toggled the first time. The list of available controllers is the same as for the continuous controllers, and can be accessed the same way.

Then comes **On Value**: the value of the Controller when the switch is on. In the case of conventionally-switched functions, such as sustain, the On Value will be 127. (For example, the default for Switch Pedal 1 is Controller #64 — Sustain — with an On Value of 127.) However, you might want to use a button or pedal as a “soft” switch, in which case you might set On Ctrl to 7 (Volume) and On Value to 50. On Value can also be set to “None”, so that turning on the switch has no effect at all in this Zone, which can be useful when you are using one switch for multiple functions in different Zones.

Off Ctrl is the MIDI Controller or other message that is sent when the switch is turned off — either released or toggled a second time. Whenever you set the On Controller, it *automatically* sets this parameter as well to match. If you want the Off Controller to be something else, however, you can change it after setting the On Controller. A situation where this might come in handy is when you want to switch a synth between Mono and Poly mode. The On Ctrl would be 126 (MonoOn) and the Off Ctrl would be 127 (PolyOn).

Off Value is the value of the Controller when the switch is off. The default value is 0. You might want to change this, as in the “soft switch” example above: in order to bring the Zone up to full volume when you release the pedal, set Off Value to 127. “None” is also a choice here.

Entry State determines whether an initial setting for the switch will be sent when the Setup is selected. There are three choices: None (no message), Off (the Off controller and value), and On (the On controller and value). In a button, if the entry state is “On”, the light will glow as soon as you select the Setup.

Exit State similarly determines whether a setting for the switch will be sent when the Setup is left, either for another Setup or for the Internal Voices mode. The same three choices are available. Very useful for turning off Sustains when changing Setups.

Do These Parameters Always Mean Something?

Be careful not to set up parameters that will do crazy things. When in doubt, leave things off, or at the factory default settings. All of the Special Function controllers should have their Entry and Exit values set to “None”.

On some of the higher-numbered MIDI controllers and Special Function controllers, the on and/or off values don’t have any meaning, because the controllers have very limited functionality. The following list shows these. “>0” means you can use any value that’s greater than zero. “=0” means the value should be 0. “x” means you can use any value, except “None”. “√” means the value does count for something:

	On Value	Off Value
120 All Sound Off	>0	x
121 Reset All Controllers	>0	x
122 Local Control Off	>0	=0
123 All Notes Off	>0	x
124 Omni mode Off	>0	x
125 Omni mode On	>0	x
126 Mono mode On	√	x
<i>(the On value, in some synths, specifies the number of MIDI channels to respond to, with one voice on each)</i>		
127 Poly mode On	>0	x
Program Increment	x	x
Program Decrement	x	x
Goto Program	√	√
Setup Increment	x	x

Setup Decrement	x	x
Goto Setup	✓	x
<i>(once you go to another Setup, this Setup's parameters are no longer operative)</i>		
Sequence Start	x	x
Sequence Stop	x	x
<i>(Start and Stop will usually be on the same button, as On and Off Ctrl's)</i>		
Sequence Continue	x	x
Transpose Up	✓	✓
Transpose Down	✓	✓

Do I Need All Those Pedals?

It's important to realize that you don't have to have an actual pedal plugged into every Pedal and Switch Pedal jack in order to take advantage of all of them. Entry and Exit Values can be assigned to a Zone and a physical controller even if the controller isn't there, and they will behave as if the controller were in fact plugged in. So if you want a specific group of Controller commands to be sent out whenever you choose a Setup, and you know they're not going to change while you're playing, you can assign them to physical controllers that aren't in use.

Multiple Controllers

Sometimes it can come in handy to assign the same Controller to more than one physical controller. For example, you might want to be able to control modulation depth both with Wheel 2 and pressure. The PC88 has no restrictions on assigning multiple controllers to a particular MIDI message. For live performers, a useful trick is to assign Goto Setup to the three buttons (E, F, and G) each with its own value. This lets you choose from among three Setups (more if you want to include the Switch pedals in the fun) to jump to, at any one time. Remember though, since going to another Setup turns off all of the old Setup's parameters, you'll have to include Goto's in the Setups you're going to, or you may not be able to get back!

Here's an example. You're playing a tune in which you want to use four Setups, numbers 1, 12, 14, and 82. Here's how you would program the buttons to be able to move among the four Setups at will:

	Goto Setup values		
	Button E	Button F	Button G
Setup 1	12	14	82
Setup 12	1	14	82
Setup 14	1	12	82
Setup 82	1	12	14

Copying Parameters

Very often, two or more Zones in a Setup will be very similar — perhaps all of the MIDI parameters will be identical, but you want to use a different instrument sound on a certain portion of the keyboard. Since there are so many parameters that define a Zone, it can be difficult making sure they're all the same in two different Zones. For that reason, a Copy function has been included.

Leave the Controllers mode (it's a special case, which we'll talk about in a moment) by pressing any of the other buttons on the top row of **Zone Parameters**. Select a Zone from the current

Setup with the **Zone** buttons. Now press **Copy**. The display asks if you want to copy the current Zone. If you do, press **Enter**. If you want a different Zone copied, press its button. Press any other parameter button to cancel.

Now press the right cursor button. The display asks you where to paste the Zone you've just copied. Press the button of the Zone you want to paste into, and press **Enter**. Again, any other parameter button cancels. When you paste a Zone, the PC88 retains the destination zone's old MIDI channel, which is less likely to conflict with the MIDI channel you have copied. It's a good idea to set the MIDI channel of the zone before you paste into it.

You can also copy a Zone from one Setup to another. Copy it the same way, and then press the MIDI Setups button and select the Setup you want to go to with the Select buttons or Data Entry controls. Press **Copy**, and then the right cursor, and the display will ask whether you want to paste into the current zone. You can select another Zone (with its Zone button), or not. Press **Enter** and the deed is done.

Besides entire Zones, you can also copy the parameters associated with a single physical controller in a Zone. The procedure is the same, except instead of using the Zone buttons to select an entire Zone, select a single controller from the **Controllers** menu. Press **Copy**, and the display confirms the controller you've selected, and the Zone it's in. Press **Enter** and all of that controller's parameters are copied. This information can now be pasted to another controller, another Zone in the Setup, or another Setup.

To copy to another controller, press the Controllers button, and scroll through the list of controllers with the cursor buttons (or use Intuitive Entry) to get to the controller you want. Press **Copy**, then right cursor, and you can paste the copied values into this controller. To copy the controller into another Zone, press a Zone button right after copying. You can also select a different controller in this Zone to paste into. To copy into another Setup, press MIDI Setups right after copying and select your Setup. Press the appropriate Zone button if the Zone you want isn't current. Press Controllers, the **Copy**, then the right cursor. Paste away.

You can only paste information from a continuous controller into another continuous controller. Likewise, you can only paste information from a switch controller into another switch controller. Different memory buffers are used to store information during Copy operations depending on whether you're copying a Zone, a single switch controller, or a single continuous controller, so different types of copy and paste operations can overlap. For example, you could copy a Zone, then copy a switch in a different Zone, then paste the first Zone into another Zone, then copy a continuous controller, then paste the continuous controller into another Zone, then paste the switch.

In addition, there are separate copy buffers for **Effects** parameters and for **Arpeggiator** parameters. We'll discuss them in the chapters on those subjects.

Here is a table that can help you keep track of what can go where:

You have copied:	It can go:
a Zone	to another Zone in the same Setup, a Zone in a different Setup
a Switch controller	to another Switch controller in the same Zone, or in a different Zone, or in a different Setup
a Continuous controller	to another Continuous controller in the same Zone, or in a different Zone, or in a different Setup
an Effect	from the Internal to the VGM effect in the same Setup, or to either effect in a different Setup
an Arpeggiator	to the Arpeggiator in a different Setup.

You can also set the zone, controller, switch, arpeggiator, or effects to a default value. “Clear,” at the end of each copy menu, copies information stored in Setup #127 that contains default parameter information. You can overwrite this setup with your own information, however, to create your own “default” parameter settings.

Storing a Setup

In Chapter 3 we discussed storing data with an Internal Voice. The Voice itself can’t be modified, but the performance parameters affecting all of the Internal Voices can be saved, to the “internal defaults” memory.

In Setups mode the story is quite different. Each Setup has four complete set of parameters — one for each Zone — and saving parameters for one Setup has no effect on any other Setup.

The **Store** button starts the procedure. When you press it, the display asks if you want to “Replace setup...”, and the name and number of the current Setup, as shown below:

```
Replace setup 3?
003 EBass/E Pno
```

If you press **Enter** now, you will replace the old version of the current Setup with your newly-edited version. If you want to store the new Setup to a different location, you can scroll to it with the Alpha wheel or enter its Setup number with the numeric keypad. For convenience, you can immediately find the first empty Setup location by pressing the increment and decrement buttons (+ and -) under the Alpha wheel *simultaneously*. Whenever you have selected an empty location, the display asks you if you want to save to the Setup at the selected location with a message such as this one:

```
Save setup 33?
03 EBass/E Pno
```

Press **Enter** and it’s done.

You can also select a Setup location with the alpha wheel, the numeric keypad, or increment/decrement buttons (one at a time). Locations that are already occupied will say “Replace...” while empty ones will say “Save...”.

Names

If you would like to come up with a new name for this Setup, then before storing it, press the right cursor button once. The display says “Rename setup...?”. Press **Enter**, and you can now edit the Setup’s name. Use the cursor buttons to locate the cursor under the first letter you want to change. Now you can scroll through the available characters using the alpha wheel. This includes an upper-case alphabet, a lower-case alphabet, the numerals 0-9, and two sets of punctuation marks. Use the cursor buttons to select other letters to change, and press **Enter** when you’re done. In the display shown below, for example, you could change the name from “EBass” to “PBass” by turning the alpha wheel until the “E” above the cursor changes to “P”.

```
Setup name:
EBass/E Pno
```

There are a few shortcuts available when naming a Setup. You can call up letters using the numeric keypad: each keypad button chooses from the letters that are printed right underneath it. Repeated pressings select the different letters in a group: for example, press the “1” button one time, the letter “A” will appear in the name, press it again and “B” appears, and one more

time and you get “C”. Press it yet again, and it brings us back to “A”. The number “2” button is responsible for the letters D, E, and F, and so on.

To change the case of a letter, from UPPER to lower or the other way around, use the “+/-” button. To get numbers into a name, use the “0” button: press it repeatedly to scroll through the digits 0 through 9. The **Clear** button makes the current letter a space. To *insert* a space, press the “E” button in the **Assignable Controllers** section. To delete a letter press the “F” button, and to move the cursor instantly to the end of the name in the display, press “G”.

Cancel works the same way with letters as it does with numerical parameter values: use it if you want to start over or forget the whole thing.

The PC88’s preset voices and Setups in ROM can never be erased. You can, however, save over them into RAM with the same number. If you subsequently delete the program in RAM, the preset ROM program will again be stored at that number.

Dumping a Setup

From the **Store** function, press the right cursor button (>>>) twice and you will come to “Dump setup...?”. This allows you to transmit the parameters that make up this Setup over MIDI System Exclusive to another PC88, or to a sequencer (if it is capable of recording Sysex messages) or other MIDI storage device, so that they can be recalled at another time. If you are using complex Setups, it’s always a good idea to have them stored externally so you can load them back into the PC88 should something go wrong with the memory (or if you have to do a hard reset). You can change which Setup you are dumping by turning the Alpha wheel or entering a number on the keypad.

Loading a Setup back into the PC88 is simply a matter of playing it from the storage device into the PC88’s MIDI In jack. However, the Device ID of the PC88 (which is set from the **Global** menu) must be set to the same number both when dumping and reloading the Setup for this to work. The same is true when going from one PC88 to another: they must have the same Device ID. You can avoid problems by setting the Device ID to “127”. In MIDI-speak, this means “broadcast to all units”, so *any* PC88 on the MIDI cable will receive the Setup data. (You might not want to do this if you have multiple PC88s that you’re trying to keep different from each other.)

You can’t dump an empty Setup — if you try, the display will say “Not Found”. Press either cursor button or any Parameter button to get out of here.

There is also a function for dumping *all* Setups — it’s on the **Global** menu.

Deleting a Setup

The last item on the **Store** menu is **Delete**. This comes in handy when you are designing and storing lots and lots of fancy Setups. It erases a Setup from memory without replacing it with another Setup, thus freeing up more space to store other Setups in other locations. (You can check the free memory in the PC88 at any time, using the “Mem Avail” option on the **Global** menu.) From the **Store** function, press the right cursor button (>>>) three times. The display says “Delete setup...?”. If the number is wrong, change it with the alpha wheel or numeric keypad. If the Setup is empty, the display will say “Not Found” and nothing will happen. Press the left cursor button or any Parameter button to bail out.

The factory-programmed Setups in the first 32 locations (64 if you have a VGM board) cannot be deleted, although they can be written over. You can Store any Setup in any of those locations, but if you then Delete it, the factory Setup that was originally in that location will reappear.