K150
USER'S MANUAL

Kurzweil Music Systems, Inc.
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Preface
How To Use This Manual

This manual assumes some knowledge of music theory and terminology, and familiarity with some concepts of electronic sound generation, the Musical Instrument Digital Interface (MIDI) standard, and other recent advances in music creation and performing.

Chapter 1 will give you a brief overview of the *Kurzweil Model K150X Expander* (K150X), and show you how to connect it to your MIDI controller and start making music right away. SThe manual assumes that your MIDI controller is a piano keyboard-like controller. However, the K150X will work with any controller which produces standard MIDI signals.

After reading Chapter 1, you should be able to play the K150X's built-in sounds, and begin to suspect that you can do much more.

Chapter 2 describes using the K150X in-depth, and gives you an overview of the editors and how to use them. After this chapter, you should be able to read the chapters on individual editors as you need them.

Chapters 3 through 13 are on individual editors. Within each editor chapter, everything you can do with that editor is documented, with examples and references to other chapters as needed.

Appendix A is a summary of editable parameters from all the editors.

Appendix B, *Battery Replacement*, describes how to change the battery in the K150X.

Introduction

Introduction

The *Kurzweil Model K150X Expander* (K150X) has built-in programs you can play directly, and editors with which you can modify these programs to create an enormous range of sounds and playing/performance options.

In most synthesizers, the sound begins with a simple electronic waveform that is then filtered and shaped to produce the final tone. The Kurzweil K150X Expander is also a synthesizer. However, instead of starting off with a simple electronic waveform, the K150X starts with a computer model of an acoustically rich instrumental sound. These models, which we call voices, are created by a Contoured Sound Model™, which produces the rich, authentic tones for which Kurzweil Music Systems has become famous.

Programs, Regions, and Layers

In addition to the voices, the K150X offers many sound-modifying resources. By using these resources, we are able to change a basic voice to create a great variety of new tone colors. The resources are referred to as *modifiers*. A voice, together with its associate modifiers, is called a *layer*.

With the K150X, you can combine layers to form a composite tone color, and then assign that combination of layers to a *region*. A region is one group of keys into which the K150X divides the incoming MIDI keyboard information. The K150X enables you to set up one, two, or three keyboard regions.

A complete keyboard setup is called a *program*. The program tells where the regions are, which layers are in each region, and which voice and modifier values are in each layer. The programs are numbered from 0 to 255. A given program may be selected by the K150X's front panel, or by a MIDI program change command.

Thus, programs are built up like the branches of a tree. The program is the tree itself, the regions are parts of the tree's "trunk", and the layers are "branches" that are attached to the trunk. To continue the analogy, you can think of the K150X as a "forest" of up to 255 trees. The size of the forest is fixed by the amount of memory in the K150X. You can have up to 255 "trees," but if you build up big trees with a lot of "branches" (that is, a complex program with a lot of layers), it will take more space in the memory than smaller trees with fewer layers, and you will be able to fit fewer than the maximum of 255 in your "forest" of programs.

The K150X allows you to build up a program of one, two, or three regions, each of which may have up to seven layers. In working on your programs, you may set up, change, or remove just a layer, a region of layers, or an entire program.

The Voices

Many voices are built in to every K150X. A list of the *resident voices* is given in Chapter 8 of this manual. In addition, every K150X contains voice expansion slots into which supplied *voice block* integrated circuits are inserted. Additional expansion slots are also supplied so that you can add more voice block integrated circuits later on.

All voices are instantly available for playing. That is, there is no waiting time to play any of the voices that you have installed within the instrument.

The Modifiers

Modifiers change a voice, or change the manner in which the voice responds to MIDI control signals. Modifiers may be applied at the layer level, program level, or be instrument-wide. A modifier which is applied at the layer level affects only that layer, a modifier applied at the program level affects all layers in all regions defined by the program, and an instrument-wide modifier affects all the programs in the K150.

Instrument-wide modifiers include:

- MIDI assignments
- Master transposition, tuning, and intonation

- Keyboard response adjustments

Program-wide modifiers include:

- Controller ranges
- Sizes and balances of regions
- Chorusing
- Vibrato
- Equalization

Layer-wide modifiers include.

- Voice selection
- Voice modification
- Layer transposition and tuning
- Layer balancing

Figure 1-1 shows pictorially how you might look at a single program, its relationship to its regions, layers, editors, and its relationship to the other programs.
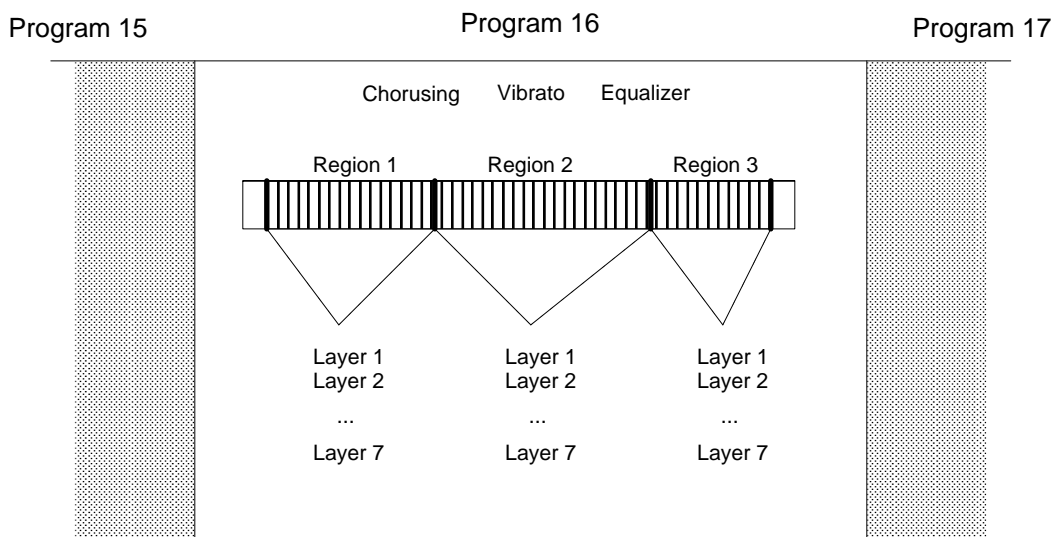
Figure 1-1. Sample Program.

The Editors

The modifiers of the K150X are accessible through its *editors*. By using the editors to create your own programs from scratch, or to modify the built-in programs, you can create an enormous range of new and different programs. They, in turn, may be stored in the K150X, or on an external cassette tape.

The following editors are available:

1. (MIDI) Channel editor
2. Tuning editor
3. MIDI Mode editor
4. Program editor

5. Region editor
6. Layer editor
7. Chorusing editor
8. Vibrato editor
9. Equalizer editor
10. (MIDI) Assignment editor
11. Miscellaneous functions editor

All changes that you make while editing take effect instantly. Thus, you can play the keyboard while you're editing to hear the changes as you make them.

The Built-In Programs

The built-in programs are popular playing configurations of conventional instruments, or highlight sound modification features of the K150X. Program #1, for instance, is a piano. Program #2 combines a piano with a bass: the lowest two octaves of the keyboard sound like a bass, while the rest of the keyboard remains a piano. You can select and play these and many other programs, as soon as the K150X is connected to a MIDI controller and an amplifier.

Getting Started

The K150X allows a myriad of connections between itself and other devices through the MIDI interface. We'll describe a simple setup with the K150X acting as a MIDI *receiver* from a MIDI *controller*, which we'll assume to be a piano keyboard-like device.

To set up the K150X and one MIDI controller, you will need:

- 110V or 220V AC electrical power
- A MIDI controller
- A MIDI cable
- Headphones with a ¼-inch stereo phone plug (mono or stereo), or a ¼-inch mono phone plug connected to an amplifier and speaker combination.

Follow this general procedure:

1. The K150X will operate on either 110V or 220V AC power, and indicates on the rear panel which kind of power it is currently set up for. Make sure the K150X is set for the voltage in your location before turning it on.

2. Connect one end of the MIDI cable to the MIDI OUT jack on the MIDI controller.

3. Connect the other end of the MIDI cable to the MIDI IN jack on the K150X. No other jacks should be used in this application.

4. Plug the power cord in between the K150X's AC LINE IN connector and the AC power source.

5. Turn on the K150X by pressing the power switch on the lower right side of the front panel. This insures that when your MIDI controller is powered up the K150X will receive any setup information which might be sent by your MIDI controller. After a few seconds, the display will read

        KURZWEIL 150X

for a few seconds, and then read

        C1 P1 PIANO

meaning that the K150X is ready to go.

6. Turn on the amplifier, and plug the ¼-inch phone plug into the AUDIO OUT jack on the rear panel of the K150X, and/or plug the headphones into the headphone jack on the front panel of the K150X.

7. Adjust the volume control on the front panel of the K150X to a low, but audible level, and press a keyboard key. You should now be getting an acoustic piano sound.

When using headphones, the volume control should be set to a comfortable listening level. However, when using an external amplifier or speaker, best results are obtained when the volume level is set as loud as your amplifier will allow without distorting.

Selecting Between Programs

The display should currently read:

        C1 P1 PIANO

meaning that Program number 1, with name "PIANO", is active and assigned to MIDI Channel 1. Press INCR, and the display should read:

        C1 P2 ABS/PNO

You should now be able to play Program number 2, which has an acoustic bass voice in the lower part of the keyboard and a piano in the upper part of the keyboard. To return to Program number 1, press DECR.

You can use INCR and DECR to step through all the currently existing programs and play them. You can also jump between non-sequentially numbered programs by entering the number of the desired program using the numbered buttons, and pressing ENTER. You are now ready learn more about the K150X and what it does.

Using the K150X

In this chapter you'll be introduced to the button-pads of the K150X, and briefed on what the individual buttons do and how they work. This will lead into a discussion of the editors and how to use them.

Communicating with the K150X

All your interaction with the K150X is through the front panel button-pad and display.

Using the buttons on the front panel, you tell the K150X what to do. The K150X gives information back to you visually through its display, and audibly through its audio output, enabling you to listen to changes as you make them.

The Buttons on the Front Panel

From here on, we're going to divide the buttons on the front panel into 2 halves: the *left button-pad* and the *right button-pad*, as shown in Figure 2-1. Each of these halves is used to perform different functions.

CHANNEL	TUNE	MIDI		LEFT	CENTER	RIGHT
F1	**F2**	**F3**		**1**	**2**	**3**
PROG	REGION	LAYER				
SAVE	**CANCEL**	**UNDO**		**4**	**5**	**6**
CHORUS	VIB	EQ				
INCR	**DECR**	**CLR**		**7**	**8**	**9**
CTRLS	MISC			NO	YES	
NEXT	**PREV**	**EDIT**		**-**	**0**	**ENTR**

left button-pad   *right button-pad*

Figure 2-1. The Front Panel Buttons.

The Left Buttonpad

The *left button-pad* is used to select parameters to edit, and to perform various other operations while editing. Although there are only 12 keys, they perform many operations by doing different things depending on what you're up to and how you got there. Sequences of previous button selections can make a difference in what a button does. (Don't worry, the display helps you keep track of your button selections.)

On the Buttons. Written on the buttons are names or abbreviations for what they do if you press them directly (i.e. if you haven't just pressed the EDIT button), as shown in Table 2-1.

Table 2-1
Left Button-pad Buttons

Button	Meaning	What It Does
F1	Function #1	changes - we'll get back to them
F2	Function *2	
F3	Function #3	
SAVE	save	save the current changes
CANC	cancel	cancel all changes since the last time save was pressed
UNDO	undo	undoes (re-does) the last value change
INCR	increment	increment the value (i.e. raise it)

DECR	decrement	decrement the value (i.e. lower it)	
CLR	clear	clear the value (usually to 0)	
NEXT	next	advance to the next parameter (i.e. step forward through the options)	
PREV	previous	go back to the last parameter (i.e. step backward through the options)	
EDIT	edit	special button, used in sequence with the others above	

Above the Buttons. Written above the buttons are abbreviations for the K150X's different editors. The EDIT button gives you access to the K150X's editors. You access the editors by pressing the EDIT button *first*, and then the button below the abbreviation. (If you've ever used a scientific calculator, in which keys have different meanings depending on whether you've pushed the "function" key, this works the same way.) For instance, pressing EDIT F2 selects TUNE, the Master Tuning Editor. The editors are summarized in Table 2-2.

Table 2-2
Button Sequences for Editors

Word or Abbreviation Above Button	Abbreviation For	Buttons Sequence to Press	Meaning
CHAN	Channel	EDIT F1	Selects the Channel Assignment Editor
TUNE	Tune	EDIT F2	Accesses the Master Tune Editor
MIDI	MIDI	EDIT F3	Selects the MIDI Editor
PROG	Program	EDIT SAVE	Accesses the Program Editor
REGION	Region	EDIT QUIT	Selects region to edit
LAYER	Layer	EDIT UNDO	Accesses the Layer Editor
CHORUS	Chorus	EDIT INCR	Accesses the Chorus Editor
VIB	Vibrato	EDIT DECR	Accesses the Vibrato Editor
EQ	Equalization	EDIT CLR	Accesses the Graphic Equalization Editor
CONTROLS	Controls	EDIT NEXT	Accesses the MIDI Control Editor
MISC	Miscellaneous	EXIT PREV	Accesses the Miscellaneous Editor

The Right Button-pad

There are numbers printed on most of the buttons of the right button-pad. You use these buttons to enter values after you've selected parameters to change with the left button-pad. The new values don't take effect until you press the ENTR button.

Three of the buttons, ENTR, 0, and -, have special meanings:

ENTR

You'll be using the ENTR button often. Pressing ENTR means different things at different times:

- enter a selected editor
- indicate you're finished entering a value; Use ENTR after entering a number to let the K150X know you're finished. If you've used a computer before, think of ENTR as the RETURN button of a computer when used in this context. If nothing seems to be happening, try pressing the ENTR button. (Don't worry, you can always press undo to undo the change.)

0

The 0 button serves 2 different purposes:
- enters 0 for numeric values
- answers "Yes" to K150X questions (the sign button, - is "no".)

- (The sign button)

Pressing the sign button means different things at different times:

- it starts entry of a negative number. When you intend to enter a negative number, press - first.
- it steps through 4-way signs. Some K150X values can be positive (+), negative (-), starting positive (±), or starting negative (-/+). Pressing **-** steps through these 4 values.
- it answers "no" to K150X questions. ("No" is printed above the button.)

Left, Center, and Right

The words "LEFT, "CENTER", and "RIGHT" appear above the 1, 2, and 3 keys. These meanings are significant only in the Region Editor. They allow you to quickly select which region of the keyboard you want to edit.

The Display

The K150X communicates back to you visually using the display, which is capable of displaying up to 16 alphabetic and/or numeric characters. The display gives you the information concisely, using abbreviations and information Fields to show you what's happening. The location of a number or abbreviation within the display is important. It can be divided approximately into 5 *fields*, as shown in Figure 2-2.
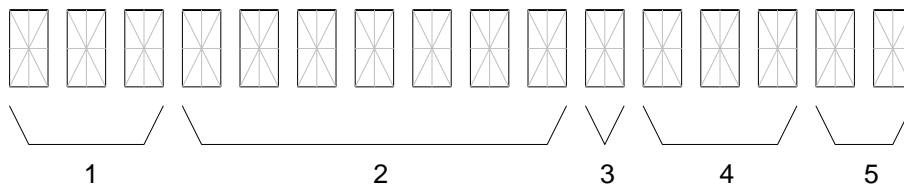
Figure 2-2. Fields of the K150X Display

When you're using the Program, Region, or Layer Editors, the number of that program, region, or layer appears in Field 1. Outside of these editors, Field 2 usually moves over into this field.

The name, or an abbreviation for the name of the parameter being edited appears in Field 2.

When applicable, the sign of the value in Field 4 appears in Field 3. This can be +, −, and sometimes ± or -/+.

The value for the parameter in Field 2 appears in Field 4.

An abbreviation for the units of the value in Field 4, when applicable, appear in Field 5. Table 2-3 shows the abbreviations the K150X uses in Field 5 and their meanings:

Table 2-3
Units in the K150X Display

Abbreviation	Unit	Meaning
C	cents	1 cent = 1/100 of a semitone
ST	semitone	1/2 of a whole tone (50 cents)
dB	decibels	a measurement of loudness
ms	milliseconds	1 millisecond = 1/1000 of a second
Hz	Hertz	cycles per second - frequency
kHz	kiloHertz	Hertz x 1000

For example, consider the following displays:

```
C1.     TUNE  -58C
```

The Center Region, Layer #1 is being edited. The parameter being edited is TUNE (tuning), whose present value is -58C. This layer is tuned down -58C (it is 58 cents flat).

```
P1    250 HZ  +5 dB
```

Program #1's equalizer is given +5 dB of emphasis at the 250Hz point.

The display which appears when the K150X is turned on, showing the MIDI channel and program number currently active, indicates that you are in the *Channel Editor*, the *top-level* editor. Any time you want to return to this editor, press EDIT F1. The display will show the Channel and Program currently active:

> C *number* P *number*   *program-name*

This is the K150X's top-level display. C stands for CHANNEL and P stands for PROGRAM. From here, you can use INCR and DECR to step through the Programs, or NEXT and PREV to step through the Channels.

Using the Editors

It is through the editors that you display and change parameters in the K150X. Press EDIT to indicate you want to select an editor. Then select the editor you want by pushing the button *below* its abbreviation. For example, EDIT F1 selects the Channel Editor while EDIT UNDO selects the Layer Editor.

Once you are in the editor, the display will identify the program, region, and/or layer that you are editing, the name of or an abbreviation for the parameter (e.g., .V-DEPTH for vibrato depth) and the current editable value, which will be flashing. To change a numeric value, simply enter the new value using the numeric button-pad and press ENTR, or use INCR and DECR to step through the numbers. (Note that flashing stops when you start entering a new value.) The NEXT and PREV buttons are used to step through the various parameters in that editor.

All changes that you make while editing take effect instantly. Thus, you can play the instrument while you are editing to hear the changes as you make them.

The Editing Buttons

Once an editor has been selected, the buttons of the left button-pad take on the meanings printed *on* them.

F1, F2 and **F3**

These buttons are active only in certain editors, and have special functions which depend on the currently active editor, as outlined in Table 2-4. These functions are discussed in detail the chapters on individual editors.

<div align="center">

Table 2-4
F1, F2 and F3 in Various Editors

</div>

Editor	F1	F2	F3
Channel	Read Cassette	Memory Space	
Program	Rename Program	Copy Program	Delete Program
Region	Delete Region	Copy Region	Replace Region
Layer (selecting)	Delete Layer	Copy Layer	Insert Layer
Layer (using)	Change Layer (up)	Change Layer (down)	Mute Other Layers
Controls	Jump to Beginning of List	Jump to Chorus Controls	Jump to Vibrato Controls
Program List (Misc)	Jumps 16 Entries	Insert Program	Delete Program

SAVE and **CANC**

The SAVE and CANC buttons can be used at any time during editing. SAVE will cause all changes that you have made to be stored in the K150X's non-volatile RAM memory. This memory is used to initialize the machine when it is turned on. CANC will cancel all changes that you have made since the last time SAVE was pressed.

UNDO

If you are in the middle of a numeric entry (no flashing) UNDO cancels the entry (i.e., the display will begin flashing again). Otherwise, UNDO cancels the last change that you made to the current parameter. Pushing UNDO again will re-do the change. Thus, UNDO can be used to switch back and forth between two values.

INCR and DECR

These buttons can be used to increment and decrement the current parameter value or entry value. If you use them after entering a value but before pushing ENTR they just increment and decrement the entered value. If the current parameter value is displayed (flashing) then INCR and DECR will alter that value directly. For example, if the current value of Master Tune is 20, pushing INCR is equivalent to pushing 2, 1, ENTR.

The INCR and DECR buttons will repeat at a rate of ten times a second if held down for more than one second.

CLR

If you are in the middle of making a numeric entry (flashing has stopped), CLR just sets the entry value to 0. Otherwise, it sets the the current parameter value to 0 (the equivalent of pushing 0, ENTR). For parameters for which 0 is not a legal value, CLR sets the parameter to the lowest allowable value. For a parameter where a number is not a legal value, CLR sets the parameter to the default value.

NEXT and PREV

These buttons allow you to step thru the parameters associated with the current editor. If you have started making a numeric entry, but haven't pressed ENTR, pressing NEXT or PREV completes the entry for you.

Like INCR and DECR, these buttons repeat if held down for more than one second, but at a slower rate (twice a second).

EDIT

In general, you can use EDIT Fn at any time to select a different editor. Press EDIT EDIT to return to the previous editor you were in. Since each editor remembers what it was doing when you exited from it, you can bounce back and forth between editors with little difficulty.

If you have started making a numeric entry, but haven't pressed ENTR, pressing EDIT completes the entry for you.

To return from all editors, press EDIT and any key on the right button-pad. The display will show the CHANNEL and PROGRAM number currently active:

C *number* P *number* *program-name*

This is the K150X's Channel Editor display: C stands for CHANNEL and P stands for PROGRAM. From here, you can use INCR and DECR to step through the Programs, or NEXT and PREV to step through the Channels.

A Block Diagram of the K150X

Figure 2-3 shows the relationships between the various K150X parameters and modifiers, and how they interact to achieve a certain result. Although reasonably complex, the diagram will become clearer as you become familiar with the K150X and its operation. It is supplied here only for reference; you don't need to study it in order to use the K150X.

(large, complex, hardly readable, original diagram not included)

Figure 2-3. The K150X Expander Effects Processing Chart.

The Channel Editor

The Channel Editor lets you assign programs to individual MIDI channels.

If the instrument is in Omni mode, changing the channel number in the Channel Editor also changes the basic MIDI channel number. In addition, changing the channel will also change the currently selected program (see program editor below), unless there is no program assigned to the channel or the currently selected program has been changed.

Using the Channel Editor

Enter the Channel Editor by pressing EDIT F1, and the display will show:

> C *xx* P *xxx*   *program name*

Where C*xx* is the currently active channel, and P*xxx* is the currently active program number.

To change the channel, enter the new channel number with the numeric button-pad and press or use the NEXT and PREV keys to step through the numbers 1 through 16. If a number greater than 16 is entered using the numeric keypad, the channel number will be set to the previous channel number when ENTR is pressed.

To de-activate a channel, use CLEAR or 0 ENTR.

Channel Editor Hints

The Channel Editor will not allow you to assign a non-existent program to a channel. In particular, the INCR and DECR keys will skip over non-existent program numbers.

The Tuning Editor

The Tuning Editor lets you specify instrument-wide tuning, set a master transposition value, and activate the programmable intonation table.

Using the Tuning Editor

Select Tuning Editing by pressing EDIT F2. (The abbreviation TUNE is printed above the F2 key on the button-pad.)

The parameters shown in Table 4-1 can be edited. One will appear in the display; the others can be selected by using NEXT and PREV.

Table 4-1
Tuning Editor Parameter

Display Reads	Parameter	Adjustable Values * (use INCR and DECR)	What it Does
MAST TUNE	Master Tuning	±0-125C	Tunes the entire instrument.
TRANSPOSE	Transposition	±60ST	Transposes the entire instrument.
INTONATION	Intonation Switch	On/Off	Switch for intonation parameters.
REFERENCE KEY	Reference key	Entire Musical Scale	Sets a reference key for intonation.

* If the value is numeric, you can also enter the value directly with the right button-pad and press ENTR.

Note that you can specify tuning and transposition values for individual layers with the *Layer Editor* (see *Layer Editing*).

See the sections on each parameter later in this chapter.

Master Tuning

When the display reads MAST TUNE, the pitch of the K150X may be tuned by ±125C.

Enter a value using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 10 cent increments.

If a value greater than 125 is entered using the numeric button-pad, the value will be set to 125 when ENTR is pressed.

This tuning is in addition to any tuning specified for a particular layer with the .TUNE parameter in the *Layer Editor*. For example, if the Master Tuning for the K150X is set at +3C, and a layer is given a tuning of +2C, the layer will have a +5C tuning relative to the natural pitch.

Transposition

When the display reads TRANSPOSE, the K150X can be transposed from 0 to ±6O semitones.

Enter a value using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 1 semitone increments.

If a value greater than 60 is entered using the numeric button-pad, the value will be set to 60 when ENTR is pressed.

This transposition is in addition to any transposition specified for a particular layer with the .TRANS parameter in the *Layer Editor*. For example, if the master transposition for the K150X is set at +3ST, and a layer is given a transposition of +2ST, the layer will have a +5ST transposition relative to the natural tone.

Intonation

Used in conjunction with the *Intonation Table Editor*, which allows you to adjust the micro-tonal distance between individual intervals, this parameter determines whether the values specified with that editor will be active or not.

When the display reads INTONATION, you can change the value of the switch. Use INCR and DECR to change the value between *off* and *on*. The default is *off*.

Reference Key

Used in conjunction with the *Intonation Table Editor*, which allows you to adjust the micro-tonal distance between individual intervals, this parameter allows you to specify which key you will be playing in so that the intervals will be properly adjusted for that key. The default key is C.

When the display reads REFERENCE KEY, you can change the key. Use INCR and DECR to step through the musical scale.

The MIDI Editor

With the MIDI Editor, you select settings which specify how the K150X will interpret its incoming MIDI signals.

Using the MIDI Editor

Enter the MIDI Editor by pressing EDIT F3. One of the two parameters shown in Table 5-1 will appear in the display; the others may be accessed by pressing NEXT or PREV.

Table 5-1
MIDI Editor Parameters

Display Reads	Parameter	Adjustable Range * (use INCR and DECR)	What it Does
MIDI MODE	MIDI Mode	Omni Poly Multi	Selects the MIDI Mode
CHANNEL	MIDI Channel	I - 16	Selects the basic MIDI Channel
MOD WHEEL	Modulation Wheel	Normal (0- 12 7) Centered	Selects the MIDI signal interpretation for the modulation wheel signal
VELOCITY MAP	Velocity Map	0-7	Selects one of the seven velocity maps
LOUDNESS MAP	Loudness Map	0-7	Selects one of the seven loudness maps
PROGRAM LIST	Program List	Direct 1-32 33-64 65-96 97-128 1-64 65-128 1-128	Selects the program list mapping from controller to K150X.

 * If the value is numeric, you can also enter the value with the right button-pad and press ENTR

MIDI Mode

About MIDI Modes

Information can be transmitted on 16 distinct channels in the MIDI interface. The K150X can respond in three ways to this incoming information, with each of the ways having different interpretations and implications.

Omni Mode   The K150X will respond to incoming information on any of the 16 MIDI Channels. This is the default mode.

Poly Mode   The K150X will respond to incoming information *only* on the specific channel currently specified (the default is Channel 1).

Multi Mode   Individual programs of the K150X can be programmed to respond to different incoming channels. Each MIDI channel can have a separate program number assigned. Multi Mode ignores the Omni on/off message.

Selecting a MIDI Mode

Use INCR and DECR to step through the three choices.

MIDI Channel

The MIDI Channel parameter lets you select the basic MIDI channel. The default channel is Channel #1.

When the display shows CHANNEL you can select the Channel number. Enter the new channel number with the numeric button-pad and press ENTR, or use the INCR and DECR keys to step through the numbers 1 through 16. If a number greater than 16 is entered using the numeric keypad, the channel number will be set to the previous channel number when ENTR is pressed.

Mod Wheel

Your controller's modulation wheel may or may not be centered. You can select which way the K150X interprets the MIDI signal coming from your modulation wheel.

When the display reads MOD WHEEL, you can use the INCR and DECR keys to select between "Normal" and "Centered." In Normal mode, signals coming from the modulation wheel are given the values 0-127. In Centered mode, the values are shifted down to be from -64 to +63, with 0 as the center point.

Velocity Map

The K150X contains 8 velocity maps, which determine how the key velocity signals coming from your MIDI controller will be interpreted. These velocity maps allow you to get different response characteristics from your MIDI controller.

When the display reads VELOCITY MAP, select one of the velocity maps by pressing INCR or DECR, or enter a value from 0-7 directly with the numeric keypad, and press ENTR. The default velocity map is map #0, which is a linear mapping in which increased MIDI values result in proportionally increased interpretations by your K150X. Although 7 different default velocity maps are supplied, the maps themselves can be modified with the Velocity Map editor under the Miscellaneous Editor. See the *Miscellaneous Editor* for more information.

Loudness Map

The K150X contains 8 loudness maps, which determine how the key velocity signals coming from your MIDI controller will be interpreted. These loudness maps allow you to get different volume characteristics from your MIDI controller.

When the display reads LOUDNESS MAP, select one of the velocity maps by pressing INCR or DECR, or enter a value from 0-7 directly with the numeric keypad, and press ENTR. The default loudness map is map #0, which is a linear mapping in which increased MIDI values result in proportionally increased volume.

The values of the 8 loudness maps are as follows:

Loudness Map #	MIDI Velocity	Attenuation (dB)	Loudness Map #	MIDI Velocity	Attenuation (dB)
0	0	26	4	0	64
	32	21		28	54
	48	17		74	12
	84	7		96	8
	110	3		116	3
	127	0		127	0
1	0	48	5	0	24
	26	26		32	18
	32	21		64	12
	48	17		96	6
	84	6			
	115	3			
	127	0			
2	0	48	6	0	30
	10	30		32	20
	32	21		64	10
	48	17		96	5
	112	6		127	0
	127	0			
3	0	48	7	0	36
	64	12		32	24
	96	5		64	12
	127	0		96	3
				127	0

Program List

From your MIDI controller, you will be able to directly select only a limited subset of the 255 program numbers of the K150X. The PROGRAM LIST parameter in the MIDI editor lets you select how your controller's program setup numbers will be mapped into the program numbers of the K150X.

This feature works in conjunction with the Program List Miscellaneous Editor, where you map the list entry numbers to K150X program numbers. See the *Miscellaneous Editor* for more information.

When the display reads PROGRAM LIST, use INCR and DECR to select among the following choices:

Direct
1- 32
33- 64
65- 96
97-128
1- 64
65-128
1-128

The way that these choices are interpreted by the K150X is outlined in Table 5-2.

Table 5-2
Program List Modes

List Mode	MIDI #	Maps to ...	K150X #
Direct	0 - 127	program	1 - 128
1 - 128	0 - 127	list entry	1 - 128
1 - 64	0 - 63	list entry	1 - 64
	64 - 127		1 - 64
65 - 128	0 - 63	list entry	65 - 128
	64 - 127		65 - 128
1 - 32	0 - 31	list entry	1 - 32
	32 - 63		1 - 32
	64 - 95		1 - 32
	96 - 127		1 - 32
33 - 64	0 - 31	list entry	33 - 64
	32 - 63		33 - 64
	64 - 95		33 - 64
	96 - 127		33 - 64
65 - 96	0 - 31	list entry	65 - 96
	32 - 63		65 - 96
	64 - 95		65 - 96
	96 - 127		65 - 96
97 - 128	0 - 31	list entry	97 - 128
	32 - 63		97 - 128
	64 - 95		97 - 128
	96 - 127		97 - 128

The Program Editor

Programs are the K150X's top-level construct, under which everything else associated with a particular keyboard configuration and sound quality is defined. Each program can divide the keyboard into three regions and each region can have up to seven sound layers. Each sound layer specifies a voice as well as a number of modifiers which alter the characteristics of the voice. You can define up to 255 programs, but the actual number can be less, depending on how complicated each program is.

Programs may be assigned to individual MIDI channels. In addition, each program contains a set of parameters which control the programmable chorusing effect and a set of parameters which control the programmable vibrato oscillator. These effects are discussed in separate sections.

Using the Program Editor

Selecting and Editing Programs

1.	Select Program Editing by pressing EDIT SAVE. When you enter the program editor, the display will show something similar to:

	```
	PROG 1   PIANO
	```

	• the currently selected program's number (1 in our example),
	• the currently selected program's name (PIANO - an acoustic piano),

2.	Select a program to work on by using INCR, DECR, NEXT, PREV, or select it by number using the numeric button-pad and press ENTR. Depending on what program numbers you select, and what their statuses are, you might see these variations in the display as you change programs:

	• An asterisk, *, as in:
	```
	PROG 1 *PIANO
	```

	This means that edits have been made to a built-in program, or that a program is user created. In this case, for instance, the PIANO program has been modified. You can delete the modifications by pressing F1. The * will disappear, and the built-in program will be restored.

	Note that built-in programs *cannot* be deleted - only modifications made to them can be deleted.

	If you wanted to save the modified built-in program, you could copy it to an undefined program before deleting the changes. See *Creating Programs* later in this chapter.

	• A question mark, ?, as in:
	```
	PROG 206 ?UNTITLED
	```

	A question mark designates an undefined program number. In this case, Program #206 is empty.

	UNTITLED is the default name for any program which has not been named, and is not an indicator of an undefined program. For example,
	```
	PROG 206 *UNTITLED
	```

	is not empty, because there is no question mark.

	To change the name of program from UNTITLED, see *Renaming Programs*, below.

3.	Press ENTR to start choosing among the parameters. One of the parameters shown in Table 6-1 will appear in the display. Use NEXT and PREV to step through the parameters.

Table 6-1
Program Editor Parameters

Display Reads	Parameter	Adjustable Range * (use INCR and DECR)	What it Does
.P-BEND	pitch wheel bend	±60ST	Sets the range and direction of the pitch bender.
.K-BEND	key pressure bend	±60ST	Sets the range and direction of key pressure pitch bending.
.SFT-PDL	soft pedal	±30dB	Sets the range of the soft pedal.
.L-SPLIT	left split point	C0-C9	Delineates the lower bound of the center region.
.R-SPLIT	right split point	C0-C9	Delineates the upper bound of the center region.
.L-BAL	left region balance	±15dB	Adjusts the volume of the left region.
.R-BAL	right region balance	±15dB	Adjusts the volume of the right region.

 * If the value is numeric, you can also enter the value with the right button-pad and press ENTR.

See the sections on each parameter later in this chapter.

F1, F2, and F3 in the Program Editor

In the Program Editor, F1 initiates program renaming. F2 initiates program copying. and F3 deletes the current program, as described below.

Renaming Programs

Undefined and user-created programs have the default name UNTITLED. To change the name:

1. Press F1. The display will ask

    RENAME PROGRAM?

    Press 0 (yes) to continue the re-naming process, or press - to quit. If you press 0 (yes), the first letter of the current name will start blinking. For instance, if the current name is UNTITLED, the U will start to blink.

2. Press the INCR or DECR button. The letter will change to another character. For instance, the U in UNTITLED will change to V or T, depending on whether you pressed INCR or DECR. Using these two buttons, you can select any of the letters of the alphabet, the numbers 0 through 9, or the characters "/", "_", or "*". Choose the first character of the new name in this way.

3. To move to the next character position, press NEXT. Use INCR or DECR to repeat the process described in (2) above. To return to a previous character position, press PREV.

4. To exit, press F1.

Copying Programs

To copy the current program, press F2. The display will ask

    COPY PROGRAM?

Press 0 (yes) to copy the program. The display will read:

    COPY *current-program number* TO *current-program number*

Enter the program number you want the current program copied to, and press ENTR. Assuming the program number you selected was empty, the program will be copied, and you will now be editing the program of the new program number.

If a program already existed under the number you selected, the display will read.

```
    REPLACE PROGRAM?
```

Press 0 (yes), and the program will be replaced. Press − (no), and you will return to the

> COPY *current-program number* TO *current-program number*

display, where you can enter a different program number.

Deleting Programs

To delete an existing program, push F3. You will be asked to confirm that you do indeed wish to delete the program:

> DELETE PROGRAM?

With the question mark flashing. Push 0 for "yes" or − for "no". If you respond yes, the program will be deleted. Remember that built-in programs cannot be deleted.

Pitch Wheel and Key-Pressure Bend

Note bending is when the played note rises or falls to another note by a smooth transition, as in Figure 6-1. It may or may not return to the original note.
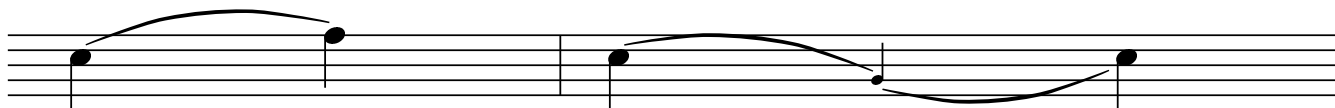
Figure 6-1. Note Bending.

The K150X allows you to control this effect in two ways - through the pitch wheel or through key pressure. Here, in the program editor, you select the ranges in semitones for both of the bending options. The .P-BEND switch in the Layer Editor allows you to select whether either or both of these options is active for a particular layer. All layers in the program set to the same option will have the same amount of bend. With the .P-BEND switch, you can select among four pitch bending options: *off*, *wheel*, *press*, or *both*. (See *Layer Editing* for more information.)

Pitch Wheel Bending

Assuming your MIDI controller has an assignable pitch wheel, it can bend a played note up or down, depending on which way the wheel is rotated (no bending occurs when the wheel is in the center of its rotation). In order to hear the effect of your changes, the .P-BEND parameter in one or more of the layers being played has to have the value *wheel* or *both*, and there has to be proper MIDI assignment of the pitch wheel signal and/or the key velocity signal from the MIDI controller to the K150X.

When the display reads .P-BEND you can adjust how many semitones away from the played note wheel rotation can bend the sound. Use INCR and DECR to change the value by 1 semitone increments, or enter a value using the numeric button-pad and press ENTR.

The value given is the amount in *each direction*. For instance, if 3ST is the value, the pitch wheel will bend the played note 3 semitones up and 3 semitones down. The maximum range is +/-6O semitones. New programs have their P-BEND set at a default value of 2ST.

The sign of the value shows the relationship between the direction the pitch wheel is rotated and the direction of the pitch. The convention is usually.

Wheel Direction	Note Direction	Sign of Semitone Value
clockwise or up	up	+

| | counterclockwise or down | down | - |

If your pitch wheel is different, or you want to reverse the relationship, change the sign of the value.

Key-Pressure Bending

Assuming that your MIDI keyboard sends after-pressure information, notes can be specified to bend when played, the range of the bend depending on the force with which you press the keys. The direction of the bending is specified by the sign of the range. A positive value means the sound bends *up* from the played note. A negative value means the sound bends *down*.

In order to hear the effects of your changes, the .P-BEND parameter in one or more of the layers being played must be set to *Press* or *Both*. There must also be proper MIDI assignment of the key velocity signal from your keyboard to the K150X.

When the display reads .K-BEND, you can set the distance (in semitones) after the played note at which pressing the key will bend the note. Use the numeric button-pad to enter a value directly and press ENTR, or use INCR and DECR to change the value by 1 semitone increments.

Change the direction of the bending by changing the sign of the value. The semitone value will be positive for a rising bend and negative for a failing one.

New programs have their KP-BEND set at +1 ST by default.

Soft Pedal

The soft pedal acts as an attenuator to control the loudness and timbre of notes. This parameter is an unsigned value (in decibels) which sets the range of the soft pedal. Note that if the soft pedal is assigned to a MIDI switch controller, it will take on the values 0 (when OFF) and the maximum pedal range (when ON).

When the display reads .SFT-PDL, you can adjust the timbre range over which the sound will be diminished when the pedal is pressed ±30dB. Use the numeric button-pad to enter a value directly and press ENTR or use INCR and DECR to change the value by 1 decibel increments.

Left and Right Split Points

When a program is first defined, the center region is defined as being the full width of the keyboard. Left and right regions are created by defining left and right *split points* for the center region, which essentially shorten the center region on either or both sides. That is, the left and right split points delineate the lower and upper bounds of the center region.

Keyboard events which occur below the left split point are routed to the left region; events which are above the right split point are routed to the right region. Each region can be given its own distinct *layers*, allowing the keyboard to be divided into up to three different voices of arbitrary keyboard width.

Setting the Split Points

Select each split point individually when the appropriate display is visible. For the left split point, the display is

> *number* `.L-SPLIT` *current note*

and for the right split point, the display is

> *number* `.R-SPLIT` *current note*

number is the program number being edited, and *current note* is the keyboard position of the appropriate split. *current note* will be flashing. In a program without a current left-hand split, the left-hand split is defined to be C in the 0 octave (the bottom most keyboard key). C0 would be flashing. In a program without a current right-hand split, the right-hand split is defined to be C in the 9th octave (the top most keyboard key). C9 would be flashing.

When the display shows .L-SPLIT or .R-SPLIT, you can use INCR and DECR to step through the keyboard keys.

Alternately, you can select the MIDI number of the key at which you want the split to occur. The key selected becomes the *last key* in the center region. The MIDI number for each key is shown in Table 6-2, and Figure 6-2 relates the MIDI numbers to keys on the keyboard.

Table 6-2
MIDI Key Number Chart

Note	Octave								
	0	1	2	3	4	5	6	7	8
C	12	24	36	48	60	72	84	96	108
C#	13	25	37	49	61	73	85	97	109
D	14	26	38	50	62	74	86	98	110
D#	15	27	39	51	63	75	87	99	III
E	16	28	40	52	64	76	88	100	112
F	17	29	41	53	65	77	89	101	113
F#	18	30	42	54	66	78	90	102	114
G	19	31	43	55	67	79	91	103	115
G#	20	32	44	56	68	80	92	104	116
A	21	33	45	57	69	81	93	105	117
A#	22	34	46	58	70	82	94	106	118
B	23	35	47	59	71	83	95	107	119

Key									
C0	C1	C2	C3	C4	C5	C6	C7	C8	C9
12	24	36	48	60	72	84	96	108	120

MIDI Number

Figure 6-2. MIDI Numbers of C Keys.

The number is automatically translated from the MIDI number to the associated musical note (the *new note*) in the display. If you selected the wrong MIDI number, you can repeat this step.

Left and Right Region Balances

The volume of the left and right regions can be adjusted relative to the center region and to each other.

When the display reads .L-BAL, you can adjust the volume of the left region. When the display reads .R-BAL, you can adjust the volume of the right region. Either region can be adjusted : ±15dB.

Enter a value in dB directly using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 1 dB increments. If a value greater than 15 is entered, the value will be set to 15 (+ or -) when ENTR is pressed.

Note that region balancing is *relative*. When you raise the volume of a specific region, you are actually *reducing* the volume of the other regions with respect to it. This is done to insure that the K150X's output gain is always as high as possible.

The Region Editor

With the Region Editor, you select the region of the active program which you want to work in. When the Layer Editor is selected, the editable layers will be those of the selected region.

Technically, all programs have 3 regions. It is possible, however, to define the split points (in the Program Editor) such that they are outside the range of the MIDI keyboard or controller you are using. For example, there are MIDI values for notes from C in the 0 octave, to B in the 9th octave, but even a "full" range, 88-key piano keyboard goes only from A in the 0 octave to C in the 8th octave, as shown in Figure 7-1.

Key

C0	C1	C2	C3	C4	C5	C6	C7	C8	B9
12	24	36	48	60	72	84	96	108	119

MIDI Number

Figure 7-1. MIDI Numbers of C Keys.

Therefore, it is possible to select a region and edit its layers even though you can't play it because no part of the actual playing keyboard has been assigned to it.

Using the Region Editor

1. Enter the Region Editor by pressing EDIT CANC. The regions edited will be those of the currently active program. To edit the regions of another program, you must first select it to be the currently active program, and then press EDIT CANC. The display will show:

        P*n* .CNTR LYRS *r*

where *n* is number of the current active program, and *r* is the number of layers currently defined for the region.

2. Select a region to work on by using INCR, DECR, NEXT, or PREV, or select it using buttons 1, 2, or 3, corresponding to "left", "center", and "right", and press ENTR.

Display Reads	Region	Region Number
.LEFT	left region	1
.CNTR	center region	2
.RGHT	right region	3

Additional information is given on the right side of the display on the number of layers in that region. The right side of the display can read "0 LYRS", meaning that there are currently no layers defined, or it can read "LYRS *n*", where *n* is the number of layers currently defined for that region. See the Layer Editor chapter for information on creating sound layers.

F1, F2, and F3 in the Region Editor

F1 deletes the selected region. You will be prompted before the region is deleted.

F2 copies the region in a storage buffer. You can then use F3 to insert that region somewhere else.

F3 replaces the selected region with the region stored in the storage buffer with F2 .

The Layer Editor

Most of the sound-shaping editing takes place at the layer level. Up to seven sound layers may be defined for each region of a program.

Using the Layer Editor

Selecting and Editing Layers

Select Layer Editing by pressing EDIT UNDO. The layers selected to be edited are those of the center region unless you specified another region previously using the Region Editor.

When you enter the layer editor, the display will show the program number, region (LEFT, CNTR, or RGHT), layer number (flashing) and total number of layers in the region. For instance, the display for the center region of Program #1 would look like:

```
P1  .CNTR LYR 1/1
```

If there are currently two or more layers defined, select a layer to work on by using INCR, DECR, NEXT, or PREV, or select it by number using the numeric button-pad and press ENTR. If there is only one layer defined, that layer is the default layer to edit, unless INCR is pressed, creating a new layer (see Creating and Deleting Layers).

Press ENTR to start choosing among the parameters for the selected layer. The display will show on the left side:

- the region
    - L for LEFT
    - C for CENTER
    - R for RIGHT
- the Layer number

The parameters shown in Table 8-1 can be edited. One will appear in the display; the others can be selected using NEXT and PREV.

Table 8-1
Layer Editor Parameters

Display Reads	Parameter	Available Values (use INCR and DECR)	What it Does
.VN	Voice	a voice	Assigns the number and name of the voice to the sound layer
.TUNE	Tuning	±125C	Adjusts the tuning of the layer
.TRANSPOSE	Transposition	±60ST	Transposes the layer
.T-MODE	Timbre-Mode	Fixed Slider A-Veloc Select	Selects the way timbre is chosen
.T-SHIFT $	Timbre-Shift	±60ST	Controls the amount and direction of timbre shifting
.T-SELECT &	Timbre-Select	C0-C9	Selects one note for all timbre shift
.T-LEVEL	Timbre Level	±30dB	Selects Timbre Proportions
.B-MODE	Balance Mode	Fixed Slider A-Veloc	Controls the mode of layer balancing
.BALANCE	Balance Level	±15dB	Controls the relative volume of the layer

.P-MODE	Pitch Bend Mode	Off P-Wheel K-Press Both	Controls the mode of pitch bending
.C-MODE	Chorus Mode	Off M-Wheel K-Press Fixed	Turns chorusing on and off
.V-MODE	Vibrato Mode	Off M-Wheel K-Press Fixed	Controls the action of the vibrato unit
.EQUALIZER	EQ Switch	Off On	Turns equalization on and off

*   If the value is numeric, you can enter the value with the right button-pad and press ENTR.
\$ Does not appear when Select value is selected for T-SHIFT.
&   Appears only when Select value is selected for T-SHIFT.

See the sections on each parameter later in this chapter.

F1, F2, and F3 in the Layer Editor

The operation of F1, F2, and F3 changes depending on whether you have pressed ENTR to begin editing the layer parameters for a specific layer (step 3 above). Once you confirm the selection and begin editing the parameters (step 3 above), these buttons have *different* meanings. F1 and F2 allow you to change the layer selection without re-entering the editor. F3 mutes the other layers in the region, allowing you to hear only the layer you are editing.

Creating and Deleting Layers

Creating Layers

1. To create a new layer, select the uppermost layer currently defined using any of the methods above and press INCR. The display will read

        New Layer?

Press ENTR, to define a new layer, or - to cancel the request. The new layer will be blank.

2. To create a new layer from an existing one, select an existing layer and press F2 to copy it, then press F3 to insert the copied layer into the region. Note that F3 always inserts layers.

Deleting Layers

To delete an existing layer, press F1. You will be asked for confirmation:

        Delete Layer?

Press ENTR to delete a layer, or - to cancel the request.

Voice

The voice is the built-in sound selected as a basis for all editing changes in this layer. When a new layer is first defined, the default voice is acoustic piano.

When the display reads .VN, you can select the voice. Enter the number of the desired voice using the numeric button-pad and press ENTR, or use INCR and DECR to step through the available voices.

The built-in voices are either accurate electronic reproductions of conventional instruments, or unconventional sounds which highlight the unique sound generation capabilities of the K150X. The built-in voices include these Resident Voices listed in Table 8-2.

Table 8-2
Resident Voices

Voice Number	Display Reads	Sound Name
1	PIANO	Acoustic Piano
2	ROCK PNO	Rock Piano
3	SOFT PNO	Soft Piano
4	ELECPNO	Electric Piano
5	BR E-PNO	Bright Electric Piano
6	HARPISCHD	Harpsichord
7	SOFTHPCD	Soft Harpsichord
8	A BASS	Acoustic Bass
9	E BASS	Electric Bass
10	SOFT EBS	Muted Electric Bass
11	VIBES	Vibes
12	MARIMBA	Marimba
13	JAZZ ORG	Jazz Organ
14	ROCK-ORG	Rock Organ

There are also additional Sound Block Voices.

Tuning

Each layer can be individually tuned by cents. This tuning is in addition to the master tuning for the entire device as specified with the *Tuning Editor*. For example, if the Master Tuning for the K150X is set at +3C, and a layer is given a tuning of +2C, the layer will have a +5C tuning relative to the natural pitch.

When the display reads .TUNE you can adjust the tuning of the layer from 0 to +/-125 Cents. Enter a value using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 10 cent increments.

If a value greater than 125 is entered using the numeric button-pad, the value will be set to 125 when ENTR is pressed.

Transposition

Each layer can be individually transposed by semitones. This transposition is in addition to the master transposition for the entire device as specified with the *Tuning Editor*. For example, if the master transposition for the K150X is set at +3ST, and a layer is given a transposition of +2ST, the layer will have a +5ST transposition relative to the natural tone.

When the display reads .TRANSPOSE you can adjust the transposition of the layer from 0 to +/-60 semitones. Enter a value using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 1 semitone increments.

If a value greater than 60 is entered using the numeric button-pad, the value will be set to 60 when ENTR is pressed.

Timbre Mode

About Timbre

Timbre describes the harmonic content of the note in addition to the nominal pitch. For most conventional instruments, the harmonic content of the timbre changes over time while the nominal pitch remains reasonably constant. The harmonic content of the timbre also changes with the loudness of the note.

All built-in sounds have a pre-selected timbre formula as a component of every note. Timbre-Shift allows you to override the default timbre and choose another timbre for a keyboard key when it is pressed. With Timbre-Shift, you can override the internal formula and use the timbres from other notes in the scale in conjunction with the nominal pitch. Timbre shifts are similar to transpositions, but they only change the harmonic content of the note and have no effect on the pitch of the note.

The effect of timbre-shifting varies depending on the built-in voice. In the case of the acoustic piano voice, positive timbre shifts, which will cause the timbres from lower notes to played at higher pitches, result in a bright, funky sound. Negative adjustments, which use the timbres from higher notes to be played at lower pitches, result in a darker sound.

The Timbre Mode Options

When the display reads .T-MODE, you can choose among four options for selecting your timbres. The default option is *manual*. Use INCR and DECR to step through the choices.

Manual   When used with the default value for .T-SHIFT (0 semitones), this option creates the default timbre mode. Picking a shift in semitones with .T-SHIFT changes the sound (See Timbre-Shift Value).

Slider   If your MIDI controller has a MIDI-assignable slider or wheel, you can set it up so that you can interactively shift the timbre between the nominal timbre and .T-SHIFT selected timbre by moving the controller. In order for this option to work, you have to make the proper MIDI assignment of the controller (see *Assignment Editor*).

Attack Velocity   (A-VELOC) If your MIDI controller can transmit key velocity information, the amount of .T-SHIFT timbre applied to the nominal pitch can be proportional to the velocity with which the key is played by selecting the .A-VELOC Timbre-Shift option.

Select   Used in conjunction with the .T-SELECT, this option takes the timbre from one note and applies it to all notes. You choose the note with the .T-SELECT parameter (see *Timbre-Select*). The default note is middle C (C4 = C in the 4th octave).

Timbre-Shift Value

Used in conjunction with the first three Timbre-Shift Modes described above (*manual, slider,* or *a-veloc*), this parameter appears as a Layer Editor Parameter *only* if one of those first three modes is selected, and *not* if the *select* option is chosen. It allows you to specify the amount to shift the timbre, relative to the played note, in semitones. For instance, if the Timbre-Shift Value is given as +1ST, and C is played, then the timbre for C# will be played with the nominal B pitch. Likewise, if the Timbre-Shift Value is given as -1 ST, and C is played, then the timbre for C# will be played.

When the display reads .T-SHIFT you can adjust the timbre shift of the layer from 0 to ±60 semitones. 0 is the default, and applies all timbre-shifts to their nominal pitches. Enter a value using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 1 semitone increments. To change the sign of the value, use the - key.

In general, positive timbre-shifts result in a brighter sound, while negative timbre-shifts result in a duller sound.

Timbre-Select

Used in conjunction *only* with the Select option of the Timbre-Shift Mode parameter, this parameter allows you to specify the note whose timbre will be applied to all the notes. The default note is middle C (C4 = C in the 4th octave).

There are 2 ways to select the note. Press INCR and DECR to step through the musical scale. Alternatively, you can select the MIDI number of the key whose timbre shift you want. Input the value using the numeric button-pad and press ENTR. The MIDI number for each key is shown in Table 8-3, and Figure 8-1 relates the MIDI numbers to keys on the keyboard.

Table 8-3. MIDI Key Number Chart.

Note	Octave								
	0	1	2	3	4	5	6	7	8
C	12	24	36	48	60	72	84	96	108

C#	13	25	37	49	61	73	85	97	109
D	14	26	38	50	62	74	86	98	110
D#	15	27	39	51	63	75	87	99	III
E	16	28	40	52	64	76	88	100	112
F	17	29	41	53	65	77	89	101	113
F#	18	30	42	54	66	78	90	102	114
G	19	31	43	55	67	79	91	103	115
G#	20	32	44	56	68	80	92	104	116
A	21	33	45	57	69	81	93	105	117
A#	22	34	46	58	70	82	94	106	118
B	23	35	47	59	71	83	95	107	119

Key

C0	C1	C2	C3	C4	C5	C6	C7	C8	C9
12	24	36	48	60	72	84	96	108	120

MIDI Number

Figure 8-1. MIDI Numbers of C Keys.

The number is automatically translated from the MIDI number to the associated musical note in the display. If you selected the wrong MIDI number, you can repeat this step.

Timbre-Level

The loudness proportions between timbres for the note being played can be modified. This parameter changes the relationship of key velocity to timbre without affecting the relationship of key velocity to loudness. Its effect can be thought of as being similar to the soft pedal, but with reversed values: a +30dB value given to .T-LEVEL will have the effect of emphasizing the loud timbres, while the same value given to .SFT-PDL would emphasize the soft timbres.

When the display reads .T-LEVEL, you can adjust this value ±30dB. The default is 0dB, which is full range. Enter a value in decibels using the numeric button-pad and press ENTR, or use INCR and DECR to change the value in 1 decibel increments. If a value greater than 30dB is entered using the numeric button-pad, the value will be set to 30dB when ENTR is pressed.

dB	T-LEVEL	SFT-PDL
+30	loud timbre only	soft timbre only
0	full range	
-30	soft timbre only	loud timbre only

Balance Mode

The volume of each individual layer can be set with the Balance Level parameter described next, and can be controlled by one of three methods selectable with the Balance Mode Parameter. When the display reads .B-MODE, you can choose among three options for controlling the balance. The default mode is *manual*. Use INCR and DECR to step through the choices:

Manual   This is the default mode for layer balance. The value given in the *Balance Level* parameter is directly applied to the layer.

Slider   If your MIDI controller has a MIDI-assignable slider or wheel, you can set it up so that you can interactively control the balance level between 0dB and the value set with the *Balance Level* parameter.

Attack Velocity   (A-VELOC) If your MIDI controller can transmit key velocity information, the balance can be controlled by key velocity. When the display reads .A-VELOC, the balance level is scaled between 0dB and the value set with the *Balance Level* parameter, and proportional to the velocity with which the key is pressed.

Balance Level

When the display reads .BALANCE, you can control the volume of this layer relative to the other layers. The volume of this layer can be adjusted to be 0 to 12dB softer than an unadjusted layer. The default value is 0dB.

Enter a value in decibels using the numeric button-pad and press ENTR, or use INCR and DECR to change the value in 1 decibel increments. If a value greater than 12dB is entered using the numeric button-pad, the value will be set to 12dB when ENTR is pressed.

Note that layer balancing is *relative*. When you raise the volume of a specific layer, you are actually *reducing* the volume of the other layers with respect to it. This is done to insure that the K150X's output gain is always as high as possible.

Pitch Bend Mode

Pitch bending is when the played note rises or falls to another note by a smooth transition, as in Figure 8-2.
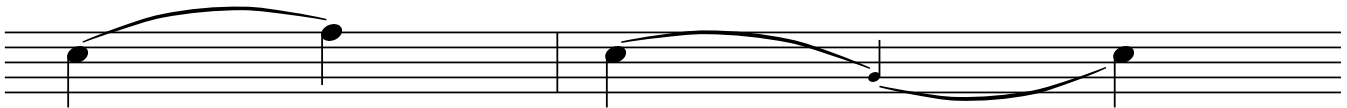
Figure 8-2. Pitch Bending.

Assuming that your MIDI controller has a MIDI-assignable continuous controller such as a wheel, knob, or slider, and/or can transmit key after-touch information, this parameter allows you to choose which combination (if any) of *control* information will control the pitch bending for this layer.

The *range* of the pitch bending is a program-wide parameter and is controlled in the Program Editor. The default values are +2 semitones for wheel bending, and +1 semitones for key-pressure bending (see *Program Editing*).

When the display reads .P-MODE, you can choose among four pitch bend control options. Use INCR and DECR to step through the choices.

Off   Disables the pitch bending capabilities of this layer.

P-Wheel   Only the pitch wheel is selected for pitch bending. Its range is determined by the .P-BEND parameter in the Program Editor (see Program Editing).

K-Press   Only key pressure is selected for pitch bending, with the amount of bend being proportional to the after-touch pressure with which you hold the key down. Its range and direction are determined by the .K-BEND parameter in the Program Editor (see Program Editing).

Both   Both pitch wheel and key pressure bending are enabled.

Chorus Mode

This parameter selects whether chorusing is active in this layer. and specifies how. The switch selected here works in conjunction with the chorus settings edited with the Chorus Editor (one set of chorus parameters can be defined for each program).

When the display reads .C-MODE, you can choose among the Chorus switch options. Use INCR and DECR to step through the available switch options. The default is *off*.

Off   Chorusing is disabled for this region.

Fixed   Chorusing is enabled in a normal mode; i.e., the chorus detuning will not respond to MIDI key pressure or modulation wheel signals.

K-Press   Assuming your MIDI controller can transmit key after-touch information, the amount of detuning, as specified with the .DTUNE parameter of the Chorus Editor can be proportional to the after-touch with which the key is held down with this option (see *Chorus Editing* for more information).

M-Wheel   Allows the amount of detuning, as specified with the .DTUNE parameter of the Chorus Editor, to be controlled with your MIDI controller's modulation wheel (see *Chorus Editing* for more information).

Vibrato Mode

This parameter selects whether vibrato is active in this layer, and specifies how. The switch selected here works in conjunction with the vibrato settings edited with the Vibrato Editor (one set of vibrato parameters can be defined for each program). When the display reads .V-MODE, you can choose among the Vibrato switch options. Use INCR and DECR to step through the available switch options. The default is *off*.

Off - Vibrato is disabled for this region.

Fixed   Vibrato is enabled in a normal mode; i.e., the vibrato intensity will not respond to MIDI key pressure or modulation wheel signals.

K-Press   Assuming your MIDI controller can transmit key after-touch information, the amount of vibrato depth, as specified with the .DEPTH parameter of the Vibrato Editor can be proportional to the after-touch with which the key is held down with this option (see *Vibrato Editing* for more information).

M-Wheel   Allows the amount of vibrato depth, as specified with the .DEPTH parameter of the Vibrato Editor, to be controlled with your MIDI controller's modulation wheel (see *Vibrato Editing* for more information).

Equalizer Number

This parameter selects whether equalization is active in this layer. When the display reads .EQUALIZER, you can use INCR and DECR to switch between *on* and *off*. The default is *on*.

One set of equalization parameters can be defined for each program. Use the Equalizer Editor to edit the equalization parameters for the active program (see *Equalizer Editing*).

The Chorus Editor

The programmable chorusing feature in the K150X can be used to create a variety of effects such as phasing, flanging, doubling, chorusing, and echo. The chorusing feature operates by generating extra notes which can be successively detuned, delayed and/or decayed.

You can define one set of Chorus parameters for each Program. Whether or not these Chorus parameters are active for any individual layer in that program is controlled by the Chorus Enable switch for each layer which can be set to *Off*, *Fixed*, *M-Wheel*, or *K-Press* (the default is *Off*). To fully understand the capabilities of Chorus mode, see the description of the various chorus enabling options in *Layer Editing*.

The Chorus parameters being modified are those for the currently active program. In order to hear the effects of your Chorus editing, turn on one of the active modes (*Fixed*, *K-Press*, or *M-Wheel*) of the Chorus Enable switch for the layer or layers you want to add Chorus to (see *Layer Editing*).

Using the Chorus Editor

Select CHORUS editing by pressing EDIT INCR (The word CHORUS is printed above the key on the button-pad).

The parameters shown in Table 9-1 (on the following page) can be edited. One will appear in the display; the others can be selected by using NEXT and PREV.

Table 9-1
Chorus Editor Parameters

Display Reads	Parameter	Adjustable Range * (use INCR and DECR)	What it Does
.X-NOTES	Extra Notes	0-7	Selects the number of extra notes to be played.
.DTUNE	Detune	±0-6,000C	Varies the pitch of the successive notes.
.DELAY	Delay	0-4000ms	Delays each successive note by the given time interval.
.DECAY	Decay	0-12dB	Reduces the volume of each successive note.

* You can also enter the value directly with the right button-pad and press ENTR.

See the sections on each parameter later in this chapter.

The Chorusing parameters work in conjunction with each other. For instance, until audibly perceptible values are set for Detune and Delay, selecting multiple notes will not sound dramatically different; it will just "fatten" up the sound of the original note. Likewise, selecting 3 Notes and a Delay of 200 ms, with no detuning, will only repeat the original sound 3 times, 200 ms apart.

Remember that you can interactively listen to your modifications to the Chorus editor. To do this, at least one layer in the region of the keyboard that you're playing *must* have its Chorus Enable switch on (see *Layer Editing*). When you select values using the numeric button pad and press ENTR or change values using INCR and DECR, the changes in sound can be heard by playing the keyboard. Also note that you can press UNDO to toggle between the current value and the previous value, or CLR to reset a value to 0.

Notes

When the display shows .X-NOTES, you can select the number of extra notes to sound. Enter the value directly with the numeric button-pad and press ENTR or use INCR and DECR to add or subtract one note at a time.

Up to 7 notes can be selected. If you enter a value greater than 7 using the numeric button-pad, the number of notes will be set to 7 when ENTR is pressed.

Detune

When the display reads .DTUNE, you can specify the amount to detune and *mode* of detuning for successive notes. Detuning amount specifies how much the chorus generated pitches will vary from the played note. The mode determines whether these additional notes are above or below the pitch of the played note, or alternate between being above and below.

You can select the detuning amount to be between 0 and 2000 cents. Enter a value in cents using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 10 cent increments.

The mode of the de-tuning can be adjusted using the sign button, - . Pressing - steps through the four values +, -, ±, -/+ :

+	above
-	below
±	alternates between above & below; starts above
-/+	alternates between below & above; starts below

For example, if 4 extra notes and 200 cents (1 whole tone) of de-tuning are specified, the effect of playing a note for each sign value is shown in Figure 9-1.

Figure 9-1. Detuning.

Delay

When the display reads .DELAY, you can adjust the amount of time between each note from 0 to 4000 ms (4 seconds) in millisecond increments.

Enter a value in milliseconds directly using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 10 ms increments. If you enter a value greater than 4000 ms, the delay value will be set at 4000 ms when ENTR is pressed.

You can also use the INCR and DECR keys to change the value in 10 ms increments.

Decay

When the display reads .DECAY, you can lower the volume of successive notes in relation to the previous one from 0 to 12dB in 1 dB increments.

Enter a value directly using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 1 dB increments. If you enter a value larger than 12 with the numeric button-pad, the decay value will be set at 12 when ENTR is pressed.

Chorus Editor Assignable Controls

Associated with the chorusing are a number of MIDI-assignable controls and switches which can be used to control the chorusing parameters in real time. See *Controls Editing*.

On/Off Switch. This switch turns the chorusing *on* and *off*. When a *chorus unit* is turned off, any extra notes are turned off as well.

Detune Control (unidirectional). This control varies the successive detune between 0 and the value set in the chorusing parameters. Chorus detune is a live effect (i.e., it is effective after the note has started.).

Detune Mode Switch. This switch changes the sign of detune mode (i.e., + becomes -; ± becomes -/+).

Detune/Mode Control (bidirectional). This is a bidirectional control that combines the detune control with the mode switch. When the control is above center (or below if the direction is reversed), the detune is varied and the normal mode is used. In the other direction, the detune mode is reversed.

Delay Control (unidirectional). This control varies the successive delay between 0 and the value set in the chorusing parameters. It is only effective when a note is started.

Decay Control (unidirectional). This control varies the successive decay between 0 and the value set in the chorusing parameters. It is only effective when a note is started.

Chorus Editor Hints

Chorusing can generate multiple notes for a single key event. The K150X can produce 16 notes simultaneously. If you play a chord while chorusing is enabled, the sound quality may be thinner than expected because the total number of notes you are trying to generate exceeds the 16-note maximum.

One "trick" you can try is to set some small delay (5ms) between chorused notes using the Delay parameter. This will greatly expand the K150X's note generation capability.

Try the initial settings in Table 9-2 in order to create popular effects.

Table 9-2
Popular Chorusing Effects

Effect	X-NOTES	DTUNE	DELAY	DECAY
		cents	ms	
Chorusing	≥2	5	25	-
Doubling	1	5 - 10	33	-
Phasing/Flanging	1	5	3-5	-
Echo	2-3	-	>100	moderate

The Vibrato Editor

The programmable vibrato feature in the K150X allows you to create a variety of frequency-shift effects.

You can define one set of Vibrato parameters for each Program. Whether or not these Vibrato parameters are active for any individual layer in that program is controlled by the Vibrato Enable switch for each layer which can be set to *Off*, *Fixed*, *M-Wheel*, or *K-Press* (the default is *Off*). To fully understand the capabilities of Vibrato mode, see the description of the various vibrato enabling options in *Layer Editing*.

The Vibrato parameters being modified are those for the currently active program. In order to hear the effects of your Vibrato editing, turn on one of the active modes (*Fixed*, *K-Press*, or *M-Wheel*) of the Vibrato Enable switch for the layer or layers you want to add Vibrato to (see *Layer Editing*).

Using the Vibrato Editor

Select VIBRATO editing by pressing EDIT DECR (The abbreviation VIBR is printed above the DECR key on the button-pad).

The parameters shown in Table 10-1 can be edited. One will appear in the display; the others can be selected by using NEXT and PREV.

Table 10-1
Vibrato Editor Parameters

Display Reads	Parameter	Available Values * (use INCR and DECR)	What it Does
.TRIANGLE	triangle wave	Triangle	Selects the base waveform used for modification.
.SQUARE	square wave	Square	
.DEPTH	Depth of Oscillation	0-3600 C	Adjusts the range in which the sound will vary.
.RATE	Oscillation Rate	0-49.9 Hz	Adjusts the frequency of oscillation.
.SYMMETRY	Symmetry of Waveform	±10	Adjusts the symmetry of the waveform.
.DELAY	Vibrato Delay	0-1000ms	Specifies a delay before vibrato reaches full intensity.

 * If the value is numeric, you can also enter the value directly with the right button-pad and press ENTR.

See the sections on each parameter later in this chapter.

The Vibrato parameters work in conjunction with each other. For instance, until an audible value is set for .RATE, changes to the other parameters will not be audible. Likewise, if .DEPTH is set to 0C, no audible oscillation occurs because the note doesn't change.

Remember that you can interactively listen to your modifications to the Vibrato editor. To do this, at least one layer in the region of the keyboard that you're playing *must* have its Vibrato Enable switch enabled (*on*, *delayed*, or *press* (see *Layer Editing*).

When you select values using the numeric button pad and press ENTR, or change values using INCR and DECR, the changes in sound can be heard by playing the keyboard. Also note that you can press UNDO to toggle between the current value and the previous value, or CLR to reset a value to its default value.

Triangle or Square

When the display shows .TRIANGLE or .SQUARE, you can select the waveform used by Vibrato. With .TRIANGLE, the sound will "ease" from the played note to the limit of oscillation specified with the .DEPTH parameter, and back again. With .SQUARE, the sound will "jump" between the limits of oscillation. The two waveforms are shown in Figure 10-1.
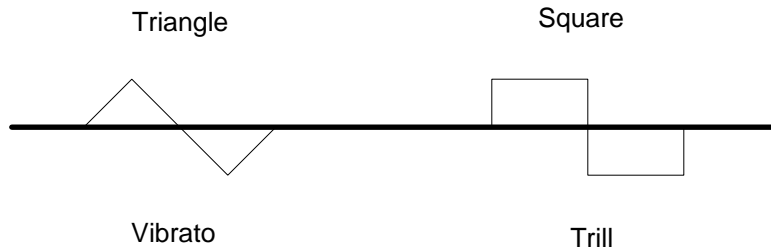
Figure 10-1. Triangle vs. Square waves

The musical effect is approximately as shown in Figure 10-2.

Figure 10-2. Musical Effect.

Use INCR and DECR to alternate between .SQUARE and .TRIANGLE.

Depth

When the display shows DEPTH, you can select the *depth* and *mode* of the oscillation. Depth is the amount that the pitch will vary, in cents. Mode is how this variation will occur in relation to the nominal pitch. above it (+), below it (-), or varying *both* above and below (±, -/+). When you choose *both*, mode selects which wave the oscillation starts: ± means the oscillation starts positive and goes negative, -/+ means the oscillation starts negative and goes positive. Figure 10-3 illustrates modes of selection for a triangle wave.
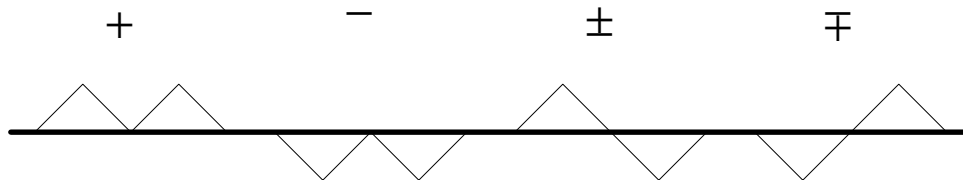
Figure 10-3. Triangle Wave Modes

The depth can be selected to be between 0 and 3600C. Enter a value in cents using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 10 C increments. Note that if the depth is selected to be 0, no vibrato effect will be audible.

Select the desired mode by pressing - to step through each of the four choices: +, -, ±, -/+.

Rate

When the display shows .RATE, the frequency at which the vibrato occurs can be selected. A low frequency results in a "slow" vibrato effect, while a high frequency results in a "fast" vibrato effect.

The frequency can be adjusted from 0 to 49.9Hz. Enter a value directly using the numeric button-pad and press ENTR, or use INCR and DECR to change the value by 0.1 Hz increments. Note that if 0Hz is selected, no vibrato effect will be audible.

Symmetry

Up to this point, vibrato waveforms have been symmetric. Symmetry allows you to specify a value which modifies the vibrato waveforms as shown in Figure 10-4.

Triangle

-10   -5   0   5   10

Square
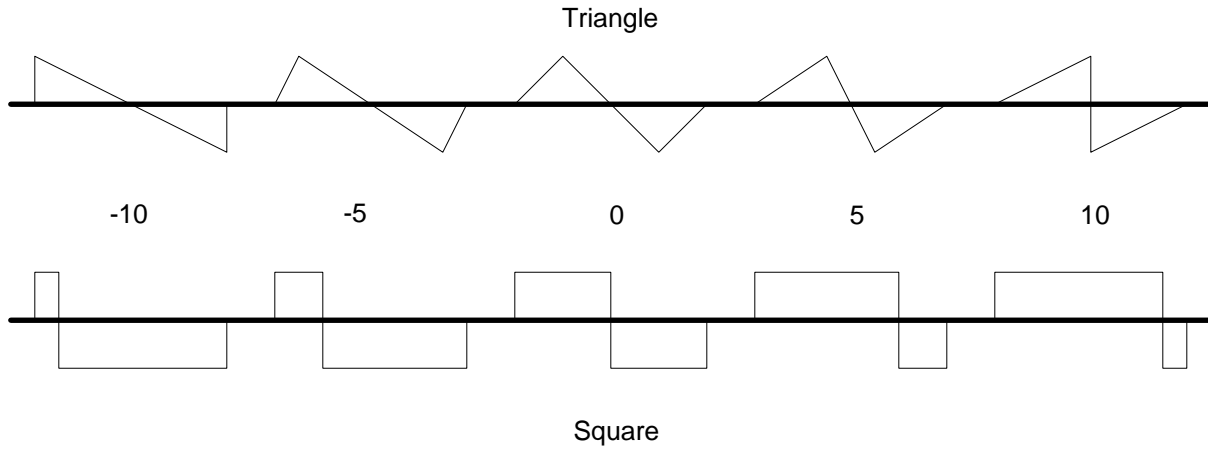
Figure 10-4. Modifying Waveform Symmetry.

Enter a value directly using the numeric button-pad and press ENTR, or use INCR and DECR to change the value 1 step at a time.

Note that it is possible to create ramps (sawteeth) using the -10 or +10 symmetry values in conjunction with the triangle wave. Figure 10-5 shows waveforms for representative mode/symmetry value combinations.

Triangle

-10   -5   0   5   10

Square
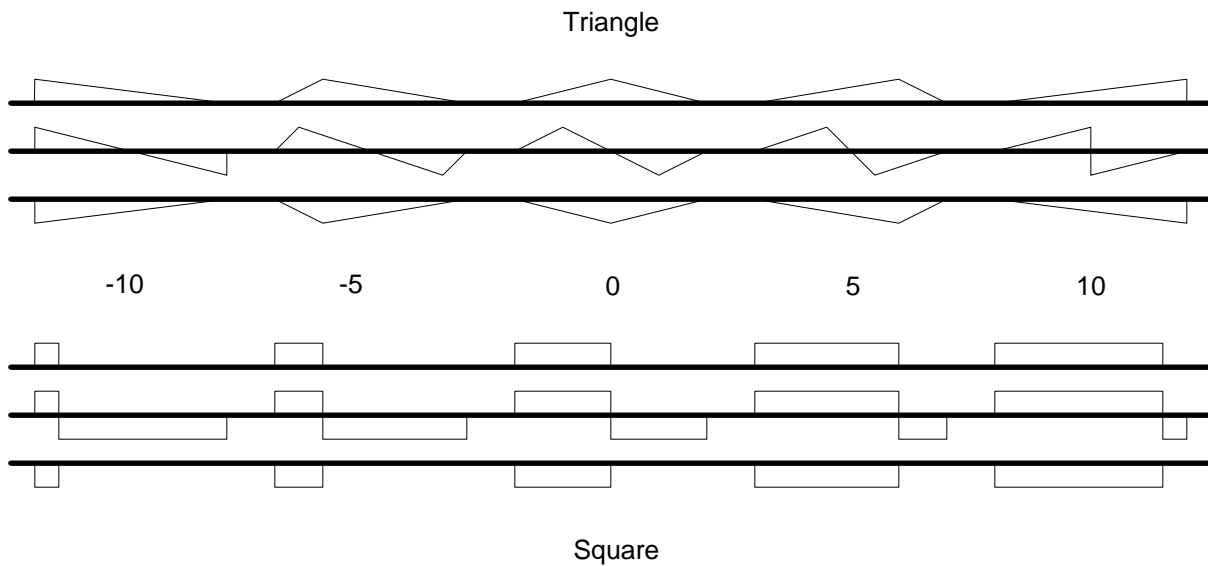
Figure 10-5. Mode/Symmetry Value Combinations.

Delay

The delay parameter establishes an "onset" delay for vibrato where the vibrato depth increases gradually after the note starts and reaches full depth after the delay time specified has elapsed.

When the display shows .DELAY, you can specify a delay from 0 to 1000 ms (1 second). Enter a value directly using the numeric button-pad and press ENTR or use INCR and DECR to change the value 10 ms at a time.

10-3

Vibrato Assignable Controls

Associated with the vibrato are a number of MIDI-assignable controls and switches which can be used to control the vibrato parameters in real time. See *Controls Editing*.

On/Off Switch. This is a master switch which turns the vibrato *on* or *off* for the entire program.

Depth Control. This is a unidirectional control which varies the vibrato depth between 0 and the current value of the vibrato depth parameter. (Note: Vibrato depth can also be controlled by key pressure or by the modulation wheel. See the section on sound layer parameters for a discussion of this feature.)

Mode Switch. This is a switch which reverses the current vibrato mode as follows:

Off	above	below	a/b	b/a
On	below	above	b/a	a/b

Rate Control. This is unidirectional control which varies the vibrato rate between 0.1 Hz and the current value of the vibrato rate.

Shape Switch. This switch changes the vibrato shape. If the current shape is triangle, turning the switch *on* changes it to square (and vice versa).

Symmetry Control. This is a bidirectional control which varies the waveform symmetry between the limits set by the current value of the symmetry parameter.

Depth/Shape Control. This is a bidirectional control which combines the vibrato depth control and the shape switch. In either direction, the control varies the depth between 0 and the maximum value. When the control is moved below center (or above center, if the control direction is reversed) the shape is changed (as with the shape switch described above).

Depth/Mode Control. This is a bidirectional control which combines the vibrato depth control with the mode switch described above. In either direction, the control varies the vibrato depth. When the control is moved below center (or above center, if the control direction is reversed) the mode is switched (as with the mode switch described above).

The Equalizer Editor

Each program in the K150X has a graphic equalizer associated with it. Each equalizer provides 8 octave bands with a range of 12dB boost and 30dB cut for each band.

Whether or not this equalizer is active in any particular layer of the program is controlled by the Equalizer Enable parameter in the layer editor, which can be set *on* or *off* for each layer (see *Layer Editing*).

The Equalization parameters being edited are those for the currently active program. In order to hear the effects of your equalization editing, turn on the Equalization Enable switch for the layer or layers you want to apply equalization to (see *Layer Editing*).

Each equalizer has eight bands centered about the follow frequencies:

> 62.5 Hz (shelf)
> 125 Hz
> 250 Hz
> 500 Hz
> 1 kHz
> 2 kHz
> 4 kHz
> 8 kHz (shelf)

Each band may be boosted by 12dB or cut by 30dB.

Using the Equalizer Editor

1. Select Equalizer Editing by pressing EDIT CLR
2. One of the frequencies listed above will appear in the display with its current value. Change the value by using the numeric button-pad and pressing ENTR, or use INCR and DECR to change the value by 1dB increments.
3. Use NEXT and PREV to step through the other frequencies.

The Control Editor

This editor allows you to assign MIDI control sources to K150X control destinations. Just as MIDI has two types of control sources (continuous controllers and switches), the K150X has two types of control destinations: virtual controls and virtual switches. Virtual controls recognize the full range of MIDI data values (0 thru 127) while virtual.switches only respond to 0 (OFF) and 127 (ON). There is, however, no restriction on assigning MIDI switches to virtual controls, or MIDI controllers to virtual switches.

Virtual controls are either unidirectional (0 is minimum, 127 is maximum) or bidirectional (with 64 as the center point). The direction of the value, as indicated by the arrow symbol in the K150X display, can be reversed by pressing the - key. For example, a control which sends higher MIDI values when turned clockwise can be reversed, having its signal interpreted as being lower MIDI values when turned clockwise. The pitch bender is an example of a bidirectional control.

When a continuous controller is assigned to a virtual switch, the switch will only react to the extremes of the controller range (OFF and ON); any intermediate values are ignored. In the opposite case, the virtual switch will only see two values (0 and 127) which correspond to the minimum and maximum range of the controller.

Note that the pitch wheel and monophonic channel pressure are treated as extra continuous controllers; they can be assigned to any control or switch destination. Polyphonic key pressure is distributed directly to individual notes and can be used to scale a number of sound layer parameters. For controllers that do not generate polyphonic pressure, a virtual control is provided which allows any control source to act like polyphonic key pressure.

The K150X also provides a connection for two external switch pedals. These pedals are treated as extra switch controllers and can be assigned to any control or switch destination.

F1, F2, and F3 in the Control Editor

Pressing F1 returns you to the top of the list.
Pressing F2 jumps to the first of the Chorus control assignments.
Pressing F3 jumps to the first of the Vibrato control assignments.

Using the Control Editor

1. Select Control Editing by pressing EDIT NEXT.

2. One of the parameters shown in Table 12-1 will appear in the display. Use NEXT and PREV to step through the parameters.

Table 12-1
Summary of Assignable Controls

Display Abbreviation	Control Name	Type of Control	MIDI Assignment
MODULATION	Modulation	CC±	1
P-WHEEL	Pitch Wheel	CC±	126
KEY PRESS	Key Pressure	CC±	125
P-SHIFT	Pitch Shift	CC±	Unassigned
TRANSPOSE	Transpose	CC±	Unassigned
TIMBRE SHIFT	Timbre Shift *	CC±	Unassigned
VOLUME	Volume	CC±	7
BALANCE	Balance	CC±	8
EXPRESSION	Expression	CC±	11
TIMBRE FREEZE	Timbre-Freeze * Pedal	SW	69
SOSTENUTO	Sostenuto Pedal	SW	66
SUSTAIN PED	Sustain Pedal	SW	64

SOFT PEDAL	Soft Pedal	CC	67
CHORUS SW	Chorus Switch	SW	Unassigned
C-DTUNE CC	Chorus Detune	CC	Unassigned
C-MODE SW	Chorus Mode	SW	Unassigned
C-MODE CC	Chorus Mode/Detune	CC	Unassigned
C-DELAY CC	Chorus Delay	CC	Unassigned
C-DECAY CC	Chorus Decay	CC	Unassigned
VIBRATO SW	Vibrato Switch	SW	Unassigned
V-DEPTH CC	Vibrato Depth	CC	Unassigned
V-SHAPE SW	Vibrato Switch	SW	Unassigned
V-SHAPE CC	Vibrato Depth/Shape	CC±	Unassigned
V-RATE CC	Vibrato Rate	CC	Unassigned
V-MODE CC	Vibrato Mode	CC	Unassigned
V-MODE SW	Vibrato Mode	SW	Unassigned
V-SYM CC	Vibrato Symmetry	CC	Unassigned
V-DELAY CC	Vibrato Delay	CC	Unassigned
DATA ENTRY	Data Entry	CC	6
INCREMENT	Increment	SW	96
DECREMENT	Decrement	SW	97
NEXT PROG	Next Program	SW	Unassigned
PREV PROG	Previous Program	SW	Unassigned
NOTES OFF	Notes Off	SW	127

Legend:	SW	switch
	CC	continuous controller
	CC±	bidirectional continuous controller

* Trademark of Kurzweil Music Systems, Inc.

How Assignment is Done

Table 12-2 contains the assignments for standard MIDI control numbers according to the latest MIDI specification. Unassigned control numbers are available for assignment to any K150X control destination.

Table 12-2
MIDI Control Assignments

MIDI #	Default Assignment
0	(ignored)
1	Modulation Wheel
2-5	(unassigned)
6	Data Entry
7	Volume
8	Balance
9-10	(unassigned)
11	Expression
12-31	(unassigned)
32-63	(all LSBs ignored)
64	Sustain Pedal
65	(unassigned)
66	Sostenuto Pedal
67	Soft Pedal
68	(unassigned)
69	Timbre-Freeze* Pedal

70-95	(unassigned)
96	Data Increment
97	Data Decrement
98-121	(unassigned)

The following numbers are not valid MIDI control numbers. They are used internally to designate MIDI control sources which are transmitted as separate MIDI messages:

<div align="center">

Table 12-3
Invalid MIDI Control Numbers

</div>

MIDI #	Default Assignment
125	Channel Pressure Message
126	Pitch Wheel Message (MSB only)
127	All Notes Off Message

Only one control source can be assigned to a control destination. When editing, the INCR and DECR keys skip over previously assigned control sources. If you enter a control source number directly with the numeric keypad, any previous assignment is canceled.

Assignable Controls and Switches

The following sections describe the basic controls and switches. The chapters on the programmable chorusing and vibrato units describe the controls and switches which are specific to those devices.

Sustain Pedal
The sustain pedal is a switch that behaves exactly like its piano counterpart. While it is down (ON) notes will continue to sound even after their keys have been released.

Sostenuto Pedal
The sostenuto pedal is a switch that behaves exactly like its piano counterpart. While it is down (ON) any notes whose keys were down when the pedal was depressed will be sustained, but subsequent notes are not effected.

Timbre-Freeze Pedal
The Timbre-Freeze pedal is a switch that behaves like a sostenuto pedal, but activates an effect called Timbre Freeze*. While it is down (ON) any notes whose keys were down when the pedal was depressed are frozen. That is, their timbral evolution is suspended. When the pedal is released, the notes will continue to evolve if their keys are still down or the sustain pedal is down. Otherwise, they will release.

Soft Pedal
The soft pedal is actually a continuous control that acts as an attenuator to control the timbre of notes. If assigned to a switch controller it is either fully up (OFF) or fully down (ON). If it is assigned to a continuous controller then it can take on any value between 0 and its maximum attenuation value, which is a program level parameter.

Mute Pedal
When the mute pedal is depressed (ON) all active notes on the associated channel are released. Subsequent notes (started while the pedal is still down) are not effected. The mute pedal is permanently assigned to the All-Notes-Off MIDI message.

Pitch Bender
The pitch bender is a bidirectional controller which bends the pitch of all notes on a particular channel. Its range is adjustable in semitones and it set at the program level. Its effect can be selectively enabled at the layer level.

Pitch Shifter
The pitch shifter is a bidirectional controller which changes the pitch of notes in semitone steps (providing a shift range of +63 to -64 semitones).

The pitch shifter can be used in conjunction with the programmable buttons on the MIDIBoard to create buttons that shift the pitch up or down in semitones. For example, programming a button to send 64 when OFF and 76 (i.e., 64+12) when ON creates an "octave up" switch.

Transpose Control
The transposer is a bidirectional control which transposes all notes on a particular channel. The value of the transpose control is additively combined with the Master Transpose and Layer Transpose. Note that transposition is a static effect. Varying the control will not effect notes that have already started.

Timbre Shift Control
The timbre shift control is used to scale the layer transpose value. Its effect can be selectively enabled at the layer level. Note that timbre shift is only effective at the start of a note.

Balance Control
The balance control is a bidirectional controller used to scale the balance adjustment in the sound layer. Its effect can be selectively enabled at the layer level. This control is only effective at the start of a note.

The balance control can be used to change the level between two sound layer give one layer a positive balance adjustment and the other a negative value. Enable the balance control for both. When the control is at the midpoint, both layers will be equally loud. Moving the control above or below center will increase the loudness of one layer and decrease the loudness of the other.

Pressure Control
The pressure control allows any continuous controller to act like polyphonic key pressure. The default assignment for the pressure control is monophonic channel pressure, which means that mono channel pressure acts like polyphonic key pressure.

Expression Control
The expression control is a bidirectional controller which converts the incoming MIDI value from -64 to +63. This value gets added to the key velocity value after the velocity map.

You might use this control with a pedal, to simulate touch sensitivity for a non-touch sensitive keyboard.

Volume Control
This is a continuous controller which adjusts volume from 0 dB (MIDI value 128) to -48 dB (MIDI value 0).

The Miscellaneous Editor

The Miscellaneous Editor allows you to choose from an additional set of editors: the Program List Editor, the Intonation Editor, and the Velocity Map Editor.

Using the MISC Editor

1. Select the Miscellaneous Editor by pressing EDIT PREV. One of the following editor names will appear in the display. Use NEXT and PREV to step through the choices shown in Figure 13- 1.

2. Press ENTER to select a particular editor.

Table 13-1
The Miscellaneous Editors

Display Reads	Editor	What it Does
PROGRAM LIST	Program List Editor	Allows you to map program numbers to program list numbers
INTONATION	Intonation Editor	Adjusts the interval width between notes
VELOCITY MAP	Velocity Map Editor	Allows you to modify the K150X's velocity maps

Once you select a particular editor by pressing ENTER, you must re-enter the Miscellaneous Editor by pressing EDIT PREV in order to choose another editor.

The Program List Editor

Used in conjunction with the PROGRAM LIST parameter in the MIDI editor, the Program List Editor allows you to set up maps between a number in the program list and the actual program number to be played when that program list number is played.

This feature is useful when changing program numbers remotely from your MIDI controller. Depending on how many programs your controller selects from at one time, you can set up the K150X to have up to 128 programs accessible directly from your controller.

Using the Program List Editor

When the display reads PROGRAM LIST, press ENTR. The display will read.

          STEP *n* PROG *n*

where STEP is the program list number currently being assigned, and PROG is the program number being assigned to that program list number.

To change the STEP number, use NEXT and PREV. The program number will advance at the same time. To change the PROG number independently, use INCR and DECR, or enter a value directly using the numeric keypad and Press ENTR.

F1, F2, and F3 in the Program List Editor

F1 jumps to the next 16 steps. For example, pressing F1 several times from STEP 5 would jump to STEP 17, STEP 35, STEP 51, STEP 67, etc. F2 inserts a step at the current point incrementing all the steps above it by 1 step. F3 deletes a step at the current point, moving all the steps above it down 1 step.

Intonation Table Editor

Used in conjunction with the Intonation Switch and Reference Key parameters in the *Tuning Editor*, the Intonation Editor allows you to micro-tonally adjust the width of the intervals between each note.

Be aware that in order to hear your changes, the Intonation Switch in the *Tuning Editor* must be on (see *Tuning Editor*).

Using the Intonation Editor

When the display reads NOTE, you can change the value of the displayed note away from its equal-tempered value. Select a new value using the numeric keypad and press ENTR or use INCR and DECR to change the value in 1 cent increments. The default value is 0 cents, meaning that equal temperament is applied to the scale.

The note selected with the Reference Key parameter in the Tuning Editor will be used as the reference key for the new tuning. Some different common tunings are given in Table 13-2.

Table 13-2
Common Tunings

Note *	Step	Interval	Pythagorean	Just		
C#	1	semitone	-10	+12 (C-Db)	-8 (C-Cb)	
D	2	whole tone	+4	+4 (C-D)	-8 (D-E)	
D#	3	min 3rd	-6	+16		
E	4	maj 3rd	+8	-4		
F	5	4th	-2	-11		
F#	6	aug 4th	+12	-10		
Gb	6	dim 5th	-2	+10		
G	7	5th	+2	+2		
G#	8	min 6th	-8	+14		
A	9	maj 6th	+6	-6		
Bb	10	min 7th	-4	-4 (D-C)	+18 (E-D)	
B	11	maj 7th	+10	-12 (C-B)	+8 (C-Cb)	

* Based on Ref Key = C

Velocity Map Editor

Used in conjunction with the VELOCITY MAP parameter in the MIDI editor, the K150X is supplied with provisions for velocity maps.

These velocity maps establish different relationships between the MIDI velocity value sent by your keyboard and the interpretation of that value by the K150X, allowing you to give your keyboard different response characteristics.

Velocity map 0 is linear, i.e., the relationship between MIDI velocity values sent by your controller and the interpretation of that value by the K150X is directly proportional, as in Figure 13- 1:
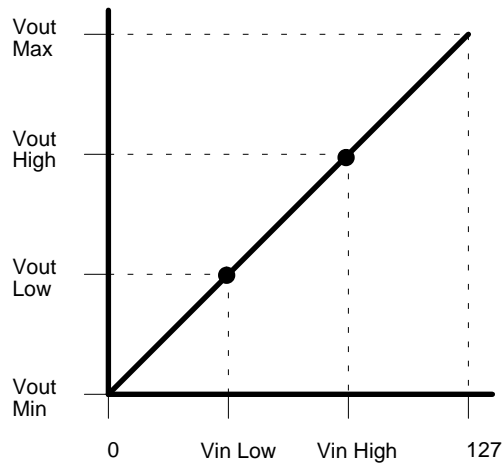
Figure 13-1. VMAP 0 (linear)

Using the Velocity Map Editor

The display reads VELOCITY MAP *x*, where *x* is the velocity map which will be edited. Select the velocity map you wish to edit by entering its value directly with the numeric keypad and pressing ENTR, or use the INCR and DECR keys.

Press ENTR, and the display will show:

1. the number of the velocity map being edited
2. the velocity map parameter being edited
3. the current value for that velocity map parameter

For instance, if the VIN HIGH parameter for velocity map 5 is currently being edited, the display will show:

```
.VM5 VIN HIGH current-value
```

The 6 editable parameters for each velocity map are:

VIN LOW
VIN HIGH
VOUT MIN
VOUT LOW
VOUT HIGH
VOUT MAX

Their relationships are shown graphically in Figure 13-2.
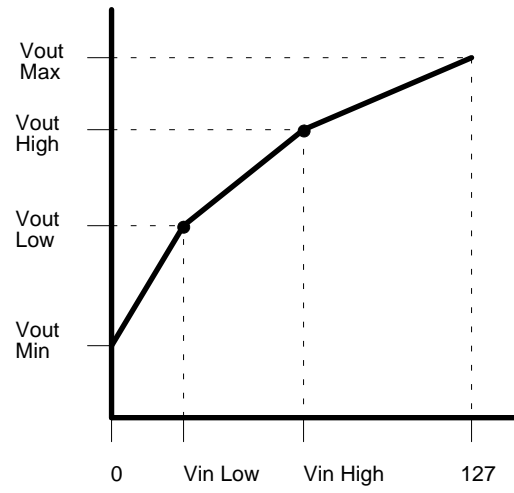
Figure 13-2. Relationship of VMAP Editable Parameters.

Summary of Editable Parameters

Parameter	Min	Max	Default	Units
Tuning Parameters				
Tuning	-125	125	0	cents
Transposition	-60	60	0	semitones
Program Parameters				
Left Split Point	12	119	12	MIDI Key #
Right Split Point	12	119	119	MIDI Key #
Pitch Wheel Range	-60	60	2	semitones
Press Bend Range	-60	60	1	semitones
Soft Pedal Range	-30	30	-12	dB
Left Region Balance	30	30	0	dB
Right Region Balance	-30	30	0	dB
Layer Parameters				
Tune	-125	125	0	cents
Transpose	-60	60	0	semitones
Timbre Shift *	-60	60	0	semitones
Timbre Level	-30	30	0	dB
Balance	-15	15	0	dB
Chorusing Parameters				
Extra Notes	1	7	1	
Detune *	0	3600		cents
Delay	0	4000	0	ms
Decay	0	12		dB
Vibrato Parameters				
Depth *	0	3600		cents
Rate *	0.1	49.9		Hz
Shape *			triangle	
Symmetry *	-10	10	0	
Delay *	0	4000	0	ms
Equalization Parameters				
All frequencies	-30	12	0	dB

* parameter effective after note start

Battery Replacement

Replacing the Battery

If you turn on the K150X and get a message like:

        EROB LOW BATTERY

you will need to replace the battery.

The K150X's program and parameter storage is protected while the unit's power is off by a battery. As with all batteries, eventually the battery will run out. You can buy extras at camera and electronics stores (e.g. Radio Shack) and replace the battery yourself.

You will only have 5 minutes after you remove the old battery before your programs will be lost. There is a back-up feature that holds the memory, briefly, when both the AC input and the battery, are absent. You might consider getting the new battery ready, before doing anything. It's also a good idea to back-up your programs onto cassette first - just in case.

To replace the battery:

1. Turn power off.
2. Remove the two screws which hold down the square lid on top of the unit, and remove the lid. You will need a Phillips screwdriver to do this.
3. In the opening, you will see six sockets for integrated circuits, and a flat, coin-shaped battery, in a clip: this battery is the one you want to replace.
4. Take a penny and ease it under the old battery in the clip, and lift out the old battery. Quickly, insert the new battery the same way, with the "+" upwards.
5. Turn on the power. Make sure no warning message appears.

Replacement Batteries

The battery recommended by Kurzweil Music Systems is Type 2430, a 3V lithium "coin cell". These batteries are available in several sizes and, in a pinch, you can use a different size. The other sizes do not last as long, however. Refer to the following tables.

	Type	Capacity (% of Original)	Typical Life
24mm Diameter (recommended)			
	2430	100%	2 years
	2420	60%	14 months
	2316	45%	10 months
20mm Diameter (only if there's no other choice)			
	2032	85%	20 months
	2025	60%	14 months
	2016	30%	6 months

The 20mm batteries will be loose in the battery clip. They will work, but we do not guarantee that memory contents will be valid, as moving the unit around, or other vibrations, may break electrical contact.

"Typical Life" means the life of the battery in an average K150X at room temperature. The life time is shortened by heat - for instance, at 130° F, a typical temperature in a car out in the sun, battery drain is triple the room temperature rate.

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