

KAWAI

**OWNER'S
MANUAL**

DIGITAL MULTI-DIMENSIONAL
SYNTHESIZER

K5



DIGITAL MULTI-DIMENSIONAL
SYNTHESIZER MODULE

K5m



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INTRODUCTION

Congratulations! You now own one of the world's most sophisticated digital musical instruments: the Kawai K5 Digital Multi-Dimension Synthesizer. With its advanced capabilities and superior sound quality, the K5 is an exceptional investment in digital synthesis technology. It will give you many years of musical enjoyment.

A POWERFUL APPROACH TO SOUND SYNTHESIS

The Kawai K5 offers all the sound-creating power of additive synthesis technology in an affordable, user-friendly format. This enables you to construct sounds from their harmonic components, the same way they are created in nature. With the K5, you can control the relative amplitude of up to 126 harmonic sine waves! This yields unprecedented clarity and accuracy for recreating natural sounds or developing your own unique timbres. And, because it is so natural, the K5's programming system will be easy for you to master. But that's just the beginning. The complex waveforms produced by harmonic manipulation can be passed through filters, amplifiers, LFOs, envelope generators and other processors with which you may already be familiar. These provide the kind of precise articulation control for which analog synthesizers are well-known. So you're getting the best of both worlds -- digital clarity and analog control in one comprehensive, performance-oriented package.

OTHER FEATURES

- Large fluorescent LCD provides readable, helpful graphic programming assistance.
- Cursors and increment dial set parameters quickly and easily.
- External card slot accommodates removable Memory Cards. Each card holds 96 additional tone patches.
- Weighted keyboard for a professional "feel" and accurate touch response.
- Programmable velocity, aftertouch (pressure) and keyboard scaling that allow you to personalize keyboard response for each tone patch
- A thorough MIDI implementation with full multitimbral capabilities and the ability to filter controller data.

K5 KEYBOARD AND K5M MODULE

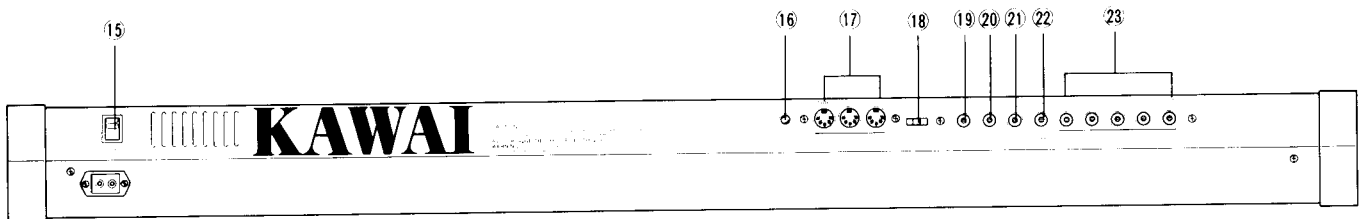
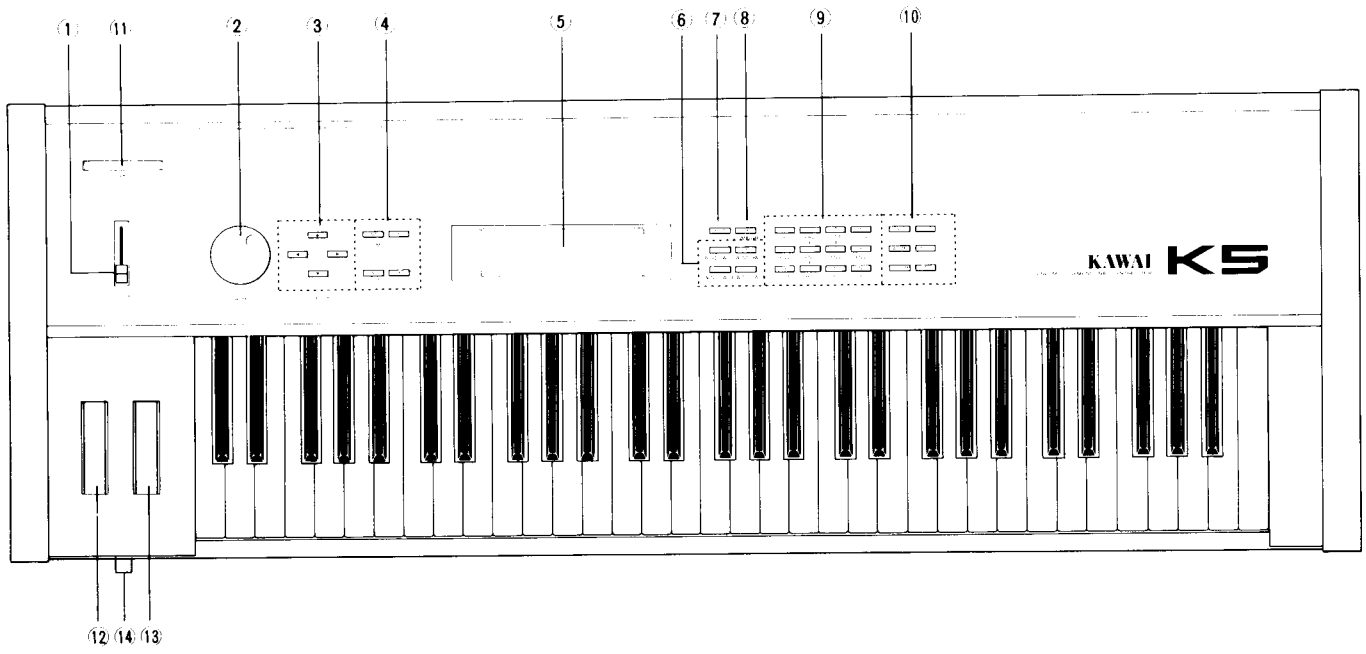
Both K5 models offer the same programming capabilities. Unless otherwise specified, all references to the K5 in this manual include both the K5 keyboard instrument and the K5m tone module.

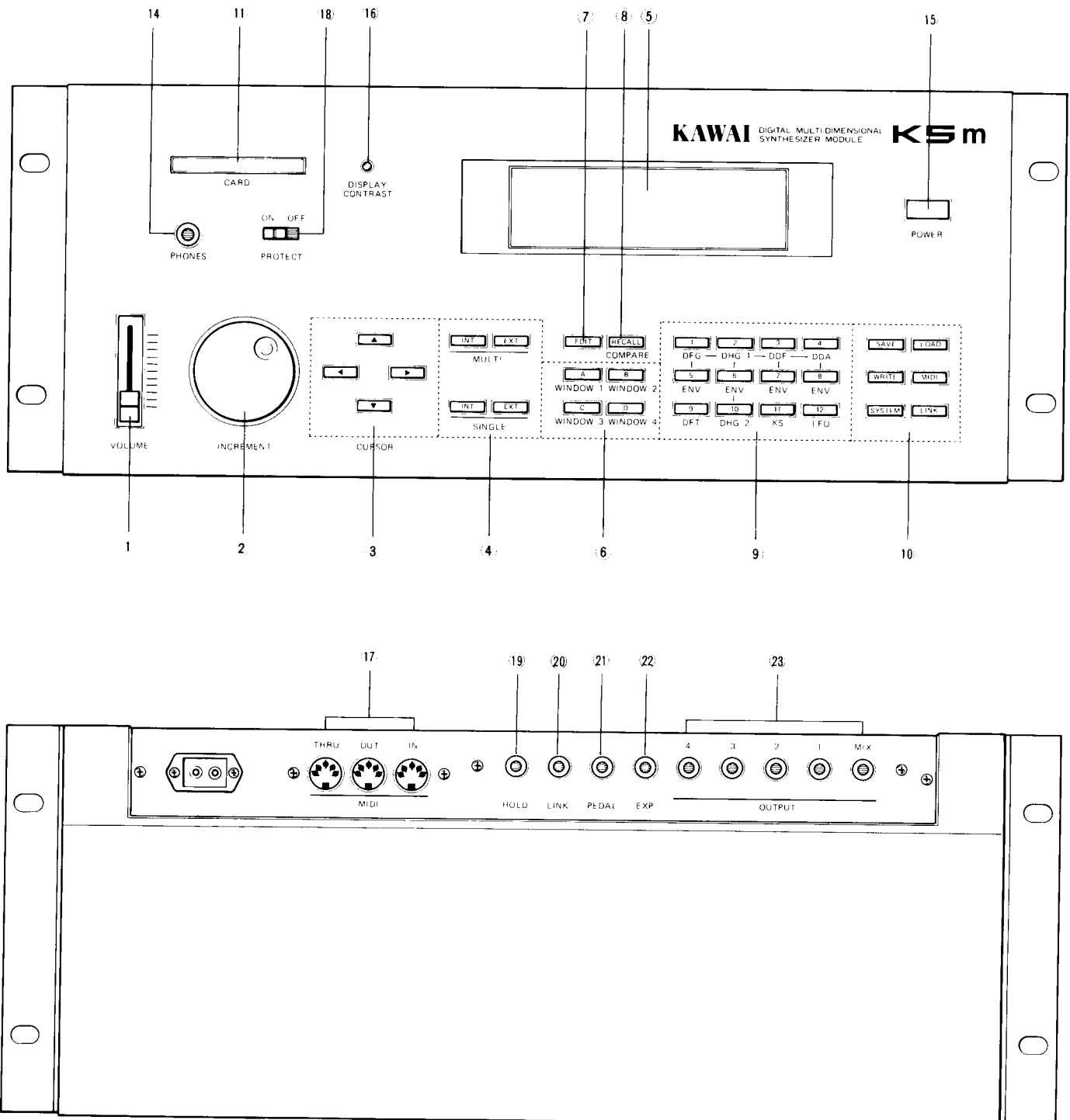
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1. GETTING STARTED

1.1 NAMES OF PARTS

- 1 VOLUME control
- 2 INCREMENT dial
- 3 CURSOR keys
- 4 Patch Single/Multi Internal/External keys
- 5 LCD display
- 6 Bank/Window select switches
- 7 EDIT switch
- 8 COMPARE/RECALL Switch
- 9 Program/Parameter select switches
- 10 Auxillary Switch Group (SAVE/LOAD, WRITE, MIDI, SYSTEM, LINK)
- 11 Memory card slot
- 12 Pitch bend wheel
- 13 Modulation wheel
- 14 Headphone jack
- 15 POWER switch
- 16 LCD DISPLAY CONTRAST control
- 17 MIDI connectors
- 18 Memory PROTECT switch
- 19 HOLD pedal jack
- 20 LINK pedal jack
- 21 PEDAL jack
- 22 EXP pedal jack
- 23 OUTPUT jacks





1.2 GENERAL CONNECTION INFORMATION

OUTPUT JACKS

The jacks marked 1 - 4 and MIX each provide a line-level audio output for connection with a keyboard amplifier, P.A. system or other audio system. (The K5 has no internal amplifiers or speakers.) Each section in a K5 Multi patch can be assigned to one of the four numbered outputs (for details, see section 5.3). The MIX jack outputs a composite signal that sums the signals of outputs 1 - 4.

EXP PEDAL JACK

A foot pedal connected to this jack allows you to control the K5's volume without removing your hands from the keyboard.

PEDAL JACK

A foot pedal connected to this jack can be used to control a number of assignable parameters (See section 4.1 below).

LINK PEDAL JACK

A foot switch connected to this jack allows you to step through pre-programmed series of patches called LINKS (see section 6.6) without taking your hands from the keyboard. When the Link feature is not activated, this advances to the next program.

HOLD PEDAL JACK

A foot pedal connected to this jack allows you to operate the damper pedal effect, which controls the amount of time it takes the sound to fade after a key is released. Use it just as you would the damper pedal on an acoustic piano. When used with continuous sounds (e.g., flute) the sound will sustain until the pedal is released.

MIDI CONNECTORS

These accept cables joining the K5 to any other MIDI instrument. (For a more detailed description, see section 6.5 below).

PROTECT SWITCH

The normal position of this switch is ON, where it protects the memory contents from accidental erasure or overwriting. It must be in the OFF position if you want to save an edited patch or copy tone patches from a Memory Card.

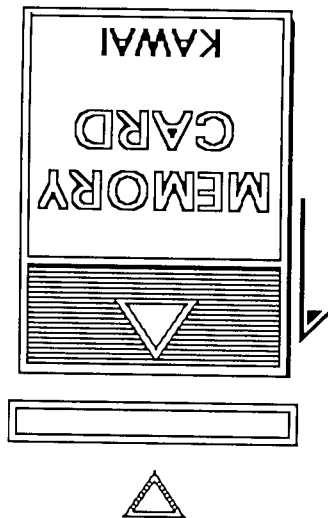
MEMORY CARD

Memory Cards hold additional tone patch data, which can be used in addition to the tone patches in internal memory. The K5 comes with one Memory Card as standard equipment. Be careful when inserting the card into the slot, as it is a piece of electronic equipment.

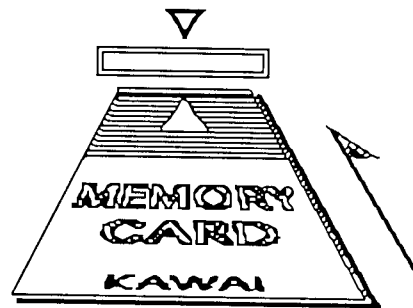
The error message "NO CARD" will be displayed if the card is inserted incorrectly.

The error message "ID ERROR" will be displayed if the card you have inserted cannot be read by the K5. One reason for this is that the card contains data for another Kawai instrument. Before the card can be used with the K5 it will have to be formatted (see section 6.6.2).

INSERTION INTO THE K5:



INSERTION INTO THE K5M:



PHONE JACK

This jack duplicates the MIX output. Plug a set of headphones into this jack for private listening.

2. HOW TO PLAY THE FACTORY PATCHES

The K5 can store and play both Single patches and Multi Patches. A Single Patch, as its name implies, is a single sound that can be played on all 16 of the K5's voices. A Multi Patch is a configuration of several Single Patches, each assigned to 1 or more voices, up to the maximum of 16 voices. 48 Single and 48 Multi Patches can be stored in the K5's internal memory banks. An additional 48 Single and 48 Multi Patches can be stored on the external Memory Card. Each group of 48 patches is arranged in four banks of 12 patches each. To start with, let's play some of the Single patches in internal memory. With the power on, press the INT key in the SINGLE row. The LCD display will look something like this.

SINGLE BANK		SIA- 1 PIANO 98
1:PIANO 98	5:M100	9:MAGIC*
2:PIANO 99	6:MINI1	10:ROADSY
3:PIANO T2	7:DIJIANA	11:DIGPIANO
4:UYBE 1	8:U10-VIBE	12:MELLOPAD

This is a directory of the 12 Single Patches in Internal Memory Bank A. The upper right-hand corner of the directory gives you information about the patch currently selected for playing: the type of patch it is (Single or Multi), its memory source (Int. or Ext.), its Bank letter, patch number and name.

(Note: Now is a good time to use the DISPLAY CONTRAST knob to adjust the LCD for comfortable viewing, located on the K5's rear panel and the K5m's front panel.)

To view a directory of the patches in the other three banks, go to the set of switches marked A, B, C and D. Press the B, C, and D switches in succession.

To select a Single patch from the currently-displayed bank, press any of the numbered switches (1-12) to the immediate right of the Bank select switches. The LCD will now look like this:

SINGLE	SIA- 1 PIANO 98
	PED S1:DFGLFO
	PED S2:DFGLFO
PIANO 98	
	WHL S1:SLOPE
	WHL S2:SLOPE

This is the Patch Information window. It gives the name of the patch in large letters and provides the same upper-right-hand- corner identification information found in the Bank directory window. It also tells you which of the patch's parameters will be affected if you operate the Mod wheel or a foot pedal connected to the rear-panel PEDAL jack. We'll tell you more about this later on, once you've gotten to know the K5 a little better.

After you've tried out some of the Single Patches, go back to the Patch Source Select switches to the left of the LCD and press the MULTI INT switch. Now you're ready to hear the Multi Patches stored in internal memory. Use the procedure outlined above to select individual banks and patches.

Now let's listen to the patches stored on the external Memory Card. Insert the card in the slot as described above. Press either the SINGLE EXT or MULTI EXT keys. Select individual banks and patches using the same procedure you used for selecting internal patches.

3. PROGRAMMING BASICS

3.1 THEORY: ADDITIVE SYNTHESIS

The "purest," most basic sound in nature is a sine wave. It is an S-shaped waveform that is constant in its frequency (pitch) and its amplitude (loudness).

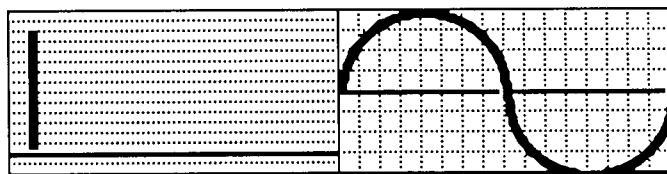
Most of the sounds we hear -- whether from musical instruments or other sources -- are much more complex, of course. But if you were to analyze any of these complex sounds, you would find that they are actually made up of several sine waves: a common frequency, or fundamental, and a series of harmonically related frequencies - 3rds, 5ths, octaves, etc. In any given sound, each of these harmonics has its own relative amplitude (loudness); and it is this unique combination of harmonic elements that gives every sound (and every musical instrument) its own unique character.

On the K5, sounds are programmed using a process called additive synthesis. It allows you to set a relative amplitude level (intensity) for each one of up to 126 harmonics. With this kind of detailed control, you can imitate the complex waveforms of acoustic instruments, the simple oscillator waveforms used in popular synthesizers (sawtooth, square, triangle, etc.) or create new timbres of your own.

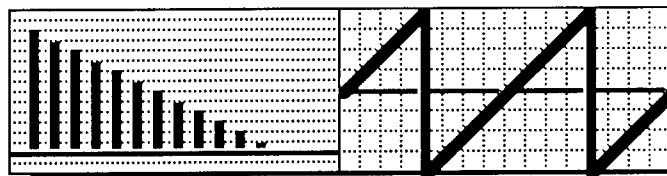
HARMONICS:

WAVEFORM:

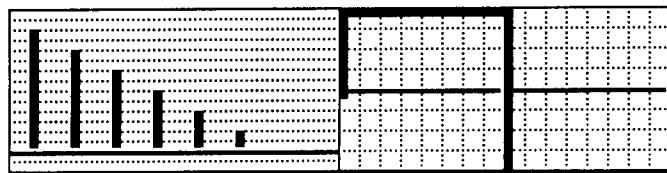
SINE:



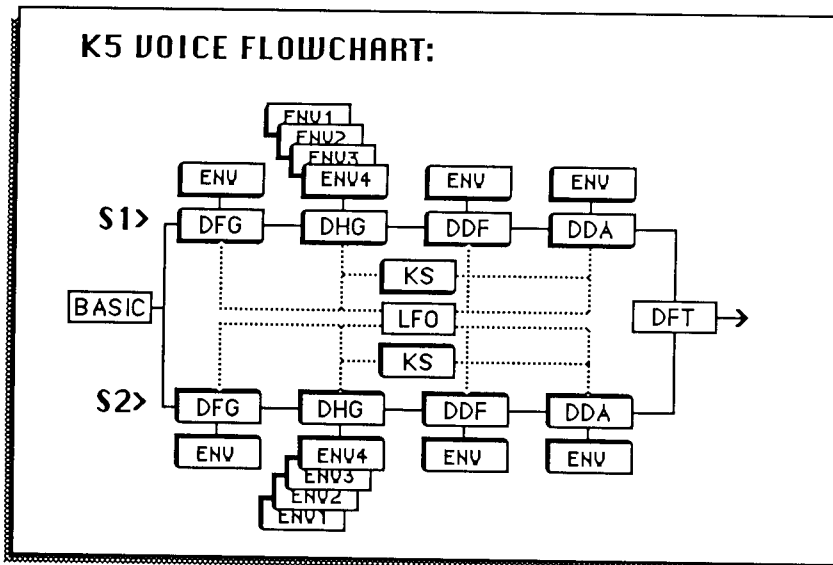
SAWTOOTH:



SQUARE:

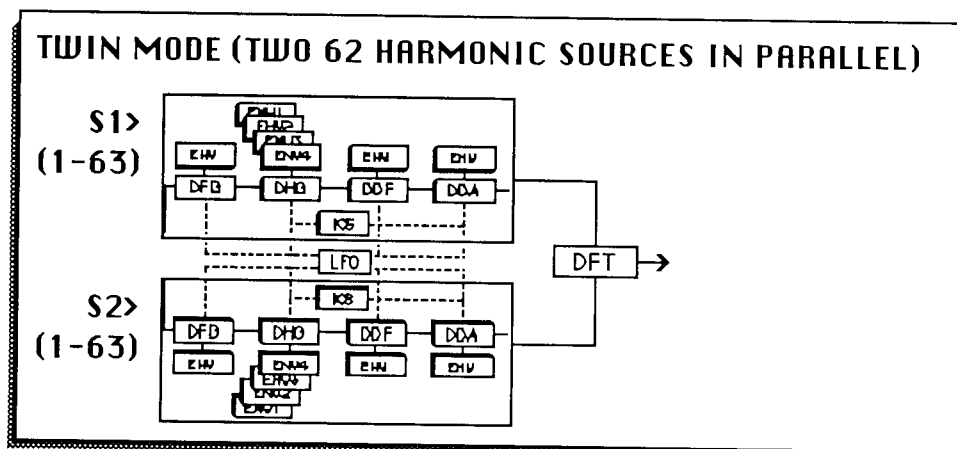


3.2 K5 VOICE ARCHITECTURE: AN OVERVIEW



Single Patches can be built using one of two modes: Twin or Full.

3.2.1 TWIN MODE



As you can see, the Twin mode provides two parallel and identical chains of sound-shaping components. These chains are called Sound Source 1 and 2 (S1 and S2) respectively. Each Sound Source consists of the following:

A Digital Frequency Generator (DFG), which is used to program the fundamental pitch of the Sound Source and to set several pitch modulation parameters. Each DFG has its own 6-stage Envelope Generator, which you can use to make the pitch vary in a set pattern every time you strike a key.

A Digital Harmonics Generator (DHG). The "heart" of K5 programming. You can set individual levels for the first 63 harmonics on each Sound Source in Twin Mode. In addition, each harmonic can be routed to one of four Envelope Generators. Each DHG ENV. Generator can be used to set an overall amplitude curve for for the harmonics assigned to it.

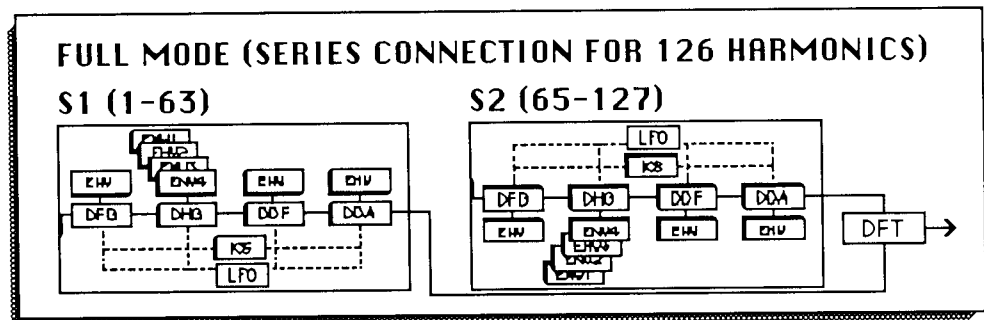
A Digital Dynamic Filter (DDF) with its own 6-stage Envelope Generator. As on a conventional analog synthesizer, these provide further shaping of the frequency content of the Sound Source.

A Digital Dynamic Amplifier (DDA) with its own 7-stage Envelope Generator. As in analog synthesis, this component provides an overall loudness contour for each sound source.

A Low Frequency Oscillator (LFO) which can be applied as a secondary modulation source to the DFG, DHG, DDF, or DDA.

A Digital Formant Filter (DFT), which resembles an 11-band graphic equalizer in its operation. It is a final frequency processor which can be applied to the combined outputs of S1 and S2.

3.2.2. FULL MODE



As you can see, the Full mode voice architecture is very much like Twin mode. In Full mode, however, the two DHGs are combined in a series. S1 controls the first 63 harmonics and S2 controls harmonics 65 through 127. The DFG for S2 can still be used to set fundamental pitch and modulation parameters for S2. DDF, DDA, LFO and DFT operation is the same as Twin mode.

3.3 EDIT CONTROLS AND PROCEDURES

To edit any currently selected Single Patch, simply press the EDIT switch, located just above the Bank A select switch. This will bring up the Basic Edit Page, which is used to name the newly edited patch and set several preliminary parameters.

On this and every other edit page, the same procedure is used for setting parameters. The four Cursor switches are used to move the cursor up, down, left or right on the page, onto the parameter you wish to reset. The actual parameter value is set by rotating the Increment Dial. Move it clockwise to increase the value; counterclockwise to decrease the value. As you change sound parameter values, you'll be able to hear the results immediately.

If you wish to compare your new settings to the original patch, simply press the Compare/Recall key. This will take you back to the original patch. To return to your edit, just press the Compare/Recall switch again.

4. PROGRAMMING AND EDITING SINGLE PATCHES

Each of the sound-building components outlined above has its own programming page on the K5. The process begins with the Basic Edit Page, which, again, is called up by pressing the EDIT switch.

4.1 BASIC EDIT PAGE

SINGLE BASIC			SIA-01 PIANO 98
-----	S1	S2	NAME=PIANO 98
BAL		±31	MODE=TWIN
DELAY	31	31	VOL =63
PEDAL	DFGLFO	DHG	POR =ON--SPD=63
P DEP	±31	±31	<COPY FROM>
WHEEL	CUTOFF	SLOPE	IB-12 S1 DHG
W DEP	±31	±31	EXEC? YES: +, NO: -

BAL: Sets the relative level for each sound source.

DELAY: Sets the delay time of the ENV for sound sources 1 & 2, respectively. In other words, how much time elapses before the DDA ENV begins to operate. If this seems a little confusing now, don't worry. The function of the DDA ENV is covered below (section 4.10).

PEDAL: For each sound source, use this line to set which parameter will be affected by a pedal connected to the rear-panel PEDAL jack. The options are: Filter SLOPE, Filter CUTOFF, DHG and DFG LFO.

P DEP: Sets the depth of the parameters selected under PEDAL above.

WHEEL: Same as PEDAL/P DEP above. Only here, the Modulation Wheel is the controller.

W DEP: Sets the depth of the parameter selected under WHEEL above.

(Remember: For your convenience, the Pedal and Wheel assignments you make here will be displayed on the Patch Information window [described in Section 2 above]. So when you call up a patch in performance, you'll have a handy reminder as to how your Mod Wheel and Pedal will affect this patch.)

NAME: Name your program or edit, using any combination of eight letters, numbers or other characters.

MODE: Select either Twin or Full voice architecture.

VOL: Sets the overall volume level for S1 + S2.

POR: Allows you to turn the Portamento effect ON or OFF (--) for S1 + S2. Portamento is an effect whereby one pitch "glides" smoothly into the next each time you play a new key.

SPD: Allows you to regulate the Speed of the Portamento Glide.

COPY FROM: Allows you to take a group of parameter settings from any other Single Patch in memory and copy them onto your present edit. This area of the page allows you to specify the memory source of the parameter you wish to copy from (INT or EXT), the Bank letter, Patch number, Sound Source and which set of parameters you wish to copy: DFG, DHG, DDF, DDA, DFT or ALL.

EXEC: Use this command to execute the copy. Move the Increment Dial clockwise (to the right) to indicate "YES," or counterclockwise (to the left) to indicate "NO."

SURE?: One last chance to decide whether or not you want to execute the copy. Again, rotate the Increment Dial clockwise for "YES," counterclockwise for "NO." The window will read "COPY COMPLETED!!" when the copy procedure is accomplished.

4.2 DFG PAGE

The parameters on this page set values associated with PITCH. To access the DFG page (Digital Frequency Generator), press the DFG button (1) while in edit mode.

DFG	BOTH	SIA-	1	PIANO	98
COARSE=	0	<DEPTH>			
FINE =	0	ENV=	0-VEL	+31	
		PRS=	0		
		LFO=	0-PRS=	0	
KEY	=TRK	BND=	0		
FIXNO.	=E 3				

COARSE/FINE: Set the fundamental pitch of the currently selected Sound Source(s).

KEY: When set in the FIX position, the K5 will output the same pitch regardless of which key is held down. When set to TRK (Track), the keyboard operates in the usual manner.

FIXNO: Sets the the output pitch in the KEY:FIX mode.

The remaining controls on the DFG page are used to define sources of DFG (pitch) modulation and the amount of that modulation. There are several controllers on the K5 that can modulate (or change) the DFG's fundamental pitch. They are:

ENV: The DFG Envelope. The actual envelope is programmed on the DFG ENV page (4.3 below). This parameter sets the Envelope amount, i.e., how much the DFG Envelope is allowed to affect the pitch.

VEL: This parameter makes the ENV amount dependent on key attack velocity (how fast you strike the key).

PRS: Allows you to use keyboard aftertouch pressure (how hard you press down on the key after striking it initially) to modulate pitch. Positive values (+1 through +31) raise the pitch. Negative values (-1 through -31) lower the pitch. Maximum pitch range is 2 octaves in either direction.

LFO: With this parameter, the Low Frequency Oscillator can be set to modulate the pitch automatically, whenever a key is struck. The numbers set the LFO amount. The actual LFO characteristics are programmed using the LFO Page (4.13 below).

PRS: Keyboard Aftertouch Pressure can also be used to control LFO amount. This value determines the maximum amount at full pressure.

BND: The Pitch Bend wheel can also be used to modulate pitch. This control sets the range of the wheel. (Wheel range = 2 octaves)

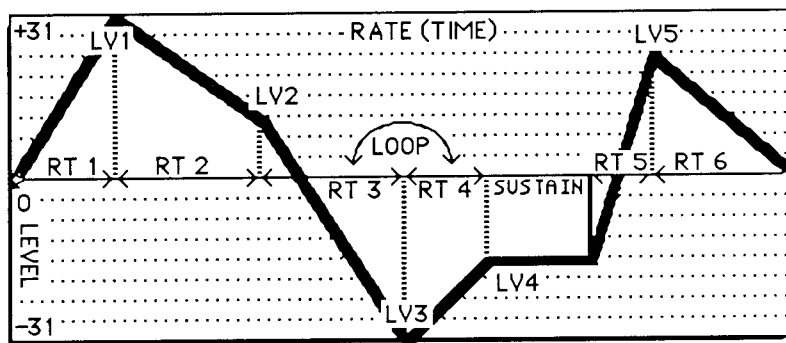
4.3 DFG ENV PAGE

Use this page to set the pitch envelope for each Sound Source. To access the DFG ENV page (DFG Envelope), press the ENV button (5) while in edit mode.

You can set a 6-segment pitch Envelope. For each segment, there are two values to be set: Level and Rate.

DFG ENV		BOTH SIA- 1 PIANO 98					
SEG	1	2	3	4	5	6	
RATE	16	16	16	16	16	16	
LEVEL	+31	+31	+31	+31	+31	+31	

LOOP <3-4>=---



LEVEL: Determines the pitch value for each stage. When set to 0, the pitch will be the normal pitch of whichever key is currently depressed. (Or, if KEY:FIX is selected on the DFG page, the pitch specified under FIXNO.) Positive Level values (+1 through +31) raise the pitch. Negative values (-1 through -31) lower the pitch.

RATE: Determines how long it takes for each segment to reach its maximum Level. When the Rate is set to 0, maximum Level is reached instantaneously. The higher the Rate setting (to a maximum of 63), the more time it takes to reach the maximum Level.

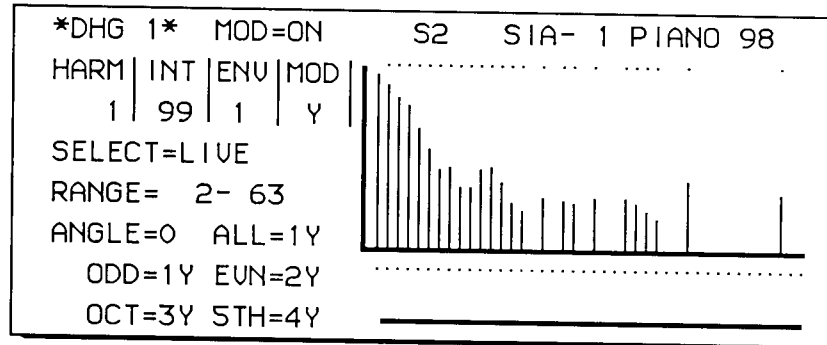
The Sustain level (LV4) is maintained as long as a key is held down. You'll note that this point in the envelope is indicated by a double line on the envelope page diagram, above.

LOOP: When set to ON, Segments 3 and 4 repeat for as long as the key is depressed.

Having reached an understanding of this envelope generator, you will readily be able to understand the K5's other envelope generators, which are all very similar in function.

4.4 DHG PAGE 1

Use this page to shape the harmonic content of your waveform. To access the DHG page (Digital Harmonic Generator), press the DHG 1 button (2) while in edit mode.



MOD: (top of screen) A master modulation control. When set to OFF (--), all DHG modulation is defeated, regardless of other settings on the page.

HARM: Selects a single harmonic (63 per page) for modification.

INT: Sets the intensity, or relative volume level, for the selected harmonic. As you change the intensity, watch the right-screen display. The line that corresponds to the selected harmonic grows longer or shorter as you increase or decrease the intensity.

ENV: Assigns the selected harmonic to one of the four DHG envelopes (see below, section 4.6). Watch the right-hand screen display as you change ENV assignments. A dot directly below the selected harmonic will change positions to indicate the new assignment. If the dot is located in the top row, the selected harmonic is assigned to ENV 1, if in the next row down, ENV 2, etc.

MOD: Determines whether or not the selected harmonic will be modulated (provided the master MOD parameter is set to ON). On the right-hand screen display, a dot located above a harmonic indicates that the modulation is on for that particular harmonic.

ALL: Allows you to set the intensity level of all 63 harmonics at once. Place the Cursor on word "ALL" and rotate the Increment Dial. You can assign the harmonics to one of the four DHG Envelopes by placing the Cursor on the number to the right of the word ALL and rotating the Increment Dial. Move the Cursor one more place to the right and you can turn on a modulation source for the harmonics on (Y) or off (N).

ODD: Same as above. But in this case, only odd-numbered harmonics are affected.

EVEN: Same as above. But in this case, only even numbered harmonics are affected.

OCT: Same as above. But in this case, only octave interval harmonics are affected.

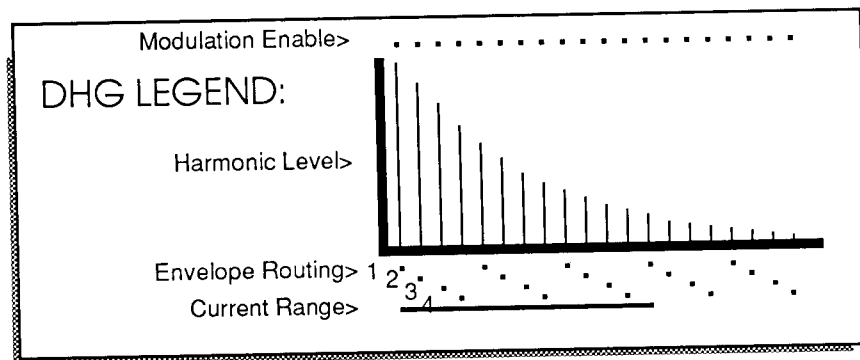
5TH: Same as above. But in this case, only 5th interval harmonics are affected.

Note: Many harmonics fall into more than one of the above groups, and are affected by the current group. For example, if you turn on the modulation of the EVEN harmonics, harmonic 4 will be turned on. If you then turn off the modulation of all the OCTAVE harmonics, harmonic 4 will be turned off again.

SELECT: Further defines which harmonics within any of the above groups (ALL, ODD, EVEN, OCT, 5TH) will be affected. When set to LIVE, only those harmonics which currently have an intensity level greater than 0 will be affected. When set to DIE ("dead"), only those harmonics which are currently turned "off" (intensity level 0) will be affected. When set to ALL, all harmonics within the specified group will be affected, regardless of whether they are currently "live" or "dead."

RANGE: Allows you to specify a group (or range) of consecutive harmonics for editing. Only those harmonics within the specified range will be affected by the edit operations described above. On the right screen display, a dark horizontal line shows you the currently-selected range.

ANGLE: Sets an automatic high-end or low-end rolloff curve for the harmonic intensities. This is useful for imitating the natural rolloff characteristics of acoustic instruments.



4.5 DHG PAGE 2

Use this page to set several parameters associated with the four DHG Envelopes (4.6 below). To access the DHG 2 page, press the DHG 2 button (10) while in edit mode.

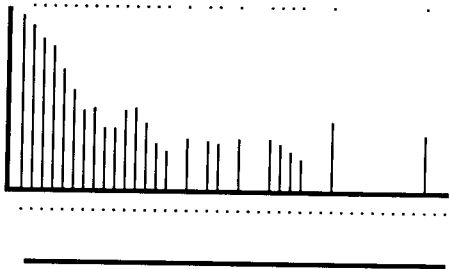
DHG 2 S1 SIA- 1 PIANO 98

<DEPTH>

VEL= 0 KS= 0

PRS= 0 LFO= 0

ENV	1	2	3	4
ACT	ON	ON	ON	ON
EFF	0	0	0	0



DEPTH FUNCTIONS

VEL: Sets a value governing how much the envelope amount will be affected by key attack velocity. If a positive value (+1 through +31) is selected, an increase in attack velocity will increase the envelope amount. If a negative value (-1 through -31) is selected, an increase in attack velocity will *decrease* the envelope amount.

PRS: Sets a value governing how much the envelope amount will be affected by key aftertouch pressure. As with the VEL parameter, positive or negative values may be set.

KS: Sets a value governing how much the envelope amount will be affected by the KS Curve (see 4.13 below). Here too, positive or negative values may be set.

LFO: Sets a value governing how much the envelope amount will be affected by the LFO (see 4.12 below).

OTHER FUNCTIONS

The chart in the lower left-hand corner of the page regulates two important functions related to the DHG ENV.

ACT (Active): Turns each DHG ENV ON or OFF (--). When any given envelope is set to OFF (--), the harmonics assigned to that envelope will not be heard. In the harmonics display on the right-hand side of the page, the lines representing those harmonics will disappear. The ACT function is very useful for isolating groups of harmonics in a patch and listening to them on their own.

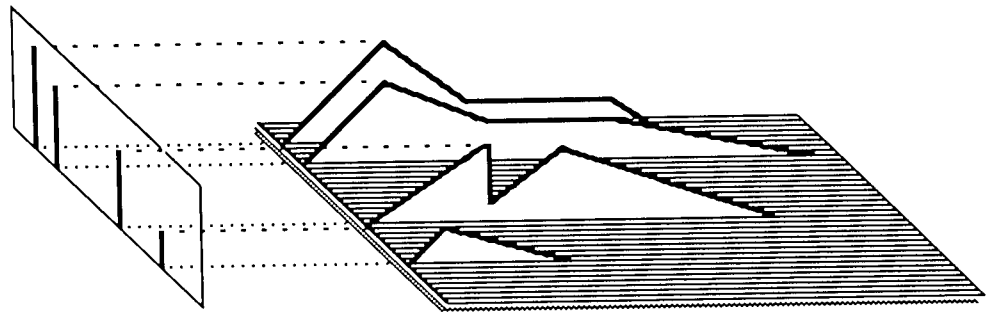
EFF: This parameter provides yet another source of modulation, which can be set differently for each Envelope. For each envelope, you turn this modulation source "on" by setting it to a value greater than 0. The actual numerical values regulate the rate of the modulation. The range starts at 1, which produces a very slow modulation rate, to 31, which produces a very rapid rate of modulation.

4.6 DHG ENV PAGE

DHG ENV		BOTH SIA- 1 PIANO 98											
SEG	1		2		3		4		5		6		
	RT	LU	RT	LU	RT	LU	RT	LU	RT	LU	RT	LU	
ENV1	0	*	16	31	16	31	17	27	21	0	0	0	
ENV2	0	*	16	31	16	31	14	27	21	0	0	0	
ENV3	0	*	16	31	16	31	14	27	21	0	0	0	
ENV4	0	*	17	31	16	31	14	3	21	0	0	0	
MAX	EU1=1		EU2=1		EU3=1		EU4=1		SHADOW=ON				

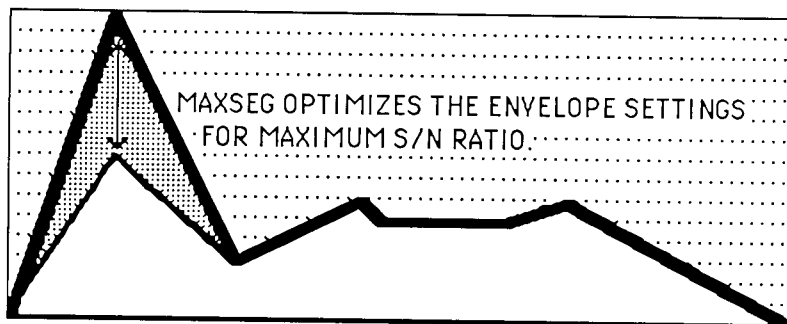
This page contains four 6-segment envelope generators. As you can see, they're very similar to the DFG ENV (section 4.3) in their layout. But unlike the DFG ENV, which is a pitch envelope, each of these four DHG ENVs affects the amplitude (loudness) of the harmonics assigned to it. Using the four DHG ENVs, you can make different groups of harmonics "rise" and "fade out" at different times. You'll find this extremely valuable in imitating the sounds of various instruments. To access the DHG ENV page, press the ENV button (6) while in edit mode.

DHG SETTINGS: MODIFIED BY DHG ENVELOPES:



MAX: (Maximum Segment) This allows you to select one segment of each envelope as the highest point (maximum value) in that envelope. It is then set to a fixed value of 31. The Maximum Segment in each Envelope is indicated by an * in the Level column of the appropriate segment. So you know that * always equals 31.

Why do you need a Maximum Segment? Well, in "tweaking" a DHG ENV by ear, you may come up with just the envelope curve you want, but the overall level of that curve may be too low. It may "max out" at only half or a third of the full possible maximum level of 31. When that happens, you can get a bad signal-to-noise ratio. In other words, your envelope is putting out more "nothing" than "something." And in the digital domain, "nothing" is noisy. Maximum Segment prevents that from happening by keeping the "top" of your envelope up at full level.



But if you don't want to use the Maximum Segment feature, just give each Envelope a MAX value of 0 (-).

SHADOW: This is an "automatic" grouping function for ease in operating the envelopes. When it's ON, any Rate or Level value that you enter on any Envelope will automatically be set onto all higher-numbered Envelopes. For example, if you change the SEG 1 Rate for ENV 1, the same parameter will be changed for ENVs 2, 3 and 4. If you change ENV 2, ENVs 3 and 4 will change, but not ENV 1.

4.7 DDF PAGE

```
*DDF*=ON   MOD=--   BOTH SIA- 1 PIANO 98
                                     <DEPTH>
CUTOFF=74-MOD=18  ENV=  0-VEL=  0
SLOPE =31-MOD= 0  VEL=+27
FLAT .LV=31      PRS=  0
                                     KS=-18
                                     LFO=  0
```

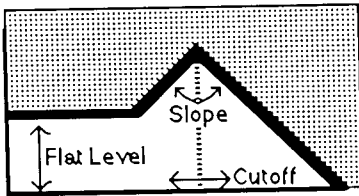
In its basic operation, the DDF section resembles the low pass filters found on other synthesizers. It has a number of special features, however, which provide a great deal of dynamic control over filter parameters.

To access the DDF page (Digital Dynamic Filter), press the DDF button (3) while in edit mode. You'll notice that this page is similar to the DFG page (4.2 above) in many respects. It allows you to "tune" the filter and then define modulation sources and amounts for the filter.

ON/OFF: ON enables the DDF and DDF ENV. OFF (--) removes them from the Sound Source Chain.

MOD ON/OFF: Enables and disables modulation of the DDF.

FILTER PARAMETERS:



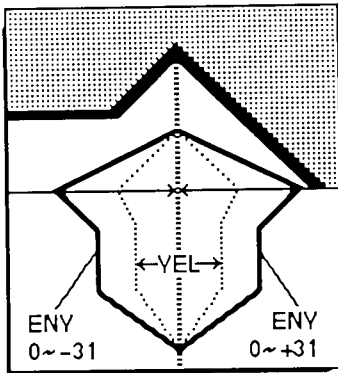
The parameters in the left-hand column define the basic filter settings:

CUTOFF: Sets the maximum cutoff frequency. Frequencies above the cutoff frequency will not be "passed." (Range 0 - 99.) The higher the cutoff level, the more frequencies will be "allowed through."

FLAT LV: (Flat Level) Sets a "normal" or "median" filter level, below the cutoff frequency.

SLOPE: Sets the rate of transition between the Flat Level and the Cutoff Frequency. The sharper the Slope (the smaller the value), the more of a "resonant" quality the filter has.

ENVELOPE + VELOCITY CONTROL OF FILTER CUTOFF:



The parameters in the center column define *how much* modulation will be applied to CUTOFF and SLOPE respectively. (Provided of course that the top screen MOD parameter is set to ON.)

The parameters in the right-hand <DEPTH> column define the modulation *sources* which can be applied to the filter CUTOFF and/or SLOPE and the modulation *amount* for each source. The sources are:

ENV: The DDF Envelope. The actual envelope is programmed on the DDF ENV page (section 4.8 below). This parameter sets the Envelope *amount*, i.e., how much the DDF Envelope is allowed to affect DDF CUTOFF and/or SLOPE.

(ENV) **VEL:** This parameter makes the ENV amount dependent on key attack velocity.

VEL: Key attack velocity can also directly modulate DDF CUTOFF and/or SLOPE, independently of the DDF ENV. Do not confuse this parameter with ENV VEL above.

PRS: Key aftertouch pressure can directly modulate DDF CUTOFF and/or SLOPE. Positive values increase CUTOFF/SLOPE amount. Negative values decrease the amount.

KS: CUTOFF/SLOPE amounts can be made to vary on different sections of the keyboard. The areas are defined on the KS (Key Scale) Curve Page (4.13 below). This parameter sets the KS *amount*.

LFO: The LFO can also modulate CUTOFF and/or SLOPE. This parameter sets the LFO *amount*. The actual LFO parameters are set on the LFO page (4.12 below).

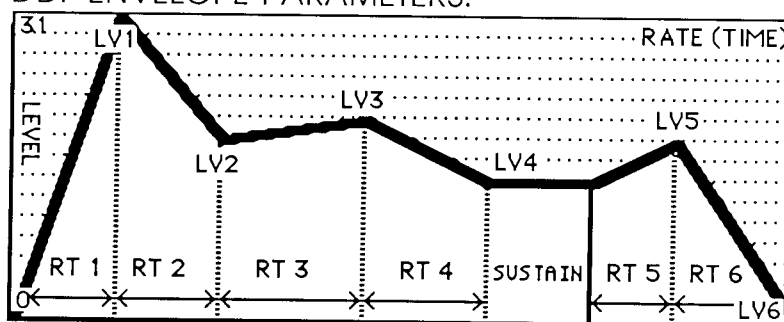
4.8 DDF ENV PAGE

DDF ENV		BOTH SIA- 1 PIANO 98					
SEG	1	2	3	4	5	6	
RATE	0	8	13	15	10	0	
LEVEL	*	31	12	0	0	0	

MAX SEG = 1

To access the DDF ENV page (DDF Envelope), press the ENV button (7) while in edit mode. In layout and function, the DDF Envelope Generator is identical to the DHG ENV. In this case, however, the envelope affects filter cutoff frequency.

DDF ENVELOPE PARAMETERS:



4.9 DDA PAGE

DDA=ON		BOTH SIA- 1 PIANO 98	
<DEPTH>		<RATE>	
AT VEL=	+25	AT VEL=	+13
PRS=	0	RL VEL=	+ 1
KS=	0	KS=	+15
LFO=	0		

The parameters on this page are associated with amplitude (loudness). To access the DDA page (Digital Dynamic Amplifier), press the DDA button (4) while in edit mode.

DDA ON/OFF: ON enables the DDA (Digital Dynamic Amplifier) and DDA ENV. OFF (--) removes them from the Sound Source chain.

The left-hand <DEPTH> column allows you to set which parameters will affect the overall amplitude level of each Sound Source, and how much they will do so. The options are:

AT VEL: Key attack velocity. When a positive value (+1 through +31) is selected, increasing the key velocity increases loudness, as on a piano. When a negative value (-1 through -31) is selected, increasing the key velocity decreases loudness.

PRS: Key aftertouch pressure.

KS: The Keyboard Scale curve, which can be set to make certain areas of the keyboard more "sensitive" than others. The actual curve is set using the KS Curve Page (4.13 below). This parameter sets the KS Curve *amount*.

LFO: The Low Frequency Oscillator. This parameter sets the *amount* of LFO amplitude modulation.

The right-hand <RATE> column allows you to select parameters which can be used to alter the RATE of any specified segment of the DDA Envelope Page (4.10 below) and set an amount for each parameter.

The parameters are:

AT VEL: Key attack velocity. When a positive value (+1 through +31) is selected, increasing the key attack velocity will increase the Rate of any selected envelope stage. When a negative value (-1 through -31) is selected, increasing the key attack velocity will *decrease* the Rate of any envelope segment selected on the DDA ENV page.

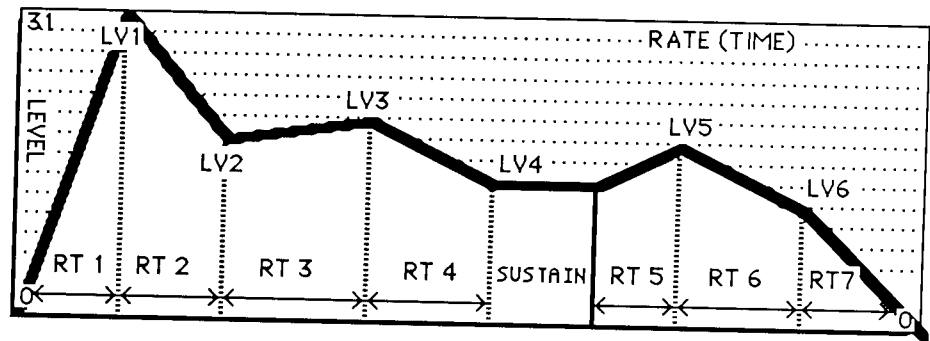
RL VEL: Key release velocity, or the speed at which the hand is lifted from the key.

KS: The Keyboard Scale Curve.

4.10 DDA ENV PAGE

DDA ENV	BOTH SIA- 1 PIANO 98						
SEG	1	2	3	4	5	6	7
RATE	1	23	22	21	12	11	0
LEVEL	*	31	31	0	0	0	00
RTMOD	ON	--	--	--	ON	--	--
MAX SEG = 1							

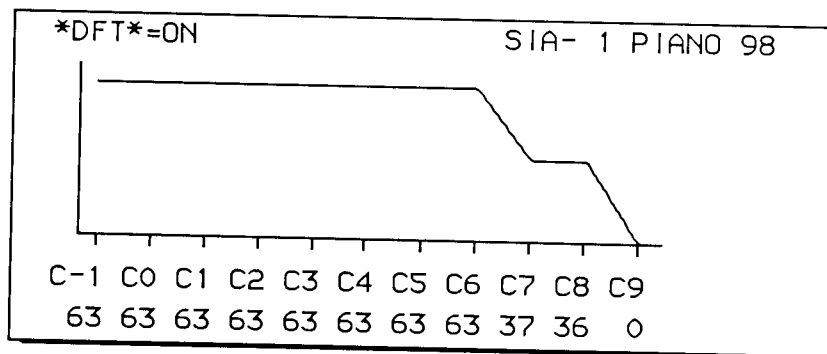
Use this page to set the amplitude envelope for each sound source. To access the DDA ENV page (DDA Envelope), press the ENV button (8) while in edit mode. The DDA envelope generator, as you can see, is very similar to the K5's other envelope generators. Here, however, you are given 7 segments, instead of 6, enabling you to construct very detailed Attack/Decay/Sustain/Release patterns.



The other difference between this and the other Envelope Generators is the RTMOD (Rate Modulation) column, which can be set to ON or OFF for each segment. When ON is selected for any segment(s), the specified RATE for that segment can be increased or decreased by any of the controllers (AT VEL, RL VEL, KS) you selected on the DDA Page (4.9 above). Thus, you can vary the Attack, Decay, Sustain or Release times of your sound based on how you play the keyboard.

4.11 DFT PAGE

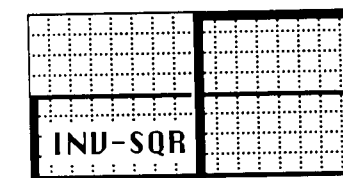
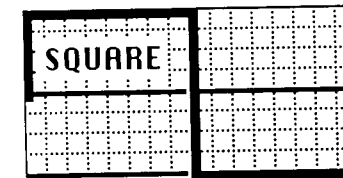
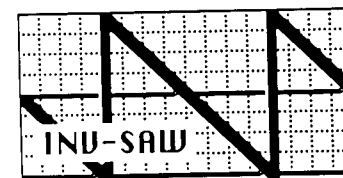
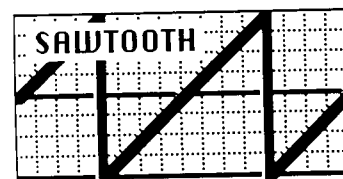
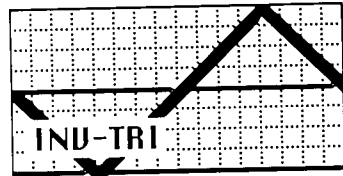
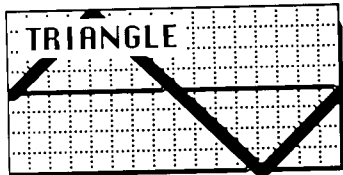
The Digital Formant filter acts as an 11-band graphic equalizer. To access the DFT page, press the DFT button (9) while in edit mode.



DFT ON/OFF: ON enables the DFT. -- removes it from the Sound Source chain.

The DFT divides the frequency spectrum into 11 bands (C-1 - C9, reading from lowest to highest frequencies). The level of each band can be adjusted. Just position the Cursor on the appropriate band and rotate the Increment Dial. The visual display can be used to help you construct very natural-sounding EQ curves. Of course, extreme EQ effects are also possible.

4.12 LFO PAGE



LFO		SIA- 1 PIANO 98	
SHAPE= 1		1: TRIANGLE	2: INV-TRI
SPEED= 20		3: SQUARE	4: INV-SQR
DELAY= 10		5: SAWTOOTH	6: INV-SAW
TREND= 10			

The parameters on this page determine the characteristics of the Low Frequency Oscillator (LFO). This oscillator produces no audible tone of its own; its wave characteristics are used to modulate other parameters, as we've already seen. To access the LFO page, press the LFO button (12) while in edit mode.

LFO characteristics are selected using the left-hand column:

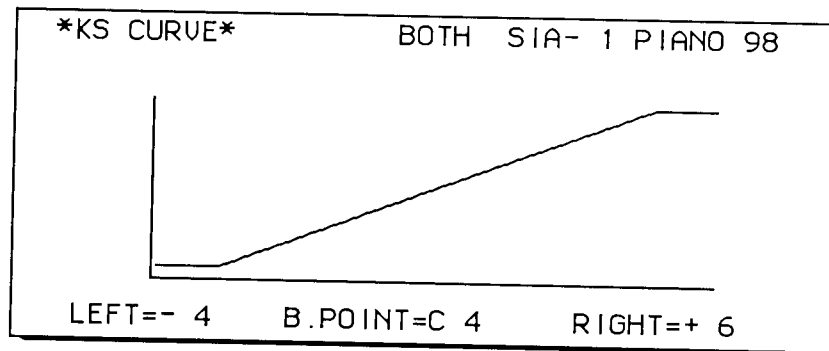
SHAPE: Selects the waveshape of the LFO. The 6 available options are listed in the center and right-hand columns.

SPEED: Sets the LFO frequency, which determines the rate, or speed, of the modulation effect.

DELAY: Allows you to set a time delay between the instant when the key is struck and the instant when the LFO modulation begins.

TREND: Determines the speed at which the LFO modulation begins, *after* the DELAY time above. A setting of 0 causes the LFO modulation to begin instantly after the delay, a setting of 31 causes the modulation to come in gradually. Trend has no effect when the SQUARE or INV-SQR waveshapes are used.

4.13 KS CURVE PAGE



The KS page allows you to set up a Keyboard Scaling Curve. Keyboard scaling, as we've seen, can be used to control the amounts of several K5 parameters. You can have more of the given parameter in certain areas of your keyboard and less of it in other areas. Keyboard scaling is useful in imitating natural instruments, many of which have different harmonic, volume, modulation and ADSR characteristics in different parts of their ranges. Beyond that, it's useful for modifying patches that may be too "aggressive" at certain pitches and even for setting up some split keyboard type of effects.

To access the KS page, press the KS button (11) while in edit mode.

B.POINT: Allows you to select one key as the center (breakpoint) of the curve. Any key (from C-2 through G8) may be selected. The breakpoint has a fixed level of 0.

LEFT: Allows you to assign a level to the keys to the left of the breakpoint. The level can be higher than the breakpoint (+1 through +31) or lower (-1 through -31). Small values (+2, -1, etc.) will produce a gently sloping curve and thus a gradual transition from the bottom of the keyboard to the breakpoint. Higher numbers will produce a more abrupt transition.

RIGHT: Allows you to assign a level to the keys to the right of the breakpoint. As with the LEFT parameter, the RIGHT level can be set higher or lower than the breakpoint, with either a gentle or an extreme curve.

If you've created any new sounds in going through the previous section and would like to keep them permanently, now is the time to do so. If this applies to you, follow the write procedure described in section 6.2 below before going on to the next section.

5. PROGRAMMING & EDITING MULTI PATCHES

A Multi Patch (as we noted at the beginning of Section 2 above) is a combination of several Single Patches -- up to 15 of them. The Single Patches can be combined in a number of different ways. They can be "stacked," so that pressing a single key will play a number of Single Patches simultaneously. You can split the keyboard into a number of zones and assign different Single Patches to each zone. Single Patches can also be assigned to MIDI channels commanded by outside devices, making the K5 an ideal multitimbral instrument for MIDI sequencer applications. You can even play some of its voices in real time while a sequencer plays other voices.

All of these options are programmed by means of five Multi Patch editing/programming pages. You enter the Multi Patch edit mode the same way you enter the Single Patch Edit mode. Once you've called up the Multi Patch you wish to edit (by pressing the MULTI INT or EXT switches + a Bank letter switch + a Patch number switch), you simply press the EDIT switch. The Multi Patch Basic Page appears in the LCD.

5.1 MULTI BASIC PAGE

```
*MULTI BASIC*           MIA- 1 BASS/CLU  
  
NAME =BASS/CLU  
  
VOLUME=63
```

NAME: Use this parameter to name or rename your Multi Patch.

VOLUME: This parameter sets a master volume level for your Multi Patch. It's very useful for matching the volume levels for a series of Multi Patches you assign to a Link. (See section 6.6.1 below).

5.2 MULTI WINDOW 1

SECTION 1-5		MIA- 1 BASS/CLU			
SC	SINGLE	ZONE	POLY	MODE	CH
1	C-12:ELJAZBAS	C -2,B 2	UR	MIX	1
2	B-12:GUIT 2	C 3 ,G 8	UR	MIX	1
3	B-12:GUIT 2	C 3 ,G 8	UR	MIX	1
4	A- 4:UYBE 1	C -2,G 8	0	MIX	1
5	A- 1:PIANO 98	C -2,G 8	0	MIX	1

Press the Window 1 key to access this page. It is used to set the following parameters:

SINGLE: Use this column to select which Single Patches will make up your Multi Patch. Use the Cursor and Increment Dial to specify a Bank and Patch number and the appropriate Single Patch name will be displayed.

The window you're currently looking at only allows you to make 5 of the 15 possible Single Patch assignments that can be made. To access the next 5 "assignment lines," simply press the Window 1 switch a second time. Press it again to access the final 5 "assignment lines." The same procedure is used for Multi Patch Programming Windows 2 through 4 below. And in each case, the values you set on each line only affect the Single Patch specified on that particular "assignment line."

ZONE: Enables you to assign the selected Single Patch to a specific region of the keyboard. The left-hand values in this column set the lowest key of the Zone; the right-hand values set the highest key. The Single Patch will be heard only if you play a key within the Zone. To assign a Single Patch to the entire keyboard, simply set the left-hand value to the lowest possible key (C -2) and the righthand value to the highest possible key (G 8).

POLY: Enables you to set how many of the K5's voices will be assigned to the selected Single Patch. Remember: the K5 has 16 voices. So if you give your very first Single Patch a Poly value of 16, you will have used up all available voices, making it impossible to add any more Single Patches to your Multi Patch. A setting of 0 effectively disables the Single Patch Section. A setting of "VR" (variable) enables the K5's dynamic assignment mode, which assigns as many voices to the selected Single Patch as needed, up to the instrument's capacity of 16, of course.

The K5 has an automatic SORT function that arranges the single patches in the multi according to their polyphony as follows:

- Single patch sections with a fixed number of voices;
- Sections with a variable number of voices ("VR");
- Sections with no voices assigned ("0").

MODE: When this parameter is set to MIDI, the selected Single Patch can only be played by an external MIDI device operating on the channel specified under CH (see below). When set to KYBD (keyboard), the selected Single Patch can be played only from the K5s keyboard. When set to MIX, it can be played by both the keyboard or MIDI. On the K5m, which does not have its own keyboard, the options are MIDI and MIX. The MIX option enables the K5m for MIDI and rear-panel jack (PEDAL, EXP and HOLD) events.

CH: Use this parameter to assign a MIDI receive channel to the selected Single Patch. By assigning a MIDI channel to a Single Patch, you enable that single patch to be played by an external MIDI device which is "tuned in" to the same MIDI channel.

(For more information about MIDI channels, see Section 6.5.1 below.)

5.3 MULTI WINDOW 2

SECTION 1-5		MIA- 1 BASS/CLU				
SC	SINGLE	VELSW	TRNS	TUNE	LVL	OUT
1	C-12:ELJAZBAS	0-7	0	0	63	1
2	B-12:GUIT 2	0-7	0	0	63	2
3	B-12:GUIT 2	0-7	0	+ 2	63	1
4	A- 4:UYBE 1	0-7	0	0	63	4
5	A- 1:PIANO 98	0-7	0	0	63	2

When you access this page, you'll notice that the SINGLE column remains the same as on Window 1, and that several new columns appear to the right. This will happen on Windows 3 and 4 as well. In each case, you are making new assignments or modifications to the Single Patches you selected in Window 1, which are listed in the SINGLE column. The patches can be changed in any of the Multi windows.

VEL SW: (Velocity Switching) This parameter enables you to set up a situation where key attack velocity will determine whether or not the selected Single Patch is sounded when you strike a key. The entire range of possible velocity values is divided into 8 steps -- from a very soft, slow velocity (0) to a very hard, fast attack (7).

So, for example, by giving the first selected Single Patch a VEL SW value of 0-3 and the second selected Single Patch a VEL SW value of 4-7, you can set up a situation where only the first Patch will be heard when you play the keyboard softly and only the second Patch will be heard if you play hard. This is just one of many possible applications for the VEL SW parameter.

(Note: the VEL SW parameter will only function if the master keyboard attack velocity (VEL) parameter on Multi Window 4 is enabled. See Section 5.5 below.)

TRNS: Allows you to transpose the pitch of each selected Single Patch. (Range = 4 octaves below the initial pitch to 4 octaves above the initial pitch.) Among other applications, this column can be used to set up large chords which can be triggered via a single key or MIDI Note On command.

TUNE: Allows you to fine-tune each selected Single Patch within a range of one half-step up or down. Among other applications, this parameter is useful for introducing slight detunings among Single Patches for a rich "phasing" or "beating" effect.

LVL: Allows you to set a relative volume level for each selected Single Patch.

OUT: Allows you to assign each selected Single Patch to one of the K5's four discrete outputs (Outputs 1 through 4). Thanks to this parameter, different Single Patches within your Multi Patch can be routed to different channels of a mixing board for stereo/quadrasonic or for separate external signal processing (EQ, reverb, etc.).

5.4 MULTI WINDOW 3

This page is used to enable or disable various controllers on the K5 (wheels, pedal jacks, etc.) and the MIDI controller commands associated with them. ON enables the controller. OFF (--) disables the controller. Each controller can be enabled or disabled for every Single Patch that makes up the Multi Patch. So, for example, you can have some Single Patches respond to the Pitch Bend wheel and have others not respond.

(For more information about MIDI controllers, see Section 6.5.1 below.)

SECTION 1-5		MIA- 1 BASS/CLU					
SC	SINGLE	PED	EXP	PRS	BND	MOD	VOL
1	C-12:ELJAZBAS	ON	ON	ON	ON	ON	ON
2	B-12:GUIT 2	ON	ON	ON	ON	ON	ON
3	B-12:GUIT 2	ON	ON	ON	ON	ON	ON
4	A- 4:UYBE 1	ON	ON	ON	ON	ON	ON
5	A- 1:PIANO 98	ON	ON	ON	ON	ON	ON

PED: Enables/disables the rear panel PED jack, or any MIDI Foot Controller command (04 Hex).

EXP: Enables/disables the rear panel EXP pedal jack, or any MIDI Expression Controller command (0B Hex). This provides a form of volume accent above the programmed or Main Volume (see below).

PRS: Enables/disables Keyboard Aftertouch Pressure commands.

BND: Enables/disables Pitch Bend Wheel commands.

MOD: Enables/disables Modulation Wheel commands. (01 Hex)

VOL: Enables/disables MIDI Main Volume controller commands (07 Hex).

(Note: the MIDI controller identification numbers above and below are expressed in Hexidecimal [Hex], a base 16 arithmetic system used by computer programmers who work with MIDI.)

5.5 MULTI WINDOW 4

This page is also used to enable or disable various K5 controllers and the MIDI controller commands associated with them. Follow the procedures outlined for Multi Window 3 (5.4 above).

SECTION 1-5		MIA- 1 BASS/CLU			
SC	SINGLE	HOLD	POR	PGM	VEL
1	C-12:ELJAZBAS	ON	ON	--	ON
2	B-12:GUIT 2	ON	ON	--	ON
3	B-12:GUIT 1	ON	ON	--	ON
4	A- 4:UYBE 1	ON	ON	--	ON
5	A- 1:PIANO 98	ON	ON	--	ON

HOLD: Enables/disables the rear pedal HOLD jack, or any MIDI Damper (Sustain) Pedal command (40 Hex).

POR: Enables/disables Portamento On/Off (41 Hex) and Time. (05 Hex)

PGM: Enables/disables Program (tone patch) Changes. This allows you to change individual Single Patches independently of all the other Single Patches within your Multi Patch.

VEL: Enables/disables Keyboard Attack Velocity. (Note, this must be set ON in order for the the VEL SW parameter on Multi Page A to function. [See Section 5.2].)

Note: MIDI controllers must be enabled globally using the MIDI Select Page (section 6.5.3 below) before you can enable them for individual Single Patches within a Multi Patch. This may seem a bit confusing now, but it will become easier to understand once you become better acquainted with the K5's MIDI implementation.

6. DATA MANAGEMENT

6.1 COMPARE/RECALL

This key serves two valuable functions:

- If you are editing a patch, you can compare your edit with the original unedited version of the patch. Press the switch again, and you return to your edited version.
- If you are not editing, you can return to the previous edited patch. You will find this function extremely valuable if you press the wrong button by mistake. Single patch edits are preserved in the Recall buffer even when the power is turned off, however, Multi edits are not.

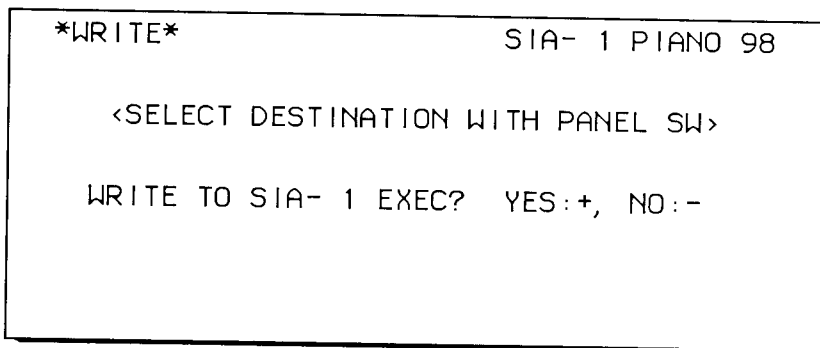
6.2 WRITE PAGE

To preserve any edit you've made to a Single or Multi Patch (or any new Single or Multi Patch you have created) you must write the new patch to either Internal or External memory.

HERE'S THE WRITE PROCEDURE:

Switch the Memory PROTECT switch to the OFF position.

Go to the bank of switches to the far right of the panel and press the one that says WRITE. The LCD will now look like this:



As always, the current memory location and patch name appear at the upper right-hand corner of the page.

The screen instructs you to select a memory location (destination) for your new sound. You will be writing to this location. You'll notice that the memory location which is now flashing on the page is the currently-selected memory location. If you wish, you can "overwrite" the new data onto the currently selected memory location (useful if you are just making a few minor changes to a previously existing patch). Just turn the Increment Dial to the right and follow the other on-screen prompts.

As an alternative, you can write to a "fresh" location (enabling you to keep the original sound in the current memory location and your new sound). Here's the procedure:

First, use the switches to the right of the LCD to indicate whether you want to write to Internal or External memory, and whether you are writing a Single or a Multi Patch. When you've made your selection, the letter code in the flashing display will read out your choice.

SI = Single Patch, Internal Memory

SE = Single Patch, External Memory Card

MI = Multi Patch, Internal Memory

ME = Multi Patch, External Memory Card

Remember: You cannot save an internal Multi Patch to the external card, or vice versa. This is so that a Multi Patch is always stored in the same bank as the Single Patches that are used in it.

Next, select the Bank letter and Patch number of the memory location where you wish to place your new sound. These too will be shown as part of the flashing display.

When the desired memory location is shown on the display and you want to go on with the write procedure, indicate "YES" by moving the Increment Dial in a clockwise direction.

The screen will now ask, "Are You Sure?" This gives you one last chance to make sure you are writing to the correct memory location.

If you want to abort the write procedure, indicate "NO" by moving the Increment Dial in a counterclockwise direction. The LCD will return to the Bank directory page.

If you want to go on with the write procedure, indicate "YES" by moving the Increment Dial in a clockwise direction. If the Write procedure was successful, the screen will read "WRITE COMPLETED!!" after a few seconds.

If there has been a mistake and the write procedure was unsuccessful, the screen will inform you of the problem by flashing one of several error messages.

PROTECTED: Memory protect is on, either on the card or on the unit.

NO CARD: No card inserted, or inserted incorrectly.

ID ERROR: Wrong card (not K5) inserted.

After a second, the LCD will return to the Patch Information Page for the currently-selected memory location. Correct the error and repeat the write procedure.

6.3 SAVE PAGE

The SAVE function allows you to transfer all Patches in Internal memory to an External Memory Card. Any voice data that was previously on a Memory Card will be erased by the save operation, so do not save to a card that already contains voices you want to keep. (For this reason it's also advisable to label each of your Memory Cards with a directory of its contents.)

The actual save operation is very simple:

Go to the bank of switches to the far right of the panel and press the one that says SAVE. The LCD will remind you that you are saving from Internal memory to External memory and ask you if you want to go ahead and execute the save operation. As always, turn the Increment Dial clockwise for "YES" and counterclockwise for "NO."

SAUE	SIA- 1 PIANO 98
INT TO EXT	EXEC? YES: +, NO: -
ARE YOU	SURE? YES: +, NO: -

If you indicated "YES," the display will then ask "ARE YOU SURE?"

Indicate "YES" or "NO" in the usual manner.

If there has been a mistake and the save procedure was unsuccessful, the LCD will inform you of the problem via one of the error messages described above under WRITE (section 6.2). After a few seconds, the LCD will return to the Patch Information page for the currently-selected memory location. Correct the error and repeat the save procedure.

If the save procedure was successful, the screen will read "SAVE COMPLETED!!"

6.4 LOAD PAGE

The LOAD function allows you to transfer all the Patches on a Memory Card to the K5's Internal memory. Any voice data that was previously in Internal memory will be erased by the load operation. So if there are any Internal voices you wish to keep, be sure to save them to a separate Memory Card before performing a load operation.

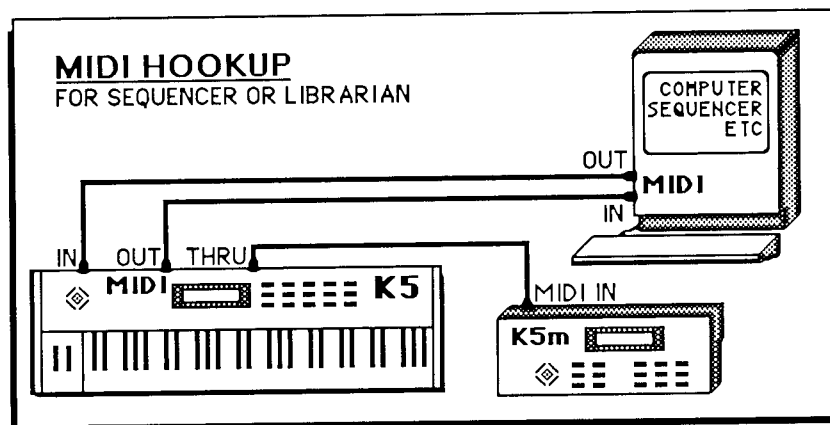
You must set the memory PROTECT switch to OFF before beginning the load procedure. Then go to the bank of switches on the far right and press the one marked LOAD. From here, the procedure is identical to the SAVE operation described above (section 6.3).

LOAD	SIA- 1 PIANO 98
EXT TO INT	EXEC? YES: +, NO: -
ARE YOU	SURE? YES: +, NO: -

6.5 MIDI PAGES

6.5.1 ABOUT MIDI

MIDI (the Musical Instrument Digital Interface) is a universally-accepted standard for interfacing synthesizers, drum machines, sequencers, personal computers and other electronic devices. Thanks to MIDI, an external device such as a keyboard or sequencer can "play" the K-5, and vice versa. The K5 is equipped with a MIDI IN connector for receiving MIDI messages, a MIDI OUT connector for sending MIDI messages and a MIDI THRU connector which can be used to take any MIDI data that comes into the K5's MIDI IN connector and pass it along to another MIDI device.



The many types of messages transmitted via MIDI can be broken down into two broad areas.

SYSTEM messages are essentially "performance" messages. They include several types of data: (a.) Note data, consisting of messages such as which key was struck, how long it was held down, etc.; (b.) Controller data, which communicates the action of mod wheels, foot pedals and other means of modifying basic note data; and (c.) Patch change data, which enables a master MIDI controller to change preset tone patches on a slave device.

EXCLUSIVE messages transmit any data which is unique to a particular MIDI device. This includes tone patch data, which can be transmitted from one K5 to another via MIDI, or to a personal computer librarian program for computer-assisted patch editing.

MIDI messages are transmitted via any of 16 data channels, which means that information for many different MIDI devices can be carried along the same MIDI cable.

The switch marked MIDI, in the right-hand bank of switches, provides access to two pages which allow you to configure the K5's MIDI implementation. Pressing the switch once gives you access to the MIDI BASIC page. Pressing it a second time brings you to the MIDI SELECT page. Let's take a closer look at each.

6.5.2 MIDI BASIC PAGE

Use this page to set the K5's basic MIDI transmit and receive parameters. You'll notice that the upper left-hand parameters pertain to MIDI System messages and the upper right-hand parameters to MIDI Exclusive messages.

MIDI BASIC		SIA- 1 PIANO 98	
<SYSTEM>		<EXCLUSIVE>	
TRS= 1	RCU= 1	TRS=---	RCU=---
	OMNI=ON		
PGM=MULTI			

<DUMP> PATCH SIA- 1 EXEC? YES:+, NO:-			

SYSTEM

OMNI: When set to ON, the K5 is able to receive on all 16 MIDI channels. When set to OFF, the K5 can receive on only 1 of the 16 channels. Remember that in MULTI mode the K5 can receive on several MIDI channels at once, as specified in the MULTI patch.

TRS: Sets the basic transmit channel (1-16).

RCV: Sets the basic receive channel (1-16).

PGM: Set to SINGLE or MULTI to determine whether MIDI program change commands will change Single or Multi patches. If PGM is set to MULTI, individual single patches *within* a multi can be changed, if desired. (See section 5.5)

EXCLUSIVE

TRS: When set to ON, enables the K5 to transmit System Exclusive data.

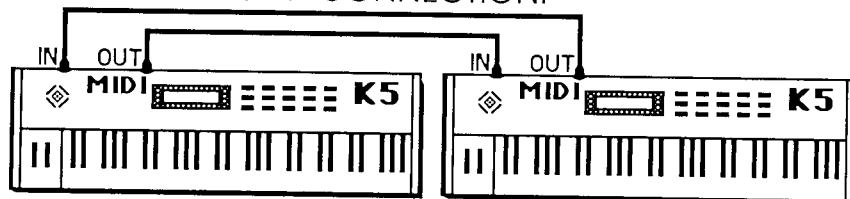
RCV: When set to ON enables the K5 to receive System Exclusive data.

DUMP

These parameters are used to transmit System Exclusive tone patch data to another MIDI device, such as a second K5 or a personal computer voice editing program. Here's the procedure:

To send an individual patch, connect the MIDI Out jack on the transmitting K5 to the MIDI IN jack on the receiving device. To send a patch block, *also* connect the MIDI OUT jack of the receiving device to the MIDI IN jack of the transmitting K5. This is necessary because of the two-way communication used in this process.

MIDI PATCH DUMP CONNECTION:



Set EXCLUSIVE TRS and RCV to ON, as described above.

Position the Cursor on the PATCH/BLOCK area of the screen. Use the Increment Dial to select the option you desire. The PATCH option will enable you to transmit one Single or Multi Patch. The BLOCK option will enable you to transmit one entire block of Patches (SINGLE INT, SINGLE EXT, MULTI INT, or MULTI EXT).

When you have made your selection, move the Cursor one place to the right.

If you selected the PATCH option above, you will now have to specify which patch you wish to transmit. Do this in the usual manner, using the SINGLE/MULTI, Bank and Number keys.

If you selected the BLOCK option above, you will now have to specify which block you wish to transmit. Do this by pressing the appropriate Single or Multi key.

When you have made your selection and are ready to execute the dump, move the Increment Dial to the right to indicate "YES."

The screen will now ask you if you are "SURE" you wish to execute the dump. Recheck your settings and move the Increment Dial to the right to indicate "YES."

If you are dumping an External Patch or Block but have not inserted the Memory Card, the screen will indicate "NO CARD."

If you have inserted the Memory Card or are dumping an Internal Patch or Block, the screen will indicate "BUSY" to let you know the K5 is now attempting the Dump process.

If there is a problem, the screen will indicate one of several error messages to make you aware of the problem:

ERROR ON TRANSMITTING SIDE:

ID ERROR: Wrong card (not K5) inserted.

NO CARD: No card inserted, or inserted incorrectly.

EXCLUSIVE OFF: Exclusive TRS is not ON (see section 6.5.2)

ERROR ON RECEIVING SIDE:

ERROR: Incorrect data received, no response from the other instrument, or a card with a different ID.

PROTECTED: Memory protect is on, either on the card or on the unit.

NO CARD: No card inserted, or inserted incorrectly.

Once the dump is successfully completed, the screen will read "TRANS COMPLETED!!"

6.5.3 MIDI SELECT PAGE

K5:

MIDI SELECT		SIA- 1 PIANO 98	
<TRANSMIT>		<RECEIVE>	
PED=ON	HOLD=ON	PED=ON	HOLD=ON
EXP=ON	PORTA=---	EXP=---	PORTA=---
PRS=ON	PGM=ON	PRS=ON	PGM=ON
BND=ON	BNDRNG=---	BND=ON	BNDRNG=---
MOD=ON	TUNE=---	MOD=ON	TUNE=---
		VOL=ON	VEL=ON

K5m:

MIDI SELECT		SIA- 1 PIANO 98	
<TRANSMIT>		<RECEIVE>	
PED=ON	HOLD=ON	PED=ON	HOLD=ON
EXP=ON	PORTA=---	EXP=---	PORTA=---
	PGM=ON	PRS=ON	PGM=ON
	BNDRNG=---	BND=ON	BNDRNG=---
	TUNE=---	MOD=ON	TUNE=---
		VOL=ON	VEL=ON

Use this page to enable those MIDI controllers which are required for your particular application. Disabling the controllers you do not need will streamline the data flow and help prevent MIDI time lags. The K5 can be configured to transmit or receive the following MIDI controllers:

PED: MIDI Foot Controller (04 Hex), an assignable controller. The K5 transmits these commands via the rear-panel PEDAL jack.

HOLD: MIDI Damper (Sustain) Pedal controller (40 Hex). The K5 transmits these commands via the rear-panel HOLD jack.

EXP: MIDI Expression controller (0BH Hex), which provides a form of volume accent above the programmed or Main MIDI Volume. The K5 transmits these commands via the rear-panel EXP jack.

PORTA: Portamento On/Off and Time.

PRS: Keyboard aftertouch pressure.

PGM: Program (tone patch) changes.

BND: Enables the Pitch Bend wheel.

BNDRNG: (Bend Range) Matches the range of the receiving instrument's Pitch Bend wheel with that of the controlling instrument.

MOD: Enables the Modulation wheel.

TUNE: Tunes all receiving instruments to the sending instrument.

VOL: (Receive only) MIDI volume.

VEL: Keyboard attack velocity.

6.6 SYSTEM/LINK PAGES

6.6.1 PAGE 1

Pressing the switch marked SYSTEM (in the right-hand bank of switches) brings up a page which is used to adjust two important sets of K5 parameters: SYSTEM and LINK parameters.

SYSTEM	*LINK*	SIA- 1 PIANO 98
TUNE= 0	LINKNO.=1	
K. TRNS= 0	NAME =K-5*LINK	
VELCURVE=2		
LOCAL=ON	SIA- 1:SIA- 2:SIA- 3:SIA- 4	
	SIA- 5:SIA- 6:SIA- 7:SIA- 8	

SYSTEM

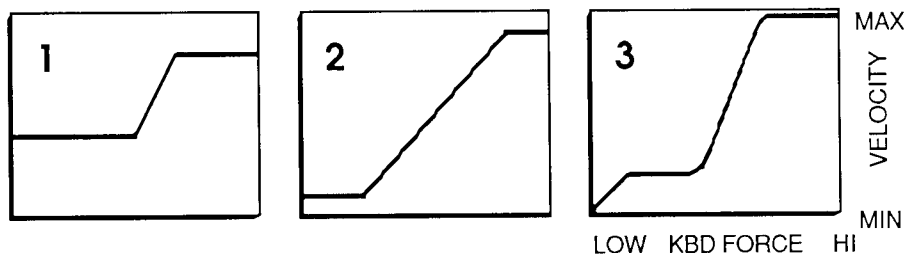
This column includes several "master" parameters which affect the K5 as a whole.

TUNE: This is the master tuning control for the K5. Range: one half step in 62 increments.

K. TRNS: This parameter allows you to transpose the K5 to any interval within an octave above or below the pitch set by the TUNE parameter above.

VEL CURVE: Allows you to scale the velocity responsiveness of your keyboard according to 1 of 3 curves:

VELOCITY CURVES:



LOCAL: (K5 keyboard version only) When set to ON, the K5's internal voices are driven by the K5 keyboard; i.e., they are under "local control." When set to OFF, the keyboard is disconnected from the internal voices. This enables you to use the K5 keyboard to control other MIDI synthesizers without hearing the K5's voices. Conversely, the K5's voices can be controlled by external devices independently of the K5 keyboard.

LINK

The LINK function enables you to pre-sequence a series of up to 8 tone patches (Single and/or Multi). In performance, this allows you to step through tone patches simply by pressing the LINK switch or a footswitch connected to the LINK jack. Using the parameters on this page, you can build 8 Links of 8 tone patches each.

LINKNO: (Link Number) Selects a numbered Link (1 - 8) for programming and playing.

NAME: Allows you to assign an 8-character name to the selected Link. (Useful for identifying which Links belong to which song, set, etc.)

The parameters in the lower section of the LINK column allow you to select, in order, the 8 patches which will make up that particular Link. Using the appropriate switches, specify Internal or External memory, Single or Multi Patch, patch Bank and Number.

6.6.2 SYSTEM PAGE TWO

This page sets several parameters associated with the Memory Card. To access it, insert a Memory Card in the slot and press the SYSTEM key a second time. The display will look like this:

```
*CARD*      PROTECT=ON      SIA- 1 PIANO 98
           ID CHECK   EXEC?   YES: +, NO: -
           FORMAT    EXEC?   YES: +, NO: -
```

PROTECT ON/OFF: Enables you to write-protect your Memory Card in order to avoid accidental erasure of patch data.

Because Memory Cards are used with several Kawai products other than the K5, it is necessary to format your Memory Cards specifically for the K5. The remainder of the parameters on this page pertain to this operation.

ID CHECK: Enables you to verify that your Memory Card is properly formatted. To execute the ID check, just move the Cursor to this area of the screen and rotate the Increment Dial to the right.

If the Memory Card is properly formatted and ready for use, the screen will indicate "ID OK!!"

If there is a problem, the screen will display "ERROR". Try re-inserting the card. You may need to reformat the card.

FORMAT: Allows you to format a Memory Card. Remove Memory PROTECT and execute the Format command. If there is a problem, and the format operation can't be completed, the screen will display one of several error messages:

When the format operation is successfully completed, the screen will indicate "FORMAT COMPLETED!!"

7. TUTORIALS: PROGRAMMING THE K5

Now that you've been introduced to all the K5's features and controls, let's take a look at some of them in action. The following tutorials are designed to make you aware of how sounds are created on the K5. Think of them as a jumping-off point for your own explorations. The tutorials suggest a few possible approaches, and are by no means meant to be exhaustive.

7.1 PROGRAMMING A SOUND "FROM SCRATCH"

In this section, we'll build a vibraharp or mallet percussion type of timbre from one of the patches you have in memory. Call up the patch named "ACOBASS1" in the usual manner (Single Int. + Bank C plus Patch Number 11) and we'll begin.

First, let's remove some filtering from ACOBASS1. This will give us a "clean slate" to start with. As you perform each operation below, take a moment to listen to the effect it has on the sound.

Go to the DDF Page and set the sound source selector to BOTH.

Set the DDF to OFF.

Go to the DFT page and set the DFT to OFF.

Go to the KS CURVE page and set both the LEFT and RIGHT values to 0.

We could also turn the DDA page off; but for now, let's stay with the amplitude envelope that has already been programmed for the DDA.

Now go to the DHG1 Page.

Our mission here is to add some harmonic characteristics to ACOBASS1 that will make it more closely resemble our target sound: a vibraharp. As you may know, odd-harmonic overtones are one important characteristic of metallic percussion instruments. So let's start by bringing up the 11th harmonic. Move the Cursor to the column marked HARM and set the value to 11. Now move the Cursor over to the INT column and begin rotating the Increment Dial. As you do so, play the keyboard (short, staccato notes will be best). You'll hear the effect of the added 11th harmonic as you increase its intensity. Meanwhile you'll see it rise majestically to its position on the harmonic display screen. Experiment for a few moments, until you find an intensity level you like. (I suggest a level of 78.)

Hmmm, our patch is already starting to sound more metallic. Let's move on to the 13th harmonic and repeat the above procedure. The metallic quality will become a little richer and more complex. To retain a natural-sounding high-frequency rolloff, set the intensity level of the 13th harmonic a little below that of the 11th harmonic, say about 62.

For a little extra "metallic richness," add the next highest odd harmonic, the 15th. Set the intensity level at about 53.

As you can hear, we've changed the quality of ACOBASS1 quite a bit just by adding three harmonics. Now let's isolate these harmonics so that we can listen to them by themselves. We can do this by assigning the harmonics to their own envelope buss. Since you probably still have the 15th harmonic dialed up, let's start there. (If you don't, set the value of the column marked HARM to 15.) Now move the Cursor to the column marked ENV and set the value to 4. You've just assigned the 15th harmonic to Envelope Buss 4. Now do the same with the 13th and 11th harmonics.

Now look at the dots beneath the harmonic display. You will notice that only harmonics 11, 13, and 15 are assigned to Envelope Bus 4. All the other harmonics are assigned to Buses 1 and 2.

OK, now that you've got your harmonics all assigned, go to the DHG 2 page. Here, we will shut off every Envelope Buss except the 4th. On the lower left-hand area of the page, find the column for Envelope Buss 4 and set the ACT (Active) value to ON. Set all the others to OFF (--). Now play the keyboard.

What do you think? These three harmonics sound rather thin by themselves, don't they? And they're inaudible in the higher registers. They need to be combined with some lower harmonics. Experiment with turning the other Envelope Busses on and off. Listen to the various combinations of harmonics assigned to each Buss. We could, of course, go back to the DHG 1 page and reset all the lower harmonics "from scratch." But it's often a useful shortcut to play around with the harmonics that are already dialed up, using the Envelope Busses. And in this case -- lo and behold -- we get a fairly convincing mallet percussion timbre by using the harmonics on Buses 1 and 4. (Set Buses 2 and 3 to OFF --.) Look at the harmonic display and you'll see which harmonic waveforms are now included in the sound and their relative intensity levels.

Now that we've got a basic harmonic structure for our sound, let's work on the amplitude envelope. Go to the DHG Envelope page. Here, we will set a different amplitude envelope for each of the three Busses we're using.

The initial attack of our sound seems a logical place to begin. Go to Segment 1 for Envelope 1 and set the Rate (RT) all the way to 0. Play the keyboard. What do you know! Our sound now has the sharp percussive attack of a mallet striking a metal key. If you want to use a "softer" mallet (felt instead of wood), set the Rate level to about 2 or 3. The Level (LV) for Segment 1 of each Envelope is set to the maximum value (31). This is as it should be with this type of percussive timbre (where the instrument is loudest when initially struck and then it gradually fades out). So we can leave those values where they are.

Now that you've changed the attack for the group of harmonics on one Envelope Buss, go ahead and experiment with the SEG 1 Rate values for your other two Busses. (ENVs 2 and 3, you'll recall, have been shut off, so any changes you make to those Envelopes will have no effect.)

You'll notice that if you set the Seg 1 Rate value fairly high (say about 22), you can get a secondary attack, or "echo" type of effect. Set it a little lower, around 16, and the harmonics rise, gradually and naturally, "behind" the group of harmonics that make up your initial attack. This is a quality of many acoustic instruments and is therefore a very desirable effect to have here. High-frequency harmonics tend to "rise" more rapidly than lower harmonics. So for maximum "naturalness," set the SEG 1 Rate of those high harmonics in ENV 4 to a lower value than the SEG 1 Rate for ENV 1. I suggest setting the ENV 4 SEG 1 Rate right at 0, and the ENV 2 SEG 1 Rate at around 5.

At this point, the patch works fairly well if you play short, staccato notes on the keyboard. Hold a key down, however, and the note doesn't sustain long enough. Our task now is to adjust that sustain. This will involve changing the current amplitude envelope. We will lengthen the decay portion of the envelope, enabling the note to "die out" smoothly even if the key is still being held down.

To achieve this, go to the DDA ENV page. Why are we using yet another amplitude envelope page here? Because we want to make a uniform change to the amplitude of all the harmonics at once. Back on the DHG ENV page, we were assigning separate envelope characteristics to different groups of envelopes.

As you'll recall, the DDA ENV sets an automatic sustain point at its fourth segment. (Hence the double line at that point.) So what we want to do is have our decay pattern begin before the fourth segment. We can accomplish that by setting the Envelope values as follows:

DDA ENV		BOTH SIC-11 ACOBASS1						
SEG	1	2	3	4	5	6	7	
RATE	0	8	18	31	19	11	0	
LEVEL	*	27	0	1	0	0	00	
RTMOD	--	--	--	--	--	--	--	
MAX SEG = 1								

As you can see, the attack portion of the envelope is identical to the one we set up for Envelope Busses 1 and 4 back on the DHG ENV page. (The ENV BUSS 1 attack, with its slower attack rate "fits inside" the DDA Envelope we're building, so it presents no problem.) The sound reaches its maximum Level instantaneously (SEG 1 RATE = 0). It quickly decays to a Level just under the maximum (SEG 2 LEVEL = 27). From there it goes into a long release pattern (fadeout) that extends out to SEG 5. Because of the automatic sustain point, it is necessary to have the SEG 4 Level make a tiny hop up to a value of 1 before returning to a final value of 0. This "hop" however is virtually inaudible.

For maximum expressiveness and realism, you'll want to make the patch velocity sensitive. This is easily done. Go to the DDA page. Find the AT. VEL parameter in the left-hand column (DEPTH) and set a sensitivity level that's comfortable for you.

There you have it. A complete Single Patch created using just 5 of the K5's pages (DHG 1, DHG 2, DHG ENV, DDA ENV and DDA). You can now go to the Basic Edit page, give the patch a name and write it to permanent memory.

If you want to experiment with the sound some more, you can try applying the DFT, LFO and KS CURVE to it. You can also go back to the DHG 2 page and try making different Envelope Busses velocity sensitive. (Use the VEL and EFF amounts to achieve this.) With this refinement, you can have actual timbral changes take place -- along with variations in volume -- as you strike a key harder or softer.

7.2 PROGRAMMING A MULTI PATCH

With the Multi Patch programming pages, you can combine Single Patches in a variety of ways. In this section, we'll illustrate several of those ways by building a split keyboard Multi Patch with a bass voice on the left-hand side of the keyboard and a composite chordal pad/lead voice on the right-hand side.

To begin with, you'll have to find a blank Internal Multi Patch or one you don't mind writing over. (The original Multi Patch can always be saved to an External Memory card, so there's no need to part with it forever.) Press the MULTI INT switch and use the A, B, C and D switches to scan the Bank directories until you find a Multi Patch memory location you want to use. When you have done so, press the appropriate Number switch (1 - 12) and go to that location. Then press the EDIT switch and we'll be ready to start.

The Multi Basic Page, which comes up when you press the EDIT switch, need not detain us long. You may want to give a tentative name to the patch you're about to program. Or you may prefer to wait until later, when you know what the patch sounds like.

Now access Multi Window 1, by pressing the A switch, and we'll get down to business. The first thing to do is find the POLY column and initialize all the POLY values to a setting of 0. Remember that each Multi Page has three windows. You want to access all three Multi Window 1 windows -- just hit the A key a second and third time to do so -- and set all the POLY levels to 0. This way there will be no "hidden surprises" when you're allocating voices later on.

OK, now let's assign our first Single Patch -- the bass voice for the left side of the keyboard. Go back to Multi Window 1 if you're not there already, and position the cursor on the first space in the first line under the heading SINGLE. This allows you to scroll through the four banks of Internal Single Patches (A - D) using the Increment Dial. The next cursor position lets you scroll through the individual Single Patches in each bank. As you do so, you'll notice that the name of each patch appears to the immediate right of its respective number.

Let's make the factory patch called DIGIBASS our bass voice. Select Single Patch C-9.

Now we'll assign that patch to the bottom two octaves of the keyboard. Move the cursor across into the ZONE column (still on the first line of the display) and set the first parameter in that column to C 0. This makes the lowest note on the K5 keyboard the lowest note in this particular zone. (Note: if you're using the K5m with an 88-note keyboard controller, you can set this parameter all the way down to C -2.) Next, set the second parameter in the ZONE column to D 2. This makes the second D on the K5 keyboard the highest note in the Zone. Play any key above this and the bass patch will not be heard. You may notice that if you play this patch on the lowest keys of the zone, the pitches are too low to be clearly distinguishable. Don't worry, we'll fix that when we get to Multi Window 2 later on.

Next, move the cursor into the POLY column (still on the first line). Here, we will assign some of the K5's 16 voices to our bass patch. Bass lines are generally monophonic (i.e., one note at a time), so we could assign just one voice to our bass patch (POLY value 1). But even in single-note bass lines, there are occasions where two or more notes will sustain simultaneously. And we may even want to play two or more bass notes simultaneously at times. So a much better option is to give our bass section a POLY value of VR (Variable). Most of the time, we will only be using one voice for bass. But on those occasions where we need an extra voice, the K-5 will automatically assign it to the bass patch -- provided, of course that one of the instrument's 16 voices is available at the time.

The next column to the right is the MODE column, where we assign a control source to the Single Patch on this particular line. As we are mainly designing this Multi Patch for real-time playing via keyboard (the K5's own keyboard or a keyboard controller driving the K5m), let's set the MODE on all our Single Patches to KEYBOARD (MIX on the K5m). And because we're not really concerned with external MIDI control at this point, we can keep all of our Single Patches assigned to MIDI Channel 1 in the CH column to the right of the MODE column.

(If this were a sequencer application, of course, you would set the MODE column parameters to MIDI. Then each Single Patch in the Multi Patch could be assigned a different MIDI channel. Each of these channels could then be assigned to a different sequencer "track" for multitrack-style applications.)

But back to our keyboard split. We've now made all the Multi Window 1 assignments for the left-hand bass voice. Next, we'll build a lead (or chordal) patch for the right-hand side of the keyboard. Only instead of using just one Single Patch for this side, let's make it a more complex "stack" of patches: a nice, lush string sound layered with a bright, staccato vibraharp timbre.

Go back to the SINGLE column and place the cursor on the second line. Select Single Patch Number C -1 (which is called STRING Q). Then go to the third line and make the selection again. We're going to be doubling this patch for extra richness.

Assign both STRING Q Single Patches (lines two and three) to the same keyboard zone. This zone will begin where the bass zone left off, so set the left-hand parameter of the ZONE column to D# 2. And it will end at the top of the K5 keyboard, at C 5. (If you're using the K5m with an 88-key controller, you can have the zone extend all the way up to G 8).

In this example, we're only splitting the keyboard into two zones. But for other applications, the K5 will let you assign up to 15 different zones -- one for each line in all three Multi Page windows.

Once you've assigned the two STRING Q patches to the same zone, give each one a POLY value of 5. This is enough to cover a 5-note chord, for example, or a 4-note chord and a monophonic melody. In such a case, 10 voices would be sounding at once -- 5 for each string patch. This will provide a good, "fat" sound and still leave some voices over. We'll use these to further "sweeten" the patch with some vibraharp enhancements.

As we've already mentioned, the MIX and CH column settings for the two string patches will be the same as for the bass patch. So, having set those, let's get on to that vibraharp Single Patch.

We'll put it on line 4 Multi Window 1's first window -- right under the other Single Patches. Go there now and call up Single Patch Number A-4: VYBE 1. (By now you should know the procedure.) Assign it to the same zone as the string patches and give it a POLY value of VR. (The reason for this will be explained later.) Also, assign it the same MODE and CH settings as the other three patches.

At this point, we've completed our Multi Window 1 programming. But, as you can hear, there's still work to be done. Some of the bass frequencies, as mentioned, are too low. And our right hand patch is too loud, relative to the left hand patch. In short, some fine-tuning needs to be done. Much of that is accomplished on Multi Window 2. Go there now by pressing the B switch.

First, let's transpose the bass up an octave. Go to the TRNS column on the first line. To transpose this patch up an octave, we give it a setting of +12. While you're on this parameter, you may want to play with some other settings, just to get an idea of how extensively patches can be transposed in this column.

Now we'll "fatten" up our string layer a bit. Go to the second string patch (line 3) and position the cursor in the TUNE column. Here we'll slightly detune the two string patches to create a rich phasing type of effect. Experiment with different settings until you find the one you like best. (I suggest a TUNE value of -5.)

While we're at it, why not give the overall layer a fuller sound by dropping this string patch an octave below the other one. You know how to do this, right? Go to the TRANS column for this patch and dial up a value of -12.

And now for another refinement. Instead of having the vibraharp patch sound every time a key in that particular zone is struck, let's make it velocity dependent. This way, we can use our key velocity to control whether or not the vibe patch is heard. We accomplish this by means of the VEL SW (Velocity Switching) column here on Multi Window 2. Position the cursor under this column on the VYBE 1 line (line 4).

Let's set up a situation where the vibe sound is only heard when you play the keys fairly hard. To do that, set the left-hand value under VEL SW to 5. Leave the right-hand value at 7. You've now limited the vibe sound to the upper range (5 - 7) of possible velocity values. (You may want to readjust that left-hand value to suit your own playing style or the the action on whatever external keyboard controller you may be using.)

Now, when your keyboard velocity is fairly gentle (values 0 - 4), only the string patches will sound. But when you increase your keyboard velocity into the 5 - 7 range, the string and vibe patches will sound.

And, by point, you should see the reason for giving the vibe patch a POLY value of VR (Variable) back on Multi Window 1: the number of voices needed to for the vibe patch will vary, depending on how we play.

(The above, of course, illustrates only one way to use the VEL SW. It would have been just as easy, for example, to set up a situation in which only the vibraharp is heard when you play loud, and only the string sound when you play soft. All you'd have to do is change the VEL SW setting for the strings from their present setting of 0 - 7 to a new setting of 0 - 4.)

So far, so good; but we still need to adjust the relative level of each patch, to produce a better balance among them. This is done using the LVL (Level) column. Move the cursor there now. With everything set to the maximum level (63), the strings are obviously too loud, compared with everything else. So let's bring them down to a level of about 32. The vibe sound doesn't need to come down quite as much, especially since we're going to use it for lead accentuations. So set that somewhere around 48.

As you can see, the LVL column functions as a sort of miniature mixing console, allowing you to blend the different elements in your Multi Patch. The next column over, labelled OUT, provides even more mixer-style flexibility. Using this column, we can assign each Single Patch to one of the four separate Outputs on the K5 rear panel. So we can, for example, have a separate Output for our bass sound, one for our string patch and another for the vibraharp. Each one can then be sent to a separate channel of a mixing console for individual EQ, processing, etc.

To assign an Output to a patch, just dial up the appropriate Output number in the OUT column. At this point, you may just be using the MIX OUT jack -- which combines all four individual Outs. But just for the sake of this exercise, go ahead and assign the bass to Output 1, the strings to Output 2 and the vibraharp to Output 3.

This leaves us with Multi Windows 3 and 4, where we can further customize each side of our keyboard split by enabling and disabling different controllers -- such as wheels, pedals, key pressure, etc. -- for each side.

To illustrate this, we'll go to Multi Window 4 and the column marked HOLD. This governs the rear panel HOLD pedal jack. So to carry out this part of the tutorial, you will have to connect a pedal to that jack. (If you don't have a suitable pedal, read on anyway; the basic principles illustrated here should be evident enough anyway.)

OK, now that you've done that, I'll remind you that the HOLD pedal works like a piano sustain pedal when you use it with patches that have a piano-style amplitude envelope. It works a little differently with patches that stay at the sustain point of their envelope for as long as you hold the key down. With a patch like this, if you engage the HOLD pedal while you're still holding a note, the note will sustain for as long as you hold the pedal down.

Now, it just so happens that the string patch we're using here is just that kind of patch. We may want to use the HOLD pedal with that patch, but we probably don't want the bass patch to be affected by the HOLD pedal at the same time. So what do we do? Move the cursor to the HOLD column and set the parameter for the bass patch (line 1) to OFF (--). Now try playing a bass pattern while sustaining string notes via the HOLD pedal.

And that just about brings us to the end of another tutorial. You can make further refinements to this Multi Patch on your own. You may want to go back to Multi Window 1 and try out alternative bass patches, string patches, etc. The SINGLE column lets you audition each Single Patch you call up.

If you'd like to save this Multi Patch and haven't given it a name yet, you may want to go back to the Multi Basic page and do so now. Just press the EDIT key to get there. When you're ready to write the Multi Patch to permanent memory, just press the WRITE key and follow the usual write procedure.

8. APPENDICES

APPENDIX A: CARE AND MAINTENANCE

FOR PROPER CARE, PROTECT YOUR K5 FROM:

- Direct sunlight and exposure to the elements
- Extreme temperature and humidity
- Unstable or "noisy" AC power
- Dust and and Vibration during transport

POWER SUPPLY

Use a supply within the stated voltage limits. Make sure that all power switches are off before changing equipment connections.

CLEANING

Clean the instrument with a soft cloth, a mild detergent and lukewarm water. Never use harsh or abrasive cleansers or organic solvents.

HELPFUL HINTS

BATTERY BACKUP

The lithium battery that protects the memory contents when you have switched the unit off is good for more than five years of normal use. We recommend, however, that you have your nearest authorized service representative replace it promptly after five years have passed.

LINE NOISE RESET

In the unlikely event of a "lockup" due to line interference, simply turn the K5 off for a few seconds and then reapply the power.

REPAIRS

Always save the INTERNAL tone patches to a memory card before taking the synthesizer in for repairs or servicing. Otherwise, they may be lost in the course of testing.

AVOIDING SURGES

Always turn equipment off before connecting and disconnecting it.

APPENDIX B: SPECIFICATIONS

KEYS (K5)	61
NUMBER OF VOICES	16
PROGRAM MEMORY	INTERNAL: 96 (48 Single/48 Multi), MEMORY CARD: 96 (48 Single/48 Multi)
SINGLE PARAMETERS (1 for each: Source 1 and 2)	<p>EDIT BASIC: Name, Balance, Decay, Pedal Assign, Depth, Wheel Assign, Depth, Volume, Portamento, Mode (Full/Twin), Copy From</p> <p>DFG: Coarse, Fine, Fix/Trk, (Modulations: Envelope by Velocity, Pressure, LFO)</p> <p>DHG1: Harmonic Select, Intensity, Envelope Assign, Modulation Assign (Group Controls: Select, Range, All, Odd, Even, Octave, 5th)</p> <p>DDF: On/Off, Cutoff, Slope, Flat Level, (Modulations: Envelope by Velocity, Velocity, Pressure, KS, LFO)</p> <p>DDA: On/Off (Depth Modulations: Attack Velocity, Pressure, KS, LFO) (Rate Modulations: Attack Velocity, Release Velocity, KS)</p> <p>DFG ENV: 6 Segment (12 Parameters), Loop between segments 3 and 4</p> <p>DHG ENV: 6 Segment (12 Parameters), Shadow, Max Seg</p> <p>DDF ENV: 6 Segment (12 Parameters), Max Seg</p> <p>DDA ENV: 7 Segment (13 Parameters), Max Seg</p> <p>DHG 2: Act (On/Off), Effect (for each DHG ENV), (Modulations: Velocity, Pressure, KS, LFO)</p> <p>KS: Left, Break Point, Right</p>
(1 for both sources)	<p>DFT: On/Off, (C-1~C9)</p> <p>LFO: Shape, Speed, Delay, Trend</p>
MULTI PARAMETERS	<p>EDIT BASIC: Name, Volume</p> <p>WINDOW 1: Single Assign, Zone, Poly, Mode (K5: Kbd/MIDI/Mix) (K5m: MIDI, Mix), MIDI Channel</p> <p>WINDOW 2: Single Assign, Velocity Switch, Transpose, Tune, Level, Output</p> <p>WINDOW 3: Single Assign, ENABLES: Pedal, Expression Pedal, Pressure, Bend, Modulation, Volume</p> <p>WINDOW 4: Single Assign, ENABLES: Hold, Portamento, Program Changes, Velocity</p>
SYSTEM	<p>SYSTEM: Tune, Key Transpose, Velocity Curve, Local Control (K5 only)</p> <p>LINK: Link No., Link Name</p> <p>CARD: ID Check, Format</p>
SAVE, LOAD, WRITE	SAVE, LOAD, WRITE
MIDI	<p>MIDI BASIC: System Transmit/Receive Channels, Omni mode On/Off, Exclusive Transmit/Receive, Program Change, Data Dump</p> <p>MIDI SELECT: <u>Transmit On/Off</u>: Pedal, Expression, Pressure (K5 only), Bend (K5 only), Modulation (K5 only), Hold, Portamento, Program Change, Bend Range, Tune, Velocity, <u>Receive On/Off</u>: Pedal, Expression, Pressure, Bend, Modulation, Volume, Hold, Portamento, Program Change, Bend Range, Tune, Velocity</p>
PANEL CONTROLS	Incremental Value Dial, Volume Control, Cursor, Headphone Jack, Power Switch, Display Contrast, MIDI In/Out/Thru, Protect On/Off, Hold, Link, Pedal, Expression, Audio Outputs (Mix, 1, 2, 3, 4)
DISPLAY	64 x 240 Bitmapped LCD
DIMENSIONS (W x D x H)	<p>K5: 41" (1040mm) x 13.4" (339mm) x 3.9" (99mm)</p> <p>K5m: 19" (483mm) x 4.7" (120mm) x 7" (177mm) [4 unit rackmount]</p>
WEIGHT	K5: 28.2 lbs. (12.8 kg) K5m: 10.6 lbs. (4.8 kg)
POWER CONSUMPTION	K5: 12w K5m: 12w

MIDI Implementation Chart

Function	Transmitted	Recognized	Remarks
Basic Channel Default Changed	1-16 1-16	1-16 1-16	Memorized
Mode Default Messages Altered	- X * * *	1, 3 OMNI on/off	Memorized MONO ignored
Note Number : True voice	○ * * *	0-127 0-126	127→115
Velocity Note ON Note OFF	* *	* *	V=1-127 V=0-127
After Touch Key's Ch's	X *	X *	
Pitch Bender	*	*	
Control Change 1 4 5 7 11 64 65 100, 101 6	* * * X * * * * (0, 1) *	* * * * * * * * (0, 1) *	Modulation Foot controller Portamento time Volume Expression Hold Portamento switch RPC Data entry
Prog Change : True #	* * * *	* 0-95	96-127→0
System Exclusive	*	*	
System Common : Song Pos : Song Sel : Tune	X X X	X X X	
System Real Time : Clock : Commands	X X	X X	
Aux Messages : Local ON/OFF : All Notes OFF : Active Sense : Reset	X ○ (123) ○ X	○ ○ (123~125) ○ X	
Notes	* Can be set to ○ or X Memorized even after turning off the power RPC #0=Pitch Bender sensitivity #1=Master fine tuning Values are given by Data entry		

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO
 Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO

○ : Y
 X : N

MIDI Implementation Chart

Function	Transmitted	Recognized	Remarks
Basic Channel Default Changed	1-16 1-16	1-16 1-16	Memorized
Mode Default Messages Altered	- X * * *	1, 3 OMNI on/off	Memorized MONO ignored
Note Number : True voice	X * * *	0-127 0-126	127→115
Velocity Note ON Note OFF	X X	* *	V=1-127 V=0-127
After Touch Key's Ch's	X X	X *	
Pitch Bender	X	*	
Control Change	1 X 4 * 5 * 7 X 11 * 64 * 65 * 100, 101 * (0, 1) 6 *	* * * * * * * * (0, 1) *	Modulation Foot controller Portamento time Volume Expression Hold Portamento switch RPC Data entry
Prog Change : True #	* * * *	* 0-95	96-127→0
System Exclusive	*	*	
System Common : : Song Pos : Song Sel : Tune	X X X	X X X	
System Real Time : : Clock : Commands	X X	X X	
Aux Messages : : Local ON/OFF : All Notes OFF : Active Sense : Reset	X X O X	X O (123~125) O X	
Notes	* Can be set to O or X Memorized even after turning off the power RPC #0=Pitch Bender sensitivity #1=Master fine tuning Values are given by Data entry		

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO

O : Y
X : N

SINGLE PARAMETERS

No.										NAME										S1												S2											
MODE					VOL					BAL					POR					BASIC												DELAY											
DHG 1					DHG 2					COARSE												KEY.																					
H	I	E	M	H	I	E	M	H	I	E	M	DFG	COARSE						KEY.						COARSE	KEY.																	
1				43				86				DFG	FINE						FIX No.						FINE	FIX No.																	
2				44				87				DFG MOD	ENV						-VEL						ENV	-VEL																	
3				45				88				DFG MOD	P.PRS												P.PRS																		
4				46				89				DFG MOD	LFO						PRS						LFO	PRS																	
5				47				90				DFG MOD	BND												BND																		
6				48				91				DFG 2	VEL						KS						VEL	KS																	
7				49				92				DFG 2	PRS						LFO						PRS	LFO																	
8				50				93				DFG 2							1 2 3 4						1 2 3 4																		
9				51				94				DFG 2	ACT												ACT																		
10				52				95				DFG 2	EFF												EFF																		
11				53				96				DDF	CUTOFF						FLAT-LV						CUTOFF	FLAT-LV																	
12				54				97				DDF	SLOPE												SLOPE																		
13				55				98				DDF MOD	CUT M						SLOPE M						CUT M	SLOPE M																	
14				56				99				DDF MOD	ENV						-VEL						ENV	-VEL																	
15				57				100				DDF MOD	VEL						KS						VEL	KS																	
16				58				101				DDF MOD	PRS						LFO						PRS	LFO																	
17				59				102				DDA MOD	AT VEL						AT VEL						AT VEL	AT VEL																	
18				60				103				DDA MOD	PRS						RL VEL						PRS	RL VEL																	
19				61				104				DDA MOD	D-KS						R-KS						D-KS	R-KS																	
20				62				105				DDA MOD	LFO												LFO																		
21				63				106				DFG ENV	1 2 3 4 5 6						1 2 3 4 5 6																								
22				65				107				DFG ENV	RATE												RATE																		
23				66				108				DFG ENV	LEVEL												LEVEL																		
24				67				109				DFG ENV	LOOP=												LOOP=																		
25				68				110				DFG ENV							1 2 3						1 2 3																		
26				69				111				DFG ENV							RT LV RT LV RT LV						RT LV RT LV RT LV																		
27				70				112				DFG ENV	ENV 1												ENV 1																		
28				71				113				DFG ENV	ENV 2												ENV 2																		
29				72				114				DFG ENV	ENV 3												ENV 3																		
30				73				115				DFG ENV	ENV 4												ENV 4																		
31				74				116				DFG ENV							4 5 6						4 5 6																		
32				75				117				DFG ENV							RT LV RT LV RT LV						RT LV RT LV RT LV																		
33				76				118				DFG ENV	ENV 1												ENV 1																		
34				77				119				DFG ENV	ENV 2												ENV 2																		
35				78				120				DFG ENV	ENV 3												ENV 3																		
36				79				121				DFG ENV	ENV 4												ENV 4																		
37				80				122				DDF ENV	1 2 3 4 5 6						1 2 3 4 5 6																								
38				81				123				DDF ENV	RATE												RATE																		
39				82				124				DDF ENV	LEVEL												LEVEL																		
40				83				125				DDA ENV	1 2 3 4 5 6 7						1 2 3 4 5 6 7																								
41				84				126				DDA ENV	RT												RT																		
42				85				127				DDA ENV	LV												LV																		
DFT	C-1			C2				C5				C8													M																		
	C0			C3				C6				C9	KS						LEFT B-P RIGHT						LEFT B-P RIGHT																		
	C1			C4				C7					LFO						SHAPE SPEED						DELAY TREND																		

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