

OWNER'S MANUAL

Matrix-6



Oberheim

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Matrix-6

OWNER'S MANUAL

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CAUTION: To prevent fire or shock hazard, do not expose this appliance to rain or moisture. Do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

WARNING: This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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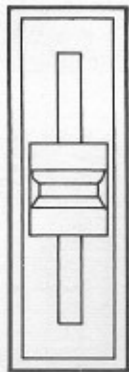
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VOLUME



7	8	9
4	5	6
1	2	3
STORE	0	+ -

NO OFF	◀	▶	▶ YES ON
-----------	---	---	----------------

NUMBER
PARAMETER
NUMBER
NUMBER
PARAMETER
PARAMETER

Matrix-6



MODE SELECT

NUMBER	NAME	COMPARE	PROTECT	<input type="checkbox"/> PATCH SELECT	PATCHES
PARAMETER	QUICK	COMPARE	VALUE	<input type="checkbox"/> PATCH EDIT	
NUMBER	SOURCE	AMOUNT	DESTINATION	<input type="checkbox"/> MATRIX MOD	
NUMBER	NAME	LOWER	UPPER	<input type="checkbox"/> SPLIT SELECT	SPLITS
PARAMETER	QUICK	COMPARE	VALUE	<input type="checkbox"/> SPLIT EDIT	
PARAMETER	TUNE		VALUE	<input type="checkbox"/> MASTER EDIT	MASTER

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MATRIX-6 Owner's Manual text by David M. Bertovic.

WELCOME TO THE MATRIX-6

Congratulations! You are now the owner of a powerful and versatile 6-Voice polyphonic synthesizer of outstanding features and value. Based upon the same revolutionary technology as the Oberheim XPANDER and MATRIX-12, the MATRIX-6 utilizes many of their sound programming, performance and MIDI features in a compact, low-cost unit.

The MATRIX-6 is divided into three main areas of operation called "modes". You have complete control over each mode and all the functions, called "parameters", within them. These three modes - the PATCHES, SPLITS and the general functions in MASTER - provide you with all the necessary ingredients to create patches, edit existing patches, split the keyboard and set up your pedals, levers and other controllers quickly and easily. Also included is a full complement of MIDI features that allows you to interface with other synthesizers, sequencers and computers.

And the sound? The MATRIX-6 utilizes a new breed of Digitally Controlled Oscillators - "DCOs" for short - that provide unparalleled tuning stability and richness of sound. A wide-range, 4-pole low-pass filter, three 5-stage envelope generators, two independent LFO's, and the Matrix Modulation™ System give you all the basics to precisely articulate the sound of each patch.

The MATRIX-6's front panel reads from left to right, conveniently laid out in logical fashion. And all the functions and parameters are printed on the front panel itself and numerically indexed for quick reference. The 16-character fluorescent display co-ordinates the use of all functions and even has a brightness adjustment for different lighting conditions.

Although the MATRIX-6 is designed with many features and controls that you may already be familiar with, we recommend that you read this manual in its entirety. It was written to provide you with all the information you will need to use your MATRIX-6 in an easy-to-read format.

We encourage you to experiment or you'll never know what you might discover. And thank you for choosing the MATRIX-6.

PLAYING THE MATRIX-6

WHAT TO DO IF YOU'RE IN A HURRY

If you absolutely MUST start now, take the next five minutes and read the following:

1. HOOK IT UP - Refer to the HOOK-UP diagram shown on page 6. Make sure you use the right cables.

2. USING MIDI? - If the MATRIX-6 is the Master, use its MIDI OUT and connect it to the MIDI IN of the Slave.

If the MATRIX-6 is a SLAVE, connect the MIDI OUT of the Master instrument to the MIDI IN of the MATRIX-6.

3. TURN IT ON - The POWER SWITCH is on the back panel just to the right of the AC cord. Flip it to your left.

4. TUNE IT UP - Press the orange MASTER button. Press the second grey button right below the display. The display will read "TUNING . . ." which will take all of five seconds.

5. SELECTING PATCHES - Press the blue PATCHES button and the PATCH SELECT light should go on. If not, press the blue PATCHES button a few times as the lights will "loop" around the three headings. Then press the first grey button beneath the display.

When NUMBER mode is entered in PATCH SELECT, you can select any one of the MATRIX-6's 100 patches numbered 00 through 99. Typing in two-digit numbers on the KEYPAD or using the < > or << >> buttons will change patches.

< > change values by one.

<< >> change values by five.

6. SELECTING SPLITS - Press the grey SPLITS button. The light next to SPLIT SELECT should come on. If not, press SPLITS again and it will. You can now use the KEYPAD, < > or << >> buttons to select any one of the MATRIX-6's 50 SPLIT programs numbered 00 through 49.

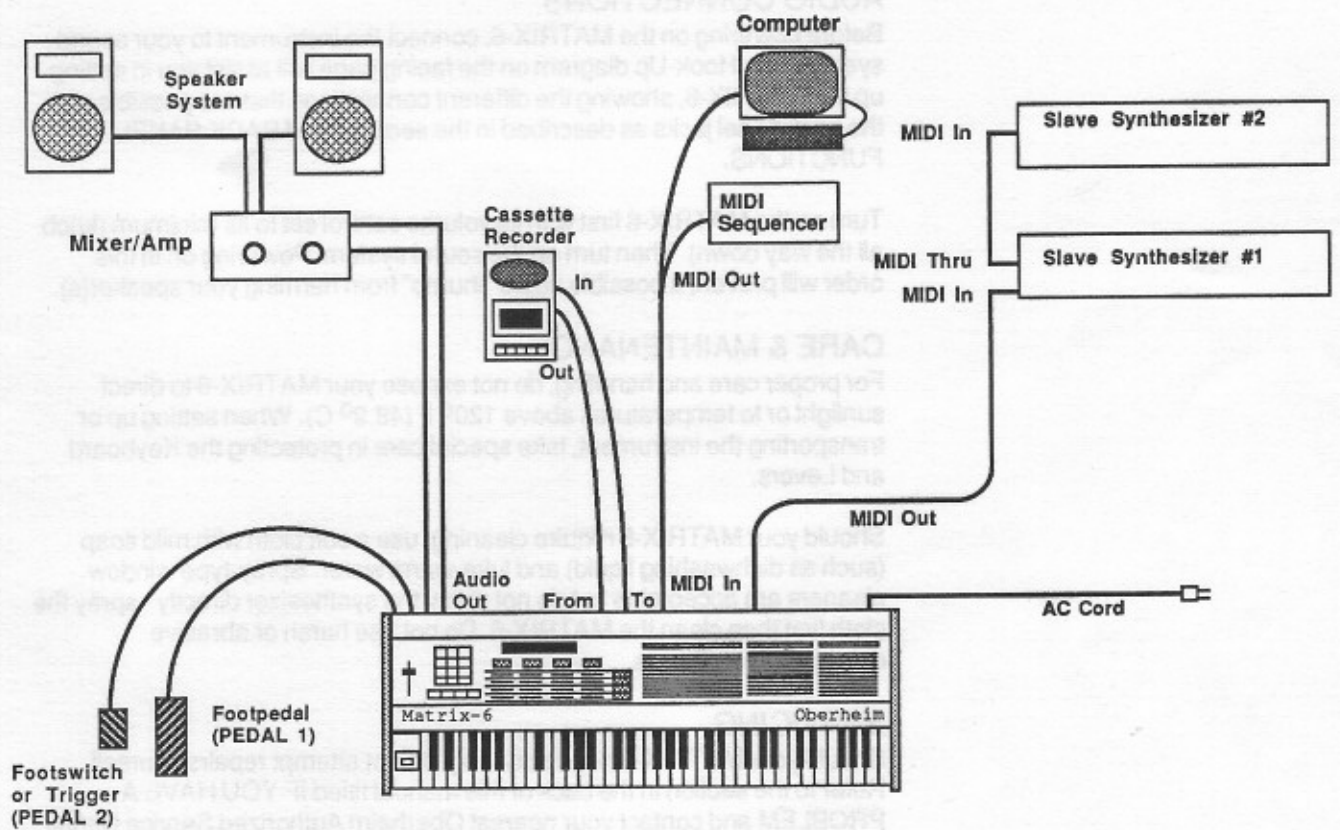
7. ADJUST THE VOLUME - The VOLUME slider controls the volume of both the main outs on the back panel and the Headphone jack in the front simultaneously. Pushing it away from you gives an increase in volume. Pulling it towards you decreases the volume.

8. PROGRAMMING - If you want to change ("EDIT") a patch, you must turn MEMORY PROTECT on the back panel OFF or permanent changes cannot take place. In addition, patches can be protected individually. The PROTECT button in the MODE SELECT section of the front panel must also be turned OFF for each patch that you want to alter permanently. To program your edits, make sure you are in the NUMBER mode of PATCH SELECT. Press and hold the bright red STORE button and while you are holding it down, type in the two-digit program Number on the KEYPAD. This will program the patch, along with its changes, permanently into memory.

These brief procedures are explained in detail throughout the rest of the manual. We encourage you to read the manual in its entirety if you would like to learn more about the MATRIX-6.

PLAYING THE MATRIX-6

BASIC HOOK-UP



PLAYING THE MATRIX-6

BASIC HOOK-UP

A.C. POWER

The MATRIX-6 is shipped from the factory set for local AC power. The small rectangular AC receptacle on the back panel will be protected by a metal-foil cover. Remove this cover, plug the female end of the AC cord into the MATRIX-6 and the male end into your wall outlet.

AUDIO CONNECTIONS

Before powering on the MATRIX-6, connect the instrument to your sound system. The Hook-Up diagram on the facing page will assist you in setting up the MATRIX-6, showing the different connections that are possible with the back panel jacks as described in the section titled BACK PANEL FUNCTIONS.

Turn on the MATRIX-6 first with its volume control set to its minimum (knob all the way down). Then turn on the sound system. Powering on in this order will prevent a possible audio "thump" from harming your speaker(s).

CARE & MAINTENANCE

For proper care and handling, do not expose your MATRIX-6 to direct sunlight or to temperatures above 120° F (48.9° C). When setting up or transporting the instrument, take special care in protecting the Keyboard and Levers.

Should your MATRIX-6 require cleaning, use a soft cloth with mild soap (such as dishwashing liquid) and luke-warm water. Spray-type window cleaners are acceptable but do not spray the synthesizer directly - spray the cloth first then clean the MATRIX-6. Do not use harsh or abrasive detergents or solvents.

SERVICING

Should your MATRIX-6 need servicing, do not attempt repairs yourself. Refer to the section in the back of this manual titled IF YOU HAVE A PROBLEM and contact your nearest Oberheim Authorized Service Center. A current roster of Service Centers is included in the Owner's Packet along with this manual.

Be sure to save your patches to Cassette before you take your MATRIX-6 in and repairs are started. This will be your "back-up" should the synthesizer's memory be lost during the repair. It is a good idea to make a habit of saving your data routinely. Refer to the section "Programming the MATRIX-6, Part III: The MASTER EDIT Page". The procedure for saving your programs to tape is described in the CASSETTE section.

TOURING THE MATRIX-6

PART 1: FRONT & BACK PANEL FUNCTIONS

In order to gain a better understanding of the numerous capabilities of your MATRIX-6, we've prepared a short tour of its general functions that will give you a good understanding of what the synthesizer is able to accomplish and how its front and back panels are laid out. Detailed information for each specific function will be provided later in the manual. Also, we will get into some step-by-step procedures that will help you make sense of all this new information. But first, let's take a quick look at the MATRIX-6 to get an idea of what this synthesizer has and what it can do.

VOLUME CONTROL/AUDIO OUTPUTS

You will notice right away that the MATRIX-6 has only one standard control and that's the slider used for the instrument's VOLUME. It controls the output level for both the LEFT/MONO and RIGHT channel AUDIO OUT jacks on the back panel as well as the HEADPHONE output jack found on the front of the LEVERS box.

The VOLUME control operates as follows: When the knob is pulled all the way down (towards you), the control is at its minimum setting - no volume or silence. When the knob is pushed all the way up, (away from you), the control is at its maximum setting.

In the MASTER EDIT Page, MISC. Parameter "56 STEREO" determines the status of the two AUDIO OUT jacks on the back panel.

When STEREO is set to OFF, the LEFT/MONO jack outputs sound for both single patches and SPLIT patches (the two playing modes of the MATRIX-6) and the RIGHT jack does not output any sound.

When STEREO is set to ON, the LEFT/MONO jack outputs all sounds from single patches and the sound from the LOWER patch when in SPLIT mode; the RIGHT jack only outputs sound when in SPLIT mode, and this sound comes from the UPPER patch.

LEVERS

The two LEVERS are the synthesizer's "performance" controls. They allow you to add subtle or dramatic inflections (changes) to the notes that you are playing on the keyboard. The most common use of the LEVERS is Pitch Bend and Vibrato, although they can have many other functions as well. That's why they are labelled simply "1" and "2" as they can be programmed to handle numerous other functions. We'll get to talk more about the LEVERS when we cover the sections on MODULATION and MASTER EDIT.

KEYPAD, MODE SELECT and DISPLAY

The KEYPAD and MODE SELECT section is the "control center" of the MATRIX-6. It is the use of these two sections in conjunction with each other that enables you to operate every function within the MATRIX-6. The DISPLAY is a visual aid that tells you what particular function has been called up and, in some instances, will "prompt" you or ask you to make a choice.

In addition to the specific information shown on the DISPLAY, the basic "modes" or groups of functions available are indicated by several small red lights. These indicator lights are referred to as "LEDs" (Light Emitting Diodes), so we'll use that term throughout the rest of the manual. There is a vertical row of LEDs next to each name right beneath the MODE SELECT heading and an LED in the corner in each of the four grey buttons right under the DISPLAY. You will soon see how cross-matching two LEDs (to select the basic mode) and using the DISPLAY (to select a specific function) is the main idea behind operating the MATRIX-6.

FRONT PANEL PARAMETER LISTS

The right half of the MATRIX-6's front panel has the operating features printed on it and is arranged in groups of related functions or "parameters" as they are called. This master list of operating parameters is used as a reference guide when programming what specific functions you want the MATRIX-6 to do.

When using the KEYPAD and MODE SELECT sections, you need to refer to one of these lists when selecting the particular parameter that you want to use. Each parameter is numbered so you simply type in this number on the KEYPAD and the parameter along with its current VALUE will be shown on the display.

KEYBOARD

The MATRIX-6 utilizes a five-octave (61-note C to C) keyboard incorporating three performance responses:

VELOCITY - When a key or several keys are played, the MATRIX-6 can be programmed to respond to how hard or soft the keys are played. This VELOCITY feature has three selectable response SCALES and adjustable SENSITIVITY from 0 to 63.

RELEASE VELOCITY - The MATRIX-6 can also be programmed to respond to how quickly or slowly the keys are let go after they have been played. The SCALE and SENSITIVITY are the same as whatever is programmed for Velocity.

PRESSURE - Once a key or keys are played and held down, the MATRIX-6 can be programmed to respond to pressing into the keys. This feature is sometimes referred to as "After-Touch" on other instruments.

These three performance responses are programmable on each patch. However, in the MASTER EDIT Page, KEYBOARD "40 VELOCITY SCALE" and "41 VELOCITY SENS." ("sensitivity") are not programmable as they are set "Globally" (that is, for the MATRIX-6 as a whole). You will notice that some of the patches that come with the MATRIX-6 use all three, some patches use only two or just one of the responses, and other patches none at all. You can use the MATRIX-6's keyboard response capability as you need it. The choice is yours.

BACK PANEL FUNCTIONS

PEDAL 1 and PEDAL 2

The MATRIX-6 is capable of being controlled by two footpedals for common functions such as volume control and sustain as well as many others as we will soon see. These pedals are connected to the synthesizer by the PEDAL 1 & PEDAL 2 input jacks on the back panel. Although they look the same, these two jacks operate differently.

The PEDAL 1 jack is designed to accept a "continuous" pedal - a rocker-type pedal usually used for volume or filter control. As we talk about the MATRIX-6's modulation capability in a later section, you will discover how you can also route the pedal's control to the DCO's, for example, to get pitch bend, to the LFO's for vibrato amount, and to many other "destinations" as they are called to achieve enormous flexibility in footpedal control.

The PEDAL 2 jack is designed to be used with a "switch" pedal - an on/off type pedal usually used for sustain. As with PEDAL 1, this pedal's control can also be used to perform other functions as well. The PEDAL 2 jack can also be used as an External Trigger input. This means that a "trigger pulse" or signal from a drum machine, sequencer or other device can time the Envelopes and LFOs. We'll cover this special application in the section "Programming the MATRIX-6".

CASSETTE

Once you begin to program your own original patches, you will find that you can very easily create more patches than the MATRIX-6 has room for in its own internal memory. The CASSETTE Interface feature allows you to "offload", or record these patches in their digital form (called DATA), on standard cassette tape. You can then begin to program a second set of patches, offload them onto cassette, do a third set and so on until you have built up a library of sounds.

The TO jack is used to connect the MATRIX-6 to your cassette recorder's input jack which can be either its AUX or MIC. This permits patch data from the synthesizer to be outputted and recorded onto the tape.

The FROM jack is used to connect the MATRIX-6 to your cassette recorder's output jack which can be either its EARPHONE, HEADPHONE, or EXTERNAL SPEAKER jack. This permits the patch data information on the tape to be loaded back into the synthesizer.

The procedure for using the CASSETTE Interface feature to save and load patches, as well as how you can also use MIDI to do this, is covered in the MASTER EDIT Sub-Page section later in the manual.

MIDI

The MATRIX-6 utilizes the universally accepted MIDI interface system and employs the three MIDI jacks - IN, OUT and THRU - that permit the synthesizer to be interfaced with other devices (another synth, drum machine, sequencer computer, etc.) equipped with MIDI.

MIDI OUT is used when the MATRIX-6 is intended to be used as the Master, controlling another synthesizer or MIDI instrument.

MIDI IN is used when the MATRIX-6 is being controlled as a Slave by another MIDI instrument.

MIDI THRU makes it possible to hook up to five MIDI instruments in a "chain" by passing MIDI data information along from one instrument to another that originates from the Master.

MEMORY PROTECT

When enabled (switched ON), the MEMORY PROTECT prohibits storing anything into memory. This prevents the accidental changing or erasure of your patches for the entire synthesizer. In order to use the STORE button to program patches or use the Cassette Interface to load patch information into the MATRIX-6, MEMORY PROTECT must be disabled (switched OFF).

There is a memory PROTECT function in the MODE SELECT section that is programmable for each patch. If MEMORY PROTECT is OFF on the back panel, you can store patches into any patch number except for the patches that have been individually Protected.

A.C. POWER SWITCH

The AC switch on the back panel applies power to the MATRIX-6 when turned on. It is recommended that the MATRIX-6 be turned off when not in use.

Directly below the AC switch is the recessed 3-prong receptacle for the AC power cord supplied with the MATRIX-6 as a standard accessory.

WHAT CABLES SHOULD I USE?

The AUDIO OUT LEFT/MONO and RIGHT jacks, the PEDAL 1 and PEDAL 2 jacks, and the CASSETTE IN and OUT jacks all require a standard guitar cord when using them. A guitar cord is simply a 2-conductor shielded cable with a 1/4" plug on the end that plugs into the MATRIX-6.

The MIDI IN, OUT and THRU jacks require a standard MIDI cable to be used properly.

TOURING THE MATRIX-6

PART 2: KEYPAD / MODE SELECT SECTIONS

The KEYPAD and MODE SELECT buttons are used in conjunction with each other to aid you in "getting around" the MATRIX-6. The MODE SELECT section tells the KEYPAD what particular job it will do in enabling you to change from one patch to another, edit a patch, use the MATRIX MODULATION section, create a SPLIT program, etc. We will now explore the ways in which these two sets of buttons are used together to operate the different functions within the MATRIX-6.

USING THE KEYPAD

The KEYPAD's functions are very straight-forward and operate the same way in every mode:

"0 - 9" BUTTONS

These buttons work much the same as a calculator with a few exceptions. They can be used to change quickly from one patch to another, change a parameter name or its value, and so on.

Unlike a calculator, however, the number buttons respond to two-digit entries, with a few functions that require three digits. Press the blue PATCHES button until the PATCH SELECT LED comes on. Then press the first grey button on the top row below the display. For this example, we'll start out with Patch 00. Press "00" on the Keypad. Now select Patch 58 by pressing just the #5 button by itself. Notice that 5 is displayed on the left and 0 flashes as the MATRIX-6 will wait for you to press another button. Press the #8 button and Patch 58 is now selected.

As we mentioned before, there are a few functions that require a three-digit entry on the Keypad to select a Value. In the VCF/VCA section, "21 FREQUENCY" of the Filter has a range of 0 to 127 and always requires three digits to be pressed when selecting its Value. But if you attempt to use three digits to select a two-digit function, the programmer will get confused.

For example, go back to PATCH SELECT / NUMBER mode. If you attempt to select Patch #158, which doesn't exist, the programmer will recognize the first pair of numerals, 1 and 5, as Patch 15. When the 8 is pressed, it replaces the 1 and the number 5 will flash because the programmer only recognizes pairs of numbers when selecting patches. To correct this error, select a valid two-digit patch number.

For any function numbered "00" through "09", you must enter both digits, the "leading 0" followed immediately by the second digit, in order to make the change you want. There are some functions, as in selecting SPLIT EDIT parameters, that have only a single digit index number, and pressing one button on the KEYPAD will make the desired change.

STORE

This bright red button enables you to take newly created patches, edited patches, SPLIT programs etc., and program them into memory. To store a patch, you must be in the NUMBER mode of PATCH EDIT. To store a SPLIT, you must be in the NUMBER mode of SPLIT EDIT.

To store information into memory, press and hold the STORE button. While you are holding the STORE button down, press the two digits of the patch number you want on the KEYPAD. The patch is now stored in memory in that Patch Number location. Please remember that you cannot use the STORE button if MEMORY PROTECT on the back panel is switched ON or if the patch has its individual PROTECT feature turned ON.

Briefly pressing STORE cuts short any sustaining sound (a patch with long Release times) or will clear partially entered digits on the display.

You can also copy a patch from one Number to another. Simply select a patch that you want to copy, press and hold the STORE button and type in the Number of the patch (its destination) that the copied patch will go. Just remember that the destination patch will be erased and replaced by the copied patch. Also, both MEMORY PROTECT on the back panel and individual patch PROTECT must be turned OFF for this to occur.

"+/-" KEY

This handy little button enables quick changes to those parameters that can be used either positive or negative. A good example is an ENVELOPE amount value (try PATCH EDIT "29 VCA2 MOD BY ENV2"). You will discover that the modulation amount of an ENVELOPE can be either positive (its normal state) or negative (inverted). If you give an envelope a positive amount to start with, pressing the "+/-" button once will change it to a negative amount. Pressing it again once will return it to positive. If a parameter can only be used with positive values (try PATCH EDIT "44 PORT RATE"), the "+/-" button will not be operative in that mode.

< > REVERSE/ADVANCE ARROWS

These buttons will make any desired change on the display in increments of one. The ">" button is used to ADVANCE or INCREASE, and the "<" button is used to REVERSE or DECREASE to the next number or function.

<< (NO/OFF) & >> (YES/ON) ARROWS

These buttons will make any desired change on the display in increments of five. The ">>" button is used to ADVANCE or INCREASE and the "<<" button is used to REVERSE or DECREASE a numerical value or parameter name by five units. For functions requiring YES or NO decisions (try MASTER mode "11 SEND ALL" or "51 PATCH INITIALIZE"), these two buttons allow you tell the MATRIX-6 whether you are ready to proceed or not. For functions that have ON or OFF choices, these buttons are used for that purpose as well.

For added speed, pressing << & < at the same time decreases by 10 and pressing > & >> simultaneously increases by 10.

ARROW REPEAT

If any of the four arrow buttons are pressed and held down, the function displayed will advance or reverse automatically.

Since there is a limit to the number of parameters or values in each mode, the ADVANCE/REVERSE function will stop when these limits are reached.

The ARROW buttons can be used at any time instead of the Keypad to make a +/- one, five, or ten increment change as needed.

THE MODE SELECT SECTION

The MODE SELECT section of the MATRIX-6 is the section where all of the possible features and functions of the synthesizer are accessed. As you can tell just by looking at the operating parameters printed on the right half of the front panel, there are a lot of functions under your control. For simplicity and speed, we have arranged these parameters into sections of related functions. These three main sections - the MODES - are titled as follows:

1. Patches
2. Splits
3. Master

Using the parameters within each of these pages in conjunction with the KEYPAD is the key to operating the MATRIX-6. The MODE SELECT buttons allow you to access any of the three Modes listed above and operate within them using the KEYPAD. As you can see, the MODE SELECT section further divides these three Modes into what are called PAGES, as follows:

PATCHES	Patch Select
	Patch Edit
	Matrix Mod

Pressing the PATCHES button repeatedly will loop through the three Pages from top to bottom.

SPLITS	Split Select
	Split Edit

Pressing the SPLITS button repeatedly will switch back and forth between the two Pages.

MASTER	Master Edit
--------	-------------

USING THE MODE SELECT BUTTONS

In using the MODE SELECT section, you may want to think of it as a "grid" where all the possible controls are located. The three buttons to the right of the grid titled PATCHES, SPLITS and MASTER select which main Page of functions you are using, indicated by the adjacent LED. The top row of four buttons (plain grey with an LED in the corner) indicate which VERTICAL column of functions is being used. By matching up the two LEDs, you can find out what function the MATRIX-6 is ready to perform.

As an example, let's select PATCH EDIT and take a look at some of the available controls.

STEP 1. Press the blue PATCHES button and select PATCH EDIT. You may have to press the button several times to get to it as the selector will "loop" among the three Pages. When the LED is on next to PATCH EDIT, that mode has been selected.

STEP 2. Press the first grey button on the top row. You are now in the PARAMETER select mode in the PATCH EDIT Page. Now, by typing in a two-digit number on the KEYPAD or using the <> or <<>> buttons, you can pick any edit parameter in the PATCH EDIT Page. This is used in creating new sounds, changing existing sounds or just finding out what settings were used to make up the patches that are in there now. And the Display will always show you where you are.

In explaining the remaining functions of the MATRIX-6, we'll be using terms and phrases that will help us get through the discussion faster. In using the MODE SELECT section as a grid, we'll be able to move through the various procedures quickly by understanding a basic concept. When a MODE has been selected from the right-hand column of the available modes in conjunction with one of the four grey buttons along the top row, we say that a function has been ENTERED. This function is the one in the column below the lit grey button and across from the MODE that you just selected.

As an example, we will "Enter PATCH EDIT/VALUE Mode".

First, you press the blue PATCHES button a few times until the LED comes on next to PATCH EDIT. Then, you press the appropriate grey button above VALUE in the PATCH EDIT row. The KEYPAD can now be used to change the numerical value on the display above the grey button. If you press PARAMETER, the KEYPAD can then be used to change the actual parameter of the patch that you are working with. The display, of course, will always show you what change has been made.

The following descriptions explain the various functions of the MODE SELECT section:

PATCHES

Modes of the PATCH SELECT Page

1. **NUMBER** - Typing in a two-digit number or using the < > or << >> buttons on the KEYPAD will enable you change from one patch to another from among the MATRIX-6's 100 patch memories, numbered 00 through 99.

2. **NAME** - This mode allows you to give each of the 100 patches a name up to eight characters (letters, numerals or symbols) long. The MATRIX-6 gives you the 26 letters of the English alphabet, numerals 0 through 9, 26 symbols including various punctuation marks, and a blank character for spaces.

When this mode is first entered, the first character of the patch's name will flash on and off. This flashing character is the one that you are now able to change. To change a character, use the < > or << >> buttons on the KEYPAD to advance or reverse to the new character. The 0 through 9 buttons are not active in this mode.

Once you have selected the desired character, pressing the grey button above NAME once more advances the display one character to the right so that it will flash. You are now able to change this character.

Pressing the grey button above NAME repeatedly advances through the characters from left to right. Once you have reached the eighth character, pressing this button again returns the display to the first character. This enables you to loop through the characters as necessary.

3. **COMPARE** - The COMPARE mode allows you to listen to an edited patch in its original state before it was edited. Pressing the COMPARE button recalls the patch from memory in its programmed or original state. Pressing COMPARE again recalls the edited version.

This mode is identical to the COMPARE mode in PATCH EDIT described in the next section. The advantage to having a Compare feature in this mode is so that you won't have to switch into PATCH EDIT to Compare.

4. **PROTECT** - One the most useful features of the MATRIX-6 is the PROTECT function. PROTECT tells the computer inside the synthesizer to ignore any STORE command you give it that will affect its PATCH EDIT or MATRIX MODULATION memories. This prevents the unwanted and often frustrating accidental changing or erasure of your patches while PROTECT is switched ON for that patch.

The PROTECT feature, not to be confused with the back panel MEMORY PROTECT, is programmable for each patch individually. To Protect a patch simply press the grey button above PROTECT and its LED will light. Whenever that patch is recalled from memory, it is protected. If you attempt to use the STORE button on a protected patch, the display will flash PATCH PROTECTED when a number or arrow button is pressed on the Keypad.

If you plan to make any changes to a Protected patch, PROTECT must be disabled (switched OFF). To do this, press the grey button above PROTECT and its LED will go out, disabling the PROTECT feature. You can now make any change to the MATRIX-6 and, of course, store it into memory with the STORE button. You will not be able to use the STORE function until PROTECT is turned OFF.

You are able to turn PROTECT ON or OFF at any time while you are in the PATCH SELECT Page.

Modes of the PATCH EDIT Page

1. PARAMETER - This mode allows you to select any one of the 96 functions of the MATRIX-6 that deal with the basic sound of a patch. These PARAMETERS are printed on the MATRIX-6's front panel for convenience under the heading PATCH EDIT and numbered 00 through 98. These functions are explained later in this manual in the section on PATCH EDIT PARAMETERS.

When the PARAMETER mode has been entered, pressing a two-digit number or the < > or << >> buttons on the KEYPAD will change from one patch PARAMETER to another and will be shown on the display. Notice that PARAMETER numbers 39, 49, 89 and 99 have no current function and will be shown as blank on the display if selected.

2. QUICK - When you have become familiar with the programming and editing capabilities of the MATRIX-6, you will be able to get around the different functions much faster. The QUICK mode gives you even more speed, hence the name.

When in QUICK mode, the PARAMETER and VALUE modes of PATCH EDIT are used at the same time. The KEYPAD now operates differently so that the 0 through 9 buttons change the VALUE only and the < > and << >> buttons select the PARAMETER. You can see how this feature adds even greater flexibility and speed to editing and creating patches.

3. COMPARE - The COMPARE mode allows you to examine a patch in its original state before it was edited. If, for example, you have edited a patch and want to find out what the original setting was for any PARAMETER or VALUE, press the COMPARE button and it will appear on the display. The COMPARE button LED will light to remind you that you are comparing.

You can also listen to the original patch because the MATRIX-6 will recall it from memory during the COMPARE process. Playing notes on the keyboard allows you to hear the patch in its original state. Switching to another mode in PATCH EDIT (either PARAMETER, QUICK or VALUE) returns the patch to its edited state. You may COMPARE a patch as often as you like.

Please note that when you are in COMPARE mode, you cannot use the STORE button to program the patch into memory.

4. VALUE - This mode of operation allows you adjust the output of the Parameter to determine how it will affect the sound quality of the patch. There are three types of outputs, depending on the Parameter you're using:

- NUMERICAL- A numerical VALUE can take on various forms. For DCO1 "00 FREQUENCY", changing the number changes the oscillator's tuning. The VALUE of 0 means the lowest end of the tuning range and 63 the highest. In the case of VCF / VCA "24 RESONANCE", changing the Value changes the Resonance amount. The Value of 0 in this case means "no output" or that the RESONANCE parameter has been effectively turned off.

For the majority of Parameters the numerical range is 0 to +63, with the exception of the VCF/VCA "21 FREQUENCY" which goes from 0 to 127 and DCO2 "12 DETUNE" which goes from -31 to +31. The majority of Modulations (Envelopes, LFOs, Velocity, Ramps, etc.) can also be assigned a negative amount, in order to invert their effect, so that their ranges go from -63 to +63.

The KEYPAD is used to select the numerical VALUE. The 0 through 9, < > or << >> buttons are used to change from one VALUE to another. Typing in a number that is out of the range of the VALUE selects the highest number in the range. If the < > or << >> buttons are used, they will stop when the range limit is reached.

- TYPE- Certain PARAMETERS have two distinctive types of outputs rather than a numerical amount. Take for example DCO1 "06 WAVE SELECT". This PARAMETER gives you a choice of two waveform outputs, PULSE or WAVE, a combination of the two labelled BOTH, and an option of turning the oscillator OFF for a total of four choices.

Most Parameters with output "types" have four choices of outputs that you can select, although this varies from parameter to parameter. DCO 2 "16 WAVE SELECT", for example, has the same four choices as DCO 1 plus a NOISE output used for effects for a total of five choices. Other examples would include LFO 1 "82 WAVEFORM" and LFO 2 "92 WAVEFORM" that have seven options each and "33 TRACK INPUT" that has 19.

The < and > buttons on the KEYPAD are the easiest to use in selecting Parameter output types. The << >> and the 0-9 buttons will work as well. In using the 0-9 buttons, "0" is always assigned to the first type, "1" to the second, "2" to the third and "3" to the fourth, etc.

• STATUS- The remaining PARAMETERS have either ON or OFF as choices. The ON or OFF status of a function can be selected as follows:

<	OFF
<< NO/OFF	OFF
>	ON
>>, YES/ON	ON
"0"	OFF
"1"	ON

Typing in numbers higher than 1 will always select ON status.

Modes of the MATRIX MOD Page

MATRIX MODULATION™ is a very useful and powerful system that allows you to construct a modulation routing with amazing flexibility. A more detailed explanation of its features as well as how to use it is covered in the section USING MODULATION. We will only concern ourselves with the basic set-up of the MATRIX MOD mode here.

The MATRIX MOD mode is simply putting together a "combination" of functions in which a SOURCE modulates a DESTINATION by a certain AMOUNT.

1. NUMBER - Typing in a one-digit number or using the < > or << >> buttons on the KEYPAD will enable you to change from one MATRIX MOD combination to another from among the MATRIX-6's 10 MATRIX MOD program memories, numbered 0 through 9.

2. SOURCE - Refer to the MATRIX MODULATION section on the front panel to select the type of modulation required as a SOURCE. Using the KEYPAD's 0-9, < > or << >> buttons will permit changes from one SOURCE to another from among the MATRIX-6's possible 20 modulation SOURCES, numbered 01 through 20.

If you are creating a new patch from PATCH INITIALIZE, the first four combinations will be set up for you (they can be edited or erased) and the remaining six MATRIX MOD programs will be blank. Selecting a SOURCE for a blank MATRIX MOD will cause it to appear on the display with a corresponding AMOUNT of 0.

If you are editing a patch that is already using a MATRIX MOD combination, you can change the SOURCE as necessary and the AMOUNT value will not be affected.

If you want to erase a MATRIX MOD combination, select "00 DELETE MODULATION". The display will go blank and the modulation will be removed from the patch.

3. AMOUNT - This mode allows you to determine how much of the SOURCE will affect the DESTINATION. Its range is from -63 to +63. The 0-9, < > and << >> buttons on the KEYPAD can be used to select the AMOUNT value.

4. DESTINATION - Refer to the MATRIX MODULATION section of the front panel to select the modulation's DESTINATION. Using the KEYPAD's 0-9, < > or << >> buttons will permit changes from one modulation DESTINATION to another from among the MATRIX-6's 32 DESTINATIONS, numbered 01 through 32.

Creating and editing a MATRIX MOD combination, as well as deleting modulation, has the same function for the DESTINATIONS as the SOURCES described above.

SPLITS

The MATRIX-6 allows you to take any two existing patches and play them on the keyboard at the same time. And there are two ways to do this.

First, as the name SPLIT implies, you can put one of these patches on the left part of the keyboard (called LOWER) and the other patch on the right part of the keyboard (called UPPER). The imaginary point where the keyboard "splits", or where the left-hand sound stops and the right-hand sound starts, is programmed as well.

Second, the patches can be "overlapped" on the keyboard to create a Double program in which pressing one key plays both of the patches at the same time.

The SPLITS section provides much flexibility in the way you can assign voices, UPPER and LOWER limits (where the SPLIT point or overlap occurs), key TRANSPOSE and even different MIDI channel assignments for each half of the keyboard.

Modes of the SPLIT SELECT Page

This Page enables you to program the basic structure of a SPLIT: selecting the SPLIT NUMBER, giving it a six-character NAME and assigning the UPPER and LOWER patches. We will cover the PARAMETER and VALUE assignments - the LIMITS, TRANSPOSE, MIDI channels etc. - in just a moment.

1. NUMBER - Typing in a two-digit number or using the < > or << >> buttons on the KEYPAD will enable you to change from one SPLIT combination to another from among the MATRIX-6's 50 SPLIT program memories, numbered 00 through 49.

2. NAME - As with single patches, you can give each of your SPLITS a name. The only difference is that you can use up to six characters instead of eight. Refer to the instructions on how to program a NAME in the PATCH SELECT/ NAME section.

LOWER/UPPER Patch Assignments

The basic construction of a SPLIT program is in choosing two existing patches from among the MATRIX-6's 100 single patch programs, using one as the LOWER and the other as the UPPER. This is accomplished as follows:

3. LOWER - Select a single patch that you want to be played on the left part of the keyboard. Using the 0-9, < > or << >> buttons on the KEYPAD, enter the patch's two-digit number. This will appear on the display as the left number of the two PATCH numbers and is now assigned to the LOWER part of the keyboard.

4. UPPER - Select a single patch that you want to be played on the right part of the keyboard. Using the 0-9, < > or << >> buttons on the KEYPAD, enter the patch's two-digit number. This will appear on the display as the right number of the two PATCH numbers and is now assigned to the UPPER part of the keyboard.

Modes of the SPLIT EDIT Page

The SPLIT EDIT Mode is where you program all of the performance functions of a SPLIT. This mode allows you customize each SPLIT program in any way you like. Thus, you have the versatility you need in setting up a SPLIT that best suits your performance requirements.

1. PARAMETER - This mode allows you to select any one of the eight functions of the MATRIX-6 that deal with the set-up of a SPLIT, numbered 0 through 7. These PARAMETERS are printed on the MATRIX-6's front panel for convenience under the heading SPLIT EDIT. These functions are explained later in this manual in the chapter on SPLIT EDIT PARAMETERS.

When the PARAMETER mode has been entered, pressing a two-digit number or the < > or << >> buttons on the KEYPAD will change from one SPLIT PARAMETER to another and will be shown on the display.

2. QUICK - The QUICK mode operates the same as it does in PATCH EDIT. When in QUICK mode, the PARAMETER and VALUE modes of SPLIT EDIT can be used at the same time. The KEYPAD now operates differently so that the 0 through 9 buttons change the VALUE only and the < > and << >> buttons select the PARAMETER.

3. COMPARE - The COMPARE Mode operates the same as in PATCH EDIT. It allows you to listen to the SPLIT in its original state before it was edited. If, for example, you have edited a SPLIT and want to find out what the original setting was for any PARAMETER or VALUE, press the COMPARE button and it will appear on the display. The PARAMETER number will flash to remind you that you are comparing.

You can also listen to the original SPLIT because the MATRIX-6 will recall it from memory during the COMPARE process. Playing notes on the keyboard allows you to hear the SPLIT in its original state. Switching to another mode in SPLIT EDIT (either PARAMETER, QUICK or VALUE) returns the SPLIT to its edited state. You may COMPARE a SPLIT as often as you like.

4. VALUE - The VALUE mode in SPLIT EDIT is similar to VALUE in PATCH EDIT. If you refer back to the discussion on VALUE in PATCH EDIT, you will see that we categorized VALUE as being "numerical", "type" or "status". In SPLIT EDIT, the VALUEs used are numerical for parameters 0 through 6 and type for #7. There is no parameter in SPLIT EDIT that uses a "status" (ON or OFF) VALUE.

As in the PATCH EDIT Page, the KEYPAD is used to select the VALUE. The 0 through 9, < > or << >> buttons are used to change from one VALUE to another. Typing in a number that is out of the range of the VALUE selects the highest number in the range. If the < > or << >> buttons are used, they will stop when the range limit is reached.

The application of these parameters is covered in the section on SPLIT EDIT PARAMETERS.

MASTER

The MASTER section contains only one Page, MASTER EDIT. The MASTER EDIT Page groups its functions into five categories that are used as the over-all controls of the synthesizer. In other words, whatever controls are necessary to operate the MATRIX-6 that are not a part of an actual patch program are found in the MASTER EDIT Page. Thus, it is important to remember that these settings are NOT programmable with each individual patch. They are, however, stored in what is called a "Global" memory (memory for the entire synthesizer) and will remain as they are set until you change them.

1. PARAMETER - As in PATCH EDIT and SPLIT EDIT, the 0-9, < > or << >> buttons on the KEYPAD are used to change from one function to another from among the MATRIX-6's 33 MASTER EDIT Parameters, numbered 00 through 55. They are conveniently listed on the front panel under the MASTER EDIT heading. Notice that PARAMETER numbers 12-19, 24-29, 37-39, 44-49 and 56-99 are not listed as they have no current function in this mode and the display will be blank if selected.

2. TUNE - While in MASTER EDIT, pressing the second grey button on the top row puts the MATRIX-6 into AutoTune. The cycle takes approximately five seconds to complete during which time the display reads "TUNING. . .".

While in TUNE mode, the computer inside the MATRIX-6 is performing very precise tuning calibrations to all 12 DCO's (there are two per voice). The result is an instrument that has been fine tuned to very strict tolerances.

3. VALUE - As with PATCH EDIT, using the KEYPAD will enable you to select either numerical outputs, choose among types of outputs or determine the ON/OFF status of a PARAMETER. Refer to the VALUE section of the PATCH EDIT discussion for more information on VALUE select.

PROGRAMMING THE MATRIX-6

PART 3: USING THE EDIT PAGES

As we mentioned earlier, all of the operating parameters of the MATRIX-6 are printed on the front panel, arranged into groups of related functions called Pages. In this section of the manual, we will examine each of these features and discuss what they do.

PATCH EDIT PAGE

The PATCH EDIT Page contains the basic sound producing and modifying functions of the MATRIX-6. "Editing" a patch means making whatever changes are necessary to produce the sound you want. In addition to the basic components of a voice - the oscillators (DCOs), VCF/VCA section, envelopes and LFOs - you will notice that there are many modulation features in this page as well. These are the most often-used modulation routings and are included in the PATCH EDIT Page for practical reasons. Because of the elaborate network of modulation designed into the MATRIX-6, a separate Page - MATRIX MODULATION - is used to program modulation for special purposes.

The PATCH EDIT Page contains 10 "Sub-Pages", each dealing with a specific part of the final sound that you hear. In this section of the manual, we will talk about each of these Sub-Pages and the functions within them, and find out how they affect the overall sound.

The DCOs

The DCO - short for "Digitally Controlled Oscillator" - is the circuitry that produces the basic tone or sound of the patch. Since the two DCOs are almost identical, we'll cover them both together.

00 & 10 FREQUENCY - This function determines the pitch of the DCOs. VALUE range is 0 to +63 (5 octaves and a minor 3rd) where each VALUE increment represents one semi-tone.

01 & 11 FREQUENCY MOD BY LFO 1 - The pitch of both DCOs can be modulated by the first LFO. VALUE range is -63 to +63 where 0 as the VALUE represents no effect and +63 is maximum modulation. -63 is maximum "negative" modulation obtained by inverting the LFO's waveform 180° out of phase.

02 SYNC (DCO 1 only) - 12 DETUNE (DCO 2 only)

These two functions operate as follows:

SYNC, the abbreviation for "synchronize", places both DCOs in close tune with each other by electronically slaving the waveform of DCO 1 to that of DCO 2 using 3 varying degrees plus OFF :

"0": OFF - SYNC has no effect and the DCOs' waveforms are independent of each other.

"1": SOFT
"2": MEDIUM
"3": HARD

The main idea to keep in mind while using SYNC is that its audible effects vary drastically with DCO tuning (are they in unison or several octaves apart?), the waveform selected for each DCO, where you are playing on the Keyboard (high notes or low notes) and what kind and how much modulation is used in the patch. The important thing is to keep experimenting.

DETUNE enables the pitch of DCO 2 to be adjusted slightly sharp or flat relative to DCO 1. This produces a richer sound quality caused by two closely tuned oscillators "beating" from the slight variation in tuning. VALUE range is -31 to +31 (+/- a 1/4 tone) where 0 is no detune, -31 is the Flat limit and +31 is the Sharp limit. Each increment of one represents varying amounts of detune: settings close to 0 provide very slight detuning while settings towards the extremes produce greater amounts of detune as each higher number is used.

03 & 13 PULSE WIDTH - If a PULSE is selected as the DCO's waveform (see 06 & 16 WAVE SELECT), this control sets the pulse's width output. VALUE range is from 0 to +63 where 63 is an extremely wide Pulse that becomes gradually narrower as the settings approach 31, the setting for a Square wave. From 30 on down, the pulse becomes even more narrow with the same audible characteristics as narrow Pulses until 0 is reached and very little sound is heard.

In describing the audible characteristics of a Pulse wave, a very narrow or very wide pulse (settings towards the extremes of the range) has a "nasal" quality and is traditionally used to synthesize woodwind instruments like Oboe and Bassoon or plucked-string instruments such as Harpsichord. Settings around 31 where the Square wave is produced have a "hollow" sound quality and resemble a Clarinet.

04 & 14 PW MOD BY LFO 2 - The PULSE WIDTH of both DCOs can be modulated by the 2nd LFO to obtain a "periodic" or steady back-and-forth change between a wide pulse and a narrow pulse. This can be used as a form of vibrato. VALUE range is from -63 to +63 where 0 is no effect and 63 is the maximum amount of positive modulation. Using negative modulation Values (-63 being the negative limit) inverts the LFO waveform 180° out of phase.

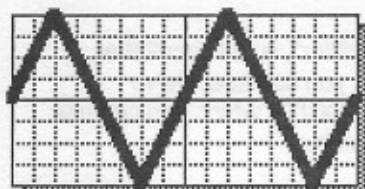
05 & 15 WAVE SHAPE - If WAVE is selected as the waveform output of the DCOs in 06 & 16 WAVE SELECT, this control varies the waveform between a Sawtooth wave (a bright sound used in creating strings and brass patches) and a Triangle wave (a mellower wave used for flutes, etc.). Since Sawtooth and Triangle waveforms are similar, they are made available in the same parameter.

VALUE range is from 0 to +63 where 0 produces the Sawtooth and 63 produces the Triangle. Settings in between these two extremes permits a variable mix of the two Waves. A setting of 31 produces a waveform that has elements of both.

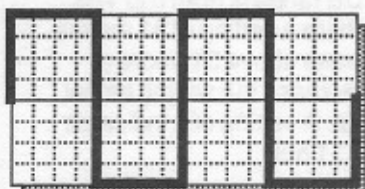
06 & 16 WAVE SELECT - The waveform output of the DCOs give each patch its tonal identity and is selected here. Your four choices are OFF, PULSE, WAVE or BOTH. DCO 2 adds NOISE as a fifth choice. The NOISE generator produces a pitchless "rushing" sound suitable for wind and thunder effects as well as adding breath inflections to flute, brass and woodwind sounds.



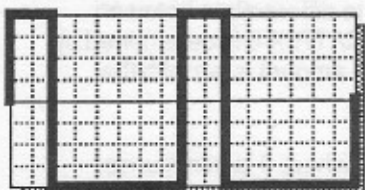
Sawtooth Wave



Triangle Wave



**Pulse Wave
(set at 31=Square)**



**Pulse Wave
(set at 15=Narrow)**

If BOTH is selected, a Pulse and a Wave are output at the same time, allowing for some very interesting and complex tones to be produced. Experiment with varying the Pulse Width (03 & 13) or the Wave Shape (05 & 15) with BOTH selected.

07 & 17 LEVERS - The performance LEVERS just to the left of the Keyboard are selected in this parameter.

OFF disables both LEVERS. They will not affect the DCOs.

BEND permits LEVER 1 to modulate the pitch of the DCOs by providing pitch bend up (pull it towards you) or down (push it away from you) a whole tone either way. When BEND is selected, LEVER 1 is the only one that is active.

VIB adds vibrato modulation to the DCOs, normally controlled by LEVER 2. Vibrato parameters such as SPEED, WAVEFORM etc. are set up in the MASTER EDIT Page. When VIB is selected, LEVER 2 is the only one that is active.

BOTH turns on both LEVERS to modulate the DCOs.

08 & 18 KEYBOARD / PORTAMENTO - Portamento routing to the DCOs is selected in these parameters. Portamento is described as a "sliding" between notes played on the keyboard. The specific operating parameters of Portamento - its RATE, MOD BY VELOCITY, MODE, and LEGATO select - are programmed in the RAMP/PORTAMENTO Sub-Page discussed later in this section.

PORTA - When this is selected, PORTAMENTO is routed to the DCO.

KEYBD - When this is selected, PORTAMENTO is turned off and the MATRIX-6's Keyboard plays normally.

OFF (available for DCO 2 ONLY) - This option disables the Keyboard control to DCO 2. This means that DCO 2 will play the same pitch no matter what keys are played. This is definitely used for effects.

09 & 19 KEY CLICK - An effect that can be used to add an audible "punch"

or "bite" to the beginning of a sound, KEY CLICK can be turned ON or OFF in this parameter. The amount is preset at the factory. You may want to experiment by using KEY CLICK with piano, vibes and other percussive instruments just to name a few.

VCF/VCA

The VCF/VCA section of the MATRIX-6 is where the sound generated by the DCOs is "tailored" by you to determine what the patch will finally sound like. This section performs important functions such as determining the volume between the two DCOs, controlling the harmonics (the overall brightness of the sound) and adding dynamics to the patch.

VCF stands for "Voltage Controlled Filter" and is the circuit that gives you very precise control over the harmonic content of the patch. In adjusting the harmonic content, the VCF acts somewhat like a tone control but with much more flexibility. After you have selected the waveforms for DCOs 1 & 2, the VCF allows you to determine the tonality of the sound and articulate this tone setting with Envelope #1 (abbreviated ENV 1) and PRESSURE. It is in the way you use ENV 1 and PRESSURE that dynamics are added to the patch.

VCA, which stands for "Voltage Controlled Amplifier", is the circuit that controls the final volume output of the patch. As you can see, we've included modulation routings of ENV 2 and VELOCITY which you can use to apply volume or loudness dynamics to the patch.

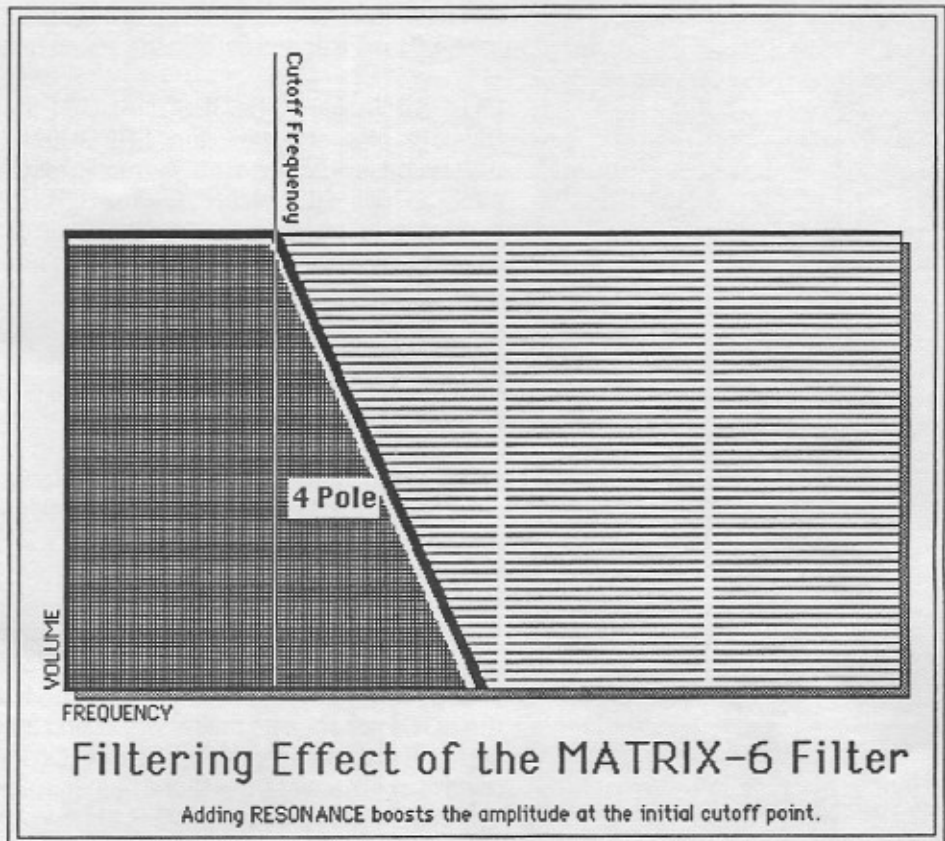
VCF PARAMETERS

20 BALANCE - This is used to set the relative volumes of DCO 1 and DCO 2 just before they are sent to the VCF/VCA. VALUE range is from 0 to +63. You can think of this function as a mix control where a setting of 31 makes the outputs of the two DCOs equal. As you increase above 31, more of DCO 1 is heard and DCO 2 fades out. As you decrease the setting below 31, more of DCO 2 is heard and DCO 1 fades out. A setting of 0 indicates that DCO 2 is heard only and a setting 63 is DCO 1 only.

21 FREQUENCY - As we mentioned before, the VCF permits you to adjust the patch's tone level by controlling the harmonic content. Harmonics are upper frequencies that give each sound its own identity. It is the amount and structure of harmonics that allow our ears to differentiate between sounds. The structure of the harmonics in the MATRIX-6 is determined by the waveform you selected with the DCOs. The amount is set with the FREQUENCY control.

The VALUE range of the VCF is from 0 to +127 where 0 is minimum or fewest harmonics and 127 is the maximum setting where all the harmonics for that waveform are present. Another way of stating this is a Value of 0 makes the patch sound muffled and a Value of 127 causes the patch to sound bright and buzzy.

The word FREQUENCY is used because each harmonic has its own specific pitch and thus the Filter can be "tuned". The tuning of the Filter, therefore, depends upon what Value (0 to 127) you give it.



22 FREQ MOD BY ENV 1 - One of the characteristics of sound as we perceive it is the way in which the harmonics change as the sound occurs. Just listen to the different playing styles of a violin or those of a trumpet. All of the different "personalities" that an instrument can have depends in great part upon how the musician articulates in his/her playing. In the MATRIX-6, using an envelope is the primary way in which harmonics are shaped - the Filter's frequency is modulated by Envelope #1 (ENV 1).

This parameter is concerned only with the amount of ENV 1 affecting the Filter's frequency. The actual settings of the envelope are made in the ENV 1 Sub-Page. VALUE range is from -63 to +63. A Value of 0 indicates that the envelope has no effect on the Filter's frequency and a setting of +63 is the maximum. Negative Values invert the effect of ENV 1 on the Filter's FREQUENCY. A Value of -63 is the maximum inversion.

23 **FREQ MOD BY PRESSURE** - Another way of modulating the Filter is through the use of keyboard after-touch. This feature is activated by playing a note or chord on the keyboard and pressing into the keys. Range is from -63 to +63. A setting of 0, of course, means that keyboard PRESSURE has no effect. Using a positive Value causes PRESSURE to "open" the Filter and thus adds more brightness to the sound. Using a negative Value "closes" the Filter and causes the sound to become dull.

24 **RESONANCE** - The RESONANCE Parameter is used to emphasize the harmonic closest to the Filter's FREQUENCY. This control actually increases the loudness or "gain" of the harmonic resulting in a ringing or whistling effect as more RESONANCE is used. This Parameter is especially useful in synthesizing the resonant characteristics of acoustic instruments (particularly woodwinds) and to achieve many other electronic special effects.

VALUE range is from 0 to +63 where 0 indicates no RESONANCE and 63 is maximum. At a RESONANCE setting of 63, the VCF will oscillate - that is, produce its own pure tone.

25 **LEVERS** - Similar to 07 & 17 LEVERS for the DCOs, this parameter selects LEVER 1 and LEVER 2 modulation to the VCF Frequency.

OFF disables the LEVERS.

BEND permits you to route LEVER 1 to the VCF Frequency so that if you're using LEVER 1 to pitch bend the DCOs, for example, the VCF will also change by a corresponding amount. This keeps the Filter level relative to the DCOs constant no matter what bend amount you're using and the sound of the patch remains the same. On the other hand, LEVER 1 can be used to open or close the filter whether it is bending the DCOs or not. When BEND is selected, LEVER 1 is the only one that is active.

VIB adds vibrato modulation to the VCF, normally controlled by LEVER 2. When VIB is selected, LEVER 2 is the only one that is active.

BOTH activates both LEVERS to modulate the VCF.

26 **KEYBOARD / PORTAMENTO** - This Parameter is similar in operation to "18 KEYBOARD / PORTAMENTO" found in the DCO 2 Sub-Page although the results sound different.

OFF - When OFF is selected, the keyboard has no effect on the VCF FREQUENCY and the keyboard will not track the Filter. The VCF FREQUENCY will remain as you set it in Parameter #21. If OFF is selected, you will need to increase the Filter FREQUENCY slightly to compensate for the Keyboard's control being removed.

PORTA - When this is selected, Portamento as set in the RAMP / PORTAMENTO Sub-Page will affect the VCF FREQUENCY. Just like the DCOs sliding from note to note, the Filter frequency will also exhibit a sliding effect when PORTA is selected in this Parameter.

KEYBD - When KEYBD is selected, the VCF will follow the keyboard as different notes are played. This is called "the keyboard tracking the filter". Playing high notes on the keyboard opens the Filter and low notes close the Filter. This allows the VCF FREQUENCY that you set with Parameter #21 to keep its relative interval with the DCOs no matter what keys are played.

VCA PARAMETERS

The VCA section in the MATRIX-6 is a two-Stage function allowing for expanded flexibility in the volume articulation of the patch. This section contains two independent Voltage Controlled Amplifiers labeled VCA 1 and VCA 2.

27 VCA 1 VOLUME - This first-stage VCA sets the initial output of the patch. VALUE range is 0 to +63 where 0 indicates no output or silence and 63 is maximum output.

28 VCA 1 MOD BY VELOCITY - One of the more common applications of VELOCITY is its use in creating loudness dynamics. VELOCITY refers to making subtle or dramatic changes by striking the keys hard or soft. In this parameter, VELOCITY is used to play the patch louder or quieter.

VALUE range is from -63 to +63. A 0 setting indicates no effect by VELOCITY. When positive Values are used, notes played harder will increase volume and softer notes will not. When negative Values are used, the opposite effect occurs: volume decreases the harder you play notes and soft playing keeps the volume close to normal.

Parameters "27 VCA 1 VOLUME" and "28 VCA 1 MOD BY VELOCITY" work hand-in-hand. If the Value of VCA 1 VOLUME is set to 63, Velocity will seem to have little or no effect if you give it a positive Value. This is because at a Value of 63, VCA 1 is set as loud as it will go and Velocity cannot make it any louder. Also, if VCA 1 is given low Values, positive Velocity settings will require very hard playing all the time or some notes will seem to "drop out" and not be heard. You should plan to spend some time experimenting to find the right combination of Values to suit your particular need.

As you experiment, you may experience some results that you didn't expect. This may be due to the fact that many of the MATRIX-6's modulations are inter-related and editing one parameter could possibly affect another indirectly. One example of this is using VELOCITY on the output of Envelope #2 ("66 AMP MOD BY VELOCITY"). Since ENV 2 is routed to VCA 2, Velocity in this case may affect VCA 2 unexpectedly.

Although we will cover this in more detail later, VELOCITY performance also relies on the Values you give it for "Scale" and "Sensitivity" (see MASTER EDIT / KEYBOARD "40 VELOCITY SCALE" and "41 VELOCITY SENS."). Using extremes in the available Values may yield unusable results. For example, setting "27 VCA 1 VOLUME" to 0 and a +63 on "28 VCA 1 MOD BY VELOCITY" will be almost useless if the Sensitivity is set to maximum. The resulting dynamic range will be too wide to be of any real use.

29 VCA 2 MOD BY ENV 2 - This second-stage VCA is used to determine the final output of the patch. As you can see, there is no Volume parameter for VCA 2 like there is for VCA 1. The volume of VCA 2 is pre-set to be 0 and its output level is controlled by Envelope #2.

This function is concerned only with the amount of ENV 2 affecting the VCA's VOLUME output. The actual settings of the envelope are made in the ENV 2 Sub-Page. VALUE range is from -63 to +63. A Value of 0 indicates that the envelope has no effect on the VCA which results in no sound when the Keyboard is played. A setting of +63 is the maximum. Using negative Values invert the effect of ENV 2 on the VCA's VOLUME. A Value of -63 is the maximum inversion.

FM / TRACK

The FM / TRACK section involves the functions of two independent modulation generators, listed here in the same Sub-Page.

"FM", which stands for Frequency Modulation, allows you to achieve a form of special-effect modulation that is routed to the VCF Frequency. Explained in more detail later, FM basically involves a high-frequency modulation of the Filter to obtain tone colors not possible with conventional LFO modulation.

TRACK is the abbreviation for Tracking Generator which can be described as a special-purpose function that permits the rescaling of a control source. We'll cover the operation and use of TRACK in just a moment.

FM

Frequency Modulation, or FM, is a basic analog concept. The evolution of Linear FM as a technique for sound synthesis has become possible in recent years because of major breakthroughs in digital signal processing and oscillator stability.

The fundamental idea of FM is that if you take two oscillators and modulate one of them (called the Carrier) by the other (called the Modulator), a series of new overtones or harmonics will be generated. This new harmonic structure is related to the frequency (pitch) and the amplitude (loudness) of the Modulator. If the frequency and amplitude of the Carrier are changed, yet another set of harmonics is produced.

In the MATRIX-6, DCO 1 is used to modulate the VCF. DCO 1 is the Modulator and the VCF is the Carrier. FM in this case is best heard when "24 RESONANCE" is set to its maximum, causing the VCF to oscillate. The VCF then becomes the second "oscillator". To experiment with FM in its simplest form, do the following:

STEP 1: Perform the PATCH INITIALIZE function as described later in the MASTER EDIT / MISC. section of the manual. We will need to use the MATRIX-6's Basic Patch for this experiment.

STEP 2: Enter PATCH EDIT / PARAMETER mode.

STEP 3: Select DCO 1 "06 WAVE SELECT".

STEP 4: Enter VALUE mode for this parameter.

STEP 5: Press the << button once to turn off DCO 1's waveforms. Its SAW (Sawtooth) waveform is routed separately for FM so we don't need to actually hear it.

STEP 6: Repeat Steps 1 through 4 for DCO 2 "16 WAVE SELECT". We are not interested in hearing DCO 2 either for this experiment.

STEP 7: Select VCF / VCA "24 RESONANCE" and set its VALUE to +63 so that the Filter will oscillate.

STEP 8: Select FM / TRACK "30 VCF FM AMOUNT" and with the > button, gradually increase its VALUE while you are playing notes on the Keyboard. What you will hear will be the new harmonics generated by the FM process.

WORKING WITH FM

A wide variety of FM-generated sounds can be produced by the MATRIX-6. There are three main components that interact to create FM sounds on the MATRIX-6: DCO 1 "00 FREQUENCY", VCF / VCA "21 FREQUENCY" and FM / TRACK "30 VCF FM AMOUNT". Experiment by changing the Values of each of these three parameters.

30 VCF FM AMOUNT - This parameter, as described previously, controls the amount of DCO 1 modulating the VCF. It is the "amplitude" or depth portion of FM. VALUE range is from 0 to +63 where 0 is no effect and 63 is maximum amplitude.

With a small FM amount, the overtones generated will be the frequencies of DCO 1 and the VCF plus the sum and difference of their frequencies. Increasing the AMOUNT Value will cause other overtones to be generated as well. Changing the AMOUNT Value changes the volume and number of the overtones, similar to conventional filtering.

31 FM MOD BY ENV 3 - The AMOUNT of DCO 1 modulating the VCF can be controlled by Envelope #3 (ENV 3). The characteristics of ENV 3 are programmed in its own Sub-Page; we are only concerned with the AMOUNT Value affecting the Filter.

VALUE range is from -63 to +63. A setting of 0 is no effect. Using positive Values increases the amount of ENV 3 modulating the VCF. Using negative Values inverts ENV 3 so that the opposite effect is obtained.

32 FM MOD BY PRESSURE - The AMOUNT of DCO 1 modulating the VCF can also be controlled by Keyboard PRESSURE. Playing notes on the Keyboard and pressing into the keys activates this function.

VALUE range is from -63 to +63. A Value of 0 indicates no effect by PRESSURE. Positive Values cause PRESSURE to increase the amount of FM while negative Values decrease FM by inverting the effect of PRESSURE.

THE TRACKING GENERATOR

The TRACKING GENERATOR (PATCH EDIT Parameters 33 through 38) is a circuit that allows you to "re-shape" a control source. In other words, TRACK lets you take any one of the MATRIX-6's modulation sources, such as the LFO's, an Envelope or even the Keyboard, and use it in a different way.

The Tracking Generator, like other circuits, has an INPUT and an OUTPUT. The INPUT is any one of the MATRIX-6's modulation sources that you want to change. The OUTPUT is the result of changing the five "Points" in the TRACKING GENERATOR that form a "response curve" allowing you to re-shape this modulation.

BASIC TRACK OPERATION

33 TRACK INPUT - The Tracking Generator is able to process any one of the MATRIX-6's MATRIX MODULATION Sources. For convenience, you can refer to the SOURCES listing printed on the front panel when selecting an INPUT in VALUE mode. The Keypad, < > and << >> can be used to select an INPUT.

The 20 possible modulation sources that you can select, plus a Value to delete the source, are (in order):

00 DELETE MODULATION

- 01 ENV1 the shape of Envelope #1
- 02 ENV2 the shape of Envelope #2
- 03 ENV3 the shape of Envelope #3
- 04 LFO1 the waveform of LFO #1
- 05 LFO2 the waveform of LFO #2
- 06 VIB the waveform of the Vibrato LFO
- 07 RMP1 the shape of Ramp Generator #1
- 08 RMP2 the shape of Ramp Generator #2
- 09 KEYB the MATRIX-6's Keyboard scaling
- 10 PORT the Portamento speed
- 11 TRAK the Tracking Generator's curve
- 12 GATE the Keyboard's gate pulse
- 13 VEL Velocity response
- 14 RVEL Release Velocity response
- 15 PRES keyboard Pressure response
- 16 PED1 the response of Pedal #1
- 17 PED2 the response of Pedal #2
- 18 LEV1 the response of Lever #1
- 19 LEV2 the response of Lever #2
- 20 LEV3 the response of Lever #3 which is accomplished by pushing Lever #2 forward.

This means that any one of these modulation functions can be modified to sound different than the way they already sound. Thus, the Tracking Generator gives you virtually unlimited possibilities when using the MATRIX-6's modulation sources. Each of the 20 modulation sources can be tailored in 1,073,744,824 ways using the five POINT parameters.

34 TRACK POINT 1
35 TRACK POINT 2
36 TRACK POINT 3
37 TRACK POINT 4
38 TRACK POINT 5

These five TRACK POINTs represent the five sections of the TRACK's control range. Each POINT Value goes from 0 to +63. Unlike other modulations, however, using a Value of 0 for all five POINTs does not mean "no effect". The Tracking Generator's default settings - or the Values that produce no effect - are as follows:

POINT 1 = 0
POINT 2 = 15
POINT 3 = 31
POINT 4 = 47
POINT 5 = 63

When the POINT Values have been set to these values, TRACK is said to have a LINEAR output. The input is the same as the output - no effect, no change. When using TRACK, use these Values as a place to start from in getting the result you want. Changing any one of these Values changes the curve of the Tracking Generator and whatever you selected as the INPUT will behave in a different way.

Let's take a look at how TRACK accomplishes this.

USING THE TRACKING GENERATOR

You can think of TRACK as having two components: the modulation source that you want to change (labelled INPUT) and the re-shaping functions (labelled POINTs 1 through 5) which make up the generator's curve and thus its OUTPUT. So, when using TRACK, assign it to its destination like you would any other modulation source (see the section covering MATRIX MOD). Then select the actual modulation source you want to use for the INPUT. The real magic begins when we experiment with the five POINT values.

Here's an example:

A very basic and easy to hear demonstration of how the Tracking Generator re-shapes a modulation source is to modulate the pitch of DCO1 by an LFO. We'll use a slow UPSAW (positive Sawtooth) waveform that will produce an effect of the note having a smooth rise in pitch with a sharp dropoff at its

peak. We are going to use TRACK to put an audible "hump" in the rising portion of the wave. Let's set up the patch as follows:

STEP 1: To hear exactly what the Tracking Generator can do without interference from other modulations, set up the MATRIX-6's Basic Patch from PATCH INITIALIZE. Refer to this function's procedure in the MASTER EDIT / MISC. section of the manual.

STEP 2: Enter PATCH EDIT / PARAMETER mode.

STEP 3: Type in the number 16 on the KEYPAD to display DCO2's WAVE SELECT.

STEP 4: Enter the VALUE mode of this page.

STEP 5: Press the << button on the KEYPAD so that the display reads OFF. We have just turned off the output of DCO2 so that in our experimentation with TRACK we will only be listening to DCO1.

STEP 6: Go back to PARAMETER mode of this page.

STEP 7: Type in number "33" on the Keypad. We will now select LFO 1 as the TRACK's INPUT.

STEP 8: Enter VALUE mode of this page.

STEP 9: Type in number "04" on the Keypad. LFO 1 has now been selected as the TRACK's INPUT and is our modulation source.

STEP 10: Press the blue PATCHES button again once to enter the MATRIX MOD page. We will now set up the modulation routing using the Tracking Generator.

STEP 11: Enter the NUMBER mode of this page.

STEP 12: Press the #4 button on the KEYPAD to access the fifth modulation route. The display will be blank to show that this MATRIX MOD is available.

STEP 13: Enter SOURCE mode.

STEP 14: Type in the number 11 on the KEYPAD and the word TRAK appears on the display. We have now selected the Tracking Generator as our modulation source.

STEP 15: Enter AMOUNT mode.

STEP 16: Use the >> button on the KEYPAD to advance the VALUE to +63. We'll use a maximum modulation amount for the most audible effect.

STEP 17: Enter DESTINATION mode.

STEP 18: Press the number 01 on the KEYPAD and the display reads DC1FR. This indicates that we have selected DCO #1's FREQUENCY, or its basic pitch, as the modulation destination.

STEP 19: Press the blue PATCHES button repeatedly until the PATCH EDIT light is lit. We are now back in the PATCH EDIT page.

STEP 20: Enter PARAMETER mode.

STEP 21: Type in the number 82 on the KEYPAD and the display reads LFO1 TRI. This indicates that we are ready to select a waveform that we will manipulate with TRACK.

STEP 22: Enter VALUE mode.

STEP 23: Press the > button twice to select the Positive-Sawtooth waveform. The display will read UPSAW.

STEP 24: Go back to PARAMETER mode.

STEP 25: Select LFO 1 "80 SPEED".

STEP 26: Enter VALUE mode.

STEP 27: Set the LFO's SPEED to "30" for this experiment.

We have just set up the MATRIX-6's MATRIX MODULATION to perform a slow, deep modulation. By experimenting with the five track POINTs, we will see how the Tracking Generator modifies a modulation source to do something that it cannot do normally.

STEP 28: Go back to PARAMETER mode of this page.

STEP 29: Select number "35 TRACK POINT 2".

STEP 30: Enter VALUE mode.

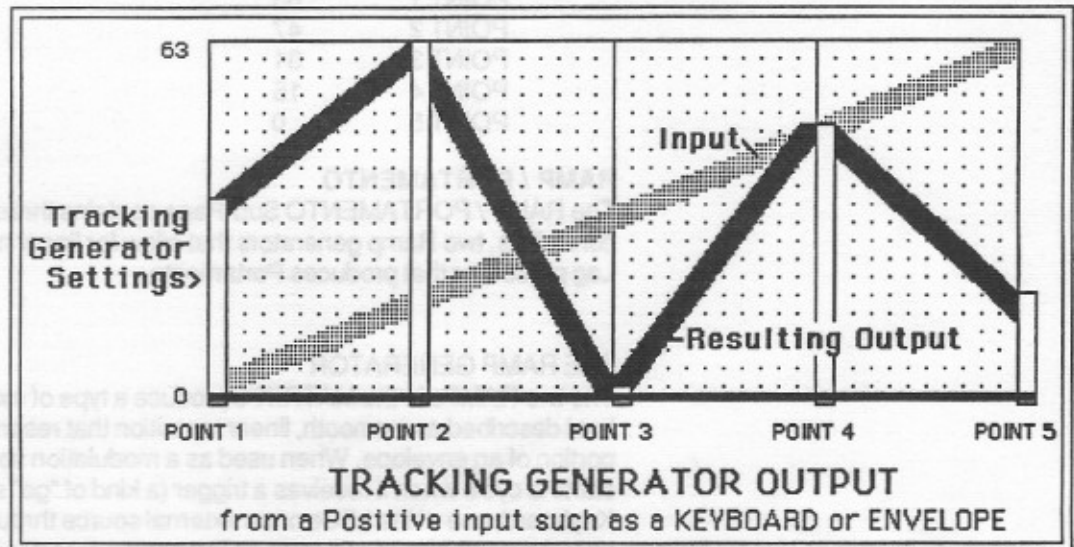
STEP 31: Change the VALUE of TRACK POINT 2 from 15 to 60 using the Keypad.

STEP 32: Play a note on the Keyboard and listen to how the normally smooth rise in the waveform now has a noticeable "glitch".

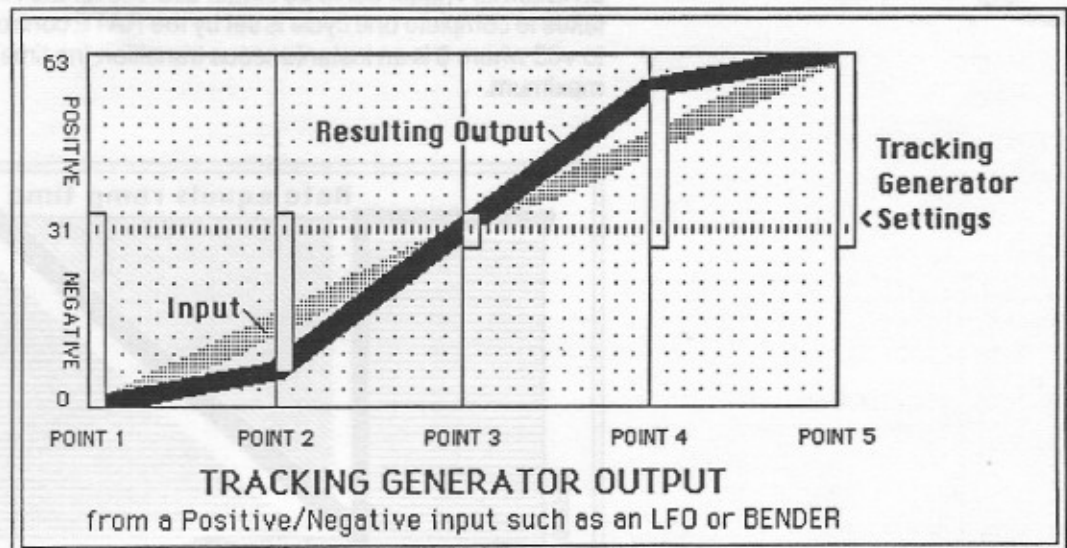
By experimenting with other POINT Values, see how many ways you can change the UPSAW waveform. Bonus Question: What POINT Values do you use to turn the UPSAW into a DNSAW?

TRACK will operate in two different ways, depending on the INPUT:

1. "POSITIVE ONLY" - INPUTs such as the Keyboard, an Envelope or a Ramp have positive outputs only. POINT 1 represents the selected INPUT's starting point (its "0 level"). Setting a POINT to 0 gives a 0 output and all other POINT Values are positive.



2. "POSITIVE / NEGATIVE" - INPUTs such as an LFO or Lever, on the other hand, have outputs that alternate between negative and positive. POINT 3 in this case represents the selected INPUT's "0 level". Setting a POINT Value to 31 results in a 0 OUTPUT, below 31 is negative and above 31 is positive.



ANSWER TO BONUS QUESTION

Turning an UPSAW into a DNSAW means that we are intending to reverse or invert the direction of the UPSAW's waveform. To accomplish this, simply set the POINT Values so that the TRACK's normally positive-linear output is inverted to a negative or inverse-linear output. Use the following settings:

POINT 1	63
POINT 2	47
POINT 3	31
POINT 4	15
POINT 5	0

RAMP / PORTAMENTO

The RAMP / PORTAMENTO Sub-Page contains three independent controllers, two Ramp generators that allow for linear modulation and one Lag processor that produces Portamento.

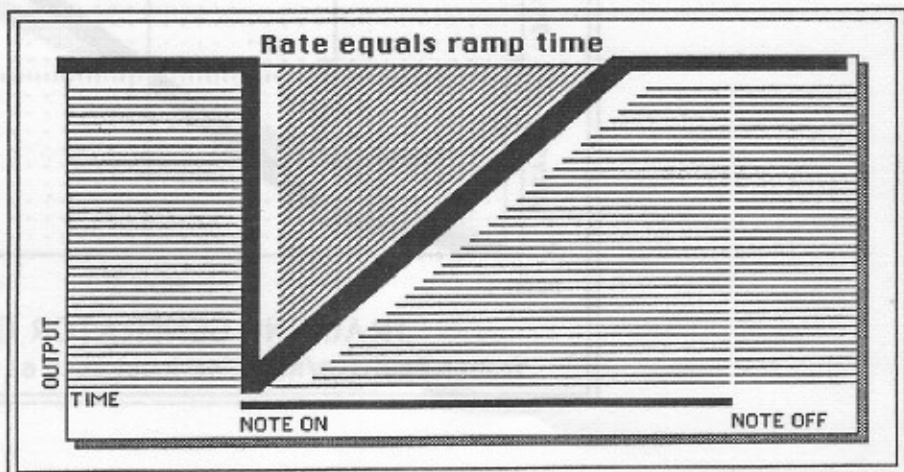
THE RAMP GENERATOR

The two RAMPs in the MATRIX-6 produce a type of modulation that can be best described as a smooth, linear transition that resembles the Attack portion of an envelope. When used as a modulation source, the RAMP starts its cycle when it receives a trigger (a kind of "go" signal) from the Keyboard, one of the LFOs or an external source through the PEDAL 1 jack. It then begins to generate an increasing control signal gradually until it reaches its maximum. The time that it takes to do this is set by the RATE parameter.

40 RAMP 1 RATE

42 RAMP 2 RATE

When triggered, the RAMP will begin its control cycle. It will complete its cycle and wait for another trigger to start again. The MATRIX-6's Keyboard or an External Trigger serve as trigger sources for the RAMPs. The time that it takes to complete one cycle is set by the RATE control. VALUE range is 0 to +63 where 0 is an instantaneous transition (no time) and 63 is the maximum.



41 RAMP 1 TRIGGER

43 RAMP 2 TRIGGER

The RAMP starts its cycle when it receives a trigger signal. There are four types of triggering on the RAMPs:

- STRIG "Single Trigger": The RAMP will be activated for a voice only if that voice is not already playing. This means that if you are holding a key down, the RAMP for that voice will not start again (won't get a new trigger) until you let go of the key and play the same voice again. Single triggering only operates when the MATRIX-6 is in UNISON (see Parameter "48 KEYBOARD MODE"). Playing Staccato generates new triggers and playing Legato does not.
- MTRIG "Multiple Trigger": The RAMP will be activated any time a new key is played. Playing Staccato or Legato will always generate new triggers.
- EXTRIG "External Single Trigger": The RAMP will be activated when a trigger pulse is received from an external source (such as a drum machine). This permits the RAMP timing to be synchronized with other instruments in your system. Otherwise, the triggering operates the same as STRIG.
- GATEDX "Gated External Single Trigger": If the RAMP is being triggered externally, GATEDX causes the MATRIX-6 to recognize the triggers only when keys are being played. Otherwise, the RAMP will trigger whenever a trigger is received as in EXTRIG - whether keys are being played or not.

One of the most common uses of the RAMP is for Vibrato delay. Refer to LFO 1 "85 AMP MOD BY RAMP 1" or LFO 2 "95 AMP MOD BY RAMP 2". If an LFO is being used for vibrato, a RAMP can be used to gradually bring it in. Or, if used with a negative Value (inverted), the RAMP can take the LFO at its programmed amount and gradually fade it out. So, anytime you need a simple increase or decrease of a modulation amount or speed etc., use a RAMP.

PORTAMENTO

As stated before, PORTAMENTO provides a sliding from note to note, smoothing out the otherwise sharp transitions between notes played on the Keyboard. We've already talked about Portamento when we covered the DCOs and VCF / VCA sections earlier in the manual (see 08, 18 and 26 "KEYBOARD / PORTAMENTO"). These parameters are concerned with programming the amount of Portamento modulating those functions. This section of the Sub-Page is where we set up the Portamento's operational parameters.

44 PORTAMENTO RATE - This parameter determines the speed with which the transition from note to note occurs. Value range is from 0 to +63 where 0 is no Portamento (actually its fastest speed) and 63 is the maximum (the slowest). Therefore, the higher the Value, the longer the PORTAMENTO time.

• **PORTAMENTO RATE** is expressed in "seconds per octave" or the time that it takes for a note to slide from its original note to its destination (the new note being played on the Keyboard). This rate is not related to the VALUE number on the display - it is used simply as a reference number in programming. You will notice that selecting among the three different modes in "46 PORTAMENTO MODE", will affect their relative Rates even though the RATE VALUE is set to the same number. This is because PORTAMENTO is calculated by the MATRIX-6's computer in a slightly different way for each mode.

45 PORT MOD BY VELOCITY - The PORTAMENTO RATE can be modulated by Velocity. When this parameter is used, how hard keys are played on the Keyboard will change the RATE. VALUE range is from -63 to +63 where a setting of 0 indicates that the RATE is not affected by Velocity. Using positive Values slows the RATE as keys are played harder to a maximum set by +63. Using negative Values speeds up the RATE as keys are played harder.

46 PORTAMENTO MODE - This parameter gives you a choice among three response modes of Portamento.

- **LINEAR**: Linear Portamento provides an even glide between notes. The RATE remains the same across the Keyboard. As an example, the time that it takes to glide two octaves is twice as long as the time it takes to glide one octave. When the Rate VALUE is set for 63, the maximum Portamento is about 35 seconds per octave.

- **CONST**: This abbreviation stands for "Constant Time" Portamento. As with LINEAR, CONST Portamento provides an even transition between notes. The difference is that the MATRIX-6's computer re-calculates the RATE depending upon the interval between notes. As an example, it will take the same amount of time to glide between a Root note and its Major 3rd as it does to glide between the Root and four octaves. Because of this, using a Rate VALUE of 63 gives a maximum Portamento speed of about 70 seconds per octave, twice that of LINEAR.

- **EXPO**: This stands for "Exponential" Portamento. Where LINEAR gives an even transition between intervals, EXPO starts out with a fast rate at the beginning of the glide and slows down as the destination note is reached. As with CONST, using a Rate VALUE of 63 gives a maximum EXPO speed of about 70 seconds per octave.

47 LEGATO PORTAMENTO - This parameter is in actuality the fourth Portamento mode but is programmed separately because of its unique operation. When LEGATO PORTAMENTO is used, Portamento will be active only when notes are played Legato (playing a new key without immediately releasing the first key). No Portamento will be heard while playing Staccato (playing a new key only after the first key has been completely released).

NOTE: This Portamento mode can only be used when the Keyboard mode is in UNISON. Putting the MATRIX-6 in Polyphonic mode will automatically disable this mode. The next section, "48 KEYBOARD MODE", describes the various playing modes of the Keyboard.

48 KEYBOARD MODE - This parameter allows you to set up the basic playing mode of the MATRIX-6's Keyboard. There are three Basic modes and two interesting and useful Variations that you can choose. And the mode that you select is programmable with each patch.

THE BASICS

- ROTATE: When playing notes on the Keyboard, this polyphonic mode loops through the six Voices assigning each new note to next available voice.

- REASGN: Abbreviation for "Reassign", this polyphonic mode is similar to ROTATE but notes that have the same pitch (otherwise known as "note value") are reassigned to the same voice. For example, if you play Middle C it will be assigned to a certain voice. Every time thereafter when Middle C is played on the Keyboard, that voice will play. "Reassign", by the way, is the KEYBOARD MODE enabled in the Basic Patch.

- UNISON: This mode takes the MATRIX-6 out of polyphonic mode and makes the synthesizer monophonic. All six Voices play with one key and only one key can be played at a time. This mode has "Low Note Priority" meaning that if you play two or more keys, only the lowest one is heard.

THE VARIATIONS

- ROTROB "Rotate Rob": In the normal ROTATE mode, holding down six keys at the same time will not allow any more notes played to be heard. The seventh key played will not sound. ROTROB permits new notes to "rob" voices from those keys already being held on the Keyboard. Each new key played will steal a voice from the notes already being played.

- REAROB "Reassign Rob": When in Reassign (REASGN) mode, voices will be robbed from keys held in the same way as ROTROB.

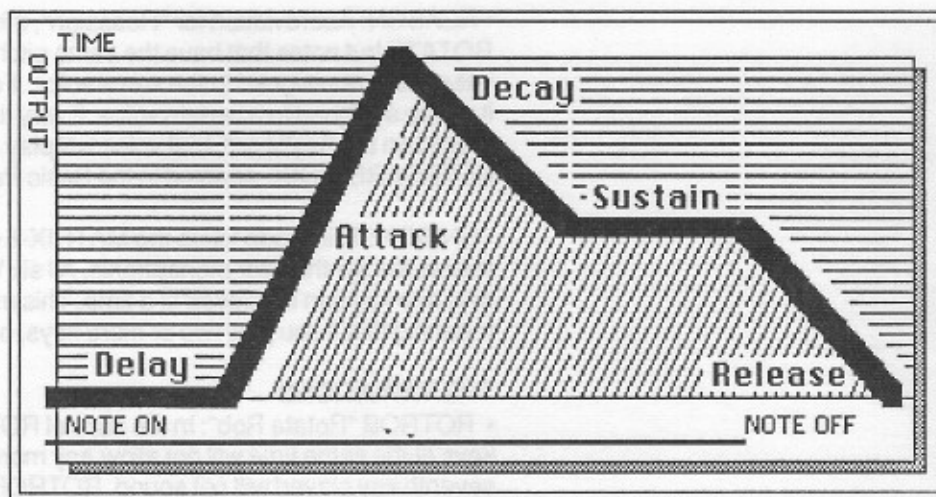
THE ENVELOPES

ENV 1, ENV 2 and ENV 3

The MATRIX-6 utilizes three independent 5-stage Envelope Generators for "time dependent" modulation. This means that Envelopes are used primarily to change the various patch parameters during a given time period. Each "stage" of an envelope, with the exception of SUSTAIN, operates for an amount of time that is set with its Value.

Envelopes are most commonly used to modulate the frequency of the Filter (VCF) and the patch's overall loudness (VCA 2). In addition, ENV 1 and ENV 2 can be used simultaneously to modulate any one of 32 parameter destinations in the MATRIX MODULATION Page that require this type of time control. The MATRIX-6 provides yet a third Envelope (ENV 3) for additional envelope modulation.

Envelopes operate much the same as RAMPs in that they require a trigger to work. When an Envelope gets a trigger (that "go" signal we mentioned before) from the Keyboard, one of the LFOs or from the PEDAL 1 input, it begins its cycle and waits for another trigger to start again.



Since the three Envelopes are identical, their parameters are covered together in the following discussion:

50, 60 & 70 DELAY - This is the time that the Envelope will wait before

starting its cycle. VALUE range is from 0 to +63. A setting of 0 means no Delay and the Envelope will start its cycle with the Attack stage the moment it is triggered. +63 is the maximum Delay time.

51, 61 & 71 ATTACK - After the DELAY stage is completed, this stage sets the amount of time it will take for the Envelope to reach its output level (set in parameters 55, 65 & 75 AMPLITUDE). VALUE range: 0 to +63. 0 = instant ATTACK. 63 is the maximum Attack time.

52, 62 & 72 DECAY - After the ATTACK stage finishes and the Envelope's output level is reached, the Envelope will then start to decrease. DECAY sets the time it will take for this decrease to occur. VALUE range: 0 to +63. 0 = instant DECAY. +63 is the maximum Decay time.

53, 63 & 73 SUSTAIN - The DECAY stage will decrease the output of the Envelope until the SUSTAIN level is reached. SUSTAIN, then, sets the Envelope's output level while you are holding a key or keys on the Keyboard. It is important for you to understand that SUSTAIN is not a time parameter but determines the Envelope's output if a key or keys are held after the DELAY, ATTACK and DECAY stages.

If SUSTAIN is set to its maximum, there will be no decrease in the Envelope's output until the keys you are holding are let go. In this case, DECAY has no effect. The envelope will remain at whatever the SUSTAIN level is until the keys you are holding are released.

VALUE range: 0 to +63. 0 = no SUSTAIN level and if keys are held for the duration of the DECAY stage, the Envelope will return to its 0 output level (its starting point). 63 = maximum Envelope output level and is maintained while keys are held.

54, 64 & 74 RELEASE - After you have let go of the key or keys, the Envelope will continue to decrease in output level until 0 level is reached. The RELEASE parameter sets the time for this to occur. VALUE range is from 0 to +63 where 0 returns the Envelope instantly to its 0 level and 63 is the maximum Release time.

55, 65 & 75 AMPLITUDE - As we mentioned earlier in this section, the Envelopes' primary function is to increase and decrease a control signal's output level over a time period. This output level is set by the AMPLITUDE parameter. VALUE range is from 0 to +63.

56, 66 & 76 AMP MOD BY VELOCITY - The AMPLITUDE of the Envelopes can be increased or decreased by how hard you play notes on the Keyboard. VALUE range is from -63 to +63.

0 indicates no effect on the output level by VELOCITY.

When positive Values are used, the Amplitude is increased as keys are played harder above the initial level set in Parameters 55, 65 or 75.

Remember that the higher you set the AMPLITUDE, the less effect VELOCITY will have. A Value of +63 sets the maximum positive amount.

When negative Values are used, the Amplitude is decreased below the initial output level the harder keys are played. A Value of -63 sets the maximum negative amount.

57, 67 & 77 TRIGGER MODE - As stated in the introduction to this Sub-Page, an Envelope starts its cycle when it receives a trigger pulse. In this parameter, we select between Keyboard or External triggers and their types.

KEYBOARD TRIGGERS

- STRIG "Single Trigger": The Envelope will be activated for a voice only if that voice is not already playing. This means that if you are holding a key down, the Envelope for that voice will not start again (won't get a new trigger) until you let go of the key and play the same voice again. Single triggering only operates when the MATRIX-6 is in UNISON (see Parameter "48 KEYBOARD MODE). This means that playing Staccato generates new triggers and playing Legato does not.
- MTRIG "Multiple Trigger": The Envelope will be activated any time a new key is played. Playing Staccato or Legato will always generate a new trigger.
- SRESET "Single Trigger Reset": Selecting this mode combines Single Triggering with the RESET Envelope mode. RESET mode tells the envelope to start its cycle from the beginning. Otherwise, the envelope will start from its current output level if it gets a new trigger part way through its cycle. Playing keys Staccato will generate a new trigger and start the Envelope from the beginning of its cycle.
- MRESET "Multiple Trigger Reset": As with SRESET, this mode combines Multiple Triggering with the RESET Envelope mode. MRESET generates a new trigger and starts the Envelope at the beginning of its cycle on every note, no matter how it is played.

EXTERNAL TRIGGERS

In the MATRIX-6, External Triggering takes the place of the Keyboard when driving the Envelopes. The trigger source is plugged into the PEDAL 1 jack on the back panel using a standard guitar cord: a 2-conductor, shielded cable with a 1/4" plug on the end that goes into the MATRIX-6.

Suitable trigger sources for this purpose can be the Oberheim DMX and DX Digital Drum Machines or the DSX Polyphonic Sequencer. The CLICK outputs of these devices generate a trigger pulse that will drive the External Trigger function of the MATRIX-6. If you plan to use another trigger source,

the MATRIX-6 requires a DC pulse of at least 20 ms. (milliseconds) in width and an amplitude of +1 to +10 volts to work.

The External Trigger modes operate the same as their Keyboard Trigger counterparts. Refer to the previous descriptions to find out the operations of each different mode. The following list deciphers the Display abbreviations:

- XTRIG "External Single Trigger":
- XMTRIG "External Multiple Trigger":
- XRESET "External Trigger Reset":
- XMRST "External Multiple Trigger Reset":

58, 68 & 78 ENVELOPE MODE - We already know that an Envelope receives a trigger to start its cycle. How the Envelope completes its cycle is selected in this parameter.

- NORM "Normal": The normal operating mode of an Envelope is to complete its cycle while a key or keys are being held down during the DELAY, ATTACK, DECAY and SUSTAIN stages of its cycle. After the keys are let go, the RELEASE stage finishes the Envelope. Holding a key or keys is called "Gating" - the Envelope in NORM mode needs a Gate to complete its cycle.

If the keys are let go at any time before the SUSTAIN level is reached (even during DELAY or ATTACK), the Envelope goes immediately to its RELEASE stage.

- DADR "Delay-Attack-Decay-Release": This mode causes the Envelope to skip its SUSTAIN portion while gated (keys are being held down). This has the same effect as if you release the keys as soon as the DECAY stage finishes. DADR otherwise operates the same as NORM. Releasing keys during the ATTACK stage, for instance, causes the Envelope to go immediately to its RELEASE stage.

- FREE "Freerun": This mode causes the Envelope to complete its entire cycle even if the key or keys are released before the SUSTAIN level is reached. Simply tapping a key very briefly to start the Envelope (give it a trigger) is sufficient to complete the cycle. FREE, therefore, provides the Envelope with a Gate even though the keys are let go.

- BOTH: This mode combines the action of DADR and FREE. If BOTH is selected, a DADR mode will complete its cycle (DADR is Gated) even if the keys are released before the DECAY stage is finished.

59, 69 & 79 LFO 1 TRIGGER - The Envelopes can also be triggered by a third source: LFO 1. This parameter is available separately because it can be used at the same time with Keyboard or External Triggering. This parameter allows you to use LFO 1 as a trigger source in order to synchronize the Envelopes with another modulation source.

• **NORMAL:** When this option is selected, the Envelopes operate with no LFO triggering. This is actually the switching LFO 1 TRIGGER off.

• **LFO 1:** When this is selected, the Envelope will now be triggered by LFO 1. This is actually switching LFO 1 TRIGGER on. Since most of the LFO's waveforms are periodic (continuous and cyclical), exactly what point on the LFO's wave that does the triggering must be determined. This is accomplished the LFO 1 Sub-Page "83 RETRIGGER POINT".

• **G-LFO1 "Gated LFO 1 Trigger":** When this is selected, LFO 1 will trigger the Envelope only when a key or keys are played (the Envelope is Gated). If this is not selected, the Envelope will be continually triggered because the LFO is always running.

THE LFOs

LFO 1 AND LFO 2

The abbreviation "LFO" stands for "Low Frequency Oscillator". An LFO is, in most respects, similar to a regular oscillator except that its pitch (frequency) range is below the threshold of normal human hearing. Thus, its primary application is being used as a modulation source.

The two LFOs in the MATRIX-6 each contain seven types of waveforms to be used for modulation. The first four are called "periodic" (TRI, UPSAW, DNSAW & SQUAR) because they repeat in even patterns or cycles. The next two are called "aperiodic" (RANDM & NOISE), that are basically disorderly patterns that do not repeat with any regularity. The seventh choice (SAMPL) samples any one of the other modulation sources and uses the result of this sampling as its waveform.

The MATRIX-6 contains two independent LFOs labeled LFO 1 and LFO 2. Since they are almost identical, we'll cover their parameters together.

80 & 90 SPEED - This parameter sets the LFOs' frequency or rate. VALUE range is from 0 to +63 where 0 represents the LFOs' slowest speed and 63 the fastest.

LFO 1: 81 SPEED MOD BY PRESSURE

LFO 2: 91 SPEED MOD BY KEYBOARD

The initial speed of the LFOs can be increased or decreased by another source of modulation. The speed of LFO 1 can be modulated by Keyboard PRESSURE: pressing into the keys after the notes are played. LFO 2 can be modulated by KEYBOARD notes: playing high notes or low notes on the keyboard will speed up or slow down the LFO Speed.

LFO 1 PRESSURE range is from -63 to +63. Using positive VALUES increase the LFO speed when PRESSURE is added. Negative VALUES decrease LFO speed when PRESSURE is added. A 0 setting represents no effect by PRESSURE.

LFO 2 KEYBOARD range is also -63 to +63. Using positive VALUES causes the LFO to speed up as higher notes are played on the Keyboard and slow down when low notes are played. Using negative VALUES gives the opposite effect: high notes slow the LFO and low notes speed it up.

82 & 92 WAVEFORM - This parameter allows you to select the waveform of the LFO that will be used as the modulation source.

PERIODIC WAVEFORMS

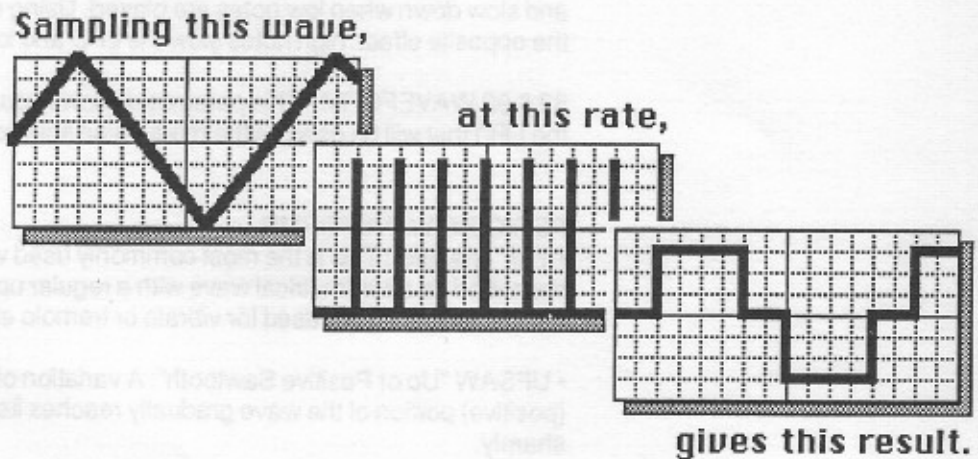
- TRI "Triangle": This is the most commonly used waveform which can be described as a symmetrical wave with a regular up-down shape. This waveform is primarily used for vibrato or tremolo effects.
- UPSAW "Up or Positive Sawtooth": A variation of TRI where the rising (positive) portion of the wave gradually reaches its peak then drops off sharply.
- DNSAW "Down or Negative Sawtooth": An inverted variation of UPSAW where the wave starts at its peak and gradually decreases.
- SQUAR "Square Wave": Another symmetrical waveshape where the rising and falling portions are sharp transitions. The SQUARE does not "peak" like the other waves but has equal high and low "plateau" portions that give the wave symmetry. This waveform, therefore, provides sharp high-low modulation.

APERIODIC WAVEFORMS

- RANDM "Random Modulation": This waveform outputs an irregular modulation pattern used mostly for effects.
- NOISE "Noise Modulation": This is also an irregular modulation signal in many respects similar to RANDM but sounds like Random Modulation at a much higher speed. As a result, using this wave gives a noisy, harsh effect to the sound, hence the name.

SPECIAL MODULATION

• **SAMPL** "Sampled Modulation": When this is selected, the LFO samples another modulation source and uses that as its waveform. Parameters 80 & 90 **SPEED** control how often this source is sampled. The source to be sampled can be any of the MATRIX-6's 20 modulation sources.



83 & 93 RETRIGGER POINT - An LFO normally cycles freely with no apparent "beginning" or start point to its cycle. An LFO, however, can be set to start at a programmable point in its cycle whenever a trigger (from the Keyboard or External) is received.

The LFO is selected to be retriggered in Parameters "86 & 96 **TRIGGER MODE**". You are able to set the actual retrigger point in this parameter. Remember that if Parameters 86 and 96 are set to **OFF**, this mode will not be operative.

VALUE range is from 0 to +63 where 0 sets the retrigger point to be at the beginning of its cycle and 63 sets it at the wave's half-way point.

84 & 94 AMPLITUDE - This sets the output level of the LFO. "Output level" in this case refers to the "intensity" of the LFO's modulation. The higher the **VALUE** number, the wider the waveform's sweep or "depth" as it is also called.

VALUE range is from 0 to +63. A setting of 0 represents no LFO output and effectively turns the LFO off. 63, of course, is the maximum.

LFO 1: 85 AMP MOD BY RAMP 1
LFO 2: 95 AMP MOD BY RAMP 2

As we stated in the section on RAMP / PORTAMENTO, RAMPs are more commonly used to simply increase or decrease something in the patch. We also mentioned that LFO amplitude or depth is one useful example. In the LFO Sub-Pages, RAMP 1 is assigned to LFO 1's Amplitude and RAMP 2 goes to the Amplitude of LFO 2.

These two Parameters operate in the same way. VALUE range is from -63 to +63. 0, as always, indicates no AMP MOD by the RAMP. Using positive numbers increases the Amplitude from its initial setting selected in Parameters 84 and 94. Using negative numbers, which invert the RAMP, decreases the LFO's output.

86 & 96 TRIGGER MODE - The LFOs, like the Envelopes and Ramps, can be triggered by the Keyboard or by an External source. As we mentioned in Parameters "83 & 93 RETRIGGER POINT", we are able to select the mode of triggering in this Parameter.

- OFF: This indicates that the LFO is not triggered and will cycle freely.
- STRIG "Single Trigger": As with Ramps and Envelopes, the LFO will retrigger only if the voice is not already playing. A Staccato style of playing will retrigger the LFO and Legato will not.
- MTRIG "Multiple Trigger": The LFO will retrigger regardless of the playing style.
- XTRIG "External Single Trigger": The LFO will retrigger only when a trigger pulse is received from an external source plugged into the PEDAL 2 jack.

87 & 97 LAG - The Lag Processor that generates the same control signal to produce Portamento is routed to the LFOs in this Parameter in order to reshape their waveforms. Just as LAG smooths out sharp or instantaneous transitions between notes played on the Keyboard, Lagging the LFOs rounds off any sharp transitions in a selected waveform.



Square Wave before and after Lag Processor

The effect of LFO LAG is especially prominent when used to reshape the Square wave because it has two instantaneous transitions - a 90° rising edge and a corresponding 90° falling edge. The diagram to the left shows a "before" and "after" effect of LAG on a Square wave. The sharp falling edge of UPSAW and the rising edge of DNSAW are affected by LAG as well. The TRI wave can also be Lagged but because of its lack of sharp edges, the effect is not as noticeable.

88 & 98 SAMPLE - As we indicated in Parameters "82 & 92 WAVEFORM", one of the available choices for the LFO's output is a Sampled waveform. When SAMPL is used, the modulation source to be sampled is selected in this Parameter. You can choose from among any of the MATRIX-6's 20 modulation Sources, selected in the VALUE mode of this Parameter.

PROGRAMMING THE MATRIX-6

MATRIX MODULATION

As we have just seen in the PATCH EDIT Page, there are a number of pre-determined Modulation Routings designed into each of the 10 Sub-Pages, 18 to be exact. These 18 "hardwired" (permanent) modulations were chosen because of their usefulness and also because they are the most commonly required routings in performance synthesizers such as the MATRIX-6.

For reference, we've listed them below:

DCO 1:

- 01 FREQ MOD BY LFO 1
- 04 PW MOD BY LFO 2

DCO 2

- 11 FREQ MOD BY LFO 1
- 14 PW MOD BY LFO 2

VCF / VCA

- 22 FREQ MOD BY ENV 1
- 23 FREQ MOD BY PRESSURE
- 28 VCA 1 MOD BY VELOCITY
- 29 VCA 2 MOD BY ENV 2

FM / TRACK

- 31 FM MOD BY ENV 3
- 32 FM MOD BY PRESSURE

RAMP / PORTAMENTO

- 45 PORT MOD BY VELOCITY

ENV 1

- 56 AMP MOD BY VELOCITY

ENV 2

- 66 AMP MOD BY VELOCITY

ENV 3

- 76 AMP MOD BY VELOCITY


LFO 1

- 81 SPEED MOD BY PRESSURE
- 85 AMP MOD BY RAMP 1

LFO 2

- 91 SPEED MOD BY KEYBOARD
- 95 AMP MOD BY RAMP 2





There will be times, however, that these permanent routings don't offer the kind of modulation you really need to do the job. That's why we created the MATRIX MODULATION™ System. This system permits taking any one of the MATRIX-6's 20 modulation Sources (most of them we already discovered in the PATCH EDIT Sub-Pages) and routing it to any one of 32 destinations. That's 640 new combinations. You are given 10 combination locations in the MATRIX MOD Page that make the possibilities practically limitless†.

With the 18 permanent and 10 custom modulation routings available, you have a total of 28 modulations per patch - and they're all programmable. You will soon find that the MATRIX-6 gives you incredible flexibility when programming a patch.

What exactly is modulation? To modulate means to "change". Modulation is simply changing something with something else. In the strictest use of the term, even the Keyboard is a source of modulation. We've already seen how it can change the pitch of the DCOs and the VCF frequency. Using MATRIX MOD, the Keyboard can be used to change 29 other things as well.

The 18 permanent modulations and the 10 MATRIX MODs all have ranges from -63 to +63. The numbers along this range are not absolute values and may differ from source to source in their ultimate effect on the sound. They are intended to be regarded simply as an index that you can use as a reference when programming patches.

The range of any modulation may in some cases not be enough to do the job. No problem. Just set up a MATRIX MOD with the same Source and Destination and adjust the AMOUNT value until the required range is achieved. If you still need more just do it again.

As an example, Pitch Bend is achieved by routing one of the LEVERs to DCO 1 and DCO 2 00 & 10 FREQUENCY. When 07 & 17 LEVERs are enabled, Pitch Bend is preset to be +/- a Whole Tone. But what if you want some other interval? Easy: set up 2 MATRIX MODs, the first with "18 LEVER 1" as the Source and "01 DCO 1 FREQUENCY" as the Destination and the second with "18 LEVER 1" as the Source and "04 DCO 2 FREQUENCY" as the Destination. Notice that we have one Source (LEVER 1) modulating two different Destinations (DCOs 1 & 2 FREQUENCY). You can do that whenever you like and with any Source. As a matter of fact, you can take LEVER 1 (or any of the other 19 Sources) and route it to a maximum of 10 different Destinations in the MATRIX MOD Page. How's that for flexibility?

† For those of you interested in the mathematics behind this, the actual number of possibilities is 2.96×10^{21} . That's just under 3 billion trillion combinations in which no two ever repeat and does not take into consideration different Value AMOUNTs. If we include all the possible Value AMOUNTs in our equation, the number comes to 1.2×10^{42} with no two combinations ever repeating. Have fun.

Use the following chart to select an AMOUNT Value when programming different semitone intervals:

Amount	Interval
46	min 2nd
54	Maj 2nd
56	min 3rd
58	Maj 3rd
60	Perf 4th
61	dim 5th
62	Perf 5th
63	min 6th

A wider interval can be achieved by modulating the DCO's Frequencies by LEVER 1 twice. You will use four MATRIX MODs in this case, two for each DCO. An octave bend is created by setting one AMOUNT to a min 6th (63) and the other to a Maj 3rd (58) to equal an octave.

Just as you can route one Source to 10 different Destinations, you can have 10 different Sources modulate the same Destination. Keep experimenting - you're only limited by your own imagination.

PROGRAMMING THE MATRIX-6

MASTER EDIT PAGE

As we mentioned in the beginning of the manual, the MASTER EDIT Page parameters are not programmable with each individual patch. Rather, they are set for the MATRIX-6 as a whole and will do the same thing for one patch as it will for all the others. This is called "Global Control" - selecting a parameter VALUE for one patch selects it for the rest of them.

The MASTER EDIT Page is comprised of five Sub-Pages of related functions. They are selected and given VALUE amounts just like the other Pages. And although they are not programmable per patch, they are stored in Global memory and will remain as they are until you change them. Even if you turn the MATRIX-6 off, come back a week later and turn it on again, these settings will still be intact.

MIDI

MIDI is an acronym for Musical Instrument Digital Interface. MIDI is a universally accepted system of digital communication that allows you to hook up your MATRIX-6 to other devices - synthesizers, sequencers, drum machines, computers, etc. - as long as they also are equipped with a MIDI interface. MIDI makes it possible to interface instruments by different manufacturers.

Because your MATRIX-6 uses an internal computer (called a "microprocessor"), it is able to communicate through MIDI to other microprocessor based devices that have this interface. MIDI, then, is a digital language that enables two or more MIDI-equipped instruments to "talk" to each other.

In the MIDI Sub-Page, you are able to determine when and what kind of communication takes place and how it will occur. MIDI communication is transmitted and received, and this occurs through channels - much the same as radio or television, but using cables instead of antennas. Connecting two or more MIDI devices together constitutes a MIDI "system".

MIDI channel communication is divided into two main categories. The first deals with notes - notes played on one instrument are played on the other(s). The second deals with control - levers, volume & sustain pedals, patch changes, etc. used on one will modulate the others in the MIDI system. The main thing to keep in mind is that if the Master instrument is transmitting on a certain channel, the receiving instruments must also be set to that channel for these events to be recognized.

The MATRIX-6 enables you to set MIDI assignments using 12 MIDI Parameters, numbered 00 through 11. They are described as follows:

00 BASIC CHANNEL - This selects the transmitting and receiving channel for the MATRIX-6. VALUE selects any one of the available MIDI channels numbered 1 through 16.

The BASIC CHANNELs are concerned primarily with transmitting and receiving Notes. There are, however, a few details you must keep in mind:

TRANSMIT - When MIDI OUT is used, the MATRIX-6 is considered the MASTER in the system and will transmit notes played on the Keyboard and the various Controllers (LEVER 1, LEVER 2, PEDAL 1, PEDAL 2, VELOCITY, PRESSURE, RELEASE VELOCITY and PATCH CHANGES) on whatever you select as the BASIC CHANNEL.

RECEIVE - When MIDI IN is used, the MATRIX-6 is considered a SLAVE and will receive Notes and Controllers on the BASIC CHANNEL. The MASTER instrument must be set to transmit on this channel as well. The exception to this (and this is an important one) is that if OMNI MODE is turned ON in the next parameter, the MATRIX-6 will receive Notes and Controllers on *any* MIDI channel. The MASTER instrument can be set to any MIDI channel and Notes and Controllers will be received by the MATRIX-6 when in OMNI mode.

01 OMNI MODE - As we mentioned above, OMNI MODE can be turned ON or OFF from this parameter.

When OMNI is ON, the MATRIX-6 will receive Notes and Controllers from the Master instrument on all 16 channels.

When OMNI is OFF, the MATRIX-6 will receive Notes and Controllers on the BASIC CHANNEL only. The MATRIX-6 will ignore MIDI information coming from any other channel. Please note that this is true only if the MATRIX-6 is in its normal 6-Voice polyphonic playing mode. When the MATRIX-6 is in SPLIT, MIDI operates just a little differently and we'll cover that later in the SPLIT EDIT Page.

02 CONTROLLERS - When the MATRIX-6 is a SLAVE, this parameter turns the MIDI Controllers ON or OFF.

When turned ON, the MATRIX-6 will respond to LEVER 1, LEVER 2, PEDAL 1, PEDAL 2, VELOCITY, PRESSURE, RELEASE VELOCITY and PATCH CHANGES from the MASTER instrument. If MIDI parameter "05 LOCAL CONTROL" is also turned ON, the MATRIX-6's Keyboard, Levers and Pedals will operate simultaneously with MIDI Controllers.

When turned OFF, the MATRIX-6 will ignore all controller information except for Notes and Velocity.

03 PATCH CHANGES - This parameter is treated separately from other Controllers because there may be many times when you will not want PATCH CHANGES to be transmitted or received.

PATCH CHANGES occur when a new patch is selected on the Master. Any instrument in the system set to receive PATCH CHANGES will respond by going to the new patch number when this command is sent. This is only an index number for the patch; it has nothing to do with the actual sound of the patch itself.

When turned ON, the MATRIX-6 will transmit and receive MIDI information that will cause instruments in the system to change to another patch number.

When turned OFF, the MATRIX-6 will not transmit a patch number when you change patches and it will ignore commands to change patches from other instruments in the system.

04 SYSTEM EXCLUSIVE - Each MIDI instrument has several functions that make it unique. Thus, each manufacturer of a MIDI instrument has a special MIDI code that distinguishes it from other manufacturers' products in the system. This is called a SYSTEM EXCLUSIVE message. It allows, for example, two MATRIX-6s to perform certain functions that one MATRIX-6 hooked up to "Brand X" cannot do because of design differences.

One example of this is the ability to send actual Patch data (not just the patch Number) from one MATRIX-6 to another by using MIDI Parameter "10 SEND PATCH". SYSTEM EXCLUSIVE allows this type of communication to occur that cannot happen between two different brands of synthesizers. If you plan to store MATRIX-6 patches on your home computer, it must first be programmed with Oberheim's SYSTEM EXCLUSIVE code before this can take place.

This parameter permits SYSTEM EXCLUSIVE to be turned ON or OFF. "SYSTEMX" as it is shown on the display is not necessary for routine MIDI functions.

05 LOCAL CONTROL - The MATRIX-6 can be controlled by its own Keyboard, Levers and Pedals or by Keyboard, Lever and Pedal information sent to it by MIDI. This parameter selects whether the MATRIX-6's Keyboard, Levers and Pedals work (its LOCAL CONTROL) or just MIDI controllers.

When turned ON, the MATRIX-6's Keyboard, Levers and Pedals are enabled. If "02 CONTROLLERS" is turned ON, both LOCAL and MIDI controllers will operate simultaneously.

Please note that LOCAL CONTROL is always enabled (activated) when the MATRIX-6 is turned ON.

When turned OFF, the MATRIX-6's Keyboard, Levers and Pedals are disabled. The MATRIX-6 will not sound unless a Master MIDI instrument is connected to its MIDI IN and playing the MATRIX-6.

06 PEDAL 1 SELECT

07 PEDAL 2 SELECT

These two parameters allow you to select the MIDI Controller Number on which the MATRIX-6 will send and receive Pedal information. You can choose any one of the 122 available MIDI Controller *Numbers* (don't confuse these with the 16 *Channels*) numbered 0 through 121.

MIDI pedals can be used simultaneously with LOCAL pedals. Be sure to check the Owner's Manual of the other instrument to find out what Controller Number it's using so that you can set up this Parameter accordingly. And if you are using the KEYPAD to select the channel number, don't forget that you are required to enter a three-digit number.

08 LEVER 2 SELECT

09 LEVER 3 SELECT

LEVER 1 on the MATRIX-6 always transmits and receives on the MIDI Controller dedicated for Pitch Bend. This is called the BENDER controller. That's why there is no separate front panel Parameter for a LEVER 1 MIDI assignment. You cannot select another Controller Number for LEVER 1.

LEVER 2, on the other hand, can be set to transmit and receive on any MIDI Controller Number from 0 to 121.

LEVER 2's normal status is to increase the modulation amount when it is pulled *toward* you. It has no effect when pushed *away* from you. We've provided a means to make use of this unused portion of LEVER 2. We call it "LEVER 3" which does not exist as a separate physical lever on the MATRIX-6 but is controlled by LEVER 2. LEVER 3 increases its modulation amount when LEVER 2 is pushed *away* from you. LEVER 3 can be set to transmit and receive on any MIDI Controller Number from 0 to 121.

10 SEND PATCH

11 SEND ALL

Any one or all 100 of the MATRIX-6's patches can be sent through its MIDI OUT to another MIDI device. This is not patch Numbers but the actual data that makes up the sound. The receiving instrument can be another MATRIX-6 or another device such as a computer that has been programmed with the Oberheim SYSTEM EXCLUSIVE code for reception.

STEP 1: Using a standard MIDI cable, connect the MIDI OUT of the MATRIX-6 to the MIDI IN of the receiving instrument.

STEP 2: On the MATRIX-6, select the patch that you want to send. If you are planning to SEND ALL, this step can be skipped.

STEP 3: On the receiving instrument, select the destination patch Number. If you are planning to SEND ALL, this step can be skipped.

STEP 4: Turn on SYSTEM EXCLUSIVE for both instruments.

STEP 5: Select "10 SEND PATCH" or "11 SEND ALL" on the MATRIX-6.

STEP 6: Press the VALUE button. The display will now read "READY?"

STEP 7: Press the YES button and the MATRIX-6 will begin its data transfer. When the transfer is completed, the display will switch back to the "SEND PATCH" or the "SEND ALL" message.

STEP 8: Check the receiving instrument to verify that the data transfer was successful.

MATRIX-6 MIDI Controller Number Assignments

Controller	MIDI Number	Re-Assignable?
PEDAL 1	7	YES
PEDAL 2	64	YES
LEVER 1	BENDER	NO
LEVER 2	1	YES
LEVER 3	2	YES
PRESSURE	PRESSURE	NO
VELOCITY	Transmitted w/ Notes	NO
RELEASE VELOCITY	Transmitted w/ Notes	NO

CASSETTE

In addition to offloading your patches via MIDI, the MATRIX-6 also utilizes a system that permits saving your patches to tape. The Cassette Interface feature of the MATRIX-6 allows you to offload your Patches and Splits onto standard cassette tape. You may find that your creativity in programming new patches exceeds the memory space (100 Patches and 50 Splits) available. The Cassette Interface gives you the option of storing your sounds on tape, programming a new set of Patches and Splits, storing those and so on until you have a library of programs. We suggest that you become familiar with the CASSETTE operation and learn to use it as you would any other Sub-Page.

We also recommend that saving your programs to tape be done on a regular basis anyway as a "back-up" in the event that one or more of your patches are edited or erased accidentally or if a malfunction causes the MATRIX-6 to drop memory. A back-up data tape should also be made before your MATRIX-6 is ever serviced for this reason.

WHAT YOU WILL NEED

The MATRIX-6's Cassette Interface system was designed so that it would not be necessary to invest a lot in tape recording equipment nor would it be required to carry around a large, expensive stereo deck. Best results are obtained with using a portable monophonic recorder or a computer data recorder. We have achieved consistent results with the Radio Shack CCR-82 Computer Cassette Recorder although many others will work. When shopping for a cassette machine, keep the following specifications in mind. Your cassette recorder should have:

1. *"Auxilliary" (AUX) or "Line" input.* Microphone (MIC) inputs may work but are not reliable.
2. *Earphone, Headphone or 8-ohm External Speaker output.* These outputs are able to drive the Cassette Interface circuitry easily. Using a Line output is usually not reliable.
3. *Playback Volume Control.* It is extremely important to be able to adjust the playback level of the data so that the MATRIX-6 is able to recognize the information coming from tape. This is also why earphone, headphone or external speaker outputs are necessary and a Line output is not - the volume control is able to set the level of these outputs while Line out remains steady and is not affected by the playback volume.
4. *Record Level Control.* It is equally important to be able to control the volume of the data signal while it is being recorded onto tape. Too high of a level will distort the signal and too low of a level will not provide enough playback volume to drive the CASSETTE circuit. A VU Meter is necessary for you to visually set the record level. Many cassette recorders have an "ARL" (Automatic Record Level) feature which automatically sets the record volume to its optimum level. ARL replaces the need for a separate record control and meter and will simply use a record LED indicator. Both of these methods work just as well.

OPTIONS

5. *Record / Play Tone Control.* If your cassette machine has a tone control, set it to its half setting. A tone control is helpful but not absolutely essential.
6. *Tape Counter.* Since you will be able to fit many banks of data on one cassette, a 3-digit tape counter to index where the data starts and ends will be helpful.
7. *AC Adaptor.* Most cassette recorders made today have a jack for an optional AC adaptor. You may want to consider getting one to insure proper tape speed. Making a tape with low batteries means that the tape will not play back properly when fresh batteries are used. An AC adaptor is also convenient in that you won't have to replace the batteries every few days.

YOU WILL ALSO NEED . . .

8. *Tape.* A good quality grade of tape can make the difference between consistent successful data transfers and total frustration. You don't have to buy the expensive premium tape but stay away from the 3-for-99-cent-drug-store "specials" too. You want a tape that is made from good materials - dropouts on the tape or an inconsistent tape surface will cause nothing but problems.

You should also use a tape that is "biased" for the machine that you are using. Chrome or metal tape will not usually work on most portable cassette recorders. Some experimentation may be required here.

9. *Connecting Cables.* Your cassette interface system requires two standard audio cables in order to connect the tape recorder to the MATRIX-6. The cable must be "2-conductor shielded" with a 1/4" plug on the MATRIX-6 end and a 1/8" Mini plug on the cassette end. If you are using a stereo deck, the plug should be an RCA type.

HOOK-UP

Connect one of your cables from the cassette's output jack (earphone, headphone or speaker) to the jack on the MATRIX-6 labeled FROM.

Connect the other cable from the cassette's input jack (Aux or Line) to the jack on the MATRIX-6 labeled TO.

Both cables must be connected at the same time for the CASSETTE function to work properly.

OPERATION

20 STORE ALL - This parameter is used to save all of the MATRIX-6's programs onto the cassette tape. The Patches and Splits are not removed from the MATRIX-6, just copied onto the tape. The synthesizer will still have its programs intact when this process is completed.

- When this Parameter is entered, the display will read "20 SAVE CASS".
- Press the VALUE button. The display will read "READY?".
- Press the RECORD button on your tape recorder. Let a few seconds of tape run so that the leader tape at the beginning passes completely.
- Press the YES button on the MATRIX-6's KEYPAD. The MASTER EDIT LED will go out and if your cassette machine has a monitor feature, a high-pitched Leader Tone from the MATRIX-6 will be heard.

The display will show the message "SAVING DATA" for the entire time the data is being transferred. During this time, the VALUE LED will slowly flash on and off to indicate that the STORE ALL function is in process and the data "chatter" will be heard through the cassette recorder's monitor speaker. Remember that if your cassette recorder does not have a monitor function, no sound will be heard.

- When STORE ALL is finished, the display will return to the "20 SAVE CASS" message.

21 CHECK ALL - The data that you just recorded can be checked to verify that the transfer was successful. We strongly recommend that you check the data every time you save to tape. The CHECK ALL process makes sure that the data was recorded at the right volume and tone and that there are no bad spots on the tape itself. You'll never know if you have a good data tape unless you check it.

- When this mode is entered, the display will read "21 CHECK CASS".

- Rewind the tape to the point where the data's leader tone just begins. This is where a tape counter on your recorder comes in handy, especially if you have several banks of data in a row.

- Press the VALUE button on the MATRIX-6. The display will read "READY?".

- Press PLAY on your cassette recorder.

- Press the YES button on the MATRIX-6. The VALUE button LED will go out and the leader tone will be heard followed by the data chatter. Again, if your recorder does not have a monitor, no sound will be heard.

- During this time, the display will show the message "CHECKING DATA" and the VALUE button LED will slowly flash on and off to verify that the CHECK ALL function is in process.

- When the CHECK ALL process is completed, one of two things will happen. If the tape is verified, the display will return to the "21 CHECK CASS" message. If the tape is found to have one or more things wrong with it, you will get an "Error Message" on the display. Error Messages are described later in this section.

22 LOAD ALL - This parameter loads the MATRIX-6's memory with the data on the tape. Please bear in mind that the LOAD ALL function will erase all of the memory in the synthesizer and replace it with the data coming from the tape.

The procedure for LOAD ALL is almost identical to that for CHECK ALL. The only extra step is to make sure that MEMORY PROTECT on the back panel is turned OFF. If it is left ON, LOAD ALL cannot take place. However, any patches with individual patch PROTECT turned on will be erased and replaced as front panel PROTECT is ignored during LOAD ALL.

When this Parameter is entered, the display will read "22 LOAD CASS". Follow the procedure above for CHECK ALL to re-load the MATRIX-6 from tape. The display will show the message "LOADING DATA" while the transfer is taking place. If the data transfer is successful, the display will return to the "22 LOAD CASS" message. If the tape has anything wrong with it, you will get an "Error Message" on the display. Error Messages are described later in this section.

23 SELECTIVE LOAD - This Parameter allows you to take a single Patch or a single Split from the tape and load it individually into the MATRIX-6. This feature permits the loading of individual patches from several tapes in order to compile them into one bank of memory.

- Turn off MEMORY PROTECT on the back panel.
- When this parameter is entered, the display will read "23 LOAD ONE".
- Rewind the tape to the point where the data's leader tone just begins. In this process, we will play the entire bank of data from the tape. The MATRIX-6, being set up to load in just a single patch, will pick the selected patch only and ignore the rest of the data on the tape.
- Press the VALUE button. The display will read "LOAD FROM 00". Here is where we select the Number of the patch on the tape that we want to load in. As always, the 0-9 buttons, < > or << >> buttons on the KEYPAD are used to select this patch Number.
- Press the VALUE button again. The display will change to read "INTO PATCH 00". Here is where we select the Number of the patch where we want the one coming from tape to be stored in the MATRIX-6. Remember that the patch that is currently stored in this memory location will be erased and replaced with the patch coming in from tape. Also, if PROTECT has been turned ON for this patch, you must turn it OFF or SELECTIVE LOAD cannot occur.
- Press the VALUE button a third time. The display will now read "READY?".
- Press the PLAY button on your cassette machine.
- Immediately press the YES button on the MATRIX-6. The LED on the VALUE button will go out and the leader tone from the tape will be heard followed by the data chatter. During this time, the display will show the message "PLAYING DATA" and the VALUE button LED will slowly flash on and off.

• As soon as the MATRIX-6 identifies the patch on the tape, it will store it into the selected patch Number in the MATRIX-6 and immediately exit the transfer mode. The display will return to the "23 LOAD ONE" message if the transfer was successful. If not, an Error Message will be displayed.

ERRORS

As we mentioned before, you will occasionally get an Error Message on the display after the CHECK ONE, LOAD ALL or SELECTIVE LOAD functions complete their cycles. An Error Message indicates that there is one or more things wrong with the data itself or that there is a mechanical problem - bad connections, poor tape quality, dirty tape heads in your cassette machine and so forth - that would cause the information on tape to not load properly.

The following list explains the "CASS ERROR" message codes that will be displayed should a problem arise during a data transfer:

"CASS ERROR 1" - The data transfer was aborted. Did you press the VALUE button while the tape transfer was still in progress?

"CASS ERROR 2" - The MATRIX-6 detected one or more errors in the single Patch data from among the PATCHES numbered 00 through 99.

"CASS ERROR 3" - The MATRIX-6 detected one or more errors in the SPLIT Patch data from among the SPLITS numbered 00 through 49.

"CASS ERROR 4" - NOT USED

"CASS ERROR 5" - The MATRIX-6 detected one or more errors in the MASTER EDIT Page data.

"CASS ERROR 6" - The MATRIX-6 is unable to read the incoming data because it was made from another MATRIX-6 with an updated software version. To correct this problem, you will need a software revision to make your synthesizer and that particular tape compatible. You should contact your nearest Authorized Oberheim Service Center for prices and availability.

As long as you make and load tapes from the same MATRIX-6, this error will not occur.

"CASS ERROR 7" - The MATRIX-6 is unable to recognize any of the data. This may be due to either recording the data at too high a volume or playing it back at too high a volume. Either of these two situations will cause the data to be distorted. Another possibility that would cause this error is attempting to load in a tape made on another device such as a drum machine, for example.

"CASS ERROR 8" - The cassette speed is too slow. Are your batteries getting low? If you have a speed control on your cassette recorder, was it accidentally changed?

"CASS ERROR 9" - NOT USED

"CASS ERROR 10" - The cassette speed is too fast. Did you put in fresh batteries since this tape was made? If you have a speed control on your cassette recorder, was it accidentally changed?

One other problem that cannot be listed by displaying an Error Message is if you record the data at too low a volume or play it back at too low a volume. The result would be no reaction or response from the MATRIX-6 at all. The display will read "CHECKING DATA" or "LOADING DATA" (depending on what function you're executing) and never change. The VALUE LED will not flash either. The MATRIX-6 cannot "hear" any of the data and, as a result, will continue to wait patiently. You should also recheck your connections.

In addition to the causes mentioned above, some of the more likely causes of cassette errors are:

- The tape heads are dirty, out of alignment, or need to be demagnetized.
- The tape quality is inferior or is not biased for the cassette machine.
- The connecting cables between the MATRIX-6 and your tape recorder are the wrong type, broken, not pushed in the jacks all the way, or the connections are reversed.

Please bear in mind that cassette interfacing requires a lot of patience and experimentation. But once you've found the right settings for your recorder, the cassette function will prove to be very reliable.

VIBRATO

The MATRIX-6 contains a third LFO dedicated for VIBRATO, freeing up LFO 1 and LFO 2 to be used for other modulation purposes if needed. VIBRATO can be on constantly or can be controlled by either LOCAL PEDAL 1, LOCAL LEVER 2, or a MIDI Pedal or Lever, selectable.

30 SPEED - Same as for the LFOs. Variable from 0 to +63.

31 WAVEFORM - Same as for the LFOs. Selectable TRI, DNSAW, UPSAW, SQUAR, RANDM and NOISE.

32 AMPLITUDE - Same as for the LFOs. Variable from 0 to +63.

33 SPEED MOD SOURCE - The SPEED of the VIBRATO can be modulated by either PEDAL 1 or LEVER 2 and is selected in this parameter. If OFF is selected, the SPEED will not be modulated and VIBRATO will run at the rate selected in MASTER EDIT Parameter "30 SPEED".

34 SPEED MOD AMOUNT - If PEDAL 1 or LEVER 2 is selected as the MOD SOURCE above, you can set the AMOUNT of modulation in this parameter. It's the same as the LFOs: variable from 0 to +63.

35 AMP MOD SOURCE - The **AMPLITUDE** (output level) of **VIBRATO** can also be modulated by either **PEDAL 1** or **LEVER 2** and is selected in this Parameter. If turned **OFF**, the **VIBRATO** will run at its output level set in Parameter "**32 AMPLITUDE**".

If **PEDAL 1** or **LEVER 2** is selected, set "**32 AMPLITUDE**" to 0 and let the Pedal or Lever bring it in.

36 AMP MOD AMOUNT - If **PEDAL 1** or **LEVER 2** is selected as the **MOD SOURCE** above, you can set the **AMOUNT** of modulation in this parameter. It's the same as the **LFOs**: variable from 0 to +63.

KEYBOARD

This Sub-Page contains the remaining four performance Parameters of the **MATRIX-6**.

40 VELOCITY SCALE - The **VELOCITY SCALE** determines the **MATRIX-6's** response to how hard the keys are played on the Keyboard. If you are playing a patch that uses **VELOCITY**, one of three scales that determine this response can be selected in this Parameter.

- **LINEAR**: This response curve causes **VELOCITY** to respond in a linear fashion - striking the keys twice as hard produces twice the output.
- **EXPO 1**: This response curve is exponential, just as the ear hears - striking the keys twice as hard produces 10 times the output.
- **EXPO 2**: This response is also exponential but its range is compressed to achieve a less dramatic effect.

41 VELOCITY SENS. (Sensitivity) - This Parameter sets the output of **VELOCITY** from the **MATRIX-6's** Keyboard. As with all other Parameters, its **VALUE** range is from 0 to +63.

42 PEDAL 2 INVERT - The response of **PEDAL 2** is inverted (reversed) in this Parameter. Selecting **ON** status reverses the effect **PEDAL 2** has as a modulation source. **OFF** lets the Pedal operate as it was programmed in the patch.

PEDAL 2 is able to be reversed because it is a "switch" and trigger input. This allows added flexibility in using this input by permitting you to reverse the **ON/OFF** action of a momentary footswitch or allow the **MATRIX-6** to recognize different polarities of the external trigger. **PEDAL 1** is the synthesizer's "continuous" pedal and cannot be inverted by the **MATRIX-6**.

43 LEVERS INVERT - This is the same operation as with "42 PEDAL 2 INVERT". ON reverses the action of both LEVER 1 and LEVER 2. OFF status lets the Levers operate as they were programmed with the patch.

MISC.

The MISC. (Miscellaneous) Sub-Page of MASTER EDIT contains the six "special purpose" Parameters of the MATRIX-6.

50 EDIT RECALL - Were you just editing a patch and accidentally selected another patch? Did you just lose all of your edits and can't remember how you got them? No problem - this Parameter will recall your last edit from memory.

STEP 1: Enter MASTER EDIT Page.

STEP 2: Select "50 EDIT RECALL".

STEP 3: Enter VALUE mode. The display will read "READY?".

STEP 4: Press the "YES" button on the KEYPAD. The display return to the "RECALL EDT" message and the patch will be recalled in its last edited state.

STEP 5: Go back to PATCH EDIT Page and continue editing the patch.

51 PATCH INITIALIZE - As stated throughout the manual, you are able to edit or modify existing patches in the MATRIX-6 using the PATCH EDIT modes. Patches can be altered just a little for whatever minor changes you need, or dramatically, so that the edited patch doesn't sound anything like the original.

Creating new patches from scratch is actually one form of editing. The MATRIX-6 has a Basic Patch stored in its permanent memory that you can edit to create these now sounds. This Basic Patch can be recalled from memory at any time with the PATCH INITIALIZE parameter.

The Basic Patch is useful in creating patches because it gives you only the essential ingredients - the "raw materials" - of a synthesizer sound that you can use to start building your patch. All but the most basic of modulations are not used but easily accessible when you need them.

Refer to page 90 for the chart listing all the default values of the Basic Patch.

PATCH INITIALIZE is accomplished as follows:

STEP 1: Enter PATCH SELECT / NUMBER mode and select a patch that you no longer want or a patch location that is blank. The Basic Patch that is generated by this operation must be edited from one of the MATRIX-6's patch Numbers. Although PATCH INITIALIZE does not itself alter your patches permanently, you may want to select a blank or unnecessary patch before initializing. This is to prevent an important patch from being lost when STORE is used. See STEP 8 below.

STEP 2: Press the orange MASTER EDIT button. We are now in the MASTER EDIT Page.

STEP 3: Enter the PARAMETER mode of the MASTER EDIT Page.

STEP 4: Type in the number 51 on the Keypad. The display will read "INIT PATCH". We are now ready to "initialize" the MATRIX-6 to its Basic Patch that we will use to start "from scratch".

STEP 5: Enter VALUE mode. The display will now read READY?

STEP 6: Press the YES button on the KEYPAD. The display will return to the display "51 INIT PATCH" showing that the patch has been reset to a basic starting point for creating a new patch or experimenting.

STEP 7: You can now return to the PATCH EDIT Page in order to start programming your new patch by editing the Basic Patch.

STEP 8: When you are finished editing the Basic Patch, you must STORE it into memory if you intend to keep it. But before you STORE your new patch, remember that typing in the patch Number erases the patch that is in that location and replaces it with one you just edited.

PATCH INITIALIZE sets all the Basic Patch VALUES to settings called "defaults". A default is simply a choice that the MATRIX-6's computer makes for every Parameter VALUE when told to initialize a patch. Each of these Values represent a setting that you can most easily use as a starting point when creating a new patch. Defaults will remain as they are until you change them and are stored with the patch.

52 CALIBRATE - This Parameter takes up where the TUNE function in the MODE SELECT / MASTER EDIT Page leaves off. Where TUNE simply fine tunes the DCOs, CALIBRATE performs precise adjustments to the VCF Frequency, Pulse Widths, Resonance amount and VCA 2 level on each voice. The CALIBRATE procedure takes a little longer than TUNE to complete.

STEP 1: Enter the MASTER EDIT Page.

STEP 2: Enter PARAMETER mode.

STEP 3: Enter "52 CALIBRATE" Parameter.

STEP 4: Enter VALUE mode and the display will read out "READY?".

STEP 5: Press the YES button and the display will blank out during the Calibration process.

When CALIBRATE has finished, the current patch will be recalled and displayed.

53 DISPLAY BRIGHTNESS - The brightness level of the display can be adjusted to suit your personal needs. VALUE range is from +1 to +31. A VALUE of 1 is the dimmest setting where the display is barely visible and a setting of 31 is the brightest. The 0 - 9 buttons on the KEYPAD as well as the < > and << >> buttons can be used to make this adjustment.

54 SOFTWARE VERSION - The microprocessor inside your MATRIX-6, as we have already discussed, is a computer that handles the calculations required to perform the various functions of the synthesizer. The processor works according to a pre-programmed set of operating instructions called "software". Software can be altered at any time by Oberheim to reflect improvements or additions to these operating instructions. Everytime software is revised, a new index number is assigned to the revision. This is known as the SOFTWARE VERSION.

The VERSION of your MATRIX-6 can be displayed at any time simply by entering this Parameter. Software Updates issued by Oberheim can be retrofitted to any MATRIX-6. Contact your nearest Authorized Oberheim Service Center for prices and availability.

55 MASTER TUNE - After you have performed the TUNE function in MASTER EDIT, the MATRIX-6 can be manually tuned to another instrument in this Parameter. VALUE range is from -63 to +63, which represents a tuning scale of +/- a quarter tone.

PROGRAMMING THE MATRIX-6

SPLIT EDIT PAGE

We've already briefly covered the use of the SPLIT EDIT buttons in the beginning of the manual in the section "Functions of the MODE SELECT Section". All we did there was give a quick overview of what makes up a SPLIT and little on how the buttons work. Now we will get into some detail about programming a SPLIT and how the various Parameters are used in "customizing" each SPLIT to suit each particular need.

As mentioned before, a SPLIT program is simply taking any two single Patches and putting one on the left-hand (LOWER) part of the Keyboard and the other on the right-hand (UPPER) part of the Keyboard. You are also able to determine the performance components of the SPLIT: the point on the Keyboard where the SPLIT occurs, transposition settings, MIDI enables, Voice assignments and the volume balance between the two parts of the Keyboard.

The easiest way to learn how a SPLIT operates is to actually put one together. Use the following procedure:

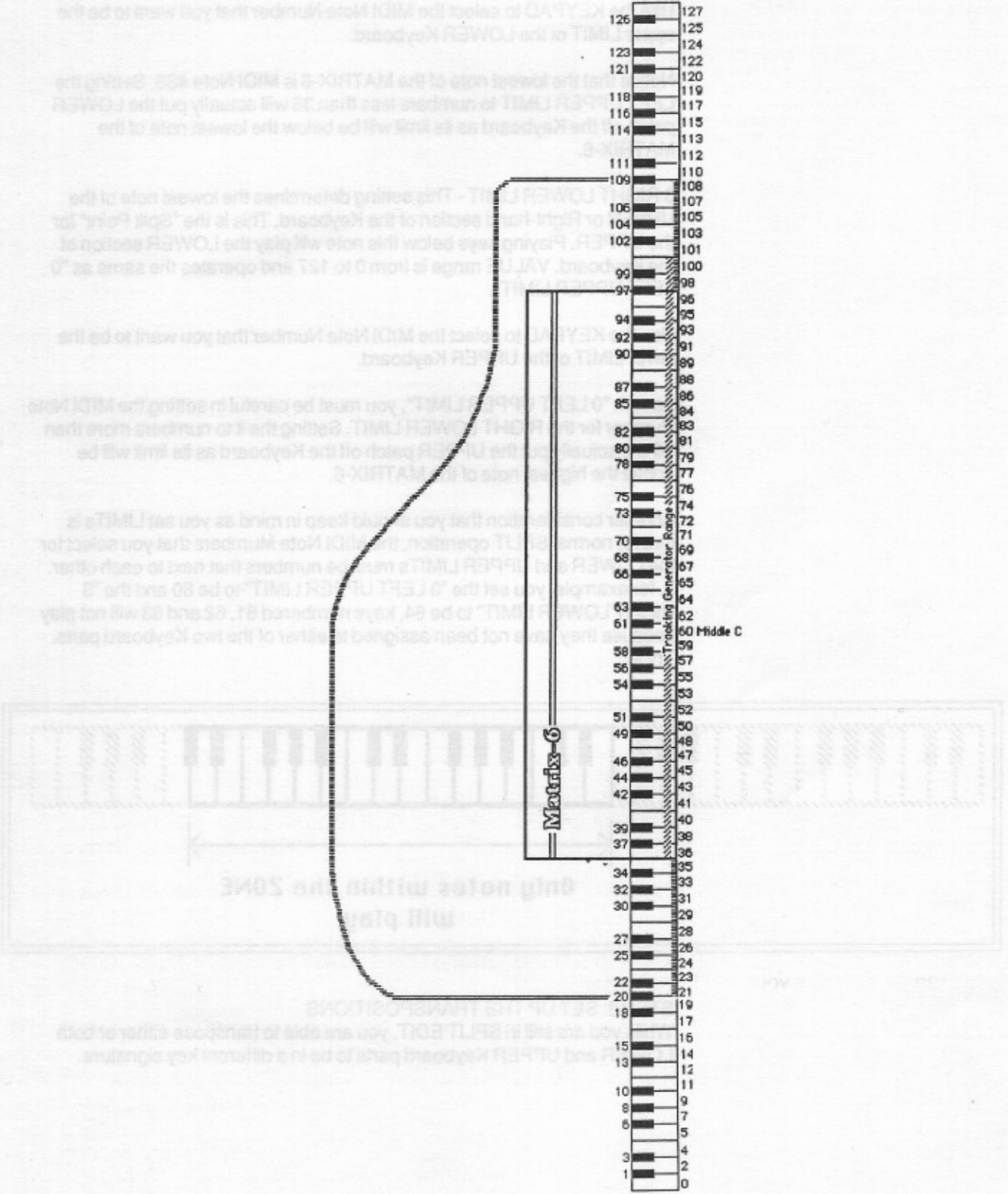
STEP 1: SELECT YOUR PATCHES

- Use the grey SPLITS button to enter the SPLIT SELECT Page.
- Using the KEYPAD, select a blank SPLIT Number.
- Enter LOWER mode and select the Number of the patch that you want to be played on the left part of the Keyboard.
- Enter UPPER mode and select the Number of the patch that you want to be played on the right part of the Keyboard.
- At this time, you can enter NAME mode and give your SPLIT a Name if you want. If not, you can always come back to it later and name it.

We have now determined what Patches we will use and what part of the Keyboard each will play from. The next sections cover how to program the performance components of a SPLIT.

STEP 2: PROGRAM THE SPLIT POINT

0 LEFT UPPER LIMIT - This determines the highest note of the LOWER or Left-hand section of the Keyboard. This is the "Split Point" for the LOWER. Playing keys above this note will play the UPPER section of the Keyboard. VALUE range is from 0 to 127 which represent MIDI note numbers. Look at the illustration on the facing page. This will give you a visual idea of how the range of the MATRIX-6 compares to that of a Grand Piano and then how it compares to MIDI which, as you can see, has the widest range of all - over 10 octaves.



Use the KEYPAD to select the MIDI Note Number that you want to be the upper LIMIT of the LOWER Keyboard.

Notice that the lowest note of the MATRIX-6 is MIDI Note #36. Setting the LEFT UPPER LIMIT to numbers less than 36 will actually put the LOWER patch off the Keyboard as its limit will be below the lowest note of the MATRIX-6.

3 RIGHT LOWER LIMIT - This setting determines the lowest note of the UPPER or Right-hand section of the Keyboard. This is the "Split Point" for the UPPER. Playing keys below this note will play the LOWER section of the Keyboard. VALUE range is from 0 to 127 and operates the same as "0 LEFT UPPER LIMIT".

Use the KEYPAD to select the MIDI Note Number that you want to be the lower LIMIT of the UPPER Keyboard.

As with "0 LEFT UPPER LIMIT", you must be careful in setting the MIDI Note Number for the RIGHT LOWER LIMIT. Setting the it to numbers more than 96 will actually put the UPPER patch off the Keyboard as its limit will be above the highest note of the MATRIX-6.

Another consideration that you should keep in mind as you set LIMITs is that for normal SPLIT operation, the MIDI Note Numbers that you select for the LOWER and UPPER LIMITs must be numbers that next to each other. If, for example, you set the "0 LEFT UPPER LIMIT" to be 60 and the "3 RIGHT LOWER LIMIT" to be 64, keys numbered 61, 62 and 63 will not play because they have not been assigned to either of the two Keyboard parts. Try it.



STEP 3: SET UP THE TRANSPOSITIONS

While you are still in SPLIT EDIT, you are able to transpose either or both LOWER and UPPER Keyboard parts to be in a different key signature.

1 LEFT TRANSPOSE
4 RIGHT TRANSPOSE

These two Parameters operate the same. VALUE range is from -36 to +24 where a setting of 0 indicates no transpose - the patch on that part of the Keyboard will play in its normal key. Each number represents a change of one semitone so you can see that the range gives you the ability to transpose up two octaves or down three octaves:

+24	UP 2 Octaves
+12	UP 1 Octave
+ 7	UP Perf. 5th
+ 5	UP Perf. 4th
0	No Transpose
- 5	DOWN Perf. 4th
- 7	DOWN Perf. 5th
-12	DOWN 1 Octave
-24	DOWN 2 Octaves
-36	DOWN 3 Octaves

STEP 4: SET THE MIDI OUTPUTS

You are able to determine if the SPLIT will allow the two Keyboard sections to transmit and receive MIDI information. Either of the LOWER or UPPER, both or neither can be set to transmit and receive MIDI.

2 LEFT MIDI OUTPUT - The ability for the LOWER Keyboard to transmit and receive MIDI is turned ON or OFF in this Parameter. When OFF, the LOWER will not output MIDI information and will ignore MIDI information coming in. When ON, the LOWER will both transmit and receive MIDI on the BASIC CHANNEL set in MASTER EDIT Parameter "00 BASIC CHANNEL".

5 RIGHT MIDI OUTPUT - The ability for the UPPER Keyboard to transmit and receive MIDI is turned ON or OFF in this Parameter. When OFF, the UPPER will not output MIDI information and will ignore MIDI information coming in. When ON, the UPPER will both transmit and receive MIDI on the BASIC CHANNEL plus One set in MASTER EDIT Parameter "00 BASIC CHANNEL".

This means that the LOWER and UPPER can control or be controlled from two other instruments on two separate MIDI Channels. As an example, if the BASIC CHANNEL is set to #5, the LOWER transmits and receives on MIDI Channel 5 and the UPPER transmits and receives on MIDI Channel 6, and so forth.

The ON or OFF status of LOWER and UPPER is independent. If the LOWER "2 LEFT MIDI OUTPUT" is turned OFF, the UPPER will still transmit and receive if turned ON.

STEP 5: SET THE LEFT / RIGHT BALANCE

There's always a possibility that the two patches that you have selected for LOWER and UPPER each have a different loudness due to the way they were programmed. You can adjust the relative "mix" between the LOWER and UPPER volumes to achieve an even balance. Or you can deliberately make one louder than the other. It's entirely up to you.

6 LEFT - RIGHT BALANCE - VALUE range is from -31 to +31 where 0 represents no change in the relative volumes - if the LOWER is louder, it will stay that way unless the BALANCE is adjusted.

Negative VALUES increase the output of the LOWER *relative* to the UPPER. As you use increasing negative numbers, the LOWER gets louder and the UPPER gets quieter. At a setting of -31, the LOWER is at its maximum output and the UPPER can barely be heard.

Positive VALUES increase the output of the UPPER relative to the LOWER. As you use increasing positive numbers, the UPPER gets louder and the LOWER gets quieter. At a setting of +31, the UPPER is at its maximum output and the LOWER can barely be heard.

STEP 6: SET THE SPLIT'S VOICE ASSIGNMENTS

The MATRIX-6 permits you to configure the voicing of the LOWER and UPPER sections to suit your playing needs.

Another way of looking at the LOWER and UPPER Keyboard sections is to regard them as "ZONES" or specific physical areas of the Keyboard with certain performance characteristics. Thus, the MATRIX-6 has two ZONES - one is called the LOWER (Left) and the other is called the UPPER (Right). These "characteristics" are the SPLIT Parameters that we just set up (0 through 6). We can sum them up as follows:

A ZONE can be defined by its:

NOTE VALUE BOUNDARIES set in Parameters "0 LEFT UPPER LIMIT" and "3 RIGHT LOWER LIMIT".

KEY SIGNATURE set in Parameters "1 LEFT TRANSPOSE" and "4 RIGHT TRANSPOSE".

MIDI STATUS set in Parameters "2 LEFT MIDI OUTPUT" and "5 RIGHT MIDI OUTPUT".

VOLUME OUTPUT set in Parameter "6 LEFT - RIGHT BALANCE".

VOICE ASSIGNMENTS set in Parameter "7 VOICE / ZONE SELECT" discussed below.

7 VOICE / ZONE SELECT - You are given four different ways to play the voices in a SPLIT:

2/4 allows you to play Voices 1 & 2 from the LOWER ZONE and Voices 3, 4, 5 & 6 from the UPPER ZONE.

4/2 assigns Voices 1, 2, 3 & 4 to the LOWER ZONE and Voices 5 & 6 to the UPPER ZONE.

6/0 assigns all six Voices to the LOWER ZONE and no Voices to the UPPER ZONE.

0/6 assigns all six Voices to the UPPER ZONE and no Voices to the LOWER ZONE.

The question becomes "Why would I want to have a ZONE play no Voices?" The 6/0 and 0/6 options allow one ZONE to play the MATRIX-6 Voices only and the other to play a MIDI instrument only, as one possibility. Just be sure to turn ON the MIDI for that ZONE in either "2 LEFT MIDI OUTPUT" or "5 RIGHT MIDI OUTPUT".

OVERLAPPING THE ZONES

One other way of using the LIMITS (Parameters 0 and 3) is to set the MIDI Note Number for each ZONE so that the "0 LEFT UPPER LIMIT" is set to a higher number than the "3 RIGHT LOWER LIMIT".

As an example, set the "0 LEFT UPPER LIMIT" Note Number to 72 and the "3 RIGHT LOWER LIMIT" Note Number to 60. The overlap occurs from Notes 60 through 72 and this octave is shared by both ZONES.

STORING A SPLIT

After you have set up a SPLIT to be just the way you want it, don't forget to STORE it. The procedure is the same as in storing PATCHES but the difference is that you must be in the NUMBER mode of the SPLIT SELECT Page. Press and hold STORE. While you are holding down STORE, type in the 2-digit SPLIT Number on the Keypad. Your SPLIT program is now stored in memory.

Matrix-6

Patch _____

Date _____

	0	1	2	3	4	5	6	7	8	9
00 DCO1	Freq	Fr/Lf1	Sync	Pw	PW/Lf2	Wave	Wsel	Levers	Keybd	Click
10 DCO2	Freq	Fr/Lf1	Detune	Pw	PW/Lf2	Wave	Wsel	Levers	Keybd	Click
20 VCF/VCA	Mix	Freq	Fr/En1	Fr/Prs	Res	Levers	Keybd	E-VCA	VCA/Vel	VCA/En2
30 FM/TRCK	FM	FM/En3	FM/Prs	TrackIn	Track1	Track2	Track3	Track4	Track5	
40 RMP/PRT	R1 Spd	Trigger	R2 Spd	Trigger	Port	Spd/Vel	Mode	Legato	Keymode	
50 ENV1	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
60 ENV 2	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
70 ENV 3	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
80 LFO 1	Speed	Sp/Prs	Wave	Retrig	Amp	Amp/Rp2	Trigger	Lag	Sample	
90 LFO 2	Speed	Sp/Prs	Wave	Retrig	Amp	Amp/Rp2	Trigger	Lag	Sample	

Matrix Modulation

Performance Notes

	Source	Amount	Destination
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			

PROGRAMMING THE MATRIX-6

PART 4: CREATING A PATCH

Now that we have covered each of the MATRIX-6's edit functions, we are ready to put this information to practical use. In this section of the manual, we will create an actual patch starting from the synthesizer's Basic Patch. This will allow you to see how the various Edit Parameters work together in programming a sound from scratch.

For our purposes, we will put together a simple String Ensemble-type sound. The following procedure will take us step-by-step through the programming process.

STEP 1: Initialize the MATRIX-6 by performing the "51 PATCH INITIALIZE" function covered in the MASTER EDIT section. It will be easiest for us to start with the Basic Patch.

STEP 2: Set up DCO 1 by programming the parameters as follows:

00	Freq	Fr/Lf1	Sync	Pw	PW/Lf2	Wave	Wsel	Levers	Keybd	Click
DCO1	12	+20	0	31	0	0	WAVE	BOTH	KEYBD	OFF

00 DCO1 FREQ - We will transpose the DCO up one octave. VALUE = +12.

01 DC1F/LF1 - DC0 1 will be modulated by LFO 1 to obtain a small amount of vibrato. VALUE = +20.

02 DCO 1 SYNC - Synchronizing the DCOs is not used in this particular patch because we will use a small amount of detune and LFO modulation between the oscillators in order to add richness to the sound. VALUE = 0.

03 DCO1 PW - PATCH INITIALIZE defaults this VALUE to 31. Since the Pulse wave is not used for DCO 1 in this patch, this setting can be left the way it is.

04 DC1PW/LF2 - PATCH INITIALIZE defaults this VALUE to 0. Since we are not using a Pulse wave in this patch, PW MOD would be pointless. Leave this setting as it is.

05 DCO1 SHAPE - We want to use a Sawtooth WAVE for this type of sound. VALUE = 0.

06 DCO1 - PATCH INITIALIZE defaults to WAVE which we will use for this patch, so leave this setting as is. We set its SHAPE above to a Sawtooth for our purposes.

07 DC1 LEV - Default setting = BOTH. You may want to use LEVER 1 and LEVER 2 for Pitch Bend and Vibrato as you play the patch, so we will keep this setting.

PROGRAMMING THE MATRIX-6

08 DC1 KEY - Default setting = KEYBD. We want the Keyboard to control DCO 1 as normal, so keep this setting.

09 DCO 1 CLIK - Default setting = OFF. Key Click is not usually associated with a String sound; leave this Parameter OFF.

STEP 3: Set up DCO 2 as follows:

10	Freq	Fr/Lf1	Detune	Pw	PW/Lf2	Wave	Wsel	Levers	Keybd	Click
DCO2	12	0	+8	31	-55	0	BOTH	BOTH	KEYBD	OFF

10 DCO 2 FREQ - We'll program DCO 2 to have a unison pitch with DCO 1. VALUE = 12.

11 DC2/LF1 - Default setting = 0. We'll leave this setting alone in order to keep the pitch of DCO 2 stable. DCO 1 being modulated slightly by LFO 1 produces a warm, moving detuning effect relative to DCO 2.

12 DCO 2 DETU - Using a slight amount of DETUNE enhances the detuning effect of the DCO 1 "01 FREQ MOD BY LFO 1". VALUE = +8.

13 DCO 2 PW - The Pulse Width of DCO 2 will be modulated by LFO 2 in the next Parameter. For our purposes in this patch, we want to use a Square wave. Set VALUE to 31.

14 DC2PW/LF2 - We want a wide Pulse Width modulation on the Square wave we set up in the previous Parameter. Using a negative number inverts the LFO's effect relative to LFO 1 (which is modulating DCO 1 FREQ.) for an enhanced modulation. Set VALUE to -55.

15 DCO2 SHAPE - We will again use a Sawtooth wave for this oscillator and use the same setting as for DCO 1. Value = 0.

16 DCO2 - For added harmonic richness, we will use a combination Pulse and Sawtooth waves for DCO 2. The Pulse Width modulation that we are using in Parameter 14 creates a unique harmonic motion as the Pulse Width changes relative to the Sawtooth, which is stable. VALUE = BOTH.

17 DC2 LEV - Since we are using Pitch Bend and Vibrato on DCO 1, we want to keep the default setting for DCO 2 as well. VALUE = BOTH.

18 DC2 KEY - Same as for DCO 1. We'll keep the default setting: VALUE = KEYBD.

19 DCO2 CLIK - Same as for DCO 1. Key Click is not needed for this sound.
VALUE = OFF.

STEP 4: The VCF / VCA Sub-Page is programmed as follows:

20	Mix	Freq	Fr/En1	Fr/Prs	Res	Levers	Keybd	E-VCA	VCA/Vel	VCA/En2
VCF/VCA	31	35	+40	+25	12	OFF	OFF	50	+57	+63

20 DCO MIX - Default VALUE = 31. The patch calls for equal volume from both DCOs so we'll use the default setting.

21 VCF FREQ - We want to have the Filter set to an initial level a little lower than the default setting of 55. ENV 1 will "open" the VCF to add the needed brightness. VALUE = 35.

22 VCFF/EN1 - The modulation amount of ENV 1 affecting the Filter is "fine tuned" to a VALUE of 40. You can experiment with different VALUES to get different brightness levels as needed.

23 VCFF/ PRS - For expression, Pressure is routed to the VCF Frequency. VALUE = 25.

24 VCF RES - A very small amount of Resonance is added to the Filter as an enhancement of the upper harmonics. VALUE = 12.

25 VCF LEV - The effect of LEVER 1 and LEVER 2 is not necessary on the Filter in this patch. VALUE = OFF.

26 VCF KEY - Default VALUE = KEYBD. We will set up a custom Keyboard scaling for the Filter using TRACK in the next Sub-Page. Set this VALUE to OFF.

27 VCA1 VOL - Default VALUE = 63. In the next Parameter we will set up VCA 1 to get louder by VELOCITY. So a setting of 50 for this Parameter will give us the necessary "headroom" for this to occur.

28 VCA1/ VEL - The setting of +57 gives a useable VELOCITY amount for our purposes in setting up this function. Adjust as needed to suit your playing style.

29 VCA2/EN2 - Default VALUE = +63. This maximum setting opens the VCA to maximum output and is suitable for the patch.

STEP 5 - Program the FM / TRACK Sub-Page as follows:

30	FM	FM/En3	FM/Prs	TrackIn	Track1	Track2	Track3	Track4	Track5	
FM/TRCK	0	0	0	KEYB	17	26	31	47	52	

30 VCF FM - Default VALUE = 0.

31 FMOD/EN3 - Default VALUE = 0.

32 FMOD/PRS - Default VALUE = 0.

FM is not required in this patch. The default settings should not be changed.

33 TRACK IN - Since we turned the Keyboard control OFF in the VCF (refer back to parameter 26), we'll use it as the input of the Tracking Generator and custom-shape its control curve. VALUE = KEYB.

34 - 38 TRAK PT 1 to 5 - The five Track Points are set to give TRAK a curve that opens the VCF more for low notes and slightly closes it for uppermost notes on the Keyboard. Thus, the sound gets somewhat brighter at the low end and less towards the top. Set VALUES: PT1 = 17, PT2 = 26, PT3 = 31, PT4 = 47, and PT5 = 52.

STEP 6: The RAMP / PORTAMENTO Sub-Page is set up as follows:

40	R1 Spd	Trigger	R2 Spd	Trigger	Port	Spd/Vel	Mode	Legato	Keymode	
RMP/PRT	35	STRIG	0	STRIG	0	0	LINEAR	OFF	ROTATE	

40 RAMP1 SPD - We will use RAMP 1 to increase the Amplitude of LFO 1. In other words, RAMP 1 will increase LFO 1 gradually to achieve a delicate string vibrato. VALUE = 35.

41 RAMP1 - It will suit our purposes for this patch to have the LFO fade in and stay on until a new voice is played. Keep the default VALUE of STRIG.

42 RAMP2 SPD

43 RAMP2

RAMP 2 is not used in the patch. Leave their default VALUES as they are.

- 44 PORTAMENTO RATE
- 45 PORTAMENTO MOD BY VELOCITY
- 46 PORTAMENTO MODE
- 47 LEGATO PORTAMENTO

Portamento is not used in this patch. Do not change their default VALUES.

48 KEYBD - The KEYBOARD MODE defaults to ROTATE. We can use this since we need a Keyboard voice assignment to allow for overlaps in the Release times of the Envelopes. You may want to experiment with ROTROB later.

STEP 7: ENV 1 is used in this patch to add dynamics to the VCF. Its application is described below. But first, program ENV 1 according to the following chart:

50	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
ENV1	0	15	10	63	50	48	+63	SPRESET	NORM	NORMAL

50 ENV1 DEL - No delay is needed on this VCF Envelope. Keep the default setting of 0.

51 ENV1 ATK - A brief ATTACK on the VCF is just enough to brighten the sound slightly (remember, this works in conjunction with VCF settings) at its beginning. VALUE = 15.

52 ENV1 DCY - Since we will be using a SUSTAIN level of 63, DECAY has no effect. Use the default VALUE of 10.

53 ENV1 SUS - For our purposes in creating this patch, we want the VCF to remain open while keys are being held on the Keyboard so that the sound will retain its brightness. VALUE = +63.

54 ENV1 REL - Using a VALUE of 50 provides a time period for the VCF Frequency to diminish after the keys are let go. Since ENV 1 is contouring the Filter's Frequency this Parameter determines how long it will take for the VCF Frequency to reach its initial level after the keys are released.

55 ENV1 AMP - We will need to set ENV 1's output level to a setting lower than full. This is because in the next parameter, we are going to use VELOCITY to raise the output thus increasing the VCF. Your playing dynamics in this case will add a small amount of brightness to the sound. VALUE = 48.

56 ENV1/VEL - Use the default VALUE of +63. This will give us maximum VELOCITY modulation to ENV 1 Amplitude.

57 ENV1 (Trig) - We will set up the triggering for ENV 1 so that it will start from the beginning every time a new voice is played. VALUE = SRESET.

58 ENV1 (Mode) - In order to expand the playability of this patch, we will leave ENV 1 at its default of Normal. In STEP 12, we will set up several MATRIX MOD combinations, one of which applies inverted RELEASE VELOCITY to the Release stage. This will provide a shorter fade-out when keys are released quickly. VALUE = NORM.

59 ENV1 (LFO1 Trig) - We only want the Keyboard to control ENV 1 as a trigger source, so leave the Default VALUE of NORMAL as it is.

STEP 8: ENV 2 is used in this patch to add dynamics to the VCA. Its application is described as follows:

60	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
ENV 2	0	30	20	50	45	40	+63	SRESET	NORM	NORMAL

60 ENV2 DEL - As with ENV 1, no delay is required for this patch. Keep the default VALUE at 0.

61 ENV2 ATK - In order to achieve the "ensemble" effect for this string patch, a slightly longer ATTACK time is required. VALUE = 30.

62 ENV2 DEC -

63 ENV2 SUS -

Using a VALUE of 50 for the SUSTAIN level permits the sound to decrease slightly in volume after the ATTACK stage. The DECAY rate diminishes the volume and is set to a VALUE of 20.

64 ENV2 REL - We will approach the programming of ENV 2 like we did with ENV 1. We'll give it a long Release time but also set up a MATRIX MOD routing that uses negative RELEASE VELOCITY, allowing you to shorten the Release time by letting go of the keys quickly. VALUE = 45.

65 ENV2 AMP - As with ENV 1, we will add VELOCITY dynamics in a MATRIX MOD combination. To allow for enough headroom, set VALUE to 40.

66 ENV2/VEL - VALUE = +63.
 67 ENV2 (Trig) - VALUE = SRESET
 68 ENV2 (Mode) - VALUE = NORM
 69 ENV2 (LFO1 Trig) - VALUE = NORMAL
 ENV 2 dynamics and Trigger modes are set up to act the same as ENV 1, although their effect on the sound will naturally be different since ENV 1 modulates the VCF and ENV 2 modulates the VCA. Program their VALUES as listed above.

STEP 9: ENV 3 is not used in this patch, so its defaults should remain as they are.

STEP 10: Set up LFO 1 according to the chart below:

80	Speed	Sp/Prs	Wave	Retrig	Amp	Amp/Rp2	Trigger	Lag	Sample	
LFO 1	57	0	TRI	0	63	0	MRESET	OFF	KEYBD	

80 LFO1 SPD - A high LFO rate is required to simulate violin string vibrato. VALUE = 57.

81 LF1S/PRS - We'd like to keep the LFO speed constant throughout the duration of the sound, therefore "SPEED MOD BY PRESSURE" is not required. Keep the default VALUE of 0.

82 LFO1 (Wave) - The default value of TRI (triangle wave) is the most suitable modulation shape for vibrato for our purposes in this patch. We'll use this one.

83 LF1 RETRG - We will use the Multiple-Reset trigger mode in Parameter 86. We want the LFO to retrigger at the point where its cycle starts. Use its default VALUE of 0.

84 LFO 1 AMP - We will want to use the LFO at full output. Its effect on the pitch of DCO 1 was "fined tuned" by Parameter 02 to a setting of +20. VALUE = 63.

85 LF1A/RP1 - The amplitude of LFO 1 should remain constant. RAMP 1 modulation is therefore not necessary. Use the default VALUE of 0.

86 LFO1 (Trig mode) - Use the Multiple-Reset mode so that the LFO will start at the retrigger point (set in Parameter 83) every time a new note is played. VALUE = MRESET.

87 LFO1 LAG - The TRI wave that we selected is suitable as the modulation shape. No LAG is required to re-shape it. Leave it OFF.

88 L1 SMP - Since we did not select SAMPL as a waveform (we're using TRI), this Parameter is ignored in this patch.

STEP 11: LFO 2 should be set up like this:

90 LFO 2	Speed	Sp/Prs	Wave	Retrig	Amp	Amp/Rp2	Trigger	Lag	Sample
	40	0	TRI	0	0	+63	STRIG	OFF	KEYBD

90 LFO2 SPD - An excellent way to increase the "animation" of a string sound is to use two different LFO speeds that are going to two different destinations. LFO 2 is modulating the Pulse Width of DCO 2 which itself produces its own type of vibrato. Use a VALUE of 40.

91 LF2S/PRS - As with LFO 1, we'd like to keep the speed of LFO 2 constant. Keep the default VALUE at 0.

92 LFO2 (Wave) - Same as with LFO 1. We'll keep the default TRI waveform.

93 LF2 RETRG - LFO 2 will not need to be retriggered since RAMP 2 will fade it in. The default VALUE of 0 should be kept.

94 LFO 2 AMP - Default VALUE = 0. Use this setting as RAMP 2 will be set in the next Parameter to bring it in gradually as a modulation.

95 LF2A/RP2 - We'll want RAMP 2 to fade in LFO 2 to its maximum output. And as with LFO 1, the amplitude LFO 2 has already been fine adjusted at its destination "14 PW MOD BY LFO 2". VALUE = +63.

96 LFO2 (Trig mode) - Since the LFO fades in by the control of RAMP 2, special triggering is not necessary. The start point of the LFO's cycle is barely heard, if at all, by the fade-in. Keep the default VALUE of STRIG.

97 LFO2 LAG - Same as with LFO 1. LAG is not required so leave it OFF.

98 L2 SMP - Same as with LFO 1. Since we selected TRI as our waveform, this Parameter is ignored.

STEP 12: In order to add dynamic expression and performance control to our String patch, we will construct two MATRIX MODULATION™ combinations using VELOCITY and one using RELEASE VELOCITY. The fourth MATRIX MOD uses TRACK to custom-tailor the Keyboard control of the VCF.

Enter the MATRIX MOD Page of the PATCHES Mode and set up the following:

Matrix Modulation

	Source	Amount	Destination
0			
1			
2			
3			
4	VEL	-50	E1ATK
5	VEL	-55	E2ATK
6	RVEL	-55	E2REL
7	TRAK	+63	VCFFQ
8			
9			

4 VEL -50 E1ATK

VELOCITY is inverted in order to shorten the ATTACK time of ENV 1 which is modulating the Filter. Playing harder causes the VCF to open faster making the sound bright at the beginning. Playing softer lets the VCF open according to the ATTACK time set in Parameter 51.

5 VEL -55 E2ATK

Negative VELOCITY is used here again to shorten the ATTACK time of ENV 2 modulating the VCA (the patch's overall loudness). Playing harder causes the sound to reach peak volume quicker and playing softer causes the Strings to fade in by the ATTACK time set in Parameter 61.

6 RVEL -55 E2REL

Negative (inverted) RELEASE VELOCITY is used to modulate the RELEASE time of ENV 2 that is controlling the VCA. You can control how fast the sound will die out depending upon how quickly keys are let go. The sound will end abruptly with fast key release and fade out much slower with a slow key release. We set the maximum RELEASE time in Parameter 64.

7 TRAK +63 VCFFQ

We defeated the Keyboard control of the VCF in Parameter 26 in order to select TRACK as the modulation source here. In Parameter 33, we selected KEYB as the INPUT controller and defined its control curve with Parameters 34 through 38. In setting up this MATRIX MOD, use an AMOUNT value of +63. We want TRACK to add or subtract to the VCF FREQUENCY as you play notes up and down the Keyboard. Try using lower AMOUNTs and hear how the brightness of the patch diminishes. Inverting the AMOUNT lowers the Filter content until no sound is heard.

Destination	Amount
E2ATK	-55
E2ATK	-55
E2REL	-55
VCFFQ	+63

STEP 13: NAME IT - Enter the PATCH SELECT Page of the PATCHES Mode. Select NAME and call it anything you want. We call it "STRINGS1" but if you have a better name it's OK by us.

STEP 14: STORE IT - If you would like to keep this patch, stay in the PATCH SELECT Page but select NUMBER. Press and hold the STORE button and type in the two-digit Patch Number of your choice. To prevent unwanted editing of your new patch, you may want to enable PROTECT while you're at it.

WARRANTY

IF YOU HAVE A PROBLEM

The staff at E.C.C. / Oberheim wishes to thank you for purchasing an Oberheim product and hope that you will remain a long-time Oberheim player. We are confident that your instrument will provide you with years of excellent service as each unit is thoroughly tested and inspected before it leaves the factory. The Owner's Manual was written to be logical and comprehensive so that you will be able to get the most out of your Oberheim.

Although we have taken great care in manufacturing your Oberheim instrument and preparing thorough documentation in the manual, products at this level of technology may require servicing. The following Warranty Policy outlines your rights and responsibilities, and also lists several limitations of coverage and important exclusions. We strongly recommend that you read the following policy statements carefully and refer to the procedure at the end in obtaining service for your Oberheim product should it ever be needed.

OBERHEIM LIMITED CUSTOMER WARRANTY (Non-Transferable)

Oberheim, a Division of E.C.C. Development Corporation, warrants its products, when purchased from an Authorized Oberheim Dealer, to be free from defects in materials or workmanship for a period of 12 months from the date of purchase. Warranty service is effective and available to the original purchaser ONLY, and only upon completion and return of the Oberheim Warranty Registration card within 14 days of the date of purchase.

To obtain service under this Warranty, the product must, upon discovery of the defect, be properly packed and shipped to the nearest Oberheim Authorized Service Center. The party requesting Warranty service must provide proof of original ownership and date of purchase of the product by supplying to the Oberheim Authorized Service Center either the Warranty Registration Sticker applied to the unit itself, or the sales receipt. In the event that both have been lost or misplaced, the Service Center shall, at the Service Center's or owner's expense, contact Oberheim to verify the Warranty status of the product.

If the Warranty has been verified, Oberheim will, without charge for parts or labor, either repair or replace the defective part(s).

PRICES AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

WHAT IS COVERED

Oberheim warrants that it will make all necessary adjustments, repairs or replacements at no cost to the original owner within the first 12 months from the purchase date if:

1. The product fails to perform its specified functions due to failure of one or more of its components.

2. The product fails to perform its specified functions due to defects in workmanship.

3. The product is maintained and operated by the owner in strict accordance with the written instructions for proper maintenance and use as specified in the Owner's Manual.

WHAT IS NOT COVERED

Before purchasing and using, the owner shall determine the suitability of the product for his/her intended use, and the owner assumes all risk and liability whatsoever in connection therewith. Oberheim shall not be liable for any injury, loss or damage, direct or consequential, arising out of the use or inability to use the product.

The Warranty provides only the benefits specified and does not cover defects or repairs needed as a result of acts beyond the control of Oberheim including but not limited to:

1. Damage caused by abuse, accident or negligence.
2. Any tampering, alteration or modification of the product's mechanical or electronic components.
3. Failure to operate the product in strict accordance with the procedures written in the Owner's Manual.
4. Repairs performed by unauthorized persons.
5. Damage caused by fire, smoke, falling objects, water or liquids etc. or acts of God such as earthquakes, floods, lightning, tornadoes, storms, etc.
6. Damage caused by operation on improper voltages.

IMPORTANT NOTICE: The warranty is VOID if the product is electronically or mechanically modified, altered or tampered with in any way.

Oberheim shall not be liable for costs involved in packing or preparing the product for shipping with regards to time, labor or materials, shipping and freight costs, or time and expenses involved in transporting the product to and from an Oberheim Authorized Service Center, an Oberheim Authorized Dealer or the Oberheim Factory. If a suitable shipping container is unavailable, a replacement carton may be purchased from Oberheim. Oberheim will not cover under Warranty an apparent malfunction that is determined to be in fact user error, or the owner's inability to use the product.

THE DURATION OF ANY OTHER WARRANTIES, WHETHER IMPLIED OR EXPRESS, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTY OF MERCHANTABILITY, IS LIMITED TO THE DURATION OF THE EXPRESS WARRANTY HEREIN.

Oberheim hereby excludes incidental and consequential damages, including but not limited to:

1. Loss of time
2. Inconvenience
3. Delay in performance of the Warranty
4. The loss of use of the product
5. Commercial loss
6. Breach of any express or implied warranty, including the Implied Warranty of Merchantability, applicable to this product.

Oberheim shall not be liable for damage or loss resulting from the negligent or intentional acts of the shipper or his contract affiliates. The owner of the product should contact the shipper for proper claims procedures in the event of damage or loss resulting from shipment.

HOW TO OBTAIN WARRANTY SERVICE

If you have reason to believe that your Oberheim product is malfunctioning or otherwise not operating properly, do the following:

STEP 1: CONTACT YOUR NEAREST OBERHEIM SERVICE CENTER

Telephone them as soon as the problem is discovered. Be prepared to discuss the problem as completely and accurately as possible. A current roster of Authorized Service Centers is included with the Owner's Manual.

The Service Center will let you know when the repair can be scheduled, the approximate number of days it will take to complete the repair and if the required parts are in stock or if they need to be ordered.

Take the failed unit to the Service Center along with the sales receipt as the Service Center will need to verify the Warranty. If you have returned your Warranty Card, the Warranty Verification Sticker affixed to the bottom panel of your unit is sufficient to prove warranty status.

The Service Center will then inspect the product and take the necessary steps to complete the repair.

If the product continues to malfunction or another problem different from the original problem occurs, contact the service center IMMEDIATELY so that the problem can be resolved without delay or further complications.

STEP 2. CONTACT YOUR OBERHEIM DEALER

If you feel that your problem has not been resolved, contact the Oberheim Dealer where the product was purchased. It will be most expedient if you discuss the matter personally with the salesperson who sold you the instrument. By making the salesperson aware of your situation, they will be in a better position to assist you in getting the problem resolved.

STEP 3: CALL OR WRITE TO THE OBERHEIM FACTORY

If you believe that the problem is still unresolved after you have contacted the Service Center and Dealer, contact the Oberheim factory. In an attempt to resolve your problem, we will work with your local Service Center or Dealer to review and verify the information and facts. Based on these facts, we will advise or consult with the Service Center or Dealer as appropriate.

Written correspondence should be addressed to:

OBERHEIM
A Division of E.C.C. Development Corporation
Customer Services Department
2230 S. Barrington Avenue
Los Angeles, CA 90064

Every attempt will be made to respond to your letter as quickly as possible.

If you would prefer to contact the Oberheim factory by telephone, a Service Representative will be available to assist you. Our telephone hours are from 1:00 PM to 4:00 PM West Coast Time, Monday through Friday *only*. The Customer Services Department can be reached at 213-479-4851. Collect calls cannot be accepted.

When calling the Oberheim offices:

- Have your instrument and amplifier turned on and in front of you when you are on the phone. You should also have your Owner's Manual with you.
- Tell the receptionist that you are having a problem with your Oberheim product and ask to speak to a Service Representative.
- Be prepared to provide the following information:
 1. Your name.
 2. The model of the product.
 3. The product's Serial Number.
 4. The name of the Dealer from where it was purchased.
 5. The exact date of purchase.
 6. A complete description of the problem.

When writing to Oberheim, please also include your full address, telephone number and the best time to call should it be necessary to call you rather than answer your letter.

Matrix-6

Patch **BASIC PATCH**

Date _____

	0	1	2	3	4	5	6	7	8	9
00	Freq	Fr/Lf1	Sync	Pw	PW/Lf2	Wave	Wsel	Levers	Keybd	Click
DCO1	0	0	0	31	0	31	WAVE	BOTH	KEYBD	OFF
10	Freq	Fr/Lf1	Sync	Pw	PW/Lf2	Wave	Wsel	Levers	Keybd	Click
DCO2	0	0	+2	24	0	31	PULSE	BOTH	KEYBD	OFF
20	Mix	Freq	Fr/En1	Fr/Prs	Res	Levers	Keybd	E-VCA	VCA/Vel	VCA/En2
VCF/VCA	31	55	+42	0	0	OFF	KEYBD	63	0	+63
30	FM	FM/En3	FM/Prs	Trackin	Track1	Track2	Track3	Track4	Track5	
FM/TRCK	0	0	0	KEYBD	0	15	31	47	63	
40	R1 Spd	Trig	R2 Spd	Trig	Port	Spd/Vel	Mode	Legato	Keymod	
RMP/PRT	0	STRIG	0	STRIG	0	0	LINEAR	OFF	REASGN	
50	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
ENV1	0	0	10	50	10	40	+63	STRIG	NORM	NORMAL
60	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
ENV 2	0	0	10	50	10	40	+63	STRIG	NORM	NORMAL
70	Delay	Attack	Decay	Sustain	Release	Amp	Amp/Vel	Trigger	Mode	Lf1trig
ENV 3	0	0	20	0	20	40	+63	STRIG	NORM	NORMAL
80	Speed	Sp/Prs	Wave	Retrig	Amp	Amp/Rp2	Trig	Lag	Sample	
LFO 1	40	0	TRI	0	0	+63	MRESET	OFF	KEYBD	
90	Speed	Sp/Prs	Wave	Retrig	Amp	Amp/Rp2	Trig	Lag	Sample	
LFO 2	30	0	TRI	0	0	+63	STRIG	OFF	KEYBD	

Matrix Modulation

Performance Notes

	Source	Amount	Destination
0	PED 2	0	E1 REL
1	PED 2	0	E2 REL
2	TRAK	0	VCFFQ
3	LEV 3	0	VCFFM
4			
5			
6			
7			
8			
9			

PATCH EDIT

DCO 1	DCO 2	VCF/VCA	FM/TRACK
00 FREQUENCY	10 FREQUENCY	20 BALANCE	30 VCF FM AMOUNT
01 FREQ MOD BY LFO 1	11 FREQ MOD BY LFO 1	21 FREQUENCY	31 FM MOD BY ENV 3
02 SYNC	12 DETUNE	22 FREQ MOD BY ENV 1	32 FM MOD BY PRESSU
03 PULSE WIDTH	13 PULSE WIDTH	23 FREQ MOD BY PRESSURE	33 TRACK INPUT
04 PW MOD BY LFO 2	14 PW MOD BY LFO 2	24 RESONANCE	34 TRACK POINT 1
05 WAVE SHAPE	15 WAVE SHAPE	25 LEVERS	35 TRACK POINT 2
06 WAVE SELECT	16 WAVE SELECT	26 KEYBOARD/PORTAMENTO	36 TRACK POINT 3
07 LEVERS	17 LEVERS	27 VCA1 VOLUME	37 TRACK POINT 4
08 KEYBOARD/PORTAMENTO	18 KEYBOARD/PORTAMENTO	28 VCA1 MOD BY VELOCITY	38 TRACK POINT 5
09 KEY CLICK	19 KEY CLICK	29 VCA2 MOD BY ENV 2	
ENV 1	ENV 2	ENV 3	LFO 1
50 DELAY	60 DELAY	70 DELAY	80 SPEED
51 ATTACK	61 ATTACK	71 ATTACK	81 SPEED MOD BY PRE
52 DECAY	62 DECAY	72 DECAY	82 WAVEFORM
53 SUSTAIN	63 SUSTAIN	73 SUSTAIN	83 RETRIGGER POINT
54 RELEASE	64 RELEASE	74 RELEASE	84 AMPLITUDE
55 AMPLITUDE	65 AMPLITUDE	75 AMPLITUDE	85 AMP MOD BY RAMP
56 AMP MOD BY VELOCITY	66 AMP MOD BY VELOCITY	76 AMP MOD BY VELOCITY	86 TRIGGER MODE
57 TRIGGER MODE	67 TRIGGER MODE	77 TRIGGER MODE	87 LAG
58 ENVELOPE MODE	68 ENVELOPE MODE	78 ENVELOPE MODE	88 SAMPLE INPUT
59 LFO 1 TRIGGER	69 LFO 1 TRIGGER	79 LFO 1 TRIGGER	

MATRIX MODULATION

RAMP/PORTAMENTO

- 40 RAMP 1 RATE
- 41 RAMP 1 TRIGGER
- 42 RAMP 2 RATE
- 43 RAMP 2 TRIGGER
- 44 PORTAMENTO RATE
- 45 PORT MOD BY VELOCITY
- 46 PORTAMENTO MODE
- 47 LEGATO PORTAMENTO
- 48 KEYBOARD MODE

LFO 2

- 90 SPEED
- 91 SPEED MOD BY KEYBOARD
- 92 WAVEFORM
- 93 RETRIGGER POINT
- 94 AMPLITUDE
- 95 AMP MOD BY RAMP 2
- 96 TRIGGER MODE
- 97 LAG
- 98 SAMPLE INPUT

SOURCES

- 00 DELETE MODULATION
- 01 ENVELOPE 1
- 02 ENVELOPE 2
- 03 ENVELOPE 3
- 04 LFO 1
- 05 LFO 2
- 06 VIBRATO
- 07 RAMP 1
- 08 RAMP 2
- 09 KEYBOARD
- 10 PORTAMENTO
- 11 TRACKING GENERATOR
- 12 KEYBOARD GATE
- 13 VELOCITY
- 14 RELEASE VELOCITY
- 15 PRESSURE
- 16 PEDAL 1
- 17 PEDAL 2
- 18 LEVER 1
- 19 LEVER 2
- 20 LEVER 3 = LEVER 2 REVERSE

DESTINATIONS

- 00 DELETE MODULATION
- 01 DCO 1 FREQUENCY
- 02 DCO 1 PULSE WIDTH
- 03 DCO 1 WAVE SHAPE
- 04 DCO 2 FREQUENCY
- 05 DCO 2 PULSE WIDTH
- 06 DCO 2 WAVE SHAPE
- 07 DCO 1 - DCO 2 MIX
- 08 VCF FM BY DCO 2
- 09 VCF FREQUENCY
- 10 VCF RESONANCE
- 11 VCA 1 VOLUME
- 12 VCA 2 VOLUME
- 13 ENV 1 DELAY
- 14 ENV 1 ATTACK
- 15 ENV 1 DECAY
- 16 ENV 1 RELEASE

- 17 ENV 1 AM
- 18 ENV 2 DE
- 19 ENV 2 AT
- 20 ENV 2 DE
- 21 ENV 2 RE
- 22 ENV 2 AM
- 23 ENV 3 DE
- 24 ENV 3 AT
- 25 ENV 3 DE
- 26 ENV 3 RE
- 27 ENV 3 AM
- 28 LFO 1 SP
- 29 LFO 1 AM
- 30 LFO 2 SP
- 31 LFO 2 AM
- 32 PORTAME



MASTER EDIT

MIDI

00	BASIC CHANNEL
01	OMNI MODE
02	CONTROLLERS
03	PATCH CHANGES
04	SYSTEM EXCLUSIVE
05	LOCAL CONTROL
06	PEDAL 1 SELECT
07	PEDAL 2 SELECT
08	LEVER 2 SELECT
09	LEVER 3 SELECT
10	SEND PATCH
11	SEND ALL

CASSETTE

20	STORE ALL
21	CHECK ALL
22	LOAD ALL
23	SELECTIVE LOAD

VIBRATO

30	SPEED
31	WAVEFORM
32	AMPLITUDE
33	SPEED MOD SOURCE
34	SPEED MOD AMOUNT
35	AMP MOD SOURCE
36	AMP MOD AMOUNT

KEYBOARD

40	VELOCITY SCALE
41	VELOCITY SENS.
42	PEDAL 2 INVERT
43	LEVERS INVERT

MISC.

50	EDIT RECALL
51	PATCH INITIALIZE
52	CALIBRATE
53	DISPLAY BRIGHTNESS
54	SOFTWARE VERSION
55	MASTER TUNE

SPLIT EDIT

0	LEFT UPPER LIMIT	4	RIGHT TRANSPOSE
1	LEFT TRANSPOSE	5	RIGHT MIDI OUTPUT
2	LEFT MIDI OUTPUT	6	LEFT-RIGHT BALANCE
3	RIGHT LOWER LIMIT	7	VOICE/ZONE SELECT

Oberheim