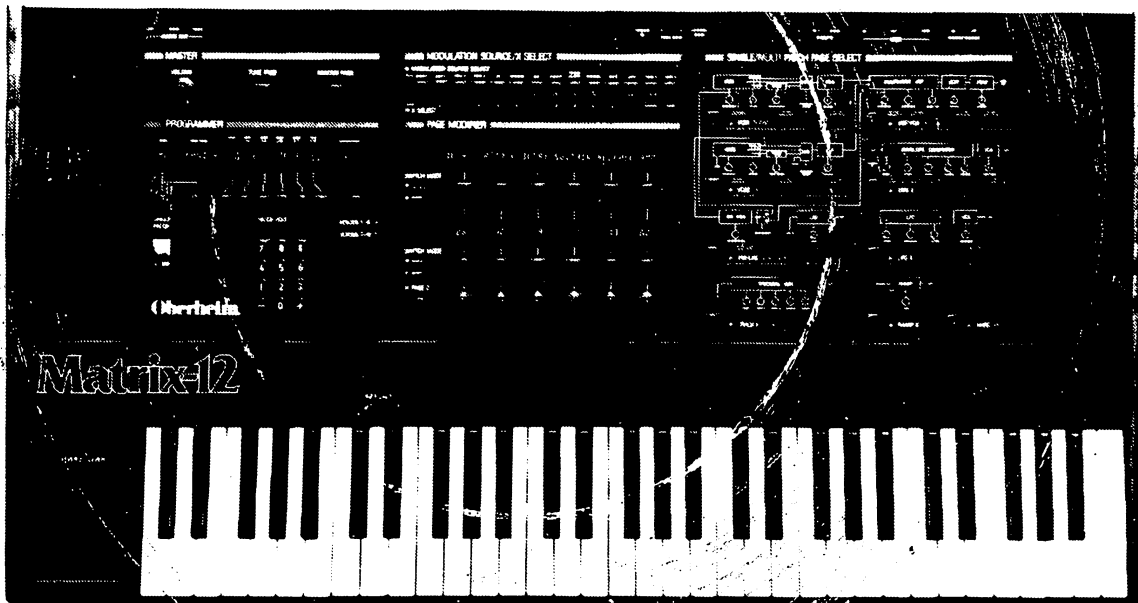# OWNER'S MANUAL

Matrix-12

Oberheim®

A Division of ECC Development Corporation

Oberheim

Matrix-12

12-Voice Polyphonic MIDI Synthesizer
OWNER'S MANUAL

First Edition – September, 1986

"Matrix-12 Owner's Manual"
First Edition Text by David M. Bertovic

Part No. 950039

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 what ever
measures may be required to correct the interference.

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WELCOME TO THE MATRIX-12

The staff at ECC/Oberheim would like to extend our congratulations to you on your purchase of the Oberheim MATRIX-12 12-Voice Polyphonic MIDI Synthesizer. Based on the same revolutionary technology as its predecessor, the Oberheim XPANDER, the MATRIX-12 features twelve powerful, independently programmable Voices and an elaborate control system for playing them.

The MATRIX-12 is actually more than two XPANDERs, and the addition of a five octave, Velocity and Pressure sensitive keyboard plus two on-board modulation levers allow for the addition of even more programmable functions. The MATRIX-12 features one of the most comprehensive MIDI systems available and its interfacing capabilities give you more control than is presently available from other synthesizers in any class.

Like the sound-producing capability of the XPANDER, the MATRIX-12 Voice utilizes a 15-Mode Voltage Controlled Filter, five Envelopes and five Low Frequency Oscillators as well as a Lag Processor, three Tracking Generators and four Ramp Generators to provide you with all the ingredients for sound creation. All of this is interlaced by the Matrix Modulation™ System for the greatest of flexibility in modulation control. And the MATRIX-12's twenty-four Voltage Controlled Oscillators (two per Voice) – with waveforms that can be selected individually or combined – are the secret to its warm, rich sound.

Each of the MATRIX-12's Voices is completely independent and each can be programmed to play a different sound. They can be grouped polyphonically into Zones or operated independently, from the Keyboard and MIDI simultaneously. All of the functions at your command are easily viewed on the MATRIX-12's three 40-character fluorescent displays, even under poor lighting conditions.

The MATRIX-12 is a very serious instrument. And you no doubt paid serious money when you purchased it. This manual will provide you with some serious information and we recommend that you read this document **in its entirety**. It was written to provide you with all the information you will need to operate and interface your MATRIX-12. We encourage you to experiment, or you'll never know what you might discover.

Thank you for your investment in the State of the Art.

Oberheim
A Division of ECC Development Corporation
Los Angeles, California U.S.A.

UNPACKING

It is obvious that by now you have opened your MATRIX-12's shipping carton. After you get it out of the box, place it on any level surface or keyboard stand capable of supporting about 150 to 200 lbs. or so. The MATRIX-12 doesn't weigh anywhere near this weight but this suggestion takes into consideration that you may be playing with some amount of force since the MATRIX-12 is Velocity **and** Pressure sensitive. You will need a strong stand to support both the MATRIX-12 and any additional punishment that you dish out.

After you have found a place to put your MATRIX-12, refer to the next section on HOOKUP for information on proper connections, interfacing and other tips.

Accessories
The MATRIX-12 is shipped from the factory with a number of accessories. The following checklist identifies the items that should be in the box when you open it. If any of these items are not in carton, **contact the ECC/Oberheim Dealer where it was purchased** and they will assist you in obtaining the missing items.

- The MATRIX-12 Synthesizer

- This Owner's Manual

- Warranty Card

- 6-foot A.C. Cord

- Cassette Tape of the MATRIX-12 Factory Stock Patches

- MATRIX-12 Owner's Manual Supplement

- ECC/Oberheim Authorized Service Centers Directory

SPECIFICATIONS

Most Owner's Manuals print the specs of the instrument buried somewhere in the back of the manual. We're going to print them right here:

Audio Sources
12 Independent Velocity, Release Velocity and Pressure (After-Touch) respsonsive analog Voices.

Voice Control Assignment can be per MIDI Input Channel (12 maximum) or per polyphonic grouping in up to six Zones.

On-Board ("Local") Controllers

61-Note (C^0 to C^5) five-Octave Velocity, Release Velocity and Pressure (After-Touch) sensitive Keyboard, non-weighted.

2   Non-dedicated Modulation Levers.

2   Non-dedicated Pedal Inputs.

Voice Architecture

2   Voltage Controlled Oscillators ("VCOs")
1   15-Mode Voltage Controlled Filter ("VCF")
15   Voltage Controlled Amplifiers ("VCAs")
1   FM Modulation Generator
1   Lag Processor
3   Tracking Generators
5   Digital Envelopes
5   Digital Low Frequency Oscillators ("LFOs")
4   Ramp Generators
1   Noise Generator

Modulation

Matrix Modulation™ System utilizing 27 possible Sources routed to 47 possible Destinations in up to 20 "Modulation Pages" per Voice.

12   Permanent ("hardwired") modulations per Voice.

MIDI Implementation

MIDI IN, MIDI OUT and MIDI THRU Ports

Transmit and Receive Channel select independent per Voice (MIDI MONO Mode) or per polyphonic Zone.

Modes – Mode 1: OMNI On, Poly
             Mode 3: OMNI Off, Poly
             Mode 4: OMNI Off, Mono

Controllers – Independent Controller Number select
               Controllers ON/OFF select
               Patch Change Commands ON/OFF select

Miscellaneous MIDI Features
    System Exclusive ON/OFF select
    MIDI Echo ON/OFF select

Miscellaneous
>Three 40-Character Fluorescent Displays
>100 SINGLE Patch Memory Locations
>100 MULTI Patch Memory Locations
>"Chain" Programming Mode
>Cassette Interface – FROM (input) and TO (output) ports
>Trigger Input Requirements:
>>+5V DC signal minimum, 1 ms Pulse Width
>
>Power Requirements (selectable):
>>North America and Japan: 95 – 120 V A.C., 50 – 60 Hz
>>Europe: 200 – 230 V A.C., 50 – 60 Hz

Dimensions

Length	38 7/16 in. (97.63 cm.)
Width	20 5/16 in. (51.59 cm.)
Height (maximum, including feet)	5 15/16 in. (15.08 cm.)
Net Weight	33 lbs. (14.97 kg.)
Shipping Weight	41 lbs. (18.60 kg.)

Optional Accessories
>FS-7 Sustain Footswitch
>POB-X Volume Pedal
>Individual Voice Outputs Update Kit

Part 1:
BASIC
MATRIX-12
OPERATION

HOOKUP

AC Power
The MATRIX-12 can operate on AC power between 95-130 volts or 200-240
volts, depending upon the setting of the recessed power selector switch, located
on the rear panel near the AC receptacle. The MATRIX-12 is shipped from the
factory set for local AC.

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-12 and the male end into your wall outlet.

Turn on the MATRIX-12 with the power switch next to the power socket on the
back panel. Does the power switch light up? Do the front panel displays light up?
If not, check your connections.
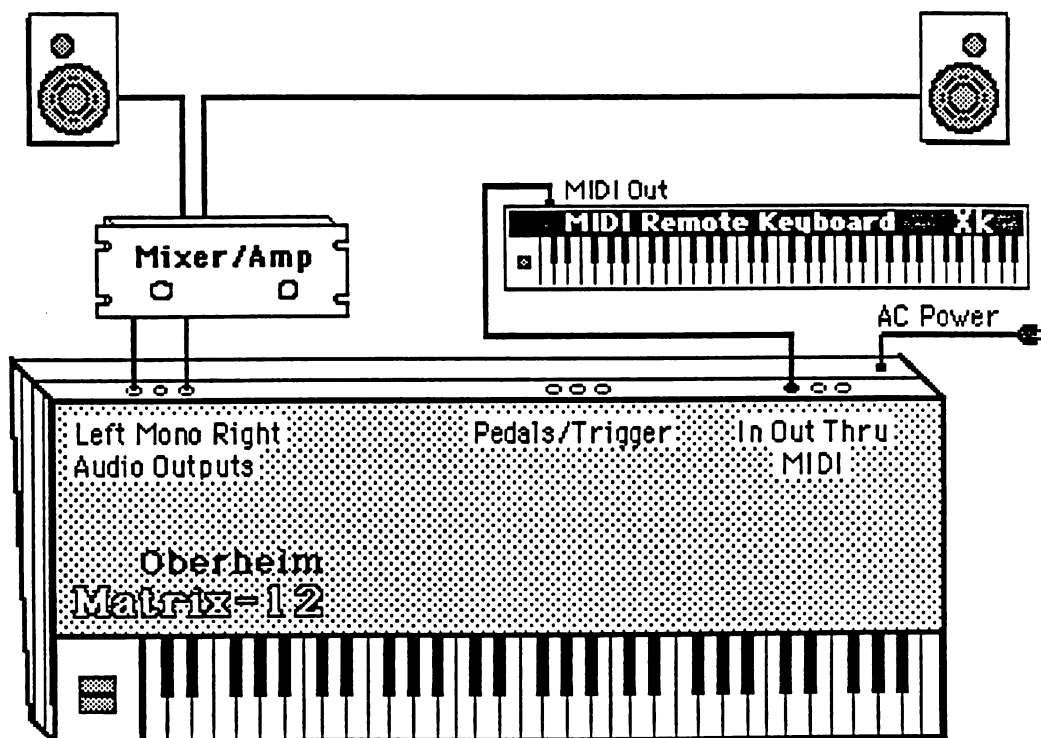
Audio Connections and Sound System

Connect the MATRIX-12 to a mixing board, hi-fi system, instrument amplifier, or a sound system using the stereo or mono mixed outputs. The MATRIX-12's Outputs can be plugged into a Line Input, or an attenuated Microphone Input. Each of the twelve Voices can be panned in the stereo mix.

Connect the instrument to your sound system **before** powering on the MATRIX-12. The Hook-Up diagram on the previous page will assist you in setting up the MATRIX-12, showing the different connections that are possible with the back panel jacks as described in the next section titled BACK PANEL FUNCTIONS.

MIDI Connections

Also before powering on the MATRIX-12, connect the synthesizer to the other MIDI instruments that you plan to use in the system. These can be other MIDI synthesizers, a MIDI guitar synthesizer or MIDI guitar interface, a MIDI-equipped sequencer, drum machine or computer, or a MIDI keyboard controller.

The order in which you power on your instruments is important. First, turn on the MATRIX-12 with its volume control set to its minimum (knob fully counter-clockwize). Next, turn on the synthesizer or MIDI Controller that will drive the MATRIX-12 (if applicable). Then turn the sound system on – the mixer should be turned on first then the power amplifier. Powering on in this order will prevent a possible malfunction in the MIDI connections or a possible audio "thump" from harming your speaker(s). When shutting down your system, reverse the order – turn off the power amplifier, then the mixer, then the MATRIX-12 and the rest of your keyboards.

Care & Maintenance

For proper care and handling, do not expose your MATRIX-12 to direct sunlight or to temperatures above 120° F (48.9° C).

Should your MATRIX-12 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-12. Do not use harsh or abrasive detergents or solvents. We do not recommend vinyl-treatment products that leave a residue.

Servicing

Should your MATRIX-12 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 ECC/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-12 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 "MATRIX-12 CONTROL: MASTER PAGE" later in the manual. The procedure for saving your programs to tape is described in the *CASS* section beginning on Page 72.

We also encourage you to familiarize yourself with the Warranty Policy in the back of the manual as it outlines your rights and responsibilities under the ECC/Oberheim Limited Warranty and lists several important exclusions.

REAR PANEL FUNCTIONS

The back panel of the MATRIX-12 is where all of the synthesizer's connecting jacks and special-purpose switches are located.

Cassette Interface
Input/Output for
data storage

Advance Chain
Advances to the next
program in the CHAIN.
(Rising Edge Trigger)

MIDI Interface
In/Out/Thru

Pedal Inputs
2 Inputs for Footpedals or Footswitches

Memory Protect
Prevents changing
stored patches

Trigger Input
Triggers Envelopes, LFOs, Ramps from
Drum Machines, etc. (Switchable Polarity)

Mixed Outputs
Stereo and Mono

Oberheim Matrix-12

Voltage Select
115 or 230 for local power

Power Input (Grounded)

Power Switch

A.C. Power Switch
The AC switch on the back panel applies power to the MATRIX-12 when turned ON – flipped downward – and will light up. It is recommended that the MATRIX-12 be turned OFF when not in use.

A.C. Power Receptacle
The recessed 3-prong receptacle is used to connect the MATRIX-12 with the AC power cord supplied with the MATRIX-12 as a standard accessory.

Voltage Select Switch
The MATRIX-12 is shipped from the factory set for either local A.C. power in the United States or Canada (the"115" setting which operates within the range of 95 to 130 volts, 50-60 cycles) or is set for European local power (the "230" setting wich has a range of 200 to 240 volts, 50-60 cycles). The recessed Voltage Selector switch adjacent to the AC Receptacle is used to select either 115V or 230V line level voltage.

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-12, MEMORY PROTECT must be disabled (switched OFF).

MIDI Memory Protect

The MEMORY PROTECT feature of the MATRIX-12 also includes incoming data transfers via MIDI. If incoming MIDI data is received when the unit's Memory Protect switch is ON, the Upper PAGE MODIFIER display will show the message...

MEMORY PROTECTED

...briefly and the MATRIX-12 will ignore the rest of the incoming data.

MIDI Ports

The MATRIX-12 utilizes the universally accepted MIDI interface system and employs the three MIDI jacks – IN, OUT and THRU – that permits 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-12 is intended to be used as the Master, controlling another synthesizer or MIDI instrument.

MIDI IN is used when the MATRIX-12 is being controlled as a Slave by another MIDI instrument or controller.

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

CASSETTE Interface

Once you begin to program your own original patches, you will find that you can very easily create more patches than the MATRIX-12 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.

TO – This jack is used to connect the MATRIX-12 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 recommended limit of five instruments is assuming that you are not using very long MIDI cables (maximum total length for the entire rig is about 50'), all of the instruments have been designed to conform to the MIDI Specification and the components of the MIDI circuitry of each instrument – especially the opto-isolators – are not malfunctioning.

FROM – This jack is used to connect the MATRIX-12 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 recorder's LINE OUT jack is not recommended for this purpose.

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 PAGE section later in the manual. See Page 72.

TRIGGER IN Jack

This is the input used when the MATRIX-12's Envelopes, LFOs or Ramps are programmed to respond from External Trigger (*EXTRIG*). The polarity is switchable from the MATRIX-12's front panel. The ideal trigger pulse to use is 1ms (millisecond) in duration and between +5 and +10 Volts DC.

PEDAL 1 and PEDAL 2

The MATRIX-12 is capable of being controlled by two footpedals for common functions such as volume control and sustain as well as many other unusual functions that we will cover later. These pedals are connected to the synthesizer by the PEDAL 1 & PEDAL 2 input jacks on the back panel. Their polarities can be switched from the front panel.

PEDAL 1 & 2 may be used with a **"continuous"** pedal – a rocker-type pedal usually used for volume or filter control. As we talk about the MATRIX-12's modulation capability in a later section, you will discover how you can also route the pedal's control to the VCO'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.

PEDAL 1 & 2 may also 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.

ADVANCE CHAIN Jack

This port is used to connect a footswitch to the MATRIX-12 that will be used to advance Patches or the Patch List programmed in the *CHAIN* Page. If you are using a trigger to advance through the Patch programs, the MATRIX-12 is programmed to respond to a rising edge (positive) trigger. This polarity is not changeable.

AUDIO OUT Jacks

These ports are the MATRIX-12's main outputs that you connect to an mixing console, amplifier and speaker system. The LEFT and RIGHT jacks are true stereo outputs and Voice Panning is controlled from the front panel displays. When MONO is used, all Voices will be output from this jack regardless of its panning assignment. However, any Voice panned *OFF* will be removed from these mixed outputs altogether.

The MATRIX-12 may also be updated with an optional update kit that adds 12 individual Voice outputs that provides a separate audio out jack for each Voice. Contact your nearest ECC/Oberheim Authorized Service Center for prices and availability.

WHAT KIND OF CONNECTING CABLES SHOULD I USE?

The "AUDIO OUT" LEFT, MONO and RIGHT jacks, the PEDAL 1 and PEDAL 2 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-12.

The CASSETTE IN and OUT jacks require a 2-conductor shielded cable with an 1/8" plug on the MATRIX-12 end.

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

FRONT PANEL FUNCTIONS

In this section of the manual, we will cover the fundamental layout of the MATRIX-12's front panel and the basic operation of the front panel controls. Getting the most out of your MATRIX-12 rests in your ability to understand the concept behind the front panel's design. We will therefore discuss these operations in detail.

The MATRIX-12's front panel has been designed for maximum efficiency in permitting the user to get from one section of controls to another easily. At first, the MATRIX-12 looks deceptively simple having few switches ("buttons") and even fewer rotary controls ("knobs"). Take for example the center section called PAGE MODIFIER. Its two displays, six knobs and twelve buttons are shared by over 1200 individual functions that you can control within the synthesizer, the majority of them being programmable.

With over 1200 separate functions under your command, it becomes immediately obvious that providing a button or a knob for each function would be impractical and outrageously expensive. Imagine what your MATRIX-12 would look like, let alone what it would cost if this were so.

In order to simplify matters, we have scaled down an otherwise monstrous instrument by grouping related functions within the MATRIX-12 into specific sections called **"Pages"**. Each Page within the MATRIX-12 contains all of the functions, called **"Parameters"**, that have to do with the operation of the selected Page. When any Page is selected, its parameters are displayed in the two windows of the PAGE MODIFIER Section in the center area of the front panel. At this point, the selected Page can be examined to see what its parameter Values are or can be edited as necessary.

If the particular Page you have selected contains more parameters than can be displayed at once, a "Sub-Page" is provided to display the remaining parameters. Selecting the Sub-Page is accomplished by pressing the PAGE 2 button whenever appropriate.

For example, let's select one of the MATRIX-12's Pages and examine its parameters.

1. For our purposes, we want to be in SINGLE PATCH Mode. Look at the left-hand area of the panel and locate the section marked PROGRAMMER. Just above the display and to its extreme left end is the word PATCH. Beneath PATCH in the display is a letter and the two-digit Patch Number. If the letter is "*S* ", you are already in SINGLE PATCH Mode.

    If this letter is "*M*", you are in MULTI PATCH Mode. If so, press the button labeled SINGLE PATCH and we are ready to move on.

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2. Look at the right-hand area of the panel under the heading SINGLE/MULTI
    PATCH PAGE SELECT. Press the button labeled VCO1. The two
    displays in the PAGE MODIFIER section will now reveal the available
    parameters for VCO1 (Voltage Controlled Oscillator #1). This display is
    identical for VCO2.

VCO 1 / VCO 2
Page 1

FREQ DETUNE	PW	VOL

0	+12	31	63

These parameters are the ones most frequently used in operating a VCO.
They are also the parameters that have: 1) "more or less" amounts (VALUE X)
and 2) parameters that can be modulated. Thus, these parameters are
displayed first when the Page is selected. This is referred to as "Page 1" or the
section's "Primary Page".

There are, however, many more parameters involved in operating a VCO than just
its Frequency (tuning), its Detune amount, the Pulse Width and Volume level as
this Page shows. What about waveform selection, keyboard control and pitch
bend/vibrato routing?

3. Press the PAGE 2 button. The displays will switch to read the available
    parameters in the VCO1 Sub-Page. The Page 2 displays show the available
    ON/OFF parameters for this group of functions. An <u>underlined</u> display
    message = ON. Not underlined = OFF.

VCO 1
Page 2

MOD = KEYBD LAG LEV_1 VIB

WAVE = TRI SAW PULSE

VCO 2
Page 2

MOD = KEYBD LAG LEV_1 VIB SYNC

WAVE = TRI SAW PULSE

So now we can see that with Page 1 (the "Primary Page") and Page 2, we have all the parameters that allow operation of this VCO at our command. Notice that VCO 2 has an extra parameter titled SYNC. The operation of this function is covered later in the manual.

4. Pressing PAGE 2 again returns the displays to the section's Primary Page. You can switch back and forth between Page 1 and Page 2 by pressing the PAGE 2 button repeatedly.

There are some Pages in the MATRIX-12 that do not require a second page of parameters. Pressing PAGE 2 in these cases will have no effect. Don't worry – it's not supposed to.

For you trivia buffs, there are a total of 59 Primary Pages and related Sub-Pages lurking within the MATRIX-12. As a learning aid, we have listed every one of the 59 Pages' displays in the **MATRIX-12 PAGES DIRECTORY**. The Directory can be found in the "MATRIX-12 Owner's Manual Supplement" included with this manual.

FRONT PANEL LAYOUT

Mastering the MATRIX-12 first requires a thorough working knowledge of its front panel operation. In the following discussions, we will examine each section of the panel and how they interact with one another. For starters, let's identify the main sections of the synthesizer:

LEFT PANEL AREA

1. **MASTER**
    Contains the synthesizer's general-purpose Master controls.

    VOLUME Control
    TUNE PAGE Select Switch
    MASTER PAGE Select Switch

2. **PROGRAMMER**
    Used to manipulate the MATRIX-12's 100 SINGLE or 100 MULTI Patches and select between the two banks of Voices.

    Programmer **DISPLAY**
    SINGLE PATCH and **MULTI PATCH** Select Switches
    PATCH EDIT Switches
    VOICES 1-6 and **VOICES 7-12** Select Switch
    STORE Switch
    NUMERIC KEYPAD including "+" and "–" Buttons

CENTER PANEL AREA

3. **MODULATION SOURCE/X SELECT**
    This section utilizes a 14-switch row used to select either a Modulation Source to be used in a patch, its "+" or "–" Numeric Value, or to select a Primary Page designated with an "X" – TRACK X, ENV X, LFO X, RAMP X or ZONE X. The X is used in these titles because there are more than one of these Pages from which to choose. For example, the "X" in LFO X represents the five possible

---

LFOs numbered 1 through 5. The "X" in RAMP X represents the four possible RAMPs numbered 1 through 4. There are three TRACKs, five ENVs and six ZONEs in the MATRIX-12 from which to choose.

The operation of these multi-function buttons depends on the type of programming that you are doing at any given time. For example, if you are editing a Patch by using modulation, the indicator light next to MODULATION SOURCE SELECT will be lit prompting you to select one of the MATRIX-12's 27 sources of modulation. These are titled on the front panel **above** the switches.

After you have chosen the modulation source you want, you can set its amount Value with the same buttons – only this time the X SELECT indicator light will be lit informing you that the buttons have now been transformed into numeric value buttons. These are marked on the front panel **below** the switches.

The "+" and "–" buttons are used to switch the modulation amount between positive and negative values. QUANTIZE and CLEAR are special-purpose switches and are covered later in the manual.

4. **PAGE MODIFIER**
Used to view the current settings of any Page or program/edit any of the MATRIX-12's 59 Pages and Sub-Pages.

2 displays: **UPPER** and **LOWER**

UPPER SELECT SWITCHES
    Dual Function: **MODULATION PAGE SELECT**or **ON/OFF** status
LOWER SELECT SWITCHES
    Dual Function: **VALUE X** or **ON/OFF** status
Six **ROTARY CONTROLS**
PAGE 2 Select Switch

RIGHT PANEL
AREA

5. **SINGLE/MULTI PATCH PAGE SELECT**
Used to select the Pages for all SINGLE Patches and MULTI Patches.

SINGLE Patch Pages   Indicated by titles in WHITE lettering
                                 SINGLE Patch signal path illustrated by Flow-Charts

VCO1	VCF/VCA	
VCO2	ENV X	
FM/LAG	LFO X	
TRACK X	RAMP X	NAME

MULTI Patch Pages   Indicated by titles in GREY lettering

TRANS	VOLUME	
PAN	VIB	
V. ASSIGN	DETUNE	
ZONE X		NAME

GETTING AROUND THE FRONT PANEL

Now that we have identified the five main sections of the MATRIX-12's front panel, we are ready to start co-ordinating the use of all these functions. So that you may better comprehend the general operations of the MATRIX-12, we'd like to point out a few basic design concepts:

1. The headings displayed in the MASTER section – VOLUME, TUNE PAGE and MASTER PAGE – are referred to as *Global* functions. A Global function is simply any parameter that affects the synthesizer as a whole, regardless of what PATCH Mode (SINGLE or MULTI) the MATRIX-12 is in. It is extremely important that you understand this concept.

    As an example, setting MASTER TUNE (displayed as *M TUNE* in the TUNE PAGE) to any tuning interval affects every Patch in the MATRIX-12. It fine tunes the instrument as a whole. In contrast, tuning the oscillators (VCO1 and VCO2) in one of the SINGLE PATCHES to different intervals only affect that Patch individually, and not the others.

    The MATRIX-12's Global functions are kept in its memory as you have set them and will remain there until they are changed. Thus, Global settings are not "programmable" in the traditional sense of the word because they are not set for a particular Patch but for the MATRIX-12 in general.

    There are two types of Global functions in the MATRIX-12. The UPPER DISPLAY in MASTER PAGE lists those functions that are Global for the entire synthesizer. The LOWER DISPLAY lists those functions that are Global for SINGLE PATCHES only. These functions, in a sense, are kind of "Semi-Global" because they affect only one of the two available Patch Modes. As we get deeper into the programming of the MATRIX-12, you will notice that the four Sub-Pages listed are programmable functions for **each** MULTI Patch **individually**, which is why these four parameters disappear from the Lower Display when MULTI PATCH Mode is entered. The individual programmabilty of *PAN*, *VIB*, *VASSIGN* and *ZONE* in the MULTI Patches gives this Mode its incredible flexibility and specialization.

2. The MASTER PAGE may be best thought of as your "Home Base". You can enter MASTER PAGE at **any time** no matter which of the MATRIX-12's 59 Pages you have currently displayed. If you should get lost or confused in your programming, you can simply enter MASTER PAGE and start over. Rest assured, however, that none of the work that you've done will be lost. Entering MASTER PAGE does not destroy any of your editing. You are just able to enter MASTER PAGE as needed.

3. PAGE MODIFIER
    Upper Display Sub-Pages
    Your "Patch List" arrangement in *CHAIN*, all of the synthesizer's *MIDI* settings and actions, the Velocity settings and Controllers Polarity selections in *MISC*, and data transfer functions in *CASS* are selected as general MATRIX-12 functions.

Lower Display Sub-Pages
The setting of the Voices' stereo imaging in *PAN*, the master Vibrato settings made in *VIB*, the poly or mono Zone / MIDI Channel Voice settings in *V ASSIGN*, and the configuration of the six Zones in *ZONE* are set for all 100 SINGLE Patches equally. In other words, whatever adjustments you make for these functions for one of the SINGLE Patches, you make for all of them. It bears repeating that the magic of the MATRIX-12 is its ability to program these very same functions individually for each of the 100 MULTI Patches.

4. As you are operating certain functions in the MATRIX-12, the three 40-character fluorescent displays will always tell you the current status of the synthesizer. Depending on the operation, the displays will prompt ("ask") you or permit you to make changes. The various knobs and buttons on the panel will allow one of five types of operations to be executed:

   - **ON/OFF** status – ON = <u>underlined</u>, OFF = no underline.
   - **YES/NO** status.
   - **PAGE, MODULATION SOURCE** or **PATCH #** select.
   - Numeric **VALUE X** or Amount select – depending on the parameter, possible Values are **0** to **+63**, **0** to **127**, **–31** to **+31** or **–63** to **+63**.
   - **OPTION** select – these functions **change name** when the button is pressed or knob is turned. In some cases, they will always be <u>underlined</u> because they are always ON.

5. In operating the MATRIX-12, performing the above functions will require you to **select** or choose a parameter, a numeric Value, etc. "Selecting" will be indicated on the displays by the name or number being <u>underlined</u>. Selecting is accomplished by pressing the button **directly beneath** the parameter's name or the number, etc. in the display.

   For parameters that have ON/OFF Status, for example, an underlined parameter name indicates that it is ON and no underlining signifies OFF.

6. There are also several "Special-Purpose" functions available in the MATRIX-12 that are not shown in the displays or printed on the Front Panel. We will cover them in detail later in the manual.

7. The MATRIX-12 employs a basic design function that remembers everything about the last state its Pages were in when it was turned off. This "Power Down/Power Up Status" feature restores all functions to the last state they were in at turn-off when you turn the MATRIX-12 back on. Things like the Patch you were playing, the last Page that was called up, all of the changes (edits) that were made, your MIDI settings and even Auto-tune values are restored exactly.

Part 2: MATRIX-12 CONTROL

PROGRAMMER

We are now ready to start operating the MATRIX-12. The most basic and often-used section of the Front Panel is the PROGRAMMER. By now, you've no doubt tried a few of the Patches and have gotten a feel for the Programmer already. In the next few pages we will cover the operation of the Programmer in detail and describe its special features. The Programmer does considerably more than just allow you to change Patches.
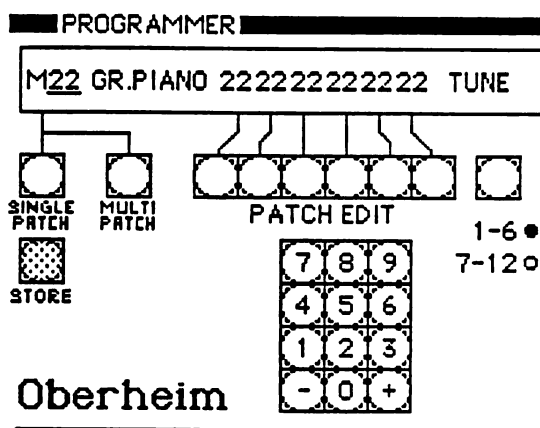
DISPLAY

The Programmer's single display is divided into four sections whose titles are printed above them on the panel itself, described as follows:

1. PATCH
The term "Patch" has two meanings in the MATRIX-12:

> A SINGLE Patch is defined as a **programmed sound** that the synthesizer will play. Each sound is programmed into a memory location in the MATRIX-12 identified by an index number called a Patch Number.

> A MULTI Patch is a memory location that permits you to program each of the 12 Voices with any of the **existing** SINGLE Patches. It is the MULTI Patch that gives the MATRIX-12 its multi-timbral (two or more sounds at once) capability.

The number of the Patch currently selected is shown in this section of the display. Just to the left of the Patch Number is a letter that tells you the Patch Mode of the MATRIX-12. "*S*" is displayed for SINGLE PATCH Mode; "*M*" is displayed for MULTI PATCH Mode.

The memory capacity of the MATRIX-12 is 100 SINGLE Patches, numbered *S00* through *S99*, and 100 MULTI Patches, numbered *M00* through *M99*.

If you have made any edits at all to the currently selected SINGLE Patch or MULTI Patch, a little "edit indicator" dot will appear in the lower right-hand corner of the Patch Number to remind you that the Patch has been edited. If you play the MATRIX-12 at this point, what you will hear may not be the same as what is stored because of the changes that you have made. The edits that you make to a Patch are not stored into memory until the STORE button is used. See the section on STORE later in this chapter.

SINGLE Patches and MULTI Patches: What's the Difference?
SINGLE PATCH Mode permits the creation of the actual sound programs of the MATRIX-12. In this mode, new sounds can be created "from scratch" or existing Patches can be changed. Making any change to a Patch is called "editing". Specific editing functions of SINGLE Patches and how sounds are created are covered in detail in **Part 3: PROGRAMMING the MATRIX VOICE.** When you are playing a SINGLE Patch, all Voices play the same sound. The MATRIX-12's ability to play different sounds at the same time is accomplished in a MULTI Patch.

MULTI PATCH Mode allows you to take sounds from the bank of SINGLE Patches and arrange them in a special way. Parameters like individual Voice panning (**PAN**), vibrato settings (**VIB**), individual Voice transpositions (**TRANS**), volume output adjustments (**VOLUME**), Zone configuations (**ZONE**), etc. can be customized in this mode and programmed for each individual MULTI Patch. Thus MULTI PATCH Mode is simply a way to take sounds that already exist in SINGLE PATCH Mode and play them with their own customized control Pages. Making changes to a MULTI Patch is also called editing.

MULTI PATCH Mode permits assigning any of the 100 different SINGLE sound Patches to the 12 Voices. Popular uses of MULTI PATCH Mode include using a "Split" function where two Patches are played at the same time – one from the left half and the Keyboard and the other from the right half. "Doubling" is also possible where two Patches are overlayed across the Keyboard and playing one key plays both sounds at once. These functions employ the use of the ZONES where each ZONE contains one of the Patches and is programmed to either split the Keyboard or double it. Since the MATRIX-12 uses six ZONES, things like 6-way Splits and 6-layer Doubles as well as a wide variety of other very unique set-ups are possible. We will show how this is done in **Part 5: CONSTRUCTING the MULTI PATCH.**

2. **PATCH NAME**
An area of the display has been set aside to permit a Patch Name to be given to each SINGLE Patch and each MULTI Patch. You are permitted to use up to eight characters including the 26 letters of the English Alphabet, numerals 0 through 9, various punctuation marks, symbols and blank spaces. How this is accomplished is covered later in the manual in **Part 3: PROGRAMMING the MATRIX VOICE.** Refer to the NAME parameter operation on Page 139.

3. **VOICE   VOICE   VOICE   VOICE   VOICE   VOICE**
   1/7   2/8   3/9   4/10   5/11   6/12
   This section of the Programmer's display tells what Patches are being
   played by each of the 12 Voices:

   • In SINGLE PATCH Mode, the display is simple: the 2-digit number directly
      beneath each of the six titles corresponds to the actual Patch Number
      displayed under the PATCH heading. Remember that in SINGLE PATCH
      Mode all Voices play the same sound. Displaying the same Patch Number
      is done to remind you that the Voices are homogeneous.

   • In MULTI PATCH Mode, because you can assign a different Patch to each
      Voice, it is possible to see a different Patch Number for each of the 12
      Voices.

   The Programmer display allows you to view six Voices at once. You are able to
   switch between the Voices 1-6 display or the Voices 7-12 display, but only as
   conditions permit. We will cover this operation later in the chapter.

   " VOICE GATE " Indication – Every time Voices are played ("Gated") on
   the MATRIX-12, either from its own Keyboard or from MIDI, you are able to
   verify which Voices are playing from this section of the display. If any of Voices
   1 through 6 are gated, a little dot will appear next to its Patch Number in the
   lower left-hand corner and will stay on as long as the note is being held.
   Voices 7 through 12 are indicated by dots appearing between the two Patch
   Number digits. This handy little feature is active at all times with the exception
   of during the execution of any of the Cassette or MIDI *SEND* functions.

4. **CURRENT PAGE**
   This section of the Programmer's display shows the name of the Page
   currently being displayed in the PAGE MODIFIER Section.

   • You can select any of the MATRIX-12's Pages for editing and its name
      will be displayed in this section of the display.

   • If the synthesizer is in MULTI PATCH Mode, a little dot will be displayed
      to the left of the Page Name, in the lower left-hand corner to remind
      you that the MATRIX-12 is in MULTI PATCH Mode. In SINGLE PATCH
      Mode, the indicator dot is removed from the display.

   • The CURRENT PAGE will also show if a Modulation Destination has
      been selected in Patch Edit (covered in **Part 3**). In this instance,
      our little dot will be displayed to the right of the Page Name, in the lower
      right-hand corner.

   Because only eight characters have been allocated for the CURRENT PAGE
   section of the Programmer Display, you will see some very strange
   abbreviations displayed.

SINGLE   MULTI
PATCH   PATCH

These two switches enable you to select between the two banks of Patches in the MATRIX-12, referred to as "Patch Modes". You are able to switch back and forth between SINGLE PATCH Mode and MULTI PATCH Mode at any time:

- If the MATRIX-12 is in MASTER PAGE or TUNE PAGE when the Patch Mode is switched, it will remain in the MASTER or TUNE Pages. Notice that the Lower display is removed in the MASTER PAGE displays of MULTI PATCH Mode. This is because these four Sub-Pages are programmable individually in MULTI PATCH Mode.

- If the MATRIX-12 is in any other Page when the banks are switched, the last Page that the synthesizer was in previously in that Mode will be recalled. This enables you to switch between Patch Modes without losing your place.

EDIT COMPARE – Notice that the SINGLE PATCH Number or the MULTI PATCH Number is underlined. This indicates that it is currently selected. If you make any changes at all to a Patch, an edit indicator dot will appear in the lower right-hand corner of the Patch Number to remind you that the patch has been edited. You are able to compare the edited version of the Patch with the original programmed version.

- If you have edited a Patch in SINGLE PATCH Mode, press the SINGLE PATCH button once to begin comparing. The underline will disappear and the Patch Number will flash off and on. The MATRIX-12 will recall the programmed version of the Patch and playing the synthesizer will allow you to hear what the Patch sounded like before you started making changes.

- Selecting different Pages will also permit you to view the original settings of the Patch as well. This feature is extremely useful, especially if you have made many changes and need to see the original values.

- You cannot perform any new edits while the MATRIX-12 is comparing. Attempting to use the knobs and buttons in the PAGE MODIFIER Section for purposes of editing will have no effect and the controls will appear to have gone dead.

- You cannot STORE (program into memory) while comparing. If you attempt to STORE the patch while comparing, the Upper display in the PAGE MODIFIER Section will read:

COMPARING – CAN'T STORE

- You cannot change to a different Patch Number while comparing. If you attempt to switch to another Patch while comparing, the Upper display in the **PAGE MODIFIER** Section will read:

COMPARING – CAN'T CHANGE PATCHES

• You can, however, switch into MULTI PATCH Mode while comparing. If you return to SINGLE PATCH Mode, the Patch that you were working with will be recalled in its edited state. The Patch Number will have stopped flashing and will be underlined again.

To stop the compare activity, press the SINGLE PATCH button again. The Patch as well as all of the displays will return to the edited state. The Patch Number will stop flashing and will be underlined again.

NOTE: The preceeding two examples are the only two ways that you can exit an edited Patch and return to it in its edited state without performing the STORE function. If you select another SINGLE Patch before Storing, the one that you were just editing will drop its edits. When you select this Patch again, it will be recalled in its original, unedited state.

• You can Compare an edited MULTI Patch with the original as well. Comparing in MULTI PATCH Mode is identical to comparing in SINGLE PATCH Mode.

PATCH EDIT

These buttons are active only in MULTI PATCH Mode. PATCH EDITing in MULTI PATCH Mode allows you to select and manipulate each of the MATRIX-12's twelve Voices **independently**. As we probe deeper into the MULTI PATCH programming capabilities of the MATRIX-12 in **Part 5**, you will discover that the possibilities of PATCH EDITing are almost limitless.

In MULTI PATCH Mode, you are able to press any one of the PATCH EDIT buttons, all six, or any combination of two, three, four or five. Pressing one or more buttons at the same time selects that Voice or Voices. You can now perform a number of different operations:

1. **Patch Selection**
    MULTI PATCH Mode, among other things, gives the MATRIX-12 its "Multi-Timbral" capability – the ability for its Voices to play different sounds at the same time.

    If one Voice is selected, the Keypad is used to select the Patch Number – taken from the bank of SINGLE Patches – that this selected Voice will play. Thus, the synthesizer can be programmed to play 12 different sounds at once, by selecting a new Patch for each Voice from the Keypad, one at a time.

    If two or more (up to six) Voices are selected, selecting a Patch from the Keypad assigns it to **all** Voices that are underlined. This is a handy time-saver. To select more than one Voice, you must press the desired PATCH EDIT buttons all at the same time.

2. **Voice Selection**
    When a Voice or Voices are selected in one bank, the corresponding Voice or Voices are selected and underlined in the other bank. However, whatever Patch selections or edits to the selected Voices' Patches you

make will only affect the Voices currently being displayed. This feature makes it possible to put corresponding Voices in both Voice Banks in PATCH EDIT Mode without having to keep pressing the same buttons again.

As an example, if Voices 1 and 2 are selected, changing Banks selects Voices 7 and 8. Voices 1 and 2 will retain their settings but are no longer selected because 7 and 8 are now being displayed. Performing edits affects only those Voices being displayed.

3. Display Modes

The PROGRAMMER display permits you to work with only six Voices at one time. The VOICES 1-6/VOICES 7-12 button permits switching between the two banks of Voices. You can switch between the two Voice Banks at any time in MULTI PATCH Mode and in the *PAN* and *VASSIGN* Pages of SINGLE PATCH Mode.

4. Patch/Voice Editing

There will be times when the sound of one or more of the SINGLE Patches used in a MULTI Patch will need to be edited. As an example, you may decide that a particular Patch would sound better in the MULTI Patch if it just had a few changes made. It is possible to edit a SINGLE Patch while it is in a MULTI Patch.

To edit a patch for one Voice:

1. Press the PATCH EDIT button of the Voice that contains the Patch you want to change so that it becomes underlined. **This actually enters "SINGLE PATCH Mode" for this Voice** and the PAGE MODIFIER will now display the SINGLE PATCH Pages for the Patch assigned to this Voice.

2. All of the Single Patch Edit Pages under the front panel heading SINGLE/MULTI PATCH PAGE SELECT are now active so that the actual sound of this Patch can be edited because the MATRIX-12 has effectively entered SINGLE PATCH Mode for this Voice alone. You can now make whatever changes to the Patch that you want.

3. After you have made any changes to the Patch, you can compare this edited Patch in the MULTI Patch with its original, unedited version. Just press its PATCH EDIT button and the original version is recalled from memory. Its Patch Number will flash off and on to remind you that you are Comparing.

4. Your edits to this Patch can be programmed into memory as well, but this will also affect this Patch in SINGLE PATCH Mode. Make sure that the MEMORY PROTECT switch on the MATRIX-12's back panel is switched to its OFF position. Press and hold the red STORE button. While you are holding it, type in the 2-digit Patch Number on the Keypad. Again, please keep in mind that if this function is performed, **you will have also permanently edited this particular Patch in its SINGLE PATCH location** as well.

To edit several Voices simultaneously:

1. Press the PATCH EDIT buttons of the Voices that contain the Patches you want to change so that they become <u>underlined</u>. You are limited, however, to the six Voices that are being displayed. As with editing a Patch for one Voice, this actually enters SINGLE PATCH Mode for these Voices and the PAGE MODIFIER will now display the SINGLE PATCH Pages for the Patches assigned to the selected Voices.

2. Editing multiple Voices is accomplished the same as in Step 2 on the previous page. Any editing will affect the Voices that are underlined. For example, increasing the amount of the VCF **RES** (Resonance) will increase it for all selected Voices, even though these Voices may have different Patches assigned to them.

   If all the selected Voices are the same Patch, all will be affected by your edits the same.

   It is possible to edit **different** sounding patches in this mode, but remember that since they are different Patches, your edits will affect each Patch differently. Making a change will not necesarily be at the same setting for all selected Voices. Therefore, the displays in the PAGE MODIFIER Section will show the Values of the **left most Voice** that you are editing at the moment.

3. Due to the enormous processing required, editing multiple Voices also involves other limitations:

   • You cannot add, delete or change any Modulation Pages in the selected Patches. If you attempt to select a parameter to be modulated, or attempt to delete an existing Modulation Page, the Upper display in the PAGE MODIFIER Section will flash:

   MULTIPLE VOICES – NO MODULATION EDITING

   • You cannot STORE the edits of the selected Patches in this mode. Attempting to use the STORE button will display the message...

   EDITING MULTIPLE VOICES – CAN'T STORE

   ... although you can store edited Voices **individually**. But remember – if an edited Voice is Stored individually in a MULTI Patch, it will be stored that way in its SINGLE Patch location as well.

   • The MATRIX-12 will not permit you to compare multiple Voices. You will need to select them individually and compare them one at a time.

4. You are, however, still able to compare the **entire** edited MULTI Patch with its original version and you can still STORE the SINGLE Patches one at a time.

5. **Patch/Voice Copy**

You can also copy a SINGLE Patch from one Voice to another within a MULTI Patch. The STORE button is used in the selection of different Patches per Voice in MULTI PATCH Mode:

To copy a Patch from one Voice to another within the same Voice Bank:

1. When the MATRIX-12 is is MULTI PATCH Mode, press the PATCH EDIT button beneath the Voice you want to copy, so that its current Patch Number becomes underlined. This is the "source" Voice.

2. Select the Patch you want this Voice to play by entering its 2-digit Patch Number from the Keypad. If this Voice already contains the Patch you want, you can skip this step.

3. Press and hold STORE. The Voice you selected will have its Patch Number replaced with " ** " as long as you are holding STORE.

4. While holding down STORE, press the PATCH EDIT button of any Voice. This is the "destination" Voice. Its Patch Number will be replaced with the one currently contained in the "source" Voice.

5. You may even switch Voice Banks, if necessary. Continue to hold STORE, press the VOICES 1-6/VOICES 7-12 key and select as many Voices in the other Bank as needed. See the discussion below.

To copy a Patch from one Voice Bank to another:

1. Press the PATCH EDIT button of the Voice with the Patch that you want to copy, so that it becomes underlined. Again, this is the "source" Patch.

2. Press and hold STORE.

3. While holding STORE, press the VOICES 1-6/VOICES 7-12 button and switch to the other Voice Bank.

4. Still holding STORE, press the PATCH EDIT button of the "destination" Voice – the Voice that you want the selected patch to go. The Patch originally in this Voice location will be replaced by the source Patch.

STORE

Although we have already talked about the use of this button, we will summarize its functions in this discussion. As you will remember, the MATRIX-12 contains 100 SINGLE and 100 MULTI Patches in memory, numbered *00* through *99* on the display for each Patch Mode. These index numbers are often referred to as the Patch's **location** in memory.

1. Programming
   STORE is used primarily to program or "write" sound Patches into the MATRIX-12's memory. Newly created Patches or existing Patches that you have modified (edited) are programmed into memory using STORE.

   STORE is used to program both SINGLE Patches and MULTI Patches into memory. To program a Patch (either SINGLE or MULTI) into memory:

   1. Make sure that the MEMORY PROTECT switch on the MATRIX-12's back panel is switched to its OFF position. Attempting to STORE when MEMORY PROTECT is on will display the message...

   MEMORY PROTECTED

   ... and wil not permit you to STORE until MEMORY PROTECT is disabled.

   Keep in mind also that the Patch location that you select to write this new Patch in will be erased and replaced with the new Patch.

   2. When you are ready to write the Patch into memory, press and hold the **STORE** button down. The currently displayed Patch Number will be replaced by " ** " as long as STORE is being held.

   3. While you are holding STORE down, type in a 2-digit number for the Patch on the Keypad where you want it to be written. The " ** " will be replaced with this Patch Number and the Patch will be written into the MATRIX-12's memory.

   Notice that you must type in a 2-digit number for the Patch to be stored. After you type in the first of the two digits, the MATRIX-12 will give you approximately two full seconds to type in the second digit. If you hesitate for too long a time, the display will revert to its original state and STORE will not occur.

   The same will hold true if you mistakenly type in a 3-digit number. The MATRIX-12 is expecting two digits, one after the other, to be entered from the Keypad. It recognizes Patch Numbers as being valid only if they are entered as **pairs**. The third number of three digits will be understood by the synthesizer as being the first number of another pair. The first two will be the Patch Number in which the Patch is actually stored. Be careful!

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2. Copying Patches

You are able to copy a SINGLE Patch from one location to another:

1. Select the Patch Number of the Patch that you want to copy. This is the "source" Patch.

2. Press and hold STORE.

3. While holding STORE, type in the 2-digit number of the "destination" patch – the new Patch where you want the source Patch to go. The Patch originally in this location will be replaced by the source Patch.

You are able to copy a MULTI Patch from one location to another. Enter MULTI PATCH Mode and follow the steps listed above for copying SINGLE Patches.

The STORE button can also be used in the selection of different Patches (copying Patches) per Voice in MULTI PATCH Mode, dicussed in the previous section on the PATCH EDIT buttons:

1. When the MATRIX-12 is in MULTI PATCH Mode, press the PATCH EDIT button beneath the Voice you want to copy, so that its current Patch Number becomes underlined. This is the "source" Voice.

2. Select the Patch you want this Voice to play by entering its 2-digit SINGLE Patch Number from the Keypad. If this Voice already contains the Patch you want, you can skip this step.

3. Press and hold STORE. The Voice you selected will have its Patch Number replaced with " ** " as long as you are holding STORE.

4. While holding down STORE, press the PATCH EDIT button of any Voice and its Patch Number will be replaced with the one currently contained in the "source" Voice.

5. You may even switch Voice Banks, if necessary. Continue to hold STORE, press the VOICES 1-6 / VOICES 7-12 key and select as many Voices as needed.

When you have finished editing the MULTI Patch, you must STORE the edited version if you intend to keep it.

3. The OBERHEIM "Basic Patch"

Although we will cover this is more detail in **Part 3**, the MATRIX-12 contains in its permanent memory a **"Basic Patch"** that is used to create new Patches "from scratch". A very simple, straight-forward Patch that makes for an ideal starting point in creating your own original Patches, the BASIC PATCH can be called up from memory any time that the MATRIX-12 is in SINGLE PATCH Mode.

1. Select a Patch Number of a patch that you want to replace.

2. Press and hold STORE.

3. While you are holding STORE, press the CLEAR button. This button is located in the MODULATION SOURCE/X SELECT section, all the way to the right.

4. The PROGRAMMER display will show the Patch Name *OBERHEIM* and the PAGE MODIFIER section will display Page 1 of VCO1. You are now ready to start programming a new Patch "from scratch".

5. Calling up the BASIC PATCH from memory and editing it to make a new Patch does **not**, in and of itself, **permanently** erase the Patch that it has replaced. This only occurs if the BASIC PATCH or the new Patch is written into memory with the STORE button. Otherwise, the presence of the BASIC PATCH, and any editing that you perform, is only temporary until you STORE it.
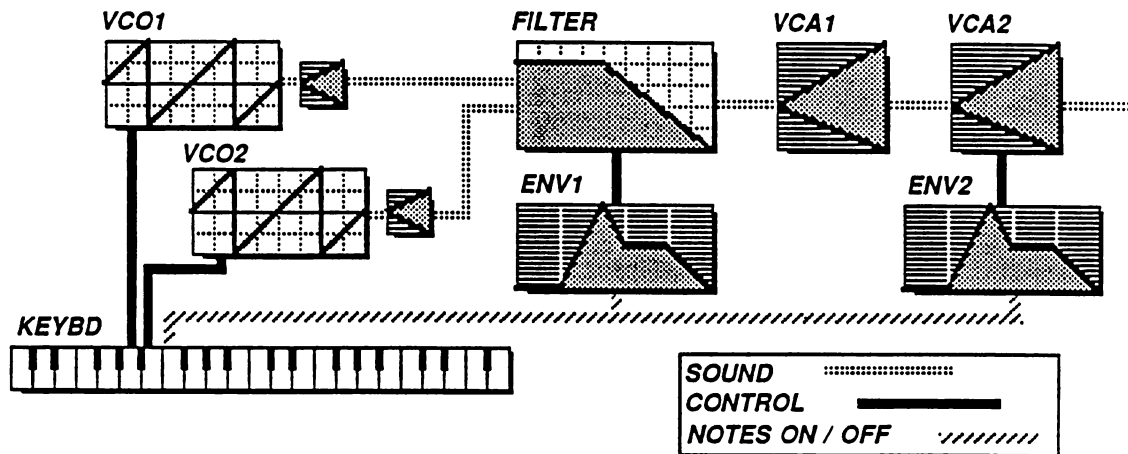
· VOICES 1-6/VOICES 7-12

We have briefly mentioned this function earlier in this section, but we'll go into a little more detail now. The MATRIX-12's Programmer display is only able to show six Voices at a time. This button allows you to switch between the two banks of Voices in order to view their displays.

- This switching capability is active **at all times** when the MATRIX-12 is in MULTI PATCH Mode. Because each Voice can be manipulated individually in this Mode, you are permitted to select between Voice Banks as often as you like.

- Voice Bank switching is active only in *PAN* and *VASSIGN* in SINGLE PATCH Mode. Because SINGLE PATCH Mode treats all Voices "homogeneously" (all the same), selecting between banks of Voices is not necessary and the button will not operate in the majority of SINGLE PATCH Pages. However, since *PAN* and *VASSIGN* affect Voices individually, these two Pages permit you to switch between Voices 1-6 and 7-12.

KEYPAD

The Keypad permits you to select any Patch in the MATRIX-12's memory and select a Patch Number when using STORE to write a Patch into memory.

When in SINGLE PATCH Mode, the Keypad's numeric buttons allow you select any of the synthesizer's 100 SINGLE Patches numbered *S00* through *S99*.

When in MULTI PATCH Mode, the Keypad's numeric buttons allow you select any of the synthesizer's 100 MULTI Patches numbered *M00* through *M99*.

The "+" and "−" buttons have two Modes of operation depending on the status of the *CHAIN* function (refer to the operation of *CHAIN* on Page 52):

* When *CHAIN* is **OFF**, the "+" button advances through the Patches in numerical order each time the button is pressed once. The "−" button is used to reverse through the Patches each time it is pressed once. If either button is pressed and **held down**, the MATRIX-12 will advance or reverse automatically through the Patches, one after another, until the button is let go.

* If *CHAIN* is **ON** or in **SLAVE**, the "+" button advances and the "−" button reverses through the Patches as they have been arranged in the Chain program.

Thus, the " + " and " − " buttons can either advance or reverse through the Patches in **Numerical** order or in the *CHAIN* order.

The action of the ADVANCE CHAIN footswitch and the "+" and "−" buttons are **not** normally transmitted and received via MIDI by the MATRIX-12. See the descriptions below for detailed information.

MIDI Patch Changes –
Operation with Oberheim Instruments
(Another MATRIX-12 or an XPANDER)

* When using the MIDI Patch Change function, both Oberheim instruments must have *SYSTEMX* (System Exclusive) and *PATCH* in the MIDI *ENABLES* Sub-Page selected in order for the Slave Oberheim to respond to the Master's switching between SINGLE Patch Mode and MULTI Patch Mode.

* *SYSTEMX* must also be enabled on both the Master and Slave Oberheim instruments for MIDI Patch Changes to occur when using the ADVANCE CHAIN footswitch or the "+" and "−" buttons on the Master Oberheim.

* If *CHAIN* is being used on the Master Oberheim, it will send MIDI Patch Numbers to the Slave Oberheim on the Basic Channel when the ADVANCE CHAIN footswitch or the "+" and "−" buttons are used. Just be

sure that PATCH **and** SYSTEMX are enabled for **both** instruments. If *SYSTEMX* is disabled on either the Master or the Slave Oberheim, the Slave will not respond at all to Patch Changes made from the Master in CHAIN.

MIDI Patch Changes –
Operation with Other Instruments

- Patch Changes made on the MATRIX-12 in *CHAIN* are not transmitted via MIDI unless System Exclusive is enabled in the MIDI *ENABLES* Sub-Page. Since the receiving instrument must be another Oberheim – or one that has the ECC/Oberheim System Exclusive code programmed – Patch Changes made in *CHAIN* will not be recognized by other manufacturers' equipment. System Exclusive, by the way, is MIDI data that identifies a particular manufacturer's products from others in a MIDI system.

PAGE MODIFIER

Although the PAGE MODIFIER Section of the MATRIX-12's front panel has been mentioned several times so far in the manual, we'd like to summarize its functions and operation.

MASTER PAGE

```
┌─────────────────────────────────────────┐
│CHAIN  MIDI  MISC            CASS          │
└─────────────────────────────────────────┘

   ▢    ▢    ▢    ▢    ▢    ▢

┌─────────────────────────────────────────┐
│SINGLE=PAN    VIB V.ASSIGN ZONE            │
└─────────────────────────────────────────┘

   ▢    ▢    ▢    ▢    ▢    ▢

  (◉)  (◉)  (◉)  (◉)  (◉)  (◉)
```
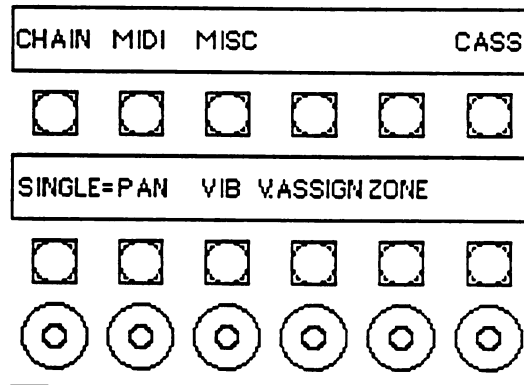
Primary Page Selection –
SINGLE PATCH Pages

Pressing the button to the immediate left of any SINGLE PATCH Page name (printed on the front panel in White lettering) will select the Primary Page for that function and display its current status in the PAGE MODIFIER Section. The LED next to its switch will light and the windows in PAGE MODIFIER will then do one of three things:

1. If **VCO1, VCO2, FM/LAG** or **VCF/VCA** is selected, the PAGE MODIFIER will display the available parameters for that Page in the Upper Display along with their current settings in the Lower Display.

2. If **TRACK X, ENV X, LFO X** or **RAMP X** is selected, the PAGE MODIFIER will prompt you to select which one (that's what the "X" is for). For added programming speed, pressing the button for any of these Pages a second time calls up the last one you selected:

   As an example, suppose you were editing LFO 4, switched to VCO1 and then wanted to go back to LFO 4. Pressing **LFO X** just once will display:

   SELECT LFO FROM 1 TO 5

   Pressing the LFO X button again will immediately recall LFO 4 for you. Or you can press button #4 in the X SELECT section to select LFO 4.

3. If **NAME** is selected, PAGE MODIFIER will display *NAME* and *MODULATION ROUTINGS*. You may then select either one of these two Sub-Pages to examine or edit. More on these later.

Primary Page Selection –
MULTI PATCH Pages

Pressing the button to the immediate left of any MULTI PATCH Page name (printed on the front panel in Grey lettering) will select the Primary Page for that function and display its current status in the PAGE MODIFIER Section. The LED next to its switch will light and the windows in PAGE MODIFIER will then do one of three things:

1. If **TRANS, PAN, VASSIGN, VOLUME, VIB** or **DETUNE** is selected, the PAGE MODIFIER will display the available parameters for that Page in the Upper Display along with their current settings in the Lower Display. The VOICES 1-6/VOICES 7-12 select switch LED will be lit showing you that you are able to switch between Voice Banks.

2. If **ZONE X** is selected, the PAGE MODIFIER will prompt you to select which one:

   SELECT ZONE FROM 1 TO 6

   For added programming speed, pressing the button for this Page a second time calls up the last ZONE you selected.

3. If **NAME** is selected, PAGE MODIFIER will display the MULTI Patch's name for you to examine or change.

Primary Page Selection –
MASTER PAGE Sub-Pages

Pressing the button beneath the name of any MASTER PAGE Sub-Page displayed on the PAGE MODIFIER windows will select the Primary Page for that function and display its current status in the PAGE MODIFIER Section.

PAGE MODIFIER Displays

Once you have selected a Page to work with, notice what happens with the SWITCH MODE lights in the PAGE MODIFIER section. Depending on which Primary Page you have selected, these LEDs will inform you as to what kind of operation the six switches directly beneath the window are able to perform.

• Upper Display SWITCH MODEs will either be MODULATION PAGE SELECT or ON/OFF status.

   If MODULATION PAGE SELECT is lit, this is telling you that the parameters displayed are able to be modulated by any one or several (up to six) of the MATRIX-12's 27 Sources of Modulation. Pressing any one of these switches will select that parameter to be modulated. In other words, pressing a switch beneath a certain parameter name on the display selects that parameter to be a Modulation Destination.

   In some instances you will notice that one or more of the available parameters **will not be able to be modulated** and their switches will not be active in this mode. Some examples of these would be VCO 1 and VCO 2 *DETUNE* and the five *POINT* values of the TRACK X Generator.

If ON/OFF is lit, the parameters displayed are able to be turned ON and will be <u>underlined</u>,or OFF and will be de-underlined.

- Lower Display SWITCH MODEs can either be VALUE X or ON/OFF status:

    If VALUE X is lit, the Amount values of the parameters displayed in the Upper window can be selected by pressing the button beneath the number displayed.

    If ON/OFF is lit, the parameters displayed are able to be turned ON and will be <u>underlined</u>, or OFF and will be de-underlined by pressing the button beneath the parameter name in the window.

- You will notice that one LED for each display will be lit for all Pages except for **TRACK X, RAMP X** and **NAME**.

    TRACK X and **RAMP X** will not have either LED lit for the Upper Display switches because the displays for these Pages simply list the available "fixed" parameters – along with their corresponding Amounts in the Lower Display – and are never modulated.

    NAME will also not have either LED lit for the Upper Display switches. This is because the switches directly beneath *NAME* and *MODULATION ROUTINGS* are used to select these two additional Sub-Pages.

Sub-Page Selection
All Primary Pages in this section, except for **TRACK X** and **NAME**, have more parameters than can be displayed in the Primary Page windows. Pressing the PAGE 2 switch displays for you the additional parameters that can be used in programming the selected Page.

You will notice that all PAGE 2 functions have SWITCH MODEs of **ON/OFF**. All Primary Pages have **MODULATION SOURCE SELECT** (for those with possible Destination parameters) and **VALUE X** SWITCH MODEs. This design keeps Page operation consistent.

MODULATION SOURCE/X SELECT

This narrow strip of controls along the top center area of the MATRIX-12's front panel consists of 14 multi-function switches used to perform a variety of functions when using modulation in programming patches. These buttons are used to...

   ... select any one of the MATRIX-12's 27 sources of modulation that are used to affect the sound of a SINGLE PATCH.

   ... select a numerical amount of modulation that will affect the patch as an alternative to using the PAGE MODIFIER rotary controls.

   ... select the Primary Page for those functions designated by an "X" that have "more than one" – TRACK X, ENV X, LFO X, RAMP X and ZONE X.

   ... quickly select Positive (normal) or Negative (inverted) Values for modulation AMOUNTs.

   ... permit the Quantization of modulation in the patch.

   ... allow you to Clear or remove an unwanted modulation from a patch.

OPERATION
Modulation Source Select
The row of MODULATION SOURCE Select buttons is where you select one of the MATRIX-12's 27 Sources of Modulation in order to program the selected modulation into the Patch.

The MODULATION SOURCE Select buttons are used exclusively in conjunction with SINGLE PATCH Mode when editing SINGLE Patches. Since it is the SINGLE Patches where modulation is used, the MODULATION SOURCE Select operation is only active when you are editing a SINGLE Patch.

Although we will get into detail in **Part 3** and **Part 4** on how modulation Sources are used in programming Patches, we wanted to mention now that the MATRIX-12 will always inform you of the status of these buttons by lighting the appropriate LED. If the LED next to MODULATION SOURCE SELECT is lit, you know that you are able to select any one of the 27 Sources to introduce into the Patch. If the X SELECT LED is lit, these buttons take on a new personality, as described in the following section.

X Select
"X" parameter selection is used whenever a numeric Value – including positive ("+" button) and negative ("–" button) values – is required or when choosing a Primary "X" Page. This section is actually the MATRIX-12's second "Keypad" used for numeric programming values and Page selection while the other one, as we have discovered, is used exclusively to select Patch Numbers.

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0 through 9

The **0** through **9** buttons are used to change settings within a Patch just like the six Knobs in the PAGE MODIFIER section. Using X SELECT to set amounts is a faster alternative to spinning the Knobs. They are also used to select the Primary Page for those functions that have "more than one" to choose from (TRACK X, ENV X, LFO X, RAMP X and ZONE X).

" **+** " and "**—** "

The "+" and "-" keys are used to invert the Amount value in a Modulation Page. Since the MATRIX-12 permits positive **and** negative modulation amounts, these buttons permit switching from plus to minus and back again easily.

"QUANTIZE" Switch

QUANTIZE is used in Modulation to change the otherwise smooth transitions of the modulation into steps. A sweeping LFO, Envelope or Pitch-Bend Lever (as well as the other Sources) can be made to modulate in discreet steps rather than the normal smooth transition. When a modulation that is routed to the *FREQ* of the VCOs or the VCF is quantized, the steps are heard in semi-tones.

Quantizing is achieved by selecting the Modulation Page, then selecting the VALUE X amount in the Lower Display so that the number becomes underlined. Pressing QUANTIZE in X SELECT will quantize the modulation and will indicate this by displaying the letter "*Q*" next to the amount number.

"CLEAR" Switch

CLEAR is a multi-purpose switch that permits removing modulations from a patch or resetting VALUE X amounts to their default settings.

- To remove a Modulation, simply press and hold the button beneath its name in the Upper Display. While you are holding this button, press CLEAR and the modulation will be removed from the Patch and will disappear from the displays.

- To reset an amount setting, simply select the numerical VALUE X by pressing and holding the button beneath its name in the Upper window. Press CLEAR and the display will change to show its default setting. In most cases the new number displayed will be **0**, but you can expect to see a wide variety of defaults depending on what parameter you are clearing. For example, you can use CLEAR to reset the five *POINT*s of a Tracking Generator: **0, 15, 31, 47** and **63**.

- In the section covering the PROGRAMMER, we also mentioned that pressing CLEAR while holding STORE recalls the MATRIX-12's Basic Patch called *OBERHEIM*. This action is actually "clearing" the Patch and is called "Patch Initialize" on many other synthesizers.

- CLEAR can also be used to reset all of the Global pararmeters in SINGLE PATCH Mode. If you have been experimenting in SINGLE PATCH Mode, remember that these settings are not programmable per Patch and will affect all SINGLE Patches Globally. Also, these settings will remain as they are until you change them, even if the MATRIX-12 is powered off.

1. Turn the MATRIX-12 off.

2. Press and hold the CLEAR button.

3. While you are holding CLEAR, turn the MATRIX-12 back on.

4. The displays in the PAGE MODIFIER section of the front panel will read:

   RESET MEMORY ?   **(DOESN'T AFFECT PATCHES)**

   YES   **NO**

5. Press the YES button and the MATRIX-12 will select SINGLE Patch 00 with the **OBERHEIM** Basic Patch recalled and the Global parameters will default to the following settings:

MIDI Page Settings:

CHANNEL	**1**

CTRLS Page:

LEVER 1	**BENDER**
LEVER 2	**1**
PEDAL 1	**7**
PEDAL 2	**64**
PRESSR	**PRESSR**

ENABLES Page:

SYSTEMX	Off
ECHO	Off
CONTROLS	On
PATCH Changes	On
VELOCITY	**EXPO 1**

PAN Page:

All Voices panned to **MID**.

VIB Page:

PAGE 1

SPEED	*WAVE*	*AMP*
56	*TRIANGLE*	*0*

PAGE 2

LAG
(off)

SPEED = OFF   *0* / *AMP =*   *LEV 2*   *+63*

VASSIGN

All Voices are assigned to *ZONE 1*.

ZONE

ZONE 1 will be the only active ZONE. It will default to:

PAGE 1

MODE	*LIMITS*	*CHANNEL*
ROTATE	*0 TO 127*	*OMNI*

PAGE 2

MIDI IN	*MIDI OUT*	*VOICE ROB*
KEYBOARD	*CONTROLLERS*	

ZONES 2 through *6* are **not** active and default to:

PAGE 1

MODE	*LIMITS*	*CHANNEL*
ROTATE	*0 TO 127*	*OMNI*

PAGE 2

MIDI IN	*MIDI OUT*	*VOICE ROB*
KEYBOARD		

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MASTER

The MASTER Section of the MATRIX-12 permits the selection of the *GLOBAL* functions – the overall functions of the synthesizer that are not programmable per Patch – that affect the entire instrument regardless of what Page is selected later.

VOLUME

This knob simply controls the overall audio output level of the MATRIX-12. When it is fully counter-clockwise, the mixed AUDIO OUT jacks – LEFT, MONO and RIGHT – are effectively turned off. Full volume is achieved when the control is turned fully clockwise.

> The VOLUME knob simultaneously controls the output of the synthesizer through the LEFT, MONO, and RIGHT AUDIO OUT jacks on the MATRIX-12's back panel. It also controls the volume output of the MATRIX-12 in CASSETTE MODE as a monitor during data transfer.

> If you have your MATRIX-12 retro-fitted with the optional Individual Voice Outputs, the Master VOLUME control has no effect on their output level.

TUNE PAGE

> The TUNE PAGE key selects the MATRIX-12's functions that affect its overall tuning. Pressing this buton displays the available Tuning parameters:

TUNE PAGE

```
┌────────────────────────────────────────────┐
│ VCOS    PW    RES    VCF    VCA    ALL       │
└────────────────────────────────────────────┘
   ▢     ▢     ▢     ▢     ▢     ▢

┌────────────────────────────────────────────┐
│ MTUNE= 0    -OCT   +OCT  TRANSPOSE=0         │
└────────────────────────────────────────────┘
   ▢     ▢     ▢     ▢     ▢     ▢
  (O)   (O)   (O)   (O)   (O)   (O)
```
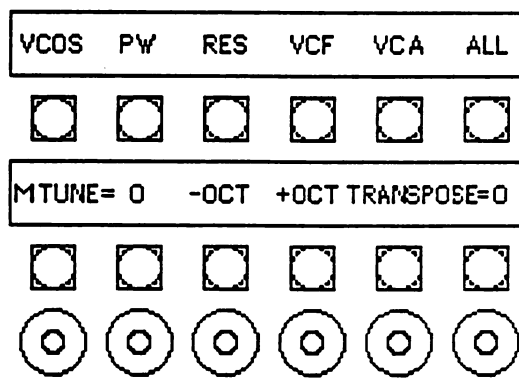
Upper Display

The UPPER window displays the MATRIX-12's Auto-Tune parameters. In addition to the standard oscillator tuning (displayed as *VCOS*), the Tune Page in the MATRIX-12 permits the calibration and scaling of several parameters not tuned on other synthesizers. *PW* selects the calibration of the Voices' Pulse Widths to insure uniformity among the 24 oscillators. *RES* calibrates the Resonance level of each of the 12 Voltage Controlled Filters (one per Voice). *VCF* tunes the frequency of each Filter. *VCA*, like

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PW, insures the uniformity of the final VCA of each Voice. This calibration makes the volume level of each of the 12 Voices equal.

- To tune an individual parameter, press the button directly below its name in the display. If *RES* is selected, *VCF* is also selected automatically. This is because the reliability of the VCF tuning is dependent upon the scaling of the Resonance parameter. It is logical, then, to tune them together if *RES* is selected.

- To tune all of the parameters, press *ALL*. The MATRIX-12 will proceed through its entire Auto-Tune cycle, which takes about 90 seconds to complete.

1. During the Auto-Tune routine, the message "*TUNING*" will appear on the LOWER display directly beneath the parameter being tuned. When the MATRIX-12's processor is finished all 12 Voices for a given parameter, the message "*PASS*" will appear on the LOWER display directly beneath its name.
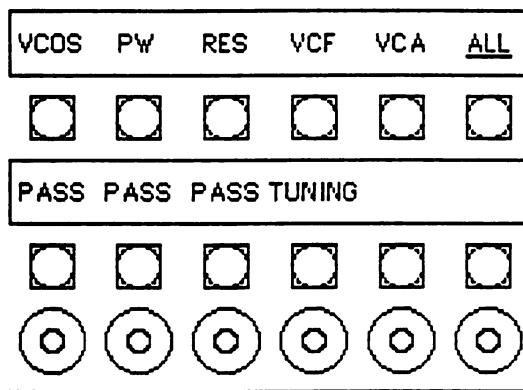
2. If, for any reason, the MATRIX-12 cannot successfully tune all 12 Voices for one of the parameters, the mesage "*FAIL*" will be displayed in the LOWER window directly beneath the parameter's name. Pressing **PAGE 2** will display the Voices that failed for that parameter. The first Voice out of the 12 to fail is displayed and turning the knob directly beneath that parameter will display the other Voices (if any) that have failed.

Failed Voices is a rare occurance and may happen if the MATRIX-12 is used in an environment that has extremes in temperature and/or humidity. You may also experience some Voice failing on occasion if the MATRIX-12 is tuned immediately after you first power it on, due to the fact that the synthesizer requires approximately 30 minutes of warm-up time in order to temperature-stabilize. If you get consistent Voice failing after several Auto-Tune attempts, your MATRIX-12 may need servicing. Consult the Oberheim Authorized Service Center directory included in your Owner's Packet.

3. After a successful Auto-Tune, pressing TUNE PAGE returns the front panel back to its original displays.

Lower Display

The LOWER display permits the operation of the synthesizer's three Master Tune functions. These parameters are not programmable per Patch, but will remain set in Global memory as they are until you change them, even if you call up another Page, turn the MATRIX-12 off, etc.

M TUNE

This is the MATRIX-12's Master Fine Tune adjustment, used to tune the entire synthesizer as a whole to other instruments. The rotary control directly beneath the number readout is used to make this adjustment. Its range is from −63 to +63 which represents a quarter-tone sharp or flat. A setting of 0 is A=440Hz.

−OCT +OCT

These two parameters are the Master Octave Switching controls. Use these buttons directly beneath their displays to operate these functions. The range of this function is five octaves. *−OCT* will transpose the MATRIX-12 as a whole down a maximum of three octaves in 1-octave increments; *+OCT* transposes up a maximum of two octaves in 1-octave increments.

When these two controls are used, a value of *12* will be added or subtracted from the value shown in the *TRANSPOSE* control in the adjacent display segment until the upper or lower limits of transpose are reached. See its description below.

TRANSPOSE

This is the MATRIX-12's Master Transpose control which transposes the entire synthesizer in semi-tone increments. Its range is the same as the Master Octave Switching controls: three octaves down or two octaves up. The display will indicate the number of semi-tones of transposition numerically from −36 to +24. Use the knob directly beneath the number display to adjust this parameter.

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MASTER PAGE

The Master Page is the heart of the MATRIX-12's performance control. Grasping the operational concepts behind the design of this Page will enable you to quickly and easily set up the synthesizer's Master functions.

MASTER PAGE

```
┌─────────────────────────────────────────┐
│ CHAIN  MIDI  MISC              CASS       │
├─────────────────────────────────────────┤
│   ▢    ▢    ▢    ▢    ▢    ▢              │
│ ┌─────────────────────────────────────┐  │
│ │ SINGLE=PAN   VIB  V.ASSIGN ZONE      │  │
│ └─────────────────────────────────────┘  │
│   ▢    ▢    ▢    ▢    ▢    ▢              │
│   ◉    ◉    ◉    ◉    ◉    ◉              │
└─────────────────────────────────────────┘
```
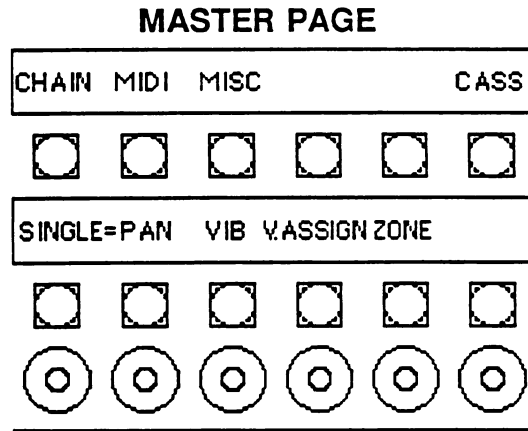
The following tables summarize the parameters of the MASTER PAGE. The Upper and Lower Display functions in Page 1 will be discussed in detail at the end of this summary.

**Page 1
Upper Display**

Global control for SINGLE PATCH Mode **and** MULTI PATCH Mode:

CHAIN
This is the Page where all existing Single and Multi Patches can be arranged in a logical "link" for live performance. Once a CHAIN has been written, the patches can be stepped through by using a footswitch plugged into the MATRIX-12's back panel ADVANCE CHAIN jack or by using the "+" and "–" on the Keypad.

MIDI
The MATRIX-12's extensive MIDI assignments are selected in this Page which enable the synthesizer to act as either a Master or a Slave in a MIDI system – or **both**, at the same time.

MISC
A Page of miscellaneous parameters that include Velocity Scale and Velocity Sensitivity adjustments as well as a PAGE 2 of controls for setting the MATRIX-12's LEVERs, PEDALs and EXT TRI (External Trigger) polarities.

CASS
"Cassette Interface" – provides a method of saving and retrieving the data you have programmed into the MATRIX-12 using standard audio cassette tape. The entire contents of the synthesizer's memory is saved to tape and can be loaded back into the MATRIX-12 in its entirety or selectively. A function called CHECK is also provided to verify the tape and identify any errors.

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Lower Display

Parameters that provide **Global** control for SINGLE PATCH Mode.
These parameters are **Programmable** for each individual MULTI Patch (in MULTI PATCH Mode, titles are printed in grey on the front panel).

PAN

These parameters enable the "placement" of the Voices' audio outputs in the stereo field from LEFT to RIGHT, similar to using a mixing console.

VIB

"Vibrato" – provides the necessary parameters to obtain some very elaborate Vibrato settings.

VASSIGN

"Voice Assignment" – sets the playing control source for each Voice, either polyphonically or monophonically from the Keyboard, direct MIDI IN control or both.

ZONE

The six ZONEs are selected from this parameter and work in conjunction with *VASSIGN* in setting up specific areas of the Keyboard or the MIDI Note Range that will play the Voices polyphonically.

Page 2

Global control for SINGLE PATCH Mode **and** MULTI PATCH Mode:

SERVICE

When selected, displays seven Test Routines used to calibrate and test the MATRIX-12. This Sub-Page is provided to assist in the production of the synthesizer and in servicing malfunctions in the field and are not necessary for normal use of the instrument. Consult the MATRIX-12 SERVICE MANUAL for more information.

VOICES ON/OFF

This parameter provides a visual means to examine which Voice or Voices, if any, that have been failed by Auto-Tune, or if it is desired that a Voice or any number of Voices be manually defeated. When selected *OFF*, the Voice will ignore any Keyboard or MIDI IN commands to play until it is re-enabled. The ON/OFF status of the Voices is retained in memory when the MATRIX-12 is powered off.

VERSION

When selected, this parameter displays the current Software Version of the MATRIX-12. The three micro-processors inside your MATRIX-12 handle all the calculations required to perform the various functions of the synthesizer. The processors work 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-12 can be displayed at any time simply by entering this Parameter. When entered, the index numbers of the MATRIX-12's operating software will be displayed. Pressing PAGE 2 displays the software's Copyright Notice. Software Updates issued by ECC/Oberheim can be retrofitted to any MATRIX-12. Contact your nearest ECC/Oberheim Authorized Service Center for prices and availability.

CHAIN

The CHAIN Page provides a very useful performance feature that permits you to arrange the SINGLE and MULTI Patches in a pre-programmed order. Once you have determined the order in which you want the Patches to be, for a live set as an example, they can be stepped through with the "+" and "−" buttons on the Keypad or by using a footswitch inserted into the ADVANCE CHAIN input on the MATRIX-12's back panel. Thus, CHAIN permits you to re-arrange your Patches as often as needed without having to continually re-program the Patch order in SINGLE and MULTI Patch Modes. In addition, CHAIN also permits switching to **any desired Patch Number with one command,** even if you are selecting between SINGLE and MULTI Patches.

ENABLE   This parameter simply turns CHAIN on or off, with a third option of *SLAVE*.

When selected *OFF*, the CHAIN Page is defeated and the Patch Number select operation of the Keypad is normal. A footswitch plugged into ADVANCE CHAIN on the back panel will advance through the Patch Numbers – the same operation as the "+" button – when CHAIN is OFF.

When *ON*, CHAIN is enabled and the Patch List that you have arranged can be stepped through with the ADVANCE CHAIN footswitch or with the "+" and "−" switches on the Keypad. You can still select among the Patches with the 0 through 9 buttons on the Keypad as normal, as well as switch between SINGLE and MULTI Patch Modes.

It should be mentioned at this point that there are two distinct functional differences between ADVANCE CHAIN and Keypad operation of CHAIN. First, the ADVANCE CHAIN footswitch steps through the CHAIN in ascending order **only.** Using the "+" or "−" keys permit you to advance (+) as well as reverse (−). Secondly, when using the footswitch, the CHAIN will stop when Step 99 is reached. The "+" and "−" buttons permit looping of the CHAIN.

When *SLAVE* is selected, the operation of the CHAIN Page does not change but simply allows the PROGRAMMER to display the current Patch in each STEP Number when Knob #3 or the X SELECT buttons are used to select STEP Numbers.

STEP   This parameter selects among the 100 available Patch Numbers in the CHAIN numbered 00 through 99. Knob #3 is used to advance or reverse through the Patch Numbers in order to program the CHAIN or simply examine its contents. Also, if the button beneath

the STEP Number is pressed, the number in the display becomes underlined and you can select among the 100 Steps using the X SELECT buttons.

As mentioned above, if *SLAVE* is selected in the ENABLE parameter, the PROGRAMMER window will also display the current Patch selected in each STEP Number.

MODE   This parameter is used to select a SINGLE Patch or a MULTI Patch to be programmed in the current STEP. The button beneath the MODE display or Knob #5 can be used to select between a SINGLE Patch or a MULTI Patch.

PATCH   This parameter is used to select the desired Patch Number for the current STEP from **00** to **99**. If the current MODE is a SINGLE Patch, the number selected will be the SINGLE Patch Number for that STEP. If the current MODE is a MULTI Patch, the number selected will be the MULTI Patch Number for that STEP.

Knob #5 is used to advance or reverse through the Patch Numbers in order to select the PATCH. Also, if the button beneath the PATCH Number is pressed, the number in the display becomes underlined and you can select among the 100 Patches using the X SELECT buttons.

MIDI Patch Changes –
Operation with another MATRIX-12 or the Oberheim XPANDER

• When using the MIDI Patch Change function, both Oberheim instruments must have *SYSTEMX* (System Exclusive) and *PATCH* in the MIDI *ENABLES* Sub-Page in order for the Slave Oberheim to respond to the Master's switching between SINGLE Patch Mode and MULTI Patch Mode.

• *SYSTEMX* must also be enabled on both the Master and Slave Oberheim instruments for MIDI Patch Changes to occur when using the ADVANCE CHAIN footswitch or the "+" and "–" buttons on the Master Oberheim.

• If *CHAIN* is being used on the Master Oberheim, it will send MIDI Patch Numbers to the Slave Oberheim on the BASIC CHANNEL when the ADVANCE CHAIN footswitch or the "+" and "–" buttons are used. Just be sure that *PATCH* and *SYSTEMX* are enabled for **both** instruments. If *SYSTEMX* is disabled on either the Master or the Slave Oberheim, the Slave will not respond at all to Patch Changes made from the Master in CHAIN.

MIDI Patch Changes –
Operation with Other Instruments

• Patch Changes made on the MATRIX-12 in *CHAIN* are not transmitted via MIDI unless System Exclusive is enabled in the MIDI *ENABLES* Sub-Page. Since the receiving instrument must be another Oberheim – or one that has the Oberheim System Exclusive code programmed, Patch Changes made in CHAIN will not be recognized by other manufacturers' equipment.

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MIDI

The extensive MIDI assignments of the MATRIX-12 are selected in this Page.

"MIDI" is the acronym for Musical Instrument Digital Interface. MIDI is a universally accepted system of digital communication that allows you to hook up your MATRIX-12 to other devices – synthesizers, sequencers, drum machines, computers, etc. – as long as they are also equipped with a MIDI interface. MIDI makes it possible to connect instruments made by different manufacturers.

Because your MATRIX-12 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-Pages, 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 Communication
With the exception of just two MIDI functions – individual Voice control from MIDI IN in *VASSIGN* and MIDI Input selection in *ZONE* – programming the MIDI control in the MATRIX-12 is accomplished in the Sub-Pages of the *MIDI* Page.

The MIDI parameters selected and programmed in these Sub-Pages are **Global**. This is true for both SINGLE and MULTI Patches.

MIDI communication is divided into several categories. For our purposes in this section of the manual, we will be concerned with three of these sub-groups:

- **NOTES**
   Notes played on one instrument are played on the other(s) as well as VELOCITY and RELEASE VELOCITY.

- **CONTROLLERS**
   LEVER1 (or a Pitch Wheel from a Master connected to the MATRIX-12's MIDI IN) and LEVER2 (or a Vibrato Wheel), PEDAL1 (normally Volume) PEDAL2 (normally Sustain) and PRESSURE (After-Touch) used on one will modulate the others in the MIDI system.

- **PATCH CHANGES**
   The remaining performance control commonly used in MIDI communication, the PATCH CHANGE command, is treated separately by the MATRIX-12. The ensuing discussion clarify this.

The MATRIX-12 enables you to set 14 MIDI assignments grouped into 6 MIDI headings described in the following pages. These six headings are:

CHANNEL   CTRLS   ENABLES   SEND   RESET   MUTE

CHANNEL

Otherwize referred to as the "Basic Channel", this parameter selects the transmitting and receiving MIDI Channel for the MATRIX-12. VALUE X selects any one of the available MIDI Channels numbered **1** through **16**.

The main thing to keep in mind is that if the Master instrument in a MIDI system is transmitting on a certain channel, the receiving instruments must also be set to that channel, or be in OMNI Mode, for MIDI communication to take place. In the MATRIX-12, these "receiving instruments" are the 12 **Voices**. Since they can be controlled independently, each of the MATRIX-12's Voices can be regarded as an "instrument". If the Voices are assigned to one or more ZONEs to be played polyphonically, each ZONE is a "receiving instrument".

The Basic Channels are concerned primarily with transmitting and receiving Notes and Controllers. There are, however, a few details you must observe:

RECEIVE

MIDI IN
When MIDI IN is used, the MATRIX-12 is considered a SLAVE and will receive **Notes** and **Controllers** on the MIDI Channel that you specify in *VASSIGN* or *ZONE*. Thus, **the MIDI Channel(s) selected for the Voices in VASSIGN or ZONE will be used by the MATRIX-12 as the "Basic Channel(s)" for those Voices assigned to them.**

PATCH CHANGES, on the other hand (because they are treated separately), are received on the Basic Channel that has been set in this parameter and not on the ZONE's channel.

As an example, assume that the Basic Channel of the MATRIX-12 is set in this parameter to **2**. If all 12 Voices are assigned to ZONE 3 and ZONE 3's *CHANNEL* setting is Channel **6**, Channel 6 is the one that will be used for Notes and Controllers but PATCH CHANGES will still be received on Channel 2. Thus, Patch Changes are global commands and Notes and Controllers are tied in to the ZONES or individual channel settings in VASSIGN.

Summary
If the *CHANNEL* of the ZONE that is being used to receive is set to OMNI, it will receive Notes and Controllers on all channels. If the ZONE is set to a single MIDI Channel, that channel is the one used for receiving Notes and Controllers and Patch Change commands will still only take place on the Basic Channel.

The Master controller that you are using to drive the MATRIX-12 must be set to transmit on the ZONE's channel as well. The exception to this (and this is an important one) is that if OMNI MODE is turned ON in the ZONE, the MATRIX-12 will receive Notes and Controllers on **any** MIDI channel for theVoices assigned to that particular ZONE. The Master instrument can be set to transmit on any MIDI Channel and its Notes and Controllers will be received by the ZONE at all times when it is in OMNI MODE. Patch Change commands are still received on the Basic Channel and is not dependent on the ZONE's channel setting.

TRANSMIT

MIDI OUT
When MIDI OUT is used, the MATRIX-12 is considered the Master in the MIDI system and handles MIDI communication the same as when receiving. It will transmit its own Notes and Controllers to other slaves in the system on the ZONEs' channels. If OMNI is selected as a ZONE's *CHANNEL*, notes and controllers will be sent on the MATRIX-12's Basic Channel. Patch Changes will be transmitted on the Basic Channel only. If the MATRIX-12 is a Slave, MIDI OUT can still be used as well. Playing notes on its Keyboard and using its controllers will control another instrument as a Slave.

When the MATRIX-12 is a Slave, if MIDI OUT is used **and** MIDI parameter *ECHO* is selected in the ENABLES Sub-Page, the MATRIX-12 will transmit MIDI **Notes** and **Controllers** coming from the Master controller as well as its **own** MIDI on whatever you select as the channel settings for the active ZONES. If an active ZONE has its *CHANNEL* parameter set to OMNI, Notes and Controllers are transmitted on the MATRIX-12's Basic Channel. Even though the MATRIX-12 is technically a Slave in the system – due to the fact that its MIDI IN "slaves it" to the Master controller – you can think of it as another Master when its MIDI OUT and MIDI ECHO are used together.

Summary
If the *CHANNEL* of the ZONE that is being used to transmit is set to OMNI, it will transmit Notes and Controllers on the MATRIX-12's Basic Channel. If the ZONE is set to a single MIDI Channel, that channel is the one used for transmitting and Patch Change commands will still take place on the Basic Channel. ECHO permits the combining of MIDI IN information plus the MATRIX-12's own MIDI data and transmitting it via MIDI OUT.

PASS

MIDI THRU
When the MATRIX-12 is Slaved and MIDI THRU is used **instead** of MIDI OUT, it will only respond as a Slave in your MIDI system and will simply pass information received from its MIDI IN to other slave instruments in the system, unaffected by any MIDI processing going on inside the MATRIX-12 itself. The MATRIX-12 can still transmit information from its MIDI OUT port but this information does not go out MIDI THRU – just the information coming from the Master.

A Word About OMNI MODE

As we mentioned above, OMNI MODE is turned ON or OFF in the ZONE Pages. Although we will cover this in detail when we discuss ZONEs, it is a good idea that we touch on OMNI Mode here briefly.

When OMNI is ON for a particular ZONE, the MATRIX-12 will receive MIDI **Notes** and **Controllers** from the Master instrument on all 16 Channels plus special MIDI data of TUNE REQUEST and SYSTEM EXCLUSIVE messages on that ZONE. These messages are controlled in the Master MIDI *ENABLES* Page only, not by OMNI Mode itself. "OMNI" simply means that the ZONE will ignore all channel numbers in deciding whether to use a given MIDI event.

As a rule of thumb, keep in mind that all MIDI information except Tune, Active Sense, MIDI Timing Clock, Song Position Pointer and System Exclusive data are sent on one of the MIDI 1 through 16 Channels.

When a single MIDI Channel is selected for a particular ZONE, OMNI MODE is thus turned OFF. The MATRIX-12 will transmit and receive MIDI **Notes** and **Controllers** on that MIDI Channel only and the Basic Channel is used simply to transmit Patch Changes. The ZONE will ignore MIDI information coming from any other channel. Selecting a single MIDI Channel turns OMNI **off**, and the ZONE is set to receive Notes polyphonically from that single MIDI Channel.

CTRLS   "Controls" – When this Sub-Page is selected, the Upper window in PAGE MODIFIER will display the five Modulation Sources of the MATRIX-12 that can also be controlled from MIDI IN when the MATRIX-12 is being used as a Slave instrument. You will notice that these same five controllers are also displayed in MODULATION SOURCE SELECT, as they are used by the synthesizer internally as part of the Patch. If you plan to use the MATRIX-12 as a Slave, it is in this Sub-Page that the settings of the Master controller or Slave are matched up with the MATRIX-12 so that effective communication between the two instruments concerning modulation can occur.

CTRLS

LEVER1	LEVER2	PEDAL1	PEDAL2	PRESSR	
☐	☐	☐	☐	☐	☐

BENDER	1	7	64	PRESSR	
☐	☐	☐	☐	☐	☐
◎	◎	◎	◎	◎	◎
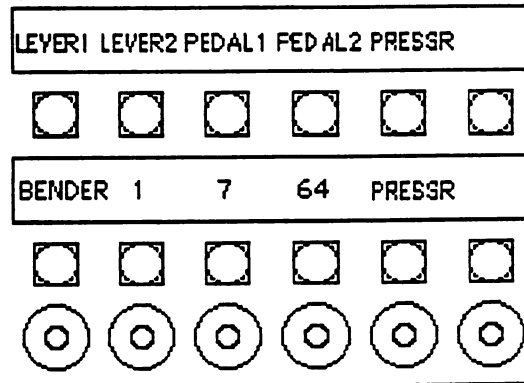
1. These five controllers, in compliance with the MIDI Specification, are transmitted and received on the MIDI Basic Channel and/or the Channel selected for each Zone.

2. Each of these five controllers can be set to any MIDI Controller Number from 0 to 121, including dedicated controller assignments of PRESSR (PRESSURE or After-Touch) and BENDER (MIDI Pitch Bend). Thus it is possible to re-define any of these controllers so that specialized MIDI communication between the MATRIX-12 and another MIDI instrument can occur. Do not confuse these Controller Numbers with the MIDI **Channel** Numbers 1 through 16.

3. Although each of these control sources can be given any other MIDI Controller Number, the following chart lists the common settings that are used among the various manufacturers of MIDI instruments:

LEVER 1	*BENDER*
LEVER 2	*1*
PEDAL 1	*7*
PEDAL 2	*64*
PRESSR	*PRESSR*

4. In addition to controlling the MATRIX-12 from MIDI, the MATRIX-12 has these very same capabilities internally – it has its own two Levers, two Pedals and Pressure. These are referred to as "Local" controls and can be used simultaneously with any control information coming in from MIDI. In addition, these settings also tell you what the MATRIX-12 is using as MIDI Controller numbers for **transmitting** when it is being used as the Master.

5. There is a fundamental difference between Lever 1/Pedal 1 and Lever 2/Pedal 2. The difference is that while Lever 1 and Pedal 1 are **separate** for each Channel, Lever 2 and Pedal 2 are only received on the Basic Channel and sent to **all** Voices. An example of this practice is, using the default assignments given above, modulate the pitch of each Voice with Lever 1, and modulate the amount of vibrato on each Voice with Lever 2. If each Voice is receiving notes from a different Channel, this will allow independent pitch bends on each Voice while Controller 1 data received on the Basic Channel will affect all Voices in parallel.

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ENABLES The **ENABLES** Sub-Page is where the MATRIX-12's MIDI parameters are turned on (underlined) or off (de-underlined). These functions – located in the Upper Display – have either an ON or an OFF status, hence the term **enable**. This Sub-Page also contains the MATRIX-12's MIDI IN **VELOCITY** Scale selection, located in the Lower Display.

ENABLES

SYSTEMX PATCH CONTROL ECHO

◻ ◻ ◻ ◻ ◻ ◻

VELOCITY=EXPO 1

◻ ◻ ◻ ◻ ◻ ◻

◉ ◉ ◉ ◉ ◉ ◉
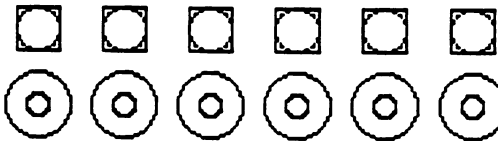
SYSTEMX "System Exclusive" – Each MIDI instrument has several functions that make it different from other brands. The System Exclusive code of a MIDI instrument is used to identify the synthesizer in MIDI and distinguish it from other manufacturers' products in the system. Thus, each manufacturer of a MIDI instrument has a special MIDI code that distinguishes it called a SYSTEM EXCLUSIVE message. It allows, for example, two MATRIX-12s or a MATRIX-12 and an XPANDER to perform certain functions that one MATRIX-12 hooked up to "Brand X" cannot do because of design differences.

One example of this is the ability to send the actual Patch data (not just the patch Number) from one MATRIX-12 to another by using MIDI parameter **SEND**. SYSTEM EXCLUSIVE allows this type of communication to occur that cannot happen between two different brands of synthesizers. If you plan to store MATRIX-12 patches on your 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 (underlined) or OFF (de-underlined). "**SYSTEMX**" as it is shown on the display is not necessary for routine MIDI functions.

SYSTEMX is MIDI data that is transmitted and received between instruments regardless of the Basic Channel setting. System Exclusive data, therefore, is not "channelized" (not associated with a particular MIDI Channel).

PATCH

"Patch Changes" – This parameter is treated separately from other Controllers because there may be many times when you would not want MIDI Patch Changes to be transmitted or received.

Patch Changes occur when a new Patch is selected from the MATRIX-12's Keypad on the front panel. The Patch Change command must be performed by typing a 2-digit number on the Keypad – using the "+" and "–" keys to change Patch Numbers are not sent to MIDI OUT. Any instrument slaved to the MATRIX-12 in the system set to receive MIDI 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. Similarly, if the MATRIX-12 is a MIDI Slave, it will respond to a Patch Change command from the Master controller.

• When turned ON (underlined), the MATRIX-12 will transmit and receive MIDI information that will cause instruments in the system to change to another Patch Number.

  When the MATRIX-12 is a slave, if your Master controller has MULTI (or Split/Double) Patch capability and it is designed to send MULTI (Split/Double) Patch Program Changes via MIDI, the MATRIX-12 will also respond to these commands when *PATCH* is enabled.

• When turned OFF (de-underlined), the MATRIX-12 will not transmit a MIDI Patch Number when you change Patches and it will ignore commands to change Patches from other instruments in the system.

SYSTEMX and *PATCH*
Operation with Oberheim Instruments
When operating two or more MATRIX-12s together, a MATRIX-12 and an XPANDER, or a MATRIX-12 and an Oberheim Xk Keyboard Controller, you are able to take advantage of the SINGLE Patch/MULTI-Patch capabilities and the Oberheim System Exclusive messages when making Patch Changes via MIDI.

System Exclusive
When *SYSTEMX* is enabled, two MATRIX-12s connected via MIDI are able to communicate with each other in **virtually every way** with a few exceptions. Just be sure to enable *SYSTEMX* on both instruments. Any operation involving all Patch Edit parameters, MASTER PAGE parameters and MULTI-Patch parameters made on the Master MATRIX-12 will be transmitted

and recognized by the Slave MATRIX-12. The same holds true when connecting a MATRIX-12 and an XPANDER, except that certain functions on the MATRIX-12 not found on the XPANDER (such as ZONES 4, 5 and 6, VOICES 1–6/VOICES 7–12 and the *MISC* Page in MASTER PAGE, etc.) will not be recognized on the XPANDER. Consequently, if the XPANDER is the Master, certain of its functions will not be received by the MATRIX-12. Examples of this are the CV Input selections, *XMITCV* in the MIDI *ENABLES* Page, etc.

If the Master Oberheim instrument enters the TUNE PAGE, the Slave Oberheim instrument will also enter it. However, if the Master is tuned by selecting any one of the TUNE parameters, the Slave Oberheim will **not** tune because it has been programmed to ignore MIDI Tune Request.

MIDI Patch Change Commands

When using the MIDI Patch Change function, both Oberheim instruments must have *SYSTEMX* enabled (as well as *PATCH*, of course) in order for the Slave Oberheim to respond to the Master's switching between SINGLE Patch Mode and MULTI Patch Mode.

SYSTEMX must also be enabled on both the Master and Slave Oberheim instruments for MIDI Patch Changes to occur when using the ADVANCE CHAIN footswitch or the "+" and "–" buttons on the Master Oberheim.

If *CHAIN* is being used on the Master Oberheim, it will send MIDI Patch Numbers to the Slave Oberheim on the BASIC CHANNEL when the ADVANCE CHAIN footswitch or the "+" and "–" buttons are used. Just be sure that PATCH **and** SYSTEMX are enabled for **both** instruments. If *SYSTEMX* is disabled on either the Master or the Slave Oberheim, the Slave will not respond at all to Patch Changes made from the Master in CHAIN.

CONTROL   This parameter selects the ON/OFF status of the MIDI Controllers (LEVER1, LEVER2, PEDAL1, PEDAL2 and PRESSURE) whose MIDI Controller Numbers you selected in the MIDI *CTRLS* Sub-Page.

Important: Please take note that this is a Global function and depends on the status of the ZONES when MIDI OUT is used. For example, if ZONE 2 is using MIDI OUT but *CONTROLLERS* is **not** selected for that ZONE in Page 2, the MATRIX-12 will not transmit MIDI Controllers with the Notes sent from that ZONE even if *CONTROL* is selected here. When *CONTROL* is selected in this Page, all Voices assigned to a ZONE that has MIDI IN selected or Voices assigned to a single MIDI Channel to receive on will recognize MIDI Controller information.

- When ON (underlined), the MATRIX-12 will transmit and receive MIDI Controllers globally.

- When OFF (de-underlined), the MATRIX-12 will not transmit MIDI Controllers and will ignore MIDI Controller information transmitted to it when it is a Slave.

The MATRIX-12, unlike many other instruments, gives you the option of turning MIDI Controllers ON or OFF because there may be times that you will not want them to be transmitted to the Slaves in your system or affect the MATRIX-12 via MIDI IN. Also, the ON or OFF status of this parameter does not affect the MATRIX-12's Local Control. They are enabled automatically when *KEYBOARD* is selected from the ZONE.

ECHO

When the MATRIX-12 is a MIDI Slave, this parameter permits the MIDI commands received by the MATRIX-12 sent from the Master controller to be combined with MIDI information generated by the MATRIX-12 itself and re-transmitted via the MATRIX-12's MIDI OUT. This parameter is used to turn the MATRIX-12's MIDI ECHO feature ON or OFF.

MIDI commands received by the MATRIX-12 as a Slave are never sent via MIDI OUT normally. Under normal conditions, MIDI information is simply passed along to other slave instruments in the system via the MATRIX-12's MIDI THRU port **only**. *ECHO* permits this to be defeated, but if two devices set to Echo MIDI information are cross-connected, "MIDI feedback" – MIDI data being regenerated between two instruments – will occur until one of the MIDI cables is disconnected, or *ECHO* is turned off.

• When ON, MIDI *ECHO* makes it possible to enhance the control over the other slave instruments in the system by combining what would normally be passed only to MIDI THRU with MATRIX-12 generated MIDI information and sending all of these commands to its MIDI OUT. Thus, MIDI ECHO allows for the other slave instruments in the line to be controlled from **two** "Masters" in a sense, because *ECHO* uses the MIDI commands from both the MATRIX-12 and its Master controller together.

• When OFF, the MATRIX-12 returns to normal MIDI operation. MIDI THRU simply passes MIDI commands from the Master controller to the other slaves unaffected by any additional MIDI information generated by the MATRIX-12. MIDI OUT transmits only those commands originating from the MATRIX-12 itself.

Using MIDI *ECHO*
Since the design of the majority of MIDI synthesizers provide for a single MIDI IN port, there is no method other than switching MIDI cables or purchasing a MIDI MERGE device to change from Master control to MATRIX-12 control over the other slaves. MIDI *ECHO* makes it possible for the MATRIX-12 **and** its Master controller to have complete control over the other slave instruments using only one MIDI cable from the MATRIX-12.

VELOCITY

There are two Sub-Pages in the MATRIX-12 devoted to the setting of the synthesizer's response to Velocity. In the *MISC* Page, the controls are used to set the MATRIX-12's Velocity reponse to its own Voices **internally** and as Velocity is **transmitted** via MIDI OUT. In this Sub-Page, you are able to determine the MATRIX-12's response to Velocity **when used via MIDI IN**.

This Sub-Page constitutes a separate set of Velocity scales for MIDI IN because Velocity information received from MIDI is usually scaled at the source. Therefore a simpler MIDI IN response system is utilized. This Sub-Page permits the scaling of MIDI IN Velocity in four different ways.

When selecting the desired MIDI Velocity Scale, just remember that you are selecting the scaling for both Attack Velocity (titled simply VELOCITY) and RELEASE VELOCITY. If you refer to the discussion of **Notes** and **Controllers** on Page 54 of this manual, you will remember that VELOCITY and RELEASE VELOCITY are transmitted and received with MIDI **Notes** on the Basic Channel. This Sub-Page, therefore, concerns the receiving of VELOCITY and RELEASE VELOCITY via MIDI. Refer to the section on Page 69 for information on scaling Velocity for the MATRIX-12 internally and transmitting it from MIDI OUT.

VELOCITY is a measure of **speed**. It is the term used to describe the speed in which keys are played – or how hard they are played – on the Keyboard, transmitted by the MATRIX-12 to MIDI OUT or received by the MATRIX-12 from MIDI IN. RELEASE VELOCITY is how fast the keys are let go once they have been played. This Sub-Page lets you tailor the MIDI IN reponse of your playing style to achieve a wide variety of results.

LINEAR

This response curve causes received VEL and RVEL to act in a linear fashion – striking the keys twice as hard on the Master controller produces twice the output on the MATRIX-12.

EXPO 1

This response curve is exponential, and responds much like the human ear percieves sound – striking the keys twice as hard produces 10 times the output. This scale produces the most dynamic range for VEL and RVEL in the MATRIX-12.

EXPO 2

This response is also exponential, like EXPO 1, but its range is compressed to achieve a less dramatic effect. There is more resolution in the middle of its range which makes it very similar to the Scales used for the internal VEL and RVEL scaling.

EXPO 3   This curve is also derived from EXPO 1, but its range is compressed even more than EXPO 2. This produces the most gradual response for MIDI Velocity and Release Velocity and has the least dynamic range.

Using MIDI Velocity and Release Velocity
You will notice several important and obvious differences when using VEL and RVEL via MIDI IN, as opposed to the way they respond internally. As stated in the beginning of this section, the Velocity and Release Velocity responses that apply to the internal Voices is also sent to other MIDI instruments in the system via MIDI OUT. These settings are made in the *MISC* Sub-Page.

However, the MIDI Velocity and Release Velocity received by the MATRIX-12 via MIDI IN is scaled much simpler from the internal VEL and RVEL responses. This is because MIDI IN Velocity is usually scaled at the source (the Master instrument). If Velocity Scaling is not a separate function in your Master Instrument, you will find that some experimentation may be required to get the Master and the MATRIX-12 to respond in the precise way that you want.

This particular situation is especially noticeable when using a MIDI sequencer to record and playback on the MATRIX-12. You may discover that recording a track on the sequencer with MIDI OUT Velocity won't sound the same when in playback (which uses the MIDI IN Velocity). Again, some experimentation is required here but as a rule-of-thumb, the MIDI IN Velocity Scale called *LINEAR* most closely approximates that of the internal Velocity *SCALE 2*.

The flow chart below depicts a visual representation of how Velocity is processed internally as opposed to Velocity control received via MIDI IN. Note the that the **KEYBD In** function provides the MISC Page Velocity SENSITIVITY control that is not present in the **MIDI IN** function. This is because Velocity Sensitivity via MIDI IN can only be set on the Master unit.
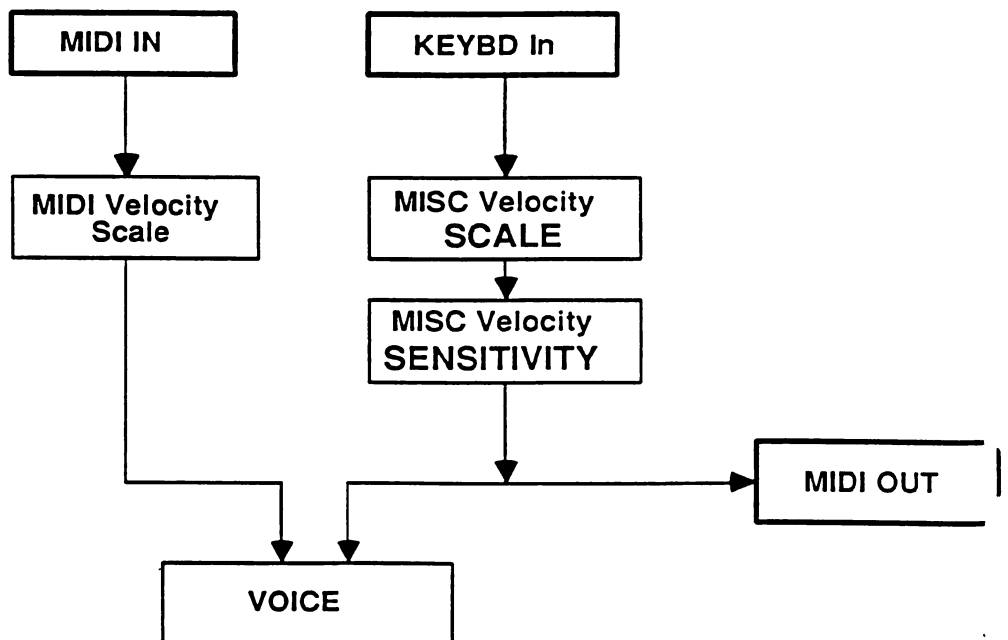
SEND Any one or all 100 of the MATRIX-12's SINGLE Patches can be sent through its MIDI OUT to another MIDI device. This is not Patch Numbers but the actual data that makes up the sound. The receiving instrument can be another MATRIX-12, an Oberheim XPANDER or another device such as a computer that has been programmed with the Oberheim SYSTEM EXCLUSIVE code for reception.

SEND PATCH

```
┌─────────────────────────────────────────────┐
│          SEND CURRENT PATCH TO MIDI           │
└─────────────────────────────────────────────┘

    ▢      ▢      ▢      ▢      ▢      ▢

┌─────────────────────────────────────────────┐
│ DESTINATION PATCH= OO                  START  │
└─────────────────────────────────────────────┘

    ▢      ▢      ▢      ▢      ▢      ▢

    ◉      ◉      ◉      ◉      ◉      ◉
```
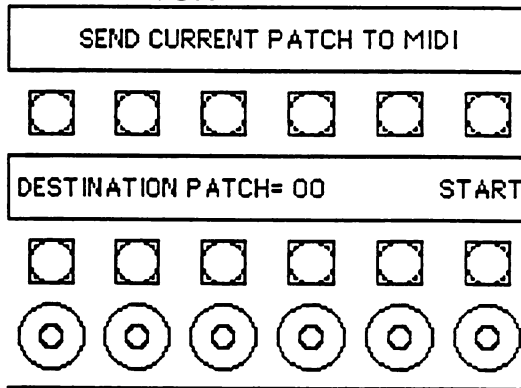
MULTI Patches are sent in their entirety (all 100) when the SEND ALL command is used, but cannot be sent individually. Also, when the MULTI Patches are transferred, remember that the MULTI Patch uses sounds stored in the bank of SINGLE Patches. This means that whenever MULTI Patches are transferred, SINGLE Patches **must** be transferred also. This is necessary so that when the MULTI Patches are played, the corresponding SINGLE Patches required for the MULTI to play properly are in memory.

When this Sub-Page is entered, the Upper window in PAGE MODIFIER will display:

SEND CURRENT PATCH TO MIDI

To transmit one SINGLE Patch from the MATRIX-12:

STEP 1:   Using a standard MIDI cable, connect the MIDI **OUT** of the MATRIX-12 to the MIDI **IN** of the receiving instrument.

STEP 2:   On the MATRIX-12, select the SINGLE Patch that you want to send from the Keypad on the PROGRAMMER.

STEP 3:   Turn on SYSTEM EXCLUSIVE for both instruments. On the MATRIX-12:

   •   Select MASTER PAGE.
   •   Select *MIDI* from the Upper Display.
   •   Select *ENABLES*.
   •   Select *SYSTEMX* from the Upper Display.

STEP 4:   Enter the MIDI Patch Send Page on the MATRIX-12:

- Select MASTER PAGE.
- Select *MIDI* from the Upper Display.
- Select *SEND*.

STEP 5:   On the Lower Display of PAGE MODIFIER, select the destination Patch Number. You can use either Knob #4 or the X SELECT buttons to select the Patch Number. The Lower window will display:

DESTINATION PATCH = XX   **START**

STEP 6:   Press the *START* button and the MATRIX-12 will begin its data transfer, which takes less than one second to complete. When the transfer is completed, the display will switch back to the MIDI Sub-Page Select display:

CHANNEL   CTRLS   ENABLES   SEND   RESET   MUTE

STEP 7:   Check the receiving instrument to verify that the data transfer was successful. If the receiving instrument is another MATRIX-12 or an XPANDER, typing in the 2-digit Destination Patch Number on its Keypad will verify that the transfer was good. This clears the Edit Buffer in the receiving instrument and recalls the transmitted Patch.

To send all Patches (the entire contents of the MATRIX-12's memory), follow the procedure as outlined above but turn Knob #4 fully counter-clockwise so that the Destination Patch = *ALL*. The Upper display will will switch to read:

SEND   ALL   PATCHES   TO   MIDI

Pressing the *START* button will begin the data transfer during which time the START display will switch to read *SENDING*. The entire contents of the MATRIX-12 will be transmitted via MIDI OUT which takes all of 20 seconds to complete. When the transfer has taken place, the Upper window will revert back to the MIDI Sub-Page Select display.

When sending data via MIDI between two MATRIX-12s, the data is transferred exactly, bit for bit. When transferring data via MIDI connected to an XPANDER, with the MATRIX-12 as either the Master or the Slave, certain parameters will either be changed or ignored due to necessary Global and MULTI-Patch differences in the two synthesizers. Refer to the discussion on DATA COMPATIBILTY in the CASSETTE INTERFACE Section, beginning on Page 80 of this manual.

RESET

The *RESET* parameter performs a comprehensive **default** function to the MATRIX-12's MIDI settings. A "default" condition is simply the basic settings used as a starting point for the synthesizer's Global parameters. Executing *RESET* results in the following:

• resets all MIDI assignments in MASTER PAGE.

• turns on *OMNI MODE* for all ZONES in SINGLE PATCH Mode.

• performs the MIDI "All Notes Off" command to:

   – any notes being played on the MATRIX-12's Keyboard.
   – any notes received by the MATRIX-12 via MIDI IN.
   – all instruments slaved to the MATRIX-12 (sends "All Notes Off" via MIDI OUT).

The MATRIX-12's MIDI defaults are as follows:

BASIC CHANNEL	**1**
OMNI Mode	On †
System Exclusive	Off
ECHO	Off
CONTROLS	On
PATCH Changes	On
VELOCITY	*EXPO 1*
LEVER 1	*BENDER*
LEVER 2	*1*
PEDAL 1	*7*
PEDAL 2	*64*
Pressure	*PRESSR*

MUTE

The *MUTE* parameter simply performs the same MIDI "All Notes Off" command as in *RESET*, but does not otherwise default the MATRIX-12. This feature is handy when it becomes necessary to mute notes but not affect anything else in the synthesizer.

The *MUTE* feature is primarily designed to provide a way to manually defeat MIDI Notes – those transmitted to the MATRIX-12 via MIDI IN and those tranmitted from the MATRIX-12 to its Slave(s) via MIDI OUT – in the event that one or more of these notes "lock" or get "stuck on". It will not, however, affect the Envelopes' settings of the current Patch in the MATRIX-12 and will let the sound die out naturally if its Envelopes have long Release times. Selecting TUNE PAGE will cut the Envelopes' Release times short.

† OMNI Mode is turned on (underlined) for all six Zones – whether Voices have been assigned to them or not – in SINGLE PATCH Mode **only**. The Zones in MULTI PATCH Mode are not affected because they are programmable.

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Remember, if a Slave receives a MIDI "Note On" command, it must receive a MIDI "Note Off" command or that note will get locked onto the Slave. *MUTE* provides the way to remove stuck notes without having to turn your instruments off and on again, which is usually your first reaction, right?

There are a number of different reasons why notes become locked or stuck, but they almost always relate to some form of a "broken" MIDI connection that occurs while notes are being sent from Master to Slave. A faulty or disconnected MIDI cable is often the case, which prevents the "Note Off" command from reaching the Slave.

Other reasons could possibly be a malfunction in the Master's MIDI OUT transmission of the notes or the Slave's MIDI IN reception. Also, if several (more than five) MIDI instruments are connected in a chain using MIDI THRU, the chances of note lock occurring will increase, especially with the instrument at the end of the chain. MIDI Note lock is not a very frequent occurance but if you are experiencing this too often, you may need to have either your Master or Slave instrument serviced.

The MATRIX-12's TUNE PAGE button also provides a way to mute notes, but unlike the *MUTE* function will also reset the Release times of the Envelopes so that any sound dying out will be cut off.

MISC

The *MISC* Sub-Page of the MASTER PAGE provides the control parameters that are used to set the MATRIX-12's internal and MIDI OUT Velocity Scaling and Sensitivity as well as the polarity selection of its Pedal Inputs, Levers and External Trigger Input.

MISC   Page 1
VELOCITY SCALES

PAGE 1

VELOCITY SCALE

Five separate Velocity *SCALE* settings are provided in the MATRIX-12 in order to adjust the reponse of its Keyboard to the synthesizer's internal Voices and MIDI OUT. MIDI VELOCITY and MIDI RELEASE VELOCITY are usually scaled from the Master and it is in this Page where these settings are made on the MATRIX-12.

MIDI IN VELOCITY and RELEASE VELOCITY scales are selected in the *MIDI* Sub-Page "*ENABLES*". See Page 63.

The graph below depicts a visual representation of how the five VELOCITY SCALES of the MATRIX-12 respond in relation to each other. Use them to adjust the keyboard response to your personal playing style, just as you would adjust the action of an acoustic instrument.
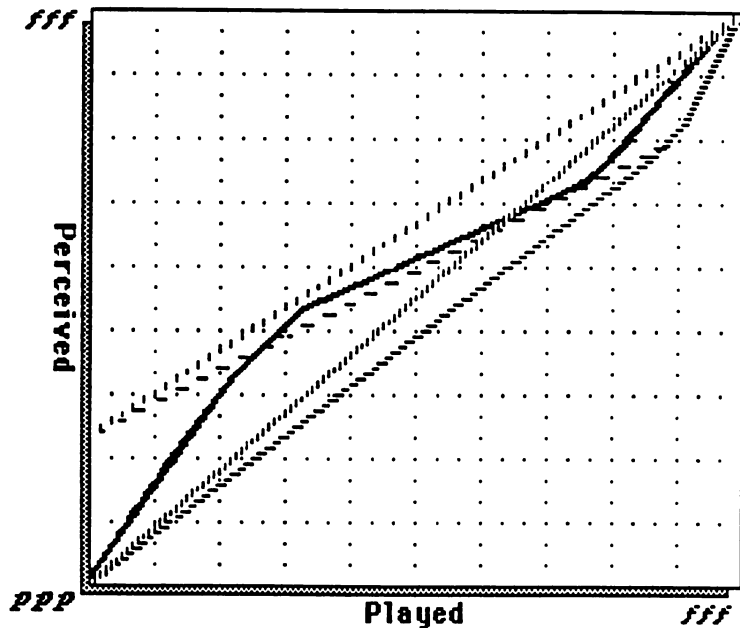
1 – LOUD This scale is straight from about 1/3 to top. This results in a fairly loud response, even with soft (slow) playing.

2 – LOUDER This scale is straight from bottom to top, and appears louder in comparison with SCALE1.

3 – SOFT Most of this scale's range is in the middle, reaching maximum output only at the hardest playing, and never reaching minimum.

4 – SOFTER This scale is shifted so that its output range is the lowest of all.

---

5 – ADJUSTED The top and bottom of this scale is angled sharply for wide dynamic range, while the middle range has a gradual slope for more consistency of medium dynamics.

SENSITIVITY The dynamic range of Velocity Scales can be adjusted with the *SENSITIVITY* control. The sensitivity is adjustable from the center of the scale, as shown:
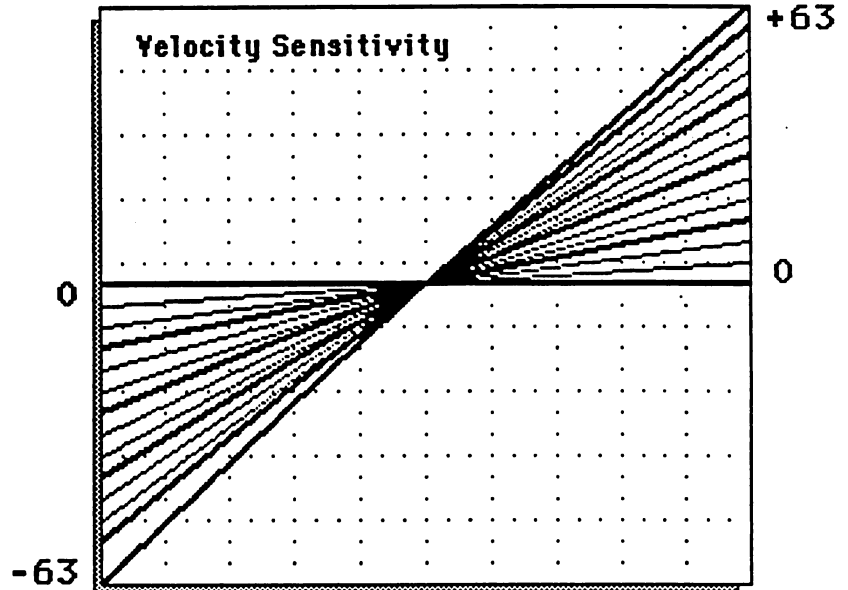
In any instance, the higher the Sensitivity amount, the more Velocity and Release Velocity that is programmed into the Patch will be used. Adjust the amount as needed. Remember that this function is Global – not programmable per Patch.

PAGE 2

POLARITY CONTROLS
The Polarity Controls on PAGE 2 are use to switch the response of the MATRIX-12's local Pedals, Levers and External Trigger input:
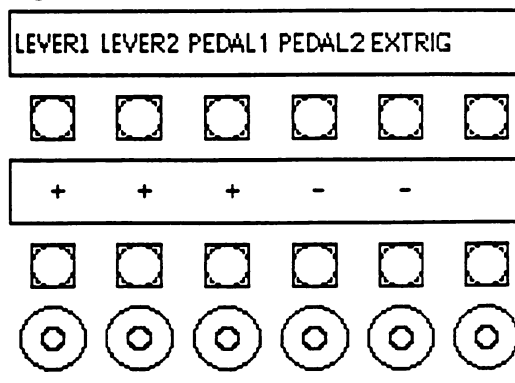
PEDAL 1
PEDAL 2

The Pedal inputs of the MATRIX-12 are designed to accept pedal controllers of either an active or a non-active type. This means that an active pedal with a battery or AC power source will work, provided that it has an output voltage of 0 to +5V DC and an output impedance of «1k Ω. If a non-active (passive) pedal is used, it should be a 47k Ω resistive type that utilizes a linear taper potentiometer. In-line type pedals that utilize an audio input and output are **not** recommended. The connecting cable must be two conductor shielded.

The Pedal input displays will indicate whether a pedal has been connected to the MATRIX-12 or not as its microprocessor is able to detect the presence of a pedal connected to the rear panel input jacks.

When disconnected, the displays read *OFF*.

When a pedal is connected, you are able to select its polarity – whether it is a pedal with a positive electrical reponse or negative. As an example, if you are using the Oberheim FS-7 footswitch for a sustain pedal, set its polarity to "–". You can also use the sustain pedal that is supplied with the Yamaha DX-7. Set its polarity to "+".

Rocker-type continuous pedals – such as those used for volume control – also have polarity. If you are using the Oberheim POB-X pedal, set its polarity to "+". The volume pedal supplied with the Yamaha DX-7 will not work at all because it is a three-conductor type.

LEVER 1
LEVER 2

The normal operating settings of the MATRIX-12's Levers is "+" for both. When set positive, LEVER 1 (normally routed for Pitch-Bend) will bend up when pulled toward you and bend down when pushed away from you. When LEVER 2 (normally routed for Vibrato) is set positive, Vibrato modulation is obtained when the Lever is pulled toward you with no effect when pushed away.

The action of the Levers can be reversed just by setting their polarities negative.

EXT TRI

The External Trigger input is sensitive to DC-type triggers sent to the MATRIX-12 from external timing devices such as drum machines.

Ideal trigger sources are those that provide at least +5 Volts but no greater than +10V with a pulse width of 1ms (millisecond) to 20 ms.

The *EXT TRI* will also respond to a footswitch such as the Oberheim FS-7.

When set "+", *EXT TRI* will respond to a positive trigger pulse (the rising edge of the pulse). When set "−", it will look for a negative trigger pulse (the pulse's falling edge).

CASS

CASSETTE INTERFACE

In addition to offloading your patches via MIDI, the MATRIX-12 also incorporates a system that permits saving your patches to tape. The Cassette Interface feature of the MATRIX-12 allows you to offload your SINGLE Patches, MULTI Patches and the information in the MASTER PAGE (the Global data) onto standard cassette tape. You may find that your creativity in programming new patches exceeds the memory space (100 SINGLE Patches and 100 MULTI Patches) available. You may also find it useful to save the MASTER PAGE – the information in *CHAIN* and your MIDI settings – along with the Patches. The Cassette Interface makes it possible to store your sounds on tape, programming a new set of Patches, 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 severe malfunction causes the MATRIX-12 to drop memory. A back-up data tape should also be made before your MATRIX-12 is ever serviced, for this reason.

What You Will Need

The MATRIX-12'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 obtained consistent results with the Radio Shack CCR-82 Computer Cassette Recorder (Radio Shack part # 26–1209) 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-12 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. On the CCR–82, the pre-set playback volume "P" may be used.

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 or Record Level indicator LED 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¢-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. Special "computer" data tapes, as another example, should be used only on computer data recorders. This type of tape, however, has the advantage of being short, leaderless and certified to be free of dropouts.

9. **Connecting Cables** – Your cassette interface system requires two standard audio cables in order to connect the tape recorder to the MATRIX-12. The cable must be "2-conductor sheilded" with a 1/8" mini-plug on the MATRIX-12 end.

   Do not use "attenuating" type cables as these are designed to reduce the signal from one end of the cable to the other.

HOOK-UP
Connect one of your cables from the cassette's output jack (earphone, headphone or speaker) to the jack on the MATRIX-12 labeled FROM.

Connect the other cable from the cassette's input jack (Aux or Line) to the jack on the MATRIX-12 labeled TO.

Both cables may be connected at the same time, but for the Cassette Interface function to work properly, only one is required. You can monitor the data tone during any one of the *TO*, *CHECK*, or *FROM* functions in which case both cables must be connected.

OPERATION

When the *CASS* button is pressed, the PAGE MODIFIER Displays will read:

CASSETTE MODE

TO CASS   *CHECK CASS*   *FROM CASS*

The available Cassette Interface functions can be entered by pressing one of these buttons. The operation of the MATRIX-12's tape storage and retrieval features are described in the following discussions.

Saving to Tape

TO CASS

This parameter is used to save all of the MATRIX-12's programs onto the cassette tape. The Patches and Splits are not removed from the MATRIX-12, just copied onto the tape. The synthesizer will still have its programs intact when this process is completed.

1. 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.

2. Press the *TO CASS* button. The PAGE MODIFIER and PROGRAMMER Displays go completely dark for the entire time the data is being transferred. During this time, the PAGE 2 LED will slowly flash on and off to indicate that the *TO CASS* function is in process. And if both cassette cables are connected, the data "chatter" will be heard through the MATRIX-12's AUDIO OUT jacks.

3. When the save-to-tape function is completed, the PAGE MODIFIER Displays will read...

DATA COMPLETED

PRESS PAGE 2

... and the PAGE 2 LED will flash. Pressing PAGE 2 will revert the displays to the *CASSETTE MODE* displays.

Checking the Tape

CHECK CASS

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 CASS* 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.

1. 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.

2. Press the PLAY button on your cassette recorder.

3. Press the *CHECK CASS* button on the MATRIX-12. Again, all three displays will go out and the leader tone will be heard followed by the data chatter through the MATRIX-12's AUDIO OUT jacks.

4. During this time, the display will remain dark and the PAGE 2 button LED will slowly flash on and off to verify that the *CHECK CASS* function is in process.

5. When the process is completed, one of two things will happen. If the tape is verified, the displays will show...

<div align="center">

DATA COMPLETED

PRESS PAGE 2

</div>

... and pressing PAGE 2 will return the synthesizer to the *CASSETTE MODE* display.

If the tape is found to have one or more things wrong with it, you will get an "Error Message" on the display.

IMPORTANT NOTE: While the Check function is in process, an error message may appear unexpectedly **during** the transfer. If the message *ABORTED* appears, the data transfer routine was stopped before completion. If the PAGE 2 button is accidentally pressed while the tape transfer is still in progress, the MATRIX-12 will interpret this action as a command to quit the *CHECK* function. Error Messages are described later in this section.

Loading from Tape

FROM CASS

The *TO CASS* function of the MATRIX-12 permits saving the entire contents of its memory to tape, but in one continuous stream of data. This is the only way you are able to off-load the data. The *FROM CASS* parameter also permits the bulk loading of data from tape into the MATRIX-12 as well, but you are also provided with six additional ways of loading in data – one SINGLE Patch only, one MULTI Patch only, all the SINGLES, all the MULTIs, just the Global information or just the CHAIN.

Called "selective loading", these functions can be used whenever needed and can really come in handy as they permit the compilation of the needed data from several different data tapes.

ALL
This parameter loads the MATRIX-12'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 loading **ALL** is identical to that for **CHECK CASS.** 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.

Selective Loading from Tape

ONE
This parameter allows you to take one SINGLE Patch or one MULTI Patch from the tape and load it individually into the MATRIX-12. This feature permits the loading of individual Patches from several tapes in order to compile them into one bank of memory.

1. Turn off MEMORY PROTECT on the back panel.

2. When the **ONE** parameter is entered, the display will read:

   LOAD FROM CASSETTE INTO MATRIX-12

   SINGLE = XX —> XX   **START**
   or
   MULTI = XX —> XX   **START**

   Knob #1 is used to select between SINGLE Patches and MULTI Patches.

3. The first **XX** display selects the Number of the Patch **on the tape** that you want to load in. This is referred to as the "source" Patch and is selected with the X SELECT buttons (if underlined) or by Knob #2.

   The second **XX** display selects the Number of the Patch **in the MATRIX-12** that you want the source Patch to go. This is referred to as the "destination" Patch and is selected with the X SELECT buttons (if underlined) or by Knob #3. Remember that the Patch currently stored in this memory location **will be erased and replaced with the Patch coming in from tape.**

4. 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-12, 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.

---

5. Press the PLAY button on your cassette machine.

6. Immediately press the *START* button on the MATRIX-12. The PAGE 2 LED will go out and the leader tone from the tape will be heard followed by the data chatter. During this time, the display will go dark as before.

7. As soon as the MATRIX-12 identifies the Patch on the tape, it will store it into the selected Patch Number into its memory and immediately exit the transfer mode. The display will return to the *DATA COMPLETED* message if the transfer was successful. If not, an Error Message will be displayed.

SINGLE   Same procedure as for loading *ALL*. This parameter loads in all SINGLE Patches from the tape, numbered *S00* through *S99*.

MULTI   Same procedure as for loading *ALL*. This parameter loads in all MULTI Patches from the tape, numbered *M00* through *M99*.

CHAIN   Same procedure as for loading *ALL*. This parameter loads in the list of Patches in the *CHAIN* Sub-Page.

GLOBAL   Same procedure as for loading *ALL*. This parameter loads in all Global information from the tape.

ERRORS

As mentioned before, you may occasionally get an Error Message on the display after the *CHECK CASS* or any of the Selective Load functions in *FROM CASS* complete their cycles. The MATRIX-12's Cassette interface is intelligent enough to compensate for wide variations in the cassette player's output level, speed and phase, but only within limits. If the MATRIX-12 cannot read the tape properly, an error message will appear on the display.

An Error Message indicates that there is one or more things wrong with the data itself or that there is a 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 or check properly.

While reading the data, the MATRIX-12 examines **each Patch** in order to verify its data. If an error is detected in the data for a particular Patch, that Patch will be ignored and the original Patch in the MATRIX-12's memory is left undisturbed. This insures that all Patches are always valid. So even if an error message is displayed, most of the Patches will load successfully.

The following table lists the possible error messages that will be displayed should a problem arise during a data transfer:

MEMORY PROTECTED
        The MEMORY PROTECT switch on the rear panel is enabled. You must turn it off to perform any of the *FROM CASS* functions.

ABORTED
The data transfer routine was stopped before completion. Did you accidentally press the PAGE 2 button while the tape transfer was still in progress?

ERROR IN SINGLE PATCH DATA
The MATRIX-12 detected one or more errors in the SINGLE Patch data.

ERROR IN MULTI PATCH DATA
The MATRIX-12 detected one or more errors in the MULTI Patch data.

ERROR IN CHAIN DATA
The MATRIX-12 detected one or more errors while loading the Patch *CHAIN.*

ERROR IN GLOBAL DATA
The MATRIX-12 detected one or more errors while loading the Global data in MASTER PAGE.

WRONG VERSION NUMBER
The MATRIX-12 is unable to read the incoming data because it was made from another MATRIX-12 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-12 – or another MATRIX-12 with the same software – this error will not occur.

NOT A MATRIX-12 TAPE
The MATRIX-12 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 possibilty that would cause this error is attempting to load in a tape made on another device such as a drum machine, for example.

CASSETTE SPEED TOO SLOW
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?

CASSETTE SPEED TOO FAST
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?

DATA COMPLETE
100 Hits, 100 Runs, no Errors.

Causes of Cassette Errors

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-12 at all. The displays will remain dark and never change. The PAGE 2 LED will not flash either. The MATRIX-12 cannot "hear" any of the data and, as a result, will continue to wait patiently. You should recheck your connections.

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

- **The Leader Tone** may not have played long enough. The MATRIX-12 will not respond at all unless it detects the Leader Tone **before** the data.

- **The tape heads are dirty**, out of alignment, or need to be demagnitized.

- **The tape quality** is inferior or, when recording, was not biased for the cassette machine that you are using.

- **The connecting cables** between the MATRIX-12 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.

Other Items of Interest....

SELECTABLE TRANSFER SPEED

The Matrix-12's tape data storage system has a selectable **baud rate** – the rate at which the data is transferred, expressed in Bits-per-Second. You can record data at a higher rate that reduces the transfer time by approximately 33%.

To set the Matrix-12 to the higher rate, hold the "+" key (in the X SELECT section above the Page Modifier) while pressing *TO CASS*.

During CHECK or PLAY modes, the interface adjusts itself to the speed of the tape being played.

Although a convenient feature, the Selectable Transfer Speed function may have limitations, however. Certain tape/cassette machine combinations may be questionable, and this feature may be less reliable than normal speed transfers. Thus, the faster transfer rate should not be used for longterm archiving or critcal backups.

DATA COMPATIBILITY WITH OBERHEIM XPANDERS

Matrix-12 and Xpander data are compatible, with several important exceptions. Data can be transferred via tape interface or MIDI. However, some changes are necessary because of the differences between the two machines.

XPANDER > MATRIX-12

SINGLE Patches are transferred exactly.

MULTI Patches are transferred and converted as follows:

The SINGLE PATCH Number, *VOLUME*, *PAN*, *TRANS*, and *VASSIGN* of Voices 1-6 are duplicated to Voices 7-12. If XPANDER Voice 1 is set to Patch 22, then MATRIX-12 Voices 1 and 7 will also be set to Patch 22.

Any XPANDER Voices assigned to CV's will be reassigned to ZONE 6.

Any XPANDER Voices panned *DIR* will be panned *OFF*.

ZONEs 1-3 are transferred almost exactly, with the following exceptions:

- *KEYBOARD* and *MIDI IN* are enabled.
- *VOICE ROB* will be enabled.
- *MIDI OUT* will be enabled only in ZONE 1.

ZONEs 4-6 are set to their default settings (*ROTATE, LIMITS = 0 TO 127, OMNI* – Page 2: *MIDI IN*, *KEYBOARD* and *VOICE ROB* enabled.)

VIB is transferred exactly.

DETUNE in any MULTI Patch is set to 0 for all 12 Voices.

Global parameters that exist in the XPANDER are transferred exactly. Those that exist only in the Matrix-12 are not changed.

CHAIN is transferred exactly.

MATRIX-12 > XPANDER

XPANDERs with Voice Software Revisions 1.3 or higher will accept patches from a Matrix-12. The initial release of XPANDER Software (Rev. 1.0) will not. [†]

SINGLE Patches are transferred exactly.

CHAIN is transferred exactly.

[†] Any XPANDER or MATRIX-12 can be retrofitted with the new software revision. Contact your nearest authorized Oberheim Service Center for prices and availability.

Multi Patch and Global data are **ignored** – existing data will not be changed.

If a Multi Patch or Global data transfer is attempted, the XPANDER will read "DATA COMPLETED" but will not actually load any information.

Any XPANDER can read tapes recorded at high speed.

SINGLE Patch
MASTER PAGE

Lower Display

SINGLE = PAN   VIB   VASSIGN   ZONE

SINGLE PATCH Mode uses four of the MULTI PATCH Mode's "Control Pages" so that the MATRIX-12's 100 SINGLE Patches can be played like a normal synthesizer. Although these SINGLE PATCH Mode MASTER Sub-Pages lack the sophistication and programmability of their MULTI PATCH Mode counter-parts, their presence is necessary in order to play any of the SINGLE Patches: you must have a way to assign the Voices to play from the Keyboard, Pan them in the stereo mix, add Vibrato and select the available Keyboard performance modes in ZONE.

Thus, the MATRIX-12 provides a type of "MULTI Patch" that is reserved only for SINGLE Patches. And the settings that you make in these Sub-Pages hold true for **all** SINGLE Patches – they are Global. Once you have made the necessary settings, the MATRIX-12's SINGLE Patches can then be played normally from the Keyboard or from MIDI IN. MIDI OUT capability can also be selected while in this Mode.

PAN

The *PAN* Page permits you to direct the audio output of each Voice between the LEFT and RIGHT stereo outputs located on the MATRIX-12's rear panel. Their operation is really not much different than that of a mixing console except that the stereo "placement" is limited to seven positions (plus *OFF*) instead of being continuously variable. Each Voice is set independently and can be assigned to any of the seven placement positions desired.

PAN

VOICE7	8	9	10	11	12
□	□	□	□	□	□

LEFT	LF2	LF1	MID	RT2	RIGHT
□	□	□	□	□	□
◉	◉	◉	◉	◉	◉

LEFT   LF2   LF1   MID   RT1   RT2   RIGHT   (OFF)

The *LEFT* and *RIGHT* displays indicate that the Voice will be panned directly to the extremes of the stereo pan. *MID* indicates that the Voice ouput will appear from both outputs equally. *LF2* display indicates the position just to the right of extreme Left and *RT2* ndicates the position just to the left of dead Right. *LF1* is the position just to the left of center and *RT1* just to the right of center.

If *OFF* is selected, that Voice is removed from the stereo LEFT and RIGHT outputs as well as the MONO. If your MATRIX-12 has ben retro-fitted with the optional Individual Voice Outputs kit, the *OFF* position routes the audio output of that Voice to its individual output jack located on the MATRIX-12's left walnut endpiece.

VIB

VIBRATO

The MATRIX-12 SINGLE Patch programming provides five independent LFOs (Low Frequency Oscillators) for extensive modulation capability. In many other synthesizers, one of the available Patch LFOs must be used if conventional Vibrato is desired. The MATRIX-12 provides a "sixth LFO" called *VIB* so that one of the five Patch LFOs need not be sacrificed to obtain this popular modulation.

VIB

Page 1

```
┌──────────────────────────────────────────────┐
│ SPEED WAVE                               AMP   │
└──────────────────────────────────────────────┘
   ☐    ☐    ☐    ☐    ☐    ☐
┌──────────────────────────────────────────────┐
│ 56 TRIANGLE                               0    │
└──────────────────────────────────────────────┘
   ☐    ☐    ☐    ☐    ☐    ☐
   ◉    ◉    ◉    ◉    ◉    ◉
```

Page 2

```
┌──────────────────────────────────────────────┐
│ LAG                                            │
└──────────────────────────────────────────────┘
   ☐    ☐    ☐    ☐    ☐    ☐
┌──────────────────────────────────────────────┐
│ SPEED = OFF   0  / AMP = LEV2  +63             │
└──────────────────────────────────────────────┘
   ☐    ☐    ☐    ☐    ☐    ☐
   ◉    ◉    ◉    ◉    ◉    ◉
```
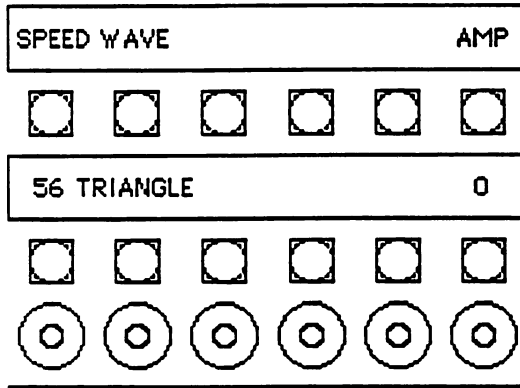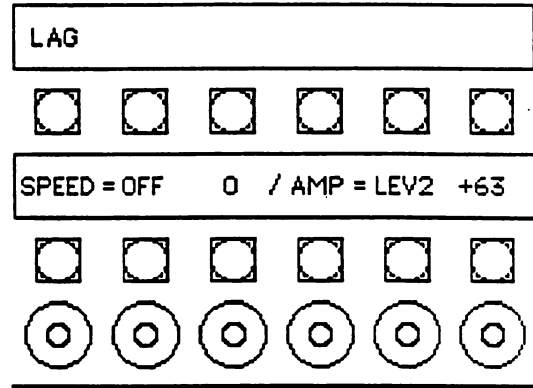
VIB

Page 1 The primary page of *VIB* contains the three most-used parameters for defining the Vibrato.

SPEED The frequency of the *VIB* is variable from 0 to 63, with 0 being the slowest and 63 the fastest.

WAVE *VIB* provides six waveforms to be used in modulating the destination. The first four are called "periodic" waveforms because they repeat in even patterns or cycles. The last two are called "aperiodic" characterized by disorderly patterns that do not repeat with any regularity. For more detailed descriptions of these waveforms, refer to the LFO X section of this manual, Page 132.

Periodic	*TRIANGLE*
	UP SAW
	DOWN SAW
	SQUARE
Aperiodic	*RANDOM*
	NOISE

You should note that the *NOISE* modulation is not affected by the *SPEED* adjustment.

AMP The amplitude or output level of *VIB* is selected with this parameter. *AMP* is also referred to as "amount" or "depth". You should notice that this parameter defaults to a value of 0 because LEVER2 or a MIDI Vibrato Wheel is normally used to bring vibrato into the Patch. The operation of LEVER2 is set

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in Page 2 of **VIB**. If the Page 1 **AMP** is set to any amount value other than 0, you will always hear Vibrato in the Patch because the Vibrato LFO is always running.

The amount value range is **0** to **63** with 63 being the highest amount and 0 the lowest, effectively turning **VIB** off.

VIB
Page 2   The secondary page of **VIB** contains the parameters that select the Vibrato's control sources. As stated above, Vibrato will always occur if the Page 1 **AMP** is set to any amount other than 0. These parameters are used to set up your LEVER2 or PEDAL 2 to be used to introduce Vibrato into the sound.

SPEED Modulation
The majority of synthesizers permit the control of Vibrato only by its amount. When you use the Vibrato lever or wheel, you get more or less. They do not offer this type of Vibrato Speed programming and generally keep the speed of the Vibrato constant. The MATRIX-12 permits the control of the **VIB**'s SPEED with the Lever or Pedal. Having performance control over the SPEED as well as the AMOUNT of the Vibrato adds flexibility to this popular modulation.

The SPEED of **VIB** can be modulated by either LEVER2 or PEDAL2 and is selected in this Sub-Page. The control parameters for SPEED Modulation are located in the left-half of the Lower PAGE MODIFIER Display.

SPEED =   OFF
                    If OFF is selected, the SPEED will not be modulated and **VIB** will run at the rate selected in the Page 1 **SPEED** .

SPEED =   LEV2
                    If LEV2 is selected, the SPEED of the Vibrato set in Page 1 will change as the LEVER2 or MIDI Vibrato Wheel or is used.

SPEED =   PED2
                    If PED2 is selected, the SPEED of the Vibrato set in Page 1 will change as the PEDAL2 is used.

Amount   If LEV2 or PED2 is selected above, you can set the Amount (the actual Range of the SPEED Change) of modulation in this parameter. Its amount range variable from **-63** to **+63**.

                    If positive values are used, the speed set in Page 1 **SPEED** will **increase** as LEV2 or PED2 are used. If negative values are used, the effect of LEV2 or PED2 is inverted and the Vibrato speed selected in Page 1 **SPEED** will **decrease** as LEV2 or PED2 are used.

AMP Modulation
The AMPLITUDE (output level) of VIBRATO can also be modulated by either LEVER2 (or a MIDI Vibrato Wheel) or PEDAL2 and is selected in this Sub-Page. The control parameters for **AMP** Modulation are located in the right-half of the Lower PAGE MODIFIER Display.

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Naturally, using the MATRIX-12's LEVER2 or a Master Controller's Vibrato Wheel are the most popular methods when using Vibrato as a performance modulation, but this parameter allows you to use PEDAL2 for this purpose as well.

AMP = OFF
If turned OFF, the VIB will run at its output level set in Page 1 *AMP*.

AMP = LEV2
AMP = PED2
If LEVER2 or PEDAL2 is selected, the amount of Vibrato will depend on using the Lever or Pedal. Set Page 1 AMP to **0** and let the Pedal or Lever bring it in.

Amount
If LEVER2 or PEDAL2 is selected, you can set the range of the Lever or Pedal in this parameter. It is variable from **–63** to **+63**.

Depending on the polarities of the Levers set in Page 2 of *MISC*, positive values increase the amount of *VIB* as the MATRIX-12's LEVER2 is **pulled toward** you. Negative values reverse this action and the amount of *VIB* will increase as the MATRIX-12's LEVER2 is **pushed away** from you.

MATRIX-12 CONTROL: BASIC OPERATIONS

As we mentioned just a moment ago, the Master Page is the heart of the MATRIX-12's performance control and contains all of the parameters that allow you to determine the precise way that the synthesizer will play. Think of the Master Page as your "Home Base" where you can perform the basic management of the synthesizer's playing capabilities.

The MATRIX-12, as a result of its flexible design, permits you as the player to use it in four different ways, as...

... an **INDEPENDENT**, stand alone instrument.

... the **MASTER** instrument in a MIDI music system.

... a **SLAVE** instrument in a MIDI system.

... both a **MASTER** *and* a **SLAVE**, at the same time, in a MIDI system.

The following discussions will instruct you how to use the MATRIX-12 in each of these four situations. Once you get acquainted with the enormous flexibility of this instrument, you will be limited only by your imagination.

The Ground Rules
In order for all this new information you're about to get to make sense, we'll be starting out using the Master Page functions in their most basic form. Set up your MATRIX-12 as follows:

1. We want the MATRIX-12 to be in SINGLE PATCH Mode. Refer to the Programmer display and make sure that a Single Patch has been selected. You can select any Single Patch you want.

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2. Do **not** connect any instrument or device to the unit's MIDI jacks. We'll get into that later.

3. You'll be getting the most out of this section if the MATRIX-12 is connected to a stereo sound system. If stereo is not available, any amplifier with a full-range speaker will do.

The MATRIX-12 as an
INDEPENDENT Instrument

By now you've no doubt taken the time to play your MATRIX-12 and listened to some of its pre-programmed Factory Stock Patches. You may have noticed that many of the patches, especially the MULTI PATCHES, play differently than the others. Some are layered (or "doubled"), some are split across the keyboard, and some use varying combinations of splits and doubling. These different performance characteristics of the synthesizer are set up in the Master Page when in SINGLE PATCH Mode.

Because the MATRIX-12 – unlike its predecessor the Oberheim XPANDER – has its own Keyboard and Modulation Levers, we're going to pay some special attention to how this synthesizer is used as a stand-alone instrument.

Basic Concepts of "Control"
The MATRIX-12, unlike the vast majority of other synthesizers, has 12 **independent** Voices (electronic circuits that produce the instrument's sounds). When we use the term "independent" we mean a number of things. For one, each Voice can play a different sound at the same time or all Voices can play the same sound. Secondly, a Voice can be played either from the Keyboard only, or from another instrument via MIDI IN. Third, the Voices can be played polyphonically (playing chords) or monophonically (one note at a time only). All of these options are referred to as sources of control and, unlike most other synthesizers, the choice is entirely up to you.

Because you have so many control sources at your command, the MATRIX-12 has been designed so that a systematic method is used to tell the Voices how they are going to be played. Two Master Page parameters, *VASSIGN* ("Voice Assignment") and *ZONE* are used for this purpose.

VASSIGN

This Sub-Page is where the Voices are given ("assigned") their source of control, either from the MATRIX-12's own Keyboard or from incoming MIDI notes. **In order for the MATRIX-12 to play its Voices, you must tell the Voices what control source (the Keyboard or MIDI IN) you plan to use to play them.** This is accomplished with *VASSIGN*.

1. Press the MASTER PAGE button.

2. Look at the PAGE MODIFIER section. On the Lower display, press the button beneath *VASSIGN.*

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3. In the *VASSIGN* Sub-Page, you have six Voices displayed in the Upper window with their corresponding control sources in the Lower one. Use the VOICES 1-6/VOICES 7-12 button in the PROGRAMMER section to switch Voice Banks as you are assigning the Voices.

⁋ ④ In this Sub-Page, you have no less than 22 sources of playing control for **each** Voice: any one of six Zones or MIDI Channels 1 through 16. Turn any one of the six knobs to view these available control options.

VASSIGN

VOICE1	2	3	4	5	6
⬚	⬚	⬚	⬚	⬚	⬚
ZONE1	ZONE1	ZONE1	ZONE4	ZONE5	CH16
⬚	⬚	⬚	⬚	⬚	⬚
◉	◉	◉	◉	◉	◉

Selecting a MIDI Channel for a Voice removes it from Keyboard control. The Voice can only be played monophonically from another instrument connected to the MATRIX-12's MIDI IN jack if it is assigned to a MIDI Channel. This is referred to as the MIDI MONO Mode – one Voice being played from one MIDI Channel.

Selecting a Zone for a Voice allows it to be played from the Keyboard **or** from MIDI (Zones can also have MIDI IN control as we will cover in a moment). Thus, if a Voice is assigned directly to a MIDI Channel in this Sub-Page, it by-passes the Zones (and therefore the Keyboard) and gives up its ability to play polyphonically.

If two or more Voices are assigned to a Zone, they will play polyphonically within that Zone. Thus, a Zone is the way to group Voices so that they will play polyphonically – either from the Keyboard or from MIDI IN. For our purposes, turn the knobs so that all 12 Voices are set to *ZONE 1* on the display. Now the MATRIX-12 is set up to play all 12 Voices polyphonically.

ZONE

By the definition given previously, a Zone is the way to play **two or more** of the MATRIX-12's Voices polyphonically. In our example, ZONE 1 is being used to play **all 12** Voices polyphonically. Think of a Zone as a "Voice Module" where Voices are assigned to be grouped together in order to be played polyphonically. But keep in mind that it is simple logic that if only **one** Voice is assigned to a Zone, it will only play monophonically in that Zone. Another way that Voices cn be set to play monophonically is by setting the *MODE* of the Zone to any of three unison ("*UNI –*") modes.

Press the button directly beneath *ZONE* on the display. The Upper display reads:

SELECT ZONE FROM 1 TO 6

Pressing an X SELECT button from 1 to 6 will select that Zone. You can switch among the six Zones with the X SELECT buttons. For this example, we will select ZONE 1. Press the "1" button in the X SELECT section. Page 1 and Page 2 of a ZONE will be displayed like this:
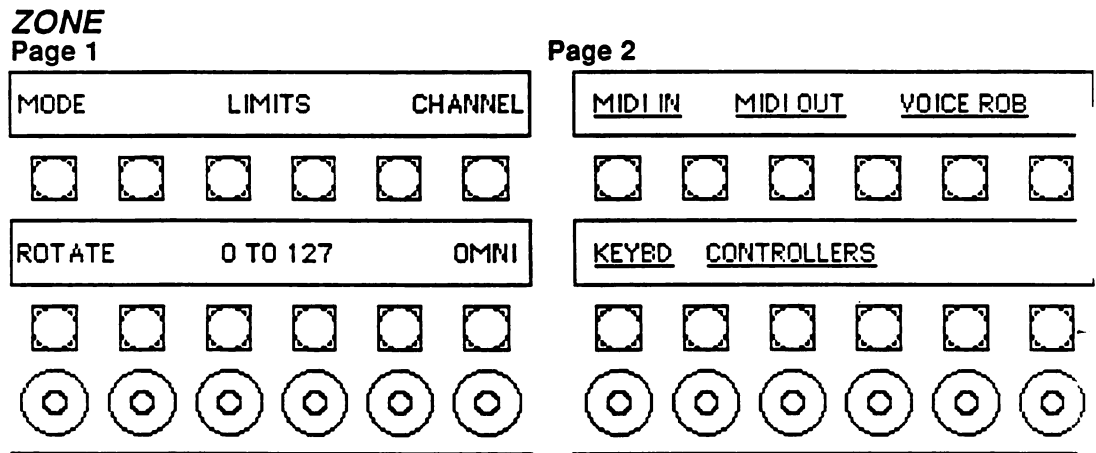
ZONE
Page 1   **Page 2**

MODE	LIMITS	CHANNEL

☐ ☐ ☐ ☐ ☐ ☐

MIDI IN	MIDI OUT	VOICE ROB

☐ ☐ ☐ ☐ ☐ ☐

ROTATE	0 TO 127	OMNI

☐ ☐ ☐ ☐ ☐ ☐
◎ ◎ ◎ ◎ ◎ ◎

KEYBD	CONTROLLERS

☐ ☐ ☐ ☐ ☐ ☐
◎ ◎ ◎ ◎ ◎ ◎

Because of its polyphonic nature and the fact that it is a versatile means by which Voices are played from the Keyboard, a Zone has several parameters that must be programmed that give it specific playing capabilities. This is referred to as "defining the Zone":

Page 1   *MODE*   This parameter determines the order in which the Voices are played when the keys are played on the Keyboard, or when incoming notes are received from MIDI:

Polyphonic Keyboard Modes
The MATRIX-12 provides you with three methods in which to play its 12 Voices polyphonically.

ROTATE   Instructs the Voices in the Zone to play in numerical order so that they will "loop" in rotation. Each new note causes the **next higher Voice assigned to that ZONE** to be played.

REASSIGN   Similar to *ROTATE*, this mode determines the order of the Voices to play depending on the **pitch** of the note. For example, when a note is played, the MATRIX-12 checks to see if any Voice in the ZONE has already played that note. If so, that Voice is retriggered. If not, the next higher available Voice is used.

RESET   Instructs the Voices to play in **numerical** order, always
                       starting with the first Voice in the ZONE, etc., but without
                       rotating. For example, if the ZONE is assigned Voices 4, 5, 6
                       and 7, playing a single note phrase *stacatto* will play all
                       notes on Voice 4. Playing two notes at the same time – or
                       playing them *legato* – will activate Voices 4 and 5. Playing a
                       triad will always use Voices 4, 5 and 6, etc.

Monophonic Keyboard Modes

These are referred to as UNISON modes, characterized by the fact that
playing one key on the Keyboard (or receiving one incoming note from
MIDI) will activate all Voices assigned to the Zone at the same time.

UNI-LOW   **"Low Note Priority"** – The lowest note played is the one
                       that gets assigned to the Voices. If two or more keys are
                       pressed, only the lowest one is heard.

                       Another way of stating Low Note Priority is if the lowest held
                       note changes, the pitch of the Voices is updated to this new
                       note and a Multi-Trigger (but not a Single-Trigger) is
                       generated.

UNI-HIGH   **"High Note Priority"** – The highest note played is the
                       one that gets assigned to the Voices. If two or more keys are
                       pressed, only the highest one is heard.

                       Another way of stating High Note Priority – just as with
                       UNI-LOW – is if the highest held note changes, the pitch
                       of the Voices is updated to this new note and a Multi-Trigger
                       (but not a Single-Trigger) is generated.

UNI-LAST   **"Last Note Priority"** – The last note played is the one
                       that gets assigned to the Voices. If two or more keys are
                       pressed, the last one pressed the one that is heard. This
                       mode is best demonstrated when playing legato. Each
                       successive note in the phrase is heard and the previous note
                       is cut off.

LIMITS   This parameter determines the specific range of keys on the
                       Keyboard, or incoming MIDI notes, that will play the Zone's
                       Voices.

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MATRIX-12

Tracking Generator Range

Middle C

(0 Volts from CV Input)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127

The *LIMITS* of the Zone are used to define an area of the Keyboard or a range of incoming MIDI notes from which the Voices assigned to it are played. A Zone Limit can be one Octave, several Octaves, a few notes, the entire length of the Keyboard or beyond, or **just one note**.

The *LIMITS* parameter is used to set the Zone's **range**. The range of the Zone is defined by selecting the lowest note (its Lower Limit) and the highest note (its Upper Limit) on the Keyboard that the Zone's Voices will play from. Playing notes out of the range of the Zone will not play its Voices.

Setting the Zone Range
When selecting the Lower and Upper notes to establish the range, a "Note Number Value" system is used. Zone range *LIMITS* are selected from the Lower display. The display *0 TO 127* represents the 128 available MIDI notes that can play the Zone's Voices. As you can see from the diagram at left, these MIDI Note Numbers extend well above and below the range of a Grand Piano. Each of the keys on the MATRIX-12's Keyboard is given a corresponding MIDI Note Number. The MATRIX-12's Keyboard range is *36* (low C) to *96* (high C).

Only notes within the ZONE
will play
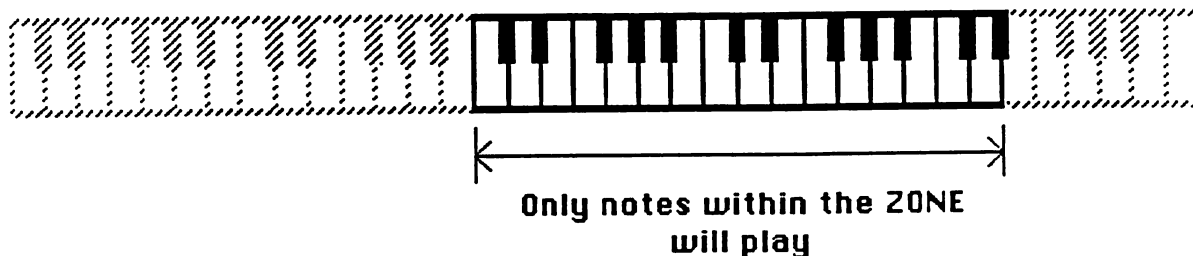
To set the range of a Zone:

Option 1. The two knobs directly below the numerical displays can be turned until the desired Note Numbers for the Lower and Upper Limits are displayed. Notice that if you attempt to set the Lower Limit above the Upper Limit (and vice-versa), both Note Numbers will be the same – the MATRIX-12 will not permit this to occur.

Option 2. Press and hold the button directly below the Lower Limit Number. While you are holding this button, press the key on the MATRIX-12's Keyboard that you want to be the Lower Limit. The display will show this key's Note Number. The same procedure is used in selecting the Upper Limit. Again you will notice that if you attempt to set the Lower Limit above the Upper Limit (and vice-versa), both Note Numbers will be matched – the MATRIX-12 will not permit this to occur.

CHANNEL This parameter specifies the Zone's MIDI input. In other words, if the Zone will be played by incoming notes from MIDI, *CHANNEL* selects the MIDI Channel that the Zone will receive on.

Page 2

MIDI IN
(on/off)

Selects whether or not the Zone will recognize incoming notes from MIDI.

MIDI OUT
(on/off)

Selects whether or not notes played on this Zone will be transmitted from the MATRIX-12's MIDI OUT to a Slave instrument. Notes transmitted from this Zone can be those played on the Keyboard or those coming from MIDI IN.

An important aspect of *MIDI OUT* control is that no Voices need be assigned to a Zone for it to transmit MIDI data. This is especially useful if you want a Zone to play a Slave instrument only without playing the MATRIX-12's Voices. For this reason, Zones that are not used should always have thier *MIDI OUT* parameters turned Off.

VOICE ROB
(on/off)

Enables all notes played in the Zone to be heard even if more notes are played than the Zone has assigned. As an example, a Zone has four Voices assigned to it and those four Voices are being played by holding down a four-note chord. If a fifth key isplayed, it will rob one of the Voices being held in order for it to be heard. *VOICE ROB* in this example will steal the first-played note of the chord in order to play the new fifth note.

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Turning on *VOICE ROB* (underlined) assures that every new note will be played. The first note played will be removed to make room for the new one.

Turning off *VOICE ROB* (not underlined) assures that voices will not jump to other notes when a playing note is let go.

KEYBOARD
(on/off)

Selects whether or not the Keyboard will be used to play the Voices assigned to this Zone.

If *KEYBOARD* is switched **on** (underlined), playing the MATRIX-12's Keyboard will play these Voices normally. The Voices can also be controlled by the MATRIX-12's Levers and Pedals.

If *KEYBOARD* is switched **off** (not underlined), playing the MATRIX-12's Keyboard will have no effect on these Voices and the synthesizer's Levers and Pedals will also be disabled (turned off). This is useful if you want the Voices assigned to this Zone to be played from incoming MIDI notes only. But if *MIDI IN* is switched **off**, the Voices assigned to the Zone will never play because you have removed both sources of playing control.

CONTROLLERS
(on/off)

If *MIDI OUT* is selected, the display *CONTROLLERS* appears in the Lower window. The MATRIX-12 gives you the option of transmitting its Levers and Pedals to a MIDI Slave instrument or not from the selected Zone.

If *CONTROLLERS* is switched **on**, the Zone will transmit its performance controllers to a Slave instrument connected to the MATRIX-12's MIDI OUT port: Lever 1, Lever 2, Pedal 1, Pedal 2, and Pressure. Velocity and Release Velocity are always transmitted whether *CONTROLLERS* is **on** or **off**. This is because VEL and RVEL are not controllers but transmitted and received via MIDI as components of MIDI **Notes.** Just be sure that your slave instruments are set to receive Controller commands.

If *CONTROLLERS* is switched **off**, the Zone will not transmit its performance controllers to MIDI OUT. Only notes played on the Zone will be transmitted to MIDI as well as Velocity and Release Velocity.

SUMMARY
As you can see, there are quite a few settings that must be made in order to get the MATRIX-12 to play as an independent, stand-alone instrument. As you become more familiar with the MATRIX-12, you will discover that this *ala carte*

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approach permits unprecendented flexibility and specialization in setting up customized performance control. You may want to refer to the following checklist when setting up the MATRIX-12 as an independent synthesizer:

VASSIGN
> Make sure that you have assigned each of the MATRIX-12's Voices to one of the ZONES. Remember that assigning a Voice to a MIDI Channel removes that Voice from the Keyboard's control. To put the MATRIX-12 into its most basic configuration, set all 12 Voices to ZONE 1.

ZONE
Page 1 Settings

- Select the desired Keyboard *MODE*.

- Set the range of the Zone with the *LIMITS* parameter. To play the Zone's Voices from the entire length of the MATRIX-12's Keyboard, set the left-hand Note Number to *36* (Lower Limit) and the right-hand Note Number to *96* (Upper Limit). You can use the *0 TO 127* settings if you like. To play the Zone's Voices from a restricted area on the Keyboard, set the Lower Limit higher than *36* and the Upper Limit lower than *96*.

- *CHANNEL* settings are not involved in this situation.

Page 2 Settings

- Make sure that <u>*KEYBOARD*</u> is selected.

- Select <u>*VOICE ROB*</u> if necessary.

- *MIDI IN*, *MIDI OUT*, and *CONTROLLERS* settings are not involved and may be turned off.

The MATRIX-12 as the MIDI MASTER

The MATRIX-12 MIDI Master capabilities far exceed those of other synthesizers due to its use of ZONEs. Because each ZONE has its own MIDI Channel, the presence of six ZONEs permits the Mastering of six Slave instruments on six different, independent MIDI Channels. And since each ZONE is able to transmit **Notes** and **Controllers** independently, the MATRIX-12's MIDI performance capabilities make it the ideal Master Keyboard controller in any MIDI system.

The discussions that follow are designed to be used as a guide in setting up a MIDI system with the MATRIX-12 as the Master Controller. Since the combinations are almost limitless, we will cover the basics and leave the rest up to your specific system needs.

Getting Started

Your Slave instrument needs to have the ability to receive MIDI **Notes** (Notes, Velocity and Release Velocity) and **Controllers** (Pitch-Bend, Vibrato, Volume Pedal, Sustain Pedal, Pressure/After-Touch and Patch Changes). Consult the Owner's Manual of your Slave to determine what Controllers it can transmit and receive and what Controller Numbers it is using. These settings should be matched on the MATRIX-12.

It is not critical that **all** Controllers are recognized by the Slave. Some MIDI synthesizers do not respond to Volume Pedal, Velocity or Pressure, as examples. It is not important that your Slave have these features but will add greatly to the usefulness of your MIDI system if it does.

As a simple starting point, enter SINGLE PATCH Mode on the MATRIX-12 and select any Single Patch. Press MASTER PAGE, select *VASSIGN* and assign all 12 Voices to ZONE 1.

EXAMPLE #1
MATRIX-12 Driving 1 Slave

Using the set-up above, the MATRIX-12 is playing all 12 Voices from ZONE 1 polyphonically. Connecting a Slave instrument's MIDI IN to the MATRIX-12's MIDI OUT constitutes a simple MIDI Master-Slave system. For proper interfacing to occur, the following checklist will cover the necessary settings:

MATRIX-12 Assignments –

1. *BASIC CHANNEL = 1*
   Press MASTER PAGE.
   Press *MIDI* in the Upper PAGE MODIFIER Display.
   Press *CHANNEL*.
   The MATRIX-12's Basic MIDI Channel should be set to **1**.

2. ZONE 1 Settings:
   Press MASTER PAGE.
   Press *ZONE* in the Lower PAGE MODIFIER Display.
   Select ZONE 1 from the X SELECT buttons.

   Page 1 – *MODE*   =   *ROTATE*
             INPUT   =   *0 TO 127*
             CHANNEL   =   *OMNI*

   Page 2 – The following parameters should be enabled:

             <u>*MIDI OUT*</u>
             <u>*KEYBOARD*</u>   <u>*CONTROLLERS*</u>

Slave Synthesizer Assignments:

1. Basic Channel = 1

2. MIDI Controllers = ON

In this situation, we have the most basic MIDI system: playing a note or notes on the Master (the MATRIX-12) will play the same notes ("doubling" or "layering") on the Slave. Notes will play from both synthesizers across the MATRIX-12's entire Keyboard. But there are many more ways that this basic system can be used. The following examples are just a few suggestions.

OPTIONS
With this basic MIDI system as a starting point, we can come up with a number of useful configurations using the MATRIX-12 as the Master driving one Slave.

Option 1:
Split MATRIX-12 Keyboard – MATRIX-12 Voices play from the **Upper** half, Slave synthesizer plays from the MATRIX-12's **Lower** half. We will now use two ZONEs in order to split the MATRIX-12's Keyboard.

    MATRIX-12 Assignments –

      1. All Voices still play polyphonically fron ZONE 1. Do not change ***VASSIGN***.

      2. ZONE 1 Settings:
          Page 1 – ***LIMITS***   **=**   ***60 TO 127***

          Page 2 – The following parameters should be enabled **only**:
               <u>KEYBOARD</u>
               <u>VOICE ROB</u> (optional)
               Be sure that ***MIDI OUT*** is disabled.

      3. ZONE 2 Settings:
          We will use ZONE 2 to play the Slave. Since all 12 MATRIX-12 Voices are playing fron ZONE 1 and its MIDI OUT has been turned off, the Upper half of the MATRIX-12's Keyboard (from Middle C and higher) will play the MATRIX-12 only. Setting up ZONE 2 as follows will play the Slave from the MATRIX-12's Lower Keyboard half only:

          Page 1 – ***MODE***   **=**   ***ROTATE***
                  LIMITS   **=**   ***0 TO 59***
                  CHANNEL   **=**   ***OMNI***

          Page 2 – ***<u>MIDI OUT</u>***
                <u>KEYBOARD</u>   ***<u>CONTROLLERS</u>***

    Slave Synthesizer Assignments: No Changes

Option 2:
Split MATRIX-12 Keyboard – MATRIX-12 Voices play from the **Lower** half,
Slave synthesizer plays from the MATRIX-12's **Upper** half. This is accomplished
simply by switching the *LIMITS* for the ZONEs:

ZONE 1:	*LIMITS*	=	*0 TO 59*
ZONE 2:	*LIMITS*	=	*60 TO 127*

EXAMPLE #2
MATRIX-12 Driving 2 or More Slaves
If another MIDI synthesizer is available, connect its MIDI IN to the MIDI THRU of the
first Slave. If the second Slave is set to receive on the same Channel as the first, it
will double the notes from the first Slave in all the previous examples. But
independent control of each synthesizer can occur simultaneously from the
MATRIX-12's Keyboard.

Option 3:
3-Way Split MATRIX-12 Keyboard – Slave #2 Lower, Slave #1 Middle,
MATRIX-12's Voices Upper.

   MATRIX-12 Assignments –

1. All Voices still play polyphonically fron ZONE 1. Do not change
    VASSIGN.

2. ZONE 1 Settings:
    Page 1 – *LIMITS*   =   *84 TO 127*
              The MATRIX-12 is now set to play from the top Octave only.

    Page 2 – The following parameters should be enabled **only**:
              <u>KEYBOARD</u>
              <u>VOICE ROB</u> (optional)
              Be sure that *MIDI OUT* is disabled.

3. ZONE 2 Settings:
    Page 1 – *MODE*   =   *ROTATE*
              LIMITS   =   *60 TO 83*
              CHANNEL   =   *1*
              Slave #1 is now set to play from the MATRIX-12's middle two
              Octaves.

    Page 2 – <u>*MIDI OUT*</u>
              <u>KEYBOARD</u>   <u>CONTROLLERS</u>

4. ZONE 3 Settings:
    We will use ZONE 3 to play the Slave #2. Set it to receive on Channel 2.
    Setting up ZONE 2 as follows will play the Slave from the MATRIX-12's
    Lower two Octaves only:

    Page 1 – *MODE*   =   *ROTATE*
              LIMITS   =   *0 TO 59*
              CHANNEL =   *2*
              By changing *CHANNEL* from *OMNI* to *2*, this ZONE will
              transmit on Channel 2 as it will now over-ride what has been
              set as the MATRIX-12's Basic Channel.

    Page 2 – <u>*MIDI OUT*</u>
              <u>*KEYBOARD*</u>   <u>*CONTROLLERS*</u>

SUMMARY

As you can imagine, any number of configurations involving independent control
of up to six Slaves can be accomplished. Connecting more than six just limits you
to doubling the additional synthesizers. The two main parameters involved are
LIMITS which set the Split Points and *CHANNEL* which allows you to isolate or
combine MIDI OUT control from the MATRIX-12's Keyboard.

The MATRIX-12 as a
MIDI SLAVE

As a Slave in a MIDI system, the MATRIX-12 offers an enormous amount of
flexibility in the way that it can be controlled from a Master instrument. Even if the
Master controller that you are using to drive the MATRIX-12 has a limited MIDI
implementation, the MATRIX-12 can still perform a number of control functions
from the receiving end.

Getting Started

Connect the MIDI IN of the MATRIX-12 to the MIDI OUT of the Master controller.
Your Master instrument needs the ability to transmit MIDI **Notes** (Notes, Velocity
and Release Velocity) and **Controllers** (Pitch-Bend, Vibrato, Volume Pedal,
Sustain Pedal, Pressure/After-Touch and Patch Changes). Consult the Owner's
Manual of the Master to determine what Controllers it can transmit and what
Controller Numbers it is using. These settings should be matched on the MATRIX-
12 unless you are instructed in the examples to change them.

It is not critical that **all** Controllers are transmitted by the Master. Some MIDI
synthesizers do not transmit nor respond to Volume Pedal, Velocity or Pressure,
as examples. It is not important that your Master have these features but will add
greatly to the usefulness of your MIDI system if it does.

Also, the Master need not have the ability to Split or Double (Layer) its keyboard. These functions can be done on the MATRIX-12 through the use of its ZONEs.

As a simple starting point, enter SINGLE PATCH Mode on the MATRIX-12 and select any Single Patch. Enter MASTER PAGE, select *VASSIGN* and assign all 12 Voices to ZONE 1. Define ZONE 1 as follows:

Page 1:   *MODE*   =   *ROTATE*
                   LIMITS   =   *0 TO 127*
                   CHANNEL   =   *OMNI*

Page 2:   Enable *MIDI IN*
              All other parameters are optional.

EXAMPLE #1
MATRIX-12 as a Simple SLAVE

Referring to the connection outlined above, playing the Master controller will play the same notes on the MATRIX-12 with a "doubling" or layered effect. If the Patch that you have selected on the MATRIX-12 employs Pitch-Bend, Vibrato, Volume and Sustain Pedals, Velocity/Release Velocity, or Pressure, these Controllers will be active assuming that your Master is transmitting them.

EXAMPLE #2
MATRIX-12 as a SPLIT SLAVE

The MATRIX-12, through the use of ZONES, can be programmed to play two or more different sounds at the same time in MULTI PATCH Mode. Although discussed in greater detail in **Part 5: CONSTRUCTING the MULTI PATCH**, we will cover some of the basics here.

In this example, we will set up the MATRIX-12 to play two different sound Patches in a Split Keyboard arrangement. Each part of the Split will be a 6-Voice. **This split will play from the Master controller even if it does not have a Split capability of its own.**

    1. Select your Patches

- Enter MULTI PATCH Mode.
  Select a blank MULTI Patch Number. MULTI Patches *M93* through *M99* are programmed to be blank from the factory.

- Go to the PROGRAMMER section.
  Press the Voice Bank Select button so that VOICES 1-6 are selected.

- Press all six PATCH EDIT buttons beneath the Programmer Display. Use the Keypad to select the SINGLE Patch that you want to play on the **Lower** part of the Keyboard.

- Press the Voice Bank Select button so that VOICES 7-12 are selected. Use the Keypad to select the SINGLE Patch that you want to play on the **Upper** part of the Keyboard.

---

2. Assign the Voices

- Press the V.ASSIGN button in the SINGLE/MULTI PATCH PAGE
  SELECT Section. V.ASSIGN, as you remember, is written in grey
  lettering for MULTI PATCH Mode functions.

  Assign Voices 1-6 to *ZONE 1*. Assign Voices 7-12 to *ZONE 2*.

3. Define the ZONEs

- Press the ZONE button in the SINGLE/MULTI PATCH PAGE SELECT
  Section. ZONE, as you remember, is written in grey lettering for MULTI
  PATCH Mode functions.

  Select ZONE 1. Set up ZONE 1 as follows:

Page 1:	*MODE*	=	*ROTATE*
	LIMITS	=	*0 TO 59*
	CHANNEL	=	*OMNI*

  Page 2:   Enable *MIDI IN*

- Press the ZONE button again in the SINGLE/MULTI PATCH PAGE
  SELECT Section. Select ZONE 2.

  Set up ZONE 2 identical to ZONE 1 with the exception of:

LIMITS	=	*60 TO 127*

Play notes on your Master and notice that its keyboard has been split with one
Patch of the MATRIX-12 playing from the lower part of the keyboard and the other
playing from the upper. Changing the Left-LIMIT Number of ZONE 1 and the
Right-LIMIT Number of ZONE 2 shifts the Split Point. Try ZONE 1 = *0 TO 71* and
ZONE 2 = *72 TO 127*.

Option
The sound Patches can be reversed so that the Lower Patch plays from the
Upper keyboard area and the Upper Patch plays from the Lower keyboard area of
the Master. Just switch the *LIMITS* of the ZONES:

ZONE 1:	*LIMITS*	=	*60 TO 127*
ZONE 2:	*LIMITS*	=	*0 TO 59*

EXAMPLE #3
MATRIX-12 as a SLAVE in a 3-Way SPLIT
Three-Way, Four-Way etc. Splits are not only possible but easy on the MATRIX-12. Using EXAMPLE #2 as our starting point, follow the steps below to achieve three Split Patches from the Master's keyboard. Each Split section will be a 4-Voice. We will set up a third ZONE for this purpose ("ZONE 3", naturally) but first, you should select the Patch that will play from the new ZONE.

1. Select the Patch for the New ZONE

• Go to the PROGRAMMER section.
Press the Voice Bank Select button so that VOICES 1-6 are selected.

• Press PATCH EDIT buttons 4 and 5 beneath the Programmer Display. Use the Keypad to select the SINGLE Patch that you want to play from the new ZONE 3.

• Press the Voice Bank Select button so that VOICES 7-12 are selected. Press PATCH EDIT buttons 7 and 8 beneath the Programmer Display. Use the Keypad to select the SINGLE Patch that you want to play from ZONE 3.

We now have Voice 1-4 playing one Patch, Voices 5-8 another and Voices 9-12 the third Patch.

2. Assign the Voices

• Press the VASSIGN button in the SINGLE/MULTI PATCH PAGE SELECT Section. Assign Voices 5-8 to *ZONE 3*.

We now have the following Voice Assignments:

VOICES 1-4	=	ZONE 1
VOICES 5-8	=	ZONE 3 (the new ZONE)
VOICES 9-12	=	ZONE 2

3. Define the New ZONE

• Press the ZONE button in the SINGLE/MULTI PATCH PAGE SELECT Section. Select ZONE 3. Set up ZONE 3 as follows:

Page 1:	*MODE*	=	*ROTATE*
	LIMITS	=	*55 TO 78*
	CHANNEL	=	*OMNI*

Page 2: Enable *MIDI IN*

• Adjust the *LIMITS* of the ZONEs 1 and 2:

ZONE 1	*LIMITS*	=	*0 TO 54*
ZONE 2	*LIMITS*	=	*79 TO 127*

Playing the Master will produce the following results:

ZONE 1 plays from the Lower 1/3 of the keyboard.
ZONE 3 plays from the Middle 1/3 of the keyboard.
ZONE 2 plays from the Upper 1/3 of the keyboard.

Switching the LIMITS will shift the Patches to different areas of the keyboard.

EXAMPLE #4
DOUBLING/LAYERING the MATRIX-12 as the SLAVE

Option 1: Doubling
Referring to **EXAMPLE #2**, setting the *LIMITS* of each ZONE to *0 TO 127*
will cause them to overlap, producing a dual layer sound. Each ZONE has six
Voices assigned to it so the Master will be able to play up to six Voices on its
keyboard from the MATRIX-12.

Option 2: 3-Level Layering
Referring to **EXAMPLE #3**, setting the *LIMITS* of each ZONE to *0 TO 127*
will cause them to overlap, producing a three layer sound. Each ZONE uses four
Voices so the Master will only be able to play up to four Voices on its keyboard
from the MATRIX-12.

EXAMPLE #5
MIDI MONO Mode
If required, any or all Voices of the MATRIX-12 can be assigned to a separate MIDI
Channel. This feature is referred to as MIDI MONO and is described in the MIDI
Specification as "Mode 4: OMNI OFF/MONO". Any combination of Voices may be
used in any order and Voices controlled in MIDI MONO may be used
simultaneously with Voices assigned to Zones.

MIDI MONO is a useful Mode when independent control of a Voice or Voices is
necessary. Playing one or more single-note lines from a MIDI sequencer on one
or more separate playtracks is just one example of how MIDI MONO Mode can be
used. MIDI guitar players will really enjoy the added flexibility of being able to have
each string control a Voice independently of the others, complete with Pitch
Bend and Volume dynamics. Another example is MIDI MONO control of the
Voices from a Master instrument that has the ability to transmit MIDI MONO such a:
the Oberheim Xk Keyboard Controller, or any other Master device that permits
transmitting on separate MIDI Channels simultaneously via MIDI MONO.

MIDI MONO settings are accomplished in *VASSIGN* by turning the knob in
PAGE MODIFIER beneath the Voice or Voices that you want to be controlled via
MIDI IN on its own separate MIDI Channel. As the rotary controls are turned clock-
wise, ZONES 1 through 6 are displayed first then MIDI Channels 1 through 16.
Here are a few details cocerning the use of MIDI MONO:

- When MIDI MONO is used, **the Voice is removed from the
  MATRIX-12's Keyboard control** and will only respond
  monophonically to notes received on the MIDI Channel that it is assigned
  to.

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- MIDI MONO on the MATRIX-12 allows each Voice to respond to VELOCITY, RELEASE VELOCITY, LEVER1, PEDAL1 and PRESSURE **independently**. This means, for example, that you can use Pitch Bend and Volume control on one Voice without affecting the others.

- MIDI MONO on the MATRIX-12 requires each Voice to respond to LEVER2 and PEDAL2 **globally**. This means, for example, that Vibrato and Sustain Pedal commands received by the Voices assigned to MIDI MONO affect **all** Voices – these two Controllers are not independent per Voice as VELOCITY, RELEASE VELOCITY, LEVER1, PEDAL1 and PRESSURE are.

- MIDI MONO is a MIDI IN (Receive) function only. The MATRIX-12 will not transmit in MIDI MONO.

The MATRIX-12 as a MIDI MASTER *and* SLAVE

We have just seen how the MATRIX-12 can be operated alone, as a MIDI Master and a MIDI Slave. Because of the independent design of the MATRIX-12's Voices – each can have its own separate control source – the simultaneaous Mastering **and** Slaving of the MATRIX-12 not only possible but easy.

EXAMPLE #1
The simplest example of a dual Master/Slave connection is to connect the MATRIX-12's MIDI OUT to the MIDI IN of another synthesizer. Then, connect the MIDI OUT of the other synthesizer to the MIDI IN of the MATRIX-12.

When the MATRIX-12's Keyboard is played, the second synthesizer plays as the Slave. When the second synthesizer's keyboard is played, the MATRIX-12 plays as the Slave.

EXAMPLE #2
The MATRIX-12 can be set up so that an external "device", such as a MIDI Sequencer or computer, can play its Voices while the Keyboard can be used to play a Slave instrument:

- In either SINGLE PATCH Mode or MULTI PATCH Mode, assign all 12 Voices to ZONE 1.
  Connect the Master controller's MIDI OUT of the MATRIX-12's MIDI IN.
  Select ZONE 1:
      Set *CHANNEL* to the transmitting Channel of the Master.
  Select ZONE 1, Page 2:
      Enable *MIDI IN*.
      Disable the remaining Page 2 parameters.

ZONE 1 is now set to play all 12 Voices from the Master instrument connected to the MATRIX-12.

- Connect the MIDI OUT of the MATRIX-12 to the MIDI IN of your Slave synthesizer.
    Select ZONE 2:
    Set the *CHANNEL* of ZONE 2 to a different transmitting Channel than that of the Master that is playing the MATRIX-12's Voices.
    Set the Slave's MIDI IN Channel to be the same Channel that you assigned to ZONE 2.
    Select ZONE 2 Page 2:
        Enable *MIDI OUT, KEYBOARD* and *CONTROLLERS*.
        Disable the remaining Page 2 parameters.

The external device as the MATRIX-12's Master will play the MATRIX-12's Voices independently. You can play the Slave from the MATRIX-12's Keyboard without interference from the Master controller. († See Footnote on the following page.)

EXAMPLE #3
The MATRIX-12 can be set up so that the external device will play some of its Voices while the Keyboard can be used to play the remaining Voices:

- In either SINGLE PATCH Mode or MULTI PATCH Mode, assign six Voices to ZONE 1 and six Voices to ZONE 2.

- Connect the Master controller's MIDI OUT ot the MATRIX-12's MIDI IN.
    Select ZONE 1:
        Set the *CHANNEL* of ZONE 1 to the transmitting Channel of the Master.
    Select ZONE 1 Page 2:
        Enable *MIDI IN*.
        Disable the remaining Page 2 parameters.

- Select ZONE 2.
    Set ZONE 2 *LIMITS* to *0 TO 127*.
    Select ZONE 2 Page 2:
        Enable *KEYBOARD*. Disable the remaining Page 2 parameters.

The external device as the MATRIX-12's Master will play six of its Voices independently. You can play the six Voices assigned to ZONE 2 from the MATRIX-12's Keyboard without interference from the Master controller's **Notes**. († See Footnote on the following page.)

EXAMPLE #4
The MATRIX-12 can be set up so that:
  - the external device will play its six of its Voices while...
  - the Keyboard plays the remaining six Voices and...
  - the Keyboard is used to play a Slave instrument:

- In either SINGLE PATCH Mode or MULTI PATCH Mode, assign six Voices to ZONE 1 and six Voices to ZONE 2.

- Connect the Master controller's MIDI OUT ot the MATRIX-12's MIDI IN.
  Select ZONE 1:
    Set the **CHANNEL** of ZONE 1 to the transmitting Channel of the
      Master.
  Select ZONE 1, Page 2:
    Enable <u>**MIDI IN**</u>.
    Disable the remaining Page 2 parameters.

- Select ZONE 2:
    Set ZONE 2 **LIMITS** to **60 TO 127**.
  Select ZONE 2, Page 2:
    Enable <u>**KEYBOARD**</u>.
    Disable the remaining Page 2 parameters.

- Connect the MIDI OUT of the MATRIX-12 to the MIDI IN of the Slave
  synthesizer.

- Select ZONE 3.
    Set ZONE 3 **LIMITS** to **0 TO 59**.
    Set ZONE 3 **CHANNEL** to a different transmitting Channel than that of
      the Master that is playing the MATRIX-12's Voices.
    Set the Slave's MIDI IN Channel to to be the same Channel that you
      assigned to ZONE 3.
    Select ZONE 3, Page 2:
      Enable <u>**MIDI OUT**</u>, <u>**KEYBOARD**</u> and <u>**CONTROLLERS**</u>.
      Disable the remaining Page 2 parameters.

The external device as the MATRIX-12's Master will play six of its Voices
independently. You can play the six Voices assigned to ZONE 2 from the
MATRIX-12's Upper Keyboard area (ZONES 2 and 3 LIMITS were used to Split
the Keyboard) without interference from the Master controller. The MATRIX-12's
Lower Keyboard area will play the Slave synthesizer independently.†

Throughout this discussion, it was mentioned that the examples can be used in
either SINGLE PATCH Mode or in MULTI PATCH Mode. Just remember that you
may STORE any of these examples in a MULTI Patch if you wish.

If you have been experimenting in SINGLE PATCH Mode, remember that these
settings are not programmable per Patch and will affect all SINGLE Patches
Globally. Also, these settings will remain as they are until you change them, even

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† There is, however, one potential conflict with **Controllers** in the examples
   given. Since the MATRIX-12 does not make a distinction between Local and
   MIDI Controllers, you may experience the effect of the Levers, Pedals and
   Pressure transmitted from the Master instrument on the Voices assigned to play
   on the MATIX-12 only. Likewise, your use of the Levers, Pedals and Pressure
   on the Voices assigned to play from the MATRIX-12's Keyboard may also affect
   the Voices assigned to play from the Master instrument. Vibrato (LEVER 2 or the
   MIDI Vibrato Wheel) is a Global modulation that will be present in the examples
   given above.

   The solution to this is to use different Controller Numbers in the MIDI **CTRLS**
   Page. You will also need to match these new numbers with the Controller numbers
   on the Master instrument.

if the MATRIX-12 is powered off. To quickly return to a simple VASSIGN/ZONE configuration, perform the following "Power-Up Clear" procedeure:

1. Turn the MATRIX-12 off.

2. Press and hold the CLEAR button in the MODULATION SOURCE/ X SELECT SECTION.

3. While you are holding CLEAR, turn the MATRIX-12 back on.

4. The displays in the PAGE MODIFIER section of the front panel will read:

   RESET MEMORY ? ***(DOESN'T AFFECT PATCHES)***

   YES   ***NO***

5. Press the YES button and the MATRIX-12 Global parameters will default to the settings listed on Page 45 and 46.

SINGLE/MULTI PATCH PAGE SELECT

As we continue to examine the layout and operation of the MATRIX-12's front panel, the last set of Primary Pages to be covered are the synthesizer's SINGLE PATCH Pages and its MULTI PATCH Pages. Because these Pages are related and also because **they are programmable per patch**, their controls are shared by the same set of buttons located on the right-hand side of the MATRIX-12's front panel.

This section is divided into two parts: one to cover the actual sound patches that the synthesizer will play – the SINGLE PATCH Pages – and the other to cover how these basic sound programs can be rearranged to be Split, Doubled etc. – the MULTI PATCH Pages.

SINGLE PATCHES

The names of the Single Patch Pages available in the MATRIX-12 for sound programming are listed in this area of the front panel in WHITE lettering. In addition, Block Diagrams indicating the flow of control and modulation signals as well as audio signals are printed on the panel as a summary of available parameters to aid you when programming sounds. As we unravel the mystery behind the design concept of this section of the MATRIX-12, you will be able to make use of these "road maps" in the event that this manual is not with you at the time you are editing.

SINGLE PATCH PAGES

Part 1: Sound Synthesis Pages
VCO1, VCO2 and VCF/VCA

Now that we are familiar with the basics of Page selection and general operating techniques discussed in the chapter on PAGE MODIFIER, we are ready to examine the specific operation and function of each of the Pages in SINGLE PATCH Mode.

VCO1
& VCO 2

"VCO" is the abbreviation for "Voltage Controlled Oscillator" – a circuit that produces the raw tone or the basic sound of the synthesizer. Since the two VCOs of the MATRIX-12 Voice are almost identical, we will cover them together.

VCO 1 / VCO 2
Page 1

FREQ DETUNE		PW		VOL

0	+12		31		63

Page 1

FREQ   **"Frequency"** This parameter determines the pitch of the VCOs. Range is **0** to **63** (five Octaves and a Minor-3rd) where each increment represents one semi-tone.

DETUNE   This parameter enables the pitch of the VCOs to be adjusted slightly sharp or flat relative to each other. This produces a richer sound quality caused by two closely tuned oscillators "beating" from the slight variation in tuning. Range is **–31** to **+31** (+/– a 1/4 tone) where 0 is no Detune, –31 is the Flat limit and +31 is theSharp limit. Each increment of **1** 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.

PW   **"Pulse Width"** – If **PULSE** is selected as the VCOs' waveform (see Pulse wave selection in VCOs Page 2 discussion), this control sets the ratio of the Pulse Width's duty cycle. Range is from **0** to **63** where 63 is an extremely narrow Pulse that becomes gradually wider as the settings approach 31, the setting for a Square wave. From 30 on down, the Pulse becomes even wider with the same audible chacteristics 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. A wide Pulse (settings around 31 where the Square wave is produced) has a "hollow" sound quality and resembles a Clarinet.

Refer to the diagram in the discussion on the VCOs' Page 2 functions for a diagram depicting the visual representation of Pulse waves, illustrated on Page 111.

VOL   **"Volume"** – The volume output of each VCO can be adjusted with this control. It is this parameter that permits the output of the VCOs to be "mixed" so that their relative volumes can be set. Range is from **0** to **63** where 63 is maximum output and 0 effectively turns the VCO off.

VCO 1
Page 2

```
MOD = KEYBD  LAG  LEV_1  VIB
```

□ □ □ □ □ □

```
WAVE = TRI   SAW   PULSE
```

□ □ □ □ □ □

◎ ◎ ◎ ◎ ◎ ◎

VCO 2
Page 2

```
MOD = KEYBD  LAG  LEV_1  VIB  SYNC
```

□ □ □ □ □ □

```
WAVE = TRI   SAW   PULSE
```

□ □ □ □ □ □

◎ ◎ ◎ ◎ ◎ ◎
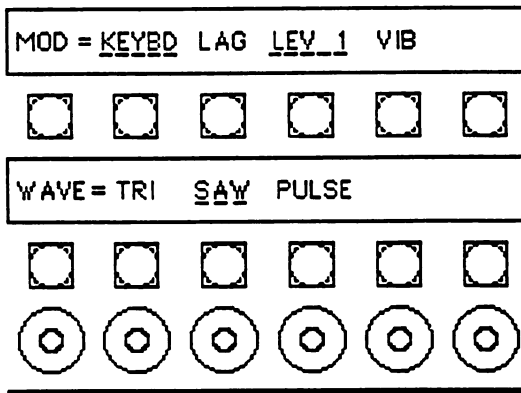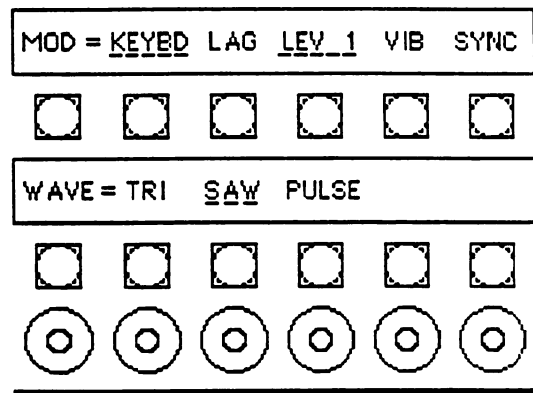
Page 2
Upper Display

KEYBOARD CONTROL

KEYBD   When this is selected, the MATRIX-12 will be controlled from the keyboard normally. If de-selected, the VCO will not be tracked by the keyboard and will output a steady pitch that will not change as keys are played. This steady pitch of the VCO can be varied with the PAGE 1 *FREQ* control and be modulated as usual.

LAG – Portamento/Glissando Select

Portamento or Glissando routing to the VCOs is selected with this parameter. Portamento is described as a "sliding" between notes played on the keyboard. Glissando quantizes this otherwize smooth glide so that the transition between notes is made in semi-tone steps.

The specific operating parameters of Portamento – its "LAG IN" (source to be Lagged), RATE (the speed of the Portamento) and MODE select – are programmed in the FM/LAG Sub-Page discussed later in this section.

LAG   When this is selected and *KEYBD* is de-selected, Portamento is routed to the VCO.

When *LAG* and *KEYBD* are selected together, Glissando is routed to the VCO.

Normal operation of the keyboard is achieved by turning off *LAG* and enabling *KEYBD* by itself. Having a separate LAG select for each VCO makes it possible for Portamento/ Glissando effects to be routed to one oscillator independent of the other.

LEVERS

The performance Levers of the MATRIX-12 or Wheel-type controllers of a MIDI Master controller are selected in this parameter.

LEV 1

When underlined, the MATRIX-12's Lever1 or a Pitch-Bend Wheel from a MIDI Master controller is enabled to modulate the pitch of the VCOs by providing pitch bend up (pull it towards you) or down (push it away from you) a whole tone either way. This action can be reversed to accomodate your playing style in MASTER PAGE *MISC*.

When *LEV 1* is selected by itself, Lever1 (or a MIDI Pitch Wheel) is the only one that is active.

VIB

When underlined, Vibrato modulation is routed to the DCOs, normally controlled by Lever 2 or a Vibrato Wheel from a MIDI Master controller. Vibrato parameters such as SPEED, WAVEFORM etc. are set up in the *VIB* Page. When *VIB* is selected by itself, Lever 2 or a MIDI Vibrato Wheel is the only one that is active.

You are able to turn on both *LEV 1* and *VIB* simultaneously (or both Wheels) to modulate the VCOs.

SYNC
(VCO 2 only)

This is the abbreviation for "synchronize", which places both VCOs in close tune with each other by electronically slaving the waveform of VCO2 to that of VCO1. Changing the *FREQ* of VCO 2 in Page 1 while the oscillators are in sync will cause more of a timbral (tone) or harmonic change than an actual frequency change.

Lower Display

WAVEFORM SELECT

The waveform output of the VCOs give each patch its tonal identity and is selected here. Your three options are *TRI*, *SAW* and *PULSE* which can be selected individually, or in any combination for some interesting tonal results. Experiment with varying the Pulse Width in Page 1 or modulating it by an LFO when selected with the other waveforms.

TRI

Triangle wave (a mellower wave used for flutes, etc.).
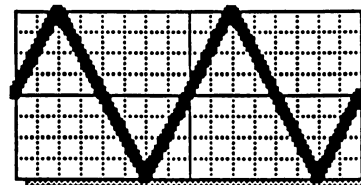
Triangle Wave
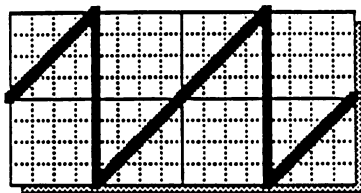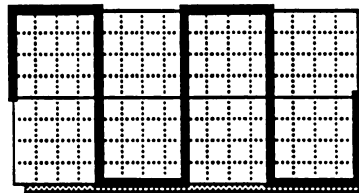
Sawtooth Wave   **Pulse Wave**   **Pulse Wave**
                  (set at 31=Square)   **(set at 15=Narrow)**
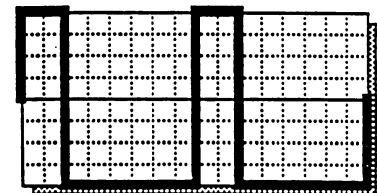
SAW   Sawtooth wave (a bright sound used in creating strings and brass patches).

PULSE   The audible characteristics of a PULSE wave are described above in the paragraph on *PW* in Page 1.

NOISE   The NOISE generator produces a pitchless "rushing" sound
(VCO 2 only)   suitable for wind and thunder effects as well as adding breath inflections to flute, brass and woodwind sounds.

VCF/VCA

The VCF/VCA section of the MATRIX-12 is where the sound generated by the VCOs is "tailored" by you to determine what the patch will finally sound like. This section performs important functions such as 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. In fact, the MATRIX-12 – like its counterpart, the Oberheim XPANDER – gives you no less than 15 Filter Modes with which to control the harmonic content of the Patch.

After you have selected the waveforms for VCOs 1 & 2, the VCF allows you to determine the tonality of the sound – by the settings that you use for *FREQ*, *RES*, and *MODE* – and articulate this tone setting with Matrix Modulation. It is in the way you use modulation 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. Two VCAs are designed into the MATRIX-12 to provide an increased ability to control Patch volume. Here is where Matrix Modulation™ can also be used to apply volume or loudness dynamics to the Patch.

Page 1   ## VCF Parameters

FREQ   **"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-12 is determined by the waveform you selected with the VCOs. The amount is set with **FREQ**.

The VALUE X range of the VCF is from 0 to 127. Assuming that you are using one of the LOW PASS Modes, 0 represents the minimum or fewest harmonics and 127 is the maximum setting where all the audible harmonics for that waveform are present. Another way of stating this is that for the LOW PASS Modes, an amount of 0 makes the Patch sound muffled or dull and higher amounts approaching 127 causes the Patch to sound bright and buzzy. The response of the numerical Filter settings depends greatly on the **MODE** that you have selected as each of the Modes filters the harmonics differently. We will cover the charteristics of the VCF Modes in just a moment.

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 X amount (0 to127) you give it.

RES

"Resonance" – The Resonance Parameter is used to emphasize the harmonic closest to the Filter's **FREQ**. This control actually increases the loudness or "gain" of this harmonic, resulting in a ringing or whistling effect as more **RES** 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.

Amount 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.

MODE

The expanded VCF of the MATRIX-12 Voice contains no less than 15 Filter Modes that are used to control the harmonic content of the Patch. The operating mode of the Filter is the primary function in determining the basic tonality of the sound. Thus; the "personality" of the Patch depends upon the **MODE** you select: the way that the VCF will filter the harmonics of the VCOs' waveforms.

The majority of analog synthesizers have only one or two Filter modes. Some utilize "Low Pass" and "High Pass" filtering or just Low Pass with two or more poles. The MATRIX-12 Voice has four Low Pass modes and three High Pass modes plus some very specialized modes including two Band Pass modes, a Notch or "Band Reject" mode and a Phase Shift mode. For added flexibility, the MATRIX-12 also includes four unique modes by combining the filtering capabilities of the 1-Pole Low Pass mode with the High Pass, Notch and Phase Shift modes.
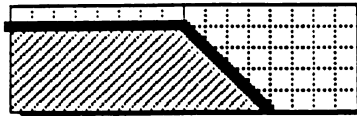
Low Pass
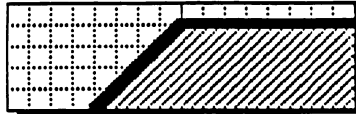
High Pass

Band Pass
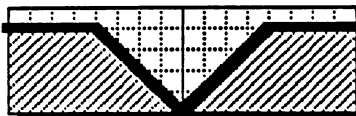
Notch
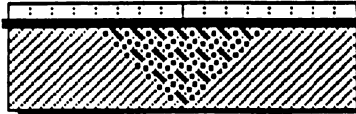
Phase
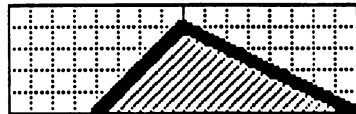
High + Low

Notch + Low
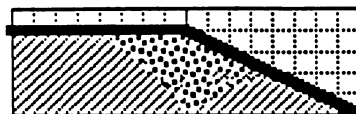
Phase + Low

Low Pass Modes
1 POLE LOW
2 POLE LOW
3 POLE LOW
4 POLE LOW
The Low Pass modes filter out the higher harmonics of the VCOs. In other words, these modes let the low frequencies "pass" through. As an example, a low FREQ setting will only allow a few of the total harmonics available pass though. Higher settings pass more of the harmonics.

The number of poles determines at what rate the highs are attenuated (filtered out) and this facet VCF operation is discussed in just a moment.

High Pass Modes
1 POLE HIGH
2 POLE HIGH
3 POLE HIGH
The High Pass modes operate just the opposite of Low Pass. They filter out the low harmonics of the VCOs and let the high frequencies pass through.

Band Pass Modes
2 POLE BAND
4 POLE BAND
The Band Pass modes combine the filtering operation of the Low Pass and High Pass filters. They filter out the extreme highs and extreme lows, letting only a band of harmonics in the middle pass through.

Notch Mode
2 POLE NOTCH
The Notch or Band-Reject mode functions the opposite of the Band Pass modes. Instead of passing harmonics in the mid frequencies, it filters this band out and passes the extreme highs and lows.

Phase Shift Mode
3 POLE PHASE
This mode is unusual because it lets all of the VCOs harmonics pass through the Filter, but changes the relative phase of the harmonics as they pass through. As the frequency (*FREQ*) of the VCF changes, it **shifts** the phase.

Using an Envelope or an LFO to change the VCF's frequency is a good way to observe how this phase shifting affects the sound. In fact, if the the VCF's Frequency is not changing, you may observe very little difference in the sound, even as differrent settings of *FREQ* are used.

Combination Modes
2 HIGH + 1 LOW
3 HIGH + 1 LOW
2 NOTCH + 1 LOW
3 PHASE + 1 LOW
Four types of exotic or special-purpose filtering is provided in these last four VCF modes. The combined filtering effects of the primary Modes used in these Filters are used to obtain tonal results not possible with conventional analog Filter modes. Some experimentation to determine the usefulness of these Modes in a particular Patch may be required.

MORE ABOUT FILTER POLES
The number of **poles** of a Filter Mode means "how sharply the Filter cuts off the harmonics". This, in technical terms, indicates its "rolloff characteristics" or the rate in which the harmonics are attenuated. In other words, polarity determines the rate in which the volume of the harmonics is reduced.

The attenuation of harmonics for the term POLE is expressed in dB (decibels) per Octave. The VCF begins to cut off harmonics at the point set by the *FREQ* control. In the MATRIX-12, each Pole of the VCF attenuates frequencies beyond the Filter Point at a rate of 6dB/Octave.
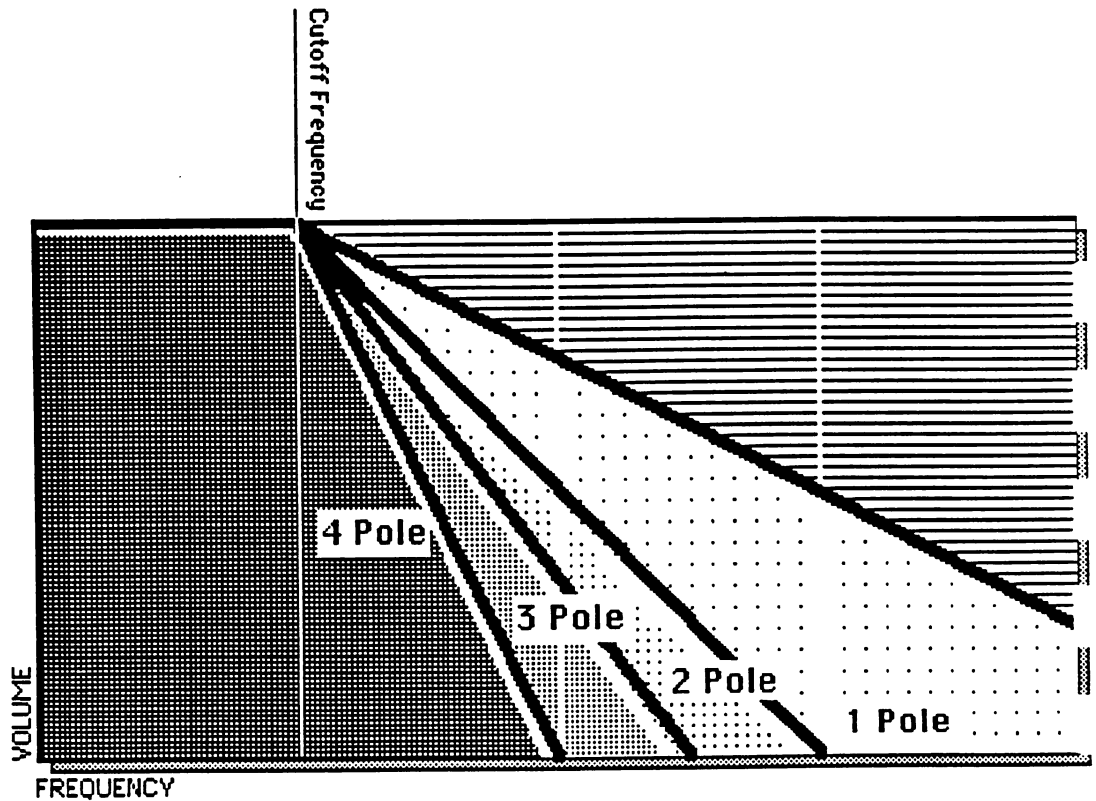
More Poles = Sharper Filter Cutoff
Comparative filtering effects of the four low pass filters.
Adding RESONANCE boosts the amplitude at the initial cutoff point.

Examples of how different Low Pass Modes roll off harmonics are illustrated in the diagram on the previous page. A 1 POLE LOW PASS filter mode attenuates at a rate of 6dB/Octave, resulting in a moderate "slope". Adding more Poles causes the roll-off slope to be steeper, cutting off more harmonics: 2 POLE LOW PASS = 12dB/Octave, 3 POLE LOW PASS = 18dB/Octave and 4 POLE LOW PASS = 24dB/Octave.

In audible terms, using fewer Poles in the LOW PASS Modes results in a brighter sound because more harmonics are passed through the VCF. Using more poles results in a fatter or bassier sound because fewer harmonics are passed.

VCA Parameters

The VCA section in the MATRIX-12 is a 2-Stage function allowing for expanded flexibilty in the volume articulation of the Patch. This section contains two independent Voltage Controlled Amplifiers labeled VCA1 and VCA2.

VCA 1   This first-stage VCA sets the initial output of the Patch. Amount value range is **0** to **63** where 0 indicates no output or silence and 63 is maximum output.

VCA 2   The second-stage VCA sets the final output of the Patch and sends its signal to the AUDIO OUT of the MATRIX-12. VCA 1 and VCA 2 are connected in "series", meaning that the output of VCA 1 goes to the input of VCA 2. The overall volume level of the Patch depends on the Amount values of these two parameters, in conjunction with the *VOL* output settings of the two VCOs. Amount value range is like that of VCA 1: **0** to **63** where 0 indicates no output or silence and 63 is maximum output.

Why *Two* VCAs?
Utilizing two Voltage Controlled Amplfiers in the MATRIX-12 Voice provides for enormous flexibility not possible with only one. Modulation routings, especially those employing the use of PRESSURE and VELOCITY, become more useful when the tasks of initial and final output levels are shared by two VCAs.

As an example, VCAs in other synthesizers have generally been "invisible" – no front panel control was present to permit the user to adjust its level or what was modulating it. Its Amount was permanently set to 0, and was activated only by the Volume Envelope hardwired to it.

In the MATRIX-12, any one of the 27 Modulation Sources can be assigned to the VCAs for a myriad of effects not otherwise possible. Since each Destination in the MATRIX-12 can be modulated by up to six Sources at the same time, you are given 12 VCA modulations to work with at any given time – six for VCA 1 and six for VCA 2.

Careful consideration must be given to what Source is selected to modulate each VCA, the Amount of modulation, and the settings of the VCAs themselves. The MATRIX-12 has a total of 15 VCAs strategically located throughout each Voice used to set the output level for the various parameters. The two VCAs in the VCF/VCA Page in particular are the ones through which the synthesizer's **sound**

passes, and are therefore most important.

As a rule-of-thumb, keep in mind that if both VCAs are set to **0** and no modulation is used to control them, no sound will be heard from the MATRIX-12. On the other hand, if both VCAs are set to any higher value than **0** – and if no modulation is used – the sound of the Voices will always be heard even though no notes are being played. This is due to the VCAs' circuits being "open" by the various Amount settings.

We will cover a number of useful modulation routings in the next section MATRIX MODULATION. But for now, the most common set-up for the VCAs would be VCA 1 = 63, VCA 2 = 0 modulated by an Envelope. This is the traditional synthesizer output setup.

Page 2   ## VCF Modulation

The VCF is able to be modulated in much the same way as the VCOs, but of course with different audible results. The MATRIX-12 provides a Page 2 of VCF modulation parameters for this purpose.

KEYBD/LAG Modulation
These parameters are similar in operation to the *KEYBD* and *LAG* found in the VCO1 and 2 PAGE 2, although the results are different audibly.

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 from the Keyboard opens the Filter and low notes close the Filter. This allows the VCF ***FREQ*** to keep its relative interval with the VCOs no matter what keys are played. This is how we percieve the frequency response of many acoustic instruments.
LAG	When this is selected, ***LAG*** as set in the FM/LAG Page will affect the VCF ***FREQ***. Just like the VCOs sliding from note to note, the Filter frequency will also exhibit a sliding effect when ***LAG*** is selected in this Sub-Page.

LEVER Modulation
Similar to *LEV 1* and *VIB* select for the VCOs, these parameters select LEVER1 (or a MIDI Pitch Wheel) and LEVER2 (or a MIDI Vibrato Wheel) modulation to the VCF Frequency.

LEV 1	When underlined, permits you to route Bend Modulation to the VCF Frequency so that if you're using LEVER1 to pitch bend the VCOs, for example, the VCF will also change by a corresponding amount. This keeps the Filter level relative to the VCOs constant no matter what bend amount you are using and the sound of the Patch remains the same. On the other hand, LEVER1 can be used to open or close the Filter whether it is bending the VCOs or not.
VIB	When selected, adds Vibrato modulation to the VCF, normally controlled by LEVER2.

SINGLE PATCH PAGES

Part 2: Sound Modulation Pages
FM/LAG, TRACK X, ENV X, LFO X and RAMP X

FM/LAG

The **FM/LAG** 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 VCO 1 or the VCF Frequency. Explained in more detail below, FM basically involves a high-frequency modulation of VCO1 or the VCF to obtain tone colors not possible with conventional LFO modulation.

> The **LAG** Processor in the MATRIX-12 is a circuit that smooths out otherwise sharp transitions in a Modulation Source. LAG takes any one of the MATRIX-12's 27 Sources of Modulation and slows the transition from its start point to its end. The most common use of LAG is in producing Portamento, although as a separate function can be used to achieve a multitude of special effects. When used to generate Portamento, LAG produces the smooth "gliding" from note to note by slowing the normal transition between the notes as keys are played on the Keyboard.

FM

Frequency Modulation – or "FM" – is a basic analog concept, derived in part from broadcast technology used in radio and television transmission and reception. 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 is changed, yet another set of harmonics is produced. Thus, the synthesist now has a whole new set of" tools" with which to create sounds that will be different from what the synthesizer is normally capable of producing.

In the MATRIX-12, VCO2 is used to modulate either the frequency of VCO 1 or the frequency of the VCF. VCO 2 is the Modulator and either VCO 1 or the VCF (although not actually an oscillator) are the possible Carriers. FM in the case of the VCF is best heard when *RES* (Resonance) in the VCF/VCA Page is set to its maximum, causing the VCF to oscillate. The VCF then becomes the second "oscillator".

FM AMP   "F.M. Amplitude" (Amount) This parameter, as described previously, controls the amount of VCO 2's Triangle wave modulating VCO 1 or the VCF. This 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 VCO2 and VCO1 or the VCF (when *RES* is at
maximum), plus the sum and difference of their frequencies.
Increasing the amount (VALUE X) will cause other overtones
to be generated as well. Changing the amount changes the
volume and number of the overtones, similar to conventional
filtering.

FM DEST   "F.M. Destination" As mentioned previously, this
parameter permits the selection of the destination of the
MATRIX-12's FM generator to be either VCO1 or the VCF.
Turning Knob #2 back and forth selects betwen VCO1 or
VCF. Also, pressing the button above this knob repeatedly
toggles between VCO1 and the VCF. Either VCO1 or the
VCF can be selected, but not at the same time.

FM Experiment
The FM Generator is actually the MATRIX-12's "28th" Source of Modulation. But
due to its unique design (utilizing a VCO for its waveform and frequency) and
specialized use as a Modulator (it can only affect VCO1 or the VCF), it is given its
own Page and is not used in the MATRIX-12's Matrix Modulation.

To experiment with FM in its simplest form, do the following:

STEP 1:   Select a SINGLE Patch that you want to work with. Or for the easiest
way to hear FM, press and hold STORE. Then while holding STORE,
press the CLEAR button. This action recalls the MATRIX-12's Basic
Patch – called "*OBERHEIM* " – from permanent memory.

            This is called the "Patch Initializing" function and is described in
the PROGRAMMER section of the manual. We will need
to use the MATRIX-12'S Basic Patch for this experiment.

STEP 2:   Select VCO2. Press PAGE 2. Turn its waveform outputs OFF in the
Lower Display. VCO 2's Triangle wave is patched separately for FM
so we don't want interference from its audio waves.

STEP 3:   Select VCO1. Enter Page 2. Turn ON any one of its waveform outputs
in the Lower Display. Using a *SAW* wave will enable us to hear the
effects of FM the best.

STEP 4:   Select the FM/LAG Page. The Lower Display will permit you to select
either VCO 1 of the VCF as the *FM DEST* (the FM destination). For
our experiment, we'll use VCO 1.

STEP 5:   Gradually increase the *FM AMP* (the Amount of FM) while you are
playing notes on the keyboard. What you will hear will be the new
harmonics generated by the FM process.

For FM routing to the VCF, select the VCF/VCA Page and turn the *RES*
(Resonance) parameter Amount to 63 and select *2 POLE LOW* as the Filter
MODE. By so doing, the VCF will be in oscillation which is the the point where FM
is best heard.

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Re-select the FM/LAG Page, select VCF as the **FM DEST**, and as you adjust the **FM AMP** while you are playing notes on the keyboard, the effect of FM on the Filter will be heard.

Working with FM
A wide variety of FM-generated sounds can be produced by the MATRIX-12. There are six main components that interact to create FM sounds on the MATRIX-12:

VCO1 – **FREQ**	VCF/VCA – **FREQ**
VCO1 – Waveform Select	VCF/VCA – **RES** Amount
FM/LAG – **FM AMP**	VCO 2 – **FREQ**

Experiment by changing the Amount values of each of these parameters.

LAG

As was mentioned in the introduction to this sub-section, the LAG Processor in the MATRIX-12 is used to smooth out otherwise sharp or instantaneous transitions in a Modulation Source. LAG processing enables the transition of any one of the MATRIX-12's 27 Sources of Modulation to diminish from its start point to its end.

The most common use of LAG is in producing Portamento, although as a separate function, it can be used to achieve a multitude of special effects. LAG is actually the equivalent of Portamento or Glide on other synthesizers but is configured differently and given its own Page for much greater flexibility in the MATRIX-12.

As an example, Portamento is achieved by Lagging the note commands from the Keyboard before sending this control to the VCOs. Because Portamento is a widely used feature, the MATRIX-12 provides an easy way of patching it by including the **LAG** select in Page 2 of both VCOs.

There are, however, many other functions that can be performed with **LAG**, such as Lagging VELOCITY. If, for example, you have programmed a Patch that has VELOCITY routed to two different Destinations, VELOCITY can be Lagged to one of them so that its effect will be different. LAG can also be used to reshape an LFO's waveform, the shape of an Envelope, the response of the LEVERs, etc.

The LAG IN simply selects the Modulation Source to be Lagged, while the **LAG RATE** controls the speed of transition.

Page 1

LAG IN   This parameter selects the Modulation Source – any one of the 27 available in the MATRIX-12 – to be Lagged. Knob #4 is used to select the Source that will be Lagged.

LAG processing that generates the same control signal to produce Portamento can be used to alter the LFOs in order

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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. †

Selecting any one of the five available LFOs in the MATRIX-12 as the **LAG IN** will cause the current waveform of that LFO to be Lagged. Adjusting the **LAG RATE** determines how exaggerated the effect of LAG will be on the wave. Entering Page 2 of the FM/LAG Page and selecting any one of several **LAG MODE**s determines how the waveform will be Lagged.

The effect of LFO LAG is especially prominent when used to reshape the **SQUARE** wave because it has two sharp transitions – a 90° rising edge and a corresponding 90° falling edge. The sharp falling edge of **UP SAW** and the rising edge of **DOWN SAW** are affected by **LAG** as well. The **TRIANGLE** wave can also be Lagged but because of its lack of sharp edges, the effect of **LAG** is not as noticeable.

LAG RATE   This parameter determines the speed with which the transition occurs. Value X range is from 0 to 63 where 0 is no **LAG** (actually its fastest speed) and 63 is the maximum (the slowest). Therefore, the higher the Value X is, the longer the **LAG** time.

When **LAG** is used to create Portamento, **RATE** is expressed in time – the time that it takes for a note to slide from its original note to its destination (the new note being played from the Keyboard). This rate is not directly related to the Value X 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 Page 2 will affect their relative Rates even though the **RATE** Value is set to the same number. This is because **LAG** is calculated by the MATRIX-12's processors in a slightly different way for each mode.

† While we're talking about it, we should mention here that the LFO **LAG** in PAGE 2 of the LFOs is independent of the LAG processor. The **LAG RATE** in the LFO Pages is pre-set. Thus, your settings in the LAG Page will not affect LAG as it appears in the LFO Sub-Page. See Page 136 for more information on this pre-set LAG function.

Using LAG

Since the LAG Processor is one of the 27 Modulation Sources, it is used in the Patch the same as any other Source. As an example, say you were using LFO4 to modulate the FREQ of VCO2 directly but decided that you want to Lag LFO4 instead:

STEP 1: Press the VCO2 button.

STEP 2: Press the switch beneath *FREQ* in the display. Since you were already using LFO4 to modulate the frequency of VCO2, *LFO4* along with its corresponding Amount will then be displayed.

STEP 3: Press the switch beneath *LFO4* in the top window so that it becomes underlined then, using the buttons in the MODULATION SOURCE Section, select *LAG* as the new Modulation Source.

STEP 4: Enter FM/LAG Page.

STEP 5: Select LFO4 as the *LAG IN*.

STEP 6: Start with a *LAG RATE* of 0, then adjust the Rate gradually higher. As you increase the amount of *LAG RATE*, you will begin to hear LFO 4's waveform being smoothed by the LAG Processor.

STEP 7: For varied LAG processing, press PAGE 2 and experiment with using different *LAG MODE*s.

Page 2   *LAG MODE*   This parameter gives you a choice among the three response modes of LAG:

          LEGATO   When this mode is used, LAG will be active only when notes **going to a particular Voice** are played Legato (playing a new note without immediately releasing the first note). No Portamento will be heard while playing Staccato (playing a new note only after the first note has been completely released). This permits LAG to be used expressively, depending on how the Keyboard is played. When *LEGATO* is off, all Voices will LAG.

NOTE: This mode is most useful when playing only one Voice or if the Zone is in UNISON. Putting the Zone in a polyphonic Keyboard mode requires very careful – and sometimes impossible – keyboard technique. As an extreme example of this, if the MATRIX-12 is set to play all 12 Voices polyphonically, causing all 12 Voices to Lag requires that 24 keys be depressed momentarily.

Another way of stating this is that since Lag affects the transition between notes **per Voice**, there will only be a Lag effect if a new note is sent to a Voice that is **already playing** (already "gated").

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LINEAR / EXPO LAG

The button beneath this parameter in the display selects between *LINEAR* and *EXPO* type Lag, described as follows:

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 X is set for 63, the maximum Portamento is about 30 seconds per octave.

EXPO   This stands for "Exponential" LAG. 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. Using a *LAG RATE* of 63 gives a maximum *EXPO* speed of about 55 seconds per octave, nearly twice that of *LINEAR*.

EQUAL TIME   As with *LINEAR*, *EQUAL TIME* provides an even transition between notes. The difference is that the MATRIX-12's processor re-calculates the *RATE* depending upon the interval between notes. As an example, it will take the same amount of time to LAG between a Root note and its Major 3rd as it does between the Root and four octaves. As with *EXPO*, using a *LAG RATE* of 63 gives a maximum speed of about 55 seconds per interval.

EQUAL TIME and *EXPO* LAG cannot be used at the same time. If *EXPO* is selected, *EQUAL TIME* is removed from the display.

TRACK X

The TRACKING GENERATOR is a circuit that allows you to "re-shape" or re-scale a control source. In other words, TRACK lets you take any one of the MATRIX-12'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-12's 27 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.

Selecting an TRACKING GENERATOR

Pressing the TRACK X button in the SINGLE/MULTI PATCH PAGE SELECT section will give the display:

SELECT TRACK GEN FROM 1 TO 3

While this message is being displayed, the LED in X SELECT will flash on and off, prompting you to select one of the three available Tracking Generators.

The CURRENT PAGE section of the PROGRAMMER display will show the Tracking Generator that was last selected. You may then...

... press an X SELECT button from 1 to 3 to select that Tracking Generator

... or press the TRACK X button **again** to select the Tracking Generator that was selected previously – the one displayed under CURRENT PAGE. This feature adds speed when selecting an Tracking Generator to be worked with.

Once you have selected a Tracking Generator, it will be displayed in PAGE MODIFIER. At this point you are able to program its parameters: you are able to select its *INPUT* and define its curve with the five *POINT* values. You may also switch among the three Tracking Generators with the X select buttons if none of the Lower display functions are underlined.

Basic *TRACK X* Operation

INPUT   The Tracking Generator is able to process any one of the MATRIX-12's Matrix Modulation™ Sources. Knob #1 is used to select the *INPUT* (you cannot use the MODULATION SOURCE SELECT button for this purpose). For covenience, you can refer to the Sources printed on the front panel when selecting an *INPUT*.

The 27 modulation sources that you can select are (in order):

KEYBD	**the MATRIX-12's Keyboard scaling**
LAG	**the response of the Lag Processor**
VEL	**Velocity response**
RVEL	**Release Velocity response**
PRESS	**keyboard Pressure response**
TRK 1	**the curve of Tracking Generator #1**
TRK 2	**the curve of Tracking Generator #2**
TRK 3	**the curve of Tracking Generator #3**
RMP1	**the shape of Ramp Generator #1**
RMP2	**the shape of Ramp Generator #2**
RMP3	**the shape of Ramp Generator #3**
RMP4	**the shape of Ramp Generator #4**
ENV1	**the shape of Envelope #1**
ENV2	**the shape of Envelope #2**
ENV3	**the shape of Envelope #3**
ENV4	**the shape of Envelope #4**
ENV5	**the shape of Envelope #5**
PED1	**the response of Pedal #1**
PED2	**the response of Pedal #2**
LFO1	**the waveform of LFO #1**
LFO2	**the waveform of LFO #2**
LFO3	**the waveform of LFO #3**
LFO4	**the waveform of LFO #4**
LFO5	**the waveform of LFO #5**
VIB	**the waveform of the Vibrato LFO**
LEV1	**the response of Lever #1**
LEV2	**the response of Lever #2**

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-12's Modulation Sources. Each of the 27 Modulation Sources can be tailored in 1,073,744,824 ways using the five *POINT* parameters.

POINT 1	A Tracking Generator divides the "control range" of the
POINT 2	Modulation Source *INPUT* into five sections. At each of
POINT 3	these points you can define the desired Output. These five
POINT 4	Track Points represent the five sections of the Track's control
POINT 5	range. Each *POINT* Value goes from 0 to +63. Unlike other

modulations, however, using a Value of 0 for all five POINT amounts does **not** mean "no effect". The Tracking Generator's default settings – or the **Default 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, the Tracking Generator is said to have a **linear** output. The input is the same as the output – no effect, no change. If values of **0** are used across the board, the Tracking Generator is effectively turned off and will not output anything: 0 amounts for all five *POINT* values yields a 0 output level.

When using TRACK, use these default 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 select as the *INPUT* will behave in a different way.

Let's see how the Tracking Generator 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 *POINT 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 titled **Part 4: MATRIX MODULATION**). 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 VCO1 by an LFO. We'll use a slow *UP SAW* (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:   You must first be sure that the MATRIX-12 is in SINGLE PATCH Mode.

STEP 2:   To hear exactly what the Tracking Generator can do without interference from other modulations, set up the MATRIX-12's **Basic Patch** by pressing and holding STORE and pressing CLEAR in the MODULATION SOURCE/X SELECT Section.

STEP 3:   Select VCO2.
            Enter Page 2.
            Turn off VCO 2's *SAW* waveform. By doing so, you have defeated the output of this VCO because in our experimentation with TRACK we are only interested in listening to VCO1.

STEP 4:   Select VCO1.
            Press the button beneath *FREQ* in the top display.
            Select TRACK X from MODULATION SOURCE SELECT. In the Upper PAGE MODIFIER display, *TRACK X* will appear with "X" flashing.

            Press "1" from X SELECT to select Tracking Generator #1. Using Knob #1, set its Amount value to **+63**.

STEP 5:   Press the LFO X button in SINGLE / MULTI PATCH PAGE SELECT.

            Press it again to select LFO1.
            Set its *SPEED* to **20**.
            Select *UP SAW* as its waveform.

STEP 6:   Press the TRACK X button in SINGLE/MULTI PATCH PAGE SELECT twice to select Tracking Generator #1.

STEP 7:   Using Knob #1, select *LFO1*. LFO1 has now been selected as the Tracking Generator's *INPUT* and is our modulation source in the Patch.

We have just set up the MATRIX-12's Matrix Modulation to perform a slow, deep modulation. Play a note on the Keyboard and listen to the effect of the *UP SAW* on the frequency of VCO1. Notice that it sounds normal as we have not yet altered the Tracking Generator's default settings. By experimenting with the five Track *POINT*s, we will see how the Tracking Generator modifies a modulation source to do something that it cannot do normally.

STEP 8:   Change the Amount value of *POINT 2* from "15" to "60" using
           Knob #3.
           Play a note from the Keyboard and listen to how the normally
           smooth rise in the waveform now has a noticable "hump".

By experimenting with other *POINT* Values, see how many ways you can change
the *UP SAW* waveform. Try Point Values of 63, 31, 0, 31 and 63. These
settings will cause the *UP SAW* wave to now closely approximate a *TRIANGLE*
waveform.

Bonus Question: What POINT Values do you use to turn the *UP SAW* into a
DOWN SAW ? (Answer at the end of this section).

More About *TRACK X* Operation
A Tracking Generator will operate in two different ways, depending on the
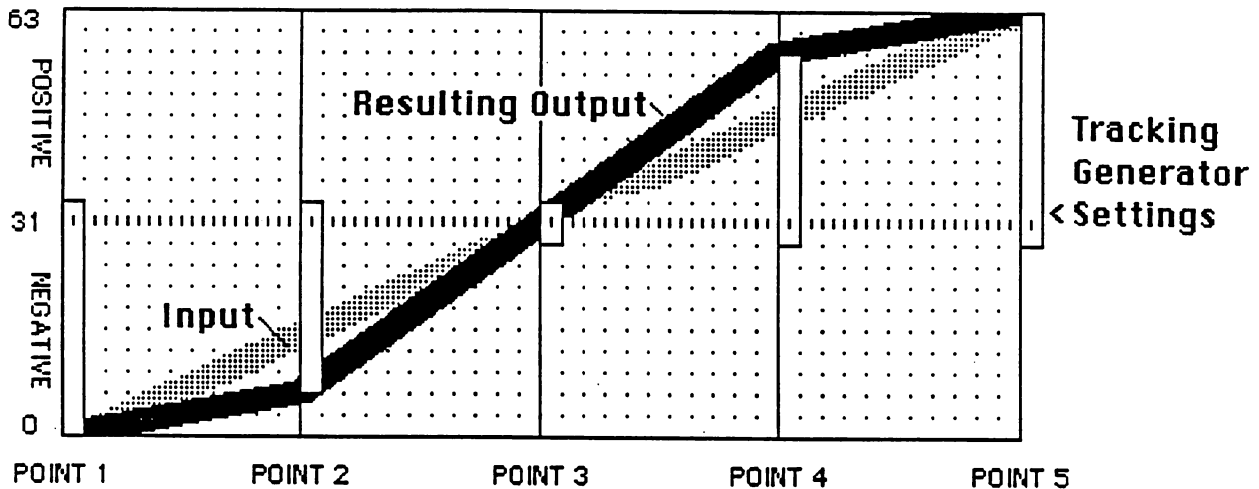*INPUT*:

1. "POSITIVE ONLY"
   An *INPUT* such as the Keyboard, an Envelope or a Ramp have positive
   outputs only. *POINT1* represents the selected *INPUT*'s starting point (its
   "0 level"). Setting a *POINT* to 0 gives no output and all of the other available
   POINT Values are positive.
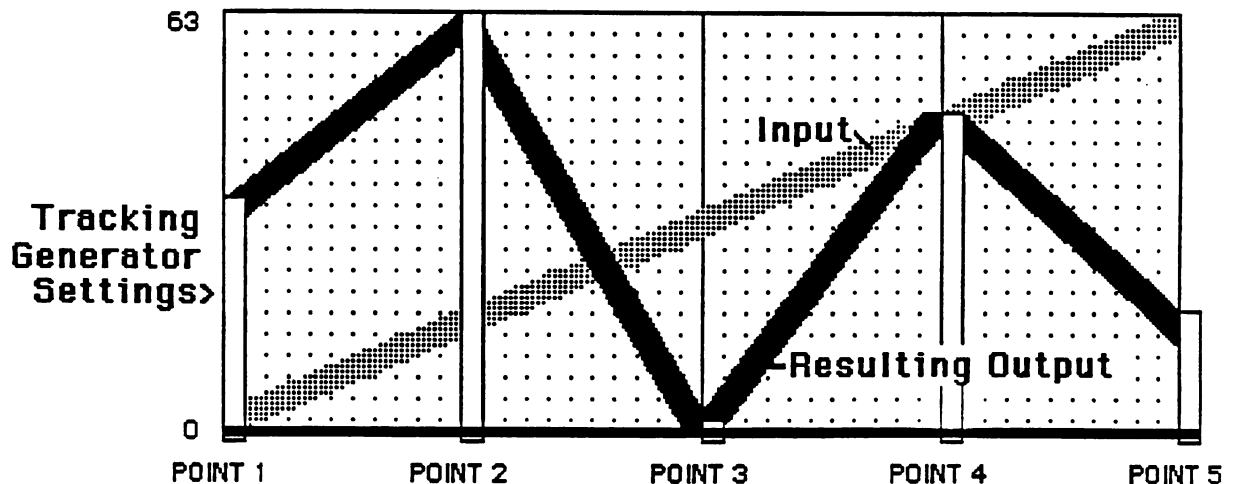
TRACKING GENERATOR OUTPUT
from a Positive input such as a KEYBOARD or ENVELOPE

2. "POSITIVE/NEGATIVE"

*INPUT*s such as an LFO or Lever, on the other hand, have outputs that alternate between negative and positive. *POINT3* in this case represents the selected *INPUT*s "0 level". Setting a *POINT* Value to 31 results in no output, below 31 is negative and above 31 is positive.

TRACKING GENERATOR OUTPUT
from a Positive/Negative input such as an LFO or BENDER

Other examples of what can be done with Tracking Generators are:

1. Using an LFO (a Positive/Negative type modulation) as the *INPUT*, select its *TRIANGLE* wave to be modified. Set *POINT2* and *POINT4* to Amount values of **63**. The result is a waveform that is closer to a Sine wave.

2. A variable or "continuous" controller such as a Volume Pedal or (Positive modulation) can be turned into a **switch**-type modulation by setting *POINT1* through **4** to **0** but *POINT5* to **63**. Only when the controller approaches its maximum input level (over 80%) will anything other than 0 come out of the Tracking Generator. You can assign the Pedal directly to other destinations in the Patch as normal, giving you the gradual control of one function with the full range of the Pedal while switching on the second destination only near the top of the Pedal.

ANSWER TO BONUS QUESTION

Turning an *UP SAW* into a *DOWN SAW* means that we are intending to reverse or invert the direction of the *UP SAW* 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*

ENV X

The MATRIX-12 utilizes five independent 5-stage Envelope Generators that provide "time dependent" modulation. This means that Envelopes are used primarily to change whatever parameters are selected in the patch as Modulation Destinations **for a selected time period**, which could be mere fractions of a second to several minutes depending on the setting. Each "stage" of an envelope, with the exception of *SUSTAIN* – which sets the Envelopes' current **output level** as a key or keys are being held down – operates for an amount of **time** that is set with its Amount value.

Envelopes are most commonly used to modulate the frequency of the Filter (VCF) and the patch's overall loudness (VCA2). In addition, the Envelopes can be used simultaneously to modulate any one of the remaining 45 parameter destinations in the Matrix Modulation that require this type of time control.

Although the majority of analog-based synthesizers provide only two Envelope Generators – one for the VCF and one for the VCA – the MATRIX-12 provides three additional Envelopes for time-dependent modulation when you need it. You can combine several Envelope Generators to create complex changes (modulating a Destination by two or three different Envelopes) or you can modulate one of the Envelope's parameters by another Envelope – or even itself – to obtain a timing that is extremely long.

When used as a modulation source, the Envelope starts is cycle when it receives **a trigger** – or a kind of "go" signal. Common trigger sources are playing notes on the MATRIX-12's Keyboard, notes transmitted from the MIDI Master controller via MIDI IN, one of the LFOs or an external source through the TRIGGER IN jack on the back panel.

Selecting an ENVELOPE
Pressing the ENV X button in the SINGLE/MULTI PATCH PAGE SELECT section will give the display:

SELECT ENVELOPE FROM 1 TO 5

While this message is being displayed, the LED in X SELECT will flash on and off, prompting you to select one of the five available Envelopes. The CURRENT PAGE section of the PROGRAMMER display will show the Envelope that was last selected. You may then...

... press an X SELECT button from 1 to 5 to select that Envelope

... or press the ENV X button **again** to select the Envelope that was selected previously – the one displayed under CURRENT PAGE. This feature adds speed when selecting an Envelope to be worked with.

Once you have selected an Envelope, it will be displayed in PAGE MODIFIER. At this point you are able to program its parameters. You may also switch among the five Envelopes with the X select buttons if none of the Lower display functions are underlined.

Basic *ENV X* Operation
Since the five Envelopes are identical, their parameters are covered together in the following discussion:

Page 1

DELAY   This is the time that the Envelope will wait before starting its cycle. Amount 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.

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 the *AMP* parameter). Range: **0** to **63**. 0 = instant *ATTACK*. 63 is the maximum Attack time.

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 the Evelope's output to decrease to the level set by *SUSTAIN*. Range: **0** to **63**. 0 = instant *DECAY*. 63 is the maximum Decay time.

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 still 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.

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.

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 X range is from 0 to 63 where 0 returns the Envelope instantly to its 0 level and 63 is the maximum Release time.

AMP   "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 **AMP** parameter. In other words, **AMP** determines how much the Envelope as a modulation source will affect its destination. Range is from **0 to 63**.

Page 2

Envelope MODES
We already know that when an Envelope receives a trigger, it will start its cycle. How the Envelope completes its cycle is selected from the three parameters displayed in the top window of PAGE MODIFIER.

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 its normal mode needs a Gate to complete its cycle. **If none of the three parameters in the top display is selected, the Envelope is said to be in its normal operating mode.**

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. Variations in this simple operating mode are selected from the following parameters:

RESET   This mode causes the Envelope to start its cycle from the very beginning every time the Voice receives a new trigger. This means if an Envelope that is in mid-cycle receives a new trigger, it will start all over again from 0 output level the moment the new trigger is received. This is true for all triggers – from keys being played, External Triggers or LFO triggers. In the normal mode, if an Envelope receives a new trigger at some point in its cycle, it will start over but not from 0. It will continue from the point in its cycle where the new trigger was received at its current output level set by **AMP**.

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 sufficent to complete the cycle. *FREERUN* therefore, provides the Envelope with a Gate even though the keys are let go.
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 in the normal operating mode: Releasing the keys during the *ATTACK* stage, for instance, causes the Envelope to go immediately to its *RELEASE* stage.

You can select any one or any combination of two or three Modes for a variety of Envelope operations. As an example, if all three are selected, this combines the action of *DADR* and *FREERUN* which will *RESET* whenever the Voice gets a new trigger. The *DADR* mode will complete its cycle (*DADR* is Gated by the action of *FREERUN*) even if the keys are released before the *DECAY* stage is finished – and will *RESET* from 0 if the Voice is played again in mid-cycle.

Trigger MODES
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 using the MATRIX-12's Keyboard (or MIDI IN from a Master controller) as the source to start the Envelopes' cycles or External triggers to accomplish this. There are several types of Triggers for this purpose:

Keyboard Triggers
The following two Modes pertain to playing the MATRIX-12 from its own Keyboard or from MIDI IN from a Master controller:

SINGLE	"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. This means that, when the ZONE for the Voices in Unison or controlled by a single MIDI Channel, playing Staccato generates new triggers and playing Legato does not.
MULTI	"Multiple Trigger" – The Envelope will be activated any time a new key is played. Playing Staccato or Legato will always generate a new trigger. Keep in mind that this is **per Voice** – the Multi Trigger will be generated on a Voice that is already playing when this same Voice is played again.

External Triggers
In the MATRIX-12, External Triggering can take the place of the Keyboard when driving the Envelopes. The trigger source is plugged into the TRIGGER IN jack on the back panel using a standard guitar cord: a 2-conductor, shieded cable with a 1/4" plug on the end that goes into the MATRIX-12.

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Suitable trigger sources for this purpose can be a footswitch or any trigger source – such as a drum machine or a sequencer – that provides a DC pulse of at least 20 ms. (milliseconds) in width and an amplitude of +1 to +10 volts.

The External Trigger modes operate the same as their Keyboard Trigger counterparts. In other words, External Triggers can either be *SINGLE* or *MULTI*, depending on which one is selected.

EXTRIG	**"External Trigger"** – When selected, the Envelope will start its cycle only when it receives a trigger signal from an external source plugged into the TRIGGER IN jack on the MATRIX-12's back panel.
GATED	**"Gated External Trigger"** – When this is selected, the external trigger source will trigger the Envelope only when the Envelope is gated. In other words, the Envelope will only recognize a trigger from the external source when keys are played. If this is not selected, the Envelope will be triggered each time it recieves an external trigger whether or not keys are being played.

LFO Triggers
The Envelopes can also be triggered by a third source, the LFOs. This option can be used at the same time with Keyboard but not External Triggering. This parameter allows you to use an LFO or VIB (the MATRIX-12's Vibrato LFO) as a trigger source in order to synchronize the Envelopes' cycles with an LFO's cycle.

The Envelopes normally operate with no LFO triggering.

LFOTRIG	When this is selected, the Envelope will now be triggered by an LFO. Knob #5 selectes which of the MATRIX-12's five LFOs or VIB will be used to trigger the Envelope. 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 in the LFO Primary Page *RETRIG*. (See Pages 135 and 137.)
GATED	**"Gated LFO Trigger"** When this is selected, the selected LFO or VIB will trigger the Envelope only when the Envelope is Gated. If this is not selected, the Envelope will be continually triggered because the LFO is always running.

LFO X

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 five LFOs in the MATRIX-12 each contain seven types of waveforms to be used for modulation. The first four are called "periodic" (*TRIANGLE*, *UP SAW*, *DOWN SAW* and *SQUARE*) because they repeat in even patterns or cycles. The next two are called "aperiodic" (*RANDOM* and *NOISE*) because they are basically disorderly patterns that do not repeat with any regularity. The seventh choice "*SAMPLE*" is used to sample any one of the other Modulation Sources and uses the result of this sampling as its waveform.

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Selecting an LFO

Pressing the LFO X button in the SINGLE/MULTI PATCH PAGE SELECT section will give the display:

SELECT LFO FROM 1 TO 5

While this message is being displayed, the LED in X SELECT will flash on and off, prompting you to select one of the five available Low Frequency Oscillators. The CURRENT PAGE section of the PROGRAMMER display will show the LFO that was last selected. You may then...

... press an X SELECT button from 1 to 5 to select that LFO

... or press the LFO X button **again** to select the LFO that was selected previously – the one displayed under CURRENT PAGE. This feature adds speed when selecting an LFO to be worked with.

Once you have selected an LFO, it will be displayed in PAGE MODIFIER. At this point you are able to program its parameters. You may also switch among the five LFOs with the X SELECT buttons if none of the Lower display functions are underlined.

The MATRIX-12 contains **five** independent LFOs labeled LFO1 through LFO5. Since they are identical, we'll cover their parameters together.

SPEED   This parameter sets the LFOs' frequency or rate. Range is from 0 to 63 where 0 represents the LFOs' slowest speed and 63 the fastest.

WAVE   This parameter allows you to select the waveform of the LFO that will be used as the modulation source.

Periodic Waveforms

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.

UP SAW – "Up or Positive Sawtooth"
A variation of *TRIANGLE* where the rising (positive) portion of the wave gradually reaches its peak then drops off sharply.

DOWN SAW – "Down or Negative Sawtooth"
An inverted variation of *UP SAW* where the wave starts at its peak and gradually decreases.

SQUARE – "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
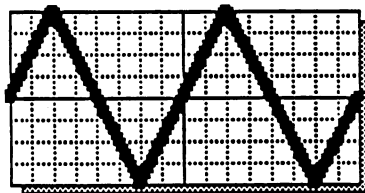
Triangle Wave

Square Wave
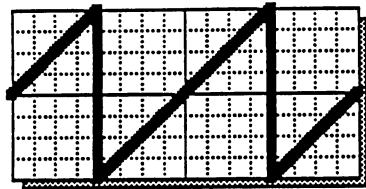
Up Saw Wave

Down Saw Wave

"plateau" portions that give the wave symmetry. This waveform, therefore, provides sharp high-low modulation and is commonly used to produce a "trill".

Aperiodic Waveforms

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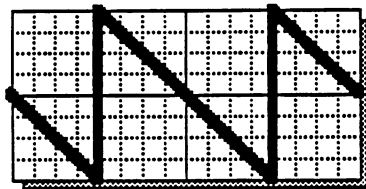
NOISE – "Noise Modulation"
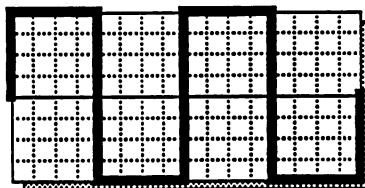This is also an irregular modulation signal in many respects similar to ***RANDOM*** but sounds like Random Modulation at a much higher speed. As a result, using this wave gives a noisy, harsh effect to the sound, hence the name.

The ***SPEED*** control has no effect for these two waveforms.
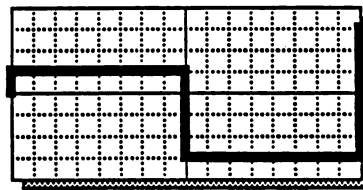
Random (typical)
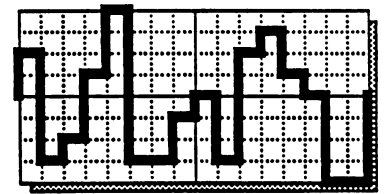
Noise (typical)

Special Modulation

SAMPLE – "Sampled Modulation"
When this is selected, the LFO samples another modulation source and uses that as its waveform. The ***SPEED*** parameter controls how often this source is sampled (the "sample rate"). The source to be sampled can be any of the MATRIX-12's 27 Sources, selected with Knob #3.

Sampling this wave,
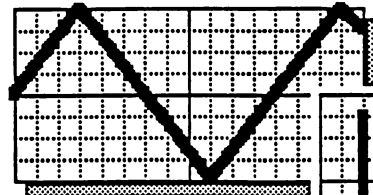
at this rate,
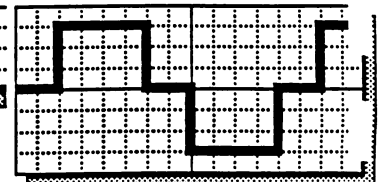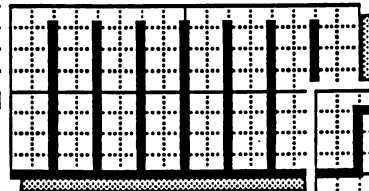
gives this result.

As with the *INPUT* parameter for TRACK X and *LAG IN*, the 27 modulation sources that you can select are (in order):

KEYBD	the MATRIX-12's Keyboard scaling
LAG	the response of the Lag Processor
VEL	Velocity response
RVEL	Release Velocity response
PRESS	keyboard Pressure response
TRK 1	the curve of Tracking Generator #1
TRK 2	the curve of Tracking Generator #2
TRK 3	the curve of Tracking Generator #3
RMP1	the shape of Ramp Generator #1
RMP2	the shape of Ramp Generator #2
RMP3	the shape of Ramp Generator #3
RMP4	the shape of Ramp Generator #4
ENV1	the shape of Envelope #1
ENV2	the shape of Envelope #2
ENV3	the shape of Envelope #3
ENV4	the shape of Envelope #4
ENV5	the shape of Envelope #5
PED1	the response of Pedal #1
PED2	the response of Pedal #2
LFO1	the waveform of LFO #1
LFO2	the waveform of LFO #2
LFO3	the waveform of LFO #3
LFO4	the waveform of LFO #4
LFO5	the waveform of LFO #5
VIB	the waveform of the Vibrato LFO
LEV1	the response of Lever #1
LEV2	the response of Lever #2

*RETRIG*   "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 Externally) is received.

The LFO is selected to be retriggered in Page 2 *RETRIG MODE*. You are able to set the actual Retrig Point in this parameter. Remember that if Page 2 *RETRIG MODE* is set to *OFF*, this mode will not be operative.

Range is from 0 to 63 where 0 sets the retrigger point to be at the beginning of its cycle, 31 the wave's half-way point, and 63 sets it at the wave's end point.

AMP   "Amplitude" This sets the output level of the LFO. "Output level" in this case refers to the "intensity" or "depth" of the LFO's modulation. The higher the Amount value number, the wider the waveform's sweep or "depth" as it is also called.

Range is from 0 to 63. A setting of 0 represents no LFO output and effectively turns the LFO off. 63 is, of course, the maximum. An important note must be made here to emphasize that this parameter must be turned up as well as the amount at the Modulation Destination for the LFO to have an effect. This aspect of routing modulation is covered in detail in **Part 4: MATRIX MODULATION.**

Page 2   *LAG*

Just as Lag smooths out sharp or instantaneous transitions between notes played on the Keyboard, Lagging the LFO rounds off any sharp transitions in the selected waveform. Thus, a separate *LAG* control with a pre-programmed amount contour is provided for each LFO. Because the amount of Lag is preset in the MATRIX-12's operating software, it is simply turned ON (underlined) or OFF (de-underlined) in this parameter. If a greater amount of *LAG* is desired, it can be achieved by selecting the LFO as the *LAG IN* input in the FM/LAG Page and adjusting the rate as needed.

A Word About LFO *LAG*
The Lag produced in the *FM/LAG* Page is produced in the MATRIX-12's software (in other words, it is digital). On the other hand, LFO Lag is accomplished in hardware (it is analog). The significance of this design consideration is that if a Lagged LFO is routed to a **hardware** destination (the FREQ or PW of VCO 1, the FREQ or PW of VCO2, the FM AMP, the FREQ or RES of the VCF, VCA 1 or VCA 2) the effect of the LFO Lag will be heard as normal.

However, if a Lagged LFO is routed to a **software** destination (any of the remaining 38 Modulation Destinations), LFO Lag will <u>not</u> be heard. To achieve LFO Lag routed to a software destination, select the desired LFO as the *INPUT* to the Lag Processor then route the *LAG* to the desired Destination.

The overall audible effect of *LAG* in the LFO Pages depends upon the waveform selected in Page 1. You will notice that *LAG* will seem to have little effect on a *TRIANGLE* wave as there are no sharp transitions to its waveform. Applying *LAG* to the *SQUARE* wave, on the other hand, has the most audible effect because the transitions of its waveform are the sharpest at 90° angles.
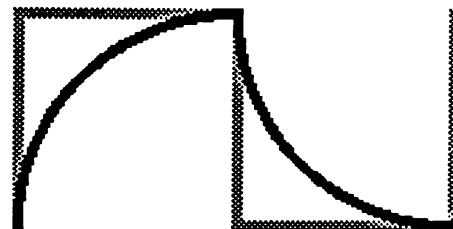
Square Wave before and after Lag Processor

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 on the previous page shows a "before" and "after" effect of *LAG* on a Square wave. The sharp falling edge of *UP SAW* and the rising edge of *DOWN SAW* are affected by *LAG* as well.

RETRIG MODE   The LFOs, like the Envelopes and Ramps, can be triggered by the Keyboard or by an External source. As we mentioned in Page 1 parameter *RETRIG*, 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.

SINGLE "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.

MULTI "Multiple Trigger"
The LFO will retrigger regardless of the playing style.

EXTRIG "External Single Trigger"
The LFO will retrigger only when a trigger pulse is received from an external source plugged into the TRIGGER IN jack.

Stopping an Envelope
Pressing the TUNE PAGE button will cut short any envelopes in progress. This is also called the Envelopes' "Manual Reset".

RAMP X

The four Ramp Generators in the MATRIX-12 produce a type of modulation that can be best described as a smooth, linear transition that resembles the Attack portion of an Envelope. Ramps operate much the same as the Envelopes in that they require a **trigger** to work. When a Ramp gets a trigger (that "go" signal we mentioned before in the ENV X chapter) from the Keyboard, one of the LFOs or externally from the TRIGGER IN input, it begins its cycle and waits for another trigger to start again.

Using the RAMPS
The operation of a Ramp is simple. When used as a modulation source, the Ramp starts is cycle when it receives a trigger. 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.

One of the most common uses of the Ramp is for Vibrato delay. If an LFO is being used for vibrato, a Ramp can be used to gradually bring it in. This is accomplished by using the Ramp as the Modulation Source, assigning it to the *AMP* of an LFO. Or, if used with a negative Amount 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.

Selecting a RAMP

Pressing the RAMP X button in the SINGLE/MULTI PATCH PAGE SELECT section will give the display:

SELECT RAMP FROM 1 TO 4

While this message is being displayed, the LED in X SELECT will flash on and off, prompting you to select one of the four available Ramps. The CURRENT PAGE section of the PROGRAMMER display will show the Ramp that was last selected. You may then...

... press an X SELECT button from 1 to 4 to select that Ramp

... or press the RAMP X button **again** to select the Ramp that was selected previously – the one displayed under CURRENT PAGE. This feature adds speed when selecting an Ramp to be worked with.

Once you have selected a Ramp, it will be displayed in PAGE MODIFIER. At this point you are able to adjust its Page 1 *RATE* parameter – its remaining parameters exist in Page 2. You may also switch among the four Ramps with the X select buttons if the Lower display *RATE* value function is not underlined.

Page 1   *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-12's own Keyboard, MIDI IN from the Master controller or an External Trigger (input to TRIGGER IN on the back panel) serve as trigger sources for the Ramps. The time that it takes to complete one cycle is set by the *RATE* control. Amount value range is **0** to **63** where 0 is an instantaneous transition (no time) and 63 is the maximum.

"RATE" = Ramp Time
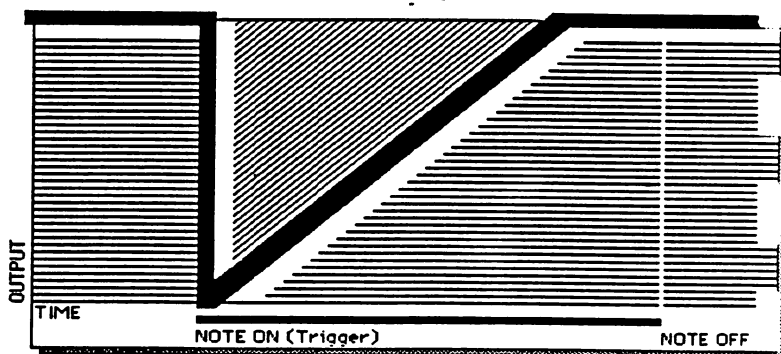
Page 2

RAMP Trigger Modes

The Ramp starts its cycle when it receives a trigger signal. There are five types of triggering available with the Ramps:

SINGLE   **"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

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play the same Voice again. Single Triggering is best exemplified when the MATRIX-12 is in Unison ("UNI-") keyboard mode. See the function of *MODE* in MASTER PAGE *ZONE*. Single Triggering is also illustrated when using MIDI MONO (see also MASTER PAGE *VASSIGN*). Playing Staccato generates new triggers and playing Legato does not.

MULTI   "Multiple Trigger" The Ramp will be activated any time a new key is played. Playing Staccato or Legato will always generate new triggers. This function operates in the polyphonic or unison Keyboard Modes (again, see MASTER PAGE *ZONE*).

EXTRIG   "External Trigger" The Ramp will be activated when a trigger pulse is received from an external source (such as a drum machine or a footswitch). This permits the timing of the Ramps to be synchronized with other instruments in your system. The triggering of the Ramps externally operates much the same as with Keyboard triggers. If *SINGLE* or *MULTI* is selected, the External Trigger will act accordingly.

LFOTRIG   "LFO Trigger" This enables any one of the MATRIX-12's Low Frequency Oscillators (LFO) to trigger the Ramp, in order to synchronize the Ramp cycle with the LFO's cycle, or simply as a programmable periodic Ramp modulation. If selected, the adjacent display permits you to select among the five LFO's plus VIB to be used to trigger the Ramp. The triggering of the Ramps from an LFO operates much the same as with Keyboard triggers. If *SINGLE* or *MULTI* is selected, the LFO Trigger will act accordingly.

GATED   "Gated Trigger" If the Ramp is being triggered Externally or from the LFOs, *GATED* appears in the display. If selected, this causes the MATRIX-12 to recognize the triggers only when keys are being played. Otherwise, the Ramp will run whenever a trigger is received as in *EXTRIG* or *LFOTRIG* – whether keys are being played or not.

SINGLE PATCH PAGES

Part 3: Miscellaneous Parameters
NAME and MODULATION ROUTINGS

NAME   The NAME Page of the MATRIX-12's SINGLE PATCH PAGE SELECT Section actually contains two Sub-Pages – one for naming the Patch and the other, titled MODULATION ROUTINGS, provides a list of the modulation Sources and Destinations used in the Patch.

NAME   When selected, this Sub-Page permits you to give this SINGLE Patch an eight-character name. When the current NAME is displayed, it will be underlined and the character

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that is able to be changed will flash its underline segment on and off. This flashing segment is called the **CURSOR** and Knob #1 permits you to move the cursor back and forth to select the character to be changed.

Once you have located the character to be changed, the **CHARACTER** Knob #3 allows you to select the desired character for that segment. The MATRIX-12 provides the 26 letters of the English Alphabet, numerals 0 through 9, a BLANK character for spaces and 27 miscellaneous characters including various punctuation marks.

MODULATION
ROUTINGS

Since the modulation capabilities of the MATRIX-12 are so extensive, it is very likely that you could lose track of all the Modulation Pages that were used in creating the Patch. This Sub-Page is provided to assist you in examining the current modulations of any Patch in the form of a summary list.

MODULATION ROUTINGS

MOD	SOURCE	AMOUNT	DEST

☐ ☐ ☐ ☐ ☐ ☐

17	R VEL	-54	ENV2 REL

☐ ☐ ☐ ☐ ☐ ☐

◎ ◎ ◎ ◎ ◎ ◎

When **MODULATION ROUTINGS** is selected, the PAGE MODIFIER will display a list of the MATRIX MODULATION routings in the Patch. Each routing is indexed under the **MOD** heading and turning Knob #1 counter-clockwise will permit you to run through the list in descending order. Each MATRIX MOD Page will be displayed showing its **SOURCE**, **AMOUNT** and **DEST**.

You are also permitted to edit the current modulations while in this Page. Although the **SOURCE** cannot be changed and new Modulation Pages cannot be created, you are premitted to change the **AMOUNT** (using Knob #4) and **DEST** (using Knob #5) of the current Mod Pages as you need. You can also remove a modulation by pressing and holding the button beneath the Source display in the Lower window and pressing CLEAR in X SELECT. If you use this method to remove **all** the modulations, the Upper Display will show the message:

NO MODULATIONS IN THIS PATCH

Part 4: MATRIX MODULATION

As we have just seen in the SINGLE/MULTI PATCH PAGE SELECT section, there are a number of pre-determined Modulation Routings designed into each of the eight Patch Editing Sub-Pages – 12 to be exact. These 12 "hardwired" (or permanent) modulations were chosen because of their usefulness and also because they are the most commonly required routings in performance synthesizers like the MATRIX-12. For reference, we've listed them below:

VCO 1 :	**KEYBD** **LAG** **LEV1** **VIB**
VCO 2:	**KEYBD** **LAG** **LEV1** **VIB**
VCF/VCA:	**KEYBD** **LAG** **LEV1** **VIB**

There will be times, however, that these permanent routings do not offer the kind of modulation that you really need to do the job. That's why we've created the MATRIX MODULATION System. This system permits taking any one of the MATRIX-12's 27 modulation Sources (some of them we already discovered in the SINGLE/ MULTI PATCH PAGE SELECT Sub-Pages) and routing it to any of the 47 available destinations. That's 1,269 new discrete combinations, not even counting multiple-modulation chains. You are permitted to create 20 Matrix Modulation™ Pages that make the possibilities practically limitless†.

With the 12 permanent and 20 "custom" Modulation Routings available, you have an unprecedented total of 32 modulations per patch – and they are all programmable. You will soon find that the MATRIX-12 gives you incredible flexibility when programming modulation in a patch.

Matrix Modulation Theory
What exactly is modulation? To modulate means to "change". Modulation is simply chaging something by something else. In the strictest use of the term, even the MATRIX-12's Keyboard is a source of modulation. We've already seen how it can change the pitch of the VCOs and the VCF Frequency (*KEYBD* select in Page 2 of the VCOs and VCF/VCA). Using Matrix Modulation, the Keyboard can be used to change 44 other parameters as well.

† For those of you interested in the mathematics behind this, the actual number of possibilities is 4.1471×10^{43}. That's just over 40 million billion trillion quadrillion combinations in which no two ever repeat and does not take into consideration different VALUE X amounts. If we include all the possible VALUE X amounts in our equation, the number comes to 5.7368×10^{85} with no two combinations ever repeating. Have fun.

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The 12 permanent modulations are simply ON/OFF functions and their amounts are pre-set in the MATRIX-12's permanent memory. The 20 Matrix Mods, however, are completely variable – all having VALUE X ranges from –63 to +63 to acheive positive (normal) and negative (inverted) effects. The numbers along these ranges 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.

For purposes of reference, and for the discussion to follow, the table below lists the 47 possible Destinations that can be modulated in the MATRIX-12:

VCO 1	*FREQ*
	PW
	VOL
VCO 2	*FREQ*
	PW
	VOL
VCF/VCA	*FREQ*
	RES
	VCA 1
	VCA 2
FM/LAG	*FM AMP*
	LAG RATE
TRACK X	None
ENV X	*DELAY*
	ATTACK
	DECAY
	RELEASE
	AMP

5 Envelopes X **5** Destinations per Envelope = **25** total

LFO X	*SPEED*
	AMP

5 LFOs X **2** Destinations per LFO = **10** total

RAMP X	None

Programmimg Modulation
Modulation programming in the MATRIX-12 is "Destination oriented". This means that you select the Destination that you want to modulate **first**, then assign the modulation Source to that selected Destination and adjust the VALUE X amount.

Selecting a Destination is accomplished simply by pressing the switch directly beneath its name in the PAGE MODIFIER display. The PAGE MODIFIER display will then immediately switch to show what Source – or Sources – is already modulating this particular parameter, or will display the message...

_ _ _ _ _ *SELECT MODULATION SOURCE*

... if the Destination is not being modulated by anything yet. You are now able to select any one of the MATRIX-12's 27 Sources to modulate the selected Destination parameter.

As an example, we will modulate the Frequency of VCO 2 by LFO 4. To start things off, you may select any one of the MATRIX-12's SINGLE Patches (remember – Patch editing is performed on SINGLE Patches only) or you can use the *OBERHEIM* Basic Patch. For simplicity, however, we will assume that the Basic Patch is to be used so press and hold STORE, press CLEAR and follow the procedure below:

1. Press the VCO 2 button.

2. Press the button beneath *FREQ* in the Upper PAGE MODIFIER display.

3. _ _ _ _ _ *SELECT MODULATION SOURCE* will be displayed. Or for any Patch that has this particular parameter modulated already, the display will show what the current modulations are and there will be a blank underline _ _ _ _ _ to the right of the modulation name(s). In either case, we want to replace this blank space with the name of the Source that will modulate this Destination parameter.

4. The LED next to MODULATION SOURCE will flash off and on to indicate that this section is active. Press the LFO X button in the MODULATION SOURCE/X SELECT section. The blank underline will be replaced by the *LFO X* display with the *X* flashing off and on, prompting you to select **which** LFO.

5. The LED next to X SELECT will now flash indicating that this section is now active. Press the number 4 button to select LFO 4.

6. The Lower PAGE MODIFIER Display will give you a *0* VALUE X amount as a default. Use the Knob directly beneath this display, or the buttons in X SELECT, to select the amount of LFO 4 that you want to modulate the Frequency of VCO 2.

7. Play a key on the MATRIX-12's Keyboard. You will now hear VCO 2's Frequency (pitch) being modulated by LFO 4.

8. Using the LFO X button in the SINGLE/MULTI PATCH PAGE SELECT section, you can select LFO 4 to adjust its *SPEED, WAVE* or any of its other parameters to obtain the precise type of modulation desired.

We have just created what is referred to as a "**Modulation Page**". If you press the PAGE 2 button, PAGE MODIFIER will return to the original VCO 2 Page 1 display. Notice that *FREQ* now has a little dot next to it (*FREQ.*) indicating that it is being modulated. This is your visual clue that a Destination is being modulated and is true for **all** Modulation Pages.

The Ground Rules of Modulation

• You are permitted to use up to six modulation Sources per Destination. There are six spaces in the display in any given Modulation Page available for Source assignments.

• If a Destination is being modulated by two or more Sources, their effects on the Destination are **summed together**. This means that the effect of one Source used alone may be interferred with or even added to by the introduction of another Source in the same Modulation Page. This situation may be even further enhanced when positve amounts are used on some of the Sources and negative amounts are used on the others. Keep experimenting!

• 20 Modulation Pages can be created per SINGLE Patch **only**. This is due to the total computing capability of the MATRIX-12's Voice Processor. If you lose track of the number of Modulation Pages in a particuler Patch and attempt to add a 21st Mod Page, the Upper PAGE MODIFIER Display will inform you of this by displaying the message:

MAXIMUM OF 20 MODULATIONS PER VOICE

• In theory, although not practical, you can take any one of the 27 Sources and route it to all 20 possible Destinations. In contrast, you can also have six different Sources modulate the same Destination. Keep experimenting – you're only limited by your own imagination.

• The range of a modulation may in some cases not be enough to do the job. No problem. Just add the same Source again in the Mod Page and adjust VALUE X until the required range is achieved. If you still need more just do it again. Also, since the same Source can be used several times, each VALUE X amount can be used for "fine tuning": a Source can be used to provide very fine increments of change if necessary. Try it.

• When modulating a Destination that already has an initial amount of a high value (above **50** or so) by a **positive** Source value, it is recommended that this initial value be set to a lower amount. This is suggested so that the modulation has enough "headroom" to be effective.

If, for example, the Destination's initial amount is **63**, in many cases the effect of positive modulation may not be heard because the Destination's amount is already at its maximum to begin with. VCA 1 in most Patches is a good example of this. Some experimentation is required depending greatly on the nature of the Modulation Page you've created.

- Conversely, when modulating a Destination that has an initial amount of a lower (below **20** or so) amount value by a **negative** Source value, it is recommended that this initial value be set to a higher amount. If, for example, the Destination's initial amount is **10**, in many cases the effect of negative modulation may not be heard because the Destination's amount is already near its minimum to begin with. Again, some experimentation is required.

- 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-12's modulations are inter-related and editing one parameter could possibly affect another indirectly.

- All Matrix Modulation routings are programmable per individual SINGLE Patch and must be written into memory with the STORE button.

USING MATRIX MODULATION

It should be obvious by now that Matrix Modulation can provide seemingly endless possibilities for programming modulation in a Patch, from very subtle nuances to the most dramatic changes. The ensuing discussions focus on the most commonly required modulations and how they are achieved. We will also make suggestions on occasion that will allow you to see how Matrix Modulation provides the flexibility to obtain modulations you never thought were possible. In all cases, we suggest using the *OBERHEIM* Basic Patch for experimentation.

Once you have selected the Destination that you intend to modulate, the MODULATION SOURCE/X SELECT section of the front Panel is used to select and define the Modulation Source. In addition to selecting the Source and giving it an amount as in the previous example, the X SELECT functions provide additional control parameters:

"+" and "–" are used to invert the Amount value in a Modulation Page. Since the MATRIX-12 permits positive **and** negative modulation amounts, these buttons permit switching from plus to minus and back again easily.

QUANTIZE is used in Modulation to change the otherwize smooth transitions of the modulation into steps. Quantizing is achieved by selecting the Modulation Page, then selecting the VALUE X amount in the Lower Display so that the number becomes underlined. Pressing QUANTIZE in X SELECT will quantize the modulation and will indicate this by displaying the letter "*Q*" next to the amount number.

CLEAR is a multi-purpose switch that permits removing modulations from a Patch or resetting VALUE X amounts to their default settings.

To remove a Modulation, simply press and hold the button beneath its name in the Upper Display of the Modulation Page. While you are holding this button, press CLEAR and the modulation will be removed from the Patch and will disappear from the display.

To reset an amount setting, simply select the VALUE X number in the Lower PAGE MODIFIER display and press CLEAR. The display will change to show its default setting. In most cases the new number displayed will be **0**, but you can expect to see a wide variety of defaults depending on what parameter you are clearing. For example, you can use CLEAR to reset the five POINTs of a Tracking Generator: **0, 15, 31, 47** and **63**.

In the section covering the PROGRAMMER, we also mentioned that pressing CLEAR while holding STORE recalls the MATRIX-12's Basic Patch called *OBERHEIM*. This action is actually "clearing" the Patch and is called "Patch Initialize" on many other synthesizers.

VELOCITY and RELEASE VELOCITY

"Velocity" (*VEL*) refers to making dynamic changes in the sound by striking the keys on the MATRIX-12's keyboard rapidly or slowly (playing the keys harder or softer). "Release Velocity" (*RVEL*) is the complimentary opposite of Velocity: modulation is achieved depending on the speed in which keys are **let go after** being played.

Velocity modulation is also available when controlling the synthesizer from MIDI IN. This assumes that the Master controller that you are using is Velocity- responsive. If it is not, MIDI VELOCITY will not work. You should also check the Owner's Manual to find out if your MIDI Master provides Release Velocity as well.

Creating Volume Dynamics with VELOCITY
The most common application of Velocity is its use in creating loudness dynamics.

In the MATRIX-12, VCA 1 is the first of two circuits in the Patch that concern volume before the sound is fed to the synthesizer's AUDIO OUTPUTS. Its normal setting is **63** because it feeds VCA 2 (commonly controlled by an Envelope to provide loudness articulation). Velocity is best used when applied to VCA 1. In this particular application, Velocity is used to play the patch **louder** or **quieter**:

Option #1
1. Select the VCF/VCA Sub-Page and set its *VCA1* amount to about **25**.

2. Press the switch beneath *VCA1* in the Upper PAGE MODIFIER Display and assign *VEL* as the Source.

VALUE X: A setting of **0** indicates no effect by Velocity. When positive Values are used, notes played quickly will increase volume and slower notes will not. When negative Values are used and the *VCA 1* amount is at **63**, the opposite effect occurs: volume decreases the faster you play notes and slow playing keeps the volume close to maximum.

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Option #2

A second alternative which may work just as well – and remember, you're still experimenting – is to apply *VEL* to the *AMP* of ENV 2 (which is controlling VCA 2) instead of VCA 1.

Select ENV 2 and set its *AMP* amount to about 25. VCA 2 is the last circuit in the Patch before the sound is fed to the synthesizer's AUDIO OUTPUTS. Its normal setting is 0 because it is almost always modulated by ENV 2 – a common Source for providing loudness articulation. *VEL* may be applied to the *AMP* of ENV 2 but be careful. Interference from other Sources, such as Volume Pedal control by PEDAL 1, may make Velocity ineffective.

How "Volume" and "Velocity" Work

Velocity and the VCA parameters work hand-in-hand and, depending on their initial settings and the routings of other modulations in the Patch. If the Value of VCA 1 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, VCA1 is set as loud as it will go and Velocity cannot make it any louder. Also, if VCA1 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.

Velocity performance also relies on the amount values you give it for "Scale" and "Sensitivity" (see MASTER PAGE MISC. *VELOCITY SCALE* and *SENSITIVITY*). Using extremes in the available Values may yield unusable results. For example, setting VCA 1 to 0 and +63 for VELOCITY in the Modulation Page will be almost useless if the Sensitivity is set to maximum. The resulting dynamic range may be too wide to be of any real use.

Brightness Modulation by VELOCITY

Velocity is also commonly used to increase the "brightness" of the Patch. It is a common occurance with acoustic instruments that harder playing not only produces more volume but a brighter sound as well. This is accomplished in synthesizers like the MATRIX-12 by applying Velocity to the VCF *FREQ* parameter:

Option #1

1. Select the VCF/VCA Sub-Page and set *FREQ* to a VALUE X between 30 and 60. When adding Velocity to an existing Patch, reduce its initial *FREQ* amount by approximately 1/3 to 1/2, for best results.

2. Press the button beneath *FREQ* in the display. Apply *VEL* as a Modulation Source. *VEL* will appear in the display next to *ENV 1*. Set the VALUE X amount of *VEL* to +63 as a starting point.

This particular example shows how Velocity can modulate the VCF Frequency independent of ENV 1. As mentioned in the **Ground Rules**, *VEL* and *ENV 1* are summed together in this case. Another approach would be to scale ENV 1 *AMP* by Velocity as we did previously in creating volume dynamics with Velocity:

Option #2
1. Select ENV 1 and set its *AMP* amount to about **25**.

2. *VEL* may now be applied to the *AMP* of ENV 1. Start with a setting of **+63**.

The amount of Velocity may be adjusted to achieve the proper effect. You should also remember that the initial *AMP* setting of 25 can be adjusted to obtain the precise tonal response that you want.

Portamento and LAG Modulation by VELOCITY
The *LAG RATE* can be modulated by Velocity. When this parameter is used, the speed in which notes are played from the MATRIX-12's Keyboard will change the Rate. VALUE X range is from –63 to +63 where a setting of 0 indicates no effect by Velocity. Using positive amounts slows the *LAG RATE* as keys are played faster to a maximum set by +63. Using negative amounts speeds up the Rate as keys are played faster. Remember that if you are playing the MATRIX-12 from MIDI IN and your Master controller is not Velocity responsive, this parameter will not operate.

Envelope Modulation by VELOCITY and RELEASE VELOCITY

EXAMPLE #1
As outlined in previous examples, the *AMP* of the Envelopes can be increased or decreased by the speed (or how "hard") that you play notes on the MATRIX-12's Keyboard. It is important to understand, as in our example, that the parameter being modulated by the Envelope will be the one that will be finally affected by Velocity. This is one of the exciting, and often confusing, features of Matrix Modulation: when a Source is modulating a Destination parameter which is in turn modulating a second Destination.

VALUE X: **0** indicates no effect on the output level of the Envelope by *VEL*. When positive Values are used, the Amplitude is increased as keys are played faster above the Envelope's *AMP* initial level. Remember that the higher you set the *AMP*, 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 of the ENV the faster keys are played. A Value of –63 sets the maximum negative amount.

EXAMPLE #2
Velocity and Release Velocity can also be used to change the **timing** of the Envelopes. This is a very useful performance feature in that the articulation of the VCF and the VCA by the Envelopes can be changed **depending on your playing style** *as you are playing*.

A common and useful application of this is to modulate the *ATTACK* stage of the VCF Frequency Envelope and the VCA 2 Envelope at the same time by a negative *VEL* amount. As you play harder, the negative modulation **shortens** the *ATTACK* time, adding "punch" to the sound. Positive amounts will add to the Attack time, making it longer the harder you play.

Release Velocity can be applied simultaneously in negative amounts to the *RELEASE* times of these same Envelopes. In this instance, *R VEL* will **shorten** the Release time of the Envelope(s) the faster the Keys are released. The speed in which keys are released will determine how quickly the sound will be cut off.

PRESSURE (After-Touch)

VCF Frequency Modulation by PRESSURE
Another way of modulating the Filter is through the use of keyboard Pressure or After-Touch as it is referred to by other manufacturers. This feature is activated by playing a note or chord on the MATRIX-12's Keyboard and pressing into the keys. If you are playing the MATRIX-12 from MIDI IN, the Master controller that you are using must have Pressure or After-Touch. If it does not, this MIDI PRESSURE will not work.

In this application, Pressure is used to modulate VCF *FREQ*. Remember to change the initial VALUE X amount of *FREQ* to a setting that is lower than its programmed amount.

VALUE X range: **–63** to **+63**. A setting of **0** means that keyboard *PRESSR* has no effect. Using a positive Value causes *PRESSR* to "open" the Filter and thus adds more brightness to the sound. Using a negative Value "closes" the Filter from its initial amount and causes the sound to become "dull" or muffled.

VCA Modulation by PRESSURE
Pressure can also be applied to either one of the VCAs to obtain a change in the Patch's loudness. Try using *PRESSR* to modulate VCA 1, setting VCA 1's initial amount to about **40**. Or, as with Velocity, apply Pressure to the *AMP* of the Envelope (in most cases ENV 2) that is controlling VCA 2. In this instance, set the initial amount of the Envelope's Amplitude to around **35**. If a much lower amount is used, Pressure will have to be used all the time just to hear the Patch.

VALUE X range: **–63** to **+63**. A setting of **0** means that keyboard *PRESSR* has no effect. Using a positive Value causes *PRESSR* to "open" the VCA and thus adds more loudness to the sound. Using a negative Value "closes" the VCA from its initial amount and causes the sound to decrease in loudness.

LFO Amount Modulation by PRESSURE
The initial amount of the LFOs can be increased or decreased by modulating it by Keyboard *PRESSR* – pressing into the MATRIX-12's keys after notes are played will add LFO modulation similar to Vibrato but with a potentially wider range.

In this application, *PRESSR* is used to modulate the *AMP* of an LFO. Just remember to set the initial *AMP* amount of the LFO to **0**. Then apply the LFO to the *FREQ* of VCO 1, VCO 2 or both and start with an amount of about **+50**. This is yet another example of dual-level Matrix Modulation: Pressure is modulating an LFO which is modulating one or both of the VCOs.

VALUE X range is from **–63** to **+63** of Pressure affecting the LFO *AMP*. Using positive VALUE X numbers increase the LFO amount when Pressure is added. Negative amounts decrease LFO modulation when the its initial amount is set to a high value and Pressure is added. **0** setting represents no effect by *PRESSR*.

LFO *SPEED* Modulation by PRESSURE

The initial speed of the LFOs can be increased or decreased by modulating it by Keyboard *PRESSR* – pressing into the MATRIX-12's keys after the notes are played will change the speed of LFO modulation.

In this application, *PRESSR* is applied in the Modulation Page to the *SPEED* of an LFO. Just remember to set the initial *SPEED* amount of the LFO to a relatively slow rate to begin with.

VALUE X range is from –63 to +63 of Pressure affecting the LFO *SPEED*. Using positive VALUES increase the LFO speed when Pressure is added. Negative amounts decrease LFO Speed when Pressure is added. A 0 setting represents no effect by *PRESSR*.

FM

FM AMP Modulation

The Amount of VCO2 modulating VCO1 or the VCF can be controlled by any one of the MATRIX-12's 27 Sources of Modulation. An interesting use of modulation on the *FM AMP* is to select an Envelope (ENV X) or Pressure to vary the amount of FM affecting VCO1 of the VCF.

Set the FM AMP amount to 0 so that the modulation Source that you select will bring it in. Press the button beneath *FM AMP* in the window and select the Source you want.

VALUE X range is from –63 to +63. A setting of 0 is no effect. Using positive values increases the amount of the Source modulating the *FM AMP*. Negative amounts decrease FM from its initial programmed amount.

As an example, if an Envelope is selected and programmed to have slow *ATTACK*, *DECAY* and *RELEASE* times, the effect of FM will be gradually heard and then gradually fade. Using negative Values inverts the Envelope so that the opposite effect is obtained: the effect of FM will be present when the patch is first played, fade away and come back again. When inverting the Source, return to Page 1 of FM/LAG and set its initial Value to +63.

The same will hold true if Pressure is used as a Modulation Source. Positive Values cause Pressure to increase the amount of FM. As an example, pressing into the keys increases the amount of FM affecting VCO1 or the Filter. As the keys are released, FM modulation goes away. Negative Values decrease FM by inverting the effect of *PRESSR* as a Source: FM modulation with a high initial amount will be present when the Patch is first played and pressing into the keys takes it away. Letting up on the keys brings the effect of FM back.

LEVERS

The MATRIX-12 provides two "performance modulation" controls called LEVER 1 and LEVER 2. Similar in function to modulation wheels found on many other synthesizers, the MATRIX-12's Levers are commonly used to provide Pitch-Bend (LEVER 1) and Vibrato (LEVER 2) modulation. But these two Levers can be used to provide other forms of modulation as well, just like the remaining 25 Sources. Thus, they are given places in the MODULATION SOURCE section and are given generic titles LEVER 1 and LEVER 2 because they are actually non-dedicated. They can be used to modulate any of the MATRIX-12's 47 Destinations.

But due to the widespread popularity of of Pitch-Bend and Vibrato performance controls, the MATRIX-12 makes it relatively easy to use these Levers for bend and vibrato.

Pitch Bend
Pitch Bend is acheived by routing one of the LEVERs to the Frequency of the VCOs. In the MATRIX-12, LEVER 1 is used for this purpose and is enabled simply by selecting *LEV1* in Page 2 of both VCO 1 and VCO 2.

When *LEV1* is enabled for both VCOs, Pitch Bend is preset to be +/– a Whole Tone. This is designed into the MATRIX-12 and is a fixed amount.

If some other interval is required, you will need to create **two** Modulation Pages, the first assigning *LEV1* as the Source and VCO1 *FREQ* as the Destination and the second with *LEV1* as the Source and VCO 2 *FREQ* as the Destination. Be sure to turn *LEV 1* in Page 2 of both VCOs **off** (de-underlined) as we do not want the pre-programmed amount of bend of this parameter to interfere with the new bend amount. Use the following chart to select a VALUE X amount when programming different intervals:

AMOUNT	INTERVAL
46	**min 2nd**
53	**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 VCO's Frequencies by LEVER 1 **twice**. An octave bend is created by setting one VALUE X amount to a min 6th (**63**) and the other to a Maj 3rd (**58**) to equal an octave. Narrower intervals, including micro-tonal amounts of bend are achieved by using amount values lower than *46*. Just be sure to turn *LEV 1* in Page 2 of both VCOs **off** so that the pre-programmed amount of bend of this parameter doesn't interfere.

Vibrato
LEVER 2 is most commonly used in the MATRIX-12 to control Vibrato amount. Like Pitch-Bend, the MATRIX-12 provides easy Vibrato routing, programmable per Patch. In PAGE 2 of each VCO is a parameter displayed as *VIB*.

When selected, Vibrato is routed to the VCO that is being displayed. The actual operating parameters (*WAVE* select, *SPEED* and *AMP*) of the Vibrato are selected in the VIB Sub-Page. For SINGLE Patches, Vibrato control is Global and is defined in MASTER PAGE *VIB*. For MULTI Patches, the VIB Page is selected in the SINGLE/MULTI PATCH PAGE SELECT section and is programmed separately for each MULTI Patch.

PEDALS

Like LEVER 1 and LEVER 2, Pedal control in the MATRIX-12 is non-dedicated as well. PEDAL 1 and PEDAL 2 inputs on the synthesizer's rear panel corresponding to the *PED1* and *PED2* modulation control in the Patch can be routed to a multitude of Destinations. Because Pedal-type modulations are a popular and necessary form of control, PEDAL 1 is normally used to control Volume in the Patch and PEDAL 2 is used for Sustain, although these settings can be reversed.

Volume control by a pedal is achieved by the use of a "continuous" pedal – a rocker-type pedal that provides a "more-or-less" function. Sustain control by a pedal, on the other hand, is obtained from a "switch" pedal – a momentary spring-loaded pedal that provides an "on/off" function.

The versatile design of the MATRIX-12 does not limit you to using only a continuous pedal in PEDAL 1 and a switch pedal in PEDAL 2. They can be reversed if you are more comfortable with that arrangement. In addition, both can be continuous or both can be switches if you like. Just remember that whever you use PEDAL 1 in the Patch for modulation, the MATRIX-12 will "look" to whatever is plugged into the PEDAL 1 jack for the control. The same applies to PEDAL 2 modulation in a Patch. This design consideration allows the MATRIX-12 to achieve enormous flexibility in footpedal control.

In most other synthesizers, the Pedals' functions are "hardwired" – permanently routed in the design. Although this is convienienient (just plug in the Pedals and go), it it very restricting as you cannot do anything else with them. The MATRIX-12 treats the Pedals like the Levers – they are non-dedicated – so that you may use them whenever continuous control or on/off switching is needed in the Patch.

Volume Control

As mentioned above, for simplicity we will consider PEDAL 1 as the source to be used for volume control. The input on the rear panel will accept a two conductor potentiometer-type pedal such as the Oberheim POB-X. This input will be summed together with MIDI VOLUME information received via MIDI IN from a Master controller set to transmit on MIDI Controller 7.

PEDAL 1 as a Modulation Source is programmed individually for each SINGLE Patch. This means that **each** SINGLE Patch must be set up, one at a time, to recognize Volume pedal control. Although somewhat tedious, this design provides unprecendented flexibility in that you are able to program different amounts of Volume – or none at all – in each Patch.

Option #1

Just like the volume dynamics programming associated with introducing Velocity in a Patch, PEDAL 1 routing can be used to affect either of the VCAs. In the MATRIX-12, VCA 2 is the last circuit in the Patch before the sound is fed to the synthesizer's AUDIO OUTPUTS. Its normal setting is 0 because it is almost always modulated by ENV 2 – a common Source for providing loudness articulation. Volume control is most effective when PEDAL 1 is applied to the *AMP* of ENV 2.

1. Select ENV 2 and set its *AMP* amount to **0**.

2. Press the switch beneath *AMP* in the Upper PAGE MODIFIER Display and assign *PED1* as the Source.

VALUE X: A setting of **0** indicates no effect by PEDAL 1 and the Patch will not make any sound. When positive amounts are used, the pedal has more control. The recommended setting for *PED1* is +63.

Option #2
Another alternative in programming volume pedal control in the Patch is routing PEDAL 1 to VCA 1. VCA 1 is the first of two circuits in the Patch that concern volume before the sound is fed to the synthesizer's AUDIO OUTPUTS. Its normal setting is **63** because it feeds VCA 2. PEDAL 1 control may be applied to VCA 1.

1. Select the VCF/VCA Sub-Page and set its *VCA1* amount to **0**.

2. Press the switch beneath *VCA1* in the Upper PAGE MODIFIER Display and assign *PED1* as the Source.

VALUE X: A setting of **0** indicates no effect by PEDAL 1 and the Patch will not make any sound. When positive amounts are used, the pedal has more control. The recommended setting for *PED1* is +63.

Sustain
As mentioned above, for simplicity we will consider PEDAL 2 as the source to be used for Sustain. The input on the rear panel will accept a two conductor switch-type pedal such as the Oberheim FS-7. This input will be summed together with MIDI SUSTAIN information received via MIDI IN from a Master controller set to transmit on MIDI Controller 64.

PEDAL 2 as a Modulation Source is programmed individually for each SINGLE Patch. This means that each SINGLE Patch must be set up one at a time to recognize the Sustain pedal. Although somewhat tedious, this design provides unprecendented flexibility in that you are able to program different amounts of Sustain pedal control – or none at all – in each Patch.

Sustain is achieved by routing PEDAL 2 to the *RELEASE* stage of the two Envelopes that are controlling VCF *FREQ* and VCA 2 *AMP*. By so doing, you are using the pedal to extend the Release time which makes the sound take longer to die out after the keys are let go.

PEDAL 2 routing to the Envelope modulating VCF *FREQ* (usually ENV 1) controls the rate at which the Patch's **harmonics** sustain. PEDAL 2 routing to the VCA 2 Envelope (usually ENV 2) controls the rate at which the Patch's overall **loudness** sustains.

1. Select ENV 1. Press the button beneath *RELEASE* in the display to select it as the Destination.

2. Assign *PED 2* as the Modulation Source. Set its VALUE X amount to +63. Use a lower amount if a shorter sustain time is desired. Or, assign *PED 2* twice if a longer sustain time is desired.

3. Select ENV 2. Press the button beneath *RELEASE* in the display to select it as the Destination.

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4. Assign *PED 2* as the Modulation Source. Set its VALUE X amount to **+63**. Use a lower amount if a shorter sustain time is desired. Or, assign *PED 2* again if a longer sustain time is desired.

Using **negative** *PED 2* amounts will invert the effect of the Pedal so that it will not provide sustain but act as a "damper" pedal. Thus, Pedal 2 control in this instance will shorten the Release time of the Envelopes when used in negative amounts.

The LFOs (LFO X)

The LFOs are commonly used to provide constant vibrato-type modulation, but can be used to acheive a wide variety of other types of periodic and random modulations in the Patch.

VCO Frequency Modulation by an LFO
The pitch (*FREQ*)of either or both VCOs can be modulated by an LFO. VALUE X 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.

VCO Pulse Width Modulation by an LFO
The Pulse Width (*PW*) of either or both VCOs can be modulated by an LFO to obtain a "periodic" or steady back-and-forth change (using a *TRIANGLE* waveform) between a wide pulse and a narrow pulse. This can be used as a form of vibrato. VALUE X 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.

In either of the two examples given above, you might want to experiment with modulating one VCO positively while the other is being modulated negatively by the same LFO. This setup will provide some interesting effects as one VCO modulates opposite of the other.

We'd like to offer one small word of caution when using a specific type of modulation – namely a non-lagged LFO using a waveform with sharp transitions (*UP SAW*, *DOWN SAW* or *SQUARE*) routed to the Pulse Width (*PW*) of a VCO. This type of modulation can cause a "glitch" (a brief distortion in the audio) depending upon the *PW* setting and the amount of LFO modulation being used.

The Envelopes (ENV X)

One of the characteristics of sound as we perceive it is the way in which the harmonics and the overall loudness 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.

VCF Frequency Modulation by an ENVELOPE
In the MATRIX-12, using an envelope is the primary way in which harmonics are shaped – the Filter's frequency is modulated by an Envelope. The Basic Patch default is Envelope #1 (displayed as *ENV1*).

This Modulation Routing is concerned only with the amount of *ENV1* affecting the VCF's Frequency. The actual settings of the Envelope are made in the ENV1 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 ENV1 on the Filter's *FREQ*. A Value of –63 is the maximum inversion.

VCA 2 Modulation by an ENVELOPE
This second-stage VCA is used to determine the final output of the Patch. The volume of VCA 2 is recommended to be set to be **0** because its output level is normally controlled by an Envelope. The Basic Patch default is Envelope #2 (displayed as *ENV 2*).

This function is concerned only with the amount of *ENV 2* affecting the VCA's output amplitude. The actual settings of the Envelope are made in the ENV2 Sub-Page. VALUE X 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 *ENV2* on the VCA's output. A Value of –63 is the maximum inversion.

KEYBOARD Modulation

Although not usually considered to be a Modulation Source, the MATRIX-12's Keyboard as well as MIDI IN keyboard control can be used whenever needed to provide linear modulation. And if *KEYBD* is selected as an input to a Tracking Generator, applying the *TRACK* to a Destination and adjusting the five Point Values will cause the Keyboard modulation control to be non-linear.

We have already seen how the MATRIX-12's Keyboard is used as a Modulation Source in the normal operation of the synthesizer. It is used to change the pitch of the VCOs as well as the Frequency of the VCF, enabling *FREQ* in PAGE 2 of VCO 1, VCO 2 and VCF respectively. Another popular modulation function of Keyboard control is its use in changing LFO Speed.

LFO Speed Modulation by the KEYBOARD
The initial speed of the LFOs can be increased or decreased by Keyboard notes: playing high notes or low notes on the Master's keyboard will speed up or slow down the LFO Speed:

1. Select VCO 1. Assign *LFO 1* as a Modulation Source to its *FREQ*.

2. Select LFO 1. Set its *SPEED* to about 25.

3. Assign *KEYBD* as the Modulation Source to LFO 1's *SPEED*.

VALUE X range is also –63 to +63. Using positive VALUE X amounts causes the LFO to speed up as higher notes are played on the Keyboard and slow down when low notes are played. Using negative amounts produces the opposite effect: high notes slow the LFO and low notes speed it up.

The Ramps
(RAMP X)

As we stated in the section on RAMP X, Ramps are commonly used to simply increase or decrease a parameter's initial VALUE X amount or another modulation in the Patch.

LFO Amplitude and Speed Modulation by a RAMP
Modulating an LFO's amplitude or depth with a Ramp is one example of how a Ramp can be used to introduce LFO modulation into the Patch. Using a Ramp to increase or decrease the LFO's *SPEED* is another example.

1. Select VCO 1. Select *FREQ* as the Destination to be modulated.

2. Assign *LFO 1* as the Modulation Source. Set is VALUE X amount to **+63**.

3. Select LFO 1. Set its *AMP* amount to 0. Select *AMP* as the Destination to be modulated.

4. Assign *RAMP1* as the Modulation Source. Set its VALUE X amount to **+63**.

5. Select RAMP 1. Set its Page 1 *RATE* to about **60**. Press and hold a key on the MATRIX-12's Keyboard. What you will hear is RAMP 1 gradually fade the effect of LFO 1 into the sound.

6. LFO *SPEED* modulation is achieved by re-selecting LFO 1, turning its *SPEED* down to about **30** and assigning *RAMP1* as the Modualtion Source with an amount of **+63**. Play and hold a key and as the LFO modulation fades in as before, it will also speed up.

These two examples operate in the same way. VALUE X range is from –63 to +63. 0, as always, indicates no effect by the RAMP. Using positive numbers increases the *AMP* or the *SPEED* from their initial settings. Using negative numbers, which invert the Ramp, decreases the LFO's output or rate.

MATRIX MODULATION provides almost unlimited resources in obtaining specialized modulation routings in a SINGLE Patch. The examples given in this section are just a few of the many things that you accomplish. We've suggested some standard routings that can be used for routine programming requirements and several routings that are not as obvious. The MATRIX-12 provides a way, through MATRIX MODULATION, to achieve programmable control not possible on other synthesizers. Just use your imagination.

The following table summarizes, for your convenience, the conventional modulation routings and how they are obtained on the MATRIX-12:

SOURCE	DESTINATION	RESULT
ENV 1	VCF *FREQ*	Brightness articulation
ENV 2	VCA 2	Loudness articulation
PED 1	VCA 2 *AMP*	Volume pedal
PED 2	ENV 1 *REL* + ENV 2 *REL*	Sustain pedal
LEV 1	VCO 1/VCO 2 *FREQ* †	Pitch Bend
LEV 2 LFO X *AMP*	LFO X *AMP* VCO 1/VCO 2 *FREQ* *	Vibrato
VEL	VCA 2 *AMP*	Loudness mod by Velocity
VEL	VCA 1 *AMP*	Brightness mod by Velocity

† Hardwired Pitch Bend of ± 1 Whole Tone is obtained by selecting *LEV 1* in PAGE 2 of VCO 1 and/or VCO 2.

* This entry in the table is a dual-destination mod. Lever 2 is modulating the Amplitude of an LFO which is then modulating the Frequency of the VCO's. Hardwired Vibrato is obtained by selecting *VIB* in PAGE 2 of VCO 1 and/or VCO 2.
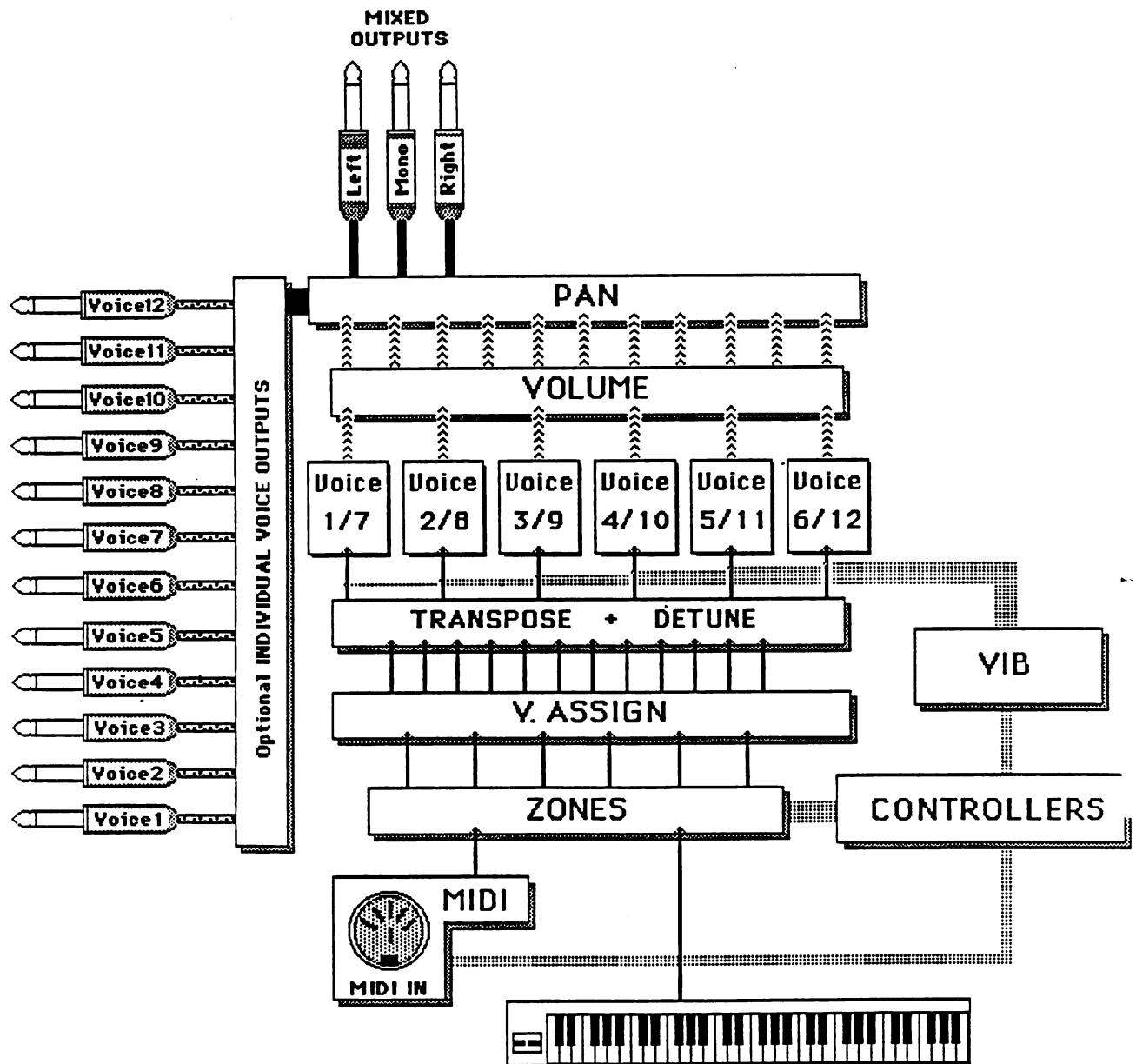
Part 5: Constructing the MULTI PATCH

The MULTI PATCH Mode of the MATRIX-12 has been referred to numerous times throughout the manual. In this section, we will discuss what a MULTI Patch is, how to put one together and some of its uses.

MULTI PATCH Mode provides the means to **program** the performance parameters used used to control the Voices – namely PAN, VIB, VASSIGN and ZONE – that are otherwise used Globally in SINGLE PATCH Mode, plus several additional parameters. SINGLE PATCH Mode, as you remember, treats these performance parameters as Global functions and does not program them per Patch. But in MULTI PATCH Mode, you are given 100 memory locations to Store the control setup that you want to use to play the Voices. And each MULTI Patch can be programmed to play a completely different arrangement of these controls.

Thus, each of the 100 MULTI Patch programs will remember the relative transpositions (TRANS), panning (PAN), volume (VOLUME), the control sources of each Voice (V. ASSIGN and ZONE), individual Voice detuning (DETUNE) and Vibrato (VIB). So in effect, a SINGLE Patch remembers a sound, while a MULTI Patch remembers information about a **collection** of sounds, but not the actual sounds themselves. The MULTI PATCH PAGE SELECT buttons – which are located on the right-hand side of the instrument and shared with the SINGLE PATCH PAGE SELECT buttons – are used to select the Pages which affect this collection of sounds.

In addition to programmable Voice control, MULTI PATCH Mode also permits a **different** SINGLE Patch sound to be assigned to each Voice. This feature gives the MATRIX-12 its "multi-timbral" capability: the ability to play many different types of sounds – up to 12 – at once. Any of the existing 100 SINGLE Patches can be assigned to any of the Voices, in any combination. Of course, you can program all the Voices to play the same sound Patch if needed.

Last, a sub-mode of MULTI PATCH Mode is the Individual Patch Edit mode where the MATRIX-12 still plays separate sounds on each Voice, but the controls affect the sound of one or more Voices as though they were in SINGLE PATCH Mode. This sub-mode is useful for editing one or more Voices in the context of an entire MULTI Patch.

Getting a Grip on MULTI Patches
A simple way to observe the difference between SINGLE Patches and MULTI Patches is to compare two Pages that exist in both Modes:

- Enter SINGLE PATCH Mode.

- Press MASTER PAGE.

- Press *VASSIGN* in the Lower PAGE MODIFIER display. The displays will show one of the two Voice Banks in the Upper Display and their corresponding control sources (either ZONEs or individual MIDI Channels) in the Lower Display.

- Using the Keypad, select several SINGLE Patches. The PROGRAMMER display will change to show the name and Patch number of each Patch that you select but notice that the settings in *VASSIGN* do **not** change. The Voice control assignments in SINGLE PATCH Mode are Global.

- Now, enter MULTI PATCH Mode. ,

- Press the V.ASSIGN button in the SINGLE/MULTI PATCH PAGE SELECT section. PAGE MODIFIER will show one of the two Voice Banks in the Upper Display and their corresponding control sources (either ZONEs or individual MIDI Channels) in the Lower Display.

- Using the Keypad, select several MULTI Patches. The PROGRAMMER display will change to show the name and Patch number of each Patch that you select and notice that the settings in V.ASSIGN change as well to reflect the Voice control assignments for each particular MULTI Patch. The Voice control assignments in MULTI PATCH Mode are **programmable**.

The Basics

We have actually covered much of what MULTI Patches are and how they work already in the manual. In describing the interaction of the MATRIX-12 with other MIDI instruments as well as the operation of many of its own internal functions, touching on MULTI Patches throughout the manual is almost unavoidable. This section will tie all of the information together that we've given so far and some of the points, naturally, will be repeated here for clarity.

The following list of MULTI Patch functions outlines its capabilities in summary form. We will cover these functions in detail.

MULTI PATCH Mode gives you the ability to...

... assign the same Patch, two different Patches, three, four or any number up to 12 different Patches to any combination of Voices. The Patches are selected from the bank of the 100 existing SINGLE Patches.

... program the control source for each Voice in V.ASSIGN independently, which can be from any of the six ZONEs or MIDI Channels 1 through 16, in any combination for all 12 Voices.

... configure each ZONE independently, with programmability of *MODE* (Polyphonic or "*UNI–*" modes), MIDI Note range *LIMITS*, MIDI input and output *CHANNEL*, and the Page 2 options of *MIDI IN* control, *MIDI OUT* and *CONTROLLERS* capability for the ZONE, and MATRIX-12 local control of *KEYBOARD* and *VOICE ROB*.

... program Vibrato in the VIB Page for the entire MULTI Patch, which can be different for each of the 100 MULTI Patches.

... program the specialty functions of Voice transpose (TRANS), stereo panning (PAN), volume output (VOLUME) and detune amount (DETUNE), which are all independent per Voice.

... give the MULTI Patch a NAME.

BUILDING A MULTI PATCH: Phase I

To best understand the ways to put MULTI Patches together, and the ways in which they can be used, we will construct a simple MULTI Patch "from scratch", then take you through a series of steps that will transform this simple MULTI Patch into a complex setup in Phase III. This section will cover multiple splits, doubling and multi-layering of sounds, and multiple control sources involving the MATRIX-12's own Keyboard and control from MIDI IN Master sources.

At this point, you may want to review the section in this manual on how the MATRIX-12 is used as an independent instrument, as a MIDI Master, as a MIDI Slave and as both Master and Slave in **Part 2: MATRIX CONTROL**, beginning on Page 85. Although Part 2 primarily deals with the MATRIX-12 in SINGLE PATCH Mode, it provides an excellent foundation for the information you are about to read. Many of the procedures and examples given in the rest of this chapter are repeated from Part 2, along with new information that deals exclusively with MULTI Patches.

Starting Out

Understanding the use of a MULTI Patch will be easiest when starting from a basic MULTI setup, much like the *OBERHEIM* Basic Patch. The procedure is very similar, but with a few additional steps:

STEP 1.   **Recall the "Basic MULTI Patch"**
Enter SINGLE PATCH Mode and select Patch 00. This can actually be any SINGLE Patch, but for simplicity, we will use SINGLE Patch 00 for this experiment.

Enter MULTI PATCH Mode and select a MULTI Patch that you do not want to keep. This can be any one of the 100 available MULTI Patches. This example will require writing the Basic MULTI Patch into memory at some point which will **permanently replace** the MULTI Patch selected.

Press and hold the STORE button. While the STORE button is being held down, press the CLEAR button in the MODULATION SOURCE/X SELECT section. The MATRIX-12 will recall SINGLE Patch 00 but it will be the *OBERHEIM* Basic Patch instead of the Patch programmed into 00. This function also clears the MULTI Patch.

Press "00" on the Keypad and the MATRIX-12 will recall the programmed SINGLE Patch 00 from memory.

Re-enter MULTI PATCH Mode and you will observe the following:

•   The MULTI Patch number that you selected previously will be recalled but with the *OBERHEIM* Basic MULTI Patch selected instead of the programmed MULTI.

•   The Voices will have SINGLE Patch 00 assigned to them. Playing the MATRIX-12's Keyboard will reveal that this is not the programmed version of SINGLE Patch 00, but the initialized Basic Patch instead.

- An Edit Indicator dot will be displayed next to each Patch number showing that the Voices' Patches have been altered by the initializing process of the Basic Patch.

- The MULTI PATCH Mode TRANS Page will be recalled and displayed in the PAGE MODIFIER displays.

The Basic MULTI Patch defaults to the following conditions:

- All Voices are assigned to ZONE 1.

- All of the ZONEs' Page 1 parameters default to:

MODE	LIMITS	CHANNEL
ROTATE	0 TO 127	OMNI

- ZONE 1 Page 2 defaults to all parameters enabled.

  ZONEs 2 through 6 default to *MIDI IN*, *VOICE ROB* and *KEYBOARD* enabled, *MIDI OUT* and *CONTROLLERS* are disabled.

- TRANS defaults all Voices to *–12* (one Octave down).

- PAN defaults all Voices to *MID*.

- VOLUME defaults all Voices to *+63*.

- VIB Page 1 defaults to:

SPEED	WAVE	AMP
56	TRIANGLE	0

  VIB Page 2 defaults to:

  LAG
  (off)

  SPEED = OFF   0   /   AMP = LEV 2   +63

- DETUNE defaults all Voices to *0* (no detune).

STEP 2: **Assign SINGLE Patches to the Voices**
Press the VOICES 1–6/VOICES 7–12 button so that VOICES 1–6 are displayed.

Press all six PATCH EDIT buttons so that all six SINGLE Patch numbers in the PROGRAMMER display become <u>underlined</u>.

On the Keypad, type in any 2-digit Patch number from the bank of SINGLE Patches. For our experiment, type in "22" which is the Stock SINGLE Patch *FAMOUS $*. When the Patch number is entered from the Keypad the "00" default Basic Patch numbers across the display will be replaced by the number "22" and the Edit Indicator dots will disappear.

NOTE: The Stock SINGLE Patch *FAMOUS $* will be recalled only if this Patch is still in SINGLE Patch memory. If you have edited SINGLE Patch 22, or replaced it with another one, the Patch that is currently in SINGLE Patch location 22 will be the one that is recalled.

Press the VOICES 1–6/VOICES 7–12 button so that VOICES 7–12 are selected. Notice that SINGLE Patch 00 is being displayed for these Voices and the Patch numbers are underlined to show that they have been selected.

Type in SINGLE Patch 22 on the Keypad. As with VOICES 1–6, the "00" default Basic Patch numbers across the display will be replaced by the number "22" and the Edit Indicator dots will disappear.

STEP 3:   **STORE the New MULTI Patch**
Press the MULTI PATCH button. The Patch number underlines of the displayed Voices will disappear and the MULTI Patch number will be underlined.

Press and hold the STORE button. The currently displayed MULTI Patch number will be replaced by two "*" as long as the STORE button is held down.

While the STORE button is being held down, type in a 2-digit MULTI Patch number. It can be the same number of the current Patch, or it can be another MULTI Patch:

•   If you select the current Patch number, this new MULTI will be written into memory over the previously Stored MULTI Patch.

•   If you select another MULTI Patch number, the new MULTI that we just put together will be **copied** to – and will **replace** – the destination Patch. The MULTI Patch number that you selected as the location in memory where the new MULTI was edited will not be changed.

At this point, you may also want to name this new MULTI Patch since the title *OBERHEIM* will still be displayed. Select the NAME parameter from the SINGLE/MULTI PATCH PAGE SELECT section. The MULTI Patch Name is programmed in the same way as SINGLE Patches. (See Page 139.)

Summary

We have just set up a simple MULTI Patch in which one sound is played from all 12 Voices. Since the Basic MULTI Patch defaults to all Voices assigned to ZONE 1 and ZONE 1 plays the Voices in *ROTATE*, with the full note range in *LIMITS*, and *KEYBOARD* and *MIDI IN* are enabled, you can play this MULTI Patch now from the MATRIX-12's Keyboard or from a Master instrument polyphonically.

This simple MULTI Patch is really not much different than a SINGLE Patch at this point, with the exception of its control parameters being programmable. We have all Voices playing the same sound Patch from one Zone, controlled from the MATRIX-12's Keyboard and/or MIDI IN. The real magic of the MATRIX-12's MULTI PATCH Mode is the ability to alter this rudimentary setup in a number of exciting ways, and program it all into memory.

BUILDING A MULTI PATCH: Phase II

The MULTI Patch that we just created can be modified in a number of ways using the parameters in the SINGLE/MULTI PATCH PAGE SELECT section. For example, you may want to set up specialized Vibrato, Panning, Detuning, and Transposition pages, just to name a few. You might also find the need to re-assign the Voices to a different Zones.

The functions of the PROGRAMMER are also involved in the construction of MULTI Patches and will be reviewed in this section as well. The following information describes these operations, some being new instructions and some taken from earlier sections of this manual. With the MULTI Patch that we just assembled as a starting point, it is suggested that you try these features as you read them.

The **PATCH EDIT** Buttons
These buttons are active only in MULTI PATCH Mode. PATCH EDITing in MULTI PATCH Mode allows you to select and manipulate each of the MATRIX-12's twelve Voices **independently**.

In MULTI PATCH Mode, you are able to press any one of the PATCH EDIT buttons, all six, or any combination of two, three, four or five. Pressing one or more buttons at the same time selects that Voice or Voices. You can now perform a number of different operations:

Patch Selection
MULTI PATCH Mode, among other things, gives the MATRIX-12 its "Multi-Timbral" capability – the ability for its Voices to play different sounds at the same time.

If one Voice is selected, the Keypad is used to select the Patch number – taken from the bank of SINGLE Patches – that this selected Voice will play. Thus, the MATRIX-12 can be programmed to play 12 **different** sounds at once by selecting a new Patch on the Keypad for each Voice, one at a time.

If two or more (up to six) Voices are selected, selecting a Patch from the Keypad assigns it to **all** Voices that are underlined. This is a handy time-saver. To select more than one Voice, you must press the desired PATCH EDIT buttons **all at the same time**.

Voice Selection
When a Voice or Voices are selected in one bank, the corresponding Voice or Voices are selected and underlined in the other bank. However, whatever patch selections or edits to the selected Voices' Patches you make will only affect the Voices currently being displayed. This feature makes it possible to put corresponding Voices in both Voice Banks in PATCH EDIT Mode without having to keep pressing the same buttons again.

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As an example, if Voices 1 and 2 are selected, changing Banks selects Voices 7 and 8. Voices 1 and 2 will retain their settings but are no longer selected because 7 and 8 are now being displayed. **Performing edits affects only those Voices being displayed**.

Patch/Voice Editing
There will be times when the sound of one or more of the SINGLE Patches used in a MULTI Patch will need to be edited. As an example, you may decide that a particular Patch would sound better in the MULTI Patch if it just had a few changes made. It is possible to edit a SINGLE Patch while it is in a MULTI Patch.

To edit a patch for one Voice:

1. Press the PATCH EDIT button of the Voice that contains the patch you want to change so that it becomes underlined. **This actually enters SINGLE PATCH Mode for this Voice** and the PAGE MODIFIER will now display the SINGLE PATCH Pages for the Patch assigned to this Voice.

2. All of the Single Patch Edit Pages under the front panel heading SINGLE/MULTI PATCH PAGE SELECT are now active so that the actual sound of this patch can be edited because the MATRIX-12 has effectively entered SINGLE PATCH Mode for this Voice alone. You can now make whatever changes to the Patch that you want.

3. After you have made any changes to the Patch, you can compare this edited Patch in the MULTI Patch with its original, unedited version. Just press its PATCH EDIT button and the original version is recalled from memory. Its Patch Number will flash off and on to remind you that you are Comparing.

4. Your edits to this Patch can be programmed into memory as well, but this will also affect this Patch in SINGLE PATCH Mode. Make sure that the MEMORY PROTECT switch on the MATRIX-12's back panel is switched to its OFF position. Press and hold the red STORE button. While you are holding it, type in the 2-digit Patch number on the Keypad. Again, please keep in mind that if this function is performed, **you will have also permanently edited this particular patch in its SINGLE Patch location** as well.

NOTE: In general, performing the STORE function operates on whatever is underlined. If a SINGLE Patch Number – either a Patch in SINGLE Mode or a SINGLE Patch within a MULTI Patch – is underlined, the newly entered SINGLE Patch will replace whatever is in memory for that Patch.

To edit several Voices simultaneously:

1. Press the PATCH EDIT buttons of the Voices that contain the Patches you want to change so that they become <u>underlined</u>. You are limited, however, to the six Voices that are being displayed. As with editing a Patch for one Voice, this actually enters SINGLE PATCH Mode for these Voices and the PAGE MODIFIER will now display the SINGLE PATCH Pages for the Patches assigned to the selected Voices.

2. Editing multiple Voices is accomplished the same as in Step 2 above. Any editing will affect the Voices that are underlined. For example, increasing the amount of the VCF **RES** (Resonance) will increase it for all selected Voices, even though these Voices may have different Patches assigned to them.

   If all the selected Voices are the same Patch, all will be affected by your edits the same.

   It is possible to edit **different** sounding Patches in this mode, but remember that since they are different Patches, your edits will affect each Patch differently. Making a change will not necesarily be at the same setting for all selected Voices. Therefore, the displays in the PAGE MODIFIER Section will show the Values of the **left most Voice** that you are editing at the moment.

3. Due to the enormous processing required, editing multiple Voices also involves some limitations:

   • You cannot add, delete or change any Modulation Pages in the selected Patches. If you attempt to select a parameter to be modulated, or attempt to delete an existing Modulation Page, the Upper display in the PAGE MODIFIER Section will flash:

   MULTIPLE VOICES – NO MODULATION EDITING

   • You cannot STORE the edits of the selected Patches in this mode. Attempting to use the STORE button will display the message...

   EDITING MULTIPLE VOICES – CAN'T STORE

   ... although you can store edited Voices **individually**. But remember – if an edited Voice is Stored individually in a MULTI Patch, it will be stored that way in its SINGLE Patch location as well.

   • The MATRIX-12 will not permit you to compare multiple Voices. You will need to select them individually and compare them one at a time.

4. You are, however, still able to compare the **entire** edited MULTI Patch with its original version and you can still STORE the SINGLE Patches that have been assigned to the Voices one at a time.

Patch-to-Voice Copy
You can also copy a SINGLE Patch from one Voice to another within a
MULTI Patch, even if has been edited. The STORE button is used in the
selection of different Patches per Voice in MULTI PATCH Mode:

To copy a Patch from one Voice to another within the same Voice Bank:

1. When the MATRIX-12 is is MULTI PATCH Mode, press the PATCH
    EDIT button beneath the Voice you want to copy, so that its current
    Patch Number becomes <u>underlined</u>. This is the "source" Voice.

2. Select the Patch you want this Voice to play by entering its 2-digit
    Patch Number from the Keypad. If this Voice already contains the
    Patch you want, you can skip this step.

3. Press and hold STORE. The Voice you selected will have its Patch
    Number replaced with " ** " as long as you are holding STORE.

4. While holding down STORE, press the PATCH EDIT button of any
    Voice. This is the "destination" Voice. Its Patch Number will be
    replaced with the one currently contained in the "source" Voice.

5. You may even switch Voice Banks, if necessary. Continue to hold
    STORE, press the VOICES 1-6/VOICES 7-12 key and select as
    many Voices in the other Bank as needed. See the discussion
    below.

To copy a patch from one Voice Bank to another:

1. Press the PATCH EDIT button of the Voice with the Patch that you
    want to copy, so that it becomes <u>underlined</u>. Again, this is the "source"
    Patch.

2. Press and hold STORE.

3. While holding STORE, press the VOICES 1-6/VOICES 7-12 button
    and switch to the other Voice Bank.

4. Still holding STORE, press the PATCH EDIT button of the
    "destination" Voice – the Voice that you want the selected patch to go.
    The Patch originally in this Voice location will be replaced by the source
    Patch.

Copying Complete MULTI Patches
You are able to copy a MULTI Patch from one location to another:

1. Select the Patch Number of the Patch that you want to copy. This is the
    "source" Patch. Be sure that the MULTI Patch Number is underlined,
    showing that this Patch is selected.

2. Press and hold STORE.

---

3. While holding STORE, type in the 2-digit number of the "destination" Patch – the new Patch where you want the source patch to go. The Patch originally in this location will be replaced by the source Patch.

When you have finished editing the MULTI Patch, you must STORE the edited version if you intend to keep it.

VOICES 1-6/VOICES 7-12 Button

The PROGRAMMER display permits you to work with only six Voices at one time. The VOICES 1-6/VOICES 7-12 button permits switching between the two banks of Voices in order to view their displays. You can switch between the two Voice Banks at any time in MULTI PATCH Mode.

This switching capability is active **at all times** when the MATRIX-12 is in MULTI PATCH Mode. Because each Voice can be manipulated individually in this Mode, you are permitted to select between Voice Banks as often as needed.

EDIT COMPARE

When the MULTI Patch number is underlined, this indicates that this particular MULTI Patch is currently selected. If you make any changes at all to a Patch, the Edit Indicator dot will appear in the lower right-hand corner of the Patch number to remind you that the Patch has been edited. You are able to compare the edited version of the Patch with the original programmed version:

• If you have edited a MULTI Patch, press the MULTI PATCH button once to begin comparing. The underline will disappear and the Patch number will flash off and on. The MATRIX-12 will recall the programmed version of the Patch and playing the synthesizer will allow you to hear what the Patch sounded like before you started making changes.

• Selecting different Pages will also permit you to view the original settings of the Patch as well. This feature is extremely useful, especially if you have made many changes and need to see the original values.

• If you have edited one of the Patches assigned to a Voice within a MULTI Patch, you may also compare this single edited Patch with its Stored version. Press the PATCH EDIT button beneath the Patch number and, as always, the underline will disappear and the number of the Patch assigned to this Voice will flash. Pressing the PATCH EDIT button again stops the compare process.

Comparing in MULTI PATCH Mode does have some limitations, however, just as with comparing SINGLE Patches:

• You cannot perform any new edits while the MATRIX-12 is comparing. Attempting to use the knobs and buttons in the PAGE MODIFIER section for purposes of editing will have no effect and the controls will appear to have gone dead.

- The MATRIX-12 will not permit you to compare multiple Voices that have been edited. You will need to select each Patch individually and compare them one at a time.

- You cannot STORE (program into memory) while comparing. If you attempt to STORE the patch while comparing, the Upper display in the PAGE MODIFIER section will read:

COMPARING – CAN'T STORE

- You cannot change to a different Patch number while comparing. If you attempt to switch to another MULTI Patch while comparing, the Upper display in PAGE MODIFIER will read:

COMPARING – CAN'T CHANGE PATCHES

You can, however, switch into SINGLE PATCH Mode while comparing. If you then return to MULTI PATCH Mode, the Patch that you were working with will be recalled in its **edited** state. The Patch Number will have stopped flashing and will be underlined again.

To stop the compare activity, press the MULTI PATCH button again. The sound of the Patch as well as all of the displays will return to the edited state. The Patch number will stop flashing and will be underlined again.

NOTE: The preceeding two examples are the only two ways that you can exit an edited Patch and return to it in its edited state without performing the STORE function. If you select another MULTI Patch before Storing, the one that you were just editing will drop its edits. When you select this Patch again, it will be recalled in its original, unedited state.

BUILDING A MULTI PATCH: Phase III

In this final section of MULTI Patch configuration, we will cover the remaining parameters that are used to define a MULTI Patch as well as provide additional examples of how to elaborate upon the MULTI Patch that was created at the beginning of this section.

MULTI Patch Pages

The remaining eight performance parameters of the MULTI Patch are located in the SINGLE/MULTI PATCH PAGE SELECT section of the MATRIX-12's front panel. It is suggested that you try these features as you read them.

TRANS

You are given the ability to Transpose each of the 12 Voices in the MATRIX-12 individually over a five Octave range in this Page. You may transpose any or all Voices, in any combination, regardless of its control source set in V.ASSIGN.

The Transpose range is two Octaves up and three Octaves down, depicted in the PAGE MODIFIER displays as *+24* to *–36*, where each number represents an incremental change of one semi-tone. A setting of *0* indicates no transposition.

TRANS

VOICE1	2	3	4	5	6
☐	☐	☐	☐	☐	☐
0	+5	+12	0	-2	-7
☐	☐	☐	☐	☐	☐
⊙	⊙	⊙	⊙	⊙	⊙

PAN

The PAN Page permits you to direct the audio output of each Voice between the LEFT and RIGHT stereo outputs located on the MATRIX-12's rear panel. Their operation is really not much different than that of a mixing console except that the stereo "placement" is limited to seven positions (plus *OFF*) instead of being continuously variable. Each Voice is set independently and can be assigned to any of the seven placement positions desired.

LEFT   *LF2*   *LF1*   *MID*   *RT1*   *RT2*   *RIGHT*   *(OFF)*

The *LEFT* and *RIGHT* displays indicate that the Voice will be panned directly to the extremes of the stereo pan. *MID* indicates that the Voice ouput will appear from both outputs equally. *LF2* display indicates the position just to the right of extreme Left and *RT2* indicates the position just to the left of dead Right. *LF1* is the position just to the left of center and *RT1* just to the right of center.

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If **OFF** is selected, that Voice is removed from the stereo LEFT and RIGHT outputs as well as the MONO. If your MATRIX-12 has ben retro-fitted with the optional Individual Voice Outputs kit, the **OFF** position routes the audio output of that Voice to its individual output jack located on the MATRIX-12's left walnut endpiece.

V. ASSIGN

As with SINGLE PATCH Mode, it is in this Sub-Page where the Voices are given ("assigned") their source of control, either from the MATRIX-12's own Keyboard or from incoming MIDI notes. **In order for the MATRIX-12 to play its Voices, you must tell the Voices what control source (either the Keyboard or MIDI IN) that you plan to use to play them.** This is accomplished with V. ASSIGN.

In the V. ASSIGN Sub-Page, you have six Voices displayed in the Upper window with their corresponding control sources in the Lower one. Use the VOICES 1-6/VOICES 7-12 button in the PROGRAMMER section to switch Voice Banks as you are assigning the Voices.

In this Sub-Page, you have no less than 22 sources of playing control for **each** Voice: any one of six Zones or MIDI Channels 1 through 16. Turn any one of the six knobs to view these available control options.

Selecting a MIDI Channel for a Voice removes it from Keyboard control. The Voice can only be played monophonically from another instrument connected to the MATRIX-12's MIDI IN jack if it is assigned to a MIDI Channel. This is referred to as the MIDI MONO Mode – one Voice being played from one MIDI Channel.

Selecting a Zone for a Voice allows it to be played from the Keyboard **or** from MIDI (Zones can also have MIDI IN control as we will cover in a moment). Thus, if a Voice is assigned directly to a MIDI Channel in this Sub-Page, it by-passes the Zones (and therefore the Keyboard) and gives up its ability to play polyphonically.

If two or more Voices are assigned to a Zone, they will play polyphonically within that Zone. Thus, a Zone is the way to group Voices so that they will play polyphonically – either from the Keyboard or from MIDI IN.

ZONE X

A Zone is the way to play **two or more** of the MATRIX-12's Voices polyphonically. Conceptually, a Zone can be thought of as a "Voice Module" where Voices are assigned to be grouped together in order to be played polyphonically. But keep in mind that it is simple logic that if only **one** Voice is assigned to a Zone, it will only play monophonically in that Zone. Another way that Voices cn be set to play monophonically is by setting the **MODE** of the Zone to any of three unison ("**UNI –**") modes.

Press ZONE X and the Upper PAGE MODIFIER display reads:

SELECT ZONE FROM 1 TO 6

Pressing an X SELECT button from 1 to 6 will select that Zone. You can switch among the six Zones with the X SELECT buttons. Pressing the ZONE X button twice recalls the last Zone that was selected.

Because of its polyphonic nature and the fact that it is a versatile means by which Voices are played from the Keyboard, a Zone has several parameters that must be programmed that give it specific playing capabilities. This is referred to as "defining the Zone".

Since the operation of the Zones in MULTI PATCH Mode is identical to Zones in SINGLE PATCH Mode, it will not be necessary to repeat the information here. Refer to Page 87 for the discussion on Zones.

VOLUME

VOICE7	8	9	10	11	12
☐	☐	☐	☐	☐	☐
63	63	63	63	63	63
☐	☐	☐	☐	☐	☐
◎	◎	◎	◎	◎	◎

VOLUME

You are given the ability to set the Volume output each of the 12 Voices relative to each other in the MATRIX-12 individually in this Page. You may adjust the Volume of any or all Voices, in any combination, regardless of its control source set in V.ASSIGN.

The Volume range is depicted in the PAGE MODIFIER displays as *0* to *63*, where a setting of *63* indicates maximum output and *0* means that the Voice is silenced.

VIB

The Vibrato used in the SINGLE Patches is achieved through the combined operation of the settings in the VIB Page as routed to the *FREQ* of either or both VCOs, either directly – through the use of MATRIX MODULATION – or by selecting *VIB* in Page 2 of the VCOs.

VIB is accomplished the same way in MULTI PATCH Mode. You must select the desired *SPEED*, *WAVE* and *AMP* settings in VIB Page1 as well as *LEVER2/ PEDAL2* control selection and their corresponding amounts in VIB Page 2. You must remember, however, that **the SINGLE Patches that you have selected for a particular MULTI Patch must have Vibrato programmed for VIB to work in the MULTI Patch.**

Since the operation of the Vibrato in MULTI PATCH Mode is identical to VIB in SINGLE PATCH Mode, it will not be necessary to repeat the information here. Refer to Page 83 for the discussion on VIB.

DETUNE

You are given the ability to set a Detune amount for each of the 12 Voices relative to each other in the MATRIX-12 individually in this Page. You may adjust the

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Detune of any or all Voices, in any combination, regardless of its control source set in V.ASSIGN.

The range of Detune is depicted in the PAGE MODIFIER displays as *–31* to *+31*, where a setting of *–31* indicates the maximum flat adjustment of a quarter-tone and *+31* indicates the maximum sharp adjustment of a quarter-tone, giving you a total range of +/– a semi-tone.

NAME
When selected, this Sub-Page permits you to give the MULTI Patch an eight-character Name, just as you can with SINGLE Patches.

When the current NAME is displayed in PAGE MODIFIER, it will be underlined, and the character that is able to be changed will flash its underline segment on and off. This flashing segment is called the CURSOR and Knob #1 permits you to move the Cursor back and forth to select the character to be changed.

Once you have located the character to be changed, the CHARACTER Knob #3 allows you to select the desired Character for that segment. The MATRIX-12 provides the 26 letters of the English alphabet, numerals 0 through 9, a BLANK character for spaces and 27 miscellaneous characters including various punctuation marks and symbols.

Advanced MULTI Patch Programming
We will now dive into the procedures that will transform the simple MULTI Patch we created in the beginning of this chapter into some interesting and useful new configurations that include split-keyboard and multiple splits, doubling and multi-layering. We will also cover numerous setups that involve combining splits with layering of sounds, overlapping splits, and combination Zoning that incorporates MATRIX-12 Keyboard control of the Voices with information coming from MIDI IN. Some of these examples were taken from the section on operating the MATRIX-12 independently, as the Master, a Slave and as both as these functions relate to SINGLE PATCH Mode. The difference here is that the really useful applications of these features are realized in MULTI PATCH Mode because of the multi-timbral capability of the Mode **and** the programability of its parameters.

We will start off first by reviewing briefly the components that make up a MULTI Patch. You may want to use this as a check-list for future reference when constructing MULTI Patches.

VASSIGN   Make sure that you have assigned each of the MATRIX-12's Voices to ZONEs for polyphonic control, or to an individual MIDI Channel for MIDI MONO control. Remember that assigning a Voice to a MIDI Channel removes that Voice from the Keyboard. To put the MATRIX-12 into its most basic configuration, assign all 12 Voices to ZONE 1.

ZONE   Page 1 Settings

   • Select the desired Keyboard *MODE*.

   • Set the range of the Zone with the *LIMITS* parameter. To play the Zone's Voices from the entire length of the MATRIX-12's

Keyboard, set the left-hand Note Number to *36* (Lower Limit) and the right-hand Note Number to *96* (Upper Limit). You can use the *0 TO 127* settings if you like in order to take advantage of the full range of Notes from MIDI IN. To play the Zone's Voices from a restricted area on the Keyboard, set the Lower Limit higher than *36* and the Upper Limit lower than *96*.

• *CHANNEL* settings depend on the type of MIDI IN control required for the Voices assigned to the Zone. If more than one Zone will be driven from MIDI IN, set each Zone to a different MIDI Channel (OMNI will be off in this case). If the MIDI Channel need not be specified, set the Zone to *OMNI*.

Page 2 Settings

• Make sure that *KEYBOARD* is selected if you want the Voices assigned to the Zone(s) to be played from the MATRIX-12's Keyboard. Select *MIDI IN* if you want the Voices assigned to the Zone(s) to be slaved from a Master controller. Both *KEYBOARD* and *MIDI IN* may be selected at the same time if required.

• Select *VOICE ROB* if necessary.

• *MIDI OUT* should be enabled if the Zone is to play an instrument slaved to the MATRIX-12.

CONTROLLERS should be enabled if the Levers, Pedals and Pressure are required when playing instruments slaved to the MATRIX-12.

The remaining parameters of **TRANS, PAN, VOLUME, VIB, DETUNE** and **NAME** can be programmed as needed for each particular MULTI Patch.

Playing the MATRIX-12 Independently
Similar to our discussions in dealing with the MATRIX-12 as an independent instrument in SINGLE PATCH Mode, this section will cover esentially the same procedures but with the synthesizer's MULTI Patch capabilities as the basis. For the examples to follow, use the experimental MULTI PATCH we created earlier in the chapter as the starting point. Do not have any other instrument connected to the MATRIX-12's MIDI ports as they may potentially interfere with its operation as a stand-alone instrument.

EXAMPLE #1

Simple SPLIT Keyboard Setup
To split the MATRIX-12's Keyboard, do this:

Select the Patches
1. Select VOICES 1–6.
   Press all six PATCH EDIT buttons so that all six Voices are selected. Select a 2-digit Patch number on the Keypad that you want to be played from the Lower half of the Keyboard.

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2. Select VOICES 7–12. All six Voices will still be selected.
   Select a 2-digit Patch number on the Keypad that you want to be
   played from the Upper half of the Keyboard.

Assign the Voices
3. Enter V. ASSIGN.
   Assign VOICES 7–12 to ZONE 2, leaving VOICES 1–6 still assigned to
   ZONE 1.

Define the Zones
4. Select ZONE 1.
      Set its *LIMITS* to *36 TO 60*.
   Select ZONE 2.
      Set its *LIMITS* to *61 TO 96*.

The MATRIX-12 will now play two different Patches, one from the Upper
Keyboard and one from the Lower, split at Middle C with six Voices assigned to
each half. This is called a "6/6" Split (six Voices Lower and six Voices Upper) and
can be modified as follows:

Variations
5. Any combination of Voice Assignments can be used to re-define the
   Split. A "1/11", "2/10", "3/9" and so forth can be obtained by
   re-assigning the Voices in V. ASSIGN.

6. The Split Point can be re-located. Just be sure that the upper *LIMITS*
   number of the ZONE 1 is adjacent to the lower *LIMITS* of the ZONE
   2. As just one possibility:

   ZONE 1   *LIMITS*   =   *36 TO 51*

   ZONE 2   *LIMITS*   =   *52 TO 96*

   Just keep in mind that if the upper *LIMITS* number of ZONE 1 is not
   adjacent to the lower *LIMITS* number of ZONE 2, the note numbers
   not specified will not play on the MATRIX-12's Keyboard. As just one
   possibility:

   ZONE 1   *LIMITS*   =   *36 TO 48*
   ZONE 2   *LIMITS*   =   *54 TO 96*
   In this instance, note numbers 49 (C#), 50 (D), 51 (Eb), 52 (E) and 53
   (F) will not play because they have not been specified to either Zone.

7. The Split can be set so that there is an area of the Keyboard that
   overlaps. Just set the upper *LIMITS* number of the ZONE 1 to be
   higher than the lower *LIMITS* of the ZONE 2. As just one possibility:

   ZONE 1   *LIMITS*   =   *36 TO 54*

   ZONE 2   *LIMITS*   =   *48 TO 96*

   In this instance, note numbers 49 (C#), 50 (D), 51 (Eb), 52 (E) and 53
   (F) will play both Patches as a layered sound because they have been
   specified to both Zones.

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EXAMPLE #2

Simple DOUBLE (Layered) Keyboard Setup
Refer back to the simple Split we just experimented with. The same two sound Patches selected to split the Keyboard can be used to layer it. This is accomplished by re-setting the LIMITS numbers so that the two Zones overlap across the entire length of the MATRIX-12's Keyboard:

Re-define the Zones
    Select ZONE 1.
        Set its *LIMITS* to *36 TO 96*.
    Select ZONE 2.
        Set its *LIMITS* to *36 TO 96*.

EXAMPLE #3

3-Way SPLIT Keyboard
Refer back to our original Split. To split the MATRIX-12's Keyboard three ways, we will need to define a third Zone and insert it into the Patch:

Select the New Patch
1. Select VOICES 1–6.
    Press the PATCH EDIT buttons so that Voices 5 and 6 are selected. Select a new 2-digit Patch number on the Keypad that you want to be played from the middle of the Keyboard.

2. Select VOICES 7–12.
    Press the PATCH EDIT buttons so that Voices 7 and 8 are selected. Select the same 2-digit Patch number on the Keypad that you selected in the last step. The new Zone will have Voices 5–8 playing this third Patch.

Assign the Voices
3. Enter V. ASSIGN.
    Assign VOICES 5–8 to ZONE 3.

Re-define the Zones
4. Select ZONE 1.
        Set its *LIMITS* to *36 TO 54*.
    Select ZONE 2.
        Set its *LIMITS* to *79 TO 96*.
    Select ZONE 3.
        Set its *LIMITS* to *55 TO 78*.

We now have three separate 4-Voice areas of the Keyboard that play as:

ZONE 1	Voices 1–4	Lower Keyboard area (lowest C to F#).
ZONE 3	Voices 5–8	Middle Keyboard area (G to F#).
ZONE 2	Voices 9–12	Upper Keyboard area (G to highest C).

By re-assigning two Voices to each of the six Zones, selecting new Patches for the Voices and re-defining the Zones' LIMITS, a six-way Split is possible:

V. ASSIGN:	VOICES 1 & 2	ZONE 1	
	VOICES 3 & 4	ZONE 2	
	VOICES 5 & 6	ZONE 3	
	VOICES 7 & 8	ZONE 4	
	VOICES 9 & 10	ZONE 5	
	VOICES 11 & 12	ZONE 6	
LIMITS:	ZONE 1	*36 TO 47*	(1st Octave)
	ZONE 2	*47 TO 59*	(2nd Octave)
	ZONE 3	*60 TO 71*	(3rd Octave)
	ZONE 4	*72 TO 83*	(4th Octave)
	ZONE 5	*84 TO 90*	(5th Octave, C to F#)
	ZONE 6	*91 TO 96*	(5th Octave, G to C)

EXAMPLE #4

3-Way LAYERED Keyboard
Referring to the 3-Way SPLIT that was created in the last example, the three
Patches used to create the Split can be layered simply by overlapping the Zones'
LIMITS numbers as in our first DOUBLE example:

ZONE 1	*LIMITS*	=	*36 TO 96*
ZONE 2	*LIMITS*	=	*36 TO 96*
ZONE 3	*LIMITS*	=	*36 TO 96*

EXAMPLE #5

SPLIT + DOUBLE Keyboard
Again referring to our original 3-Way SPLIT, we can set up the MATRIX-12's
Keyboard so that ZONE 1 plays from the Lower half of the Keyboard and ZONEs
2 and 3 are layered and play from Upper half. Again, this is accomplished simply by
re-defining the Zones' *LIMITS*:

ZONE 1	*LIMITS*	=	*36 TO 60*
ZONE 2	*LIMITS*	=	*61 TO 96*
ZONE 3	*LIMITS*	=	*61 TO 96*

MATRIX-12 as the Master

Even though we have made many changes to our original MULTI Patch in the
previous section, the following examples will start with this same simple MULTI.
You may want to re-initialize the MULTI Patch at this point using STORE + CLEAR
before proceeding.

EXAMPLE #1

MATRIX-12 Driving 1 Slave
Using our experimental MULTI Patch, connecting a Slave instrument's MIDI IN to
the MATRIX-12's MIDI OUT constitutes a simple MIDI Master-Slave system. For
proper interfacing to occur, be sure that the MATRIX-12's *BASIC CHANNEL* is
set to *1* and your Salve synthesizer is receiving on Channel 1 with its MIDI
Controllers turned on.

In this situation, we have the most basic MIDI system: playing a note or notes on
the Master (the MATRIX-12) will play the same notes ("doubling" or "layering") on
the Slave. Notes will play from both synthesizers across the MATRIX-12's entire

Keyboard. But there are many more ways that this basic system can be used as we discovered when using the MATRIX-12 in SINGLE PATCH Mode. The following examples are just a few suggestions.

OPTIONS
With this basic MIDI system as a starting point, we can come up with a number of useful configurations using the MATRIX-12 as the Master driving one Slave.

Option 1: Split MATRIX-12 Keyboard
The MATRIX-12's Voices play from the **Upper** half and the Slave synthesizer plays from the MATRIX-12's **Lower** half. We will now use two ZONEs in order to split the MATRIX-12's Keyboard.

MATRIX-12 Assignments –

1. All Voices still play polyphonically fron ZONE 1. Do not change
    VASSIGN.

2. ZONE 1 Settings:
    Page 1 – *LIMITS*   =   *60 TO 127*

    Page 2 – Turn off *MIDI OUT*
    Enable <u>*KEYBOARD*</u>

3. ZONE 2 Settings:
    We will use ZONE 2 to play the Slave. Since all 12 MATRIX-12 Voices are playing fron ZONE 1 and its MIDI OUT has been turned off, the Upper half of the MATRIX-12's Keyboard (from Middle C and higher) will play the MATRIX-12 only. Setting up ZONE 2 as follows will play the Slave from the MATRIX-12's Lower Keyboard half only:

    Page 1 – *MODE*   =   *ROTATE*
             LIMITS   =   *0 TO 59*
             CHANNEL   =   *1*
             Setting CHANNEL to 1 on the Zone causes the MATRIX-12
             to tramsmit on Channel 1 from that Zone.

    Page 2 – <u>*MIDI OUT*</u>
             <u>*KEYBOARD*</u>   <u>*CONTROLLERS*</u>

Slave Synthesizer Assignments: No Changes
                                            Keep its receiving Channel to 1.

Option 2: Split MATRIX-12 Keyboard
The MATRIX-12 Voices will play from the **Lower** half of the Keyboard and Slave synthesizer plays from the MATRIX-12's **Upper** half. This is accomplihed simply by switching the *LIMITS* for the ZONEs:

          ZONE 1:   *LIMITS*   =   *0 TO 59*
          ZONE 2:   *LIMITS*   =   *60 TO 127*

EXAMPLE #2   **MATRIX-12 Driving 2 or More Slaves**
                      If another MIDI synthesizer is available, connect its MIDI IN to the MIDI THRU of the
                      first Slave. If the second Slave is set to receive on the same Channel as the first, it

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will double the notes from the first Slave in all the previous examples. But independent control of each synthesizer can occur simultaneously from the MATRIX-12's Keyboard.

Option 3: 3-Way Split MATRIX-12 Keyboard
Slave #2 Lower, Slave #1 Middle, MATRIX-12's Voices Upper.

MATRIX-12 Assignments –

1. All Voices still play polyphonically fron ZONE 1. Do not change *VASSIGN*.

2. ZONE 1 Settings:
    Page 1 – *LIMITS*   =   *84 TO 127*
    The MATRIX-12 is now set to play from the top Octave only.

    Page 2 – The following parameters should be enabled **only**:
    KEYBOARD
    VOICE ROB (optional)
    Be sure that *MIDI OUT* is disabled.

3. ZONE 2 Settings:
    Page 1 – *MODE*   =   *ROTATE*
    LIMITS   =   *60 TO 83*
    CHANNEL   =   *1*
    Slave #1 is now set to play from the MATRIX-12's middle two Octaves.

    Page 2 – *MIDI OUT*
    KEYBOARD   *CONTROLLERS*

4. ZONE 3 Settings:
    We will use ZONE 3 to play the Slave #2. Set it to receive on Channel 2. Setting up ZONE 2 as follows will play the Slave from the MATRIX-12's Lower two Octaves only:

    Page 1 – *MODE*   =   *ROTATE*
    LIMITS   =   *0 TO 59*
    CHANNEL   =   *2*

    By changing *CHANNEL* from *OMNI* to *2*, this ZONE will transmit on Channel 2 as it will now over-ride what has been set as the MATRIX-12's Basic Channel.

    Page 2 – *MIDI OUT*
    KEYBOARD   *CONTROLLERS*

The MATRIX-12 as the Slave
For the following examples, you will need to return to our experimental MULTI Patch. As a Slave in a MIDI system, the MATRIX-12 offers an enormous amount of flexibility in the way that it can be controlled from a Master instrument. Even if the

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Master controller that you are using to drive the MATRIX-12 has a limited MIDI implementation, the MATRIX-12 can still perform a number of control functions from the receiving end.

Getting Started
Connect the MIDI IN of the MATRIX-12 to the MIDI OUT of the Master controller. Your Master instrument needs the ability to transmit MIDI **Notes** (Notes, Velocity and Release Velocity) and **Controllers** (Pitch-Bend, Vibrato, Volume Pedal, Sustain Pedal, Pressure/After-Touch and Patch Changes). Consult the Owner's Manual of the Master to determine what Controllers it can transmit and what Controller Numbers it is using. These settings should be matched on the MATRIX-12 unless you are instructed in the examples to change them.
It is not critical that **all** Controllers are transmitted by the Master. Some MIDI synthesizers do not transmit nor respond to Volume Pedal, Velocity or Pressure, as examples. It is not important that your Master have these features but will add greatly to the usefulness of your MIDI system if it does.

Also, the Master need not have the ability to Split or Double (Layer) its keyboard. These functions can be done on the MATRIX-12 through the use of its ZONEs.

As a simple starting point, change ZONE 1 Page 2 to enable _MIDI IN_. All other parameters are optional.

EXAMPLE #1

MATRIX-12 as a Simple SLAVE
Referring to the connection outlined above, playing the Master controller will play the same notes on the MATRIX-12 with a "doubling" or layered effect. If the Patch that you have selected on the MATRIX-12 employs Pitch-Bend, Vibrato, Volume and Sustain Pedals, Velocity/Release Velocity, or Pressure, these Controllers will be active assuming that your Master is transmitting them.

EXAMPLE #2

MATRIX-12 as a SPLIT SLAVE
In this example, we will set up the MATRIX-12 to play two different sound Patches in a Split Keyboard arrangement. Each part of the Split will be a 6-Voice. **This split will play from the Master controller even if it does not have a Split capability of its own.**

1. **Select your Patches**
   • Go to the PROGRAMMER section.
     Press the Voice Bank Select button so that VOICES 1-6 are selected.

   • Press all six PATCH EDIT buttons beneath the Programmer Display. Use the Keypad to select the SINGLE Patch that you want to play on the **Lower** part of the Keyboard.

   • Press the Voice Bank Select button so that VOICES 7-12 are selected. Use the Keypad to select the SINGLE Patch that you want to play on the **Upper** part of the Keyboard.

2. **Assign the Voices**
   • Press the VASSIGN button in the SINGLE/MULTI PATCH PAGE SELECT Section. Assign Voices 1-6 to *ZONE 1*. Assign Voices 7-12 to *ZONE 2*.

3. Define the ZONEs

- Press the ZONE button in the SINGLE/MULTI PATCH PAGE SELECT Section. ZONE, as you remember, is written in grey lettering for MULTI PATCH Mode functions.

  Select ZONE 1. Set up ZONE 1 as follows:

  Page 1: *MODE*   =   *ROTATE*
           LIMITS   =   *0 TO 59*
           CHANNEL   =   *OMNI*

  Page 2: Enable *MIDI IN*

- Press the ZONE button again in the SINGLE/MULTI PATCH PAGE SELECT Section. Select ZONE 2.

  Set up ZONE 2 identical to ZONE 1 with the exception of:

  LIMITS   =   *60 TO 127*

Play notes on your Master and notice that its keyboard has been split with one Patch of the MATRIX-12 playing from the lower part of the keyboard and the other playing from the upper. Changing the Left-LIMIT Number of ZONE 1 and the Right-LIMIT Number of ZONE 2 shifts the Split Point. Try ZONE 1 = *0 TO 71* and ZONE 2 = *72 TO 127*.

Option
The sound Patches can be reversed so that the Lower Patch plays from the Upper keyboard area and the Upper Patch plays from the Lower keyboard area of the Master. Just switch the *LIMITS* of the ZONES:

  ZONE 1: *LIMITS*   =   *60 TO 127*
  ZONE 2: *LIMITS*   =   *0 TO 59*

EXAMPLE #3

MATRIX-12 as a SLAVE in a 3-Way SPLIT
Again using the experimental MULTI as our starting point, follow the steps below to achieve three Split Patches from the Master's keyboard. Each Split section will be a 4-Voice. We will set up a third ZONE for this purpose ("ZONE 3", naturally) but first, you should select the Patch that will play from the new ZONE.

1. **Select the Patch for the New ZONE**

   - Press the Voice Bank Select button so that VOICES 1-6 are selected.

   - Press PATCH EDIT buttons 4 and 5 beneath the Programmer Display. Use the Keypad to select the SINGLE Patch that you want to play from the new ZONE 3.

- Press the Voice Bank Select button so that VOICES 7-12 are selected. Press PATCH EDIT buttons 7 and 8 beneath the Programmer Display. Use the Keypad to select the SINGLE Patch that you want to play from ZONE 3.

  We now have Voice 1-4 playing one Patch, Voices 5-8 another and Voices 9-12 the third Patch.

2. Assign the Voices

- Press the VASSIGN button in the SINGLE/MULTI PATCH PAGE SELECT Section. Assign Voices 5-8 to *ZONE 3*. We now have the following Voice Assignments:

VOICES 1-4	=	ZONE 1
VOICES 5-8	=	ZONE 3 (the new ZONE)
VOICES 9-12	=	ZONE 2

3. Define the New ZONE

- Select ZONE 3 and define it as follows:

Page 1:	*MODE*	=	*ROTATE*
	LIMITS	=	*55 TO 78*
	CHANNEL	=	*OMNI*

Page 2:	Enable *MIDI IN*

- Adjust the *LIMITS* of the ZONEs 1 and 2:

ZONE 1	*LIMITS*	=	*0 TO 54*
ZONE 2	*LIMITS*	=	*79 TO 127*

Playing the Master will produce the following results:

  ZONE 1 plays from the Lower 1/3 of the Master's keyboard.
  ZONE 3 plays from the Middle 1/3 of the Master's keyboard.
  ZONE 2 plays from the Upper 1/3 of the Master's keyboard.

Switching the LIMITS will shift the Patches to different areas of the keyboard.

EXAMPLE #4   DOUBLING/LAYERING the MATRIX-12 as the SLAVE

Option 1: Doubling
Referring to *EXAMPLE #2*, setting the *LIMITS* of each ZONE to *0 TO 127* will cause them to overlap, producing a dual layer sound. Each ZONE has six Voices assigned to it so the Master will be able to play up to six Voices on its keyboard from the MATRIX-12.

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Option 2: 3-Level Layering
Referring to *EXAMPLE #3*, setting the *LIMITS* of each ZONE to *0 TO 127*
will cause them to overlap, producing a three layer sound. Each ZONE uses four
Voices so the Master will only be able to play up to four Voices on its keyboard
from the MATRIX-12.

EXAMPLE #5   **MIDI MONO Mode**

If required, any or all Voices of the MATRIX-12 can be assigned to a separate MIDI
Channel. This feature is referred to as MIDI MONO and is described in the MIDI
Specification as "Mode 4: OMNI OFF/MONO". Any combination of Voices may be
used in any order and Voices controlled in MIDI MONO may be used
simultaneously with other Voices assigned to Zones.

Although described previously, MIDI MONO is mentioned here in the MULTI
PATCH Mode section because, unlike SINGLE Patches, **you are able to
assign a different Patch to each of the 12 Voices** if desired.

MIDI MONO is a useful Mode when independent control of a Voice or Voices is
necessary. Playing one or more single-note lines from a MIDI sequencer on one
or more separate playtracks is just one example of how MIDI MONO Mode can be
used. MIDI guitar players will really enjoy the added flexibility of being able to have
each string control a Voice independently of the others, complete with Pitch
Bend and Volume dynamics. Another example is MIDI MONO control of the
Voices from a Master instrument that has the ability to transmit MIDI MONO such as
the Oberheim Xk Keyboard Controller, or any other Master device that permits
transmitting on separate MIDI Channels simultaneously via MIDI MONO.

MIDI MONO settings are accomplished in *VASSIGN* by turning the knob in
PAGE MODIFIER beneath the Voice or Voices that you want to be controlled via
MIDI IN on its own separate MIDI Channel. As the rotary controls are turned clock-
wise, ZONES 1 through 6 are displayed first then MIDI Channels 1 through 16.
Here are a few details cocerning the use of MIDI MONO:

- When MIDI MONO is used, **the Voice is removed from the
  MATRIX-12's Keyboard control** and will only respond
  monophonically to notes received on the MIDI Channel that it is assigned
  to as a control source.

- MIDI MONO may be used in either SINGLE PATCH Mode or MULTI PATCH
  Mode. In MULTI PATCH Mode, **you are able to assign a different
  Patch to each of the 12 Voices** if desired. In SINGLE PATCH Mode,
  of course, each Voice must play the same Patch.

- MIDI MONO on the MATRIX-12 allows each Voice to respond to
  VELOCITY, RELEASE VELOCITY, LEVER1, PEDAL1 and PRESSURE
  independently. This means, for example, that you can use Pitch Bend
  and Volume control on one Voice without affecting the others.

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- MIDI MONO on the MATRIX-12 requires each Voice to respond to LEVER2 and PEDAL2 **globally**. This means, for example, that Vibrato and Sustain Pedal commands received by the Voices assigned to MIDI MONO affect **all** Voices – these two Controllers are not independent per Voice as VELOCITY, RELEASE VELOCITY, LEVER1, PEDAL1 and PRESSURE are.

- MIDI MONO is a MIDI IN (Receive) function only. The MATRIX-12 will not transmit in MIDI MONO.

The MATRIX-12 as a Simultaneous Master and Slave

Because of the independent design of the MATRIX-12's Voices – each can have its own separate control source – the simultaneaous Mastering **and** Slaving of the MATRIX-12 not only possible but easy. Again, we will start out with the experimental MULTI Patch that was created at the beginning of this section.

EXAMPLE #1

The simplest example of a dual Master/Slave connection is to connect the MATRIX-12's MIDI OUT to the MIDI IN of another synthesizer. Then, connect the MIDI OUT of the other synthesizer to the MIDI IN of the MATRIX-12.

When the MATRIX-12's Keyboard is played, the second synthesizer plays as the Slave. When the second synthesizer's keyboard is played, the MATRIX-12 plays as the Slave. Just be sure that MIDI **ECHO** is disabled (in MASTER Page **MIDI ENABLES**) or you will experience an unexpected "doubling" of notes as MIDI information will be fed back to the Master instrument.

EXAMPLE #2

The MATRIX-12 can be set up so that an external "device", such as a MIDI Sequencer or computer, can play its Voices while the Keyboard can be used to play a Slave instrument:

- Connect the Master controller's MIDI OUT of the MATRIX-12's MIDI IN.
  Select ZONE 1:
     Set **CHANNEL** to the transmitting Channel of the Master.
  Select ZONE 1, Page 2:
     Enable **MIDI IN**.
     Disable the remaining Page 2 parameters.

ZONE 1 is now set to play all 12 Voices from the Master instrument connected to the MATRIX-12.

- Connect the MIDI OUT of the MATRIX-12 to the MIDI IN of your Slave synthesizer.
  Select ZONE 2:
  Set the **CHANNEL** of ZONE 2 to a different transmitting Channel than that of the Master that is playing the MATRIX-12's Voices.
  Set the Slave's MIDI IN Channel to be the same Channel that you assigned to ZONE 2.
  Select ZONE 2 Page 2:
    Enable _MIDI OUT_
    KEYBOARD   _CONTROLLERS_

    Enable _VOICE ROB_ if desired.
    Disable _MIDI IN_.

The external device as the MATRIX-12's Master will play the MATRIX-12's Voices independently. You can play the Slave from the MATRIX-12's Keyboard without interference from the Master controller.

EXAMPLE #3

The MATRIX-12 can be set up so that the external device will play some of its Voices while the Keyboard can be used to play the remaining Voices:

- Enter the V. ASSIGN Page and assign six Voices to ZONE 1 and six Voices to ZONE 2.

- Connect the Master controller's MIDI OUT ot the MATRIX-12's MIDI IN.

- Select ZONE 1:
    Set the **CHANNEL** of ZONE 1 to the transmitting Channel of the Master.

    Select ZONE 1 Page 2:
      Enable _MIDI IN_.
      Disable the remaining Page 2 parameters.

- Select ZONE 2.
    Set ZONE 2 **LIMITS** to **0 TO 127**.

    Select ZONE 2 Page 2:
      Enable _KEYBOARD_.
      You may select _CONTROLLERS_ if desired.
   Disable the remaining Page 2 parameters.

The external device as the MATRIX-12's Master will play six of its Voices independently. You can play the six Voices assigned to ZONE 2 from the MATRIX-12's Keyboard without interference from the Master controller's Notes.†

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† See footnote on Page 189.

EXAMPLE #4

The MATRIX-12 can be set up so that:
- the external device will play its six of its Voices while...
- the Keyboard plays the remaining six Voices and...
- the Keyboard is used to play a Slave instrument:

• In either SINGLE PATCH Mode or MULTI PATCH Mode, assign six Voices to ZONE 1 and six Voices to ZONE 2.

• Connect the Master controller's MIDI OUT ot the MATRIX-12's MIDI IN.

• Select ZONE 1:
Set the *CHANNEL* of ZONE 1 to the transmitting Channel of the Master.
Select ZONE 1, Page 2:
Enable *MIDI IN*.
Disable the remaining Page 2 parameters.

• Select ZONE 2:
Set ZONE 2 *LIMITS* to *60 TO 127*.
Select ZONE 2, Page 2:
Enable *KEYBOARD*.
Disable the remaining Page 2 parameters.

• Connect the MIDI OUT of the MATRIX-12 to the MIDI IN of the Slave synthesizer.

• Select ZONE 3.
Set ZONE 3 *LIMITS* to *0 TO 59*.
Set ZONE 3 *CHANNEL* to a different transmitting Channel than that of the Master that is playing the MATRIX-12's Voices.
Set the Slave's MIDI IN Channel to to be the same Channel that you assigned to ZONE 3.
Select ZONE 3, Page 2:
Enable *MIDI OUT*
KEYBOARD   CONTROLLERS
Disable the remaining Page 2 parameters.

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The external device as the MATRIX-12's Master will play six of its Voices independently. You can play the six Voices assigned to ZONE 2 from the MATRIX-12's Upper Keyboard area (ZONES 2 and 3 LIMITS were used to Split the Keyboard) without interference from the Master controller. The MATRIX-12's Lower Keyboard area will play the Slave synthesizer independently.†

Oh yes, there is one last item we did not yet mention. Just remember that you may STORE any of these examples in a MULTI Patch if you wish.

† There is, however, one potential conflict with **Controllers** in these examples. Since the MATRIX-12 does not make a distinction between Local and MIDI Controllers, you may experience the effect of the Levers, Pedals and Pressure transmitted from the Master instrument on the Voices assigned to play on the MATIX-12 only. Likewise, your use of the Levers, Pedals and Pressure on the Voices assigned to play from the MATRIX-12's Keyboard may also affect the Voices assigned to play from the Master instrument. Vibrato (LEVER 2 or the MIDI Vibrato Wheel) is a Global modulation that will be present in the examples given above.

The solution to this is to use different Controller Numbers in the MIDI *CTRLS* Page. You will also need to match these new numbers with the Controller numbers on the Master instrument.

THE MODULATION MATRIX
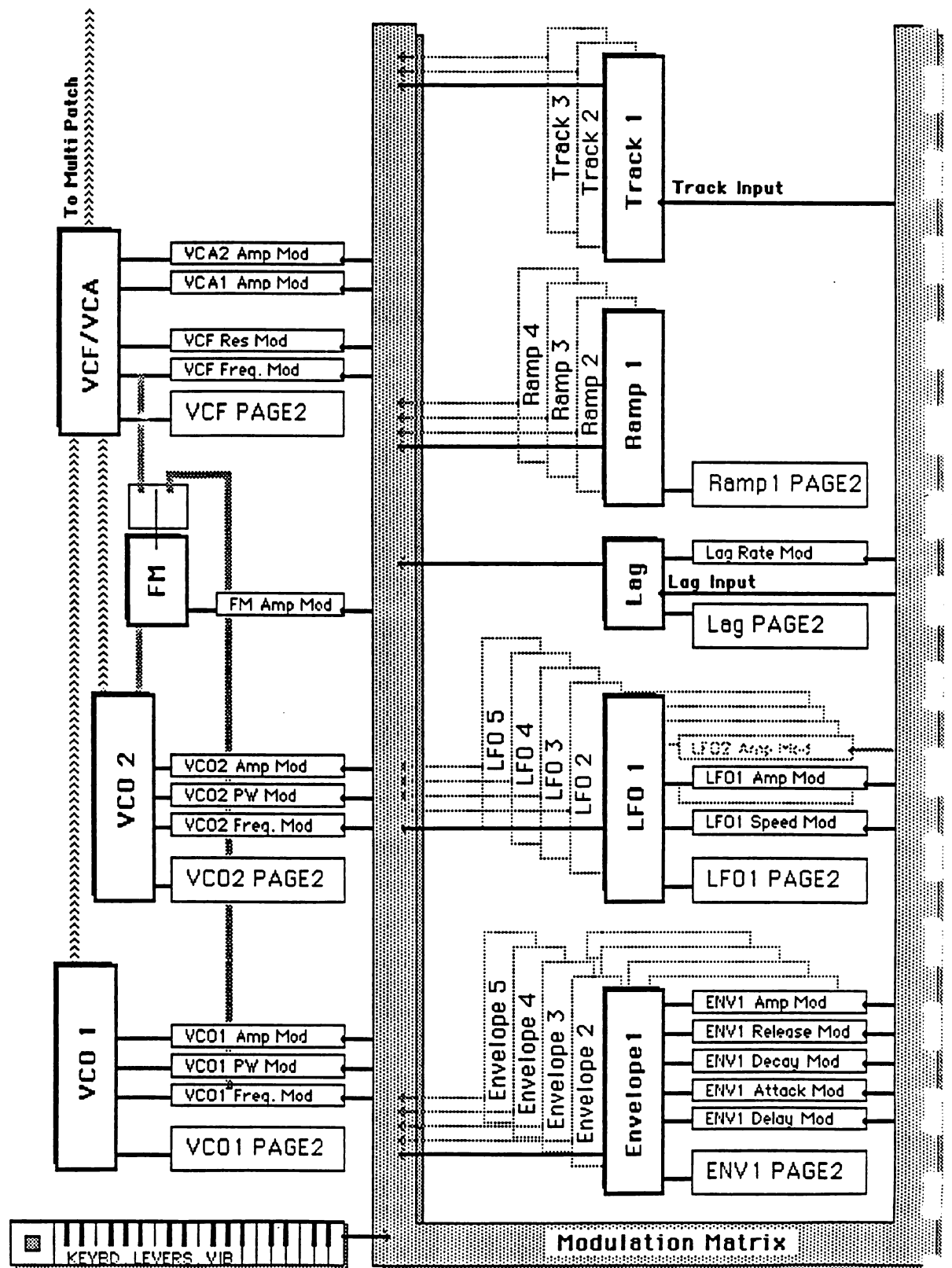
Part 6:
WARRANTY

IF YOU HAVE A PROBLEM

The staff at ECC/Oberheim wish 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 ECC Development Corporation, warrants its products, when purchased in the United States of America 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.

Warranty coverage is valid for Factory-Authorized updates to Oberheim products when their installation is performed by an ECC/Oberheim Authorized Service Center and a properly completed Warranty Certificate is returned to the factory within 14 days of installation.

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, or date of installation of the update, by supplying to the Oberheim Authorized Service Center either the Warranty Registration Sticker applied to the unit itself, or the sales receipt/ installation 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). If the Warranty cannot be verified, the entire cost of the repair in parts and labor is the responsibility of the product's owner.

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PRICES AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

WHAT IS COVERED

ECC/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 instuctions 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 product owner's 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.

Oberheim will not cover under warranty any Sound Chip or Voice Card damaged or destroyed as a result of the owner's mis-handling, or the improper removal and installation into the DMX, DX or Stretch Digital Drum Machines or use with the Prommer.

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 natural events such as rain, earthquakes, floods, lightning, tornadoes, storms, etc.

6. Damage caused by operation on improper voltages.

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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, telephone call charges, 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.

ECC/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.

ECC/Oberheim will not cover under Warranty an apparent malfunction that is inaccurately or inadequately described by the owner to the Service Center at the time of repair.

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.

ECC/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 ECC/OBERHEIM AUTHORIZED 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 approxiamate 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 futher complications.

STEP 2. **CONTACT YOUR ECC/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: **WRITE TO THE ECC/OBERHEIM NATIONAL OFFICES**
If you believe that the problem is still unresolved after you have contacted the Service Center and Dealer, contact the ECC/Oberheim National Offices. 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 ECC Development Corporation
Customer Services Department
11650 Olympic Boulevard
Los Angeles, CA   90064

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