

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 wherever 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 convenient (just plug in the Pedals and go), it is 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 unprecedented 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 unprecedented 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.

- 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 are commonly used to provide constant vibrato-type modulation, but can be used to achieve a wide variety of other types of periodic and random modulations in the Patch.

The LFOs (LFO X)

VCO Frequency Modulation by an LFO
The pitch (**FREQ**) of either or both VCOs can be modulated by an LFO to 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**).