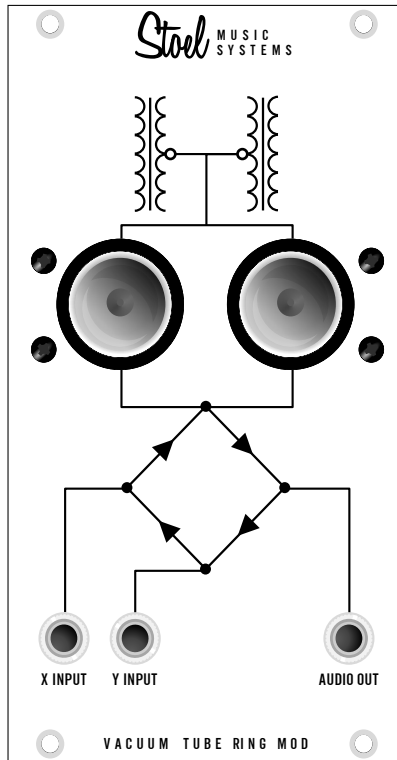


Steel

MUSIC SYSTEMS



VACUUM TUBE RING MOD USER MANUAL

Table of Contents

Warranty Information	3
Installation	4
Replacing Vacuum Tubes	5
Requirements	6
Front Panel Overview	7
Front Panel Components	8
Operation	9
Basic Operation	9
Application	9
Example Configuration	10
Advanced Operation	13
Using the Module as a VCA	13

Warranty Information

Limited Warranty

Stoel Music Systems warrants that each of its products will be free of manufacturing and assembly defects for a period of (1) one year from the purchase date by the original owner. All warranty claims require proof of purchase.

Stoel Music System does not warranty products due to improper installation, including but not limited to, insufficient or defective power supply voltages, installing the power cable backward either on the module or buss board side, or static discharge that damages 5V components.

If the product is deemed defective during the warranty period, Stoel Music Systems will:

(1) repair or replace the product at no charge to the customer except for shipping costs to Stoel Music Systems,

(2) or, refund the customer the amount of the original price.

If Stoel Music Systems determines the product is damaged by the fault of the customer, Stoel Music Systems will:

(1) repair the product (please see repair rates here),

(2) or, send the product back at the expense of the customer.

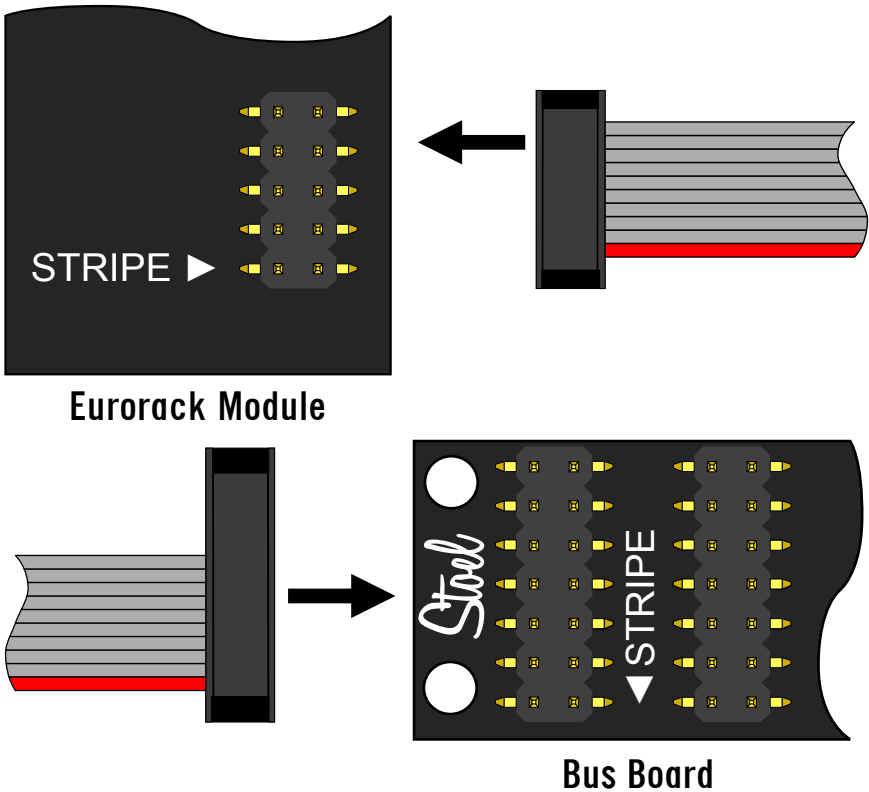
Stoel Music Systems is not liable, either explicit or implied, for any damages to persons or other equipment during the operation of the product.

For warranty or repair requests, do not hesitate to contact service@stoelmusicsystems.com to obtain a "Return to Manufacturer Authorization" request.

Installation

Before installation: **UNPLUG EURORACK CASE!!** Connect the 10-pin side of the power cable to the module with the red stripe as indicated. Connect the 16-pin side of the power cable to the bus board with the red stripe facing down, as shown. Check to verify the location of the red strip on your bus board. Mount the unit with the provided M3 screws within the rack rails.

Failure to properly plug in your module could damage the unit or other equipment.



Replacing Vacuum Tubes

All vacuum tubes come with a thirty day warranty from the manufacturer. However, like an incandescent light bulb, vacuum tubes eventually need to be replaced. The Vacuum Tube Ring Mod requires two 6AL5 tubes.

Before removing the old tube, be sure the power is shut off and the module is unplugged from the system. Carefully wiggle the tube back and forth with gentle upward force until it becomes loose from the socket. Remove the tube and properly dispose.

Orient the new vacuum tube to the correct pin layout (fig. 1). Carefully line up the pins to the socket and with gentle pressure, press the tube into the socket. Once both tubes are in place, plug in the power cable. It is now safe to turn on the eurorack system.

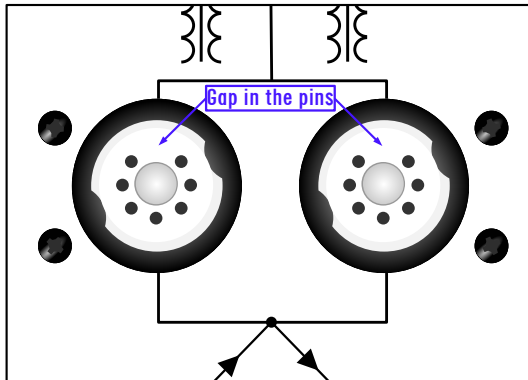


Fig. 1

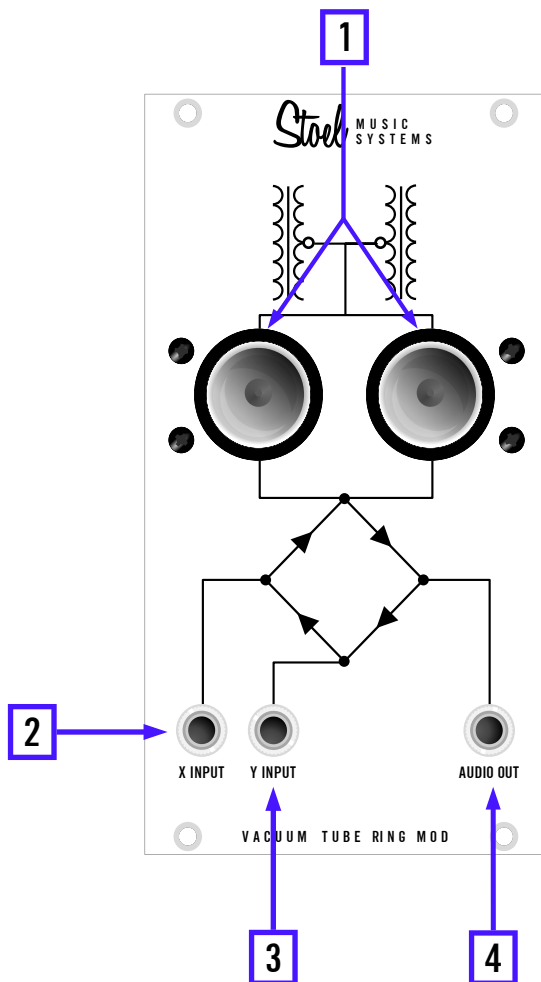
Requirements

HP Required	14 HP
Mounting Depth	36mm
+12 Volt Current Draw	300ma peak
-12 Volt Current Draw	0ma
+5 Volt Current Draw	0ma
5V Requirement	No
Mounting Screws Required	4
Power Cable	10 pin to 16 pin
Unit Weight	3 oz

PLEASE NOTE: Because of the use of vacuum tubes, the module is designed to “warm up” so that the initial current draw does not negatively affect other components of the system. The module may take up to 30-60 seconds to “warm up” before it is ready to use.

The +12V current draw drops to 280ma once the tubes are warmed up.

Front Panel Overview



Front Panel Components

- (1) **VACUUM TUBE SOCKETS:** The Vacuum Tube Ring Mod uses two 6AL5 vacuum tubes. **WARNING:** the tubes may get warm during operation.
- (2) **X INPUT:** The jack accepts any audio signal to be modulated.
- (3) **Y INPUT:** The “Y” jack is the carrier signal to the “X” audio signal. The audio of “X” will be modulated by the audio signal of “Y”
- (4) **AUDIO OUT:** The final modulated audio is outputted out of the jack.

Operation

Basic Operation

The operation of the module is straightforward. The “X” input accepts any audio signal. The “Y” input is the carrier to modulate the “X” audio. “Y” should be any audio signal. The final modulated audio will be presented on the Audio Out jack.

Application

At first, it may seem that the audio is unusable for any practical application. However, this is far from the truth.

The audio can make percussion sounds if a short envelope is applied. For example, higher-pitched tones create sounds such as a bell or a high tom. In contrast, lower pitches can create low toms or kick drums. To add animation to the percussion sound, add a sweeping filter or EQ with a fixed filter bank.

The Vacuum Tube Ring Mod makes excellent bass lines. By tuning the “X” audio and “Y” audio appropriately, it is possible to create house-style bass sounds. Add a slew module to add portamento to the bass line.

Finally, the Vacuum Tube Ring Mod makes fantastic sound effects. For those who wish to produce generative music, complexro, or Dub Step, the tone can be varied to make grinds, pops, clicks, and short musical licks within the composition.

Example Configuration

Basic Configuration

The Vacuum Tube Ring Mod has no controls. Therefore, any sound modification comes from other modules. In the example below, the two oscillators are connected to the X and Y input of the ring modulator. As the tuning of each of the oscillators changes, the tone of the ring mod changes as well (fig. 2).

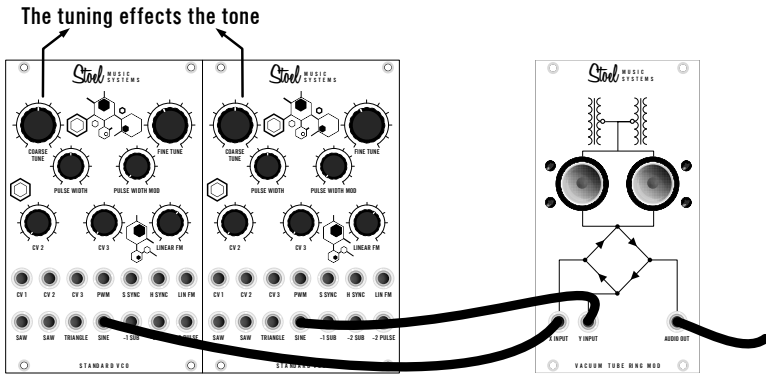


Fig. 2

Two sine waves modulating one another, as shown in figure 1, look like the waveform below (fig. 3). As a result, the timbre resembles a bell sound.



Fig. 3

Example Configurations

Making a Metallic Sound

To make a basic metallic sound, input a sine wave into the X INPUT and a clean triangle into the Y INPUT (fig. 4). As seen in the waveform, the sine is modulated in a triangle fashion. Detuning the carrier (the Y INPUT) controls the modulation of the sine wave.

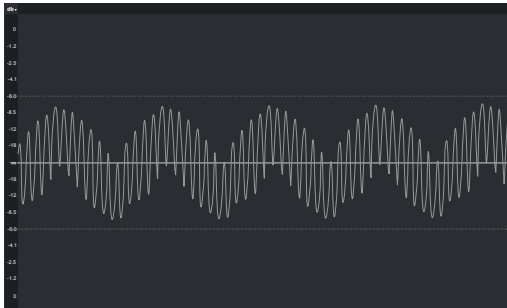


Fig. 4

Making an FM Bell

Combining two sine waves in the X and Y Input creates a bell-like sound. The bell timbre can be modified by tuning the carrier (Y Input) (fig. 5).



Fig. 5

Example Configurations

Using Pulse Width in the Carrier Signal

When listening to a pulse waveform, the signal can be canceled out by turning the PWM to 0% or 100%. However, when using PWM as the carrier signal (Y Input), the audio signal will still be modulated even at 0% or 100% PWM, even though it is not audible on its own. As a result, intriguing waveforms are generated. In addition, the vacuum tubes add to the tonal quality of the overall sound (fig. 6).

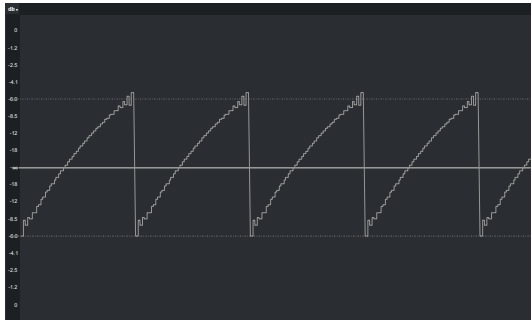


Fig. 6

Pulse modifying saw at 50% PWM (fig. 7).

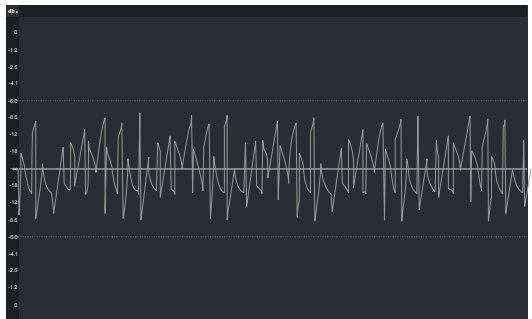


Fig. 7

Advanced Operation

Using the Module as a VCA

A ring modulator is similar to a voltage-controlled amplifier as the audio signal, the X Input, can be multiplied by a CV source through the carrier, the Y Input. The transformers block the DC signal allowing the Vacuum Tube Ring Mod to act as a VCA. The effect is a warmer sound than a standard solid-state VCA.

However, there is a problem. The CV does not close all the way, which causes the audio to leak through. A clever solution to minimize audio leakage is to add a fixed CV Source (fig. 8).

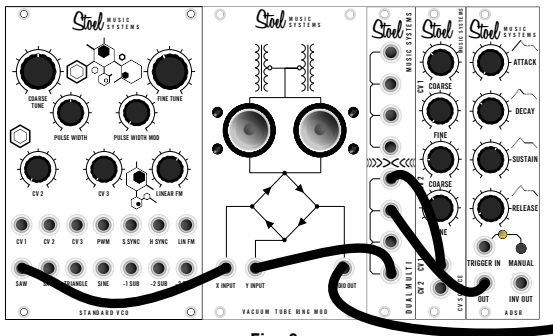


Fig. 8

The figure above shows that an ADSR is the primary CV source. By mixing fixed CV with the CV Source module using multiple, the CV can be adjusted to minimize audio leakage. Remember that the Vacuum Tube Ring Mod was not intended to be a VCA. The vacuum tubes' inconsistencies and their ever-changing properties as they warm up and age will render it impossible to completely “trim out” audio leakage. However, the tone produced by the vacuum tubes is pleasing.



Just make music
