Serge Modular Music Systems

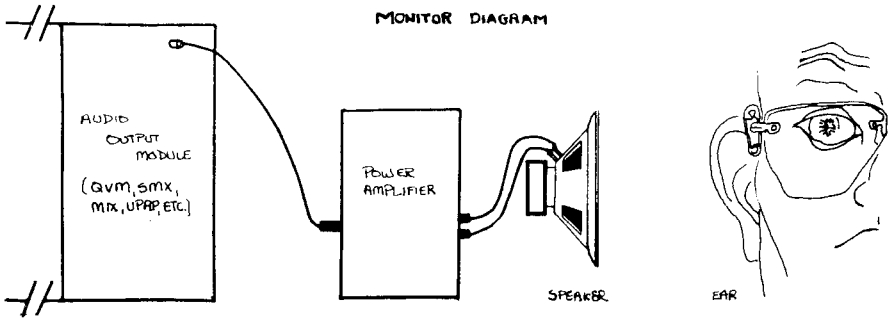
Owner's Guide

1107½ N. Western Ave.
Hollywood. Calif. 90029
213-461-7987

Serge Modular Music Systems

OWNER'S GUIDE

The following patch diagrams represent a means of easily testing each module's proper operation. These tests are a useful introduction to the various functions of the Serge synthesizer. In order to perform these patches, a means of monitoring the Audio Signals from the synthesizer is needed. On most audio mixers, VCA's and Panners, mini-jacks are included on the outputs to provide an easy hook-up to other audio equipment. The signals from such modules as the Quad or Stereo Output Mixer, the Audio Mixer, or the Quad VCA can be directly attached to the "AUXILIARY" input of any audio amplifier or stereo receiver to drive the monitor loudspeakers. (Since the output is a high level output, no further pre-amplification is necessary, and the output can be directly connected to the "LINE" inputs of P.A. amplifiers, tape decks, and other devices.)



In order to check each module's operation, other modules are usually required as controllers or as signal inputs or as signal generators which will be controlled in some manner by the module under test. In the following patch diagrams Dual Transient Generators are used as an all-purpose module to generate control voltages for testing, since this module can be patched to "cycle" (to repeat operation) or to accept triggers from other modules. The DTG also provides a suitable pulse source. Many other Serge modules will function equally well for these checks. What is needed is a source of sub-audio control voltages (SSG,RVG,DSG,PCO, etc.), a pulse source (SSG, RVG, KBD, DSG, SEQ, etc), and a means of determining pulse activity (SEQ,ROU, DSG,SSG,ASR, etc.). These patches are meant to be simple and clear in order to demonstrate the most obvious functions of the modules, and these do not represent the only manner in which the modules may be used. There are many thousands of ways of patching modules together, and there is only one type of connection that should be avoided. Outputs should never be connected together. This type of interconnection is not a useful patch since a processor or mixer is required to combine and add signals. If this connection is inadvertantly made, no damage will result, but sometimes this will put an excessive strain on the power supply. This condition may over a period of time result in damage to the output stage due to the inbalance "seen" at the output jack.

There are four principle types of voltages in the Serge System: DC Control, Bipolar Control, Trigger Pulses, and Audio Signals. DC Control and Bipolar Control provide a "how much" control to vary the amplitude, frequency, rate, or other voltage-controlled parameters within the synthesizer. Trigger Pulses are used as a "when" or "how long" signal to produce timing pulses and to activate or de-activate other functions for a controlled length of time. The Audio Signals are the "what" signals which are usually the electrical oscillations which can be directly transformed into sound.

DC CONTROL VOLTAGES: BLUE. These blue jacks are the inputs and outputs which normally handle signals in the DC Control range. The polarity of DC Control voltages is positive, ranging from 0 to +5 volts, with a maximum range of + and -12 volts.

BIPOLAR CONTROL VOLTAGES: BLACK. The black jacks handle voltages which can go both negative and positive.

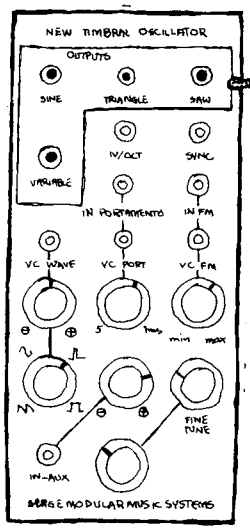
AUDIO SIGNALS: BLACK. Audio and Bipolar signals share the use of the black jacks because they operate within the same range. The main difference between the two is that audio signals always can be converted directly into sound since audio signals are electrical oscillations at frequencies from 16 to 16,000 Hertz. Bipolar Control voltages may extend to much lower frequencies and to static voltage levels. Most audio modules such as Mixers and VCA's will block static DC voltage levels and signals below the frequency of 16 Hertz.

TRIGGER PULSES: RED. The red jacks handle trigger pulses. Trigger pulses are either "high" or "low". The fast transition from low to high defines the point in time that something can be "triggered". The inverse transition, from high to low, cannot be used to trigger anything. The length of time the trigger pulse is high can also determine how long something is sustained.

Some special color jacks are used within the system to designate functions which do not fit into these other categories. The SYNC input of the oscillators and the COUPLER output of the Smooth & Stepped Generator are such functions.

One of the notable features of the Serge system is that only one type of patchcord is used. This is in contrast with a number of synthesizer systems which use different types of patchcords to handle the various signals. The advantage of a one patchcord system is that it allows signals to be used wherever useful, for example, using control voltage envelopes as audio signals. This is often done in the Serge system, especially since most modules have extremely wide ranges with overlapping audio and sub-audio ranges of frequencies.

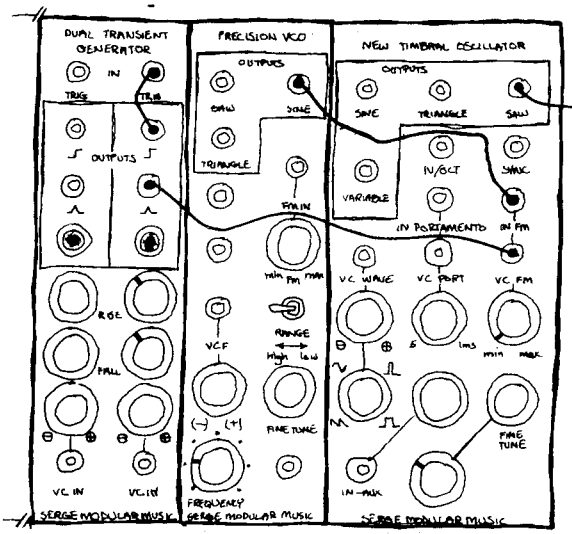
NTO

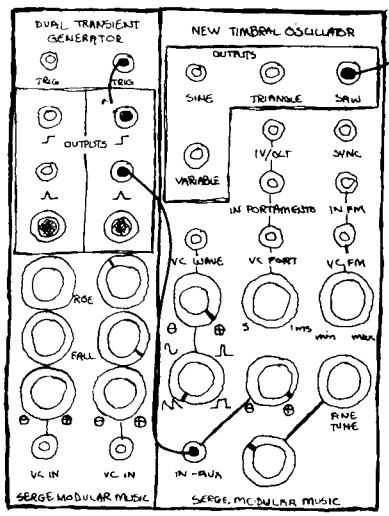


OUTPUT WAVEFORMS

Connect each of the outputs, one at a time, to a suitable monitor and listen for

1. SINE-pure tone
2. TRIANGLE-slightly reedy, with odd harmonic overtones
3. SAW-very rich in harmonics
4. VARIABLE-varying from saw through sine to variable pulse

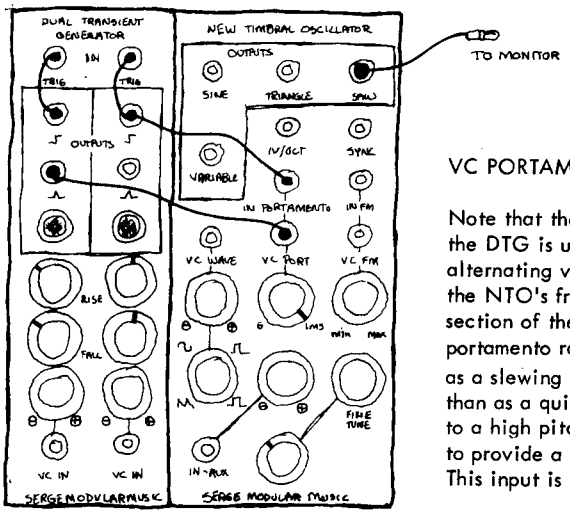




VC FUNCTIONS

Connect the patch cord into each of the various VC functions:

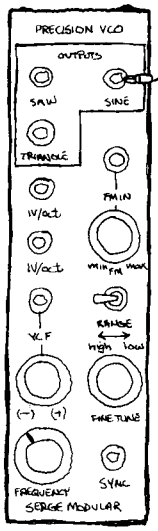
1. IN AUX
2. VC WAVE
3. 1V/oct



VC PORTAMENTO

Note that the second section of the DTG is used to provide an alternating voltage level to control the NTO's frequency. The first section of the DTG provides a varying portamento rate which should be heard as a slewing of the NTO's pitch rather than as a quick step from the low pitch to a high pitch. The knob can be set to provide a fixed portamento time. This input is calibrated at 1V/oct.

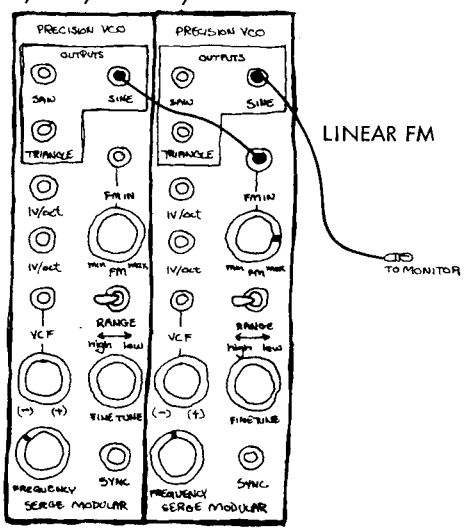
PCO

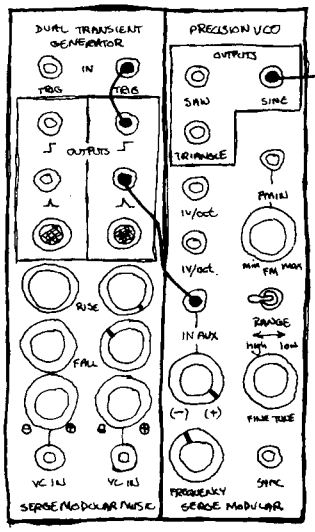


OUTPUT WAVEFORMS

Connect the outputs, one at a time, to a suitable monitor:

1. SINE-pure tone
2. TRIANGLE-slightly reedy with only odd harmonics
3. SAW-very rich

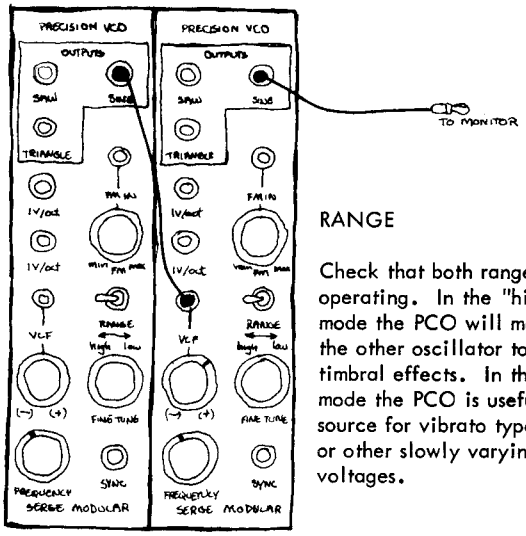




VC FUNCTIONS

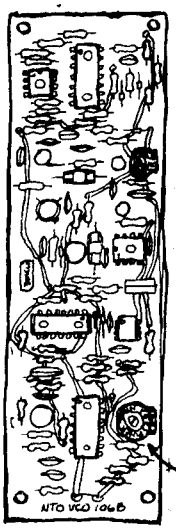
Connect the control voltage from the DTG to each of the VC inputs

1. IN-AUX
2. 1V/oct
3. 1V/oct



RANGE

Check that both ranges are operating. In the "high" mode the PCO will modulate the other oscillator to produce timbral effects. In the "low" mode the PCO is useful as a source for vibrato type effects or other slowly varying control voltages.

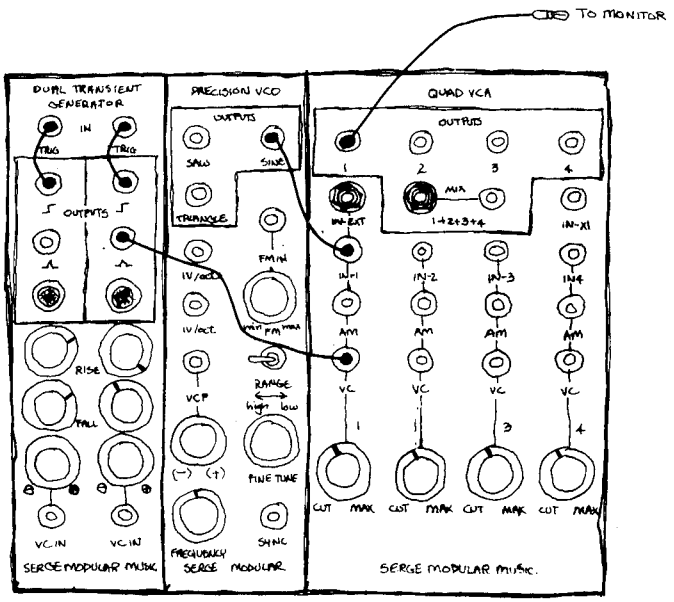


CALIBRATION PROCEDURE

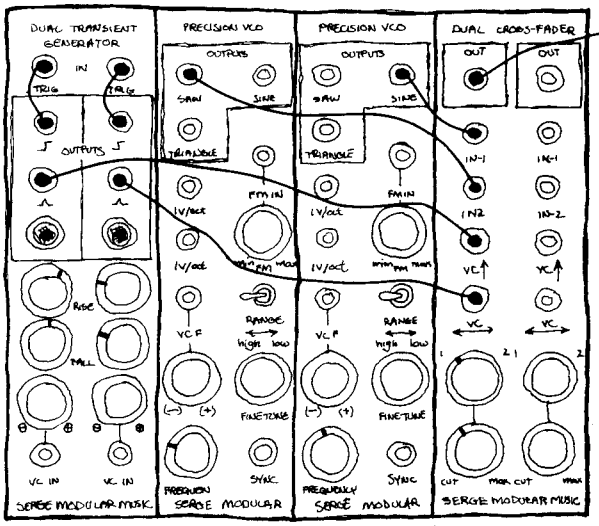
The NTO/VCO PC board is calibrated to very rigid specifications at the factory. There should be no need to adjust the oscillator if your source of control voltages is exactly one volt per octave. If your controller is slightly less or more than one volt per octave, a trimpot has been included on the PC board to compensate for these slight voltage differences. The bottom most pot on the board can be adjusted by the user if it is definitely determined that such an adjustment is necessary. The other trimpots on the PC board should not be adjusted under any circumstances.

QUAD VCA

The position of the "cut-max" knob is critical in this patch. When control voltages are used with high input signal levels, the knob should not have to be turned up past the half-way point. If it is turned up much higher, excessive gain may overload subsequent modules causing them to distort the signal.
Check each section and check to see that the MIX output mixes the four VCA outputs. A signal applied to the IN-X1 jack should appear at the MIX output unaffected by the gain controls of the VCA's. With this patch the AM function of the VCA's can be tested also. If the left hand section of the DTG or a signal from an oscillator or other signal source is applied to the AM input, the signal through the VCA will be amplitude modulated.



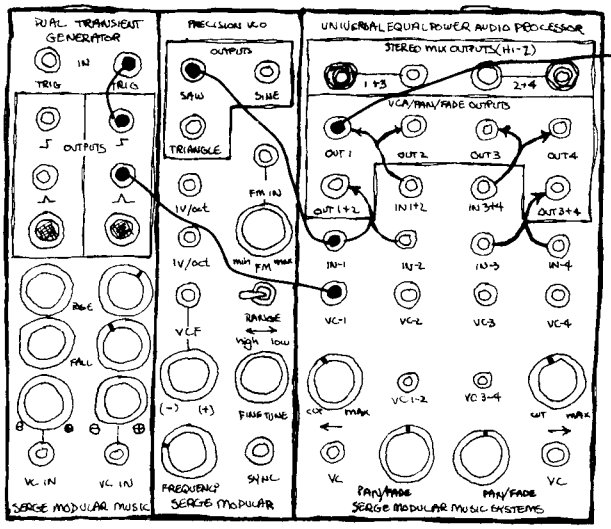
VCA



DUAL CROSS-FADER

Note the two VC inputs. One controls the cross-fade function (the one with the horizontal arrow) and one controls the internal VCA gain. The VCA's operation is exactly identical to the VCA's in the QCA except the AM input is not present.

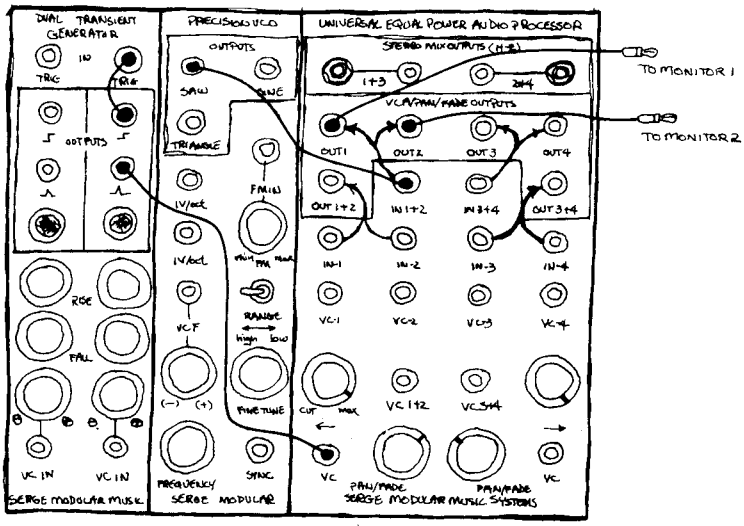
FAD



UNIVERSAL EQUAL-POWER AUDIO PROCESSOR

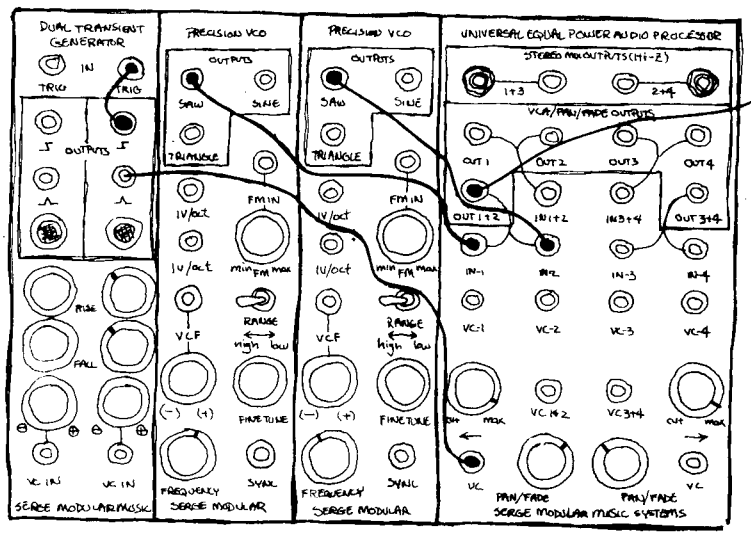
Check each of the four VCA's as shown. The signal inputs, outputs, and control voltage inputs are located in the same horizontal rows. Note the position of the PAN/FADE pot. This pot should be adjusted adjusted so that each pair of VCA's has equal gain. This can be done by ear by putting the same signal and control voltage into each pair (1&2, 3&4) and monitoring the output.
When the outputs are determined to be equal, loosen the set screw and turn the knob so that it points straight up. Tighten the set screw and check the balance again to insure that the setting was not changed by calibrating the knob position.

UPAP



PAN FUNCTIONS

Note the position of the PAN/FADE knob. If adjusted according to the last test, this is the approximate position for a full pan with a control voltage that goes from 0 to +5 volts. Check the other section (3&4) in the same manner.

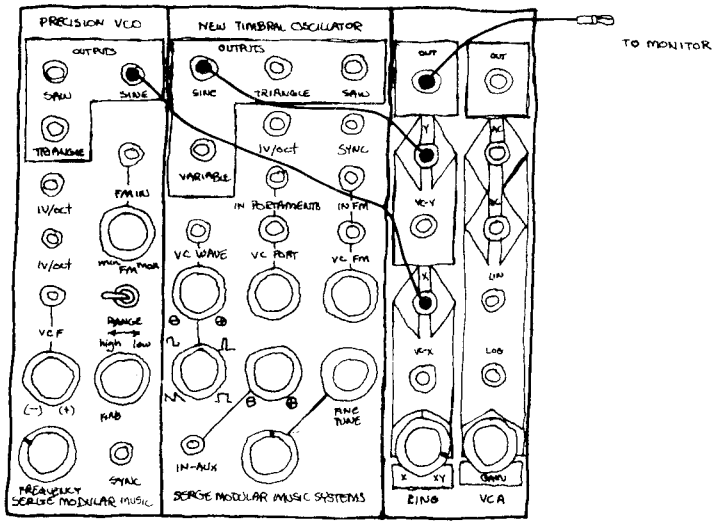


CROSS-FADE FUNCTIONS

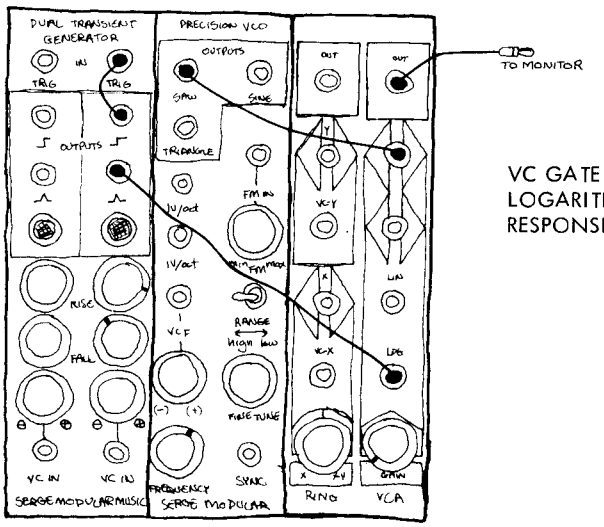
This is similar to the PAN check except that two inputs are cross-faded to a single output rather than distributing a single input signal to two outputs.

RING MODULATOR/VC GATE

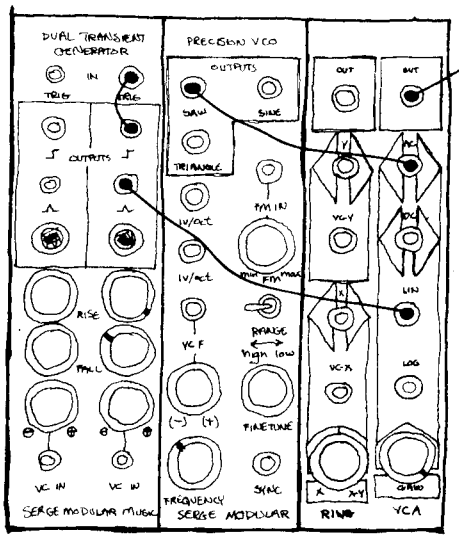
The knob is adjusted so that the output is nulled when a signal is applied to the X input only. This produces the purest Ring Modulation when another signal is applied to the Y input. A Control Voltaage into the VC-X or VC-Y will increase the amplitude of the X or Y signal at the output. There is an internal adjustment for the Y input which should only need to be adjusted if a sine wave patched to input Y when no other signals are attached t the module bleeds into the output. The top trimpot (the one furthest from the potentiometer) can be adjusted to null the Y input.



MOD



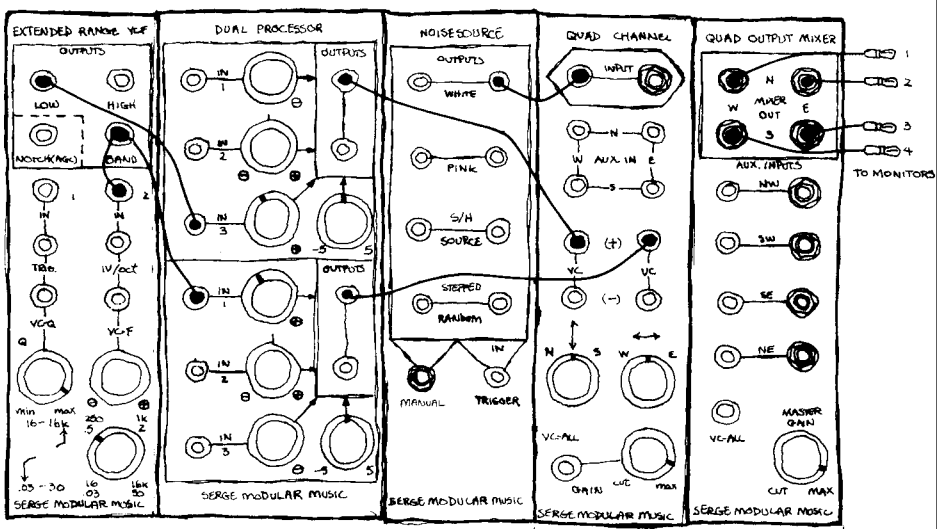
VC GATE with LOGARITHMIC RESPONSE



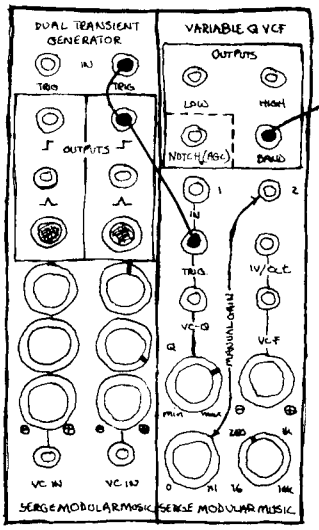
VC GATE with LINEAR RESPONSE (INVERTED)

EXTENDED RANGE VC FILTER

Using feedback to get the filter to oscillate is a good method for producing sine waves that are in a quadrature relationship (90 degrees out of phase). This is useful for many effects, one of which is rotating a sound in space with a channel of the Multi-Input Quadraphonic Mixer. A processor is used to adjust the signal levels for the smoothest panning function.



VCFQ

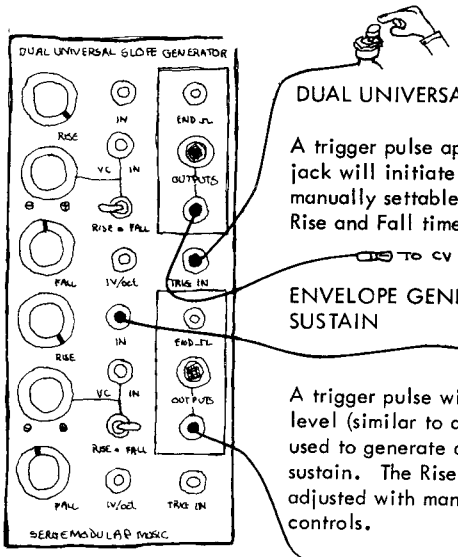


VARIABLE Q VC FILTER

TO MONITOR

This patch will demonstrate some of the possibilities of the VCFQ as a source of percussive sounds. The settings of Q and of the center frequency alter the nature of the timbre, and the other outputs can be used for other sound qualities also. Applying a signal to either Input 1 or 2 (or both!) can provide some very unique effects. Note that as the Q is increased, an input signal into Input 1 will not overload the filter, while an input into Input 2 will increase in amplitude when the center frequency of the filter sweeps across the fundamental frequency or any of the harmonics.

A Note about Triggers:
The trigger pulses shown on these pages (little hands on push buttons) are used to indicate any type of trigger pulse. These pulses can be obtained from such modules as the DSG, DTG, and RVG. The DSG and DTG will produce a trigger pulse each time a cycle is completed. Manual triggers from the C/M module or the Touch Sensitive Sequencing Keyboard can be used, as can any fast voltage transistion from 0 to +5 volts. Some modules have functions which are affected by trigger lengths. The length of a trigger is defined by the length of time it stays "high".



DUAL UNIVERSAL SLOPE GENERATOR

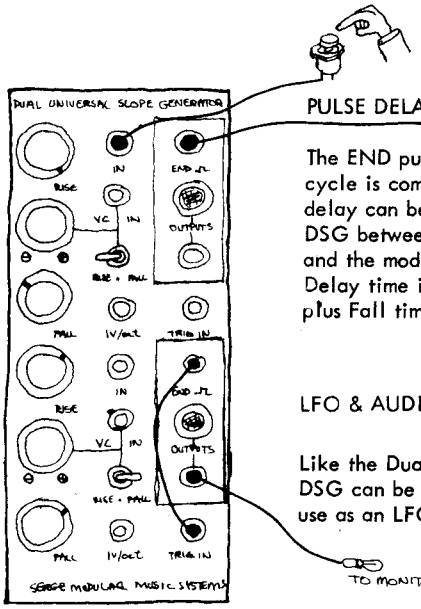
A trigger pulse applied to the TRIG IN jack will initiate an envelope with a manually settable and voltage controllable Rise and Fall time.

TO CV INPUT

ENVELOPE GENERATOR with SUSTAIN

A trigger pulse with an extended high level (similar to a "Gate" signal is used to generate an envelope with a sustain. The Rise and Fall times are adjusted with manual or voltage controls.

TO CV MONITOR



PULSE DELAY

TO TRIGGER INPUT

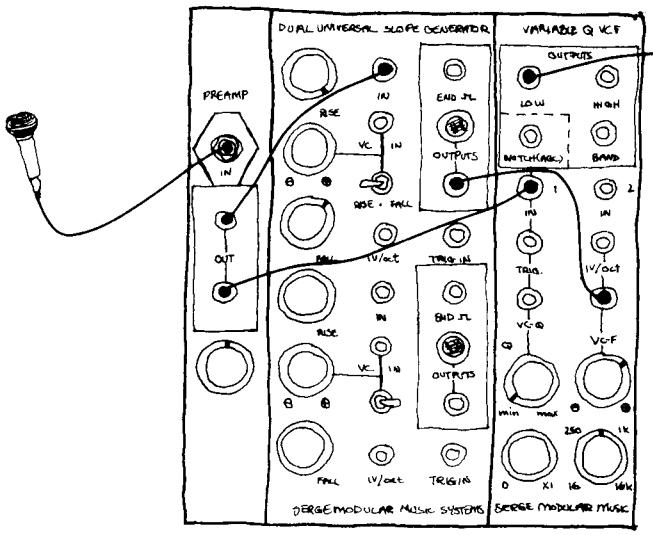
The END pulse goes high when the cycle is complete, thus a pulse delay can be set by inserting the DSG between the pulse source and the module to be triggered. Delay time is equal to the Rise plus Fall time.

LFO & AUDIO OSCILLATOR

Like the Dual Transient Generator, the DSG can be patched to oscillate for use as an LFO.

TO MONITOR OR CV INPUT

DSG

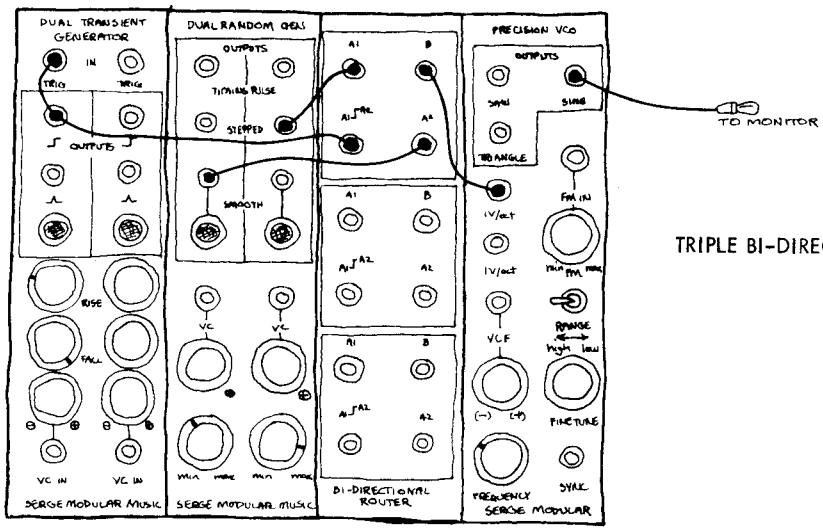


ENVELOPE FOLLOWER

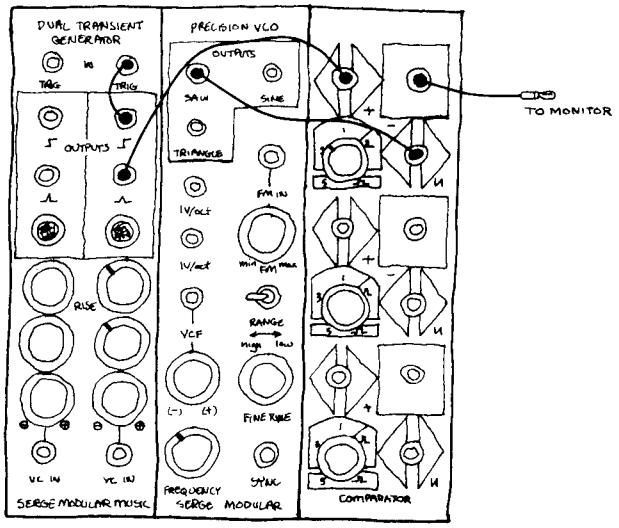
TO MONITOR

If a complex audio signal is applied to the input with the Rise time set very fast and the Fall time set about mid-range, the envelope detection will occur. This setting will produce an envelope detector (follower) which follows the positive peaks of the input signal and smooths out the audio variations into a varying control voltage. Thus amplitude of a complex audio signal can be used to control other parameters within the synthesizer. If the Fall time is made very fast, and the Rise time is adjusted about mid-range, then negative peak detection will result.

ROU



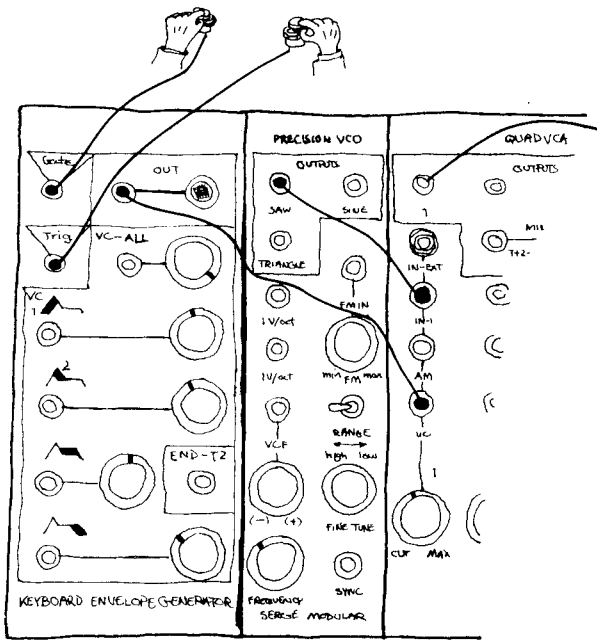
TRIPLE BI-DIRECTIONAL ROUTER



TRIPLE VC COMPARATOR

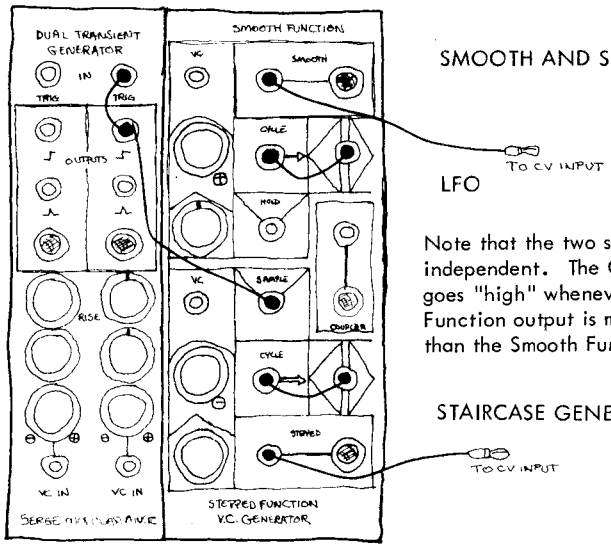
This output will provide a variable pulse width output which can be voltage controlled.

COM



The KEG controls determine the length of the ATTACK, DECAY, and RELEASE time. The knob by the VC-ALL input will affect all of the times proportionally. The knobs will increase the lengths as they are turned CCW. Voltages applied to the VC inputs will decrease the times. The normal way of using the module is to apply the "gate" level to the Gate input. This will initiate the envelope and its length will determine the length of time the SUSTAIN stays high (T-3). When the "gate" level is present, the initial ATTACK and DECAY (T-1 and T-2) will be activated by a trigger applied to the Trig input. There is a trimpot adjustment for the range of the KEG. This is normally adjusted by applying a relatively fast Gate signal continuously to the Gate input with all knobs turned all the way up (CW). Adjust the trimpot until turning the VC-ALL pot slightly CCW begins to have an effect on the envelope length. If this adjustment is too far off, the KEG may not operate.

KEG



SMOOTH AND STEPPED FUNCTION GENERATOR

TO CV INPUT

LFO

Note that the two sections are independent. The Coupler output goes "high" whenever the Stepped Function output is more positive than the Smooth Function output.

STAIRCASE GENERATOR

TO CV INPUT

RANDOM VOLTAGE GENERATOR