

## Fast-Forward and Rewind



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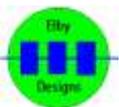
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# EURO-SERGE - SELF-TEACHING PATCHES #1

## MAKING SOUNDS KNOWING NOTHING

1.1 Locate an [ES20 VCO](#), [ASM325 VCO 2](#) or an [ASM321 BASIC VCO](#) on the Euro-Serge. Both of these modules are oscillators. All identically labelled modules are identical and interchangeable, so that if a system contains more than one of these modules any of them will do. For brevity these modules will be referred to as "VCO".

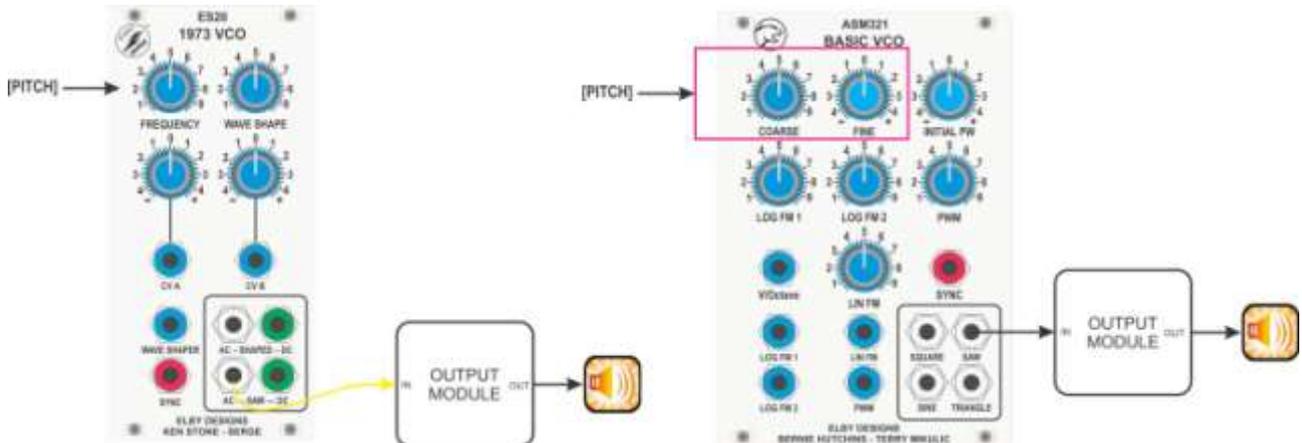


Figure 2.1.1

In the following discussion the ASM321 will be used as the example oscillator module, though the ES20 can be substituted as in the above diagram in most of the following discussions (the ES20 does not have a 1V/OCTAVE input but can be calibrated to give this response).

1.2 It should be noted that all of the jacks on the VCO, though of different colours, are the same type. The Euro-Serge system recommends and promotes the use of the 4mm banana connector as used on the original Serge system although 3.5mm jacks can be fitted if preferred. This means that only one kind of plug is needed to patch from anything to anything else: a banana to banana cord. This kind of cord, since it is the primary cord for patching various modules together, we will simply call a PATCH CORD.



Figure 2.1.2 - 4mm Patch Cord



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## EURO-SERGE - SELF-TEACHING PATCHES #1

1.3 At the bottom of the VCO is the output section with jacks for several outputs. Take one end of a patch cord and insert its plug in to the jack labelled [SAW]. The other end of the cord should be inserted into the [IN] jack of the output module. Make sure that the volume control on your amp is all the way down.

In the above diagram, and all subsequent diagrams in this section, a patch cord will be shown by a thick line drawn between the appropriate jacks on the modules. The output module will be shown as a square with the input labelled [IN]. The amplifier/speaker is shown by a small speaker.

1.4 On the VCO you will find pots that are labelled [PITCH], [COARSE TUNE], [FINE TUNE] or [FREQUENCY] (pot is the name given to all knobs on synthesizers because beneath the faceplate the knob turns a potentiometer) and hereafter will be referred to as the [PITCH] pot. Turn this pot so that its pointer is set to '4'.

1.5 There should be no sound from your speakers until, slowly, you turn up the volume on your amp. You should hear a buzz. Set the volume on the amp so the sound is at a comfortable level. Try moving the [PITCH] pot back and forth. You should hear a whining sound that moves up and down not unlike the sound of a police siren. The further the [PITCH] pot is turned clockwise the higher the sound becomes; the further counter-clockwise, the lower the sound.

If all is working then [skip](#) the next page

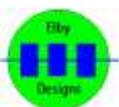


## TROUBLESHOOTING

IF YOU HEAR NO SOUND, then it is time to "troubleshoot" that is, to look for the problem and fix it. This should be done as methodically as possible and with as cool a head as you are able to muster. Things go wrong for the best engineers learning how to troubleshoot is just another, and rather important, thing to learn about synthesizer playing. Below are some elementary troubleshooting steps if no sound is heard:

- A. Check to see that the amp, pre-amp and Euro-Serge system are all plugged into an AC outlet and that each device is turned on. All the modules on the Euro-Serge are turned on by the single master switch. If there is an [ES28](#) TOUCH SEQUENCERPAD or ES25 TOUCH KEYBOARD in the system, one of the led lights should be on.
- B. Visually check that everything is patched correctly together. The [SAW-AC] output of the VCO to the output module. The output module to the amp. The amp to the speaker.
- C. Check that the VCO's [PITCH] pot is set to '4'.
- D. Check the settings on your output module against the settings listed.
- E. Check to see that all the settings on your pre-amp are correct. It should be set to AUX if the synthesizer is patched into AUX. The tape monitor switch, if present, should be off. Try unplugging the cord that goes to the amp from the output module and touching the disconnected end with your finger. If the amp and speaker are set up properly you should hear a buzz or hum.
- F. If all else fails try switching patch cords. It would not be the first time that a patch cord or adaptor was broken. Try a different VCO.

Now that you have the first PATCH working there are a few things you can try:.....



## BACK ON THE ROAD AGAIN

1.6 Try turning the [PITCH] pot as far left as it will go. At some point it will start to become a series of clicks. They try turning it as far to the right as it will go. The pitch will get higher until it is barely within the human range of hearing. Try turning the pot labelled [FINE] or [FINE TUNE]. Like the [PITCH] pot it alters the pitch, but over a much smaller range.

1.7 Unpatch the plug inserted in to the [SAW] output. The sound will suddenly stop. Re-patch in to the [SHAPED-AC] or [SINE] output (if using the [SPAPED-AC] output set the [WAVESHAPE] knob fully right). You should notice a difference in sound quality between these outputs. This quality is called "timbre" and is one reason why different instruments playing the same pitch can be distinguished. For instance, a piano playing Middle C and a violin playing Middle C are distinguished by their timbres.



# EURO-SERGE - SELF-TEACHING PATCHES #1

## STEP TWO

2.1 On the Euro-Serge system find the module labelled AUDIO MIXER.

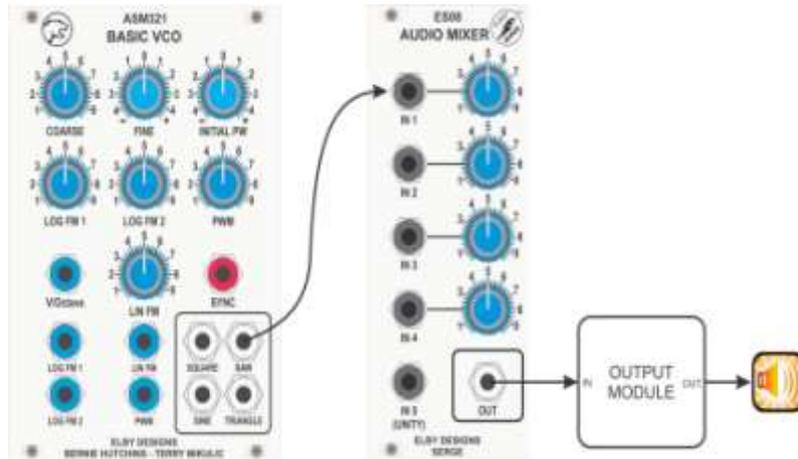


Figure 2.2.1

2.2 Patch the [SAW] out of the VCO to [IN 1] of the mixer. Patch the output of the mixer to the [IN] of the output module. The pot that is associated with [IN 1] by a line should be turned fully left. Make sure that the [PITCH] pot on the VCO is set as in STEP ONE.

2.3 Slowly turn the pot associated with [IN 1] to the right. The buzzing sound heard in STEP ONE should now once again be heard from the speaker, but at a softer volume. By turning the mixer pot further and further to the right, the sound can be made louder and louder.

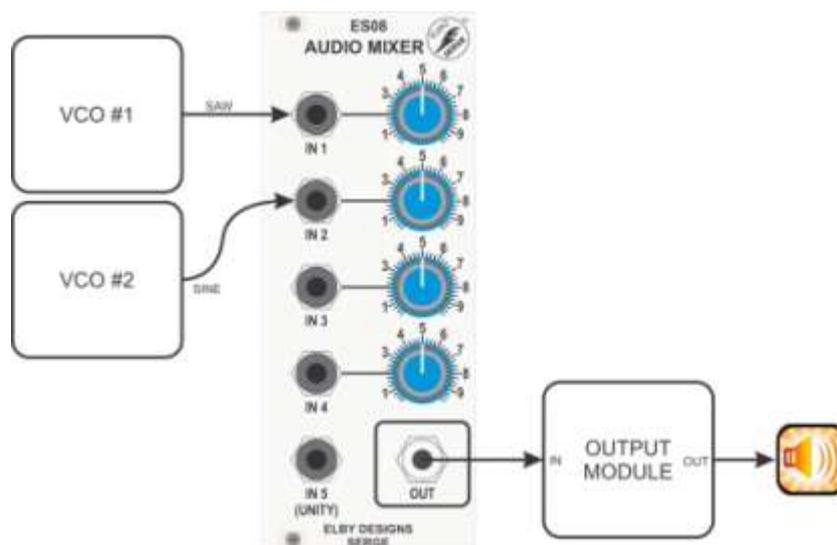


Figure 2.2.2



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## EURO-SERGE - SELF-TEACHING PATCHES #1

2.4 Using a second VCO on the Euro-Serge set up the patch in Figure 2.4.

Using the second VCO's [SHAPED-AC] or [SINE] output to [IN 2] of the mixer. Slowly turn its associated pot up. A second sound being MIXED with the first should now be heard. The loudness of the each two sounds can be determined by their associated pots on the mixer. Note that you can adjust each VCO's pitch separately.

2.5 When a single piano note is struck the sound quickly gets loud and the slowly dies out (if the pedal is down). Try getting this effect by turning the mixers pot quickly to the right and then slowly back to the left.



*Click for for audio*



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## STEP THREE

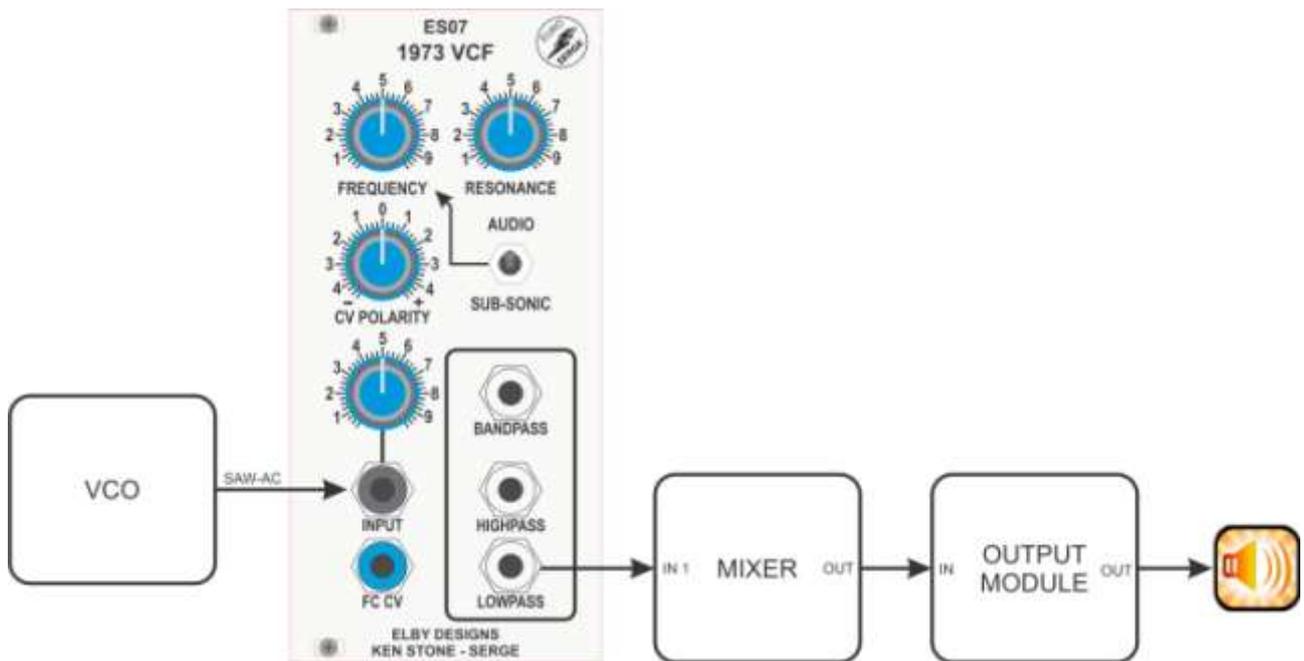


Figure 2.3.1

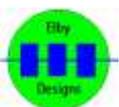
3.1 Patch the [SAW] output of the VCO in to the [INPUT] of the filter module. Patch the [LOWPASS] output of the filter to [IN 1] of the mixer. Set the pot associated with the filter [INPUT] fully left.

3.2 Turn the [PITCH] of the VCO to about '2', which will produce a fairly low sound. The [IN 1] pot of the mixer should be at the level that it had been adjusted to in the previous step.

3.3 Turn the [FREQUENCY] pot on the filter all the way right. You should hear a buzz similar to the one in the previous steps.

3.4 Slowly turn the [FREQUENCY] pot on the filter to the left. The sound should get softer and softer and finally disappear. However, it will get softer in a different manner than when the mixers pots were tuned down. This time, the sound seems to get more and more muffled. The high buzz in the sound disappears first, and then the rest of the sound.

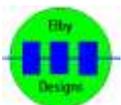
Try VCO's set to different frequencies, different outputs of VCO's, and a mixer output. When listening to these sounds start with the filters [FREQUENCY] pot set full right in order to hear the full sound before filtering it.



## EURO-SERGE - SELF-TEACHING PATCHES #1

3.5 Try the same patch but using the [BANDPASS] output of the filter. Then try the [HIGHPASS] output of the filter, but start with the [FREQUENCY] pot fully left.

3.6 It should be clear that there are a lot more pots to turn and adjust than there are hands to turn them. It should also be clear that the sounds so far produced are still very simple and hardly music. These two problems are attacked in STEP FOUR.



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# EURO-SERGE - SELF-TEACHING PATCHES #1

## STEP FOUR

Certain things about STEP THREE can easily be said. The pitch pots on the VCO controlled how high or low the frequency of the sound would be, while the gain pots on the mixer controlled how loud or soft the sound would be. The filter controlled certain aspects of the timbre or quality of the sound.

Loudness, Pitch and Timbre are all components of a single sound. Even in traditional scores these three "parameters" are notated.

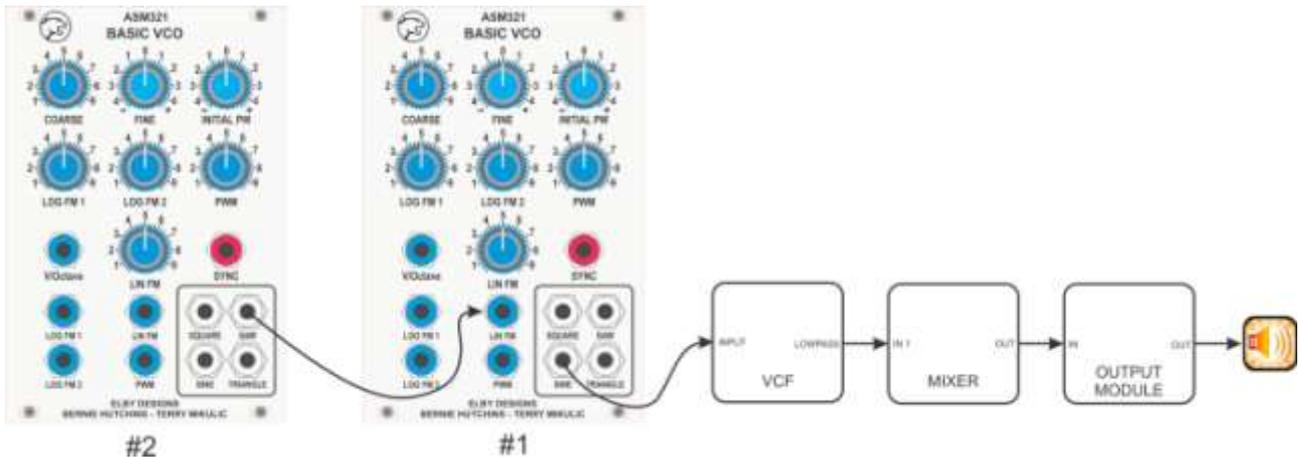


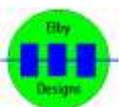
Figure 2.4.1

4.1 Set up the patch in Figure 2.4.1

4.2 On VCO #2 set [PITCH] fully left. Set the associated [INPUT] pot on the filter to '8'.

4.3 Set the [PITCH] pot of VCO #1 to about '2'; set the [IN 1] pot on the mixer to a comfortable volume. Set the [FREQUENCY] pot on the VCF fully right. The pitch of the output will start to rise, getting higher and higher. It might so high that you will not be able to hear it. Then suddenly the sound will drop to a very low sound and start rising again. It is JUST AS IF you were turning the pitch pot of the VCO slowly to the right and then suddenly, fast as lightning, turning it fully left.

4.4 Slowly turn the [PITCH] pot on VCO #2 to the right. As you do this the speed at which the pitch rises should increase. As this rising and falling accelerates to more than once a second, the ear starts to hear it as a constant wavering sound. When it approaches 20 times per second, the ear no longer distinguishes individual sweeps (though they are still happening),



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## EURO-SERGE - SELF-TEACHING PATCHES #1

but rather hears a new, very low sound as well as some stranger higher sounds. Turn the [PITCH] pot on VCO #2 higher and higher listening to results as you do so.

4.5 Return VCO #1 and VCO #2 to the settings at the beginning of this step. Try using the [SHAPED-AC] output (turn [WAVESHAPE] fully to the right) and any other wave shape that may be available. When used with the [SHAPED-AC] output, the sweep is a gentle one both up and back down.

4.6 Reset VCO #1 and VCO #2 to the settings at the beginning of this step. Slowly turn the associated filter [INPUT] pot from its '8' setting to its '5' setting. The sweep will take as long, but won't get as high or drop as low. At '5' there should hardly be any sweep at all. As the pot is turned past '5' to '2' the sweep should start heading DOWNWARD, jumping UPWARD just the opposite of what it has been doing.



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## STEP FIVE

5.1 Set the patch in the previous step. Set the associated [VC FREQUENCY] pot to '5' so that there is almost no sweeping and so that the sound is neither muffled nor too soft. The filter [FREQUENCY] pot should be set to about '4'.

5.2 Locate the [ES28](#) Touch Sequencer which is normally at the bottom of the synthesizer.

5.3 On the [ES28](#) there are 4 rows and 8 columns of pots. The rows are labelled [A] - [D] and the columns are labelled [STEP 1] - [STEP 8]. Set the pots in row [A] to 8 different positions - it doesn't matter what positions these are so long as they all different.

5.4 To the right of the [ES28](#) is the output section. Patch from [A] to the [1V/OCTAVE] on VCO #1 as in the Figure 2.5.1 below.

5.5 Touch different keypads on the [ES34](#) with your finger, as you do, notice that a light on the [ES28](#) goes on in the associated column to the keypad you have just touched. The light remains on until you have touched another key, so only one light will be on at a time. This light indicates that the column above it is activated. The pitch of the sound should change as each keypad is touched.

5.6 Turn the pot in the [A] row in the column that is now activated (i.e. has its light lit). It should be just like turning the pitch pot of the VCO #1, but by REMOTE CONTROL.

5.7 Try setting the pots in row [A] so that a tune can be played on the keypads.



# EURO-SERGE - SELF-TEACHING PATCHES #1

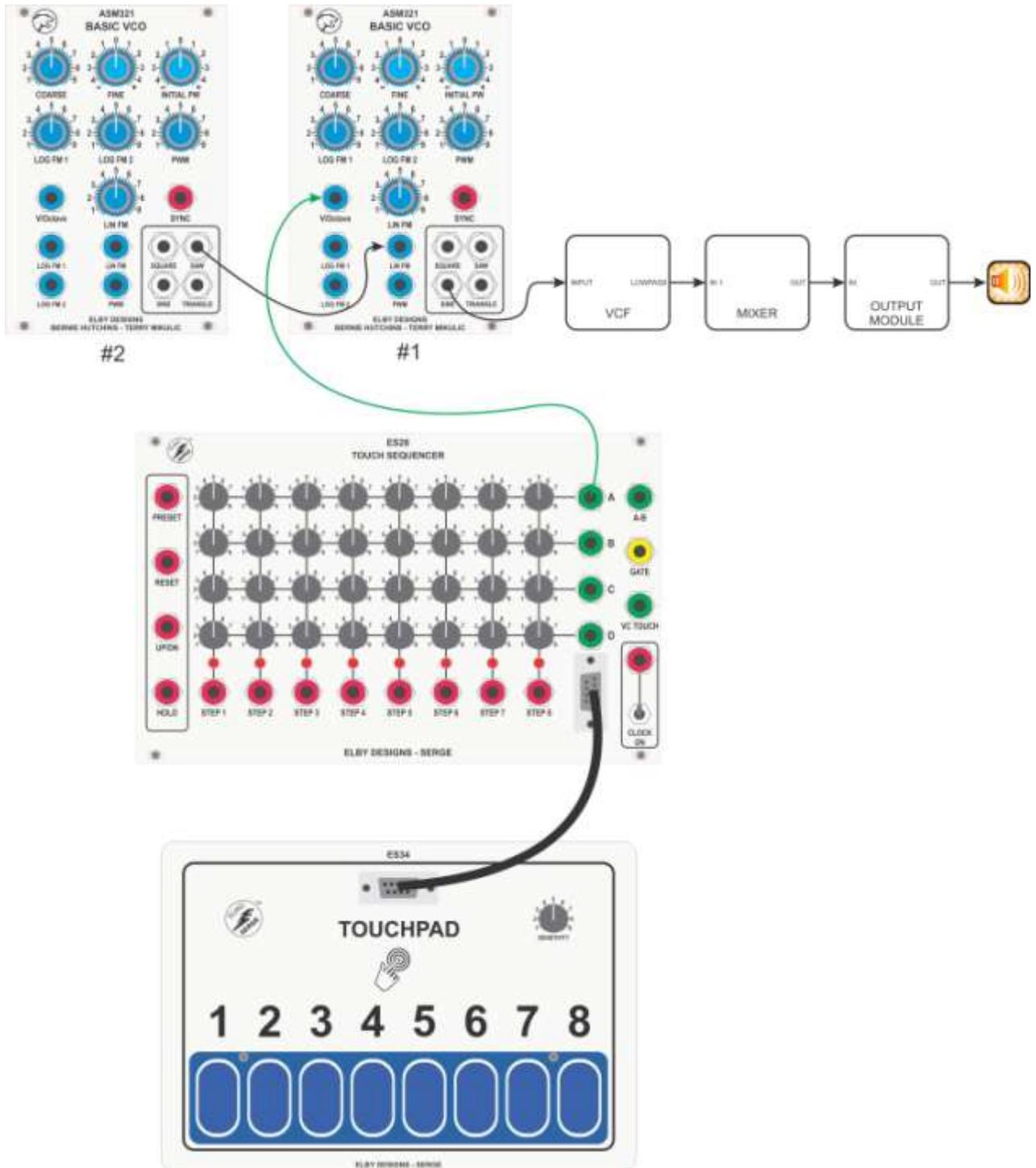


Figure 2.5.1



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## STEP SIX

6.1 Just as an oscillator's frequency can be made to rise or fall by remote or voltage control (that is without turning that oscillator's pots) there are a number of mixers and other modules on the Euro-Serge which can control the GAIN of a sound by voltage control. The volume can be increased or decreased without turning a pot. In general these modules are called Voltage Controlled Amplifiers (VCAs) when they have single inputs or Voltage Controlled Mixers when they have more than one input.

6.2 Almost all the output mixers in the Euro-Serge system are voltage controllable, meaning that the gain of their inputs can be controlled by a voltage coming from another module. Each input to the mixer has one or more VC inputs. These will be noted as "VC IN" on the output mixer module.

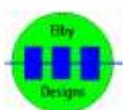
6.3 Some Euro-Serge systems have independent VCA modules which often contain extra features. Patched as another link in the synthesis chain they can be used instead of the VC-output mixer to provide voltage controlled gain. In the diagrams below the VC-IN is noted on these modules. In the patches that follow, the VC-IN will be shown patched to the output mixer, but it can refer to these independent VCAs as well.

6.4 In the following patch the VCO which is connected to the VC-IN of the mixer should be set with its [PITCH] controls to the left. It will increase and decrease the GAIN (loudness) of the sound in the same fashion that it controlled the frequency of the other oscillator in the previous patches:

6.5 Try increasing and decreasing the frequency of the controlling VCO. The bursts of sound should get faster and slower. Also try using the different outputs of the VCO and listen to the different "shapes" of the bursts. This shape is called the "Envelope" of the sound.

6.6 On the output section of the [ES28](#) find the jack labelled [GATE] and patch it to the [TRIG IN] of the [ES114](#). The [A] output of the SEQ will control the frequency of the VCO as in previous patches. The output of the [ES114](#) should be patched to the VC-IN of the output module.

6.7 In this the [ES114](#) produces a single envelope, unlike the VCO, which produces a continuous stream of envelopes. Furthermore it will produce this envelope on demand, in this case whenever a key is touched on the [ES34](#). In this sense the [ES34](#) is controlling the [ES114](#). The length of the RISE and FALL times of the envelope are controlled by the [RISE] and [FALL] pots on



## EURO-SERGE - SELF-TEACHING PATCHES #1

the [ES114](#). To produce the approximate envelope of a piano set the [RISE] pot to '6' and the [FALL] pot to '2'.

6.8 It is possible to get a somewhat 'backward' feel to the sound by reversing the settings of these two pots. It is also possible to vet very long envelopes or envelopes so short that they sound like nothing more than clicks.

6.9 At the back of each plug on the patch cord is another Banana jack. This allows you to "stack" the plugs so that you can patch more than one cord from a single jack on the Euro-Serge. You should NOT STACK MODULE INPUTS, however. In order to combine voltages, a mixer or processor is required. If you try to stack at the inputs, you will be connecting the outputs of modules directly together. This is the one connection that should always be avoided in the synthesizer.

OK, now that we have said this, let's moderate it a little; you should not live in total fear of using the system. In every case, modules are protected against inadvertent output shorts, but if a lot of outputs are connected together over a long period of time, it is possible to an excessive strain on the power supply. If you find outputs shorted together accidentally, simply remove them, but get in the habit of thinking of "multing" or stacking ONLY outputs whenever you are stacking banana cords



*Figure 2.6.1*

6.10 Stacking cords in this way, patch the output of the [ES114](#) to the [VC-IN] of the mixer AND to the [INPUT] of the filter. Set associated pots full right. Set the [FREQUENCY] pot of the filter to '2'.

6.11 Tap a key. The sound should now approach very closely the sound of an acoustical instrument. Like the oscillator and the mixer, the filter is now being controlled. Not only does the sound get softer and softer as it dies away (from the action of the mixer), but it should sound as if it is being damped, or losing



# EURO-SERGE - SELF-TEACHING PATCHES #1

its 'highs' as time progresses. This is what happens when a piano note is struck

6.12 In the following patch all remains the same as the above patch except that [GATE] is now connected to the [INPUT] jack of the [ES114](#).

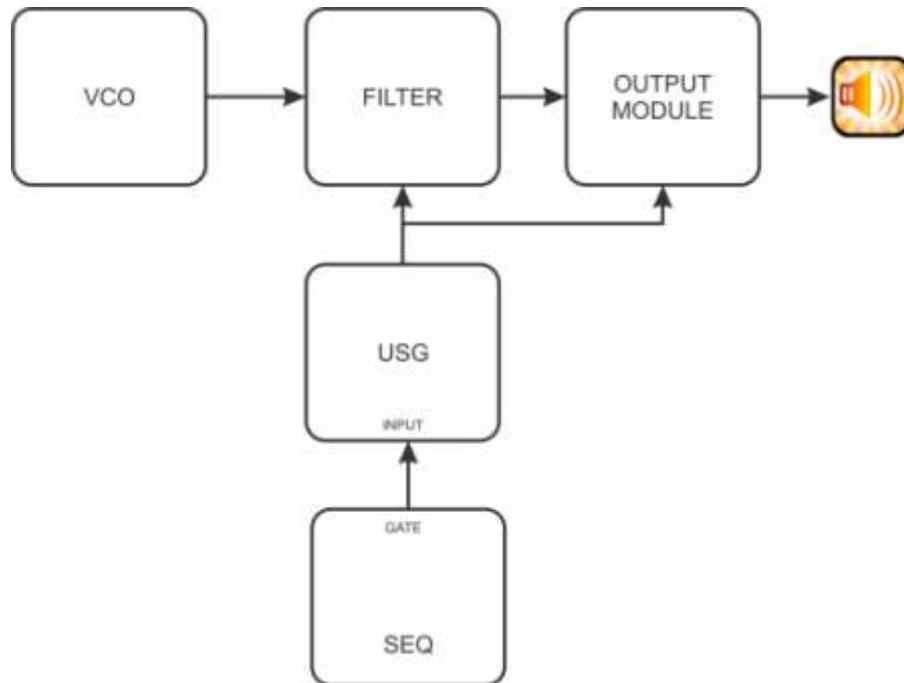


Figure 2.6.2

What has been added here is the ability to hold or sustain a sound by keeping one's finger on the keyboard. The RISE will begin as soon as the key is touched, but the FALL won't begin until the finger is released.

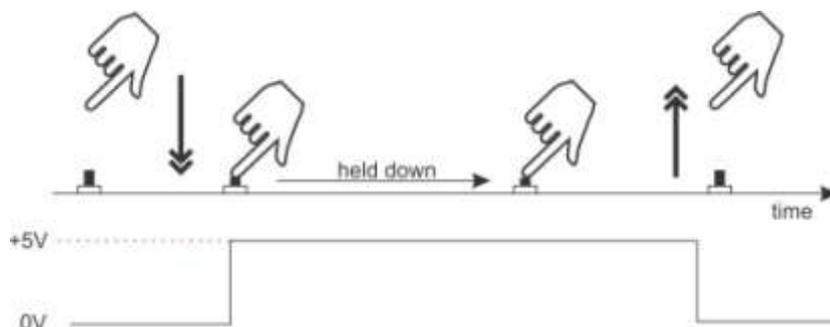


Figure 2.6.3



## STEP SEVEN

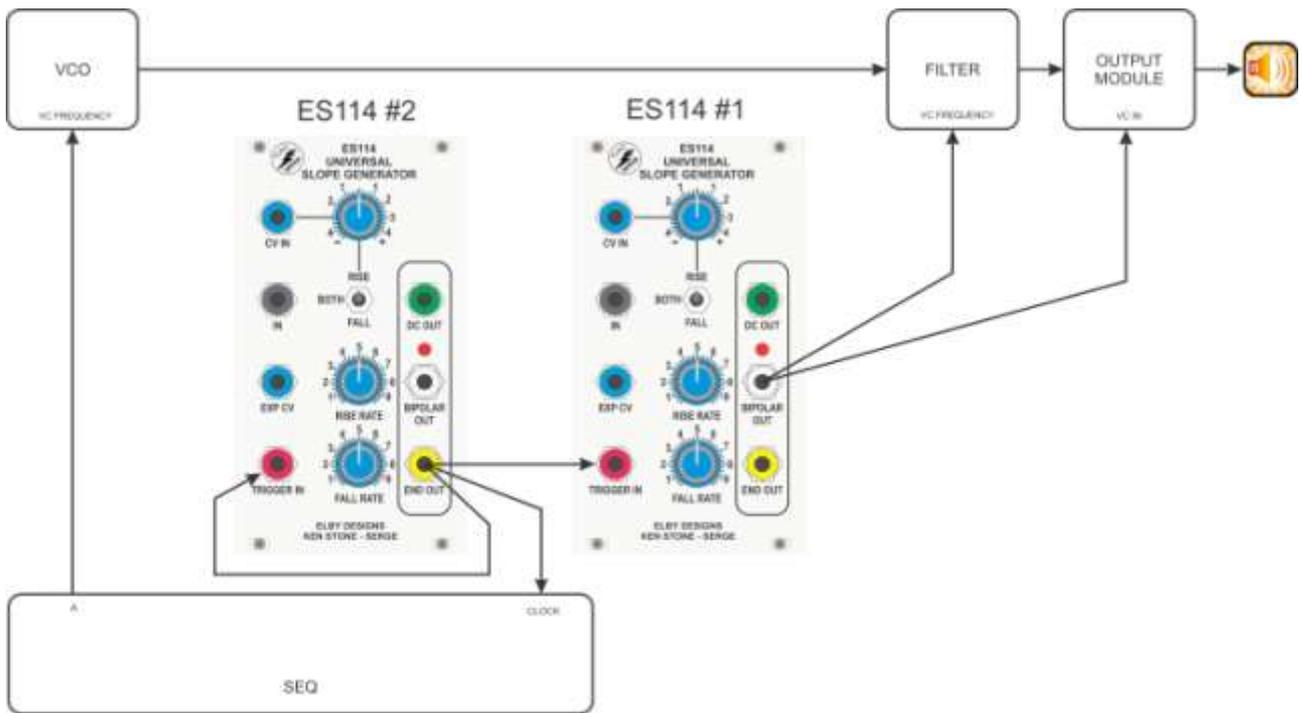


Figure 2.7.1

7.1 Using a second [ES114](#), which will be referred to as [ES114 #2](#), patch from the [END] jack to the [TRIGGER] jack of [ES114 #2](#). This will be the first time that you patch between two jacks of the same module.

7.2 Using the LED light on [ES114 #2](#) as a guide, set the [RISE] and [FALL] pots of [ES114 #2](#) so that the light flashes about once per second or even slightly slower.

7.3 Remove the cord from [GATE] on the [ES28](#) to [TRIGGER IN] of [ES114 #1](#) and patch it from [END] of [ES114 #2](#) (stacking the plugs) to [TRIGGER IN] of [ES114 #1](#). Also stack a patch cord from the [END] of [ES114 #2](#) to the [CLOCK] jack on the [ES28](#) (again note that we are stacking at the output. No input here has more than one output connected to it, but the [END] output of [ES114 #2](#) is stacked to two places, [TRIGGER IN] of [ES114 #1](#) and [CLOCK] of the [ES28](#)).

7.4 The [ES28](#) should now begin to "sequence" all by itself, stepping through its columns as if you were touching one keypad after the other.



## EURO-SERGE - SELF-TEACHING PATCHES #1

7.5 Try turning [RISE] and [FALL] of [ES114 #2](#) further and further to the right. The [ES28](#) should step even faster. You may have to adjust the [RISE] and [FALL] pots on [ES114 #1](#) to the left to keep the sounds from "blurring" together. Try turning the pots on [ES114 #2](#) farther and farther to the left to make the [ES28](#) step slower.

7.6 The patch that you have now set up is one of the most common patches on a synthesizer, yet it is but one of an infinite variety. Other modules may be added to this patch that change the timbre, that create complex rhythms, that add second, third and fourth voices. From this section it is hoped that you have gained some of the sense of the sounds that a synthesizer can create and to some degree how it creates them.

In the following section some of the theory of syntheses will be explored.



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## Chapter 3 The Theory of Electronic Music



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