ARPSOLUS

CONTENTS

INTRODUCTION

Welcome to the ARP Solus. This instrument has been designed by ARP's engineers and product specialists to incorporate all of the most important technological developments which have made ARP the leader in the field of electronic music synthesizers. It includes such state-of-the-art firsts as Phase-Synchronization and Digital Ring Modulator circuits.

The controls on your Solus have been "human engineered" to feel right in your hands. Controls are grouped logically and are electronically scaled to respond easily to musical demands. As you learn to play your Solus, the value of this human engineering will become increasingly apparent. The result is an instrument of elegant simplicity and superior performance. As you will read later in this booklet, the Solus is an open-ended system. Jacks on the top of the panel can be used to expand the Solus as your musical needs grow.

The Solus belongs to the class of Variable synthesizers. A variable synthesizer, as opposed to a Preset synthesizer, allows you to shape every aspect of a sound, from the attack and decay to the harmonic structure. Your Solus is equipped with controls that will let you precisely shape each and every parameter of the sound you are creating.

Synthesizers create sounds electronically in much the same fashion that any natural sound is created acoustically. There are definite elements of sound which, when put together in different combinations, will reproduce any sound from a clarinet to a seagull. The Solus is a musical instrument comprised of a number of different electronic circuits, each one designed to control different elements of sound.

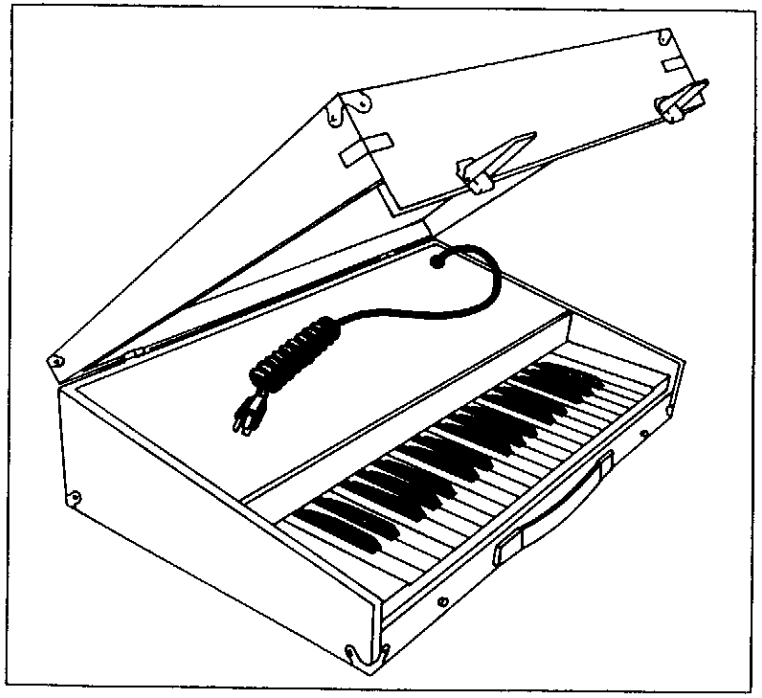
This manual is an operational guide for the Solus, but it should also give you a working knowledge of electronic music functions.

Be sure to fill out your warranty card and send it in. This will protect you in the unlikely event that your instrument should require service.

GETTING STARTED

SET-UP

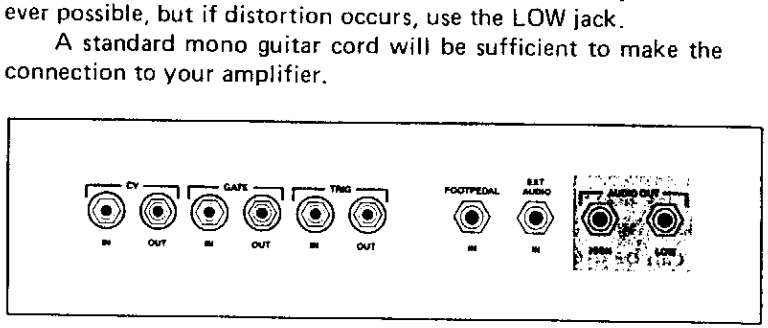
To open the Solus, unlatch the two catches on the front of the instrument and lift the cover back. The cover may be unhooked and placed beneath the instrument, tilting it for ease of playing.



OUTPUTS

Two OUTPUT jacks are provided. The HIGH position is a line-level audio signal capable of driving even the most insensitive amplifiers. The LOW position is a somewhat lower-level signal, since much of the commercial equipment used in a P.A. application might overload or distort from the high-level signal. Use the HIGH jack whenever possible, but if distortion occurs, use the LOW jack.

A standard mono guitar cord will be sufficient to make the connection to your amplifier.



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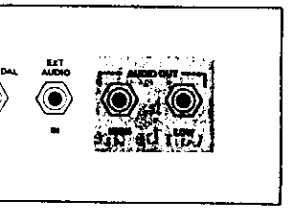


AMPLIFICATION

The whole idea of a synthesizer is to give you the capability to shape and control every aspect of a musical sound using the synthesizer's controls. Therefore, the ideal amplification system for synthesizers should introduce as little distortion or coloration as possible. For this reason, P.A. systems usually produce the cleanest sound with synthesizers. Likewise, a bass guitar amplifier is probably the worst kind of amplification for synthesizers because bass guitar amps usually have poor high frequency response. Some lead guitar amps also have a lot of distortion and coloration. If you play your synthesizer through such an amp, your sounds will tend to be characteristic of the amplifier rather than the synthesizer. Sometimes, however, the combination of the synthesizer and amplifier with a great deal of its own coloration will produce just the sound you might be looking for.

Generally, the type of sound system that is right for you depends on the following factors:

1. Exactly what instruments will be connected into the sound system.

2. The type of music you play.

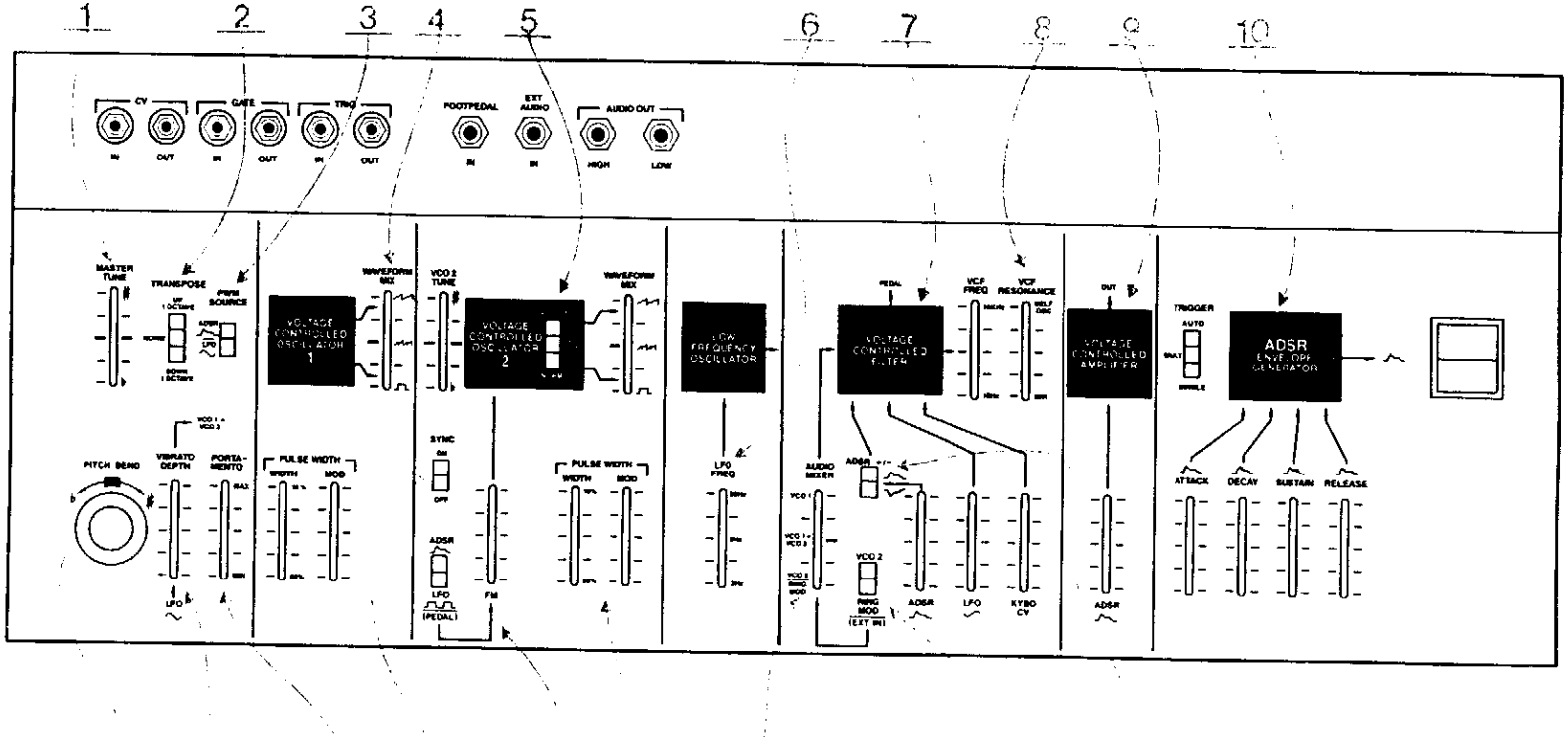
3. How loud you play.

4. The size of the room you play in.

Since there are numerous amp/speaker combinations available on the market, ARP suggests that you consult your local ARP dealer who should be able to tailor a sound system to your style of music.

Also, don't be afraid to use accessory devices, such as phasers, fuzz-wah pedals, equalizers and so forth with your Solus. You can get interesting results.

You're probably very anxious to begin. If so, briefly study the control panel diagram and control function descriptions on the next page. Then turn to page 34 and set up any of the diagrams (called "patches") that you would like to try. If you wish to study the control functions in detail, read the sections on Signal Sources, Modifiers, and Controllers beginning on page 6.



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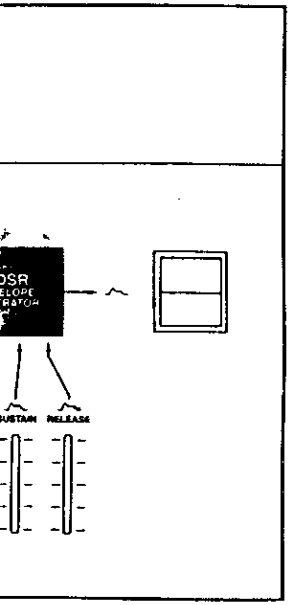


1. MASTER TUNE: Used to set the tuning of the entire instrument

2. TRANSPOSE: Shifts the pitch of both VCOs up or down by one octave.

3. PWM SOURCE: Selects Pulse Width Modulation source for both VCOs.

4. VCO WAVEFORM MIX: Used to select either sawtooth or square waveforms, or a mixture of both.

5. VCO 2 TRANSPOSE: Used to select pitch range of VCO 2 only, handy for quick tuning changes.

6. LFO FREQ: Sets the rate at which the LFO (sine wave or square wave) operates.

7. VOLTAGE CONTROLLED FILTER (VCF): Modifies the sound fed to it by removing the higher frequencies of the sound.

8. RESONANCE: Emphasizes a small band of harmonics at the filter cut-off point. Useful in generating a sine wave.

9. VOLTAGE CONTROLLED AMPLIFIER (VCA): Used to control the amplitude of the sound fed to it by the VCF.

10. ADSR ENVELOPE GENERATOR: Used to "shape" the sound. May be used to control the VCA, the VCF, pulse width, or the frequency of VCO 2.

11. ADSR +/—: Selects either a positive or negative-going (inverted) envelope to control the VCF.

12. RING MOD: A modifier used primarily in the generation of gong and bell sounds.

13. AUDIO MIXER: Used to adjust the mixture of VCO 1 and VCO 2 sent to the VCF.

14. PULSE WIDTH: May be adjusted manually, or controlled by the LFO and ADSR.

15. SYNC SWITCH: Synchronizes the frequencies of VCO 1 and VCO 2.

16. ADSR/LFO (PEDAL) FM: Used to select either the ADSR or the LFO square wave to modulate the frequency of VCO 2. A pedal may be used in place of the LFO.

17. PORTAMENTO: Causes the Solus to "slide" from one note to the next.

18. VIBRATO DEPTH: Routes the LFO sine wave to both VCOs for vibtrato.

19. PITCH BEND: Shifts the pitch of the instrument up to one octave sharp or flat.

SIGNAL SOURCES

THEORY

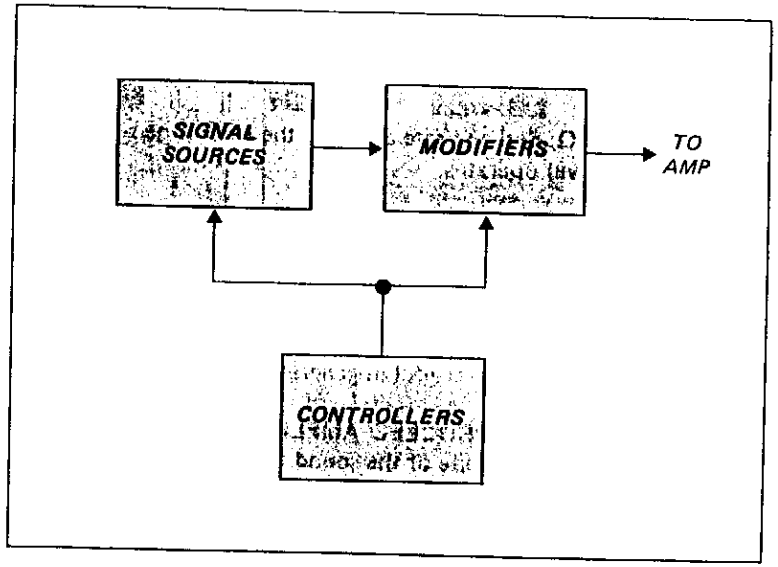
All of the electronic circuits in your Solus fall into one of three basic categories:

1. SIGNAL SOURCES: The "raw" pitched tones which will be modified or controlled by the other functions on the Solus. The Signal Sources on your instrument are VCO 1 & 2 (saw-tooth or square wave), and the External Audio Input. The VCF may also be used as a Signal Source, but its primary function is that of a Modifier.

2. MODIFIERS: Devices which "process" the raw signal from a Signal Source. These devices may be used to alter the timbre (tone quality) of a sound, or to increase/decrease the amplitude of a sound. The Modifiers on your Solus are the VCF, VCA, and RING MOD.

3. CONTROLLERS: Used to operate or "control" the output of Signal Sources or Modifiers. For example, the keyboard is a Controller which you use to tell the VCO which note to produce. Similarly, the LFO (sine wave) may be used to open and close the VCF, producing a tremolo effect. The Controllers on your Solus are the keyboard (including the Portamento and Transpose functions), LFO (square wave or sine wave), and the ADSR Envelope Generator. You may also use a foot pedal (optional) to control your Solus.

The following is a simple block diagram. Block Diagrams are commonly used as visual aids to help understand the flow of information in electronic devices, such as the Solus. From the diagram below, you will see that signals flow from Signal Sources through the Modifiers, and out to the amplifier. Controllers, however, are constantly being used to adjust the outputs of both Signal Sources and Modifiers.



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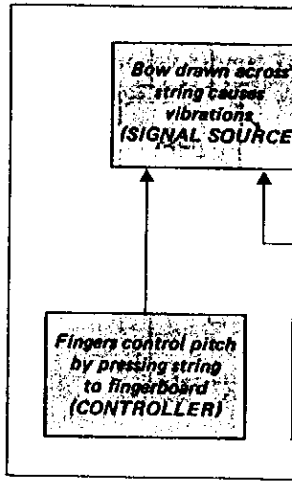

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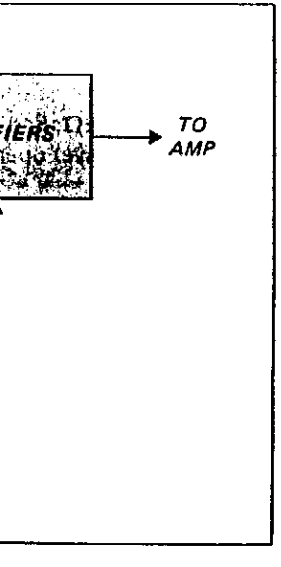
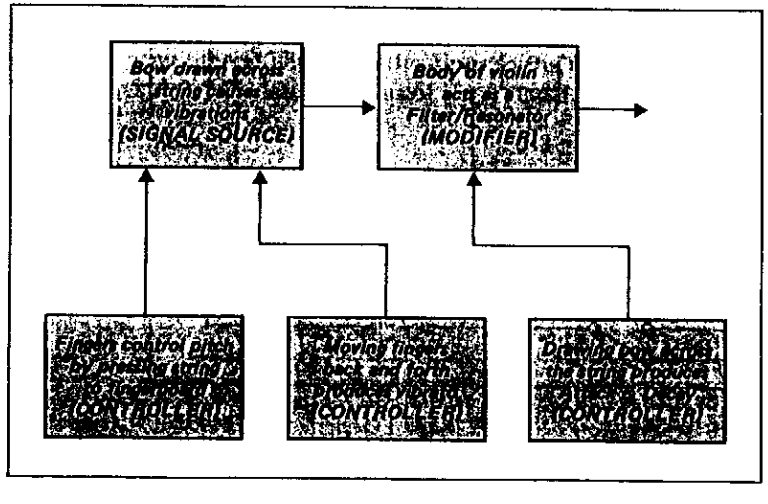
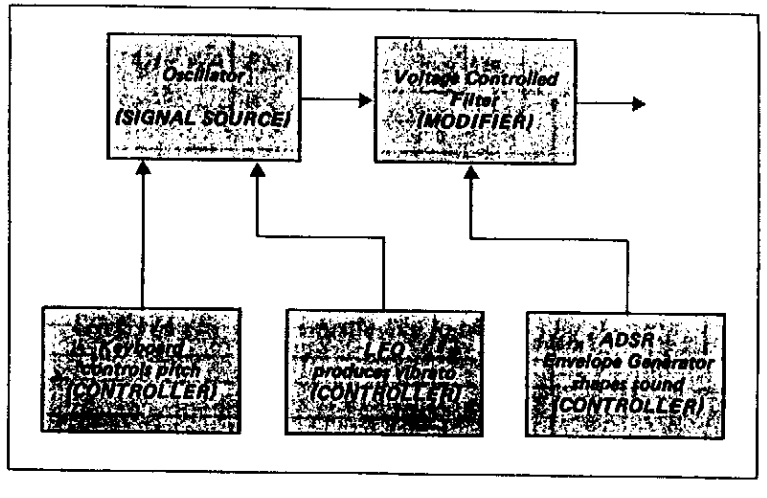


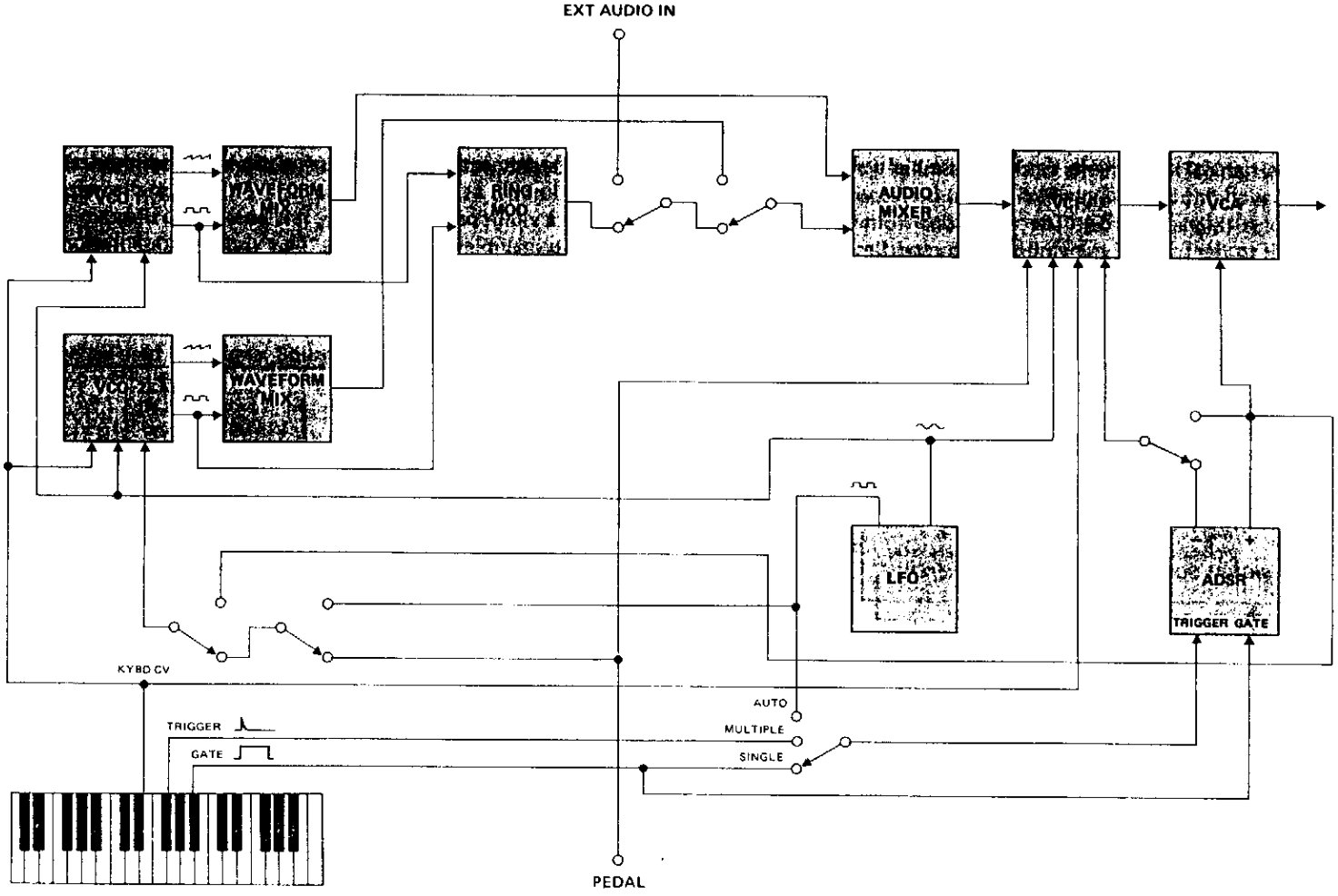
All mechanical instruments work in a similar way. A violin, for instance, has a vibrating string which would correspond to the VCO in your Solus (Signal Source). The vibrations from the string are transmitted to the body of the violin which modifies the sound of these vibrations. This corresponds to the action of the VCF in your Solus (Modifier). The fingerboard corresponds to the keyboard on your Solus, since it determines the pitch of the sound produced by the violin (Controller). The movement of the bow on the string "shapes" the sound, just as the ADSR Envelope Generator on your Solus does (Controller).



Interconnecting the various functions of a synthesizer as shown here is known as creating a "patch." This block diagram is, of course, a violin patch. Similarly, it is possible to diagram any patch that you may play on the Solus. This visual representation of a patch permits you to better understand which functions of the synthesizer are being employed, and how each function contributes to the finished sound.



On page 8 you will find a block diagram of the entire Solus. As you proceed through this manual, refer to the block diagram to help you understand the signal flow.



WAVEFORMS

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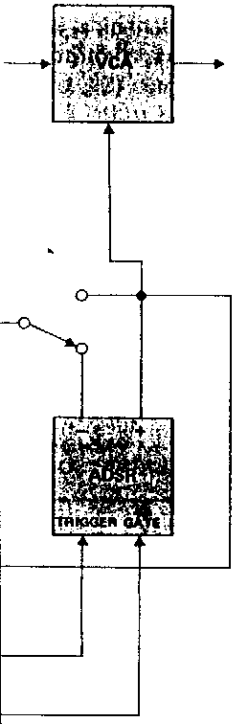
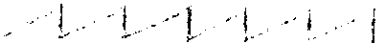


WAVEFORMS

The Voltage Controlled Oscillators on your Solus produce electrical waveforms (sawtooth, pulse, and square waves) which are used to create a wide range of sound timbres. If a signal generated by an oscillator has the same waveform as a sound created by a traditional instrument, both will sound the same (once the signal has been properly modified).

Different waveforms have different sounds. Your Solus can produce four basic waveforms.

These four waveforms are known as "static" waveforms because their characteristics are stable (unmodulated). You can produce lots of modified or modulated waveforms on your Solus. Among these are the Dynamic Pulse Wave, Phase Synchronization, Ring Modulation, and many others. These modifications to the four basic waveforms are explained in later sections of this manual.



SAWTOOTH WAVE: Full, brassy

SQUARE WAVE: Hollow, clarinet-like

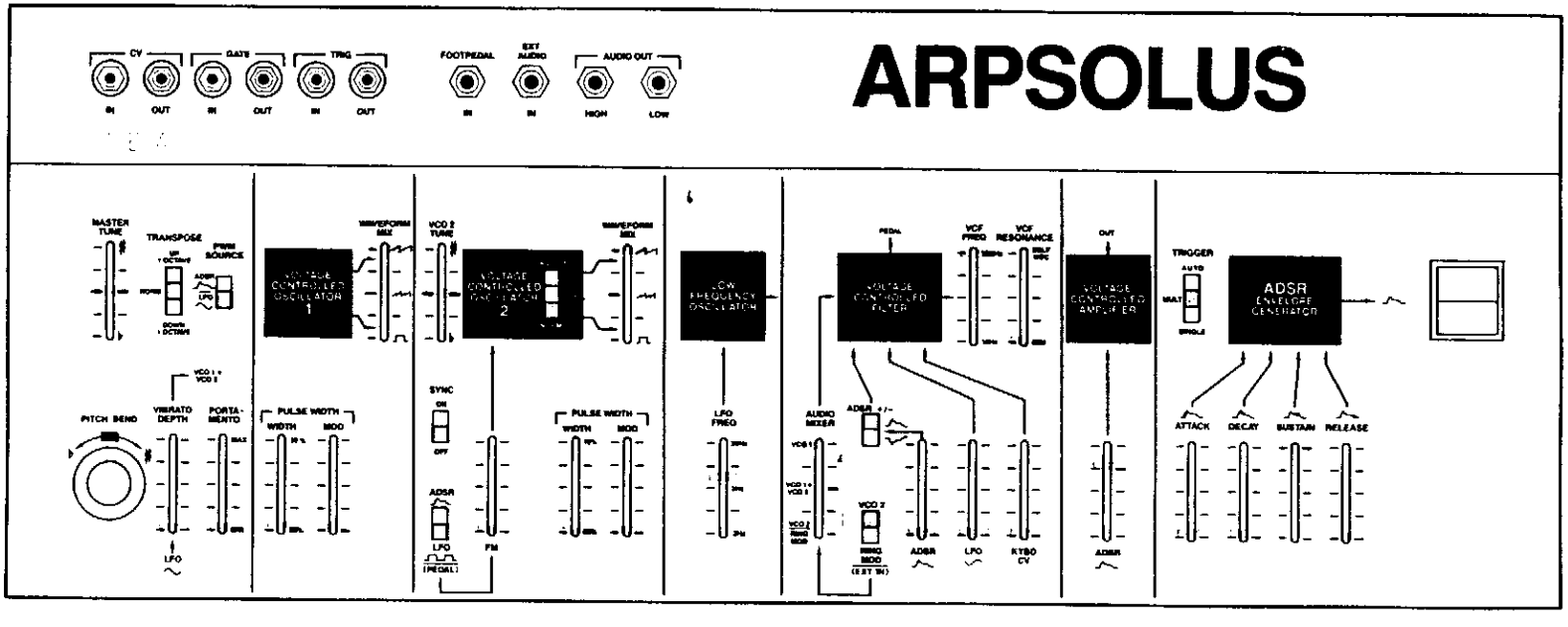
PULSE WAVE: Bright, nasal

SINE WAVE: Pure, whistle-like (generated by the VCF)

THE SAWTOOTH WAVE

1. Set the controls on your Solus to match the settings shown in Figure A. Move the AUDIO MIXER slider (shown with an arrow) all the way up.

2. Play a note on the keyboard. You will hear a sawtooth wave generated by VCO 1.



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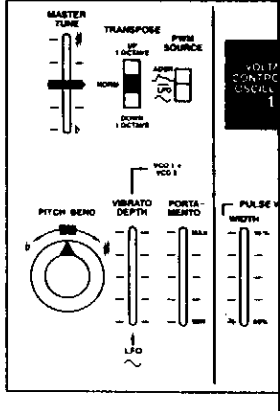

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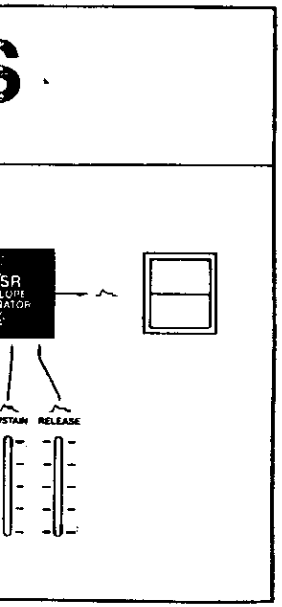
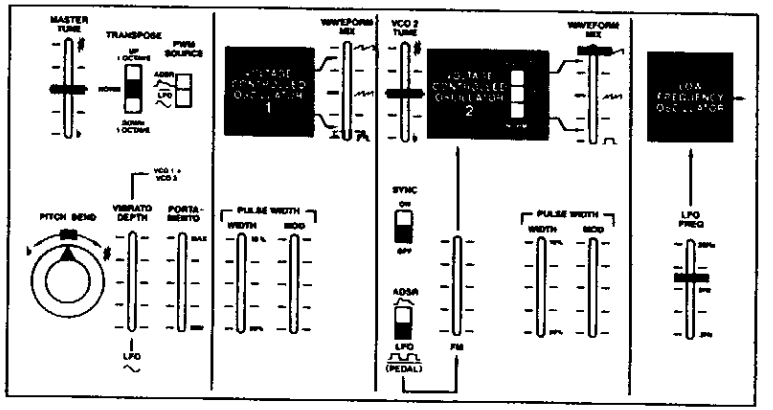
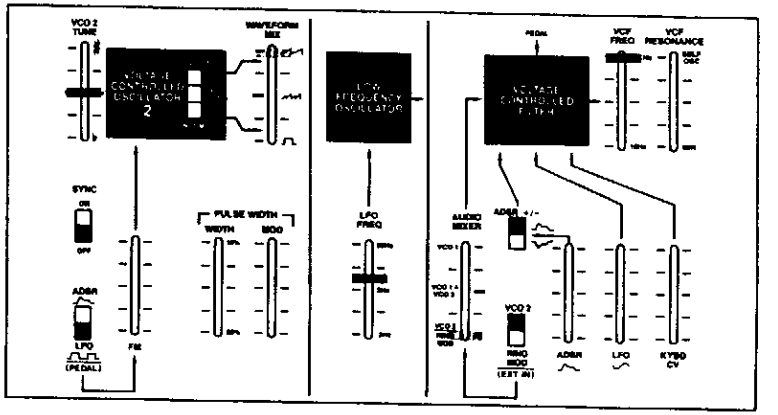


THE SQUARE WAVE

1. Move the VCO 1 WAVEFORM MIX slider down. Now when you play the keyboard, you will hear the square wave generated by VCO 1. Notice that the square wave has a hollow, clarinet-like sound.



2. Move the AUDIO MIXER slider down to the VCO 2 position. Repeat the sawtooth and square wave experiments with the VCO 2 WAVEFORM MIX slider.

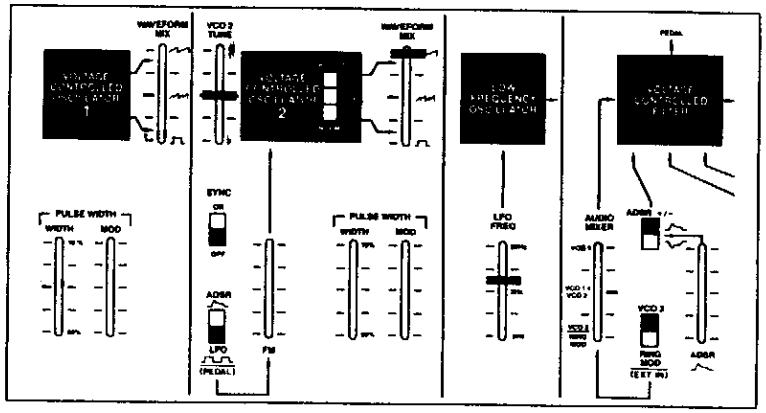


3. Center the AUDIO MIXER slider. If your MASTER TUNE and VCO 2 TUNE sliders are tuned exactly in unison, you will hear no noticeable change in the sound. If they are not in unison, you will hear two notes when you play one key. Try tuning both oscillators in unison, then to different intervals (thirds, fifths, octaves, etc.).

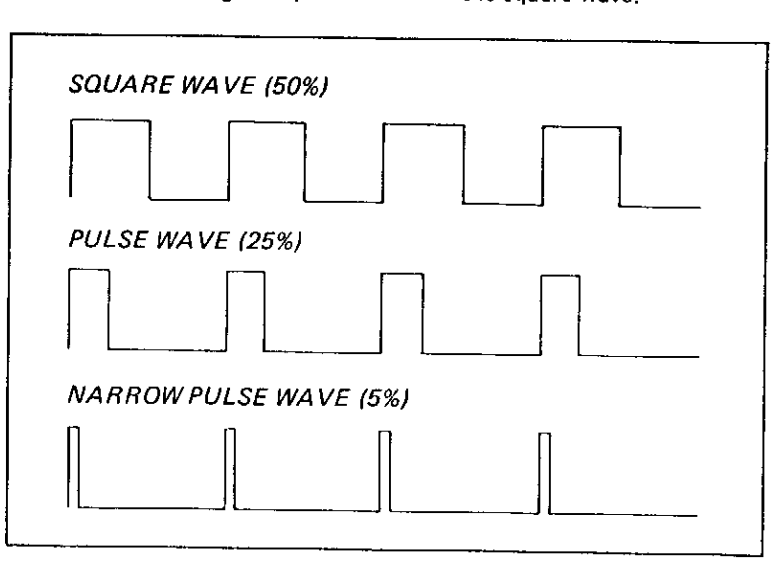
THE PULSE WAVE

1. Set the controls to match the settings in Figure A. Raise the AUDIO MIXER slider to select VCO 1, and put the VCO 1 WAVEFORM MIX all the way down (square wave).

2. In the VCO 1 section, you will find two sliders marked PULSE WIDTH. Raise the slider labelled WIDTH to about half way, and play a few notes on the keyboard. Notice how the sound has become brighter and more nasal than the square wave.



3. An even narrower square wave can be created by raising the WIDTH slider all the way to the 10% marking. This waveform is very buzzy and thin. At the 10% marking, the top part of the pulse wave is only about 10% of the total cycle. A square wave, as its name implies, has a top part of its waveform that is exactly fifty percent of the total cycle. The PULSE WIDTH function is provided on both VCO 1 & VCO 2. Try different settings of the WIDTH sliders in both VCOs. One thing to remember; you can *only* change the pulse width of the square wave.



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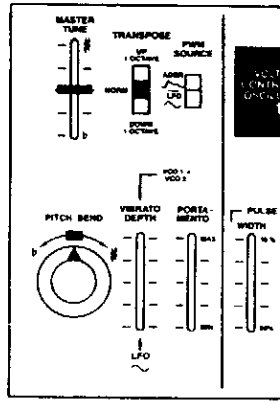

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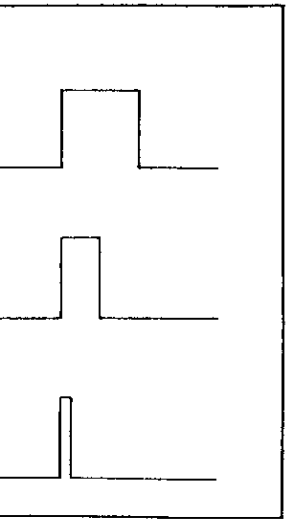
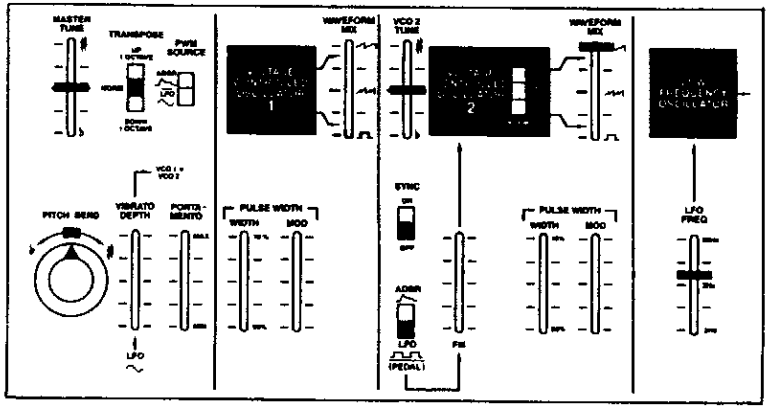


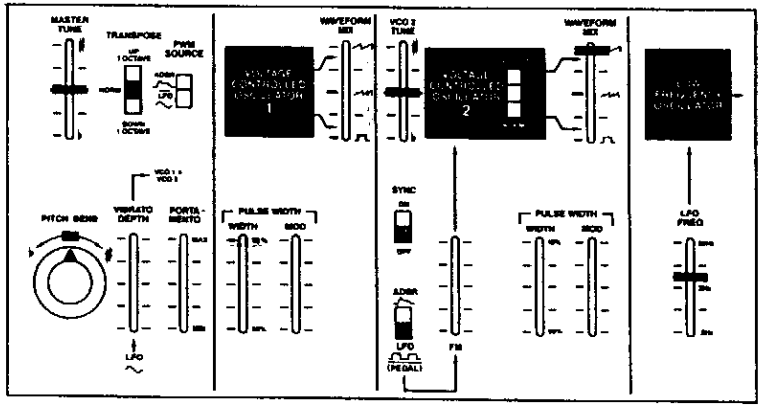
SAW/PULSE MIX

1. Set the controls as shown in Figure A. Move the AUDIO MIXER slider to the VCO 1 position.

2. Hold down a key and move the VCO 1 WAVEFORM MIX slider from the top (sawtooth) position to the bottom (square wave) position. Notice how the sound blends from the brassy sawtooth sound, to a sound which is one octave higher in pitch, and then to the hollow sound of a square wave. The octave "doubling" effect is caused by the summing of the sawtooth and square waves.



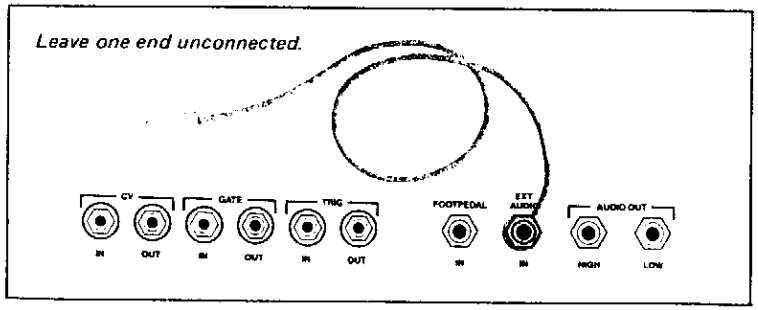
3. Try the same experiment as in step 2, but with the WIDTH in VCO 1 up. Notice that the octave "doubling" effect does not occur, but other effects can be heard.



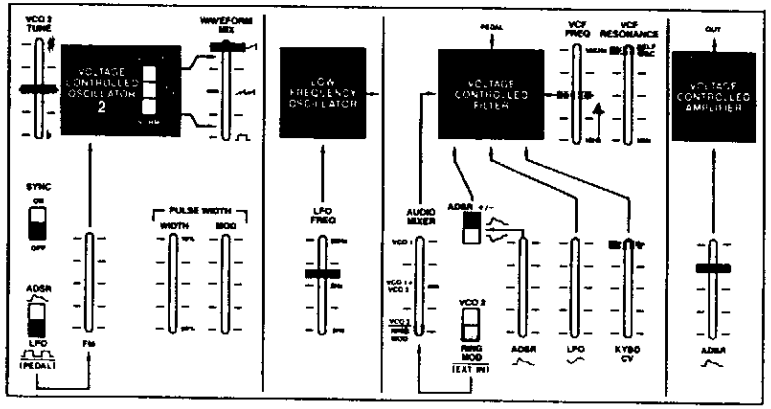
THE SINE WAVE

You can produce a sine wave on your Solus using the VCF. In order to hear a *pure* sine wave, however, you must first disconnect the oscillators from the VCF (normally, either one or both of them are connected to the VCF at all times). To disconnect the oscillators and produce a sine wave, follow these instructions:

1. First, set the controls as shown in Figure A. Insert a "dummy" plug into the EXT AUDIO IN jack on the top of the Solus. This can be any ¼" phone plug, as long as it is not connected to anything besides the Solus. Lower the AUDIO MIXER slider to the VCO 2 position. Set the switch next to the slider in the (EXT IN) position.



2. Raise the KYBD CV slider under the VCF section all the way up. Lower the VCF FREQ slider, and raise the RESONANCE slider all the way. Now when you play a key, slowly raise the VCF FREQ slider. You will hear a pure sine wave rise in pitch. Leave the slider at about half way, and play some keys. Note the pure, whistle-like quality of the sine wave.



3. Remove the "dummy" plug, and change the switch under the VCF section to the VCO 2 position. You will now hear two notes with every key depression. One note is the sine wave, the other note is VCO 2. You can tune the sine wave to VCO 2 by using the VCF FREQ slider, or you can tune VCO 2 to the sine wave by using the VCO 2 TUNE control. All of these controls will be discussed individually later in this manual.

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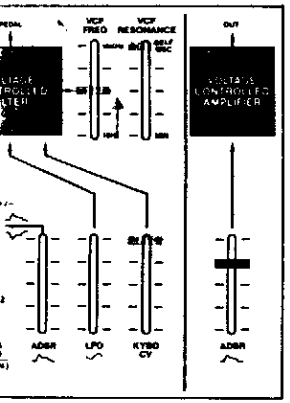

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MODIFIERS

THEORY

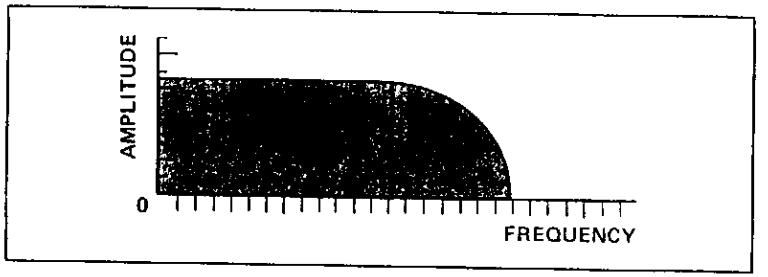
Modifiers are electronic devices that can process a signal and change its sound. Consequently, a modifier must have an input and an output. A tone control on a hi-fi set is a simple modifier which changes the nature of the sound signal passing through its circuitry.

The ARP Solus contains three modifiers: The Voltage Controlled Filter (VCF), the Ring Modulator, and the Voltage Controlled Amplifier (VCA). Any signal introduced into the AUDIO MIXER (i.e., sawtooth, square wave or external audio) must pass through the VCF and the VCA before reaching the output of the Solus.

THE VOLTAGE CONTROLLED FILTER (VCF)

The Voltage Controlled Filter is the most important modifier on any synthesizer. The VCF is responsible for taking the raw signals from the VCOs and shaping them into useful musical sounds.

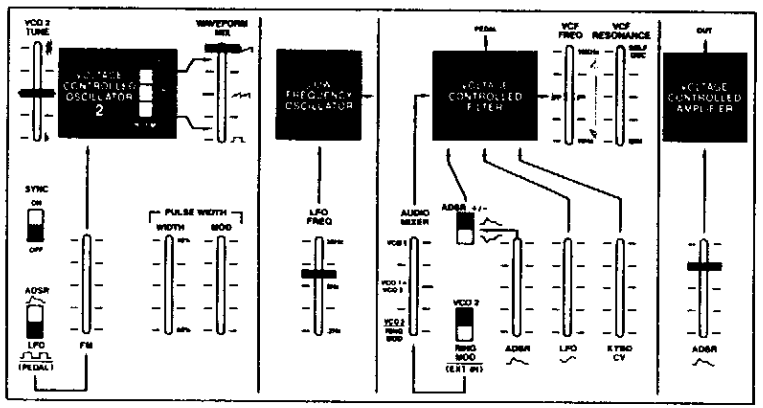
The VCF in your Solus is technically called a "Low Pass Filter." Low Pass means that the filter will pass all audio frequencies below a certain point (called the "cut-off" point) determined by the setting of the VCF FREQ slider, and will filter out all frequencies above this point. The colored area in the diagram shown here indicates the frequencies passed by the filter.



VCF FREQ

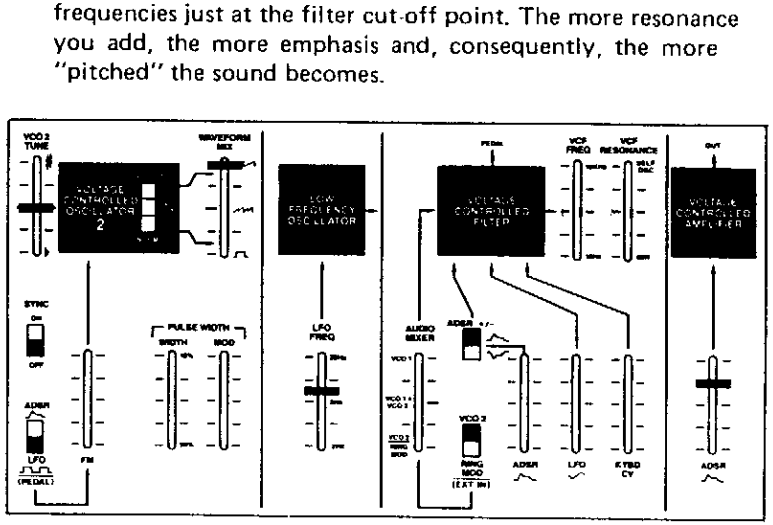
1. Set the controls on your Solus according to Figure A. Raise the AUDIO MIXER slider to the VCO 1 position.

2. Play a note in the middle of the keyboard and hold it down. Slowly lower and raise the VCF FREQ control and listen to the effect. Notice how the sound gets brighter and louder as you raise this control. It does so because you are raising the cut-off point of the filter, thereby letting more and more high frequencies pass through.



RESONANCE

1. Raise the RESONANCE slider about half way up. Hold down a key and try raising and lowering the VCF FREQ slider. Notice how the sound takes on a nasal quality. This is caused by the resonance of the filter. Resonance emphasizes a narrow band of frequencies just at the filter cut-off point. The more resonance you add, the more emphasis and, consequently, the more "pitched" the sound becomes.



2. Again move the VCF FREQ slider up and down slowly with different settings of the RESONANCE control. Notice that when the resonance is set between 1/2 and 3/4 you can actually hear the individual harmonics of the sound as you slowly sweep up and down.

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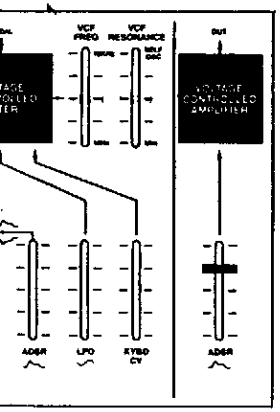

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THE VOLTAGE CONTROLLED AMPLIFIER (VCA)

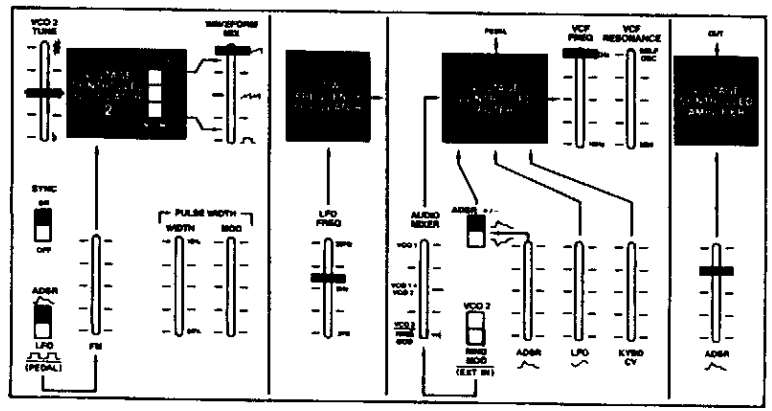
The Voltage Controlled Amplifier is responsible for modifying the amplitude (loudness) of a sound. All signals passed by the VCF must go through the VCA before reaching the output of the Solus.

The VCA has only one Controller, the ADSR Envelope Generator. The ADSR Envelope Generator will be discussed in the Controllers section of this manual, but for now we will simply say that raising or lowering the ADSR slider under the VCA section will produce the same effect as a volume control.

RING MOD

The Ring Modulator takes the square wave output of VCO 1 & VCO 2, performs a complex mathematical operation on the combined signal, and outputs it to the VCF. The final signal has unique audio properties, bearing close relation to gong and bell sounds.

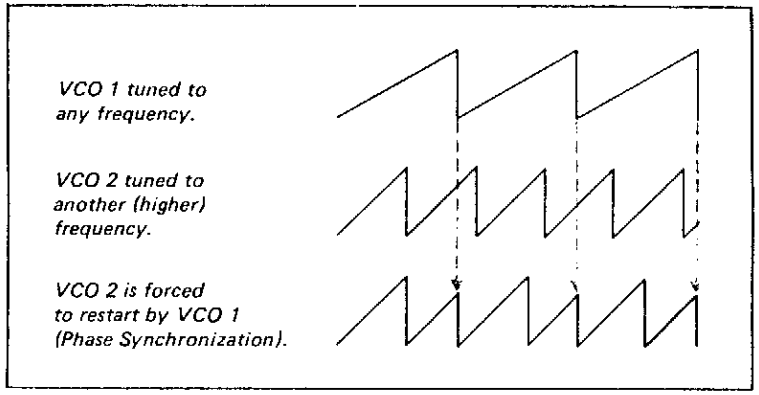
1. Set the controls as shown in Figure A. Change the switch beneath the VCF to the RING MOD position. Lower the AUDIO MIXER slider and play a few notes on the keyboard.



2. Vary the MASTER TUNE and VCO 2 TUNE controls, and play some notes on the keyboard. When the sliders are tuned to octaves, fifths, thirds, etc., useful musical timbres result.

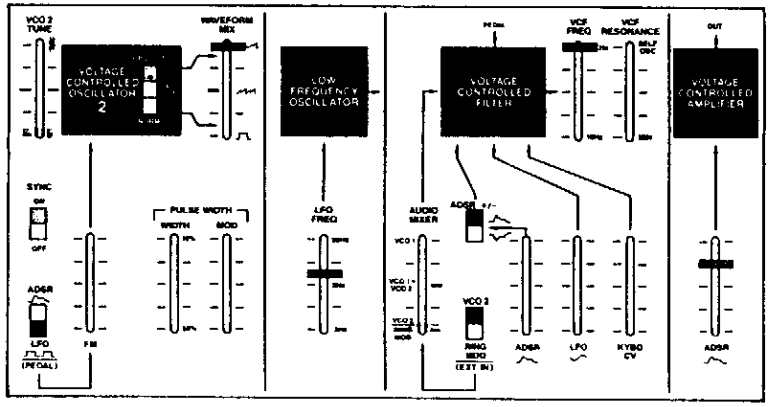
PHASE SYNC

Phase Synchronization is a means of combining two waveforms. The waveform supplied by VCO 1 is used to establish the fundamental frequency (pitch), and the waveform from VCO 2 is used to determine the harmonic content of the fundamental frequency. The square wave or the sawtooth wave may be selected to perform either function.



1. Set the controls as shown in Figure A. Lower the AUDIO MIXER slider to the VCO 2 position. Set the VCO 2 TRANSPOSE switch to the UP 2 OCT position, and lower the VCO 2 TUNE control all the way.

2. Change the SYNC switch in the VCO 2 section to ON. Play a note on the keyboard and hold it down. Slowly raise the VCO 2 TUNE slider. You will hear the fundamental frequency (from VCO 1) remain constant, while the harmonic content steps up as you raise the slider. Try playing the keyboard with different tunings of VCO 1 & VCO 2.



CONT

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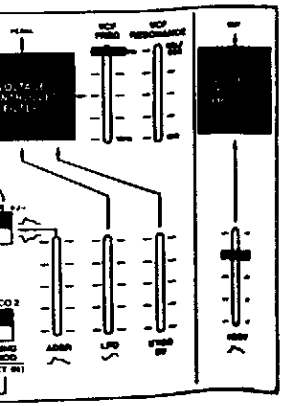


CONTROLLERS

THEORY

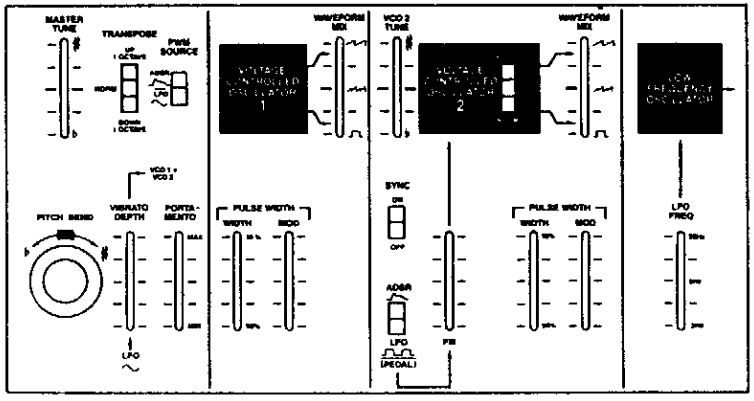
Controllers are devices on the synthesizer which are used to create electrical signals which in turn control Modifiers or Signal Sources. For instance, the most obvious Controller on the Solus is the keyboard. The keyboard produces a voltage (called Control Voltage or KYBD CV) which controls the VCOs and may be used to control the VCF. Other controllers on the Solus are the ADSR Envelope Generator, Portamento, Transpose, and the LFO. A foot pedal (optional) may also be used to control either VCO 2 or the VCF.

THE KEYBOARD

As we have already mentioned, the keyboard is the primary controller of your Solus. The Keyboard Control Voltage is normally connected to the VCOs. The pitch of the VCO changes according to the voltage that the keyboard produces. Later, we will see how this Control Voltage may be applied to the VCF. The keyboard on your Solus is connected to three other Controllers: the TRANSPOSE switch, the PORTAMENTO slider, and the PITCH BEND knob.

TRANSPOSE

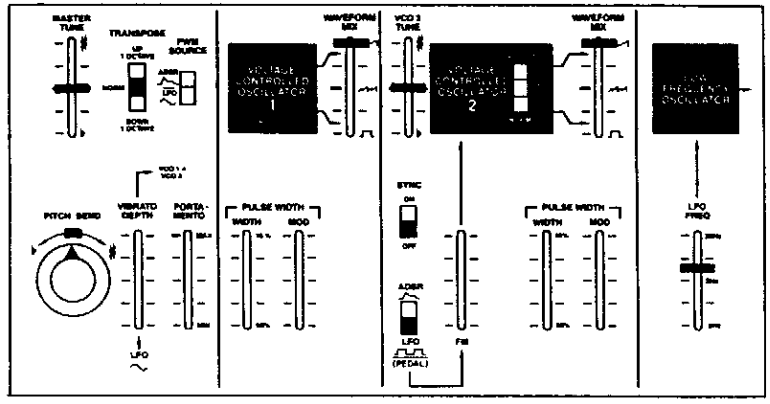
The TRANSPOSE switch will shift the pitch of both oscillators up or down exactly one octave. There is a second TRANSPOSE switch located in the VCO 2 block. This switch will transpose VCO 2 *only* up two octaves. This gives VCO 2 a seven-octave range, and VCO 1 a five-octave range.



PORTAMENTO

Portamento is a "sliding" effect; that is, the pitch will rise and fall gradually from one note to the next.

1. Set up the controls as shown in Figure A. As you play, raise the PORTAMENTO slider and listen to the effect. You will note that the time necessary to slide from one note to the next is determined by the setting of this slider.



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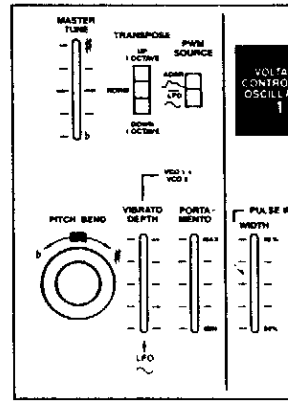

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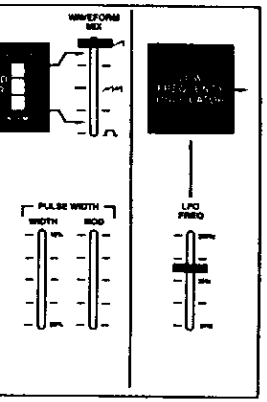
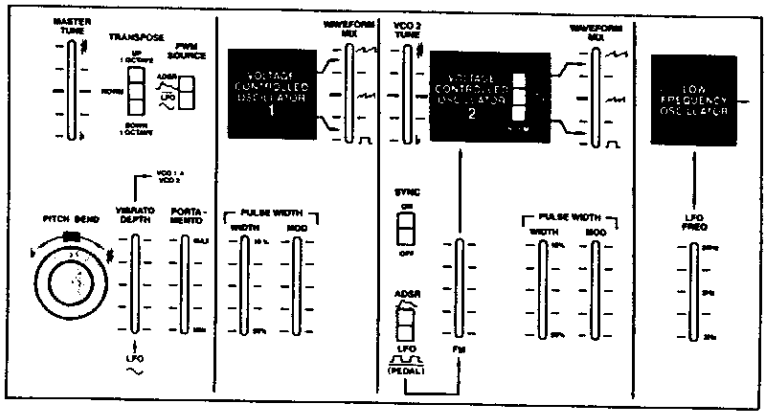


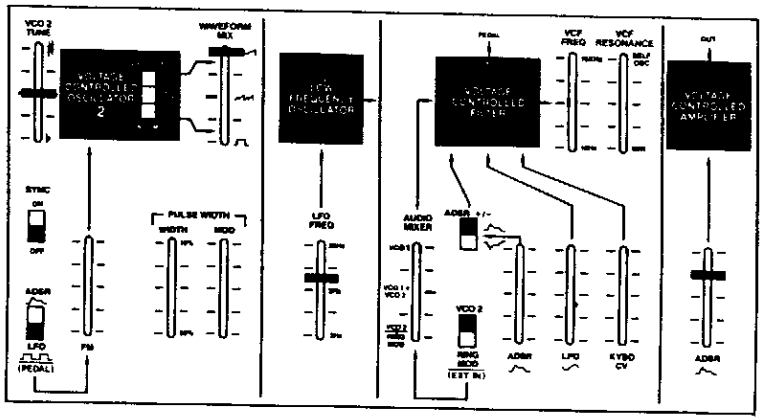
PITCH BEND

The PITCH BEND knob may be used to increase or decrease the pitch of the keyboard by up to one full octave sharp or flat. The center position of this knob features a "dead zone," making it easy to return to normal tune range during performance. You may wish to use the PITCH BEND knob to "bend" notes like a guitarist.



KYBD CV

1. Set the panel controls as shown in Figure A. Raise the AUDIO MIXER slider to the VCO 1 position. Lower the VCF FREQ slider to about half way. Hit the lowest note on the keyboard, then the highest. You will hear a very muted low note, and probably no high note at all. This is because the Low Pass Filter in the VCF is not passing the higher frequencies.



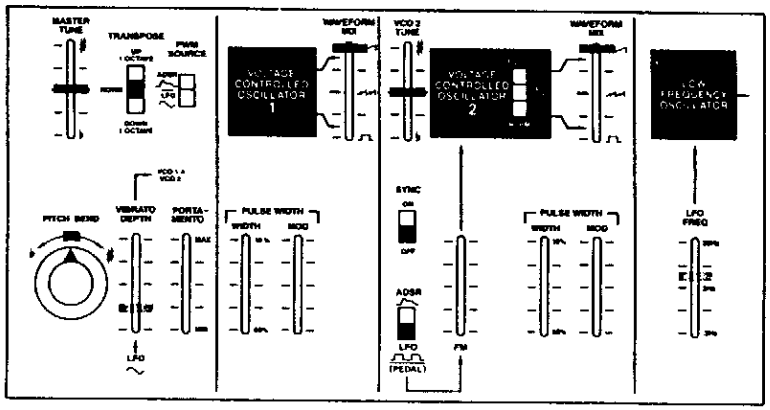
2. Now raise the KYBD CV slider under the VCF box. Hit the lowest note on the keyboard, then the highest. The low note will still sound muted, but the high note will be audible. The Control Voltage from the keyboard is now automatically opening the filter more and more as you play higher notes.

THE LOW FREQUENCY OSCILLATOR (LFO)

The Low Frequency Oscillator is one of the most widely used features in synthesizers. The LFO in your instrument produces two waveforms: a low-frequency sine wave, and a low-frequency square wave. These waveforms are below the audio spectrum; that is, they are not audible as pitched sounds. They are used as tools to control other functions in your Solus, helping to produce useful musical effects such as vibrato, tremolo, and other repetitive effects. First, we will see how to use the LFO to modulate the frequency of an oscillator.

FREQUENCY MODULATION WITH THE LFO

1. Set the controls as shown in Figure A. Put the AUDIO MIXER slider in the VCO 2 (down) position. Hold a note and raise the VIBRATO DEPTH slider to about 1/4.



2. You should hear a pleasant vibrato. This is due to the sine wave from the LFO raising and lowering the frequency (pitch) of the oscillator. By raising the VIBRATO DEPTH slider even further, you will produce extremely deep "siren-like" effects. If you change the LFO FREQ slider, you can speed up or slow down the vibrato effect. Return the LFO FREQ slider to about 1/2.

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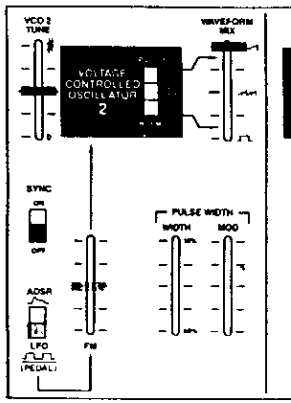

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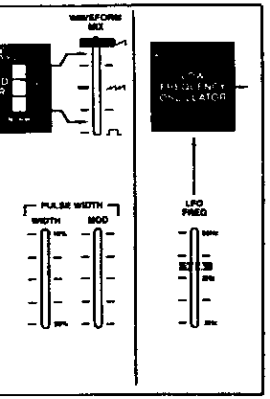

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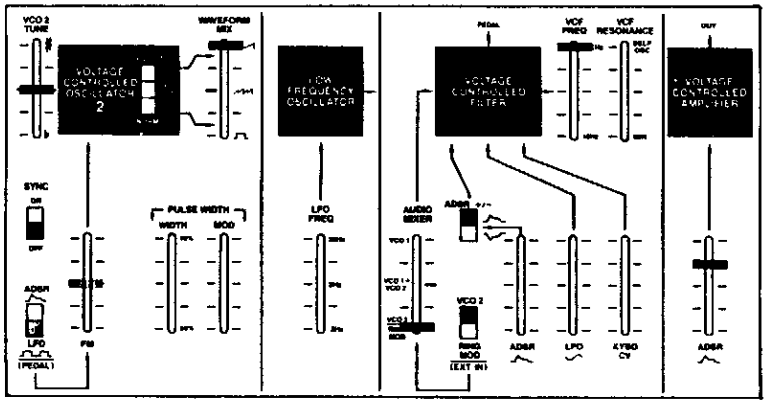
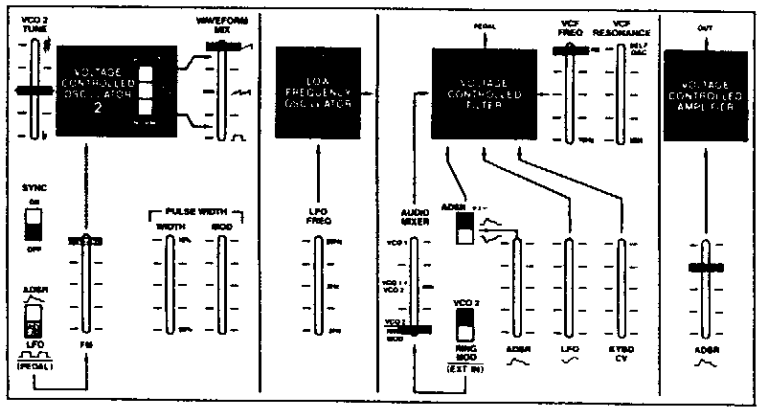
Q slider to about 1/2.

3. Lower the VIBRATO DEPTH slider all the way. Raise the VCO 2 FM slider (the switch associated with this slider should be set in the LFO square wave position). This will produce what is known as a trill. The speed of the trill, like the speed of the vibrato effect, is controlled by the LFO FREQ slider.

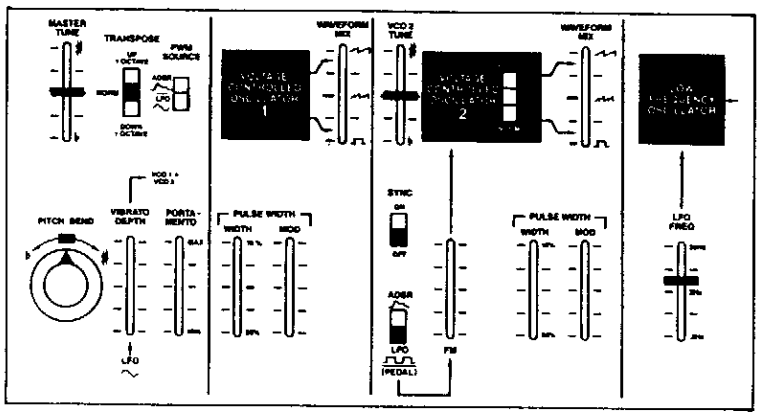


4. Varying the VCO 2 FM slider will cause the two notes of the trill to become more widely separated. The lower note is the one you are holding on the keyboard, and will remain the same. The higher note will become even higher as you raise the slider. The VCO 2 FM slider is controlling the depth of the trill, just as the VIBRATO DEPTH slider controlled the depth of the vibrato effect. Try tuning the trill to fifths, thirds, octaves, etc.

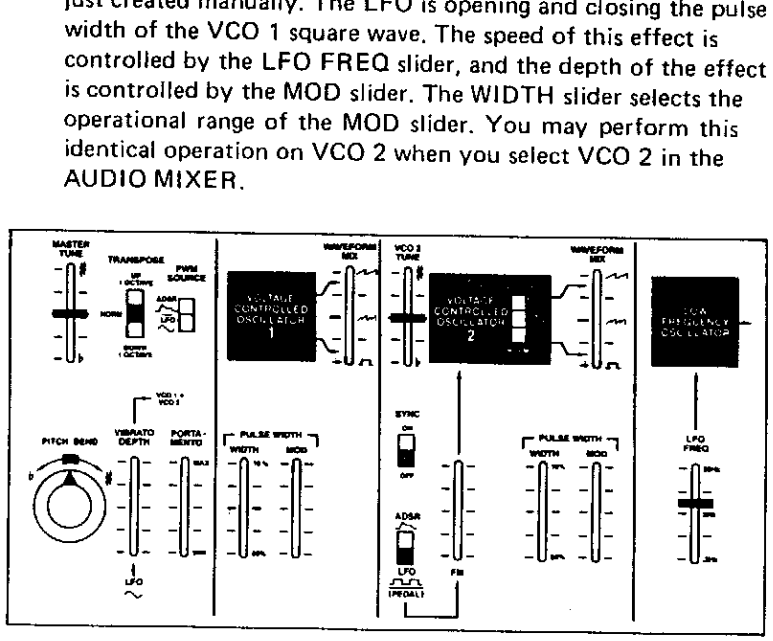


PULSE WIDTH MODULATION WITH THE LFO

1. Set the controls as shown in Figure A. Select VCO 1 with the AUDIO MIXER slider. Set both VCO WAVEFORM MIX sliders to the square wave position, and put the PWM SOURCE switch down to the LFO sine wave position. Manually raise and lower the WIDTH slider in the PULSE WIDTH section of VCO 1. You will hear a constantly changing (dynamic) pulse wave.



2. Leave the WIDTH slider set at about half way. Raise the MOD slider in the VCO 1 PULSE WIDTH section all the way. The sound you will hear will automatically duplicate the sound you just created manually. The LFO is opening and closing the pulse width of the VCO 1 square wave. The speed of this effect is controlled by the LFO FREQ slider, and the depth of the effect is controlled by the MOD slider. The WIDTH slider selects the operational range of the MOD slider. You may perform this identical operation on VCO 2 when you select VCO 2 in the AUDIO MIXER.



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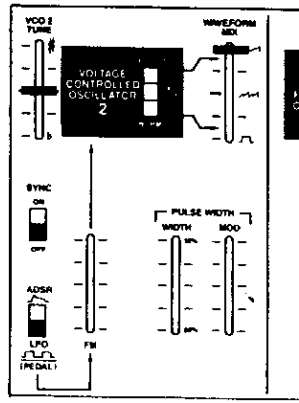

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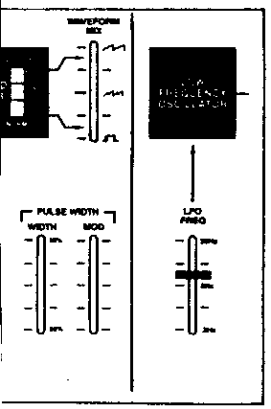
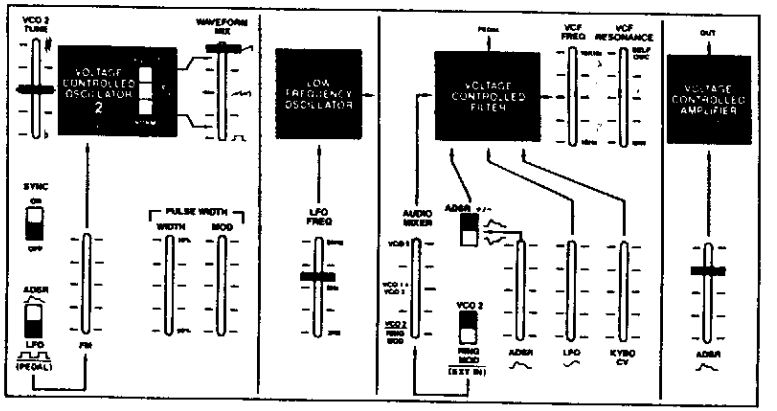
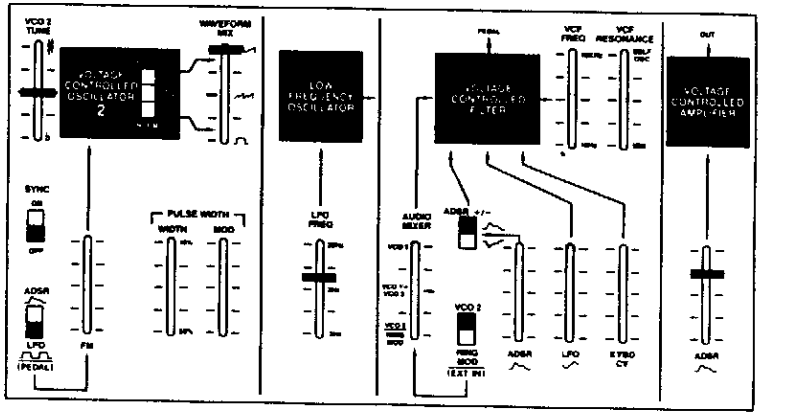


LFO MODULATION OF THE VCF

1. Set the controls as shown in Figure A. Select VCO 1 in the AUDIO MIXER. Hold a key down, then raise and lower the VCF FREQ slider. You will hear a wah-wah sound, similar to that produced by a guitar effects pedal. You can enhance this effect by raising the RESONANCE slider to about 1/2.

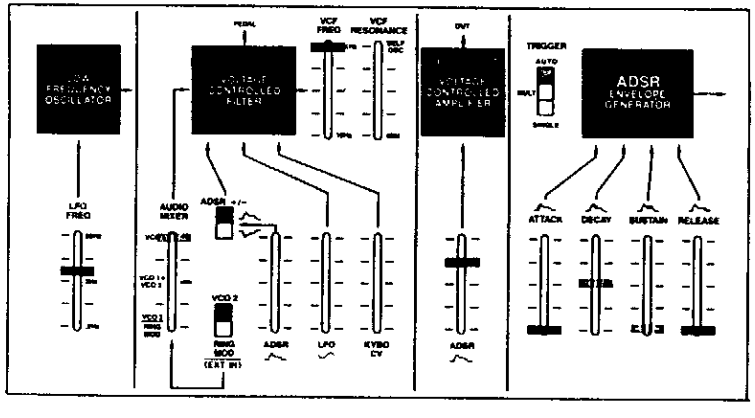


2. Leave the VCF FREQ slider set at about half way. Raise the LFO slider in the VCF section all the way. Now when you hold down a key, you will hear a sound close to that which you just produced by hand. The LFO sine wave is automatically raising and lowering the cut-off point of the VCF. The speed of this effect is controlled by the LFO FREQ slider. The depth of the effect is controlled by the LFO slider in the VCF section. The VCF FREQ slider determines the operational range of the effect. This is known as "tremolo." The most pleasing tremolo is produced with the LFO slider set at about 1/4.



LFO CONTROL OF THE ADSR ENVELOPE GENERATOR (TRIGGER SWITCH)

1. Set the controls as shown in Figure A. Select VCO 1 in the AUDIO MIXER. In the ADSR Envelope Generator section, find the slider labelled SUSTAIN and lower it all the way. Raise the DECAY slider next to it about half way.



2. Next to the ADSR ENVELOPE GENERATOR is a three-position switch. Set the switch to the AUTO position. When it is in this position, the Solus will trigger continuously at a rate determined by the LFO FREQ slider as long as a key is held down. This is useful for repetitive effects, such as rapid banjo plucking, marimba, etc.

3. Set the switch to the MULT position. Depress a key in the upper portion of the keyboard and hold it down. You will notice that the sound dies away rather quickly. Now, *while holding the first key down* depress a second key lower on the keyboard. The lower note will now sound and die away at the same rate as the first key did. If you depress a key higher up on the keyboard, nothing will happen. This is because the Solus has "low-note priority," meaning that no matter how many keys are held down, only the lowest note will sound. Also, when the TRIGGER switch is in the MULT position, a new trigger is produced whenever a new key (lower than the first key) is depressed.

4. Now put the switch in the SINGLE position and repeat step 3. You will see that while a new note sounds on every new key depression, the sound still dies away from the point of the *first* key depression. A new trigger will not be produced until you release all keys. The single-trigger mode is useful for certain expressive keyboard effects.

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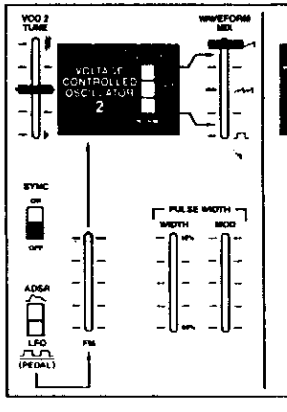

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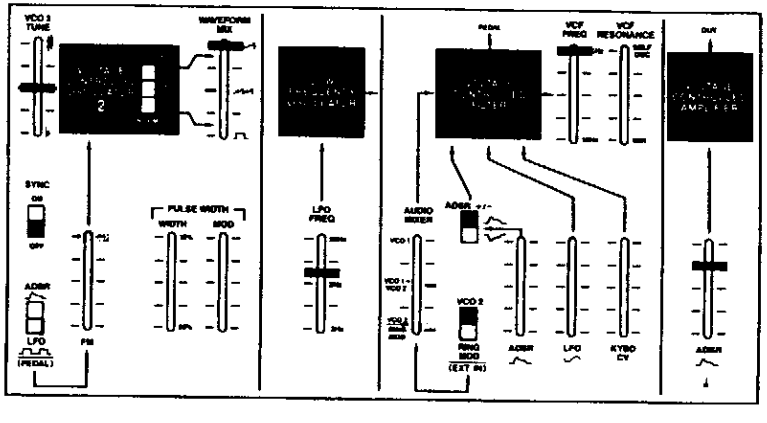
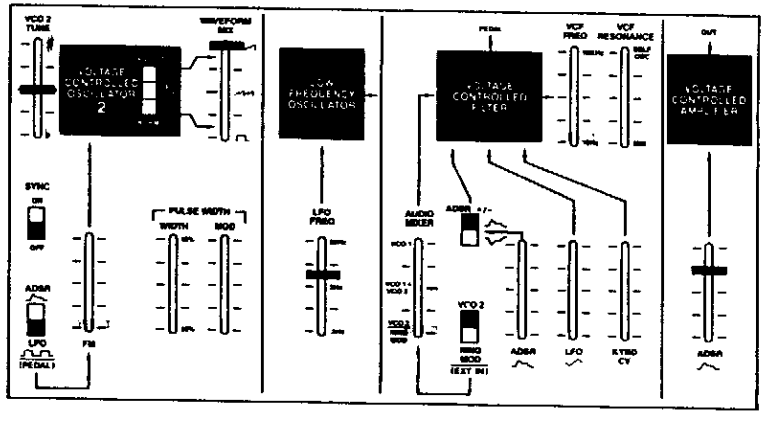
PEDAL

1. To connect an optional ARP foot pedal into your Solus, insert the plug into the jack labelled PEDAL. Set the controls as shown in Figure A. Set the AUDIO MIXER slider to the VCO 2 position.

2. Raise the FM slider in the VCO 2 section all the way. Set the switch next to the slider in the (PEDAL) position. Now you may control the frequency (pitch) of VCO 2 with the pedal. The FM slider will control the range of the pedal.



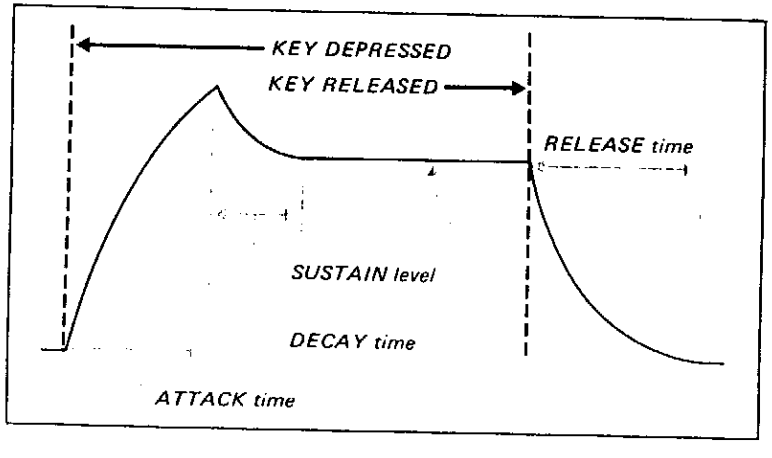
3. Lower the FM slider all the way. Lower the VCF FREQ slider. The pedal is automatically connected to the VCF. You may now open and close the VCF with the pedal. Try using various amounts of RESONANCE to emphasize this effect.



ADSR ENVELOPE GENERATOR

The ADSR Envelope Generator is the most versatile and flexible function on your synthesizer. The Envelope Generator is used to "shape" the sound from start to finish. The ADSR Envelope Generator produces no sound of its own, but is used as a controller in much the same way that the LFO is used.

Each time a key is depressed the keyboard generates a trigger signal that initiates an ATTACK signal from the ADSR. A complete cycle of the ADSR looks something like this:



As you will see, this is a somewhat idealized illustration of an envelope, as all of these parameters are adjustable. This is what happens during the course of an ADSR event:

When a key is depressed and held down, the ADSR produces a rising voltage. This signal is called the ATTACK. The ATTACK signal rises at a speed which you determine with the setting of the ATTACK slider. When the ATTACK slider is set at minimum, it produces an immediate signal. When the slider is set at maximum, the signal will take about four seconds to reach its full strength.

When the ATTACK signal has reached its peak, it turns around and begins descending at a speed determined by the DECAY slider. The signal will continue to descend until it reaches the level selected by the SUSTAIN slider.

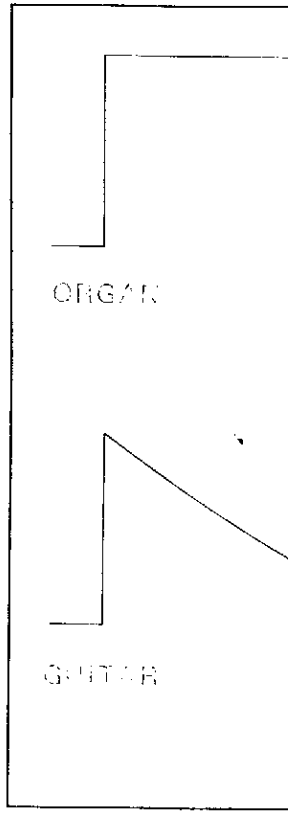
The SUSTAIN slider sets a level at which the signal will be maintained as long as the key is held down. As soon as the key is released, the signal will again begin to fade at a speed selected by the RELEASE slider.

The RELEASE signal is initiated only when the key is released. At the minimum setting, the RELEASE slider will produce an immediate decrease in the signal. At the maximum setting, it takes about five seconds.

These four sliders can be used to control the volume of a sound, or they may be used to open and close the filter, modulate the pulse width of the square wave, or control the frequency of VCO 2.

If you look at the panel of your Solus, you will find several places where the ADSR signal may be used as a Controller. They will be marked with the characteristic symbol of the ADSR signal.

ADSR SETTINGS FO



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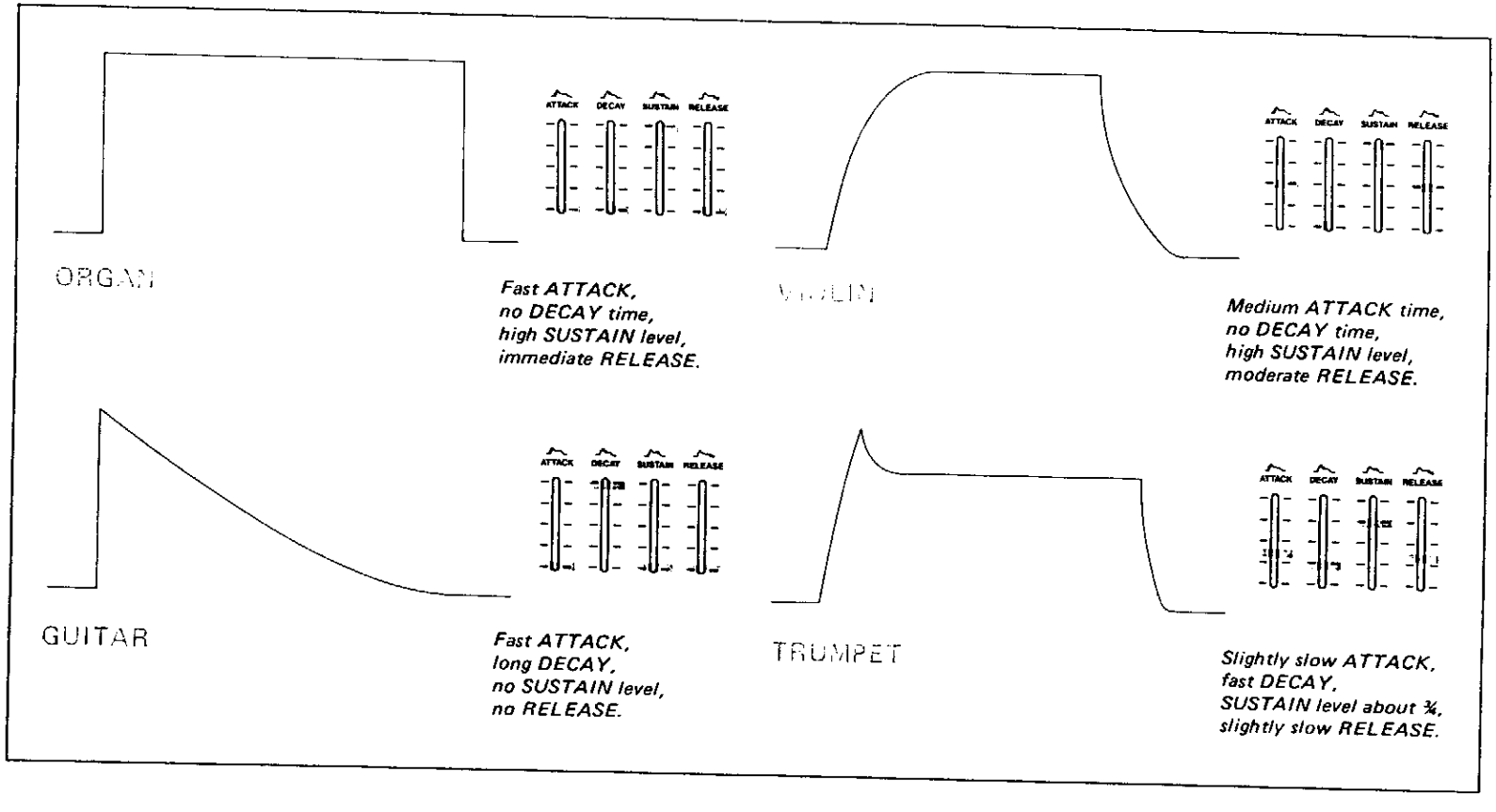
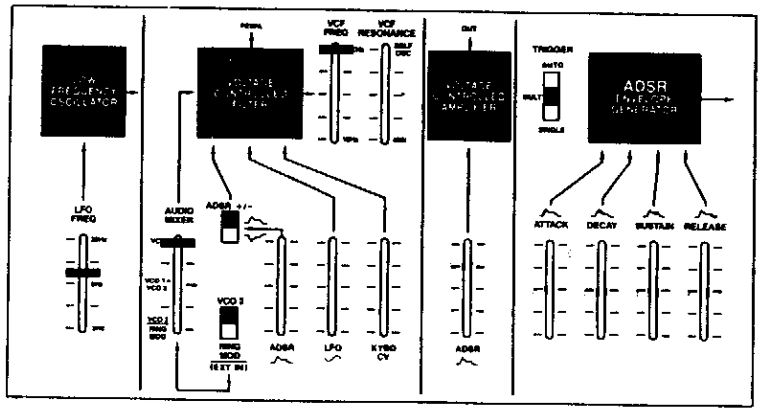
ADSR SETTINGS FOR VARIOUS INSTRUMENTAL ENVELOPES



ADSR MODULATION OF THE VCA

1. Throughout this manual you have been controlling the VCA with an elementary envelope. Set the controls as shown in Figure A. Set all four ADSR sliders at half way. Play a few notes on the keyboard, then raise the ATTACK slider all the way up. Play a few notes, then lower it all the way. Play a few more notes.

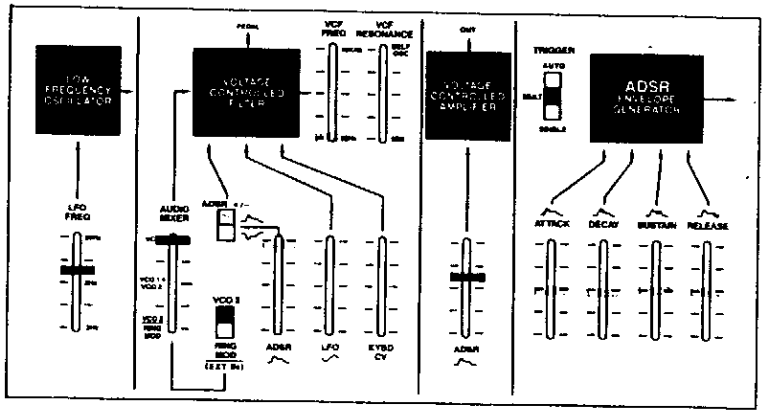


2. Repeat the same steps with the DECAY, SUSTAIN, and RELEASE sliders. Play around with the ADSR sliders until you have familiarized yourself with the process of creating an envelope. Try digramming your results as in the examples you have seen. Remember the ADSR slider in the VCA attenuates the effect of the ADSR Envelope Generator.

ADSR MODULATION OF THE VCF

1. The ADSR Envelope Generator may be used to open and close the VCF in just the same manner as it was used to open and close the VCA. Set the controls as shown in Figure A. Lower the VCF FREQ control all the way. The keyboard will now produce no sound, as the filter is completely closed.

2. Now raise the ADSR slider in the VCF section. Make sure the switch associated with this slider is in the up (+) position. Set the four ADSR controls to half way. When you play a key the ADSR Envelope Generator will open and close the filter. Try different settings of the four ADSR sliders as you did in the previous experiment. The ADSR slider in the VCF section controls the depth of this effect.



ADSR +/-

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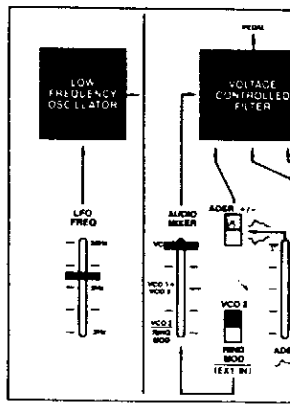

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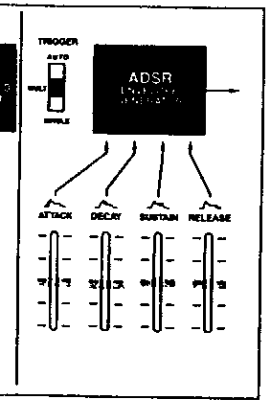
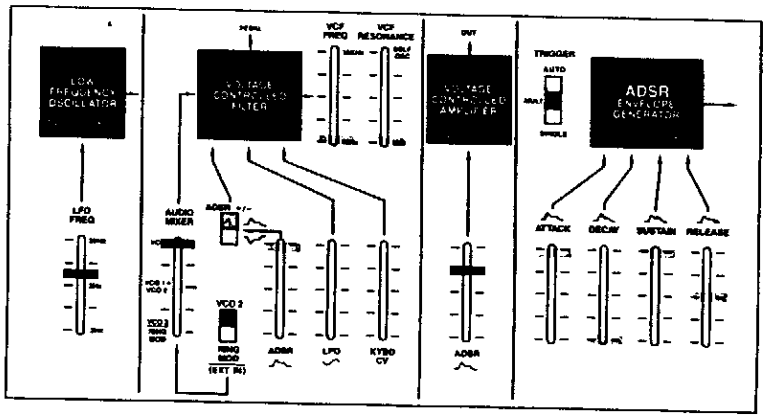


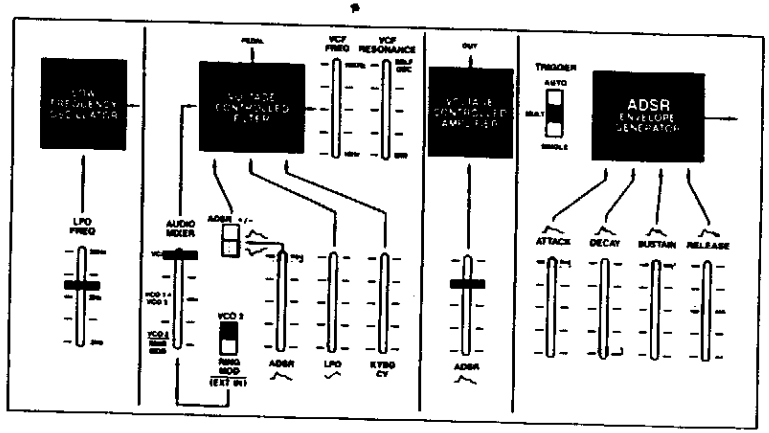
ADSR +/-

1. Set the controls as shown in Figure A. Put the VCF FREQ and the RESONANCE sliders all the way down. Set all of the ADSR Envelope Generator sliders as shown below. Put the ADSR +/- switch in the up (+) position, and put the ADSR slider in the VCF section all the way up.



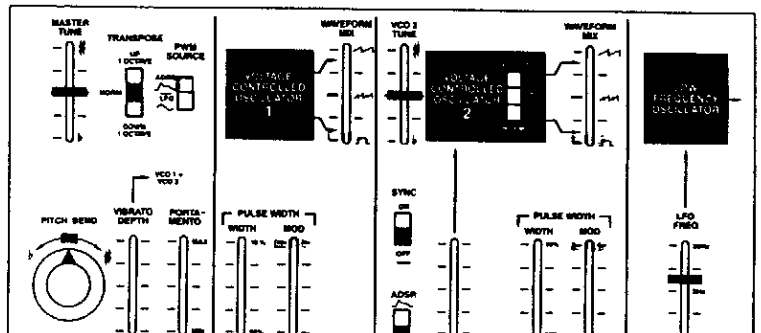
2. Depress and hold a key. Notice how the sound becomes brighter as you hold the note. When you release the key, the note becomes mellower as it fades out.

3. Now put the ADSR +/- switch in the down (-) position. Put the VCF FREQ slider all the way up. Now when you play a note on the keyboard, the sound becomes more *mellow* as you hold the note, and *brighter* when you release the note. Try moving the ADSR slider in the VCF section to different positions as you play notes and notice how the degree of filtering changes.



ADSR MODULATION OF PULSE WIDTH

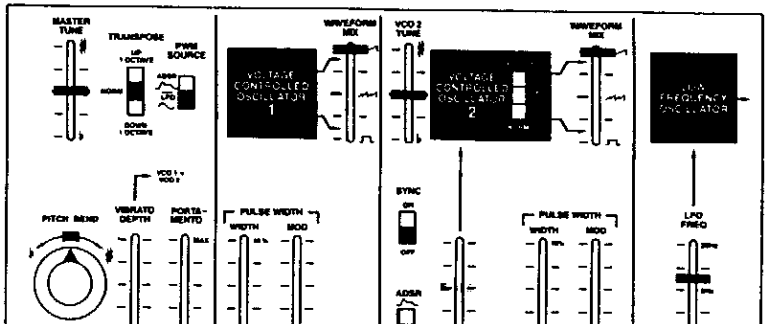
1. Set the controls as shown in Figure A. Lower the VCO WAVE-FORM MIX sliders to the square wave position. (Remember,you can only modulate the frequency of the square wave.) Set the PWM SOURCE switch to the ADSR position and raise the VCO PULSE WIDTH MOD sliders.



2. When you play a key, the ADSR control voltage will open and close the pulse width of the square wave in exactly the same way it opened and closed the filter. Play around with the four ADSR sliders as you did in the first experiment. You will notice that this effect can be applied to either VCO 1 or VCO 2. The MOD sliders control the depth of the effect, and the WIDTH sliders control the operational range.

FREQUENCY MODULATION WITH THE ADSR

1. Set the controls as shown in Figure A. Lower the AUDIO MIXER slider to the VCO 2 position. Raise the FM slider in the VCO 2 section to about half way. Change the switch next to the slider to the ADSR position. Set the four ADSR sliders to about half way.



2. Now when you play a key, the ADSR control voltage will raise and lower the pitch of VCO 2 just as it opened and closed the filter, the VCA, and the pulse width of the square wave. Play around with the four ADSR sliders as you did in the first experiment. The FM slider controls the depth of this effect.

EXTERNAL AUDIO

On the top of your
AUDIO IN. This jack is u
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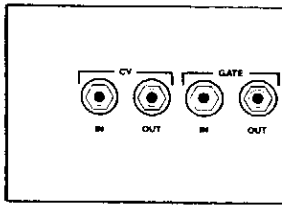

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THE ADSR

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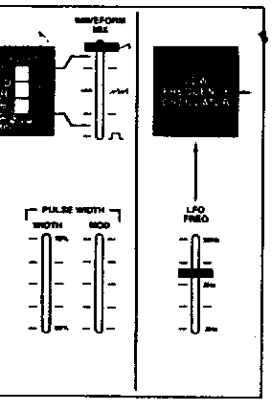

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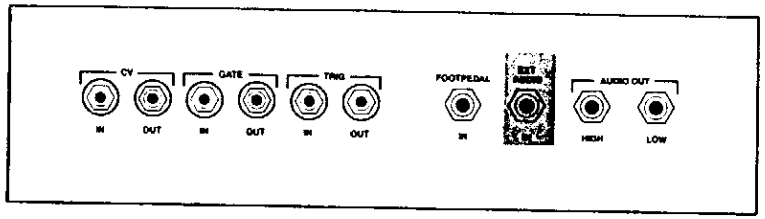
EXTERNAL AUDIO INPUT

On the top of your Solus you will see a jack labelled EXT AUDIO IN. This jack is used to bring an external signal, such as the output of an organ, electric piano, other synthesizers, etc., into the VCF of your Solus.



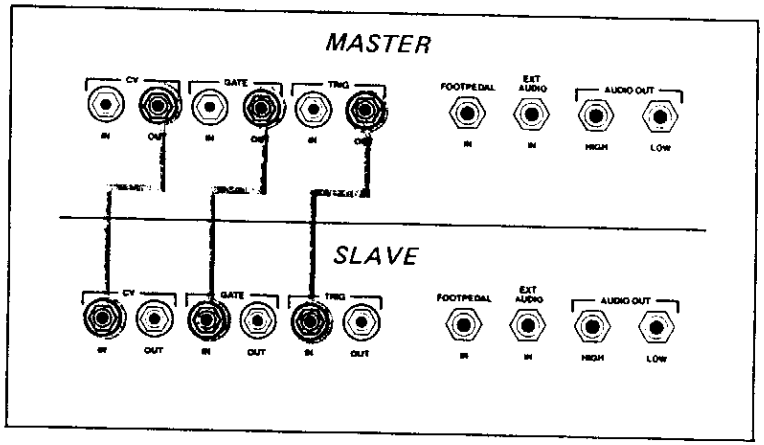
The External Audio Input is fixed in sensitivity. The sensitivity is adequate for use with most electronic instruments. Some very low-level signals, like dynamic microphones and low-level guitar pickups, may have to be preamplified before entering the Solus. Many guitar amplifiers have a separate preamp output that can be used for this purpose.

Once an external signal has been brought into the Solus, it can be processed through the VCF. The optional foot pedal is especially useful in processing external signals, since the VCF can perform like a wah-wah pedal with adjustable range and resonance.

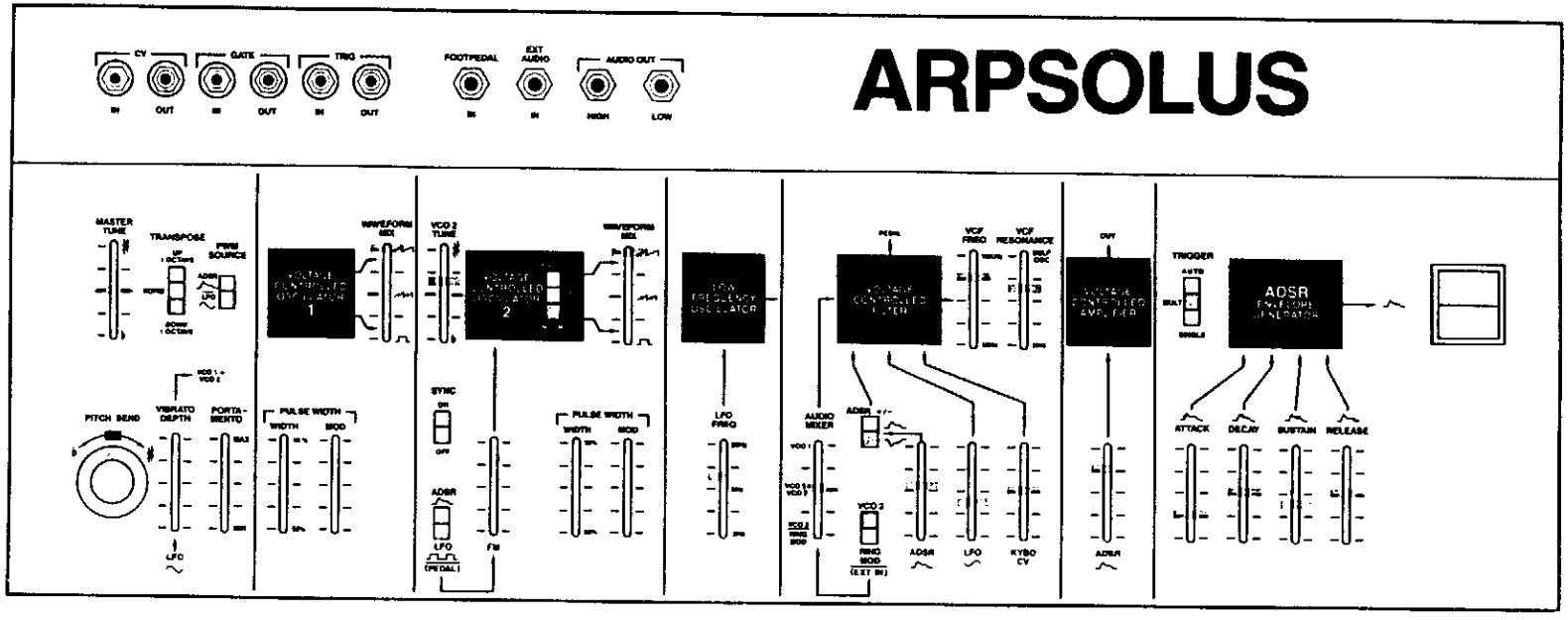
INTERFACE JACKS

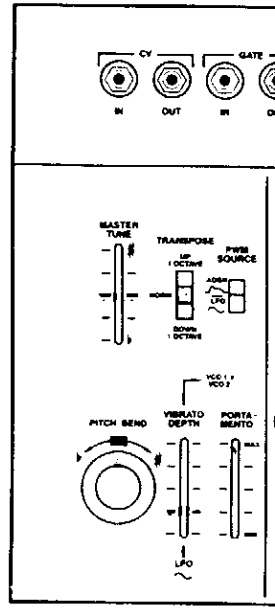
Your Solus is one member of a whole family of ARP synthesizers and synthesizer accessories. As such, it is equipped with input and output jacks that allow your Solus to control other ARP synthesizers or to be controlled by other ARPs. For instance, you can use two synthesizers together and play them both from one keyboard. Or, you can hook up your Solus as either a master or a slave to other ARP synthesizers, such as the Odyssey or 2600. The possibilities are endless.

If you wish to hook up two Soluses in a master-slave setup, simply connect the jacks labelled CV OUT, GATE OUT, and TRIG OUT on the master to the CV IN, GATE IN, and TRIG IN jacks on the slave.



PATCHES





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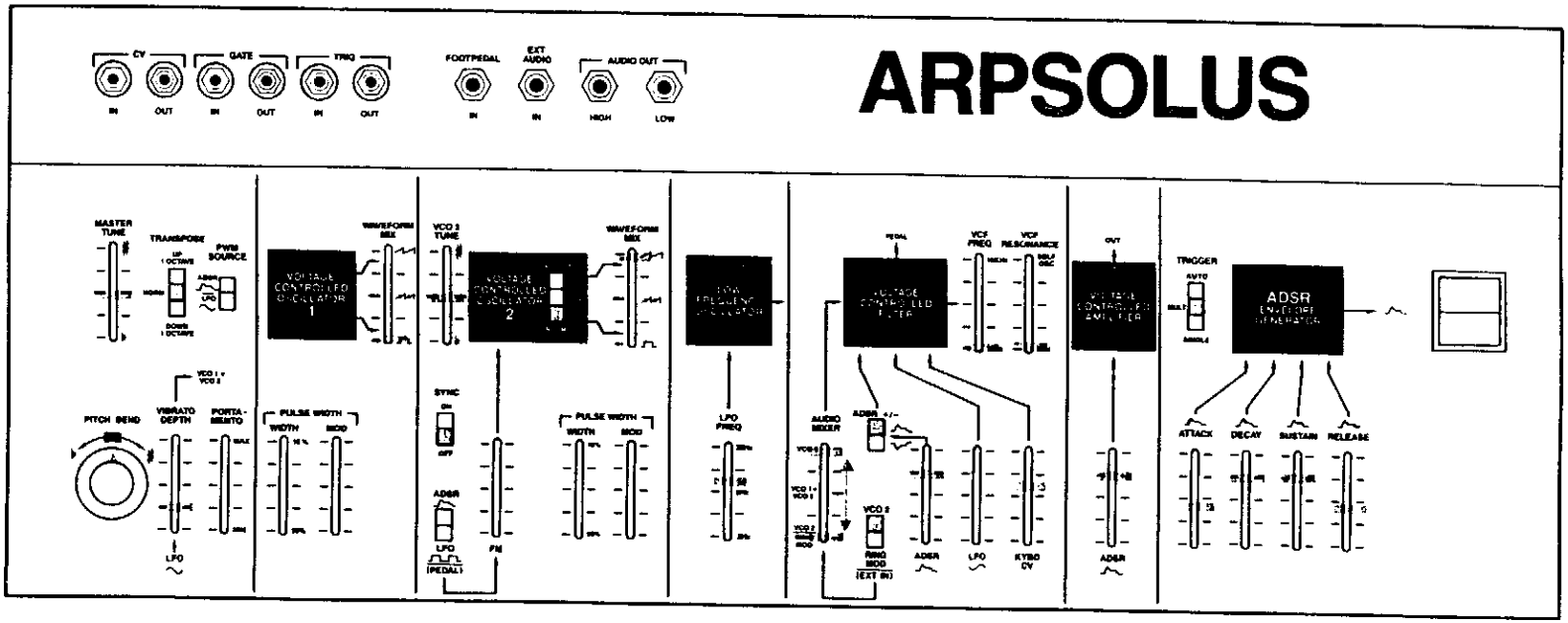
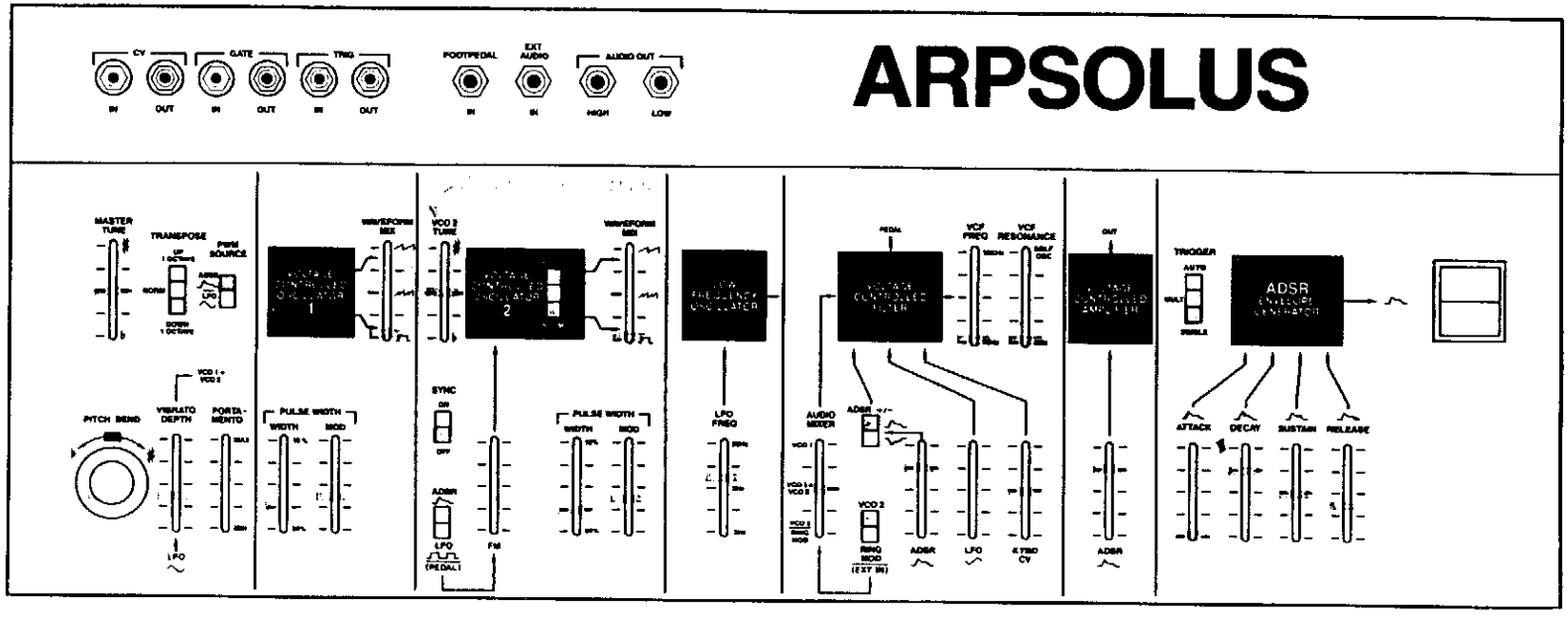
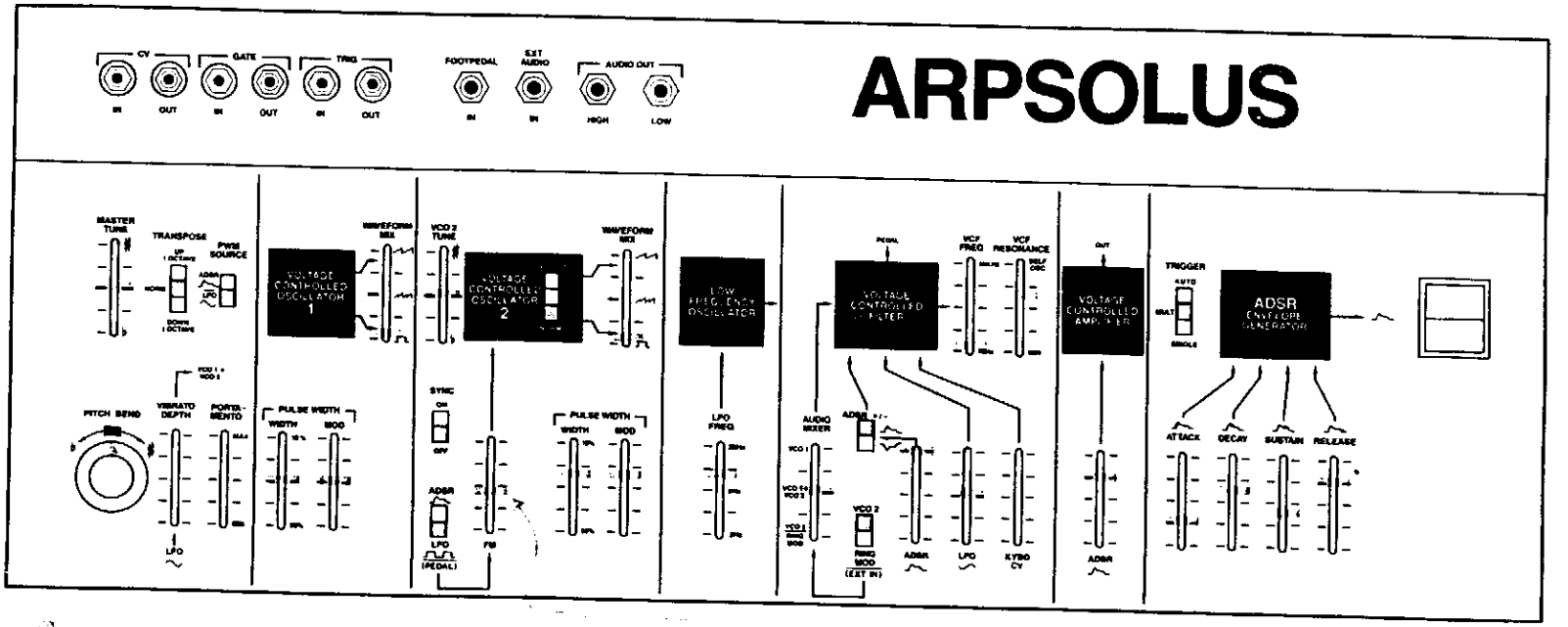
VCO 2 = Trun



VCO 1 = Clarinet
VCO 2 = Trumpet



Electric Bass


CV
GATE
TRIG
FOOTPEDAL
EXT AUDIO
AUDIO OUT
ARPSOLUS
MASTER TUNE
TRANSPOSE
PWSE SOURCE
VOLTAGE CONTROLLED OSCILLATOR 1
WAVEFORM MIX
VCO 2 TUNE
VOLTAGE CONTROLLED OSCILLATOR 2
LOW FREQ. OSCILLATOR
PEDAL
VCF FREQ
VCF RESONANCE
VOLTAGE CONTROLLED AMPLIFIER
TRIGGER
ADSR ENVELOPE GENERATOR
PITCH BEND
VIBRATO DEPTH
PORTA-MENTO
PULSE WIDTH
WIDTH
MOD
SYNC
ADSR
LFO
LFO FREQ
AUDIO MIXER
ATTACK
DECAY
SUSTAIN
RELEASE

SPECIFICATIONS

VOLTAGE CONTROLLED OSCILLATOR

Waveforms: Sawtooth, Pulse (variable pulse width)
Frequency Range: 20 Hz to 20 KHz
Maximum Frequency Shifts:
LFO Square Wave - +1 Octave
LFO Sine Wave - ± 2/3 Octave
ADSR - +7.5 Octaves

LOW FREQUENCY OSCILLATOR

Waveforms: Sine, Square
Frequency Range: .2 Hz to 20 Hz

VOLTAGE CONTROLLED FILTER

Type: Low Pass
Freqency Range: 16 Hz to 16 KHz

VOLTAGE CONTROLLED AMPLIFIER

Dynamic Range: 57 dB

ADSR ENVELOPE GENERATOR

Attack Time: 1.3 msec to 1.3 sec.
Decay Time: 10 msec to 10 sec.
Sustain Level: 0 to 100% at peak
Release Time: 10 msec to 10 sec.

AUDIO OUTPUTS

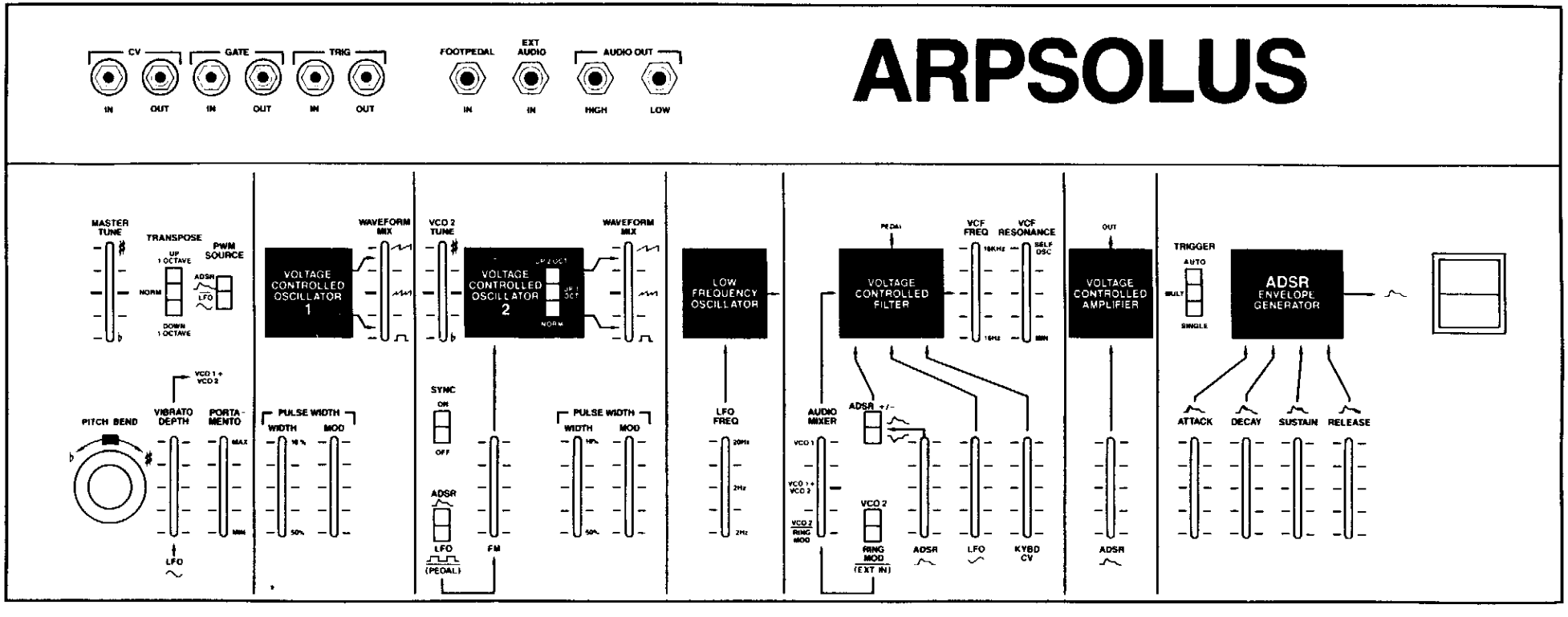
High Level: 2 V PP max., 1 K ohms impedance
Low Level: .3 V PP max., 8 K ohms impedance
External Audio In: 6 V PP max., 68 K ohms impedance

INTERFACE JACKS

CV In/Out: 1V/Oct., 5 K ohms impedance (IN)
330 ohms impedance (OUT)
Gate Out: + 12 V - key down, 15 K ohms impedance
Gate In: + 1 V pulse min., 470 K ohms impedance
Trigger Out: + 12 V pulse, 100 msec duration, 4.7 ohms impedance
Trigger In: + 2.8 V min., 15 msec duration min.,
120 K ohms impedance

GENERAL

Height: 6.5"
Width: 25"
Depth: 16"
Weight: 22 lbs.



ARP SOLUS FACSIMILE PAD

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To reorder, see your ARP dealer or contact ARP Instruments, Inc.
45 Hartwell Avenue, Lexington, MA 02173 (617) 861-6000.

PATCH TITLE _____

NOTES _____

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