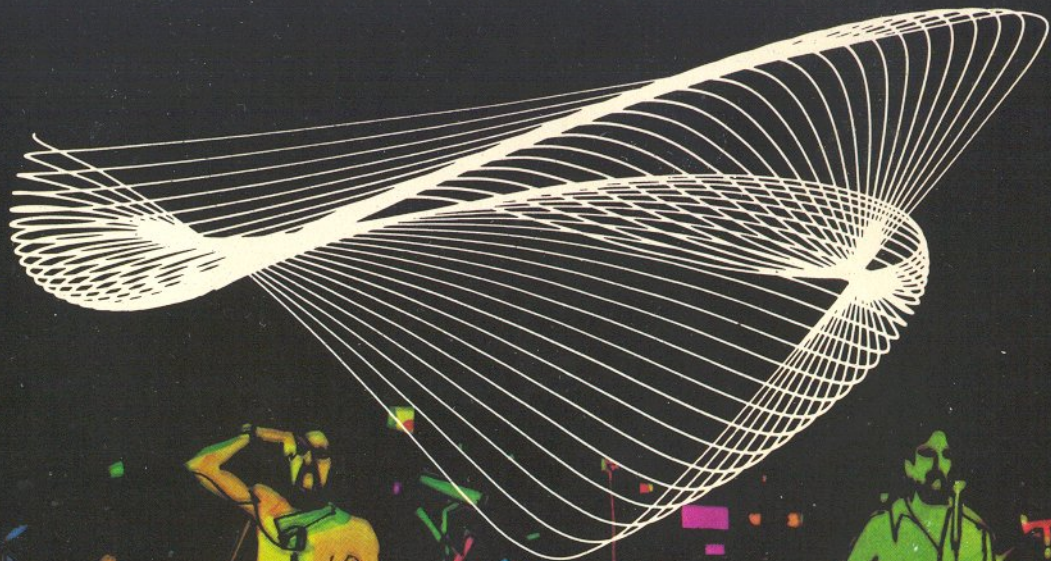# EXPLORER I
OWNER'S MANUAL

ARP

INTRODUCTION

Synthesizers can generally be classified in one of two ways—preset or variable. While preset models are usually noted for their ease of operation and quickness in changing settings, the variable-performance synthesizers normally permit more flexibility in creating a variety of sounds. The ARP Explorer I, a unique instrument among synthesizers, combines both preset and variable characteristics into *one* instrument capable of meeting the demands of live performance while at the same time providing further opportunity to discover and refine electronic sounds and effects that will reflect your own personal taste. Explorer I can create traditional instrumental sounds such as flutes, clarinets, and trumpets as well as unpitched effects like crashing surf, thunder, whistling wind and countless indescribable electronic sounds. In addition, the Explorer I offers a choice of basic wave-forms and pitch ranges which may be combined additively to produce a "heavy" sound that's unique to the Explorer I!

The primary purpose of this guidebook is 1) to get you involved quickly and meaningfully with the Explorer I through a systematic examination of the various controls and how they are related to electronic sound synthesis, and 2) the inclusion of 10 patches—instrumental and sound effects—which highlight the capabilities of the Explorer I and also provide a point of departure leading to the building of your own library of favorite sounds.

CONTENTS

EXTERNAL AMPLIFIER
AND SPEAKER SYSTEM

The Explorer I, like all electronic musical instruments, is designed to be connected to an amplifier and loudspeaker system. This external equipment (amplifier and loudspeaker) may be a guitar amplifier, an electronic organ, or even a high fidelity or stereo system. Two outputs are provided on the rear panel of the synthesizer —a phone jack labeled "Low" and a smaller phono (RCA) jack labeled "High." Use the outputs in the following manner:

1) If you are planning to plug your synthesizer into a guitar amplifier, use the synthesizer's "Low" output. A standard guitar cord can be used for this connection.

2) If you're using the synthesizer with an organ or a hi-fi amplifier, use the output marked "High." An input jack is already available on most organ models. In the event your organ is lacking this input, it will only take a serviceman a few moments to install one. Ask him to wire the jack so the volume of the synthesizer can be controlled by the expression pedal of the organ.

SECTION I
THE ARP EXPLORER I

The sound quality produced by your Explorer I will depend upon the type of speaker system you are using. Speakers designed to create special effects—the rotating type for example—will not reproduce the sound of your synthesizer as well as good quality speakers found in most organs and guitar amps, although rotating speakers may create special sounds which you might use on occasion. Normally, the Tremolo and tone controls on guitar amps should be turned off, unless, of course, you are deliberately seeking to modify the synthesizer's output. If your amplifier provides reverberation, by all means experiment freely with this feature, for it may serve to enhance many of the sounds you'll be synthesizing.

Your ARP dealer will be happy to answer any questions about connecting your synthesizer to an amplifier and loudspeaker system.

If you plan to use the Explorer I with an electronic organ, consider one of the following arrangements:

1) Place the synthesizer on top of the organ. In this position, the synthesizer can be played as if it were a third keyboard of the organ. To insure maximum stability remove the organ's music rack, if possible, rather than simply folding it back flat.

2) Some organ cabinets are not designed to permit placing another instrument on top in the manner described above. Therefore, the Explorer I can be conveniently placed on a performer's stand to the right of the organ. After a little practice, this arrangement will be as comfortable and convenient as having the instrument directly in front of you. For the best results, have the synthesizer at least as high as the lower manual of the organ.

LET'S BEGIN

By now your curiosity is probably beginning to exert itself, and you may wish to start playing immediately. In this case simply turn to page 24, read the brief description of the control functions, and then set up any of the patches illustrated. While these patches provide some basic ideas of the vast potential that lies within the Explorer I, you'll ultimately discover an ever greater number of new and exciting sounds and effects on your own.

If you prefer to systematically examine each control of your Explorer I before playing, continue on to the information which follows without turning to the back of the guidebook.

HOW YOUR EXPLORER I OPERATES

A synthesizer is a collection of electronic functions working together to generate, process, and control electrical signals to give you the capability of shaping a wide variety of sounds. Because it's so easy to get into the habit of thinking of your synthesizer as just a number of unrelated controls—a few here, a few there—let's preface our discussion of these controls with an overview of what's actually happening inside the instrument.

Generally speaking, all the electronic circuits in your Explorer I perform one of three basic functions: 1) Signal sources: the "raw" tones or noise which will ultimately be shaped into musical sounds, 2) Signal Modifiers: the "raw" sounds are passed through signal modifiers where the timbre is changed to produce the desired sound, and 3) Controllers: devices which determine the operating characteristics of the signal sources and the

signal modifiers. For instance, the keyboard is a controller which produces a voltage to tell the oscillator what pitch to create. Similarly, the ADSR envelope generator creates an attack and decay signal that controls the signal passing through the Voltage Controlled Filter (VCF), which is a modifier, so that the final musical sound can have an attack and decay.

All mechanical instruments work in a similar way. A violin, for instance, has a vibrating string which would be a signal source. The vibrating string corresponds to the oscillator in your Explorer I. The vibrations from the string are transmitted to the body of the violin which modifies the sound of these vibrations. The body of the violin is actually a mechanical filter and corresponds to the Voltage Controlled Filter (VCF) on the Explorer 1. It is the characteristic resonances of the body that give the violin its distinctive tone quality. The fingerboard, like the keyboard on your Explorer I, determines the pitch of the sound. The movement of the bow, like the ADSR Envelope generator, determines the attack and decay characteristics of the sound.

The operation of a synthesizer, like the operation of a conventional instrument such as the violin, can be explained visually using "block diagrams." Block diagrams showing the operation of a violin and the operation of a synthesizer are shown in Figure 1. Note the similarities in the way that the signals are generated, modified, and controlled.
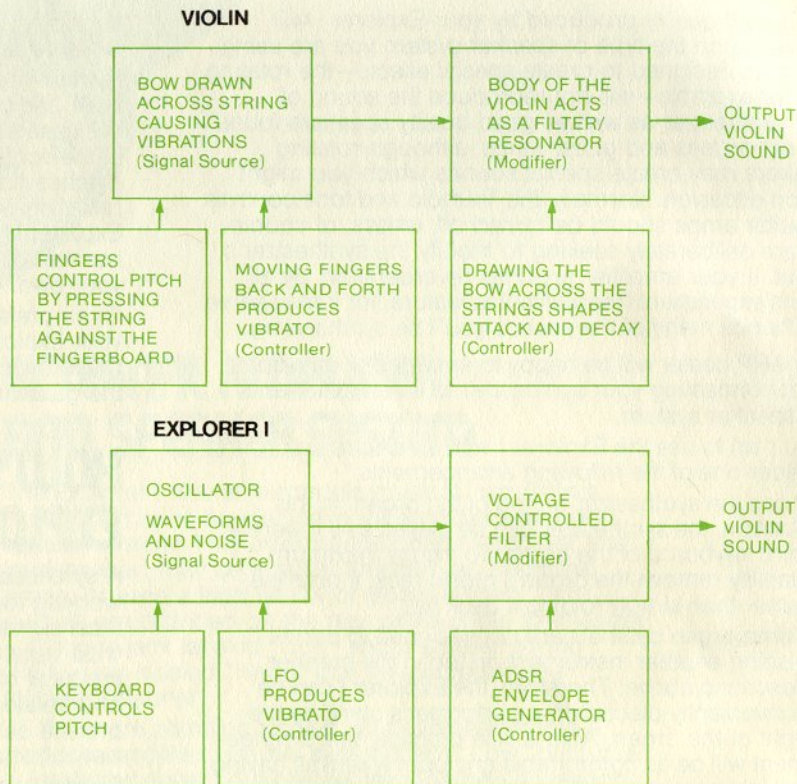
VIOLIN

BOW DRAWN ACROSS STRING CAUSING VIBRATIONS (Signal Source)

BODY OF THE VIOLIN ACTS AS A FILTER/ RESONATOR (Modifier)

OUTPUT VIOLIN SOUND

FINGERS CONTROL PITCH BY PRESSING THE STRING AGAINST THE FINGERBOARD

MOVING FINGERS BACK AND FORTH PRODUCES VIBRATO (Controller)

DRAWING THE BOW ACROSS THE STRINGS SHAPES ATTACK AND DECAY (Controller)

EXPLORER I

OSCILLATOR

WAVEFORMS AND NOISE (Signal Source)

VOLTAGE CONTROLLED FILTER (Modifier)

OUTPUT VIOLIN SOUND

KEYBOARD CONTROLS PITCH

LFO PRODUCES VIBRATO (Controller)

ADSR ENVELOPE GENERATOR (Controller)

Figure 1

4

Interconnecting the various functions shown in Figure 1 is known as creating a "patch." The block diagram illustrated in Figure 1 is, of course, a violin patch. Similarly, it is possible to diagram any patch that you may play on the Explorer I. Actually, this visual representation of a patch permits you to better understand what functions of the synthesizer are being employed and how each function contributes to the finished sound. In short: the patch is the means by which the various parts of your Explorer I "talk to each other."

Since all the signal generating and processing is done with electrical circuits in a synthesizer (rather than with strings, wood, and resin), it is possible to change all the characteristics of the signal sources, modifiers, and controllers just by moving some knobs on the front panel. For instance, the string on a violin creates a waveform called a "sawtooth wave." On your Explorer I, you can select a sawtooth wave if you want to make a violin sound, or you can also select square waves, pulse waves, and other waveforms at the touch of a tab, thereby completely changing the nature of the sound. Similarly, most conventional instruments have just one characteristic attack and decay. However, on your Explorer I, using the four ADSR controls, you can create thousands of different attack and decay characteristics.

All the sounds you will create with your Explorer I begin with the two sound sources, the Oscillator and the Noise Generator. The oscillator produces pitched tones and the noise generator produces unpitched sounds (used for making wind, thunder, and other similar sounds). The oscillator produces four different waveforms and four different pitch ranges simultaneously. Switches located on the sloping portion of the panel over the keyboard are used to select the waveforms and the pitch ranges desired for a particular sound. The pitch of the oscillator is controlled by the keyboard, the Pitch Bend knob, and other controllers that will be discussed later on.

As shown in Figure 1, the "raw" signals from the oscillator or Noise Generator are processed through the Voltage Controlled Filter (VCF) where the timbre or tone color is adjusted. The ADSR envelope generator is hooked up to the filter so that attack and decay characteristics can be added to the sound. Each of the four sliders on the VCF panel perform a particular function: briefly, the ADSR slider is a brilliance control. The LFO slider (Low Frequency Oscillator) creates a tremolo effect, the Freq slider sets the cut off frequency, influencing the tonal quality, and the Resonance slider may be employed to amplify a particular band of frequencies, creating effects such as the "wow" sound.

The Effects section located directly to the left of the keyboard, provides the type of controls which add the finishing touches to your sound after a waveform has been selected and the Voltage Controlled Filter and ADSR Envelope Generator setting have been chosen. For instance, the use of vibrato is common to most instrumental players and vocalists. This musical effect is under your direct command by employing three of the Effects controls—LFO Speed, Vibrato Depth, and Vibrato Delay. Not only will you be able to create the normal vibratoes associated with traditional instruments, but also an entirely new array of unusual pitch deviations.

PRESET/MANUAL SWITCHES

As mentioned briefly in the introduction, the Explorer I is a synthesizer which is both preset and manual. First, locate the two preset/manual switches illustrated in Figure 2, and notice how each switch relates to four controls.
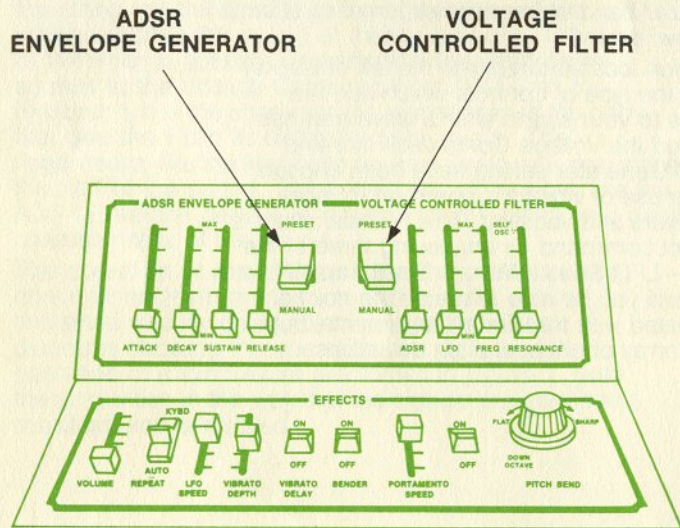
ADSR ENVELOPE GENERATOR PRESET/MANUAL

When this switch is in the preset mode (up), all four ADSR controls are disengaged and an "envelope" is set automatically; that is, the four sliders—attack, decay, sustain, and release—are pre-programmed. The opposite is true when the switch is moved to manual (down)—all four ADSR controls are operable, permitting you to adjust the attack, decay, sustain, and release sliders until you obtain the exact envelope you're seeking. The ADSR Envelope Generator will be discussed in more detail later on in this guidebook.

At this time it may be interesting for you to know that the "Preset" envelope is equivalent to these positions of the sliders in the manual mode. Figure 3 illustrates.

ADSR
ENVELOPE GENERATOR

VOLTAGE
CONTROLLED FILTER
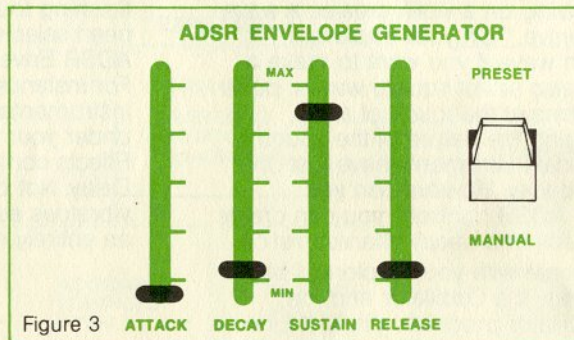
Figure 2

Figure 3

By changing from preset to manual, you'll notice that the envelope remains the same.

VOLTAGE CONTROLLED FILTER PRESET/MANUAL

The second preset-manual switch controls the filter in a somewhat more complicated manner. When the preset mode is selected for the filter, only two sliders—the Freq and Resonance—are totally deactivated. These controls are now pre-programmed internally, just as the four ADSR controls were "preset" in the above example.
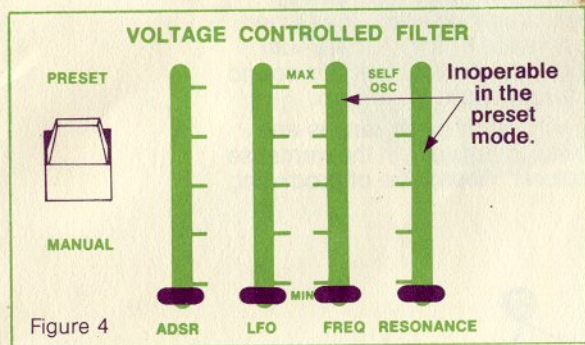
control voltage is responsible for opening the filter. If the ADSR slider is all the way down, no control voltage will be permitted to pass to the filter. Thus, the filter will remain closed, and your synthesizer is then incapable of producing sound.

One additional point that should be mentioned: the preset-manual switches work independently of each
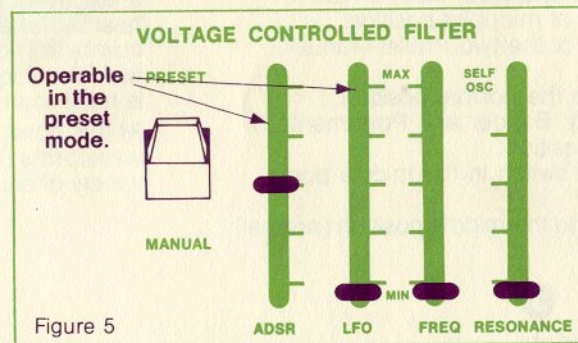

Figure 4

Figure 5

The two remaining controls—ADSR and LFO—are not disengaged in the preset mode, and will affect the sound of the instrument. Although a certain amount of pre-programmed voltage is automatically routed to the ADSR control, movement of this slider continues to affect the brightness of the sound because the control is still operable. The LFO is in no way affected by the preset switch and functions the same as it does in the manual mode.

The manual mode of the filter puts the four filter controls under your direct command. The Voltage Controlled Filter, like the ADSR Envelope Generator, will be discussed in more detail later in this guidebook. However, you should note that whereas the ADSR slider simply provided a range of tonal quality in the preset mode, this slider must be raised in the manual mode as this

other; that is, you may select preset for the ADSR Envelope Generator and manual for the Voltage Controlled Filter, or manual for the ADSR Envelope Generator and preset for the Voltage Controlled Filter. The net result is an unlimited number of sound possibilities and quick changes for live performances.

Most of the experiments you'll be doing in the following pages employ the manual settings only. While the manual mode was chosen because it provides the best method of demonstrating the capabilities of your Explorer I, the preset aspects of the instrument can, and will be, of equal importance to you. For example, in live performance the ability to quickly change from one basic setting to another becomes extremely important. The preset switches answer this need as they permit these quick changes and still give you a tremendous amount of flexibility.

GETTING SET UP FOR EXPERIMENTS

1. Turn on the Explorer I.
2. Place all the Pitch Range and Waveform switches in the "up" position.
3. Move the ADSR Envelope Generator, Voltage Controlled Filter and Effects controls to the "down" position, except for the one slider labeled ADSR. This control should be at midpoint position.
4. Select *Preset* for both of the two Preset-Manual switches.
5. Turn the Pitch Bend to the normal position.
6. Move the Vibrato Delay, Bender and Portamento switches to the "off" position.
7. Place the Auto Repeat switch in the middle position (normal).
8. Move the Tune control to the middle position (normal).

Now, to begin your explorations, press down the bass 16' (Pitch Range) and Reed (Waveform). Remember to adjust the volume slider; then play several notes on the keyboard. Return each switch to the original "up" position, and select Soprano 2' and Hollow. Again, play a few notes or a short tune, if you wish. You quickly hear that the sound is measurably different. This time combine two pitch ranges, Tenor 8' and Alto 4', with two Waveforms, Brass and Fuzz. Notice how this sound is fuller than just one pitch range and waveform.

At this point, experiment with all the pitch ranges and waveforms (including Noise) to appreciate the immense variety of sounds your Explorer I is capable of producing.

Figure 6

8
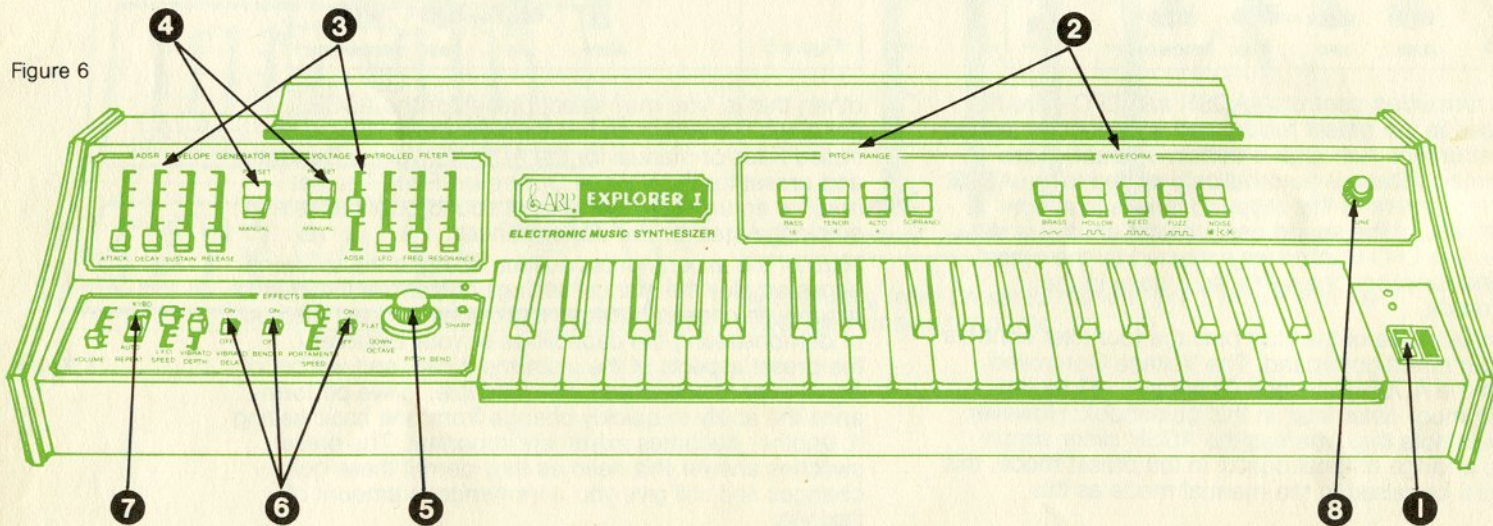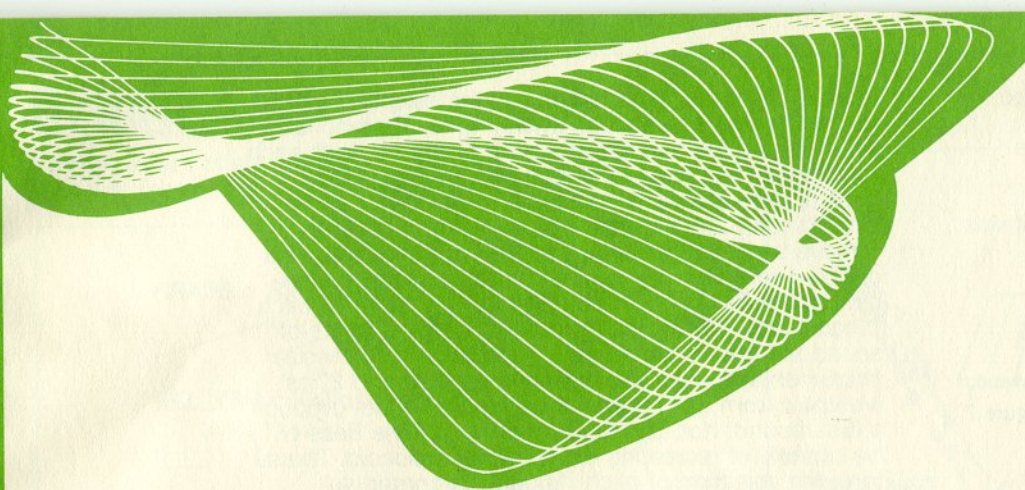
SECTION II
SOUND SOURCES

PITCH RANGE

Now that you've had a moment to enjoy the Explorer I, take a closer look at the four pitch ranges—Bass 16', Tenor 8', Alto 4, and Soprano 2'. Notice the mark which follows each numerical designation. These markings are called footages, and date back to pipe organ terminology which indicated the length of individual pipes. Because synthesizers are electronic, they do not, of course, utilize pipes. However, the relationship between the footage and the pitch remains the same. As you may have already noticed, the pitch becomes lower as the footage increases. Conversely, the shorter footage always produces the higher pitch. Turn the page, and then using Figure 7 as a reference, let's experiment:

1. Use Brass and Bass 16′, and play the "C" located below Bass 16′. Listen closely to the sound.
2. Without changing the setting, play "C" an octave higher. Again listen closely.
3. Now, change Bass 16′ to Tenor 8′ and play the first "C" again. The pitch range is the same as it was in number 2.

Figure 7

Same Pitch
Use Brass and Bass 16′
Use Brass and Tenor 8′
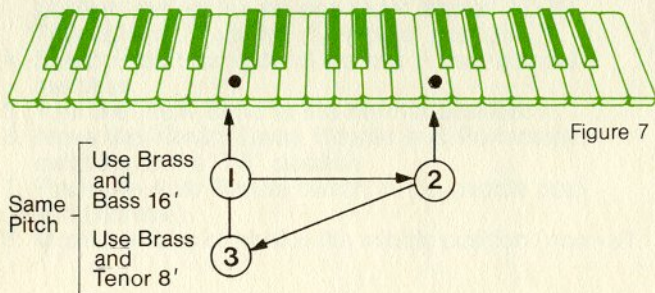
Try the same experiment using Bass 16′ and Alto 4′; only this time play a note two octaves higher before switching to Alto 4′. Again, identical pitches are the result.

Figure 8

Same Pitch
Use Brass and Bass 16′
Use Brass and Alto 4′
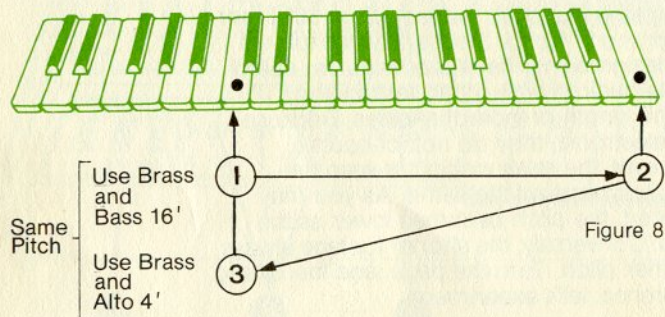
A variation of this experiment involves selecting a pitch range such as Alto 4′ then switching to Soprano 2′ while playing the same note on the keyboard. With each successive doubling of the footage, the pitch range goes up one octave. A final experiment: select all the pitch ranges. As you play a single note, randomly remove and add the various pitches to get a clear idea of how each pitch range contributes to overall sound quality. The flexibility of your Explorer I in terms of pitch range is not only for the purpose of building layers of sound but also to permit you to realistically synthesize instrumental voices. The high pitched Soprano 2′, as we know from our musical experience, will not produce a tuba sound; nor, on the other hand, will the Bass 16′ be capable of recreating the sound of a piccolo. Therefore, the selection of pitch range(s) becomes an extremely important part of the many sounds you'll be seeking.

Incidentally, the tone produced by the Tenor 8′ is known as concert pitch. When the Tenor 8′ is in use and the Explorer I is tuned properly, the synthesizer will have the same pitch as the corresponding keys on a piano.
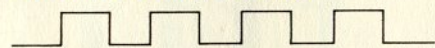
WAVEFORMS

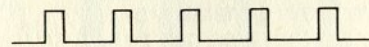The Explorer I offers a choice of four basic waveforms plus a Noise source. The four waveforms are:

BRASS – Rich, full, brassy
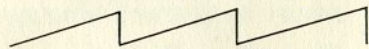
HOLLOW – Hollow, reedy

REED – Thin, nasal

FUZZ – Fuzzy sound, fuzz guitar, pop or rock sound

Figure 9

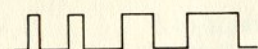OSCILLIOSCOPE

CLARINET

MICROPHONE

SOUND-WAVE TRANSMISSION

Figure 10

Although it is possible to combine Noise with the other tone sources, we'll treat it as a separate subject due to its unique unpitched characteristics.

Whenever an acoustical instrument is played or the human voice is used, air waves are set in motion and sound is transmitted to your ear. These sound waves can be picked up by a microphone and converted into electrical signals. Once an acoustical sound has been converted into an electrical signal, the waveform shape of the sound can be seen using an oscilloscope. Every acoustical instrument has its own characteristic waveform.
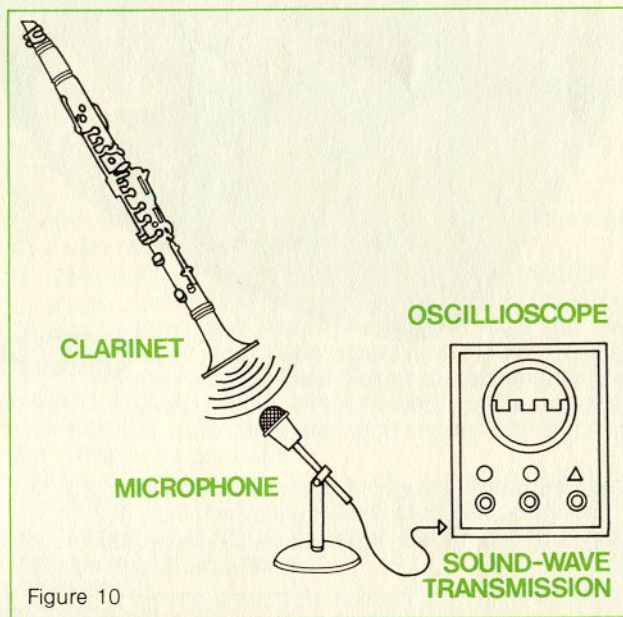
Keep these important concepts in mind: 1) all acoustical sounds produce waveforms, and the waveform of each sound has a particular, unique shape; and 2) acoustical waveforms can be turned into electrical waveforms by using a microphone, and electrical waveforms can be turned back into acoustical waveforms by a loud-speaker. From this point, it's only a short step to the world of electronic sound synthesis with your Explorer I, because complex waveforms can be *generated* by purely electronic means and turned into acoustical sounds by an amplifier and speaker.
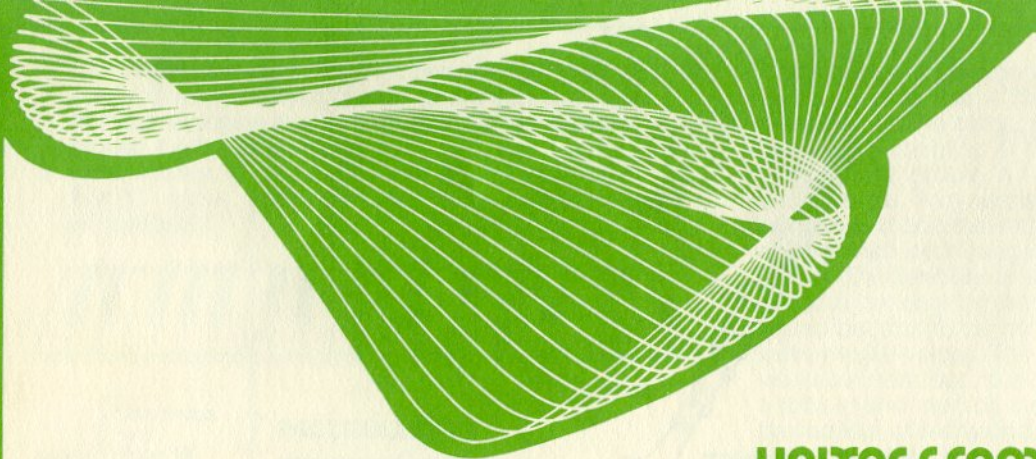
VOLTAGE CONTROLLED FILTER

Not only can waveforms be electronically generated by electronic means in a synthesizer, but they also can be significantly modified or altered by electronic means. Your Explorer I performs this signal modification function with the Voltage Controlled Filter.

Filters are devices which can change the shape of a waveform. Examples of simple filters are the tone controls of any stereo. Your experiences with these tone controls tells you that they are capable of removing or increasing the high (treble control) or low (bass control) frequencies. As you'll discover, the Voltage Controlled Filter of your Explorer I is much more sophisticated in its operation.

The Explorer's Voltage Controlled Filter is a "low-pass filter" which means that it "passes" low frequency tones while cutting out higher frequencies. The frequency, below which the filter passes signals, can be varied from so low that no audio signals get through at all, to so high that virtually all audible frequencies pass through the filter. This "cutoff" frequency of the Explorer's Voltage Controlled Filter can be controlled in two ways:

SECTION III
MODIFIER

1) by a voltage from another circuit, or 2) manually, using the "Freq" control slider. Also, this filter has an additional characteristic called Resonance. Adding resonance to a low-pass filter causes the filter to emphasize a narrow band of frequencies just at the cutoff point. First, locate the four slider controls labeled ADSR, LFO, FREQ, and RESONANCE illustrated in Figure 11.
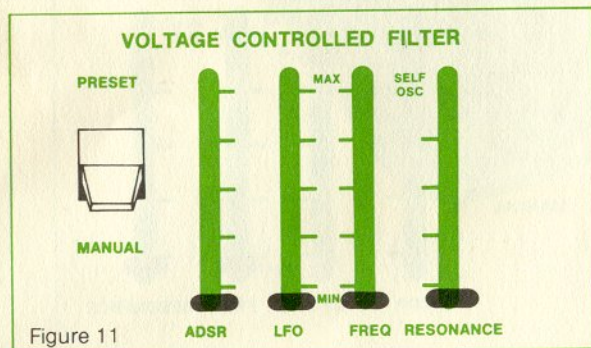

VOLTAGE CONTROLLED FILTER

PRESET
MAX   SELF OSC

MANUAL

MIN

Figure 11   ADSR   LFO   FREQ   RESONANCE

LET'S EXPERIMENT AGAIN

1. Select Noise (waveform section—all other waveforms and footage tabs "off"), and move the Preset switch of the filter to Manual. Set the filter controls as shown in Figure 11. All other controls should be kept in their normal positions. Now, press down the first key on the keyboard—any key may be used—and then gradually raise the Freq slider while holding the key down. Move this slider to the top of its range; then gradually lower it all the way through the entire range. As you lower it, you'll hear the high frequencies of the noise signal weaken and disappear, then the middle frequencies, and finally the low frequencies will also vanish.

2. Again use Noise as the signal source and follow the same procedure as the previous experiment. Move the Freq slider to a middle position, then gradually raise the Resonance slider. As the Resonance slider is raised, you'll hear the low frequencies fade as the band of frequencies, which is allowed to pass through the filter, becomes narrower. Eventually, as you reach the top, you'll hear a whistling effect caused by the filter going into self-oscillation, thus producing a pitch of its own. (More on using this effect later.) With the Resonance control halfway up, again move the Freq slider through its entire range and observe the effect.

3. Now that you have a general idea of how the filter operates, perform the preceding experiments using the Brass waveform and Tenor 8'. While you raise and lower the VCF Freq control, listen carefully to the harmonics of this waveform as they are picked out or emphasized when the resonance control is moved up. Experiment with different waveforms and pitch ranges and also the Resonance control.

Set the controls as illustrated in Figure 12 and let's now investigate how the Voltage Controlled Filter may be controlled by the ADSR Envelope Generator. To begin, choose Alto 4' and Reed.
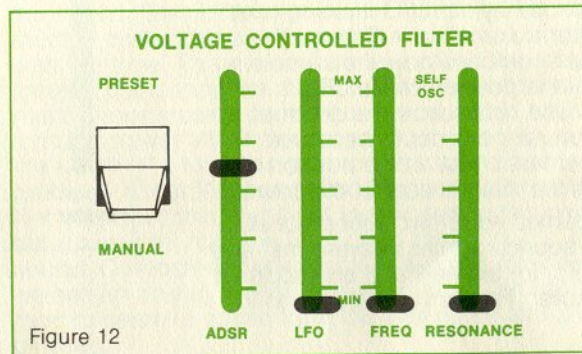

VOLTAGE CONTROLLED FILTER

PRESET
MAX   SELF OSC

MANUAL

MIN

Figure 12   ADSR   LFO   FREQ   RESONANCE

4. The ADSR Envelope Generator produces a voltage which automatically "opens" the filter, in the same way that you manually "opened" the filter by raising the Freq control. The slider labeled "ADSR" determines the amount of control the envelope generator will be permitted to have in opening and closing the filter. Try different settings of this slider and listen closely. Notice how the sound becomes "brighter" as the ADSR slider is raised. This happens because the voltage which is produced by the ADSR Envelope Generator is being used to "open" the VCF, which in turn lets more and more of the high-frequency (bright) sounds pass through. Lowering the ADSR slider will reduce the amount of ADSR signal which passes to the filter's control input; and consequently, the filter will not open as far and will continue to cut out the higher frequencies, producing a more muffled sound. By controlling the filter in this manner, you have a precise means by which you can control the timbre, or tone quality of any sound. You'll find this is an extremely important concept in the sounds you'll be seeking to create.

5. Tremolo—a form of timbre or tone modulation again utilizing the filter—is produced by raising the LFO slider as illustrated in Figure 13.

The control voltage produced by the LFO is being used to open and close the filter automatically. Change the setting of the LFO Speed and notice how the tremolo is affected. In addition, vary the position of the LFO slider in the filter section and notice how the depth of the tremolo changes. Naturally, the depth becomes greater as the voltage increases, just as the position of the ADSR slider controls the "brightness" of the sound.

At this point, you have learned about two aspects of electronic sound synthesis—sound sources (waveforms) and sound modification (VCF). To this we'll add an important third element—the controller. The term controller, as in

the case of the Explorer's low-pass filter, is descriptive in nature; namely, these circuits produce control voltages for the express purpose of controlling other circuits such as the filter just discussed.

Figure 13

VOLTAGE CONTROLLED FILTER

USE HOLLOW AND TENOR 8'

14
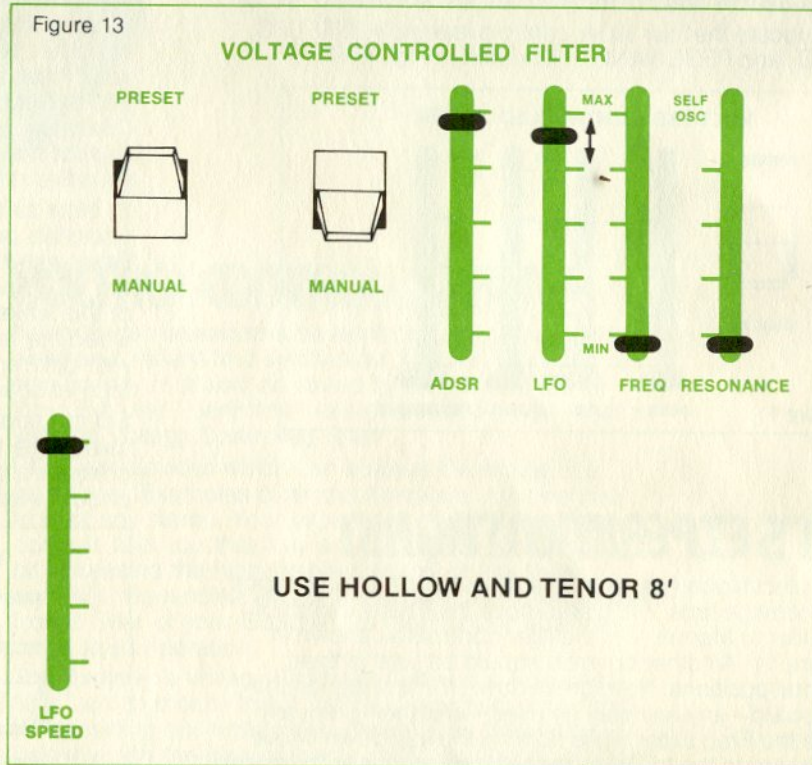
ADSR ENVELOPE GENERATOR

An "envelope" is essentially the attack and decay characteristics of a sound. The ADSR envelope generator provides controls which will let you create an infinite variety of attack and decay shapes. The most common use of the ADSR Envelope Generator has already been demonstrated—control of the filter. This precise control of the filter is imperative because not only does a sound get louder or softer during the attack and decay, but also the harmonic content of most instrumental tones changes from the beginning of the sound to the end of the sound. Consider: as you blow into any wind instrument, a certain amount of time is required to simply start the tone. This period of time is called the attack time. In comparing the attack times of various instruments, your musical experience tells you that a tuba has a much slower attack than a guitar or piano. During the attack of a tuba, for instance, the sound builds gradually about ⅕ second after the person starts blowing. Not only does the sound get louder during this period, but it also gets richer in harmonics resulting in a brighter sound. Compared to the attack of a guitar, for instance, we see an entirely different situation in that all harmonics seem to sound from the instant the string is plucked.

SECTION IV
CONTROLLERS

In addition to an attack time control, the ADSR Envelope Generator of your Explorer I also offers adjustable sliders for programming three other parts of the sound "envelope." The following diagram graphically illustrates the function of the four ADSR controls.

Figure 14   ATTACK   DECAY   SUSTAIN   RELEASE
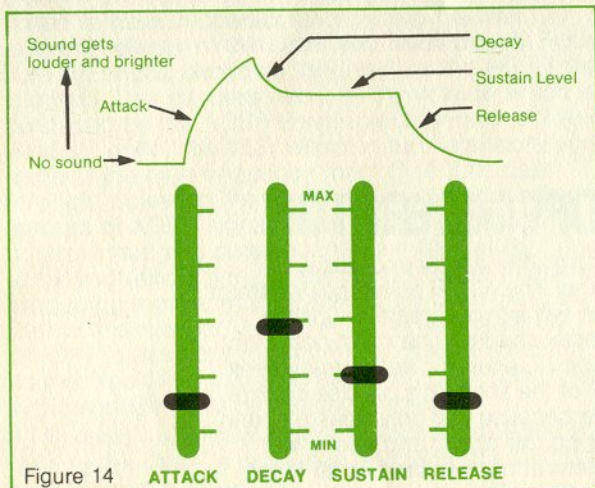
The important point to remember is that the envelope generator provides a control voltage that opens the filter in an extremely precise and controllable manner. By adjusting the attack, decay, sustain, and release time, this voltage will open, hold open, and then close the filter in a manner characteristic of the sound you are synthesizing.

Let's experiment with the four ADSR controls. To begin, set the controls as shown in Figure 15.

Play a few notes or a short tune on the keyboard; then move the ADSR *attack* slider to various positions. The change in sound is due to the "automatic" voltage control of the VCF by the ADSR Envelope Generator. As you raise the attack slider, the ADSR opens the filter more slowly—thus "slowing" the attack, by opening the filter more gradually. Continue by returning the attack slider control to its lowest position and experiment with the decay, sustain, and release sliders in the same way.

ADSR ENVELOPE GENERATOR   **VOLTAGE CONTROLLED FILTER**

ATTACK   DECAY   SUSTAIN   RELEASE

USE REED AND TENOR 8'

Figure 15

ADSR   LFO   FREQ   RESONANCE

16
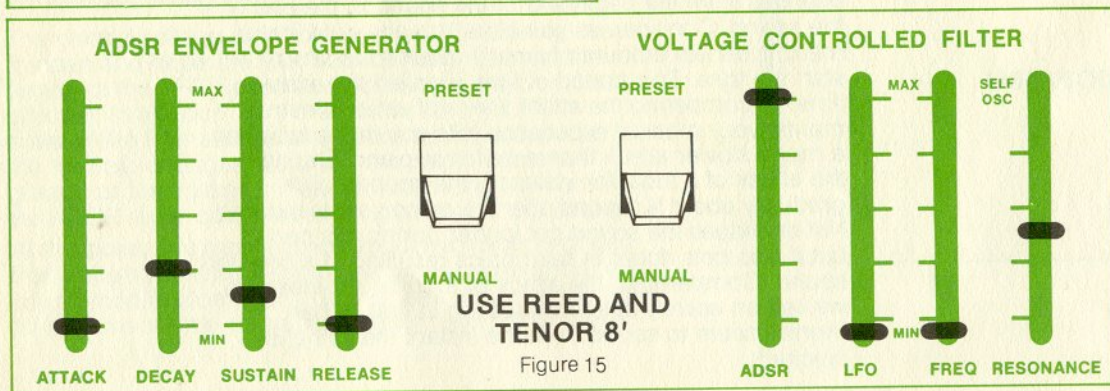
LFO-LOW FREQUENCY OSCILLATOR

The LFO is another circuit which produces control voltages, and therefore, like the ADSR, is a controller. There are two LFO sliders—the LFO control input to the filter (next to the ADSR slider) and the LFO speed in the Effects section. (The Vibrato Depth slider is also an LFO slider since it controls the amount of LFO output that is applied to the oscillator.)

Low frequency waveforms serve a number of purposes. The tremolo, which you produced earlier, was the result of a low frequency sine wave generated by the LFO. When you increase or decrease the LFO speed, you're simply increasing or decreasing the frequency (speed) of the low frequency waveform. The result in the above example, was an increase or decrease in the speed of the tremolo. If you wish, review experiment 5 in the group of experiments dealing with the filter.

The LFO control voltage is also used to produce vibrato. To experiment with the LFO, set the controls as illustrated in Figure 16.

VOLTAGE CONTROLLED FILTER

PRESET

PRESET

MANUAL

MANUAL

MAX

SELF OSC

MIN

ADSR   LFO   FREQ   RESONANCE

ON

OFF

LFO SPEED   VIBRATO DEPTH   VIBRATO DELAY

USE HOLLOW AND ALTO 4'
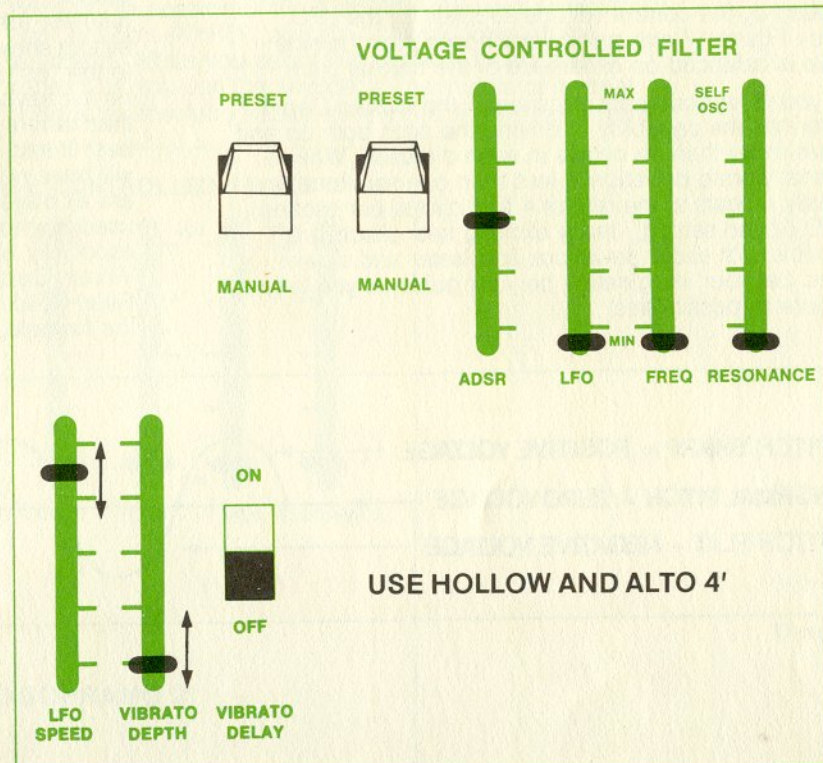
Figure 16

Gradually raise the Vibrato Depth control and play a few notes on the keyboard—you'll hear a vibrato. As this slider is moved to higher positions, the vibrato becomes wider. Similar to the tremolo, the vibrato you hear is created by the control voltage supplied by the LFO. Study Figure 17 and particularly notice how the sine wave is balanced on either side of the normal pitch.

As you've undoubtedly discovered, the Vibrato Depth slider has the capability of driving the pitch both up and down more than an octave in each direction. While a normal vibrato deviation is less than one semitone and usually repeats at the rate of 4 to 8 cycles per second (LFO Speed setting), many exciting new effects are possible with wider deviations and faster and slower rates. Let your imagination be your guide as you fully explore all possibilities.

The one other vibrato control is an on/off switch located next to the Vibrato Depth slider. This is a unique control which momentarily delays the LFO's output and then gradually permits the vibrato or tremolo to fade in naturally for realistic and expressive playing. Using the setting shown in Figure 16, move the Vibrato Delay switch to the "on" position, and again play a series of notes on the keyboard. Purposely hold some notes longer than others to formulate an idea of how this effect will best fit into your playing. Naturally, the Vibrato Delay will have no affect on the notes you are playing if they are all played very quickly. Delayed vibrato is frequently used by most vocalists and instrumental musicians— especially when performing slow ballads. Lower the Vibrato Depth control and raise the LFO control on the Filter. Notice that the Vibrato Delay also applies to the tremolo.

PITCH SHARP = POSITIVE VOLTAGE

NORMAL PITCH = ZERO VOLTAGE

PITCH FLAT = NEGATIVE VOLTAGE
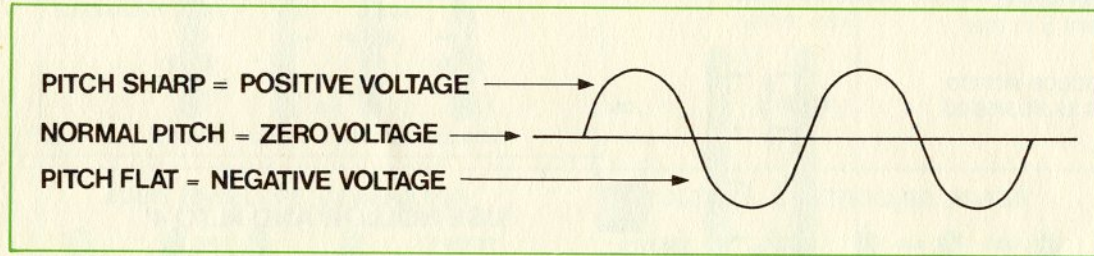
Figure 17

AUTO REPEAT

The three-position Auto Repeat switch is located in the Effects section next to the volume control. Set the sliders as illustrated in Figure 18, and you'll be ready to try this control.

Move the Auto Repeat switch to the "down" position, and you'll hear a rapidly repeating tone. The speed at which this tone repeats is controlled by the LFO. Now change the position of the Auto Repeat switch to the "up" position (KYBD), and play several notes on the keyboard. When you select this position, the tone only repeats as you use the keyboard. The middle or normal position for the Auto Repeat switch deactivates this control.

ADSR ENVELOPE GENERATOR

MAX

ATTACK   DECAY   SUSTAIN   RELEASE

MIN

PRESET

MANUAL

VOLTAGE CONTROLLED FILTER

PRESET

MANUAL

MAX   SELF OSC

ADSR   LFO   FREQ   RESONANCE

MIN

KYBD

AUTO

REPEAT   LFO SPEED

USE BRASS AND SOPRANO 2′

Figure 18

19
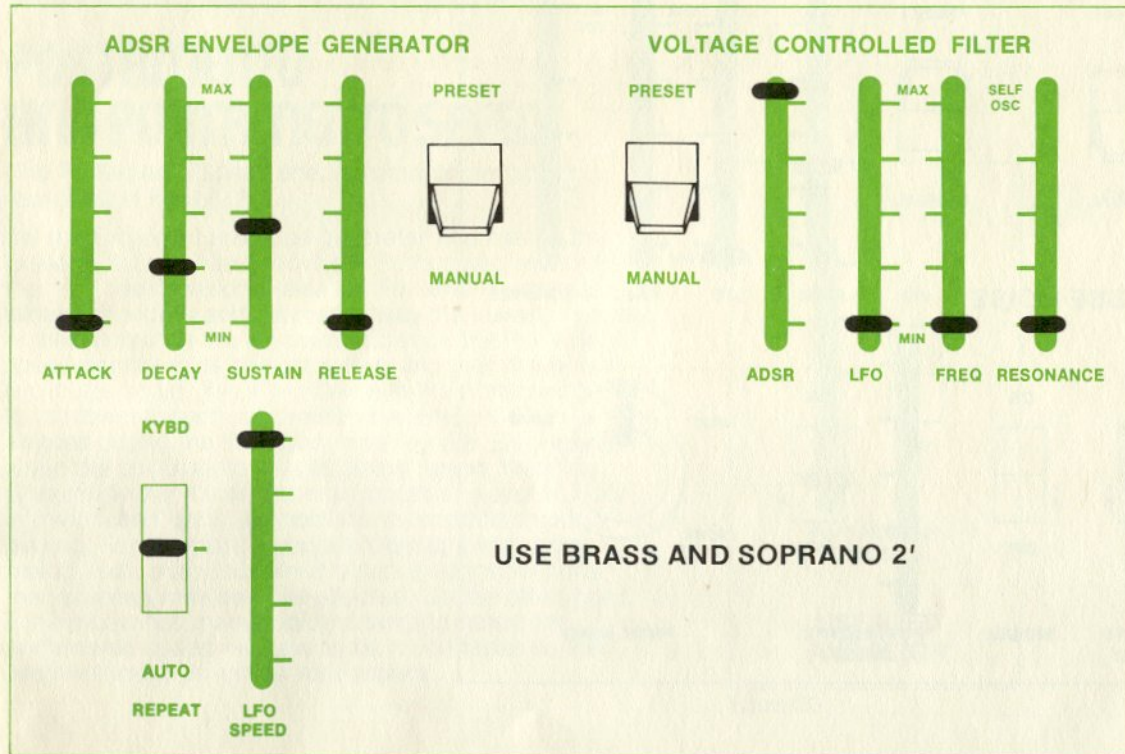
In addition, many unpitched effects like wind, thunder and surf can be realistically created by using the Auto Repeat as a part of the setting. Set the controls as shown in Figure 19 and enjoy some crashing surf sounds.

ADSR ENVELOPE GENERATOR

MAX

PRESET

MANUAL

MIN

ATTACK   DECAY   SUSTAIN   RELEASE

VOLTAGE CONTROLLED FILTER

PRESET

MAX   SELF OSC

MANUAL

MIN

ADSR   LFO   FREQ   RESONANCE

USE NOISE

KYBD

ON   ON   ON

FLAT   SHARP

OFF   OFF   OFF

DOWN OCTAVE

AUTO

VOLUME   REPEAT   LFO SPEED   VIBRATO DEPTH   VIBRATO DELAY   BENDER   PORTAMENTO SPEED   PITCH BEND
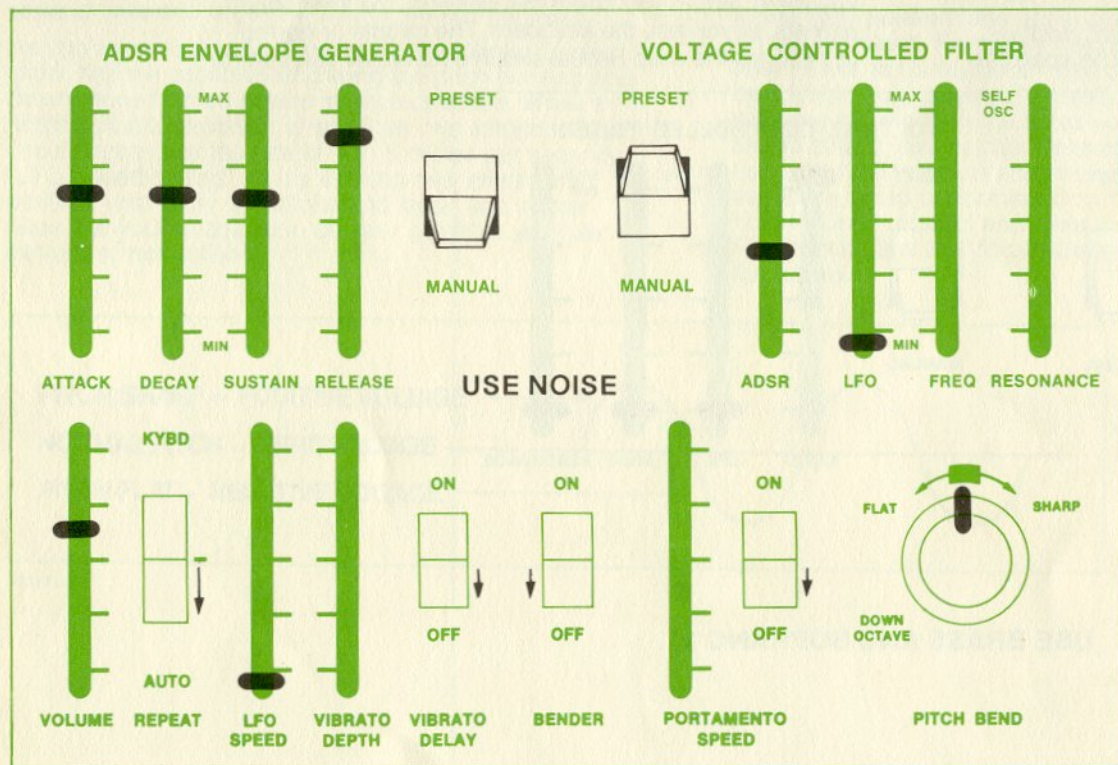
Figure 19

BENDER

The Bender puts a "chirp" at the beginning of each note you play, adding an amusing musical effect. Set the ADSR Envelope Generator and Voltage Controlled Filter to the "Preset" position and move the Bender switch to the "up" position. To compliment the Bender, try different waveforms and pitch ranges; you'll discover many interesting uses for this fun-to-play effect.

PORTAMENTO AND PORTAMENTO SPEED

The Portamento Speed and Portamento switch are illustrated in Figure 20.

Set the Explorer I envelope generator and filter to the preset positions. Next, move the Portamento switch to the "on" (up) position. Raise the Portamento speed slider just slightly and alternately play the lowest, then the highest notes on the keyboard. Change the Portamento speed control to its highest setting and play the same two notes again. You'll find that with the portamento at its slowest speed, a considerable amount of time elapses during the slide from note to note. Conversely, when the portamento is at its fastest speed, the slide is so quick that it's almost imperceptible. Keep this fact in mind when using the portamento control in your playing. For example, if you are playing a very slow melody with many sustained notes, a very slow portamento speed may be quite effective. On the other hand, if the music has many rapidly changing notes, the portamento speed will have to be much faster so the pitch will move as fast as your fingers.

ON

OFF

PORTAMENTO
SPEED

USE REED
AND ALTO 4'
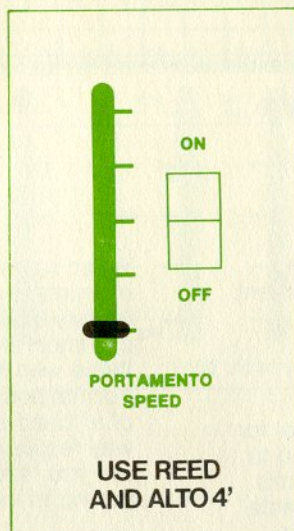
Figure 20

Locate the Tune and Pitch Bend controls shown in Figure 21.

PITCH BEND

TUNE

Figure 21
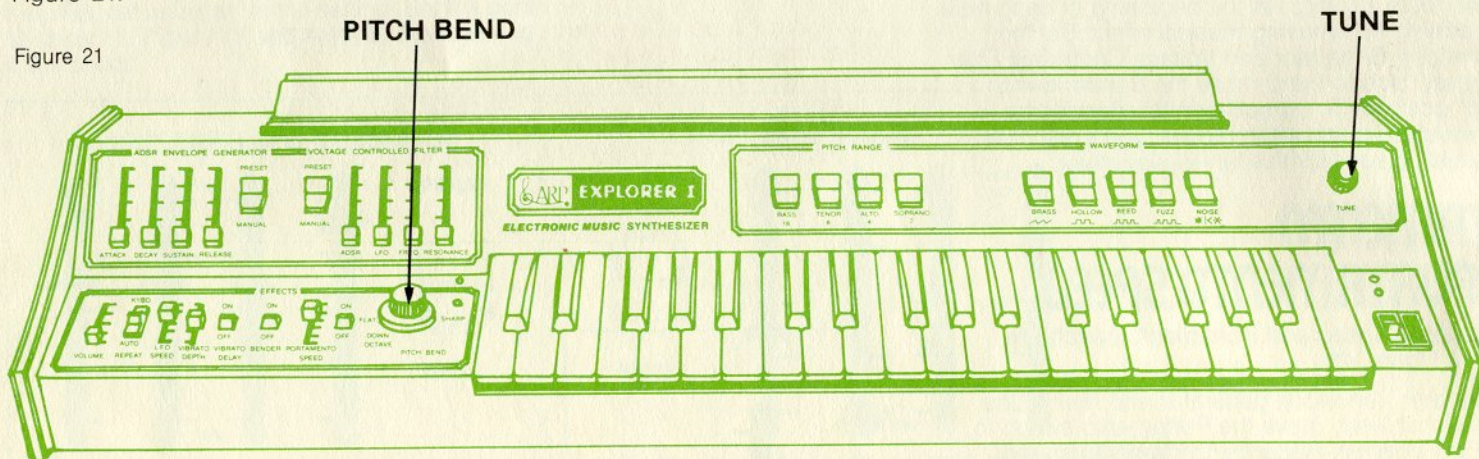
TUNE CONTROL

The tune control permits you to easily tune to other instruments. Once you've tuned to another instrument, your Explorer I will remain in tune indefinitely.

PITCH BEND

The Pitch Bend knob is a live performance control for bending notes. It also extends the tuning range up to an extra octave beyond normal. This control permits you to realistically "bend" pitches in order to recreate the kinds of effects produced by guitars and other stringed instruments. Naturally, you can go beyond these effects and create sounds that are not imitative of traditional instruments.

When recreating the effect of the pitch bend of traditional instruments, however, limit the pitch deviation to approximately one half-step. This is the most useful and common effect employed by most guitarists including those who work with rock groups. Notice that the normal position for the pitch bend knob is in the center of a "dead zone" where turning the knob slightly either way results in little or no pitch change. This feature lets you "feel" the normal position while playing without having to look at the panel.

KEYBOARD

The Explorer's keyboard is actually a controller, and it produces a voltage that tells the oscillator what pitch to create. Not only is the keyboard connected to the oscillator, but it is also connected to the filter, enabling you to "play" noise, as in the following experiment.

Set the controls as illustrated in Figure 22.

Play several notes on the keyboard. It's possible to tune this effect by adjusting the Freq slider or the Pitch Bend control. For some interesting sound effects, experiment with the vibrato and ADSR brilliance controls.

WXERE TO GO FROM XERE

In this guidebook, a considerable amount of material has been covered ranging from set-up instructions through the basic theory of how waveforms are generated, modified, and controlled electronically. However, this information is actually only a beginning in this rapidly expanding world of electronic music synthesis. ARP INSTRUMENTS, the recognized leader in this field, offers a wide range of informative materials including INSTANT EXPLORER patch charts, demonstration records and a comprehensive textbook entitled *LEARNING MUSIC WITH SYNTHESIZERS*. See your ARP dealer for all the details.

Figure 22

SPECIFICATIONS

OSCILLATOR WAVEFORMS: Four oscillator waveforms — sawtooth, square, narrow pulse, and modulated-width pulse — are offered by your Explorer I. These waveforms may be used individually or combined to produce endless combinations.

NOISE GENERATOR: The noise generator produces pink noise which is used in creating unpitched effects like thunder, surf, and wind. This sound source is also useful in synthesizing a variety of exciting electronic sounds which are becoming a significant part of today's rock music.

PITCH RANGE: The Explorer I has four pitch ranges — 16' (Bass), 8' (Tenor), 4' (Alto), and 2' (Soprano). Like the oscillator waveforms, the pitch ranges may also be selected individually or combined. This wide choice of pitch range(s) permits you to realistically synthesize instrumental voices. The Pitch Bend Control has the capability of lowering the pitch range one additional octave beyond the 16' bass, thus adding another pitch range — the 32' contrabass.

SECTION V
SPECIFICATIONS AND PATCHES

VOLTAGE CONTROLLED FILTER: The VCF may be controlled in one of two ways—preset or manual. Four sliders comprise the VCF controls. These controls are the ADSR, LFO, Freq, and Resonance. The ADSR is a brilliance control, the LFO opens and closes the filter creating tremolo and repeat effects, the Freq determines those frequencies which will be permitted to pass, while the last control, Resonance, is capable of emphasizing a particular band of frequencies which creates musical effects such as the "wow" sound. With 24dB/octave rolloff for bright, lively brass sounds, and the capability of doubling as a second sine wave source when the Resonance control is raised all the way to the top, the Explorer I filter is an extremely versatile part of your synthesizer.

ADSR ENVELOPE GENERATOR

The ADSR Envelope Generator also offers a choice of either being used in a preset or a manual mode. Four sliders—attack, decay, sustain, and release, provide a sensitive and precise means of shaping the sound envelope. Briefly, the attack is how a sound begins, decay refers to the natural fading away of the sound, sustain will affect the level to which the sound drops back after the initial attack and decay of the sound, and release is the final fade-time. These controls permit you to realistically duplicate the envelope of all instrumental sounds and to create unique sound envelopes of your own.

EFFECTS CONTROLS

VOLUME: The volume slider controls both high and low level outputs, independent of whatever amplification you are using.

TUNING: The tuning control permits you to adjust the pitch plus or minus, one-half octave above or below concert pitch.

REPEAT SWITCH: The Repeat Switch has three positions—Auto Repeat (bottom), Middle (off), and KYBD (top). The Auto Repeat triggers the repeat sound automatically without using the keyboard; the repeat, therefore, is continuous. When the switch is in the KYBD position (top), the repeat is triggered by playing any note on the keyboard. The middle position simply deactivates the control.

LFO SPEED: The LFO Speed determines the speed of vibrato, tremolo, and repeat effects.

VIBRATO DEPTH: The Vibrato depth has the capability of controlling the extent of pitch deviations, up to plus or minus one octave.

VIBRATO DELAY: The LFO control voltage to the oscillator is slightly delayed by this control permitting the vibrato to fade in naturally for realistic and expressive playing.

BENDER: The Bender puts a "chirp" at the beginning of each note, adding an amusing musical effect.

PORTAMENTO: The Portamento effect is activated by two controls—an on/off switch and a Portamento Speed. The on/off switch permits you to activate or deactivate this effect. The Portamento Speed determines the time it will take for one note to slide to the next.

PITCH BEND: This control bends notes up to one octave sharp or flat. The center "dead zone" is included for the purpose of easy tuning. In addition to extending the tuning range of the synthesizer up an extra octave, the Pitch Bend control also permits you to bend individual notes, thus simulating the pitch bend techniques used by many guitarists.
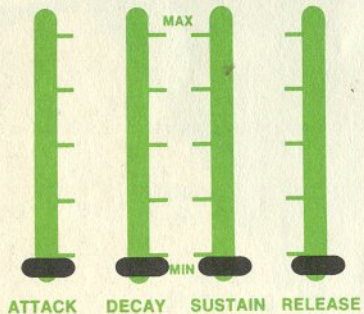
PATCHES

ADSR ENVELOPE GENERATOR — VOLTAGE CONTROLLED FILTER

MAX

PRESET — PRESET

MANUAL — MANUAL

MIN

SELF OSC

MAX

MIN

HOLLOW VIBES

ATTACK DECAY SUSTAIN RELEASE

ADSR LFO FREQ RESONANCE

Use Hollow and Bass 16' and Soprano 2'

EFFECTS

KYBD

ON ON ON

FLAT SHARP

AUTO

OFF OFF OFF

DOWN OCTAVE

VOLUME REPEAT LFO SPEED VIBRATO DEPTH VIBRATO DELAY BENDER PORTAMENTO SPEED PITCH BEND
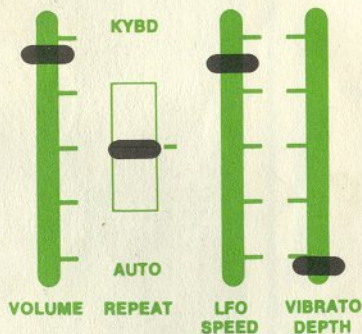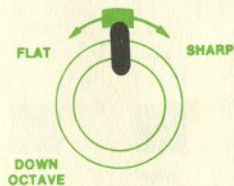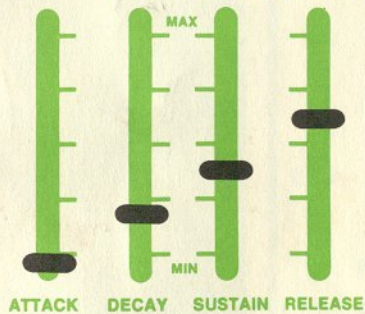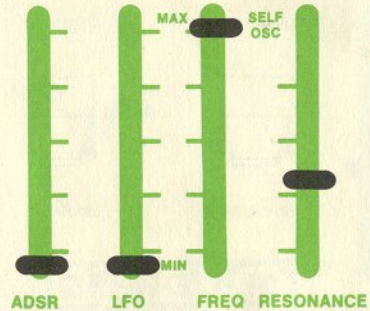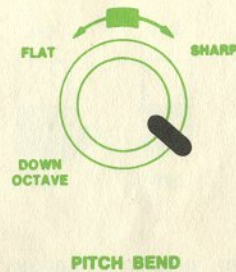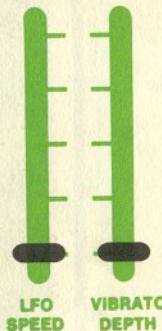
ADSR ENVELOPE GENERATOR

VOLTAGE CONTROLLED FILTER

MAX

MIN

PRESET

PRESET

MAX

SELF
OSC

MANUAL

MANUAL

MIN

COSMIC FLUTTER

ATTACK   DECAY   SUSTAIN   RELEASE

ADSR   LFO   FREQ   RESONANCE
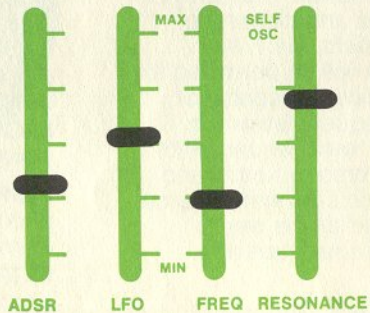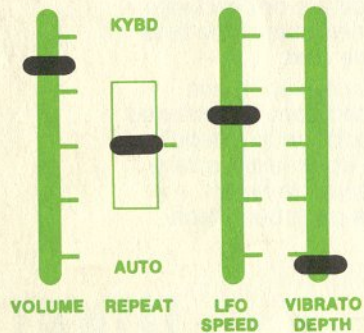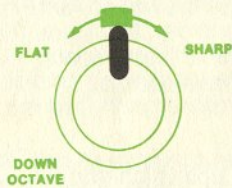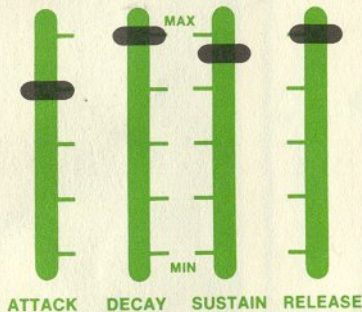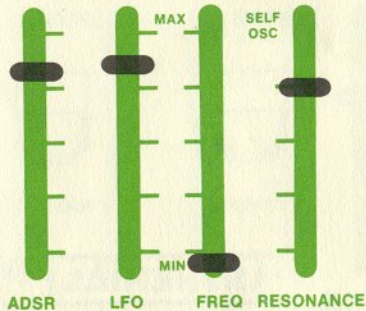
Use Fuzz and Bass 16'

*Upper keyboard for pitched effects
Play lowest C for unpitched effects

EFFECTS

KYBD

AUTO

ON

OFF

ON

OFF

ON

OFF

FLAT

SHARP

DOWN
OCTAVE

VOLUME   REPEAT   LFO
SPEED   VIBRATO
DEPTH   VIBRATO
DELAY   BENDER   PORTAMENTO
SPEED   PITCH BEND

ADSR ENVELOPE GENERATOR

VOLTAGE CONTROLLED FILTER

MAX

PRESET

PRESET

MAX

SELF
OSC

MANUAL

MANUAL

MIN

MIN

ATTACK   DECAY   SUSTAIN   RELEASE

ETHERIAL

ADSR   LFO   FREQ   RESONANCE

Use Hollow and Bass 16′ and Soprano 2′

EFFECTS

KYBD

ON

ON

ON

FLAT   SHARP

AUTO

OFF

OFF

OFF

DOWN
OCTAVE

VOLUME   REPEAT   LFO   VIBRATO   VIBRATO   BENDER   PORTAMENTO   PITCH BEND
                  SPEED   DEPTH   DELAY   SPEED

ADSR ENVELOPE GENERATOR — VOLTAGE CONTROLLED FILTER

MAX

PRESET   PRESET

MAX   SELF OSC

MANUAL   MANUAL

MIN

HARPSICHORD

ATTACK   DECAY   SUSTAIN   RELEASE   ADSR   LFO   FREQ   RESONANCE

MIN
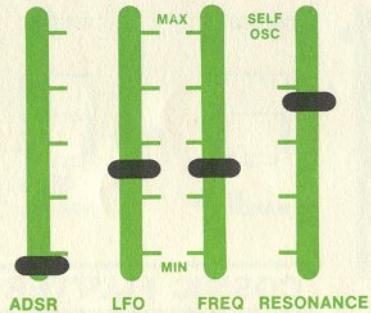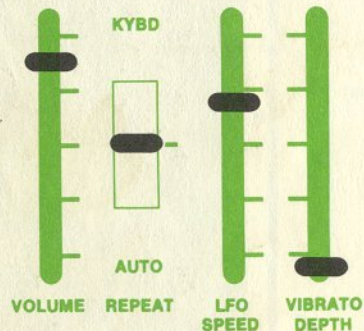
Use Reed, Alto 4' and Soprano 2'
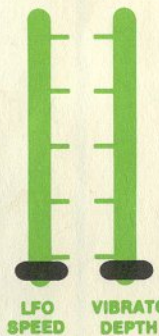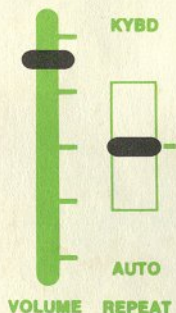
EFFECTS

KYBD

ON   ON   ON

FLAT   SHARP

OFF   OFF   OFF

AUTO   DOWN OCTAVE
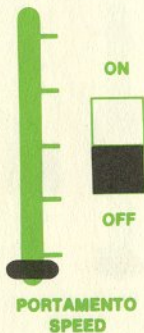
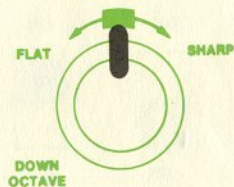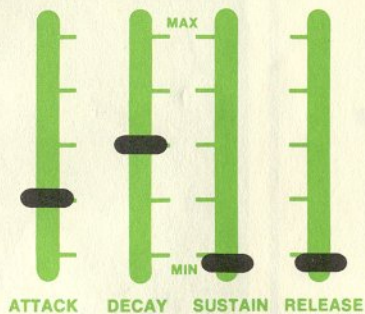VOLUME   REPEAT   LFO SPEED   VIBRATO DEPTH   VIBRATO DELAY   BENDER   PORTAMENTO SPEED   PITCH BEND

ADSR ENVELOPE GENERATOR

VOLTAGE CONTROLLED FILTER

MAX

PRESET

PRESET

MAX

SELF OSC

MIN

MANUAL

MANUAL

MIN

SLIDE REED

ATTACK   DECAY   SUSTAIN   RELEASE

ADSR   LFO   FREQ   RESONANCE
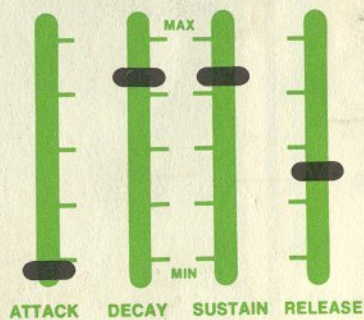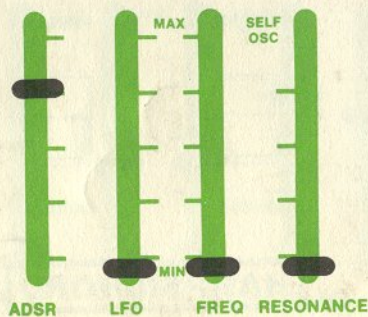
Use Hollow and Tenor 8', Alto 4' and Soprano 2'

EFFECTS

KYBD

ON

ON

ON

FLAT

SHARP

OFF

OFF

DOWN OCTAVE

AUTO

OFF

VOLUME   REPEAT   LFO SPEED   VIBRATO DEPTH   VIBRATO DELAY   BENDER   PORTAMENTO SPEED   PITCH BEND

ADSR ENVELOPE GENERATOR — VOLTAGE CONTROLLED FILTER

ATTACK DECAY SUSTAIN RELEASE

PRESET / MANUAL PRESET / MANUAL

TRIPLE FUZZ

ADSR LFO FREQ RESONANCE

Use Fuzz and Bass 16′, Tenor 8′ and Alto 4′

EFFECTS
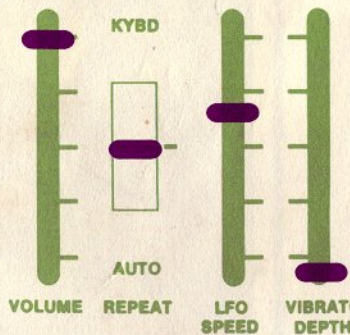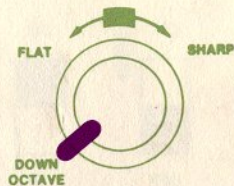
VOLUME REPEAT LFO SPEED VIBRATO DEPTH VIBRATO DELAY BENDER PORTAMENTO SPEED PITCH BEND

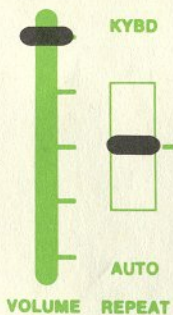## ADSR ENVELOPE GENERATOR — VOLTAGE CONTROLLED FILTER

MAX

PRESET PRESET

SELF
OSC

MAX

MANUAL MANUAL

MIN

MIN

FUNKY BASS

ATTACK DECAY SUSTAIN RELEASE   ADSR LFO FREQ RESONANCE
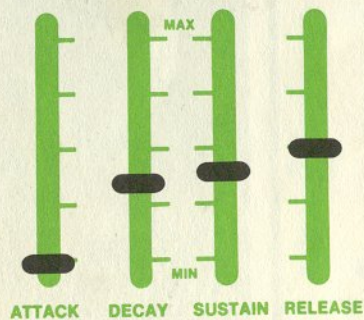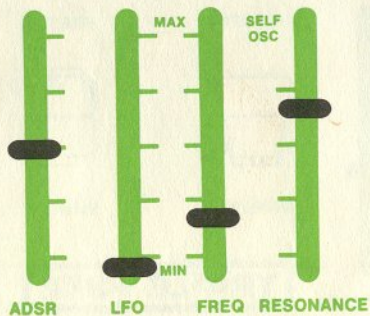
Use Reed and Bass 16'

EFFECTS

KYBD

ON ON ON

FLAT   SHARP

OFF OFF OFF

AUTO

DOWN
OCTAVE

VOLUME REPEAT LFO VIBRATO VIBRATO BENDER PORTAMENTO PITCH BEND
SPEED DEPTH DELAY SPEED

ADSR ENVELOPE GENERATOR — VOLTAGE CONTROLLED FILTER

MAX

PRESET

PRESET

MAX

SELF
OSC

MANUAL

MANUAL

MIN

MIN

BASS WOW

ATTACK   DECAY   SUSTAIN   RELEASE

ADSR   LFO   FREQ   RESONANCE

Use Brass and Bass 16′

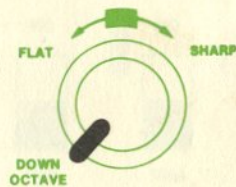## EFFECTS
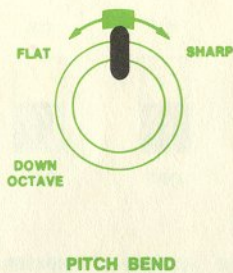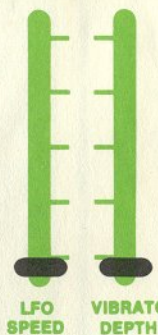
KYBD

ON

ON

ON

FLAT

SHARP

AUTO

OFF

OFF

OFF

DOWN
OCTAVE

VOLUME   REPEAT   LFO
SPEED   VIBRATO
DEPTH   VIBRATO
DELAY   BENDER   PORTAMENTO
SPEED   PITCH BEND

ADSR ENVELOPE GENERATOR — VOLTAGE CONTROLLED FILTER

MAX

PRESET   PRESET

MANUAL   MANUAL

MIN

COSMIC FALL

ATTACK   DECAY   SUSTAIN   RELEASE

SELF OSC

MAX

MIN

ADSR   LFO   FREQ   RESONANCE
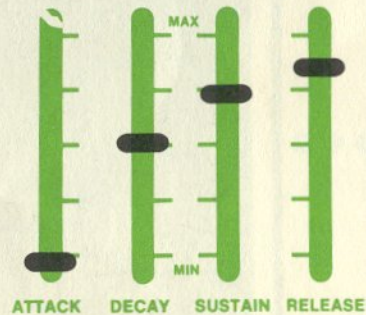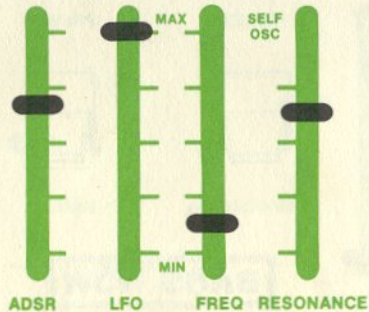
Use Brass, Hollow and Fuzz and Bass 16′, Tenor 8′, Alto 4′ and Soprano 2′
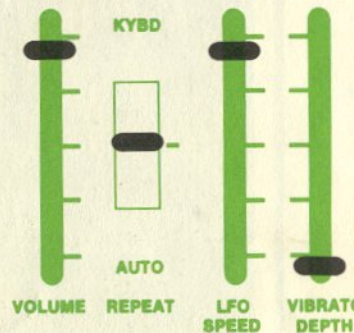
EFFECTS

KYBD

AUTO

ON   ON   ON

OFF   OFF   OFF

FLAT   SHARP

DOWN
OCTAVE

VOLUME   REPEAT   LFO SPEED   VIBRATO DEPTH   VIBRATO DELAY   BENDER   PORTAMENTO SPEED   PITCH BEND
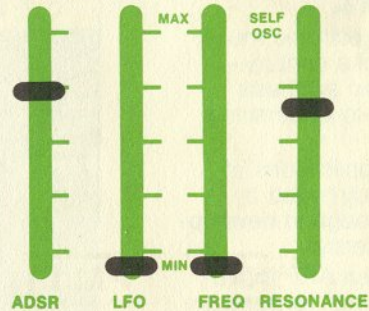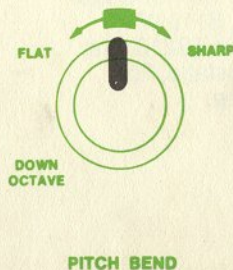
ADSR ENVELOPE GENERATOR

ATTACK DECAY SUSTAIN RELEASE

MAX
MIN
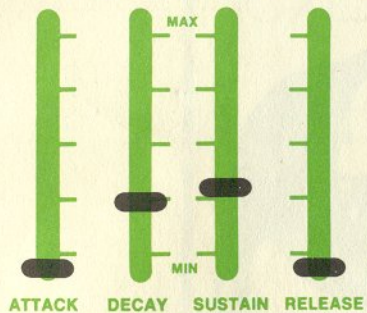
PRESET

MANUAL

PRESET

MANUAL

STACCATO WOW

VOLTAGE CONTROLLED FILTER

MAX

SELF
OSC

MIN

ADSR LFO FREQ RESONANCE

Use Brass and Fuzz and Bass 16', Tenor 8', Alto 4' and Soprano 2'

EFFECTS

KYBD

AUTO

VOLUME REPEAT

ON

OFF

LFO
SPEED

VIBRATO
DEPTH

ON

OFF

VIBRATO
DELAY

ON

OFF

BENDER

ON

OFF

PORTAMENTO
SPEED

FLAT SHARP

DOWN
OCTAVE

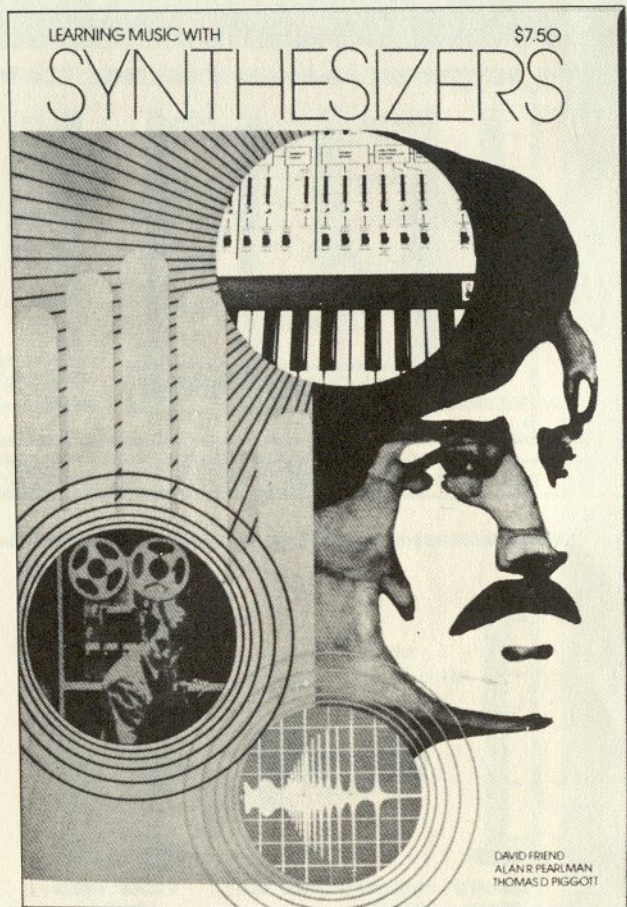PITCH BEND
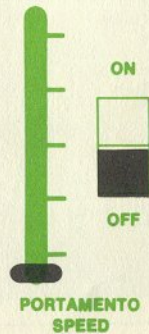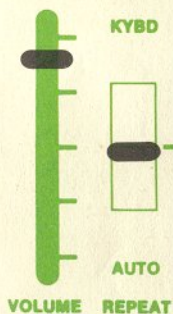
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