



3620 KEYBOARD OWNER'S MANUAL

OWNER'S MANUAL

MODEL 3620 KEYBOARD



ARP INSTRUMENTS, INC.,
320 Needham St, Newton,
Mass. 02164

Copyright 1976 by ARP Instruments, Inc., Newton, MA 02164 USA

Printed in USA Apr. 1976

All rights reserved. No part of this book may be used or reproduced in any manner whatsoever without permission from ARP INSTRUMENTS, except in the case of brief quotations embodied in critical articles and reviews.

TABLE OF CONTENTS

INTRODUCTION	1
HUMAN ENGINEERING	1
CONTROL PANEL OVERVIEW	3
PROPER CONNECTION OF KEYBOARD	4
KEYBOARD CONTROL FUNCTIONS	4, 5
Keyboard Outputs	
Gate Signal	
Trigger Signal	
Keyboard Control Voltages	
USING TWO VOICES	5
FEATURES	10, 12, 14
Interval Latch	
Trigger Mode	
Low Frequency Oscillator (LFO)	
Vibrato Delay & Depth	
LFO Output Jacks	
Other Effects	
ADDITIONAL KEYBOARD FEATURES	18
Portamento	
Repeat Switch	
Pitch Bend Control Knob	
Transpose Switch	
SPECIFICATIONS	19
FUNCTION DESCRIPTIONS	20



INTRODUCTION

Since the introduction of the ARP 2600, literally thousands of musicians have enjoyed its incredible range of capabilities.

The new ARP 2600, with the 3620 keyboard, offers you the very latest in synthesizer keyboard design: two-voice polyphonic dual-memory circuitry. The new keyboard has pushed the 2600's incredible potential beyond that of any other synthesizer available today, maintaining its role as the studio and "live" performance standard for countless performing and recording artists the world over.

HUMAN ENGINEERING

Your new two-voice, dual memory keyboard has been designed with ARP's traditional concern for fast, flexible and accurate manipulation, especially in "live" performance.

A built-in low frequency oscillator (LFO) gives you an expressive vibrato for use with any or all of the 2600 oscillators or other functions. Delayed vibrato and multiple vibratos for chorus effects are now much easier to achieve.

Foot switch jacks are provided for control of portamento and interval latching. There are also input and output jacks for many other keyboard functions.

The pitch bend and transpose controls are precisely calibrated for quick and easy use, providing a full 10-octave keyboard range.

This manual will explain the basic control functions of the 3620 Keyboard Controller and its relationship to the 2600. For further reference on the 2600 electronic music functions, consult your 2600 Owner's Manual.

CONTROL PANEL OVERVIEW

This jack allows foot-pedal control of portamento when the portamento switch is off.

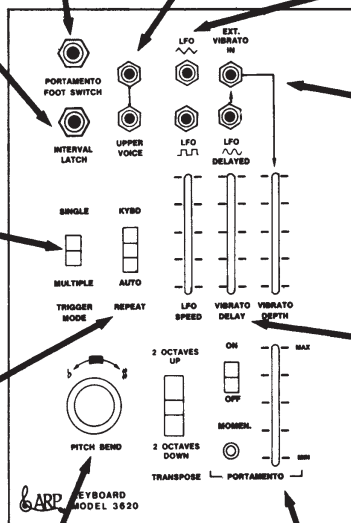
These output jacks provide the control voltage for the highest keyboard voice.

While a footpedal connected to this jack is depressed, the interval between the two keyboard voices remains constant, and the pitches are controlled by the lower voice only.

The Low Frequency Oscillator (LFO) is a controller; its output signal is used to create vibrato, tremolo, repeat and other effects. Normally its output is also connected directly to the keyboard vibrato.

The Trigger Mode switch governs whether additional keys, depressed after the first one, trigger the envelope generators.

Allows a vibrato signal to be applied from outside the 3620.



This slider controls the amount of time before vibrato begins after a note is depressed. It also governs the delayed LFO output jack.

Repeat switch has three positions: Auto (bottom), off (middle) and KYBD (top).

Pitch Bend control bends notes up to one octave sharp or flat. The center "dead zone" facilitates tuning. In addition to extending the tuning range of the 2600 up and down an extra octave, the Pitch Bend control permits you to bend individual notes, simulating the bending techniques used by guitarists.

Portamento allows you to glide from one note to the next. This control determines the speed of the glide.

PROPER CONNECTION OF KEYBOARD

Please note that the prongs on the keyboard connector cable will fit into the 2600 console *one* way only.

The keyboard should be properly connected to the console (see diagram) before the 2600 is turned on.

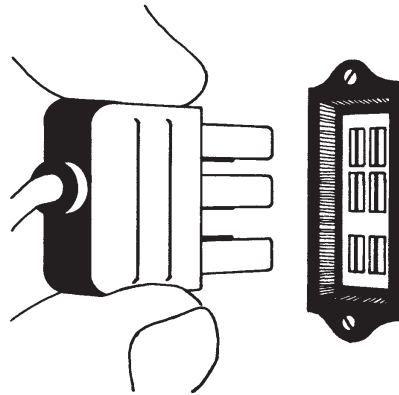


DIAGRAM A

KEYBOARD CONTROL FUNCTIONS

KEYBOARD OUTPUTS

The keyboard controls the 2600 by generating four voltages, each one serving a distinct purpose.

The four voltages are:

- 1) GATE SIGNAL
- 2) TRIGGER SIGNAL
- 3) LOWER-VOICE control voltage
- 4) UPPER-VOICE control voltage

The GATE, TRIGGER AND LOWER-VOICE signals are connected to the 2600's oscillators and filters through the main cable linking the keyboard to the console.

The UPPER-VOICE is connected to the 2600 with a standard patch cord. The proper connection and use of the UPPER-VOICE is covered later in this manual. (see page 5)

THE GATE SIGNAL

The GATE signal tells the keyboard to memorize the note being played and tells the envelope generators, AR and ADSR, when a key is being held down. The envelope generator begins when the GATE voltage is turned on (by depression of any key), and the "Release" begins when the GATE voltage is no longer present (letting go of depressed key).

THE TRIGGER SIGNAL

TRIGGER voltage indicates the exact instant a key is depressed, "firing" the ADSR envelope generator into action. THE ADSR envelope generator on the 2600 begins an attack when the TRIGGER signal is received, provided GATE voltage is also present. The response of the ADSR is dependent on the setting of the TRIGGER MODE switch. The use of this switch and its relation to playing technique is discussed later in this manual. (page 12)

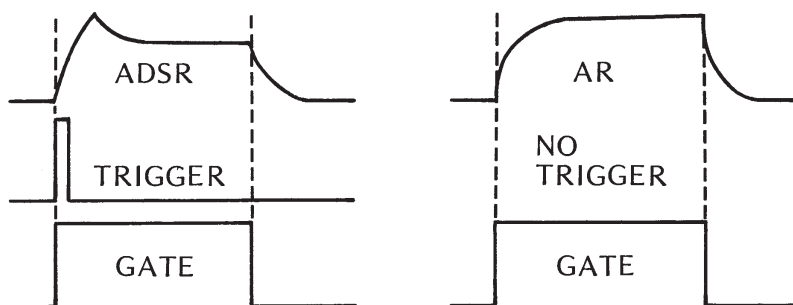


DIAGRAM B

KEYBOARD CONTROL VOLTAGES

The keyboard produces two control voltages corresponding to the highest and lowest notes played. If only one key is depressed, the two control voltages will be the same.

The keyboard also has a memory for both upper-voice and lower-voice control voltages, enabling indefinite sustain of two pitches. This feature makes it possible to play two completely separate music lines, with different sounds for each line.

USING TWO VOICES

To use the two-note (upper and lower voice) capability of the 2600 keyboard, set up the patch in diagram C. (page 7)

NOTE: With some filter settings, the upper voice will not sound as loud as the lower voice. To avoid this effect, a patch cord can be used to connect the upper voice output jack to the VCF KBD CV input jack on the 2600.

The 3620 Keyboard plays no more than two keys at a time. Connecting the two upper voice jacks to two of the oscillators will *not* give three key capability. (See diagram D, page 9)

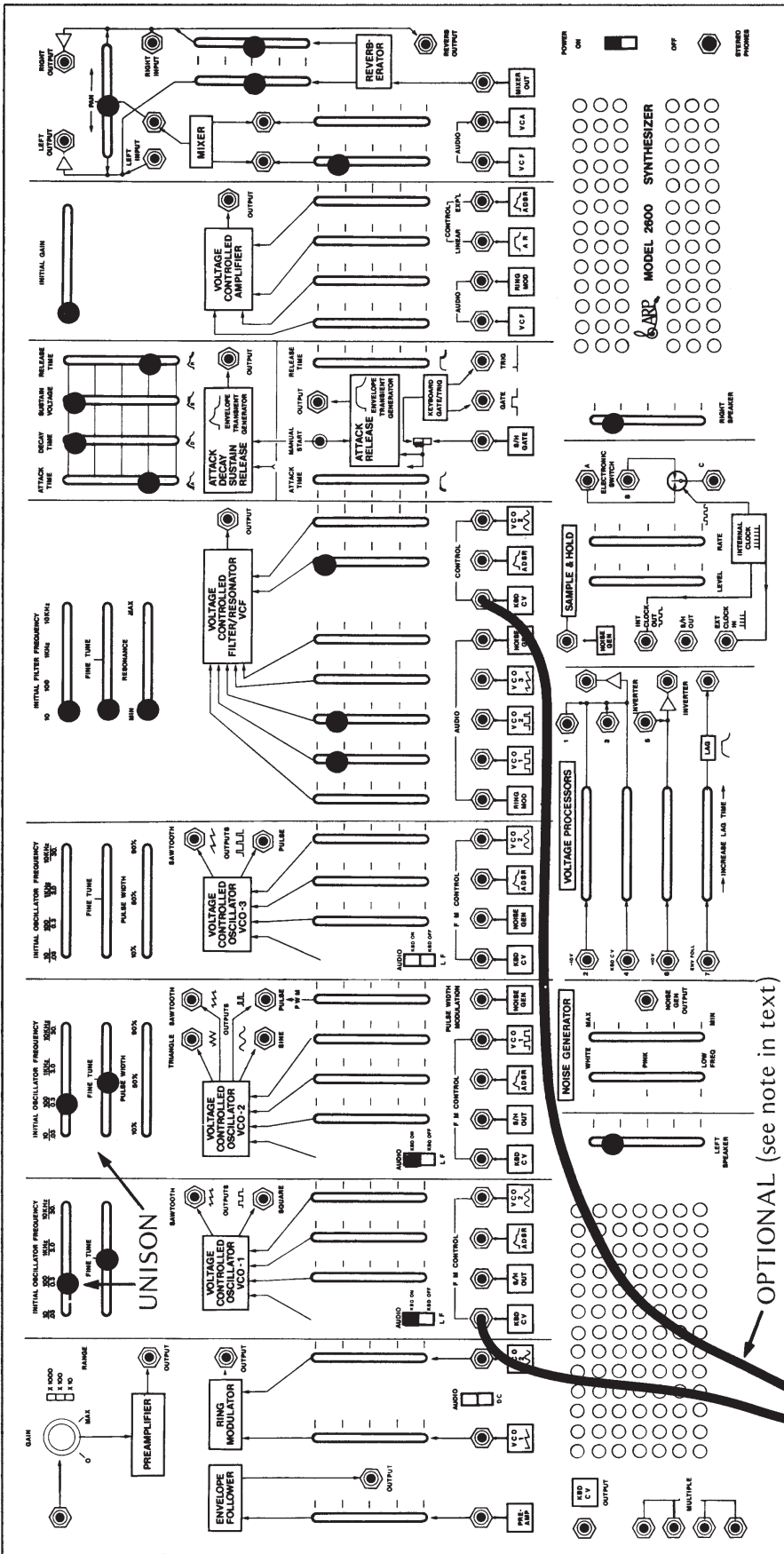
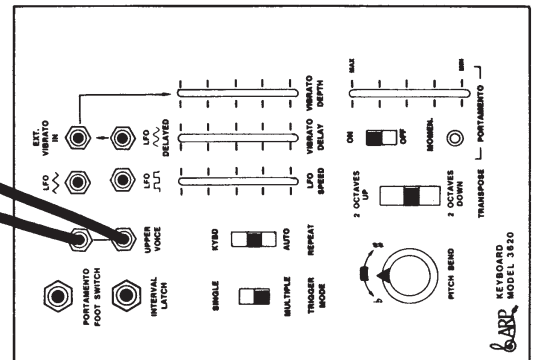


DIAGRAM C

NOTE: All sliders not illustrated should be all the way down.

OPTIONAL (see note in text)



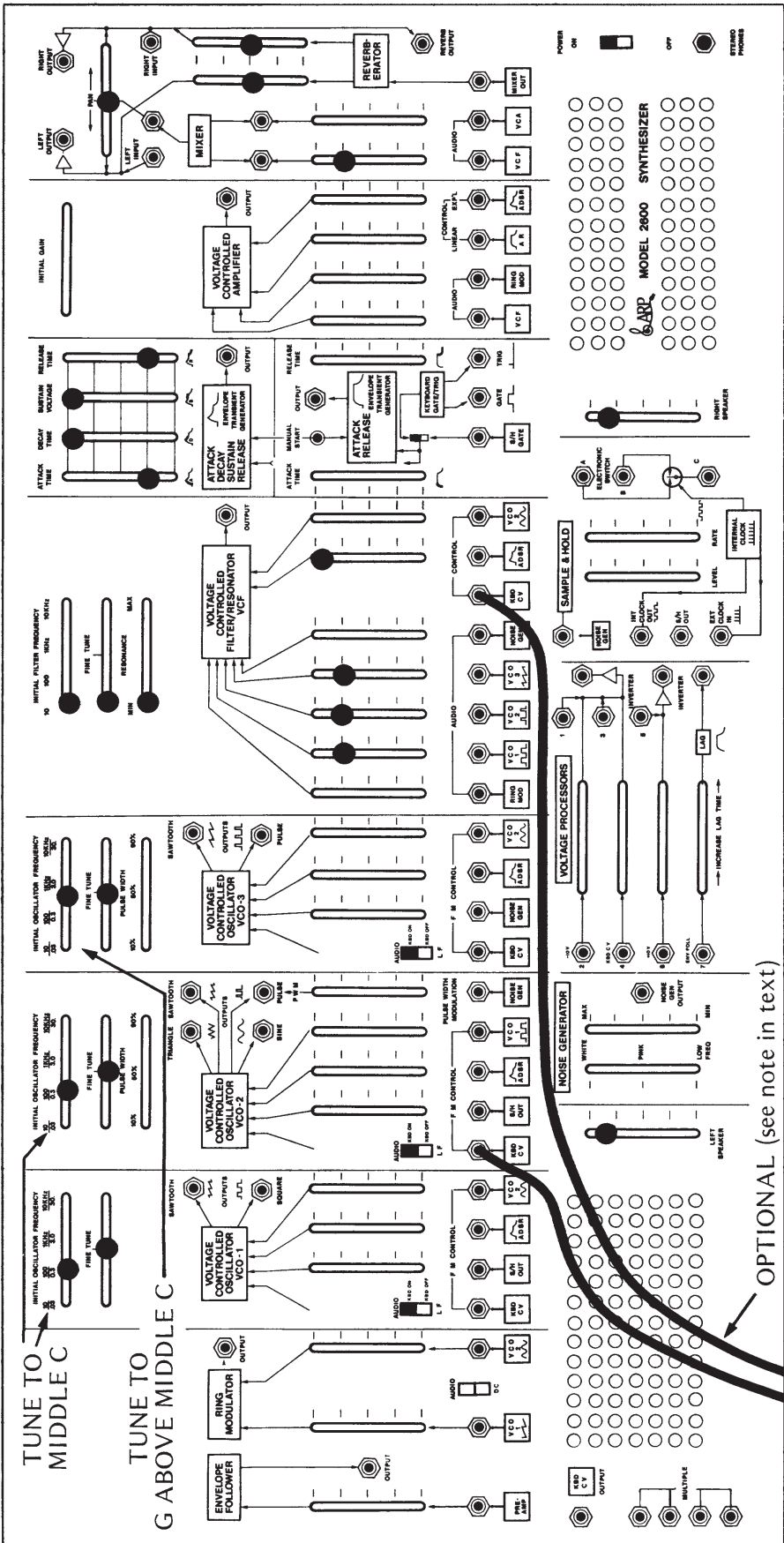
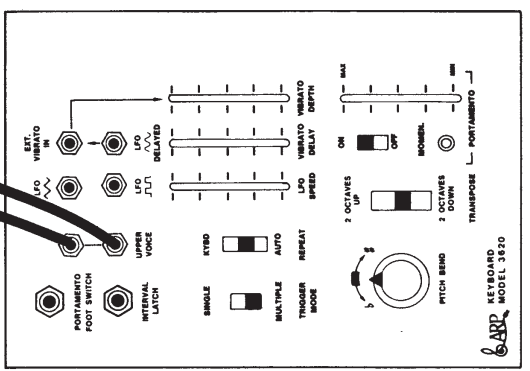


DIAGRAM D

Play Middle C and E above Middle C (second voice) to create a three-note chord.

OPTIONAL (see note in text)



FEATURES

INTERVAL LATCH



The INTERVAL LATCH - one of the most novel features on the keyboard - requires the use of the foot switch. When the foot switch is depressed, the 3620 will memorize the interval between the two notes being played. From that point on, playing only one note on the keyboard will produce the same musical interval until the pedal is released.

This feature is extremely useful when you wish to pre-set tunings for certain orchestral sounds where specific instruments remain at fixed interval for a short time during performance. The convenience here is that you can change this interval in an instant by releasing the foot switch, depressing a different interval, and then depressing the foot switch again to memorize.

Common intervals are major fifths and octaves. Try the following musical example using the patch in DIAGRAM F and experiment with other intervals.

NOTE: Both upper and lower voices are needed. First play the interval, depress switch while holding the interval, and play one note at a time, while switch is depressed.

INTERVAL



PLAY



INTERVAL
(use Portamento
set at 1/3)



PLAY



DIAGRAM E

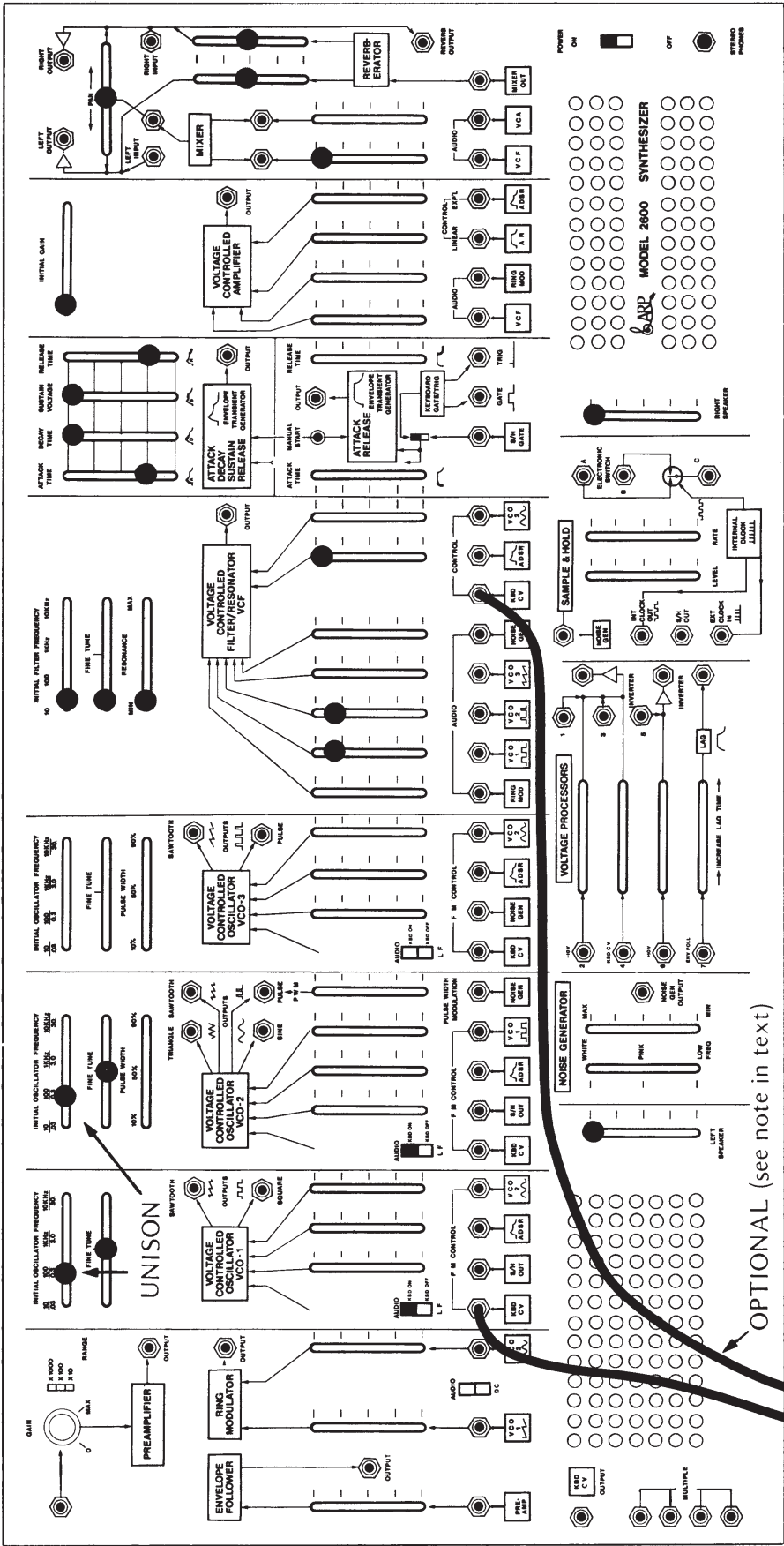
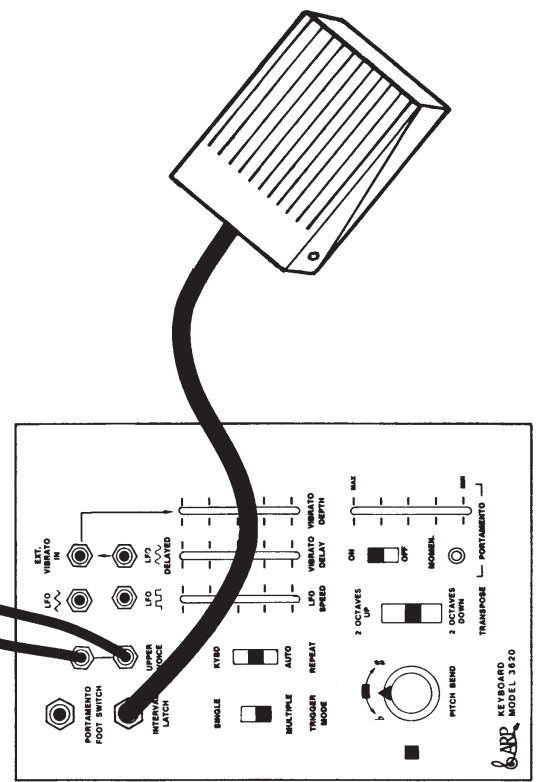
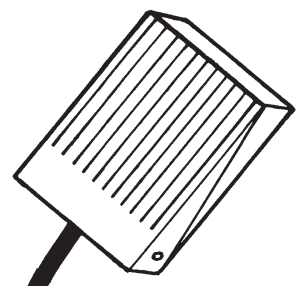


DIAGRAM F



OPTIONAL (see note in text)



TRIGGER MODE

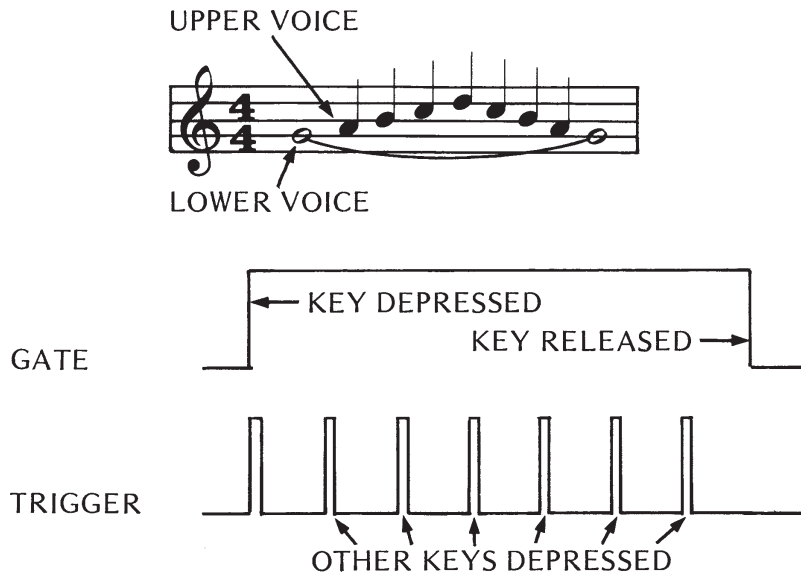


The TRIGGER MODE switch controls how TRIGGER signals are generated when more than one key is being played.

The most commonly used switch position is the MULTIPLE position. In this mode, the TRIGGER output “fires” the ADSR Envelope Generator every time a key is depressed, regardless of how many other keys are already being held down.

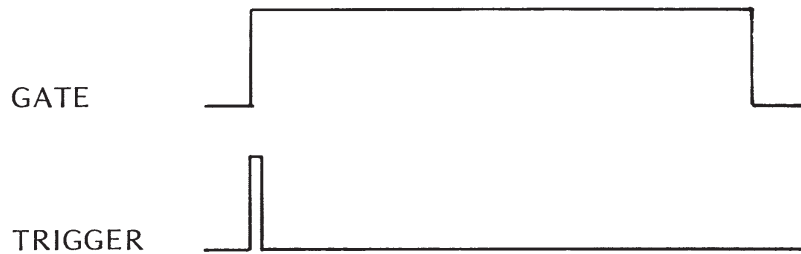
In the SINGLE position, a TRIGGER signal is produced for the first key depressed only.

Try the following example. (Note: the TRIGGER MODE will *not* affect behavior of the AR envelope generator.) Use the patch in DIAGRAM I.



Place TRIGGER in MULTIPLE MODE and play the musical example. Note that the TRIGGER “fires” every time key is depressed.

DIAGRAM G



Now, change the TRIGGER to SINGLE MODE and play again, trying both staccato and legato phrasing.

Listen to the difference in the musical effect.

DIAGRAM H

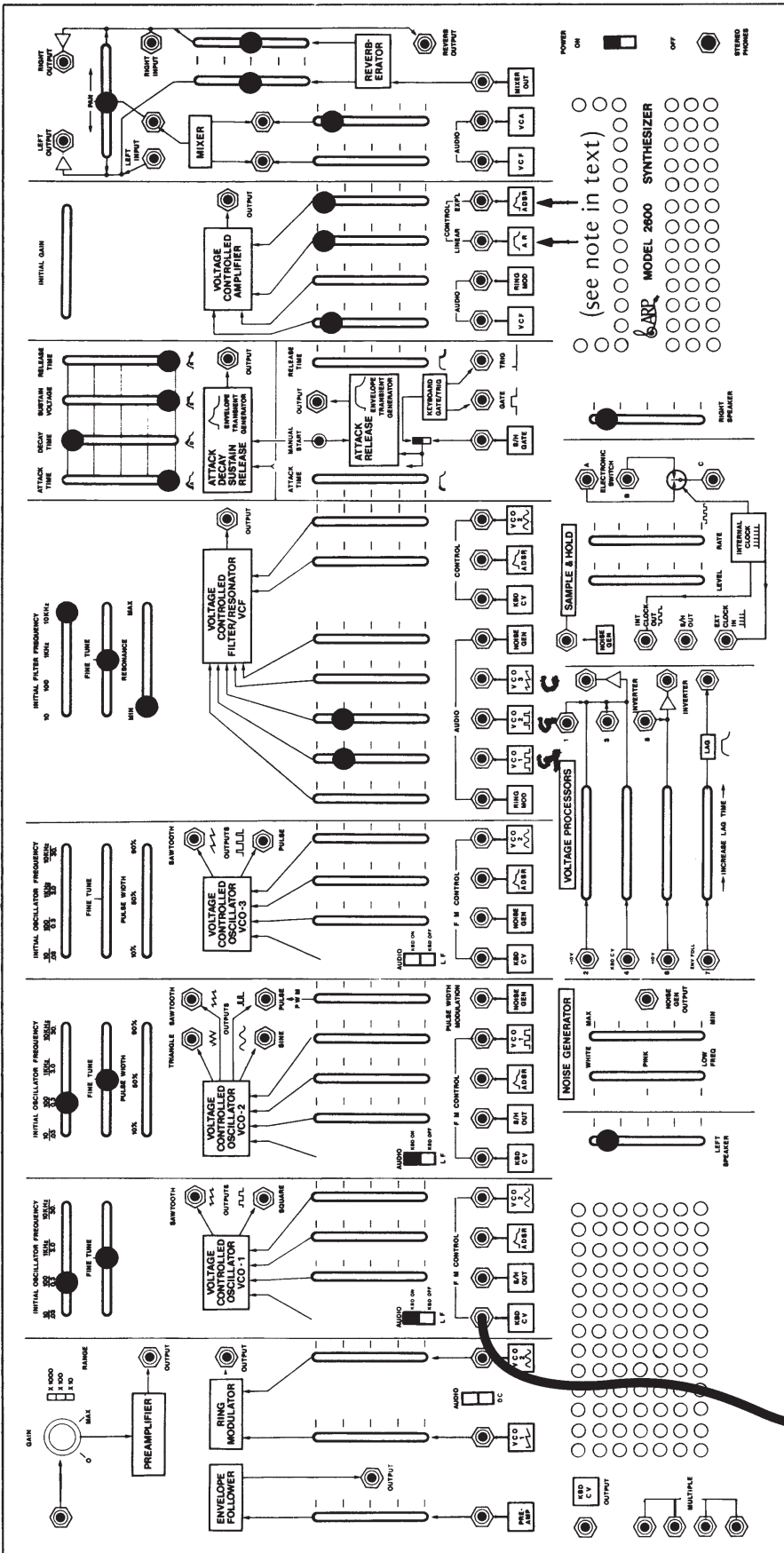
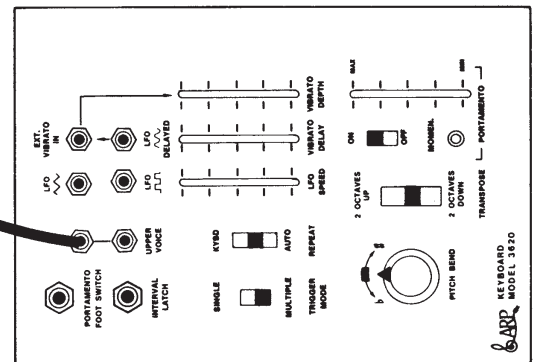
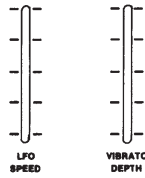


DIAGRAM I



THE LOW-FREQUENCY OSCILLATOR (LFO)



The LFO is a controller. Its output signal is used to create vibrato, tremolo, repeat and other effects.

The *rate* of oscillation is controlled by the LFO SPEED slider, and the *depth* of oscillation is controlled by the VIBRATO DEPTH slider. The output of the LFO is combined directly with the keyboard control voltages to give vibrato.

Vibrato Delay

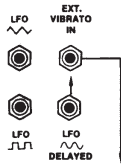


This slider allows the player to delay the vibrato signal so that the vibrato will fade in. (only on sustained notes) With this slider in its lowest position, there is no delay. At the highest position, the delay is so great that only very long notes will receive any vibrato.

LFO Jacks

The LFO produces a triangle wave, a square wave, and a delayed sine wave available as outputs on the keyboard panel.

The delayed sine wave used for keyboard vibrato may also be patched into the 2600 console by means of the LFO DELAYED jack on the keyboard panel. For example, tremolo can be achieved by connecting a patch cord from the LFO DELAYED jack to the VCO 2 input of the VCF. See Diagram J.



Other LFO Effects

It is also possible to use a signal other than the LFO DELAYED sine wave to modulate the Keyboard Control Voltage. This is done by patching the desired waveform signal (triangle, square, sine, sawtooth) on the 2600 to the EXTERNAL VIBRATO INPUT jack on the keyboard. For example, try patching the square wave to the EXTERNAL VIBRATO IN to give a trill effect. See Diagram K. (Page 17)

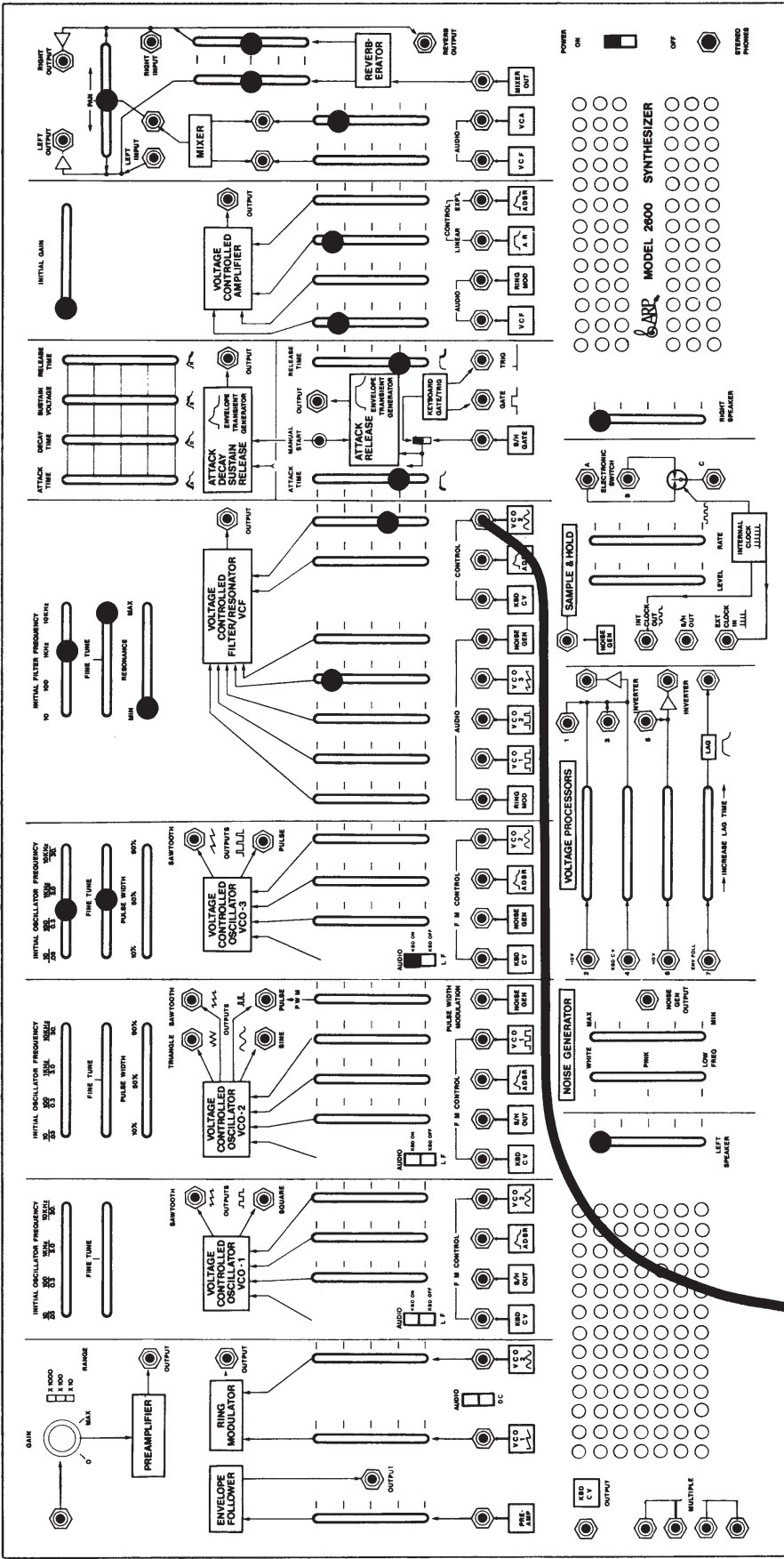
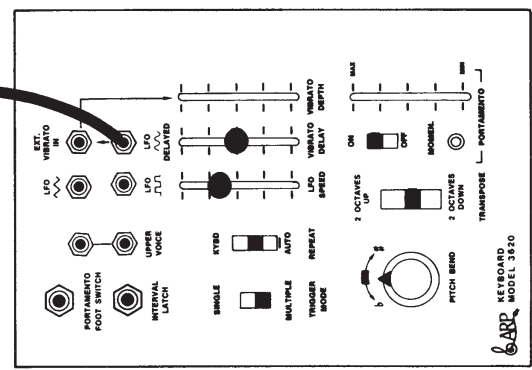
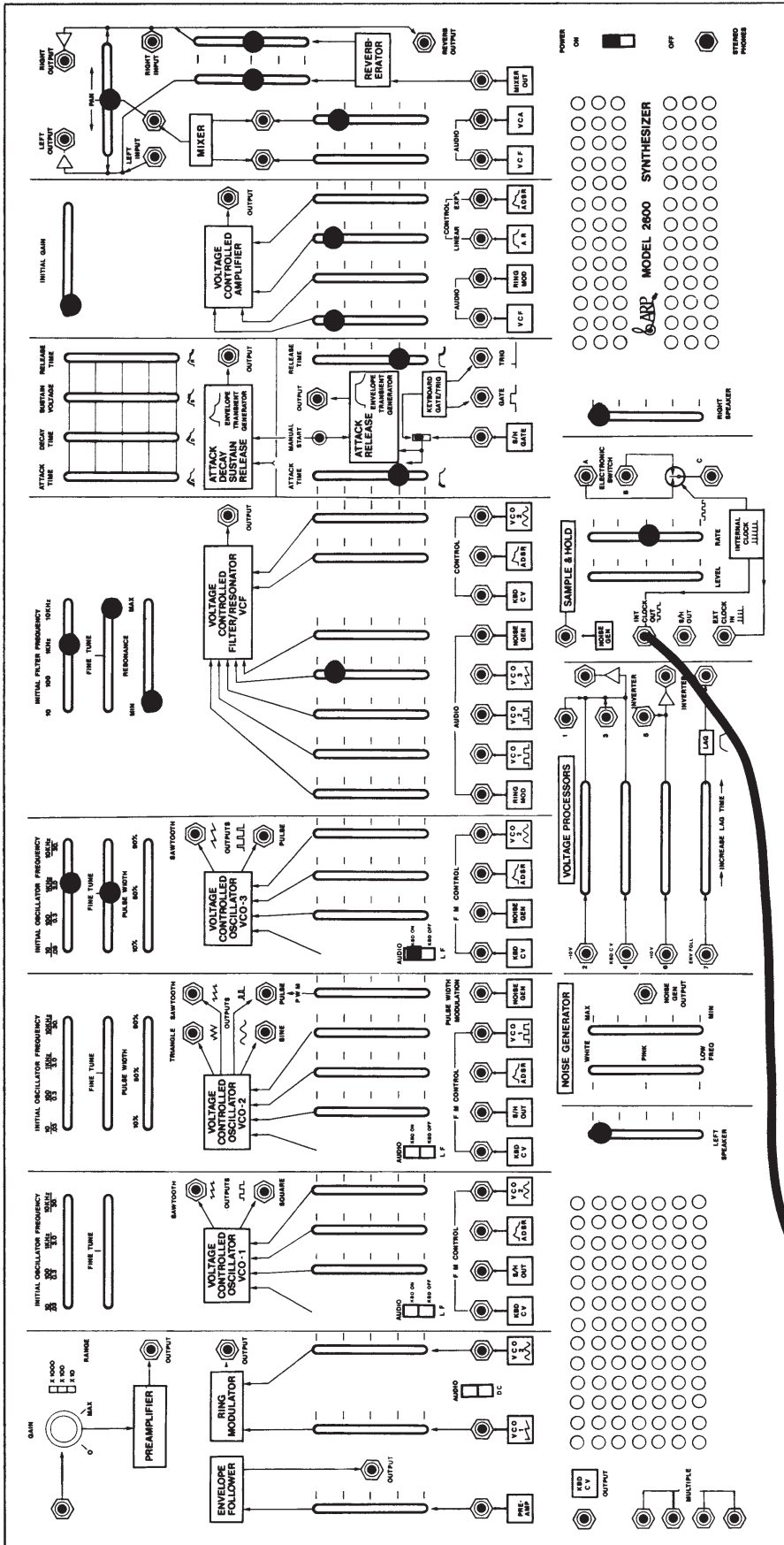


DIAGRAM J



ARP KEYBOARD MODEL 2600



ADDITIONAL KEYBOARD FEATURES

PORTAMENTO

Portamento, the “gliding pitch” sound so commonly associated with synthesizers, can be controlled in four different ways:



- 1) portamento on/off switch,
- 2) a momentary contact push button for quick sliding effects,
- 3) a portamento foot switch that momentarily engages the portamento,
- 4) a portamento slider control that adjusts portamento speed.

The PORTAMENTO slider controls the speed of the glide from one note to the next. A high degree of portamento will create a pronounced slur in the sound, while very little portamento will produce a “squeaky” sound between notes.

REPEAT SWITCH

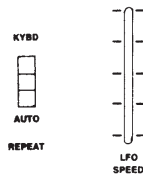
The REPEAT switch is used to create repetitive attacks on notes, like mandolin or banjo “picking” sound.

In the AUTO (down) position, the last note depressed will be repeated indefinitely until a new note is played, causing continuous striking of the new note.

In the KYBD (up) position, the repeat is activated only when a key is depressed and will discontinue when the key is released.

The center switch position is OFF.

The repeat rate is determined by the setting of the LFO SPEED slider. Generally, “percussive” envelope setting is needed in order to hear repeat.



PITCH BEND

The PITCH BEND is a “live” performance control which can be used to change the tuning of the entire keyboard.

A primary use of the PITCH BEND control is to allow the performer to “bend” notes and add musical feeling to playing, similar to the “bending” techniques used by guitarists. Naturally, a performer may go beyond this type of traditional instruments effect with equally satisfying musical results.

The normal position for the PITCH BEND knob is in the center of a “dead zone,” where turning the knob slightly in either direction results in little or no pitch change.

This feature lets you feel the normal position while playing, without having to look at the knob. Turning the PITCH BEND control fully clockwise or counter-clockwise results in transposing the keyboard up or down precisely one octave.



TRANSCOPE



The TRANSPOSE switch shifts the entire keyboard pitch up or down two octaves. This switch extends the keyboard's effective pitch range to eight octaves, even wider than a piano. Combined with the PITCH BEND control, the keyboard's total range is extended to 10 full octaves *without retuning of the VCO's*.

EXPERIMENT!

In the preceding pages we have given you some ideas for using the capabilities of the keyboard in conjunction with the 2600 console. You are limited only by your creative technique and your playing style will reflect the time spent on practicing. Happy experimenting, good luck and enjoy a new musical world on the ARP 2600.

SPECIFICATIONS

UPPER VOICE CV OUTPUT	-3 volts to +10 volts, 1V/OCT
LOWER VOICE CV OUTPUT.....	-3 volts to +7 volts, 1V/OCT
LFO TRIANGLE OUTPUT.....	±5 volts, 10 volts peak to peak
LFO SQUARE WAVE OUTPUT.....	+10 volts, 10 volts peak to peak
LFO DELAYED SINE WAVE OUTPUT.....	±3 volts, 6 volts peak to peak
EXTERNAL VIBRATO INPUT	Accepts ±10 volts maximum
VIBRATO DEPTH SLIDER	10 volts yields approx. 1 octave shift
VIBRATO DELAY SLIDER.....	Delays sine wave from 0 sec. to approx. 2.5 seconds
LFO SPEED SLIDER0.25Hz to approx. 25Hz
PITCH BEND CONTROL.....	±1 octave, calibrated
TRANSCOPE SWITCH	±2 octaves, calibrated
PORTAMENTO SPEED SLIDER1msec. to approx. 2sec. for 4 octaves
PORTAMENTO FOOT SWITCH.....	Accepts only ARP foot switch
INTERVAL FOOT SWITCH.....	Accepts only ARP foot switch
GATE OUTPUT (ON 2600 PANEL).....	.0 volts keys up, +10 volts key down
TRIGGER OUTPUT (ON 2600 PANEL)	+10 volts on key depression, .5msec duration

FUNCTION DESCRIPTIONS

CONTROL	CIRCUIT FUNCTION	MUSICAL USE
PITCH BEND CONTROL	When turned clockwise or counterclockwise from center, an offset voltage is summed with the upper and lower voice control voltages. The Pitch Bend control is calibrated to a maximum ± 1 octave.	Manually 'Bends' the pitch of the oscillators sharp or flat. Also can be used as a ± 1 octave transpose.
TRANPOSE SWITCH	Up and down two octave positions sum ± 2 V offset voltage with upper and lower voice control voltages.	Changes the playing range of keyboard.
PORTAMENTO ON/OFF SWITCH	Turns on portamento circuit. Upper Voice memory is disabled when in the 'on' position.	Allows notes to slide from one pitch to another.
PORTAMENTO MOMENTARY PUSH BUTTON	Provides the same function as portamento on/off switch.	Allows momentary control of portamento effect.
PORTAMENTO SLIDER	Increases Portamento time from 1msec. to 2sec.	Manually controls speed of portamento effect.
TRIGGER MODE SWITCH	Multiple mode provides a trigger to the envelope generators for each key depression; single mode provides a trigger for the first key depression only.	Single mode provides attack on first key down, but not on second.
REPEAT SWITCH	In the auto Repeat mode, the LFO square wave is supplied to the envelope generator instead of the keyboard gate; in the Keyboard Repeat mode, the square output wave of the LFO is supplied to the envelope generator only while a key is held.	Allows the envelope generators to be triggered by the LFO instead of by key depressions.
LFO SPEED SLIDER	Varies the LFO speed from .25Hz to 25Hz.	Controls Vibrato rate and repeat speed.
VIBRATO DELAY SLIDER	Delays the vibrato from 0 to 2.5sec. after key depression.	Allows vibrato to 'fade' in after key is depressed.
VIBRATO DEPTH SLIDER	Attenuates the vibrato signal supplied to upper and lower control voltages.	Varies the degree of frequency shift of vibrato.
EXTERNAL VIBRATO IN JACK	Sums external signals to upper and lower voice control voltages through the vibrato depth slider.	Allows other (low frequency) waveforms to frequency modulate the oscillators through the upper and lower control voltages.
LFO TRIANGLE JACK	Supplies the LFO triangle waveform for use outside the keyboard.	Provides additional control of other functions in the 2600.
LFO SQUARE WAVE JACK	Supplies the LFO square wave for use outside the keyboard.	Provides additional control of other functions in the 2600.
PORTAMENTO JACK	Provides same function with foot switch as the portamento momentary push button.	Allows momentary control of portamento effect.
INTERVAL LATCH JACK	Latches (holds) second voice control voltage when foot switch is depressed.	Allows single notes to play preset intervals when foot switch is held down.
UPPER VOICE JACK	Control voltage outputs for use outside the keyboard.	Allows the upper voice control voltage to be connected to any VCO (or the VCF).

