

***RMI HARMONIC  
SYNTHESIZER***

***OPERATION MANUAL***

***TECHNICAL MANUAL***

***SCHEMATICS***

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## SET-UP INFORMATION:

### 1. Connections

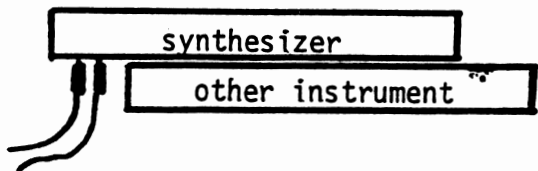
- a. A.C. power cord plugs into any convenience outlet - it draws very little.
- b. Volume and Filter pedals plug into jacks labeled "pedals". No mistake can be made between "Volume" and "Filter" jacks because of different sizes. The synthesizer can be operated without the pedals being connected - you merely lose the control over the two functions.
- c. Audio outputs for Left and Right Voices are labeled "Left" and "Right" Output. The signals are low-level, high-impedance. Any microphone or guitar-type input will provide sufficient amplification. The audio system should have tweeters to reproduce the high frequencies being generated by the synthesizer.
- d. VCF Input allows external audio signals to be processed through the Dynamic Filter. When being used with the RMI Keyboard Computer, the Third Channel from the Computer can be routed through the filter for "wah" effects. Other audio sources such as guitars, microphones, or electric pianos can be passed through the filter for special effects. If some sources are too low in level to produce the desired effects, a small battery-operated preamp module can be inserted just before the VCF Input. Several companies manufacture such modules for use with guitars.

Stereo vs. Mono: For the best performance, two separate audio systems should be used for Left and Right audio outputs. However, if two are not available, both Left and Right can be "mixed" into one amplifier having a two-channel input.

### 2. Using with other instruments

- a. Remove front legs by unscrewing brackets from case.
- b. Add LONG "leg extenders" to rear legs.(available from RMI).
- c. Place on top of other instrument in "piggy-back" style.

Line up so that all plugs are to the left of other instrument:



note - removal of front strap lock may be necessary to prevent damage to other instrument.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLUME

First: Tune to A440 or another instrument.

# RIGHT

Then: Tune to match Left Generator or set desired interval.

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLUME

HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	REED	HARMONIC GENERATOR		SYNC	PULSE	FLUTE	REED
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		PERCUSSION	
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		TREMULO DEPTH	
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH	
PORTAMENTO		SPEED		SPEED		DEPTH		LOW PASS		HI PASS	
SPEED		SWEEP		SPEED		TREMULANT		BAND PASS		PORTAMENTO	
OFF		UP		SPEED		OFF		OFF		SPEED	
OFF		DOWN		DEPTH		LOW		OFF		OFF	
OFF		NO SWEEP		TREMULANT		HIGH		OFF		OFF	
OFF		FILTER OFF		OFF		OFF		OFF		OFF	

NOTE: Arrow markings on the panel beside the Tuning Slider are a good approximate indication of A440 tuning. Set the sliders on the arrows, then proceed to tune by ear as indicated above. Interesting "beating" effects can be achieved by tuning the Right Voice slightly sharp.

TUNING COMBINATIONS:

By using the Left and Right Voice Octave Shifters and the Right Voice Tuning Slider, any interval can be set between the two voices.

INTERVAL:	Octave Shifter		Tuning Slider
	LEFT:	RIGHT:	RIGHT:
1. Unison	one	one	tune for "unison" (slightly sharp for chorus effect)
2. Unison	two	two	same
3. Unison	three	three	"
4. Unison	four	four	"
5. Octave	one	two	"
6. Octave	one	three	"
7. Octave	one	four	"
8. Octave	two	one	"
9. Octave	two	three	"
10. Octave	two	four	"
11. Octave	three	one	"
12. Octave	three	two	"
13. Octave	three	four	"
14. Octave	four	one	"
15. Octave	four	two	"
16. Octave	four	three	"
17. Third	one	one	tune for a third above (major or minor)
18. Third	two	two	same
19. Third	three	three	"
20. Third	four	four	"
21. Tenth	one	two	"
22. 2 oct.& 3rd	one	three	"
23. 3 oct.& 3rd	one	four	"
24. Tenth	two	three	"
25. 2 oct.& 3rd	two	four	"
26. Tenth	three	four	"



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER OCTAVE SHIFTER TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

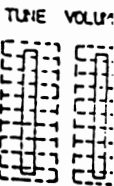
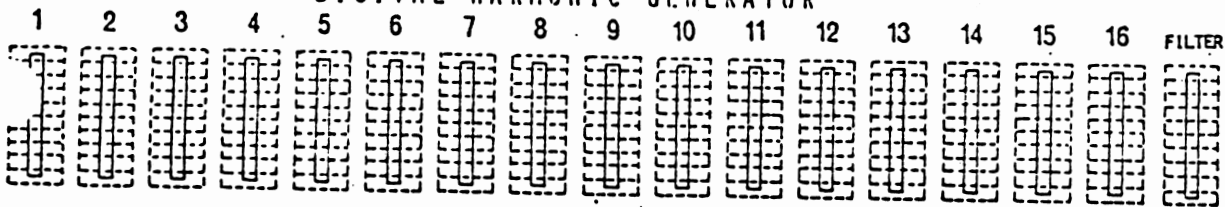
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER OCTAVE SHIFTER TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		PERCUSSION	SEQUENCER	NORMAL		MODE		PERCUSSION
ATTACK	DECAY	DECAY	DECAY	SPEED	ATTACK	DECAY	DECAY	DECAY	DECAY	
TREMULANT SHAPE			VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE			VIBRATO DEPTH	TREMOLO DEPTH
PITCH BEND		DEPTH		DEPTH	NOISE FREQUENCY	PITCH BEND		DEPTH		
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH	
OFF	FLAT	SHARP	OFF	OFF	OFF	OFF	FLAT	SHARP	OFF	
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN	NO SWEEP	FILTER OFF	OFF	LOW	HIGH	OFF	OFF	OFF

After you have arrived at a setting on the Harmonic Generator, should you desire a slight attenuation of highs for a more mellow tone, it is easily accomplished with the manual filter without resetting the harmonics. Raising the slider attenuates the highs.

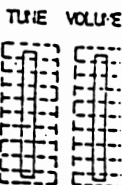
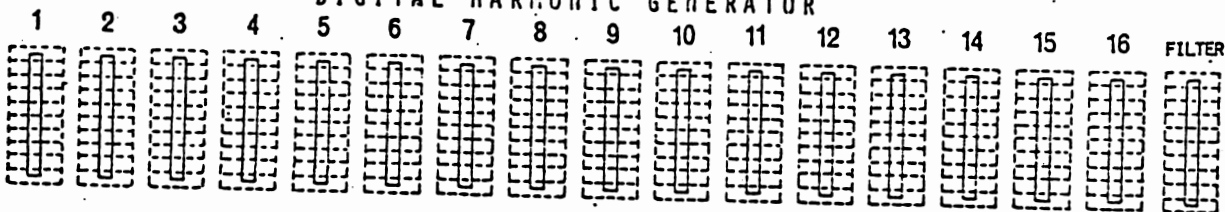
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR		SYNC	PULSE	FLUTE	HORN	REED
NORMAL ATTACK DECAY		MODE PERCUSSION DECAY		SEQUENCER SPEED PUSH ON-OFF		NORMAL ATTACK DECAY		MODE PERCUSSION DECAY					
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
PITCH BEND TIME DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME DEPTH		DEPTH		PORTAMENTO SPEED	
PORTAMENTO		DYNAMIC FILTER		SPEED DEPTH		TREMULANT Q		LOW PASS BAND PASS HI PASS		PORTAMENTO SPEED			
Envelope		Envelope											
Attack Time		Decay Time		Attack Time		Decay Time							

SET-UP SHEET - TITLE ENVELOPE GENERATORS - NORMAL NUMBER CF-2

TRIMIT - HARMONIC SYNTHESIZER



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR		SYNC	PULSE	FLUTE	HORN	REED
NORMAL ATTACK DECAY		MODE		PERCUSSION DECAY	SEQUENCER SPEED		NORMAL ATTACK DECAY		MODE		PERCUSSION DECAY	PUSH ON-OFF	
TREMULANT SHAPE		VIBRATO DEPTH		TREMOLO DEPTH	LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMOLO DEPTH	OFF	
PITCH BEND TIME DEPTH		DEPTH		DEPTH	NOISE FREQUENCY		DEPTH		PITCH BEND TIME DEPTH		DEPTH		FLAT SHARP
PORTAMENTO SPEED		SWEEP UP DOWN NO SWEEP FILTER OFF		DYNAMIC FILTER SPEED DEPTH TREMULANT Q LOW PASS BAND PASS HI PASS				PORTAMENTO SPEED		OFF			



Envelope  
Decay  
Time



Envelope  
Decay  
Time

TUNING COMBINATIONS (contd.)

INTERVAL:	Octave Shifter		Tuning Slider
	LEFT:	RIGHT:	RIGHT:
27. Fifth	one	two	tune for a Perfect Fifth above
28. Fifth	two	three	same
29. Fifth	three	four	"
30. Twelfth	one	three	"
31. Twelfth	two	four	"
32. 2 oct.& 5th	one	four	"

The tuning combinations listed are probably the most common and musically useful, however, DO NOT STOP HERE! EXPERIMENT! Try other combinations: major and minor seconds, fourths, diminished fifths and sevenths, etc. When tuning octaves and unisons, experiment with "dead" tuning vs. beats for "chorus" effects.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

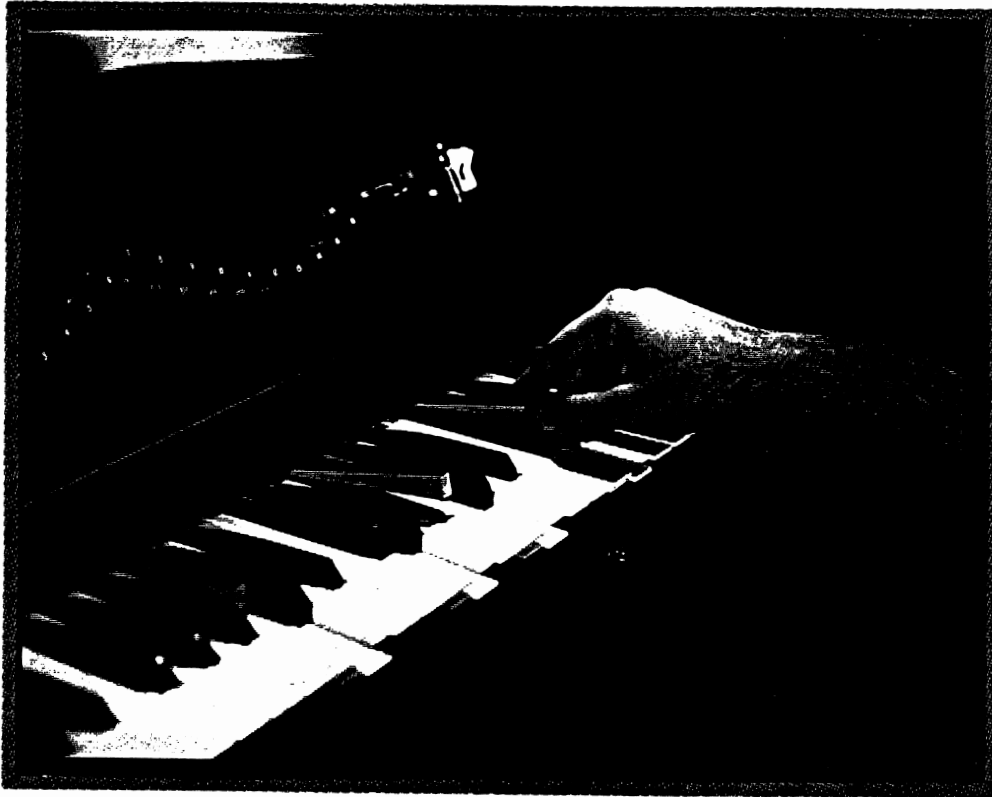
TUNE VOLUME

HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION	
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY		DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		DEPTH	
PORTAMENTO		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS	
SPEED		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS	
UP		DOWN		NO SWEEP		FILTER OFF		LOW HIGH OFF		OFF		OFF	
PORTAMENTO		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS	
SPEED		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS	
OFF		UP		DOWN		NO SWEEP		FILTER OFF		LOW HIGH OFF		OFF	
PORTAMENTO		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS	
SPEED		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS	
OFF		UP		DOWN		NO SWEEP		FILTER OFF		LOW HIGH OFF		OFF	

Sequencer is activated by pushing knob. Mode of operation is alternately "sequential" and "random". Example: push "on" - sequential, push "off", push "on" - random, push "off", etc. Speed is set by turning knob. A pilot light indicates when the sequencer is in operation. If no keys are held, the light will remain "on". If keys are being held or pinned, the light will pulse when the sequencer "resets". In the "sequential" mode, this pulse of light will serve as a "downbeat" indicator for most rhythmic patterns or bass lines. In the "random" mode, it will pulse at random indicating the mode of operation.



## PROGRAMMING THE SEQUENCER



The sequencer can be activated by holding chords or groups of notes. However, if your hands are busy with controls or another instrument, the sequencer can be "programmed" by inserting RMI "Spare Fingers" into the keys (key wedges).

Examples to try:

1. C1, G1, Bflat1, C2 (the makings of a good 'boogie bass')
2. C1, G1, C2, G2, C3, G3. (allows harmonic freedom in accompaniment)
3. C1, D1, E1, F1, G1, A1, B1, C1 (major scale - harmonic freedom)

Try the major scale with the sequencer in the "random" mode.

For rhythmic percussion effects:

A1, A2, A3

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL	
ATTACK	DECAY	DECAY	DECAY	SPEED		ATTACK	DECAY	DECAY	DECAY
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE	
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH	
PORTAMENTO		SWEEP		SPEED		DEPTH		TREMULANT	
SPEED		UP		DOWN		NO SWEEP		FILTER OFF	
DYNAMIC FILTER		LOW PASS		BAND PASS		HI PASS		PORTAMENTO	
SPEED		LOW		HIGH		OFF		SPEED	

Modulation Shape    Frequency Modulation    Amplitude Modulation    Modulation Rate Common to Left & Right Voices    Modulation Shape    Frequency Modulation    Amplitude Modulation

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					CLARINET					PULSE					FLUTE					HORN					REED														
HARMONIC GENERATOR					SYNC					PULSE					FLUTE					HORN					REED														
NORMAL				MODE				PERCUSSION				SEQUENCER				NORMAL				MODE				PERCUSSION															
ATTACK		DECAY		ATTACK		DECAY		ATTACK		DECAY		SPEED		ATTACK		DECAY		ATTACK		DECAY																			
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		PITCH BEND TIME		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		DEPTH													
OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		FLAT SHARP		OFF		OFF		OFF		FLAT SHARP		OFF													
PORTAMENTO				DYNAMIC FILTER																PORTAMENTO																			
SPEED				SWEEP				SPEED				DEPTH				TREMULANT				Q				LOW PASS				BAND PASS				HI PASS				SPEED			
OFF				UP DOWN NO SWEEP FILTER OFF				OFF				OFF				OFF				LOW HIGH OFF				OFF				OFF				OFF							

Pitch Deviation Upon Attack: "Depth" control determines point at which "slide" begins. Setting "Depth" control to "flat" will cause pitch to start "flat" and slide up to the correct pitch. "Sharp" works in reverse, as you would expect. Setting the "Depth" control at 12:00 in the center of its travel will cause little or no deviation. "Time" control determines the time it will take to travel from the deviated pitch to the correct pitch.



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION	
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY		DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		DEPTH	
TIME	DEPTH	DEPTH		DEPTH		DEPTH		DEPTH		TIME	DEPTH	DEPTH	
PORTAMENTO		DYNAMIC FILTER		PORTAMENTO		PORTAMENTO		PORTAMENTO		PORTAMENTO		PORTAMENTO	
SPEED		SPEED		SPEED		SPEED		SPEED		SPEED		SPEED	
UP		DOWN		NO SWEEP		FILTER OFF		TREMULANT		LOW PASS		BAND PASS	
NO SWEEP		FILTER OFF		LOW		HIGH		OFF		OFF		OFF	

Noise Modulation: Either voice can be frequency-modulated by noise in infinitely-variable degrees. Noise "frequency" or "color" can be controlled from "pink" to "white". Most useful, however, is the "white" - turned fully clockwise. Noise modulation is most commonly used in creating drums, traps, and other percussion instruments. It is also effective in producing wind, thunder, and whistles. It is up to you to experiment.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR	SYNC	PULSE	FLUTE	HORN	REED							
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION							
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY		DECAY							
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH							
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		DEPTH							
TIME		FLAT SHARP		OFF		OFF		OFF		TIME		FLAT SHARP							
PORTAMENTO		DYNAMIC FILTER										PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF	
Mode Switch		Envelope Time		Envelope Depth		Sine Modulation		Resonance											

Voltage-Controlled Filter: Mode Switch - "Filter Off" position passes left voice unaffected by the filter. "No Sweep" position activates filter allowing foot pedal control and/or sine modulation. "Up" or "Down" positions cause rising or falling ramp envelope modulations. Envelope "time" and "depth" are controllable. Low, band, and high pass outputs are mixable. Typical "wow" effects are created by modulating the full "low pass" with some "resonance". "Notch" filter effects are created by mixing low and high pass outputs in varying portions.



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLL

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

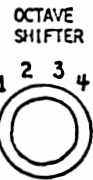
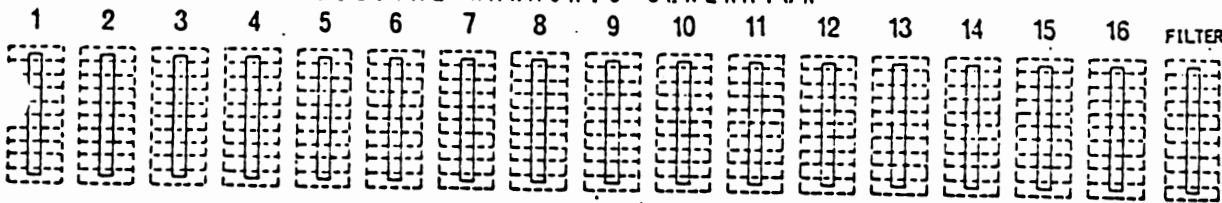
TUNE VOLL

HARMONIC GENERATOR					HARMONIC GENERATOR														
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED										
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION							
ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY							
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH							
OFF		OFF		OFF		OFF		OFF		OFF		OFF							
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		DEPTH							
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH						
OFF	FLAT	SHARP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	FLAT	SHARP	OFF						
PORTAMENTO		DYNAMIC FILTER										PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP		DOWN		NO SWEEP		FILTER OFF		OFF		LOW		HIGH		OFF		OFF	

Portamento: This very popular synthesizer effect refers to the sliding from one pitch played to the next pitch played. The RMI Harmonic Synthesizer is unique because of two features of the portamento - independent controls for each voice, and "follow-through" effect, causing the final desired pitch to be achieved without having to hold the key down. In most cases, you will find the 12:00 setting in the center most musically useful. To activate the portamento effect, play the first note desired, then hold down the long touch bar just above the keyboard; finally, play the note to which you want to slide. Hold the touch bar down until the pitch arrives at the desired note. Experiment with contrasting speeds for the left and right controls or releasing the touch bar before the final pitch is reached.

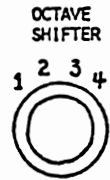
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR					HARMONIC GENERATOR								
CLARINET	PULSE	FLUTE	HORN	REED	CLARINET	PULSE	FLUTE	HORN	REED				
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION	
ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		DEPTH	
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	
PORTAMENTO	DYNAMIC FILTER										PORTAMENTO		
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED			
OFF	UP	DOWN	NO SWEEP	NO SWEEP	OFF	LOW	HIGH	OFF	OFF	OFF			
	NO SWEEP		FILTER OFF										

**REMEMBER - EXACT ANALOG SETTINGS** may vary from instrument to instrument, not to mention the varying tastes of the individual owners. Therefore, you should set your panel controls to look as close as possible to the drawings, then EXPERIMENT with each variable control by adjusting it to either side of the initial setting. You will note that noise modulation, VCF outputs and sine modulation are not included as critical because they are usually full "on" or full "off."

By now, you should have a rough idea of where the controls are and what effects they should have on the sound.

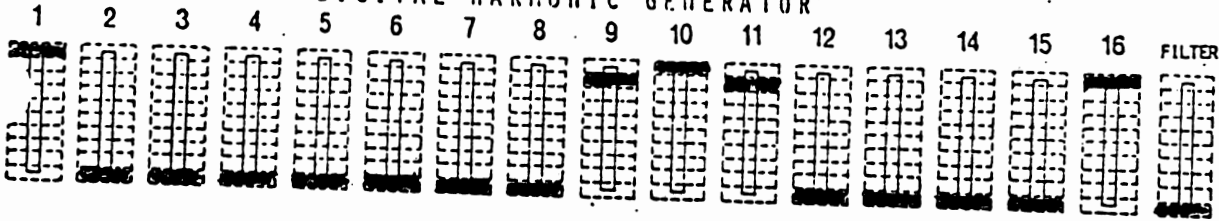
You are about ready to put all of this raw knowledge to practical use, but before you do, GO BACK AND ONCE AGAIN READ THE PAGE ON CRITICAL ANALOG CONTROLS. It will only take a minute. Those controls are what it's all about - interfacing the human being with the electronic machine. You have an idea of what you would like to hear, but the machine dosen't. You must tell it through the controls. Now, read that page, and let's get on with the best part - making the sounds.....

NOTE: When referring to the Set-Up Sheets,  
ANY CONTROLS NOT ██████████ SHOULD BE IN THE "OFF" OR "MINIMUM" POSITION.



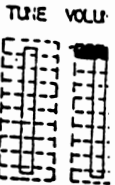
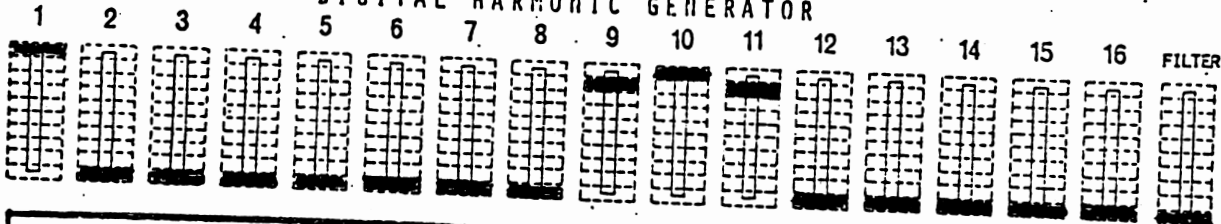
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



WARPING  
 CLARINET  
 PULSE  
 FLUTE  
 HORN  
 REED  
 WARPING  
 SYNC  
 PULSE  
 FLUTE  
 HORN  
 REED

**MODE**  
 NORMAL: ATTACK, DECAY  
 PERCUSSION: DECAY

**SEQUENCER**  
 SPEED  
 PUSH ON-OFF

**MODE**  
 NORMAL: ATTACK, DECAY  
 PERCUSSION: DECAY

TREMULANT SHAPE, VIBRATO DEPTH, TREMOLO DEPTH, LFO RATE, TREMULANT SHAPE, VIBRATO DEPTH, TREMOLO DEPTH

PITCH BEND TIME, DEPTH, DEPTH, NOISE FREQUENCY, DEPTH, PITCH BEND TIME, DEPTH

PORTAMENTO SPEED, OFF

**DYNAMIC FILTER**  
 SWEEP: UP, DOWN, NO SWEEP, FILTER OFF  
 SPEED, DEPTH, TREMULANT, Q: LOW, HIGH, OFF, LOW PASS, BAND PASS, HI PASS, PORTAMENTO SPEED, OFF

Percussion Tonalities can be varied with filter pedal.

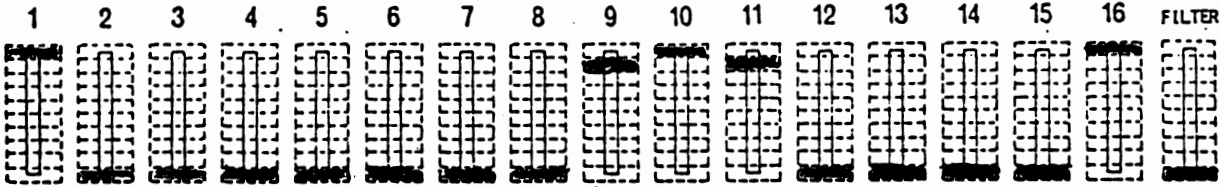
Wedge keys for sequence: A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>.

SET-UP SHEET - TITLE PERCUSSION W. BLOCKS & TOM TOM NUMBER SU-1

# TRIMM HARMONIC SEQUENCER

# LEFT

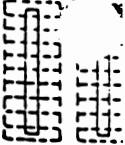
## DIGITAL HARMONIC GENERATOR



OCTAVE SHIFTER

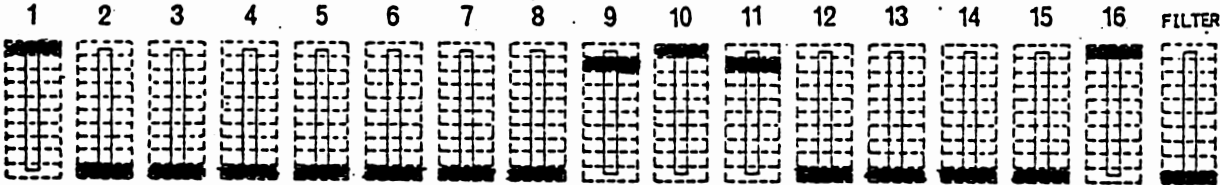


TUNE VOLUME



# RIGHT

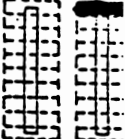
## DIGITAL HARMONIC GENERATOR



OCTAVE SHIFTER



TUNE VOLUME



<input type="checkbox"/> WIND GEN OFF					<input type="checkbox"/> CLARINET					<input type="checkbox"/> PULSE					<input type="checkbox"/> FLUTE					<input type="checkbox"/> HORN					<input type="checkbox"/> REED					<input type="checkbox"/> WIND GEN OFF					<input type="checkbox"/> SYNC					<input type="checkbox"/> PULSE					<input type="checkbox"/> FLUTE					<input type="checkbox"/> HORN					<input type="checkbox"/> REED				
NORMAL ATTACK DECAY										MODE DECAY										SEQUENCER SPEED PUSH ON-OFF										NORMAL ATTACK DECAY										MODE DECAY																			
TREMULANT SHAPE					VIBRATO DEPTH OFF					TREMOLO DEPTH OFF					LFO RATE					TREMULANT SHAPE					VIBRATO DEPTH OFF					TREMOLO DEPTH OFF																													
PITCH BEND TIME DEPTH					DEPTH					NOISE FREQUENCY DEPTH					PITCH BEND TIME DEPTH					DEPTH																																							
PORTAMENTO SPEED OFF					DYNAMIC FILTER SWEEP UP DOWN NO SWEEP FILTER OFF										SPEED DEPTH TREMULANT Q OFF LOW HIGH OFF					LOW PASS BAND PASS HI PASS OFF OFF OFF					PORTAMENTO SPEED OFF																																		

Percussion Tonalities can be varied with filter pedal.

Wedge keys for sequence: A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>



LEFT

DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

RIGHT

DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

Optional --



HARMONIC GENERATOR		CLARINET	<input type="radio"/>	FLUTE	<input type="radio"/>	REED	HARMONIC GENERATOR		SYNC	<input type="radio"/>	FLUTE	<input type="radio"/>	REED						
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION							
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY		DECAY							
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH							
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		DEPTH							
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH						
OFF	FLAT SHARP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	FLAT SHARP	OFF	FLAT SHARP	OFF	FLAT SHARP						
PORTAMENTO		DYNAMIC FILTER										PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP DOWN NO SWEEP		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF	
OFF		FILTER OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF	

Vary Octave Shifters Together:

1. Bass Viol
2. Cello
3. Viola
4. Violin

Notes: A. There should be a slight "beat" in the tuning between the left and right voices.

B. Portamento can be very effective.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

Vary contour to suit your taste.

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

WAVE GEN OFF		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR		SYNC	PULSE	FLUTE	HORN	REED
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION	
ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	PUSH ON-OFF	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY
TREMULANT SHAPE	VIBRATO DEPTH	TREMULO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMULO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMULO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH
PITCH BEND TIME	DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME
PORTAMENTO SPEED	DYNAMIC FILTER										PORTAMENTO SPEED		
OFF	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	PORTAMENTO SPEED		OFF	
OFF	UP	DOWN	NO SWEEP	FILTER OFF	OFF	LOW	HIGH	OFF	OFF	OFF	OFF	OFF	

Filter "speed" & "depth" settings are particularly critical in producing a realistic bass sound -- experiment.

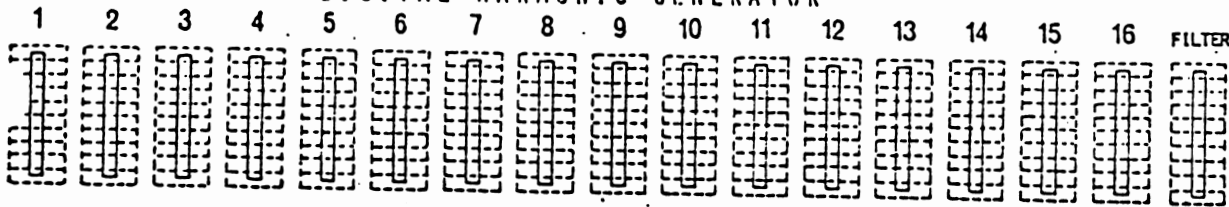
Suggestions: Try a "boogie" on the sequencer - Pin: C<sub>1</sub> G<sub>1</sub> B<sup>b</sup><sub>1</sub> C<sub>2</sub>  
Add percussion in the right voice, such as set-up sheet

#1 or #2.



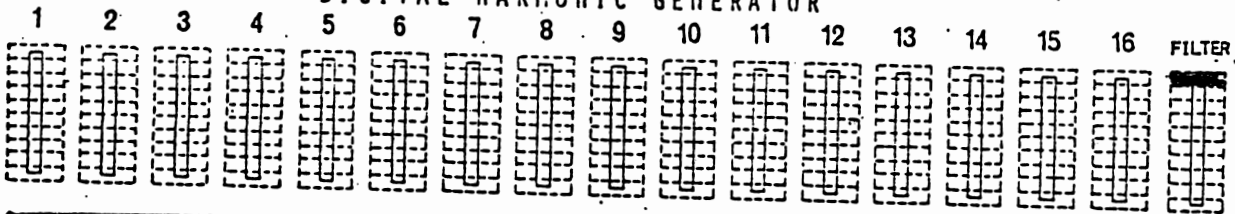
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR				CLARINET				PULSE				FLUTE				REED				HARMONIC GENERATOR				SYNC				PULSE				FLUTE				REED			
NORMAL				MODE				PERCUSSION				SEQUENCER				NORMAL				MODE				PERCUSSION															
ATTACK		DECAY		ATTACK		DECAY		ATTACK		DECAY		SPEED		ATTACK		DECAY		ATTACK		DECAY		SPEED		ATTACK		DECAY		ATTACK		DECAY									
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH											
PITCH BEND				DEPTH				NOISE FREQUENCY				DEPTH				PITCH BEND				DEPTH																			
TIME		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		TIME		DEPTH		TIME		DEPTH		TIME		DEPTH		TIME		DEPTH		TIME		DEPTH											
PORTAMENTO				DYNAMIC FILTER				PORTAMENTO																															
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED																					
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF																					

Program a major scale with "spare fingers"  
 Example: A<sub>2</sub> B<sub>2</sub> C#<sub>3</sub> D<sub>3</sub> E<sub>3</sub> F#<sub>3</sub> G#<sub>3</sub> A<sub>3</sub>  
 Set sequencer in "random" mode  
 Use filter pedal for gradual "sweep" effects

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

HARMONIC GENERATOR		CLARINET		PULSE		HORN		REED		HARMONIC GENERATOR		SYNC		PULSE		HORN		REED		
NORMAL ATTACK DECAY				MODE PERCUSSION DECAY				SEQUENCER SPEED PUSH ON-OFF				NORMAL ATTACK DECAY				MODE PERCUSSION DECAY				
TREMULANT SHAPE			VIBRATO DEPTH			TREMLO DEPTH			LFO RATE			TREMULANT SHAPE			VIBRATO DEPTH			TREMLO DEPTH		
PITCH BEND TIME DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME DEPTH		DEPTH		PITCH BEND TIME DEPTH		DEPTH						
PORTAMENTO SPEED		DYNAMIC FILTER												PORTAMENTO SPEED						
SWEEP UP DOWN NO SWEEP FILTER OFF		SPEED DEPTH		TREMULANT Q		LOW PASS BAND PASS HI PASS		PORTAMENTO SPEED												



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR					
PULSE					PULSE					
FLUTE					FLUTE					
HORN					HORN					
REED					REED					
NORMAL		PERCUSSION		SEQUENCER		NORMAL		PERCUSSION		
ATTACK	DECAY	MODE	DECAY	SPEED	ATTACK	DECAY	MODE	DECAY	DECAY	
PUSH ON-OFF										
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH				
PITCH BEND			NOISE FREQUENCY		PITCH BEND					
TIME	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH				
OFF	FLAT	SHARP	OFF	OFF	OFF	FLAT	SHARP			
PORTAMENTO	DYNAMIC FILTER							PORTAMENTO		
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN	NO SWEEP	OFF	LOW	HIGH	OFF	OFF	OFF	OFF
	FILTER OFF									

SET-UP SHEET - TITLE CLARINET SOLO

NUMBER SU-7

# IRVING HARMONIC SYNTHESIZER

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

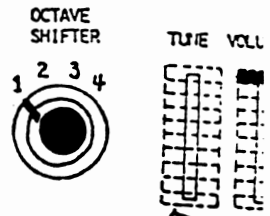
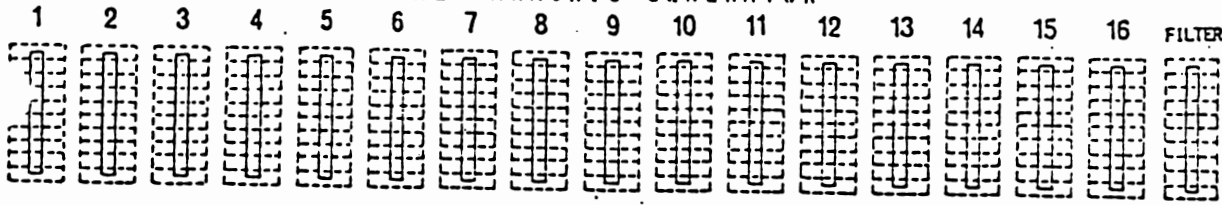
TUNE VOLU

<input type="checkbox"/> WARPING GEN OFF					<input type="checkbox"/> WARPING GEN OFF														
CLARINET					SYNC														
PULSE					PULSE														
FLUTE					FLUTE														
HORN					HORN														
REED					REED														
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION							
ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	PUSH ON-OFF	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY						
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH							
OFF		OFF		OFF		OFF		OFF		OFF		OFF							
PITCH BEND TIME		PITCH BEND DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		PITCH BEND DEPTH							
OFF		FLAT SHARP		OFF		OFF		OFF		OFF		FLAT SHARP							
PORTAMENTO		DYNAMIC FILTER										PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF	



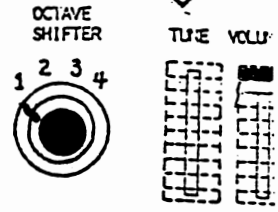
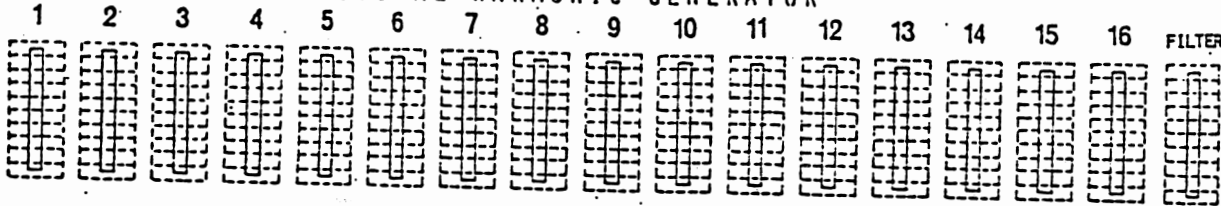
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR

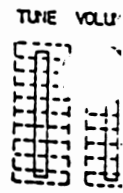
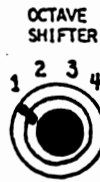
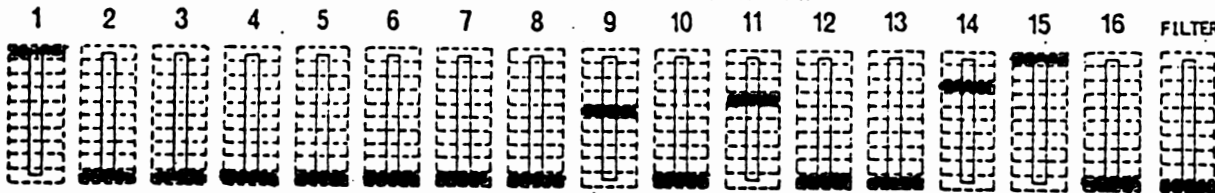


Tuning should have no beats

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN		SYNC	PULSE	FLUTE	HORN		
NORMAL		PERCUSSION		SEQUENCER	NORMAL		PERCUSSION			
ATTACK	DECAY	MODE	DECAY	SPEED	ATTACK	DECAY	MODE	DECAY		
PUSH ON-OFF										
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH				
PITCH BEND		DEPTH		NOISE FREQUENCY	PITCH BEND					
TIME	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH				
OFF	FLAT	SHARP	OFF	OFF	OFF	FLAT	SHARP			
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN	NO SWEEP	FILTER OFF	OFF	LOW	HIGH	OFF	OFF	OFF

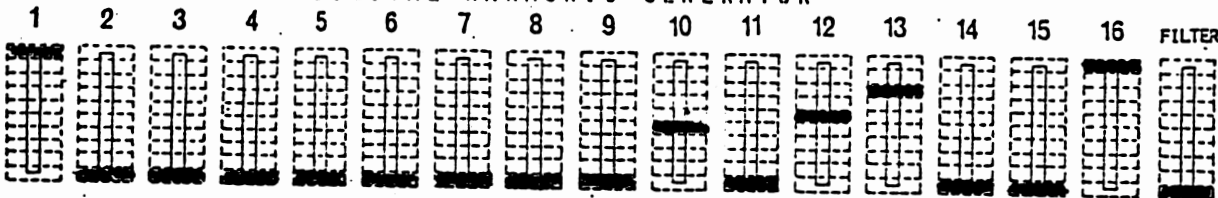
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



<input type="checkbox"/> WAVE GEN OFF <input type="checkbox"/> CLARINET <input type="checkbox"/> PULSE <input type="checkbox"/> FLUTE <input type="checkbox"/> HORN <input type="checkbox"/> REED						<input type="checkbox"/> WAVE GEN OFF <input type="checkbox"/> SYNC <input type="checkbox"/> PULSE <input type="checkbox"/> FLUTE <input type="checkbox"/> HORN <input type="checkbox"/> REED											
NORMAL ATTACK <input type="checkbox"/>		MODE <input type="checkbox"/>		PERCUSSION DECAY <input type="checkbox"/>		SEQUENCER SPEED <input type="checkbox"/>		NORMAL ATTACK <input type="checkbox"/>		MODE <input type="checkbox"/>		PERCUSSION DECAY <input type="checkbox"/>					
TREMULANT SHAPE <input type="checkbox"/>		VIBRATO DEPTH <input type="checkbox"/>		TREMOLO DEPTH <input type="checkbox"/>		LFO RATE <input type="checkbox"/>		TREMULANT SHAPE <input type="checkbox"/>		VIBRATO DEPTH <input type="checkbox"/>		TREMOLO DEPTH <input type="checkbox"/>					
PITCH BEND TIME <input type="checkbox"/>		DEPTH <input type="checkbox"/>		DEPTH <input type="checkbox"/>		NOISE FREQUENCY <input type="checkbox"/>		DEPTH <input type="checkbox"/>		PITCH BEND TIME <input type="checkbox"/>		DEPTH <input type="checkbox"/>					
PORTAMENTO SPEED <input type="checkbox"/>		DYNAMIC FILTER SWEEP <input type="checkbox"/>								PORTAMENTO SPEED <input type="checkbox"/>							
		UP <input type="checkbox"/>		SPEED <input type="checkbox"/>		DEPTH <input type="checkbox"/>		TREMULANT <input type="checkbox"/>		Q <input type="checkbox"/>		LOW PASS <input type="checkbox"/>		BAND PASS <input type="checkbox"/>		HI PASS <input type="checkbox"/>	
		DOWN <input type="checkbox"/>						OFF <input type="checkbox"/>		LOW <input type="checkbox"/>		HIGH <input type="checkbox"/>		OFF <input type="checkbox"/>		OFF <input type="checkbox"/>	
		NO SWEEP <input type="checkbox"/>															
		FILTER OFF <input type="checkbox"/>															

SET-UP SHEET - TITLE RING MODULATOR EFFECT

NUMBER SU-10

# TRIMM - HARMONIC SYNTHESIZER

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

WAVEFORM SELECTOR OFF CLARINET PULSE FLUTE HORN REED WAVEFORM SELECTOR OFF SYNC PULSE FLUTE HORN REED

**MODE** NORMAL PERCUSSION

ATTACK DECAY MODE DECAY

SEQUENCER SPEED PUSH ON-OFF

**MODE** NORMAL PERCUSSION

ATTACK DECAY MODE DECAY

TREMULANT SHAPE VIBRATO DEPTH TREMOLO DEPTH LFO RATE TREMULANT SHAPE VIBRATO DEPTH TREMOLO DEPTH

PITCH BEND TIME DEPTH DEPTH NOISE FREQUENCY DEPTH PITCH BEND TIME DEPTH

OFF FLAT SHARP OFF OFF OFF OFF OFF FLAT SHARP

PORTAMENTO SPEED

**DYNAMIC FILTER**

SWEEP UP DOWN NO SWEEP FILTER OFF

SPEED DEPTH TREMULANT Q LOW PASS BAND PASS HI PASS

OFF OFF OFF OFF OFF OFF OFF

PORTAMENTO SPEED

Modulated "notch" filter effect



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

Vary together

OCTAVE SHIFTER

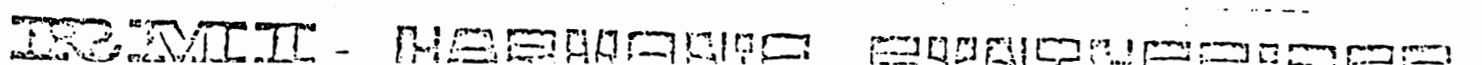
1 2 3 4

TUNE VOLU

<input type="checkbox"/> WARPING <input type="checkbox"/> CLARINET <input type="checkbox"/> PULSE <input type="checkbox"/> HORN <input type="checkbox"/> REED					<input type="checkbox"/> WARPING <input type="checkbox"/> SYNC <input type="checkbox"/> PULSE <input type="checkbox"/> FLUTE <input type="checkbox"/> HORN <input type="checkbox"/> REED					
NORMAL ATTACK DECAY		MODE PERCUSSION DECAY		SEQUENCER SPEED PUSH ON-OFF		NORMAL ATTACK DECAY		MODE PERCUSSION DECAY		
TREMULANT SHAPE VIBRATO DEPTH OFF		TREMOLO DEPTH OFF		LFO RATE		TREMULANT SHAPE VIBRATO DEPTH OFF		TREMOLO DEPTH OFF		
PITCH BEND TIME OFF DEPTH FLAT SHARP		DEPTH OFF		NOISE FREQUENCY DEPTH OFF		PITCH BEND TIME OFF DEPTH FLAT SHARP		PORTAMENTO SPEED OFF		
DYNAMIC FILTER										
SWEEP UP DOWN NO SWEEP FILTER OFF		SPEED DEPTH		TREMULANT OFF		Q LOW HIGH OFF		LOW PASS BAND PASS HI PASS OFF OFF OFF		PORTAMENTO SPEED OFF

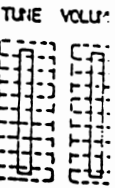
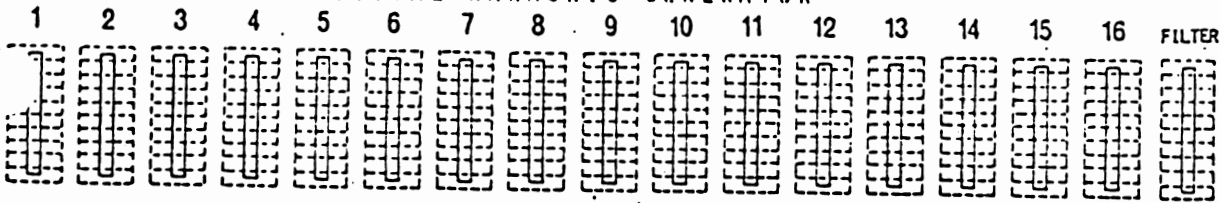
Press a key and hold (Low "E" is particularly effective).

While holding key, raise "tune" and "volume" sliders on right voice.



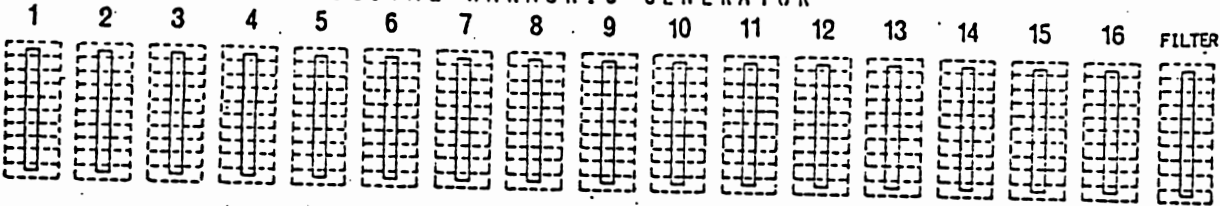
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR		CLARINET		PULSE		FLUTE		HORN		REED		HARMONIC GENERATOR		S		PULSE		HORN		REED					
NORMAL ATTACK DECAY				MODE PERCUSSION DECAY				SEQUENCER SPEED Random PUSH ON-OFF				NORMAL ATTACK DECAY				MODE PERCUSSION DECAY									
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		PITCH BEND TIME DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME DEPTH		DEPTH	
OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF	
PORTAMENTO		DYNAMIC FILTER												PORTAMENTO											
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED							
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH		OFF		OFF		OFF		OFF							

### DOING YOUR OWN THING:

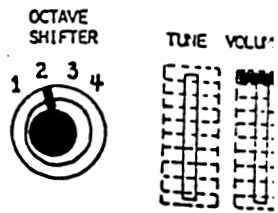
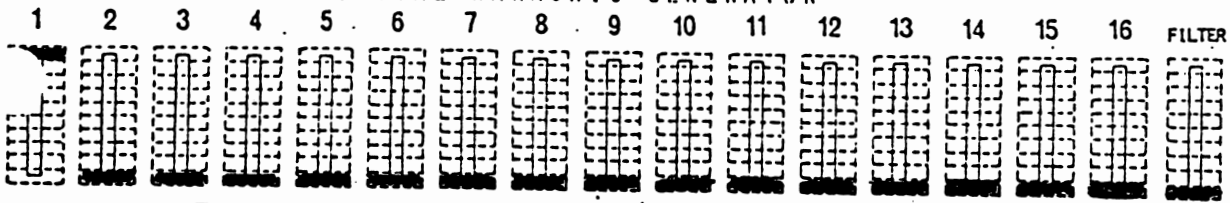
The most exciting thing about synthesis is creating your own voices. Having tried several Set-Ups created by someone else, you probably have some ideas of your own. Of course, you can still create further variations on the Set-Ups by re-combining them. Example: the Left Voice of Set-Up #4 with the Right Voice of Set-Up #6, etc. However, let's get on with some actual creativity.

The following VOICING EXPERIMENTS are designed to take you through all of the control features of the RMI HARMONIC SYNTHESIZER. It is most important that you attempt to associate the sound effects with the controls. Herein lies the secret to becoming a synthesist.



# LEFT

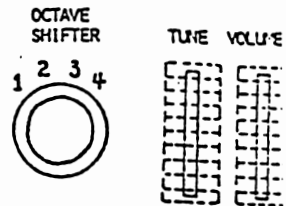
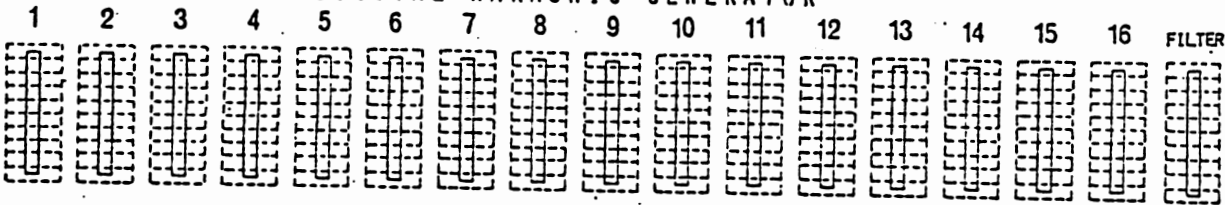
## DIGITAL HARMONIC GENERATOR



Raise and return each slider one at a time.

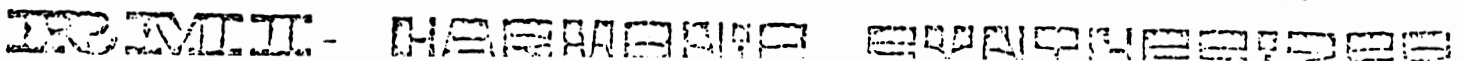
# RIGHT

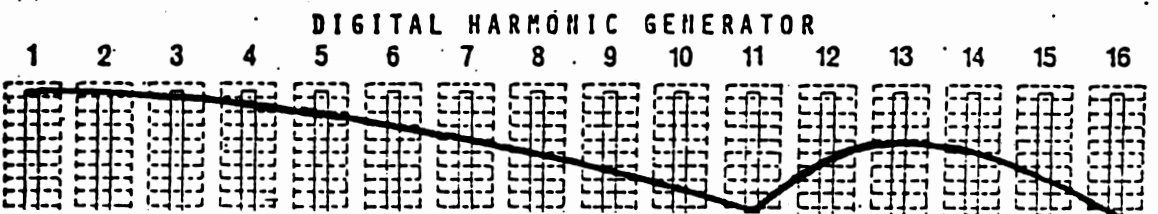
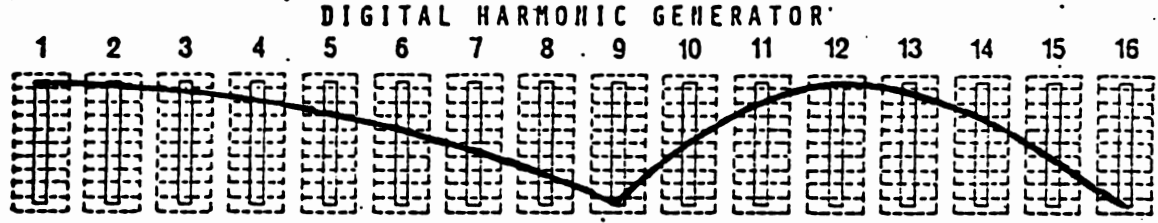
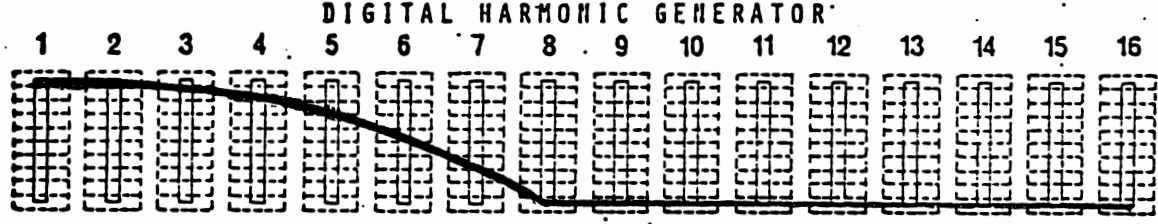
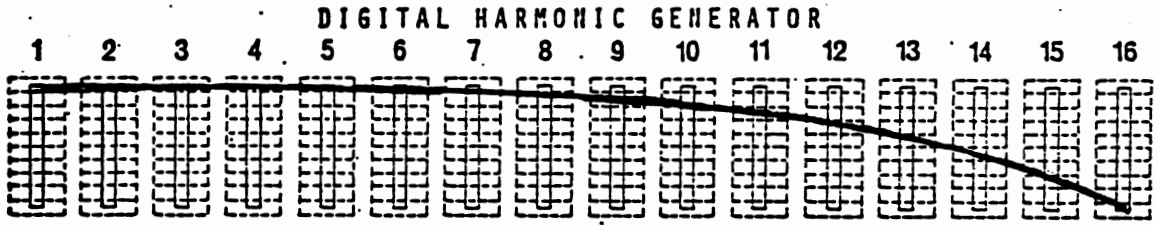
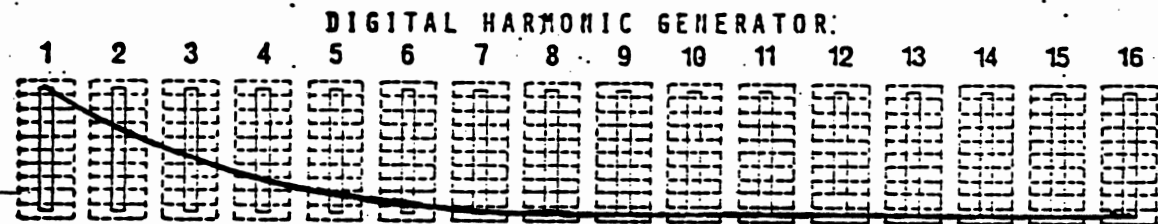
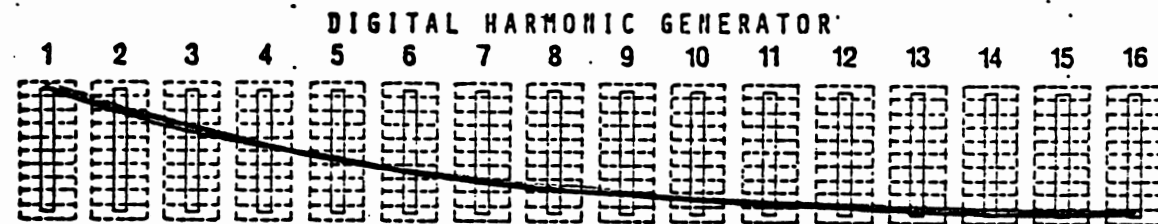
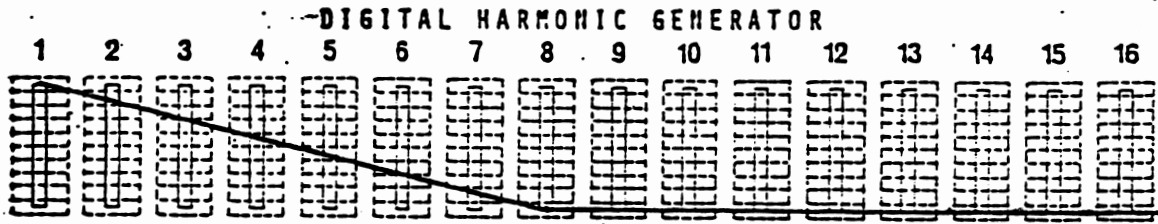
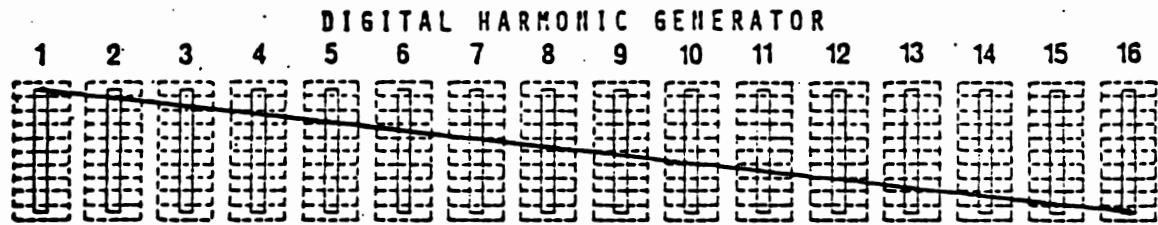
## DIGITAL HARMONIC GENERATOR



WAVEFORM SELECTOR: OFF		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR		SYNC	PULSE	FLUTE	HORN	REED
NORMAL MODE PERCUSSION		ATTACK	DECAY	DECAY	DECAY	SEQUENCER		NORMAL MODE PERCUSSION		ATTACK	DECAY	DECAY	DECAY
TREMULANT SHAPE		VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE		VIBRATO DEPTH	TREMOLO DEPTH	TREMULANT SHAPE		VIBRATO DEPTH	TREMOLO DEPTH	
PITCH BEND TIME DEPTH		DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME DEPTH		DEPTH	PITCH BEND TIME DEPTH		DEPTH		
PORTAMENTO	DYNAMIC FILTER											PORTAMENTO	
SPEED	SWEEP UP DOWN NO SWEEP FILTER OFF		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED			

Volume Pedal (left) full open. Filter Pedal (right) full open.  
 Hold a key so that sound is heard. Slowly raise 2nd harmonic slider.  
 Return it. Raise 3rd and return it. Raise 4th, etc.  
 Experiment with geometric contours that follow.



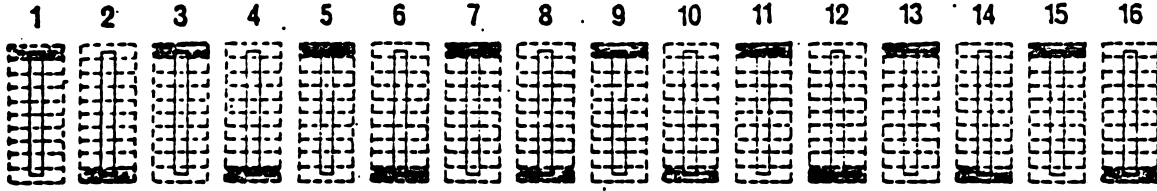


When setting up a waveform on the Digital Harmonic Generator, you should think in general contours rather than specific settings of individual harmonics. You will create set-ups and changes faster if you move sliders in groups rather than individually. As an example, the contour of a sawtooth can be rapidly changed by wiping one finger across the tops of all sixteen sliders, pushing each one down as you pass.

THE CONTOUR APPROACH:

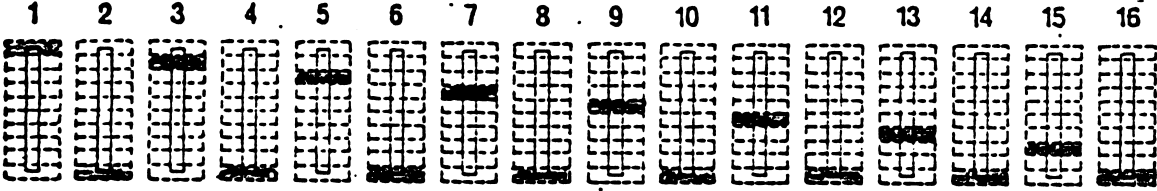


DIGITAL HARMONIC GENERATOR



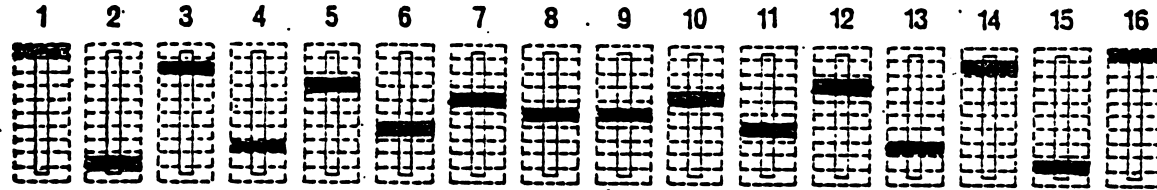
9. Square wave - odd harmonics

DIGITAL HARMONIC GENERATOR



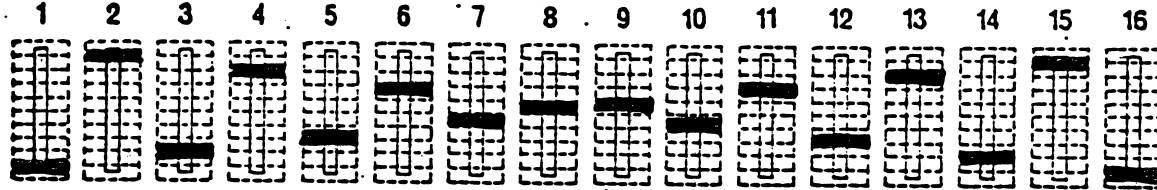
10. Square wave - odd harmonics with decreased highs

DIGITAL HARMONIC GENERATOR



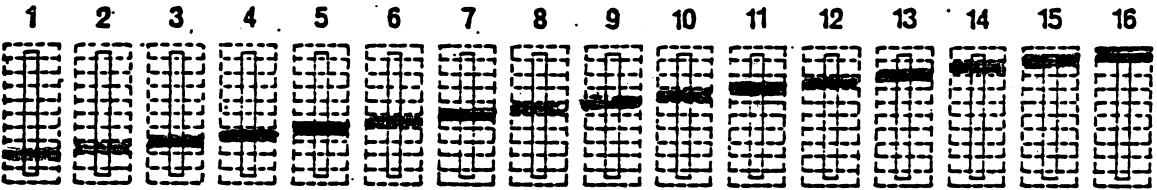
11. #10 mixed with even harmonics tapered at the low end

DIGITAL HARMONIC GENERATOR



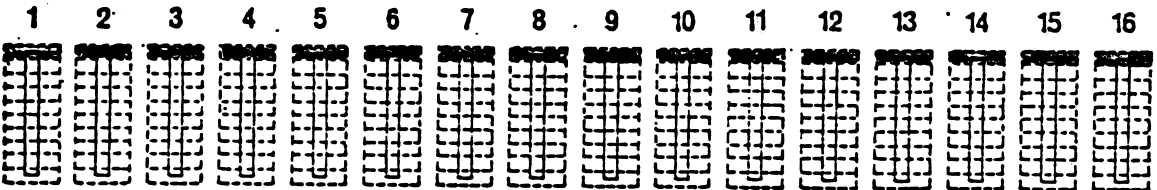
12. Same tapers as #11 with even and odd harmonics reversed

DIGITAL HARMONIC GENERATOR



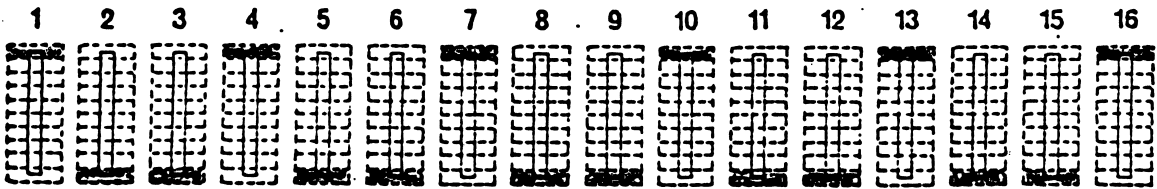
13. All harmonics with taper at the low end

DIGITAL HARMONIC GENERATOR



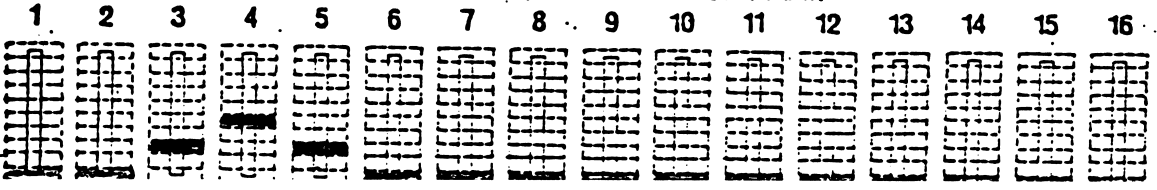
14. All harmonics full strength

DIGITAL HARMONIC GENERATOR



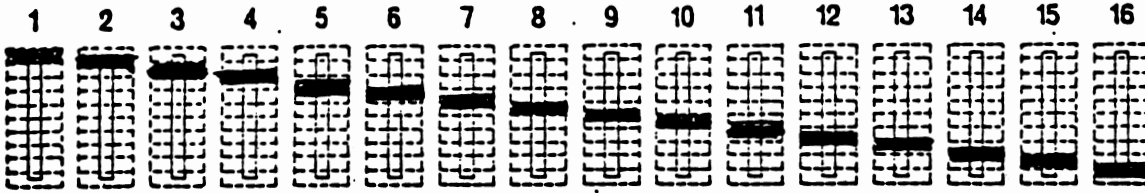
15. Isolated harmonics: 1st, 4th, 7th, 10th, 13th, and 16th.

DIGITAL HARMONIC GENERATOR



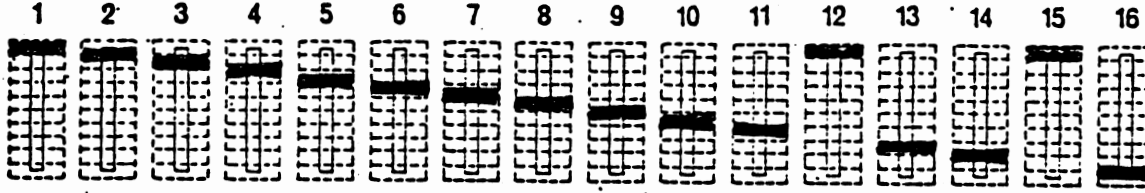
16. Narrow band centered at 4th harmonic

DIGITAL HARMONIC GENERATOR



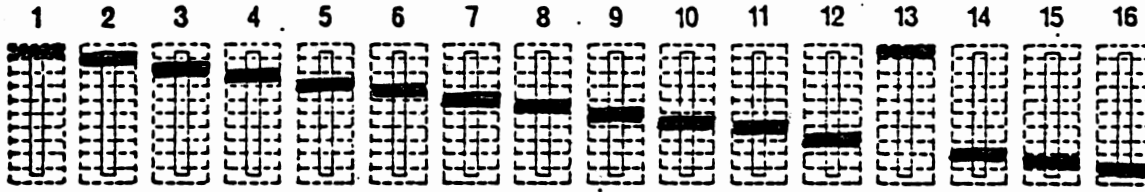
1. Sawtooth

DIGITAL HARMONIC GENERATOR



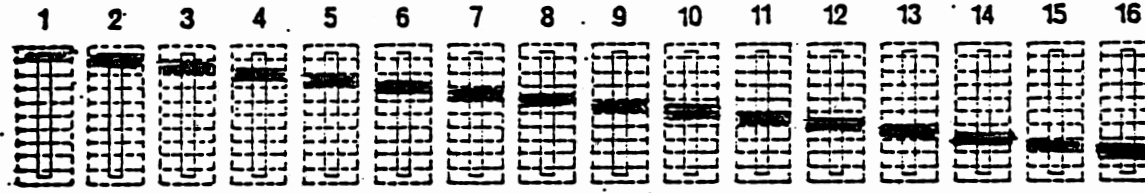
2. Sawtooth with raised 12th and 15th harmonics

DIGITAL HARMONIC GENERATOR



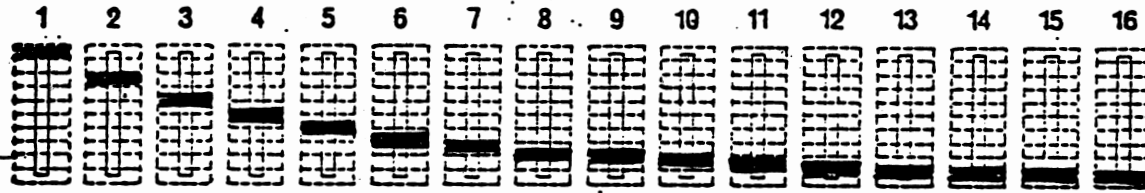
3. Sawtooth with raised 13th harmonic

DIGITAL HARMONIC GENERATOR



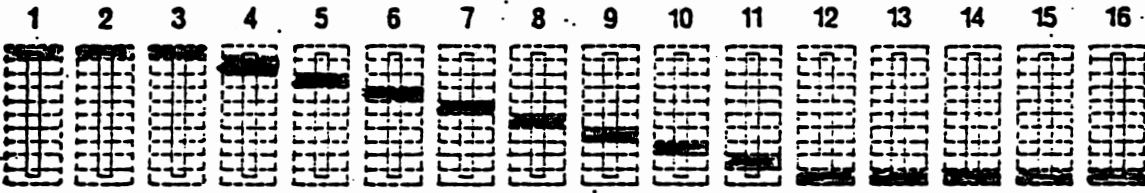
4. Sawtooth with increased upper harmonics

DIGITAL HARMONIC GENERATOR



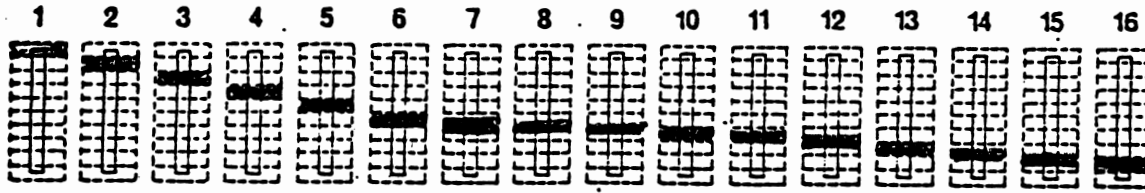
5. Sawtooth with decreased mid harmonics

DIGITAL HARMONIC GENERATOR



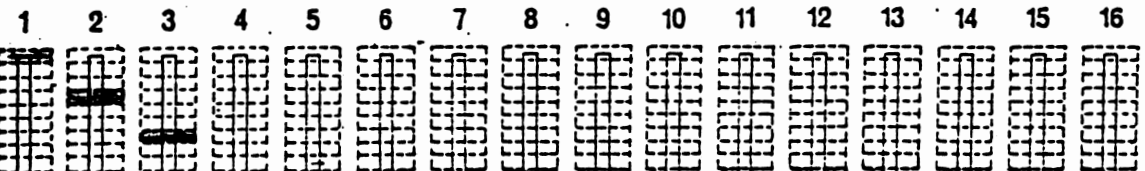
6. Sawtooth with decreased upper and increased lower harmonics

DIGITAL HARMONIC GENERATOR



7. Sawtooth with dual taper

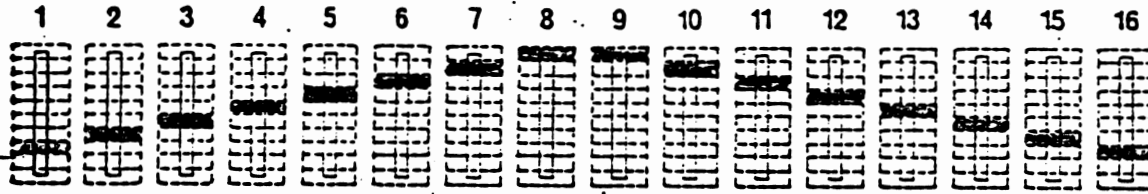
DIGITAL HARMONIC GENERATOR



8. Sawtooth with greatly decreased upper harmonics

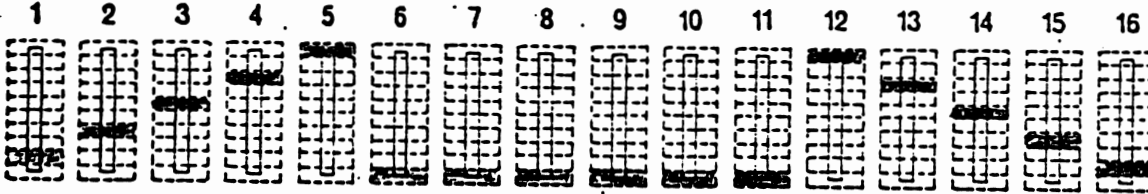


DIGITAL HARMONIC GENERATOR



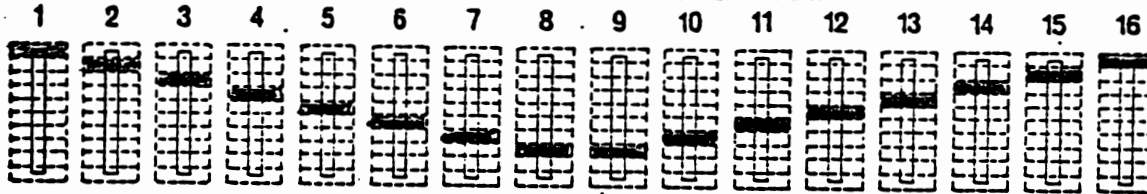
17. Wide band centered at 8th and 9th harmonics.

DIGITAL HARMONIC GENERATOR



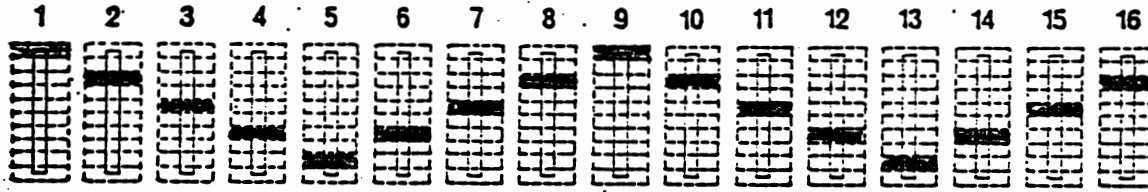
18. Wide band with notch effect

DIGITAL HARMONIC GENERATOR



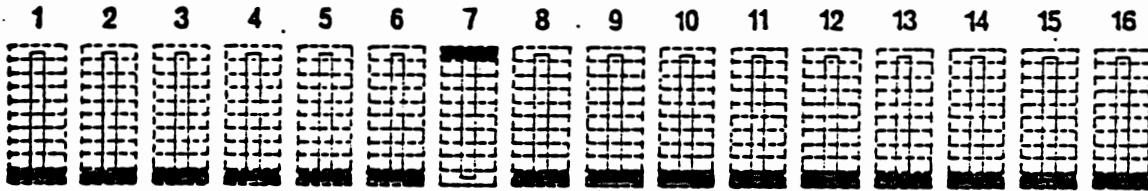
19. All harmonics with taper at center

DIGITAL HARMONIC GENERATOR



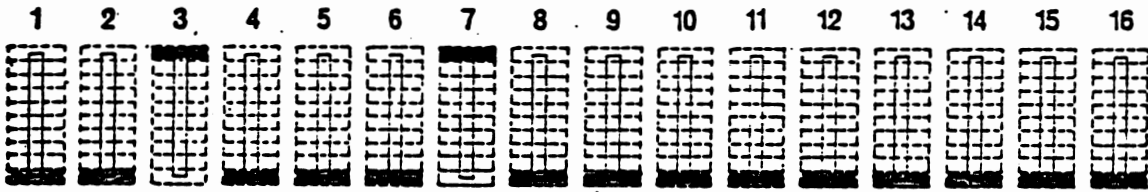
20. All harmonics with low, band, and high-pass effects

DIGITAL HARMONIC GENERATOR



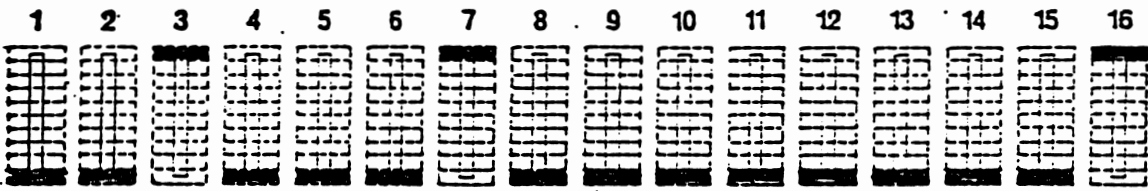
21. Isolated 7th harmonic

DIGITAL HARMONIC GENERATOR



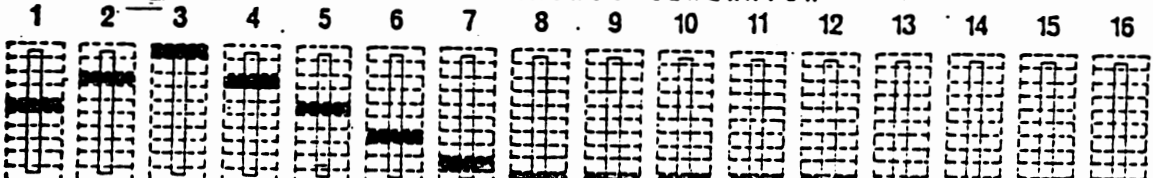
22. Isolated 3rd and 7th harmonics - bell tone

DIGITAL HARMONIC GENERATOR



23. Isolated 3rd, 7th, and 16th harmonics - bell tone

DIGITAL HARMONIC GENERATOR



24. Band centered 3rd harmonic



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR														
CLARINET	PULSE	FLUTE	HORN	REED	CLARINET	PULSE	FLUTE	HORN	REED										
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION							
ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	DECAY						
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH							
PITCH BEND TIME		PITCH BEND DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		PITCH BEND DEPTH							
PORTAMENTO		DYNAMIC FILTER										PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP DOWN NO SWEEP		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF	

All other controls as they were on Set-Up "VE-1".  
 Vary the filter pedal (right). Listen carefully to what is happening:  
 Upper Harmonics are being cut off by the low pass filter as you close the pedal.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU:  
TUNE VOLU:  
TUNE VOLU:

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU:  
TUNE VOLU:  
TUNE VOLU:

HARMONIC GENERATOR					HARMONIC GENERATOR					HARMONIC GENERATOR																																							
CLARINET					FLUTE					HORN					REED																																		
PULSE					FLUTE					HORN					REED																																		
NORMAL					PERCUSSION					SEQUENCER					NORMAL					PERCUSSION																													
ATTACK					DECAY					MODE					ATTACK					DECAY																													
TREMULANT SHAPE					VIBRATO DEPTH					TREMULO DEPTH					LFO RATE					TREMULANT SHAPE					VIBRATO DEPTH					TREMULO DEPTH																			
PITCH BEND					DEPTH					DEPTH					NOISE FREQUENCY					DEPTH					PITCH BEND					DEPTH																			
TIME					DEPTH					DEPTH					NOISE FREQUENCY					DEPTH					TIME					DEPTH																			
PORTAMENTO					DYNAMIC FILTER					DYNAMIC FILTER					DYNAMIC FILTER					PORTAMENTO					PORTAMENTO																								
SPEED					SWEEP					SPEED					DEPTH					TREMULANT					Q					LOW PASS					BAND PASS					HI PASS					SPEED				
OFF					UP					SPEED					DEPTH					OFF					LOW					OFF					OFF					OFF					OFF				
OFF					DOWN					SPEED					DEPTH					OFF					HIGH					OFF					OFF					OFF					OFF				
OFF					NO SWEEP					SPEED					DEPTH					OFF					LOW					OFF					OFF					OFF					OFF				
OFF					FILTER OFF					SPEED					DEPTH					OFF					LOW					OFF					OFF					OFF					OFF				

All other controls as they were on Set-up "VE-2"  
 Very slowly move the filter pedal (right) from "full open" to "full close."  
 You will hear the cut-off point being resonated.  
 Try different "Q" settings for less resonance.



# LEFT

DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOL

# RIGHT

DIGITAL HARMONIC GENERATOR

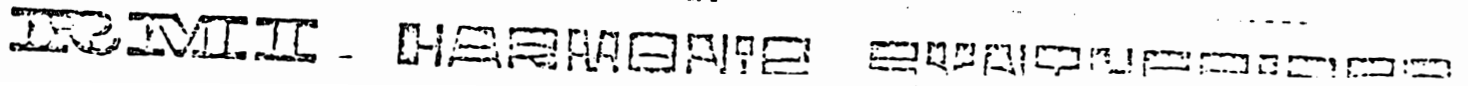
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED
NORMAL		PERCUSSION		SEQUENCER	NORMAL		PERCUSSION		
ATTACK	DECAY	MODE	DECAY	SPEED	ATTACK	DECAY	MODE	DECAY	
TREMLANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMLANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH			
PITCH BEND TIME	PITCH BEND DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	PITCH BEND DEPTH			
PORTAMENTO	DYNAMIC FILTER							PORTAMENTO	
SPEED	SWEEP	SPEED	DEPTH	TREMLANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP DOWN NO SWEEP FILTER OFF			OFF	LOW HIGH	OFF	OFF	OFF	OFF

All other controls as they were on Set-Up "VE-3"  
 Open and close filter pedal. Note a narrow band of harmonics is heard moving from low to high. Add full resonance "Q" and repeat experiment.





# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

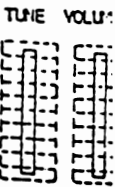
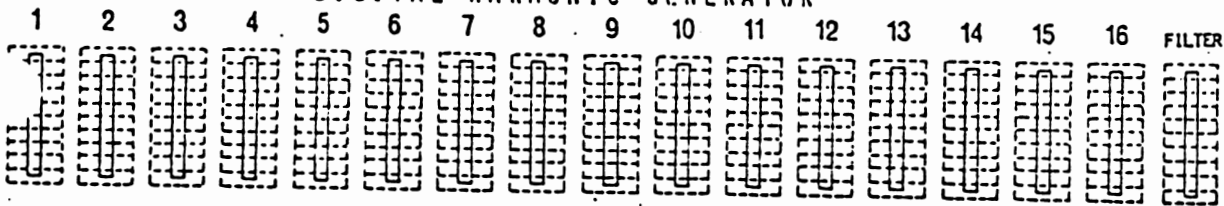
TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED
NORMAL ATTACK DECAY		MODE PERCUSSION DECAY		SEQUENCER SPEED PUSH ON-OFF	NORMAL ATTACK DECAY		MODE PERCUSSION DECAY		
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH			
PITCH BEND TIME DEPTH	DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME DEPTH	DEPTH			
PORTAMENTO SPEED	DYNAMIC FILTER							PORTAMENTO SPEED	
	SWEEP UP DOWN NO SWEEP FILTER OFF	SPEED	DEPTH	TREMULANT	Q LOW HIGH OFF	LOW PASS	BAND PASS	HI PASS	

All other controls as they were on Set-Up "VE-4"  
Repeat pedal experiment, then add resonance.

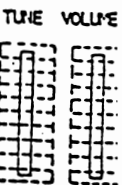
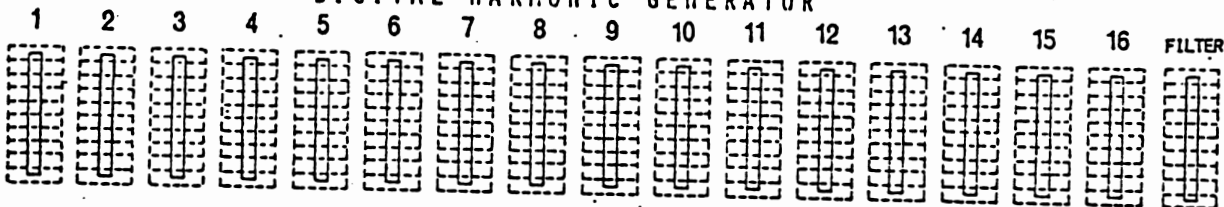
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR		CLARINET		PULSE		FLUTE		HORN		REED		HARMONIC GENERATOR		SYNC		PULSE		FLUTE		HORN		REED			
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION		ATTACK		DECAY		ATTACK		DECAY		MODE		PERCUSSION	
ATTACK		DECAY		DECAY		SPEED		ATTACK		DECAY		DECAY		ATTACK		DECAY		ATTACK		DECAY		DECAY		DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		OFF		OFF		OFF		OFF		OFF		OFF	
PITCH BEND TIME		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		DEPTH		OFF		OFF		OFF		OFF		OFF		OFF	
PORTAMENTO		SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		PORTAMENTO		SPEED		OFF	
OFF		OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH		OFF		OFF		OFF		OFF		OFF		OFF	

All other controls as they were on Set-Up "VE-5"  
Repeat pedal experiment, then add resonance.

Note: Partial "low pass" is mixed with full "high pass" to create "notch filter."

SET-UP SHEET - TITLE VOICING EXPERIMENT  
NOTCH FILTER

NUMBER VE-6

**DAVID** - HARMONIC EQUIPMENT

Dynamic Filtering is a very important part of synthesis. Before you go further, return to Set-Up VE-2 and repeat the experiments through Set-Up VE-6 until you feel that you have developed a good ear for the differences between "Low Pass", "Band Pass", "High Pass", "Notch", and "Resonance." You should be able to recognize each effect by merely listening.

Now, we can continue with Modulation of the Filter by LFO Sine and Rising or Falling-Ramp Envelopes.



**LEFT**

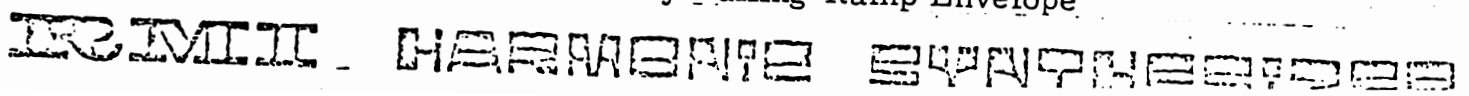
DIGITAL HARMONIC GENERATOR

**RIGHT**

DIGITAL HARMONIC GENERATOR

HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED
NORMAL		PERCUSSION		SEQUENCER SPEED	NORMAL		PERCUSSION		
ATTACK	DECAY	MODE	DECAY		ATTACK	DECAY	MODE	DECAY	
TREMULANT SHAPE			VIBRATO DEPTH		LFO RATE	TREMULANT SHAPE		TREMULO DEPTH	
OFF			OFF			OFF		OFF	
PITCH BEND		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH	
TIME	DEPTH	DEPTH		DEPTH		TIME	DEPTH	DEPTH	
OFF	FLAT SHARP	OFF		OFF		OFF	FLAT SHARP	OFF	
PORTAMENTO		DYNAMIC FILTER						PORTAMENTO	
SPEED		SWEEP		SPEED		TREMULANT		Q	
OFF		UP DOWN NO SWEEP FILTER OFF		DEPTH		LOW HIGH OFF		LOW PASS BAND PASS HI PASS	
OFF		OFF		OFF		OFF		OFF	
OFF		OFF		OFF		OFF		OFF	

All other controls as before. Close filter pedal. Repeat key slowly. Note change in harmonic content after key is pressed. Increase "depth" to "full" and repeat. Vary "speed." Repeat this experiment with "band pass" settings, then "high pass" and "notch," each time varying the resonance "Q".



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	HORN	REED	HARMONIC GENERATOR		SYNC	PULSE	FLUTE	HORN	REED						
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION							
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY		DECAY							
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH							
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		DEPTH							
TIME	DEPTH	FLAT	SHARP	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	FLAT	SHARP	DEPTH	DEPTH						
PORTAMENTO		DYNAMIC FILTER										PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF	

All other controls as before. Close Filter Pedal.

Repeat Experiment "VE-7" in its entirety.

SET-UP SHEET - TITLE VOICING EXPERIMENT

NUMBER VE-8

Filter Modulation by Rising-Ramp Envelope

**INITIAL HARMONIC SYNTHESIS**



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN	REED	CLARINET	PULSE	FLUTE	HORN	REED
NORMAL		PERCUSSION		SEQUENCER	NORMAL		PERCUSSION		
ATTACK	DECAY	MODE	DECAY	SPEED	ATTACK	DECAY	MODE	DECAY	
TREMULANT SHAPE		VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE		VIBRATO DEPTH	TREMOLO DEPTH	
PITCH BEND		DEPTH		NOISE FREQUENCY	PITCH BEND		DEPTH		
TIME	DEPTH	DEPTH			TIME	DEPTH			
PORTAMENTO		DYNAMIC FILTER					PORTAMENTO		
SPEED	SWEEP		SPEED	DEPTH	LFO Sine TREMULANT	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN			OFF	LOW	OFF	OFF	OFF
	NO SWEEP					HIGH			
	FILTER OFF					OFF			

All other controls as before. Close filter pedal.

Repeat Experiment "VE-8" in its entirety. Vary amount of sine modulation. Vary rate of LFO.

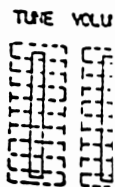
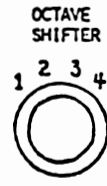
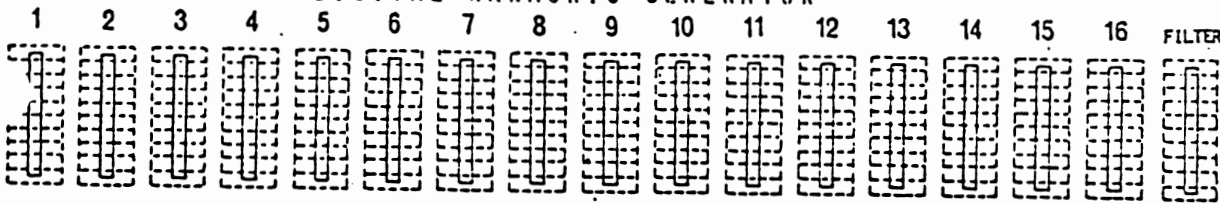
SET-UP SHEET - TITLE VOICING EXPERIMENT NUMBER VE-9  
Filter Modulation by LFO Sine

TRIMM - HARMONIC EQUIPMENT



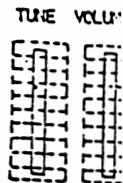
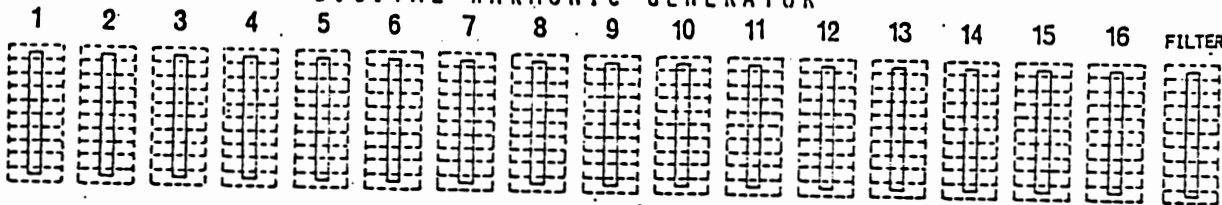
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR					HARMONIC GENERATOR													
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED									
NORMAL		MODE		PERCUSSION	SEQUENCER	NORMAL		MODE		PERCUSSION								
ATTACK	DECAY		DECAY		SPEED	ATTACK	DECAY		DECAY									
					PUSH ON-OFF													
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH								
	OFF	OFF			OFF	OFF			OFF	OFF								
PITCH BEND		DEPTH		NOISE FREQUENCY	PITCH BEND		DEPTH		NOISE FREQUENCY									
TIME	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH	TIME	DEPTH								
OFF	FLAT SHARP	OFF	OFF	OFF	OFF	FLAT SHARP	OFF	OFF	OFF	FLAT SHARP								
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO									
SPEED	SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF	UP	DOWN	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP	NO SWEEP
	FILTER OFF						OFF		LOW HIGH		OFF		OFF		OFF		OFF	

All other controls as they were. Close filter pedal.

Repeat Experiment "VE-9".

SET-UP SHEET - TITLE VOICING EXPERIMENT NUMBER VE-10

Filter Modulation by Falling-Ramp Envelope and LFO Sine

**EXPERIMENT - HARMONIC GENERATOR**

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR									
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED					
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION		
ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	PUSH ON-OFF	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH
PITCH BEND TIME	PITCH BEND DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	PITCH BEND DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	PITCH BEND DEPTH	DEPTH	NOISE FREQUENCY	DEPTH
PORTAMENTO	DYNAMIC FILTER										PORTAMENTO			
SPEED	SWEEP		LFO Sine		TREMULANT		LOW PASS	BAND PASS	HI PASS	PORTAMENTO		SPEED		
OFF	UP	DOWN	NO SWEEP	DEPTH	DEPTH	OFF	LOW	HIGH	OFF	OFF	OFF	OFF		
	FILTER OFF													

All controls as before. Close filter pedal.

Repeat Experiment "VE-9"



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

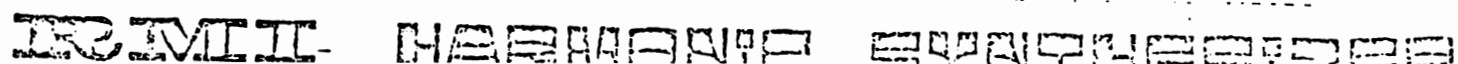
OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR							
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED			
NORMAL ATTACK		PERCUSSION DECAY		MODE	SEQUENCER SPEED	NORMAL ATTACK		PERCUSSION DECAY				
DECAY		DECAY				DECAY		DECAY				
TREMULANT SHAPE			VIBRATO DEPTH		TREMLO DEPTH		LFO RATE		TREMULANT SHAPE			
OFF			OFF		OFF		OFF		OFF			
PITCH BEND TIME		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		
OFF		FLAT SHARP		OFF		OFF		OFF		OFF		
PORTAMENTO SPEED			DYNAMIC FILTER						PORTAMENTO SPEED			
OFF			SWEEP		SPEED		DEPTH		TREMULANT		Q	
OFF			UP DOWN NO SWEEP FILTER OFF		OFF		OFF		LOW HIGH OFF		LOW PASS BAND PASS HI PASS	
OFF			OFF		OFF		OFF		OFF		OFF	

All controls as before.

Repeat Experiments "VE-7 through VE-11" varying Filter Pedal.





# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

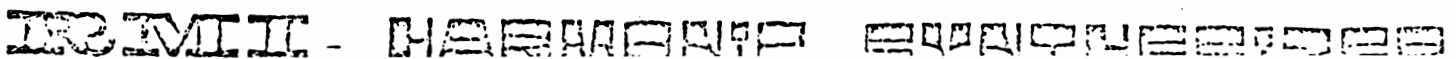
OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

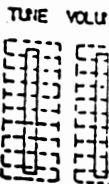
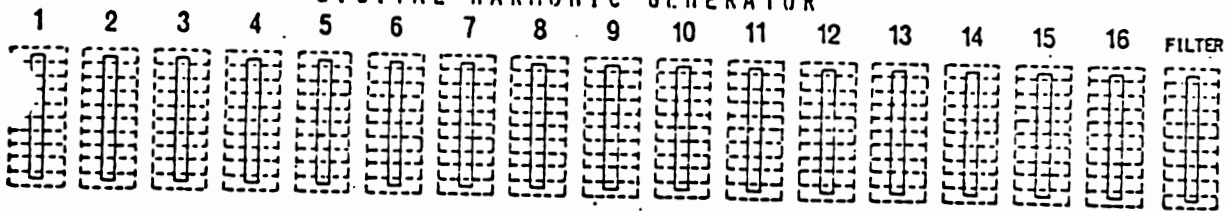
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NORMAL ATTACK <input type="text"/>		MODE <input type="text"/>		PERCUSSION DECAY <input type="text"/>		SEQUENCER SPEED <input type="text"/>		NORMAL ATTACK <input type="text"/>		MODE <input type="text"/>		PERCUSSION DECAY <input type="text"/>					
TREMULANT SHAPE <input type="text"/>		VIBRATO DEPTH <input type="text"/>		TREMOLO DEPTH <input type="text"/>		LFO RATE <input type="text"/>		TREMULANT SHAPE <input type="text"/>		VIBRATO DEPTH <input type="text"/>		TREMOLO DEPTH <input type="text"/>					
PITCH BEND TIME <input type="text"/>		DEPTH <input type="text"/>		DEPTH <input type="text"/>		NOISE FREQUENCY <input type="text"/>		DEPTH <input type="text"/>		PITCH BEND TIME <input type="text"/>		DEPTH <input type="text"/>					
PORTAMENTO SPEED <input type="text"/>		DYNAMIC FILTER SWEEP <input type="text"/>								PORTAMENTO SPEED <input type="text"/>							
		UP DOWN NO SWEEP FILTER OFF		SPEED <input type="text"/>		DEPTH <input type="text"/>		TREMULANT <input type="text"/>		Q <input type="text"/>		LOW PASS <input type="text"/>		BAND PASS <input type="text"/>		HI PASS <input type="text"/>	

Repeat a key and listen carefully as you slowly turn normal "attack" control. You must slow the key repetition so that the envelope will reach its full height before you repeat a note, or full volume will not be achieved. Experiment with normal "decay" time.



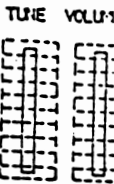
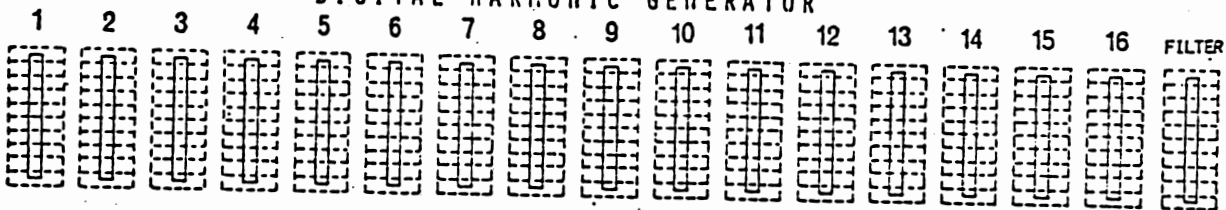
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

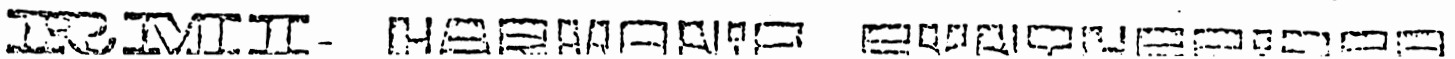
## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL ATTACK		PERCUSSION DECAY		MODE	SEQUENCER SPEED	NORMAL ATTACK		PERCUSSION DECAY		
DECAY		DECAY			PUSH ON-OFF	DECAY		DECAY		
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	TREMOLO DEPTH	
OFF	OFF	OFF		OFF	OFF	OFF		OFF	OFF	
PITCH BEND TIME		DEPTH		NOISE FREQUENCY	PITCH BEND TIME		DEPTH			
OFF	FLAT	SHARP	OFF		OFF	FLAT	SHARP	OFF	OFF	
PORTAMENTO SPEED	DYNAMIC FILTER							PORTAMENTO SPEED		
OFF	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	OFF
	UP	DOWN			OFF	LOW	HIGH	OFF	OFF	OFF
	NO SWEEP					OFF				
	FILTER OFF									

All controls as before.

Repeat key and listen carefully. Note sharpness of attack. "Attack" time is "fixed" in the percussion mode. Vary the "decay" time. The percussion mode with short decay settings is particularly useful with noise modulations of high pitches.



A NOTE AT THIS POINT:

When using the DYNAMIC FILTER in either UP or DOWN SWEEP modes, keep in mind that the timing of the FILTERING ENVELOPE must be EQUAL TO or LESS THAN that of the AMPLITUDE ENVELOPE being used, in order that the full effect of the FILTERING ENVELOPE be heard.

example: A very short PERCUSSION DECAY would not allow you to hear the entire length of a long DOWN SWEEP on the FILTER.



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

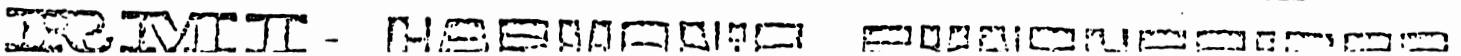
1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		SEQUENCER		NORMAL		MODE		
ATTACK	DECAY	DECAY	PERCUSSION	SPEED	ATTACK	DECAY	DECAY	PERCUSSION	DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		LFO RATE		TREMULANT SHAPE		TREMULO DEPTH		
PITCH BEND		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH	
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN	NO SWEEP	FILTER OFF	OFF	LOW HIGH	OFF	OFF	OFF	OFF

All other controls as before.

Repeat a key. Vary time. Vary depth "flat" and "sharp."  
Pitch bend is effective in creating drums (note SU-1 and SU-2).



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR							
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED			
NORMAL		PERCUSSION		SEQUENCER SPEED	NORMAL		PERCUSSION					
ATTACK	DECAY	MODE	DECAY		ATTACK	DECAY	MODE	DECAY				
TREMULANT SHAPE		VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE		VIBRATO DEPTH	TREMOLO DEPTH				
PITCH BEND TIME DEPTH		DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME DEPTH		DEPTH	NOISE FREQUENCY				
PORTAMENTO		DYNAMIC FILTER						PORTAMENTO				
SPEED		SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF	OFF	OFF	LOW HIGH	OFF	OFF	OFF	OFF	

All other controls as before.

Experiment with vibrato and tremolo depths. Vary LFO rate. Change LFO waveshape.



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

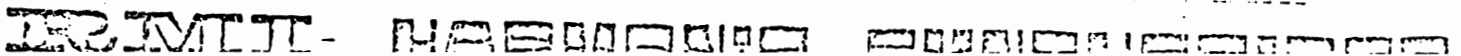
OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR				CLARINET				PULSE				FLUTE				REED				HARMONIC GENERATOR				SYNC				PULSE				FLUTE				REED			
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION		SEQUENCER									
ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	SPEED	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY										
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH											
PITCH BEND TIME		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND TIME		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND TIME		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND TIME		DEPTH		DEPTH											
PORTAMENTO				DYNAMIC FILTER																PORTAMENTO																			
SPEED				SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED																			
OFF				UP		DOWN		NO SWEEP		OFF		LOW		HIGH		OFF		OFF		OFF																			
				FILTER OFF																																			

Hit low "C" key.  
 Hold down Portamento touch bar (name plate).  
 While holding touch bar, hit top "B".  
 You will hear the right voice "chase" the left voice up the scale.





# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL ATTACK		PERCUSSION DECAY		MODE	SEQUENCER SPEED	NORMAL ATTACK		PERCUSSION DECAY		
DECAY		DECAY			PUSH ON-OFF	DECAY		DECAY		
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH				
OFF	OFF	OFF		OFF	OFF	OFF				
PITCH BEND TIME		DEPTH		DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME		DEPTH	
OFF	FLAT	SHARP	OFF			OFF	OFF	FLAT	SHARP	
PORTAMENTO SPEED	DYNAMIC FILTER							PORTAMENTO SPEED		
OFF	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	OFF
	UP	DOWN			OFF	LOW HIGH	OFF	OFF	OFF	
	NO SWEEP									
	FILTER OFF									

All other controls as before. Vary noise modulation depth.  
 Vary harmonic generator settings. Listen to single harmonics.  
 Bands of harmonics, highs and lows, etc. Vary the envelope generators.  
 Try short percussions.

There are two types of contrasts: Horizontal and Vertical.

Horizontal - Contrasts appearing in sequence of time.  
example: flute/viola/flute/viola, etc.

Vertical -- Contrasts appearing between each other at the same time.  
example:  $\frac{\text{flute}}{\text{viola}}$

A sequence of time occurs as music is performed. On paper, as music is performed, it moves from left to right - horizontal. When two or more musical lines are played at the same time, their arrangement on paper is vertical. Therefore, two musical lines (one above the other) can progress from left to right, creating both horizontal and vertical relations.

example:  $\frac{\text{flute/horn/flute/horn/flute/horn, etc.}}{\text{viola/bass/viola/bass/viola/bass, etc.}}$

#### HOW TO GENERATE CONTRASTS:

The contrasts shown above were between different instruments. On your synthesizer, you are given four areas in which to create contrasts:

WAVEFORM - AMPLITUDE - FREQUENCY - ENVELOPE

1. Waveform - mellow vs. rich / odd harmonics vs. even harmonics, etc.

Horizontal - rapid changes can be made with the Preset Voices or gradual changes can be made with the Harmonic Generator sliders.

Vertical -- create contrasting instruments on Left and Right Voices.

## A GENERAL APPROACH TO THE USE OF THE INSTRUMENT:

Your RMI Harmonic Synthesizer is actually two synthesizers in one case. We feel that more musical excitement is created when two things are happening at once. This is what you paid for when you bought the instrument, and now, you should take full advantage of its potential. Here's how:

Whenever possible, use both Voices at the same time. When you reach for the Left or Right Voice to set up a sound, think to yourself: "What differences are there between the Left and Right Voices, and how can I use these differences to my advantage?" Remember, the Left Voice has the Voltage-Controlled Dynamic Filter with foot pedal control. Therefore, any sounds that require filter work will go on the Left Voice. The Right Voice has a one-octave tuning range, therefore, any special tunings will be set in the Right Voice (see Tuning Chart).

When you have set sounds in Both Voices, their relationships will fall into two categories: "Doubling" or "Contrasting".

**Doubling** - Creating the same sound or instrument in Both Voices. Richness of sound is enhanced by subtleties in differences of "attack" and "release" parameters, and "beats" or "phasing" caused by slight differences in tuning between voices.

**Contrasting** - Creating different instruments in Two Voices. Interesting music is full of contrasts in many forms. The successful synthesist will be fully aware of all areas in which he can create contrasts. Of course, the trick is to apply these contrasts to the music being performed.



2. Amplitude - loud vs. soft.

Horizontal - use volume pedal for dynamic changes.

Vertical - use contrasting intensities on Left and Right Voices.

3. Frequency - high vs. low / pitched vs. non-pitched (noise-modulated).

Horizontal - change octaves with Octave Shifters, or add noise modulation.

Vertical - use contrasting octaves between Left and Right Voices, tune Right Voice to a different interval, such as a third, fifth, or sixth (see Tuning Chart), or add noise modulation to one voice.

4. Envelope - slow and long vs. fast and short.

Horizontal - change envelope generator settings while playing.

Vertical - use contrasting envelope generator settings for Left and Right Voices.

A NOTE OF IMPORTANCE:

Most synthesizer performers make few changes while playing, therefore their music becomes uninteresting. To make your music interesting, you should constantly be thinking about your next change while you are playing. Get in a habit of practicing your changes as an integral part of your music. Adding vibrato, tremolo, or dynamic changes are as critical as playing the correct note!!!

SOME HELPFUL HINTS:

(which may be obvious to you already)

Always have as many controls as possible set up in advance.

example: if you are using one of the Preset Waveforms, have the Harmonic Generator sliders set-up in advance for their next usage.

example: if you are not using the Sequencer, have its Speed set in advance for the next usage.

example: if you are using the Percussion Mode of the envelope generator, have the "attach" and "decay" controls of the Normal Mode set in advance for their next usage, and vice versa.

example: if you are not using Vibrato or Tremolo, have the LFO Rate set in advance at the proper speed and pre-select the sine wave on the Tremulant Shape controls. Since Vibrato is often used, it is helpful to leave the Vibrato Depth controls in the "minimum" position, but not "off". The pilot light will remain "on" but the function will not be in effect.

example: if noise modulation is not being used, the most common use will be "white" noise, therefore, have the Noise Frequency control set fully clockwise in advance.

example: unless portamento is desired on only one voice, it is wise to set both Portamento Speed controls somewhere around the 12:00 to 1:00 position, so that touching the bar will immediately bring both portamentos into action at an average speed.

example: if the Dynamic Filter is not being used, it should be set up for all the parameters of its next usage. Common usage would call for Speed and Depth to be set at 12:00, Q at 10:00, and Low Pass full. Filter pedal should be closed.

example: if only one voice is being used, all of the controls for the other voice should be set in advance for their next usage.

When using the RMI Harmonic Synthesizer for elaborate sequences with other instruments, keep in mind that the Volume Pedal completely stops the sound when in the fully-closed position. Therefore, complete set-ups can be arranged in advance without being heard, then, merely open the Volume Pedal to start the sequence. In the "sequential" mode, the Sequencer Pilot Lamp serves as a "down-beat" indicator, assuming the lowest note is on the down-beat, giving you a chance to synchronize yourself with the beat before listening to it. Remember, you can add accents on various beats with the Volume or Filter Pedals.

Well, that's it....

.....sorry, we've run out of ideas.

You are on your own from now on.

And to prove our faith in you, we have included some blank Set-Up sheets to jot down your ideas so that they won't be forgotten. You might even have some good ones.

In fact, if you come up with some real winners, don't keep them a secret. Instead, send them to RMI. We will be adding to this owner's manual from time to time and would like to include new ideas.

In an attempt to offer further inspiration to those hooked on synthesizers, we will offer workshops in "synthesis" and "performance" at various times at our factory studio in Macungie, Pennsylvania, and in <sup>other</sup> odd places around the country. We will figure out some method of informing you. Meanwhile, fill out your WARRANTY CARD so that we have a record of you. Thanx.

Should we have somehow inspired you to such heights of creativity that you run out of blank Set-Up Sheets, it is possible to order more from us. Just drop a card in the mail explaining your problem. Here's where we are:

ROCKY MOUNT INSTRUMENTS  
Macungie, Pa. 18062  
215-965-9801



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR							
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED			
NORMAL		MODE	PERCUSSION	SEQUENCER		NORMAL		MODE	PERCUSSION			
ATTACK	DECAY		DECAY	SPEED	ATTACK	DECAY	DECAY					
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	PUSH ON-OFF					
OFF	OFF	OFF		OFF	OFF	OFF						
PITCH BEND		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND				
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH			
OFF	FLAT SHARP	OFF	OFF	OFF	OFF	OFF	OFF	FLAT SHARP	FLAT SHARP			
PORTAMENTO		DYNAMIC FILTER						PORTAMENTO				
SPEED		SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED	
OFF		UP DOWN NO SWEEP FILTER OFF				OFF	LOW HIGH OFF	OFF	OFF	OFF	OFF	

SET-UP SHEET - TITLE \_\_\_\_\_

NUMBER \_\_\_\_\_

# RMI

April 21, 1975

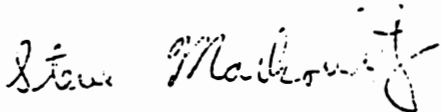
RMI Dealer:

The following important enclosures should be read carefully and kept as a reference by your service people:

1. The RMI Service Letter which explains all changes brought about by the improved Keyboard Computer.
2. The Basic Guide to Keyboard Computer Servicing which is the first document that should be reviewed before the instrument is serviced.
3. The Keyboard Computer Trouble Shooting Guide which should be completely followed on any service problem before RMI is contacted.
4. Technical Diagrams.

The above information will help keep service problems to a minimum.

Sincerely,



Steve Markowitz

SM:dw

August 6, 1975

TO ALL RMI HARMONIC SYNTHESIZER and KEYBOARD COMPUTER DEALERS:

ITEM #1 - EXTERNAL CLOCK INPUT FOR HARMONIC SYNTHESIZER SEQUENCER

In a desire to offer more reliable operation, which we like to associate with RMI, we will no longer be offering the option of the external sequencer clock modification either in the field or here at the factory.

ITEM #2 - KEYBOARD COMPUTER PITCH BENDER RANGE

In order to insure that the MOS Board operates in a frequency range that allows an adequate margin of safety on either side of its limits, we have decided to set the internal trims for the Pitch Bender controls so that the "Pedal Down" control will reach a "Perfect Fourth" instead of the original "Fifth". You will notice that interval of a fourth is only available in the "sharp" direction, instead of the original sharp or flat. Our reasoning for these changes should be obvious - we want to insure uniform results from unit to unit, and reliability for your customers. If you have any questions, please contact us. We will be glad to explain.



# RMI

## SERVICE LETTER

April 21, 1975

RE: Board Interchangeability Between Wooden and Molded  
Cased Keyboard Computers.

As of April 10, 1975, an improved version of the RMI Keyboard Computer was introduced. These improvements were: 1. A new more durable case made out of a high impact material, and 2. A modified Clock & Logic Board.

### CLOCK & LOGIC BOARD

Because of the Clock & Logic Board change, this unit now has vibrato depth control and also an improved frequency control on the pitch bender. This board, however, cannot be changed from a unit in the new type case, to one in a wooden case or vice versa.

### MOS BOARD

The configuration of boards in the Keyboard Computer has been changed in the new case. A change of mounting brackets on the MOS Board is necessitated. These brackets will have to be changed when putting a MOS Board from a wooden unit into a new one. It will not have to be done when inserting a board from the new case to that of an older one. These brackets will be sent to all dealers when they receive their initial new units.

## BASIC GUIDE TO KEYBOARD COMPUTER SERVICING

1. Always check A.C. input and Power Supply voltages first.
2. Never change more than one board at a time. If changing a board does not correct a problem, always put the original board back before changing the next one.
3. Always turn the instrument off before changing boards. Plugs or boards should never be inserted or disconnected while the instrument is "on" -- this includes audio connectors.
4. If changing a board seems to correct your problem, always re-insert the original board again just to help verify that the board is really defective. Sometimes the act of changing a board can correct a plug problem, and the board isn't actually at fault.
5. Each instrument has two audio channels. On the DAC board they are identified as Main and Flute. However, they shall be referred to as Channel 1 (Flute) and Channel 2 (Main). Keeping this in mind, isolate problems to one channel or the other by using the following criteria:
  - A. Use the Ensemble division only with the #2 switch.
  - B. With (A) above, all white voices will sound through Channel 1 and all yellow and red voices through Channel 2.
  - C. Problems affecting all voices in both channels are usually related to the Power Supply, MOS board or DAC board defects. Check power supply voltages. Clock board problems will affect the entire instrument, but problems in this board are rare. Static problems are usually related to MOS board malfunctions.
  - D. Problems affecting the voices in one channel only (all white voices or all yellow and red voices) can be MOS board, DAC board or your audio system, but not Stopboard Array, Keyboard Array or Clock board. The division of the two voice channels originates in the MOS board and continues through the DAC and audio system.
  - E. With the instrument turned off, reverse the two audio connectors on the DAC board. If the problem now stays in the same audio channel, the audio system is at fault and the Keyboard Computer is O.K. If, however, the problem switches to the opposite audio channel when you make the exchange, then the problem is in the Keyboard Computer.
  - F. Problems affecting stops, especially groups of stops in patterns such as 5 or 6 voices being either dead or on all the time are related to the Stopboard Array.

- G. Problems affecting keys, especially groups of keys in patterns of six adjacent keys on one keyboard or perhaps all C#'s and G's on the entire instrument (example) are usually Keyboard Array problems. Percussion, Tremulant and Transposer problems are also Keyboard Array related. As a matter of routine, always rotate the Transposer switch through all positions. If some positions are O.K., suspect the Keyboard Array. Make sure that the switch is not in between two positions.
- H. Problems affecting the Card Reader can be somewhat broken down as follows:
- (1) All alterables are malfunctioning. This is usually incorrect voltage on the reader lamps or a defective card reader unit. The lamp voltage adjustment is on the main power supply. Usually adjust for between 7 and 7-1/2 volts. A new reader can be temporarily tried by holding it in your hand and transferring the plug. This should be done, however, in subdued room light. CAUTION -- It is easy to put the plug on backwards. This does no harm, but your clue is that the lights are not lit.
  - (2) Alterables of both odd numbers or even numbers are malfunctioning. For example, Alterable I and III. This usually indicates a MOS board problem.
  - (3) Alterable problems which do not fit either of the above patterns -- suspect the Clock and Logic Board.

6. Suggestions for checking voltages:

There are three voltages involved, +5, -5 and -27. All should be close to the prescribed voltage. To check the +5 volts you put the black meter lead on the ground terminal and the red lead on the +5 volt terminal.

To check the minus voltages you put the red lead on ground and the black lead on the -5 and -27 volt terminals.



# KEYBOARD COMPUTER TROUBLE SHOOTING GUIDE

Problem	Cause	Action
Unit is dead	Power Supply Problem	Check all voltages. If one voltage is defective, remove wire on output terminal to determine if cause is internal or an external short. If internal, trouble shoot or return to factory for repairs. Use maximum ½A. S.B fuses.  If problems are external, turn instrument off and check wiring with ohmmeter.
	Defective on/off Switch	With A.C. plug disconnected, temporarily join red & black wires at A.C. barrier strip. See Drawing 012-0074
	Plug Loose on Circuit Board	Turn instrument off and check all plugs for tightness.
	Broken Common Ground to Voice Switches	Try a clip lead from Power Supply Ground to common on switches. See Drawing 012-0078
	MOS Board	Replace board.
	Clock Board	Replace. (Not as likely to cause dead condition as MOS or DAC board)
	DAC Board	Replace.
Dead deviation, such as all channel one or all channel two voices	Shorted Expression (vol. pedal) Cable	Temporarily disconnect expression cable plug
	Defective Audio Connector	See Drawing 012-0076
	MOS Board	Replace.
	DAC Board	Replace.
One dead key	Key contact adjustment or open diode on switch	Adjust contact or replace diode (50v..300m.a

Problem	Cause	Action
Patterns of dead keys	Broken Wire on Contact System	See Drawing 012-0077
	Keyboard Array	Replace.
	MOS Board	Replace.(Not as likely as keyboard array)
Dead or distorted notes	Defective Memory	Replace MOS board.
Some voices dead	MOS board	Replace.
	Defective Transistor on Stopboard Array	Replace stopboard array.
One voice dead	Defective Voice Switch	Replace switch.
	Stopboard Array	Replace stopboard array.
Dead bass stops	Defective Pedal Memory(If all pedal stops are dead, could be Keyboard Array)	Replace MOS board.
Tones continue to sound after keys are released if the percussion stop is used	Defective Sustain Oscillator	Replace Keyboard Array. For temporary fix, turn instrument off, P & S switches off, turn on again and avoid using these switches.
	Shorted SL Switch	Replace switch. Temporarily remove wire from switch.
Continuous sound as though keys are playing	Defective MOS Chip	Replace MOS board.
Additional unwanted pitches sound when keys are played in a certain range	Defective Transistor on Keyboard Array.	Replace Keyboard Array.
	Shorted Diode on Key Switch	Check each diode with ohmmeter.
	Check -5 V. to Stopboard Array	J6 pin 12.

Problem	Cause	Action
Tremolo on all the time	Defective Transistor on Keyboard Array	Replace Keyboard Array.
	MOS Board	Replace MOS board.
Key clicks or crackling sound	Improper Voltage adjustment	Especially check -5 and -27 V.
Hum	-27 V. Adjustment too High	Re-adjust to proper Level.
	Defective Filter P.S. Module	Check D.C. outputs for A.C. ripple. Should be pure D.C.
Keys play reverse pitches	Defective Transposer Circuit	Replace Keyboard Array.
	Defective Transposer Switch	Check all positions for broken wire.
Some stops on all the time	Defective Transistor on Stopboard Array	Replace Stopboard Array.
	Defective MOS Chip	Replace MOS board.
Any card in card reader produces Clarinet type tones	Card Reader Lamp Voltage too High	Re-adjust lamp voltage.
Card reader inoperative on alterables	Possible Defective MOS Chip	Replace MOS board.
Improper programming from card reader	Card Reader Lamp Voltage Incorrect	Adjust "C.R." on power supply.
	Card Reader Assembly	Replace.
	MOS Board	Replace.
	Clock and Card Reader Logic Board	Replace.



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR		CLARINET		PULSE		FLUTE		REED		HARMONIC GENERATOR		SYNC		PULSE		FLUTE		HORN		REED							
NORMAL				MODE				PERCUSSION				SEQUENCER				NORMAL				MODE				PERCUSSION			
ATTACK		DECAY		DECAY		DECAY		SPEED				ATTACK		DECAY		DECAY		DECAY		PUSH ON-OFF							
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE				TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		OFF											
PITCH BEND TIME		PITCH BEND DEPTH		DEPTH				NOISE FREQUENCY				PITCH BEND TIME		PITCH BEND DEPTH		OFF											
OFF		FLAT SHARP		OFF				OFF				OFF		FLAT SHARP		OFF											
PORTAMENTO		DYNAMIC FILTER																		PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED									
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF									

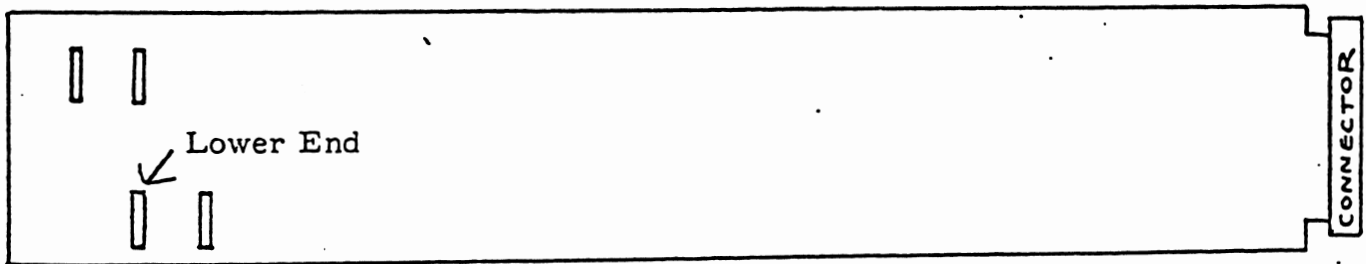
All controls NOT SHADED should be in MINIMUM or OFF Position.

Open volume pedal to FULL position and insert wedge in A#<sub>2</sub>.

Adjustment instructions are on the following page.

### Tuning Spread - Lower End (left voice)

Tuning Standard: "A" 440hz. The standard may take the form of a tuning fork, another "fixed" instrument, a strobe or other electronic tuning device, or a frequency counter.



(rear view of Harmonic Generator slider panel)

Procedure: Listening to both the standard and the synthesizer, or having attached the left channel output to a tuning device, adjust the "Lower End" trimpot until all "beats" stop.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

HARMONIC SHEPARCH					CLARINET					PULSE					FLUTE					REED					HARMONIC GENERATOR					SYNC					PULSE					FLUTE					HORN					REED																																																											
NORMAL										MODE										PERCUSSION										SEQUENCER										NORMAL										MODE										PERCUSSION																																																	
ATTACK					DECAY					ATTACK					DECAY					SPEED					ATTACK					DECAY					ATTACK					DECAY					ATTACK					DECAY																																																											
TREMULANT SHAPE										VIBRATO DEPTH										TREMULO DEPTH										LFO RATE										TREMULANT SHAPE										VIBRATO DEPTH										TREMULO DEPTH																																																	
PITCH BEND TIME										PITCH BEND DEPTH										DEPTH										NOISE FREQUENCY										DEPTH										PITCH BEND TIME										PITCH BEND DEPTH										DEPTH																																							
OFF										FLAT										SHARP										OFF										OFF										OFF										FLAT										SHARP										OFF										FLAT										SHARP									
PORTAMENTO										DYNAMIC FILTER										PORTAMENTO																																																																																									
SPEED					SWEEP					SPEED					DEPTH					TREMULANT					Q					LOW PASS					BAND PASS					HI PASS					SPEED																																																																
OFF					UP					DOWN					NO SWEEP					FILTER OFF					OFF					LOW					HIGH					OFF					OFF					OFF					OFF																																																						

All controls NOT SHADED should be in MINIMUM or OFF position.

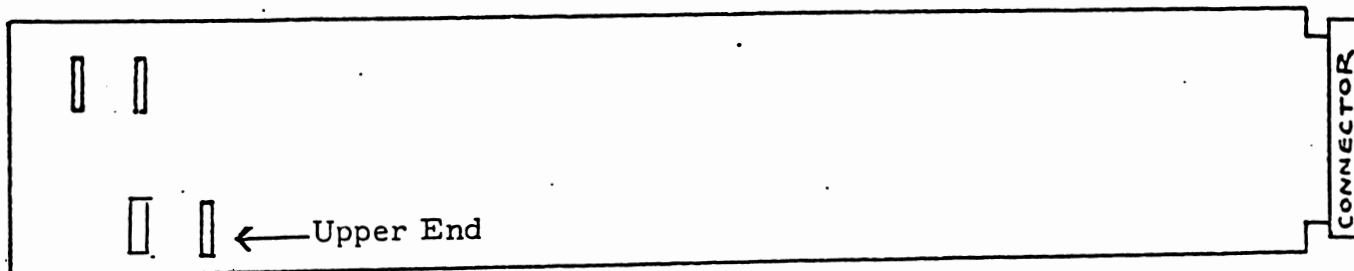
Open volume pedal to FULL position and insert wedge in G#<sub>2</sub>.

Adjustment instructions are on the following page.



### Tuning Spread - Upper End (left voice)

Tuning Standard: Same as before.



(rear view of Harmonic Generator slider panel)

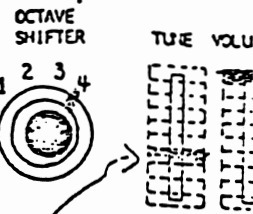
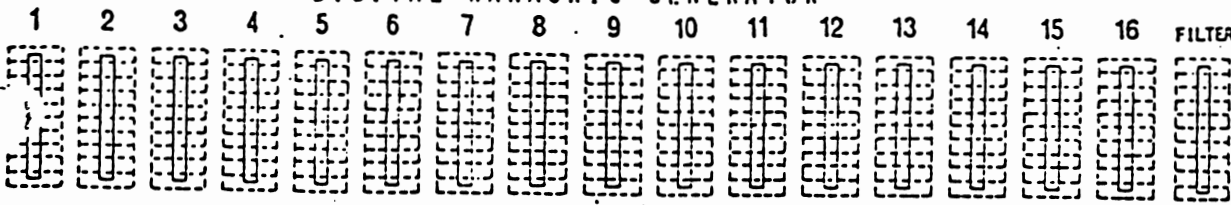
Procedure: Same as before, adjusting the "Upper End" trimpot for zero beat.

When finished, placing the tuning slider at the arrow mark on the panel should produce "A" 440 tuning. Moving the slider to its upper extremity should give a half-step rise in pitch. Moving the slider to its lower extremity should give a half-step fall in pitch.

Note: Changes in the scale tuning can cause a change in the range covered by the tuning slider.

# LEFT

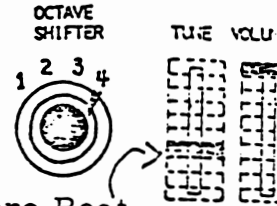
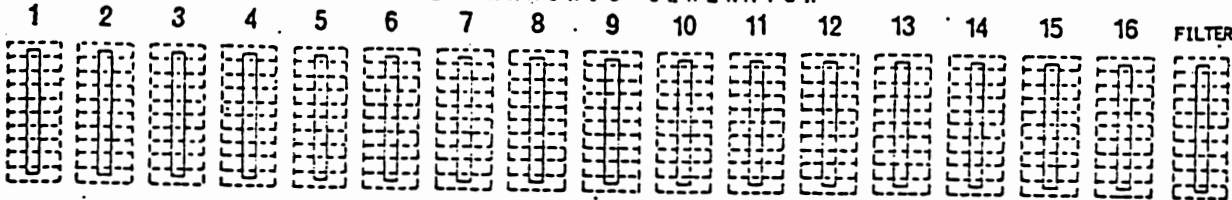
## DIGITAL HARMONIC GENERATOR



Set at panel mark

# RIGHT

## DIGITAL HARMONIC GENERATOR



Zero Beat

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	REED		CLARINET	PULSE	FLUTE	REED		
NORMAL		MODE		SEQUENCER		NORMAL		MODE		
ATTACK	DECAY	DECAY	DECAY	SPEED	ATTACK	DECAY	DECAY	DECAY		
PUSH ON-OFF				PUSH ON-OFF						
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH
OFF	OFF	OFF		OFF	OFF	OFF		OFF	OFF	OFF
PITCH BEND		NOISE FREQUENCY		PITCH BEND		NOISE FREQUENCY		PITCH BEND		
TIME	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH	TIME	DEPTH	
OFF	FLAT SHARP	OFF		OFF	FLAT SHARP	OFF		OFF	FLAT SHARP	
PORTAMENTO		DYNAMIC FILTER						PORTAMENTO		
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN			OFF	LOW HIGH	OFF	OFF	OFF	OFF
	NO SWEEP									
	FILTER OFF									

All controls NOT SHADED should be in MINIMUM or OFF position.

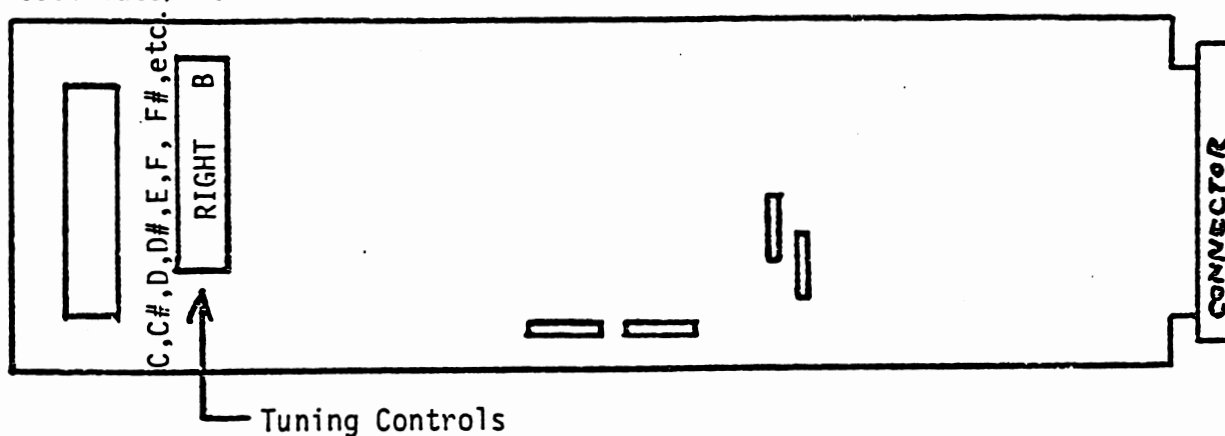
Open pedal to FULL position and insert wedge in C<sub>2</sub>.

Adjustment instructions are on the following page.

## Scale Tuning - Right Voice

Tuning Standard: Left Voice (after it has been tuned)

Oscillator Board



Procedure: Start with C2 key, zero beat Right Voice with Left Voice.  
Continue thru C#2, D2, D#2, etc. up to B2.

Note: Be sure Tuning Slider for Right Voice has been tuned to the Left Voice.



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR					SYNC		PULSE		FLUTE		REED			
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION		ATTACK		DECAY			
ATTACK	DECAY					SPEED			ATTACK	DECAY									
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		OFF		OFF			
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		DEPTH		OFF		OFF			
TIME	DEPTH	FLAT	SHARP	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	FLAT	SHARP	DEPTH	DEPTH	FLAT	SHARP		
PORTAMENTO		DYNAMIC FILTER												PORTAMENTO					
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF	UP	DOWN	NO SWEEP	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	LOW	HIGH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	FILTER OFF																		

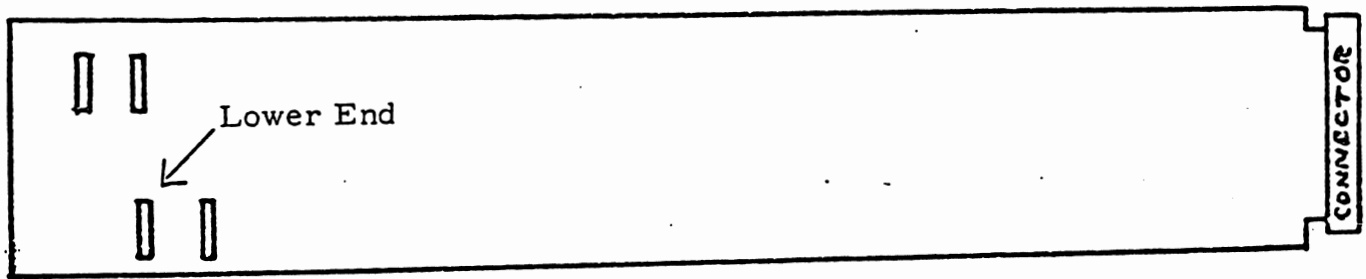
All controls NOT SHADED should be in MINIMUM or OFF position.

Open pedal to FULL position and insert wedge in D#3.

Adjustment instructions are on the following page.

### Tuning Spread - Lower End (right voice)

Tuning Standard: Same as before. "A" 440 hz.



(rear view of Harmonic Generator slider panel)

Procedure: Same as before, adjusting "Lower End" trimpot for zero beat.

When finished, placing the tuning slider at the arrow mark on the panel should produce "A" 440 tuning. Moving the slider to its upper extremity should give a diminished fifth rise in pitch. Moving the slider to its lower extremity should give a diminished fifth fall in pitch.

Note: Changes in the scale tuning can cause a change in the range covered by the tuning slider.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	CLARINET	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		PERCUSSION	SEQUENCER	NORMAL		MODE		PERCUSSION
ATTACK	DECAY		DECAY		SPEED	ATTACK	DECAY		DECAY	
					PUSH ON-OFF					
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH				
	OFF	OFF			OFF	OFF				
PITCH BEND		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		
TIME	DEPTH	DEPTH		DEPTH		TIME	DEPTH	DEPTH		
OFF	FLAT SHARP	OFF		OFF		OFF	FLAT SHARP	OFF		
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN			OFF	LOW HIGH	OFF	OFF	OFF	OFF
	NO SWEEP									
	FILTER OFF									

All controls NOT SHADED should be in MINIMUM or OFF position.

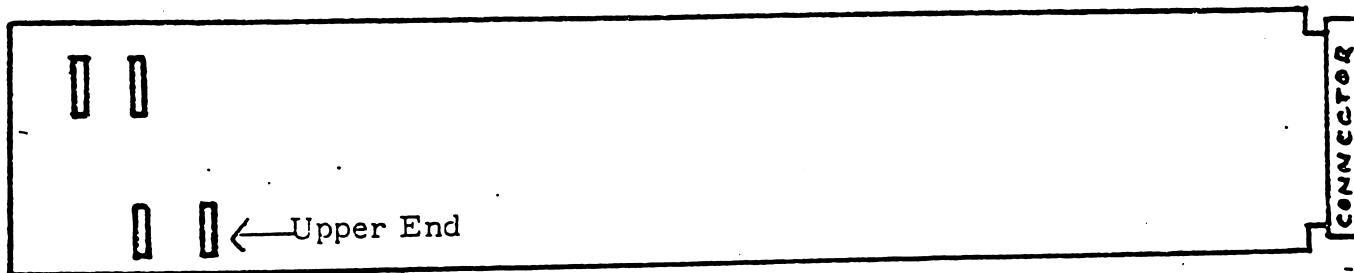
Open volume pedal to FULL position and insert wedge in D#<sub>2</sub>.

Adjustment instructions are on the following page.



Tuning Spread - Upper End (right voice)

Tuning Standard: Same as before. "A" 440 hz.



(rear view of Harmonic Generator slider panel)

Procedure: Listening to both the synthesizer and the standard, or having attached the output of the Right Voice to a tuning device, adjust the "Upper End" trimpot until all "beats" stop.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR						
CLARINET	PULSE	FLUTE	HORN		SYNC	PULSE	FLUTE	HORN	REED		
NORMAL		MODE		PERCUSSION	SEQUENCER	NORMAL		MODE		PERCUSSION	
ATTACK	DECAY		DECAY		SPEED	ATTACK	DECAY		DECAY		
					PUSH ON-OFF						
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	
	OFF	OFF			OFF	OFF			OFF	OFF	
PITCH BEND		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		PITCH BEND	
TIME	DEPTH	DEPTH		DEPTH		DEPTH	TIME	DEPTH	DEPTH	TIME	DEPTH
OFF	FLAT SHARP	OFF		OFF		OFF	OFF	FLAT SHARP	OFF	FLAT SHARP	OFF
PORTAMENTO	DYNAMIC FILTER									PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED	
OFF	UP	DOWN			OFF	LOW HIGH	OFF	OFF	OFF	OFF	
	NO SWEEP										
	FILTER OFF										

All controls NOT SHADED should be in MINIMUM or OFF position.

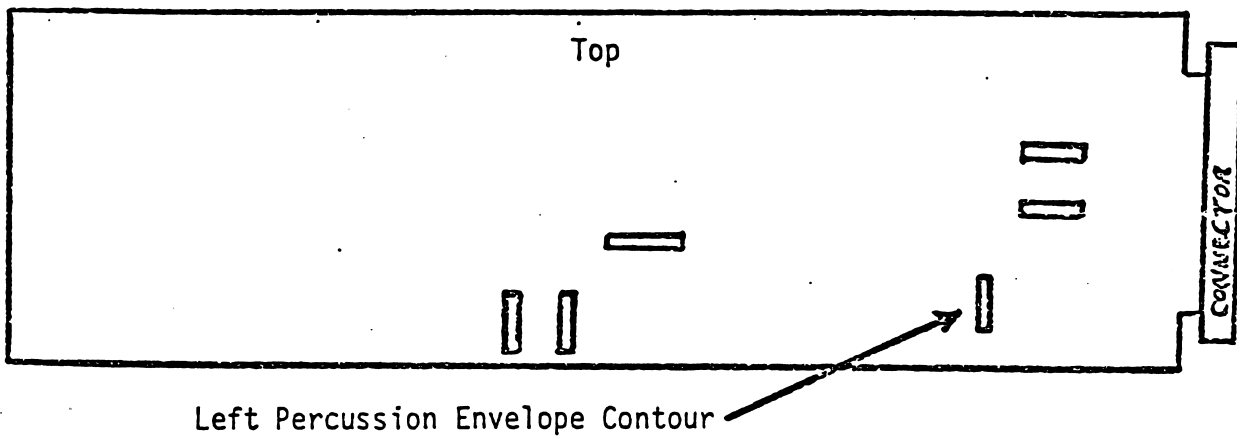
Open volume pedal to FULL position and REPEAT A KEY.

Adjustment instructions are on the following page.

## Left Percussion Envelope Contour

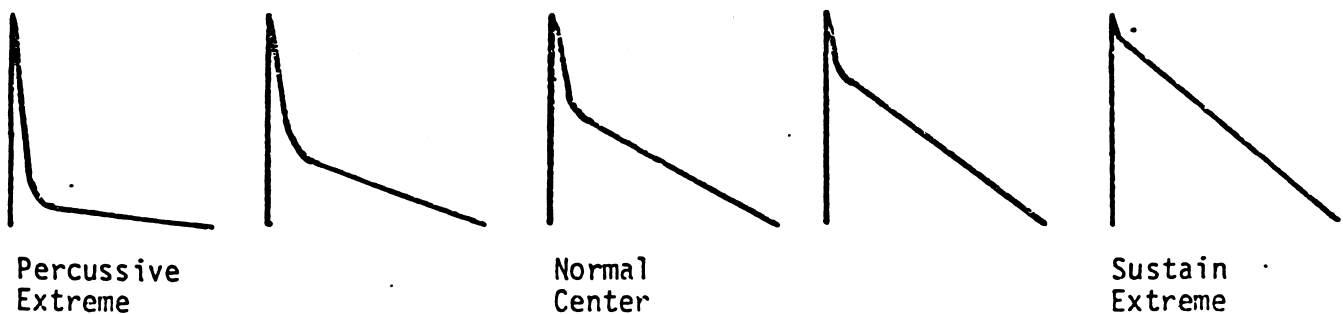
NOTE: Any adjustments made here will require a RE-ADJUSTMENT of the Left Percussion Envelope Generator Cut-off (See Procedure)

Keyboard Scanner



Normal setting is in the "center" position. Deviations from this setting are subject to personal taste.

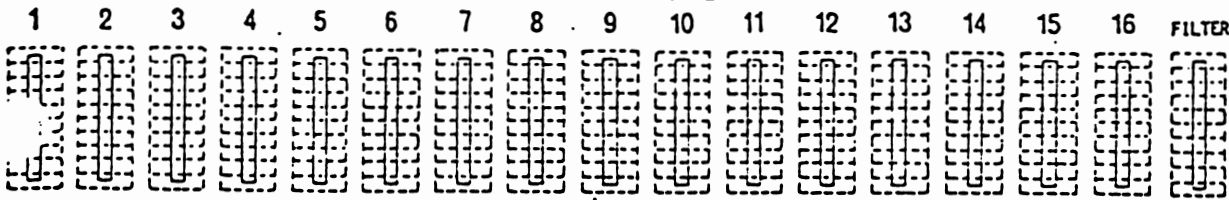
Procedure: Adjust contour to taste while repeating key and listening to decay contour.



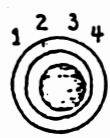


# LEFT

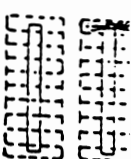
## DIGITAL HARMONIC GENERATOR



OCTAVE SHIFTER

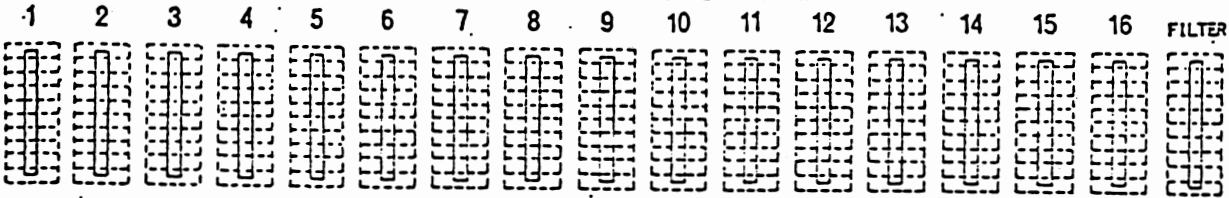


TUNE VOLUME

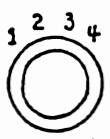


# RIGHT

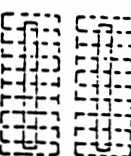
## DIGITAL HARMONIC GENERATOR



OCTAVE SHIFTER



TUNE VOLUME



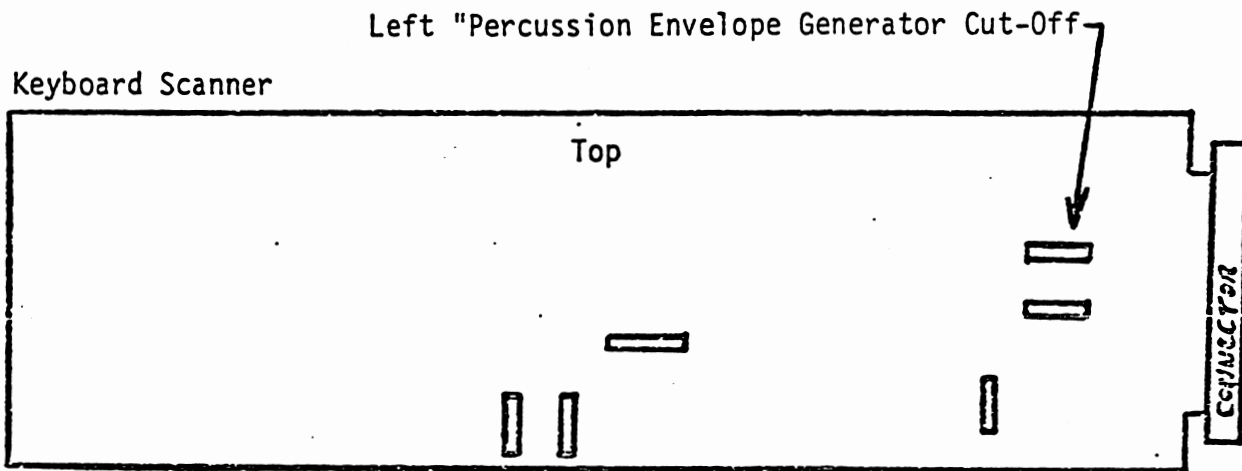
HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN		SYNC	PULSE	FLUTE	HORN	FEED
NORMAL MODE		PERCUSSION MODE		SEQUENCER SPEED	NORMAL MODE		PERCUSSION MODE		
ATTACK	DECAY	DECAY	DECAY	PUSH ON-OFF	ATTACK	DECAY	DECAY	DECAY	
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	TREMOLO DEPTH
OFF	OFF	OFF		OFF	OFF	OFF		OFF	OFF
PITCH BEND TIME		PITCH BEND DEPTH		NOISE FREQUENCY DEPTH		PITCH BEND TIME		PITCH BEND DEPTH	
OFF	FLAT SHARP	OFF		OFF		OFF		OFF	FLAT SHARP
PORTAMENTO SPEED	DYNAMIC FILTER							PORTAMENTO SPEED	
OFF	SWEEP UP DOWN NO SWEEP FILTER OFF		SPEED	DEPTH	TREMULANT	Q LOW HIGH	LOW PASS BAND PASS HI PASS	OFF	
					OFF		OFF		

All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position. DO NOT hold any keys.

Adjustment instructions are on the following page.

Left "Percussion" Envelope Generator Cut-Off:



Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR						
CLARINET	PULSE	FLUTE	HORN		SYNC	PULSE	FLUTE	HORN	FEED		
NORMAL		MODE		PERCUSSION	SEQUENCER	NORMAL		MODE		PERCUSSION	
ATTACK	DECAY			DECAY	SPEED	ATTACK	DECAY			DECAY	
					PUSH ON-OFF						
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH					
	OFF	OFF			OFF	OFF					
PITCH BEND		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		DEPTH	
TIME	DEPTH	DEPTH						TIME	DEPTH	DEPTH	
OFF	FLAT SHARP	OFF						OFF	FLAT SHARP	OFF	
PORTAMENTO	DYNAMIC FILTER									PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED	
OFF	UP	DOWN			OFF	LOW HIGH	OFF	OFF	OFF	OFF	
	NO SWEEP	FILTER OFF									

All controls NOT SHADED should be in MINIMUM or OFF position.

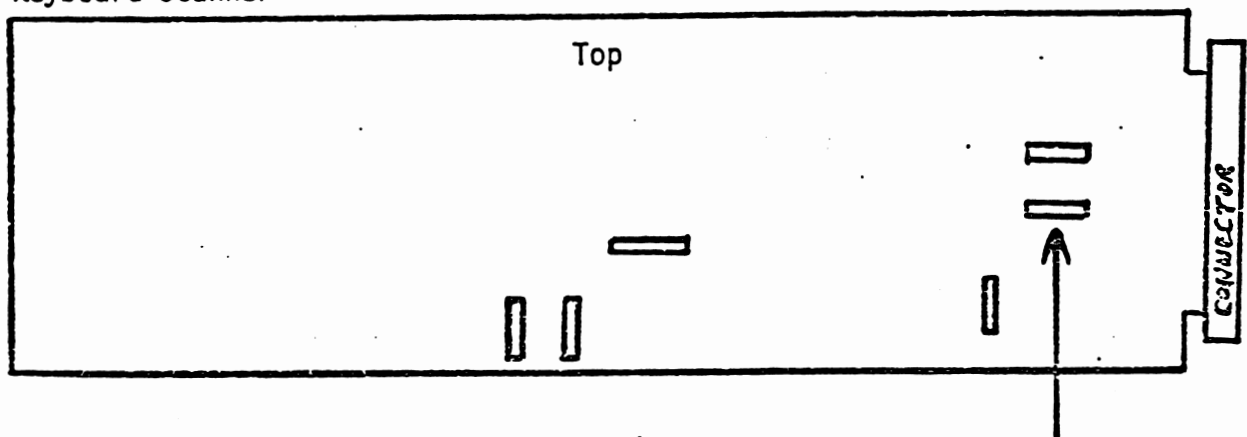
Open volume pedal to FULL position. DO NOT hold any keys.

Adjustment instructions are on the following page.



Left "Normal" Envelope Generator Cut-Off:

Keyboard Scanner



Left "Normal" Envelope Generator Cut-Off

Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

HARMONIC SEPARATOR					CLARINET					PULSE					FLUTE					HORN					REED					HARMONIC GENERATOR					SYNC					PULSE					FLUTE					HORN					GLOBE														
NORMAL										MODE										PERCUSSION										SEQUENCER										NORMAL										MODE										PERCUSSION									
ATTACK					DECAY					ATTACK					DECAY					SPEED					ATTACK					DECAY					ATTACK					DECAY					ATTACK					DECAY																			
TREMULANT SHAPE					VIBRATO DEPTH					TREMULO DEPTH					LFO RATE					TREMULANT SHAPE					VIBRATO DEPTH					TREMULO DEPTH					PITCH BEND TIME					PITCH BEND DEPTH																													
OFF					OFF					OFF					OFF					OFF					OFF					OFF					OFF					OFF					OFF																								
OFF					FLAT					SHARP					OFF					NOISE FREQUENCY					OFF					OFF					OFF					FLAT					SHARP																								
PORTAMENTO										DYNAMIC FILTER										PORTAMENTO																																																	
SPEED					SWEEP					SPEED					DEPTH					TREMULANT					Q					LOW PASS					BAND PASS					HI PASS					SPEED																								
OFF					UP					DOWN					NO SWEEP					OFF					LOW					HIGH					OFF					OFF					OFF					OFF																			
OFF					FILTER OFF					OFF					OFF					OFF					OFF					OFF					OFF					OFF					OFF																								

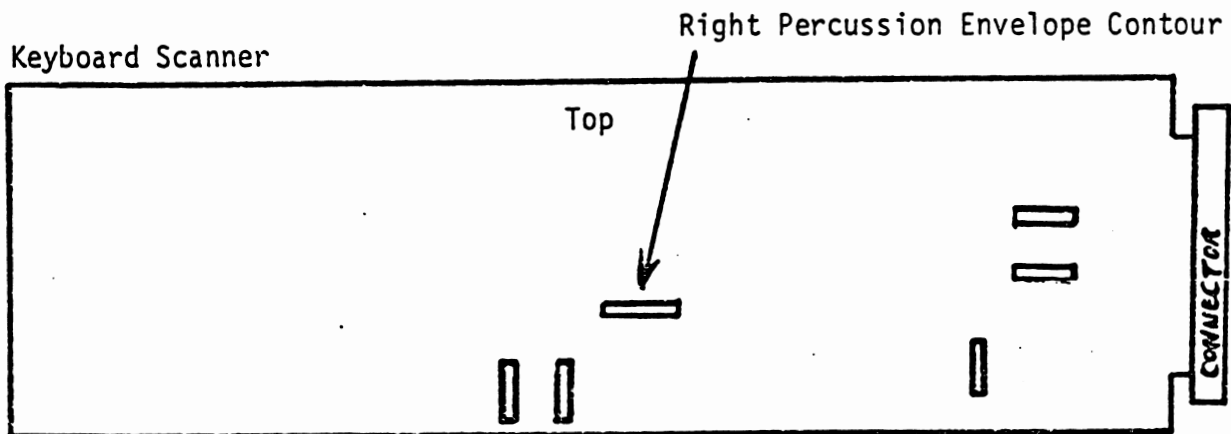
All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to "FULL" position and REPEAT A KEY.

Adjustment instructions are on the following page.

## Right Percussion Envelope Contour

NOTE: Any adjustments made here will require a RE-ADJUSTMENT of the Right Percussion Envelope Generator Cut-Off (See Procedure).



Procedure: Same as for Left Voice.



LEFT

DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

RIGHT

DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN		
NORMAL		MODE		SEQUENCER	NORMAL		MODE			
ATTACK	DECAY	DECAY	DECAY	SPEED	ATTACK	DECAY	DECAY	DECAY		
				PUSH ON-OFF						
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	TREMOLO DEPTH	
	OFF	OFF			OFF	OFF			OFF	
PITCH BEND		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	
OFF	FLAT SHARP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	FLAT SHARP	
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN	NO SWEEP	DEPTH	OFF	LOW HIGH	OFF	OFF	OFF	OFF
			FILTER OFF							

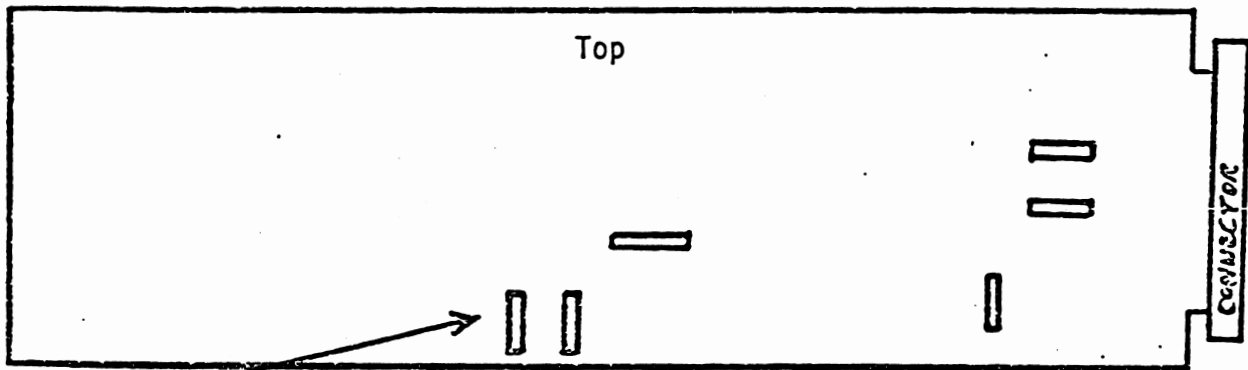
All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position. DO NOT hold any keys.

Adjustment instructions are on the following page.

Right "Percussion" Envelope Generator Cut-Off:

Keyboard Scanner

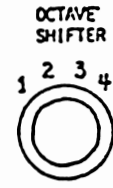
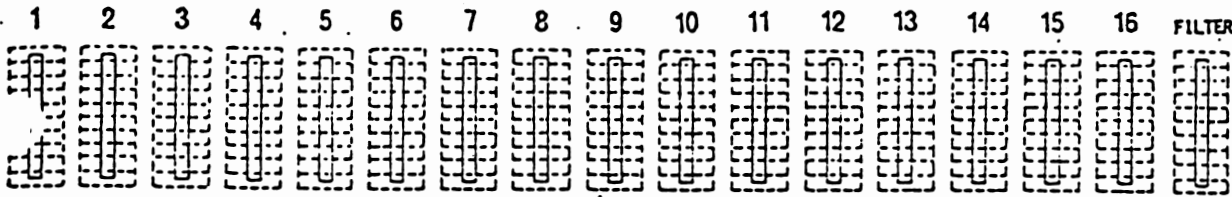


Right "Percussion" Envelope Generator Cut-Off

Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.

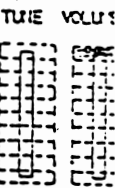
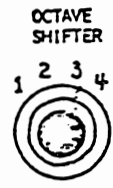
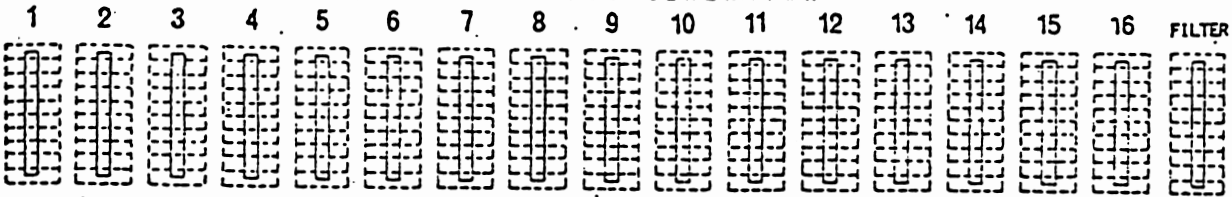
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN		
NORMAL ATTACK		MODE PERCUSSION		SEQUENCER SPEED	NORMAL ATTACK		MODE PERCUSSION			
DECAY		DECAY		PUSH ON-OFF	DECAY		DECAY			
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	TREMOLO DEPTH	
OFF	OFF	OFF		OFF	OFF	OFF		OFF	OFF	
PITCH BEND TIME		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		
OFF	FLAT	SHARP	OFF	OFF	OFF	FLAT	SHARP	OFF	OFF	
PORTAMENTO SPEED	DYNAMIC FILTER							PORTAMENTO SPEED		
OFF	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	OFF
	UP	DOWN	OFF	OFF	OFF	LOW	HIGH	OFF	OFF	OFF
	NO SWEEP		FILTER OFF							

All controls NOT SHADED should be in the MINIMUM or OFF position.

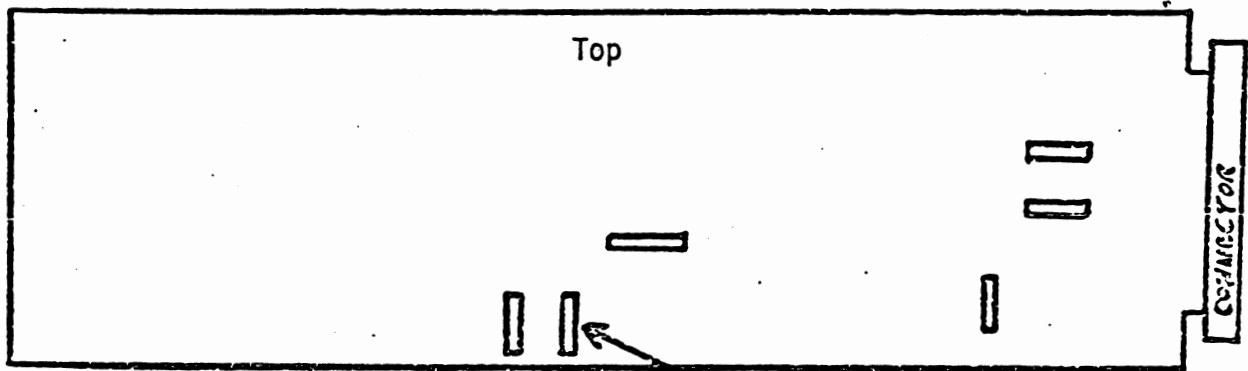
Open volume pedal to FULL position. DO NOT hold any keys.

Adjustment instructions are on the following page.



Right "Normal" Envelope Generator Cut-Off:

Keyboard Scanner

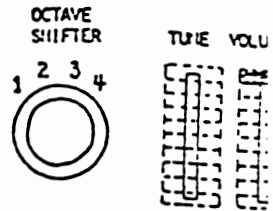
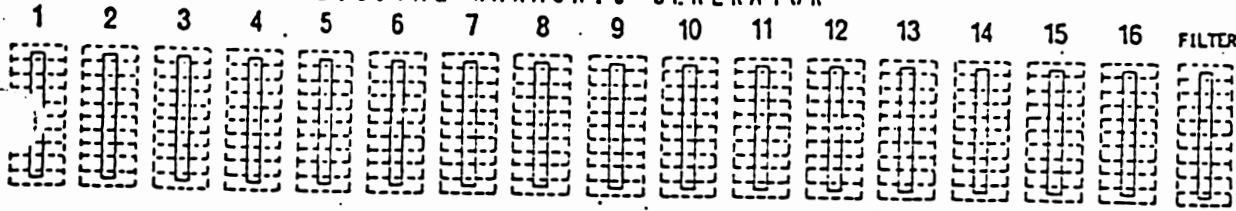


Right "Normal" Envelope Generator Cut-Off

Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.

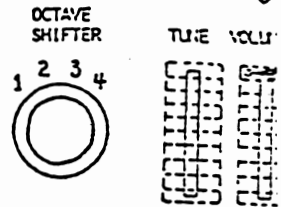
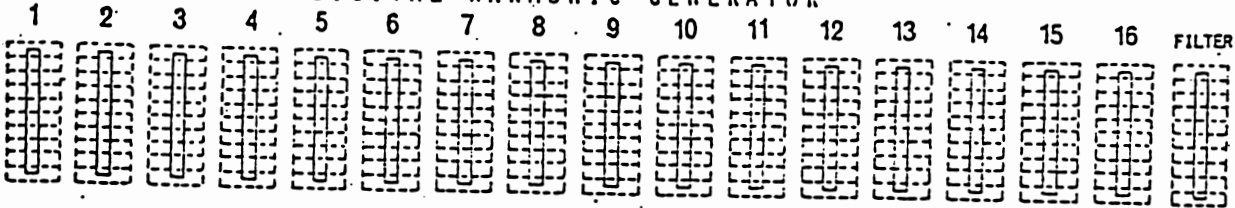
LEFT

DIGITAL HARMONIC GENERATOR



RIGHT

DIGITAL HARMONIC GENERATOR



Alternate

HARMONIC GENERATOR					HARMONIC GENERATOR												
CLARINET	PULSE	FLUTE	HORN	REED	CLARINET	PULSE	FLUTE	HORN	REED								
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION					
ATTACK	DECAY	ATTACK	DECAY	SPEED	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY	ATTACK	DECAY					
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH					
PITCH BEND TIME		PITCH BEND DEPTH		NOISE FREQUENCY		NOISE FREQUENCY		PITCH BEND TIME		PITCH BEND DEPTH		PITCH BEND DEPTH					
PORTAMENTO SPEED		DYNAMIC FILTER SWEEP		DYNAMIC FILTER SPEED		DYNAMIC FILTER DEPTH		DYNAMIC FILTER Q		DYNAMIC FILTER LOW PASS		DYNAMIC FILTER BAND PASS		DYNAMIC FILTER HI PASS		PORTAMENTO SPEED	

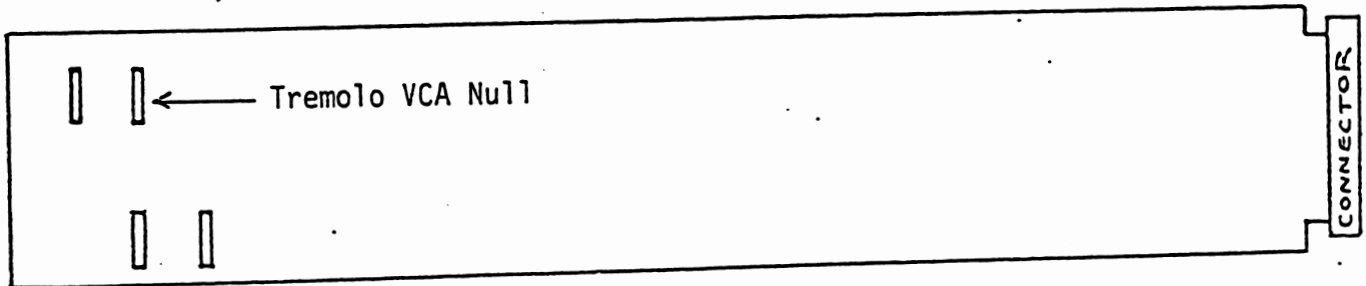
All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position and insert wedge in key.

Adjustment instructions are on the following page.

Tremolo VCA Null:

note: Left and Right boards are identical. Repeat procedure for each board, raising corresponding Volume slider. Be sure you are listening to only ONE SIDE at a time.



(rear view of Harmonic Generator slider panel)

Procedure: Adjust blue trimpot "Tremolo VCA Null" until "thumps" or "clicks" are minimized.



# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

Alternate

OCTAVE SHIFTER 1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR					HARMONIC GENERATOR									
CLARINET					FLUTE					HORN					REED				
PULSE					FLUTE					HORN					REED				
MODE					SEQUENCER					MODE					SEQUENCER				
ATTACK					SPEED					ATTACK					SPEED				
DECAY					PUSH ON-OFF					DECAY					PUSH ON-OFF				
TREMULANT SHAPE					LFO RATE					TREMULANT SHAPE					LFO RATE				
VIBRATO DEPTH					TREMULANT SHAPE					VIBRATO DEPTH					TREMULANT SHAPE				
OFF					OFF					OFF					OFF				
PITCH BEND					NOISE FREQUENCY					PITCH BEND					NOISE FREQUENCY				
TIME					DEPTH					TIME					DEPTH				
OFF					FLAT SHARP					OFF					FLAT SHARP				
PORTAMENTO					DYNAMIC FILTER										PORTAMENTO				
SPEED					SWEEP					SPEED					SPEED				
OFF					UP DOWN NO SWEEP FILTER OFF					DEPTH					TREMULANT				
					LOW HIGH OFF					LOW PASS					BAND PASS				
					OFF					OFF					OFF				

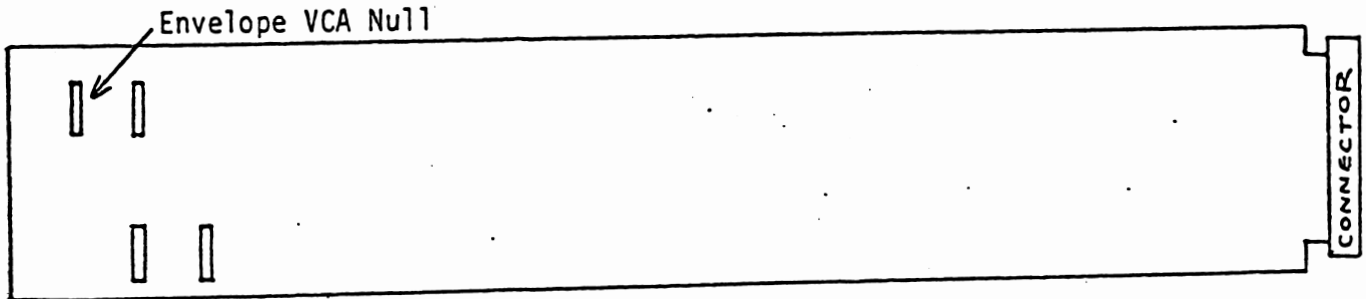
All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume to FULL position and insert wedge in key.

Adjustment instructions are on the following page.

### Envelope VCA Null:

Note: Tremolo VCA Null procedure should be performed BEFORE performing the Envelope VCA Null procedure.



(rear view of Harmonic Generator slider panel)

Procedure: Adjust blue trimpot "Envelope VCA Null" until "thumps" or "clicks" are minimized.

Left and Right boards are identical. Repeat procedure for each board, raising corresponding Volume slider. Be sure you are listening to only ONE SIDE at a time.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

Alternate

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

WINDIC REPEATC		CLARINET		PULSE		FLUTE		HORN		WINDIC GENERATOR		SYNC		PULSE		FLUTE		HORN											
NORMAL				MODE				PERCUSSION				SEQUENCER				NORMAL				MODE				PERCUSSION					
ATTACK		DECAY		ATTACK		DECAY		ATTACK		DECAY		SPEED		ATTACK		DECAY		ATTACK		DECAY		ATTACK		DECAY					
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH			
PITCH BEND TIME		PITCH BEND DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND TIME		PITCH BEND DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND TIME		PITCH BEND DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND TIME		PITCH BEND DEPTH		DEPTH	
PORTAMENTO SPEED		SWEEP UP		SWEEP DOWN		NO SWEEP		FILTER OFF		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		PORTAMENTO SPEED		OFF		OFF	

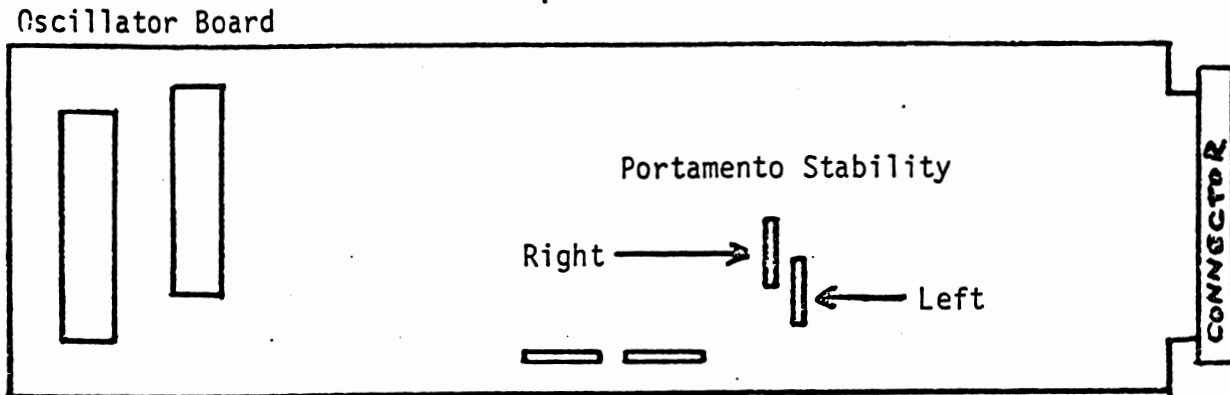
All controls NOT SHADED should be in MINIMUM or OFF position.

Open pedal to FULL position and insert wedge in C<sub>2</sub>.

Adjustment instructions are on the following page.



## Portamento Stability - Left / Right



Raise corresponding Volume Slider (left/right) one at a time.  
Be sure that you are hearing only ONE VOICE at a time.

Procedure: Turn control (while holding down Touch Bar) until  
noise appears.  
Turn back very slowly until noise stops.  
Turn back 1/8 turn additional.

Repeat procedure for other voice.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

Alternate

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

HARMONIC GENERATOR CLARINET PULSE FLUTE HORN					HARMONIC GENERATOR SYNC PULSE FLUTE HORN													
NORMAL MODE PERCUSSION ATTACK DECAY				SEQUENCER SPEED PUSH ON-OFF		NORMAL MODE PERCUSSION ATTACK DECAY												
TREMULANT SHAPE		VIBRATO DEPTH OFF		TREMOLO DEPTH OFF		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH OFF		TREMOLO DEPTH OFF						
PITCH BEND TIME DEPTH OFF FLAT SHARP		DEPTH OFF		NOISE FREQUENCY DEPTH OFF		PITCH BEND TIME DEPTH OFF FLAT SHARP		PORTAMENTO SPEED OFF		DYNAMIC FILTER SWEEP UP DOWN NO SWEEP FILTER OFF			SPEED DEPTH TREMULANT Q OFF LOW HIGH OFF		LOW PASS BAND PASS HI PASS OFF OFF OFF		PORTAMENTO SPEED OFF	

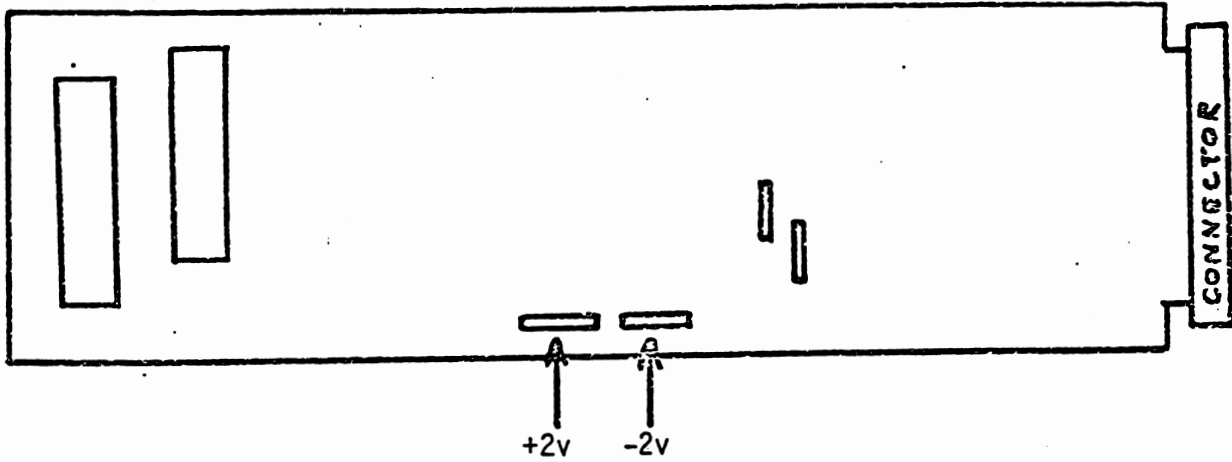
All controls NOT SHADED should be in MINIMUM or OFF position.

Open pedal to FULL position and insert wedge in C<sub>2</sub>.

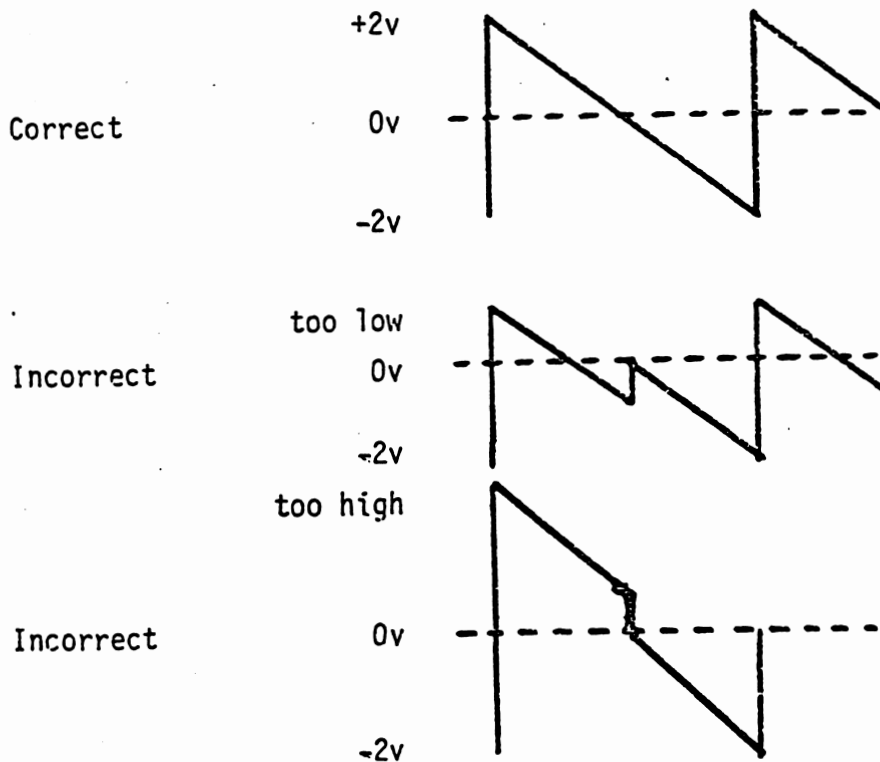
Adjustment instructions are on the following page.

### LFO Ramp Linearity - Left/Right (common to both voices)

Oscillator Board



Procedure: Adjust +2v and -2v for smooth fall in pitch.





# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

### OCTAVE SHIFTER

1 2 3 4

### TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

### OCTAVE SHIFTER

1 2 3 4

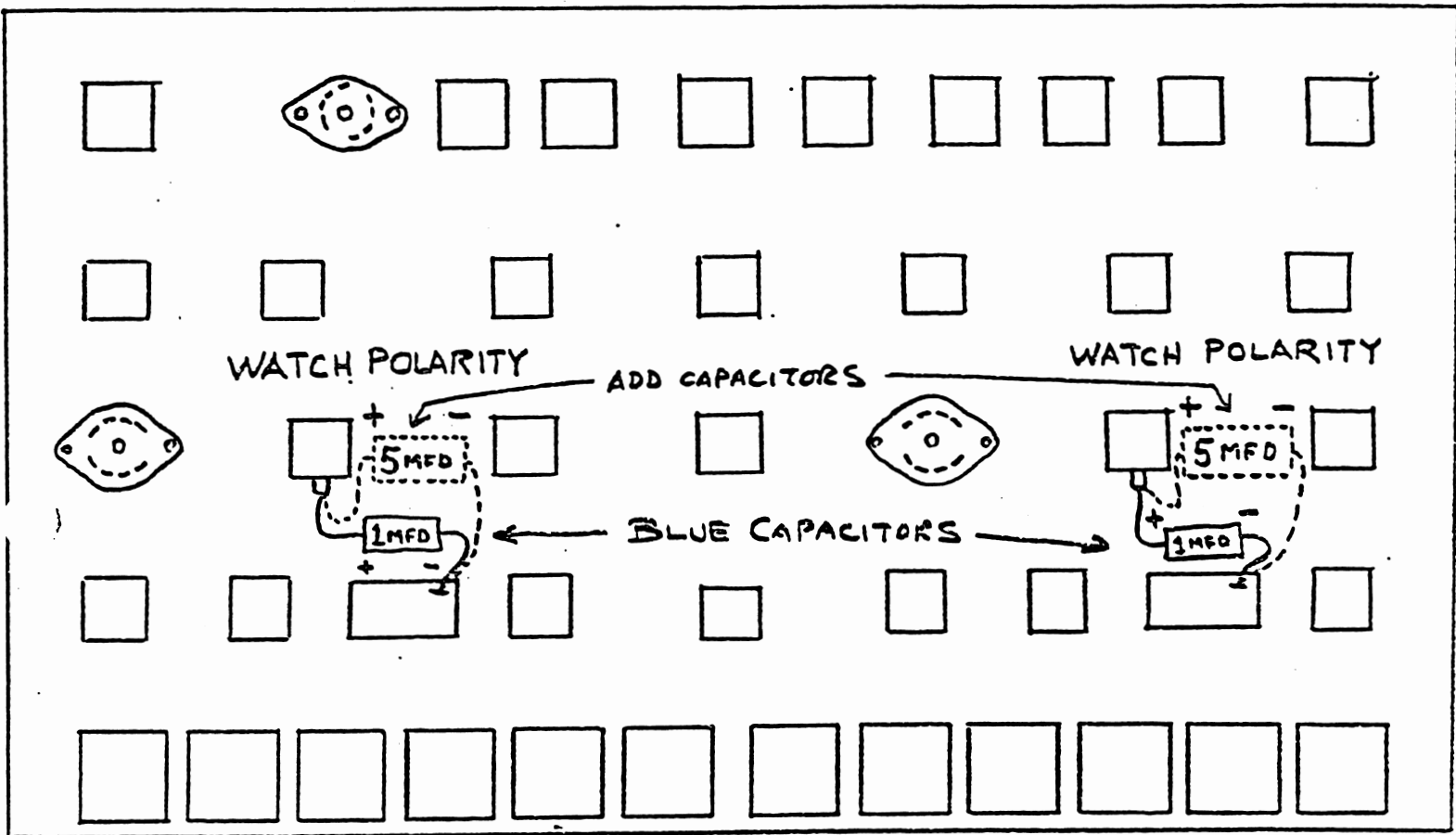
### TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR							
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED			
NORMAL ATTACK DECAY		PERCUSSION MODE DECAY		SEQUENCER SPEED		NORMAL ATTACK DECAY		PERCUSSION MODE DECAY				
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	PITCH BEND TIME	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	DEPTH
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	FLAT SHARP	OFF	FLAT SHARP	OFF	FLAT SHARP
PORTAMENTO SPEED			DYNAMIC FILTER							PORTAMENTO SPEED		
OFF	SWEEP UP DOWN NO SWEEP FILTER OFF		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	OFF	OFF	OFF
OFF	NO SWEEP	OFF	OFF	OFF	LOW HIGH OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

# RMI

August 16, 1974

SERVICE NOTE: Harmonic Synthesizer  
Percussion attack time modification (if desired)



End Panel - Bottom View

If a slower rise time is desired on the Percussion Envelopes, the following modification can be performed without voiding the warranty:

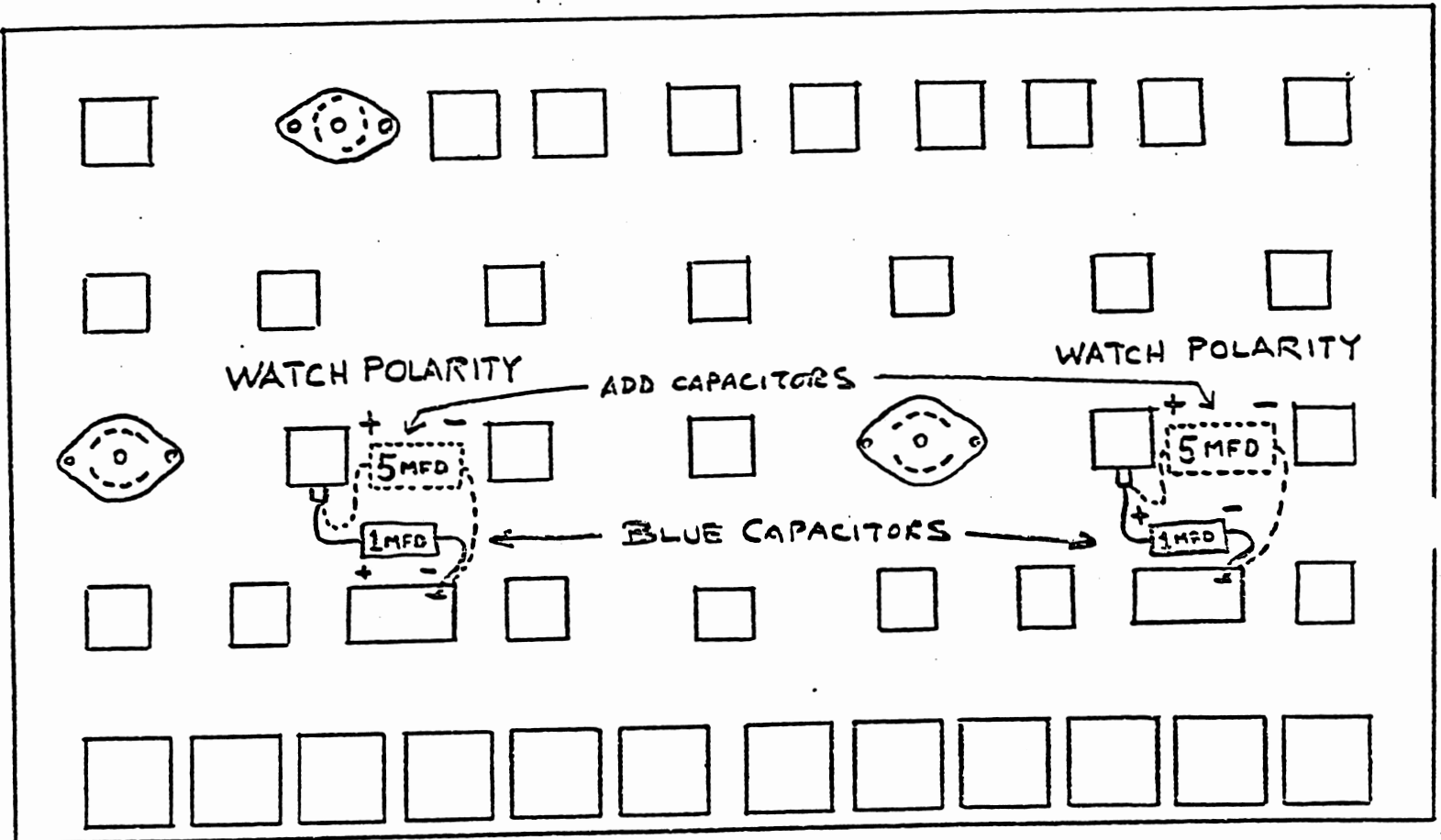
Place a 5 mfd electrolytic capacitor in parallel with the existing 1 mfd (blue) capacitor, as illustrated.

WATCH THE POLARITY!

# RMI

August 16, 1974

SERVICE NOTE: Harmonic Synthesizer  
Percussion attack time modification (if desired)



End Panel - Bottom View

If a slower rise time is desired on the Percussion Envelopes, the following modification can be performed without voiding the warranty:

Place a 5 mfd electrolytic capacitor in parallel with the existing 1 mfd (blue) capacitor, as illustrated.

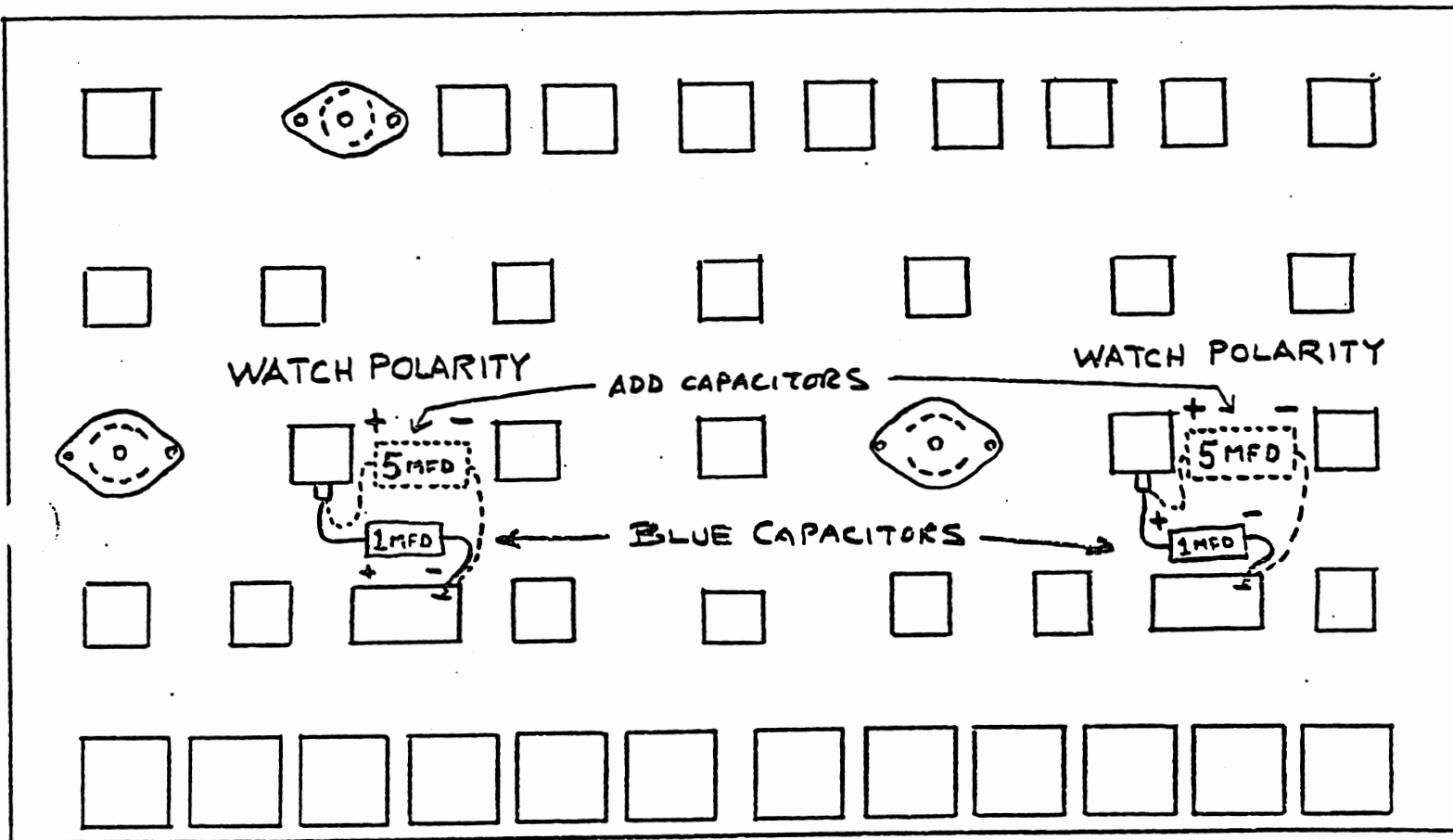
WATCH THE POLARITY!



# RMI

August 16, 1974

SERVICE NOTE: Harmonic Synthesizer  
Percussion attack time modification (if desired)



End Panel - Bottom View

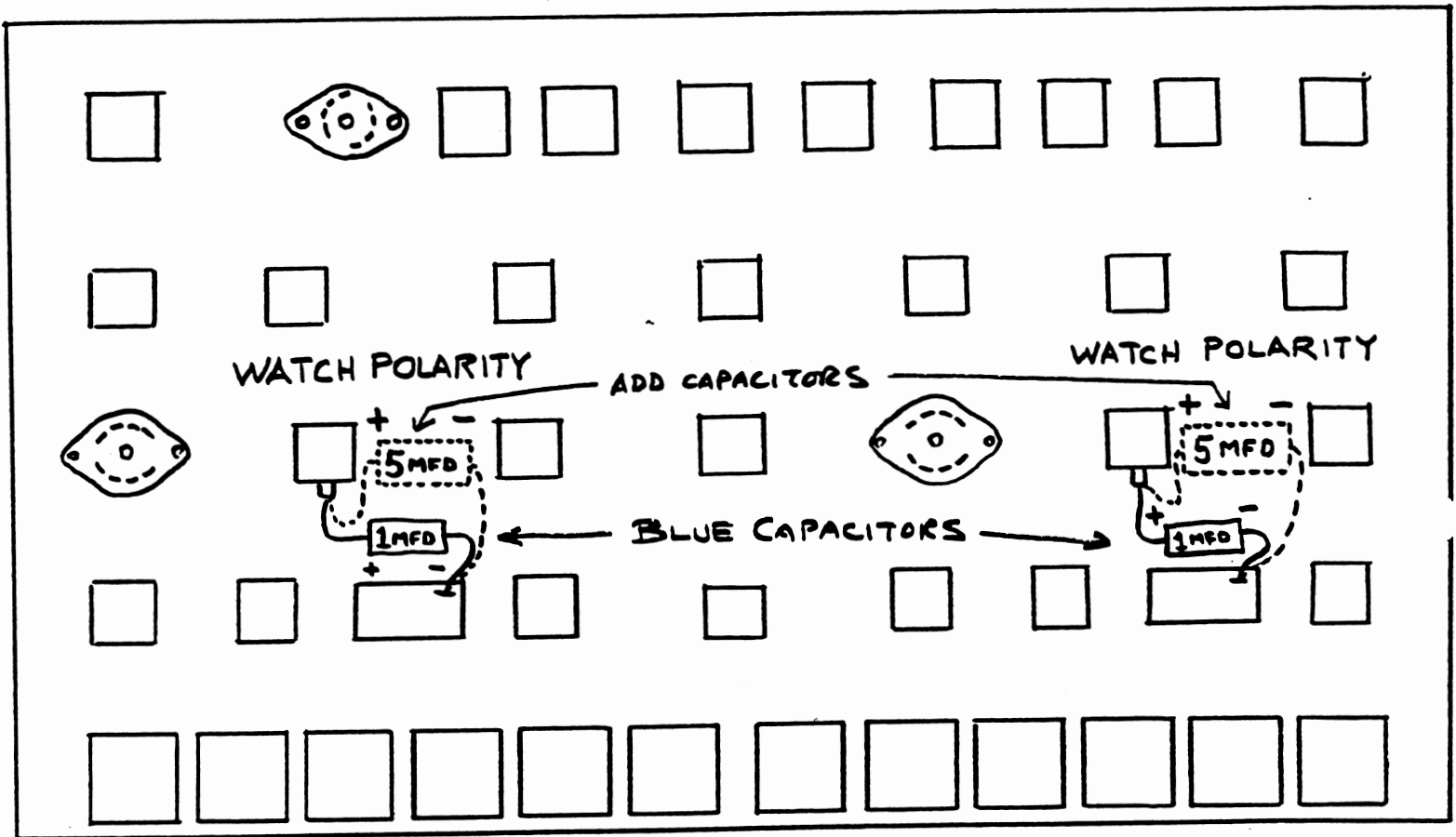
If a slower rise time is desired on the Percussion Envelopes, the following modification can be performed without voiding the warranty:

Place a 5 mfd electrolytic capacitor in parallel with the existing 1 mfd (blue) capacitor, as illustrated.

WATCH THE POLARITY!

August 16, 1974

SERVICE NOTE: Harmonic Synthesizer  
Percussion attack time modification (if desired)



End Panel - Bottom View

If a slower rise time is desired on the Percussion Envelopes, the following modification can be performed without voiding the warranty:

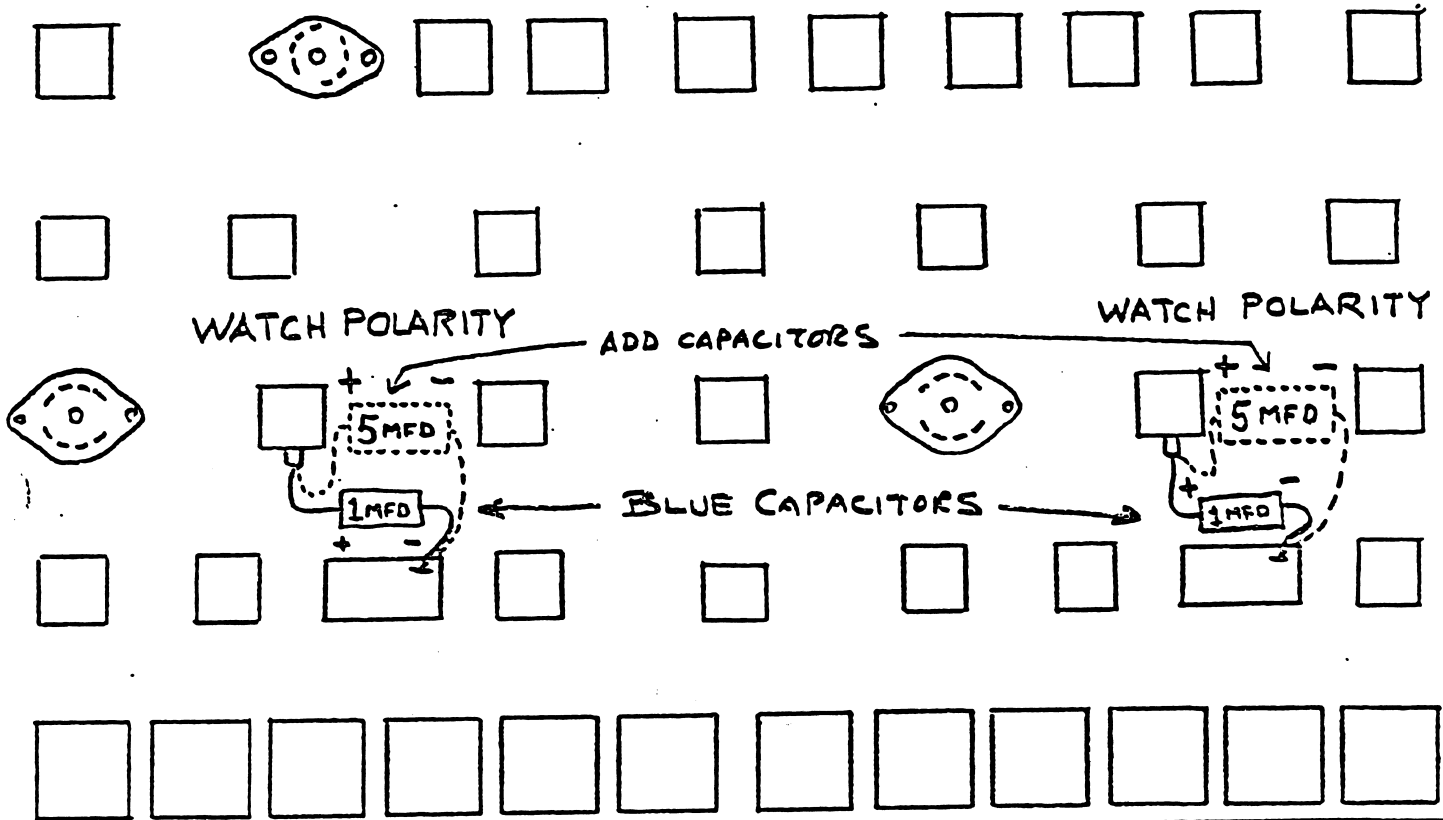
Place a 5 mfd electrolytic capacitor in parallel with the existing 1 mfd (blue) capacitor, as illustrated.

WATCH THE POLARITY!

# RMI

August 16, 1974

SERVICE NOTE: Harmonic Synthesizer  
Percussion attack time modification (if desired)



End Panel - Bottom View

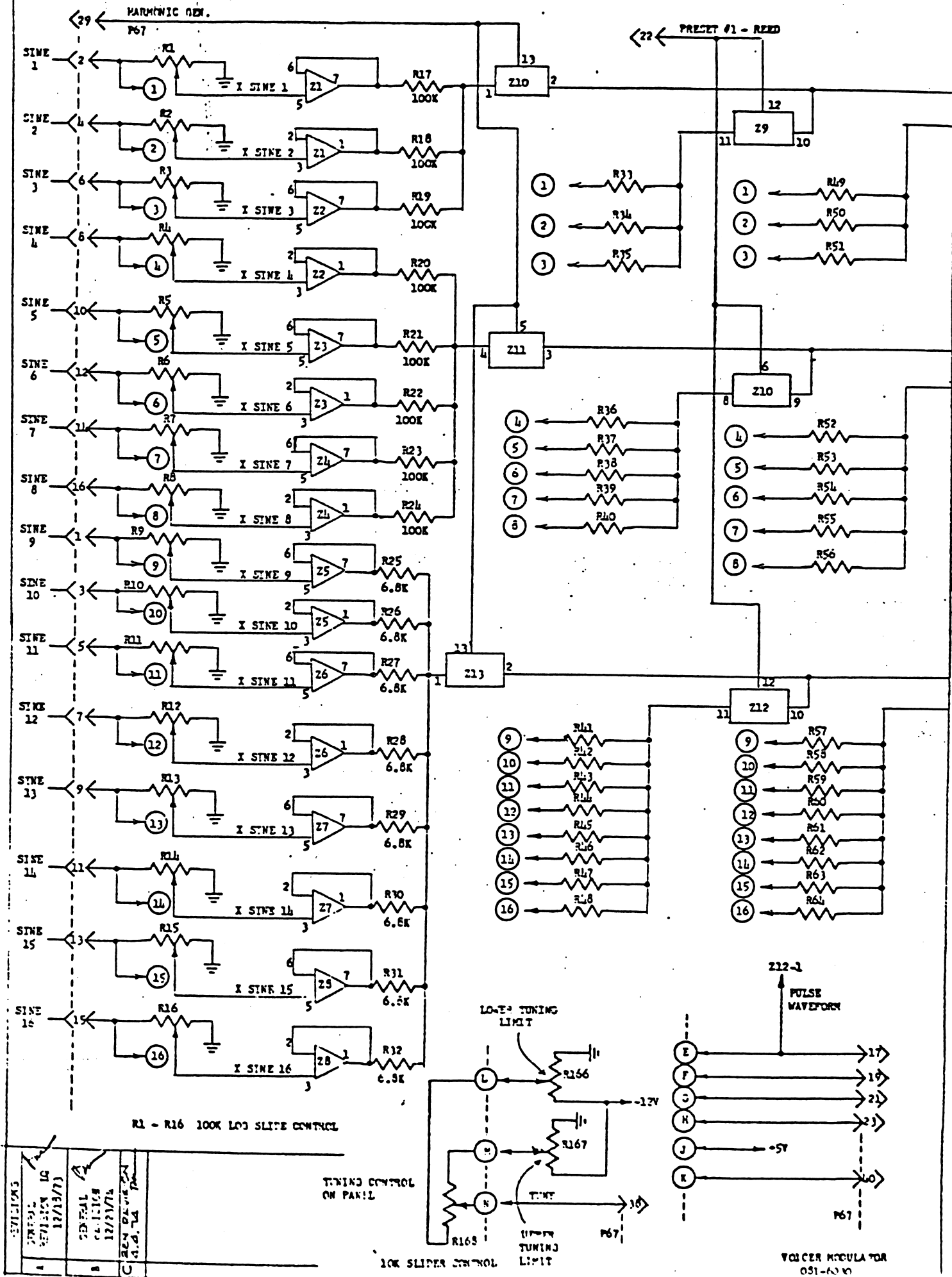
If a slower rise time is desired on the Percussion Envelopes, the following modification can be performed without voiding the warranty:

Place a 5 mfd electrolytic capacitor in parallel with the existing 1 mfd (blue) capacitor, as illustrated.

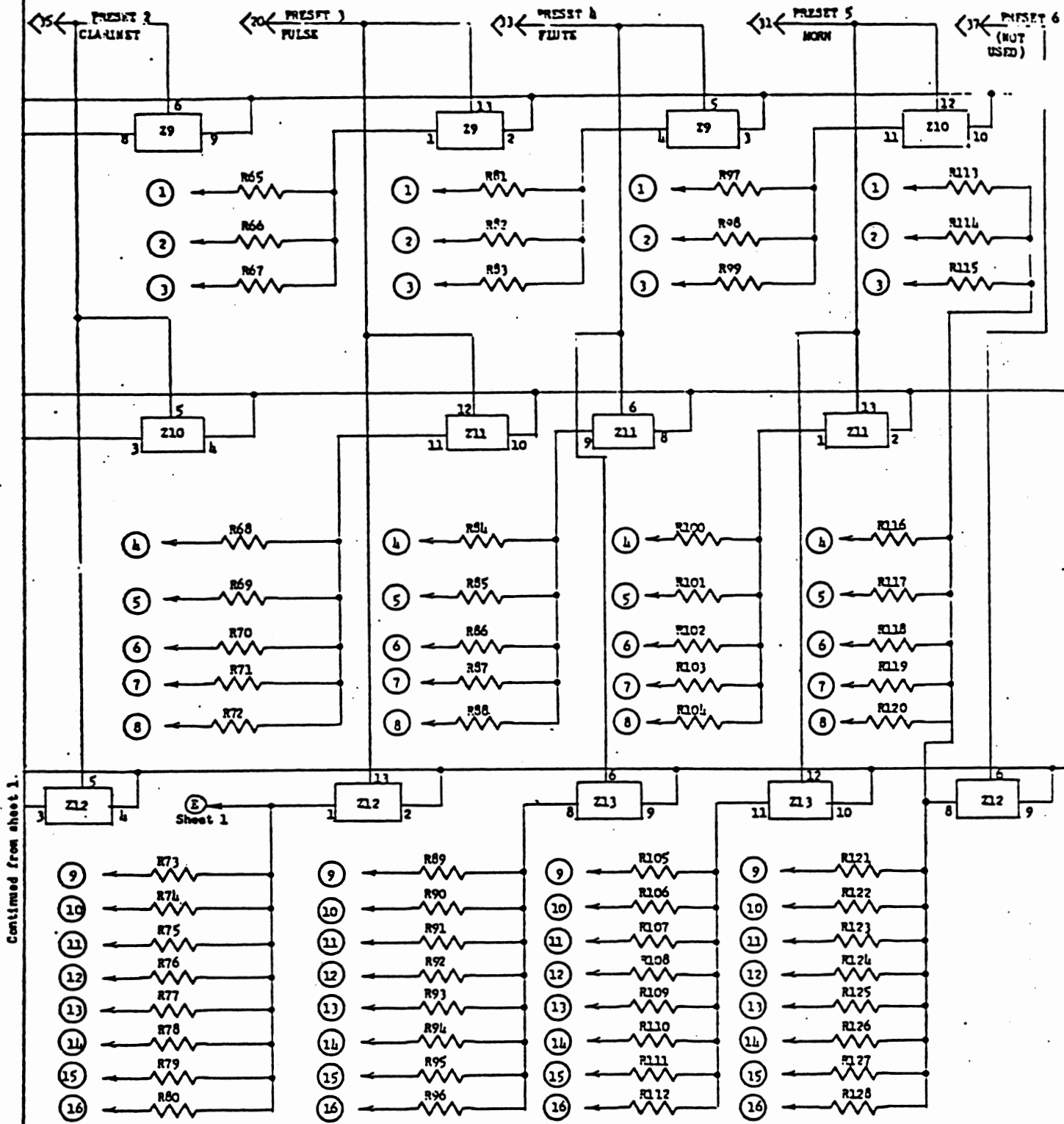
WATCH THE POLARITY!



FOR VALUES OF R33 TO R48 SEE VOICING CHART ON SHEET 4

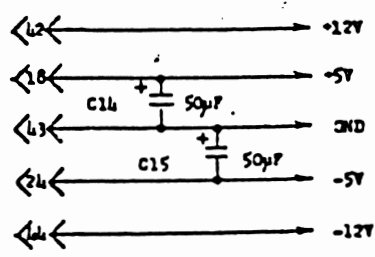


FOR VALUES OF R11 TO R128 SEE VOICING CHART ON SHEET 4



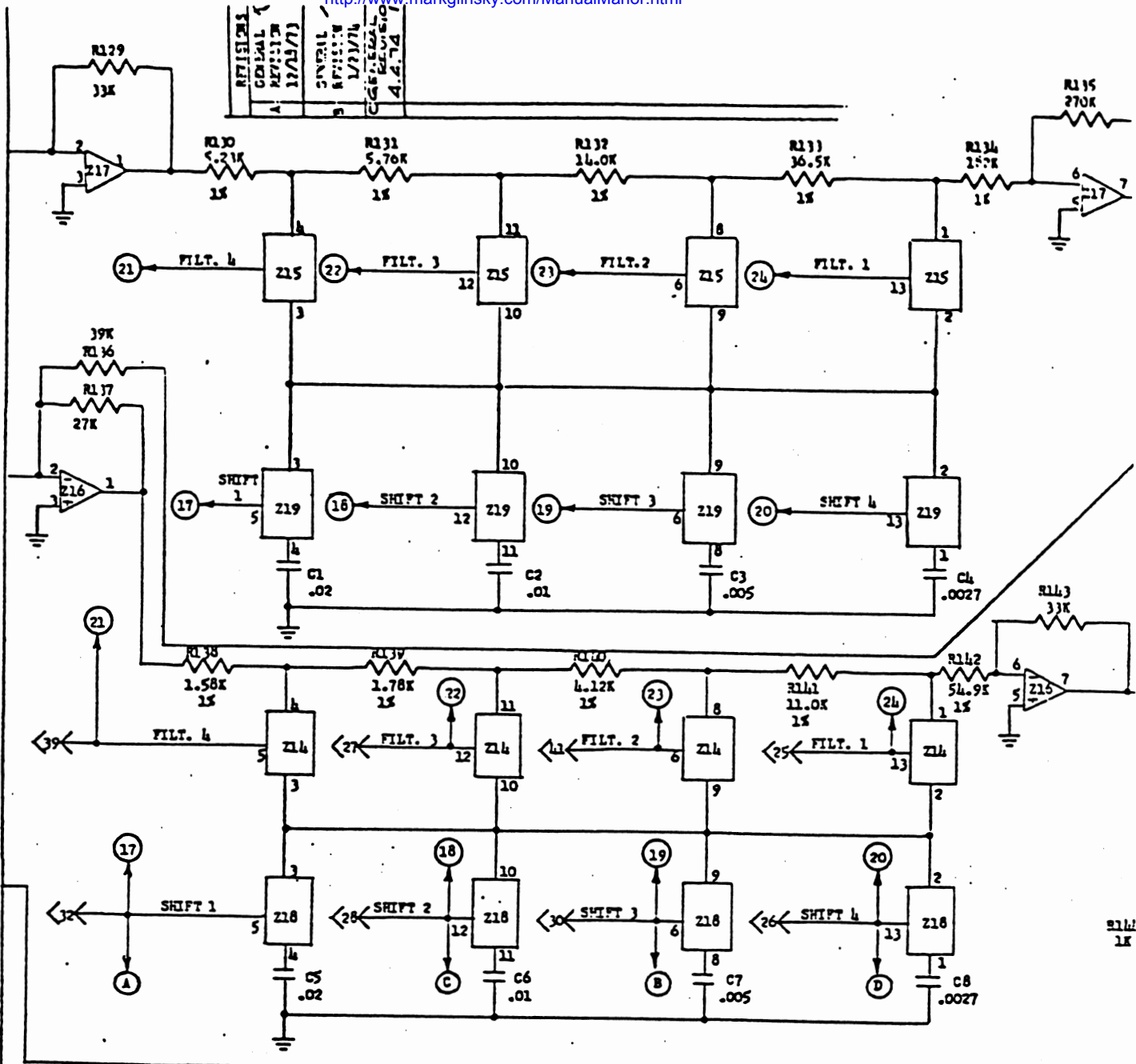
Continued from sheet 1.

REVISIONS	
A	GENERAL REVISION LA 12/18/73
B	General Revision April 4, 1974

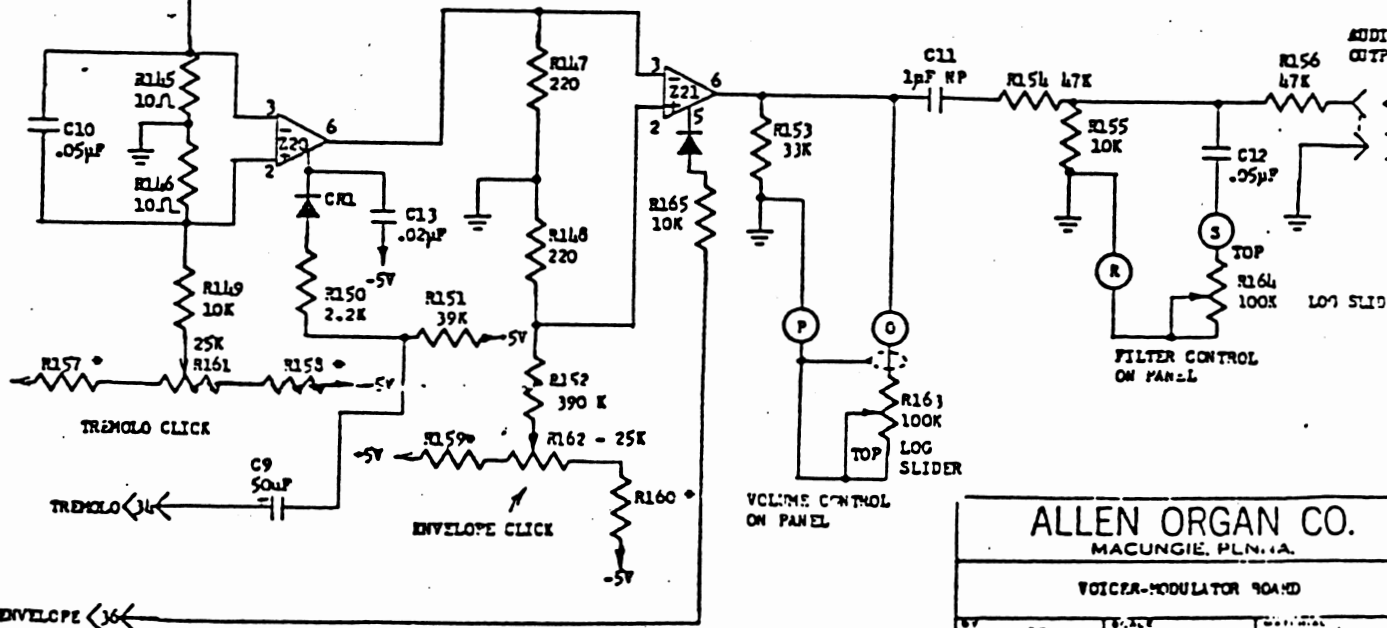


Z1 - Z8	1458	PIN 4: -12V	PIN 8: +12V
Z16 - Z17			
Z9 - Z15	4016	PIN 7: -5V	PIN 8: -5V
Z18 - Z19			
Z20 - Z21	3080	PIN 4: -5V	PIN 7: -5V

P67



Continued from sheet 2



(\*) R157, R158, R159, R160 NOT USED; REPLACED WITH JUMPERS.

**ALLEN ORGAN CO.**  
MACUNGIE, PENN.A.

VOICER-MODULATOR BOARD

REV	DATE	DESIGNED BY
12	12/16/73	

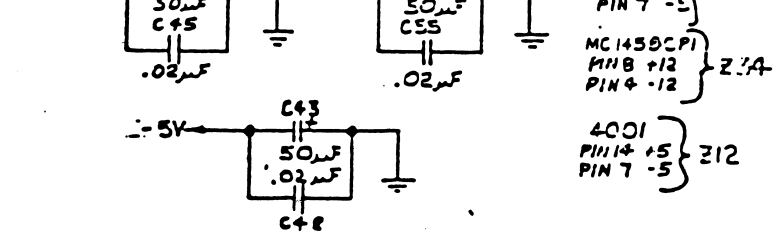
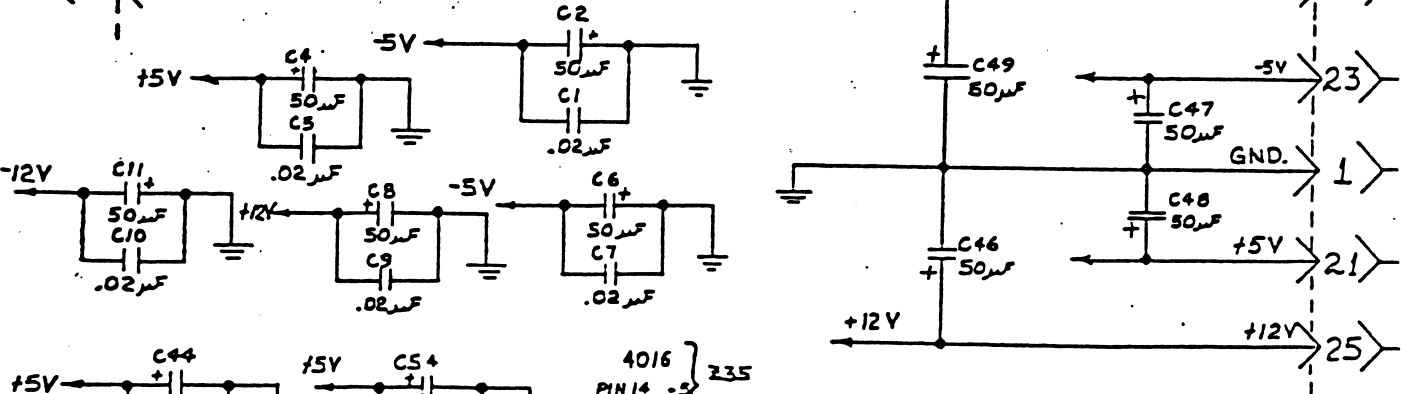
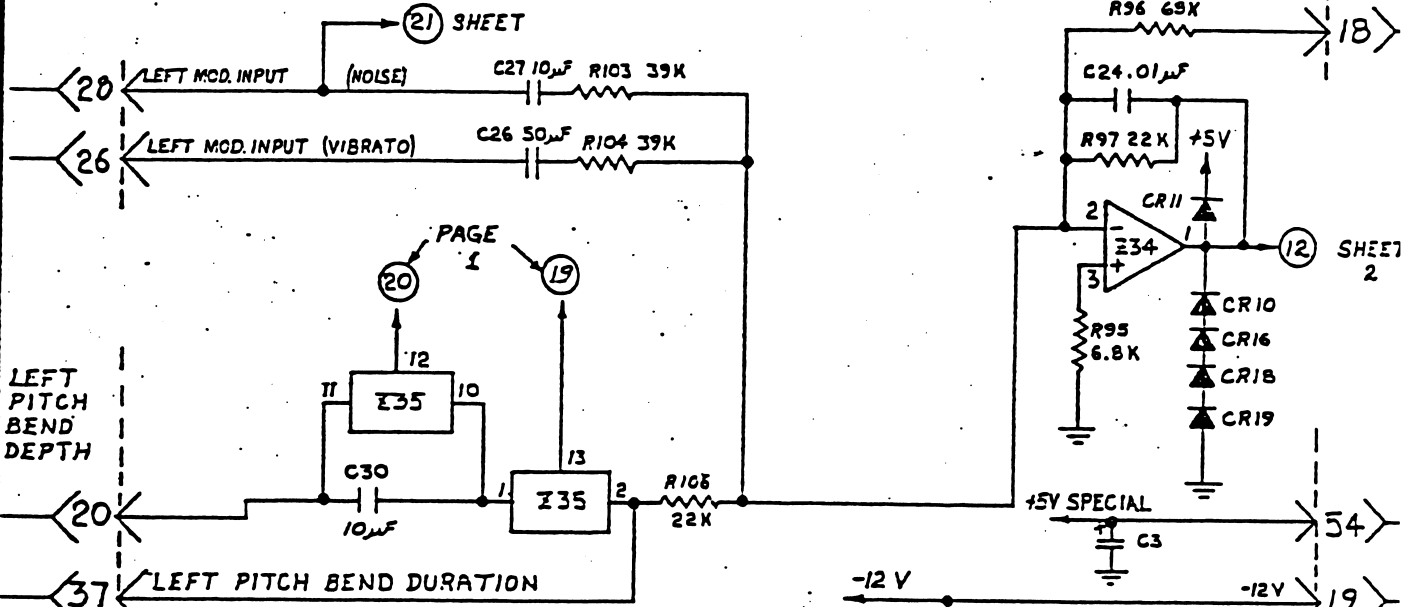
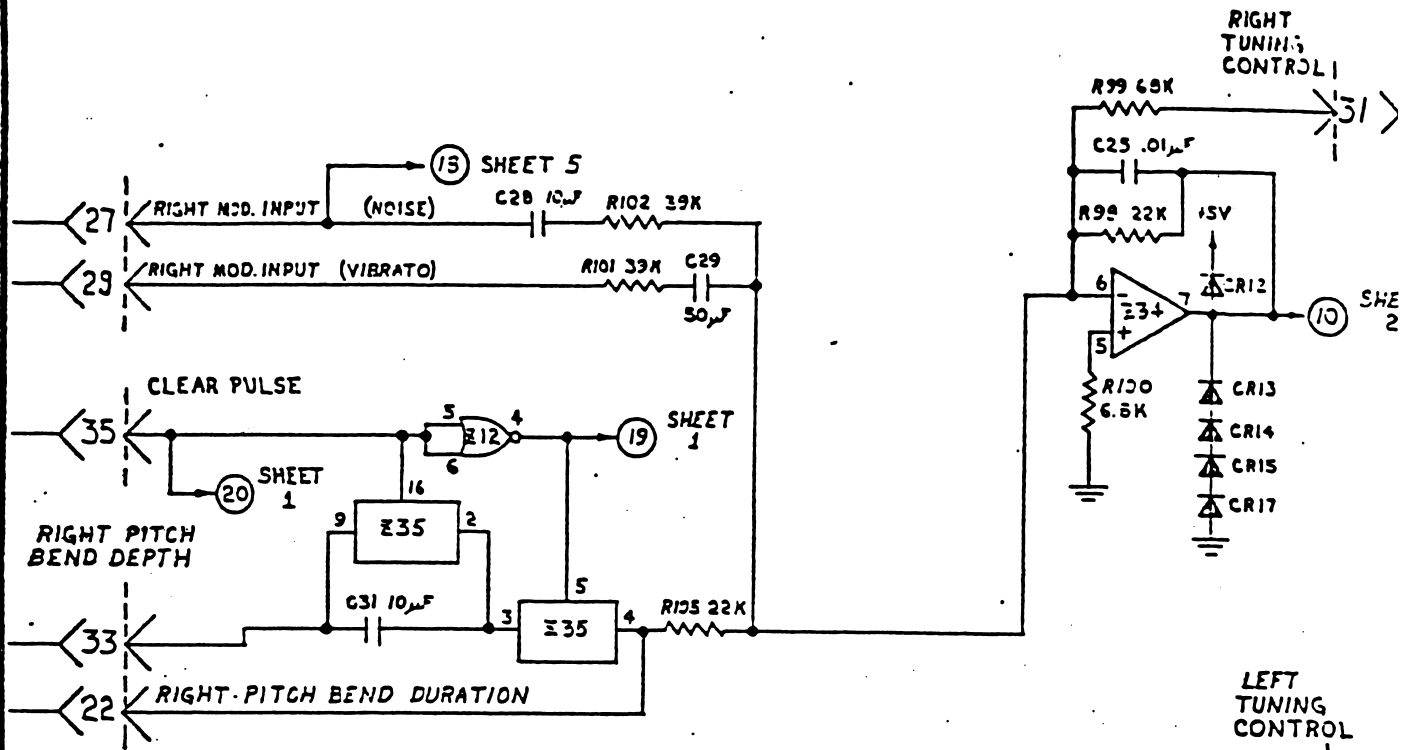
091-6010



REF.	VALUE
R33	—
R34	100K
R35	—
R36	100K
R37	—
R38	100K
R39	—
R40	100K
R41	—
R42	6.8K
R43	—
R44	6.8K
R45	—
R46	6.8K
R47	—
R48	6.8K
R49	390K
R50	1M
R51	100K
R52	2.2M
R53	120K
R54	2.2M
R55	220K
R56	2.2M
R57	470K
R58	—
R59	—
R60	—
R61	—
R62	—
R63	—
R64	—
R65	—
R66	—
R67	—
R68	—
R69	—
R70	—
R71	—
R72	—
R73	—
R74	—
R75	—
R76	—
R77	—
R78	—

REF.	VALUE
R79	—
R80	—
R81	100K
R82	—
R83	180K
R84	—
R85	—
R86	—
R87	—
R88	—
R89	—
R90	—
R91	—
R92	—
R93	—
R94	—
R95	—
R96	—
R97	100K
R98	120K
R99	270K
R100	630K
R101	1M
R102	3.3M
R103	—
R104	—
R105	—
R106	—
R107	—
R108	—
R109	—
R110	—
R111	—
R112	—
R113	—
R114	—
R115	—
R116	—
R117	—
R118	—
R119	—
R120	—
R121	—
R122	—
R123	—
R124	—
R125	—
R126	—
R127	—
R128	—

ALLEN ORGAN CO. MACHINERY, ELECTRONICS VOICER-MODULATOR BOARD	
GS 42274 JW 45174	081-6030



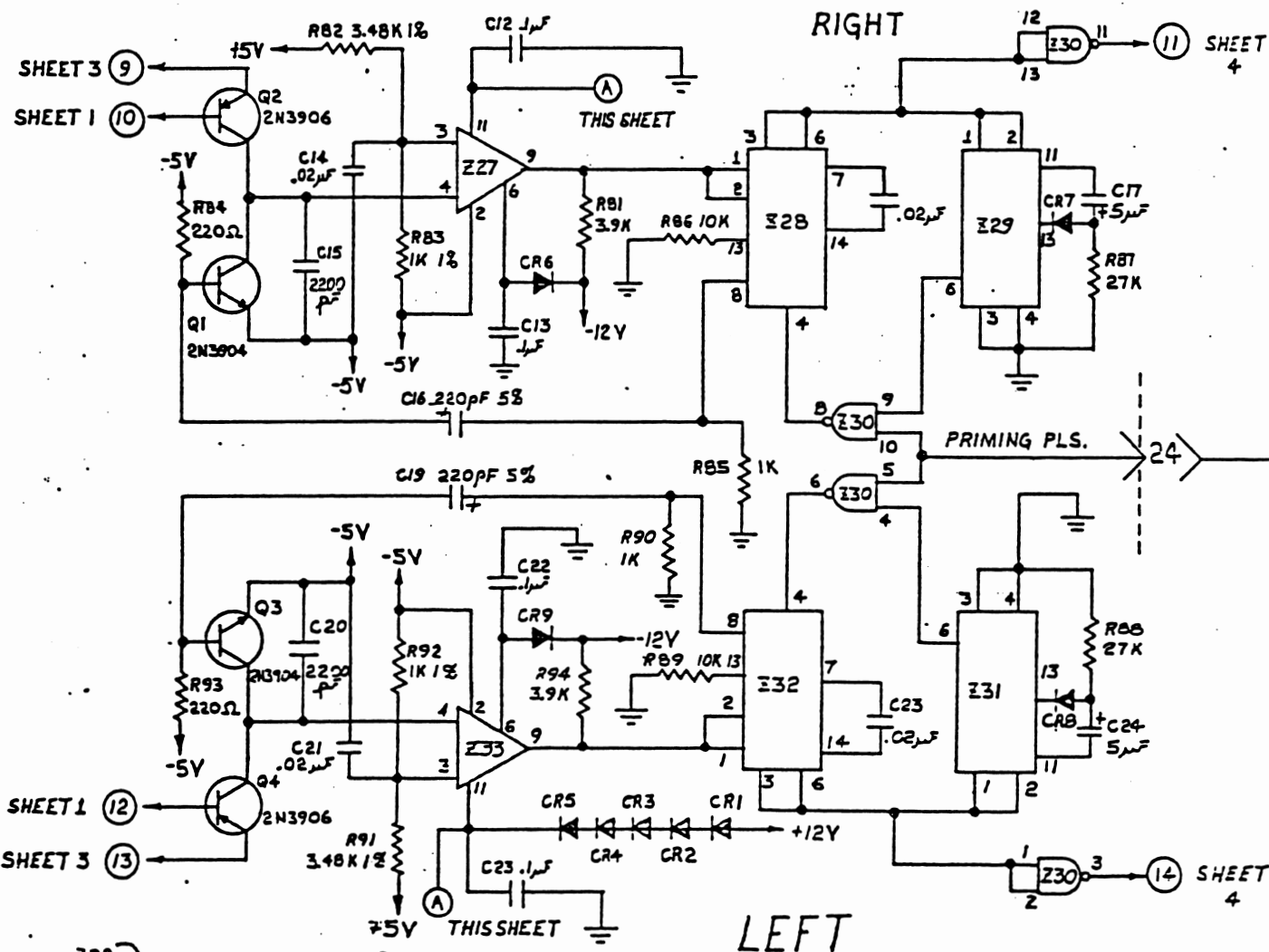
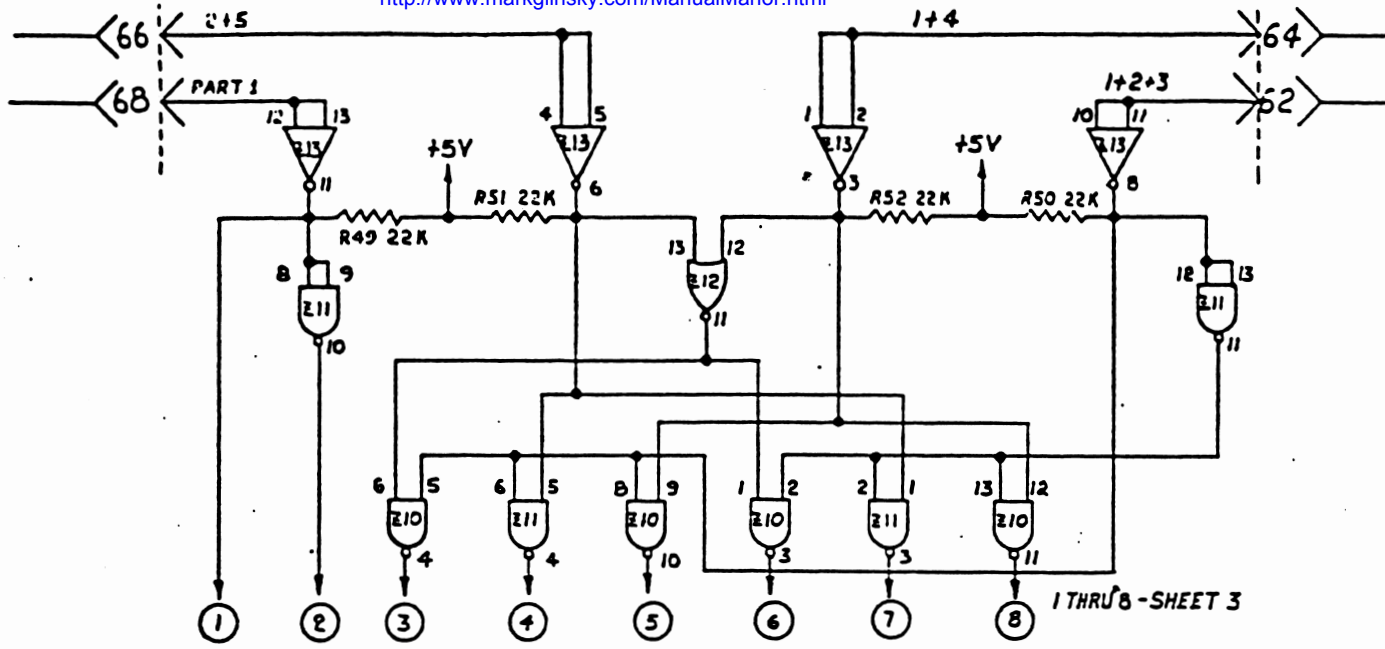
ALL DIODES ARE  
222-0006

SHEET 1 OF 6

**ALLEN ORGAN CO.**  
MACUNGIE, PENNA.

**OSCILLATORS BOARD**

REV. 1	DATE 3-10-74	NO. 051-201
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Z28 } 8601  
 Z29 } PIN 14 GND.  
 Z32 } PIN 7 -5V

Z27 } MC1710CL  
 Z33 } OR EQUIV.

Z13 } 7426  
 } PIN 14 GND  
 } PIN 7 -5.

Z10 } 4011  
 Z11 } PIN 14 +5V  
 } PIN 7 -5

Z30 } 7400  
 } PIN 14 GND  
 } PIN 11 7 -5

(SHEET 2 OF 6)

ALL DIODES ARE 232-0006

REVISIONS

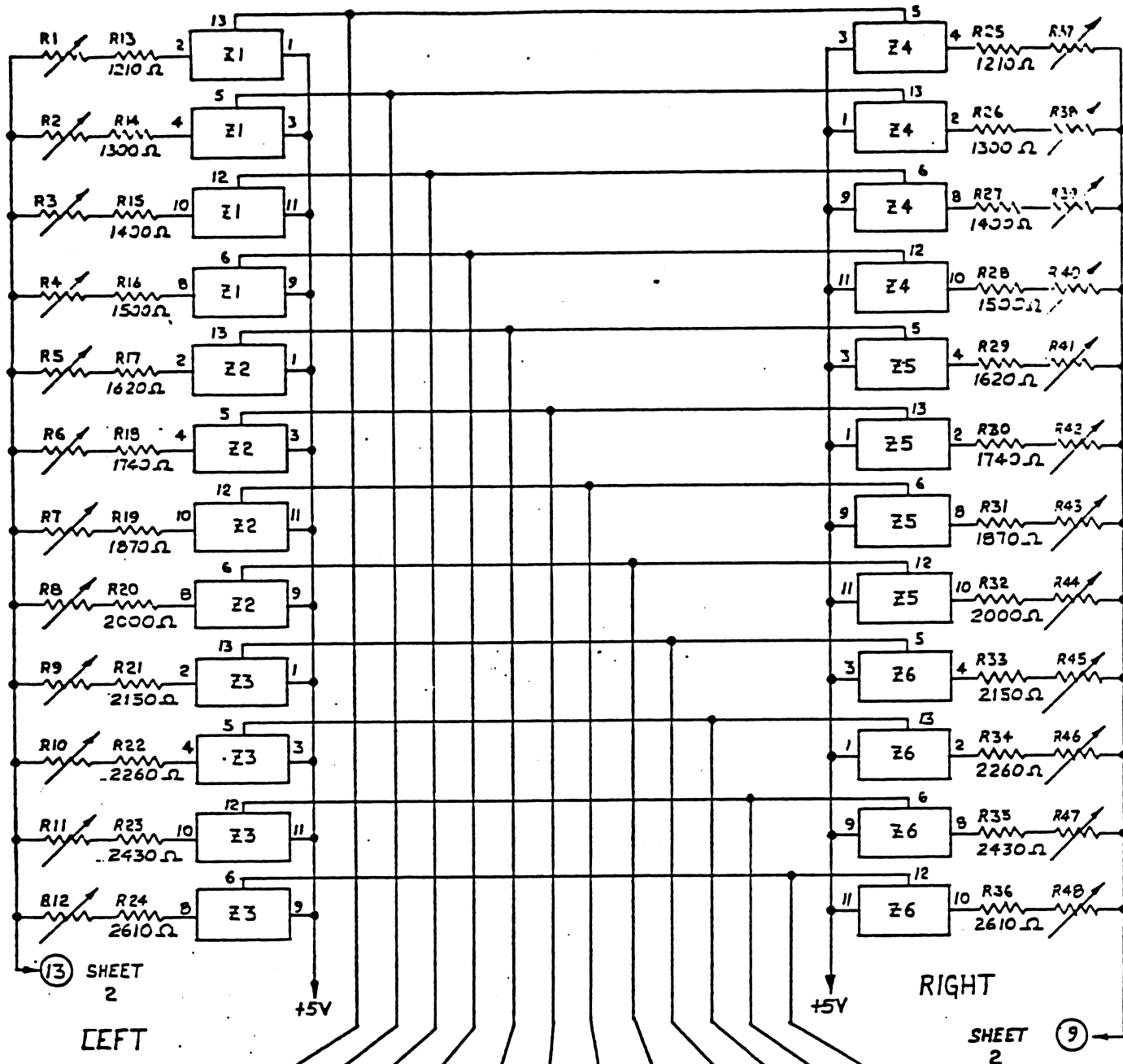
**ALLEN ORGAN CO**  
 MACUNGIE, PENNA.

**OSCILLATORS BOARD**

BY G.S.	DATE	REVISION

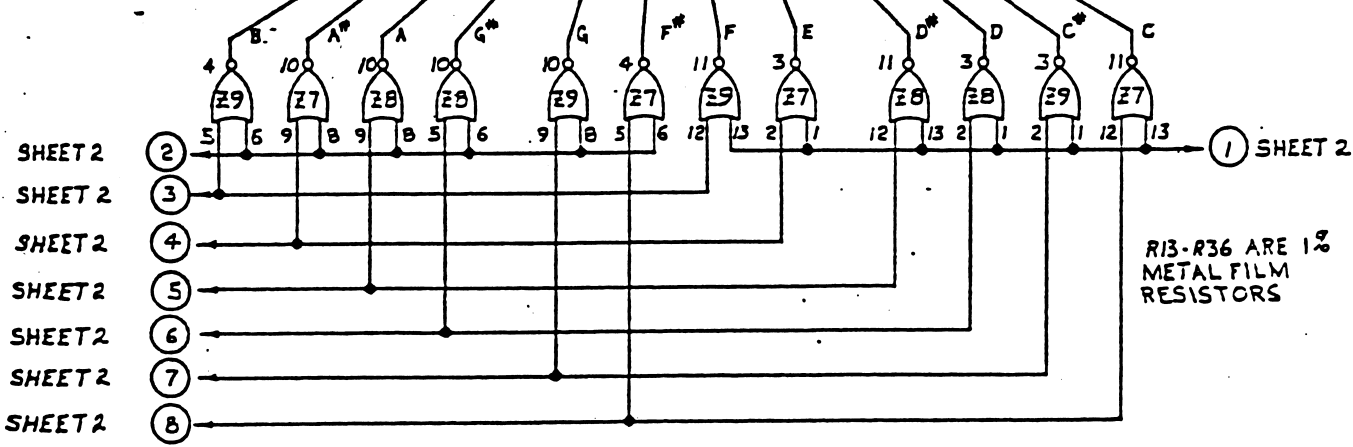
081-2001





LEFT  
 SHEET 2

RIGHT  
 SHEET 2



SHEET 2  
 SHEET 2  
 SHEET 2  
 SHEET 2  
 SHEET 2  
 SHEET 2  
 SHEET 2

R13-R36 ARE 1% METAL FILM RESISTORS

4001 { Z7  
 Z8  
 Z9 } ALL VARIABLE RES. ARE 200Ω CERMET

ALL IC'S ON THIS SHEET  
 PIN 7 -5  
 PIN 14 +5SPECIAL

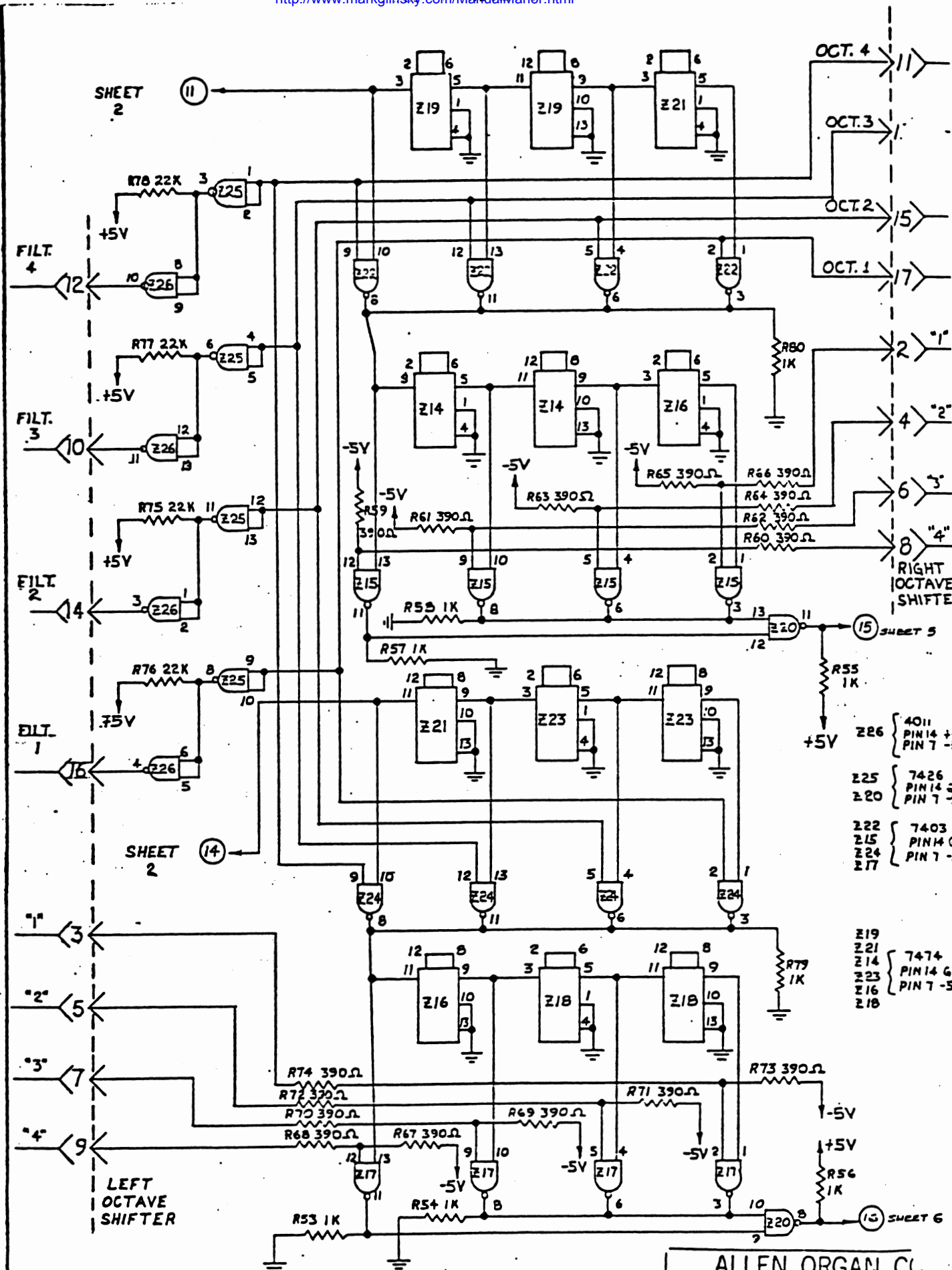
SHEET 3 OF 6

ALLEN ORGAN CO.  
 MACUNGIE, PENN.A.

OSCILLATORS BOARD

GS  
 9-10-74

REVISIONS



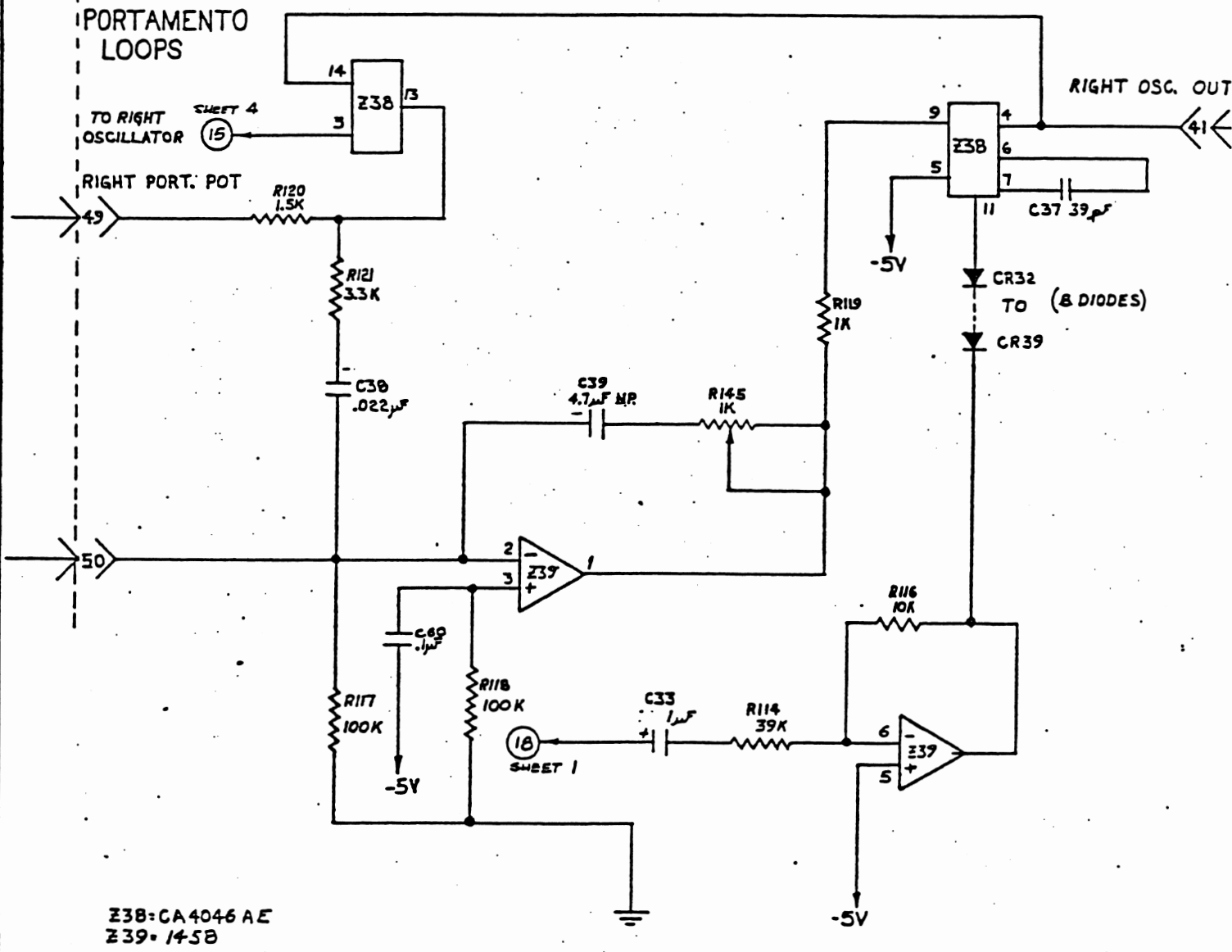
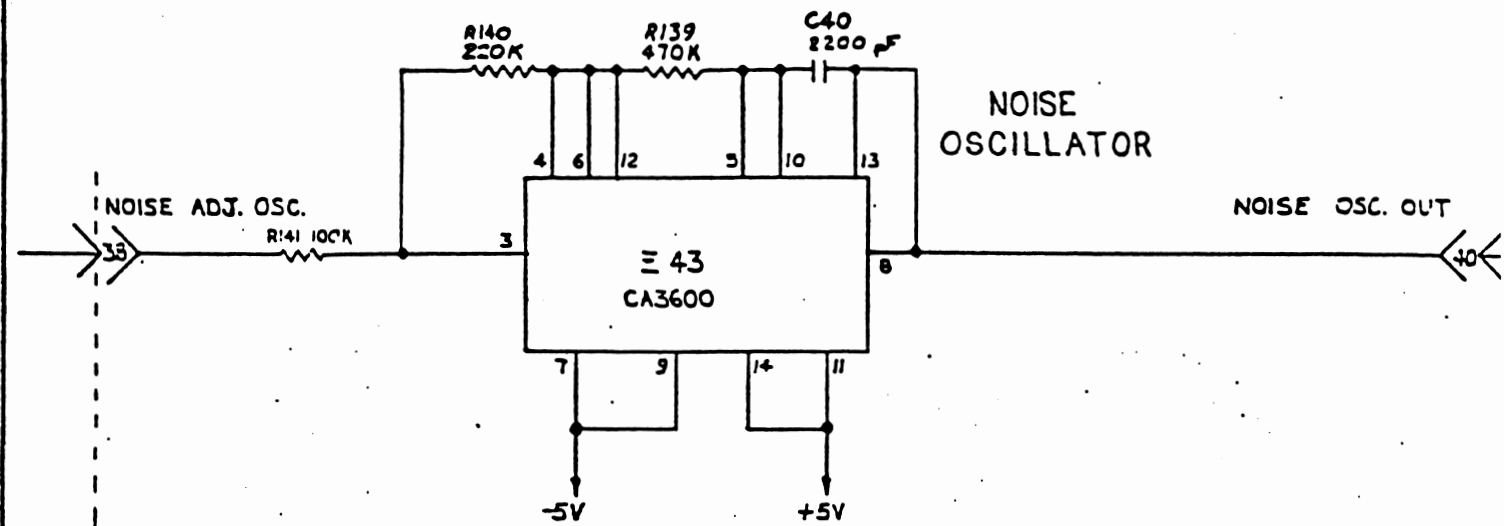
- Z86 { 4011  
PIN 14 +  
PIN 7 -
- Z25 { 7426  
PIN 14 +  
PIN 7 -
- Z20 { 7426  
PIN 14 +  
PIN 7 -
- Z22 { 7403  
PIN 14 +  
PIN 7 -
- Z15 { 7403  
PIN 14 +  
PIN 7 -
- Z24 { 7403  
PIN 14 +  
PIN 7 -
- Z17 { 7403  
PIN 14 +  
PIN 7 -
- Z19 { 7474  
PIN 14 +  
PIN 7 -
- Z21 { 7474  
PIN 14 +  
PIN 7 -
- Z14 { 7474  
PIN 14 +  
PIN 7 -
- Z23 { 7474  
PIN 14 +  
PIN 7 -
- Z16 { 7474  
PIN 14 +  
PIN 7 -
- Z18 { 7474  
PIN 14 +  
PIN 7 -

REVISIONS

ALLEN ORGAN CO.  
 MACUNGIE, PENNA.

OSCILLATORS BOARD

BY G.S.	DATE	REVISED
	7-10-74	021 2001



Z38-CA4046 AE  
 Z39-145B

**REVISIONS**

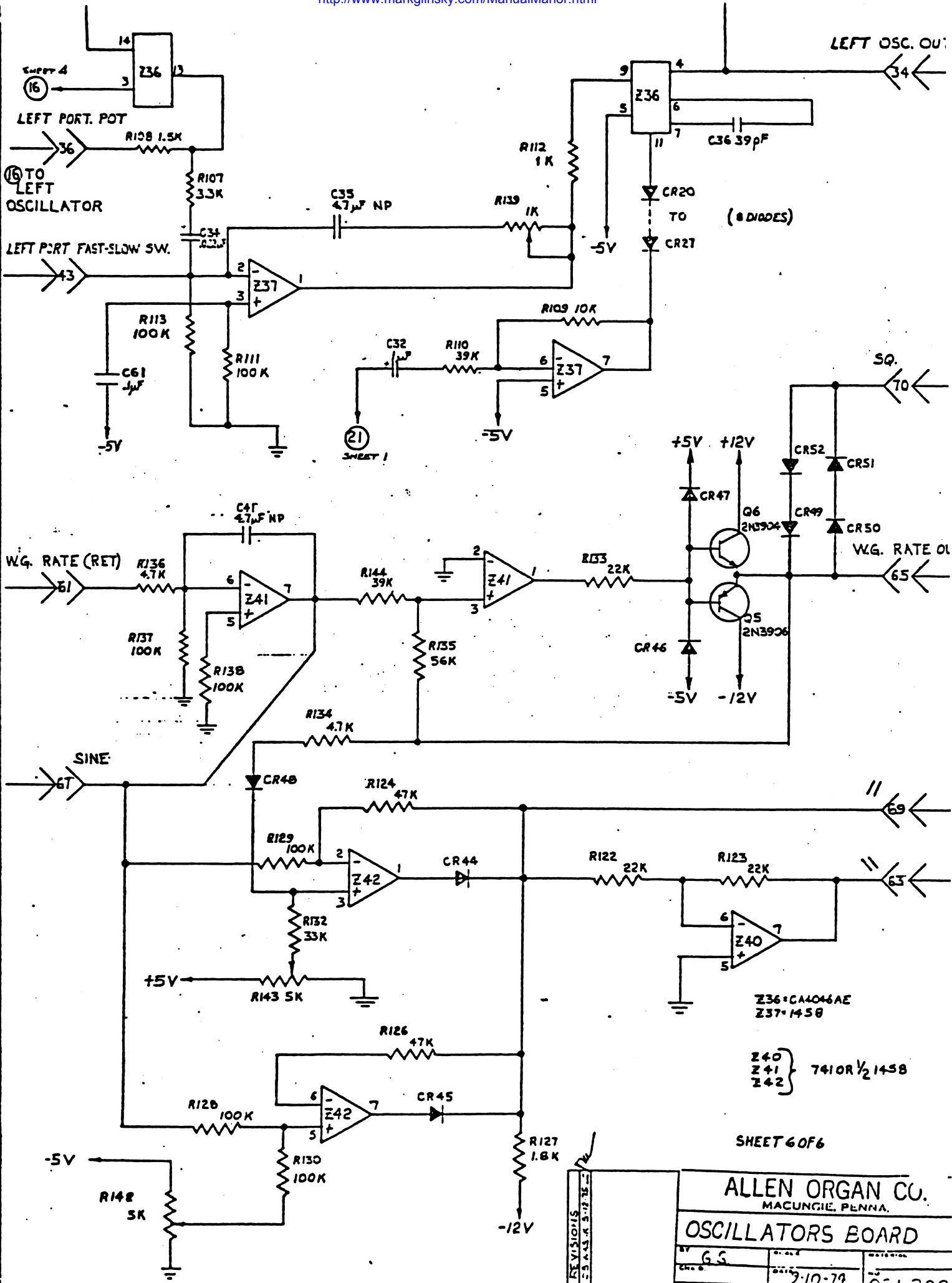
1	WAS D05 J14
2	WAS D05 J14
3	WAS D05 J14
4	WAS D05 J14
5	WAS D05 J14
6	WAS D05 J14
7	WAS D05 J14
8	WAS D05 J14
9	WAS D05 J14
10	WAS D05 J14

**ALLEN ORGAN CO.**  
 MACUNGIE, PENNA.

**OSCILLATORS BOARD**

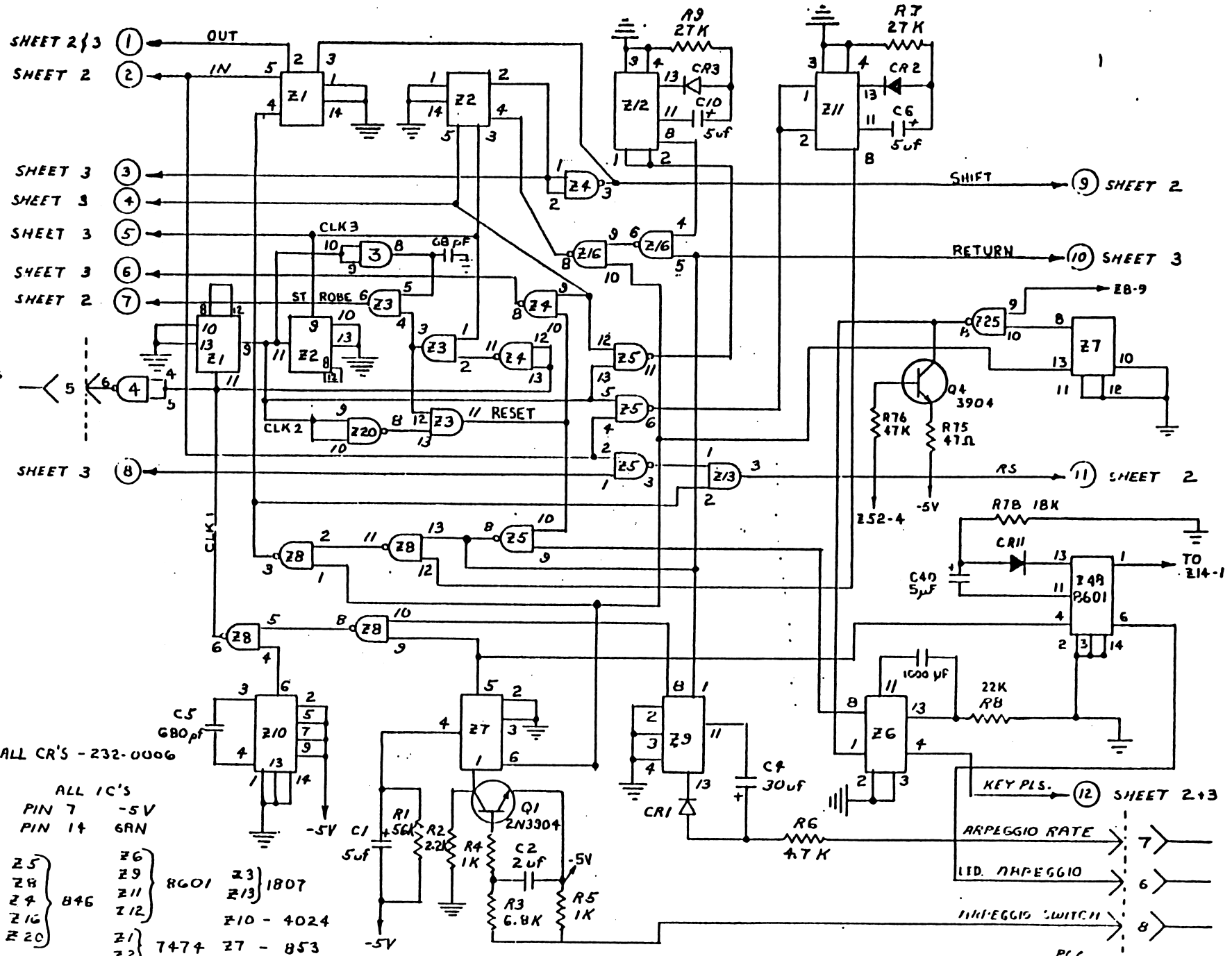
DATE: 9-10-74





REVISIONS

- GENERAL REVISION Q 12-12-73
- GENERAL REV. 1-23-74
- ADDED Z25, Z7, PINS 8, 10, 11, 12, 13, ALSO ADDED Q4, R75, R76, R7B, CR1, C40, Z47.
- Q.S. 8-14-74
- GENERAL REV. Q.S. 10-4-74



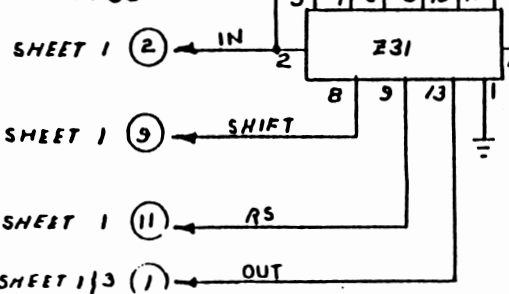
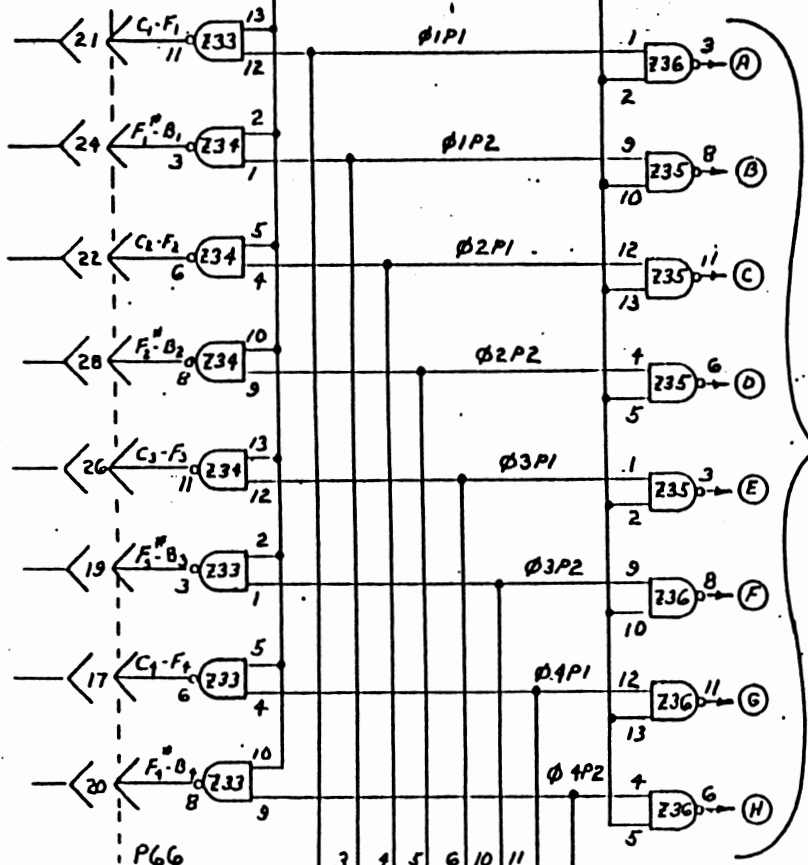
- ALL CR'S - 232-0006
- ALL IC'S
- |        |     |
|--------|-----|
| PIN 7  | -5V |
| PIN 14 | 6RN |
- |     |     |     |      |
|-----|-----|-----|------|
| Z5  | Z6  | Z3  | 1807 |
| Z8  | Z9  | Z13 | 8601 |
| Z9  | Z11 | Z10 | 4024 |
| Z16 | Z12 | Z1  | 7474 |
| Z20 | Z21 | Z2  | 853  |
- 846

ALIEN ORGAN CO.  
 SCHEMATIC FOR  
 KEYBOARD SCANNER  
 SHEET 1 OF 5  
 DT

REVISIONS  
 12-12-73  
 12-12-73

SHEET 1 of 3 (12) ← KEY. PLS.

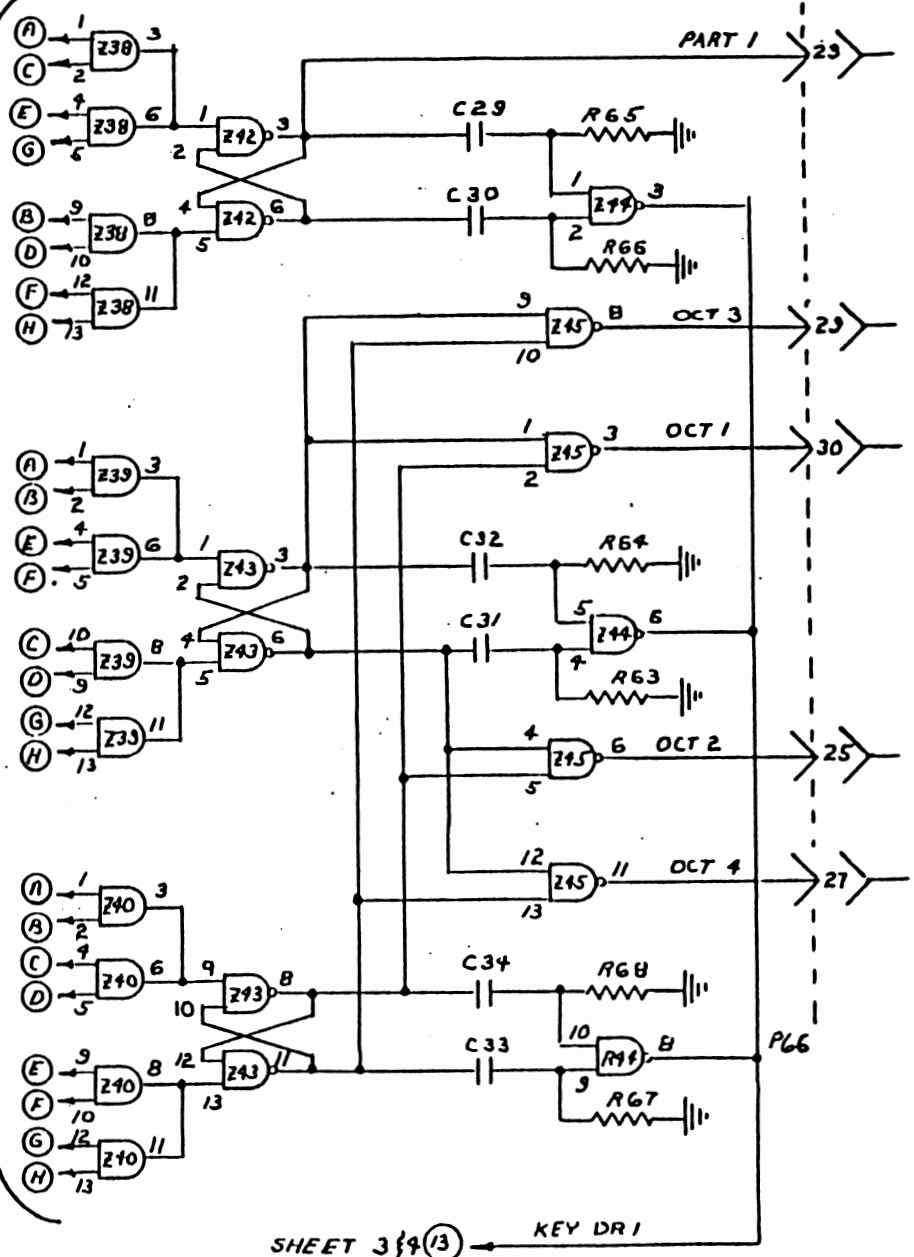
SHEET 1 (7) → STROBE



ALL IC'S  
 PIN 7 -5V  
 PIN 14 GRN

Z33	} B46	Z38	} 1B07
Z34		Z39	
Z35		Z40	
Z36		Z44	
Z42		Z4	
Z43			

Z31-741G4



SHEET 3 of 4 (13) ← KEY DR 1

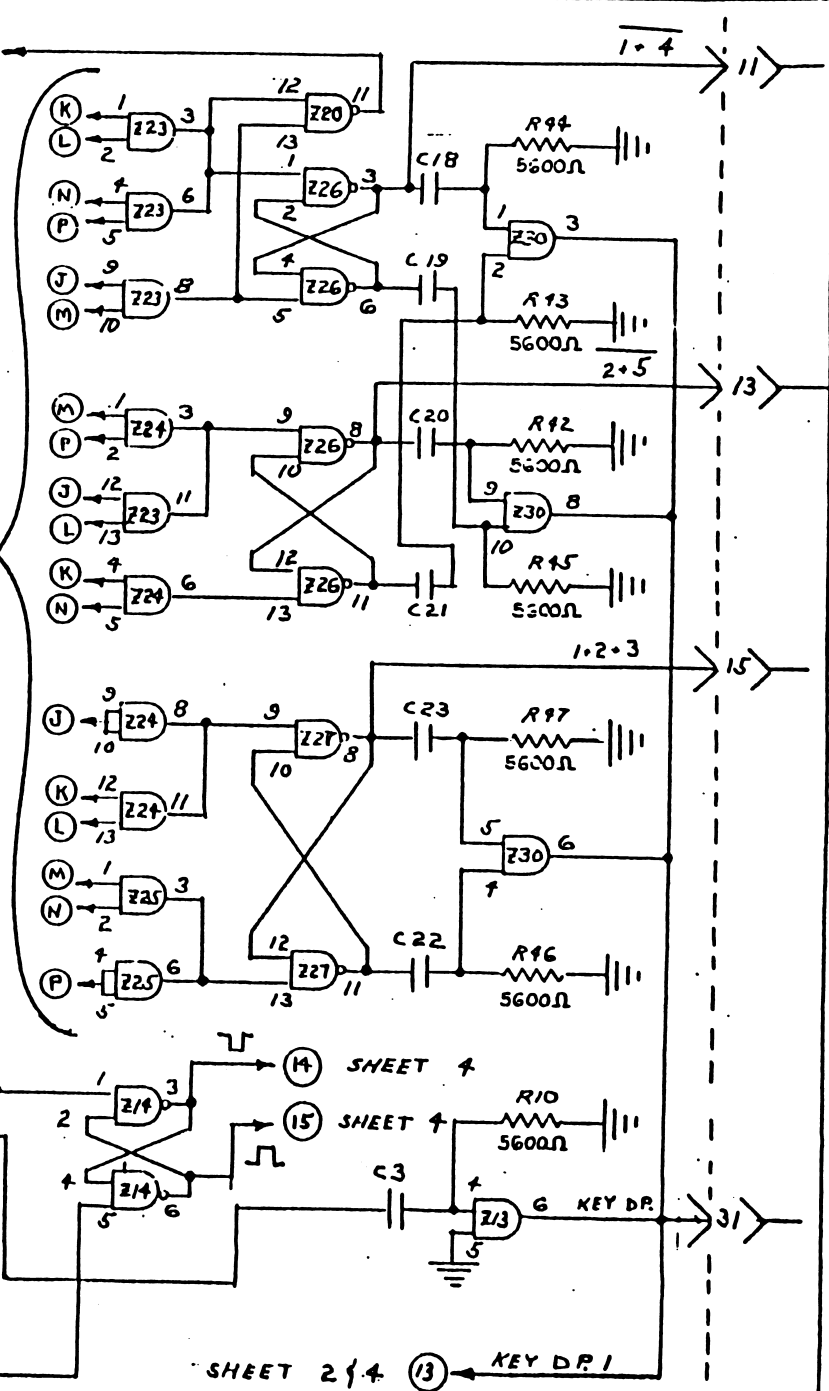
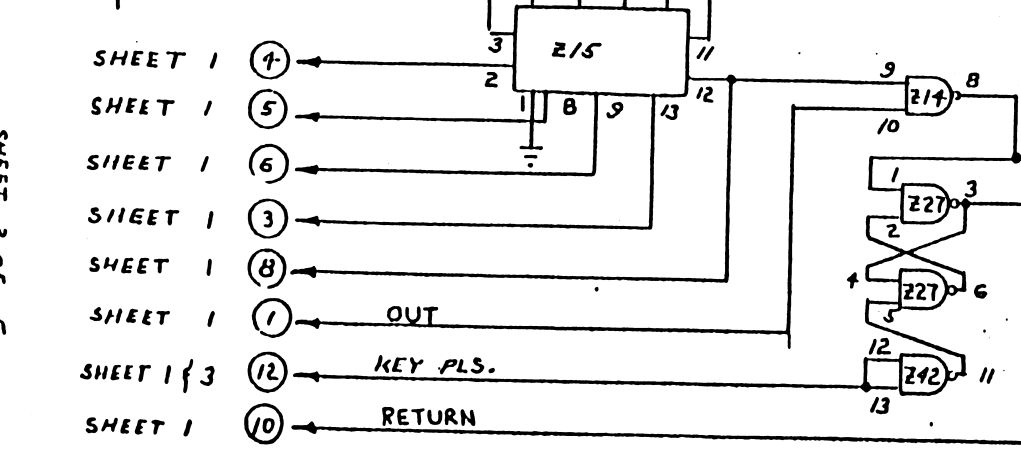
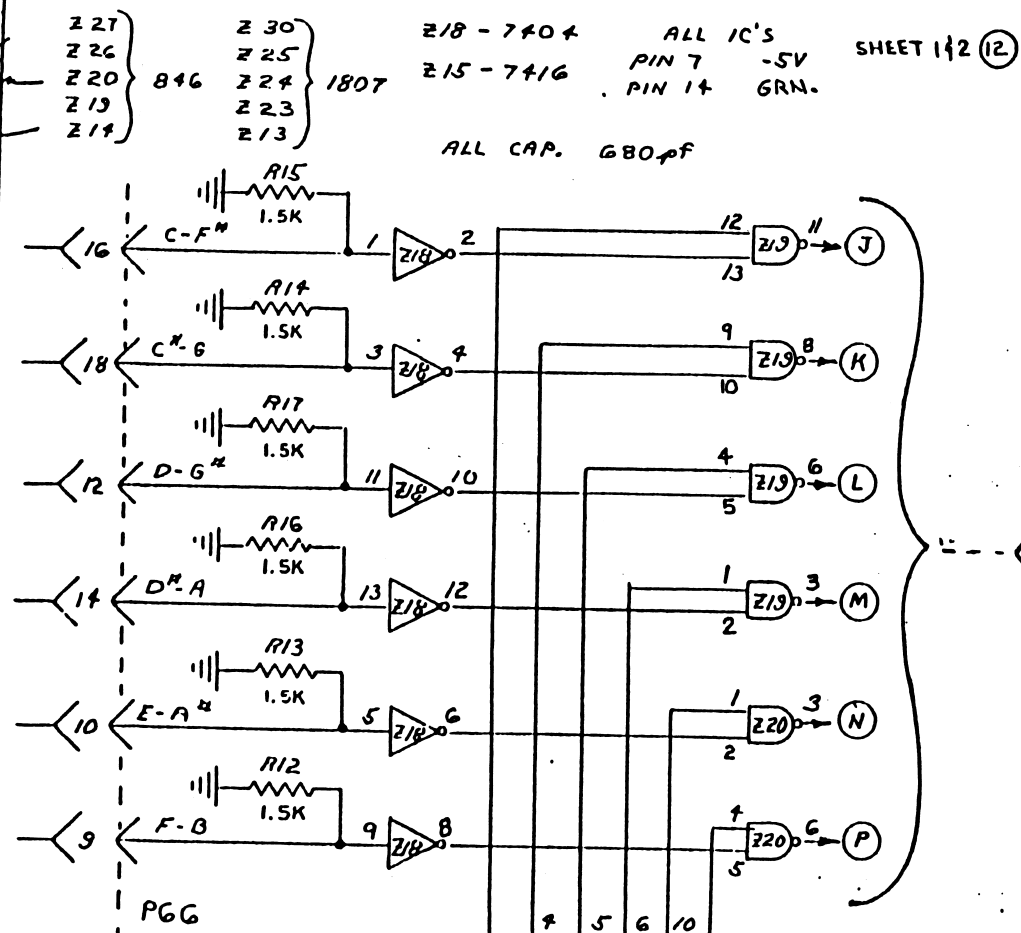
ALL RES. 5600Ω  
 ALL CAP. 680pf

SHEET 2 OF 5  
 ALLEN ORGAN CO.  
 MACUNGIE, PENNA.  
 SCHEMATIC FOR  
 KEYBOARD SPEAKER  
 11-11-73  
 11-11-73  
 11-11-73

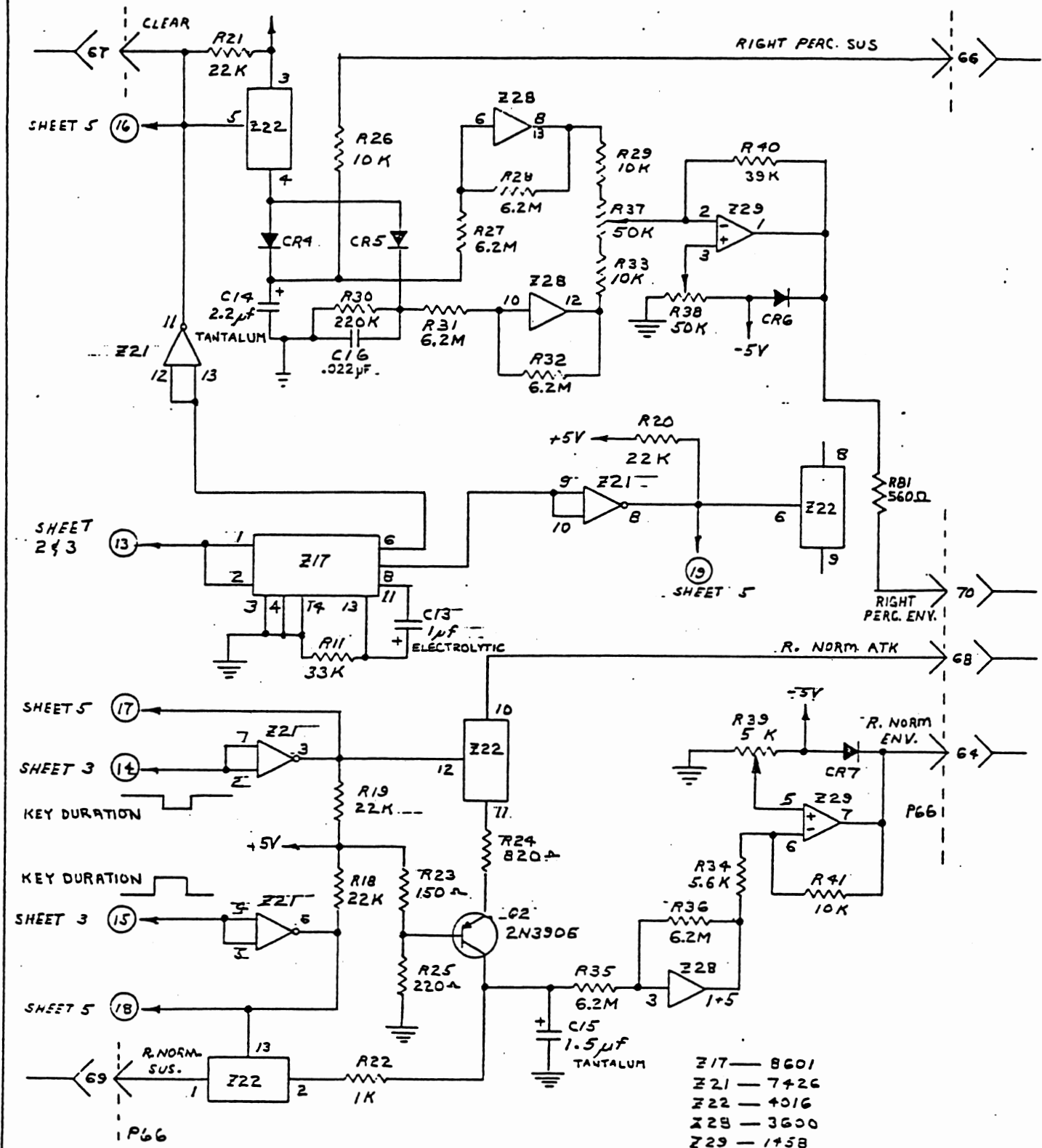


**REVISIONS**

GEN. REV. 10-2-73	Z 27	Z 30	Z 18 - 7404	ALL IC'S
ADDED PINS P12	Z 26	Z 25	Z 15 - 7416	PIN 7 -5V
ADDED PINS P13	Z 20	Z 24		PIN 14 GRN.
ADDED PINS P14	Z 19	Z 23		
GEN. REV. 10-7-74	Z 14	Z 13		



SHEET 3 OF 5  
**ALLEN ORGAN CO.**  
 MACUNGIE, PENNA.  
 SCHEMATIC FOR  
 MASTER CANNER



8601, 7426 - PIN 14, GND, PIN 71 -5V  
 4016 - PIN 14, -5V, PIN 71 -5V  
 CA3200E - PINS 2, 11, 14: +5V, PINS 4, 7, 9: -5V  
 MC1459CPM - PINS 8, +12V PIN +: -12V

- Z17 - 8601
- Z21 - 7426
- Z22 - 4016
- Z28 - 3600
- Z29 - 1458

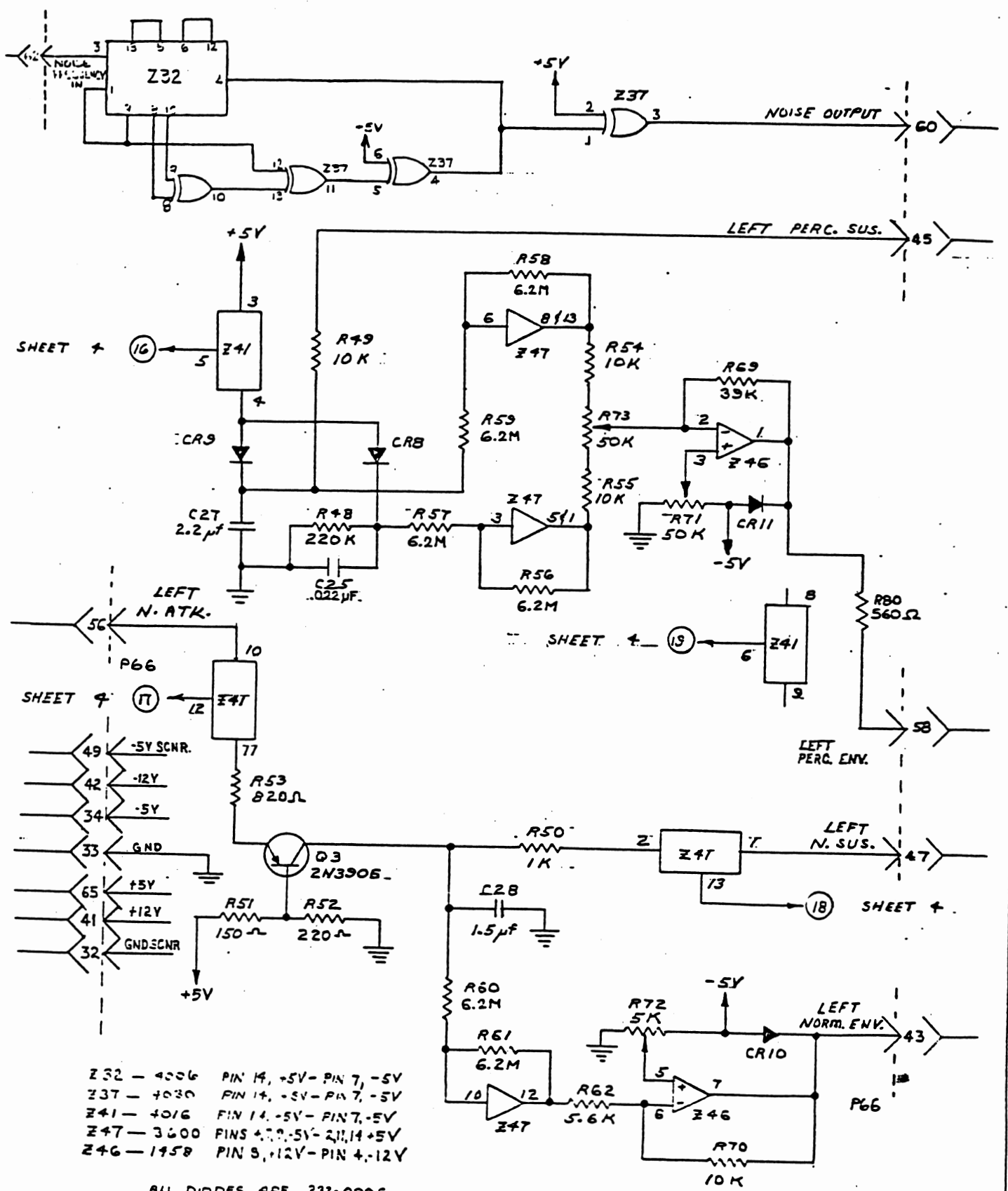
REVISIONS	DATE	BY	DESCRIPTION
1	11-21-74	...	...
2	...	...	...
3	...	...	...
4	...	...	...
5	...	...	...
6	...	...	...
7	...	...	...
8	...	...	...
9	...	...	...
10	...	...	...
11	...	...	...
12	...	...	...
13	...	...	...
14	...	...	...
15	...	...	...
16	...	...	...
17	...	...	...
18	...	...	...
19	...	...	...
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27	...	...	...
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31	...	...	...
32	...	...	...
33	...	...	...
34	...	...	...
35	...	...	...
36	...	...	...
37	...	...	...
38	...	...	...
39	...	...	...
40	...	...	...
41	...	...	...
42	...	...	...
43	...	...	...
44	...	...	...
45	...	...	...
46	...	...	...
47	...	...	...
48	...	...	...
49	...	...	...
50	...	...	...

SHEET 4 OF 5

**ALLEN ORGAN CO.**  
 MACUNGIE, PENNA.

SCHEMATIC FOR  
 ALYSOND SCANNER

DATE	BY	APPROVED
11-21-74	...	...



- Z32 - 4006 PIN 14, +5V - PIN 7, -5V
- Z37 - 4030 PIN 14, -5V - PIN 7, -5V
- Z41 - 4016 PIN 14, -5V - PIN 7, -5V
- Z47 - 3600 PINS 4, 7, -5V - 2, 11, +5V
- Z46 - 1458 PIN 9, +12V - PIN 4, +12V

ALL DIODES ARE 232-0006

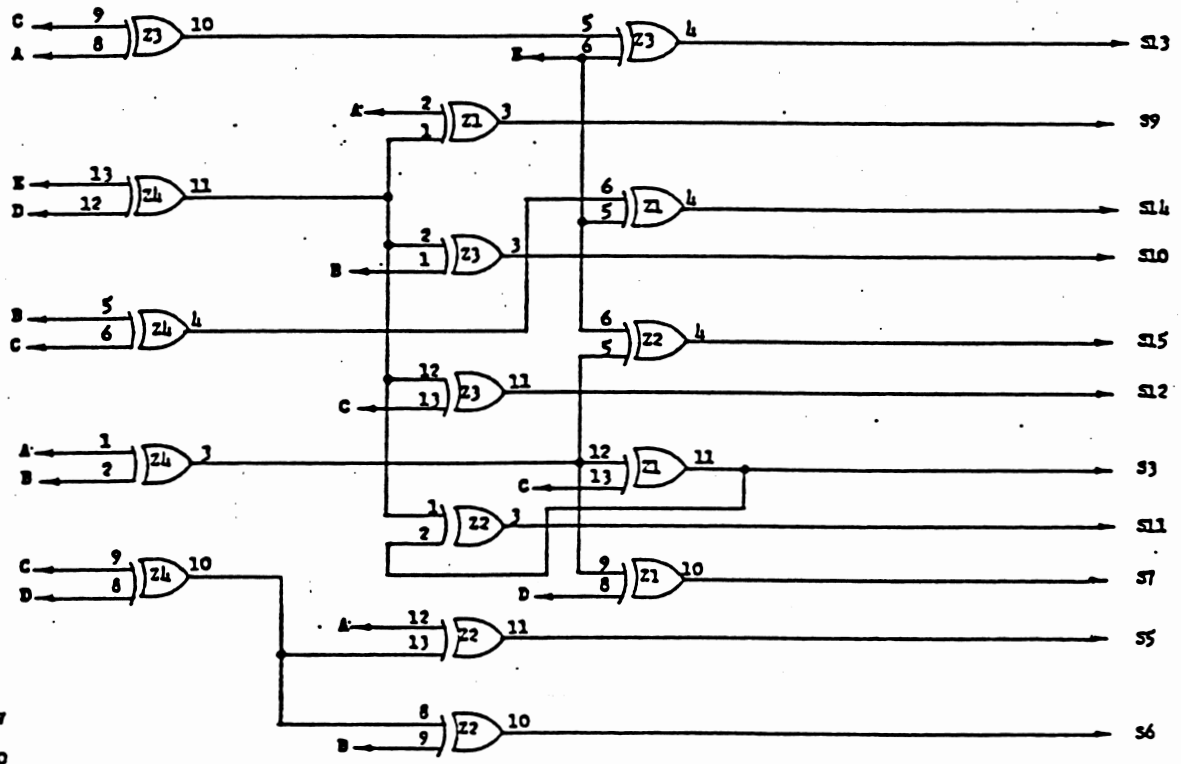
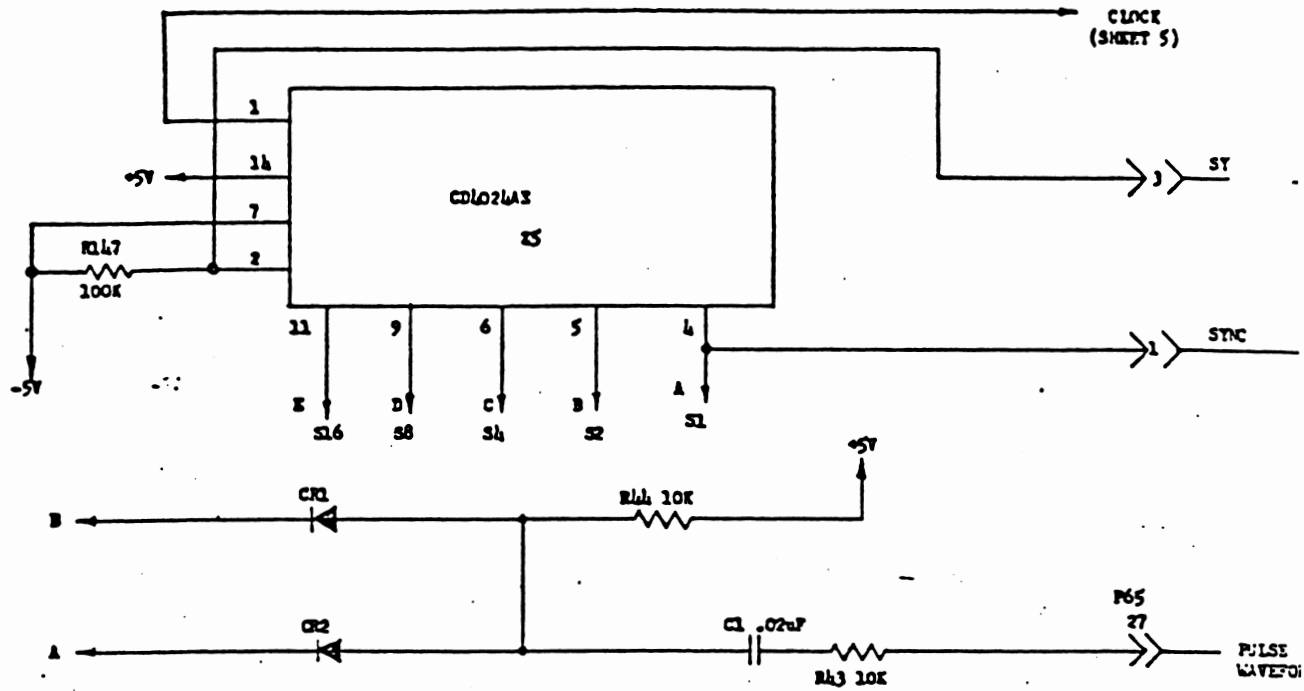
REVISIONS	DATE	BY	DESCRIPTION
1	11-15-73	BLK	GEN. REV. BY
2	12-12-73	BLK	GEN. REV. BY
3	1-27-74	LT	GEN. REV. BY
4	2-4-74	LT	GEN. REV. BY
5	2-23-74	LT	GEN. REV. BY
6	4-22-74	LT	GEN. REV. BY
7	6-5-74	LT	GEN. REV. BY
8	10-7-74	LT	GEN. REV. BY
9	ECO-74-07R	LT	GEN. REV. BY

SHEET 5 OF 5

**ALLEN ORGAN CO.**  
 MACUNGIE, PENNA.  
 SCHEMATIC FOR  
 KEYBOARD SCANNER

DT	DATE	BY	REV.
11-29-73	7-73		





Z1,2,3, = 4013  
 PIN 7 to -5V  
 PIN 14 to +5V

Z4,5,6,7 = 4070  
 PIN 7 to -5V  
 PIN 14 to +5V

Z8 = 4011  
 PIN 7 to -5V  
 PIN 14 to +5V

FOR SERIAL NO'S  
 109 AND HIGHER

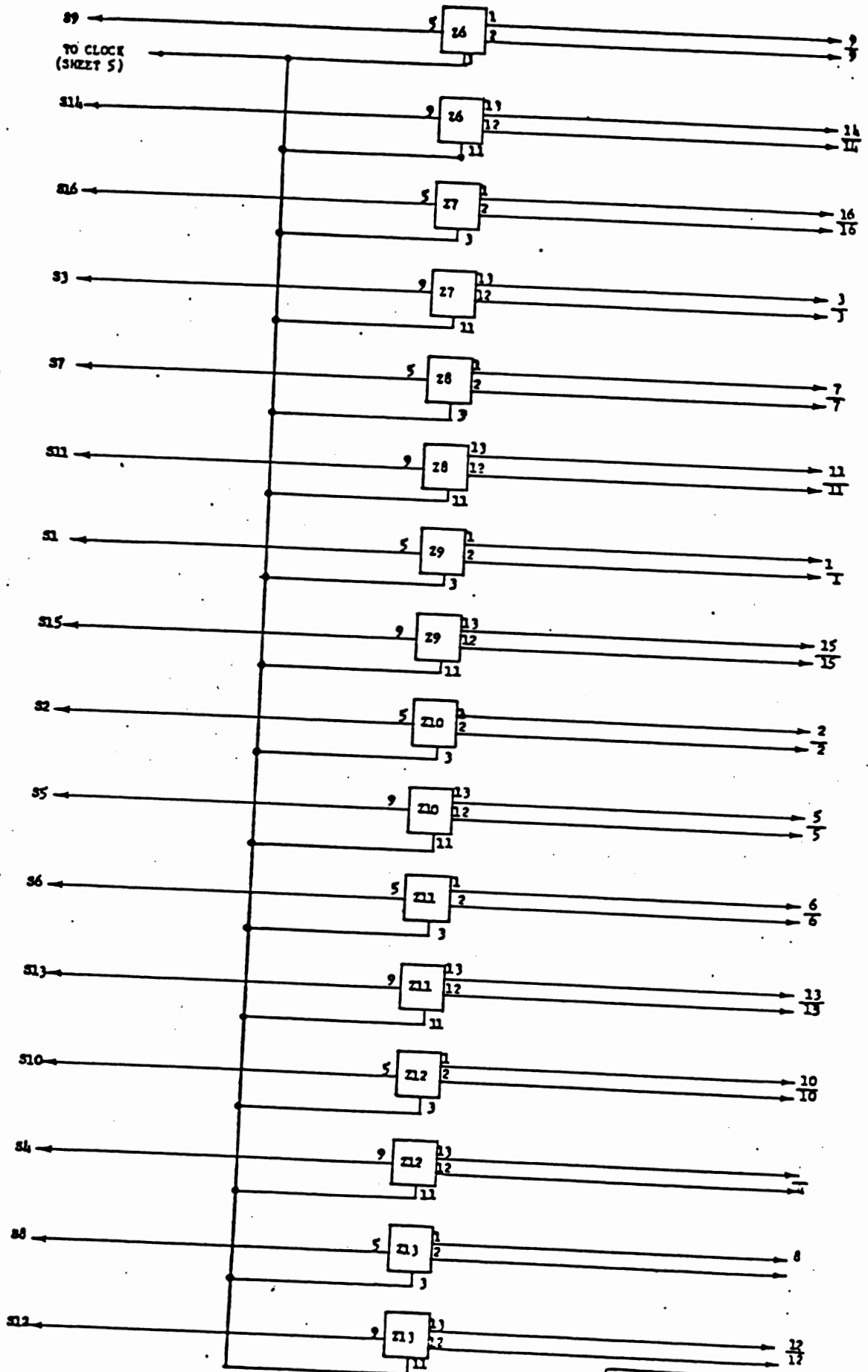
PAGE 1 of 5

REV: 5/63  
 SYNC CON TRCL  
 ALL: H  
 10071-066  
 O.S. 9/12/74

**ALLEN ORGAN CO.**  
 MACUNGIE, PENNA.

HARMONIC OPERATOR FOR SYNTHESIZER

BY	O.S.	DATE	8/27/74
CHKD	1.9.76	DATE	12/20



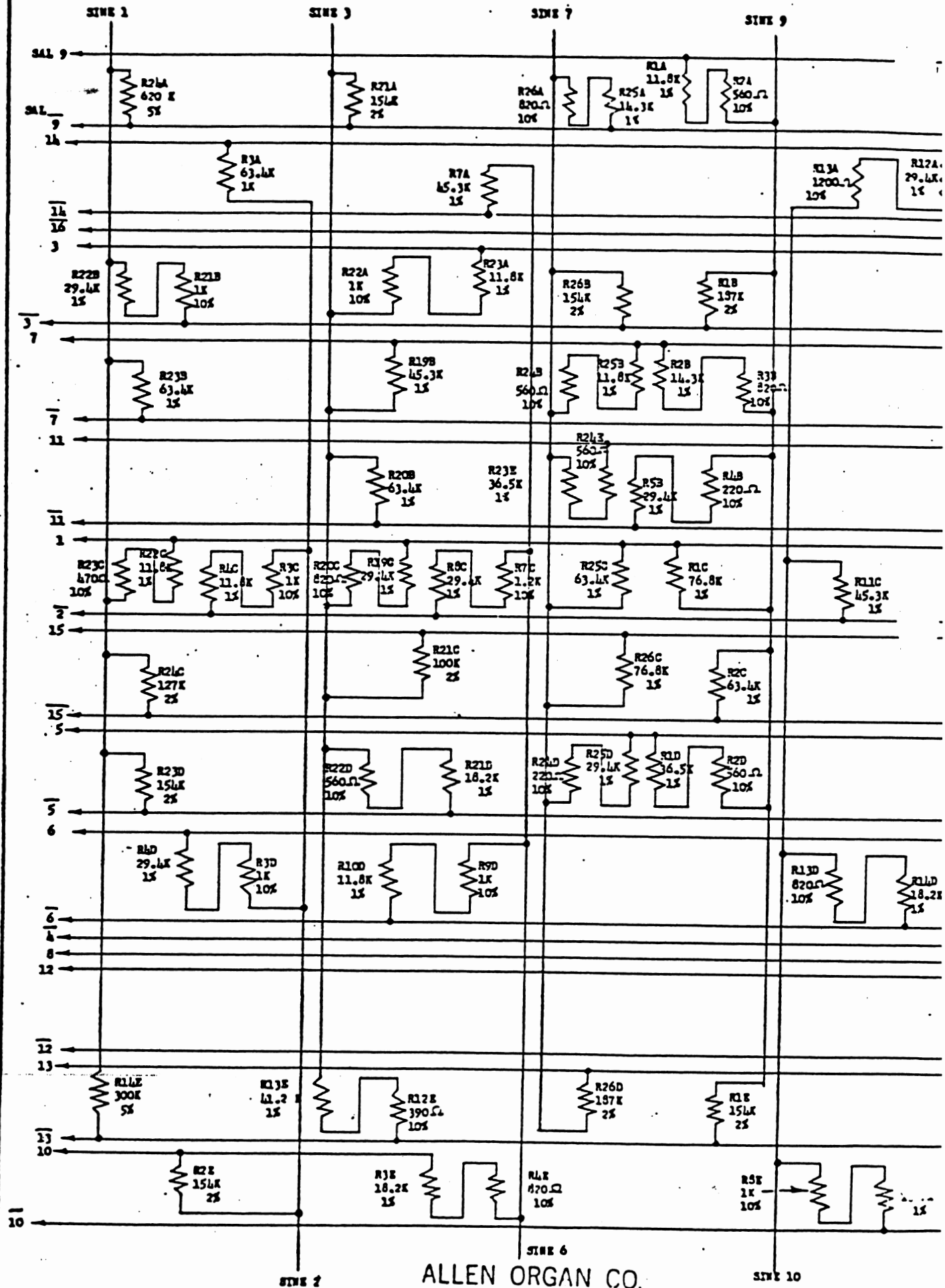
29 Thru 33 = 400  
 PIN 14 to -5V  
 PIN 4,6,7,8 and 10 to -5V

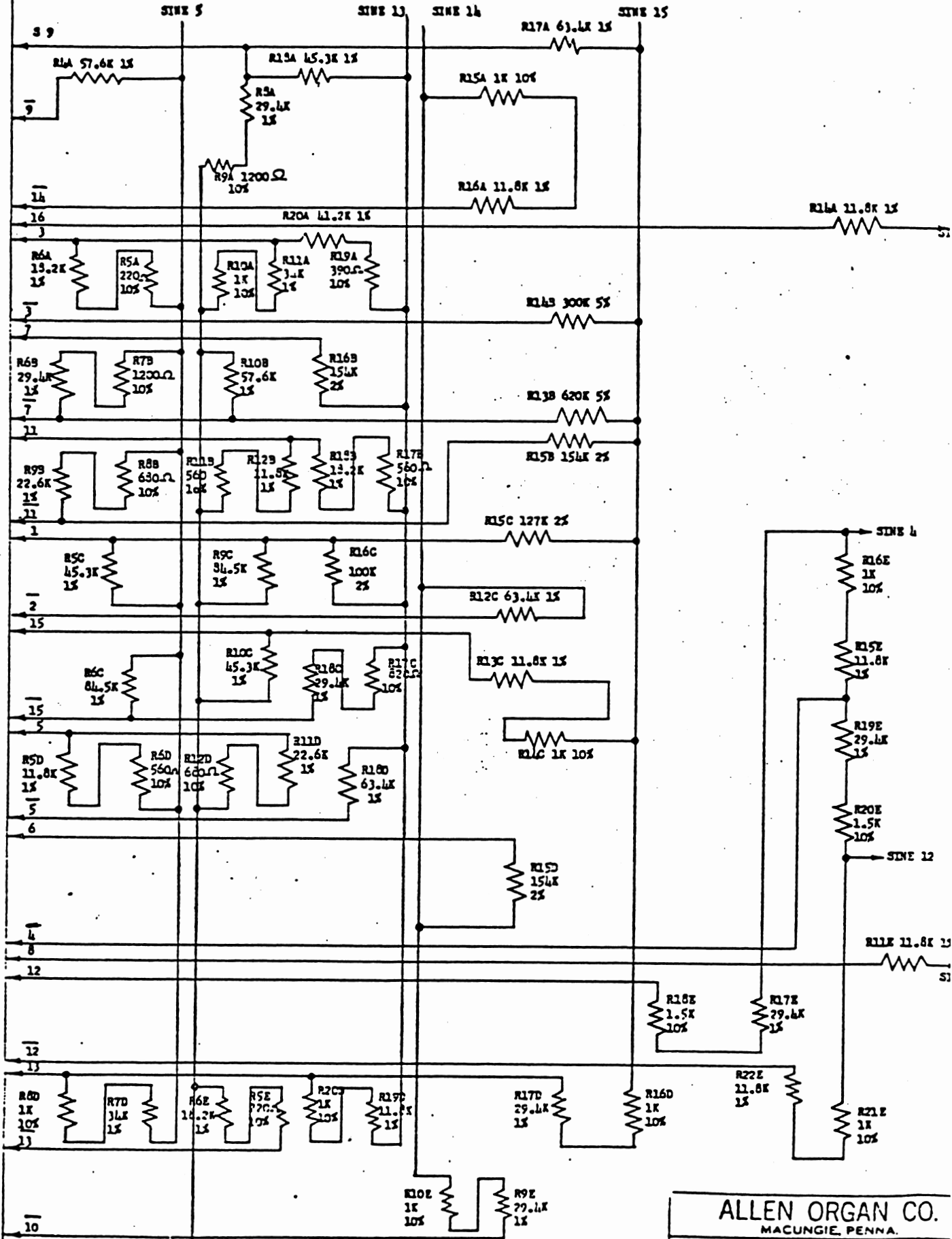
**ALLEN ORGAN CO.**  
 MACUNGIE, PENN.A.

HARMONIC GENERATOR FOR SYNTHESIZER

BY G.S.      DATE      SERIAL NO.

7/20/72      807711      1001 0000



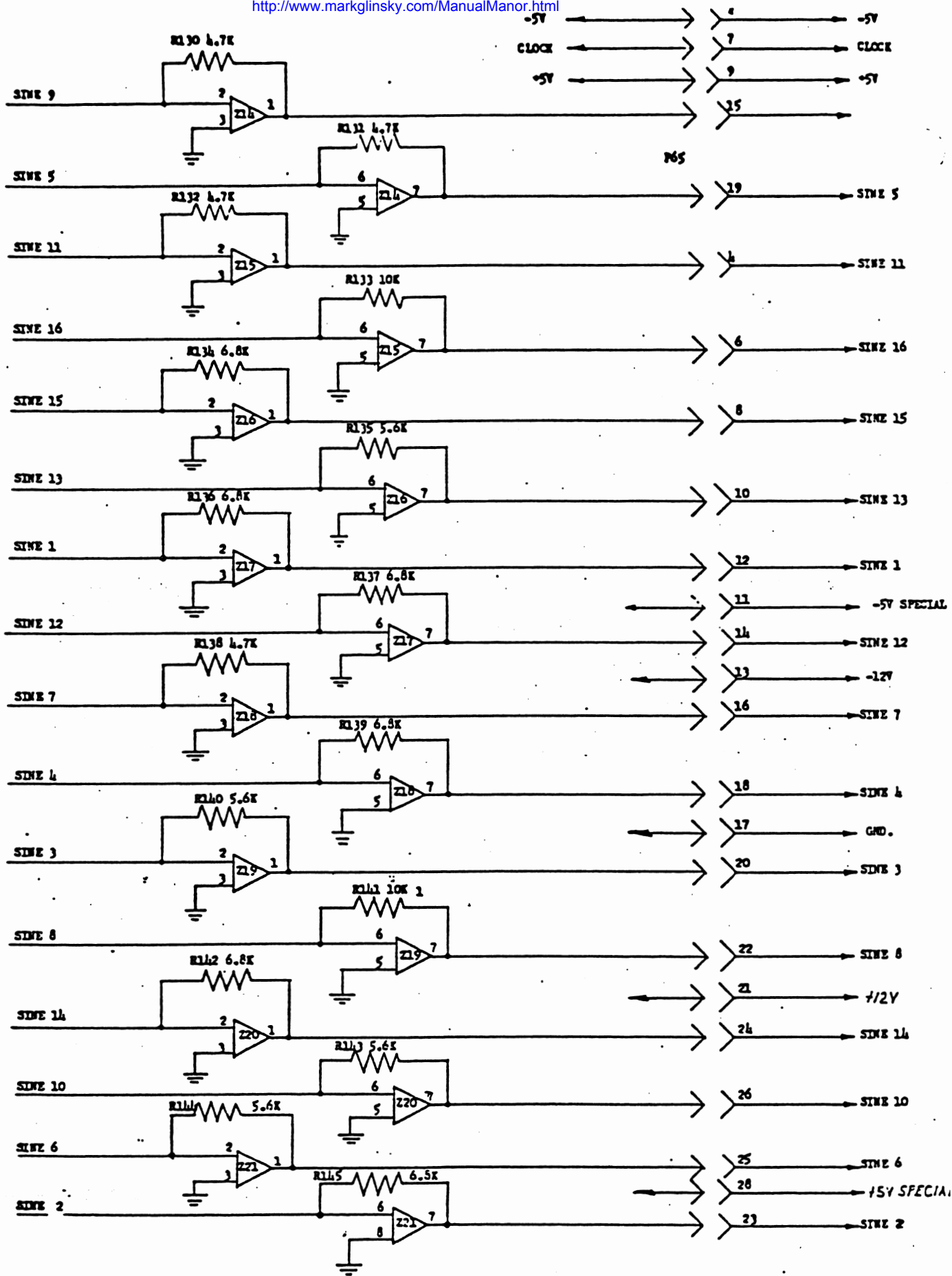


**ALLEN ORGAN CO.**  
 MACUNGIE, PENNA.

HARMONIC GENERATOR FOR SYNTHESIZER

BY G.S.	DATE	REVISION
REV 9.11.72	9/11/74	





SHEET 5 OF 5

REVISIONS

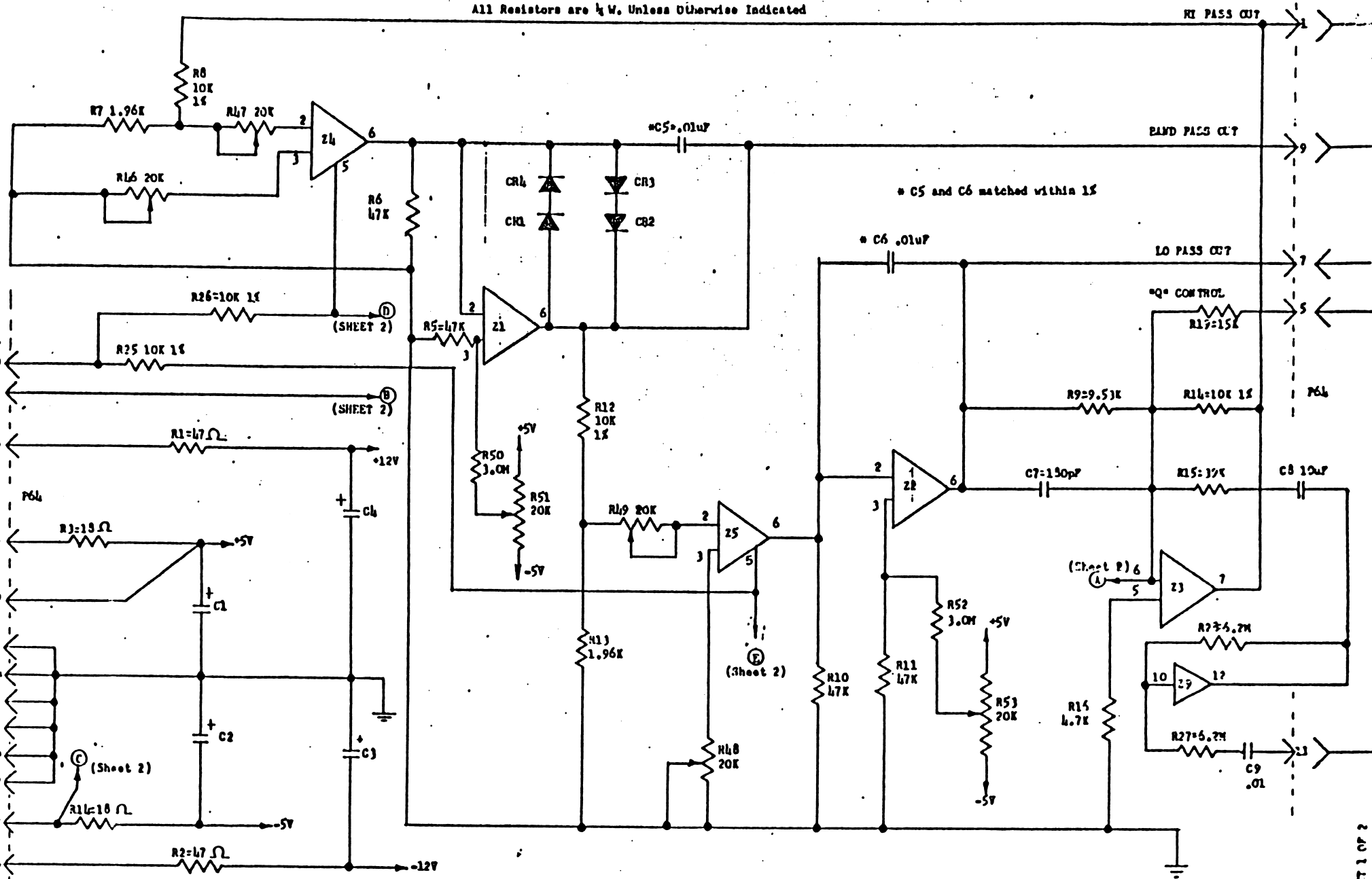
Z31 THRU Z38:MSB  
 PIN 4 TO -12V  
 PIN 6 TO +12V

ALLEN ORGAN CO.  
 MACUNGIE, PENNA.

HARMONIC GENERATOR-SYNTHESIS

REV. 6.5	DATE 7-74	BY
DESIGNED BY	DATE	BY
CHECKED BY	DATE	BY

All Resistors are 1/4 W. Unless Otherwise Indicated



FOR SERIAL NO'S 109 AND HIGHER

SHEET 1 OF 2

		+12V	-12	+5	-5	OV
21, 22	1M107H, W	7	4			
23, 24	MC1458CP1	8	4			
24, 25	CA 3090			7	4	
26	4016			14	7	

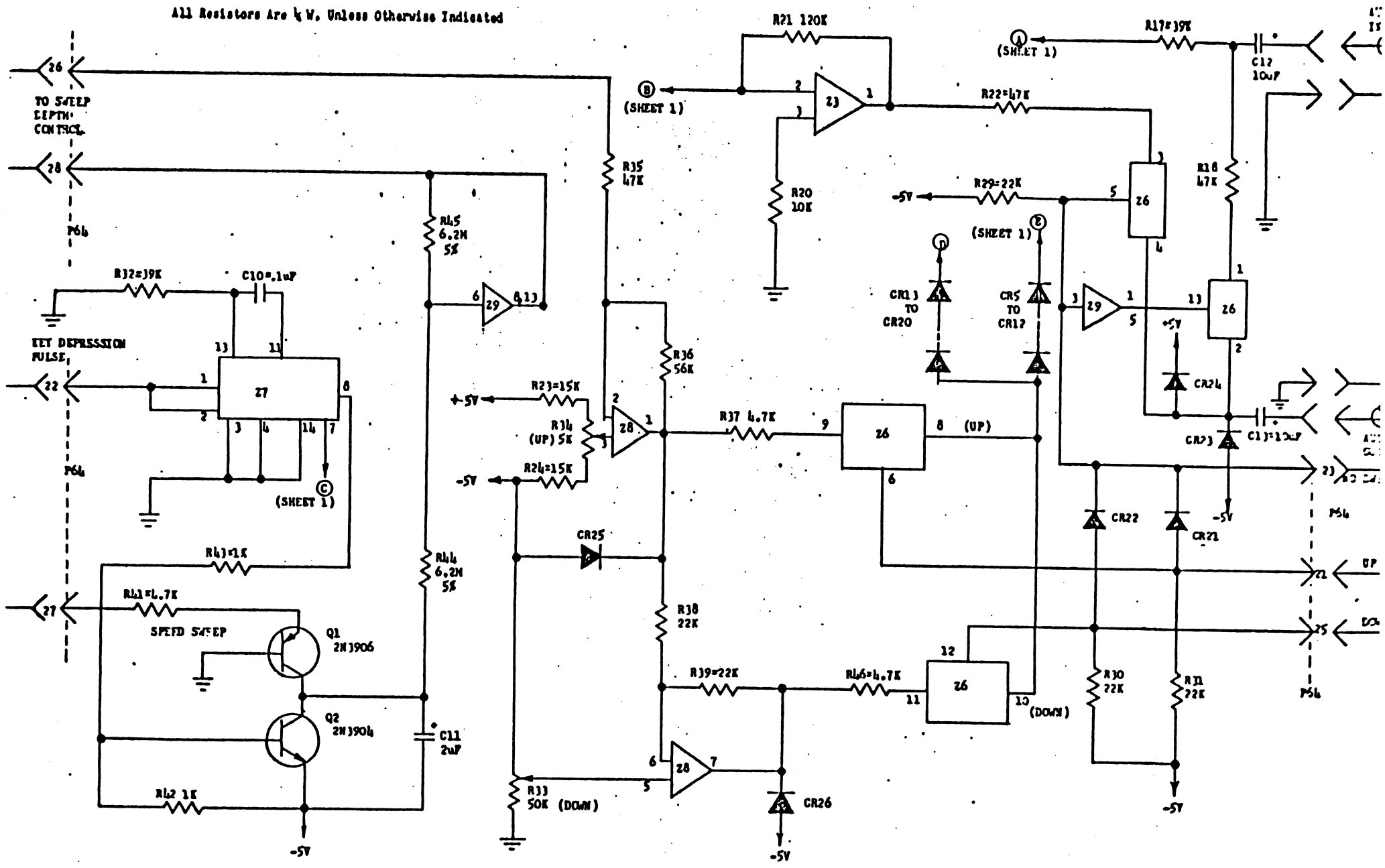
**ALLEN ORGAN CO.**  
 MACON, GEORGIA

DYNAMIC FILTER FOR SYNTHESIZERS

BY: [ ] CHECKED: [ ]

G.S. 8/20/76

All Resistors Are 1/4 W. Unless Otherwise Indicated

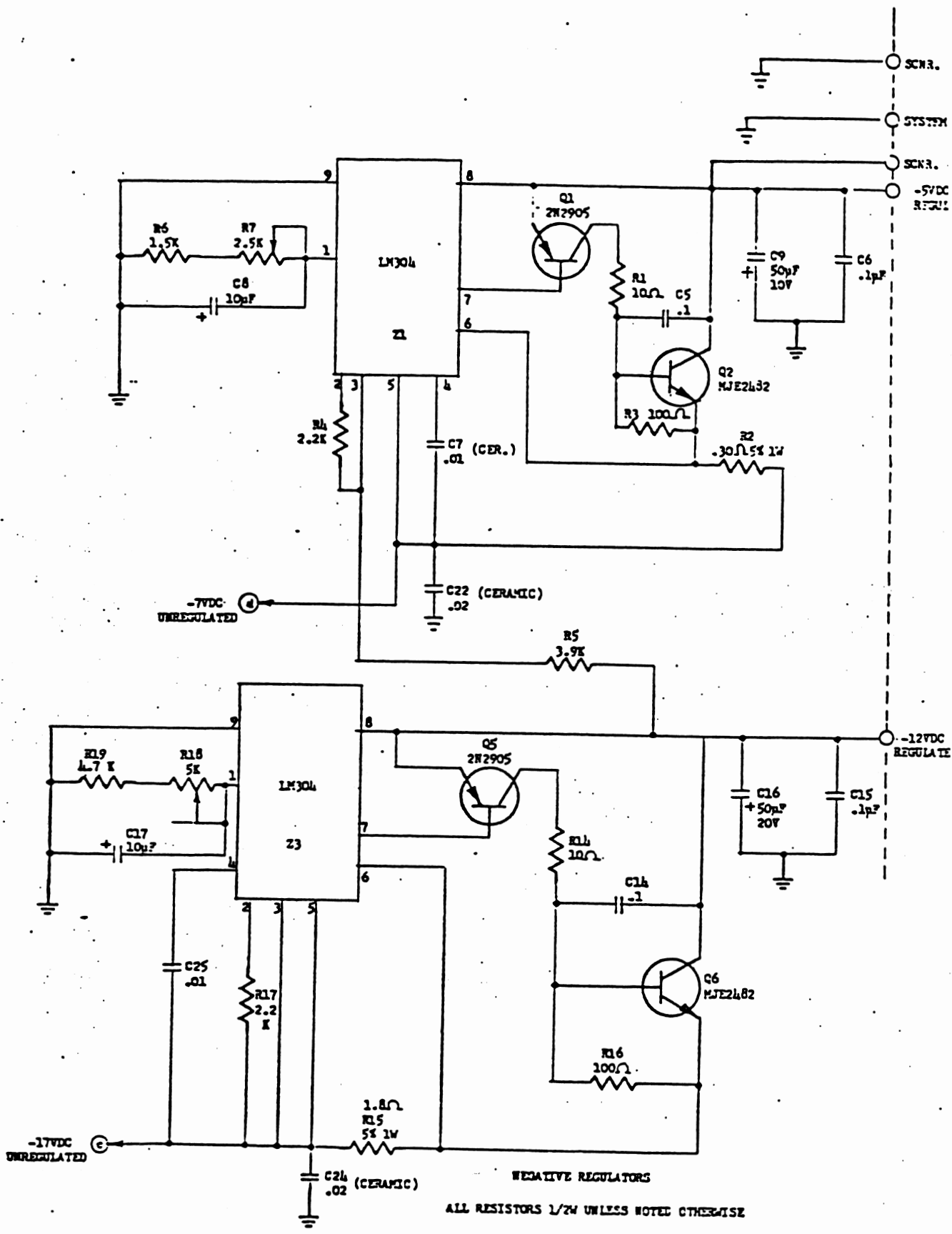


FOR SERIAL NO'S 104 AND NEWER

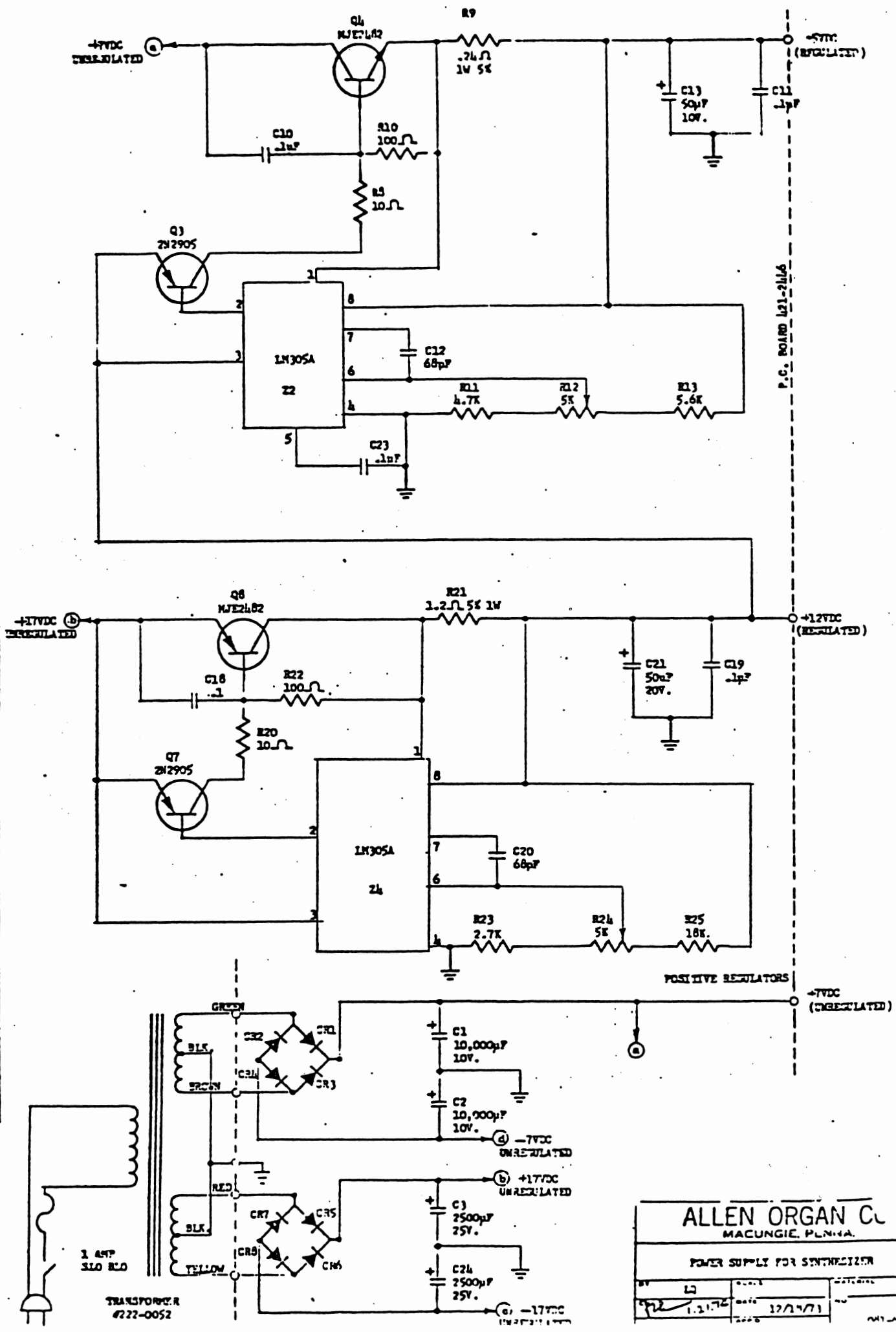
**ALLEN ORGAN CO.**  
 MACUNGIE, PENNSA.

DYNAMIC FILTER FOR SYNTHESIZER

REV. 1-5-71







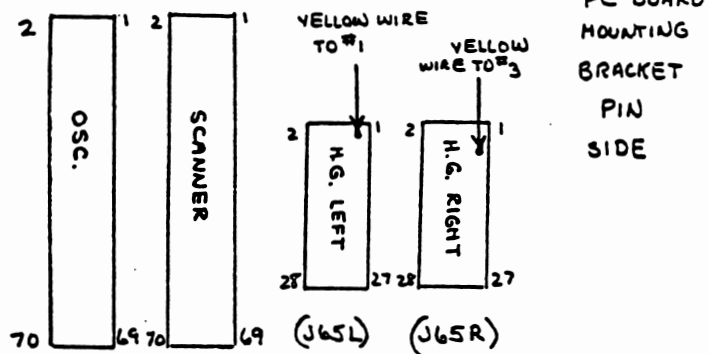
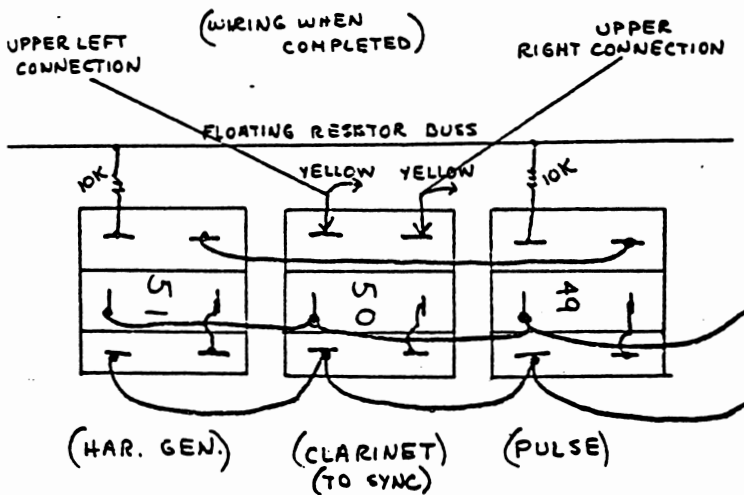
**ALLEN ORGAN CO**  
 MACUNGIE, PENNSA.

POWER SUPPLY FOR SYNTHESIZER

BY	LD	DATE	12/24/71
12	1.2.172	DATE	12/24/71

## HARMONIC SYNTHESIZER

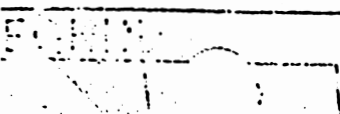
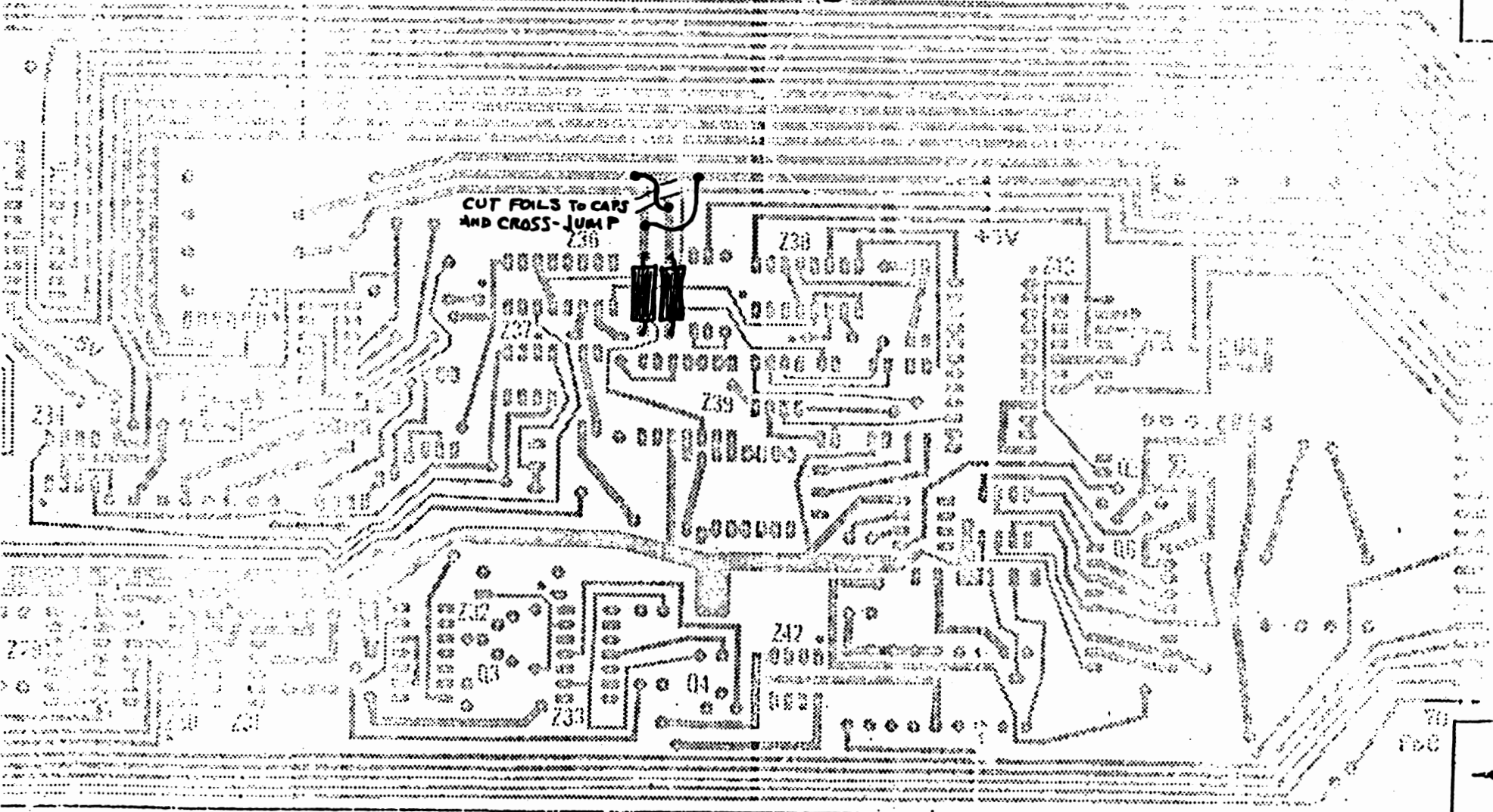
1. With the under side of switch panel facing repairman, remove white wire from top left Clarinet (#50) switch connection and solder same wire to physically floating resistor buss line.
2. Jumper line connected to upper right connection Clarinet #50 must by-pass Clarinet Switch #50. Jumper will now go from switch #51 to #9.
3. 10K resistor from upper left connector Clarinet #50 completely removed from circuit.
4. Add a yellow wire from each upper switch connection Clarinet #50 and attach to (a) left harmonic generator receptacle (J65L) Pin #1 and (b) right harmonic generator receptacle (J65R) Pin #3. It does not matter which wire goes to which connection.
5. Replace plastic tab cover and colored insert.



17  $\frac{3}{4}$

SOME RECENT HSs MAY EXHIBIT CROSS NOISE MODULATION FROM OPPOSITE VOICES. TO ELIMINATE, CUT FOILS LEADING TO C32+C33 ON OSCILLATOR BOARD AND ADD CROSS JUMPETSCS.

OSCILLATORS BOARD 421-2445 (D)

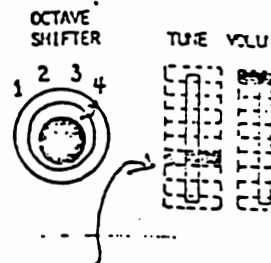
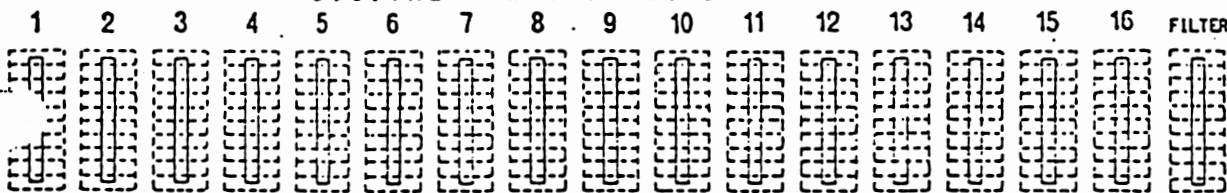


80115



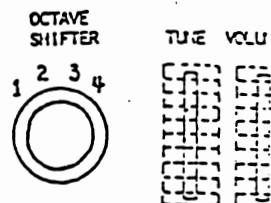
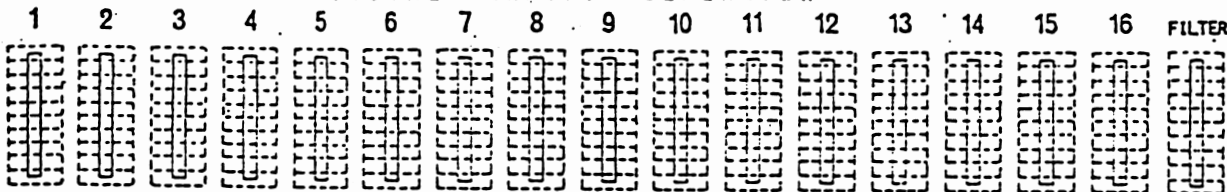
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



Set at Panel Mark - Critical

<input type="checkbox"/> HARMONIC GENERATOR					<input type="checkbox"/> CLARINET					<input type="checkbox"/> PULSE					<input type="checkbox"/> FLUTE					<input checked="" type="checkbox"/> REED					<input type="checkbox"/> HARMONIC GENERATOR					<input type="checkbox"/> SYNC					<input type="checkbox"/> PULSE					<input type="checkbox"/> FLUTE					<input type="checkbox"/> HORN					<input type="checkbox"/> REED				
NORMAL ATTACK DECAY										MODE DECAY										SEQUENCER SPEED PUSH ON-OFF										NORMAL ATTACK DECAY										MODE DECAY														
TREMULANT SHAPE					VIBRATO DEPTH OFF					TREMOLO DEPTH OFF					LFO RATE					TREMULANT SHAPE					VIBRATO DEPTH OFF					TREMOLO DEPTH OFF																								
PITCH BEND TIME DEPTH					DEPTH					NOISE FREQUENCY DEPTH					PITCH BEND TIME DEPTH					DEPTH																																		
PORTAMENTO SPEED OFF					DYNAMIC FILTER SWEEP UP DOWN NO SWEEP FILTER OFF										SPEED DEPTH TREMULANT Q OFF LOW HIGH OFF					LOW PASS BAND PASS HI PASS OFF OFF OFF					PORTAMENTO SPEED OFF																													

All controls NOT SHADED should be in MINIMUM or OFF position.

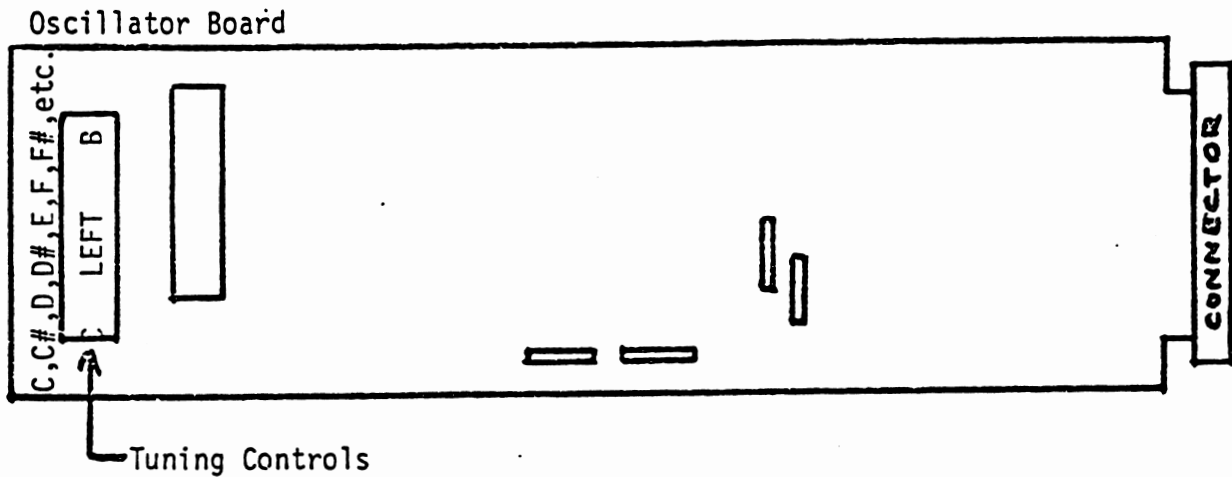
Open pedal to FULL position and insert a wedge in C2.  
Adjustment instructions are on the following page.



## Scale Tuning - Left Voice

Tuning Standard: "C" thru "B" - "A" 440 hz octave.

Tuning forks, strobe device, or other fixed instrument.



Procedure: Starting with C2 key, zero beat synthesizer with standard.  
Continue thru C#2, D2, D#2, etc. up to B2.

Note: If all controls appear to be flat or all controls appear to be sharp, check the Tuning Spread adjustment. Be sure that the Tuning Slider is exactly on the "A" 440 hz mark.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

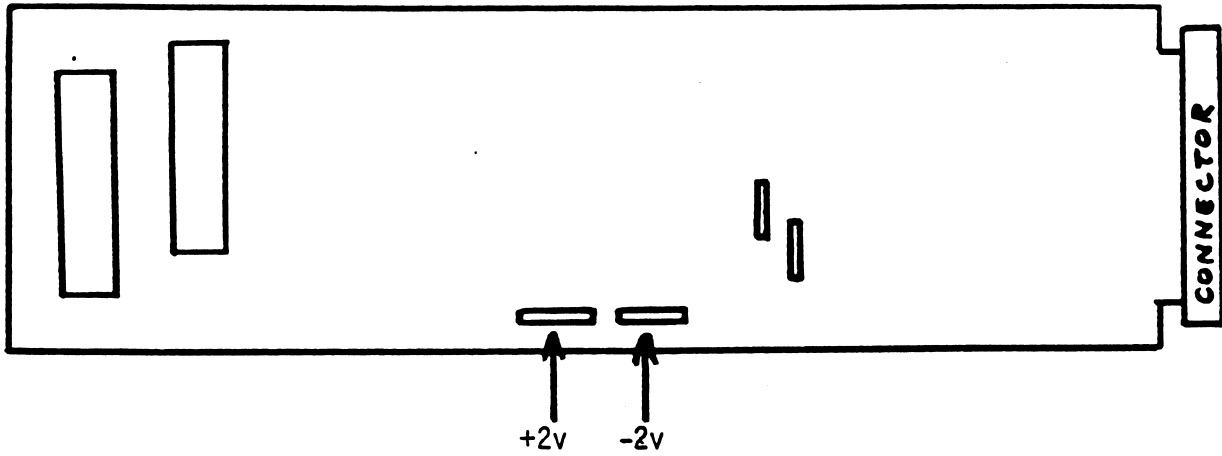
2 3 4

TUNE VOLUME

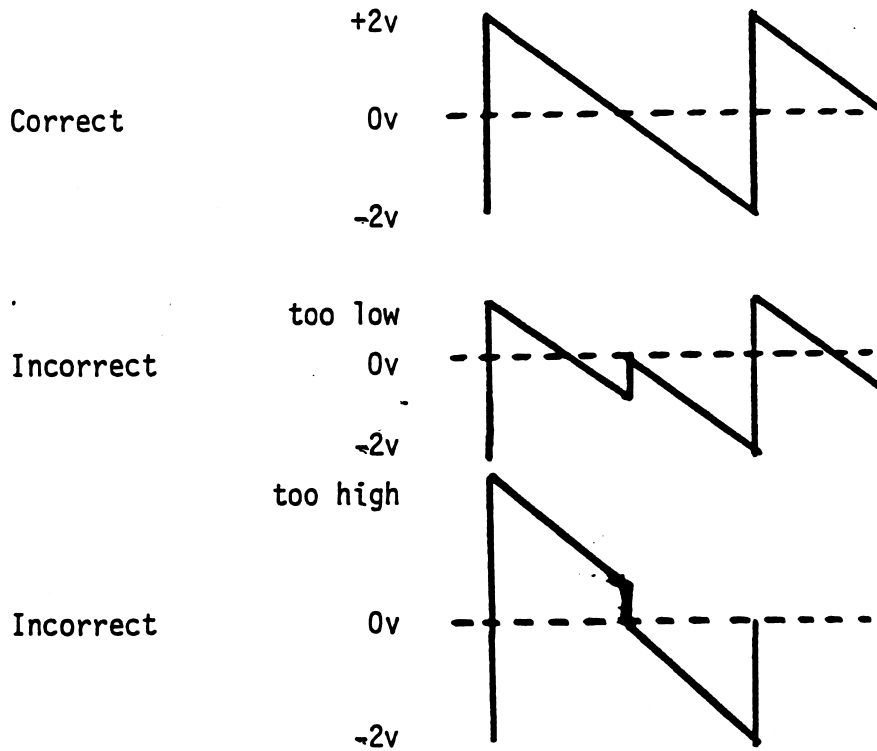
HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL			MODE	PERCUSSION	SEQUENCER	NORMAL			MODE	PERCUSSION
ATTACK	DECAY			DECAY	SPEED	ATTACK	DECAY			DECAY
					PUSH ON-OFF					
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH		LFO RATE		TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH		
	OFF	OFF					OFF	OFF		
PITCH BEND			DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND			DEPTH	
TIME	DEPTH		OFF		OFF	TIME	DEPTH		OFF	
OFF	FLAT SHARP					OFF	FLAT SHARP			
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN			OFF	LOW HIGH OFF	OFF	OFF	OFF	OFF
	NO SWEEP									
	FILTER OFF									

LFO Ramp Linearity - Left/Right (common to both voices)

Oscillator Board

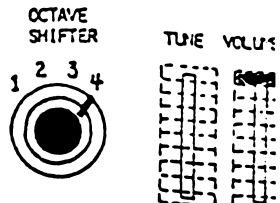
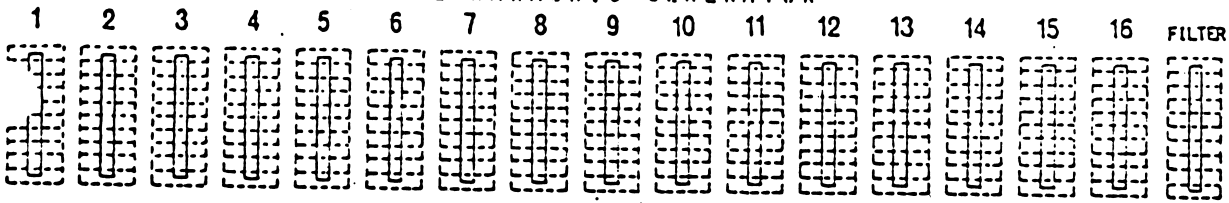


Procedure: Adjust +2v and -2v for smooth fall in pitch.



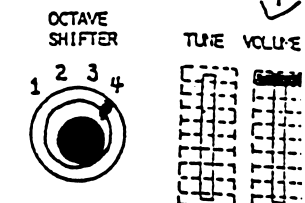
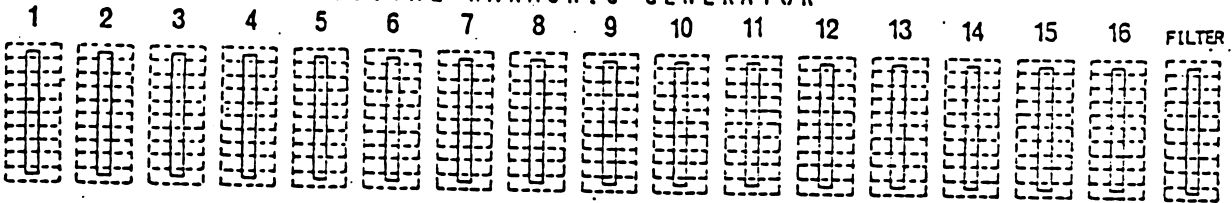
# LEFT

## DIGITAL HARMONIC GENERATOR

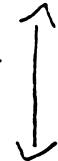


# RIGHT

## DIGITAL HARMONIC GENERATOR



Alternate



HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN		CLARINET	PULSE	FLUTE	HORN		
NORMAL		MODE		SEQUENCER		NORMAL		MODE		
ATTACK	DECAY	PERCUSSION	DECAY	SPEED	ATTACK	DECAY	PERCUSSION	DECAY		
PUSH ON-OFF					PUSH ON-OFF					
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	
	OFF	OFF			OFF	OFF			OFF	
PITCH BEND		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		
TIME	DEPTH	DEPTH		DEPTH	TIME	DEPTH	DEPTH			
OFF	FLAT SHARP	OFF		OFF	OFF	FLAT SHARP	OFF			
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO	
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN			OFF	LOW HIGH	OFF	OFF	OFF	OFF
	NO SWEEP									
	FILTER OFF									

All controls NOT SHADED should be in MINIMUM or OFF position.

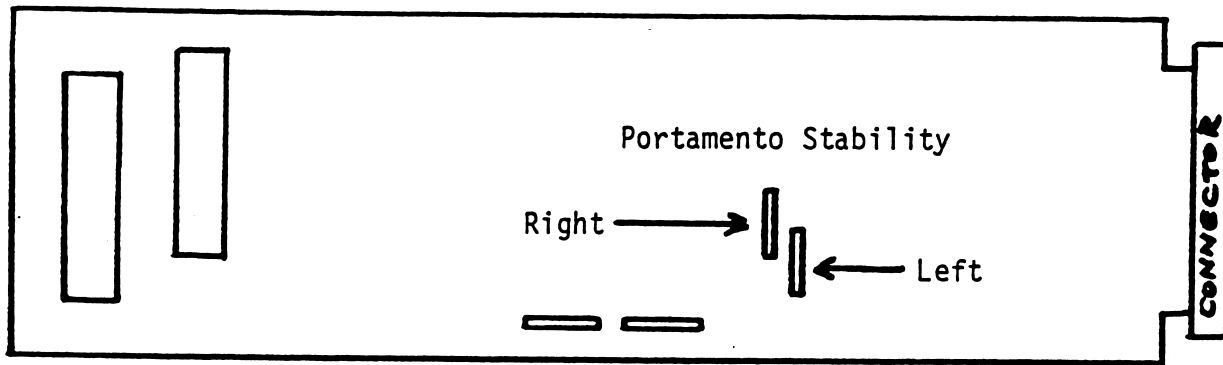
Open pedal to FULL position and insert wedge in C<sub>2</sub>.

Adjustment instructions are on the following page.



## Portamento Stability - Left / Right

### Oscillator Board



Raise corresponding Volume Slider (left/right) one at a time.  
Be sure that you are hearing only ONE VOICE at a time.

Procedure: Turn control (while holding down Touch Bar) until  
noise appears.  
Turn back very slowly until noise stops.  
Turn back 1/8 turn additional.

Repeat procedure for other voice.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

Alternate

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN		SYNC	PULSE	FLUTE	HORN	
NORMAL		MODE		SEQUENCER		NORMAL		MODE	
ATTACK	DECAY	PERCUSSION	DECAY	SPEED	ATTACK	DECAY	PERCUSSION	DECAY	
PUSH ON-OFF									
TREMULANT SHAPE			VIBRATO DEPTH		LFO RATE		TREMULANT SHAPE		
OFF			OFF		OFF		OFF		
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH	
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH
OFF	FLAT	SHARP	OFF	OFF	OFF	OFF	OFF	FLAT	SHARP
PORTAMENTO		DYNAMIC FILTER						PORTAMENTO	
SPEED		SWEEP		SPEED		DEPTH		TREMULANT	
OFF		UP		OFF		OFF		OFF	
		DOWN		OFF		LOW		LOW	
		NO SWEEP		OFF		HIGH		HIGH	
		FILTER OFF		OFF		OFF		OFF	
				LOW PASS		BAND PASS		HI PASS	
				OFF		OFF		OFF	
								SPEED	
								OFF	

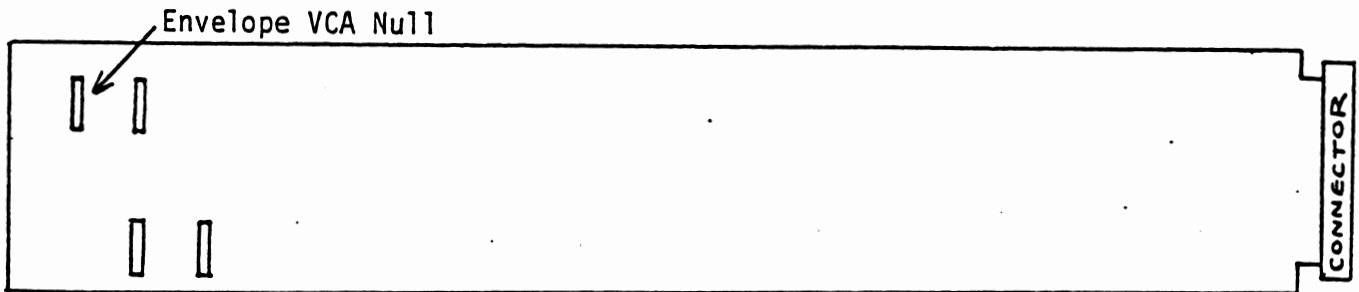
All controls NOT SHADED should be in MINIMUM or OFF position.

Open pedal to FULL position and insert wedge in C<sub>2</sub>.

Adjustment instructions are on the following page.

### Envelope VCA Null:

Note: Tremolo VCA Null procedure should be performed BEFORE performing the Envelope VCA Null procedure.



(rear view of Harmonic Generator slider panel)

Procedure: Adjust blue trimpot "Envelope VCA Null" until "thumps" or "clicks" are minimized.

Left and Right boards are identical. Repeat procedure for each board, raising corresponding Volume slider. Be sure you are listening to only ONE SIDE at a time.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

Alternate



HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN	REED	CLARINET	PULSE	FLUTE	HORN	REED
NORMAL		PERCUSSION		SEQUENCER	NORMAL		PERCUSSION		
ATTACK	DECAY	MODE	DECAY	SPEED	ATTACK	DECAY	MODE	DECAY	
PUSH ON-OFF									
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	TREMOLO DEPTH
OFF	OFF	OFF		OFF	OFF	OFF		OFF	OFF
PITCH BEND		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND	
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH
OFF	FLAT SHARP	OFF	OFF	OFF	OFF	OFF	FLAT SHARP	OFF	FLAT SHARP
PORTAMENTO	DYNAMIC FILTER								PORTAMENTO
SPEED	SWEEP	SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP DOWN NO SWEEP FILTER OFF	OFF	OFF	OFF	LOW HIGH OFF	OFF	OFF	OFF	OFF

All controls NOT SHADED should be in MINIMUM or OFF position.

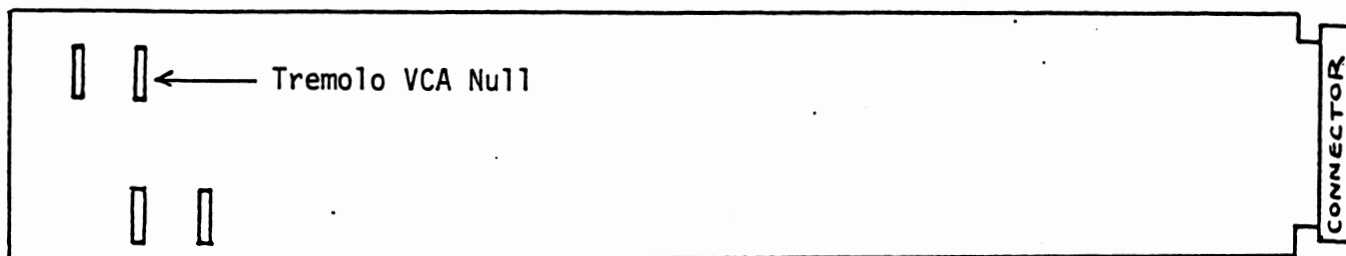
Open volume to FULL position and insert wedge in key.

Adjustment instructions are on the following page.



Tremolo VCA Null:

note: Left and Right boards are identical. Repeat procedure for each board, raising corresponding Volume slider. Be sure you are listening to only ONE SIDE at a time.



(rear view of Harmonic Generator slider panel)

Procedure: Adjust blue trimpot "Tremolo VCA Null" until "thumps" or "clicks" are minimized.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER  
1 2 3 4

TUNE VOLU

Alternate

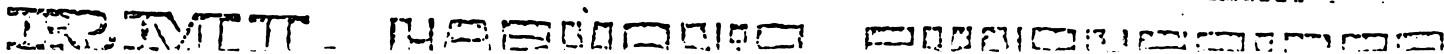


HARMONIC GENERATOR		CLARINET		PULSE		FLUTE		HORN		REED		HARMONIC GENERATOR		SYNC		PULSE		FLUTE		HORN		REED	
NORMAL ATTACK DECAY		MODE PERCUSSION DECAY		SEQUENCER SPEED PUSH ON-OFF		NORMAL ATTACK DECAY		MODE PERCUSSION DECAY															
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH											
PITCH BEND TIME DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME DEPTH		DEPTH													
PORTAMENTO SPEED		SWEEP UP DOWN NO SWEEP FILTER OFF		SPEED DEPTH		TREMULANT Q		LOW PASS BAND PASS HI PASS		PORTAMENTO SPEED													

All controls NOT SHADED should be in MINIMUM or OFF position.

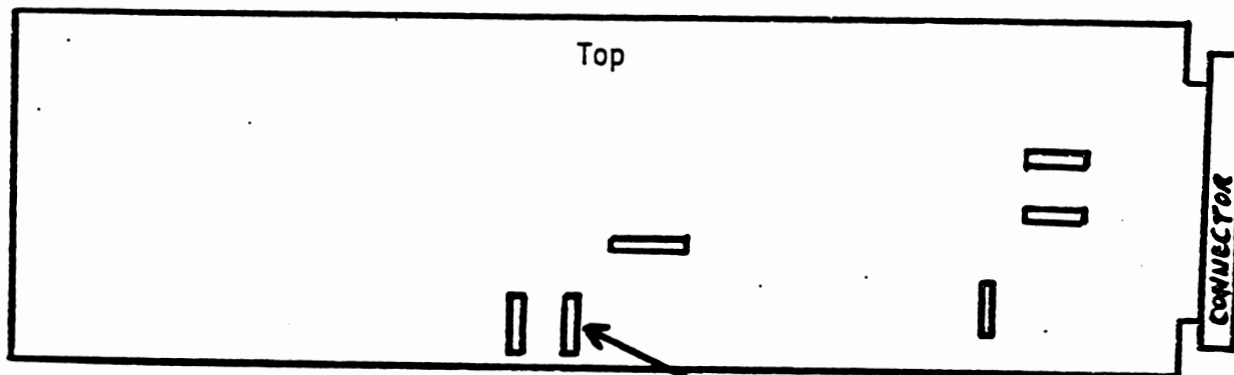
Open volume pedal to FULL position and insert wedge in key.

Adjustment instructions are on the following page.



Right "Normal" Envelope Generator Cut-Off:

Keyboard Scanner



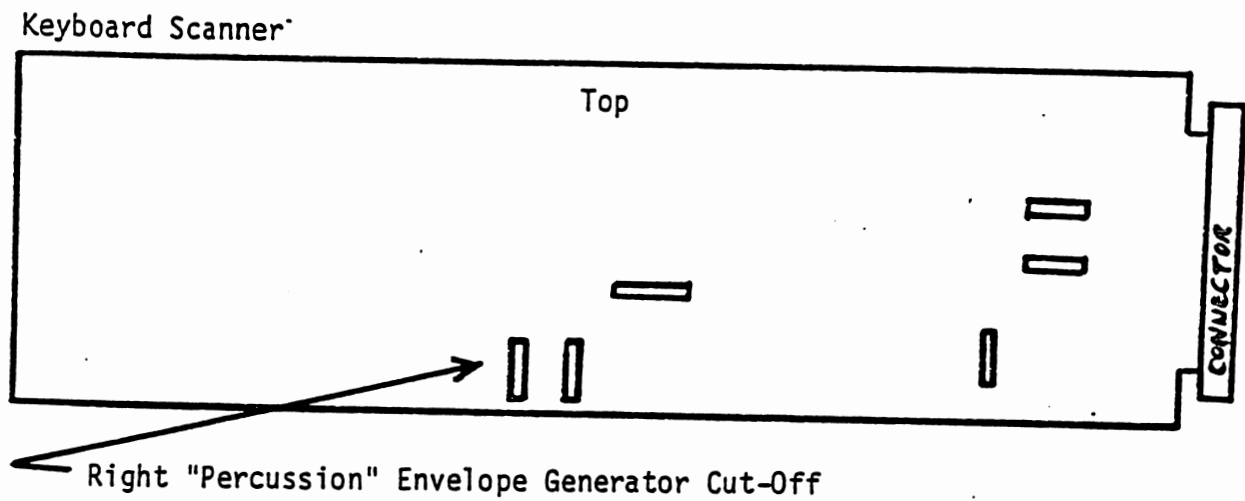
Right "Normal" Envelope Generator Cut-Off

Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.





Right "Percussion" Envelope Generator Cut-Off:



Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

TUNE VOLU

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

TUNE VOLU

HARMONIC GENERATOR					HARMONIC GENERATOR					SYNC		PULSE		FLUTE		HORN		●	
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION		ATTACK		DECAY		DECAY	
ATTACK		DECAY		DECAY		SPEED		ATTACK		DECAY		DECAY		DECAY		DECAY		DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF	
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND		DEPTH		PITCH BEND		DEPTH		DEPTH	
TIME		DEPTH		DEPTH		DEPTH		DEPTH		TIME		DEPTH		TIME		DEPTH		DEPTH	
OFF		FLAT SHARP		OFF		OFF		OFF		OFF		FLAT SHARP		OFF		FLAT SHARP		OFF	
PORTAMENTO		DYNAMIC FILTER										PORTAMENTO							
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF	

All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position. DO NOT hold any keys.

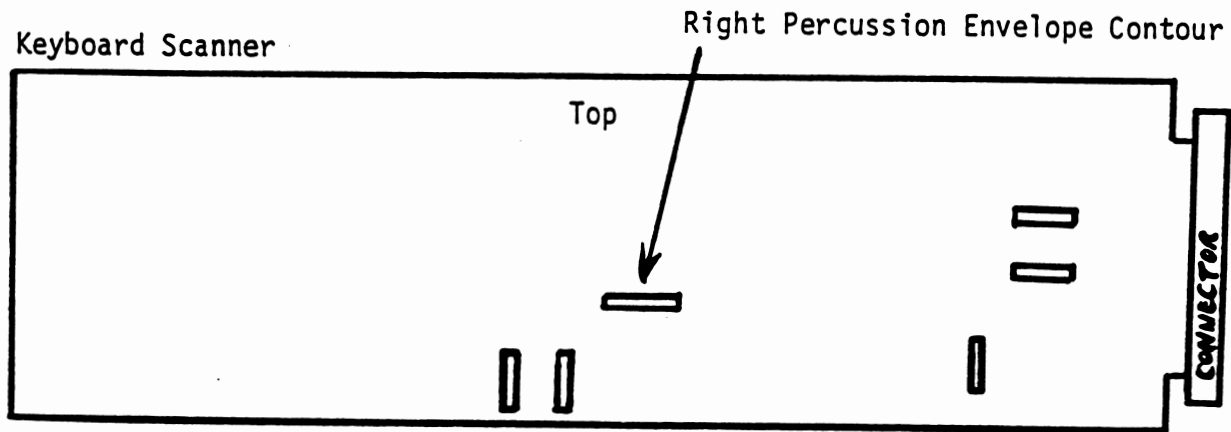
Adjustment instructions are on the following page.

SET-UP SHEET - TITLE RIGHT "PERCUSSION" ENVELOPE GENERATOR NUMBER TAP-11  
CUT=OFF

TOP LEFT TO RIGHT

## Right Percussion Envelope Contour

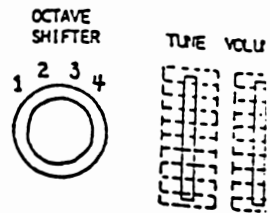
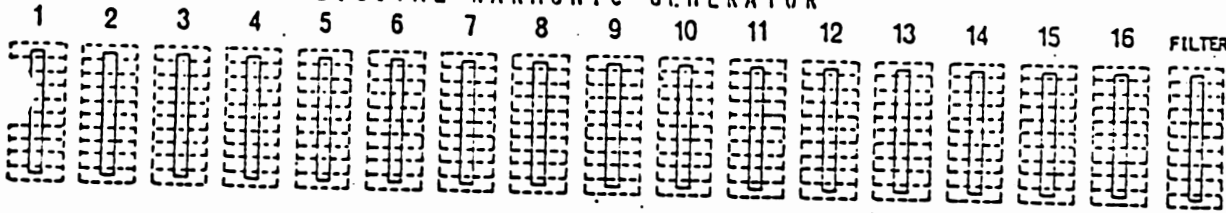
NOTE: Any adjustments made here will require a RE-ADJUSTMENT of the Right Percussion Envelope Generator Cut-Off (See Procedure).



Procedure: Same as for Left Voice.

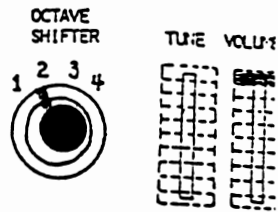
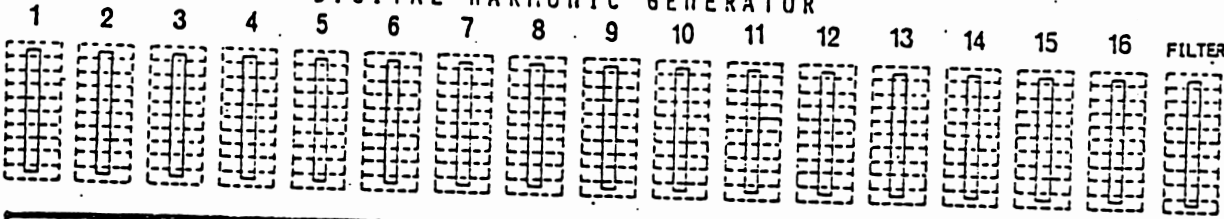
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR

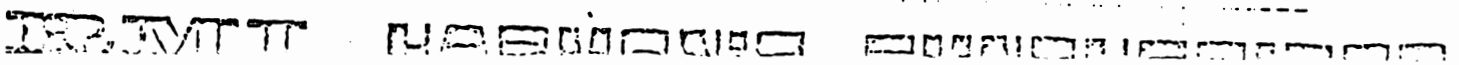


HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	
NORMAL		PERCUSSION		SEQUENCER	NORMAL		PERCUSSION		
ATTACK	DECAY	MODE	DECAY	SPEED	ATTACK	DECAY	MODE	DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		LFO RATE	TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH
PITCH BEND TIME		PITCH BEND DEPTH		NOISE FREQUENCY	PITCH BEND TIME		PITCH BEND DEPTH		
PORTAMENTO		DYNAMIC FILTER					PORTAMENTO		
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS
OFF	UP	DOWN	NO SWEEP	OFF	LOW	HIGH	OFF	OFF	OFF
	FILTER OFF								

All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to "FULL" position and REPEAT A KEY.

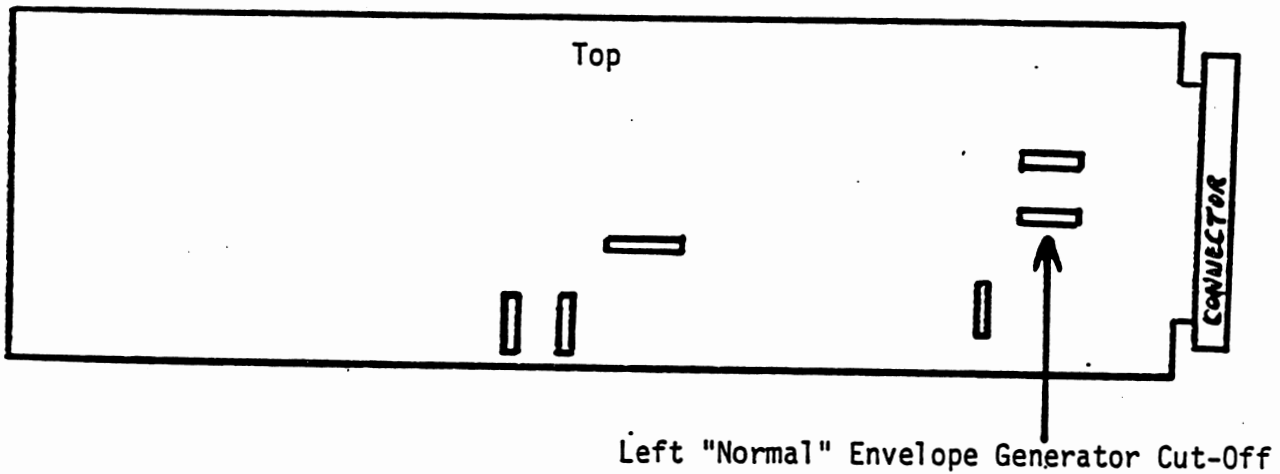
Adjustment instructions are on the following page.





Left "Normal" Envelope Generator Cut-Off:

Keyboard Scanner



Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLL

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLL

HARMONIC GENERATOR					HARMONIC GENERATOR														
CLARINET	PULSE	FLUTE	HORN		SYNC	PULSE	FLUTE	HORN	REED										
NORMAL ATTACK		MODE PERCUSSION		SEQUENCER SPEED		NORMAL ATTACK		MODE PERCUSSION											
DECAY		DECAY		PUSH ON-OFF		DECAY		DECAY											
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH									
PITCH BEND TIME		DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		DEPTH							
FLAT SHARP		OFF		OFF		OFF		OFF		FLAT SHARP		OFF							
PORTAMENTO		DYNAMIC FILTER								PORTAMENTO									
SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		SPEED	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF	

All controls NOT SHADED should be in MINIMUM or OFF position.

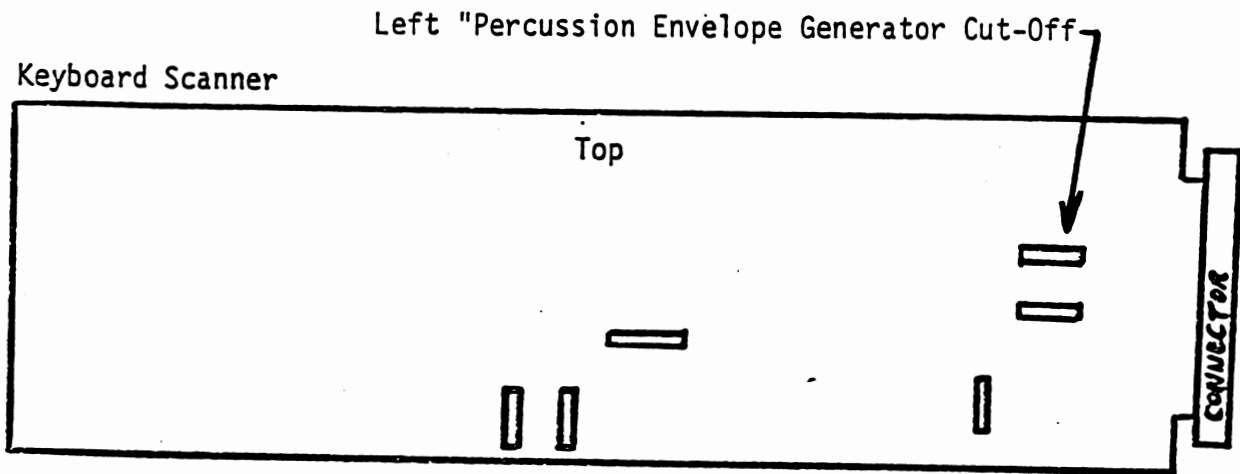
Open volume pedal to FULL position. DO NOT hold any keys.

Adjustment instructions are on the following page.

SET-UP SHEET - TITLE LEFT "NORMAL" ENVELOPE GENERATOR NUMBER TAP-9  
CUT-OFF

TR. TMTT

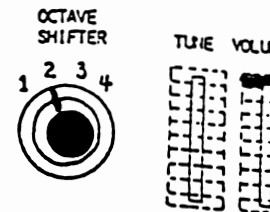
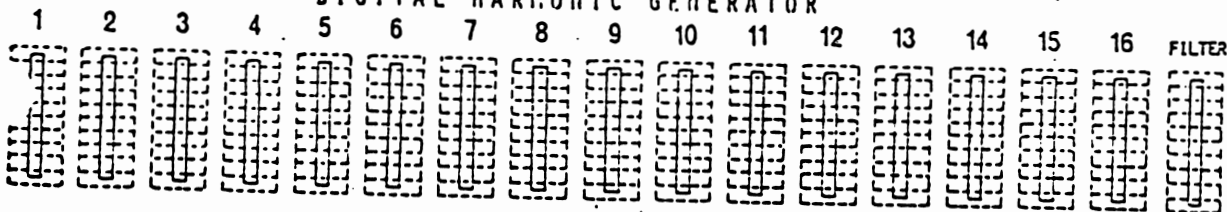
Left "Percussion" Envelope Generator Cut-Off:



Procedure: With NO KEYS being held, listen for "leakage" of sound.  
Adjust "Cut-Off" trimpot until sound can be heard.  
Then, back off JUST ENOUGH to create silence - no farther.

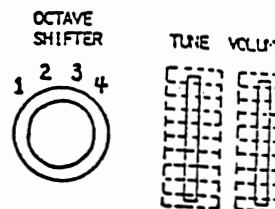
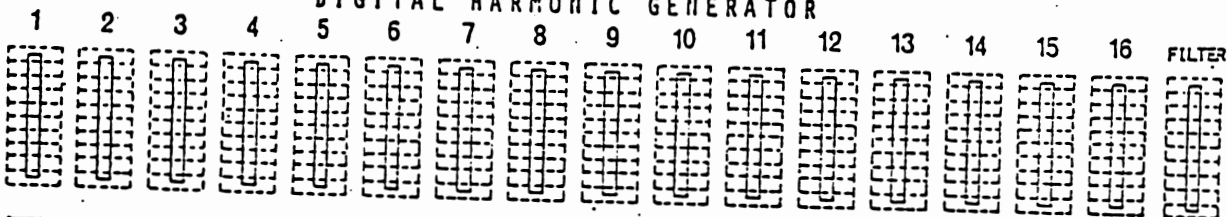
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	HORN	HARMONIC GENERATOR		SYNC	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION	
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY		DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
PITCH BEND TIME		PITCH BEND DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME		PITCH BEND DEPTH	
PORTAMENTO SPEED		SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF	
OFF		OFF		OFF		OFF		OFF		OFF		OFF	
PORTAMENTO SPEED		PORTAMENTO		PORTAMENTO		PORTAMENTO		PORTAMENTO		PORTAMENTO		PORTAMENTO	
OFF		OFF		OFF		OFF		OFF		OFF		OFF	

All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position. DO NOT hold any keys.

Adjustment instructions are on the following page.

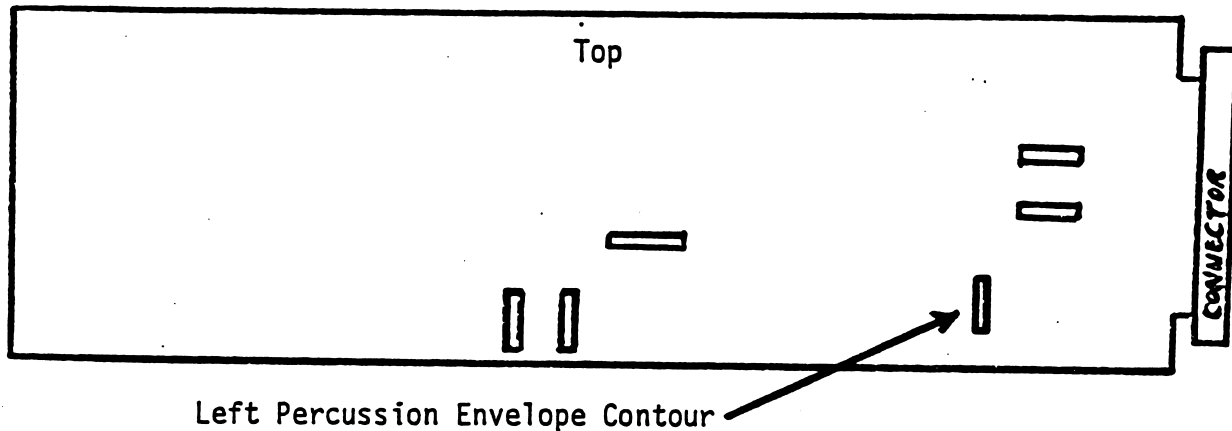
SET-UP SHEET - TITLE LEFT "PERCUSSION" ENVELOPE GENERATOR NUMBER TAP-8  
CUT-OFF



## Left Percussion Envelope Contour

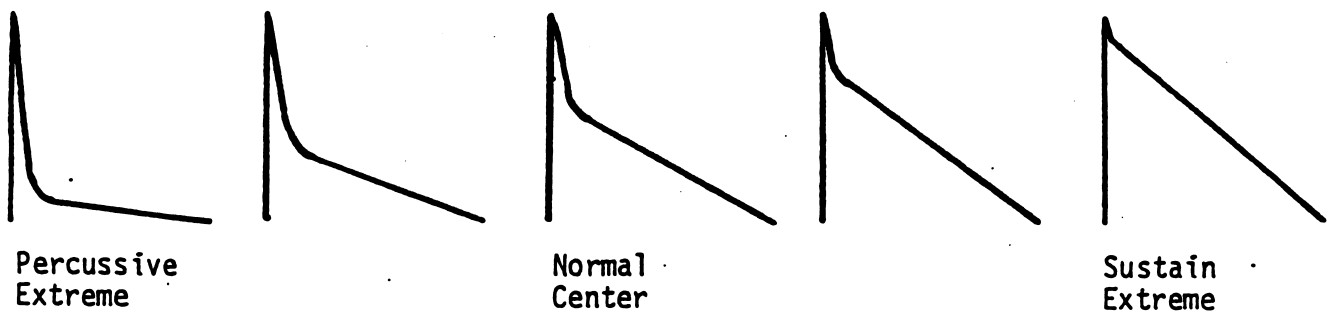
NOTE: Any adjustments made here will require a RE-ADJUSTMENT of the Left Percussion Envelope Generator Cut-off (See Procedure)

Keyboard Scanner



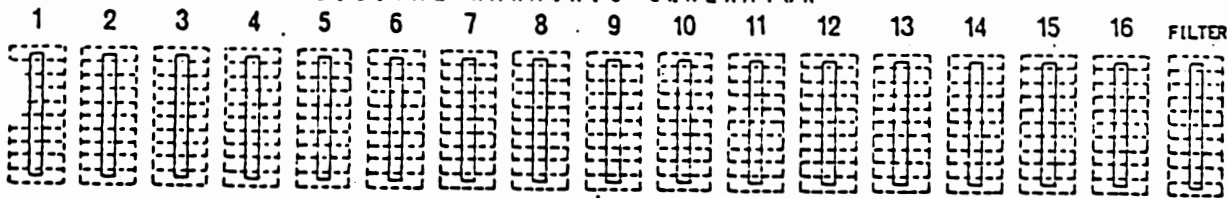
Normal setting is in the "center" position. Deviations from this setting are subject to personal taste.

Procedure: Adjust contour to taste while repeating key and listening to decay contour.



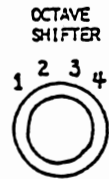
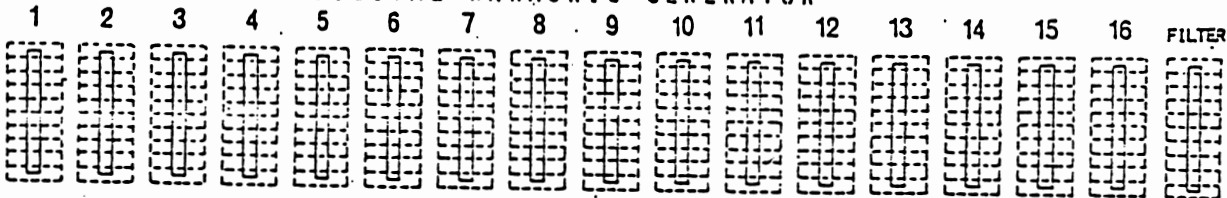
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR					HARMONIC GENERATOR						
CLARINET	PULSE	FLUTE	HORN	●	SYNC	PULSE	FLUTE	HORN	REED		
NORMAL ATTACK		PERCUSSION DECAY		MODE	SEQUENCER SPEED	NORMAL ATTACK		PERCUSSION DECAY			
DECAY	DECAY	PUSH ON-OFF	DECAY		DECAY						
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	
PITCH BEND TIME	PITCH BEND DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	PITCH BEND DEPTH	DEPTH	NOISE FREQUENCY	DEPTH	PITCH BEND TIME	PITCH BEND DEPTH
PORTAMENTO SPEED	DYNAMIC FILTER							PORTAMENTO SPEED			
OFF	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	OFF	
OFF	UP	DOWN	NO SWEEP	FILTER OFF	OFF	LOW HIGH	OFF	OFF	OFF	OFF	

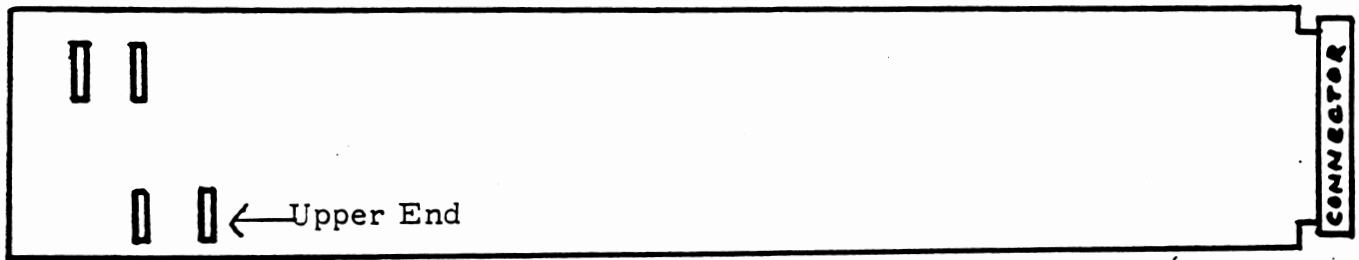
All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position and REPEAT A KEY.

Adjustment instructions are on the following page.

Tuning Spread - Upper End (right voice)

Tuning Standard: Same as before. "A" 440 hz.



(rear view of Harmonic Generator slider panel)

Procedure: Listening to both the synthesizer and the standard, or having attached the output of the Right Voice to a tuning device, adjust the "Upper End" trimpot until all "beats" stop.

# LEFT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

# RIGHT

## DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLUME

HARMONIC GENERATOR					HARMONIC GENERATOR					
CLARINET	PULSE	FLUTE	HORN	REED	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		SEQUENCER		NORMAL		MODE		
ATTACK	DECAY	DECAY	DECAY	SPEED	ATTACK	DECAY	DECAY	DECAY		
TREMULANT SHAPE		VIBRATO DEPTH		LFO RATE		TREMULANT SHAPE		TREMULO DEPTH		
PITCH BEND		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH		
OFF	FLAT SHARP	OFF	OFF	OFF	OFF	OFF	FLAT SHARP	OFF		
PORTAMENTO	DYNAMIC FILTER							PORTAMENTO		
SPEED	SWEEP		SPEED	DEPTH	TREMULANT	Q	LOW PASS	BAND PASS	HI PASS	SPEED
OFF	UP	DOWN	NO SWEEP	OFF	LOW	HIGH	OFF	OFF	OFF	OFF
	FILTER OFF									

All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position and insert wedge in D#<sub>2</sub>.

Adjustment instructions are on the following page.

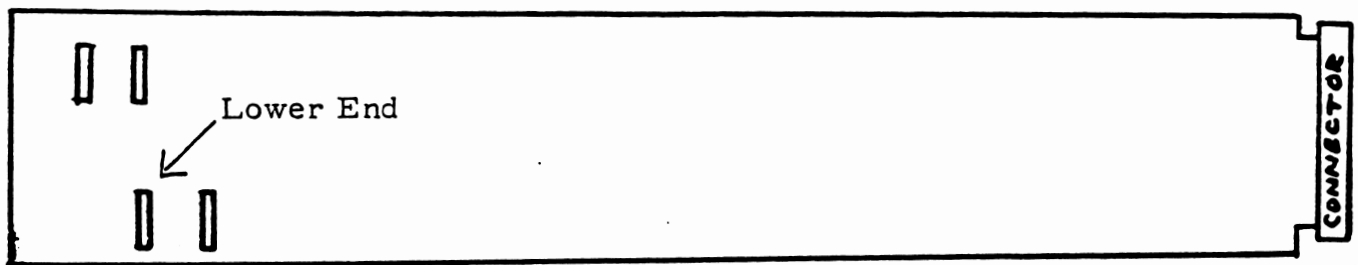
SET-UP SHEET - TITLE TUNING SPREAD - UPPER END, RIGHT VOICE NUMBER TAP-6

TRETTT



### Tuning Spread - Lower End (right voice)

Tuning Standard: Same as before. "A" 440 hz.



(rear view of Harmonic Generator slider panel)

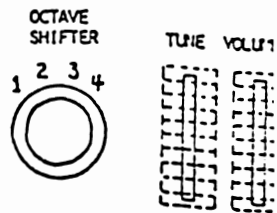
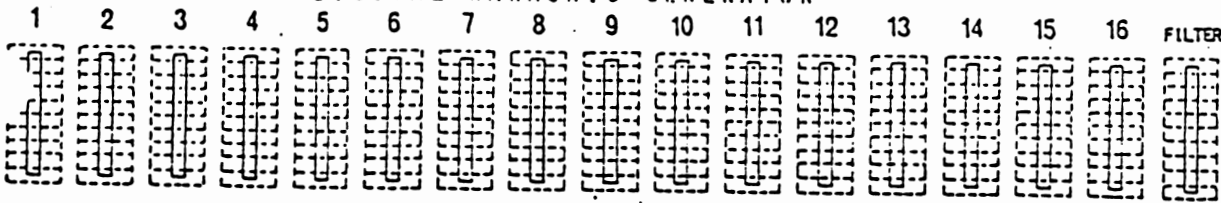
Procedure: Same as before, adjusting "Lower End" trimpot for zero beat.

When finished, placing the tuning slider at the arrow mark on the panel should produce "A" 440 tuning. Moving the slider to its upper extremity should give a diminished fifth rise in pitch. Moving the slider to its lower extremity should give a diminished fifth fall in pitch.

Note: Changes in the scale tuning can cause a change in the range covered by the tuning slider.

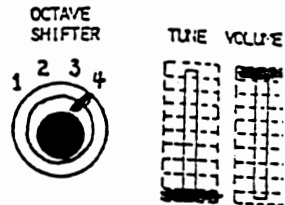
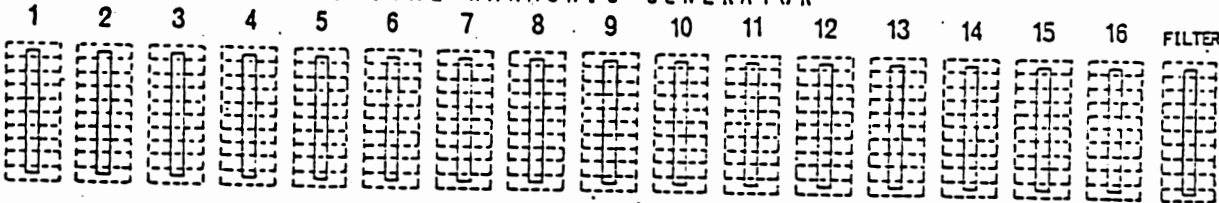
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



HARMONIC GENERATOR					HARMONIC GENERATOR					CLARINET		FLUTE		HORN		REED		SYNC		PULSE		FLUTE		REED					
NORMAL				MODE				PERCUSSION				SEQUENCER				NORMAL				MODE				PERCUSSION					
ATTACK		DECAY		ATTACK		DECAY		ATTACK		DECAY		SPEED		ATTACK		DECAY		ATTACK		DECAY		ATTACK		DECAY		ATTACK		DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		PITCH BEND TIME		PITCH BEND DEPTH		NOISE FREQUENCY DEPTH		PITCH BEND TIME		PITCH BEND DEPTH		PORTAMENTO SPEED		PORTAMENTO SPEED			
OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		FLAT SHARP		OFF		OFF		FLAT SHARP		OFF		OFF			
SWEEP		SPEED		DEPTH		TREMULANT		Q		LOW PASS		BAND PASS		HI PASS		PORTAMENTO SPEED		UP		DOWN		NO SWEEP		FILTER OFF		OFF			
OFF		OFF		OFF		OFF		LOW HIGH OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF		OFF			

All controls NOT SHADED should be in MINIMUM or OFF position.

Open pedal to FULL position and insert wedge in D#3.

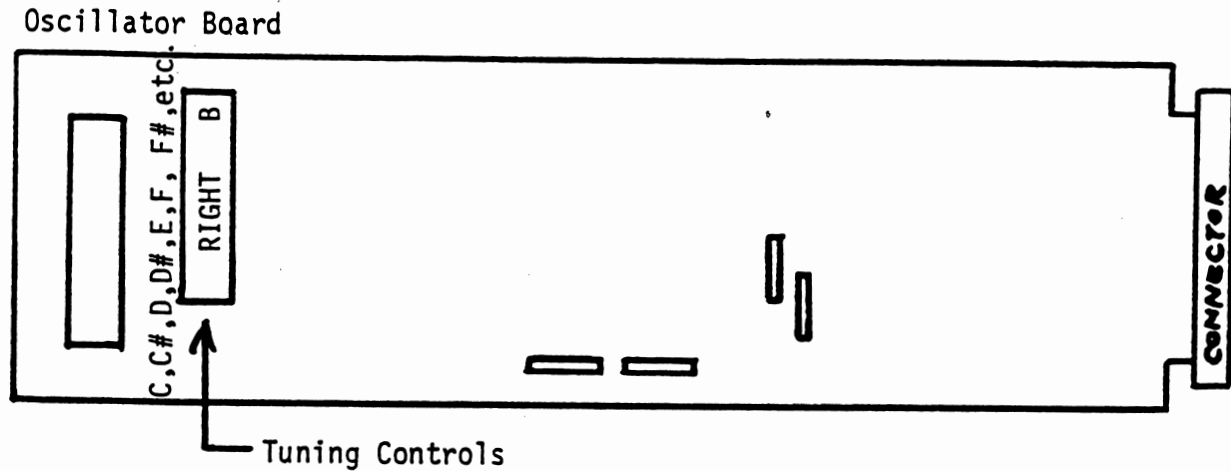
Adjustment instructions are on the following page.

SET-UP SHEET - TITLE TUNING SPREAD - LOWER END, RIGHT VOICE NUMBER TAP-5

TAP-5

## Scale Tuning - Right Voice

Tuning Standard: Left Voice (after it has been tuned)

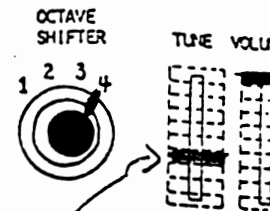
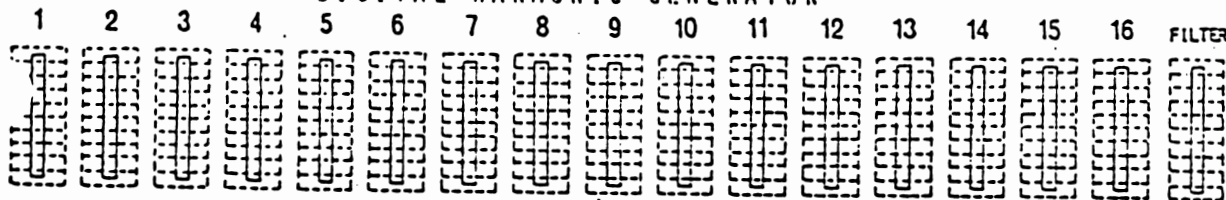


Procedure: Start with C2 key, zero beat Right Voice with Left Voice.  
Continue thru C#2, D2, D#2, etc. up to B2.

Note: Be sure Tuning Slider for Right Voice has been tuned to the Left Voice.

# LEFT

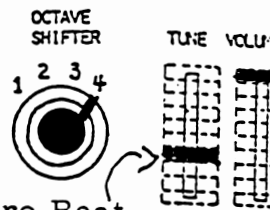
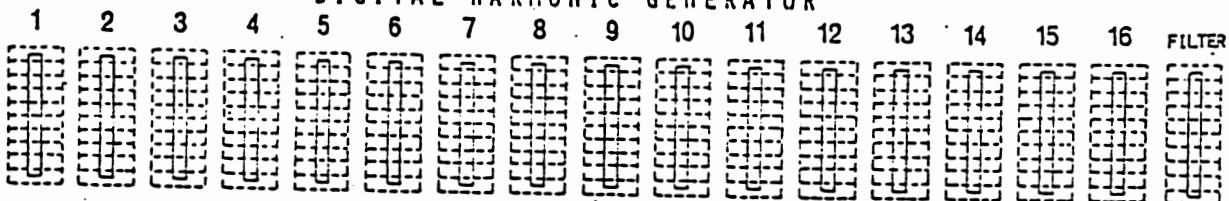
## DIGITAL HARMONIC GENERATOR



Set at panel mark

# RIGHT

## DIGITAL HARMONIC GENERATOR



Zero Beat

HARMONIC GENERATOR					HARMONIC GENERATOR				
CLARINET	PULSE	FLUTE	REED		CLARINET	PULSE	FLUTE	REED	
NORMAL		MODE		SEQUENCER		NORMAL		MODE	
ATTACK	DECAY	PERCUSSION	DECAY	SPEED	ATTACK	DECAY	PERCUSSION	DECAY	
PUSH ON-OFF									
TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	VIBRATO DEPTH	TREMOLO DEPTH	LFO RATE	TREMULANT SHAPE	TREMOLO DEPTH
	OFF	OFF			OFF	OFF			OFF
PITCH BEND		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH	
TIME	DEPTH	DEPTH	DEPTH	DEPTH	DEPTH	TIME	DEPTH	DEPTH	DEPTH
OFF	FLAT	SHARP	OFF	OFF	OFF	OFF	FLAT	SHARP	OFF
PORTAMENTO		DYNAMIC FILTER						PORTAMENTO	
SPEED		SWEEP		SPEED		LOW PASS		HI PASS	
OFF	UP	DOWN	NO SWEEP	DEPTH	TREMOLO	Q	LOW PASS	BAND PASS	HI PASS
	OFF	OFF	OFF	OFF	LOW	HIGH	OFF	OFF	OFF
SPEED		SPEED		SPEED		SPEED		SPEED	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

All controls NOT SHADED should be in MINIMUM or OFF position.

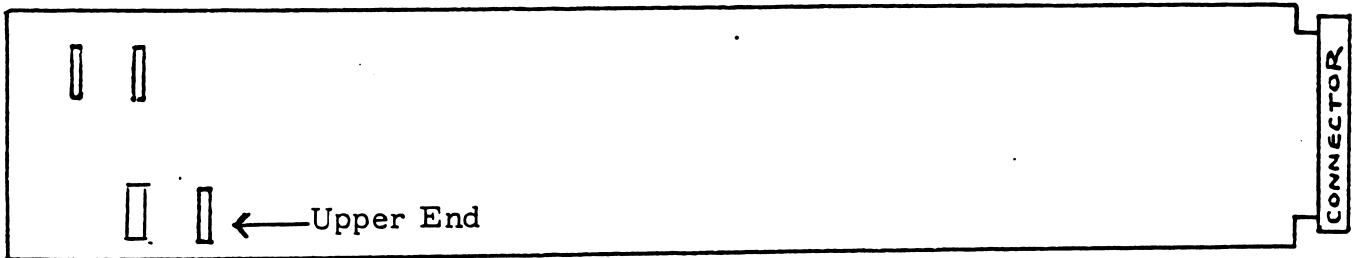
Open pedal to FULL position and insert wedge in C<sub>2</sub>.

Adjustment instructions are on the following page.



Tuning Spread - Upper End (left voice)

Tuning Standard: Same as before.



(rear view of Harmonic Generator slider panel)

Procedure: Same as before, adjusting the "Upper End" trimpot for zero beat.

When finished, placing the tuning slider at the arrow mark on the panel should produce "A" 440 tuning. Moving the slider to its upper extremity should give a half-step rise in pitch. Moving the slider to its lower extremity should give a half-step fall in pitch.

Note: Changes in the scale tuning can cause a change in the range covered by the tuning slider.

# LEFT

DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

# RIGHT

DIGITAL HARMONIC GENERATOR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FILTER

OCTAVE SHIFTER

1 2 3 4

TUNE VOLU

HARMONIC GENERATOR				HARMONIC GENERATOR									
CLARINET	PULSE	FLUTE	REED	SYNC	PULSE	FLUTE	HORN	REED					
NORMAL MODE PERCUSSION		SEQUENCER		NORMAL MODE PERCUSSION		SEQUENCER		NORMAL MODE PERCUSSION					
ATTACK	DECAY	DECAY	SPEED	ATTACK	DECAY	DECAY	SPEED	ATTACK	DECAY	DECAY	SPEED		
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
PITCH BEND TIME DEPTH		DEPTH		NOISE FREQUENCY		DEPTH		PITCH BEND TIME DEPTH		DEPTH		NOISE FREQUENCY	
PORTAMENTO		DYNAMIC FILTER								PORTAMENTO			
SPEED		SWEEP		SPEED DEPTH		TREMULANT Q		LOW PASS BAND PASS HI PASS		SPEED		PORTAMENTO	
OFF		UP DOWN NO SWEEP FILTER OFF		OFF		OFF LOW HIGH OFF		OFF OFF OFF		OFF		OFF	

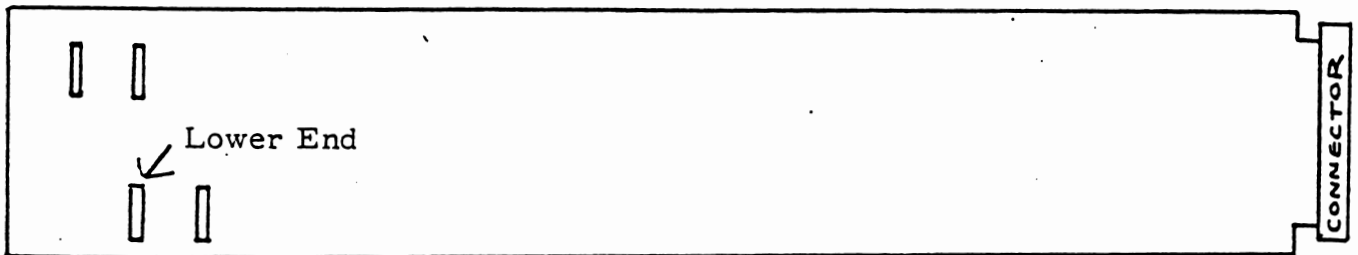
All controls NOT SHADED should be in MINIMUM or OFF position.

Open volume pedal to FULL position and insert wedge in G#2.

Adjustment instructions are on the following page.

Tuning Spread - Lower End (left voice)

Tuning Standard: "A" 440hz. The standard may take the form of a tuning fork, another "fixed" instrument, a strobe or other electronic tuning device, or a frequency counter.

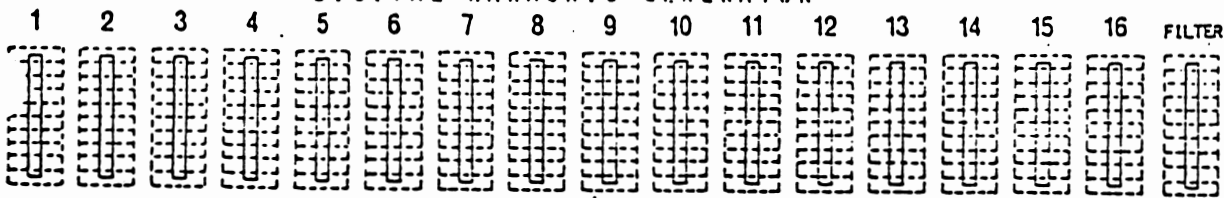


(rear view of Harmonic Generator slider panel)

Procedure: Listening to both the standard and the synthesizer, or having attached the left channel output to a tuning device, adjust the "Lower End" trimpot until all "beats" stop.

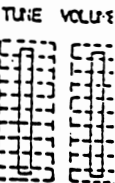
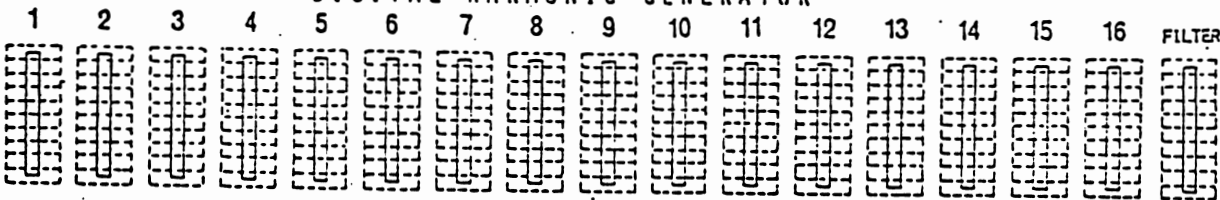
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR



<input type="checkbox"/> HARMONIC GENERATOR					<input type="checkbox"/> CLARINET					<input type="checkbox"/> PULSE					<input type="checkbox"/> FLUTE					<input checked="" type="checkbox"/> REED					<input type="checkbox"/> HARMONIC GENERATOR					<input type="checkbox"/> SYNC					<input type="checkbox"/> PULSE					<input type="checkbox"/> FLUTE					<input type="checkbox"/> HORN					<input type="checkbox"/> REED				
NORMAL ATTACK DECAY					MODE DECAY					PERCUSSION DECAY					SEQUENCER SPEED PUSH ON-OFF					NORMAL ATTACK DECAY					MODE DECAY					PERCUSSION DECAY																								
TREMULANT SHAPE					VIBRATO DEPTH OFF					TREMOLO DEPTH OFF					LFO RATE					TREMULANT SHAPE					VIBRATO DEPTH OFF					TREMOLO DEPTH OFF																								
PITCH BEND TIME DEPTH OFF FLAT SHARP					DEPTH OFF					NOISE FREQUENCY DEPTH OFF					PITCH BEND TIME DEPTH OFF FLAT SHARP					DEPTH OFF					PITCH BEND TIME DEPTH OFF FLAT SHARP					DEPTH OFF																								
PORTAMENTO SPEED OFF					SWEEP UP DOWN NO SWEEP FILTER OFF					DYNAMIC FILTER SPEED DEPTH TREMULANT Q LOW PASS BAND PASS HI PASS OFF LOW HIGH OFF OFF OFF					PORTAMENTO SPEED OFF																																							

All controls NOT SHADED should be in MINIMUM or OFF Position.

Open volume pedal to FULL position and insert wedge in A#<sub>2</sub>.

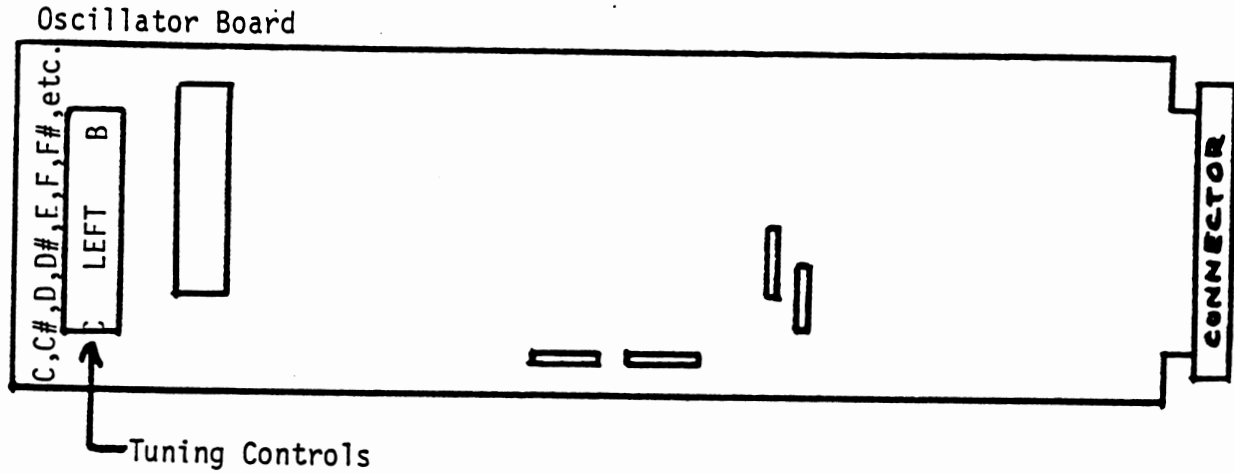
Adjustment instructions are on the following page.



## Scale Tuning - Left Voice

Tuning Standard: "C" thru "B" - "A" 440 hz octave.

Tuning forks, strobe device, or other fixed instrument.

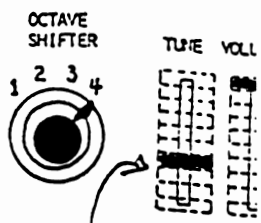
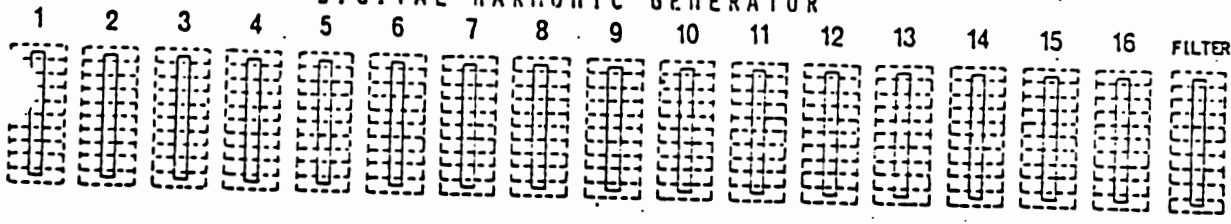


Procedure: Starting with C2 key, zero beat synthesizer with standard. Continue thru C#2, D2, D#2, etc. up to B2.

Note: If all controls appear to be flat or all controls appear to be sharp, check the Tuning Spread adjustment. Be sure that the Tuning Slider is exactly on the "A" 440 hz mark.

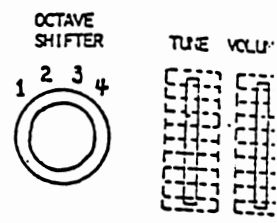
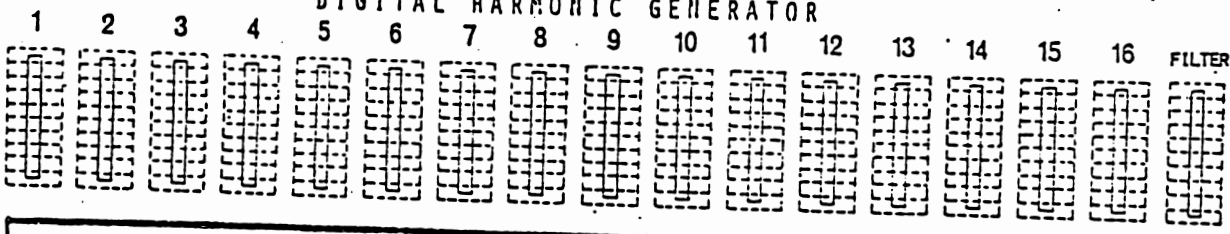
# LEFT

## DIGITAL HARMONIC GENERATOR



# RIGHT

## DIGITAL HARMONIC GENERATOR

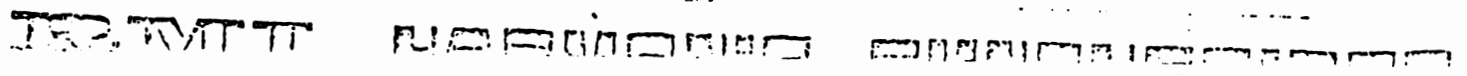


Set at Panel Mark - Critical

HARMONIC GENERATOR		CLARINET	PULSE	FLUTE	<input checked="" type="radio"/>	REED	HARMONIC GENERATOR	SYNC	PULSE	FLUTE	HORN	REED	
NORMAL		MODE		PERCUSSION		SEQUENCER		NORMAL		MODE		PERCUSSION	
ATTACK	DECAY	DECAY		DECAY		SPEED		ATTACK	DECAY	DECAY		DECAY	
TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH		LFO RATE		TREMULANT SHAPE		VIBRATO DEPTH		TREMULO DEPTH	
PITCH BEND		DEPTH		DEPTH		NOISE FREQUENCY		PITCH BEND		DEPTH		DEPTH	
TIME		FLAT SHARP		FLAT SHARP		DEPTH		TIME		FLAT SHARP		FLAT SHARP	
PORTAMENTO		SPEED		SPEED		DEPTH		TREMULANT		Q		LOW PASS	
SPEED		UP DOWN NO SWEEP		SPEED		DEPTH		OFF		LOW HIGH		OFF	
OFF		FILTER OFF		OFF		OFF		OFF		OFF		OFF	
PORTAMENTO		SPEED		SPEED		DEPTH		TREMULANT		Q		LOW PASS	
SPEED		UP DOWN NO SWEEP		SPEED		DEPTH		OFF		LOW HIGH		OFF	
OFF		FILTER OFF		OFF		OFF		OFF		OFF		OFF	

All controls NOT SHADED should be in MINIMUM or OFF position.

Open pedal to FULL position and insert a wedge in C2.  
Adjustment instructions are on the following page.



TUNING AND ALIGNMENT PROCEDURES:

On the following pages you will find tuning and alignment procedures that can be performed in the field by the service department of the dealership from which the synthesizer was purchased. In some cases of emergency, the owner himself can perform these adjustments; however, before you even consider opening the case to get inside.....

**CALL THE FACTORY FOR HELP:  
215-965-9801**

Your problem, no matter how it may appear to you, might very well not be inside!

Another reason to give us a buzz is that once you get inside, the procedures listed are often COMPLETE PROCEDURES, whereas only a partial procedure need be performed - get the picture? Call us first!

**EXAMPLE:** One note of one voice appears to be out-of-tune with the other.

**SOLUTION:** Discover which voice the note is out-of-tune on and zero beat it with the other voice.

TUNING AND ALIGNMENT PROCEDURES - TABLE OF CONTENTS:

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TUNING SPREAD - LOWER END, LEFT VOICE. . . . .	TAP-2
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# RMI

## RMI HARMONIC SYNTHESIZER

### Modification for External Clock Control of Sequencer

**PURPOSE:** For synchronizing with another synthesizer, rhythm unit, or "click" track in a recording studio.

**PARTS REQUIRED:** 1. New keyboard scanner board with factory installed modification for external clock control of sequencer.  
2. Switching jack.

### PROCEDURE:

1. Install modified scanner board and return old scanner for credit.
2. Drill hole in left side of bottom half of case and install 1/4" phone jack provided (note switching function).
3. Run wire from jack ground to power supply ground (black).
4. Run wire from jack "tip" to pin #1 of plug #66 (P66) at the end of keyboard scanner board.
5. Run wire for jack "shunt" to pin #70 of plug #68 (P68) at the end of oscillators board.

### THEORY:

Pin #1 of P66 is the clock input to the sequencer. Any 3V (approx) square or pulse wave will "advance" or "step" the sequencer. The input is capacitively coupled. Pin #70 of P68 is the square wave output of the "LFO" or "tremulant" oscillator. It is hooked through the jack "shunt" to drive the sequencer when plug is not inserted in jack. Sequencer rate will be controlled by "LFO rate" control.

May 16, 1975

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