STEINER-PARKER

Modular Synthesizer
Instruction Manual.
BASIC STUDIO and
SYNTHASYSTEM models.

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INTRODUCTION

The instructions on the following pages are intended to familiarize the reader with the operation of the STEINER-PARKER Basic Studio and Synthasound model synthesizers, plus all special purpose modules manufactured by us. This manual is considered to be too narrow in scope to include very much general information on synthesizer technique in general. That is the subject of another entire book of several hundred pages. We are in the process of publishing such a book, but publication is not expected to be complete before the end of the year. In the meantime, we recommend the following books, in the order listed, as being most applicable to the Steiner-Parker synthesizers.

PRINCIPLES AND PRACTICE OF ELECTRONIC MUSIC by Gilbert Trythall, published by Grosset & Dunlap, 51 Madison Ave., New York, N.Y. 10010, ISBN # 0-448-40002-6.

ELECTRONIC MUSIC, by Allen Strange, published by the Wm. C. Brown Co., 2460 Kerper Blvd., Dubuque, IA 52001. ISBN 0-697-03612-X.

ELECTRONIC MUSIC SYNTHESIS, by Hubert S. Howe Jr., published by the W.W. Norton Co., 55 Fifth Ave, New York, N.Y. 10003, ISBN 0-393-09257-3.

The above textbooks will serve as a good general purpose treatise on the subject of electronic music, although not ideally suited to the highly versatile STEINER-PARKER synthesizers. Nontheless, they are the best currently available.

The Trythall text has many good definitions of current electronic music terms and practices, and includes an extensive listing of sample hookups for special sounds.

The Allen Strange text includes some very extensive and very good sections on modulation, gating, waveshapes and their characteristics, as well as instruction in using the synthesizer for live performances.

The Howe text includes rather large and detailed sections on tape recording and computer generation of music and is, therefore, highly specialized.

No prices for the above books can be given here in view of the state of the economy, as anything said here would likely be out of date before it arrived at the printers office.

SWITCHES

Noise Gen

81 White/Pink select

Bal. Modulator

88 Mult/Square select

Input Amp

96 Hi/Lo select
97 Flat/RIAA select

V.C. Trigger Gen

107 Manual trigger ON/OFF
108 Free Run ON/OFF
109 Gate ON/OFF

S & H

122 Common ON/OFF

Triple Env. Gen

139 Damp #1
141 Common #2 input and #1 input
140 Quathin #1
146 Common out #1 and #2
147 Damp #2
148 Common #1 and #3 input
153 Common #1 and #3 output
154 Damp #3
147A Quathin #2
155 External trigger control of duration time #3

Keyboard and Power Supply

190 Power

Sequencer

251 Manual reset
252 Manual advance
253 Free Run ON/OFF
264 8/16 step select switch AB16

Voltage Processor

404 Voltage On

Keyboard

306 Scale (Norm/Aux)
307 Reverse (On/Off)
308 Trigger (Lift/Legato)

VC Osc Type A

9.	Triangle wave output
10.	" " "
12.	Sine wave output
13.	" " "
15, 16	Sawtooth wave output
18, 19	Pulse wave output
20.	V.C. Var calibrated input
21, 22, 23	Uncalibrated modulation inputs
25.	Phase reset input
26.	V.C. pulse width input

V.C. Osc type B

35, 36	Sine output
38, 39	Sawtooth output
41.	V.C. Var calibrated input
42, 43	Uncalibrated modulation inputs
47.	Phase reset

V.C. Osc type C

57.	Phase Reset
54.	V.C. Var calibrated input
55, 56,	Uncalibrated modulation inputs
58, 59	Waveform Output

V.C. Filter

67, 68, 69	Signal inputs
73.	V.C. Var calibrated input
74.	Uncalibrated modulation input .
77, 78	parallel outputs

Noise Gen

82, 84	Parallel outputs

Bal Mod

90.	Signal in
91.	Carrier in
92.	Signal output

Input Amp

98, 99, 100	Various parallel input jacks
101, 102	Parallel Outputs

V.C. Trigger Gen

110, 111, 112, 113	Parallel output jacks
114.	V.C. Rate control
115.	Trigger gate input
116.	V.C. width

S & H

123.	Ext sig #1 input
124.	Trigger #1 input
125, 126	Parallel outputs, signal #1
127.	Ext sig #2 input
128.	Trigger #2 input
129, 130	Parallel #2 signal outputs

Triple Env. Gen

156.	Trigger #1 and Common input
157.	Trigger #2 input
158.	Trigger #3 input
159.	Envelope #1 output
160.	Envelope #2 output
161.	Envelope #3 output

VCA Mixer

170.	Input #1
171.	Input #2
172.	Input #3
175, 176	V.C. Input(both uncalibrated)
180.	Output

Tuner Monitor

186.	Input
185.	Headphone output
187.	System output

Keyboard and Power supply

198, 199, 200, 201	Keyboard voltage(one two voice systems, voice #1 is on 198, 199, and voice #2 is on 200 and 201.)
206, 207, 208, 209	Keyboard trigger
214, 215, 216, 217	Multiplier buss #1
218, 219, 220, 221	Multiplier buss #2
192.	+12 Volts DC
193.	Ground
194.	-10 Volts DC

Sequencer

265, 266	Output A
270, 271	Output B
275, 276	Output C
280, 281	Trigger in/out
285.	Reset input
286A	Trigger #1 output
286B	Trigger #2 output
286C	Trigger #3 output
286D	Trigger #4 output
286E	Trigger #5 output

286F	Trigger #6 output
286G	Trigger #7 output
286H	Trigger #8 output

Frequency Divider

239, 240	Signal input
241.	Trigger input
242, 243	Trigger output
245, 246	Signal output

Phaser

350.	Signal in
351.	V.C. Input
352.	Signal out

Voltage Processor

405, 406	A+, B- input
407, 408	A-, B+ input
409, 410	A+, B+ input

Peak Selector

500.	Input
501, 502, 503	Output

Dual Voltage Follower

600.	Input #1
601, 602	Output #1
603.	Input #2
604, 605	Output #2

KNOBS

Type A Osc.

1. Triangle Amplitude
2. Sine Amplitude
3. Sawtooth Amplitude
4. Pulse Amplitude
5. Frequency-Course
6. Frequency-Fine
7. Pulse Width

Type B Osc.

30. Sine Amplitude
31. Sawtooth Amplitude
32. Frequency-Course
33. Frequency-Fine

Type C Osc

50. Waveform Amplitude
51. Frequency Adjust

V.C. Filter

63. Resonance (Q)
64. Mode Select-Low Pass, Band Pass, Hi Pass.
65. Frequency Adjust

Noise Gen.

80. Amplitude

Bal. Modulator

86. Mix Degree

Input Amp

95. Gain

V.C. Trigger Gen

105. Rate
106. Width

Sample & Hold

120. Output Level #1
121. Output Level #2

Phase Shifter

240. Signal Mix
241. Phase Frequency

Peak Selector

270. Threshold

Dual Voltage Follower

280. Slew Rate #1
281. Slew Rate #2

Keyboard

300. Scale-Normal
301. Range Select
302. Normal Tune
303. Portamento
304. Auxiliary Scale
305. Auxiliary Tune
310. Pitch Bend

Voltage Processor

400. Level #1
401. Level #2
402. Level #3
403. Voltage Level (internal)

Triple Envelope Generator

135. Attack #1
136. Duration Level #1
137. Decay #1
138. Output Level #1
142. Attack #2
143. Duration Level #2
144. Decay #2
145. Output Level #2
149. Attack #3
150. Duration Time #3
151. Decay #3
152. Output Level #3

VCA Mixer

165. Input Level #1
166. Input Level #2
167. Input Level #3
168. Overall Gain

Tuner Monitor

182. Mode Select
184. Headset Level

Sequencer

250. Trigger Rate
254. Step Select
255A thru 262A--"A" output levels for steps one thru eight.
255B thru 262B--"B" output levels for steps one thru eight.
255C thru 262C--"C" output levels for steps one thru eight.
263A-Master output level A
263B-Master output level B
263C-Master output level C

Frequency Divider

227. Octave Select #1
228. Octave Mix #1 (divide by 2)
229. Octave Mix #2 (divide by 4)
230. Octave Mix #3 (divide by 8)
235. Octave Select #2
236. Divide
237. Mix Level #2
238. Overall Output Level

Figure Numbers

1. Basic Set Up
2. Triple Envelope Generator
3. Triple Envelope Generator Waveforms
3A Triple Envelope Generator Waveforms
4. V.C. Filter
4A V.C. Filter Charateristics
5. Trigger Generator
6. Sequence
7. Keyboard and Power Supply Panel
7A Keyboard Panel
8. V.C.A. Mixer
9. Sample and Hold
10. Tuner Monitor
11. Voltage Controlled Oscillator Type A
11A Sample and Hold Waveforms and P.R. Waveforms
12. Voltage Controlled Oscillator Type B
13. Voltage Controlled Oscillator (Square Wave)
14. Noise Generator
15. Frequency Divider
16. Dual Envelope Generator
17. Balanced Modulator
18. Input Amplifier
19. Voltage Processor
20. Trigger Generator Waveforms
21. Phaser
22. Peak Selector
23. Dual Voltage Follower

Trigger Sources

Peak Selector
Trigger Generator
Sequencer
Keyboard
Frequency Divider

Signal/Sound Sources

Oscillators
Noise Generator
Tuner Monitor

The Following are also Signal/Sound sources but require an input signal for operation.

Output of Frequency Divider
Phaser
Balance Modulator
Filter

Control Voltage Sources

- Keyboard
- S & H
- Oscillator Outputs
- Filter Outputs
- Envelope Outputs
- Sequencer
- Frequency Divider
- Phaser
- Balance Modulator
- Noise Generator

Sound Modifiers

- Filter
- Frequency Divider
- Phaser
- Balance Modulator

The Basic Hookup Fig. 1

The basic hookup is the easiest and simplest way to get a sound out of the unit using the KBD, filter, Envelope Generator, VCA Mixer, and two of the three oscillators on a BASIC STUDIO unit.

Sound can be taken out directly from one of the outputs of any one of the oscillators directly into your sound system or amplifier. The simplest hookup possible is keyboard voltage to VC Var of any one oscillator and that oscillators output directly into the sound system of your guitar amp. (This produces a constant sound, as the env gen and VCA Mixer are not being used to modulate the amplitude of the signal). Adding the env gen and the VCA Mixer will produce articulated sounds, and placing the filter between the osc output and the Mixer input will allow the addition of filtered sounds. The most frequent use of the filter involves modulating it simultaneously with KBD voltage and also with one of the outputs of the env gen (but usually not the same one that is controlling the VCA Mixer, for maximum effect).

Tuning Procedure

Assume voltage controlled oscillators have all been calibrated (see osc. calibration procedure). With the synthesizer in the basic set up of figure #1, use the following steps.

1. Set the envelope generator #1 duration level (136) so that a sound is heard continuously when a key of the keyboard is depressed and held down.

2. Turn down all signals (166, 167) so that just osc #1 tone is heard when a key is depressed (leave 165 up).

3. Turn switch on Tuner Monitor (182) to T OUT position. Concert C should be heard.

4. Turn keyboard range switch (301) to T position. Tune knob (302) to 12 0' clock, Portamento (303) all the way counter clockwise, scale switch (306) to Norm and Reverse switch (307) to off.

5. Press lowest note (C) on the keyboard and adjust Osc #1 frequency to beat perfectly two octaves below the C pitch from the Tuner Monitor. (NOTE: hold a key down on the keyboard during all adjustments as the keyboard voltage can drift slowly whenever all the keys are up).

6. Press the key on the keyboard 3 octaves above and adjust the Scale knob (300) to beat perfectly one octave above the C from the Tuner Monitor. Tuning is now complete.

To check Range switch calibration on the Keyboard, press the lowest note on the Keyboard again and perfect unison two octaves below tuner C should still be heard. Turn the Range Switch (301) clockwise to 5, and perfect unison with tuner C should be heard. If not, adjust the trim pot (300) located on the rear of the keyboard until perfect unison occurs. This adjustment need only be made once and will stay in adjustment unless keyboard is heavily jarred or the trimmer (309) is moved.

Tuning is now complete and Oscillator #2 will track osc #1 in unison or at any interval to which it is set in relation to osc #1. Osc #1 sine signal can be heard by turning up the pot on the VCA Mixer (166).

VOLTAGE CONTROLLED OSCILLATOR CALIBRATION

Use the basic set up (see Fig. #1). This procedure will adjust all the oscillators so that they shift exactly the same musical interval for a given control voltage change and will adjust the amount of change to be compatible with the control voltage from the keyboard. This only involves the use of the VC input on each oscillator marked VAR. Use of any other input during calibration will result in improper tuning and therefore lead to improper operation. All other inputs must be left unused here.

1. Choose one of the oscillators as a master reference. Plug the keyboard's control voltage into that oscillator's VC input marked VAR.

2. Set keyboard controls as follows:
   Scale Knob (300) to 12 o'clock.
   Portamento (303) all the way counter clockwise.
   Scale Switch (306) to NORM.
   Reverse Switch (307) to off.

3. Set the gain of the VCA Mixer (168) so that a sound is heard continuously and turn the envelope generator level control (138) all the way down.

4. If playing an octave on the keyboard while adjusting the scale knob (300) on keyboard produces an octave shift of the osc, no adjustment of VC variable trimmer is necessary. If this can't be done, then, adjust the "V.C. VAR." trimpot (8) on the oscillator while playing an octave interval on the keyboard until the oscillator pitch shifts an octave when an octave interval is played. Absolute precision is not necessary in this step as the keyboard scale knob (300) will compensate for small errors in this adjustment. Once this adjustment has been made, all other oscillators must be precisely matched to it as described in the next step.

5. Unplug all keyboard cables from the oscillator just set and the second oscillator to be calibrated. Tune both oscillators to an extact unison in the lower part of the audio range.

6. Plug the same keyboard voltage into both oscillators VC VAR inputs and adjust the keyboard (by depressing the right most key of the keyboard and adjusting the range switch) so that both oscillators play in the upper part of the audio range.

7. Adjust the VC VAR trimpot, on the second oscillator only, until both oscillators play in perfect unison. Both oscillators should now stay in unison at any frequency as the control voltage applied to both VC VAR inputs is changed.

8. Calibrate the third oscillator in the same way by referencing it to the first oscillator.

Recalibration is reqquired only when the oscillators fail to track each other over the entire keyboard range.

TUNER MONITOR
Fig. 10

This module can be used as a final step through which the signal is fed before it goes to the audio sound system or studio mixer as shown in the basic set up in figure one. Its sole purpose is for convenience in tuning the system and to provide a stable pitch standard which can be trimmed (183) to match other pitch standards such as pianos, oboes, etc.

This module will do the following when the selector switch is in the positions listed.

Switch (182) position	Function
OUT	Synthesizer signals fed into input jack (186) go straight through this module unaltered in any way to the output jack (187).
MON.	You can hear the synthesizer signal fed into input jack (186) only through a set of mono headphones (eight ohms) plugged into the tuner. There is no output from jack #187).
TUNE	The synthesizer signal fed into input jack (186) can be heard only through the headphones and is mixed with a concert C (523.3 Hz) for the purpose of tuning during a live performance with no output at jack 187.
OUT	The synthesizer signals fed into input jack (186) go to the output jack (187) mixed with a concert C for the purpose of tuning in a studio situation.

Voltage Controlled Oscillator

Type A Fig. 11

Each voltage controlled oscillator (V.C.O.) is identical except for the number of available output waveforms that each produces. To avoid repetition we will describe the operation of the Type A oscillator shown above, which produces all four waveforms. Each waveform is available at two parallel output jacks and each waveform has a separate amplitude level pot. Example: Sine wave amplitude is controlled with control knob #2 (Figure #11) and is fed to two output jacks in parallel, (12 & 13). Likewise for the triangle, sawtooth and pulse waveforms produced by this oscillator. The pulse waveform has an additional control for pulse width (#7) and an additional input jack for controlling pulse width (#26). Either of these (or both together) can control the width of the pulse coming out jacks 18 & 19. With the pulse width all the way CCW, and no input at jack #26, the pulse waveform is symmetrical and thus is a square wave.

The frequency (or pitch) is controlled with the frequency adjust knob (5) from less than 1/10 Hz (cycles per second) to greater than 20K Hz and can be fine adjusted with pot #6. Frequency is also controlled by feeding control voltages in the VC input jacks (20, 21, or 22). Frequency modulation is accomplished by feeding an A.C. signal (such as the output from an oscillator) into one of these jacks instead of a D.C. voltage.

The V.C. jack marked VAR (20) goes through a trimmer (#8) on the front panel which is used to adjust that input for a precise interval to voltage relationship so that numerous oscillators can track with precision. (See oscillator calibration procedure). This input is the only one to be used as an input for keyboard voltages, as it is the only one calibrated to produce an octave change in the pitch of the oscillator when an octave is played on the keyboard.

Each oscillator has an input jack called phase reset (#25). Any signal with a fast negative going edge, for example a sawtooth, square wave, or pulse, will reset the output waveform to a precise point whenever the negative edge occurs as shown in Fig. #11A. Usually the input signal at jack #25 is lower in frequency than the oscillator, and the oscillator tends to take on a pitch sensation of the lower frequency with the timbre changing as the osc fretuency is varied. This also makes it possible to have one oscillator track at a harmonic of another with no beating whatsoever.

Voltage Controlled Oscillator

Type B Fig. 12

The Type B oscillator is identical to the Type A oscillator except in the number of outputs. The Type B oscillator only has two outputs, a sine wave and a sawtooth.

Voltage Controlled Oscillator

Type C Fig. 13

The Type C oscillator is identical to the types A & B except for the number of outputs. The Type C oscillator has only one output, which the customer can specify to be either a square wave, a triangle or a sawtooth. The traingle is particularly handy for producing a "vibrato" sound out of this unit.

White Noise Gen.

Fig. 14

This is a signal producing module which produces a randomly varying voltage which in theory is composed of all frequencies of the audio spectrum (range) and hence is called white noise because of its similarity to white light ---being composed of all frequencies in the light spectrum. It has a sound similar to that of a waterfall.

If we filter out the higher frequencies we call this sound a pink noise.

Both white and pink noise signals are available by the use of the switch marked White-Pink (81). The output voltage level can be set from nothing to greater than 0 Dbm by use of the knob marked Level (80).

An example of the use of white noise is to create a windstorm effect by feeding the white noise through a sweeping resonant filter. See example #1. The noise gen has no inputs.

Input Amplifier

Fig. 18

The input amp acts as a preamplifier to use when a microphone, guitar or similar signal is to be fed into the system. The preamp brings these signal levels up to a good working level for the system.

Three different input jacks (98, 99, 100) are in parallel to provide ease of interfacing with different kinds of mike plugs, patch cords, etc. One simply chooses the appropriate input jack which fits the cable being plugged in.

The preamp output appears at two output jacks (101, 102) which are also in parallel.

In addition to the gain control knob (95) on the front panel there is an overall gain switch (96). In the low position, the max gain is 30DB; in the HI position, the max gain is 56DB.

A switch (97) is also provided which when in the RIAA position will equalize the preamp for use with a magnetic phonograph cartridge output. In all other uses, this switch should be in the position marked flat.

Phaser

Fig. 21

The Phaser is a sound modifier. It consists of several networks in series which will shift the phase of a signal a certain amount for any given frequency. The Phaser is equiped with a knob (240) which can cause the output to be all shifted signal, all straight unaltered signal, or anything in between.

The amount of shift, FOR A GIVEN FREQUENCY, can be varied with the frequency knob (241) and/or with a voltage fed into the V.C. input jack.

The most popular use of the phaser involves equally mixing the input signal with the phase shifted signal (knob in the midway or straight-up position). For a particular setting of the frequency knob, certain frequencies will be in phase with the input signal and will add to the overall output level. Others will be exactly out of phase and will cancel each other, leaving no output at that frequency. Still others will fall in between these two extremes of enhancement and cancellation. These points of enhancement and cancellation can be shifted across the entire audio spectrum (range) by turning the frequency knob and/or by a voltage fed into the V.C. input.

Another use involves running the input signal straight thru the Phaser without combining it with any of the input signal (pot all the way clockwise). During the time that the phase is being shifted, a pitch change is perceived. Therefore a vibrato or warbling effect (in some ways similar to a tape deck with unsteady speed control), can be created on any signal by feeding a low frequency sine wave into the V.C. input.

SPECIFICATIONS:

4 stages of approximately 180 degrees of shift each for a total shift of approximately 720 degrees. Line level input and output approximately ODB.

Balanced Ring Modulator

Fig. 17

The Ring Modulator is a sound modifier. Its use involves a signal to be modified and a carrier signal which is usually a sine wave from one of the VCO's.

The RM is equipped with a knob (86) to mix the input signal with the modified output signal. With this knob all the way counter clockwise, the signal passes through the Rm unaltered in any way. With the knob all the way clockwise, the output signal is completely the Ring Modulated signal.

The input and carrier signals are both canceled. What appears in the output is all of the signal frequencies shifted up and down by the frequency of the carried signal. Hence, twice as many frequencies appear in the Rm output as are fed into the signal input.

For Example. A major Triad is fed into the RM signal input with a 100Hz sine wave fed into the carrier input.

Input Frequencies	Carrier	Output Frequencies
440 Hz		340 & 540 Hz
554.4 Hz	100 Hz	654.4 & 454.4 Hz
650.3 Hz		550.3 & 750.3 Hz

Thus the Rm produces an effect on musical sounds that seemingly changes all of its key and timbre (timbral) characteristics.

As in all RM's, the carrier must be carefully nulled for proper operation. A front panel adjustment marked Car. Null (87) is provided for this purpose. Turn all input signals except carrier signal from oscillator all the way down and the mix pot all the way clockwise. The applied carrier will be heard in the output. Adjust the front panel trimmer (87) until a null or minimum carrier is heard in the output. RM is then ready to be used with the input signals. Now the inputs and mix pot can be adjusted as desired.

The MULT/SQUARE switch (88) when in the MULTIPLY position causes the RM to operate as described above. When in the SQUARE position, the carrier input is internally disconected and the input signal is used as both input and carrier signal. The effect on sinetones is to double the frequency, but on audio and other complex signals, the effect is markedly more pronounced--voices and audio signals are seemingly "scrambled" when the mix knob is all the way up.

Patch Cords

CAUTION

The patch cords provided with this system are intended only for use in making interconnections between the modules of the system. They are not suitable for use as input/output cables to bring signals into the system from other sources or to get signals out of the system into other systems. They are not even to be used to connect one synthesizer to another. This is because all the modules in the system are internally grounded to each other. Our jumpers, therefore, are single conductor interconnect jumpers only. Use of these jumpers to connect to equipment external to the unit, could easily result in damage to the equipment and/or the operator, and will most surely result, at the very least, in improper operation of the unit and anything to which is is connected. All cables used to connect to anything external to the unit must be two conductor cables, preferably shielded.

System Keyboard Input

Fig. 7

The lower right hand corner of all STEINER-PARKER Basic Studio and SYNTHASOUND units is occupied by a keyboard input and power supply module. This module provides the plus and minus working voltages for the entire system and also provides the means for interfacing the keyboard with the rest of the system. In the bottom center of this module is the system power switch (190) just below the red "ON" lamp. To the right of that are three monitoring jacks. The center jack (193) is ground potential and the one above is (192) is at +12 volts DC with respect to ground and the bottom jack (194) is at -10 volts DC with respect to ground.

After the keyboard cable has been plugged into the back of the system, the top row of four jacks (198-201) becomes the supply point for the keyboard voltage for the system. If your system has a single voice keyboard, all four jacks are the same voltage at all times. If you have two voices, the left two jacks are lower voice and the right two jacks are the upper voice. In either case, the second row of four jacks will provide a trigger each time a key is depressed anywhere on the keyboard.

The next row of jacks is merely a buss for expanding any other jack on the system. For example, if four KBD voltages (top row of this module) is not enough to control all the modules you want to control, merely install a jumper between the top row on this module and one of the rows marked Mult. (they are identical, but independent), then, that entire row will have the same voltage as the top row of keyboard voltages. Etc.

Peak Selector

Fig. 22

The peak selector will provide an output trigger at output jacks (501, 502, 503) whenever a signal input or DC level input fed into input jack (500) exceeds a preset level controlled (set) with the threshold knob (270) on the front panel.

The duration of the trigger lasts as long as the signal or Dc voltage stays above the threshold level, but has a minimum duration of approximately 30 milliseconds. A red light (504) on the FP indicates when the peak selector has been triggered and stays on for the duration of the trigger.

A few typical uses of this module include: Triggering the synthesizer in sync from sounds (or "Ticks") already recorded on a tape recorder.

Production of triggers by blowing into an amplified microphone fed into the peak selector.

Production of triggers by human touch. Simply attach a metal pad to the hot conductor of a shielded cable and feed directly into peak selector. When body touches pad, it feeds in stray 60Hz A.C. hum (which triggers the peak selector). The input amplifier may be necessary in some locations where low levels of A.C. fields are present.

Finally, you can produce random trigger rythmns by feeding in white noise and adjusting the level to the appropriate level.

A chain of triggers can be produced from a low frequency oscillator fed into the peak selector input.

Signal to filter to peak selector could for example produce triggers only on bass line, etc.

Dual Sample & Hold

Fig. 9

Each S & H module, upon application of a trigger to its input jacks (124 or 128) will step to a new and randomly chosen D.C. output voltage and hold at that level until the next trigger occurs.

Each S & H has two output jacks in parallel (125-126 for #1 and 129-130 for #2).

The output voltage range of each S & H can be compressed to zero or turned to maximum by adjusting the level pot on the front panel (knob #120 for S & H #1, and knob #121 for S & H #2).

Each S & H samples its own internal randomly changing waveform. However, an external signal can be sampled by plugging it into the ext. sig jack (123 or 127). This automatically disconnects the internal random signal of that particular S & H.

The input trigger duration is irrelevant to the operation of the S & H.

Sample waveforms illustrating the operation of the S & H are shown at the top of fig. #11A.

Voltage Controlled Filter

Fig. 4

The filter is a sound modifier capable of passing certain audio frequencies while attenuating others. All STEINER-PARKER filters are capable of three modes of operation, namely low pass, band pass, and high pass.

The filter also has a variable resonance (Q) knob (#63) which will produce a resonant peak at the center frequency. The height of the peak depends upon the setting of the resonance knob.

The center frequency of the filter can be controlled by a knob (#65) on the front panel and or by control voltages fed into the control voltage inputs (73 & 74).

The filter has three inputs which are automatically mixed in equal proportions before being fed on into the filter. The filter is made to operate in the low pass, band pass, or hi pass mode by turning switch #64 to one of the three positions marked L.P., B.P., or H.P.

The filtered signal comes out of two jacks in parallel marked Sig Out (77 & 78).

The filter can be calibrated by feeding white noise into a signal input, turning the resonance high, plugging keyboard voltage into the VAR Jack (#73) and adjusting the V.C. Var trimmer (#66) until the hiss pitch shifts one octave when an octave is played on the keyboard.

Figure 4A contains some drawings of waveform envelopes that serve to illustrate the filter's pass characteristics.

Use of the filter involves feeding audio signals into one or all of the filter's input jacks and taking a signal out of one or both of the output jacks.

A keyboard, sequencer, envelope generator, or any control voltage producer can be fed into the V.C. input jack to control the cutoff frequency as well as using the front panel knob for this purpose.

When using the filter at high resonance settings, its amplification is increased at its cut off frequencies and it is advisable to keep the input signals, particularly at frequencies near the resonant peak, at a sufficiently low level so as not to overdrive the filter and cause distortion, unless the distortion is desired.

Triple Envelope Generator

Fig. 2

This module contains three envelope generators. Envelope generators one and two have controls on attack, trigger duration level, decay and overall output level. The third (bottom) envelope generator has controls on attack, duration time, decay, and output level. Envelope Generator #3 has a switch (155) located near the duration time pot so that the duration time can be controlled with the Duration Time pot, irregardles of the trigger duration, or externally (Ext. position) by the duration of the input trigger.

All three envelope generators have a damp switch. When this switch is in the Damp position, the envelope voltage will go immediately to zero whenever the input trigger is over. See figure #3, part B.

Env Gen #1 and #2 each have a Quathin function switch mark QTN. With the QTN switch down, the decay can start only after the attack reaches its peak level (set by the attack knob) even when the trigger duration is less than the attack time (see figure 3 part C). With the QTN switch up, the decay can start anytime, even before the attack has reached its peak, if the input trigger duration is less than the attack time. That is, the decay starts whenever the trigger ends.

Envelope gen #2 and #3 each have a com switch on their trigger inputs (141 & 148). The Com switch can disconnect the env generator from its own input jack and connect it to the input jack of the #1 env. Gen (#156). This makes it so that one, two, or all three envelope generators can be run from a single trigger source fed into the #1 trigger input jack. When the Com switch for env #2 (#141) is in the up position, the trigger input jack for env #2(#157) is disconnected. Likewise for the env #3 Com switch (#148) and the #3 input (#158). When the Com switch is not in the Com position, then that envelope generator can only be triggered by feeding a trigger into its own separate trigger input jack.

SEE ADDITIONAL PAGE INSERTED 2 PAGES AHEAD

Envelope generators #2 and #3 each have a Com switch on their outputs (#146 for env #2 and 153 for env #3). This switch, in the Com position, disconnects its envelope generator's output from its own output jack and combines that output with the output of Env Gen #1 to form a more complex envelope. For Example:

Env Gen #1 set to: 

Env Gen #2 set to: 

Resultant output from env #1 output jack #159. 

Only triggers and never audio signals are fed into the envelope generator. The envelope generator's output voltages can control the gain of the VCA, which in turn will control the amplitude of audio signals. Or, the env gen's output can be used to control any other voltage controlled device such as the oscillators, the filter or the phaser.

Keyboard

Fig. 7A

The keyboard function is to provide output voltages corresponding to pitches (to control modules with a V.C. input) and triggers to trigger modules with a trigger input. A voltage and a trigger are produced each time a key is depressed except as noted below.

Whenever a key is depressed, a trigger is produced with a duration which is slightly longer than the length of time during which the key is pressed.

The keyboard is provided with a LIFT-LEGATO switch (#308). With this switch in the lift position, a continuous trigger is sustained, even though different keys are being played, as long as the fingers are not lifted off of the keyboard. To get a separate trigger for each note played, one must lift the fingers off the keys between each successive note. This mode is useful for triggering certain modules only on chosen notes by playing legato style and lifting the fingers only whenever the trigger function is desired. The output signal level from the synthesizer in a case like this may be controlled for the duration of the trigger and the other function (such as filter sweep) occuring only at the beginning of a trigger.

With this switch in the LEGATO position, a new trigger is started for each note played whether or not the fingers are lifted from the keys. This is useful for triggering functions while playing fast runs where it would be awkward to lift the fingers between each note.

The keyboard has a REVERSE SWITCH (#307). With this switch on, the keys are inverted (highest note is on the left and lowest note is on the right). This is useful for producing inverted themes. It should be kept in mind when using the reverse feature, however, that the keyboard is now structured as if one were standing behind the keyboard and playing the normal intervals. That is, the following interchanges are realized: C-C, C sharp to B, D to A sharp, D sharp to A, E to G sharp, F to G, F sharp remains F sharp, G to F, G sharp to E, A to D sharp, A sharp to D, B to C sharp and C to C.

The PORTAMENTO (#303) knob will adjust the keyboard response time. With this knob fully Counterclockwise (CCW) the time required for keyboard voltage changes (and therefore pitch changes on modules controlled bythe keyboard voltage) is practically instantaneous. With this control all the way up (fully clockwise) the response time is increased to roughly five seconds. Therefore, when the time between successive notes is less than the portamento response time, some notes may not ever be heard, because the oscillators will begin moving toward a new pitch before completing the last pitch change.

The RANGE (#301) knob will shift the entire keyboard one octave for each of its five positions. This expands a three octave keyboard to a seven octave range, a four octave keyboard to an eight octave range, and a five octave keyboard to a nine octave range.

The scale (#300) knob is a fine adjustment to adjust the amount of output voltage change for a given interval played on the keyboard. While adjusting the scale knob with the range switch in the T position, the lowest note on the keyboard will not shift but all notes above it will. Therefore, if playing an octave on the keyboard does not produce an octave change in pitch from the oscillators, the scale knob should be used to correct this situation. Tune lowest not (C) on keyboard to concert C; play C three octaves higher and adjust scale knob for perfect unison three octaves above. Lowest note will stay in tune and keyboard is now properly tuned.

The TUNE (302) knob shifts the whole KBD voltage up or down slightly without affecting the scale setting. With this knob, the overall pitch can be shifted to match other instruments and stay in tune with itself.

There are two auxiliary knobs on the KBD and a switch (#306) to bring the two auxiliary knobs in and out. With the scale switch (#306) in the NORM position, the AUX knobs do nothing. With the switch in the AUX position, the AUX scale knob (#304) can expand or contract the scale of the keyboard from nothing to somewhat greater than normal. An example of this would be to set up a scale made up entirely of quarter tones instead of the normal half tones. The normal scale knob (#300) still acts as a fine scale adjustment when using the AUX scale knob. The overall pitch can be adjusted using the AUX TONE knob (#305). This allows adjusting the newly formed scale to start on any desired pitch. The normal TUNE knob still acts as a fine tune when using the AUX tune knob.

The PITCH BEND knob (#310) can shift the whole KBD up or down just like the tune knob. However, the pitch bend is also provided with an electrical dead spot in the center of its range for ease in returning precisely to the original pitch.

Voltage Controlled Amplifier and Mixer

Fig. 8

Audio signals are fed into inputs one (170), two (171) and/or three (172), and levels of relative mixing are set with the three input pots (165, 166, 167).

The overall gain can be controlled by adjusting the pot labeled GAIN (168) and or by feeding control voltages into V.C. input jacks (175 and or 176).

For use in conjunction with the envelope generator, use the following steps.

1. Plug the audio signal (from one of the oscillators) into one of the VCA Mixer inputs (say 170) and turn up the pot for that channel (165 in this case) about half way. Feed out jack (180) into audio amplifier, guitar amplifier, or whatever sound system is being used.
2. Turn up the master Gain pot (168) until a signal is heard.
3. Turn the env generator output level pot for env #1 (138) all the way down.
4. Turn the gain pot on the VCA Mixer (168) slowly counterclockwise until the audio signal just barely dissappears.
5. Turn the output level pot on the env gen #1(138) to about 12 o'clock.
6. Now a signal should be heard in accordance with the setting of Env. Gen #1 whenever a KBD trigger or other trigger is fed into jack #156 of the envelope generator.

Envelope generators #2 and #3 can be used to control other modules while #1 is controlling the VCA Mixer. For example to sweep the V.C. Filter and/or Ocs. Frequency.

One final note: Overdriving the VCA Mixer overides control voltage rejection. You should keep the control voltage pot (#138 in the example above) at about the 12 o'clock position, generally. Lack of control voltage rejection makes a "popping" sound.

Voltage Processor/Mixer

Fig. 19

The voltage processor is a six input mixer with two outputs. Three of the inputs run through input level pots and the other three have a fixed gain.

DC voltages and or AC signals can be mixed (summed) together and taken out any of the output jacks.

The voltage processor has two outputs A and B. A consists of four output jacks in parallel (411 thru 414) and output B consists of two output jacks in parallel (414, 416).

Any signal, no matter what input is used, will appear in output A and B simultaneously but their phase relationship depends upon what inputs are used. When AC signals from separate sources are mixed and taken out of an output it is not, in most cases, important as to what their phase relationships are because a waveforem will sound the same whether or not it is inverted. Therefore the polarity markings above the inputs can be disregarded.

When using the voltage processor to mix DC control voltages it is important however to understand how each input treats the input voltage.

The first two inputs (405, 406) are marked A+ B-. This means that a positive DC voltage fed into any of these two inputs will drive output A positive and output B negative in equal amounts simultaneously. This could for example drive two oscillators in perfect contrary motion. One of these two inputs marked VR 1 (405) is fed through an input level pot (400) which can turn the input signal to zero. The other input (406) is set at a fixed level.

The next two inputs marked A- B+ (407, 408) do just the opposite of the first two inputs. A positive voltage fed into any of these two inputs will drive output A negative and output B positive. One of these is marked VR2 (407) and goes through an input level pot (401). The other input (408) is set at a fixed level.

The last two inputs marked A+ B+ (409, 410) mean that a positive voltage fed into any of these two inputs will drive both outputs A and B in a positive direction. One input marked VR3 (409) goes through an input level pot (402). The other input (410) is set at a fixed level. A front panel voltage pot (403) can also be turned on with a switch (404) to feed in a voltage which also drives both outputs A and B in the same direction simultaneously. All oscillators being driven can be shifted or tuned up or down in pitch exactly the same amount by turning this pot (403).

Trigger Generator

Fig. 5

Triggers are the command signals of the system and are electronically equivalent to a grounding switch. See figure #20 part A for a graphic representation of this analogy.

Two or more trigger sources can be connected together in parallel, or as computer designers say, "WIRE ORED" together.

Triggers can be of any length in duration, from very short to very long. The STEINER-PARKER Basic Studio and Synthasound units typically produce and use triggers ranging from a few 1/1000ths of a second to greater than 10 seconds. Whereas some of the modules requiring a trigger input do not care whether the trigger is short or long (such as the S & H and the sequencer input), other modules requiring a trigger input are sometimes controlled by the trigger duration (such as the envelope generator).

Two trigger sources connected in parallel are like two switches in parallel. When one trigger source is ON, the other has no effect. Therefore, one trigger source can act as an inhibitor to recurring triggers from another trigger source. See figure #20, part C.

The trigger generator can produce triggers of varying duration and rate. The rate is controlled by the rate knob (105) and or a voltage fed into the V.C. Rate jack (114). Trigger duration is controlled with the Duration knob (106) and or voltage fed into the V.C. Width jack (116).

The trigger gen can be made to run in one of three ways. 1. Put the free run switch (#108) to the RUN position (up). 2. Push the button marked GATE (109) while the free run switch is in the OFF (down) position. 3. Finally, you can feed a long trigger into the jack called GATE (115), once again with the free run switch in the OFF (down) position. The generator will run for the duration of the input trigger, in this mode.

Manual triggers can be generated by pushing a button marked Man. Trig. (#107). The trigger duration in this case is continuous for as long as the button is pushed.

The trigger generator output is connected to four output jacks in parallel (110, 111, 112, 113) to facilitate ease of patching.

Sequencer

Fig. 6

The sequencer is used to program voltage patterns of up to eight steps (16 in a special case). Whenever a trigger of any duration is fed into one of the two trigger input jacks (#280 and 281) with the run switch (#253) in the MAN position (down), the sequencer will advance one step. Step position is indicated by a small red light. After step eight has been reached, the sequencer will recycle to step one and start over again. Each step is capable of supplying three separate adjustable output voltages, one each to Out A, Out B, and Out C, respectively (jacks #265, 270, and 275). Output A is controlled by the top row of pots (#255A-262A), Out B by the middle row (255B-262B), and Out C by the bottom row ("255C-262C). The magnitude of each respective set of voltages can be turned from zero to a maximum value with output level pots 263A, B, or C. Each output voltage has two output jacks in parallel.

The number of steps, up to eight, in a sequence is controlled by Steps switch #254. Output A can be made into 16 steps or less at the expense of Output B by moving switch 264 to the AB16 position. The number of steps is now the number selected by step switch (#254) plus eight. Output A will sequence through the voltages set on the top row of pots and then recycle a second time over the voltages set on the second row of pots up to the number se on switch #254. There will be no voltage present at Out B. Out C remains as though it were an eight step sequencer.

Each sequential step, one through eight, has its own separate trigger output. The trigger duration is equal to the length of time spent on each step.

The sequencer can be manually advanced through its steps for purposes of setting the voltages by pressing ADV button #252 when the run switch (253) is in the off position and no triggers are being fed into jacks (280 or 281).

The sequencer will reset to step #1 anytime reset button #251 is pressed or a trigger is fed into the reset jack (#285).

As an added feature, this sequencer has its own internal trigger generator with the rate controlled by rate pot #250. This trigger source runs only when the run switch (#253) is in the run position. This trigger source, as well as being able to run the sequencer internally, is connected in parallel with the two trigger jacks #280 and 281. Thus, triggers from this source can be taken out of these two jacks to run other triggered modules.

Since one trigger can inhibit another (see the trigger generator explanation), one trigger can be fed via a patch cord from step eight trigger output #286H, for example, to one of the trigger input jacks #280 or 281. With the internal or an external trigger generator running, the sequencer will start at step one, advance through to step eight, and hold until a trigger from another source is fed into the reset jack #285 (say from the KBD) or reset button #251 is pressed. At this instant the sequencer will again reset to step one and sequence to step eight and hold. This is because the trigger from step eight output jack inhibits any further triggers present at trigger jack 280 or 281 from triggering the sequencer.

Frequency Divider

Fig. 15

This module contains two sets of frequency dividers. One set divides by 2, 4, and 8 (1,2, and 3 octaves) and mixes these sub octaves in the output with octave mix pots #228, 229, and 230 respectively. This whole mixture can be shifted in octaves by octave selector switch #227.

The second divider can divide by 3,5,7,9,11, or 15 according to the setting of the Divider Switch (#236) and also mix this with the output through mix pot #237. This divider can also be shifted in octaves with octave select switch #235.

In the second divider, illustrated in the second table below, dividing by 3 shifts the input tone down by an octave and a Perfect fifth, dividing by 5 shifts by 2 octaves and a Major third, dividing by 7 shifts 2 octaves and a minor seventh, dividing by 9 shifts 3 octaves and a major second, dividing by 11 shift by 3 octaves and an augmented fourth, and dividing by 15 shifts by 3 octaves and a major seventh. Add one octave to each of the above for each position of the selector switch #235. For example, with the selector (#235) in position 2 and the divider switch (#236) in position 9, the total shift is 4 octaves and a major second. etc.

A signal fed into the SIG IN jack (#239) comes out of two SIG OUT jacks in parallel (#245 and 246) after being divided. Overall output level can be adjusted with output level pot (238). All the output signals from the divider are square waves and thus can also be used as control voltages to an oscillator to create very interesting sequential effects. Even staircase waves can be generated by the proper setting of the octave mix pots.

This module can be used as a trigger divider by feeding recurring triggers into the Trigger Input jack #241 and taking the resulting divided triggers out of Trigger Out jack #242. The triggers are produced by a voltage level threshold circuit on the mixed waveforms. Different divide patterns for triggers can be produced with certain mixtures of the octave pots and mix pots. A table of divides is given on the next page for both halves of the divider.

Table of Divides

Selector #1 (#227)	#228 (2)	#229 (4)	#230 (8)
1	2	4	8
2	4	8	16
3	8	16	32
4	16	32	64

Dividing by two is equivalent to a one octave shift, 4 equals a 2 octave shift, 8 equals 3 octaves, 16 equals 4 octaves, 32 equals 5 octaves, and 64 equals 6 octaves.

Selector #2 (#235)	3	5	7	9	11	15
1	3	5	7	9	11	15
2	6	10	14	18	22	30
3	12	20	28	36	44	60
4	24	40	56	72	88	120

Dual Voltage Follower

Fig. #23

The Voltage Follower does the same thing for control voltages that the Portamento does to keyboard voltages. It requires as an input the output of a control voltage source, such as the Sample and Hold or the Sequencer, etc.

The output of the Sample and Hold, for example, could be fed into the Voltage Follower #1 jack (#600) and taken out of output jacks #601 or 602. With the Slew Rate knob (#280) at the way CCW, the voltage at the output jacks will follow the input voltage simultaneously. As the slew rate knob is turned clockwise, the slew rate of the output voltage gets slower.

If the voltage from the voltage follower, for example, is used to control the frequency of a VCO, then the VCO will glide from one pitch to another at a slower rate as knob #280 is turned clockwise.

Some Sample Hookups

WIND

White Noise into the filter (Jack 84 to 67) with the filter in the low pass mode with high resonance. Modulate the filter with KBD voltage (jack 198 to jack 73) and turn the KBD portamento (#303) all the way up. Or, you can produce the same effect without the KBD by manually turning the Filter Frequency knob up and down.

TRAIN

Use the above set up, except modulate the filter (Jack #74) with an oscillator instead of the KBD. The Osc. can be KBD driven for speed changes.

RACE CAR

Use a sawtooth waveform as an input to the Frequency divider and run the output of the frequency divider back into the oscillator that is producing the sawtooth waveform. Set the upper and lower divider knobs on the frequency divider at 3 and 4 respectively and turn all the divider mix pots up about half way. Adjust the Oscillator frequency until a race car type sound results. The KBD with portamento fully up can be used to modulate the Osc. to produce the sounds of the entire race from start to finish, including shifting and cornering.

STRINGS

Listen to two sawtooths (slightly detuned from each other) mixed through the filter, and modulate both oscillators with a triangle from the type C Oscillator at very low frequency and amplitude. Adjust modulation to taste.

RUNNING THE RAMP

Let the S & H sample a sawtooth, say from Osc #1, and let the output of the S & H be used to modulate another oscillator, say #2. Trigger the S & H with the output of the trigger generator. Tune the #1 oscillator, the one that is being sampled, to a very low frequency (without a KBD input), say below the audio frequency, and turn up the rate on the trigger generator until the trigger generator is faster than the frequency of Osc #1 or until there is a definite relationship between the frequencies of Osc #1 and the Trigger generator.

JET AIRPLANES

Run White Noise into the Phaser and modulate the Phaser with a slow sine wave. Be sure to have the Phaser mix pot set about half way between min and max.

PHASE SHIFTING OF EXTERNAL SIGNALS

Run external signals into the Input Amp and feed the output of the input Amp into the phase shifter and modulate the phase shifter as above.

BASOON

Feed a KBD modulated sawtooth into the filter and use the resonant high pass mode, but not resonant enough for the filter to self oscillate.

HARPSICORD

Run a skinny pulse from the type "A" Osc through the filter in the non resonant low pass mode. Set envelope generator #1 for fast attack, duration level about ½ way up (#6) and very fast decay. Use this envelope to sweep the filter.

BANJO

Use the above set up except that the envelope generator must be triggered by the trigger generator instead of the KBD and the trigger generator must be gated off and on by the KBD trigger. COMMON the inputs and outputs of Envelope generators #1 and #2 and set #1 as listed for a Harpsicord. Set #2 envelope for "0" attack and duration level and a low decay (about #2).

TRUMPET

Use a sawtooth as an input into the filter in a non-resonant low pass mode. Sweep the filter with the Envelope generator and also modulate the filter with the KBD voltage. COMMON envelope inputs and outputs for envelope #1 and #2. Set #1 for fast attack, duration level all the way up, and a fairly fast decay. Set #2 for a slow attack, duration level all the way up, and fast decay.

CLARINET

Use the same set up and settings as for the trumpet, but use a square wave for the sound source instead of a sawtooth.

BAGPIPES

Use a skinny pulse and run it directly from the Osc to the VCA, that is, use no filter.

FLUTE

Use a sine wave as the sound source with tremelo (amplitude modulation of the VCA) and Vibrato (frequency modulation of the sine wave oscillator) and add some low amplitude white noise fed directly in the VCA.

CHIMES

Use two sine wave oscillators. Triangle waves can be used but sine waves are preferable and produce better effects. Both should be patched to track the KBD and one should modulate the other. Listen to the output of both simultaneously. Use a complex envelope by combining (COMMON) the outputs and inputs on Env #1 and #2. Set both for a very sharp attack, both for duration level all the way down, and one for fast decay and one for a long decay. Use the complex envelope listed above to control the VCA.

ZYLOPHONE

Same envelope as above to VCA except second envelope has a fast decay and #3 envelope should also be set for fast Attack and Decay (common input with #1 and #2, but DO NOT common the output of #3) and Envelope #3 should be used to modulate the sine wave oscillator.

Power Requirements

The following is a list of power requirements for each module manufactured by STEINER-PARKER. The Power Supply is capable of producing 650 milliamps of positive and 650 milliamps of negative current without ripple. Beyond that level, ripple may result during heavy load conditions, adversely affecting the performance of the unit. Owners wishing to expand their system should be careful not to exceed the 650 milliamp limit on either the positive or negative current. Once enough modules have been added to the system to require 650 milliamps or more of current, another power supply should also be added.

MODULE	POSITIVE 12VDC	NEGATIVE 10VDC
Type "A" VCO	37	21
Type "B" VCO	26	7
Type "C" VCO	22	3
VC Filter	10	8
Noise Generator	16	N.A.
Balanced Modulator	7	7.5
Input Amp	4	4
Trigger Generator	11	N.A.
Sample & Hold	35	27
Envelope Generator	70	N.A.
Tuner Monitor	17	3.5
VCA Mixer	7.5	4.5
Keyboard	47.5	18
Sequencer	60	5
Frequency Divider	100	N.A.
Phaser	22	25
Dual Voltage Follower	20	20
Peak Selector	20	20
Voltage Processor	20	20

All of the figures on the preceding page are in milliamps. N.A. means Not applicable, that is, that polarity is not required in the operation of that module. The Basic Studio, consisting of the first 13 modules listed above, requires a total of 310 milliamps positive and 103.5 milliamps negative current. The Synthasound, consisting of the first 16 modules listed above, requires 492 milliamps positive and 133.5 milliamps of negative current.

Mechanical Details

The Basic Cabinet is a triple layer of spaces into which individual modules can be installed. Each space is 21 inches wide and 5 3/4 inches high.

All fron panels are 1 3/4 inches wide or multiples thereof, for example 3½ inches, 7 inches, etc. All the front panels are 5 3/4 inches high.

The width of each module is as follows:

V.C. Oscillator Type "A"	7
V.C. Oscillator Type "B"	3.5
V.C. Oscillator Type "C"	1.75
V.C. Filter	3.5
Noise Generator	1.75
Balanced Modulator	1.75
Input Amp	1.75
V.C. Trigger Generator	3.5
Dual Sample and Hold	1.75
Triple Envelope Generator	7
VCA Mixer	3.5
Tuner Monitor	1.75
Keyboard & Power Supply Panel	3.5
Sequencer	12.25
Peak Selector	1.75
Voltage Processor	3.5
Dual Voltage Follower	1.75
Frequency Divider	7
Phase Shifter	1.75

The information listed above will be very helpful to you in designing the layout of your own synthesizer if you decide to get something other than the Basic Studio or Synthasound. On our standard units, the following layout is used:

Top Row:

Sequencer, Frequency Divider, Phase Shifter.

Middle Row:

VCO Type "A", VCO Type "B", VCO Type "C", VC filter, Noise Generator, Balanced Modulator, Input Amp.

Bottom Row:

VC Trigger Generator, Dual Sample and Hold, Triple Envelope Generator, VCA Mixer, Tuner Monitor, Keyboard and Power Supply Panel.

If, for example, you decide to get a Synthasound without the Frequency Divider, which is 7 inches wide, then in that 7 inch space you could substitute four 1.75 inch modules or two 3.5 inch modules or one 7 inch module. In the layout list just given, the modules listed as comprising the bottom and middle rows constitute a Basic Studio unit and the addition of the top row makes the unit into a Synthasound.

TRIPLE ENVELOPE GENERATOR

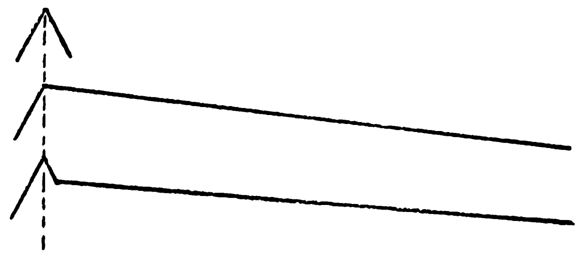
The three trigger input jacks (156, 157, 158) are connected such that all three envelope generators will trigger simultaneously from a trigger fed into the #1 input jack (157). Each envelope generator can be triggered separately by plugging into the other two trigger input jacks respectively. When a cable is plugged into Envelope #2 input jack, it disconnects the envelope gen input from the #1 jack and accepts a trigger from the cable. Example, with a keyboard trigger plugged into #1 input jack and the trigger Gen. plugged into env. #2 input jack, envelope gen #1 and #3 will trigger from the keyboard and Env #2 will trigger from the trigger gen.

Envelope Generators #1 and #2 each have a com. switch on their outputs (#146 for env #1 and 153 for env #2). These switches enable envelope #3 to be combined with envelope #1 or envelope #2 or both. For example,

Env gen #1 set to

Env gen #3 set to

Result from env #1 output jack



Envelope Generators #2 and #3 each have a switch which converts the attack time setting into an equivalent delay time. (141 for env. #2 and 148 for env #3) When this switch is on, the attack time is always instantaneous. See fig. 3B.

Switch down

Switch up

Trigger

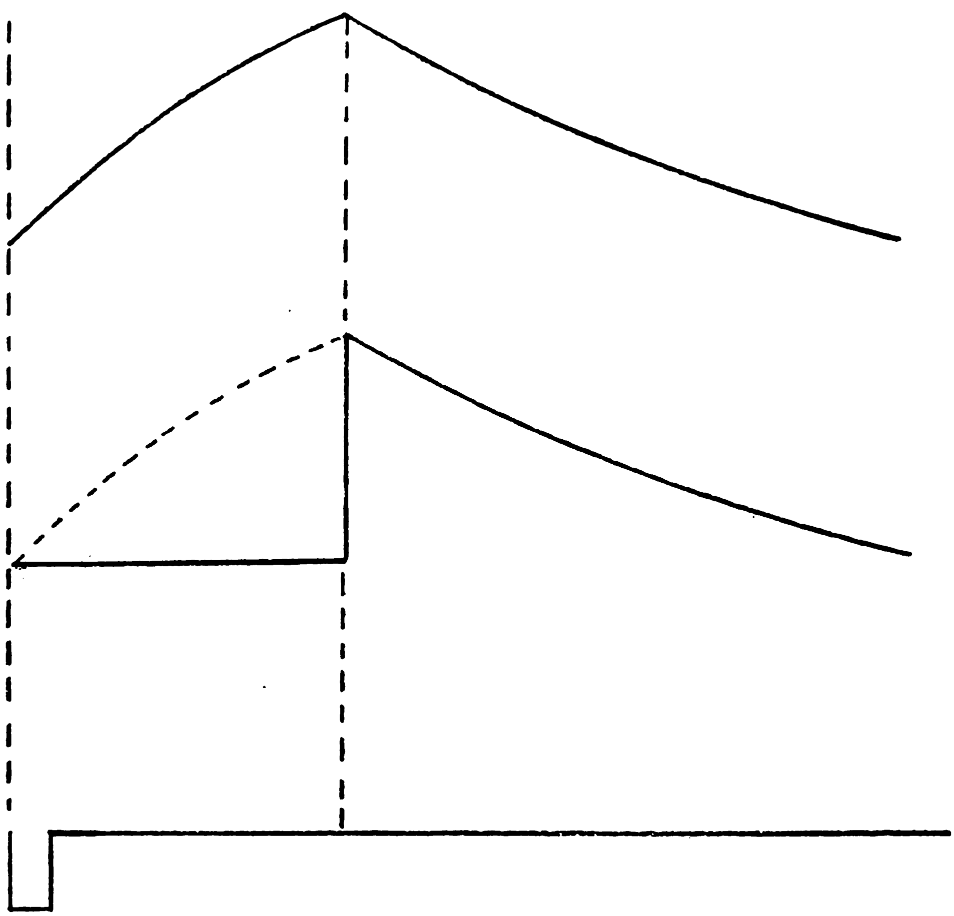


Fig. 3B

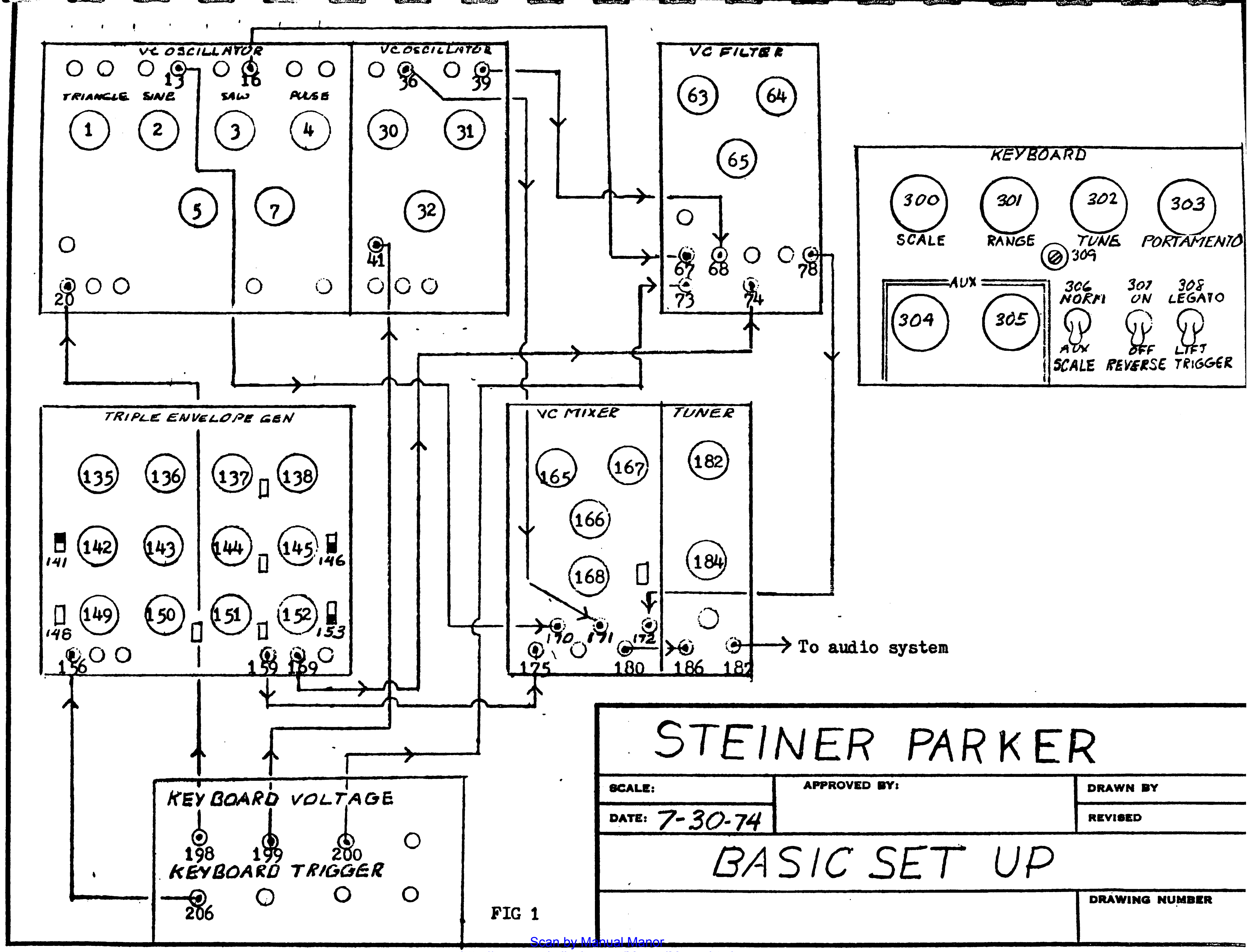

VC OSCILLATOR
13
16
TRIANGLE
SINE
SAW
PULSE
1
2
3
4
5
7
20
VC OSCILLATOR
36
39
30
31
32
41
VC FILTER
63
64
65
67
68
78
73
74
KEYBOARD
300
SCALE
301
RANGE
302
TUNE
303
PORTAMENTO
309
AUX
304
305
306 NORM
AUX
SCALE
307 ON
OFF
REVERSE
308 LEGATO
LIFT
TRIGGER
TRIPLE ENVELOPE GEN
135
136
137
138
141
142
143
144
145
146
148
149
150
151
152
153
156
159
169
VC MIXER
165
167
166
168
170
171
172
175
180
TUNER
182
184
186
187
To audio system
KEY BOARD VOLTAGE
198
199
200
KEYBOARD TRIGGER
206
STEINER PARKER
SCALE:
APPROVED BY:
DRAWN BY
DATE: 7-30-74
REVISED
BASIC SET UP
DRAWING NUMBER
PRINTED ON NO. 1000H CLEARPRINT

FIG 1

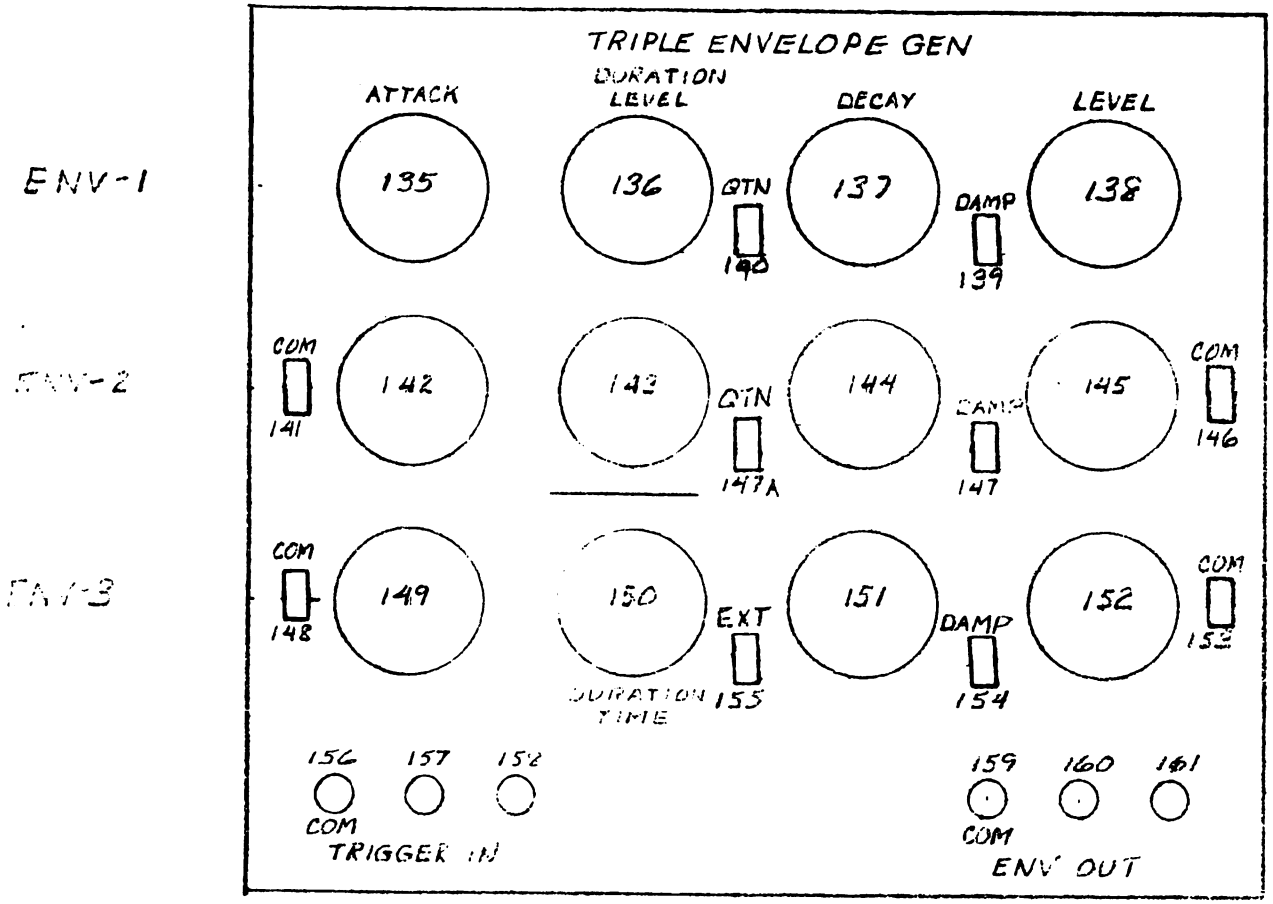


FIG 2

STEINER PARKER		
SCALE:	APPROVED BY: D Parker	DRAWN BY
DATE: 6-6-74		REVISED
TRIPLE ENVELOPE GEN		
		DRAWING NUMBER FP0100-0100

8½ X11 PRINTED ON NO. 1000H CLEARPRINT

ENVELOPE GENERATOR

Envelope generator 1 and 2 Trigger input duration and envelope output voltage relationships.

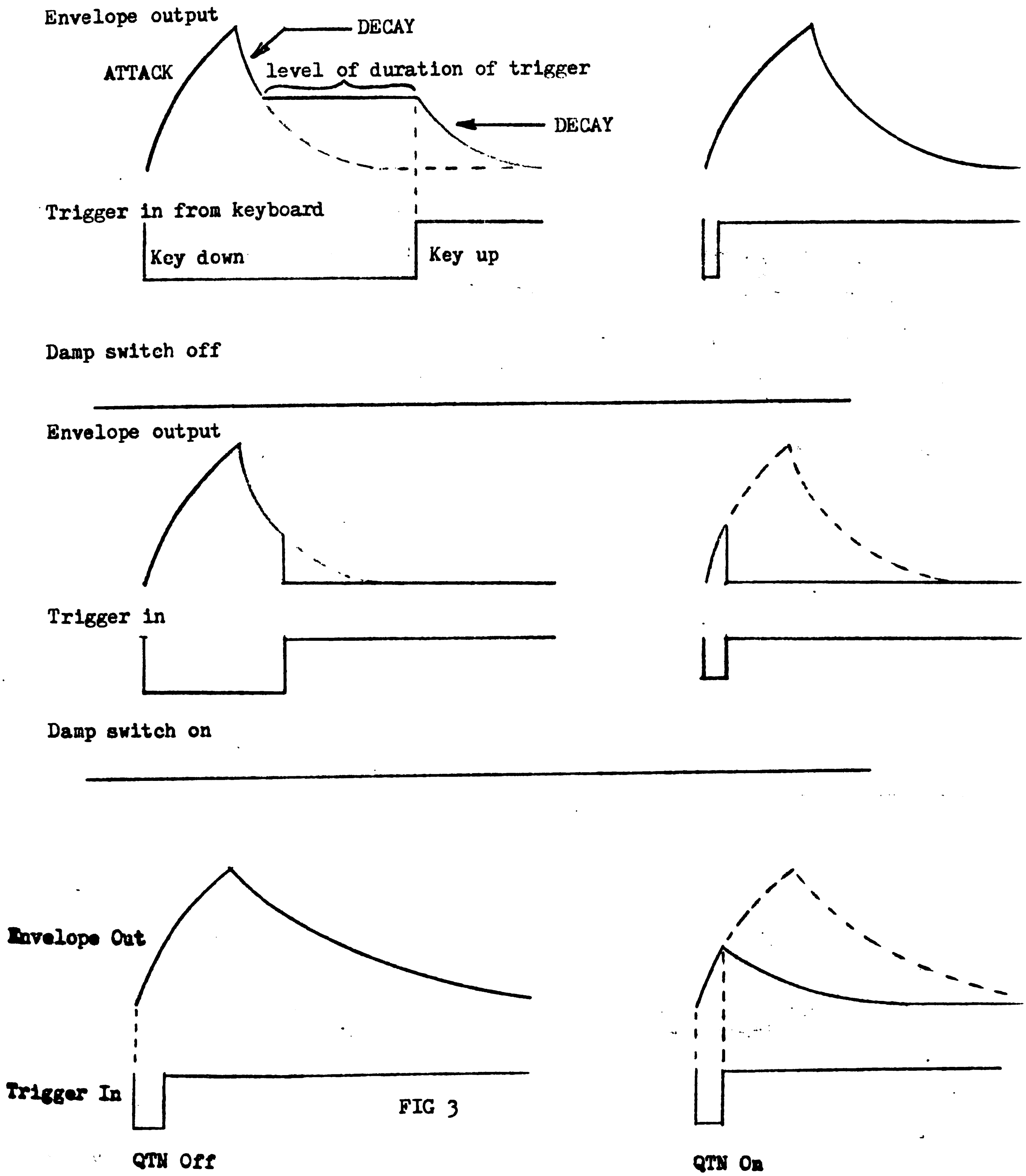
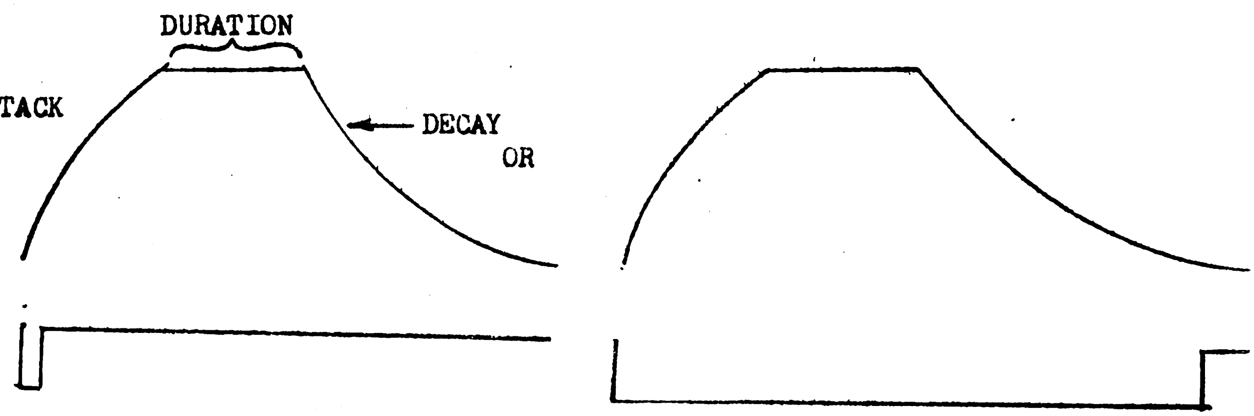


FIG 3

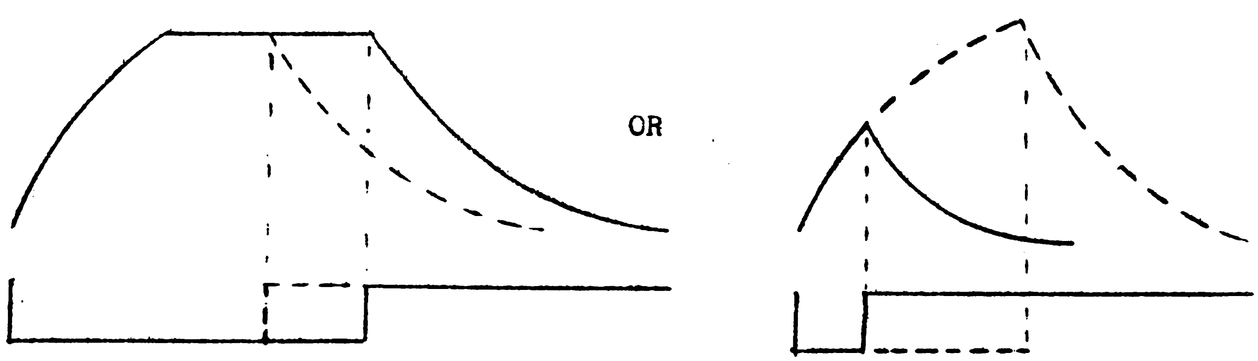
ENVELOPE GENERATOR

Envelope #3

Envelope output



EXT switch (155) in down position



EXT switch (155) in "EXT" position

FIG 3A

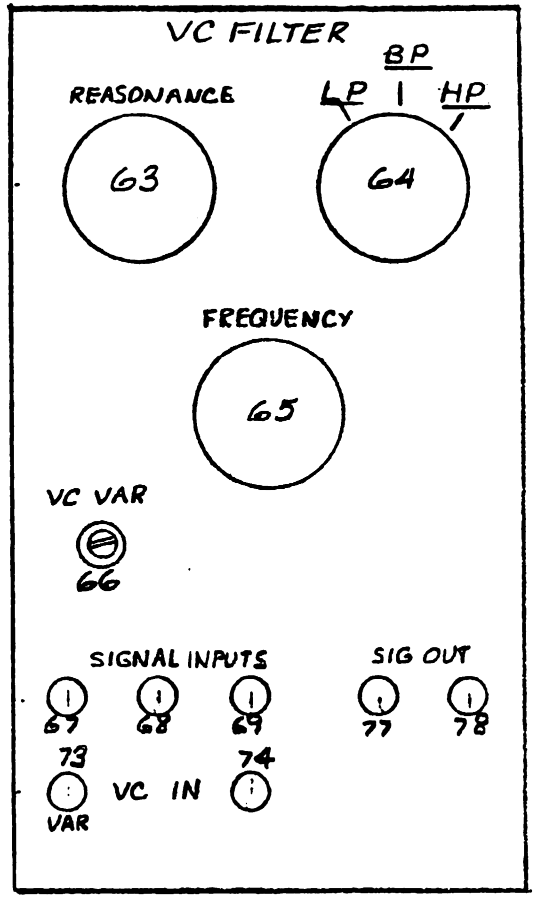
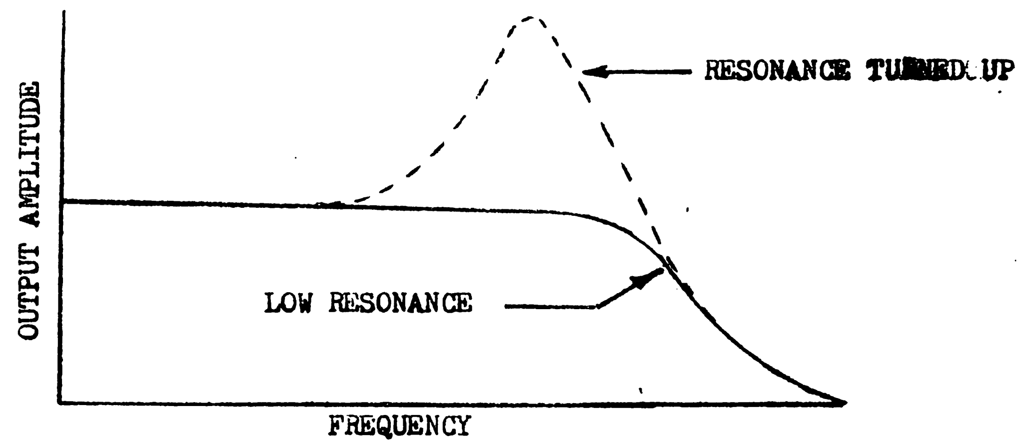


FIG 4

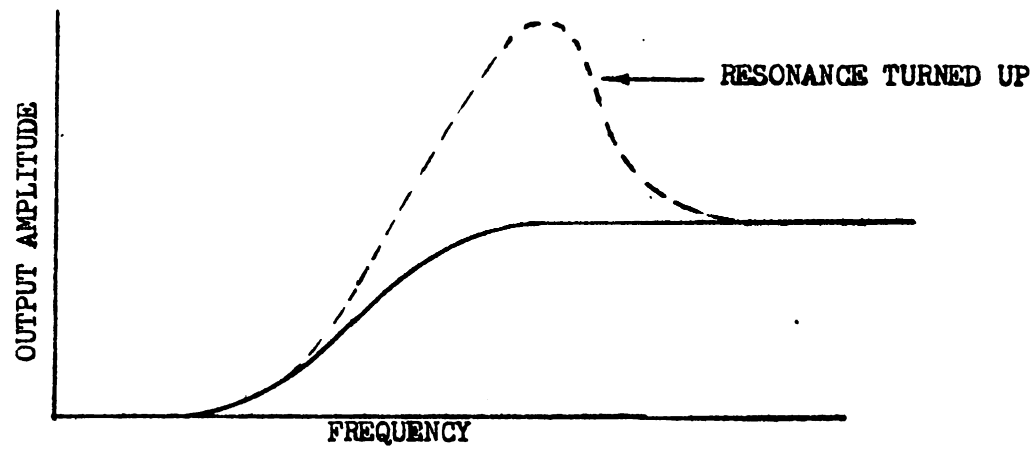
STEINER PARKER		
SCALE:	APPROVED BY:	DRAWN BY
DATE: 6-6-74		REVISED
VC FILTER		
		DRAWING NUMBER FP0100-0040

FILTER CHARACTERISTICS

LOW PASS



HIGH PASS



BAND PASS

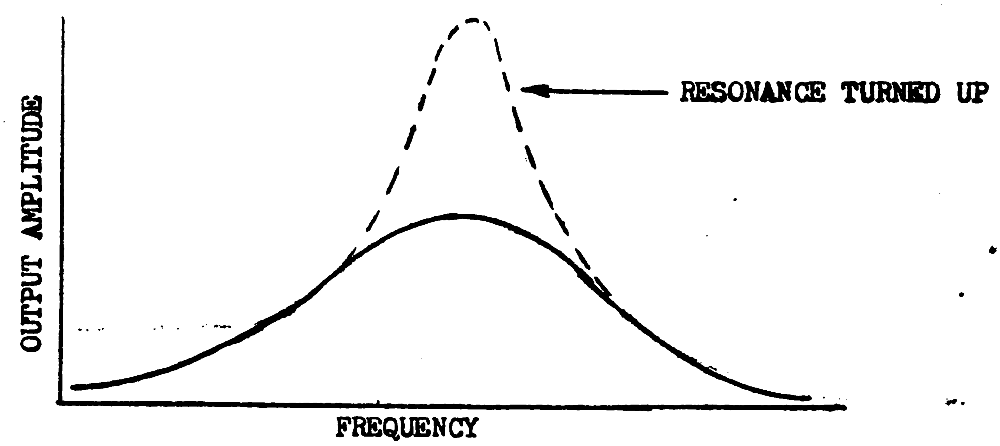


FIG 4A

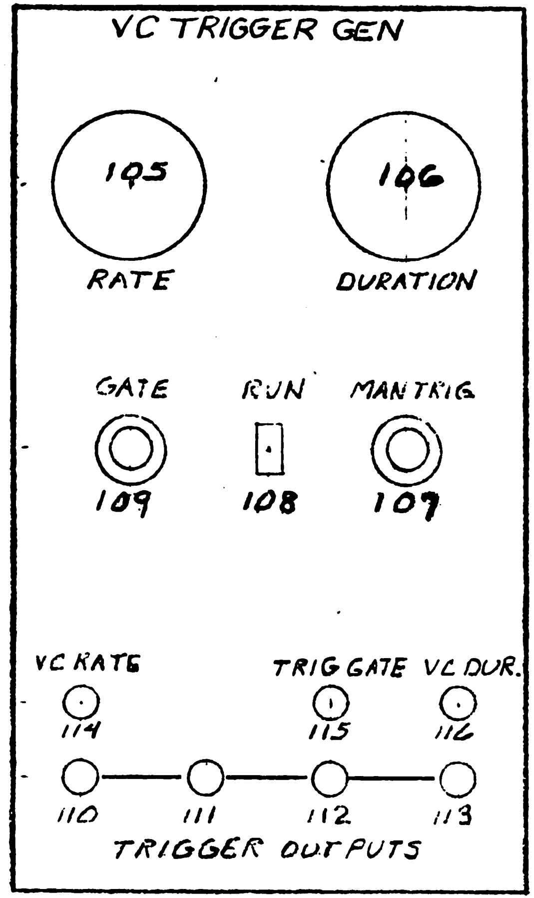


FIG. 5

STEINER PARKER		
SCALE:	APPROVED BY:	DRAWN BY
DATE: 12-30-74		REVISED
VC TRIGGER GEN		
		DRAWING NUMBER FP 0100-0080

8½ X 11 PRINTED ON NO 1000H CLEARPRINT

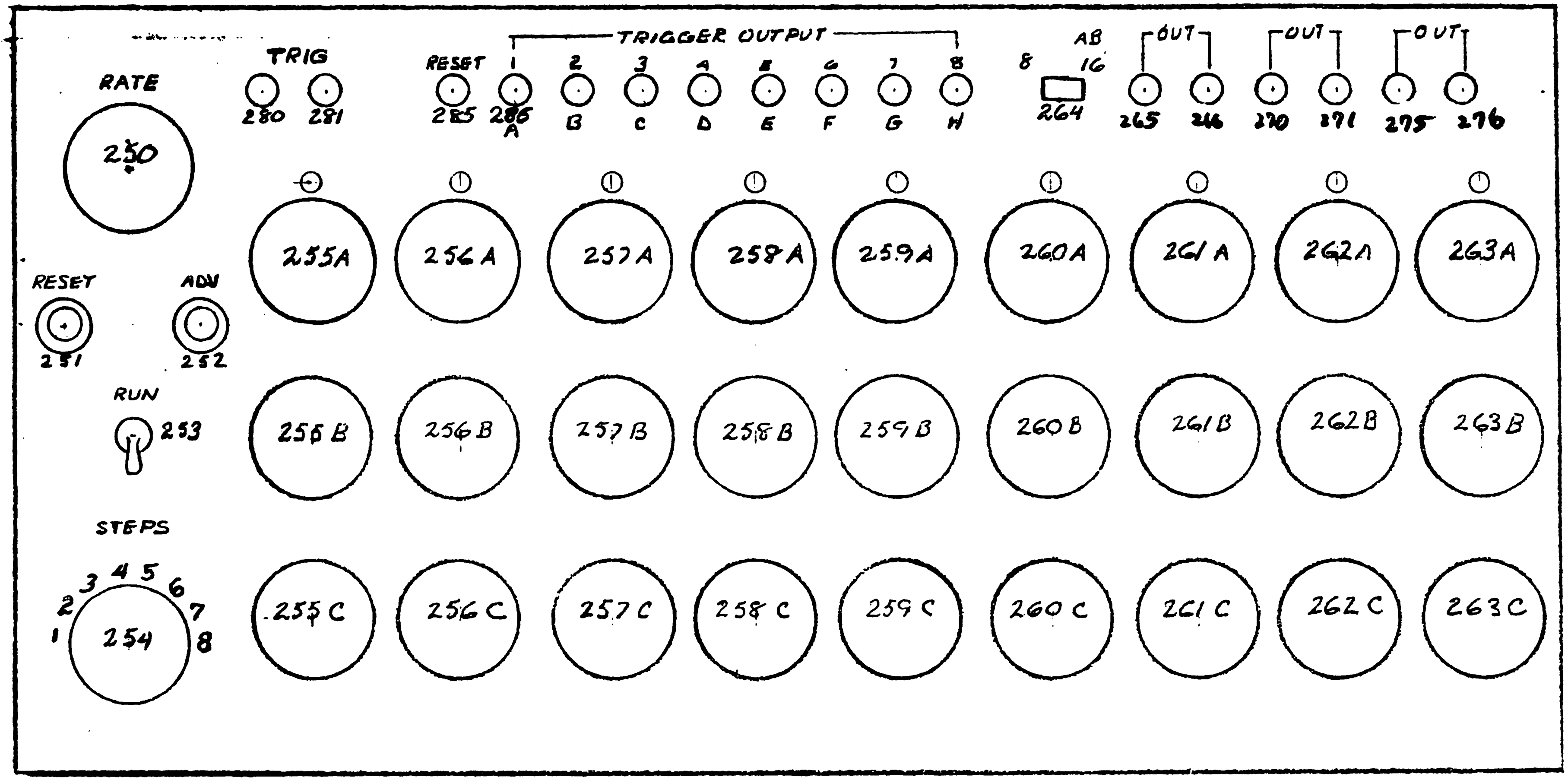


FIG 6

STEINER PARKER

SCALE:

DATE:

APPROVED BY:

DRAWN BY

REVISED

SEQUENCER

DRAWING NUMBER FP0100-0140

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT

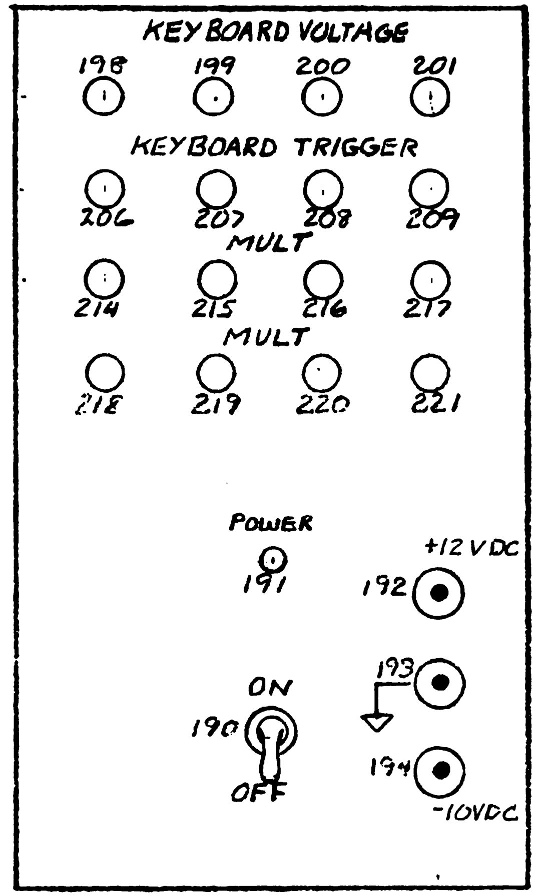


FIG 7

STEINER PARKER

SCALE:	APPROVED BY:	DRAWN BY
DATE:		REVISED

POWER SUPPLY

DRAWING NUMBER
FP0100-0130

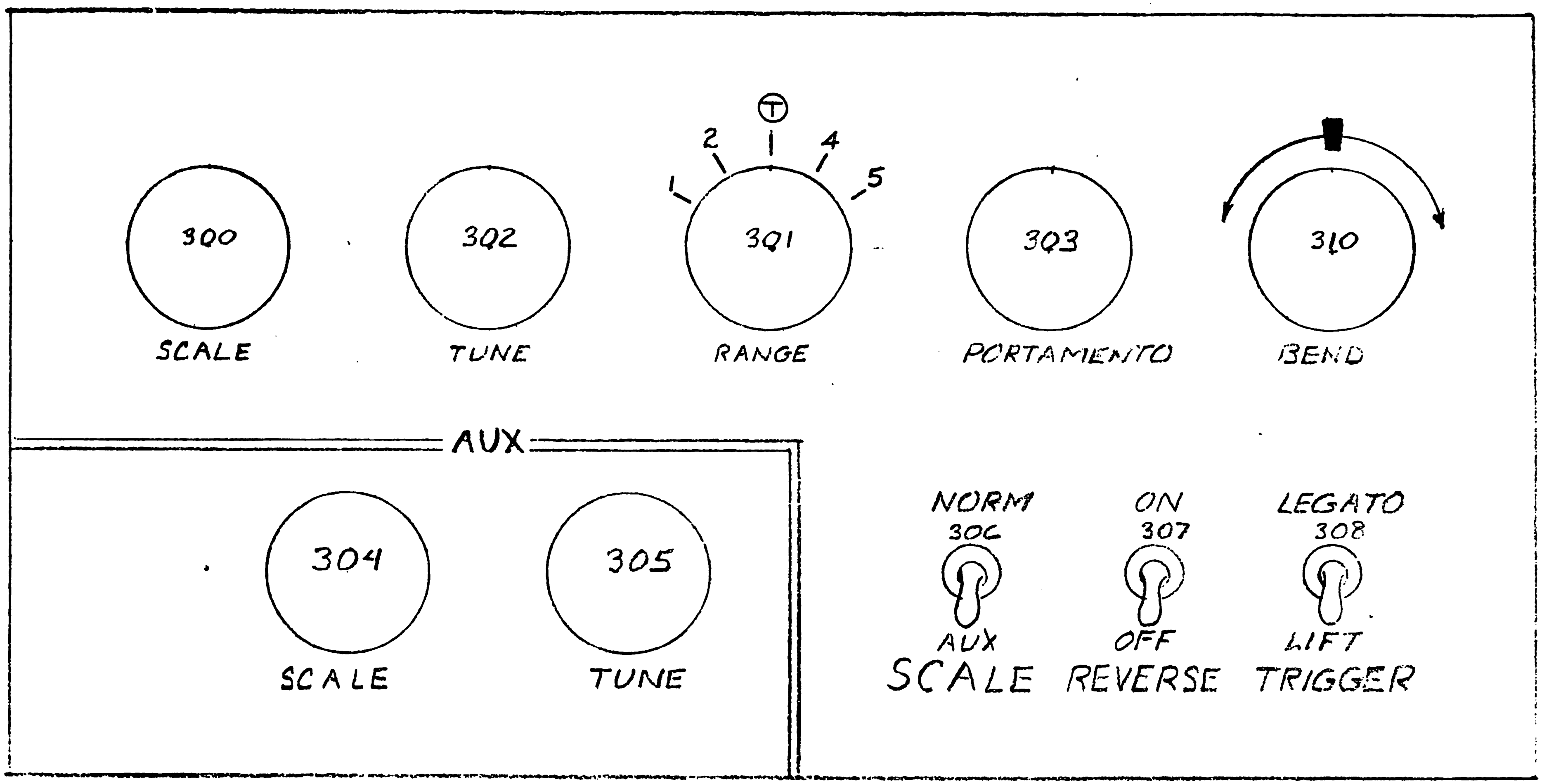


FIG. 7A

STEINER PARKER		
SCALE:	APPROVED BY:	DRAWN BY
DATE: 2-22-75		REVISED
KEYBOARD WITH PITCH BEND		
		DRAWING NUMBER FP0100-0141

8½X11 PRINTED ON NO. 1000H CLEARPRINT

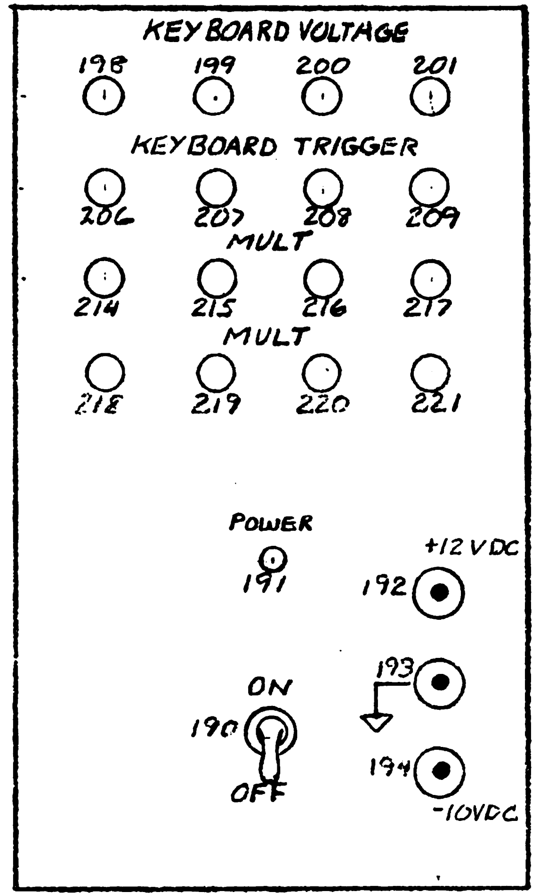


FIG 7

STEINER PARKER		
SCALE:	APPROVED BY:	DRAWN BY
DATE:		REVISED
POWER SUPPLY		
		DRAWING NUMBER FP0100-0130

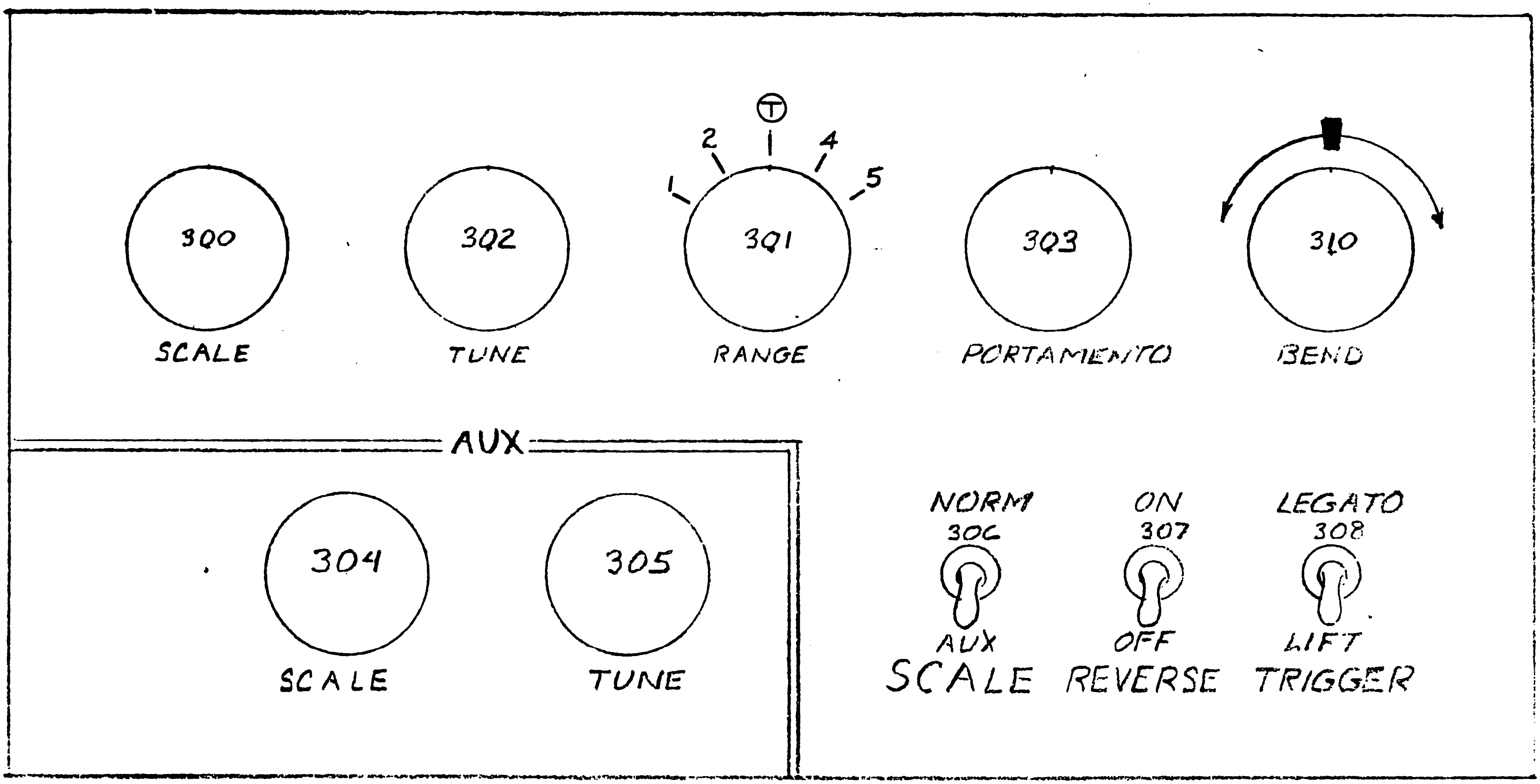


FIG. 7A

STEINER PARKER

SCALE:

APPROVED BY:

DRAWN BY

DATE: 2-22-75

REVISED

KEYBOARD WITH PITCH BEND

DRAWING NUMBER FP0100-0141

8½X11 PRINTED ON NO. 1000H CLEARPRINT

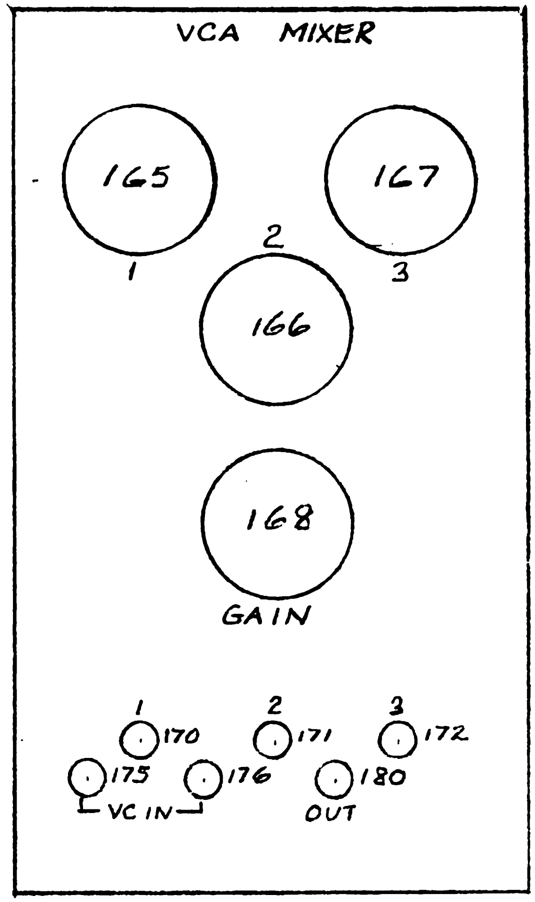


FIG 8

STEINER PARKER		
SCALE:	APPROVED BY:	DRAWN BY
DATE: 6-6-74		REVISED
VCA MIXER		
		DRAWING NUMBER FP0100-0110

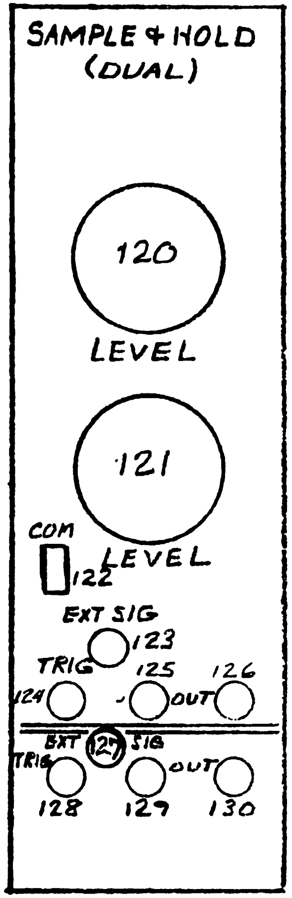


FIG. 9

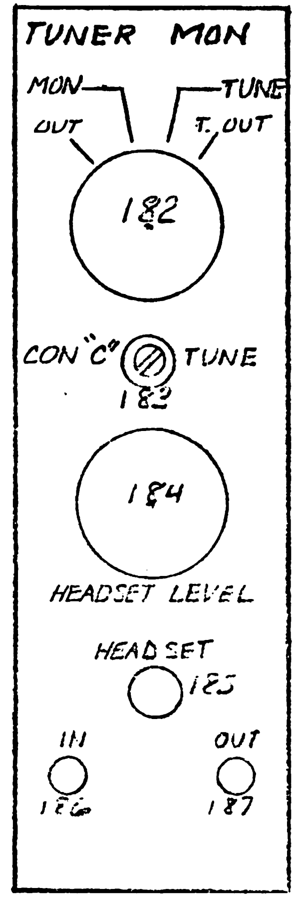


FIG. 10

STEINER PARKER

SCALE:	APPROVED BY:	DRAWN BY
DATE:		REVISED

SAMPLE & HOLD TUNER MON

DRAWING NUMBER
FP0100-0090
FP0100-0120

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT

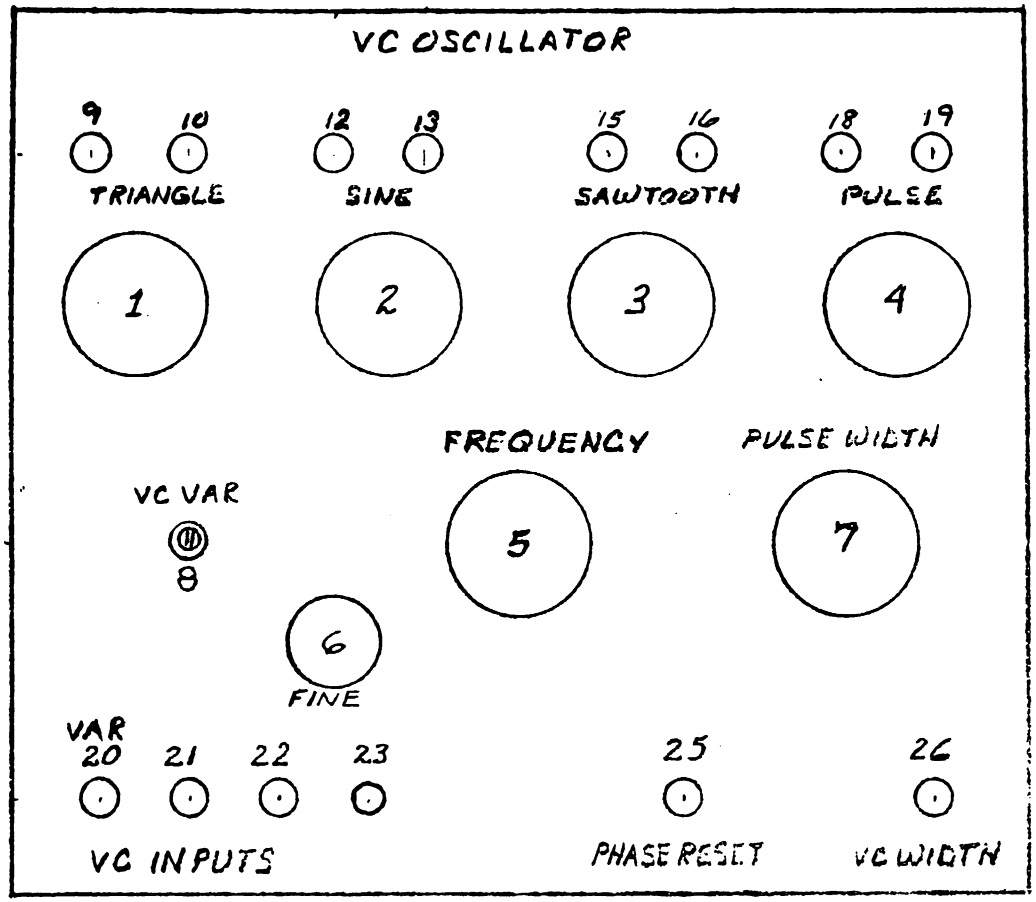
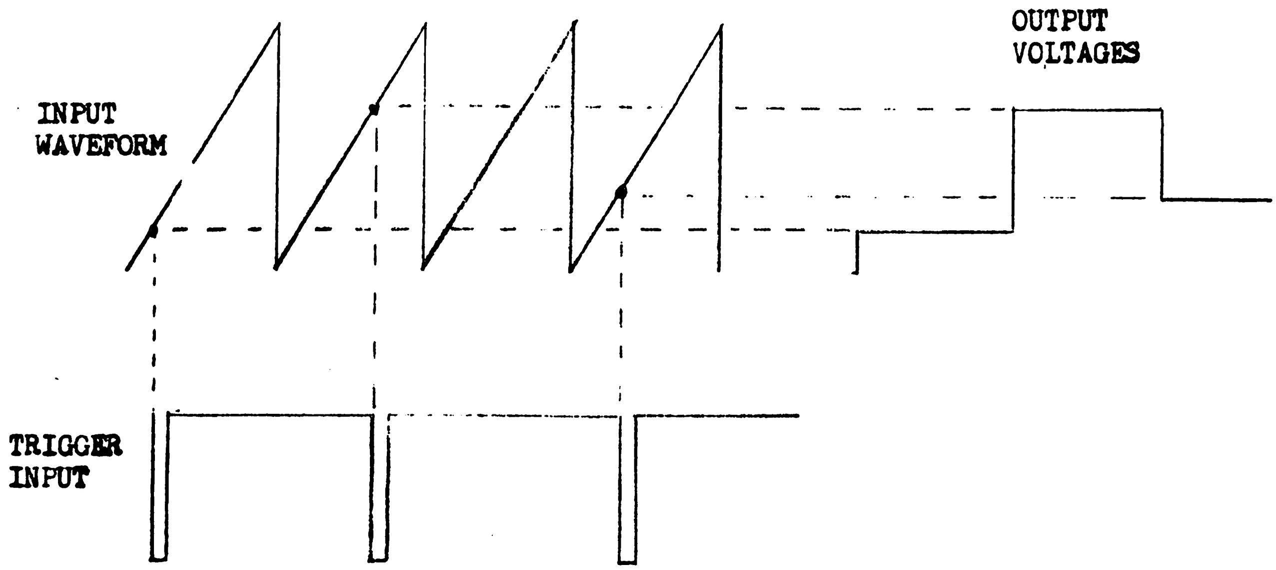


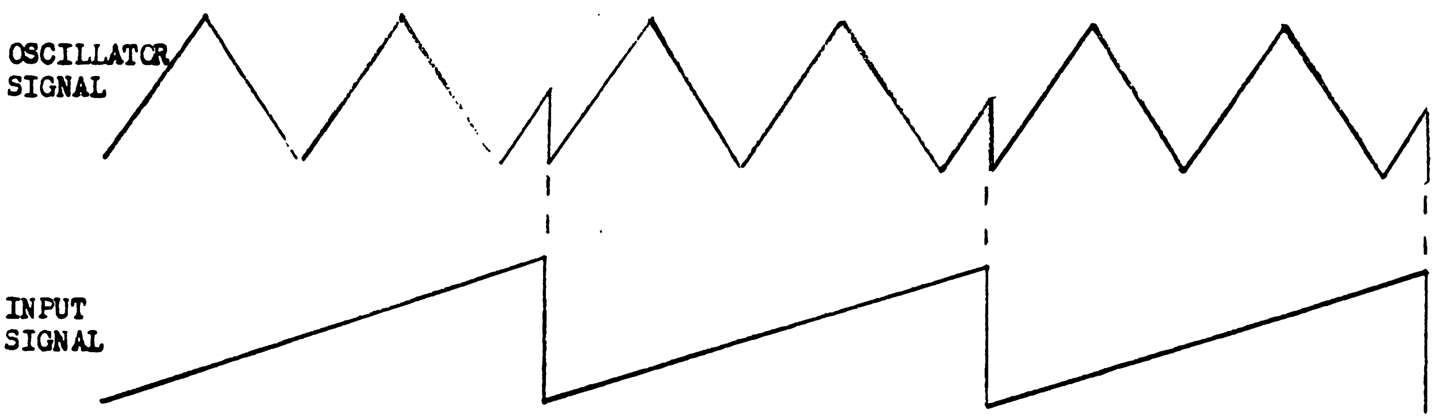
FIG 11.

STEINER PARKER		
SCALE: 1	APPROVED BY:	DRAWN BY
DATE: 6-6-74		REVISED
VC OSCILLATOR (SINE-SAW-PULSE)		
		DRAWING NUMBER FP0100-0010

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT



A. SAMPLE & HOLD OPERATION



B. PHASE RESET

FIGURE # 11A

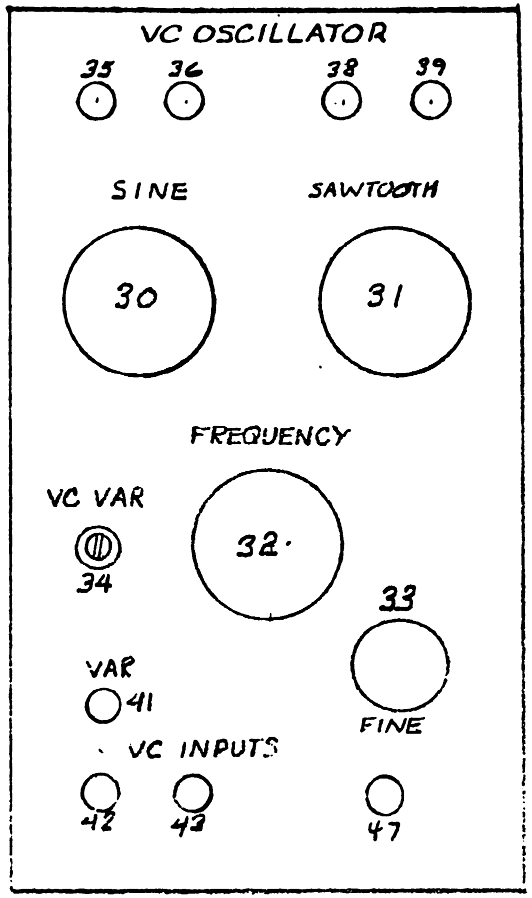


FIG. 12

STEINER PARKER

SCALE:	APPROVED BY:	DRAWN BY
DATE: 6-6-74		REVISED

VC OSCILLATOR (SINE-SAW)

DRAWING NUMBER FP0100-0020

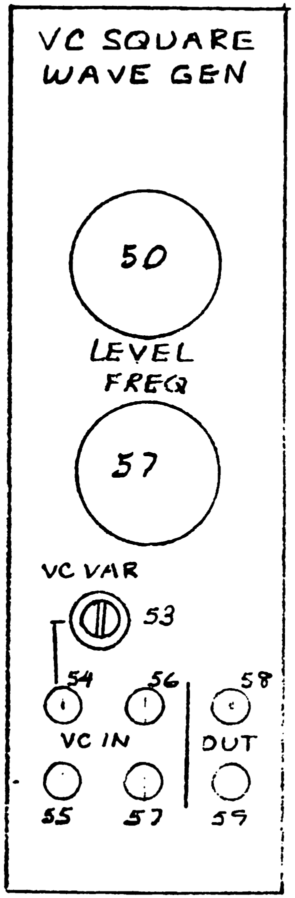


FIG. 13

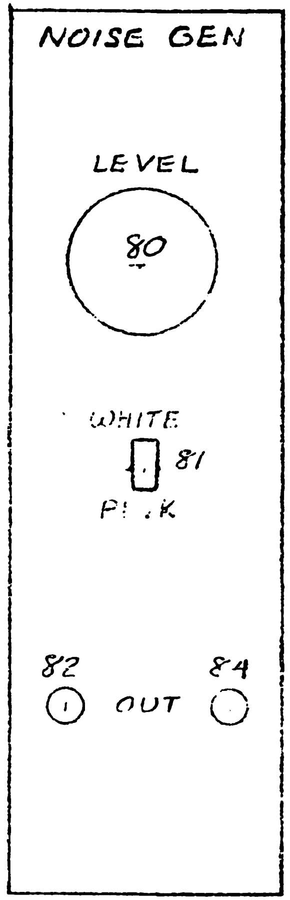


FIG. 14

STEINER PARKER		
SCALE:	APPROVED BY:	DRAWN BY
DATE:		REVISED
SQUAR WAVE GEN / WHITE NOISE		
		DRAWING NUMBER FP0100-0030 FP0100-0050

8½X11 PRINTED ON NO. 1000H CLEARPRINT

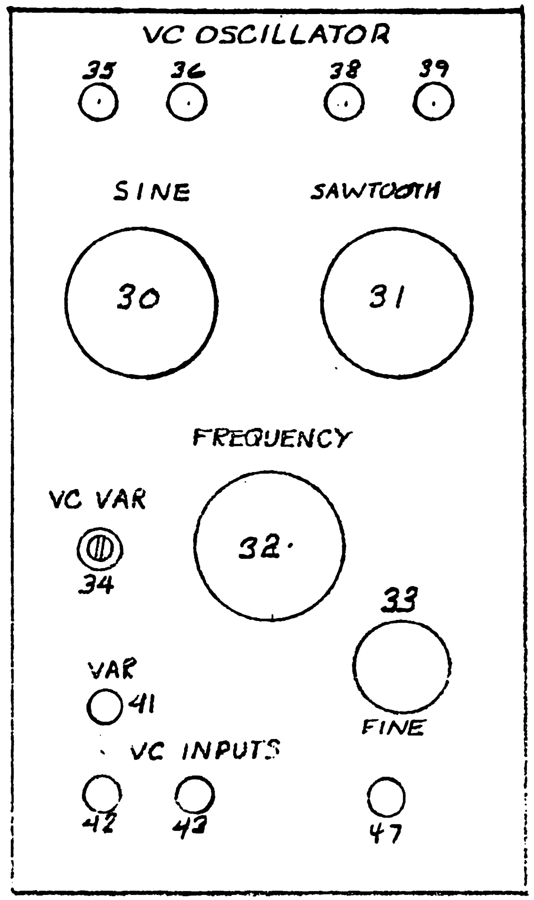


FIG. 12

STEINER PARKER

SCALE:	APPROVED BY:	DRAWN BY
DATE: 6-6-74		REVISED

VC OSCILLATOR (SINE-SAW)

DRAWING NUMBER FP0100-0020

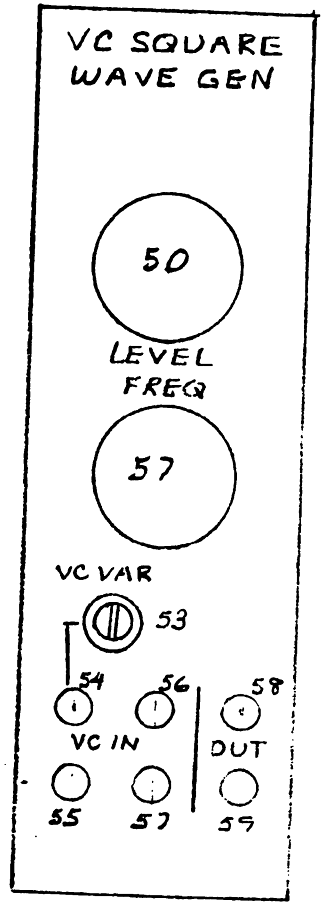


FIG. 13

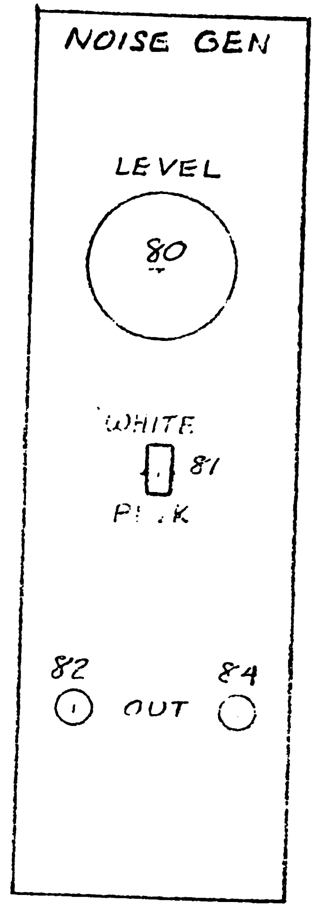


FIG. 14

STEINER PARKER

SCALE:	APPROVED BY:	DRAWN BY
DATE:		REVISED

SQUAR WAVE GEN / WHITE NOISE

DRAWING NUMBER
FP0100-0030
FP0100-0050

8½X11 PRINTED ON NO. 1000H CLEARPRINT

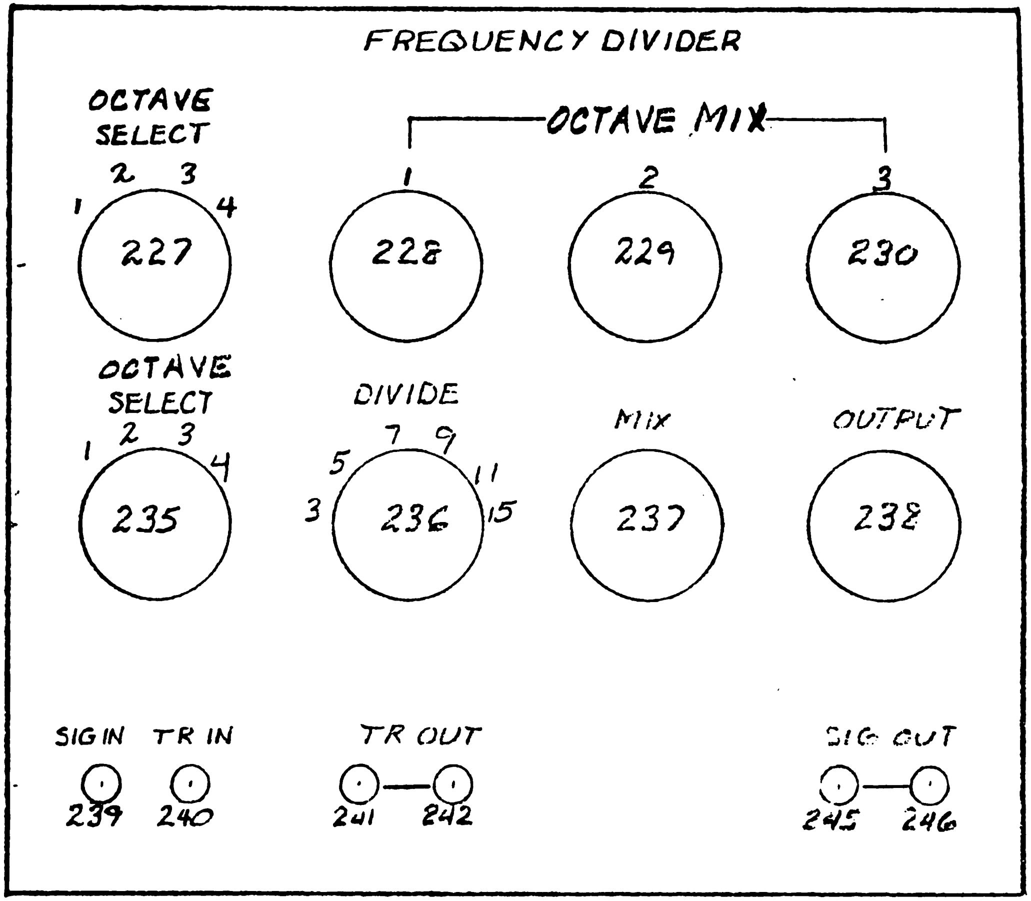


FIG 15.

STEINER PARKER		
SCALE:	APPROVED BY: D Parker	DRAWN BY
DATE:		REVISED
FREQUENCY DIVIDER		
		DRAWING NUMBER FP0100-015C

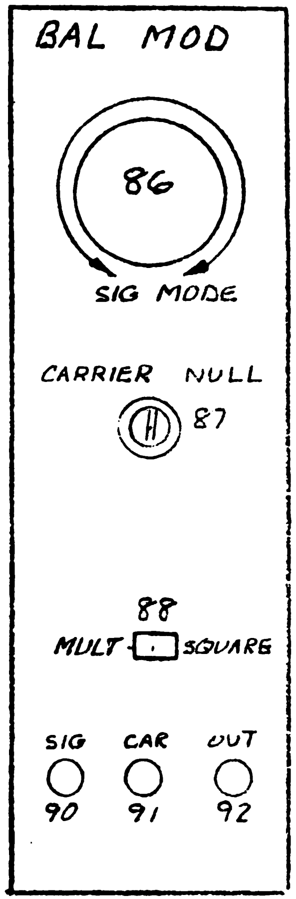


FIG. 17

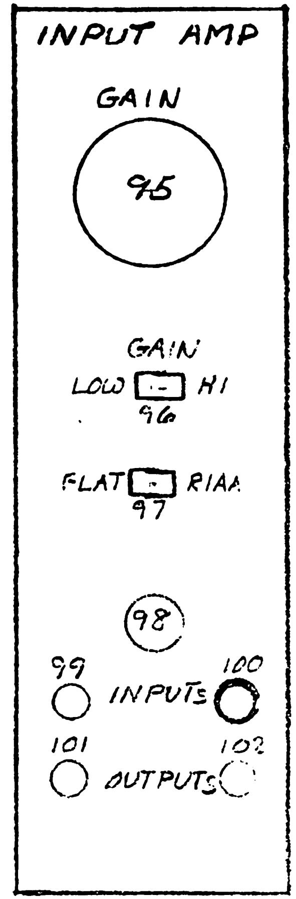


FIG 18

STEINER PARKER

SCALE:	APPROVED BY:	DRAWN BY
DATE:		REVISED

BALANCED MODULATOR / INPUT AMP

DRAWING NUMBER
FP0100-006 0
FP0100-007 0

8½X11 PRINTED ON NO. 1000H CLEARPRINT

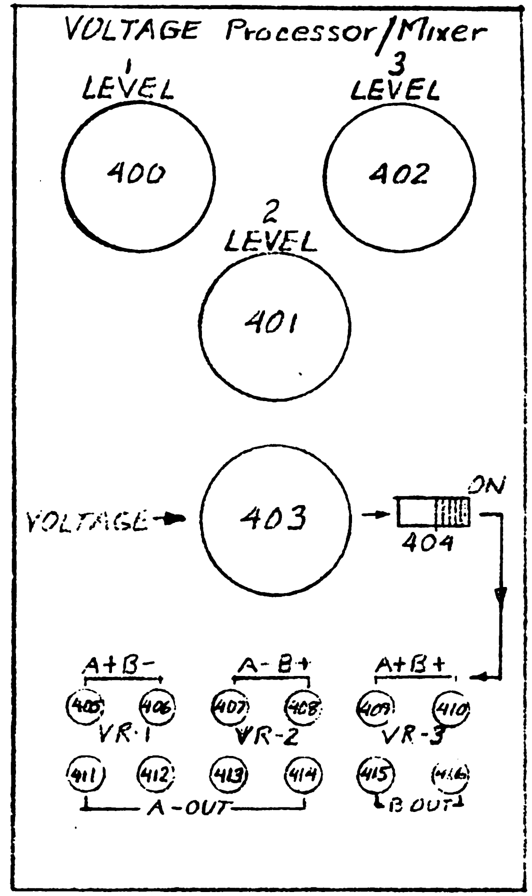


FIG. 19

STEINER PARKER

SCALE:

APPROVED BY:

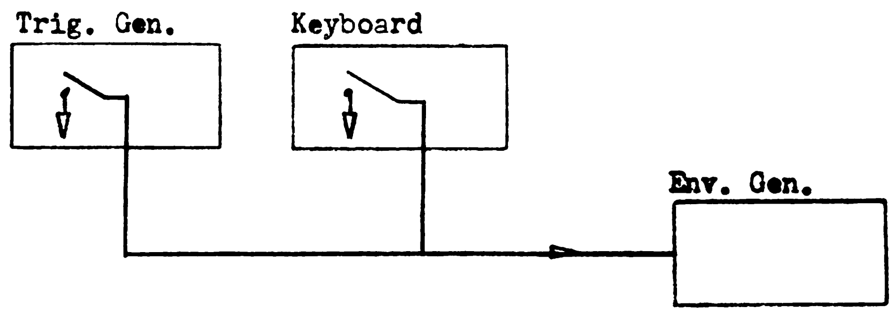
DRAWN BY

DATE: 2-22-75

REVISED

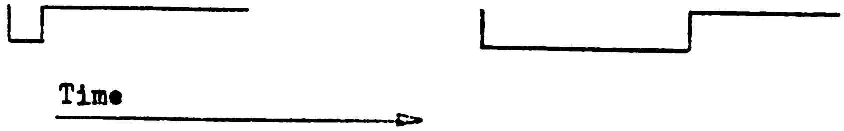
VOLTAGE PROCESSOR - MIXER

DRAWING NUMBER FP0100-0190

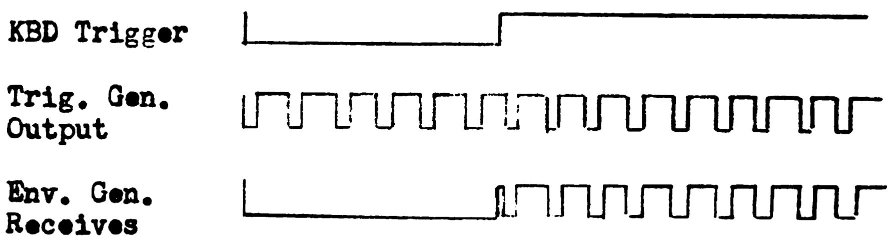


A. WIRE "OR"

Triggers can have short or long duration.

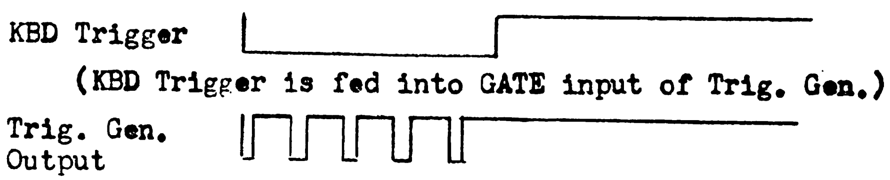


B. TRIGGER DURATION



Setup is as in part "A" above.

C. INHIBITING TRIGGERS



D. KEYBOARD GATING OF TRIGGER GENERATOR

FIGURE #20

SCALE:

DATE:

APPROVED BY:

DRAWN BY

REVISED

DRAWING NUMBER

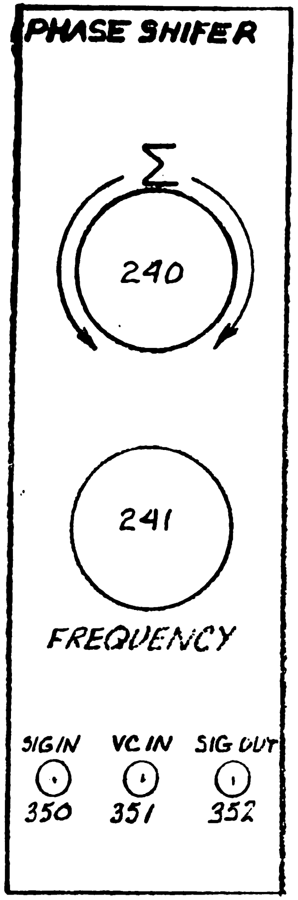


FIG 21

0100-0170

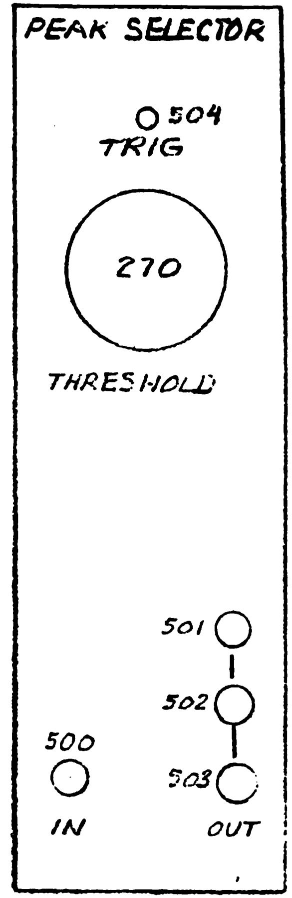


FIG 22

0100-0180

STEINER PARKER		
SCALE:	APPROVED BY:	DRAWN BY
DATE: 2-21-75		REVISED
PHASE SHIFTER + PEAK SELECTOR		
		DRAWING NUMBER FP0100-0170 -0180

8½X11 PRINTED ON NO. 1000H CLEARPRINT

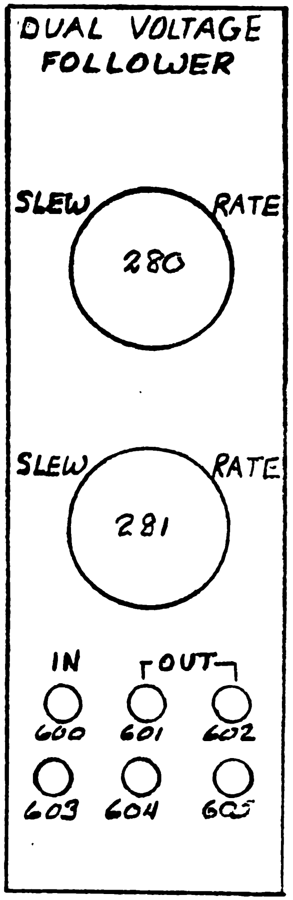
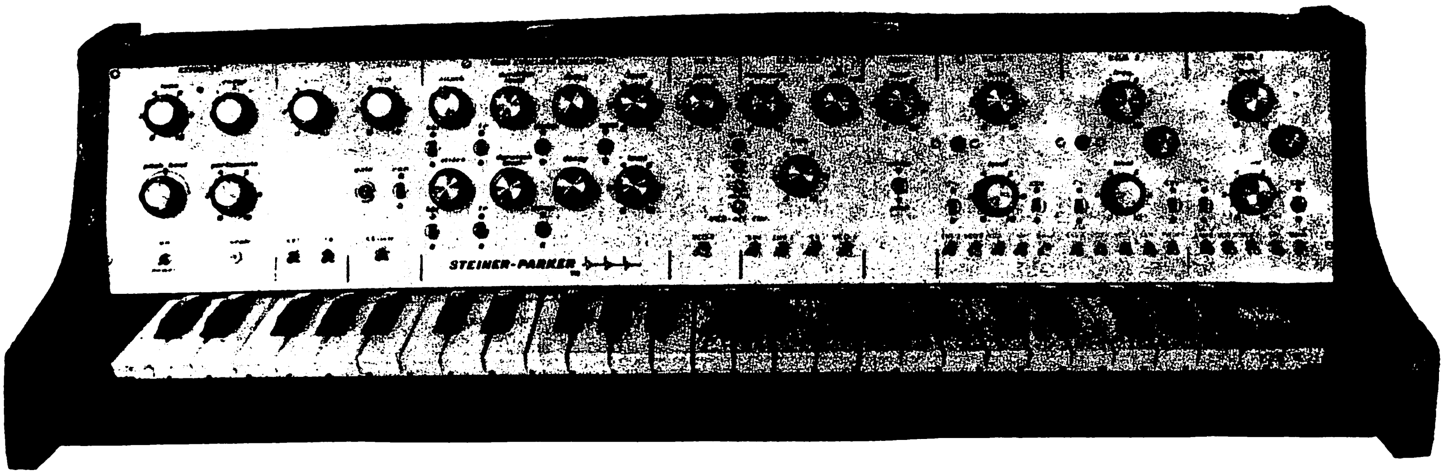


FIG 23

STEINER—PARKER		
SCALE:	APPROVED BY: D Parker	DRAWN BY
DATE: 2-24-75		REVISED
DUAL VOLTAGE FOLLOWER		
		DRAWING NUMBER FP-0100-0200

8½X11 PRINTED ON NO. 1000H CLEARPRINT



THE SYNTHACON

STEINER-PARKER is proud to announce their newest synthesizer, a small, extremely versatile unit designed for live performance and also for studio use, called the SYNTHACON. The SYNTHACON'S extreme versatility is realized through the use of switching to achieve function interconnections. No patch cords are necessary to route signals and voltages from one area to another. This switching system makes it possible to achieve over 35 billion different sounding set ups, without ever turning a knob or depressing a key on a keyboard!!! A brief summary of the unit's major features is listed here. For additional information, see your music dealer or contact the manufacturer if no dealers are available in your area.

WAVEFORMS: Sawtooth, triangle, square wave, pulse, sine wave, and two types of noise (white and pink).
OSCILLATORS: Three Voltage Controlled Oscillators plus a White/Pink Noise Generator.
CONTROLS: 26 knobs, 3 trimmers and 43 switches.
SECTIONS: Ten; KBD/PWR, Sample and Hold, Trigger Generator, Dual Envelope Generator, Voltage Controlled Amplifier, Three Mode Filter, Noise Generator, VCO No. 1, VCO No. 2, VCO No. 3.
OSCILLATOR RANGES: From less than 1/10 cycle per second (Hertz) to greater than 20,000 cycles per second.
FILTER MODES: Low Pass, Band Pass, High Pass.
FILTER CONTROLS: Resonance (Q), Frequency, Mode.
EXTERNAL INPUTS: Four — Through the Sample and Hold, Through the Keyboard, in parallel with the Trigger Generator, and direct to the Filter (control voltages only).
FILTER: The three mode variable Q filter can be switched in or out separately for each sound source.
KEYBOARD: 4 octaves, 49 keys (shown), playable over 8 octave range by use of range switch.
BACK PANEL OUTPUTS: DC Ground and all operating voltages, plus keyboard control voltages. These outputs can be used to run optional modules with the SYNTHACON, (such as sequencers, etc.) which are manufactured by STEINER-PARKER as well as many optional units manufactured by other companies (using special adapter cables). Back panel connectors are also provided to allow connection to an external sound source for amplifying the SYNTHACON'S output as well as connections for all the external inputs listed above.
POWER REQUIREMENTS: 117 Volts at approximately 15 Watts.

PARTIAL LISTING OF SALIENT FEATURES:

Keyboard controls: Tune, Scale, Portamento (Glissando), Range Select, and pitch bend.
Sample and Hold Controls: Output Level, Trigger source select (Keyboard or trigger generator).
Trigger Generator Controls: Rate, Manual Gate, KBD Gate, Free Run.
Dual Envelope Generator Controls: Each section has its own adjustment for Attack Time, Duration Level, and Decay Time, plus switches to select trigger sources (KBD or Trig. Gen.), Damp Select (ON/OFF), and a common switch for the generation of complex envelopes.
Voltage Controlled Amplifier: Inputs: VCO No. 1, VCO NO. 2, VCO No. 3, Noise, and Filter. Control for overall gain and modulation by VCO No. 3 ON/OFF.
V. C. Filter: Inputs - VCO No. 1, VCO No. 2, VCO No. 3, and Noise. Controls — Mode, Resonance (Q), Frequency. Modulation sources - KBD, Envelope No. 2, Sample and Hold, and VCO No. 3. Filter can be turned off (bypassed).
Noise Generator: Controls - Level, Select Mode (White/Pink).

Voltage Controlled Oscillator No. 3: Controls - Frequency, Level, KBD Track, output select (sawtooth/triangle). Modulation by any, all, or none of the following: KBD, Envelope No. 2, VCO No. 1, VCO No. 2, Sample and Hold, Noise.
Voltage Controlled Oscillator No. 2: Controls - Frequency (coarse and fine), Level, KBD Track, Output Select (sawtooth, square, pulse). Modulation by any, all, or none of the following: KBD, Env. No. 2, VCO No. 3, VCO No. 1, Sample and Hold.
Voltage Controlled Oscillator No. 1: Controls - Frequency (coarse and fine), Level, KBD Track, Output Select (sawtooth/sine). Modulation by any, all, or none of the following: Envelope No. 2, VCO No. 3, VCO No. 2, Sample and Hold, Noise, KBD.
Dynamic Range of Oscillators: A minimum of 17 1/2 Octaves.
Optional Carrying Case: Available on special order.

For additional information contact your local music dealer or, if none is available in your area, you may contact the manufacturer directly.

STEINER-PARKER
P. O. Box 305
Salt Lake City, Utah 84110
Phone: (801) 486-0812
Attn: O. D. Williams

$1195.00