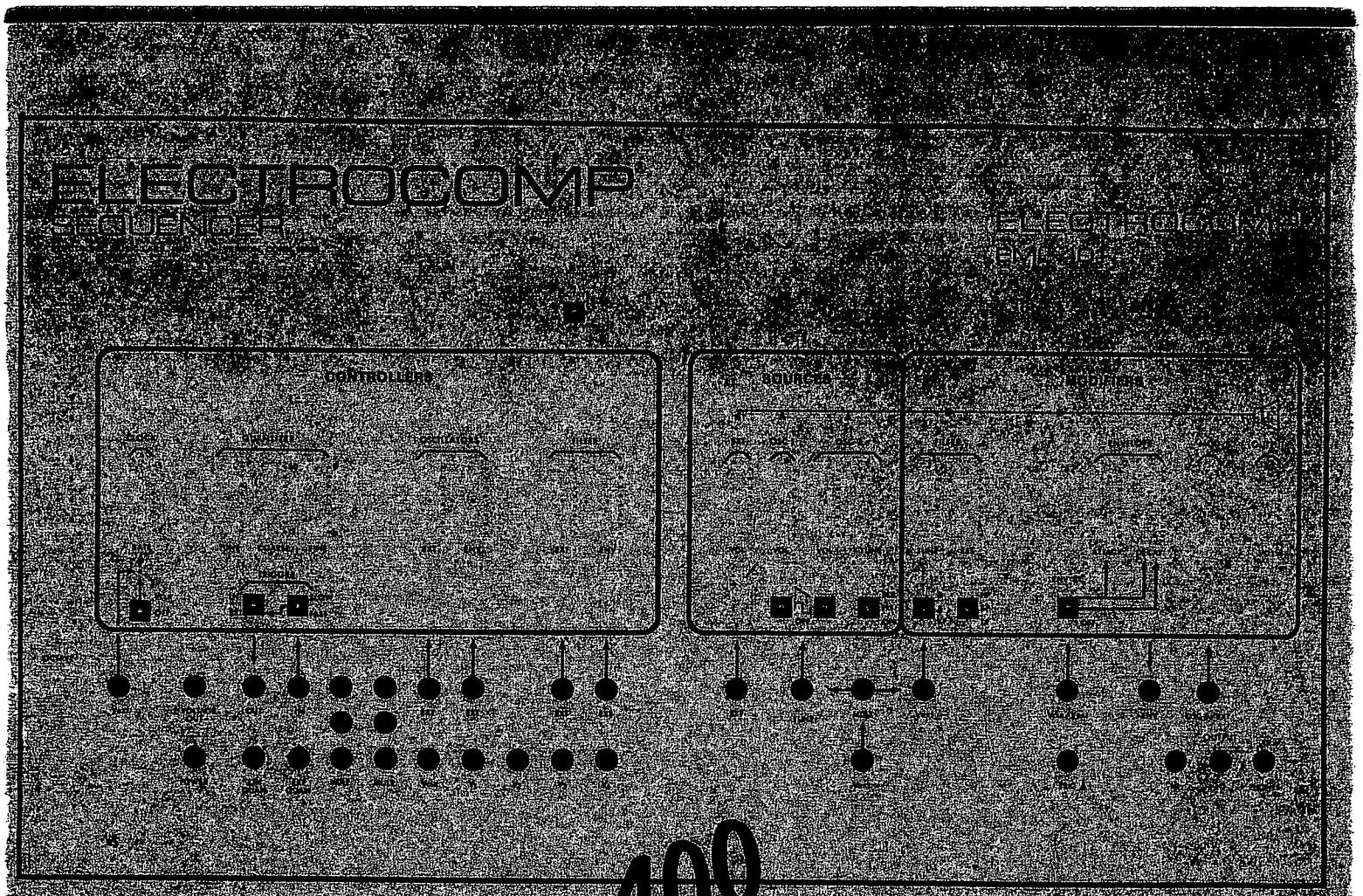
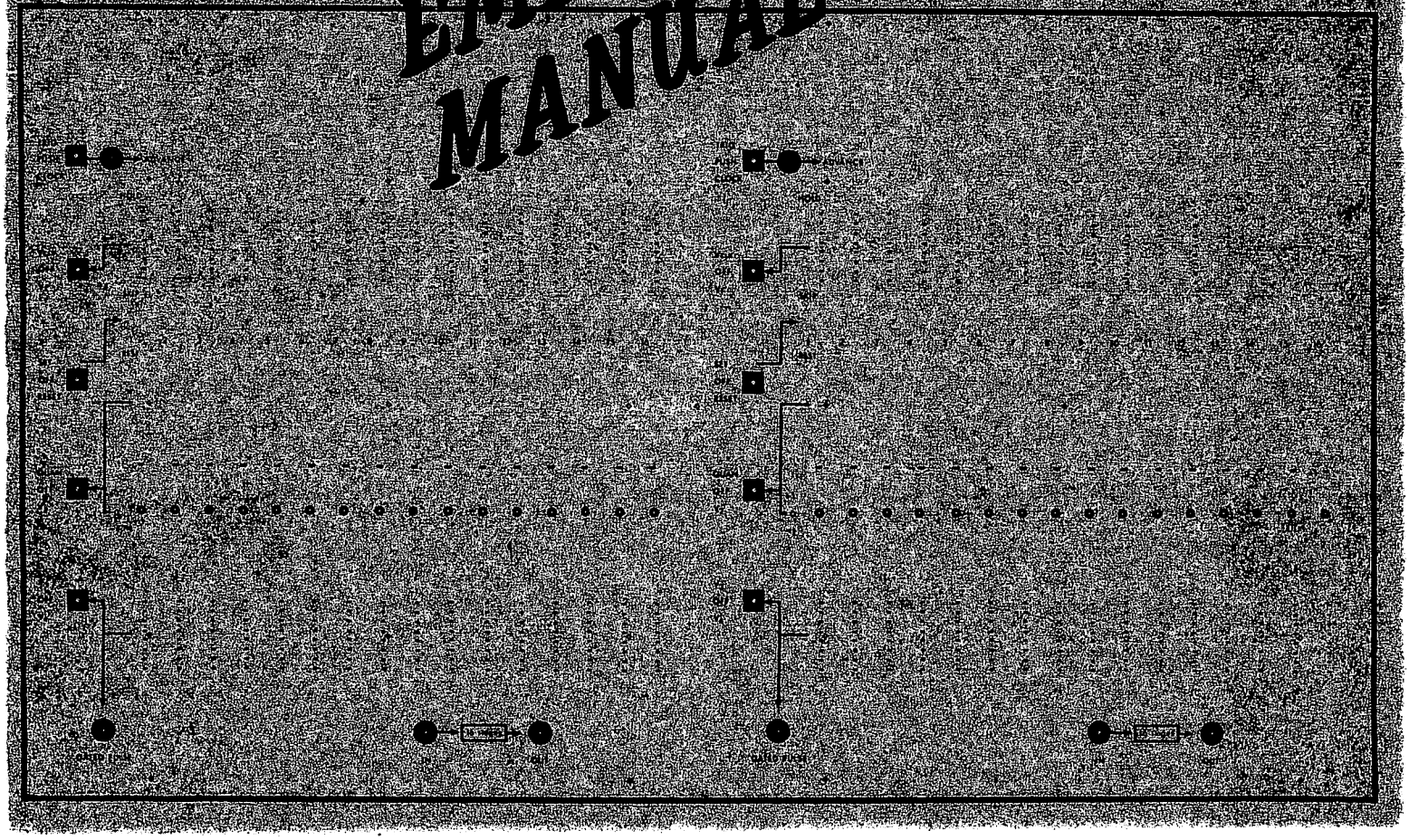
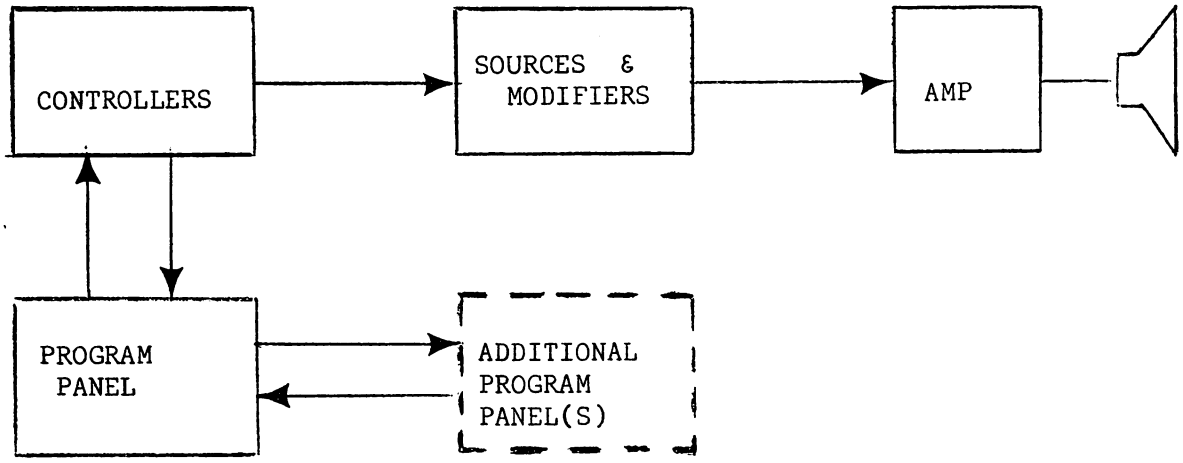


EML 400 MANUAL



EML 400 SERIES SEQUENTIAL SYNTHESIZER MANUAL

The EML 400 Series Sequential Synthesizer is available in several configurations to permit each user a maximum of flexibility. A basic sequencer consists of the following:



The PROGRAM PANEL is used to set up a series or sequence of events. During each event period, the PROGRAM PANEL generates 3 independently adjustable voltages. These voltages may be used to:

a. control a Voltage Controlled Clock which determines the time advance to the next event.

b. control the pitch of a Voltage Control Oscillator.

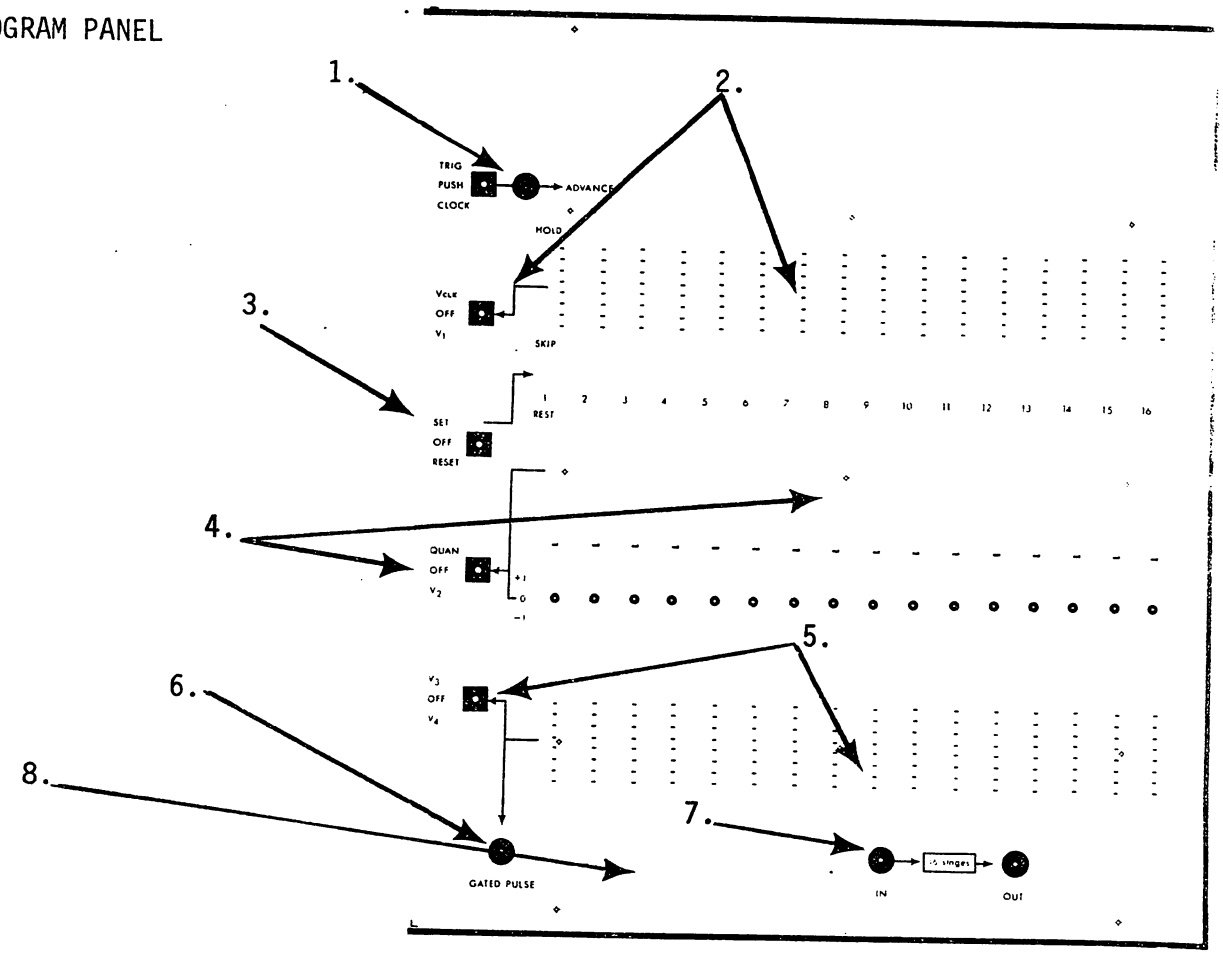
c. control the timbre, loudness, a second pitch, etc. of the note by applying the voltage to the Voltage Control Filter, Voltage Control Amplifier, another Voltage Control Oscillator(s), etc.

The CONTROLLER PANEL contains the overall rate control, tuning controls, triggering circuits, and controls for implementing pitch and timbre variations.

The SOURCE PANEL contains the oscillators, filter, envelope generator, amplitude shaper and their associated controls. This panel is designated the 401 module. Either the EML 100, EML 101 or EML 500 may be substituted for the 401 module. (Early serial numbered instruments may require a minor modification - consult factory.) The sequencer will also run the EML 200 but the Voltage Controlled Filter function is not available.

GENERAL MODULE DESCRIPTION:

I. PROGRAM PANEL



1. ADVANCE SLIDE SWITCH

This slide switch determines how the sequence advances from stage to stage.

A. TRIGGER: sequence will advance from trigger pulse corresponding to the output of the trigger function on controller panel.

B. PUSH: sequence will advance when pushbutton is depressed.

C. CLOCK: sequence will advance under control of the clock.

2. This row of slide controls will generate a series of voltages as the sequence advances from stage to stage. If the associated slide switch is in the CLOCK position, the slide controls will determine the rate of the clock pulses and hence the advance of the sequence to the next event. If the slider is at top of its travel - HOLD - its sequence will not advance. As the control is moved toward SKIP, that event will last for a shorter period. Finally, when the slide control is near the end of its travel near SKIP the event will occur so rapidly that it is not detectable and that stage will effectively be skipped.

If the Advance Slide Switch is in the OFF position, the Voltage will not be used. If the slide switch is in V1, the Voltage is available at the V1 jack on the CONTROLLER PANEL for use as desired.

3. SET/OFF/RESET SLIDE SWITCH

In SET, the sequence is "set" to stage 1 and will remain there. In RESET, all stages will be inactivated and remain so. OFF - this position permits advance of the sequence.

4. This row of slide controls generates a series of voltages as the sequence advances. If the associated slide switch is in the QUAN position, the voltage determined by the slide controls and their associated Octave switches will be routed to the Quantizer within the CONTROLLER PANEL and hence to the Voltage Controlled Oscillators and Filter. It is this Quantizer Circuit which converts the infinitely variable Voltage from the slide controls into discrete stepped voltages corresponding to the pitches of the scale. In the OFF position the voltage is not used.

In V2 position, the control slider voltage is routed to the V2 jack on the CONTROLLER PANEL. The Octave Slide Switch associated with each of the independent stages will then have no function.

5. The slide controls in this row generate a series of voltages as the sequence advances. The slide switch determines whether the voltage is directed to V3 or V4 jacks on the CONTROLLER PANEL or not used. The voltage may be patched from V3 or V4 to the filter control input to vary the timbre of the pitch for each stage, or a number of other places to control a different parameter.

6. GATED PULSE

A pulse occurs at this jack whenever the sequence advances to a stage where a slide control in the Control Voltage row marked 5 in the picture, is more than 20% up from its bottom position. The GATED PULSE may be used for selectively triggering other functions on the 100, 101 and 200 as well as controlling the advance of a sequence on an additional PROGRAM PANEL.

7. 16 STAGES IN-OUT

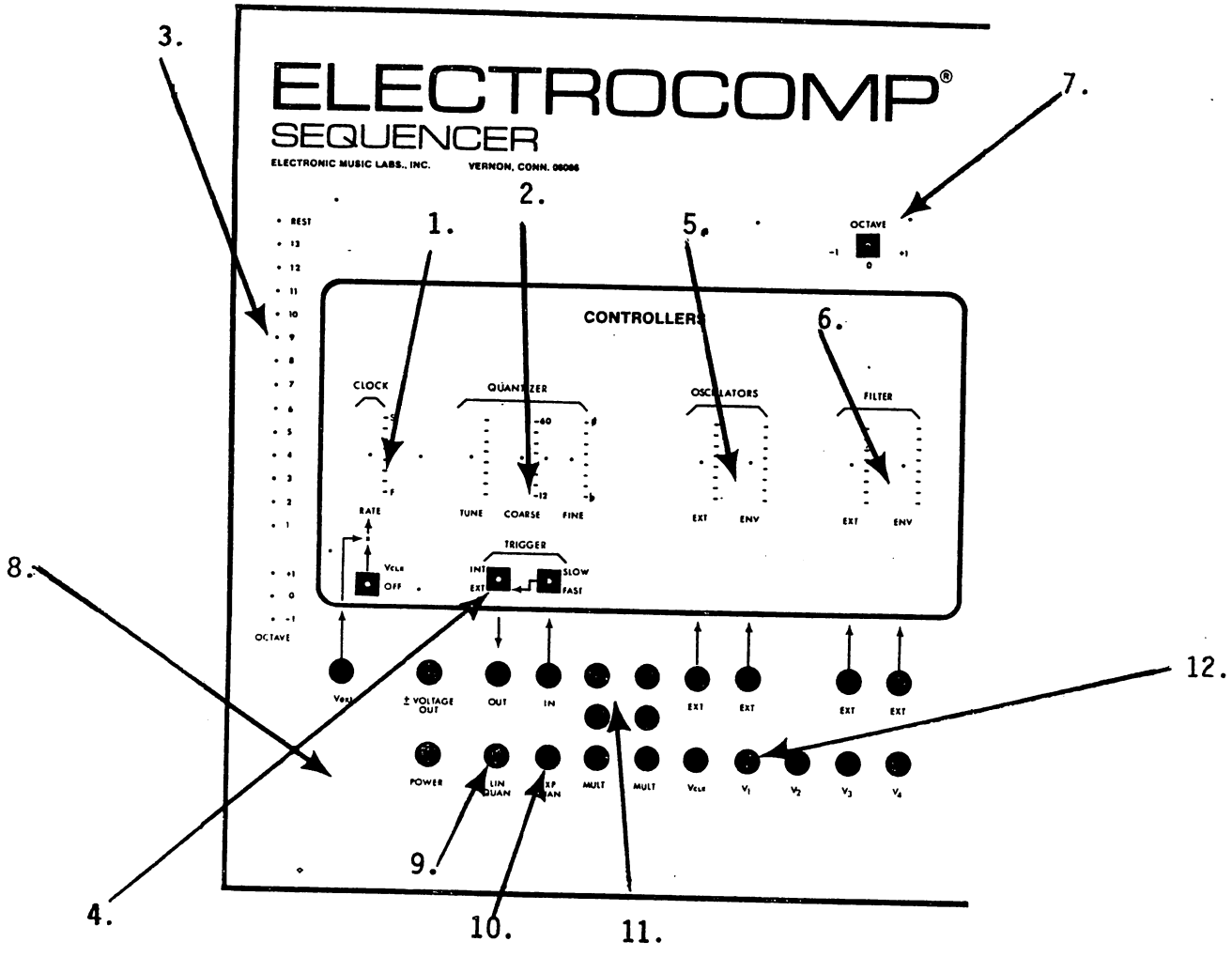
These jacks are used to "loop" the sequence. If one program panel is used, a patch cord between the two jacks will cause the 16th stage to trigger the first so that the sequence will repeat. No patchcord - no repeat.

If additional PROGRAM PANELS are available a patchcord is used between the OUT jack of the first panel and the IN jack of the second PROGRAM PANEL and from the OUT jack of the second to the IN jack of the first. The sequencer will then go through 32 stages before repeating.

8. EXPAND PLUG

This connector connects to the CONTROLLER PANEL through the cable provided; if you have 2 Programming Panels, the cable from the CONTROLLER PANEL may go to either PROGRAM connector. If there are more than 2 Programming Panels, they must be interconnected with an additional cable.

II CONTROLLER PANEL



EML 401 MODULE -
SOURCES AND MODIFIERS PANEL

SOURCES

The EXTERNAL VOLUME slide control and the associated external jack are used to bring external audio signals into the 401 panel.

The OSC 1 volume control determines the volume of the Oscillator 1 signal applied to the Filter. The switch below the slide control selects a Sawtooth or Square waveform or removes the Oscillator 1 signal from the Filter.

The OSC 2 volume control determines the volume of the Oscillator 2 signal applied to the Filter. The switch below the slide control selects a Sawtooth or Square waveform or removes the Oscillator 2 signal from the Filter.

OSC 2 TUNE. Oscillator 2 may be tuned to a unison with Oscillator 1 or to more than an octave above. The switch below the tune control determines the degree of PHASE LOCKING between OSC 1 and OSC 2. With the switch in PL2 there is a strong tendency for Oscillator 2 to "lock" at a pitch which is a whole numbered ratio to OSC 1 such as at a 3rd, 4th, or 5th. In PL1, the locking influence is diminished and "lock" may be accomplished at other musical intervals. In OFF, the locking effect is removed.

With the PHASE LOCK Switch in PL1 or PL2, the OSC 2 TUNE slide control will sound "scratchy" as the pitch will jump into "lock" as whole numbered ratios are approached. If a clicking sound is heard, the TUNE control should be adjusted slightly down. A little practice will pay dividends.

MODIFIERS

FILTER. The Filter TUNE controls the cut frequency of the Filter. (If you are unfamiliar with the Filter, consult the EML 101, or 500 manual.) The Switch labeled 0., .5, 1.0 indicates that degree to which the Filter "tracks" the Oscillators and hence the degree to which the timbre remains constant over the range of the instrument. In 1, the timbre will remain constant, in 0, the timbre may change dramatically becoming more mellow in the higher registers. The .5 position gives intermediate results.

The RESONANCE control is similar to that on the EML 100/101/500, the slide switch below selects LOW PASS, BAND PASS or HIGH PASS filters. Note that at High Resonance condition there is little difference between the three. At Low Resonance, the difference is dramatic and often delightful.

Vext

This input may be used to control the EML 401 module by the EML 100/101. A patchcord must be used from the MULT jack to the Vext at the end of the dashed arrow. The rotary TUNE pot is used to set the pitch of Oscillators 1 and 2. The EML 100/101 CM2 jack is patched to Vext. A patchcord from the EML 100/101 GATE output to the CONTROLLER PANEL TRIGGER Input will cause envelope initiation with the TRIGGER switches in SLOW and EXT. The Oscillators and Filter will not be controlled by the sequencer in this situation. (See the section titled "Interfacing the EML 401 Module with either the EML 101 or EML 500".)

ENVELOPE

The EML 401 contains an Envelope Generator in which the ATTACK and DECAY times may be Voltage Controlled.

When the selector switch below is in OFF position, the ATTACK and DECAY slide controls will function in normal fashion. When the selector switch is in mid position, the DECAY will be proportional to Vclk voltage - (Vclk comes from the top row of sliders on the PROGRAM PANEL, hence the DECAY time will be proportional to the length of notes in the sequence). In the uppermost position, both ATTACK and DECAY are Voltage Controlled. The associated jack may be used to substitute any desired external voltage for Vclk.

MODULATOR

The MODULATOR is a combined Ring/Amplitude Modulator. Oscillator 2 is the normal modulation source, but any signal may be substituted at the associated jack.

OUTPUT

The OUTPUT slide control determines the audio output level at the HI and LO jacks. Use the HI output jack for Hi-Fi and similar amplifiers. Use the LO output jack for guitar amplifiers and low level mixers. The PHONES output is unaffected by the output slide control.Use high impedance phones (600 ohms).

Now that we've gotten through the description of how things work, it's time to put it all together and make some music. This section assumes you have the 401 module. If not, turn to the last part of this section for instructions in using the 100/101/500 as signal sources and modifier.

1. Plug the EML 400 into the AC power source. If you don't have a 3 wire grounded socket, use a universally available adapter. Don't cut the 3rd prong of the power cord.

2. Connect cable provided between the connector on the CONTROLLER PANEL and any connector on a PROGRAM PANEL.

3. Turn the power on and adjust all controls as described and shown in the accompanying section(s).

SCALING AND FINE TUNING THE EML 400 SEQUENCER

The procedure for "tuning" the EML 400 Sequencer is divided into two major steps and their respective substeps.

The first major step shall be known as "Readying the Sequencer". That is to say, all of the functions that directly influence "tuning" are adjusted to facilitate the actual tuning procedure. All of the sequencer functions which do not bear directly on the tuning are turned off. The second major step is the "Scaling and Fine Tuning for the EML 400 Sequencer".

PART I READYING THE EML 400 SEQUENCER

A. CONTROLLERS

1. CLOCK

Switch to Vclk and move the clock's rate slider near the bottom of its travel.

2. TRIGGER

The trigger routing switch should be set to INT. (internal). Switch the trigger input to FAST.

3. QUANTIZER

Explained in Part 2.

4. OSCILLATOR & FILTER CONTROL MIXERS

All of the application sliders associated with either of these two controller mixers should be off - sliders set to the bottom of their travel.

B. SOURCES

1. OSCILLATOR #1

Oscillator 1 shall be used as the pitch source for tuning the sequencer. Select either the Square or Sawtooth waveform with the waveform SELECT/OFF switch and raise Oscillator 1's volume slider.

2. OSCILLATOR #2

OFF

3. OCTAVE TRANSPOSE SWITCH (located just above the CONTROLLER section)

Select to 0, zero.

C. MODIFIERS

1. FILTER

Select the LOW PASS Filter (LP) and set the Filter Tracking Switch to full (1.). The TUNE slider should be moved approximately 3/4" from the bottom. The Resonance Slider to the half way point in its travel.

2. ENVELOPE

For tuning purposes, the voltage control features of the envelope generator are not desired, set the ENV VC switch to OFF. The ATTACK and DECAY time sliders should both be set fairly high (half way or more).

3. MODULATOR

OFF

4. OUTPUT

Adjust loudness output of the sequencer (in conjunction with amp) to a comfortable level.

D. PROGRAM PANEL

1. ADVANCE SLIDE SWITCH

Set to the CLOCK position

2. CONTROL VOLTAGE SLIDERS - ROW 1

Set Stage #1's slider just above the SKIP position.

3. THE VOLTAGE/OFF SELECT SWITCH

Place in the Vclk position.

4. SET/OFF/RESET SWITCH

Set to RESET

5. QUAN/OFF/V_2 SLIDE SWITCH

Set to QUAN.

6. THE V_3/OFF/V_4 SLIDE SWITCH

Set to OFF.

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DIAGRAM A-2
SCALING & FINE TUNING THE SEQUENCER

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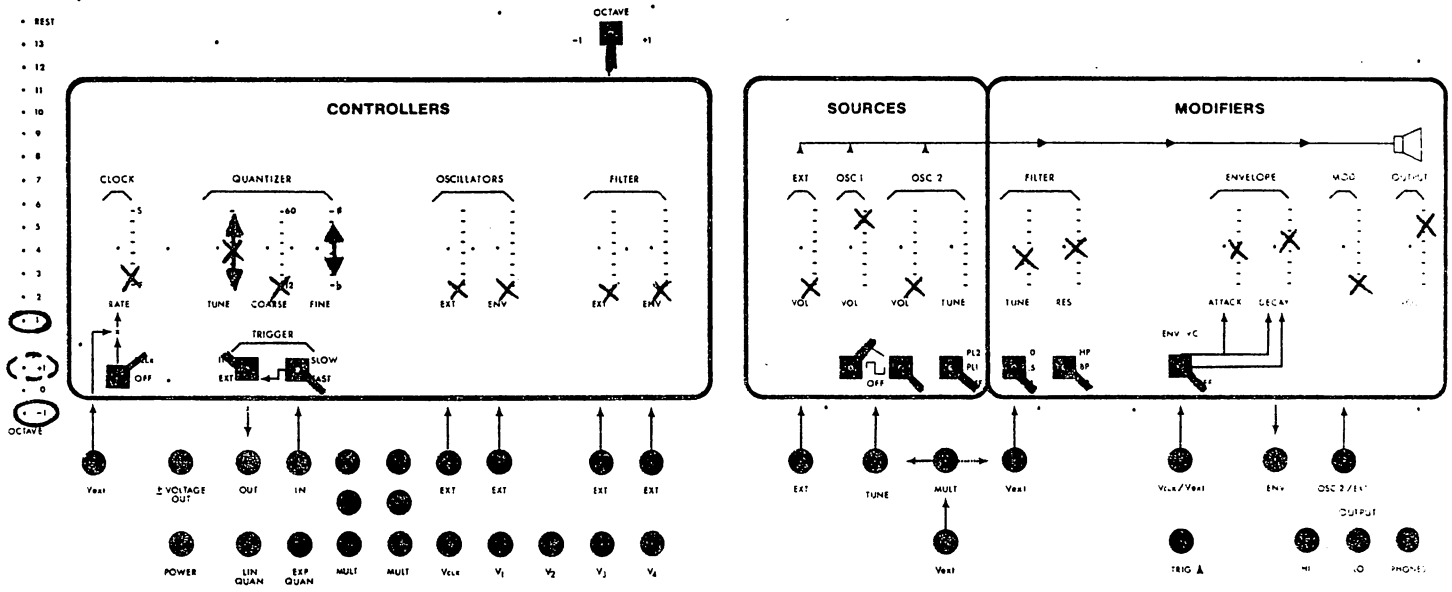
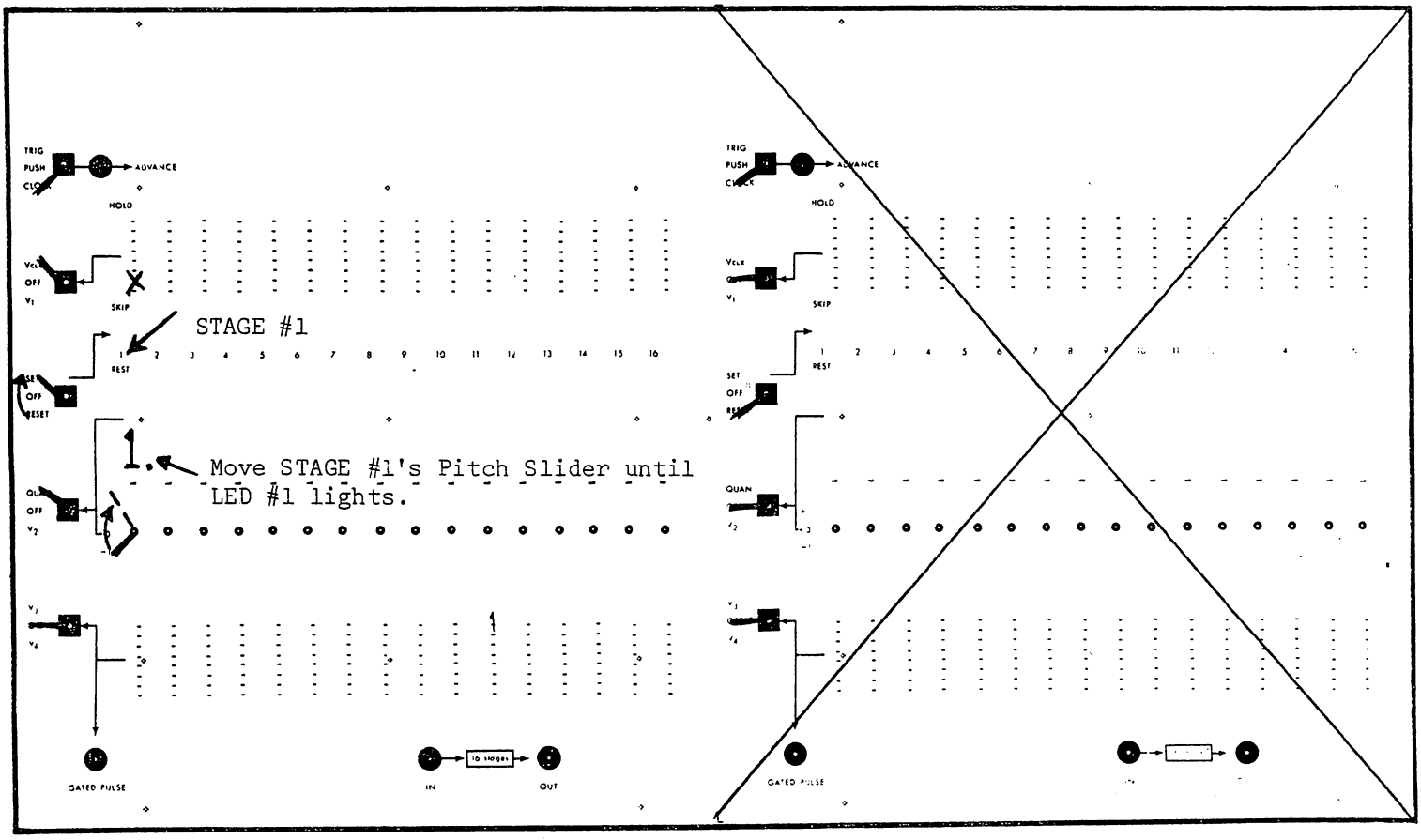
EML 401





PROGRAMMING THE EML 400 SEQUENCER

The "PROGRAMMING" procedure consists of two steps, they are as follows:

1) "Program Readying" the Sequencer.

2) "Programming the Sequencer", followed by the actual running of the Sequencer.

PART I READYING THE EML 400 SEQUENCER

Program Readying the EML 400 Sequencer for a PROGRAM consists of Parts 1 and 2 of the section Scaling and Fine Tuning the EML 400 Sequencer. For details reread the aforementioned section and carefully note diagram R1. READYING the EML 400 Sequencer allows the user to "program" the Sequencer without "confusing" it or the user! It is a failsafe procedure.

After setting the desired scale and tuning the Sequencer, the actual programming of the Sequencer may commence.

PART 2 PROGRAMMING THE EML 400 SEQUENCER

Moussorgsky's Promanade Theme from Pictures at an Exhibition will be used as the PROGRAM example.

A. SET/OFF/RESET SLIDE SWITCH

Position to SET

B. ADVANCE SLIDE SWITCH

Set from CLOCK to PUSH. This will activate the TRIGGER and the QUANTIZER sections.

C. PROGRAMMING THE PITCH AND OCTAVE/STAGE OF THE SEQUENCE

1. Position the SET/OFF/RESET Slide Switch to OFF. Move Stage 1's pitch slider until LED #8 lights. Set the Octave switch for Stage #1 in the zero position. The zero Octave LED will light.

2. Depress the pushbutton associated with the Advance Slide Switch once or until the light indicating Stage #2 is on. Move Stage #2's pitch slider until LED #6 lights. Set the Octave switch to zero.

NOTE: If the pushbutton is held, the Sequencer continues to advance until the button is released. If you are advancing the Sequencer via the pushbutton and you inadvertantly go past the stage you wished, simply move the SET/OFF/RESET slide switch to RESET then SET, and finally to OFF. This will bring you back to Stage #1 and you will be ready to advance with the pushbutton.

3. Advance the Sequencer to Stage #3. Position the pitch slider until LED#11 lights; set the Octave switch to zero.

4. Continue the process through Stage 16 according to the LED numbers and positions of the octave slide switches marked in diagram P-2.

Because the theme is 13 events long, the remaining 3 stages have been set to REST - no pitch is programmed or sounds.

5. It is good practice to go through the sequence again just to double check and make sure all the pitches and octave settings are correct.

D. SETTING THE DURATIONS OF EACH PITCH/STAGE IN THE SEQUENCE

- PROGRAMMING THE RHYTHMN -

1. Diagram P-3 indicates the 13 slider positions for the timing-rhythmn of the sequence. It is not necessary to pushbutton advance the Sequencer to set the duration for each respective stage. The duration slide controls for stages 14-16 can be, at your descretion, set to SKIP (moving the slider to the bottom of its travel) or set to any time increment up to HOLD (at HOLD the sequence will not advance until the slider is dropped to a definite time value).

E. DEFINING OVERALL CHARACTERISTICS OF THE SEQUENCE

1. The tempo of the sequence is controlled by the CLOCK slider control Vclk OFF Switch. Set the CLOCK slider next to the third hash mark.

2. SOURCES: Oscillator 2 may be turned on to add another voice; a waveform selected, tuned, and its volume slider raised. The option is open to tune Oscillator 2 to unison or various intervals in relation to Oscillator 1 giving an effective chordal effect.

3. Octave transposition of the oscillators and filter is achieved with the OCTAVE switch above the CONTROLLER section. This switch determines the overall range.

4. FILTER: The quality of the sound is defined by the Filter. Experiment freely with the TUNE and RESonance sliders, Filter Select (HP, BP, LP) and the Filter tracking (0, .5, 1) switches to determine the timbral setting you wish.

5. ENVELOPE: The envelope controls the loudness pattern/pitch/stage. When the envelope is in the OFF position, the ATTACK and DECAY sliders determine the time for their respective functions. Moving the switch to either the Voltage Control of Envelope Decay or Voltage Control of Envelope Attack and Decay, means that the envelope no longer defines a time unit for ATTACK and DECAY, but rather the voltage controlled function now "reads time" or "reads voltage". The ATTACK and DECAY sliders now determine proportion. Experiment

with the VOLTAGE CONTROLLED ENVELOPE. It's a unique and vitalizing new synthesizer function/feature.

6. MODULATOR: Ring or Amplitude Modulation can be added to the signal(s) out of the filter.

F. RUNNING THE SEQUENCER

1. SET/OFF/RESET SLIDE SWITCH

Position in RESET

2. THE ADVANCE SLIDE SWITCH

TRIG/PUSH/CLOCK switch should be set to CLOCK.

3. To "run" the sequence simply move the SET/OFF/RESET slide switch to SET and then to OFF.

4. To have the Sequencer repeat be sure there's a patch cord between the IN and OUT jacks near the bottom of the PROGRAM panel.

G. DIAGRAM P-5

Patch 5 diagrams some special effects that can be achieved with the EML 400 Sequencer and the EML 401 module.

For example, V_3 or V_4 can be used to change the timbre of each stage; or voltage control the envelope to vary the attack and/or decay; or V_3 or V_4 can be used as a modulating signal and vary the dynamics of the piece. Many uses are possible.

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DIAGRAM R-1

READYING the EML 400 SEQUENCER

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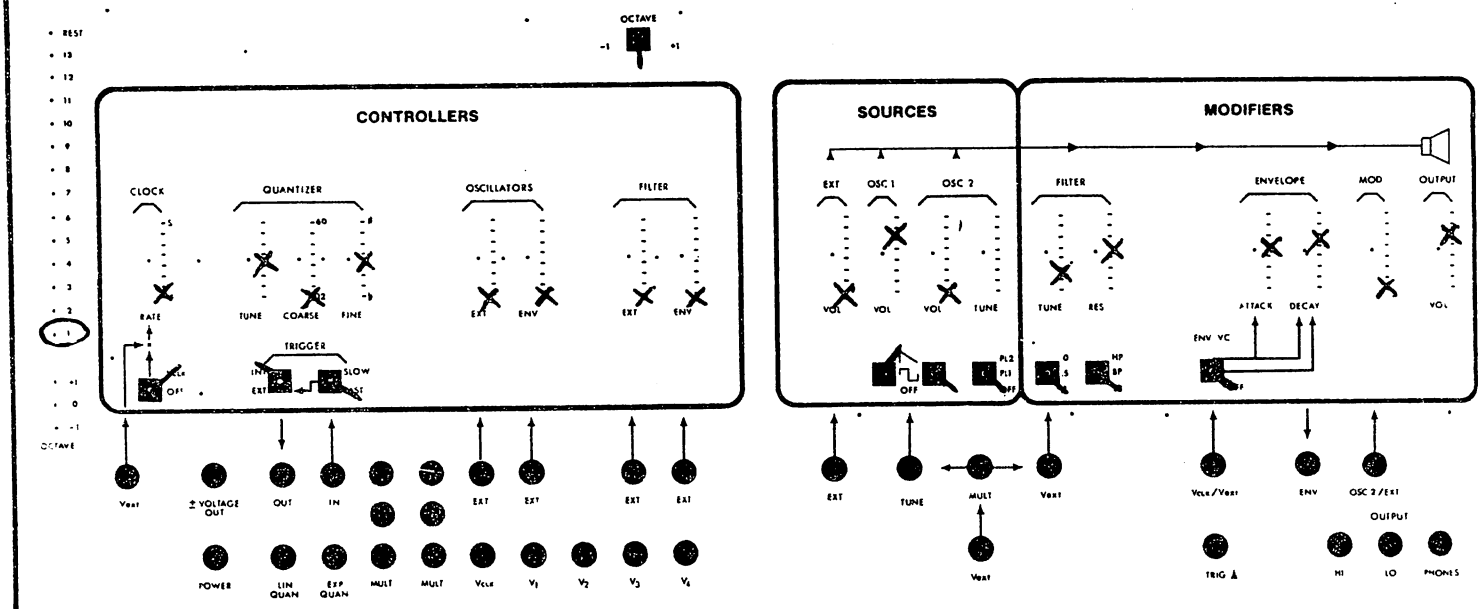
EML 401



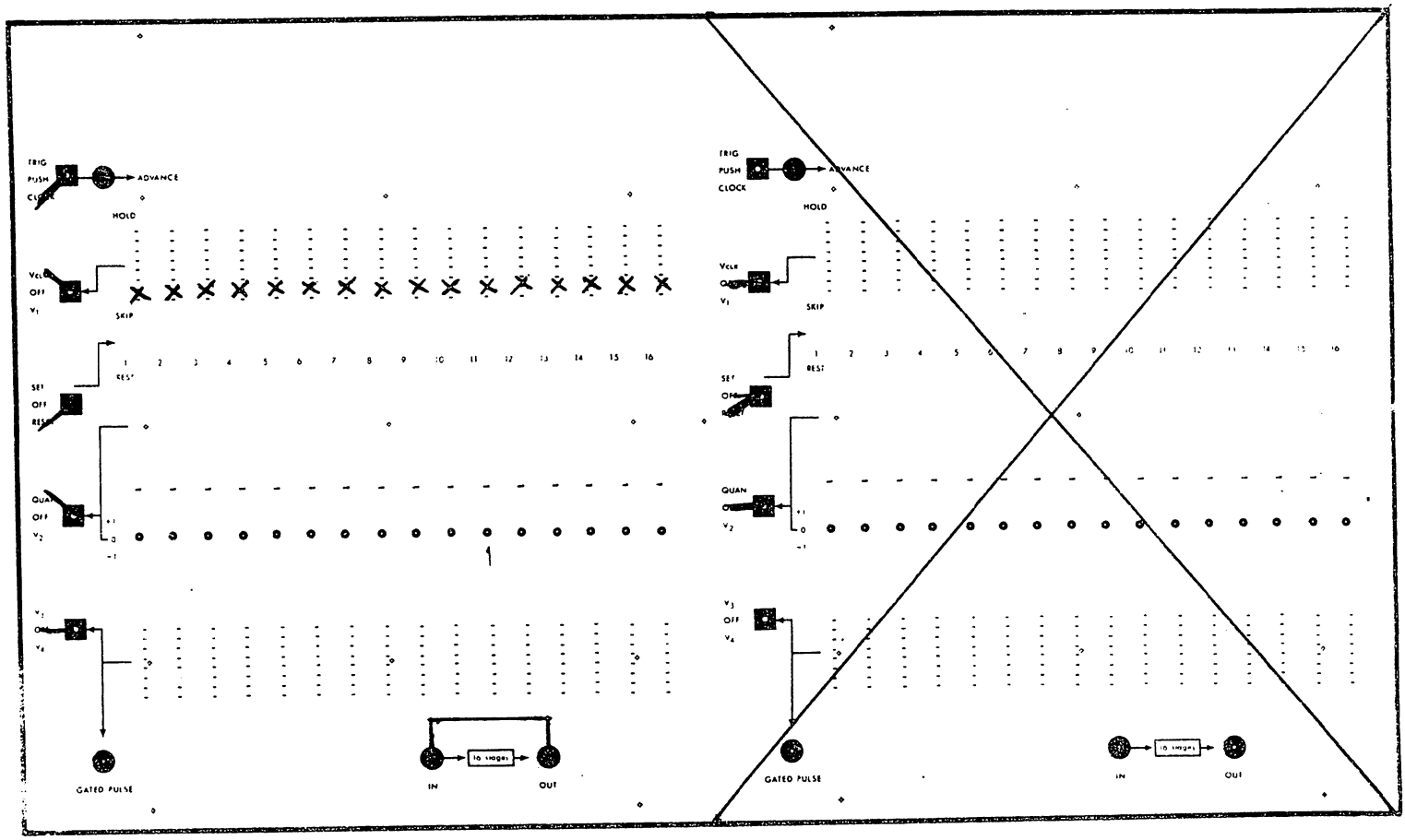


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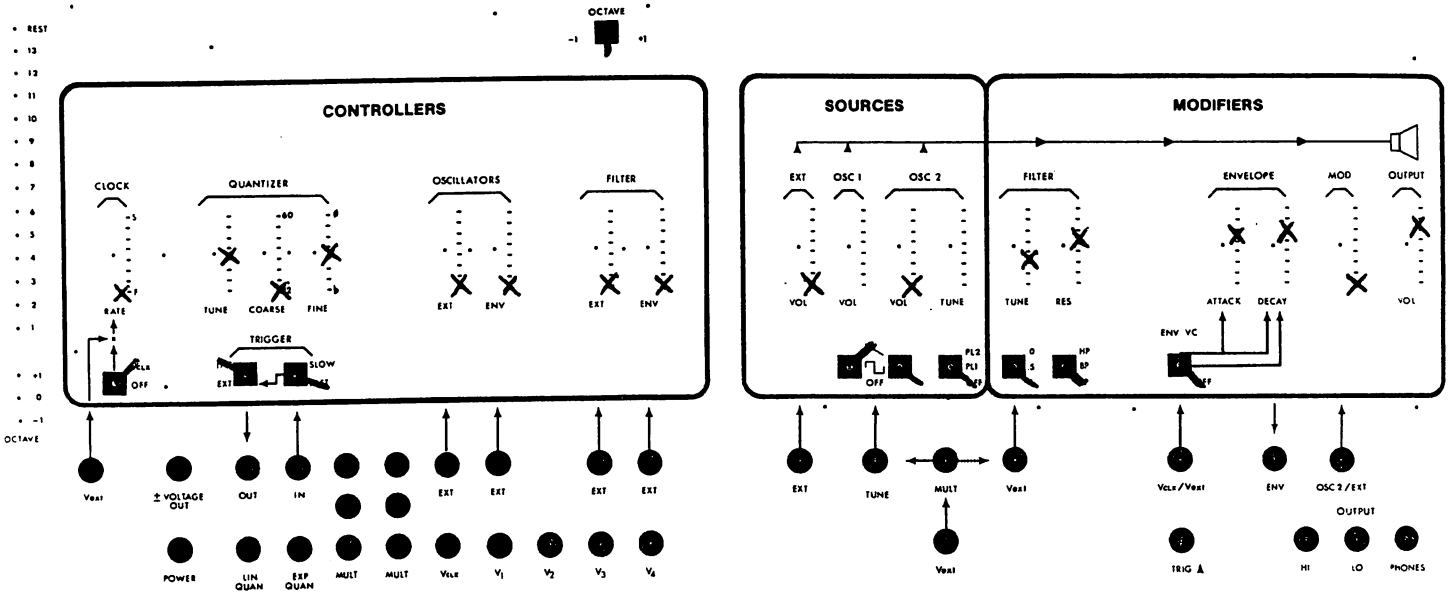
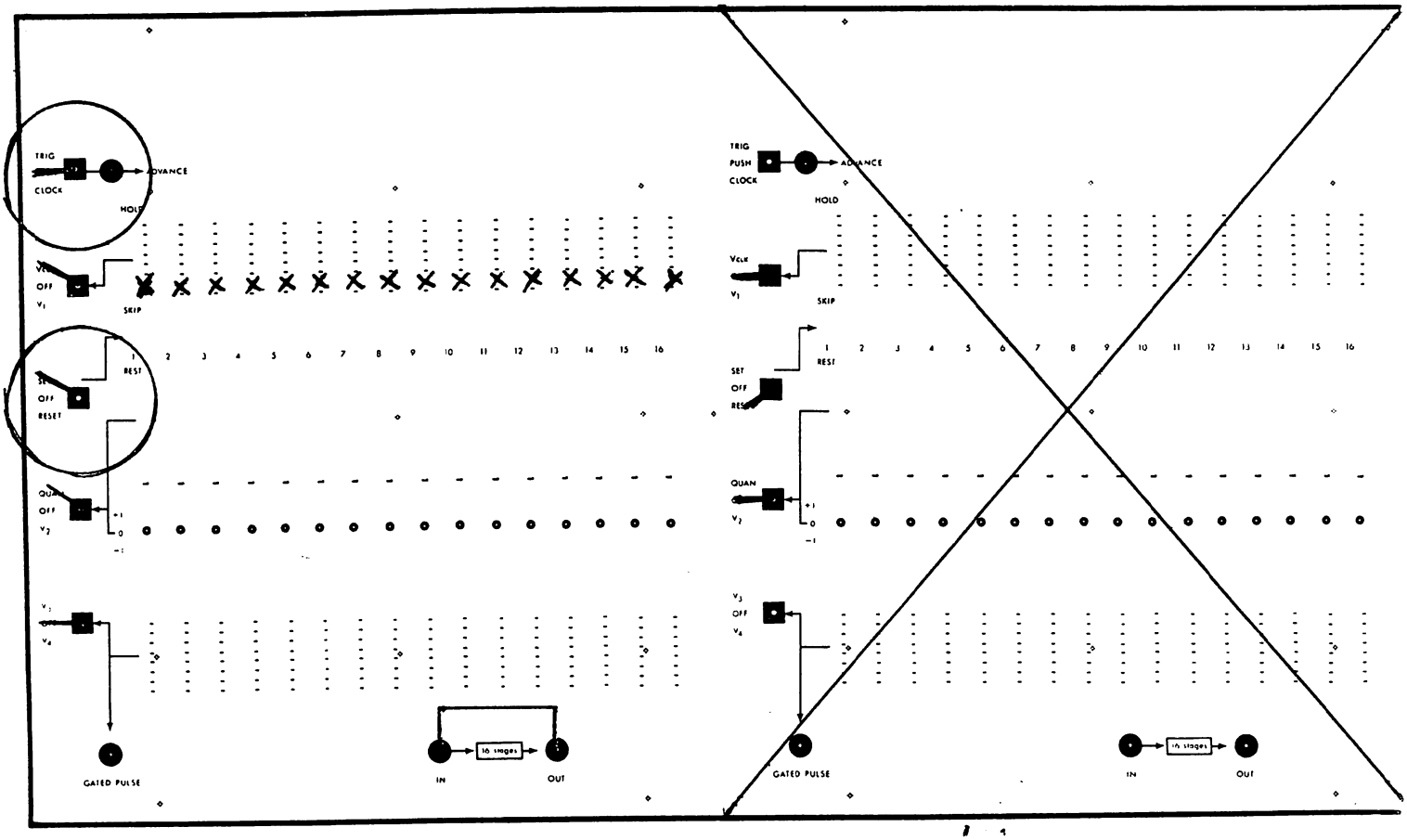
DIAGRAM P-1

PROGRAMMING THE EML 400

ELECTROCOMP®
EML 401





ELECTROCOMP® DIAGRAM P-2

SEQUENCER

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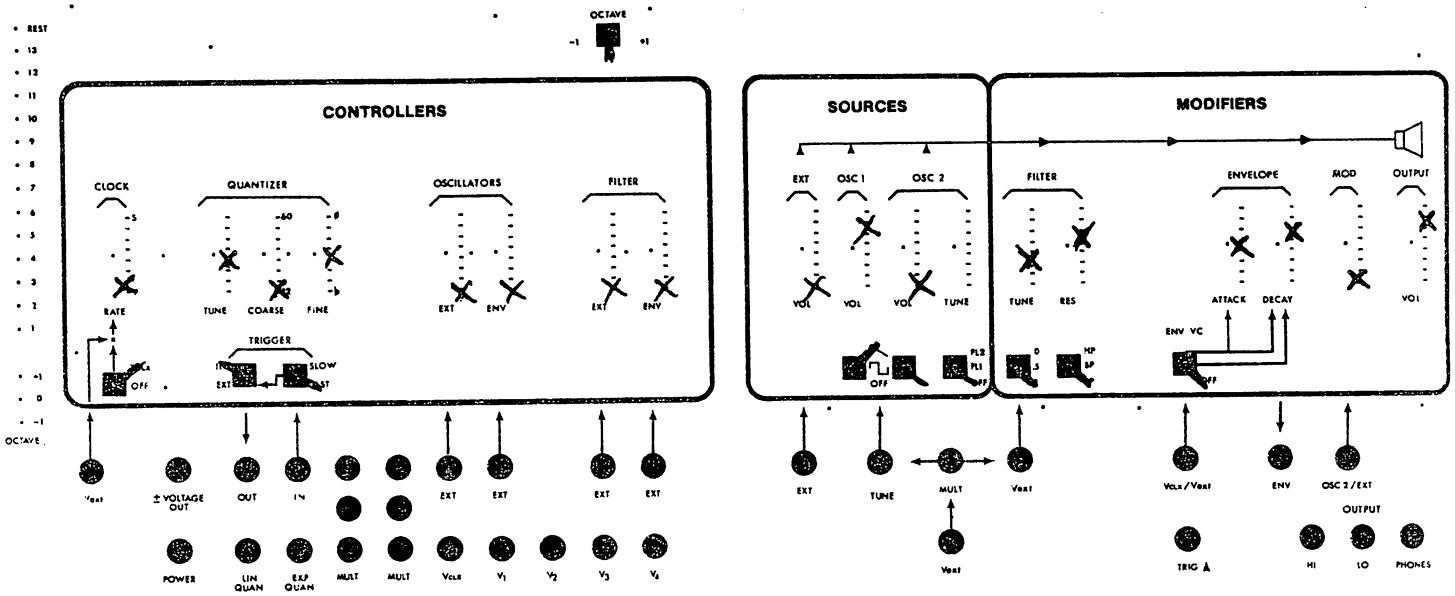
PROGRAMMING THE EML 400

ELECTROCOMP®
EML 401



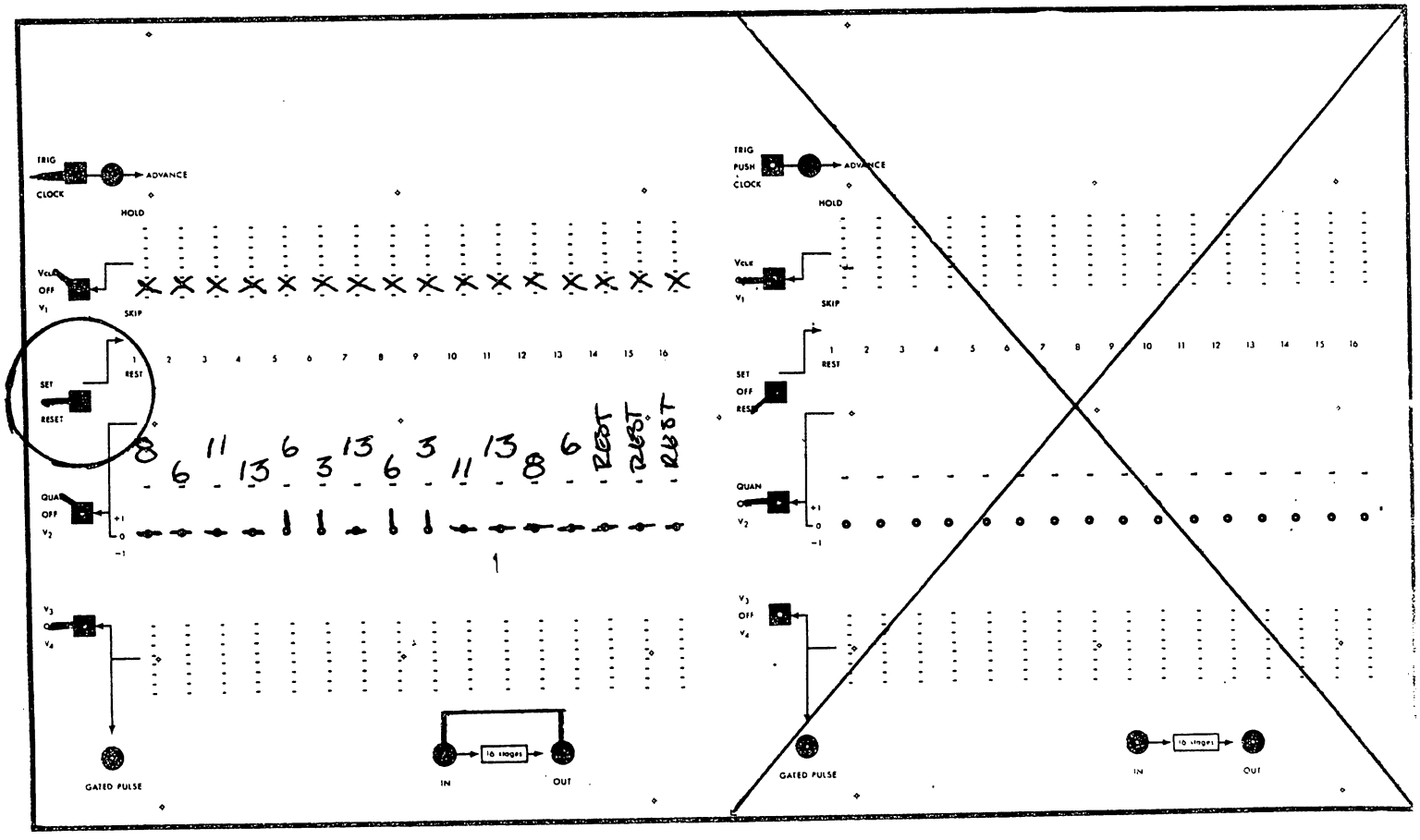


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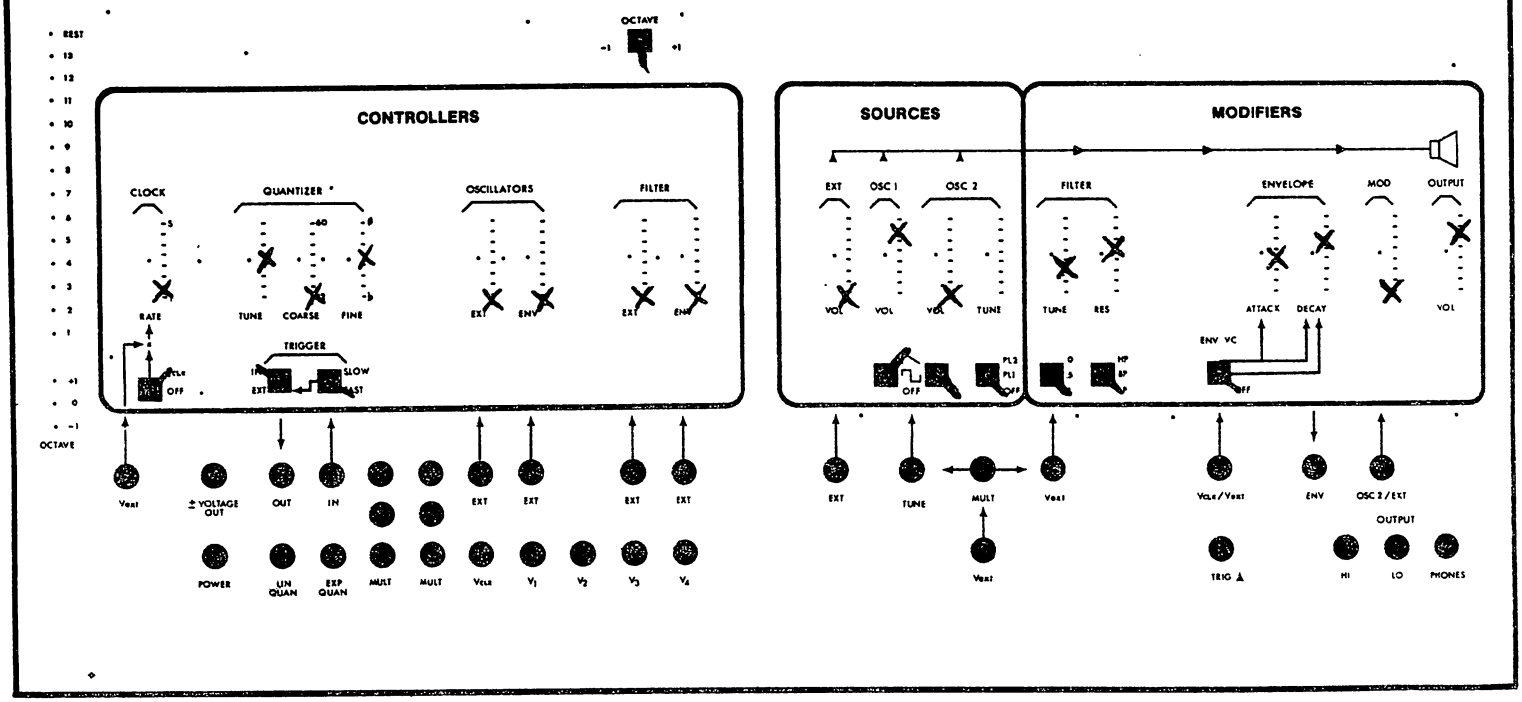
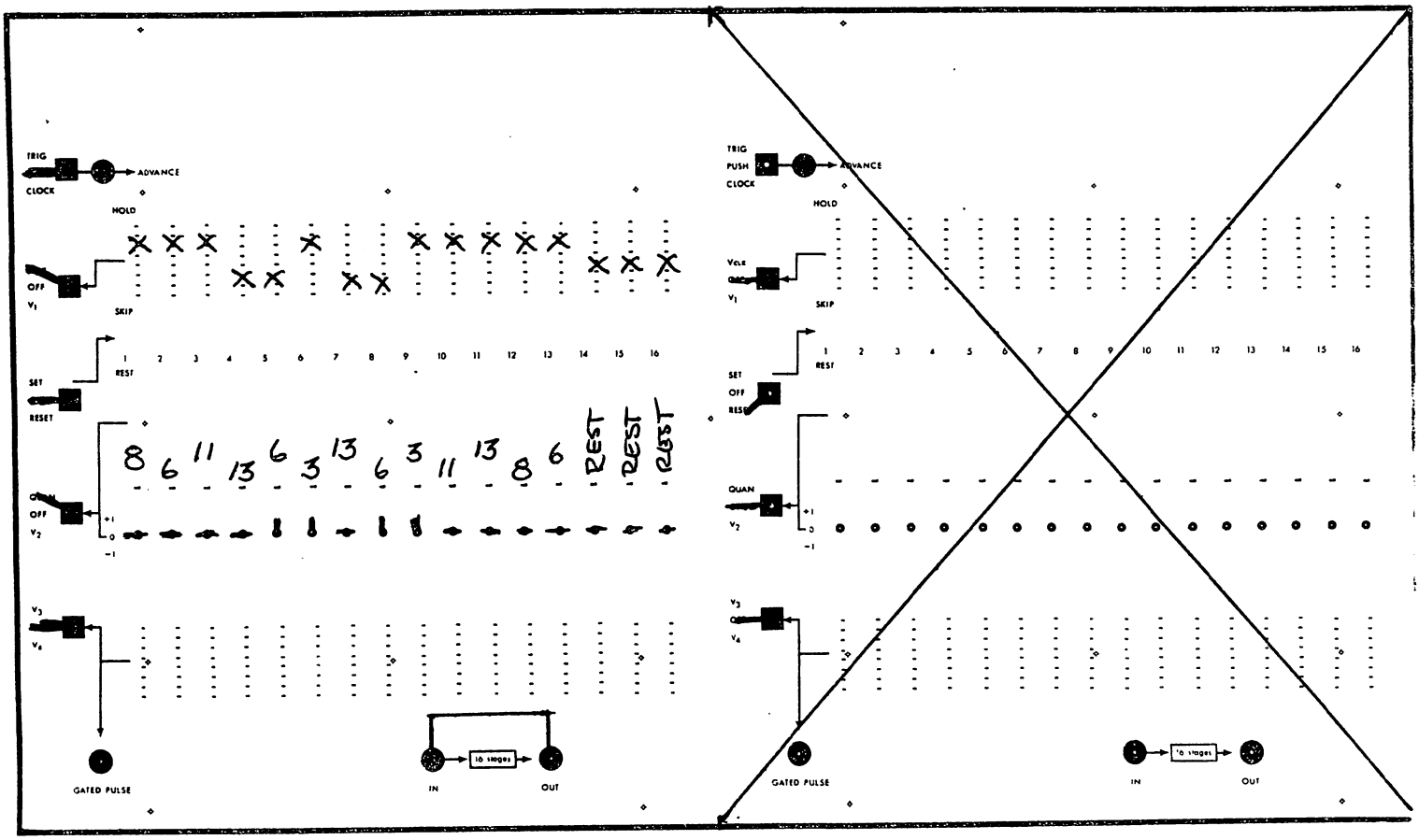
DIAGRAM P-3

PROGRAMMING THE EML 400

ELECTROCOMP®
EML 401





1. CLOCK

The CLOCK slide control effects the tempo of the sequence. The Vclk/OFF switch determines whether the CLOCK rate is controlled by the Vclk voltage from a PROGRAM PANEL. In OFF, the sequence will advance at a constant tempo controlled only by the Clock's Slide Control, it ignores the voltages set by the first row sliders. An external control voltage from an appropriate source may be patched into Vext to further control the tempo of a sequence.

2. QUANTIZER

The TUNE control is used to transpose the pitch produced by the QUANTIZER output voltage. The COARSE and FINE controls are used to adjust the tuning interval.

3. The QUANTIZER voltage is applied to the Light Emitting Diodes. The lights, numbered 1-13 (vertical column of lights, left of the CONTROLLER PANEL) correspond to an octave and one note on the 12 tone scale. The TUNE control may be used to transpose pitch so that the #1 light corresponds to a particular pitch, such as a C. If the interval controls are adjusted for the 12 tone scale, light 2 will correspond to C#, light 3 to D, etc. Light 13 will be a C, up one octave from light 1. The green light indicates the active stage is in REST. No pitch has been set, nor will a pitch sound.

The -1, 0, +1 lights indicate the octave setting of the active sequencer stage.

In tuning the instrument to the proper interval, note that in the -1 octave, light 1 condition, the COARSE and FINE Quantizer controls have no effect. This provides a convenient reference point. It is necessary to set the instrument to this condition and adjust the pitch to a C or any other convenient pitch with the QUANTIZER TUNE control, then go to a +1 octave, light 13 condition and use the FINE control to adjust the pitch to precisely 3 octaves above the previous pitch. The COARSE control is used for generating microtonal scales. (See the section on Scaling and Fine Tuning the EML 400 Sequencer.)

4. TRIGGER

The TRIGGER section performs a variety of functions. It consists of two switches and two jacks. The TRIGGER OUT jack provides a pulse which may be used to trigger the EML 101, 200 or 500. The output of the INTERNAL/EXTERNAL slide switch is routed to the envelope of the 401 module. In INTERNAL position, a trigger pulse will be directed to the envelope at each clock advance except for rests and skips

In the EXTERNAL position, pulses inputted at the TRIGGER IN jack will be directed to the envelope, and will cause the sequence to advance if the PROGRAM PANEL Advance Switch is in the TRIGGER position. The TRIGGER Input Switch will normally be in the FAST position unless a "noisy" source such as the EML 100/101 Gate Out signal is used to advance the sequence.

5. OSCILLATORS

This is an OSCILLATOR CONTROL MIXER used to provide vibrato and transposition voltages to the Oscillators. The two jacks labeled EXT are used to bring external control voltages to the Oscillators. The slide control labeled ENV norma-ly has envelope voltage applied to it unless an external voltage is patched in at the EXT jack immediately below it.

6. FILTER

This is a FILTER CONTROL MIXER used to provide additional timbre control voltages to the Filter. The two jacks labeled EXT are used to bring external control voltages to the Filter. The slide control labeled ENV normally has envelope voltage applied to it unless another voltage is patched in at the EXT jack immediately below it.

7. OCTAVE SWITCH

The Octave Switch transposes the pitch set at the active stage by two octaves. Both Oscillators and the Filter are transposed.

8. EXPAND OUT CONNECTOR

The cable provided should be connected between this connector and one on the PROGRAM PANEL.

9. LINEAR QUANTIZE JACK

Provides pitch voltage output to the SEQUENCER INput on the EML 101 and 500. All EML 100's and early serial numbered EML 101's may require minor modification. See the back of the manual. On the EML 101's with serial numbers 646 or above, the CM3 jack has been modified to accept the SEQUENCER. INPUT.

10. EXPONENTIAL QUANTIZE JACK

Provides pitch voltage output to EML 200 Voltage Control Oscillators.

11. MULTIPLE

Two 3 jack multiples are provided.

12. V_{clk}

V1

V2 These Voltages appear at jacks for further use as
V3 determined by the positions of the various voltage routing switches on a PROGRAM PANEL.

V4

PART II SCALING AND FINE TUNING THE EML 400 SEQUENCER

A. QUANTIZER Part 1

Set the COARSE slider so it corresponds to 12. 12 represents 12 tones/octave, the semitone scale. The various scales set by the COARSE control span 12 tones/octave up to 60 tones/octave.

Temporarily place the FINE control slider in the middle of its travel. Fine tuning the sequencer to a reference is realized utilizing the FINE slide control - the procedure for this is detailed in QUANTIZER PART 2.

B. SET/OFF/RESET SLIDER SWITCH

1. Move this switch from the RESET position to the SET position. When this switch is in the RESET position, LED #1 should be on. (The vertical column of QUANTIZER LED'S just left of the CONTROLLERS section.) Switching to SET, an LED numbered 1-13, or the REST LED (the green LED) will appear. This is completely dependent on the position of the slider in Control Voltage Row #2 of Stage #1. In addition, an Octave light will light, depending on which position Stage 1's Octave Switch is in.

2. The first slide of Control Voltage Row #2 (Stage #1) should be moved all the way to the bottom of its travel until LED #1 lights. The Octave switch associated with Stage 1 positioned to -1. The corresponding LED will appear.

C. QUANTIZER Part 2

1. Using the TUNE slider in the QUANTIZER section tune the sequencer to the pitch (frequency) of your reference (or as you desire). Adjust the TUNE slider until they no longer "beat".

2. Increase the pitch of the reference source by two octaves (or triple frequency).

Now shift the Octave switch associated with Stage 1 to the +1 position. Use the FINE slide control to tune the two pitches until the "beating" ceases.

The Sequencer is now tuned and octavated! It is ready to PROGRAM!

NOTE Diagrams A-1 and A-2

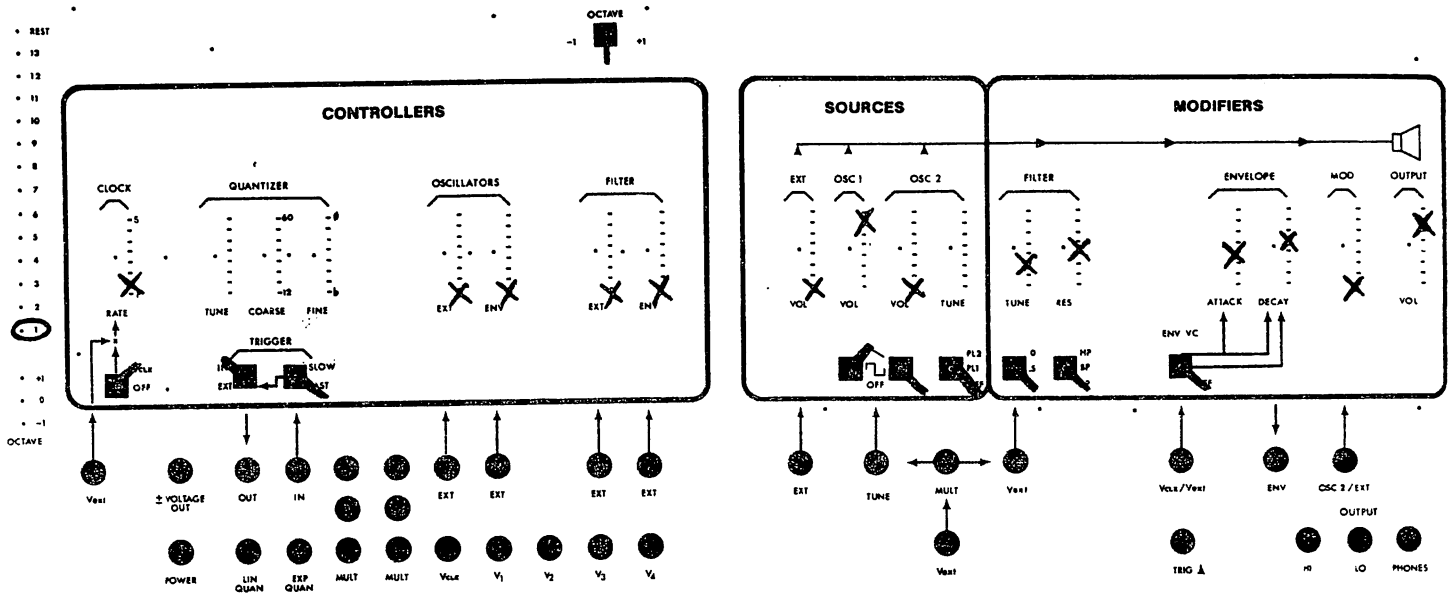
ELECTROCOMP®
SEQUENCER

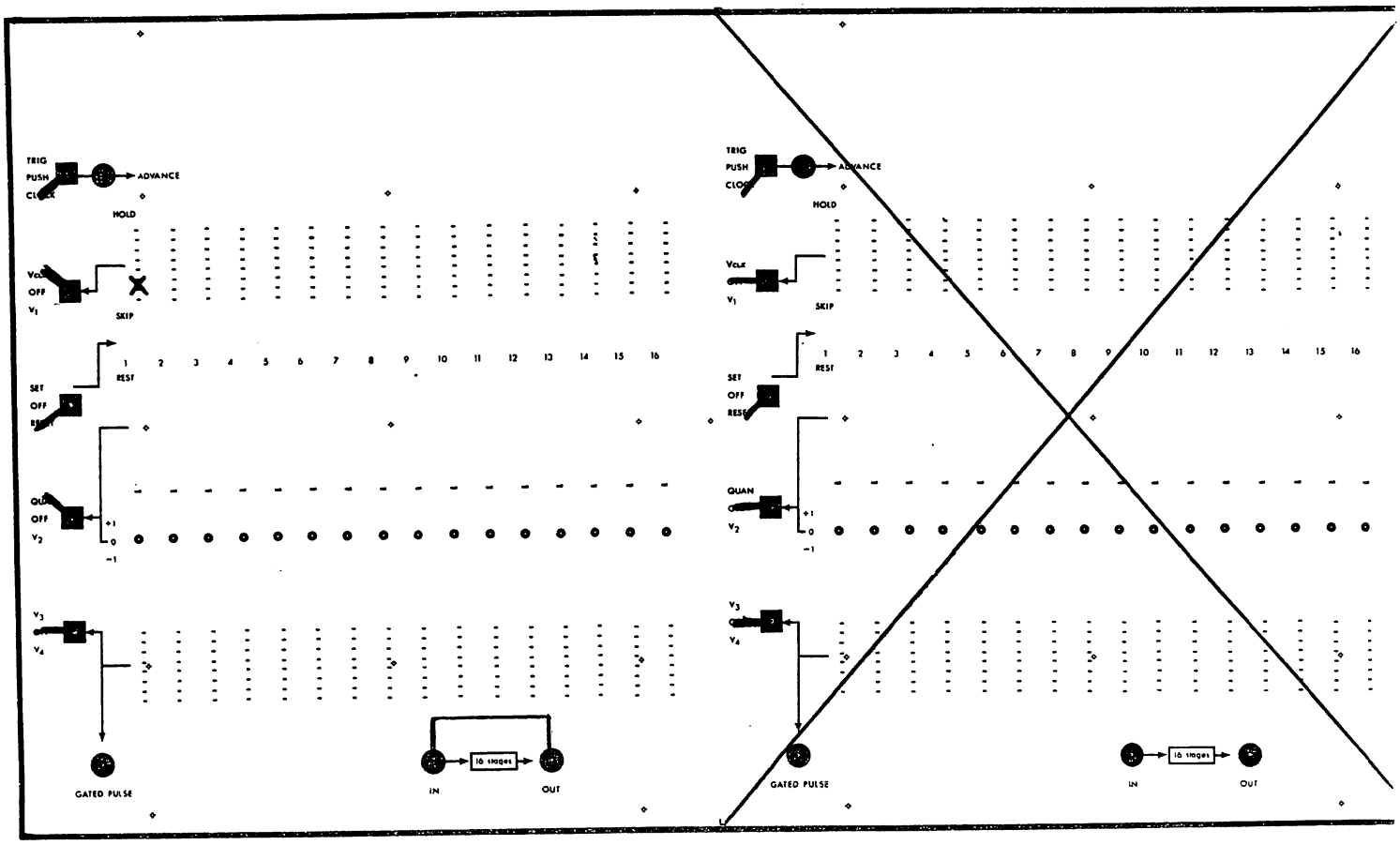
ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM A-1

READYING THE SEQUENCER

ELECTROCOMP®
EML 401



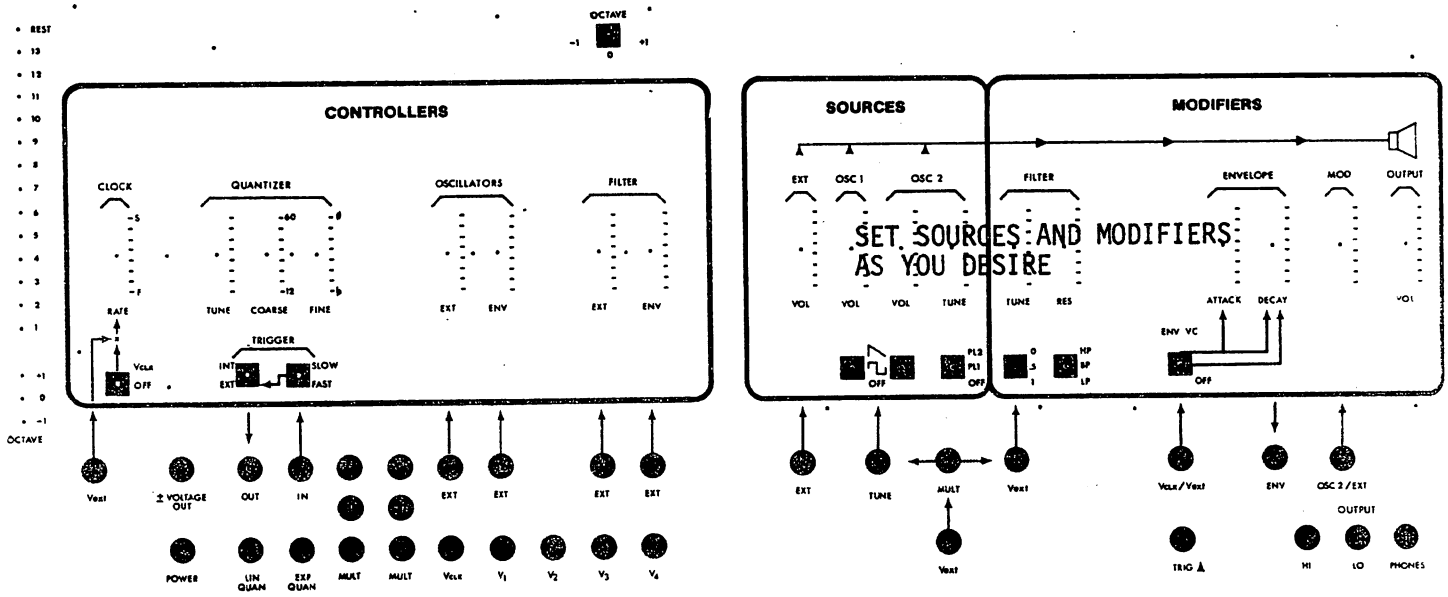


ELECTROCOMP®
SEQUENCER

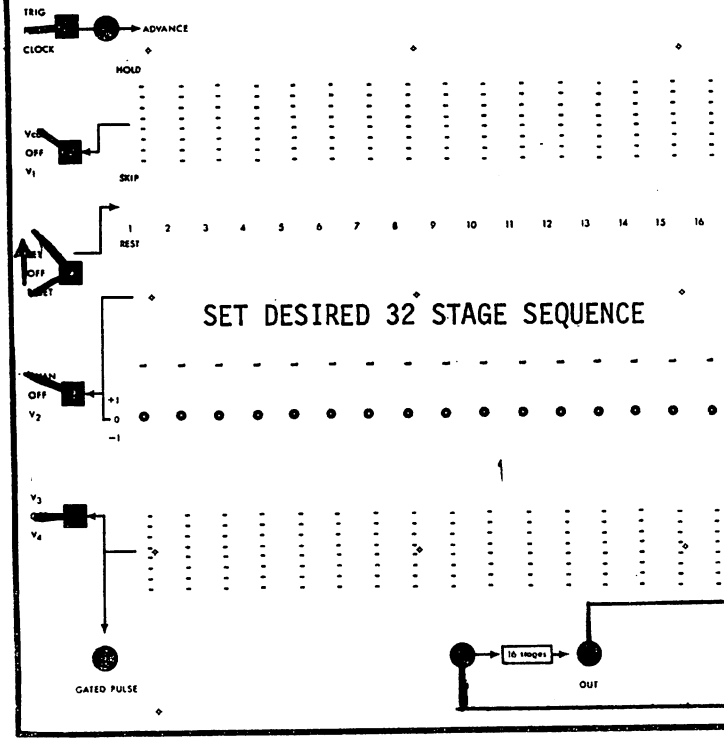
ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM P-9

ELECTROCOMP®
EML 401

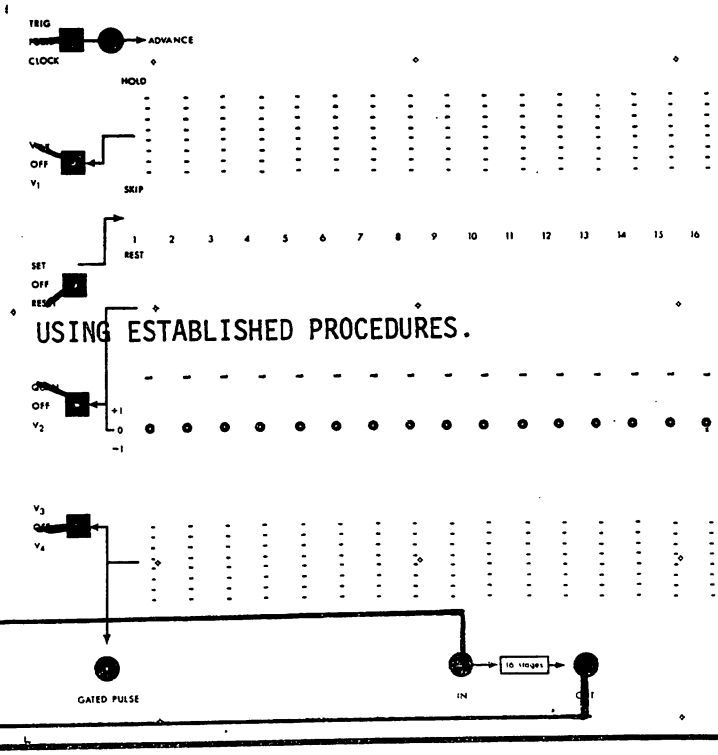


PROGRAM PANEL "A"



SET DESIRED 32 STAGE SEQUENCE

PROGRAM PANEL "B"



USING ESTABLISHED PROCEDURES.

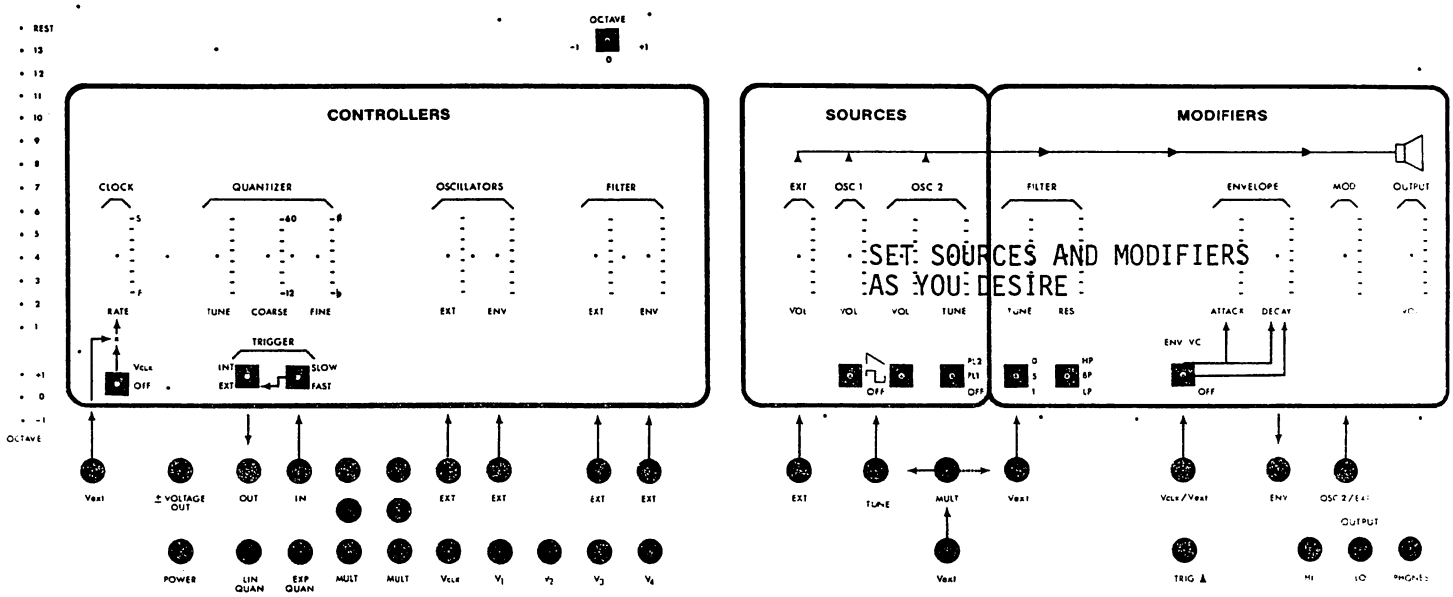
ELECTROCOMP®

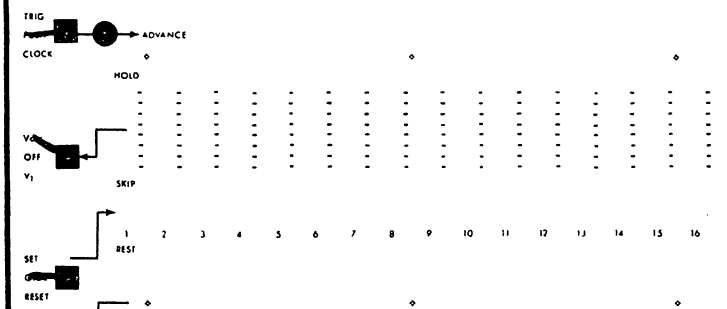
SEQUENCER

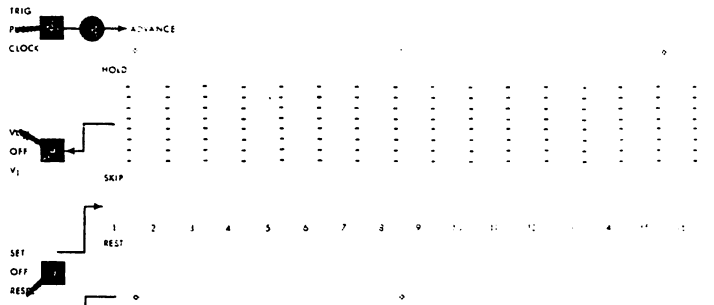
DIAGRAM P-10

ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

ELECTROCOMP®
EML 401

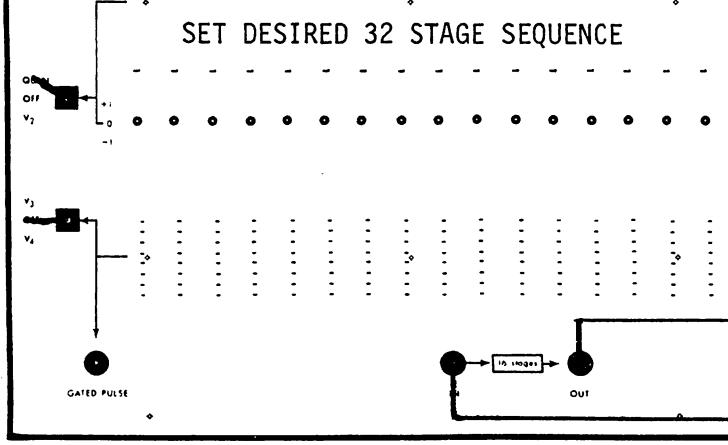


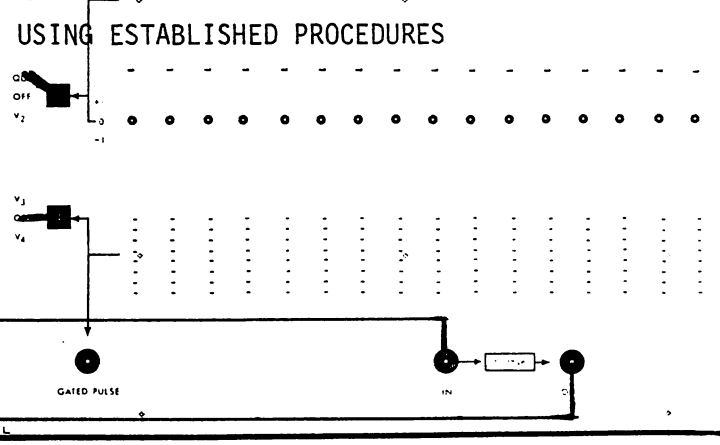


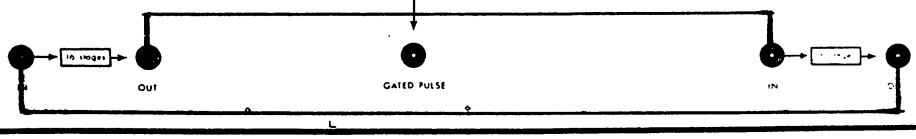


SET DESIRED 32 STAGE SEQUENCE

USING ESTABLISHED PROCEDURES







ELECTROCOMP®
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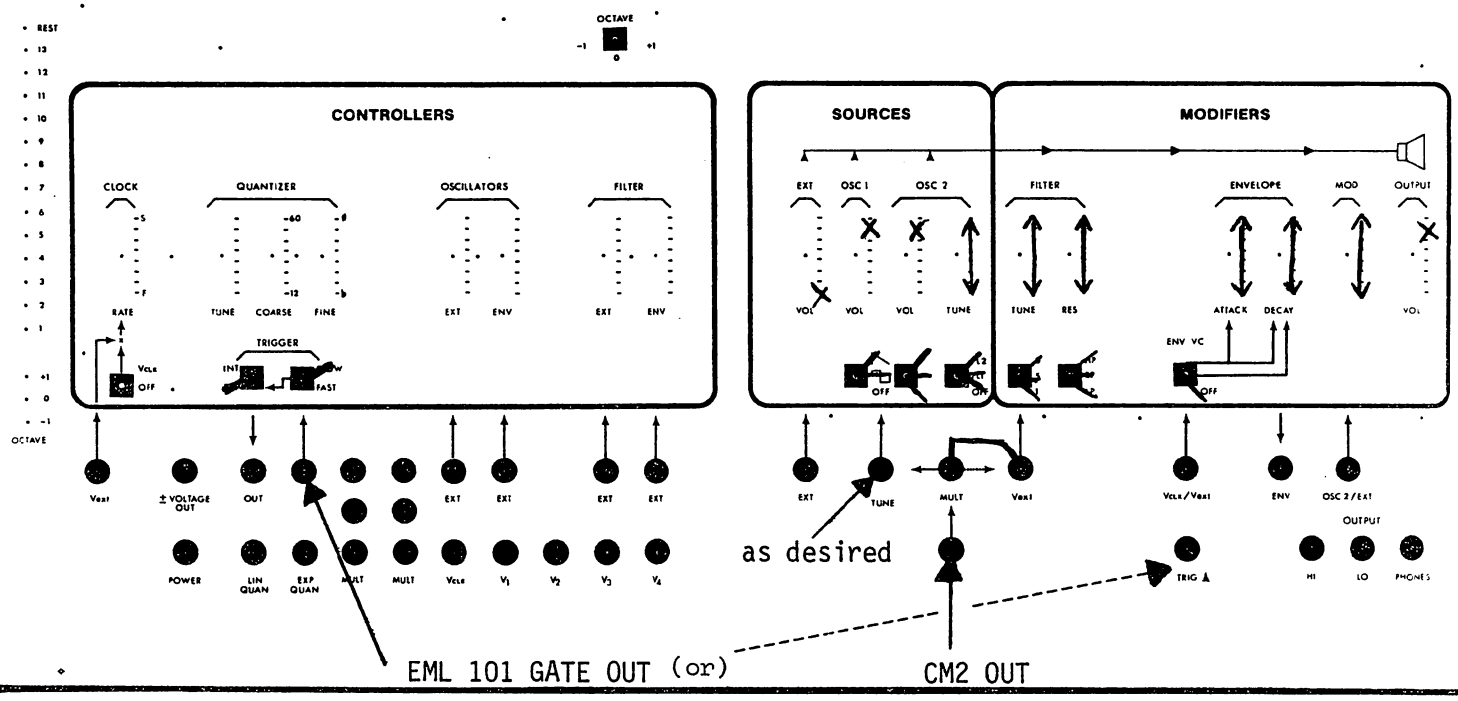
ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM I-1

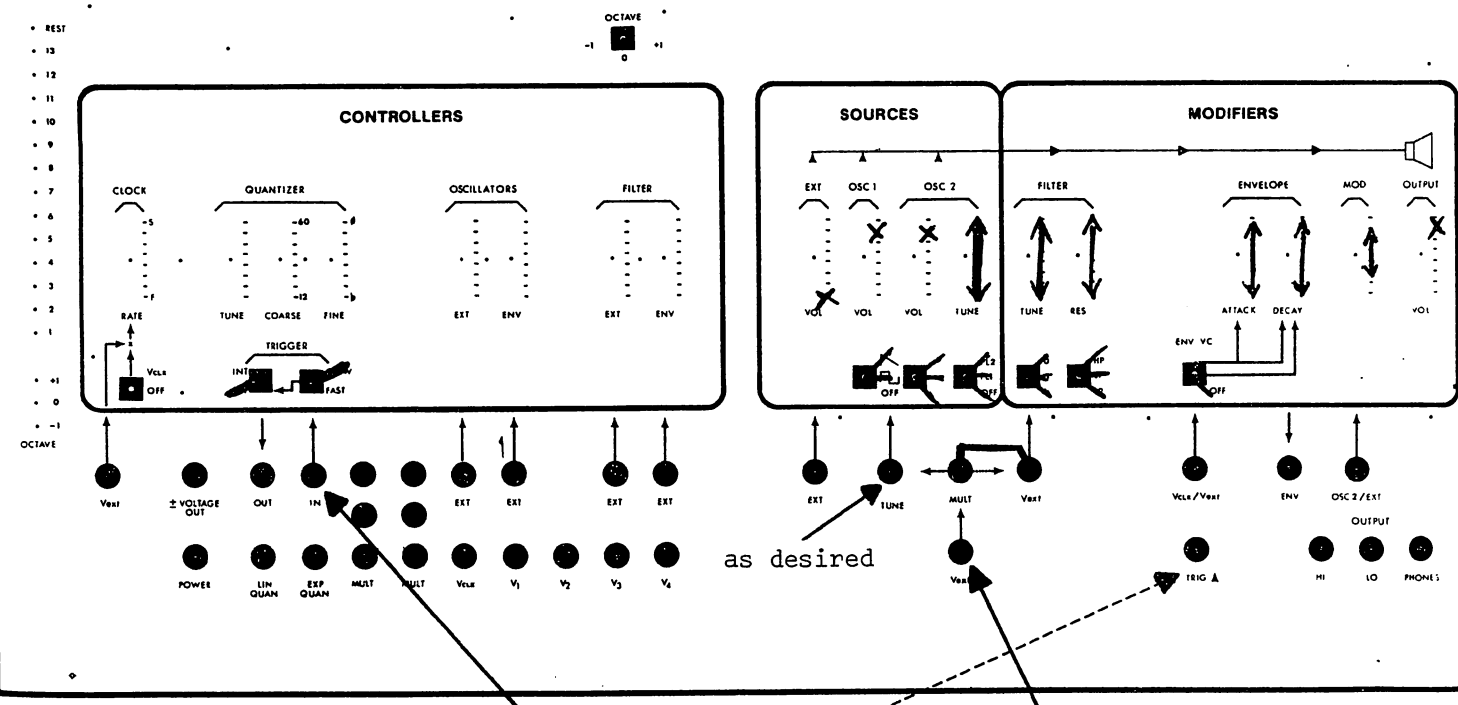
ELECTROCOMP®
EML 401



ELECTROCOMP®
SEQUENCER
ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM I-2

ELECTROCOMP®
EML 401



ELECTROCOMP SEQUENCER

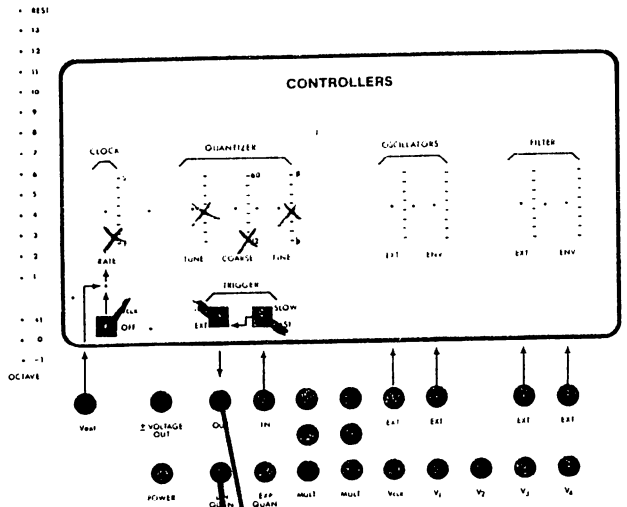
ELECTRONIC MUSIC LABS INC VERNON, CONN 06066

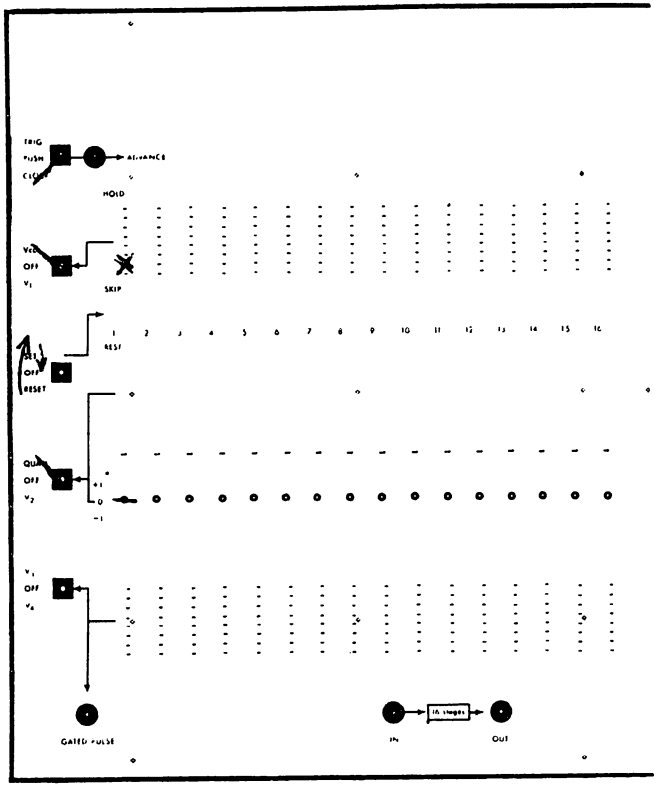
EML 101 KEYBOARD SYNTHESIZER

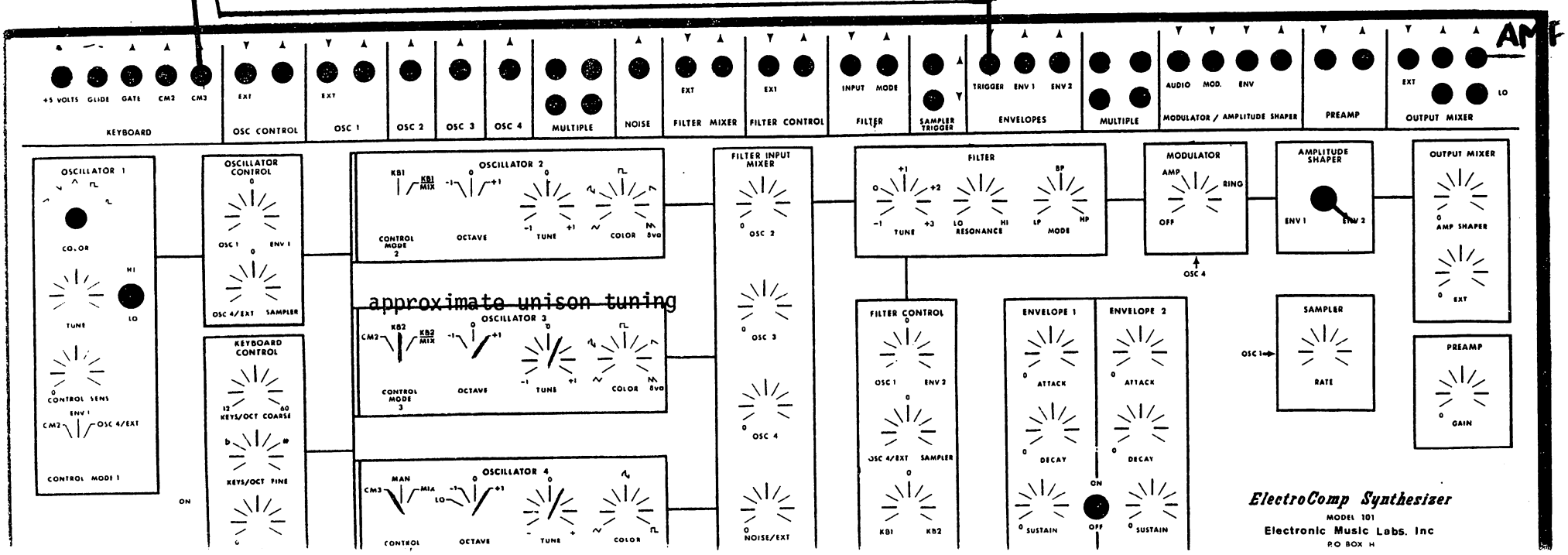
as the SOURCE and MODIFIER

SECTION for the EML 400

SERIES SEQUENCER







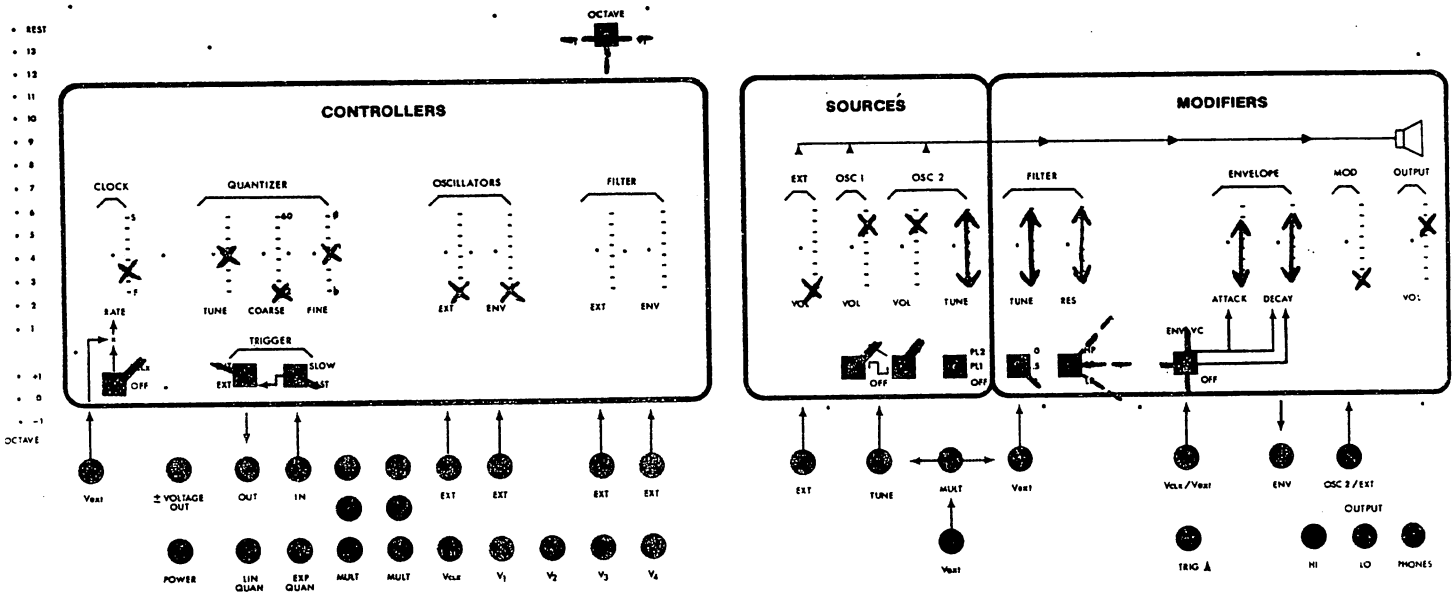
ELECTROCOMP® SEQUENCER

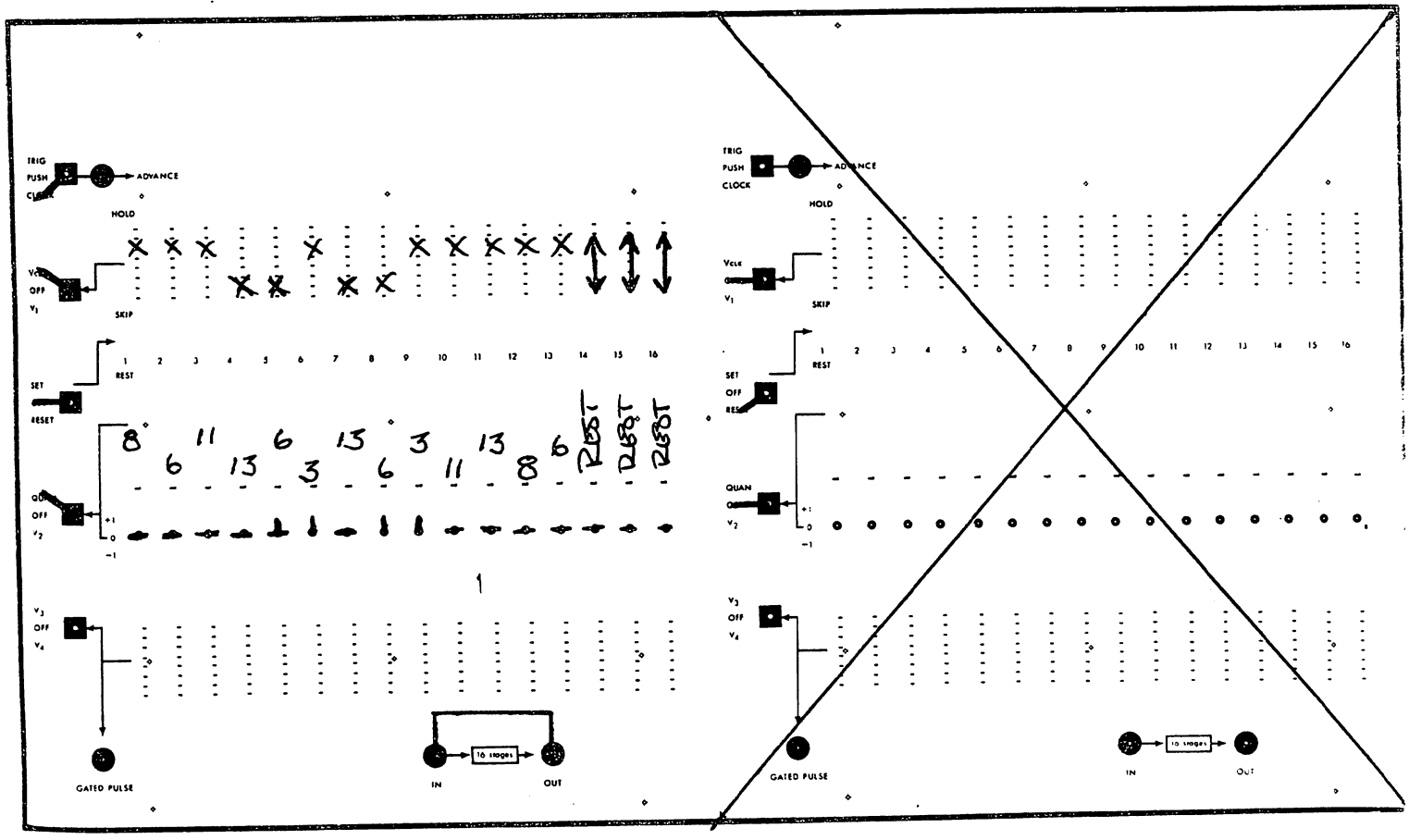
ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM P-4

PROGRAMMING THE EML 400

ELECTROCOMP®
EML 401





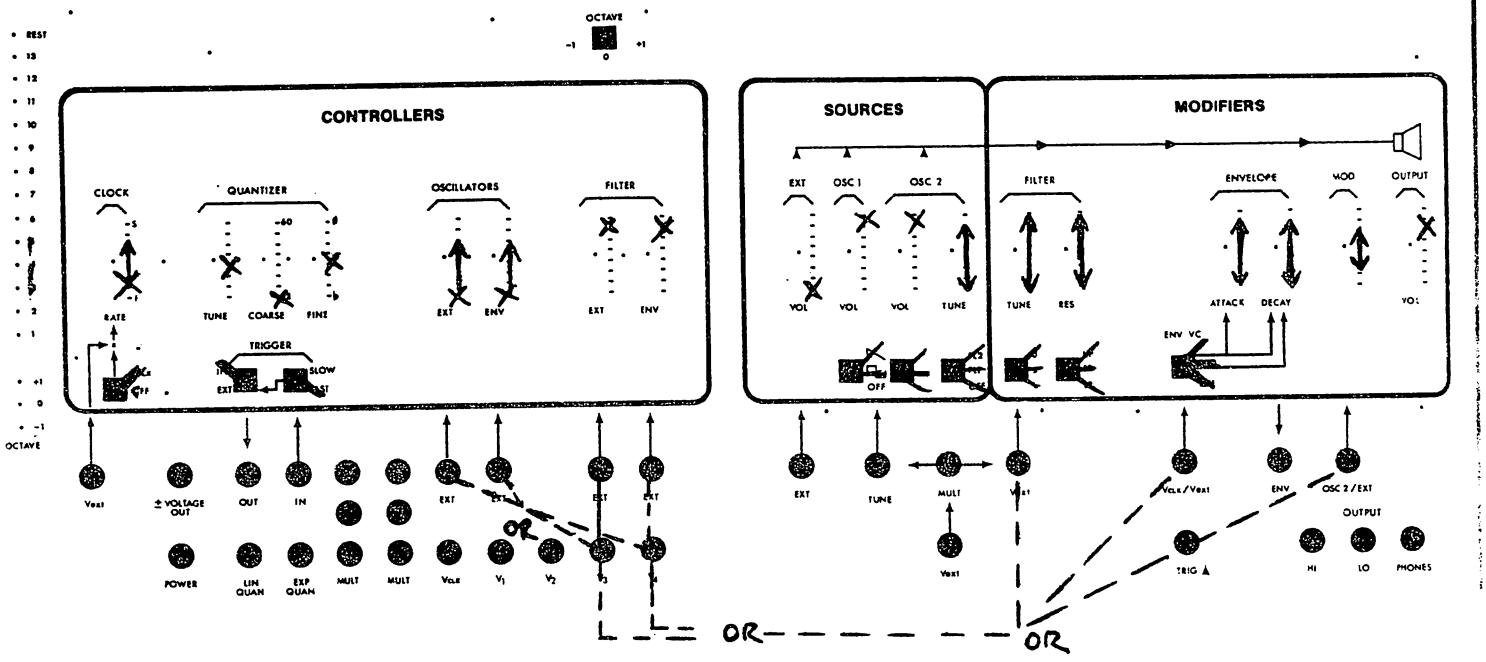
ELECTROCOMP®
SEQUENCER

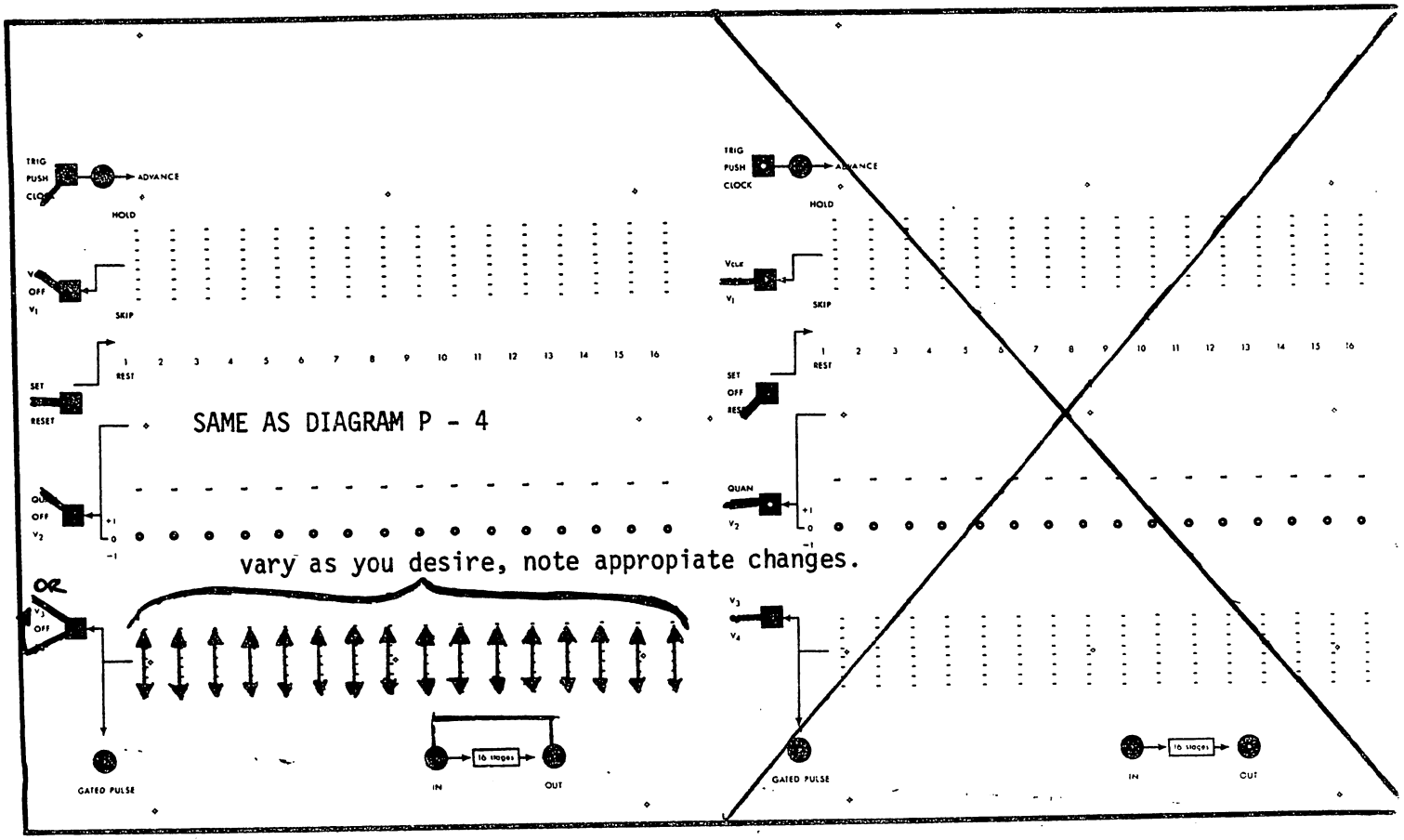
ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM P-5

PROGRAMMING THE EML 400

ELECTROCOMP®
EML 401





SAME AS DIAGRAM P - 4

vary as you desire, note appropiate changes.

PATCHES FOR PERMUTATING A SEQUENCE

FOR SEQUENCER SYSTEMS CONTAINING EML 400/416/401

A. PERMUTATING A SEQUENCE

I "READY" THE SEQUENCER - (Note accompanying Diagram P-6)

II PROGRAM PANEL A MAY BE PROGRAMMED FOR ANY SEQUENCE YOU DESIRE

III The SET/OFF/RESET SLIDE SWITCHES for both PROGRAM PANELS should be positioned in the following sequence - RESET - SET - OFF.

IV Control Voltage Row 1 sliders should all be set in the SKIP position except Stage #1, which may be set to any duration above SKIP.

V Control Voltage Row 3 sliders are implemented to provide GATED PULSES. For each slider raised one pulse is produced. The number of sliders up determines whether a patterned permutation will occur, or if the sequence "moves" continuously, or if only 8, 4, or 2 stages will sound.

A patterned permutation exists when the number of sliders "up" does not divide equally into the 16 stages. S = 3, 5, 7, 9, 10, 11, 12, 13, 14, do not divide into 16 equally. Permutations exist on the order of 16 x S.

If you have 2 sliders up in PROGRAM PANEL B, ROW 3, the same 8 stages of PROGRAM PANEL A will light and sound. 16 ÷ 2 = 8. 4 up, 4 stages will light and sound. 16 ÷ 4 = 4.

When 15 sliders are "up" in the third row of controller voltages of PROGRAM PANEL B. The result is a retrograde.

1 slide up - 1 continual pulse

2 slides up - 1 pulse, 1 skip

3 slides up - 1 pulse, 2 skip

4 slides up - 1 pulse, 3 skip

B. SPECIAL EFFECTS

V_3 or V_4 of either PROGRAM PANEL may be implemented to "control" a parameter of the sequence. It could be timbre, tempo, envelope, dynamics, a number of options are open.

EXPLORING VARIOUS RHYTHMNS ON A PREVIOUSLY PROGRAMMED SEQUENCE

I. READY THE SEQUENCER (Note Diagram P-7)

II. Wherever slider of Control Voltage Row 3 is raised (more than 20%), a GATED PULSE is initiated. In this patch, a raised slider will move the programmed sequence, on PROGRAM PANEL A, one stage over. Two adjacent sliders raised will provide two triggers, one right after the other. The length of time between them is directly proportioned to the CLOCK rate and the position of the duration sliders for the respective stages.

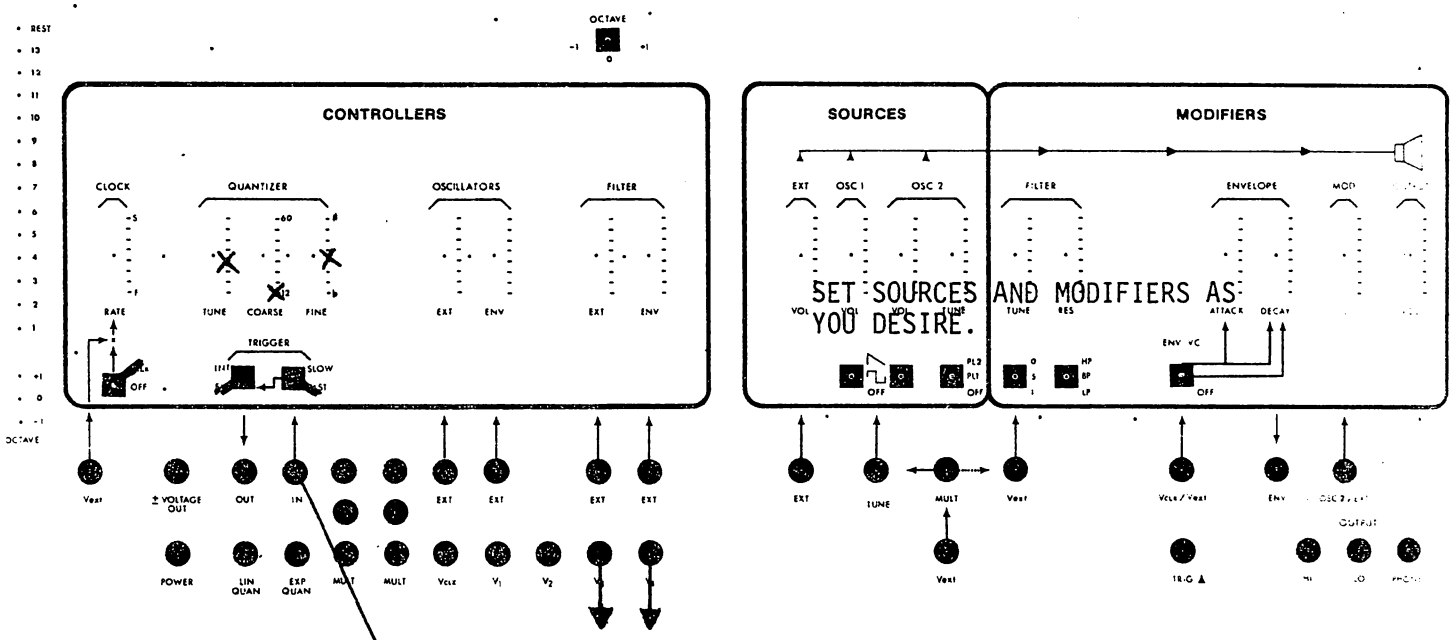
Note Diagram P-6. You may raise the third row of voltage control sliders of PROGRAM PANEL B at random.

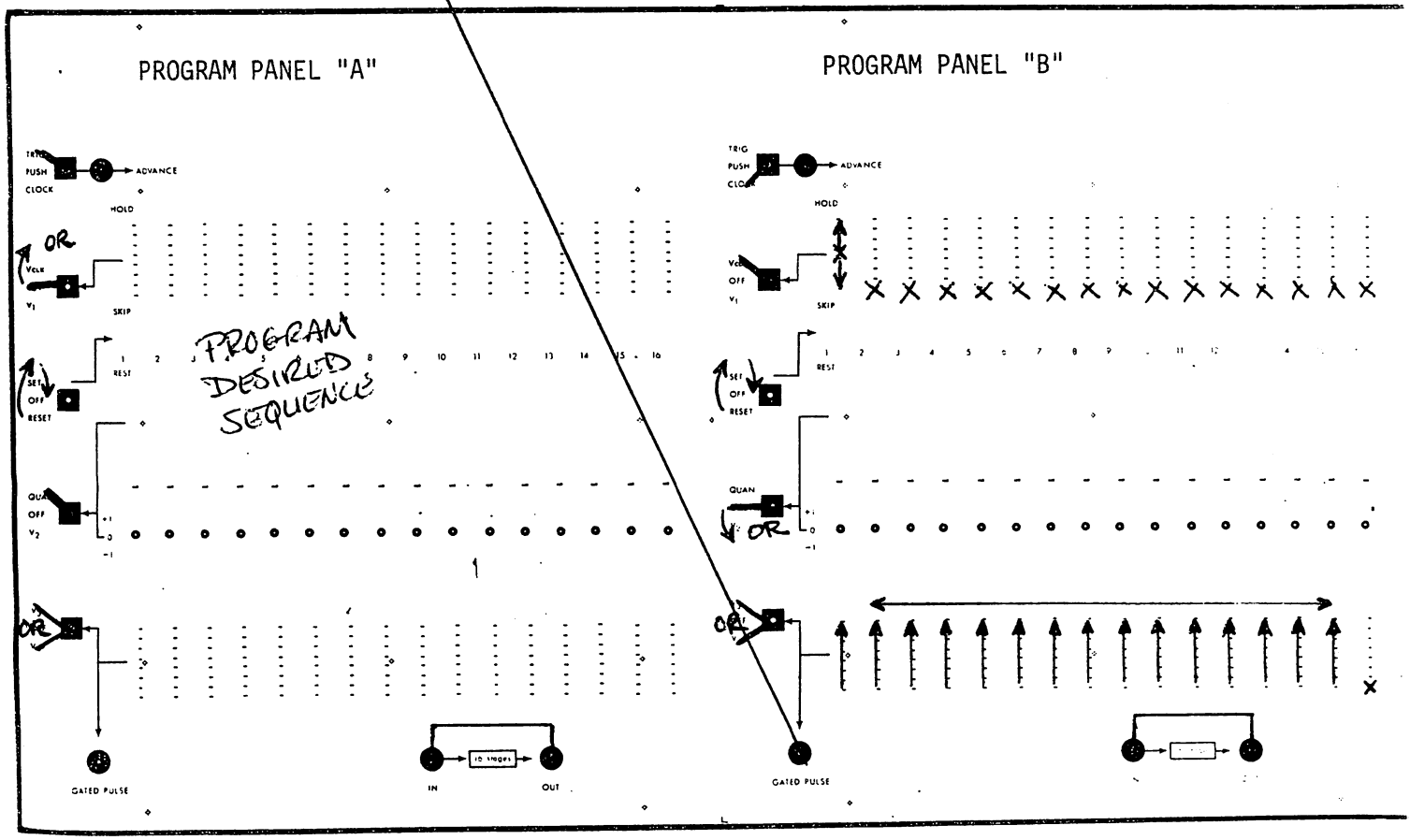
ELECTROCOMP® SEQUENCER

DIAGRAM P-6

ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

ELECTROCOMP®
EML 401



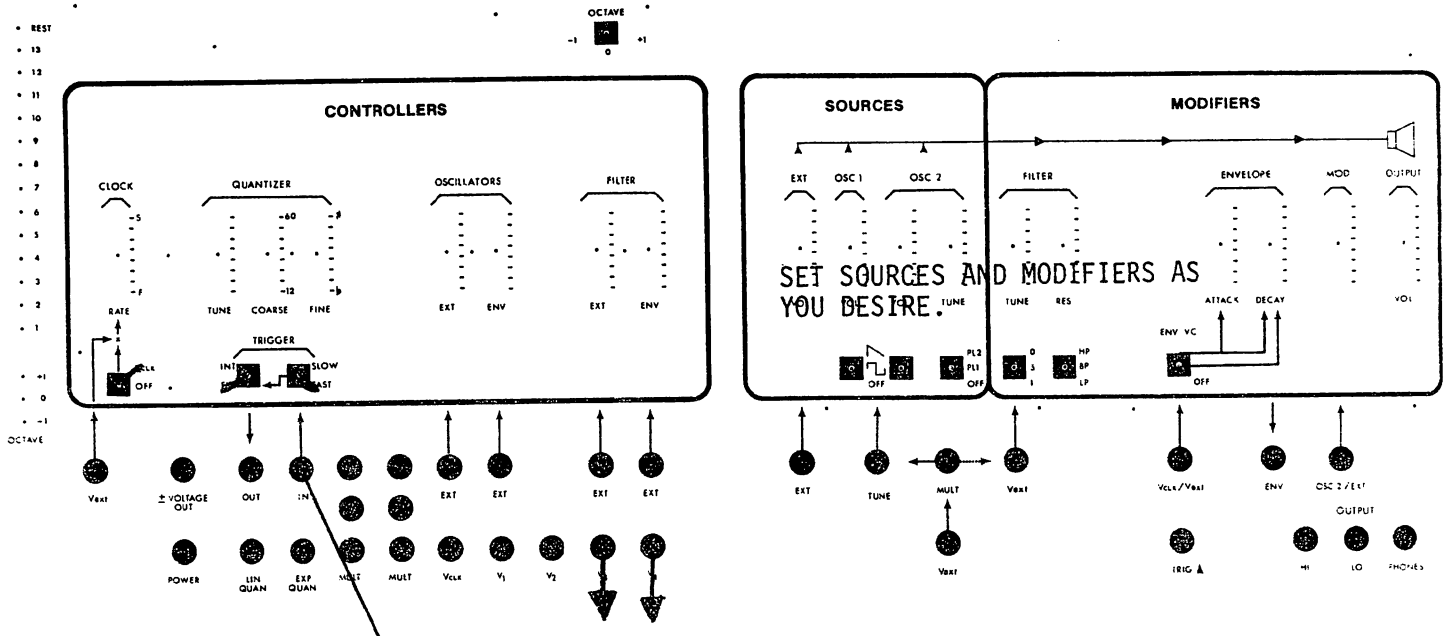


ELECTROCOMP®
SEQUENCER

ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

DIAGRAM P-7

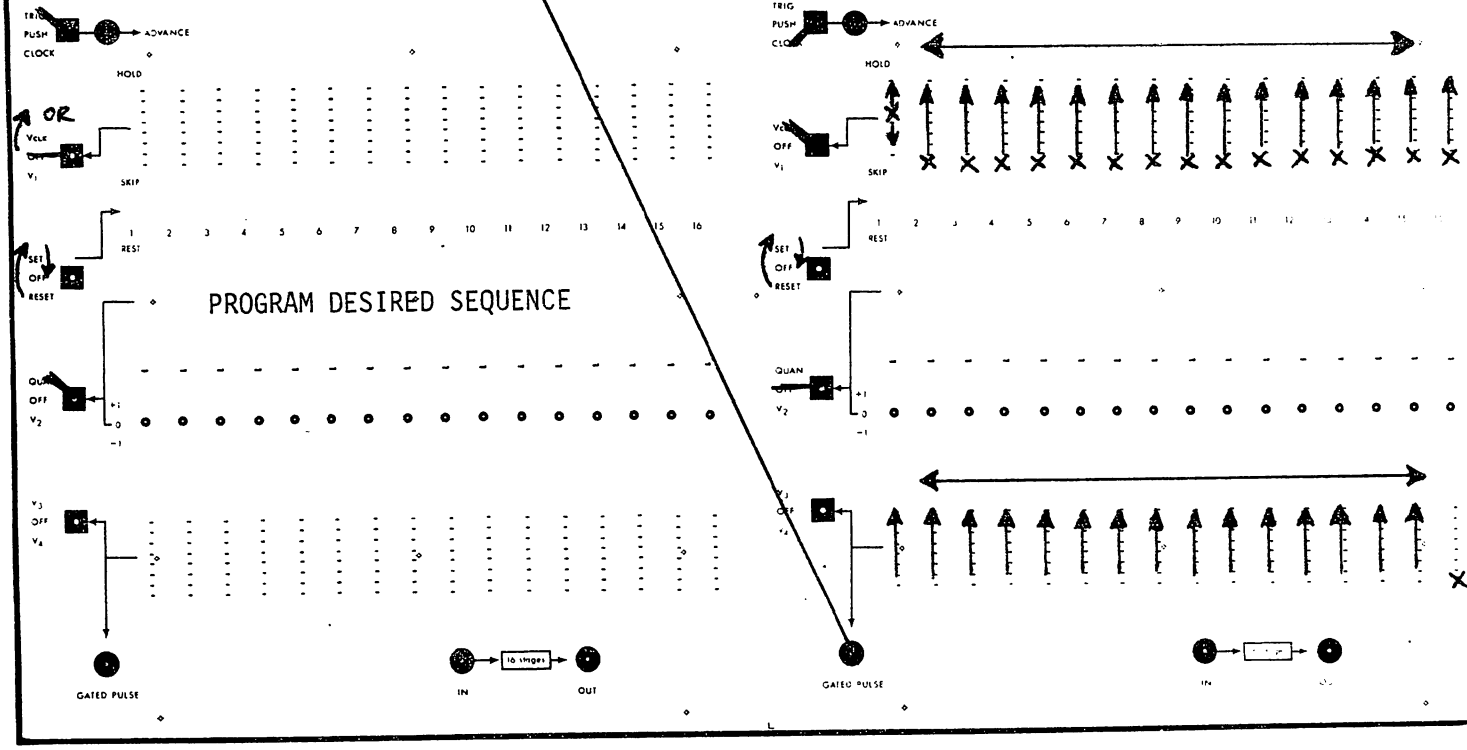
ELECTROCOMP®
EML 401



AS DESIRED

PROGRAM PANEL "A"

PROGRAM PANEL "B"



32 STAGE SEQUENCE

The methodology - the READYING, PROGRAMMING and RUNNING procedures - for setting up a sequence of 32 stages are precisely the same as for a 16 stage sequence. The difference lies in the fact that you have to READY and PROGRAM two PROGRAM PANELS instead of one.

NOTE: The section on "Programming the EML 400 Sequencer".

In order to program Stages 17 to 32 (PROGRAM PANEL B) set the SET/OFF/RESET Slide Switch of PROGRAM PANEL A (Stages 1-16) to RESET. Set the Advance Switch of PROGRAM PANEL B to PUSH for pushbutton advance and the SET/OFF/RESET Switch to RESET, to SET, finally to OFF.

When the programming has been completed, check the sequence.

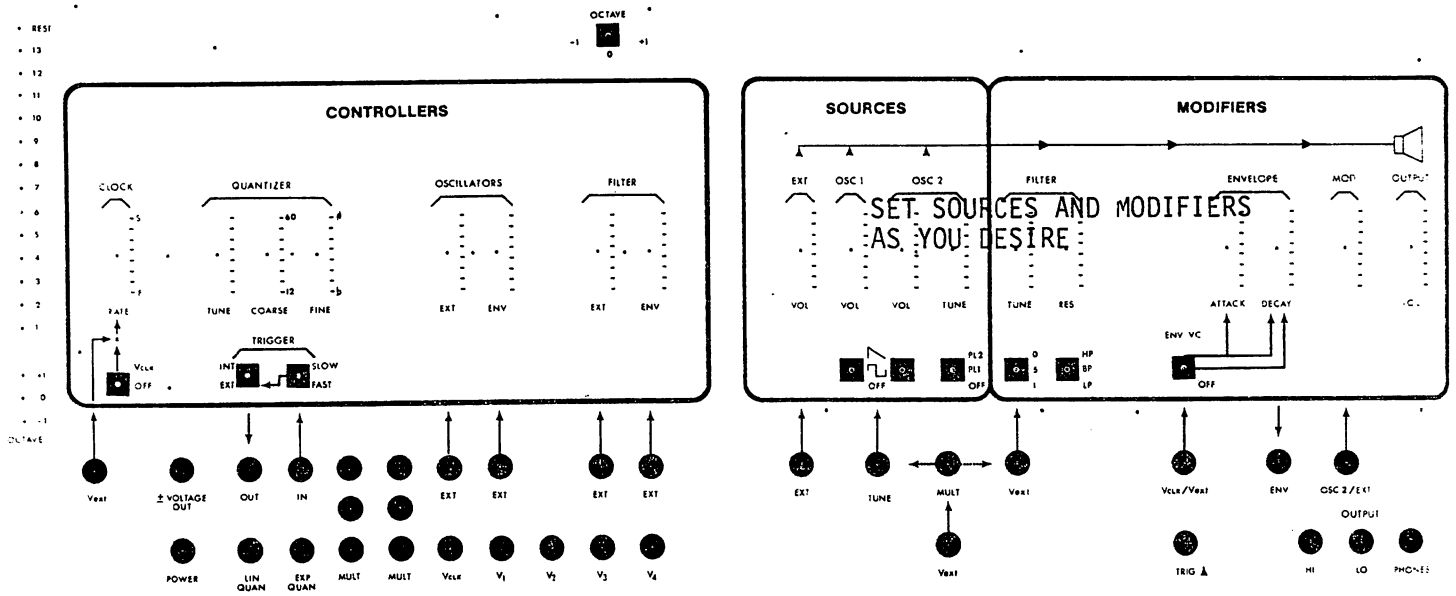
To run the sequence, place the Advance Slide Switches of both PROGRAM PANELS to CLOCK and fix the tempo. Next, position the SET/OFF/RESET switch to RESET, to SET, finally to OFF.

ELECTROCOMP® DIAGRAM P-8

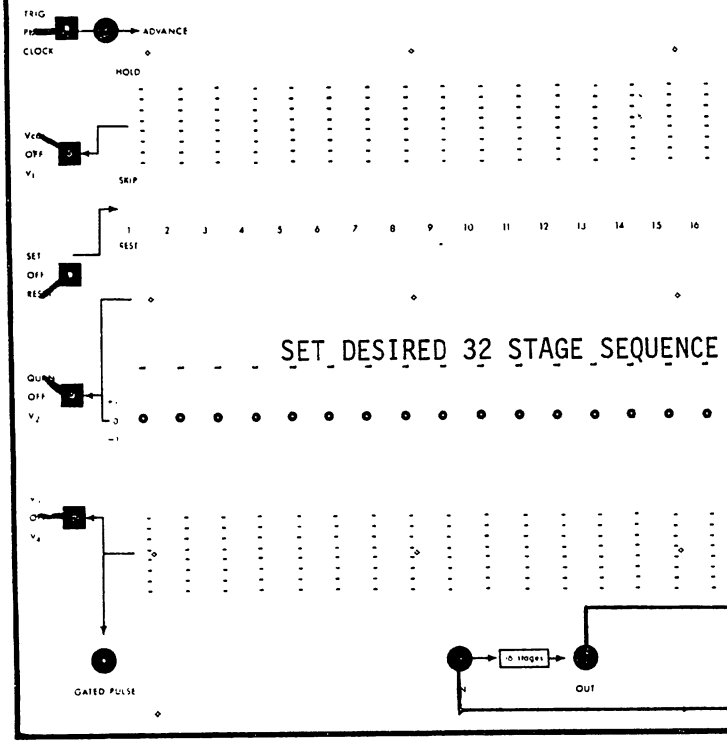
SEQUENCER

ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

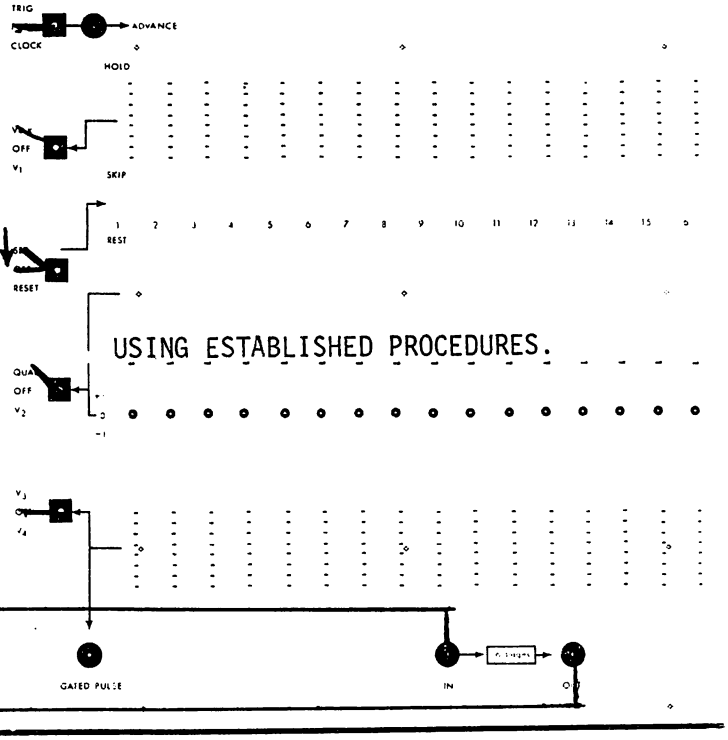
ELECTROCOMP®
EML 401



PROGRAM PANEL "A"



PROGRAM PANEL "B"

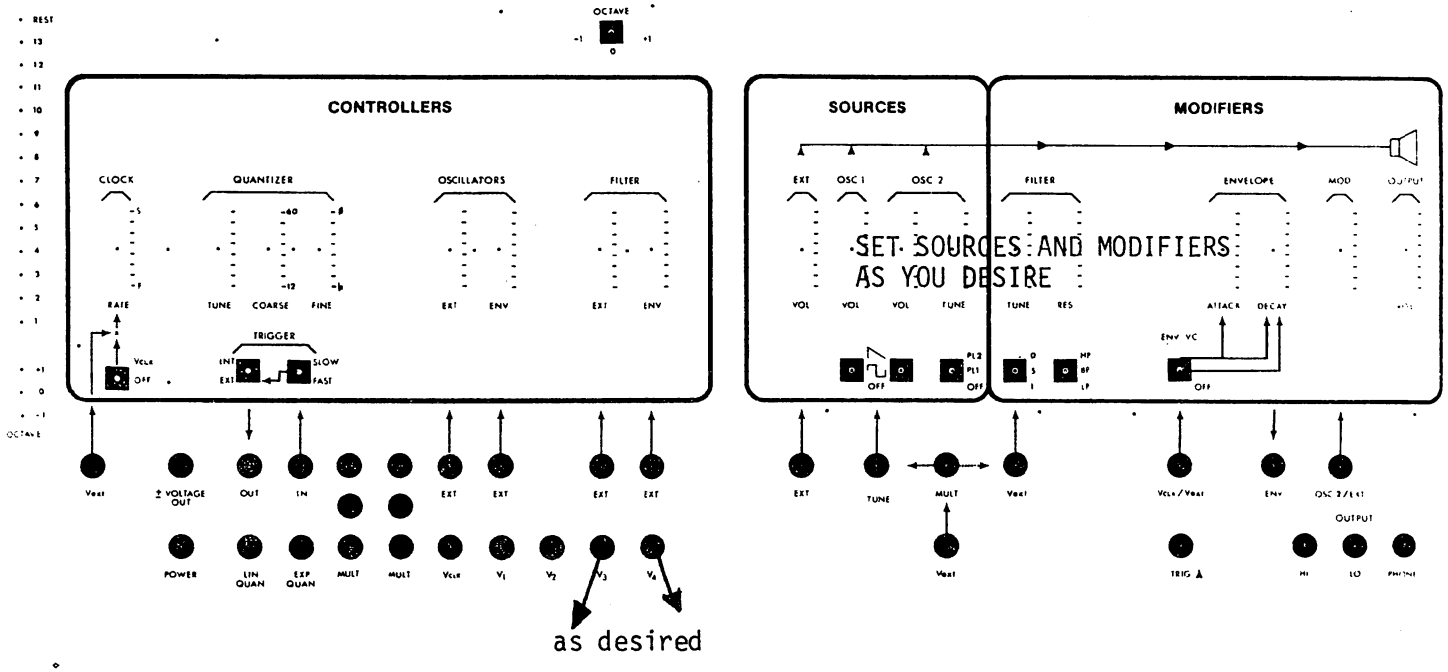


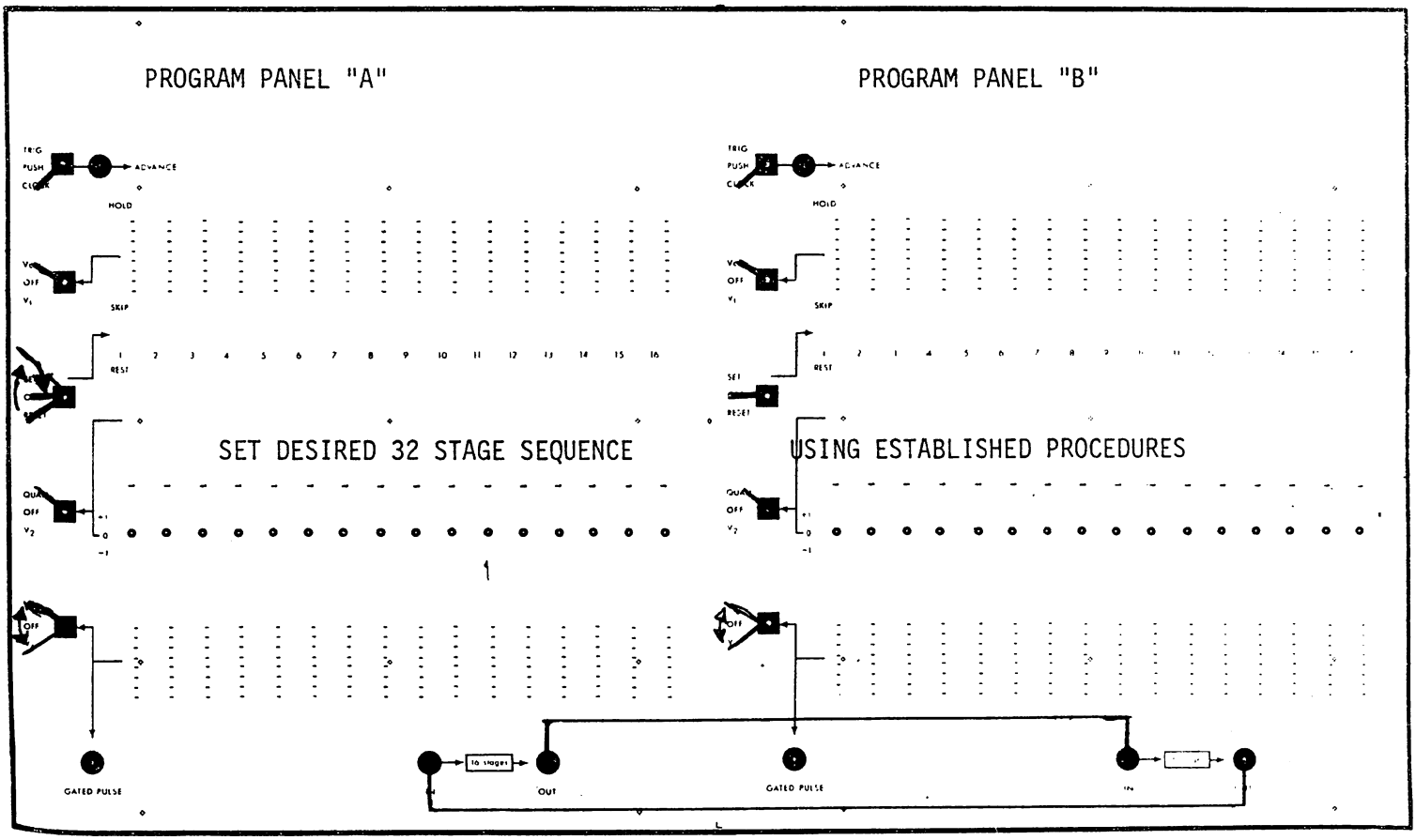
ELECTROCOMP® DIAGRAM P-11

SEQUENCER

ELECTRONIC MUSIC LABS., INC. VERNON, CONN. 06066

ELECTROCOMP®
EML 401





SEQUENCER METHODOLOGY -

OVERVIEW

It is recommended that the methodology established, which consists of the procedures for Scaling and Fine Tuning and Programming the EML 400 Series Sequencer, be followed whenever the Sequencer is to be programmed or reprogrammed. In summary the methodology is as follows:

I READYING THE SEQUENCER

- A. Place CONTROLLER functions in the "READY" mode.
- B. Place SOURCE functions in the "READY" mode.
- C. Place MODIFIER functions in the "READY" mode.

II READYING THE PROGRAM PANEL

- A. Slide switches
- B. Control voltage rows and their respective sliders.

III SCALE AND TUNE

- A. QUANTIZER
  - 1. COARSE
  - 2. TUNE
  - 3. FINE
- B. PROGRAM PANEL
  - 1. "Readying" the PROGRAM PANEL for tuning.
  - 2. Stage #1, pitch row, slider #1
  - 3. LED vertical column
- C. OPTIONAL - Reference Pitch

INTERFACING THE EML 401 MODULE WITH THE EML 101

OR EML 500* KEYBOARD SYNTHESIZERS

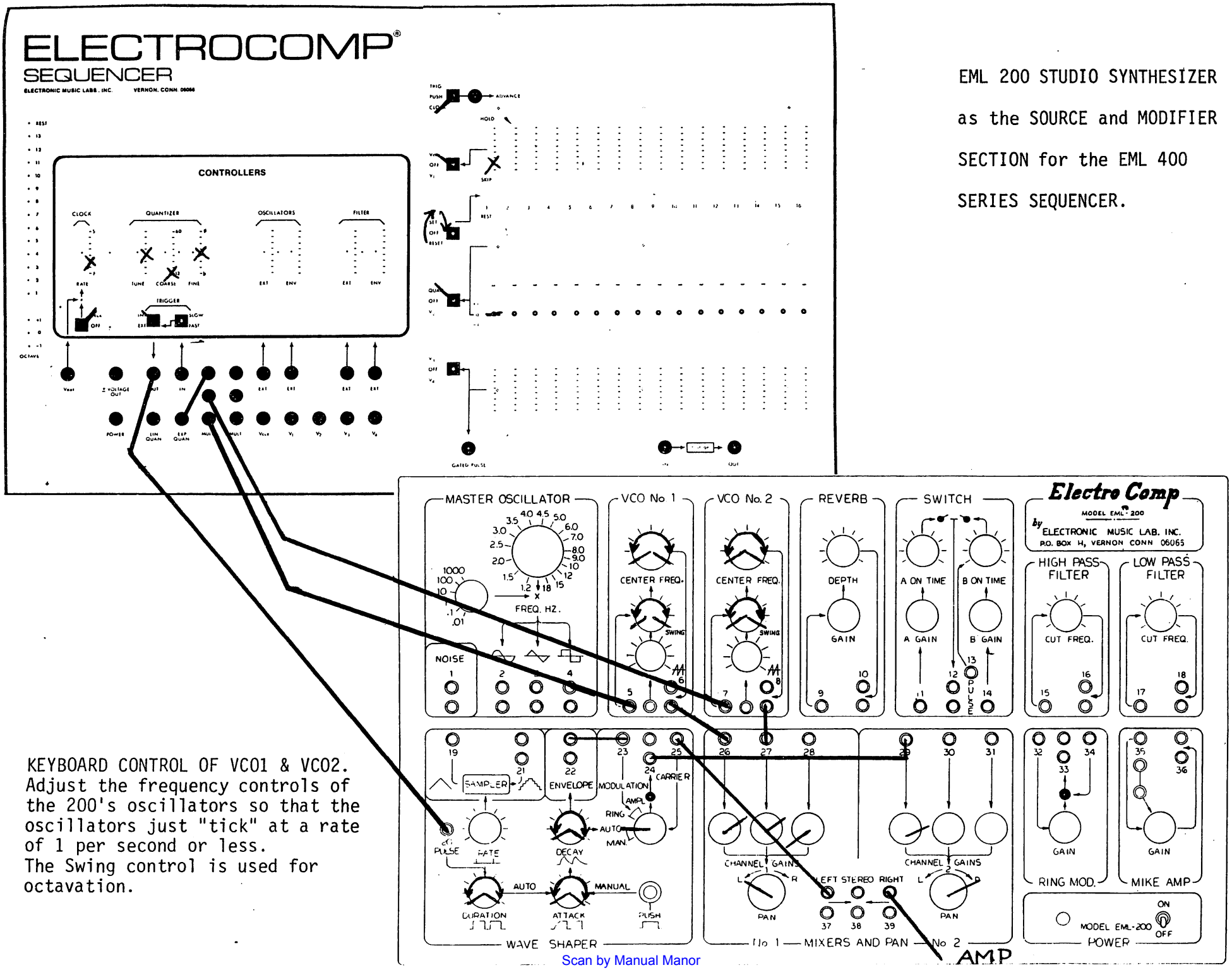
EML 101 (Note Diagram I-1) Connect as indicated. The TUNE rotary control is used to tune the 401 oscillators and filters in relation to the 101's sources. They may be tuned to unison or to varied intervals.

EML 500 (Note Diagram I-2) To control the oscillators of the 401 from the EML 500, simply connect the CONTROL VOLTAGE output of the EML 500 to the oscillator control input of the EML 401 marked - Vext. Tuning the 401's oscillators to either unison or intervals in respect to the EML 500's is accomplished with the TUNE control know on the 401. Initiating the 401's voltage control envelope generator is realized by taking a patchcord and connecting the GATE output from the EML 500 to the TRIGGER input of the EML 400 Sequencer or of the EML 401 module.

In order to have the Filter track the Keyboard control voltage a patchcord must be connected from the MULT jack to the filter's Vext jack. Carefully note Diagrams I-1 and I-2.

* The EML 500 synthesizer does require some modifications in order to make a complete and effective interfacing.

EML 200 STUDIO SYNTHESIZER as the SOURCE and MODIFIER SECTION for the EML 400 SERIES SEQUENCER.



KEYBOARD CONTROL OF VCO1 & VCO2.
Adjust the frequency controls of the 200's oscillators so that the oscillators just "tick" at a rate of 1 per second or less.
The Swing control is used for octavation.

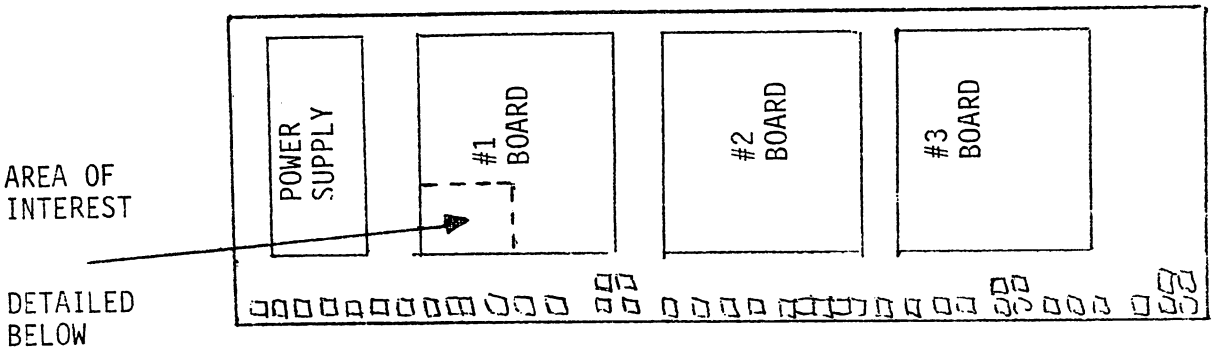
100/101 MODIFICATION FOR SEQUENCER OWNERS

This modification permits Oscillator 3 and Oscillator 4 to be controlled from the Sequencer.

1. Remove the 4 or 5 allen screws located around the periphery of the synthesizer's panel.

2. While facing the 100/101 lift the right side of panel out first (the OUTPUT MIXER side). Slide the panel to the right and out.

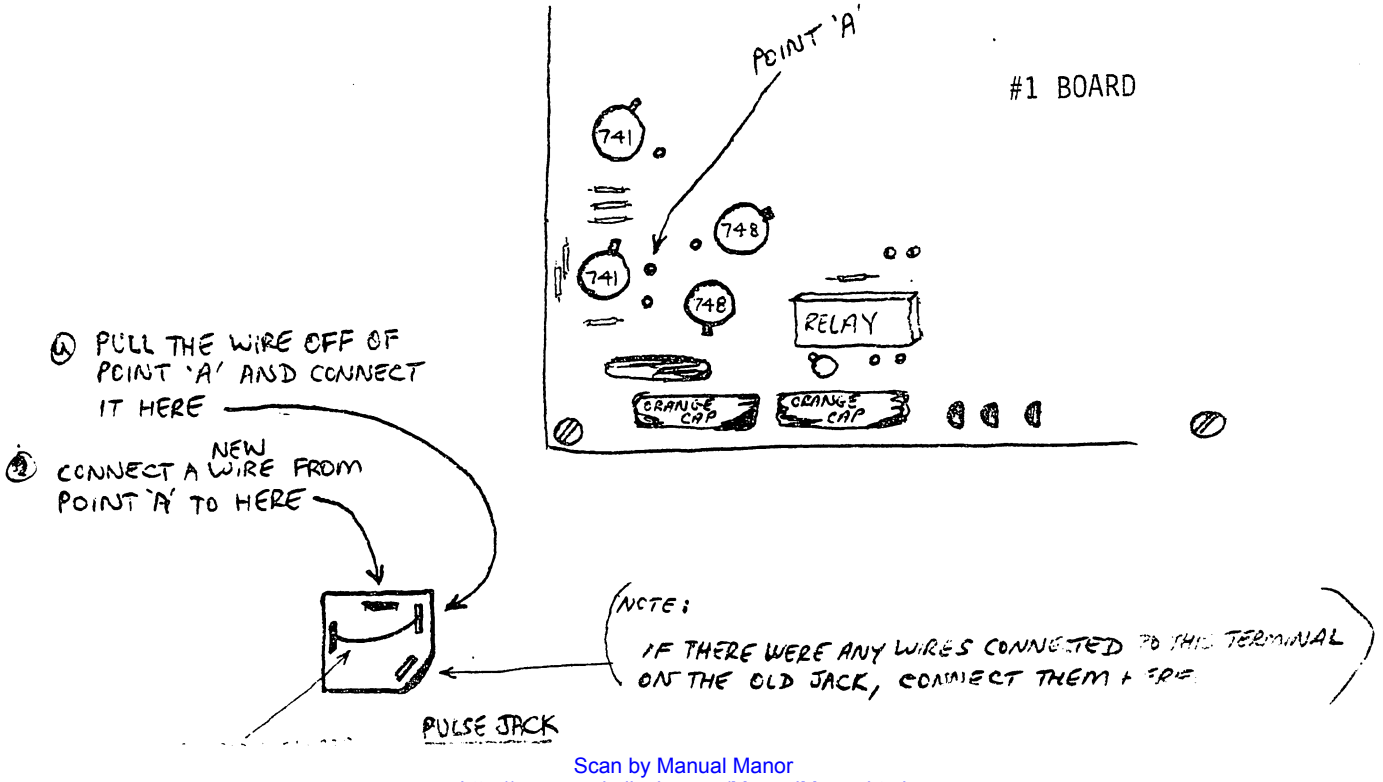
3. Set the panel on a firm surface on its control knobs. Locate board #1 (see below).



For 100's and 101's before serial number 410:

4. Locate the KB2 jack, CM# jack on 101's. Disconnect the colored wire from the jack and tape the end so it won't short. This wire will <u>not</u> be connected to anything.

5. Replace the KB2 jack, CM# jack on 101's, with the pulse type jack supplied Mount it so that the slanted corner faces the same direction as the other jack Wire as shown:

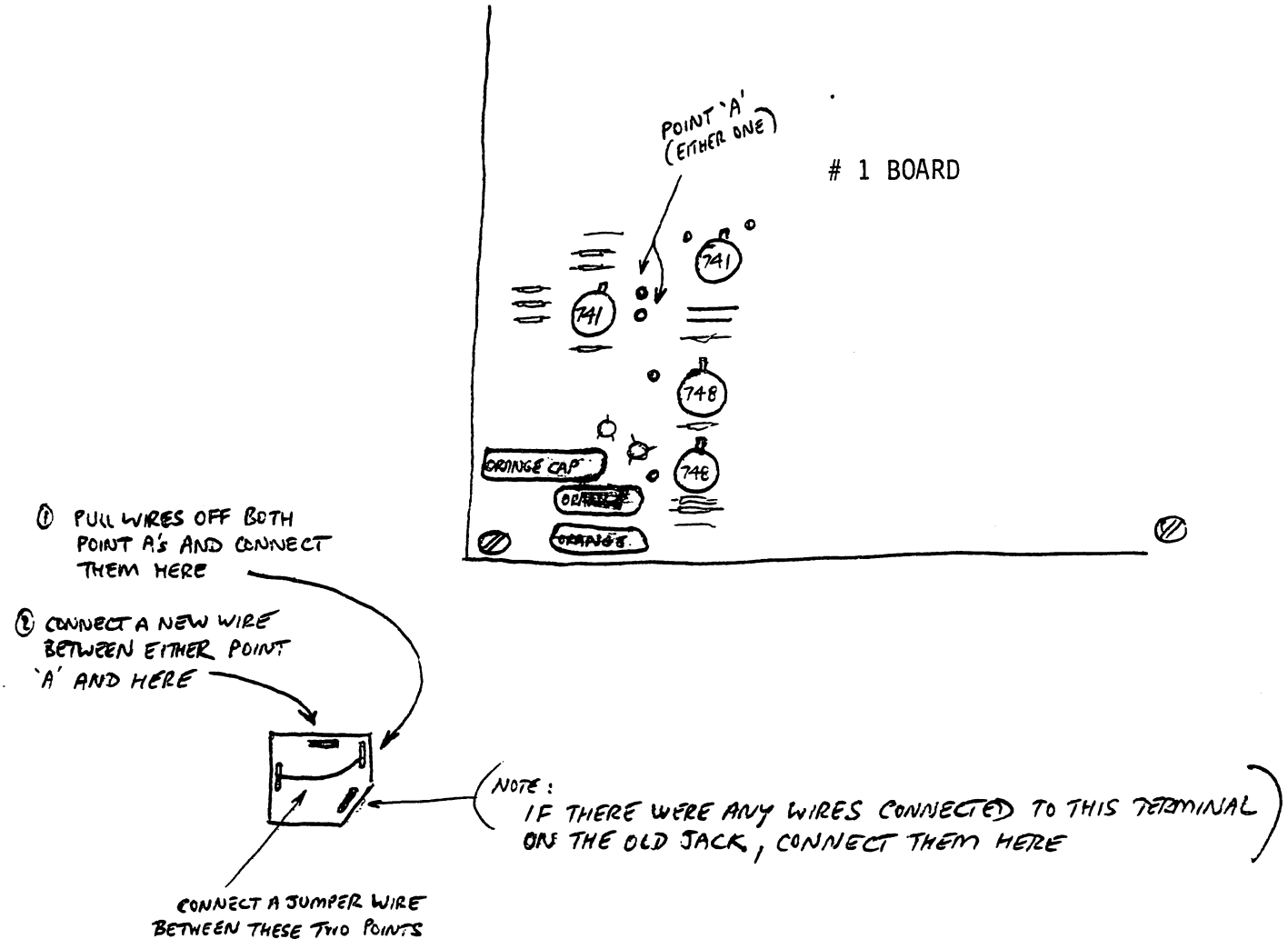


For 101's from serial number 410 to number 646.

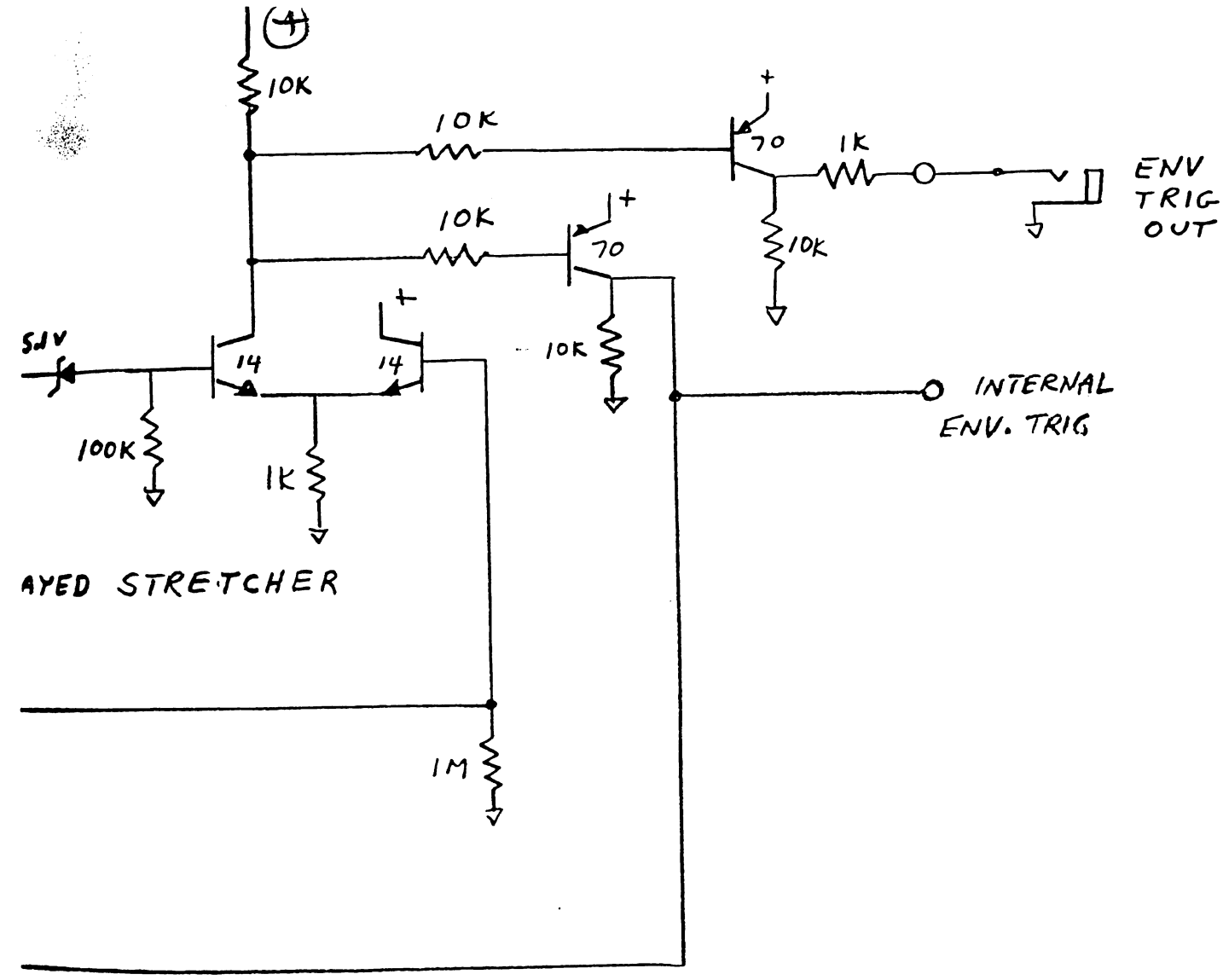
4. (same as previous page)

5. (same as previous page)

Wire as shown:



If this procedure generates any questions, please don't hesitate to call or write before proceeding.

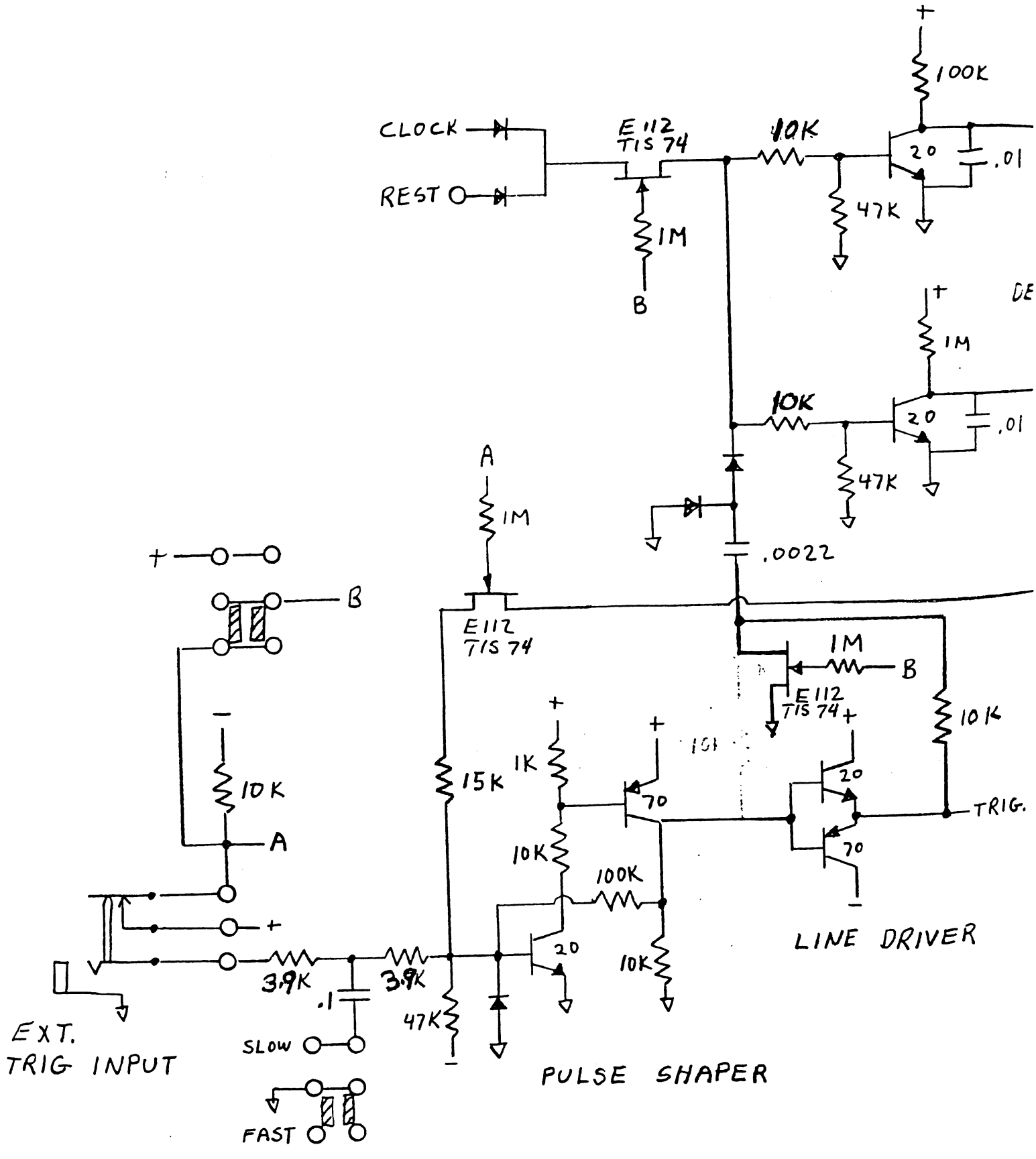


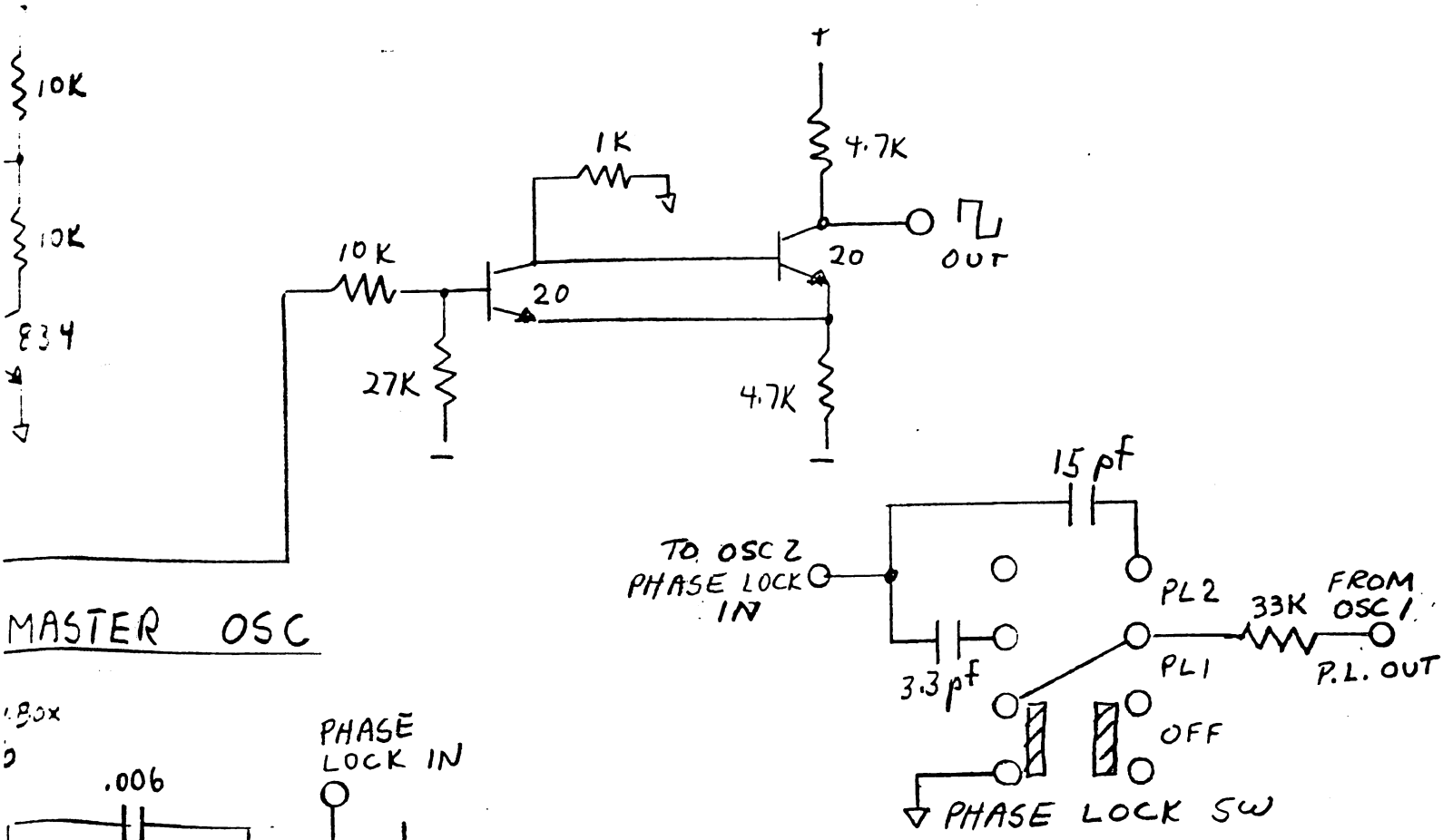
TRIGGER CIRCUITS

INE

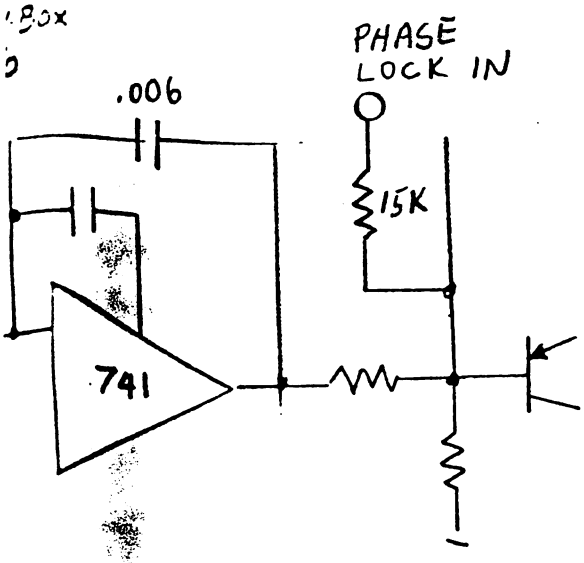
ELECTRONIC MUSIC LABS, INC
SEQUENCER

5-16-74 JJM
REV 4-14-77 KK





MASTER OSC

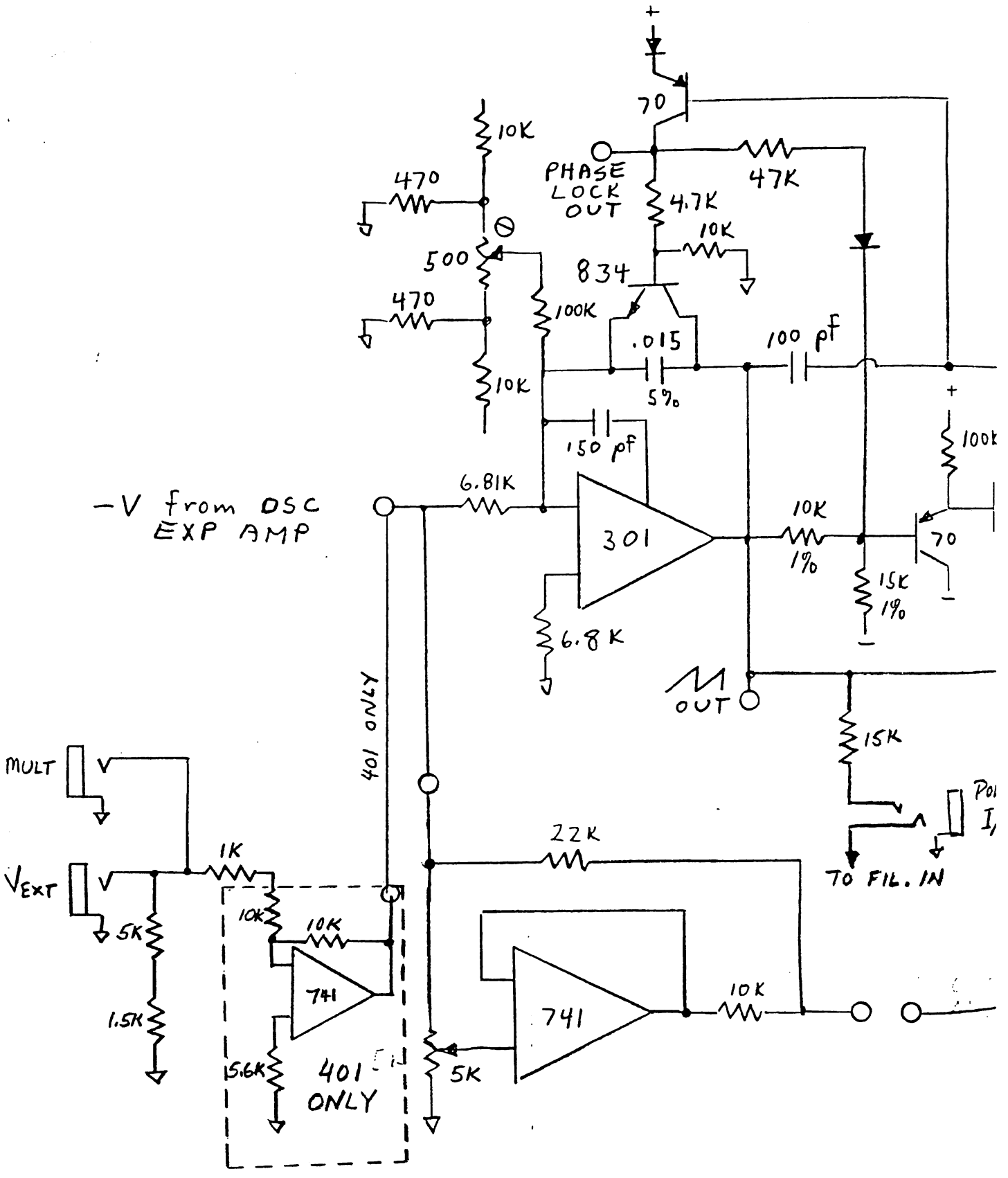


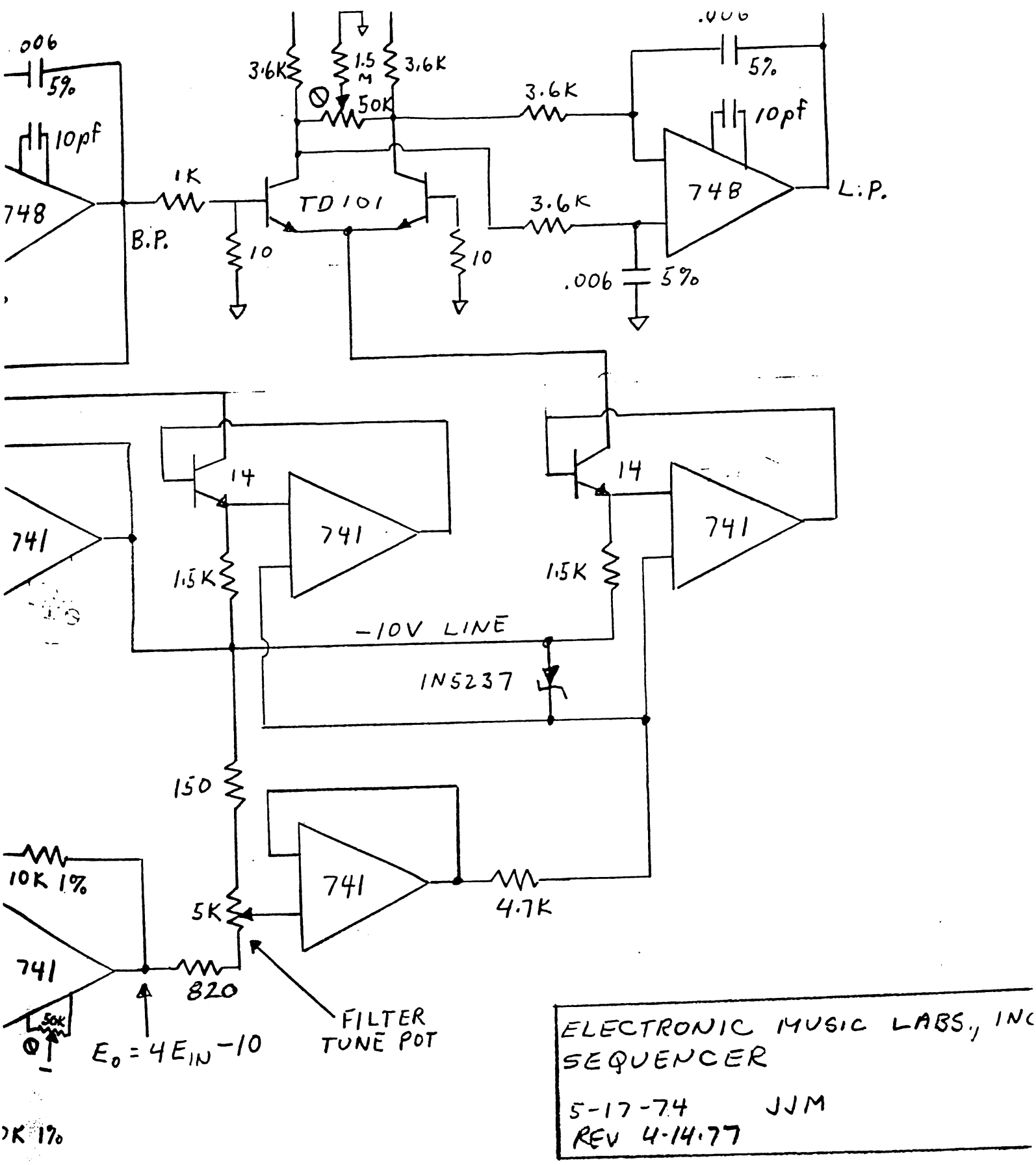
SLAVE OSC.

SAME AS MASTER OSC

ELECTRONIC MUSIC LABS,
SEQUENCER

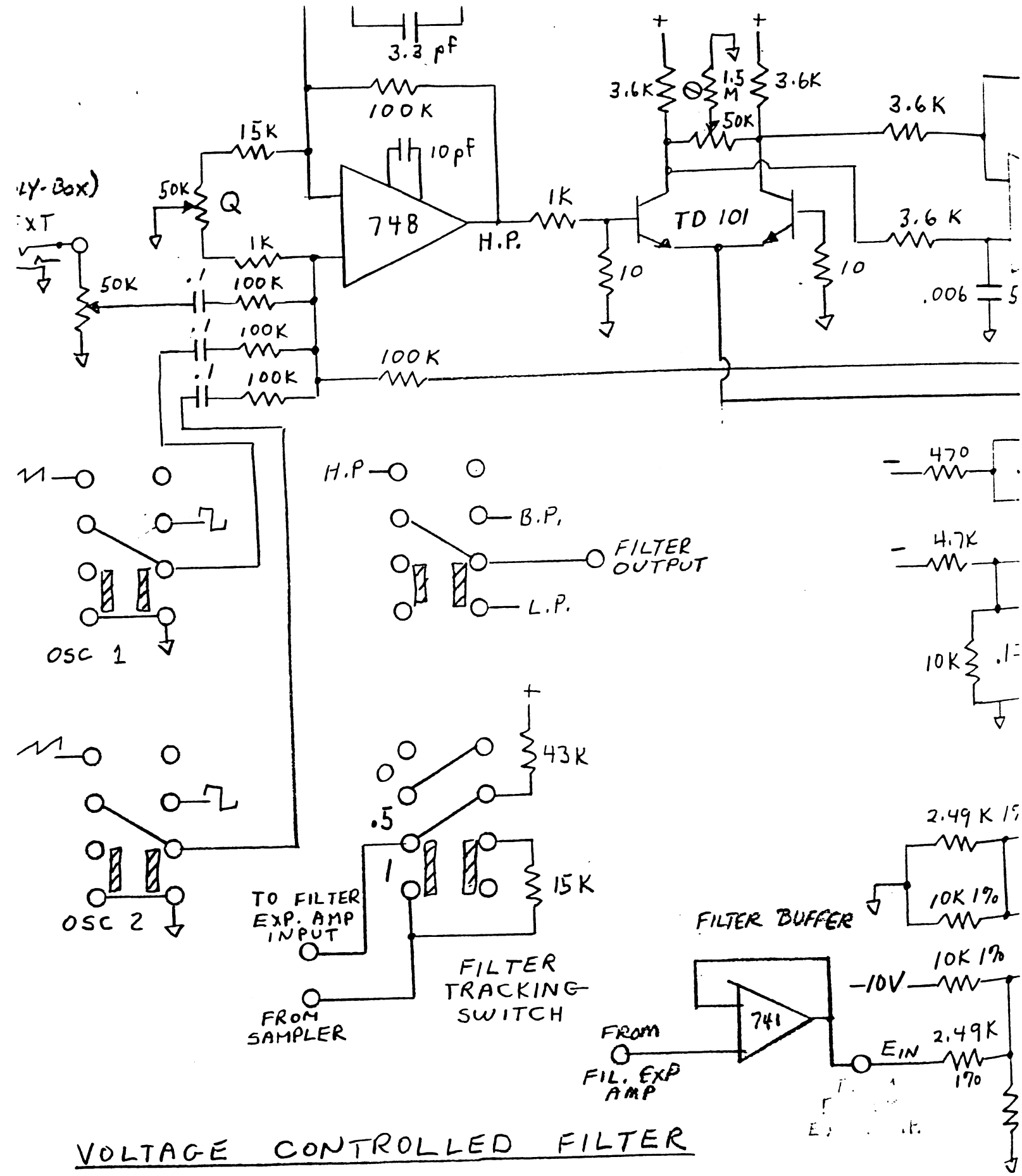
5-20-74 JJM
REV 4-14-77 KK



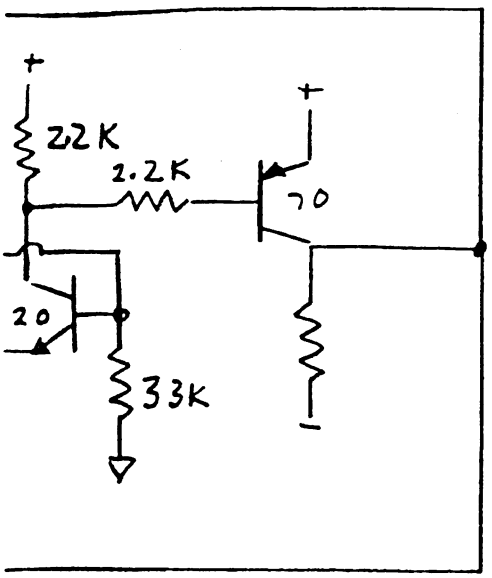


ELECTRONIC MUSIC LABS., INC
SEQUENCER

5-17-74 JJM
REV 4-14-77

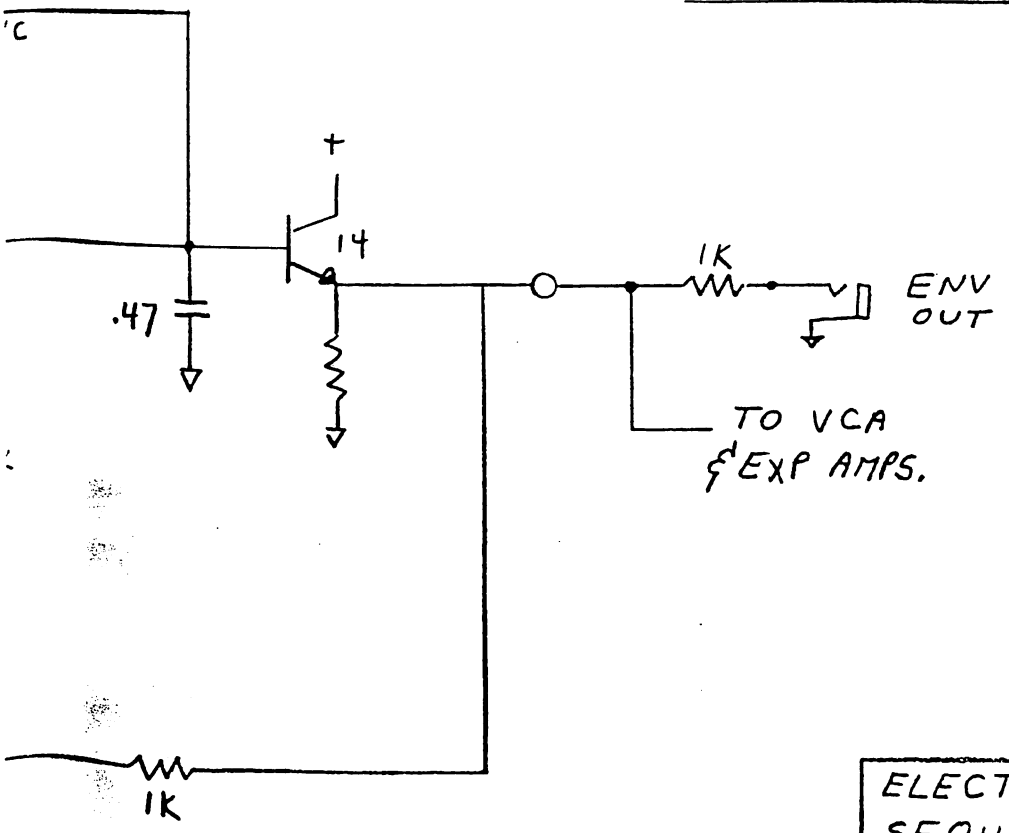


VOLTAGE CONTROLLED FILTER



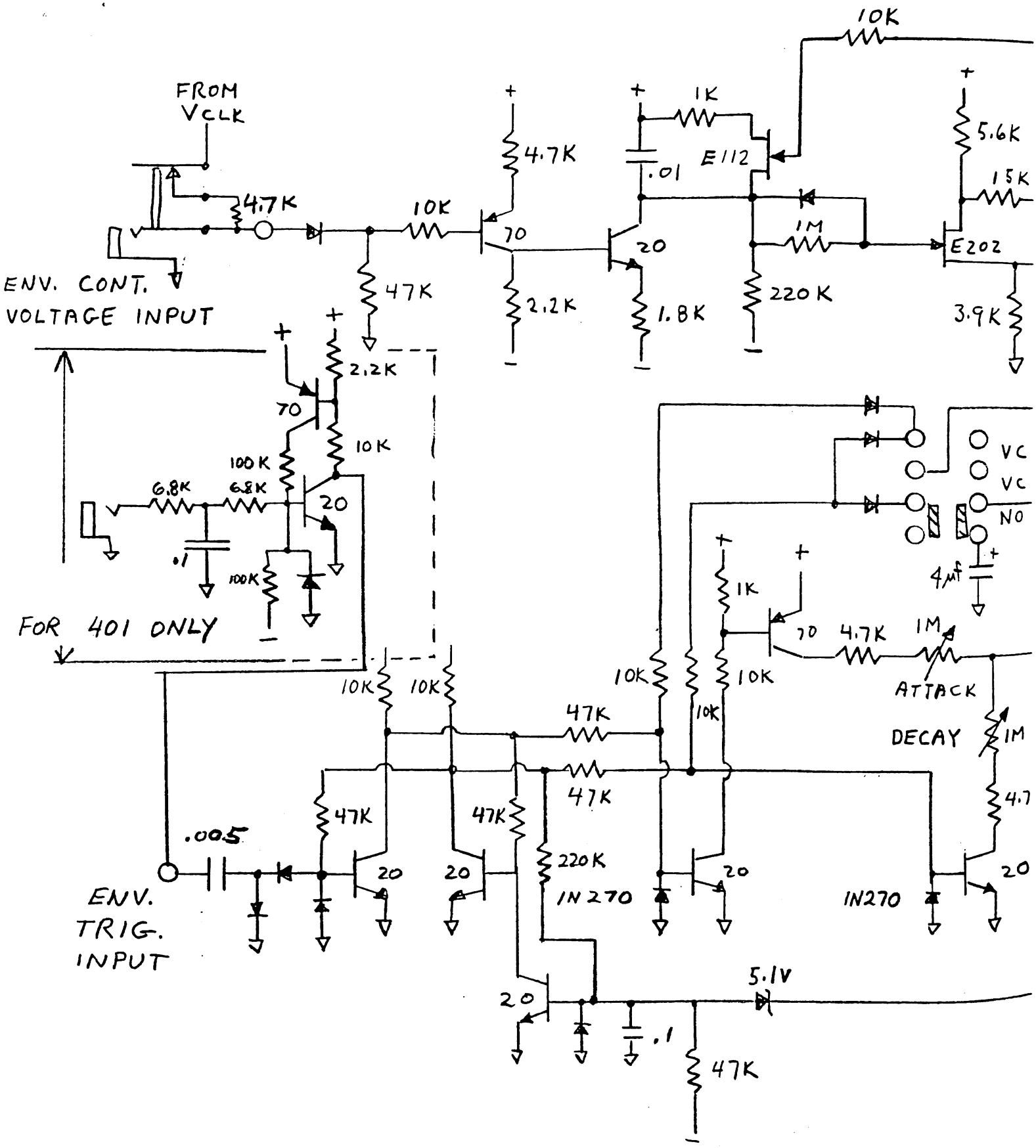
ξD

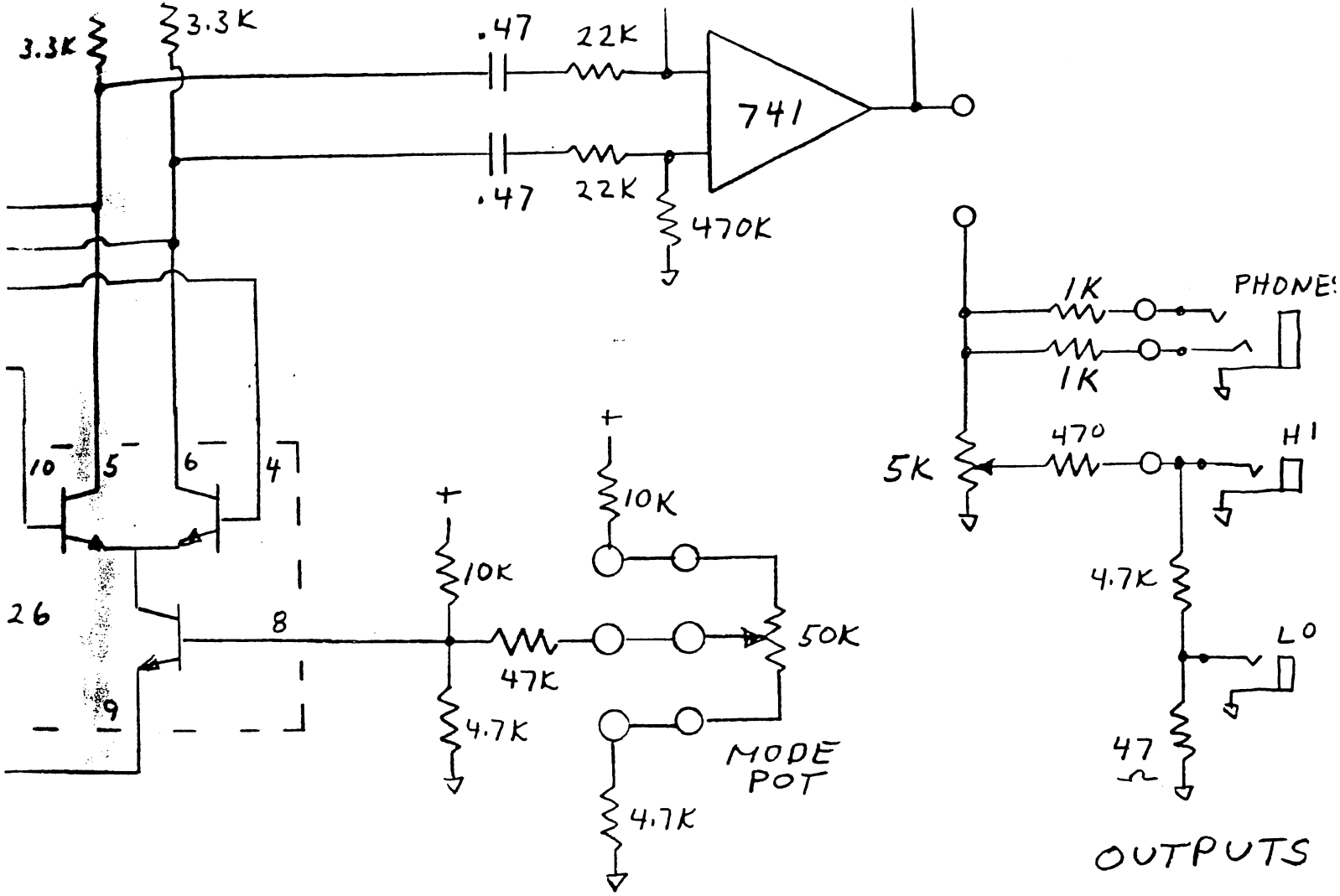
VOLTAGE CONTROLLED ENVELOPE



ELECTRONIC MUSIC LABS., INC.
SEQUENCER

5-20-74
REV 4-14-77 KK

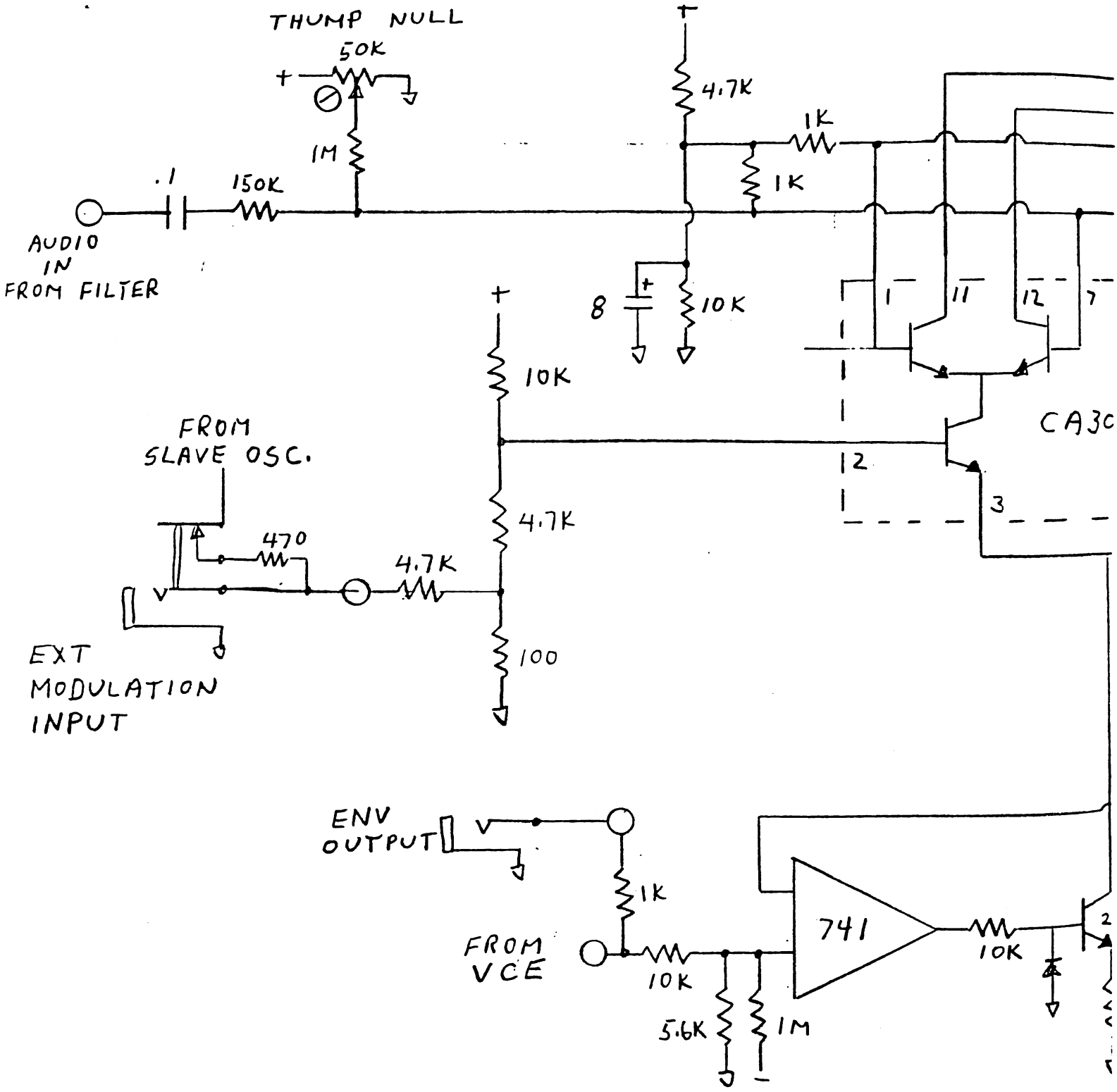


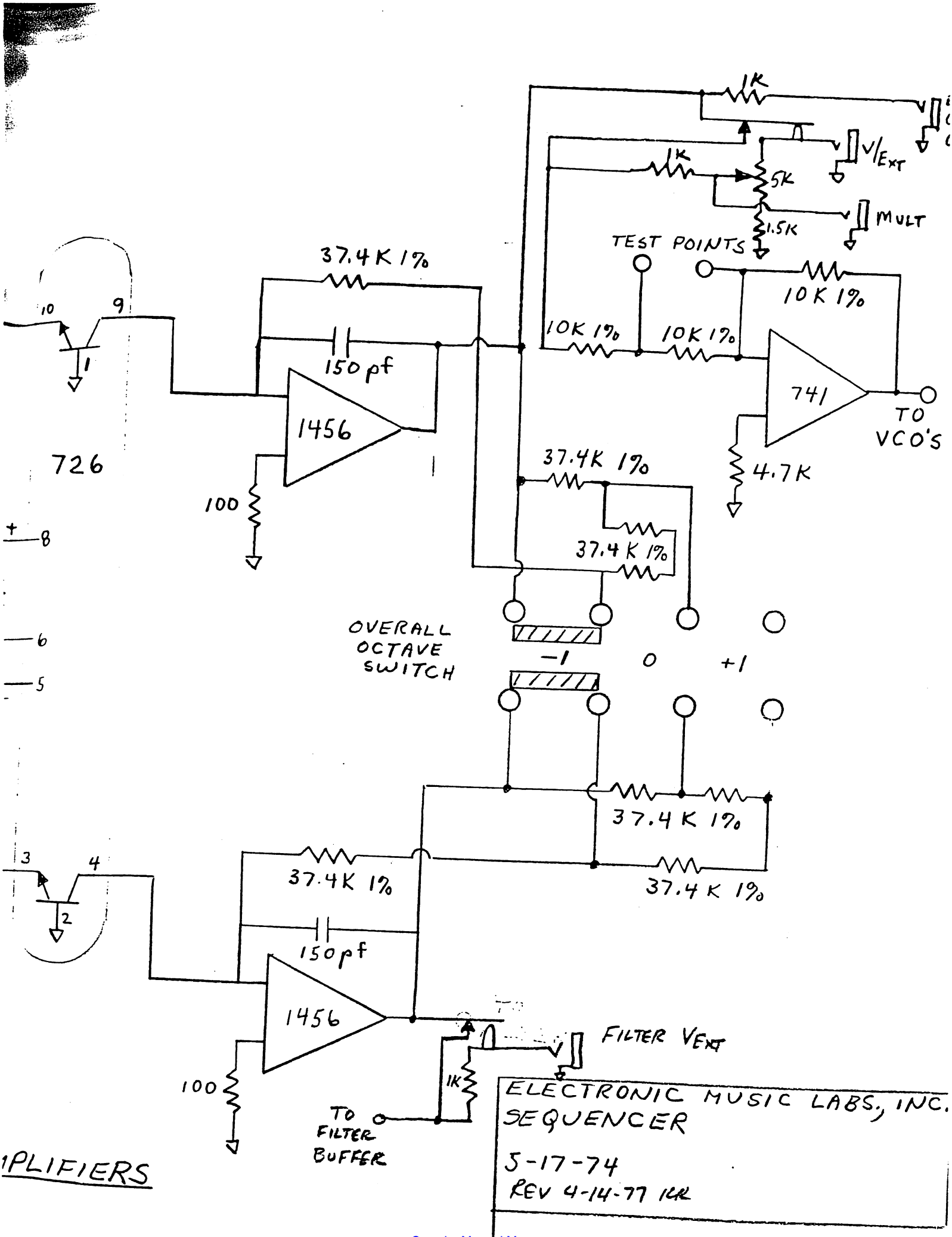


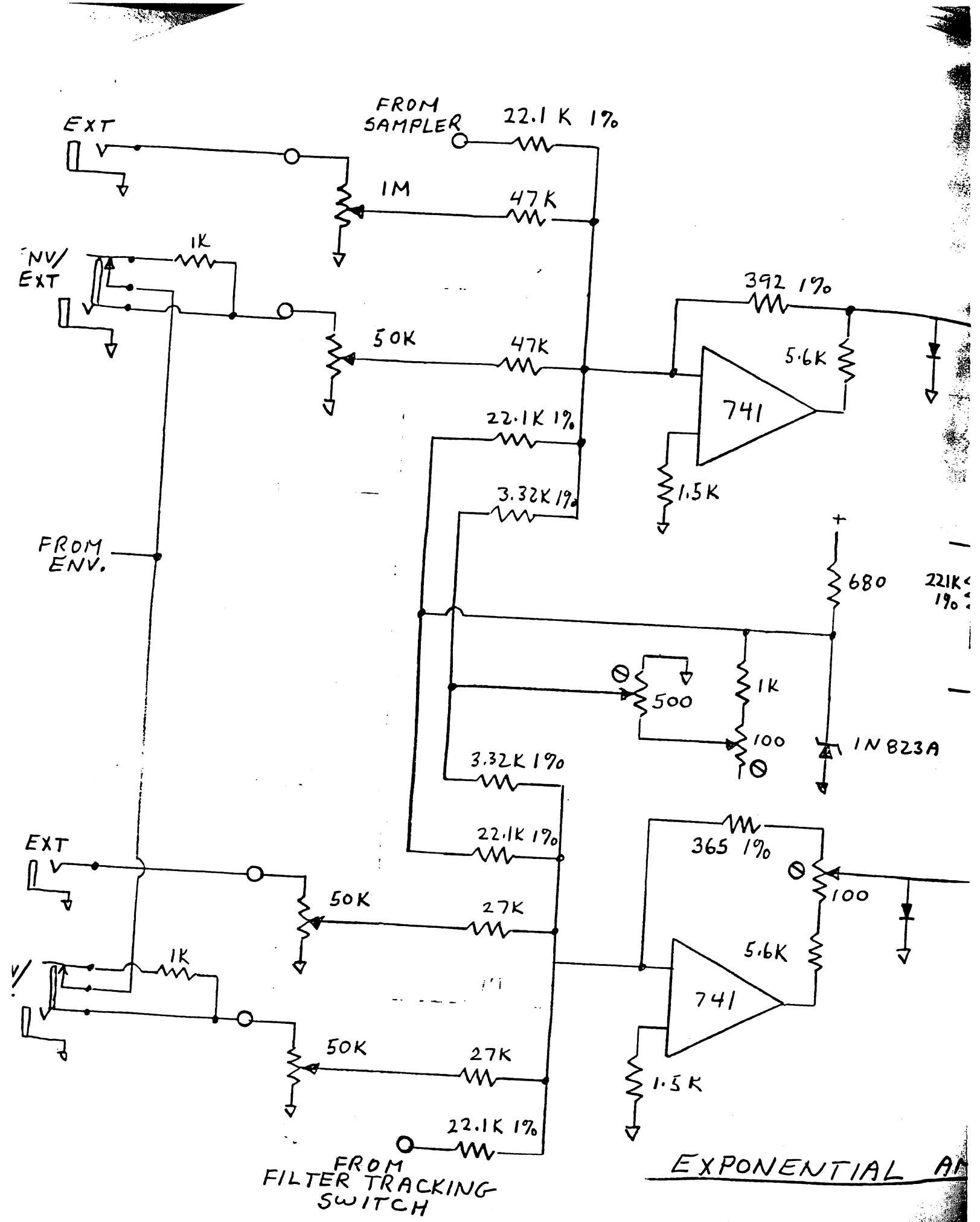
VCA

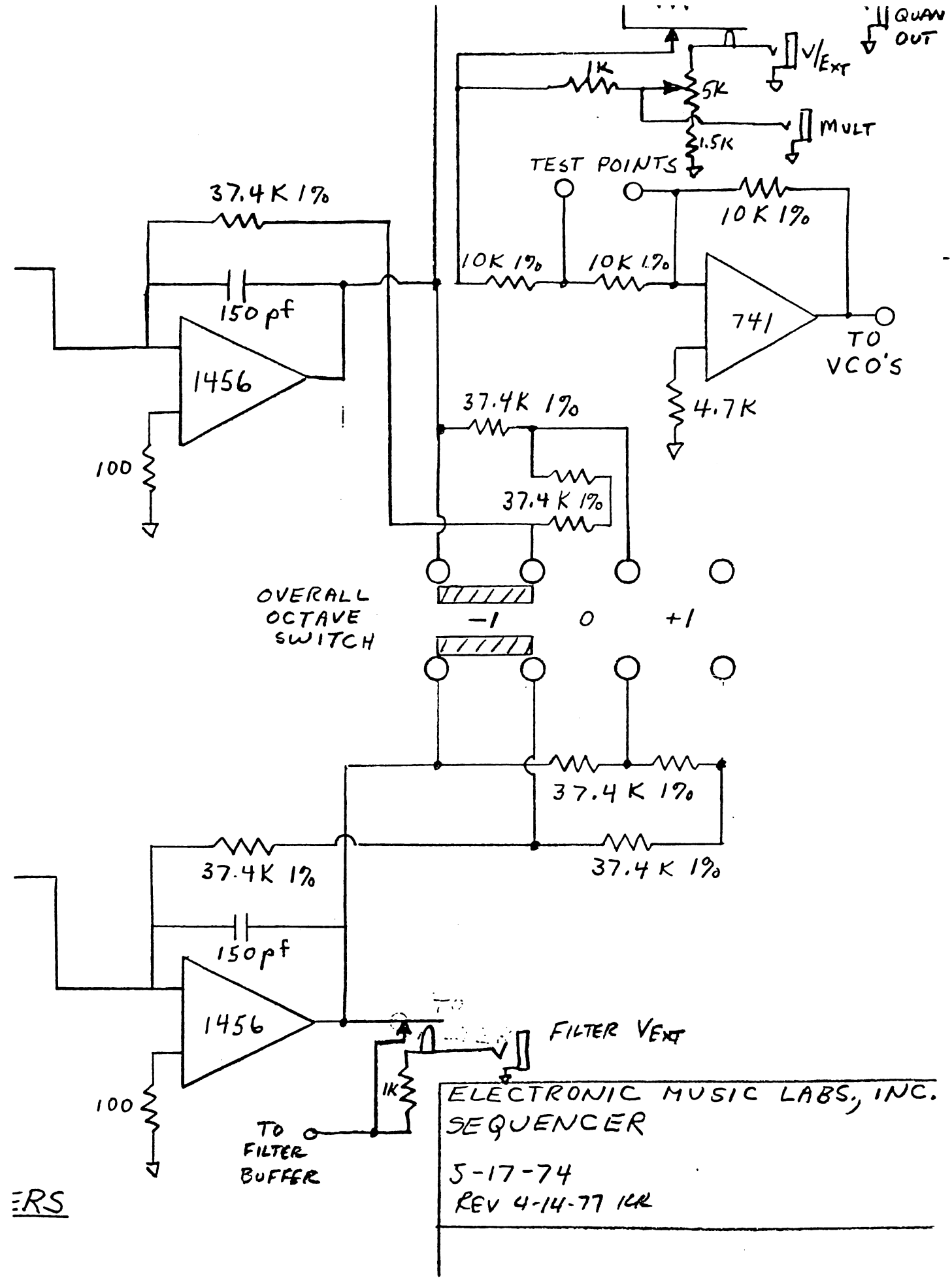
.10K

ELECTRONIC MUSIC LABS., INC SEQUENCER 5-20-74 REV 4-14-77 MC









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