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NEW PATTERN GENERATOR MK II

NOTE: THIS OUTLINE DONE AT THE BEGINNING. NOT ALL MODULES WERE BUILT, AND DESCRIPTIONS ARE NOT 100% CORRECT. — Bill Hearn 4/18/92

MODULES:

I. SEQUENCED VOLTAGE SOURCE.

A module to be used in multiples; at least 4 required; (6 USED HERE)

This module is triggered "on" either by an external logic edge or level. it remains "on" either as long as the external level lasts, or for SEQUENCER until its internal timing 1-shot stays on. when it is "on", it puts out 10 individually set voltages between +10 and -10 Volts. It also puts out a 20 μsec timing pulse when it turns on, a 20 μsec pulse when it turns off, and a logic level, indicating it is "on".

SEE INSTRUCTIONS ON PATCHING FOR SEQUENCER OPERATION ON PAGE OPPOSITE THE SCHEMATIC (P. 143, INSIDE)

The 10 Analog outputs are arranged to present a very high source impedance when "off" so that they may be "wire OR" connected with other modules.

The analog outputs may be selected by a switch at each output so that when the module is "on" the output may be either the internally set voltage, or an externally applied voltage or signal.

2. Voltage controlled Function generator. (6 required)

A function generator putting out sine, square, triangle, ramp, and pulse waveforms. Output frequency is proportional to analog input voltage 10Hz to 10KHz. The waveform may be started at any phase by applying a timing pulse: at the time the oscillator receives the timing pulse, it sets the phase of its waveform according to the voltage present at another analog input.

11. Fixed filter bank divides musical spectrum into 8 bands, to use in vocoder. Provide two 4-input mixers for comb filter patching.

12. Digitally controlled Adder/Subtractor.

Two Analogue Inputs, A + B. four logic inputs corresponding to A+B, A-B, -A+B, -A-B, one Analogue output. The sum or difference of the two Analogue voltages appears at the output.

3. Voltage controlled Amplifier.

Gain is controlled by an external analog voltage; 5 volts in corresponds to a gain of exactly 1. Maximum gain is ≈6 db at 10 volts in. ~~gain is zero for inputs of less than 100 millivolts.~~

4. Voltage controlled phase shifter;

The 90° phase shift frequency is directly proportional to an analog input level. (10hz to 10khz)

5. FOUR QUADRANT MULTIPLIER.

$e_{out} = e_1 \cdot e_2$ or $\frac{e_1 \cdot e_2}{5}$, switched.

6. Voltage controlled MIXER.

To be used as output mixer for X & Y. has 24 signal inputs and 24 control inputs. Gain on each input is 1 for a control input of 5 volts.

7. Output circuits;

provides for image rotation vertical and horizontal movement by means of joysticks and control voltages, Color & pixe modulation

8. voltage controlled linear envelope generator (with lamp indicators)

Rise time, Duration, and Fall time are directly proportional to analog input voltages. A sequence is initiated by trigger pulse. Output level is +5V. As with all control voltage sources, the output may be wire or

9. Variable trigger delay

Delay trigger pulse an amount proportional to an input control voltage.

ENVELOPE FOLLOWER provides detection of envelopes of musical or other waveforms. ~~Has voltage controlled~~ internally adjustable gain.

General Rules - MK II pattern generator.

1. All logic levels are active in the 0V level; that is, negative logic is used when patching between modules: This is so that all logic connections may be Wire-or connected.

The standard logic is current sink DTL; ← * NOTE
all outputs are either resistive pullup or bare collector.

2. Analog outputs in the sequencer operate similarly to wire-or logic, as explained in previous page.

Banana Jacks are color coded as follows.

Red Analog output
Blue Analog input.
Black Digital Input
White Digital output.

3. Clock pulses are 50 microseconds long, ±20% always generated by

.01
.0068

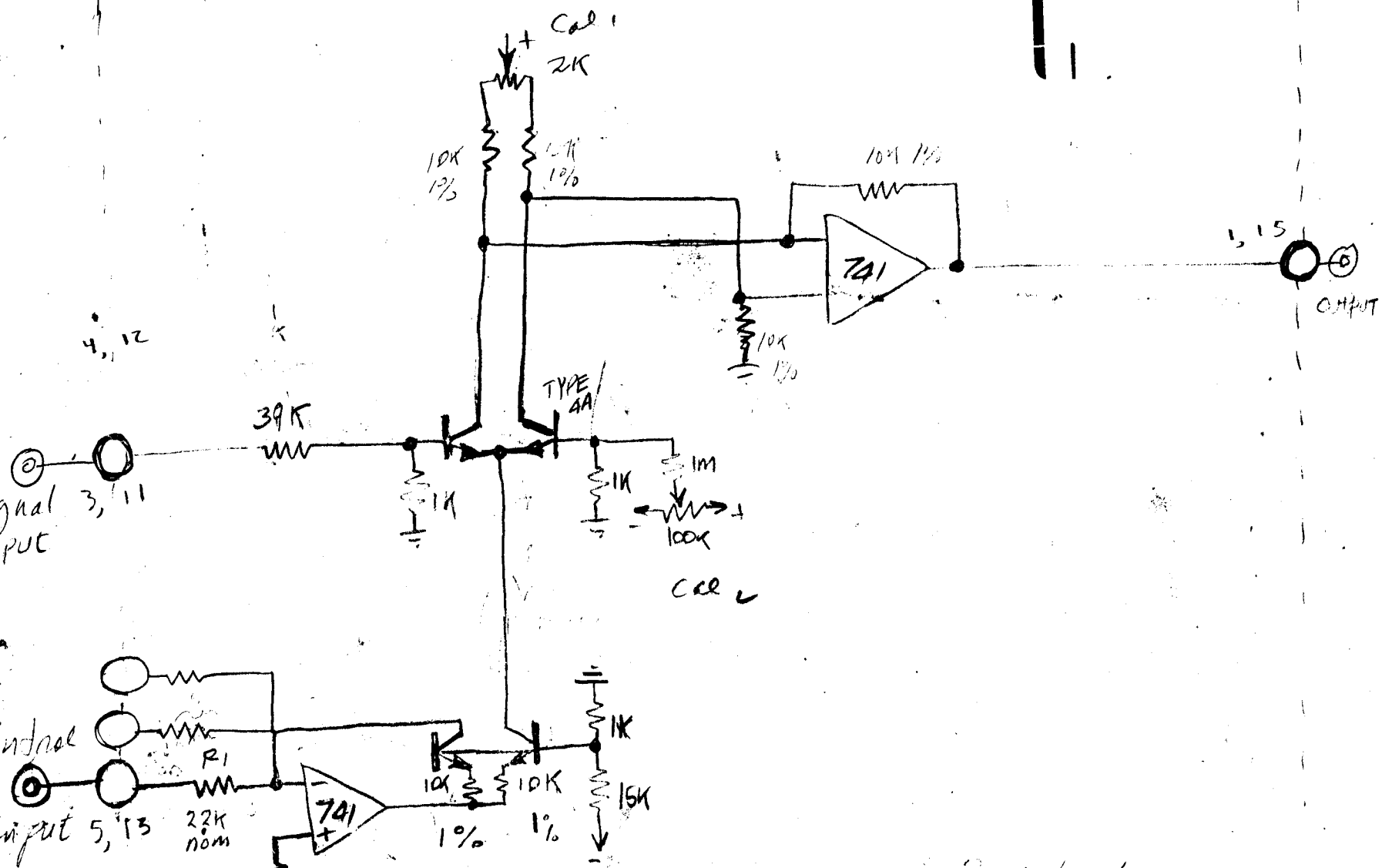
MODULES (cont.)

CVM/VCM

Voltage controlled mixer. An intermediate voltage controlled mixer with wide dynamic range on each input, 4 ch. in, 2 pos, 2 inv, 2 ch. per channel.

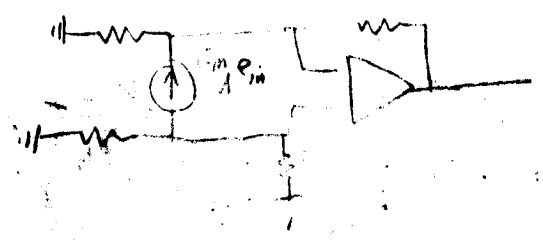
Variable Voltage Source.

VOLTAGE CONTROLLED AMPLIFIER, DC coupled.



NOTES:

R1 selected and trimmed for unity gain at +5V in.



Calculations for VCA: $\frac{1}{G_{md}}$ = intrinsic emitter to emitter resistance; $\frac{1}{G_{md}} = \frac{.104}{I}$

where I = Other current source current

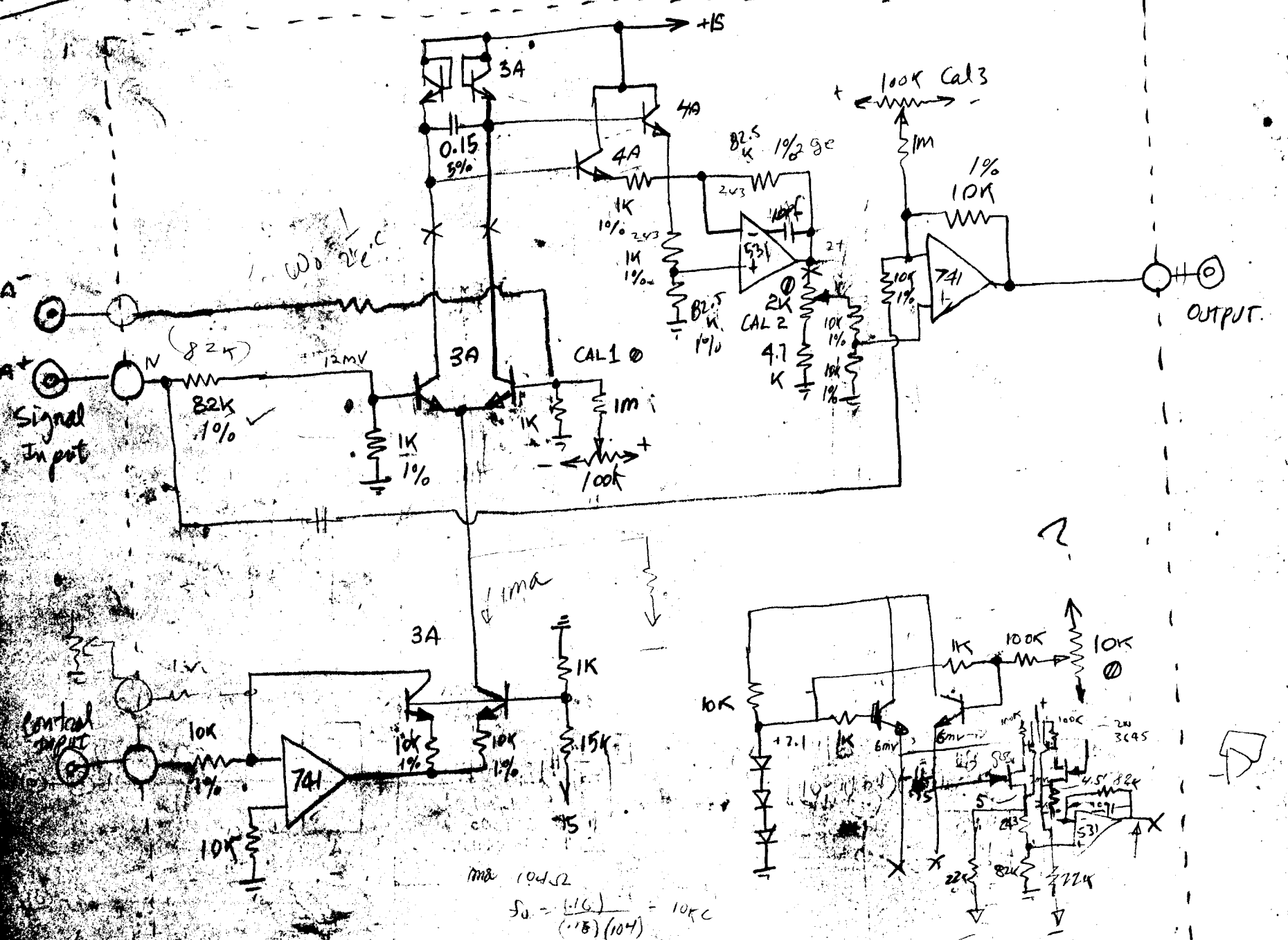
NOTES: Cal 1 zeros output with control input = 0

Cal 2 zeros output with control input = +5V. (0 = input)

MK II pattern generator.

VOLTAGE CONTROLLED PHASE SHIFTER.

Jan



$$\text{ma } 10\text{K}\Omega \qquad f_0 = \frac{1/6}{(.18)(10^{-4})} = 10\text{KC}$$

$$\left(e_{in}\cdot\Phi - \tfrac{1}{2}e_{in}\right)x^2 = -e_{in} + 2e_{in}\cdot\Phi$$

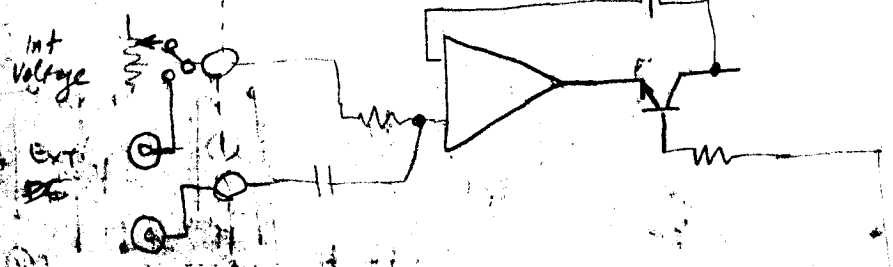
$$\frac{7\text{K}}{2\text{K}3}\,\frac{82}{}\,V = 2V$$

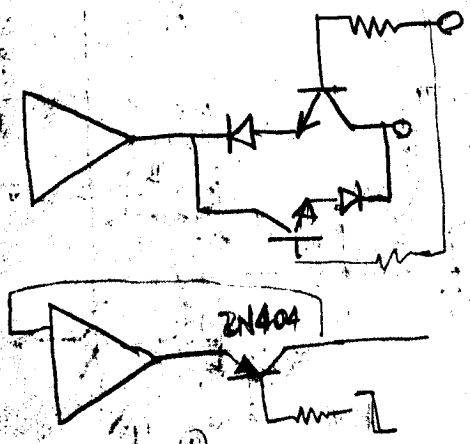
Calibration procedure: 1. Apply 10V sine wave to control Input, adjust cal 1 for signal Cancellation at output.

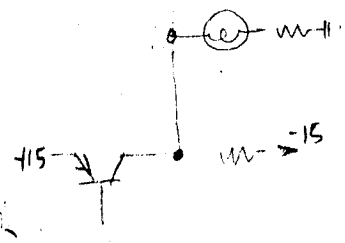
2. With +10V on control input, adjust level of 1 Khz input sinewave to give 1 volt out. With control input grounded, adjust cal 2 for 1 volt out.

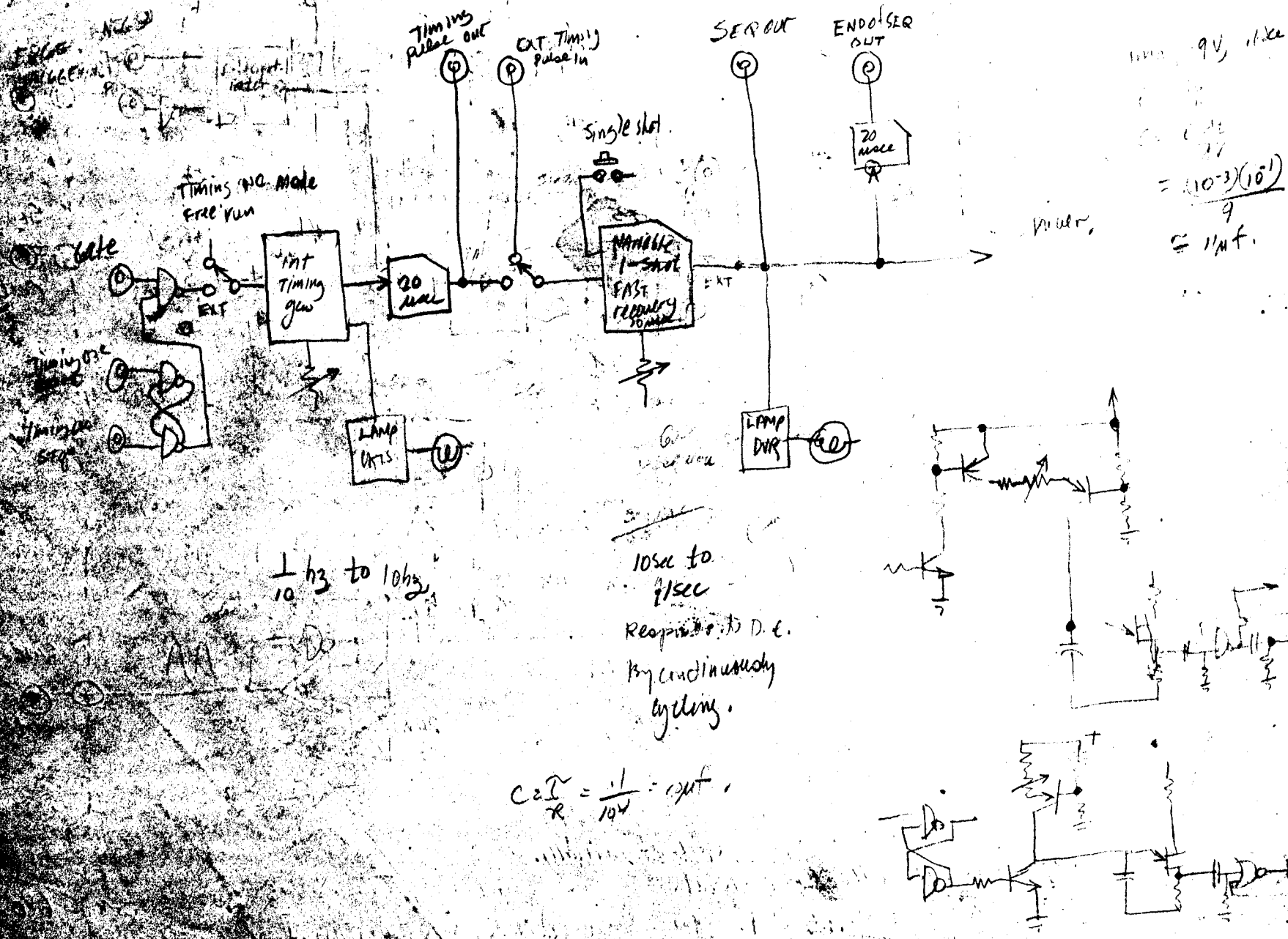
3. With +1V on control input, and with Signal Input grounded, adjust cal 3 for zero volts output.

Sequenced voltage source - Development.









W Theurer
Apr 18 92

SEQUENCER OPERATION:

TO Set Up a 6-Stage 10 output Sequencer, first make a Ring Counter by patching "EOS OUT" (next to red button) of ~~Module~~ each module to the "EXT TIMING PULSE IN" input of the Module below it (This Jack is not labeled, but it's to the right of the "Timing Source" Switch)

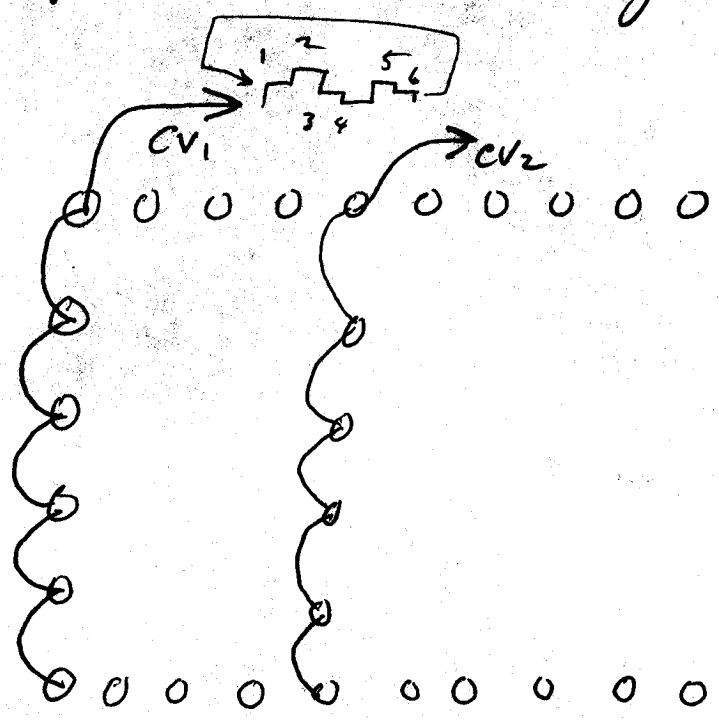
The EOS OUT pulse of the Lowest Stage goes back to The "EXT TIMING pulse IN" input of the top Stage. You Can now Start the Sequencer by pressing the top red button. ADJUST DURATION by "DURATION" control of each section.

NOW, Analog Voltages will appear at the red jacks on the right of the panel.

You Can "WIRE OR" These Voltages by connecting them in parallel. IN THIS Case, the Voltages put out will come from the Row of Knobs whose "GATE" Light is on.

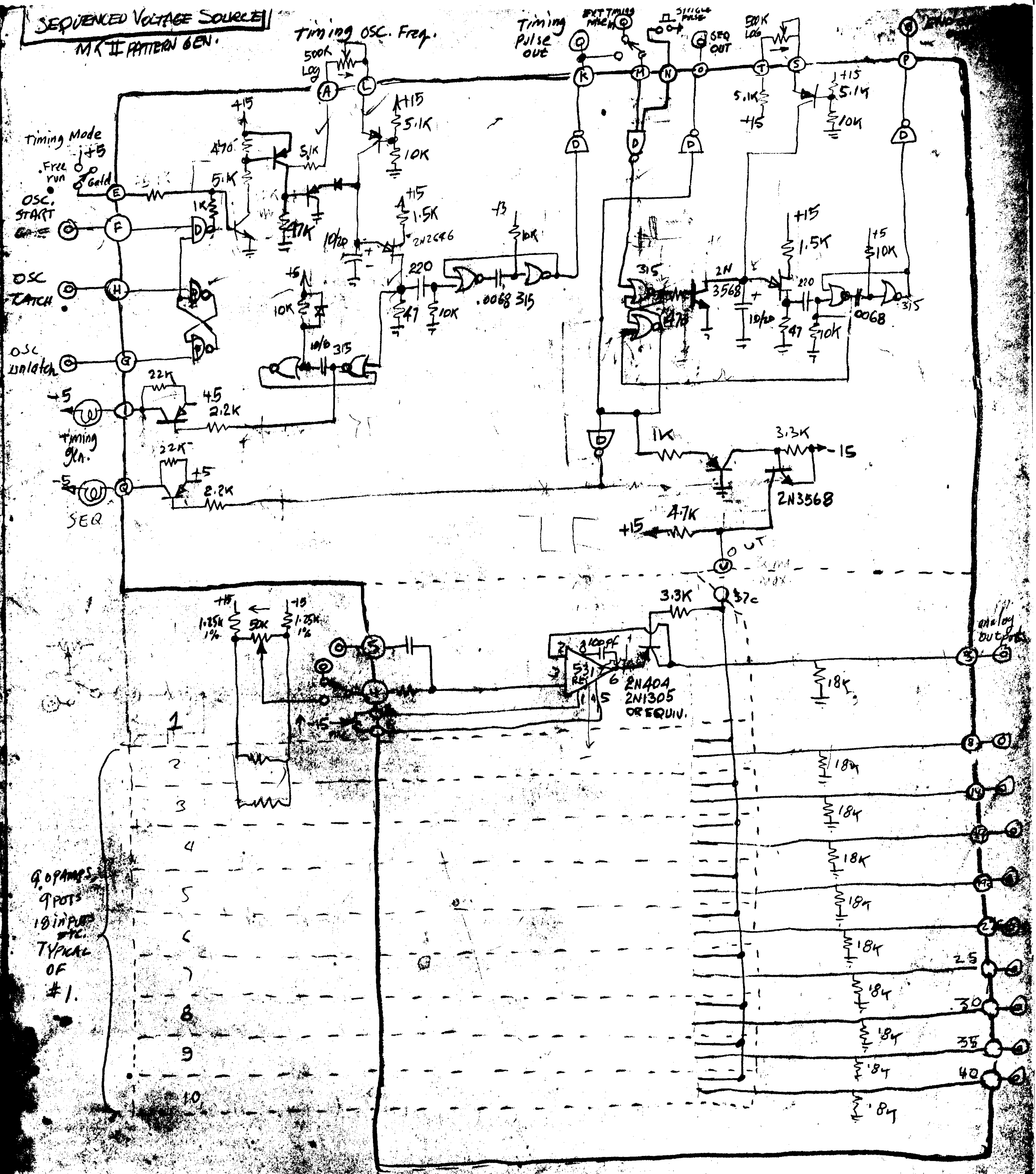
Example:

You will need 50 each 4" molded, stacking banana Cords to get 10 sequenced Voltages, 6 ~~Stations~~ States.



SEQUENCED VOLTAGE SOURCE

MK II PATTERN GEN.

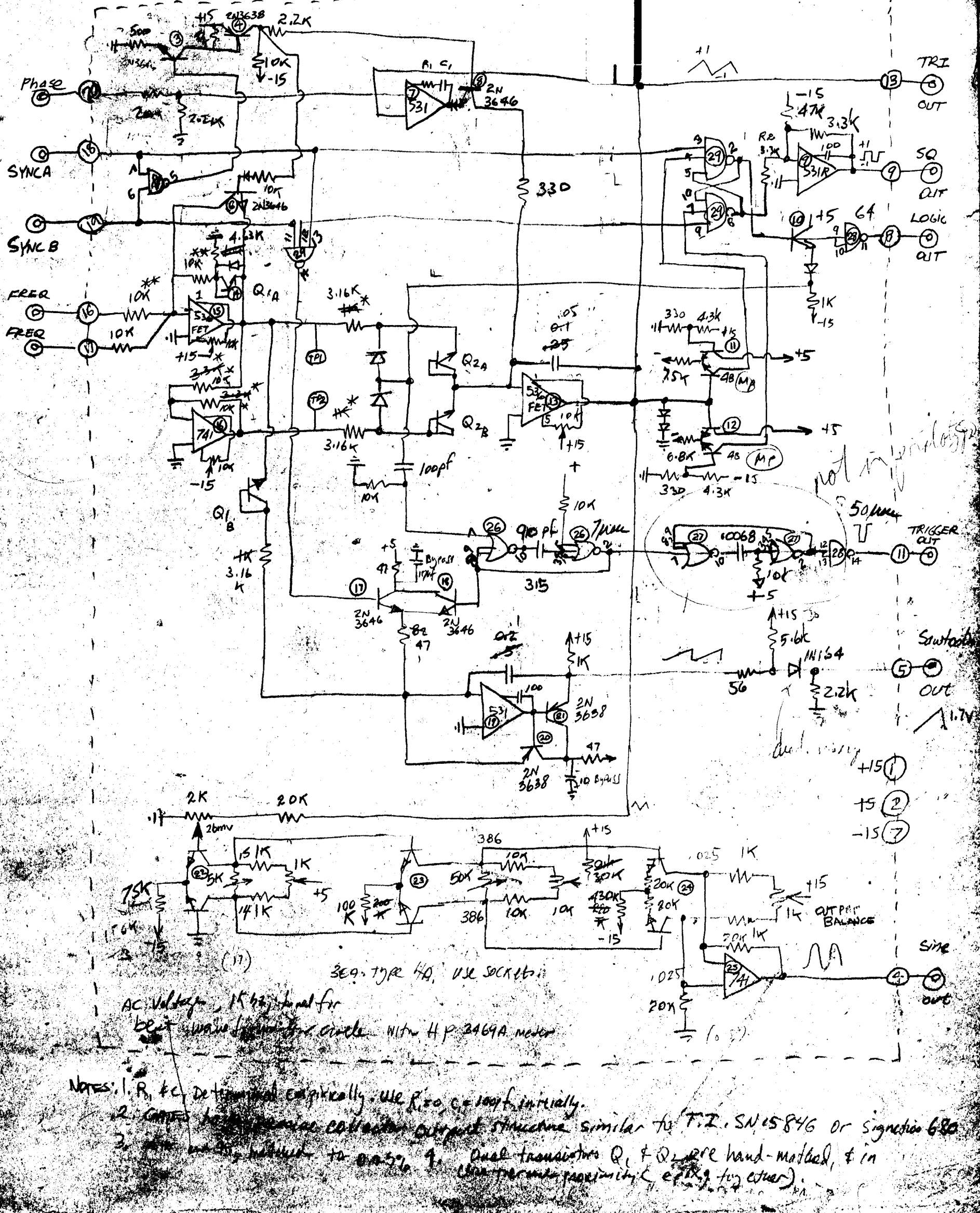


NOTES: 1. GATES MARKED "T" ~~are active output~~; GATES MARKED "D" Are passive output. Norgates Are 315; DTL GATES ARE 620 ~~TTL is 8880~~

2. TRANSISTORS ARE 2N3646 (2N708, 2N706, 2N914) and 2N3638 Unless noted.

VOLTAGE CONTROLLED FUNCTION GENERATOR FOR MARK II PATTERN GENERATOR.

NEW YEARS DAY 1971
Bill Hearn
Corrected Jan 18 1971

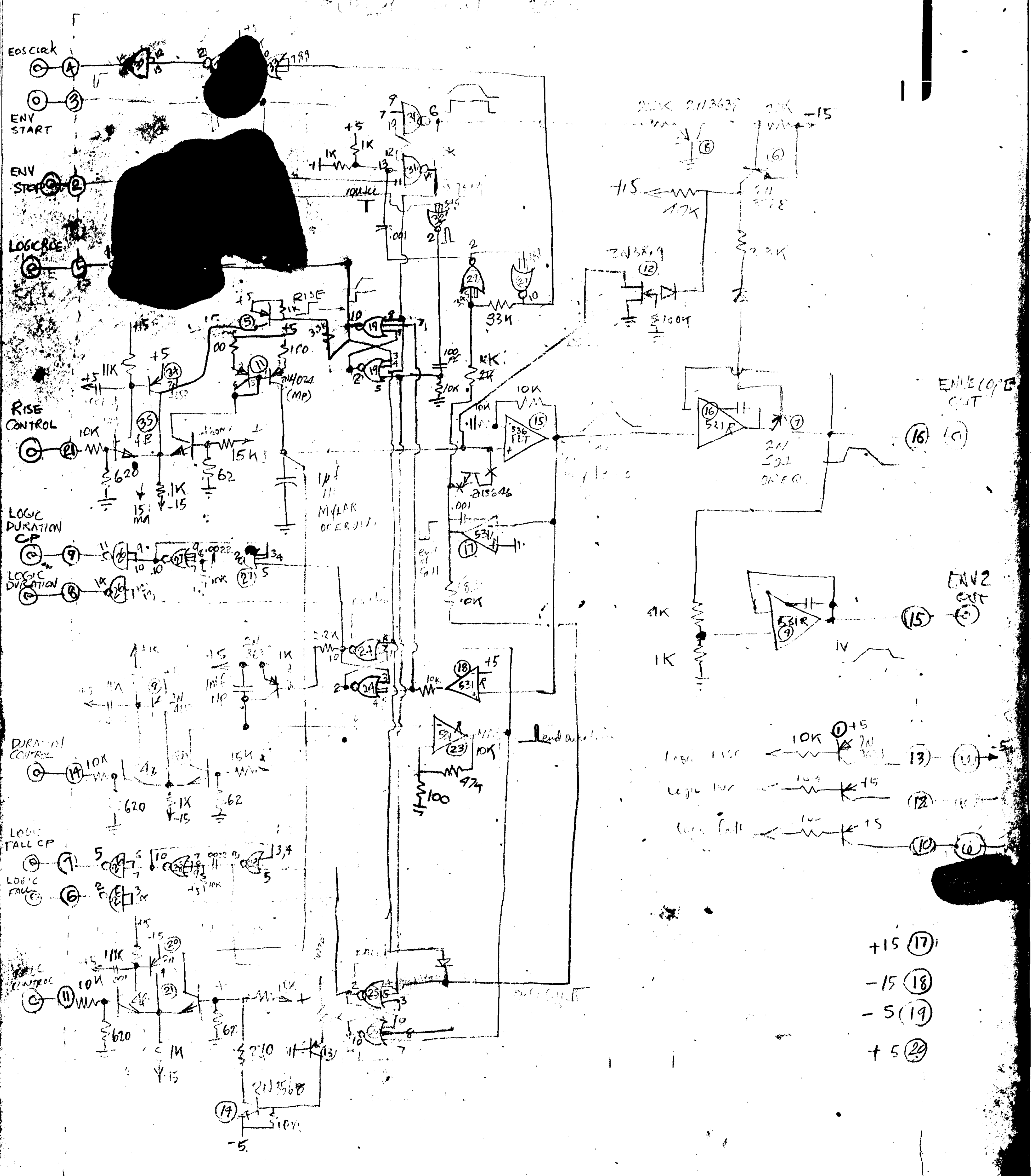


Seq. type HA, use sockets.

AC Voltage, 1 kHz, tuned for best waveform for circle with HP 3469A meter

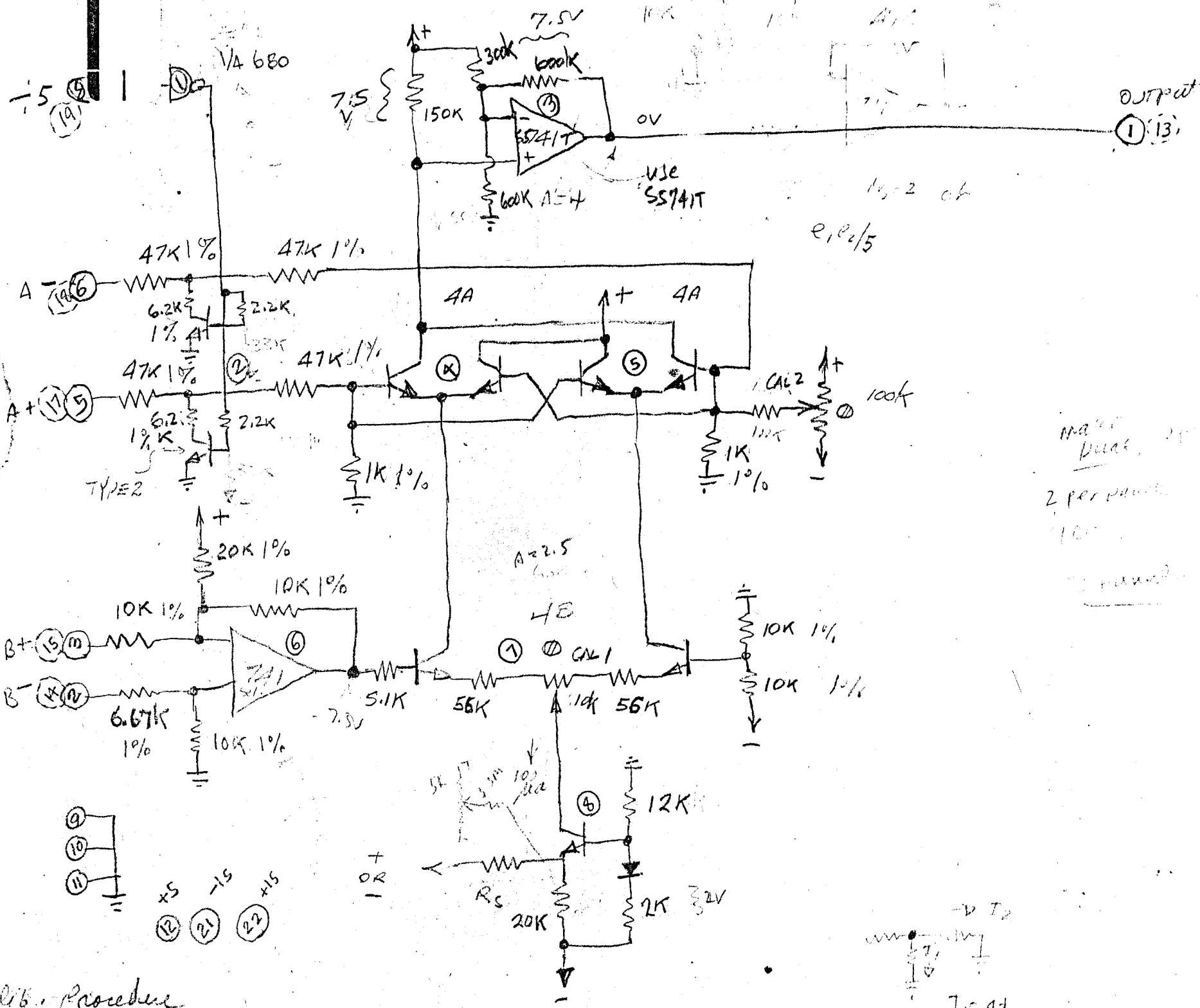
Notes: 1. R1 & C1 Determined empirically. Use R1=0, C1=100pf initially.
2. Comp's have open collector output structure similar to T.I. SN5846 or Signetics 680
3. [illegible] matched to 0.5%. 4. Dual transistors Q1 & Q2 are hand-matched, & in close thermal proximity (e.g. in the same can).

152 VOLTAGE [illegible] ENVELOPE [illegible]



Precision four Quadrant Multiplier.

#5 6-71 179



Calib. Procedure

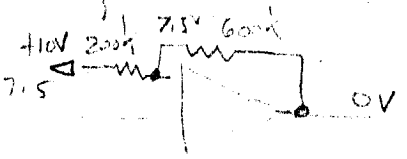
1. A = 1V 1Khz, B = 0V. Adjust CAL 1 for null
2. B = 1V 1Khz A = 0V Adjust CAL 2 for null
3. A = 0V; B = 0V; Adjust RS for zero output V.

$R_{11} = 150k$; $R_1 = 3R_2$, $\frac{R_2 \cdot 3R_2}{4R_2} = 150k$

$R_2 =$ [illegible] $= 200k$.

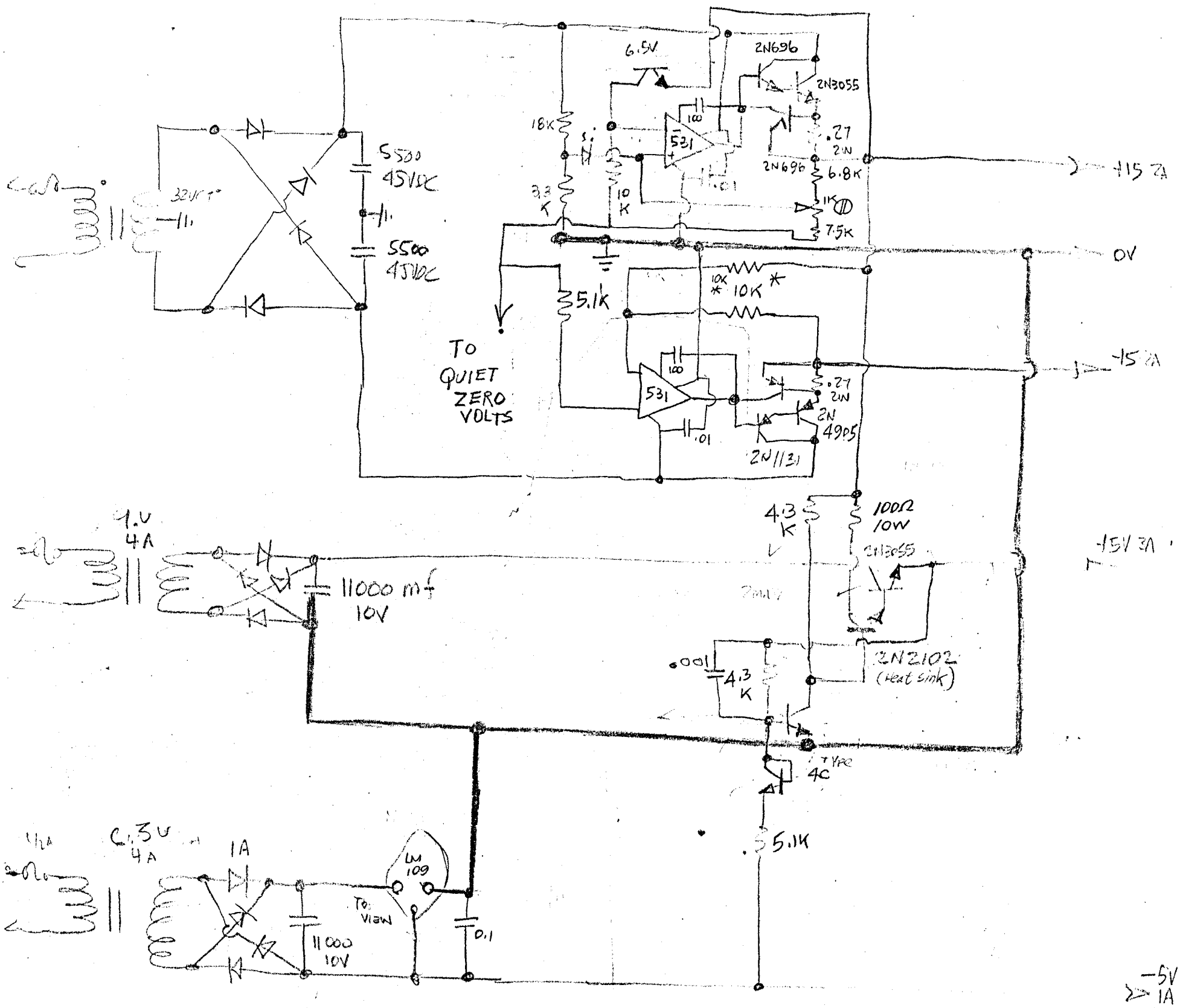
$R_1 = 600k$.

R_2 = thru opt. isol. & source R_1.



So $R_{eq} = 200k$; $E_{oc} = +10V$; $R_A = ?$ $R_{15} = ?$

REDESIGNED POWER SUPPLY FOR GRAPHIC SYNTHESIZER



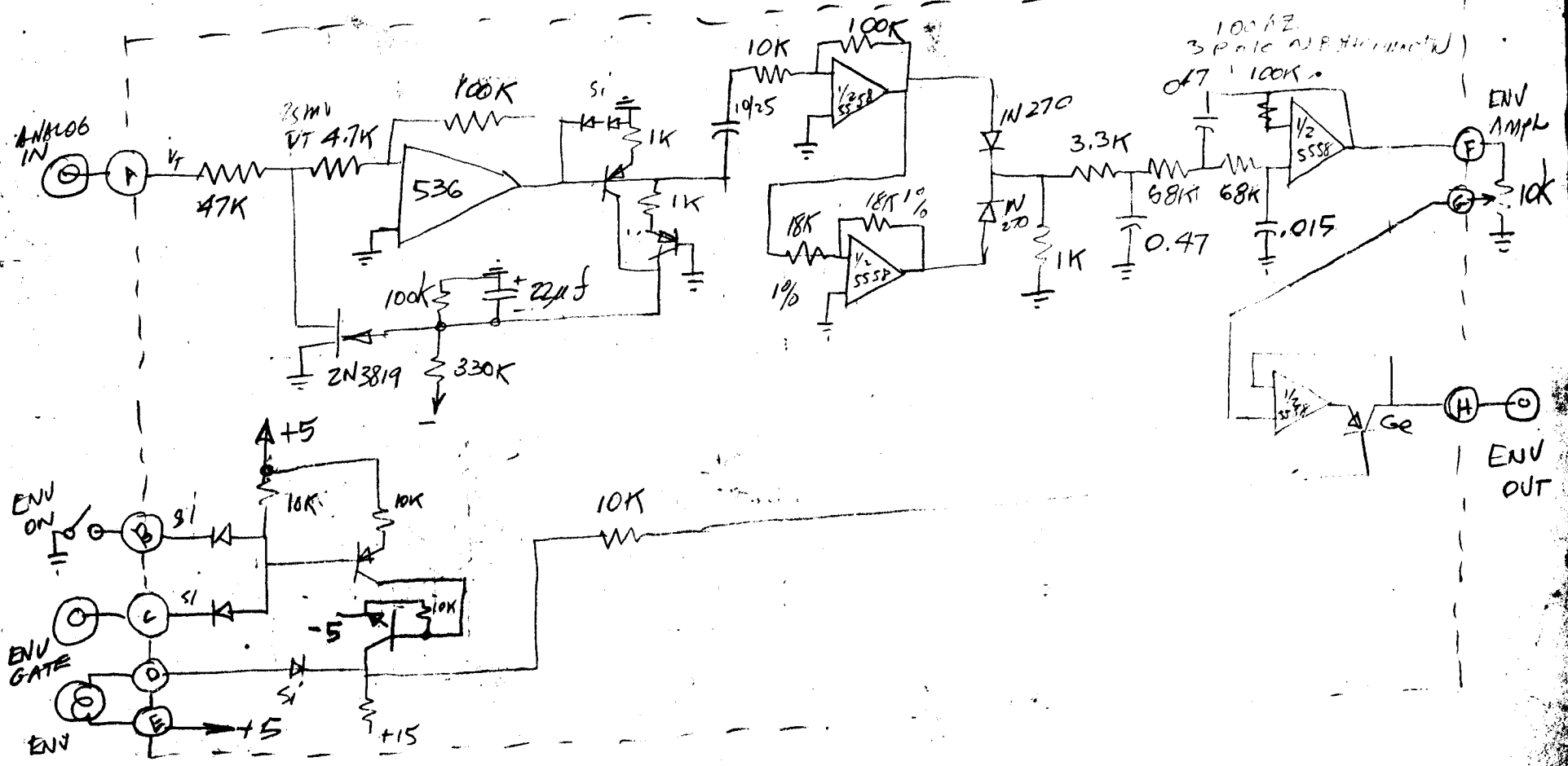
* Match to .1%

Top

6.8K
1K
7.5K
7.5V

ENVELOPE FOLLOWER
WITH AGC

(for video servers)



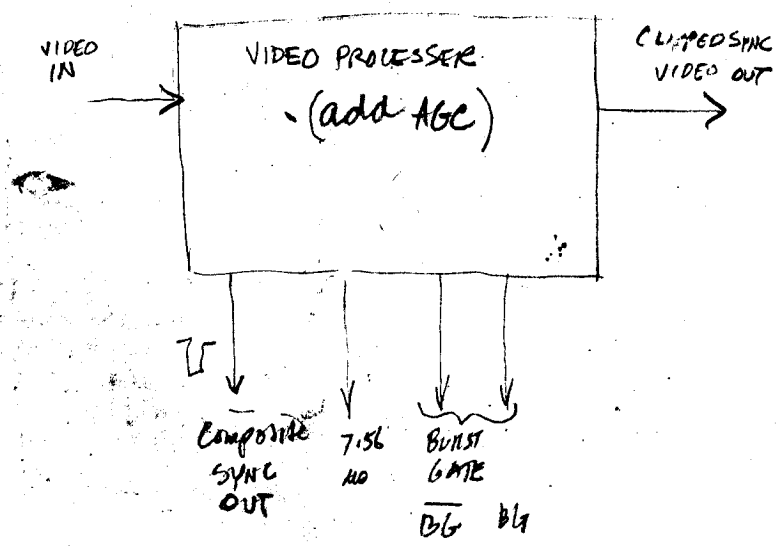
R = 4.7K → 100hz C = .16 ≈ 0.22

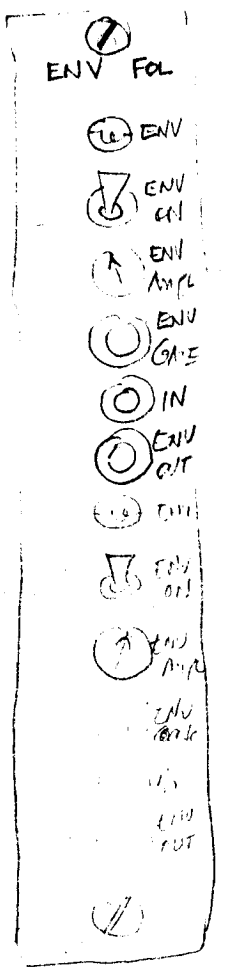
10K .16

100K .016

68K .027

See future models





BLACK

BLU

RED