DISTRIBUTION RELIGION

THE IMAGE PROCESSOR MAY BE COPIED BY INDIVIDUALS AND NOT-FOR-PROFIT INSTITUTIONS WITHOUT CHARGE. FOR-PROFIT INSTITUTIONS WILL HAVE TO NEGOTIATE FOR PERMISSION TO COPY. I THINK CULTURE HAS TO LEARN TO USE HIGH-TEK MACHINES FOR PERSONAL AESTHETIC, RELIGIOUS, INTUITIVE, COMPREHENSIVE, EXPLORATORY GROWTH. THE DEVELOPMENT OF MACHINES LIKE THE IMAGE PROCESSOR IS PART OF THIS EVOLUTION. I AM PAID BY THE STATE, AT LEAST IN PART, TO DO AND DISEMINATE THIS INFORMATION; SO I DO.

As I am sure you (who are you) understand a work like developing and expanding the Image Processor requires much money and time. The'U' does not have much money for evolutionary work and getting of grants are almost as much work as holding down a job. Therefore, I have the feeling that if considerable monies were to be made with a copy of the Image Processor, I would like some of it.

Put in your own method of returning energy to me here: _____

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Of course enforcing such a request is too difficult to be bothered with. But let it be known that I consider it to be morally binding.

Much Love,

I DECIDED THAT I WOULD LIKE 1 good TAPE FROM EACH COPY OF THE I. P.

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Lab phone: 312-996-2312
Messages: 312-996-3337 (Department of Art)

NOTES ON THE AESTHETICS OF 'copying-an-Image Processor':

Being a 'copier of many things, in this case the first copier of an Image Processor, I trust the following notes to find meaning to future copiers of Image Processors:

First, it's okay to copy! Believe in the process of copying as much as you can; with all your heart is a good place to start - get into it as straight and honestly as possible. Copying is as good (I think better from this vector-view) as any other way of getting 'there.'

The more you 'buy' the 'copying' of Sandin's encoded intelligence in the I-P, the more you will learn about the man-and-machines. Don't try to make improvements; you'll make it only worse if you modify what already is best, even if it doesn't appear to be the 'best' to your mind's eye. It bothers me very much to see 'folk' laying onto Dan, suggestions of improvement (supposedly) without a thorough giving-in-to understanding of the I-P design. Please realize, that if you 'had-it' to do it you would not be building (copying) an I-P to begin with; you would have done it yourself along time ago...so get to work copying--as-usual.

Dan's evolutionary design of the I-P comes from a very high and thorough CONSCIOUS systems--design-intelligence-level. If you deviate in the process of 'copying' and then Dan makes an improvement on his I-P, you will most likely find it quite frustrating in updating your instrument due to your I-P being incompatible in detail to the original. If you get yourself in a jam, then you have to go to Dan and "$PEND' his time getting you out of it.

So...after all this: the Art of 'copying' is a good form to try on for a year or so while you get into building your Image Processor...enjoy.

PEACE/ASCESIS (love):

Phil Morton

OCT 78

~~FEBRUARY 28, 1976~~

This edition of the documentation was paid for by a grant from the Illinois Arts Council. Thank you, Ill. Arts!

HI:

A bunch of miscelaneous notes -

If you didn't send postage, send it in stamps, money or check, or any thing else of comparable value (*surprise has intrinsic value*); postage costs me $2.00.

AND COPPYS OF INFORMATION AND CORRECTIONS COST ME 1$

The master parts list contains the minimum order to complete the Image Processor. It is necessary to order more than the minimum of nearly everything. Parts may be damaged in assembly or may be defective. Although the Image Processor is very reliable, replacement parts are necessary for maintence. Furthermore, I attempt to design with a minimum of different parts, therefore new modules or modifications of modules are likely to use the same parts. With the exception of the hardware and the most expensive components, I reccommend ordering many extra.

If you need clarification on details; CALL (or send video tape). Don't write; I hate to write.

STILL TRUE IN 78

New corrections and additions are forth-coming in a few months. When ready to build, send self addressed stamped envelope ~~(5oz. should do)~~ ? Mention the last date of corrections you have.

CORRECTION OF ERRORS IN DOCUMENTATION

Master Parts List:

The following-

1000 FT	36F1800WM RG 59/U	CO-AXIAL CABLE	81.28	81.28	N

SHOULD BE CHANGED TO

1000 ft	36F 110WM	RG 59/U COAXIAL CABLE (BELDEN # 8241-1000)	50.85	50.85	N

PAGES FOLOWING DOCUMENTATION ERRORS SHOULD REPLACE CORRESPONDING PAGES IN THE DOCUMENTATION

BRIEF SYSTEMS LEVEL DESCRIPTION:

The IP physically is an array of a minimum of approximately 24 modules (aluminum boxes), representing approximately 40 electrical modules.

The documentation that follows is simply a description of how to build the aluminum boxes; the system is considerably more powerful than the sum of the boxes.

On paper a description of how the IP works is more difficult than I am prepared to do. It is best communicated on video-tape; send me a video tape of you best stuff and I will send you a video tape on the IP, and/or send blank tape and $5/hr. (2 hours should do it.)

But in brief, the Image Processor accepts signals = ± .5 volts 75 ohm including video signals. These signals (images) are distributed into (usually) a number of processing modules and then (usually) mixed out into a standard color encoder (output module). Since most of the processing modules are voltage controllable and control voltages and images are interchangeable, fantastic combinatorial power is possible.

The 'classic' Image Processor contains 8 adder-multipliers, 3 function generators, 3 comparators, 3 amplitude classifiers, 4 oscillators, 3 differentiators, 9 references, 1 sync strip and camera input, 3 inputs, 1 sync generator, 1 color encoder and power supplies. These refer to electrical modules and not aluminum boxes. This constitutes a very powerful processing instrument and because of systems power level (inter-connect-ability), I recommend building approximately this much.

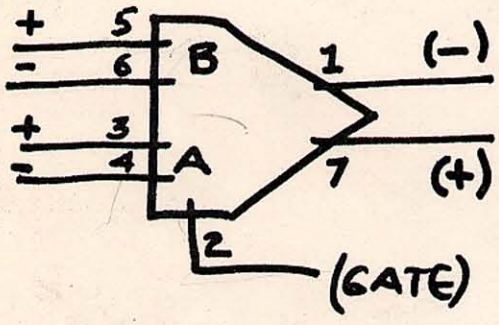
MC 1445 Gain Controlled Amplifier (multiplier):

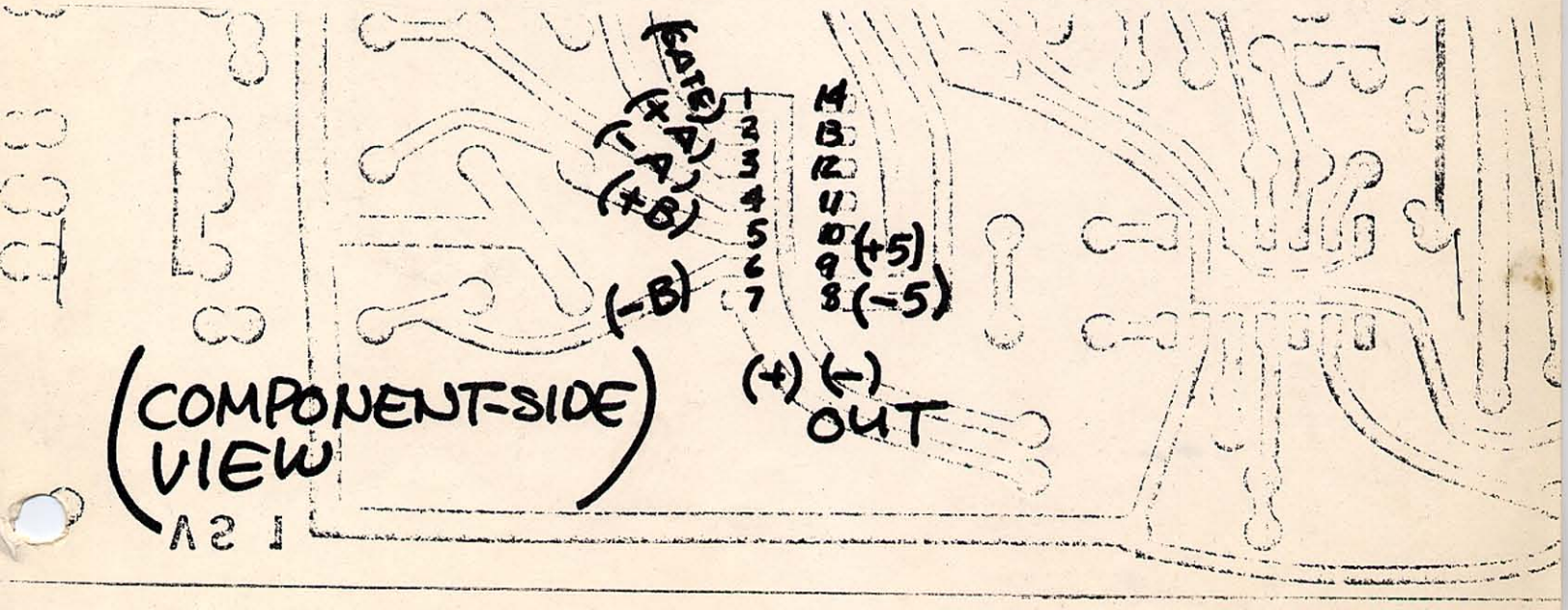
Detailed information on this integrated circuit is available from Motorola Linear Integrated Circuits Manual, available from Motorola or some Motorola distributors.

This I.C. is a four input gain controlled amplifier and is used throughout the IP. Pin (4) is the inverting input to channel A. Pin (3) is the non-inverting input to channel A. Pin (5) is the non-inverting input to channel B; pin (6) is the inverting input to channel B. Non-inverting output is available at pin (7); and the inverting output is available at pin (1).

Which input channel is connected to the output is controlled by the gate voltage at pin (2). If this voltage is high (greater than 1 volt) channel B is on; if the gate voltage is low (0 volts) channel A is connected to the output. The gate voltage produces continous control over the gains of the channels such that .5 volts causes both channel A and B to be connected to the output with 1/2 gain each. Full gain is approximately 10.

Power supply voltage (+5 volts) is connected to pin (9) and (-5 volts) is connected to pin (8). No other pins are used.



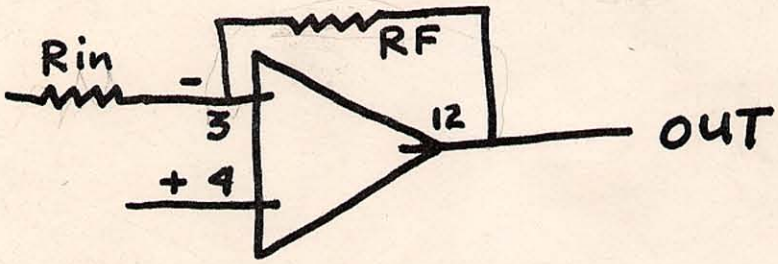


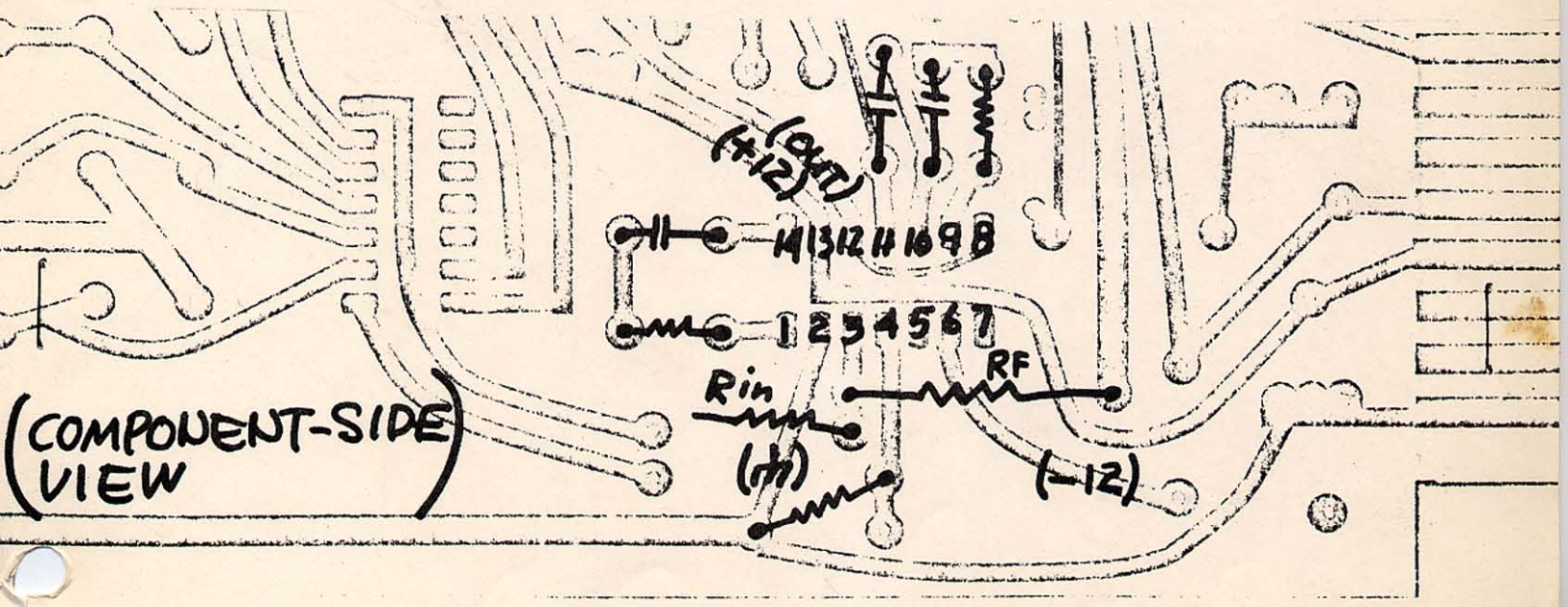
CA 3030 operational amplifier:

The CA 3030 op amp is used through out the IP. Detailed descriptions of the device are available in the RCA Linear Integrated Circuits Manuel. The book can be gotten from RCA or some distributors of RCA integrated circuits.

What follows is a brief description of the I.C.
The Op Amp has a very large gain (4000). Except in the comparator circuit, this gain is reduced by feedback of a percentage of the output signal pin (12) to the inverting input signal pin (3). A signal to be amplified is applied to pin (3) and will be inverted in the output, or it is applied to pin (4) and is not inverted. Pin (2) is grounded always. Pins (1,14,9,10,11) have to do with compensation for the amplifier which controls the tendency of the amplifier to oscillate (put out a signal of its own). The positive supply voltage (+12v.) is applied to pin (13); negative supply voltage (-12v.) is applied to pin (6). Pin (8) is sometimes connected to the output pin (12) to increase the power available from the I.C.

In simple inverting amplifier circuits, the voltage gain of the amplifier is the ratio of the feedback resistor between pin (12) and pin (3) to the input resistor connected from the input signal to pin (3).
RF/R in

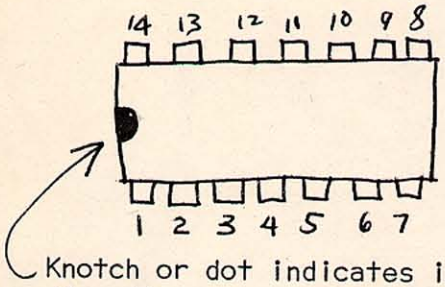




INTEGRATED CIRCUITS

Dual Inline Packages (DIP)

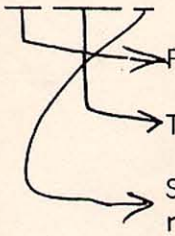
TOP VIEW:



Knotch or dot indicates installation direction.

IDENTIFICATION NO. (example):

MC 1445 L



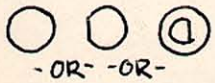
Prefix indicates manufacturer.

Type.

Suffix indicates case or temperature range or detail specifications.

TRANSISTORS

TOP VIEW:



Physical cases will vary with the manufacturer.

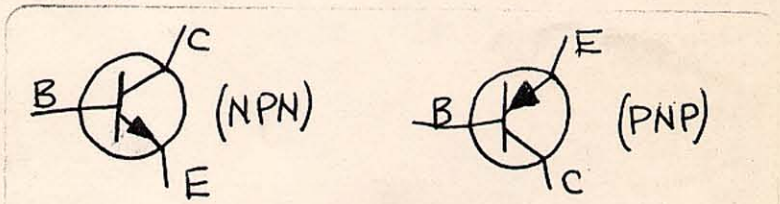
Check and match carefully the emitter, base, collector (EBC) leads with the NPN & PNP character of each transistor type.

Leads typically have to be bent for proper and convenient insertion into PC Board.

IDENTIFICATION NO.:
(only two transistors used in entire system)

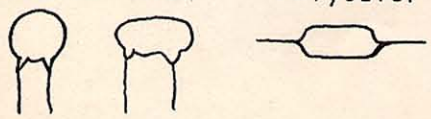
2N 4123 (NPN)
2N 4125 (PNP)

SYMBOL:



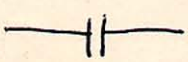
CAPACITORS

Ceramic Mica Polyestor

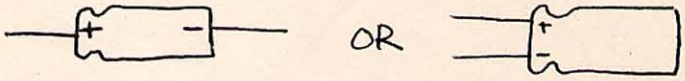


Installation direction makes no difference.

SYMBOL:

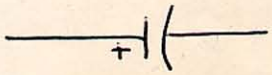


Electrolytic



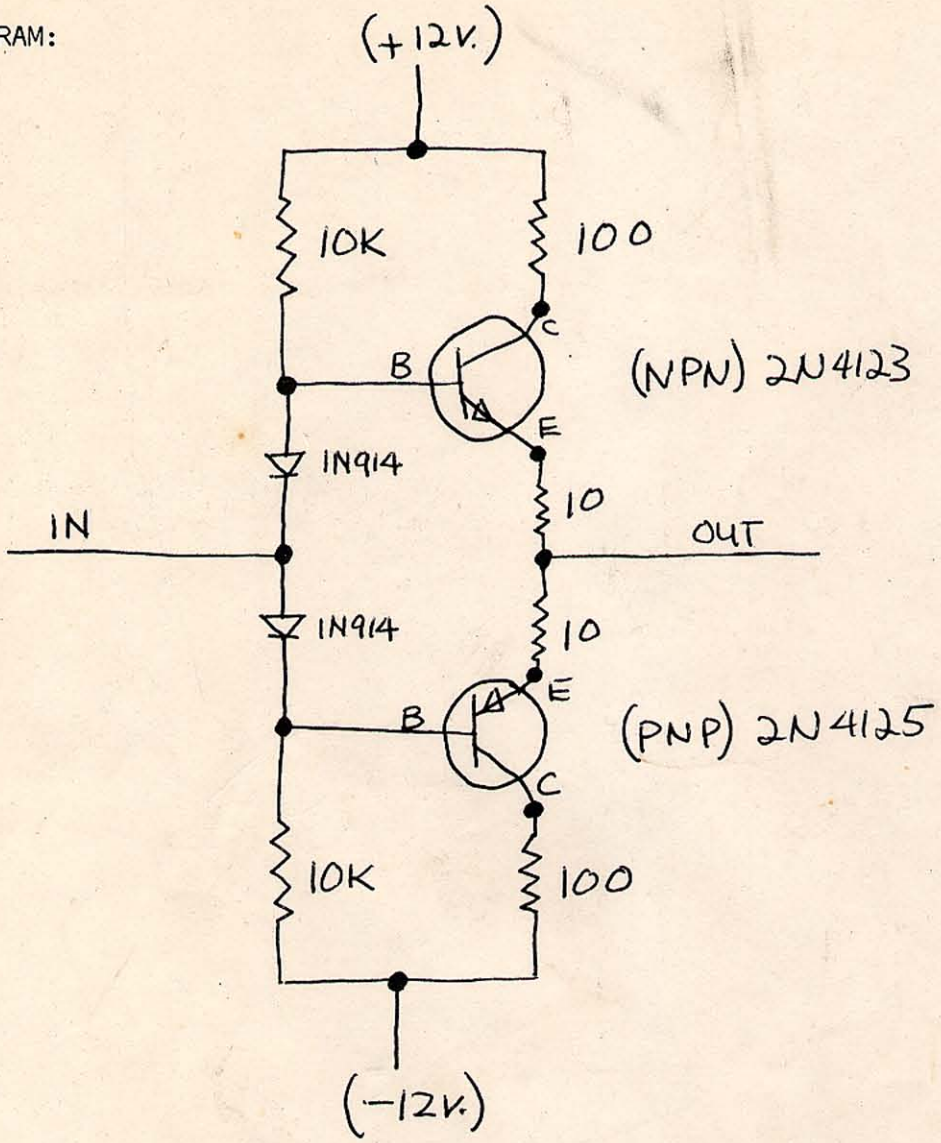
Installation must have correct (+) and (-) orientation.

SYMBOL:

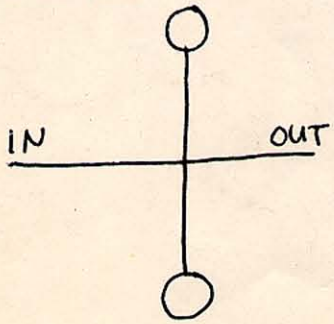


The STANDARD DRIVER is a complimentary current amplifier with voltage gain less than 1. It is used so many times in the I-P that it is abreviated:

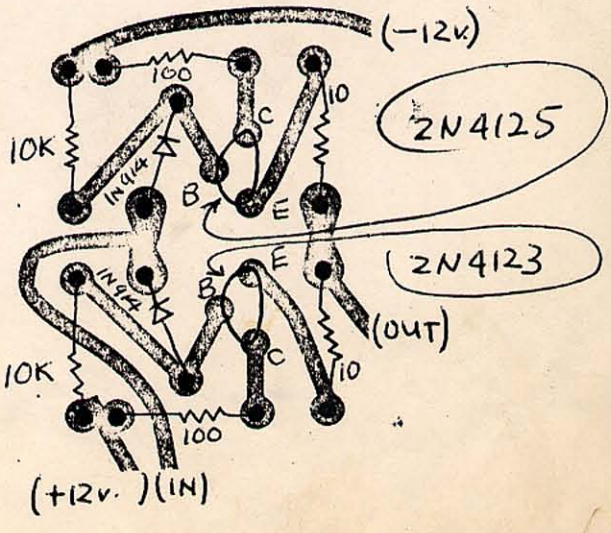
DIAGRAM:



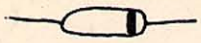
ABREVIATION:



COMPONENT SIDE VIEW:

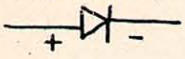


DIODES

COMPONENT: 

Band or dot indicates the cathode (-).

SYMBOL:

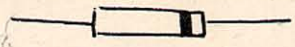


Direction of current flow is from (-) to (+).

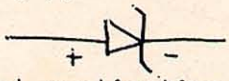
IDENTIFICATION NO.:
(only two signal diodes used in entire system)

1N 914
1N 270

ZENER DIODES

COMPONENT: 

Band or dot indicates the cathode (-).

SYMBOL: 

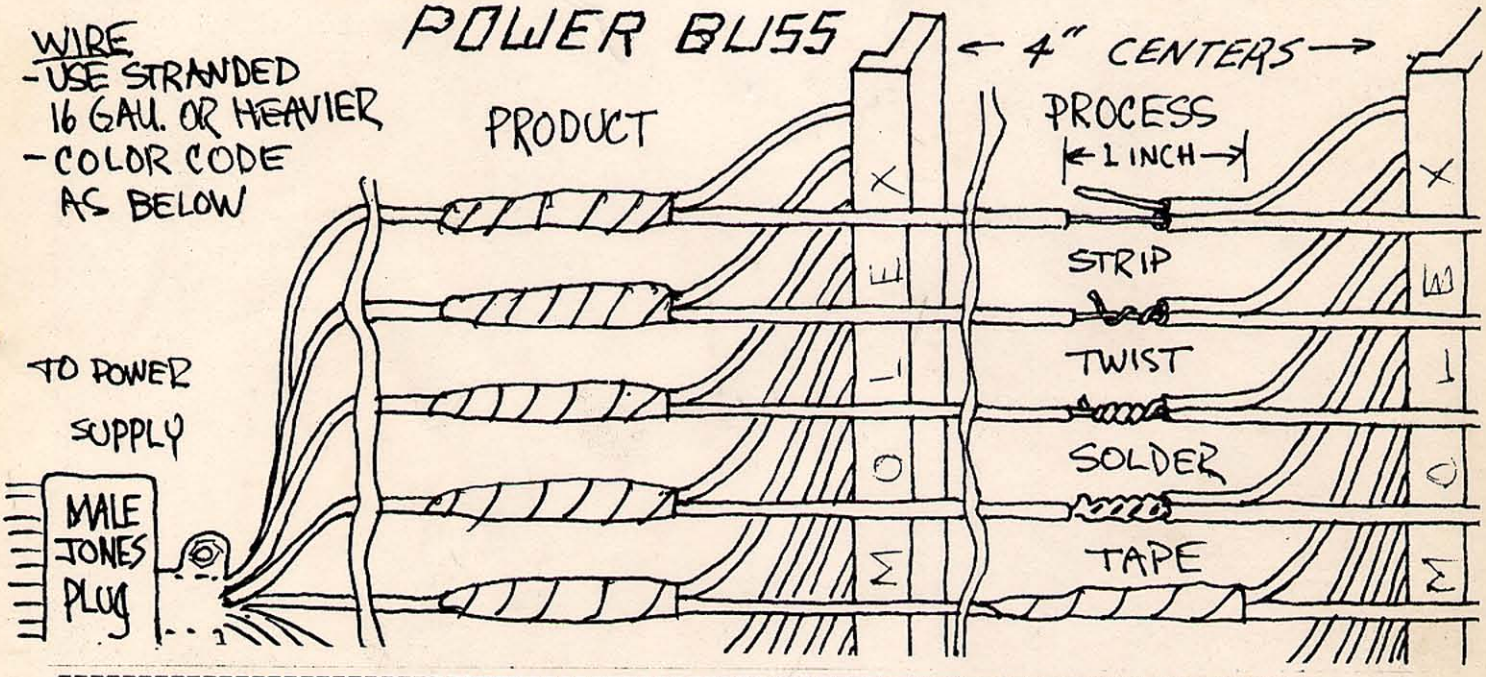
In normal application (+) supply voltage is supplied to cathode and (-) supply voltage is supplied to anode.

IDENTIFICATION NO. (example):

1N 5338 B

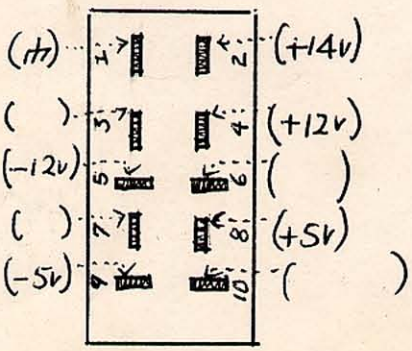
Indicates tolerance.

Type.

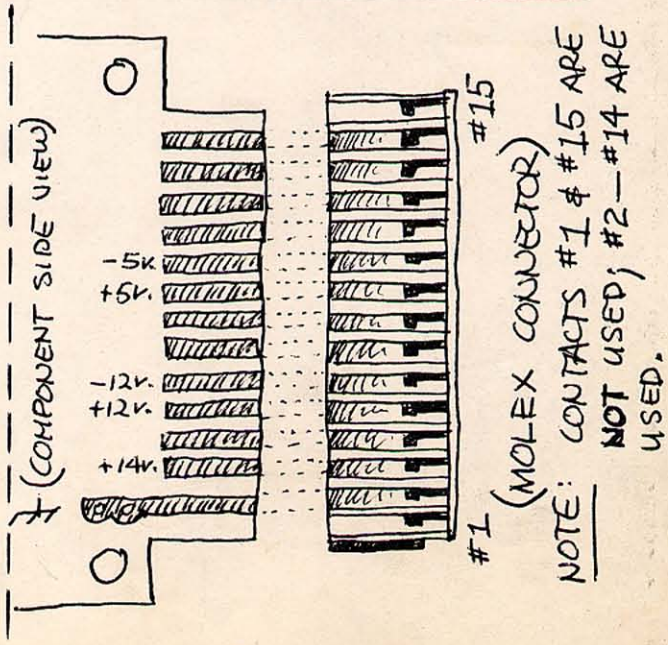


COLOR CODE FOR POWER BUSSING

BLACK (⏚)
ORANGE ( )
WHITE ( )
RED (+12v)
BLUE (-12v)
GREEN (+6v)
GRAY ( )
YELLOW (+5v)
VIOLET (-5v)
BROWN ( )

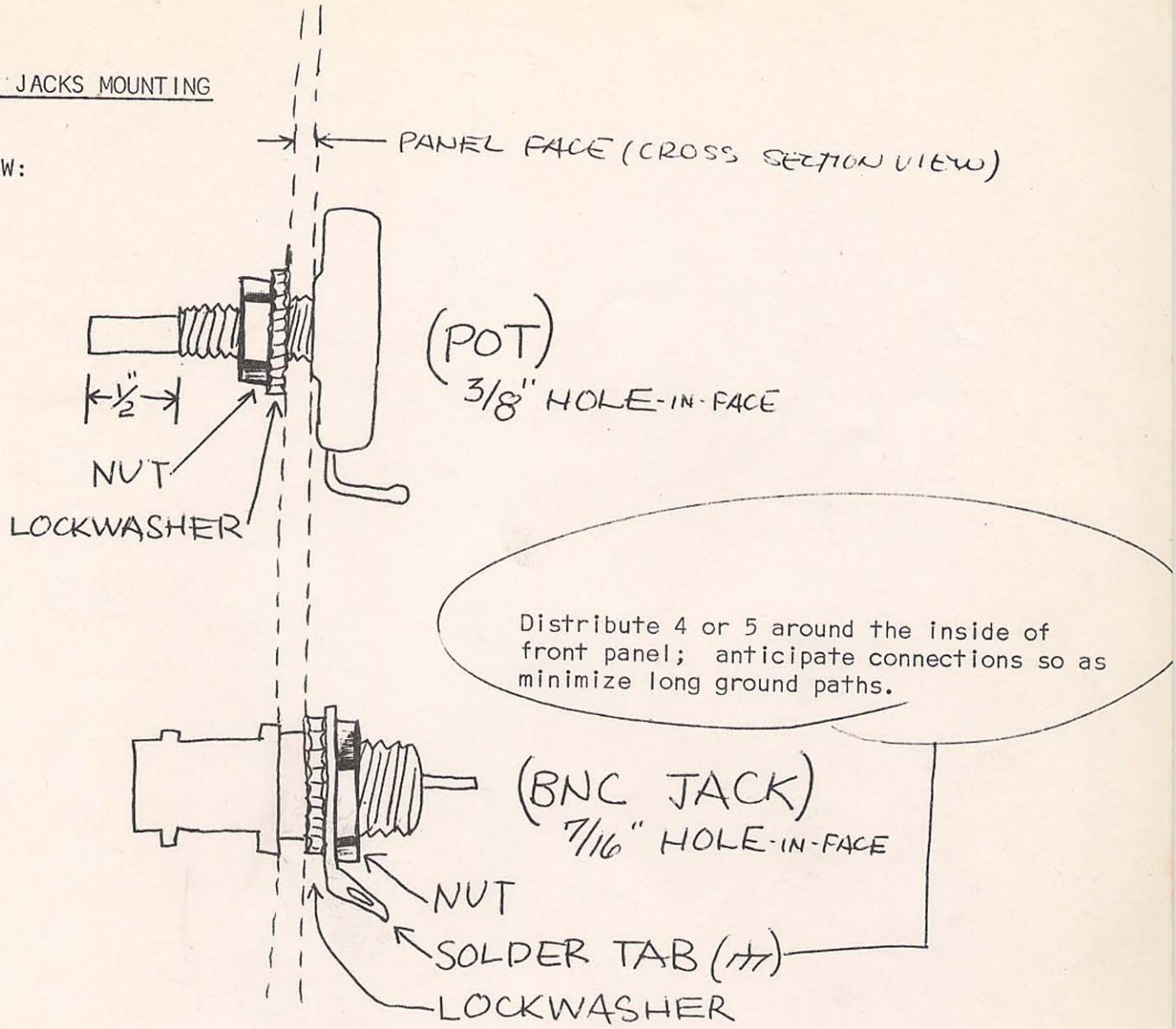


NOTE: All power supply lines into PC board are by-passed to ground (⏚) with a 100µF 25wvdc electrolytic capacitor (indicated in pictorials only).

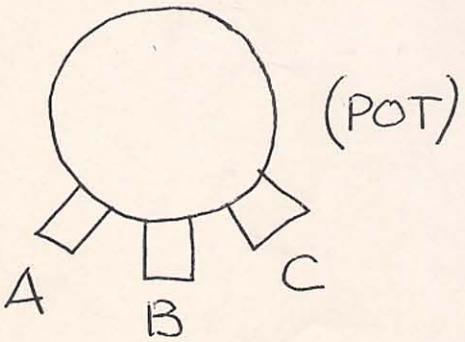


POTS and JACKS MOUNTING

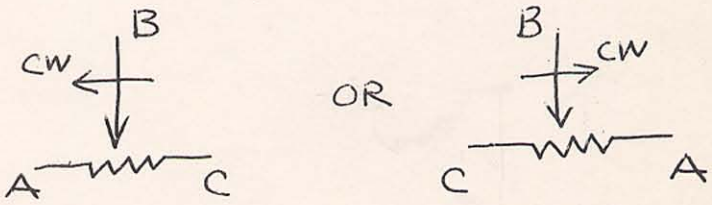
SIDE VIEW:



BACK VIEW:

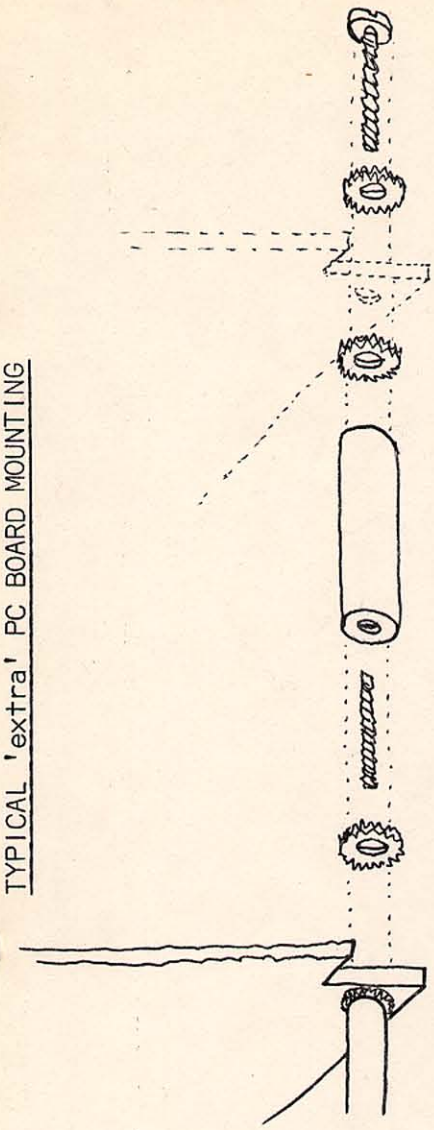


SYMBOL:

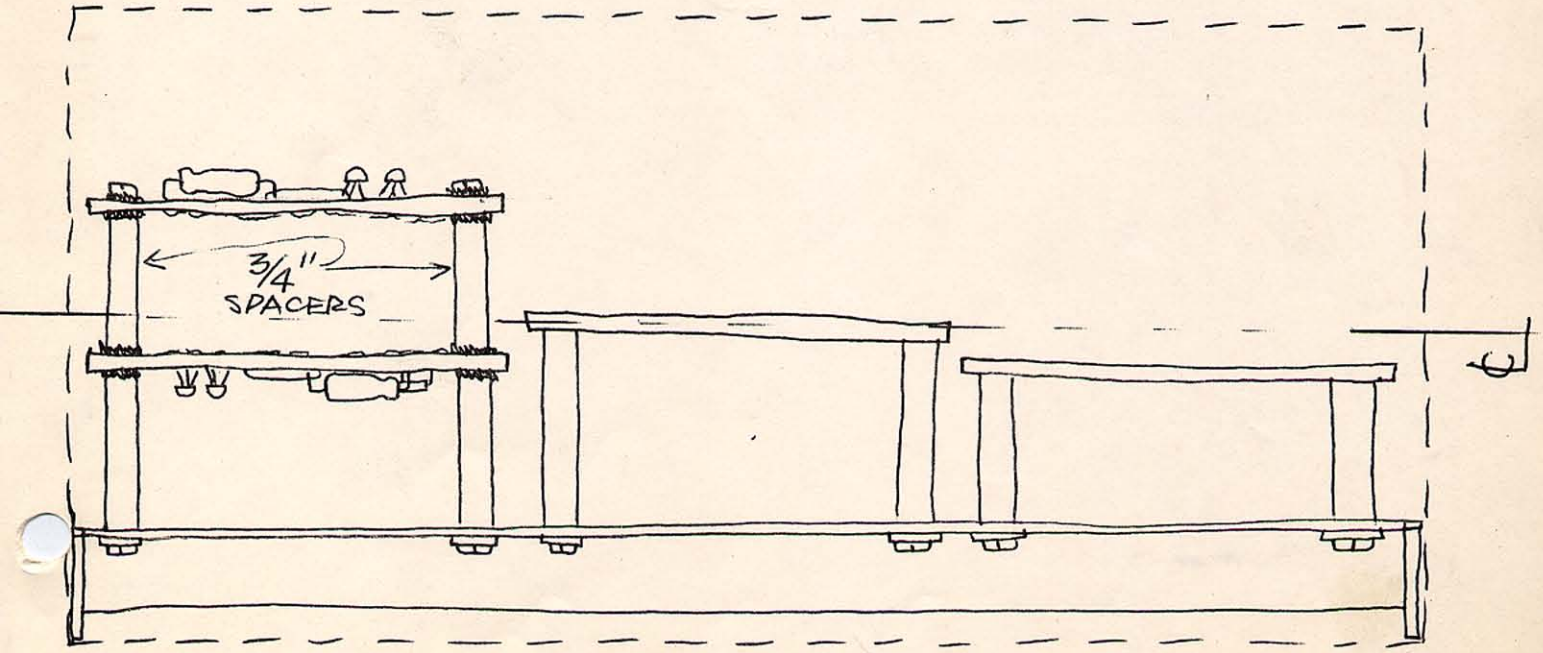


CW = clockwise

TYPICAL 'extra' PC BOARD MOUNTING

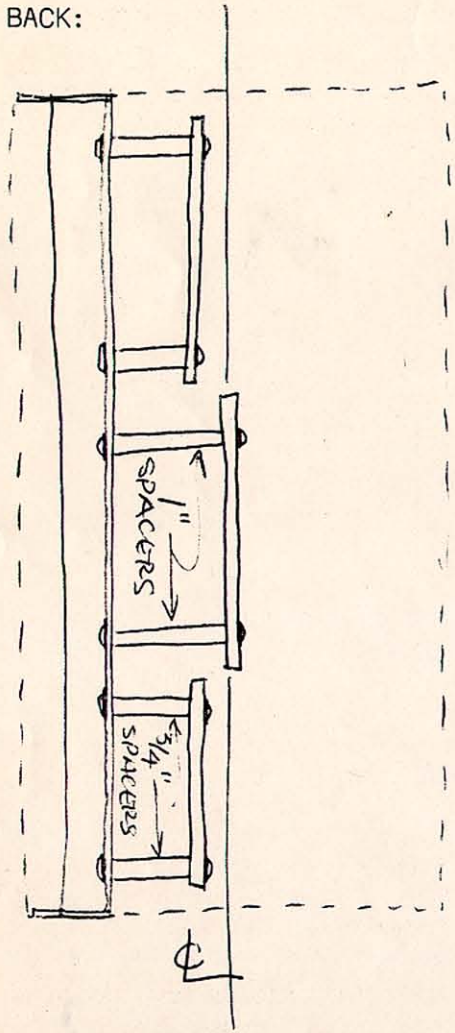


NOTE: Use additional washers for proper spacing when necessary; make sure that middle board is dead-on with center line of module.

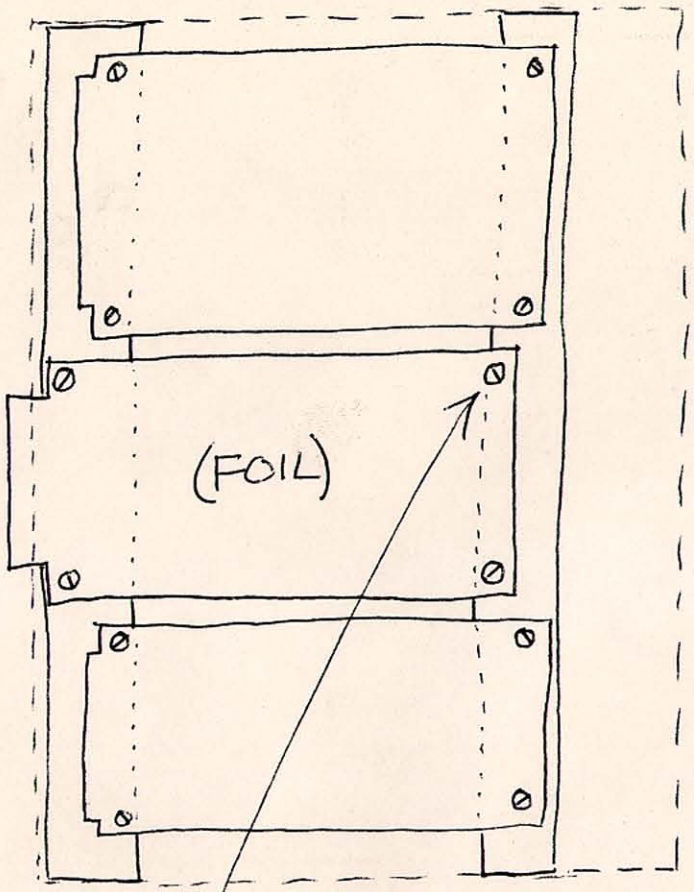


PRINTED CIRCUIT BOARD MOUNTING

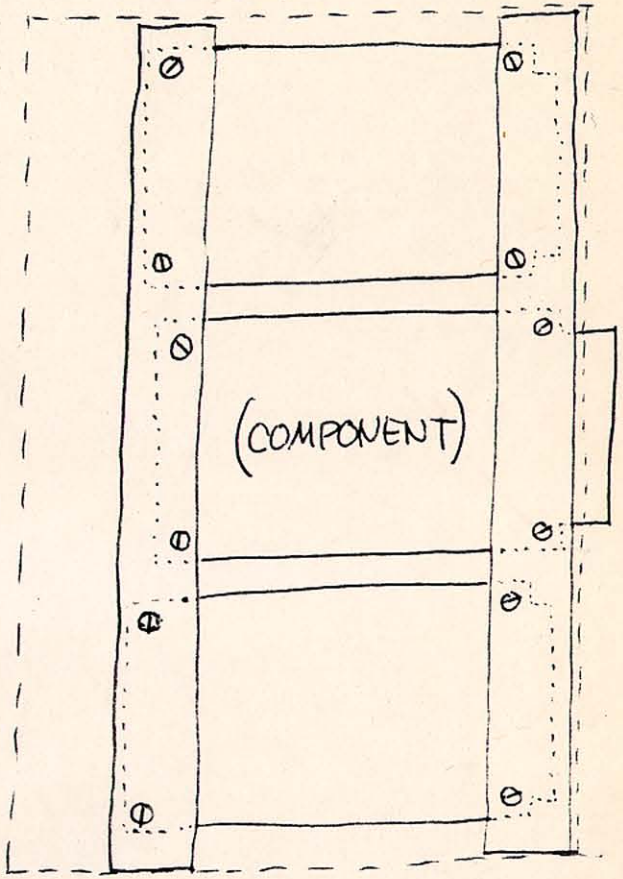
BACK:



LEFT SIDE:



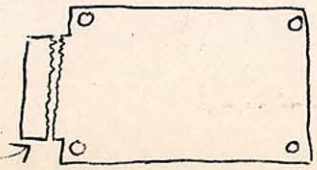
RIGHT SIDE:



Crucial screw; circuits all run to ground (⏚) at this point.

Adjust middle board so as to be dead-on with center line of module; use washers for additional spacing if neccessary.

On top and bottom boards it is necessary to hacksaw off 3/8" on power buss end for clearance of back panel.



Star washer all 4-40 screws which hold boards to supports.

Use #6 x 3/8" panhead self threading screws for mounting supports to chassis box (no washers).

ADDER MULTIPLIER:

The adder multiplier is used to add (superimpose), fade and gain control (multiply) signals.

JI1, JI2, JI3 and the inverted signal of JI7 are added together to form input channel A.

JI4, JI5, JI6 and the inverted signal of JI8 are added together to form input channel B.

The knobs above the connectors control the gain (contrast) of each individual input.

The amount of channel A and B mixed into the output, JO1 through JO4, is dependent on the position of R9 and the voltage inputted to JI9.
The effect of the knob position and the voltage are additive; the knob to the left and/or a maximum negative voltage on JI9 will cause channel B to be outputted only, similiarly, the knob to the right and/or a maximum positive voltage will cause channel A to be outputted only.
The knob at approximately the center with no voltage applied to JI9 will cause half-of channel A and half-of channel B to be added together and outputted.

TEST STUFF:

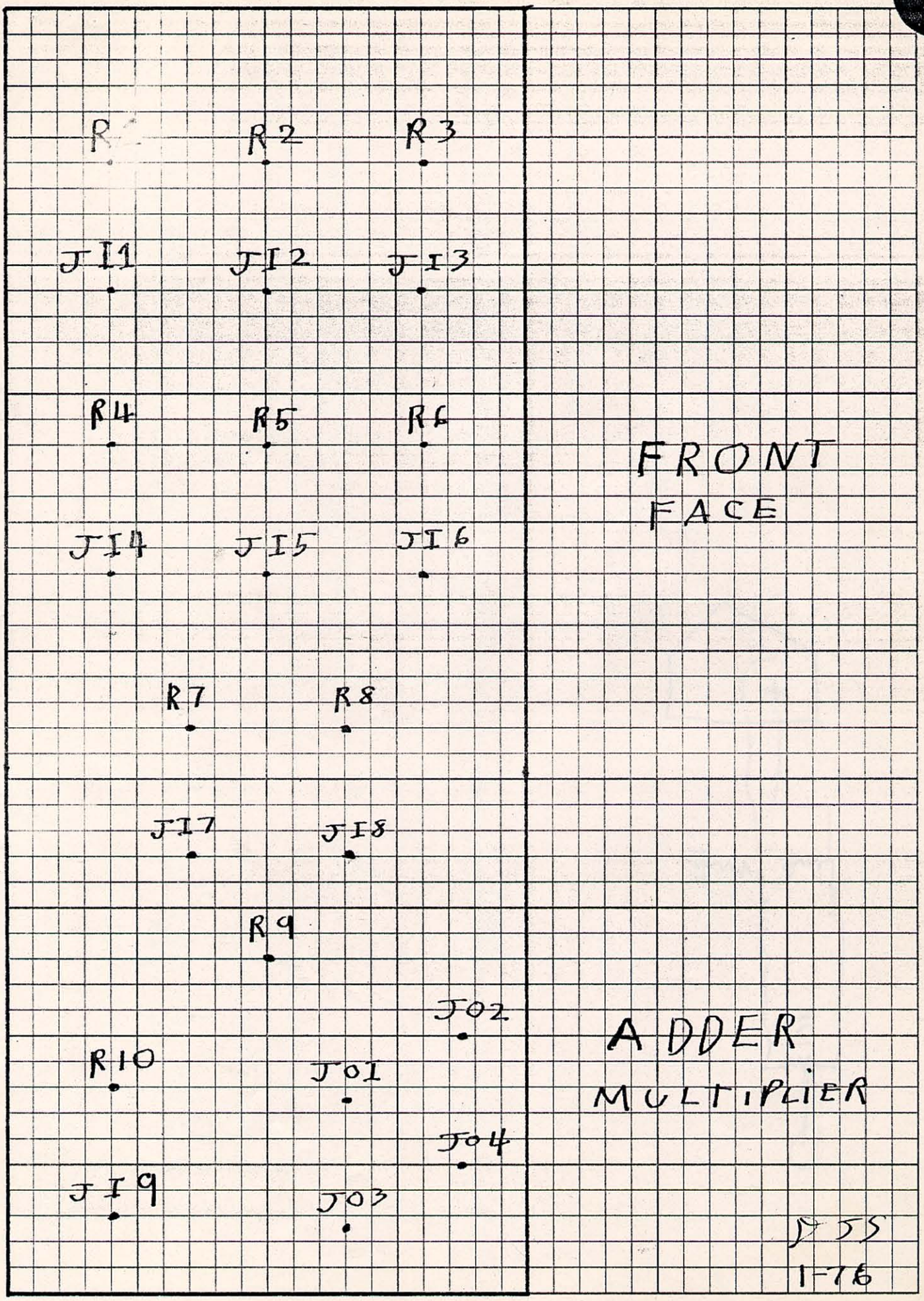
The adder multiplier should have a net gain of slightly greater than 1.
That is, a (+) or (-) .5 volt signal into the module should result in an undistorted output of approximately the same magnitude into a 75 ohm load.

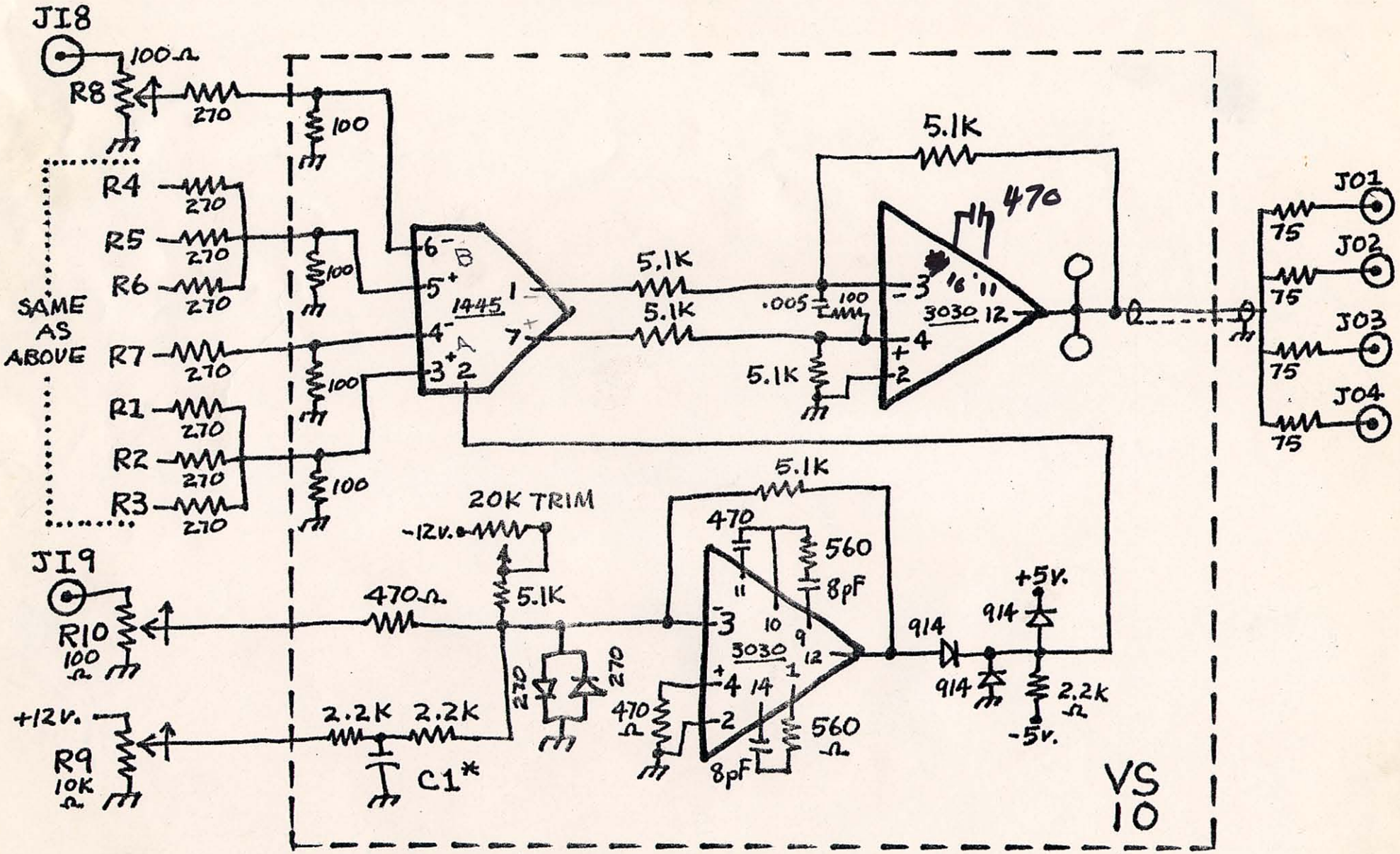
With no input the output should be approximately 0 volts (+ or - .05 volts).
Adjust 20k trimmer pot so with R9 in center position and no input to JI9 channel A and channel B have equal gain.

C1* STUFF:

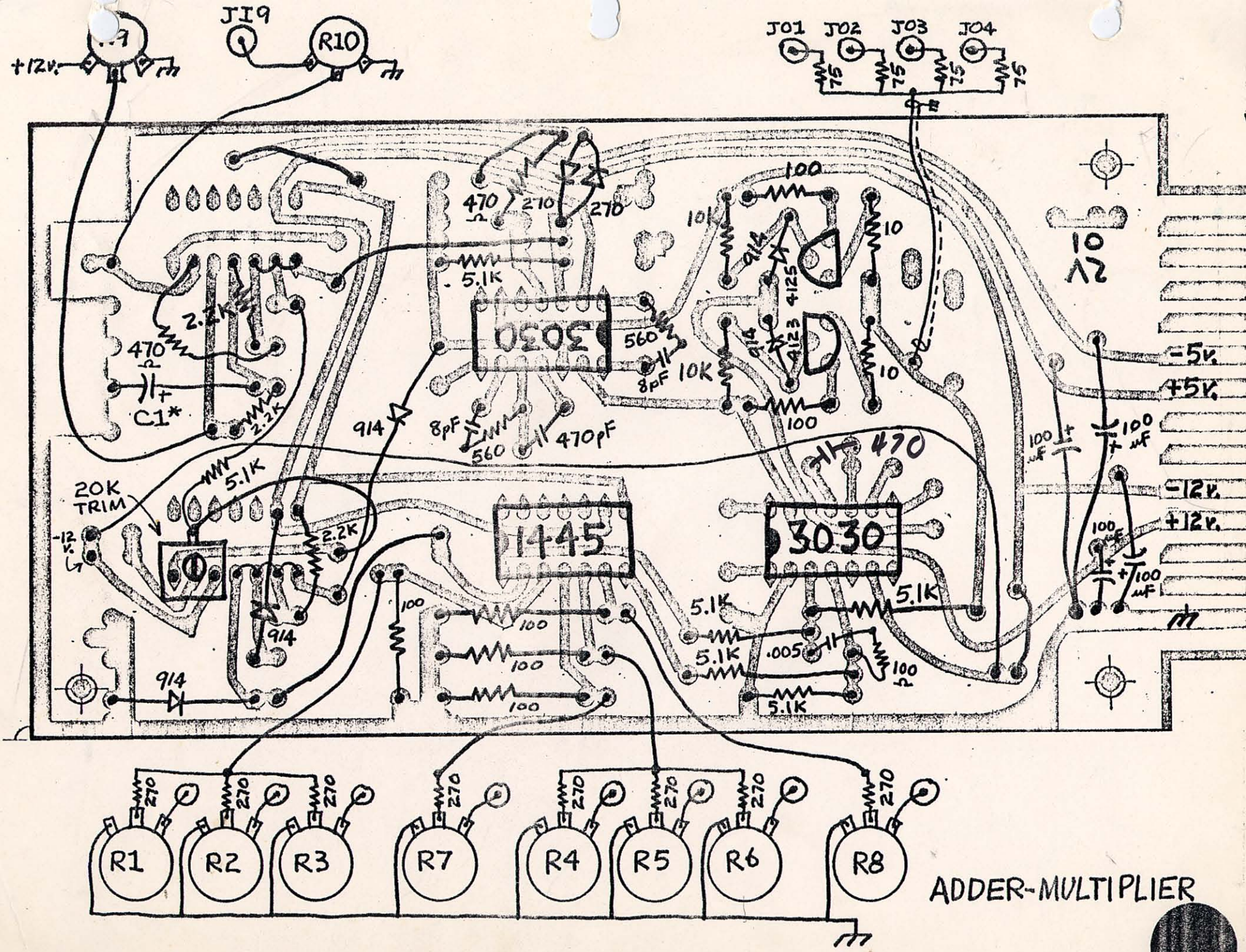
The capacitor, C1, is used to filter the bias control, R9. One may choose a value which will vary the 'feel' of the knob.

20uF is a minimum value which will remove some noise...
50uF is the minimum value that I use; it doesn't affect the feel of the knob...
100uF removes some shakiness of the hand (included in the parts list)...
500uF is Phil's recommendation (very slushy feeling)...


R1
R2
R3
JI1
JI2
JI3
R4
R5
R6
JI4
JI5
JI6
R7
R8
JI7
JI8
R9
JO2
R10
JO1
JO4
JI9
JO3
FRONT
FACE
ADDER
MULTIPLIER
J55
1-76

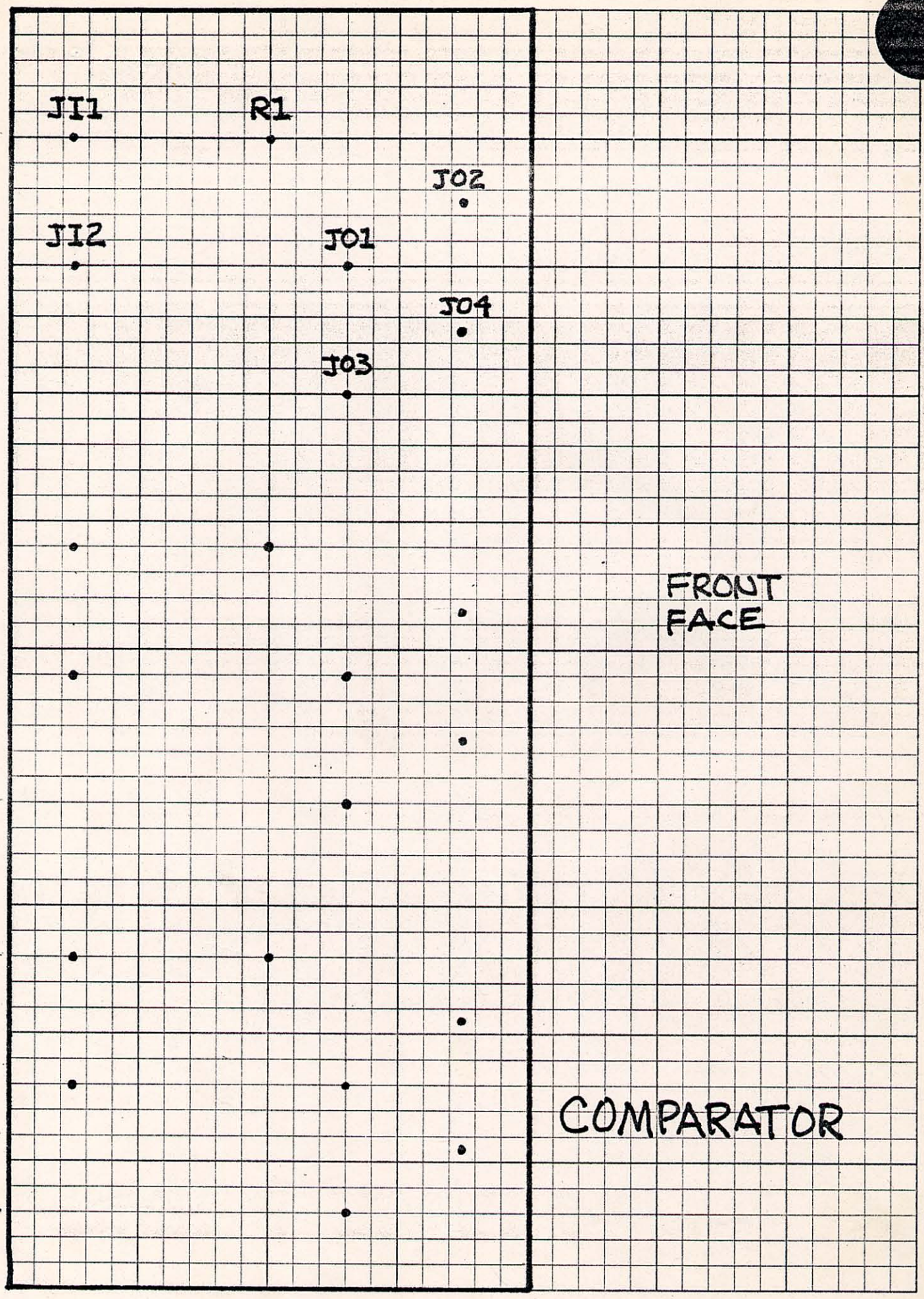


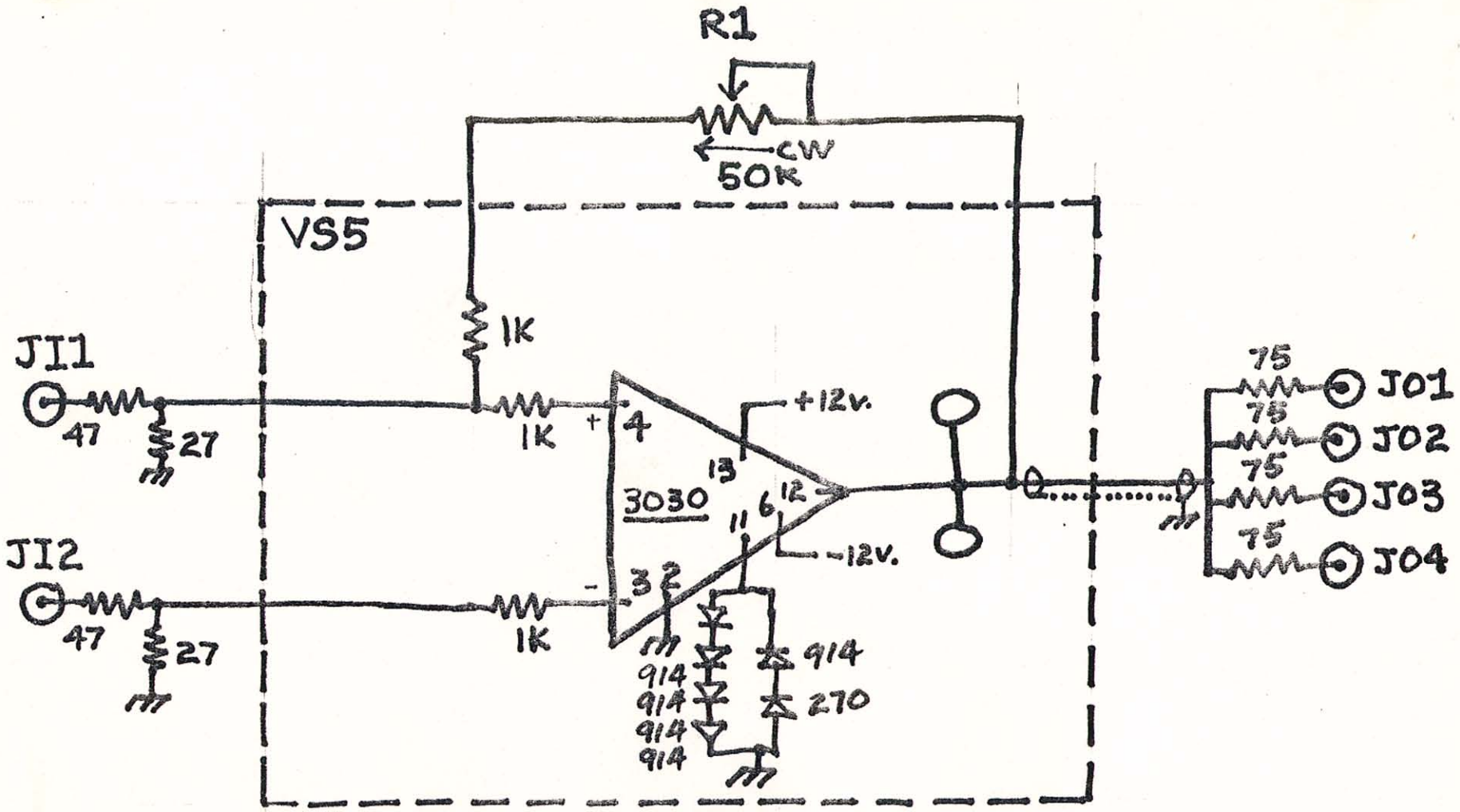
ADDER-MULTIPLIER



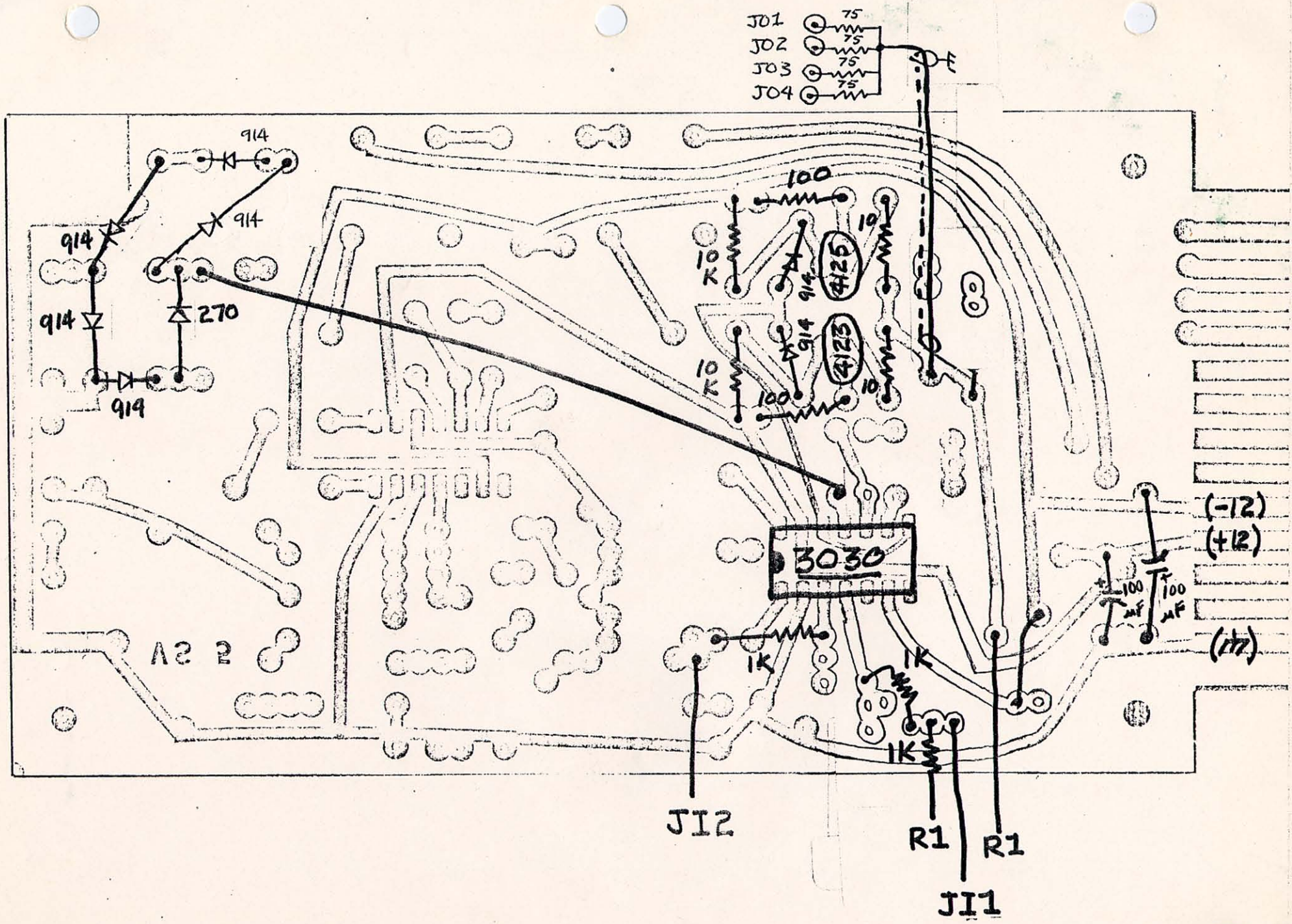
ADDER-MULTIPLIER

2		525-1060	10 OHM, 1/4 W RES	.06	A	AM
4		525-1165	75 OHM, 1/4 W RES	.06	A	AM
6		525-1202	100 OHM, 1/4 W RES	.06	A	AM
~~7~~		~~525-1248~~	~~220 OHM, 1/4 W RES~~	~~.06~~	~~A~~	~~AM~~
8		525-1263	270 OHM, 1/4 W RES	.06	A	AM
~~4~~		~~525-1328~~	~~510 OHM, 1/4 W RES~~	~~.06~~	~~A~~	~~AM~~
1		525-1356	1K0 OHM, 1/4 W RES	.06	A	AM
5		525-1467	5.1KOHM, 1/4 W RES	.06	A	AM
2		525-1522	10K OHM, 1/4 W RES	.06	A	AM
2		525-1302	470 OHM, 1/4 W RES	.06	A	AM
3		525-1405	2.2KOHM, 1/4 W RES	.06	A	AM
1		525-1550	15K OHM, 1/4 W RES	.06	A	AM
1		525-1603	27K OHM, 1/4 W RES	.06	A	AM
8	10F454	101UA	100 OHM POT 1/4SFAB	1.71	N	AM
1	9F089	U20	10K OHM POT 1/4SFT	1.45	N	AM
1	12F9800	3389P	20K TRIM BD-MT	.65	N	AM
2	14F592	DM15-417J	470 PF,DIP-MICA CAP	.32	N	AM
~~2~~	~~14F593~~	~~DM15-330J~~	~~33 PF,DIP MICA CAP~~	~~.32~~	~~N~~	~~AM~~
2	14F1269	DM5-080D	8 PF,DIP-MICA CAP	.36	N	AM
6	71U-1260	7-G-1000	100 MF,25VDC,ELEC.	.24	A	AM
1			.005			
5	553-0914	1N914B	SIL-DIODE	.19	A	AM
2		1N270	GERM-DIODE	.22	S	AM
1		2N4123	NPN TRANS	.22	S	AM
1		2N4125	PNP TRANS	.27	S	AM
2		CA3030	DIP OP-AMP,RCA	1.32	S	AM
1		MC1445L	DIP GAIN-CONT.AMP	1.90	S	AM
1			VS10 PC BOARD			AM
~~1~~			~~VS1 PC BOARD~~			~~AM~~
~~1~~			~~VES PC BOARD~~			~~AM~~
13	39F1337	13-236	BNC,FM-CHS.MT.	.72	N	AM
1			CHASSIS,AM-FACE	8.25	DG	AM
4	RB-67-1-DC-M-L-9		KNOB,BLACK/INLAY299	1.00	R	AM
4	RB-67-1-DC-M-L-9		KNOB,BLACK/INLAYSIL	1.00	R	AM
1	RB-67-1-DC-M-L-9		KNOB,BLACK/INLAY120	1.00	R	AM
1	RB-67-0-DC-M-D-9		KNOB,BLK/INLAY 299	1.00	R	AM


JI1
R1
JO2
JI2
JO1
JO4
JO3
FRONT FACE
COMPARATOR


R1
CW
50K
VS5
1K
JI1
47
27
1K
+
4
+12v.
13
3030
12
6
11
-12v.
JI2
47
27
1K
-
3
2
914
914
914
914
914
270
75
75
75
75
J01
J02
J03
J04

COMPARATOR



COMPARATOR 9-75

		525-1060	10 OHM, 1/4 W RES	.06	A	COM
7		525-1117	27 OHM, 1/4 W RES	.06	A	COM
5		525-1155	47 OHM, 1/4 W RES	.06	A	COM
5		525-1165	75 OHM, 1/4 W RES	.06	A	COM
5		525-1202	100 OHM, 1/4 W RES	.06	A	COM
9		525-1356	1K OHM, 1/4 W RES	.06	A	COM
6		525-1522	10K OHM, 1/4 W RES	.06	A	COM
3	10F473	503UA	50K OHM POT 1/4SFAB	2.21	N	COM
6	710-1260	7-6-1060	100 MF,25VDC,ELEC.	.24	A	COM
21	555-0914	1N914B	SIL-DIODE	.19	A	COM
3		1N270	GERM-DIODE	.22	S	COM
3		2N4123	NPN TRANS	.22	S	COM
3		2N4125	PNP TRANS	.27	S	COM
3		CA3030	DIP OP-AMP,RCA	1.32	S	COM
3			VS 5 P-C BOARD			COM
18	5EF1537	15-256	BNC,FR-CHS.MT.	.72	N	COM
1			CHASSIS,COMP-FACE	8.25	OG	COM
3	RB-67-1-DC-M-L-9		KNOB,GRAY/LINE,9-BL	1.00	R	COM

FUNCTION GENERATOR

The function generator generates an output which is an arbitary function (with up to two points of inflection) of the input at JI1. This results in an effect that is similiar to but more complex and controllable than photographic solerization.

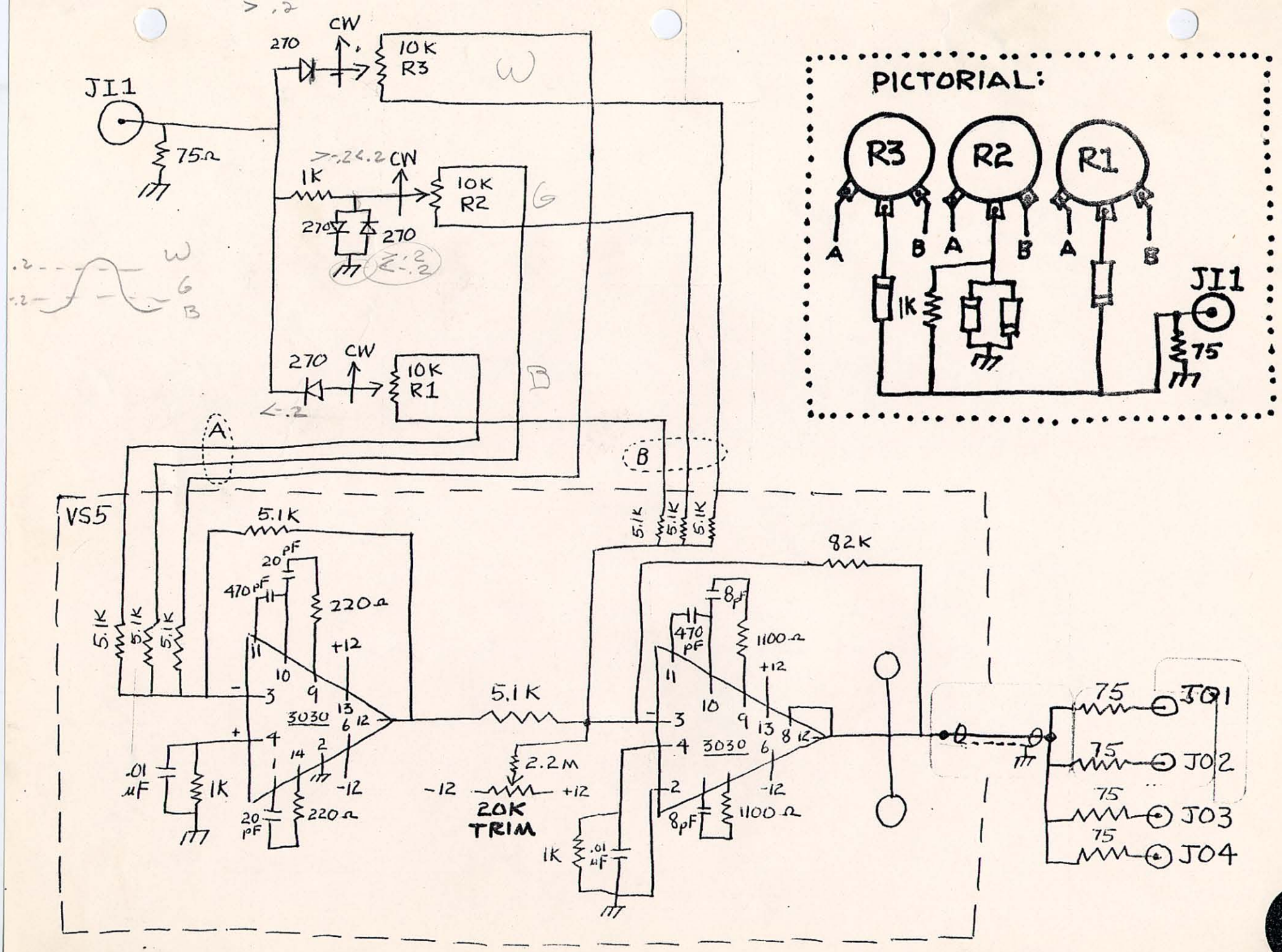
The function is controlled by R1, R2, and R3.
R1 controls the slope of the function for large negative inputs.
R2 controls the slope of the function for inputs near 0 voltages.
R3 controls the slope of the function for inputs of large positive voltage.

Clockwise is positive slope; counterclockwise is negative slope.

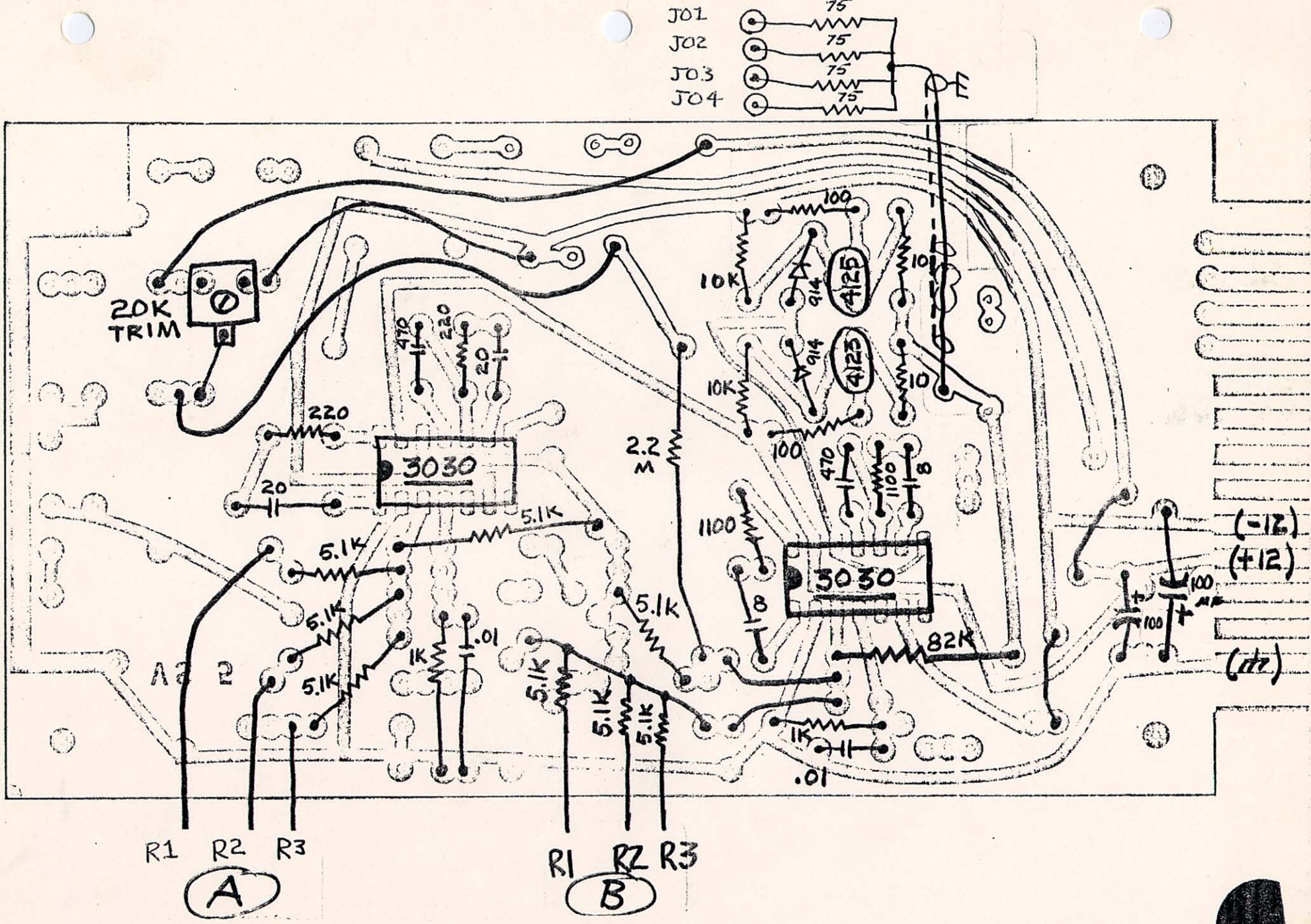
There are three electrical modules in one chassis box, so replicate work three times. Remember to buss (connect) +12 and -12 and ground wires from middle board to top and bottom board. Soldering directly to the foil is convenient.

TEST STUFF:

The 20K trimming resister on the VS5 board is adjusted such that no input results in 0 output voltage + or - .05 volts.



FUNCTION GENERATOR 9-75



FUNCTION GENERATOR 9-75

	525-1060	10 OHM, 1/4 W RES	.06	A	FGN
	525-1105	75 OHM, 1/4 W RES	.06	A	FGN
	525-1202	100 OHM, 1/4 W RES	.06	A	FGN
	525-1248	220 OHM, 1/4 W RES	.06	A	FGN
	525-1356	1K0 OHM, 1/4 W RES	.06	A	FGN
	525-1361	1.1KOHM, 1/4 W RES	.06	A	FGN
	525-1467	5.1KOHM, 1/4 W RES	.06	A	FGN
	525-1522	10KKOHM, 1/4 W RES	.06	A	FGN
	525-1703	82KKOHM, 1/4 W RES	.06	A	FGN
	525-1907	2.2MOHM, 1/4 W RES	.06	A	FGN
10F468	1030A	10K OHM POT 1/4SFAB	2.21	N	FGN
12F9900	3389P	20K TRIM BO-MT	.65	N	FGN
14F1269	DM5-080D	8 PF,DIP-MICA CAP.	.36	N	FGN
14F557	DM15-200J	20 PF,DIP-MICA CAP.	.18	N	FGN
14F572	DM15-417J	470 PF,DIP-MICA CAP.	.32	N	FGN
67F507	TDC-103Z	.01 MF,DSC-CER CAP.	.05	N	FGN
710-1260	7-G-1000	100 MF,25VDC,ELEC.	.24	A	FGN
553-0914	1N9146	SIL-DIODE	.19	A	FGN
	1N270	GERM-DIODE			FGN
	2N4123	NPN TRANS	.22	S	FGN
	2N4125	PNP TRANS	.27	S	FGN
	CA3030	DIP OP-AMP,RCA	1.32	S	FGN
		VS 5 P-C BOARD			FGN
39F1337	13-236	BNC,FM-CHS.MT.	.72	N	FGN
		CHASSIS,F.G. FACE	8.25	DG	FGN
RB-67-1-DC-M-L-9		KNOB;#299,MAT-BLACK			
		INLAY ,IND.7WHITE			
		=9 /WHITE	1.00	R	FGN

DIFFERENTIATOR

The differentiator produces an output which is proportional to the rate of change of the input signal. Fast rates of change correspond to edges in a picture and are preferentially amplified by the module.

JI6 amplifies only the sharpest edges...
JI5 amplifies the sharpest edges and slightly softer edges...
JI4, JI3 and JI2 amplify progressively softer and softer edges until by JI1 almost all of the whole picture is amplified.

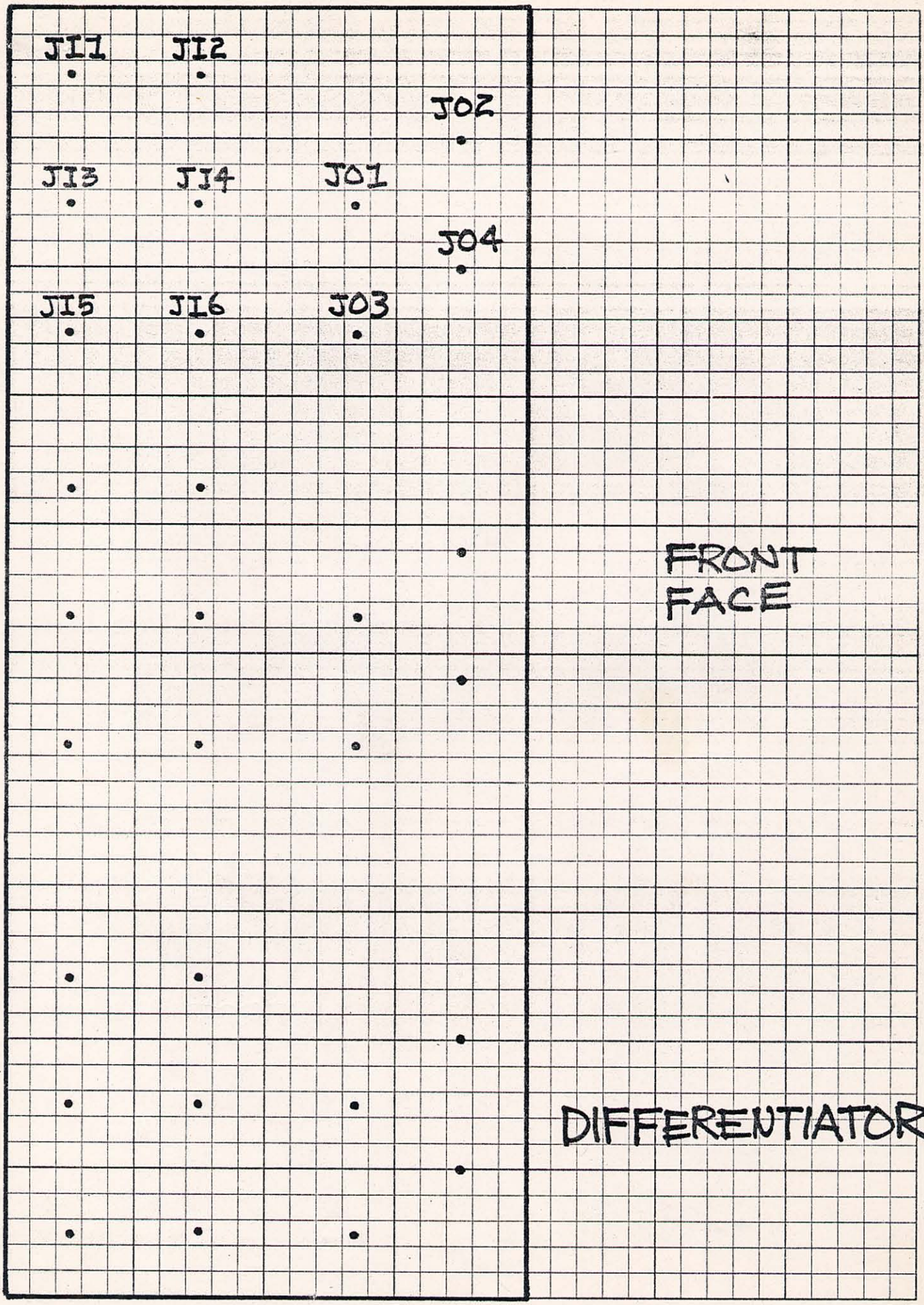
There are three electrical modules in one chassis box. One diagram is supplied, so replicate work three times. Remember to buss (connect) +12, -12 and ground from the center board to the upper and lower boards; soldering directly to the foil or connecting corresponding bypass capacitors is convenient.

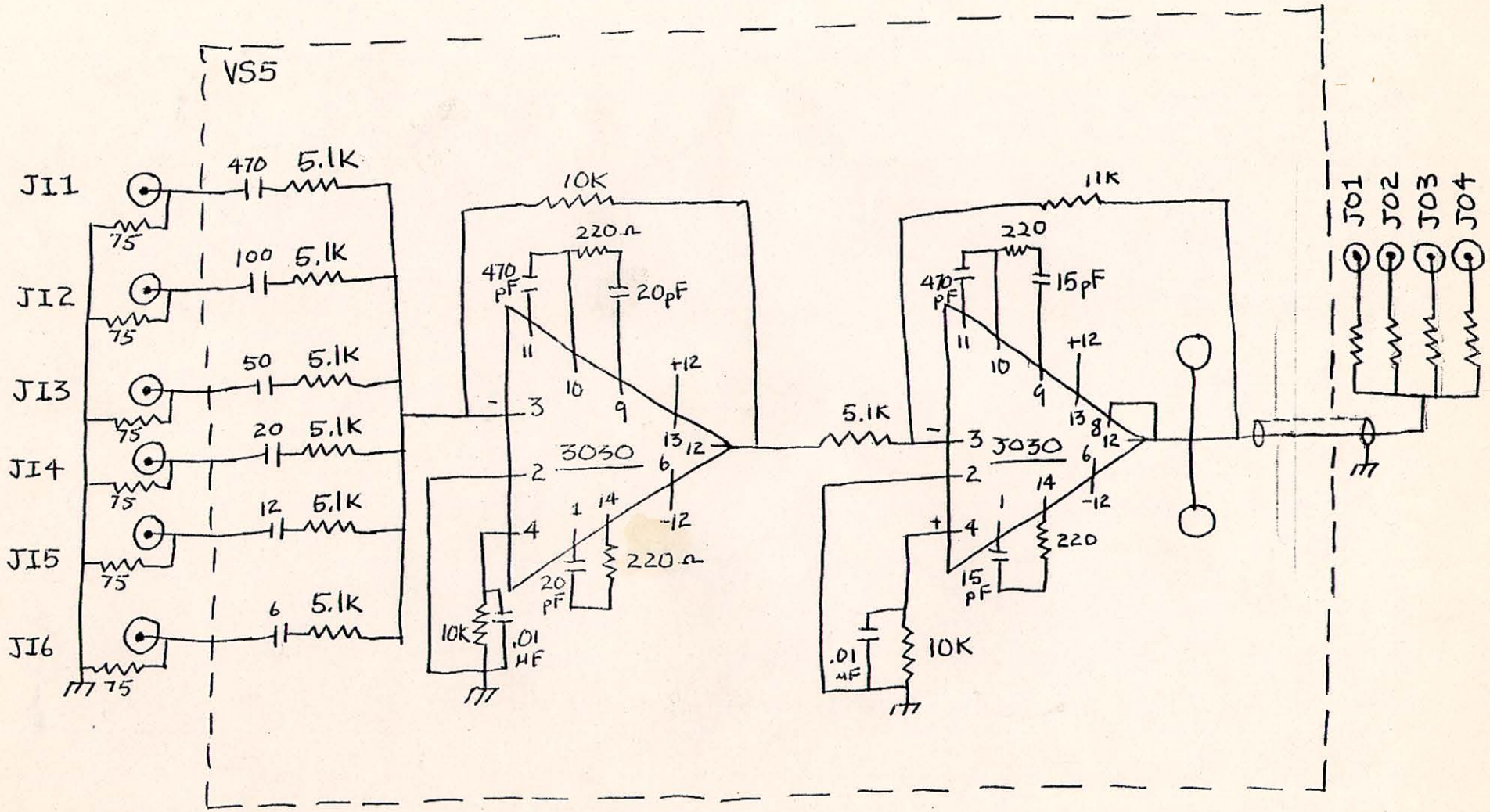
TEST STUFF:

The module should amplify high frequency (greater than 20 kHz) sine waves with greater gain than lower frequency sine waves. The sine waves should be undistorted.

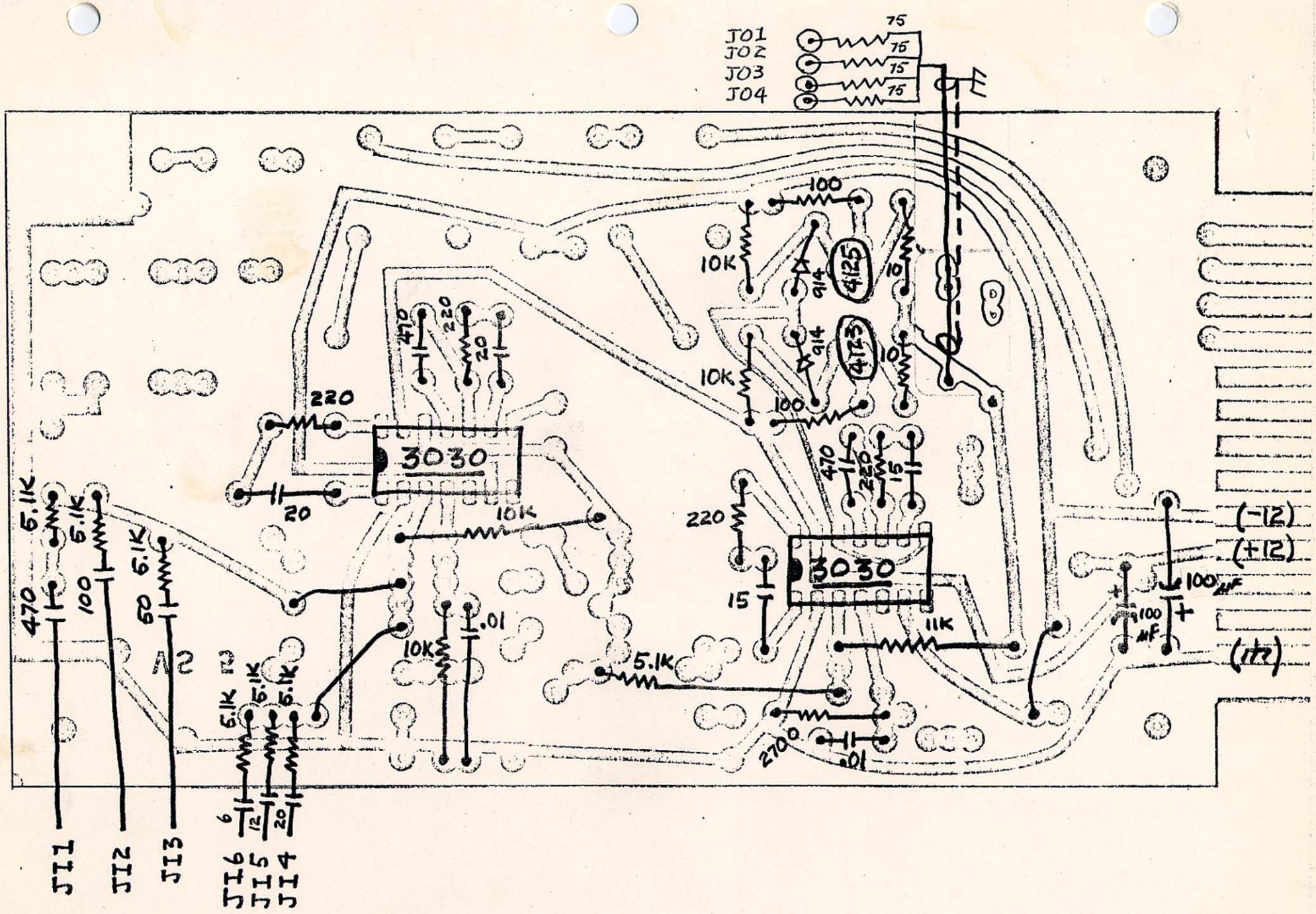
Square waves should be differentiated; that is, there should be a positive spike associated with the rising edge of the square wave, and a negative spike associated with the falling edge of the square wave.

No input should result in 0 volts output <u>+ or - .05 volts.</u>


JI1
JI2
JO2
JI3
JI4
JO1
JO4
JI5
JI6
JO3
FRONT FACE
DIFFERENTIATOR



DIFFERENTIATOR 9-75



DIFFERENTIATOR 9-15

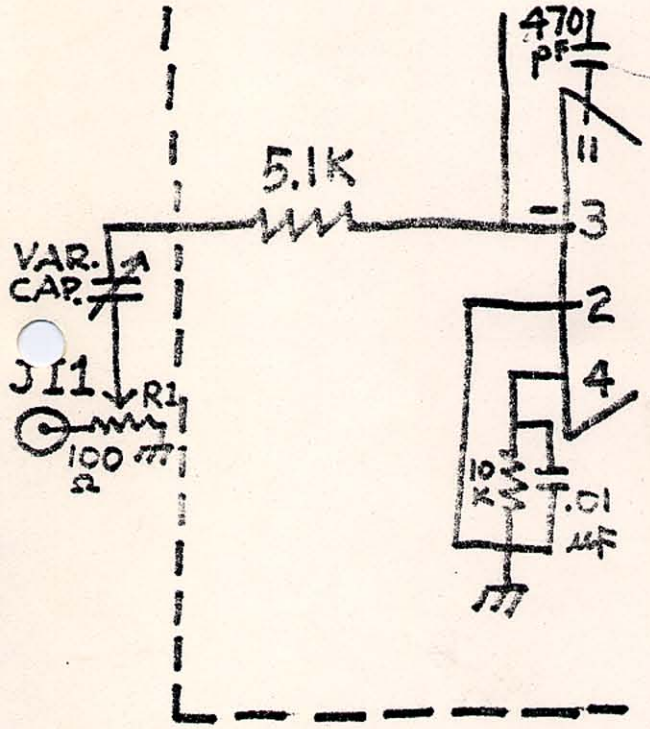
ADDENDUM

This addendum provides brief data for an optional differentiator (opt. diff.). The opt. diff. has some trade-offs compared to the original differentiator (orig. diff.). Consider the following and evaluate for yourself:

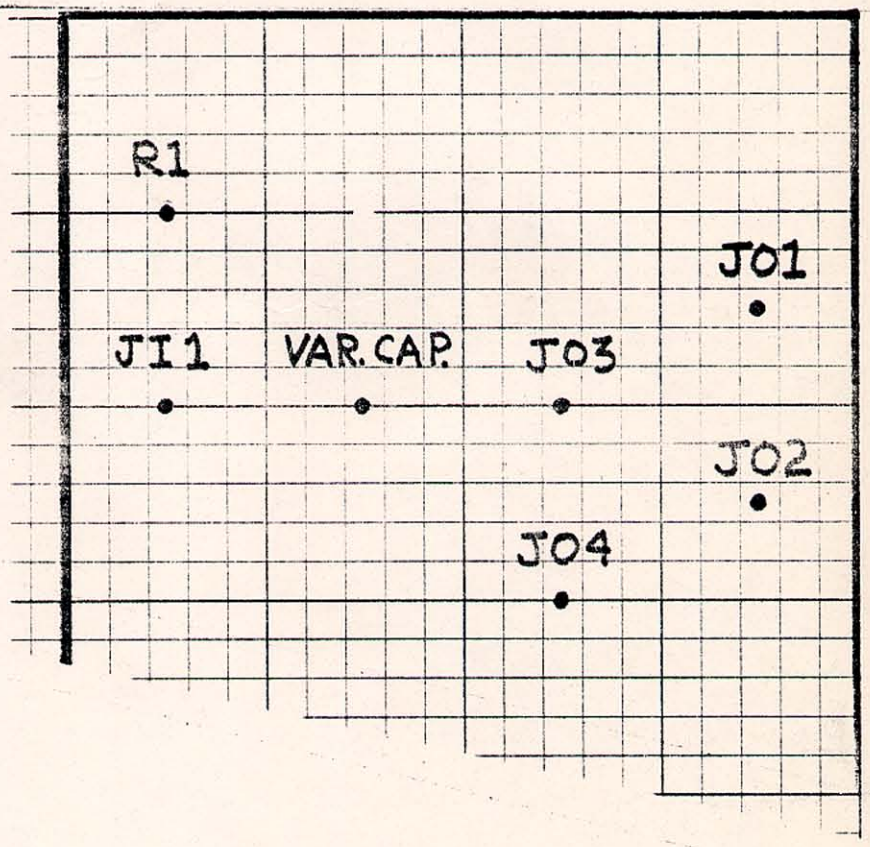
In the orig. diff. you input a signal via any 6 BNC inputs (JI1-thru-JI6); and, in the opt. diff. you input a signal to 1 BNC input (JI1), control its gain with R1, and its differentiation constant via a variable capacitor (VAR. CAP.). The VAR. CAP. will give you the same approximate differentiation constants as JI2-thru-JI6 in the orig. diff.; but, will not give you the largest differentiation constant available at JI1 in the orig. diff.

PART NUMBER FOR THE VAR. CAP. IS: ALLIED #695-2300 (7.2pf-151pf) $9.00/ea.

SCHEMATIC for opt. diff. -



FRONT FACE for opt. diff. -



		525-1060	10 OHM, 1/4 W RES	.06	A	DIF
24		525-1165	75 OHM, 1/4 W RES	.06	A	DIF
6		525-1202	100 OHM, 1/4 W RES	.06	A	DIF
12		525-1248	220 OHM, 1/4 W RES	.06	A	DIF
21		525-1467	5.1KOHM, 1/4 W RES	.06	A	DIF
15		525-1522	10KKOHM, 1/4 W RES	.06	A	DIF
3		525-1528	11KKOHM, 1/4 W RES	.06	A	DIF
3	14F1267	DM5-060D	6 PF,DIP-MICA CAP	.36	N	DIF
3	14F554	DM15-120J	12 PF,DIP-MICA CAP	.20	N	DIF
6	14F555	DM15-150J	15 PF,DIP-MICA CAP	.20	N	DIF
9	14F557	DM15-200J	20 PF,DIP-MICA CAP	.18	N	DIF
3	14F567	DM15-500J	50 PF,DIP-MICA CAP	.19	N	DIF
3	14F557	DM15-101J	100 PF,DIP-MICA CAP	.18	N	DIF
3	14F592	DM15-471J	470 PF,DIP-MICA CAP	.32	N	DIF
6	67F307	TDC-103Z	.01 MF,DSC-CER CAP.	.05	N	DIF
3	719-1200	7-0-1000	100 MF,25VDC,ELEC.	.24	A	DIF
6	553-2914	1N9146	SIL-DIODE	.19	A	DIF
3		2N4123	NPN TRANS	.22	S	DIF
3		2N4125	PNP TRANS	.27	S	DIF
5		CA3030	DIP OP-AMP,RCA	1.32	S	DIF
30	59F1337	13-236	BNC,FM-CHS.MT.	.72	N	DIF
3			VS 5 P-C BOARD			DIF
1			CHASSIS,DIF-FACE	8.25	DG	DIF

---

3 (see ADDENDUM)	695-2300	7.2-151 pf, var. cap.	9.00	A	DIF

SYNC STRIPPER and CAMERA INPUT

This module performs several related utility functions.

A video signal is inputted to JI1; this signal is clamped and sync suppressed and is available at JO1, JO2, JO3 and JO4. This part is identical to one-third of the INPUT module except the composite sync is generated internally (consult INPUT module documentation for explanation).

In addition, the video signal inputted at JI1 is separated from the sync information by the sync strip card. The vertical sync is filtered and amplified by the vertical filter-amp and distributed to output jacks.

Similiarly, the horizontal sync information is filtered and amplified and distributed to output jacks.

Burst flag and blanking information is regenerated from the horizontal and vertical sync and distributed to output jacks.

Vertical sync (-4v.) is available at JO13, JO14 and at pin#2 of the EIAJ (6-pin) camera connectors.

Horizontal sync (-4v.) is available at JO9, JO10 and at pin#5 of the EIAJ (6-pin) camera connectors.

Blanking is available at JO11 and JO12. Burst is available at JO5 and JO6

The video signal (from the camera) with composite sync is made available at the BNC connector above the corresponding EIAJ (6-pin) camera connectors.

When this module is used, the sync for the IP is stripped from the video signal inputted to JI1. If a camera is used for this purpose it should of course not be be sunk to the IP; but must be internally sunk or sunk from a non-IP source.

TEST STUFF:

R2 and R3 should be adjusted the same as R1 and R2 in the INPUT module.
The trimmer on the vertical filter amp should be adjusted so the vertical signal out is the same length as the vertical sync present in the original signal.

The trimmer on the horizontal filter amp should be adjusted so the horizontal signal out is the same as the horizontal sync in the original signal. (NOTE: these adjustments are hard to make, but are not very critical in timing).

R4, front panel associated with the sync stripper, should be adjusted to minimize any jitter in output picture.

The blanking and burst amp is a set of three identical circuits except for the timing capacitors. Referring to the schematic diagram, the first half of the 9602 sets a delay time to the pulse and the second half times the pulse.

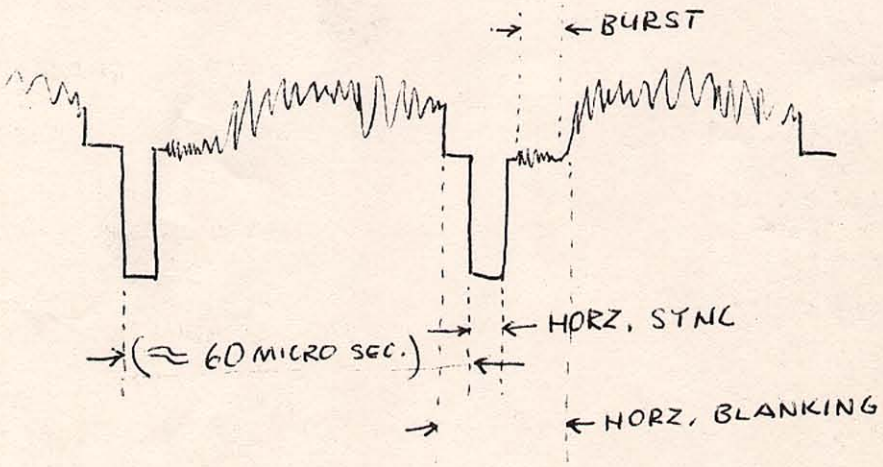
In the case of the burst flag R1T sets the delay from the beginning of the horizontal sync pulse to the beginning of the burst flag, and R2T determines the length of the burst flag.

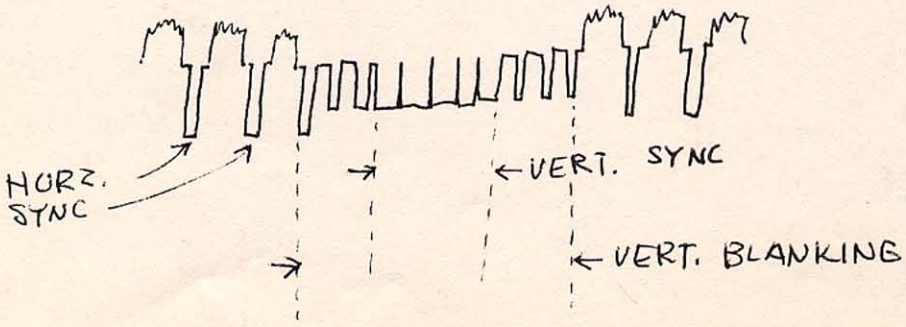
In blanking, R3T sets the delay from the beginning of the horizontal sync pulse to the beginning of the blanking pulse for the next horizontal line. This period is slightly less than on horizontal line. R4T sets the length of the blanking pulse.

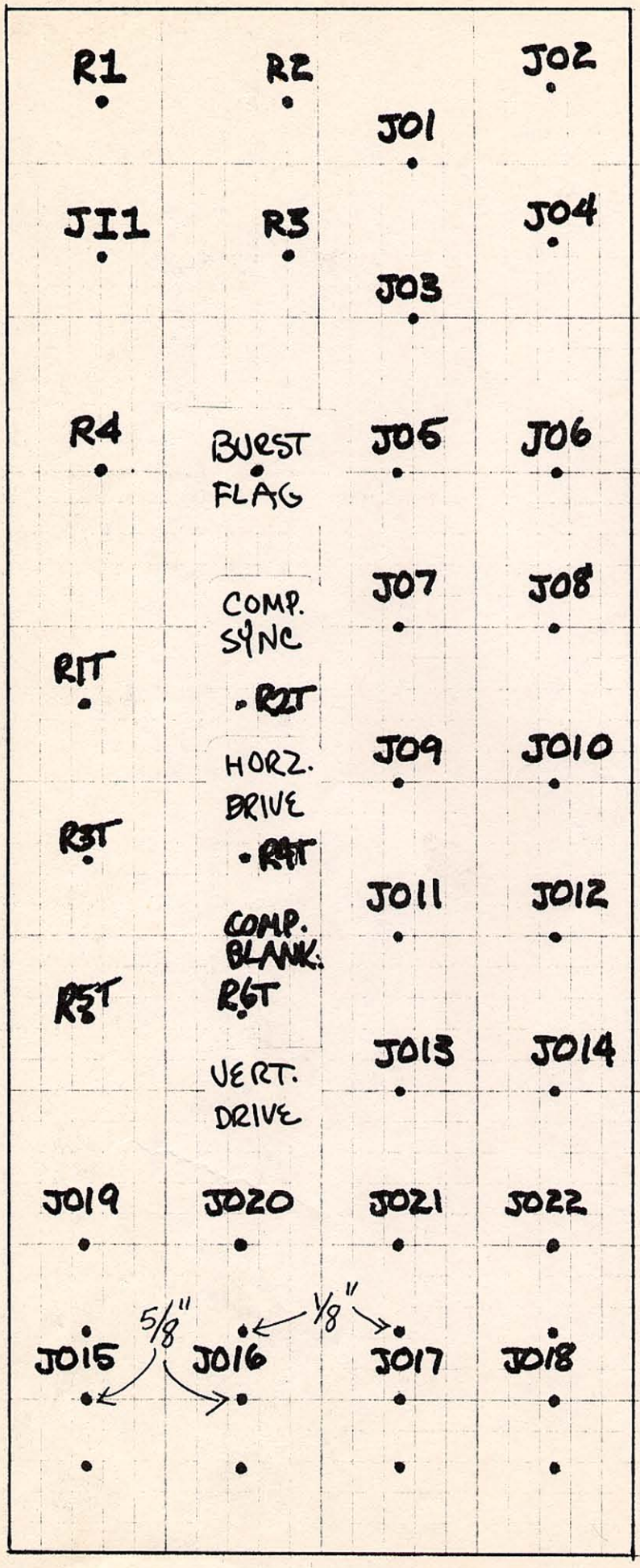
Vertical blanking is similiar with R5T setting the delay from the beginning of the vertical sync pulse to the beginning of the vertical blanking interval. R6T sets the length of the blanking interval.

To adjust all of these, feed into the module a high quality video signal (from a clearly received broadcast station or from the color encoder in the IP driven by a high quality sync generator). Adjust the output pulses from the sync strip to be identical with the pulses from the standard source.

HINT: start with all pots turned nearly full clockwise (minimum resistance). If the resistance is too high the device stays on all the time and if the resistance is too small, pulse may be too short to be seen on an inexpensive osscilloscope. A dual-trace triggered osscilloscope is preferred but a single trace scope can be used.



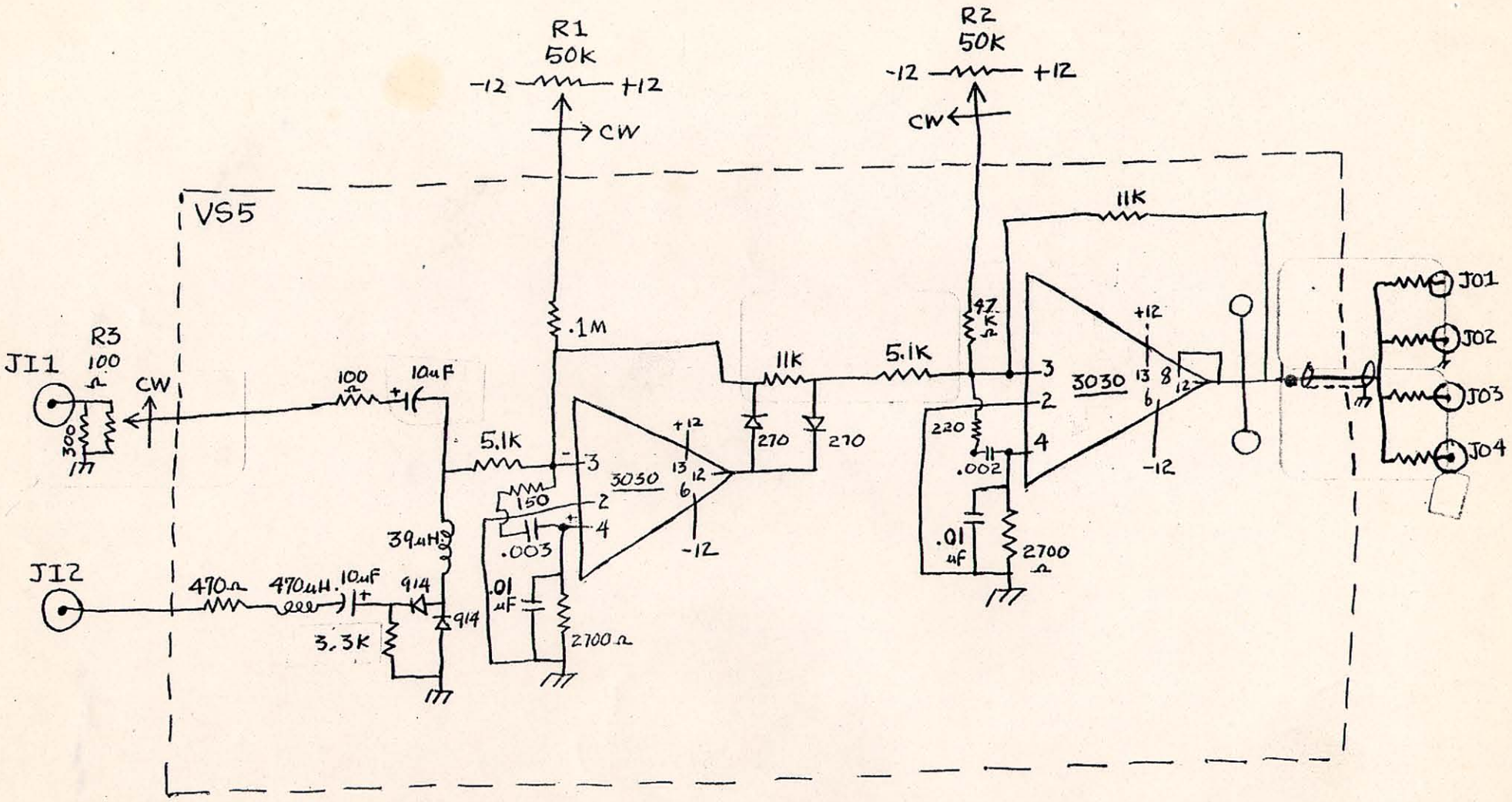




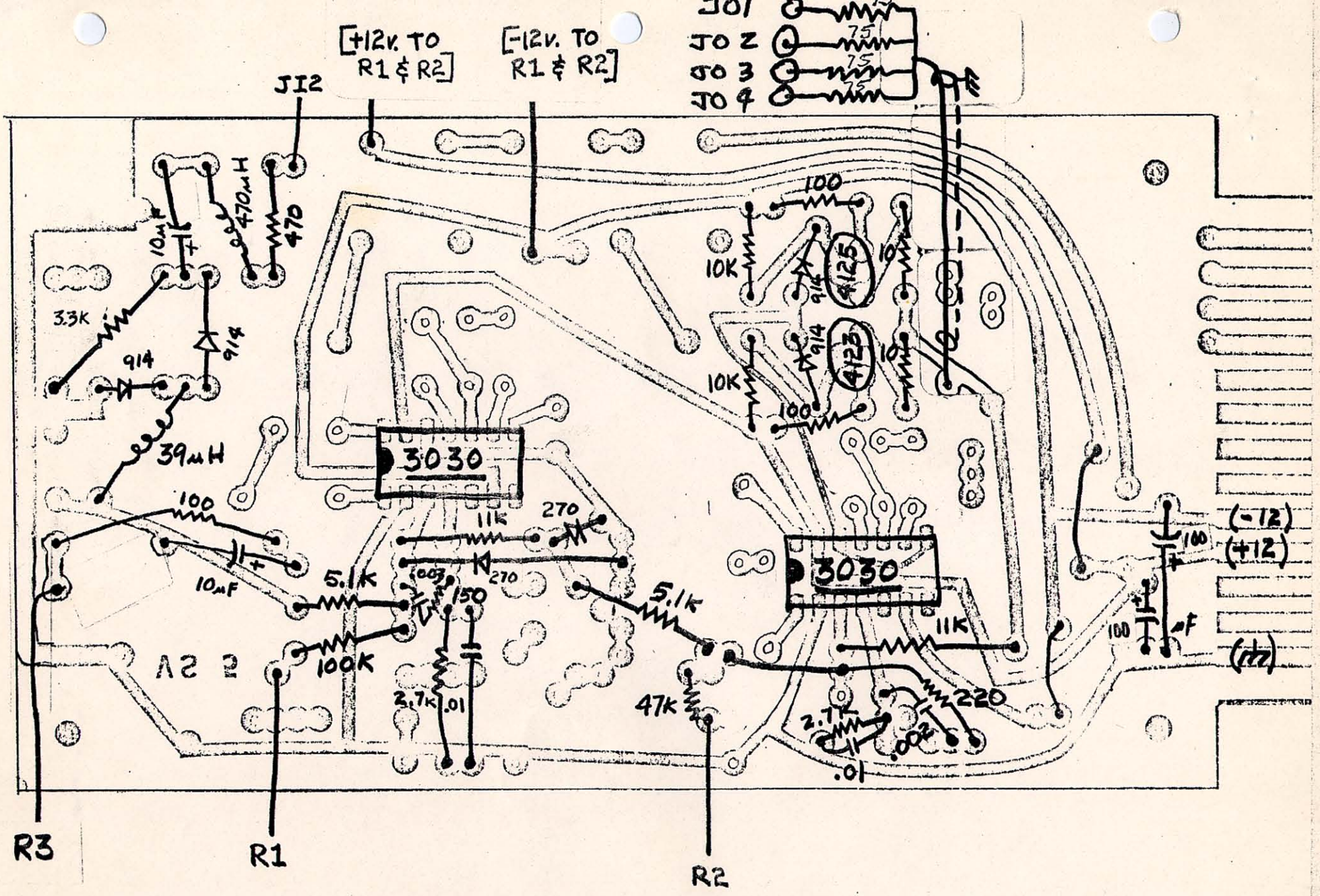
OK 9-75

FRONT FACE

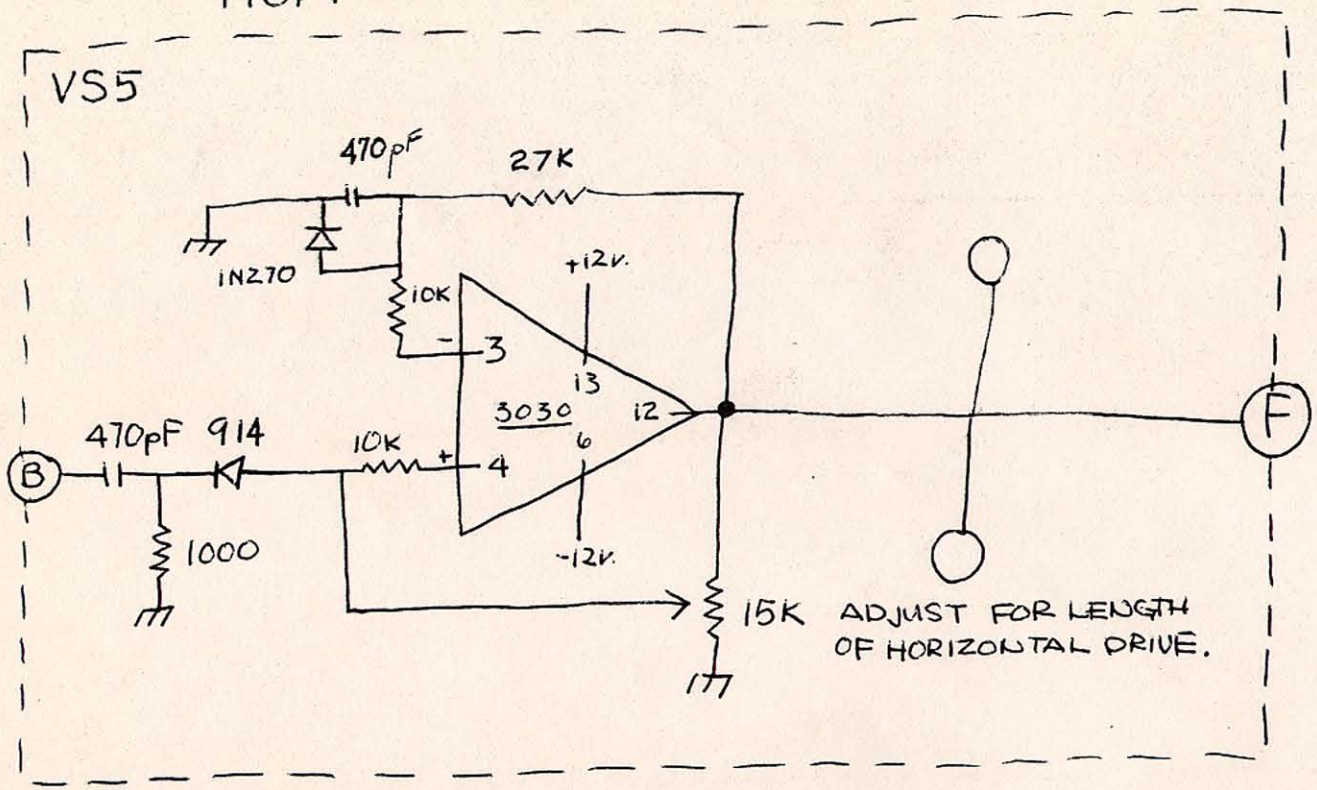
SYNC STRIPPER & CAMERA INPUT


R1
50K
-12
+12
CW
R2
50K
-12
+12
CW
VS5
11K
.1M
R3
100
JI1
CW
300
100
10uF
5.1K
150
.003
3050
+12
13
12
6
-12
270
270
11K
5.1K
47 K
3030
+12
13
8
12
6
-12
220
.002
.01 uF
2700
JO1
JO2
JO3
JO4
39uH
JI2
470
470uH
10uF
914
914
3.3K
.01 uF
2700

INPUT

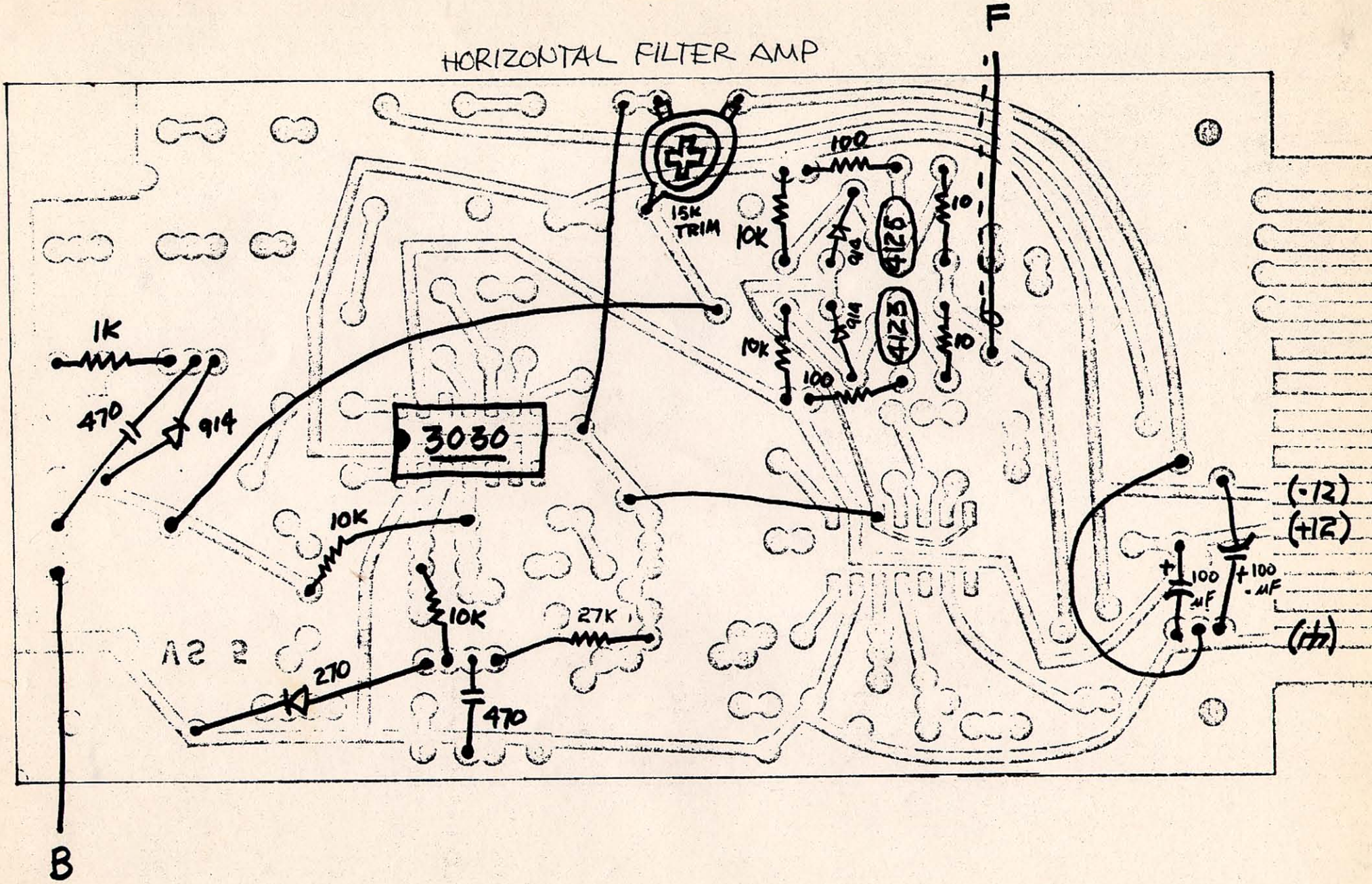

[+12v. TO R1 & R2]
[-12v. TO R1 & R2]
JO1
JO2
JO3
JO4
75
75
75
JI2
10μF
470μH
470
3.3K
914
914
39μH
100
10μF
5.1K
100K
11K
270
.003
270
150
3.7K
.01
5.1K
47K
3030
3030
100
10K
914
4125
10
914
4123
10
10K
100
11K
2.7K
.01
.02
220
100
100
(-12)
(+12)
R3
R1
R2
INPUT
9-75

HORIZONTAL FILTER AMP



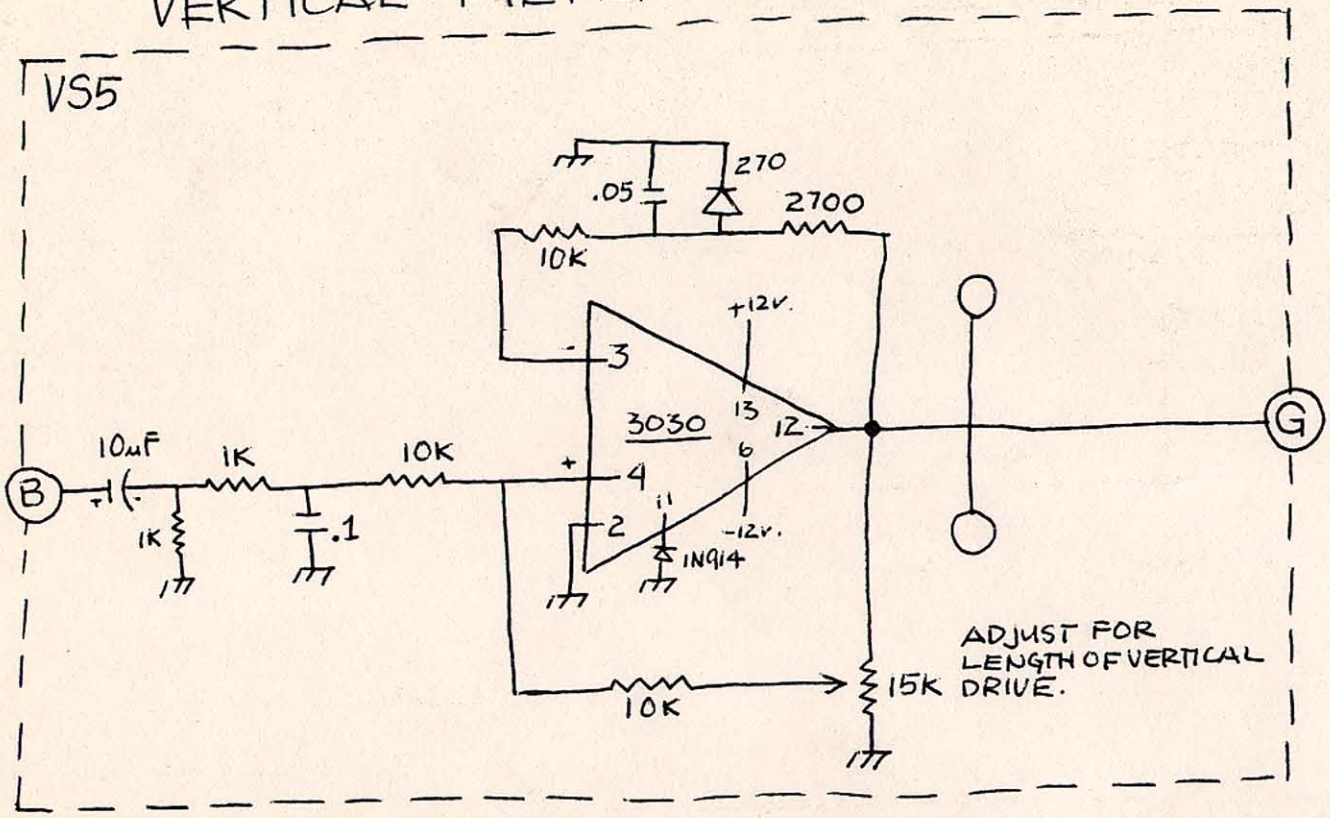
SYNC STRIPPER & CAMERA INPUT

HORIZONTAL FILTER AMP



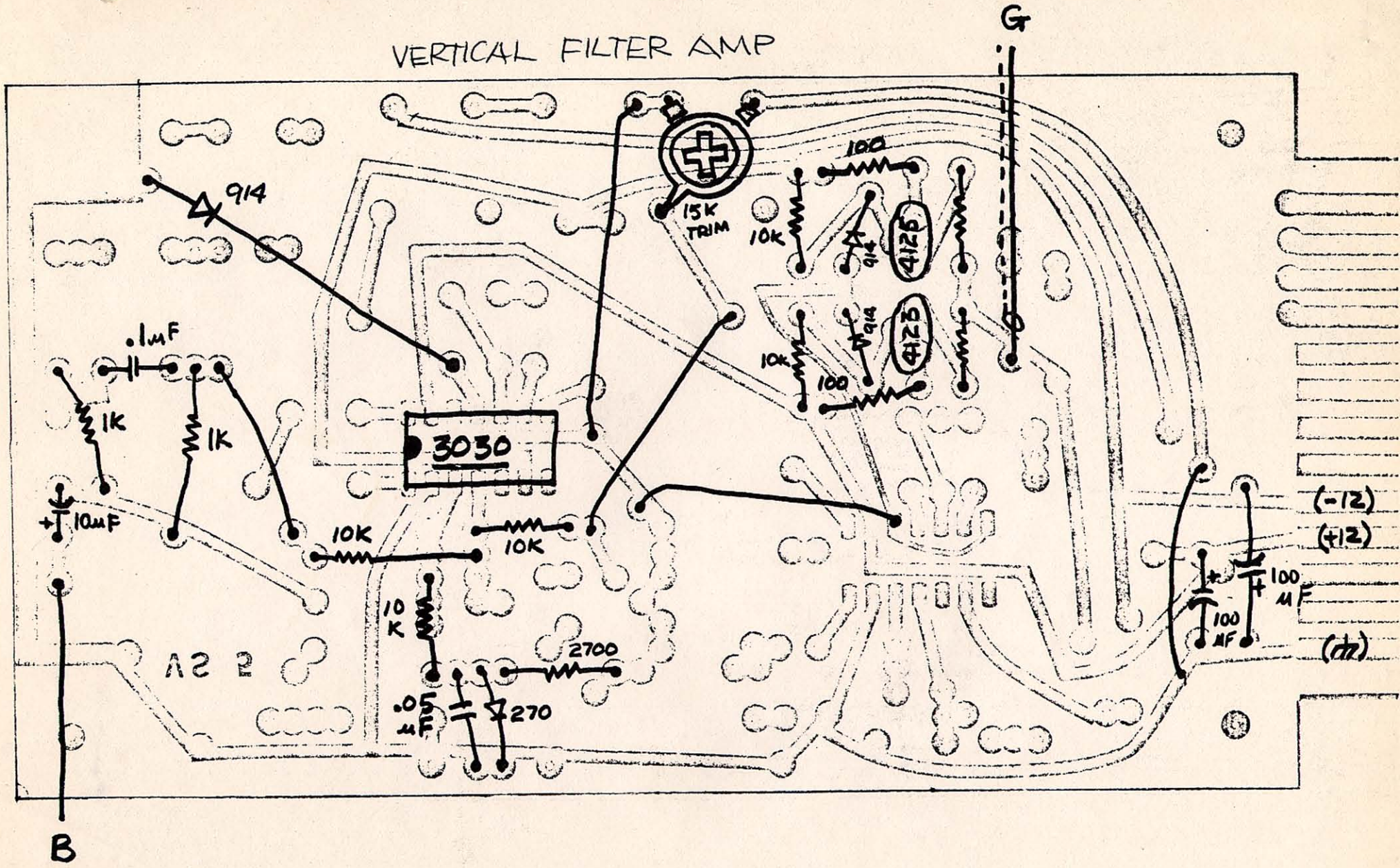
SYNC STRIPPER & CAMERA INPUT

VERTICAL FILTER AMP



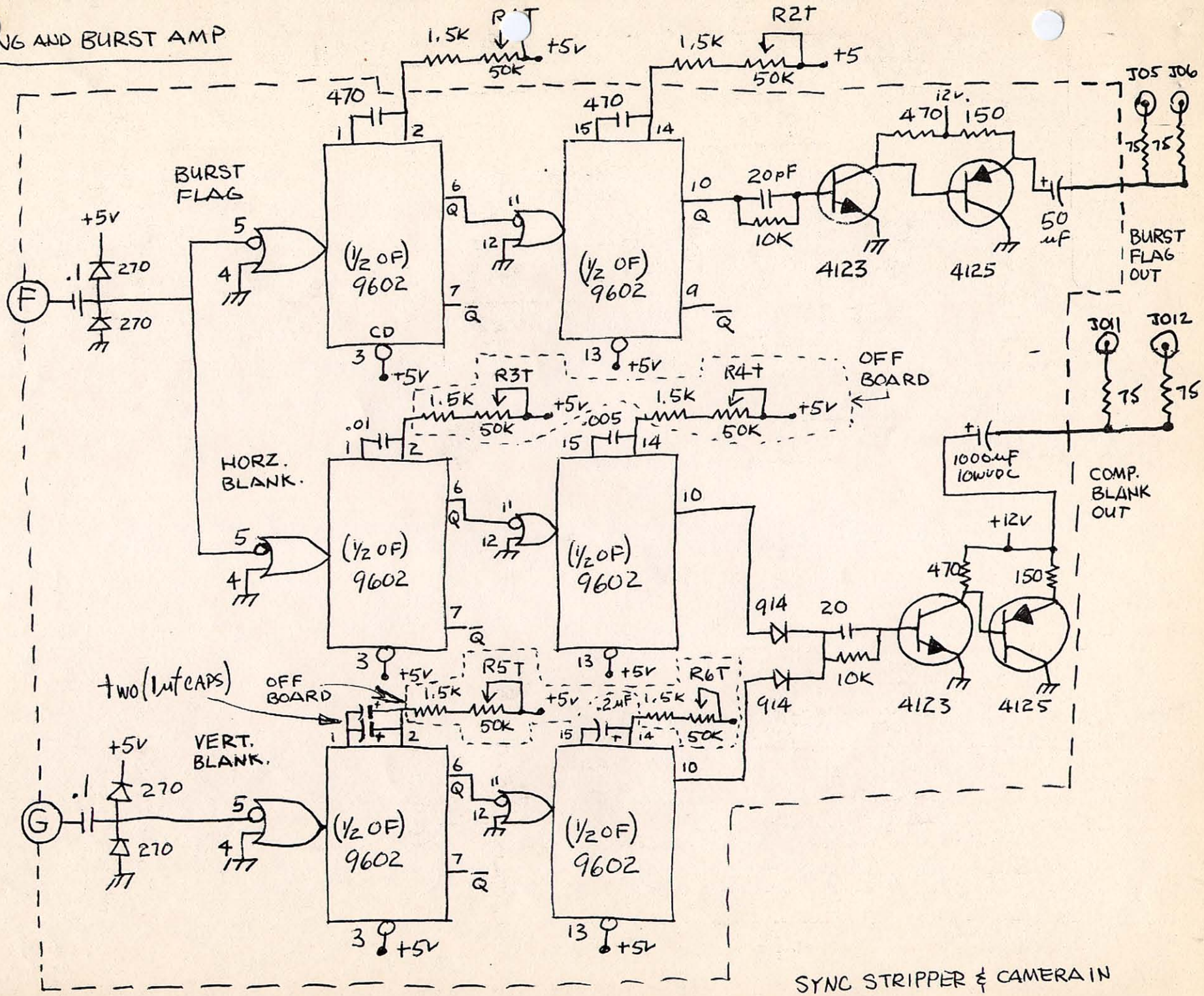
SYNC STRIPPER & CAMERA INPUT

VERTICAL FILTER AMP



SYNC STRIPPER & CAMERA INPUT

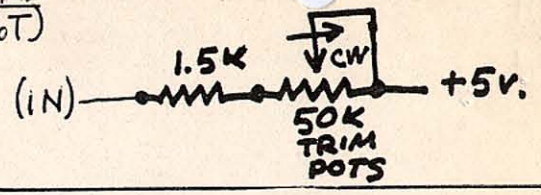
BLANKING AND BURST AMP



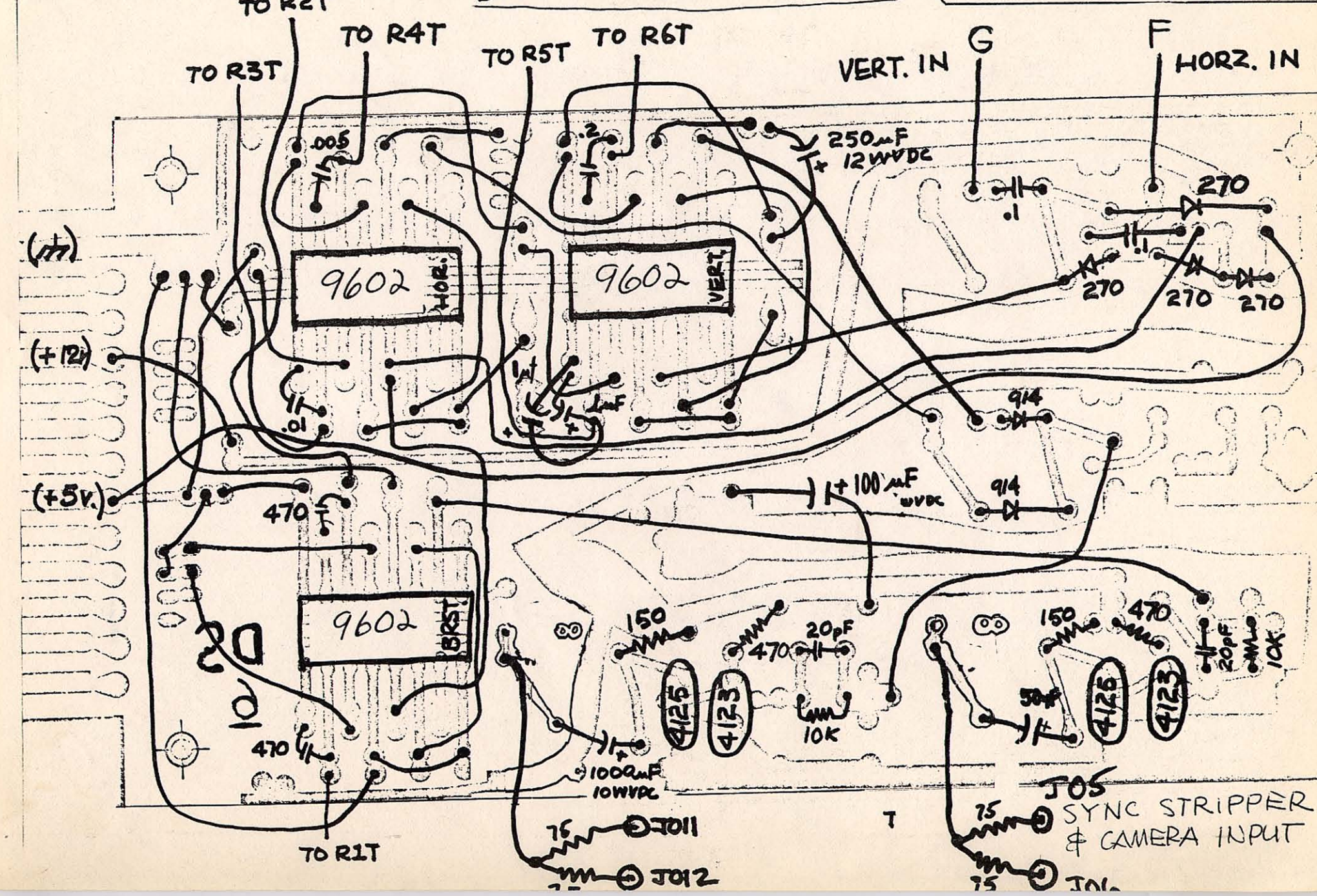
SYNC STRIPPER & CAMERA IN

R1T THROUGH R6T (TRIM POTS) SHOULD BE MOUNTED ON A HOME-MADE PLASTIC, MASONITE??? BOARD PUT IN THE LEFT SIDE (FROM FRONT VIEW) OF MODULE. SHOULD BE SCREW DRIVER ADJUSTABLE THROUGH SIDE PANEL, SO DRILL HOLES APROPRIATELY.

EXAMPLE:
(R1T-R6T)



BLANKING & BURST AMP



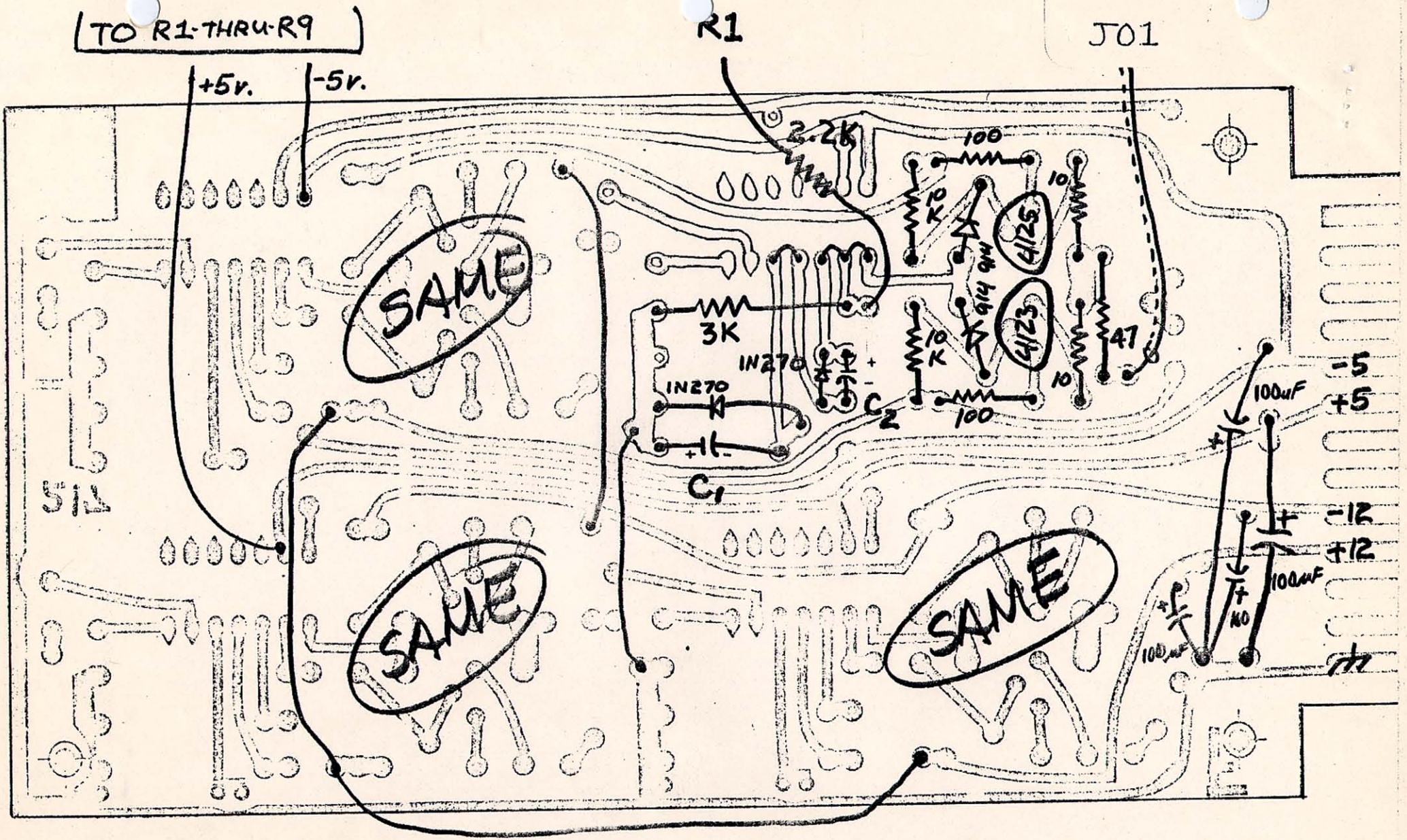
6		525-1060	10 OHM, 1/4 W RES	.06	A	IP
12		525-1165	75 OHM, 1/4 W RES	.06	A	IP
9		525-1202	100 OHM, 1/4 W RES	.06	A	IP
3		525-1248	220 OHM, 1/4 W RES	.06	A	IP
3		525-1270	300 OHM, 1/4 W RES	.06	A	IP
2		525-1467	5.1KOHM, 1/4 W RES	.06	A	IP
6		525-1522	10KKOHM, 1/4 W RES	.06	A	IP
6		525-1526	11KKOHM, 1/4 W RES	.06	A	IP
6		525-1717	100KOHM, 1/4 W RES	.06	A	IP
3		525-1302	470 OHM, 1/4 W RES	.06	A	IP
8		525-1421	2.7KOHM, 1/4 W RES	.06	A	IP
3		525-1433	3.3KOHM, 1/4 W RES	.06	A	IP
3		525-1650	47KKOHM, 1/4 W RES	.06	A	IP
3			150 OHM 1/4 W RES	.06	A	IP
6	10F655		50K TRIM,LOK,PNL-MT	3.00	N	IP
3	9F073	U1	100 OHM POT 1/4SFT	1.45	N	IP
3			.002 pF			
~~1~~	~~[illegible]~~	~~[illegible]~~	~~15 PF,DIP MICA CAP~~	~~.26~~	~~N~~	~~IP~~
6	14F592	DM15-417J	470 PF,DIP-MICA CAP	.32	N	IP
6	67F307	TDC-103Z	.01 MF,DSC-CER CAP.	.05	N	IP
6	71K-1251	2-6-101	10 MF,25VDC,ELEC.	.44	A	IP
6	71K-1260	7-6-1000	100 MF,25VDC,ELEC.	.24	A	IP
3			.003 pF			
8	553-0914	1N9146	SIL-DIODE	.19	A	IP
		1N270	GERM-DIODE	.22	S	IP
3		2N4123	NPN TRANS	.22	S	IP
3		2N4125	PNP TRANS	.27	S	IP
6		CA3030	DIP OP-AMP,RCA	1.32	S	IP
3	55F1956	SWD 39	39 MICROHENRY CHOKE	2.91	N	IP
3	55F1969	SWD470	470 MICROHENRY CHOK	2.91	N	IP
3			VSS P-C BOARDS			IP
16	39F1337	13-236	BNC,FM-CHS.MT.	.72	N	IP
1			CHASSIS,INPUT-FACE	8.25	DG	IPM
3	R8-67-1-DC-M-L-9		KNOB,BLACK/INLAY299	1.00	R	IP

REFERENCE MODULE:

The Reference module produces a constant voltage proportional to front panel knob position. It uses 2¼ #217 printed circuit boards; save other 3/4 of board for making 3-D Joystick later...

Joystick and slide pot inputs could be created in analogous manner. The value of input resistor, R1 through R9, is not critical; for instance if 5K ohm pots in joysticks are available, use them.

Capacitors C_1, C_2, are used to filter out noise. 100uF is the minimum and does not affect the feel much. Dan chose 250uF and Phil chose 1000uF; 1000uF is very 'slushy'.



CAPACITORS C_1, C_2, MAY BE ANY VALUE BETWEEN 100uf — 1000uf.

REFERENCE

$I = .0009615 \approx .001$ or 1mA

$E = .001 \times 2200$

$E = 2.2V$

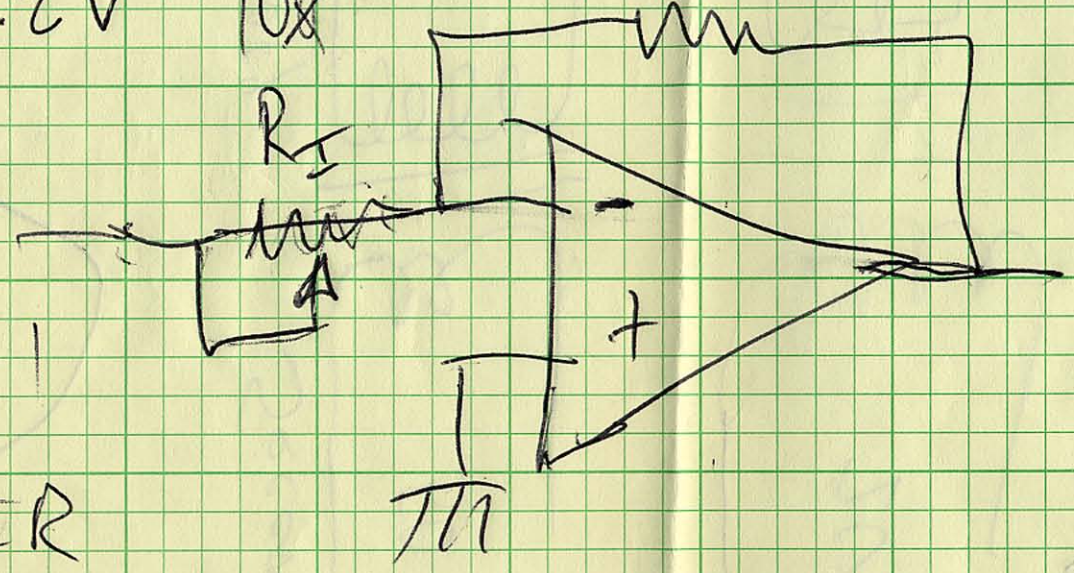
100

R_F

$V_{IN} \times R_F / R_I = V_{OUT}$

10X

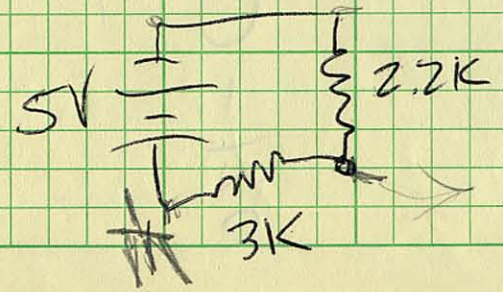
R_I



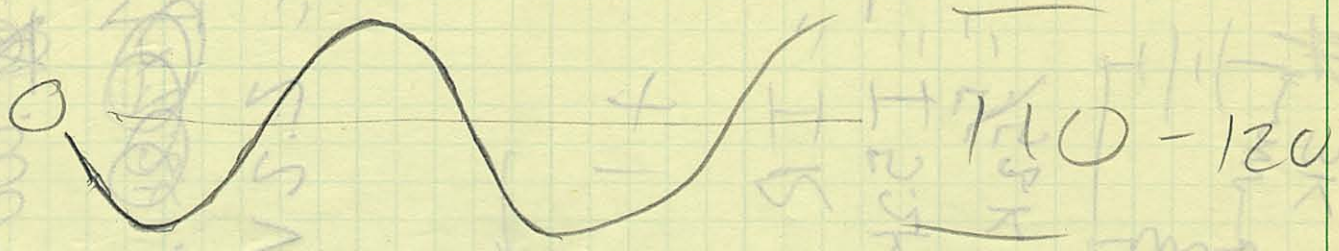
$E = IR$

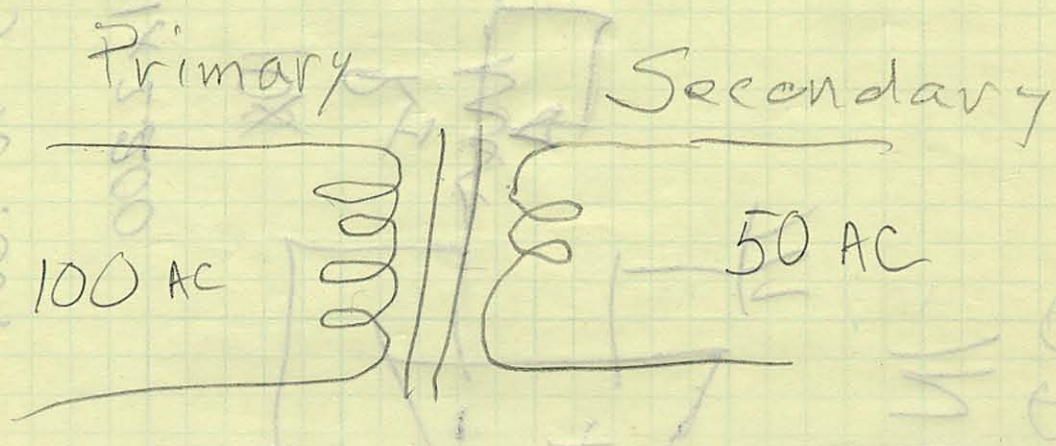
$5 = I\,5.2K$

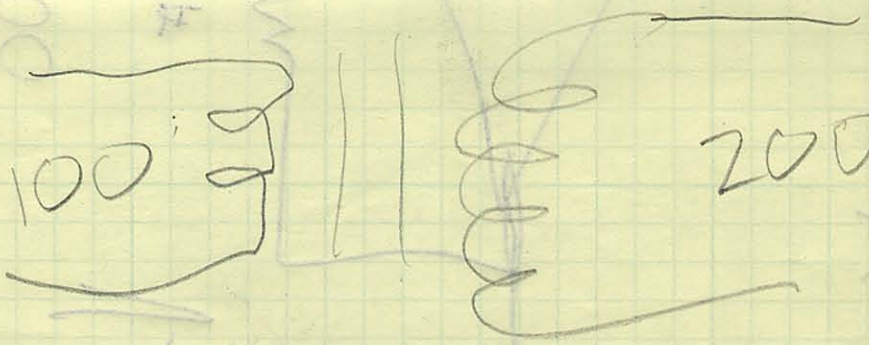
$I = 5/5.2K$

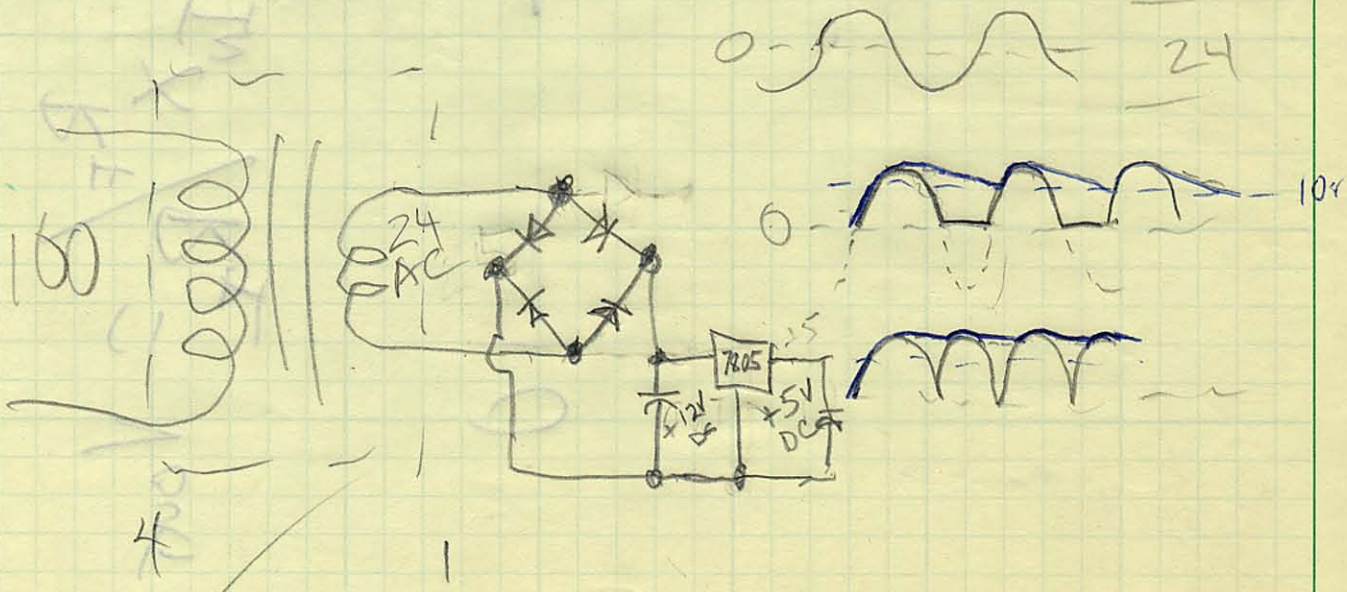


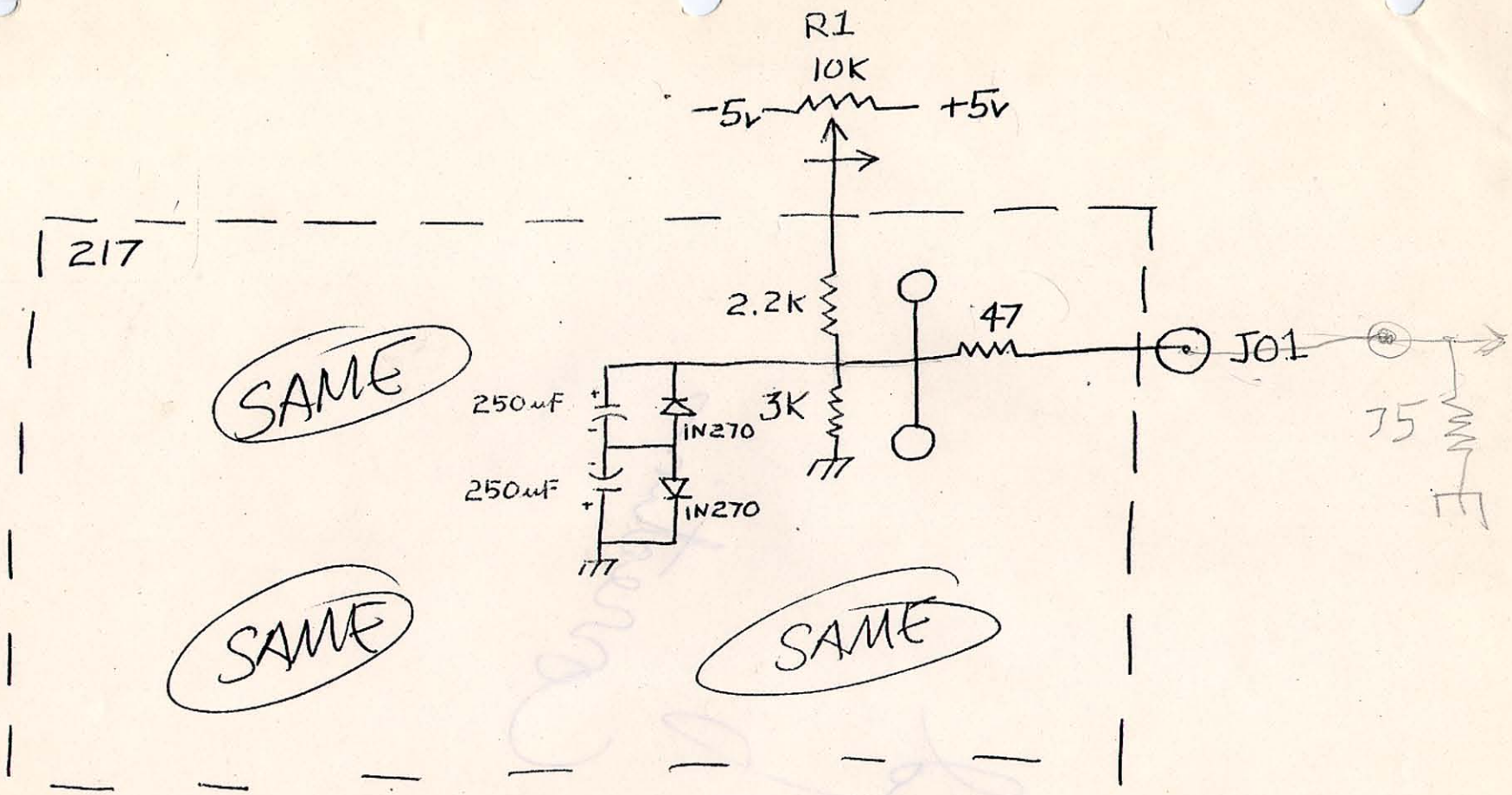
INVERTING OP AMP

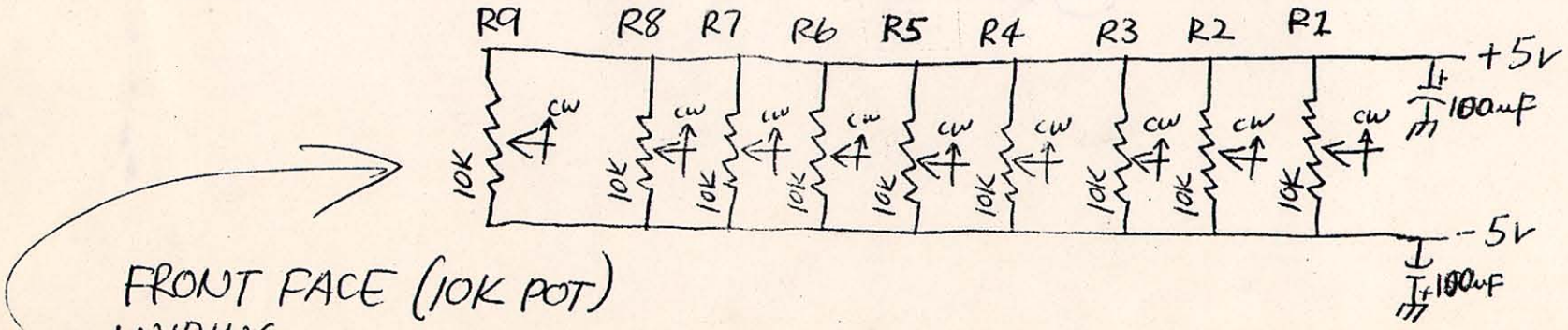

0
110 - 120


Primary
Secondary
100 AC
50 AC


100
200


0
24
100
24 AC
7805
12V
+5V DC
0
10





FRONT FACE (10K POT) WIRING

REFERENCE

[illegible]		525-1000	10 OHM, 1/4 W RES	.06	A	REF
9		525-1153	47 OHM, 1/4 W RES	.06	A	REF
10		525-1202	100 OHM, 1/4 W RES	.06	A	REF
9		525-1405	2.2KOHM, 1/4 W RES	.06	A	REF
9		525-3427	3K OHM, 1/4 W RES	.06	A	REF
10		525-1522	10KKOHM, 1/4 W RES	.06	A	REF
9	10F453	103UA	10K OHM POT 1/4SFAB	2.21	N	REF
4	710-1250	7-6-1000	100 MF,25VDC,ELEC.	.24	A	REF
10	553-0914	1N9148	SIL-DIODE	.19	A	REF
9		2N4123	NPN TRANS	.22	S	REF
9		2N4125	PNP TRANS	.27	S	REF
3			217 P-C BOARD			REF
2	59r1337	13-236	BNC,FM-CHS.MT.	.72	N	REF
1			CHASSISREFRENCE-FAC	8.25	DG	REF
9	[illegible]-67-1-0C-M-0-9		ANOB,BLACK/INLAY299	1.00	R	REF

18		1N270	GERM-DIODE	.22	S	REF
18		710-1260	100uF, 25v, ELECT.		A	REF
-or-						
18		710-1218	250uF, 12v, ELECT.		A	REF
-or-						
18		623-0701	470uF, 16v, ELECT.		A	REF
-or-						
18		623-0703	1000uF ELECT.		A	REF

AMPLITUDE CLASSIFIER

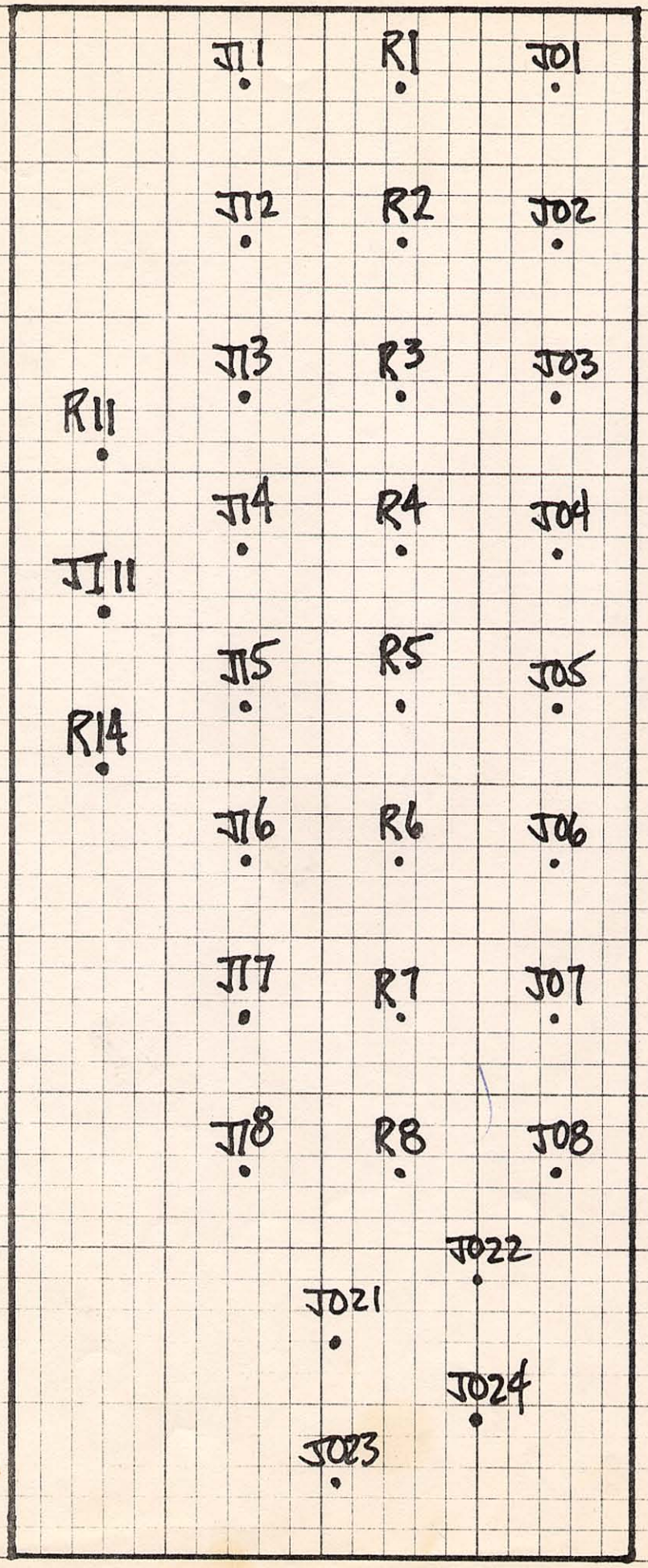
The amplitude classifier takes an input signal at JI 11and separates it into 8 contigeous regions varying from black to white. The value put out by each region is controled by R 1 through R 8 and by signals inputed to JI 1 through JI8. The output signals are available for each region seperately, JO 1 through JO 8. The sum of these signals is available at JO 21 through JO 24. The effect of JI 1, JI2, R 2, etc., is additive in each region. R11 controls the gain of the signal inputed at JI 11, and R 14 generates a bias (constant gray level proportional to knob position) which is added to the input signal. In general, R 11 and R 14 are used to match the incoming signal to the lightest, or 'top and 'darkest' or 'bottom' of the 8 regions.

TEST INFORMATION

These tests are best performed with a 1 volt, peak to peak triangle wave inputed to JI 11, and a calibrated dual trace oscilloscope connected to the input and output of the amplitude classifier. R 13 is adjusted so that a +.4 volt signal activates channel 8 (bottom). R 12 is adjusted so that a +.4 volt signal activates channel 1 (top). R11 should be full clockwise and R 14 should be in the exact center of rotation. R 12 and R13 interact greatly, so, repeat adjustments until both conditions can be met simultaneously. R 16 should be adjusted so that with R 1 through R 8 in their centers the individual output are near 0 volts when not activated. R 15 should be adjusted so the summed output appearing at JO 21 through JO 24 is 0 volts for the non-activated channels.

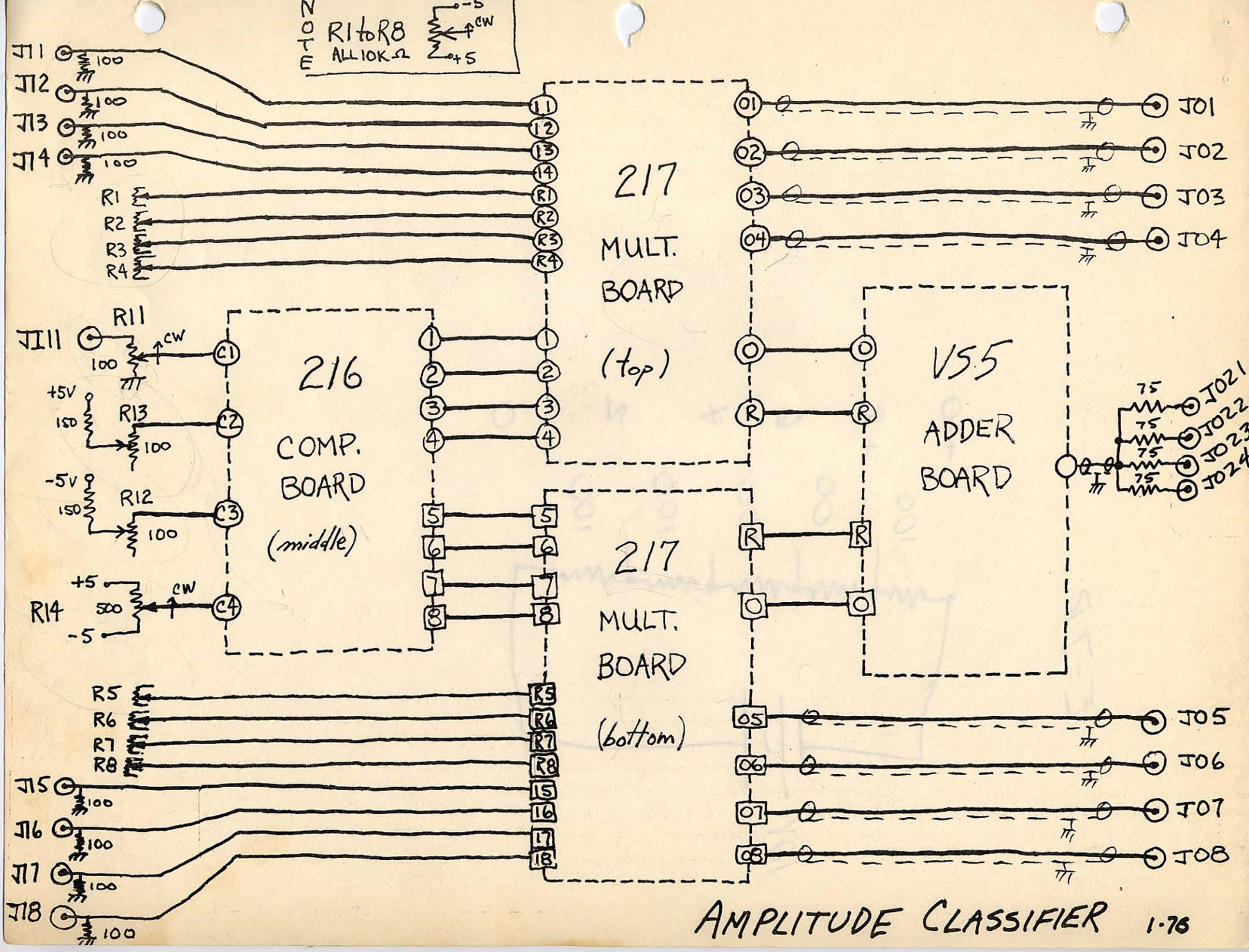
BASIC CIRCUIT DESCRIPTION AND TEST INFORMATION--AMPLITUDE CLASSIFIER

A signal at JI11 is sent to all comparators. The resistor string of 100 ohm resistors combined with voltage sources at R 13 and R 12 bias so that IC 1 switches on at a higher (+) voltage than IC 2, IC 2 switches on at a higher voltage than IC 3, etc.. For example; with 0 volts at JI 11, IC 5,6,7 might be on and IC 1,2,3,4 would be off. The transistors connected to the outputs of the comparators decode the comparator string output such that only the highest comparator on is outputed. In this example, channel 5 would be on, all others off. This signal is sent to the multiplier associated with channel 5, turning it on. All other multipliers would be off.

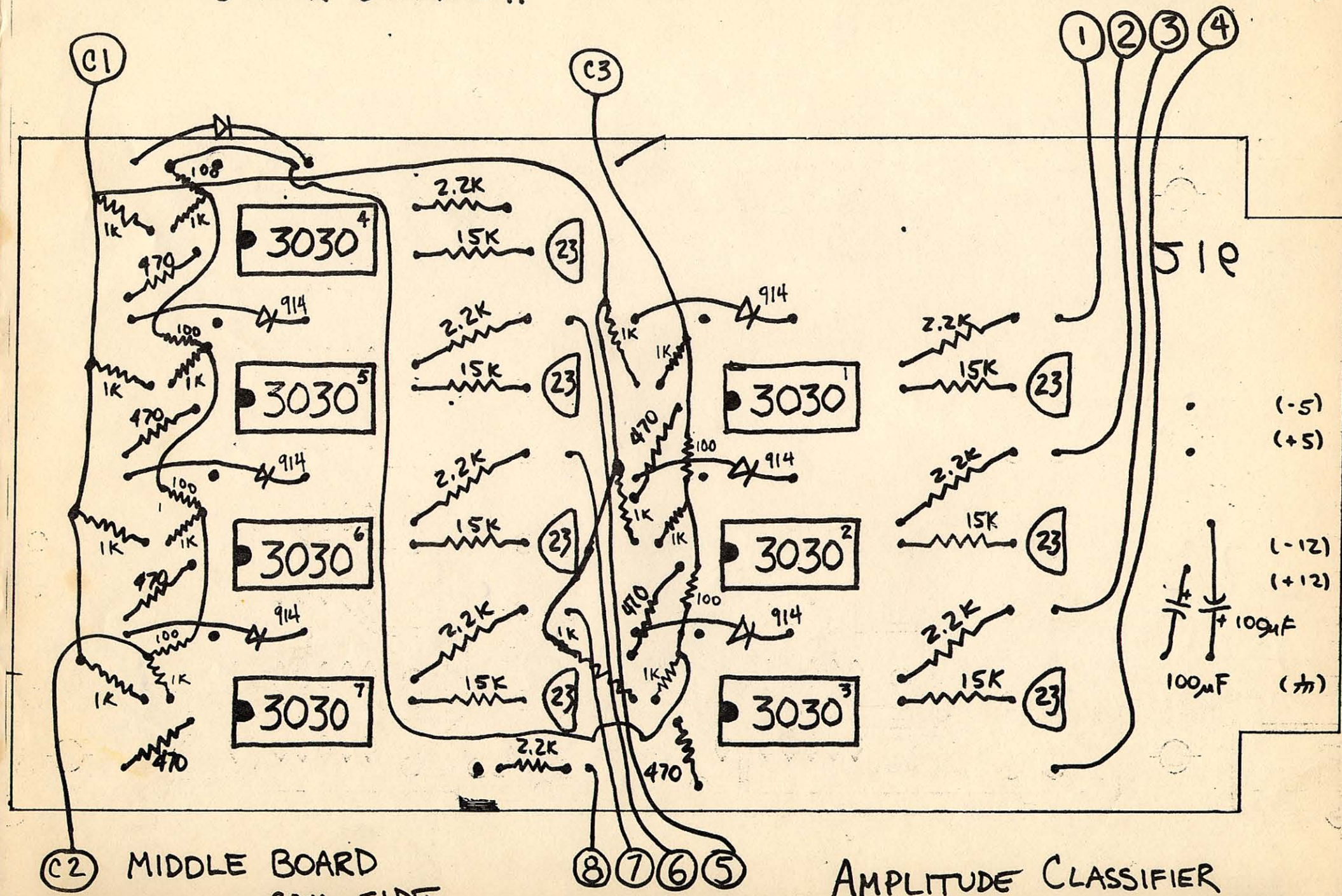


AMPLITUDE CLASSIFIER

FACE 1-78


NOTE
R1 to R8
ALL 10K Ω
-5
CW
+5
J11
J12
J13
J14
100
R1
R2
R3
R4
217
MULT.
BOARD
(top)
J01
J02
J03
J04
R11
J111
CW
+5V
150
R13
-5V
R12
+5
R14
500
-5
216
COMP.
BOARD
(middle)
C1
C2
C3
C4
V55
ADDER
BOARD
75
J021
J022
J023
J024
217
MULT.
BOARD
(bottom)
R5
R6
R7
R8
J15
J16
J17
J18
J05
J06
J07
J08
AMPLITUDE CLASSIFIER
1-76

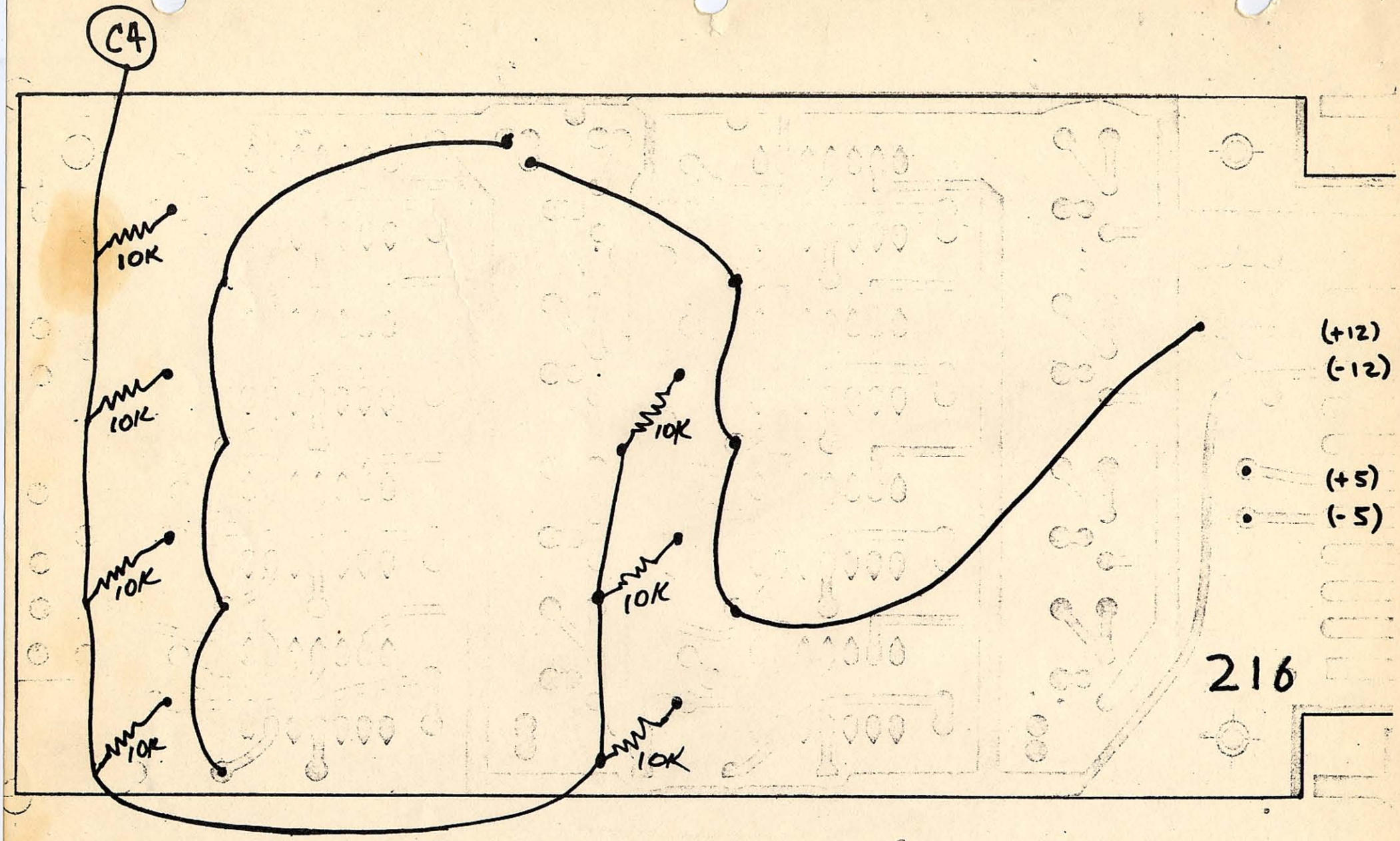
NOTE: BUS POWER TO ALL OTHER BOARDS!!



MIDDLE BOARD
COM. SIDE

AMPLITUDE CLASSIFIER

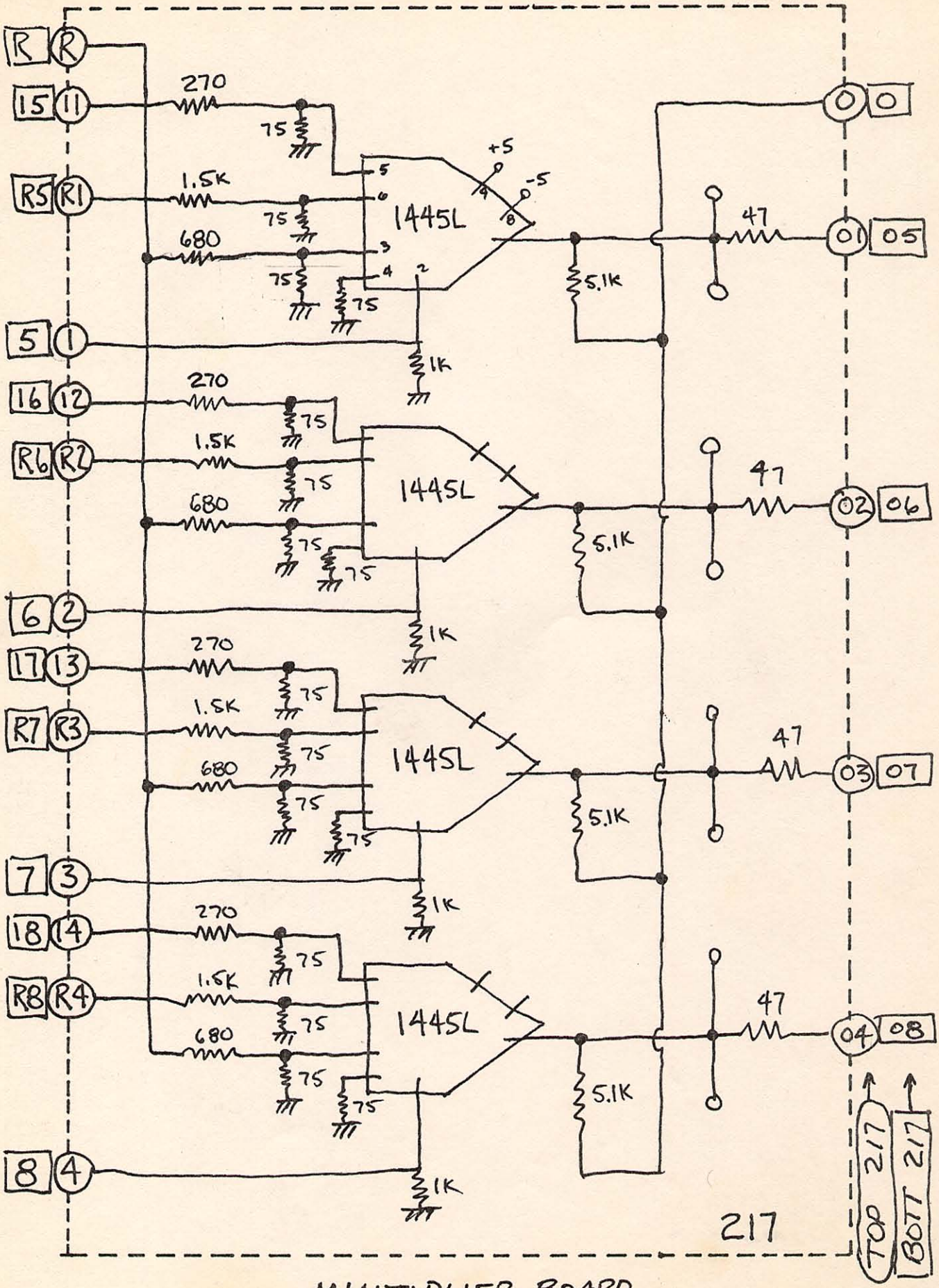
9-75



MIDDLE BOARD
FOIL SIDE

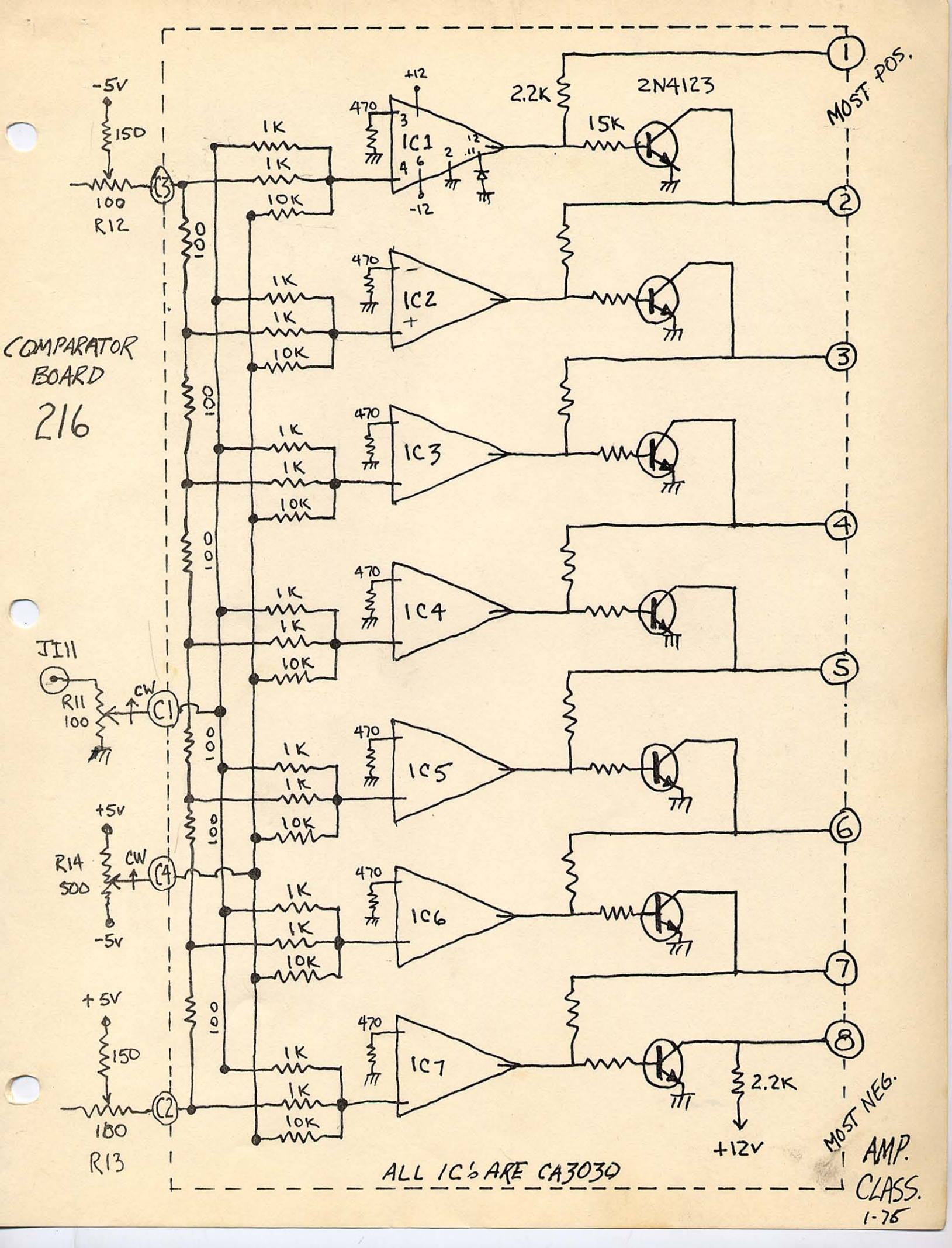
AMPLITUDE CLASSIFIER

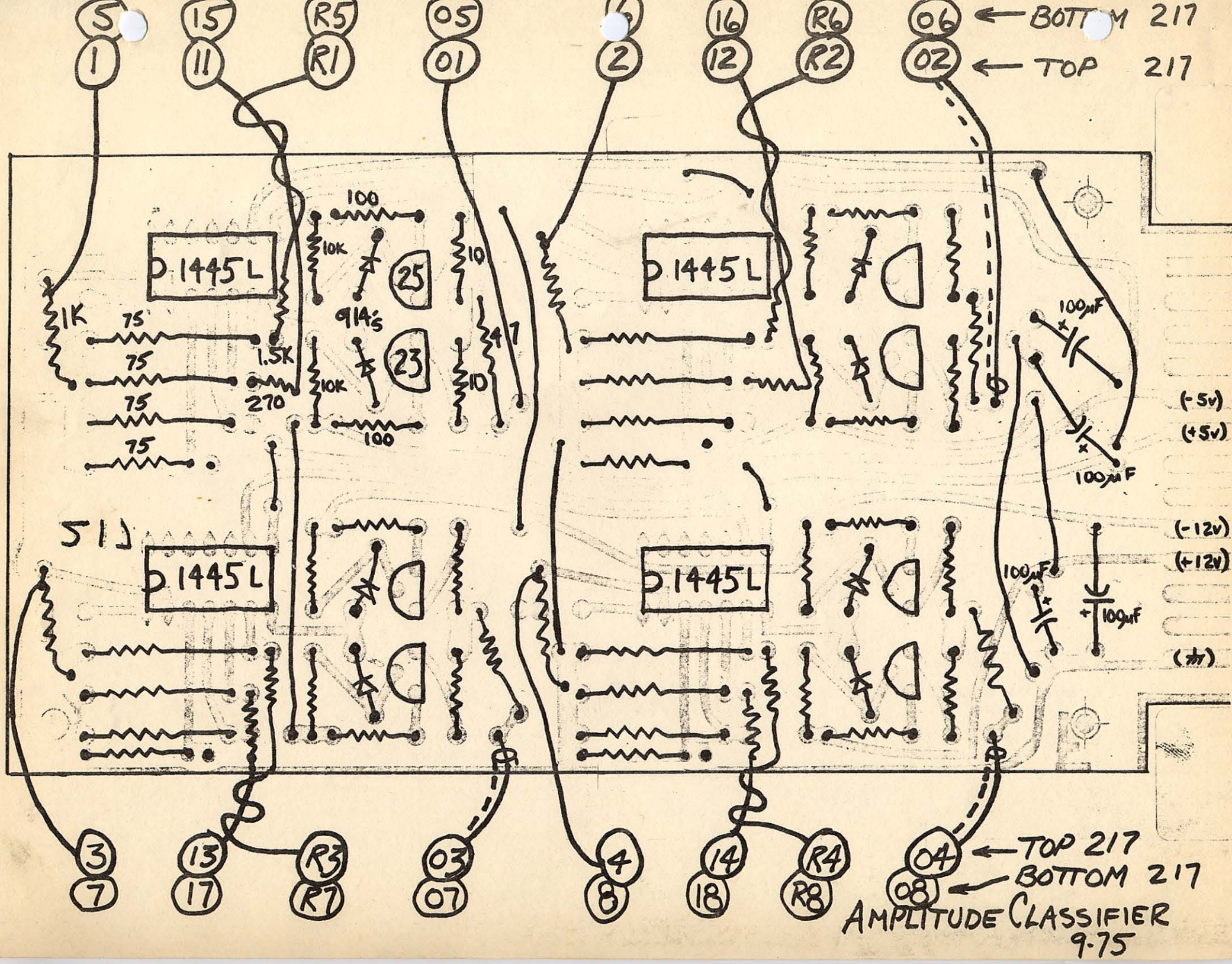
9-75



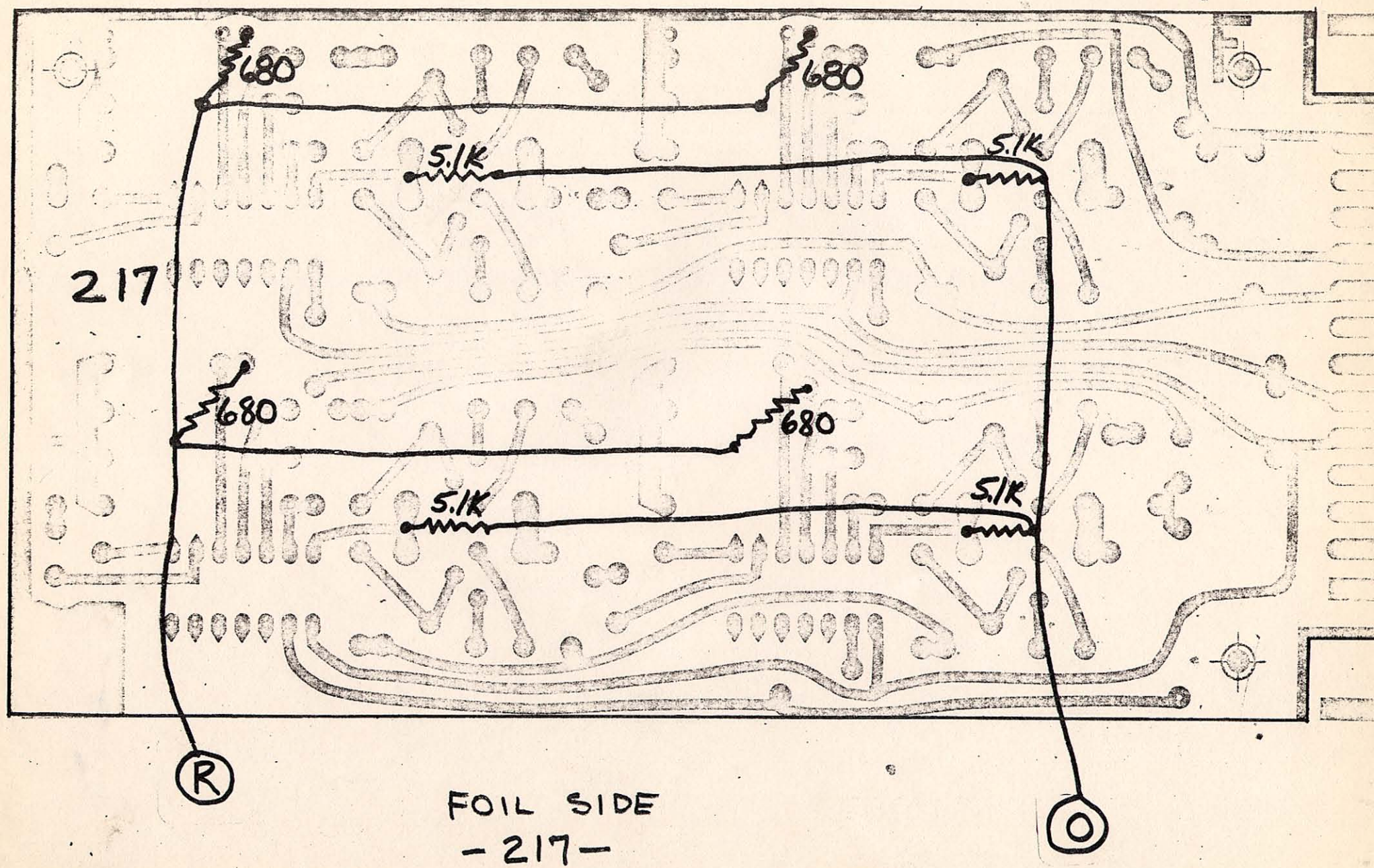
MULTIPLIER BOARD
TOP OR BOTT.

AMP. CLASS.
1-76


COMPARATOR BOARD
216
-5V
150
100
R12
C3
1K
1K
10K
470
+12
IC1
-12
2.2K
15K
2N4123
MOST POS.
IC2
IC3
IC4
IC5
IC6
IC7
100
JI11
R11
100
CW
C1
+5V
R14
500
C4
-5V
+5V
150
100
R13
C2
2.2K
+12V
MOST NEG.
ALL IC's ARE CA3030
AMP. CLASS.
1-76

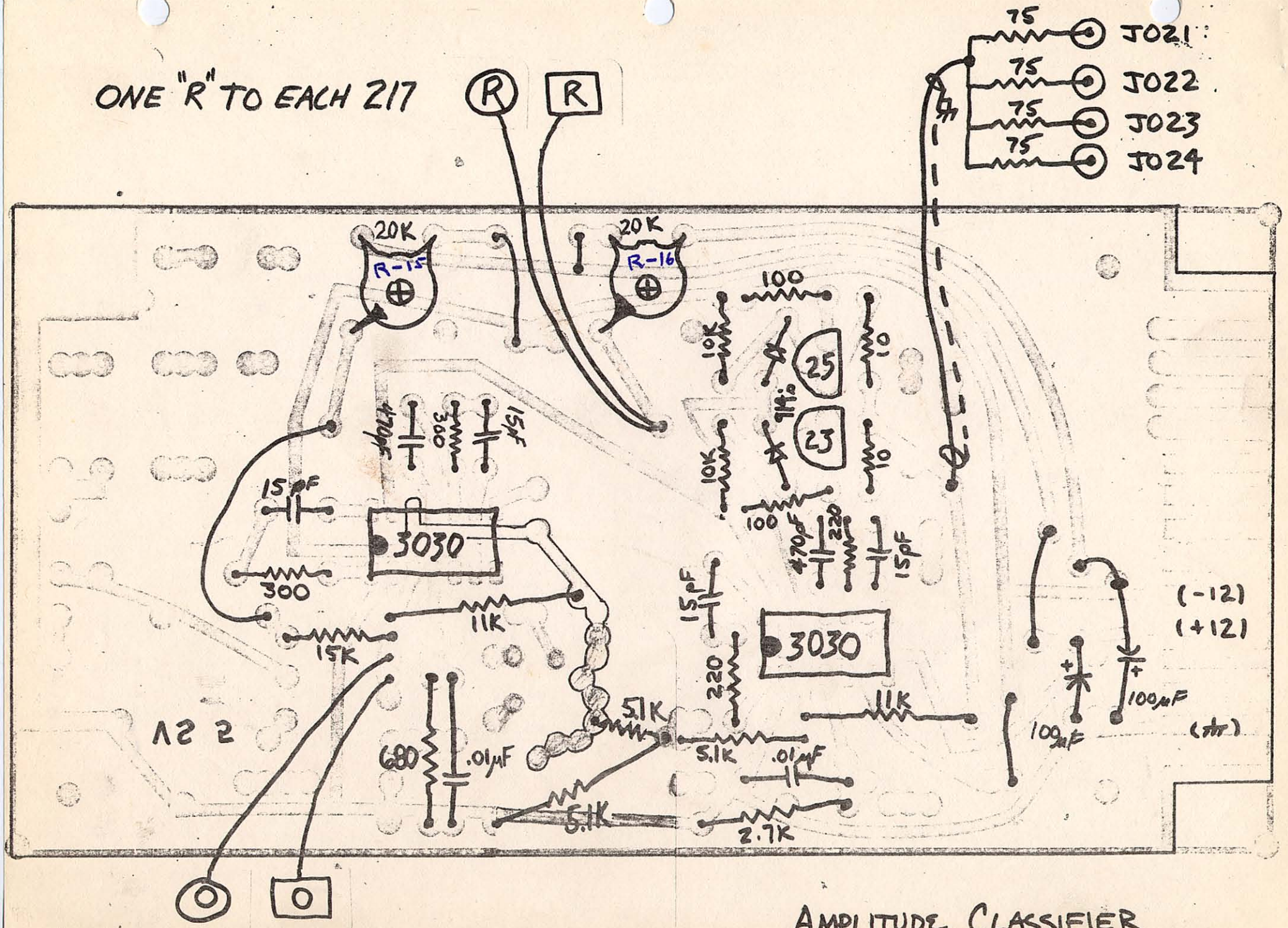


AMPLITUDE CLASSIFIER
9-75



FOIL SIDE
-217-
TOP BOARD
&
BOTTOM BOARD

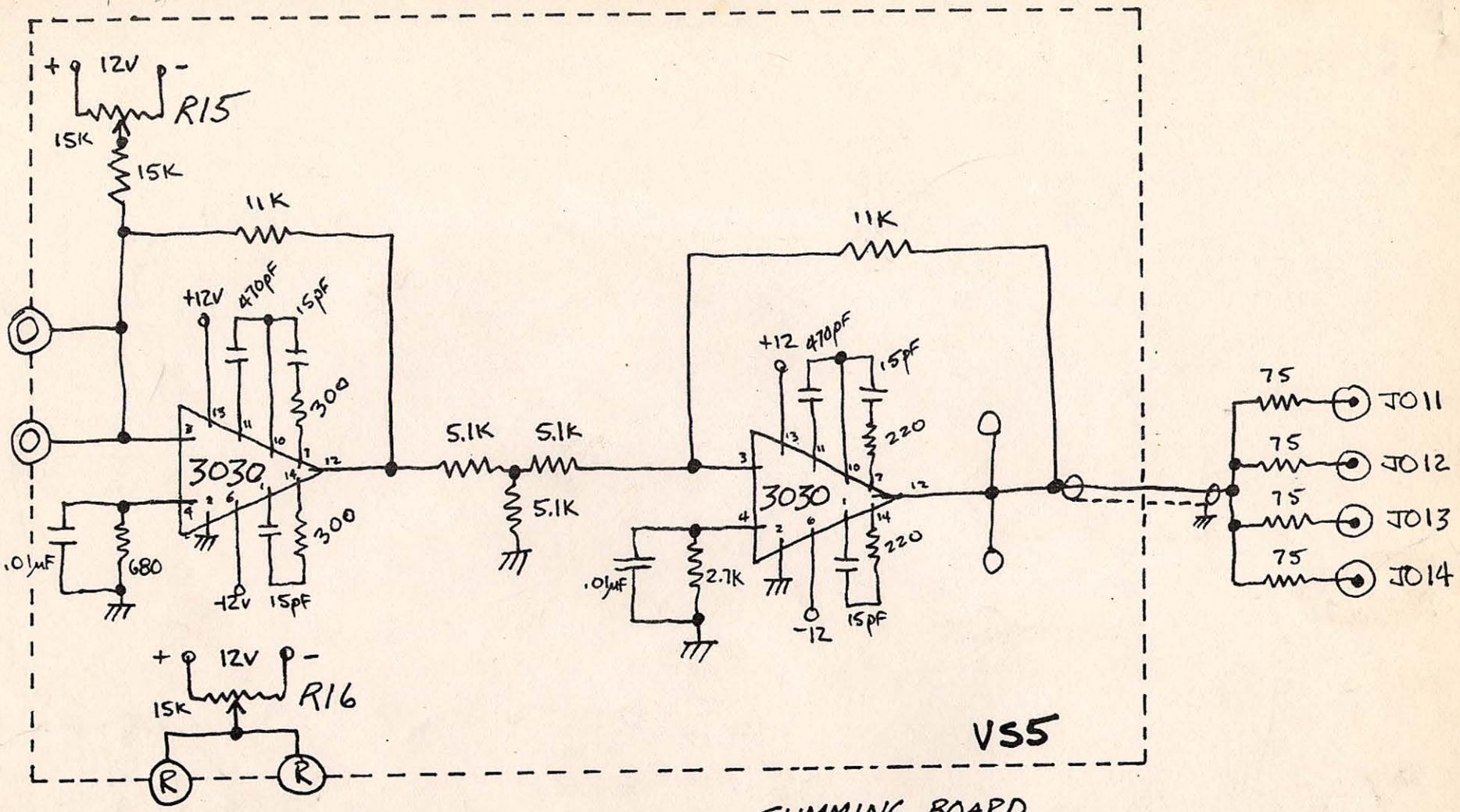
AMPLITUDE CLASSIFIER
9-75



ONE "O" TO EACH 217 BOARD

AMPLITUDE CLASSIFIER

9-75



SUMMING BOARD

AMP. CLASS.

1-76

18		525-1060	10 OHM, 1/4 W RES	.06	A	AC
8		525-1153	47 OHM, 1/4 W RES	.06	A	AC
36		525-1185	75 OHM, 1/4 W RES	.06	A	AC
32		525-1202	100 OHM, 1/4 W RES	.06	A	AC
2		525-1226	150 OHM, 1/4 W RES	.06	A	AC
2		525-1248	220 OHM, 1/4 W RES	.06	A	AC
8		525-1263	270 OHM, 1/4 W RES	.06	A	AC
2		525-1270	300 OHM, 1/4 W RES	.06	A	AC
7		525-1302	470 OHM, 1/4 W RES	.06	A	AC
9		525-1330	680 OHM, 1/4 W RES	.06	A	AC
22		525-1356	1K0 OHM, 1/4 W RES	.06	A	AC
8		525-1380	1.5KOHM, 1/4 W RES	.06	A	AC
8		525-1405	2.2KOHM, 1/4 W RES	.06	A	AC
1		525-1421	2.7KOHM, 1/4 W RES	.06	A	AC
11		525-1467	5.1KOHM, 1/4 W RES	.06	A	AC
25		525-1522	10K OHM, 1/4 W RES	.06	A	AC
2		525-1528	11K OHM, 1/4 W RES	.06	A	AC
7		525-1550	15K OHM, 1/4 W RES	.06	A	AC
3	10F454	101UA	100 OHM POT 1/4SFAB	1.71	N	AC
1	10F459	501UA	500 OHM POT 1/4SFT	1.71	N	AC
8	9F089	U20	10K OHM POT 1/4SFT	1.45	N	AC
2	12F9600	3389P	20K TRIM BD-MT	.65	N	AC
4	14F555	DM15-150J	15 PF,DIP-MICA CAP	.20	N	AC
2	14F592	DM15-417J	470 PF,DIP-MICA CAP	.32	N	AC
2	67F307	TDC-103Z	.01 MF,DSC-CER CAP.	.05	N	AC
12	710-1260	7-G-1000	100 MF,25VDC,ELEC.	.24	A	AC
25	553-0914	1N914B	SIL-DIODE	.19	A	AC
24		2N4123	NPN TRANS	.22	S	AC
9		2N4125	PNP TRANS	.27	S	AC
9		CA3030	DIP OP-AMP,RCA	1.32	S	AC
8		MC1445L	DIP GAIN-CONT.AMP	1.90	S	AC
21	39F1337	13-236	BNC,FM-CHS,MT.	.72	N	AC
1			CHAS,A-CFACE	8.25	DG	AC
1			VSS P-C BOARD			AC
1			216 P-C BOARD			AC
2			217 P-C BOARD			AC
1	RB-67-1-DC-M-L-9		KNOB,AMBER GAIN	1.00	R	AC
8	RB-67-0-DC-M-D-9		299 IN/MBL,D/WHT	1.00	R	AC
1	RB-67-1-DC-M-D-9		KNOB,SILVER BIAS	1.00	R	AC

SYNC GENERATOR

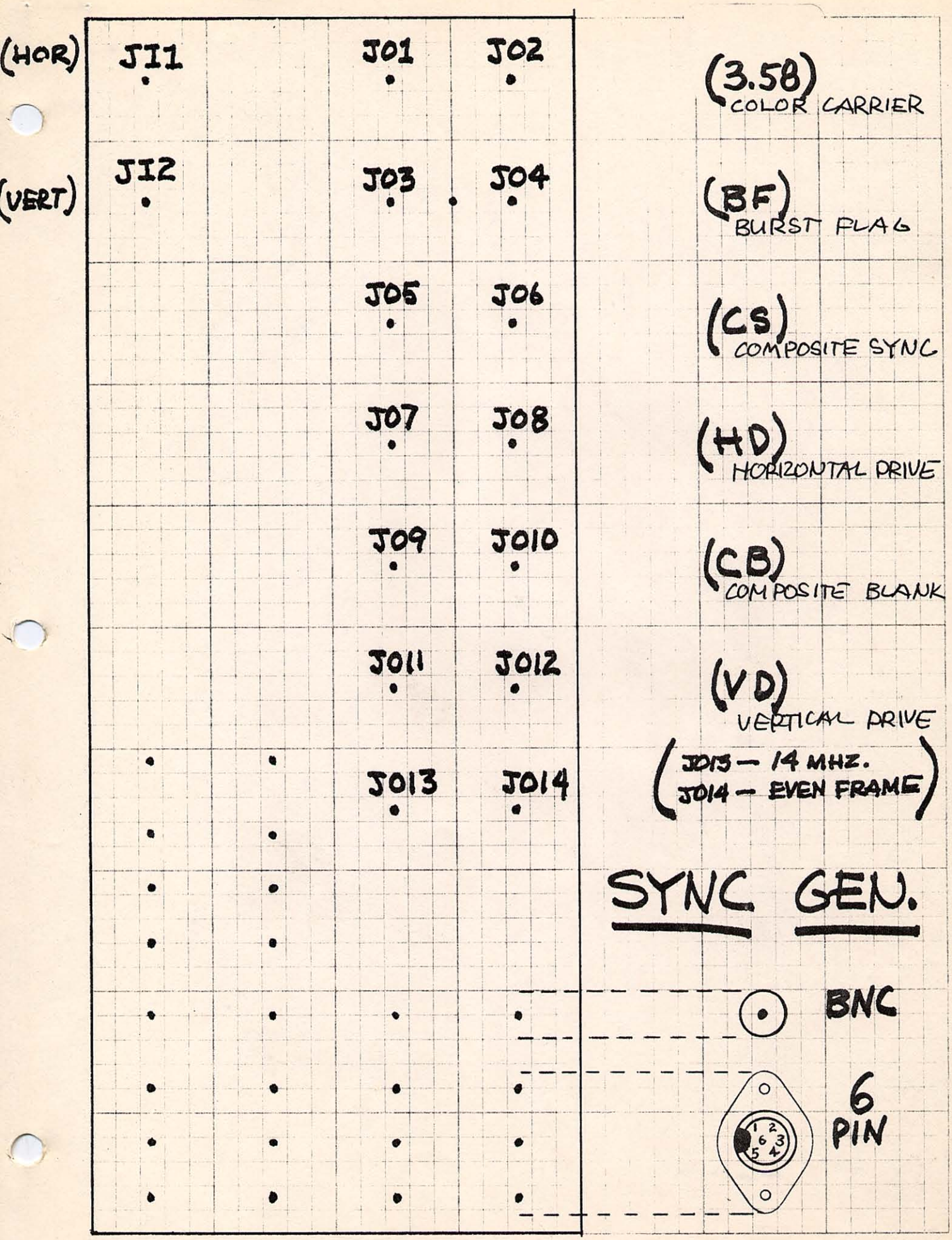
This module generates full NTSC color sync conforming to RS 170 EIA after trimming the master osscillator. The sync generator should stay well within the broadcast standard.

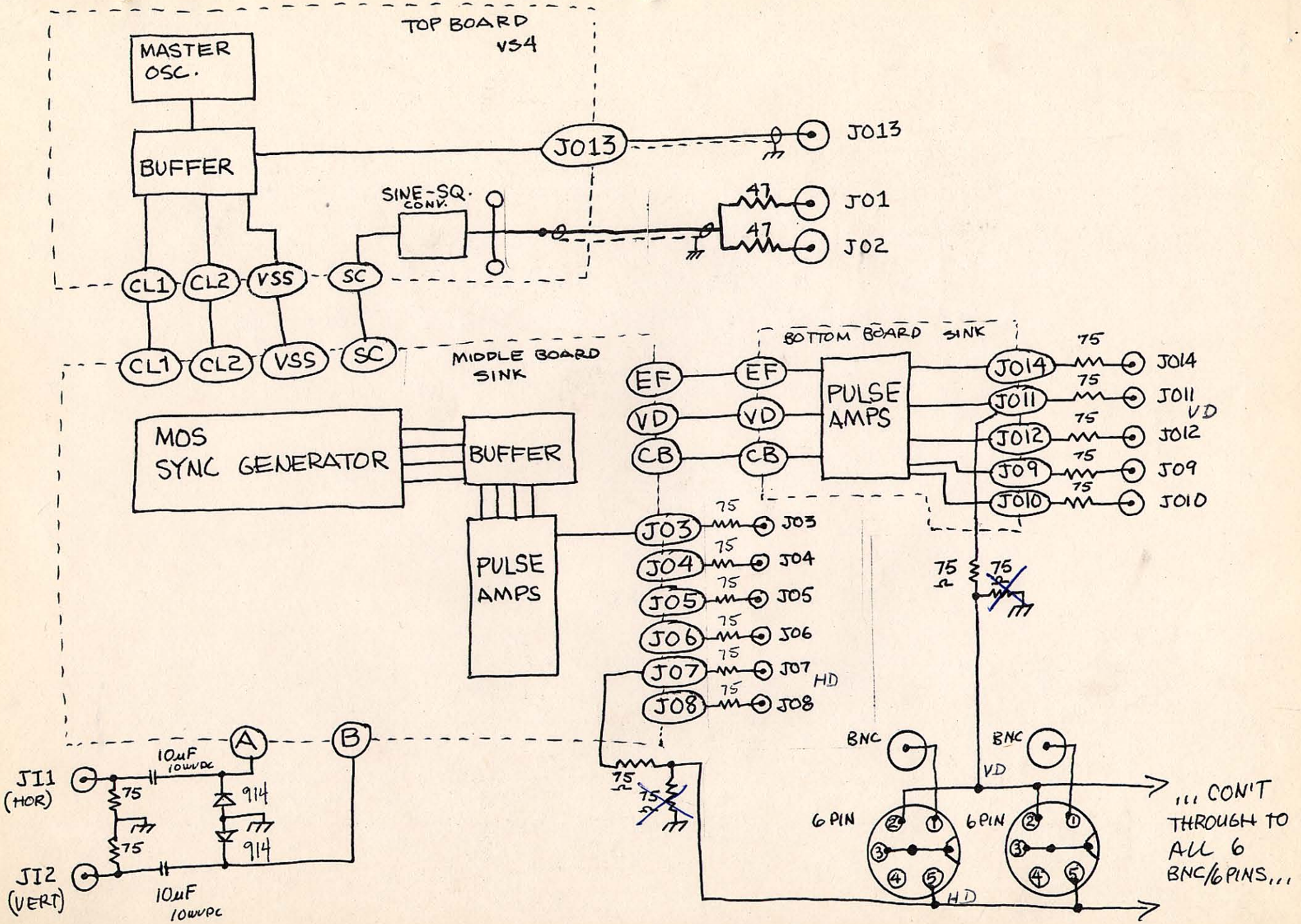
All outputs are -4v. into 75 ohm except the 14 MHZ. (JO13) which is an open collector TTL. JO13 is not used except for work with digital computers.

JI1 horizontal reset and JI2 vertical reset are not implemented in full.

The sync generator requires starting pulses which are provided by capacitors associated with JI1 and JI2. Time must be allotted after power-down before power-up (at least 30 seconds) to assure proper starting of sync generator.

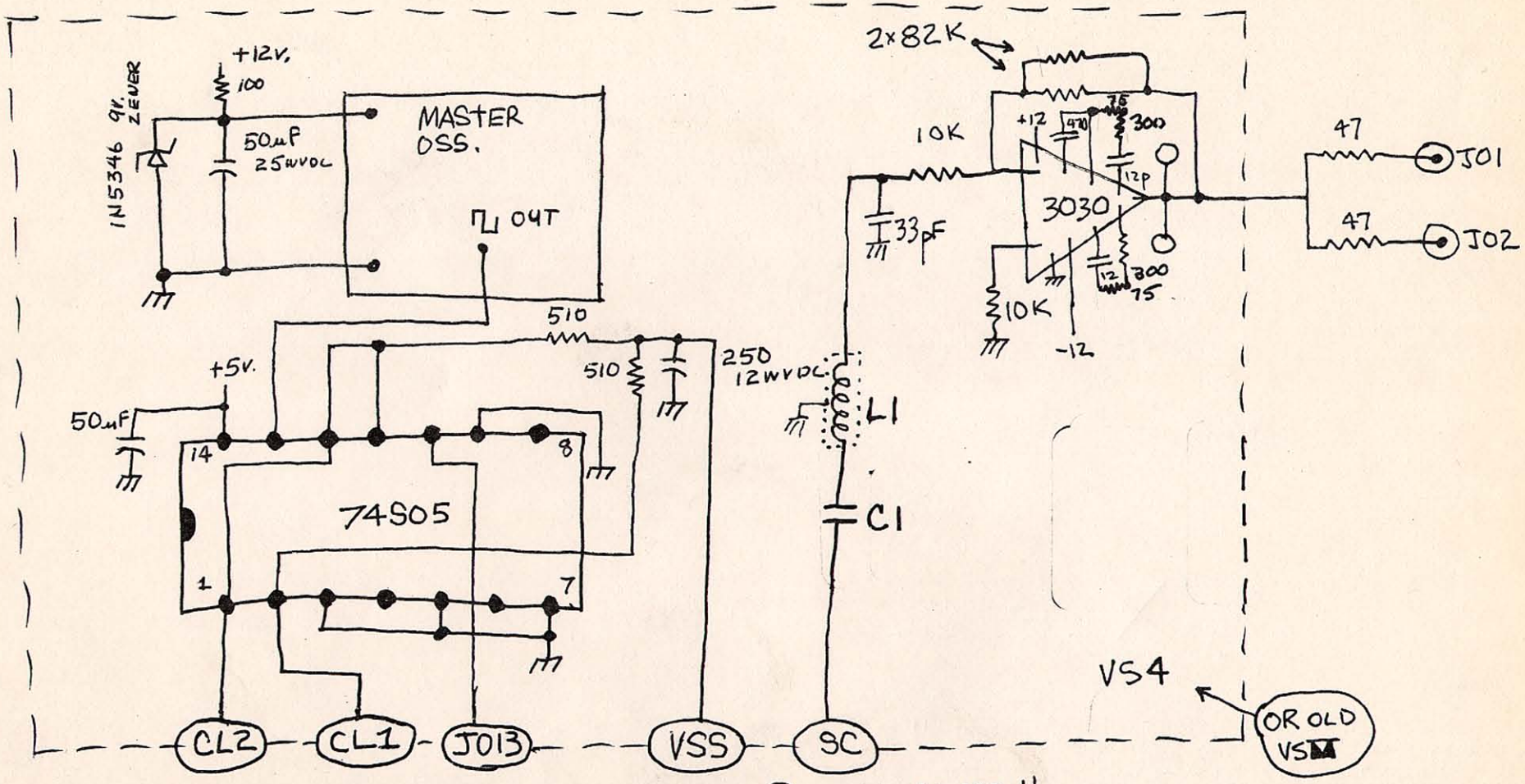
Master osscillator trim:
Adjust the master osscillator frequency to 14.318180 MHZ. A convenient way to do this is to run a lead from horizontal drive and wrap it (still fully insulated) around the antennae of a TV receiver. Tune the receiver to a station on feed from a major network (in color). You will notice two vertical lines or one vertical bar drifting across the screen. Adjust the master osscillator with a long insulated screwdriver through the access hole in the front panel of module until vertical lines do not drift.


(HOR)
JI1
J01
J02
(3.58)
COLOR CARRIER
(VERT)
JI2
J03
J04
(BF)
BURST FLAG
J05
J06
(CS)
COMPOSITE SYNC
J07
J08
(HD)
HORIZONTAL DRIVE
J09
J010
(CB)
COMPOSITE BLANK
J011
J012
(VD)
VERTICAL DRIVE
J013
J014
(J013 — 14 MHZ.
J014 — EVEN FRAME)
SYNC GEN.
BNC
6 PIN
1 2 3 4 5 6



SYNC GENERATOR

TOP BOARD (VS4)



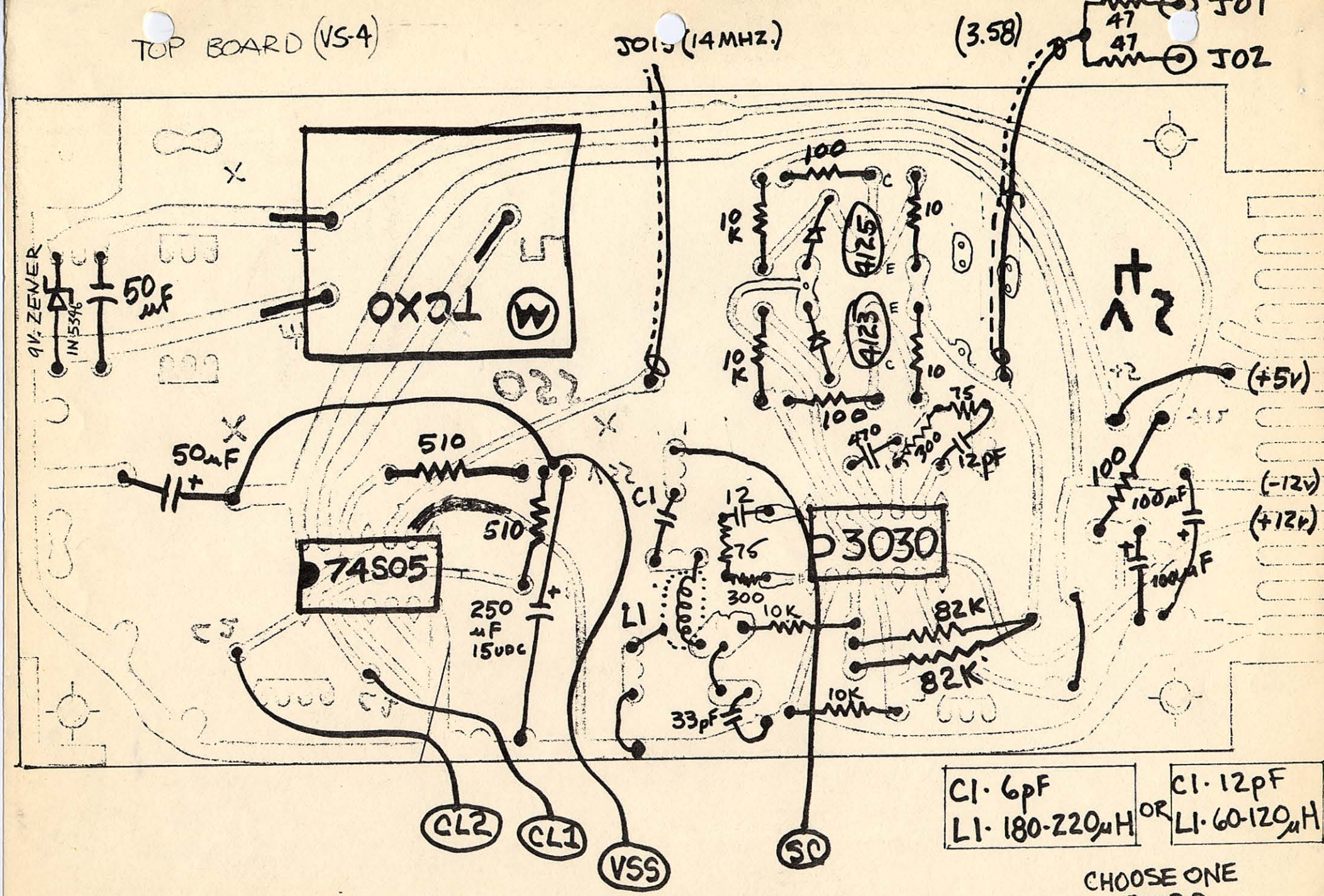
NOTE: L1 = 120-280 µH SHIELDED VARIABLE CHOKE } OR L1 = 60-120 µH, C1 = 12pF
C1 = 6pF
MASTER OSSCILLATOR 14.318180 MHZ.
K1087A-2T1B (MICROSONICS)

DO NOT SUBSTITUTE 74S05 (FAIRCHILD)

SYNC GENERATOR

update 10-75

TOP BOARD (VS-4)



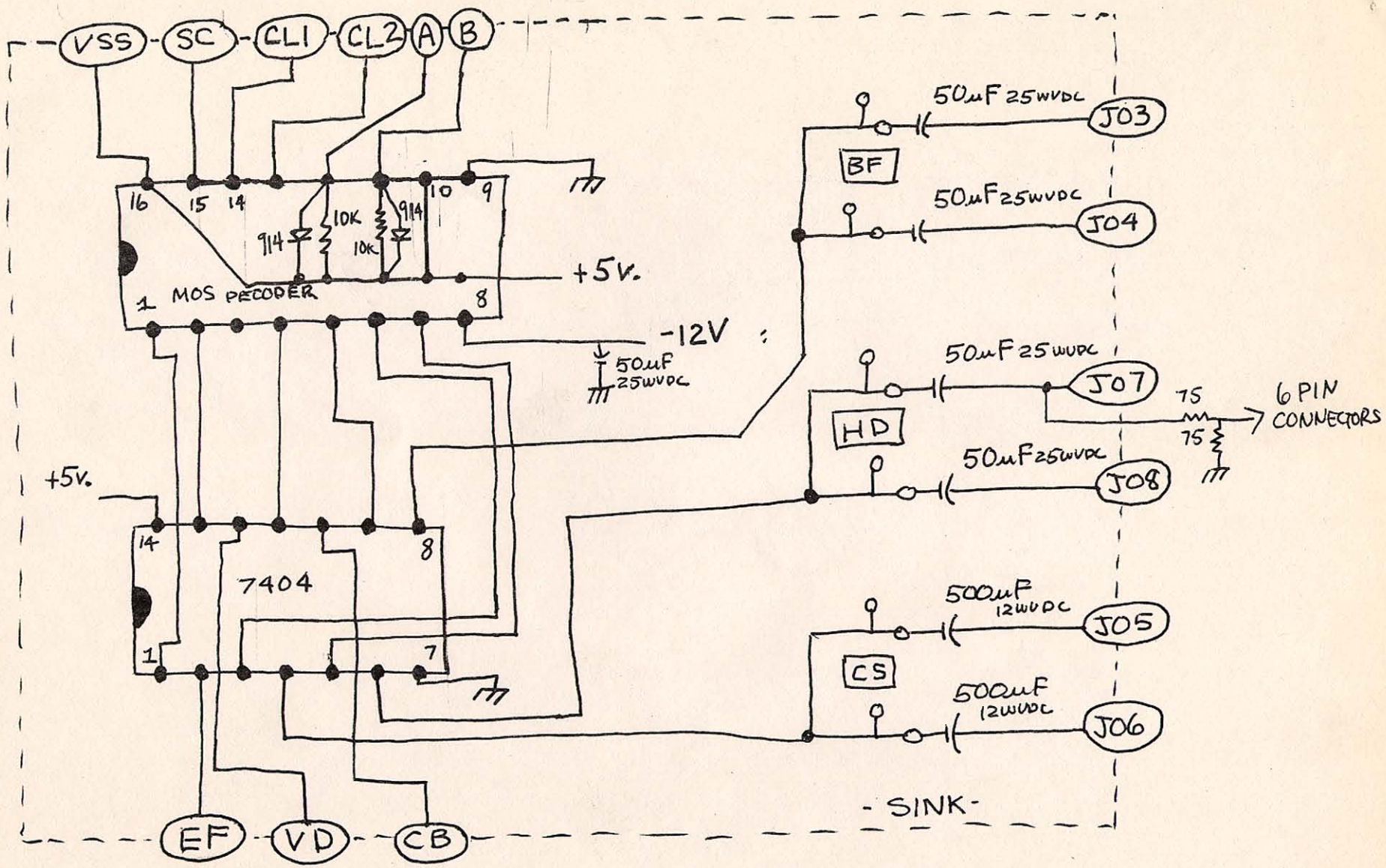
C1 · 6pF L1 · 180-220µH	OR	C1 · 12pF L1 · 60-120µH

CHOOSE ONE COMBO ONLY

SYNC GENERATOR

update 10-75

MIDDLE BOARD (SINK)

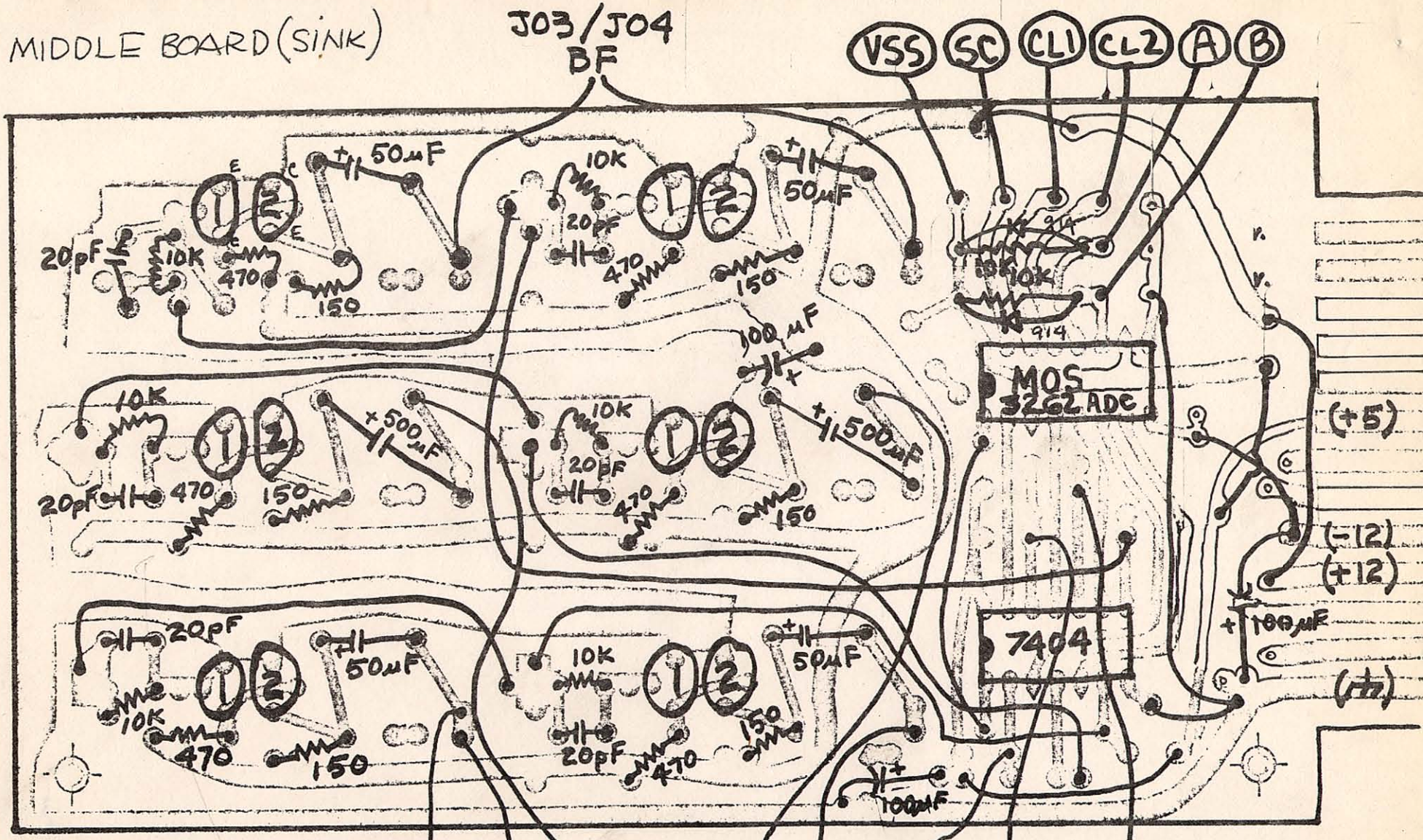


NOTE: USE 3262 ADC DECODER

SYNC GENERATOR

UPDATE: 10-75

MIDDLE BOARD (SINK)



NOTE: ① = 2N4123

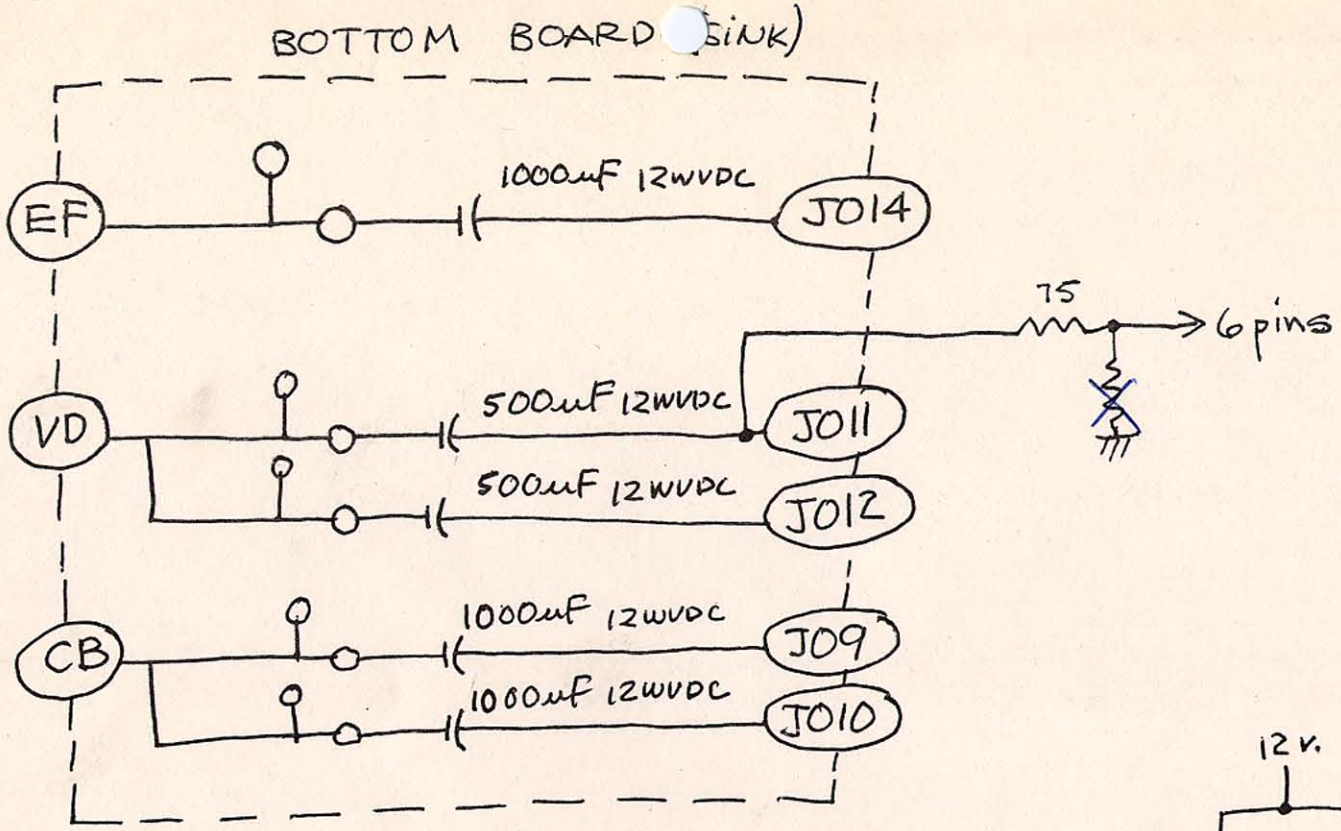
② = 2N4125

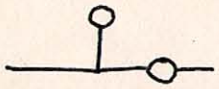
PIN #5 ON ALL 6 PIN CONNECTORS

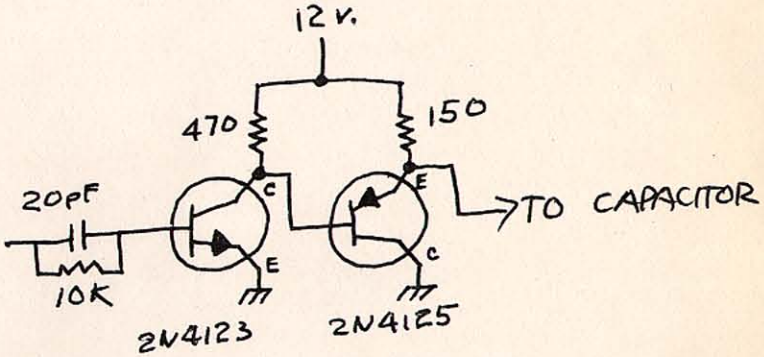
'A' VERSION

SYNC GENERATOR

UPDATE 10-75



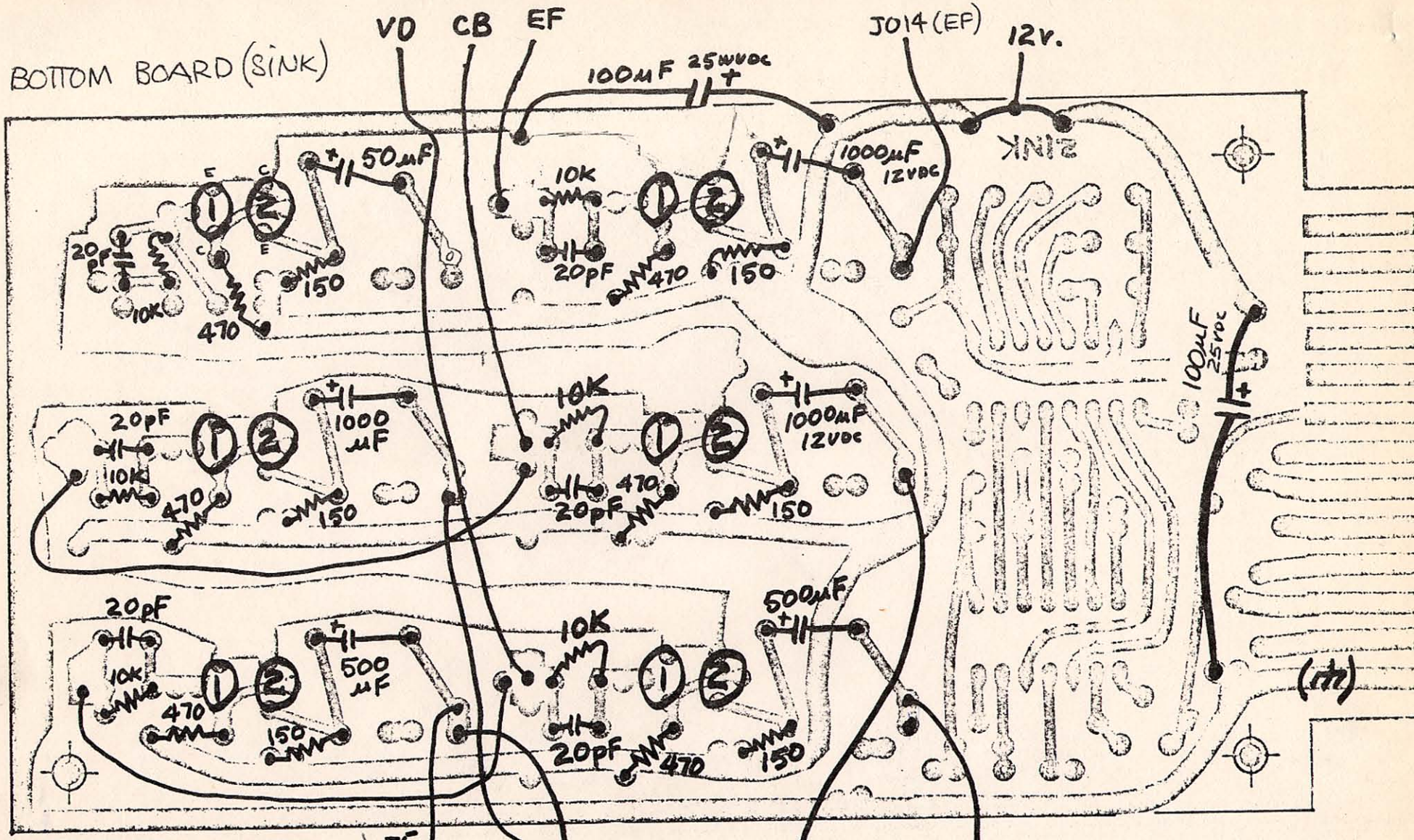
NOTE:  MEANS PULSE DRIVER AND =



SYNC GENERATOR

update 10-75

BOTTOM BOARD (SINK)



NOTE: ① = 2N4123

② = 2N4125

75

75

PIN#2 ON ALL 6 PIN CONNECTORS

J011 (VD)

CB J09/J010

J012 (VD)

SYNC GENERATOR

2		525-1060	10 OHM, 1/4 W RES	.06	A	SG
2		525-1153	47 OHM, 1/4 W RES	.06	A	SG
19		525-1185	75 OHM, 1/4 W RES	.06	A	SG
3		525-1202	100 OHM, 1/4 W RES	.06	A	SG
11		525-1226	150 OHM, 1/4 W RES	.06	A	SG
2		525-1270	300 OHM, 1/4 W RES	.06	A	SG
11		525-1302	470 OHM, 1/4 W RES	.06	A	SG
2		525-1308	510 OHM, 1/4 W RES	.06	A	SG
17		525-1522	10K OHM, 1/4 W RES	.06	A	SG
2		525-1703	82K OHM, 1/4 W RES	.06	A	SG
1	14F1267	DM5-0600	6 PF,DIP-MICA CAP	.36	N	SG
4	14F554	DM15-120J	12 PF,DIP-MICA CAP	.20	N	SG
11	14F557	DM15-200J	20 PF,DIP-MICA CAP	.18	N	SG
1	14F562	DM15-330J	33 PF,DIP-MICA CAP.	.24	N	SG
1	14F566	DM15-470J	47 PF,DIP-MICA CAP.	.24	N	SG
2	710-1251	2-G-101	10 MF,25VDC,ELEC.	.44	A	SG
6	710-1258	4-G-050	50 MF,25VDC,ELEC.	.46	A	SG
7	710-1260	7-G-1000	100 MF,25VDC,ELEC.	.24	A	SG
1	710-1218	8-D-2500	250 MF,21VDC,ELEC.	.58	A	SG
4	710-1339	L-E-500	500 MF,16VDC,ELEC.	.45	A	SG
3	710-1340	N-E-1000	1000MF,16VDC,ELEC.	.67	A	SG
1	15F2317	9056	120-280 VARI.CHOKE	3.39	N	SG
6	553-0914	1N914B	SIL-DIODE	.19	A	SG
12		2N4125	PNP TRANS	.27	S	SG
12		2N4123	NPN TRANS	.22	S	SG
1		1N53466	9.1V ZENER SW	2.50	N	SG
1		74805	DIP BUFF,FAIRCHILD	1.04	S	SG
1		CA3030	DIP OP-AMP,RCA	1.32	S	SG
1		3262ADC	DIP MOS DECODER	18.56	S	SG
1		7404	DIP BUF	.70	S	SG
22	39F1337	13-236	BNC,FM-CHS.MT.	.72	N	SG
1			VS4 P-CBOARD			SG
2			SINK P-CBOARD			SG
60	1-526-063-11		6-PIN FEMALE CHS MT	.90	AP	SG
1			CHASSIS,S.GEN-FACE	8.25	DG	SG
1	K1087A2T18		XTAL-14.318180MHZ	140.00	M	SG

OSCILLATOR

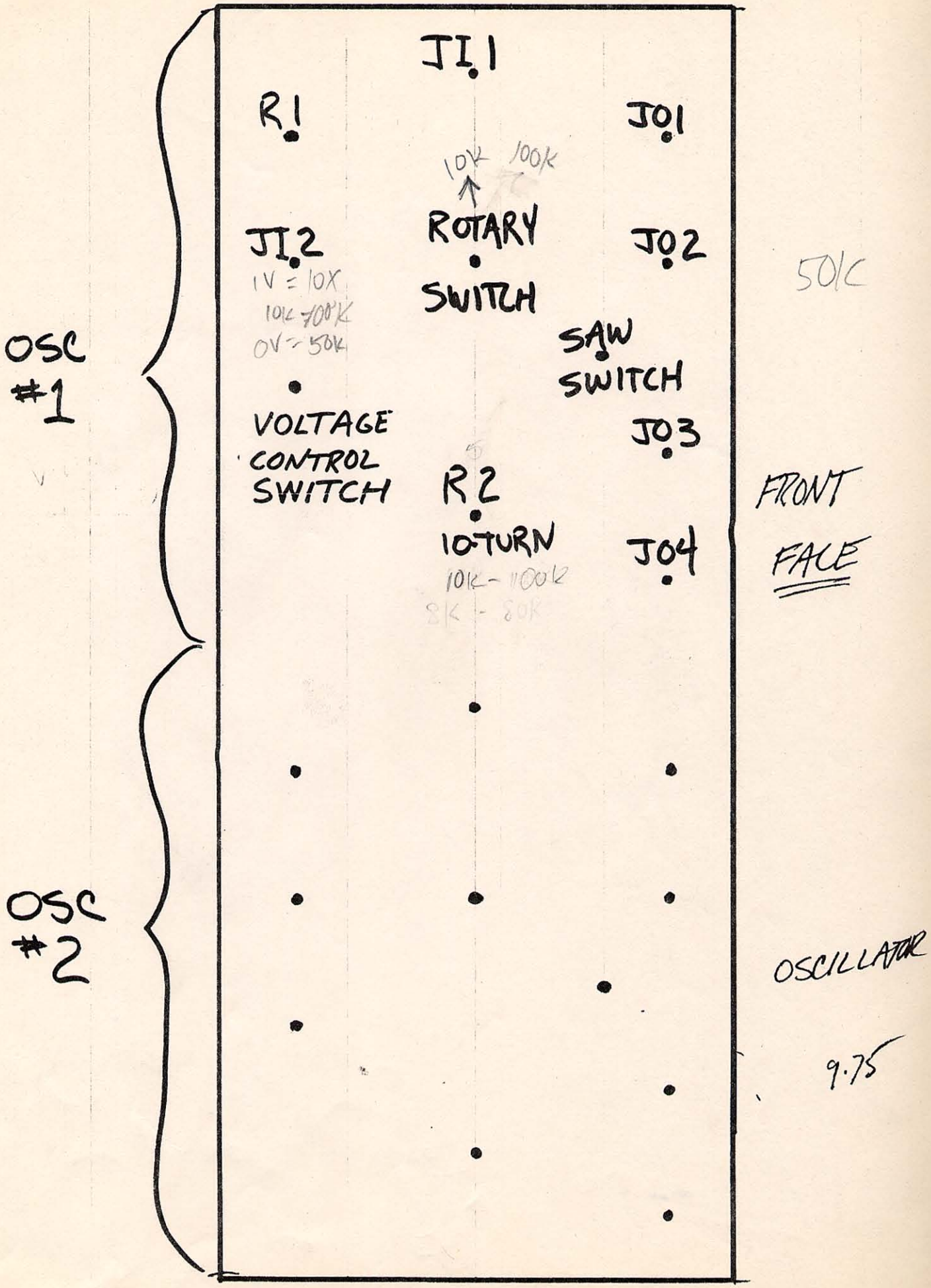
This module contains two oscillators that generates a sine wave output available at JO3, JO4 and a triangle wave output at JO1 and JO2. If the sawtooth switch is down instead of up, the triangle wave becomes a sawtooth and the sine wave becomes an "s" wave. The rotary switch sets the gross frequency range form 1/100 Hz. to ½ MHz. R2 is the continuous frequency adjustment. If the voltage control switch is up, a signal inputed to JI2 will control the frequence of the oscillator in combination with R2. With the switch down the voltage control is disabled but the oscillator is more stable. A sync. level (4 volt) signal into JI1 will trigger the oscillator to stabilize patterns.

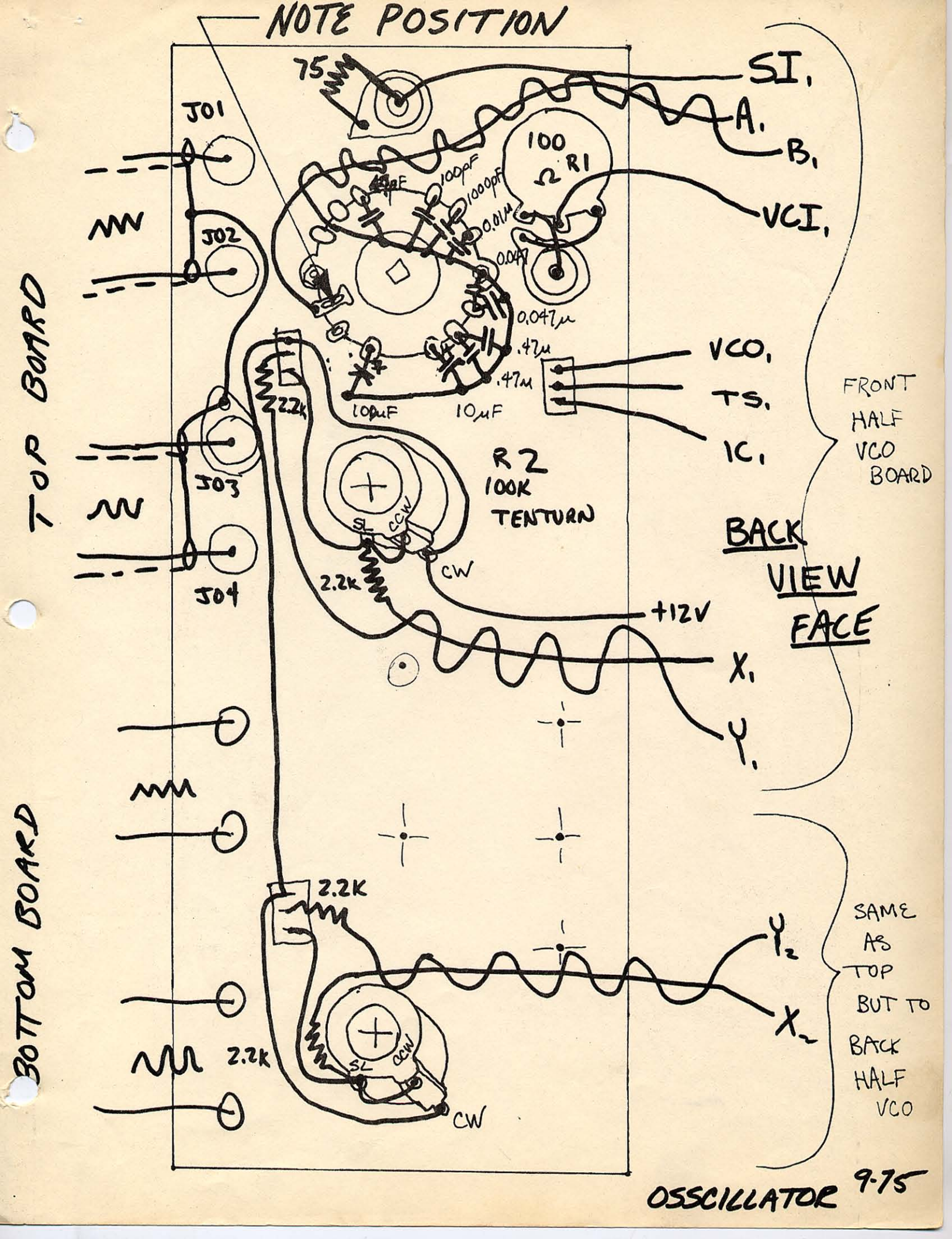
CIRCUIT DESCRIPTION

The 8038 is a complete voltage controlled oscillator whose frequency is controlled by resistance R2 and the voltage at pin 8. The 715 is a 10x amplifier and- in combination with the zener diode produces a controll voltage at pin 8.

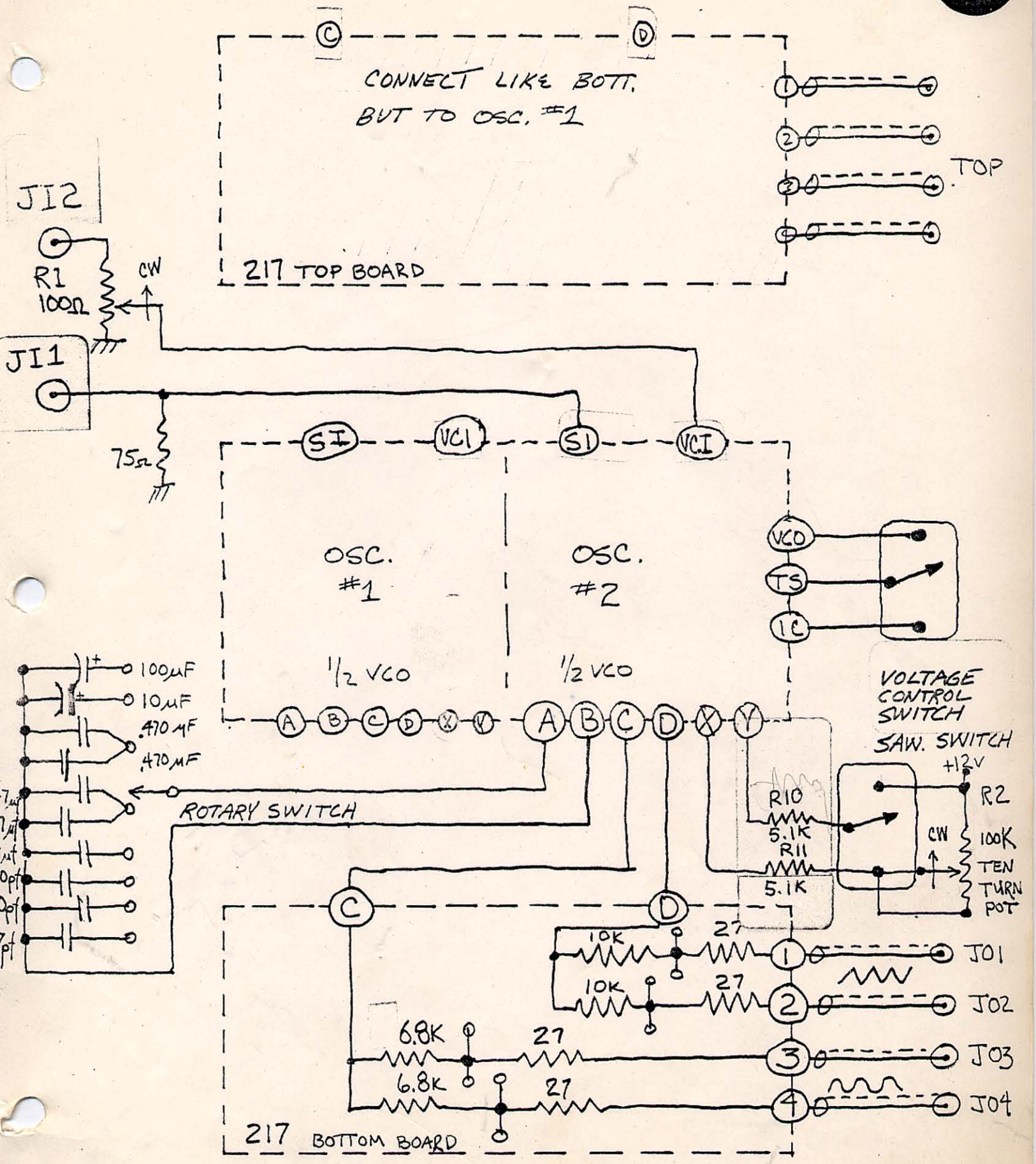
The trimmer associated with the input of the 715 should be adjusted so that the control voltage is centered within its range with 0 volts in. To do this, input a triangle wave to the voltage control input and adjust the trimmer until the voltage that makes the maximum frequency is as positive as the voltage that quenches the oscillator is negative.

The two transistors and zeners are used to trigger the oscillator. When a fast-falling signal is presented at the sync. input this turns the first transistor off which turns the second transistor on. This clamps the oscillator to the bottom of its output wave form.

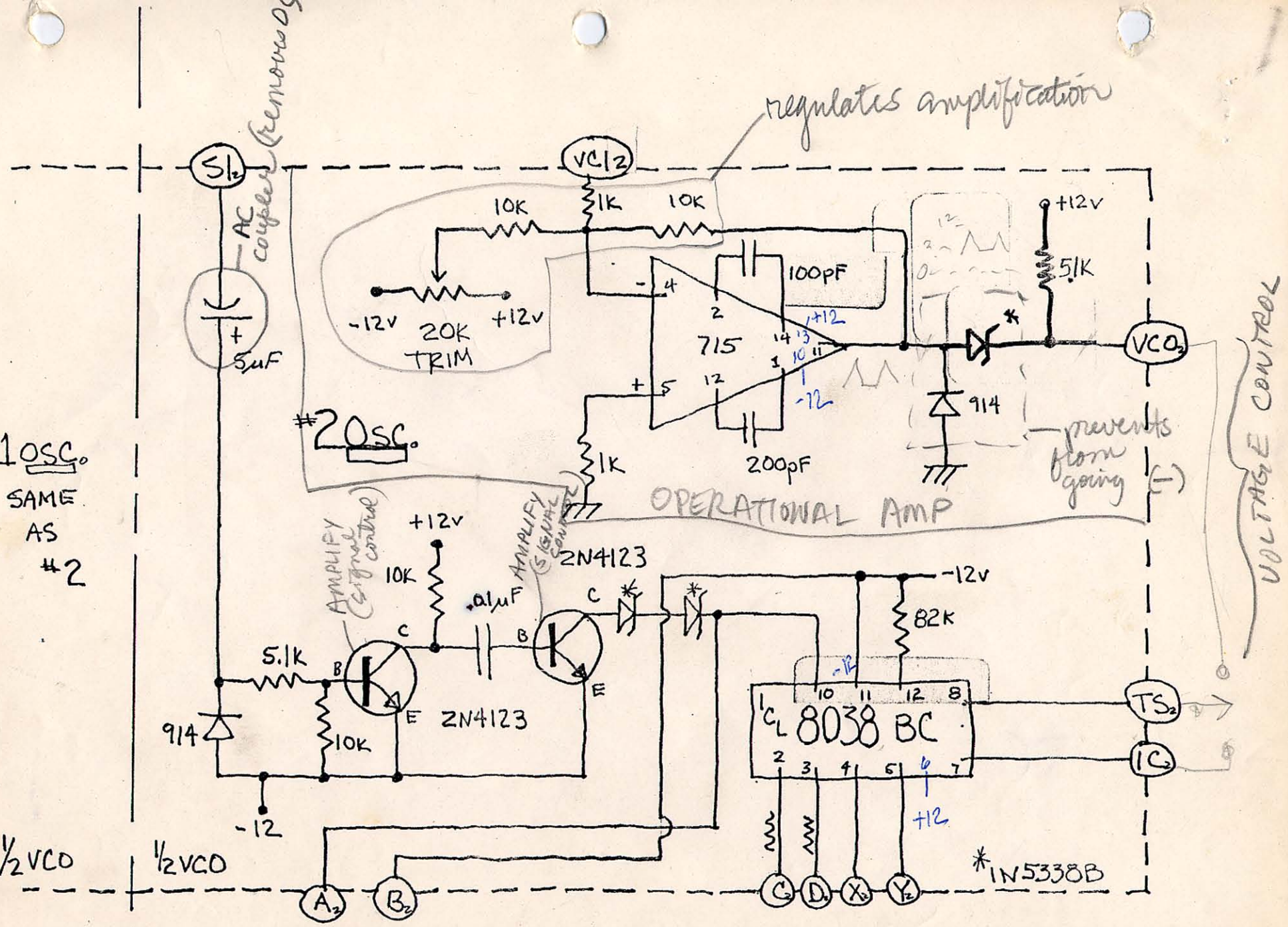

JI1
R1
JO1
10K 100K
ROTARY
SWITCH
JI2
JO2
1V = 10K
10K - 100K
0V - 50K
50K
SAW
SWITCH
OSC
#1
VOLTAGE
CONTROL
SWITCH
JO3
R2
10-TURN
10K - 100K
8K - 80K
JO4
FRONT
FACE
OSC
#2
OSCILLATOR
9.75



OSSCILLATOR 9-75



OSCILLATOR 9/75

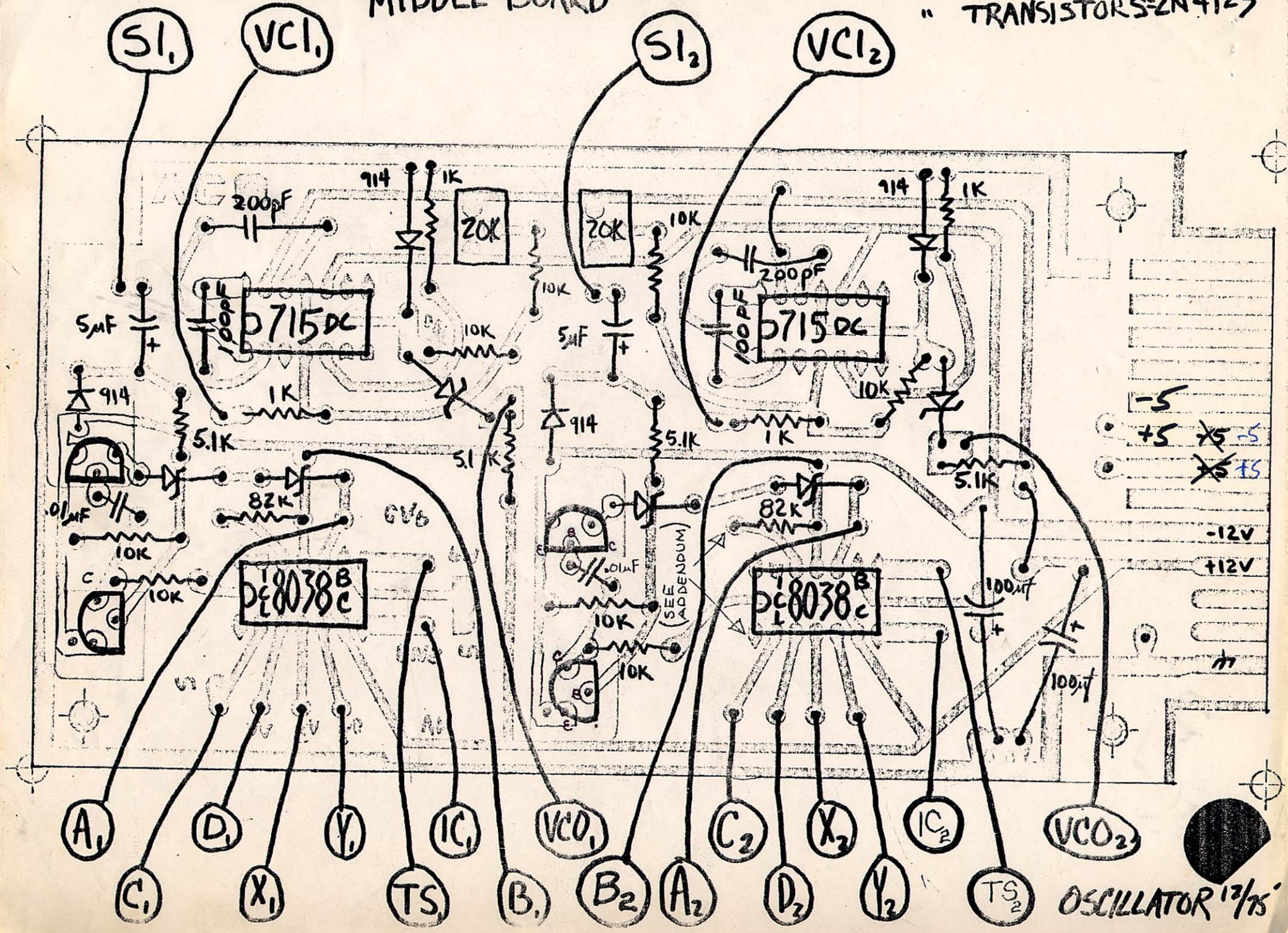


½ MIDDLE BOARD VCO

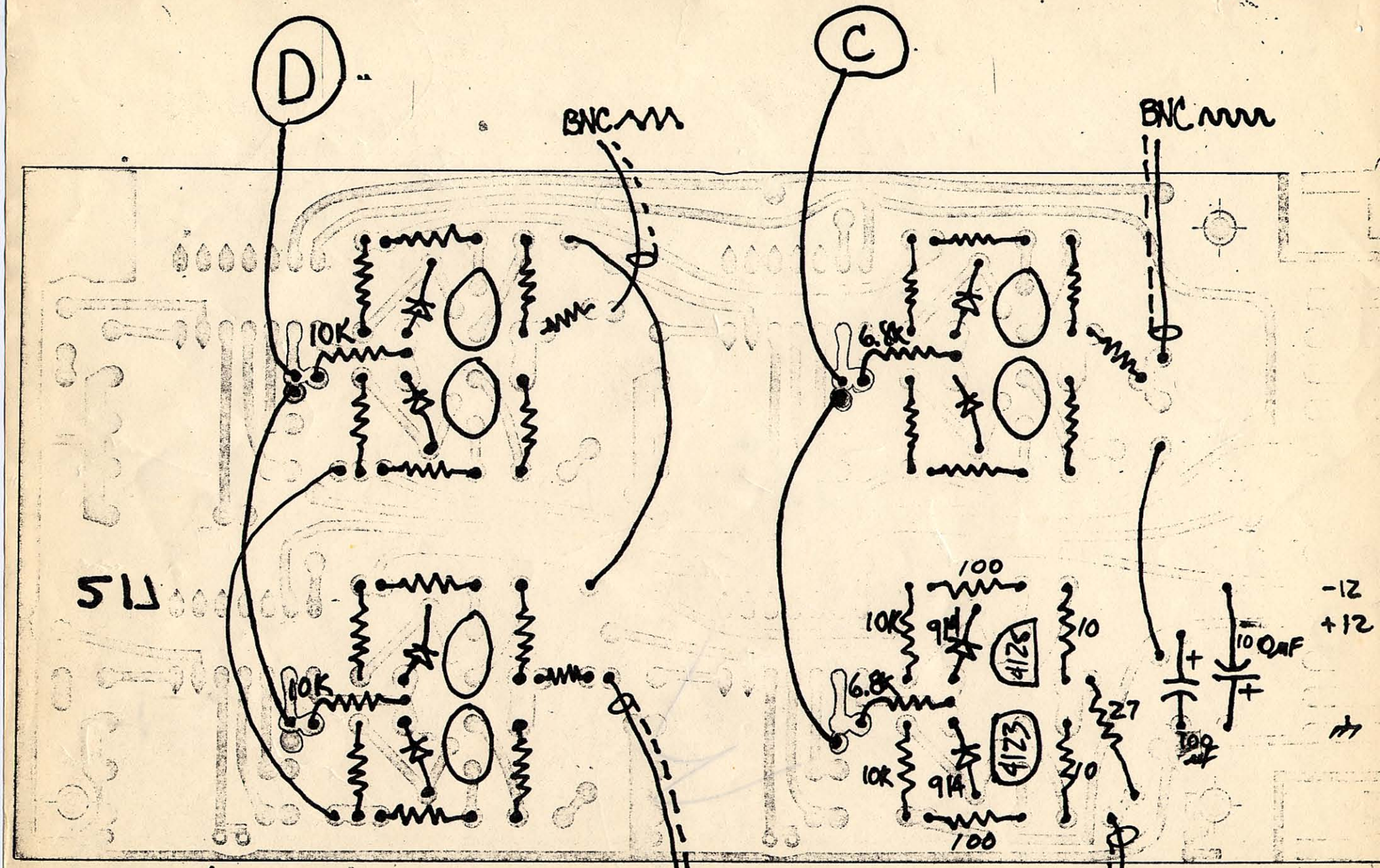
OSCILLATOR 9-75

ALL ZENERS — DF N5338B
" TRANSISTORS = 2N4123

MIDDLE BOARD



OSCILLATOR 12/75



TOP & BOTTOM BOARD

BNC

OSCILLATOR

BNC

9/75

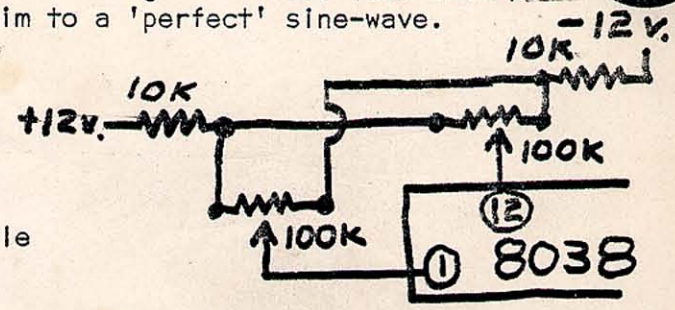
OSCILLATOR

ADDENDUM

MARCH, 1977

1.) SINE-WAVE PURITY CONTROL:

Remove 82K resistor; and, add 100K trim-pots as shown in diagram. These 100K trim-pots correct sine-wave purity. You should be able to trim to a 'perfect' sine-wave.



PROCEDURE-

A) Before supplying power to the module, center all trim-pots.
B) Set the oscillator at a middle frequency range, and display sine-wave on scope.
C) Tweek the trim-pots for highest amplitude possible (±1 volt) without creating any flats or peaks in the waveform; i.e. 'perfect' sine-wave.

2.) HIGH-FREQUENCY SYMETRY CONTROL:

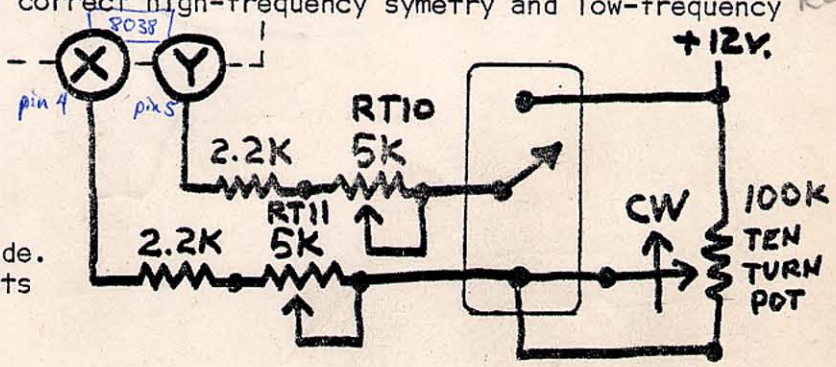
→ SQUELCHING (TOO HIGH VOLTAGE POOR RESPONSE)

R10 and R11 maybe replaced by a series combination of 2.2K resistor and a 5K trim-pot. This series combination (RT10 and RT11) correct high-frequency symetry and low-frequency quenching of waveform; see diagram.

If both trim-pots are too large, the high-frequency end of each range will be lower than optimum.

If both trim-pots are too small, the low-frequency end in some ranges may quench, particularly in SAWTOOTH mode.

The difference between the trim-pots determines the high-frequency symetry.



PROCEDURE-

B) Turn 10-turn pot to extreme left (lowest freq.); check to make sure that no range quenches in sawtooth mode. If quenching happens in any range, tweek trim-pot to get rid of it...
C) Turn 10-turn pot to extreme right (highest-freq.); check to make sure that in a higher frequency range you still have good symetry in triangle mode. If you don't have good triangle symetry, tweek trim-pot to get it...

GO BACK AND CHECK FOR SAWTOOTH QUENCHING...

D) To maximize high-frequency in ranges, decrease both trim-pots equally and go-to-step B). If oscillator quenches at low-frequencies, back up some; i.e. increase resistance, go-to-step C). Stop.

NOTE:

These trim-pots will have to be outboarded on a perf-board and attached to card support frame of the module. Leave enough lead length on the trim-pots so it can be gotten out of the way for servicing the cards...!

Some 8038 integrated circuits appear to behave better than others; you may want to try various 8038's, choosing the best behaved ones...!

16		525-1060	10 OHM, 1/4 W RES	.06	A	OSS
8		525-1117	27 OHM, 1/4 W RES	.06	A	OSS
2		525-1165	75 OHM, 1/4 W RES	.06	A	OSS
15		525-1202	100 OHM, 1/4 W RES	.06	A	OSS
2		525-1356	1K OHM, 1/4 W RES	.06	A	OSS
2		525-1405	2.2KOHM, 1/4 W RES	.06	A	OSS
6		525-1467	5.1KOHM, 1/4 W RES	.06	A	OSS
4		525-1489	6.8KOHM, 1/4 W RES	.06	A	OSS
33		525-1522	10K OHM, 1/4 W RES	.06	A	OSS
2		525-1703	82K OHM, 1/4 W RES	.06	A	OSS
2	10F454	101UA	100 OHM POT 1/4SFAB	1.71	N	OSS
2	12F9800	3389P	20K TRIM BD-MT	.65	N	OSS
2	9F1660		100KOHM 10-TURN POT	5.30	N	OSS
2	652-0019		47PF,POLY CAP	.13	A	OSS
2	652-0026		100PF, POLY CAP	.13	A	OSS
4	652-0050		1000PF ,POLY CAP	.13	A	OSS
2	652-0110		.01 MFD, POLY CAP	.13	A	OSS
4	652-0900		.047 MFD, POLY CAP	.13	A	OSS
4	652-0104		.47 MFD, POLY CAP	.13	A	OSS
2	852-4601		10 MFD,ELEC CAP,35V	.48	A	OSS
2	852-5256		100 MFD,ELEC CAP,150V	2.41	A	OSS
2	14F582	DM15-201J	200 PF,DIP-MICA CAP	.20	N	OSS
2	710-1248	1-6-005	5 MF,25VDC,ELEC.	.42	A	OSS
6	710-1260	7-6-1000	100 MF,25VDC,ELEC.	.24	A	OSS
20	555-0914	1N914B	SIL-DIODE	.19	A	OSS
6		1N5338B	5.1V ZENER SW	2.50	N	OSS
12		2N4123	NPN TRANS	.22	S	OSS
8		2N4125	PNP TRANS	.27	S	OSS
2		ICL8038BC	DIP OSC(V-CONT)	8.40	S	OSS
2		MA715	DIP SINK	8.25	S	OSS
2			217 P-C BOARD			OSS
1			VCO P-C BOARDS			OSS
2	22F423	1402	SW. 8-POS.	3.00	N	OSS
4	652-0507	205N	SW. SPDT	2.13	A	OSS
12	39F1337	13-236	BNC,FM-CHS.MT.	.72	N	OSS
~~2~~	~~KD-67-1-CC-M-L-9~~		~~299 1N/MBL,LB-9/WHT~~	~~1.00~~	~~R~~	~~OSS~~
~~2~~	~~KC-67-1-DC-M-L-9~~		~~3501GRY,LB-9/BL~~	~~1.00~~	~~R~~	~~OSS~~
1			CHASSIS,OSC-FACE	8.25	DG	OSS
2	61F1175	KD-1250A-1/4"	ALUM. KNOB	1.75	N	OSS
2	12F6045	DFA-N	COUNTING DIAL	4.75	N	OSS
2	12F9800	3389P	5K TRIM. BD. MT.	.65	N	OSS
2	12F9800	3389P	100K TRIM. BD. MT.	.65	N	OSS

COMPLETE PARTS LIST
for
Classical I-P

QUANTITY	SUPPLIER'S STOCK NUMBER	MANUFACTURER'S TYPE NUMBER	PART DISCRIPTION	UNIT PRICE	QUANTITY PRICE	CODE/SUPPLIER
****NEWARK ELECTRONICS****						
5(PKG100)	67F4065	8325	3/4" SPACER	11.00	55.00	
2(PKG100)	67F4067	8327	1" SPACER	14.00	24000	
1	29F263	1900	BOLT CUTTERS(CRIMPER)	4.37	4.37	
1000 FT	36F1800WM	RG 59/U	CO-AXIAL CABLE	81.28	81.28	N
100	39F029	68175	BNC,M-CABLE MT KRMP	.79	.79	N
500 FT	36F058WF	RG 174/U	CO-AXIAL CABLE	25.25	25.25	N
1	36F650WA1	8529	WIRE,SOLID-20AWG BRN	2.19	2.19	N
1	36F650WA2	8529	WIRE,SOLID-20AWG RED	2.19	2.19	N
1	36F650WA3	8529	WIRE,SOLID-20AWG ORG	2.19	2.19	N
1	36F650WA4	8529	WIRE,SOLID-20AWG YEL	2.19	2.19	N
1	36F650WA5	8529	WIRE,SOLID-20AWG GRN	2.19	2.19	N
1	36F650WA6	8529	WIRE,SOLID-20AWG BLU	2.19	2.19	N
1	36F650WA7	8529	WIRE,SOLID-20AWG VIO	2.19	2.19	N
1	36F650WA8	8529	WIRE,SOLID-20AWG GRY	2.19	2.19	N
1	36F650WA9	8529	WIRE,SOLID-20AWG WHT	2.19	2.19	N
1	36F650WA10	8529	WIRE,SOLID-20AWG BLK	2.19	2.19	N
1(100FT)	36F590WA1	8500	WIRE,STR-16AWG BRN	2.96	2.96	N
1(100FT)	36F590WA2	8500	WIRE,STR-16AWG RED	2.96	2.96	N
1(100FT)	36F590WA3	8500	WIRE,STR-16AWG ORG	2.96	2.96	N
1(100FT)	36F590WA4	8500	WIRE,STR-16AWG YEL	2.96	2.96	N
1(100FT)	36F590WA5	8500	WIRE,STR-16AWG GRN	2.96	2.96	N
1(100FT)	36F590WA6	8500	WIRE,STR-16AWG BLU	2.96	2.96	N
1(100FT)	36F590WA7	8500	WIRE,STR-16AWG VIO	2.96	2.96	N
1(100FT)	36F590WA8	8500	WIRE,STR-16AWG GRY	2.96	2.96	N
1(100FT)	36F590WA9	8500	WIRE,STR-16AWG WHT	2.96	2.96	N
1(100FT)	36F590WA10	8500	WIRE,STR-16AWG BLK	2.96	2.96	N
2	36F1260	17656	POWER CORDS 14 AWG.	2.73	5.46	N
1	60F2408	15-15	FUZED AC OUTLET BOX	12.85	12.85	N
1	27F692	31-3001	FUZE,1 A.-3AG,SB	1.50	1.50	N
8(BOX100)	31F2245		INTER.LOCKWASH#4	.95	7.60	N
4(BOX100)	30F698		BINDHEAD4-40*1/4	1.84	7.36	N
1(BOX100)	30F699		BINDHEAD4-40*1/2	1.95	1.95	N
1	35F2521	W-TCP	SOLDERING STATION	37.00	37.00	N
1	35F2526	PTA	1/16 TIP (W-TCP)	1.00	1.00	N
1	58F587	45-121	WIRE STRIPPER	2.65	2.65	N
1	34F093	0257-4C	CUTTERS	3.15	3.15	N
				SUB-TOTAL=	400.92	

NEWARK ELECTRONICS
500 N. PULASKI RD.
CHICAGO, ILL. 60624

****NEWARK ELECTRONICS****

78	10F454	101UA	100 OHM POT 1/4SFAB	1.7	133.38	N
3	10F459	501UA	500 OHM POT 1/4SFT	1.7	5.13	N
6	9F073	U1	100 OHM POT 1/4SFT	1.45	8.70	N
1	10F588		500 OHM POT 1/4SFTB	5.02	5.02	N
3	9F078	U4	1K OHM POT 1/4SF	1.45	4.35	N
1	9F081	U6	2K OHM POT 1/4SFT	1.45	1.45	N
19	10F468	103UA	10K OHM POT 1/4SFAB	2.21	41.99	N
32	9F089	U20	10K OHM POT 1/4SFT	1.4	46.40	N
3	10F473	503UA	50K OHM POT 1/4SFAB	2.21	9.00	N
4	9F1860		100KOHM 10-TURN POT	5.3	21.20	N
3	10F683	501UC	500 TRIM,LOK,PNL-MT	3.00	9.00	N
15	10F655		50K TRIM,LOK,PNL-MT	3.00	45.00	N
28	12F9800	3389F	20K TRIM BD-MT	.6	18.20	N
4	14F1267	DM5-0600	6 PF,DIP-MICA CAP	.36	1.44	N
22	14F1269	DM5-0800	8 PF,DIP-MICA CAP	.36	7.92	N
7	14F554	DM15-120J	12 PF,DIP-MICA CAP	.20	1.40	N
34	14F555	DM15-150J	15 PF,DIP-MICA CAP	.20	6.80	N
45	14F557	DM15-200J	20 PF,DIP-MICA CAP	.18	8.10	N
1	14F562	DM15-330J	33 PF,DIP-MICA CAP.	.24	.24	N
1	14F566	DM15-470J	47 PF,DIP-MICA CAP.	.24	.24	N
3	14F567	DM15-500J	50 PF,DIP-MICA CAP	.19	.57	N
3	14F557	DM15-101J	100 PF,DIP-MICA CAP	.18	.54	N
4	14F582	DM15-201J	200 PF,DIP-MICA CAP	.20	.80	N
51	14F592	DM15-471J	470 PF,DIP-MICA CAP	.32	16.32	N
1	19F1700	835-000	.005 MFDSC-CER CAP.	.12	.12	N
27	67F307	TDC-103Z	.01 MF,DSC-CER CAP.	.05	1.35	N
1	67F305	TDC-503M	.05 MF,DSC-CER CAP.	.37	.37	N
7	67F313	TDC-104Z	.1 MF,DSC-CER CAP.	.16	1.12	N
4	35F1956	SWD 39	39 MICROHENRY CHOKE	2.91	11.64	N
4	35F1969	SWD470	470 MICROHENRY CHOK	2.91	11.64	N
1	15F2317	9056	120-280 VARI.CHOKE	3.39	3.39	N
1		1N5346B	9.1V ZENER 5W	2.50	2.50	N
15		1N5338B	5.1V ZENER 5W	2.50	37.50	N
4	22F423	1402	SW. 8-POS.	3.00	12.00	N
1	59F1740	182090	POWER SWITCH,AMBER	3.97	3.97	N
2	27F784	344125A	110V LAMP-FUZE KNOB	4.06	8.12	N
1	39F1232	160-4-N	AC RECP.FM*2POLE-GD	1.58	1.58	N
2	39F1233	160-5-N	AC RECP.M*2POLE-GRD	2.06	4.12	N
11	39-F-255	S-310-FP	JONES FM*CHS.MT.	1.21	13.31	N
2	39F1547	111-0103-001	POST BLACK 10	.52	1.04	N
2	39F1552	111-0108-001	POST BROWN 1	.52	1.04	N
2	39F1546	111-0102-001	POST RED 2	.52	1.04	N
2	39F1550	111-0106-001	POST ORANGE 3	.52	1.04	N
2	39F1551	111-0107-001	POST YELLOW 4	.52	1.04	N
2	39F1548	111-0104-001	POST GREEN 5	.52	1.04	N
2	39F1554	111-0110-001	POST BLUE 6	.52	1.04	N
2	39F1556	111-0112-001	POST VOILET 7	.52	1.04	N
2	39F1557	111-0113-001	POST GRAY 8	.52	1.04	N
2	39F1545	111-0101-001	POST WHITE 9	.52	1.04	N
314	39F1337	13-235	BNC,FM-CHS.MT.	.72	226.08	N
7	61F1175	KD-1250A-¼"	ALUM. KNOB(TIMING)	1.75	12.25	
4	12F6045	DFA-N	COUNTING DIAL	4.75	19.00	

SUB-TOTAL: 772.95
SUB-TOTAL: 400.92

NEWARK TOTAL 1173.81

****ALLIED ELECTRONICS****

154		525-1060	10 OHM, 1/4 W RES	.06	10.78	A
10		525-1081	15 OHM, 1/4 W RES	.06	1.00	A
30		525-1117	27 OHM, 1/4 W RES	.06	3.00	A
41		525-1153	47 OHM, 1/4 W RES	.06	4.10	A
243		525-1185	75 OHM, 1/4 W RES	.06	17.01	A
235		525-1202	100 OHM, 1/4 W RES	.06	16.45	A
19		525-1226	150 OHM, 1/4 W RES	.06	1.90	A
48		525-1248	220 OHM, 1/4 W RES	.06	4,80	A
79		525-1263	270 OHM, 1/4 W RES	.06	7.00	A
21		525-1270	300 OHM, 1/4 W RES	.06	2.10	A
10		525-1276	330 OHM, 1/4 W RES	.06	1.00	A
58		525-1302	470 OHM, 1/4 W RES	.06	5.80	A
66		525-1308	510 OHM, 1/4 W RES	.06	6.60	A
27		525-1330	680 OHM, 1/4 W RES	.06	2.70	A
107		525-1356	1K0 OHM, 1/4 W RES	.06	7.49	A
10		525-1361	1.1KOHM, 1/4 W RES	.06	1.00	A
30		525-1380	1.5KOHM, 1/4 W RES	.06	3.00	A
65		525-1405	2.2KOHM, 1/4 W RES	.06	6.50	A
13		525-1421	2.7KOHM, 1/4 W RES	.06	1.30	A
10		525-3427	3K OHM, 1/4 W RES	.06	1.00	A
10		525-1433	3.3KOHM, 1/4 W RES	.06	1.00	A
10		525-1461	4.7KOHM, 1/4 W RES	.06	1.00	A
134		525-1467	5.1KOHM, 1/4 W RES	.06	9.38	A
10		525-1489	6.8KOHM, 1/4 W RES	.06	1.00	A
227		525-1522	10K OHM, 1/4 W RES	.06	15.89	A
17		525-1528	11K OHM, 1/4 W RES	.06	1.70	A
32		525-1550	15K OHM, 1/4 W RES	.06	3.30	A
10		525-1603	27K OHM, 1/4 W RES	.06	1.00	A
10		525-1650	47K OHM, 1/4 W RES	.06	1.00	A
10		525-1703	82K OHM, 1/4 W RES	.06	1.00	A
10		525-1717	100KOHM, 1/4 W RES	.06	1.00	A
10		525-1907	2.2MOHM, 1/4 W RES	.06	1.00	A
241	555-0914	1N914B	SIL-DIODE	.19	45.79	A
4	852-0019		47PF,POLY CAP	.13	.52	A
4	852-0026		100PF, POLY CAP	.13	.52	A
8	852-0050		1000PF ,POLY CAP	.13	1.04	A
4	852-0110		.01 MFD, POLY CAP	.13	.52	A
8	852-0900		.047 MFD, POLY CAP	.13	1004	A
8	852-0104		.47 MFD, POLY CAP	.13	1.04	A
4	852-4601		10 MFD,ELEC CAP,35V	.48	1.92	A
4	852-5256		100 MFD,ELEC CAP,150V	2.41	9.64	A
4	710-1248	1-G-005	5 MF,25VDC,ELEC.	.42	1.68	A
11	710-1251	2-G-101	10 MF,25VDC,ELEC.	.44	4.84	A
1	710-1253	3-G-020	20 MF,10VDC,ELEC.	.20	.20	A
2	710-1254	3-G-025	25 MF,25VDC,ELEC.	.46	.92	A
7	710-1258	4-G-050	50 MF,25VDC,ELEC.	.46	3.22	A
142	710-1260	7-G-1000	100 MF,25VDC,ELEC.	.24	34.08	A
2	710-1218	8-U-2500	250 MF,212DC,ELEC.	.58	11.16	A
4	710-1339	L-E-500	500 MF,16VDC,ELEC.	.45	1.80	A
4	710-1340	N-E-1000	1000MF,16VDC,ELEC.	.67	2.68	A
4(BOX100)	920-1803	1803	TAP SCREWS #6*3/8	1.78	7.12	A
4(BOX100)	920-1365	1365	NUTS 4-40*1/4 HEX	1.62	6.48	A
1(BOX100)	920-1397	1497	SOLDER LUGS 3/8 HOLE	2.25	2.25	A
1#SPOOL	707-5060		SOLDER,60/40*.025	6.38	6.38	A
1	707X3036	3036	36 DRAWER CABINET	10.00	10.00	A
1	548Z0240	CC40	40 BIN RACK	22.50	22.50	A
8	652-0507	205N	SW. SPDT	2.13	18.48	A

TOTAL=338.62

ALLIED ELECTRONICS
1355 SLEEPY HOLLOW RD.
ELGIN, ILL. 60120

MICROSONICS
WEYMOUTH, MASS. 02188

1	K1087A2T1B	XTAL-14.318180MHZ	140.00	140.00	M
			TOTAL	140.00	

OHM ELECTRONICS
649 VERMONT AVE.
PALANTINE, ILL. 60067

2000	1938-4	05-30-0001	IC DIP SOCKETS	.036	25,50	O
1000	1875-2L	02-04-1112	TRANS. SOCKETS	.245	24.50	O
				TOTAL	50.00	

ADVENT ELECTRONICS
7110-16 N. LINCOLN AVE
ROSEMONT, ILL. 60018

10	1-526-063-11		6-PIN FEMALE CHS MT	.90	9.00	AF
30		09-02-1152	MOLEX P-C BOARD CON.	.58	17.50	AF
300	8-30110		MOLEX INSERTS	.036	10.70	AF
* 1		CEN-4092-5	COLOR ENCODER BRD	400.00	400.00	AF
* 1	713-6140	225-2222-401	44CONTACT CON	5.89	5.89	A
				TOTAL	437.20	

LAMBDA ELECTRONICS
2420 E. OAKTON ST.
ARLINGTON HEIGHTS, ILL.

1	LOS-Z-15	15V1.4AMP POW SUP	32.00	32.00	L
2	LOS-Z-5	5V,3AMP POWER SUP.	32.00	64.00	L
1	L-12-OV-15	NON-ADJ. OVP	8.00	8.00	L
2	L-12-OV-5	NON-ADJ. OVP	8.00	16.00	L
1	LOD-W-152	12V,3AMP POWER SUP	87.00	87.00	L
2	L-12-OV-12	NON-ADJ. OVP	8.00	16.00	L
			TOTAL	207.00	

SEMI CONDUCTOR SPECIALISTS
P.O. BOX 66125
OHARA AIRPORT
CHICAGO, ILL. 60666

53	1N270	GERM-DIODE	.22	11.66	S
144	2N4123	NPN TRANS	.28	38.88	S
90	2N4125	PNP TRANS	.27	24.30	S
70	CA3030	DIP OP-AMP, RCA	1.32	92.40	S
35	MC1445L	DIP GAIN-CONT. AMP	1.90	66.50	S
3	MC9602P	DIP MONOSTBL. VIB.	8.10	24.30	S
2	MC74121P	DIP MONO. VIB.	1.18	2.36	S
4	ICL8038BC	DIP OSC(V-CONT)	8.40	33.60	S
4	MA715	DIP SINK	8.25	33.00	S
1	74S05	DIP BUFF, FAIRCHILD	1.04	1.04	S
1	3262ADC	DIP MOS DECODER	18.56	18.56	S
1	7404	DIP BUF	.70	.70	S
			TOTAL	347.30	

NOTICE: THE SONY COLOR ENCODER BOARD (FROM ADVENT) HAS BEEN DISCONTINUED.
WHEN A REPLACMENT IS FOUND AN ADDENDUM WILL FOLLOW....
-NOTE ALSO THE 44-PIN CONNECTOR (USED W/ SONY ENCODER) NEITHER ONE SHOULD BE ORDERED!!

1142.62	NEWARK
338.62	ALLIED
140.00	MICRO.
50.00	OHM
207.00	LLAMBDA
347.00	SEMI CON.
437.00	ADVENT
198.00	D&G
+ 140.58	ROGAN
$ 3000.82	TOTAL

BOX & P.C. BOARD DATA

for

****classical I-P****

QUANTITY/I-P BOXES	MODULE NAME	P-C BOARD NAME	QUANTITY BOARDS/BOX
1	POWER SUPPLY-1	NONE	0
1	POWER SUPPLY-2	NONE	0
1	INPUT	VS5	3
1	COMPARATOR	VS5	3
1	DIFFERENTIATOR	VS5	3
1	FUNTION GENERATØR	VS5	3
1	REFERENCE	217	3
8	ADDER-MULT.	VS1	1
		VS5	1
2	OSCILLATOR	VCO	1
		217	2
1	SYNC. GENERATOR	VS4*(vsv)**	1
		SINK	2
1	SYNC. STRIPPER	VS5	4
		DS6*(f)**	1
3	AMPL. CLASSIFIER	VS5	1
		216	1
		217	2
1	COLOR ENCODER	DS6*(f)**	1
		217	1
		VS1	1

**old name in parenthisis*

FOR CLASSICAL I-P TOTAL P-C BOARD TALLY		HOLE COUNT
VS1	9	157
VS4	1	144
VS5	27	202
DS6	2	333
216	3	290
217	14	256
VCO	2	182
SINK	2	258
VS10		213

TO ORDER P-C BOARDS @ E.D.I.

1-XEROX EDI ORDER FORM(10)COPIES
2-FILL OUT ONE COPY FOR EACH TYPE BOARD
 (A)-PUT BOARD NAME IN UPPER LEFT
 (B)-PUT QUANTITY IN UPPER RIGHT
3-TO CALCULATE PRICE:
 (A)-BASE PRICE = BASE COST($1.746)XQUANTITY
 (B)-SERVICE=ETCHING COST(*varies w/ hurry&quantity*)XQUANTITY
 (C)-MISC.CHARGES:DRILLING HOLES COSTS 1 CENT EACH.....
  -MISC.CHARGE=HOLE COST per BOARD X QUANTITY
  -**note*hole cost=(hole count)X($0.01)*
4-TOTAL COST= (3A)+(3B)+(3C)x20%

SANDIN IMAGE PROCESSER

_____BOARD

QUANTITY=_____

ORDER FORM

☒ ORDER FORM (Use one form for each type board)967 ☐ QUOTATION REQUEST ☐ SEND____FORMS #

PRICE CHART

foil wt./oz	foil sides	PLATING (dip process)	XXXP PAPER PHENOLIC THICKNESS 1/32	1/16	3/32	1/8	GIO GLASS EPOXY THICKNESS 1/32	1/16	3/32	1/8	CUSTOMER SUPPLIED Non sens.	Photo sens.	
1	1	None	.040	.044	.051	.056	.072	.087	.122	.144	.050	.000	1
		Water dip lacquer	.045	.049	.056	.061	.077	.092	.127	.149	.055	.005	2
		Silver	.048	.052	.059	.064	.080	.095	.130	.152	.058	.008	3
		Tin	.047	.051	.058	.063	.079	.094	.129	.151	.057	.007	4
1	2	None	.058	.062	.069	.075	.088	.105	.134	.164	.050	.000	5
		Water dip lacquer	.063	.067	.074	.080	.093	.110	.139	.169	.055	.005	6
		Silver	.069	.073	.080	.086	.099	.116	.145	.175	.061	.011	7
		Tin	.067	.071	.078	.084	.097	.114	.143	.173	.059	.009	8
2	1	None	.042	.046	.053	.059	.074	.090	.123	.145	.050	.000	9
		Water dip lacquer	.047	.051	.058	.064	.079	.095	.128	.150	.055	.005	10
		Silver	.050	.054	.061	.067	.083	[illegible]	.131	.153	.058	.008	11
		Tin	.049	.053	.060	.066	.081	.097	.130	.152	.057	.007	12
2	2	None	.063	.067	.075	.081	.091	.107	.137	.169	.050	.000	13
		Water dip lacquer	.068	.072	.080	.086	.096	.112	.142	.174	.055	.005	14
		Silver	.074	.078	.086	.092	.102	.118	.148	.180	.061	.011	15
		Tin	.072	.076	.084	.090	.100	.116	.146	.178	.059	.009	16
			A	B	C	D	E	F	G	H	I	J	

CHART INSTRUCTIONS:

From left side of chart, select in order, foil weight, number of foil sides, and type of PLATING.

From top of chart, select type of base material and THICKNESS.

The figure, at intersection of PLATING and THICKNESS, is base cost per square inch.

Use letter at bottom of column and number at right of row for order number.

Enter E.D.I. order number here. F12

SERVICE SCHEDULE quantity	Price/board Delivery required 1 DAY	2 DAYS	3 DAYS	1 WEEK	2 WEEKS
1	5.00	4.50	4.05	3.65	3.28
2	3.50	3.15	2.75	2.48	2.23
3	3.00	2.70	2.43	2.19	1.86
4	2.75	2.48	2.24	2.02	1.62
5	2.50	2.25	2.03	1.83	1.38
6 to 9	2.25	2.03	1.83	1.65	1.32
10 to 25	2.00*	1.80	1.62	1.46	1.10
25 to 50	1.90*	1.71*	1.54	1.31	.98
50 to 100	1.82*	1.64*	1.48	1.18	.83
100 & Up	1.77*	1.59*	1.43	1.06	.77

* Call to confirm delivery on these quantities.

$1.746 × _____ = base price = $_____ A
base cost — quantity

$_____ × _____ = service = $_____ B
etching cost — quantity

$_____ × _____ = misc. charg = $_____ C
hole cost — quantity

(A+B+C) X 20% = TOTAL COST = $_____ D

We are selling service. You will be notified by phone of any failure to fill order. Payment refunded.

Be sure to enclose artwork and payment or P.O. Number.

If desired, send blank check (With limit) and we figure cost.

Sign here _____

Phone Number _____

P.O. Number _____

E.D.I.
2615 PARK AVE.
P.O. BOX 66
CAIRO, ILL. 62914

Phone 618 734-1694 (Office)

Customer Name & Address. Correct if necessary.

1	35r1260	1/636	POWER CORDS 14 AWG.	2.73	N	MISC
1	00r2436	15-15	FUZED AC OUTLET BOX	12.85	N	MISC
1	27r392	31-3001	FUZE,1 A.-3AG,SB	1.50	N	MISC
30		09-02-1152	MOLEX P-C BOARD CON.	.58	AP	MISC
300	0-30110		MOLEX INSERTS	.036	AP	MISC
2000	1933-4	05-30-0001	IC DIP SOCKETS	.036	O	MISC
1000	1875-2L	02-04-1112	TRANS. SOCKETS	.245	O	MISC
1000 FT	35r1000WM	RG 59/U	CO-AXIAL CABLE	81.28	N	MISC
100	34r269	00175	BNC,M-CABLE MT KRMP	.79	N	MISC
500 FT	35r3568WF	RG 174/U	CO-AXIAL CABLE	25.25	N	MI>"
1	36r3500WA1	0529	WIRE,SOLID-20AWG BRN	2.19	N	MISC
1	36r3500WA2	0529	WIRE,SOLID-20AWG RED	2.19	N	MISC
1	36r3500WA3	0529	WIRE,SOLID-20AWG ORG	2.19	N	MISC
1	36r3500WA4	0529	WIRE,SOLID-20AWG YEL	2.19	N	MISC
1	36r3500WA5	0529	WIRE,SOLID-20AWG GRN	2.19	N	MISC
1	36r3500WA6	0529	WIRE,SOLID-20AWG BLU	2.19	N	MISC
1	36r3500WA7	0529	WIRE,SOLID-20AWG VIO	2.19	N	MISC
1	36r3500WA8	0529	WIRE,SOLID-20AWG GRY	2.19	N	MISC
1	36r3500WA9	0529	WIRE,SOLID-20AWG WHT	2.19	N	MISC
1	36r3500WA10	0529	WIRE,SOLID-20AWG BLK	2.19	N	MISC
1(100FT)	36r3910WA1	0500	WIRE,STR-16AWG BRN	2.96	N	MISC
1(100FT)	36r3900WA2	0500	WIRE,STR-16AWG RED	2.96	N	MISC
1(100FT)	36r3900WA3	0500	WIRE,STR-16AWG ORG	2.96	N	MISC
1(100FT)	36r3900WA4	0500	WIRE,STR-16AWG YEL	2.96	N	MISC
1(100FT)	36r3900WA5	0500	WIRE,STR-16AWG GRN	2.96	N	MISC
1(100FT)	36r3900WA6	0500	WIRE,STR-16AWG BLU	2.96	N	MISC
1(100FT)	36r3900WA7	0500	WIRE,STR-16AWG VIO	2.96	N	MISC
1(100FT)	36r3900WA8	0500	WIRE,STR-16AWG GRY	2.96	N	MISC
1(100FT)	36r3900WA9	0500	WIRE,STR-16AWG WHT	2.96	N	MISC
1(100FT)	36r3900WA10	0500	WIRE,STR-16AWG BLK	2.96	N	MISC
3(50X100)	31r2245		INTER.LOCKWASH#4	.95	N	MI>"
4(50X100)	30r348		BINDHEAD4-40*1/4	1.84	N	MISC
1(50X100)	30r349		BINDHEAD4-40*1/2	1.95	N	MISC
4(50X100)	920-1803	1803	TAP SCREWS #6*3/8	1.78	A	MISC
4(50X100)	920-1365	1365	NUTS 4-40*1/4 HEX	1.62	A	MISC
1(50X100)	920-1397	1497	SOLDER LUGS 3/8 HOLE	2.25	A	MISC
1#SPOOL	707-5060		SOLDER,60/40*.025	6.38	A	MISC
1	35r2521	W-TCP	SOLDERING STATION	37.00	N	MISC.
1	35r2520	PTA	1/16 TIP (W-TCP)	1.00	N	MISC
1	30r367	45-121	WIRE STRIPPER	2.65	N	MISC
1	34r393	0257-4C	CUTTERS	3.15	N	MISC
1	707X5050	5056	56 DRAWER CABINET	10.00	A	MISC
1	54020240	CC40	40 BIN RACK	22.50	A	MISC

I-P KNOBS

quantity	stock #		cost
32	RB-67-1-DC-M-L-9	BLACK KNOBS (GAIN) #299-INLAY/MATT BLACK LINE/WHITE -9 /WHITE @$.86each	27.52
32		INLAY/SILVER (GAIN) LINE/BLACK -9 /WHITE @$.86each	27.52
33		#120-INLAY/AMBER (GAIN) LINE/BLACK -9 /WHITE @$.88each	29.04
25	RB-67-1-DC-M-D-9	BLACK KNOBS (BIAS) #299-INLAY/MATTE BLACK DOT /WHITE -9 /WHITE @$.86each	21.50
25	RB-67-0-DC-M-D-9	BLACK KNOBS (BIAS) #299-INLAY/MATTE BLACK DOT /WHITE -9 /WHITE @$1.40each	35.00
deliver to:			TOTAL $ 140.58

250 1.00

1.50

mail w/ check to:

TO: ROGAN KNOBS
3455 WOODHEAD DR.
NORTHBROOK, ILL.
498 2300
60062

ATTN: Barbara Post

1.50

**********mail original**********cut here**********keep a copy**********

I-P BOXES
(chassis)

··· POWER SUPPLY #1	-1
··· POWER SUPPLY #2	-1
··· INPUT	-1
··· COMPARATOR	-1
··· DIFFERENTIATOR	-1
··· FUNCTION GENERATOR	-1 2
··· REFERENCE	-1 2
··· ADDER-MULTIPLIER	-8 9 2m
··· OSCILLATOR	-2 3
··· SYNC. GENERATOR	-1
··· SYNC. STRIPPER	-1
··· AMPLITUDE CLASSIFIER	-3
··· COLOR ENCODER	-1
··· BOX(blank)	-1
total for	
for classical I-P=	24

total # boxes x$8.25 = *total price* $

deliver to:

name

address

city

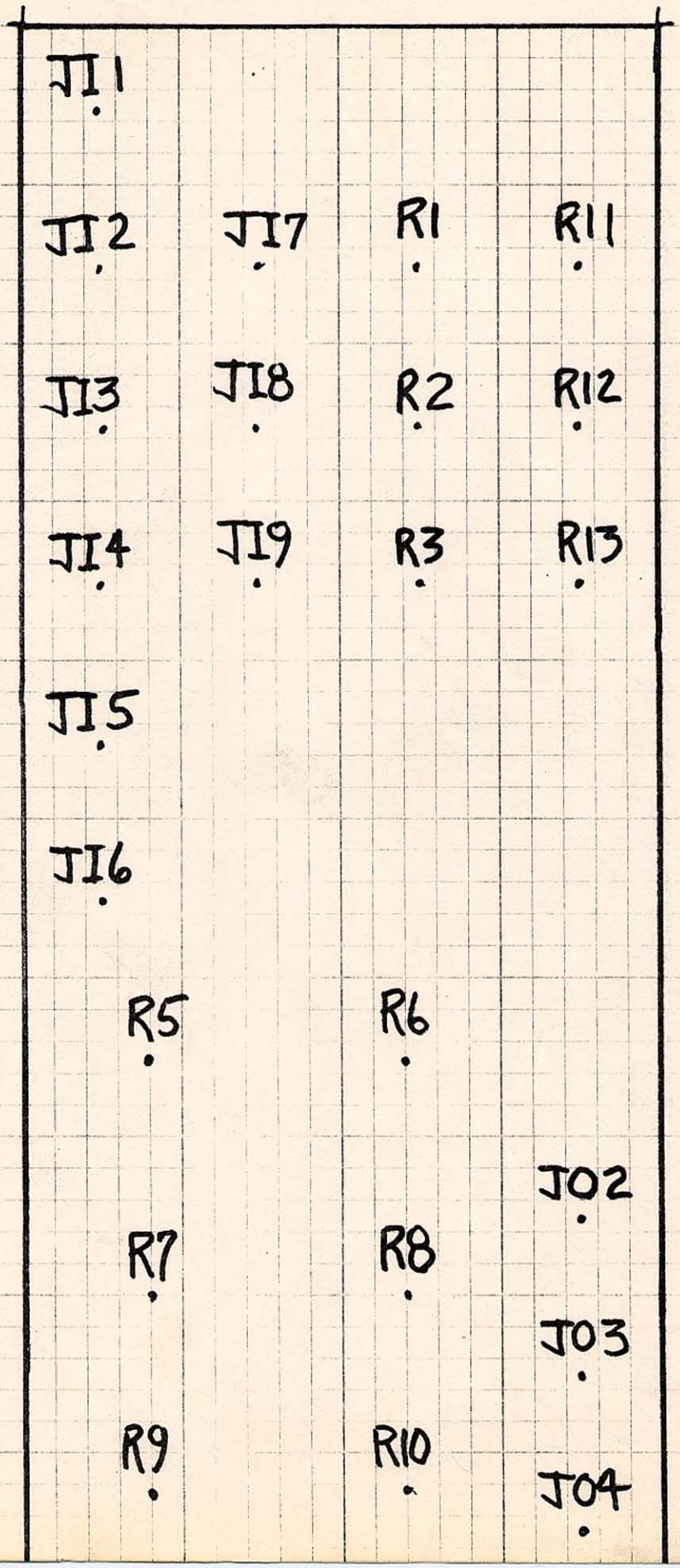
phone

signiture

date

mail w/ check to:

TO: D&G ENTERPRISES
1820 S. HALSTED ST.
CHICAGO, ILL. 60608



FRONT FACE

COLOR ENCODER

9.75

COLOR ENCODER

The Color Encoder module is a N.T.S.C. standard color encoder based around the color encoder board of a Sony DXC-5000B color camera. A summary of inputs, outputs and controls follows:

JI1 COLOR CARRIER (3.58)	1v.p-p 75ohm	Supplied from Sync Generator, Sync Strip or 'House-Sync' in any TV studio...
JI2 BURST FLAG	4v.p-p 75ohm	
JI3 COMPOSITE SYNC	"	
JI4 HORIZONTAL DRIVE	"	
JI5 COMPOSITE BLANKING	"	
JI6 (reserved for future expansion)		All inputs supplied from Image Processor with associated gain controls...
JI7 RED INPUT	(+ and -).5v. 75ohm	
JI8 GREEN INPUT	"	
JI9 BLUE INPUT	"	
JI10 (not implemented yet)		
JO1 LUMINANCE OUT ONLY	non-comp. 1v.p-p	
JO2 N.T.S.C. OUT COMPOSITE		
JO3 "		
JO4 "		

R1 through R4 are normally left at ½ gain...

R5 (chromance control) and R6 (hue control) act like adjustments on a color TV. Adjust using a vectorscope or adjust (visually) to a monitor tuned to a standard TV station.
R7 is adjusted to produce no chromance (color) out when there is no signal coming into the red, green, blue inputs of the encoder.
R9 (burst height), R8 (pedistal) and R10 (sync height) are adjusted to standard; if in doubt use signal from local TV station for reference (oscilliscope is necessary).

The function of the Blanking and Pedistal Board (top) is to insert blanking and pedistal to each of the monochrome input signals and route signals to the encoder board. The luminance component of the signal (red, green, and blue) is taken from the encoder and amplified by the Luminance Board (middle) and fed to the luminance output and back to the encoder. The Horizontal Clamp Board (bottom) receives horizontal sync and generates a clamping pulse which is sent to the encoder board. (pulse is positive) Adjust RT1 for a delay of 1.7 micro-seconds after horz. sync falling-edge, and adjust RT2 for a pulse length of 3 micro-seconds.

Presently, the Color Encoder Module has some 'funkiness' from a stringent point of view. It is quite adequate for all small format recording; however, in a 2" quad broadcast context, a proc-amp is recommended on its output to prevent oversaturation of chromance information.

MODIFICATIONS on the SONY ENCODER BOARD:
Remove the white delay line (DL2); it has four leads to be de-soldered...

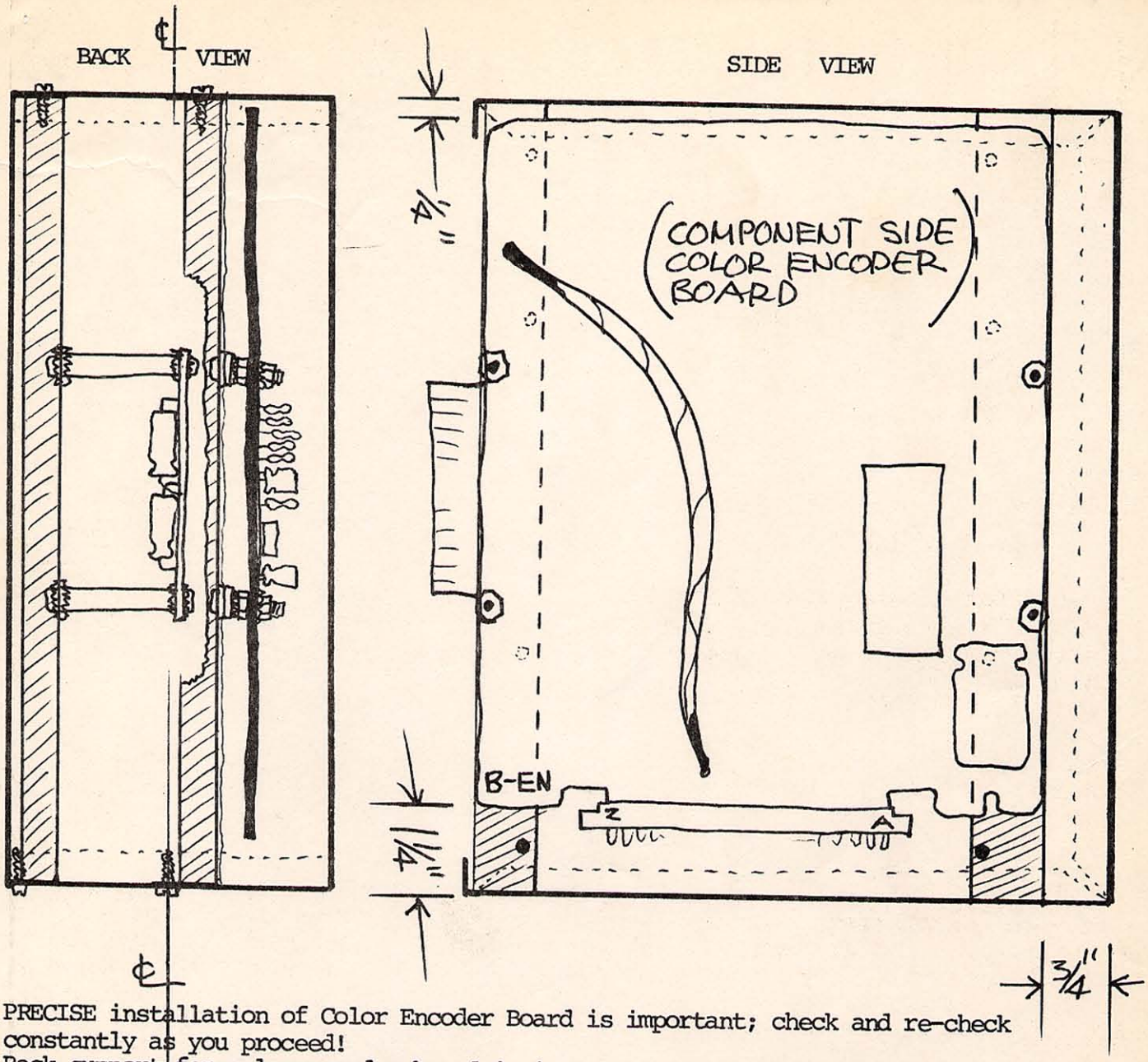
NOTE WELL

THIS DOCUMENTATION OF COLOR ENCODER IS OUT OF DATE

THE SONY ENCODER BOARD IS NO LONGER AVAILABLE

THE NEW DISIGN IN PROGRESS IS LIKELY ??? TO BE VERY SIMILAR.

USE FOR GENERAL REFERENCE ONLY??



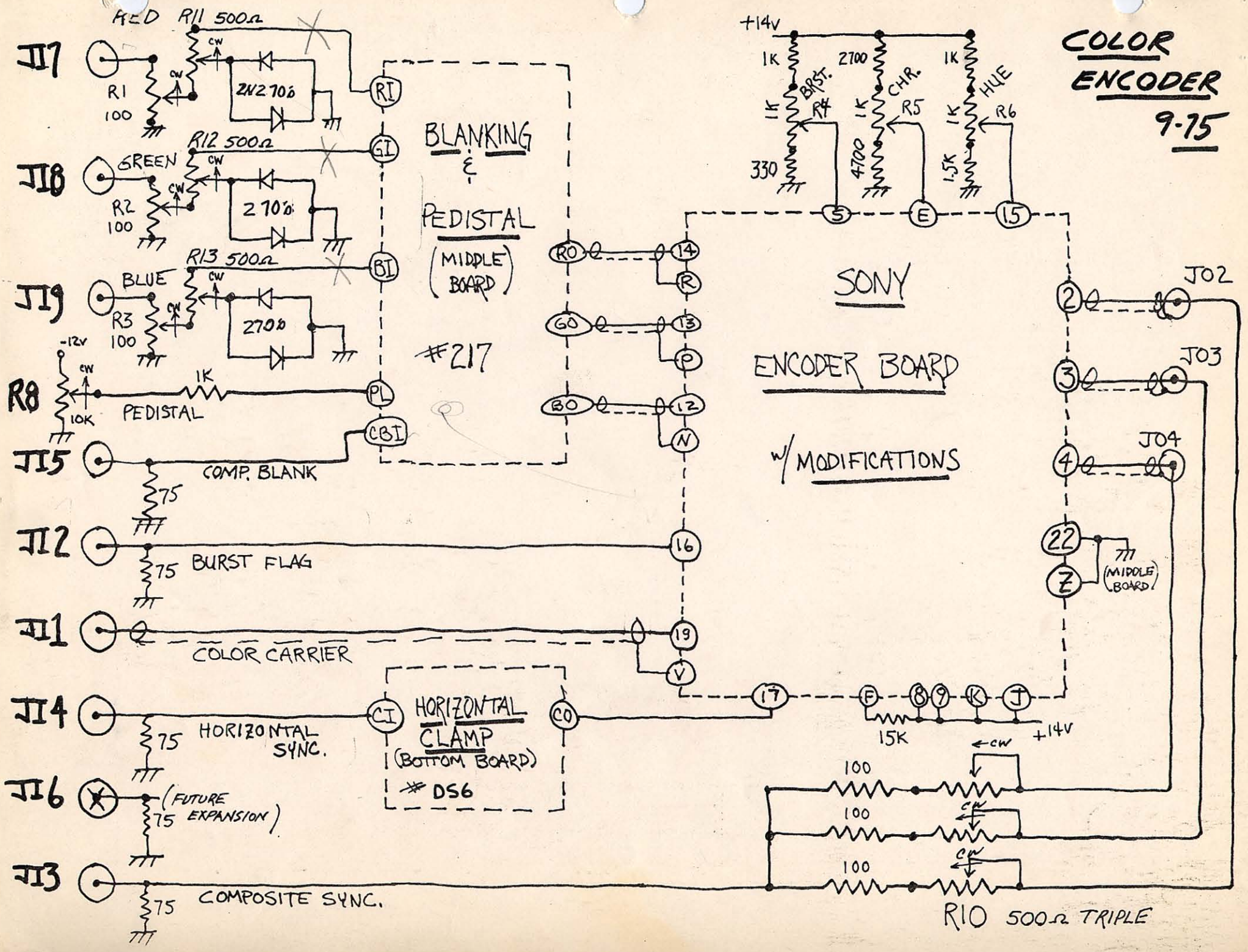
PRECISE installation of Color Encoder Board is important; check and re-check constantly as you proceed!
Back support for color encoder board is installed identical in position and orientation as is back support for the three printed circuit boards; see BACK VIEW pictorial. NOTE the position of bottom screw is on center-line of module and the top screw is abit shifted to right as usual. Be sure to cut plently of clearance in the support bracket for the middle printed circuit board to clear; see BACK VIEW pictorial.

Check for plently of clearance, made up of flat washers, star washer and nut, between encoder board and support bracket. As a 'safety measure' against board ever touching the supports due to bending etc, insulate the supports with a couple layers of super-tape or very thin rubber...

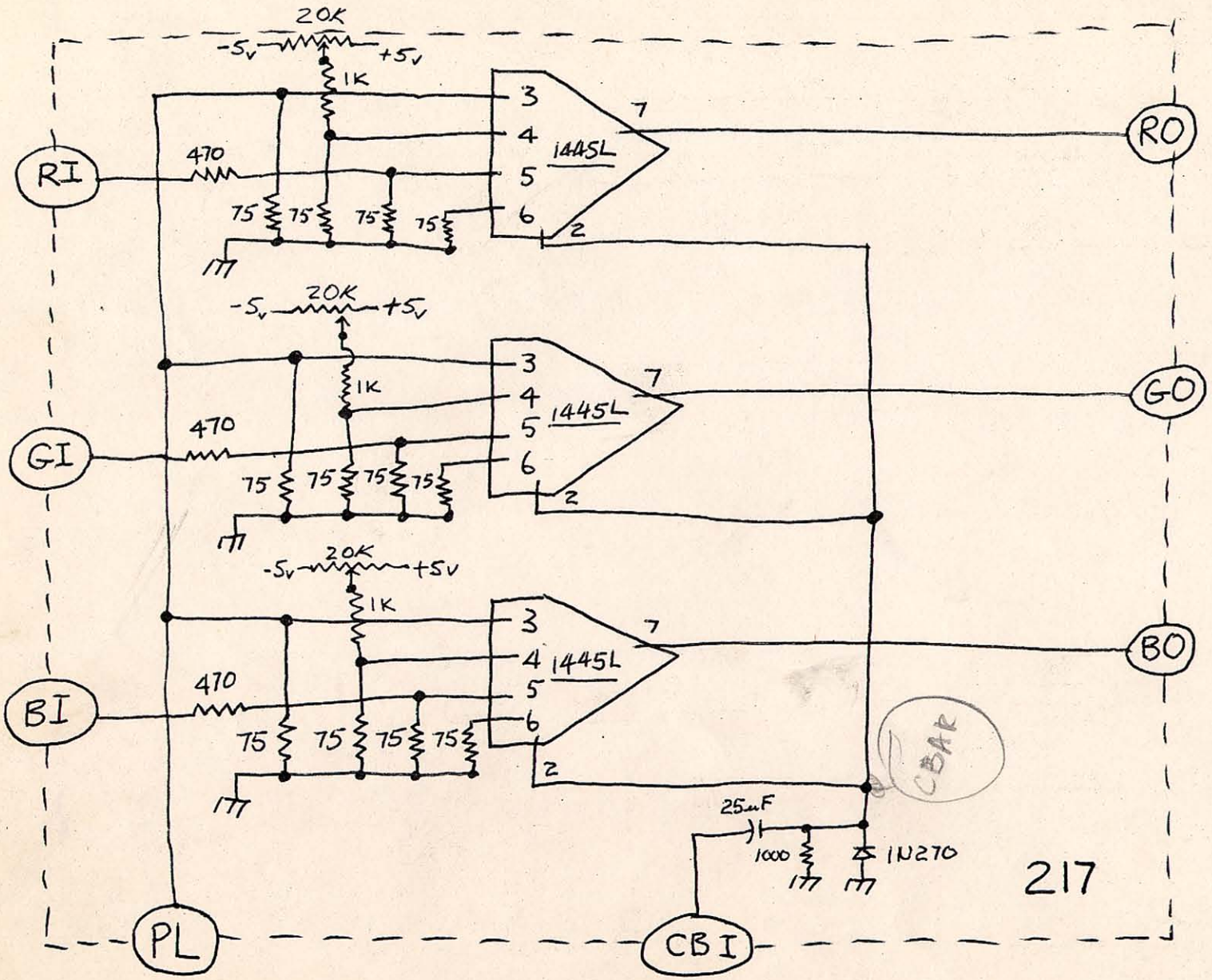
Front support bracket for color encoder board is installed upside-down and backwards to all other support brackets in module. This will put the screws for top-mounting of the bracket on center-line of module (not shown in pictorials). It is not necessary to cut away the lip of this front support bracket as done for the back support bracket.

NOTE the top 1/4", bottom 1 1/4" and front 3/4" clearances for encoder board from the module chassis; see SIDE VIEW pictorial.

You must drill 4 holes in encoder board for mounting it to the support brackets; be absolutley sure of correct allignment and positioning prior to drilling board.


COLOR ENCODER
9-75
SONY
ENCODER BOARD
w/ MODIFICATIONS
BLANKING & PEDISTAL
(MIDDLE BOARD)
#217
HORIZONTAL CLAMP
(BOTTOM BOARD)
#DS6
RED
GREEN
BLUE
R11 500Ω
R12 500Ω
R13 500Ω
2N2706
270Ω
R1 100
R2 100
R3 100
R8 10K
1K
PEDISTAL
COMP. BLANK
BURST FLAG
COLOR CARRIER
HORIZONTAL SYNC.
(FUTURE EXPANSION)
COMPOSITE SYNC.
J17
J18
J19
J15
J12
J11
J14
J16
J13
J02
J03
J04
+14V
BRST.
CHR.
HUE
R4
R5
R6
330
4700
1.5K
2700
15K
R10 500Ω TRIPLE
CW

BLANKING & PEDISTAL BOARD
(MIDDLE BOARD)

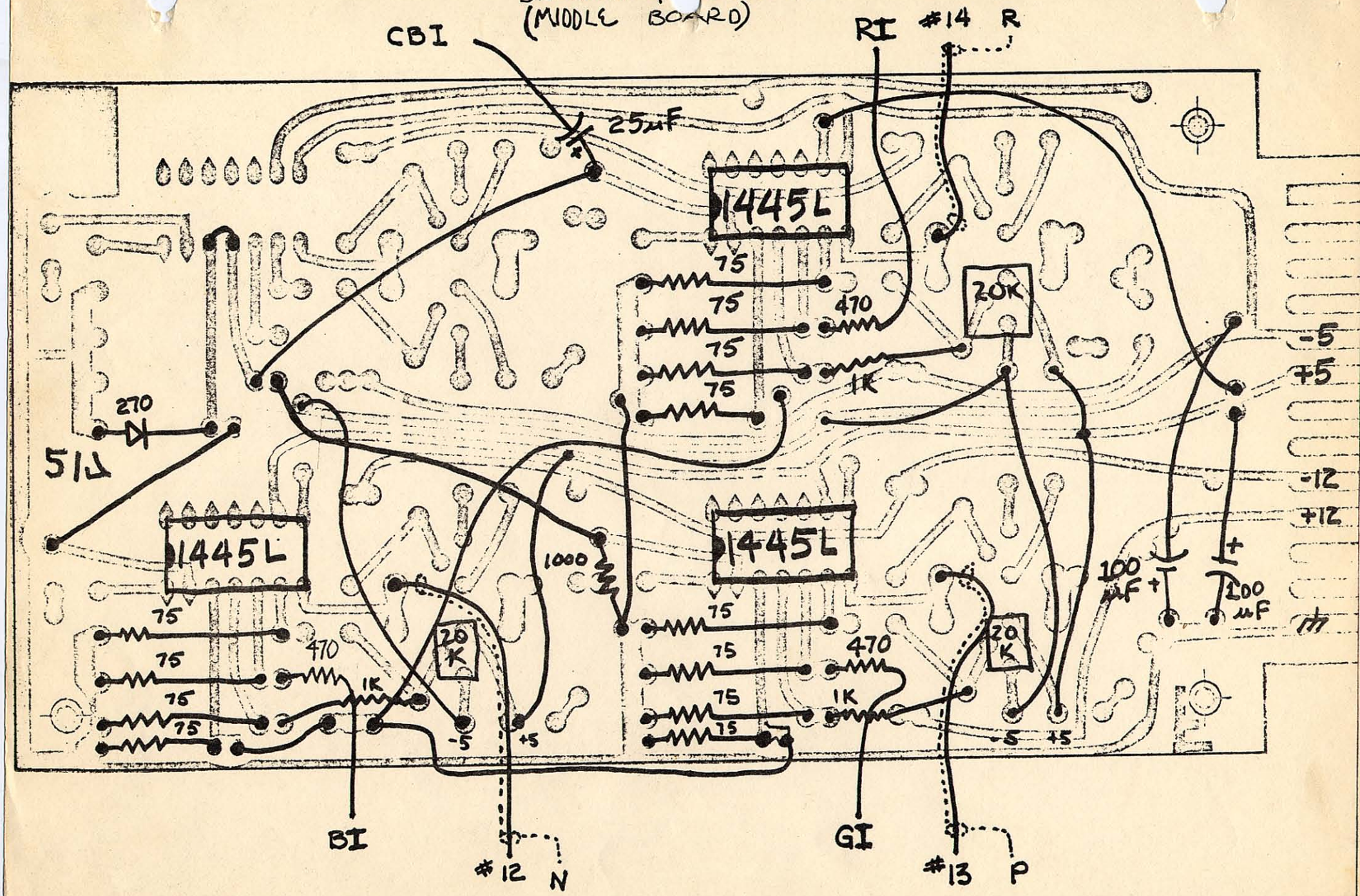


TRIMMERS ARE
RED PEDISTAL
GREEN PEDISTAL
BLUE PEDISTAL
ADJUST

217

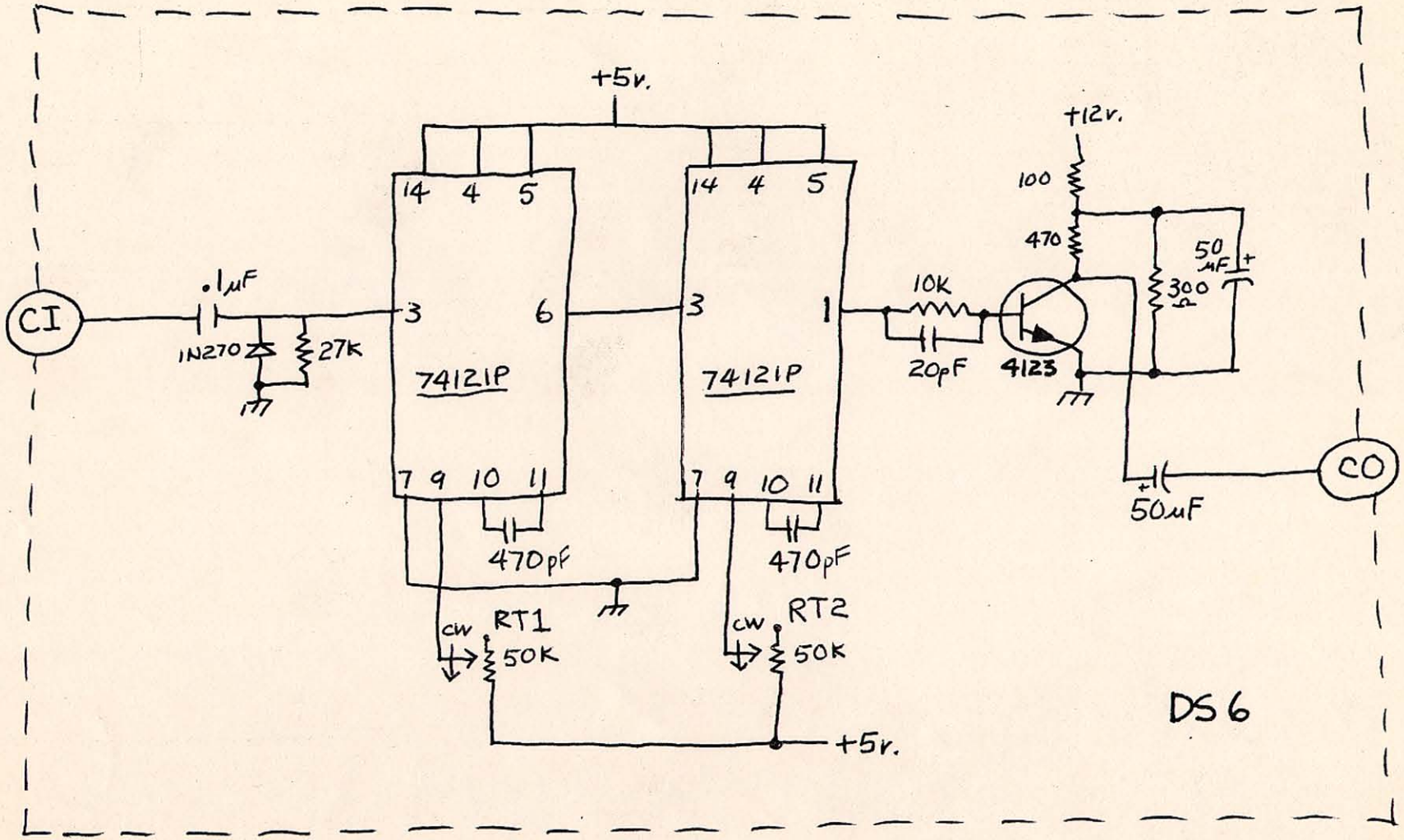
COLOR ENCODER

BLANKIN & PEDISTAL
(MIDDLE BOARD)

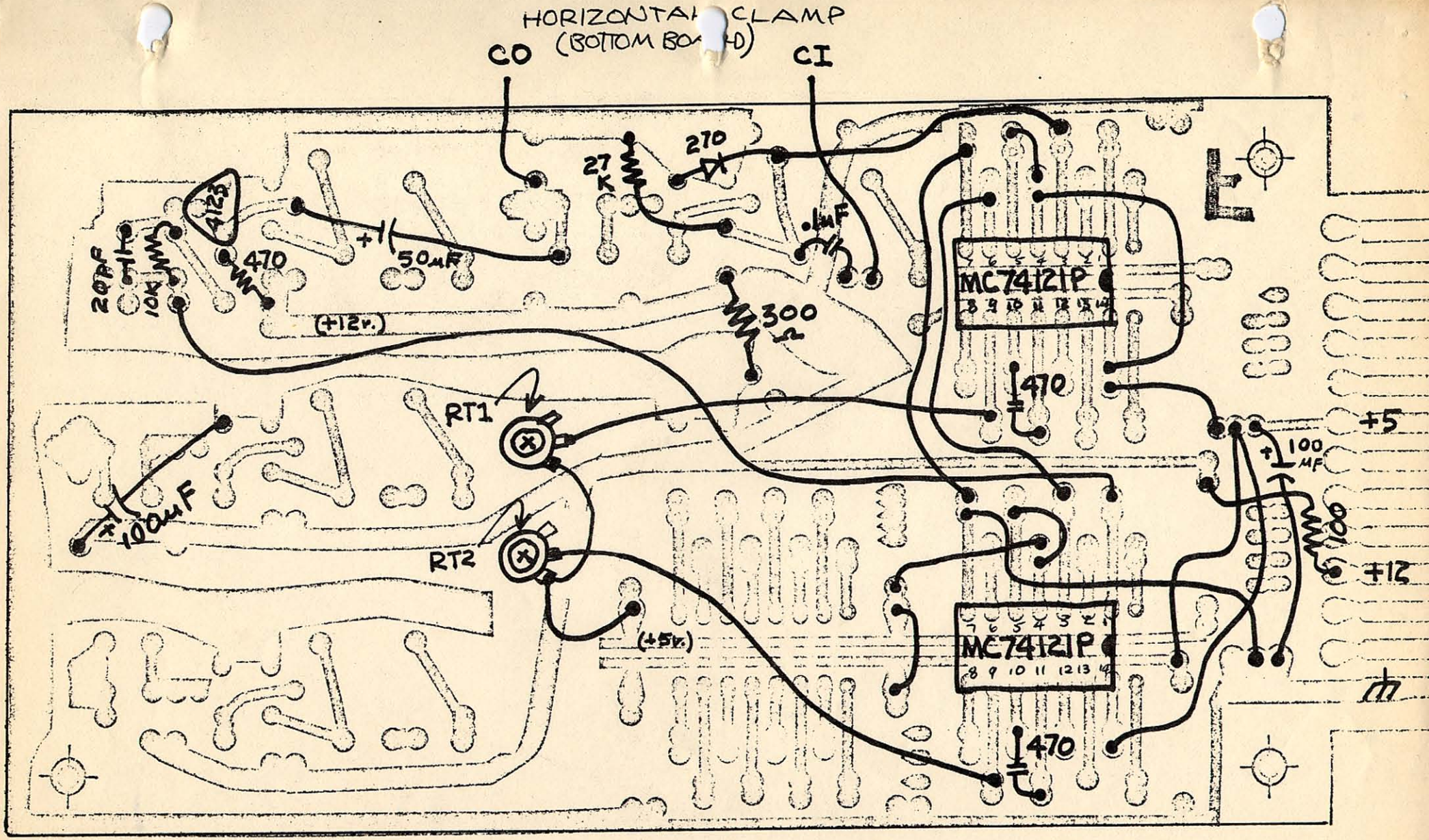


COLOR ENCODER

HORIZONTAL CLAMP BOARD
(BOTTOM BOARD)

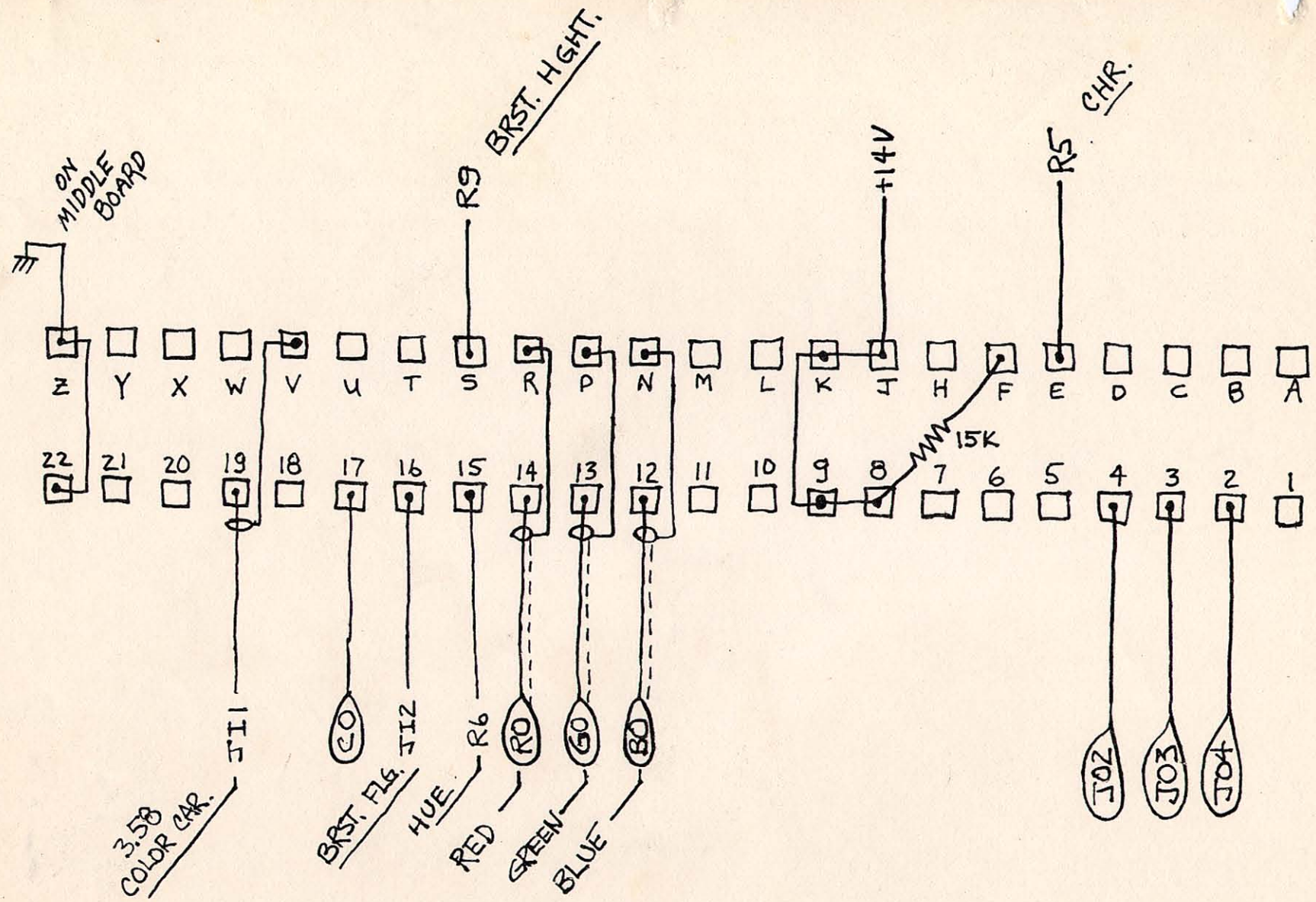


COLOR ENCODER



NOTE: "KNOTCH" ON MC74121P (IC's); THEY ARE ATYPICAL TO OTHER IC INSTALLATIONS...
RT1 & RT2 SHOULD NOT TOUCH ANY PATHS...

COLOR ENCODER



22 thru 1 = FOIL SIDE
Z thru A = COMPONENT SIDE

COLOR ENCODER BOARD

44PIN - CONNECTOR DIAGRAM

update 9-75

21		525-1185	75 OHM, 1/4 W RES	.06	A	COL
1		525-1202	100 OHM, 1/4 W RES	.06	A	COL
1		525-1263	270 OHM, 1/4 W RES	.06	A	COL
2		525-1270	300 OHM, 1/4 W RES	.06	A	COL
1		525-1276	330 OHM, 1/4 W RES	.06	A	COL
4		525-1302	470 OHM, 1/4 W RES	.06	A	COL
7		525-1356	1K0 OHM, 1/4 W RES	.06	A	COL
1		525-1421	2.7KOHM, 1/4 W RES	.06	A	COL
1		525-1461	4.7KOHM, 1/4 W RES	.06	A	COL
1		525-1522	10KKOHM, 1/4 W RES	.06	A	COL
3		525-1550	15KKOHM, 1/4 W RES	.06	A	COL
1		525-1603	27KKOHM, 1/4 W RES	.06	A	COL
3	9F073	U1	100 OHM POT 1/4SFT	1.45	N	COL
3	10F683	501UC	500 TRIM,LOK,PNL-MT	3.00	N	COL
3	9F078	U4	1K OHM POT 1/4SF	1.45	N	COL
1	9F081	U6	2K OHM POT 1/4SFT	1.45	N	COL
1	10F468	103UA	10K OHM POT 1/4SFAB	2.21	N	COL
1	10F588		500 OHM POT 1/4SFTB	5.02	N	COL
2			50K TRIM		N	COL
3	12F9800	3389P	20K TRIM BD-MT	.65	N	COL
1	14F557	DM15-200J	20 PF,DIP-MICA CAP	.18	N	COL
2	14F592	DM15-417J	470 PF,DIP-MICA CAP	.32	N	COL
1	67F313	TDC-104Z	.1 MF,DSC-CER CAP.	.16	N	COL
1	710-1254	3-G-025	25 MF,25VDC,ELEC.	.46	A	COL
3	710-1260	7-G-1000	100 MF,25VDC,ELEC.	.24	A	COL
6	553-0914	1N914B	SIL-DIODE	.19	A	COL
8		1N270	GERM-DIODE	.22	S	COL
1		2N4123	NPN TRANS	.22	S	COL
3		MC1445L	DIP GAIN-CONT.AMP	1.90	S	COL
2		MC74121P	DIP MONO.VIB.	1.18	S	COL
1			217 P-C BOARD			COL
1			P-C BOARD,DS6			COL
1		CEN-4092-5	COLOR ENCODER BRD	400.00	AP	COL
1	713-6140	225-2222-401	44CONTACT CON	5.89	A	COL
12	39F1337	13-236	BNC,FM-CHS.MT.	.72	N	COL
1			CHASSIS,COL.ENC-FAC	8.25	DG	COL
6	RB-67-1-DC-M-L-9		KNOB,BLACK/INLAY299	1.00	R	COL
1	RB-67-1-DC-M-L-9		KNOB,BLACK/INLAY109	1.00	R	COL
1	RB-67-1-DC-M-L-9		KNOB,BLACK/INLAY122	1.00	R	COL
1	RB-67-1-DC-M-L-9		KNOB,BLACK/INLAY117	1.00	R	COL

NOTE WELL
THES PARTS ARE INCLUDED IN MASTER PARTS LIST

POWER SUPPLY

The power supplies are purchased modules and should come with complete documentation; if not request from LAMDA.

In the IP, power supply regulation and high frequency transient response are critical. Substitution of other power supply modules is NOT recommended.

In each box all corresponding terminals of the 10 pin Jones connector are connected together.

The output of the power supplies are connected to the appropriate pin of one of the connectors.

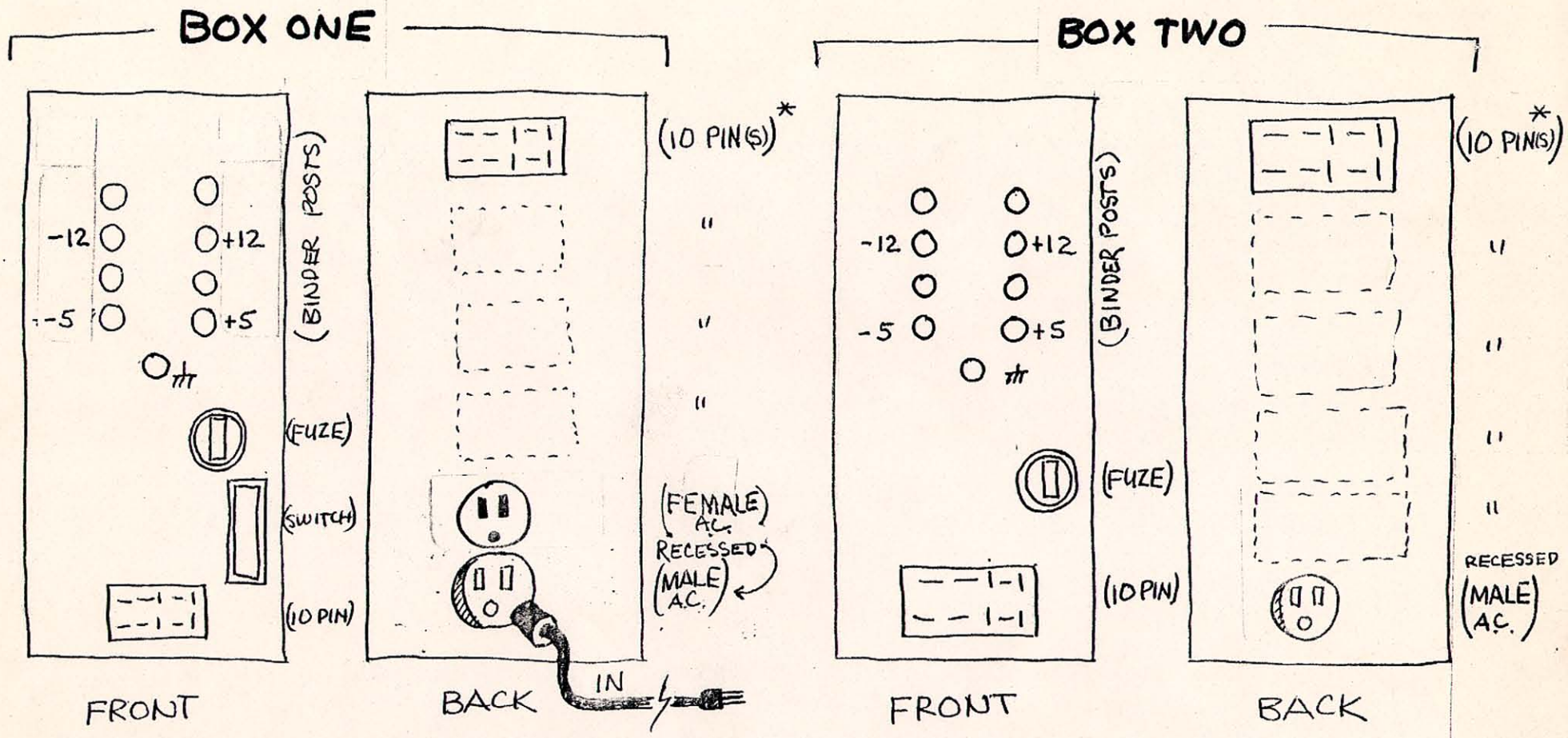
In both power supplies (Box one and Box two), the binding post terminals are connected to the appropriate 10 pin Jones.

A cable with two male Jones plugs and corresponding pins connected together is used to communicate power between the boxes.

One side of each box should be covered with perferated metal or screen to allow for ventilation. This side should never be blocked to prevent ventilation. DO NOT let transistors touch screen.

The 110 v. AC which powers the power supplies is the only potentially lethal voltage in the IP. BE CAREFUL AND WATCH YOUR FINGERS.

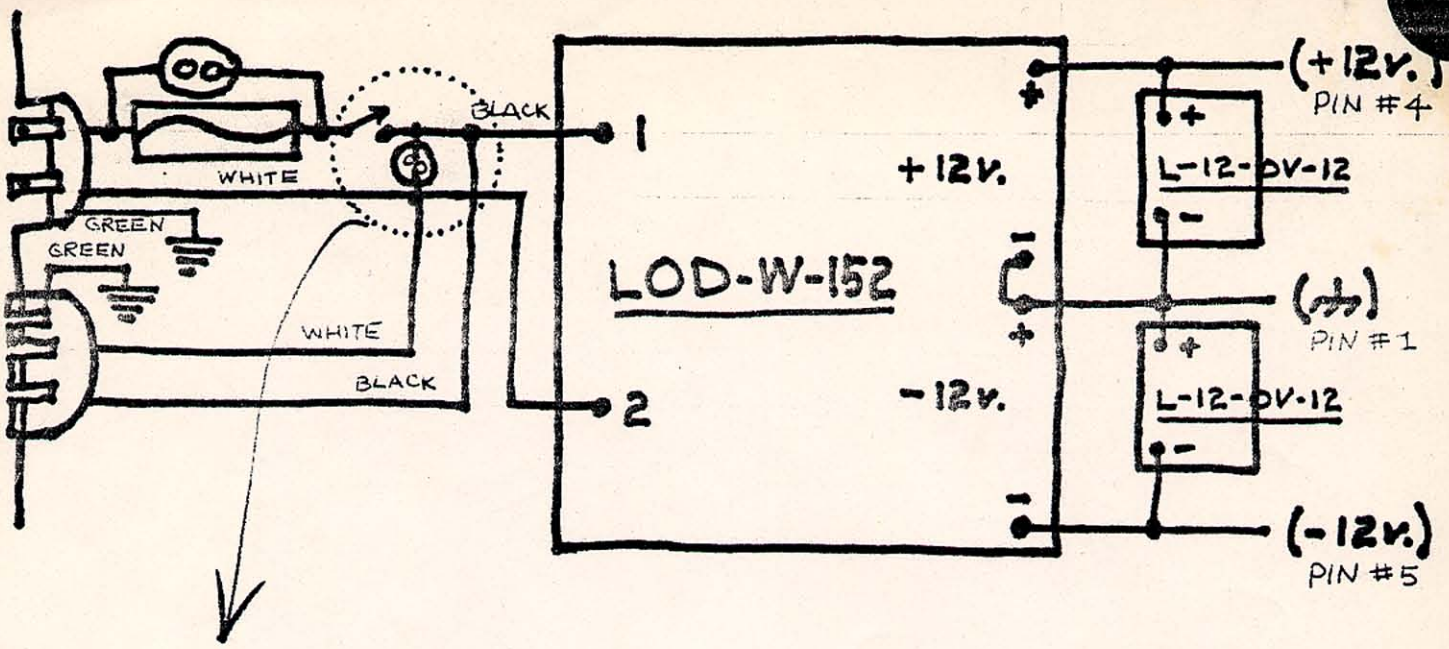
--Box one contains +12, -12 power supplies.
--Box two contains +5, -5 power supplies.

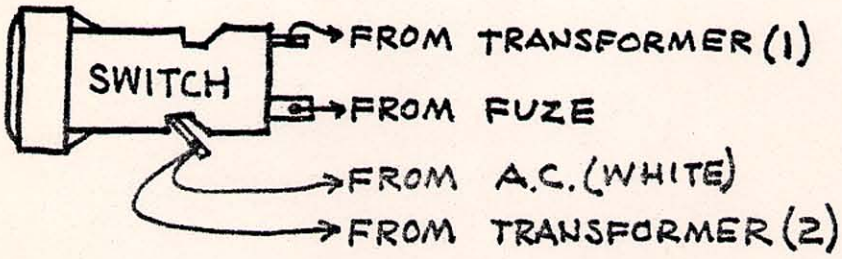


* TRY TO MOUNT AS MANY 10 PIN CINCH-JONES (FEMALES) AS POSSIBLE.

- A.C. POWER IS JUMPED FROM "BOX ONE" TO "BOX TWO" BY MALE-FEMALE A.C. CORD SO AS TO BE SWITCHED ON/OFF BY COMMON SWITCH ON 'POWER I'.
- "BOX ONE" AND "BOX TWO" ARE ALWAYS CONNECTED BY ONE MALE-MALE 10 PIN CABLE SO AS TO MAKE ALL 10 PIN CONNECTORS HAVE ALL POWER SUPPLY VOLTAGES.

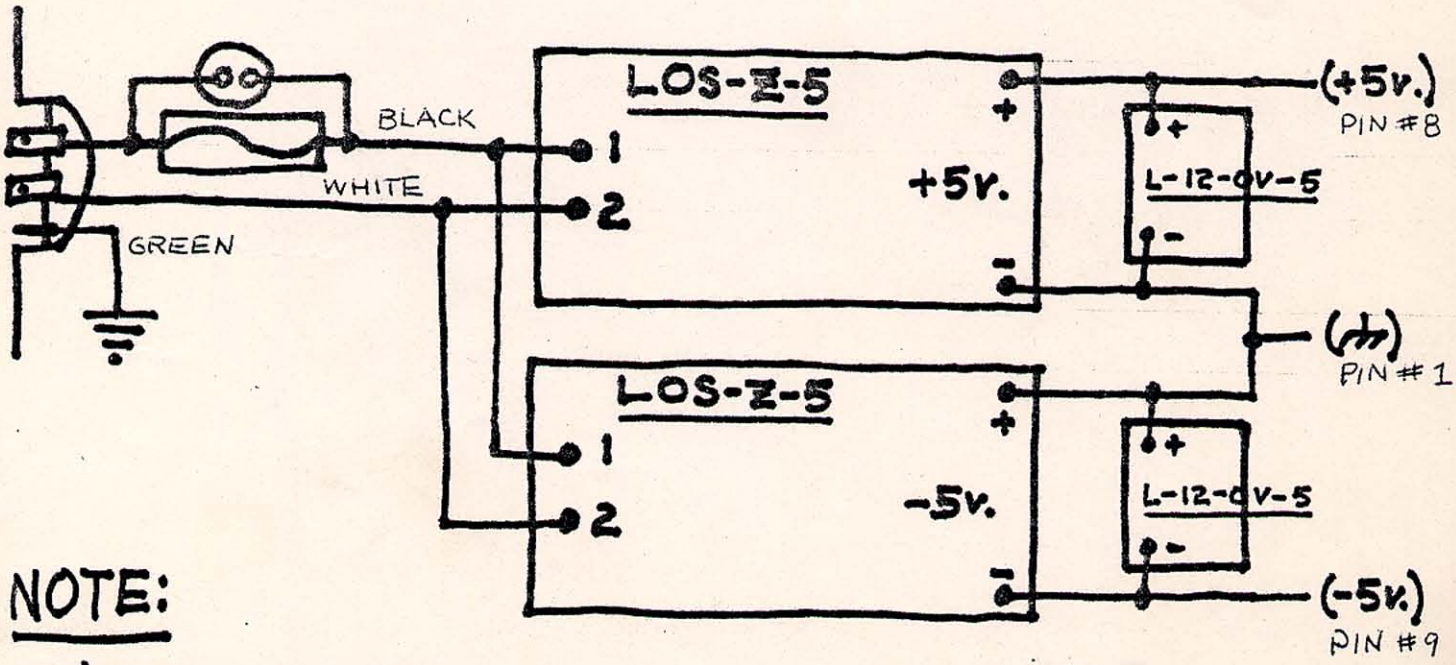
POWER SUPPLY 9-75





BOX ONE

BOX TWO



NOTE:

⏚ - MEANS GROUND TO METAL BOX

⏚ - MEANS GROUND TO PIN #1

1	LOC-W-152		12V,3AMP POWER SUP	87.00		L	PS1
2	L-12-OV-12		NON-ADJ. OVP	8.00		L	PS1
1	59F1740	162090	POWER SWITCH,AMBER	3.97	-2	N	PS1
1	27F784	344125A	110V LAMP-FUZE KNOB	4.06	-2	N	PS1
1	39F1232	160-4-N	AC RECP.FM*2POLE-GR	1.58	-2	N	PS1
1	39F1233	160-5-N	AC RECP.M*2POLE-GRD	2.06		N	PS1
5	39-F-255	S-310-FP	JONES FM*CHS.MT.	1.21	-6	N	PS1
1	39F1547	111-0103-001	POST BLACK 10	.52	-4	N	PS1
1	39F1552	111-0108-001	POST BROWN 1	.52		N	PS1
1	39F1546	111-0102-001	POST RED 2	.52	-4	N	PS1
1	39F1550	111-0106-001	POST ORANGE 3	.52		N	PS1
1	39F1551	111-0107-001	POST YELLOW 4	.52	-4	N	PS1
1	39F1548	111-0104-001	POST GREEN 5	.52	-4	N	PS1
1	39F1554	111-0110-001	POST BLUE 6	.52		N	PS1
1	39F1556	111-0112-001	POST VOILET 7	.52		N	PS1
	39F1557	111-0113-001	POST GRAY 8	.52		N	PS1
1	39F1545	111-0101-001	POST WHITE 9	.52		N	PS1
1			CHASSIS,POWER 1-FAC	8.25		DG	PS1

~~1~~	~~LOC-W-17~~		~~12V,3AMP POWER SUP~~	~~32.00~~		~~L~~	~~PS2~~
2	LOC-Z-5		5V,3AMP POWER SUP	32.00		L	PS2
~~1~~	~~L-12-OV-5~~		~~NON-ADJ. OVP~~	~~8.00~~		~~L~~	~~PS2~~
	L-12-OV-5		NON-ADJ. OVP	8.00		L	PS2
1	39F1547	111-0103-001	POST BLACK 10	.52		N	PS2
1	39F1552	111-0108-001	POST BROWN 1	.52		N	PS2
1	39F1546	111-0102-001	POST RED 2	.52		N	PS2
1	39F1550	111-0106-001	POST ORANGE 3	.52		N	PS2
1	39F1551	111-0107-001	POST YELLOW 4	.52		N	PS2
1	39F1548	111-0104-001	POST GREEN 5	.52		N	PS2
1	39F1554	111-0110-001	POST BLUE 6	.52		N	PS2
1	39F1556	111-0112-001	POST VOILET 7	.52		N	PS2
	39F1557	111-0113-001	POST GRAY 8	.52		N	PS2
1	39F1545	111-0101-001	POST WHITE 9	.52		N	PS2
1	39F1233	160-5-N	AC RECP.M*2POLE-GRD	2.06		N	PS2
1	27F784	344125A	110V LAMP-FUZE KNOB	4.06		N	PS2
5	39-F-255	S-310-FP	JONES FM*CHS.MT.	1.21		N	PS2
1			CHASSIS,POWER 2-FAC	8.25		DG	PS2

Electronic Visualization Laboratory
Department of Information Engineering and School of Art and Design
University of Illinois at Chicago Circle Box 4348 Chicago, Ill. 60680
Telephone: 312 996 4621

HI Z* LOW PASS INPUT MODUAL

This modual alows high inpedence sorces shuch as audio, and audio synthesizer controll voltages it be inputed to the I.P.

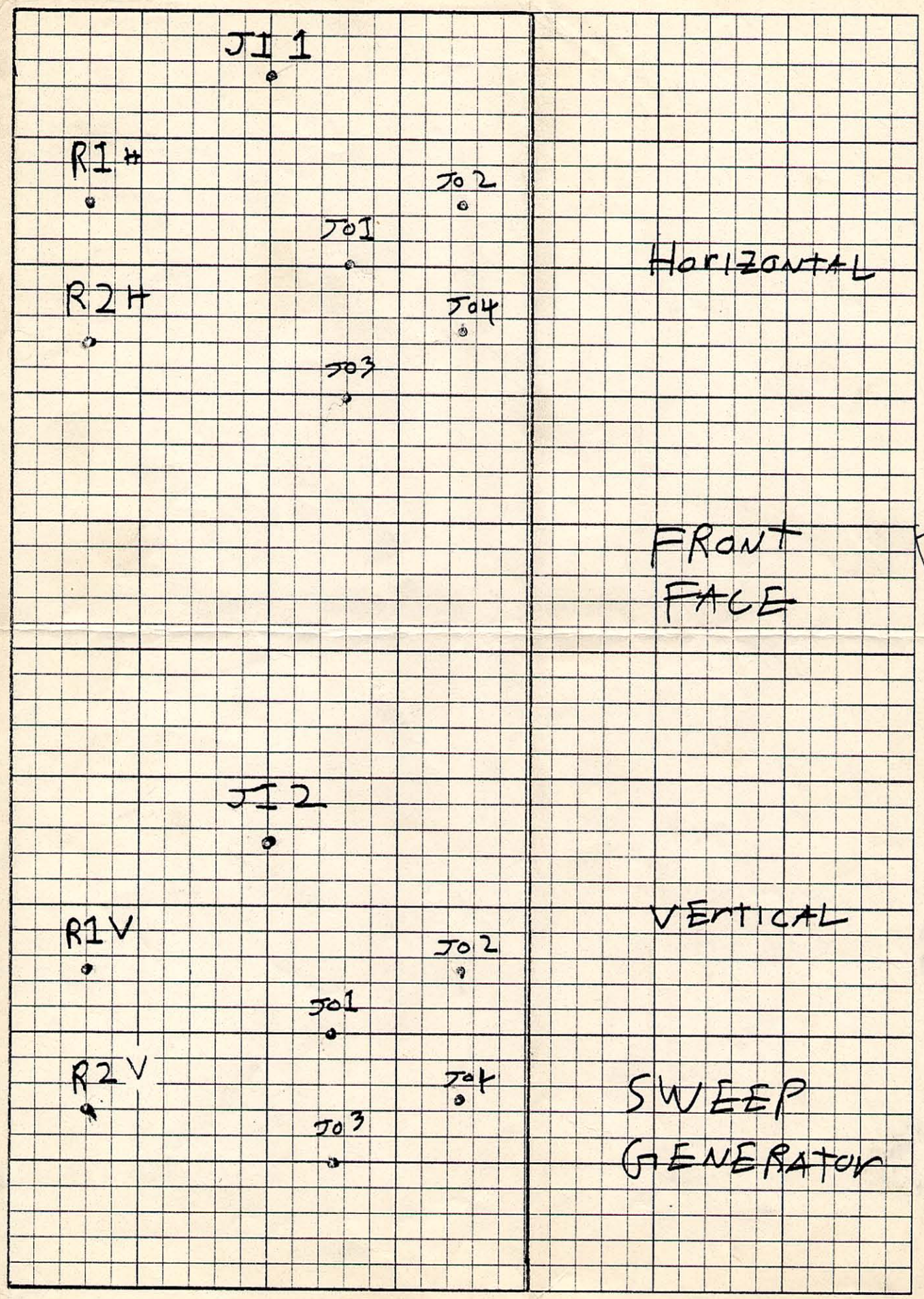
It is based on the input modual so use its part list etc.

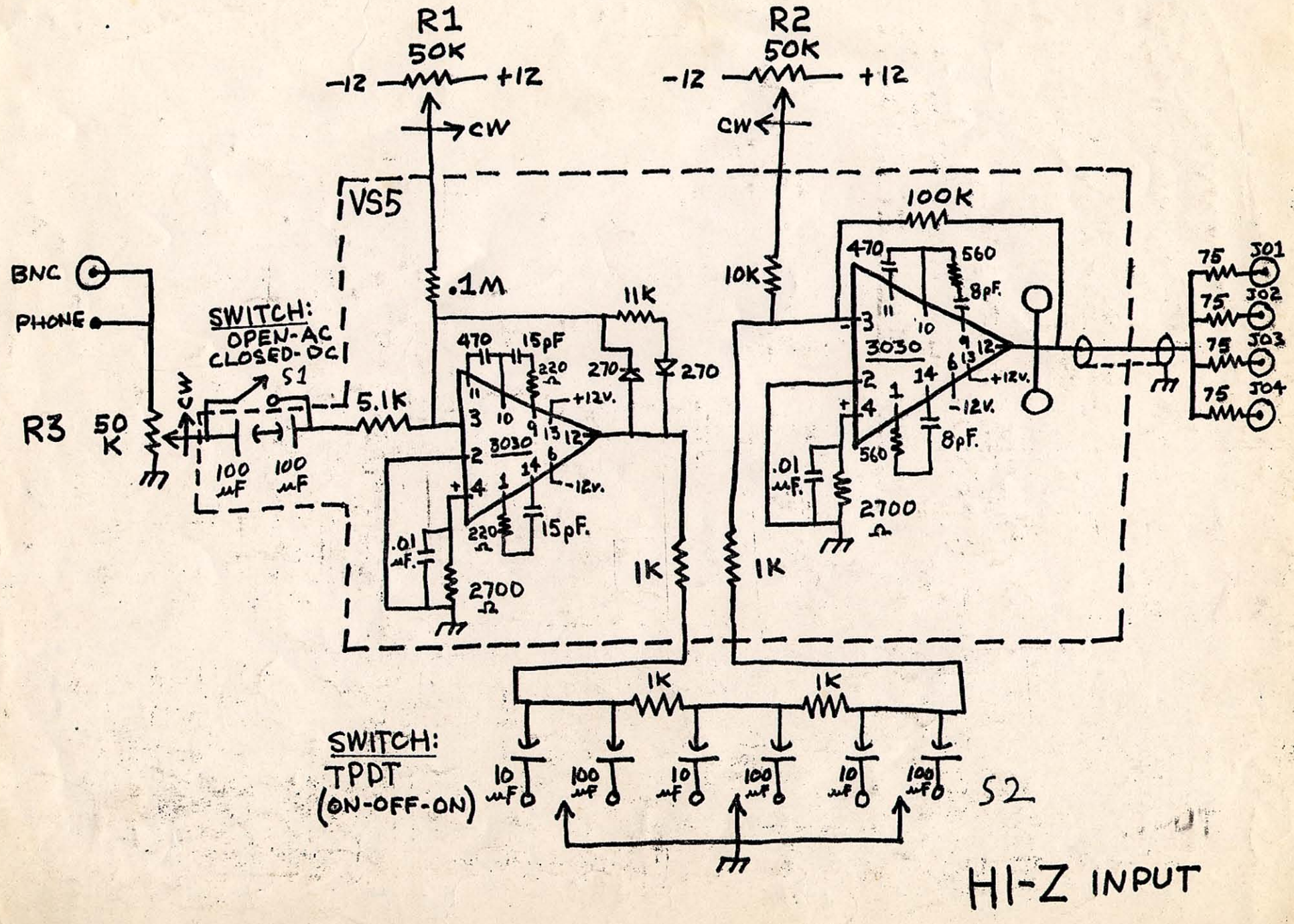
The controles r1,r2 work in the same way as the camer input modual. except the idea is to supress some of the incoming signil. switch #s1 either ac cupples input (up) or dc cupples(down). switch #s2 selects lowpass filter. center is no filter up is maximum filtration, down is less filtration(averaging).

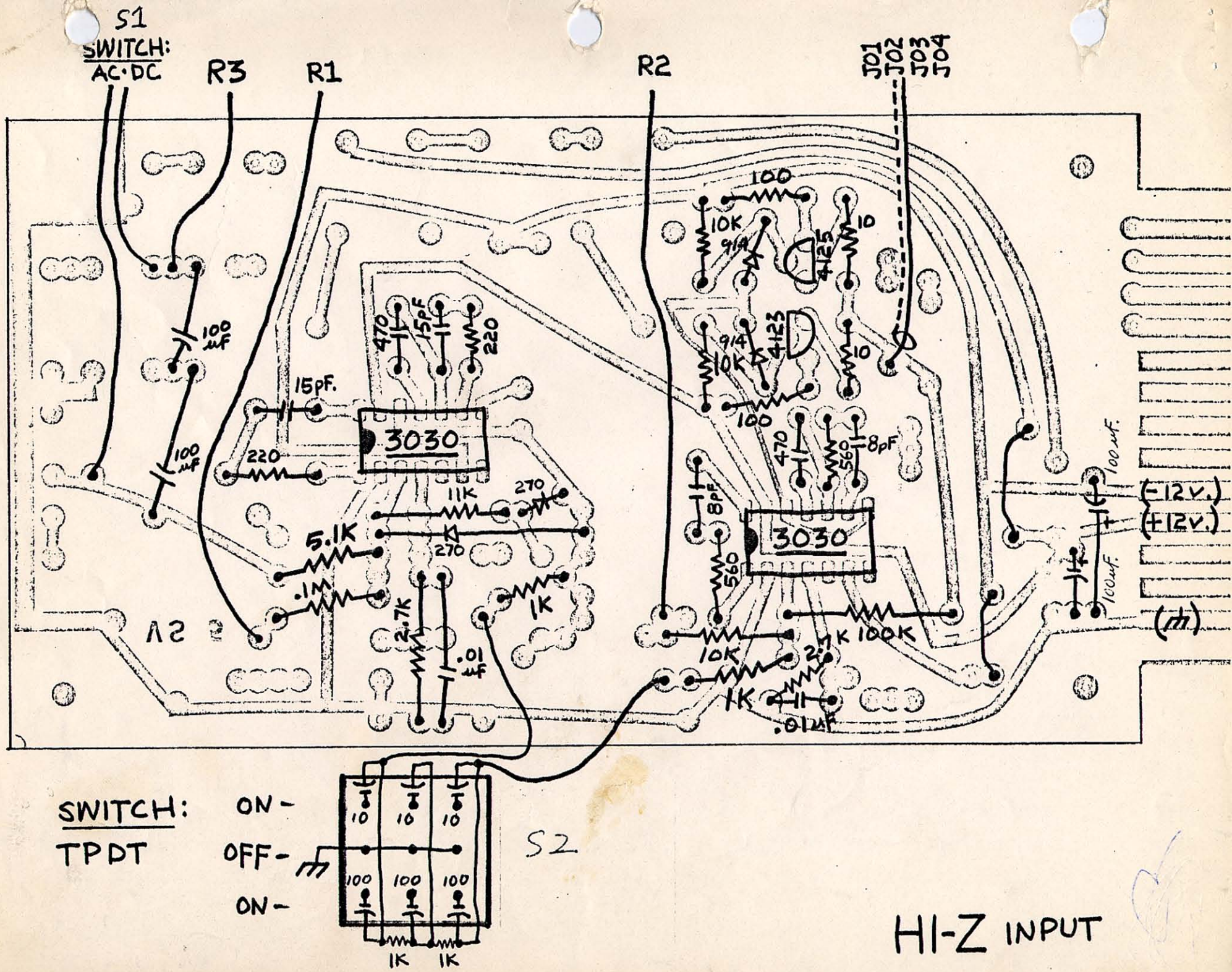
thanks to Mi Mi Shevitz for help documenting.

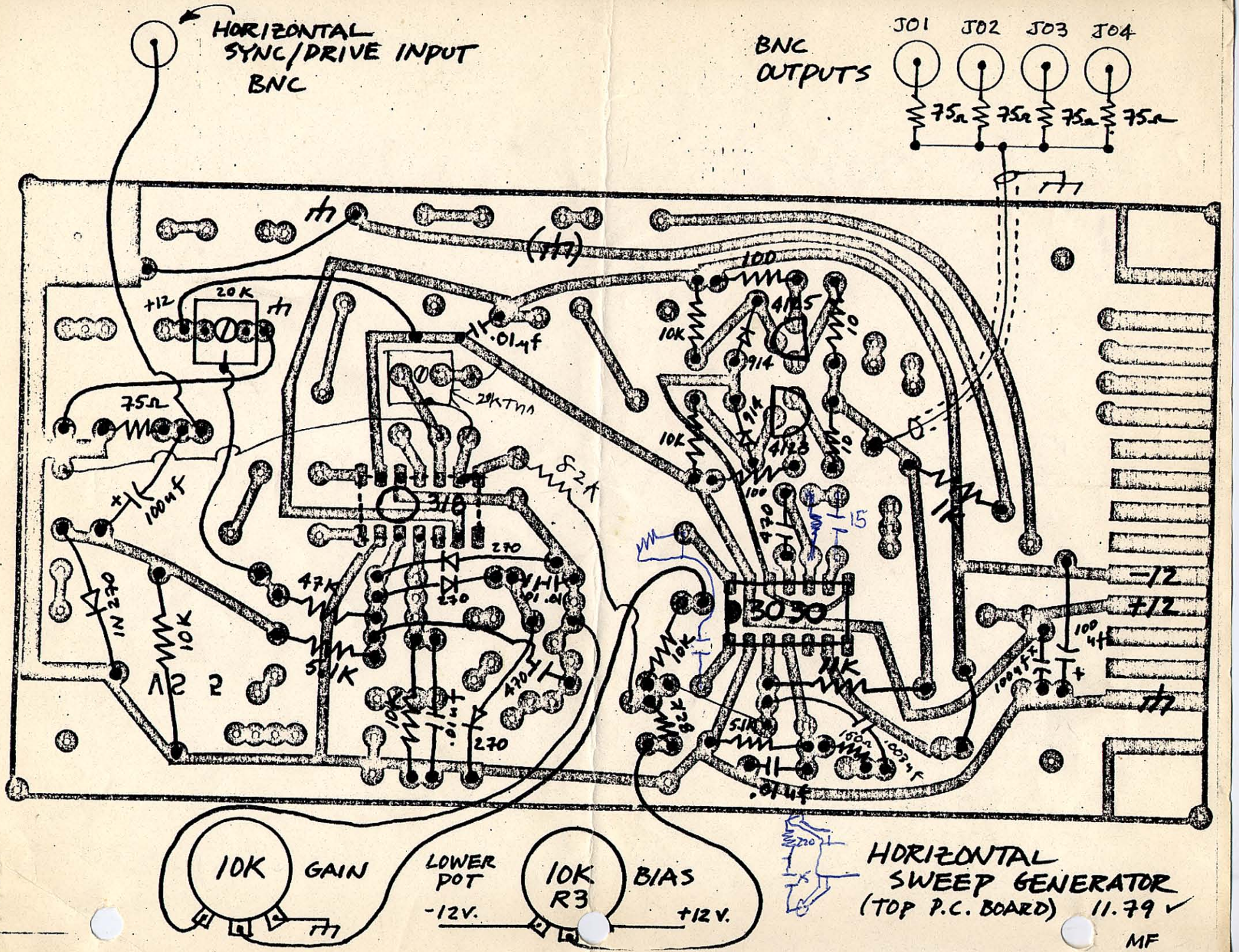
The tripil through ~~xmxm~~ dubble pole switch

newark # 61f867
or 61f1251
or 29f2284

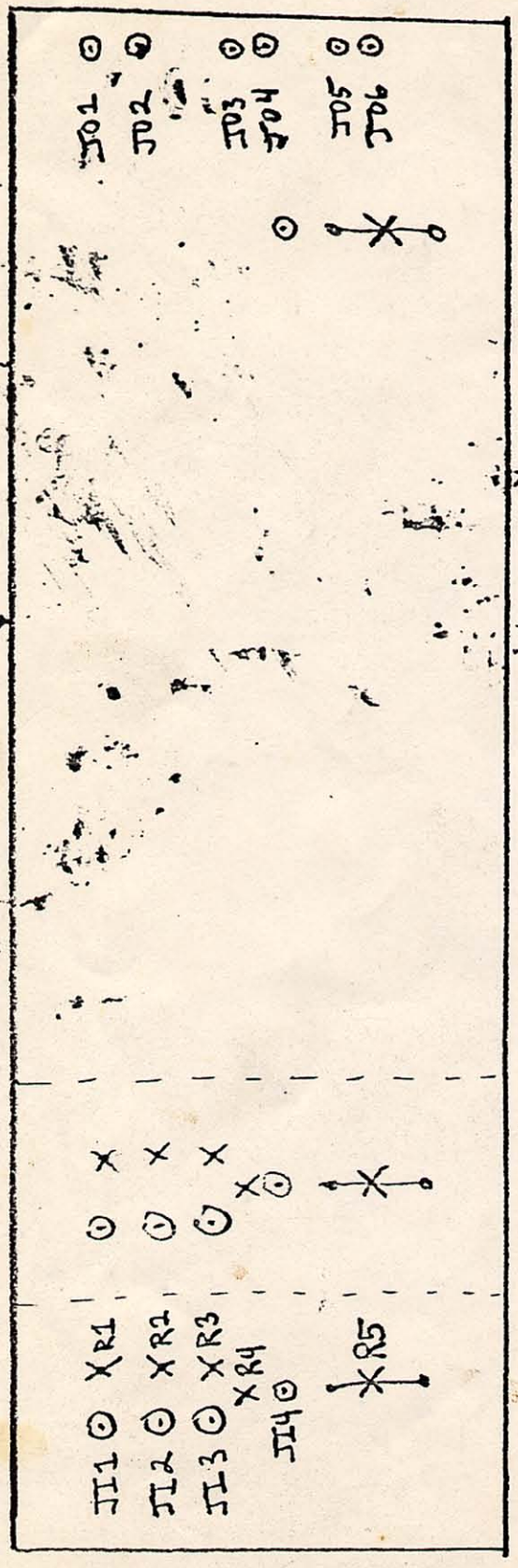

J1 1
R1H
JO2
JO1
R2H
JO4
JO3
HORIZONTAL
FRONT
FACE
J1 2
R1V
JO2
JO1
R2V
JO4
JO3
VERTICAL
SWEEP
GENERATOR


R1
50K
-12
+12
CW
R2
50K
-12
+12
CW
VS5
BNC
PHONE
SWITCH:
OPEN-AC
CLOSED-DC
S1
R3
50
K
CW
100
µF
100
µF
5.1K
.1M
470
15pF
220
Ω
270
270
11K
+12V.
3030
-12V.
220
Ω
15pF.
.01
µF.
2700
Ω
1K
10K
100K
470
560
8pF.
3030
+12V.
-12V.
8pF.
560
.01
µF.
2700
Ω
1K
75
J01
75
J02
75
J03
75
J04
1K
1K
SWITCH:
TPDT
(ON-OFF-ON)
10
µF
100
µF
10
µF
100
µF
10
µF
100
µF
S2
HI-Z INPUT


S1
SWITCH:
AC·DC
R3
R1
R2
J01
J02
J03
J04
100
10K
914
4125
10
470
15pF
220
15pF.
3030
100 uf
100 uf
220
11K
270
5.1K
270
.1M
2.7K
.01 uf
1K
8pF
560
3030
100
10K
2.7K
100K
1K
.01uf
100 uf.
100uf.
(-12v.)
(+12v.)
(th)
S2
SWITCH:
TPDT
ON-
OFF-
ON-
10
100
1K
1K
S2
HI-Z INPUT


HORIZONTAL SYNC/DRIVE INPUT BNC
BNC OUTPUTS
J01
J02
J03
J04
75Ω
75Ω
75Ω
75Ω
+12
20K
75Ω
100µf
IN230
10K
5.1K
47K
270
270
270
470
10K
10K
.01µf
29KTM
316
24
100
4125
10K
914
914
4128
10K
100
.024
15
3030
10K
11K
5.1K
100Ω
.003µf
.01µf
100µf
100µf
100µf
-12
+12
10K GAIN
LOWER POT
-12V.
10K R3 BIAS
+12 V.
HORIZONTAL SWEEP GENERATOR
(TOP P.C. BOARD) 11.79 ✓
MF

FOR GREG →

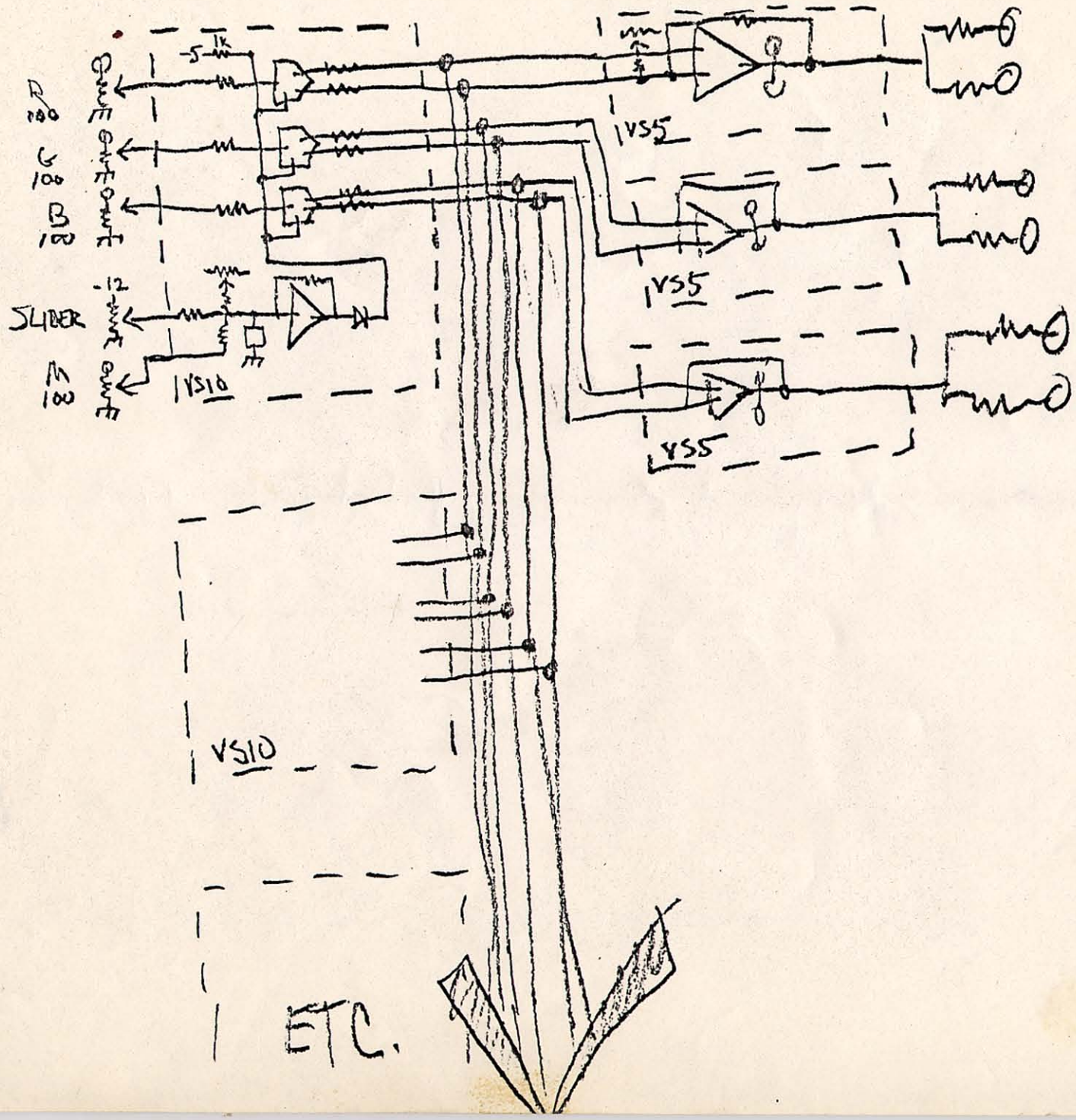


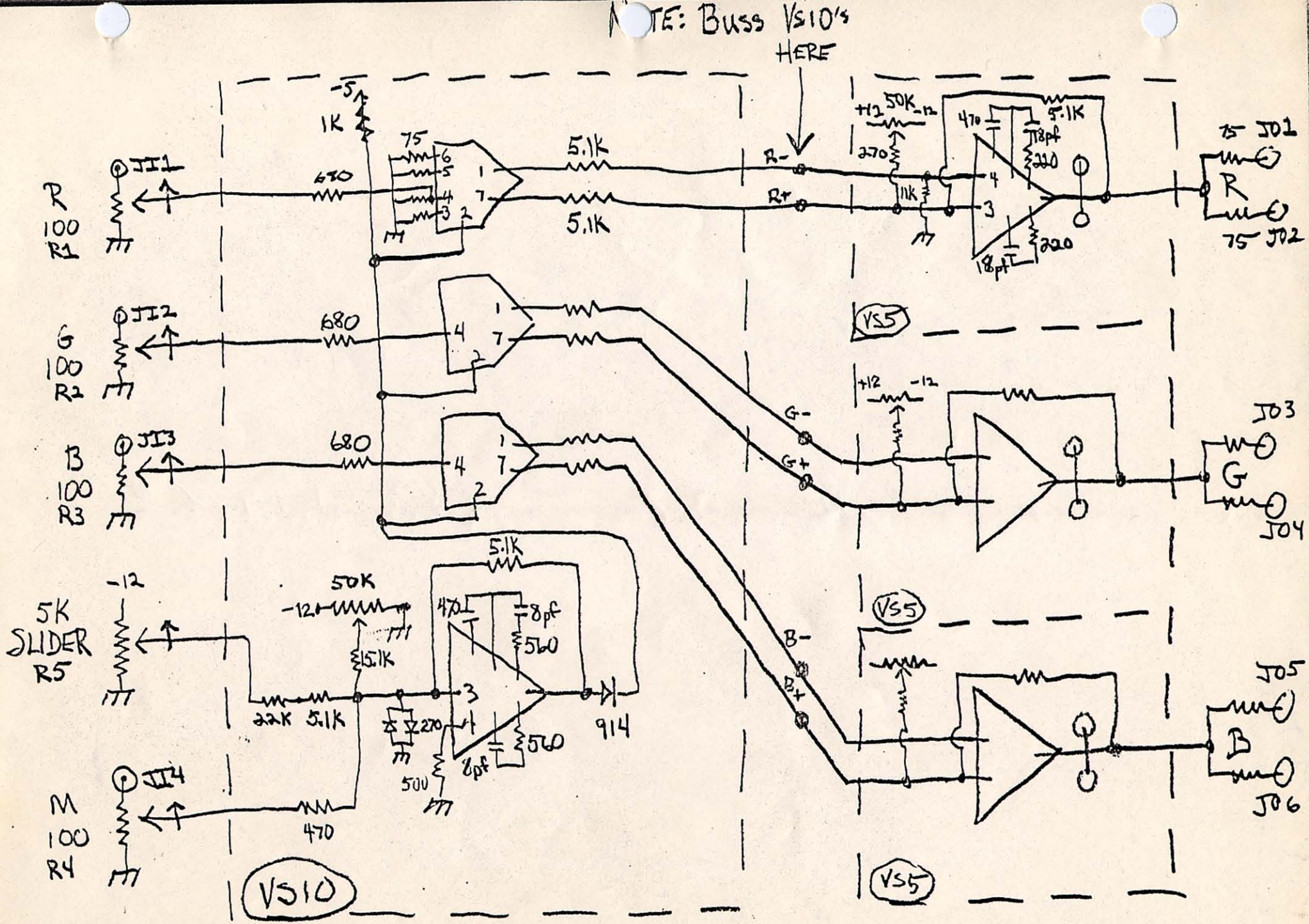
FRONT FACE

+5	186.8 mA
-5	174.2 mA
+12	211 mA
-12	269 mA

OUTPUT MIXER

12/75

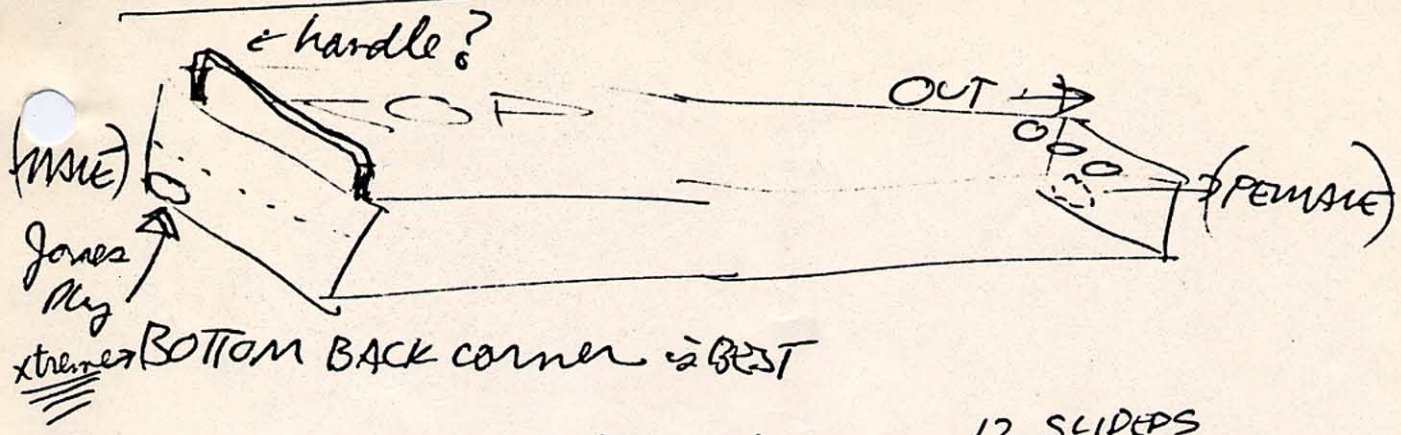

-5
1k
R
100
G
100
B
100
-12
SLIDER
M
100
VS10
VS5
VS5
VS5
VS10
ETC.

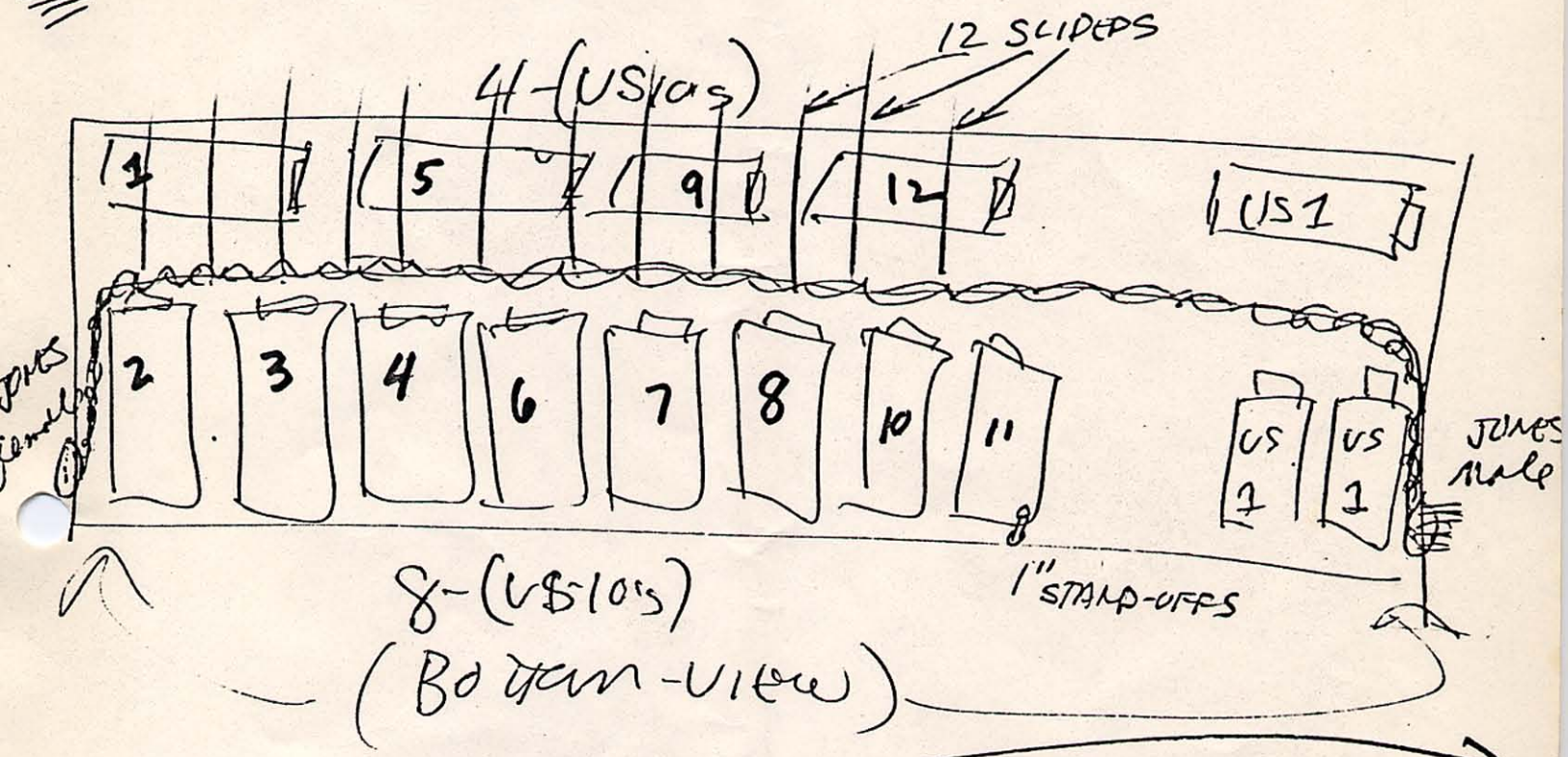


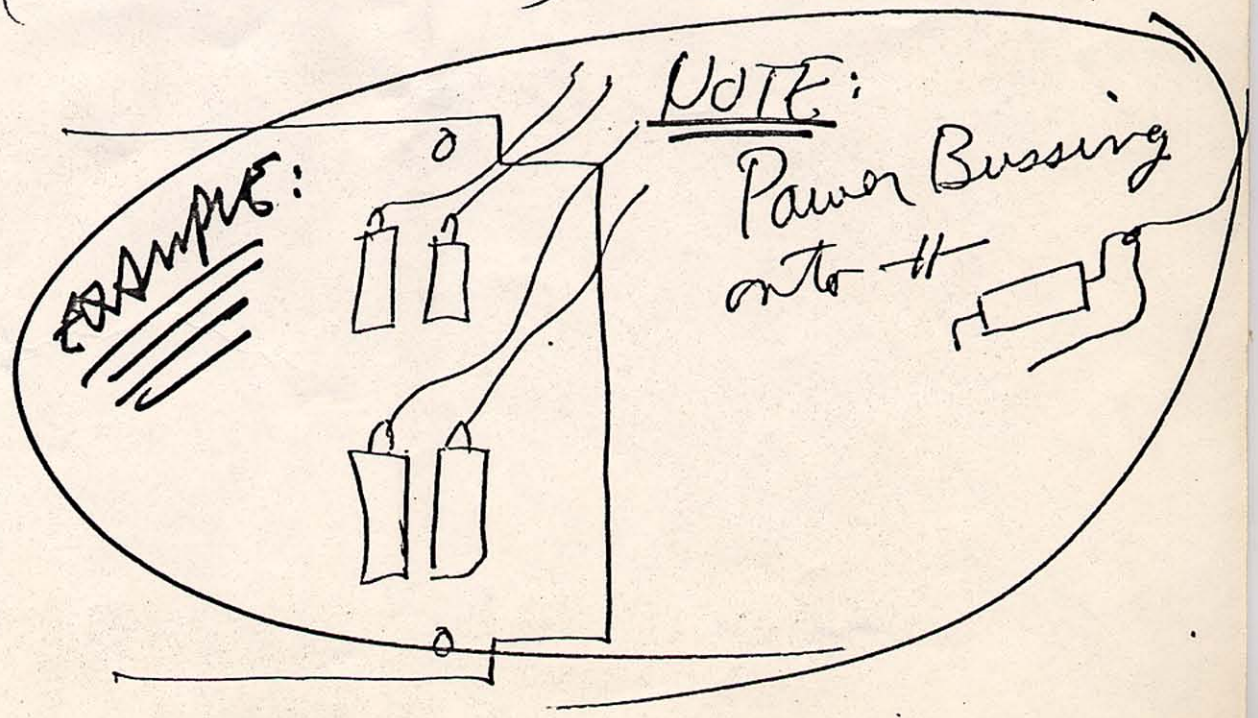
OUTPUT MIXER

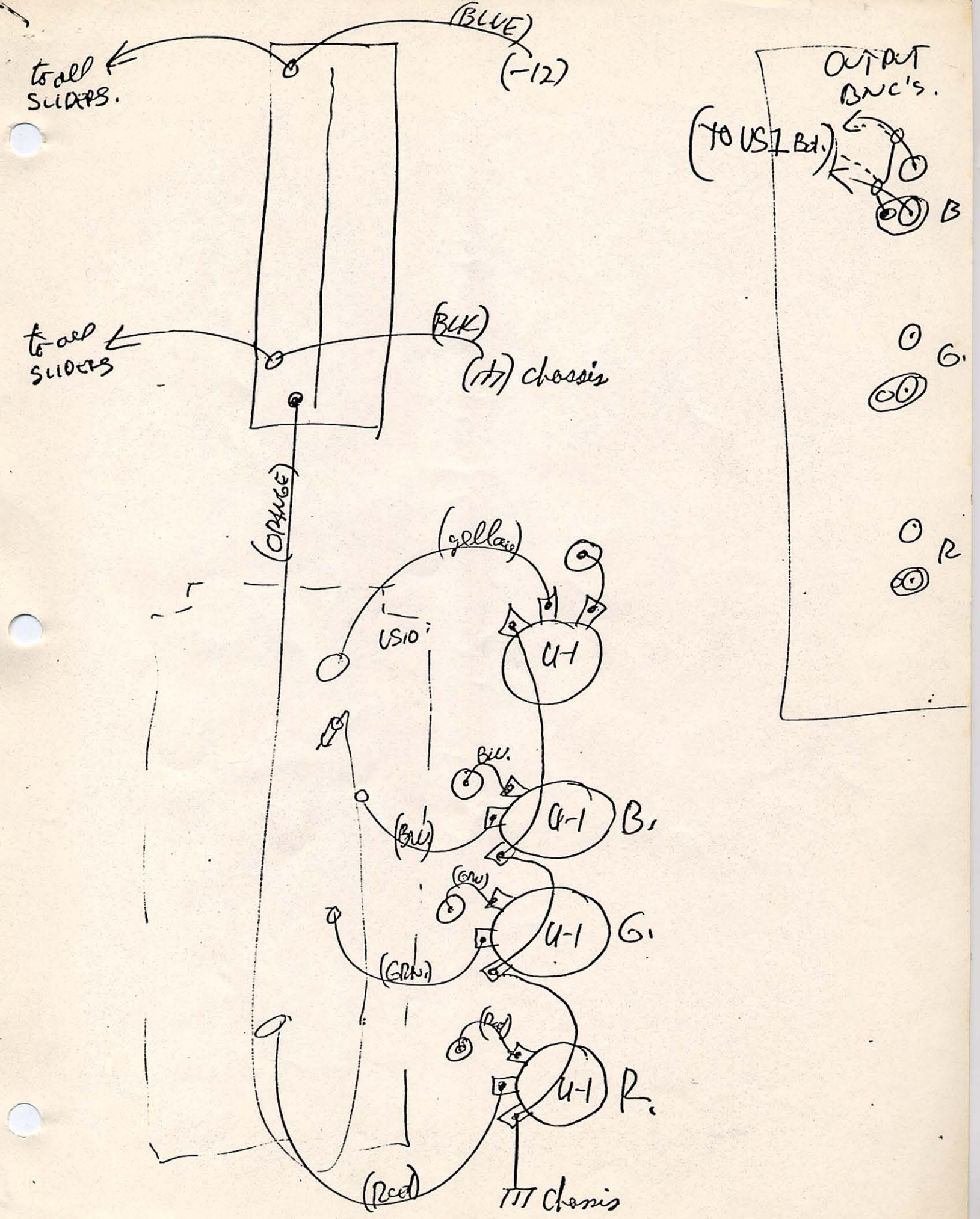
BUILD PROCEDURE NOTES:

OUTPUT MIX:








(BLUE)
(-12)
to all SLIDERS.
OUTPUT BNC's.
(TO US1 Bd.)
B
G.
R
to all SLIDERS
(BLK)
(GND) chassis
(ORANGE)
(yellow)
US10
U-1
Blu.
(Blu)
U-1
B.
(Grn)
(Grn.)
U-1
G.
(Red)
U-1
R.
(Red)
GND chassis

Phew, PAW:

~~[illegible] on OCTAGON~~
~~2 ROX's of DX BOARD~~

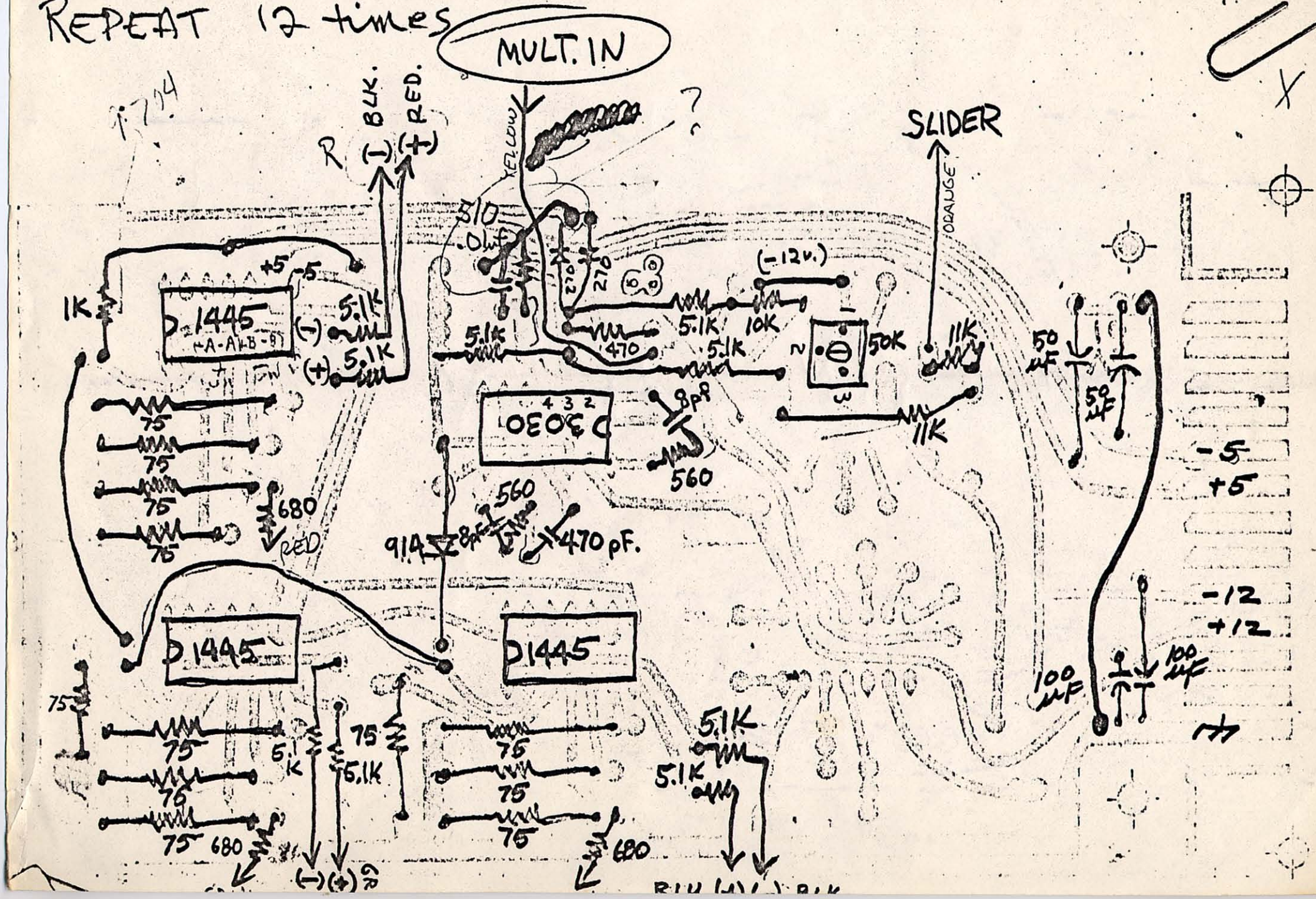
- no final slider pot?
- OK TRIM; #3 goes to 1/2 or float...?
  PAW'S
- US1 (US5) board; 270Ω or 270,000Ω?
  PAW'S
- Multiply input BNC pot → transfer cat moving?

BNC tool

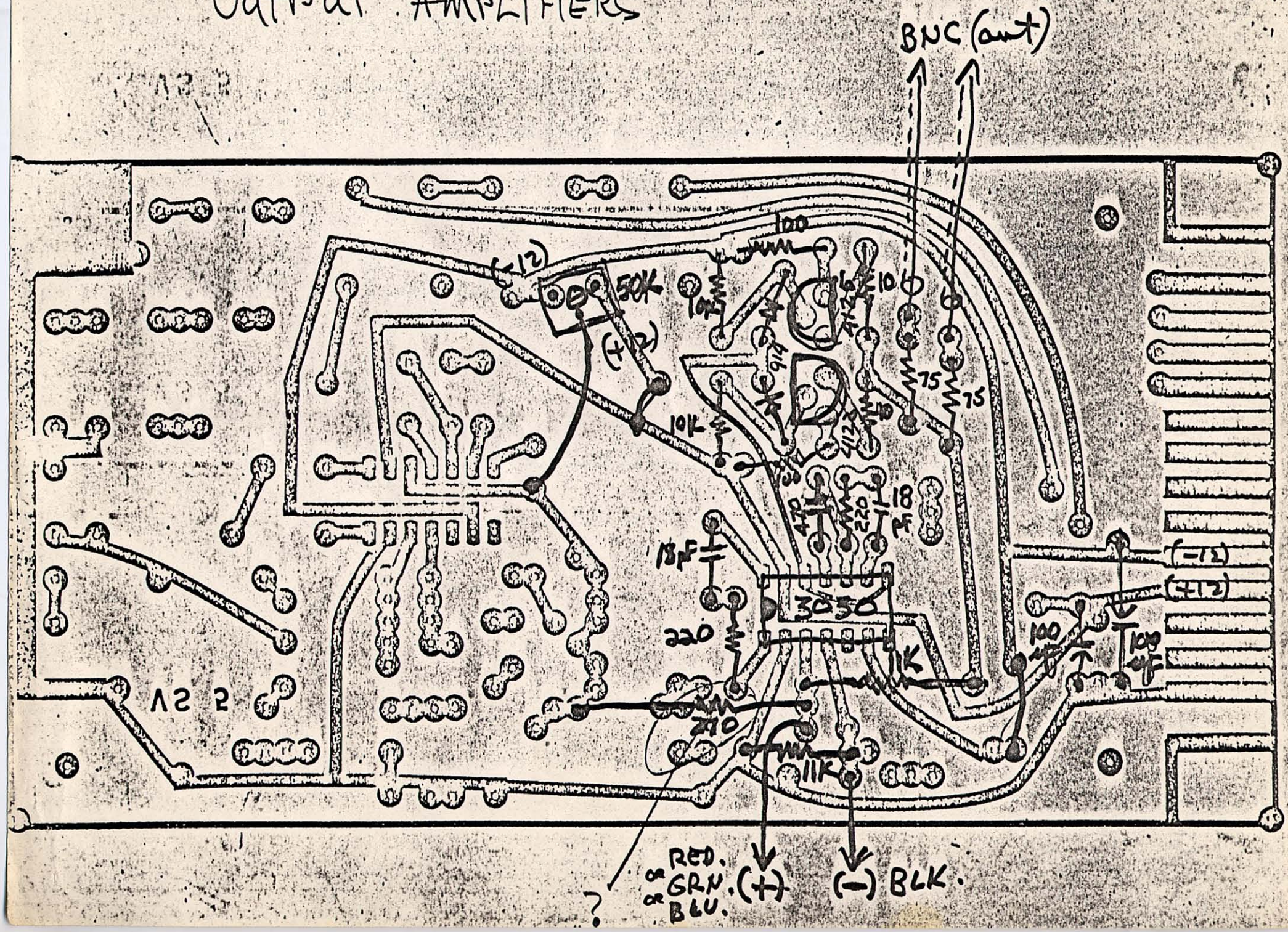
OUTPUT MIXER

(MULTIPLIERS) Use 151 for 3 output Mix

REPEAT 12 times



OUTPUT AMPLIFIERS



APROX. SUMMARY of TOTAL PARTS for OUTPUT MIX MODULE

≈50 - 100Ω POTS

12 - SLIDE POTS (MAY NEW TYPE) 3 MOΩ

70 - BNC

HARDWARE STAND-OFFS for 15 CARDS

12 - OUTPUT MIX CARDS ~~VS10~~ VS10's

10 MOLE FET X-1

3 - VS 5 ~~[illegible]~~ ~~4 TYPE FETS~~

1 ~~[illegible]~~ DIGITAL CARD

~~25 1445L~~

~~15 CA 3030~~

CAP. 8 PF 570Ω

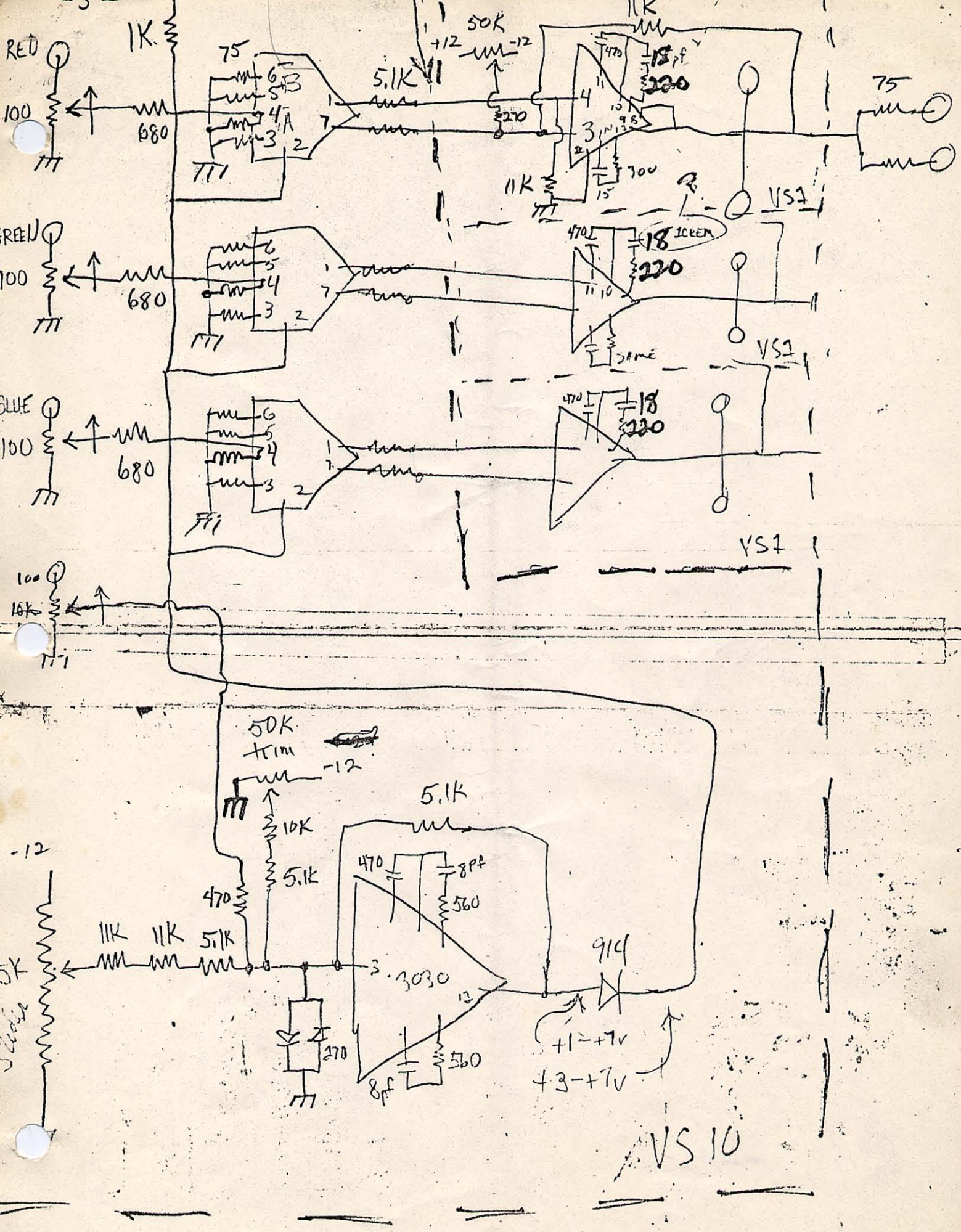
2 1N270 CERAMICS

1 1N914

1) 2-7493P

2) 8601

150-75Ω RESISTORS


RED
GREEN
BLUE
100
680
1K
75
5.1K
50K
+12
-12
11K
470
18 pf
220
270
300
15
VS7
18 screen
same
10K
470
8pf
560
3030
914
+1-+7v
+3-+7v
VS10