

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 miscellaneous 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. *IN FORMATION and*

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 maintenance. 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 recommend ordering many extra.

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

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	36F110MM	RG 59/U	CO-AXIAL CABLE	81.28	7.51	81.28	N
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SHOULD BE CHANGED TO

1000 FT	36F110MM	RG 59/U	COAXIAL CABLE	50.85	50.85		N
			(Belden # 8241-1000)				

PAGES FOLLOWING DOCUMENTATION ERRORS SHOULD REPLACE CORRESPONDING PAGES IN THE DOCUMENTATION

FEBRUARY 28, 1976

CORRECTION OF ERRORS IN DOCUMENTATION

Master Parts List:

The following-

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

10	1-526-063-11	6-PIN FEMALE CHS MT	.90	9.00	AP
30		09-02-1152 MOLEX P-C BOARD CON.	.58	17.50	AP
300	8-30110	MOLEX INSERTS	.036	10.70	AP
* 1		CEN-4092-50 COLOR ENCODER BRD	400.00	400.00	AP
* 1	713-6140	225-2222-401 44 CONTACT CON	5.89	5.89	A
		TOTAL		437.20	

should be changed to-

ADVENT ELECTRONICS
7110-16 N. Lincoln Ave.
Rosemont, Ill. 60018

30	09-02-1152 Molex P-C Board Con.	.58	17.50
300	8-30110 Molex Inserts	.036	10.70

ADVANCED PHOTO SOUND PRODUCTS
49 So. Washington St.
Hinsdale, Ill. 60521

10	1-526-063-11	6-Pin Female Chassis Mt.	.90	9.00
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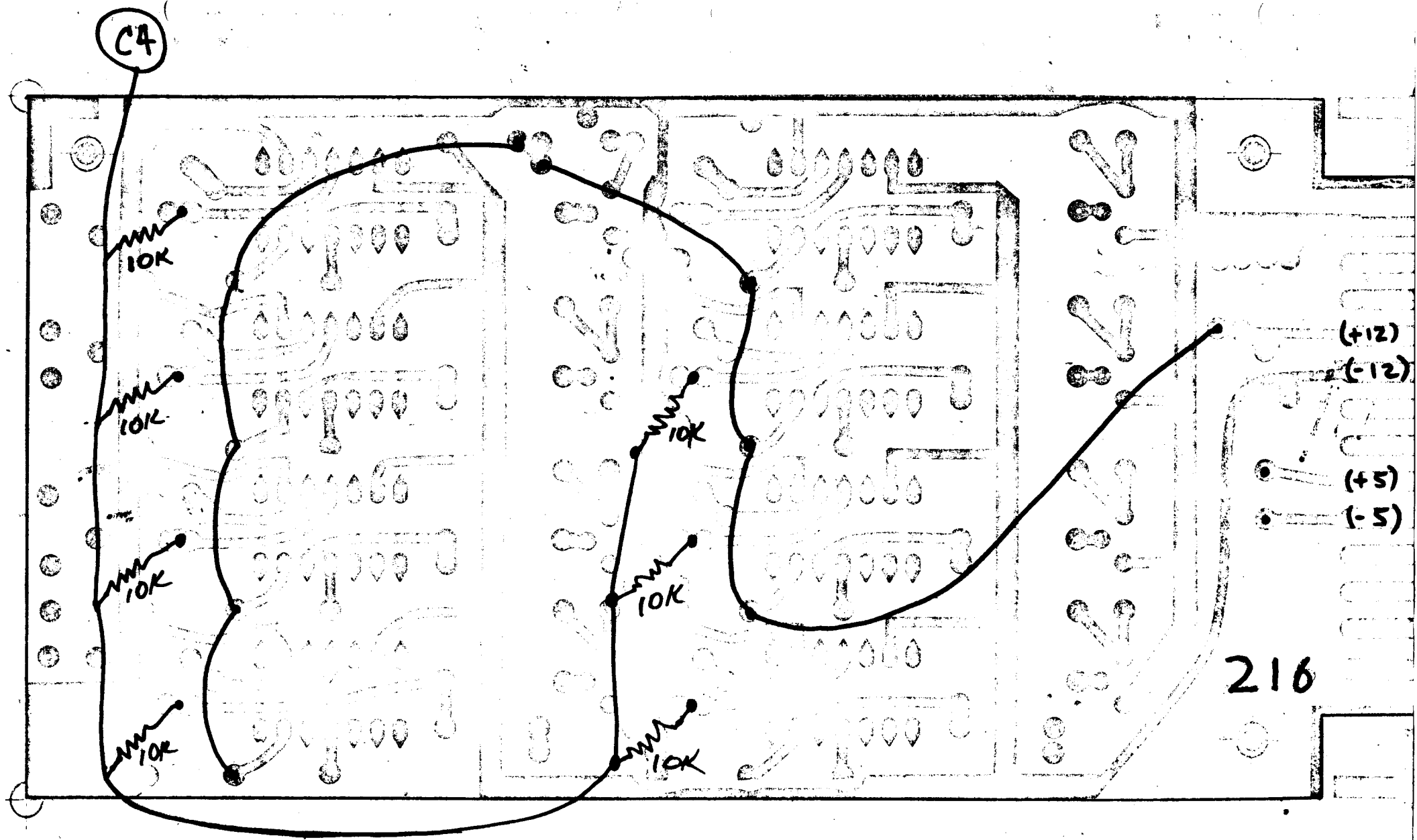
(also, Color Encoder Board when design is finished)

COLOR ENCODER:

The Sony board that was used in the color encoder is no longer available. I am redesigning the encoder based on another card. The new design will be very similiar to the old one. With the exception of the encoder board itself and its P-C Board connector, it would be fairly safe to order the parts (this is a prediction not a promise).

VS5 BOARD:

The VS5 board is used to route power into the Sync Strip, Input Mod, Comparator, Function Gen. modules. Due to a drafting error on the card, the tongue that sticks out to receive the power connector may be too large for the Molex connector on the power buss. File the tongue equally on both sides so that the connector will fit if necessary.



C4

10K

10K

10K

10K

10K

10K

10K

(+12)

(-12)

(+5)

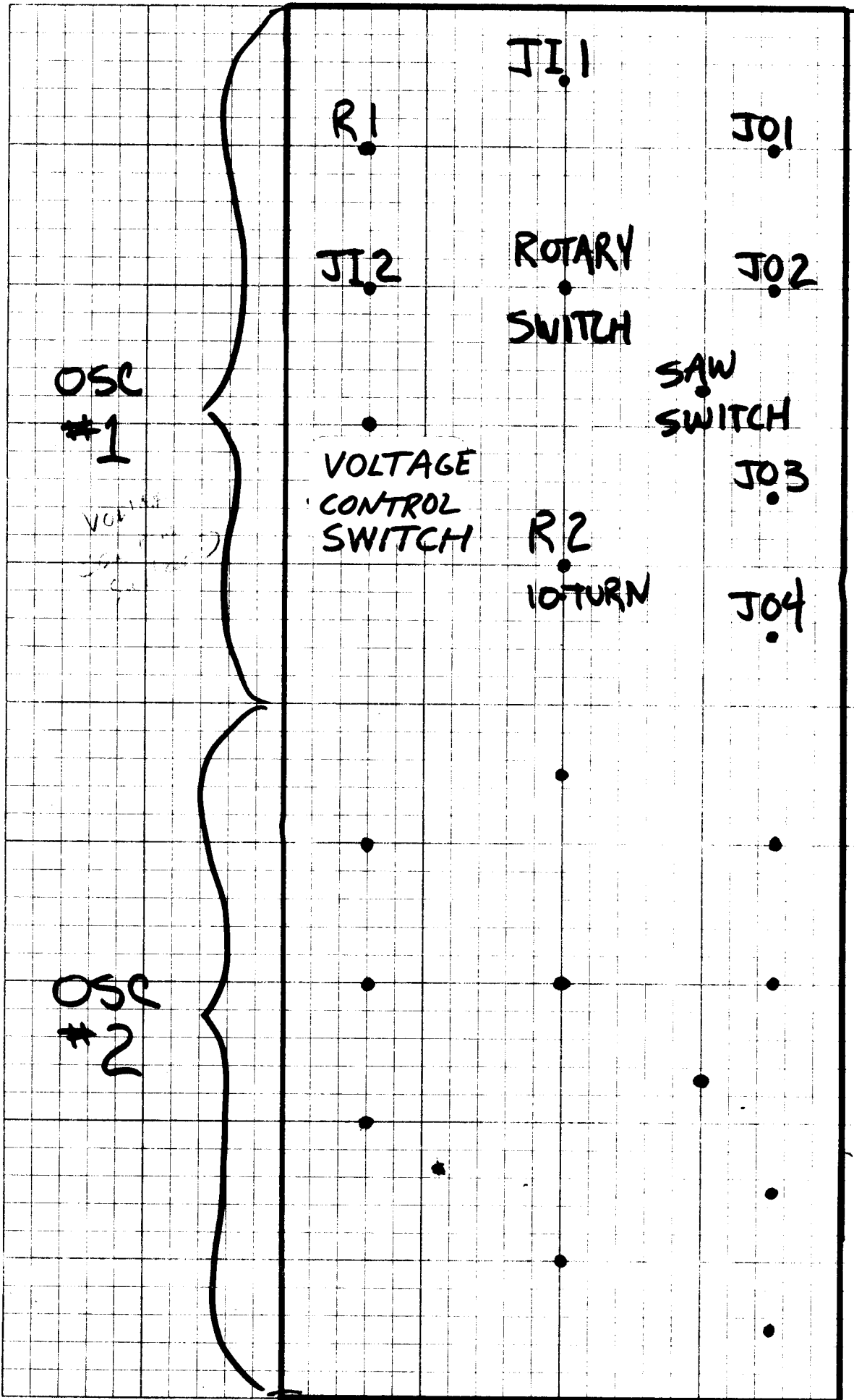
(-5)

216

MIDDLE BOARD
FOIL SIDE

AMPLITUDE CLASSIFIER

9-75



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,

Daniel J. Sandin
Department of Art
University of Illinois at Chicago Circle
Box 4348
Chicago, Illinois 60680
Office phone: 312-996-8689
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

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.

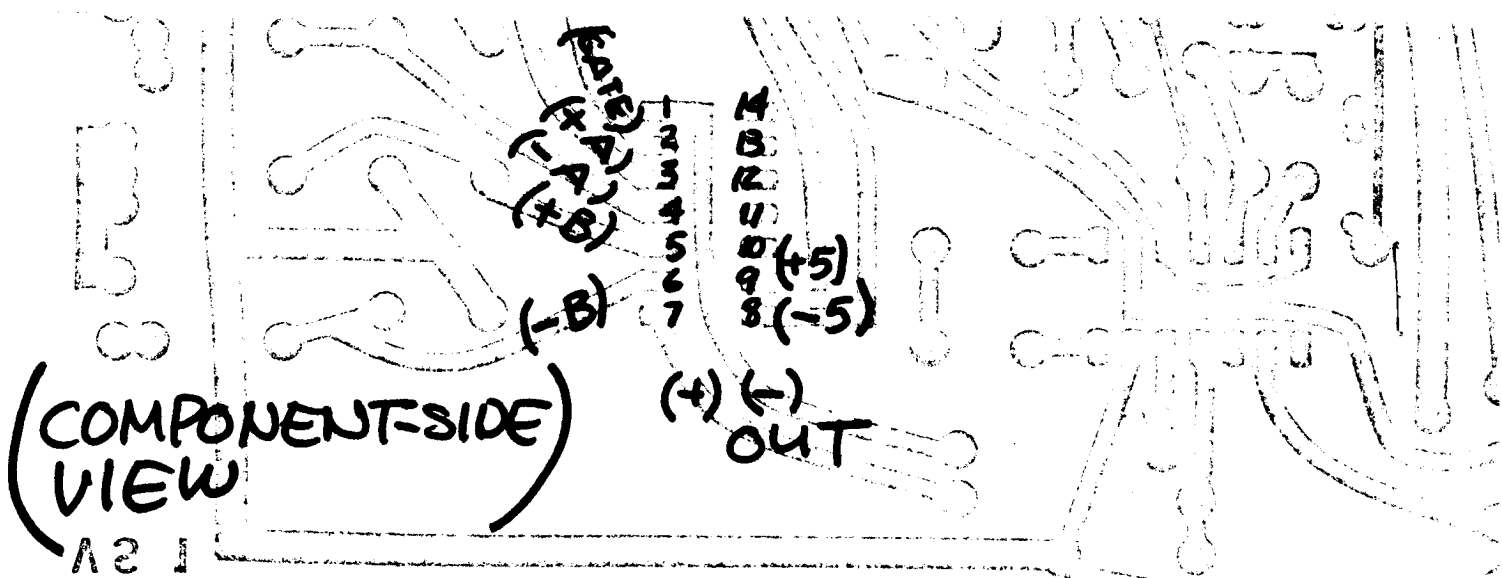
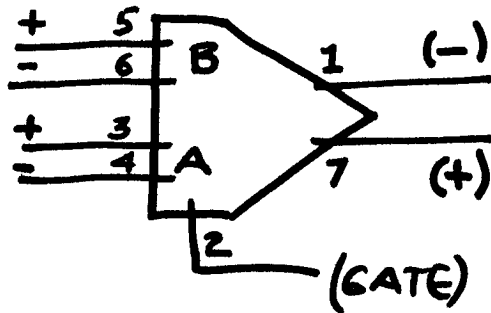
MC 1445 Gain Controlled Amplifier (multiplier):

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 continuous 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.



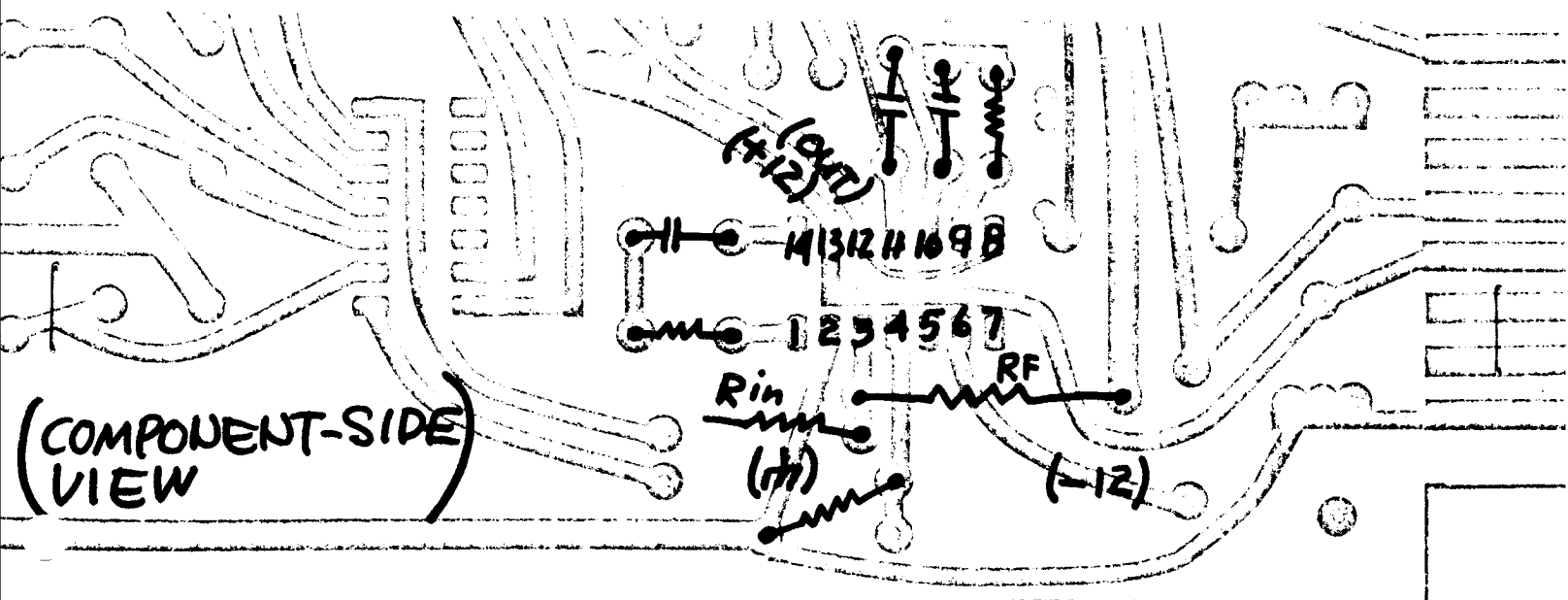
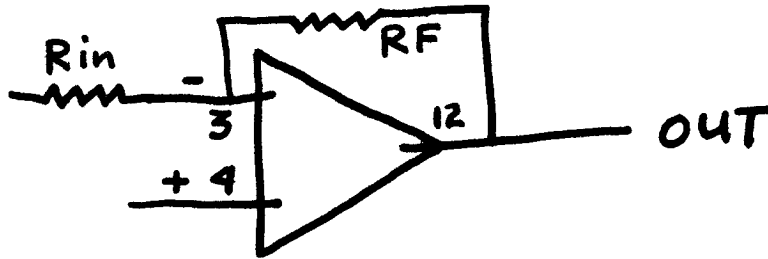
CA 3030 operational amplifier:

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.

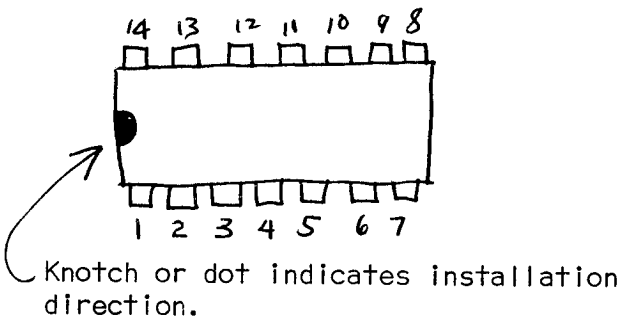
In simple inverting amplifier circuits, the voltage gain of the amplifier is the ratio of the feedback resistor between pin (12) and pin (3) to the input resistor connected from the input signal to pin (3).
 RF/R_{in} in



INTEGRATED CIRCUITS

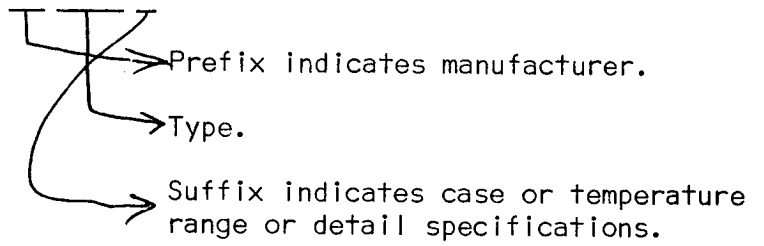
Dual Inline Packages (DIP)

TOP VIEW:



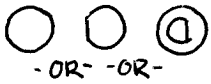
IDENTIFICATION NO. (example):

MC 1445 L



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.

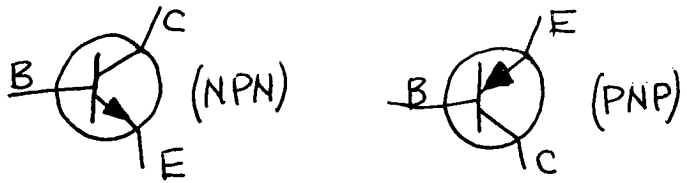
Leads typically have to be bent for proper and convenient insertion into PC Board.

IDENTIFICATION NO.:

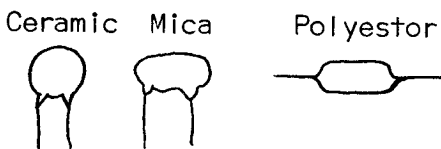
(only two transistors used in entire system)

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

SYMBOL:

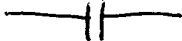


CAPACITORS

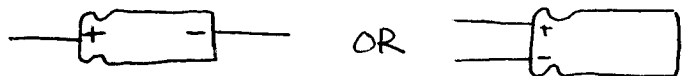


Installation direction makes no difference.

SYMBOL:

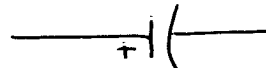


Electrolytic



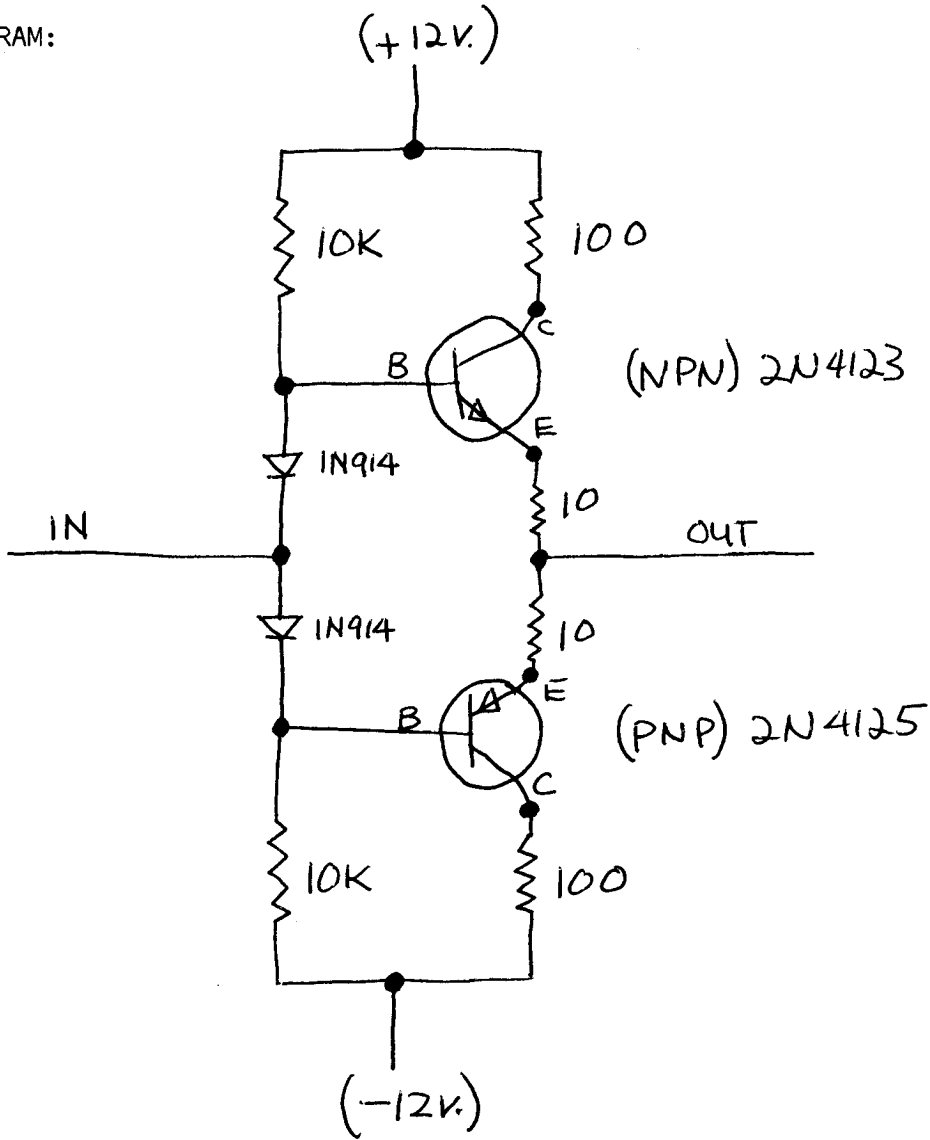
Installation must have correct (+) and (-) orientation.

SYMBOL:



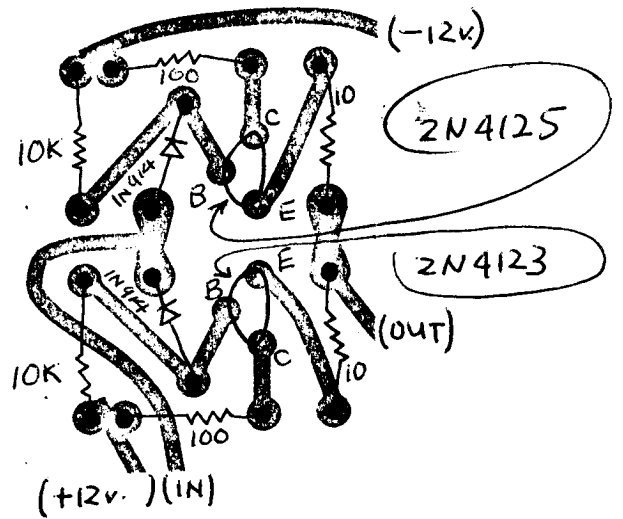
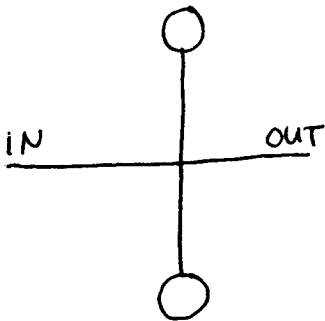
The STANDARD DRIVER is a complimentary current amplifier with voltage gain less than 1. It is used so many times in the I-P that it is abbreviated:

DIAGRAM:



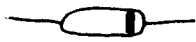
COMPONENT SIDE VIEW:

ABREVIATION:



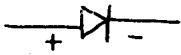
DIODES

COMPONENT:



Band or dot indicates the cathode (-).

SYMBOL:



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

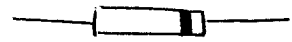
IDENTIFICATION NO.:

(only two signal diodes used in

1N 914 entire system)
1N 270

ZENER DIODES

COMPONENT:



Band or dot indicates the cathode (-).

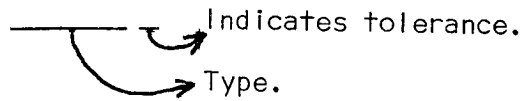
SYMBOL:



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

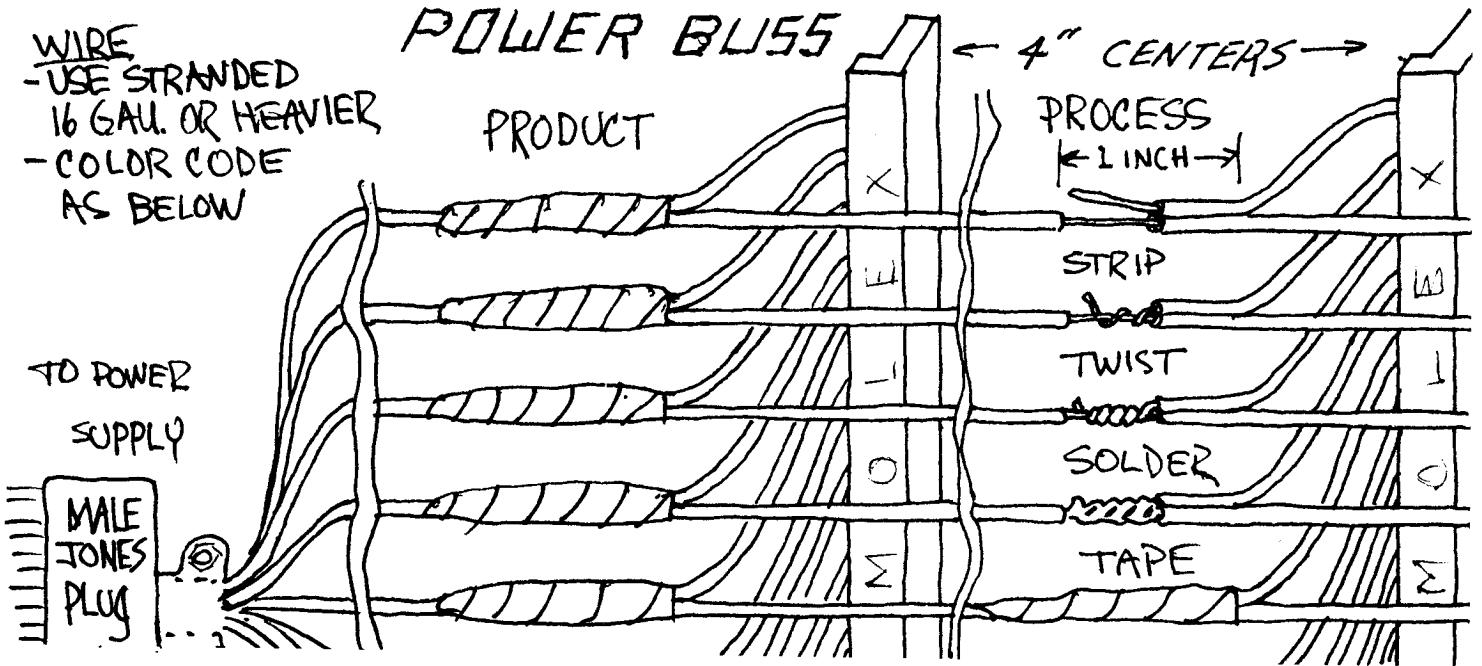
IDENTIFICATION NO. (example):

1N 5338 B



Indicates tolerance.

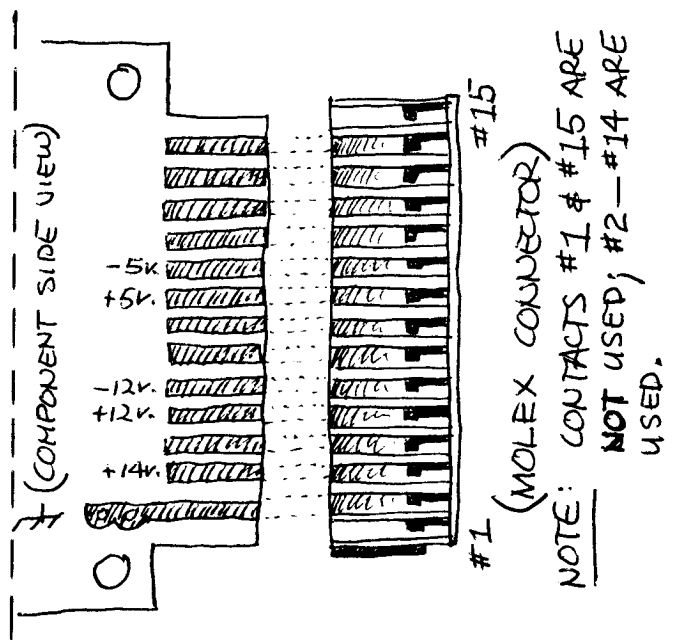
Type.



COLOR CODE FOR POWER BUSSING

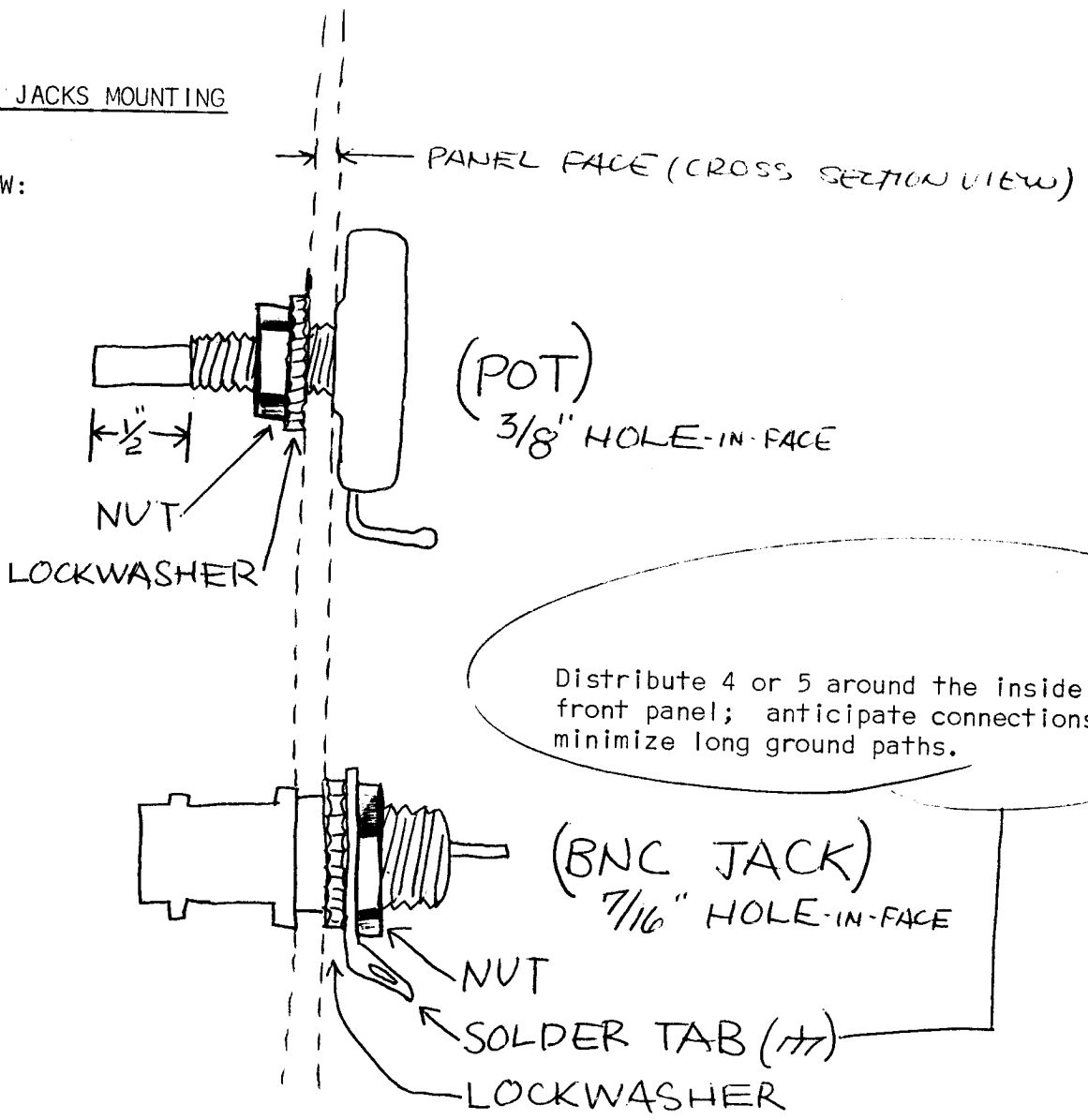
BLACK (⚡)	(⚡)	1	2	(+14v)
ORANGE ()	()	3	4	(+12v)
WHITE ()	()	5	6	()
RED (+12v)	()	7	8	(+5v)
BLUE (-12v)	(-12v)	9	10	()
GREEN (+6v)	()			
GRAY ()	()			
YELLOW (+5v)	()			
VIOLET (-5v)	(-5v)			
BROWN ()	()			

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

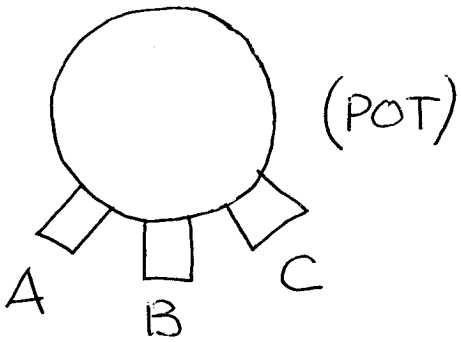


POTS and JACKS MOUNTING

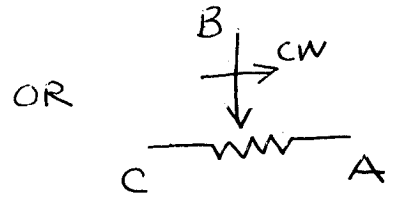
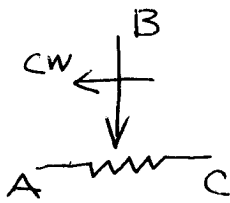
SIDE VIEW:



BACK VIEW:

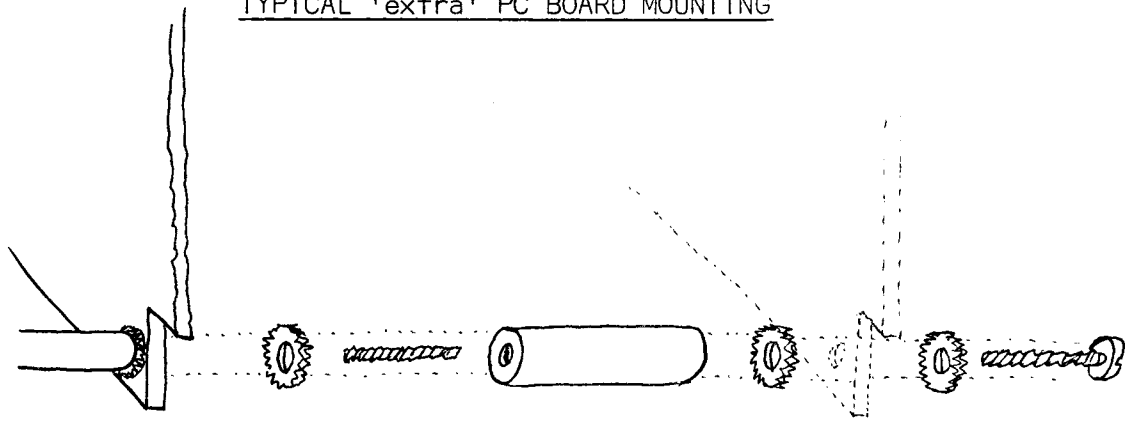


SYMBOL:



CW = clockwise

TYPICAL 'extra' PC BOARD MOUNTING



4-40 screw

star washer

extra PC board

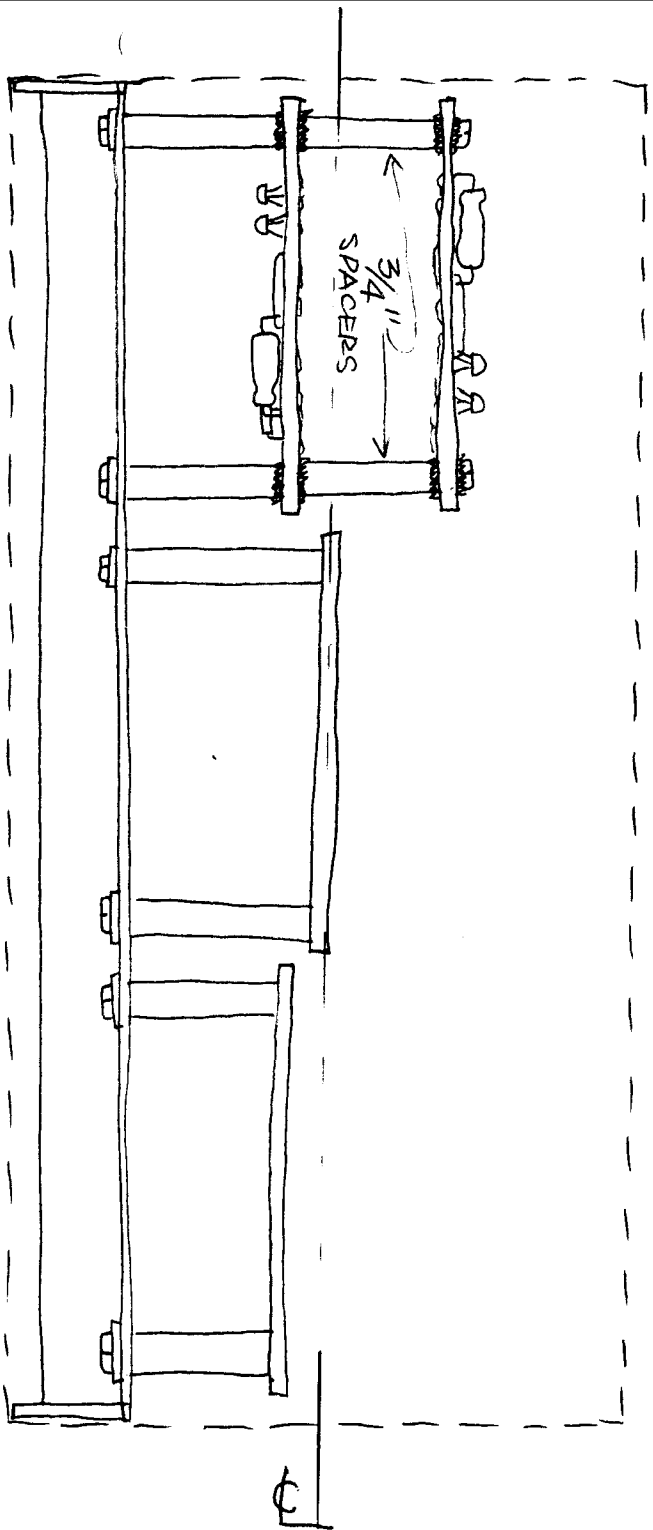
star washer

3/4" spacer

4-40 screw with head cut-off
making a 'threaded-shaft' screw-able
into both spacers

star washer

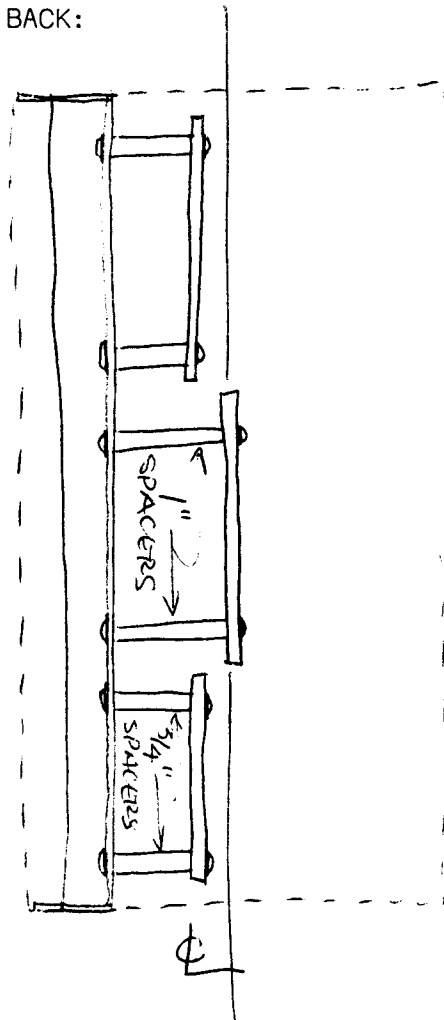
PC board



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

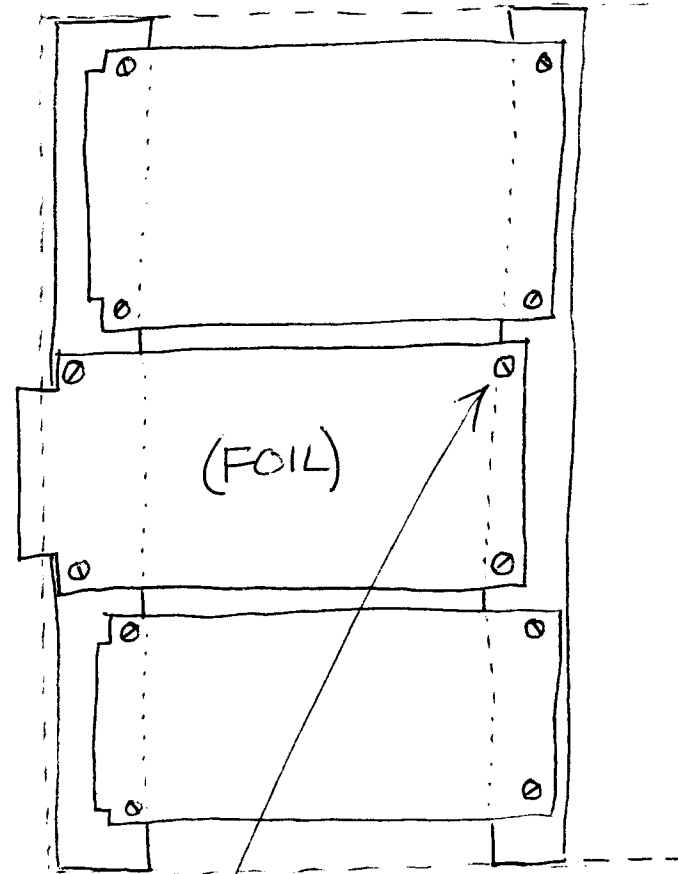
BACK:



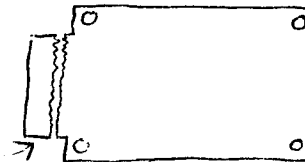
Adjust middle board so as to be dead-on with center line of module; use washers for additional spacing if necessary.

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

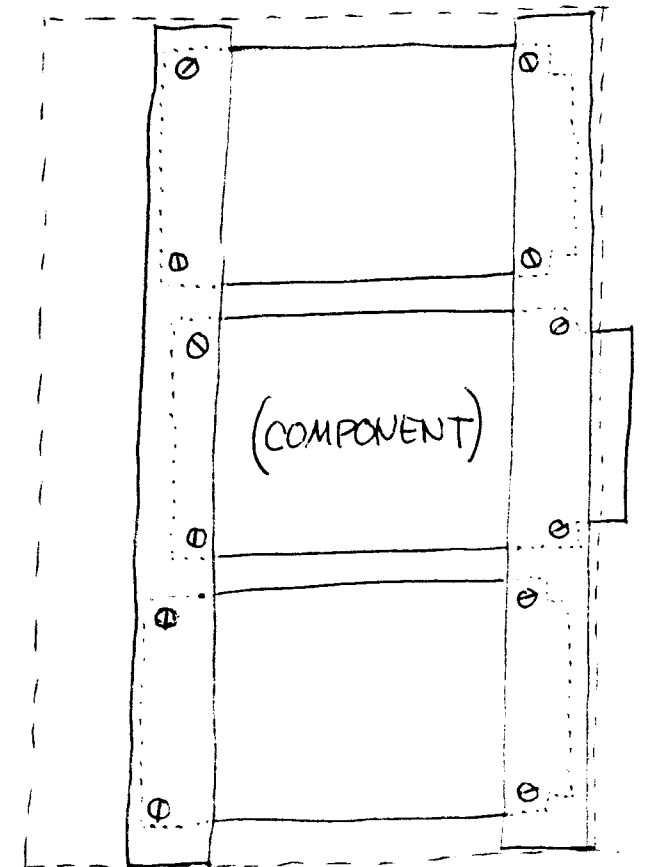
LEFT SIDE:



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



RIGHT SIDE:



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).

SYNC GENERATOR

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

All outputs are -4v. into 75 ohm except the 14 MHz. (J013) which is an open collector TTL. J013 is not used except for work with digital computers.

J11 ~~horizontal~~ reset and J12 vertical reset are not implemented in full.

The sync generator requires starting pulses which are provided by capacitors associated with J11 and J12. Time must be allotted after power-down before power-up (at least 30 seconds) to assure proper starting of sync generator.

Master oscillator trim:

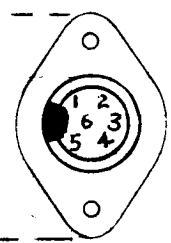
Adjust the master oscillator frequency to 14.318180 MHz. A convenient way to do this is to run a lead from horizontal drive and wrap it (still fully insulated) around the antennae of a TV receiver. Tune the receiver to a station on feed from a major network (in color). You will notice two vertical lines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

(HOR)	J11	J01	J02	(3.58) COLOR CARRIER
(VERT)	J12	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)
	.			
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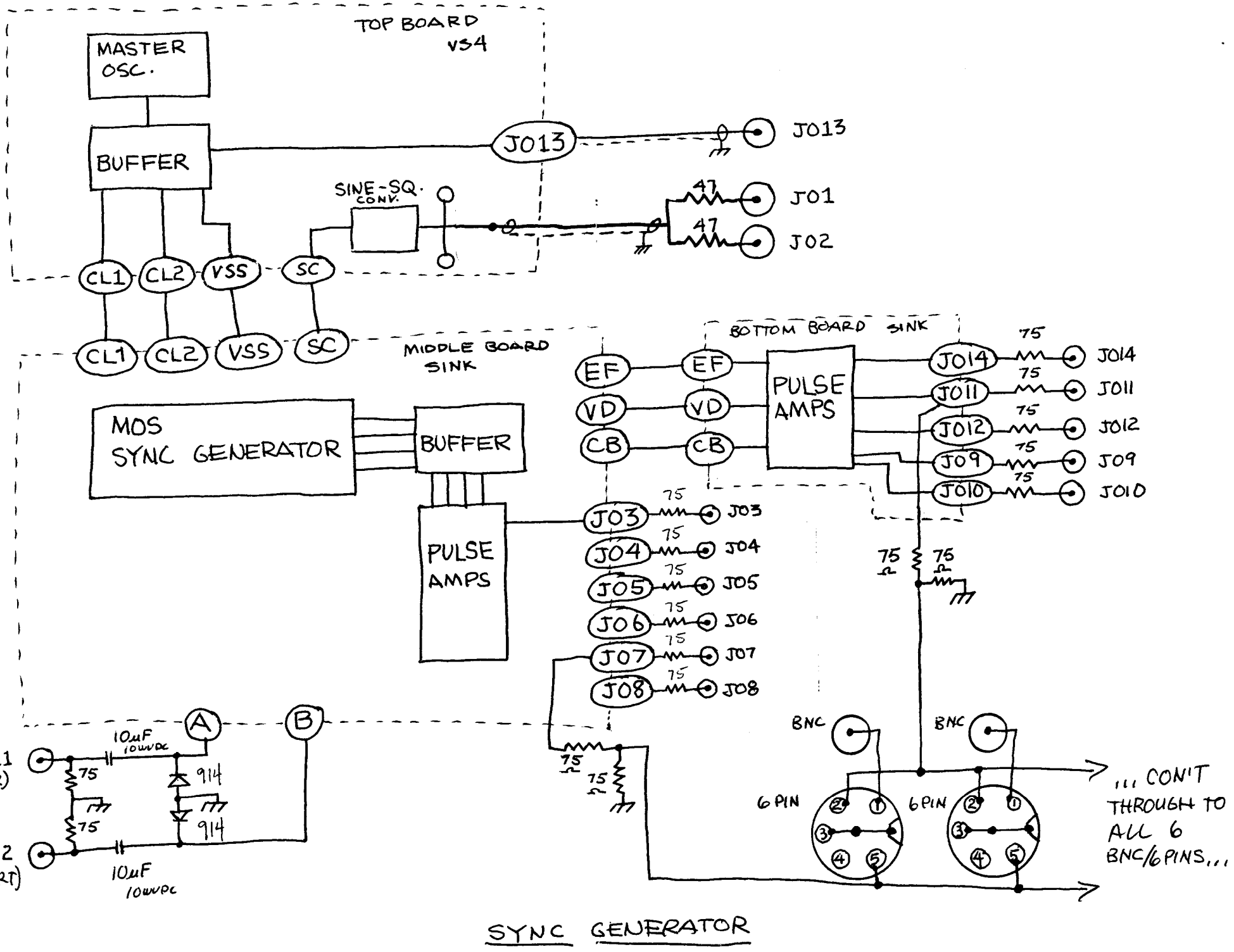
SYNC GEN.



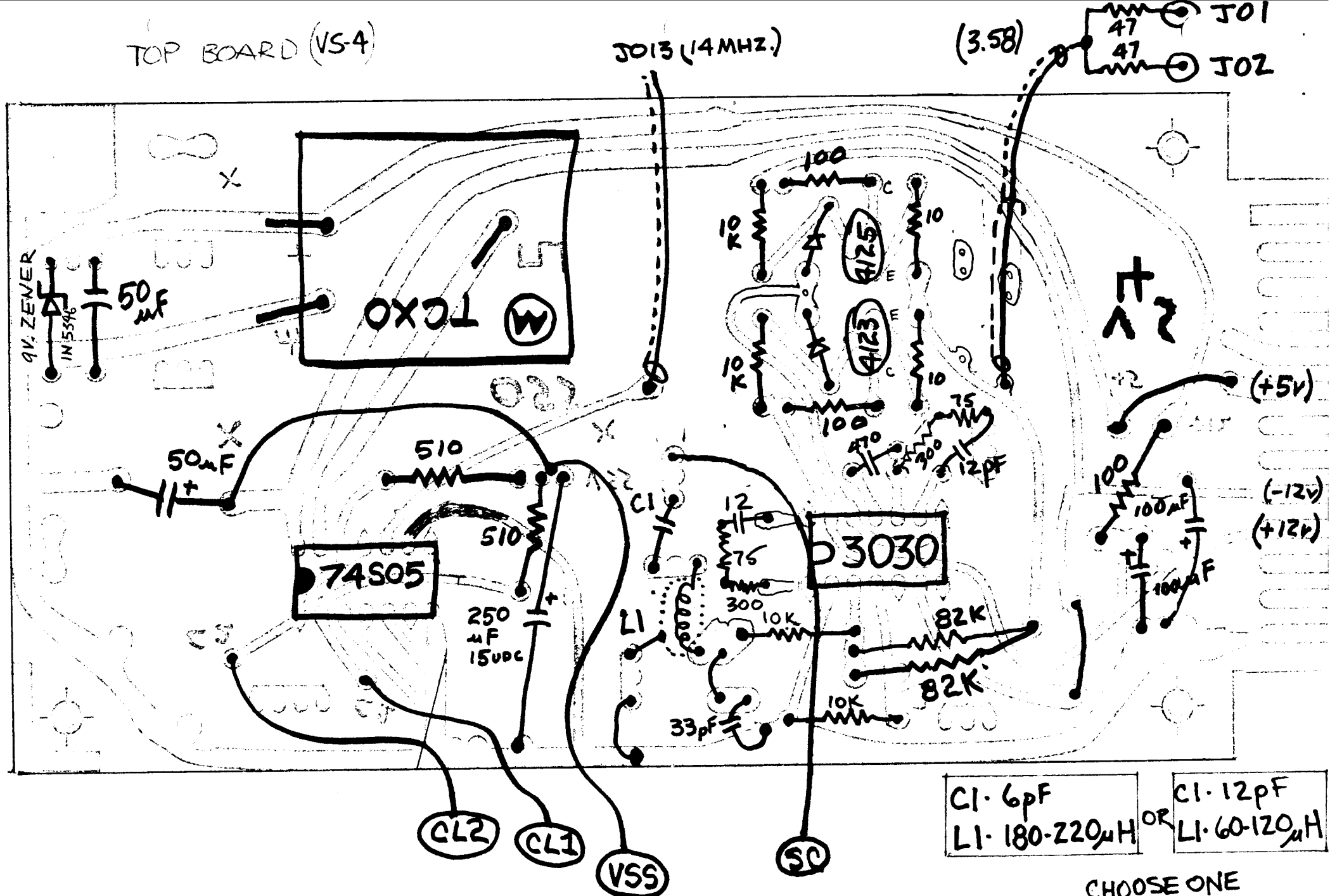
BNC



6
PIN



TOP BOARD (VS-4)

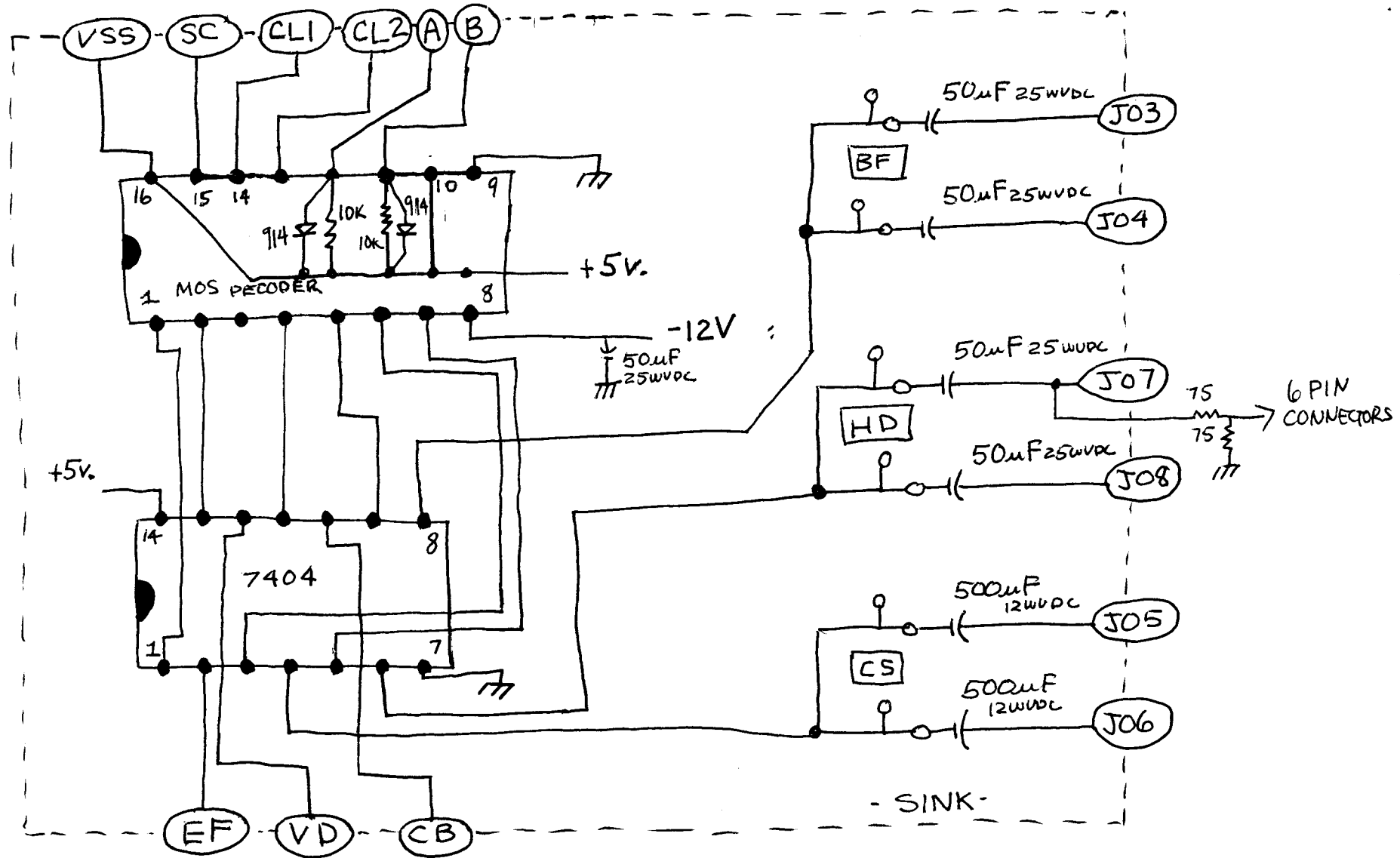


CL- 6pF
 LI- 180-220µH OR LI- 60-120µH
 CL- 12pF

CHOOSE ONE
 COMBO
 SYNC GENERATOR ONLY

update 10-75

MIDDLE BOARD (SINK)



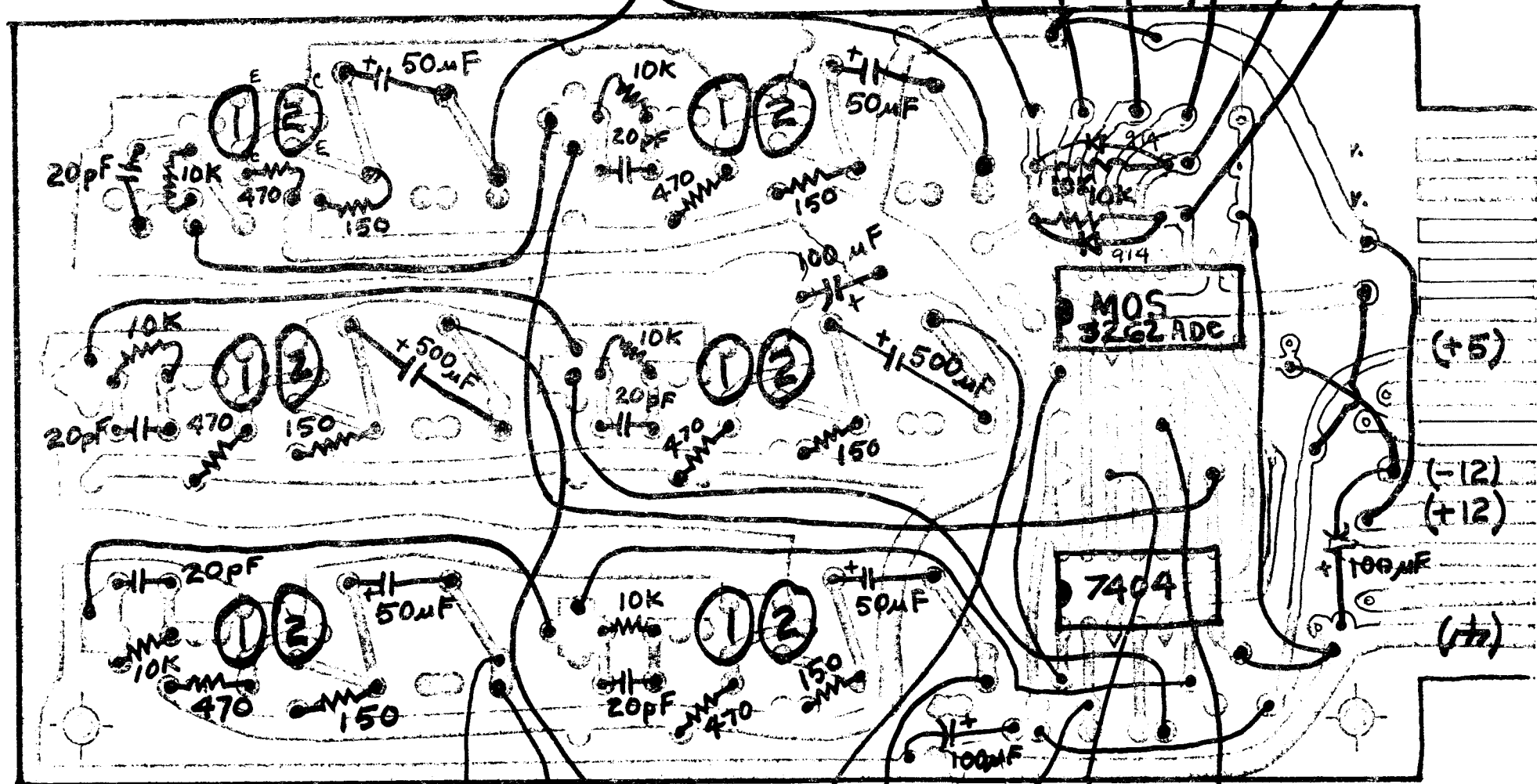
NOTE: USE
3262 ADC DECODER

SYNC GENERATOR

MIDDLE BOARD (SINK)

J03/J04
BF

VSS SC CL1 CL2 A B



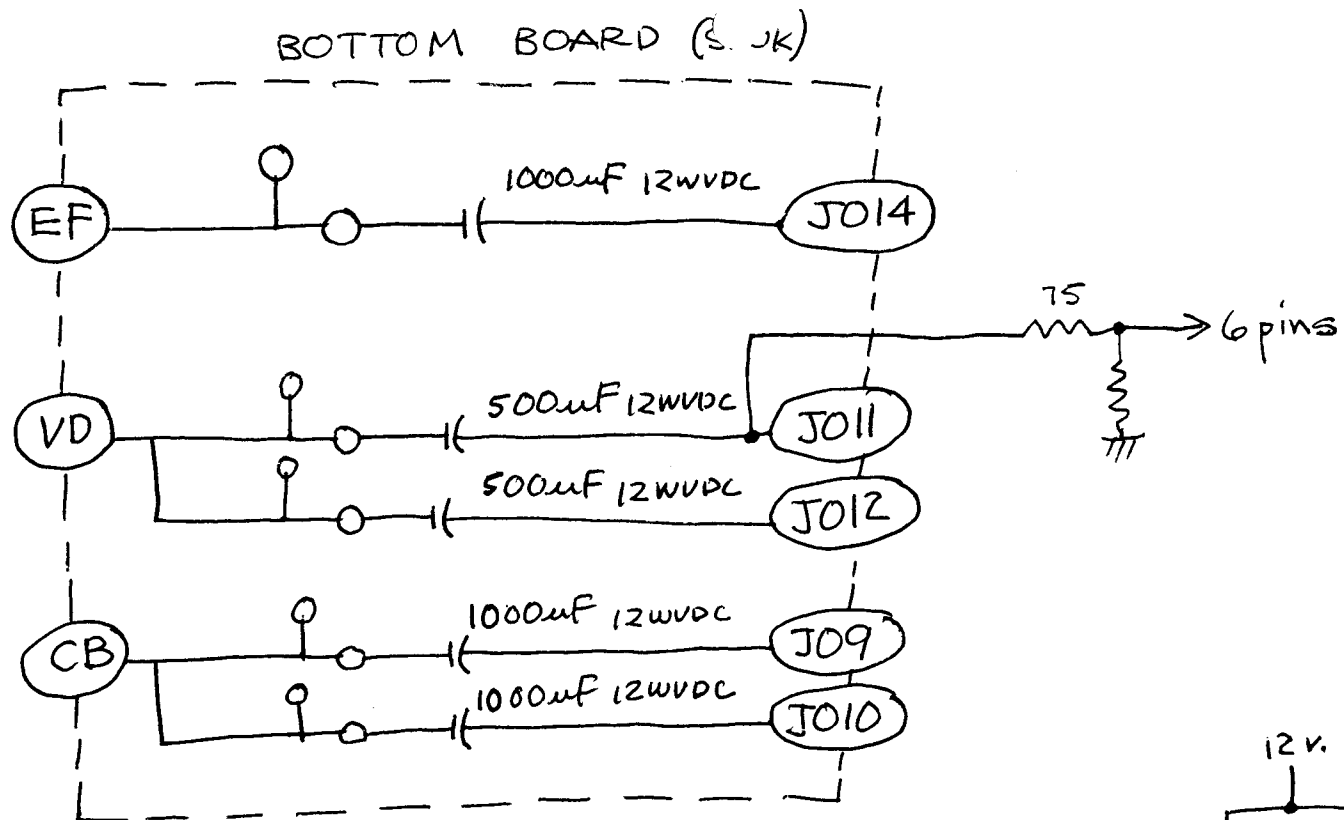
NOTE: ① = 2N4123
② = 2N4125

75 75
J07(HD)
CS
J05/J06
PIN #5 ON ALL 6 PIN CONNECTORS

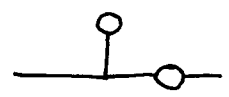
EF
J08(HD)

VD CB
A VERSION

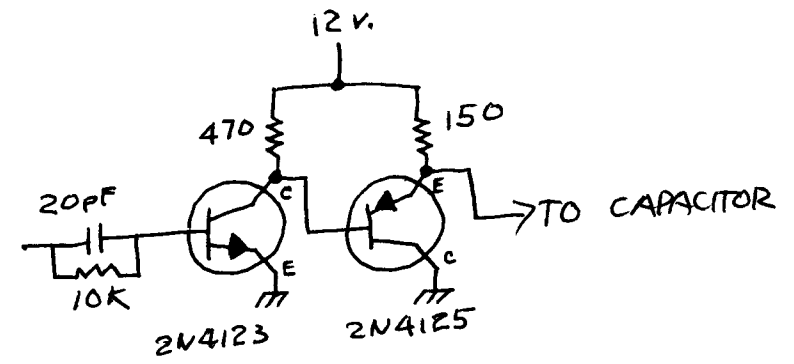
SYNC GENERATOR
UPDATE 10-75



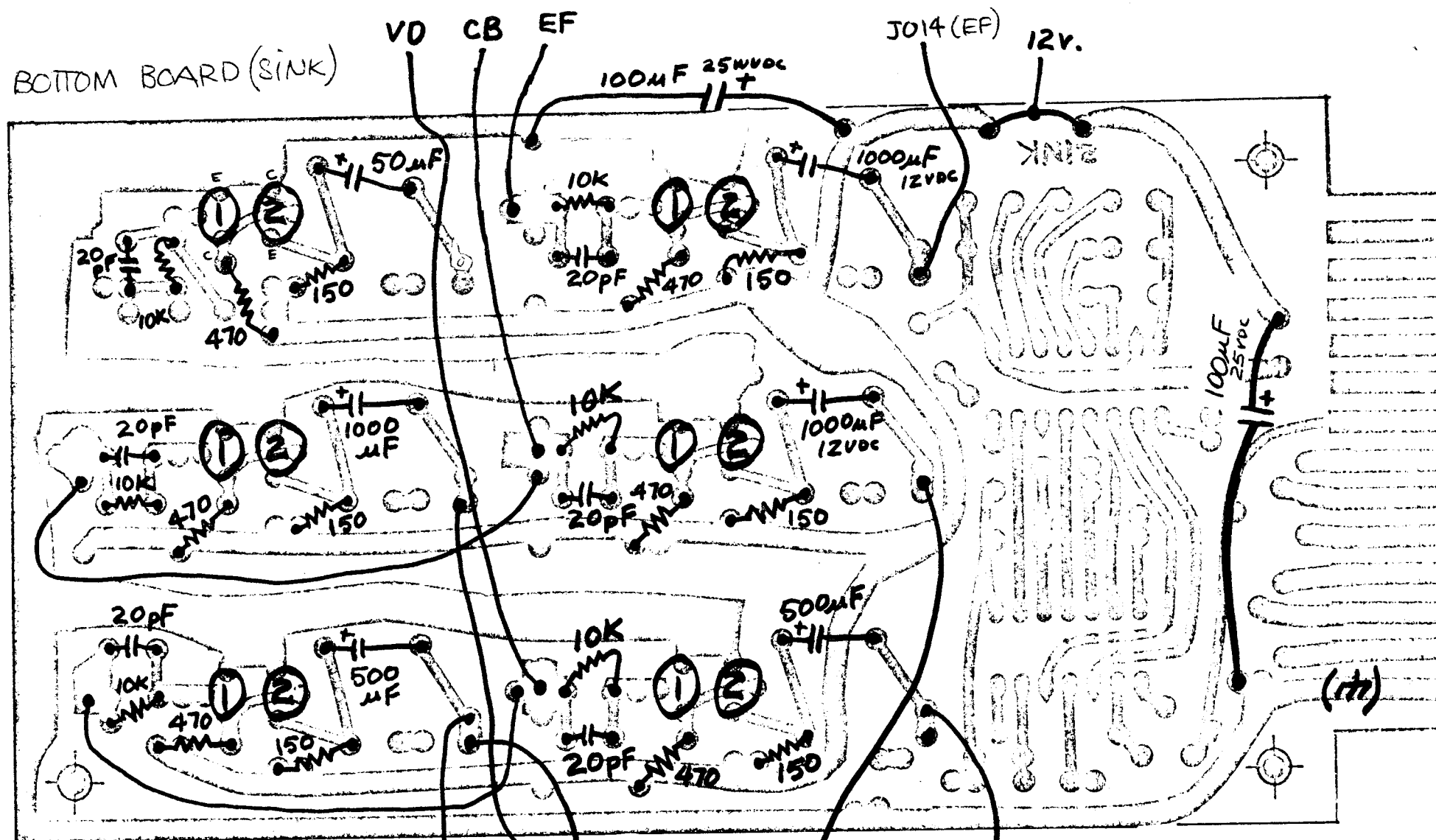
NOTE:



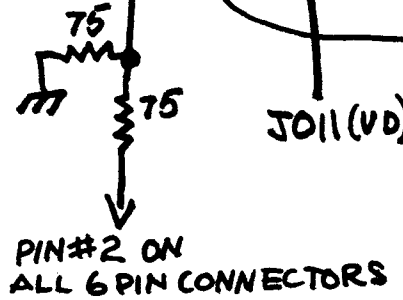
MEANS PULSE DRIVER AND =



SYNC GENERATOR
update 10-75



NOTE: ① = 2N4123
 ② = 2N4125



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		525-1165	75	OHM, 1/4 W RES	.06		A	SG
3		525-1262	100	OHM, 1/4 W RES	.06		A	SG
11		525-1266	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
1/		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.	.16		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	710-1256	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-U-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	1000	MF, 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		1N5340B		9.1V ZENER 5W	2.50		N	SG
1		74505		DIP BUFF, FAIRCHILD	1.04		S	SG
1		CA3030		DIP OP-AMP, RCA	1.32		S	SG
1		3262ADL		DIP MOS DECODER	18.56		S	SG
1		7404		DIP BUF	.70		S	SG
22	34F1337	13-236		BNC, FM-CHS. MT.	.72		N	SG
1				V84 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	K1007A2T1B			XTAL-14.316180MHZ	140.00		M	SG

SYNC STRIPPER and CAMERA INPUT

This module performs several related utility functions.

A video signal is inputted to J11; this signal is clamped and sync suppressed and is available at J01, J02, J03 and J04. 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 J11 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.

Similarly, 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 J03, J04 and at pin#2 of the EIAJ (6-pin) camera connectors.

Horizontal sync (-4v.) is available at J09, J10 and at pin#5 of the EIAJ (6-pin) camera connectors.

Blanking is available at J11 and J12. Burst is available at J05 and J06

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 J11. If a camera is used for this purpose it should of course not 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.

SYNC STRIPPER and CAMERA INPUT

This module performs several related utility functions.

A video signal is inputted to J11; this signal is clamped and sync suppressed and is available at J01, J02, J03 and J04. 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 J11 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.

Similarly, 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 J03, J04 and at pin#2 of the EIAJ (6-pin) camera connectors.

Horizontal sync (-4v.) is available at J09, J10 and at pin#5 of the EIAJ (6-pin) camera connectors.

Blanking is available at J011 and J012. Burst is available at J05 and J06

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 J11. If a camera is used for this purpose it should of course not 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.

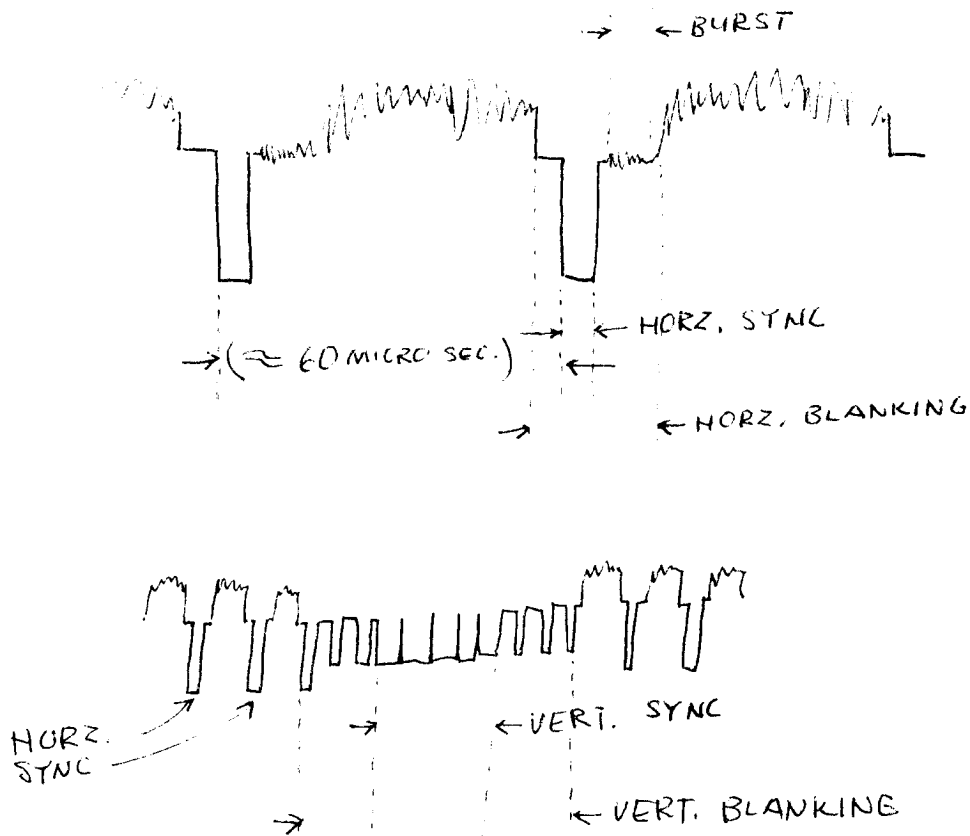
In the case of the burst flag R1T sets the delay from the beginning of the horizontal sync pulse to the beginning of the burst flag, and R2T determines the length of the burst flag.

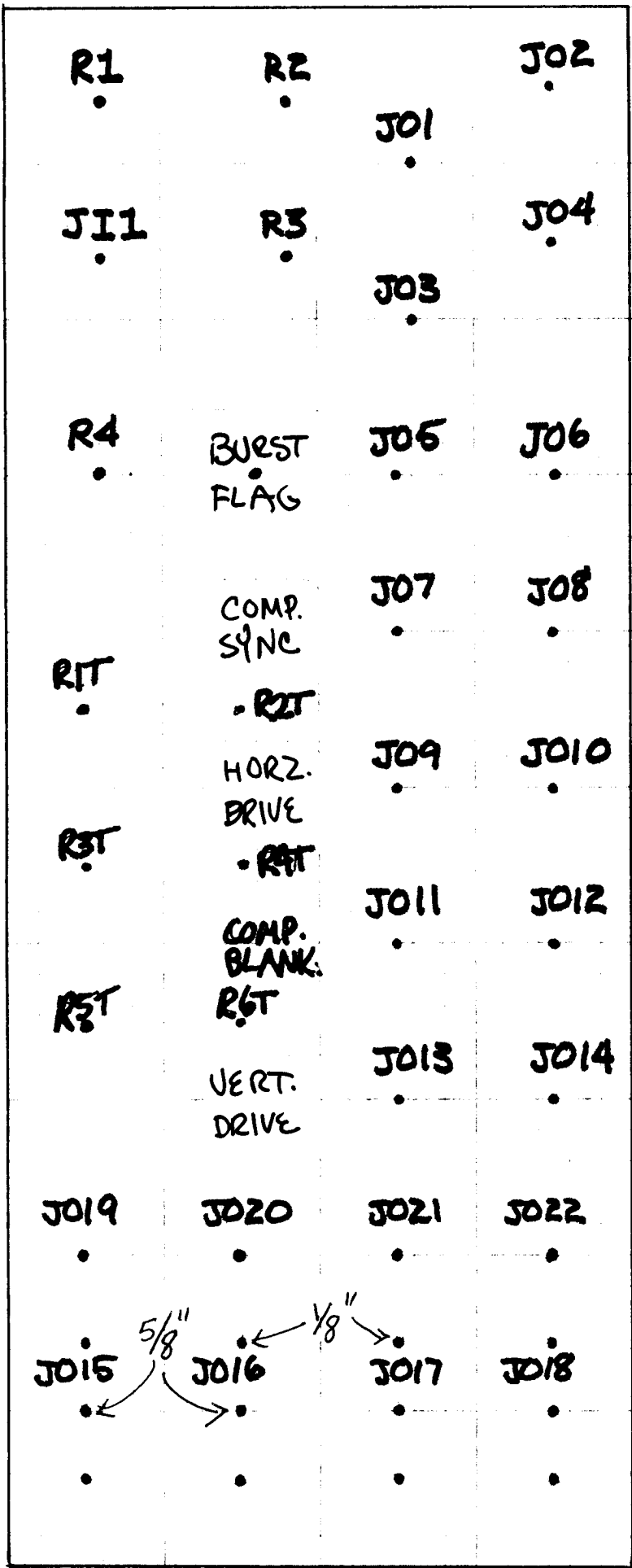
In blanking, R3T sets the delay from the beginning of the horizontal sync pulse to the beginning of the blanking pulse for the next horizontal line. This period is slightly less than one horizontal line. R4T sets the length of the blanking pulse.

Vertical blanking is similar 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 oscilloscope. A dual-trace triggered oscilloscope is preferred but a single trace scope can be used.

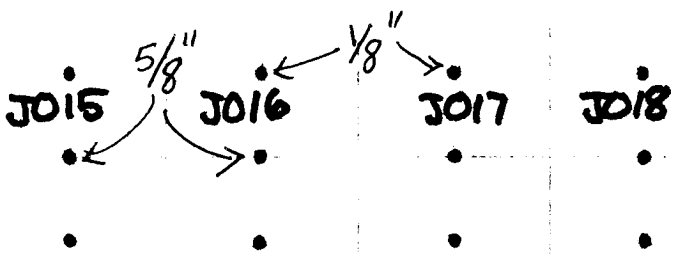


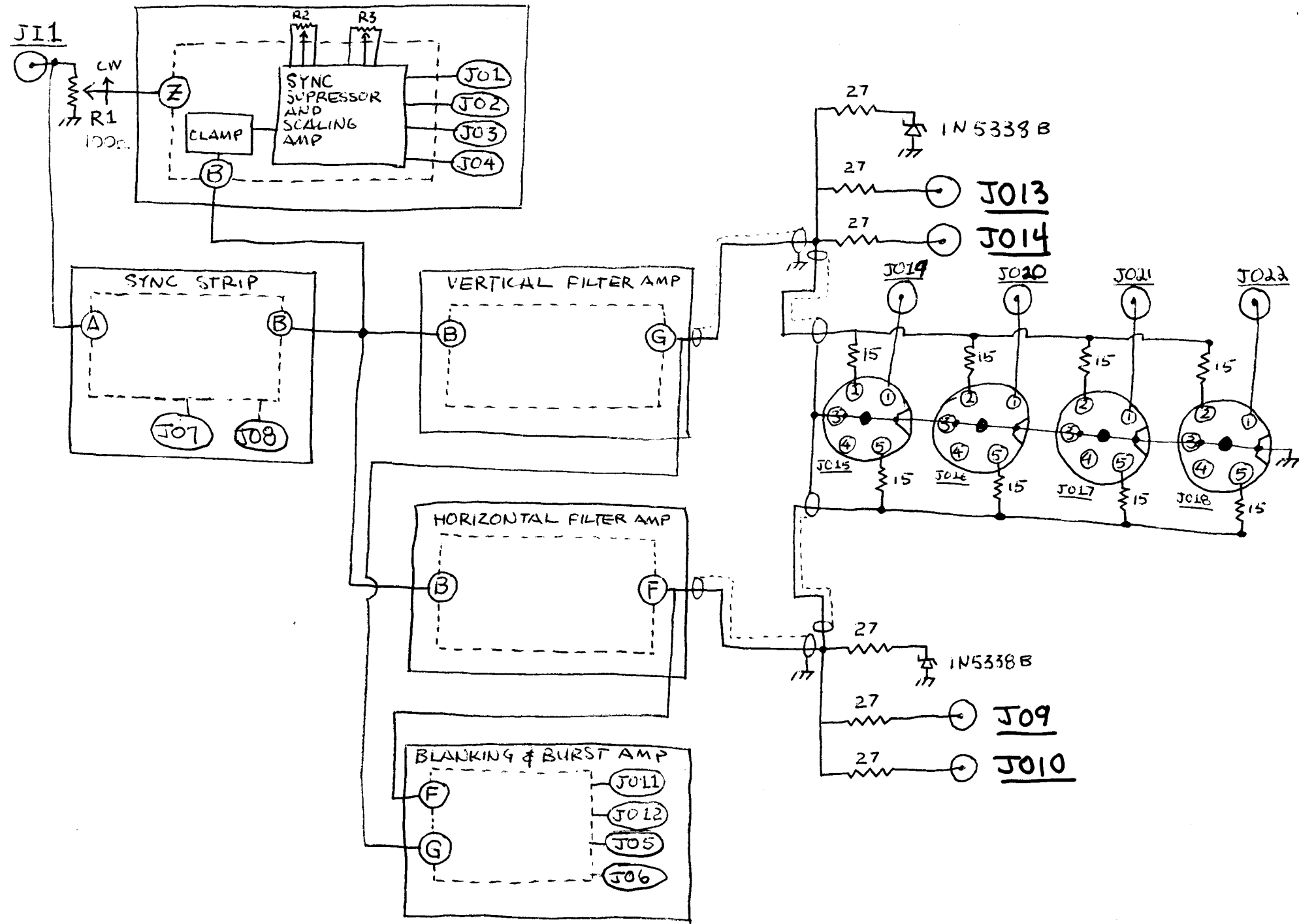


OK 9-95

FRONT
FACE

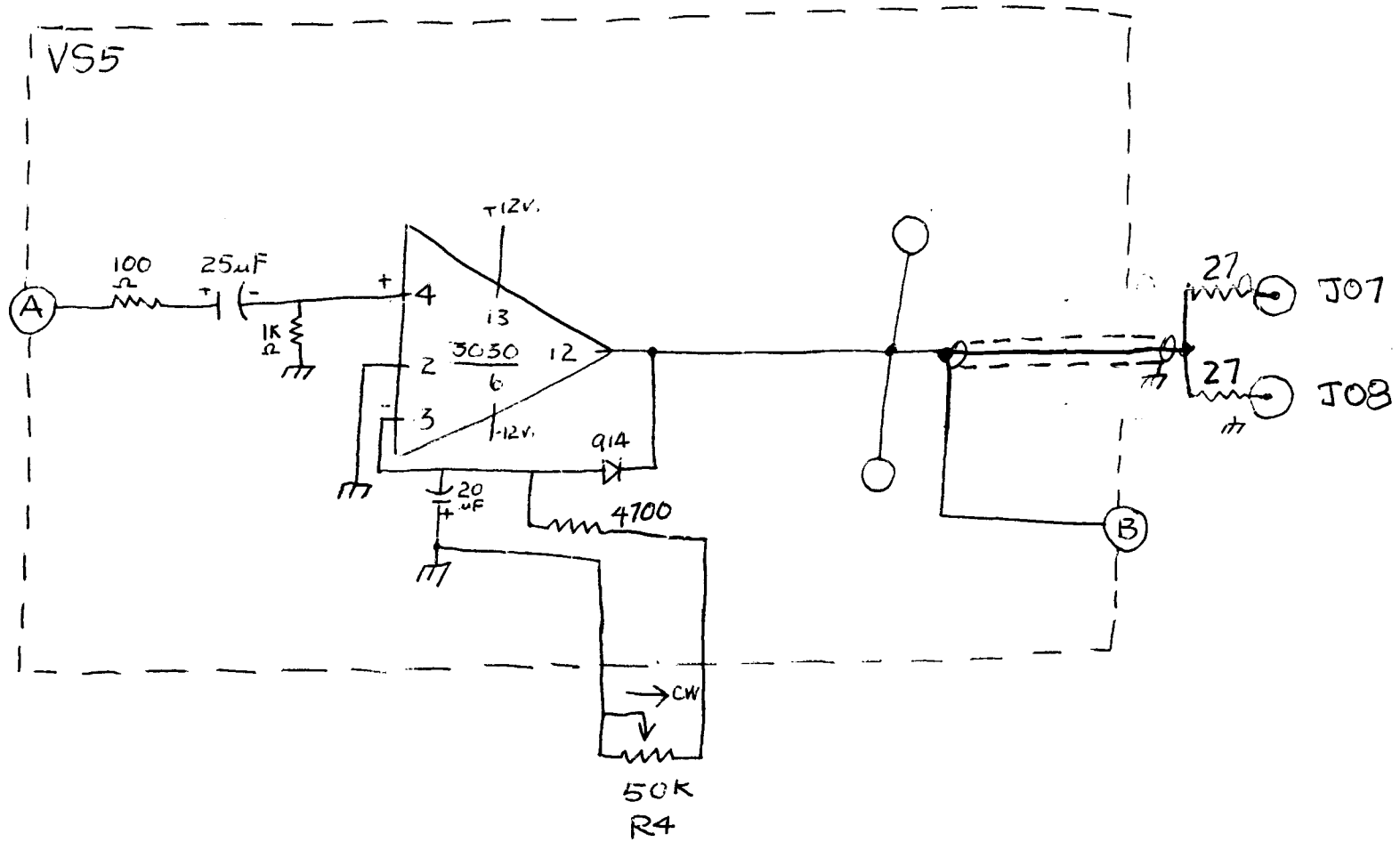
SYNC STRIPPER
⊥
CAMERA INPUT





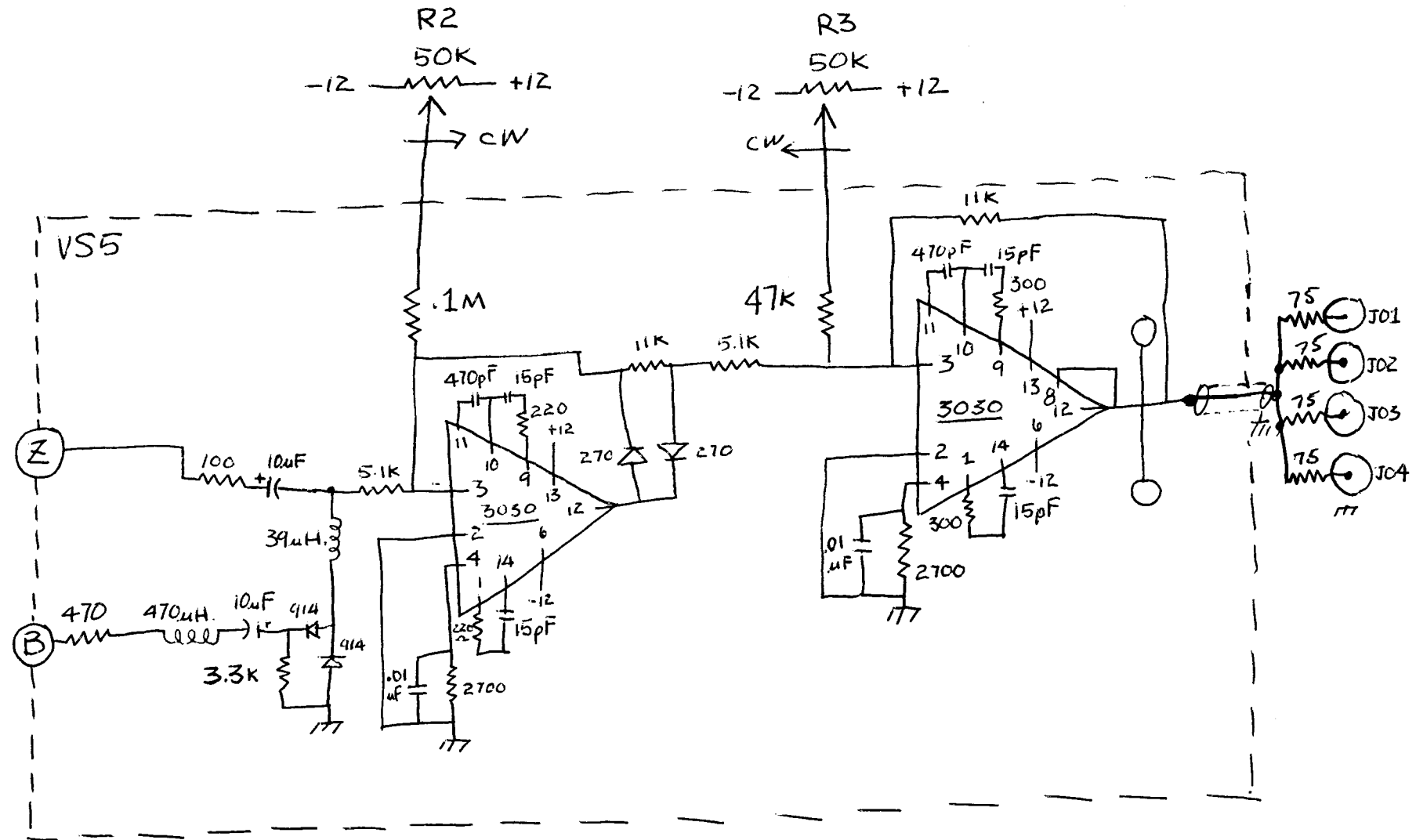
SYNC STRIPPER & CAMERA INPUT

SYNC STRIP

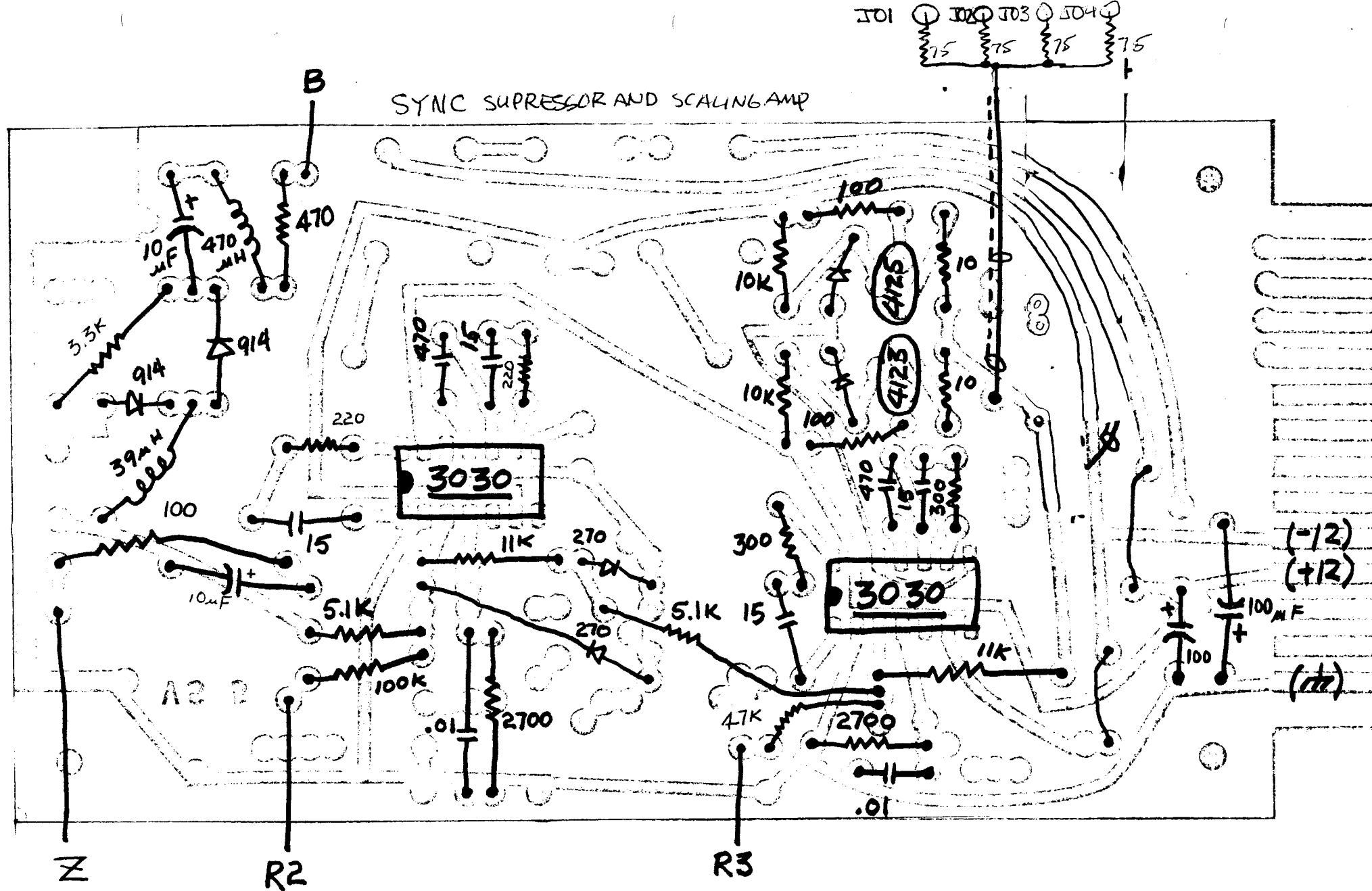


SYNC STRIPPER & CAMERA INPUT

SYNC SUPPRESSOR AND SCALING AMP



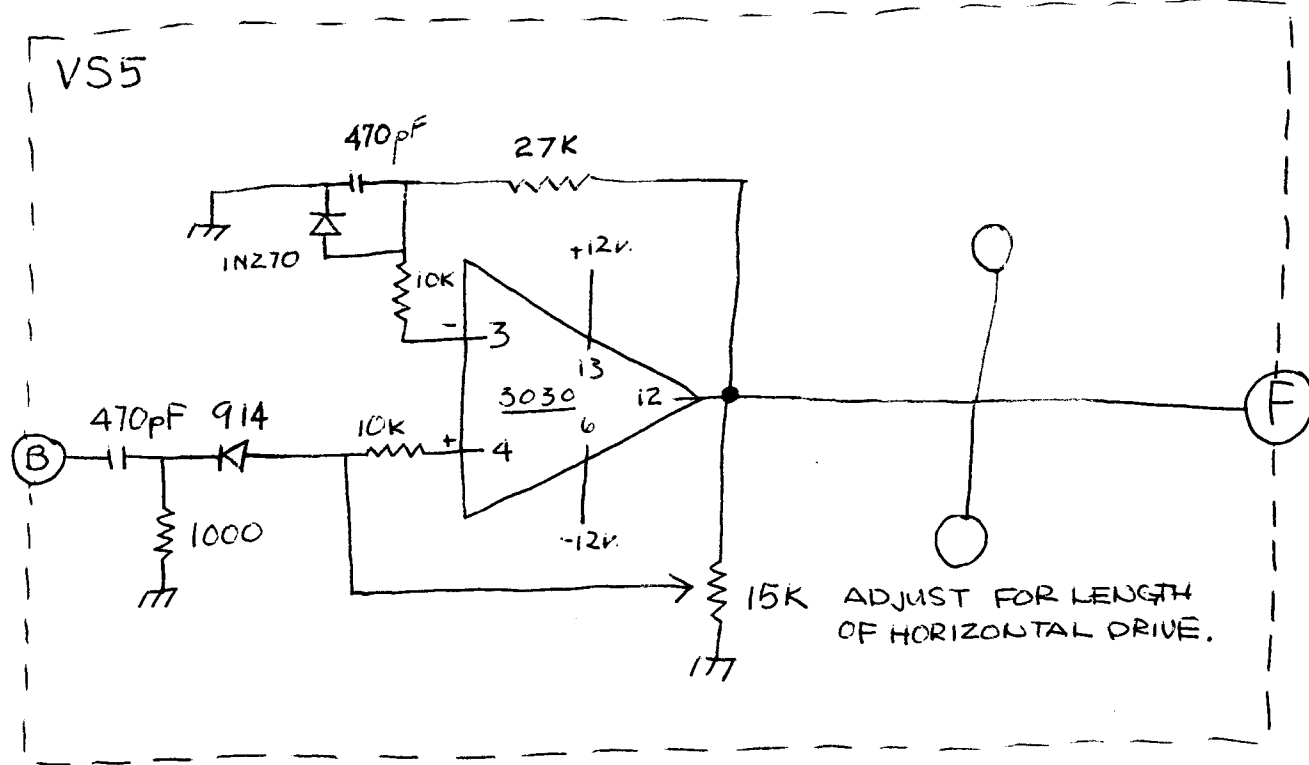
SYNC STRIPPER & CAMERA INPUT



SYNC SUPPRESSOR AND SCALING AMP

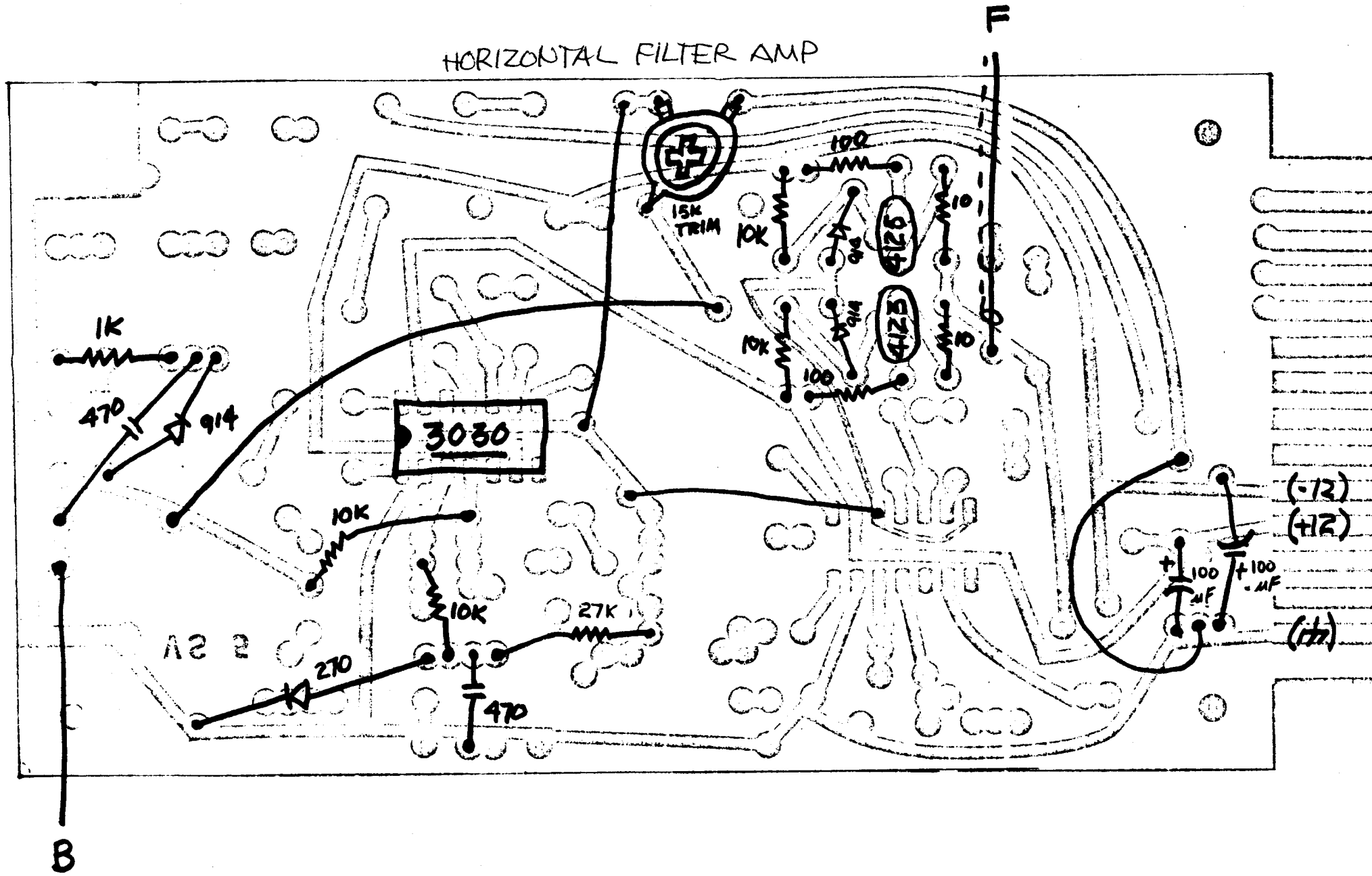
SYNC STRIPPER & CAMERA INPUT

HORIZONTAL FILTER AMP



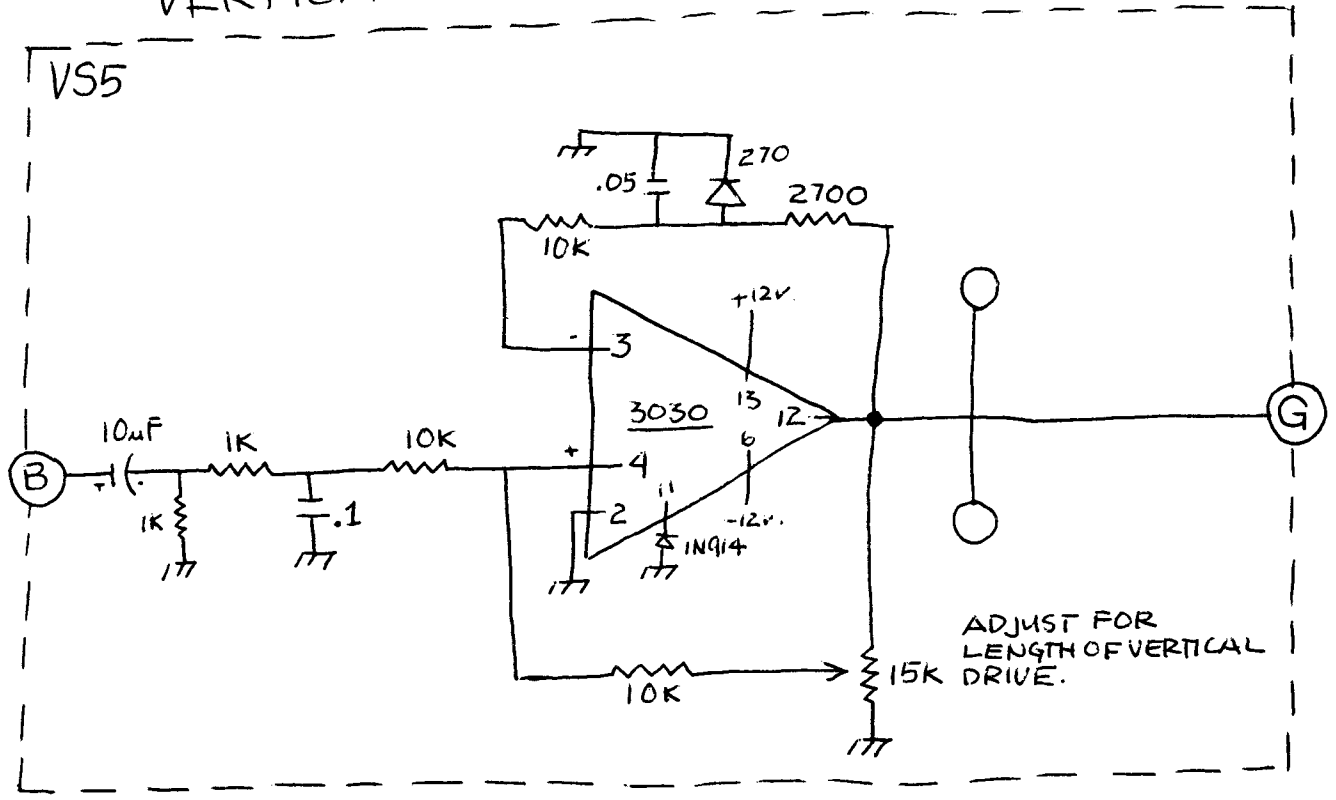
SYNC STRIPPER & CAMERA INPUT

HORIZONTAL FILTER AMP



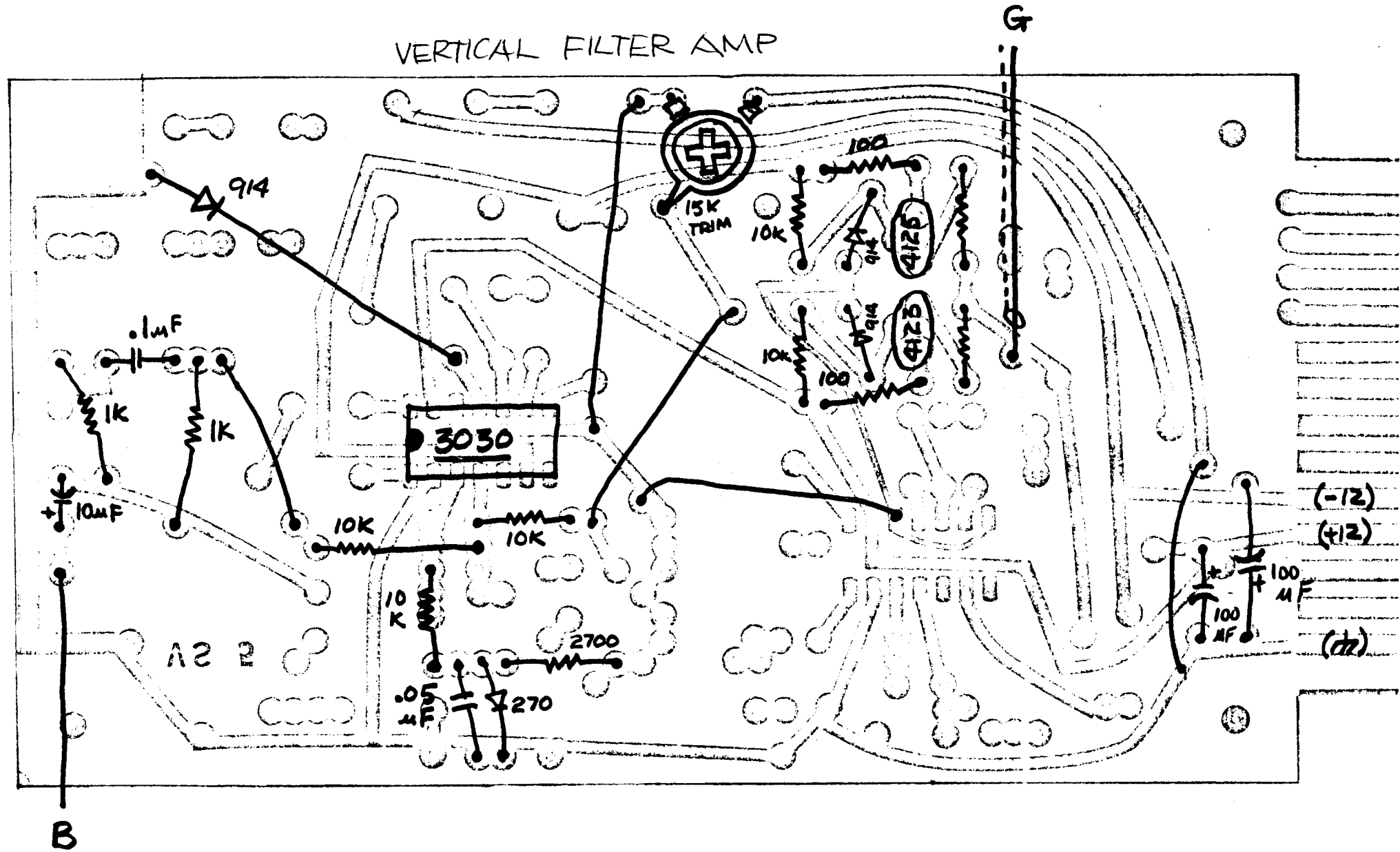
SYNC STRIPPER & CAMERA INPUT

VERTICAL FILTER AMP



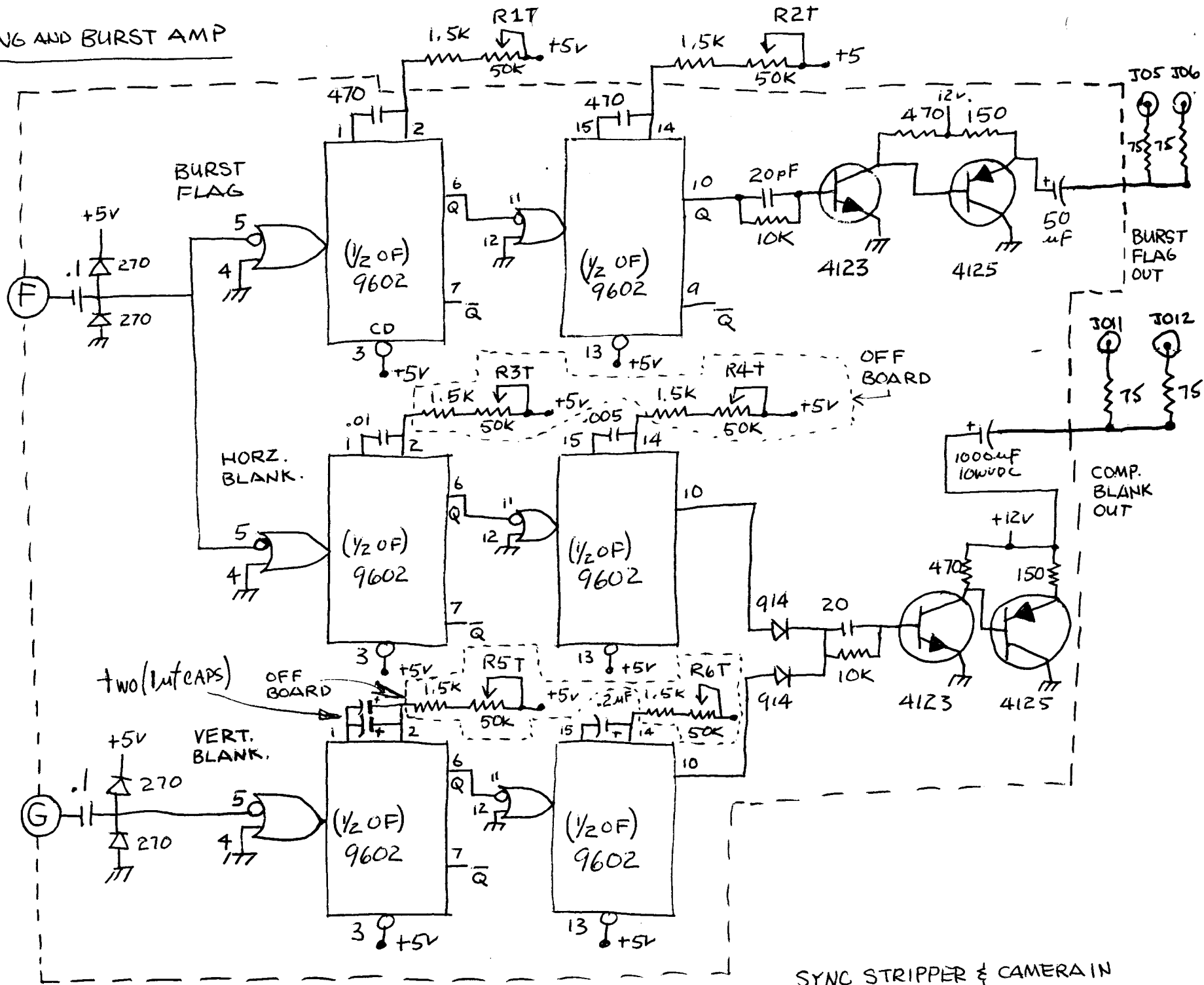
SYNC STRIPPER & CAMERA INPUT

VERTICAL FILTER AMP



SYNC STRIPPER & CAMERA INPUT

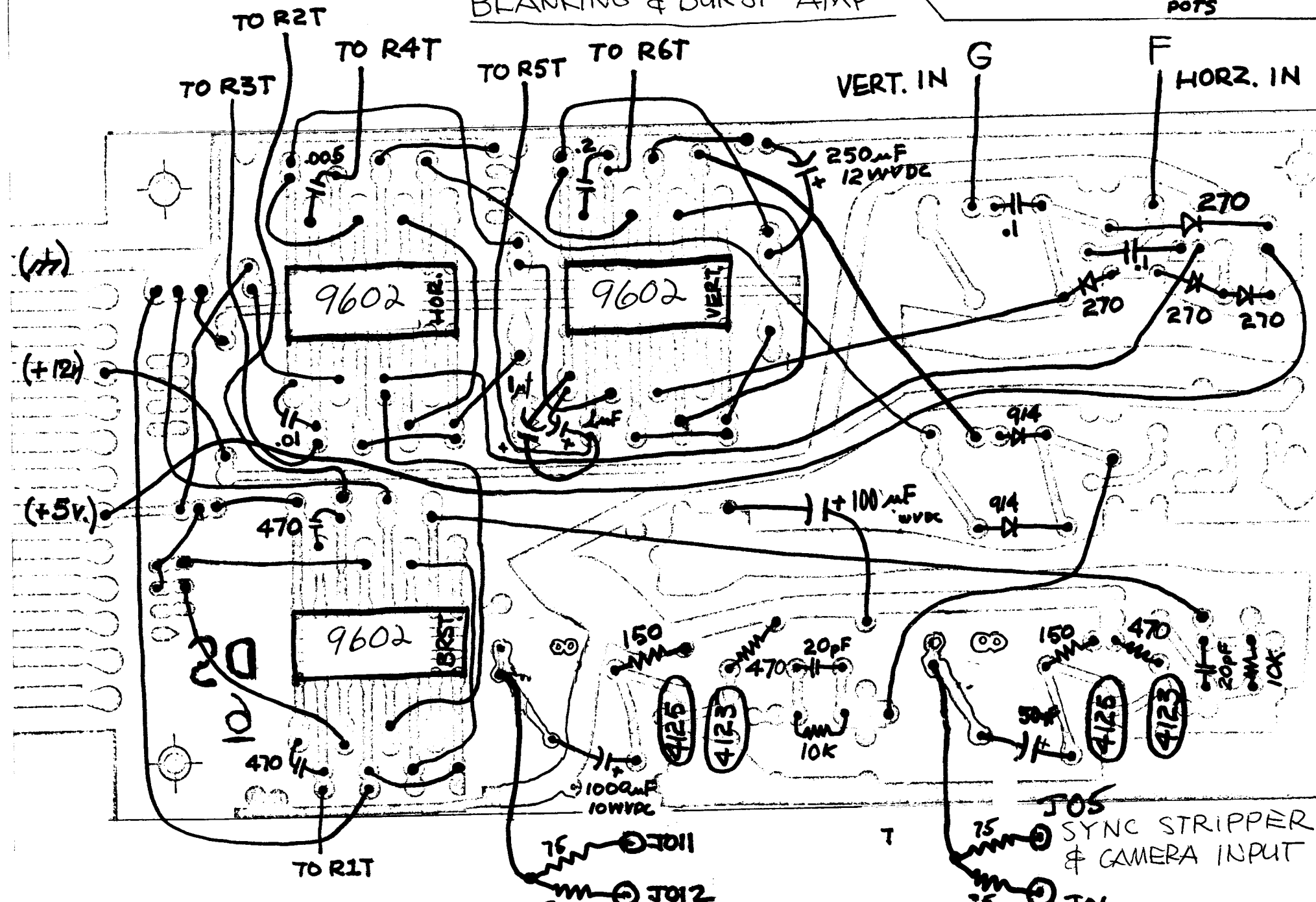
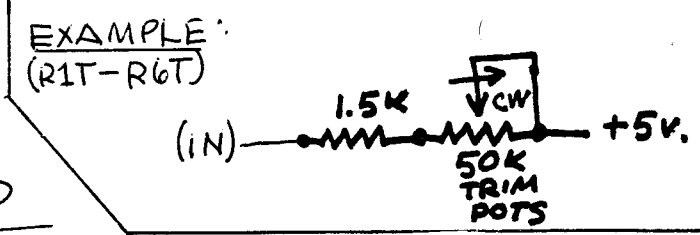
BLANKING AND BURST AMP



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 APPROPRIATELY.

BLANKING & BURST AMP



0		525-1060	10 OHM, 1/4 W RES	.06	A	SS
0		525-1061	15 OHM, 1/4 W RES	.06	A	SS
0		525-1117	27 OHM, 1/4 W RES	.06	A	SS
0		525-1165	75 OHM, 1/4 W RES	.06	A	SS
10		525-1202	100 OHM, 1/4 W RES	.06	A	SS
2		525-1226	150 OHM, 1/4 W RES	.06	A	SS
2		525-1248	220 OHM, 1/4 W RES	.06	A	SS
3		525-1270	300 OHM, 1/4 W RES	.06	A	SS
5		525-1302	470 OHM, 1/4 W RES	.06	A	SS
5		525-1304	1.5KOHM, 1/4 W RES	.06	A	SS
5		525-1421	2.7KOHM, 1/4 W RES	.06	A	SS
1		525-1433	3.3KOHM, 1/4 W RES	.06	A	SS
1		525-1461	4.7KOHM, 1/4 W RES	.06	A	SS
1		525-1603	27K OHM, 1/4 W RES	.06	A	SS
1		525-1654	47K OHM, 1/4 W RES	.06	A	SS
4		525-1356	1K0 OHM, 1/4 W RES	.06	A	SS
7		525-1467	5.1KOHM, 1/4 W RES	.06	A	SS
15		525-1522	10K OHM, 1/4 W RES	.06	A	SS
2		525-1525	11K OHM, 1/4 W RES	.06	A	SS
1		525-1717	100KOHM, 1/4 W RES	.06	A	SS
2	10F057	502UC	50K TRIM, LOK, PNL-MT	3.00	N	SS
2	12F1600	3309P	20K TRIM 50-MT	.65	N	SS
1	3F073	01	100 OHM POT 1/4SFT	1.45	N	SS
1	14F055	0M15-1500	15 PF, 01P-MICA CAP.	.20	N	SS
2	14F057	0M15-2000	20 PF, 01P-MICA CAP.	.18	N	SS
3	14F092	0M15-4170	470 PF, 01P-MICA CAP.	.32	N	SS
1	19F1700	030-000	.005 MF, DSC-CER CAP.	.12	N	SS
3	07F307	TUC-1032	.01 MF, DSC-CER CAP.	.05	N	SS
1	07F305	TUC-0230	.05 MF, DSC-CER CAP.	.37	N	SS
3	07F313	TUC-1242	.1 MF, DSC-CER CAP.	.16	N	SS
3	710-1251	2-G-101	10 MF, 25VDC, ELEC.	.44	A	SS
1	710-1253	3-G-020	20 MF, 10VDC, ELEC.	.20	A	SS
1	710-1254	3-G-025	25 MF, 25VDC, ELEC.	.46	A	SS
1	710-1258	4-G-050	50 MF, 25VDC, ELEC.	.46	A	SS
9	710-1260	7-G-1000	100 MF, 25VDC, ELEC.	.24	A	SS
1	710-1210	0-G-0500	050 MF, 212DC, ELEC.	.58	A	SS
1	710-1340	N-E-1000	1000MF, 10VDC, ELEC.	.77	A	SS
13	555-2914	149140	SIL-DIODE	.19	A	SS
0		14270	GERM-DIODE	.22	S	SS
0		204123	NEO TRANS	.22	S	SS
0		204125	POP TRANS	.27	S	SS
3		1203300	5.1V ZENER 5W	2.43	N	SS
3		043030	DIP OP-AMP, RCA	1.32	S	SS
3		0E9002P	DIP MONOSTBL.VIB.	8.10	S	SS
1	25F1950	500 39	39 MICROHENRY CHUKE	2.91	N	SS
1	25F1969	500 470	470 MICROHENRY CHGR	2.91	N	SS
4	1-526-063-11		6-PIN FEMALE CHS MT	.90	AP	SS
17	39F1337	13-230	0NC, FM-CHS.MT.	.72	N	SS
1			VS S P-C BOARD			SS
1			DS4 K-L BOARD			SS
1			CHASSIS, S.STRIP-FA0	6.25	UG	SS
1	01-07-1-00-0-1-9		K000, BLAD#71NLAY299	1.00	R	SS

INPUT

The input module suppresses the sync and clamps the signal coming from the camera, thus preparing any standard video input for the IP.

The video signal is inputted at J11 and composite sync (-4v.) is inputted at J12.

There are three electrical modules in the chassis box, so replicate work three times. There is only one J12 in the chassis box and its terminal should be connected to the same spot on all three cards. Remember to buss (connect) +12 and -12 and ground from center card to top and bottom card. Also buss +12 and -12 to front panel for R1(s) and R2(s); take from center card.

TEST STUFF:

R1 is adjusted until most of the sync is suppressed but blacks are not clipped. (An oscilloscope is necessary.) R2 is adjusted until the video signal is symmetrical, about 0 volts and has a magnitude of approximately 1 volt peak-to-peak into a 75 ohm load.

The output is available at J01, J02, J03 and J04.

NOTE: these adjustments may have to be retuned, off and on, for different video sources.

OK 7-75

R3

R1

J02

J01

J11

R2

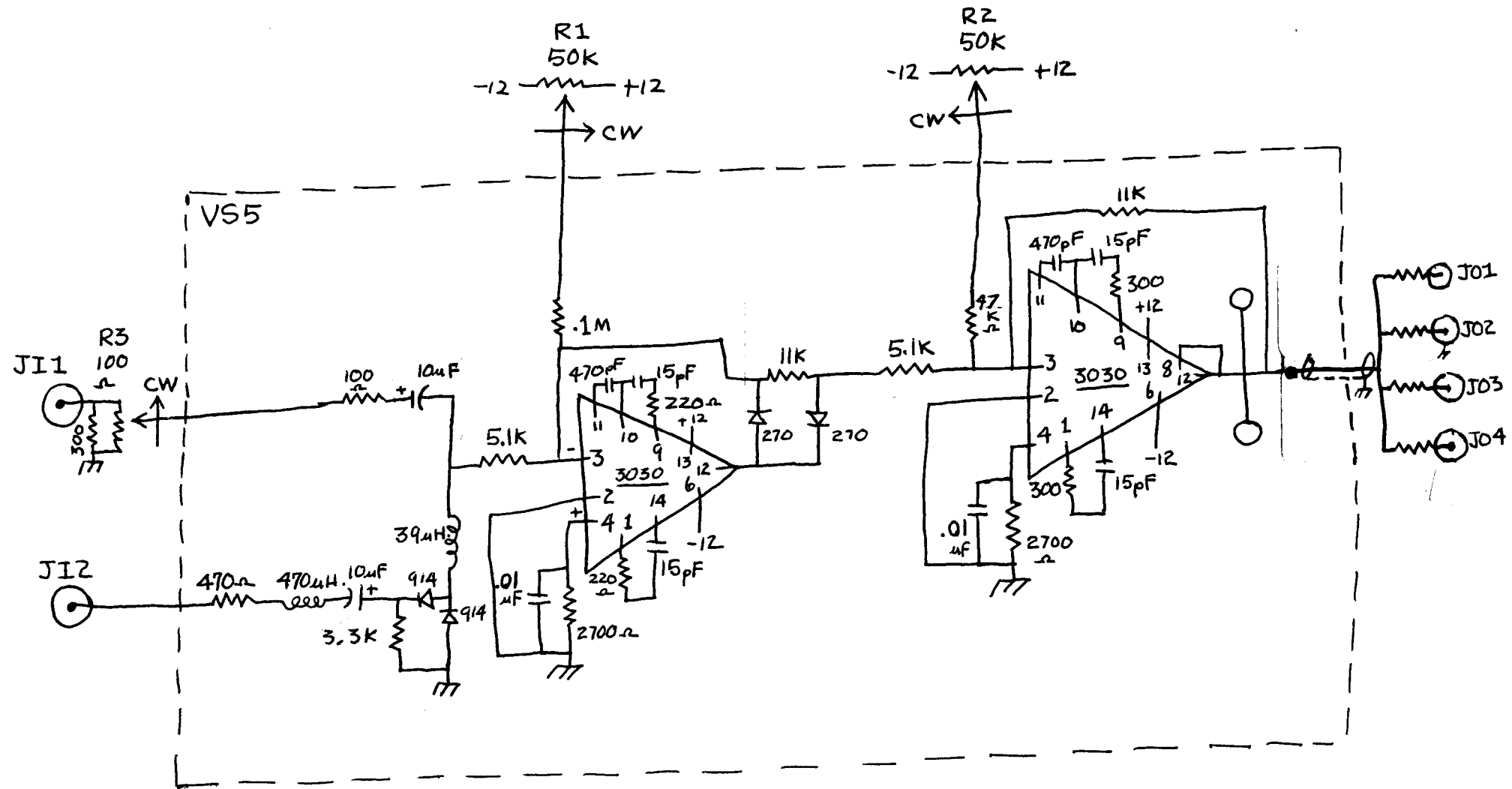
J04

J03

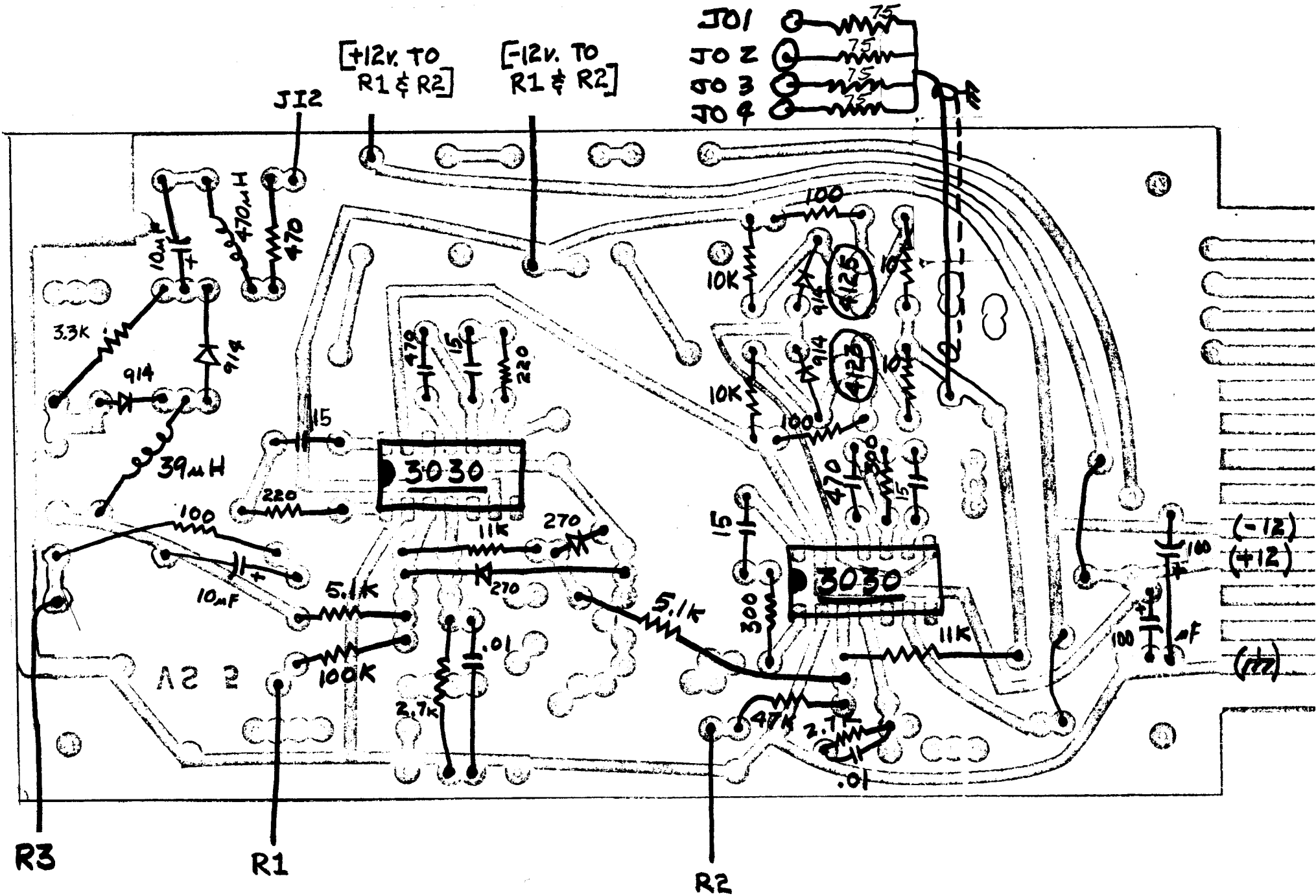
J12

FRONT
FACE

INPUT



INPUT



6		525-1050	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
6		525-1248	220 OHM, 1/4 W RES	.06	A	IP
9		525-1270	500 OHM, 1/4 W RES	.06	A	IP
9		525-1467	5.1KOHM, 1/4 W RES	.06	A	IP
6		525-1522	10KOHM, 1/4 W RES	.06	A	IP
6		525-1526	11KOHM, 1/4 W RES	.06	A	IP
6		525-1717	100KOHM, 1/4 W RES	.06	A	IP
3		525-1382	470 OHM, 1/4 W RES	.06	A	IP
6		525-1421	2.7KOHM, 1/4 W RES	.06	A	IP
3		525-1433	5.3KOHM, 1/4 W RES	.06	A	IP
3		525-1550	47KOHM, 1/4 W RES	.06	A	IP
6	10P655		50K TRIM, LOK, PNL-MT	3.20	N	IP
3	4P673	U1	100 OHM POT 1/4SFT	1.45	N	IP
12	14P555	DM15-150J	15 PF, DIP-MICA CAP	.20	N	IP
6	14P592	DM15-417J	470 PF, DIP-MICA CAP	.32	N	IP
6	67P307	100-103Z	.01 MF, USC-CER CAP.	.05	N	IP
6	71P-1251	2-G-101	10 MF, 25VDC, ELEC.	.44	A	IP
6	71P-1260	7-G-1000	100 MF, 25VDC, ELEC.	.24	A	IP
6	555-0914	1N914B	SIL-DIODE	.19	A	IP
6		1N270	GERM-DIODE	.22	S	IP
3		2N4123	PNP TRANS	.22	S	IP
3		2N4125	PNP TRANS	.27	S	IP
6		CA3030	DIP OP-AMP, RCA	1.32	S	IP
3	55P1956	SW039	39 MICROHENRY CHOK	2.91	N	IP
3	55P1959	SW0470	470 MICROHENRY CHOK	2.91	N	IP
3	59P1537	13-236	V35 P-C BOARDS	.72	N	IP
1			GND, PM-CRS, M1.	8.25	DG	IPM
3	K3-57-1-UC-M-L-W		CHASSIS, INPUT-FACE	1.00	R	IP
			KNOB, BLACK/INLAY			

ADDER MULTIPLIER:

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

J11, J12, J13 and the inverted signal of J17 are added together to form input channel A.

J14, J15, J16 and the inverted signal of J18 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, J01 through J04, is dependent on the position of R9 and the voltage inputted to J19.

The effect of the knob position and the voltage are additive; the knob to the left and/or a maximum negative voltage on J19 will cause channel B to be outputted only, similarly, 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 J19 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 J19 channel A and channel B have equal gain.

R1

R2

R3

J11

J12

J13

R4

R5

R6

J14

J15

J16

R7

R8

J17

J18

R9

J02

R10

J01

ADDER
MULTIPLIER

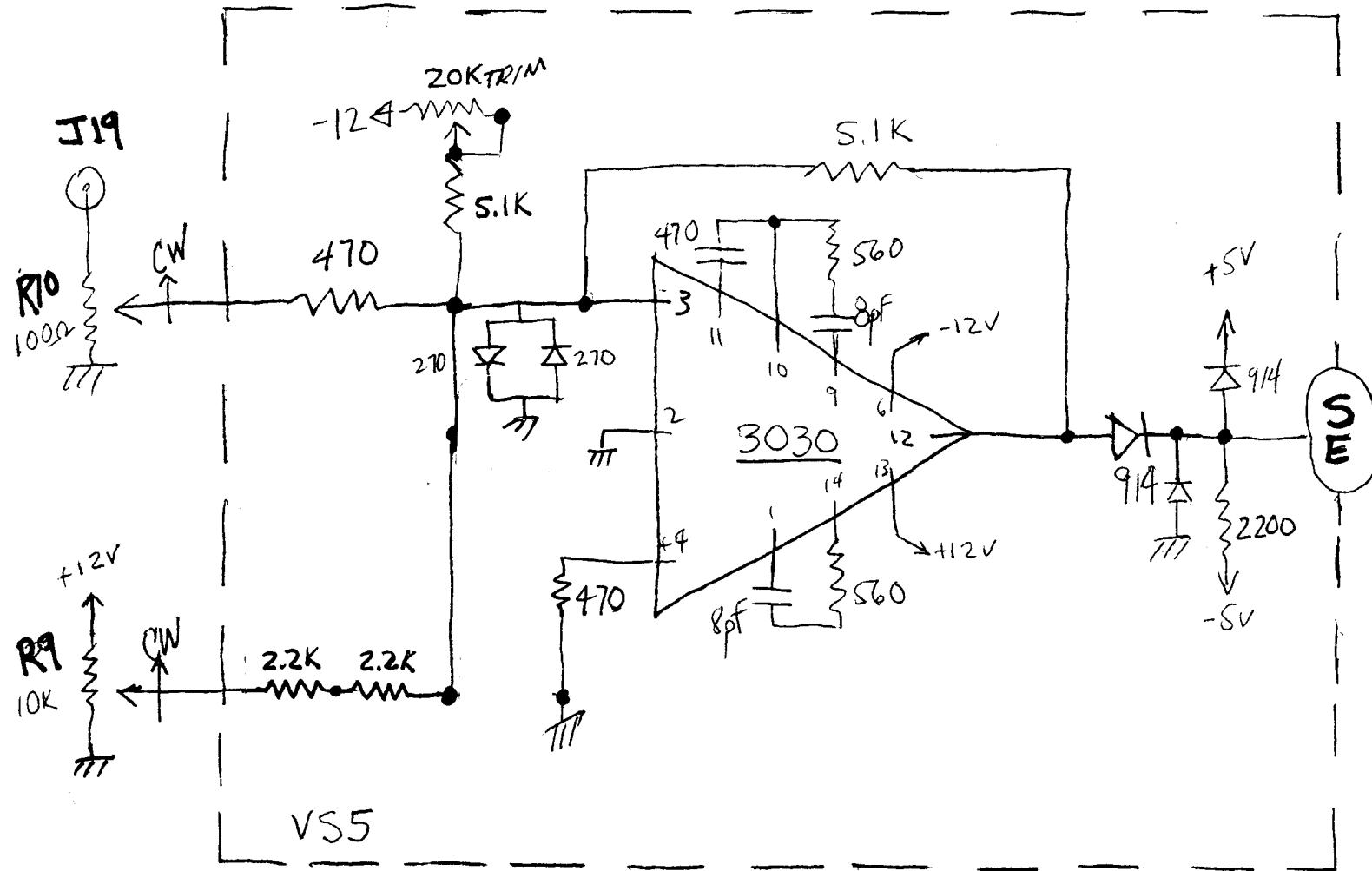
J04

J19

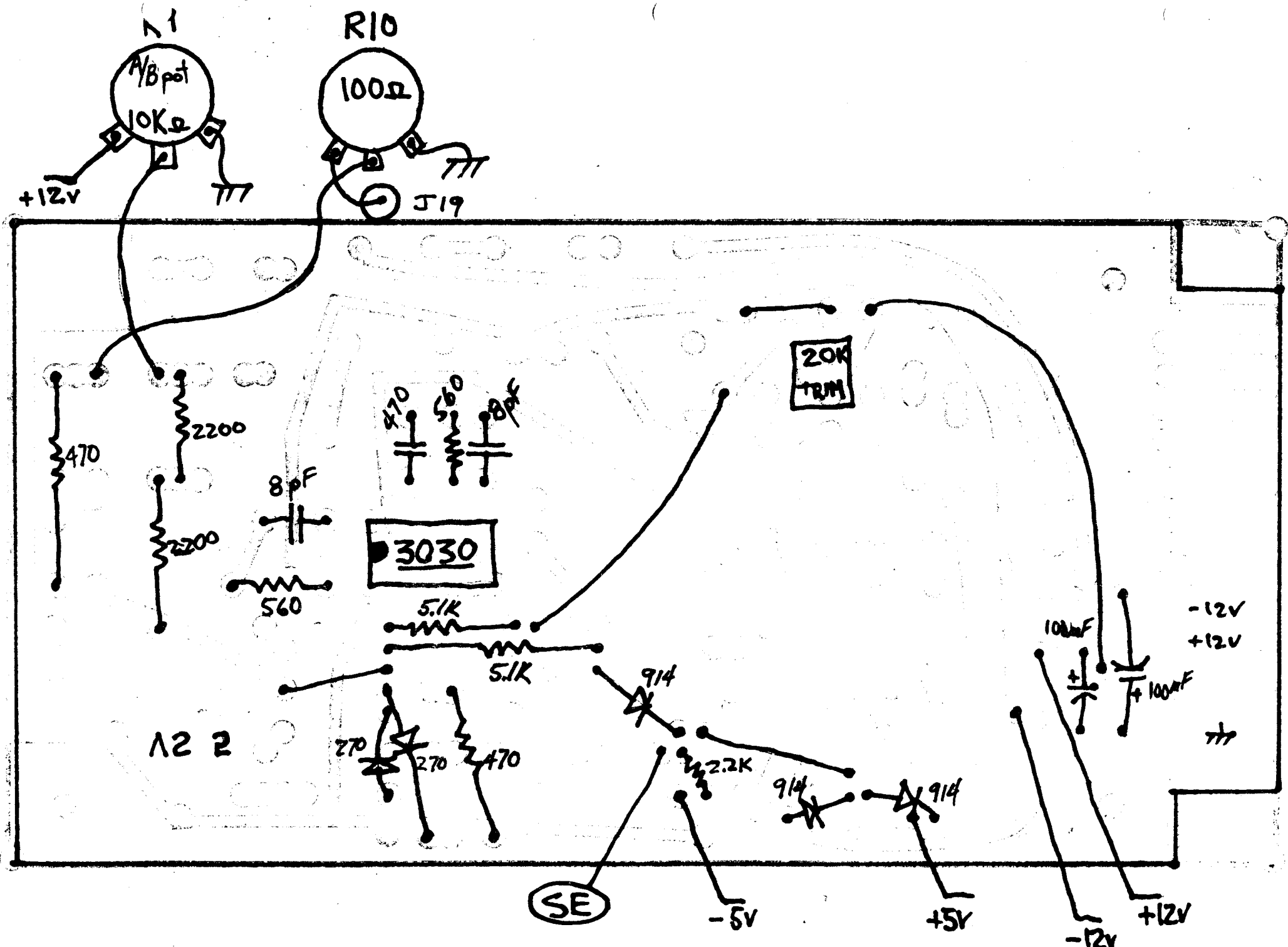
J03

J 55

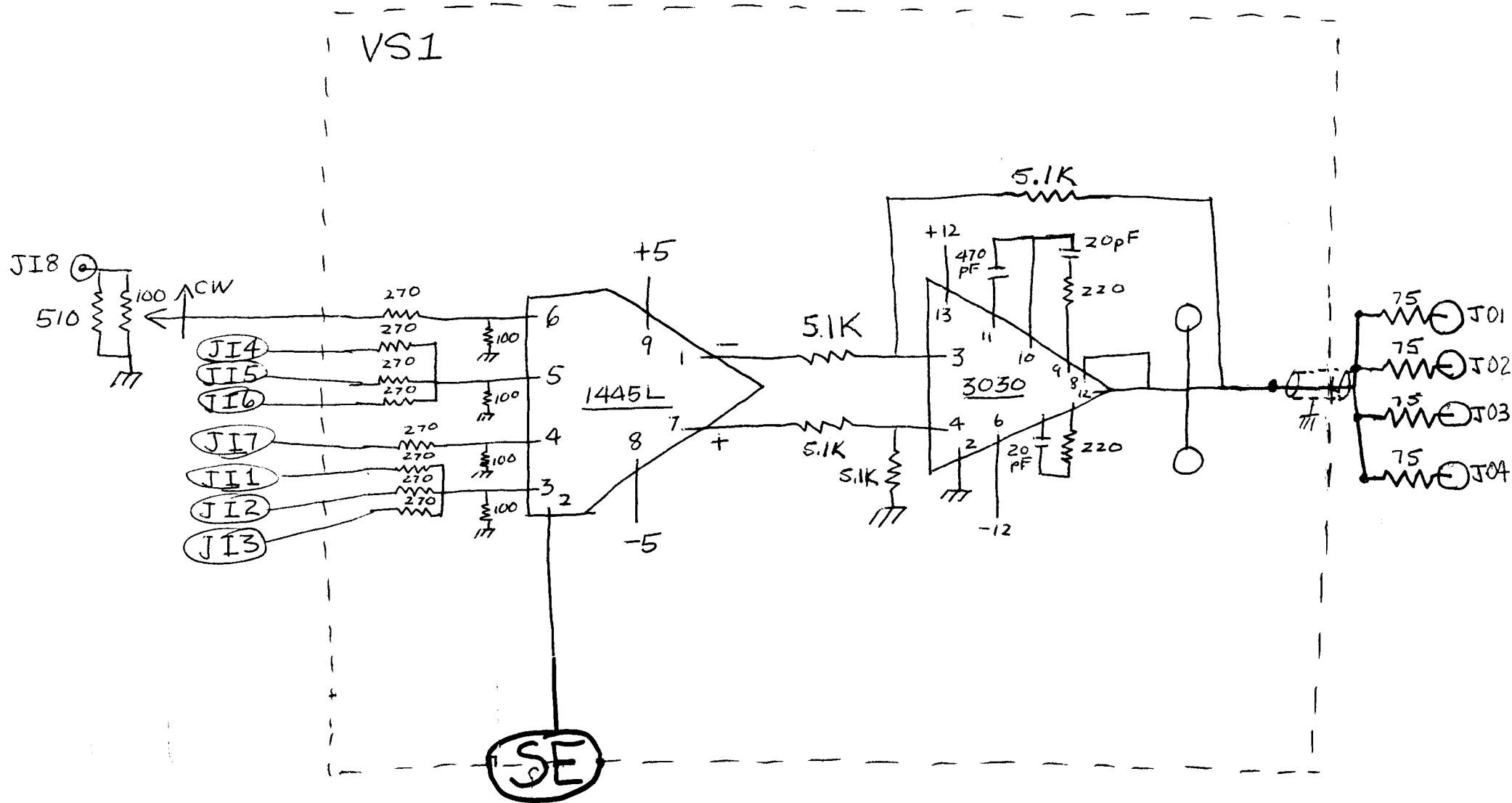
1-76



ADDER-MULTIPLIER UPDATE 9-75

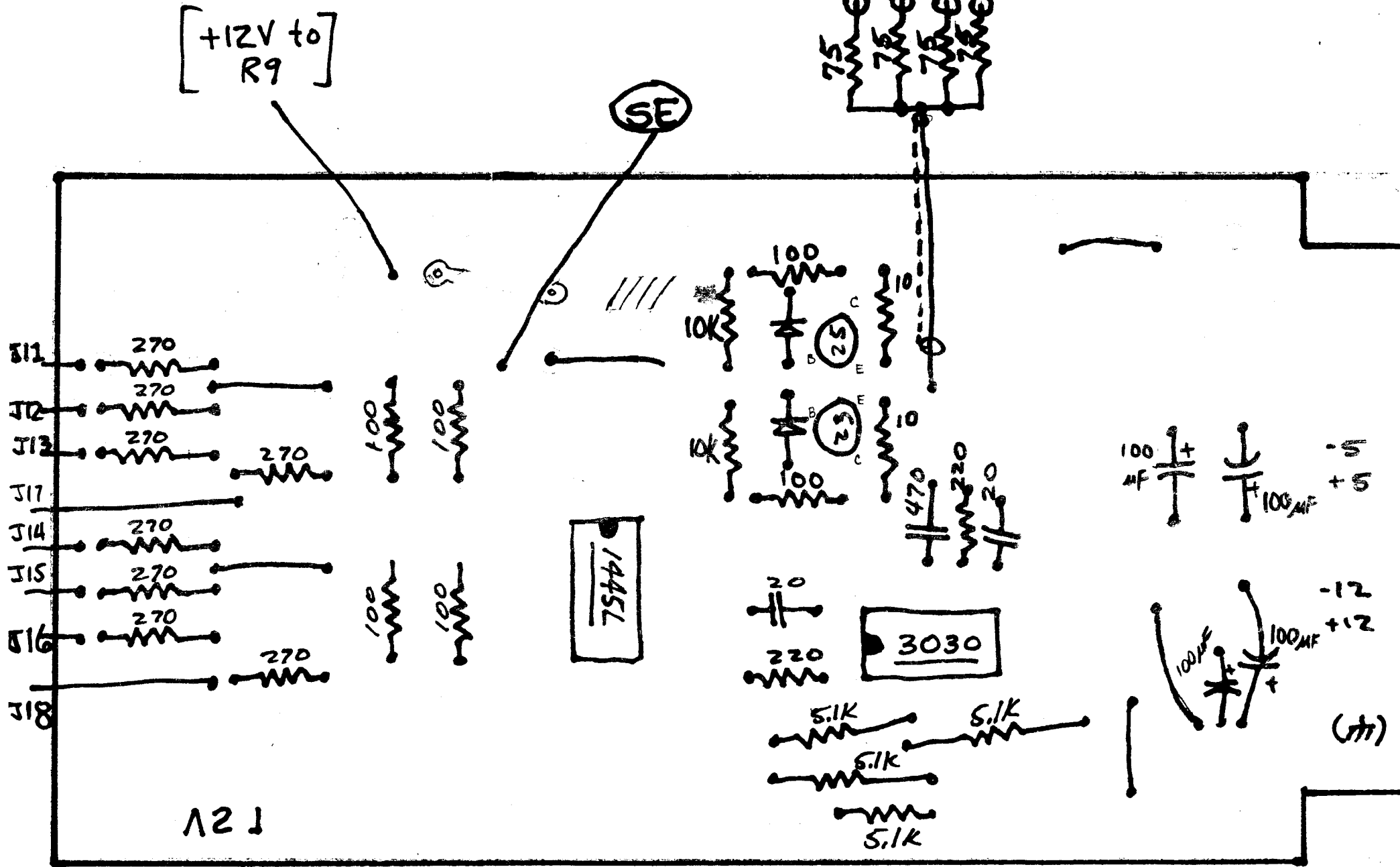


ADDER-MULTIPLIER UPDATE 9-75



NOTE: J11 THRU J17 ARE SAME AS DIAGRAMED AT J18

ADDER-MULTIPLIER



ADDER-MULTIPLIER

UPDATE 9-75

2 4 6 8 0 2 4 6 8 1 3 5 7 9 1 1		525-1060 525-1125 525-1200 525-1245 525-1265 525-1300 525-1350 525-1400 525-1450 525-1500 525-1550 525-1600	1W UHM, 1/4 W RES 75 UHM, 1/4 W RES 100 UHM, 1/4 W RES 220 UHM, 1/4 W RES 270 UHM, 1/4 W RES 510 UHM, 1/4 W RES 1K0 UHM, 1/4 W RES 5.1K0HM, 1/4 W RES 10K UHM, 1/4 W RES 470 UHM, 1/4 W RES 2.2K0HM, 1/4 W RES 15K UHM, 1/4 W RES 27K UHM, 1/4 W RES	.06 .06 .06 .06 .06 .06 .06 .06 .06 .06 .06 .06 .06	A A A A A A A A A A A A A	AM AM AM AM AM AM AM AM AM AM AM AM AM
0 1 1	14F454 9F109 14F4000	1010P 020 5309P	100 UHM POT 1/4SFAB1 10K UHM POT 1/4SFT 20K TRIM 50-MT	1.71 1.45 .65	N N N	AM AM AM
2 2 2 0	14F592 14F557 14F1269 710-1260	0M15-4170 0M15-24K0 0M5-0800 7-0-1000	470 PF, DIF-MICA CAP. 20 PF, DIF-MICA CAP. 0 PF, DIF-MICA CAP. 100 PF, 25VLC, ELEC.	.32 .16 .36 .24	N N N A	AM AM AM AM
5 2 1 1 1 2 1	553-0914	10414E 10270 2N4125 2N4125 CA3050 MC1445L	SIL-DIODE GERM-DIODE PNP TRANS PNP TRANS DIP OP-AMP, RCA DIP GAIN-CONT. AMP	.19 .22 .22 .27 1.32 1.90	A S S S S S	AM AM AM AM AM AM AM
1 1 15 1 4 4 1 1	59F1557 RD-67-1-00-P-L-9 RD-67-1-00-P-L-0 RD-67-1-00-P-L-9 RD-67-2-00-P-L-9	15-236	V51 P-C BOARD V55 P-C BOARD ENC, PM-UHS, MT. CHASSIS, AM-FACE KNUB, BLACK/INLAY299 KNUB, BLACK/INLAYSIL KNUB, BLACK/INLAY120 KNUB, BLK/INLAY 299	.72 8.25 1.00 1.00 1.00 1.00	N DG R R R R	AM AM AM AM AM AM AM AM

COMPARATOR

The comparator produces an output which is +.5 volts (white) if the input voltage at J11 is greater (more positive) than the voltage at J12.

The comparator produces an output which is -.5 volts (black) if the input voltage at J11 is less (more negative) than the voltage at J12.

With 0 volts or no input, the output will be either +.5 or -.5 volts into a 75 ohm load, depending on history.

The variable resistor (pot) R1, determines the positive feedback which controls the tendency of the module to stay in the state it is in. Typically it is turned fully clockwise.

There are three electrical modules in one chassis box, so replicate work three times. Remember to buss (connect) + 12 volts, - 12 volts and ground from the center card to upper and lower cards.

TEST STUFF:

A sine-wave input should produce a clean square-wave output.

The output voltage should be between + or - .5 volts to + or - .75 volts.

J11

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J01

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R1

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OK 9-77

J12

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J02

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FRONT
FACE

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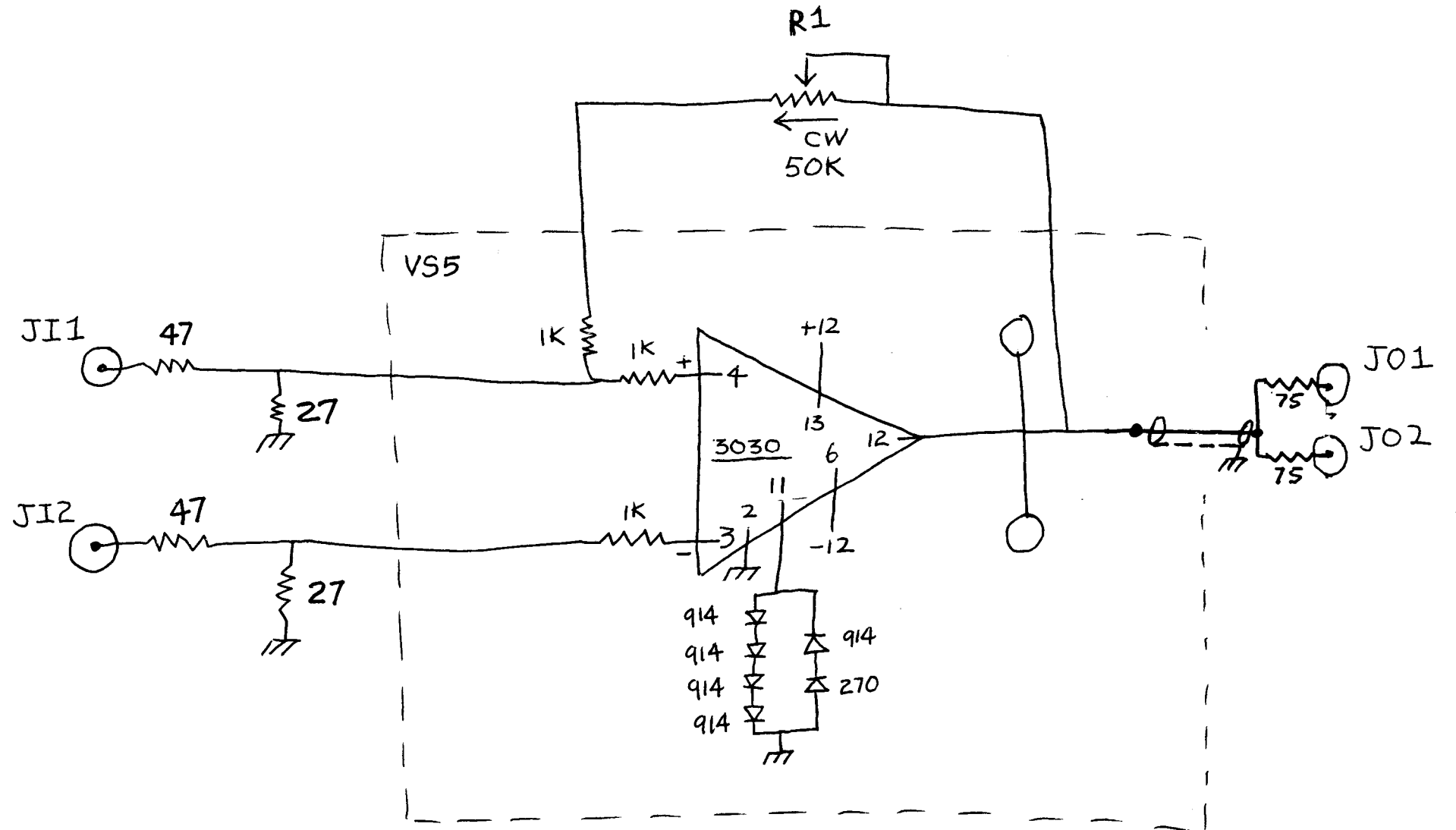
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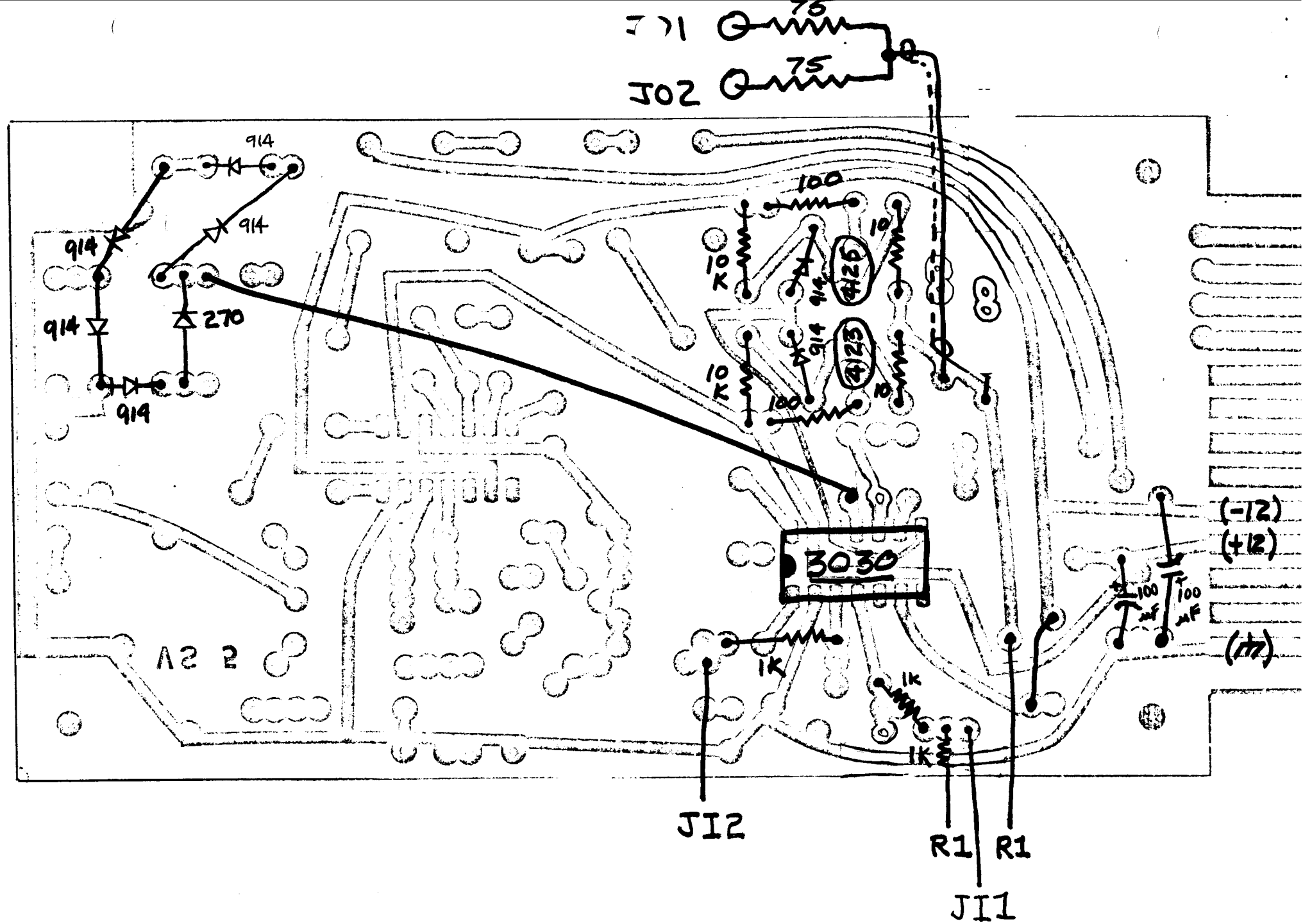
.

COMPARATOR

9/75



COMPARATOR 9-75



COMPARATOR 9-75

6		525-1062	1W	OHM, 1/4 W RES	.06	A	COM
5		525-1117	27	OHM, 1/4 W RES	.06	A	COM
5		525-1153	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
4		525-1356	1K	OHM, 1/4 W RES	.06	A	COM
5		525-1522	10K	OHM, 1/4 W RES	.06	A	COM
5	10F473	50304	50K	OHM POT 1/4SFA	2.21	N	COM
6	714-1200	7-0-1000	100	MF, 25VDC, ELEC.	.24	A	COM
21	555-2914	1N914B	51L	DIODE	.19	A	COM
3		1N270	6ER	DIODE	.22	S	COM
3		2N4123	NPN	TRANS	.22	S	COM
3		2N4125	PNP	TRANS	.27	S	COM
5		CA3030	DIP	OP-AMP, MCA	1.32	S	COM
3			VS	5 P-C BOARD			COM
10	59F1337	15-236	3NC	FM-CHS.MT.	.72	N	COM
1			CHASSIS	COMP-FACE	8.25	DG	COM
3	80-67-1-DC-M-L-4		ANUS	GRAY/LINE, 9-8L	1.00	R	COM

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.

J16 amplifies only the sharpest edges...

J15 amplifies the sharpest edges and slightly softer edges...

J14, J13 and J12 amplify progressively softer and softer edges until by J11 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 + or - .05 volts.

J11

J12

J13

J01

J14

J15

J16

J02

OK 9.75

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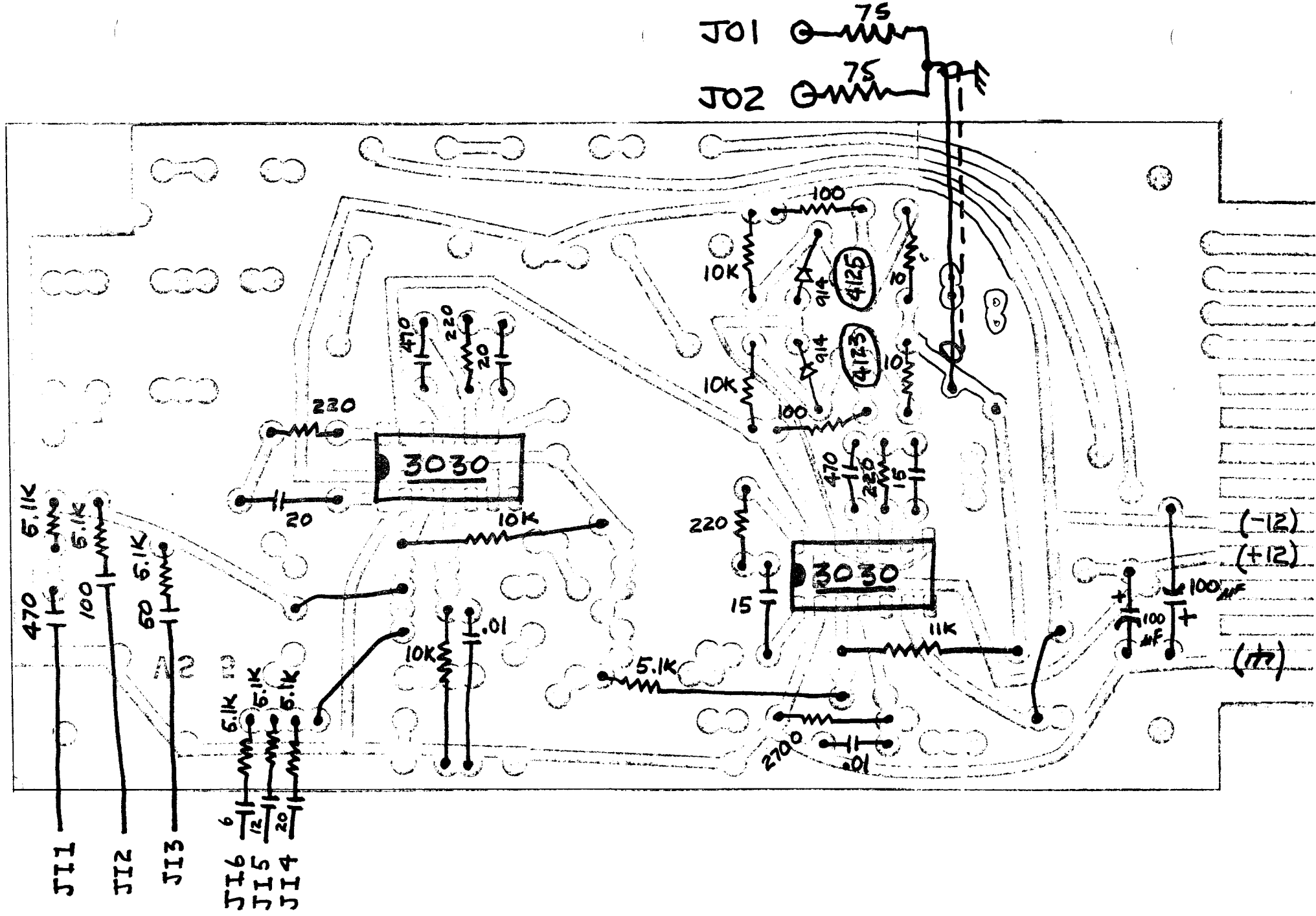
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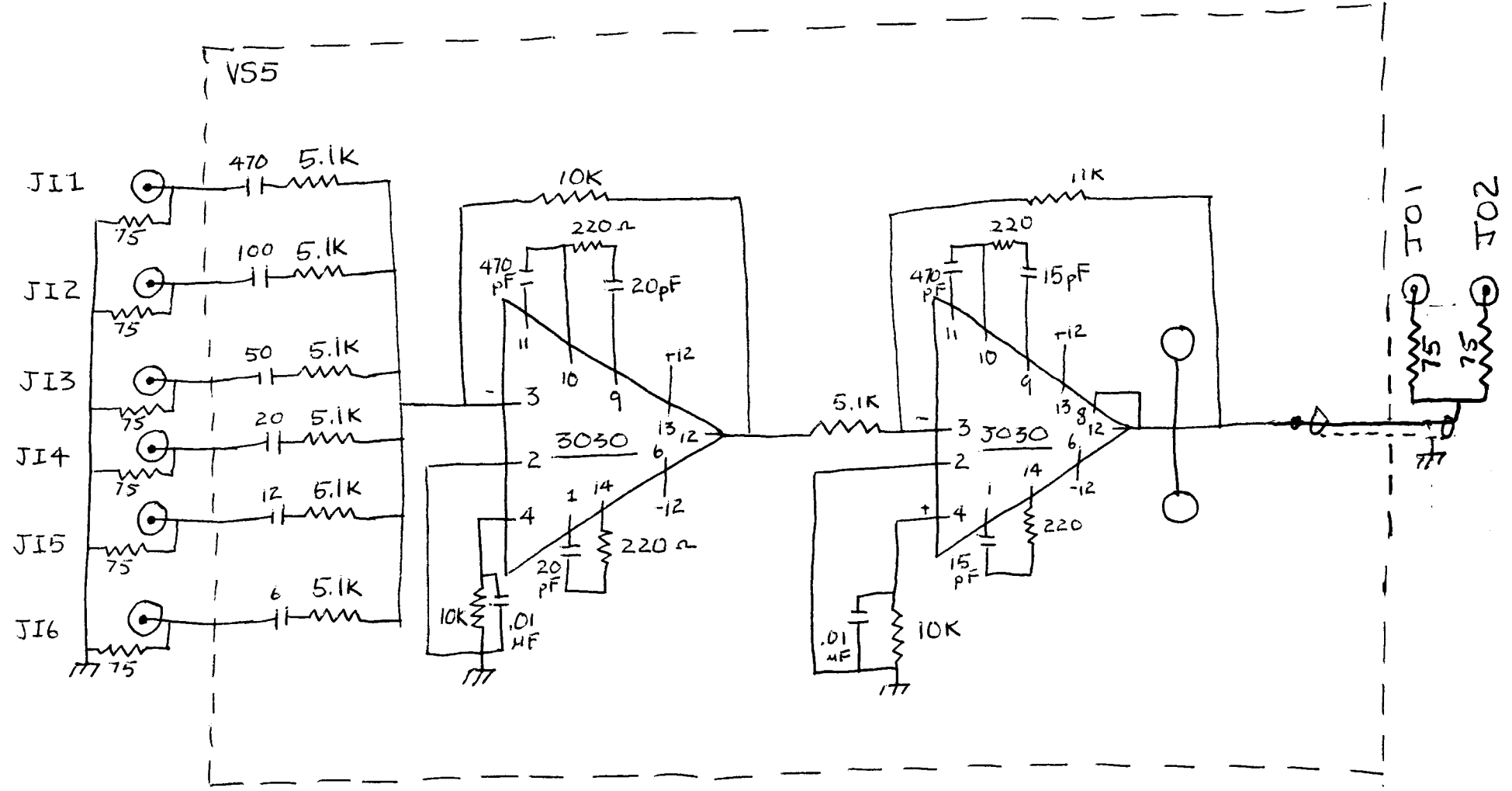
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FRONT
FACE

DIFFERENTIATOR



DIFFERENTIATOR 9-15



DIFFERENTIATOR 9-15

0		525-1100	10	OHM, 1/4 W RES	.06	A	DIF
24		525-1105	75	OHM, 1/4 W RES	.06	A	DIF
0		525-1202	100	OHM, 1/4 W RES	.06	A	DIF
10		525-1240	220	OHM, 1/4 W RES	.06	A	DIF
21		525-1407	5.1KOHM,	1/4 W RES	.06	A	DIF
13		525-1522	10KOHM,	1/4 W RES	.06	A	DIF
3		525-1526	11KOHM,	1/4 W RES	.06	A	DIF
3	14F1257	0F5-0600	6	PF, DIF-MICA CAP	.36	N	DIF
3	14F334	0F15-1200	12	PF, DIF-MICA CAP	.20	N	DIF
0	14F335	0F15-1500	15	PF, DIF-MICA CAP	.20	N	DIF
9	14F337	0F15-2000	20	PF, DIF-MICA CAP	.16	N	DIF
3	14F337	0F15-5000	50	PF, DIF-MICA CAP	.19	N	DIF
3	14F337	0F15-1010	100	PF, DIF-MICA CAP	.18	N	DIF
9	14F372	0F15-4170	470	PF, DIF-MICA CAP	.32	N	DIF
6	57F337	100-145Z	.01	MF, DSC-CER CAP	.05	N	DIF
3	710-1200	7-0-1000	100	MF, 25VDC, FLEC.	.24	A	DIF
0	350-0910	109145	310	DIODE	.19	A	DIF
3		2N4123		PNP TRANS	.22	S	DIF
3		2N4125		PNP TRANS	.27	S	DIF
5		0A5M50		DIF OP-AMP, RCA	1.32	S	DIF
24	59F1537	13-230		ENC, FR-CNS. MT.	.72	N	DIF
3				VS 5 P-C BOARD			DIF
1				CHASSIS, DIF-FACE	8.25	DG	DIF

AMPLITUDE CLASSIFIER

The amplitude classifier takes an input signal at JI 11 and separates it into 8 contiguous regions varying from black to white. The value put out by each region is controlled by R 1 through R 8 and by signals inputted to JI 1 through JI 8. The output signals are available for each region separately, JO 1 through JO 8. The sum of these signals is available at JO 21 through JO 24. The effect of JI 1, JI 2, R 2, etc., is additive in each region. R 11 controls the gain of the signal inputted 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 inputted 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). R 11 should be full clockwise and R 14 should be in the exact center of rotation. R 12 and R 13 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 JI 11 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 outputted. 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.

R11

R12

R14

J11

J12

J13

J14

J15

J16

J17

J18

R1

R2

R3

R4

R5

R6

R7

R8

J021

J023

J01

J02

J03

J04

J05

J06

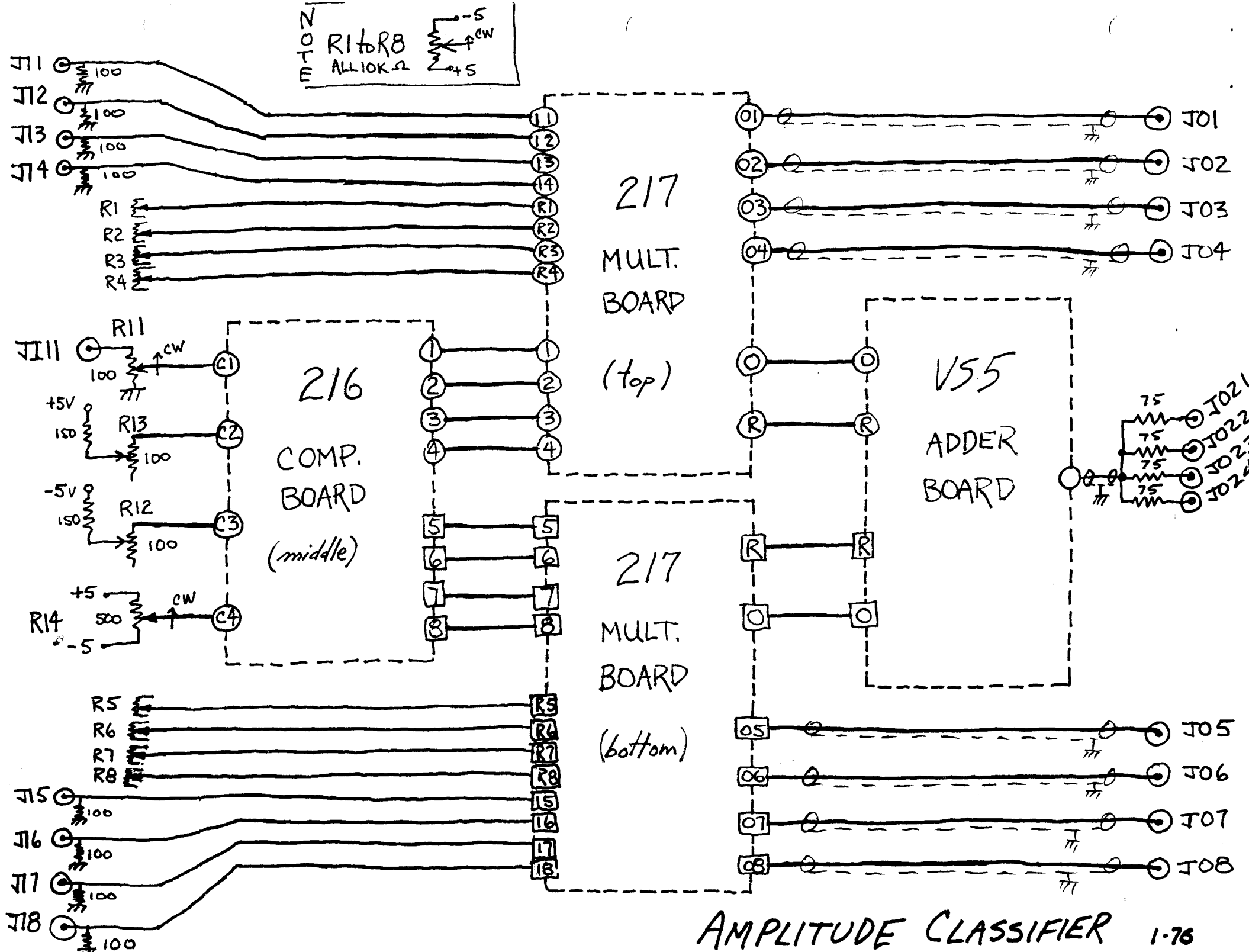
J07

J08

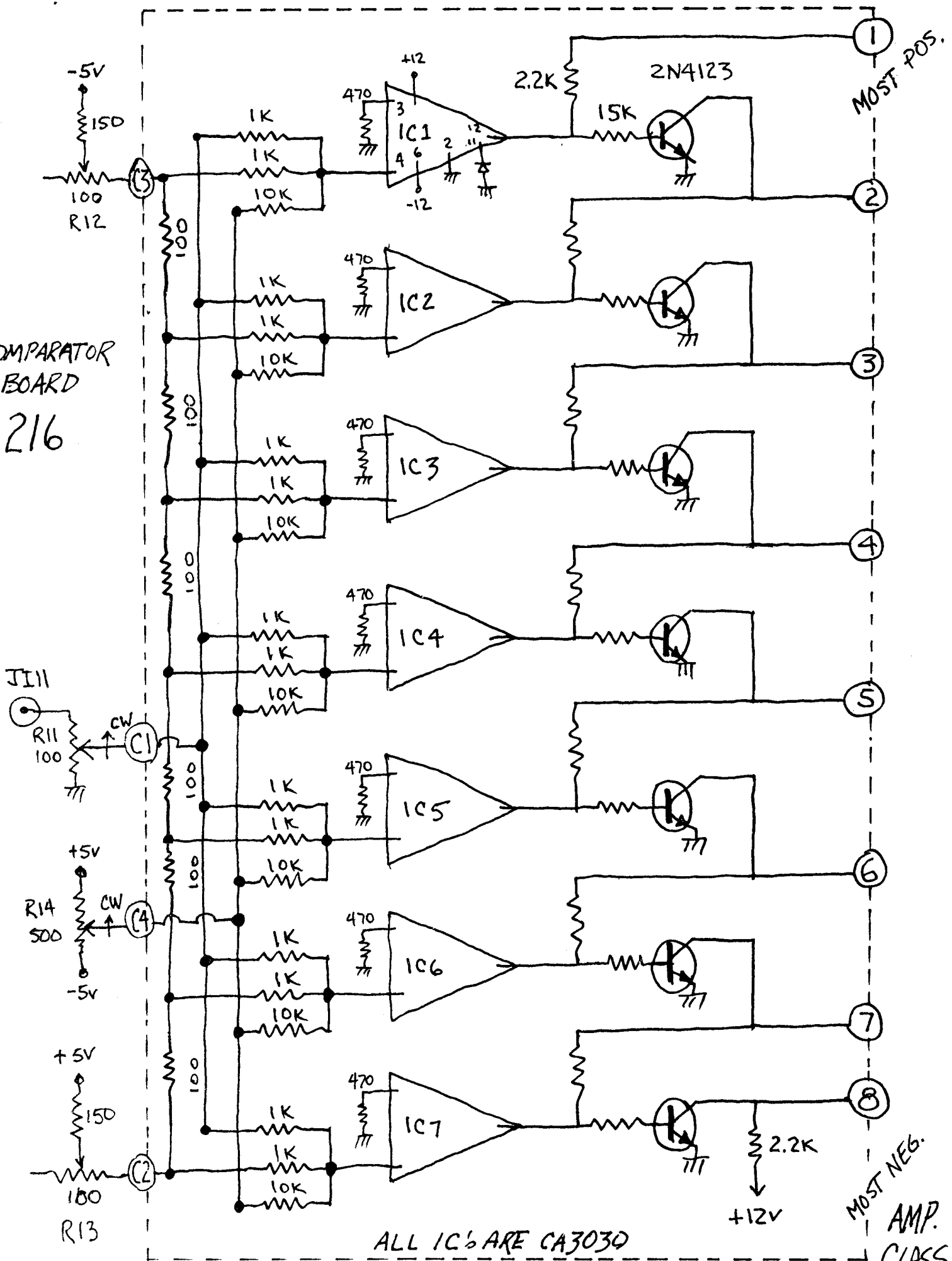
J022

J024

AMPLITUDE
CLASSIFIER
PAGE
1-75



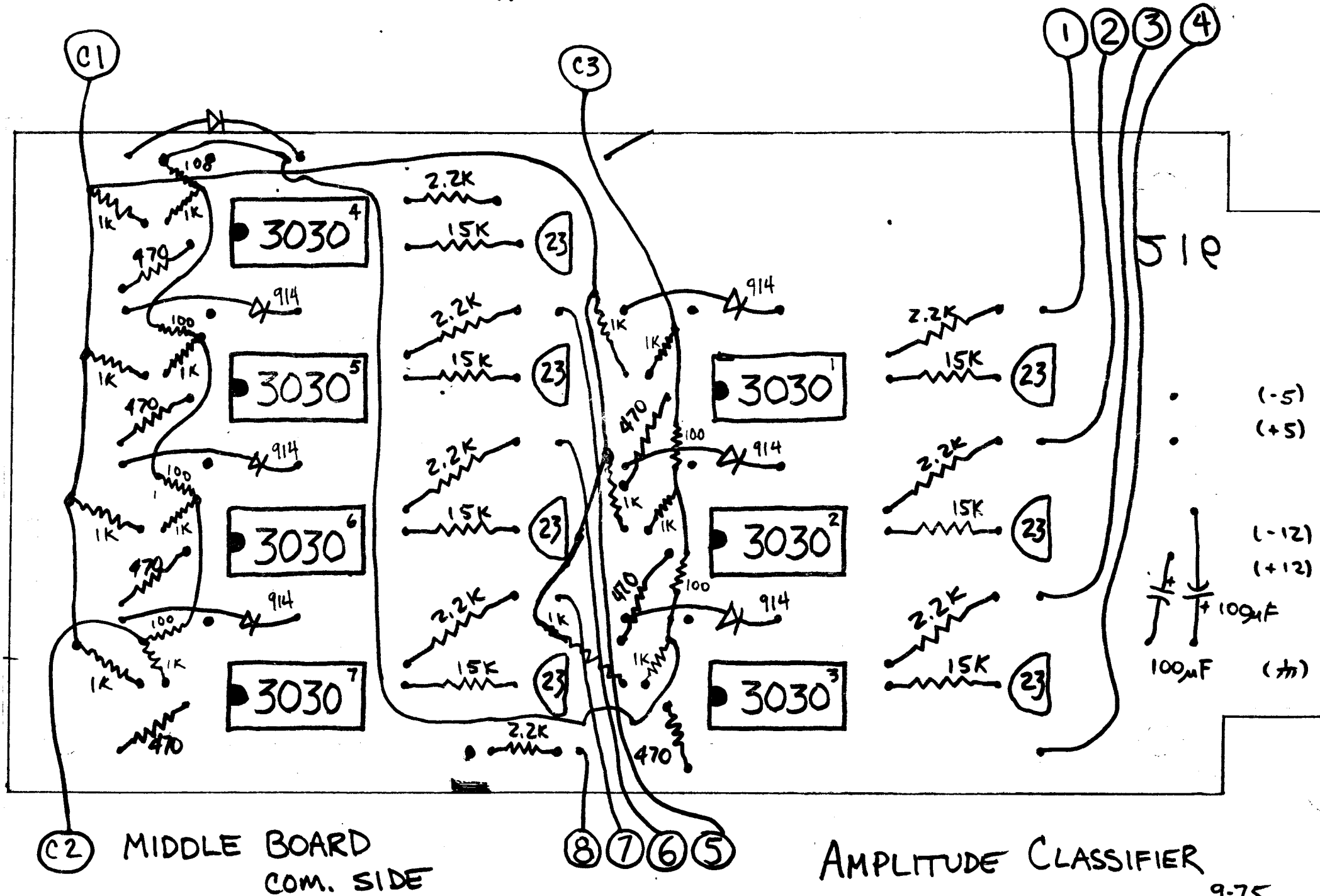
COMPARATOR BOARD
216



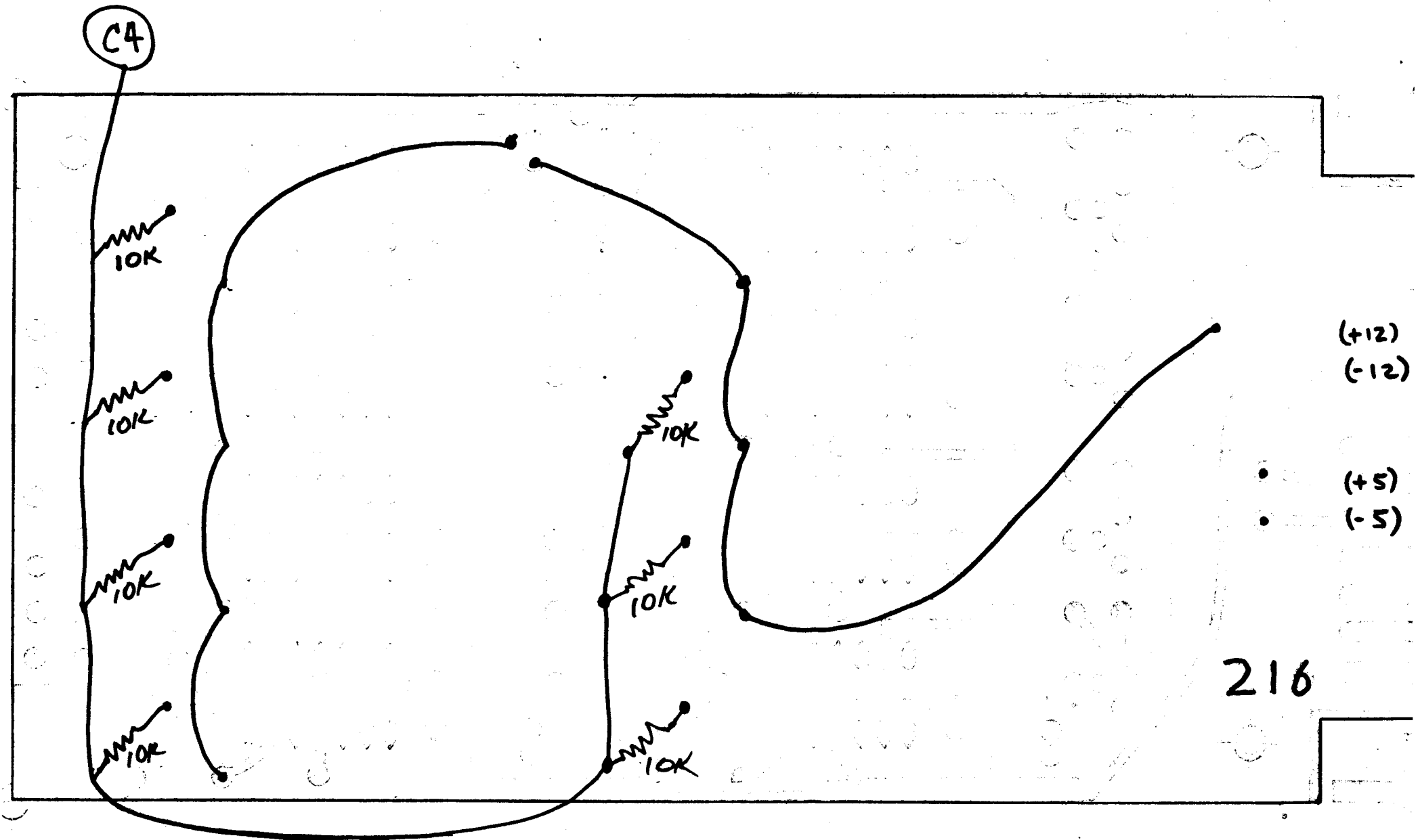
ALL IC'S ARE CA3030

AMP.
CLASS.
1-75

NOTE. BUS POWER TO ALL
OTHER BOARDS !!



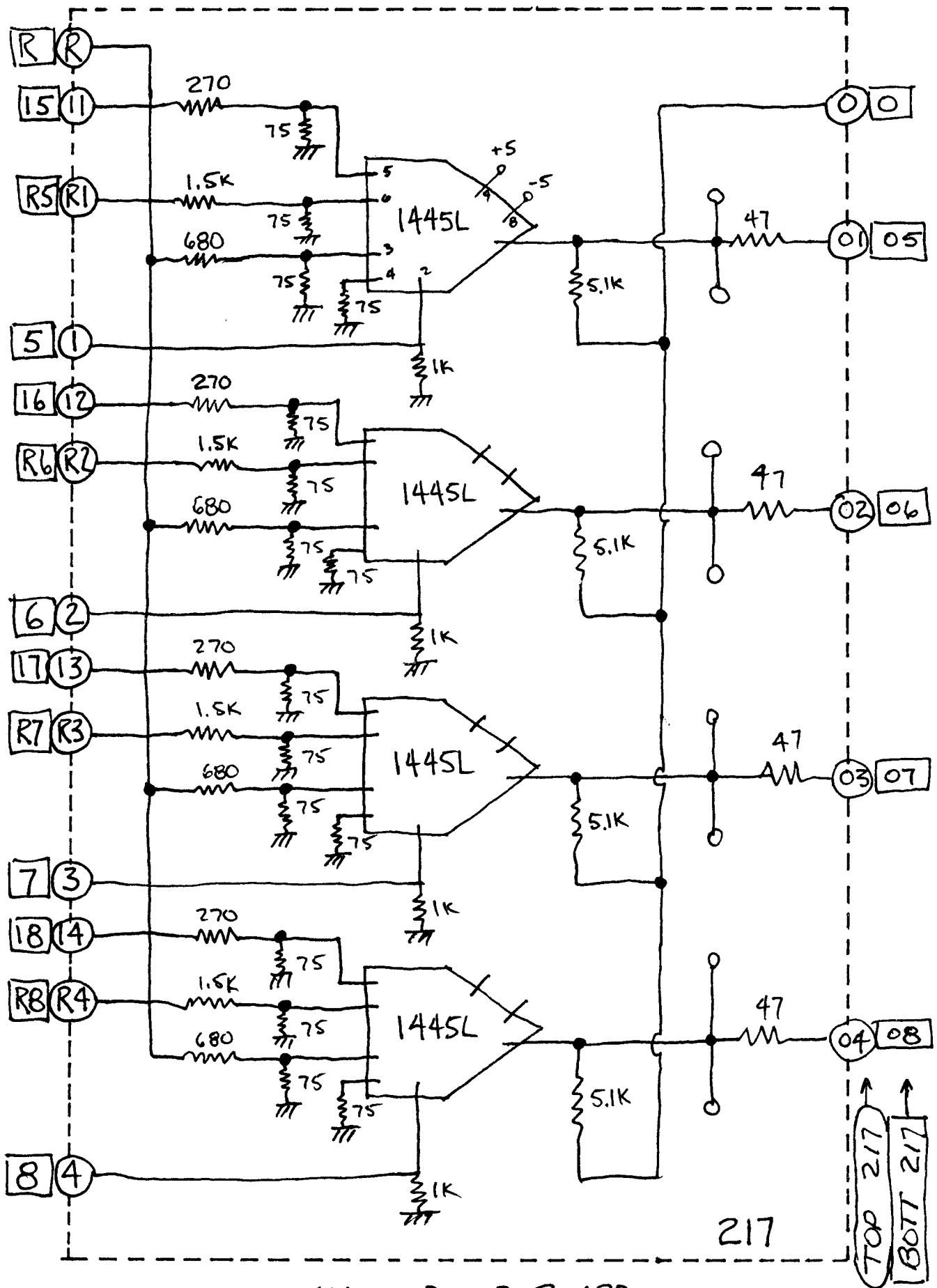
AMPLITUDE CLASSIFIER



MIDDLE BOARD
FOIL SIDE

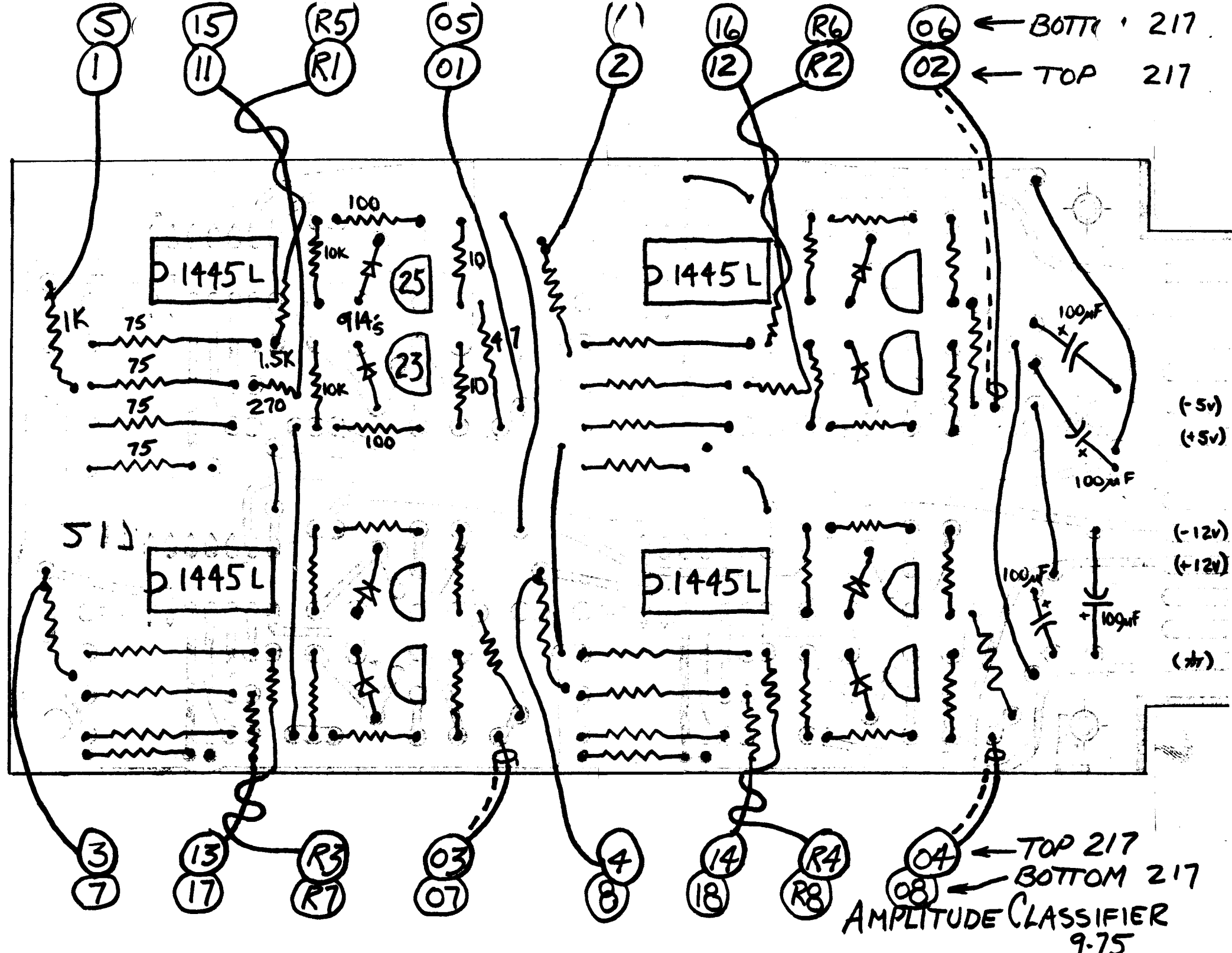
AMPLITUDE CLASSIFIER

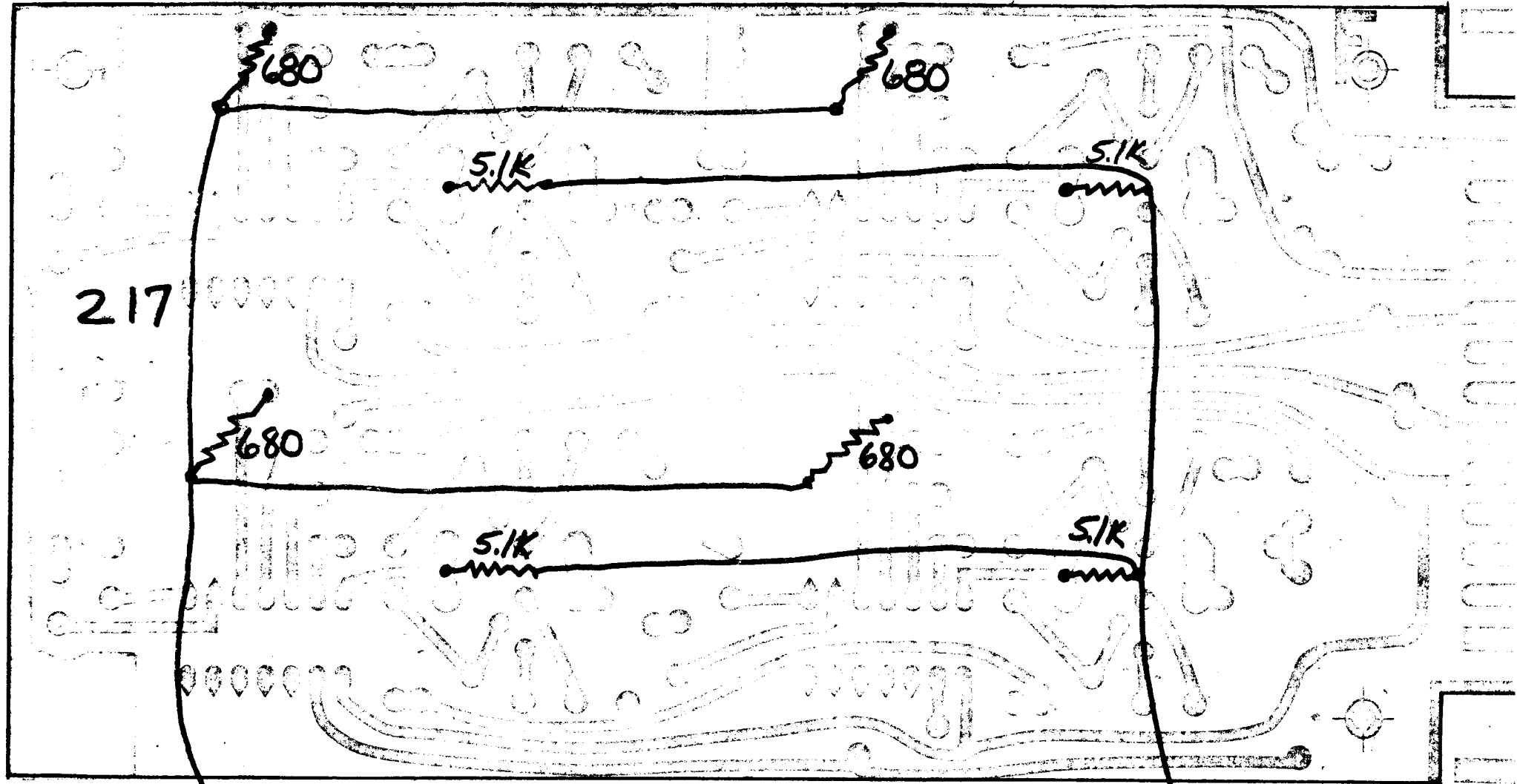
9-75



MULTIPLIER BOARD
TOP OR BOTT.

AMP. CLASS.
1-76





(R)

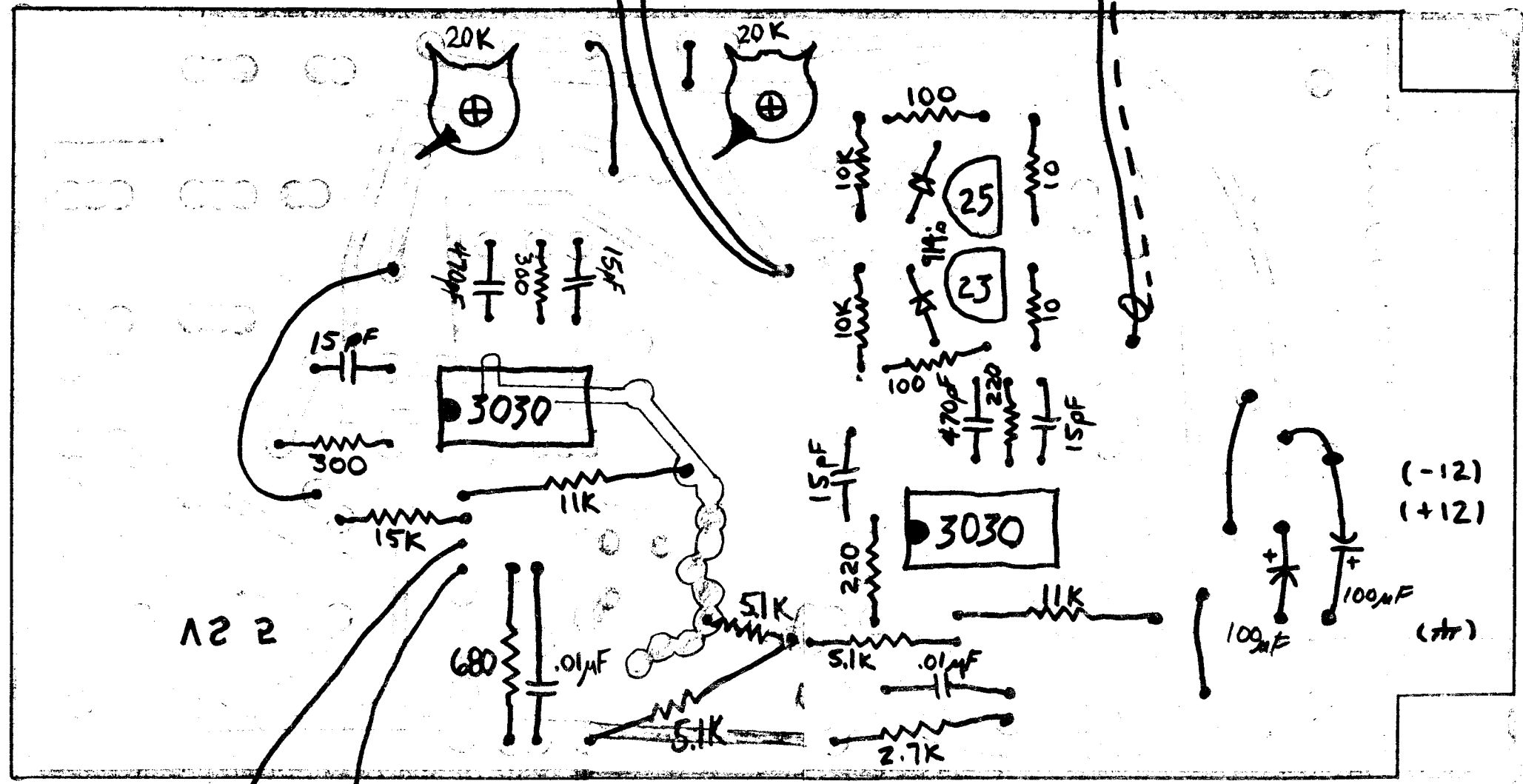
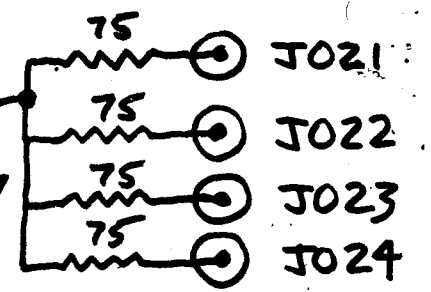
(O)

FOIL SIDE
- 217 -
TOP BOARD
ε
BOTTOM BOARD

AMPLITUDE CLASSIFIER

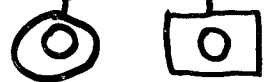
9-75

ONE "R" TO EACH 217



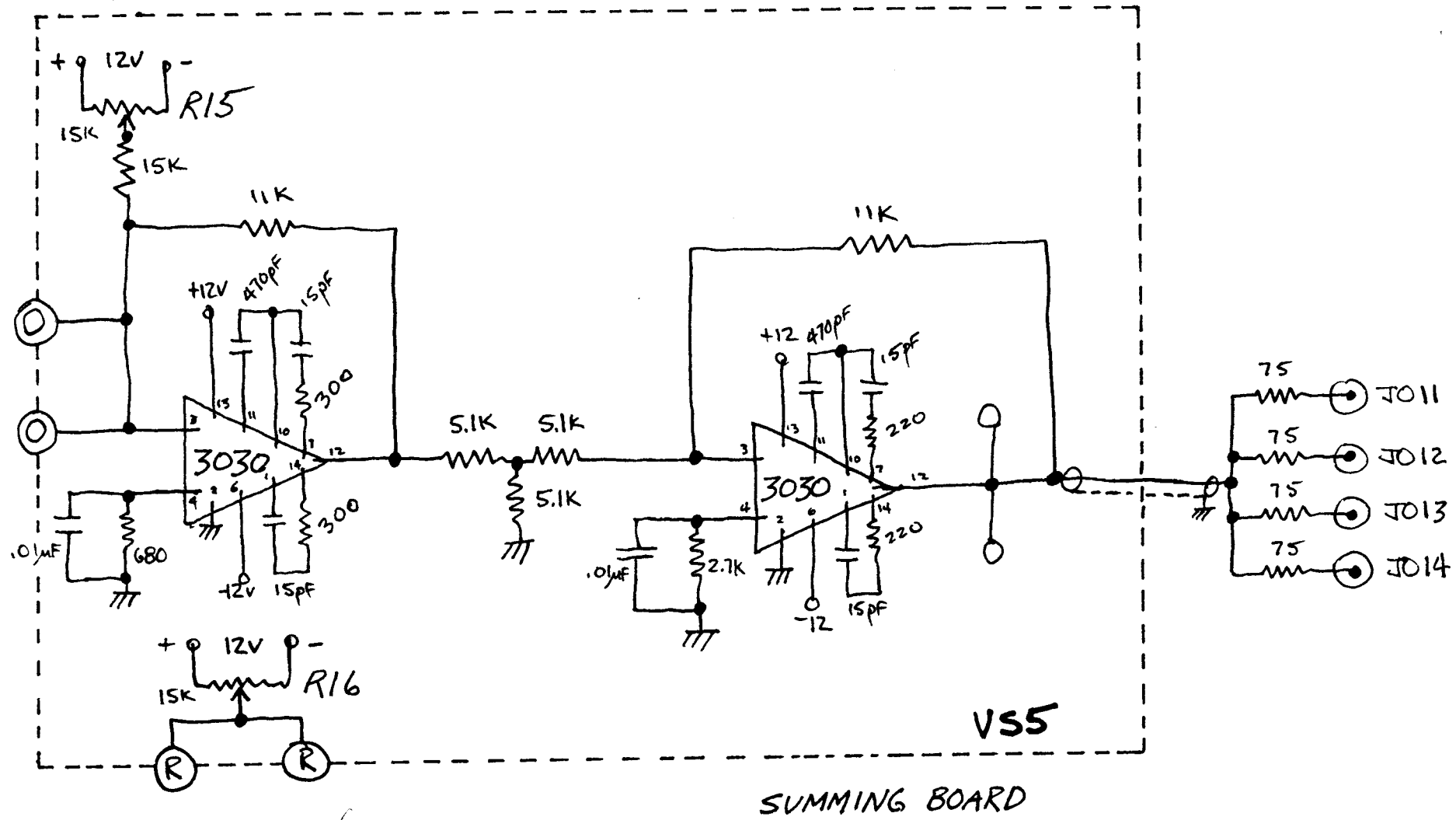
12 2

ONE "O" TO EACH 217 BOARD



AMPLITUDE CLASSIFIER

9-75



AMP. CLASS.
1-76

10		525-1060	10 OHM, 1/4 W RES	.06	A	AC
8		525-1155	47 OHM, 1/4 W RES	.06	A	AC
30		525-1165	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
6		525-1248	220 OHM, 1/4 W RES	.06	A	AC
2		525-1263	270 OHM, 1/4 W RES	.06	A	AC
7		525-1270	300 OHM, 1/4 W RES	.06	A	AC
9		525-1302	470 OHM, 1/4 W RES	.06	A	AC
22		525-1330	680 OHM, 1/4 W RES	.06	A	AC
8		525-1356	1K0 OHM, 1/4 W RES	.06	A	AC
4		525-1380	1.5K0HM, 1/4 W RES	.06	A	AC
1		525-1405	2.2K0HM, 1/4 W RES	.06	A	AC
11		525-1421	2.7K0HM, 1/4 W RES	.06	A	AC
25		525-1467	5.1K0HM, 1/4 W RES	.06	A	AC
2		525-1522	10K OHM, 1/4 W RES	.06	A	AC
7		525-1526	11K OHM, 1/4 W RES	.06	A	AC
		525-1550	15K OHM, 1/4 W RES	.06	A	AC
3	10F454	1010A	100 OHM POT 1/4SFAB	1.71	N	AC
1	10F459	5010A	500 OHM POT 1/4SFT	1.71	N	AC
8	9F009	020	10K OHM POT 1/4SFT	1.45	N	AC
2	12F9600	3309P	20K TRIM BU-MT	.65	N	AC
4	14F555	UM15-150J	15 PF, DIP-MICA CAP.	.20	N	AC
2	14F592	UM15-417J	470 PF, DIP-MICA CAP.	.32	N	AC
2	67F307	TUL-105Z	.01 MF, USC-CER CAP.	.05	N	AC
12	710-1260	7-G-1000	100 MF, 25VDC, ELEC.	.24	A	AC
25	555-0914	1N914B	SIL-DIODE	.19	A	AC
24		2N4123	NPN TRANS	.22	S	AC
9		2N4125	PNP TRANS	.27	S	AC
9		CA3030	DIP UP-AMP, RCA	1.32	S	AC
2		MC1445L	DIP GAIN-CONT. AMP	1.90	S	AC
21	39F1537	13-23b	BNC, FM-CHS, MT.	.72	N	AC
1			CHAS, A-CFACE	8.25	DG	AC
1			V55 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
6	RB-67-0-DC-M-D-9		299 IN/MDL, D/WHT	1.00	R	AC
1	RB-67-1-DC-M-D-9		KNOB, SILVER BIAS	1.00	R	AC

FUNCTION GENERATOR

The function generator generates an output which is an arbitrary function (with up to two points of inflection) of the input at J11. This results in an effect that is similar to but more complex and controllable than photographic solarization.

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.

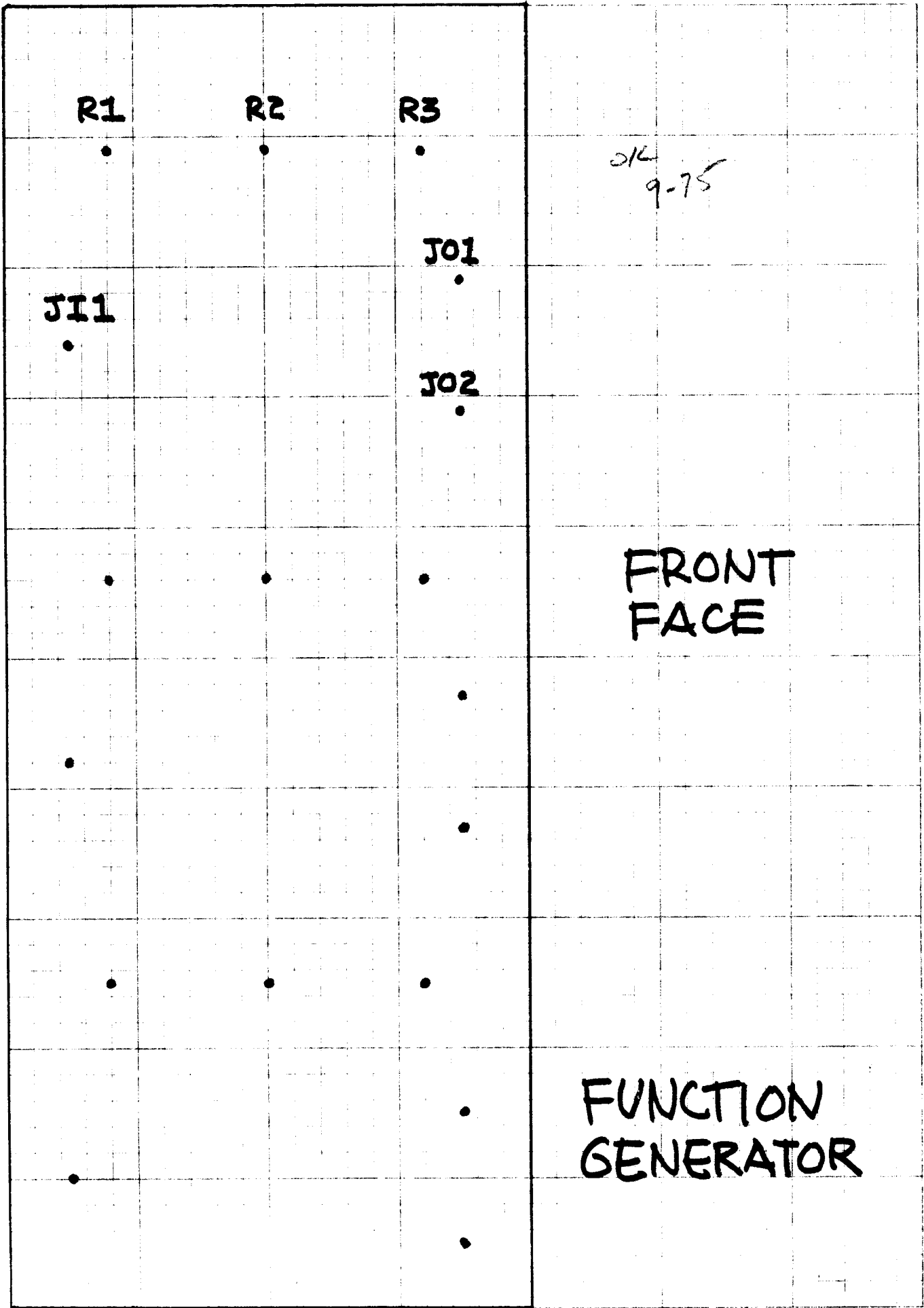
R3 controls the slope of the function for inputs of large positive voltage.

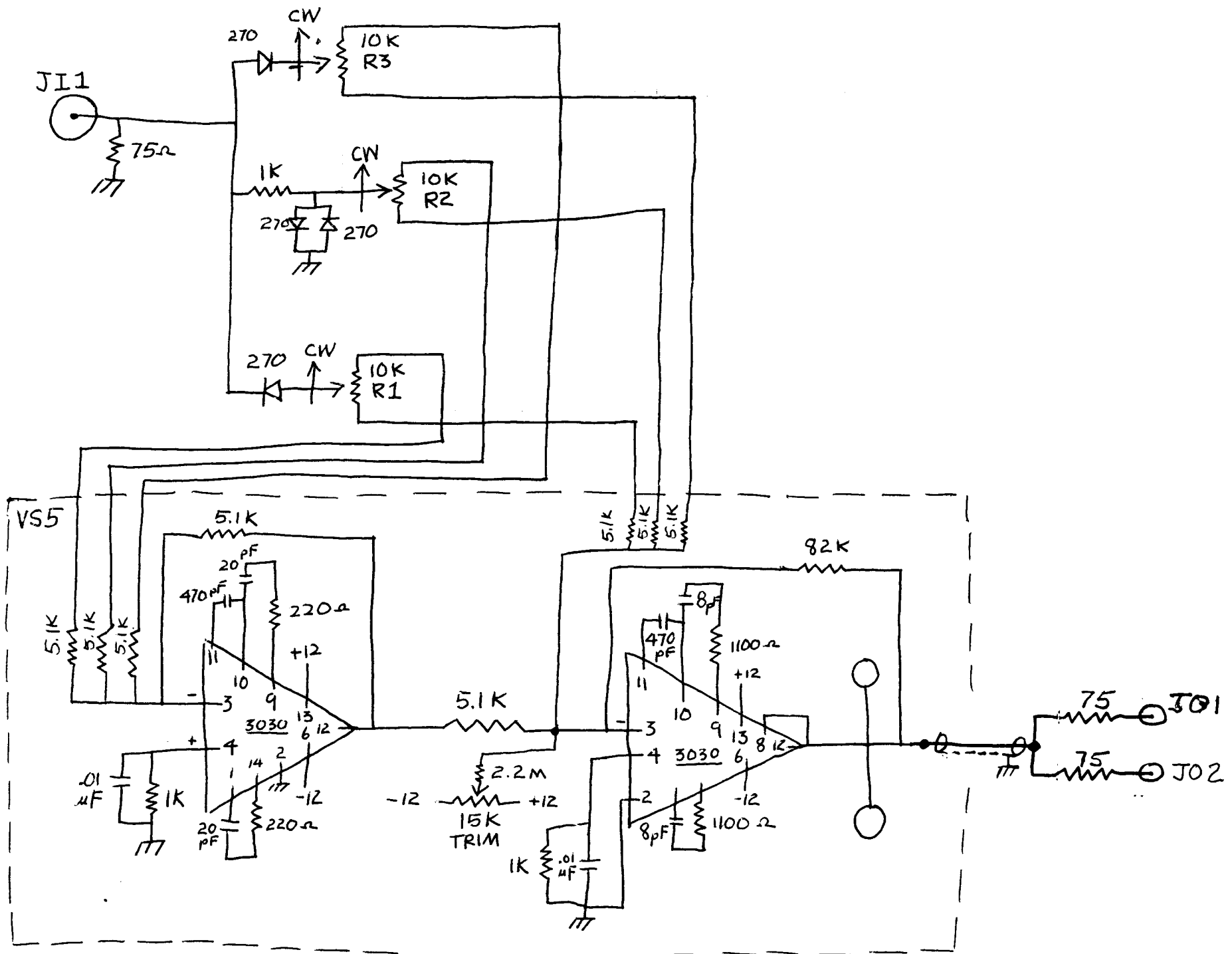
Clockwise is positive slope; counterclockwise is negative slope.

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.

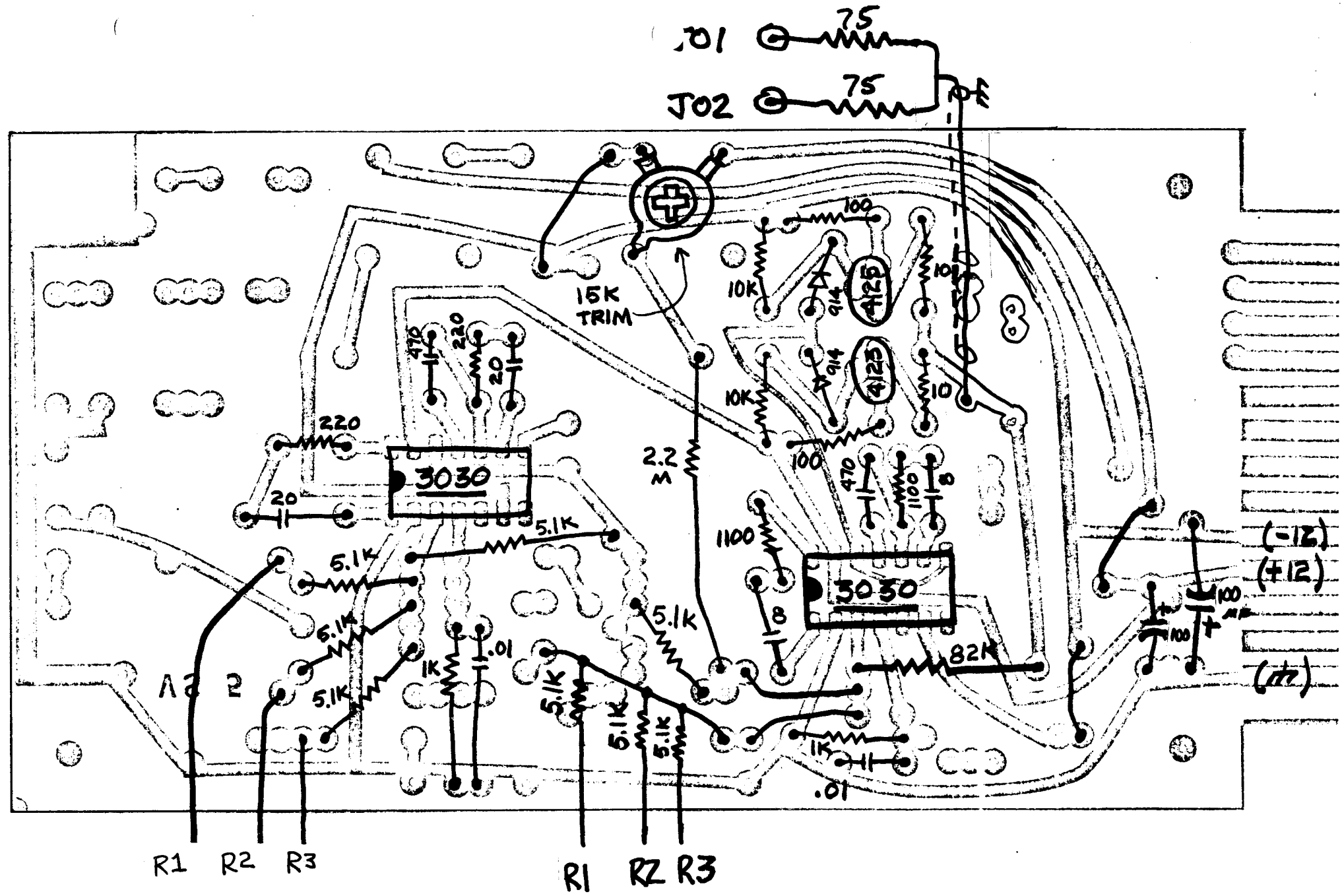
TEST STUFF:

The 15K trimming resistor 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

6		525-1062	10 OHM, 1/4 W RES	.06	A	FGN
9		525-1105	75 OHM, 1/4 W RES	.06	A	FGN
5		525-1202	100 OHM, 1/4 W RES	.06	A	FGN
8		525-1248	220 OHM, 1/4 W RES	.06	A	FGN
9		525-1356	1K0 OHM, 1/4 W RES	.06	A	FGN
6		525-1361	1.1K0HM, 1/4 W RES	.06	A	FGN
24		525-1467	5.1K0HM, 1/4 W RES	.06	A	FGN
6		525-1522	10K0HM, 1/4 W RES	.06	A	FGN
3		525-1703	52K0HM, 1/4 W RES	.06	A	FGN
3		525-1927	2.2M0HM, 1/4 W RES	.06	A	FGN
9	12F458	1030A	10K OHM POT 1/4SFA6	2.21	N	FGN
3	12F9500	3309F	20X TRIM BU-MT	.65	N	FGN
5	14F1269	DM5-2800	8 PF,DIP-MICA CAP.	.36	N	FGN
6	14F557	DM15-200J	20 PF,DIP-MICA CAP.	.18	N	FGN
6	14F592	DM15-417J	470 PF,DIP-MICA CAP.	.32	N	FGN
6	67F307	TDC-103Z	.01 MF,OSC-CER CAP.	.05	N	FGN
5	710-1200	7-0-1000	100 MF,25VDC,ELEC.	.24	A	FGN
5	555-0914	1N914C	SIL-DIODE	.19	A	FGN
12		1N272	GERM-DIODE			FGN
3		2N4123	NPN TRANS	.22	S	FGN
3		2N4125	PNP TRANS	.27	S	FGN
5		CA3030	DIP OP-AMP,RCA	1.32	S	FGN
3			VS 5 P-C BOARD			FGN
9	54F1557	15-236	BNC,FM-CHS,MT.	.72	N	FGN
1			CHASSIS,F.G. FACE	8.25	DG	FGN
9	RB-67-1-DC-M-L-9		KNOB;#299,MAT-BLACK			
			INLAY .IND.7WHITE			
			_9 /WHITE	1.00	R	FGN

REFERENCE MODULE:

The Reference module produces a constant voltage proportional to front panel knob position. It uses 2¼ #217 printed circuit boards; save other ¾ 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.

R1



R2



R3



OK 9/75

J01



J02



J03



R4



R5



R6



FRONT
FACE

J04



J05



J06



R7



R8



R9



J07



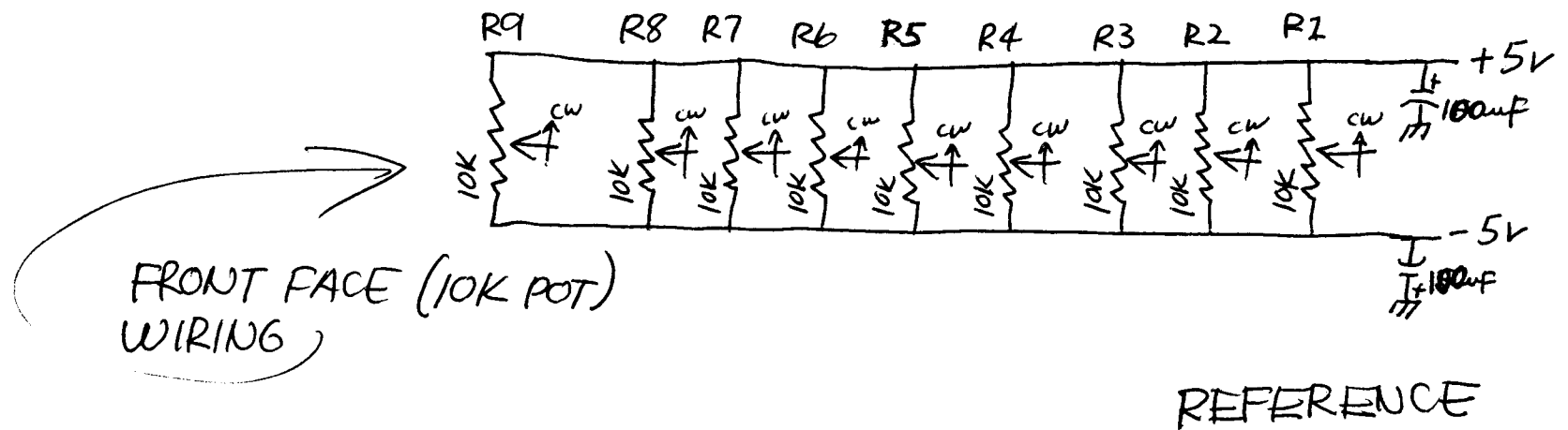
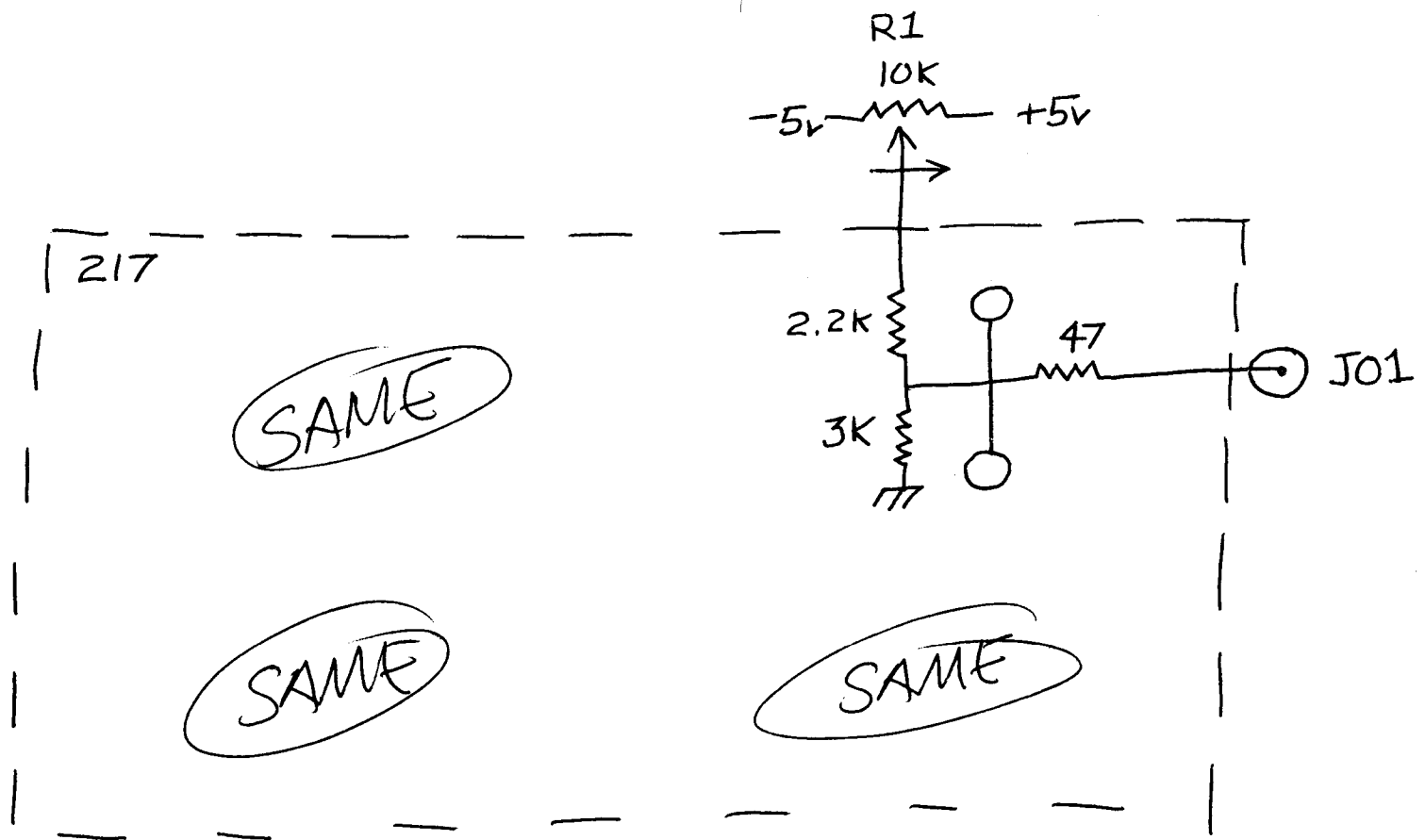
J08



J09



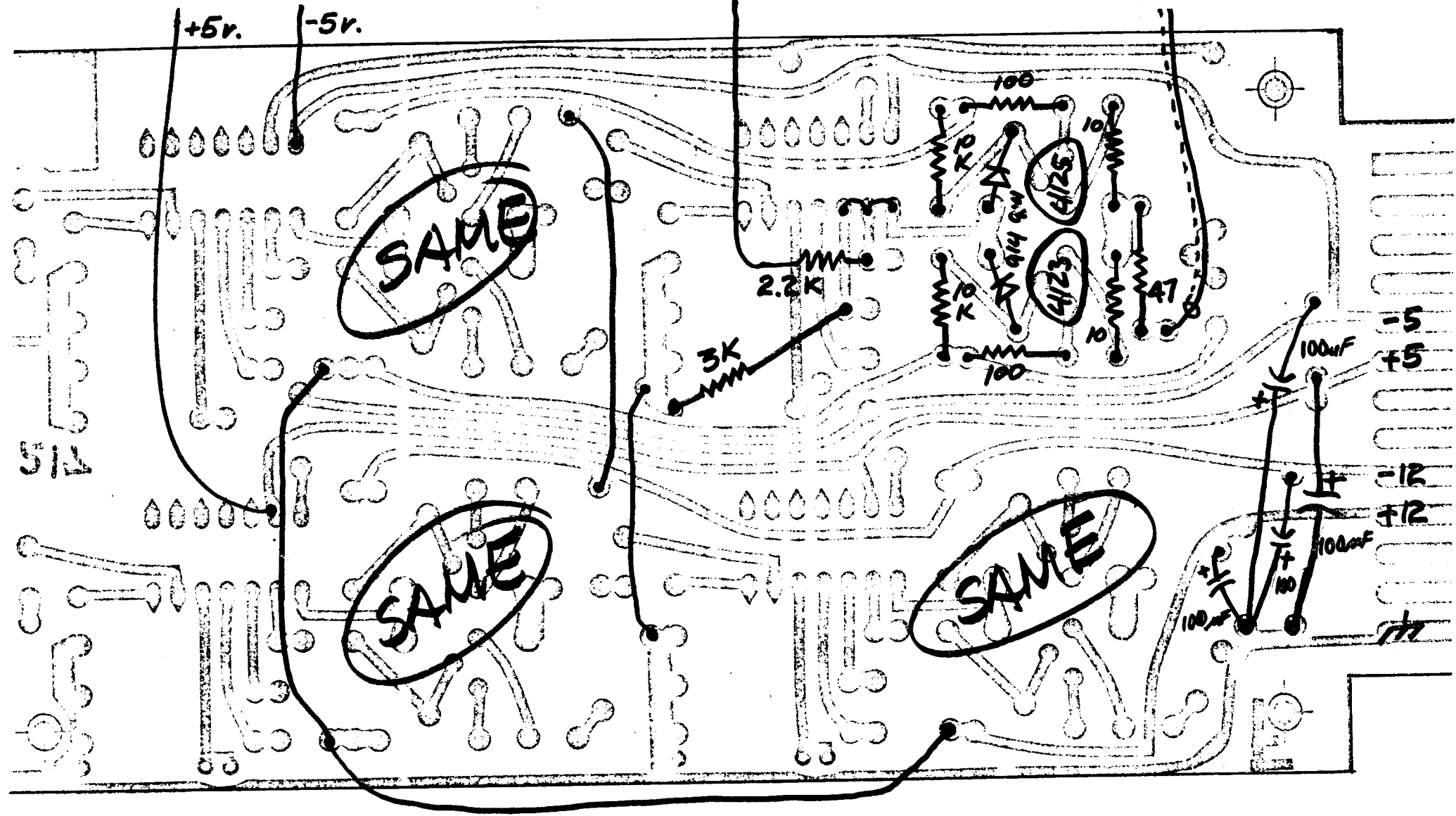
REFERENCE



(TO R1-THRU-R9)

R1

J01



REFERENCE

18		525-1060	10 OHM, 1/4 W RES	.06	A	REF
9		525-1153	47 OHM, 1/4 W RES	.06	A	REF
18		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
18		525-1522	10KOHM, 1/4 W RES	.06	A	REF
9	10F468	1050A	10K OHM POT 1/4SFA	2.21	N	REF
4	710-1260	7-6-1020	100 MF, 25VDC, ELEC.	.24	A	REF
18	553-0914	1N914B	SIL-DIODE	.19	A	REF
9		2N4123	NPN TRANS	.22	S	REF
9		2N4125	PNP TRANS	.27	S	REF
5			217 P-C BOARD			REF
9	59F1337	13-236	GND, FM-CHS.MT.	.72	N	REF
1			CHASSIS REFERENCE-FAC	.25	DG	REF
9	AS-67-1-DC-M-0-9		KNOB, BLACK/INLAY	2.99	R	REF

OSCILLATOR

This module contains two oscillators that generates a sine wave output available at J03, J04 and a triangle wave output at J01 and J02. 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 from 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 frequency 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

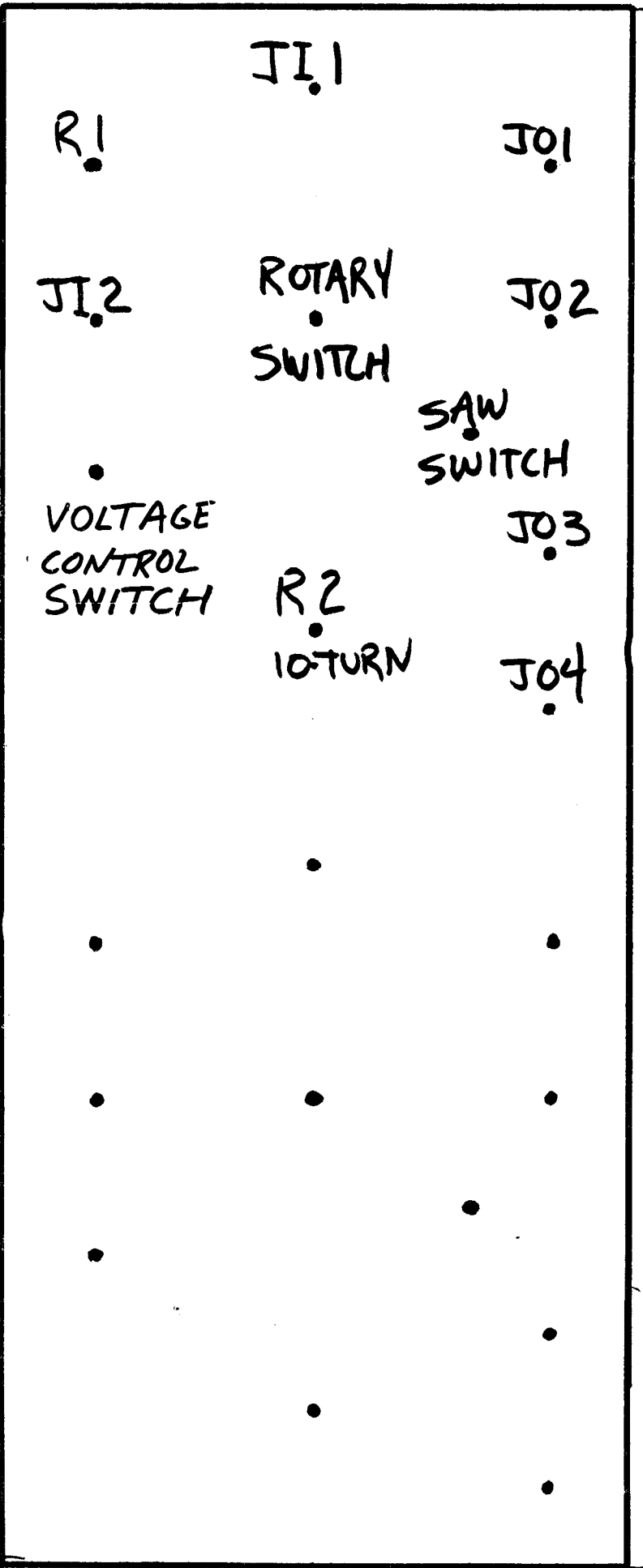
The 8038 is a complete voltage controlled oscillator whose frequency is controlled by resistance R2 and the voltage at pin 8. The 715 is a 10x amplifier and- in combination with the zener diode produces a control voltage at pin 8.

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.

OSC
#1

OSC
#2



FRONT
FACE

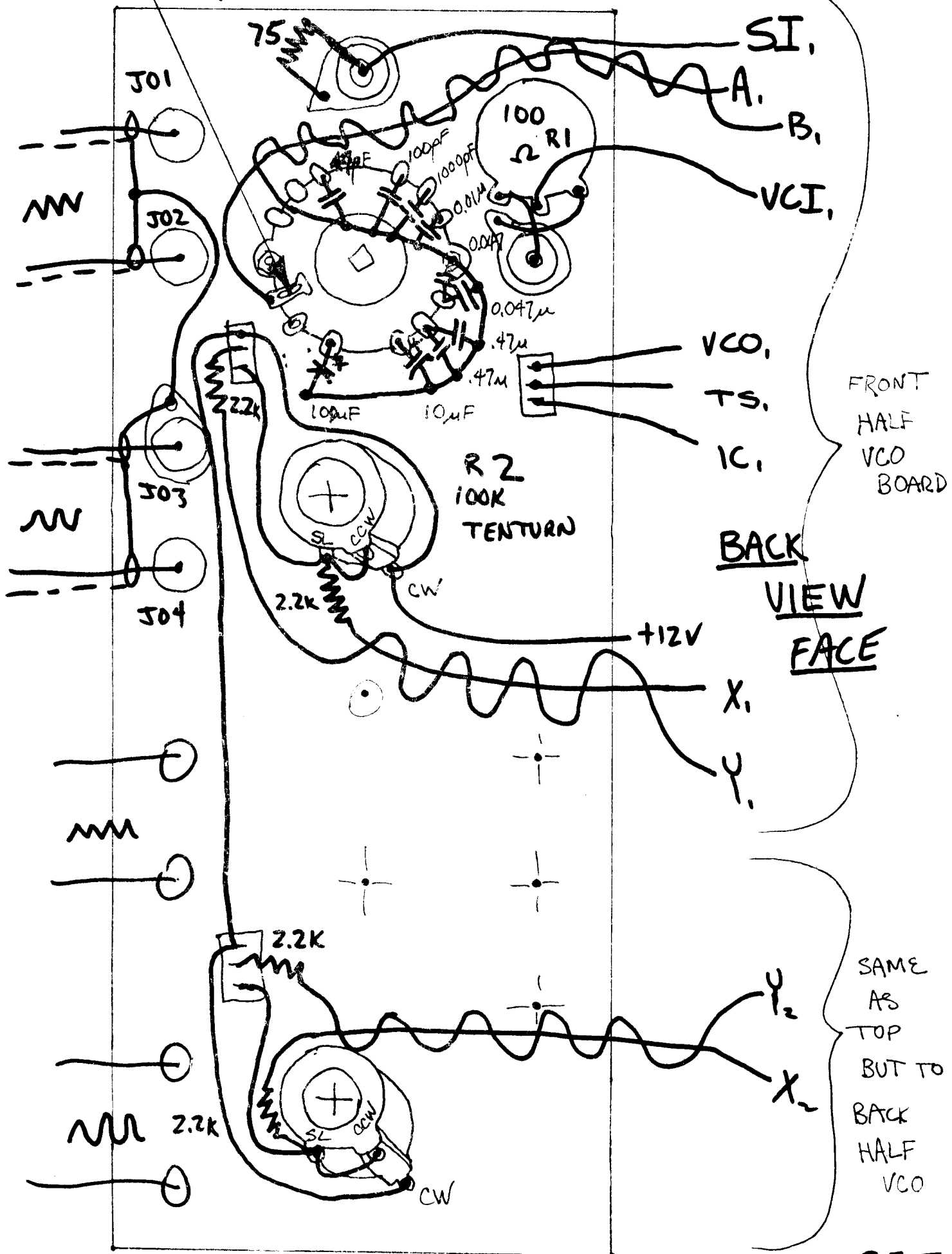
OSCILLATOR

9.75

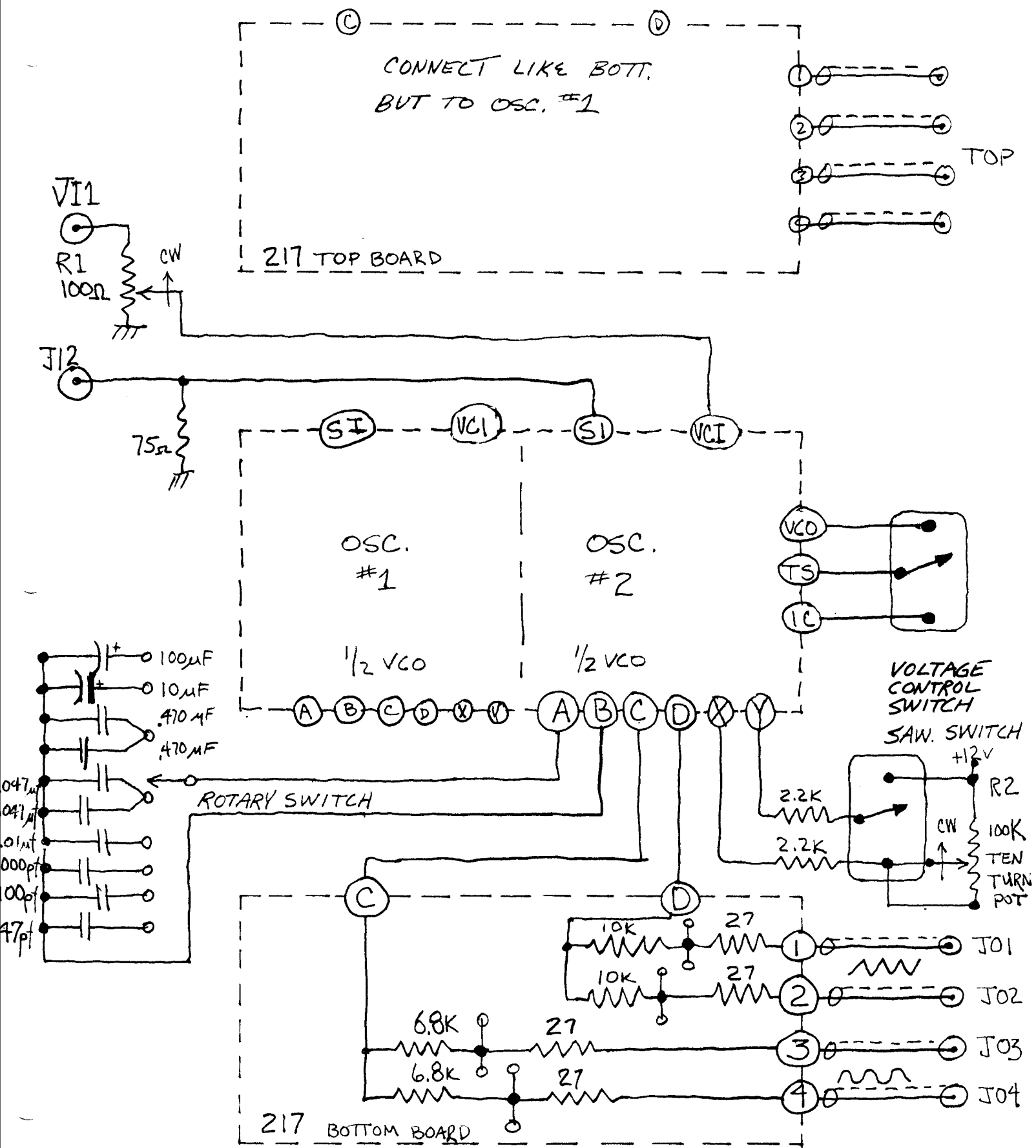
NOTE POSITION

TOP BOARD

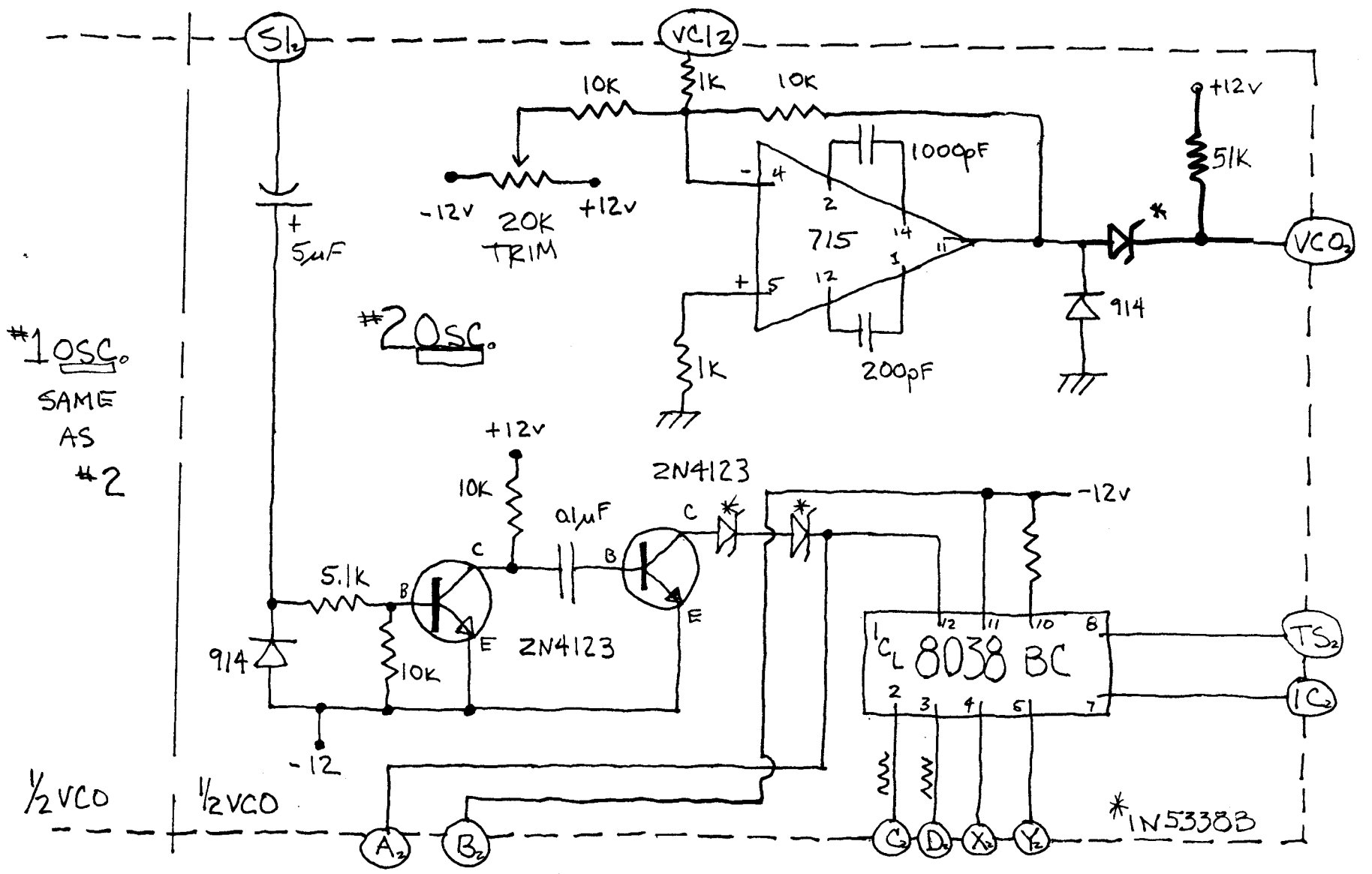
BOTTOM BOARD



OSCILLATOR 9-75



OSCILLATOR 9/75



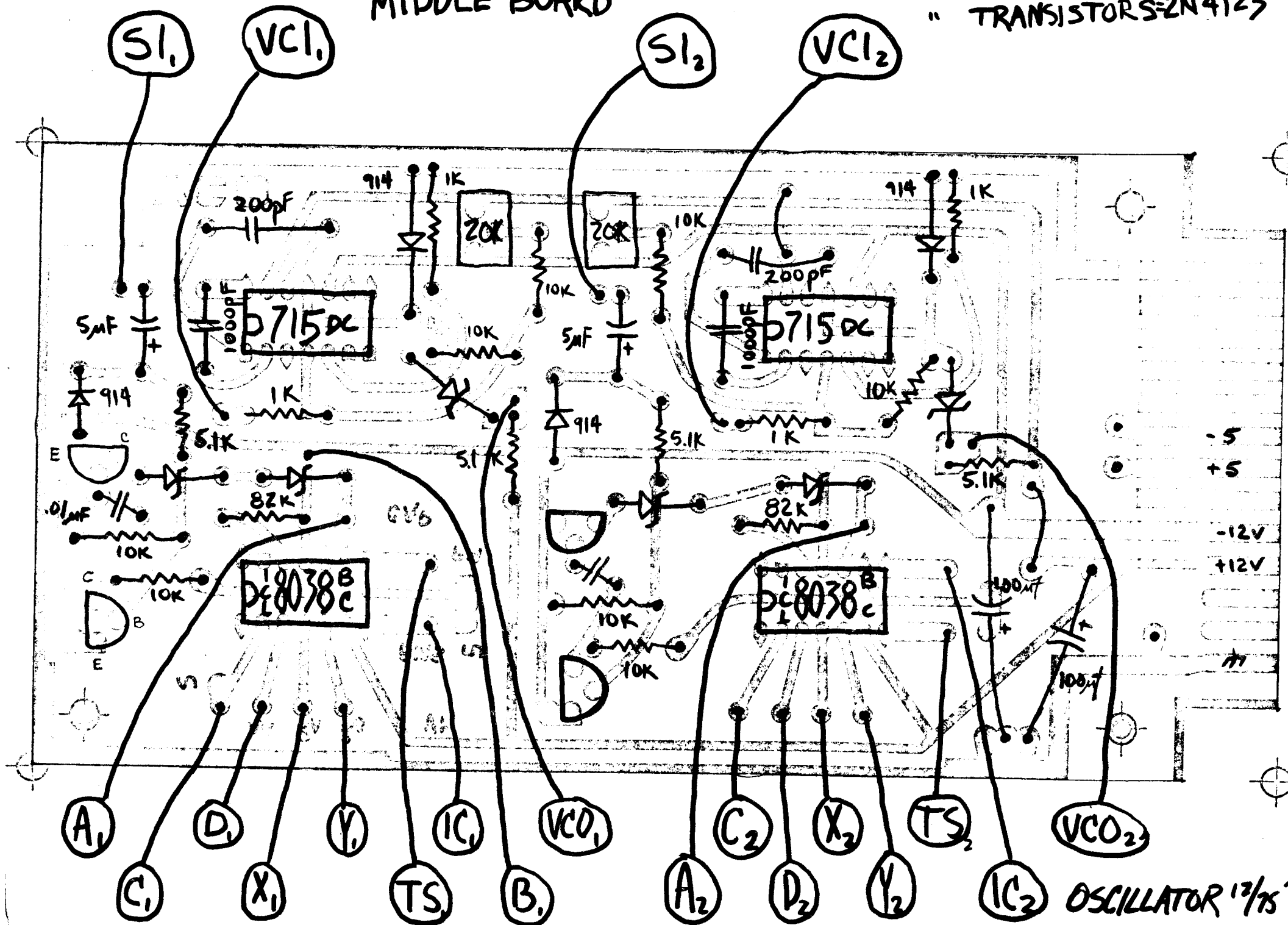
#1 OSC.
SAME
AS
#2

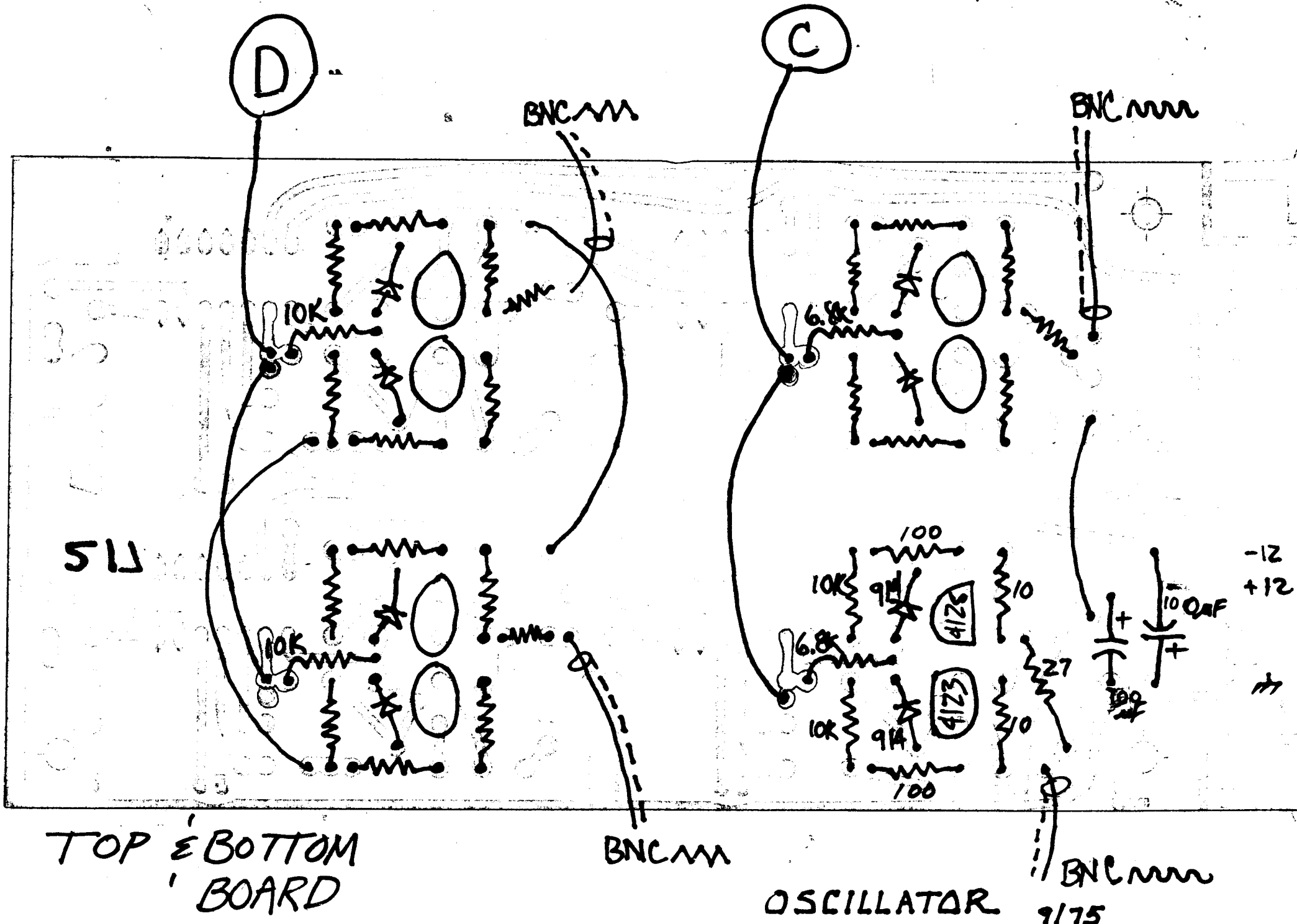
1/2 MIDDLE BOARD VCO

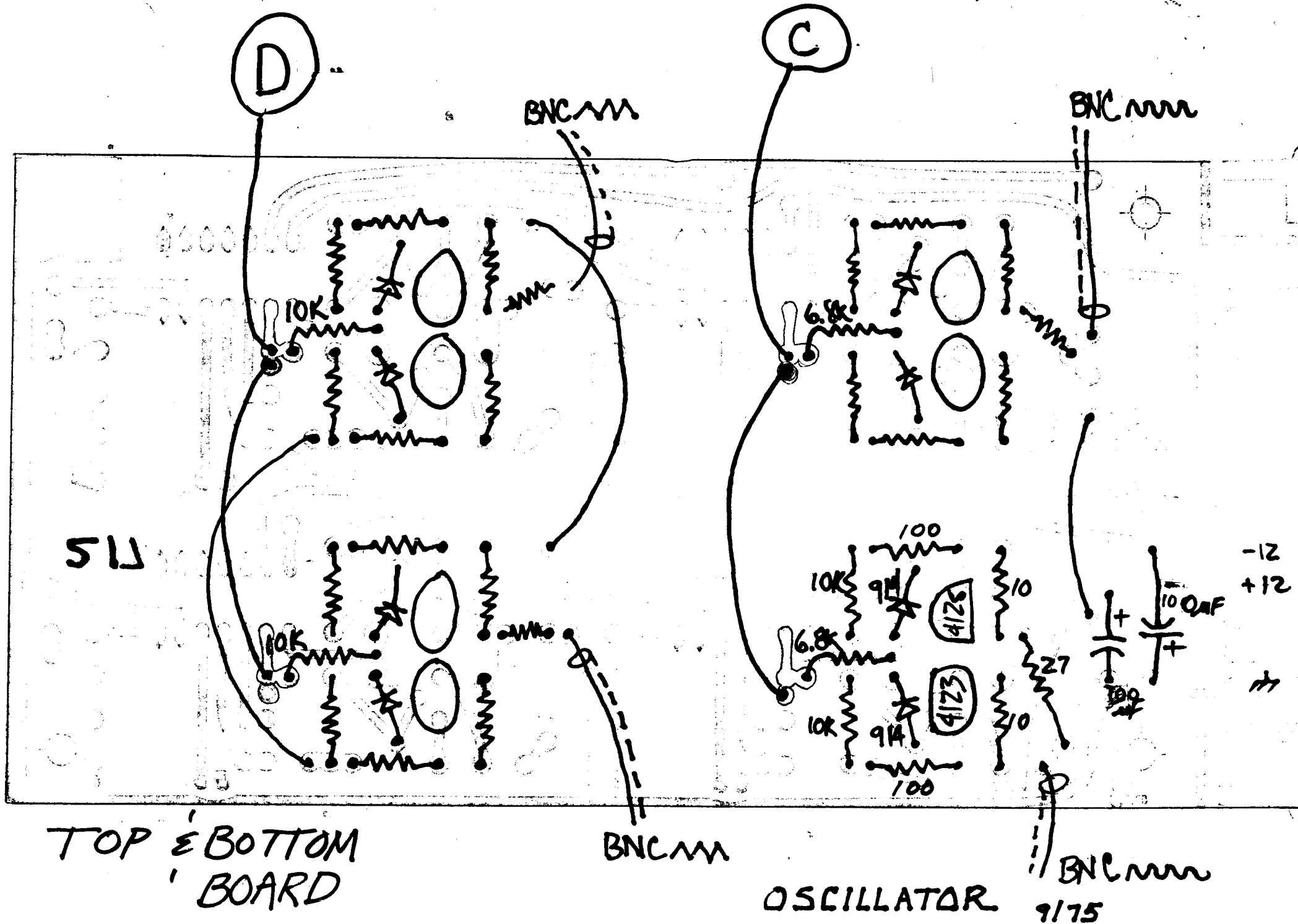
OSCILLATOR-75

MIDDLE BOARD

ALL ZENERS - Δ N5338B
" TRANSISTORS - 2N4123



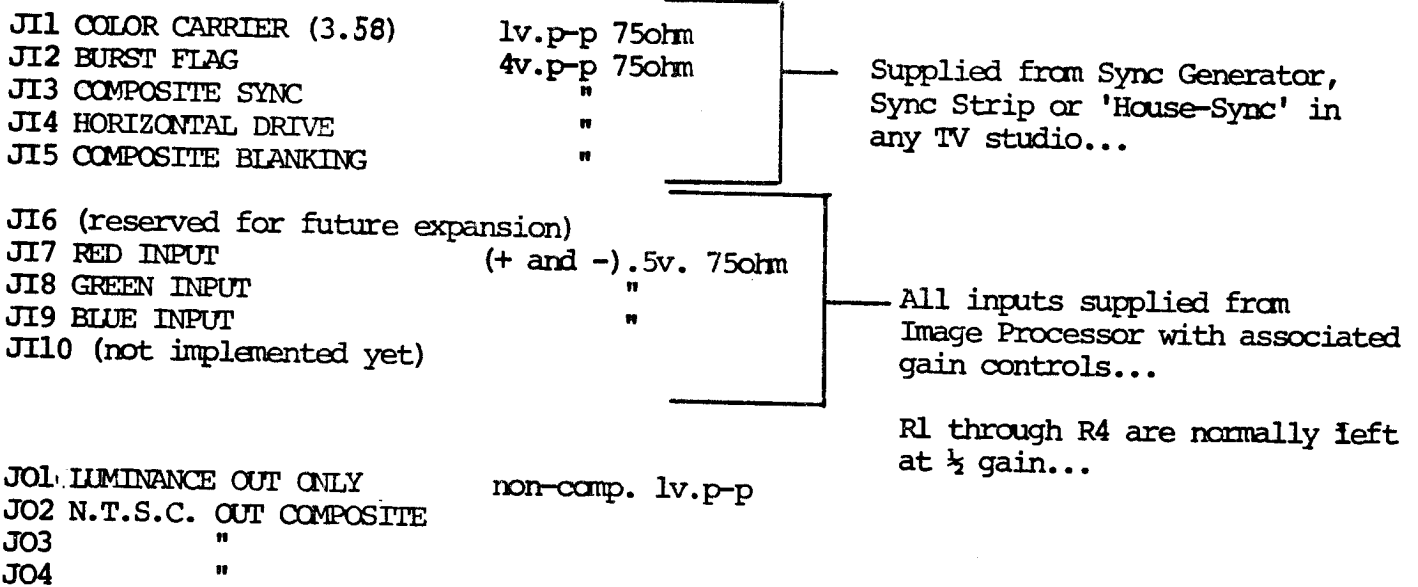




10		525-1060	10 OHM, 1/4 W RES	.06	A	OSS
8		525-1117	27 OHM, 1/4 W RES	.06	A	OSS
2		525-1125	75 OHM, 1/4 W RES	.06	A	OSS
10		525-1222	100 OHM, 1/4 W RES	.06	A	OSS
8		525-1356	1K OHM, 1/4 W RES	.06	A	OSS
6		525-1405	2.2KOHM, 1/4 W RES	.06	A	OSS
4		525-1467	5.1KOHM, 1/4 W RES	.06	A	OSS
6		525-1489	6.0KOHM, 1/4 W RES	.06	A	OSS
2		525-1522	10K OHM, 1/4 W RES	.06	A	OSS
2		525-1763	62K OHM, 1/4 W RES	.06	A	OSS
2	10F454	1010A	100 OHM POT 1/4SFA6	1.71	N	OSS
2	12F600	3389F	20K TRIM BU-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	652-0920		.047 MFD, POLY CAP	.13	A	OSS
4	652-0104		.47 MFD, POLY CAP	.13	A	OSS
2	652-4001		10 MFD, ELEC CAP, 35V	.48	A	OSS
2	652-5256		100 MFD, ELEC CAP, 150V	2.41	A	OSS
2	14F522	DM15-2010	200 PF, DIP-MICA CAP.	.20	N	OSS
2	71K-1240	7-0-005	5 MF, 25VDC, ELEC.	.42	A	OSS
6	71K-1260	7-0-1000	100 MF, 25VDC, ELEC.	.24	A	OSS
20	553-0914	1N914B	SIL-DIODE	.19	A	OSS
8		1N5350B	5.1V ZENER SW	2.50	N	OSS
12		2N4123	NPN TRANS	.22	S	OSS
8		2N4125	PNP TRANS	.27	S	OSS
2		10L0030NC	DIP USL(V-CONT)	0.40	S	OSS
2		MA715	DIP SINK	0.25	S	OSS
2			217 P-C BOARD			OSS
1			VCO P-C BOARD			OSS
2	22F423	1402	SW. 0-POS.	3.00	N	OSS
4	652-0507	205N	SW. SPDT	2.13	A	OSS
12	34F1337	13-230	DNL, FM-LHS, MT.	.72	N	OSS
2	KD-07-1-EL-N-L-4		EYE IN/MPL, L8-9/WH1	1.00	N	OSS
2	KD-07-1-06-N-L-9		55ELKTY, L8-9/BL	1.00	N	OSS
1			CHASSIS, USL-FALE	0.25	DG	OSS
2	61F1175	KD-1250A-1/4"	ALUM. KNOB	1.75	N	
2	12F6045	DFA-N	COUNTING DIAL	4.75	N	

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:



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 DESIGN IN
PROGRESS IS LIKELY ??? TO BE VERY SIMILAR.
USE FOR GENERAL REFERENCE ONLY???

J11

J12

J13

J14

J15

J16

R5

R7

R9

J17

J18

J19

R1

R2

R3

R6

R8

R10

R11

R12

R13

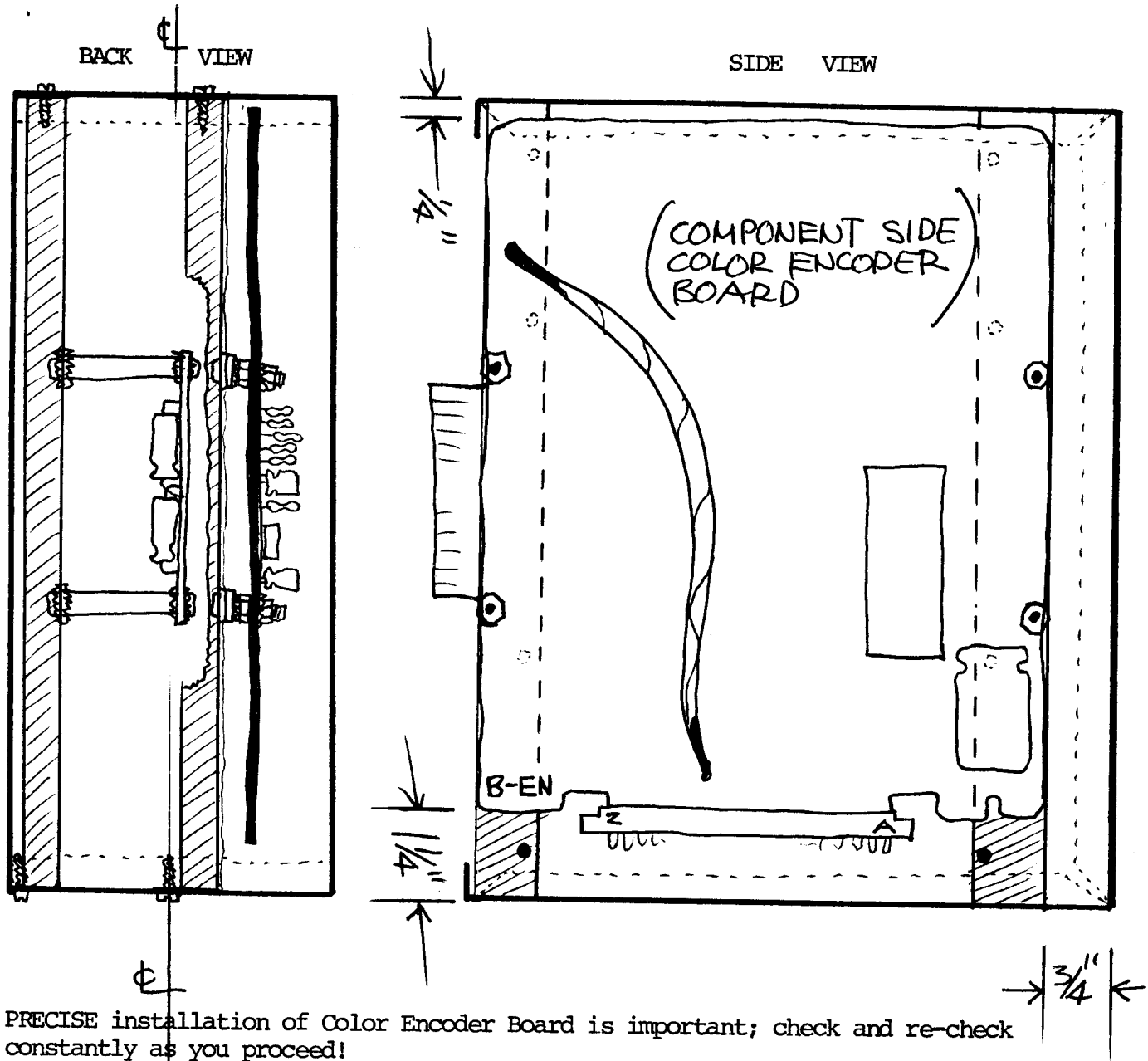
J02

J03

J04

FRONT
FACE

COLOR
ENCODER
9.75



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 plenty of clearance in the support bracket for the middle printed circuit board to clear; see BACK VIEW pictorial.

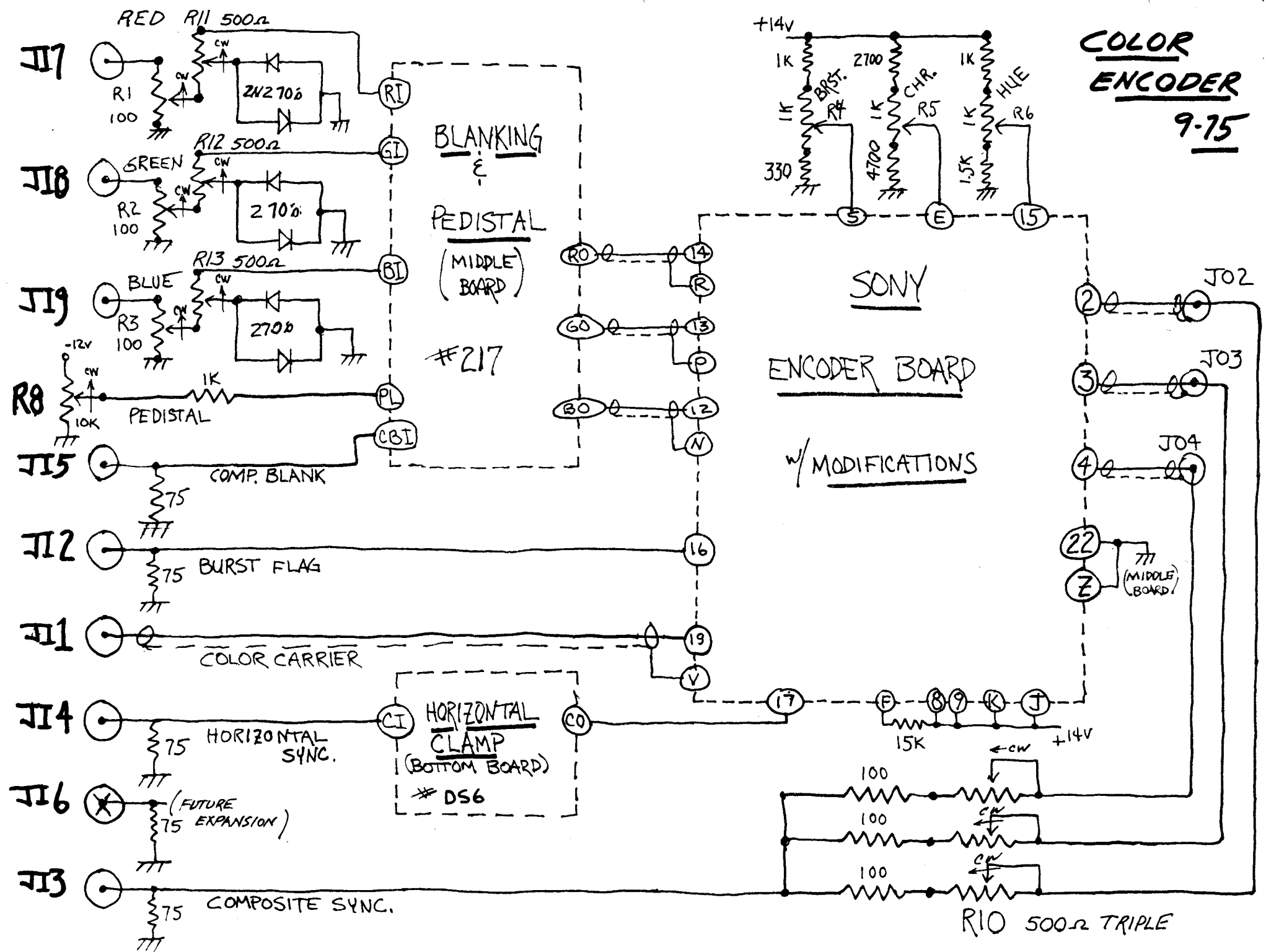
Check for plenty of clearance, made up of flat washers, star washer and nut, between encoder board and support bracket. As a 'safety measure' against board ever touching the supports due to bending etc, insulate the supports with a couple layers of super-tape or very thin rubber...

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.

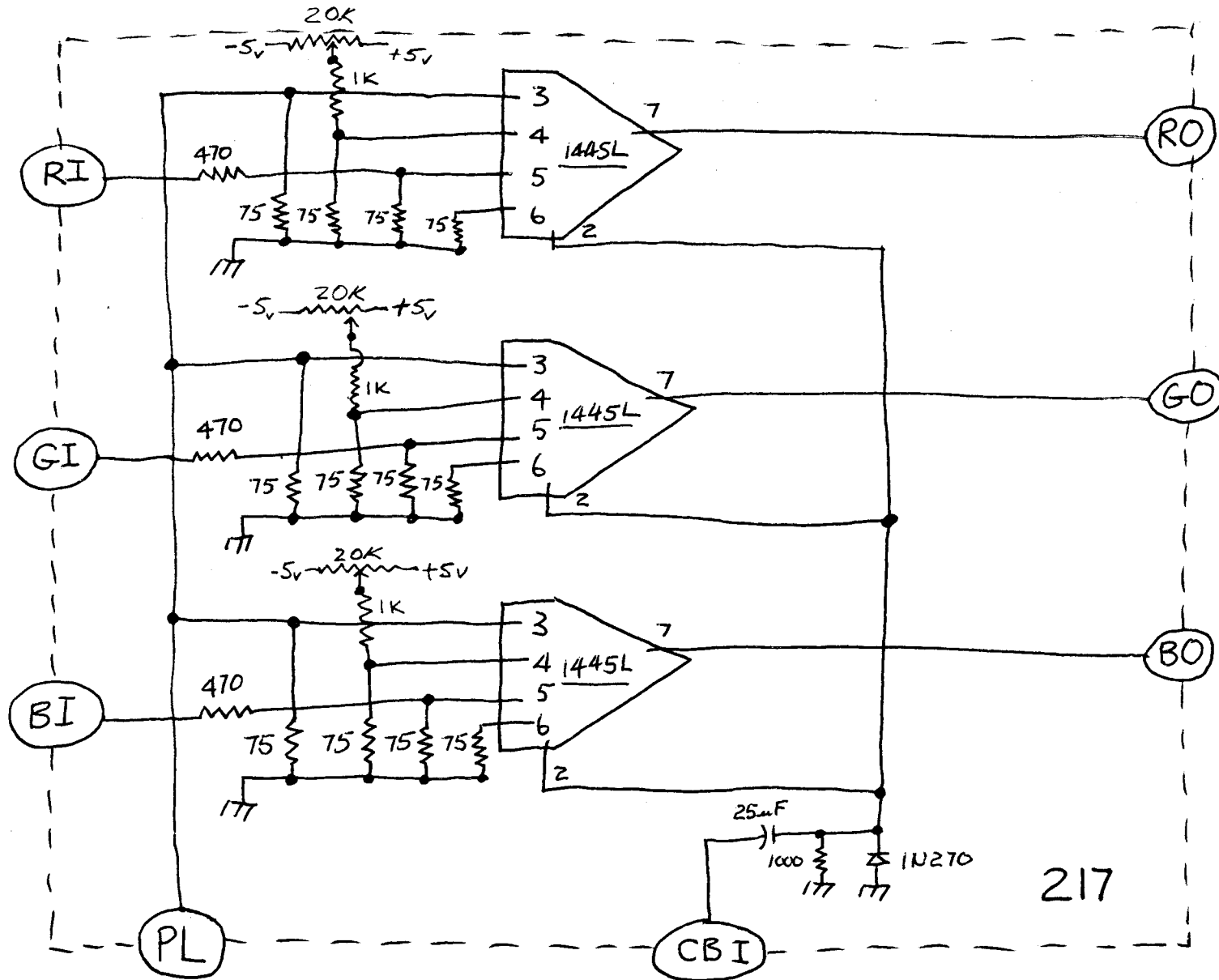
NOTE the top 1/4", bottom 1 1/4" and front 3/4" clearances for encoder board from the module chassis; see SIDE VIEW pictorial.

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

COLOR ENCODER 9-75



BLANKING & PEDISTAL BOARD (MIDDLE BOARD)



TRIMMERS ARE
 RED PEDISTAL
 GREEN PEDISTAL
 BLUE PEDISTAL
 ADJUST

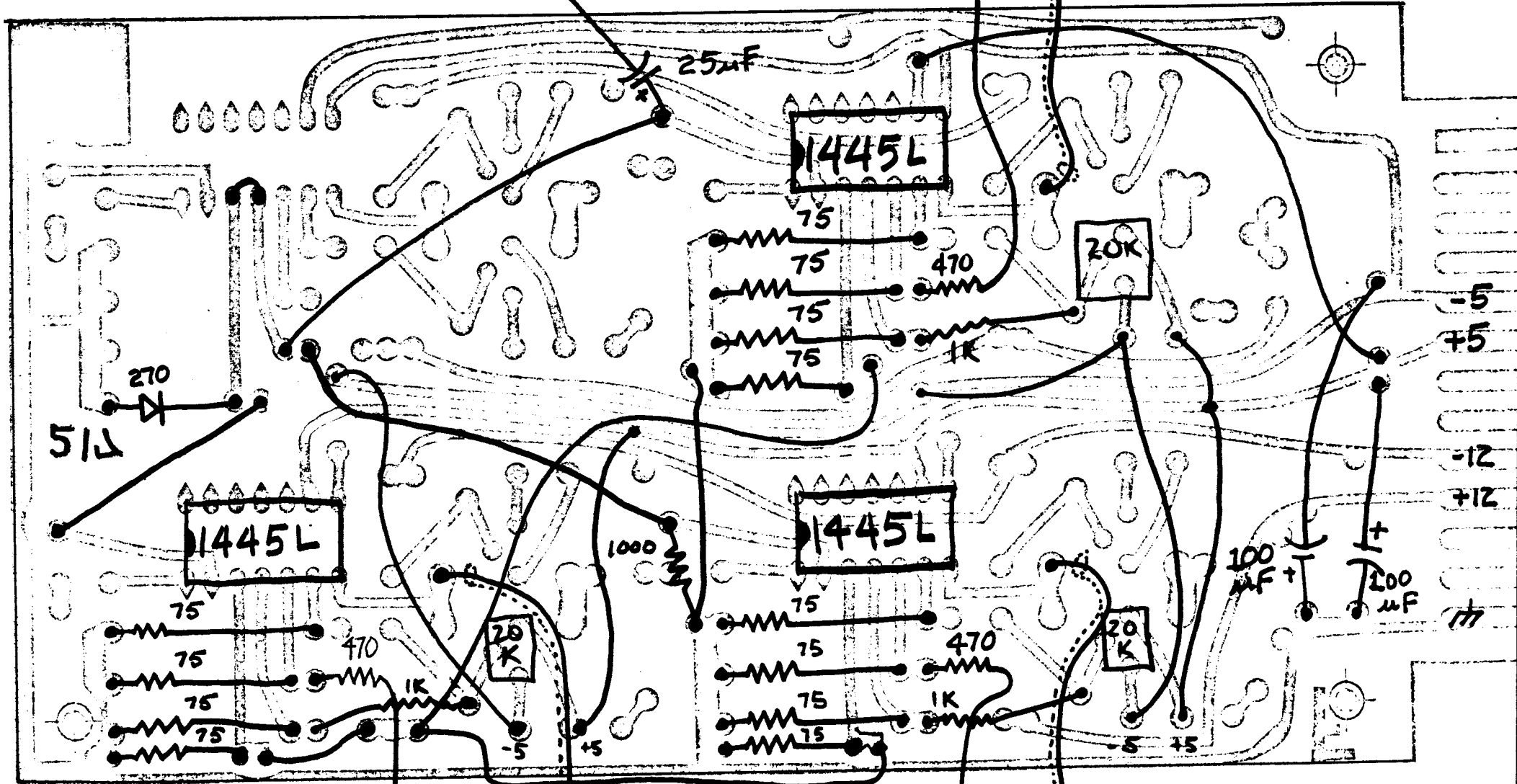
217

COLOR ENCODER

BLANKIN & R DISTAL
(MIDDLE BOARD)

CBI

RI #14 R



BI

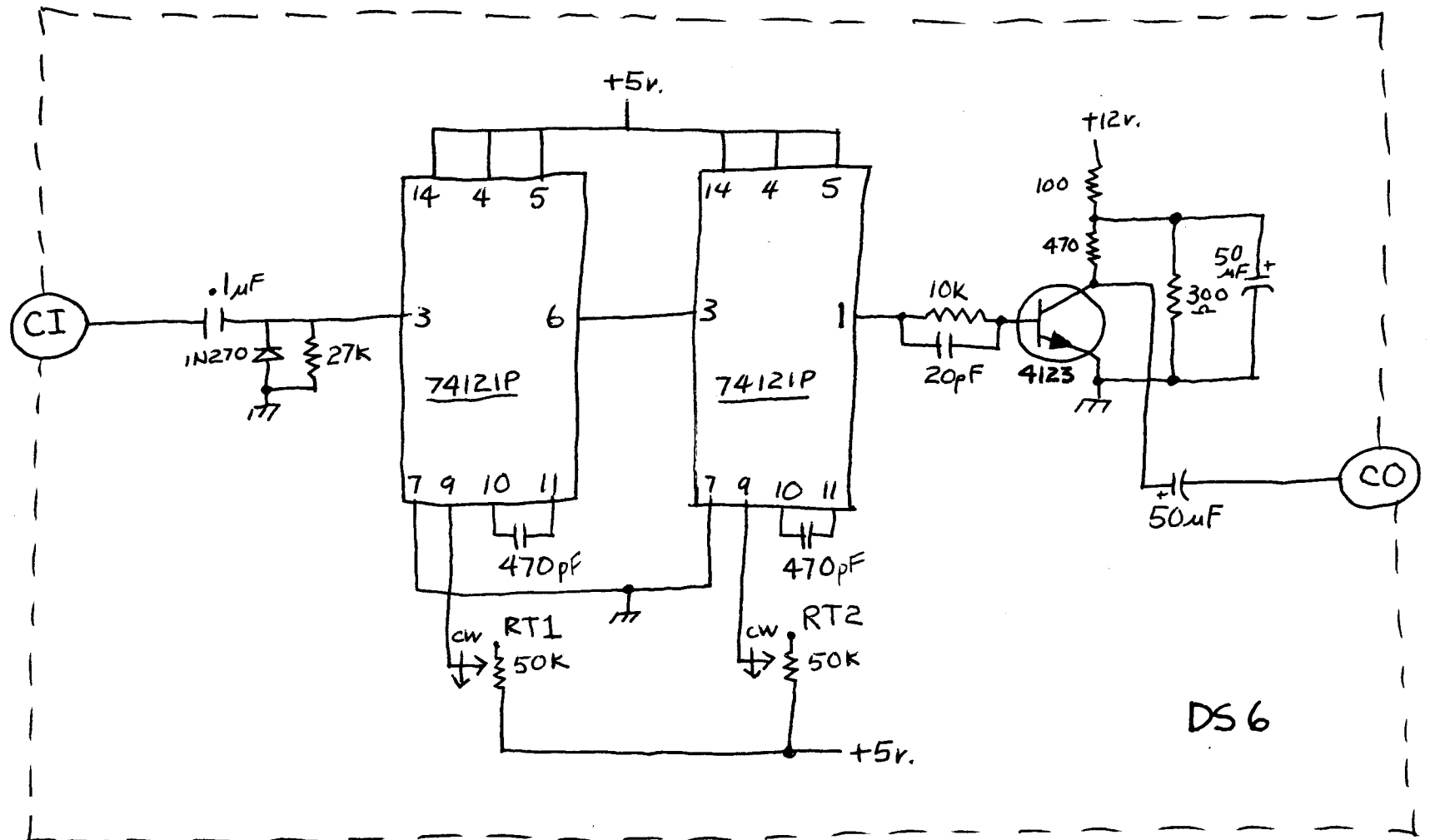
#12 N

GI

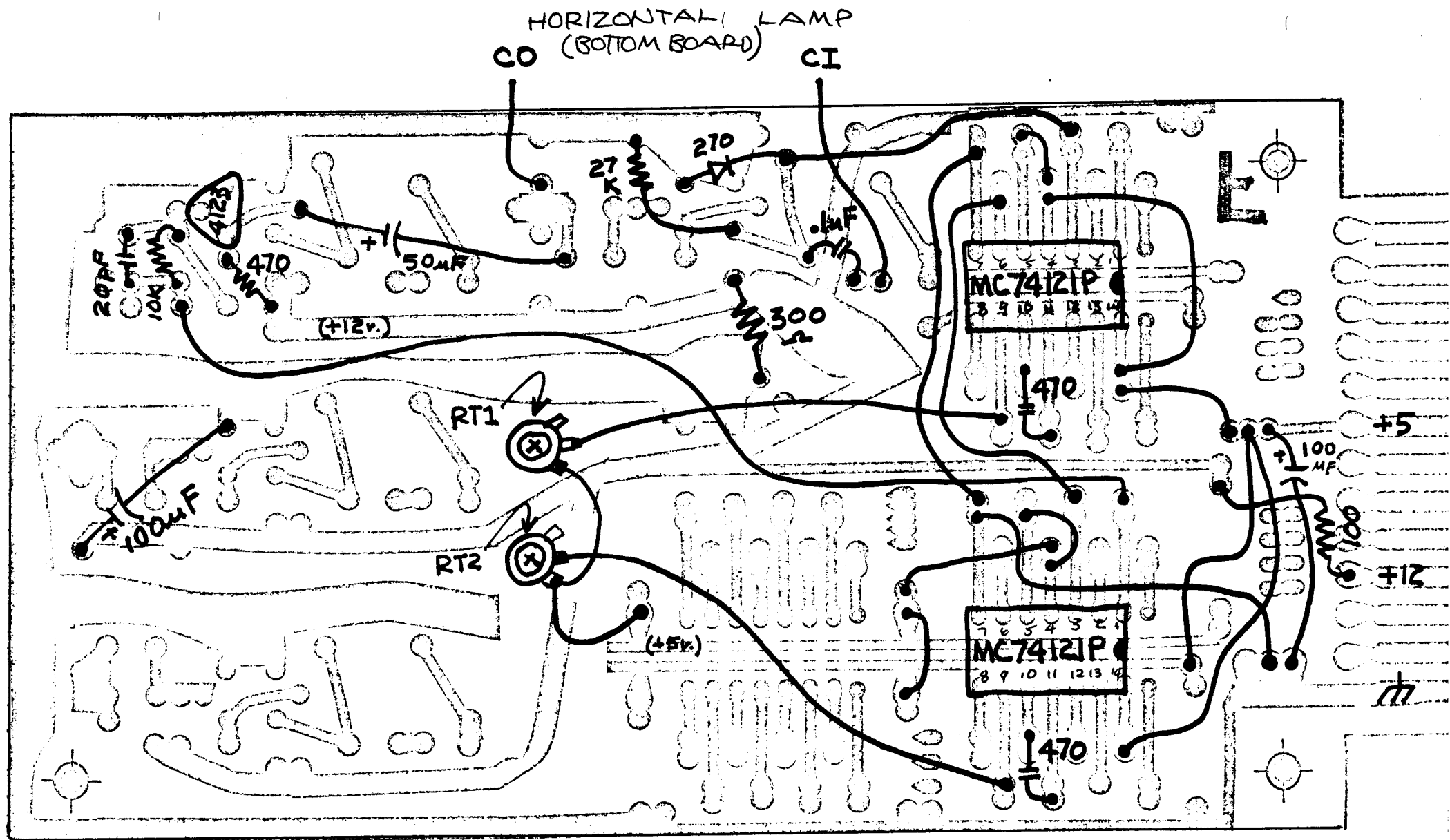
#13 P

COLOR ENCODER

HORIZONTAL CLAMP BOARD (BOTTOM BOARD)

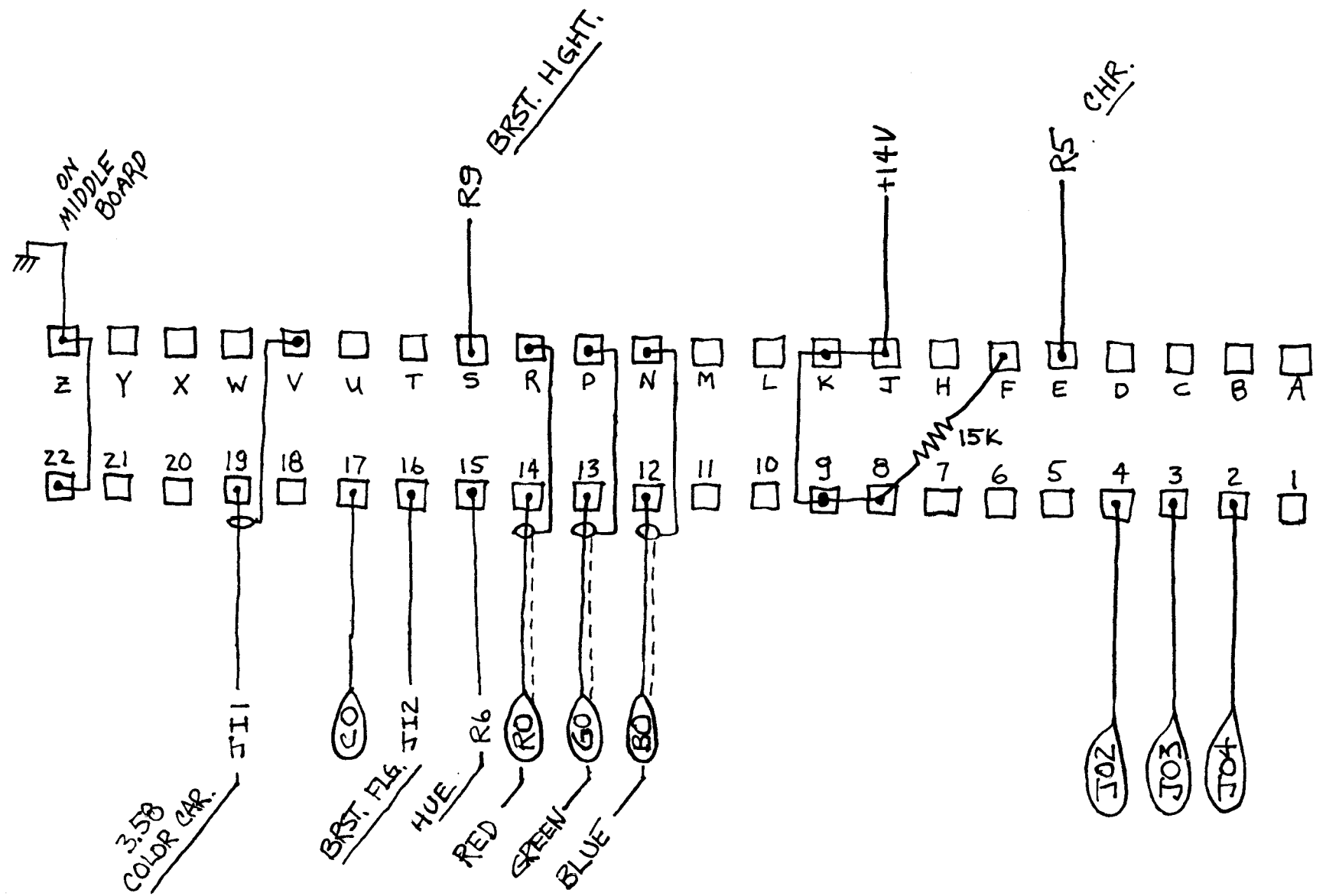


COLOR ENCODER



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
 44 PIN - CONNECTOR DIAGRAM

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	10KOHM, 1/4 W RES	.06		A	COL
3		525-1550	15KOHM, 1/4 W RES	.06		A	COL
1		525-1603	27KOHM, 1/4 W RES	.06		A	COL
3	9F073	U1	100 OHM POT 1/4SFT	1.45		N	COL
3	10F583	5010C	500 TRIM, LOK, PNL-MT	3.00		N	COL
3	9F075	U4	1K OHM POT 1/4SF	1.45		N	COL
1	9F081	U6	2K OHM POT 1/4SFT	1.45		N	COL
1	10F468	1030A	10K OHM POT 1/4SFAB	2.21		N	COL
1	10F588		520 OHM POT 1/4SFTBS	5.02		N	COL
2			50K TRIM			N	COL
3	12F9800	3309F	20K TRIM BD-MT	.65		N	COL
1	14F557	UM15-200J	20 PF, DIP-MICA CAP.	.16		N	COL
2	14F592	UM15-417J	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
5	710-1260	7-G-1000	100 MF, 25VDC, ELEC.	.24		A	COL
6	553-0914	1N9140	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.	1.16		S	COL
1			217 P-C BOARD				COL
1			P-C BOARD, D56				COL
1		CEN-4092	SCOLOR ENCODER BRD	400.00		AP	COL
1	713-0140	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	K8-67-1-DC-M-L-9		KN08, BLACK/INLAY299	1.00		R	COL
1	K8-67-1-DC-M-L-9		KN08, BLACK/INLAY109	1.00		R	COL
1	K8-67-1-DC-M-L-9		KN08, BLACK/INLAY122	1.00		R	COL
1	K8-67-1-DC-M-L-9		KN08, BLACK/INLAY117	1.00		R	COL

NOTE WELL

THESE 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 box one, 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 perforated 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, +14 power supplies.

NOTICE: --+14 volt power supply needed for Color Encoder only!
(not needed for black and white operation.)

AC PLUG SYSTEM

WATCH ALL OF THIS STUFF!!!

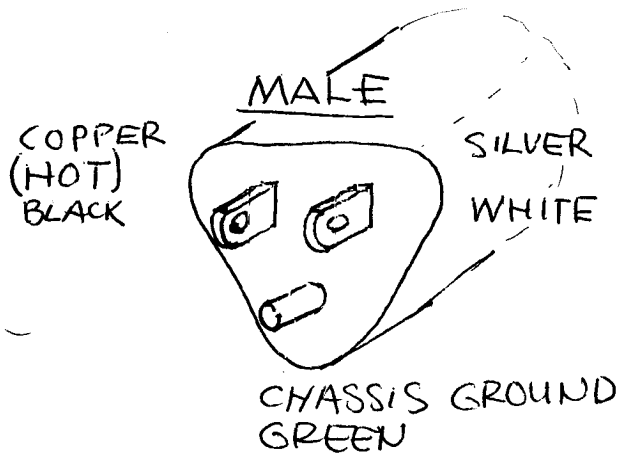
SOMEONES LIFE MAY DEPEND ON IT!!!

———— BLACK (HOT) \approx 120V. ABOVE GROUND

———— WHITE \approx GROUND

———— GREEN

CHASSIS GROUND
(EVENTUALLY CONNECTED
TO EARTH (PLANET) (WATER-
SYSTEM) ...



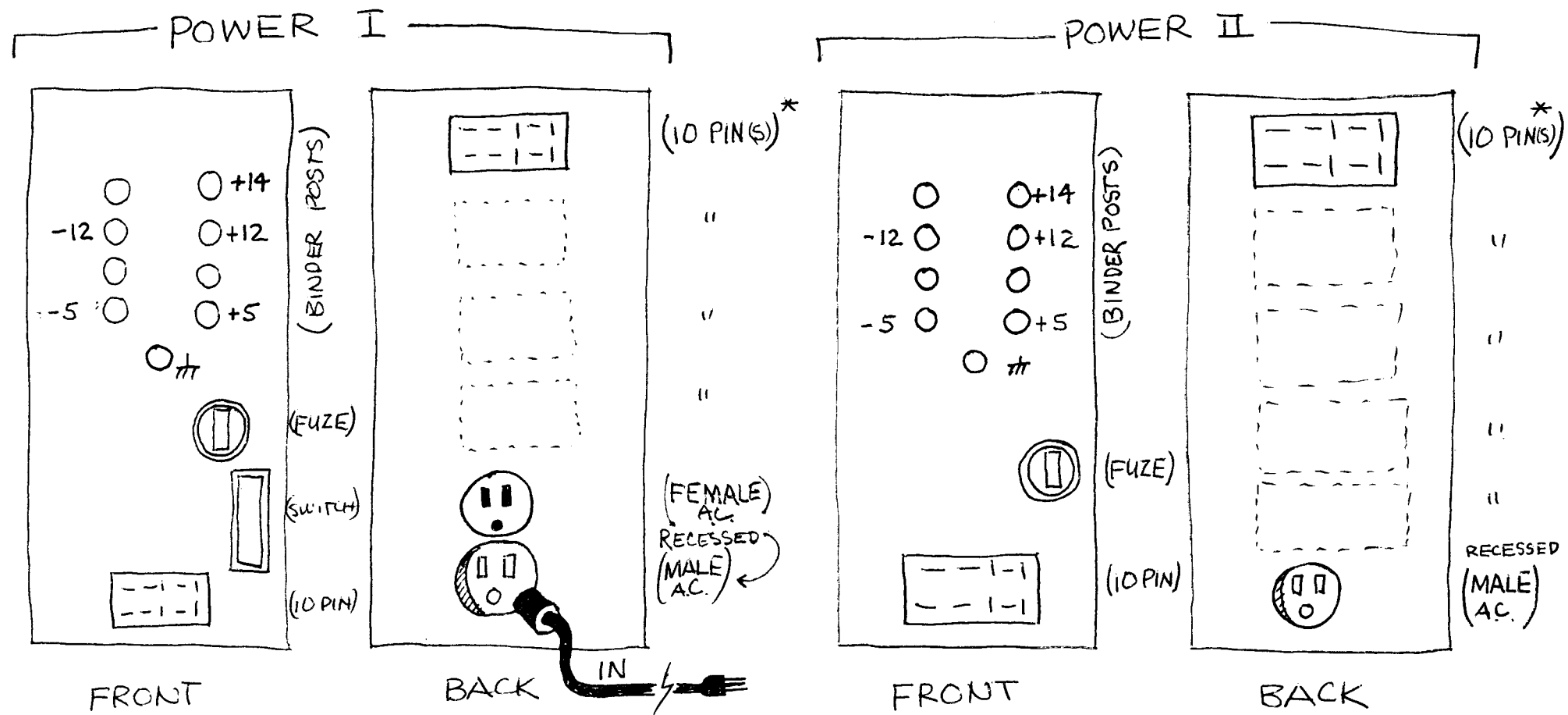
BLACK IS HOT LINE. THIS IS THE ONE WIRE THAT GOES THROUGH FUZE AND SWITCH.

WHITE IS RETURN.

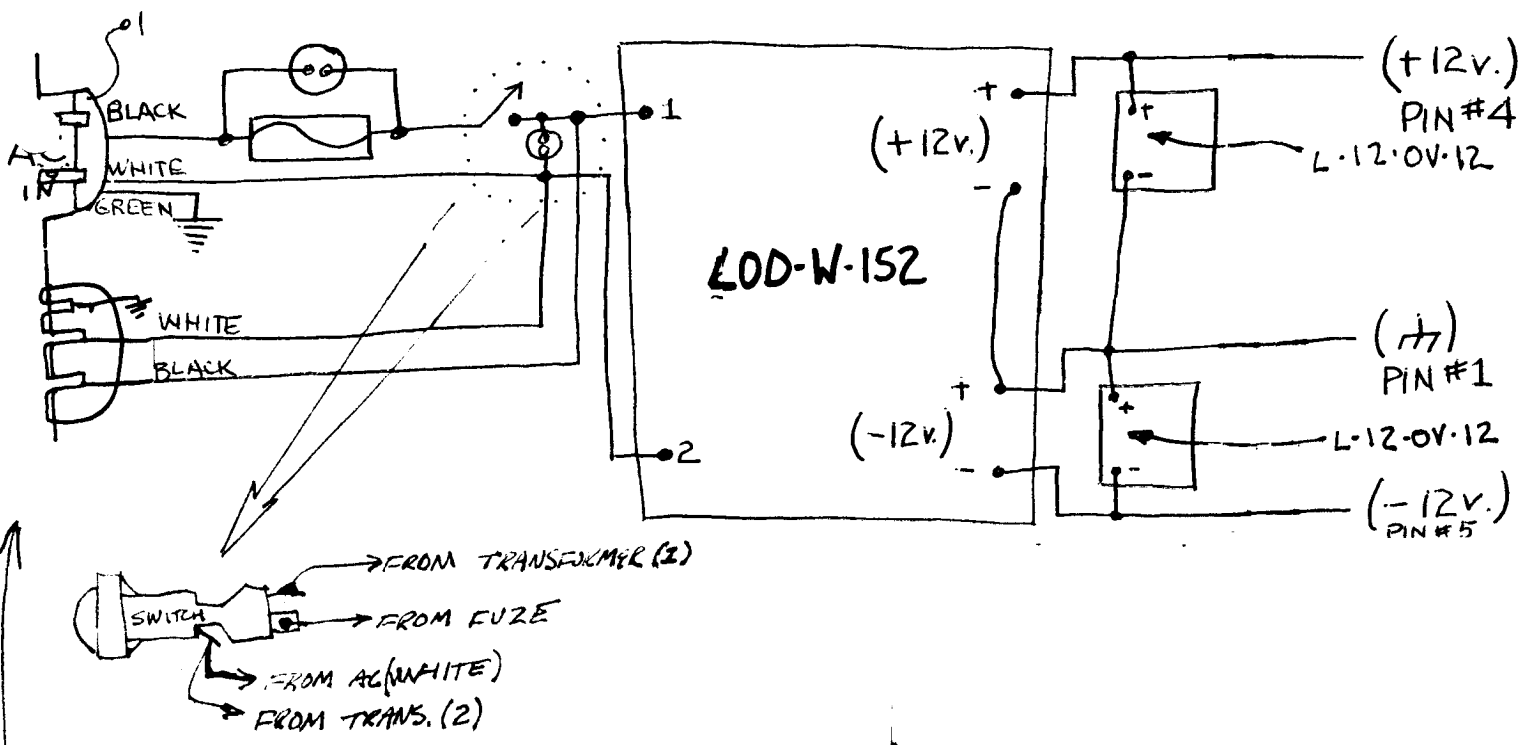
GREEN IS CONNECTED TO METAL BOX. THIS SOMETIMES IS DONE IN THE FIXTURE ITSELF.

SILVER IS EQUIVALENT TO WHITE ON CONNECTORS.

COPPER IS EQUIVALENT TO BLACK ON CONNECTORS.

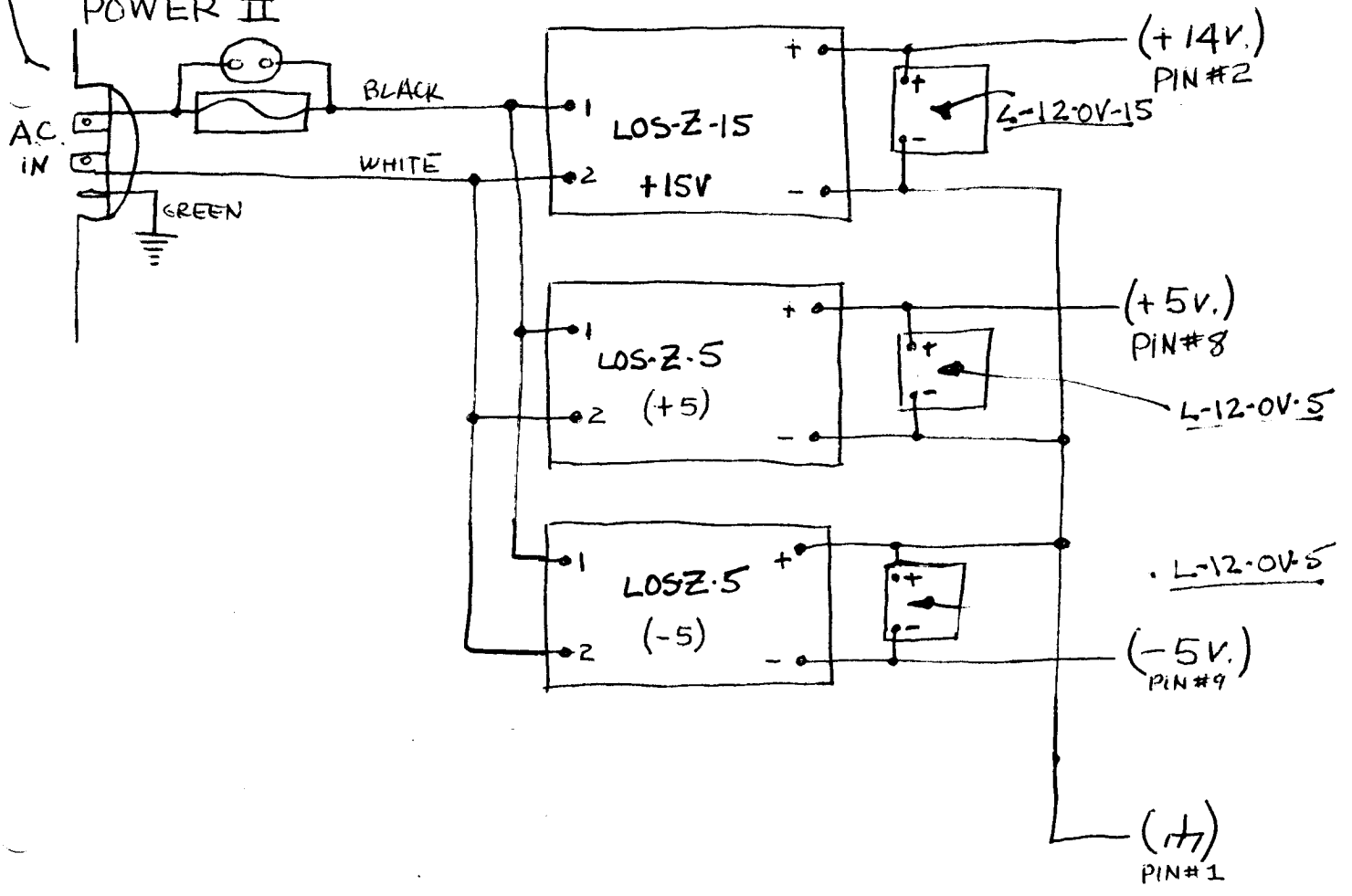


- * TRY TO MOUNT AS MANY 10 PIN CINCH-JONES (FEMALES) AS POSSIBLE.
- AC. POWER IS JUMPED FROM 'POWER I' TO 'POWER II' BY MALE-FEMALE AC. CORD SO AS TO BE SWITCHED ON/OFF BY COMMON SWITCH ON 'POWER I'.
- 'POWER I' AND 'POWER II' ARE ALWAYS CONNECTED BY ONE MALE-MALE 10 PIN CABLE SO AS TO MAKE ALL 10 PIN CONNECTORS HAVE ALL POWER SUPPLY VOLTAGES.



POWER I

POWER II



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(CRIMP)	4.37	4.37	
1000 FT	36F590WA	RG 59/U	CO-AXIAL CABLE	81.28	81.28	
100	36F590WA	68175	ONC,M-CABLE MT KRMF	.79	.79	
500 FT	36F590WA	RG 174/U	CO-AXIAL CABLE	25.25	25.25	
1	36F590WA1	8529	WIRE,SOLID-20AWG BRN	2.19	2.19	
1	36F590WA2	8529	WIRE,SOLID-20AWG RED	2.19	2.19	
1	36F590WA3	8529	WIRE,SOLID-20AWG ORG	2.19	2.19	
1	36F590WA4	8529	WIRE,SOLID-20AWG YEL	2.19	2.19	
1	36F590WA5	8529	WIRE,SOLID-20AWG GRN	2.19	2.19	
1	36F590WA6	8529	WIRE,SOLID-20AWG BLU	2.19	2.19	
1	36F590WA7	8529	WIRE,SOLID-20AWG VID	2.19	2.19	
1	36F590WA8	8529	WIRE,SOLID-20AWG GRY	2.19	2.19	
1	36F590WA9	8529	WIRE,SOLID-20AWG WHT	2.19	2.19	
1	36F590WA10	8529	WIRE,SOLID-20AWG BLK	2.19	2.19	
1(100FT)	36F590WA1	8500	WIRE,STR-16AWG BRN	2.96	2.96	
1(100FT)	36F590WA2	8500	WIRE,STR-16AWG RED	2.96	2.96	
1(100FT)	36F590WA3	8500	WIRE,STR-16AWG ORG	2.96	2.96	
1(100FT)	36F590WA4	8500	WIRE,STR-16AWG YEL	2.96	2.96	
1(100FT)	36F590WA5	8500	WIRE,STR-16AWG GRN	2.96	2.96	
1(100FT)	36F590WA6	8500	WIRE,STR-16AWG BLU	2.96	2.96	
1(100FT)	36F590WA7	8500	WIRE,STR-16AWG VID	2.96	2.96	
1(100FT)	36F590WA8	8500	WIRE,STR-16AWG GRY	2.96	2.96	
1(100FT)	36F590WA9	8500	WIRE,STR-16AWG WHT	2.96	2.96	
1(100FT)	36F590WA10	8500	WIRE,STR-16AWG BLK	2.96	2.96	
2	36F1260	17050	POWER CORDS 14 AWG.	2.73	5.46	
1	62F2400	15-15	FUZED AC OUTLET BOX	12.85	12.85	
1	27F092	31-3001	FUZE,1 A.-3AG,SB	1.50	1.50	
8(BOX100)	51F2245		INTER.LOCKWASH#4	.95	7.60	
4(BOX100)	30F098		6INDHEAD4-40*1/4	1.84	7.36	
1(BOX100)	30F699		6INDHEAD4-40*1/2	1.95	1.95	
1	35F2521	w-TCP	SOLDERING STATION	37.00	37.00	
1	35F2520	PTA	1/16 TIP (w-TCP)	1.00	1.00	
1	58F387	45-121	WIRE STRIPPER	2.65	2.65	
1	34F093	0257-40	CUTTERS	3.15	3.15	

SUB-TOTAL= 400.92

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

NEWARK ELECTRONICS

78	10F454	1010A	100 OHM POT 1/4SFAB	1.7	133.38	N
3	10F459	5010A	500 OHM POT 1/4SFT	1.7	5.13	N
6	9F073	01	100 OHM POT 1/4SFT	1.45	8.70	N
1	10F500		500 OHM POT 1/4SFT	5.02	5.02	N
3	9F070	04	1K OHM POT 1/4SF	1.45	4.35	N
1	9F081	06	2K OHM POT 1/4SFT	1.45	1.45	N
19	10F460	1030A	10K OHM POT 1/4SFAB	2.21	41.99	N
32	9F089	020	10K OHM POT 1/4SFT	1.4	46.40	N
3	10F473	5030A	50K OHM POT 1/4SFAB	2.21	9.00	N
4	9F1800		100KOHM 10-TURN POT	5.3	21.20	N
3	10F003	50100	500 TRIM, LOK, PNL-MT	3.00	9.00	N
15	10F055		50K TRIM, LOK, PNL-MT	3.00	45.00	N
28	12F9000	3309F	20K TRIM BU-MT	.6	18.20	N
4	14F1207	UM5-0000	0 PF, DIP-MICA CAP.	.36	1.44	N
22	14F1269	UM5-0800	8 PF, DIP-MICA CAP.	.36	7.92	N
7	14F554	UM15-1200	12 PF, DIP-MICA CAP.	.20	1.40	N
34	14F555	UM15-1500	15 PF, DIP-MICA CAP.	.20	6.80	N
45	14F557	UM15-2000	20 PF, DIP-MICA CAP.	.18	8.10	N
1	14F562	UM15-3300	33 PF, DIP-MICA CAP.	.24	.24	N
1	14F565	UM15-4700	47 PF, DIP-MICA CAP.	.24	.24	N
3	14F567	UM15-5000	50 PF, DIP-MICA CAP.	.19	.57	N
3	14F557	UM15-1010	100 PF, DIP-MICA CAP.	.18	.54	N
4	14F560	UM15-2010	200 PF, DIP-MICA CAP.	.20	.80	N
51	14F592	UM15-4170	470 PF, DIP-MICA CAP.	.32	16.32	N
1	19F1700	035-0000	.005 MF, DSC-CER CAP.	.12	.12	N
27	07F307	100-1052	.01 MF, DSC-CER CAP.	.05	1.35	N
1	07F305	100-5050	.05 MF, DSC-CER CAP.	.37	.37	N
7	07F313	100-1050	.1 MF, DSC-CER CAP.	.16	1.12	N
4	35F1950	SW039	39 MICROHENRY CHOKE	2.91	11.64	N
4	35F1969	SW0470	470 MICROHENRY CHOK	2.91	11.64	N
1	15F2317	9050	120-280 VARI. CHOKE	3.39	3.39	N
1		1053400	9.1V ZENER 5W	2.50	2.50	N
15		1053500	5.1V ZENER 5W	2.50	37.50	N
4	22F423	1402	SW. 0-POS.	3.00	12.00	N
1	59F1740	182090	POWER SWITCH, AMBER	3.97	3.97	N
2	27F704	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-PP	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	39F1540	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	39F1540	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	13-230	0NC, FM-CHS. MT.	.72	226.08	N
7	61F1175	KD-1250A-1/4"	ALUM. KNOB(TIMING)	1.75	12.25	N
4	12F6045	DFA-N	COUNTING DIAL	4.75	19.00	N

SUB-TOTAL: 772.95
 SUB-TOTAL: 400.92

NEWARK TOTAL 1173.81

****ALLIED ELECTRONICS****

154		525-1060	10 OHM, 1/4 W RES	.26	10.78	A
10		525-1081	15 OHM, 1/4 W RES	.26	1.00	A
30		525-1117	27 OHM, 1/4 W RES	.26	3.00	A
1		525-1153	47 OHM, 1/4 W RES	.26	4.10	A
243		525-1185	75 OHM, 1/4 W RES	.26	17.01	A
235		525-1202	100 OHM, 1/4 W RES	.26	16.45	A
19		525-1226	150 OHM, 1/4 W RES	.26	1.90	A
48		525-1248	220 OHM, 1/4 W RES	.26	4.80	A
79		525-1263	270 OHM, 1/4 W RES	.26	7.00	A
21		525-1270	300 OHM, 1/4 W RES	.26	2.10	A
10		525-1276	330 OHM, 1/4 W RES	.26	1.00	A
58		525-1302	470 OHM, 1/4 W RES	.26	5.80	A
66		525-1308	510 OHM, 1/4 W RES	.26	6.60	A
27		525-1330	680 OHM, 1/4 W RES	.26	2.70	A
107		525-1356	1K0 OHM, 1/4 W RES	.26	7.49	A
10		525-1361	1.1K0OHM, 1/4 W RES	.26	1.00	A
30		525-1360	1.5K0OHM, 1/4 W RES	.26	3.00	A
65		525-1405	2.2K0OHM, 1/4 W RES	.26	6.50	A
13		525-1421	2.7K0OHM, 1/4 W RES	.26	1.30	A
10		525-1427	3K OHM, 1/4 W RES	.26	1.00	A
10		525-1433	3.3K0OHM, 1/4 W RES	.26	1.00	A
10		525-1461	4.7K0OHM, 1/4 W RES	.26	1.00	A
134		525-1467	5.1K0OHM, 1/4 W RES	.26	9.38	A
10		525-1469	6.8K0OHM, 1/4 W RES	.26	1.00	A
227		525-1522	10K OHM, 1/4 W RES	.26	15.89	A
17		525-1528	11K OHM, 1/4 W RES	.26	1.70	A
32		525-1550	15K OHM, 1/4 W RES	.26	3.30	A
10		525-1603	27K OHM, 1/4 W RES	.26	1.00	A
10		525-1650	47K OHM, 1/4 W RES	.26	1.00	A
10		525-1703	62K OHM, 1/4 W RES	.26	1.00	A
10		525-1717	100K0OHM, 1/4 W RES	.26	1.00	A
10		525-1907	2.2M0OHM, 1/4 W RES	.26	1.00	A
241	555-0914	1N914B	SIL-DIODE	.19	45.79	A
4	652-0019		47PF, POLY CAP	.13	.52	A
4	652-0026		100PF, POLY CAP	.13	.52	A
8	652-0050		1000PF, POLY CAP	.13	1.04	A
4	652-0110		.01 MFD, POLY CAP	.13	.52	A
8	652-0900		.047 MFD, POLY CAP	.13	1.04	A
8	652-0104		.47 MFD, POLY CAP	.13	1.04	A
4	652-4601		10 MFD, ELEC CAP, 35V	.48	1.92	A
4	652-5250		100 MFD, ELEC CAP, 150V	2.41	9.64	A
4	710-1248	1-0-005	5 MF, 25VDC, ELEC.	.42	1.68	A
11	710-1251	2-0-101	10 MF, 25VDC, ELEC.	.44	4.84	A
1	710-1253	3-0-020	20 MF, 10VDC, ELEC.	.20	.20	A
2	710-1254	3-0-025	25 MF, 25VDC, ELEC.	.46	.92	A
7	710-1258	4-0-050	50 MF, 25VDC, ELEC.	.46	3.22	A
142	710-1260	7-0-1000	100 MF, 25VDC, ELEC.	.24	34.08	A
2	710-1216	6-0-2500	250 MF, 2120C, ELEC.	.58	11.16	A
4	710-1339	L-0-500	500 MF, 16VDC, ELEC.	.45	1.80	A
4	710-1340	N-0-100V	1000MF, 16VDC, ELEC.	.67	2.68	A
4 (BOX 100)	920-1603	1803	1AP SCREWS #6*3/8	1.78	7.12	A
4 (BOX 100)	920-1365	1365	NUTS 4-40*1/4 HEX	1.62	6.48	A
1 (BOX 100)	920-1397	1497	SOLDER LUGS 3/0 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	54620240	CC40	40 BIN RACK	22.50	22.50	A
8	652-0507	205N	SN, SPOT	2.13	18.48	A

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

TOTAL=338.62

MICROSONICS
WEYMOUTH, MASS. 02188

1	K108/ART1B	X TAL-14,318180MHZ	140.00	M
			<u>TOTAL</u>	140.00

OHM ELECTRONICS
649 VERMONT AVE.
PALANTINE, ILL. 60067

2000	1938-4	05-30-0001 IC DIP SOCKETS	.036	25.50	0
1000	1875-2L	02-04-1112 TRANS. SOCKETS	.245	24.50	0
			<u>TOTAL</u>	50.00	

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

TO	1-525-063-11	6-PIN FEMALE CHS MT	.90	9.00	AP
30		09-02-1152 MOLEX P-C BOARD CON.	.58	17.50	AP
300	0-30110	MOLEX INSERTS	.036	10.70	AP
* 1		CEN-4092-5 COLOR ENCODER BRD	400.00	400.00	AP
* 1	713-6140	225-2222-401 44 CONTACT CON	5.89	5.89	A
			<u>TOTAL</u>	437.20	

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

1	LOS-2-15	15V, 1.4AMP POW SUP	32.00	32.00	L
2	LOS-2-5	5V, 3AMP POWER SUP	32.00	64.00	L
1	L-12-0V-15	NON-ADJ. OVP	8.00	8.00	L
2	L-12-0V-5	NON-ADJ. OVP	8.00	16.00	L
1	LOD-W-152	12V, 3AMP POWER SUP	87.00	87.00	L
2	L-12-0V-12	NON-ADJ. OVP	8.00	16.00	L
			<u>TOTAL</u>	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	1CL80388C	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	3202ADC	DIP MOS DECODER	18.56	18.56	S
1	7404	DIP BUF	.70	.70	S
			<u>TOTAL</u>	347.30	

NOTICE: THE SONY COLOR ENCODER BOARD (FROM ADVENT) HAS BEEN DISCONTINUED.
WHEN A REPLACEMENT 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 GENERATOR	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 parenthesis

FOR CLASSICAL I-P P-C BOARD TALLY	TOTAL	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

QUANTITY= _____

BOARD

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				G10 GLASS EPOXY				CUSTOMER SUPPLIED		
			THICKNESS				THICKNESS				Non sens.	Photo sens.	
			1/32	1/16	3/32	1/8	1/32	1/16	3/32	1/8			
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	.098	.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	Price/ board Delivery required				
	1 DAY	2 DAYS	3 DAYS	1 WEEK	2 WEEKS
quantity 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

$\$1.746 \times \text{quantity} = \text{base price} = \$ \text{_____} \text{ A}$
base cost

$\$ \text{_____} \times \text{quantity} = \text{service} = \$ \text{_____} \text{ B}$
etching cost

$\$ \text{_____} \times \text{quantity} = \text{misc. charg} = \$ \text{_____} \text{ C}$
hole cost

$(A+B+C) \times 20\% = \text{TOTAL COST} = \$ \text{_____} \text{ D}$

* Call to confirm delivery on these quantities.

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.

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

mail w/
check to:

TO: ROGAN KNOBS
3455 WOODHEAD DR.
NORTHBROOK, ILL.

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

I-P BOXES
(chassis)

mail w/
check to:

- ... POWER SUPPLY #1 -1
- ... POWER SUPPLY #2 -1
- ... INPUT -1
- ... COMPARATOR -1
- ... DIFFERENTIATOR -1
- ... FUNCTION GENERATOR -1
- ... REFERENCE -1
- ... ADDER-MULTIPLIER -8
- ... OSCILLATOR -2
- ... SYNC. GENERATOR -1
- ... SYNC. STRIPPER -1
- ... AMPLITUDE CLASSIFIER-3
- ... COLOR ENCODER -1
- ... BOX(blank) -1

deliver to:

name

address

city

phone

signature

date

total
boxes

total for
for classical I-P= 24

x\$8.25 =

\$

price

TO: D&G ENTERPRISES

1820 S. HALSTED ST.
CHICAGO, ILL. 60608