

PARTS LIST
AND
SERVICE INFORMATION
FOR
PACE CAR PRO
(4 PLAYER - COLOR)

ELECTRA GAMES, INC.
2570 United Lane
Elk Grove Village, Illinois 60007

504005 - EG 1000 D Digital Logic Printed Circuit Assembly

Replacement Parts for EG 1000 D

Resistors

All resistors (both 1/2 watt and 1/4 watt) used on the EG 1000 D assembly are standard ±10% carbon resistors.

Capacitors

102001	5 mfd, 25 volt axial lytic capacitor -20% +80%
102007	10 mfd, 35 volt axial lytic capacitor -20% +80%
102017	1 mfd, 25 volt axial lytic capacitor -20% +80%
102029	50 mfd, 35 volt axial lytic capacitor -20% +80%
102031	500 mfd, 25 volt axial lytic capacitor -20% +80%
102066	200 mfd, 6 volt non-polarized axial lytic capacitor -20% +80%
103001	.001 mfd, 100 volt ceramic disc <u>±10%</u>
103003	.047mfd, 100 volt ceramic disc <u>±10%</u>
103013	.003 mfd, 100 volt ceramic disc <u>±10%</u>
103017	.01 mfd, 100 volt ceramic disc <u>±10%</u>
103025	100 pfd, 50 volt ceramic disc <u>±10%</u>
103039	.1 mfd, 16 volt ceramic disc <u>±10%</u>
103060	1 mfd, 35 volt tantalum capacitor <u>±20%</u>
103068	.0047 mfd, 100 volt mylar capacitor <u>±10%</u>
103071	470 pfd, 100 volt ceramic disc <u>±10%</u>
103076	47 pfd, 100 volt ceramic disc <u>±10%</u>

Replacement Parts for EG 1000 D cont'd.

Semiconductors

105003	2N3394 NPN transistor
105005	2N3416 NPN transistor
105015	DA 1704 diode
105044	2N5458 transistor

Integrated Circuits

Refer to integrated circuits parts list and EG 1000 D component layout, part number 504009.

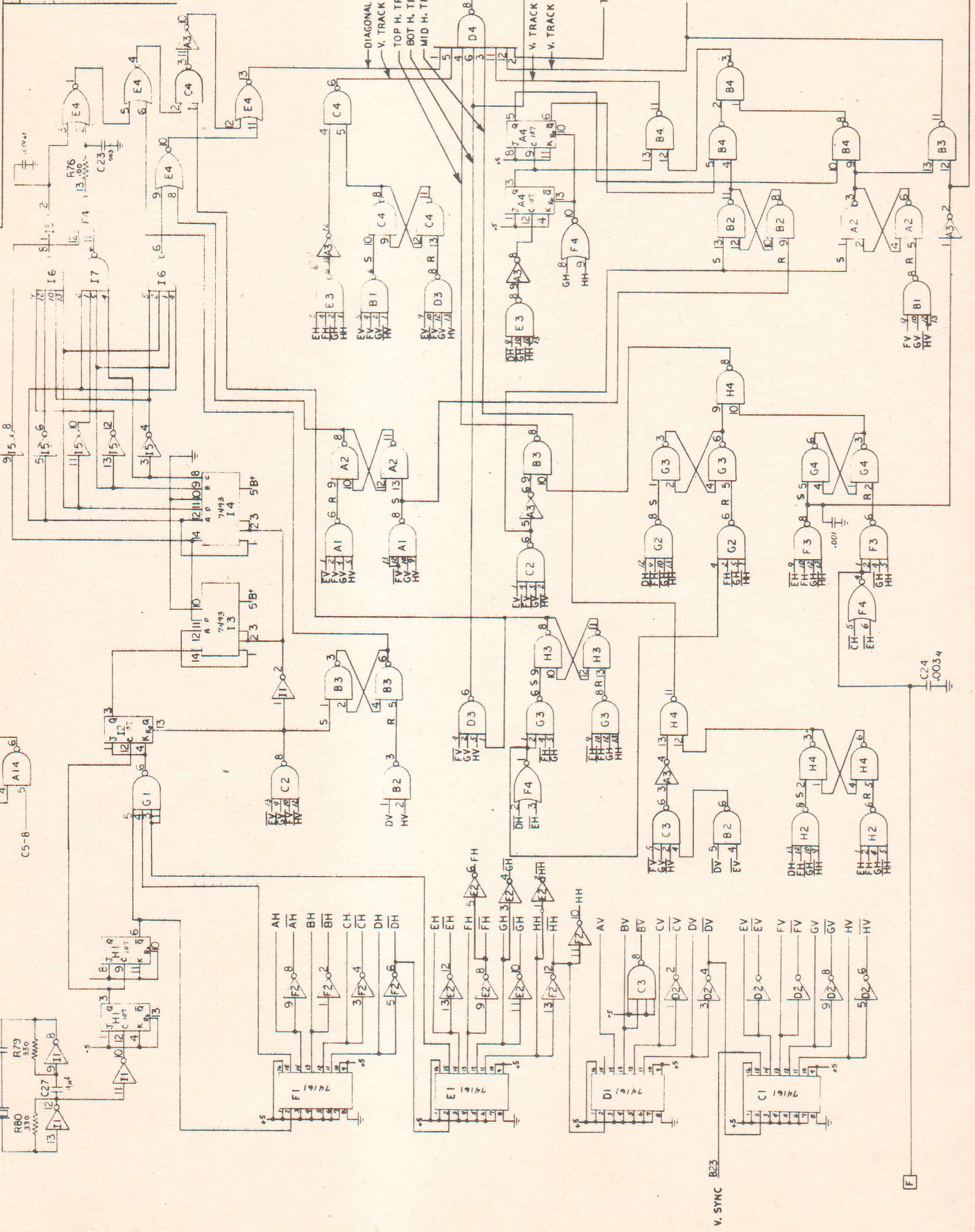
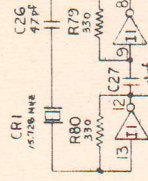
Miscellaneous Parts

107048	5K ohm linear trimmer potentiometer
110005	Sigma 191-TE1A15S relay
112003	U.I.D. SW422P DPDT slide switch
901035	SCM-35 crystal

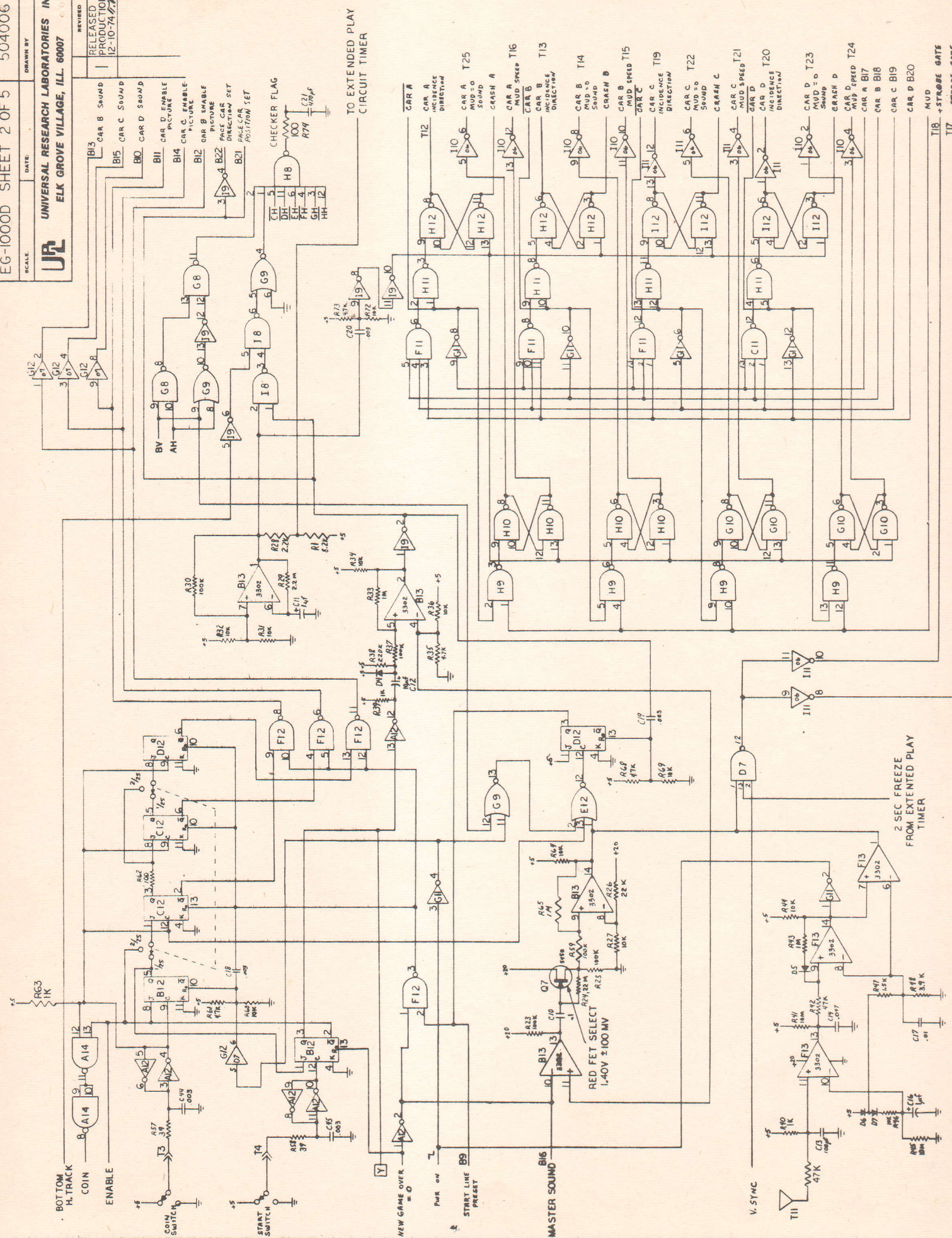
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PRODUCTION
12-10-74
R.E.A.

BLANKING

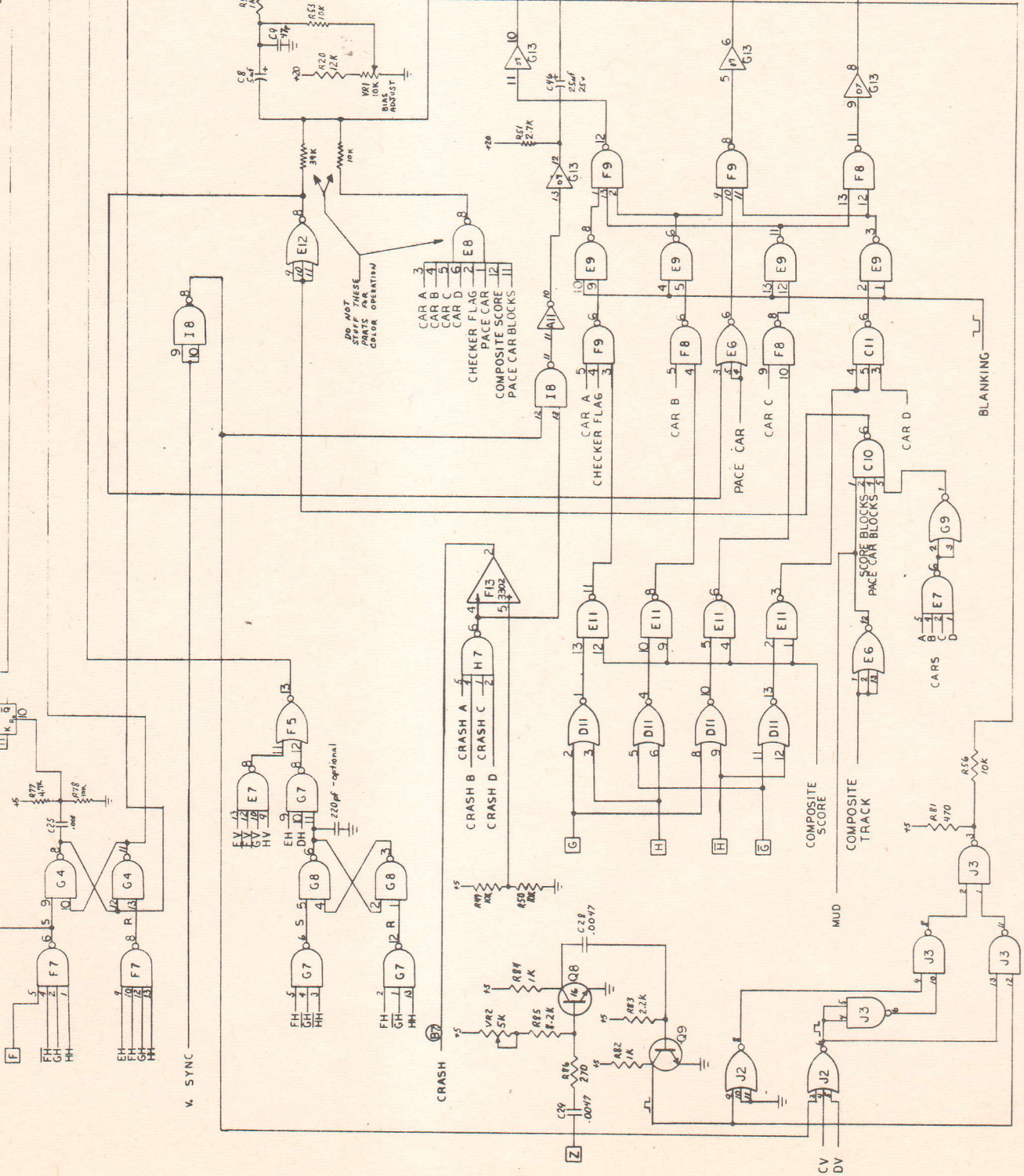
EH
GH
HH

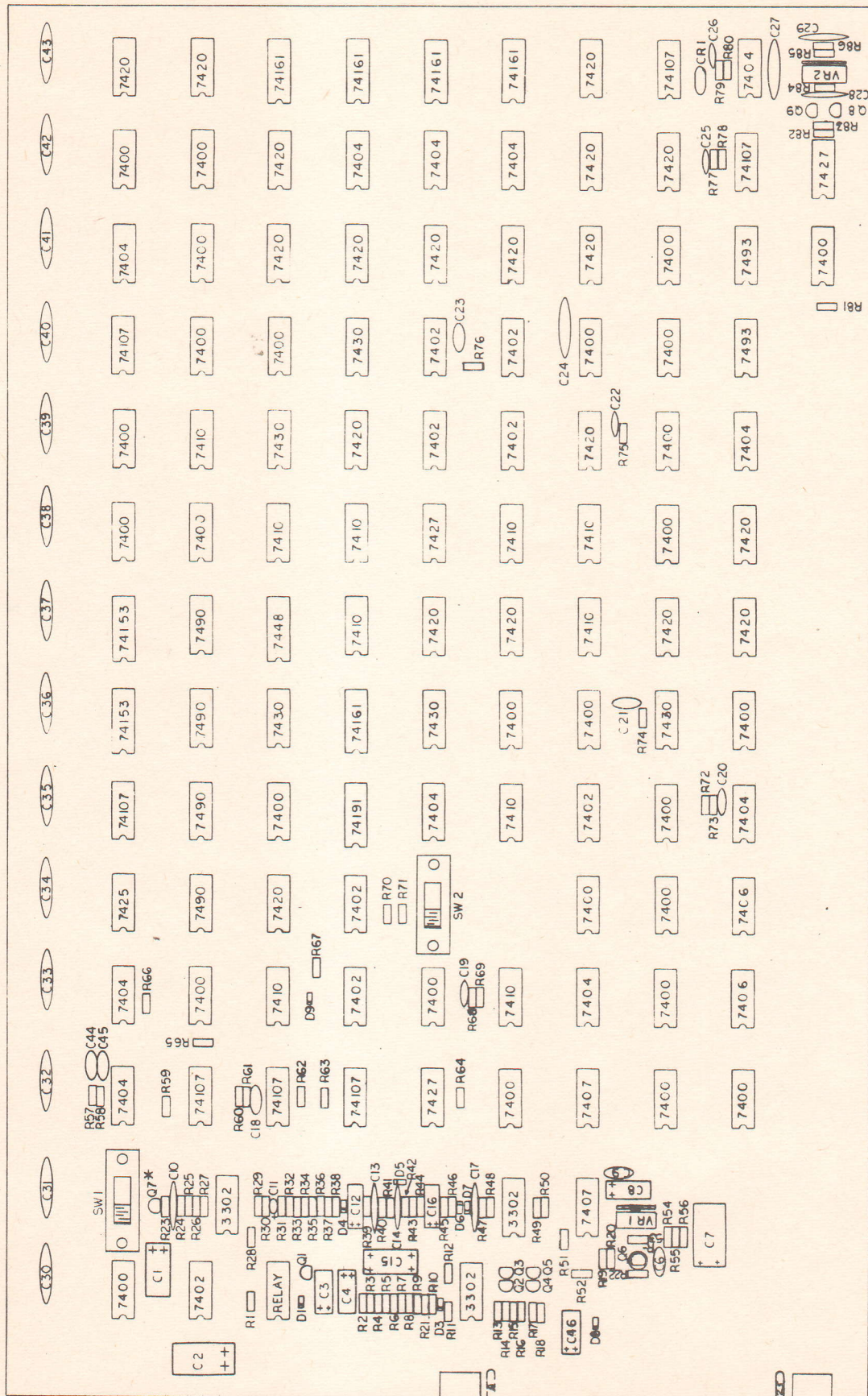


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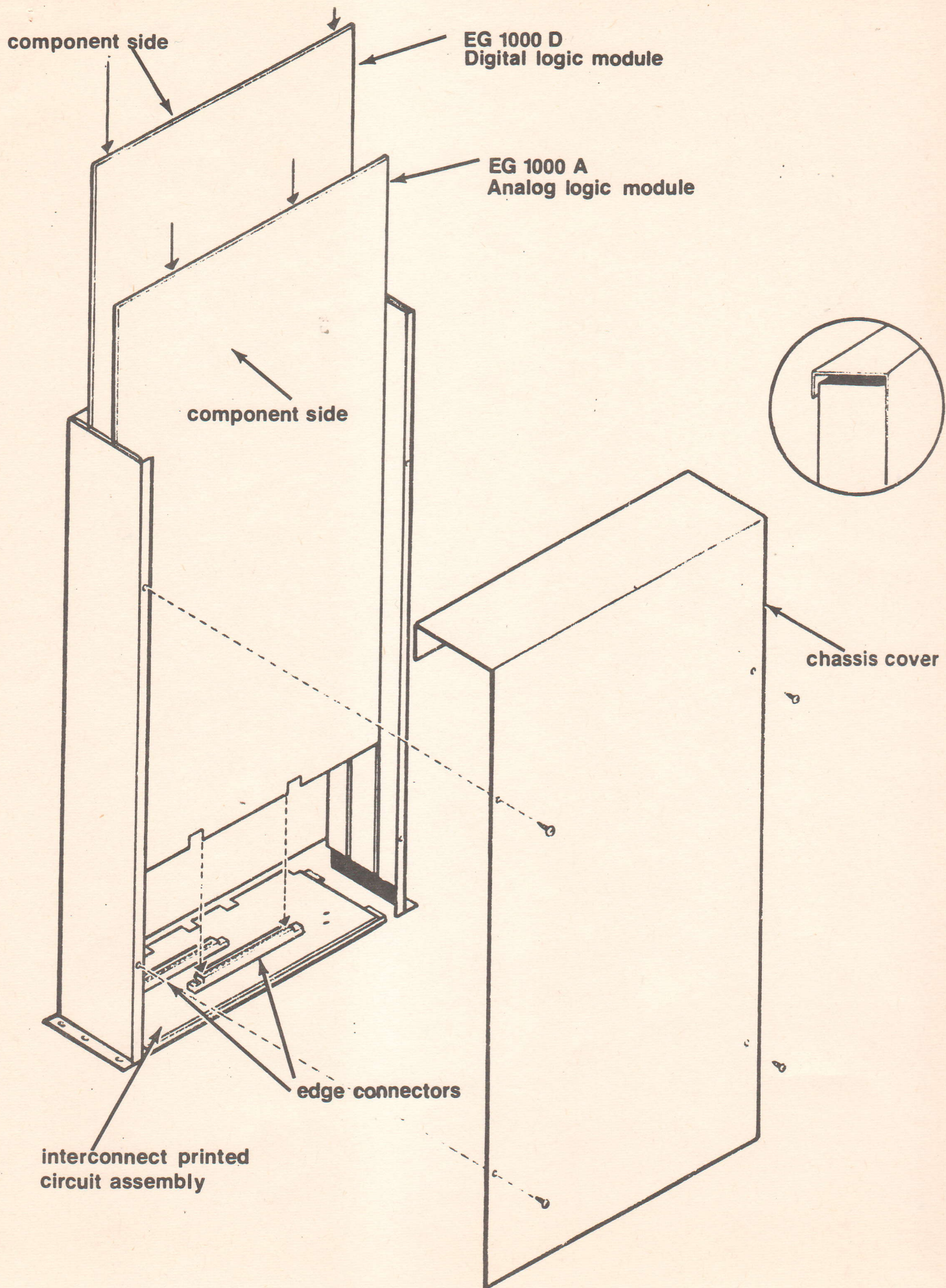
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COMPONENT SIDE

* RED SELECTED FET.



504010 - EG 1000 A Analog Logic Printed Circuit Assembly

Replacement Parts for EG 1000 A

Resistors

All 5% and 10% tolerance resistors (both 1/2 watt and 1/4 watt) used on the EG 1000 A assembly are standard carbon resistors.

All 1% tolerance resistors are metal film.

101220	100 ohm, 1/2 watt, 1% resistor
101221	121 ohm, 1/2 watt, 1% resistor
101222	130 ohm, 1/2 watt, 1% resistor
101223	150 ohm, 1/2 watt, 1% resistor
101224	250 ohm, 1/2 watt, 1% resistor
101225	523 ohm, 1/2 watt, 1% resistor
101226	768 ohm, 1/2 watt, 1% resistor
101227	1.62K ohm, 1/2 watt, 1% resistor
101228	1.74K ohm, 1/2 watt, 1% resistor
101229	2.49K ohm, 1/2 watt, 1% resistor
101230	3.65K ohm, 1/2 watt, 1% resistor

Capacitors

102001	5 mfd, 25 volt axial lytic capacitor -20% +80%
102019	25 mfd, 25 volt axial lytic capacitor -20% +80%
102033	1 mfd, 50 volt axial lytic capacitor -20% +80%
102039	100 mfd, 25 volt axial lytic capacitor -20% +80%
102040	10 mfd, 25 volt axial lytic capacitor -20% +80%

Replacement Parts for EG 1000 A cont'd.

Capacitors, cont'd.

102045	250 mfd, 25 volt axial lytic capacitor -20% +80%
103001	.001 mfd, 100 volt ceramic disc $\pm 10\%$
103003	.047 mfd, 100 volt mylar capacitor $\pm 10\%$
103006	.22 mfd, 100 volt mylar capacitor $\pm 10\%$
103008	.022 mfd, 100 volt mylar capacitor $\pm 10\%$
103014	.47 mfd, 100 volt mylar capacitor $\pm 10\%$
103017	.01 mfd, 100 volt ceramic disc $\pm 10\%$
103019	.002 mfd, 100 volt ceramic disc $\pm 10\%$
103028	.0068 mfd, 100 volt ceramic disc $\pm 10\%$
103039	.1 mfd, 16 volt ceramic disc -20% +80%
103066	.015 mfd, 100 volt ceramic disc $\pm 20\%$
103068	.0047 mfd, 100 volt mylar capacitor $\pm 10\%$
103071	470 pfd, 100 volt ceramic disc $\pm 10\%$
103085	15 mfd, 35 volt tantalum capacitor $\pm 10\%$
103086	.015 mfd, 100 volt mylar capacitor $\pm 10\%$
103087	.0068 mfd, 100 volt mylar capacitor $\pm 10\%$

Semiconductors

105003	2N3394 NPN transistor
105003	2N3394 NPN selected noise transistor (special)
105005	2N3416 NPN transistor
105015	DA 1704 diode
105021	2N5355 PNP transistor
105044	2N5458 transistor

Replacement Parts for EG 1000 A cont'd.

Semiconductors, cont'd.

105066 1N752A 5.6 volt, ±5% zener diode

Integrated Circuits

Refer to integrated circuits parts list and EG 1000 A component layout, part number 504014.

Miscellaneous Parts

107001	10K ohm trimmer potentiometer
107006	500 ohm trimmer potentiometer
107007	1K ohm trimmer potentiometer
107009	250K ohm trimmer potentiometer
107047	100K ohm linear trimmer potentiometer

EG-1000A SHEET 1 OF 5

504011

SCALE:

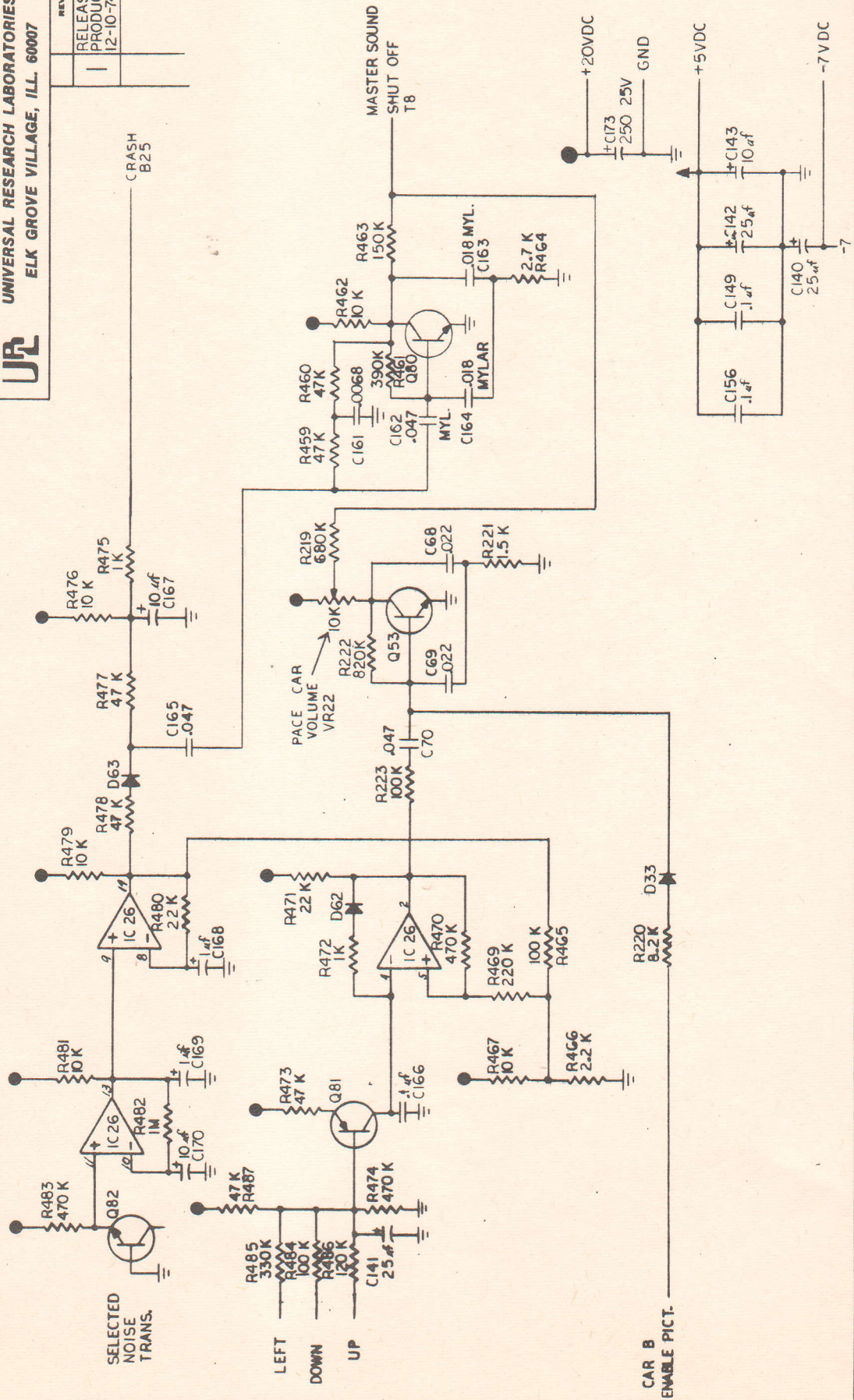
DATE:

DRAWN BY: *W.C.*

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ELK GROVE VILLAGE, ILL. 60007

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12-10-74 *W.C.*



EG-1000D SHEET 2 OF 5

504014

SCALE: 1/1

DATE:

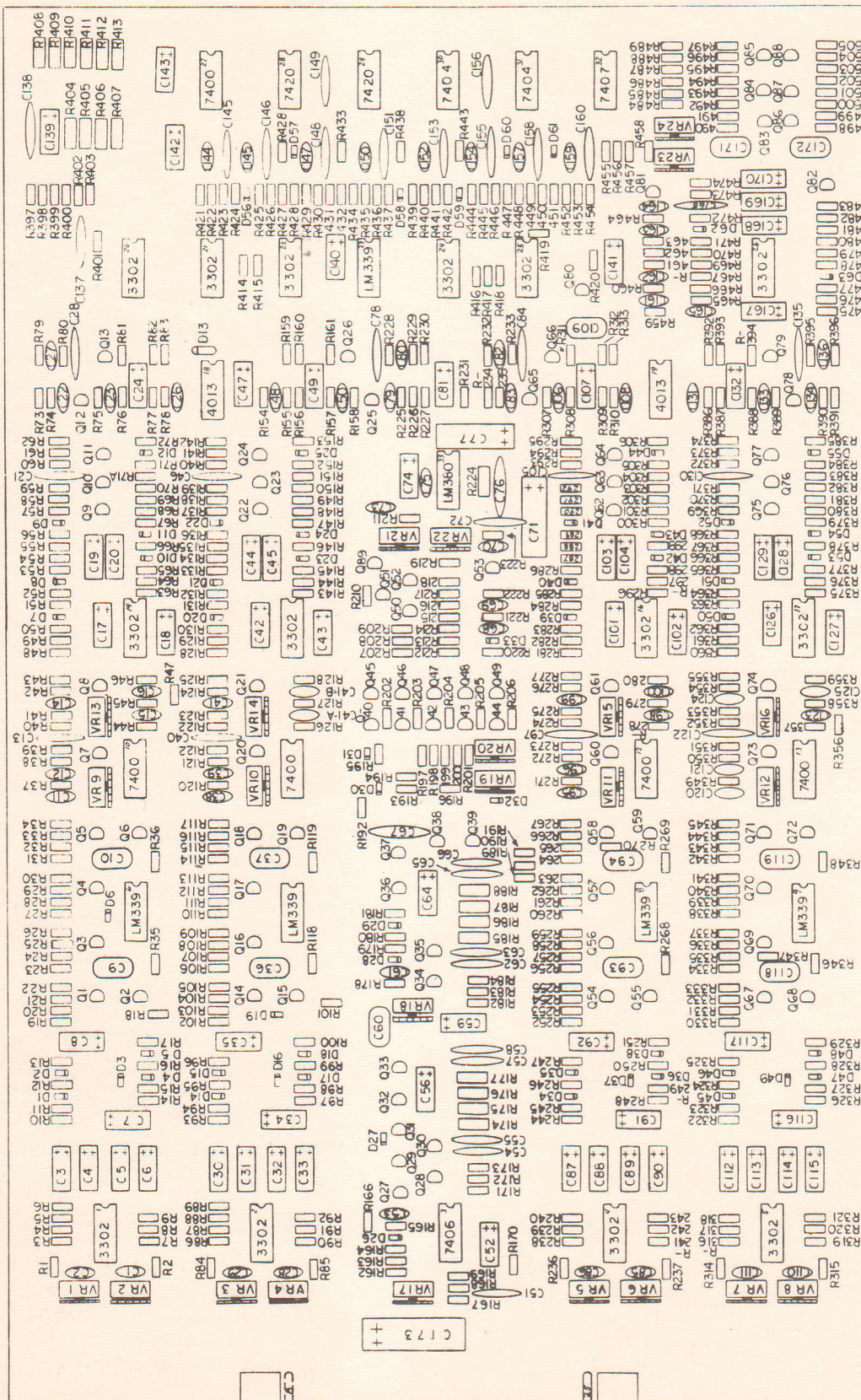
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UNIVERSAL RESEARCH LABORATORIES INC.
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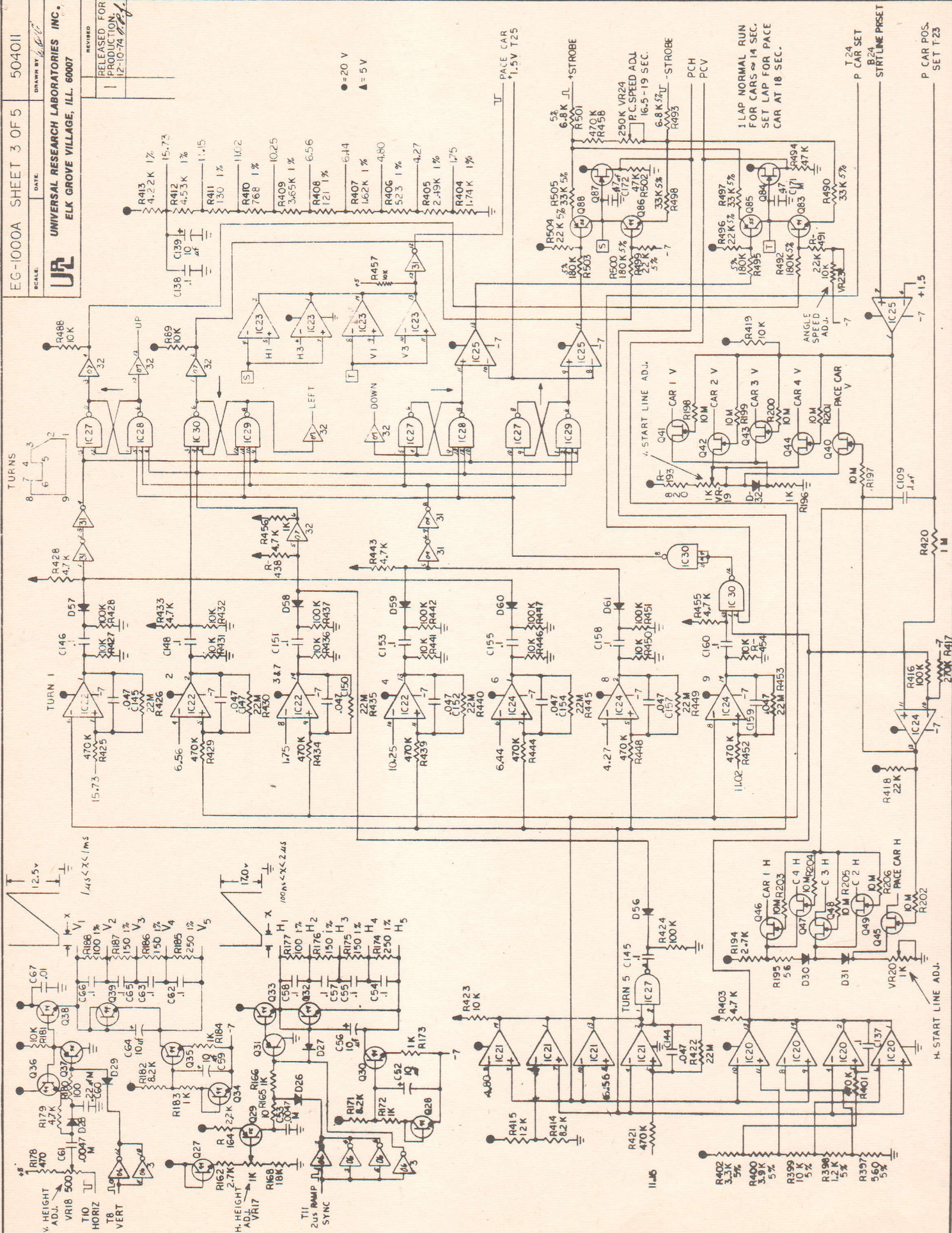
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COMPONENT SIDE



TRIMMER POTS:VR1		HORIZ. AMP. BIAS	VR9	RED CAR	HEIGHT ADJ.	VR17	HORIZ. RAMP ADJ.
VR2		VERT. AMP. BIAS	VR13	WIDTH ADJ.		VR18	VERT. RAMP ADJ.
VR3		HORIZ. AMP. BIAS	VR0	YELLOW CAR	HEIGHT ADJ.	VR19	VERT. CAR PLACEMENT
VR4		VERT. AMP. BIAS	VR14	WIDTH ADJ.		VR20	HORIZ. CAR PLACEMENT
VR5		HORIZ. AMP. BIAS	VR11	VIOLET CAR	HEIGHT ADJ.	VR21	MASTER VOLUME ADJ.
VR6		VERT. AMP. BIAS	VR15	WIDTH ADJ.		VR22	PACE CAR VOLUME ADJ.
VR7		HORIZ. AMP. BIAS	VR12	BLUE CAR	HEIGHT ADJ.	VR23	PACE CAR DIAGONAL TRACK ADJ.
VR8		VERT. AMP. BIAS	VR16	WIDTH ADJ.		VR24	PACE CAR SPEED ADJ.

● -20 V
▲ = 5 V



504016 - Interconnect Printed Circuit Assembly

504020 - CA-1 Color Adjust Printed Circuit Assembly

Replacement Parts for CA-1

Resistors

All resistors used on the CA-1 are 1/2 watt ±10% tolerance carbon resistors.

Capacitors

102007	10 mfd, 35 volt axial lytic capacitor -20% +80%
102029	50 mfd, 35 volt axial lytic capacitor -20% +80%
103020	220 pfd, 50 volt ceramic disc <u>±</u> 10%
103025	100 pfd, 50 volt ceramic disc <u>±</u> 10%
103029	150 pfd, 500 volt ceramic disc <u>±</u> 20%

Semiconductors

105003	2N3394 NPN transistor
105015	DA 1704-diode
105021	2N5355 PNP transistor

Miscellaneous Parts

107001	10K ohm trimmer potentiometer
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504045 - SB-1 Switch Board Printed Circuit Assembly

Replacement Parts for SB-1

103039	.1 mfd, 16 volt ceramic disc -20% +80%
112003	U.I.D. SW422P DPDT slide switch

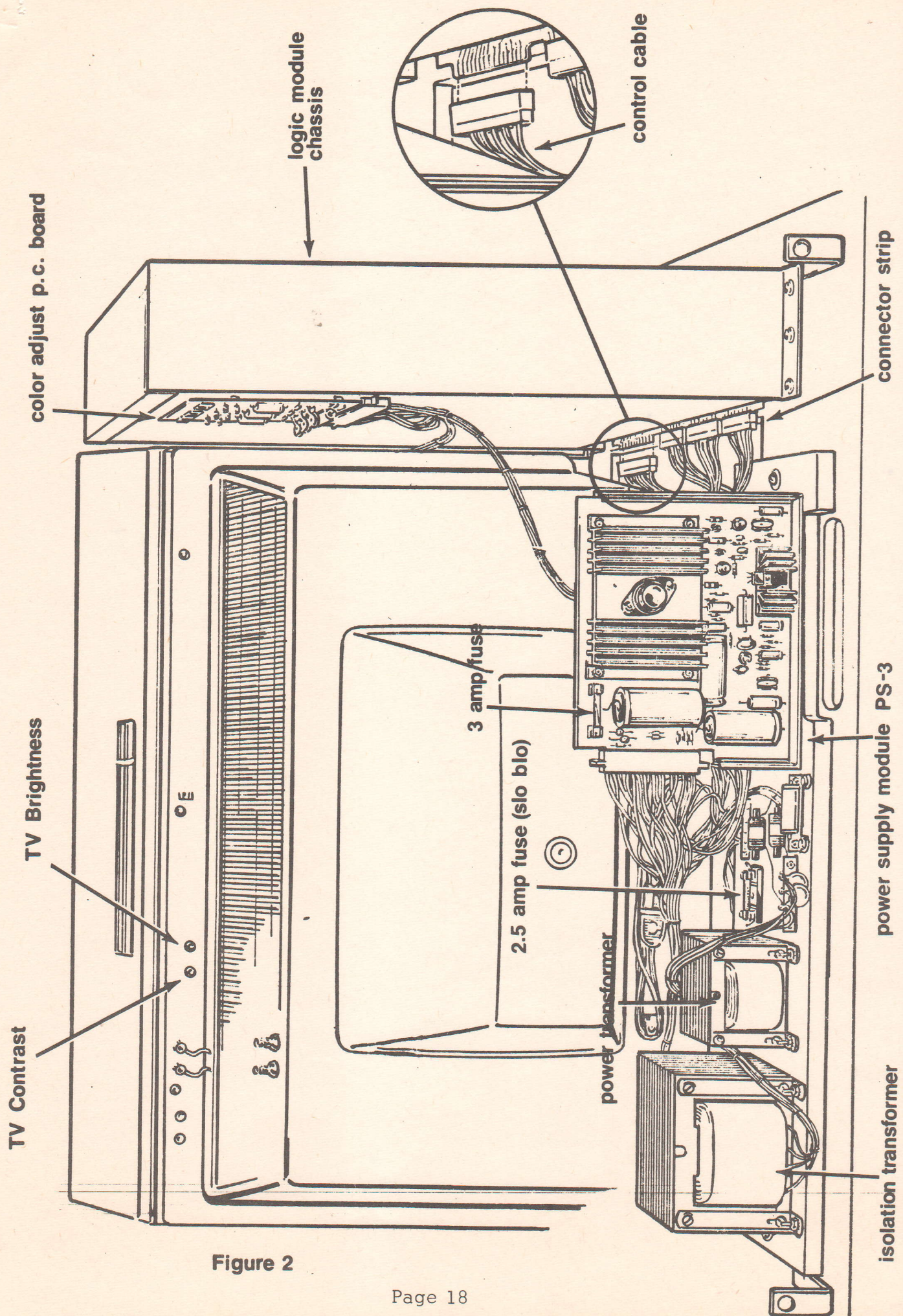
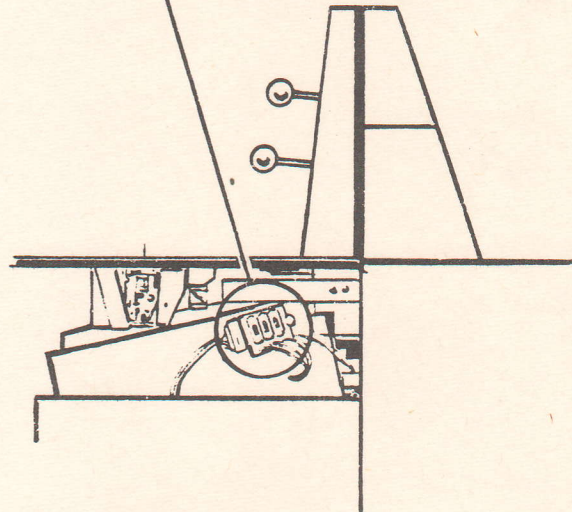
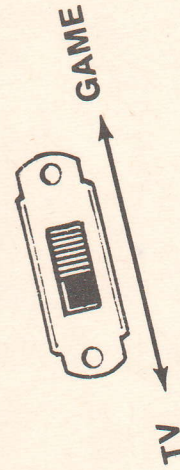
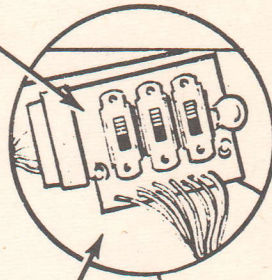


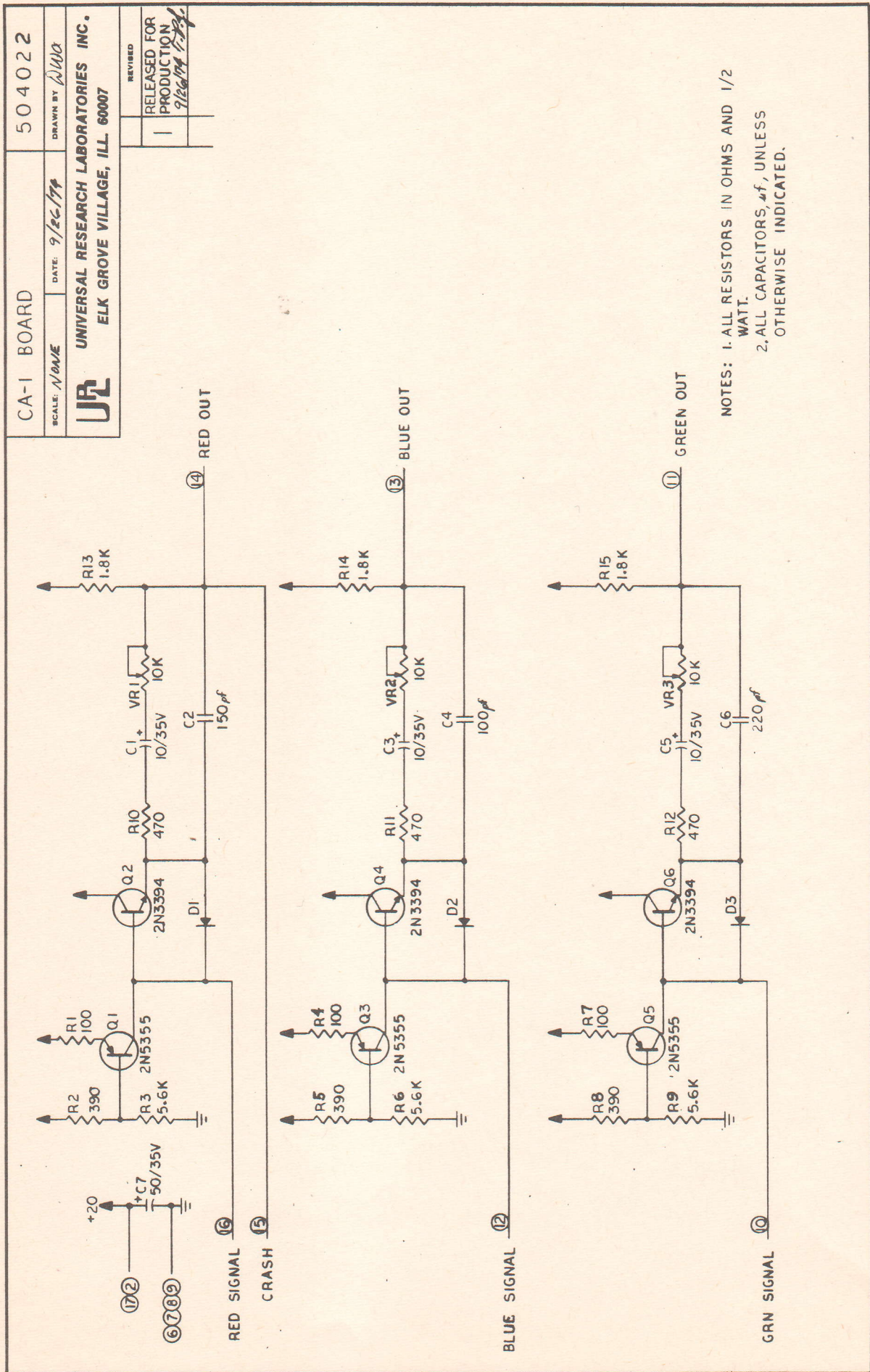
Figure 2

**SB-1 PRINTED CIRCUIT
ASSEMBLY**

GAME-TV switches (shown in game position)

**NOTE: All three switches must
be in the same position.**





504025 - ACS-1 AC Supply Assembly

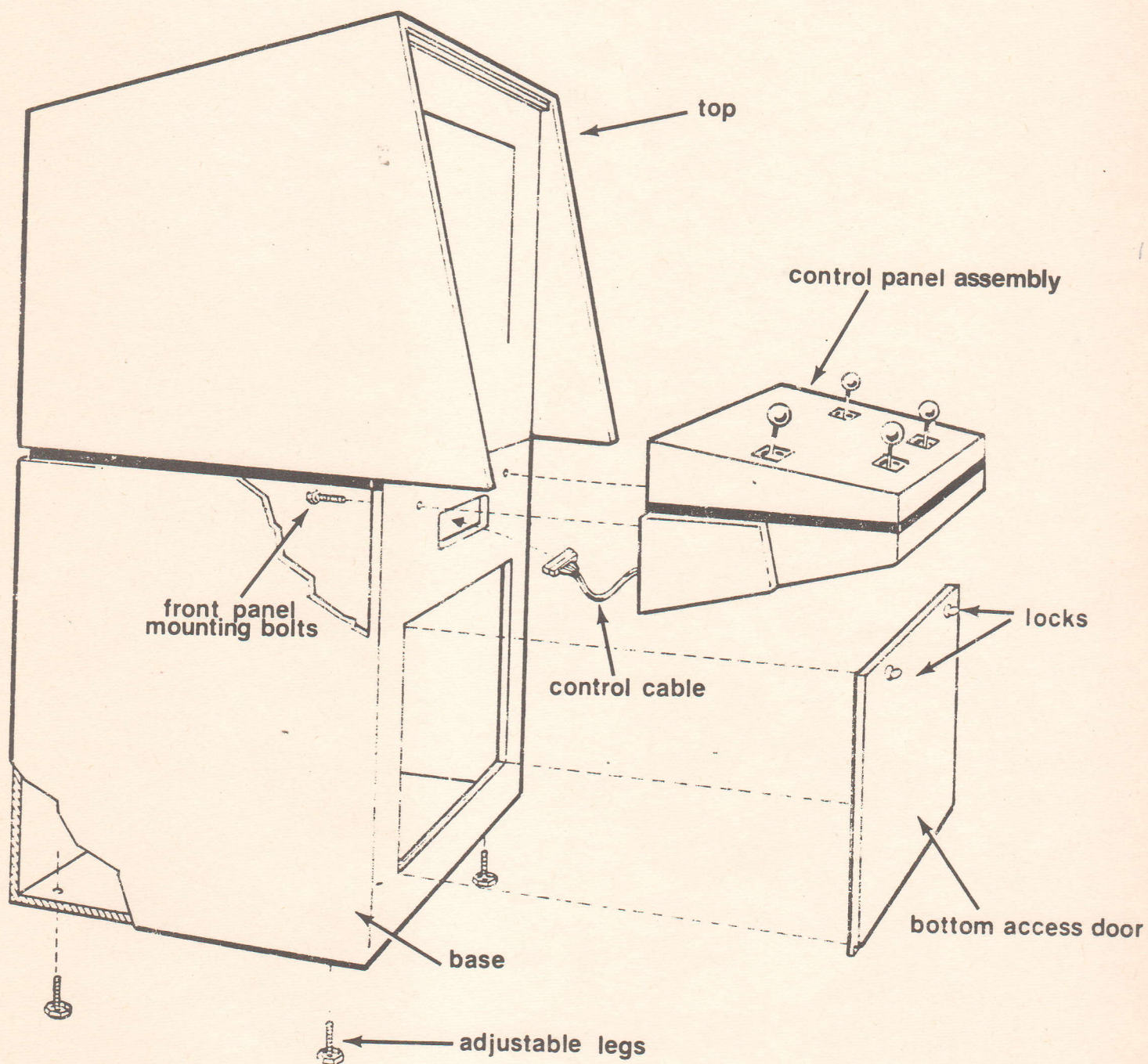
Replacement Parts for ACS-1

108011	Isolation transformer
504059	Power transformer assembly
103046	.01 mfd, 1400 volt ceramic disc $\pm 20\%$
103075	.47 mfd, 400 volt mylar capacitor $\pm 20\%$
104001	100 vk, 1.5 amp, R.F. choke coil
114013	3 ag, 2.5 amp slo blo fuse

504035 - Control Panel Assembly (complete)

Replacement Parts for Control Panel

901059	Control panel cabinet
901064	Control panel cabinet access door
901052	Formica top
504030	Control Arm (Joystick) assembly (without knob)
119016	Red knob
119017	Yellow knob
119018	Blue knob
119019	Purple knob
112012	Pushbutton (start) switch
115021	4" 8ohm loudspeaker



504050 - Front Window Panel Assembly

Replacement Parts for Above

504051	Plywood mounting board
119024	Smoked plexiglas rear window
119025	Clear plexiglas front window (screened)
119023	Black plastic trim moulding ("L" channel)
901044	Coin mechanism (complete)
901045	"Electra" nameplate

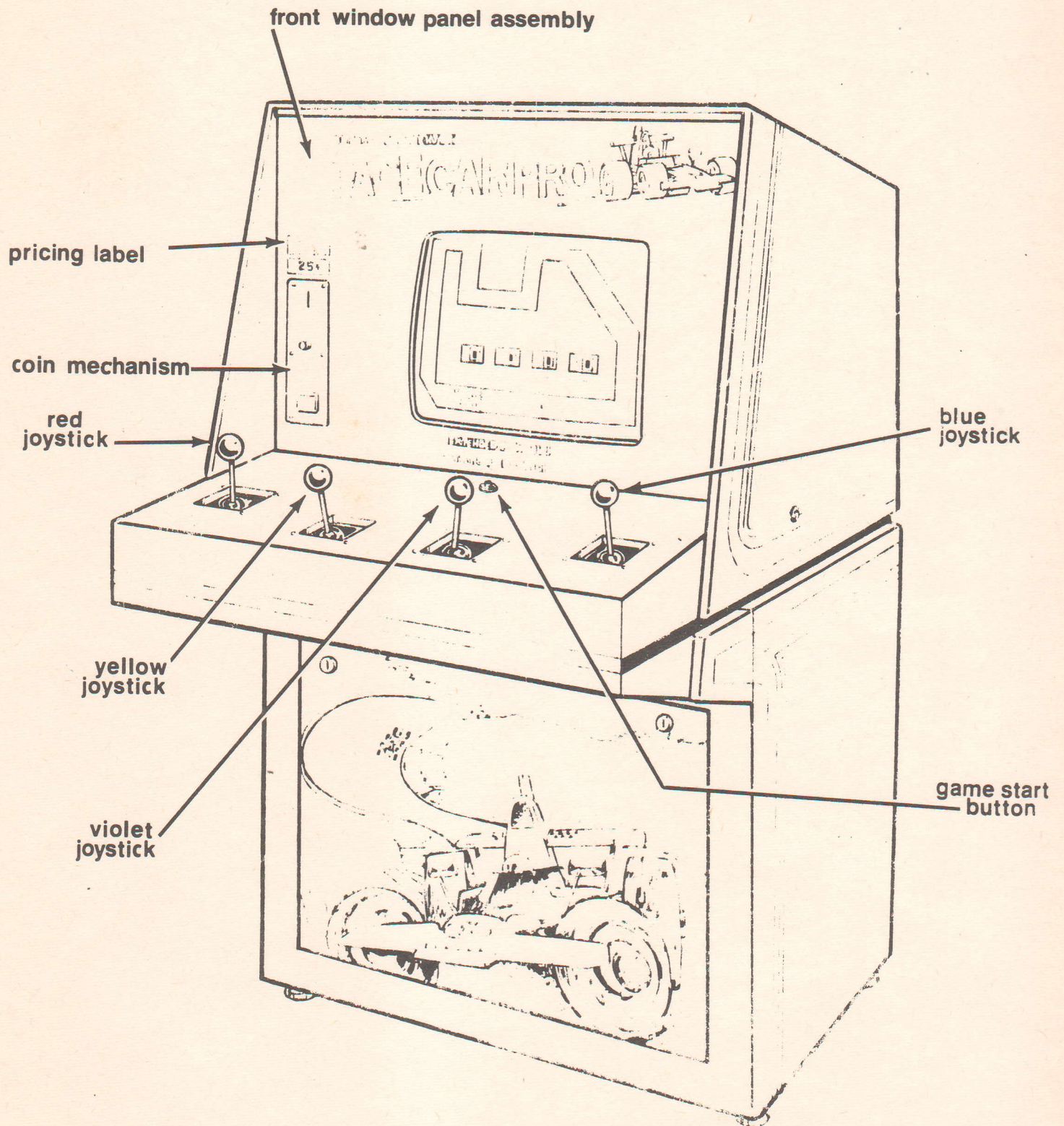
504040 - Color Television Assembly

Sylvania Model CX 4161 W modified, complete with SB-1. (See Sylvania parts list for replacement parts.)

504000 - Cabinet Assembly

Replacement Parts for Cabinet Assembly

901057	Cabinet base
901062	Cabinet base door
901058	Cabinet cover
901053	Coin box
901054	Coin box top
901055	Coin tube
118112	Coin box bracket
112009	Toggle (power) switch
117007	Lock hook bracket (to lock cabinet top to base)
117009	Lock (for L. S. cabinet top)



117010	Lock (for R.S. cabinet top)
117008	Lock (for cabinet base door)
118072	Adjustable leg (cabinet base)
110006	Electro-Mechanical counter (120 volt 60 Hz.)
103075	.47 mfd, 400 volt mylar capacitor $\pm 20\%$
102090	2.2 mfd, 250 volt axial lytic capacitor -20% +80%
105004	1N4003 rectifier
110007	Relay (DPDT coil 120 volt 60 Hz.)
113011	#47 lamp (6 volt)

501905 - PS-3 Power Supply Printed Circuit Assembly

Replacement Parts for PS-3

Resistors

All 1/2 watt resistors used on the PS-3 assembly are standard $\pm 10\%$ carbon resistors.

101102	15 ohm, 1 watt, $\pm 10\%$ resistor
101197	30 ohm, 1 watt, $\pm 10\%$ resistor
101199	25 ohm, 5 watt, $\pm 10\%$ resistor

Capacitors

102010	200 mfd, 12 volt axial lytic capacitor -20% +80%
102013	1000 mfd, 50 volt axial lytic capacitor -20% +80%
102018	10 mfd, 15 volt axial lytic capacitor -20% +80%
102019	25 mfd, 25 volt axial lytic capacitor -20% +80%
102035	1000 mfd, 25 volt axial lytic capacitor -20% +80%
102040	10 mfd, 25 volt axial lytic capacitor -20% +80%

102068 5 mfd, 10 volt axial lytic capacitor -20% +80%
102072 8000 mfd, 15 volt axial lytic capacitor -20% +80%
103001 .001 mfd, 100 volt ceramic disc $\pm 10\%$
103024 10 pfd, 50 volt ceramic disc $\pm 10\%$
103070 .0047 mfd, 100 volt ceramic disc $\pm 10\%$

Semiconductors

105004 Al4BX373 silicon rectifier
105017 D44C8 NPN transistor
105020 2N3055 NPN transistor
105041 Al5F silicon rectifier
105045 TO-3 transistor socket
105054 MPS 6531 NPN transistor
105055 MPS 6533 PNP transistor
105006 1N752A 5.6 volt zener diod $\pm 5\%$

Integrated Circuits

106004 N5748T operational amplifier

Miscellaneous Parts

107001 10K trimmer potentiometer
107007 1K trimmer potentiometer
114011 3 ag, 3 amp normal blo fuse
901024 Heat sink thermal compound

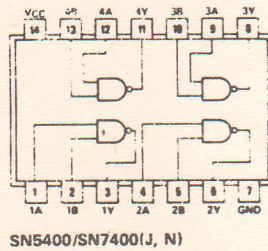
Integrated Circuits Parts List

<u>Part #</u>	<u>Type</u>	<u>Description</u>	<u>Subs.</u>
106019	7400	Quad 2-input nand gate	5400
106020	7402	Quad 2-input nor gate	5402
106011	7404	Hex inverter	5404
106057	7406	Hex inverter buffer	
106060	7407	Hex buffer	
106021	7410	Triple 3-input nand gate	
106030	7420	Dual 4-input nand gate	5420
106013	7425	Dual 4-input nor with strobe	US7429A
106034	7427	Triple 3-input nor gate	
106016	7430	Single 8-input nand gate	
106024	7448	BCD to 7-segment decoder	
106026	7490	decade counter	9390
106018	7493	4-bit binary counter	9393
106015	74107	Dual JK m/s flip flop	54107
106031	74153	Dual 4-bit multiplexer	DM8214
106033	74161	4-bit binary counter	9316
106055	74191	Up/down binary counter	
106061	MC14013	C/mos dual D flip flop	CM4013A
106037	LM339	Quad comparator	MC3302
106037	MC3302P	Quad comparator	LM339
106005	LM380	Power amplifier	
106004	LM748C	Operational amplifier	CA3748T

00

QUADRUPLE 2-INPUT
POSITIVE-NAND GATES

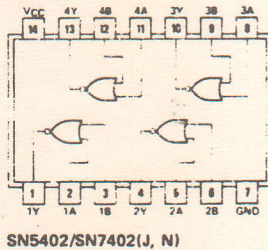
positive logic:
 $Y = \overline{AB}$



02

QUADRUPLE 2-INPUT
POSITIVE-NOR GATES

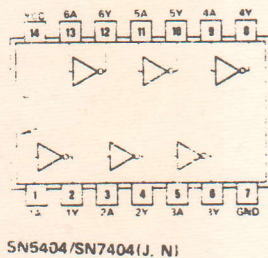
positive logic:
 $Y = \overline{A+B}$



04

HEX INVERTERS

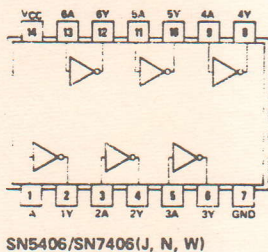
positive logic:
 $Y = \overline{A}$



06

HEX INVERTER BUFFERS/DRIVERS
WITH OPEN-COLLECTOR
HIGH-VOLTAGE OUTPUTS

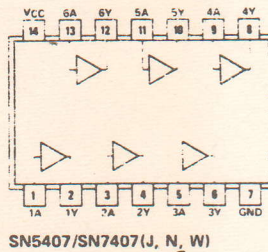
positive logic:
 $Y = \overline{A}$



07

HEX BUFFERS/DRIVERS
WITH OPEN-COLLECTOR
HIGH-VOLTAGE OUTPUTS

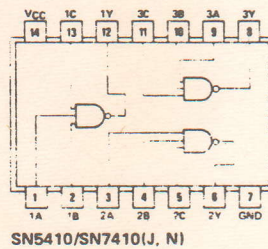
positive logic:
 $Y = A$



10

TRIPLE 3-INPUT
POSITIVE-NAND GATES

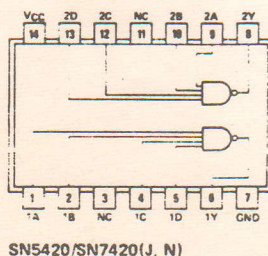
positive logic:
 $Y = \overline{ABC}$



20

DUAL 4-INPUT
POSITIVE-NAND GATES

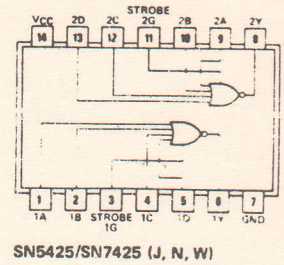
positive logic:
 $Y = \overline{ABCD}$



25

DUAL 4-INPUT
POSITIVE-NOR GATES
WITH STROBE

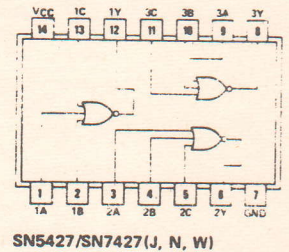
positive logic:
 $Y = \overline{G(A+B+C+D)}$



27

TRIPLE 3-INPUT
POSITIVE-NOR GATES

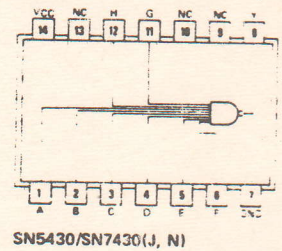
positive logic:
 $Y = \overline{A+B+C}$



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8-INPUT
POSITIVE-NAND GATES

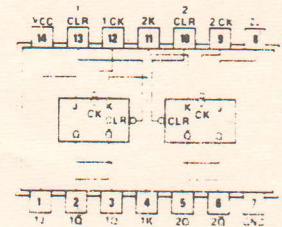
positive logic:
 $Y = \overline{ABCDEFGH}$



107

DUAL J-K MASTER-SLAVE FLIP-FLOPS WITH CLEAR

FUNCTION TABLE				
INPUTS				OUTPUTS
CLEAR	CLOCK	J	K	Q Q̄
L	X	X	X	L H
H	X	L	L	Q ₀ Q ₀
H	X	H	L	H L
H	X	L	H	L H
H	X	H	H	TOGGLE



POSITIVE-NAND GATES



A	B	Y
1	1	0
1	0	1
0	1	1
0	0	1

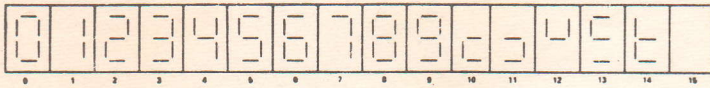
POSITIVE-NOR GATES



A	B	Y
1	1	0
1	0	0
0	1	0
0	0	1

7448

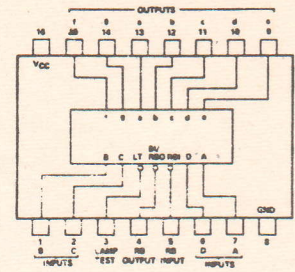
BCD-TO-SEVEN SEGMENT DECODER/DRIVER



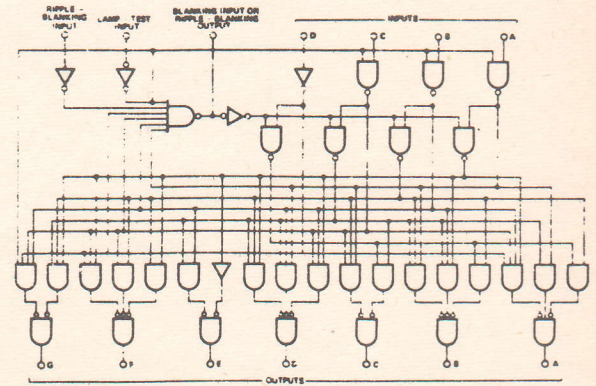
NUMERICAL DESIGNATIONS - RESULTANT DISPLAYS



SEGMENT IDENTIFICATION



FUNCTION	INPUTS							OUTPUTS						
	LT	RBI	D	C	B	A	BI/RBO	a	b	c	d	e	f	g
0	1	1	0	0	0	0	1	1	1	1	1	1	1	0
1	1	x	0	0	0	1	1	0	1	1	0	0	0	0
2	1	x	0	0	1	0	1	1	1	0	1	1	0	1
3	1	x	0	0	1	1	1	1	1	1	1	0	0	1
4	1	x	0	1	0	0	1	0	1	1	0	0	1	1
5	1	x	0	1	0	1	1	1	0	0	1	1	0	1
6	1	x	0	1	1	0	1	0	0	1	1	1	1	1
7	1	x	0	1	1	1	1	1	1	1	0	0	0	0
8	1	x	1	0	0	0	1	1	1	1	1	1	1	1
9	1	x	1	0	0	1	1	1	1	1	1	0	1	1
10	1	x	1	0	1	0	1	0	0	0	1	1	0	1
11	1	x	1	0	1	1	1	0	0	1	1	0	0	1
12	1	x	1	1	0	0	1	0	1	0	0	0	1	1
13	1	x	1	1	0	1	1	1	0	0	1	0	1	1
14	1	x	1	1	1	0	1	0	0	0	1	1	1	1
15	1	x	1	1	1	1	1	0	0	0	0	0	0	0
BI	x	x	x	x	x	x	0	0	0	0	0	0	0	0
RBI	1	0	0	0	0	0	0	0	0	0	0	0	0	0
LT	0	x	x	x	x	x	1	1	1	1	1	1	1	1



7490

DECADE COUNTER

BCD COUNT SEQUENCE (See Note 1)

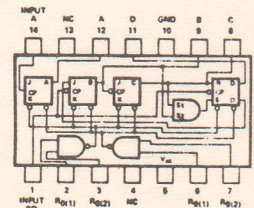
COUNT	OUTPUT			
	D	C	B	A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

RESET/COUNT (See Note 2)

RESET INPUTS				OUTPUT
R ₀ (1)	R ₀ (2)	R ₉ (1)	R ₉ (2)	
1	1	0	X	0 0 0 0
1	1	X	0	0 0 0 0
X	X	1	1	1 0 0 1
X	0	X	0	COUNT
0	X	0	X	COUNT
0	X	X	0	COUNT
X	0	0	X	COUNT

NOTES:

- Output A connected to input BD for BCD count.
- X indicates that either a logical 1 of a logical 0 may be present.
- Fanout from output A to input BD and to 10 additional Series 54/74 loads is permitted.



N7490-A,F

7493

4-BIT BINARY COUNTER

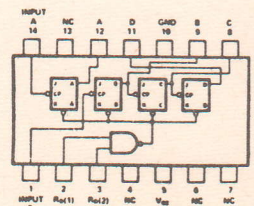
LOGIC

COUNT	OUTPUT			
	D	C	B	A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0

COUNT	OUTPUT			
	D	C	B	A
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

NOTES:

- Output A connected to input B.
- To reset all outputs to logical 0, both R₀(1) and R₀(2) inputs must be at logical 1.



N7493-A,F

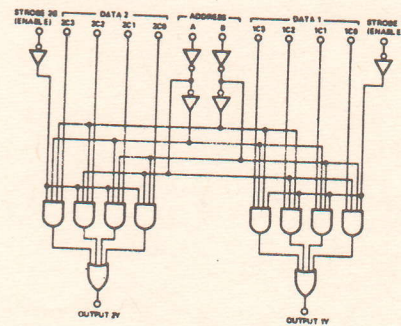
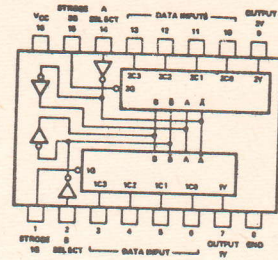
74153

DUAL 4-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER

TRUTH TABLE

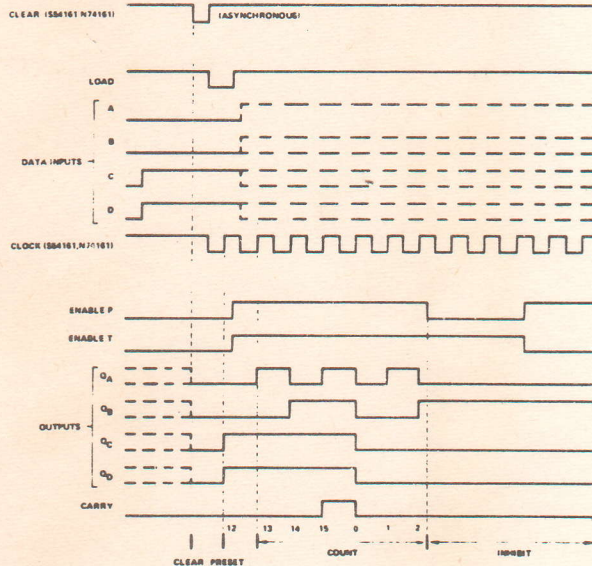
ADDRESS INPUTS		DATA INPUTS				STROBE	OUTPUT
B	A	C0	C1	C2	C3	G	Y
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	L	X	L	X	X	L	L
L	L	X	H	X	X	L	H
L	H	X	X	L	X	L	L
L	H	X	X	H	X	L	H
H	L	X	X	X	L	L	L
H	L	X	X	X	H	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Address inputs A and B are common to both sections. H = high level, L = low level, X = irrelevant.



74161

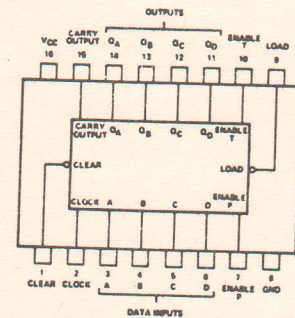
SYNCHRONOUS 4-BIT COUNTER



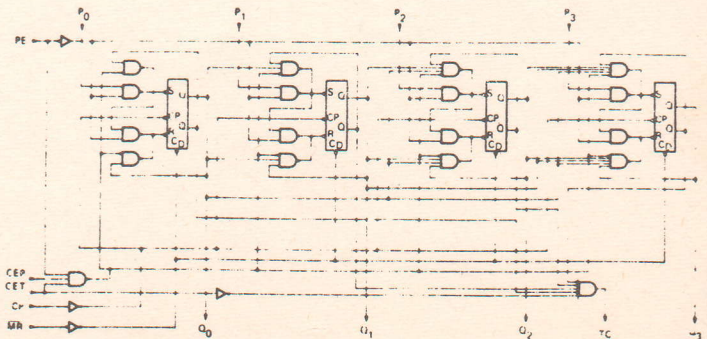
MODE SELECTION

$\overline{PE}$	CET	CET	MODE
L	L	L	Preset
L	L	H	Preset
L	H	L	Preset
L	H	H	Preset
H	L	L	No Change
H	L	H	No Change
H	H	L	No Change
H	H	H	Count

($\overline{MR}$ = HIGH)

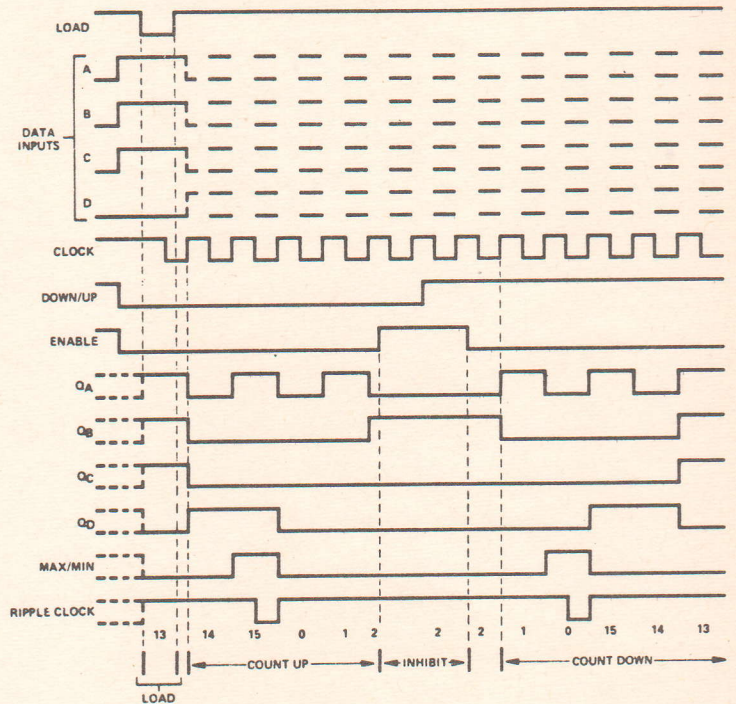
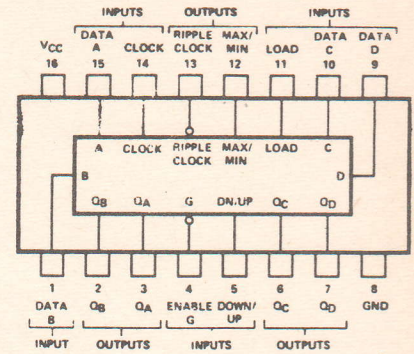
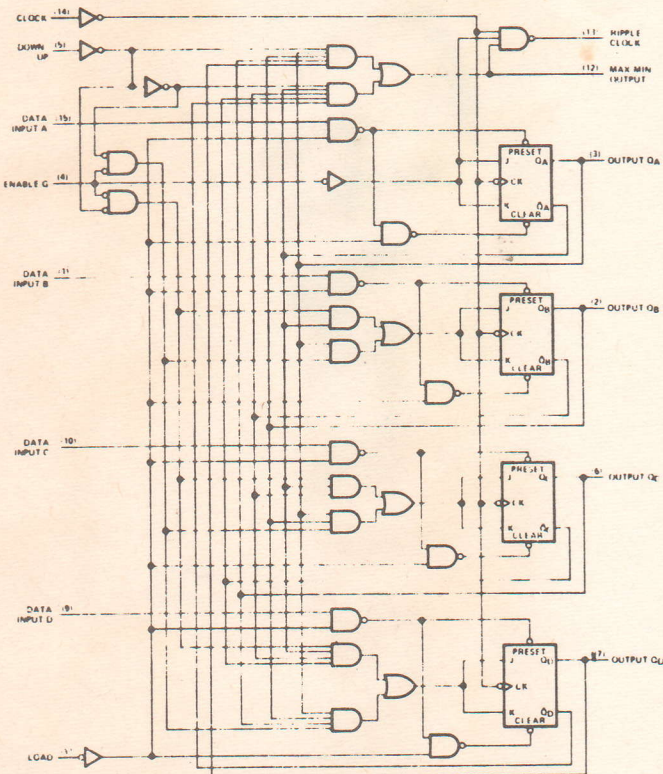


74161

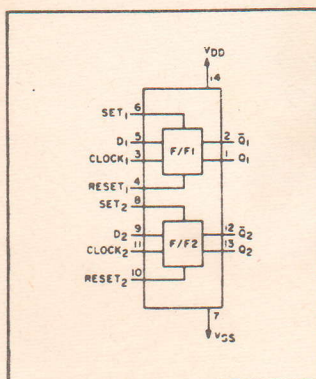


74191 SYNCHRONOUS UP/DOWN COUNTERS WITH DOWN/UP MODE CONTROL

'191, 'LS191 BINARY COUNTERS



MC 14013 Dual 'D'-Type Flip-Flop CMOS With Set-Reset Capability



TRUTH TABLE

CL*	D	R	S	Q	Q̄
0	0	0	0	0	1
1	0	0	1	0	1
x	0	0	Q	Q	Q̄
x	x	1	0	0	1
x	x	0	1	1	0
x	x	1	1	-	-

* = INVALID CONDITION

** = FF1/FF2 TERMINAL ASSIGNMENTS

x = LEVEL CHANGE

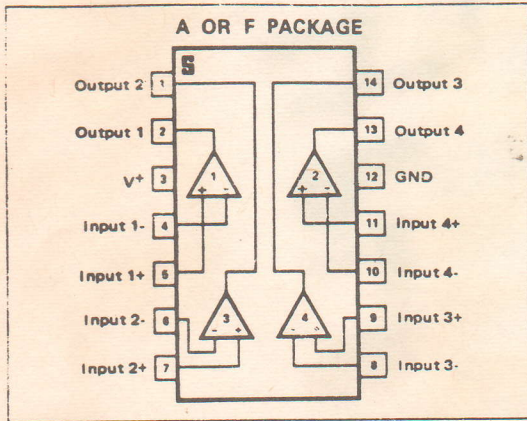
- = DON'T CARE CASE

LINEAR INTEGRATED CIRCUITS

MONOLITHIC QUAD
COMPARATOR

LM339

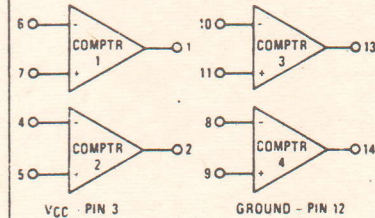
(Top View)



MC3302P

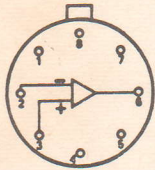
QUAD COMPARATOR

FIGURE 1 - EQUIVALENT CIRCUIT



The $\mu A748$ is a High Performance Operational Amplifier

T PACKAGE

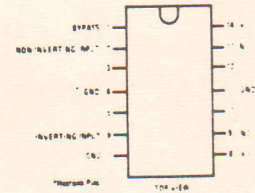
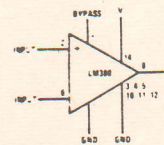


ORDER PART NOS.
 $\mu A748T/\mu A748CT$

1. Freq. Comp A/Offset Null
2. Inverting Input
3. Noninverting Input
4. V^-
5. Offset Null
6. Output
7. V^+
8. Freq. Comp. B

LM380 audio power amplifier

Dual-In-Line Package



Control Arm Assembly - Parts List

1	107050	100K ohm, 110° rotation potentiometer
2	118035	6-32 machine screw, 1/4" long, hex head
3	118082	Shaft, control arm
4	118083	Detent bracket, left bend
5	118084	Detent bracket, right bend
6	118085	Pivot retainer
7	118086	Pivot (threaded)
8	118087	Bail, inside
9	118088	Bail, outside
10	118089	Cage
11	118090	6-32 clinch nut
12	118100	Spring
13	118101	Stop bushing (threaded)
14	118102	6-32 Press screw, 5/8" long
15	118103	#6 steel washer, 3/8" OD, zinc plated
16	118119	6-32 machine screw, 1" long, round head, slotted
17	119020	Pivot ball
18	119021	Spacer, plastic