

Head On™ 2

PART NO.
420-0311

MANUFACTURED BY

Gremlin®
Industries, inc.

OWNER'S MANUAL

HEAD ON 2
OWNER'S MANUAL

HEAD ON 2 OWNER'S MANUAL

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INTRODUCTION

This is an electronic game that makes extensive use of digital integrated circuitry and television monitor circuitry. This manual assumes the maintenance technician possesses a general knowledge of solid state circuitry, microprocessor, TTL digital integrated circuitry and T.V. monitor concepts. Any individual NOT knowledgeable in these areas SHOULD NOT attempt repair of the electronic portion of this game. IT SHOULD BE NOTED THAT ANY ATTEMPT TO REPAIR THE GAME IN THE FIELD WITHOUT EXPRESS CONSENT OF THE FACTORY WILL IMMEDIATELY VOID THE WARRANTY!!!

IMPORTANT NOTES:

- NEVER replace any components with anything other than exact replacement parts. (See Parts List located on Service Schematics.
 - NEVER remove circuit boards/connections while power is on.
 - DO NOT replace the fuse with anything other than the proper value. A blown fuse indicates an overload condition within the game. Replacing the fuse with a higher value can cause severe damage to internal components if an overload occurs.
 - ALWAYS consult the manual before attempting repairs.
- CORRESPONDENCE regarding this game should be addressed to:

GREMLIN INDUSTRIES, INC.
8401 Aero Drive
San Diego, California 92123
(714) 277-8700

IMPORTANT NOTE

An important service note is posted in this game and is repeated here for emphasis:

IF AT ANY TIME THE T. V. SCREEN SHOWS A MEANINGLESS DISPLAY
OR THE GAME OTHERWISE MALFUNCTIONS, SIMPLY DROP A COIN INTO
THE COIN MECHANISM. THIS SHOULD CORRECT THE PROBLEM. IF
NOT, THE GAME REQUIRES SERVICE.

The circuitry in this game has been arranged so that the insertion of a quarter through the coin mechanism will reset the system. This clears up temporary problems caused by power line disturbances, static, etc.

SERVICE TECHNICIAN NOTE:

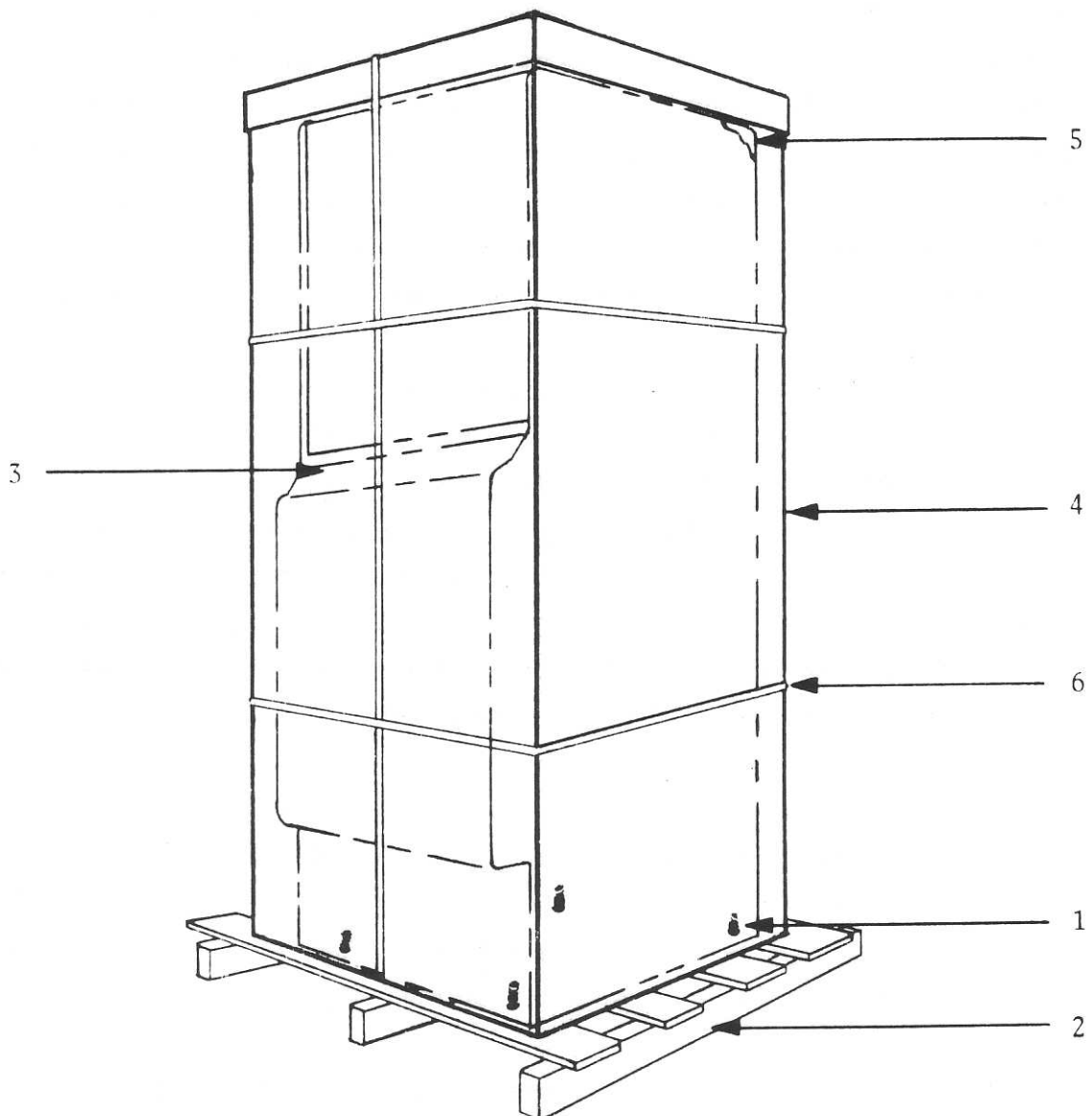
The system reset circuitry described above requires that the coin counter is attached to the system. If there is a coin counter problem and no replacement is available, the game will function properly if a 10K Ohm resistor is connected across the coin counter input pins to the video logic board.

REPACKAGING INSTRUCTIONS

Should it be necessary to ship this game, follow the instructions below for game recrating:

- A) If the original shipping bolts have been discarded (Ref.1), obtain four 5/16-18x1 3/4" hex head bolts with 5/16" flat washers. Carefully lay the game on its side and attach skid (Ref.2).
- B) Place game upright. Tape game keys to upper flange of operator's panel (Ref.3). Crate the game using appropriate shock-absorbent packing material (Ref.4). Include padding on all four corners of the game (Ref.5). After crating is completed, secure package with strapping (Ref.6).

NOTE: If the game is to be shipped to GREMLIN for service or repair, attach a tag identifying the distributor and indicate the service or repair to be made; include the full serial number of the game. GAME MUST BE SHIPPED PREPAID.



HEAD ON 2-GAME CONCEPT

The most noticeable change on Gremlin's new HEAD ON 2 game, is the addition of two turn-around lanes on either side of the screen. With these turn-around lanes, HEAD ON 2 becomes a different game, even more challenging and exciting.

The game begins by displaying the following information on the screen:

```
BONUS
200
POINTS PER ... = 5
POINTS PER ♦♦ = 10
```

The computer's car and the player's car start at the bottom of the screen. When the player clears all lane markers against one computer car, he is awarded the 200 BONUS points and then is pitted against 2 computer cars. After clearing the lane markers again, 3 computer cars appear. Finally, 4 computer cars are the maximum amount that drive against the player. Each time a player clears all lane markers, the BONUS POINTS value is increased, so that more bonus points are awarded for beating 2 computer cars than for beating 1. In addition, the POINTS PER dot/diamonds values increase each time the bonus is awarded.

In HEAD ON 2, the player now has a few more lane options open to him in order to gain the most points and avoid a collision with the computer car. For example, if the player reverses his car's direction by passing through a turn-around lane, he then becomes either the pursuer or the pursued. If he is pursued by the computer car, the player must be careful to avoid a rear-end collision. If the player is following a computer car, he must again watch for a possible rear-end collision into the computer car. The different possibilities are what makes HEAD ON 2 an even more challenging and strategy-demanding game.

Also, each game is different from the next. While it is tempting to find a winning pattern, the game will not necessarily respond the same way every time. Because of the varied combination of action, a working pattern for one game may not work for the next. This feature will keep them playing game after game; and, each time, new video excitement is there for all players.

Refer to the OPTIONS section of this manual for instructions on changing the number of player cars.

MAINTENANCE PROCEDURES- HEAD ON 2

I. POWER SUPPLY (refer to drawing #815-0020, sheet 4)

1. Remove output connectors from power supply.
2. Make these initial tests: (GND to BLACK lead on c18, 9000 mfd capacitor)
 - a) +9 V DC on POSITIVE terminal of C18
 - b) +17-19 V on C6 (4700 mfd. cap.)
 - c) -17-19 V on C5 (4700 mfd. cap.)
 - d) -12 V at pin 11 (adjustable by trim pot R42)
 - e) +12 V at pin 12 (adjustable by trim pot R8)
 - f) +5 V at pins 18-20 (adjustable by trim pot R9)
 - g) GND (ground, 0 V) at pins 14-16
 - h) 2-3 V AC at pin 13 (Don't forget to change meter scale to AC)
3. Check these voltages again with the logic board connected. If any are wrong, a loading problem exists in the logic board, most likely.
Possible causes of a short on the logic board could be: U73, C21, C25, or C26.

II. SOUND BOARD (refer to drawing #822-0002, sheet 6)

1. If no sounds are produced:
 - a) check connections between logic board (labelled "Sound Out") and Sound board (pins 1 through 14) and between the Sound board and the Power Supply.
 - b) If they are good, check IC U16 on the logic board, pins 2,5,6,9,12, 15,16,and 19 for outputs when each sound is produced.
 - c) If the outputs are present, check the output of the sound board, pin 5. If the signals are present here (use an oscilloscope for best results) check the amplifier circuit on the power supply, specifically, U4, Q8, and Q9.
2. If some sounds are produced, but not all:
 - a) repeat steps a and b, above.
 - b) If these prove OK, check the specific circuit for each sound:

SOUND TYPE:	SOUND BOARD PIN #:	CHECK THESE PARTS:
Crash	Pin 1	Q2, U2, U1, U13
High Speed (computer car)	Pin 2	Q8, U9, U8, U7
Car on	Pin 3	Q9, Q6, U9, U12, Q10, U6, U5

MAINTENANCE PROCEDURES- cont'd.

High Speed (player car)	Pin 4	Q12, Q10, U12, U6, U5
Screech #1	Pin 6	Q14, U10, D7
Screech #2	Pin 7	Q13, U10, D6
Bonus	Pin 8	Q5, U4, U10, D8, C19

III. LOGIC BOARD (refer to drawing #822-0001, sheets 4,5, and 6)

1. Game does not reset at power on: (see sheet 5)
 - a) check connector pin 3 on logic board for 3 V AC signal. Also, check Q10, Q11, U55, U54, and U71.
2. No video: (see sheet 5)
 - a) check U48 (part #315-0042) for video signals. Also, check U41, Q6 and Q7 for the video signals.
3. Game does not coin: (see sheet 5)
 - a) Check coin switch connections to the logic board; make sure the coin switch is wired correctly.
 - b) Check U12, pins 3 and 11 for a pulse each time the coin switch is activated. Also, check U11 and U13.
 - c) Check also for the 4 msec. pulses at pin 7 of U10. These pulses serve as timing for the video circuit. Check also pin 5 of U11; pin 6, U13.
 - d) If a game is started only occasionally when a coin is deposited, the coin switch wire may need to be adjusted for a lighter, or heavier, tension.
 - e) If the coin counter does not activate, check U12, pin 3 for a pulse each time the coin switch is activated; also, check Q1 and Q2. (see sheet 5)
4. No \emptyset 1 clock pulses to the microprocessor: (see sheet 4)
 - a) check for pulses at the crystal, Y1.
 - b) check for pulses at pin 6 of U68; at pin 6 of U49; and at pin 4 of U54.
5. No player control: (see sheet 5)
 - a) make sure the player control connections from the switches to the

MAINTENANCE PROCEDURES- cont'd.

logic board are intact. Ensure that each switch is connected.

- b) If these are good, check for an output from U1 as you push each switch.

6. Random display on the screen:

- a) If the screen shows what appears to be a meaningless display, and it cannot be cleared by activating the coin switch, several different parts of the circuit should be considered:

One or more RAM's, U56 through U63 (sheet 5)

One of the programmed IC's, or EPROM's (sheet 6) Check their sockets.

The reset circuit is not working. (see #1, above)

The microprocessor is bad. (sheet 4)

Data or address bus problem (e.g. U33 or U34, sheet 4, could be bad)

TRANSFORMER VOLTAGE CONVERSION INSTRUCTIONS:

To convert the game transformer to 100, 115, or 230 VAC, refer to the following chart:

For 100 Volts: Connect the voltage INPUT lines to terminals 1 and 2 on the transformer.

For 115 Volts: Connect the voltage INPUT lines to terminals 1 and 3.

For 230 Volts: Connect the voltage INPUT lines to terminals 1 and 4, with terminal 3 connected to the LAMP circuit.

Also, the TV monitor must be converted to the same voltage input as the game transformer. Refer to the monitor manual included in the game.

OPTIONS SELECTION CHART: To select the desired number of player cars. (Locate logic board connector labelled 'P3').

<u># of Cars</u>	<u>Pin 1</u>	<u>Pin 2</u>
4	HI	HI
5	LO	HI
5	HI	LO
6	LO	LO

Gromlin Industries, Inc. San Diego, California 92123		PARTS LIST		TITLE TOP ASS'Y HEADON 2		722-0013 DWG NO		SH 1 OF 9		A REV	
		DRAWN S. MAGNOLIA		ENGR							
		CHECK <i>Steven J. Fay</i>		10-2-79		APPR					
		REVISION DESCRIPTION				DRAFT		CHECK		APPR	
LTR DATE		REVISION DESCRIPTION				MAGNOLIA		<i>[Signature]</i>		<i>[Signature]</i>	
A 9-27-79		RELEASED				10-2-79					

Gremlin Industries, Inc. San Diego, California 92123		PARTS LIST		TITLE TOP ASSY HEAD ON 2		722-0013 DWG NO		SH 2 OF 9		A REV	
ITEM NO	PART NO	QTY PER ASSY			DESCRIPTION	REF DES					
1	800-0054	1			SPEAKER GAME 6X9						
2	130-0002	1			SPEAKER COVER 6X9						
3	140-0021	1			COVER JUNCTION BOX						
4	140-0033	1			CABINET HEAD ON 19"						
5											
6	200-0011	1			MONITOR COLOR 19"ALGOL						
7	252-0075	1			MONITOR BOARD						
8											
9	822-0035	1			ASSY COIN MECHANISM						
10	210-0011	2			CONN INSUL BUTTSPLICE						
11	250-0032	1			FRAME BEZEL						
12	250-0034	1			SPRING RETAINER						
13	250-0038	1			MOLDING STRIP						
14	250-0048	1			CLIP SWITCH						
15											
16	250-0356	2			BRACKET MONITOR SUPP.						
17	181-0031	1			CHOKE 250 μ h 2.5 A						
18	156-0001	1			CAP 0.47 μ f 100 V						
19	253-0105	1			PANEL LOGO GRAPHIC						
20	253-0104	1			MONITOR PLEXIGLASS						
21											
22											
23	390-0011	1			LAMP FLOR.						
24	280-0004	25			CLIP WIRE HOLD DOWN						
25											

Gremlin Industries, Inc.
 San Diego, California 92123

PARTS LIST

TITLE TOP ASS'Y HEAD ON 2

DWG NO 722-0013

SH 3 OF 9

A REV

ITEM NO	PART NO	QTY PER ASSY			DESCRIPTION	REF DES
26	280-0005	11			CABLE TIES	
27	280-0010	4			WIRE NUT	
28						
29						
30	800-0052	1			ASS'Y FLOR LAMP 18"	
31						
32	420-0028	1			S/N DECAL	
33	420-0030	1			DECAL CAUTION 115 V	
34	420-0038	2			IMPORTANT NOTE	
35	420-0040	1			DECAL RE-CYCLE	
36	420-0041	1			DECAL S/N SMALL	
37	420-0060	1			DECAL TIP-N-TELL	
38	420-0071	1			UNCRATING INSTRUCTIONS	
39	420-0116	1			WRAPAROUND SIDE	
40	420 0117				TOP COVER	
41	420-0124	4			CORNER STRIP	
42	420-0294	1			MANUAL ALGOL 19" COLOR	
43	420-0307				GRAPHIC LEFT SIDE	
44	420-0308				GRAPHIC RIGHT SIDE	
45	420-0309				GRAPHIC INTERIOR	
46	420-0310	1			DECAL CARTON	
47	420-0311	1			MANUAL HEAD ON	
50	807-0009	1			JUNCTION BOX	

Gremlin Industries, Inc. San Diego, California 92123		PARTS LIST	TITLE	DWG NO	SH 4 OF 9	A REV
ITEM NO	PART NO	QTY PER ASSY		DESCRIPTION	REF DES	
51	800-0029	1		HARN ASSY GROUND CABLE		
52						
53	815-0020	1		ASSY GAME PWR SUPPLY		
54						
55						
56						
57	822-0002	1		ASSY SOUND BOARD		
58	822-0034	1		CONTROL PNL ASSY COMP.		
59	822-0031	1		LOGIC BOARD		
60						
61						
62						
63						
64	822-0021	1		ASSY HARN MONITOR JUMPER		
65	822-0022			ASSY HARN GROUND CABLE		
66						
67		1		PALET HEAD-OU		
68		6		MACH SCR #8-32 X 2 SLOT HD		
69		4		PHL PAN HD SCR #6-X 3/8 SHT MTL		
70		7		SCR #6 X 1/2 PHL PAN HD SHT MTL		
71		4		SCR #8-32 X 1 1/2 SLOT HD		
72		2		NUT HEX #10-32		
73		4		SCR #8-32 X 1 1/2 SLOT HD		
74		14		BOLT CARRIGE 10-24 X 1 3/4		
75		6		SCR 10-32 X 1.0 PHL PAN HD		

Greenlan Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE PC ASSY -
POWER SUPPLY

DWG NO 815-0021

SH 1 OF

B REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
1	170-0082		PCB - POWER SUPPLY	
2	150-0019		CAP. E 4700µF, 25V	C5, C6
3	151-0001		CAP. CER. .05µF, 50V	C11
4	151-0002		CAP. CER. 100PF, 50V	C17, C19
5	151-0008		CAP. CER. .001µF, 50V	C10
6	151-0011		CAP. CER. .01µF, 50V	C12, C14, C16
7	151-0012		CAP. CER. .01µF, 50V	C3
8	153-0001		CAP. TANT 10µF, 25V	C1, C2, C7, C13, C15
9				
10	212-0003		CONN M 10 PIN	
11	212-0004		CONN M 4 PIN	
12				
13	313-0001		IC LM723	U3
14	313-0004		IC LM741EN	U1, U2, U4
15				
16	471-0101		RES 100Ω, 1/2W, 5%	R15
17	471-0102		RES 1KΩ, 1/2W, 5%	R5, 17, 20, 22-24, 35, 36, 38, 39
18	471-0103		RES 10KΩ, 1/2W, 5%	R1, R14, R21, R37
19	471-0104		RES 100KΩ, 1/2W, 5%	R33
20	471-0122		RES 1.2KΩ, 1/2W, 5%	R18
21	471-0152		RES 1.5KΩ, 1/2W, 5%	R13, R16
22	471-0272		RES 2.7KΩ, 1/2W, 5%	R7, R25, R26, R43, R46
23	471-0332		RES 3.3KΩ, 1/2W, 5%	R32
24	471-0471		RES 470Ω, 1/2W, 5%	R34, 40
25	471-0473		RES 47KΩ, 1/2W, 5%	R44, R45

Crescent Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE PC ASSY.
POWER SUPPLY

815-0021
DWG NO

SH 3
OF

B
REV

ITEM NO	PART NO	QTY PER ASSY			DESCRIPTION	REF DES
26	471-0562	1			RES 5.6K Ω , 1/2W, 5%	R12
27	472-00RS	4			RES 0.5, 1W, 5%	R4, R29-R31
28	473-00R1	1			RES 0.1, 5W, 3%	R28
29						
30	475-0004	1			POT 1K TRIMMER	R9
31	475-0005	2			POT 2K TRIMMER	R8, R42
32						
33	481-0004	4			DIODE MRS01	D1-D4
34	481-0006	2			DIODE 1N914	D7, D8
35	481-0008	1			DIODE ZENER 1N5231	D10
36						
37	482-0006	3			TRANSISTOR 2N4403	Q1, Q3, Q4
38	482-0013	1			TRANSISTOR TIP 110	Q6
39	482-0014	2			TRANSISTOR 2N4401	Q2, Q5
40	482-0015	1			TRANSISTOR TIP 115	Q7
41	482-0016	2			TRANSISTOR TIP 29	Q8, Q9
42						
43	471-0133	1			RES 13K OHMS 1/2W 5%	R41
44						
45	815-0020	REF			SCHEMATIC	
46						
47						
48						
49						
50						

GREMLIN IND. INC. SAN DIEGO CA. 92123		PARTS LIST	TITLE ASSY, POWER SUPPLY	815-0020 DWG NO	SH 2 OF 3	A REV
ITEM NO	PART NO	QTY PER ASSY		DESCRIPTION	REF DES	
1	140-0015			1 CHASSIS, POWER SUPPLY		
2	150-0022			1 CAP, E, 9000UF 12V		
3	211-0005			9 CONN CRIMP LOCK		
4	211-0007			1 CONN, KEY, POLARIZING		
5	211-0017			4 CONN, QUICK, 1/4" FEM		
6	211-0019			2 CONN, SPADE LUG 1/4"		
7	212-0016			1 CONN. FEM 10 PIN		
8	213-0006			1 SOCKET, T0-3		
9	280-0014			4 STAND-OFFS, CLIPS		
10	280-0056			1 CLAMP, CAP. VRA 1 1/2"		
11	481-0009			1 DIODE, MDA 3500		
12	482-0007			1 X1STOR, 2N3055		
13	560-0003			1 XFMR, MODEL 4-10345B		
14	815-0021			1 POWER SUPPLY ASSY (PCB)		
	815-0020			SCHEM. ASSY. PWR. SUPP.		(REFERENCE)
15				5 SCREW-MACH P.HD#6-32 X.5		
16				4 NUT HEX #6-32		
17				4 SCREW-MACH RD, HD#4-40 X.37		
18				4 NUT HEX #4-40		
19				4 RIVET, POP 3/16		
20				4 SCR, MACH, HEX, WAS, HD 1/4-20 X 5/8"		
21				1 SCR, MACH, P.HD. #6-32 x 1.0"		

ITEM NO	PART NO	QTY PER ASSY			DESCRIPTION	REF DES
1						
2	151-0011	6			CAP CER .01 μ f 50V	C8,13,17,32,21,22
3	151-0012	4			CAP CER .1 μ f 50V	C5,C12,C26,C27
4	152-0001	3			CAP FILM .1 μ f 100V	C31,C20,C25
5						
6	152-0012	3			CAP FILM .047 μ f 200V	C2, C23, C24
7	152-0018	3			CAP FILM .01 μ f 250V	C3, C6, C19
8	152-0020	3			CAP FILM .47 μ f 100V	C1, C18, C16
9	153-0001	7			CAP TANT 10 μ f 25V	C10, C11, C28-C30, C33, C34
10	153-0002	2			CAP TANT 1 μ f 25V	C4, C9
11	153-0003	2			CAP TANT 2.2 μ f 25V	C14, 15
12	153-0004	1			CAP TANT 4.7 μ f 25V	C7
13	170-0154	1			PCB HEAD ON SOUND	
14	212-0031	1			CONN M 12 PIN	P1
15	313-0004	1			IC LM741 EN DIP	U3
16	313-0008	1			IC LM348 DIP	U1
17	314-0001	5			IC NE555 DIP	U2, U4, U9, U12, U14
18	315-0005	4			IC 4013	U5-U8
19	315-0009	1			IC 4081	U11
20	315-0035	1			IC MM5837	U13
21	315-0043	1			IC 4069	U10

Gremlin Industries, Inc. San Diego, California 92123		PARTS LIST		TITLE HEAD ON SOUND		822-0002 DWG NO		SH 3 OF 6		B REV	
ITEM NO	PART NO	QTY PER ASSY		DESCRIPTION	REF DES						
22	471-0101	2		RES 100 OHM 1/2W 5%	R23, R32						
23	471-0102	10		RES 1K OHM 1/2W 5%	R4, R5, R8, R14, R22, R35, R45, R55, R72, R48						
24	471-0103	16		RES 10K OHM 1/2W 5%	R10, R12, R13, R25, R43, R46, R50, R56-R60, R64, R67, R68, R75						
25	471-0104	17		RES 100K OHM 1/2W 5%	R15-R21, R24, R34, R38, R41, R42, R62, R65, R69, R71, R76						
26	471-0105	3		RES 1 MEG OHM 1/2W 5%	R3, R70, R77						
27	471-0124	4		RES 120K OHM 1/2W 5%	R47, R51, R63, R66						
28	471-0153	2		RES 15K OHM 1/2W 5%	R1, R2						
29	471-0154	1		RES 150K OHM 1/2W 5%	R39						
30	471-0220	1		RES 22 OHM 1/2W 5%	R49						
31	471-0224	1		RES 220K OHM 1/2W 5%	R40						
32	471-0394	8		RES 390K OHM 1/2W 5%	R26-R31, R44, R73						
33	471-0472	3		RES 4.7K OHM 1/2W 5%	R36, R52, R74						
34	471-0473	1		RES 47K OHM 1/2W 5%	R33						
35	471-0474	2		RES 470K OHM 1/2W 5%	R9, R11						
36	471-0682	2		RES 6.8K OHM 1/2W 5%	R53, R54						
37	475-0006	2		POT 100K	R6, R7						
38	481-0006	8		DIODE IN914/IN4148	D1-D8						

Greenline Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE

ASSTY BASIC V.I.C. B.D.

800-0031

SH 1

OF 8

DWG NO

REV

SHT 5,6,7,8 "D" SIZE

DRAWN *W. J. B.* 11-20-78

ENGR

CHECK *Steve L. Fay* 12-22-78

APPR

LTR	DATE	REVISION DESCRIPTION	DRAFT	CHECK	APPR
A	12-22-78	RELEASED	WJB	<i>[Signature]</i>	<i>[Signature]</i>
B	5-10-79	CHG'D PER ECN 310	SB	<i>[Signature]</i>	<i>[Signature]</i>
C	7-5-79	CHG'D PER ECN 310 & 321	WJB	<i>[Signature]</i>	<i>[Signature]</i>

SH 2
OF 8
REV

800-0031
DWG NO

TITLE
ASSY BASIC U.C.B.D.

PARTS
LIST

Gremkin Industries, Inc.
San Diego, California 92123

ITEM NO	PART NO	QTY PER ASSY			DESCRIPTION	REF DES
1	151-0005	1			CAP CER 680 pf 50V	C39
2	151-0012	54			CAP CER .1 pf 50V	C3,5,7-11,13-17,22,25, C27-38,C40-67
4	152-0001	1			CAP FILM .1 pf 100V	C4
5	152-0017	1			CAP FILM .33 pf 100V	C24
6	153-0001	6			CAP TANT 10 pf 25V	C12,20,21,23,26,68
7	153-0002	1			CAP TANT 1 pf 25V	C19
8	151-0011	2			CAP CER .01 pf 50V	C69,C70
9	170-0150	1			PCB C.V. LOGIC	
10						
11	211-0004	7			CONN PIN TEST PT	TP1-TP4, GND
12	212-0063	4			CONN M 4 PIN PLZD	
13	212-0021	7			CONN M 10 PIN	
14	212-0031	2			CONN M 12 PIN	
15	213-0003	4			SKT 14 PIN DIP	XU14,30,69,70
16	213-0001	8			SKT 24 PIN DUAL INLN	XU20-XU27
17	213-0004	18			SKT 16 PIN DUAL INLN	XRP2,XU5-8,33,34,44, XU56-63,65,66
18						
19	213-0005	2			SKT 40 PIN DUAL INLN	XU48, XU53
20	213-0008	7			SKT 20 PIN DUAL INLN	XU1-3,15,16,19,28
21	213-0011	2			SKT 22 PIN DUAL INLN	XU17, XU18
22	213-0010	1			SKT 8 PIN DIP	XU9
23	230-0009	1			XTAL CLK 15.46848	Y1
24	313-0023	1			IC 320T-5.0	U73
25	314-0001	2			IC NE 555	U10, U55

Greenline Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE
ASSY BASIC V.I.C.BD.

800-0031
DWG NO

SH 3
OF 8

C
REV

ITEM NO	PART NO	QTY PER ASSY		DESCRIPTION	REF DES
26	314-0015	1		1C 7404	U54
27	314-0018	3		1C 74LS00	U4, U12, U32
28	314-0019	2		1C 74LS04	U35, U64
29	314-0040	3		1C 74LS125	U13, U46, U47
30	314-0046	1		1C 74LS04	U68
31	314-0073	3		1C 74LS175	U45, U49, U50
32	314-0055	2		1C 74LS244	U1, U19
33	314-0058	6		1C 74LS08	U29, 37-39, 41, 71
34	314-0059	1		1C 74LS10	U52
35	314-0061	1		1C 74LS42	U40
36	314-0062	4		1C 74LS74	U11, U31, U67, U72
37	314-0078	1		1C 74LS02	U36
38	314-0092	2		1C B216	U33, U34
39	315-0039	8		1C 4K RAM 12V	U56-U63
40	315-0031	1		1C Z80 MK 3880	U53
41	314-0086	1		1C 74LS163	U66
42	314-0093	1		1C 74LS374	U16
43					
44	316-0206	1		1C PROM 32X8 CTL	U65
45	316-0138	1		1C PROM 32x8	U44
46	390-0003	1		LED RED	D4
47	471-0220	3		RES 22 OHM 5%	R26-28
48	471-0011	5		RES 10 OHM 1/2W 5%	R50-53, R29
49	471-0102	10		RES 1K OHM 1/2W 5%	R7-11, 32, 37, 56-58
50	471-0103	1		RES 10K OHM 1/2W 5%	R6

Greenline Industries, Inc.
San Diego, California 92121

PARTS LIST

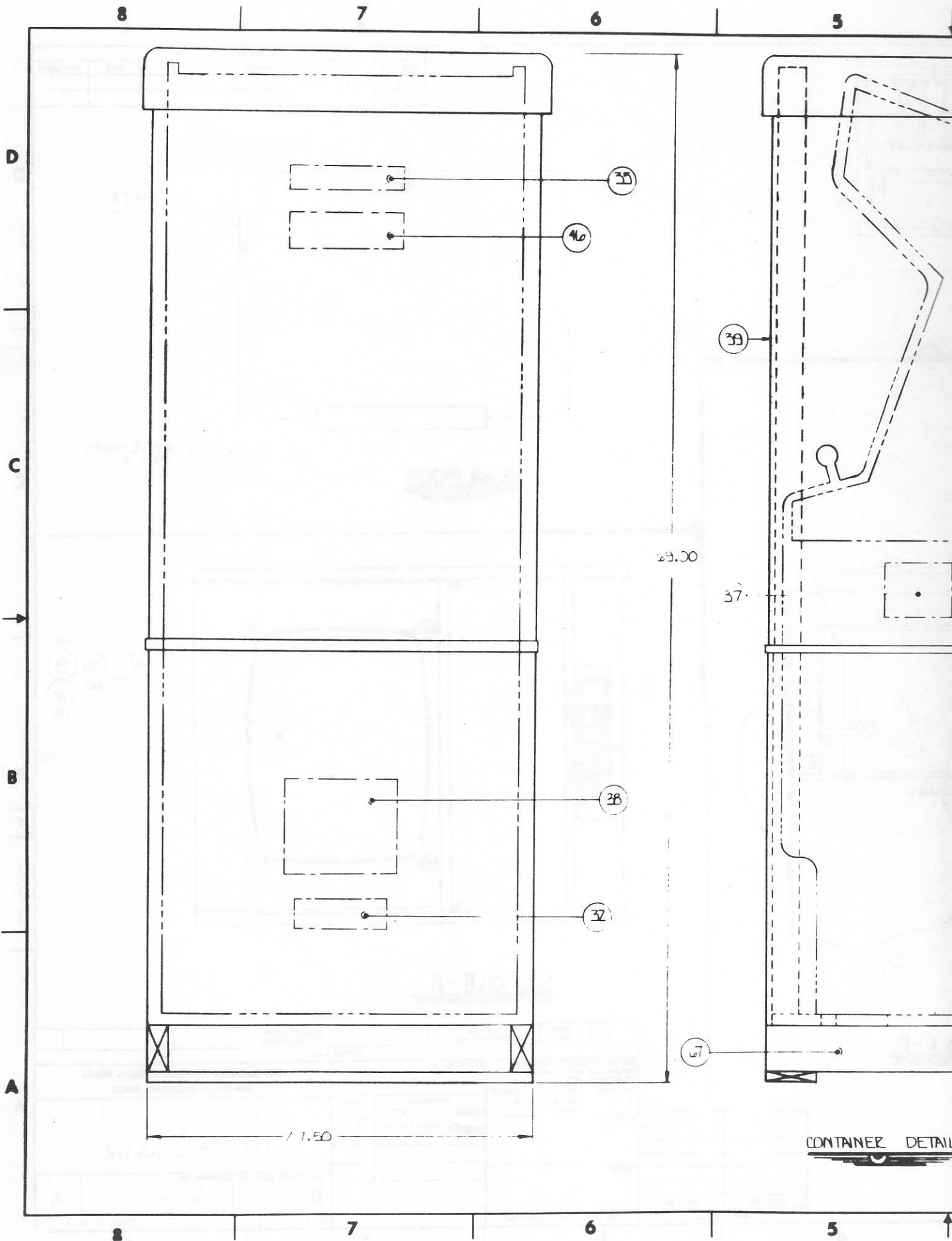
TITLE
ASSY BASIC V.I.C.B.D.

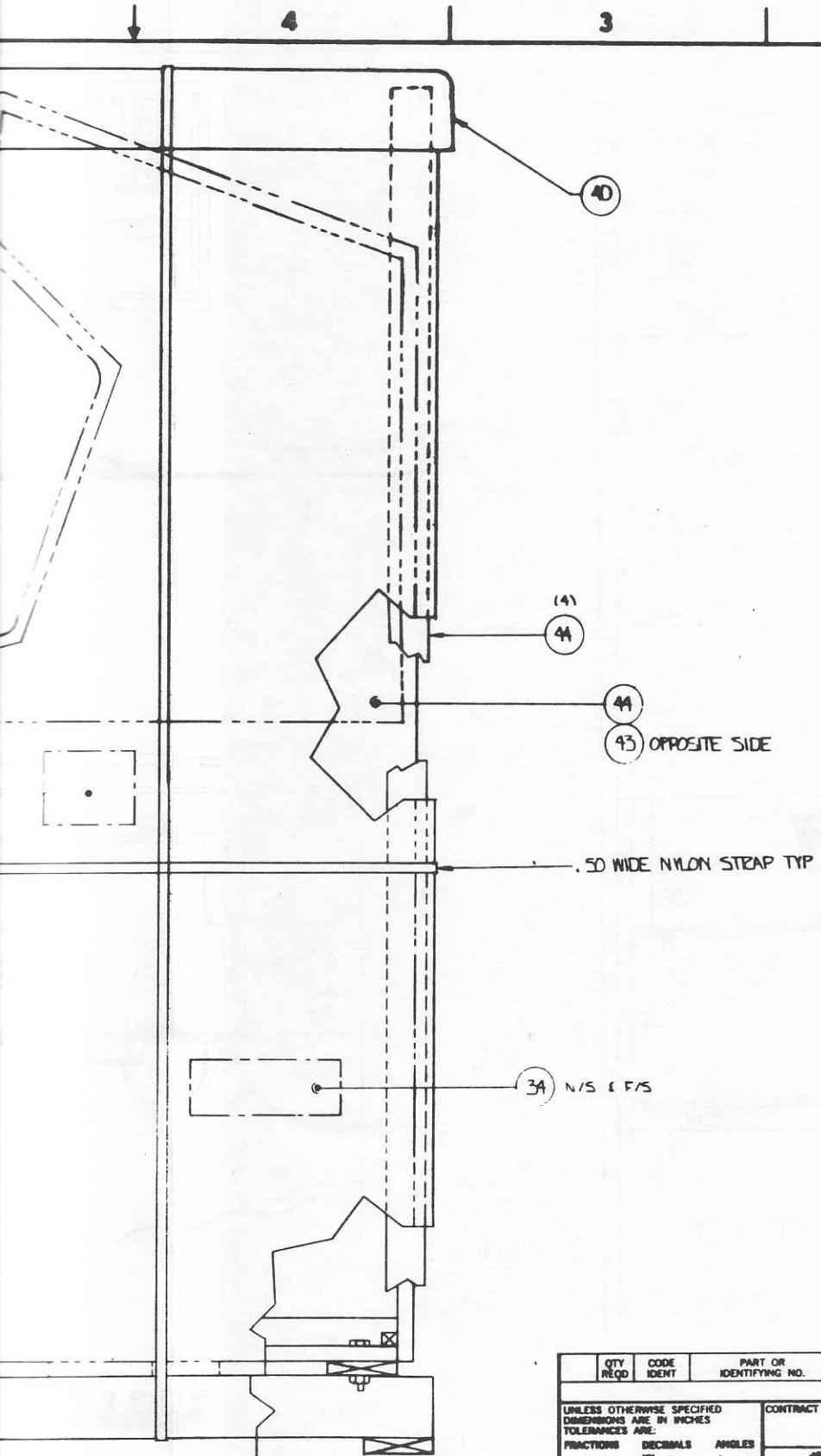
DWG NO
800-0031

SH 4
OF 8

REV
C

ITEM NO	PART NO	QTY PER ASSY			DESCRIPTION	REF DES
51	471-0104	3			RES 100K OHM 1/2W 5%	R42 - R44
52	471-0222	8			RES 2.2K OHM 1/2W 5%	R18 - R25
53	471-0223	1			RES 22K OHM 1/2W 5%	R3
54	471-0331	8			RES 330 OHM 1/2W 5%	R30,31,33,34,45,46,59,60
55	471-0221	1			RES 220 OHM 5%	R55
56	471-0471	1			RES 470 OHM 1/2W 5%	R49
57	471-0472	3			RES 4.7K OHM 1/2W 5%	R5, R47, R48
58	471-0750	1			RES 75 OHM 1/2W 5%	R41
59						
60	475-0001	1			POT 10K PC MTV	R4
61						
62	477-0002	2			RES PACK 15 X 2.2K	R P1, R P3
63						
64	481-0006	4			DIODE 1N914 / 1N4148	D1, D2, D5, D6
65						
66	482-0006	1			XSTR 2N4403	Q6
67	482-0010	1			XSTR PE8050	Q2
68	482-0014	4			XSTR 2N4401	Q1, Q7, Q10, Q11
69	510-0049	1			SWITCH 8 POS DIP SPST	SW1
70	530-0006	1			HEAT SINK 295-1	
71						
72						
73	314-0072	1			IC 74LS174	U43
74						
75	314-0076	1			IC 74LS157	U42





REV	DATE	BY	CHKD
10			

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS ±	DECIMALS .XX ±	ANGLES ±	Green Industries, Inc. San Diego, California 92122
	.XXX ±		
MATERIAL		APPROVALS	DATE
FINISH		<i>[Signature]</i>	<i>4/2/10</i>
NEXT ASSY		SIZE	
USED ON		D	
APPLICATION		CODE IDENT NO	
		DRAWING NO	
		761-0013	
		SHEET 1 OF 5	
		DO NOT SCALE DRAWING	

INNER DETAIL

8

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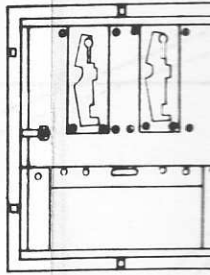
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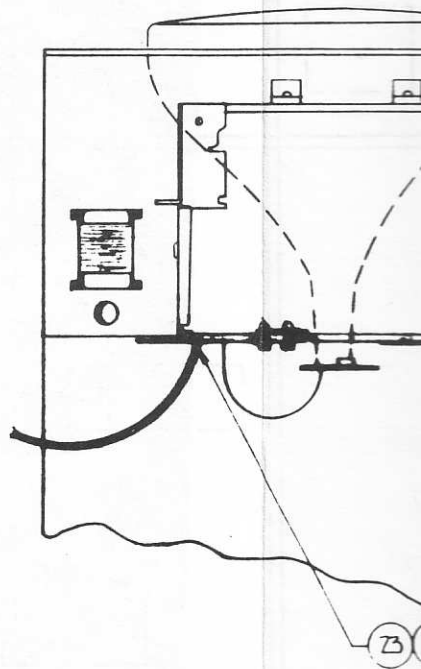
SECTION E-E

71 50 3

57 70

70 59

51
(6)



SECTION D-D

VIEW C-C

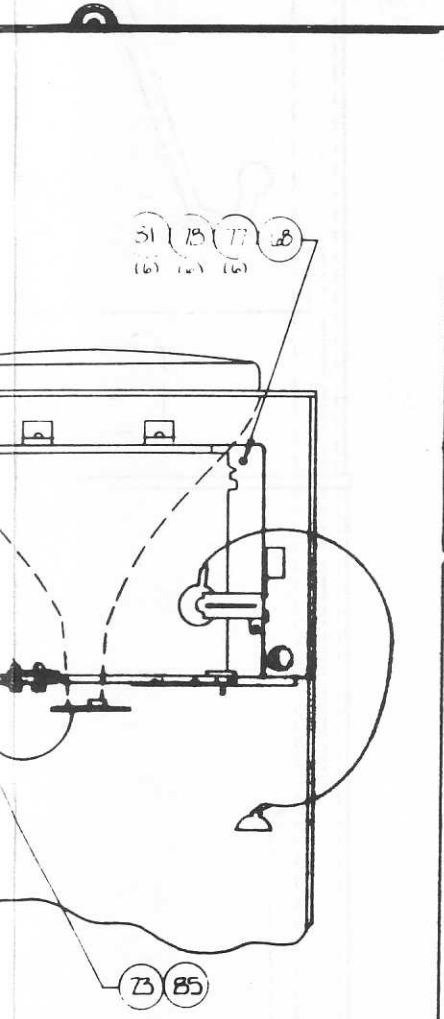
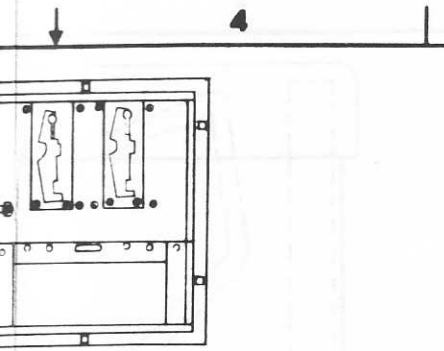
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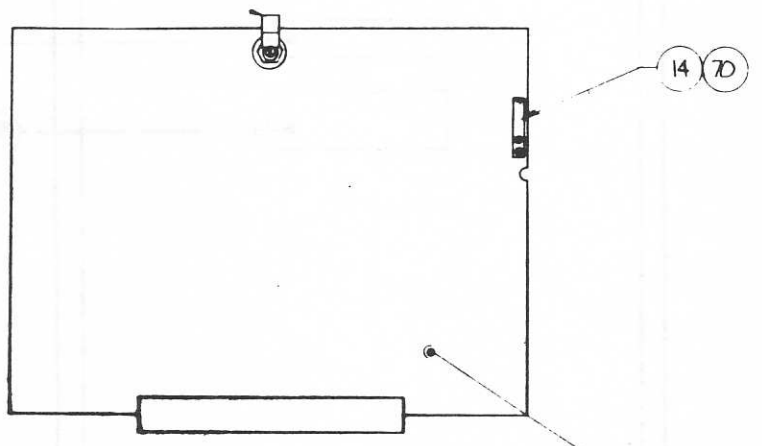




SECTION D-D

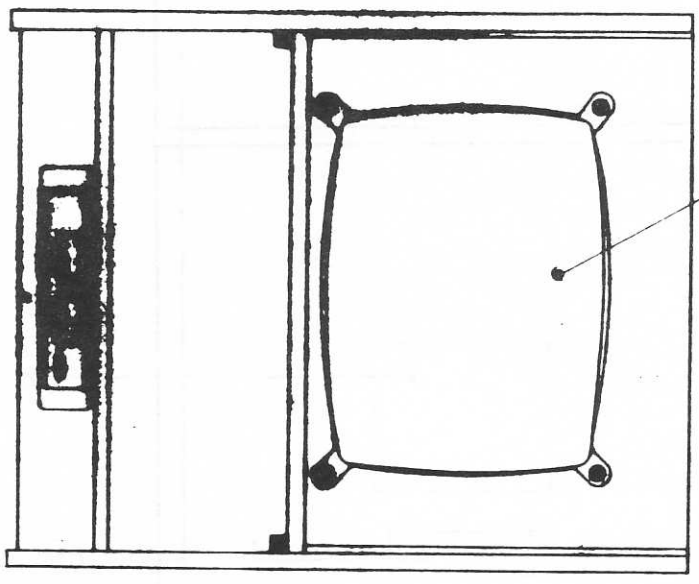
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISED		

69 B



REAR DOOR

REF. 140-0033
ITEM 4



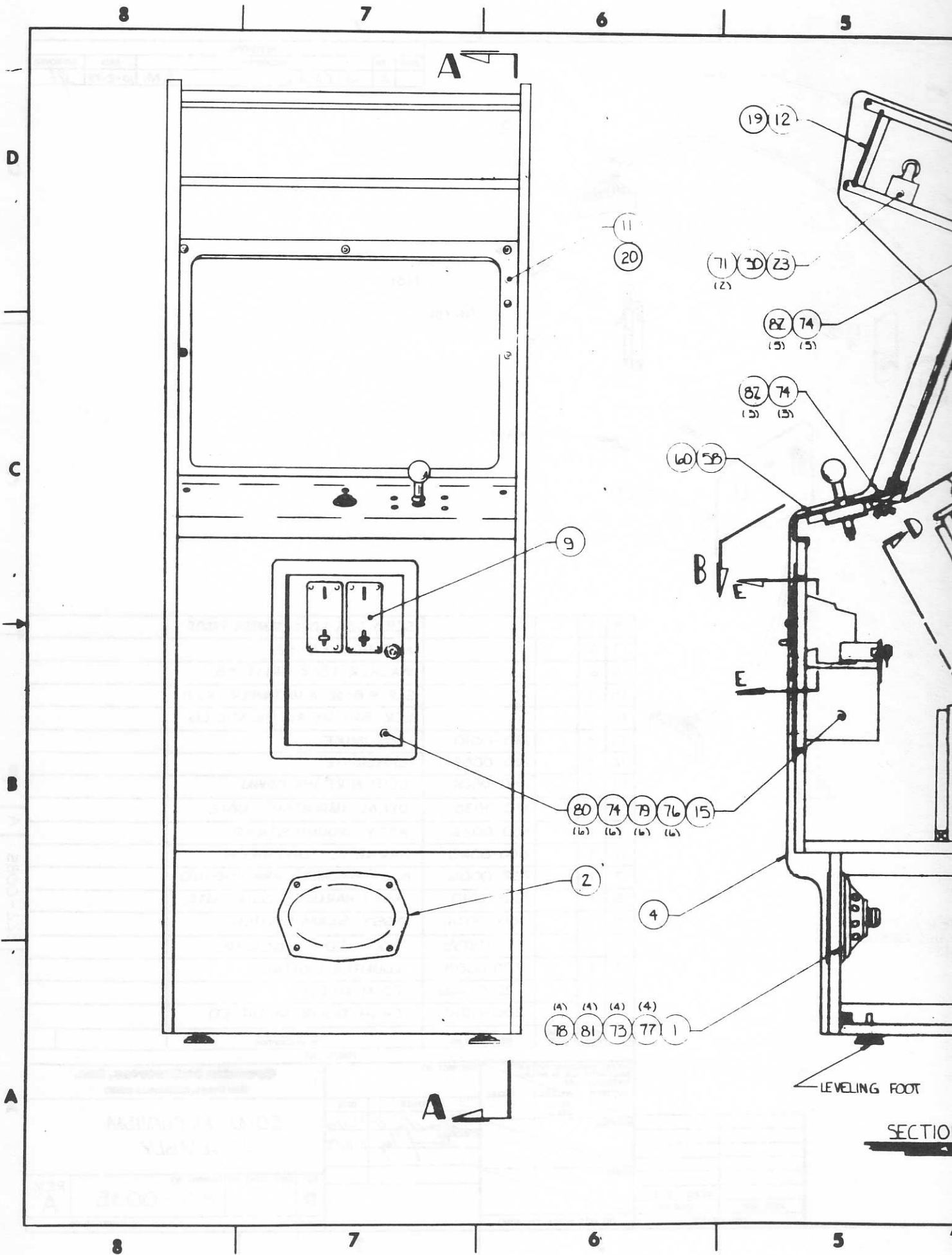
SECTION B-B

NEXT ASSY	USED ON
APPLICATION	

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	
PARTS LIST				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.		
FRACTIONS	DECIMALS	ANGLES	Grosdin Industries, Inc. San Diego, California 92108	
±	.01 ±	±		
GENERAL		APPROVALS	DATE	TOP ASSY HEAD ON 2 COLOR
FINISH		APPROVED: <i>[Signature]</i> 7/27/79 CHECKED: <i>[Signature]</i>		
NEXT ASSY		SIZE	CODE IDENT NO.	
APPLICATION		D	722-0013	
DO NOT SCALE DRAWING		DRAWING NO.		A
		SCALE		SHEET 8 OF 9

722-0013

A

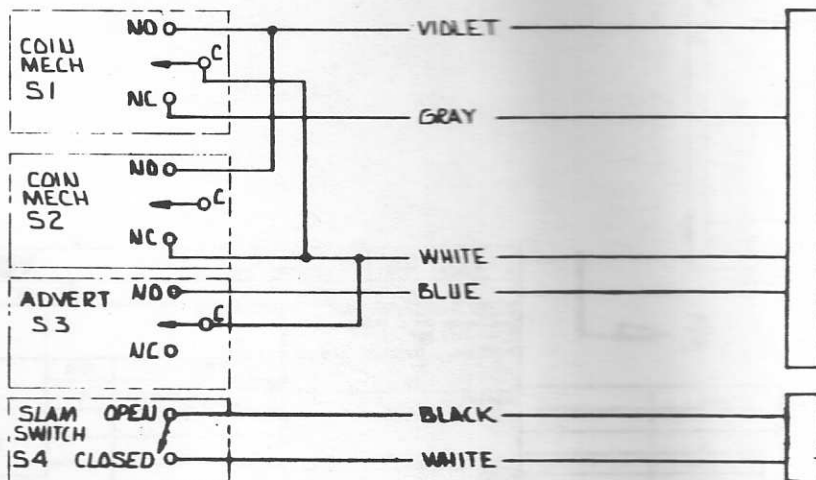
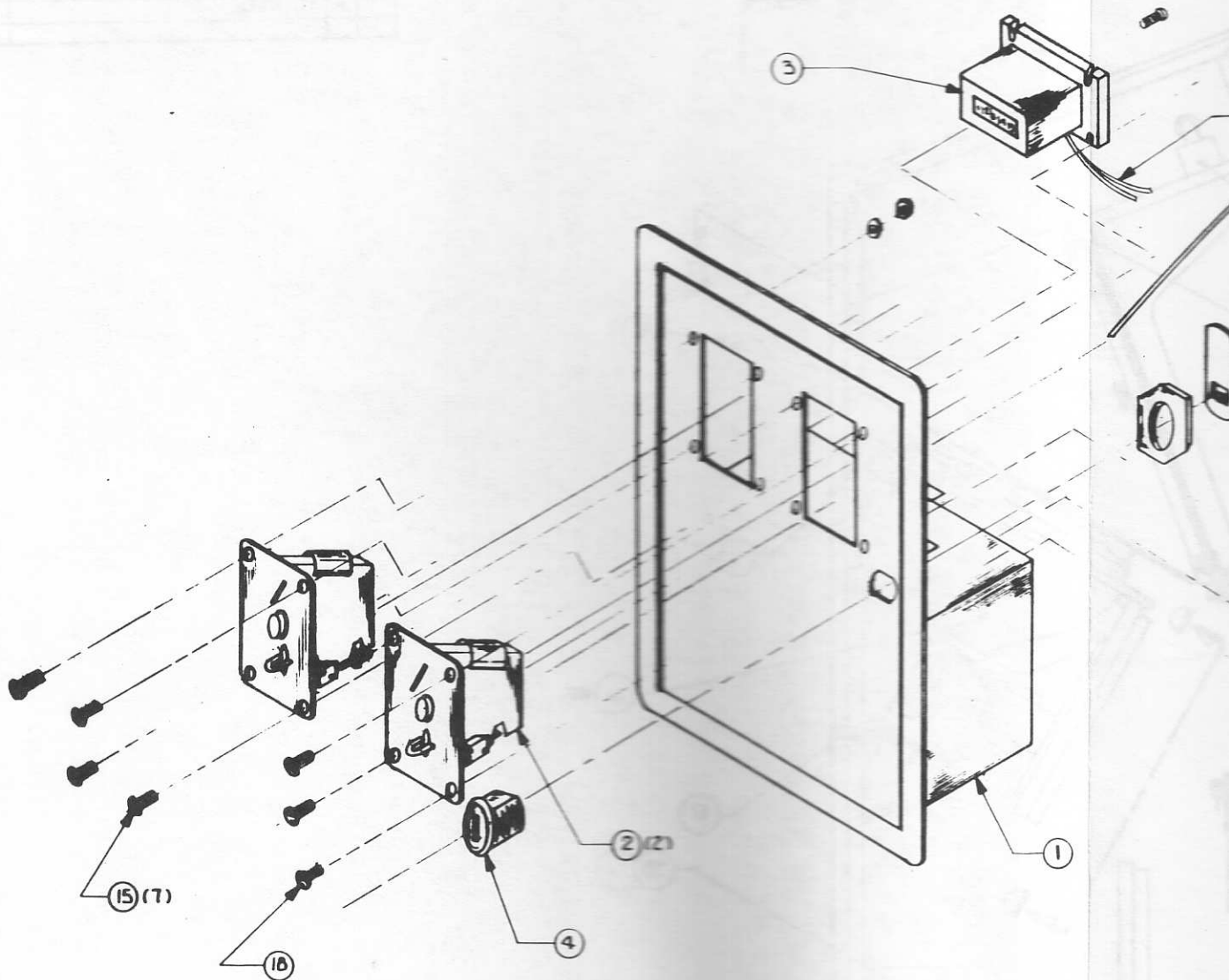


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FOR CONNECTOR/
HARNESS PIN DESIGNATION
SEE 800-0060

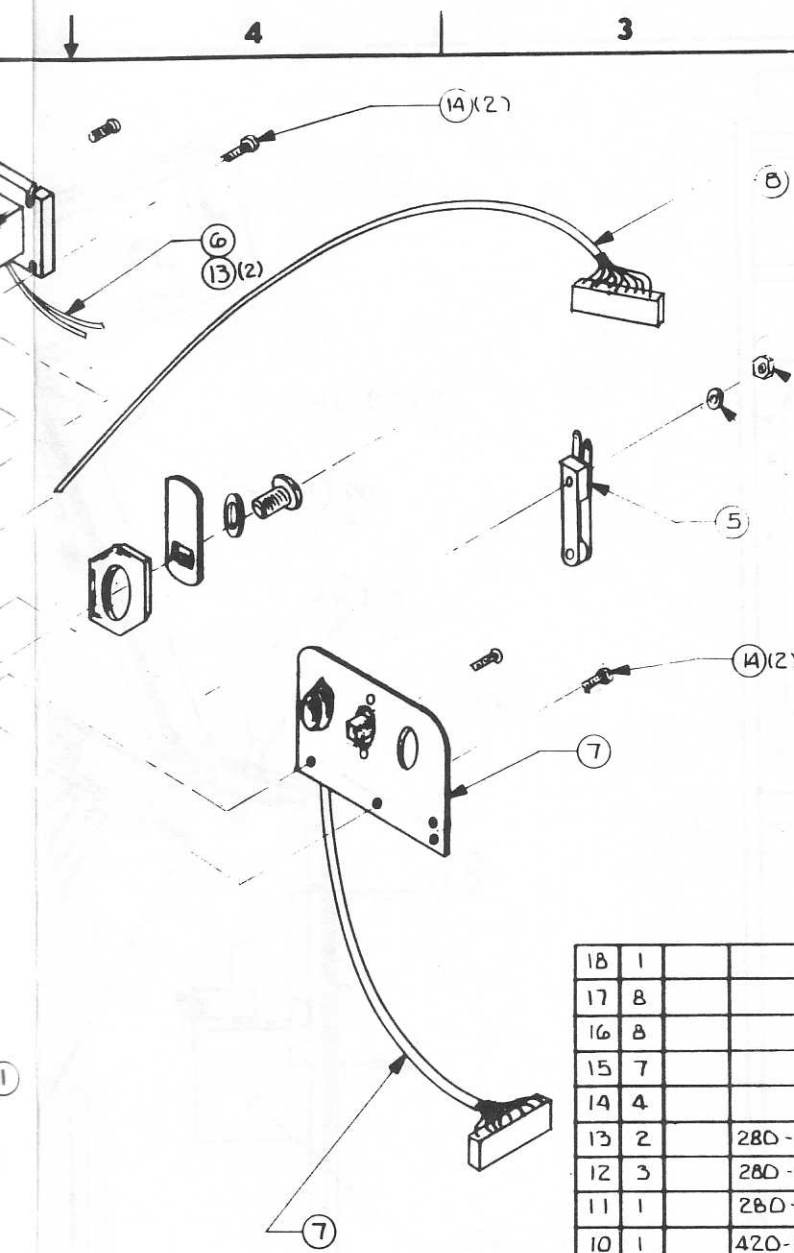
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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
A		RELEASED	S.M. 10-2-79	[Signature]



18	1		SCR 8-32 X 1.0 LG TAMPER PROOF	
17	8		NUT HEX # 8-32	
16	8		WASHER LOCK SPLIT # 8	
15	7		SCR # 8-32 X 1/2 TAMPER PROOF	
14	4		SCR SHT METAL # 6 X 1/2 LG	
13	2	280-0010	NUT WIRE	
12	3	280-0005	CABLE TIE	
11	1	280-0004	CLIP WIRE HOLDDOWN	
10	1	420-0038	DECAL IMPORTANT NOTE	
9	1	800-0026	ASSY GROUND STRAP	
8	1	800-0060	HARNESS COIN MECH	
7	1	822-0006	ASSY HARNESS PWR/SOUND	
6	1	822-0010	ASSY HARNESS COIN CNTR	
5	1	800-0051	ASSY SLAM SWITCH	
4	1	220-0035	LOCK FORT LOCK IR	
3	1	220-0008	COUNTER DIGITAL	
2	2	220-0066	COIN MECH	
1	1	250-0285	CASH DOOR MODIFIED	
	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

CONNECTOR/
SS PIN DESIGNATIONS
00-0060

APPLICATION	USED ON
HEAD ON 2	
NEXT ASSY	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS .XX ± DECIMALS .XXX ± ANGLES ±		CONTRACT NO.		Greenline Industries, Inc. San Diego, California 92108	
MATERIAL		APPROVALS	DATE	COIN MECHANISM ASSEMBLY	
FINISH		DRAWN: [Signature] 9/27/79 CHECKED: [Signature] 10-2-79			
DO NOT SCALE DRAWING		SIZE	CODE IDENT NO.	DRAWING NO.	REV.
		D		822-0035	A
		SCALE	SHEET / OF /		

D
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B
A
822-0035
A

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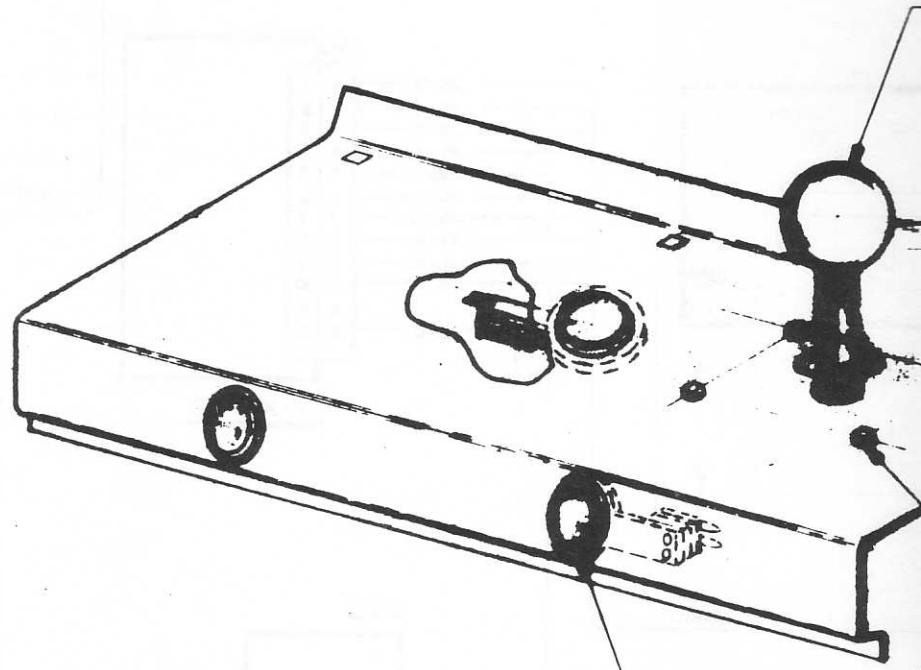
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- 9
- 10

3 PLS

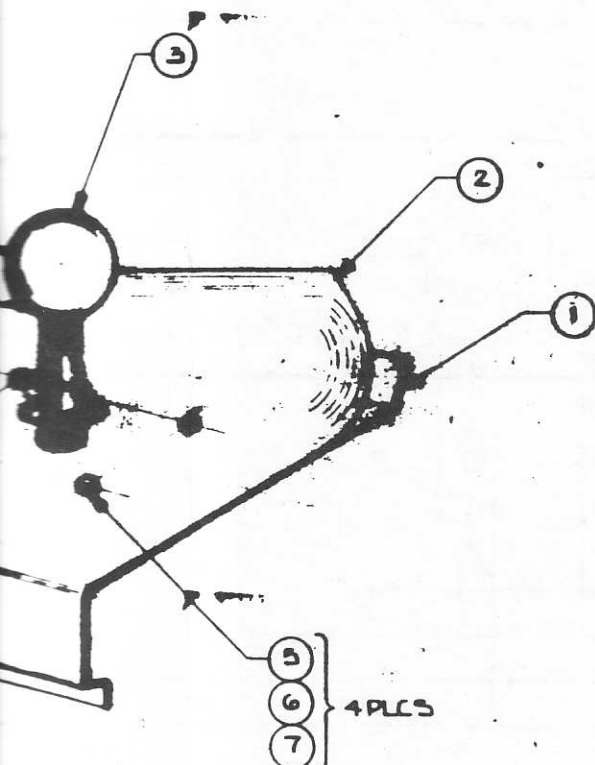
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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
A		RELEASED	SM. 10-2-79	<i>[Signature]</i>

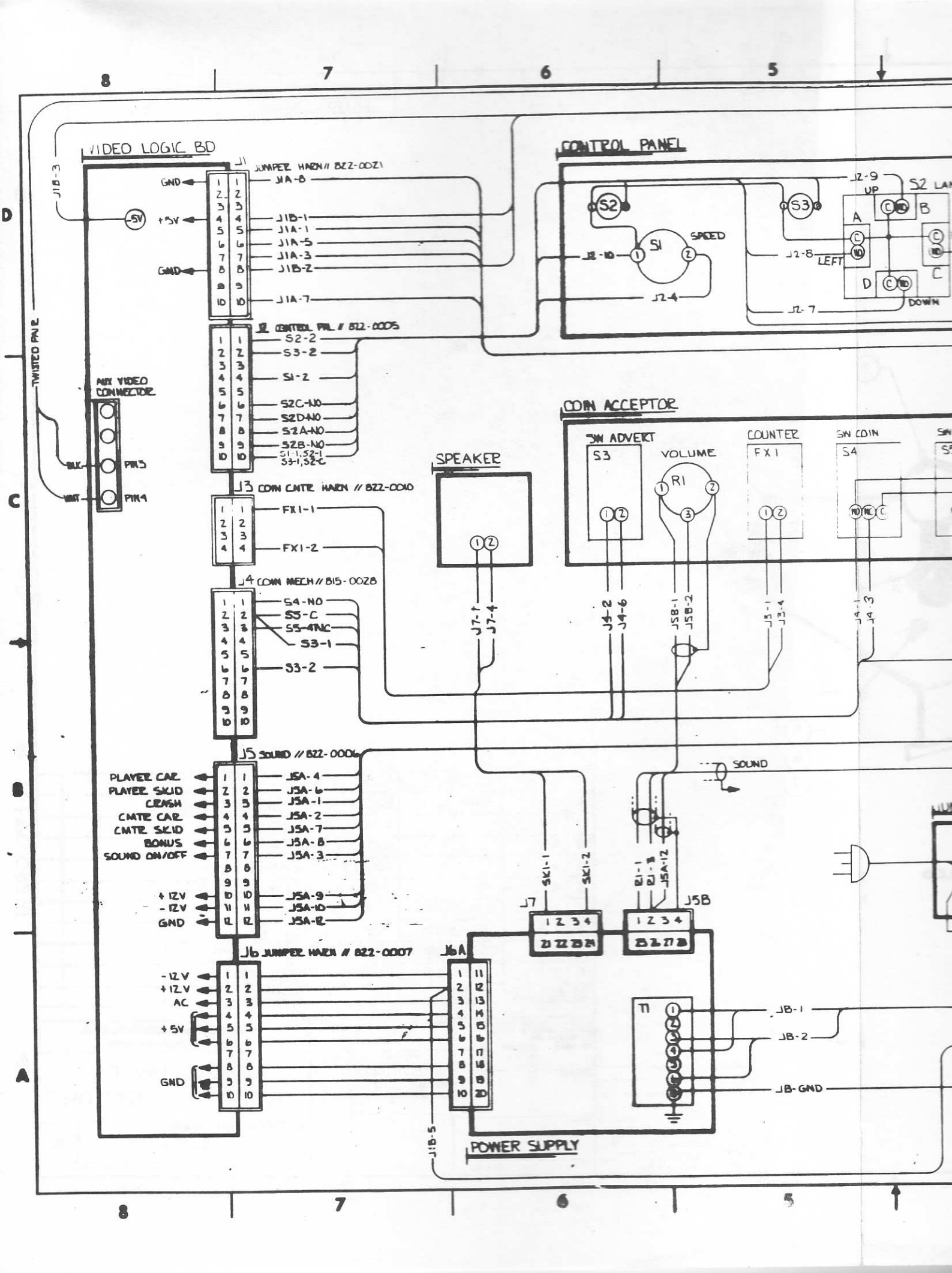


ITEM NO	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
10	6		253-0031	SPACER WILD SWITCH
9	3		240-0007	BUTTON PLUNGER BLACK
8	3			PAL NUT 1/2 X 13
7	4			NUT HEX #10-32
6	4			WASHER LOCK SPLIT #10
5	4			CARRIGE BOLT #10-32 X 3/4
4	3		510-0023	SWITCH WILD
3	1		800-0036	ASSY JOYSTICK
2	1		253-0106	CONTROL PANEL GRAPHIC
1	1		250-0365	CONTROL PANEL METAL

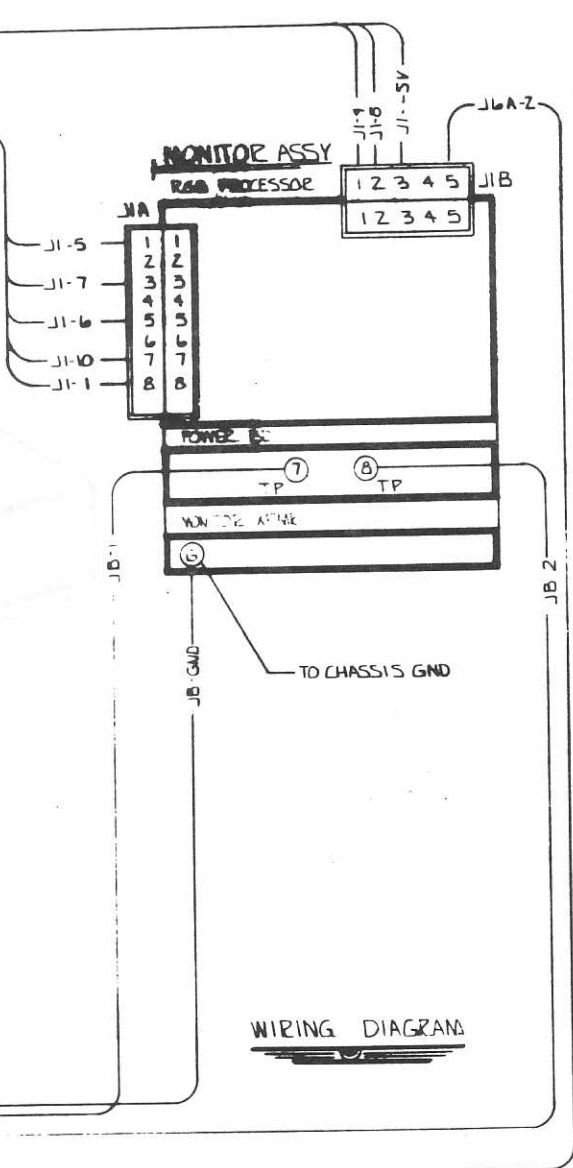
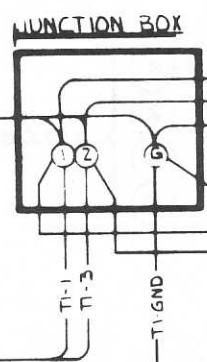
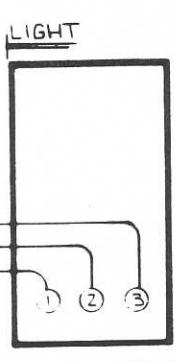
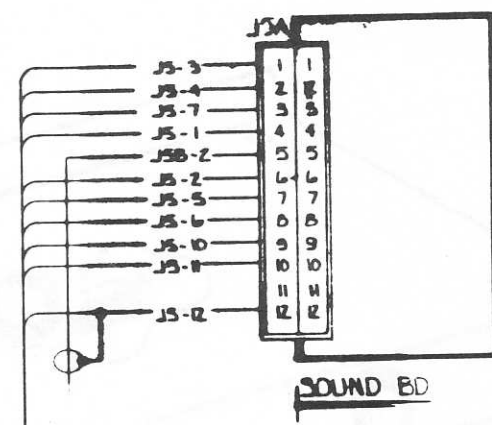
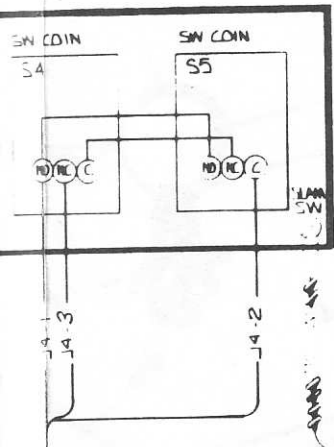
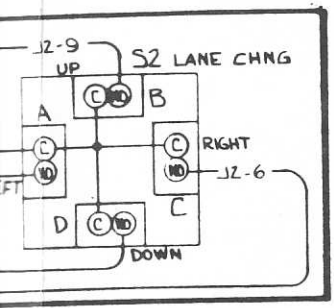
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:			CONTRACT NO.		Green Industries, Inc. San Diego, California 92101	
FRACTIONS	DECIMALS	ANGLES	APPROVALS	DATE	CONTROL PANEL ASSEMBLY HEAD ON 2	
±	JXX ± JXXX ±	±	DRAWN S MAGNOLIA	9-24-79		
MATERIAL	FINISH		CHECKED <i>[Signature]</i>	10-2-79	SCALE SHEET OF	
722-0013	HEAD ON II					
NEXT ASSY	USED ON					

PLCS

822-0036



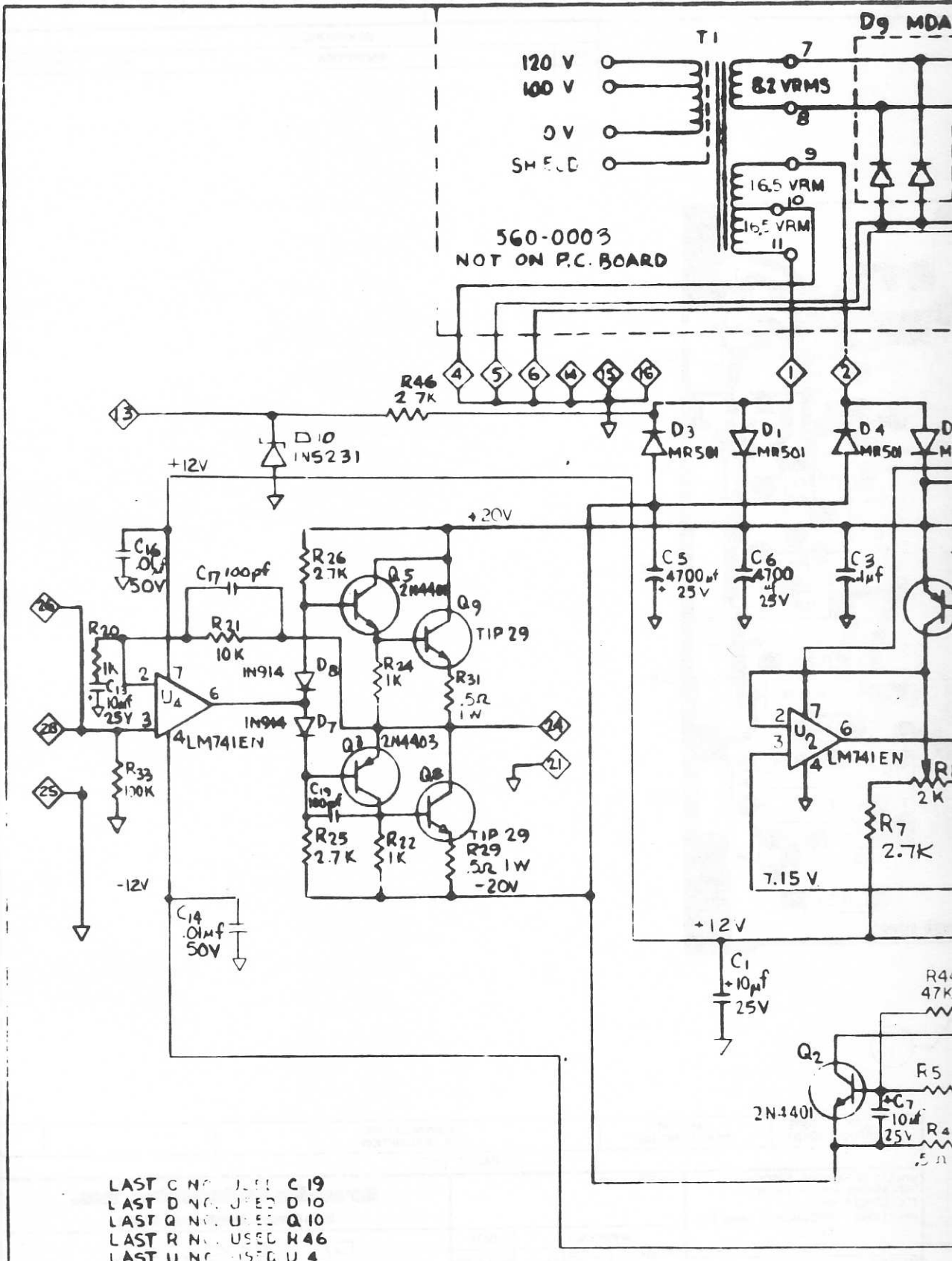
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED		



WIRING DIAGRAM

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS ±	DECIMALS .XXX ±	ANGLES ±	Gremkin Industries, Inc. San Diego, California 92108
MATERIAL	FINISH	APPROVALS	
NEXT ASSY	USED ON	DO NOT SCALE DRAWING	TOP ASSEMBLY HEAD ON 2 COLOR SIZE: D CODE IDENT NO.: 722-0013 DRAWING NO.: 722-0013 REV: A
APPLICATION			SCALE: SHEET 6 OF 9

D
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722-0013

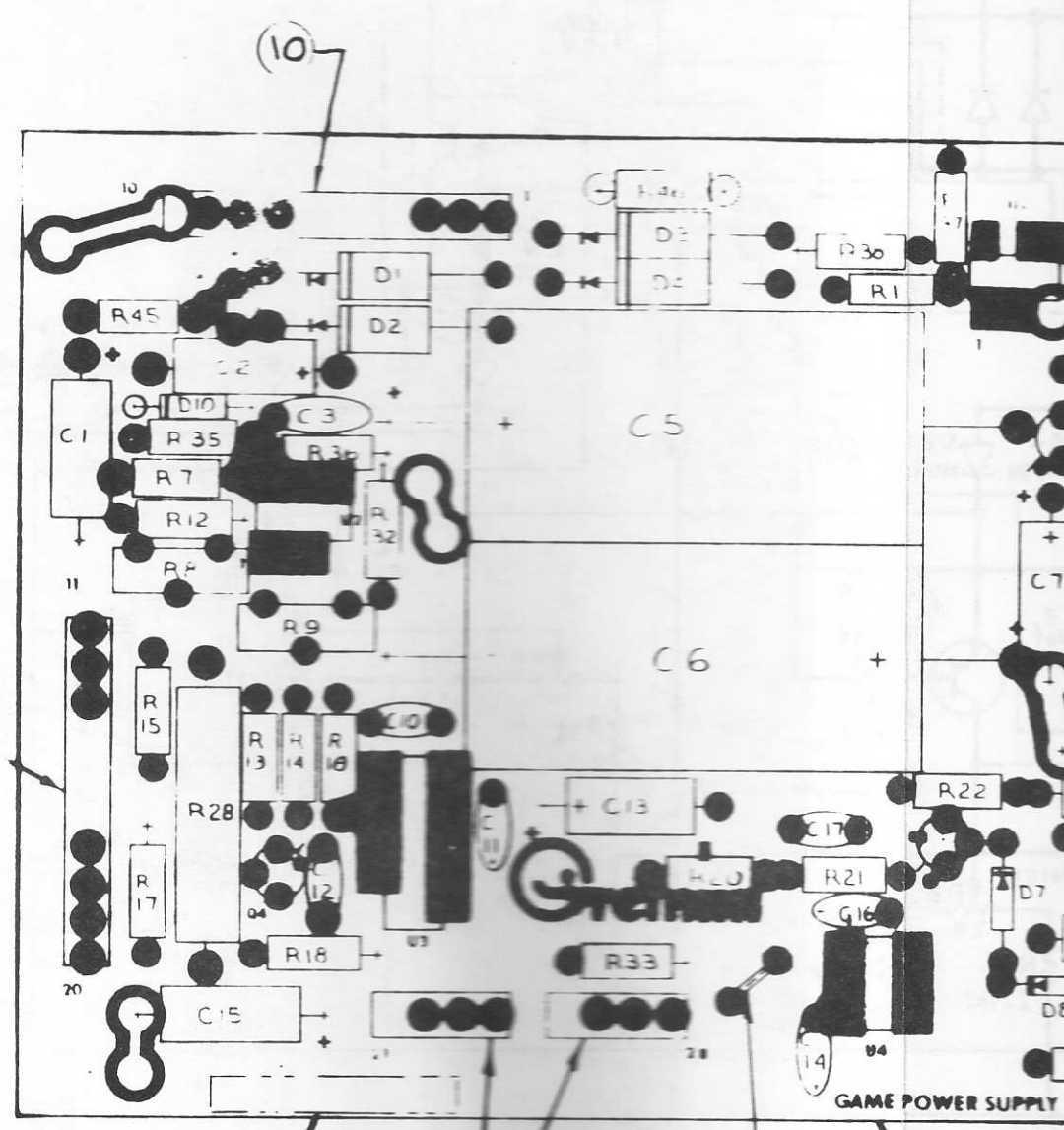


LAST C NO. USED C 19
 LAST D NO. USED D 10
 LAST Q NO. USED Q 10
 LAST R NO. USED R 46
 LAST U NO. USED U 4

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REIDENTIFY ASSY
WITH NO. 815-0021
& LATEST REV

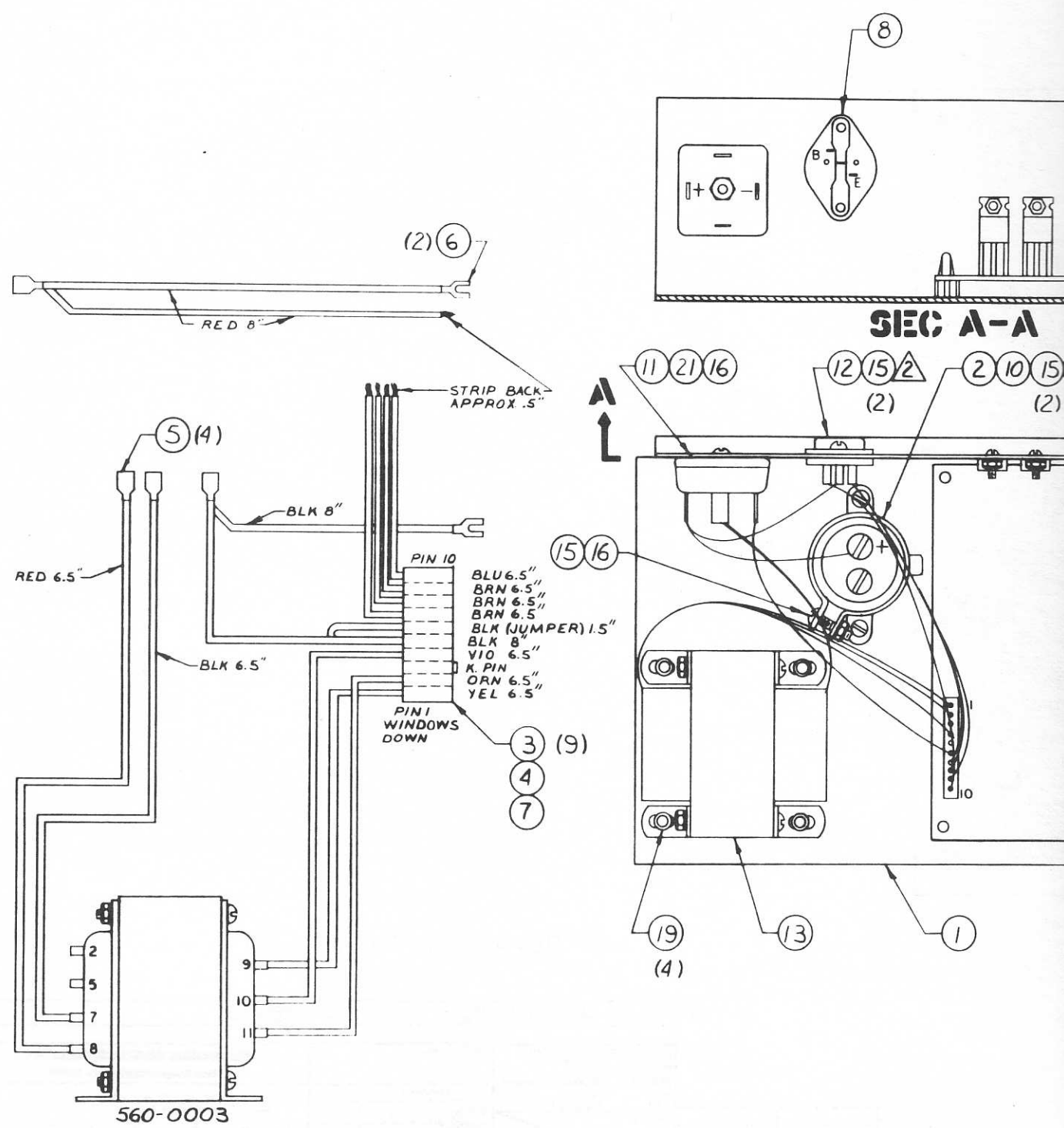
		QTY	REVISION
UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES			
FRACTIONS ARE TO BE USED			
MATERIAL			
FINISH			
815-0020	Power Supply Assy		
NEXT ASSY	USED ON		
APPLICATION			DO NOT

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8 7 6 5

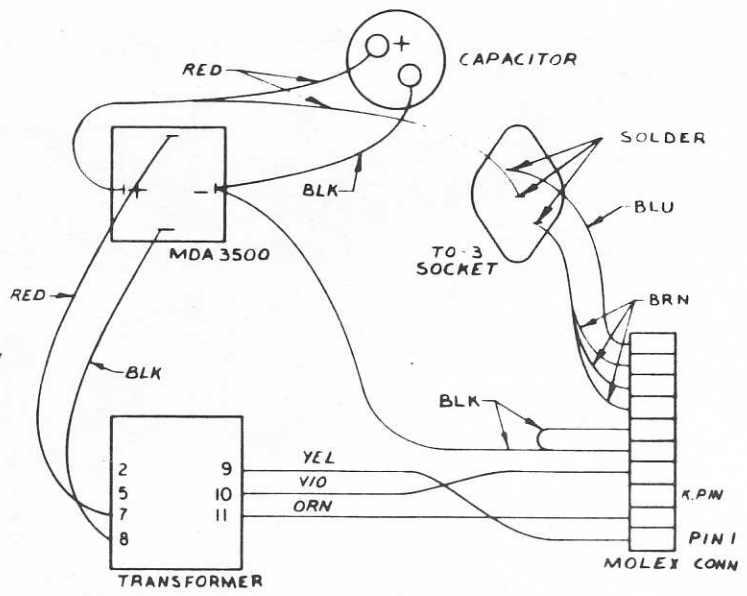
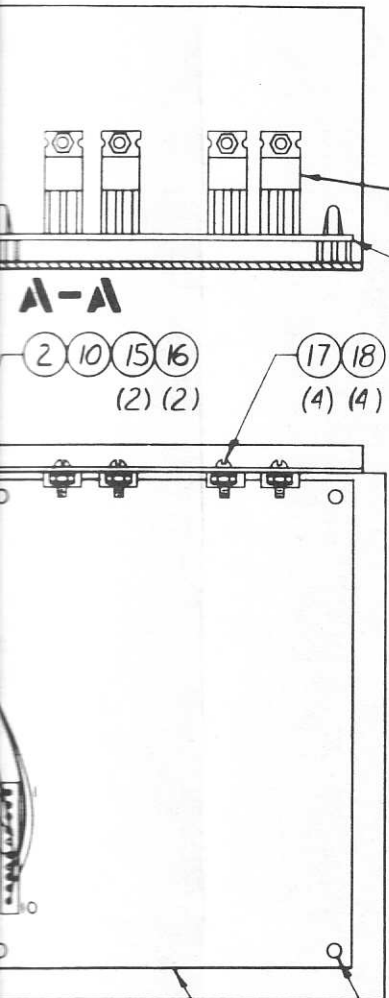
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⚠ ALL POWER TRANSISTORS TO BE MOUNTED WITH HEAT SINKING PASTE & INSULATING HARDWARE
 1. ALL WIRE TO BE AWG #22 GA
 NOTES: UNLESS OTHERWISE SPECIFIED

8 7 6 5

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



WIRING DIAGRAM

SEE DETACHED PARTS LIST 815-0020

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	Greslin Industries, Inc. San Diego, California 92108
±	JXX ±	±	
MATERIAL		APPROVALS	DATE
FINISH		DRAWN	CHECKED
715-0001 SAFARI		ASSY POWER SUPPLY	
NEXT ASSY USED ON		SIZE	CODE IDENT NO.
APPLICATION		D	815-0020
DO NOT SCALE DRAWING		DRAWING NO.	REV
SCALE FULL		815-0020	A
		SHEET 3 OF 4	

D

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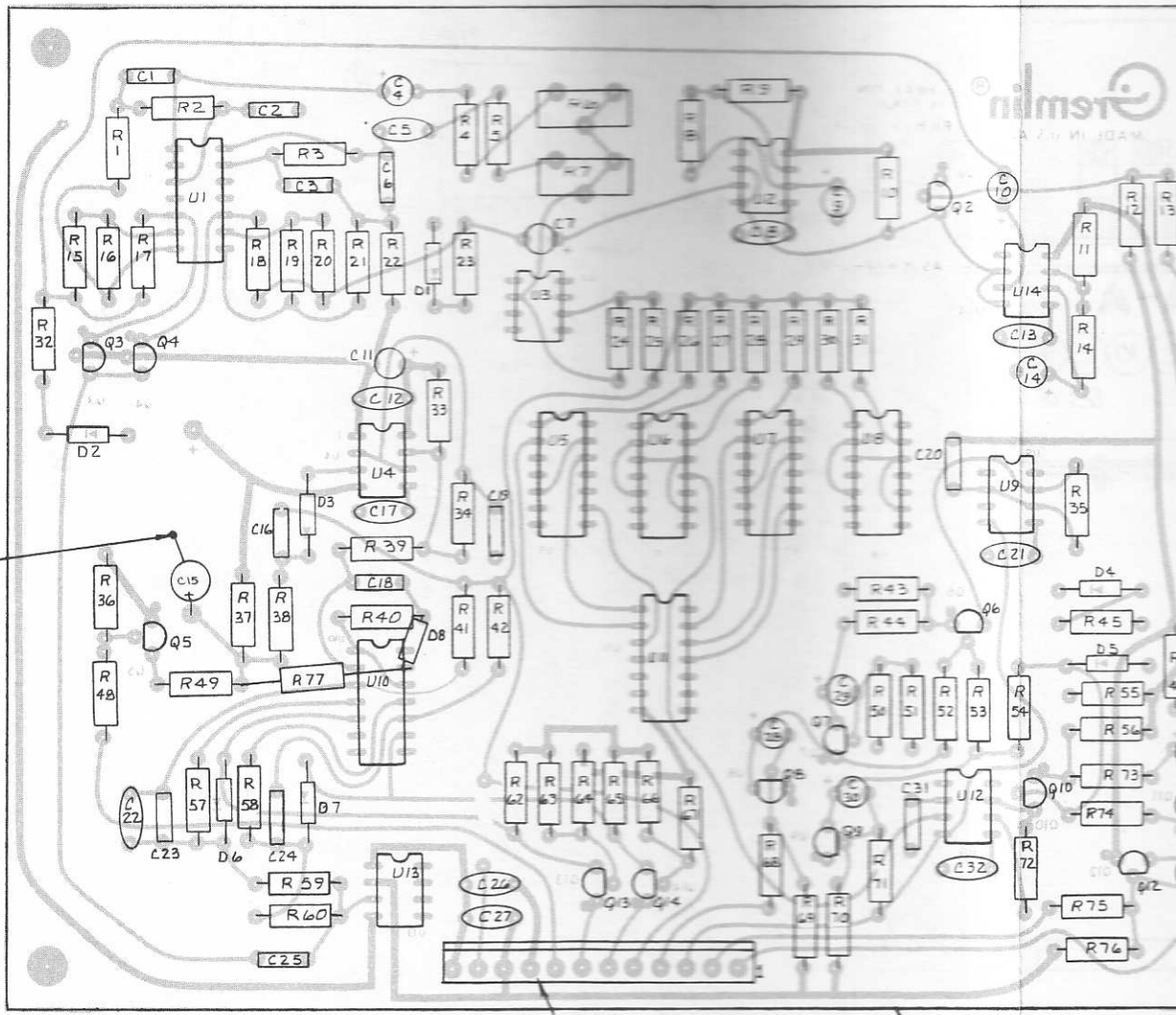
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GND PLANE

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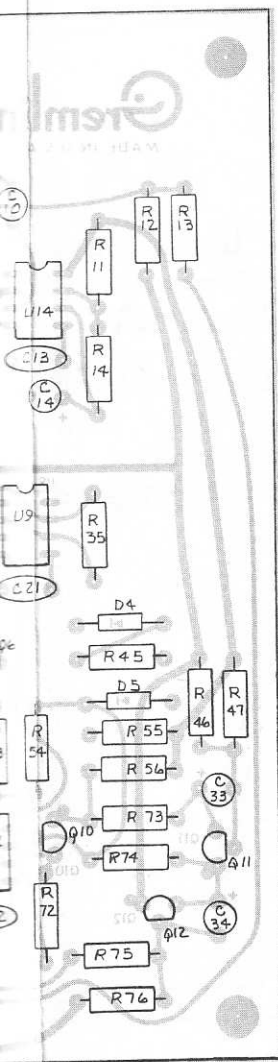
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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED	1-8-79	<i>[Signature]</i>
	B	ECN 273 1-25-79 ADDENDUM 273	1-25-79	<i>[Signature]</i>



SEE DETACHED PARTS LIST

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	Gremlin Industries, Inc. San Diego, California 92123
FRACTIONS ±	DECIMALS .XX ± .XXX ±	APPROVALS	
MATERIAL		DATE	PC ASSEMBLY HEAD ON SOUND
FINISH		DRAWN <i>Wynne</i> 11-10-78	
APPLICATION		CHECKED <i>Stw-f. Fay</i> 12-22-78	SIZE D
NEXT ASSY USED ON			CODE IDENT NO. 822-0002
DO NOT SCALE DRAWING			DRAWING NO. B
			SCALE 2/1
			SHEET 5 OF 6

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822-0002 B

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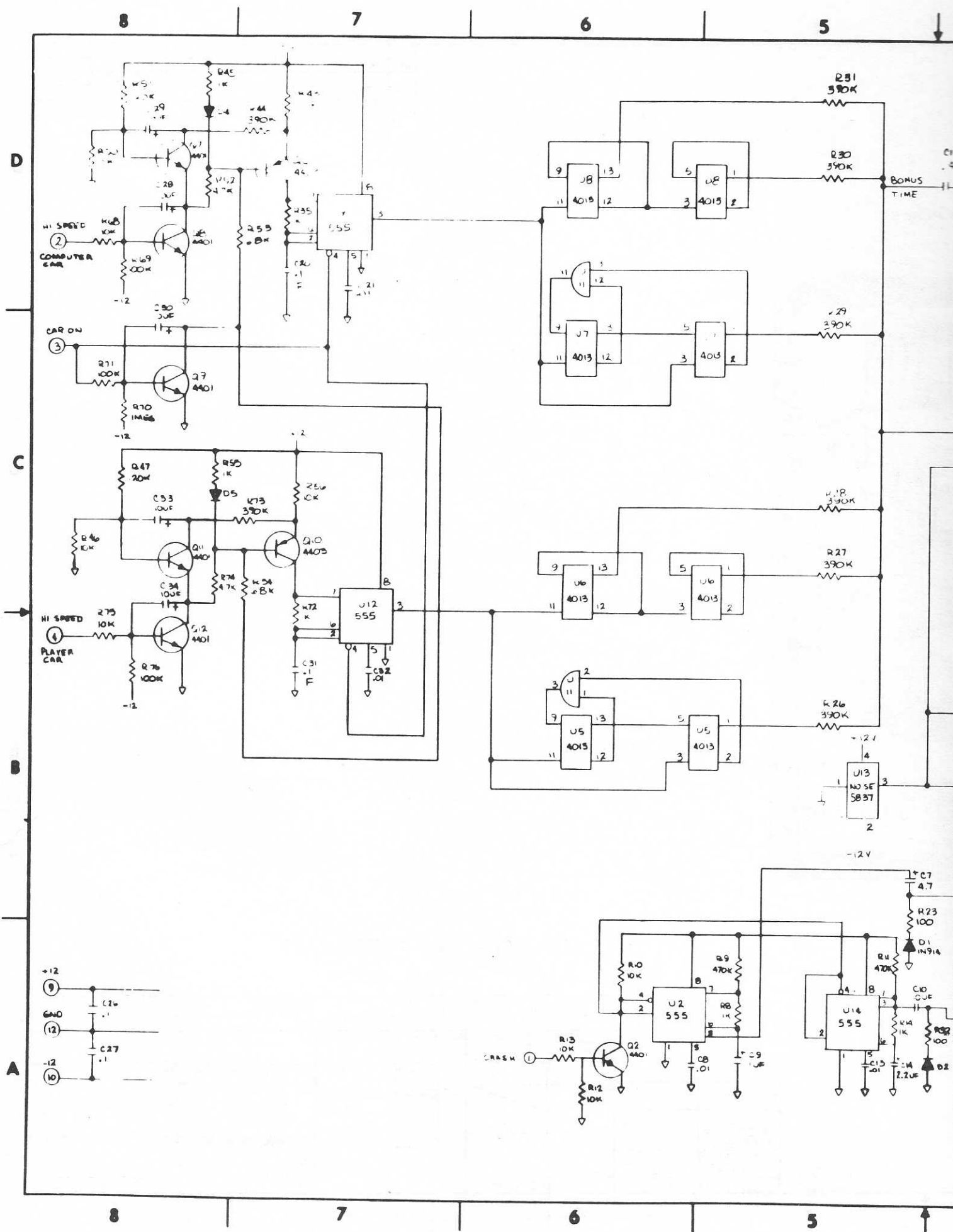
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3

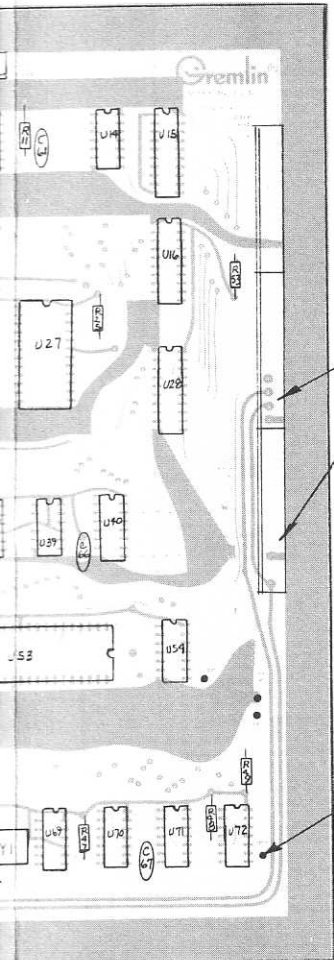
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1



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED	10-22-78	<i>[Signature]</i>
	B	PER ECN 310	5-29-79	<i>[Signature]</i>
	C	PER ECN 318 & 321	8-8-79	<i>[Signature]</i>

2 + PLACES



14

11 7 PLACES

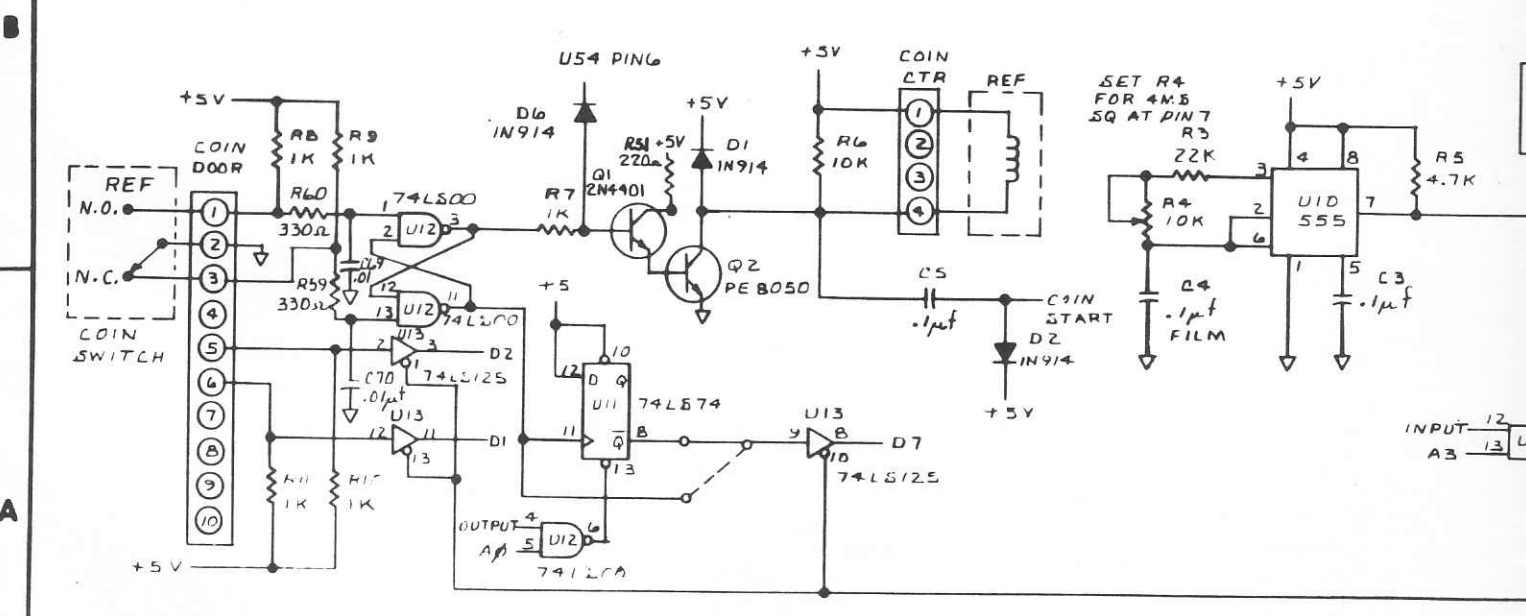
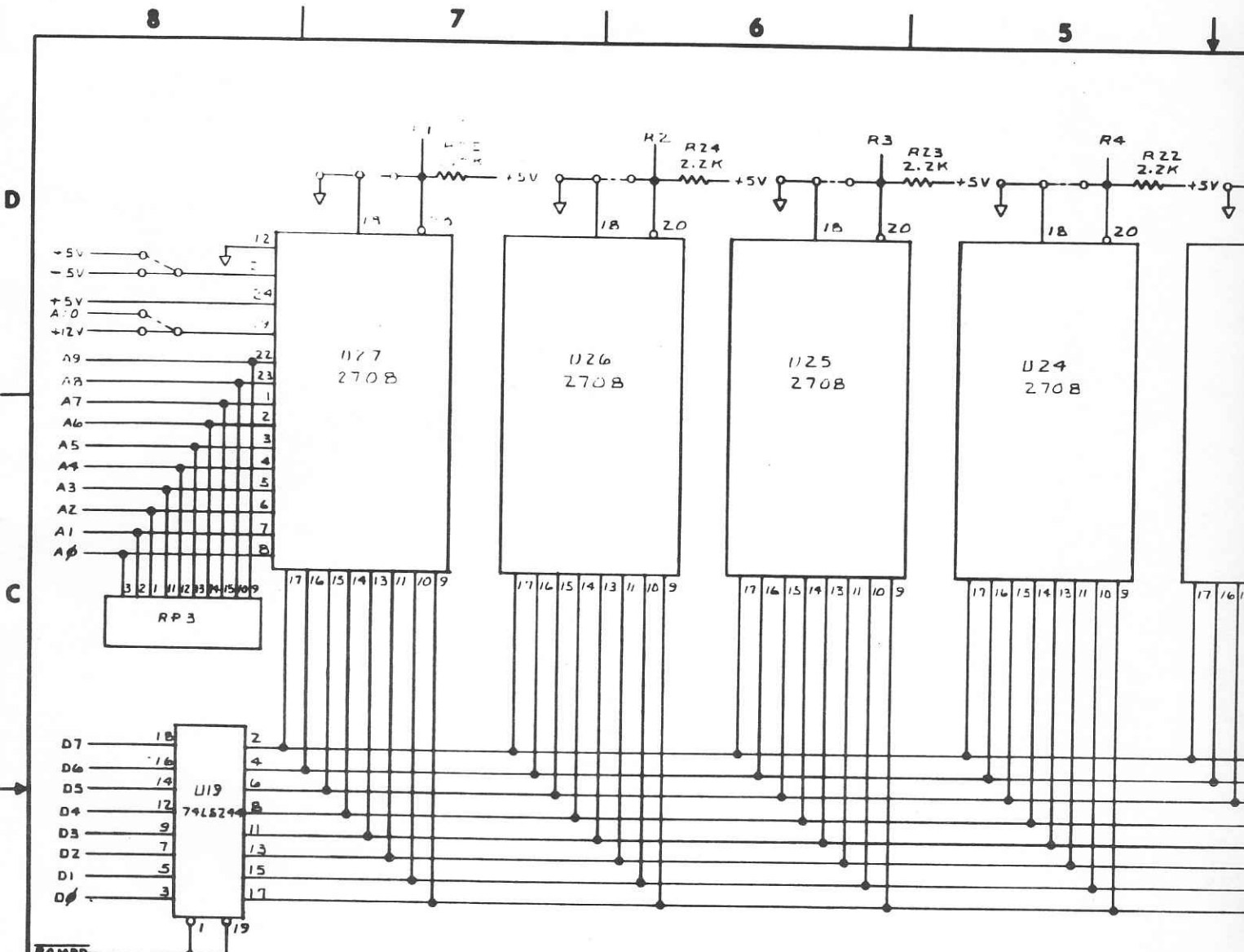
SEE DETACHED PARTS LIST

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			ASSEMBLY — BASIC V.I.C. BOARD
			CONTRACT NO.
			APPROVALS
			DATE
			DRAWN <i>Wynona</i> 11-23-78
			CHECKED 12-22-78
			SIZE D CODE IDENT NO. DRAWING NO. 830-0031 C REV
			SCALE 1/1 SHEET 5 OF 3

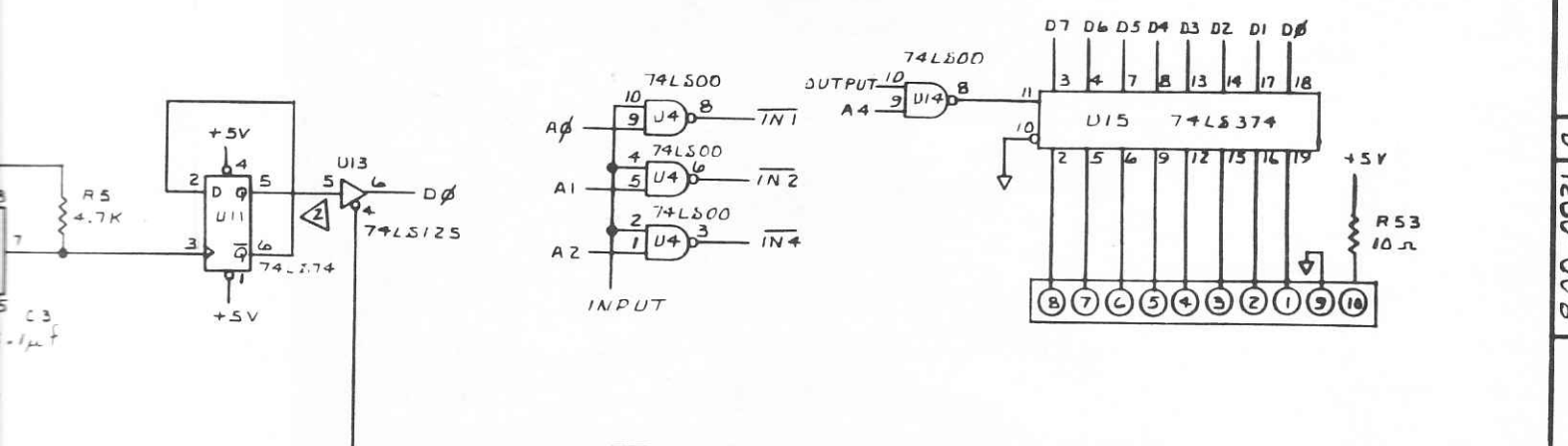
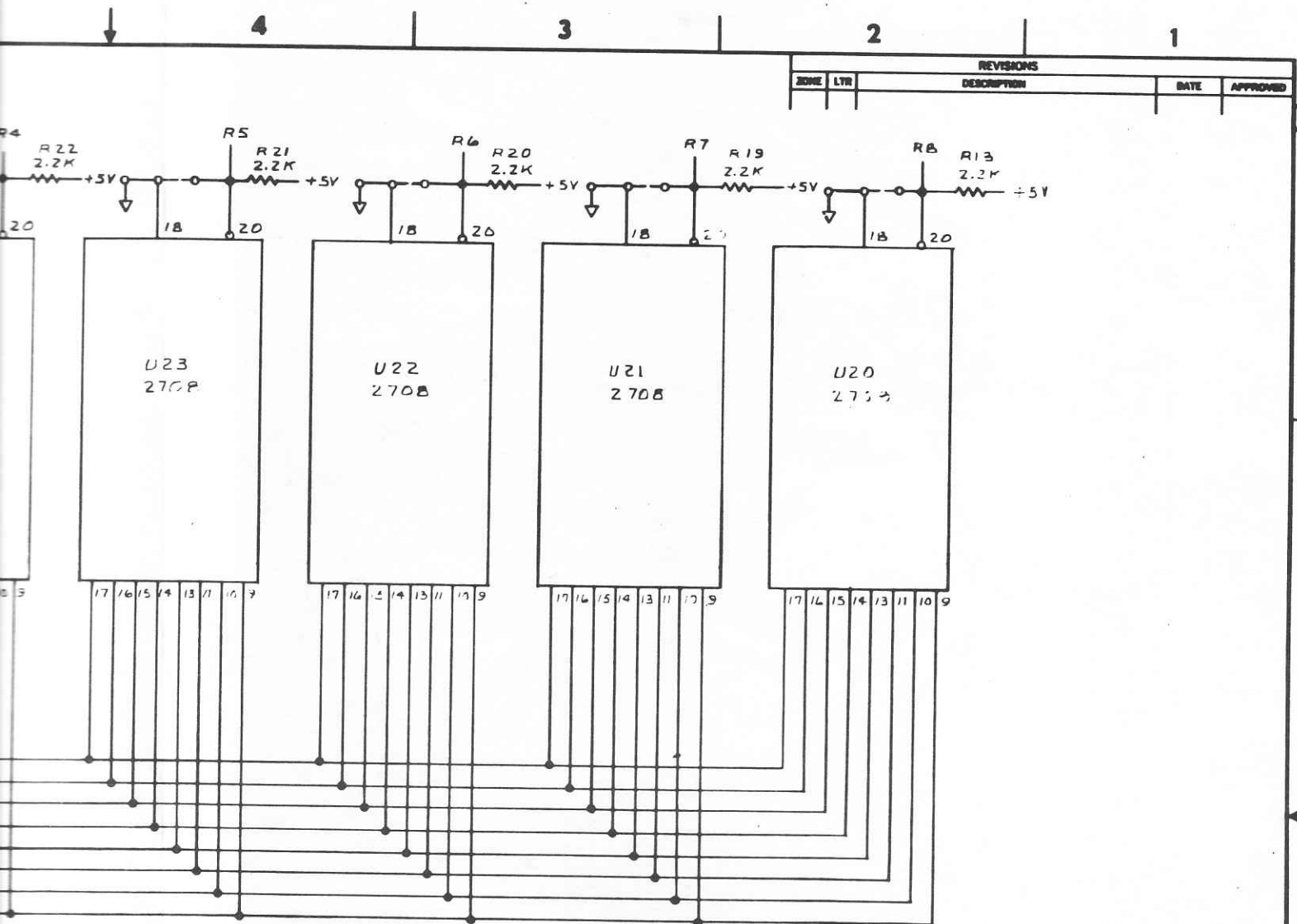
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:	FRACTIONS	DECIMALS	ANGLES
	±	.XX ±	±
		.XXX ±	

MATERIAL	FINISH
826-0004	
814-0019	
822-0011	
822-0001	
NEXT ASSY	USED ON
APPLICATION	DO NOT SCALE DRAWING

D
C
B
800-0031 C



⚠️ SLT ETCH BETWEEN U11 & U13-5
 JUMPER BETWEEN U11 & U13-5 FOR R26-C001 ONLY
 NOTES:



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS ±	DECIMALS .XX ±	ANGLES ±	APPROVALS
±	.XXX ±	±	DATE
MATERIAL	FINISH		DATE
			DATE
B22-0009	FINISH		DATE
B22-0011			DATE
B22-0001	FINISH		DATE
B14-0019			DATE
NEXT ASSY	USED ON	DATE	
APPLICATION		DO NOT SCALE DRAWING	
SIZE		CODE IDENT NO.	DRAWING NO.
D			800-0031
SCALE 1:1		REV	C
SHEET 2 OF 2		SHEET 2 OF 2	

800-0031 C

A