Hedon

PART NO.
420-0193

MANUFACTURED BY

Gremlin® Industries, inc.

OWNER'S MANUAL

HEAD ON

OPERATING INSTRUCTIONS

AND

SERVICE MANUAL

HEAD ON 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.

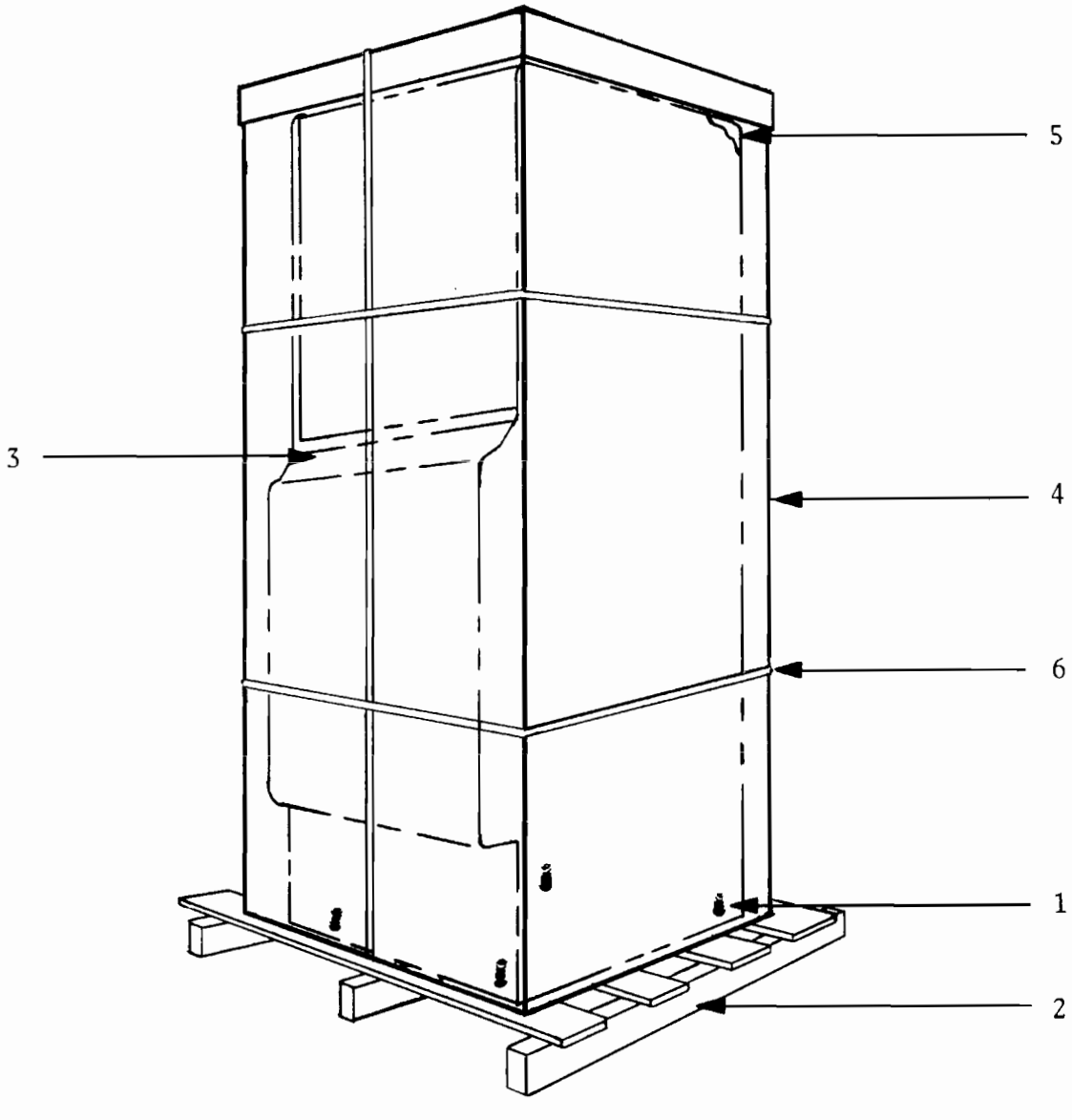
REPACKAGING INSTRUCTIONS

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.



GAME CONCEPT - HEAD ON

HEAD ON is a single-player video driving game. A player steers his car around the screen track, gaining as many points as possible in the time allotted. By maneuvering his car through the lanes, the player erases the markers in each lane for high score. But, the game has an additional element of challenge- the computer's car. It also moves around the track, in the opposite direction, and presents a test of skill by challenging the player to outsmart its moves and avoid a crash.

Both the player's car and the computer's car (it's the hollow one) start at the bottom of the screen. As the player moves his car around the track, he clears the lane markers and adds points to his score. He must judge which lane to stay in or move to, depending on where the computer's car is. With the control panel joystick and accelerator button, the player controls not only his car's speed, either fast or slow, but also the number of lane changes he can make. For example, the player sees he can avoid the other car by making a lane change. Depending on how fast he is moving, the player can maneuver his car to change one or two lanes. If the car is moving fast, the player can make only one lane change; at slow speed, two lane changes are possible. Play continues in this manner, with the player continually trying to predict where the computer car will go, so that the two cars won't crash. If they do, the game resets the cars to the starting line and the lane markers reappear. The player again tries to clear as many lane markers as possible before time runs out. While game time is 90 seconds, play continues after that time to allow the player a last chance to clear any remaining lane markers. If he does this, the game gives a bonus time of 30 seconds. If he crashes, the game ends. The bonus time is awarded any time the player clears all the lane markers without crashing.

Each lane is given a point value, as shown in the track infield. At game start, each lane is worth 5 points. This value increases by 5 points each time the player clears all the lane markers. Also, the three highest scores to date are displayed on the track infield.

GAME CONCEPT cont'd.

As mentioned above, the computer's car adds challenge to the game action. At first, the player may have no difficulty avoiding the computer's car; but, as the game progresses, and the player's score increases, predicting which way the computer car will go becomes harder. This feature allows for a variety of player skill levels.

HEAD ON is played with two controls- a joystick and push button. The joystick allows the player to make a lane change up, down, or left or right, depending on which part of the track his car is located. The push button controls the speed: Push down to move the car faster; release it to slow the car down.

HEAD ON has a complete set of sounds to highlight the action. Each car has its own engine sound; both the player's car and computer's car have different sounds for fast and slow speeds. Also, both cars produce a screech sound at each corner of the track, and when changing lanes. A sensational explosion occurs whenever the cars collide.

There are two options in HEAD ON: The number of coins per game (1,2,3,or 4) and, sound off during advertising. To select 2, 3, or 4 coins per game (the game is shipped in the 1 coin per game mode) a jumper is connected from ground (pin 10 on the player control connector on the logic board) to pin 3 for 2 coins per game, or to pin 4 for 3 coins. Both pins 2 and 3 are grounded for 4 coins per game. To turn off the advertising sound, simply turn the sound switch, located inside the coin door, to "OFF".

MAINTENANCE PROCEDURES- HEAD ON

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 cpacitor)
   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

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; pin6, U13.
   d) If a game is started only occas ionally 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 Ø1 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

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.

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE TOP ASSY HEAD ON	722-0001 DWG NO	SH 1 OF 8	A REV
		DRAWN G. LLOYD	ENGR		
		CHECK Steve S. Fay	APPR		

LTR	DATE	REVISION DESCRIPTION	DRAFT	CHECK	APPR
A		RELEASED 3-2-79	G.LLOYD	S Fay	SF

FORM NO. 001-1500

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE TOP ASSY. HEAD ON	722-0001 DWG NO	SH 2 OF 8	A REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
1	722-0001		TOP ASSY HEAD ON.	
2	130-0001	1	SPEAKER GAME	
3	130-0002	1	SPEAKER COVE	
4	140-0021	1	COVER J-BOX	
5	140-0033	1	CABINET HEAD-ON	
6	200-0002	1	MONITOR 19"	
7	220-0035	1	LOCK	
8	220-0066	2	COIN MECH.	
9	250-0032	1	BEZEL	
10	250-0034	1	SPRING RETAINER	
11	250-0038	1	MOULDING	
12	250-0048	1	CLIP SWITCH	
13	250-0285	1	FRNT. CASH DOOR MOD.	
14	253-0092	1	PANEL MON. SCR.	
15	253-0093	1	PANEL LOGO	
16	280-0004	25	CLIP WIRE	
17	280-0005	5	CABLE TIE	
18	280-0010	2	NUT WIRE	
19	390-0011	1	LAMP FLOR.	
20	390-0012	1	LAMP FIX.	
21	420-0028	1	DECAL S/N	
22	420-0030	1	DECAL CAUTION 115V	
23	420-0038	2	DECAL IMPORTANT NOTE	
24	420-0040	1	DECAL RECYCLE	

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE TOP ASSY HEAD-ON	722-0001 DWG NO	SH 3 OF 8	A REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
25	420-0041	1					DECAL S/N SM.	
26	420-0060	1					DECAL TIP N TELL	
27	420-0071	1					INST CRATING	
28	420-0116	1					WRAP AROUND SIDE	
29	420-0117	1					TOP COVER	
30	420-0124	4					CORN. STRIP.	
31	420-0158	1					MANUAL WELLS GARDNER.	
32	420-0189	1					GRAPHIC SIDE LEFT	
33	420-0190	1					GRAPHIC SIDE RIGHT	
34	420-0191	1					GRAPHIC INTERIOR.	
35	420-0192	1					DECAL CARTON	
36	420-0193	1					MANUAL HEAD-ON	
37	250-0327	1					BRKT SUPPORT CRT.	
38	807-0009	1					J-BOX	
39	807-0010	1					SPKR HARNESS	
40	815-0020	1					PWR SUPPLY	
41	815-0028	1					COIN MECH HARNESS	
42	822-0001	1					VID LOGIC BD.	
43	822-0002	1					SOUND BD.	
44	822-0004	1					ASSY. CONTROL PNL.	
45	822-0005	1					HARNESS CONTROL PNL.	
46	822-0006	1					HARNESS PWR./SOUND	
47	822-0007	1					JUMPER HARNESS	
48	822-0008	1					MONITOR HARNESS	
49	822-0010	1					HARNESS COIN CTR.	

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE TOP ASSY. HEAD-ON	722-0001 DWG NO	SH 4 OF 8	A REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
50		1	PALET HEAD-ON	
51	220-0008	1	COUNTER DIGITAL	
52				
53		4	SCR PHL PAN HD # 6 X 3/8 SHT MTL	
54		7	SCR, #6 SHT, RD. HD. CRS REC. 1/16	
55				
56		4	SCR, #8 X 1/2 SHT RD. HD PHL	
57		2	NUT HEX # 10-32	
58		4	MACH, SCR, #8-32 X 1 1/2 SLOT HD	
59		14	BOLT, CARRIAGE 10-24 X 1 3/4	
60		6	MACH. SCR, #10-32 X 1.0 PHL PAN	
61		6	WASHER, LOCK, SPLIT #10	
62				
63				
64		4	WASHER, FLAT # 8	
65		12	WASHER, LOCK, SPLIT # 8	
66		12	WASHER, FLAT # 10	
67		6	NUT, HEX # 10-24	
68		12	NUT, HEX # 8-32	
69		8	NUT, WING 10-24	
70		8	8-32 X 3/4 CRES TAMPER PROOF	

FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE CONTROL PANEL ASSY	822-0004 DWG NO	SH 1 OF 3	A REV
Sheet 3 "D" size		DRAWN G. LLOYD 12-7-78	ENGR		
		CHECK Steven P. Fay 12-22-78	APPR		

LTR	DATE	REVISION DESCRIPTION	DRAFT	CHECK	APPR
A	12-7-78	INITIAL RELEASE	G. LLOYD.	SPF	SPF

FORM NO. 001-1500

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE CONTROL PANEL ASSY.	822-0004 DWG NO	SH 2 OF 3	A REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
1			CONTROL PANEL ASSY.	
2	250-0317	1	CONTROL PANEL / HEAD-ON	
3	240-0007	1	BUTTON PLUNGER BLK.	
4	510-0023	1	SW. ASSY WICO	
5	819-0031	1	SW. ASSY JOY STICK	
6	253-0094	1	GRAPHIC CONTROL PANEL	
7		4	CARG. BOLT 8-32 x 1/2 BLK OZIDE	
8		4	WASHER FLAT #8	
9		4	NUT STD. HEX. 8-32	
10	280-0117	1	TAB RIVET	
11	253-0031	2	SPACER WICO SW.	

FORM NO. 001-1501

GREMLIN IND INC SAN DIEGO CA. 92123	PARTS LIST	TITLE ASSY, POWER SUPPLY	815-0020 DWG NO	SH 1 OF 4	A REV
RELEASED		DRAWN LEE J. LIPTAK	ENGR		
DESIGN		CHECK Ken DeFrost	APPR		

LTR	AUTH	REVISION DESCRIPTION	DRAFT	CHECK	APPR
A		RELEASED		2/1/78	R.H.D.
		SHT. 3 IS "D" SIZE SHT 4 IS 'C' SIZE			

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, 9000 UF 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, TO-3	
9	280-0014	4	STAND-OFFS, CLIPS	
10	280-0056	1	CLAMP, CAP. VR4 1 1/2"	
11	481-0009	1	DIODE, MDA 3500	
12	482-0007	1	XISTOR, 2N3055	
13	560-0003	1	XFMR. MODEL 9-10345B	
14	815-0021	1	POWER SUPPLY ASSY (PCB)	
	815-0020		SCHEM. ASSY. PWR. SUPP.	(REFERANCE)
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"	

Cromlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE PC ASSY - POWER SUPPLY	815-0021 DWG NO	SH 1 OF	B REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
1	170-0082	1	PCB - POWER SUPPLY	
2	150-0019	2	CAP. E 4700 uF, 25V	C5, C6
3	151-0001	1	CAP. CER .05 uF, 50V	C11
4	151-0002	2	CAP. CER 100 PF, 50V	C17, C19
5	151-0008	1	CAP. CER .001 uF, 50V	C10
6	151-0011	3	CAP. CER .01 uF, 50V	C12, C14, C16
7	151-0012	1	CAP. CER. .1 uF, 50V	C3
8	153-0001	5	CAP. TANT 10 uF, 25V	C1, C2, C7, C13, C15
9				
10	212-0003	2	CONN M 10 PIN	
11	212-0004	2	CONN M 4 PIN	
12				
13	313-0001	1	IC LM723	U3
14	313-0004	3	IC LM741 EN	U1, U2, U4
15				
16	471-0101	1	RES 100 Ω, 1/2 W, 5%	R15
17	471-0102	10	RES 1K Ω, 1/2W, 5%	R5, 17, 20, 22-24, 35, 36, 38, 39
18	471-0103	4	RES 10K Ω, 1/2W, 5%	R1, R14, R21, R37
19	471-0104	1	RES 100K Ω, 1/2W, 5%	R33
20	471-0122	1	RES 1.2K Ω, 1/2W, 5%	R18
21	471-0152	2	RES 1.5K Ω, 1/2W, 5%	R13, R16
22	471-0272	5	RES 2.7K Ω, 1/2W, 5%	R7, R25, R26, R43, R46
23	471-0332	1	RES 3.3K Ω, 1/2W, 5%	R32
24	471-0471	2	RES 470 Ω, 1/2W, 5%	R34, 40
25	471-0473	2	RES 47K Ω, 1/2W, 5%	R44, R45

FORM NO. 001-1501

Gremlin 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	472-00R5	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 MR501	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				

FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE HEAD ON SOUND	822-0002 DWG NO	SH 1 OF 6	B REV
SHT 5 & 6 "D" SIZE		DRAWN Wynema 11-9-78		ENGR	
		CHECK Steven J Fay 12-22-78		APPR	

LTR	DATE	REVISION DESCRIPTION	DRAFT	CHECK	APPR
A	1-8-79	RELEASED	WJB	SJF	SJF
B	1-25-79	ECN 273 ADDENDUM 273 2-12-79 SJF 2-12-79	KB	SJF	SJF

FORM NO. 001-1500

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE HEAD ON SOUND	822-0002 DWG NO	SH 2 OF 6	B REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
1								
2	151-0011	6					CAP CER .01 µf 50V	C8,13,17,32,21,22
3	151-0012	4					CAP CER .1 µf 50V	C5,C12,C26,C27
4	152-0001	3					CAP FILM .1 µf 100V	C31,C20,C25
5								
6	152-0012	3					CAP FILM .047 µf 200V	C2, C23, C24
7	152-0018	3					CAP FILM .01 µf 250V	C3, C6, C19
8	152-0020	3					CAP FILM .47 µf 100V	C1, C18, C16
9	153-0001	7					CAP TANT 10 µf 25V	C10, C11, C28-C30, C33, C34
10	153-0002	2					CAP TANT 1 µf 25V	C4, C9
11	153-0003	2					CAP TANT 2.2 µf 25V	C14, 15
12	153-0004	1					CAP TANT 4.7 µf 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

FORM NO. 001-1501

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

FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE HEAD ON SOUND	822-0002 DWG NO	SH 4 OF 6	B REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
39	482-0006	2	XSTR 2N4403	Q6, Q10
40	482-0014	9	XSTR 2N4401	Q2, Q5, Q7-Q9, Q11-Q14
41	482-0023	2	XSTR 2N4093	Q3, Q4
42	471-0223	1	RES 22K OHM 1/2W 5%	R37
43				

FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE ASSEMBLY C.V. LOGIC BD.	822-0001 DWG NO	SH 1 OF 6	A REV
SHT 3 "E" SIZE SHT 4,5,6 "D" SIZE		DRAWN Wynema 11-20-78	ENGR		
		CHECK Steven S. Fay 12-22-78	APPR		

LTR	DATE	REVISION DESCRIPTION	DRAFT	CHECK	APPR

FORM NO. 001-1500

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE ASSEMBLY V. V. LOGIC BD.	822-0001 DWG NO	SH 2 OF 6	A REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
1	315-0019	6	IC EPROM 2708	U22-U27
2	800-0031	1	ASSY BASIC V.I.C.BOARD	

FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92122	PARTS LIST	TITLE ASSY BASIC V.I.C. BD.	800-0031 DWG NO	SH 1 OF 5	A REV
SHT 5 "E" SIZE		DRAWN Wynema 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	SLF.	SLF.

FORM NO. 001-1500

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE ASSY BASIC V.I.C.BD.	800-0031 DWG NO	SH 2 OF 5	A REV

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 µf 50V	C3,5,7-11,13-17,22,25,
								C27-38, C40-67
3	152-0001	1					CAP FILM .1 µf 100V	C4
4	152-0017	1					CAP FILM .33µf 100V	C24
5	153-0001	6					CAP TANT 10 µf 25V	C12,20,21,23,26,68
6	153-0002	1					CAP TANT 1µf 25V	C19
7	170-0150	1					PCB C.V. LOGIC	
8	211-0004	6					CONN PIN TEST PT	TP1-TP4, GND
9	212-0004	2					CONN M 4 PIN	
10	212-0021	3					CONN M 10 PIN	
11	212-0031	1					CONN M 12 PIN	
12	213-0001	6					SKT 24 PIN DUAL INLN	XU22-XU27
13	213-0004	12					SKT 16 PIN DUAL INLN	XU33, XU34, XU56-XU63,
								XU65, XU66
14	213-0005	2					SKT 40 PIN DUAL INLN	XU48, XU53
15	213-0008	3					SKT 20 PIN DUAL INLN	XU1, XU16, XU19
16	230-0009	1					XTAL CLK 15.46848	Y1
17	313-0023	1					IC 320T-5.0	U73
18	314-0001	2					IC NE 555	U10, U55

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE ASSY BASIC V.I.C.BD.	800-0031 DWG NO	SH 3 OF 5	A REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
19	314-0015	1	IC 7404	U54
20	314-0018	3	IC 74LS00	U4, U12, U32
21	314-0019	2	IC 74LS04	U35, U64
22	314-0040	3	IC 74LS125	U13, U46, U47
23	314-0046	1	IC 74S04	U68
24	314-0053	4	IC 74 S175	U49-U51, U67
25	314-0055	2	IC 74LS244	U1, U19
26	314-0058	5	IC 74LS08	U37-U39, U41, U71
27	314-0059	1	IC 74LS10	U52
28	314-0061	1	IC 74LS42	U40
29	314-0062	2	IC 74LS74	U11, U72
30	314-0078	1	IC 74LS02	U36
31	314-0092	2	IC 8216	U33, U34
32	315-0039	8	IC 4K RAM 12V	U56-U63
33	315-0031	1	IC Z80 MK 3880	U53
34	315-0042	1	IC VID INTERFACE	U48
35	314-0093	1	IC 74LS 374	U16
36	316-0042	1	IC PROM 32X8 SEQ	U66
37	316-0043	1	IC PROM 32X8 CTL	U65
38	390-0003	1	LED RED	D4
39	471-0011	1	RES 10 OHM 1/2W 5%	R50
40	471-0102	7	RES 1K OHM 1/2W 5%	R7-R11, R32, R37
41	471-0103	1	RES 10K OHM 1/2W 5%	R6

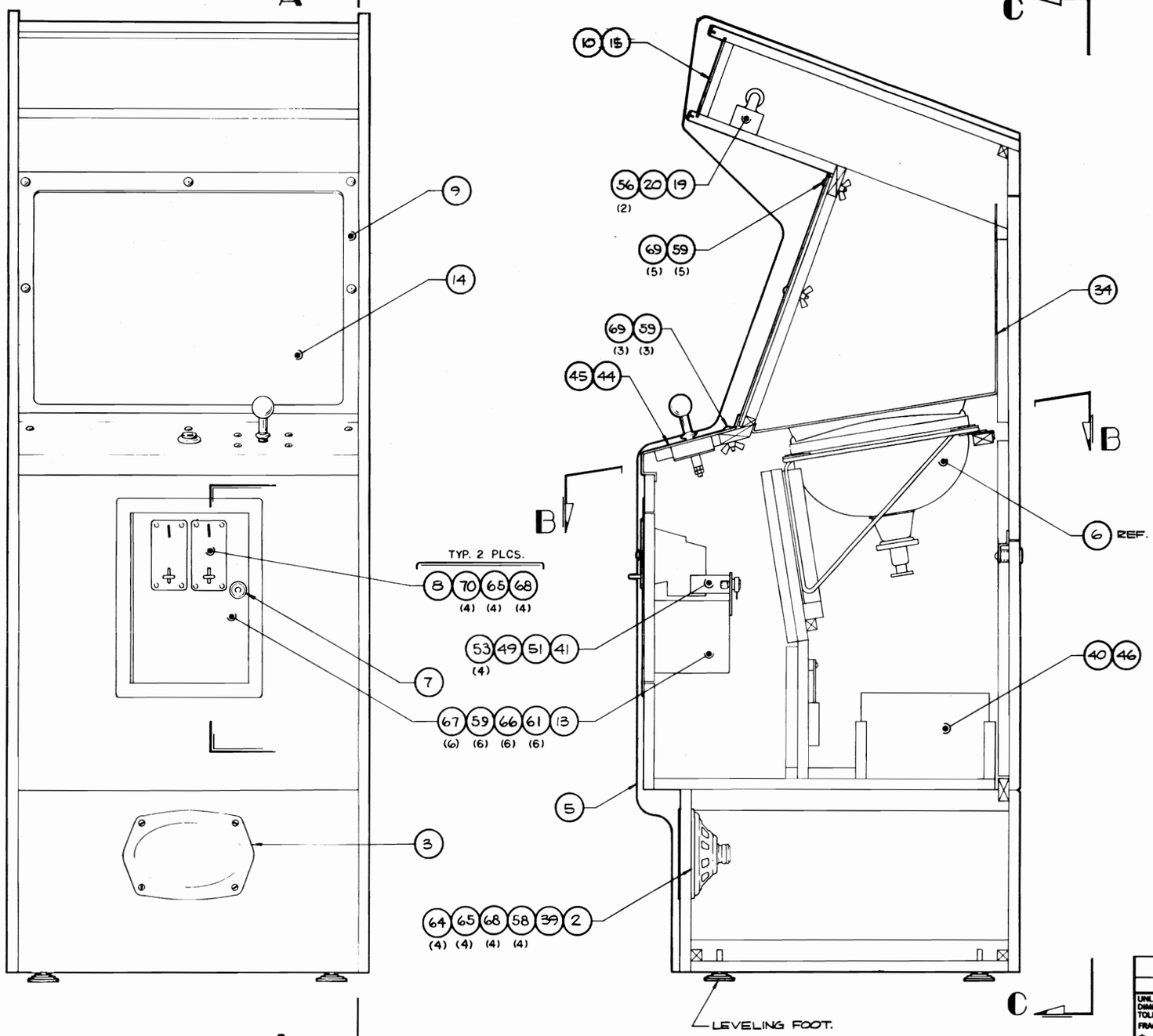
FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE ASSY BASIC V.I.C.BD.	800-0031 DWG NO	SH 4 OF 5	A REV

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
42	471-0104	3	RES 100K OHM 1/2W 5%	R42 – R44
43	471-0222	6	RES 2.2K OHM 1/2W 5%	R20 – R25
44	471-0223	1	RES 22K OHM 1/2W 5%	R3
45	471-0331	6	RES 330 OHM 1/2W 5%	R30, R31, R33, R34, R45, R46
46	471-0471	1	RES 470 OHM 1/2W 5%	R49
47	471-0472	3	RES 4.7K OHM 1/2W 5%	R5, R47, R48
48	471-0750	1	RES 75 OHM 1/2W 5%	R41
49	475-0001	1	POT 10K PC MTV	R4
50	477-0002	2	RES PACK 15 X 2.2K	RP1, RP3
51	481-0006	3	DIODE IN914/IN4148	D1, D2, D5
52	482-0006	1	XSTR 2N4403	Q6
53	482-0010	1	XSTR PE8050	Q2
54	482-0014	4	XSTR 2N4401	Q1, Q7, Q10, Q11
55	530-0006	1	HEATSINK 295-1	

FORM NO. 001–1501

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED S.M	3-2-79	



SECTION A-A

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST

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

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN G. LLOYD	1-29-79
CHECKED	3-2-79

NEXT ASSY	USED ON
APPLICATION	

Gremlin Industries, Inc.
San Diego, California 92123

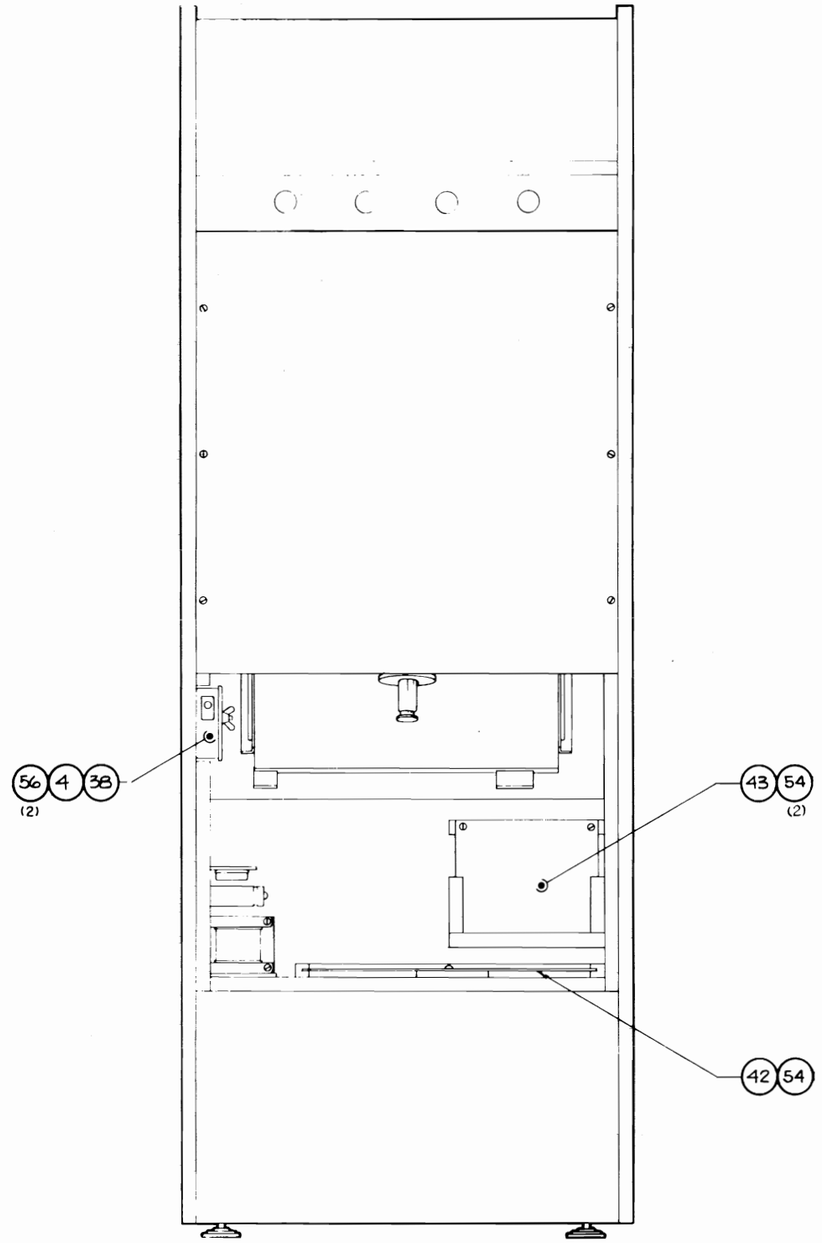
TOP ASSEMBLY HEAD-ON

SIZE	CODE IDENT NO.	DRAWING NO.	REV.
D		722-0001	A

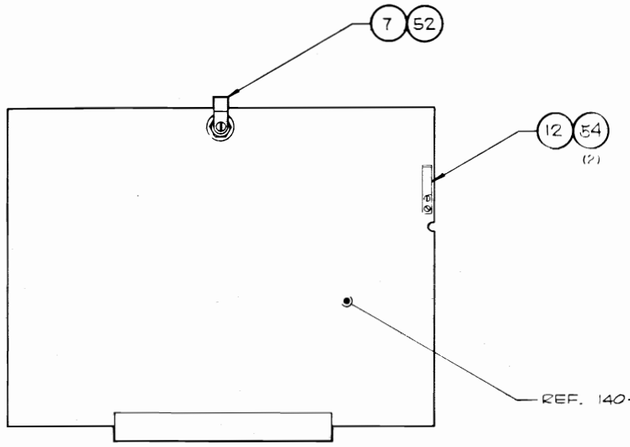
SCALE 1/4 SHEET 5 OF 8

722-0001

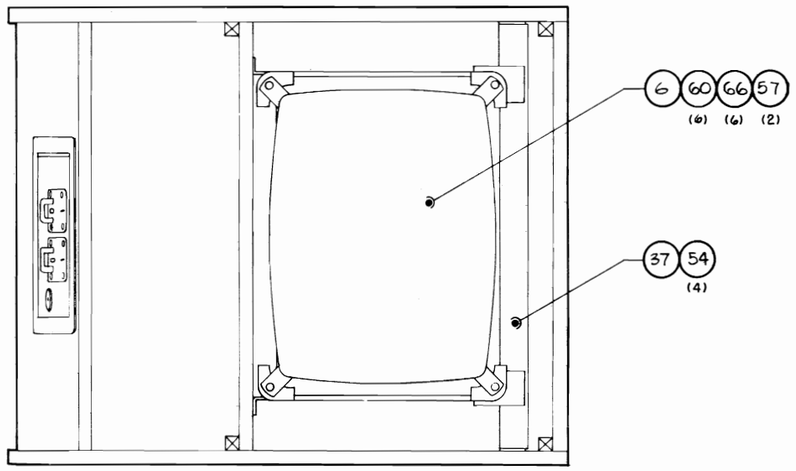
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED S.M.	3-2-79	



VIEW C - C



REAR DOOR



SECTION B - B

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST

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

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN G. LLOYD	1-26-79
CHECKED	3-2-79

NEXT ASSY | USED ON
APPLICATION

Cromlin Industries, Inc.
San Diego, California 92123

TOP ASSEMBLY HEAD-ON

SIZE	CODE IDENT NO.	DRAWING NO.	REV.
D		722-0001	A

SCALE 1/4 | SHEET 6 OF 8

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED S.M.	3-2-79	

VIDEO LOGIC BD.

J1 VIDEO HARNS.// 822-0008
J1A-1

J2 CONTROL PNL.// 822-0005
S1-2
S3-2
S2B-2
S2A-2
S2D-2
S2C-2
S1-1
S3-1

J3 COIN CNTR. HRNS.// 822-0010
FX1-1
FX1-2

J4 COIN MECH//815-0028
S4-NO
S4-NC
S5-C

J5 SOUND//822-0006
PLAYER CAR — J5A-4
PLAYER SKID — J5A-6
CRASH — J5A-1
CMTR CAR — J5A-2
CMTR SKID — J5A-7
BONUS — J5A-8
SOUND ON/OFF — J5A-3
+12V — J5A-9
-12V — J5A-10
GND. — J5A-12

J6 JUMPER HRNS.// 822-0007
-12V
+12V
AC
+5V
GND.
J6A

CONTROL PANEL

J2-6
S2 LANE CHNG.
A
B
C
D
S1 SPEED
J2-10
J2-1
J2-7
J2-9
J2-8

VIDEO

SPEAKER
J7-1
J7-4

COIN ACCEPTOR
SW ADVERT. S3
VOLUME R1
COUNTER FX1
SW COIN S4
SW COIN S5
J2-10
J2-2
J5B-1
J5B-2
J3-1
J3-4
J4-1
J4-2
J4-3

SOUND

SOUND

SK1-1
SK1-2
21-1
21-3
J5A-12
J5B
1 2 3 4
21 22 23 24
25 26 27 28

POWER SUPPLY
TI
JB-1
JB-2
JB-GND

J5A
J5-3
J5-4
J5-7
J5-1
J5B-2
J5-2
J5-5
J5-6
J5-10
J5-11
J5-12
SOUND BD.

VIDEO

LIGHT

JUNCTION BOX
J1A-9
T1-1
T1-3
J1A-10
T1-GND.
J1A-7

VIDEO

CRT MODULE
1 2 3 4 5 6 7 8 9 10 11 12
1 2 3 4 5 6 7 8 9 10 11 12
J1A
J1-1
JB-GND.
JB-1
JB-2
VIDEO

WIRING DIAGRAM

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST

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

MATERIAL

FINISH

DO NOT SCALE DRAWING

NEXT ASSY | USED ON
APPLICATION

CONTRACT NO.

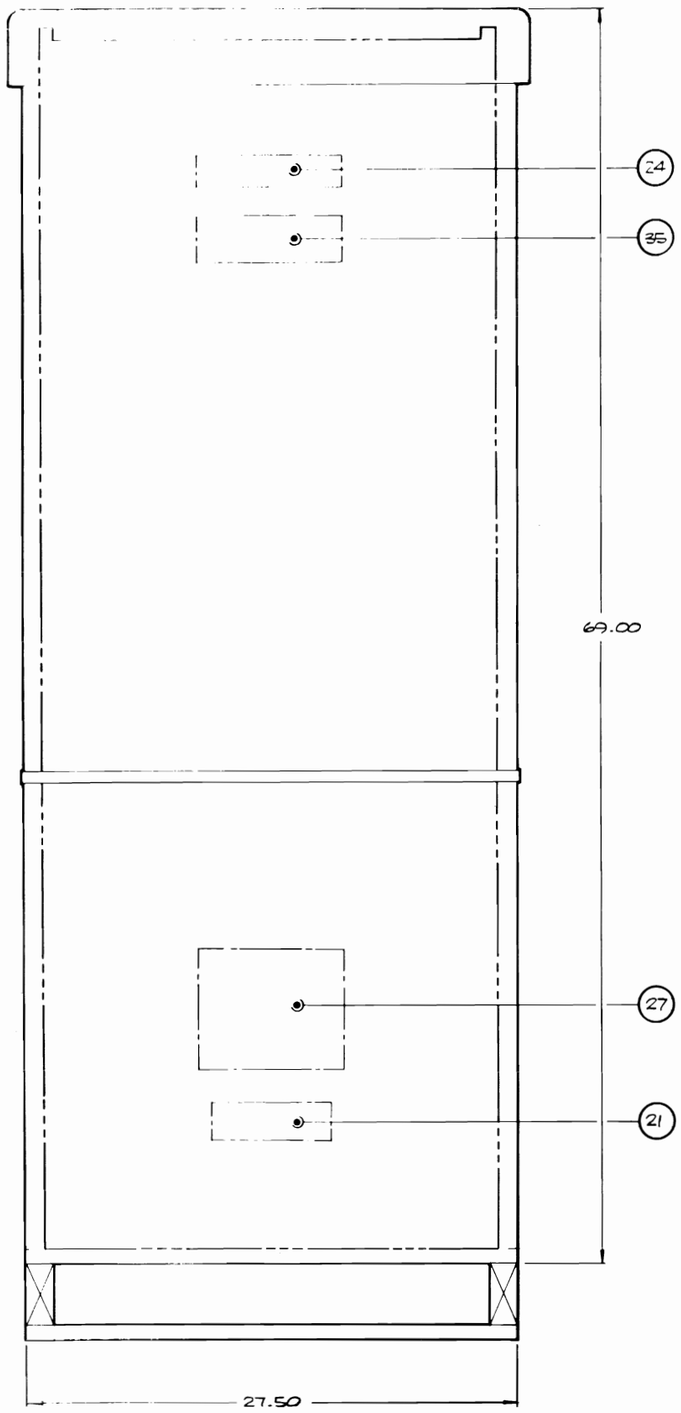
APPROVALS	DATE
DRAWN G. LLOYD	2-6-79
CHECKED Sean J. Fay	3-2-79

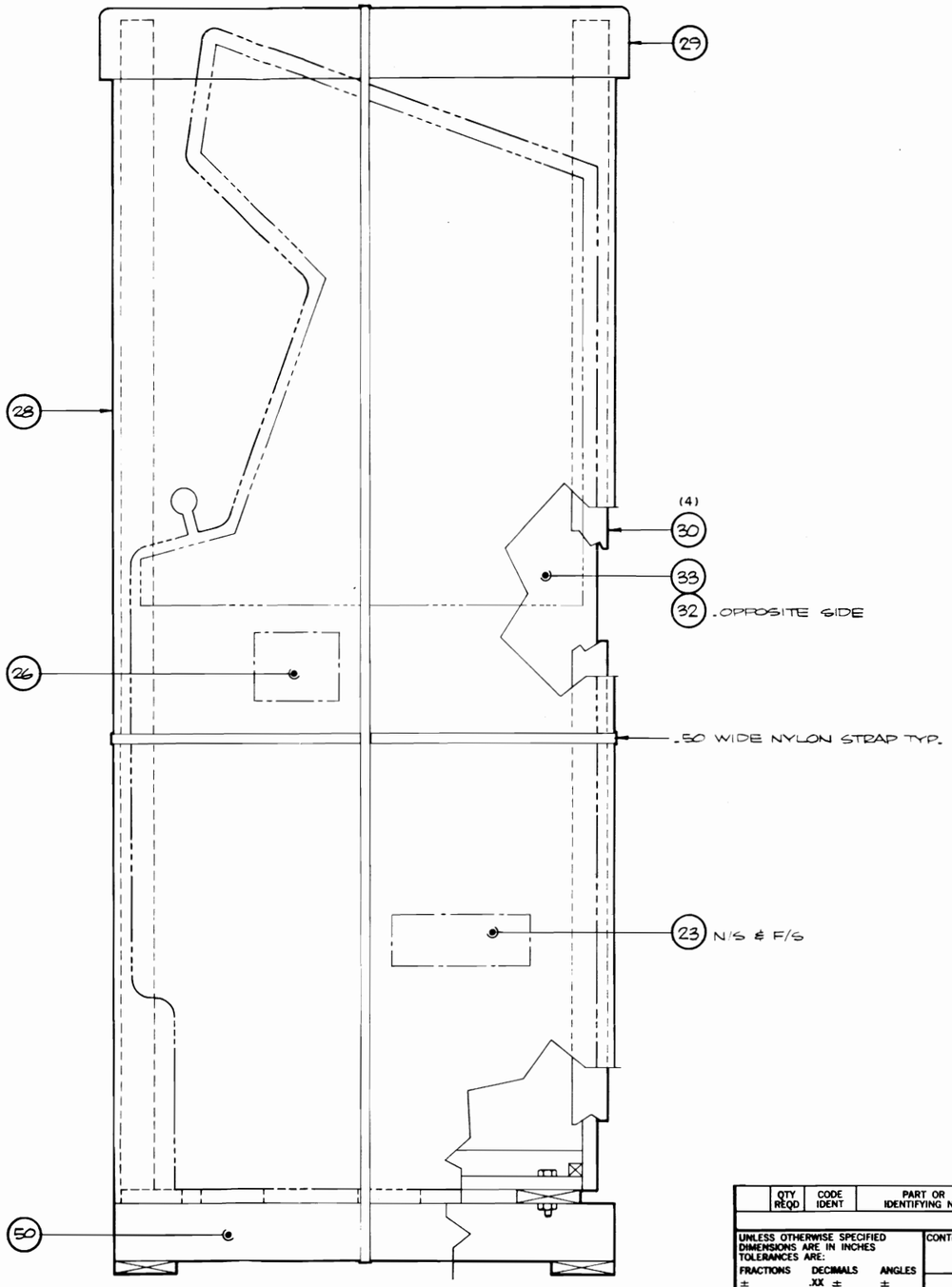
Gremlin Industries, Inc.
San Diego, California 92123

TOP ASSEMBLY HEAD-ON

SIZE D | CODE IDENT NO. | DRAWING NO. 822-0001 | REV. A.
SCALE | SHEET 7 OF 8

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED S.M.	3-2-79	





CONTAINER DETAIL

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

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

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN G. LLOYD	1-24-79
CHECKED	3-2-79

NEXT ASSY | USED ON
APPLICATION

Gremlin Industries, Inc.
San Diego, California 92128

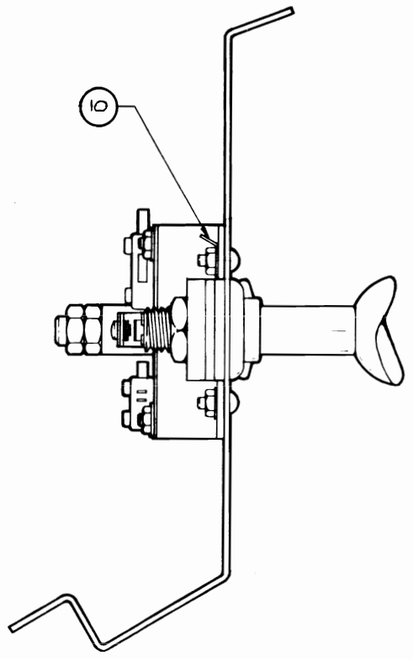
TOP ASSEMBLY HEAD-ON

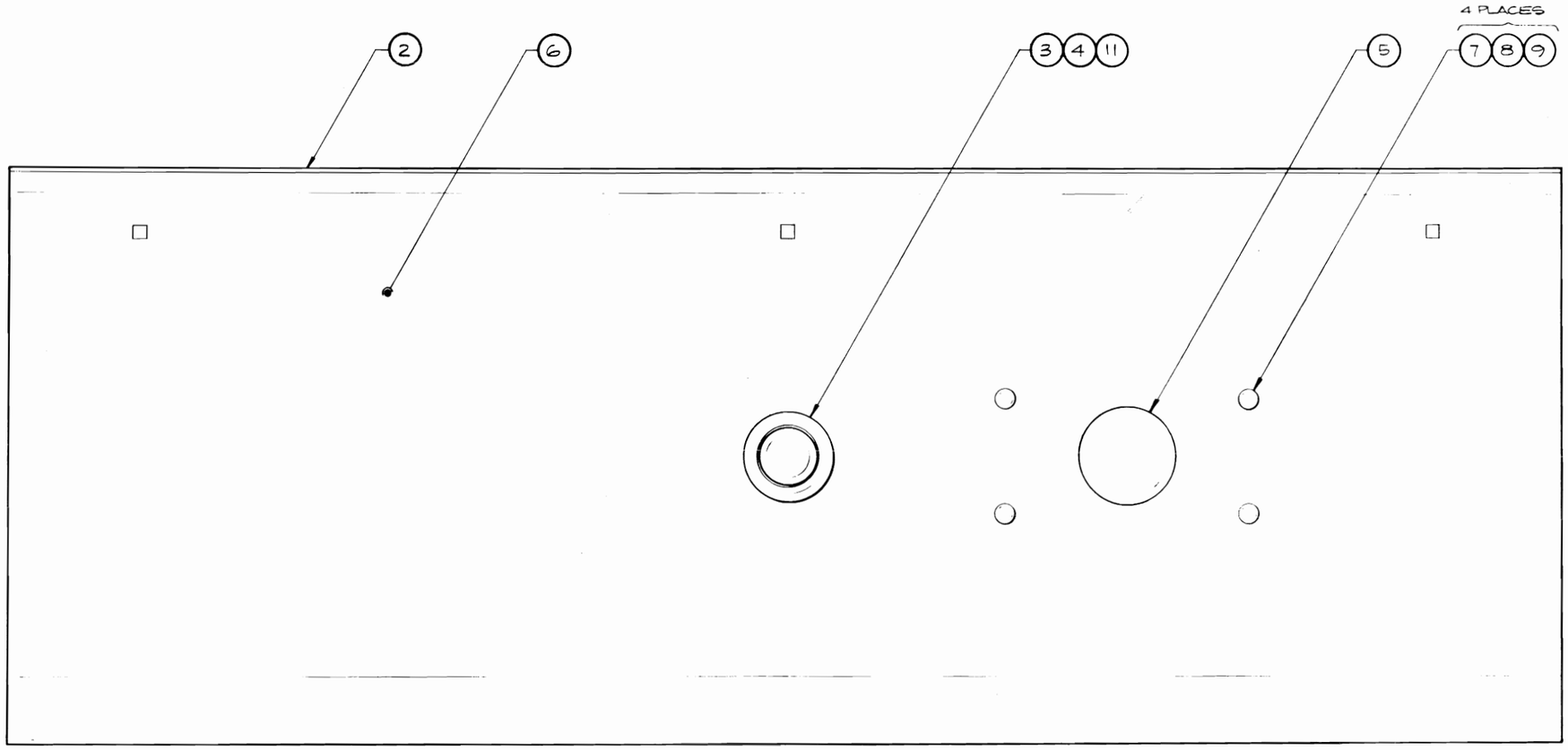
SIZE	CODE IDENT NO.	DRAWING NO.	REV.
D		722-0001	A

SCALE 1/4 SHEET 8 OF 8

722-0001 A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED





ASSY (ITEM 1)

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST

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

MATERIAL: SEE PARTS LIST.

FINISH:

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN G LLOYD	12.7.78
CHECKED	12.22.78

NEXT ASSY	USED ON

APPLICATION

Gremlin Industries, Inc.
San Diego, California 92123

CONTROL PANEL ASSY.

SIZE	CODE IDENT NO.	DRAWING NO.	
D		822-0004	A

SCALE 1/1 SHEET 3 OF 3

822-0004

A	RELEASE	2/1/78	RHD

D9 MDA 3500

T1

120 V
100 V
0 V
SHIELD
7
8 2 VRMS
9
16.5 VRMS
10
16.5 VRMS
11

560-0003
NOT ON P.C. BOARD

+9 V
C18 9,000 12V

TIP115 Q7
Q10 2N3055

BLANK KEYING PINS
5 N.C
17 N.C.
22 N.C
23 N.C
27 N.C

R46 2.7K
D0 IN5231
+12V
D3 MR501
D1 MR501
D4 MR501
D2 MR501
R34 470Ω
+12V
+20V

C16 10µf 50V
C17 100pf
R26 2.7K
Q5 2N4403
Q9 TIP29
R31 10K
IN914
D8
D7
R24 1K
R31 .5Ω 1W
R20 1K
C13 10µf 25V
U4 LM741EN
R33 10K
Q3 2N4403
Q8 TIP29
C19 100pf
R25 2.7K
R22 1K
R29 .5Ω 1W
-20V
-12V
C14 01µf 50V

C5 4700µf 25V
C6 4700µf 25V
C3 1µf
Q3
R3C .5Ω 1W
C2 25V
R33 1K
Q4 2N4403
R45 47K

U2 LM741EN
R8 2K
R7 2.7K
R12 5.6K
R35 1K
R36 1K
7.15 V

C11 .05µf
U3 LM723
R9 1K
R13 1.5K
R32 3.3K
C10 .003µf
R16 1.5K
Q4 2N4403
R14 10K
R18 1.2K
R17 1K
+5V
C12
R15 100Ω
R28 .1Ω 5W

+12 V
C1 10µf 25V
R44 47K
R1 10K
Q2 2N4401
R5 1K
C7 10µf 25V
R4
R37 10K
U1 LM741EN
R38 1K
C15 10µf 25V
-12V
R39 1K
R40 470Ω
Q6 TIP110
R41 13K
R42 2K
R43 2.7K

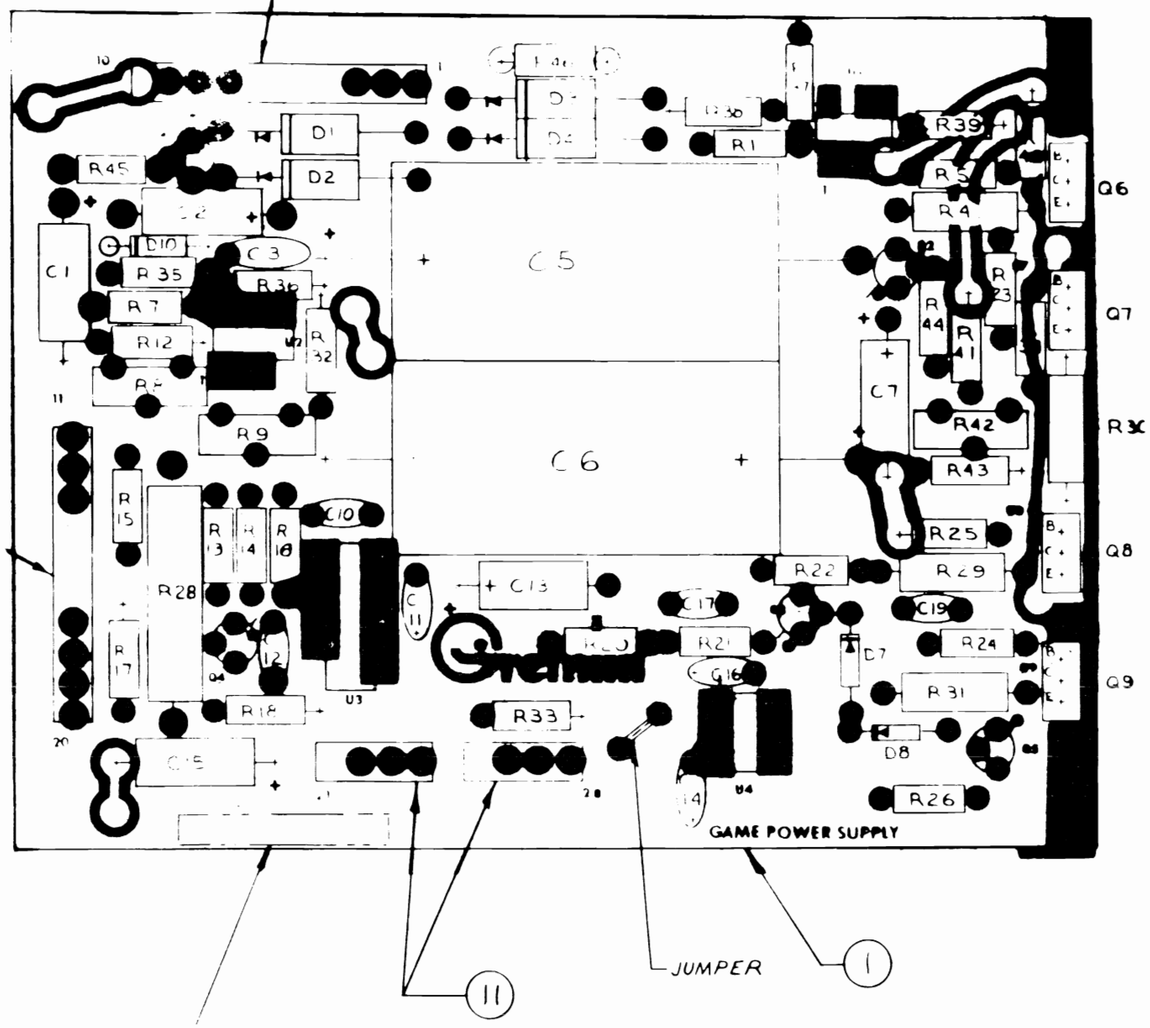
LAST C NO. USED C 19
LAST D NO. USED D 10
LAST Q NO. USED Q 10
LAST R NO. USED R 46
LAST U NO. USED U 4

GREMLIN INDUSTRIES INC.
8401 AERO DR. SAN DIEGO, CA. 92123

REVISIONS	TITLE	
	SCHEMATIC GAME PWR SUPPLY	
	SCALE NONE	DRAWING NO. 815-0000
		REV. A

SHEET 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



— REIDENTIFY ASSY
WITH NO. 815-0021
& LATEST REV

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION
			PARTS LIST

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

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO

APPROVALS	DATE
DRAWN K LE BLANC	16JAN78
CHECKED	2/1/78

Gremlin Industries, Inc.
San Diego, California 92111

PC ASSY-
POWER SUPPLY

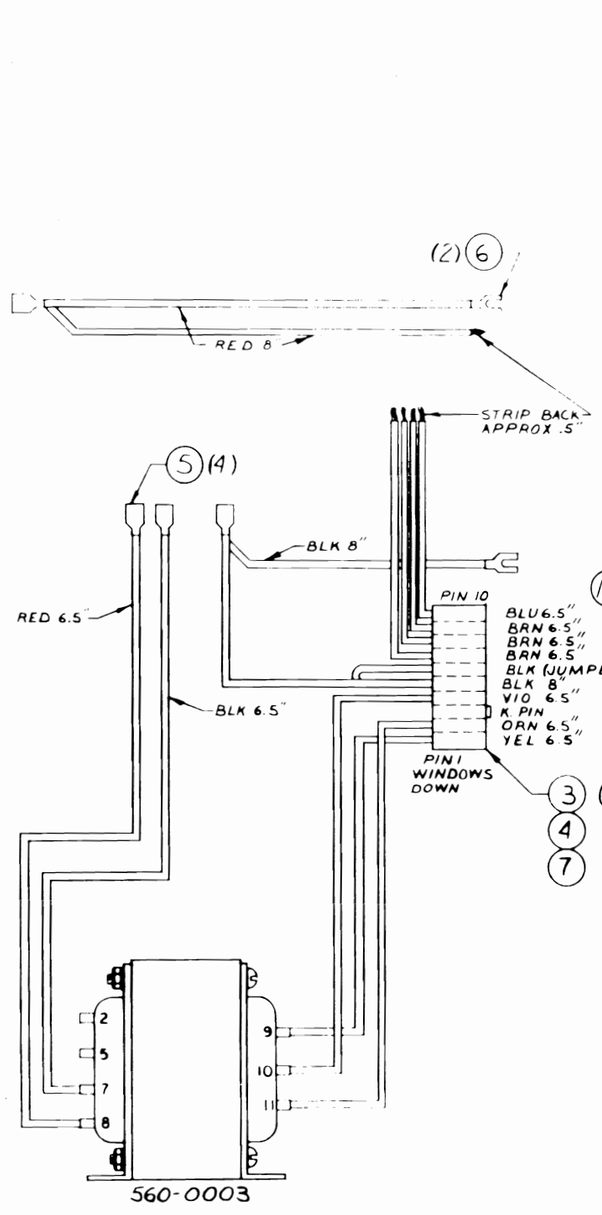
SIZE	CODE IDENT NO	DRAWING NO	REV
C		815-0021	A

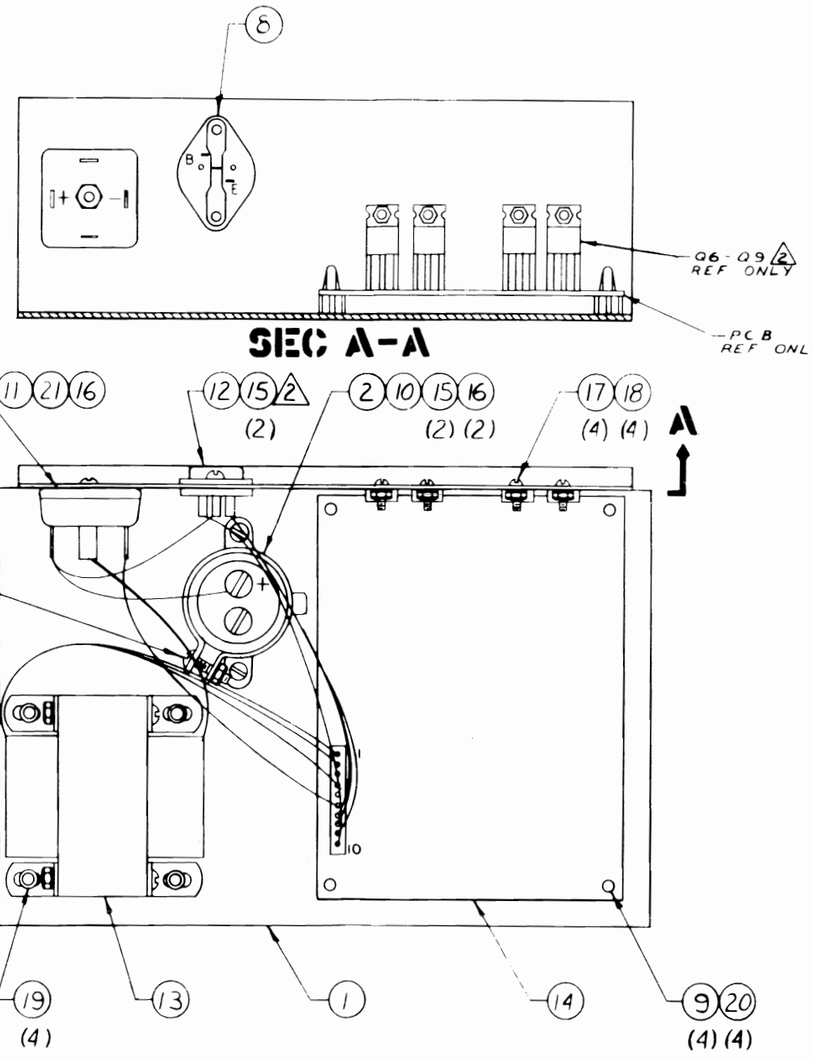
SCALE | SHEET 9 OF

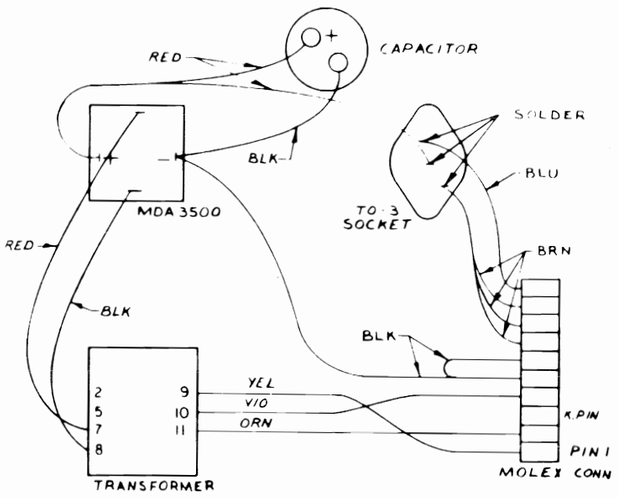
NEXT ASSY	USED ON
815-0020	PWR Sply Assy

APPLICATION

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:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN Lee J Lipsk	
CHECKED	

Cromwin Industries, Inc.
San Diego, California 92123

ASSY
POWER SUPPLY

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		815-0020	A

SCALE FULL — SHEET 3 OF 4

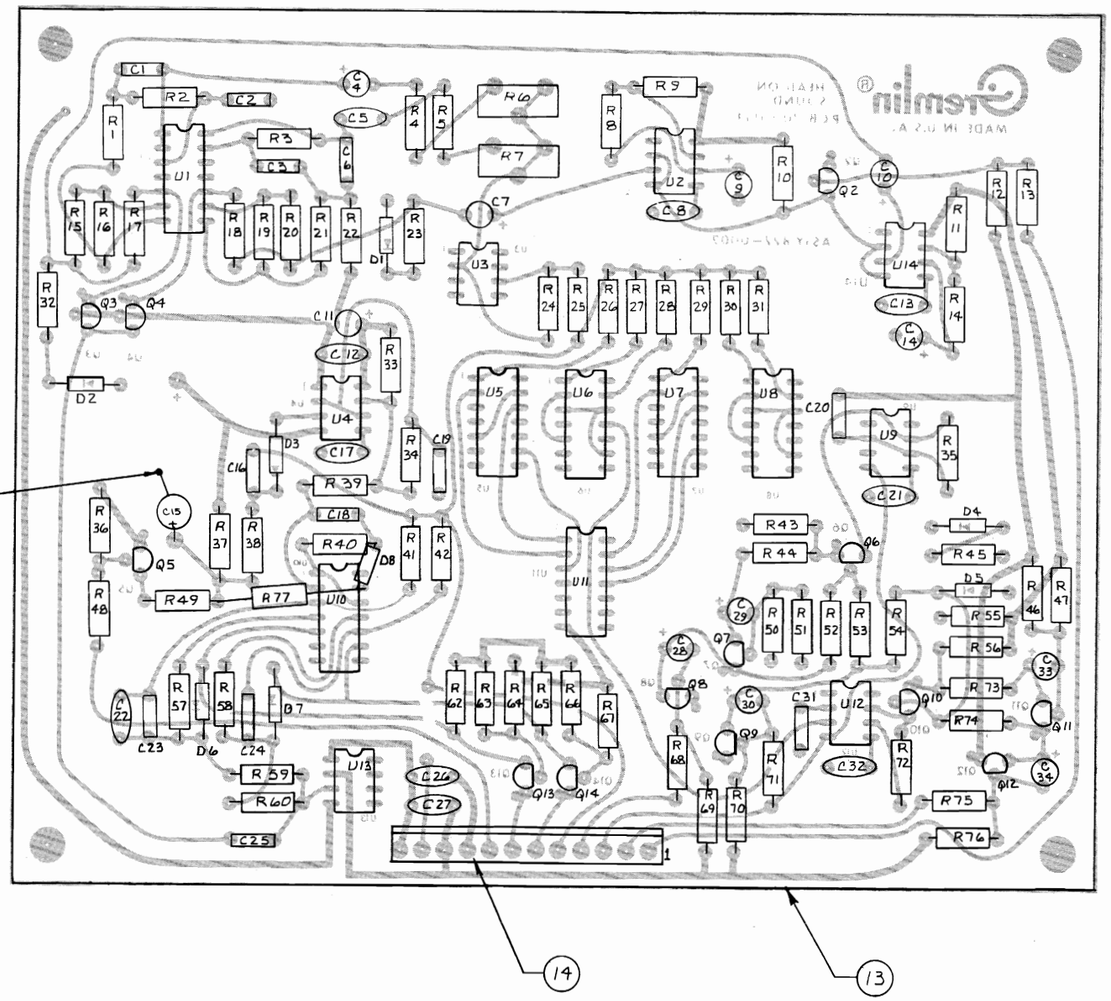
715-0001	SAFARI
NEXT ASSY	USED ON
APPLICATION	

△2 ALL POWER TRANSISTORS TO BE MOUNTED WITH HEAT SINKING PASTE & INSULATING HARDWARE
1. ALL WIRE TO BE AWG #22 GA

NOTES: UNLESS OTHERWISE SPECIFIED

815-0020 A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED	1-8-79	
	B	ECN 273 1-25-79 ADDENDUM 273	1-25-79	



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:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN Wynema	11-10-78
CHECKED Stan J. Fay	12-22-78

Gremlin Industries, Inc.
San Diego, California 92128

PC ASSEMBLY
HEAD ON SOUND

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		822-0002	B

SCALE 2/1 SHEET 5 OF 6

722-0001	HEAD ON
NEXT ASSY	USED ON
APPLICATION	

822-0002 B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

HI SPEED COMPUTER CAR (2)
CAR ON (3)
HI SPEED PLAYER CAR (4)
CRASH (1)
+12 (9)
GND (12)
-12 (10)
BONUS TIME
BONUS (8)
AUDIO OUT (5)
SCREECH #1 (6)
SCREECH #2 (7)

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

722-0001	HEAD ON
NEXT ASSY	USED ON
APPLICATION	

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

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN	11-6-78
CHECKED	12-22-78

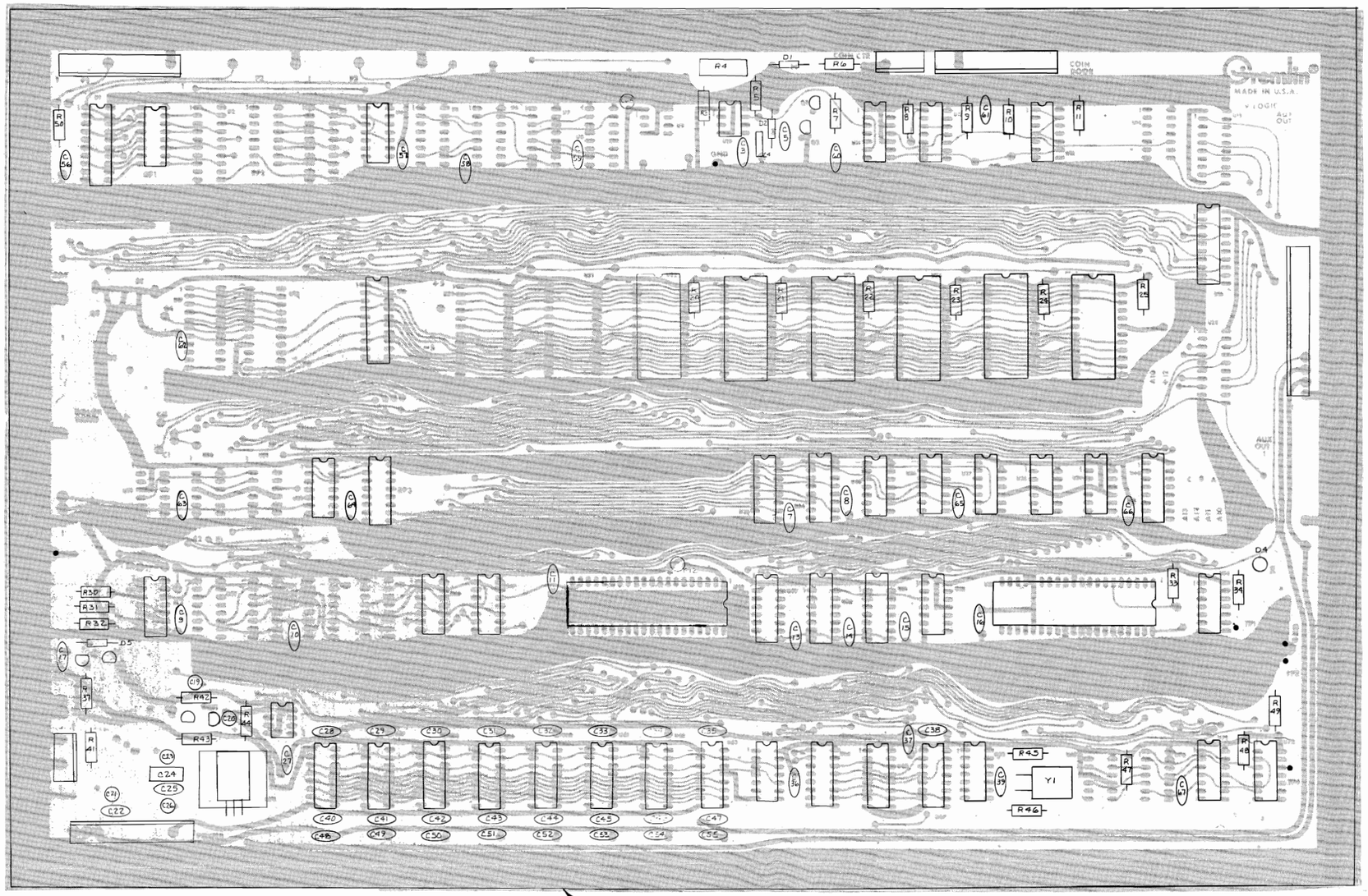
Gremlin Industries, Inc.
San Diego, California 92123

SCHEMATIC
HEAD ON SOUND BD.

SIZE	CODE IDENT NO.	DRAWING NO.	REV.
D		822-0002	B

SCALE | SHEET 6 OF 6

822-0002 B



(2)

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:
FRACTIONS ± DECIMALS XX ± XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN	11-13-78
CHECKED	11-22-78

Gremlin Industries, Inc.
San Diego, California 92123

PC ASSEMBLY —
C.V. LOGIC B/W

SIZE	CODE IDENT NO.	DRAWING NO.	REV
E		822-0001	A

SCALE 2/1 SHEET 3 OF 6

722-0001	HEAD ON
NEXT ASSY	USED ON

APPLICATION

2 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

U66 316-0042 — A0 A1 A2 A3 A4 — pins 10 11 12 13 14 / 15
U65 316-0043 — A0 A1 A2 A3 A4 — pins 10 11 12 13 14 / 15
U67 74LS175 — pins 9 5 12 13 14 / 1 7 10 15 2 — +5V
U51 74LS175 — pins 9 5 12 13 4 / 1 7 10 13 14 2 — +5V
U50 74LS175 — pins 9 13 4 5 12 / 1 15 2 3 7 10 — +5V
U49 74LS175 — pins 9 13 12 5 4 / 1 15 10 7 6 2 — +5V
SRC SRL — SHT 5
M1 M2 M4 — SHT 5
WG VCAS — SHT 5
MSB VRAS — SHT 5 SHT 5
TP4
U54 7404 — Φ → Φ
+5V R33 330Ω
27 M1
U53 Z80 MK3880D
R48 4.7K +5V
VID
MREQ
U72 74LS74 — D Q Q̄ — pins 2 5 3 6 1 4
U71 74LS08 — pins 4 5 6 — 24 WAIT
+5V R47 4.7K
Y1 15.46848 MHZ
R45 330Ω R46 330Ω
U68 C39 680pf U68 U68
74LS04 74LS04 74LS04
+5V
11 Vcc
16 INT
17 NMI
25 BUSRQ
N.C. 23 BUSAK
18 HLT
N.C. 28 RFSH
26 RESET
POWER
-12V 1
+12V 2
AC 3
GND 4
5
6
KEY 7
+5V 8
9
10
U73 LM320 T-5.0 — -5V / +12V
C25 .1μf
C26 10μf TANT
C21 10μf TANT
C22 .1μf
C24 .33μf FILM
C23 10μf TANT
R43 100K
Q10 2N4401
Q11 2N4401
R42 100K
R44 100K
U55 555 — pins 4 8 2 6 3 1 5
C19 1μf TANT
C20 10μf TANT
C27 .1μf
U54 7404 — pins 5 6
U71 74LS08 — pins 10 9 8
D4 LED1
R34 330Ω
U54 7404 — pins 10 11
U54 7404 — pins 12 13
R49 470Ω +5V
COIN START SHT 5
TP2
TP3
U54 7404 — pins 9 8 — TP1 S.S.
A15 5
A14 4
A13 3
A12 2
A11 1
A10 40
A9 39
A8 38
A7 37
A6 36
A5 35
A4 34
A3 33
A2 32
A1 31
A0 30
SHT 5 & 6
VID
U71 74LS08 — pins 13 12 11
MEMR 9 U52 74LS10 — 8 VIDRD SHT 5
MEMW 4 5 U52 74LS10 — 3 VIDWR SHT 5
WG 3
+5V 1 MEMR 13 12 U52 2 74LS10 — ROMRD SHT 6
U35 74LS04 — 13 12
A13 A12 A11 A10
U40 74LS42 — A B A — pins 12 14 15 — 9 7 6 5 4 3 2 1
R8 R7 R6 R5 R4 R3 R2 R1 } SHT 6
A10 SHT 5 & 6
74LS08
U39 U39 U39 U39 U38 U38 U38 U38 U37 U37 U37 U37 — pins 9 10 8 / 12 13 11 / 2 1 3 / 5 4 6 / 9 10 8 / 12 11 / 2 3 / 5 4 6 / 9 10 8 / 12 13 11
A9 A8 A7 A6 A5 A4 A3 A2 A1 A0
SHT 5 & 6
D7 13
D6 10
D5 9
D4 7
U33 8216 — pins 4 2 7 5 9 11 12 14 / 3 6 10 13 / 1 15
D7 D6 D5 D4 } SHT 5 & 6
D3 8
D2 12
D1 15
D0 14
U34 8216 — pins 4 2 7 5 9 11 12 14 / 3 6 10 13 / 1 15
D3 D2 D1 D0 } SHT 5 & 6
74LS08 U37 — pins 6 5 4
RD 21
WR 22
MREQ 19
IORQ 20
U35 74LS04 — pins 11 10
U35 74LS04 — pins 9 8 — MREQ
74LS02 U36 — pins 8 9 10 — MEMR
U36 — pins 3 2 1 — OUTPUT SHT 5
U36 — pins 5 6 4 — MEMW
U36 — pins 12 11 13 — INPUT SHT 5

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

722-0001	HEAD ON
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± — DECIMALS .XX ± .XXX ± — ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN	11-8-78
CHECKED	12-22-78

Cromlin Industries, Inc.
San Diego, California 92123

SCHEMATIC —
C.V. LOGIC B/W

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		822-0001	A

SCALE NONE — SHEET 4 OF 6

822-0001 A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

SHT 4
M4 M2 M1 SRC SRL MSB

U48
315-0042

A11 A10 A9 A8 A7 A6 A5 A4 A3 A2 A1 A0 N.C.
SHT 4 & 6

SYNC VIDEO

C11 .1µf
C12 10µf

U63 U62 U61 U60 U59 U58 U57 U56
315-0039

VRAS SHT 4
VCAS SHT 4
VIDWR SHT 4
U64 74LS04

D0 D1 D2 D3 D4 D5 D6 D7

+12V
+5V
-5V

74LS125
U47 U47 U47 U47 U46 U46 U46 U46

VIDRD SHT 4

D0 D1 D2 D3 D4 D5 D6 D7
SHT 4 & 6

+5V
R32 1K
Q7 2N4401
R30 330Ω
R41 75Ω
VIDEO
74LS08 U41
SYNC
R31 330Ω
D5 IN914
Q6 2N4403
R37 1K
-5V
C17 .1µf
VIDEO

U16 74LS374
OUTPUT SHT 4
74LS00 U32
A1 SHT 4 & 6
OUT 2
+12-12V
SOUND OUT

+5V
COIN CTR
REF
R6 10K
C5 .1µf
COIN START SHT 4
D2 IN941
D1 IN941
Q1 2N4401
Q2 PE8050
R8 1K
R9 1K
R7 1K
74LS00 U12

U13 74LS125
D2 SHT 4 & 6
D1 SHT 4 & 6
D7 SHT 4 & 6
74LS125

U11 74LS74

SHT 4 OUTPUT A0 SHT 4 & 6
74LS00 U12

R3 22K
R4 10K
U10 555
R5 4.7K
C3 .1µf
C4 .1µf FILM
INPUT SHT 4
74LS00 U4
SHT A3 & 4

U13 74LS125
74LS174

D0 SHT 4 & 6

U1 74LS244
74LS00 U4
A0 SHT 4 & 6
INPUT SHT4
RP1
R50 10
P1

RESISTOR PACK

INDO
NC
REF COIN SWITCH
COIN DOOR

R11 1K
R10 1K

* BOURNS RESISTOR PACK

NOTES:

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST

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

MATERIAL
FINISH
DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN	11-7-78
CHECKED	11-22-78

NEXT ASSY	USED ON
722-0001	HEAD ON
APPLICATION	

Cromalin Industries, Inc.
San Diego, California 92123

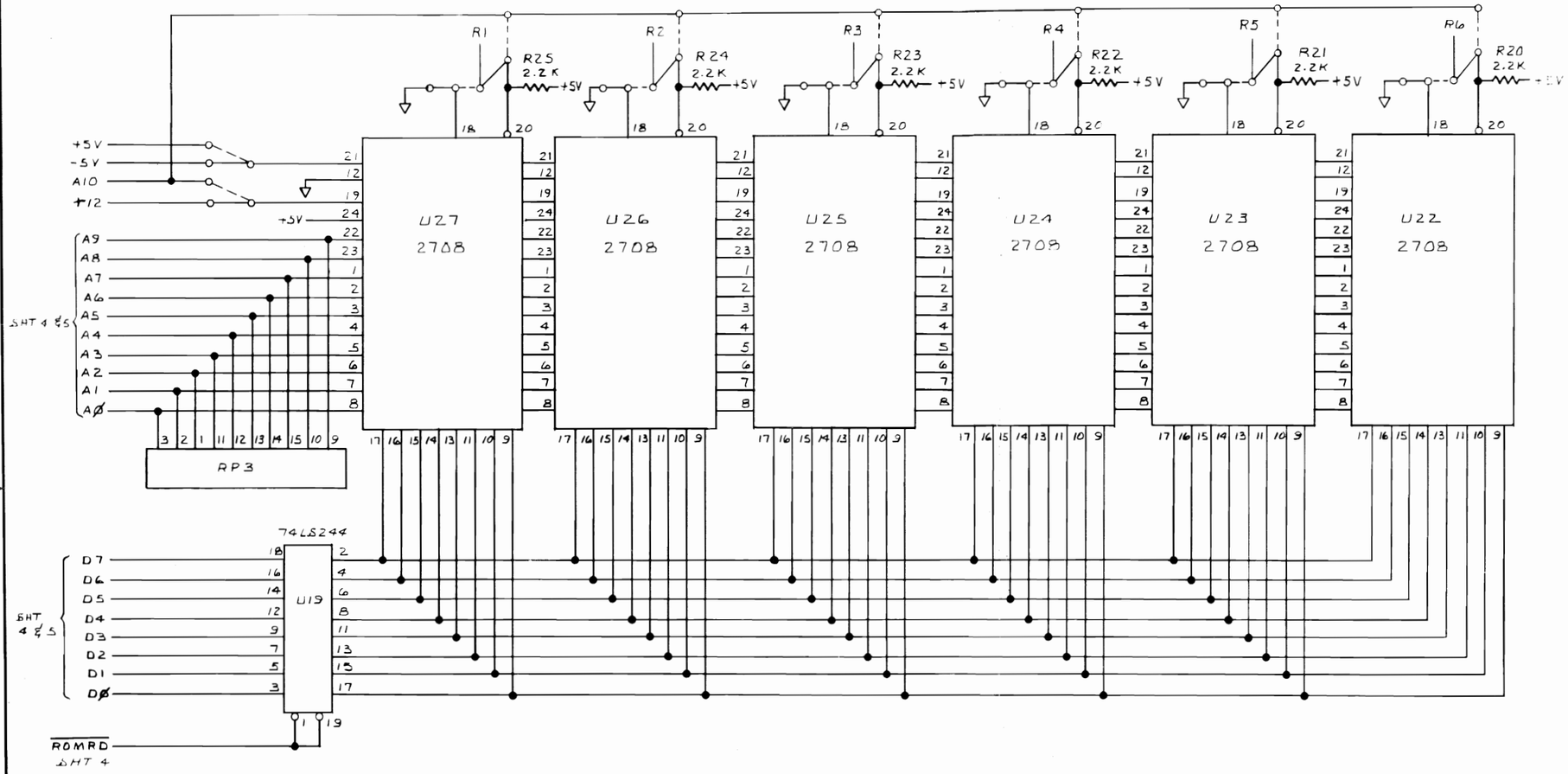
SCHEMATIC —
C.V. LOGIC B/W

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		822-0001	A

SCALE NONE
SHEET 5 OF 6

822-0001A

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:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN	10-30-78
CHECKED	12-22-78

Cromlin Industries, Inc.
San Diego, California 92123

SCHEMATIC —
C.V. LOGIC B/W

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		822-0001	A

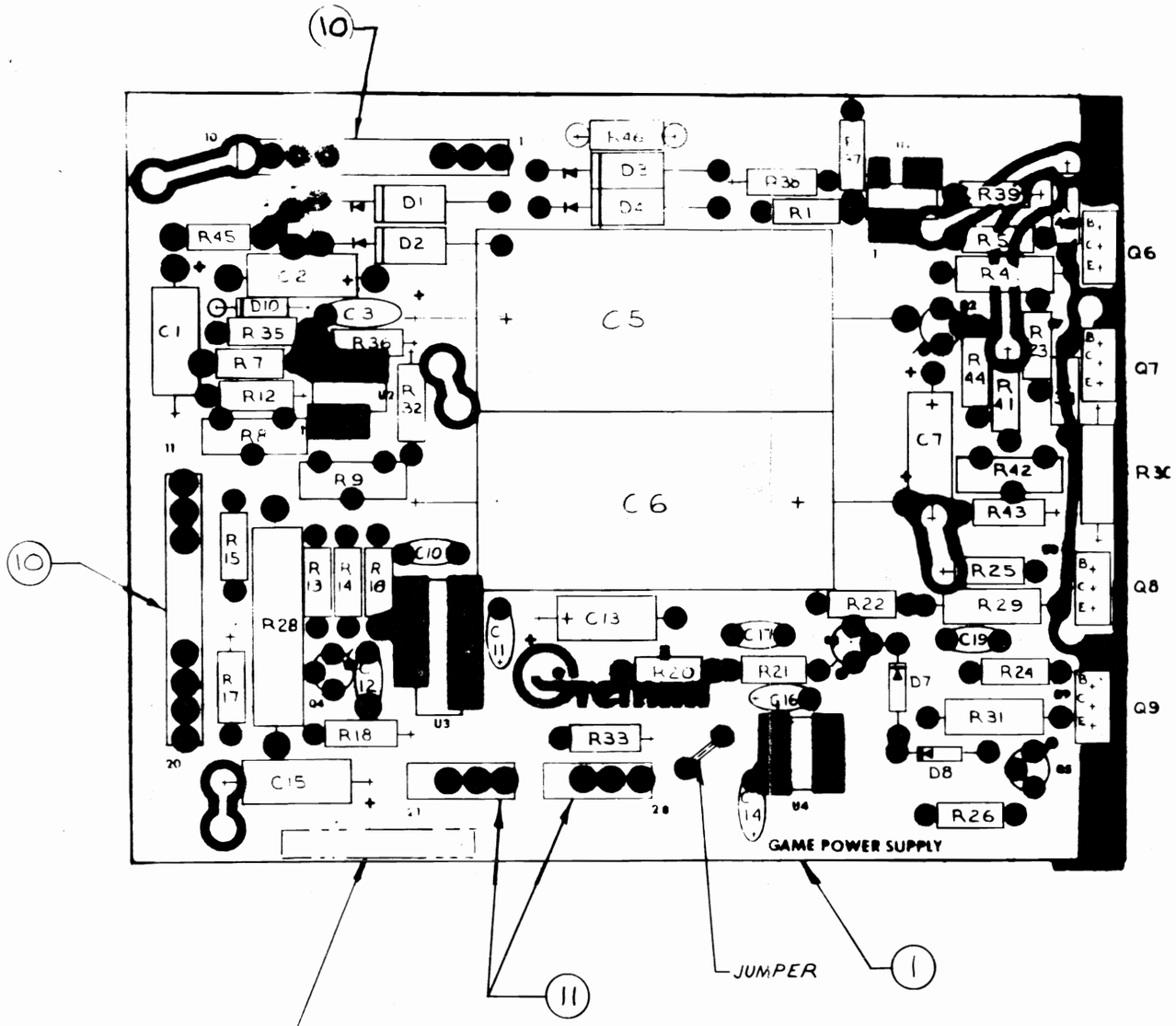
SCALE NONE — SHEET 6 OF 6

722-0001	HEAD ON
NEXT ASSY	USED ON

APPLICATION

822-0001 A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



REIDENTIFY ASSY WITH No. 815-0021 & LATEST REV

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

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

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN K. LeBlanc	16 JAN 78
CHECKED Randy Frost	2/1/78

Cromlin Industries, Inc.
San Diego, California 92111

PC ASSY-
POWER SUPPLY

SIZE	CODE IDENT NO.	DRAWING NO.	
C		815-0021	A REV

SCALE | SHEET 4 OF

NEXT ASSY	USED ON
815-0020	PWR Sply Assy

APPLICATION

A	RELEASE	2/1/78	RHD

D9 MDA 3500

T1

120 V
100 V
0 V
SHIELD
7
8 2 VRMS
8
9
16.5 VRM
10
16.5 VRM
11

560-0003
NOT ON P.C. BOARD

+9 V
C18 9,000 12V

TIP115
Q7
Q10 2N 3055

BLANK KEYING PINS
N.C
N.C.
N.C
N.C.
N.C

R46 2.7K
D10 IN5231
+12V
D3 MR501
D1 MR501
D4 MR501
D2 MR501
R34 470Ω
+12V
+20V

+20V
C16 .01μf 50V
C17 100pf
R26 2.7K
Q5 2N4403
Q9 TIP29
R20 1K
C13 10μf 25V
R31 10K
IN914
D8
R24 1K
R31 .5Ω 1W
U4 LM741EN
IN914
D7
Q3 2N4403
Q8
C19 100pf
R25 2.7K
R22 1K
TIP 29
R29 .5Ω 1W
-20V
R33 100K
-12V
C14 .01μf 50V

C5 4700μf 25V
C6 4700μf 25V
C3 .1μf
R3C .5Ω 1W
C2 25V
R23 1K
Q1 2N4403
R45 47K

C11 .05μf
U3 LM723
R9 1K
R13 1.5K
R32 3.3K
C10 .003μf
R16 1.5K
Q4 2N4403
C12
R15 100Ω
R28 .1Ω 5W
+5V
R18 1.2K
R17 1K
R14 10K

U2 LM741EN
R8 2K
R7 2.7K
R12 5.6 K
R35 1K
R36 1K
7.15 V

+12V
C1 10μf 25V
R44 47K
R1 10 K
Q2 2N4401
R5 1K
C7 10μf 25V
R4 .5Ω 1W
U1 LM741EN
R37 10K
R35 1K
R39 1K
R40 470Ω
Q6 TIP110
C15 10μf 25V
-12V

R41 13K
P42 2K
R43 2.7K

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

GREMLIN INDUSTRIES INC.
8401 AERO DR. SAN DIEGO, A. 92123

REVISIONS	TITLE	
	SCHEMATIC GAME PWR SUPPLY	
	SCALE: NONE	DRAWING NO. 815-0020 REV. A

SHEET 4