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GRAND LIZARDTM

Preliminary

INSTRUCTION MANUAL

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Introduction

To accompany this initial production of **GRAND LIZARD**, in advance of the final manual for which not all details are as yet available, the Publications Group at Williams Electronics Games is providing this 'preliminary' Instruction Manual.

We believe that it includes the essential information concerning this game. If you determine that some other additional information is vital, please add a comment describing this information to the letter requesting a copy of the final manual. In this way, you will help us provide you with the information you need.

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GRAND LIZARD Audit Table

Audit Item	Descriptive Phrases	Audit Factor ¹ Value
(MATCH)	(SPEEDER 1 and 2 Displays)	(SPEEDER 4)
01	Left Coins [chute next to coin door hinge]	432
02	Center Coins	0
03	Right Coins	398
04	Paid Credits	830
05	Total Plays	
06	Total Free (Total Free Plays)	
07	Percent Free (% Free Plays)	
08	Replay Awards	
09	Percent Replay (% Replay Awards)	
10	Special Awards	
11	Percent Special (% Special Awards)	
12	Match Awards	
13	HSTD (High Score to Date) Credits	
14	Percent HSTD (% HSTD Credits)	
15	Extra Balls	
16	Percent Ex. Ball (% Extra Balls)	
17	Av. Ball Time (Average Time in Seconds)	
18	Min. of Play (Minutes of Play)	
19	Balls Played	
20	Replay 1 Awards	
21	Replay 2 Awards	
22	Replay 3 Awards	
23	Replay 4 Awards	
24	1 Playr Games	
25	2 Playr Games	
26	3 Playr Games	
27	4 Playr Games	
28	Burn in Cycles	
29	3 Bank X Balls (# of Extra Balls at 3-Bank)	
30	Maximum Bonuses (# of Bonuses Awarded from Outlane)	
31	100K Scores (# of 4-Bank 100K Scores)	
32	Awarded Speed50 (# of Scored Speed 50)	
33	2X Mult Ball (# of 2X Multi-Ball Plays)	
34	3X Mult Ball (# of 3X Multi-Ball Plays)	
35	Bonus Holdovr (# of Bonus Holdovers Collected)	
36	Not Used	
37	Not Used	
38	Not Used	
39	H. S. Reset Counter	
40	Aut. Pct. Data 1	
41	Aut. Pct. Data 2	
42	Aut. Pct. Data 3	
43	Aut. Pct. Data 4	
44	Aut. Pct. Data 5	

NOTE:

1. The numbers shown in this column for Items 1 through 4 are examples. Entries for all items depend on the amount of play; thus, they will vary from location to location.

GRAND LIZARD Game Adjustment Table

Adjustment Item (MATCH)	Descriptive Phrases (Player 1 and 2 Displays)	Factory Setting (Player 4)
01	AUTO REPLAY (%) (or FIXED REPLAY SCORES) ¹	10 (%)
02	REPLAY START (or REPLAY LEVEL 1) ¹	1,400,000
03	REPLAY LEVELS (or REPLAY LEVEL 2) ¹	01
04	(REPLAY LEVEL 3) ¹	OFF
05	(REPLAY LEVEL 4) ¹	OFF
06	REPLAY AWARD	Credit
07	SPECIAL AWARD	Credit
08	MATCH FEATURE	On
09	BALLS / GAME	03
10	TILT WARNING	03
11	MAXIMUM EX. BALL	04
12	MAXIMUM CREDITS	30
13	HIGHEST SCORES	On
14	BACKUP HI. SCR1	4,000,000
15	BACKUP HI. SCR 2	3,500,000
16	BACKUP HI. SCR 3	3,000,000
17	BACKUP HI. SCR 4	2,500,000
18	HI. SCR1 CREDITS	03
19	HI. SCR2 CREDITS	01
20	HI. SCR3 CREDITS	01
21	HI. SCR4 CREDITS	01
22	H. S. RESET EVERY (6,000 PLAYS) ²	
23	FREE PLAY	NO
24	U.S.A. 1 COINAGE (1 COIN 1 PLAY) ^{2,3}	
25	LEFT UNITS	01
26	CENTER UNITS	04
27	RIGHT UNITS	01
28	UNITS/ CREDIT	01
29	UNITS/ BONUS	00
30	MINIMUM UNITS	00
31	4 BANK CYCLE [0 - 9; 0 = fast ... 9 = slow]	04
32	4 BANK TIMEOUT [0 - 9; 0 = fast ... 9 = slow]	05
33	3 BANK TIMEOUT [0 - 9; 0 = fast ... 9 = slow]	05
34	MYSTERY TIME [Lamp 'on' time; 0 = 1 sec ... 9 = 10 sec]	05
35	MAGNET TIME [1 lamp = 1 unit; 0 - 9; 0 = 1 sec ... 9 = 3 sec]	05
36	SPEED50 TIME [0 - 9; 0 = 1/2 sec ... 9 = 3 sec]	03
37	MEMORY B. MULTS [no = not retained; yes = retained]	NO
38	MEMORY 3 BANK [no = cave & spl not retained; yes = retained]	NO
39	RAMPS SPOT A. B. [easy = A/B lamp via EITHER A or B shot; hard = ONLY A and B shot spots A/B lamp]	easy
40	ATMODE SOUND [no = no sound; yes = attract mode sound]	YES

GRAND LIZARD Game Adjustment Table (Continued)

Adjustment Item (MATCH)	Descriptive Phrases (Player 1 and 2 Displays)	Factory Setting (Player 4)
41	X. BALL MEMORY [no = extra ball lamps not retained; yes = retained]	
42	A / B MEMORY [no = A/B awards not retained; yes = A/B awards retained]	YES
43	L. I. Z. A. R. D SPOT A . B. [no = no A/B ramp spot for spelling LIZARD; yes = spot A or B]	YES
44	3 BANK AWARDS [easy = no timing; hard = x-ball & special timed; harder = all attempts timed]	hard
45	UNUSED ADJUST	
46	UNUSED ADJUST	
47	UNUSED ADJUST	
48	UNUSED ADJUST	
49	CUSTOM MESSAGE ⁴	On
50	SW. ALARM KNOCKER	YES
51	UNUSED ADJUST	
52	UNUSED ADJUST	
53 ⁵	INSTALL GERMAN 1 ⁶	
54 ⁵	INSTALL GERMAN 2 ⁶	
55 ⁵	INSTALL GERMAN 3 ⁶	
56 ⁵	INSTALL GERMAN 4 ⁶	
57 ⁵	INSTALL GERMAN 5 ⁶	
58 ⁵	INSTALL GERMAN 6 ⁶	
59 ⁵	INSTALL ADDABALL	NO
60 ⁵	INSTALL 5-BALL	NO
61 ⁵	INSTALL NOVELTY	NO
62 ⁵	INSTALL EX. EASY	NO
63 ⁵	INSTALL EASY	NO
64 ⁵	INSTALL MEDIUM	NO
65 ⁵	INSTALL HARD	NO
66 ⁵	INSTALL EX. HARD	NO
67	AUTO BURN IN	NO
68	CLEAR COINS	NO
69	CLEAR AUDITS	NO
70	INSTALL FACTORY	NO

NOTES:

1. Automatic Replay percentage value range is adjustable from 5 to 50%, via the Credit button. Item 02 permits changing the factory setting value for Replay Start Level (valid for next 500 games played). Item 03 permits setting up to four replay levels, with values as detailed in text describing item 03.
For Fixed Replay Scores, set Auto Replay value to 1 less than 5(%) via the Credit button. Go to items 02, 03, 04, and 05 to install their replay level scores. Turn off any replay score level by setting 00 as its value.
2. Phrase in parentheses is Factory Setting. Phrase appears in (player) 3 and 4 displays. Press Credit button to change setting of item 22, or the game pricing of item 24.
3. To change country OR coinage setting, press Credit button to obtain 16 Standard settings, followed by a Custom Setting. The Custom Setting activates items 25 through 30. When a Standard Setting is used items 25 through 30 are set automatically, and cannot be changed.
4. To install Custom Message, press flipper button for alphabet and special characters. Press Credit button for next message letter or character.
5. Special Preset Adjustment, whose effects are noted in the Game Adjustment text.
6. Refer to **Pricing Table** and text describing these items.

Pricing Table

Country	Coin Chute			Games/Coin	Pricing Functions							
	Left	Center	Right		24	25	26	27	28	29	30	
USA and Canada	25¢	-	25¢	1/25¢, 4/\$1 ^{1,2} 1/50¢, 2/\$1 ² 2/25¢, 8/\$1 1/25¢, 3/50¢, 6/\$1 ² 1/25¢, 5/\$1 1/50¢, 3/\$1 ²	01	01	04	01	01	00	00	
West Germany	1 DM	2 DM	5 DM	1/1 DM, 3/2 DM, 10/5 DM ^{2,3}	09	09	18	45	05	45	00	
				1/1 DM, 2/2 DM, 6/5 DMark ²	10	06	12	30	05	00	00	
				1/1 DM, 3/2 DM, 9/5 DM	00	09	18	45	05	00	00	
				1/2x1 DM, 1/2 DM, 3/5 DM ²	11	03	15	06	05	00	00	
				2/1 DM, 5/2 DM, 14/5 DM ²	12	13	65	26	05	65	00	
				Ticket/Token Mode ⁴ Keyset Mode ⁴								
France	1 F	5 F	10 F	1/3x1 F, 2/5 F, 5/10 Franc ²	13	02	10	20	05	20	00	
Antilles (Netherlands)	25¢	-	1 G	1/25¢, 4/1 Guilder	00	01	01	04	01	00	00	
Netherlands	25¢	-	1 G	1/25¢, 5/1 Guilder	00	01	00	05	01	00	00	
Belgium	5 F	-	20 F	1/2x5 F, 2/20 Franc ²	08	01	01	04	02	00	00	
	5 F	5 F	20 F	1/2X5 F, 1/2X5 F, 2/20 F ²	08	01	01	04	02	00	00	
	5 F	20 F	20 F	1/2x5 F, 2/20 F, 2/20 F ²	00	01	04	04	02	00	00	
Spain	25 P	-	100P	1/25 P, 5/100 Peseta ²	15	01	00	05	01	00	00	
Switzerland	1 F	2 F	5 F	1/1 F, 3/2 F, 7/5 Franc	00	02	06	14	02	00	00	
	1 F	-	2 F	1/1 F, 3/2 F ²	07	03	00	06	02	00	00	
Japan	100 ¥	-	100 ¥	2/100 Yen	00	04	00	04	02	00	00	
	-	100 ¥	-	2/100 ¥ ²	16	01	04	01	02	00	00	
Italy	100 L	-	100 L	1/200 Lire ²	14	01	04	01	02	00	00	
Australia	20¢	-	\$1	1/2x20 ¢, 3/\$1 ²	05	01	00	06	02	00	00	
United Kingdom	10 P	50 P	20 P	1/10 P, 5/50 P, 2/20 Pence	00	01	05	02	01	00	00	
	10 P	50 P	10 P	1/10 P, 5/50 P ²	06	01	05	01	01	00	00	
Argentina	10¢	10¢	10¢	1/1 Token	00	01	01	01	01	00	00	
Austria	5 Sch	-	10 Sch	2/5 Sch, 5/10 Schilling	00	02	00	05	01	00	00	
	1 Sch	5 Sch	10 Sch	2/5x1 Sch, 2/5 Sch, 5/10 Sch	00	02	10	25	05	00	00	
Chile	Token	-	Token	1/1 Token ^{1,2}	01	01	04	01	01	00	00	
Denmark	1 Kr	5 Kr	10 Kr	1/2x1 Kr, 3/5 Kr, 7/10 Krone	00	01	06	14	02	00	00	
Finland	1 Mka	-	1 Mka	1/1 Markka ^{1,2}	01	01	04	01	01	00	00	
New Zealand	20¢	-	20¢	1/2x20¢ ²	03	01	04	01	02	00	00	
Norway	1 Kr	-	1 Kr	1/2x1 Kr, 3/5x1 Krone	00	01	00	01	02	05	00	
Sweden	1 Kr	-	1 Kr	1/2x1 Krona ²	03	01	04	01	02	00	00	

Notes: 1. Factory Default. 2. Standard Setting - Adjust setting of Item 24 ONLY. 3. Default with jumper W7 cut/removed. 4. Other functions are also affected; see the explanations for Adjustment items 53 through 58.

GRAND LIZARD Switch-Matrix Table

COLUMN ROW	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Bob Tilt 1	Playfield Tilt 9	Right Return Lane 17	3-Bank 25	Multi-Ball 2 33	Right Special Arrow 41	Not Used 49	Not Used 57
2 WHT-RED 1J10-8	Ball Roll Tilt 2	Outhole 10	Left Outlane 18	3-Bank 26	Multi-Ball 3 34	Ramp Tongue 42	Not Used 50	Not Used 58
3 WHT-ORN 1J10-7	Credit Button 3	Shooter Lane 11	Right Outlane 19	3-Bank 27	L 35	Left Kicker 43	Not Used 51	Not Used 59
4 WHT-YEL 1J10-6	Right Coin Chute 4	Ball Trough #3 (Upper Left) 12	4-Bank 20	Spinner 28	I 36	Right Kicker 44	Not Used 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin Chute 5	Ball Trough #2 (Center) 13	4-Bank 21	Right Ramp 29	Z 37	Left Magnet 45	Not Used 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin Chute 6	Ball Trough #1 (Lower Right) 14	4-Bank 22	Right Chute to Top 30	A 38	Right Magnet 46	Not Used 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Turnaround 15	4-Bank 23	Left Ramp 31	R 39	Not Used 47	Not Used 55	Not Used 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Left Return Lane 16	Top Right Standup 24	Multi-Ball 1 32	D 40	Right Flipper (E O S) 48	Not Used 56	Not Used 64

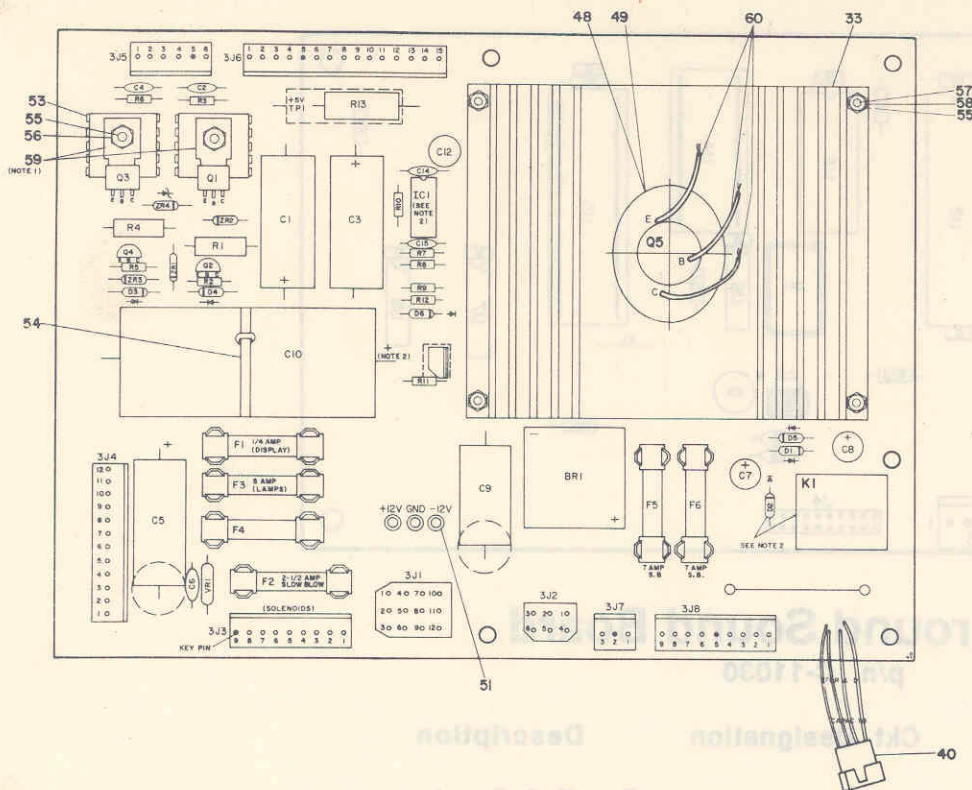
GRAND LIZARD Lamp-Matrix Table

COLUMN ROW	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
Q80 RED-BRN 1J6-1	Game Over 1	4X 9	5 17	All Scores 2X 25	Multi-Ball Arrow (middle) 33	Special (Bottom Right Standup) 41	Left Drain 49	4-Bank 20K 57
Q81 RED-BLK 1J6-2	Match 2	5X 10	6 18	All Scores 3X 26	Multi-Ball Arrow (upper) 34	Left Magnet (lower) 42	Right Drain 50	4-Bank 40K 58
Q82 RED-ORN 1J6-3	Sword 3	10X 11	7 19	Bonus Holdover Collected 27	L 35	Left Magnet (middle) 43	51	4-Bank 60K 59
Q83 RED-YEL 1J6-5	Sword 4	Shoot Again (Playfield) 12	8 20	Spinner 28	I 36	Left Magnet (upper) 44	Left Ramp Mystery 52	4-Bank 80K 60
Q84 RED-GRN 1J6-6	Ball in Play 5	1 13	9 21	Right Ramp B 29	Z 37	Right Magnet (lower) 45	Extra Ball (top) 53	4-Bank 100K 61
Q85 RED-BLU 1J6-7	Shoot Again (Backbox) 6	2 14	10 22	Lane to Top Bonus Holdover Arrow 30	A 38	Right Magnet (middle) 46	Turn 10K 54	Top Right 50K 62
Q86 RED-VIO 1J6-8	2X 7	3 15	20 23	Left Ramp A 31	R 39	Right Magnet (upper) 47	Turn 20K 55	Top Right Release 63
Q87 RED-GRY 1J6-9	3X 8	4 16	Extra Ball (bottom) 24	Multi-Ball Arrow (lower) 32	D 40	Right Ramp Mystery 48	Turn 40K 56	3-Bank Special 64

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trans.	Solenoid Part No.
				CPU Bd.	Playfield/Cabinet		
01	Outhole	Controlled	Gry-Brn	1P11-1	8P3-1	Q33	AE-23-800-01
02	3-Bank	Controlled	Gry-Red	1P11-3	8P3-2	Q25	AE-23-800-04
03	4-Bank (left 2 targets)	Controlled	Gry-Orn	1P11-4	8P3-3	Q32	AE-23-800-04
04	4-Bank (right 2 targets)	Controlled	Gry-Yel	1P11-5	8P3-4	Q24	AE-23-800-04
05	Multi-Ball Eject	Controlled	Gry-Grn	1P11-6	8P3-5	Q31	AE-23-800-03
06	Multi-Ball Flash	Controlled	Gry-Blu	1P11-7	8P3-6	Q23	#63 flashlamps
07	Not Used	Controlled				Q30	
08	Ball Feed	Controlled	Gry-Blk	1P11-9	8P3-8	Q22	AE-23-800-03
09	Left Magnet	Controlled	Brn-Blk	1P12-1	8P3-9	Q17	5580-09613-00
10	Right Magnet	Controlled	Brn-Red	1P12-2	8P3-10	Q9	5580-09613-00
11	General Illumination Relay	Controlled	Brn-Orn	1P12-4	3P7-1	Q16	5580-09555-00
12	3-Bank Flasher	Controlled	Brn-Yel	1P12-5	8P3-12	Q8	#63 flashlamps
13	Eyes (Backbox & Head)	Controlled	Brn-Grn	1P12-6	8P3-13	Q15	#63 flashlamps
14	Knocker (& Token Dispenser)	Controlled	Brn-Blu	1P12-7	Backbox	Q7	AE-23-800-02
15	Bell	Controlled	Brn-Vio	1P12-8	7P1-17	Q14	SM-29-1000-DC
16	Coin-Lockout Relay	Controlled	Brn-Gry	1P12-9	7P1-18,7P4-4	Q6	404603-2 ²
17	Left Kicker	Special #1	Blu-Brn	1P19-7	8P3-17	Q75	AE-23-800-03
18	Right Kicker	Special #2	Blu-Red	1P19-4	8P3-18	Q71	AE-23-800-03
19	Not Used	Special #3					
20	Not Used	Special #4					
21	Not Used	Special #5					
22	Not Used	Special #6					
-	Upper Right Flipper	-	(Blk-Yel)		(7J1-31,8P3-33) ³	-	FL24/600-30/2600-50VDC
-	Right Flipper	-	Orn-Vio (Blu-Vio)	1P19-1	7P1-7 (7J1-8,8P3-34) ³	-	FL23/600-30/2600-50VDC
-	Upper Left Flipper	-	(Blk-Blu)		(7J1-30,8P3-31) ³	-	FL24/600-30/2600-50VDC
-	Left Flipper	-	Orn-Gry (Blu-Gry)	1P19-2	7P1-9 (7J1-10,8P3-32) ³	-	FL23/600-30/2600-50VDC

Notes:

1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch.
2. Solenoid 16 has a Coinco part number.
3. Connections shown in parentheses are from flipper switch to flipper coil.



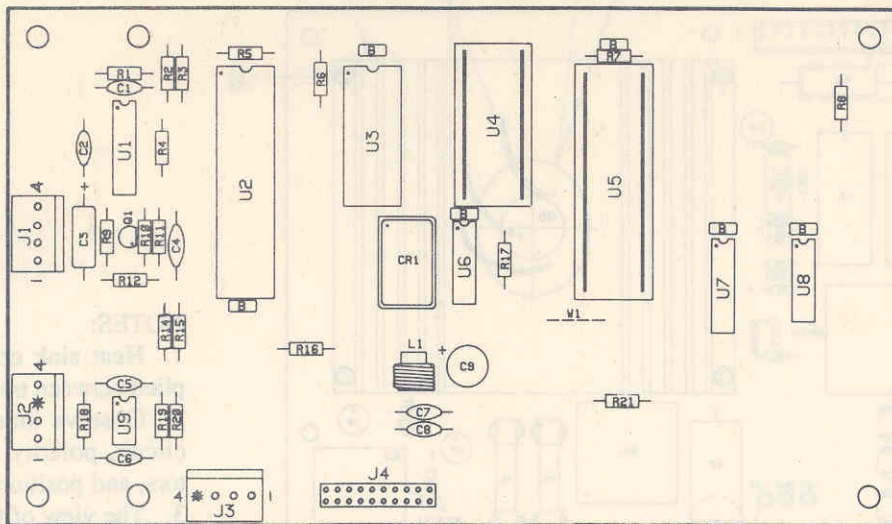
NOTES:

1. Heat sink compound must be applied between transistor and heat sink.
2. Observe index mark on integrated circuit, polarity of diodes and capacitors, and position of transistors.
3. The view of Q5 and its related heat sink and hardware is from the bottom of the heat sink, to clarify installation.

Power Supply

p/n D-8345-541

Item	Part No.	Ckt Designation	Description	Item	Part No.	Ckt Designation	Description
1	5765-09466-01		Bare P. C. Board	28	5164-09057-00	Q1	Transistor, SDS201, NPN
2	5013-09426-00	R7	Resistor, 2.15K, 1%, 1/4w, Metal Film	29	5164-09056-00	Q4	Transistor, MPSD02, NPN
3	5013-09427-00	R8	Resistor, 4.99K, 1%, 1/4w, Metal Film	30	5194-09058-00	Q3	Transistor, SDS202, PNP
4	5010-09428-00	R11	Resistor, 1.5K, 2%, 1/4w, Carbon Film	31	5194-09055-00	Q2	Transistor, MPSD52, PNP
5	5010-09085-00	R10	Resistor, 1.5K, 5%, 1/4w	32	5162-09425-00	Q5	Transistor, 2N6057, NPN
6	5010-09541-00	R9	Resistor, 2.7K, 2%, 1/4w	33	5705-09431-00		Heat Sink
7	5010-09508-00	R12	Resistor, 270Ω, 2%, 1/4w, Carbon Film	34	5791-09074-00	3J6	Connector, 15 pin (Hdr)
8	5012-09429-00	R13	Resistor, 0.12Ω, 5%, 5w	35	5791-09027-00	3J3, 3J8	Connector, 9 pin (Hdr)
9	5010-09536-00	R1, R4	Resistor, 39K, 5%, 1w	36	5791-09038-00	3J2	Connector, 6 pin (Hdr)
10	5010-09061-00	R2, R5	Resistor, 680Ω, 2w	37	5791-09067-00	3J5	Connector, 6 pin (Hdr)
11	5010-09069-00	R3, R6	Resistor, 330K, 5%, 1/2w	38	5791-09434-00	3J4	Connector, 12 pin (Hdr)
12	5040-09419-00	C10	Capacitor, 18,000 mfd, electr., 20V, axial	39	5791-09435-00	3J7	Connector, 3 pin (Hdr)
13	5040-09420-00	C9	Capacitor, 1000 mfd, electr., 25V, axial or radial	40	H-11065	3J9	Cable/Connector Assembly
14	5040-09423-00	C12	Capacitor, 330 mfd, electr., 10V, radial	a)	5791-09400-00		Connector shell
15	5043-9065-00	C15	Capacitor, 470 pfd	b)	5820-09080-00		Connector pin
16	5040-9053-00	C1, C3	Capacitor, 100 mfd, electr., 150V	41	5791-09068-00	3J1	Connector, 12 pin (Hdr)
17	5040-09070-00	C5	Capacitor, 100 mfd, electr., 100V, axial or radial	42	5321-09178-00		Fuseholder
18	5043-09072-00	C2, C4	Capacitor, 0.1 mfd, 500V, disc	43	5731-09128-00	F2	Fuse, 2.5A, 250v, S-B
19	5043-09446-00	C14	Capacitor, 0.1 mfd, 50V, disc	44	5731-09071-00	F3	Fuse, 8A, 32v
20	5070-06258-00	D1, D2, D5, D6	Diode, 1N4001	45	5731-09128-00	F4	Fuse, 2.5A, 250v, S-B
21	5070-09054-00	D3, D4	Diode, 1N4004	46	5731-08761-00	F1	Fuse, 1/4A, 250v, S-B
22	5075-09059-00	ZR1, ZR3	Zener, 1N5990, 3.9v, 5%	47	5017-09064-00	VR1	Varistor
23	5075-09060-00	ZR2, ZR4	Zener, 1N4764, 100v, 5%	48	5700-09445-00		Socket
24	5460-09424-00	IC1	IC, Volt. Reg., MC1723C	49	5701-09652-00		Mica Insulator
25	5043-09443-00	C6	Capacitor, 0.1 mfd, 200v, disc	50	5580-09555-00	K1	Relay, 24VDC, 10A, DPDT
26	5040-09421-00	C7	Capacitor, 100 mfd, 25v, radial	51	5824-09428-00	TP1 - TP4	Terminal, #1502-1 (Test Post)
27	5040-09422-00	C8	Capacitor, 47 mfd, 50v, radial	52	5100-09418-00	BR1	Bridge Rectifier, 35A, 100V
				53	5705-09042-00		Heat Sink
				54	03-7947		Tie Wrap
				55	4005-01016-00		Mach. Screw, 5-40 x 7/16, RH
				56	4700-00004-00		Flatwasher, 0.146 x 3/8, 21 Ga.
				57	4701-00023-00		Lockwasher, #5, split
				58	4405-01117-00		Hex Nut, 5-40
				59	20-9229		Heat sink Thermal Compound
				60	HW-30118-4		Lead wire, 18 AWG, 3"
				61	5731-01003-00	F6, F5	Fuse, 7A, 250V, S-B

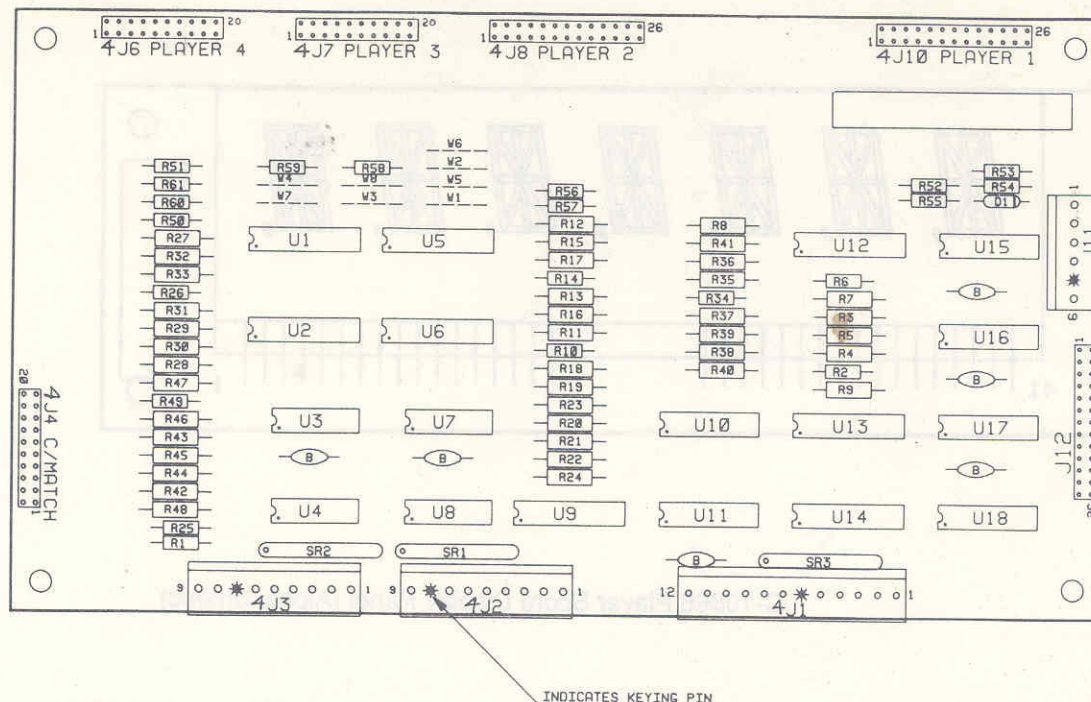


Background Sound Board

p/n C-11030

Item	Part No.	Ckt Designation	Description
1	5766-10929-00		Bare P. C. Board
2	5371-09152-00	U1	IC, D/A Convtr, MC1408
3	5430-10322-00	U2	IC, PIA, MC68B21
4	5340-09878-00	U3	IC, RAM, 2016
5	5281-09487-00	U6	IC, 74LS74
6	5281-09745-00	U7	IC, 74LS138
7	5281-09235-00	U8	IC, 74LS10
8	5281-09321-00	U9	IC, Op Amp, MC1458
9	5160-10269-00	Q1	Transistor, 2N3904, NPN
10	5010-08983-00	R1, R4, R11	Resistor, 3.3K, 5%, 1/4w, Carbon Film
11	5010-08991-00	R2, R3, R5 - R8 R16, R17, R21	Resistor, 4.7K, 5%, 1/4w, Carbon Film
12	5010-08997-00	R12	Resistor, 2.7K, 5%, 1/4w, Carbon Film
13	5010-09179-00	R10	Resistor, 3.3M, 5%, 1/4w, Carbon Film
14	5010-09034-00	R14, R15	Resistor, 10K, 5%, 1/4w, Carbon Film
15	5010-09363-00	R18	Resistor, 5.6K, 5%, 1/4w, Carbon Film
16	5010-09324-00	R19, R20	Resistor, 27K, 5%, 1/4w, Carbon Film
17	5043-09844-00	C1	Capacitor, 47 pfd, ceramic, 50V, axial
18*	5043-08980-00	C2, C5, C6	Capacitor, .01 mfd, ceramic, 50V, axial
19	5043-09343-00	C3	Capacitor, 10 mfd, electr., 20V, axial
20	5043-09030-00	C4	Capacitor, .047 mfd, ceramic, 50V, axial
21	5043-09845-00	C7, C8	Capacitor, .001 mfd, ceramic, 50V, axial
22	5040-10974-00	C9	Capacitor, 100mfd, electr., 35V, axial
23	5551-10161-00	L1	Inductor, 2.0 μ H, 3A
24	5791-10862-04	J1, J2, J3	Connector, 4 pin (Hdr)
25	5791-09437-00	J4	Connector, 20 pin, (Hdr) Ribbon Cable
26	5700-10176-00		IC Socket, 28 pin
a)	A-5343-541-4	U4	IC, B/G Sound ROM
27	5700-08985-00		IC Socket, 40 pin
a)	5400-10320-00	U5	IC, μ Processor, MC68B09E
28	5010-09534-00	W1, R9	Resistor, 0 Ω , 1/4w, Carbon Film
29	5521-10931-00	CR1	Oscillator, 8 MHz

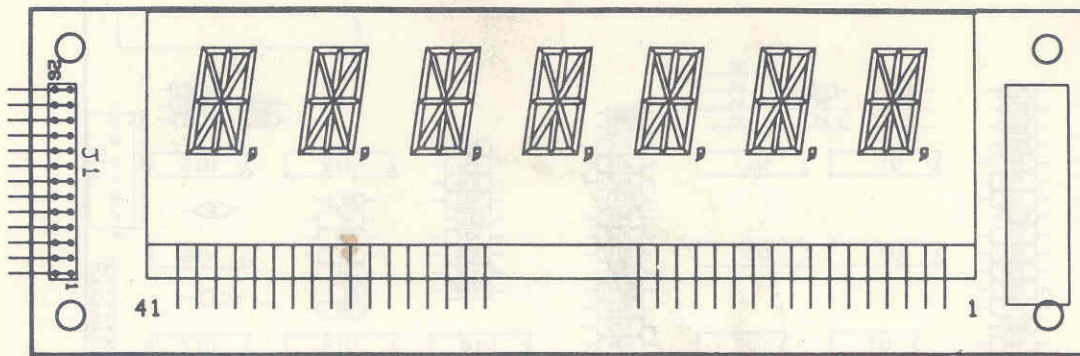
Note: Six capacitors provide +5VDC filtering for ICs; they are shown on diagram with "B" symbol.



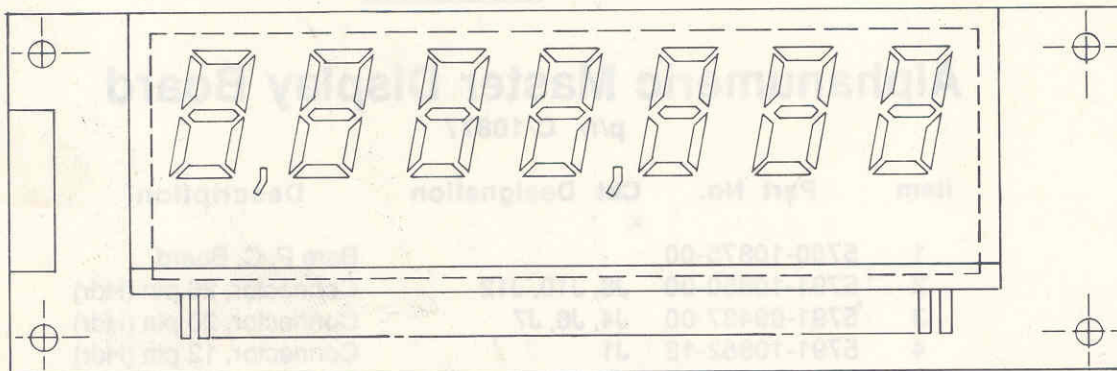
Alphanumeric Master Display Board

p/n C-10877

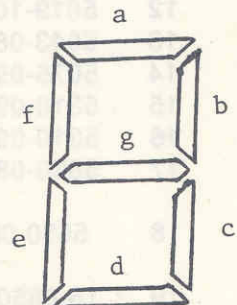
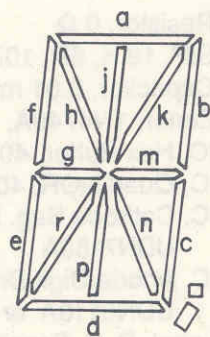
Item	Part No.	Ckt Designation	Description
1	5760-10875-00		Bare P. C. Board
2	5791-10850-00	J8, J10, J12	Connector, 26 pin (Hdr)
3	5791-09437-00	J4, J6, J7	Connector, 20 pin (Hdr)
4	5791-10862-12	J1	Connector, 12 pin (Hdr)
5	5791-10862-09	J2, J3	Connector, 9 pin (Hdr)
6	5791-10862-06	J11	Connector, 6 pin (Hdr)
7	5010-10258-00	R25, R26, R50 - R61	Resistor, 1 M, 1/4 w, 5%
8	5010-09774-00	R1, R2, R6, R10, R14, R34, R35	Resistor, 18 K, 1/4 w, 5%
9	5010-08772-00	R49	Resistor, 15 K, 1/4 w, 5%
10	5010-08981-00	R18 - R24, R27 - R33, R36, R37, R39, R40, R42 - R48	Resistor, 10 K, 1/4 w, 5%
11	5010-09534-00	W1 - W8	Resistor, 0 Ω
12	5019-10387-00	SR1 - SR3	SIP, 18 K, 9R, 10P, 5%
13	5043-08980-00	B	Capacitor, 0.01 mfd, 50V
14	5075-09135-00	D1	Zener, 1N4740A, 10V, 1 w
15	5310-09153-00	U10, U11, U15 - U18	IC, Hex Buffer, 4050
16	5310-09882-00	U3, U4, U7, U8	IC, Quad NOR, 4001B
17	5680-08969-00	U9, U12 - U14	IC, Cathode Seg. Driver, UDN7180A
18	5680-08968-00	U1, U2, U5, U6	IC, Anode/Digit Driver, UDN6118A or 6184
19	16-8850-139		Label, P. C. Board Ident.
20	5010-10927-00	R3 - R5, R7 - R9, R11 - R13, R15 - R17, R38, R41	Resistor, 8.2 K, 1/2 w, 5%



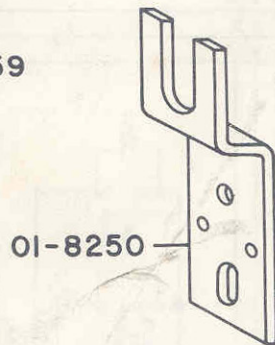
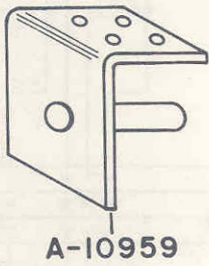
C-10866 Player Score Display Panel (Alphanumeric)



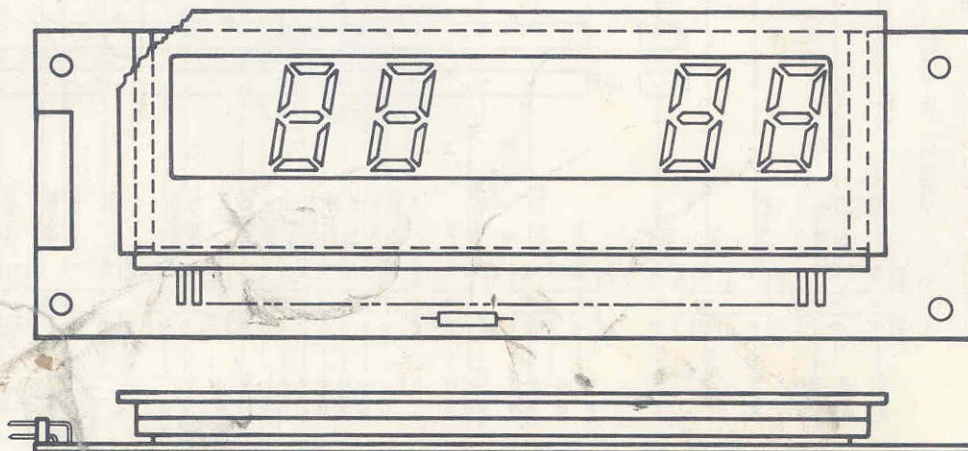
C-8364 Player Score Display Panel (7-Segment)



Display Characters Segment Designations

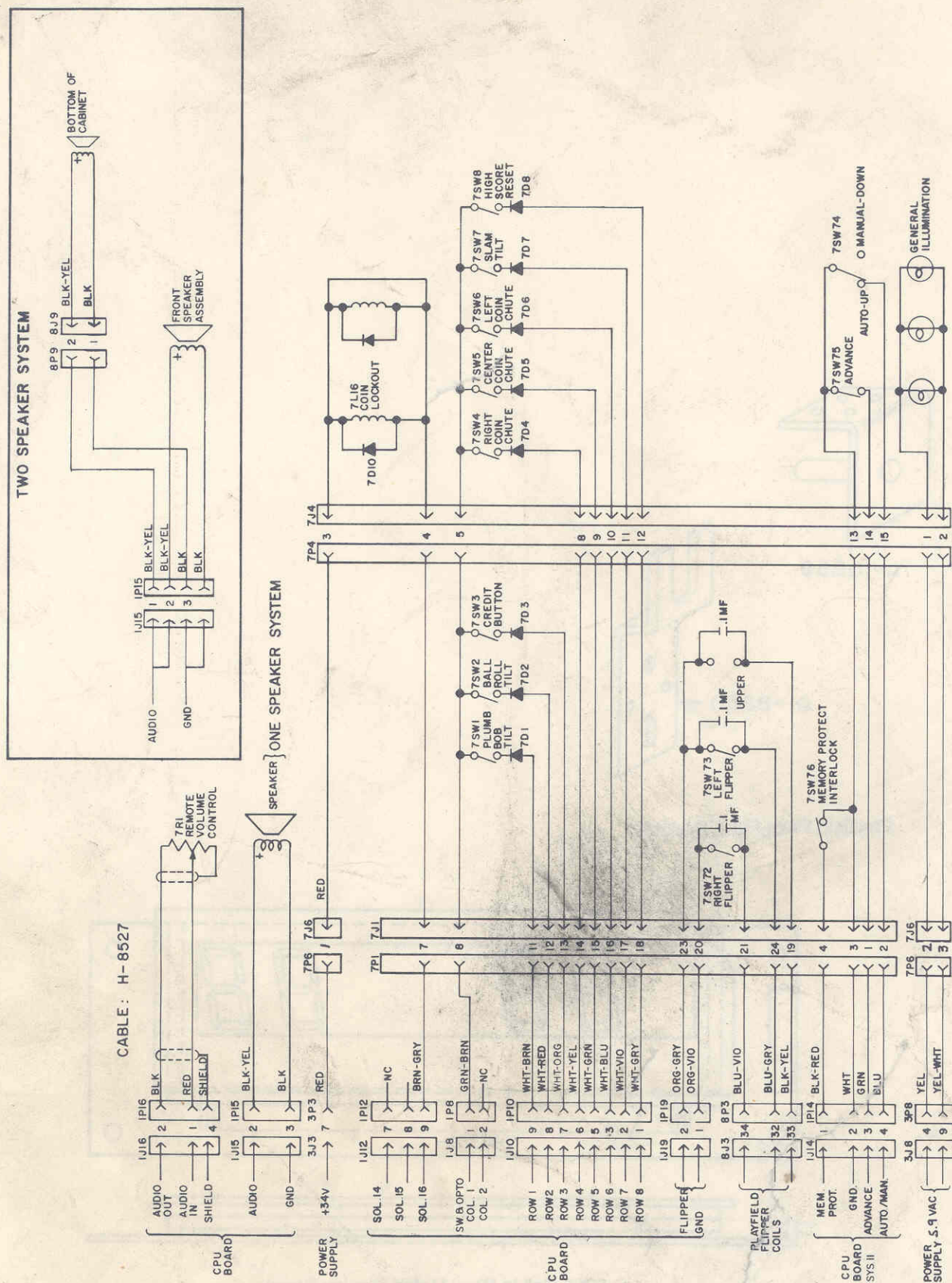


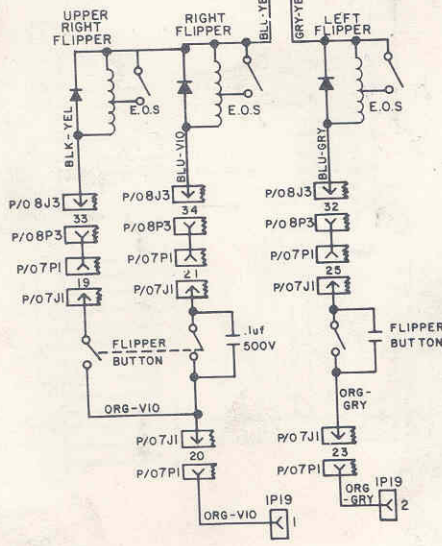
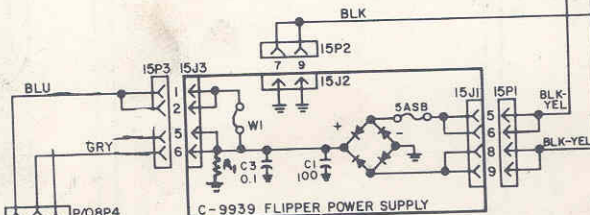
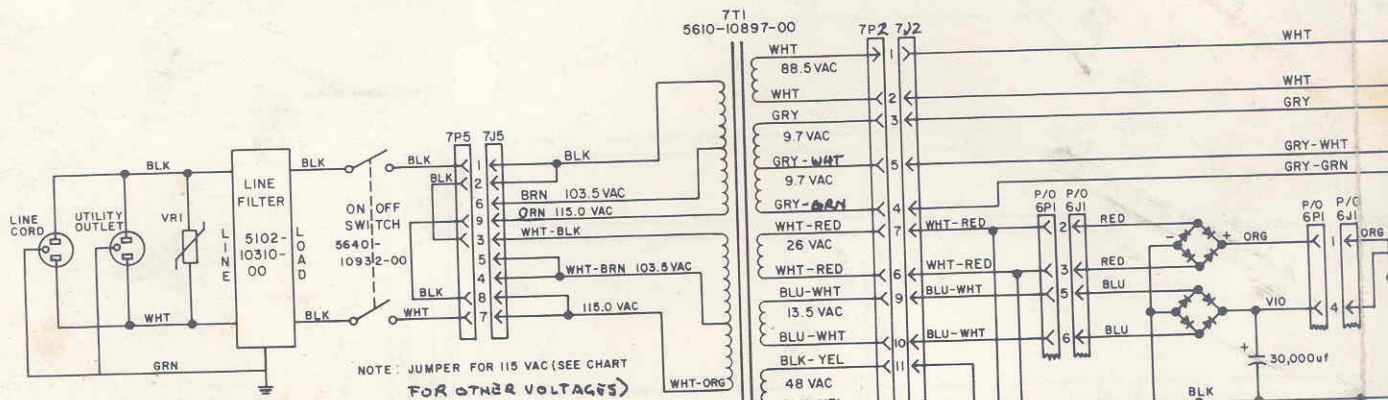
Playfield Pivot Pin & Bracket



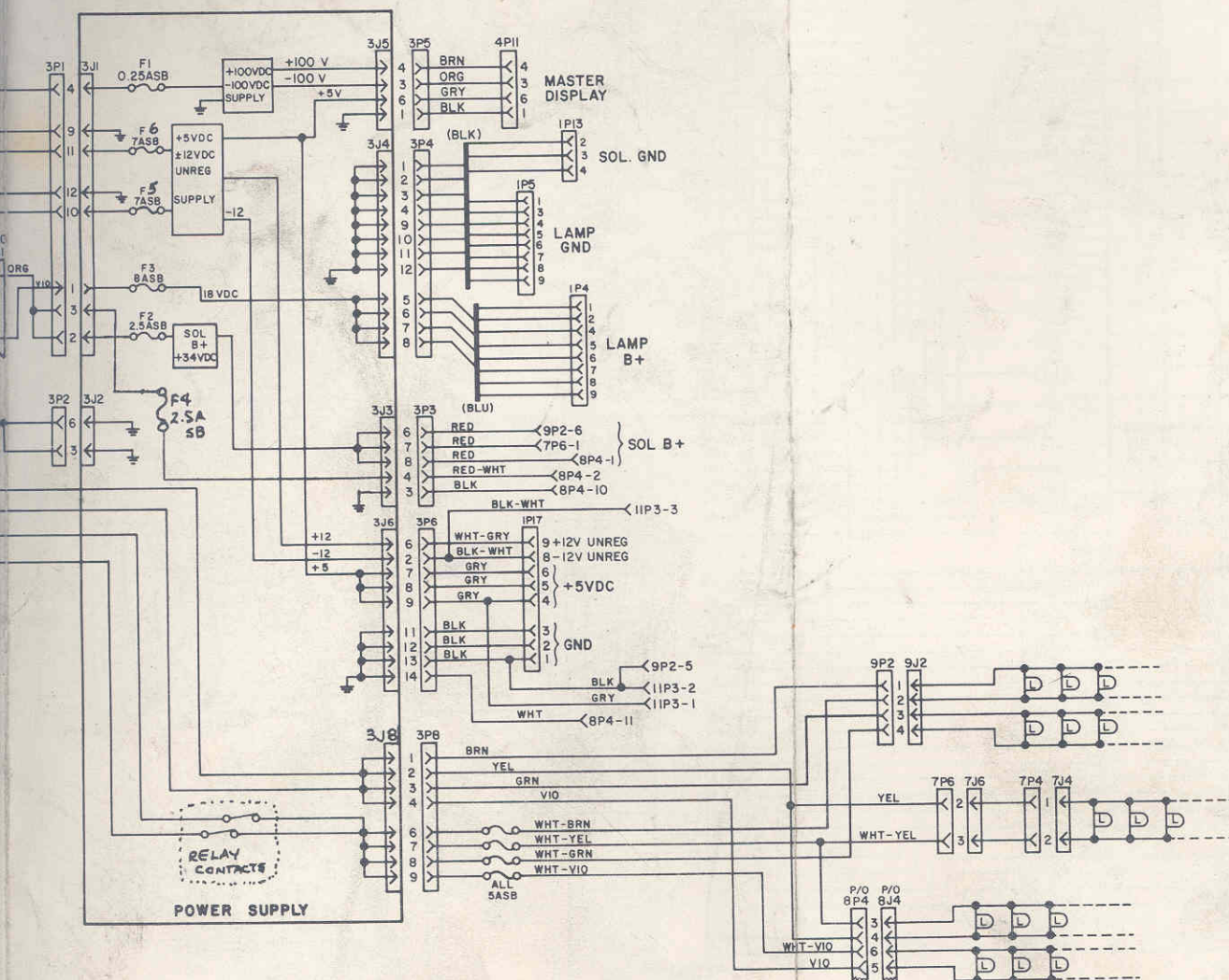
C-8365 Ball In Play/ Match Display Panel

Cabinet Wiring Diagram





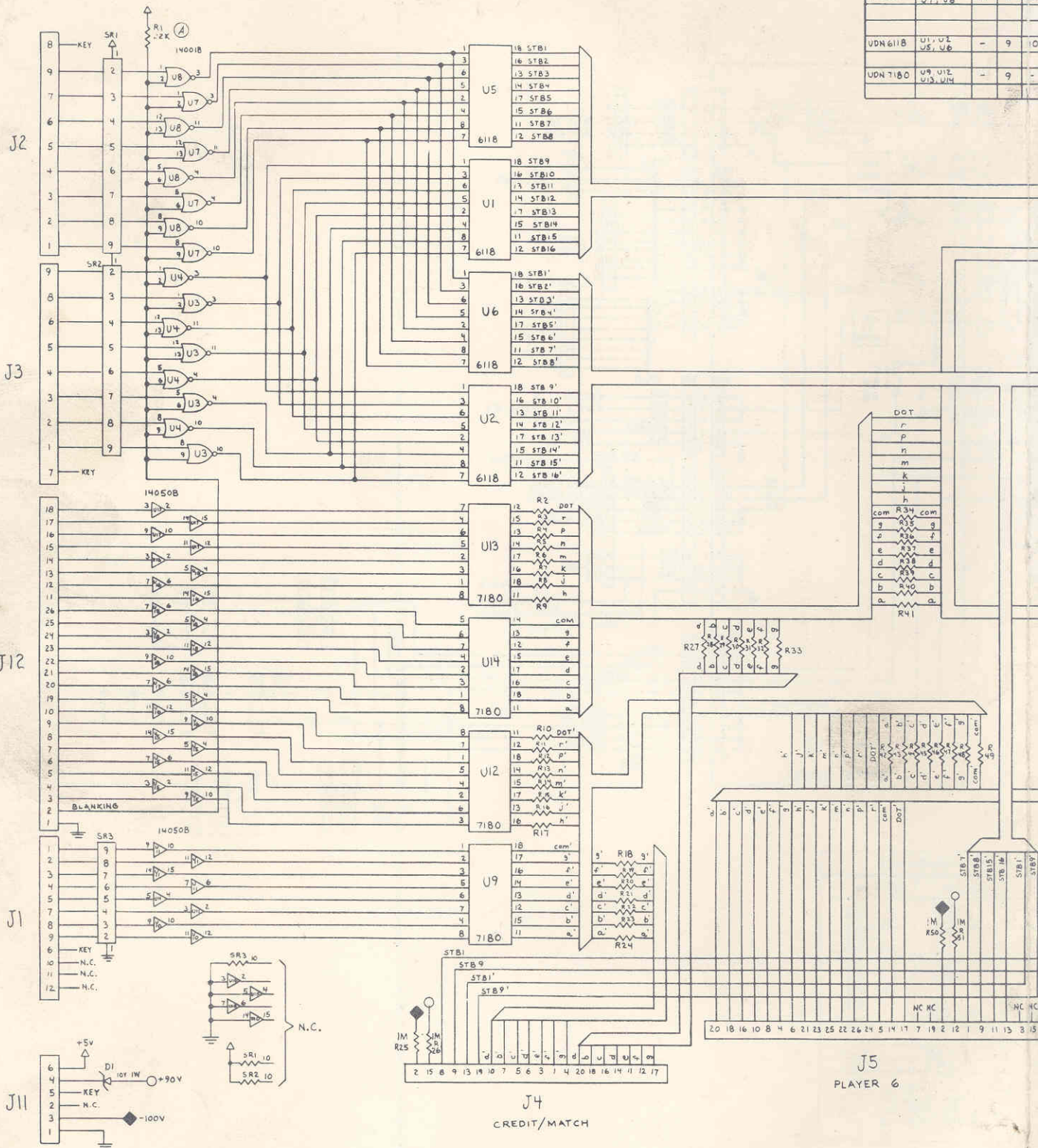
JUMPER	
206 / 218 VAC	
7P5	BLK
206	WHT
FUSE	4 AS
VARISTOR	275
	275
	130



WIRING CHART (Transformer)		
VAC	230 VAC	103.5 VAC
1 2 3 4 5 6 7	7P5 1 2 3 4 5 6 7 WHT	7P5 1 2 3 4 5 6 7 WHT
8 9 10 11 12 13 14 15 16 17	4 ASB 275 V	8 ASB 130 V
5V. VARISTOR: 5017-09063-00 10V. VARISTOR: 5017-09044-00 4 ASB: 5731-06314-00 8 ASB: 5730-09252-00		

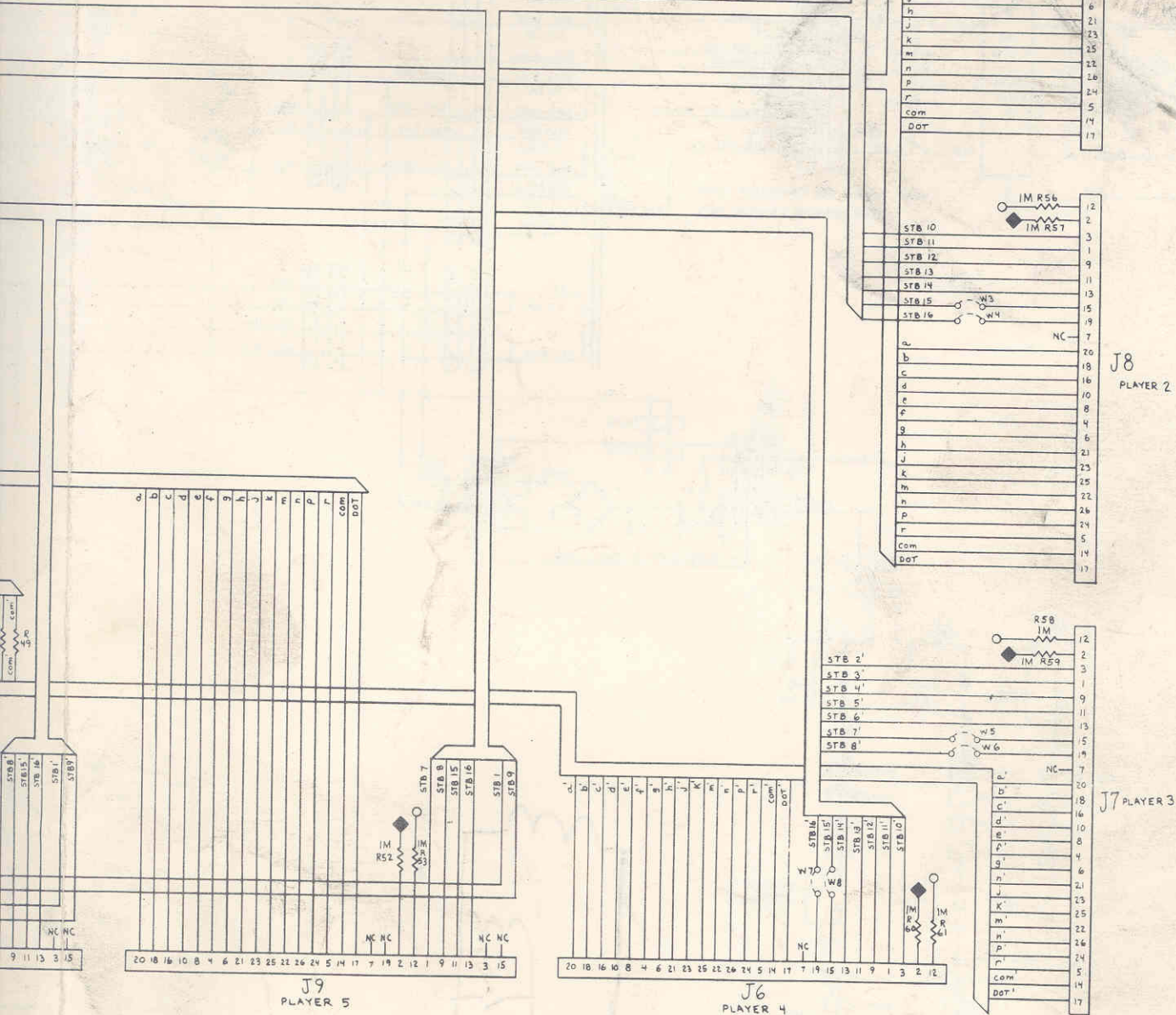
Power Wiring Diagram

POWER TABLE					
TYPE	REF. DESIG	SY	GND	190	
14050	U10, U11, U15, U18	1	8	-	
14001	U3, U4, U7, U8	14	7	-	
UDN6118	U1, U2, U5, U6	-	9	10	
UDN7180	U9, U12, U13, U14	-	9	-	

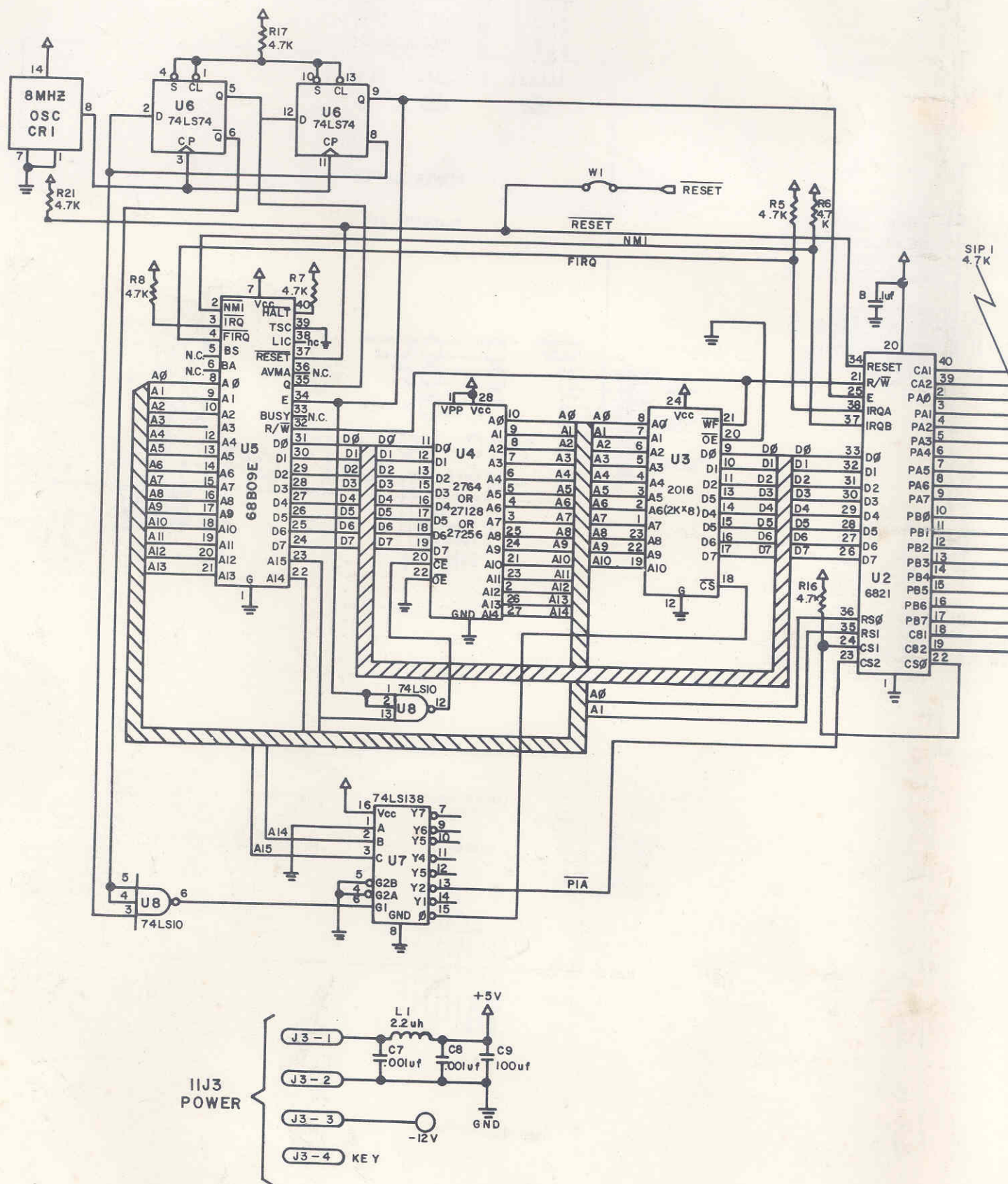


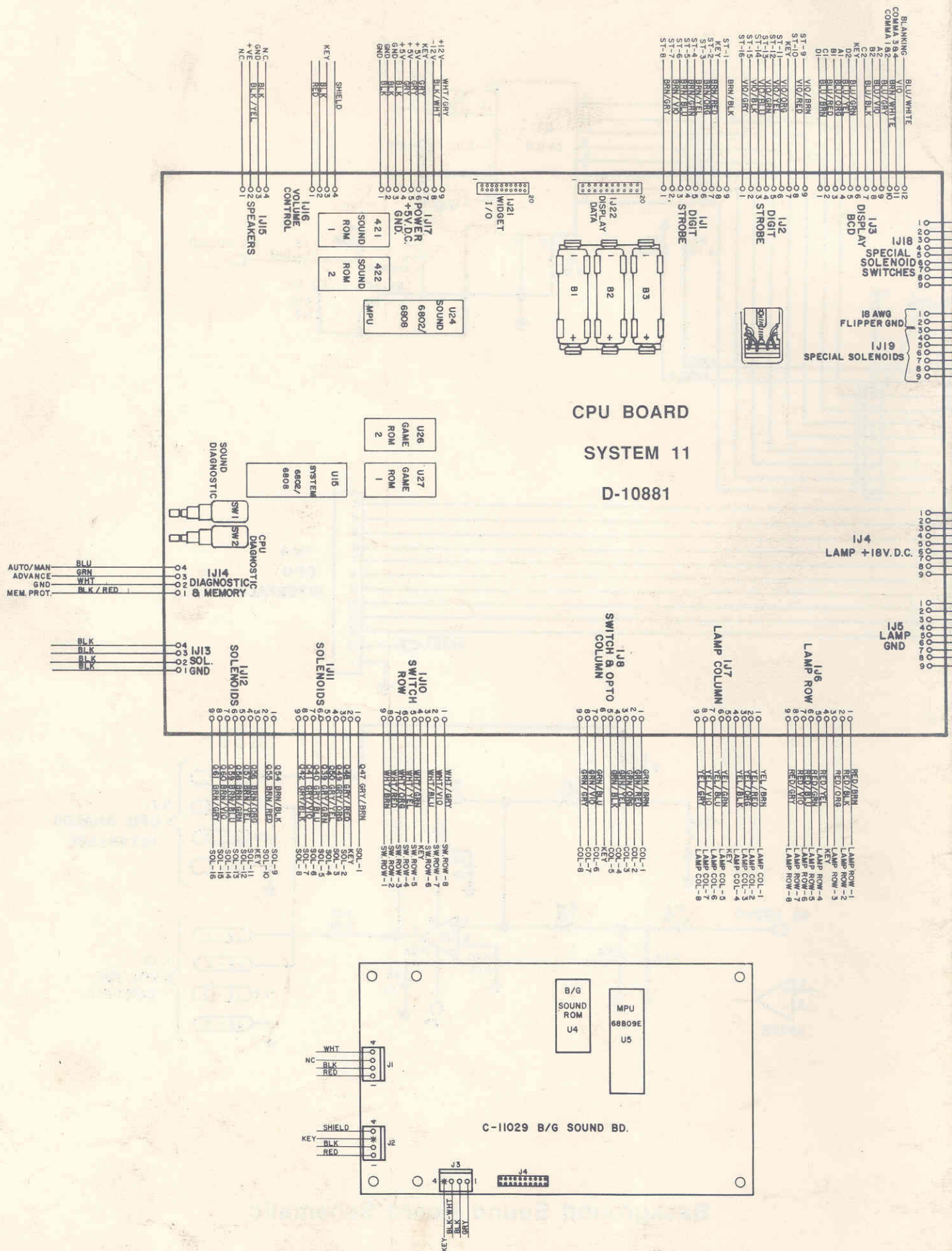
SIG.	15V	GND	90	-100
8	1	8	-	-
14	7	-	-	-
-	9	10	-	-
-	9	-	10	-

VALUE OF UNMARKED RESISTORS			
DESIGNATORS	OHMS	WATTS	%
R3-R5, R7-R9 R10-R12, R14-R16, R18-R20 R22-R24, R26-R28, R30-R32	8.2K	1/2W	5
R10-R12, R14-R16, R18-R20 R22-R24, R26-R28, R30-R32	10K	1/2W	5
R49	15K	1/4W	5
R1, R2, R6, R10, R14, R18, R22, R26, R30, R34, R38	18K	1/4W	5



Alphanumeric Master Display Board Schematic



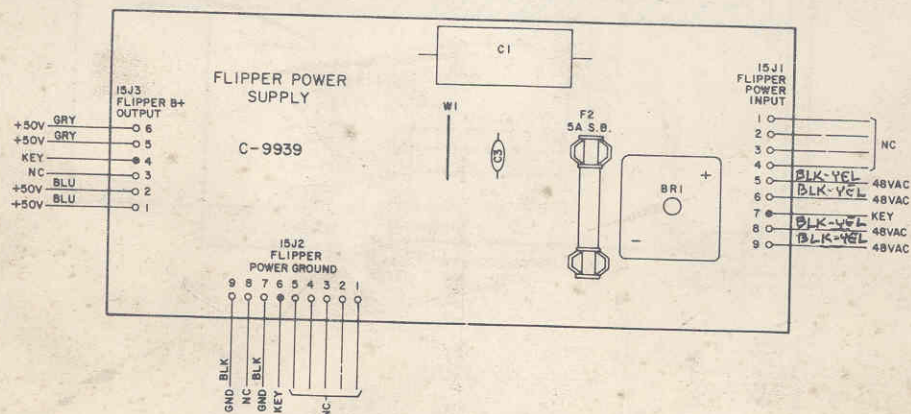
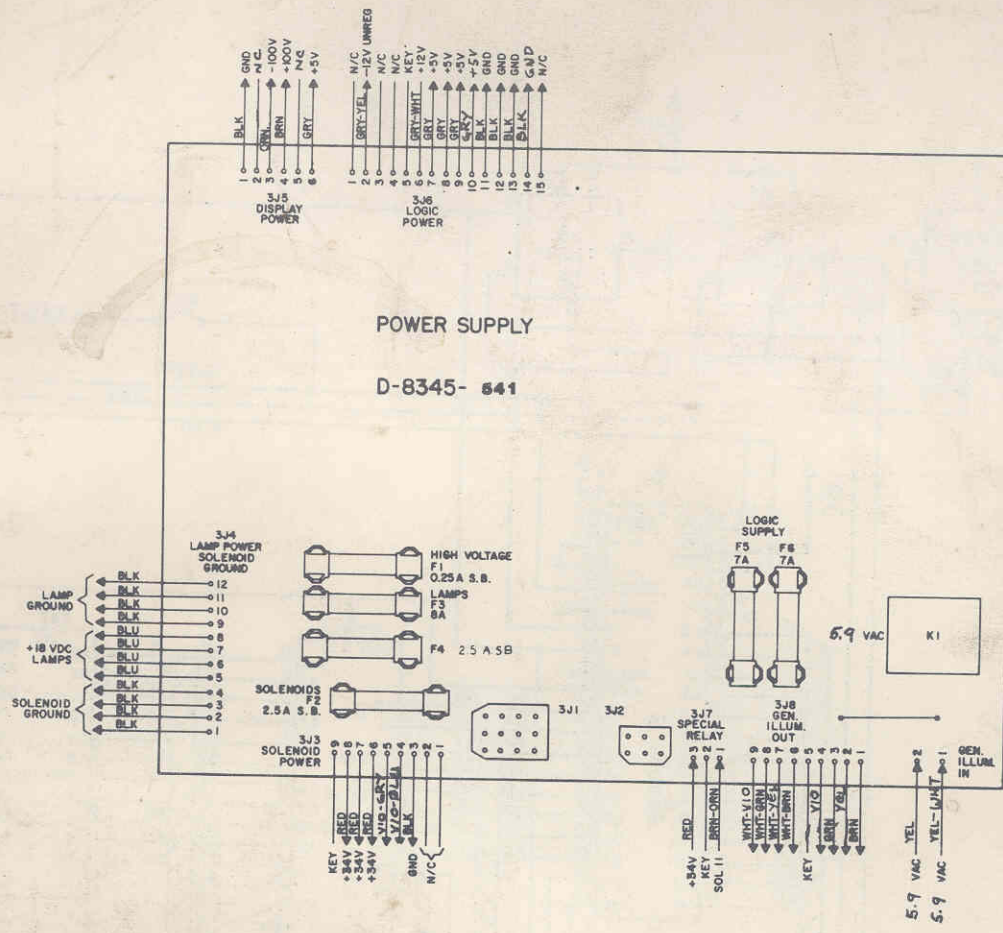


0 ORG/BLK KEY
1 ORG/RED SP SOL-3SW
2 ORG/YEL SP SOL-2SW
3 ORG/BRN SP SOL-4SW
4 N/C
5 ORG/GRN SP SOL-5SW
6 ORG/BLU SP SOL-6SW

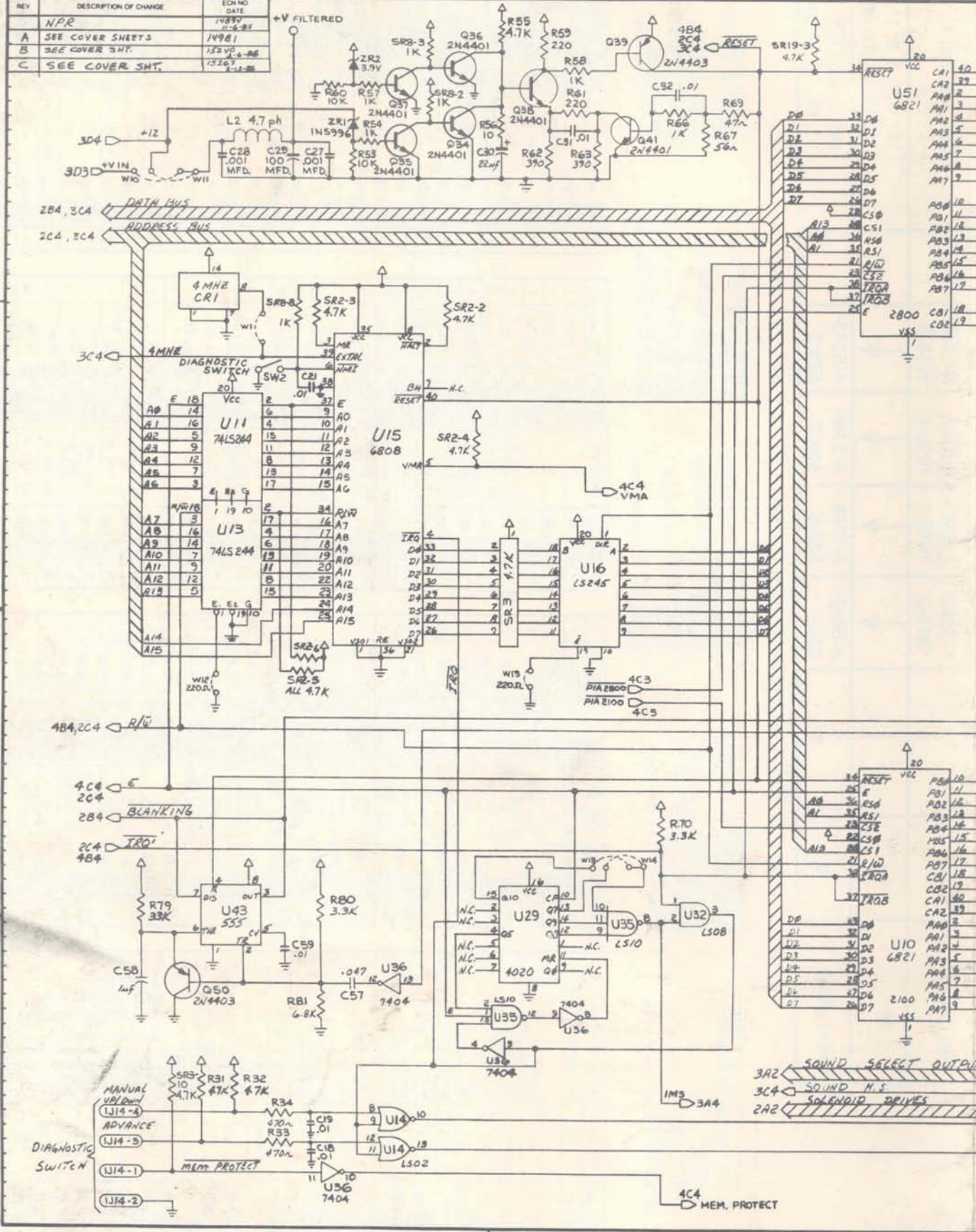
10 ORG/VIO
11 ORG/GRY
12 BLU/ORG SP SOL-3
13 BLU/RED SP SOL-2
14 BLU/YEL SP SOL-4
15 BLU/GRN SP SOL-1
16 BLU/GRN SP SOL-5
17 BLU/BLK SP SOL-6

10 BLU
11 BLU
12 BLU
13 BLU
14 BLU
15 BLU
16 BLU
17 BLU
18 BLU

10 BLK
11 BLK
12 BLK
13 BLK
14 BLK
15 BLK
16 BLK
17 BLK
18 BLK



REV	DESCRIPTION OF CHANGE	ECN NO	DATE
	NPR	1489	11-6-85
A	SEE COVER SHEETS	14981	
B	SEE COVER SMT.	15245	8-11-86
C	SEE COVER SMT.	15267	8-11-86

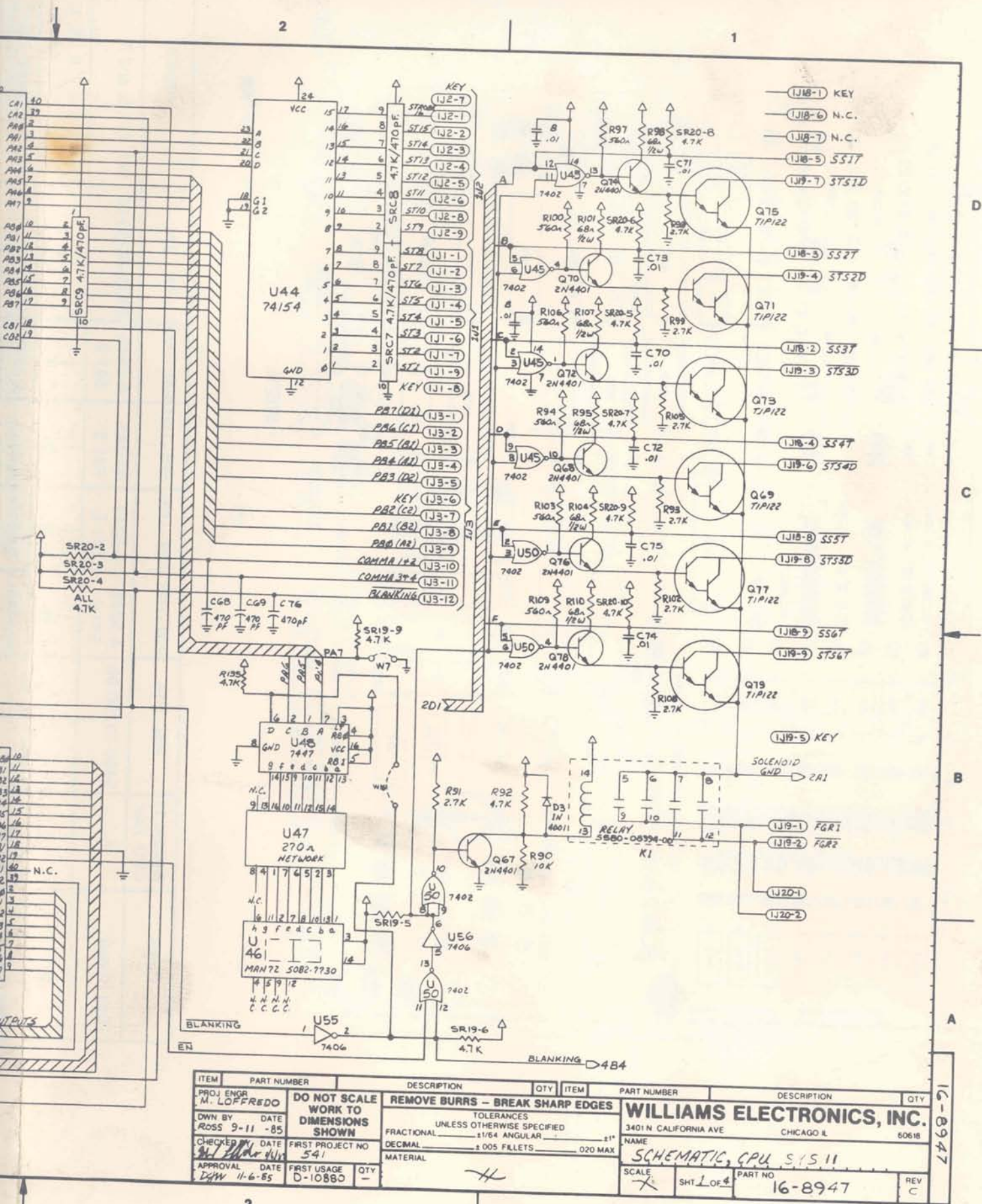


D

C

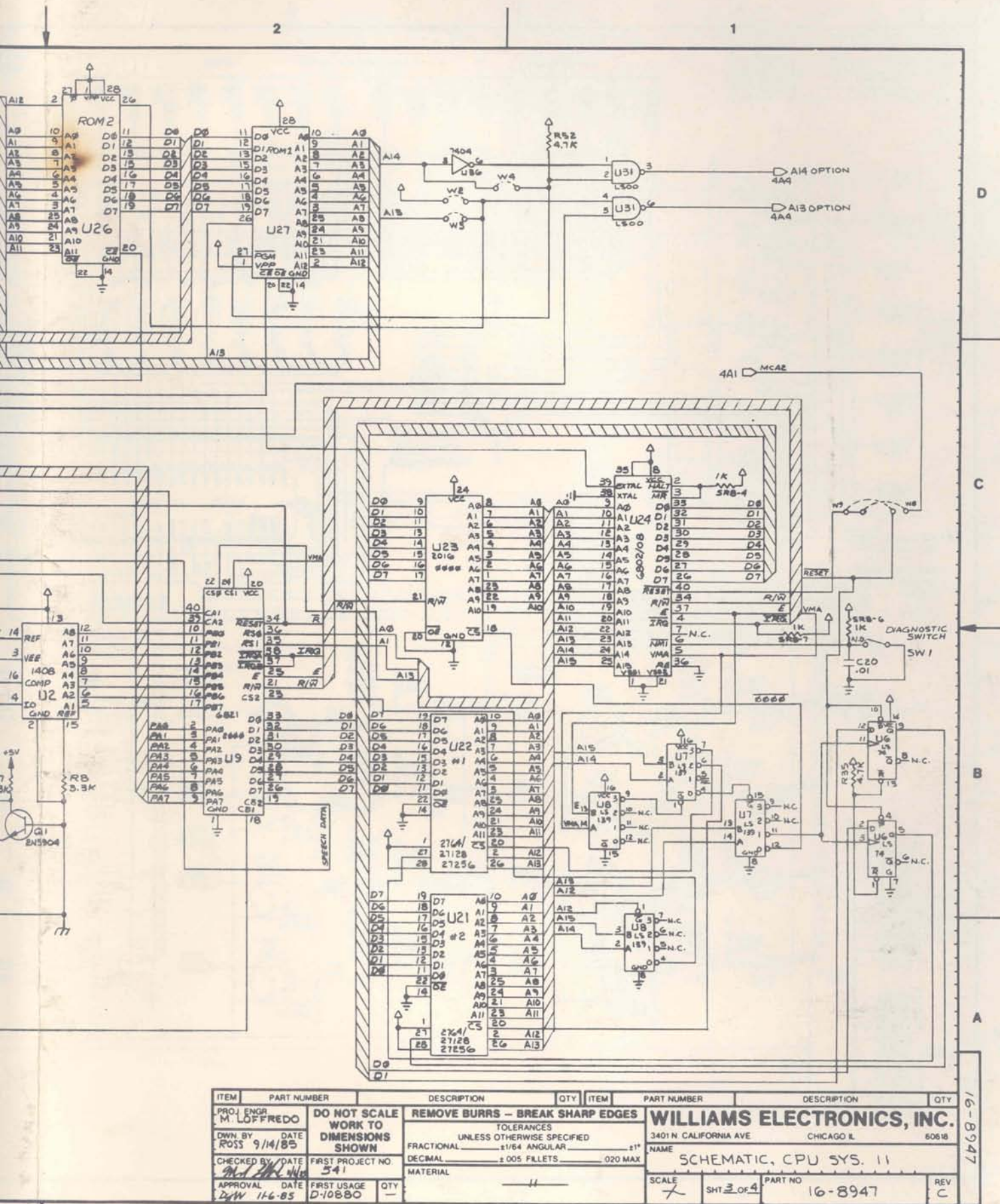
B

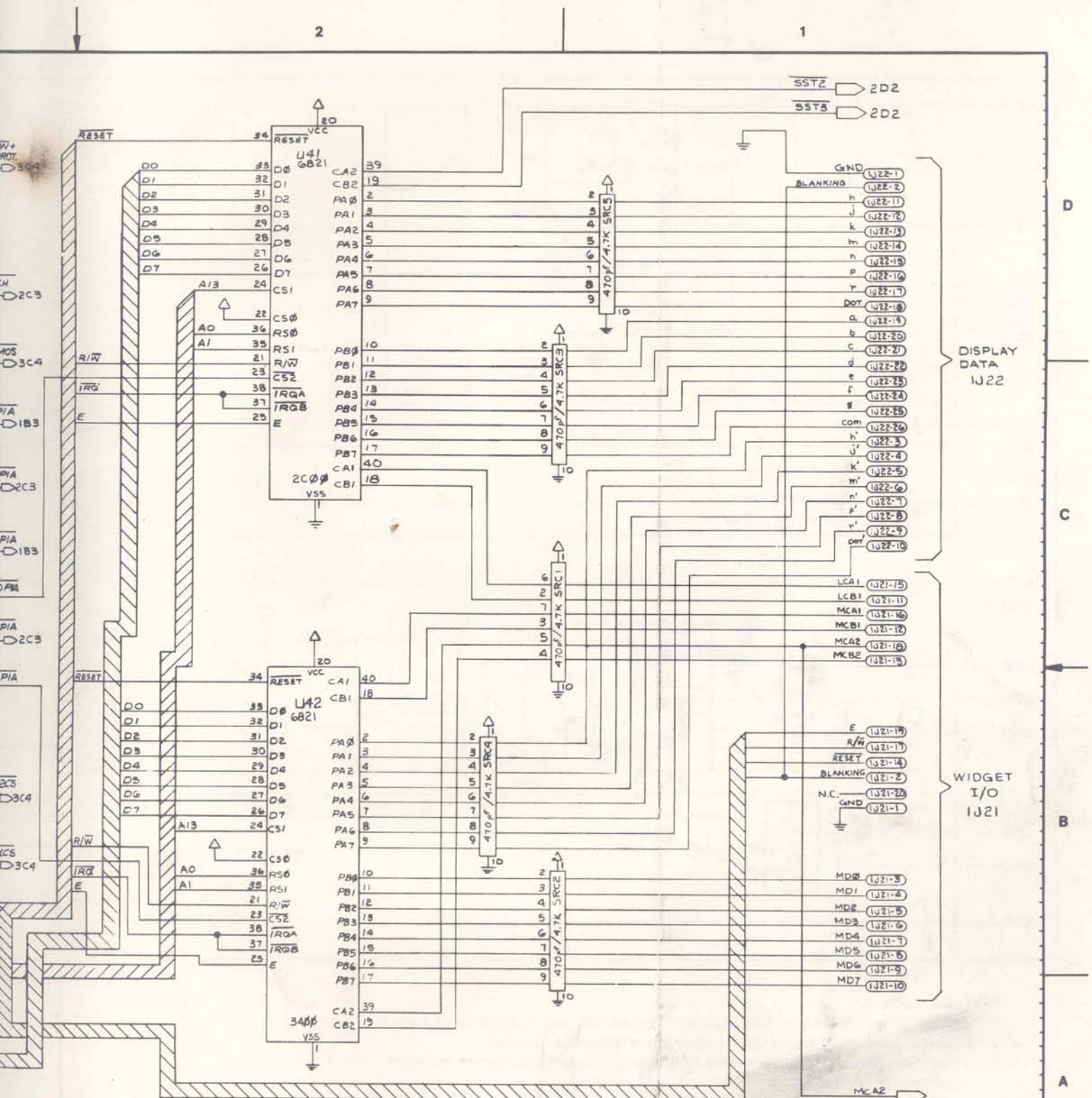
A



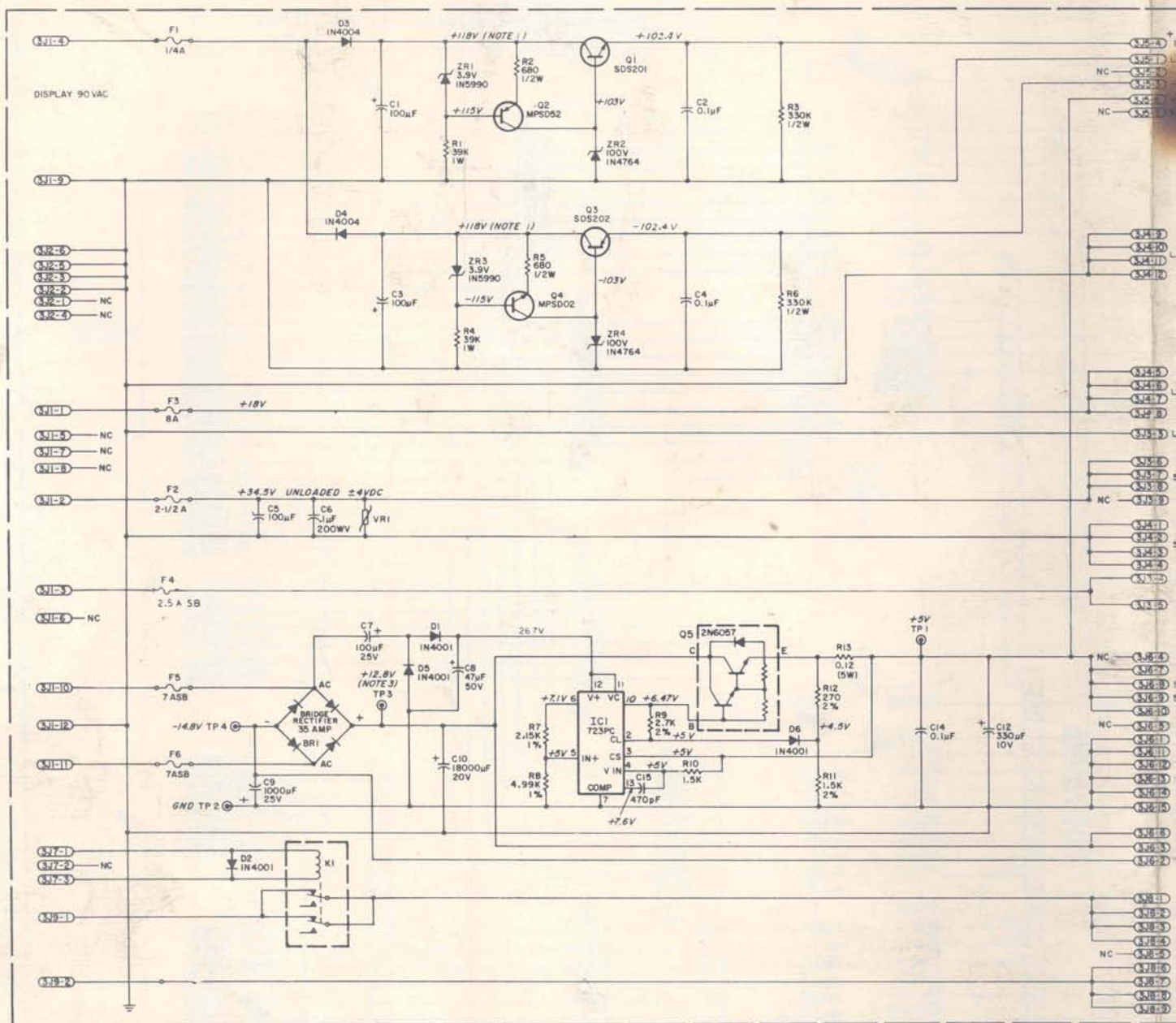
C

1A3 $\Rightarrow$ 1MS





ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR M. LOFFREDO		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS - BREAK SHARP EDGES		WILLIAMS ELECTRONICS, INC.	
DWN BY ROSS	DATE 8/1/85	FIRST PROJECT NO 541		TOLERANCES UNLESS OTHERWISE SPECIFIED		3401 N. CALIFORNIA AVE	CHICAGO IL 60618
CHECKED BY DATE	DATE	FIRST USAGE DATE	QTY	FRACTIONAL 1/64 ANGULAR 2°		NAME	SCHEMATIC, CPU SYS 11
APPROVAL DATE	DATE	FIRST USAGE DATE	QTY	DECIMAL ± 0.05 FILLETS 0.020 MAX		SCALE	N/S
				MATERIAL	11	SHT	4 OF 4
						PART NO	16-8947
						REV	C



NOTES:

1. Display voltage measured with digits display test ON, and displays at all zeroes.
2. Unless otherwise indicated, all resistors are in ohms (Ω), 1/4 watt.
3. TP3 (unregulated +12 VDC) readout should not go lower than +10.5 V, or intermittent reset will occur.

D-8345 Power Supply Schematic

