



PLAYBOY

35th Anniversary



9/5/89

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DATA EAST PINBALL®

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CPU JUMPER TABLE

Game	CPU* Version	ROM Location	Installed	Jumpers Removed
Laser Wars	Ver 1	5C	J1b,J3,J4,J6a,J7a,&J8	J1a,J2,J5,J6,&J7b
	Ver 2	5C	J1b,J3,J4,J5a,J6a,J7b,&J8	J1a,J2,J5,J5b,J6b,&J7a
Secret Service	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Torpedo Alley	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Time Machine	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Playboy	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a

*Version 1 has a 2K RAM which is a 24-pin IC at location 5D.

*Version 2 has an 8K RAM which is a 28-pin IC at location 5D.

Power-up CPU Self Tests

Upon power-up, the CPU board performs a series of self tests of major components. Turn the game on while observing the LEDs on the CPU board. Tests of the PIAs, RAM, and EPROMs are performed automatically and results of the test are indicated by the PIA LED.

With all tests passed, the LEDs illuminate in the following sequence at power turn-on. The PIA and +5V LEDs illuminate immediately. Approximately 1/2-second later the PIA LED goes out and the Blanking LED illuminates; the +5V and Blanking LEDs remain illuminated until the game is turned off. Test failures are indicated with the PIA LED:

PIA LED

Stays On
Flashes 1 Time
Flashes 2 Times
Flashes 3 Times

SUSPECT COMPONENT

One of the 6821 PIAs
6064 RAM at location D5.
EPROM at location B5.
EPROM at location C5.

QUICK REFERENCE FUSE CHART

PPB BOARD

F1 5A Slo-Blo G.I. 6.3VAC
F2 5A Slo-Blo G.I. 6.3VAC
F3 5A Slo-Blo G.I. 6.3VAC
F4 5A Slo-Blo G.I. 6.3VAC
F5 5A Slo-Blo Flipper Power 48VAC
F6 3A Slo-Blo PPB Solenoids/Flash Lamps (34VDC)

POWER SUPPLY BOARD

F1 7A Slo-Blo +5VDC Regulator Input (9VAC)
F2 7A Slo-Blo +5VDC Regulator Input (9VAC)
F3 0.25A Slo-Blo Display Reg. Input (90VAC)
F4 8A Slo-Blo Switched Illumination Buss (18VDC)
F5 4A Slo-Blo Solenoid Buss (34VDC)
F6 5A Slo-Blo Solenoid Buss (34VDC)

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DATA EAST LIMITED WARRANTY

Data East USA, Inc., ("Seller") warrants only to the initial purchaser of its products that the items listed below are free from defects in material and workmanship under normal use and service for the warranty period specified:

PRINTED CIRCUIT BOARDS (GAME LOGIC) 60 DAYS

No other parts of Seller's product are warranted.

Warranty periods are effective from the initial date of shipment from Seller to its authorized distributors.

Seller's sole liability shall be, at its option, to repair or replace products which are returned to Seller during the warranty periods specified, provided:

1. Seller is notified promptly upon discovery by purchaser that stated products are defective.
2. Such products are properly packaged and then returned freight prepaid, to Seller's plant.

This warranty does not apply to any parts damaged during shipment and/or due to improper handling, or due to improper installation or usage, or alteration. In no event shall the Seller be liable for any anticipated profits, loss of profits, loss of use, accidental or consequential damages or any other losses incurred by the customer in connection with the purchase of a Data East USA, product.

WARRANTY DISCLAIMER

EXCEPT AS SPECIFICALLY PROVIDED IN A WRITTEN CONTRACT BETWEEN SELLER AND PURCHASER, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

WARNING—This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

GAME SPECIFICATIONS

POWER REQUIREMENTS

This game is provided with a 3-prong plug and **must be connected to a properly grounded outlet to reduce shock hazard** and insure proper game operation. Refer to AC Power Wiring Diagram for transformer connections required for normal, high, and low line conditions.

Normal Line: 109 to 129 Vac (211 to 225 Vac)

High Line: (226 to 235 Vac)

Low Line: 95 to 108 Vac (200 to 210 Vac)

MAJOR ASSEMBLY AND FUSE LOCATIONS

Refer to the Game Illustration (page 2) to identify locations of the major assemblies, and fuse values and locations.

PROM SUMMARY

CPU Board: Location 5B, 5C

Sound Board: Locations 6F (Voice ROM 1), 4F (Voice ROM 2), and 7F (Sound ROM)

TRANSPORTATION

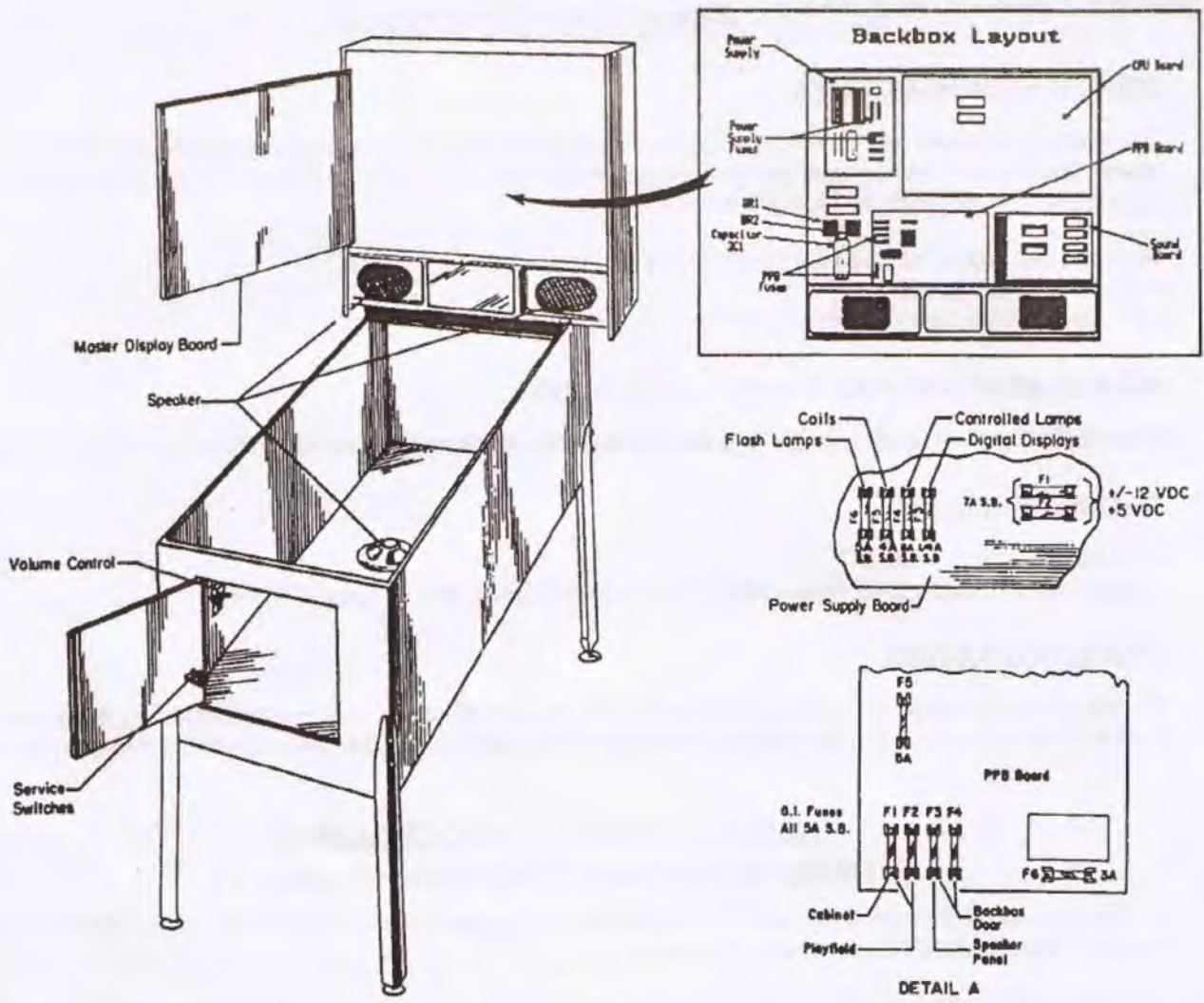
To reduce the possibility of damage, observe the following precautions whenever transporting the game. Lower the backbox and secure it to the cabinet. Remove the legs and secure the game within the transporting vehicle.

GAME ASSEMBLY PROCEDURES (Refer to the Game Illustration on page 2)

1. Open the top of the carton and lay it on its side with the bottom of the cabinet down. Using the plastic banding strip as a handle, slide the game out of the carton.
2. Remove all packing material. Locate cabinet legs in filler packing inserts and assembly parts package in the cashbox. There should be four leg levelers, eight leg bolts, two head bolts with washers, and three pinballs.
3. Attach leg leveler from the parts package to each leg, make sure that each leveler is threaded through a hex nut before threading it into the leg.
4. Support rear of cabinet and attach rear legs using two leg bolts for each leg.
5. Support front of cabinet and attach front legs using two leg bolts for each leg.
6. While assuring that no cables are being pinched, carefully raise the backbox and temporarily secure it in its upright position with the clamps provided on the rear of the cabinet.

WARNING

Do not attempt to move the game with the backbox secured in this temporary manner. If moved, the backbox could come unclamped and suddenly fall to the lowered position resulting in possible **injury to personnel and equipment damage**.



GAME ILLUSTRATION

7. Remove the backbox keys from the clip on the inside of the coin door and unlock and carefully remove the backglass. Set the backglass aside.
8. Carefully remove the playfield glass and set it aside.
9. Obtain the two bolts and washers from the parts package and open the backbox insert board. Secure the backbox to the cabinet pedestal with the two bolts and washers.
10. Check all connectors in the backbox for loose wire terminations. Reseat any loose wire by pushing in on the terminal.
11. Push on all connectors plugged into the CPU board, Sound Board, Power Supply Boards, and (on insert board) Display board to check that they are properly seated.
12. Check that the fuses on the Power Supply board, PPB board and fuse panel are seated properly.
13. Raise the playfield and the support bar on the right side of the cabinet; support the playfield by inserting the support bar into the countersunk notch on the bottom side.
14. Check all cabinet cable and playfield lamp board connector terminations.

15. Remove the Plumb tilt from the parts package and install on the panel on the inside left of the cabinet. Note that this game is not equipped with a ball roll tilt.

16. Lower the playfield and level the playfield side-to-side by adjusting leg levelers.

17. The playfield front-to-back incline is factory set at approximately 6 degrees. If a pitch indicating meter is not available, adjust the front and rear levelers to the lowest position for the proper pitch. Readjust side-to-side level as required.

NOTE

The playfield incline affects difficulty of play. Use the recommended Incline; game difficulty is best varied using game adjustments.

18. Check the plumb tilt and adjust as required.

19. If desired, perform any self tests at this time. With the insert door closed, carefully reinstall and lock the backglass.

20. Place the three pinballs on the playfield near the outhole and carefully reinstall the playfield glass.

21. If desired, make game pricing and Add-A-Ball, Novelty, or 5-Ball Play adjustments at this time.

GAME OPERATION

STANDARD FEATURES

Insert coin(s), the game "wolf whistles" 1 for the first credit and plays the Playboy Theme for each subsequent coin and the Player 4 display indicates the number of credits posted. Depress the credit button and a start-up sound is produced, the posted credits are reduced by one, Player 1 display flashes, Player 4 display indicates BALL 1, and a ball is served to the plunger trough. Additional players may be added by depressing the Credit button before the end of ball 1.

The second closure (adjustable) of the plumb bob tilt switch tilts the ball in play. Closure of the slam tilt switch in the coin door ends the current game(s).

At the end of each ball, earned bonuses are collected. At the end of the last ball for the last player and after bonuses are collected, the system produces a random 2-digit number (a multiple of 10; 00 to 90) for a Match feature (adjustable). Matching the last two digits of a player score with this number awards a credit. Players exceeding high score levels receive free credits (adjustable) and are able to enter their initials with the new High Score achieved. The game then proceeds into the game-over mode and then to the attract mode. A custom message (adjustable) can be displayed during the attract mode.

AUTOMATIC BALL TIME AVERAGING

A ball time averager feature is provided which can make automatic adjustments affecting player appeal. This feature is provided by 'quick look' adjustment Ad 15 and is enabled as the factory setting. Periodically a check is made of the average ball time and adjustments are made to maintain approximately 65-second ball time. This check is made at the same time that highest scores are reset (expanded ADJUSTMENT E Ad 36) so make sure that E Ad 36 is not set to OFF. (Note that the other highest score adjustments may be disabled if desired.) Refer to Game Adjustments for additional details.

MANUAL PERCENTAGING

This game is equipped with Manual Percentage Adjustment.

As previously with our games, you can either set operator adjustments for a replay percent or you can set a fixed replay score.

If you set operator adjustments for a particular replay percent, the game will compute a recommended score to keep the game at that replay percentage. If a change is recommended and the game coin door is opened, the displays will indicate a recommended replay score to beat and knock the Kicker to alert the operator. By pressing the start button, the score to beat will be changed to the recommended level. If you close the coin door or go into audit or adjustment mode, no score change will be made.

You may choose to ignore the recommended change; for example, you may not think last week's players were the usual crowd. Just close the door and the message will disappear without altering the existing level. Or you may choose to make a different score to beat adjustment; this is done by utilizing adjustment AD02.

GAME SPECIFIC FEATURES

Top Lanes- Completing H-M-H steps up the Bonus Multiplier to 2x, 3x, 4x, & 5x. Upon the 5th completion the Spinner Extra Ball Lamp lights. Every completion of the the Top Lanes spots a letter on the **PLAYBOY** Targets.

PLAYBOY- Spell P-L-A-Y-B-O-Y by hitting each of the targets and receive the flashing award displayed in the pool patio.

PINBALL- Extra Ball-Every ramp shot made during Multi-ball lights a letter in P-I-N-B-A-L-L on the speaker panel. Completing **PINBALL** lights the Spinner Extra Ball Lamp.

Bunny Hop- Shoot the left and right ramps to re-light the Bunny Hop Kicker (Laser Kick) .

Mansion Million Countdown-Any ramp shot spots a letter in the word **MANSION** shown on the displays and back panel. Spelling the word **MANSION** initiates the Million countdown timer. As the timer ticks away the Mansion bonus points diminish quickly. the faster you make another ramp shot the higher the bonus you collect.

Photo Shoot Special-Each time the drop targets are completed the center Photo Shoot feature increments by one. After five "Photo Shoots" the Special Lamp lights. When the Drop Targets are completed again the Special is awarded.

Mansion Zoo- Complete the animal targets in the mansion zoo to start a countdown timer. During countdown the points awarded by all playfield switches will Double, Triple, Quadruple etc. depending how many times the animal targets were completed.

Multi-Ball & Super Ramp Jackpots- Lock 2 Balls in the Grotto to enable the multiball feature. Shooting either ramp shot releases the locked balls. While in Multiball any ramp shot will award the Jackpot.

Refer to the Game Specific Adjustments on page 16 for additional information.

AUDIT FUNCTIONS

GENERAL

There are 69 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are eleven most-used audits (AU01 through AU11) in a 'quick look' group and 57 less-used audits (E AU13 through E AU69), in an 'expanded' group. The various auditing functions are summarized in the **AUDITING FEATURES TABLE** and, when accessed, are shown on the player score displays. The *Audit Number* is shown in the Player 3 Display, the *Description* in the Player 1 and 2 Displays, and the *Audit Total* in the Player 4 Display. Access and control is provided from switches located on the inside of the coin door.

To access audit functions, open the coin door and make sure that the FORWARD/REVERSE switch is in the FORWARD (up) position. Depress the STEP switch and the game name is shown in the Player 1 and 2 displays, the Player 3 display is blank, and the PROM revision level is shown in the Player 4 display. This indicates access to audit functions.

With the FORWARD/REVERSE push-button switch still in the FORWARD (up) position, depressing the STEP push-button switch advances through the audit functions one at a time. To review lower-numbered functions, set the forward/reverse push-button switch to the REVERSE (down) position and operate the STEP push-button switch.

To access expanded audits, operate the step push-button until AU12, EXPAND AUDITS is displayed. Set the choice to ON as indicated in the Player 4 display by depressing the Game Start push-button and then depress the step push-button. The request is installed and E AU13 is displayed. When you exit audits and adjustments, the AU12 setting is returned to off for the next time that a review of audits are required.

Audit totals may be reset to zero using Game Adjustment Ad17, Audits Reset. Game adjustments (Ad01 to Ad19 and E Ad20 to E Ad59) begin after the last audit function (AU12 or E AU69). Once audits functions have been recorded, and if no adjustments are required, you may return the game to the attract mode. If adjustments are required, continue pressing the STEP button until the game adjustments are reached. See Game Adjustments for details.

'QUICK LOOK' FUNCTIONS

Total Paid Credits (AU01) - the total number of paid credits is displayed.

Free Percent (AU02) is Free Total (E AU14) divided by Plays Total (E AU13).

Ball Time Average (in seconds) (AU03) is Total Play Time (in minutes) (E AU20) divided by Total Balls Played (E AU21) with the result multiplied by 60.

Coins (AU04, 05, and 06) - These three audit totals are provided to show the amount of coins registered for the left, right, and center coin chutes, respectively.

Replay Percentage (AU07) is the Replay Total awards for exceeding replay score levels (E AU15) divided by Plays Total (E AU13).

High Score Percentage (AU08) is High Score Total (E AU19) divided by Plays Total (E AU13).

Extra Ball Total (AU09) is the total number of extra balls awarded.

Extra Ball Percentage (AU10) is AU09 divided by Balls Total (E AU21).

Cycles Burn In (AU11) provides the number of diagnostic burn-in cycles (factory use).

Expand Audits (AU12) permits viewing of expanded audits.

Playboy

Audit Table

Audit Number (Player 3 Display)	Audit Description (Players 1 & 2 Displays; totals in Player 4 Display)
-	Playboy PROM ID
AU 01	Total Paid Credits
AU 02	Free Percent
AU 03	Ball Time Average
AU 04	Coins Left
AU 05	Coins Right
AU 06	Coins Center
AU 07	Replay Percent
AU 08	High Score Percent
AU 09	Extra Ball Total
AU 10	Extra Ball Percent
AU 11	Cycles Burn In
AU 12	Expand Audits (ON/OFF)
E AU 13	Plays Total
E AU 14	Free Total
E AU 15	Replay Total
E AU 16	Special Total
E AU 17	Special Percent
E AU 18	Match Total
E AU 19	High Score Wins
E AU 20	Play Time (Minutes)
E AU 21	Balls Total
E AU 22	1 Replay Awards
E AU 23	2 Replay Awards
E AU 24	3 Replay Awards
E AU 25	4 Replay Awards
E AU 26	Games 1 Player
E AU 27	Games 2 Player
E AU 28	Games 3 Player
E AU 29	Games 4 Player
E AU 30	Cycles Attract Mode
E AU 31	Cycles Reset High Score
E AU 32	4343 Enter 3 Ball
E AU 33	Unused
E AU 34	1482 Percent Multiball
E AU 35	4812 Lock Ball 1
E AU 36	5260 Lock Ball 2
E AU 37	3461 Percent Lock Ball
E AU 38	9589 Laser Kick Scored
E AU 39	2275 Laser Kick Relit
E AU 40	18967 Left Ramp
E AU 41	4868 Right Ramp
E AU 42	4277 Mansion Lit
E AU 43	12862 Mansion Scored
E AU 44	874 Pinball Lit
E AU 45	904 Pinball Scored
E AU 46	109 Special Scored
E AU 47	511 Playboy 50K
E AU 48	557 Playboy 100k
E AU 49	960 Playboy Outlane
E AU 50	1124 Bonus Hold
E AU 51	911 Playboy Extra Ball
E AU 52	914 Playboy Million
E AU 53	915 2x Bonus
E AU 54	2967 3x Bonus
E AU 55	1040 4x Bonus
E AU 56	361 5x Bonus
E AU 57	904 Lane Extra Ball
E AU 58	2715 2x Scores
E AU 59	132 3x Scores
E AU 60	07 4x Scores
E AU 61	07 5x Scores
E AU 62	6282 Jackpot Shots
E AU 63	81 Jackpot Average
E AU 64	81 Ramp Average
E AU 65	1913 Drain Left
E AU 66	5559 Drain Center
E AU 67	1623 Drain Right
E AU 68	1274 Buy In Games
E AU 69	200 Average Game Time

EXPANDED FUNCTIONS

Plays Total (E AU13) is the sum of Total Paid Credits (AU01) and Free Total (E AU14). Note that free credits are not recorded in the audits until they are actually used.

Free Total (E AU14) is the total free credits for replays, high-score-to-date, specials, and match.

Replay Total (E AU15) is the total awards (credits, extra balls, or audit only) for exceeding replay score levels.

Special Total (E AU16) is the total awards (credits, extra balls, or scores) for making specials.

Special Percentage (E AU17) is Special Total (E AU16) divided by Plays total (E AU13).

Match Total (E AU18) is the total credits awarded for matching the last two digits of the score with the system-generated Match Number at the end of the game. Percentage of match credits will be approximately 8%, if enabled.

High Score Wins (E AU19) is the total credits awarded for exceeding the high-score-to-date scores.

Play Time (E AU20) is the cumulative time of balls in play (in minutes).

Balls Total (E AU21) is the total of regular and extra balls.

Replay Awards (E AU22 through 25) provide the total awards (credit, extra ball, or audit) for replay levels 1 through 4, respectively.

Games - Player (E AU26 through 29) provide individual totals of 1- player, 2-player, 3-player, and 4-player games, respectively.

Cycles Attract Mode (E AU30) provides the number of cycles through the attract mode (factory use).

Cycles High Score Reset (E AU31) provides the number of times that the high score levels have been automatically reset (if enabled).

GAME SPECIFIC FUNCTIONS

Enter 3 Ball (E AU32) provides the number of times three ball multi-ball was accomplished.

Percent Lock Multiball (E AU 34) provides the percentage of games that three ball multi-ball was accomplished.

Lock Ball 1 (E AU35) provides the total number of times one ball was locked.

Lock Ball 2 (E AU36) provides the total number of times two balls were locked.

Percent Lock Ball (E AU37) provides the total percentage of times Lock Ball 1 & Lock Ball 2 were accomplished divided by the total games played.

Laser Kick Scored (E AU38) provides the number of times the Laser Kick was used.

Laser Kick Lit (E AU39) provides the number of times the Laser Kick was re-qualified.

Left Ramp (E AU40) provides the number of times the left ramp was made.

Right Ramp (E AU41) provides the number of times the right ramp was made.

Mansion Lit (E AU42) provides the number of times the Mansion feature is enabled by spotting all the letters in the word MANSION.

Mansion Scored (E AU43) provides the total number of times the Mansion feature was awarded by completing another ramp shot with-in the countdown time frame.

Pinball Lit (E AU44) provides the number of times the PINBALL feature is enabled by spotting all the letters in the word PINBALL.

Pinball Scored (E AU45) provides the total number of times the PINBALL feature was awarded by completing the spinner/VUK shot when PINBALL was lit

Special Scored (E AU46) provides the number of times the special was scored.

Playboy 50k (E AU47) provides the number of times completing the Playboy targets awarded 50,000 points.

Playboy 100k (E AU48) provides the number of times completing the Playboy targets awarded 100,000 points.

Playboy Outlane (E AU49) provides the number of times completing the Playboy targets lit the outlane .

Playboy Bonus Hold (E AU50) provides the number of times completing the Playboy targets awarded the bonus hold feature.

Playboy Extra Ball (E AU51) provides the number of times completing the Playboy targets awarded an Extra Ball.

Playboy Million (E AU52) provides the number of times completing the Playboy targets awarded 1,000,000 points.

2X Bonus (E AU53) provides the number of times 2x bonus was made.

3X Bonus (E AU54) provides the number of times 3x bonus was made.

4X Bonus (E AU55) provides the number of times 4x bonus was made.

5X Bonus (E AU56) provides the number of times 5x bonus was made.

Lanes Extra Ball (E AU57) provides the number of times the Lane Extra Ball Feature was awarded.

2X Scores (E AU58) provides the number of times 2x playfield values feature was awarded.

3X Scores (E AU59) provides the number of times 3x playfield values feature was awarded.

4X Scores (E AU60) provides the number of times 4x playfield values feature was awarded.

5X Scores (E AU61) provides the number of times 5x playfield values feature was awarded.

Jackpot Shots (E AU62) provides the total ramp shots completed during multi-ball.

Jackpot Average (E AU63) provides the average number of Jackpot shots per game.

Ramp Average (E AU64) provides the average number of ramp shots per game.

Drain Left (E AU65) provides the number of times the ball drained out the left drain.

Drain Center (E AU66) provides the number of times the ball drained out the center drain.

Drain Right (E AU67) provides the number of times the ball drained out the right drain.

Buy in Games (E AU68) provides the number of times the Buy-In feature was used.

Average Game Time (E AU69) provides the average length of a game in seconds.

GAME ADJUSTMENTS

GENERAL

There are 59 adjustable functions provided to vary difficulty of play and to periodically reset audits and the high score levels. The various game adjustments are summarized in the **Game Adjustments Table** and, when accessed, are shown on the player score displays. The *Adjustment Number* is shown in the Player 3 Display, the *Description* in the Player 1 and 2 Displays, and the setting in the Player 4 Display. Access and control is provided from switches located on the inside of the coin door.

Game adjustments are accessed from the audit mode. With the audits displaying game identification and the FORWARD/REVERSE switch in the REVERSE (down) position, depress the STEP switch and E Ad59 (Expanded Adjustment 59) is shown in the Player 3 display, FACTORY RESET is shown in the Player 1 & 2 displays, and OFF is shown in the Player 4 display. With the audits displaying AU12 (or expanded E AU69) and the FORWARD/REVERSE switch in the FORWARD (up) position, depress the STEP switch and Ad01 is shown in the Player 3 display, REPLAY MANUAL/FIXED is shown in the Player 1 and 2 displays, and the setting is shown in the Player 4 display.

With the FORWARD/REVERSE switch in the FORWARD (up) position, depressing the STEP switch advances through the game adjustments one at a time. With it in the REVERSE (down) position, the STEP switch selects lower-numbered adjustments. To rapidly scroll through adjustments, hold the STEP switch depressed. Adjustment values are changed by operating the GAME START push-button. The FORWARD/REVERSE switch setting determines whether the values are increased or decreased. (With the FORWARD/REVERSE switch up, the value increases, with it down, the value decreases). When the STEP switch is depressed the Player 1 and 2 displays indicate REQUEST INSTALLED.

REPLAY AND GENERIC FEATURES

Replays may be adjusted either for fixed levels or for a system-adjusted manual percentage of replay awards. Four levels may be selected. Adjustments allow awarding of a credit or an extra ball as each level is exceeded. With the manual percentage feature, if the actual replay percentage is higher or lower than that desired, the game computes new recommended manual percentage score(s). When the coin door is subsequently opened the player displays indicate the recommended level and the Klocker knocks to alert the operator of a potential change. This new level is entered into adjustments simply by pressing the game start push-button. (If the coin door is closed or you enter audits/adjustments or diagnostics, the replay level is not changed.)

REPLAYS (Ad 01 through 06)

Ad 01 Replay Manual/Fixed

Manual: Adjust for percentage of awards for replay levels (1% through 50%). Proceed to Ad 02 and 03 for starting replay levels.

Fixed: Lower the automatic value below 1% and Player 1 display indicates FIXED. Proceed to Ad 02 through 05 for fixed replay levels.

Ad 02 Start Replay/Level 1 Replay

Manual: With Ad 01 set for manual, adjust the starting Replay 1 setting to between 800,000 and 9,900,000.

Fixed: With Ad 01 set for fixed, adjust Replay 1 level to between 100,000 and 9,900,000. To disable Replay 1, lower the setting to 00.

Ad 03 Levels Replay/Level 2 Replay

Manual: With Ad 01 set for manual, adjust the number of replay levels to be active (1 to 4). Any additional starting replay levels are automatically set to values higher than Replay 1. Proceed to Ad 06.

Fixed: With Ad 01 set for fixed, adjust Replay 2 level to between 100,000 and 9,900,000. To disable Replay 2, lower the setting to 00.

Game Adjustment Table

Adjustment Number (Player 3)	Description (Players 1 & 2)	Factory Setting (Player 4)	
AD 01	Replay/Manual	10%	10% 10%
AD 02	Start Replay/Level 1 Replay	2,300,000	3,000,000
AD 03	Levels Replay/Level 2 Replay	01	3
AD 04	Level 3 Replay	-	-
AD 05	Level 4 Replay	-	-
AD 06	Extra Easy Rules	OFF	OFF ON
AD 07	Easy Rules	OFF	OFF OFF
AD 08	Factory Rules	ON	OFF OFF
AD 09	Hard Rules	OFF	OFF
AD 10	Extra Hard Rules	OFF	OFF
AD 11	Novelty Rules	OFF	OFF
AD 12	5 Ball Rules	OFF	OFF
AD 13	Addaball Rules	OFF	OFF
AD 14	Standard/Custom Pricing	USA 1	SWEDEN
AD 15	Time Setting	ON	ON
AD 16	Coin Reset	OFF	OFF
AD 17	Audits Reset	OFF	OFF
AD 18	Restore Hiscr	OFF	OFF
AD 19	Expand Adjustments	OFF	?
E Ad 20	Awards Replay	CREDITS	CREDITS
E Ad 21	Awards Special	CREDITS	CREDITS
E Ad 22	Match Feature	ON	ON
E Ad 23	Balls/Game	03	5
E Ad 24	Warning Tilt	01	2
E Ad 25	Maximum Extra Balls	03	3
E Ad 26	Credits Limit	30	15
E Ad 27	Scores Highest	ON	ON
E Ad 28	Credits High Score 1	03	3
E Ad 29	Credits High Score 2	00	2
E Ad 30	Credits High Score 3	00	1
E Ad 31	Credits High Score 4	00	0
E Ad 32	High Score 1 Backup	5,000,000	5,000,000
E Ad 33	High Score 2 Backup	4,000,000	4,000,000
E Ad 34	High Score 3 Backup	3,000,000	3,000,000
E Ad 35	High Score 4 Backup	2,500,000	2,500,000
E Ad 36	High Score Reset Every	700	700
E Ad 37	Free Play	OFF	OFF
E Ad 38	Left Coin Pulses	-	} set ad 14 To Sweden Price
E Ad 39	Right Coin Pulses	-	
E Ad 40	Center Coin Pulses	-	
E Ad 41	Pulses For Credit	-	
E Ad 42	Pulses For Bonus Credit	-	
E Ad 43	Message Custom	ON	ON
E Ad 44	Text	ENGLISH	ENGLISH
E Ad 45	Attract Mode Music	ON	ON
E Ad 46	Lights	FACTORY	ON
E Ad 47	General Scores	FACTORY	FACTORY
E Ad 48	General Timer	FACTORY	FACTORY
E Ad 49	General Memory	FACTORY	FACTORY
E Ad 50	Playboy Targets	HARD	FACTORY
E Ad 51	Extra Ball 6x	ON	ON
E Ad 52	Playboy Percent	FACTORY	FACTORY
E Ad 53	Laser Kick	FACTORY	FACTORY
E Ad 54	Knocker Alarm	ON	ON
E Ad 55	Mansion Memory	BALL	Ball
E Ad 56	Pinball Memory	BALL	Ball
E Ad 57	Auto Special	ON	ON
E Ad 58	Risque Sound	ON	ON
E Ad 59	Factory Restore	OFF	OFF

60¢ = 1 play
\$1 = 2 play
5 Balls

Ad 04 Level 3 Replay (Fixed Only) - With Ad 01 set for fixed, adjust Replay 3 level to between 100,000 and 9,900,000. To disable Replay 3, lower the setting to 00.

Ad 05 Level 4 Replay (Fixed Only) - With Ad 01 set for fixed, adjust Replay 4 level to between 100,000 and 9,900,000. To disable Replay 4, lower the setting to 00.

SINGLE-FUNCTION DIFFICULTY ADJUSTMENTS (Ad 06 to 10)

Any one of these five INSTALL adjustments may be activated to automatically select settings for multiple adjustments affecting game difficulty. After activation, the individual adjustments may be readjusted if desired. Refer to Install Adjustment Table for details.

Ad 06 Extra Easy Rules - Set to ON or OFF.

Ad 07 Easy Rules - Set to ON or OFF.

Ad 08 Factory Rules - Set to ON or OFF.

Ad 09 Hard Rules - Set to ON or OFF.

Ad 10 Extra Hard Rules - Set to ON or OFF.

NOVELTY / 5-BALL/ADD-A-BALL RULES (Ad 11, 12, 13)

One of these three INSTALL adjustments may be activated to automatically select settings for multiple adjustments. After activation, the individual adjustments may be readjusted if desired.

NOTE: When more than one of these features is required (for example, Add-A-Ball rules with 5-Ball Play) set only one of these rule features and then change additional adjustments. For the Add-A-Ball and 5-Ball Play example:

Ad 13 Add a Ball Rules = 0n
E Ad 23 Balls per Game = 5
E Ad 47 General Scores = Hard
E Ad 48 General Timer = Hard
E Ad 49 General Memory = Factory

E Ad 50 Playboy Targets = Factory
E Ad 51 Extra Ball 5x = On
E Ad 52 Playboy Percent = Hard
E Ad 53 Laser Kick = On

By setting the game up in this fashion, all specials and replay levels will award an extra ball. However, because the operator desires 5-ball play, all game play features are set to 5 Ball settings.

Ad 11 Novelty Play Rules - Set to establish settings for no free play or extra balls; ON or OFF. If ON the following settings are established:

Ad 01 Manual Replay = Fixed
Ad 02 to Ad 05 Replays 1 to 4 = Off
E Ad 20 Awards Replay = Audit
E Ad 21 Awards Special = Score

E Ad 22 Match Feature = Off
E Ad 25 Maximum Extra Balls = 00
E Ad 27 Scores Highest = Off
E Ad 28 to 31 Credits High Score = 00

Ad 12 5-Ball Play Rules - Set to establish recommended settings for 5-ball play; ON or OFF. If ON the following settings are established

Ad 01 Manual Replay = 07%
Ad 02 Replay Start = 3,000,000
Ad 03 Replay Levels = 01
E Ad 23 Balls Per Game = 05
E Ad 47 General Scores = Hard
E Ad 48 General Timer = Hard
E Ad 49 General Memory = Factory

E Ad 50 Playboy Targets = Factory
E Ad 51 Extra Ball 5x = On
E Ad 52 Playboy Percent = Hard
E Ad 53 Laser Kick = Factory
E Ad 55 Mansion Memory = Player
E Ad 56 Pinball Memory = Player

INSTALL ADJUSTMENT TABLE

Install Adjustment	Ad 06 Extra Easy	Ad 07 Easy	Ad 08 Factory	Ad 09 Hard	Ad 10 Extra Hard
E Ad 47 General Scores	EASY	FACTORY	FACTORY	HARD	HARD
E Ad 48 General Timer	EASY	EASY	FACTORY	FACTORY	HARD
E Ad 49 General Memory	EASY	EASY	FACTORY	HARD	HARD
E Ad 50 Playboy Targets	EASY	FACTORY	FACTORY	FACTORY	HARD
E Ad 51 Extra Ball 5x	ON	ON	ON	OFF	OFF
E Ad 52 Playboy Percent	EASY	FACTORY	FACTORY	HARD	HARD
E Ad 53 Laser Kick	EASY	EASY	FACTORY	HARD	HARD
E Ad 55 Mansion Memory	PLAYER	BALL	BALL	BALL	NONE
E Ad 56 Pinball Memory	PLAYER	PLAYER	BALL	BALL	NONE

Ad 13 Add-A-Ball Rules - Set to disable awarding of credits, replacing replay and Special awards with an extra ball; **ON** or **OFF**. If **ON** the following settings are established:

- E Ad 20 Awards Replay = Extra Ball
- E Ad 21 Awards Special = Extra Ball
- E Ad 22 Match Feature = OFF
- E Ad 27 Scores Highest = OFF
- E Ad 28 to 31 High Score Credits = 00

GAME PRICING (Ad 14 and E Ad 38 to 42)

There are two methods available for coin switch programming; Standard and Custom. Standard pricing uses a single adjustment (Ad 14) to select a pricing scheme shown in the **Standard Pricing Table**. Custom pricing is used to select additional pricing schemes defined by expanded adjustments E Ad 38 to 42. In order to program E Ad 38 to 42, Ad 14 must be set to **CUSTOM** and Ad 19 must be set to **ON** for expanded adjustments.

With Ad 14 set to **CUSTOM** and expanded adjustments selected, E Ad 38, 39, and 40 represent coin switch pulses for the left, right, and center coin slots. E Ad 41 prescribes the number of pulses required for one credit. For example, if E Ad 38 was set to 02 and E Ad 41 to 01 a coin in the left slot would produce two credits. Further, if E Ad 38 was set to 01 and E Ad 41 to 02, two coins in the left slot would be required for one credit.

E Ad 43 may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if E Ad 38 was set to 01, E Ad 41 to 01 and E Ad 42 to 04, one credit would be posted for each of the first three coins in the left slot and two credits for the fourth coin.

Ad 14 Standard/Custom Pricing - Set for the desired pricing scheme from the Standard Pricing Table as indicated in the Player 1 and 2 displays. For Custom Pricing, set to **CUSTOM**. When set to **CUSTOM**, Expanded adjustments E Ad 38 to 42 are utilized to tailor each individual coin chute.

E Ad 38 Left Coin Switch Pulses - Set the number of pulses registered for closure of the left coin switch; 00 to 99.

E Ad 39 Right Coin Switch Pulses - Set the number of pulses registered for closure of the right coin switch; 00 to 99.

E Ad 40 Center Coin Switch Pulses - Set the number of pulses registered for closure of the center coin switch; 00 to 99.

E Ad 41 Coin Switch Pulses Required for 1 Credit - Set the number of coin switch pulses required to post one credit; 00 to 99.

E Ad 42 Coin Switch Pulses Required for Bonus Credit - Set the number of coin switch pulses required to award a bonus credit; 00 to 99.

STANDARD PRICING TABLE

Ad 14 Standard Pricing Select			Coin Mechs			Plays/Coins		
			Left	Center	Right	Left	Center	Right
1	2	4						
USA1	1COIN	1PLAY	25¢	\$1.00	25¢	1 PLAY/ 1COIN	4 PLAY/ 1COIN	1 PLAY/ 1COIN
USA2	4 COINS	3PLAYS	25¢	\$1.00	25¢	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN	3 PLAY/ 1COIN	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN
USA3	2 COINS	1 PLAY	25¢	\$1.00	25¢	1 PLAY/ 2COIN	2 PLAY/ 1COIN	1 PLAY/ 2COIN
USA4	2COINS	1 PLAY 1COIN BUY-1N	25¢		25¢	2 COINS FOR THE 1st PLAY 1PLAY/ 1 COIN ONLY DURING BUY-IN		
AUSTRIA COINAGE			5 SCH	10 SCH	10SCH	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN	2 PLAY/ 1COIN 3 PLAY/ 2COIN	2 PLAY/ 1COIN 3 PLAY/ 2COIN
AUSTRALIA COINAGE			20¢		\$1.00	1 PLAY/ 2COIN		3 PLAY/ 1COIN
UK COINAGE			10P	5P	10P	1 PLAY/ 1COIN	5 PLAY/ 1COIN	1 PLAY/ 1COIN
SWISS 1 SWISS 2			1 SFR	2 SFR	5 SFR	Same as German 1 Same as German 2		
BELGIUM COINAGE			20f	20f	20f	1 PLAY/ 1COIN	1 PLAY/ 1COIN	1 PLAY/ 1COIN
GERMAN 5DM 1			1DM	2DM	5DM	1 PLAY/ 1COIN 7 PLAY/ 5COIN	2 PLAY/ 1COIN 8 PLAY/ 3COIN	7 PLAY/ 1COIN
GERMAN 5DM 2			1DM	2DM	5DM	1 PLAY/ 1COIN 3 PLAY/ 2COIN 5 PLAY/ 3COIN 7 PLAY/ 4COIN 9 PLAY/ 5COIN	3 PLAY/ 1COIN 7 PLAY/ 2COIN 10 PLAY/ 3COIN 14 PLAY/ 4COIN	9 PLAY/ 1COIN
NETHERLAND COINAGE			1 Guilder		1 Guilder	1 PLAY/ 2COIN		1 PLAY/ 2COIN
SWEDEN COINAGE			1Kr	5Kr	2Kr	1 PLAY/ 3COIN 2 PLAY/ 5COIN	2 PLAY/ 1COIN	2 PLAY/ 1COIN
FRANCE COINAGE			1f	5f	10f	1 PLAY/ 3COIN 2 PLAY/ 5COIN	2 PLAY/ 1COIN	4 PLAY/ 1COIN
ITALY COINAGE			500L		500L	1 PLAY/ 1COIN		1 PLAY/ 1COIN
SPAIN COINAGE			25P		100P	1 PLAY/ 1COIN		5 PLAY/ 1COIN
JAPAN COINAGE				100¥			1 PLAY/ 1COIN	

CUSTOM PRICING TABLE

Coin Mechs			Plays/Coins	Adjustment Numbers						
Left	Right	Center		14	19	38	39	40	41	42
25¢	25¢	\$1.00	1/25¢ 3/50¢ 1/25¢ 5/\$1.00 1/25¢/ 6/\$1.00	Custom Custom Custom	ON ON ON	01 01 05	01 01 05	04 04 20	01 01 04	02 04 20
5SCH	10SCH	10SCH	1/10 SCH 1/10 SCH 4/30SCH	Custom Custom	ON ON	01 04	02 08	02 08	02 06	00 00
20¢	\$1.00	--	1/20¢ 1/60¢ 2/\$1.00	Custom Custom	ON ON	01 01	05 05	00 00	01 03	00 05
10P	10P	50P	1/10P 6/50P 1/20P 3/50P	Custom Custom	ON ON	01 01	01 01	05 05	01 02	05 05

ADDITIONAL GENERIC FEATURES

Ad 15 Average Ball Time - Maintains average ball time close to 65 seconds. Every 700 (vary with **E Ad 36**) games, average ball time is checked. If greater than 65 seconds, **E Ad 53** is set to **HARD**. If less than 65 seconds, **E Ad 53** is set to **EASY**.

Ad 16 Coin Reset - When enabled (set to **ON**) all coin and paid credit totals will be reset to zero when **STEP** is depressed.

Ad 17 Audits Reset - When enabled (set to **ON**) all audit totals except for coins and paid credits will be reset to zero when **STEP** is depressed.

Ad 18 Restore High Score - When enabled (set to **ON**) the High Score Levels and associated initials will be restored to backup settings when **STEP** is depressed.

Ad 19 Expand Adjustments - When set to **OFF**, depressing the **STEP** push-button advances directly to **E Ad 59**, **FACTORY RESET**. When set to **ON**, depressing the **STEP** push-button sequences through the expanded adjustments. When exiting from expanded adjustments, this function is reset to **OFF** for the next time that adjustments are required.

E Ad 20 Awards Replay - Set for replays to award: **CREDIT**, **EXTRA BALL**, or **AUDIT** (no award but recorded in the audit totals).

E Ad 21 Awards Special - Set for Special to award: **CREDIT**, **EXTRA BALL**, or **SCORE LEVEL**.

E Ad 22 Match Feature- Set Match **ON** or **OFF**.

E Ad 23 Balls Per Game - Adjust the number of balls per game; 2 to 9.

E Ad 24 Warning Tilt - Adjust the number of plumb bob tilt switch closures before the ball in play is tilted; 1 to 3 or **OFF**.

E Ad 25 Maximum Extra Balls - Adjust for the maximum number of extra balls that may be accumulated per ball; 1 to 9 or **OFF**.

E Ad 26 Credits Limit - Adjust the maximum number of credits that may be posted; 5 to 99.

HIGH SCORE LEVELS (E Ad 27 through 36)

There are four high score levels with associated player initials that are displayed during the attract mode. This provides a high-score-to-date feature. When players exceed these levels, the player initials may be entered to replace the previous ones. These levels may be adjusted to award credits and to be reset to backup values after a selected number of games.

E Ad 27 Scores Highest - Set to enable or disable the four high score levels; ON or OFF.

E Ad 28 Credits High Score Level 1 - Adjust the number of credits awarded for exceeding level 1 (the highest of the four levels); 0 to 9.

E Ad 29 Credits High Score Level 2 - Adjust the number of credits awarded for exceeding level 2; 0 to 9.

E Ad 30 Credits High Score Level 3 - Adjust the number of credits awarded for exceeding level 3; 0 to 9.

E Ad 31 Credits High Score Level 4 - Adjust the number of credits awarded for exceeding level 4; 0 to 9.

E Ad 32 High Score 1 Backup - Adjust the backup score level to which level 1 (the highest of the four levels) may be reset.

E Ad 33 High Score 2 Backup - Adjust the backup score level to which level 2 may be reset.

E Ad 34 High Score 3 Backup - Adjust the backup score level to which level 3 may be reset.

E Ad 35 High Score 4 Backup - Adjust the backup score level to which level 4 may be reset.

E Ad 36 High Score Reset Every - Adjust the number of games between automatic resets of high score levels to backup settings and ball time averager adjustments; 100 to 900 or OFF (no reset or adjustment).

E Ad 37 Free Play - When set to ON, no coins are required for games.

E Ad 38 to 42 Custom Pricing - Described previously in Game Pricing.

E Ad 43 Message Custom - When desired, this function is used to establish a custom message periodically displayed during the attract mode. Set the feature to **CHANGE** using the Credit button and depress STEP. The letter **A** is indicated in the first position of the Player 1 display. Vary the letter by operating the left and right flippers. With the desired letter indicated, depress the CREDIT button to lock in the letter and advance to the next display character. Repeat this procedure until the desired message is indicated in the Player 1 and 2 displays. At this time, depress the STEP push-button switch to advance to E Ad 44.

NOTE

To lock in the custom message, the game must be returned to Game Over by depressing STEP with E Ad 59 displayed.

E Ad 44 English/French/German Text - Select English, French, or German for display during Audits, Adjustments, and Game Diagnostics.

E Ad 45 Attract Mode Music - Set to ON (once every seven attract mode cycles), OFTEN (every attract mode cycle), or OFF.

E Ad 54 Knocker Alarm-When the game is first powered up and after it has passed its self test, any suspect switches or coils are displayed in the Player Displays. With this feature enabled (set to ON), the Knocker is pulsed to alert the location attendant if there are any suspect switches or coils. With this feature disabled (set to OFF), the Knocker is not pulsed during indications of suspect switches or coils.

GAME SPECIFIC FEATURES (E Ad 46 TO 54)

E Ad46 Flash Lamps- Set to **ON** or **OFF**.When set to **ON** the Flash Lamps are active,when **OFF** the Flash Lamps do not flash.

E Ad47 General scores- Set to **EASY,FACTORY** or **HARD**.

Feature Affected	Hard	Factory	Easy
Center Bank Lit	2000	3000	5000
Center Bank Unlit	200	500	1000
Playboy Lit	5000	5000	5000
Playboy Unlit	200	500	1000
Lock Ball	3000	5000	10000
Champagne Kick	3000	5000	10000
Laser Kick	25K	25K	25K
Left Drain	25K	25K	25K
Right Drain	20K	20K	20K
Return Lanes	5000	5000	5000
Drop Targets	10000	10000	10000
Lamps	20K	20K	20K

E Ad48 General Timer- Set to **EASY,FACTORY** or **HARD**.

Feature Affected	Easy	Factory	Hard
Manslon Shot	22	20	18
Drop Targets 100K	7	6	5
Drop Targets 75K	9	7	6
Drop Targets 50K	10	9	7
Drop Targets 25K	11	10	9
2x Playfield Scores	22	20	18
3x Playfield Scores	20	18	14
4x Playfield Scores	18	14	12
5x Playfield Scores	14	12	10

The number expressed in the difficulty settings indicates the time duration of the feature in seconds.

E Ad 49 General Memory- Set to **EASY,FACTORY** or **HARD**.

Feature Affected	Easy	Factory	Hard
PLAYBOY	Player	Ball	None
Top Lanes	Ball	Ball	None
Special	Ball	Ball	Ball

BALL:Each player builds up the feature for his own individual use and the feature accumulates from ball to ball within a game.

PLAYER:The feature builds up in value for the use of all players throughout the game.

NONE:The feature resets after every ball.

E Ad50 Playboy Targets-Set to **EASY,FACTORY** or **HARD**.When set to **EASY**,striking any target will spot a letter (**P-L-A-Y-B-O-Y**) starting from the bottom target.When set to **FACTORY**, striking any **UNLIT** Target will spot a letter begining with the bottom target.When set to **HARD** any unlit target will spot the letter hit.

E Ad51 Extra ball 6x-Set to **ON** or **OFF**.When set to **ON**, completing the Top Lanes 5 times lights one of the outlanes that award an Extra Ball.

E Ad52 Playboy Percent-Set to EASY,FACTORY or HARD.

Completing Playboy Awards	Easy	Factory	Hard
50K	10%	20%	30%
100K	10%	20%	25%
Outlanes Lite 50K	25%	20%	20%
Bonus Hold 50K	25%	20%	15%
Extra Ball	15%	10%	5%
1 Million	15%	10%	5%

E Ad53 Laser Kick- Set to EASY,FACTORY or HARD.

EASY-Starts lit on each ball and completing one lit ramp will relite the feature.

FACTORY-Starts lit on each ball and completing two lit ramps will relite the feature.

HARD-Starts lit on the first ball only, once used,the feature must be re-lit by completing both ramps.

E Ad54 Knocker Alarm-Previously described at the end of Generic Game Features.

E Ad55 Mansion Memory-Set to **BALL,PLAYER** or **NONE**.

BALL:Each player builds up the feature for his own individual use and the feature accumulates from ball to ball within a game.

PLAYER:The feature builds up in value for the use of all players throughout the game.

NONE:The feature resets after every ball.

E Ad56 Pinball Memory-Set to **BALL,PLAYER** or **NONE**.

BALL:Each player builds up the feature for his own individual use and the feature accumulates from ball to ball within a game.

PLAYER:The feature builds up in value for the use of all players throughout the game.

NONE:The feature resets after every ball.

E Ad57 Auto Special-Set to **ON** or **OFF**. When **ON**, every 100 games this automatically determines the number of times the Drop Targets must be completed to award a Special.(3,4,5 or 6 times) When **OFF** the Drop Targets must be completed 6 times to award a Special.

E Ad58 Risque Sounds-Set to **ON** or **OFF**. When **OFF** moaning sounds activated by certain switches and features will be replaced with normal pinball sounds.

E Ad59 Factory Restore-Depressing **STEP** without changing the value shown in the Player 4 Display locks in any custom message set with **E Ad43** and returns the game to **GameOver**.Set the value to **ON** and depress **STEP** switch to revert all game adjustments to factory settings, clear the Custom Message and return to **Game Over**.

GAME DIAGNOSTICS

The Data East Pinball system provides tests for sounds, digital displays, lamps, switches, and solenoids. Each feature may be tested manually or automatically using the STEP and FORWARD/REVERSE push-button switches inside the coin door and the Game Start push-button switch on the front of the cabinet. The automatic tests may be used for a quick verification of automatic test functions and the manual tests, for troubleshooting.

During game play, activation of switches and operation of coils with associated switches are monitored. If a switch is not made for 100 games it is considered bad. When operation of a coil should close or open a switch and does not, the coil is considered bad. Each time the game is powered up, bad switches and coils (if any) are reported; to alert the location attendant, the credit knocker is pulsed. Note that reporting of an unused switch does not constitute a problem and that a bad coil could mean that the associated switch requires adjustment.

Wiring to switches, solenoids and controlled lamps uses color-coded wires that basically follows a resistor color-code scheme for the eight rows and eight columns. During the switch tests and during the discrete lamp test, identification of the color of the row and column wires are indicated in the Player 3 Display. For example, making the right coin switch during the Switch Test results in the switch functional name (RIGHT COIN) shown in the Player 1 and 2 Displays, the row (94) and column (51) wire color codes shown in the Player 3 display, and the switch number shown in the Player 4 display. The 94 code (refer to the chart below) indicates a White wire with Yellow stripe for the row wire and the 51 code indicates a Green wire with Brown stripe.

0 = Black	5 = Green
1 = Brown	6 = Blue
2 = Red	7 = Violet
3 = Orange	8 = Grey
4 = Yellow	9 = White

ENTERING DIAGNOSTICS

With the game in the game-over mode, open the coin door and make sure that the FORWARD/REVERSE push-button switch is set to REVERSE (down) and depress the STEP push-button switch. The Player displays will show the tollfree Customer Service number 1-800-KICKERS, that is 1-800-542-5377 (outside Illinois) and the toll number (312) 345-7700 (inside Illinois). This indicates entry into game diagnostics.

SOUND TESTS

The Data East Pinball sound system produces true digital stereo sound on left and right speakers and mono on a center speaker. During Sound tests, the Player 1 and 2 displays show the sound board circuit under test and the corresponding sounds are produced. Refer to the Sound Test Chart for the sound circuits displayed and the sounds produced.

The sine wave functions allow verification that all channels are functioning properly and that the speaker connections are correct. Speaker Phase Testing procedures follow for checking speaker connections.

SOUND TEST CHART

Auto/Manual Tests (Player 1 & 2)	Sounds Produced
LEFT SINE CENTER SINE RIGHT SINE VOICE ROM1 (Loc F6)	60 CYCLE TONE (Left Speaker Only) 60 CYCLE TONE (All speakers) 60 CYCLE TONE (Right Speaker Only) "THAT'S BEAUTIFUL", "OOHI!", HORN BLAST "MMM..!" CHIMPANZEE SOUNDS
VOICE ROM2 (Loc F4) MUSIC TEST (Sound ROM Loc F7)	BIRD CALL, "OOHI", "CAIO BABY" HORN BLAST. MUSIC

Automatic Test

With Customer Service telephone numbers displayed, depress the STEP push-button switch. Player 1 and 2 displays indicate SOUNDS AUTO and the system sequences through the test producing the sounds indicated in the Sound Test Chart.

Manual Test

Operate the STEP push-button switch during the Automatic tests until SOUNDS MANUAL is indicated in the Player 1 and 2 displays. Depressing the Game Start push-button switch allows you to advance through each sound function.

Speaker Phase Testing

Connections to each of the three speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other two, bass frequencies will not be produced properly and the overall sound quality will be poor.

To test for proper speaker phasing, use the manual sound test to cycle through the Left, Center, and Right Sine functions. If the Center Sine produces more volume and bass than the Left and Right Sines, the speakers are connected properly. If it produces the same or less, one speaker is connected improperly. To isolate and correct reversed speaker connections, one of two methods may be used.

1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the single-color wire (BLK, YEL or RED) is connected to the negative (-) terminal.
2. Disconnect the speaker output connector from the Sound Board and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers. Make sure that the positive battery terminal is connected to the positive lead (CN1-pin 1, 3, or 6) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.

DIGITAL DISPLAY TEST

Digital displays are driven by digit and segment driver circuits. Digit drivers sequentially select individual character positions (Player 1 and 2 displays) and digit positions (Player 3 and 4 displays). Segment drivers (16 for Player 1 and 2 characters; 7 for Player 3 and 4 digits) select the individual segments of each position.

Automatic Test

To enter Display tests, operate the STEP push-button switch from the Sound Manual test. Player 1 and 2 displays indicate DISPLAY AUTO. The displays will sequence from all ZEROS to all nines in the four displays. Next all segments are lit for each digit position in sequence.

Manual Test

Operate the TEST push-button switch from the automatic test; Player 1 and 2 displays indicate DISPLAY MANUAL and then display ZEROS in all positions. Operate the Game Start push-button switch to cycle through each portion of the test.

Switches

Switches are configured in an 8 x 8 matrix of columns (switch drives) and rows (switch returns) with up to 64 switches possible. The switch tests include three parts; switch test, active switches, and bad switches. Row and column wire colors are indicated in each test using corresponding resistor color code numbers.

Switch Test

From the Display Manual test, operate STEP push-button switch. Player 1 and 2 displays indicate SWITCH TEST. Close each switch and observe the displays. The Player 1 and 2 displays will indicate the switch name, the Player 3 display indicates the row and column wire colors, and the Player 4 display indicates the switch number. When a switch is released, the name and number disappear until another switch is closed or the test is exited.

Active Switches

Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, and the switch numbers are indicated in the Player 4 display. This cycle continues until all switches are cleared or until the STEP push-button switch is depressed.

Bad Switches

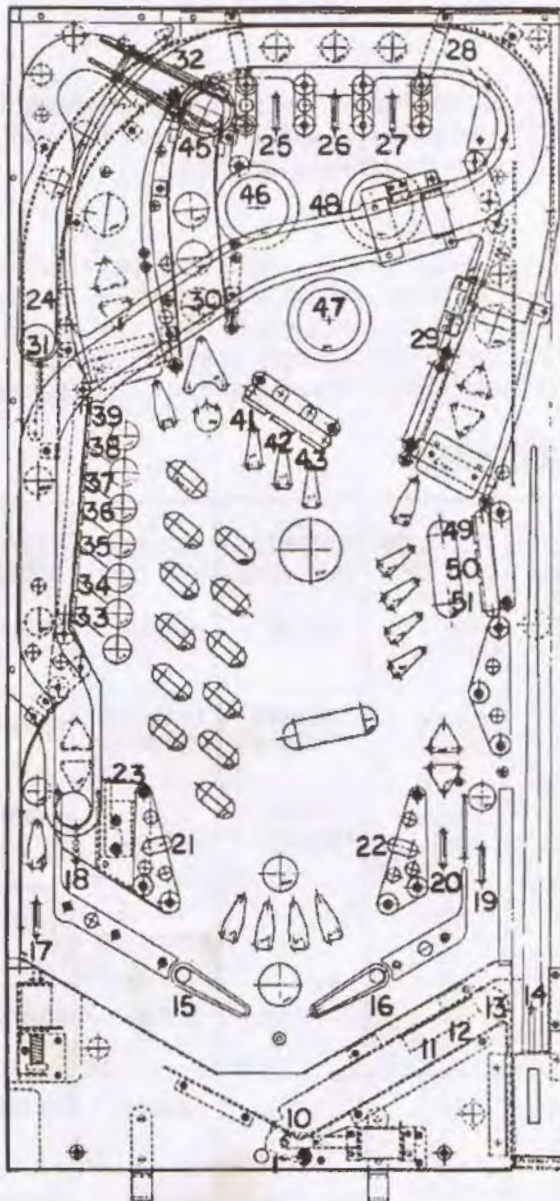
Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate BAD SWITCHES. During game play, the system keeps track of the last game in which each switch was made. Should a switch not be made for 100 games, it is considered to be bad. If there are any, the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, and the switch numbers are indicated in the Player 4 display. This cycle continues until the STEP push-button switch is depressed.

SWITCH MATRIX CHART

Column Row (*)	1 GRN-BRN (51) Q55	2 GRN-RED (52) Q54	3 GRN-ORN (53) Q53	4 GRN-YEL (54) Q52	5 GRN-BLK (50) Q51	6 GRN-BLU (56) Q50	7 GRN-VIO (57) Q49	8 GRN-GRY (58) Q48
1 WHT-BRN (91)	Plumb Tilt 1	Not Used 9	Left Outlane 17	Left Top Lane 25	P Target 33	Ctr 3 Bank-Lft 41	Drop 1 Top 49	Not Used 57
2 WHT-RED (92)	Not Used 2	Outhole 10	Left Return 18	Cntr.Top Lane 26	L Target 34	Cntr 3 Bank-Mid 42	Drop 2 Center 50	Not Used 58
3 WHT-ORN (93)	Credit Button 3	Trough #1 11	Right Outlane 19	RightTop Lane 27	A Target 35	Cntr 3 Bank-Rt. 43	Drop 3 Bottom 51	Not Used 59
4 WHT-YEL (94)	Right Coin 4	Trough #2 12	Right Return 20	Ramp Center 28	1st Y Target 36	Not Used 44	Not Used 52	Not Used 60
5 WHT-GRN (95)	Center Coin 5	Trough #3 13	Left Slingsht 21	Ramp Right 29	B Target 37	VUK 45	Not Used 53	Not Used 61
6 WHT-BLU (96)	Left Coin 6	Shooter Lane 14	Right Slingsht 22	Left Spinner 30	O Target 38	Left Pop 46	Not Used 54	Not Used 62
7 WHT-VIO (97)	Slam Tilt 7	Left EOS 15	Champ. Kicker 23	Grotto 2 31	2nd Y Target 39	Center Pop 47	Not Used 55	Not Used 63
8 WHT-GRY (98)	Not Used 8	Right EOS 16	Grotto 1 24	Ramp Left 32	Not Used 40	Right Pop 48	Not Used 56	Not Used 64

(*) 2 DIGIT NUMBER IN PARENTHESES INDICATES RESISTOR/WIRE COLOR CODE NUMBER DISPLAYED DURING DIAGNOSTICS.

Number	Description	Part No.	Number	Description	Part No.
01*	Plumb Tilt	500-5023-00	10	Out Hole	180-5011-00
02	Not Used	--	11	Trough #1	180-5009-00
03	Credit Button	500-5097-00	12	Trough #2	180-5009-00
04*	Right Coin	180-5024-00	13	Trough #3	180-5010-00
05*	Center Coin	180-5024-00	14	Shooter Lane	500-5142-00
06*	Left Coin	180-5024-00	15	Left Flip. Instant Info.	180-5026-00
07*	Slam Tilt	180-5022-00	15	Left EOS	180-5018-00
08	Not Used	--	16	Right Flip. Instant Info.	180-5026-00
09	Not Used	--	16	Right EOS	180-5018-00



17	Left Outlane	500-5143-00
18	Left Return Lane	180-5003-00
19	Right Outlane	515-5138-00
20	Right Return Lane	180-5003-00
21	Left Slingshot Trigger Sw.	180-5054-00
21	Left Slingshot Point Sw.	180-5055-00
22	Right Slingshot Trigger Sw.	180-5054-00
22	Right Slingshot Point Sw.	180-5055-00
23	Champagne Kicker	180-5040-00
24	Grotto 1	180-5028-00
25	Left Top Lane	515-5138-00
26	Center Top Lane	515-5138-00
27	Right Top Lane	515-5138-00
28	Ramp Center	180-5010-00
29	Ramp Right	180-5010-00
30	Left Spinner	180-5004-00
31	Grotto 2	180-5040-00
32	Ramp Left	180-5034-00
33	P -Target	515-5124-18
34	L -Target	515-5124-08
35	A -Target	515-5124-18
36	1st Y -Target	515-5124-18
37	B -Target	515-5124-18
38	O -Target	515-5124-18
39	2nd Y -Target	515-5124-18
40	Not Used	--
41	Center 3 Bank Left	515-5124-18
42	Center 3 Bank Middle	515-5124-18
43	Center 3 Bank Right	515-5124-18
44	Not Used	--
45	VUK	180-5041-00
46	Left Pop Bumper	180-5036-00
47	Center Pop Bumper	180-5036-00
48	Right Pop Bumper	180-5036-00
49	Drop 1 (Top)	180-5025-01
50	Drop 2 (Center)	180-5025-01
51	Drop 3 (Bottom)	180-5025-01
52	Not Used Thru 64	

*INDICATES CABINET SWITCHES.

LAMP TESTS

Controlled lamps are configured in an 8 x 8 matrix of columns (lamp drives) and rows (lamp returns) with up to 64 lamps possible. The lamp tests include four parts, all lamps, lamp return (row), lamp drive (column), and discrete (individual) lamps. Row and column wire colors are indicated in the discrete lamp test using corresponding resistor color code numbers.

All Lamps

From the Bad Switch test, operate the STEP push-button switch. Player 1 and 2 displays indicate ALL LAMPS and all controlled lamps will light.

Lamp Returns

From the ALL LAMPS test, depress the STEP push-button switch. Player 1 and 2 displays indicate LAMP ROWS and the Player 4 display indicates 01 for row 1. All controlled lamps in row 1 should be lit. Operating the Game Start push-button switch cycles through each of the rows separately.

Lamp Drives

From the LAMP ROWS test, depress the STEP push-button switch. Player 1 and 2 displays indicate LAMP COLUMNS and the Player 4 display indicates 01 for column 1. All controlled lamps in column 1 should be lit. Operating the Game Start push-button switch, cycles through each of the columns separately.

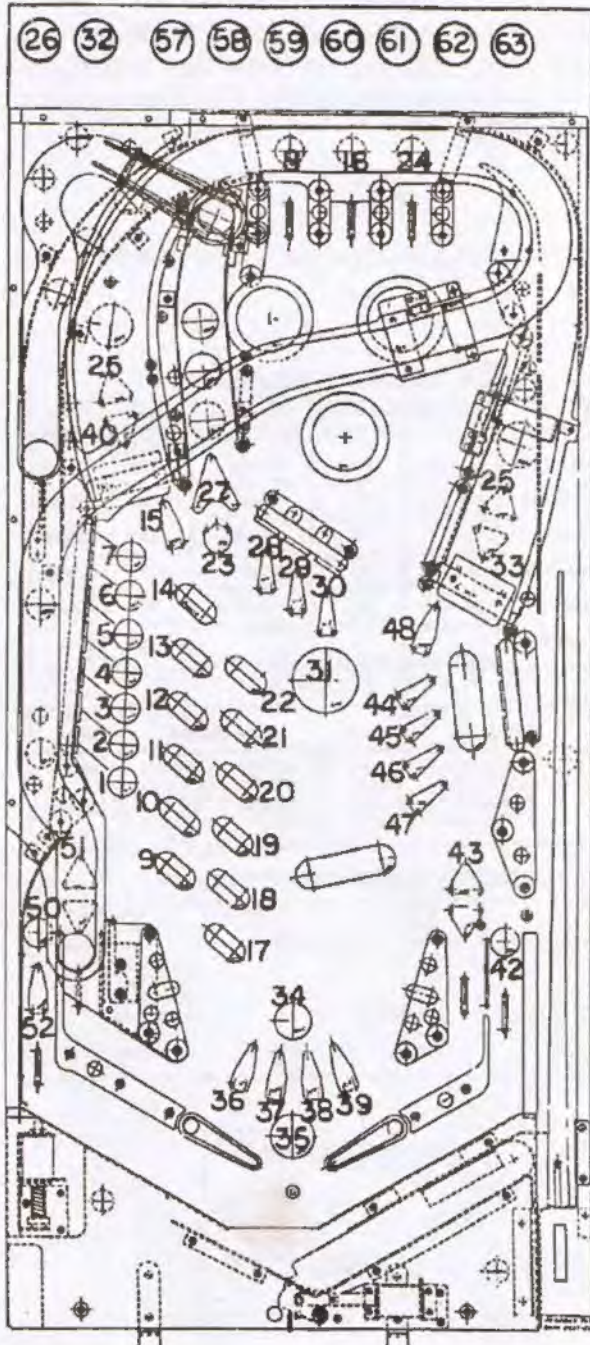
Discrete Lamp

From the LAMP COLUMNS test, depress the STEP push-button switch. Player 1 and 2 displays indicate LAMP TEST and then the name assigned to lamp 01; the Player 1 and 2 displays indicate the lamp name, the Player 3 display indicates the row and column wire colors, and the Player 4 display indicates 01. Lamp 01 should light. With the FORWARD/REVERSE push-button switch in the FORWARD (up) position, operating the Game Start push-button switch selects higher-numbered lamps; with it in the REVERSE (down) position, Game Start selects lower-numbered lamps.

LAMP MATRIX CHART

Column Row (*)	1 YEL-BRN (41) Q71	2 YEL-RED (42) Q70	3 YEL-ORN (43) Q69	4 YEL-BLK (40) Q68	5 YEL-GRN (45) Q67	6 YEL-BLU (46) Q66	7 YEL-VIO (47) Q65	8 YEL-GRY (48) Q64
1 RED-BRN (21) Q72	Playboy 1	Miss July 50k 9	Photo Shoot 1 17	Up L&R Release 25	Up Rt. Man.Pty 33	Pinball 41	pinball 49	Mansion 57
2 RED-BLK (20) Q73	playboy 2	Miss Aug. 100k 10	Photo Shoot 2 18	Lock Ball#1 26	Bonus Hold 34	Rt.Score PBValue 42	Lt.Score PBValue 50	mansion 58
3 RED-ORN (23) Q74	playboy 3	Miss Sept. 11	Photo Shoot 3 19	Lock Ball Arr. 27	Play Again 35	Right Peacock 43	Left Peacock 51	manSion 59
4 RED-YEL (24) Q75	playboy 4	Miss Oct. 12	Photo Shoot 4 20	Left Grn Arr.Tar. 28	2X 36	DropTar. 100K 44	Lwr.Lft. BunnyHop 52	manSion 60
5 RED-GRN (25) Q76	playboy 5	Miss Nov. 13	Photo Shoot 5 21	Ctr.Grn Arr.Tar. 29	3X 37	DropTar. 75K 45	pinball 53	mansion 61
6 RED-BLU (26) Q77	playboy 6	Miss Dec. 14	Photo Special 22	Rt.Green Arr.Tar. 30	4X 38	DropTar. 50K 46	pinball 54	mansion 62
7 RED-VIO (27) Q78	playboy 7	Top Left BunnyHop 15	Spinner X-Ball 23	Mult.All Scores 31	5X 39	DropTar. 25K 47	pinball 55	mansion 63
8 RED-GRY (28) Q79	Lt."H" Lane 8	Ctr."M" Lane 16	Rt."H" Lane 24	Lock Ball#2 32	Up.Left Man.Pty. 40	Up.Rt. BunnyHop 48	pinball 56	pinball 64

Lamp Number	Description
01*	"P"layboy
02*	p"L"ayboy
03*	pl"A"yboy
04*	pla"Y"boy
05*	play"B"oy
06*	playb"O"y
07*	playbo"Y"
08*	Left "H" Lane
09	Miss July 50K
10	Miss August 100k



11	Miss September Lites Out-lane 50k
12	Miss October 50k Bonus Hold Over
13	Miss November Extra Ball
14	Miss December 1,000,000
15	Top Left Bunny Hop
16	Center "M" Lane
17	Photo Shoot 1
18	Photo Shoot 2
19	Photo Shoot 3
20	Photo Shoot 4
21	Photo Shoot 5
22	Photo Shoot Special
23	Spinner Extra Ball
24	Right "H" Lane
25	Upper Left and Right Release Ball
26	Lock Ball #1
27	Lock Ball (Big arrow)
28	Left Green Arrow Target
29	Center Green Arrow Target
30	Right Green Arrow Target
31	Multiply All Scores
32	Lock Ball #2
33	Upper Right Mansion Party
34	Bonus Holdover
35	Play Again
36	2x
37	3x
38	4x
39	5x
40	Upper Left Mansion Party
41	"P"inball
42	Rt Score Playboy Value
43	Right Peacock
44	Drop Target 100k
45	Drop Target 75k
46	Drop Target 50k
47	Drop Target 25k
48	Upper Right Bunny Hop
49	p"l"nball
50	Lt. Score Playboy Value
51	Left Peacock
52	Lwr Lft. Bunny Hop
53	pi"N"ball
54	pin"B"all
55	pinb"A"ll
56	pinba"L"l
57	"M"ansion
58	m"A"nsion
59	ma"N"sion
60	man"S"ion
61	mans"l"on
62	mansi"O"n
63	mansio"N"
64	pinbal"L"

*Indicates Insert Lamp

COIL TESTS

Sixteen regular (pulsed under microprocessor control) and six switch-triggered coil drivers are provided to switch ground to coils. Coil number 10 is used in conjunction with drives 1 through 8 to switch +32 volts between coils or flash lamps; these sets are termed "left" and "right". Coil number 10 is located on the PPB board which provides isolation diodes and current limiting resistors. This effectively provides 23 regular coils.

Automatic Test

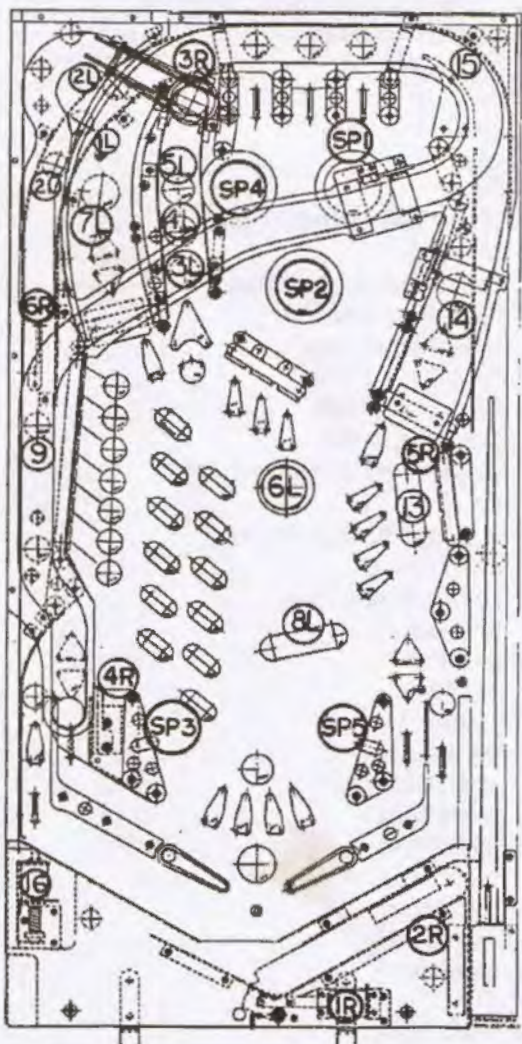
From the Discrete Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate COIL TEST. The test pulses each regular solenoid or flash lamp sequentially with the coil/flash lamp name indicated in the Player 1 and 2 displays and the drive number in the Player 4 display.

Select Coil

From the Coil Test, depress the STEP push-button switch. Player 1 and 2 displays indicate SELECT COIL and then the name of drive 1L, the drive number is indicated in the Player 4 display. Operate the Game Start push-button switch to select the coil or flash lamp to be tested. With the desired drive number indicated in the Player 4 display, depress the STEP push-button switch to cause it to be pulsed repeatedly.

RETURN TO GAME OVER

From the Select Coil test, depress the STEP push-button switch one time if a selected coil is pulsing or two times if none is pulsing. The game returns to the game-over mode.



SWITCH TRIGGERED SOLENOIDS

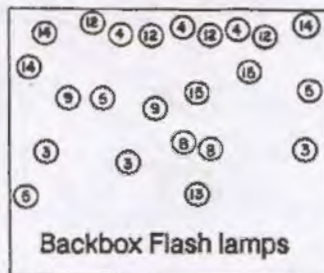
Coil Number	Coil Description	Control Line (CPU to Coil)	Power Line (PS to Coil)	Trigger Line (Coil Sw To CPU)	Drive Transistor (TIP 122)	Coil Type
SP1	Center Pop Bumper	BLU-ORN CPU CN19-3	RED PS CN3-8	ORN-BLK CPU CN 18-2	Q6	23-800
SP2	Right Pop Bumper	BLU-RED CPU CN18-4	RED PS CN3-8	ORN-RED CPU CN 18-3	Q9	23-800
SP3	Left Slingshot	BLU-YEL CPU CN19-8	RED PS CN3-8	ORN-YEL CPU CN 18-4	Q10	23-800
SP4	Left Pop Bumper	BLU-BRN CPU CN19-7	RED PS CN3-8	ORN-BRN CPU CN 18-5	Q11	23-800
SP5	Right Slingshot	BLU-GRN CPU CN19-8	RED PS CN3-8	ORN-GRN CPU CN 18-8	Q12	23-800
SP6	NOT USED	- CPU CN19-9	- PS CN3-4	- CPU CN 18-9	Q13	-

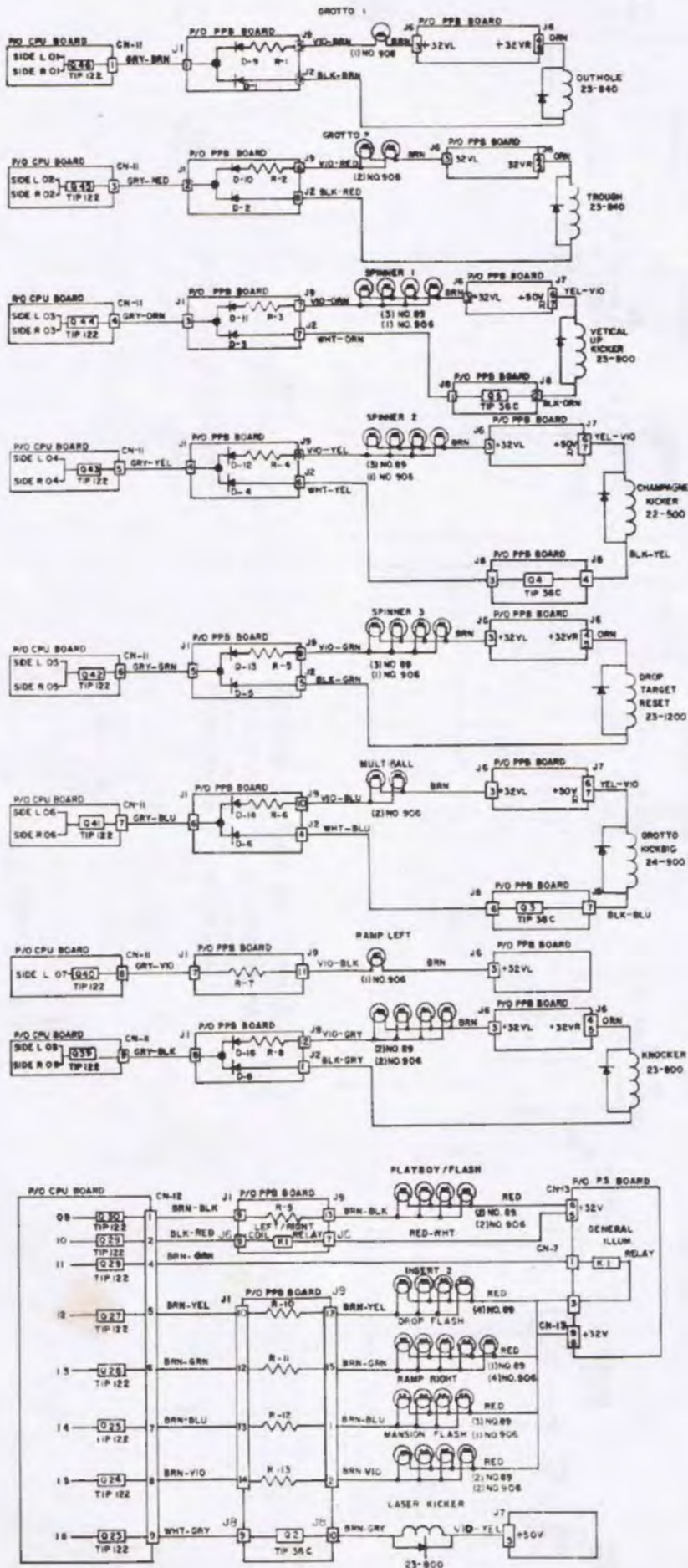
FLIPPER SOLENOIDS

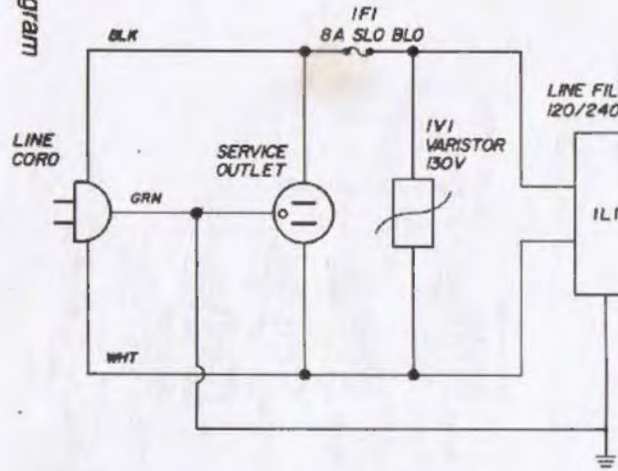
Coil Description	Flipper GND (CPU to Cab)	Flipper GND (Cab To Coil)	Power Lines (PPS & PS to Coil)	Coil Type	
Left Flipper	ORN-GRY CPU CN19-2	BLU-GRY 1M/F-24	GRY-YEL PPB J7-5	GRY-GRN PS CN1-10	22-900
Right Flipper	ORN-VIO CPU CN19-1	BLU-VIO 1M/F-21	BLK-WHT PPB J7-1,2	GRY-GRN PS CN1-10	22-900
			50VDC 9VAC		

PLAYBOY COIL PART NUMBER CHART

QUANTITY USED	COIL TYPE	DATA EAST PINBALL PART NUMBER
8	23-800	090-5001-00
1	24-900	090-5002-00
2	23-840	090-6005-00
1	12-1200	090-6006-00
1	22-600	090-6017-00
2	22-900	090-6020-21

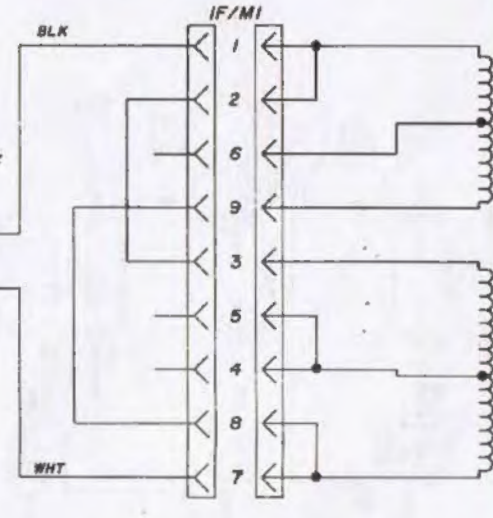






THIS CONFIGURATION FOR 115V

FOR LOWER LINE VOLTAGES
OR 230 VOLT OPERATION
SEE SAMPLES BELOW



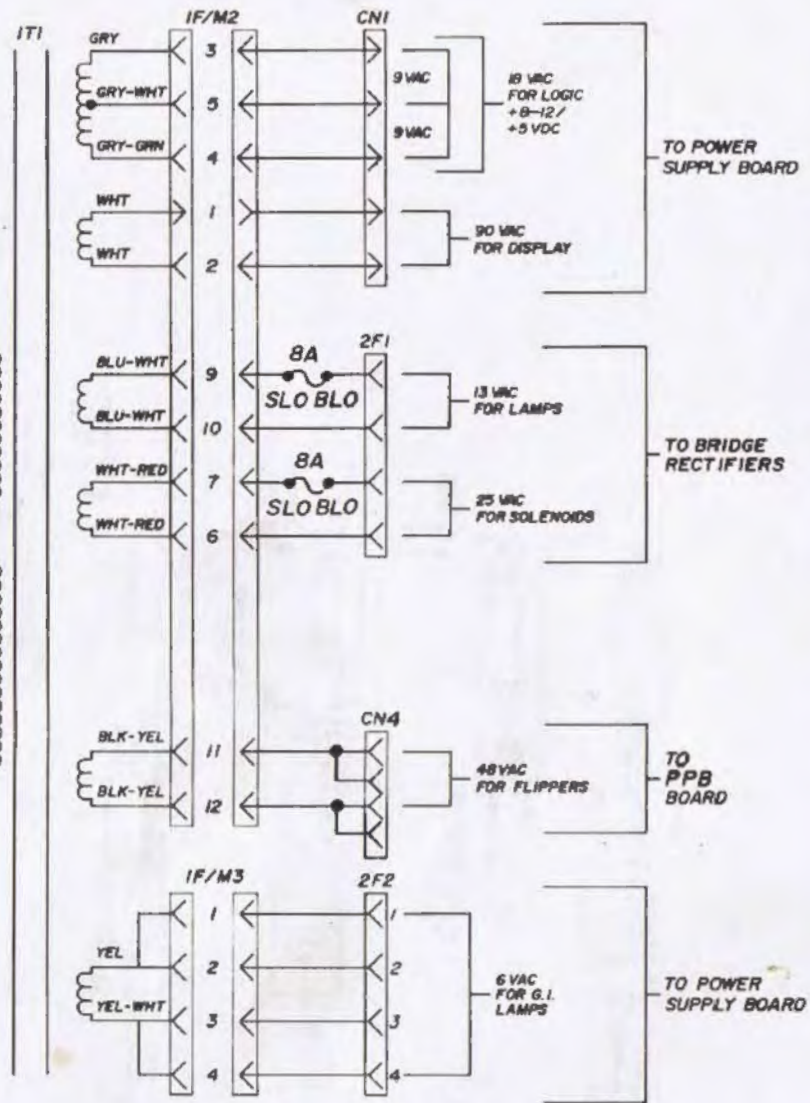
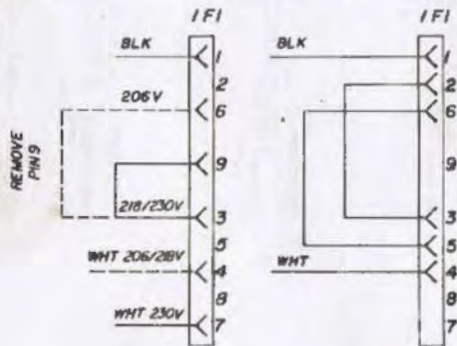
JUMPERS FOR VOLTAGE VARIATION

230/218/206VOLTS

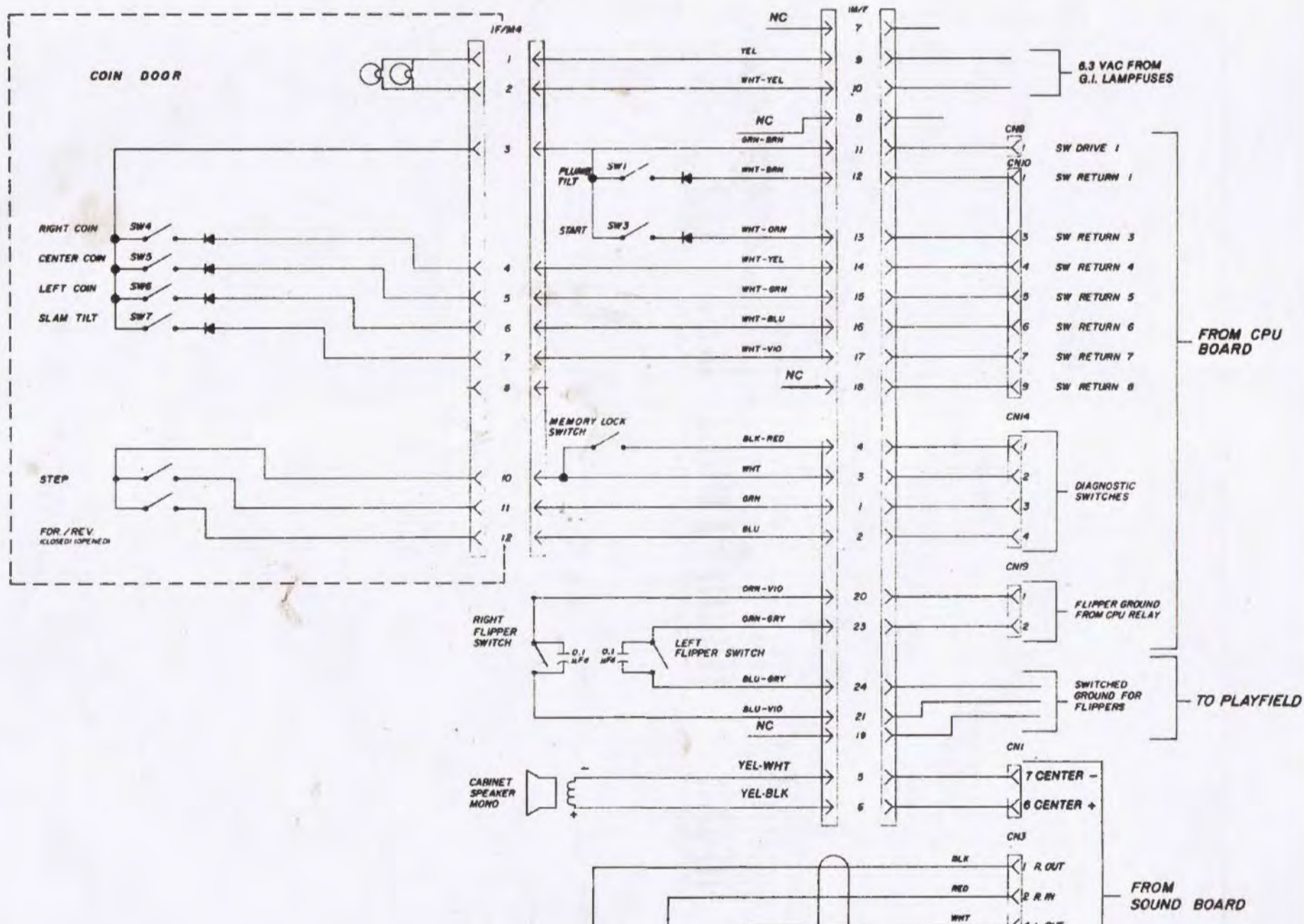
IF1 = 4A SLO BLO
IVI = 275V VARISTOR

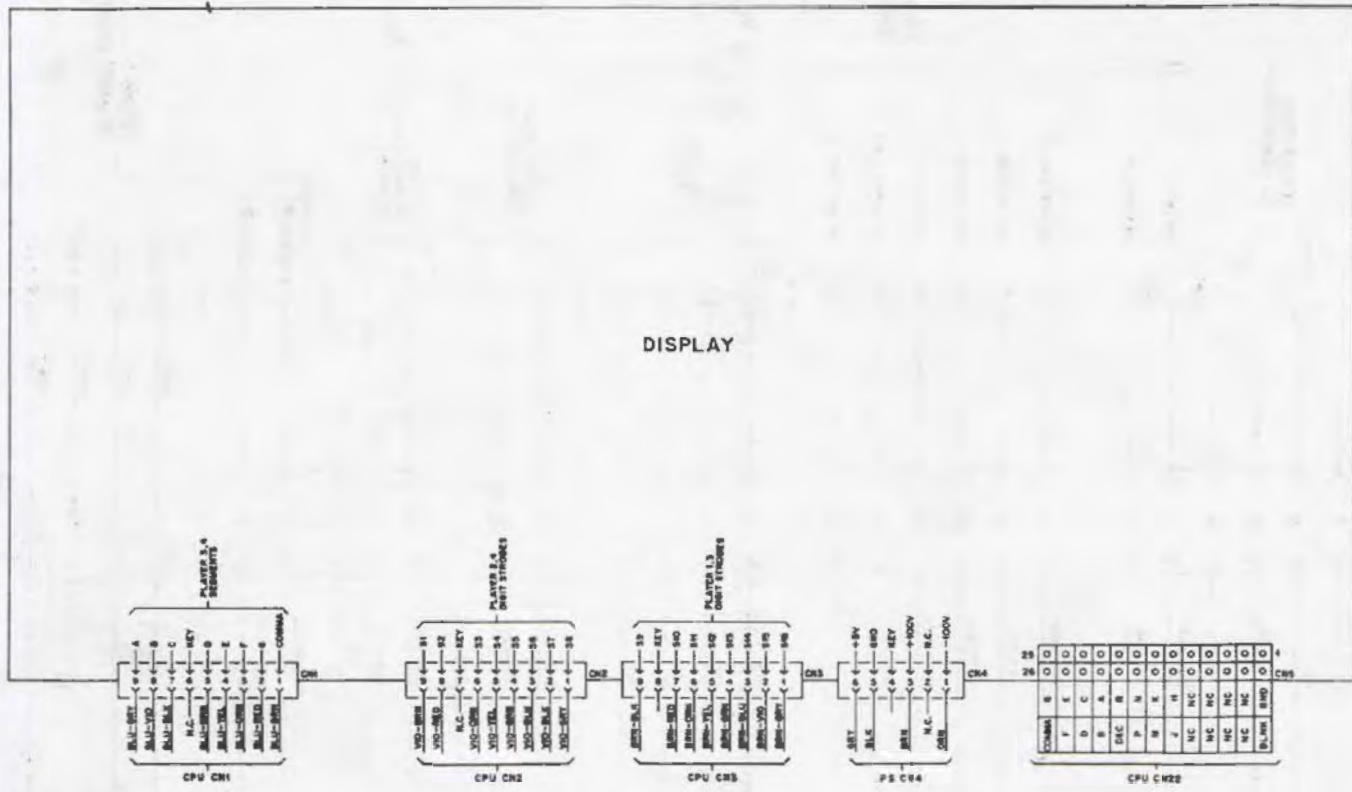
100/105 VOLTS

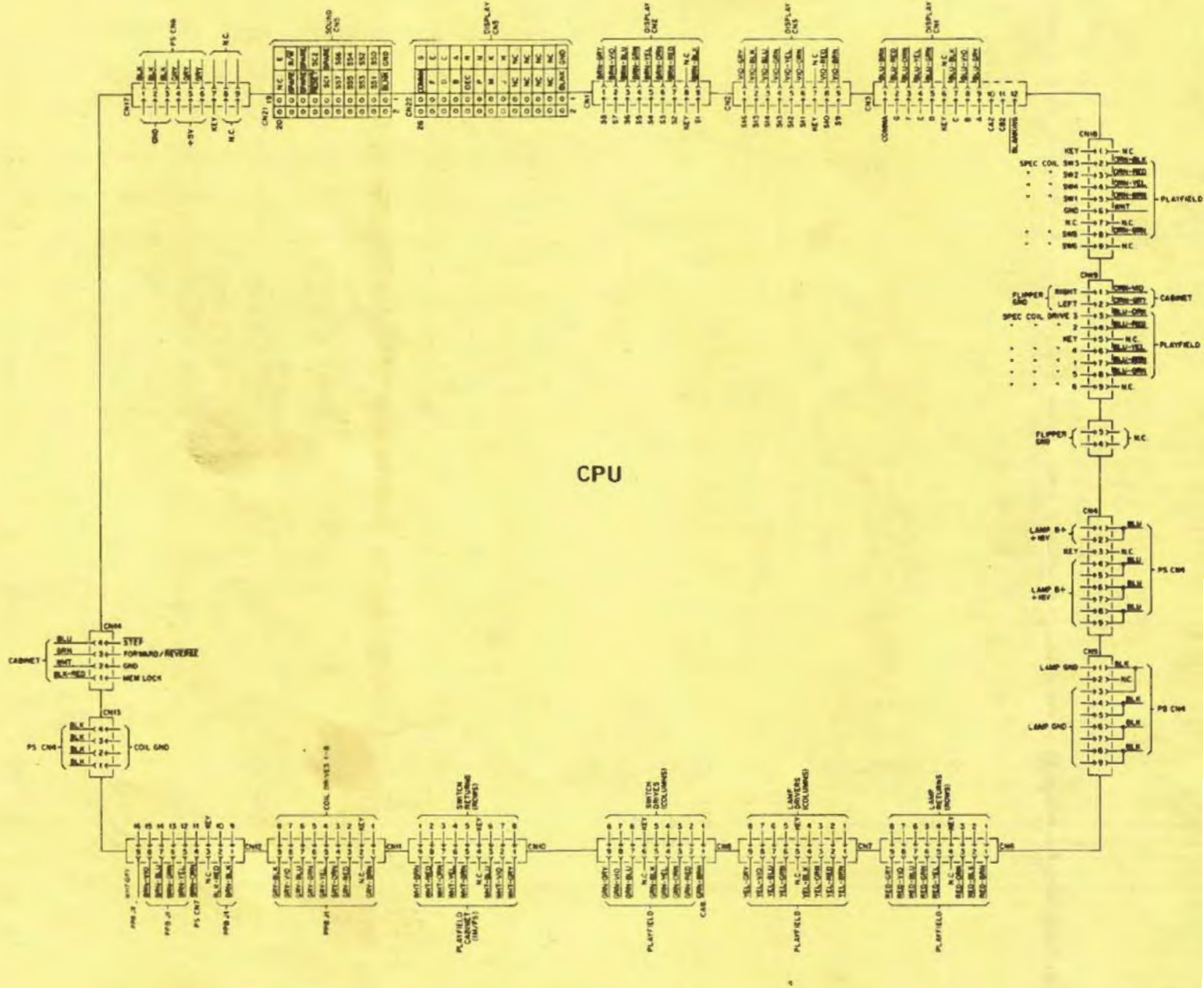
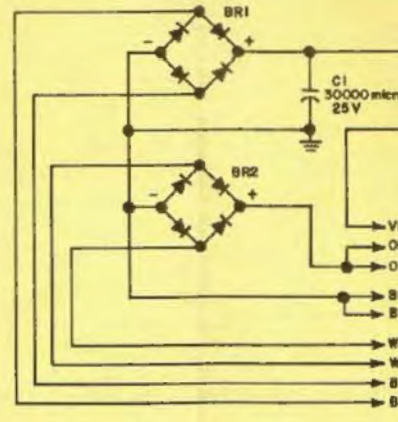
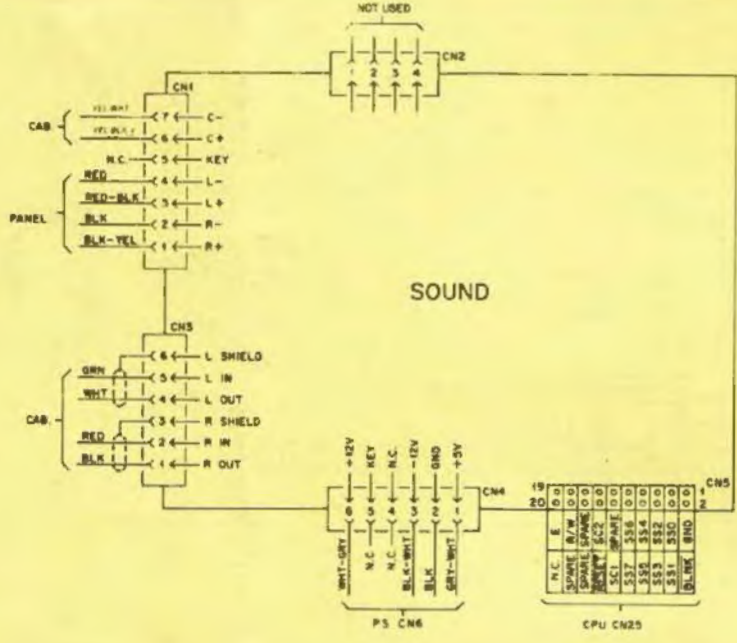
IF1 = 8A SLO BLO
IVI = 130V VARISTOR



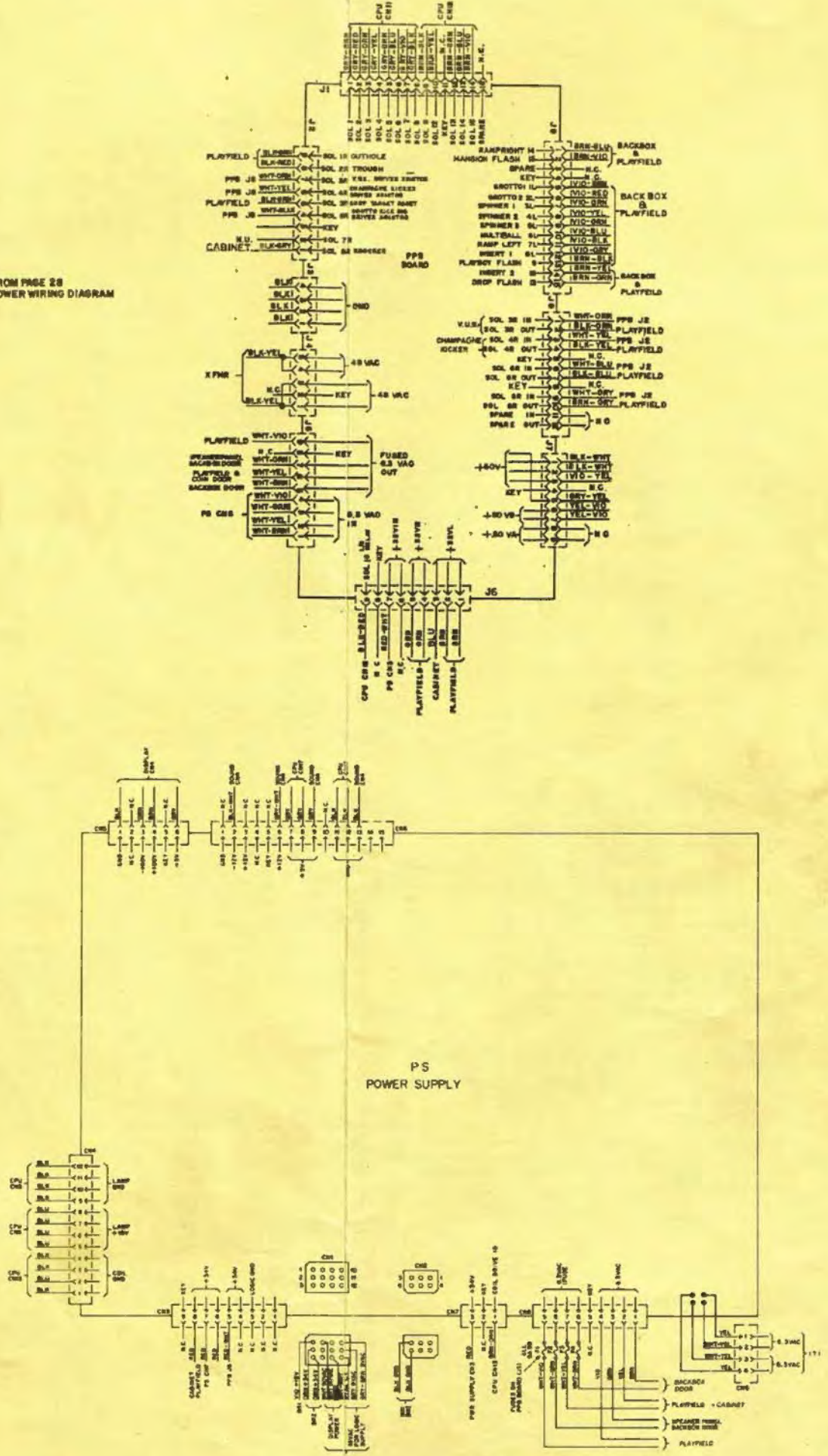
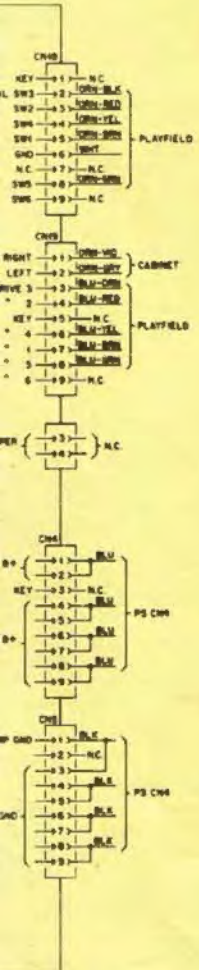
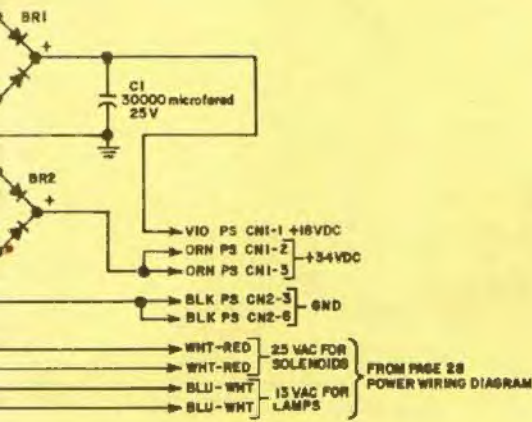
Cabinet Wiring Diagram



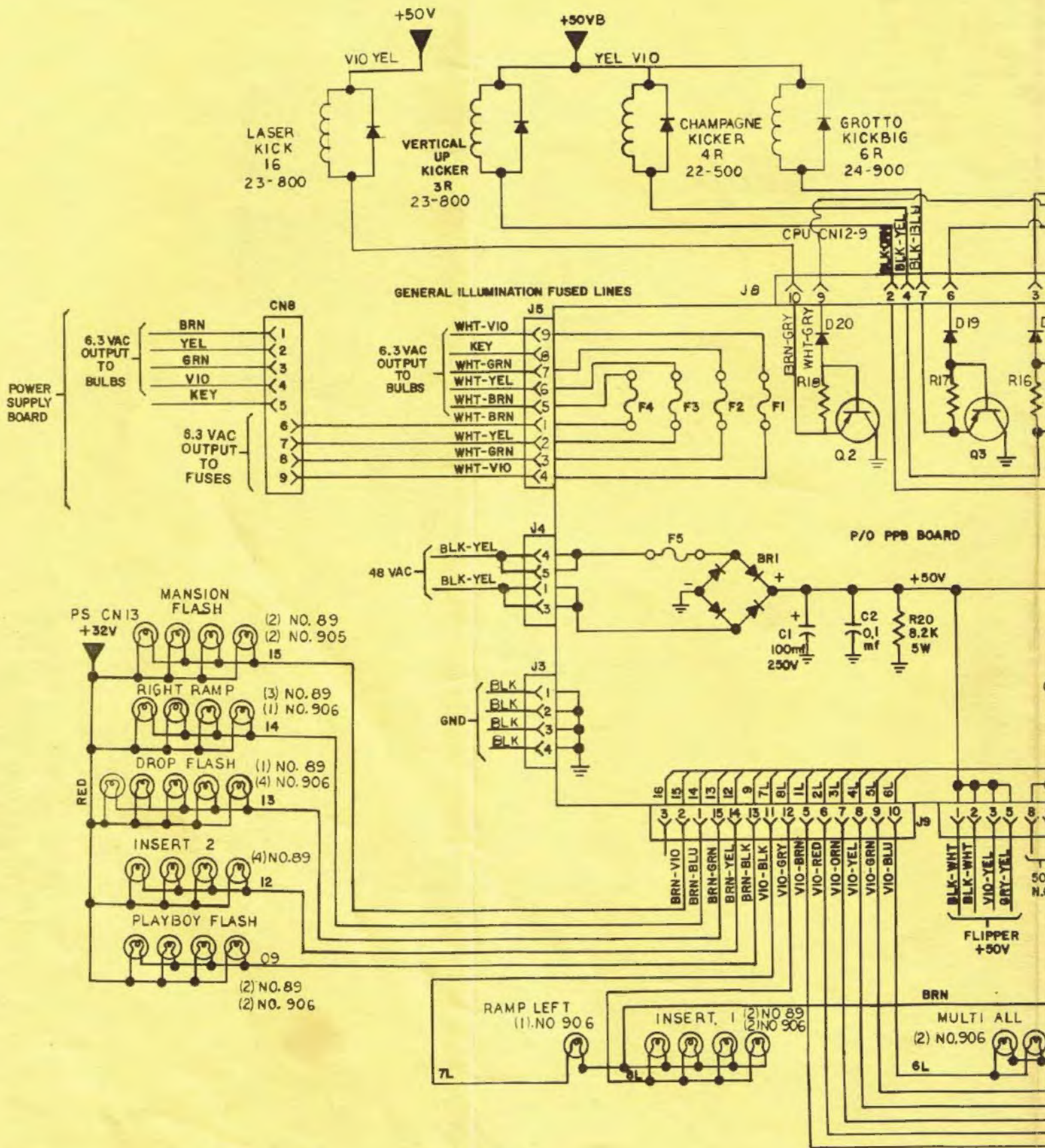


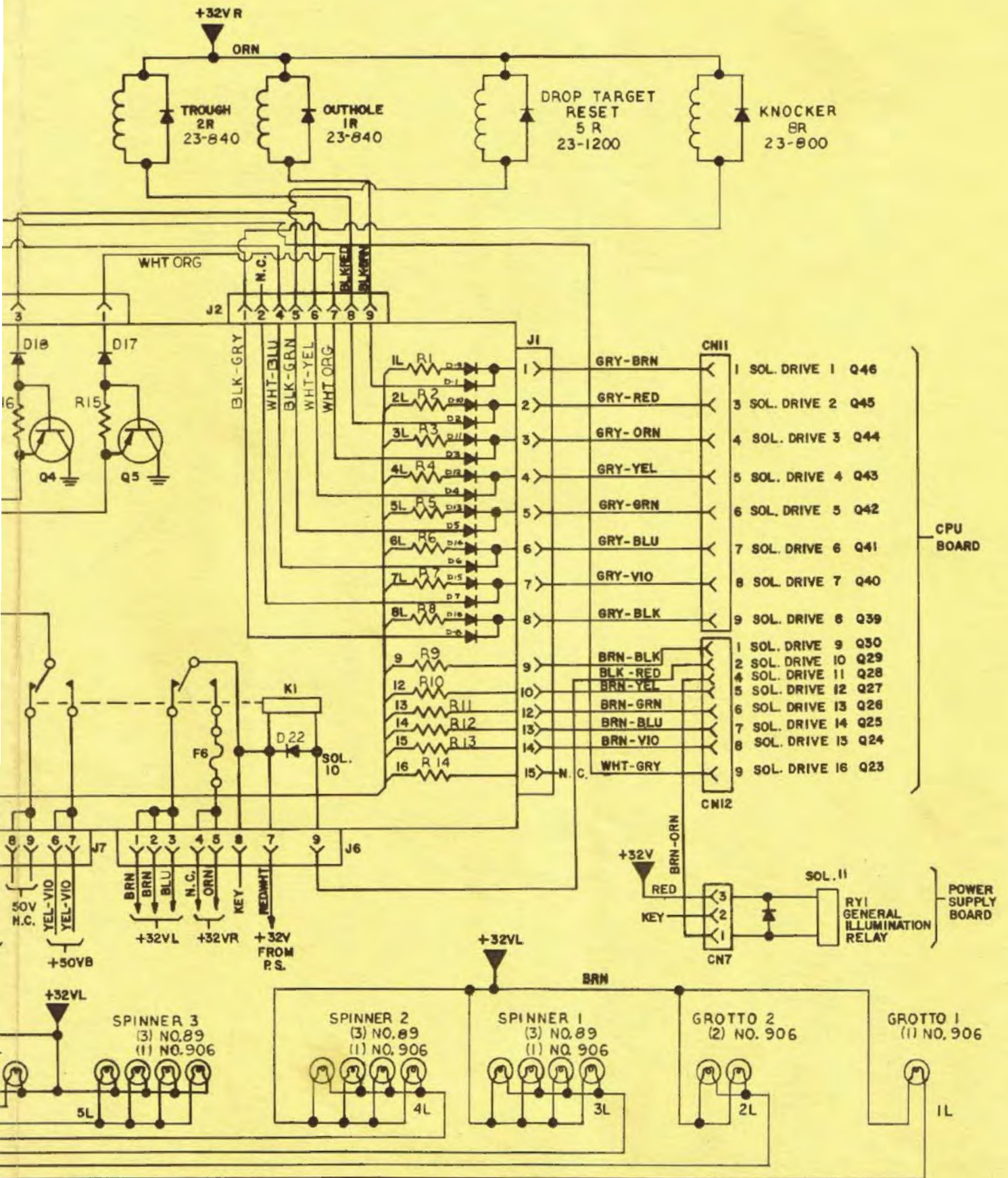


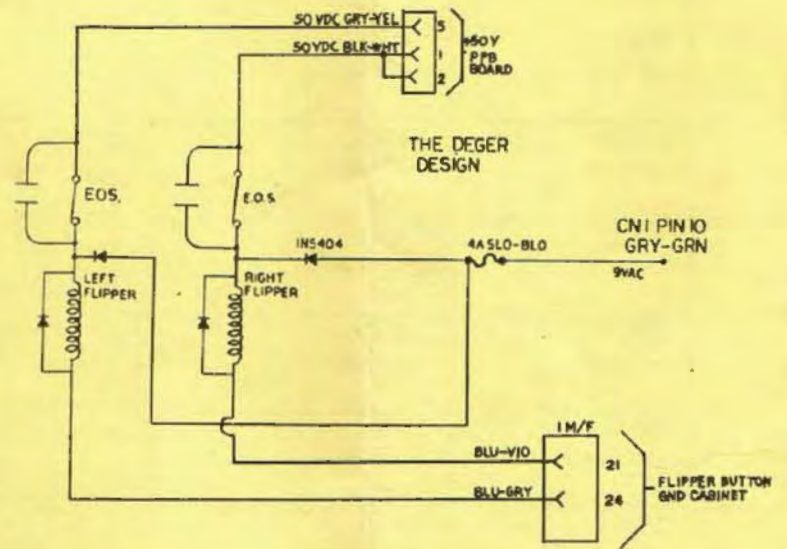
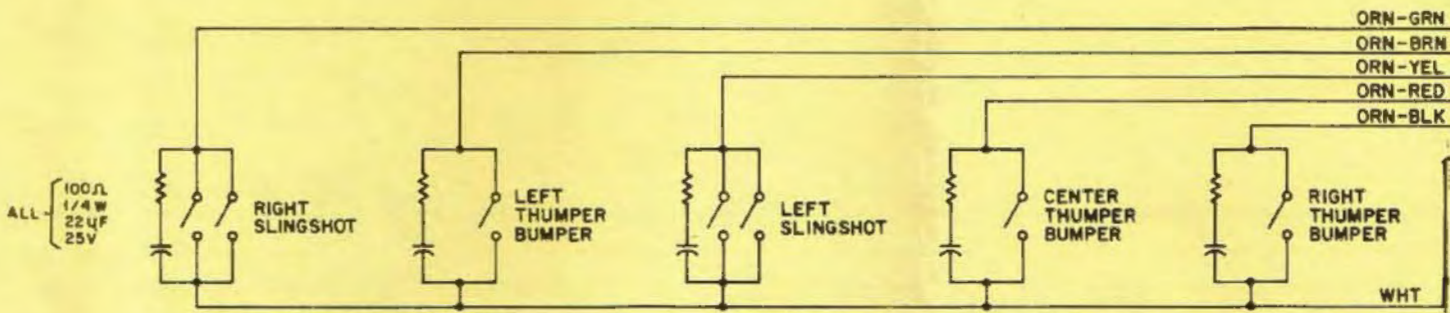
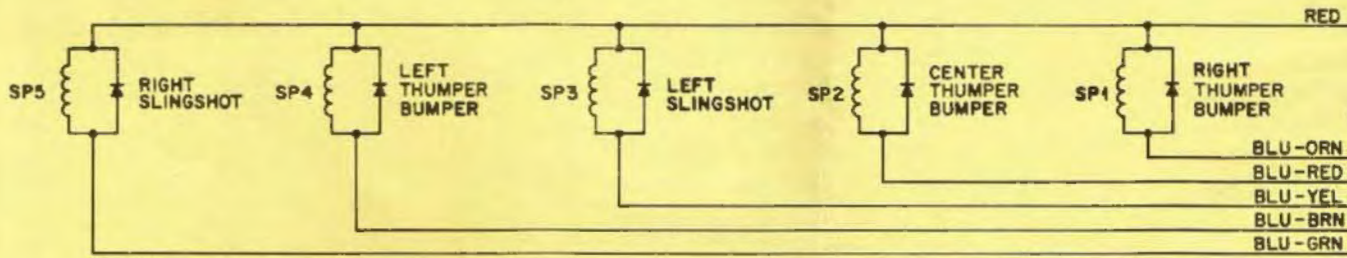
CPU

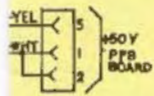
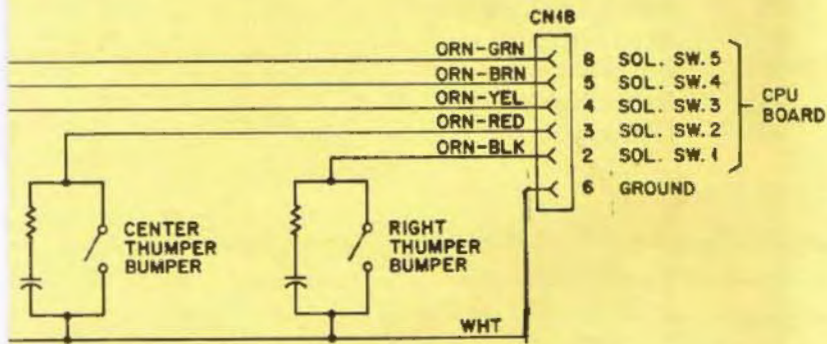
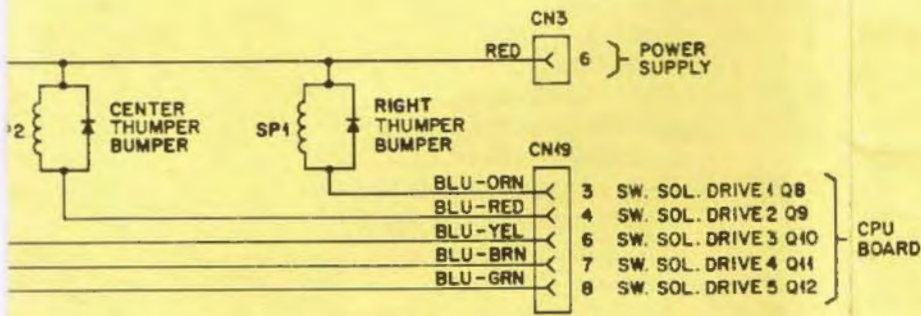


Backbox Wiring Diagram

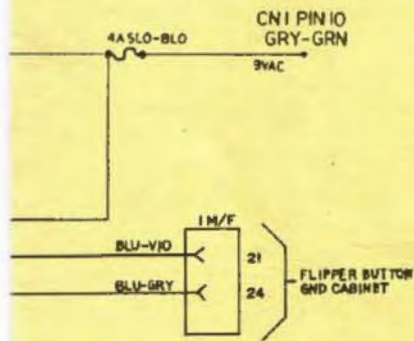








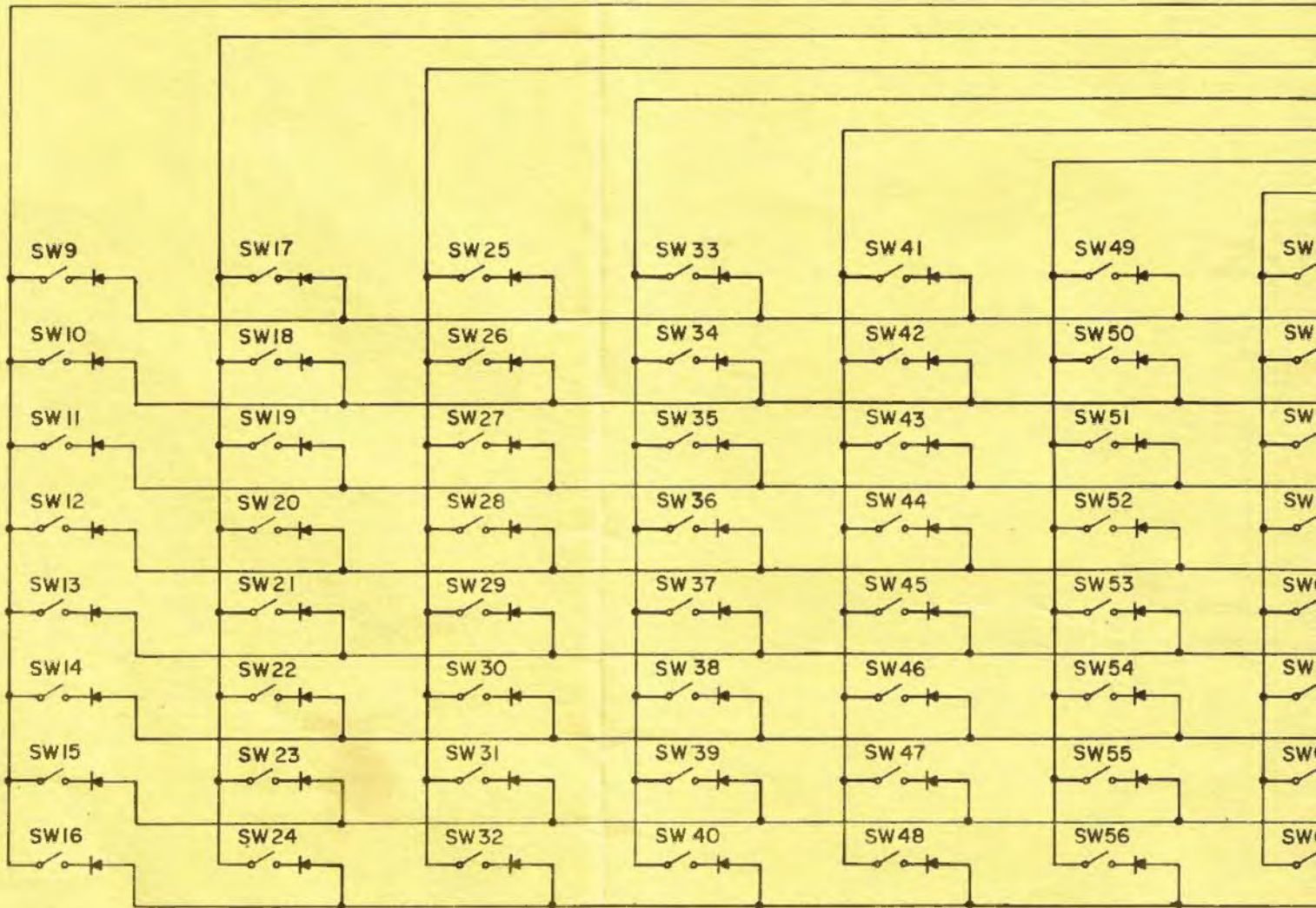
THE DEGER DESIGN



Switch

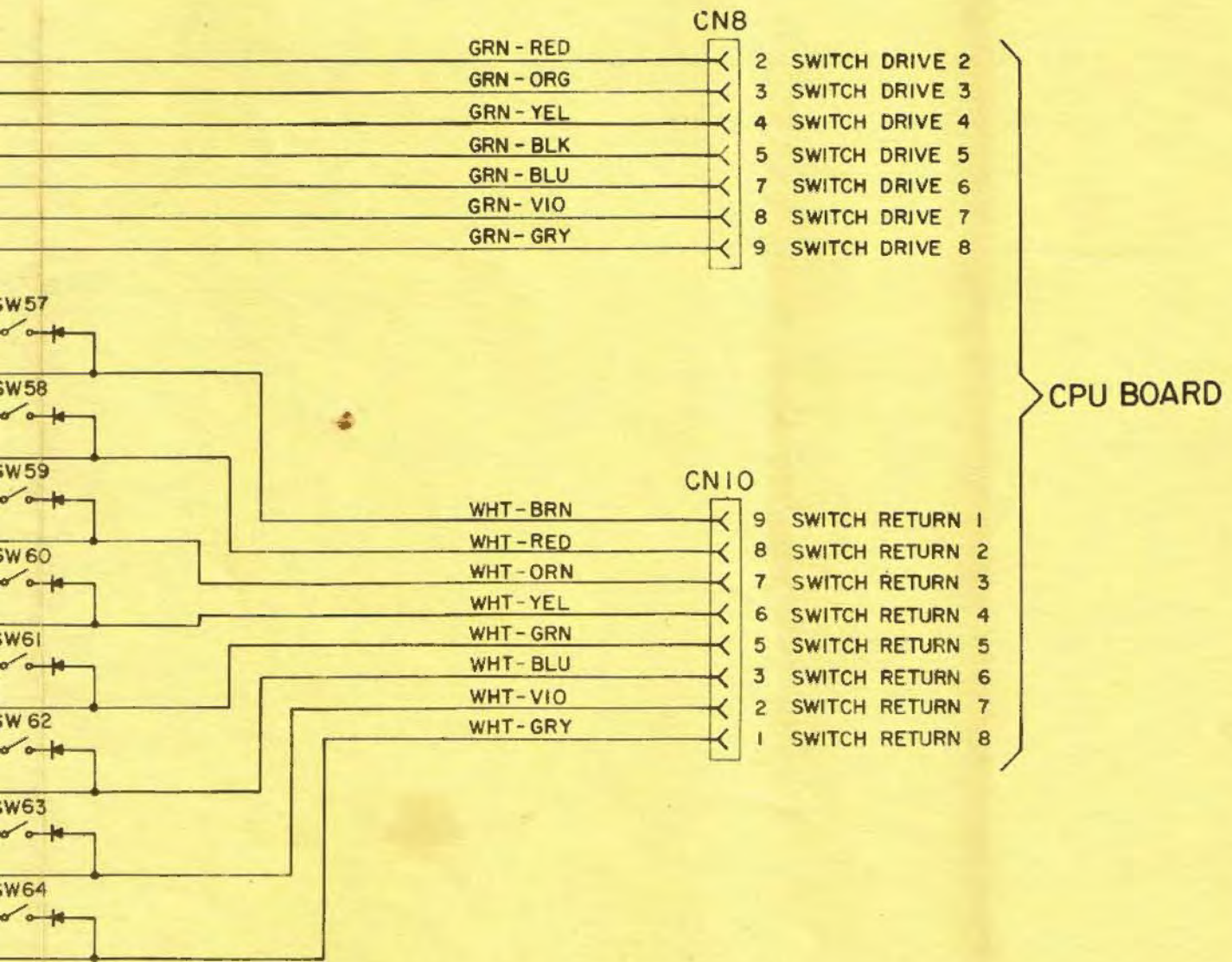
Number Description

01*	Plumb Tilt	16	Right Flip. Instant Info.	31
02	Not Used		Right EOS	32
03	Credit Button	17	Left Outlane	33
04*	Right Coin	18	Left Return Lane	34
05*	Center Coin	19	Right Outlane	35
06*	Left Coin	20	Right Return Lane	36
07*	Slam Tilt	21	Left Slingshot Trigger Sw.	37
08	Not Used		Left Slingshot Point Sw.	38
09	Not Used	22	Right Slingshot Trigger Sw.	39
10	Out Hole		Right Slingshot Point Sw.	40
11	Trough #1	23	Champagne Kicker	41
12	Trough #2	24	Grotto 1	42
13	Trough #3	25	Left Top Lane	43
14	Shooter Lane	26	Center Top Lane	44
15	Left Flip. Instant Info. Left EOS	27	Right Top Lane	45
		28	Ramp Center	
		29	Ramp Right	
		30	Left Spinner	



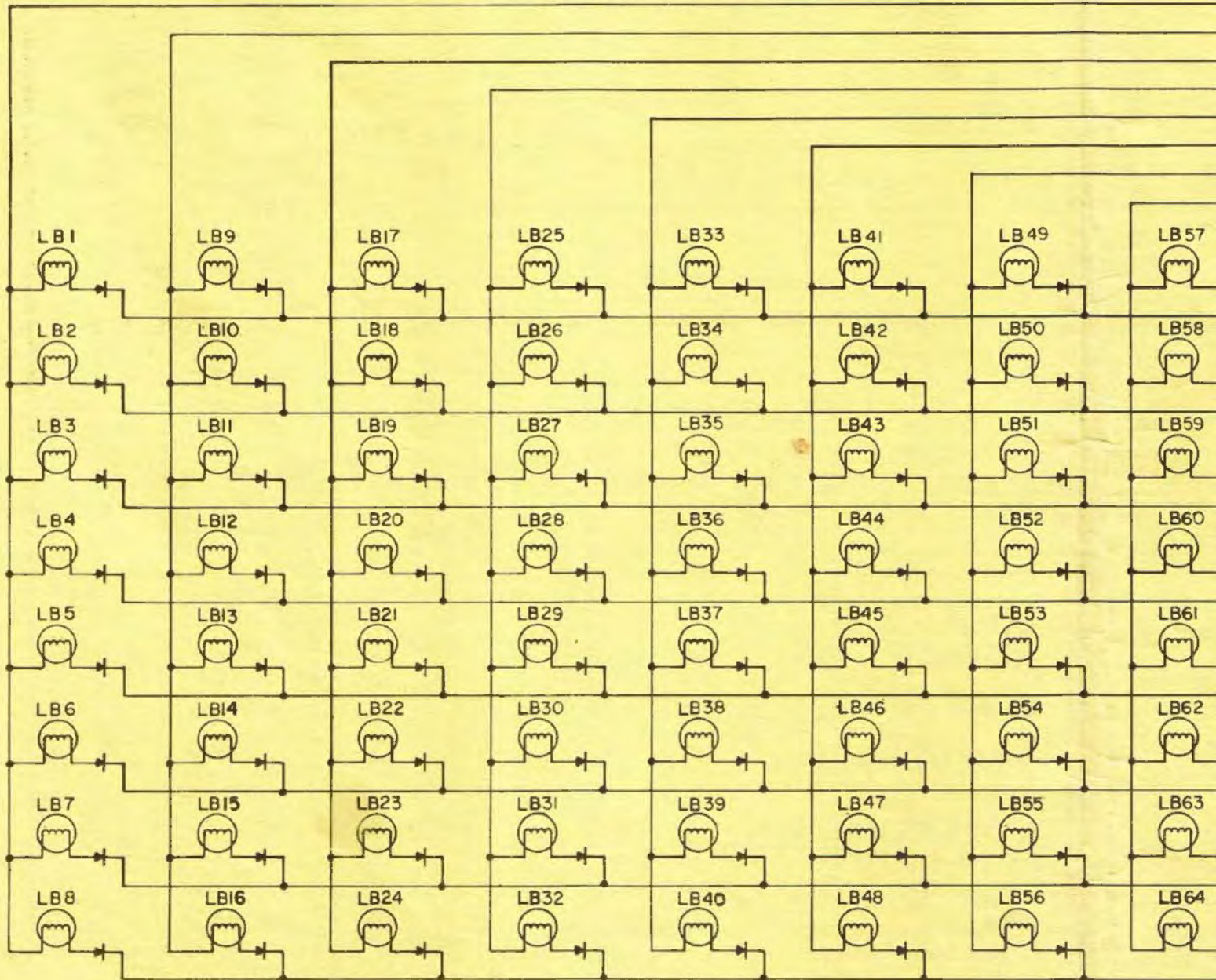
Grotto 2	46	Left Pop Bumper	SWITCH DRIVE 1	Q55
Ramp Left	47	Center Pop Bumper	SWITCH DRIVE 2	Q54
P -Target	48	Right Pop Bumper	SWITCH DRIVE 3	Q53
L -Target	49	Drop 1 (Top)	SWITCH DRIVE 4	Q52
A -Target	50	Drop 2 (Center)	SWITCH DRIVE 5	Q51
1st Y -Target	51	Drop 3 (Bottom)	SWITCH DRIVE 6	Q50
B -Target	52	Not Used Thru 64	SWITCH DRIVE 7	Q49
O -Target			SWITCH DRIVE 8	Q48
2nd Y -Target				
Not Used				
Center 3 Bank Left				
Center 3 Bank Middle				
Center 3 Bank Right				
Not Used				
VUK				

* Indicates cabinet switches.



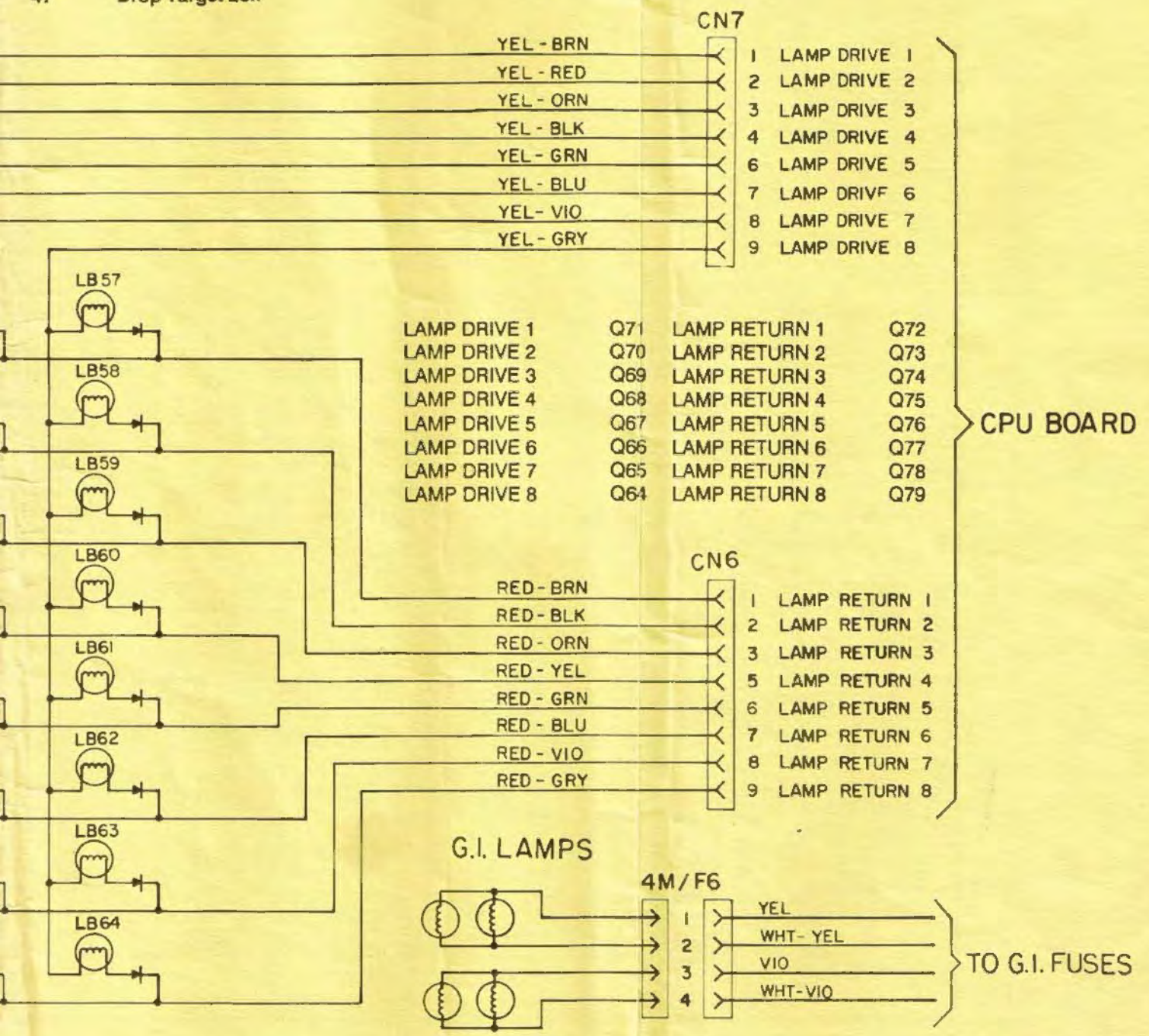
* Indicates insert board lamps.

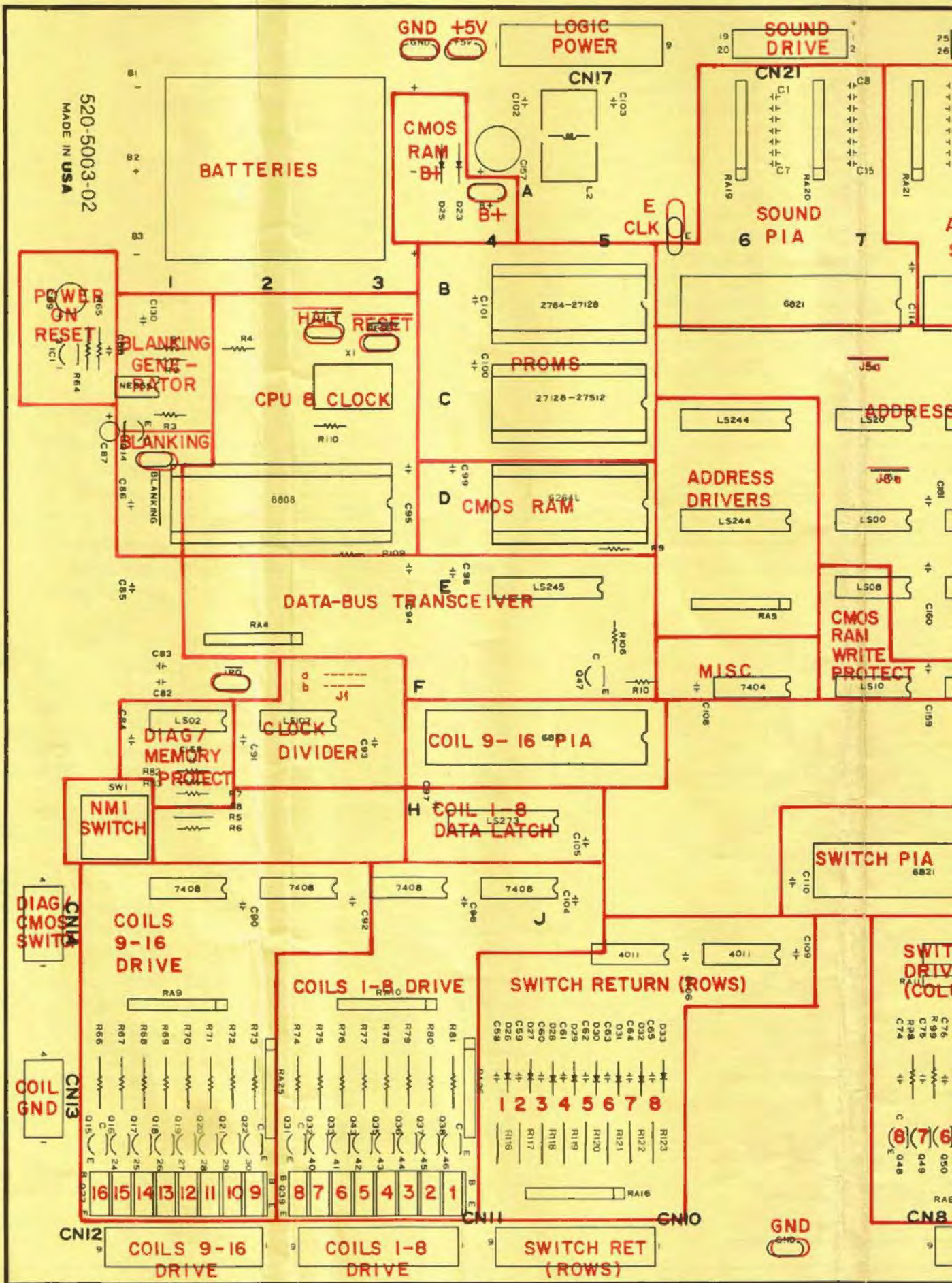
Lamp Number	Description	Lamp Number	Description	Lamp Number	Description
01*	"P"layboy	15	Top Left Bunny Hop	31	M
02*	p"L"ayboy	16	Center "M" Lane	32	Lo
03*	pl"A"yboy	17	Photo Shoot 1	33	Up
04*	pla"Y"boy	18	Photo Shoot 2	34	Bo
05*	play"B"oy	19	Photo Shoot 3	35	Pl
06*	playb"O"y	20	Photo Shoot 4	36	2x
07*	playbo"Y"	21	Photo Shoot 5	37	3x
08*	Left "H" Lane	22	Photo Shoot Special	38	4x
09	Miss July 50K	23	Spinner Extra Ball	39	5x
10	Miss August 100k	24	Right "H" Lane	40	Up
11	Miss September Lites Out-lane 50k	25	Upper Left and Right Release Ball	41	"P
12	Miss October 50k Bonus Hold Over	26	Lock Ball #11	42	R
13	Miss November Extra Ball	27	Lock Ball (Big arrow)	43	R
14	Miss December 1,000,000	28	Left Green Arrow Target	44	D
		29	Center Green Arrow Target	45	D
		30	Right Green Arrow Target	46	D
				47	D



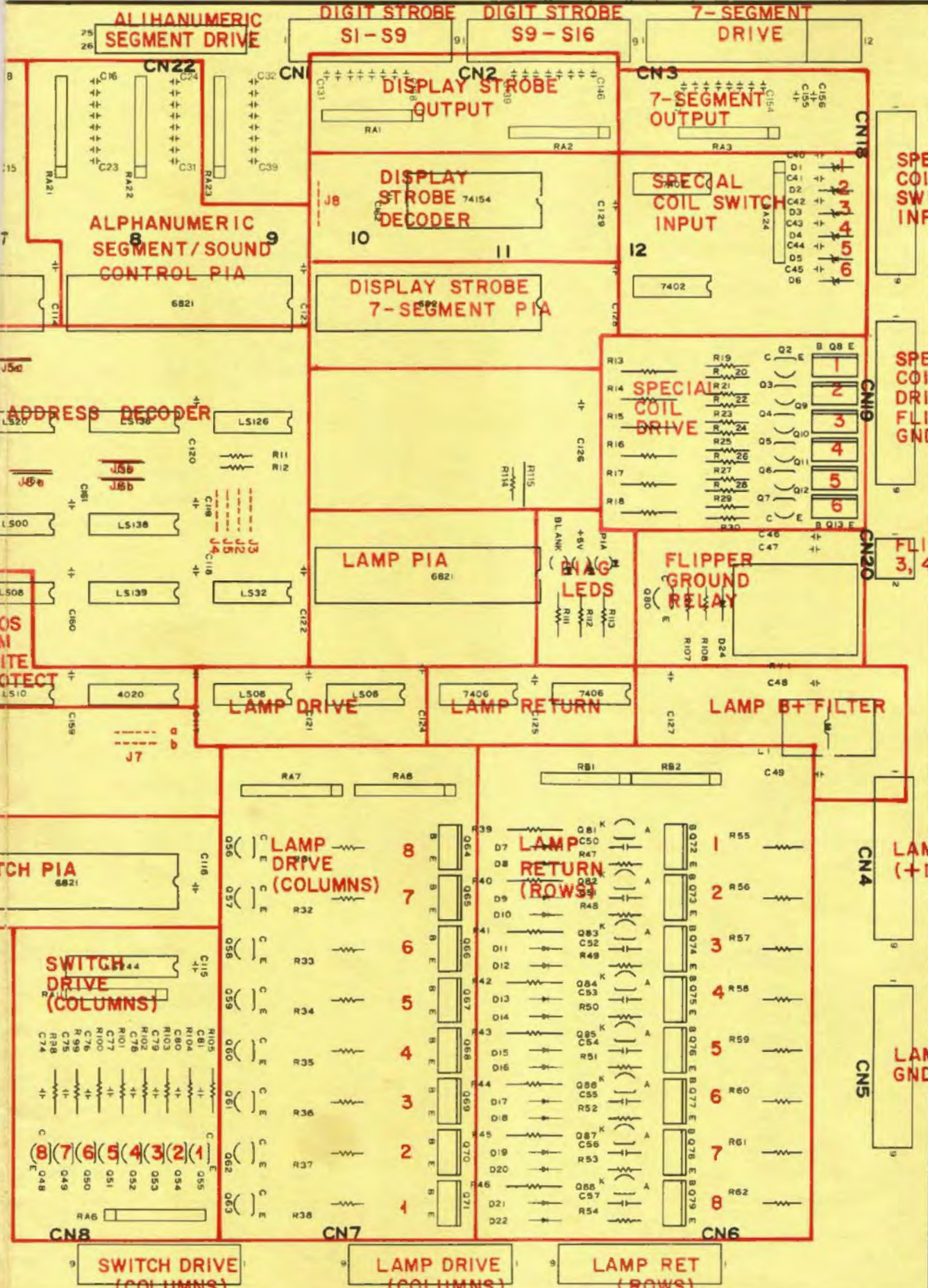
ps.

- | | | | |
|----|---------------------------|----|------------------------|
| 31 | Multiply All Scores | 48 | Upper Right Bunny Hop |
| 32 | Lock Ball #2 | 49 | p"l"nball |
| 33 | Upper Right Mansion Party | 50 | Lt.Score Playboy Value |
| 34 | Bonus Holdover | 51 | Left Peacock |
| 35 | Play Again | 52 | Lwr Lft.Bunny Hop |
| 36 | 2x | 53 | p"N"ball |
| 37 | 3x | 54 | pin"B"all |
| 38 | 4x | 55 | pinb"A"l |
| 39 | 5x | 56 | pinba"L"l |
| 40 | Upper Left Mansion Party | 57 | "M"ansion |
| 41 | "P"inball | 58 | m"A"nsion |
| 42 | Rt Score Playboy Value | 59 | ma"N"sion |
| 43 | Right Peacock | 60 | man"S"ion |
| 44 | Drop Target 100k | 61 | mans"I"on |
| 45 | Drop Target 75k | 62 | mansi"O"n |
| 46 | Drop Target 50k | 63 | mansio"N" |
| 47 | Drop Target 25k | 64 | pinbal"L" |





CPU Board Assembly Drawing



SPEC COIL SWITCH INPUT

SPEC COIL DRIVES FLIPPER GND

FLIPPER 3, 4 GND

LAMP B+ (+18V)

LAMP GND

ALPHANUMERIC SEGMENT DRIVE

DIGIT STROBE S1-S9

DIGIT STROBE S9-S16

7-SEGMENT DRIVE

DISPLAY STROBE OUTPUT

7-SEGMENT OUTPUT

ALPHANUMERIC SEGMENT/SOUND CONTROL PIA

DISPLAY STROBE DECODER

SPECIAL COIL SWITCH INPUT

DISPLAY STROBE 7-SEGMENT PIA

ADDRESS DECODER

SPECIAL COIL DRIVE

LAMP PIA

FLIPPER GROUND RELAY

LAMP DRIVE

LAMP RETURN

LAMP B+ FILTER

SWITCH PIA

LAMP DRIVE (COLUMNS)

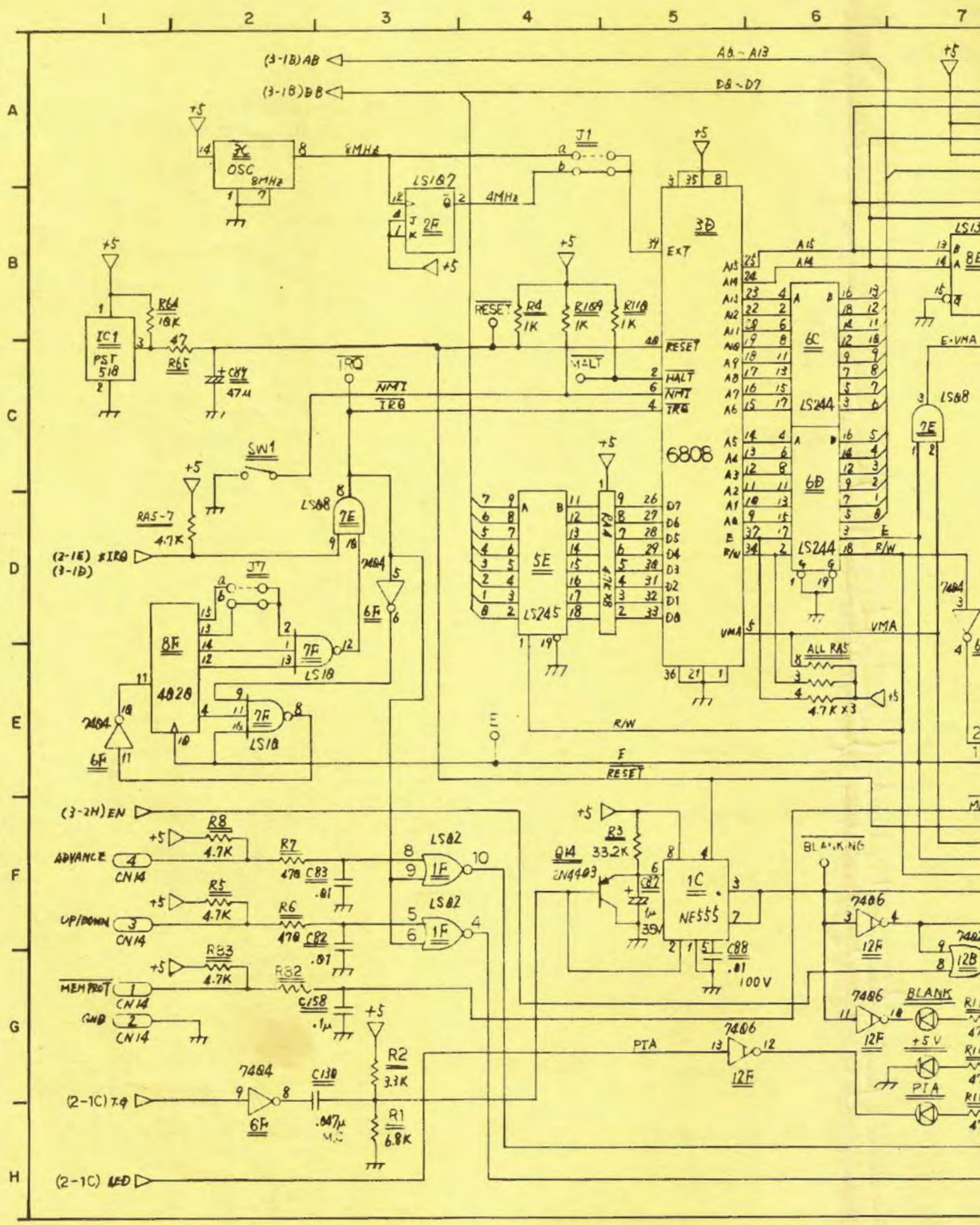
LAMP RETURN (ROWS)

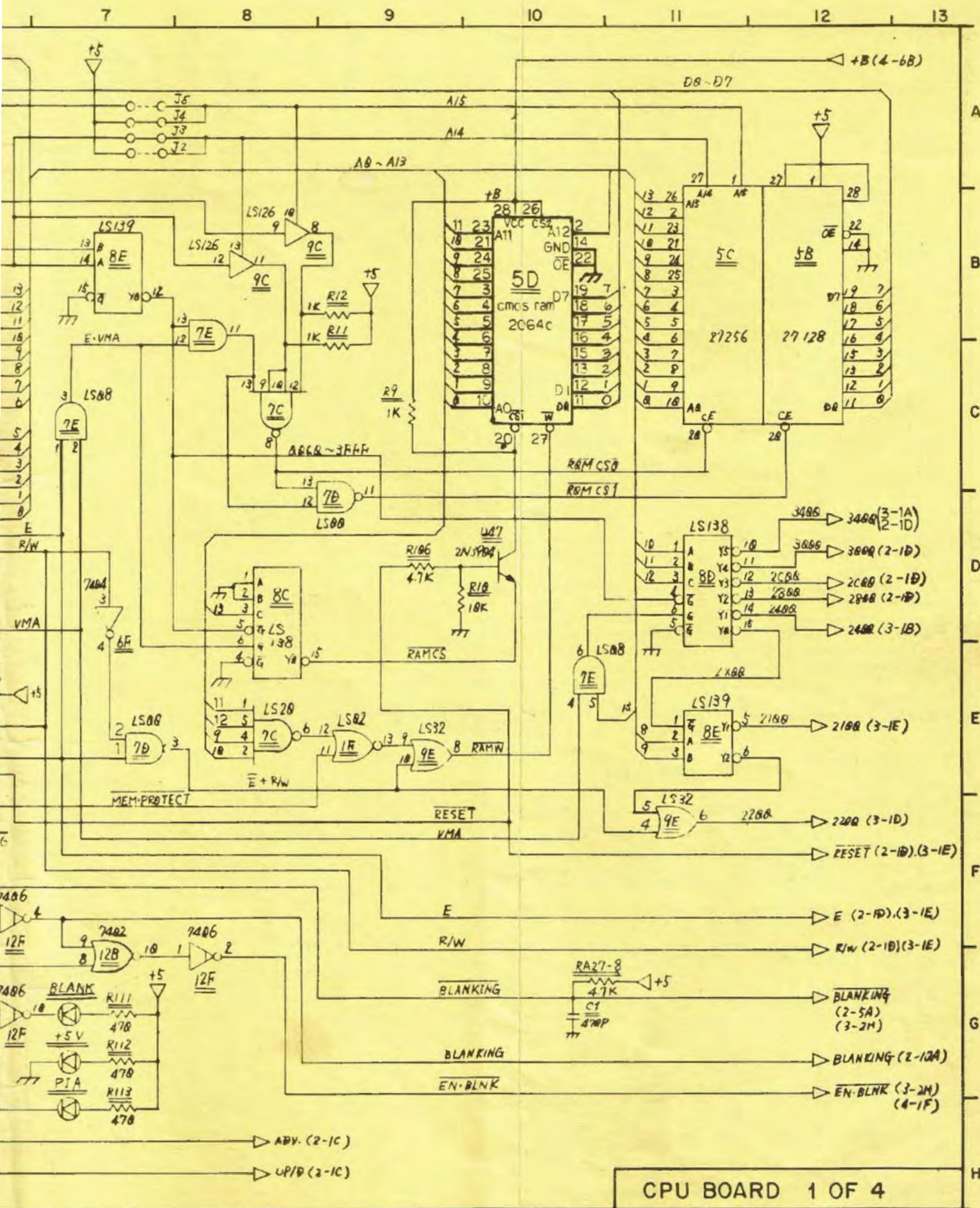
SWITCH DRIVE (COLUMNS)

SWITCH DRIVE (COLUMNS)

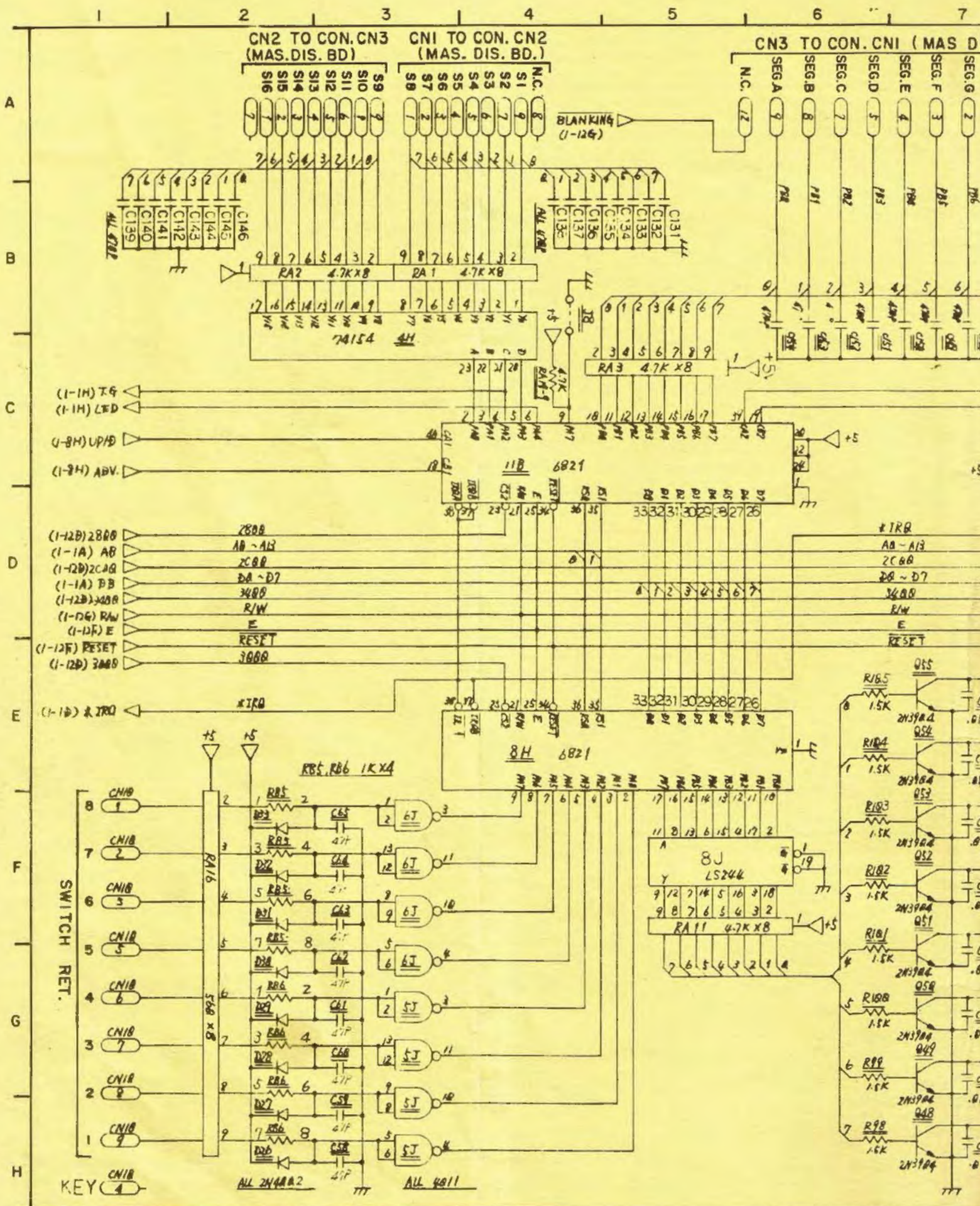
LAMP DRIVE (COLUMNS)

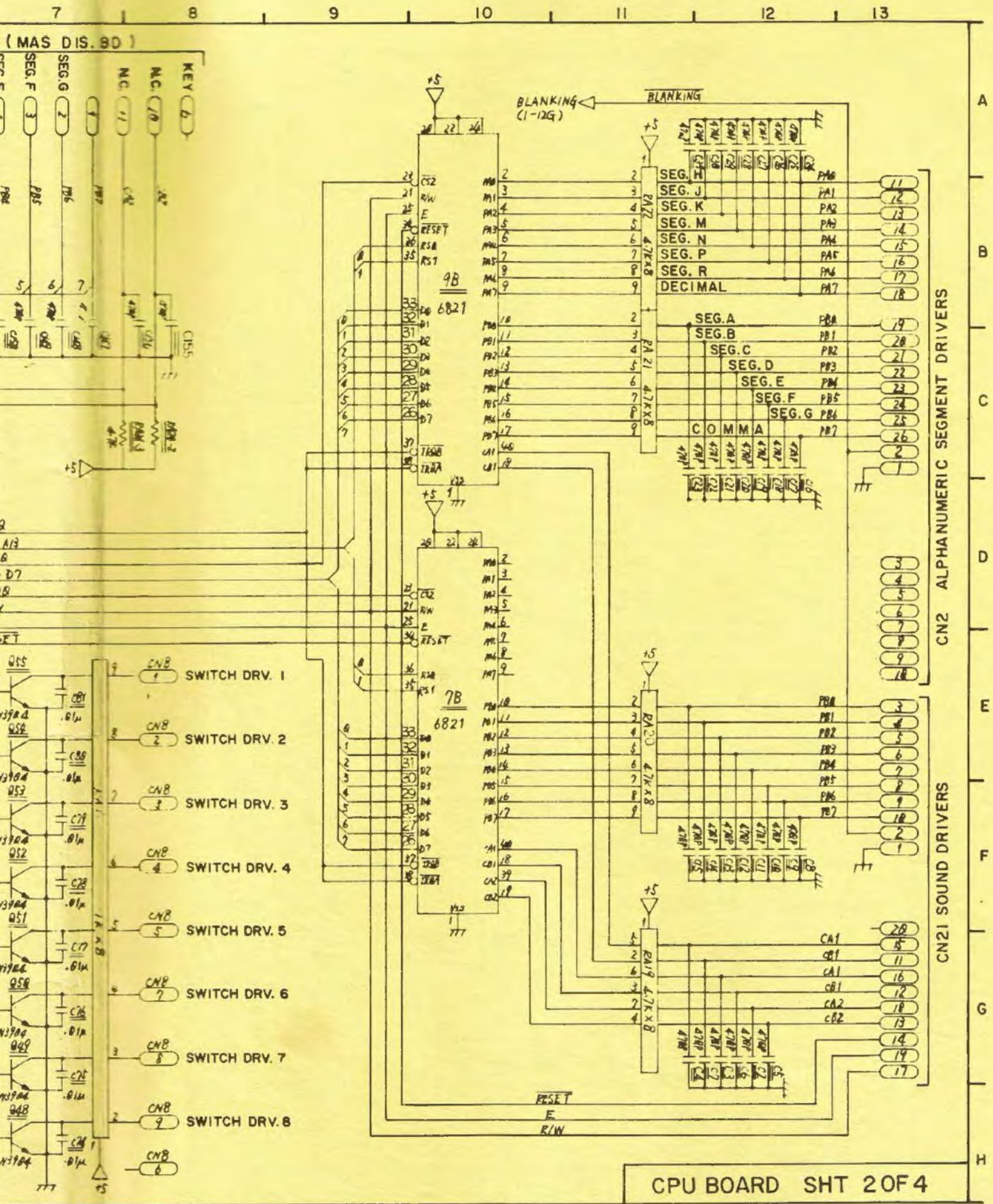
LAMP RET (ROWS)



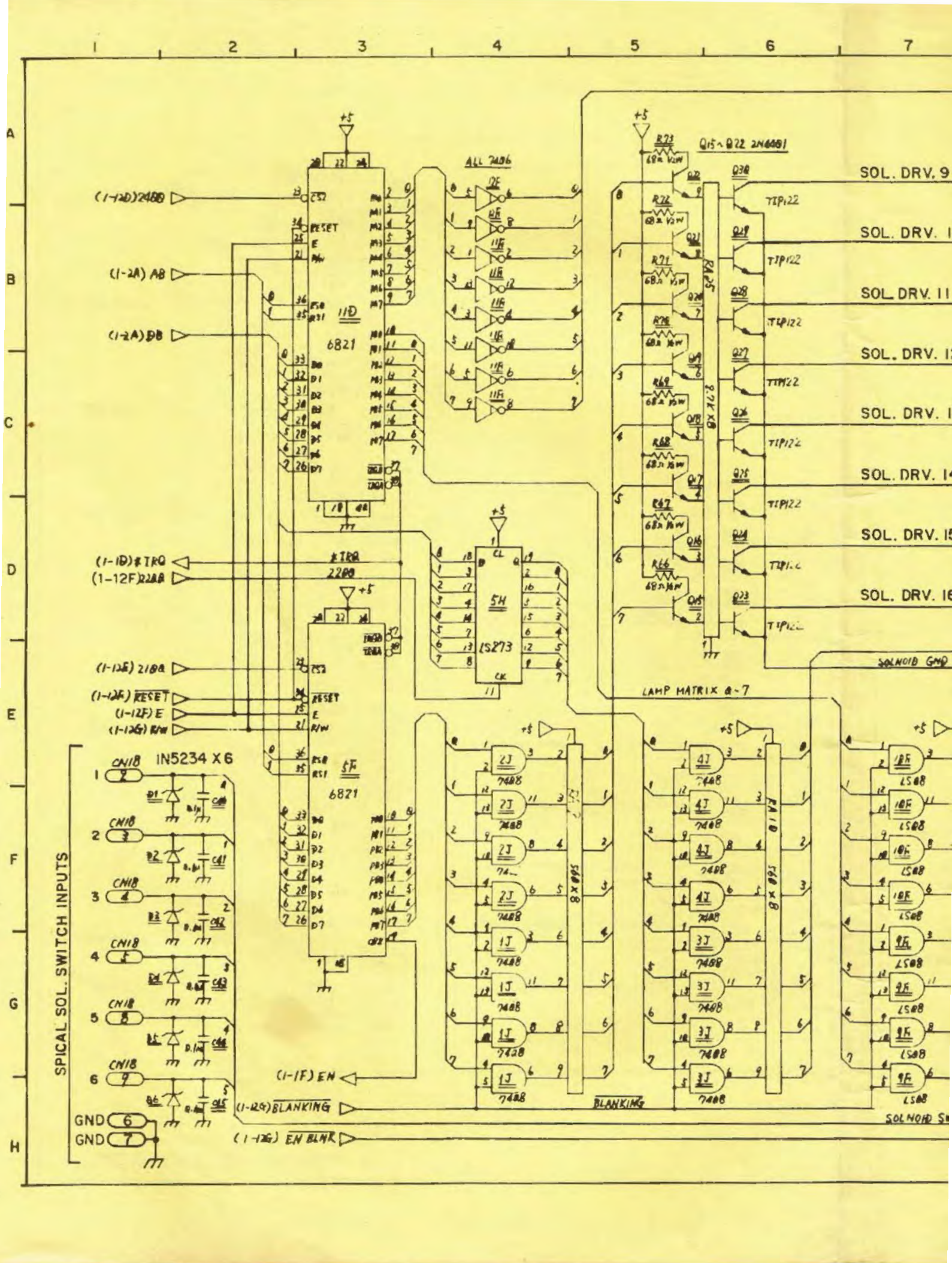


CPU BOARD 1 OF 4



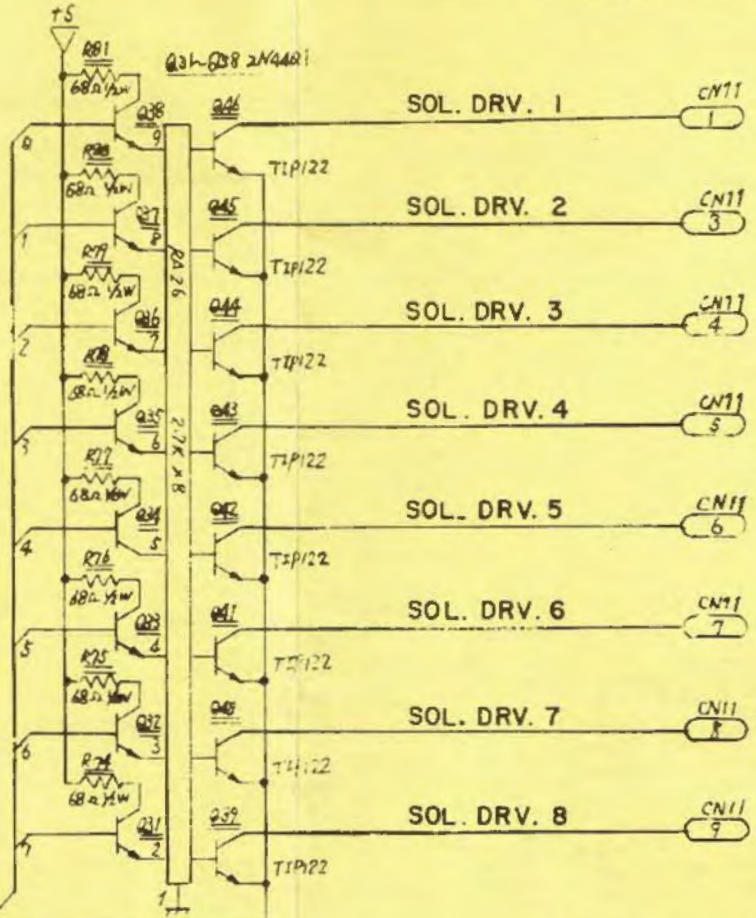
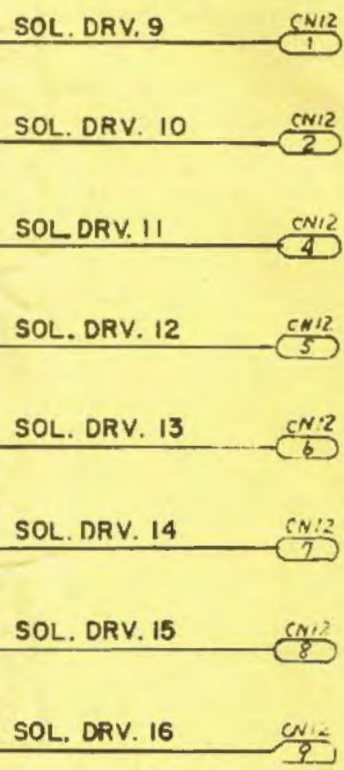


CPU BOARD SHT 20F4



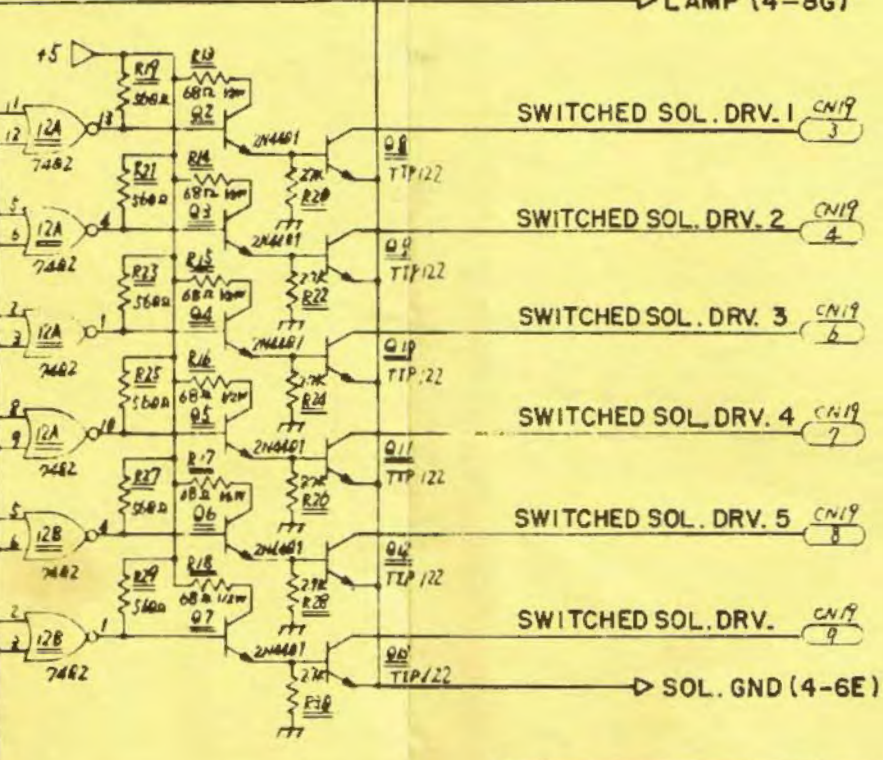
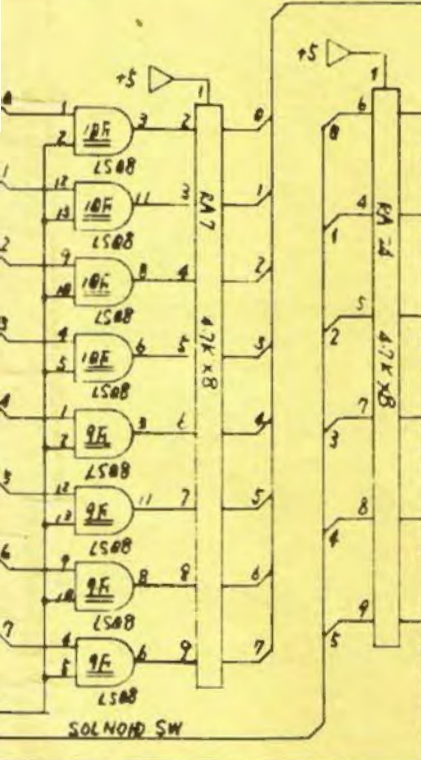
LAMP MATRIX CONT. 8~7

LAMP CNT (4-8A)



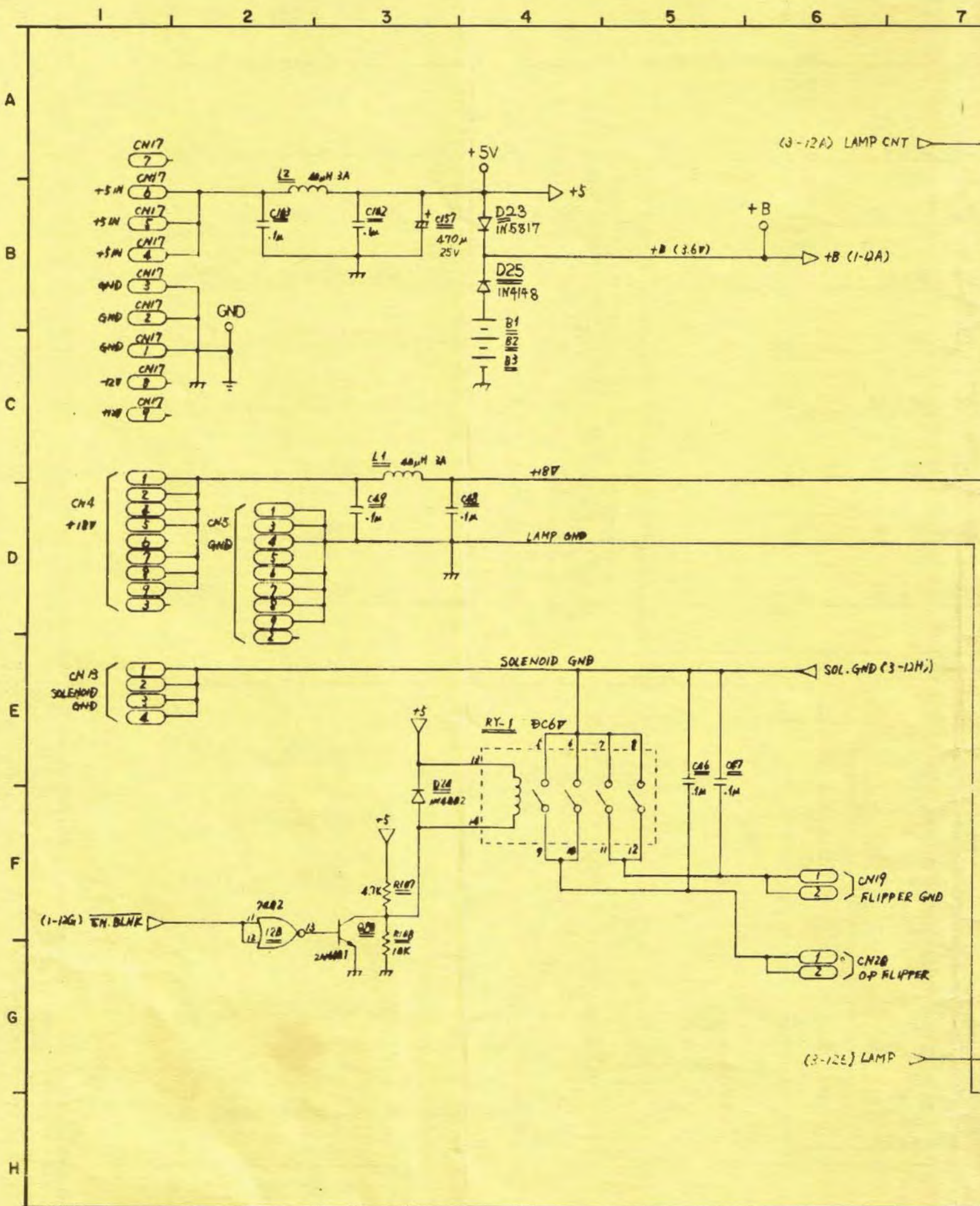
SOL. GND

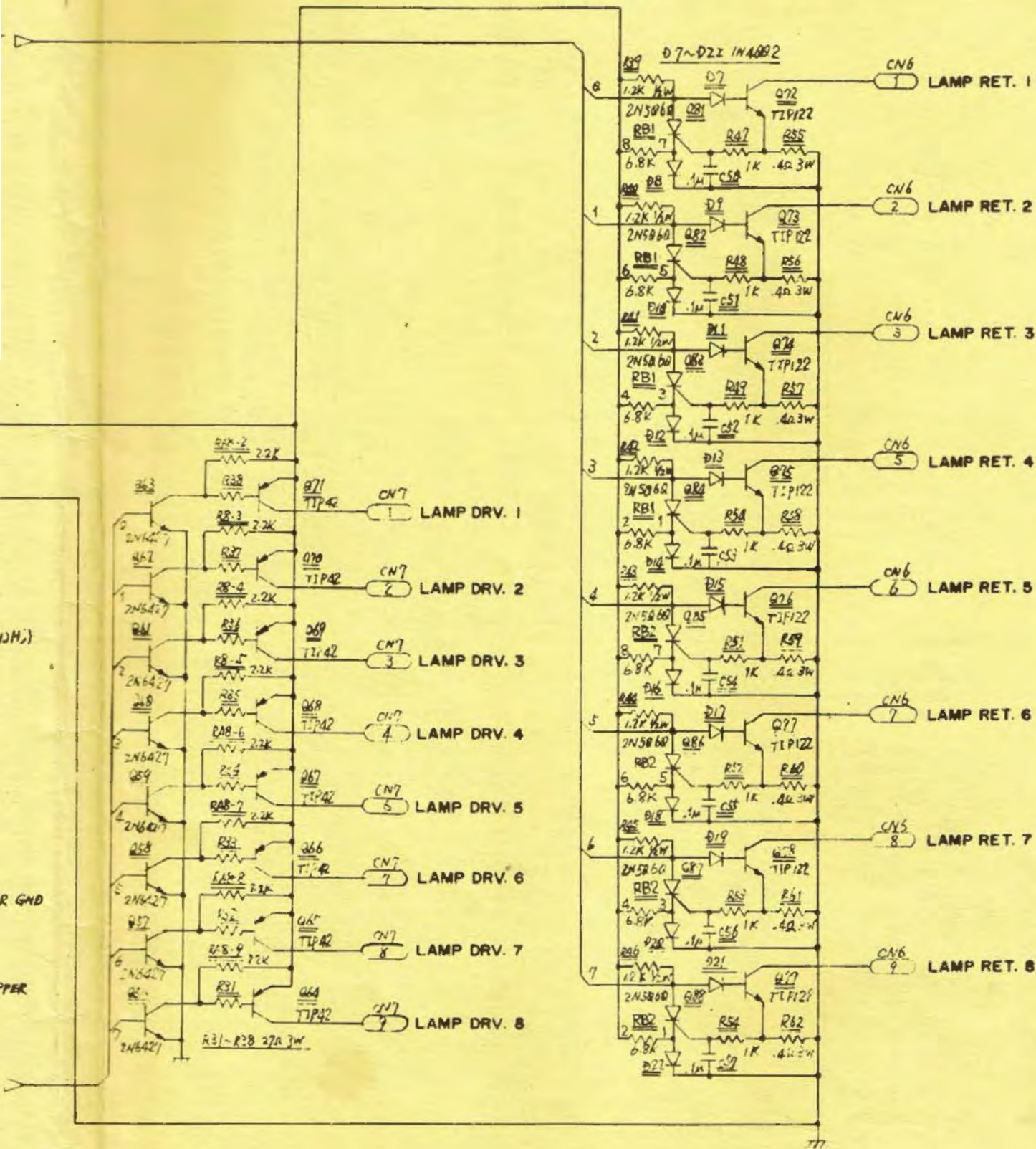
LAMP (4-8G)

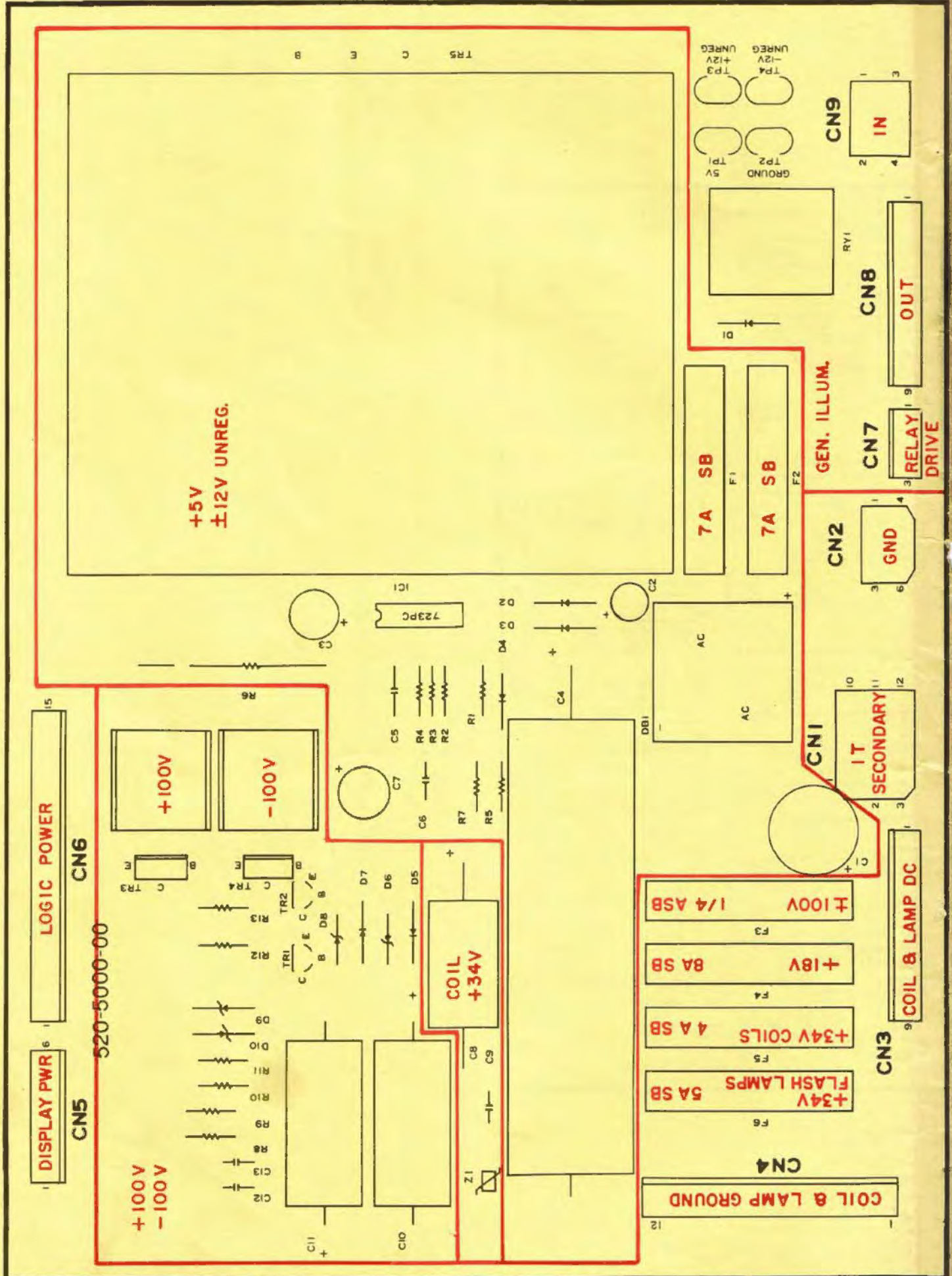


SOL. GND (4-6E)

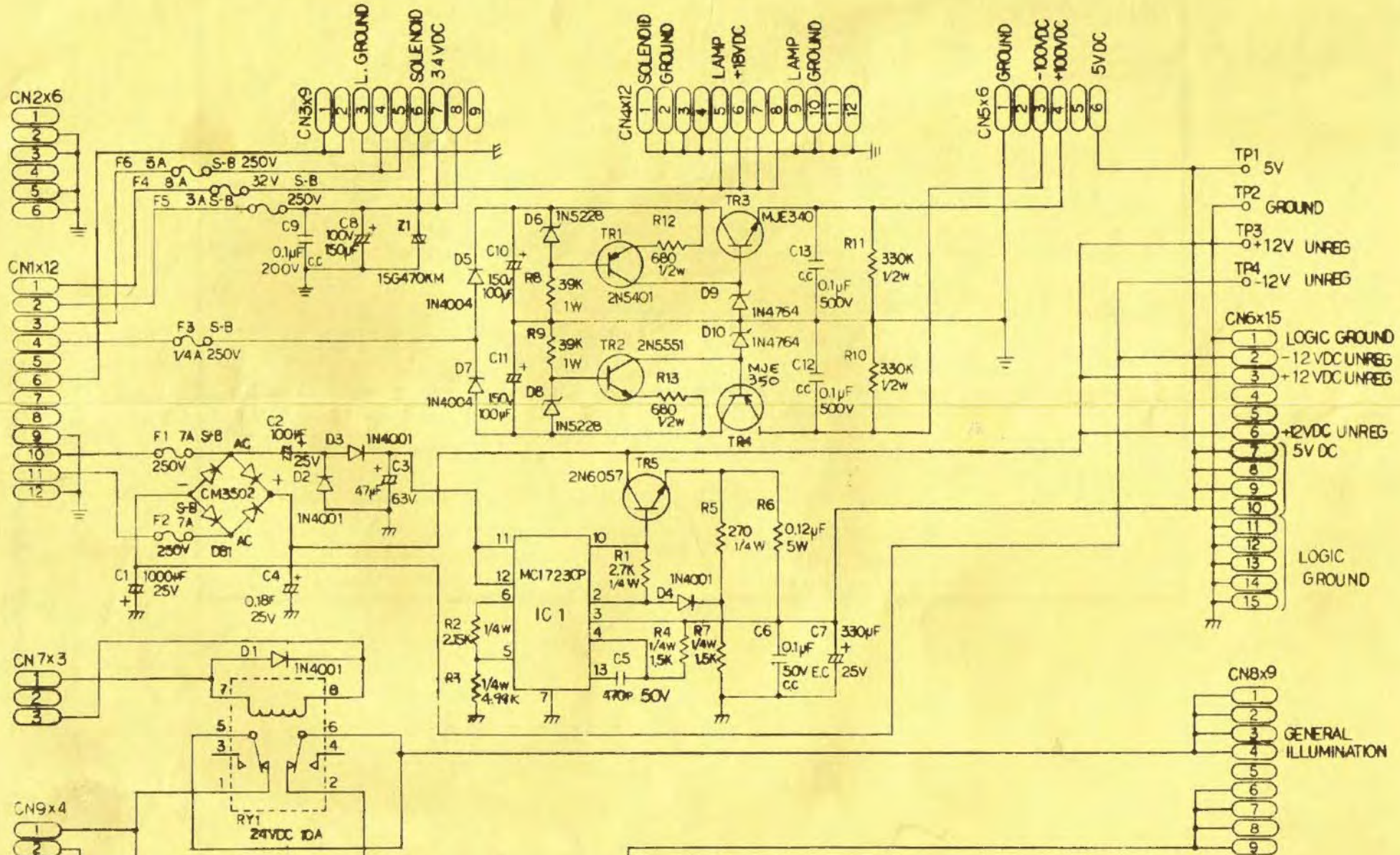
CPU BOARD 3 OF 4

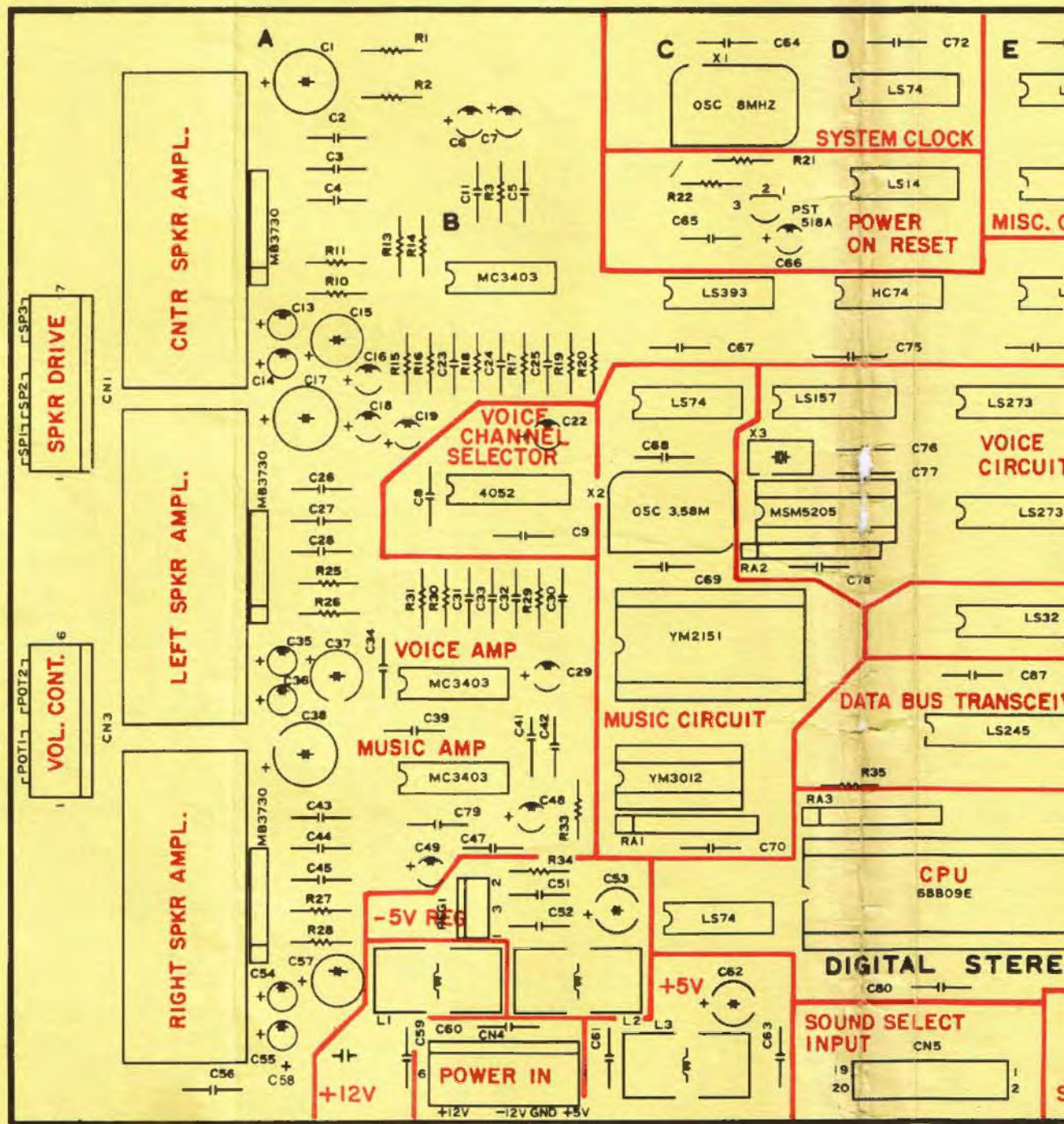




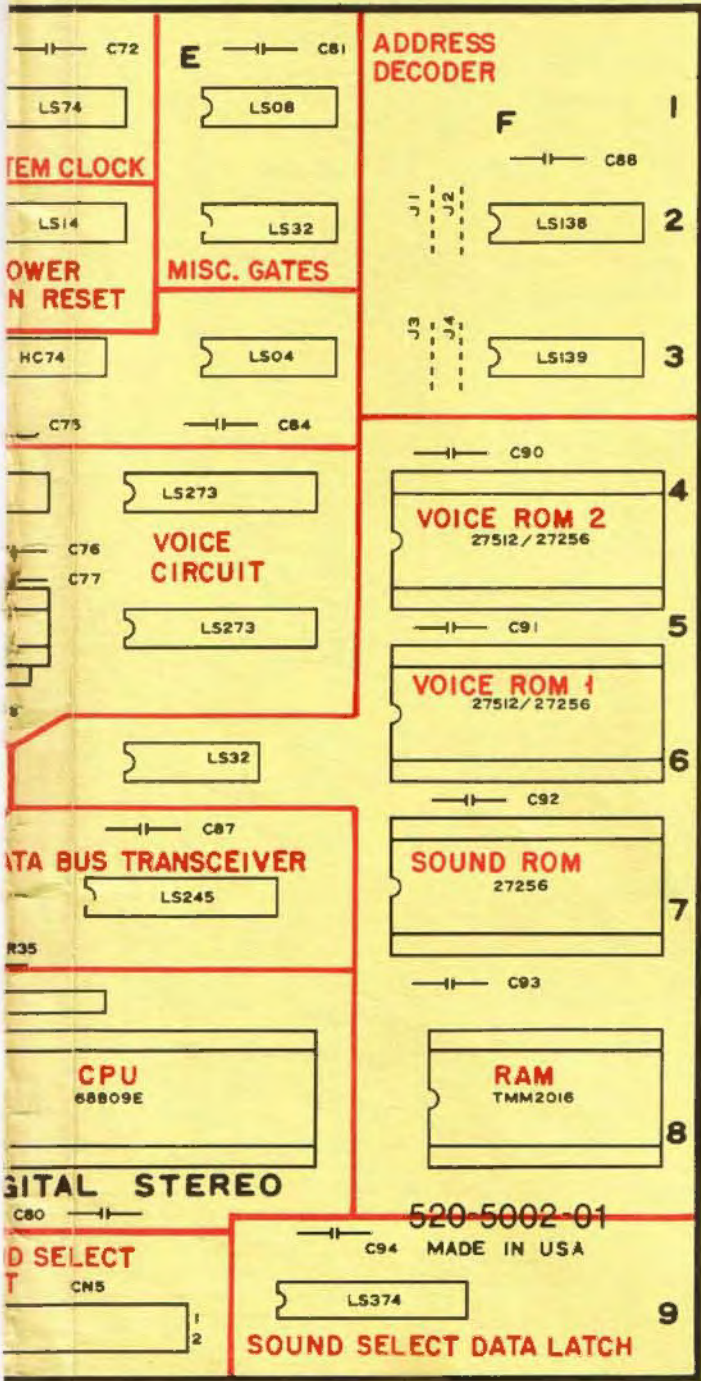


Power Supply Servicing Diagrams



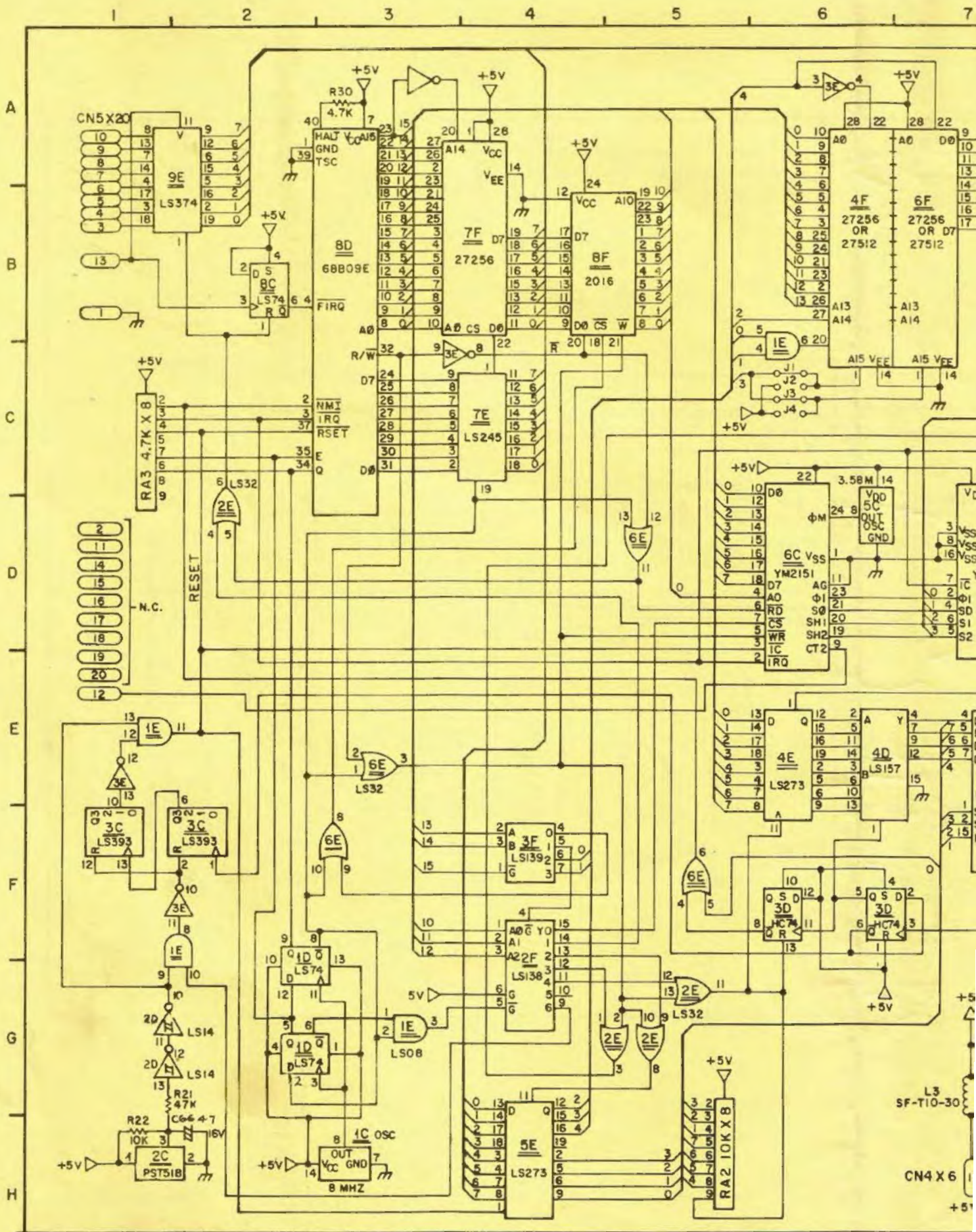


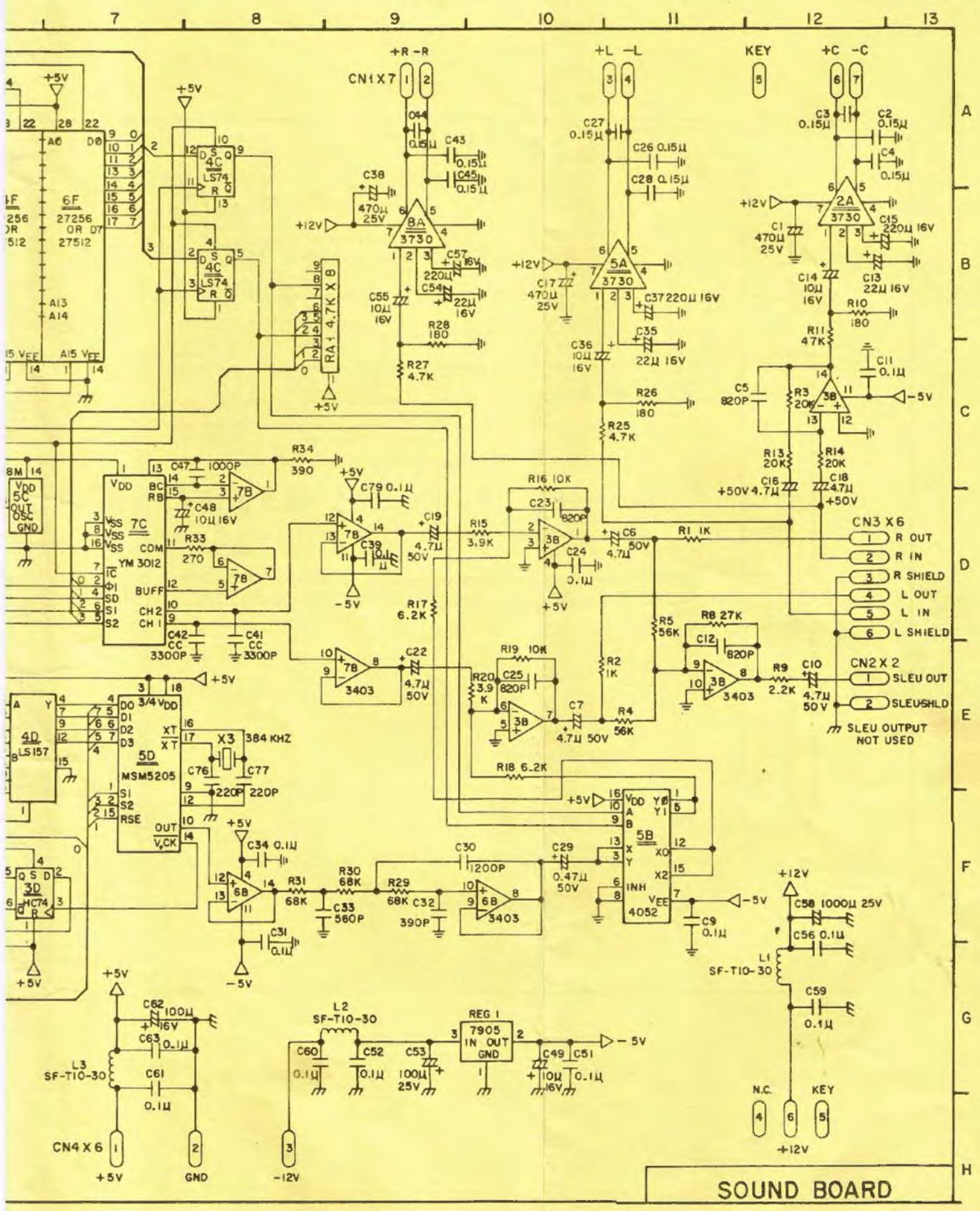
Sound Board Assembly Drawing



520-5002-01

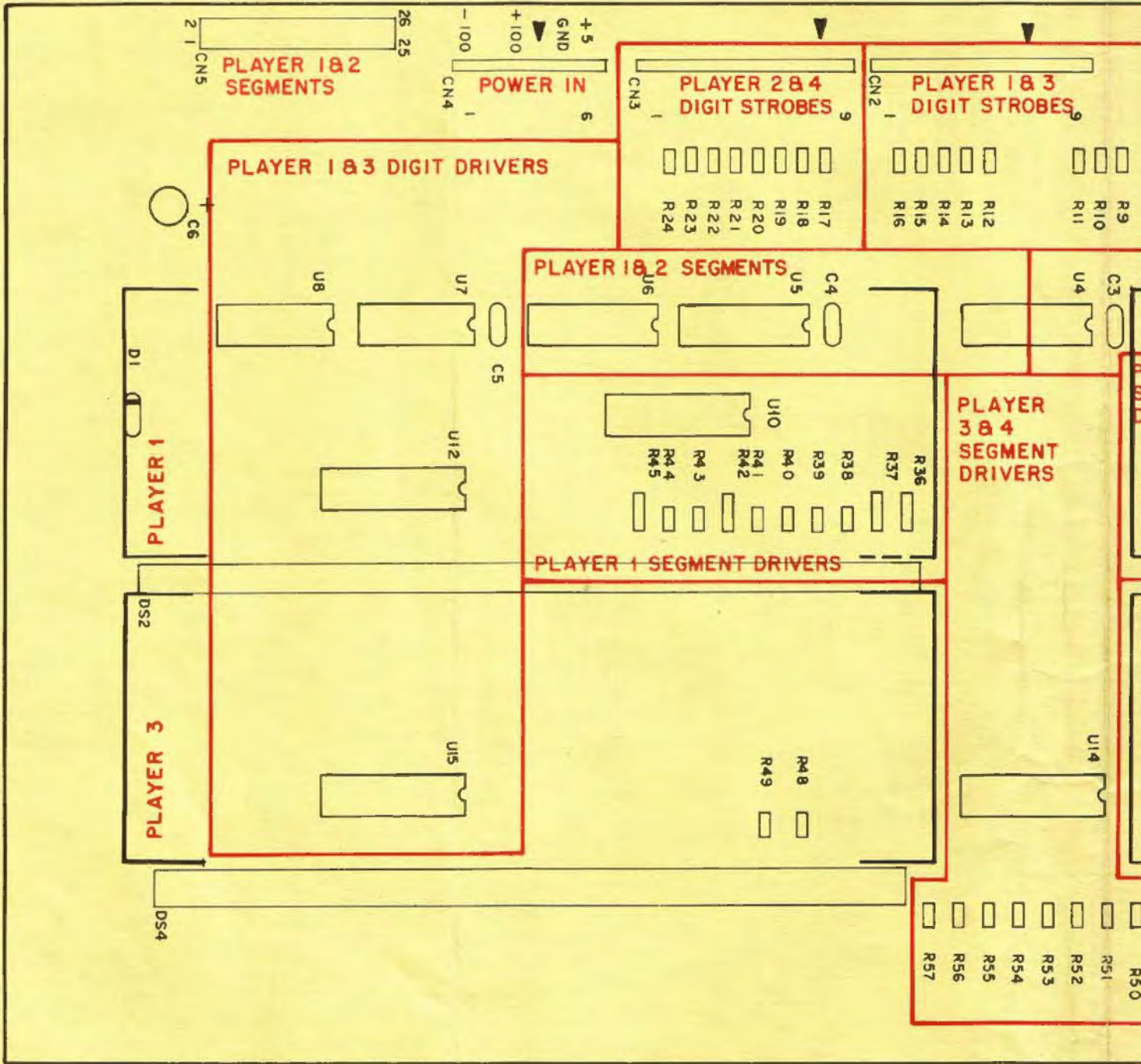
MADE IN USA





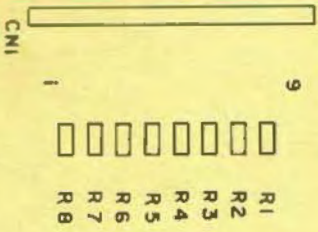
SOUND BOARD

Sound Board Logic Diagram



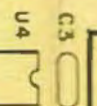
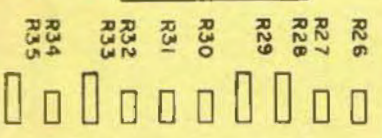
8 3
OBES

**PLAYER 3 & 4
SEGMENTS**

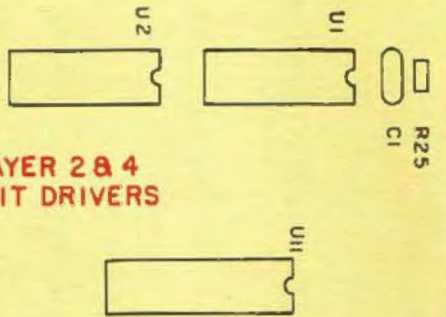


ER
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**PLAYER 2
SEGMENT
DRIVERS**



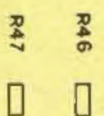
**PLAYER 2 & 4
DIGIT DRIVERS**



PLAYER 2

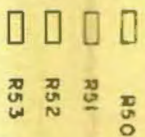
PLAYER 4

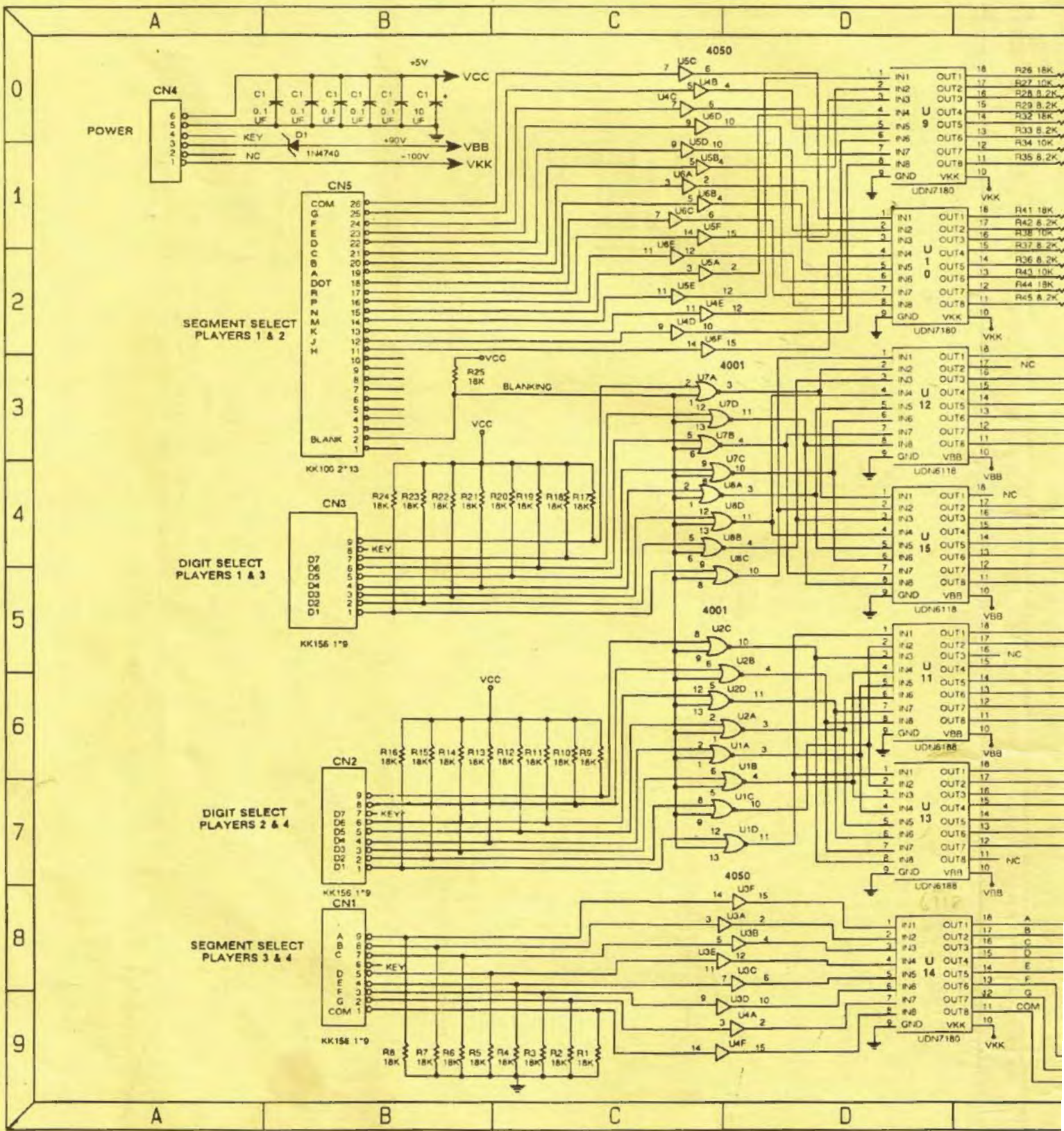
DS1



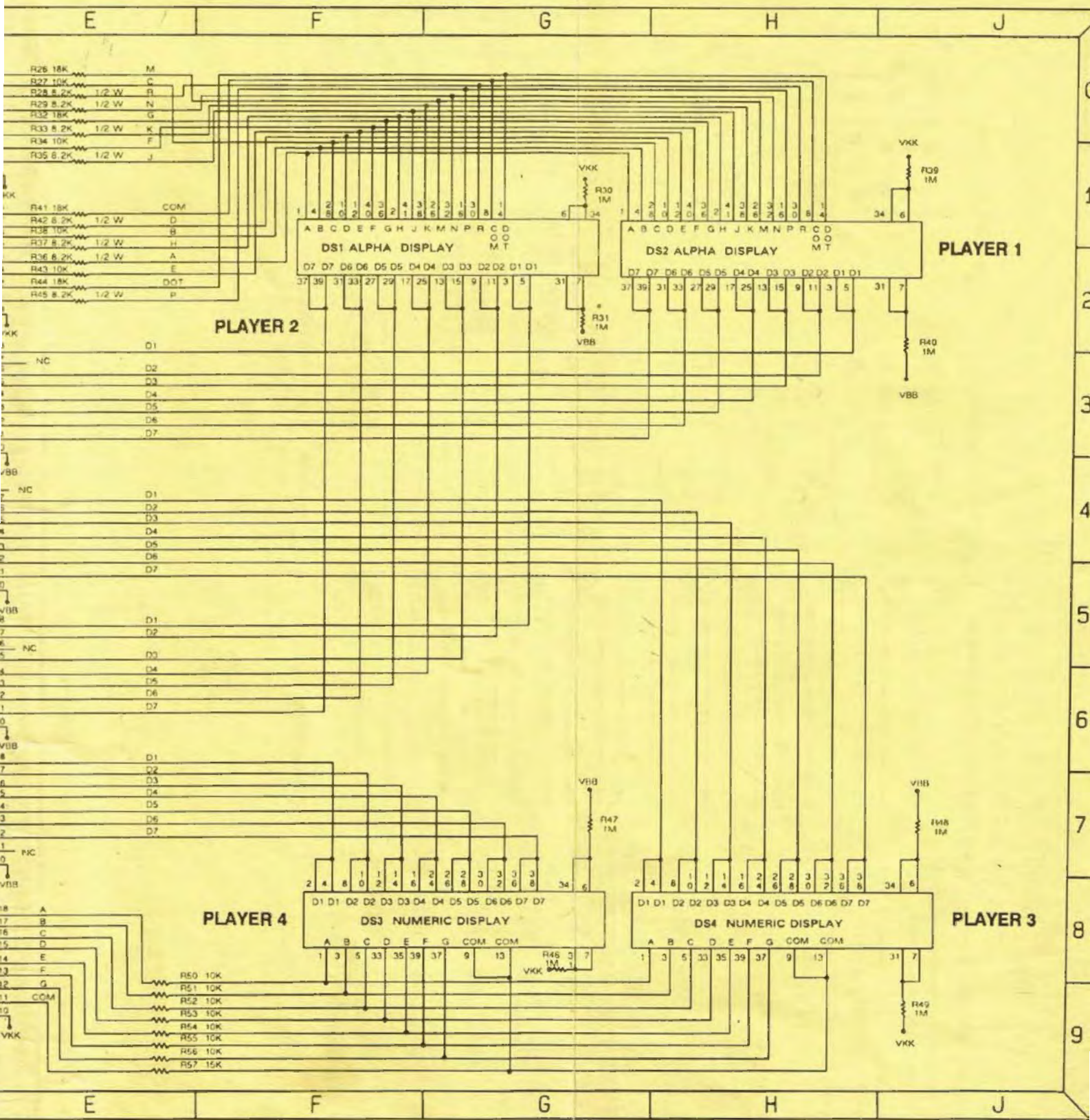
U14

DS3

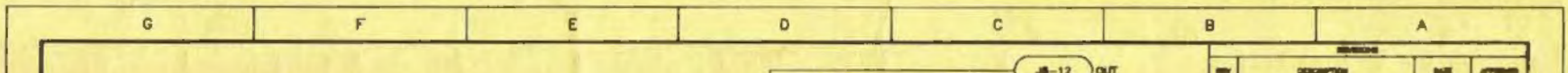
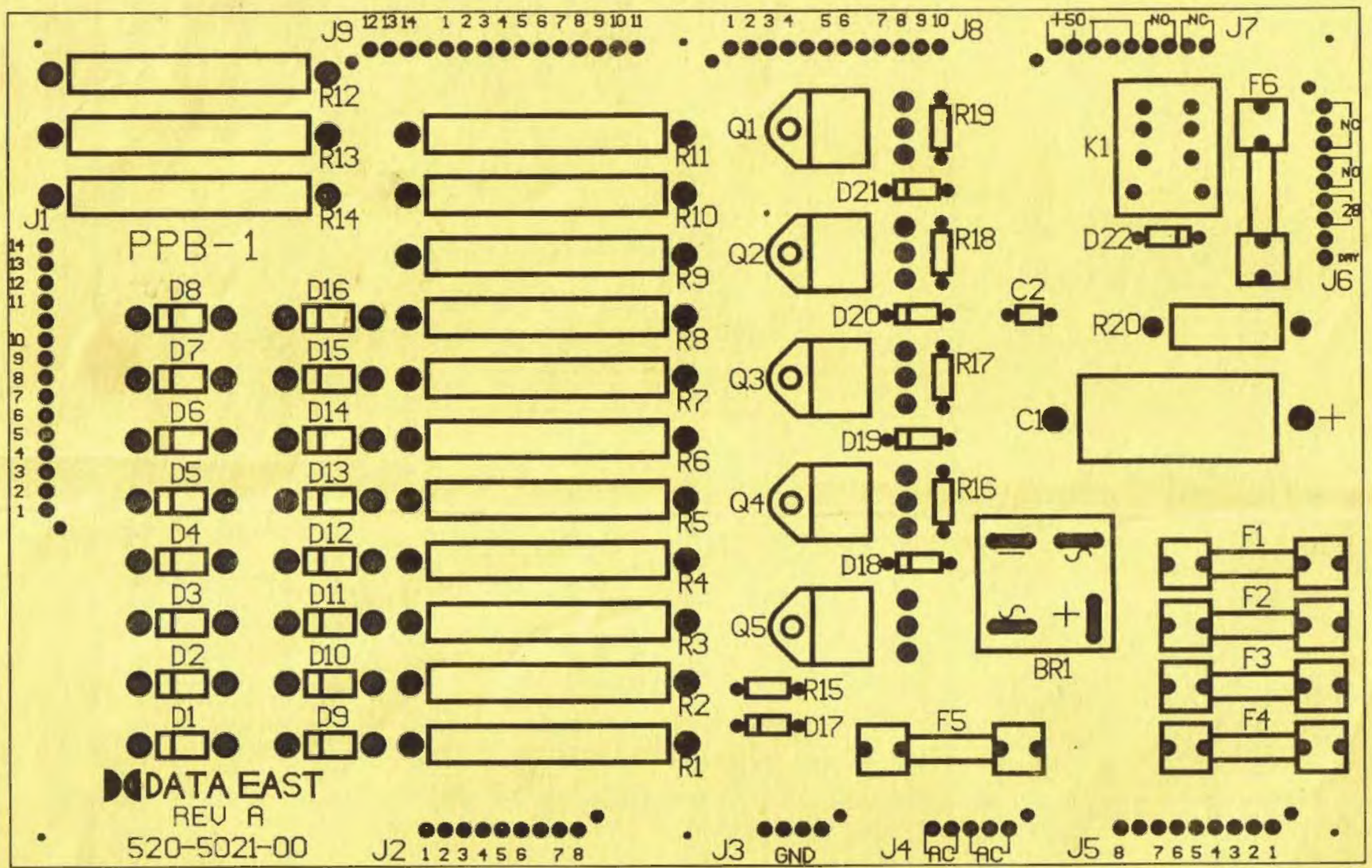


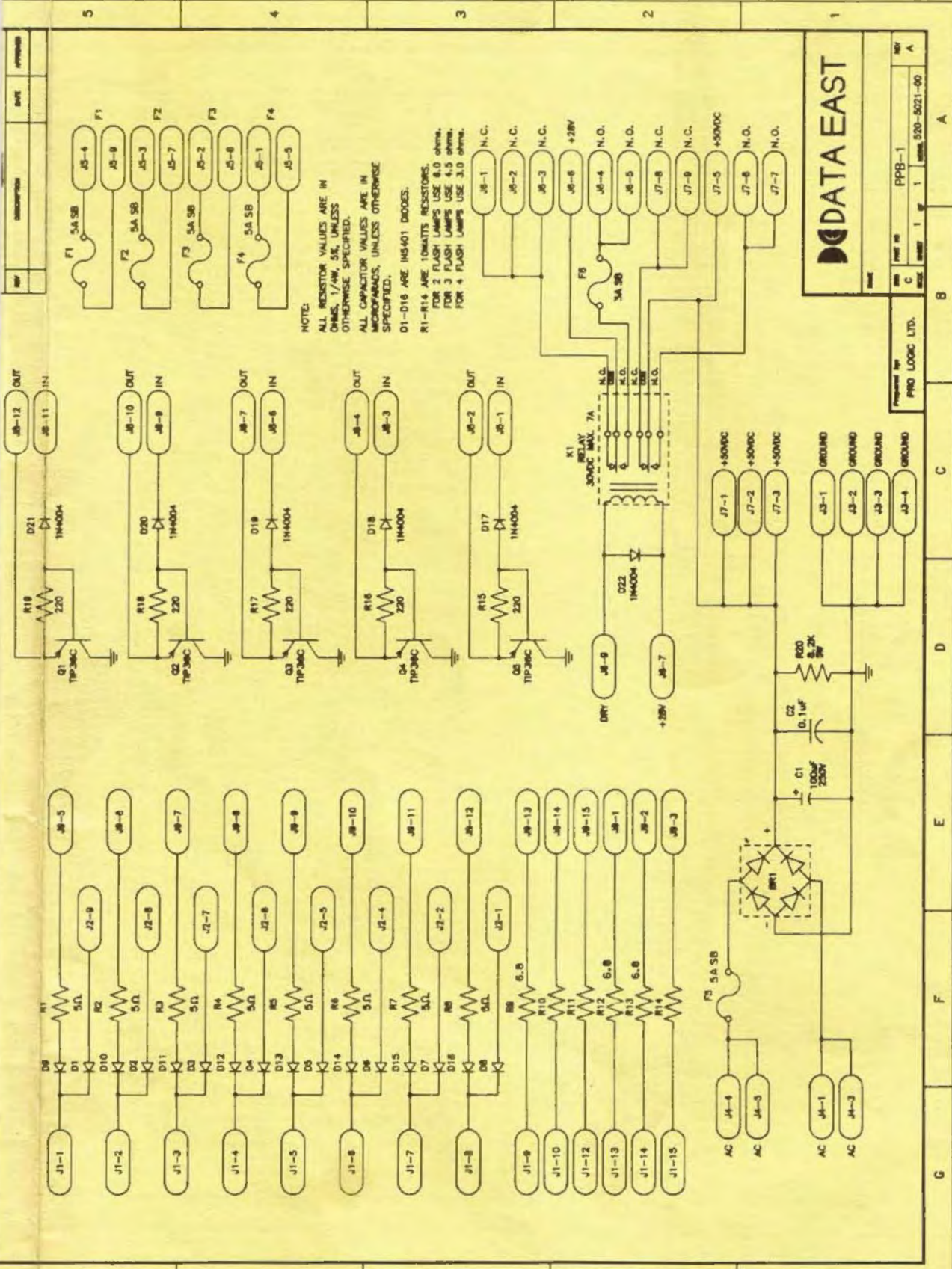


All done
5/20/78
6/1/78



Combined Display Logic Diagram





NOTE:
 ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
 ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
 D1-D16 ARE 1N5401 DIODES.
 R1-R14 ARE 10MILTS RESISTORS, FOR 2 FLASH LAMPS USE 8.0 ohms, FOR 3 FLASH LAMPS USE 4.5 ohms, FOR 4 FLASH LAMPS USE 3.0 ohms.

DATA EAST

Model: PPB-1

Serial: 520-5021-90

Rev: A

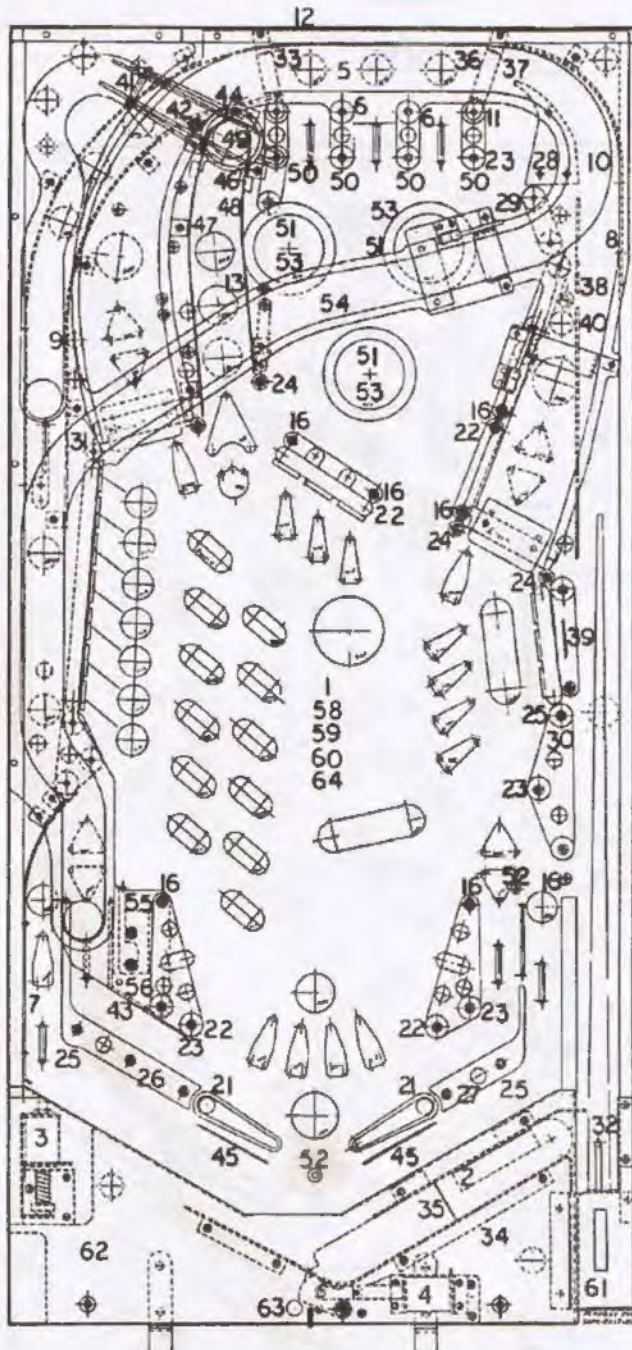
5 4 3 2 1

G F E D C B A

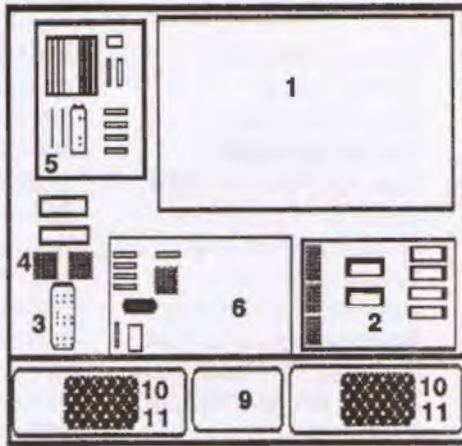
Playfield Top Parts

Item	Description	Part Number
1.	Completely Assmbl'd Plyfld.	500-5135-00
2.	Outhole side Brkt. & plate	500-5043-00
3.	Laser Kick Assembly	500-5080-00
4.	Outhole Assembly	500-5082-00
5.	Right Ramp Assembly	500-5083-00
6.	2" Hex Spacer (2)	254-5008-07
7.	Laser Kick Ball Guide	500-5113-00
8.	Shooter Ln. Ball Guide	500-5114-00
9.	Grotto Ball Guide	500-5117-00
10.	Mansion Assembly	500-5140-00
11.	1" Hex Spacer	254-5008-06
12.	Back Panel Assy	500-5145-00
13.	Spinning Target	500-5050-02
14.*	Spin.Tgt.Mtg.brkt Right	535-5259-01
15.*	Spin.Tgt.Mtg.brkt Left	535-5259-02
16.	Metal Stand-off (12)	530-5035-01
17.*	Spinning Tgt.Sw Act.	535-5309-01
18.*	Spinning Tgt.Wshrs (2)	545-5037-00
19.*	Spinning Tgt.Decal Frnt.	820-5205-01
20.*	Spinning Tgt.Decal Back	820-5205-02
21.	Flipper Bat Assembly (2)	515-5133-01
22.	Acorn Nut (25)	240-5000-00
23.	Jewel Post 1 1/32" Red (26)	545-5013-02
24.	Top Thread.Mach.Post (5)	530-5007-00
25.	1/2" Plastic Spacer (19)	254-5000-01
26.	Left Rtn Lane Ball Guide	535-5429-00
27.	Right Rtn Lane Ball Guide	535-5428-00
28.	Ball Guide	535-5438-00
29.	1/2" Hex Spacer (3)	254-5008-03
30.	5/8" Hex Spacer (4)	254-5008-02
31.	Bumper Post	530-5057-00
32.	Side Rail Guard	535-5008-00
33.	Flap Gate Assy.	515-5205-00
34.	Outhole Main Brkt	535-5232-00
35.	Outhole Rebound Wire Gate	535-5318-00
36.	Gate Mounting Brkt.	535-5269-04
37.	Gate Rebound Wire Form	535-5314-01
38.	3" Straight Wire Form	535-5300-02
39.	1" Straight Wire Form	535-5300-05
40.	8" Straight Wire Form	535-5300-08
41.	VUK To Grotto Channel	535-5342-00
42.	Bumper Post	530-5075-00
43.	Left Flip.Feed Wire Form	535-5350-00
44.	Wire Form	535-5303-00
45.	Flipper Snubber Wire (2)	535-5373-00
46.	VUK Ball Rebound Wire	535-5365-00
47.	Left VUK Ent.Flt.Rail	535-5430-00
48.	Right VUK Ent.Flt.Rail	535-5436-00
49.	VUK Ball Stop Brkt	535-5273-00
50.	Light Hood-Red (4)	545-5011-02
51.	Red Pop Bumper Cap (3)	545-5035-22
52.	Mini Post (3)	530-5004-00
53.	Pop Bumper Decal (3)	820-5305-00
54.	Left Ramp Assy.	545-5111-00
55.	Champ.Kicker Ball Guide	535-5123-00
56.	Chmp.Kck.Ball Gd Mtg Brkt	515-5195-00
57.	Complete Decal Sheet	820-5018-xx
58.	Playfield Mylar	820-5805-00
59.	Screened Plastic Set	830-5405-xx
60.	Screened Playfield	830-5105-00
61.	Shooter Gauge	830-5505-02
62.	Bottom Arch	830-5505-01
63.	Bottom Arch Grommet	280-5002-00
64.	Playfield Glass (Tempered)	660-5001-00

* Not Shown



BACKBOX PARTS ILLUSTRATION

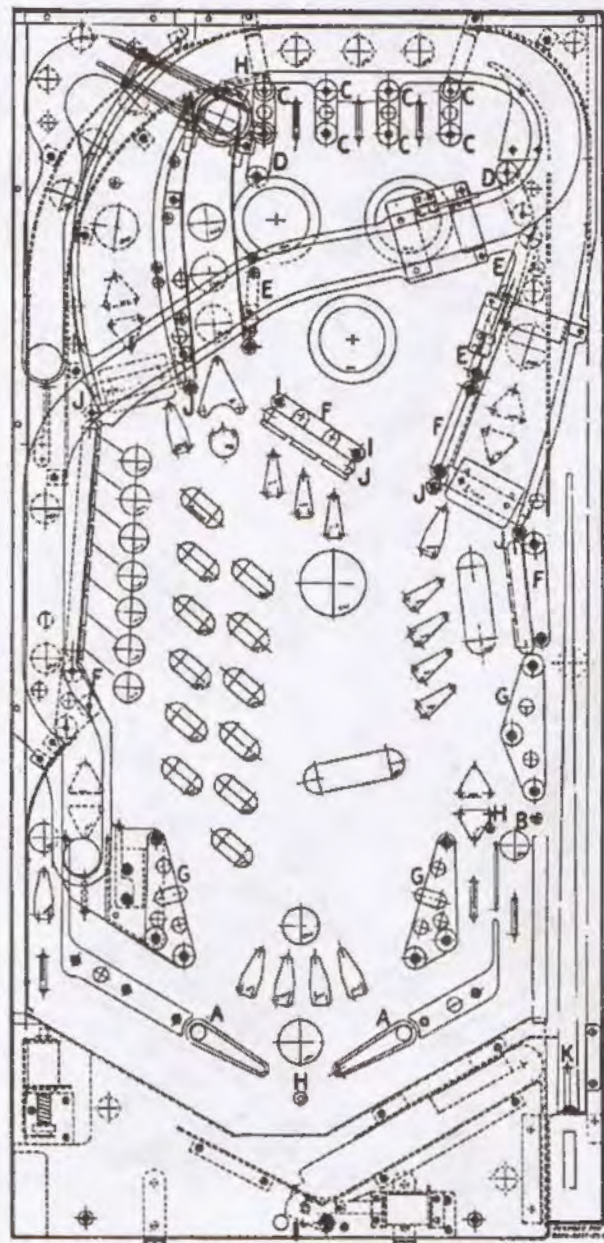


Item	Description	Part No.
1	CPU Board Assy.	520-5003-02
2	Sound Board Assy	520-5002-01
3	Capacitor 2C1	125-5000-00
4	Bridge Rectifiers	112-5000-00
5	Power Supply Bd. Assy	520-5000-00
6	PPB Board	520-5021-03
7	Combined Display Bd Assy*	520-5014-01
8	Backglass Picture*	830-5205-01
9	Speaker Housing	500-5133-05
10	Speakers (2)	031-5002-00
11	Speaker Grill (2)	545-5087-00
12	Back Box Glass*	830-5203-00

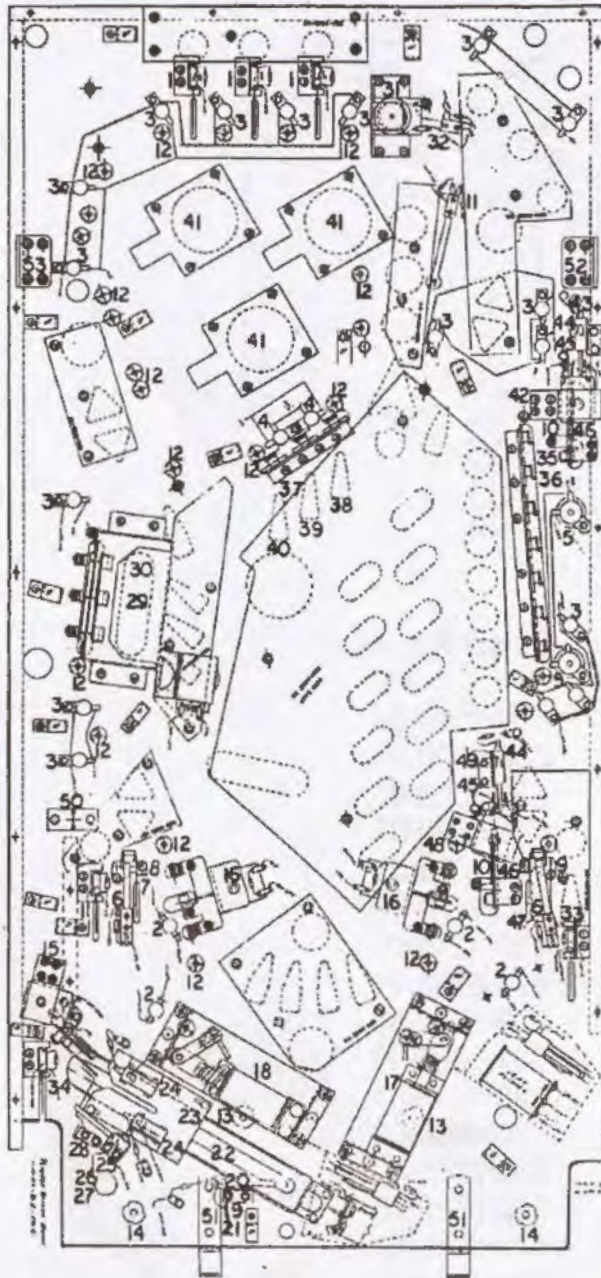
* Not Shown

RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A.	Red Flipper (2)	545-5024-02
B.	$\frac{3}{16}$ " (1)	545-5025-01
C.	$\frac{5}{16}$ " (7)	545-5025-02
D.	1" (2)	545-5025-05
E.	$1\frac{1}{4}$ " (3)	545-5025-06
F.	$1\frac{1}{2}$ " (4)	545-5025-07
G.	$2\frac{1}{2}$ " (3)	545-5025-09
H.	$\frac{7}{16}$ " (3)	545-5025-17
I.	Post (2)	545-5151-00
J.	Black Rubber Post (5)	545-5009-00
K.	Plunger Tip	545-5027-00

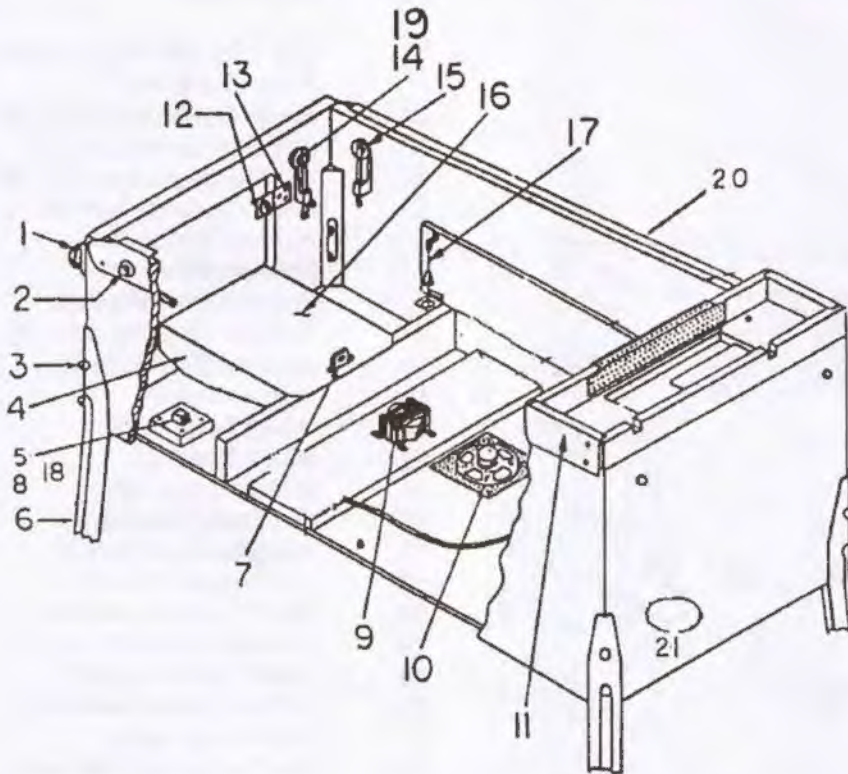


Playfield Bottom Parts



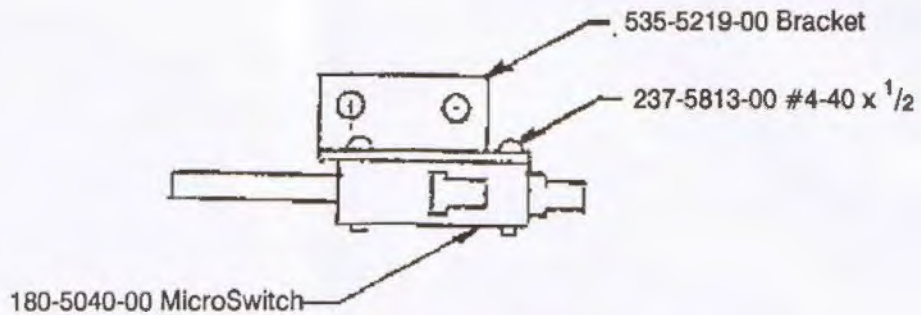
Item	Description	Part Number
1.	Top Lane and Right Flipper Return Sw.& Brkt.(4)	515-5138-00
2.	Staple Down Lamp Sckt.(4)	077-5000-00
3.	Stand up Lamp Sckt.(17)	077-5010-00
4.	Tall Stand-up LampSckt (2)	077-5009-00
5.	#89 Bulb Lamp Sckt.(2)	077-5102-00
6.	Rollover Switch (2)	180-5003-00
7.	Rollover Wire Form	535-5315-01
8.	Rollover Wire Mtg.Brkt.	535-5238-01
9.	Rollover Wire Mtg.Brkt. (3)	535-5238-02
10.	Rollover Wire Form (2)	535-5352-00
11.	Spinner Switch	180-5004-00
12.	#6-32 T-Nut (29)	240-5002-00
13.	#8-32 T-Nut (2)	240-5101-00
14.	#10-24 T-Nut (2)	240-5200-00
15.	Ball Feed Cam Assy.	500-5012-00
16.	Slingshot Assembly (2)	500-5077-00
17.	Left Flipper Assembly	500-5031-52
18.	Right Flipper Assembly	500-5031-51
19.	Outhole Sw.& Brkt. Assy.	500-5040-00
20.	Outhole Micro Switch	180-5011-00
21.	Outhole Micro Switch Brkt.	535-5219-00
22.	Ball Trough Ramp	535-5026-00
23.	Ball Trough Sw.Plate Assy.	500-5041-00
24.	#1 and #2 Trough Sws.(2)	180-5009-00
25.	#3 Trough Sw. w/Bracket	500-5049-00
26.	#3 Trough Micro Switch	180-5010-00
27.	#3 Trough Sw.Mtg.Brkt	535-5212-00
28.	#3 Trough Sw.Act. Wire	500-5042-00
29.	3 Bank Drop Tar.Assy.	500-5055-31
30.	Drop Target Decal (3)	820-5104-00
31.	Vertical Up Kicker	500-5067-00
32.	VUK Switch	180-5041-00
33.	Laser Kick Sw.& Bracket	500-5142-00
34.	Shooter lane Sw. & Bracket	500-5143-00
35.	7 Bank Standup Tgt. Assy.	515-5145-00
36.	7 Bank Standup Tgt.Sticker	820-5105-00
37.	3 Bank Standup Tgt Assy.	500-5103-08
38.	Ostrich Sticker (Left Tgt.)	820-5105-01
39.	Monkey Sticker (Cntr.Tgt.)	820-5105-02
40.	Swan Sticker (Right Tgt.)	820-5105-03
41.	Pop Bumper Assembly (3)	500-5034-00
42.	Grotto Kickbig Assy	500-5053-00
43.	Grotto Switch and Brkt Assy.	515-5084-00
44.	Kickbig Switches(2)	180-5040-00
45.	Kickbig Switch Brkts.(2)	535-5219-00
46.	Kickbig R.O. Wire Form (2)	535-5352-00
47.	Rollover Wire form	535-5315-02
48.	Champagne Kicker Assy.	500-5053-03
49.	Champagne Kick Sw.w/Brkt	515-5084-01
50.	Outlane Adjustment Plate	535-5091-00
51.	Playfield Support Brkt.(2)	535-5216-00
52.	Playfield Hinge (L)	535-5222-00
53.	Playfield Hinge (R)	535-5223-00

CABINET PARTS ILLUSTRATION

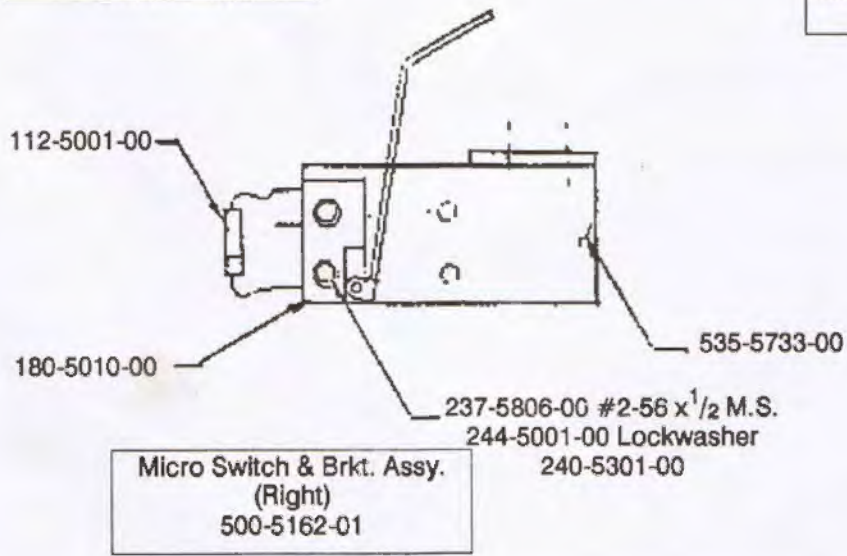
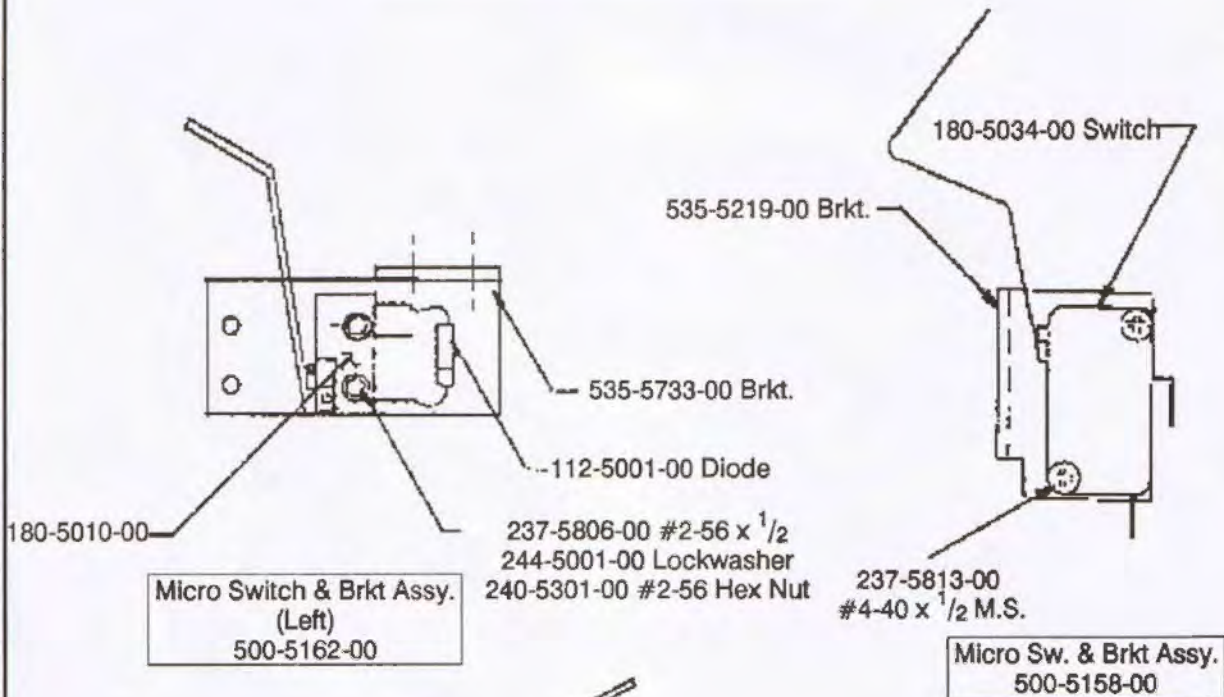


Item	Description	Part No.
1	Ball-shooter Assy	500-5019-04
2	Flipper Button	500-5026-02
3	Leg Bolt (Chrome)	231-5000-00
4	Cash Box Bottom	545-5090-00
5	On/Off Switch DP/ST	180-5001-00
6	Leg (Chrome)	535-5020-00
7	Lock Bracket-Cash Box	535-5215-00
8	Power Input Box Assy	515-5153-01
9	Transformer	010-5002-00
10	Speaker-Round (6")	031-5000-00
11	Side Armor-Right	535-5010-01
12	Memory Protect Switch	180-5000-00
13	Memory Protect Switch Bracket	535-5225-00
14	Start Switch	500-5026-02
15	Tungston Switch-Flipper	180-5048-00
16	Cash Box Top	535-5013-01
17	Plumb Bob Tilt Mech. Assy	500-5023-00
18	Volume Control	123-5000-00
19	Playfield Glass (Tempered)	660-5001-00
20	Side Armor -Left	535-5010-02
21	Line Cord Receptacle	545-5122-00

UNIQUE GAME PARTS

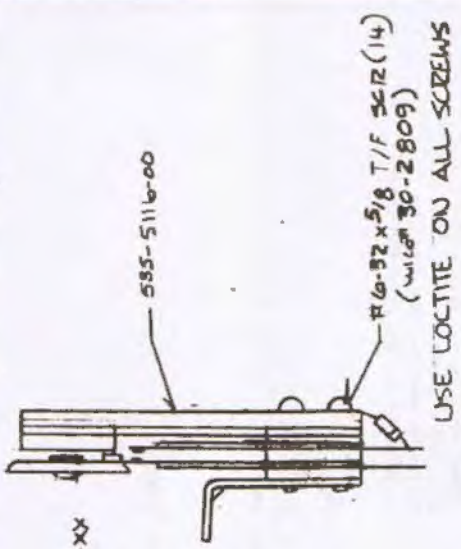
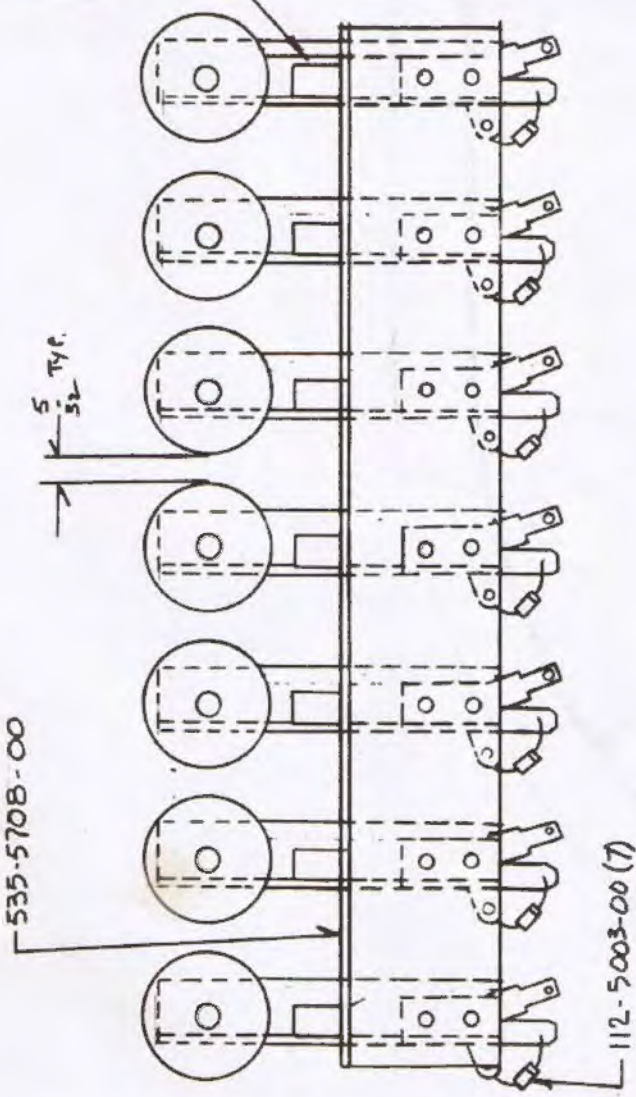


Micro Sw. & Bracket Assembly
 515-5084-01 Left (Shown)
 515-5084-00 Right



OPAQUE CLEAR

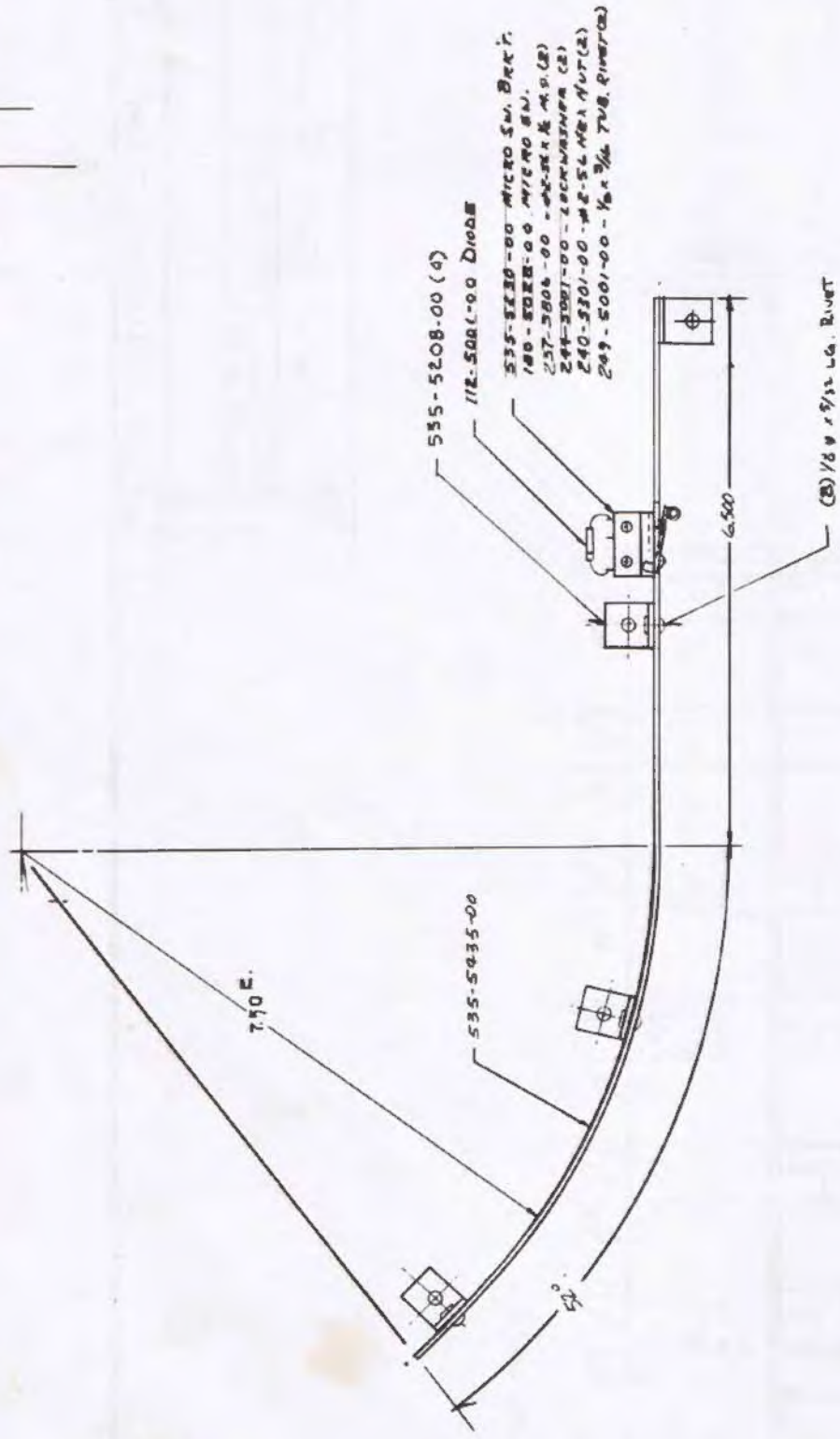
PART NO.	PART NO.	COLOR-CR.
515-5145-11	515-5145-01	CLEAR
-12	-02	RED
-13	-03	AMBER
-14	-04	GREEN
-15	-05	BLUE
-16	-06	YELLOW
-17	-07	ORANGE
-18	-08	WHITE
-19	-09	YELLOW-NT/P



SCALE: FULL		APPROVED BY	DRAWN BY
DATE: 8-16-88			CF
ADD-11719 T POS.			
4	7 BK. STAND UP TGT. ASSY	DRAWING NUMBER	
	P/B	515-5145-XX	

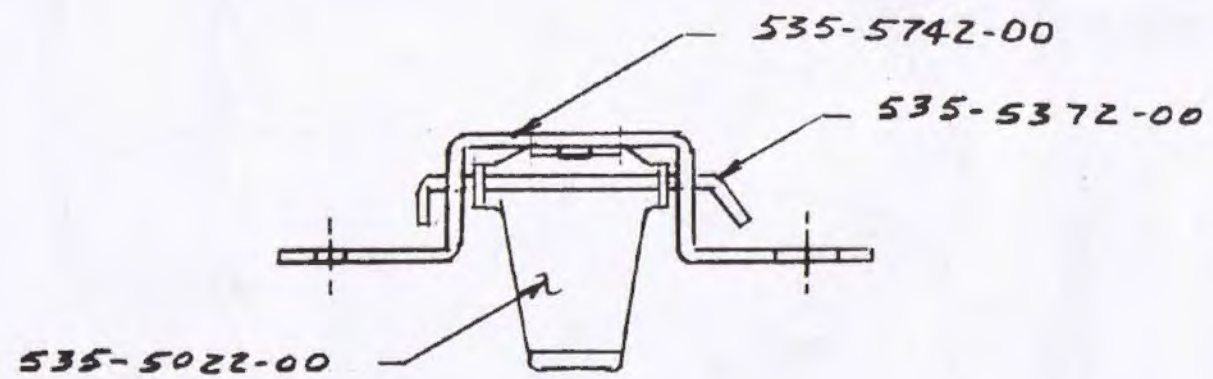
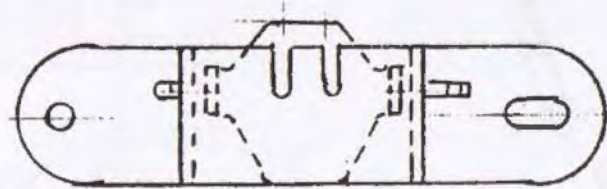
DATA EAST PINBALL

REV.	DESCRIPTION	DATE



DATA EAST USA, INC.	
SCALE: FULL	APPROVED BY: DENBY/DK
DATE: 7.28.69	
BALL GUIDE ASSEMBLY 500-S117-00	
LEF.	

REV	DESCRIPTION	BY	DATE	APP
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PLAYBOY

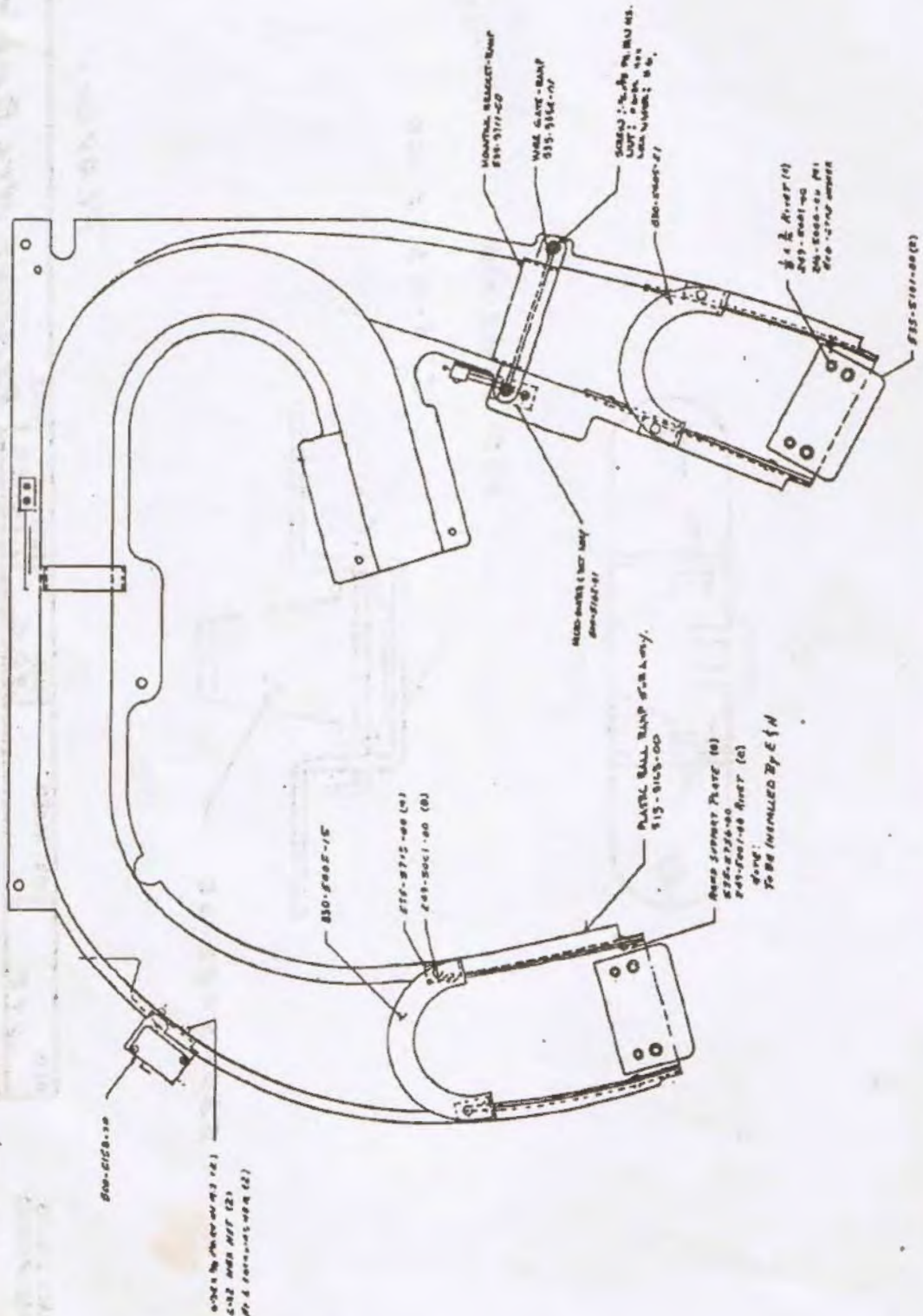
TOLERANCE UNLESS OTHERWISE SPECIFIED

DIM. X.X ± .05 X.XXX ± .005
 X.XX ± .015 X.XXXX ±

ANGULAR FRACTIONAL ± 1/64
 XX ± 5°
 XXX ± 1°

REQ. <i>ONE</i>	NEXT ASSEM.	DWN. <i>ED.C.</i>	DATE <i>1-25-89</i>	TITLE <i>REBOUND MT& BRK'T. ASS'Y</i>
MAT. <i>NOTED</i>		CHKD.	SCALE <i>FULL</i>	
H.T. <i>-H-</i>		DATA EAST PINBALL, INC. 1990 JANICE AVE., MELROSE PARK, IL. 60160		PART NO. <i>515-5205-00</i>
FIN. <i>-H-</i>				

Plastic Ramp Final Assembly



Babcock's 7-Digit, 7-segment, Gas-Plasma Display is designed for coin-op pinball games. The flat display has a wide viewing angle and a bright neon-orange output and is easily read at distances up to 35 feet (10 meters). Legibility is assured by the 0.7-inch-high numbers, and bright, 210 fL (720 cd/m²) output. The display has an attached, hermetically sealed, lead system for added protection in humid environments.

In most applications, this part is a direct substitute for any of the following industry standard models:

CROSS REFERENCE GUIDE

BECKMAN	CHERRY	DISPLAY'S INC
SP-493/SP-494	W07-1007	AR07700

FEATURES

- 0.7 inch (17.8 mm) digit height
- Numeric, 7-segment digits
- 7-digit field width
- Decimal point and comma in six digits positions.
- Superior lead integrity and reliability
- Luminance - 210 fL (720 cd/m²) at 1/7 duty cycle

SPECIFICATIONS

Absolute Maximum Ratings

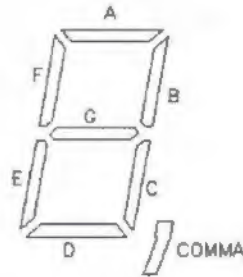
PARAMETER	MIN	MAX	UNITS
Voltage Differential between any to terminals		250	V(dc)
Current (Duty Cycle = 1/16)		5.0	mA
Storage Temperature	-40	+85	°C
Operating Temperature	-10	70	°C

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
Anode Supply Voltage	V _{bb}	170	180	210	V(dc)
Anode Voltage Swing			60		V(dc)
Anode to Cathode Voltage Drop at I _k (TYP)	V _{op}		145		V(dc)
Current, "b" segment (Duty Cycle = 1/7)	I _k	3.0	3.4	3.8	mA
Current, "b" segment (Duty Cycle = 1/16)(1)	I _k	3.6	4.1	4.5	mA
Current, Keep-alive (2)	I _{ka}	25	50	100	□A
Anode on-time			500		□s
Interdigit Blanking (Duty Cycle = 1/7)			50		□s
Refresh Period			10	16	ms
Initial Ionization Time				5	Sec

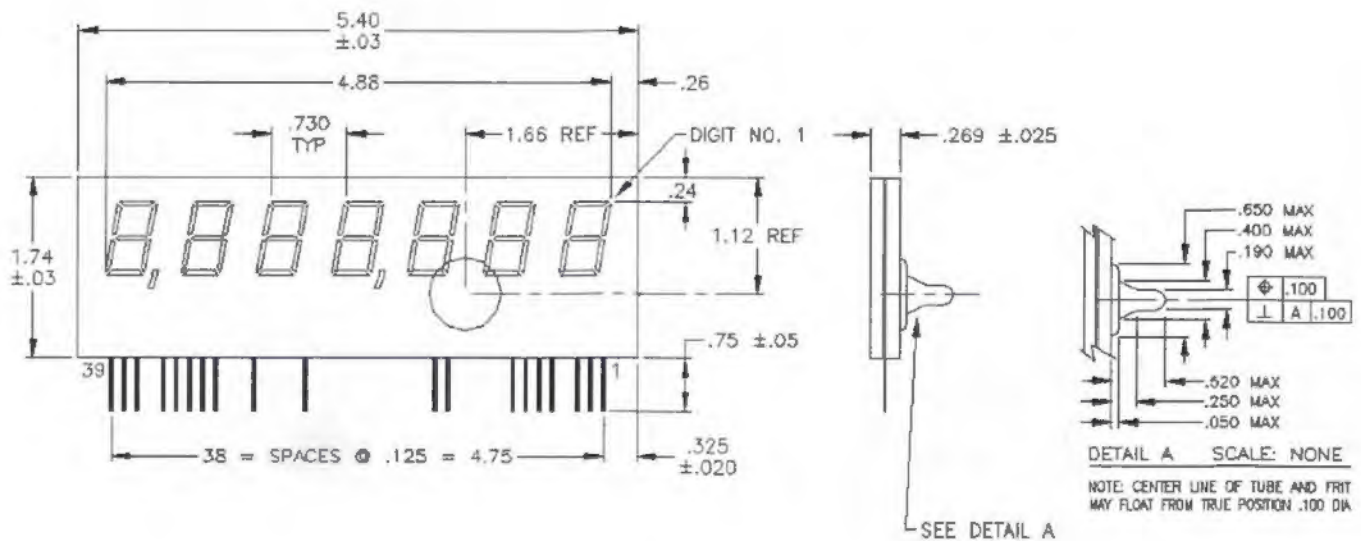
- (1) Typical Luminance is 100 fL at 1/16 duty cycle.
- (2) Use of the Keep-alive cathode is recommended for multiplexed operation.
- (3) Accept for decimal point and comma, all segment currents are equal. Set the decimal and comma currents to 0.27 and 0.40 times the segment current respectively.

SPECIFICATIONS ARE FOR REFERENCE ONLY



Terminal/Assignments

Terminal No.	Segment/Function	Terminal No.	Segment/Function
1	a	24	Anode-4
2	Anode-1	25-27	N/C
3	b	28	Anode-5
4	N/C	29,30	N/C
5	c	31	K.A. Cathode (L)
6	K.A. Anode (R)	32	Anode-6
7	K.A. Cathode (R)	33	D
8	Anode-2	34	K.A. Anode (L)
9-12	N/C	35	e
13	Comma	36	N/C
11	N/C	37	g
14	Anode-3	38	Anode-7
14, 16	Anode 3	39	f
15-23	N/C		



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