

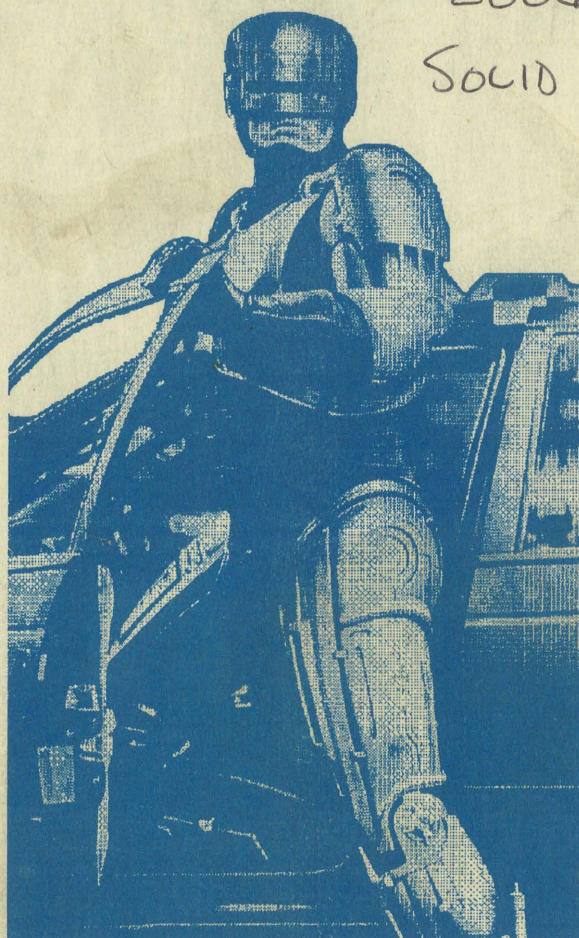


ROBOCOP™

TY-FFAS1
The Future in Law Enforcement

2006

SOLID STATE



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DATA EAST PINBALL®

CPU JUMPER TABLE

Game	CPU* Version	ROM Location	Jumpers	
			Installed	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
ABC M.N. Football	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Robocop	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)

Five individual fuses for the Turbo Bumpers and Slingshots- 2.5A Slo-Blo

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780-5006-01

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

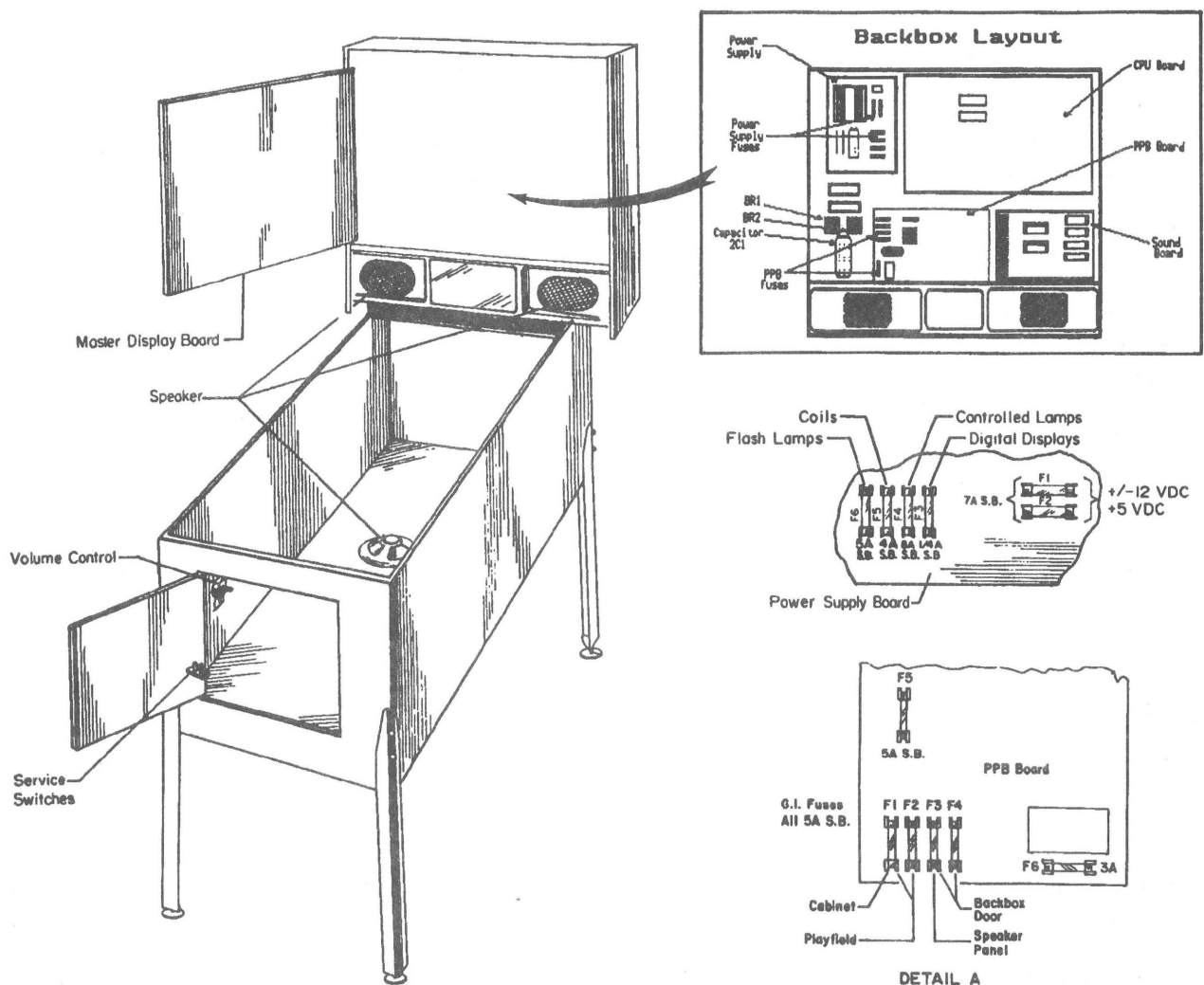
To reduce the possibility of damage, observe the following precautions whenever transporting the game. Lower the backbox and secure it to the cabinet. Remove the legs and secure the game within the transporting vehicle.

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 says "Robocop" for the first credit and generates sounds 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 13 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 34) so make sure that E Ad 34 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 make a sound 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

Multiball - Shoot all the targets of each bank to complete each Prime Directive (Green, Yellow or Red). After successfully completing each bank (color) shoot the Ramp to make an Arrest (Lock Ball). Locking the 3rd ball causes the game to enter Multiball mode and lights the Jackpot feature.

Jackpot - While in Multiball, shoot the targets to advance the Jackpot Value shown on the Displays. Successfully jumping the ramp collects the Jackpot Value.

100K Top Lane - At the beginning of each ball, two ball guides will begin flashing. Completing the shooter lane shot through this lane will award 100,000 points multiplied by the ball number.

209 Top Lanes - Each lane spots a target for its corresponding color. Completing all 3 Lanes advances the Bonus Multiplier to 2x, 3x, 4x & 5x.

ED 209 Million - After each target color is completed (Green, Yellow, or Red). Shoot the flashing Sight Lamps to enable the ED 209 Million feature on the Ramp. While the feature is enabled (ED 209 Mumbling) complete the ramp shot to collect 1 Million points.

Special - After the Jackpot is awarded, shoot the targets to light the Ramp Special. Then complete the ramp shot to collect the Special.

Scanner - Each shot to the right eject kicker awards the Mystery Sanner Value (Shown in the Displays). The shot also spots a letter in the word R-O-B-O-C-O-P. When the word is completed an Extraball is Awarded.

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

AUDIT FUNCTIONS

GENERAL

There are 70 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 68 less-used audits (E AU13 through E AU70), 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 Ad17 and E Ad18 to E Ad54) begin after the last audit function (AU12 or E AU70). 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.

ROBOCOP Audit Table

Audit Number (Player 3 Display)	Audit Description (Players 1 & 2 Displays: totals in Player 4 Display)	Audit Number (Player 3 Display)	Audit Description (Players 1 & 2 Displays: totals in Player 4 Display)
	ROBOCOP PROM ID		
AU 01	Total Paid Credits	E AU 36	Bodd Lit
AU 02	Percent Free	E AU 37	Jones Lit
AU 03	Ball Time Average	E AU 38	Emil Arrest
AU 04	Coins Left	E AU 39	Bodd Arrest
AU 05	Coins Right	E AU 40	Jones Arrest
AU 06	Coins Center	E AU 41	Laser Kick Used
AU 07	Replay Percent	E AU 42	Laser Kick Relit
AU 08	High Score Percent	E AU 43	Right Ramp
AU 09	Extra Ball Total	E AU 44	Ramp Jumped
AU 10	Extra Ball Percent	E AU 45	Percent Jumped
AU 11	Cycles Burn-In	E AU 46	Upper Eject
AU 12	Expand Audits (ON/OFF)	E AU 47	Right Eject
E AU 13	Plays Total	E AU 48	Eject Extra Ball
E AU 14	Free Total	E AU 49	Jackpot Lit
E AU 15	Replay Total	E AU 50	Jackpot Made
E AU 16	Special Total	E AU 51	100K Points Made
E AU 17	Special Percent	E AU 52	Special Lit
E AU 18	Match Total	E AU 53	Special Made
E AU 19	Hi Score Wins	E AU 54	2X Scores
E AU 20	Playtime	E AU 55	Bonus Hold
E AU 21	Balls Total	E AU 56	ED 209 Lit
E AU 22	1 Replay Awards	E AU 57	ED 209 Made
E AU 23	2 Replay Awards	E AU 58	2x Bonus
E AU 24	3 Replay Awards	E AU 59	3x Bonus
E AU 25	4 Replay Awards	E AU 60	4x Bonus
E AU 26	Games 1Player	E AU 61	5x Bonus
E AU 27	Games 2Player	E AU 62	Green Target Practice
E AU 28	Games 3Player	E AU 63	Yellow Target Practice
E AU 29	Games 4Player	E AU 64	Red Target Practice
E AU 30	Attract Cycles	E AU 65	Target Practice Made
E AU 31	Cycles H.S. Reset	E AU 66	Buy In Games
E AU 32	Enter 3 Ball	E AU 67	Outlane Extra Ball
E AU 33	Percent 3 Ball	E AU 68	Drain Left
E AU 34	Total Locked	E AU 69	Drain Center
E AU 35	Emil Lit	E AU 70	Drain Right

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 AU 30) 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 3 Ball (E AU33) provides the percentage of games that three ball multi-ball was accomplished.

Total Locked (E AU 34) provides the total number of balls locked .

Emil Lit (E AU35) provides the total number of times the Emil Lock Ball lamp was enabled.

Bodd Lit (E AU36) provides the total number of times the Boddecker Lock Ball lamp was enabled.

Jones Lit (E AU37) provides the total number of times the Jones Lock Ball lamp was enabled.

Emil Arrest (E AU38) provides the total number of times a ball was locked in the one of the left kickers when the Emil feature was enabled.

Bodd Arrest (E AU39) provides the total number of times a ball was locked in the one of the left kickers when the Boddecker feature was enabled.

Jones Arrest (E AU40) provides the total number of times a ball was locked in the one of the left kickers when the Jones feature was enabled

Laser Kick Used (E AU41) provides the number of times that the Laser Kick has kicked the ball.

Laser Kick Relit (E AU 42) provides the number of times that the Laser Kick was re-lit .

Right Ramp (E AU43) provides the total number of times the Right Ramp was completed.

Ramp Jumped (E AU44) provides the total number of times the Jump from the Right ramp to the Left was successfully completed.

Percent Jumped (E AU45) provides the percentage of successful jumps for Right Ramp attempts.

Upper Eject (E AU46) provides the total number of balls that have gone into the Upper Eject.

Right Eject (E AU47) provides the total number of balls that have gone into the Right Eject.

Eject Extra Ball (E AU48) provides the total number of Extra Balls awarded for going into the Right Eject when the Extra Ball feature was lit.

100K Points Made (E AU49) provides the total number of times the 100K Points feature was awarded for completing the Shooter Lane skill shot through the lit ball guides at the start of each ball.

Jackpot lit (E AU50) provides the total number of times the Ramp Jackpot Lamp is enabled.

Jackpot Made (E AU51) provides the total number of times the ramp was jumped when Jackpot feature was lit.

Special lit (E AU52) provides the total number of times the Ramp Special Lamp is enabled.

Special Made (E AU53) provides the total number of times the ramp was jumped when Special feature was lit.

2x Scores (E AU54) provides the number of times 2x Playfield Values feature was awarded.

Bonus Hold (E AU55) provides the total number of times the Bonus Hold Feature was awarded.

ED 209 Lit (E AU56) provides the total number of times the ED 209 Million lamp is enabled.

ED 209 Made (E AU57) provides the total number of times the ED 209 Million Ramp shot was completed.

2X Bonus (E AU58) provides the number of times 2x bonus was made.

3X Bonus (E AU59) provides the number of times 3x bonus was made.

4X Bonus (E AU60) provides the number of times 4x bonus was made.

5X Bonus (E AU61) provides the number of times 5x bonus was made.

Green Target Practice (E AU62) provides the total number of times Target Practice was started on the Green Bank.

Yel. Target Practice (E AU63) provides the total number of times Target Practice was started on the Yellow Bank..

Red Target Practice (E AU64) provides the total number of times Target Practice was started on the Red Bank..

Target Practice Made (E AU65) provides the total number of times Target Practice was completed. (See E Ad49)

Buy-In-Games (E AU66) provides the total number of times a game was bought into retaining Locked Balls etc.

Outlane Extra Ball (E AU67) provides the number of times the Outlane Extra Ball Feature was awarded.

Drain Left (E AU68) provides the number of times the ball drained out the left drain.

Drain Center (E AU69) provides the number of times the ball drained out the center drain.

Drain Right (E AU70) provides the number of times the ball drained out the right drain.

GAME ADJUSTMENTS

GENERAL

There are 54 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 Ad54 (Expanded Adjustment 54) 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 AU70) 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 a sound is made 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	15%
AD 02	Start Replay/Level 1 Replay	2,500,000
AD 03	Levels Replay/Level 2 Replay	01
AD 04	Level 3 Replay	-
AD 05	Level 4 Replay	-
AD 06	Easy Rules	OFF
AD 07	Factory Rules	ON
AD 08	Hard Rules	OFF
AD 09	Novelty Rules	OFF
AD 10	5 Ball Rules	OFF
AD 11	Addaball Rules	OFF
AD 12	Standard/Custom Pricing	USA2
AD 13	Time Setting	ON
AD 14	Coin Reset	OFF
AD 15	Audits Reset	OFF
AD 16	Restore Hiscr	ON
AD 17	Expand Adjustments	OFF
AD 18	Awards Replay	CREDIT
AD 19	Awards Special	CREDIT
E Ad 20	Match Feature	ON
E Ad 21	Balls/Game	03
E Ad 22	Warning Tilt	01
E Ad 23	Maximum Extra Balls	03
E Ad 24	Credits Limit	30
E Ad 25	Scores Highest	ON
E Ad 26	Credits High Score 1	03
E Ad 27	Credits High Score 2	00
E Ad 28	Credits High Score 3	00
E Ad 29	Credits High Score 4	00
E Ad 30	High Score 1 Backup	4,000,000
E Ad 31	High Score 2 Backup	3,500,000
E Ad 32	High Score 3 Backup	3,000,000
E Ad 33	High Score 4 Backup	2,000,000
E Ad 34	High Score Reset Every	700
E Ad 35	Free Play	OFF
E Ad 36	Left Coin Pulses	-
E Ad 37	Right Coin Pulses	-
E Ad 38	Center Coin Pulses	-
E Ad 39	Pulses For Credit	-
E Ad 40	Pulses For Bonus Credit	-
E Ad 41	Message Custom	OFF
E Ad 42	Attract Mode Music	ON
E Ad 43	Buy In Feature	ON
E Ad 44	Flash Lamps	ON
E Ad 45	Standup Seq	EASY
E Ad 46	Spinner Lamp	EASY
E Ad 47	Spot Standup	EASY
E Ad 48	Target Practice	HARD
E Ad 49	1 Meg Target	4
E Ad 50	Laser Kick On	EASY
E Ad 51	Special Target	5
E Ad 52	2X All Scores	10
E Ad 53	All lit Jumps	14
E Ad 54	Factory Restore	OFF

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 08)

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 Easy Rules - Set to ON or OFF.

Ad 07 Factory Rules - Set to ON or OFF.

Ad 08 Hard Rules - Set to ON or OFF.

NOVELTY / 5-BALL/ADD-A-BALL RULES (Ad 09, 10, 11)

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 11 Add a Ball Rules = On
E Ad 23 Balls per Game = 5
E Ad 49 1 Meg Target = 5
E Ad 50 All Lit Jumps = 5 Seconds

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 09 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 18 Awards Replay = Audit
E Ad 19 Awards Special = Score

E Ad 20 Match Feature = Off
E Ad 23 Maximum Extra Balls = 00
E Ad 25 Scores Highest = Off
E Ad 26 to 29 Credits High Score = 00

Ad 10 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 = 10%
Ad 02 Replay Start = 5,000,000
Ad 03 Replay Levels = 01

E Ad 21 Balls Per Game = 05
E Ad 49 1Meg Target = 5
E Ad 53 All Lit Jumps = 5 Seconds

INSTALL ADJUSTMENT TABLE

Install Adjustment	Ad 06 Easy	Ad 07 Factory	Ad 08 Hard
E Ad 45 Standup Sequence	EASY	EASY	HARD
E Ad 47 Spot Standup	EASY	EASY	HARD
E Ad 48 Target Practice	EASY	HARD	HARD
E Ad 49 1 Meg Target	2	4	6

Ad 11 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 18 Awards Replay = Extra Ball
 E Ad 19 Awards Special = Extra Ball
 E Ad 20 Match Feature = OFF
 E Ad 27 Scores Highest = OFF
 E Ad 26 to 29 High Score Credits = 00

GAME PRICING (Ad 12 and E Ad 36 to 40)

There are two methods available for coin switch programming; Standard and Custom. Standard pricing uses a single adjustment (Ad 12) 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 36 to 40. In order to program E Ad 36 to 40, Ad 12 must be set to **CUSTOM** and Ad 17 must be set to **ON** for expanded adjustments.

With Ad 12 set to **CUSTOM** and expanded adjustments selected, E Ad 36, 37, and 38 represent coin switch pulses for the left, right, and center coin slots. E Ad 39 prescribes the number of pulses required for one credit. For example, if E Ad 36 was set to 02 and E Ad 39 to 01 a coin in the left slot would produce two credits. Further, if E Ad 36 was set to 01 and E Ad 39 to 02, two coins in the left slot would be required for one credit.

E Ad 40 may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if E Ad 36 was set to 01, E Ad 39 to 01 and E Ad 40 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 12 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 36 to 40 are utilized to tailor each individual coin chute.

E Ad 36 Left Coin Switch Pulses - Set the number of pulses registered for closure of the left coin switch; 00 to 99.

E Ad 37 Right Coin Switch Pulses - Set the number of pulses registered for closure of the right coin switch; 00 to 99.

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

E Ad 39 Coin Switch Pulses Required for 1 Credit - Set the number of coin switch pulses required to post one credit; 00 to 99.

E Ad 40 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 12 Standard Pricing Select			Coin Mechs			Plays/Coins		
1	2	4	Left	Center	Right	Left	Center	Right
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 <i>ONLY DURING</i> 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	50P	£1	1 PLAY/ 3COIN	2 PLAY/ 1COIN	5 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	7 PLAYS		1DM	2DM	5DM	1 PLAY/ 1COIN 7 PLAY/ 5COIN	2 PLAY/ 1COIN 8 PLAY/ 3COIN	7 PLAY/ 1COIN
GERMAN 5DM 2	9 PLAYS		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		12	17	36	37	38	39	40
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 13 Average Ball Time - Maintains average balltime close to 65 seconds. Every 700 (vary with **E Ad34**) games, average ball time is checked. If greater than 65 seconds, **E Ad 50** is set to **HARD**. If less than 65 seconds, **E Ad50** is set to **EASY**.

Ad 14 Coin Reset - When enabled (set to **ON**) all coin and paid credit totals will be reset to zero when **STEP** is depressed.

Ad 15 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 16 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 17 Expand Adjustments - When set to **OFF**, depressing the **STEP** push-button advances directly to **E Ad 54**, **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 18 Awards Replay - Set for replays to award: **CREDIT**, **EXTRA BALL**, or **AUDIT** (no award but recorded in the audit totals).

E Ad 19 Awards Special - Set for Special to award: **CREDIT**, **EXTRA BALL**, or **SCORE LEVEL**.

E Ad 20 Match Feature- Set Match **ON** or **OFF**.

E Ad 21 Balls Per Game - Adjust the number of balls per game; 2 to 9.

E Ad 22 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 23 Maximum Extra Balls - Adjust for the maximum number of extra balls that may be accumulated per ball; 1 to 9 or **OFF**.

E Ad 24 Credits Limit - Adjust the maximum number of credits that may be posted; 5 to 99.

HIGH SCORE LEVELS (E Ad 25 through 34)

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

E Ad 26 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 27 Credits High Score Level 2 - Adjust the number of credits awarded for exceeding level 2; 0 to 9.

E Ad 28 Credits High Score Level 3 - Adjust the number of credits awarded for exceeding level 3; 0 to 9.

E Ad 29 Credits High Score Level 4 - Adjust the number of credits awarded for exceeding level 4; 0 to 9.

E Ad 30 High Score 1 Backup - Adjust the backup score level to which level 1 (the highest of the four levels) may be reset.

E Ad 31 High Score 2 Backup - Adjust the backup score level to which level 2 may be reset.

E Ad 32 High Score 3 Backup - Adjust the backup score level to which level 3 may be reset.

E Ad 33 High Score 4 Backup - Adjust the backup score level to which level 4 may be reset.

E Ad 34 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 35 Free Play - When set to ON, no coins are required for games.

E Ad 36 to 40 Custom Pricing - Described previously in Game Pricing.

E Ad 41 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 42.

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 42 Attract Mode Music - Set to ON (once every seven attract mode cycles), or OFF.

E Ad 54 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 SPECIFIC FEATURES (E Ad 46 TO 54)

E Ad 43 Buy In Feature- Set to **ON**, or **OFF**. When set to **ON** the top All Features and lit locked balls feature will be retained if a player immediately buys into a game. When set to **OFF** all features will be reset and locked balls will be released.

E Ad 44 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 Ad 45 Standup Sequence- Set to **EASY** or **HARD**. When set to **HARD**, all standup Targets must be completed in sequence. When set to **EASY**, the targets may be hit in any order to complete a bank.

E Ad 46 Spinner Lamp- Set to **EASY**, or **HARD**. When set to **EASY**, the Spinner lamp is enabled as soon as the bank of the appropriate color is completed (Red, Green or Yellow). When set to **HARD**, the Spinner lamp is lit only after the ball is locked (ie. Jones Arrested).

EAd 47 Spot Standup-Set to **ON** or **OFF**. When **ON**, the Top Lanes spot their corresponding colored targets.

E Ad 48 Target Practice- Set to **EASY** or **HARD**. When set to **EASY**, all Target practice lamps of a bank will be flashing after one completion of those targets. When set to **HARD** only one Target practice lamp of the bank will flash at a time.

E Ad 49 1 Meg Target -Set from **1** through **8**. This determines the number of flashing targets that must be hit during Target practice to enable the ED 209 Million feature.

E Ad 50 Laser Kick On -Set to **EASY** or **HARD**. When **EASY**, the Laser kick feature is turned on at the start of each ball. When **HARD**, the feature is enabled for the second and subsequent balls only by making the Laser Kick When Lit Target.

E Ad 51 Special Target- Set from **1** to **8**. Determines the number of Targets to be made after Jackpot to enable the Ramp Special Lite.

E Ad 52 2x All scores - Set from **5** to **25**. Determines the number of seconds the 2x Scores feature is enabled.

E Ad 53 All Lit Jumps-Set from **2** to **20**. Determines the total number of successful Ramp Jumps required to enable the All Features Lit Mode.

E Ad 54 Factory Restore-Previously described under Generic Game Features on page 15.

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
1 = Brown
2 = Red
3 = Orange
4 = Yellow

5 = Green
6 = Blue
7 = Violet
8 = Grey
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 (708) 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) VOICE ROM2 (Loc F4) MUSIC TEST (Sound ROM Loc F7)	60 CYCLE TONE (Left Speaker Only) 60 CYCLE TONE (All speakers) 60 CYCLE TONE (Right Speaker Only) "You are under arrest ." "I..... like it !" 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 for both displays (Player 1 and 2 display) and (Player 3 and 4 display). Segment drivers (16 for Player 1 and 2 characters; 16 for Player 3 and 4 characters) 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 two 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.

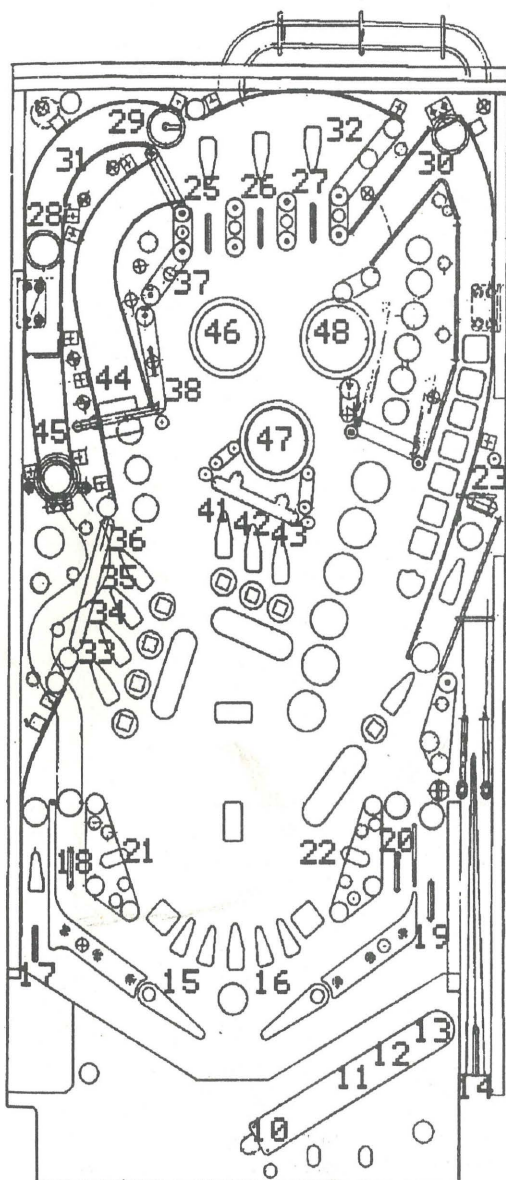
SWITCH MATRIX CHART

ROW (*)	COLUMN (*)	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	Laser Kick 17	2 Lane 25	Green Target 1 (Left) 33	Yellow Target 1 (Left) 41	Not Used 49	Not Used 57
2 WHT-RED (92)		Not Used 2	Outhole 10	Left Return 18	0 Lane 26	Green Target 2 34	Yellow Target 2 42	Not Used 50	Not Used 58
3 WHT-ORN (93)		Credit Button 3	Trough #1 11	Right Outlane 19	9 Lane 27	Green Target 3 35	Yellow Target 3 (Right) 43	Not Used 51	Not Used 59
4 WHT-YEL (94)		Right Coin 4	Trough #2 12	Right Return 20	Left Eject 28	Green Target 4 (Right) 36	Spinner 44	Not Used 52	Not Used 60
5 WHT-GRN (95)		Center Coin 5	Trough #3 13	Left Slingshot 21	Center Eject 29	10 Point Top 37	VUK 45	Not Used 53	Not Used 61
6 WHT-BLU (96)		Left Coin 6	Shooter Lane 14	Right Slingshot 22	Right Eject 30	10 Point Bottom 38	Left Turbo Bumper 46	Not Used 54	Not Used 62
7 WHT-VIO (97)		Slam Tilt 7	Left EOS 15	Right Trap Ball 23	Left Ramp 31	Not Used 39	Center Turbo Bumper 47	Not Used 55	Not Used 63
8 WHT-GRY (98)		Not Used 8	Right EOS 16	Not Used 24	Right Ramp 32	Not Used 40	Right Turbo Bumper 48	Not Used 56	Not Used 64

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

Switch Part Numbers and Locations

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	500-5143-00
06*	Left Coin	180-5024-00	15	Left Flip. Instant Info.	See Solid State
07*	Slam Tilt	180-5022-00		Left EOS	Flipper Board
08	Not Used	--	16	Right Flip. Instant Info.	See Solid State
09	Not Used	--		Right EOS	Flipper Board
			17	Left Outlane	500-5142-00
			18	Left Return Lane	500-5142-00
			19	Right Outlane	500-5142-00
			20	Right Return Lane	500-5142-00
			21	Left Slingshot Trigger Sw.	180-5054-00
				Left Slingshot Point Sw.	180-5055-00
			22	Right Slingshot Trigger Sw.	180-5054-00
				Right Slingshot Point Sw.	180-5055-00
			23	Right Trap Ball	500-5035-02
			24	Not Used	--
			25	2 Lane	500-5142-00
			26	0 Lane	500-5142-00
			27	9 Lane	500-5142-00
			28	Left Eject	515-5079-00
			29	Top Eject	515-5079-00
			30	Right Eject	515-5079-00
			31	Left Ramp	180-5010-01
			32	Right Ramp	180-5010-01
			33	Green Target 1	500-5103-14
			34	Green Target 2	500-5103-14
			35	Green Target 3	500-5103-14
			36	Green Target 4	500-5103-14
			37	10 Point Top	500-5069-00
			38	10 Point Bottom	500-5069-00
			39	Not Used	--
			40	Not Used	--
			41	Yellow Target 1	500-5103-16
			42	Yellow Target 2	500-5103-16
			43	Yellow Target 3	500-5103-16
			44	Spinner	500-5193-00
			45	Vertical Up Kicker	180-5041-00
			46	Left Turbo Bumper	180-5036-00
			47	Center Turbo Bumper	180-5036-00
			48	Right Turbo Bumper	180-5036-00
			49	Not Used Thru 64	



Switch Locations

*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

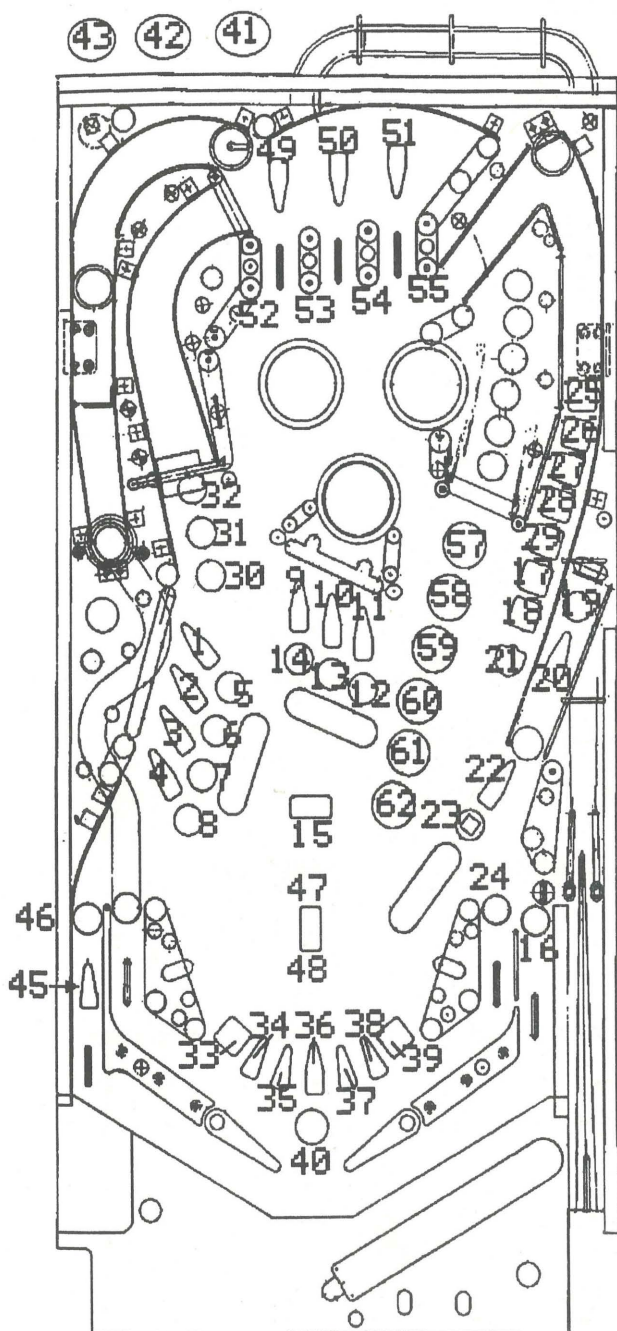
COLUMN (*) ROW (*)	1 YEL-BRN (41) Q71	2 YEL-RED (42) Q70	3 YEL-ORN (43) Q69	4 YEL-BLK (40) Q68	5 YEL-GRN (45) Q67	6 YEL-BLU (46) Q66	7 YEL-VIO (47) Q65	8 YEL-GRY (48) Q64
1 RED-BRN (21) Q72	Green Target 4 1	Yellow Target 1 9	Eject robocop 17	Eject Robocop 25	Bottom Special 33	Back Red 41	2 Lane 49	Arrest Emil 57
2 RED-BLK (20) Q73	Green Target 3 2	Yellow Target 2 10	Eject robocop 18	Eject robocop 26	2x Mult. 34	Back Yellow 42	0 Lane 50	Arrest Bodd 58
3 RED-ORN (23) Q74	Green Target 2 3	Yellow Target 3 11	Trapball Top 19	Eject robocop 27	3x Mult. 35	Back Green 43	9 Lane 51	Arrest Jones 59
4 RED-YEL (24) Q75	Green Target 1 4	Yellow Sight 3 12	Relite Laser Kick 20	Eject robocop 28	Bonus Hold 36	Left Return 44	Ball Guide 1 52	ED 209 1 Meg 60
5 RED-GRN (25) Q76	Green Sight 4 5	Yellow Sight 2 13	Right Extra Ball 21	Eject robocop 29	4x Mult. 37	Laser Kick Outlane 45	Ball Guide 2 53	Ramp Special 61
6 RED-BLU (26) Q77	Green Sight 3 6	Yellow Sight 1 14	Red Trap Ball 22	Spinner Green 30	5x Mult. 38	Left Outlane 46	Ball Guide 3 54	Ramp Jackpot 62
7 RED-VIO (27) Q78	Green Sight 2 7	ROBOCOP Mask 15	Red Sight 23	Spinner Yellow 31	Bottom Target Practice 39	ROBOCOP Green 47	Ball Guide 4 55	ED 209 Left 63
8 RED-GRY (28) Q79	Green Sight 1 8	Right Outlane 16	Right Return 24	Spinner Red 32	Extra Ball 40	ROBOCOP Orange 48	Not Used 56	ED 209 Right 64

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

Lamp Number Description

01	Green Target 4
02	Green Target 3
03	Green Target 2
04	Green Target 1
05	Green Sight 4
06	Green Sight 3
07	Green Sight 2
08	Green Sight 1
09	Yellow Target 1
10	Yellow Target 2

11	Yellow Target 3
12	Yellow Sight 3
13	Yellow Sight 2
14	Yellow Sight 1
15	ROBOCOP Mask
16	Right Outlane
17	Eject robocOp
18	Eject robocoP
19	Trap Ball Top
20	Relite Laser Kick
21	Right Extra Ball
22	Red Trap Ball
23	Red Sight
24	Right Return
25	Eject Robocop
26	Eject rObocop
27	Eject roBocop
28	Eject robOcop
29	Eject roboCop
30	Spinner Green
31	Spinner Yellow
32	Spinner Red
33	Bottom Special
34	2X Multiplier
35	3X Multiplier
36	Bonus Hold
37	4X Multiplier
38	5X Multiplier
39	Bottom Target Practice
40	Extra Ball
41	Back Panel Red
42	Back Panel Yellow
43	Back Panel Green
44	Left Return
45	Laser Kick Outlane
46	Left Outlane
47	ROBOCOP Green
48	ROBOCOP Orange
49	2 Lane
50	0 Lane
51	9 Lane
52	Ball Guide 1
53	Ball Guide 2
54	Ball Guide 3
55	Ball Guide 4
56	Not Used
57	Arrest Emil
58	Arrest Boddecker
59	Arrest Jones
60	ED 209 Million
61	Ramp Special
62	Ramp Jackpot
63	ED 209 Left
64	ED 209 Right



Lamp Locations

*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

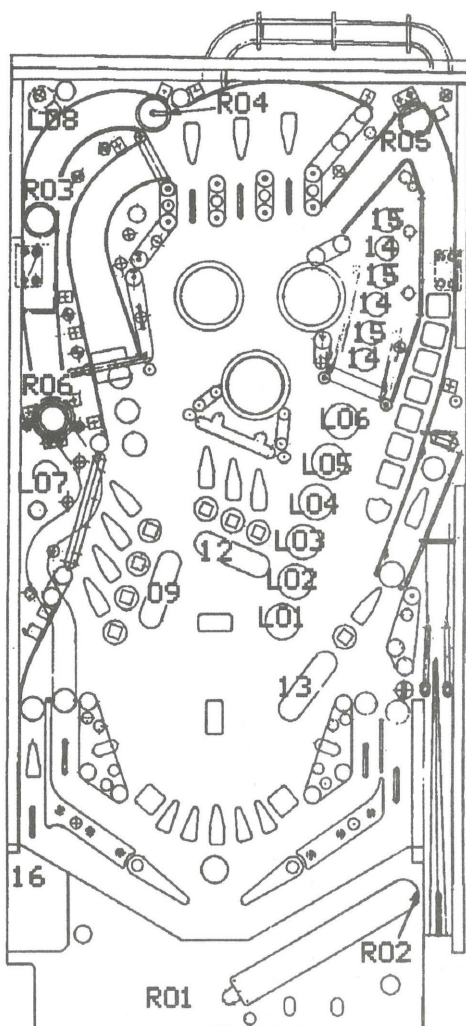
From the Discrete Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate COIL TEST. The test pulses each regular solenoid or flash lamp sequentially with the coil/flash lamp name indicated in the Player 1 and 2 displays and the drive number in the Player 4 display.

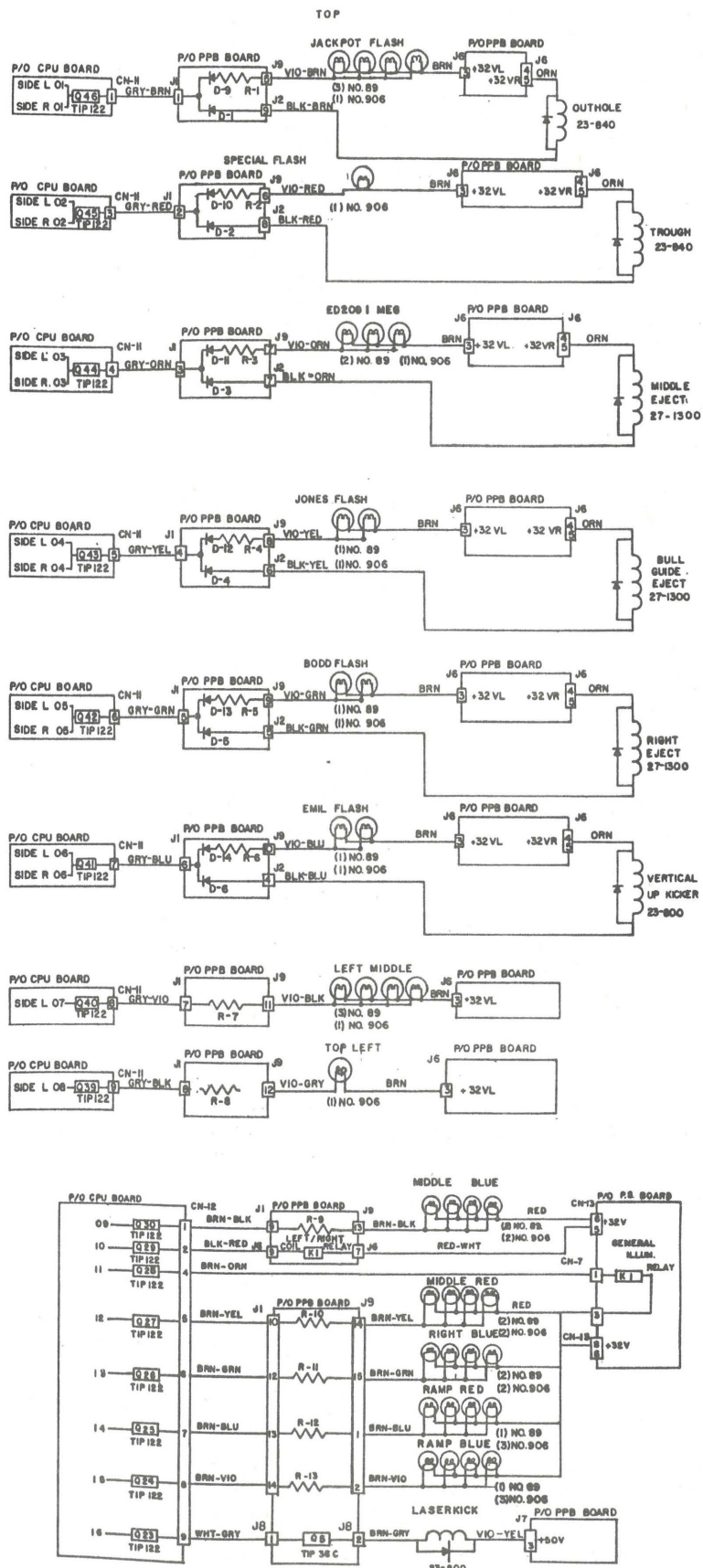
Select Coil

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.

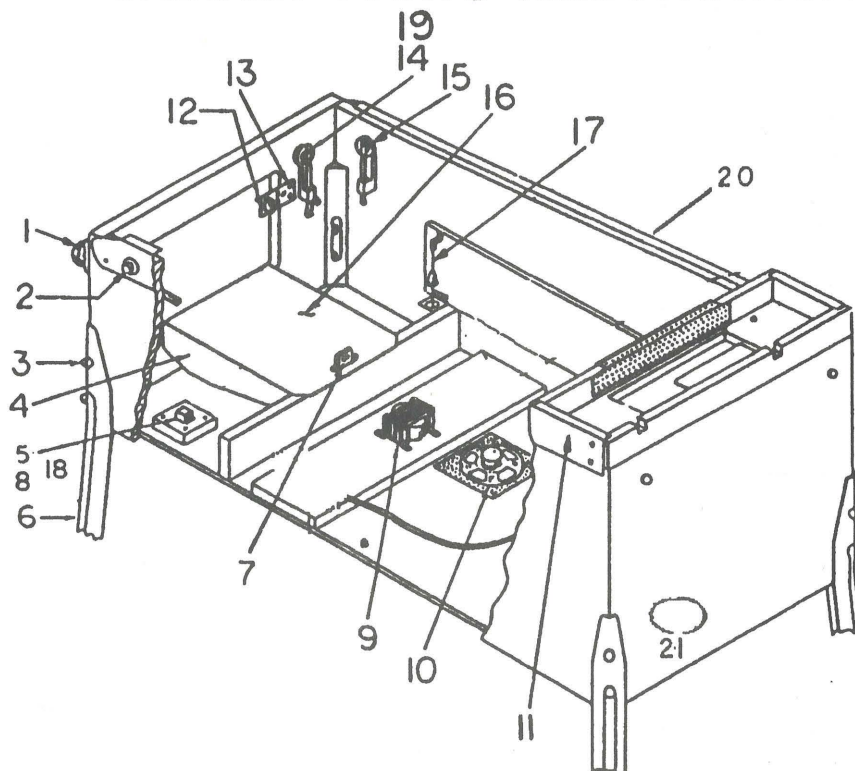
RETURN TO GAME OVER

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.





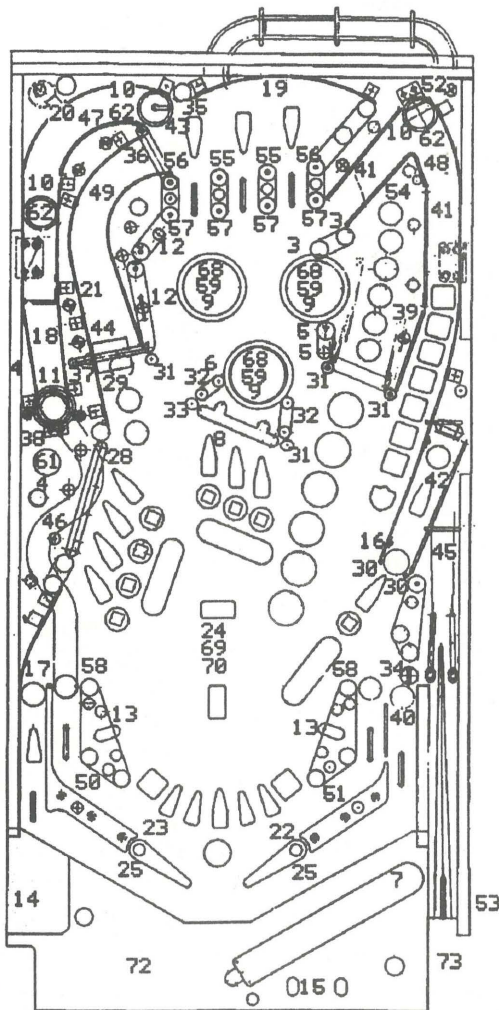
CABINET PARTS ILLUSTRATION



Item	Description	Part No.
1	Ball-shooter Assy	500-5019-04
2	Flipper Button	500-5026-22
3	Leg Bolt (Black)	231-5000-01
4	Cash Box Bottom	545-5090-00
5	On/Off Switch DP/ST	180-5001-00
6	Leg (Black)	535-5020-30
7	Lock Bracket-Cash Box	535-5215-00
8	Power Input Box Assy. USA	515-5153-00-06
9	Transformer	010-5002-00
10	Speaker-Round (6")	031-5000-00
11	Side Armor-Right	535-5010-11
12	Memory Protect Switch	180-5000-00
13	Memory Protect Switch Bracket	535-5225-00
14	Start Switch	500-5097-00
15	Flipper Switch-	180-5048-01
16	Cash Box Top	535-5013-01
17	Plumb Bob Tilt	535-5029-00
18	Volume Control	123-5000-00
19	Playfield Glass (Tempered)	660-5001-00
20	Side Armor -Left	535-5010-12
21	Line Cord Receptacle	545-5122-00
22	Service Switch (Not Shown)	180-5012-00
23	Front Molding Lockdown Assy.	500-5020-00
24	Front Molding -Black (Not Shown)	500-5021-10
25	S.S.Flipper P.C.B.(Not Shown)	520-5033-00

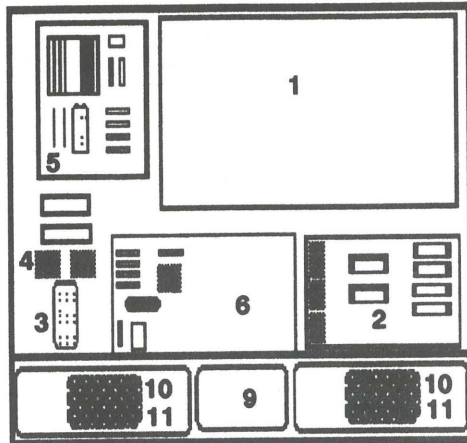
Playfield Top Parts

Item	Description	Part Number			
1.	Red Mini Lamp - ED 209 (2)*	165-5005-02	20.	Left Top Ball Guide	500-5153-00
2.	Acorn Cap Nuts (27)*	240-5006-00	21.	Left of Spinner Ball Guide	500-5154-00
3.	5/8" Hex Spacer (2)	254-5008-02	22.	Right Flipper Assembly	500-5177-01
4.	7/8" Hex Spacer (2)	254-5008-05	23.	Left Flipper Assembly	500-5177-02
5.	1/2" Hex Spacer (3)	254-5008-03	24.	Playfield Complete Assy.	505-6004-06
6.	Ball Deflector Spring	265-5010-00	25.	Flipper Bat and Shaft (2)	515-5133-02
7.	Ball Trough Eject Assy.	500-5012-00	26.	Left Catch Ramp Assy.*	515-5207-00
8.	Slingshot Assy. (2)	500-5077-00	27.	Right Ramp Assy. *	515-5208-00
9.	3 Bank S.U. Tgt. Assy	500-5103-16	28.	4 Bank S.U. Tgt. Assy.	515-5211-14
10.	Turbo Bumper Assy. (3)	500-5034-10	29.	Spinning Target	515-5236-00
11.	Playfield Eject Assy. (3)	500-5051-02	30.	Machine Mini Post (2)	530-5005-00
12.	Vertical Up Kicker	500-5067-00	31.	Top Thread. Bump. Post (4)	530-5007-00
13.	10 Point S.U. Switch (2)	500-5069-00	32.	Grooved Metal Stand Off (9)	530-5035-02
14.	Laser Kick Assy.	500-5080-00	33.	Bumper Post	530-5057-00
15.	Outhole Kicker Assy.	500-5082-00	34.	Outlane Adjustment Plate	535-5091-02
16.	Right Side Ball Guide	500-5149-00	35.	One Way Gate Mtg.Brkt.	535-5210-00
17.	Ball Guide -VUK	500-5151-00	36.	One Way Gate Mtg.Brkt.	535-5210-01
18.	Laser Kick Ball Guide	500-5150-00	37.	Spin.Tgt. Support Bracket	535-5249-00
19.	Center Top Ball Guide	500-5152-00	38.	VUK Ball Stop Brkt.	535-5273-00
			39.	ROBOCOP Btm.Ball Gd. Wr.	535-5300-06
			40.	Right Drain Ball Guide Wire	535-5300-12
			41.	ROBOCOP Top Ball Gd. Wr.2	535-5300-14
			42.	Boot-a-Ball Guide Wire	535-5300-15
			43.	Wire Gate (2)	535-5307-05
			44.	Spin. Sw. Actuator Wire	535-5319-00
			45.	Shooter Lane Wire Ramp	535-5349-00
			46.	VUK Left Flip. Feed Ramp	535-5355-00
			47.	Top Left Ball Guide Wire	535-5362-00
			48.	Right Eject Ball Guide	535-5363-00
			49.	Rt. Of Spinner Ball Gd. Wire	535-5364-00
			50.	Left Flip. Ball Return Guide	535-5406-01
			51.	Right Flip. Ball Return Guide	535-5407-01
			52.	Right Eject Ball Stop Brkt.	535-5749-00
			53.	Shooter Lane Sd. Rail Guard	535-5795-00
			54.	Bracket under Right Ramp	535-5815-00
			55.	2 Sided Clear Ball Guide (2)	545-5011-01
			56.	1 Sided Clear Ball Guide (2)	545-5012-01
			57.	1 1/16" Clear Post (8)	545-5013-01
			58.	1 1/16" Red Post (13)	545-5013-02
			59.	Turbo Bumper Cap (3)	545-5035-35
			60.	Spinning Target Washer (2) *	545-5037-00
			61.	Red Mini-Mars (Twist In)	545-5059-02
			62.	Yellow Eject Playfield Insert	545-5060-06
			63.	Plastic ED 209*	545-5152-00
			64.	Robocop Decal Sheet*	820-5020-XX
			65.	Left Catch Arrow Sticker*	820-5030-00
			66.	Spinner Decal Front*	820-5206-01
			67.	Spinner Decal Back*	820-5206-02
			68.	Turbo Bumper Decal (3)	820-5306-00
			69.	Playfield Protective Mylar	820-5807-00
			70.	Screened Playfield	830-5106-00
			71.	Screened Plastics	830-5406-XX
			72.	Bottom Arch	830-5506-01
			73.	Shooter Gauge	830-5506-02
			74.	Ramp Sw. Act. Wire (2)*	535-5361-00
			75.	1 1/16" Blue Post (7)*	545-5013-05



* Indicates Not Shown

BACKBOX PARTS ILLUSTRATION

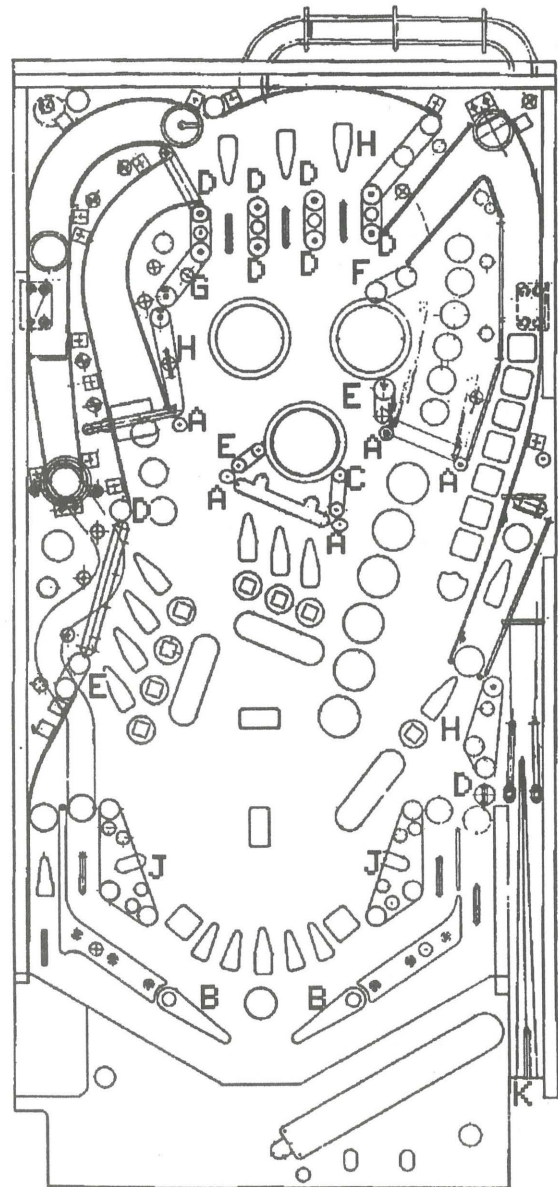


Item	Description	Part No.
1	CPU Board Assy.	520-5003-06
2	Sound Board Assy	520-5002-06
3	Capacitor 2C1	125-5000-00
4	Bridge Rectifiers	112-5000-00
5	Power Supply Bd. Assy	520-5000-00
6	PPB Board	520-5021-04
7	Combined Display Bd Assy*	520-5030-00
8	Display Ribbon Cable*	036-5001-30
9	Speaker Housing	515-5215-00-06
10	Speakers (2)	031-5003-00
11	Speaker Grill (2)	545-5072-02
12	Back Box Glass*	830-5206-00

* Not Shown

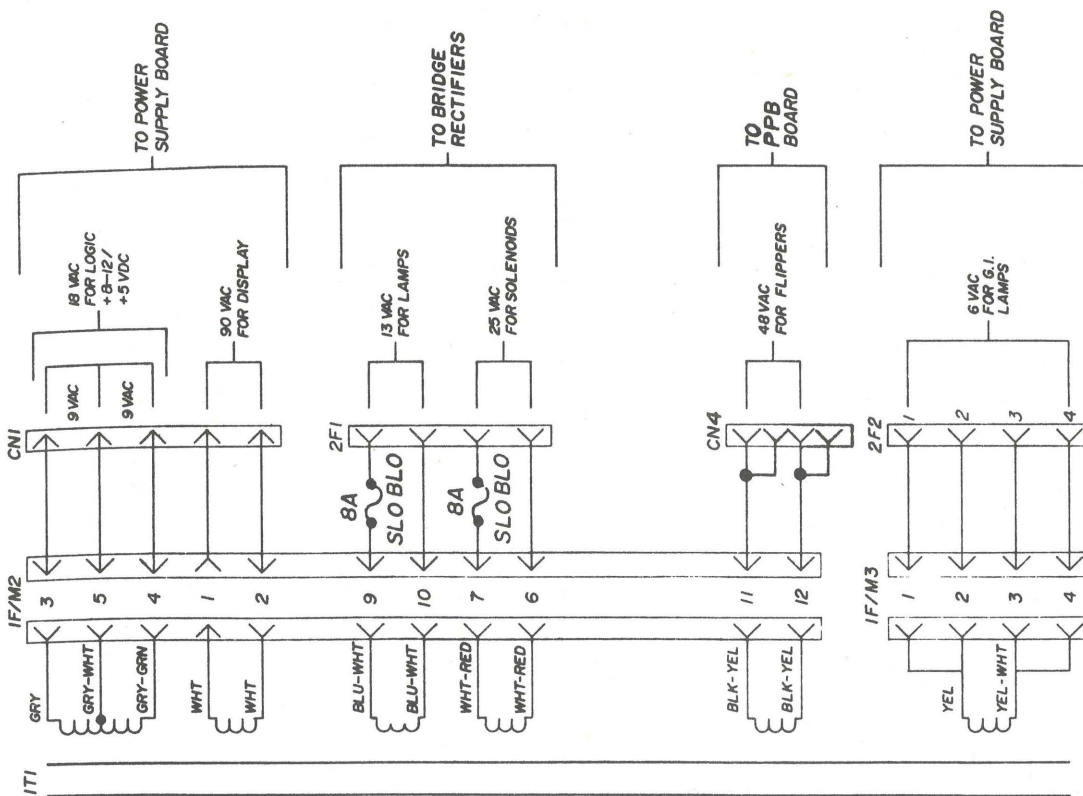
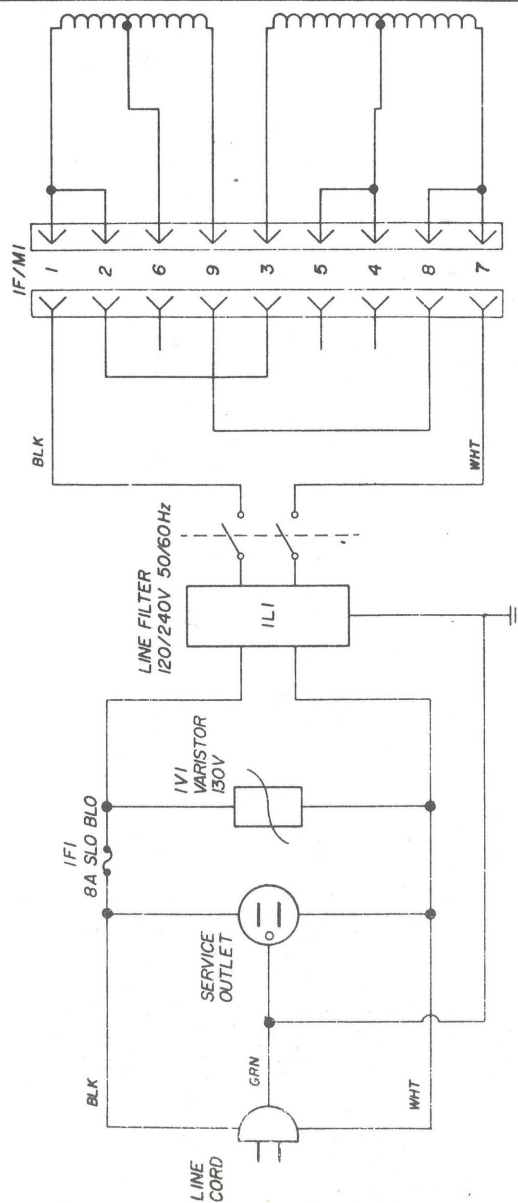
RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A.	Black Rubber Post (5)	545-5009-00
B.	Red Flipper (2)	545-5024-02
C.	$\frac{3}{16}$ " (3)	545-5025-01
D.	$\frac{5}{16}$ " (8)	545-5025-02
E.	$\frac{3}{4}$ " (3)	545-5025-04
F.	1" (1)	545-5025-05
G.	$1\frac{1}{4}$ " (1)	545-5025-06
H.	2" (4)	545-5025-08
J.	$2\frac{3}{4}$ " (2)	545-5025-20
K.	Shooter Tip (1)	545-5027-00



THIS CONFIGURATION FOR 115 V

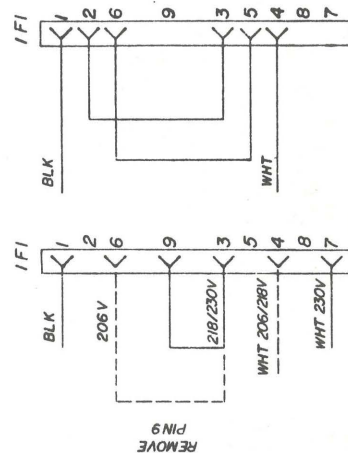
FOR LOWER LINE VOLTAGES
OR 230 VOLT OPERATION
SEE SAMPLES BELOW

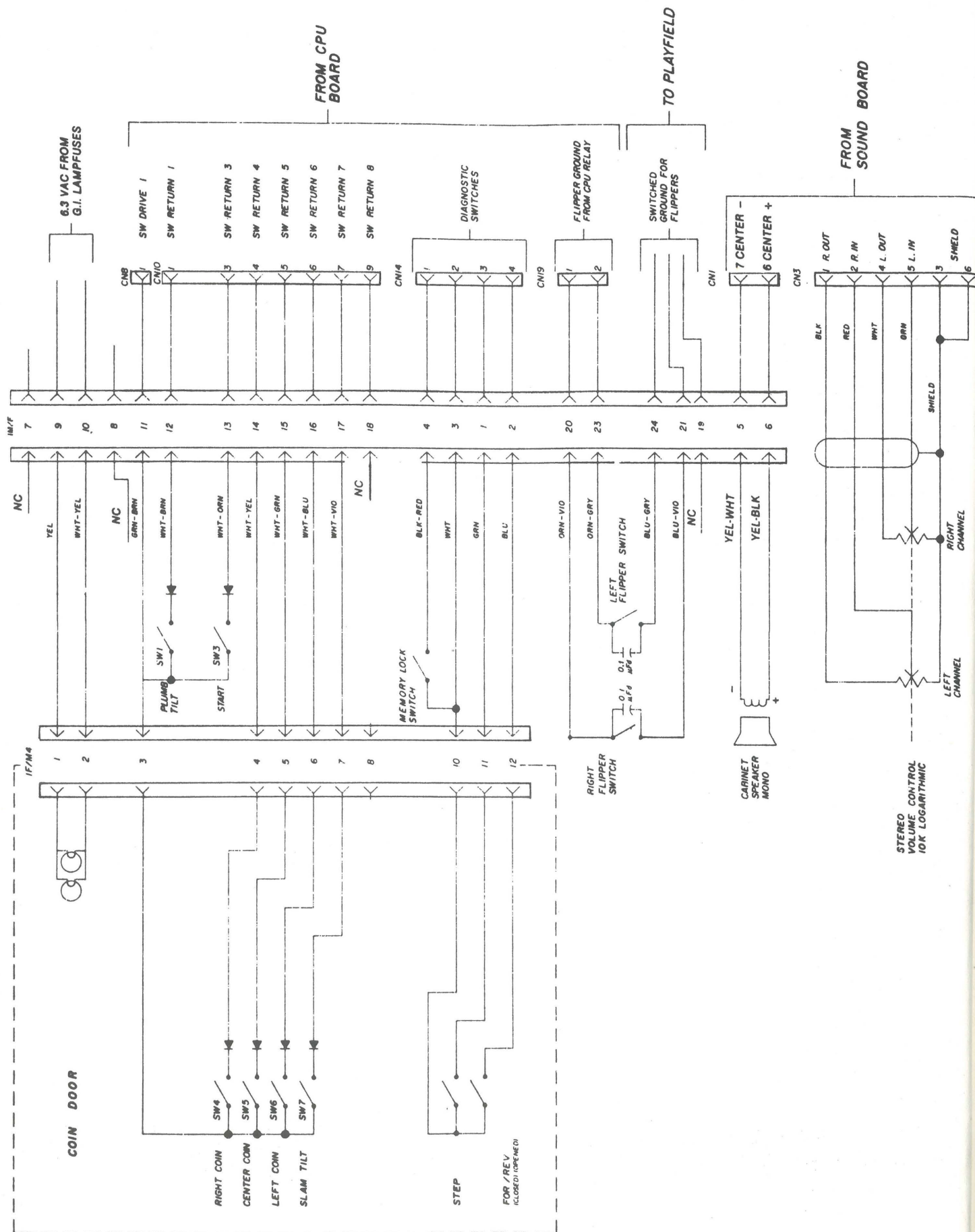


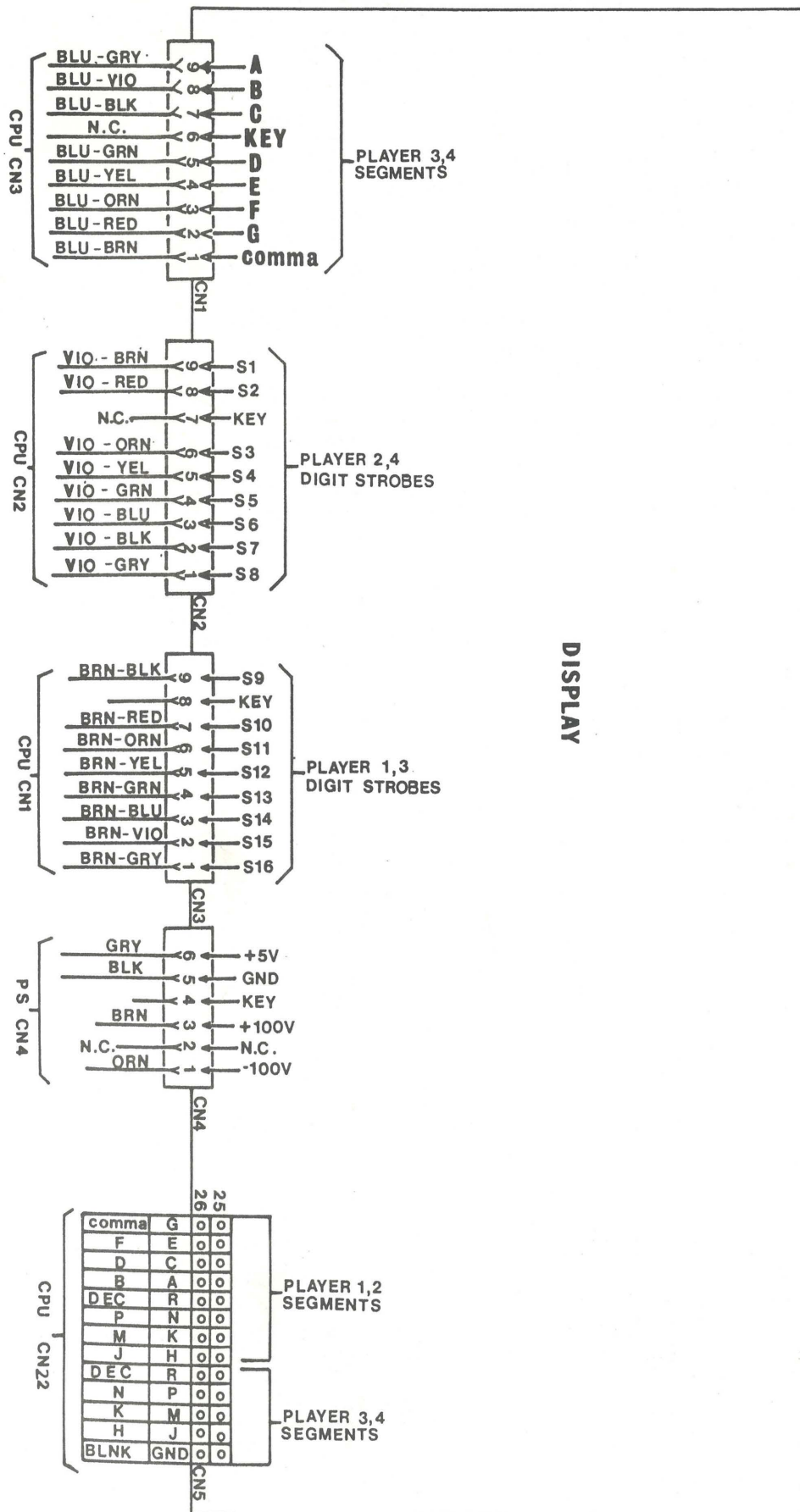
JUMPERS FOR VOLTAGE VARIATION

230/218/206 VOLTS 100/105 VOLTS

IF1 = 4A SLO BLO IF1 = 8A SLO BLO
IV1 = 275V VARISTOR IV1 = 130V VARISTOR

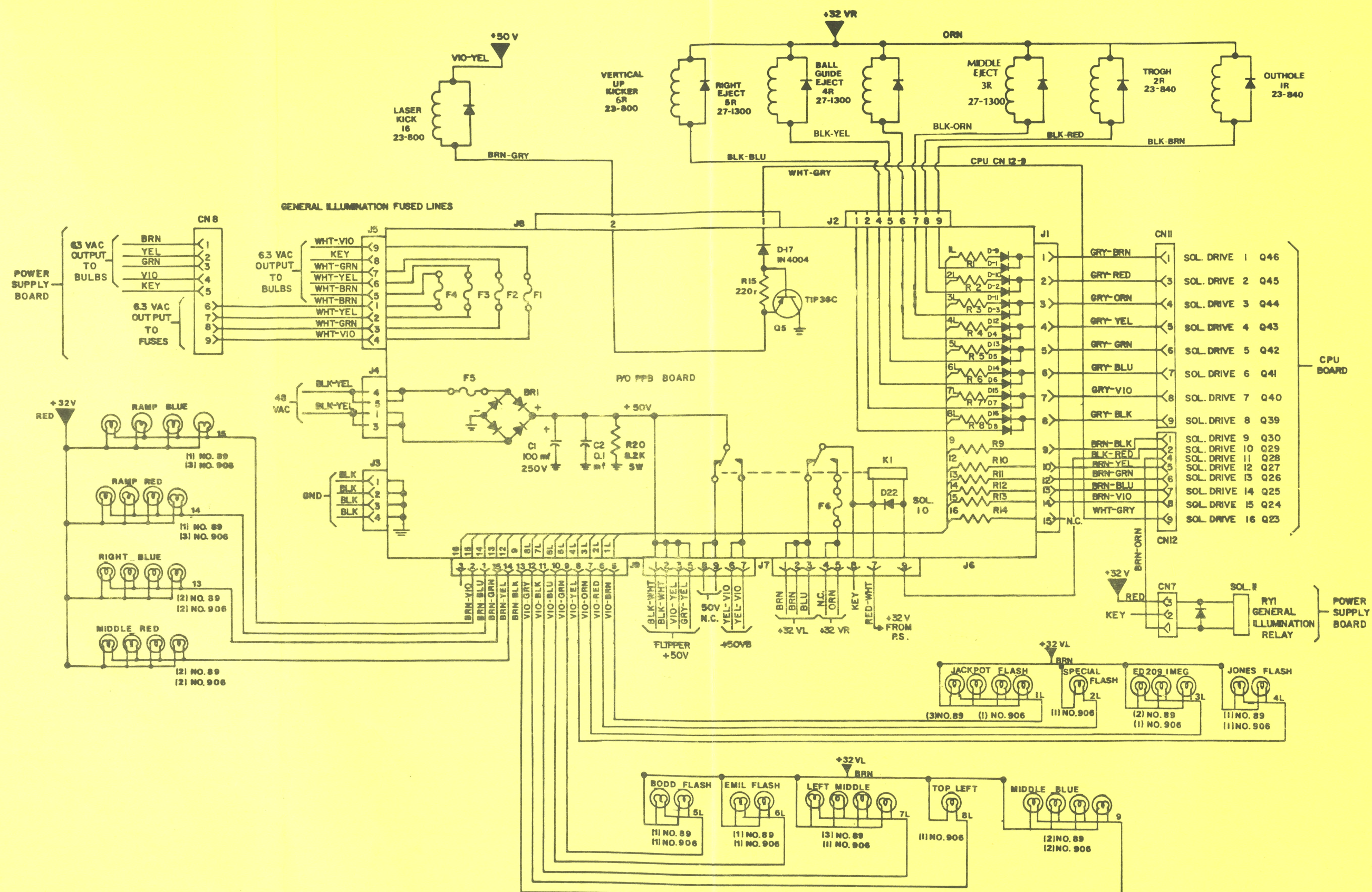


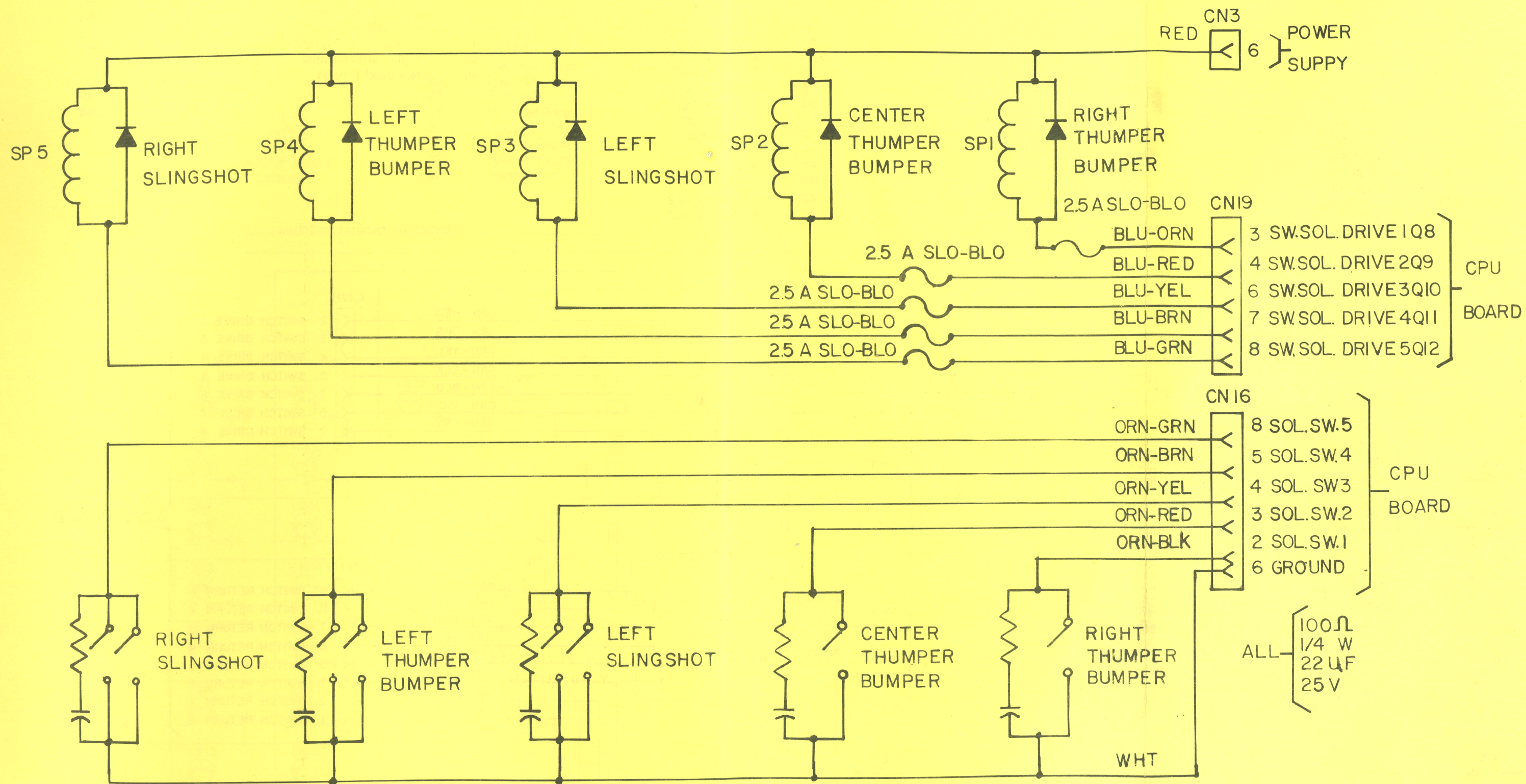




NOTES







**Switch
Number Description**

01* Plumb Tilt
02 Not Used
03 Credit Button
04* Right Coin
05* Center Coin
06* Left Coin
07* Slam Tilt
08 Not Used
09 Not Used
10 Out Hole
11 Trough #1
12 Trough #2
13 Trough #3
14 Shooter Lane
15 Left Flip. Instant Info.

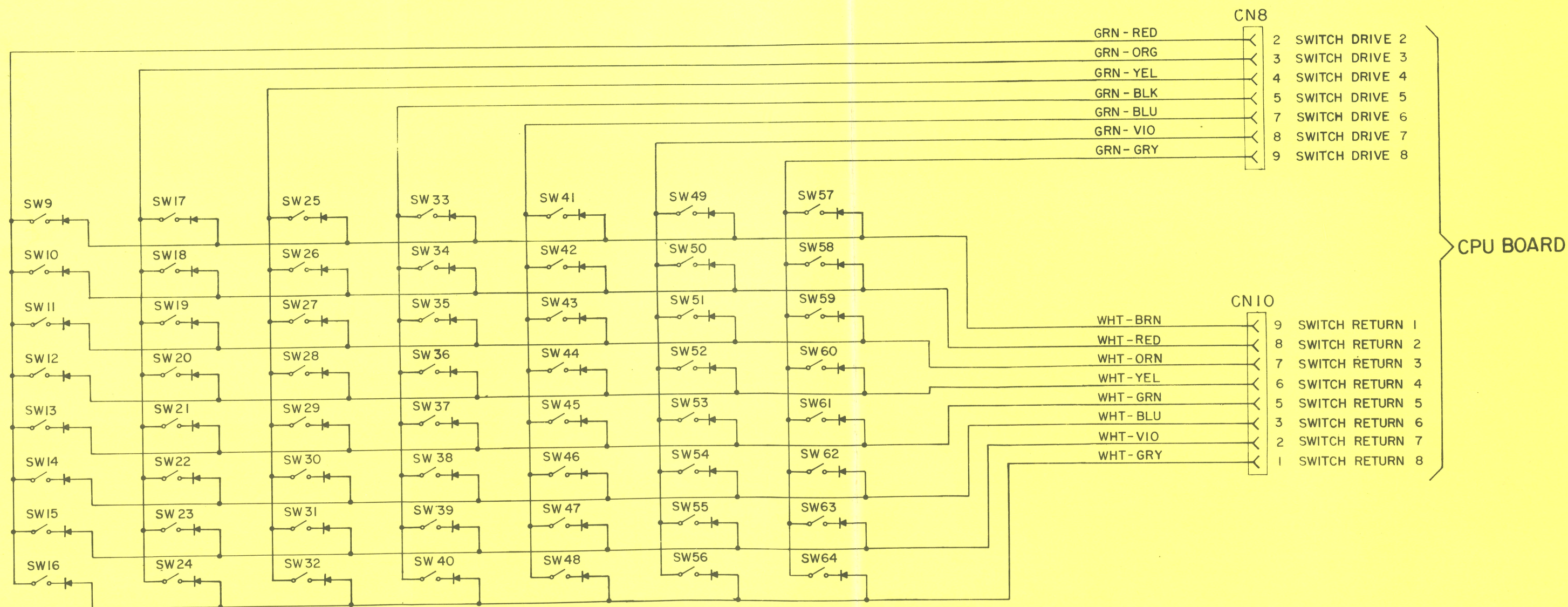
16 Right Flip. Instant Info.
Right EOS
17 Left Outlane
18 Left Return Lane
19 Right Outlane
20 Right Return Lane
21 Left Slingshot Trigger Sw.
Left Slingshot Point Sw.
22 Right Slingshot Trigger Sw.
Right Slingshot Point Sw.
23 Right Trap Ball
24 Not Used
25 2 Lane
26 0 Lane
27 9 Lane
28 Left Eject

29 Top Eject
30 Right Eject
31 Left Ramp
32 Right Ramp
33 Green Target 1
34 Green Target 2
35 Green Target 3
36 Green Target 4
37 10 Point Top
38 10 Point Bottom
39 Not Used
40 Not Used
41 Yellow Target 1
42 Yellow Target 2
43 Yellow Target 3

44 Spinner
45 Vertical Up Kicker
46 Left Turbo Bumper
47 Center Turbo Bumper
48 Right Turbo Bumper
49 Not Used Thru 64

Switch Drive 1 Q55
Switch Drive 2 Q54
Switch Drive 3 Q53
Switch Drive 4 Q52
Switch Drive 5 Q51
Switch Drive 6 Q50
Switch Drive 7 Q49
Switch Drive 8 Q48

* Indicates cabinet switches.



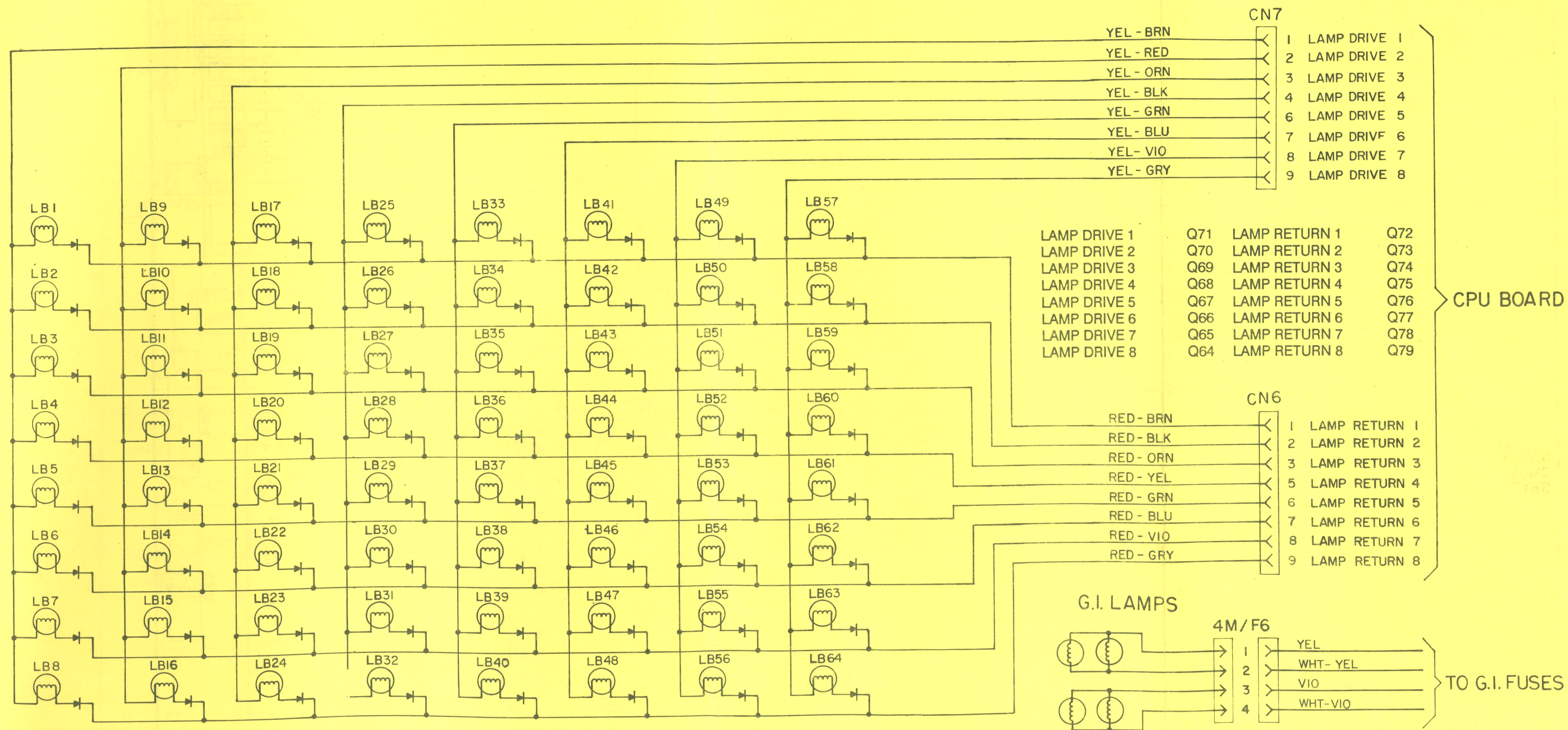
Lamp Number	Description
01	Green Target 4
02	Green Target 3
03	Green Target 2
04	Green Target 1
05	Green Sight 4
06	Green Sight 3
07	Green Sight 2
08	Green Sight 1
09	Yellow Target 1
10	Yellow Target 2
11	Yellow Target 3
12	Yellow Sight 3
13	Yellow Sight 2
14	Yellow Sight 1
15	ROBOCOP Mask
16	Right Outlane

17	Eject roboCOp
18	Eject robocoP
19	Trap Ball Top
20	Relite Laser Kick
21	Right Extra Ball
22	Red Trap Ball
23	Red Sight
24	Right Return
25	Eject Robocop
26	Eject rObocop
27	Eject roBocop
28	Eject robOcOp
29	Eject roboCOp
30	Spinner Green
31	Spinner Yellow
32	Spinner Red

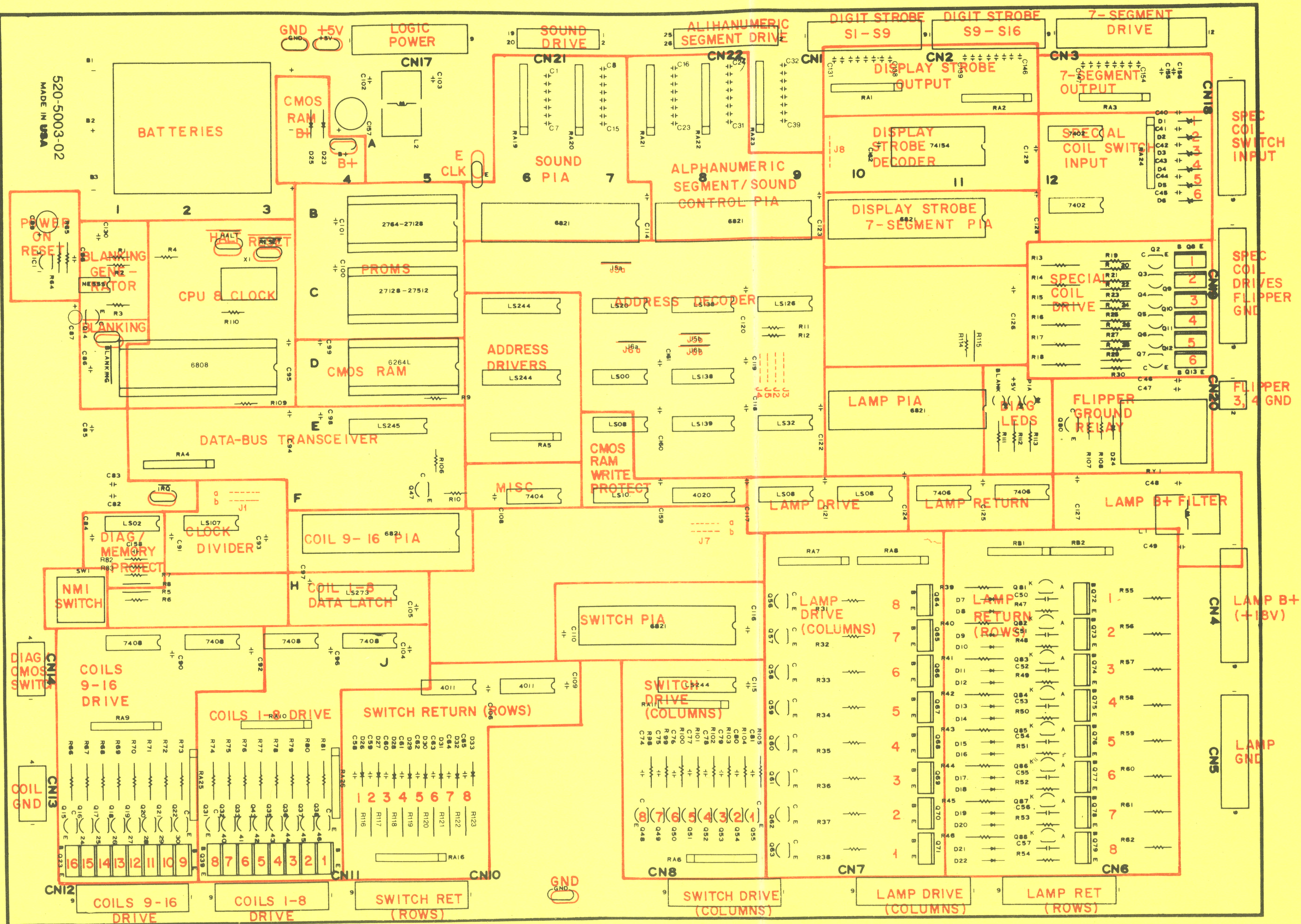
* Indicates insert board lamps.

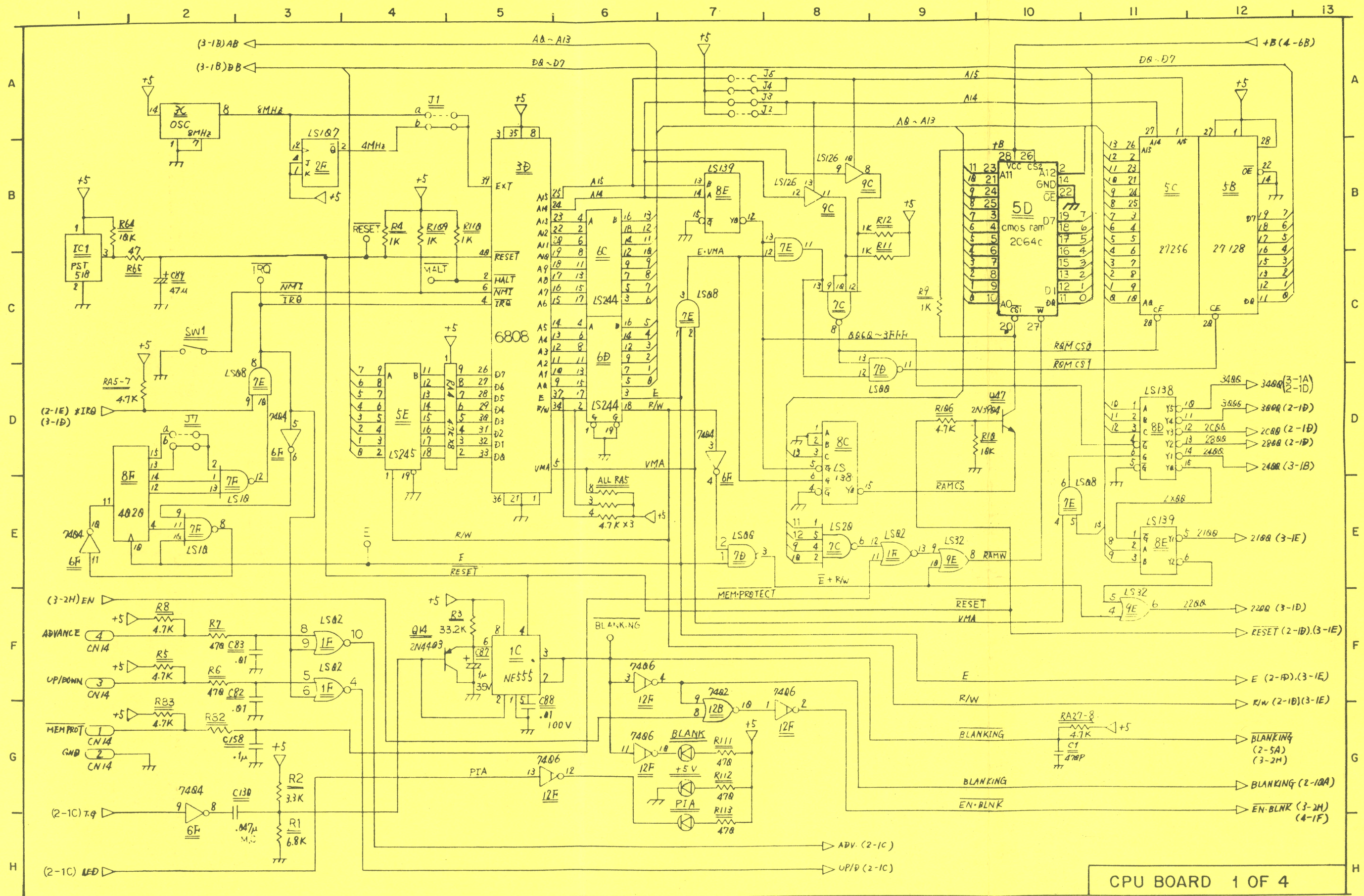
33	Bottom Special
34	2X Multiplier
35	3X Multiplier
36	Bonus Hold
37	4X Multiplier
38	5X Multiplier
39	Bottom Target Practice
40	Extra Ball
41	Back Panel Red
42	Back Panel Yellow
43	Back Panel Green
44	Left Return
45	Laser Kick Outlane
46	Left Outlane
47	ROBOCOP Green
48	ROBOCOP Orange

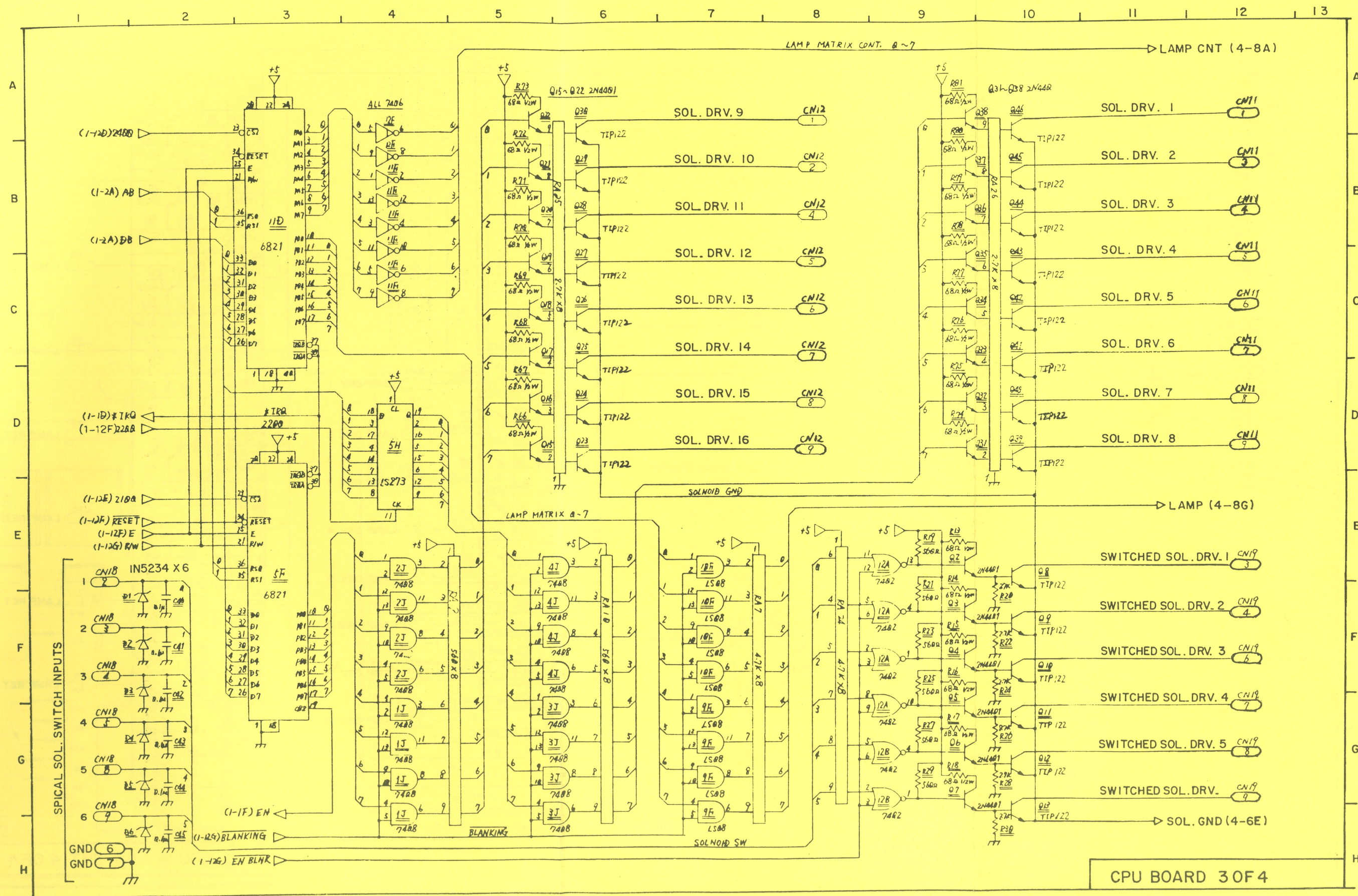
49	2 Lane
50	0 Lane
51	9 Lane
52	Ball Guide 1
53	Ball Guide 2
54	Ball Guide 3
55	Ball Guide 4
56	Not Used
57	Arrest Emil
58	Arrest Boddecker
59	Arrest Jones
60	ED 209 Million
61	Ramp Special
62	Ramp Jackpot
63	ED 209 Left
64	ED 209 Right

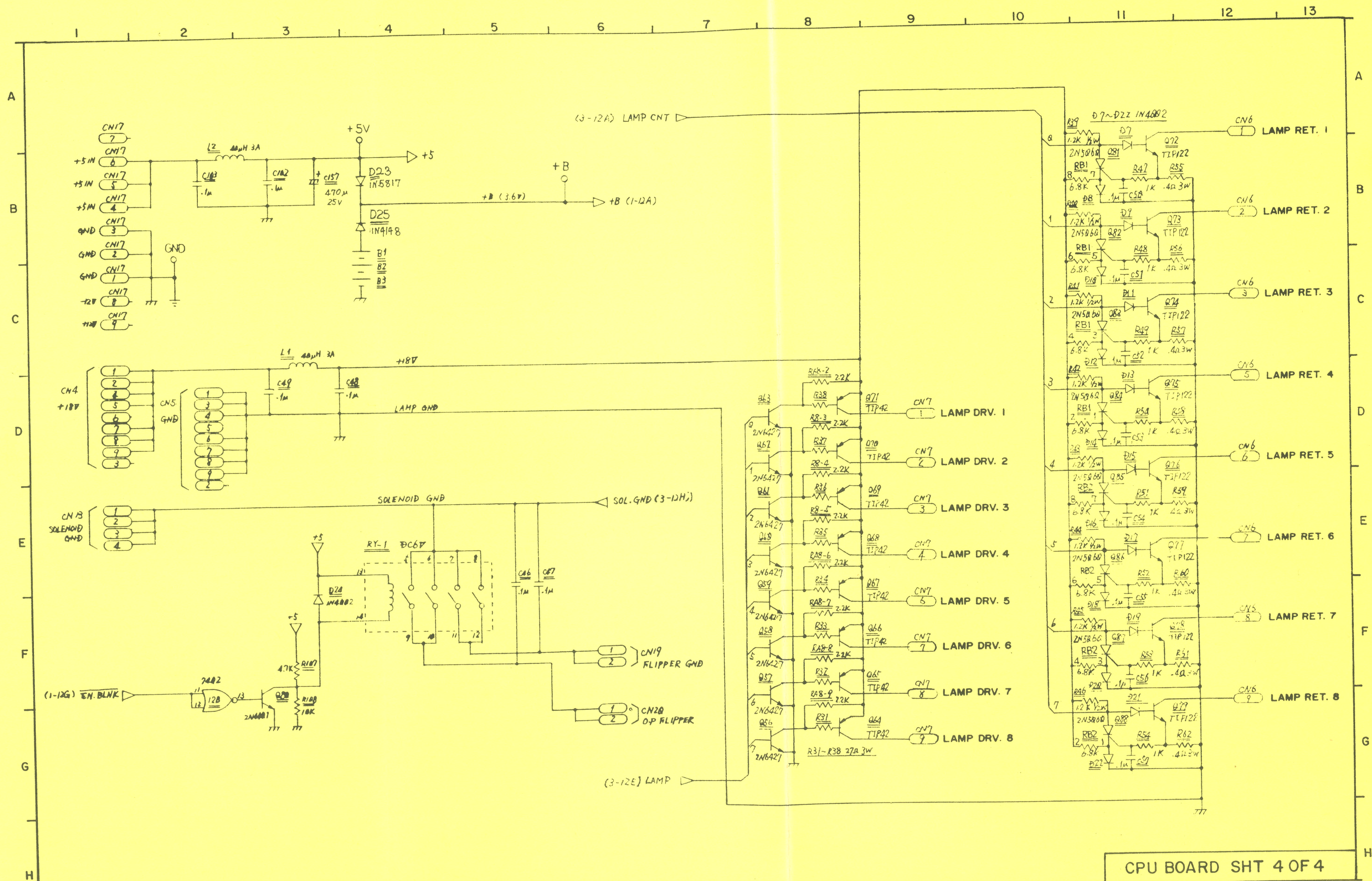


520-5003-02
MADE IN USA

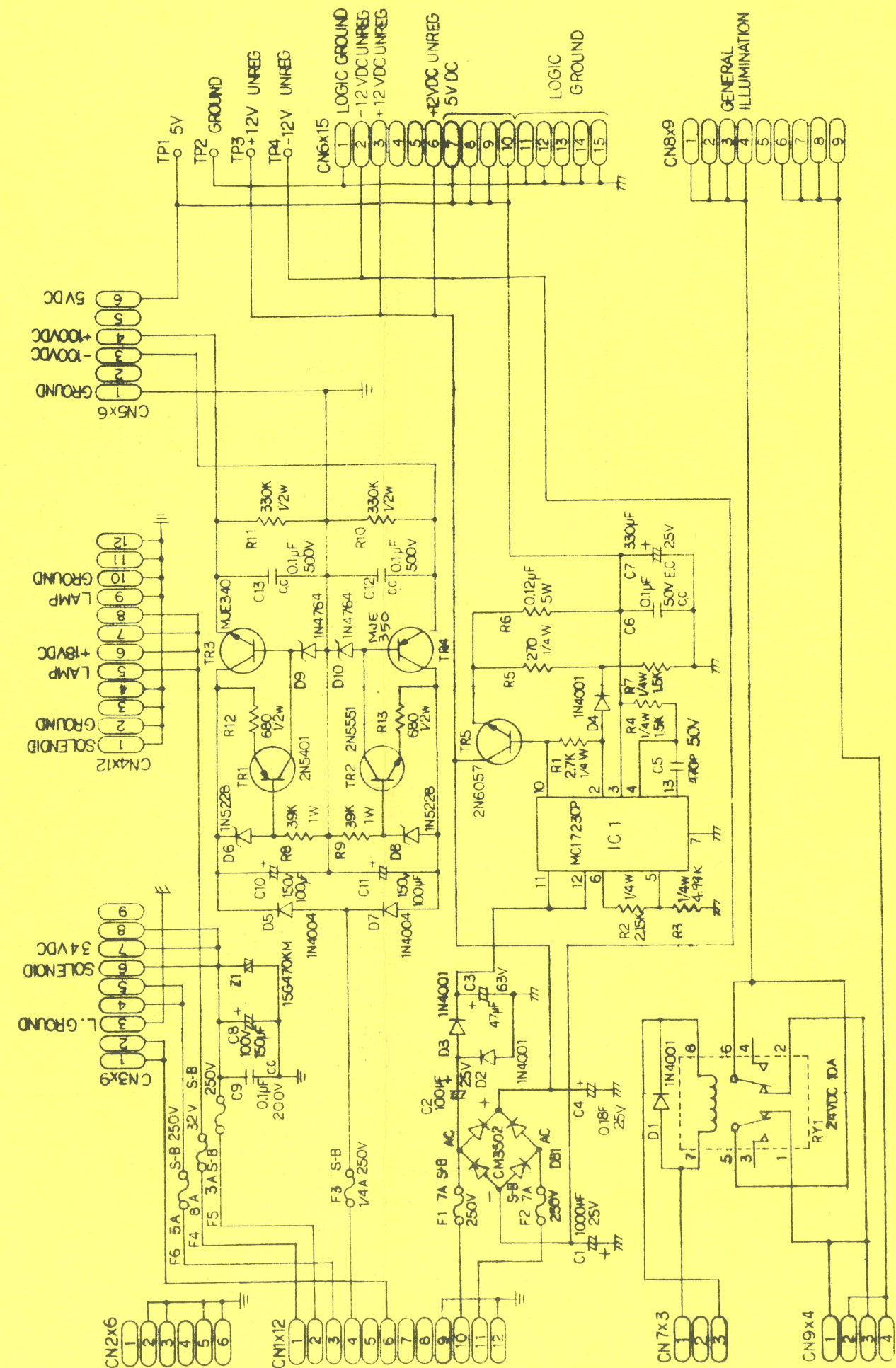
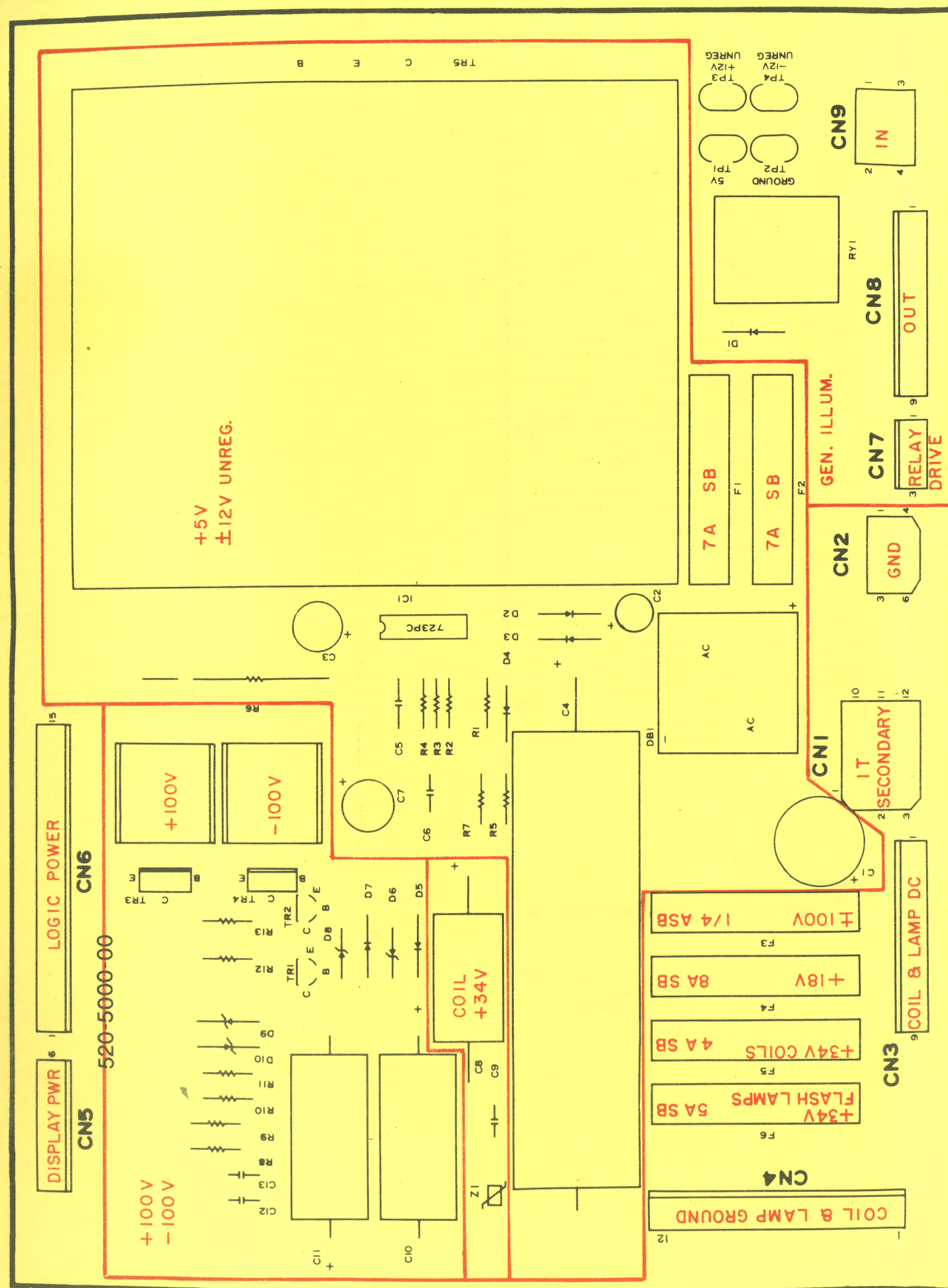


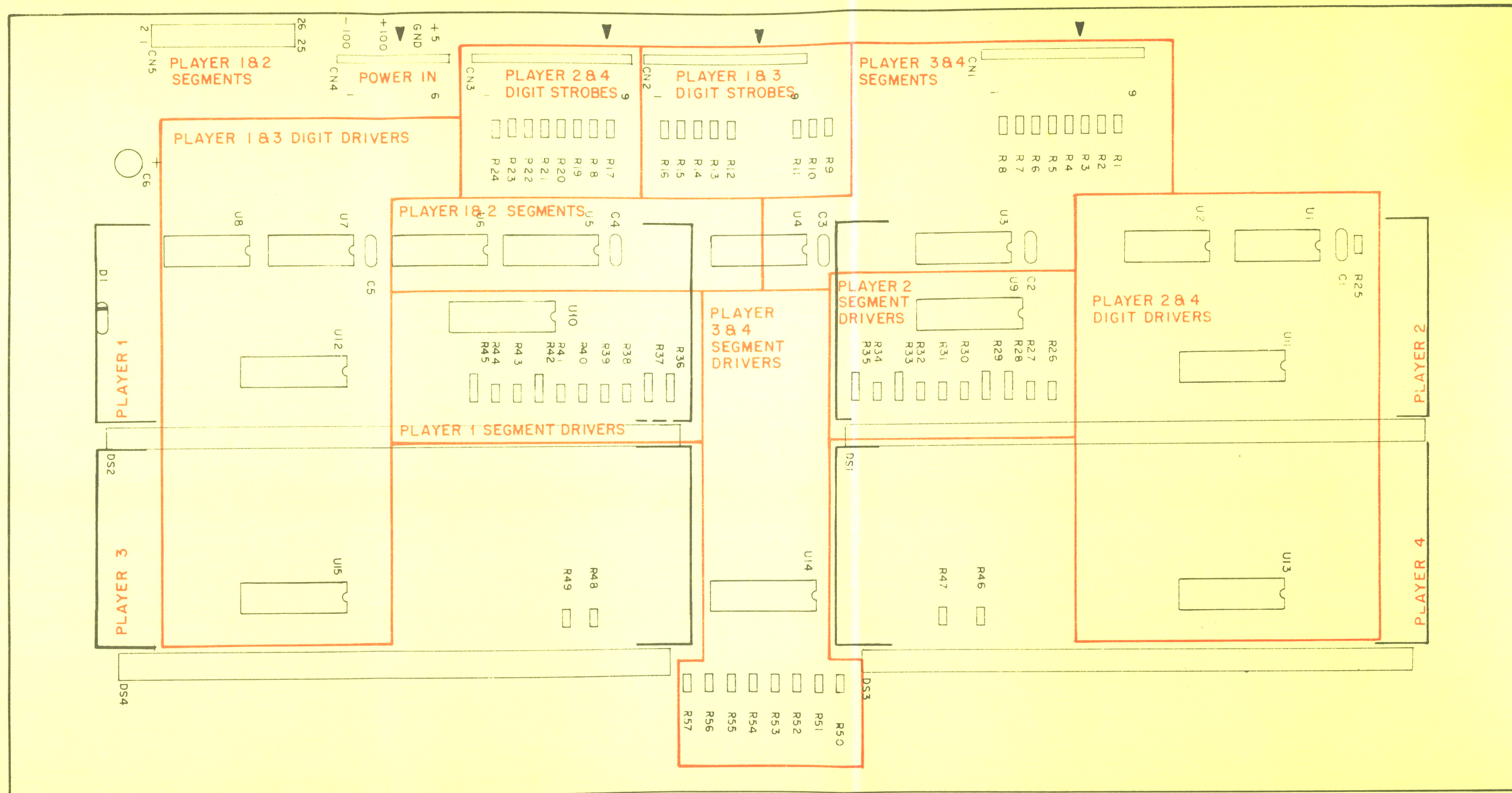


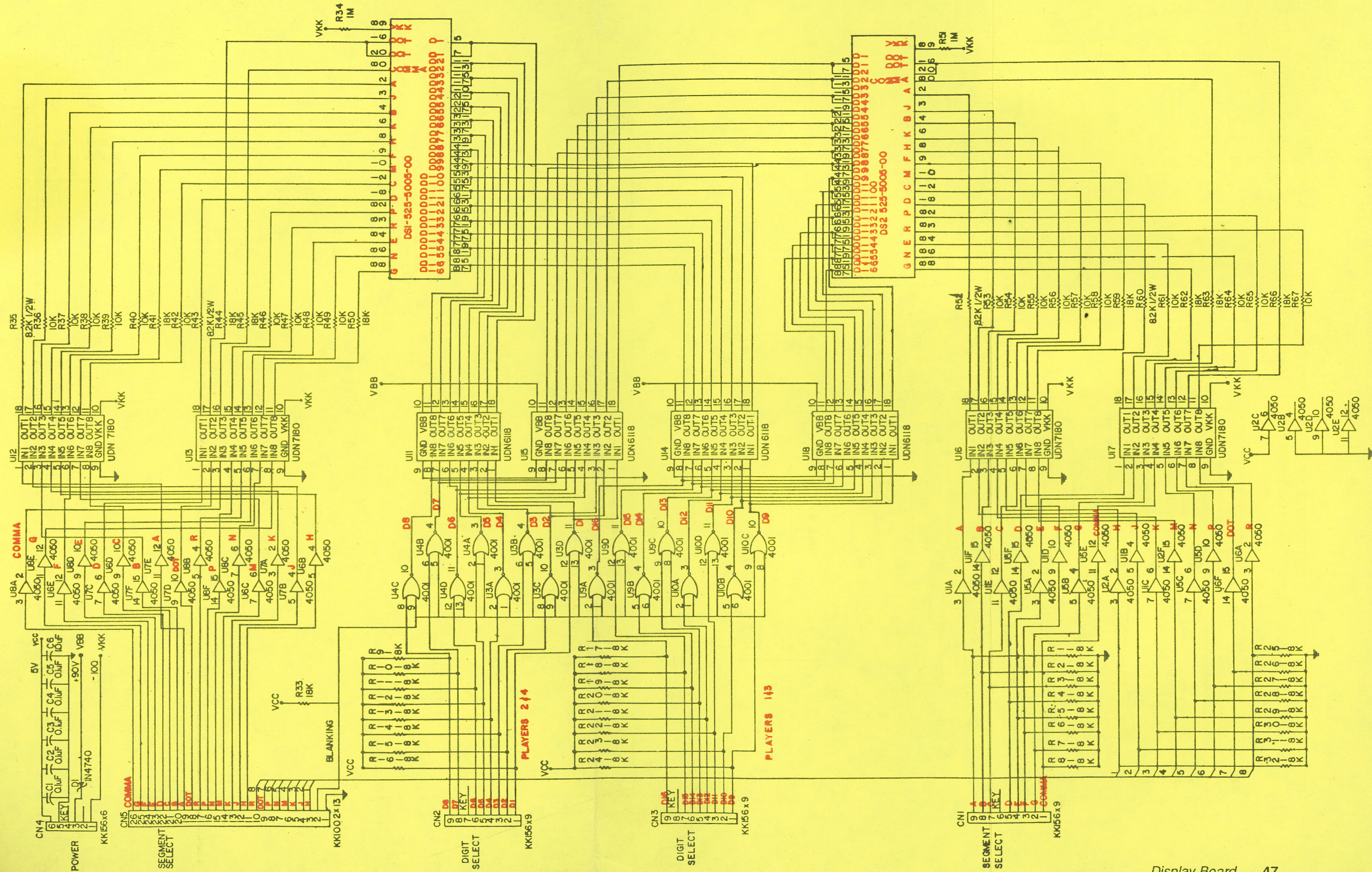


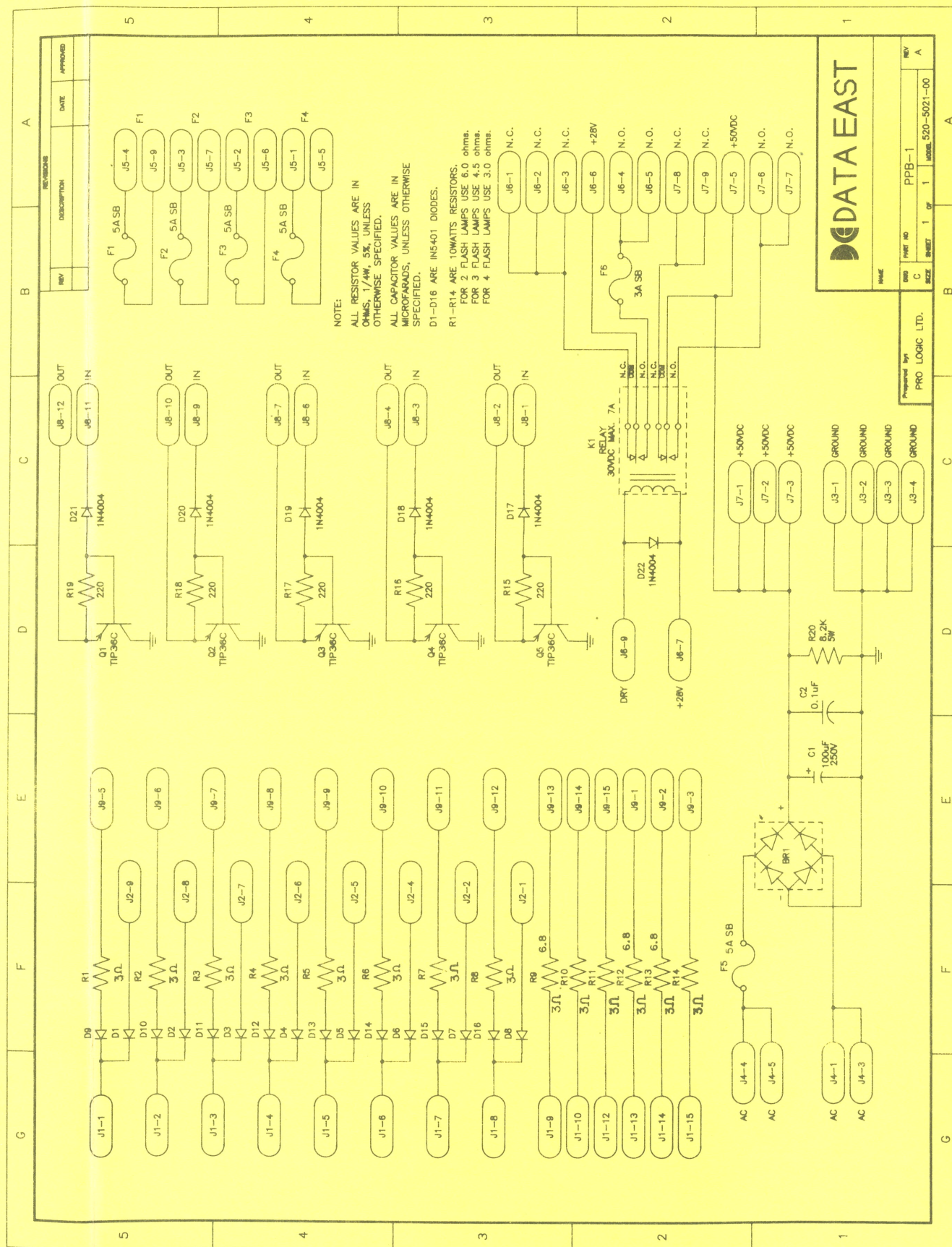


CPU BOARD SHT 4 OF 4











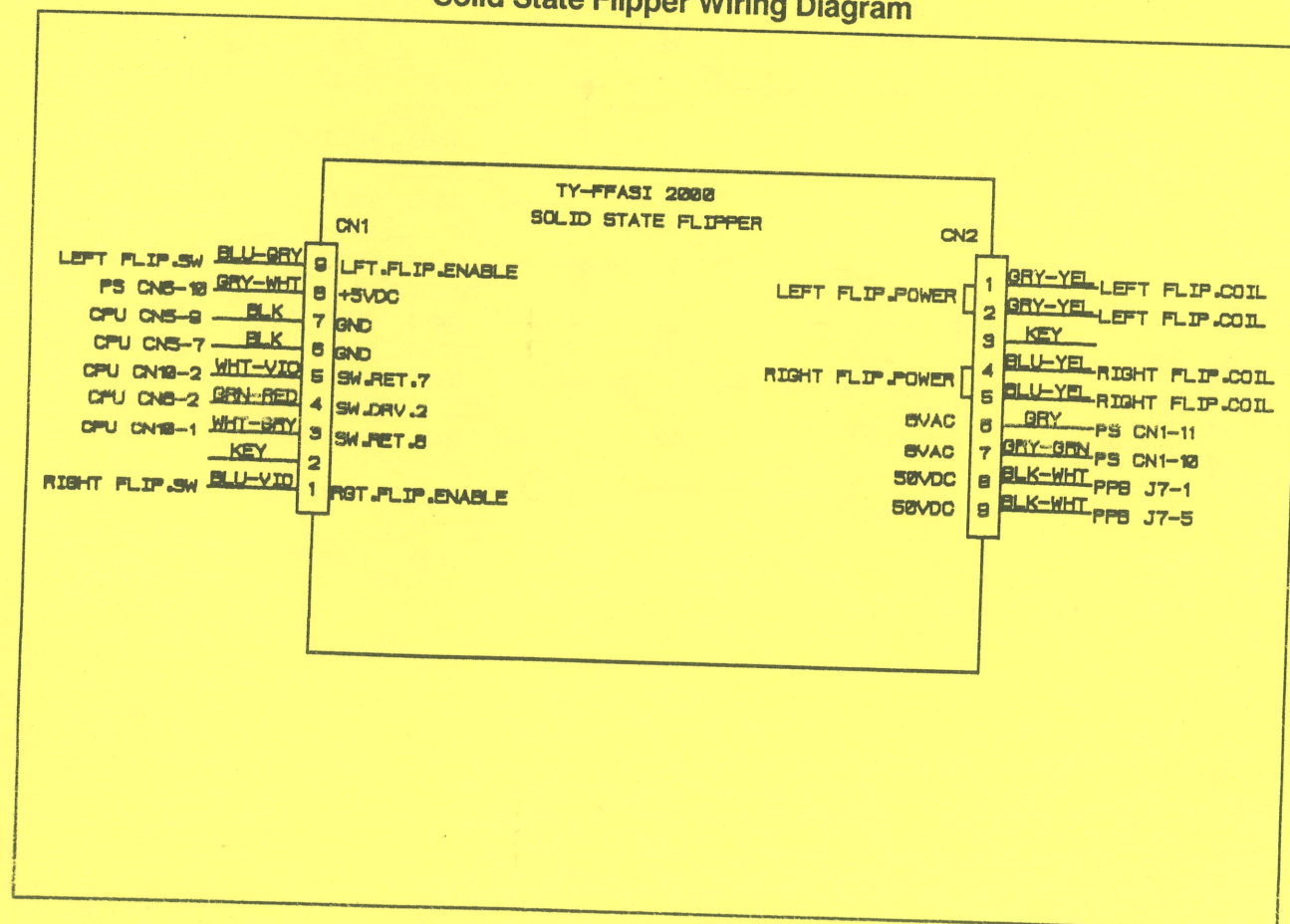
Theory of Operation for the Solid State Flippers

- The solid state flipper board is a dual flipper solenoid driver circuit. Each solenoid driver circuit contains a one shot timer, a 50V driver, and an 8V driver.

Looking at one circuit, Schmidt NAND gates U1A, U1B, and U1D make up the one shot timer. The timer length is controlled by R10, R33 and C2. The output of the timer is gated at U1C with the buffered switch input from Q6. The output of U1C controls the 50V driver circuit consisting of Q4, Q1, Q2, Q3, and D1. As long as the flipper button is activated, Q6 will keep the 8V driver circuit, SR1, on.

The 50V provides the actuation power to the flipper solenoid while the 8V provides the holding power.

Solid State Flipper Wiring Diagram



Solid State Flippers
PCB Wiring Diagram

Connector CN 1			
Pin #	Goes To	Wire Color	It Is
1	Rgt. Flipper Sw.	BLU-VIO	RGT. FLIP ENABLE
2			KEY
3	CPU CN10-1	WHT-GRY	SW. RET 8
4	CPU CN8-2	GRN-RED	SW. DRV 2
5	CPU CN10-2	WHT-VIO	SW. RET 7
6	CPU CN5-7	BLK	GND
7	CPU CN5-9	BLK	GND
8	PS CN6-10	GRY-WHT	+5VDC
9	Lft. Flipper Sw.	BLU-GRY	LFT. FLIP ENABLE

Connector CN 2			
Pin #	Goes To	Wire Color	It Is
1	Lft. Flip Coil	GRY-YEL	LFT. FLIP POWER
2			
3			KEY
4	Rgt. Flip Coil	BLU-YEL	RGT. FLIP POWER
5			
6	PS CN1-11	GRY	9 VAC
7	PS CN1-10	GRY-GRN	9 VAC
8	PPB J7-1	BLK-WHT	50 VDC
9	PPB J7-5	BLK-WHT	50 VDC

