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DATA EAST PINBALL®

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CPU JUMPER TABLE

Game	CPU*	ROM	Jumpers	
	Version	Location	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
Phantom of the Opera	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Back to the Future	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
The Simpsons	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Checkpoint	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Teen. Mut. Ninja Turtles	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Batman	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Star Trek	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Hook	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,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 5A 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 Not Used
F4 8A Slo-Blo Switched Illumination Buss (18VDC)
F5 5A Slo-Blo Solenoid Buss (34VDC)
F6 5A Slo-Blo Solenoid Buss (34VDC)
F7 0.5A Slo-Blo Display Reg. Input (90VAC)

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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 5C

Sound Board: Locations U17 (Voice ROM 1), U21 (Voice ROM 2), and U7 (Sound ROM)

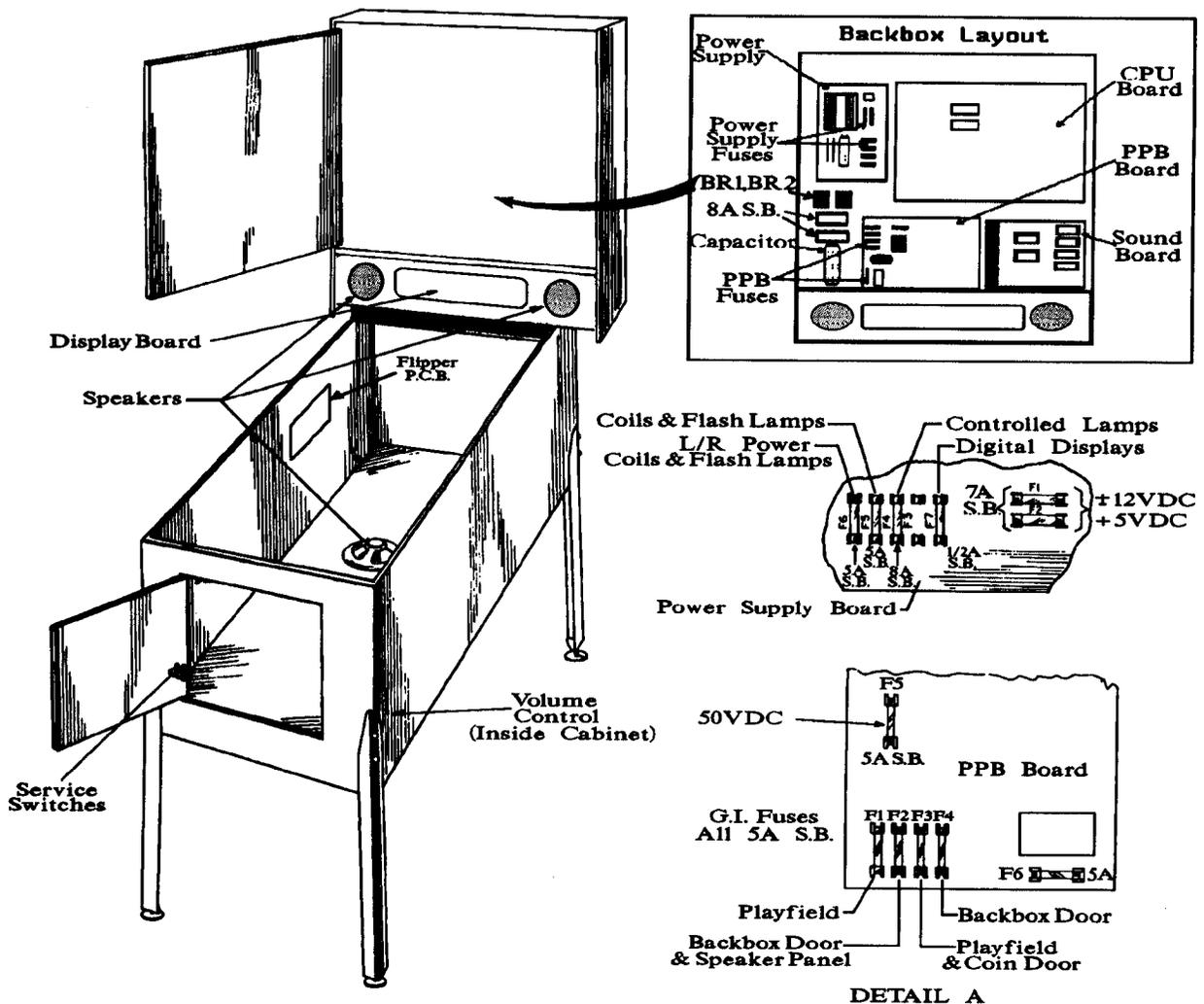
Display Board: Location U8

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, three pinballs and a large Allen Wrench used for securing the backbox.
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 secure it in its upright position by inserting the Allen Wrench in the hole in the back of the cabinet and rotating the wrench 270 degrees(3/4 turn).



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. Check all connectors in the backbox for loose wire terminations. Reseat any loose wire by pushing in on the terminal.
10. 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.
11. Check that the fuses on the Power Supply board, PPB board and fuse panel are seated properly.
12. 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.
13. Check all cabinet cable and playfield lamp board connector terminations.

14. 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.

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

16. Using an inclinometer (protractor) adjust the pitch of the playfield to 6.5 degrees. If a pitch indicating meter is not available, adjust the front levelers to the lowest position and extend the rearleg levelers approximately half way out. 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.

17. Check the plumb tilt and adjust as required.

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

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

20. 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 makes a sound 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.

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

Skill Shot

Shoot lit hole (1) in the Entry Ramp (2)

Clock ramp (right)

Shoot the Clock Ramp (3) twice (A.M. & P.M.) to light both the Clock Ramp and Clock Shop (7) for 5 Million points.

Windcoaster ramp (left)

Shoot the Windcoaster Ramp (4) six consecutive times to lite 3 Million Plus.

Baseball

Shoot the Right Lane (5) and collect 3 Strikes for 5 Million points.

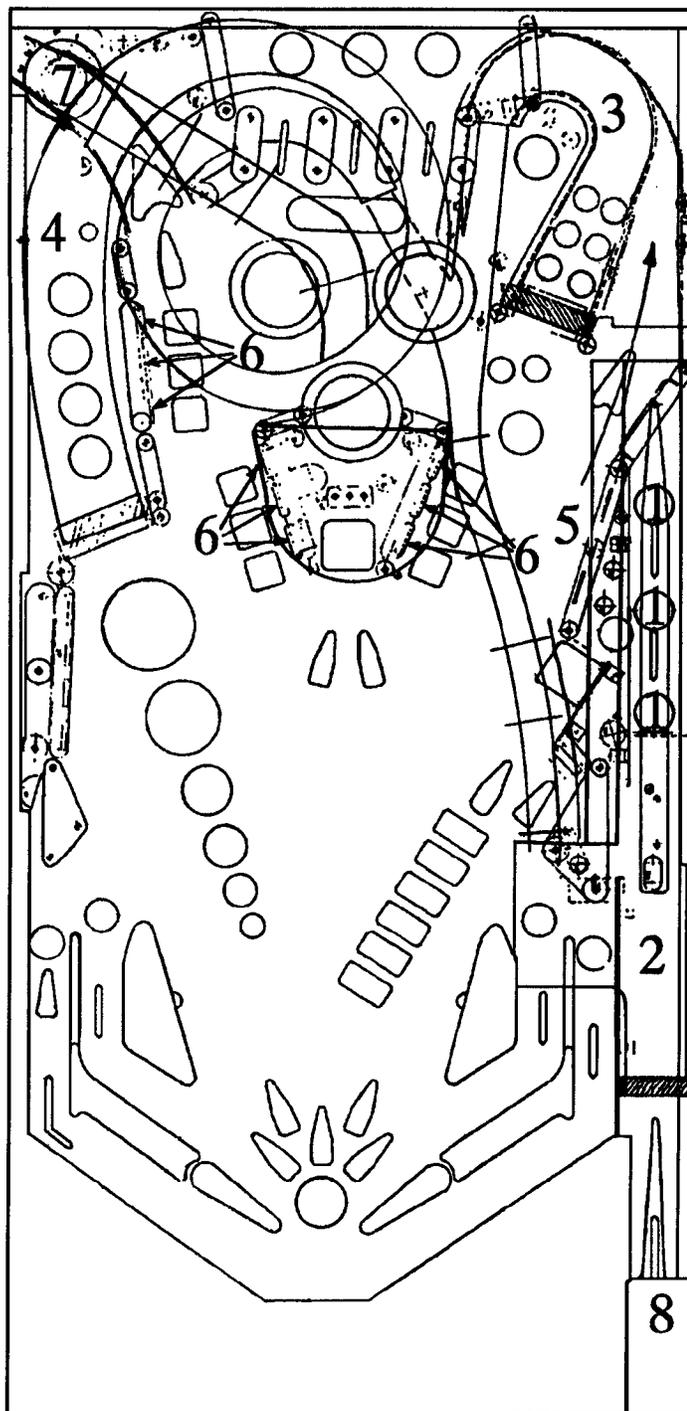
Multiball

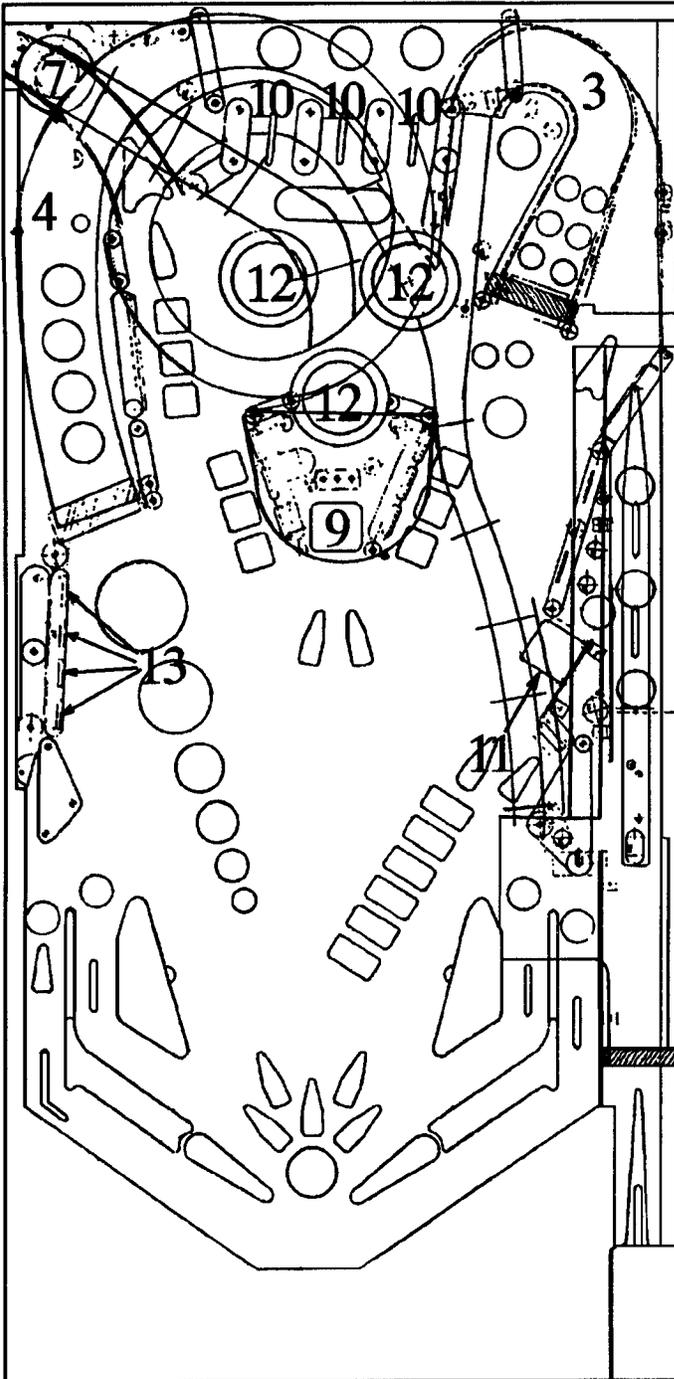
Completing all 9 spot targets (6) or shooting left hole (7) will spot targets (6).

When the Targets are completed, shoot the Left Lock (7).

A ball will appear at the shooter (8). Shoot lit hole (1) and another ball will appear at shooter (8). Shoot lit hole (1) and 3 Ball Multiball begins by awarding 10 Million points.

In 2 ball play, shoot the Left Lock (7) then shoot either Ramp (4) or (3) then, plunge (8) to the lit hole (1) for 3 Ball Play.





Jackpot

In 3 Ball Multiball, the Jackpot alternates between Left and Right Ramp.
 First, shoot Left Ramp (4)
 then Right (3) and so on...
 Increase the Jackpot Value by shooting the 9 Stand-up Targets.

Combo Shot

Shoot the Right Ramp (3), the Left Ramp (4),
 then the Croc Clock Shot (7) to collect
 5 Million Points.

Multiplier

Completing the Top 3 Lanes (10) advances the
 Bonus Multiplier to 2X, 4X, 6X, 8X, & 10X.
 Acheiving 10X lites Bonus Hold.

Power Scoop Awards

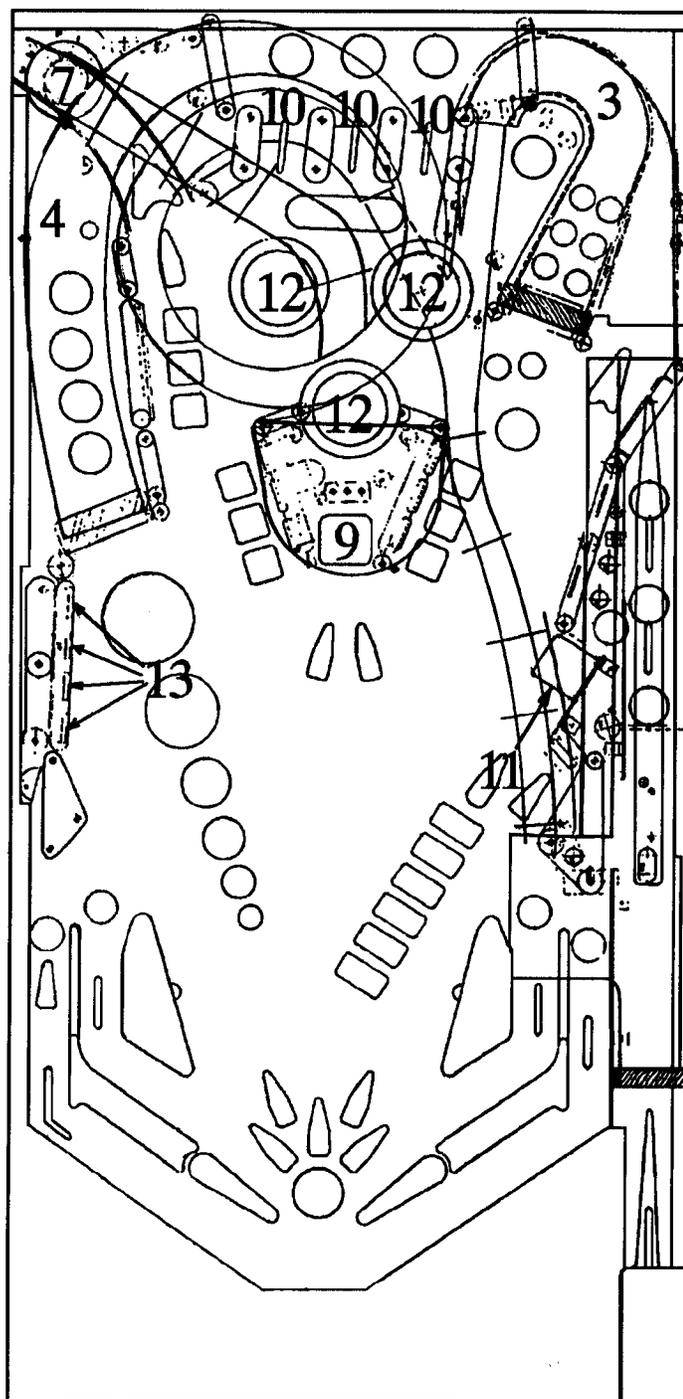
Shoot Skull (9) to lite Value, shoot Scoop (11) to collect the lit Value.

Striking any of the Turbo Bumpers (12) changes the lit Value of the Scoop:

- 1) Light bumpers (12)
- 2) 5 Million Points
- 3) Light Croc Time - Shoot right ramp (3) to collect the Count Down Bonus.
- 4) Fast Scoring - Large scores per switch closure (limited event)
- 5) Skull 20 million - Shoot Skull Hole (9) for 20 Million points.
- 6) Max Multiplier
- 7) Bangarang- All Main Features are lit during the Countdown Timer.
The Skull (9), Windcoaster Ramp (4), Clock Shop (7) and Baseball Shot (5) score 5 Million points during Bangarang Timer Countdown.

Pirate Town Special

Complete the Drop Targets (13) to collect the lit Value, either Special, Extra Ball or 10 Million Points.



AUDIT FUNCTIONS

GENERAL

There are 75 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are nine most-used audits (AU01 through AU09) in a 'quick look' group and 65 less-used audits (E AU11 through E AU75), 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 AU09, 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 AU10 is displayed. When you exit audits and adjustments, the AU09 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 Ad11, Audits Reset. Game adjustments (Ad01 to Ad13 and E Ad14 to E Ad46) begin after the last audit function (AU10 or E AU75). 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 AU24) divided by Plays Total (E AU25).

Ball Time Average (in seconds) (AU03) is Total Play Time divided by Total Balls Played (AU10).

Average Game Time (AU04) is the Average Game Time expressed in minutes and seconds.

Coins (AU05, 06, 07 and 08) - These four audit totals are provided to show the amount of coins registered for the left, right, center, and 4th coin chutes, respectively.

Total Coins (AU09) is the total number of coins dropped through all 3 coin chutes.

Expand Audits (AU010) permits viewing of expanded audits.

Hook

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)
AU 01	Hook PROM ID	E AU 39	Cycles H.S. Reset
AU 02	Total Paid Credits	E AU 40	Coins No Credit
AU 03	Free Game Percentage	E AU 41	Service Credits
AU 04	Average Ball Time	E AU 42	# Tickets Dispensed
AU 05	Av Game Time	E AU 43	Drains Left
AU 06	Coins Left	E AU 44	Drains Center
AU 07	Coins Right	E AU 45	Drains Right
AU 08	Coins Center	E AU 46	Left Ramp Shots
AU 09	Coins 4th Chute	E AU 47	Right Ramp Shots
E AU 10	Total Coins	E AU 48	Skill Shot Made
E AU 11	Expand Audits (ON/OFF)	E AU 49	All Banks Made
E AU 12	Balls Total	E AU 50	Bank Completed
E AU 13	Extra Balls Total	E AU 51	Spot Target From VUK
E AU 14	Extra Ball Percent	E AU 52	2 Ball Multiball
E AU 15	Replay 1 Awards	E AU 53	3 Ball Multiball
E AU 16	Replay 2 Awards	E AU 54	Rite Jackpot Award
E AU 17	Replay 3 Awards	E AU 55	Left Jackpot Award
E AU 18	Replay 4 Awards	E AU 56	Scoop Mill. Award
E AU 19	Total Replays	E AU 57	Skull Award
E AU 20	Replay Percent	E AU 58	Scoop Max X
E AU 21	Total Specials	E AU 59	Croc Time
E AU 22	Special Percent	E AU 60	Scoop Bumps Active
E AU 23	Total Matches	E AU 61	Scoop Fast Scoring
E AU 24	Hi Score Wins	E AU 62	Scoop Mystery Score
E AU 25	High Score Percent	E AU 63	Scoop Bangerang
E AU 26	Total Free Plays	E AU 64	2X Made
E AU 27	Total Games	E AU 65	4X Made
E AU 28	0.0 - 19.9 Million	E AU 66	6X Made
E AU 29	20.0 - 39.9 Million	E AU 67	8X Made
E AU 30	40.0 - 59.9 Million	E AU 68	10X Made
E AU 31	60.0 - 79.9 Million	E AU 69	More Than 10X Made
E AU 32	80.0 - 99.9 Million	E AU 70	Laser Kick Lit
E AU 33	100 Million Plus	E AU 71	Laser Kick Award
E AU 34	Average Scores	E AU 72	Rerace Made
E AU 35	Games 1Player	E AU 73	Pirate Town Special Lit
E AU 36	Games 2Player	E AU 74	Pirate Town Special Awarded
E AU 37	Games 3Player	E AU 75	# Of Victory Shots
E AU 38	Games 4Player		
	Attract Minutes		

EXPANDED FUNCTIONS

Balls Total (E AU11) is the total of regular and extra balls.

Extra Balls Total (E AU12) is the total number of extra balls awarded.

Extra Ball Percentage (AU13) is AU12 divided by Plays Total (AU26).

Replay Awards (E AU14 through 17) provide the total awards (credit, extra ball, or audit) for replay levels 1 through 4, respectively.

Total Replays (E AU18) is the total awards (credits, extra balls, or audit only) for exceeding replay score levels.

Replay Percentage (E AU19) is the Replay Total awards for exceeding replay score levels (E AU18) divided by Plays Total (E AU26).

Total Specials (E AU20) is the total awards (credits, extra balls, or scores) for making specials.

Special Percentage (E AU21) is Special Total (E AU20) divided by Plays total (E AU26).

Match Total (E AU22) 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 adjustable from 0% to 10%, by E Ad 14 if enabled.

High Score Wins (E AU23) is the total credits awarded for exceeding the high-score-to-date scores.

High Score Percentage (E AU24) is High Score Wins (E AU23) divided by Plays Total (E AU26).

Total Free Plays (E AU25) is the total free credits for replays, high-score-to-date, specials, and match.

Total Games (E AU26) is the sum of Total Paid Credits (AU01) and Free Total (E AU25). Note that free credits are not recorded in the audits until they are actually used.

0.0 - 19.9 Million (E AU27) provides the total number of games the Player's final score was between 0 and 19,999,990 points.

20.0 - 39.9 Million (E AU28) provides the total number of games the Player's final score was between 20,000,000 and 39,999,990 points.

40.0 - 59.9 Million (E AU29) provides the total number of games the Player's final score was between 40,000,000 and 59,999,990 points.

60.0 - 79.9 Million (E AU30) provides the total number of games the Player's final score was between 60,000,000 and 79,999,990 points.

80.0 - 99.9 Million (E AU31) provides the total number of games the Player's final score was between 80,000,000 and 99,999,990 points.

100 Million Plus (E AU32) provides the total number of games the Player's final score was over 100,000,000 points.

Average Scores (E AU33) provides the Average Score by adding the Final Score of each game to a table and dividing this sum by the Total Plays .

Games - Player (E AU34 through 37) provide individual totals of 1- player, 2-player, 3-player, and 4-player games, respectively.

Attract Minutes (E AU38) provides the number of minutes the game is in Attract Mode (Factory use).

Cycles High Score Reset (E AU39) provides the number of times that the high score levels have been automatically reset (if enabled).

Coin No Credit (E AU40) provides the number of times the coin switch was closed without awarding credit(s)-This option is used in multiple coin conditions.(ie. 2 quarters 1 Play)

Service Credits (E AU41) provides the total number of Service credits added to the game. See *Game Diagnostics on page 19 for instructions regarding entry of Service Credits.*

Tickets dispensed (E AU 42) provides the total number of Tickets dispensed.

Drains Left (E AU43) provides the number of times the ball drained out the left drain.

Drains Center (E AU44) provides the number of times the ball drained out the center drain.

Drains Right (E AU45) provides the number of times the ball drained out the right drain.

GAME SPECIFIC FUNCTIONS

Left Ramp Shots (E AU46) provides the total number of times the Left Ramp was completed.

Right Ramp Shots (E AU47) provides the total number of times the Right Ramp was completed.

Skill Shot Made (E AU48) provides the number of times the Shooter Lane Skill shot was completed.

All Banks Made (E AU49) provides the number of times, all 3 Standup Target Banks were completed.

Bank Completed(E AU50) provides the number of times, all 4 targets in the Drop Target Bank were completed.

Spot Target from VUK (E AU51) provides the number of times the Vertical Up Kicker, lit one of the 9 flashing Standup Targets.

2 Ball Multiball (E AU52) provides the number of times the 2 Ball Multiball feature was achieved.

3 Ball Multiball (E AU53) provides the number of times the 3 Ball Multiball feature was achieved.

Rite Jackpot Awd (E AU54) provides the number of times the Right Jackpot feature was collected.

Left Jackpot Awd (E AU55) provides the number of times the Left Jackpot feature was collected.

Scoop Mill. Award (E AU56) provides the number of times the Power Scoop awarded 5 Million points.

Skull Award (E AU57) provides the number of times the Power Scoop enabled the Skull 20 Million Feature.

Scoop Max X (E AU58) provides the number of times the Power Scoop increased the Bonus Multiplier to 10X.

Croc Time (E AU59) provides the number of times the Power Scoop enabled the Croc Time Feature.

Scoop Bumps Active (E AU60) provides the number of times the Power Scoop enabled the Super Bumpers feature.

Scoop Fast Scoring (E AU61) provides the number of times the Power Scoop initiated the Fast Scoring Feature.

Scoop Mystery Score (E AU62)provides the number of times the Power Scoop awarded a Mystery Score.

Scoop Bangerang(E AU63) provides the number of times the Power Scoop enabled the Bangerang Feature.

2X Made (E AU64) provides the number of times 2X bonus was enabled.

4X Made (E AU65) provides the number of times 4X bonus was enabled.

6X Made (E AU66) provides the number of times 6X bonus was enabled.

8X Made (E AU67) provides the number of times 8X bonus was enabled.

10X Made (E AU68) provides the number of times 10X bonus was enabled

More Than 10X Made (E AU69) provides the number of times the Top 3 Lanes were completed after the 10X Multiplier was awarded.

Laser Kick Lit (E AU70) provides the number of times the Laser Kick was re-lit by a ball operating the lit Single Stand up Target

Laser Kick Award (E AU71) provides the number of times the Laser Kick returned a ball into play.

Rerace Made (E AU72) provides the total number of times the Multiball Feature was re-enabled by the program. (Note- In the early stages of Multiball, a safety timer is used to re-establish the feature, should a ball exit prematurely.)

Pirate Town Special Lit (E AU73) provides the number of times the Pirate Town Special was lit.

Pirate Town Special (E AU74) provides the number of times the Pirate Town Special was awarded

of Victory Shots (E AU75) provides the number of times the game awarded 8 Million points for completing either Ramp during Victory Mode.

Notes

GAME ADJUSTMENTS

GENERAL

There are 46 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 Ad46 (Expanded Adjustment 46) is shown in the Player 3 display, FACTORY RESTORE is shown in the Player 1 & 2 displays, and OFF is shown in the Player 4 display. With the audits displaying AU10 (or expanded E AU75) 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 and 03 for fixed replay levels.

Ad 02 Start Replay

- **Manual:** Adjust the starting Replay 1 setting to between 100,000 and 99,900,000.

Ad 03 Levels Replay/Level 1,2,3 & 4 Replay

- 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
- Adjust Replay 1 level to between 100,000 and 99,900,000. (Same as Start Replay)
If Ad 03 is set for 2, adjust Replay 2 level to between 100,000 and 99,900,000.
If Ad 03 is set for 3, adjust Replay 3 level to between 100,000 and 99,900,000.
If Ad 03 is set for 4, adjust Replay 4 level to between 100,000 and 99,900,000.

Hook Game Adjustment Table

Adjustment Number (Player 3)	Description (Players 1 & 2)	Factory Setting (Player 4)
Ad 01	Replay/Manual	10%
Ad 02	Start Replay	80,000,000
Ad 03	Levels Replay *	01
Ad 04	Game Awards	CREDIT
Ad 05	Limit Freegame	03
Ad 06	Limit Extraball	03
Ad 07	Game Rules	FACTORY
Ad 08	Game Price*	USA2
Ad 09	Game Cleaned	NO
Ad 10	Coin Reset	NO
Ad 11	Audits Reset	NO
Ad 12	Restore H.S.T.D.	NO
Ad 13	Expand Adjustments	NO
E Ad 14	Match Percent	08
E Ad 15	Balls Per Game	03
E Ad 16	Tilt Warnings	01
E Ad 17	Replay Boost	NO
E Ad 18	Credits Limit	30
E Ad 19	High Scores Allowed	YES
E Ad 20	Hiscore 1 Awards	03
E Ad 21	Hiscore 2 Awards	01
E Ad 22	Hiscore 3 Awards	00
E Ad 23	Hiscore 4 Awards	00
E Ad 24	Backup World Record	90,000,000
E Ad 25	Backup Hiscore 2	85,000,000
E Ad 26	Backup Hiscore 3	80,000,000
E Ad 27	Backup Hiscore 4	75,000,000
E Ad 28	Backup Hiscore 5	70,000,000
E Ad 29	Backup Hiscore 6	65,000,000
E Ad 30	Reset H.S.T.D. Every	700
E Ad 31	Clean Game Every	1500
E Ad 32	Free Play	NO
E Ad 33	Custom Message	ON
E Ad 34	Attract Mode Music	ON
E Ad 35	Flash Lamps	NORMAL
E Ad 36	Coils Pulse	NORMAL
E Ad 37	Level Adjust By	ANY
E Ad 38	Install Country	USA
E Ad 39	Ticket Dispenser	OFF
E Ad 40	# Tickets Per Award	1
E Ad 41	Outlane Toggle	BOTH
E Ad 42	Croc Timer	FACTORY
E Ad 43	Loop Timer	FACTORY
E Ad 44	Try Again	ON
E Ad 45	Next Game Promo	ON
E Ad 46	Factory Restore	OFF

* Some settings result in Drop-Down Tables- See Text

Ad 04 Game Awards Set for replays to award: **CREDIT, EXTRA BALL, NONE** or **SPECIAL** (when score threshold is achieved a playfield special is lit).

Ad 05 Limit FreeGame - Adjust for the maximum number of free games that may be accumulated per game; 0 to 9 .

Ad 06 Limit Extra Balls - Adjust for the maximum number of extra balls that may be accumulated per game; 1 to 9 or OFF.

SINGLE-FUNCTION DIFFICULTY ADJUSTMENT (Ad 07)

Any one of five INSTALL settings for this adjustment may be activated to automatically select settings for multiple adjustments affecting game difficulty. Use the Start button to choose the difficulty level you require and press the step button to activate the setting. After activation, the individual adjustments may be readjusted if desired. Refer to Install Adjustment Table for details.

Ad 07 Game Rules - Set to **EXTRA EASY, EASY, FACTORY, HARD** or **EXTRA HARD**.

(Note - Additional game features not variable by the Expanded Adjustments may also change using this setting.)

Install Adjustment	E Ad07 Extra Easy	E Ad07 Easy	E Ad07 Factory	E Ad07 Hard	E Ad07 Extra Hard
E Ad 41 Outlane Toggle	FLIPPER	BOTH	BOTH	SLING	SLING
E Ad 42 Croc Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 43 Loop Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 44 Try Again	ON	ON	ON	OFF	OFF

NOVELTY / 5-BALL/ADD-A-BALL SETTINGS

The following three combinations are recommended for situations where local laws restrict certain game features regarding the use of replays or the number of balls per game:

Novelty Play Rules - Set to establish recommended settings for no free play or extra balls:

Ad 01 Manual Replay = Fixed
 Ad 02 Start Replay = 00
 Ad 03 Levels Replay = None
 Ad 04 Game Awards = None
 Ad 05 Limit Freegame = 0

Ad 06 Limit Extra Balls = 0
 E Ad 14 Match Percent = Off
 E Ad 20 World Record Awards = 0
 E Ad 21-23 Todays 1-3 Awards = 0

5-Ball Play Rules - Set to establish recommended settings for 5-ball play:

Ad 01 Manual Replay = 07%
 Ad 02 Replay Start = 90,000,000
 Ad 03 Replay Levels = 01
 Ad 04 Game Awards = Credit
 Ad 05 Limit Freegame = 3
 Ad 06 Limit Extra Balls = 3
 E Ad 14 Match Percent = 04

E Ad 15 Balls/Game = 5
 E Ad 20 World Record Awards = 3
 E Ad 21 Todays 1 Award = 1
 E Ad 41 Outlane Toggle = Sling
 E Ad 42 Croc Timer = Hard
 E Ad 43 Loop Timer = Hard
 E Ad 44 Try Again = Off

Extra Ball Settings-To disable awarding of credits and provide awards with an extra ball make the following adjustments:

Ad 04 Game Awards = Extra Ball
 Ad 05 Limit Freegame = 0
 E Ad 14 Match Percent = OFF

E Ad 19 Scores Highest = No
 E Ad 20 to 23 World Record & Todays High Awards = 0

GAME PRICING (Ad 08)

There are two methods available for coin switch programming; Standard and Custom. Standard pricing uses a single adjustment (Ad 08) to select a pricing scheme shown in the **Standard /CustomPricing Table**. Custom pricing is used to select additional pricing schemes defined by a Drop Down menu .

With Ad 08 set to **CUSTOM** operating the step button again initiates a drop down menu representing coin switch pulses for the left, right, and center coin slots. The prescribes the number of pulses required for one credit. For example, if *Left Coin Pulses*, was set to 02 and *Coin Switch Pulses Required for 1 Credit*, to 01 a coin in the left slot would produce two credits. Further, if *Left Coin Pulses*, was set to 01 and *Coin Switch Pulses Required for 1 Credit*, to 02, two coins in the left slot would be required for one credit.

Coin Switch Pulses Required for Bonus Credit may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if *Left Coin Pulses* was set to 01, *Coin Switch Pulses Required for 1 Credit* to 01 and *Coin Switch Pulses Required for Bonus Credit* 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.

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, the following adjustments are utilized to tailor each individual coin chute.

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

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

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

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

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

Meter Clicks for Left, Right, Center & 4th Coin Chute- Set the number of meter clicks for each individual coin chute switch closure.

CUSTOM PRICING TABLE

Left	Coin Mechs			Plays/Coins	Ad08	Adjustments					
	Right	Center	4th			Left Pulses	Right Pulses	Mid Pulses	4th Pulses	Pulses / credit	Pulses / bonus
25¢	25¢	\$1.00	n/u	1/25¢ 3/50¢	Custom	01	01	04	00	01	02
				1/25¢ 5/\$1.00	Custom	01	01	04	00	01	04
				1/25¢/ 6/\$1.00	Custom	05	05	20	00	04	20
5SCH	10SCH	10SCH	n/u	1/10 SCH	Custom	01	02	02	00	02	00
				1/10 SCH 4/30SCH	Custom	04	08	08	00	06	00
10P	£1	50P	20P	1/30P 2/50P 5/£1	Custom	01	15	06	02	03	00
				1/50P 3/£1	Custom	01	15	05	02	05	00
				1/30P 4/£1	Custom	01	12	05	02	03	00
20¢	\$1.00	n/u	n/u	1/60¢ 2/\$1.00	Custom	01	05	00	00	03	05

STANDARD PRICING TABLE

Ad 08 Standard Pricing Select			Coin Mechs			Plays/Coins		
			Left	Center	Right	Left	Center	Right
1	2	4	25¢	\$1.00	25¢	1 PLAY/ 1COIN	4 PLAY/ 1COIN	1 PLAY/ 1COIN
USA1	1COIN	1PLAY						
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-IN	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	1 PLAY/ 1COIN 3 PLAY/ 2COIN	1 PLAY/ 1COIN 3 PLAY/ 2COIN
AUSTRALIA COINAGE			20¢	\$1.00	\$2.00	1 PLAY/ 3COIN	2 PLAY/ 1 COIN	4 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	50f	20f	1 PLAY/ 1COIN	3 PLAY/ 1COIN	1 PLAY/ 1COIN
GERMAN 5DM 1			1DM	2DM	5DM	1 PLAY/ 1COIN	2 PLAY/ 1COIN	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	2.5Guilder	1 PLAY/ 1COIN	1 PLAY/ 1COIN	3 PLAY/ 1COIN
SWEDEN COINAGE			1Kr	5Kr	5Kr	1 PLAY/ 3COIN 2 PLAY/ 5COIN	2 PLAY/ 1COIN	2 PLAY/ 1COIN
FRANCE 1 COINAGE			1f	5f	10f	1 PLAY/ 3COIN 2 PLAY/ 5COIN	2 PLAY/ 1COIN	5 PLAY/ 1COIN
FRANCE 2 COINAGE			1f	5f	10f	1 PLAY/ 5COIN	1 PLAY/ 1COIN	3 PLAY/ 1COIN
ITALY COINAGE			500L		500L	1 PLAY/ 1COIN		1 PLAY/ 1COIN
SPAIN COINAGE			100 Pts		500 Pts	1 PLAY/ 1COIN		6 PLAY/ 1COIN
JAPAN COINAGE					100¥			1 PLAY/ 1COIN 3 PLAY/ 2COIN

ADDITIONAL GENERIC FEATURES

Ad 09 Game Cleaned - When enabled (set to **YES**) the game cleaning counter will be reset to zero and Game Clean-Me message in Tech Alert will go out when STEP is depressed. (Also see E Ad31.)

Ad 10 Coin Reset - When enabled (set to **YES**) all coin and paid credit totals will be reset to zero when STEP is depressed.

Ad 11 Audits Reset - When enabled (set to **YES**) all audit totals except for coins and paid credits will be reset to zero when STEP is depressed.

Ad 12 Restore High Score - When enabled (set to **YES**) the High Score Levels and associated initials will be restored to backup settings when STEP is depressed .

Ad 13 Expand Adjustments - When set to **NO**, depressing the STEP push-button advances directly to E Ad 46, **FACTORY RESTORE**. When set to **YES**, depressing the STEP push-button sequences through the expanded

E Ad 28 Backup Highscore 5- Adjust the backup score level to which level 4 may be reset.

E Ad 29 Backup Highscore 6- Adjust the backup score level to which level 5 may be reset.

E Ad 30 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 31 Clean Game Every- Adjust the number of games in which the Clean Game message appears in Tech Alert to indicate the playfield needs cleaning. Adjustable from 100 to 2000.

E Ad 32 Free Play - When set to **YES**, no coins are required for games.

E Ad 33 Custom Message - 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 34.

E Ad 34 Attract Mode Music - Set to **ON** (approximately every 3 minutes), or **OFF**.

E Ad 35 Flash Lamps- Set to **NORMAL**, **DIM** or **OFF**. When set to **NORMAL** the Flash Lamps are active, when **DIM** the Flash Lamps impulse power is reduced by 25% and when **OFF** the Flash Lamps do not flash.

E Ad 36 Coils Pulse- Set To **NORMAL**, **HARD** or **SOFT**. When **HARD** the coil pulse power is increased by 12.5% of the normal pulse rate. When set to **SOFT** the coil pulse power is reduced by 12.5% of the normal pulse rate. These adjustments are provided to compensate for Low Line or High Line voltage conditions where the solenoids appear to kicking too weak or too hard.

E Ad 37 Level Adjust by - When set to **OPERATOR**, the Manual Percentage Replay Adjustment can only be altered with the front door open (see manual page 3). When set to **ANY**, the Manual Percentage Replay Adjustment will display the message "PRESS START TO CHANGE REPLAY LEVEL" on power up if a change is recommended, and anyone operating the replay button will initiate the change to the replay score.

E Ad 38 Install Country- Set to **USA**, **FRENCH** or **GERMAN**. Determines the default settings for the respective country for game pricing etc.

E Ad 46 Factory Restore-Depressing **STEP** without changing the value shown in the Player 4 Display locks in any custom message set with E Ad33 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 39 TO E Ad 45)

E Ad 39 Ticket dispenser- Set to **ON** or **OFF**. When set to **ON**, the game will dispense ticket(s) (optional) when each replay award level is attained. When set to **OFF**, no tickets will be dispensed.

E Ad 40 # Tickets per Award- Set from 1 thru 5. The game will dispense the selected number of tickets for each award level.

E Ad 41 Outlane Toggle- Set to **FLIPPER**, **SLING** or **BOTH**. This feature controls how the lit Outlane- 500K x Ball in play- will alternate from the Left lane to the right. When set to **FLIPPER**, operating either flipper button will cause the special light to move from one lane to the other. When set to **SLING**, operating either slingshot switch cause the special light to move from one lane to the other. When set to **BOTH**, operating either the Flipper or Slingshot switches will cause the Special light to move from one lane to the other. In all 3 settings operating the un-lit Outlane when the other Outlane is lit will award 250K x Ball in Play.

E Ad 42 Croc Timer- Set to **EXEASY, EASY, FACTORY, HARD** or **EXHARD**. Determines how long the Croc feature remains enabled in seconds.

EXEASY	EASY	FACTORY	HARD	EXHARD
18 Seconds	16 Seconds	14 Seconds	12 Seconds	10 Seconds

E Ad 43 Loop Timer- Set to **EXEASY, EASY, FACTORY, HARD** or **EXHARD**. Determines how long the Loop feature remains enabled in seconds at its highest level. At lower levels the time will be proportionate to the setting.

EXEASY	EASY	FACTORY	HARD	EXHARD
6 Seconds	5.5 Seconds	5 Seconds	4.5 Seconds	4 Seconds

E Ad 44 Try Again -Set to **ON** or **OFF**. When set to **ON**, the game will require at least 12 seconds of ball time to be a valid ball. If the ball drains in less than 12 seconds it will be returned to the player without stepping to the next ball. When set to **OFF**, the ball only needs to operate 2 switches prior to draining to acknowledge a complete ball play.

E Ad 45 Next Game Promo- Set to **ON** or **OFF**. When set to **ON**, the game, in attract mode will randomly display a short promotion for our next game. When set to **OFF**, the game in attract mode will not generate any sounds or graphics referring to the next game.

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 50 games it is considered bad. When operation of a coil should close or open a switch and does not, the coil is considered bad. In Game over attract mode, bad switches and coils (if any) are reported (See Tech Alert Description below). 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 & 4 Displays. 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 (WHT-YEL) and column (GRN-BRN) wire color codes shown in the Player 3 display, and the switch number shown in the Player 4 display.

BLK = Black
BRN = Brown
RED = Red
ORN = Orange
YEL = Yellow

GRN = Green
BLU = Blue
VIO = Violet
GRY = Grey
WHT = 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 (U.S. Including Illinois) and the toll number (708) 345-7700 (Outside the United States). this indicates entry into game diagnostics.

Service Credits

With the phone number displayed depress the STEP push-button switch. The game now gives the technician the option of adding 1 to 5 service credits. These credits allow the technician to test-play the game without adding any counts to the coin audits (AU 01 & AU 05-AU 08). When the message appears, press and hold the Game Start pushbutton until the desired number of credits are shown on the display. Then press the step button again to add these credits to the game and enter Tech Alert. If no Service Credits are desired, press the step button with the initial message displayed.

Tech Alert

The player displays will now indicate if there are any Bad Switches (Switches that are closed, that should not be or switches that have not been activated in 50 games) it also indicates if the game requires cleaning, based on the number set in E Ad 31.

Burn-In Minutes

Pressing the step button while in Tech Alert mode will step game into Burn-in Mode(Factory use). At this stage pressing the game start button will cause the game to exercise all CPU I/O functions. This is provided to constantly exercise sounds, solenoids, etc...

To stop the test press the start button again. Cumulative Burn-In minutes will be displayed. To reset Burn-In minutes to 00, you must perform a Audit Reset Ad 11 or a Factory Restore E Ad 46.

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 bottom display shows the sound board circuit under test and the corresponding sounds are selected by operating the left and right flipper buttons to choose the circuit to be tested. Now press the start button to initiate the sound. Refer to the Sound Test Chart for the sound circuits displayed and the sounds produced.

The sound 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 SPEAKER CENTER SPEAKER RIGHT SPEAKER VOICE ROM1 (Loc U17) VOICE ROM2 (Loc U21) MUSIC TEST (Sound ROM Loc U7)	Left Sine (Left Speaker Only) Center Sine (All speakers) Right Sine (Right Speaker Only) " I hate.. I hate.. I hate..Peter Pan!" " What great games!" Level 1 Through Level 4 Music

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 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 display utilizes an intelligent Dot Matrix Display Board. The purpose behind this board is to provide more information to the operator as well as displaying graphics to the player.

The board is controlled by a Z80A microprocessor and its personality ROM . (Unique to the Game) . It receives Data, Reset & Clock information from the CPU Board via the ribbon cable and sends back Status and Busy signals to the CPU . This is to insure synchronized communication of both boards.

The Drivers for the rows and columns are provided on 3 surface mounted integrated circuits. U13 & U14 supply the anode power to the columns and U15 supplies the cathode power to the rows.

Automatic Test

To enter Display tests, operate the STEP push-button switch from the Sound Manual test. The displays will first illuminate all dots in the entire Display. After a slight delay it will cycle one column from left to right. After a period of time, it will begin the Row test by lighting the top row of the display, then turning it off and illuminating the next row, until each row has been individually lit, while the other rows are off. The next test begins with every other dot lit, in both the rows and columns. These dots then go out, and the unlit dots light, resulting in an alternating checkerboard pattern. The test concludes with the words "DOT MATRIX LIVES". (Please Note- these tests may be interrupted at any time by operating the STEP push-button switch to advance to the next 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

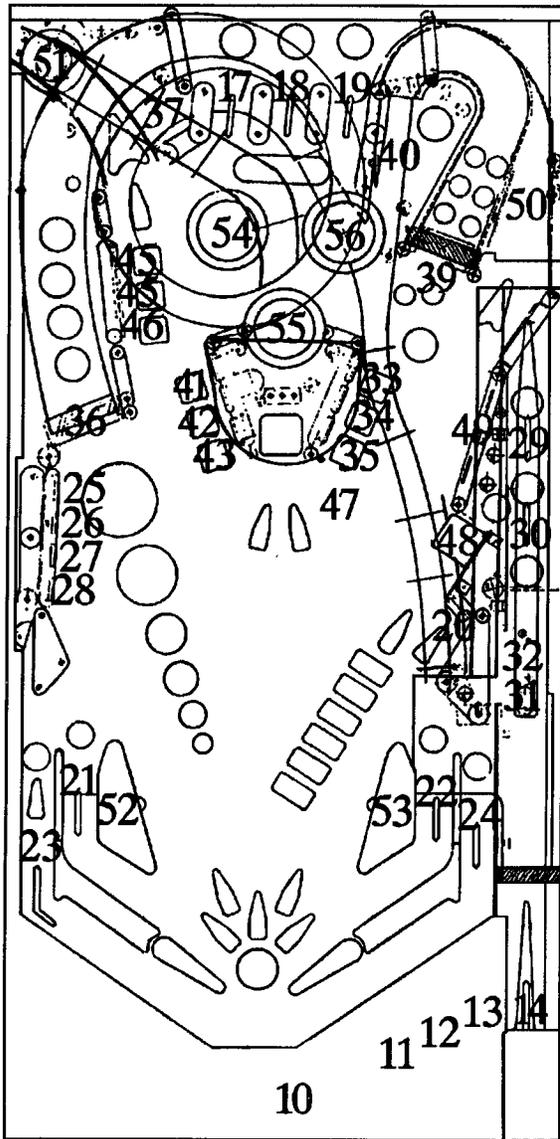
Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, 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.

SWITCH MATRIX CHART

ROW \ COLUMN	1 GRN-BRN CN8-1 Q55	2 GRN-RED CN8-2 Q54	3 GRN-ORN CN8-3 Q53	4 GRN-YEL CN8-4 Q52	5 GRN-BLK CN8-5 Q51	6 GRN-BLU CN8-7 Q50	7 GRN-VIO CN8-8 Q49	8 GRN-GRY CN8-9 Q48
1 WHT-BRN CN10-9	Plumb Tilt 1	Not Used 9	Left Top Lane 17	Left Drop Tar. 1 Top 25	Right 3 Bank Top 33	Left 3 Bank Top 41	Right 10 Point 49	Not Used 57
2 WHT-RED CN10-8	4th Coin 2	Outhole 10	Center Top Lane 18	Left Drop Tar. 2 26	Right 3 Bank Mid. 34	Left 3 Bank Mid. 42	Upper Right R.O. 50	Not Used 58
3 WHT-ORN CN10-7	Credit Button 3	Trough #1 Left 11	Right Top Lane 19	Left Drop Tar. 3 27	Right 3 Bank Bot. 35	Left 3 Bank Bot. 43	Upper Left VUK 51	Not Used 59
4 WHT-YEL CN10-6	Right Coin 4	Trough #2 Center 12	Right Single Target 20	Left Drop Tar. Bot. 4 28	Left Ramp Entr. 36	Upper 3 Bank Top 44	Left Slingshot 52	Not Used 60
5 WHT-GRN CN10-5	Center Coin 5	Trough #3 Right 13	Left Return 21	Skill Shot 3 29	Left Ramp #2 37	Upper 3 Bank Mid. 45	Right Slingshot 53	Not Used 61
6 WHT-BLU CN10-3	Left Coin 6	Shooter Lane 14	Right Return 22	Skill Shot 2 30	Not Used 38	Upper 3 Bank Bot. 46	Left Turbo Bumper 54	Not Used 62
7 WHT-VIO CN10-2	Slam Tilt 7	Left EOS 15	Left Outlane 23	Skill Shot 1 Upper 31	Right Ramp Entr. 39	Under Pfd. Trough 47	Center Turbo Bumper 55	Not Used 63
8 WHT-GRY CN10-1	Not Used 8	Right EOS 16	Right Outlane 24	Skill Shot 1 Lower 32	Right Ramp #2 40	Power Scoop 48	Right Turbo Bumper 56	Not Used 64

Hook- Switch Part Numbers

Number	Description	Part No.	Number	Description	Part No.
01*	Plumb Tilt	See Cabinet	10	Out Hole	180-5011-00
02*	4th Coin Chute Option	-	11	Trough #1 (Left)	180-5009-00
03*	Credit Button	500-5097-02	12	Trough #2 (Center)	180-5009-00
04*	Right Coin	180-5024-00	13	Trough #3 (Right)	180-5010-00
05*	Center Coin	180-5024-00	14	Shooter Lane	180-5053-00
06*	Left Coin	180-5024-00	15*	Left Flip. Cab. Switch	180-5048-01
07*	Slam Tilt	180-5022-00	16*	Right Flip. Cab. Switch	180-5048-01
08	Not Used	-	17	Left Toplane	515-5138-00
09	Not Used	-	18	Center Toplane	515-5138-00
			19	Right Toplane	515-5138-00
			20	Right Single Target	500-5252-06
			21	Left Return	500-5142-00
			22	Right Return	500-5142-00
			23	Left Outlane	500-5142-00
			24	Right Outlane	500-5142-00
			25	Left Drop Target 1 Top	180-5092-00
			26	Left Drop Target 2	180-5092-00
			27	Left Drop Target 3	180-5092-00
			28	Left Drop Target 4 Bottom	180-5092-00
			29	Skill Shot 3	500-5142-00
			30	Skill Shot 2	500-5142-00
			31	Skill Shot 1 (Upper)	515-5138-00
			32	Skill Shot 1 (Lower)	500-5142-00
			33	Right 3 Bank Top	500-5252-06
			34	Right 3 Bank Middle	500-5252-06
			35	Right 3 Bank Bottom	500-5252-06
			36	Left Ramp Entrance	180-5009-00
			37	Left Ramp #2	180-5057-00
			38	Not Used	-
			39	Right Ramp Entrance	180-5009-00
			40	Right Ramp #2	180-5093-00
			41	Left 3 Bank Top	500-5252-00
			42	Left 3 Bank Middle	500-5252-00
			43	Left 3 Bank Bottom	500-5252-00
			44	Upper 3 Bank Top	500-5252-00
			45	Upper 3 Bank Middle	500-5252-00
			46	Upper 3 Bank Bottom	500-5252-00
			47	Under Playfield Trough	180-5093-00
			48	Power Scoop	180-5057-00
			49	Right 10 Point	500-5033-00
			50	Upper Right Rollover	515-5138-00
			51	Upper Left VUK	180-5064-00
			52	Left Slingshot	180-5054-00
			53	Right Sling Shot	180-5054-00
			54	Left Turbo Bumper	180-5015-00
			55	Center Turbo Bumper	180-5015-00
			56	Right Turbo Bumper	180-5015-00
			57	Through 64 Not Used	



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 Active 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. The top display indicates LAMP RETURNS and the Bottom display indicates wire color and the LAMP RETURN driver transistor. 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 RETURNS test, depress the STEP push-button switch. The Top display indicates LAMP COLUMNS and the bottom display indicates wire color and the LAMP DRIVES driver transistor. All controlled lamps in column 1 should be lit. Operating the Game Start push-button switch, cycles through each of the columns separately.

Single Lamp

From the LAMP DRIVES test, depress the STEP push-button switch. The top display indicates lamp name. The bottom display indicates the row and column wire colors and the lamp matrix number. 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.

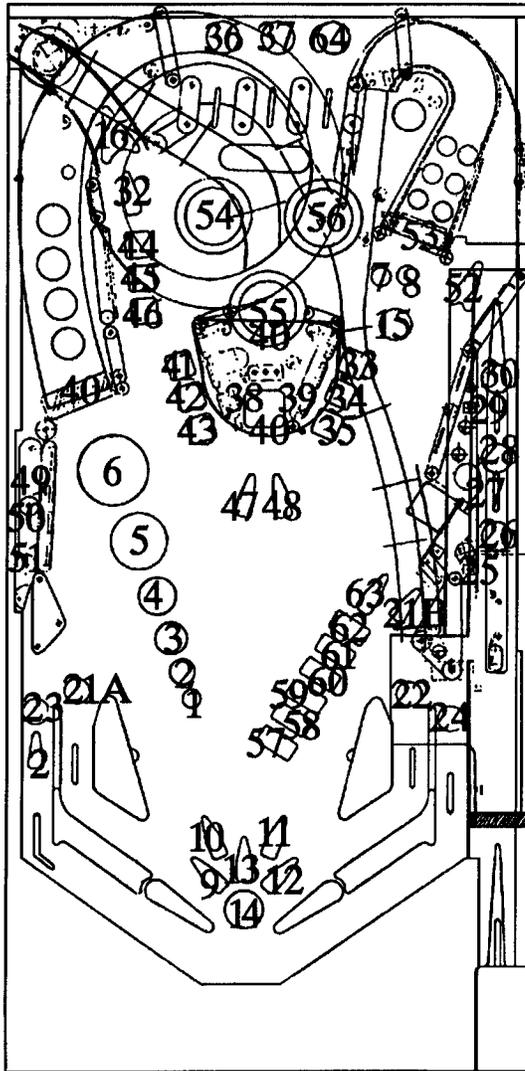
LAMP MATRIX CHART

ROW \ COLUMN	1 Q71 YEL-BRN CN7-1	2 Q70 YEL-RED CN7-2	3 Q69 YEL-ORN CN7-3	4 Q68 YEL-BLK CN7-4	5 Q67 YEL-GRN CN7-6	6 Q66 YEL-BLU CN7-7	7 Q65 YEL-VIO CN7-8	8 Q64 YEL-GRY CN7-9
1 Q72 RED-BRN CN6-1	250K 1	2X 9	Backpanel Left 17	Multiball Bottom 25	Right 3 Bank Top 33	Left 3 Bank Top 41	Pirate Town Special 49	Light Bumpers 57
2 Q73 RED-BLK CN6-2	500K 2	4X 10	Backpanel Center 18	Skillshot Bottom 26	Right 3 Bank Middle 34	Left 3 Bank Middle 42	Pirate Town 10 Mil 50	2 Million 58
3 Q74 RED-ORN CN6-3	750K 3	6X 11	Backpanel Right 19	Multiball Middle 27	Right 3 Bank Bottom 35	Left 3 Bank Bottom 43	Pirate Town XBall 51	Light Croc Time 59
4 Q75 RED-YEL CN6-5	1 MIL 4	8X 12	Laser Kick (Ready) 20	Skillshot Middle 28	Left Toplane 36	Upper 3 Bank Top 44	Strike 52	Fast 60
5 Q76 RED-GRN CN6-6	2 MIL 5	10X 13	Left Ret & Rt. Tar 21	Multiball Top 29	Center Toplane 37	Upper 3 Bank Middle 45	Right Ramp Entry 53	Skull 10 Million 61
6 Q77 RED-BLU CN6-7	3 MIL Plus 6	Shoot Again 14	Right Return Lane 22	Skillshot Top 30	Skull Left Eye 38	Upper 3 Bank Bottom 46	Left Turbo Bumper 54	Light Extra Ball 62
7 Q78 RED-VIO CN6-8	Right Ramp AM 7	R Ramp Croc Clock 15	Left Outlane Top 23	Cab.- Start Button 31	Skull Right Eye 39	Extra Ball 47	Center Turbo Bumper 55	Bangerang 63
8 Q79 RED-GRY CN6-9	Right Ramp PM 8	Lft.VUK Top Arrow 16	Right Outlane 24	Top Left VUK Lock 32	Left Ramp Entry 40	Skull 10 Mill Arrow 48	Right Turbo Bumper 56	Right Toplane 64

Lamp Number Description

- 01. 250K
- 02. 500K
- 03. 750K
- 04. 1 Million
- 05. 2 Million
- 06. 3 Million
- 07. Right Ramp (AM)
- 08. Right Ramp (PM)
- 09. 2x

- 10. 4x
- 11. 6x
- 12. 8x
- 13. 10x
- 14. Shoot Again
- 15. Right Ramp Croc Clock
- 16. Left VUK Top Arrow
- 17.* Backpanel Left
- 18.* Backpanel Center
- 19.* Backpanel Right
- 20. Laser Kick Ready
- 21. Left Return & Right Target
- 22. Right Return Lane
- 23. Left Outlane Top
- 24. Right Outlane
- 25. Multiball Bottom
- 26. Skill Shot Bottom
- 27. Multiball Middle
- 28. Skill Shot Middle
- 29. Multiball Top
- 30. Skill Shot Top
- 31. Start Button
- 32. Top Left VUK Lock
- 33. Right 3 Bank Top
- 34. Right 3 Bank Middle
- 35. Right 3 Bank Bottom
- 36. Left Toplane
- 37. Center Toplane
- 38. Skull Left Eye
- 39. Skull Right Eye
- 40. Left Ramp Entry
- 41. Left 3 Bank Top
- 42. Left 3 Bank Middle
- 43. Left 3 Bank Bottom
- 44. Upper 3 Bank Top
- 45. Upper 3 Bank Middle
- 46. Upper 3 Bank Bottom
- 47. Extra Ball
- 48. Skull 10 Million Arrow
- 49. Pirate Town Special
- 50. Pirate Town 10 Million
- 51. Pirate Town Extra Ball Strike
- 52. Right Ramp Entry
- 53. Left Turbo Bumper
- 54. Center Turbo Bumper
- 55. Right Turbo Bumper
- 56. Light Bumpers
- 57. 2 Million
- 58. Light Croc Time
- 59. Fast
- 60. Skull 10 Million
- 61. Light Extra Ball
- 62. Bangarang
- 63. Right Toplane
- 64.



Lamp Locations

* Indicates Insert Panel or Backpanel Lamps

FLASH LAMP COIL TESTS

Twenty-Two regular (pulsed under microprocessor control) coil drivers are provided to switch ground to coils. The Left/Right relay 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". This relay is located on the PPB board which provides isolation diodes and current limiting resistors. This effectively provides 29 regular coils.

Flash Lamp

From the Single Lamp test, depress the STEP push-button switch. All Flash lamps will fire randomly. This allows the Technician to easily spot any burned out bulbs and replace them without stepping through the tests below.

Automatic Test

From the Flash Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate ALL COILS. 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 wire colors in the Player 3 and 4 displays.

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 1st drive, the wire colors are indicated in the Player 3 and 4 displays. Operate either Flipper 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 START push-button switch to cause it to be pulsed repeatedly.

RETURN TO GAME OVER

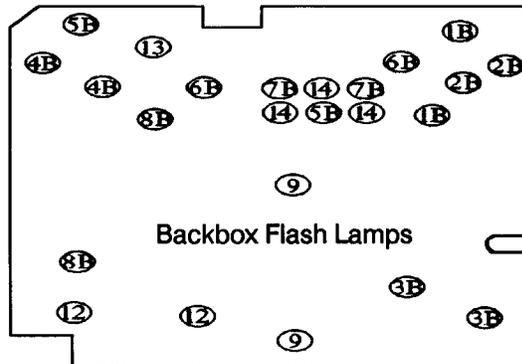
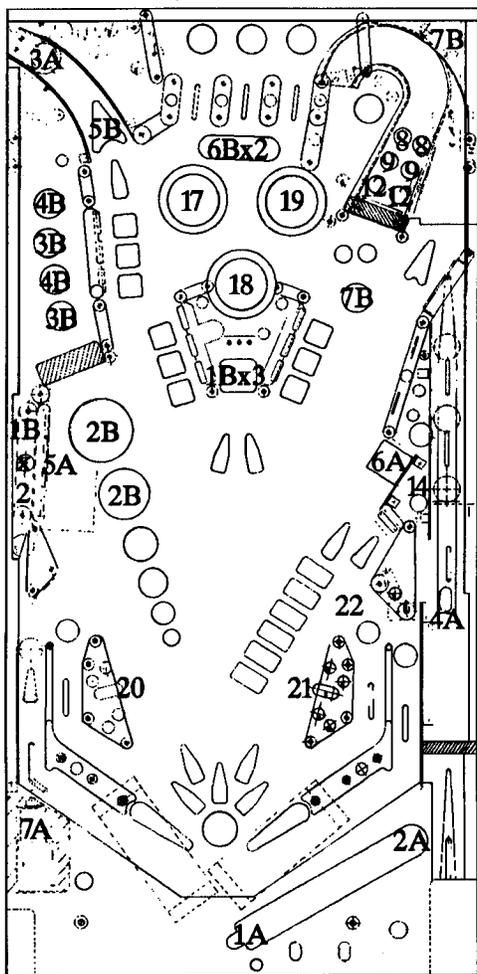
From the Select Coil test, depress the STEP push-button switch once. The game returns to the game-over mode.

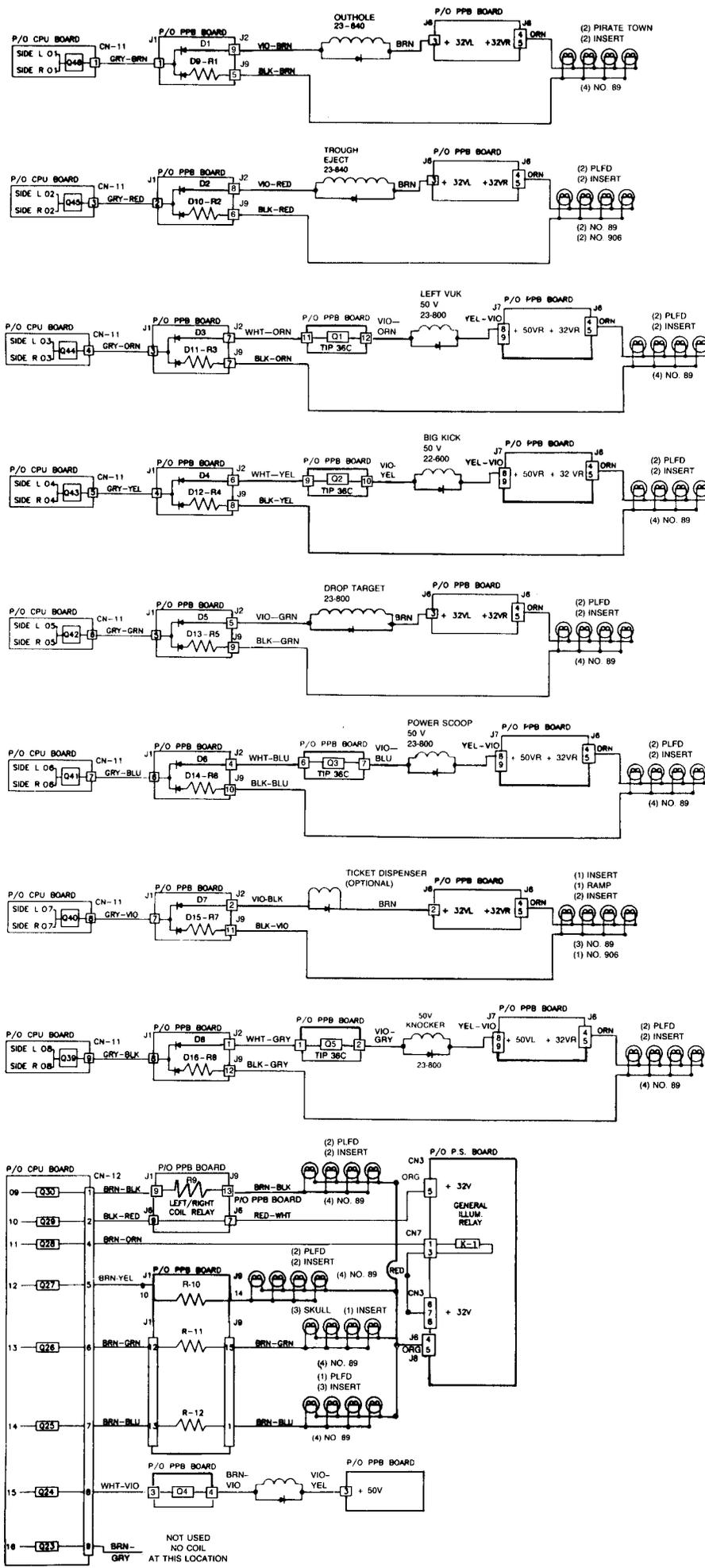
CPU Controlled Auxillary Solenoids

Coil Number	Coil Description	Control Line (CPU to Coil)	Power Line (PS to Coil)	Drive Transistor	Coil Type
17	Left Turbo Bumper	BLU-BRN CPU CN19-7	RED PS CN3-6	Q11	23-800
18	Center Turbo Bumper	BLU-RED CPU CN19-4	RED PS CN3-6	Q9	23-800
19	Right Turbo Bumper	BLU-ORN CPU CN19-3	RED PS CN3-6	Q8	23-800
20	Left Slingshot	BLU-YEL CPU CN19-6	RED PS CN3-6	Q10	23-800
21	Right Slingshot	BLU-GRN CPU CN19-8	RED PS CN3-6	Q12	23-800
22	Diverter(See Schematic)	BLU-BLK CPU CN19-9	RED PS CN3-6	Q13	27-1400

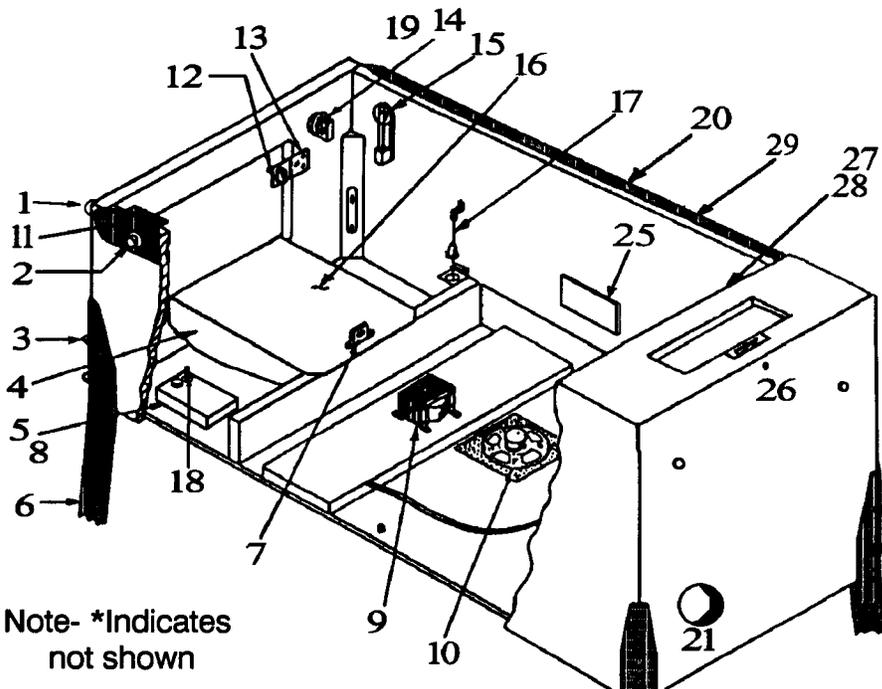
Flipper Solenoids

Coil Description	Flipper GND CPU to Coil	Flipper GND Sw. to Flip.PCB	Power Lines FlipPc toCoil	Coil Type	Power Input To Flip PCB
Left Flipper 090-5030-00	ORN-GRY CPU CN19-2	BLU-GRY CN1-9	GRY-YEL CN2-1,2	23-1100	BLK-WHT 50VDC
Right Flipper 090-5020-30	ORN-VIO CPU CN19-1	BLU-VIO CN1-1	BLK-WHT CN1-1	23-900	GRY, GRN 8VAC





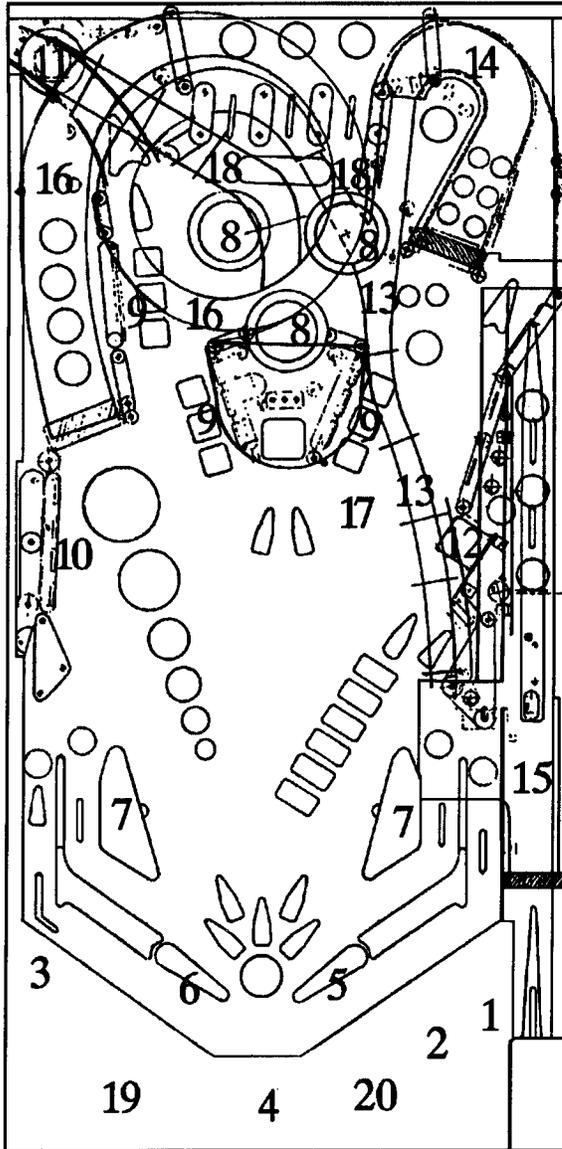
CABINET PARTS ILLUSTRATION



Note- *Indicates
not shown

Item	Description	Part No.
1	Ball Shooter Assy.	500-5409-02-05
2	Flipper Button	500-5026-18
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	515-5360-00-10
9	Transformer	010-5003-00
10	Speaker-Round (6")	031-5000-00
11	Side Armor-Right	535-5010-31
12	Memory Protect Switch	180-5000-00
13	Memory Protect Switch Bracket	535-5225-01
14	Start Switch Assembly	500-5407-06
15	Flipper Leaf Switch	180-5048-01
16	Cash Box Top	535-5013-01
17	Plumb Bob Tilt Assembly	500-5023-00
18	Volume Control	123-5000-00
19	Playfield Glass (Tempered) *	660-5001-00
20	Side Armor -Left	535-5010-32
21	Recessed cup for Line cord	545-5122-00
22	Service Switch (Not Shown)	180-5012-00
23	Front Molding Lockdown Assy.*	500-5020-00
24	Front Molding -Black *	500-5021-10
25	S.S.Flipper P.C.B.	520-5033-02
26	Roto Lock Bottom	355-5006-01
27	Rear Plastic Extrusion for Playfield Glass	545-5038-00
28	Mounting Foam for Extrusion	626-5004-00
29	Plastic Channel (Right & Left)	545-5017-00
30	Backbox Hinge Left *	535-6172-00
31	Backbox Hinge Right *	535-6172-01
32	Leg Leveler *	500-5017-00

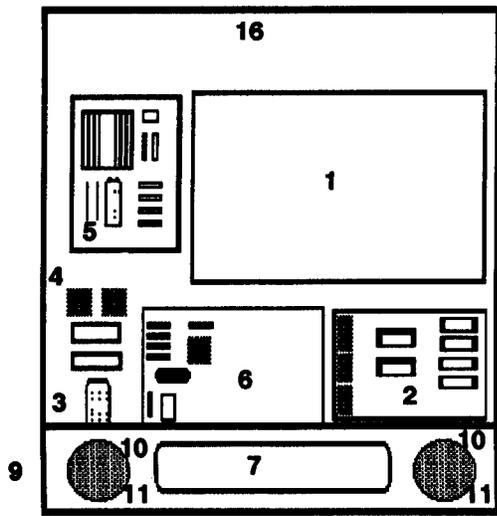
Playfield - Major Assemblies



Item	Description	Part Number
1.	Ball Trough Eject	500-5012-01
2.	Ball Trough Switch Assy.	500-5190-09
3.	Kick Back Assy	500-5080-00
4.	Outhole Kicker	500-5082-00
5.	Flipper Assy. Right	500-5177-71
6.	Flipper Assy. Left	500-5177-72
7.	Sling Shot Assy.	500-5226-00
8.	Turbo Bumper Assy.	500-5227-00
9.	3 Bank Standup Tgt. Assy.	500-5384-01
10.	Drop Target 4 Bank	500-5437-02
11.	VUK	500-5472-00
12.	Power Scoop Assy.	515-5468-00
13.	Wire Ramp	515-5515-00
14.	Right Plastic Ramp	515-5519-00
15.	Shooter Lane Ramp	515-5520-00
16.	Circular Ramp	515-5522-00
17.	Under Chute Ramp Assy.	535-5156-00
18.	Wire Ramp (VUK)	535-5640-00
19.	Bottom Arch	545-5302-01
20.	Ball Return Ramp	535-5026-00

Individual part breakdowns for most of these assemblies can be found on pages 34 through 41 and 63, 64, 65, & 66.

BACKBOX PARTS ILLUSTRATION



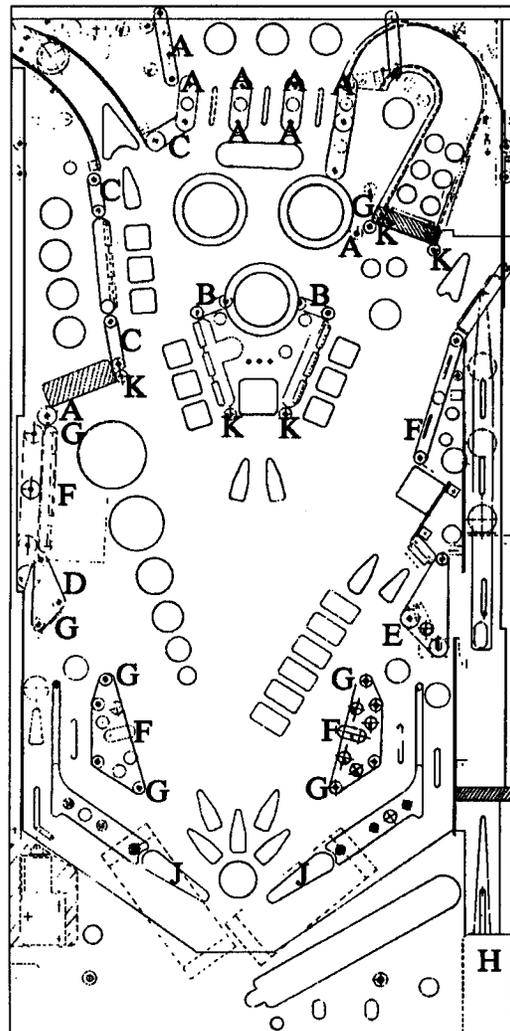
† When ordering PC Boards with ROMs
please specify game name

Item	Description	Part No.
1	CPU Board Assy.(Non-Refix)	520-5003-03 †
2	Sound Board Assy	520-5050-01†
3	Capacitor 2C1	125-5000-00
4	Bridge Rectifiers	112-5000-00
5	Power Supply Bd. Assy	520-5047-00
6	PPB Board	520-5021-05
7	Dot Matrix Display Bd	520-5042-00 †
8	Display Ribbon Cable*	036-5000-24-10
9	Speaker Housing	515-5416-00
10	Speakers (2)	031-5004-00
11	Speaker Grill (2)	830-5615-00
12	Back Box Glass (Clear)*	660-5012-00
13	Roto-Lock Top*	355-5006-02
14	Backglass Artwork*	830-5617-01
15	Chaser Light PCB.*	520-5054-01
16	Lock (For Retaining Glass)	355-5008-00

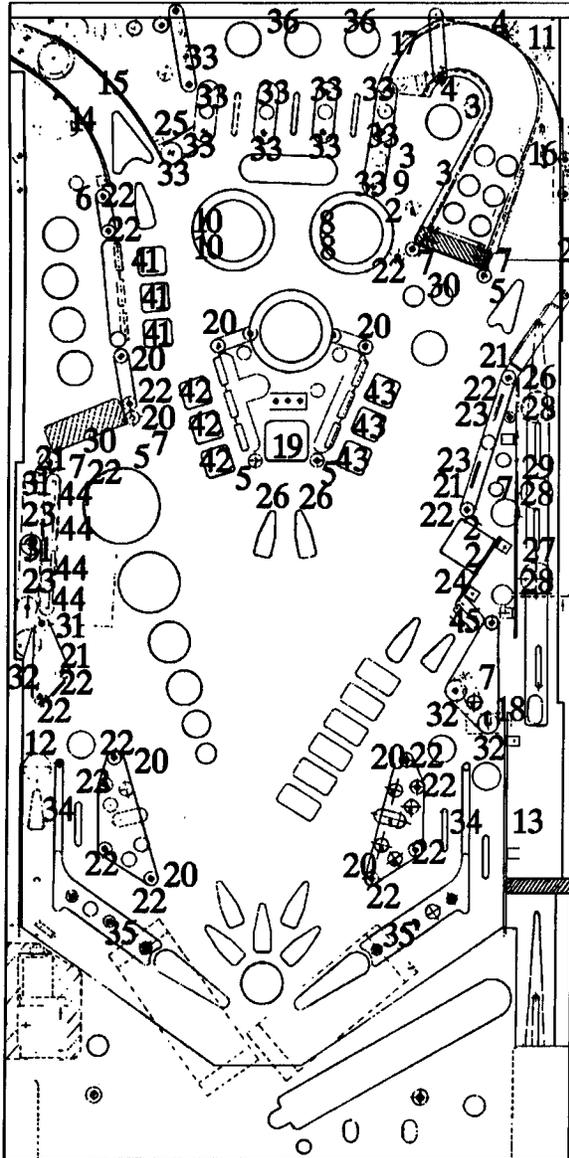
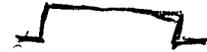
* Not Shown

RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A.	$\frac{3}{16}$ "(9)	545-5025-01
B.	$\frac{3}{4}$ " (2)	545-5025-04
C.	1" (3)	545-5025-05
D.	1 $\frac{1}{4}$ "(1)	545-5025-06
E.	2" (1)	545-5025-08
F.	2 $\frac{1}{2}$ " (4)	545-5025-09
G.	Rubber Post -Short (7)	545-5151-00
H.	Shooter Tip	545-5276-00
J.	Flipper (2)	545-5277-00
K.	Rubber Post-Long (5)	545-5260-00



Playfield Parts



Note:
See page 25 for switch part numbers

No. Description	Part No.
1. Chase Lights	500-5434-02
2. Plastic Spacer 1/2" (3)	254-5000-03
3. Plastic Spacer 1" (3)	254-5000-04
4. Spacer Plastic 3/4" (1)	254-5000-07
5. Lg. Standoff 5/16" (4)	254-5003-00
6. Spacer Hex 5/8" (1)	254-5008-02
7. Spacer Hex 1/2" (7)	254-5008-03
8. Spacer Hex 3/4" (2)	254-5008-04
9. Spacer Hex 1" (1)	254-5008-06
10. Spacer Hex 2" (2)	254-5008-07
11. Light Hood Yellow 1 Sided(2)	550-5035-06
12. Laser Kick Rail	500-5424-00
13. Shooter Lane Rail	500-5425-00
14. Left VUK Rail	500-5426-00
15. Right VUK Rail	500-5427-00
16. Top Right Rail	500-5428-00
17. Top Court Right Rail	500-5429-00
18. KickBig Shooter Rail	500-5430-00
19. Skull Assy.	515-5517-00
20. Machine Post (8)	530-5008-00
21. Machine Post (4)	530-5012-00
22. Metal Standoff (17)	530-5035-01
23. Wire Form 1" (4)	535-5300-05
24. Not Used	-
25. Ramp Bracket	535-6170-00
26. Light Cover Red (3)	545-5014-02
27. Light Cover Green (1)	545-5014-04
28. Light Cover Blue (4)	545-5014-05
29. Light Cover Yellow (1)	545-5014-06
30. Light Cover Orange (2)	545-5014-07
31. Double Rubber Post (3)	545-5209-06
32. Pirate Town Molded Plastic	830-5801-00
33. Small Yellow Post (13)	550-5034-06
34. Return Lane Guide	550-5037-01
35. Return Lane Lower	550-5042-06
36. Mirrored Backpanel	820-6079-00
37. Decal Sheet	820-6081-XX
38. Playfield Screened	830-5119-00
39. Screened Butryate Set	830-5430-XX
40. Light Hood Yellow 2 Sided(2)	550-5036-06
41. Upper 3 Bank Decals	820-6080-04
42. Left 3 Bank Decals	820-6080-03
43. Right 3 Bank Decals	820-6080-02
44. 4 Bank Drop Target Decals	820-6080-01
45. Single Stand-Up Target Decal	820-6080-05
46. Skull Painted	830-5800-00

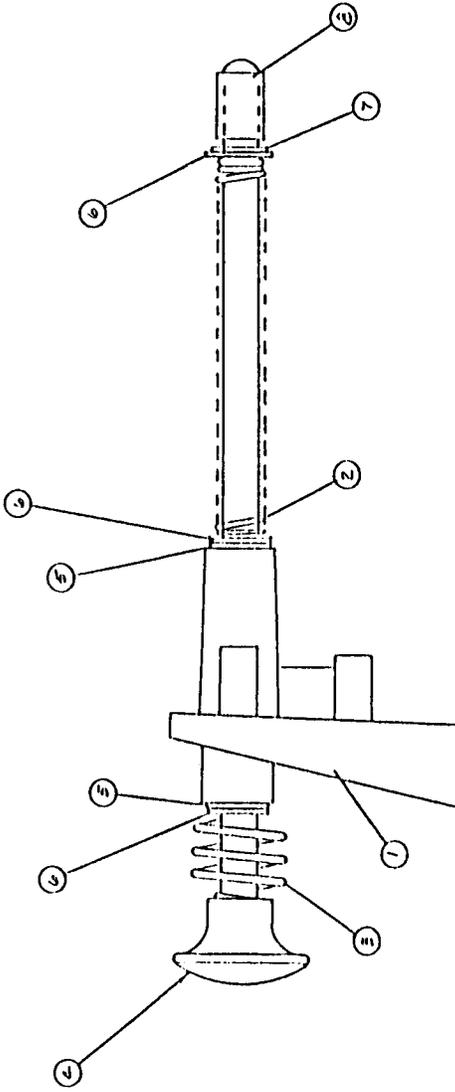
* Indicates not shown

REV	DESCRIPTION	BY	DATE	APP

X-REF. COLOR CODE	SPRING COLOR CODE	PART NO.	WIRE DIA.	COLOR
01 CLEAR		226-5001-XX		
02 RED				
03 AMBER				
04 GREEN				
05 BLUE				
06 YELLOW				
07 ORANGE				
08 WHITE				
09 PURPLE				
10 FLO. ORANGE				
11 FLO. GREEN				
212 FLO. RED				

PART NO.	WIRE DIA.	COLOR
01	.01	RED
02	.042	RED
03	.037	BLK.
04	.035	GRN
05	.031	BLU.
06	.051	YEL.
07	.028	GRG.
08	.039	1/2 RED
09	.021	BLACK

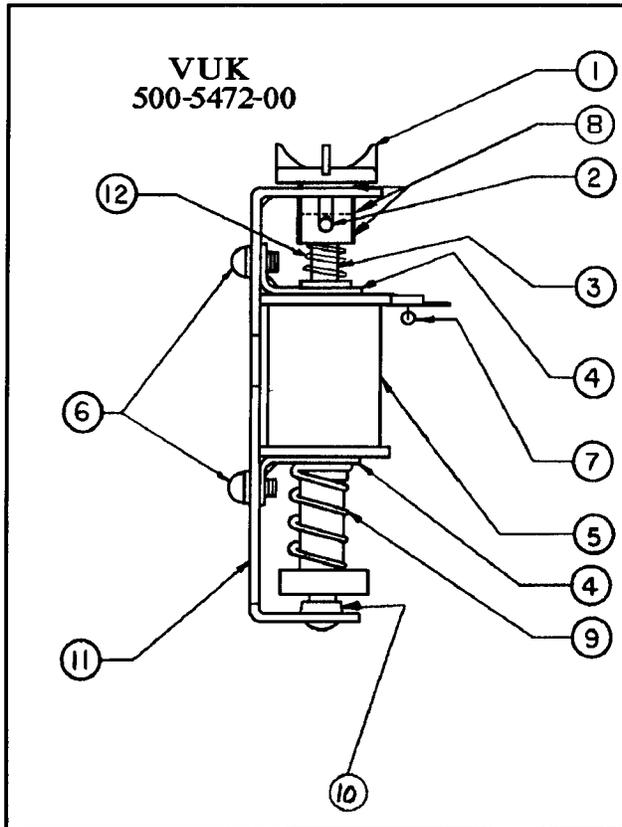
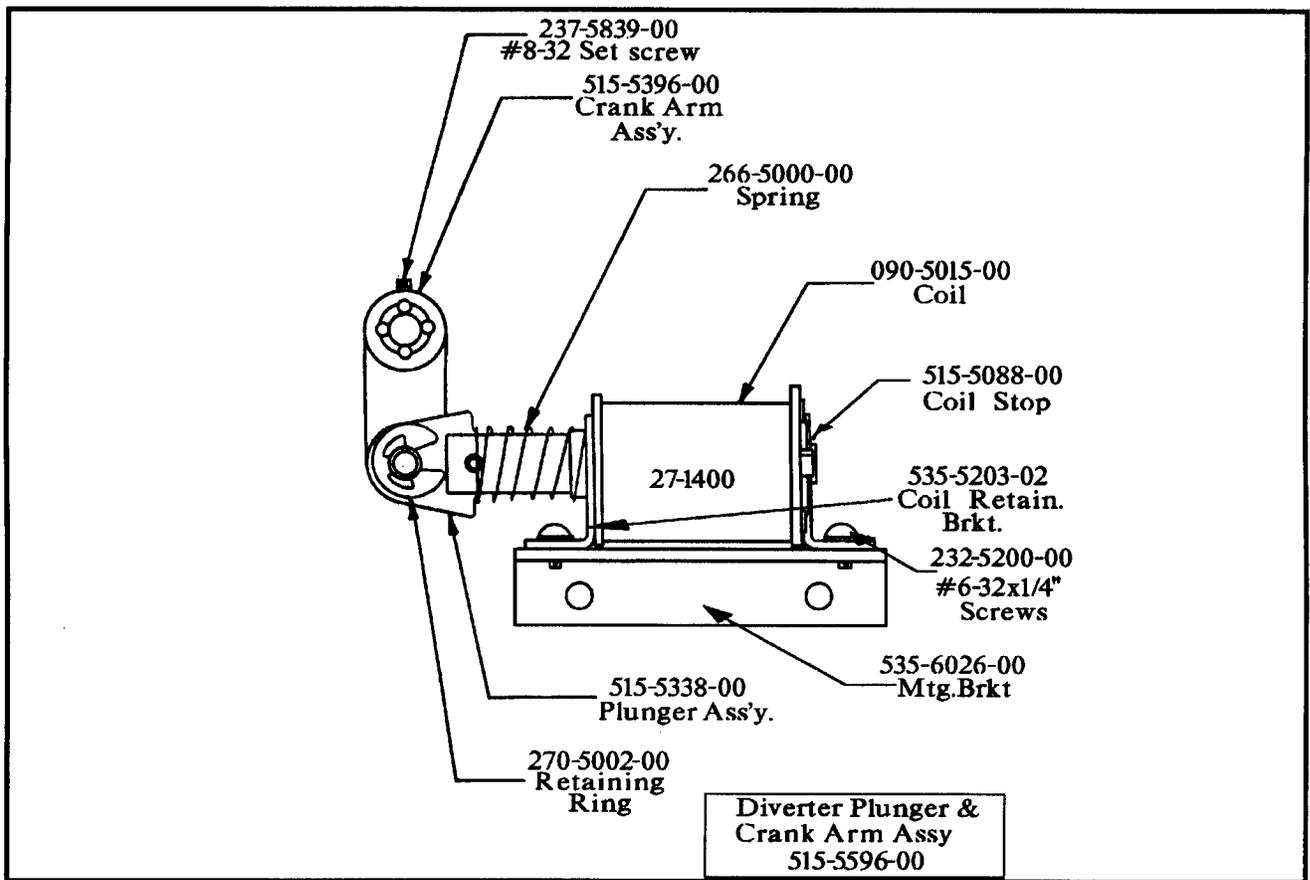
NOTE
 1ST XX - DENOTES ROD ASSY.
 2ND XX - DENOTES SPRING



REV	DESCRIPTION	BY	DATE	APP
01	PLUNGER TIP		505-5276-00	
02	RETAINING RING		270-5012-00	
03	WASHER		242-5014-00	
04	BUSHING-DIAPHR.		280-5016-00	
05	ROD ASSY.		520-5023-00	
06	SPRING		266-5010-00	
07	HOUSING		266-5007-XX	
08	DESCRIPTION		525-5067-00	
09	DESCRIPTION		525-5067-00	

REV	DATE	TITLE	SCALE	DRAWN	CHECKED
		SHOOTER ASSY			
		ROD SHAF			

DE DATA EAST PINBALL, INC. 1990 JANICE AVE. MELROSE PARK, IL 60160



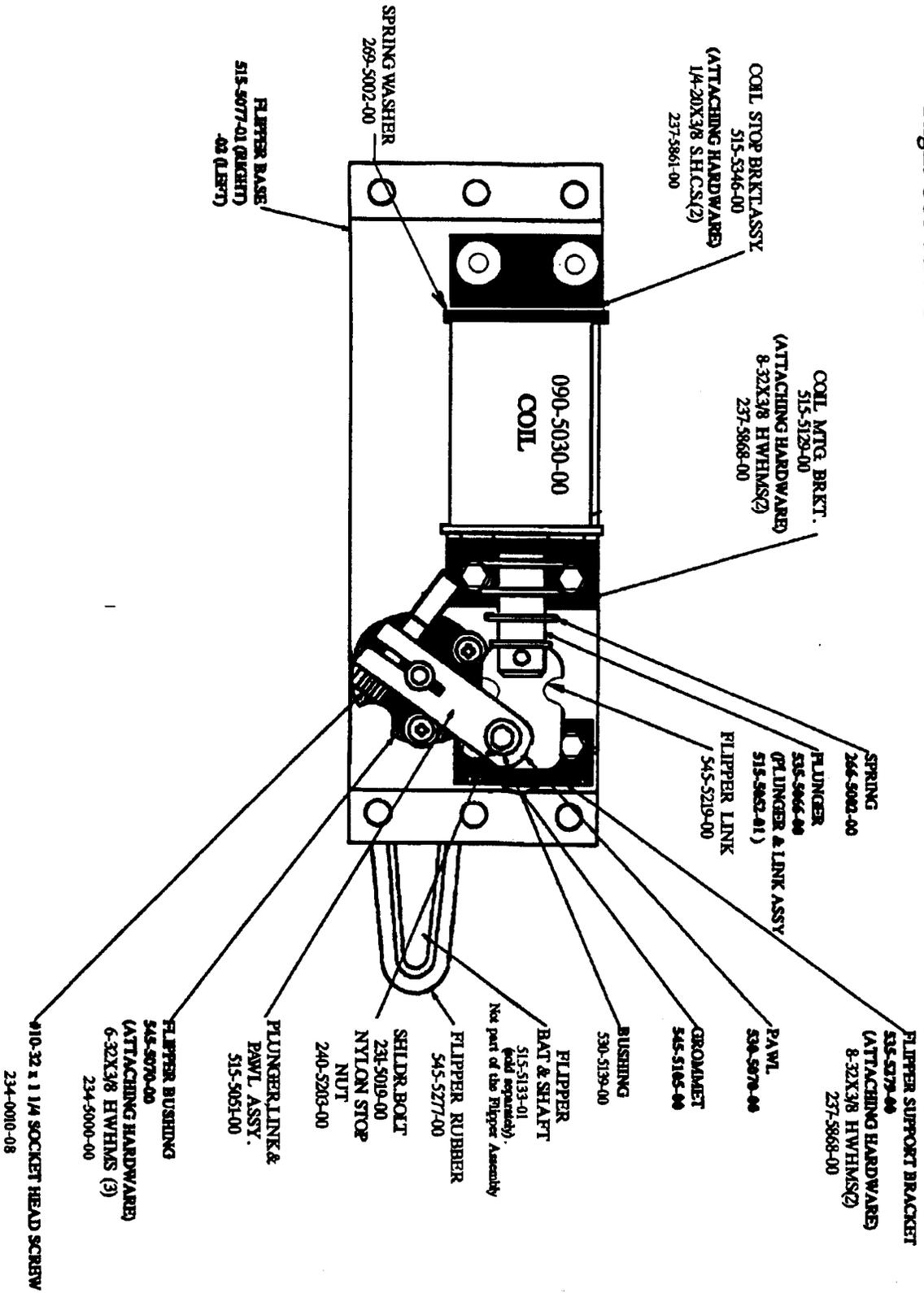
Item	Part #	Description
1	545-5227-00	Vert.Kick.Cap
2	251-5004-00	Pin $\frac{3}{32} \times \frac{7}{16}$
3	515-5352-00	Plunger Assy.
4	535-5203-01	Coil Retainer Brkt. (2)
5	090-5001-01	Coil 23-800
6	232-5300-00	#8-32 X $\frac{1}{4}$ "
7	112-5003-00	1N4004 Diode
8	270-5010-00	Compression Ring (3)
9	266-5009-00	Spring
10	545-5105-00	Bumper
11	535-6345-00	VUK Bracket
12	266-5025-00	Cap Spring
13*	545-5193-00	Sw.Insulator
14*	180-5063-00	Micro Switch
15*	237-5806-00	2-56x $\frac{1}{2}$ Screw(2)
16*	244-5001-00	Lock Washer
17*	240-5301-00	Hex Nut

* Indicates not shown

FLIPPER ASSEMBLY

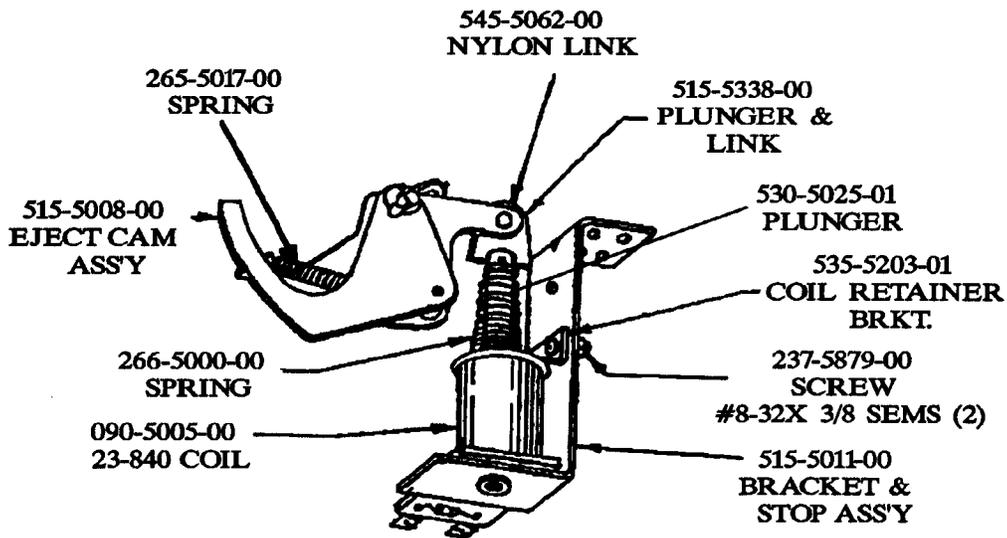
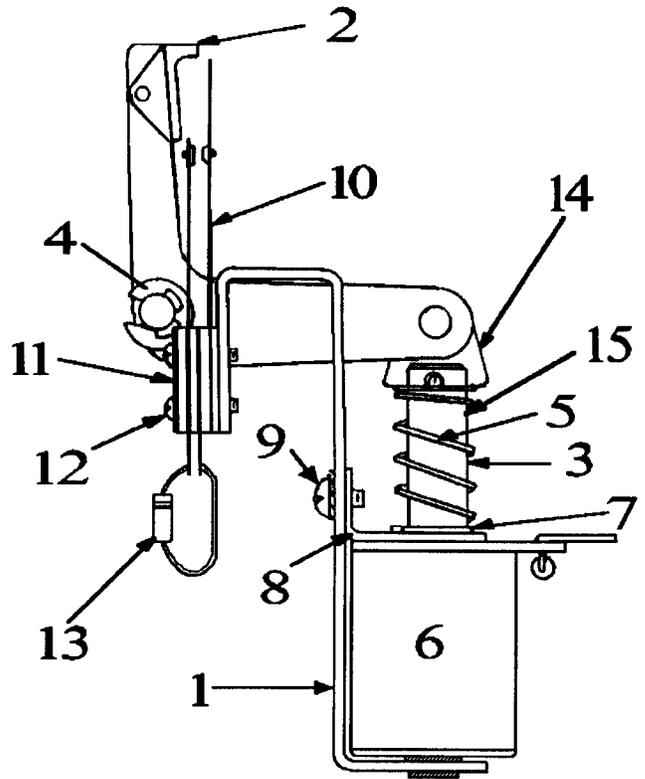
Left 500-517772

Right 500-517771

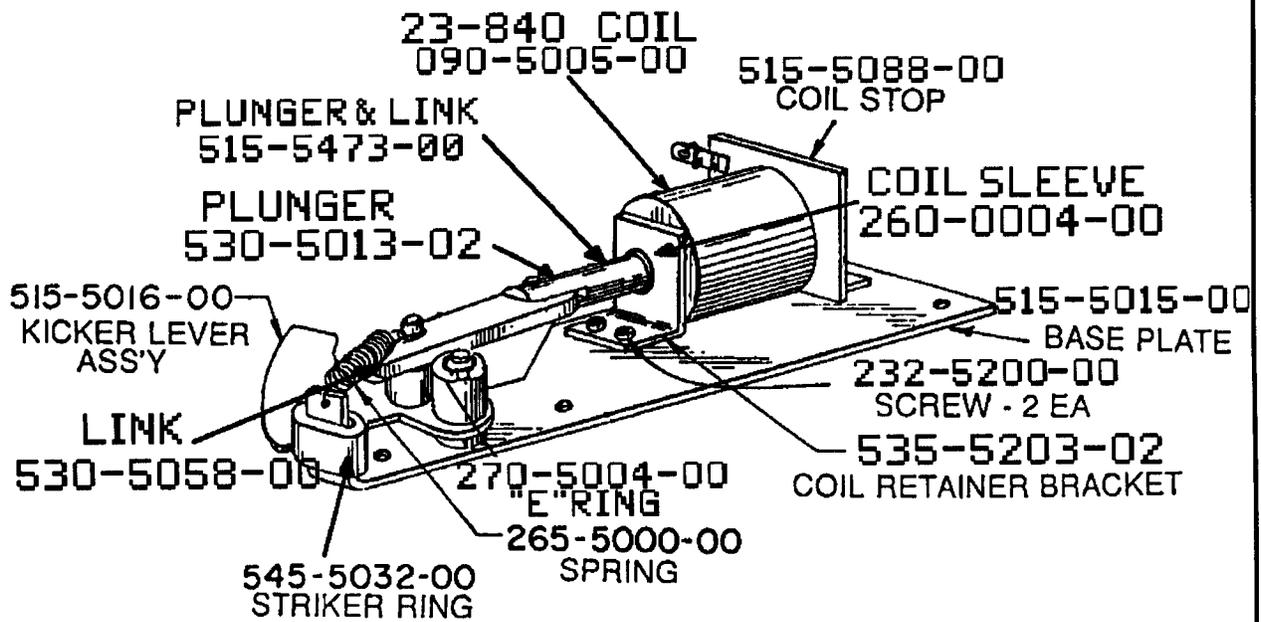


Slingshot Assembly 500-5226-00

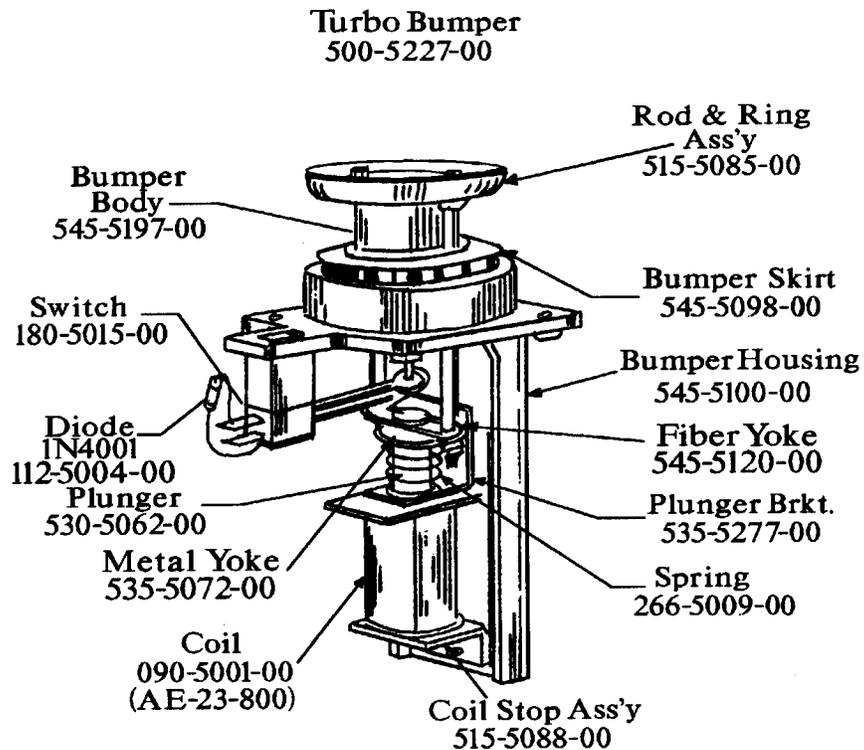
Item	Description	Part No.
1	Slingshot Bracket	515-5339-00
2	S.S. Arm & Tip Assy.	515-5340-00
3	Plunger & Link Assy.	515-5338-00
4	1/4 Retaining Ring (2)	270-5002-00
5	Spring	266-5020-00
6	23-800 Coil	090-5001-02
7	Coil Sleeve	260-0004-00
8	Coil Retainer	535-5203-01
9	#8-32 X 1/4" Screw (2)	232-5300-00
10	Slingshot Switch (2)	180-5054-00
11	Tension Plate (2)	535-5846-00
12	#4-40 X 1/2" Screw (4)	237-5837-00
13	Diode 1N4004 (2)	112-5004-00
14	Link	545-5062-00
15	Plunger(not indicated)	530-5025-01

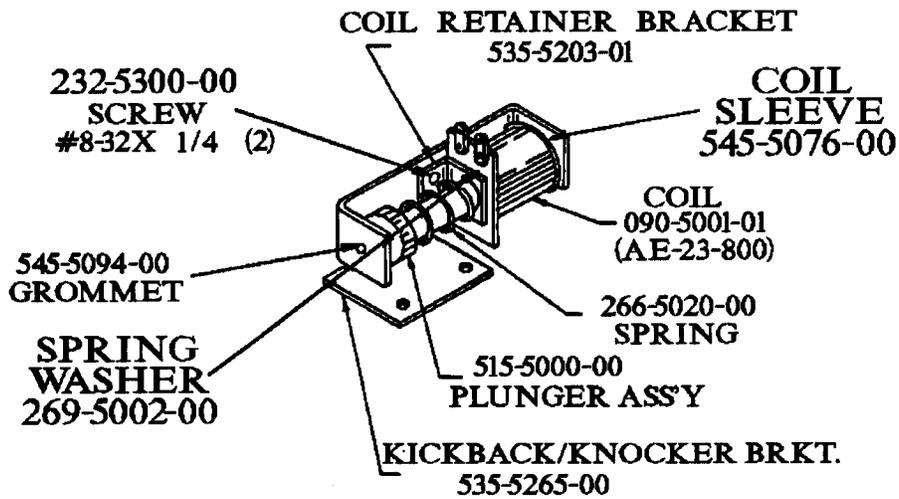


500-5012-01 BALL FEED ASS'Y (TROUGH EJECT)

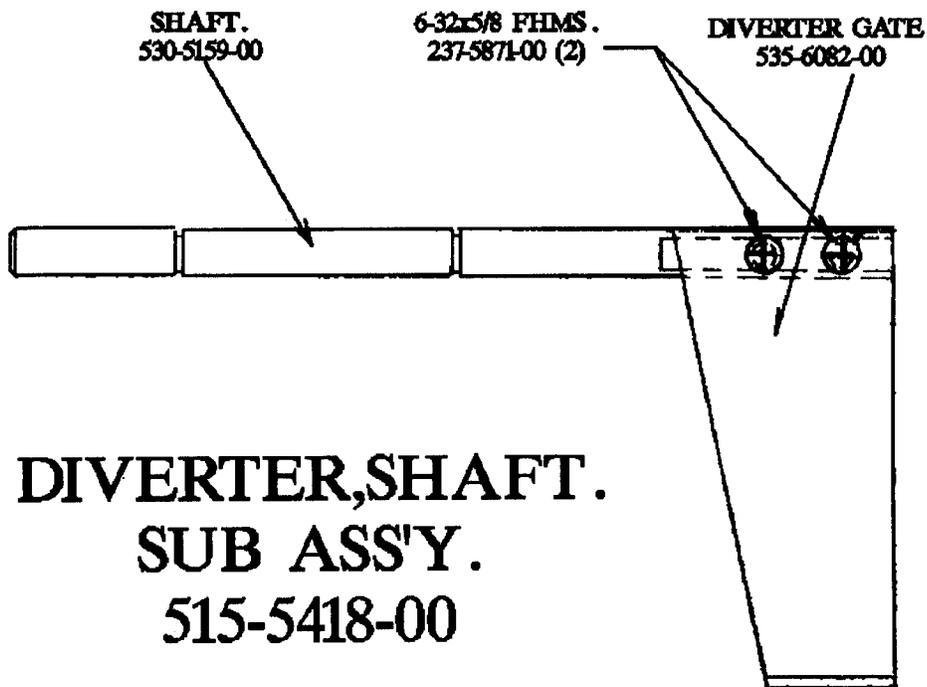


500-5082-00 OUTHOLE BALL RETURN ASSY

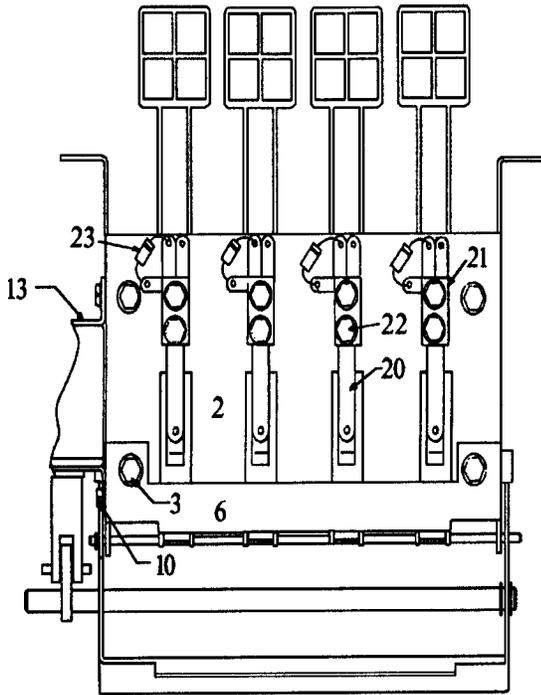
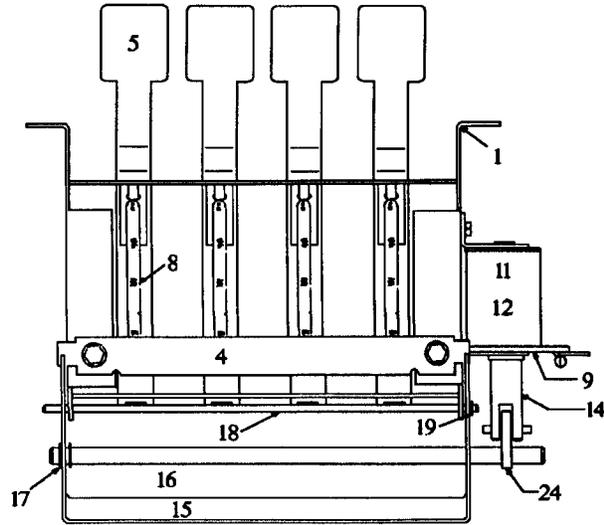




KICKBACK ASSEMBLY 500-5080-00 (COIL LUGS ON THE SIDE)
 KNOCKER ASSEMBLY 500-5081-00 (PICTURED)

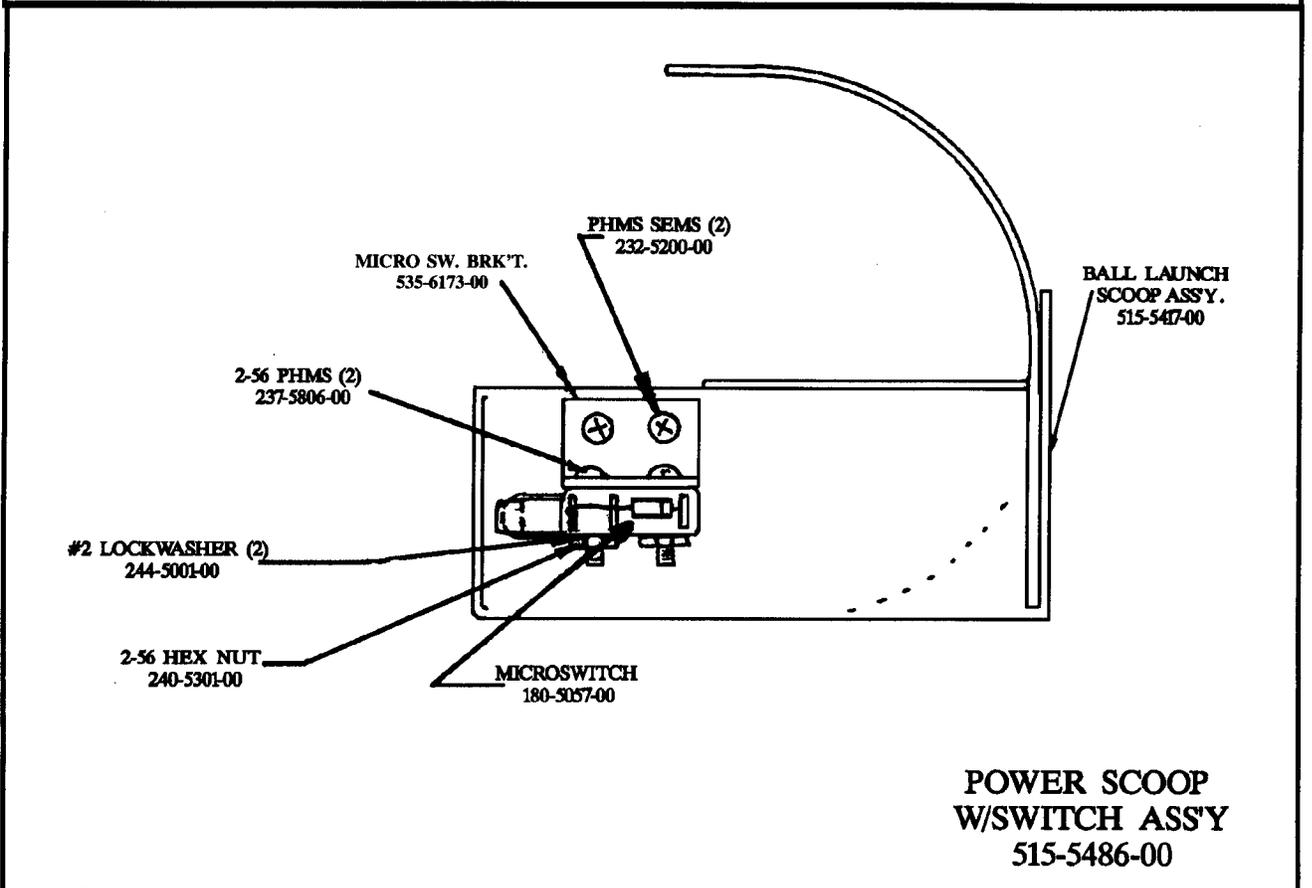
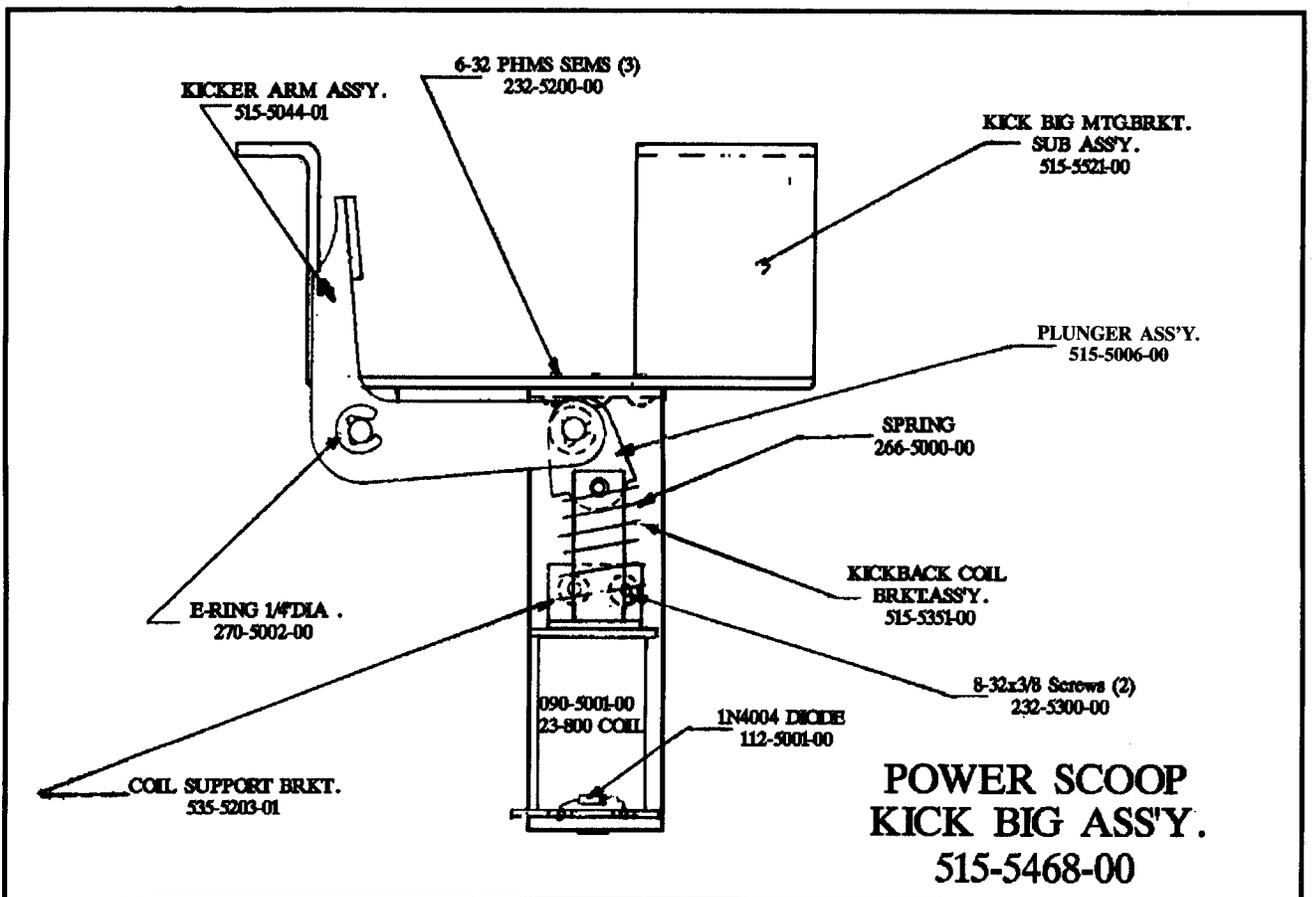


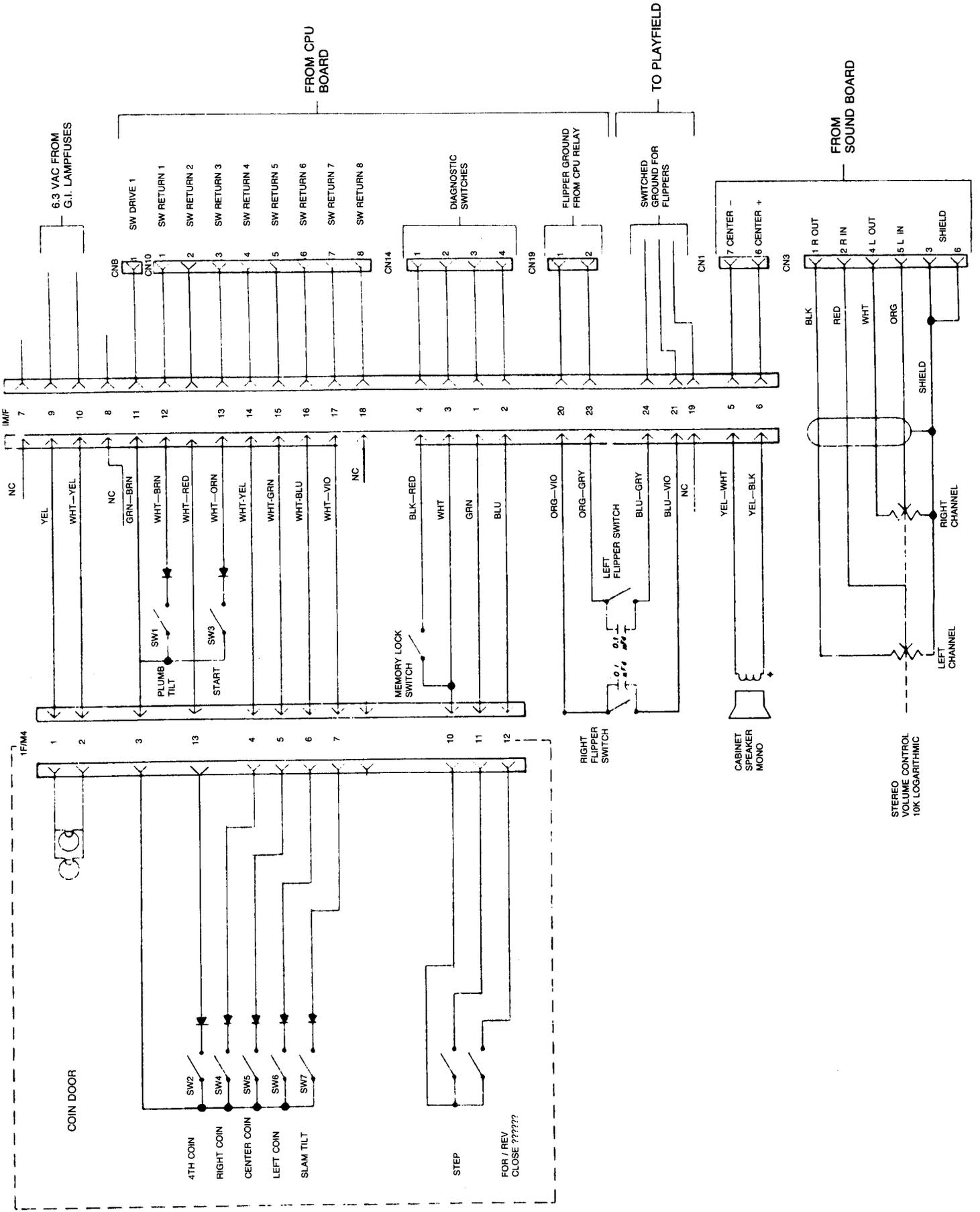
Item	Description	Part No.
1	Target End Plate (2)	535-6162-00
2	Bank Target Frame	535-6159-02
3	#8-32 X ³ / ₈ Screw (6)	237-5879-00
4	Spring Mounting Plate	535-6160-02
5	Target (4)	545-5048-01
6	Drop Tgt.Retain.Brkt.	535-5042-02
7	Washer ¹³ / ₆₄ X ¹ / ₂ (2)	242-5018-00
8	Target Reset Spring (3)	265-5003-00
9	Coil Support Bracket	535-6154-00
10	#6-32 X ³ / ₈ Screw (4)	237-5877-00
11	23-800-Coil	090-5001-02
12	Coil Sleeve	545-5076-00



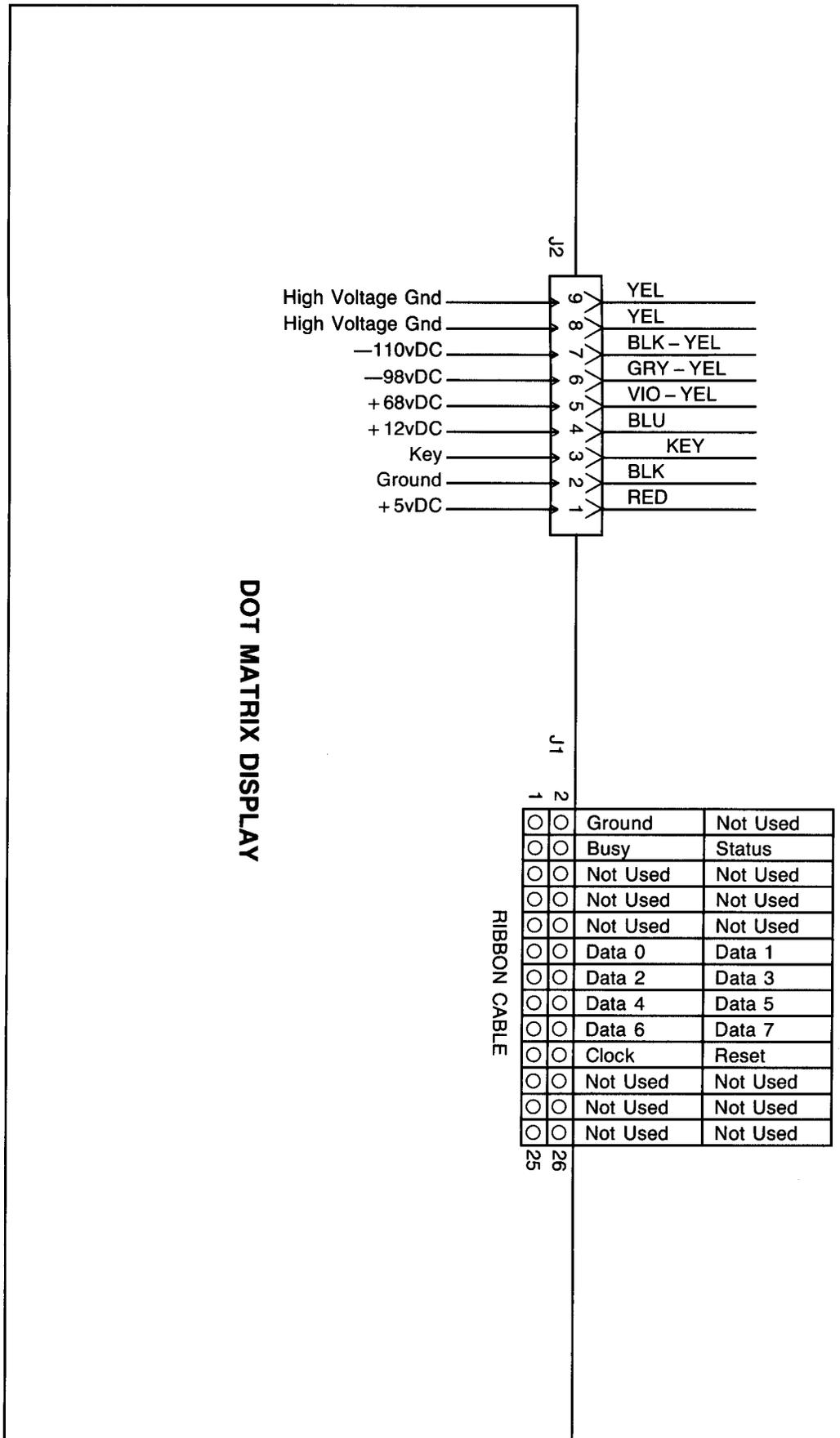
Item	Description	Part No.
13	Plunger Stop Assy.	515-5088-00
14	Plunger & Link Assy.	515-5338-00
15	Target Lift Bracket	535-6169-02
16	Target Shaft	530-5179-02
17	Retaining Ring (2)	270-5002-00
18	Pivot Shaft	530-5180-02
19	Retaining Ring (2)	270-5000-00
20	Switch (4)	180-5092-00
21	SwitchPlate (3)	535-5045-00
22	#6-32 X ¹ / ₂ " (8)	237-5878-00
23	Diode 1N4001	112-5001-00
24	Link,Plunger	545-5062-00

4 Bank Drop Target Ass'y
500-5437-02

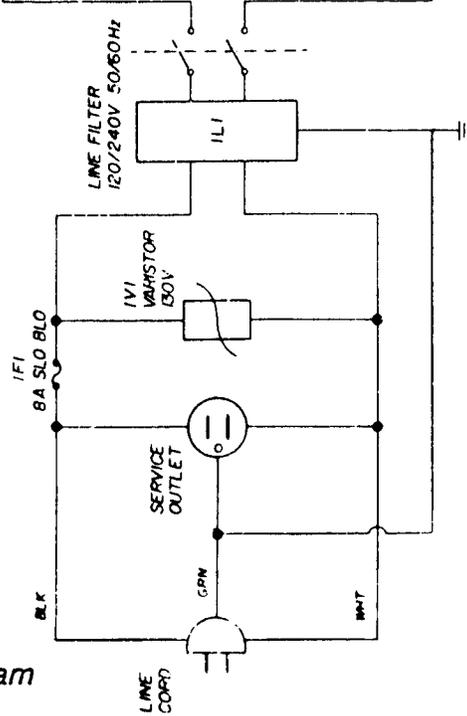




42 Cabinet Wiring Diagram

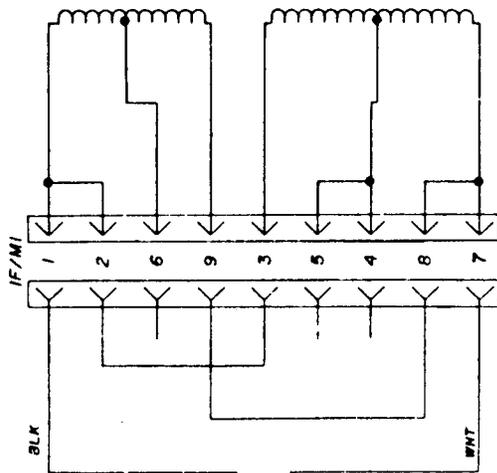


44 Power Wiring Diagram



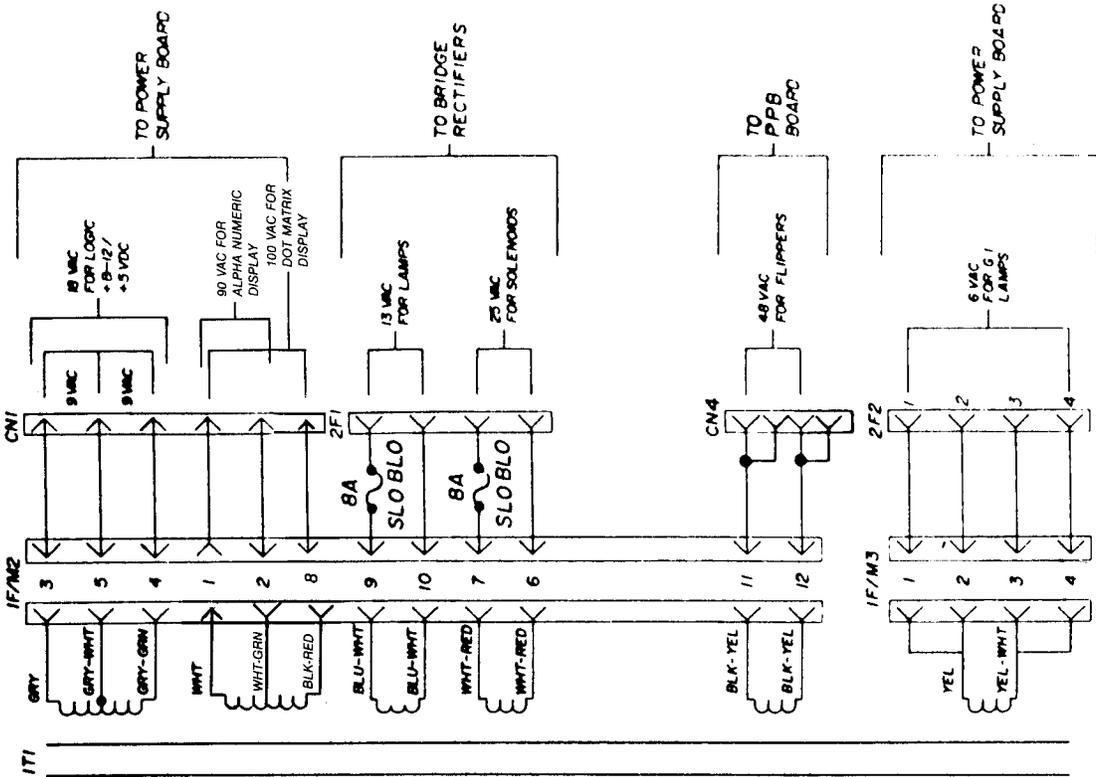
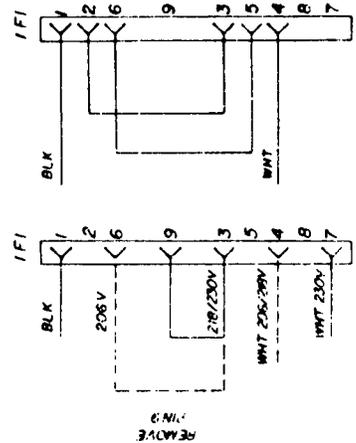
THIS CONFIGURATION FOR 115V

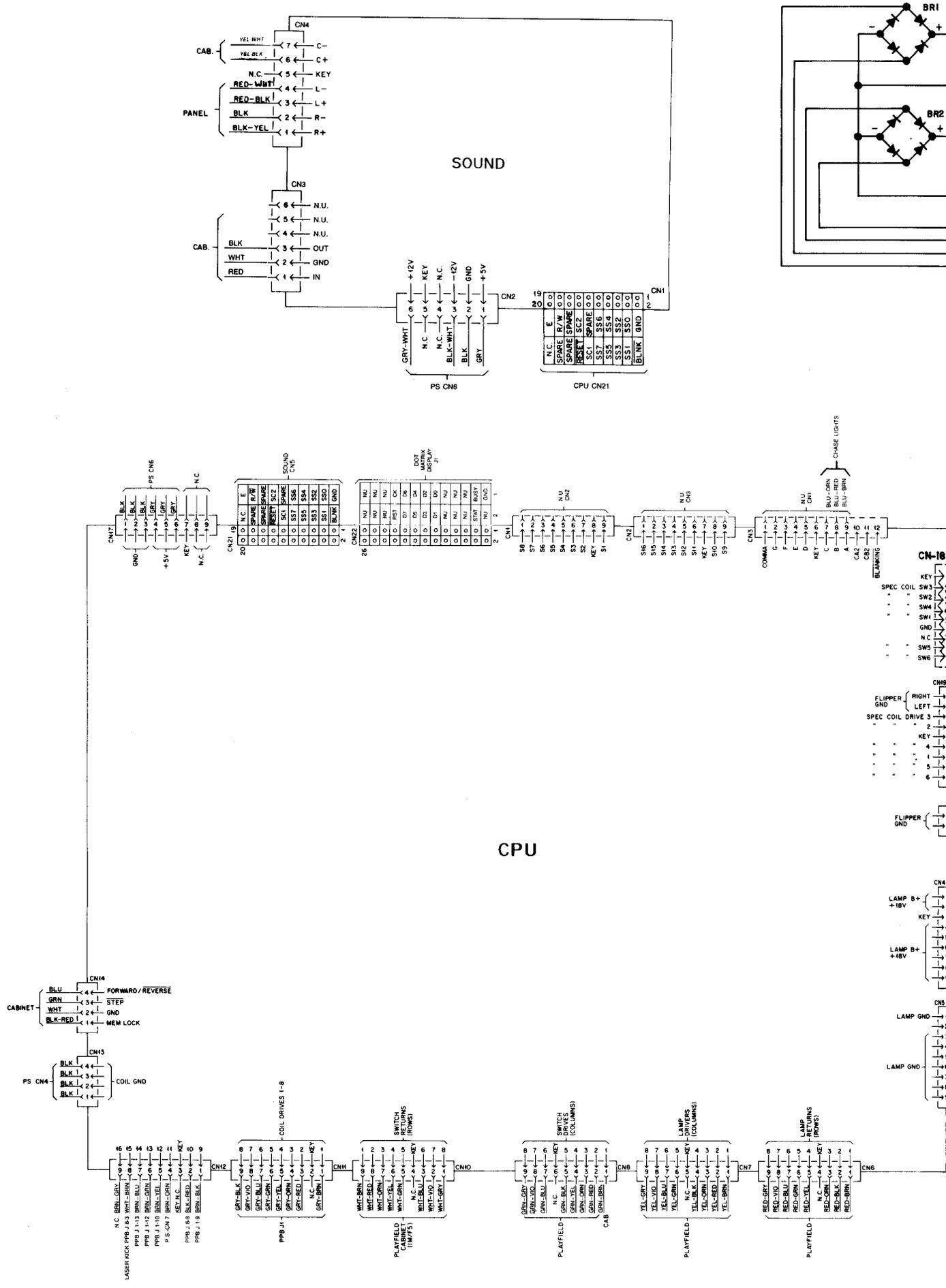
FOR LOWER LINE VOLTAGES OR 230 VOLT OPERATION SEE SAMPLES BELOW

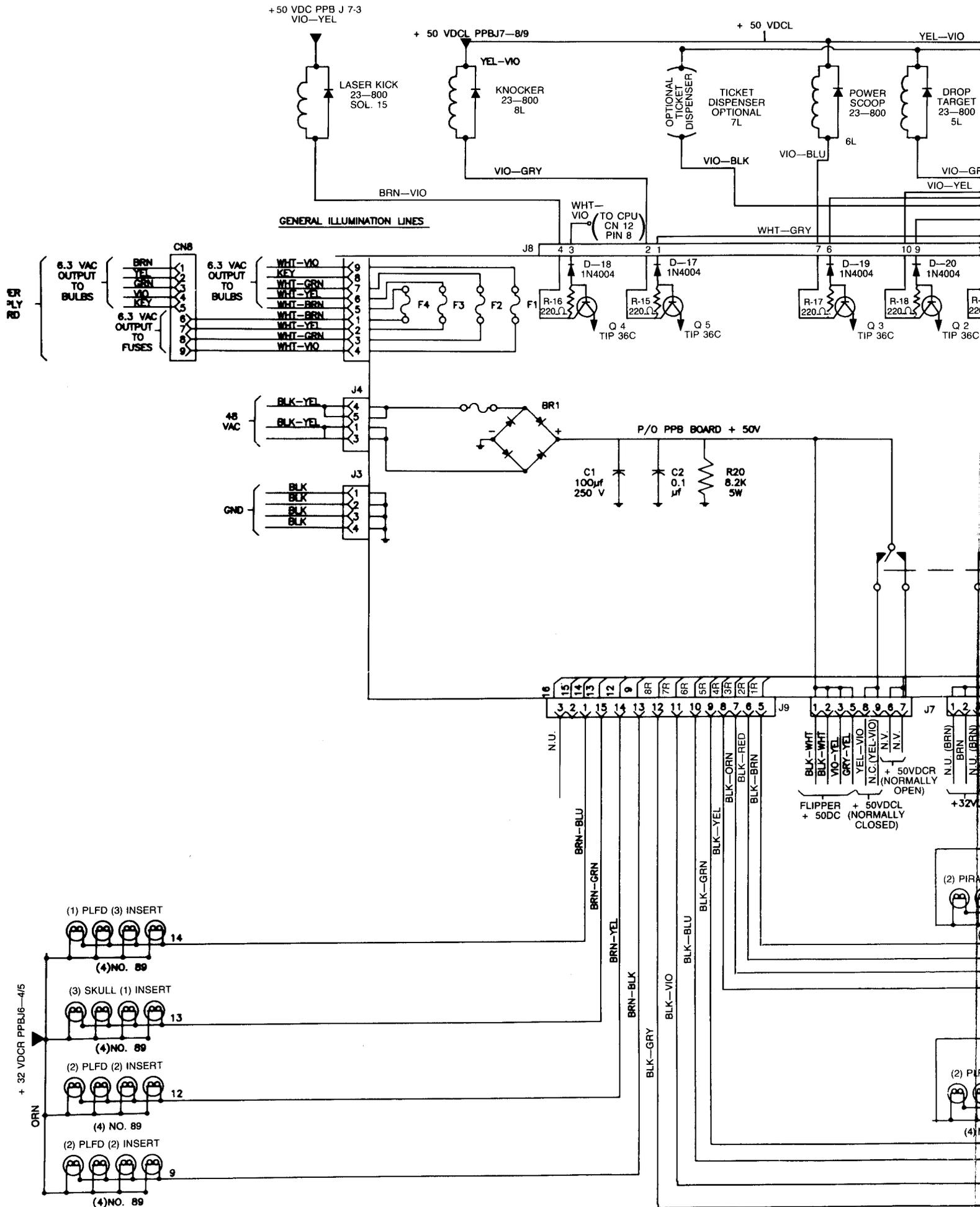


JUMPERS FOR VOLTAGE VARIATION

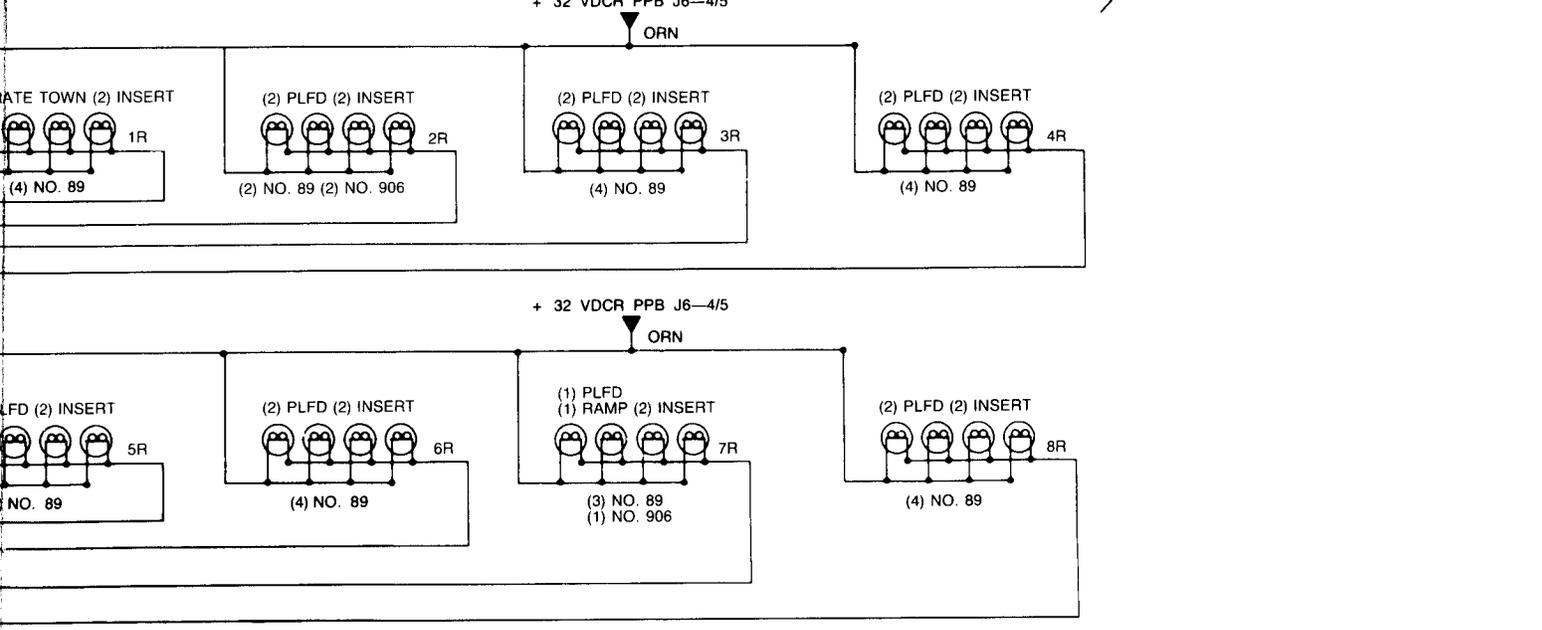
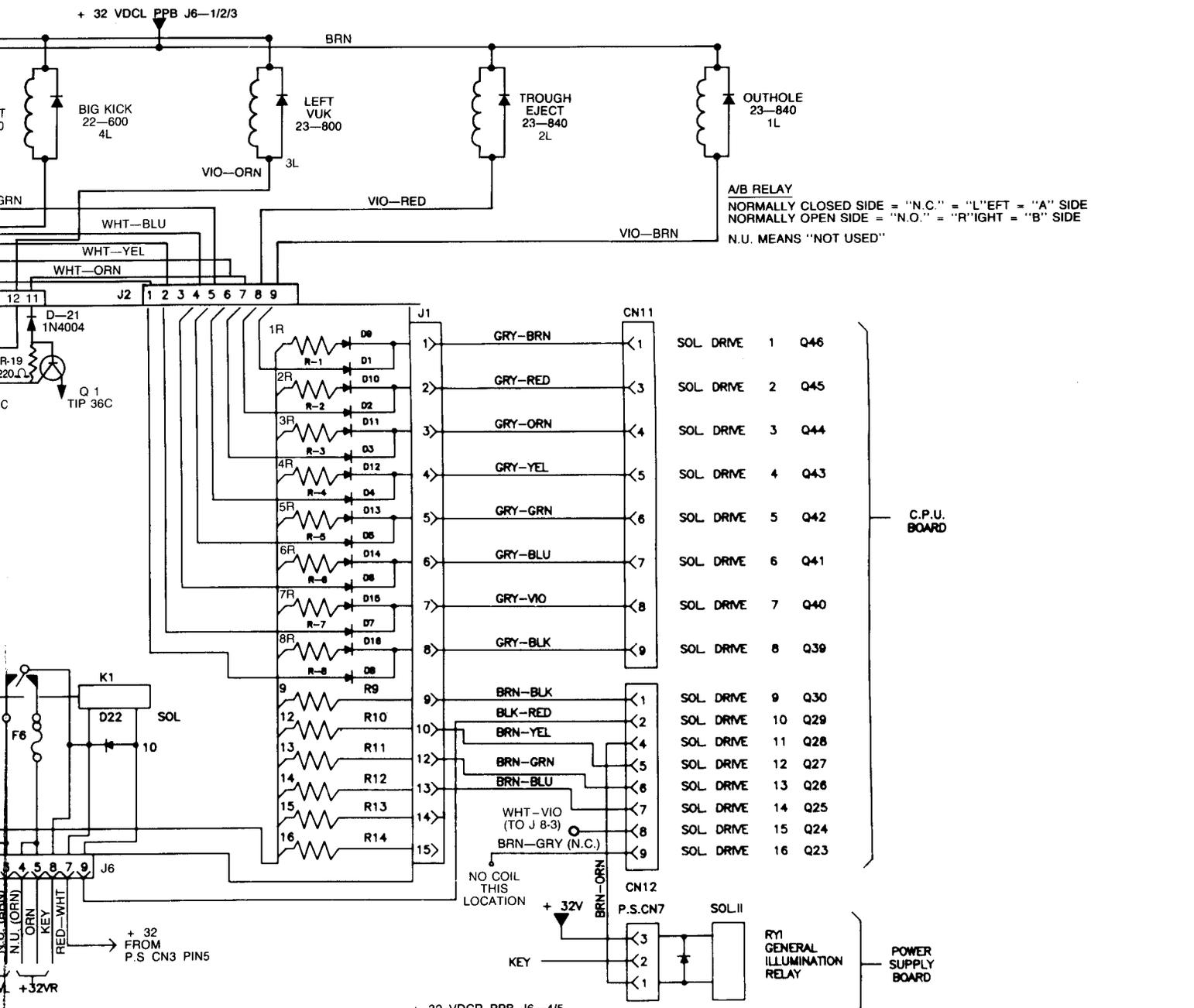
230/218/206 VOLTS
 IFI = 4A SLO BLO
 I/VI = 275V VARIATOR

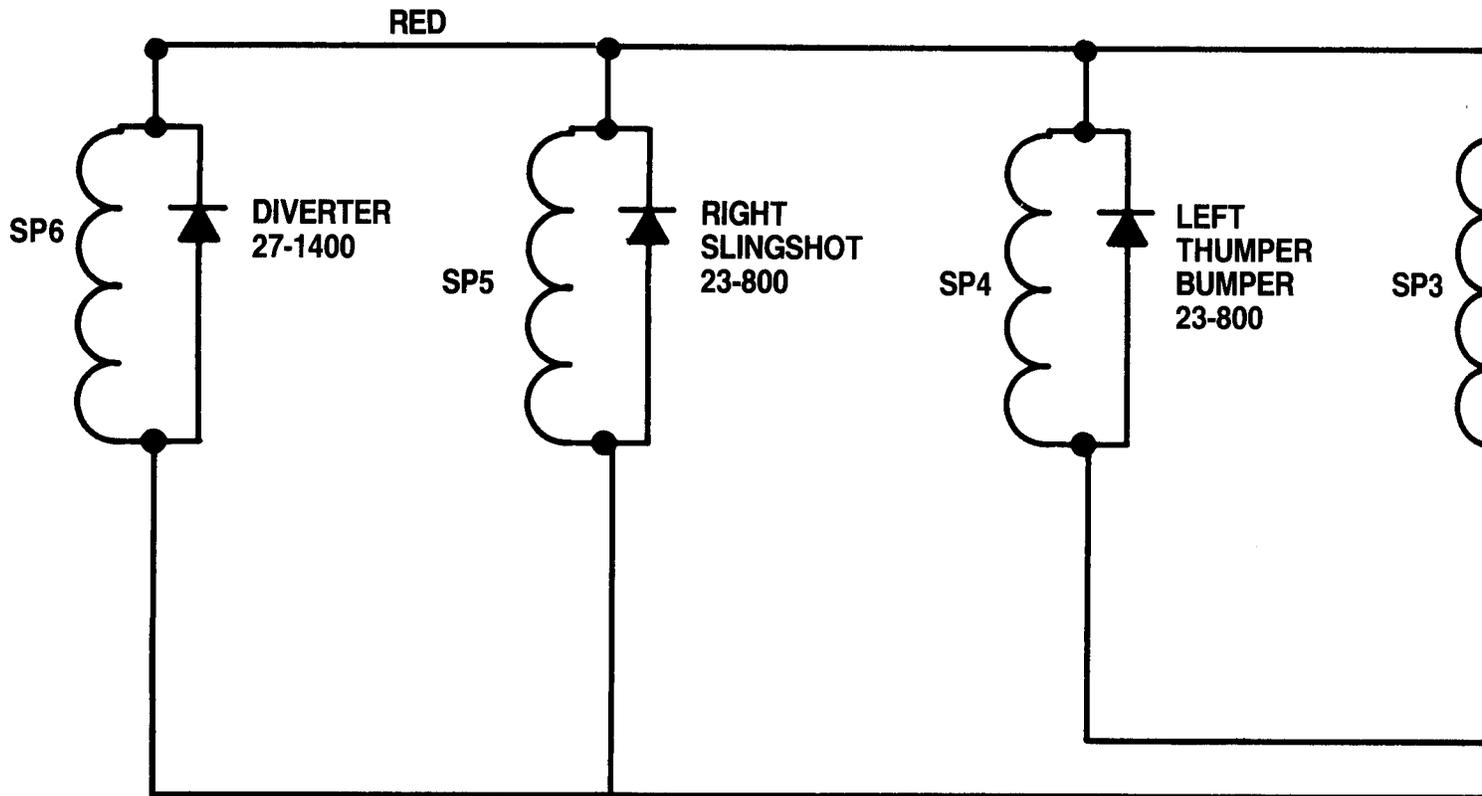


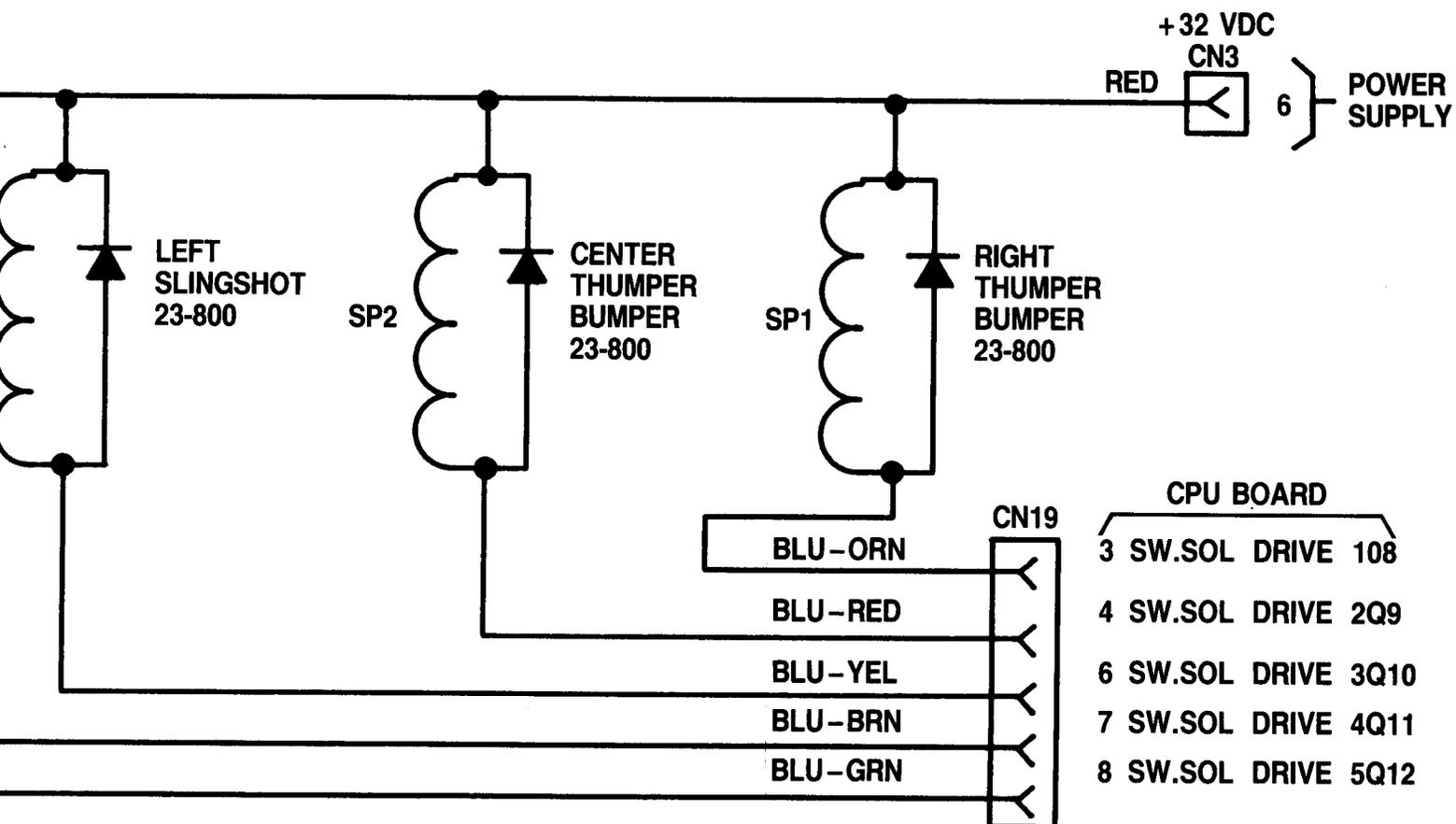




46 Playfield Coil / Flash Lamp Wiring Diagram

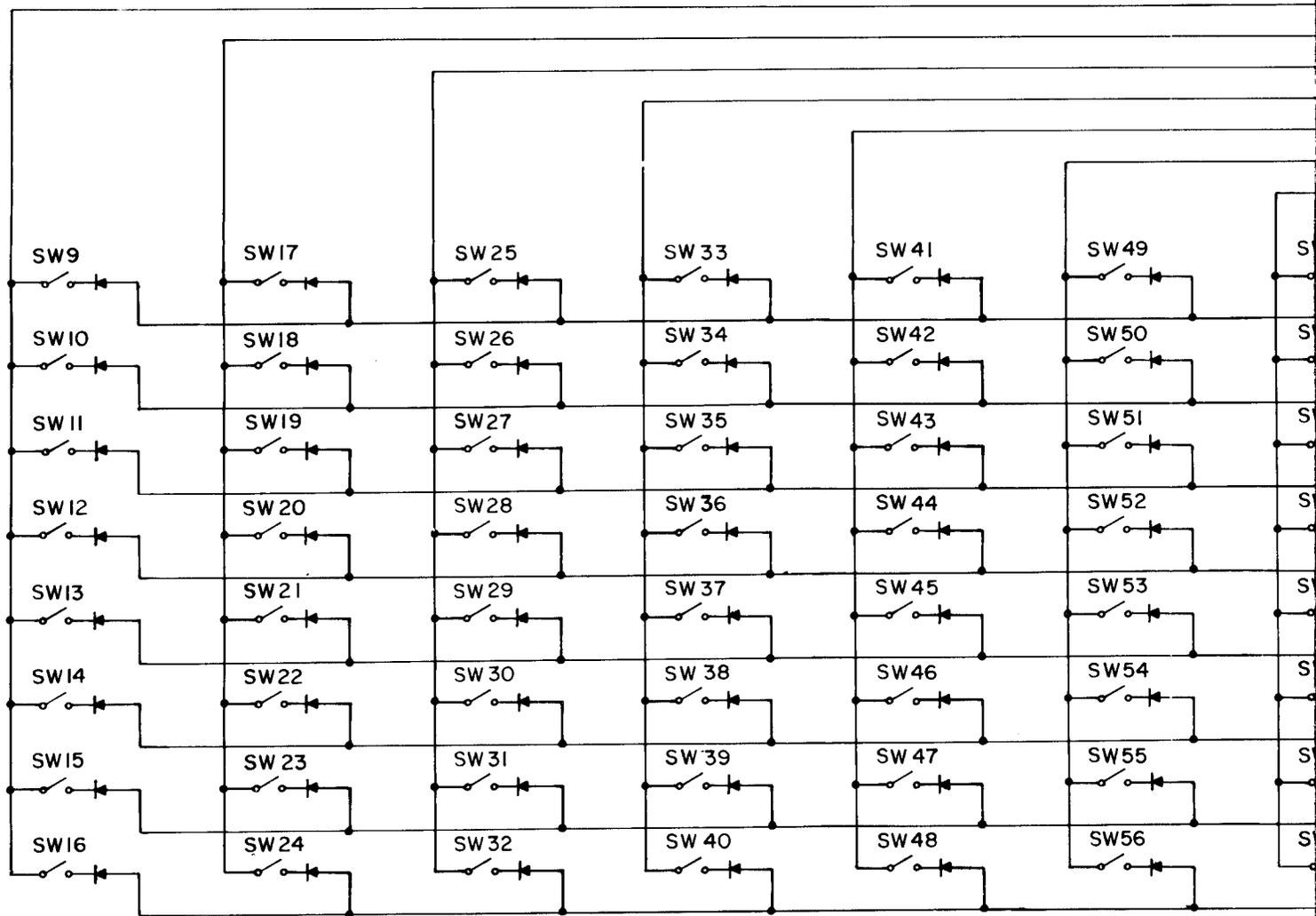






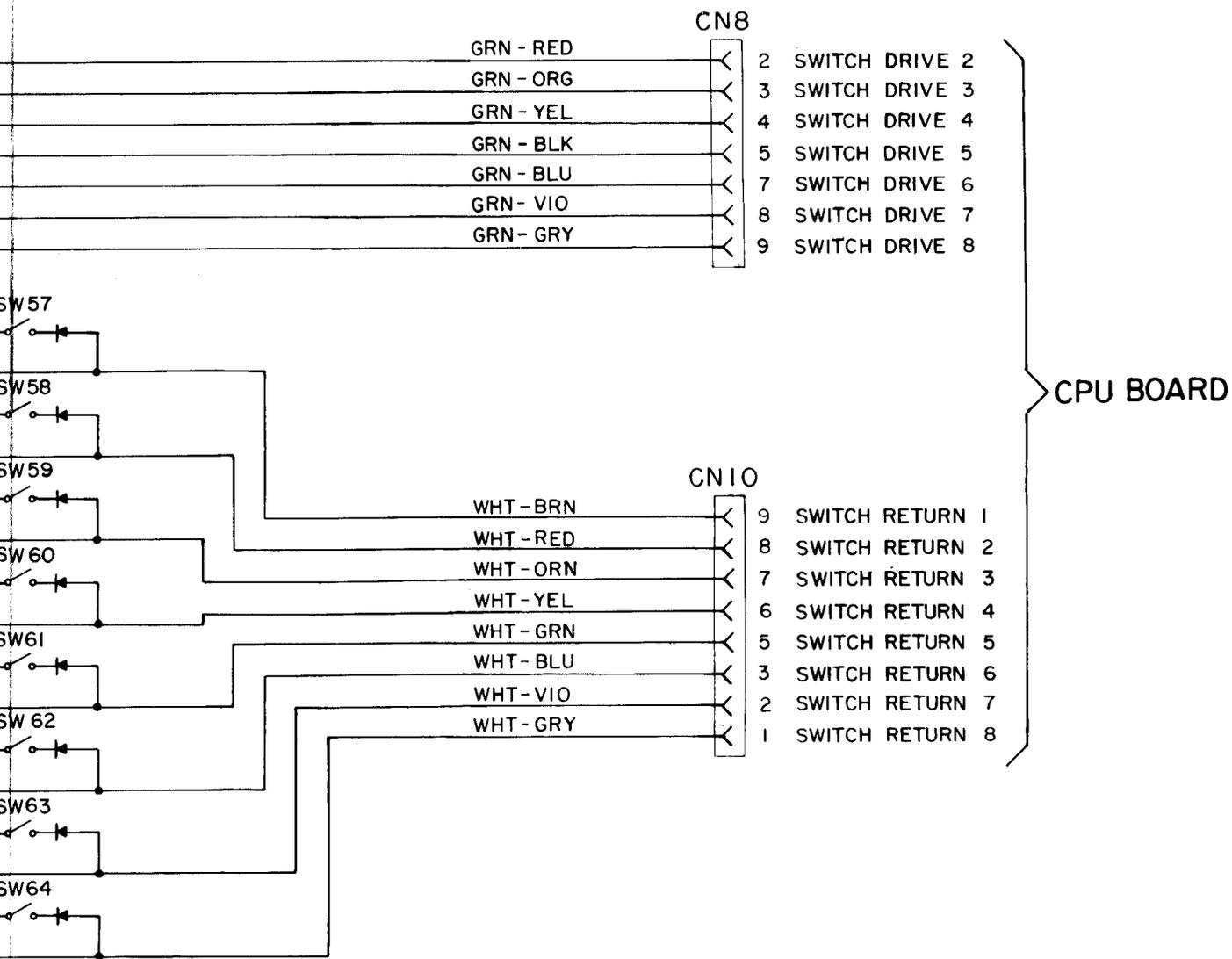
**Switch
Number Description**

01 *	Plumb Tilt	16 *	Right Flip. Cab. Switch	31	S
02 *	4th Coin Chute Option	17	Left Toplane	32	S
03 *	Credit Button	18	Center Toplane	33	R
04 *	Right Coin	19	Right Toplane	34	R
05 *	Center Coin	20	Right Single Target	35	R
06 *	Left Coin	21	Left Return	36	L
07 *	Slam Tilt	22	Right Return	37	L
08	Not Used	23	Left Outlane	38	N
09	Not Used	24	Right Outlane	39	R
10	Out Hole	25	Left Drop Target 1 Top	40	R
11	Trough #1 (Left)	26	Left Drop Target 2	41	L
12	Trough #2 (Center)	27	Left Drop Target 3	42	L
13	Trough #3 (Right)	28	Left Drop Target 4 Bottom	43	L
14	Shooter Lane	29	Skill Shot 3	44	U
15 *	Left Flip. Cab. Switch	30	Skill Shot 2	45	U



Skill Shot 1 (Upper)	46	Upper 3 Bank Bottom
Skill Shot 1 (Lower)	47	Upper Playfield Trough
Right 3 Bank Top	48	Power Scoop
Right 3 Bank Middle	49	Right 10 Point
Right 3 Bank Bottom	50	Upper Right Rollover
Left Ramp Entrance	51	Upper Left VUK
Left Ramp #2	52	Left Slingshot
Not Used	53	Right Slingshot
Right Ramp Entrance	54	Left Turbo Bumper
Right Ramp #2	55	Center Turbo Bumper
Left 3 Bank Top	56	Right Turbo Bumper
Left 3 Bank Middle	57	Through 64 Not Used
Left 3 Bank Bottom		
Upper 3 Bank Top		
Upper 3 Bank Middle		

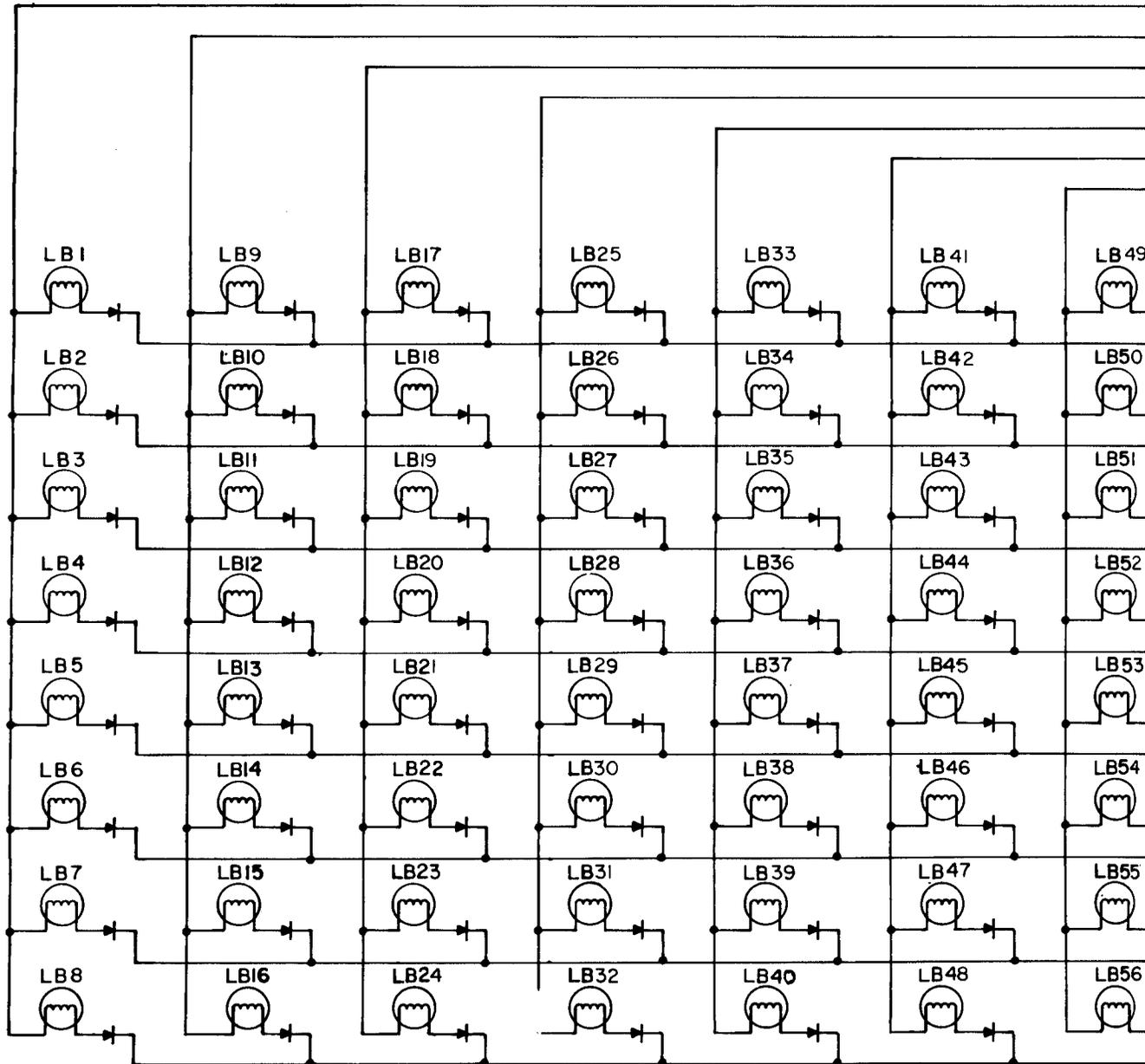
*Indicates Cabinet Switches.



**Lamp
Number Description**

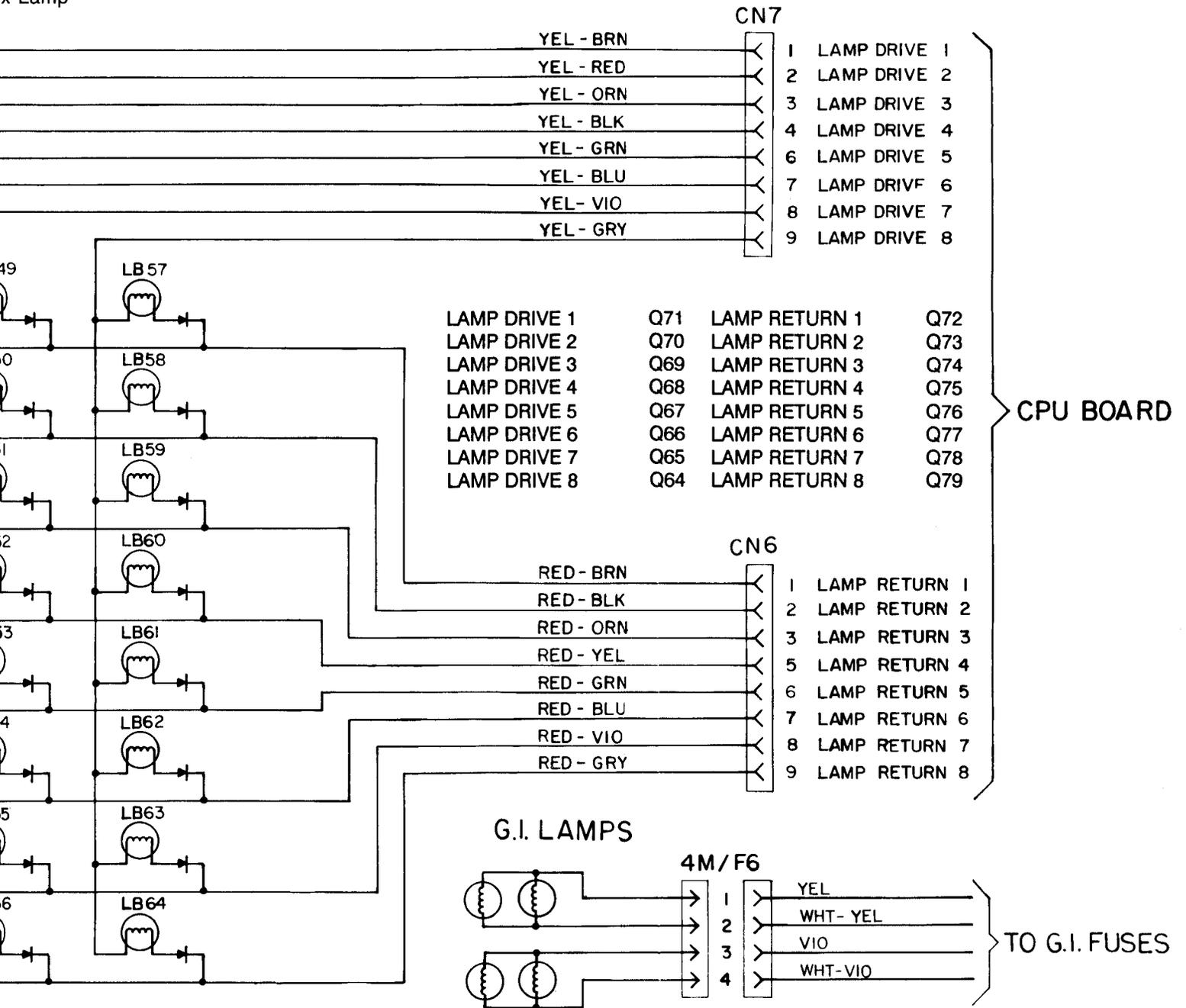
01	250K	17 *	Backpanel Left	33
02	500K	18 *	Backpanel Center	34
03	750K	19 *	Backpanel Right	35
04	1 Million	20	Laser Kick Ready	36
05	2 Million	21	Left Return & Right Target	37
06	3 Million	22	Right Return Lane	38
07	Right Ramp (AM)	23	Left Outlane Top	39
08	Right Ramp (PM)	24	Right Outlane	40
09	2X	25	Multiball Bottom	41
10	4X	26	Skill Shot Bottom	42
11	6X	27	Multiball Middle	43
12	8X	28	Skill Shot Middle	44
13	10X	29	Multiball Top	45
14	Shoot Again	30	Skill Shot Top	46
15	Right Ramp Croc Clock	31	Start Button	47
16	Left VUK Top Arrow	32	Top Left VUK Lock	48

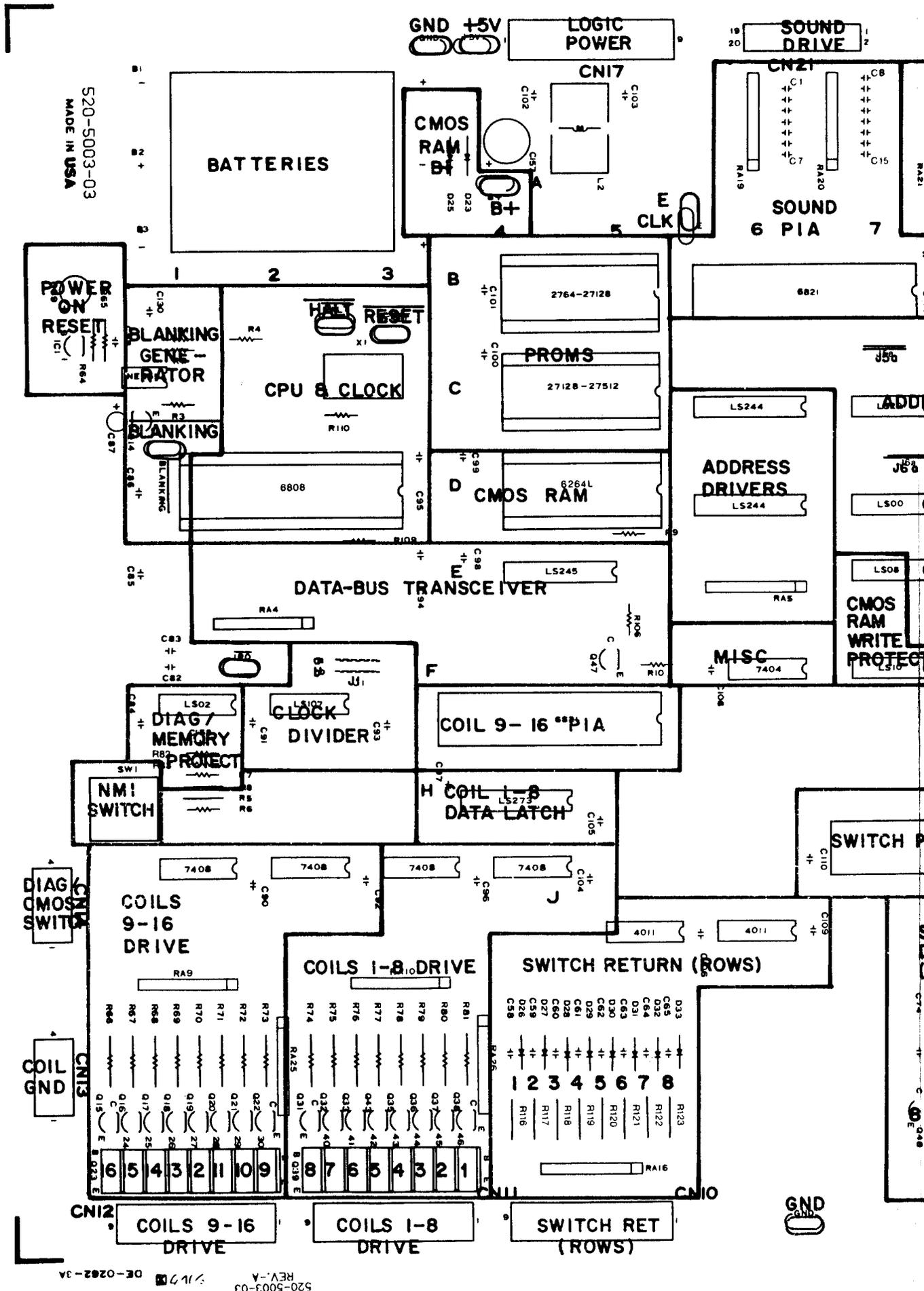
*Indicates Speaker or Backbox



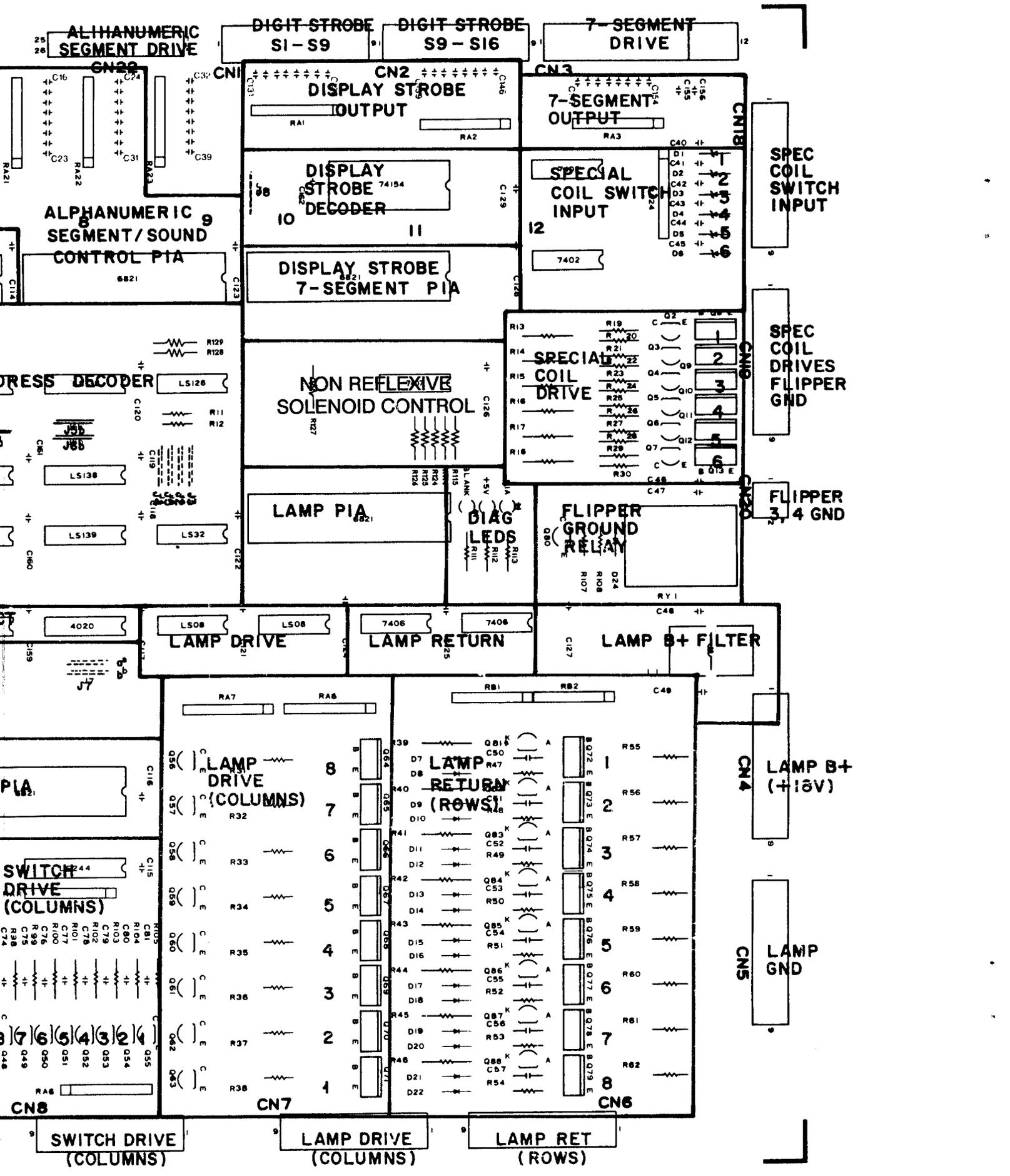
Right 3 Bank Top	49	Pirate Town Special
Right 3 Bank Middle	50	Pirate Town 10 Million
Right 3 Bank Bottom	51	Pirate Town Extra Ball
Left Toplane	52	Strike
Center Toplane	53	Right Ramp Entry
Skull Left Eye	54	Left Turbo Bumper
Skull Right Eye	55	Center Turbo Bumper
Left Ramp Entry	56	Right Turbo Bumper
Left 3 Bank Top	57	Light Bumpers
Left 3 Bank Middle	58	2 Million
Left 3 Bank Bottom	59	Light Croc Time
Upper 3 Bank Top	60	Fast
Upper 3 Bank Middle	61	Skull 10 Million
Upper 3 Bank Bottom	62	Light Extra Ball
Extra Ball	63	Bangarang
Skull 10 Million Arrow	64	Right Toplane

x Lamp





50 CPU Board Assembly Diagram



ALPHANUMERIC SEGMENT DRIVE

DIGIT STROBE S1-S9
DIGIT STROBE S9-S16

7-SEGMENT DRIVE

DISPLAY STROBE OUTPUT

7-SEGMENT OUTPUT

ALPHANUMERIC 9 SEGMENT/SOUND CONTROL PIA

DISPLAY STROBE 74154 DECODER

SPECIAL COIL SWITCH INPUT

SPEC COIL SWITCH INPUT

DISPLAY STROBE 7-SEGMENT PIA

7402

ADDRESS DECODER

NON REFLEXIVE SOLENOID CONTROL

SPECIAL COIL DRIVE

SPEC COIL DRIVES FLIPPER GND

LAMP PIA

DIAG LEADS

FLIPPER GROUND RELAY

FLIPPER 3, 4 GND

LAMP DRIVE

LAMP RETURN

LAMP B+ FILTER

PIA

LAMP DRIVE (COLUMNS)

LAMP RETURN (ROWS)

LAMP B+ (+10V)

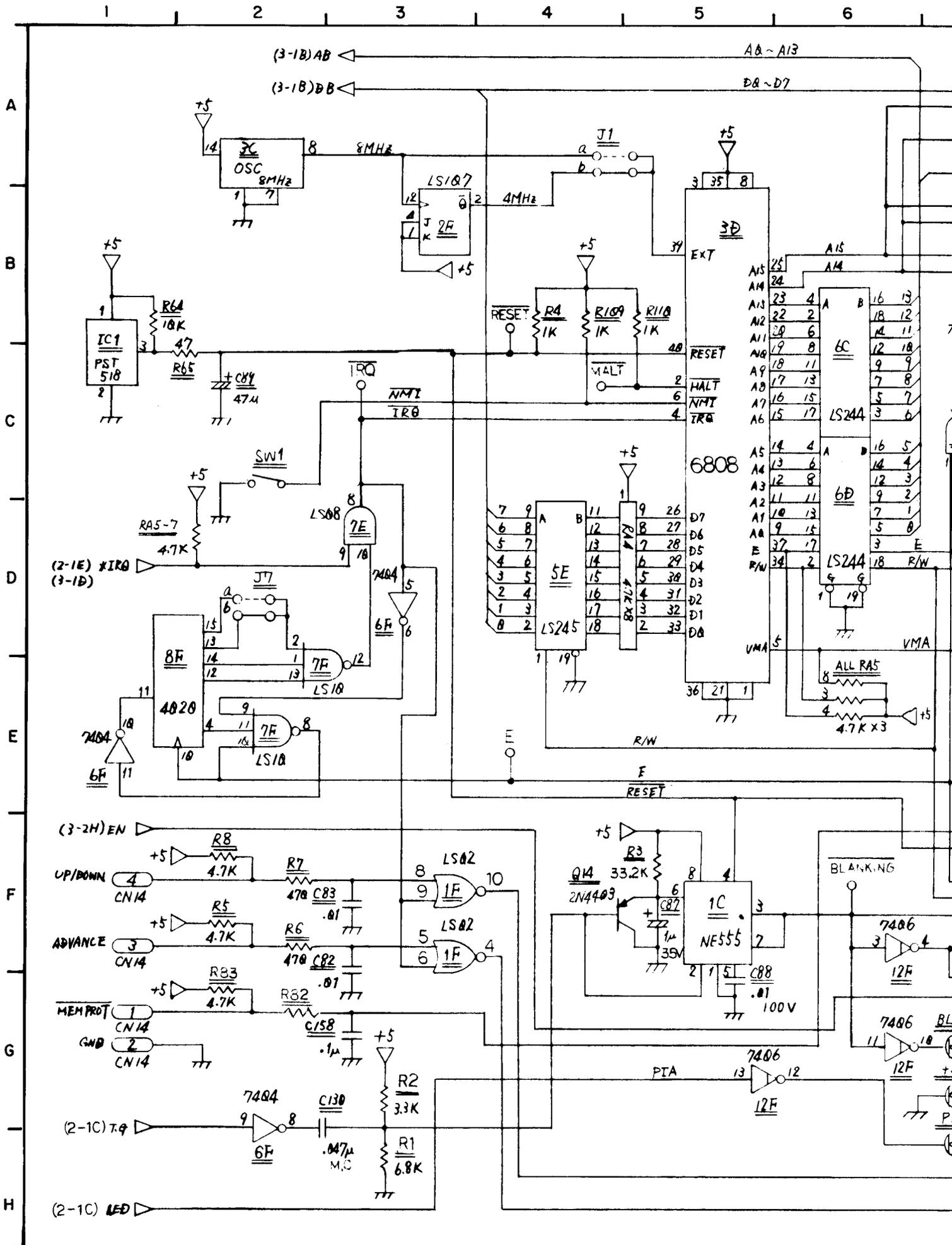
SWITCH DRIVE (COLUMNS)

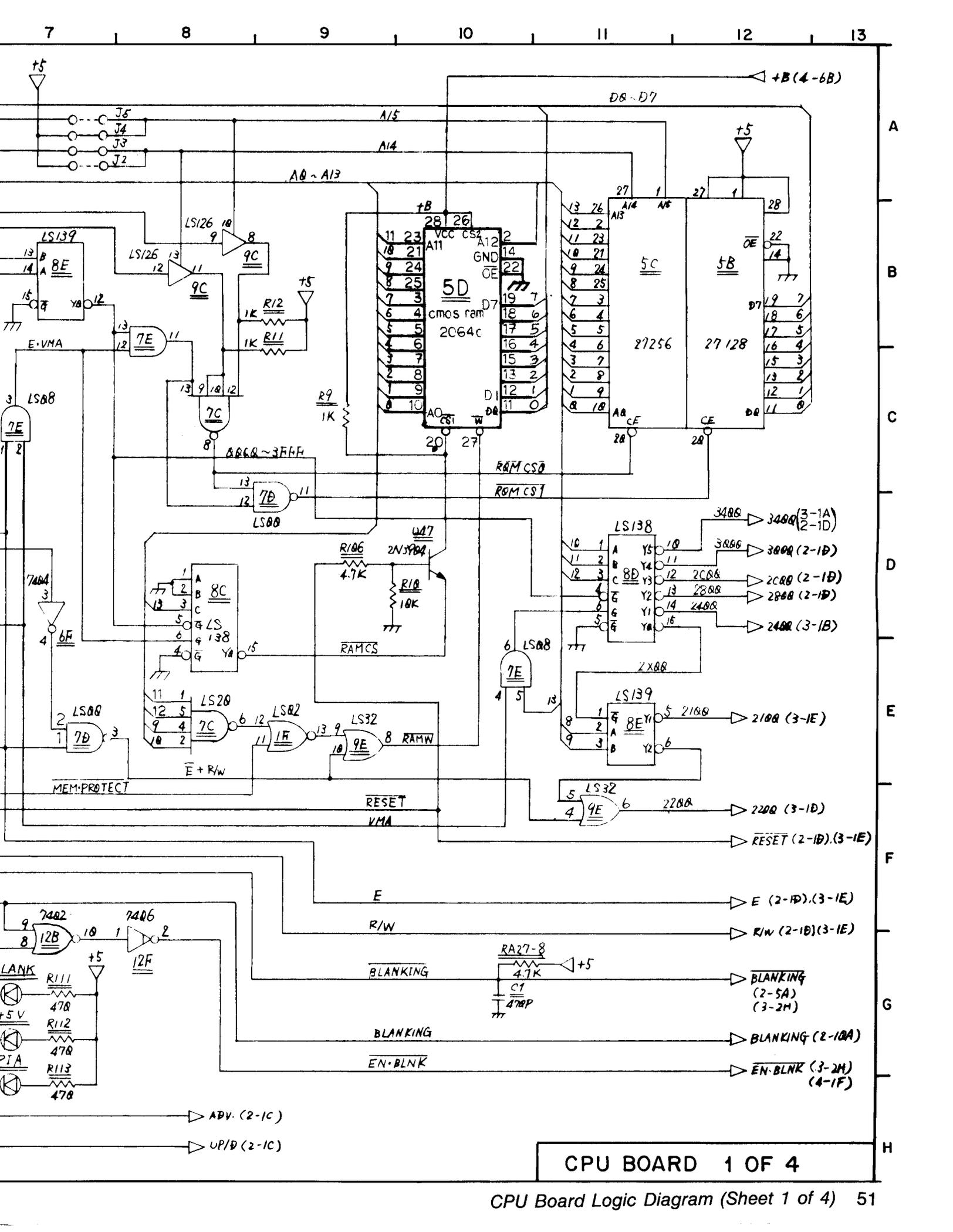
LAMP GND

SWITCH DRIVE (COLUMNS)

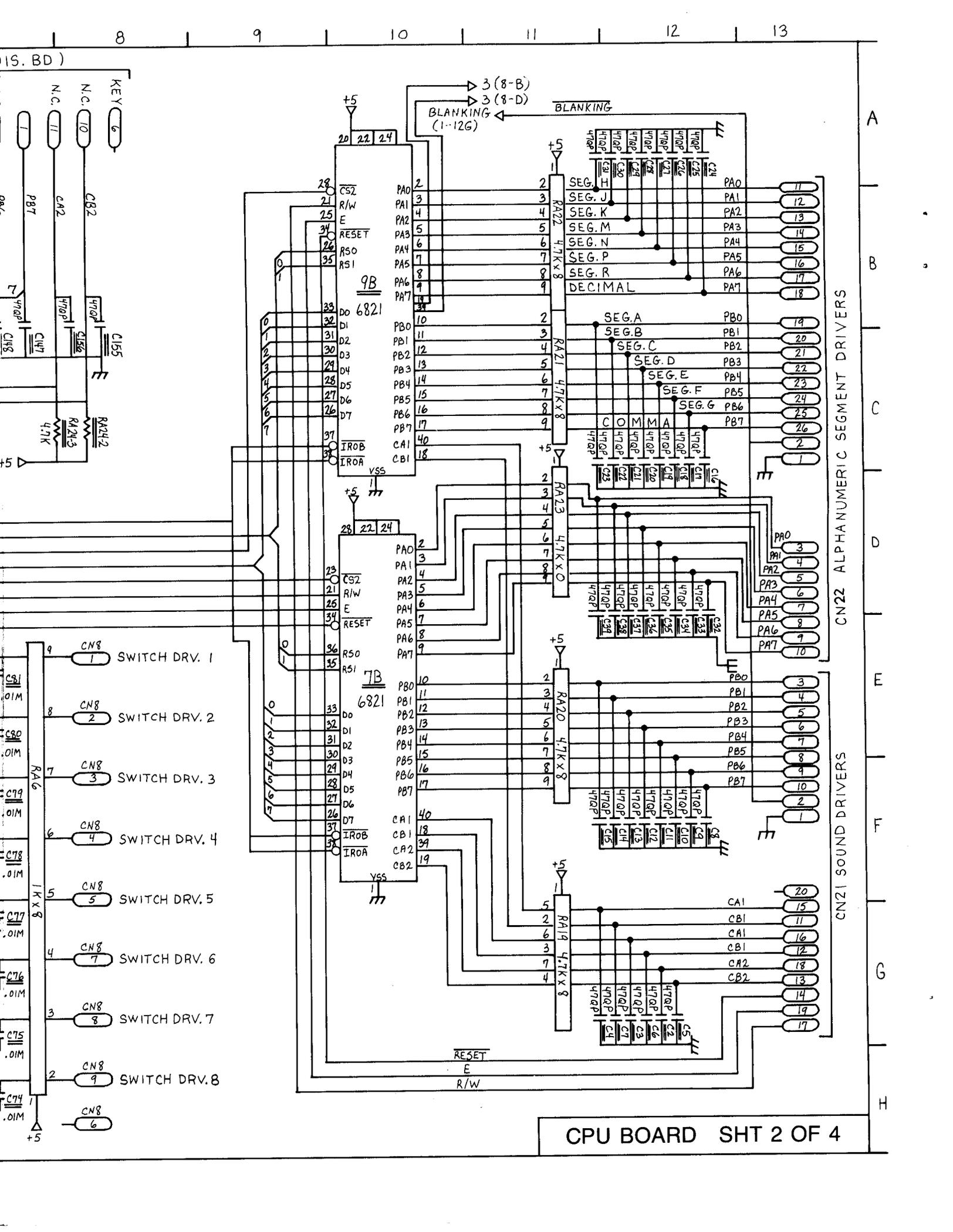
LAMP DRIVE (COLUMNS)

LAMP RET (ROWS)

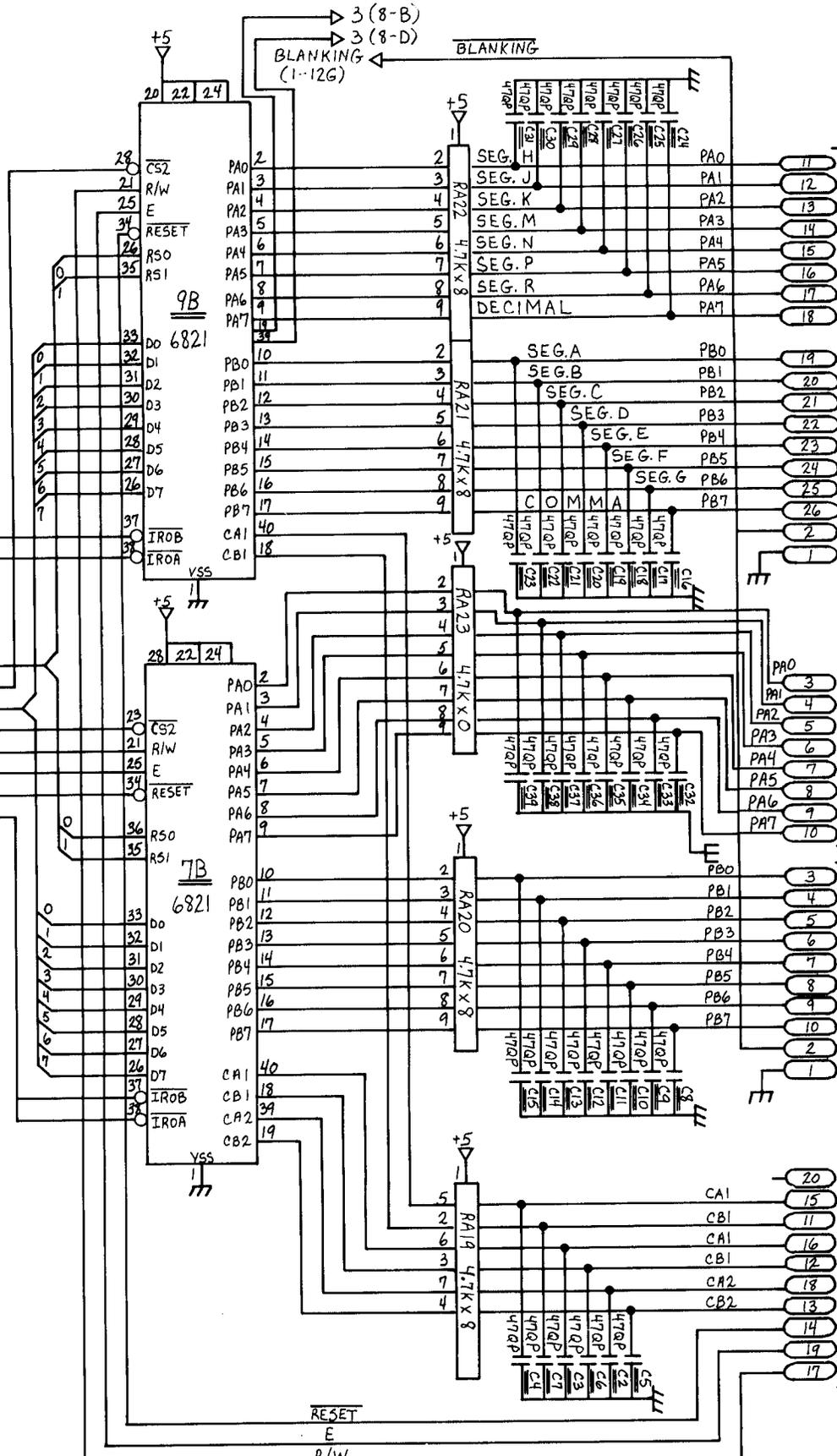
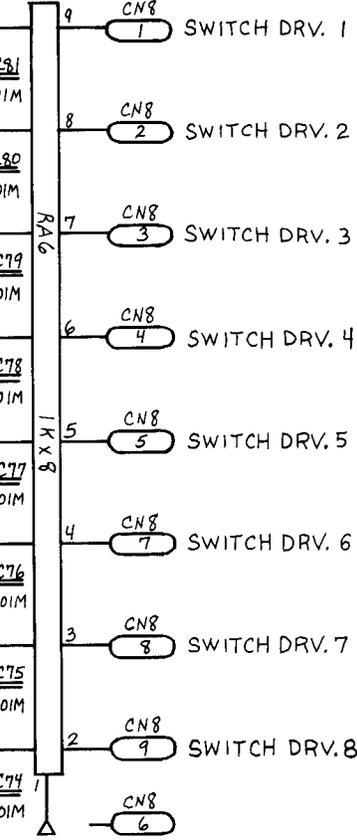




CPU BOARD 1 OF 4



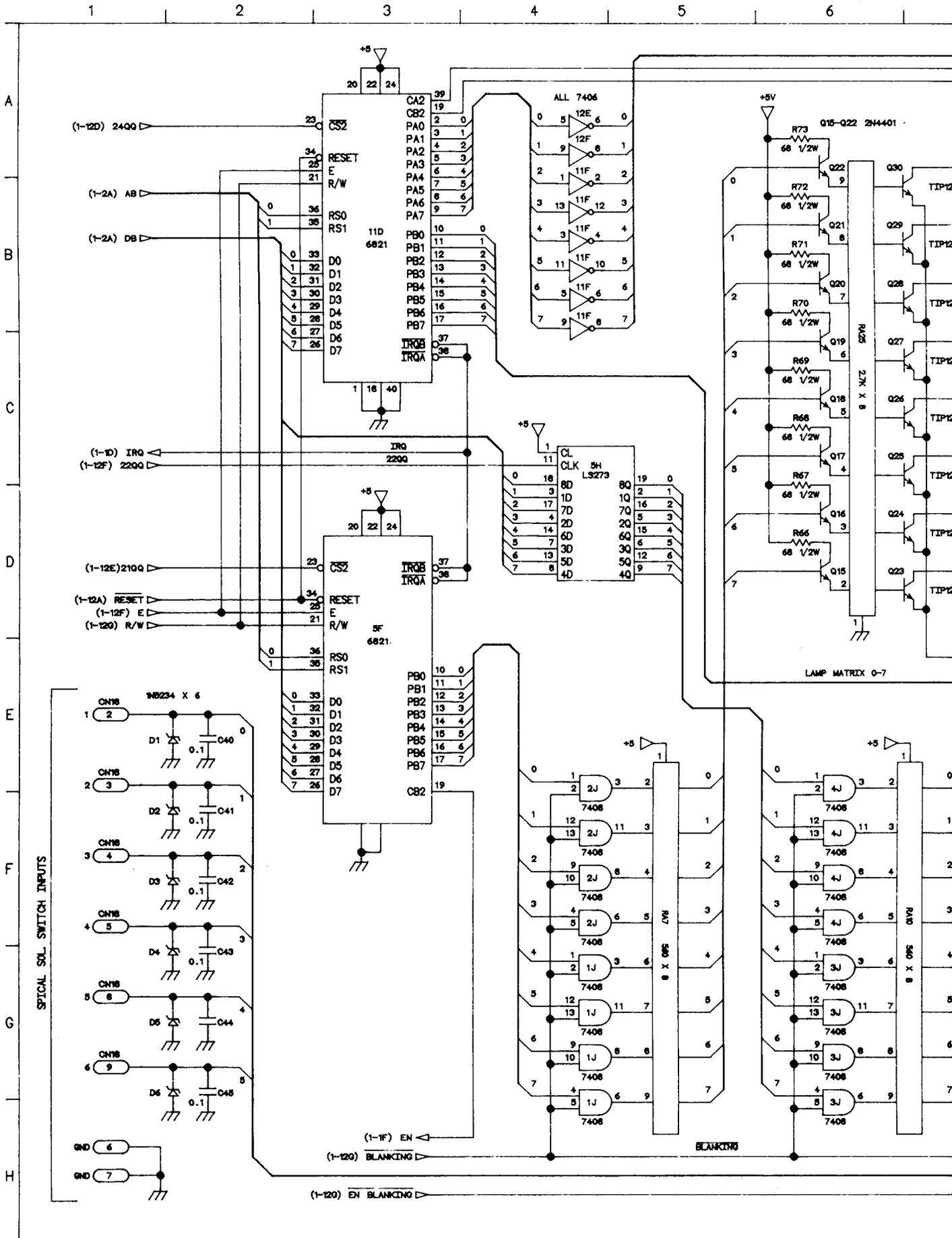
(S. BD)



CN22 ALPHANUMERIC SEGMENT DRIVERS

CN21 SOUND DRIVERS

A
B
C
D
E
F
G
H



A
B
C
D
E
F
G
H

1 2 3 4 5 6

SPECIAL SOL. SWITCH INPUTS

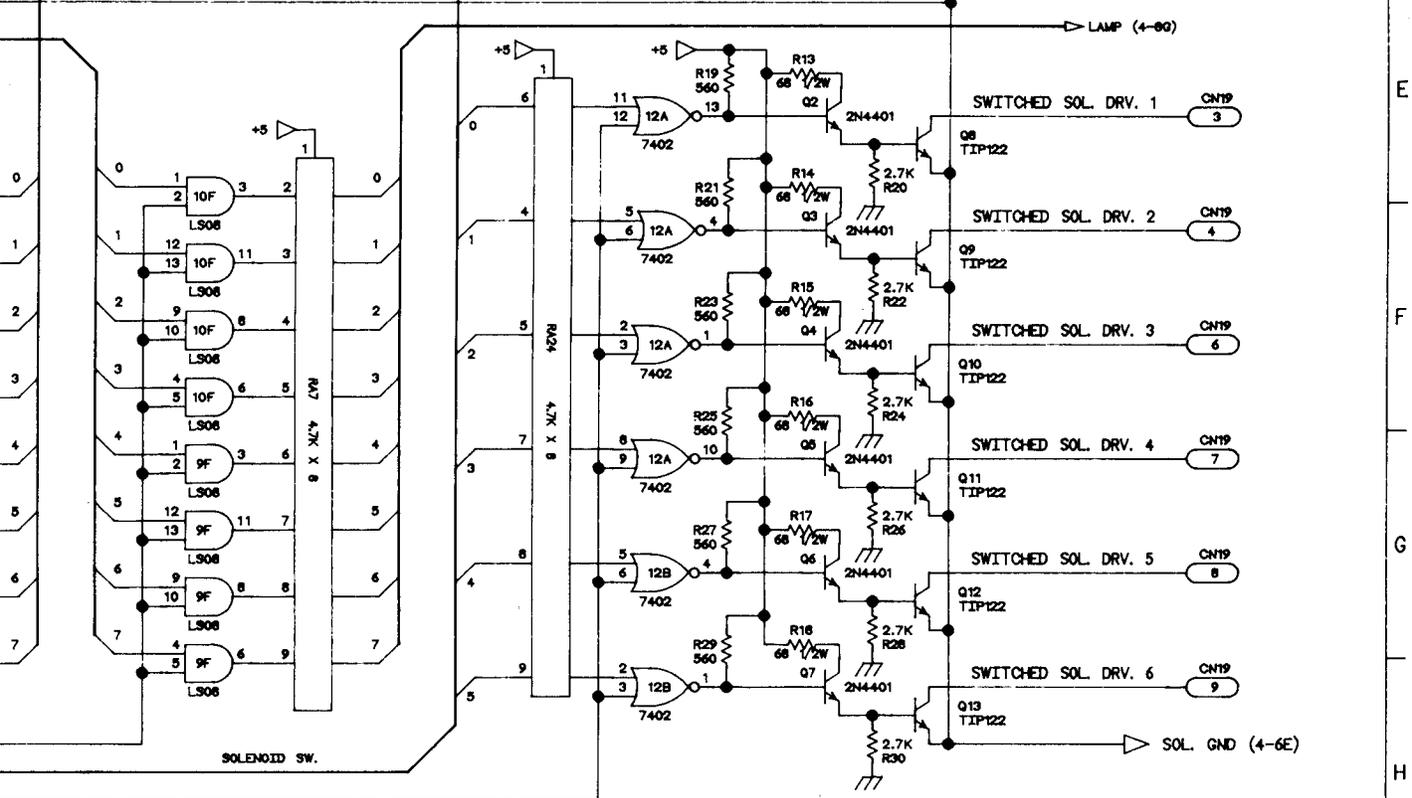
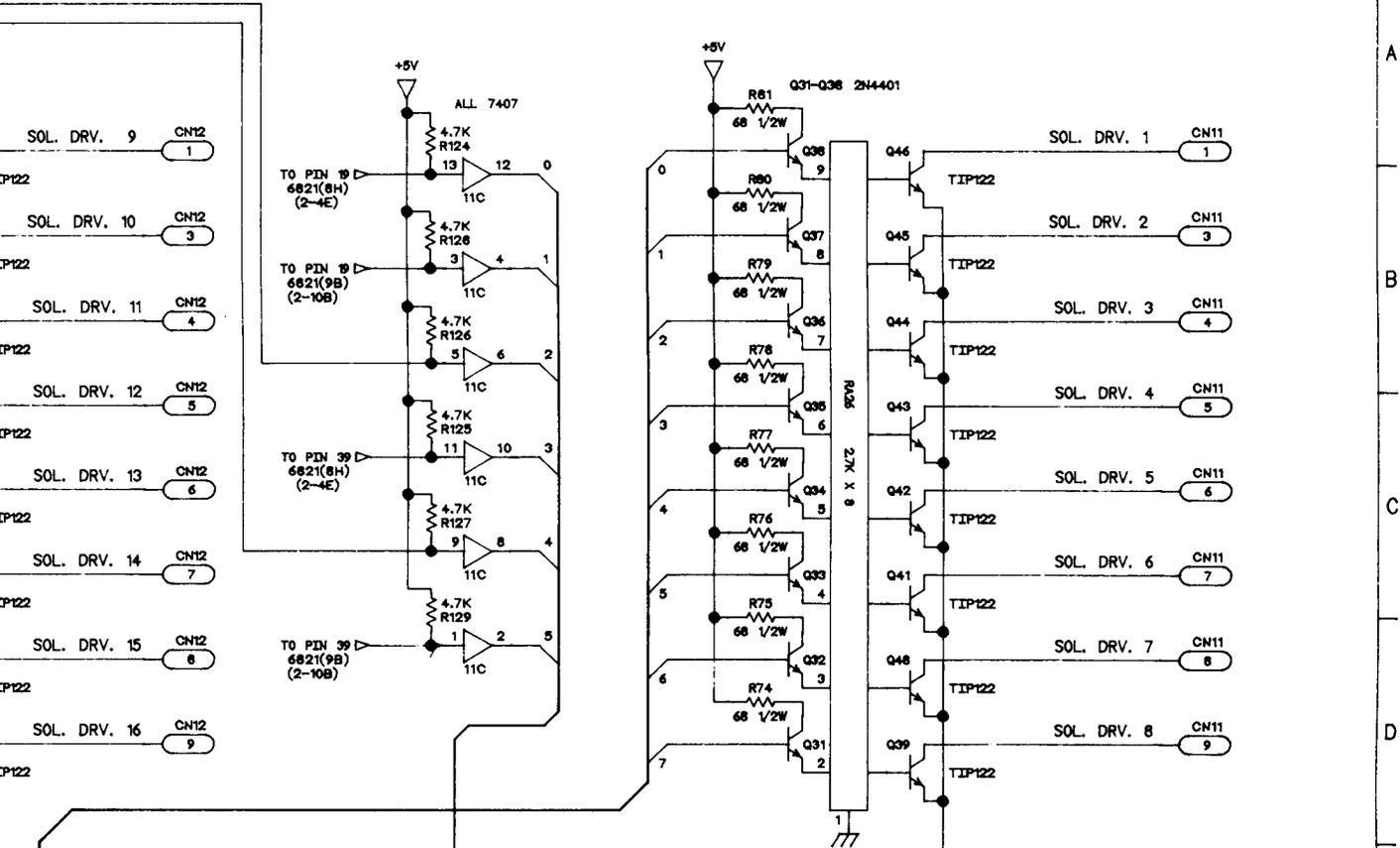
LAMP MATRIX 0-7

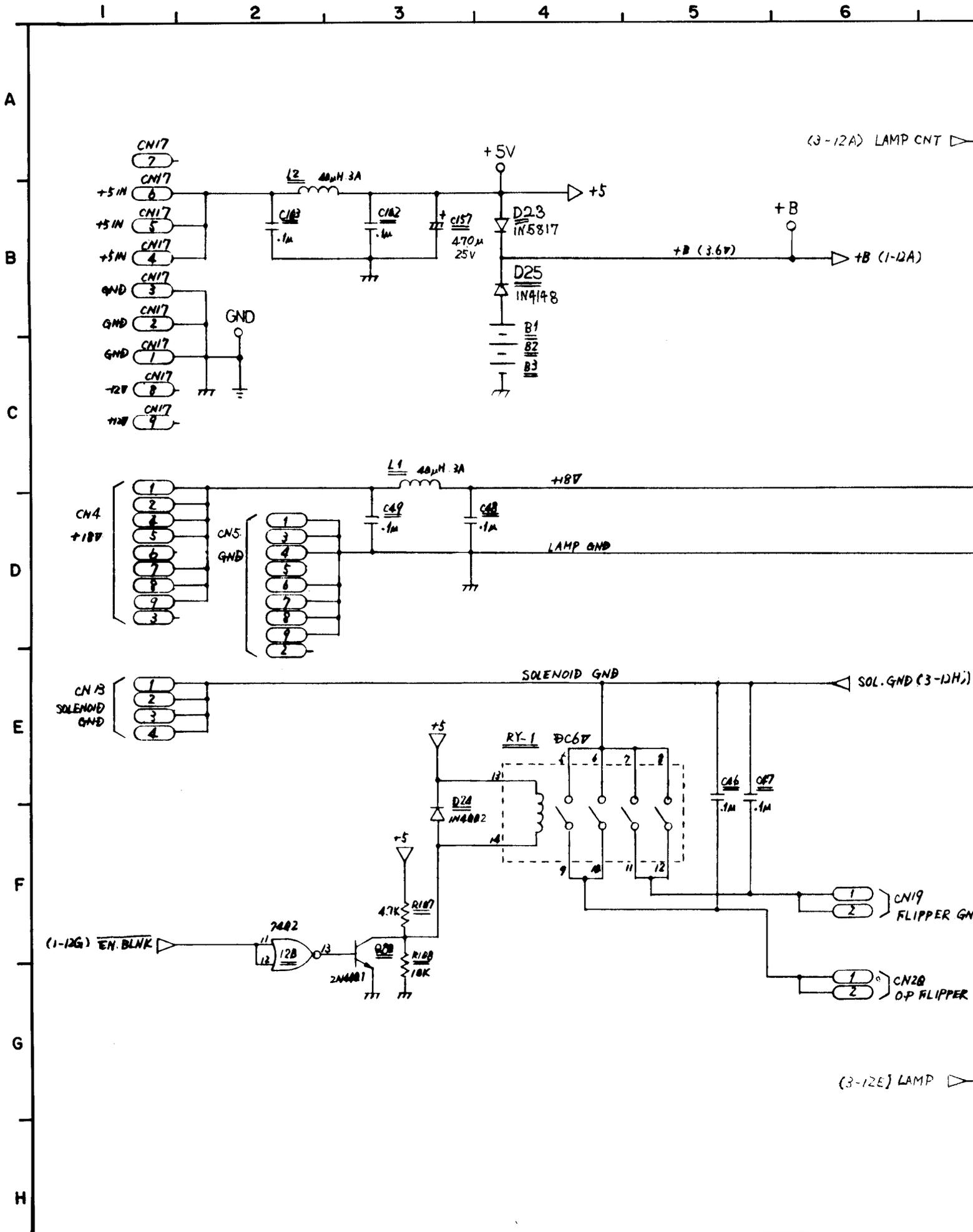
BLANKING

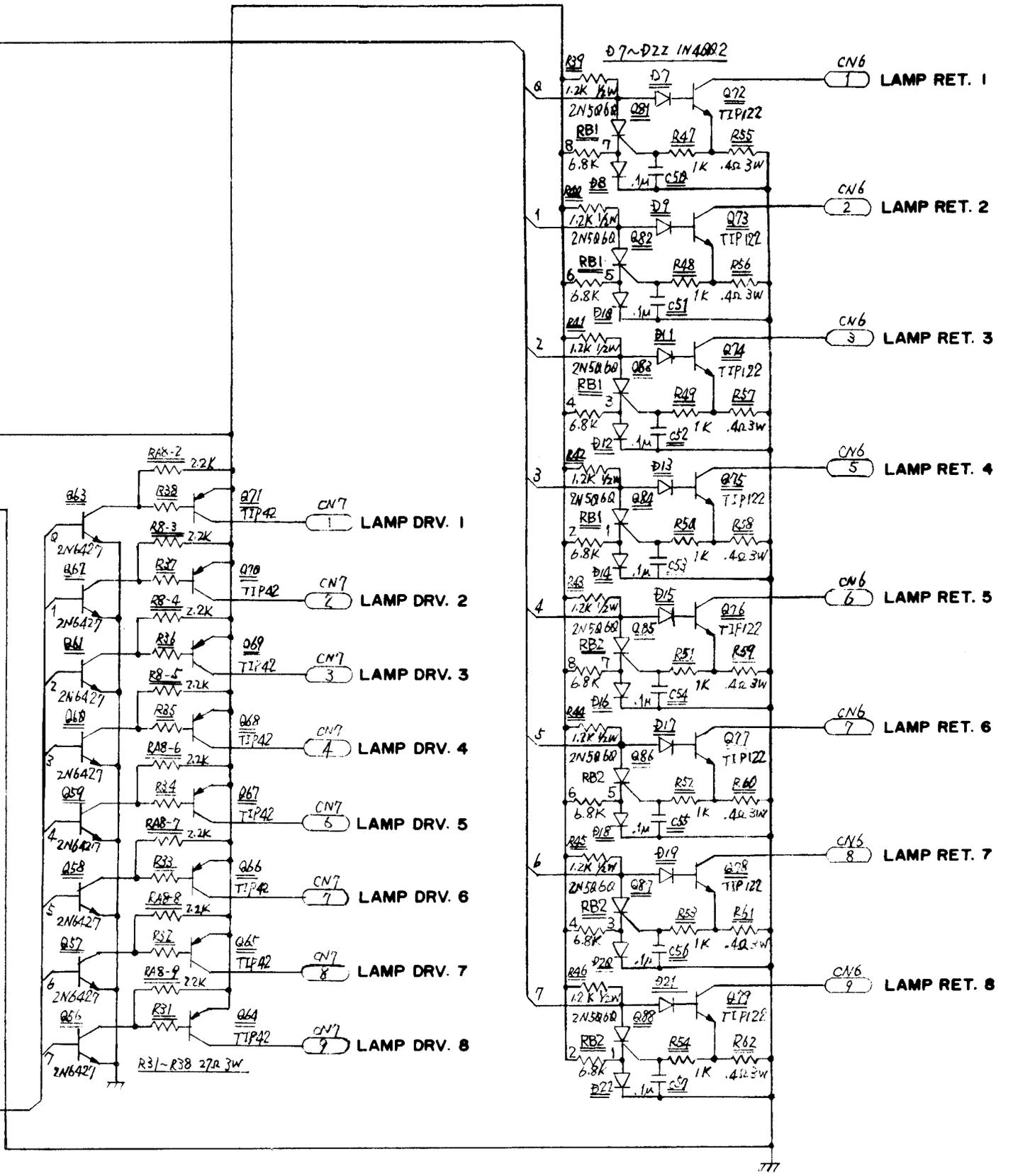
(1-1F) EN
(1-12G) BLANKING
(1-120) EN BLANKING

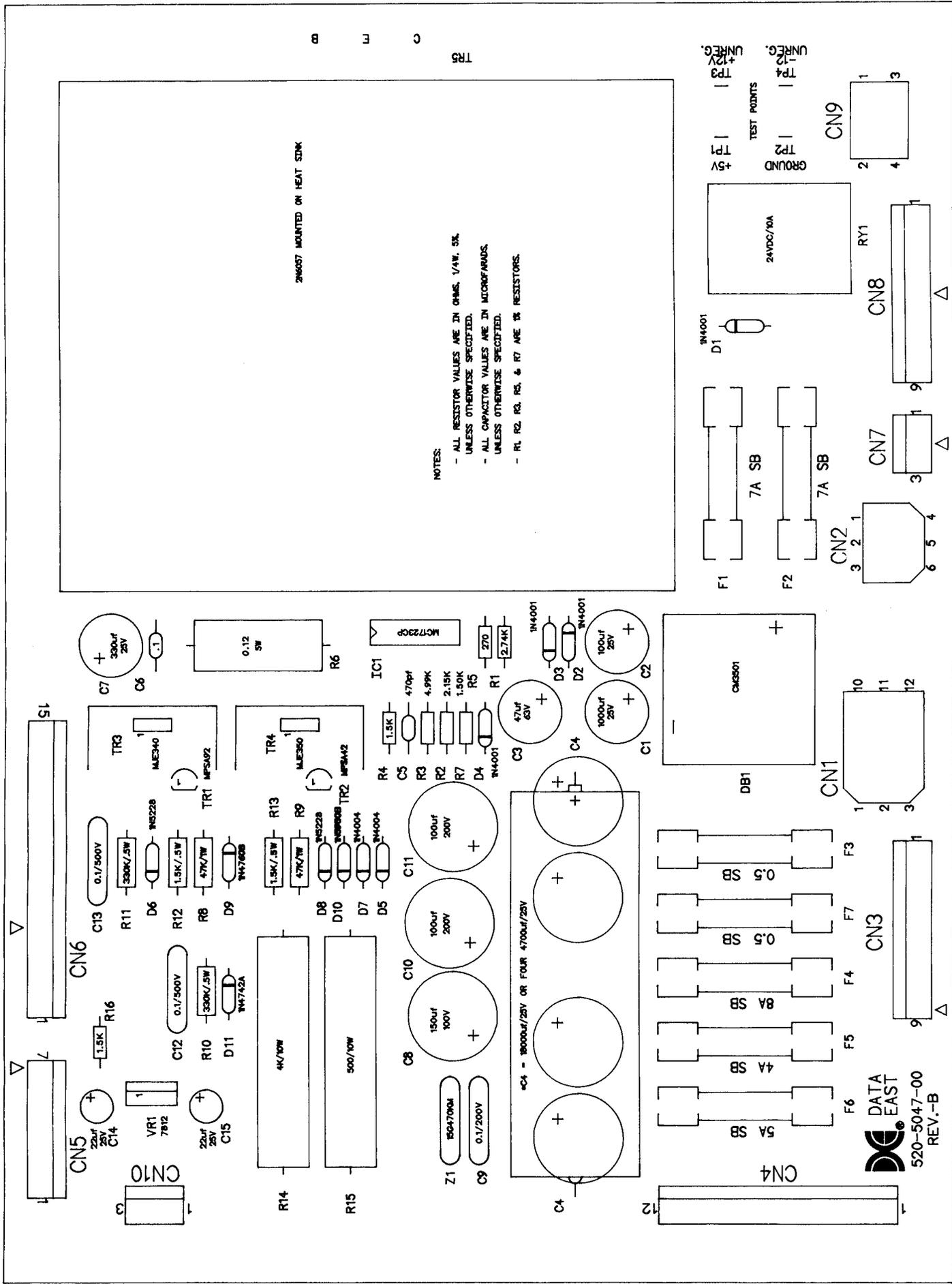
LAMP MATRIX CONT. 0-7

LAMP CNT (4-8A)



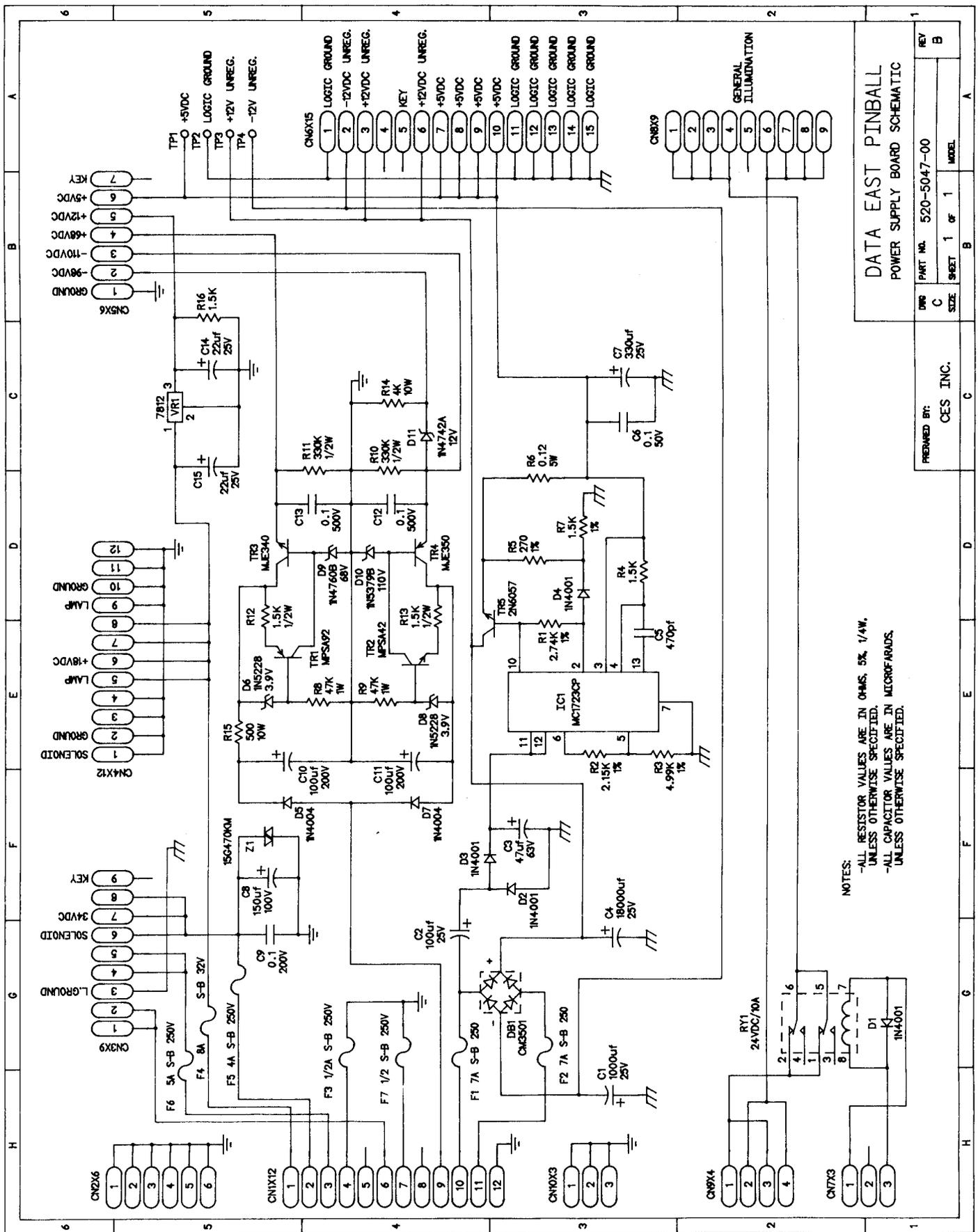






2N6057 MOUNTED ON HEAT SINK

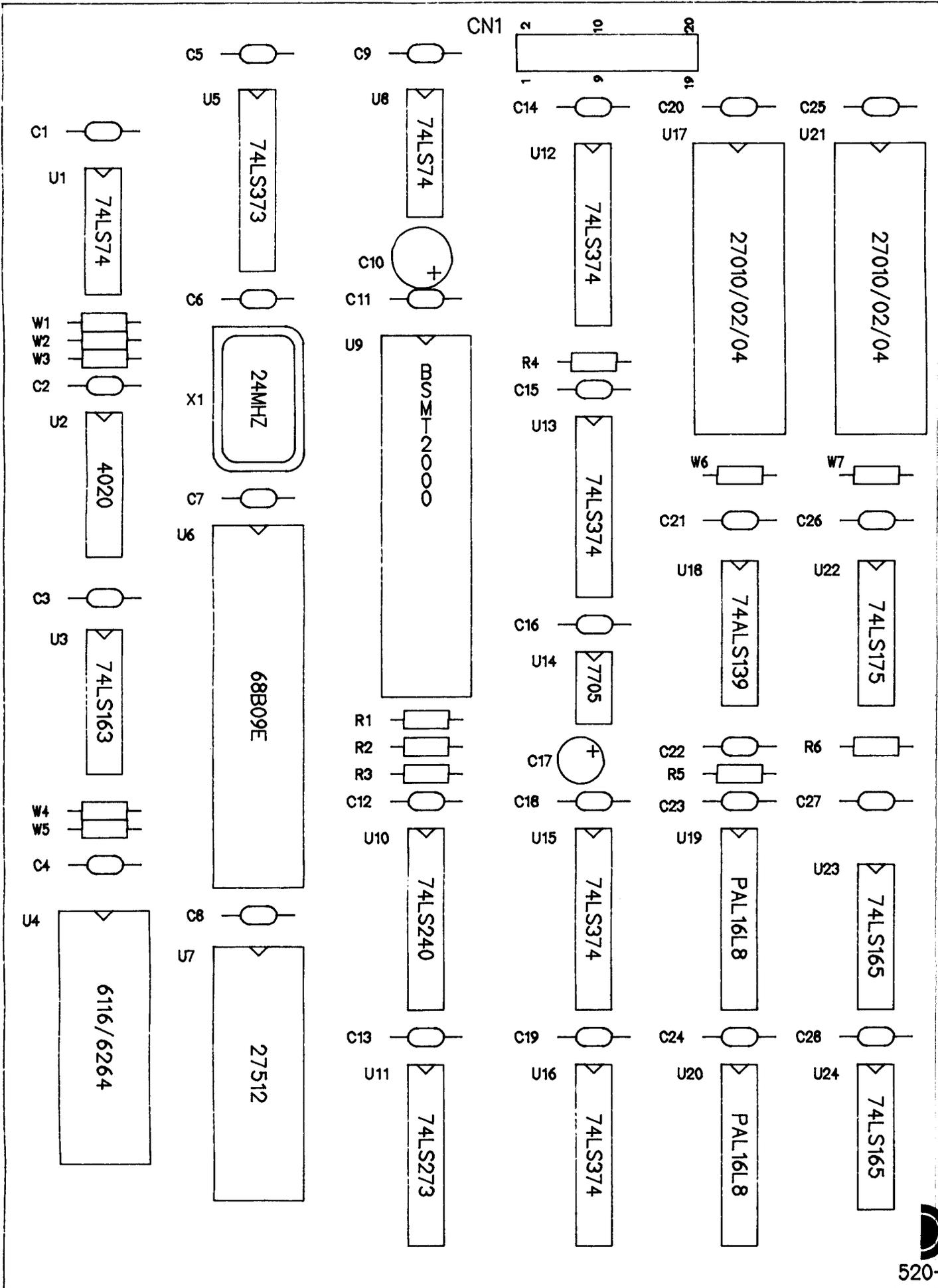
- NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
 - ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
 - R1, R2, R3, R5, & R7 ARE 1% RESISTORS.

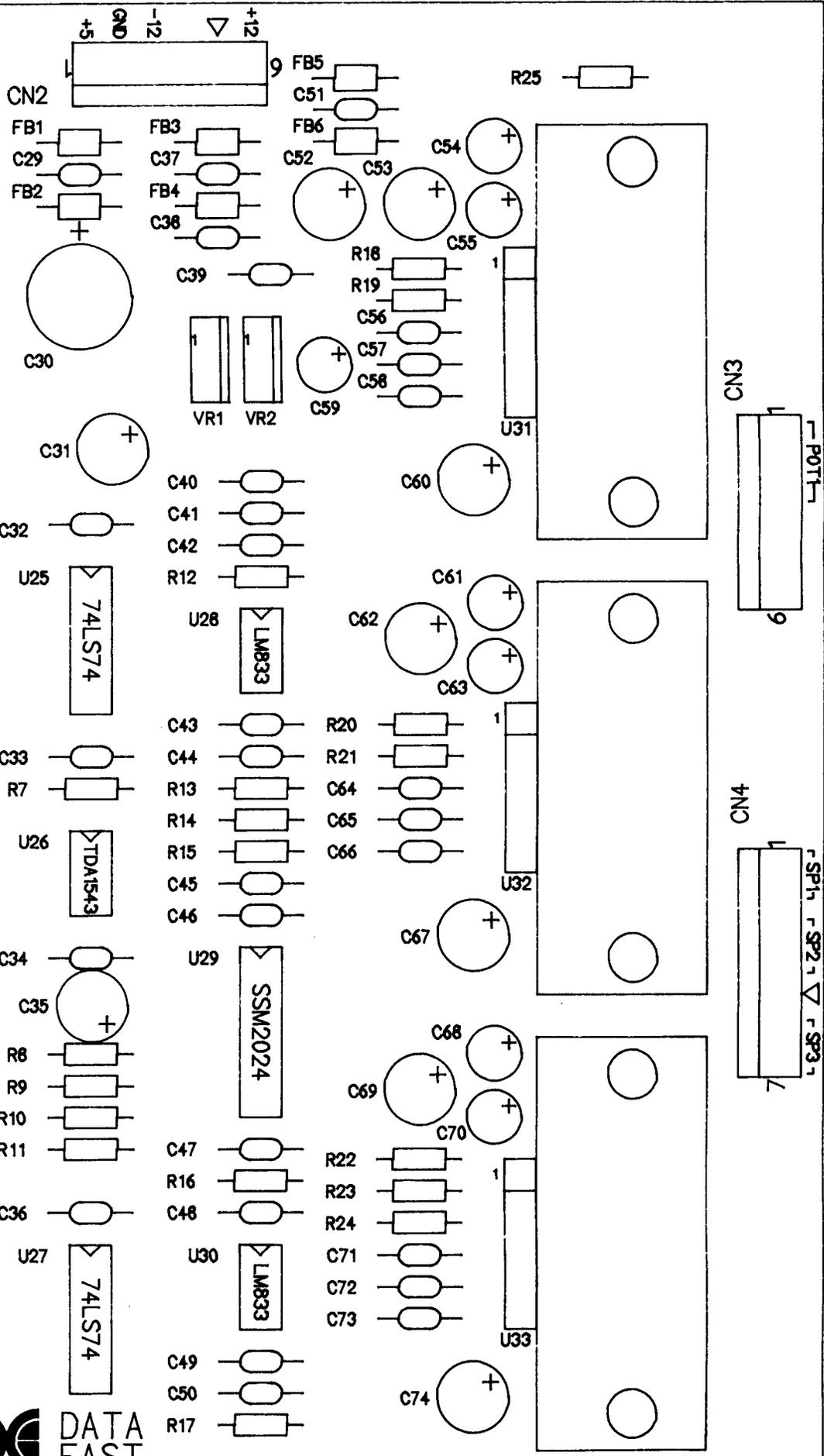


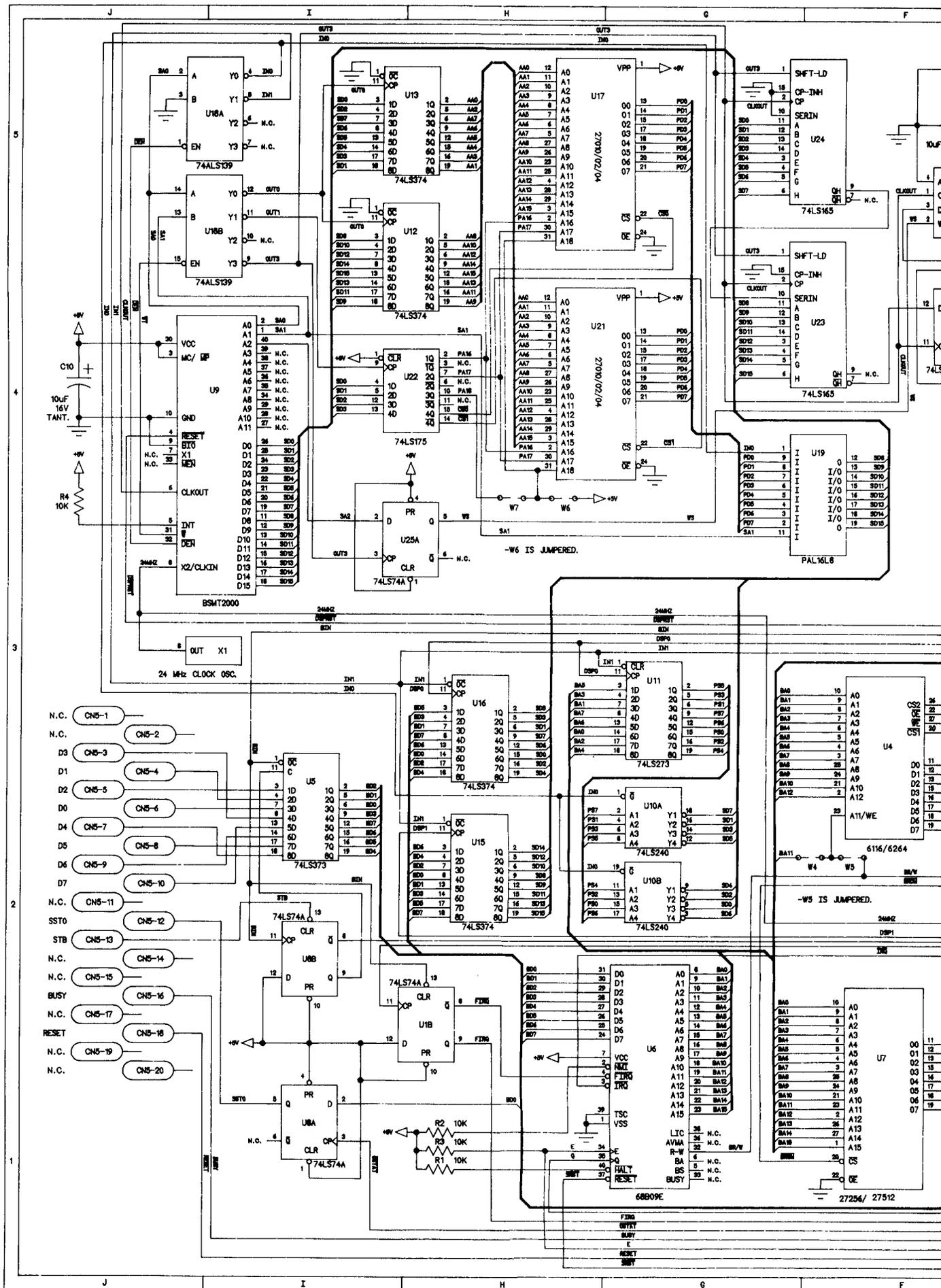
NOTES:
 -ALL RESISTOR VALUES ARE IN OHMS, 5%, 1/4W, UNLESS OTHERWISE SPECIFIED.
 -ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

DATA EAST PINBALL
 POWER SUPPLY BOARD SCHEMATIC

REV	B
PART NO.	520-5047-00
SHEET	1 OF 1
MODEL	
PREPARED BY:	CES INC.
DWG	C
SIZE	

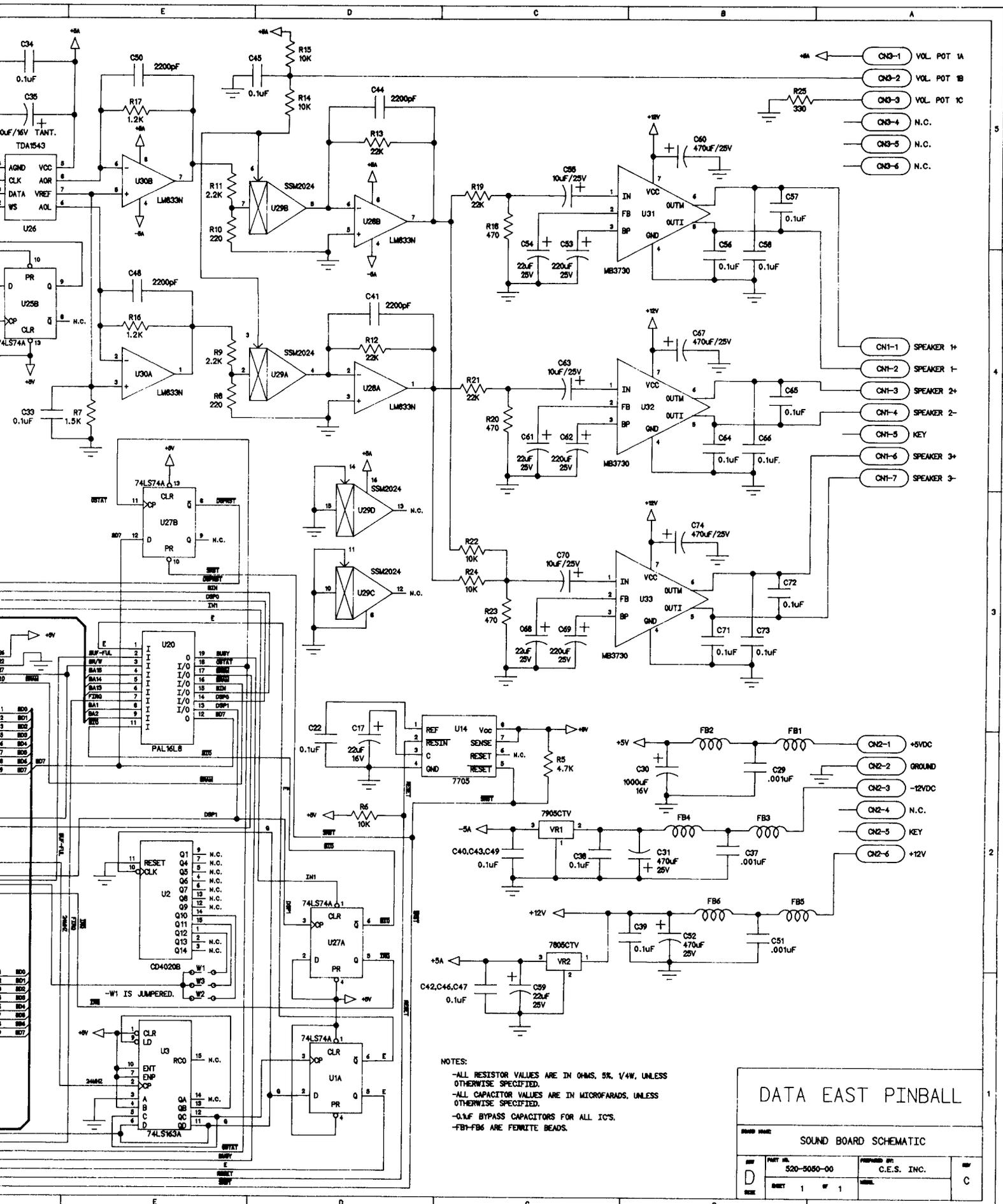






- N.C. CN5-1
- N.C. CN5-2
- D3 CN5-3
- D1 CN5-4
- D2 CN5-5
- D4 CN5-6
- D5 CN5-7
- D6 CN5-8
- D7 CN5-9
- D8 CN5-10
- N.C. CN5-11
- SST0 CN5-12
- STB CN5-13
- N.C. CN5-14
- N.C. CN5-15
- BUSY CN5-16
- N.C. CN5-17
- RESET CN5-18
- N.C. CN5-19
- N.C. CN5-20

FREQ
 BURY
 C
 RESET
 SHFT

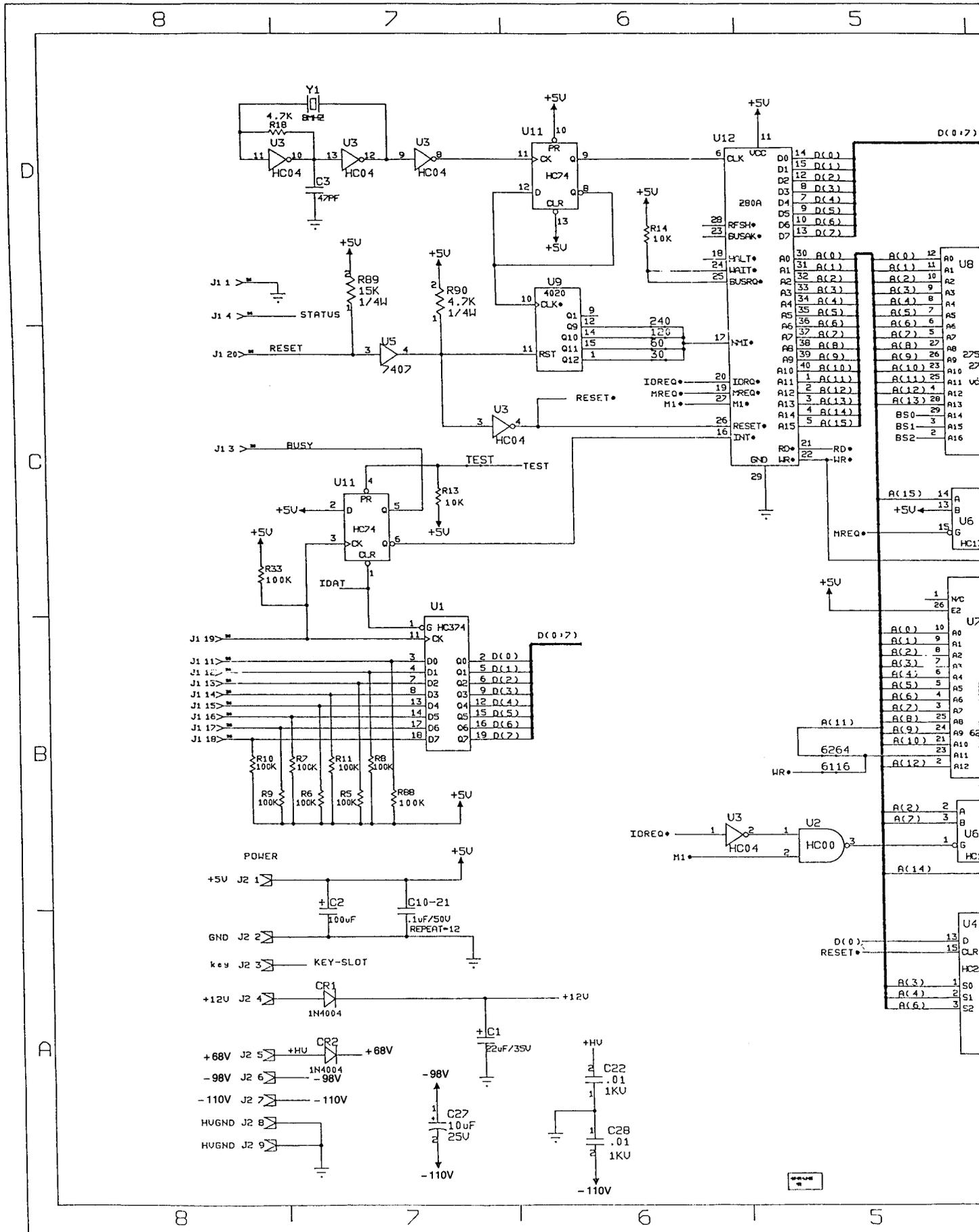


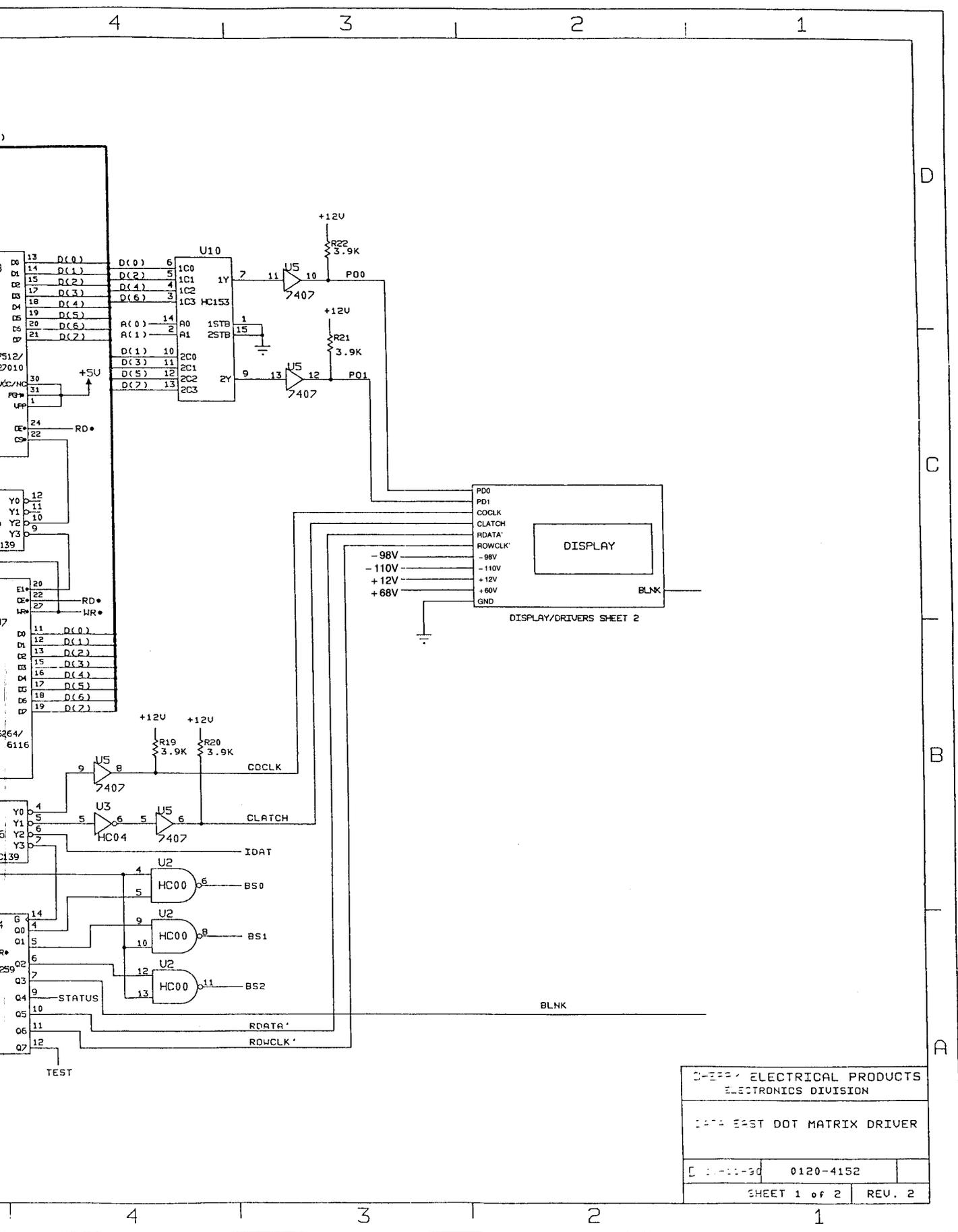
NOTES:
 -ALL RESISTOR VALUES ARE IN OHMS, 5%, 1/4W, UNLESS OTHERWISE SPECIFIED.
 -ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
 -0.1uF BYPASS CAPACITORS FOR ALL IC'S.
 -FB1-FB6 ARE FERRITE BEADS.

DATA EAST PINBALL

SOUND BOARD SCHEMATIC

REV	PART NO. 520-9050-00	PREPARED BY C.E.S. INC.	REV
D	SHEET 1 OF 1	DATE	C





0-128 EAST DOT MATRIX DRIVER

0120-4152

SHEET 1 of 2 REV. 2

8

7

6

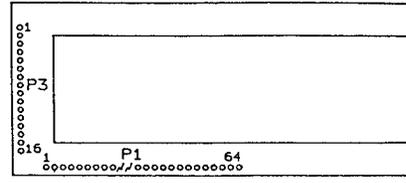
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D

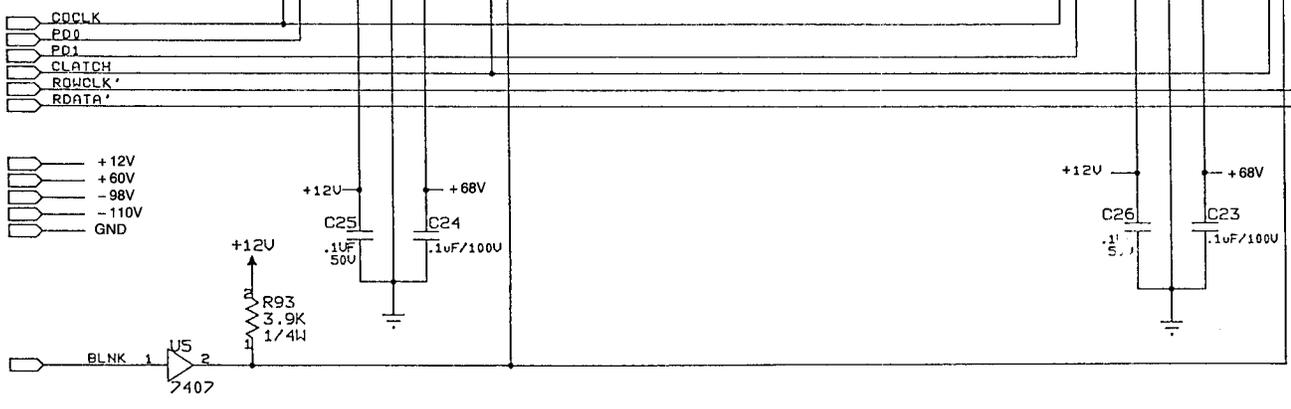
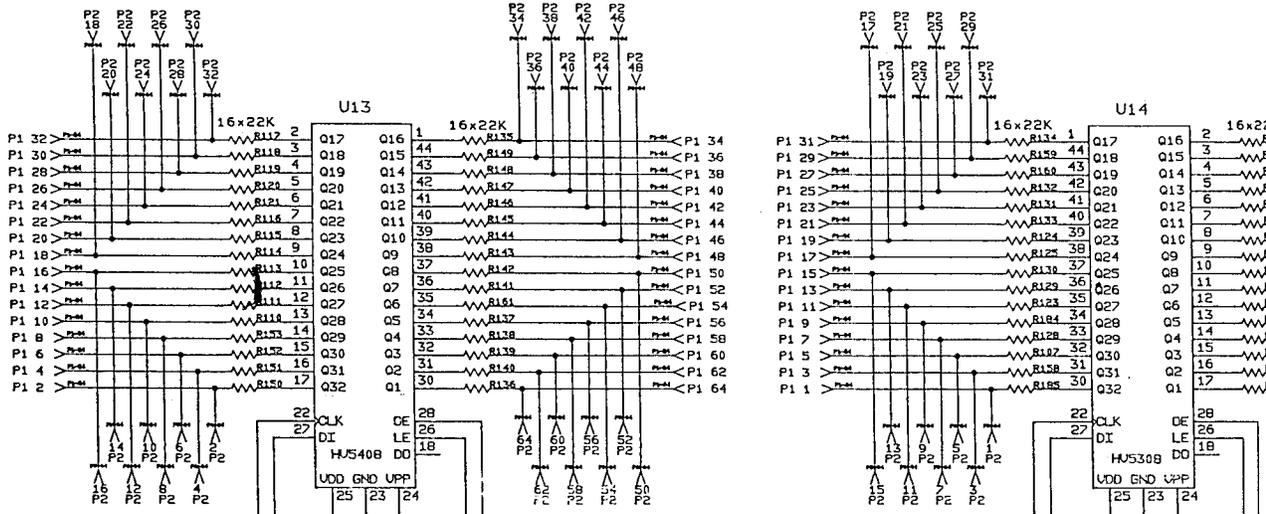
C

B

A



DISPLAY - GL

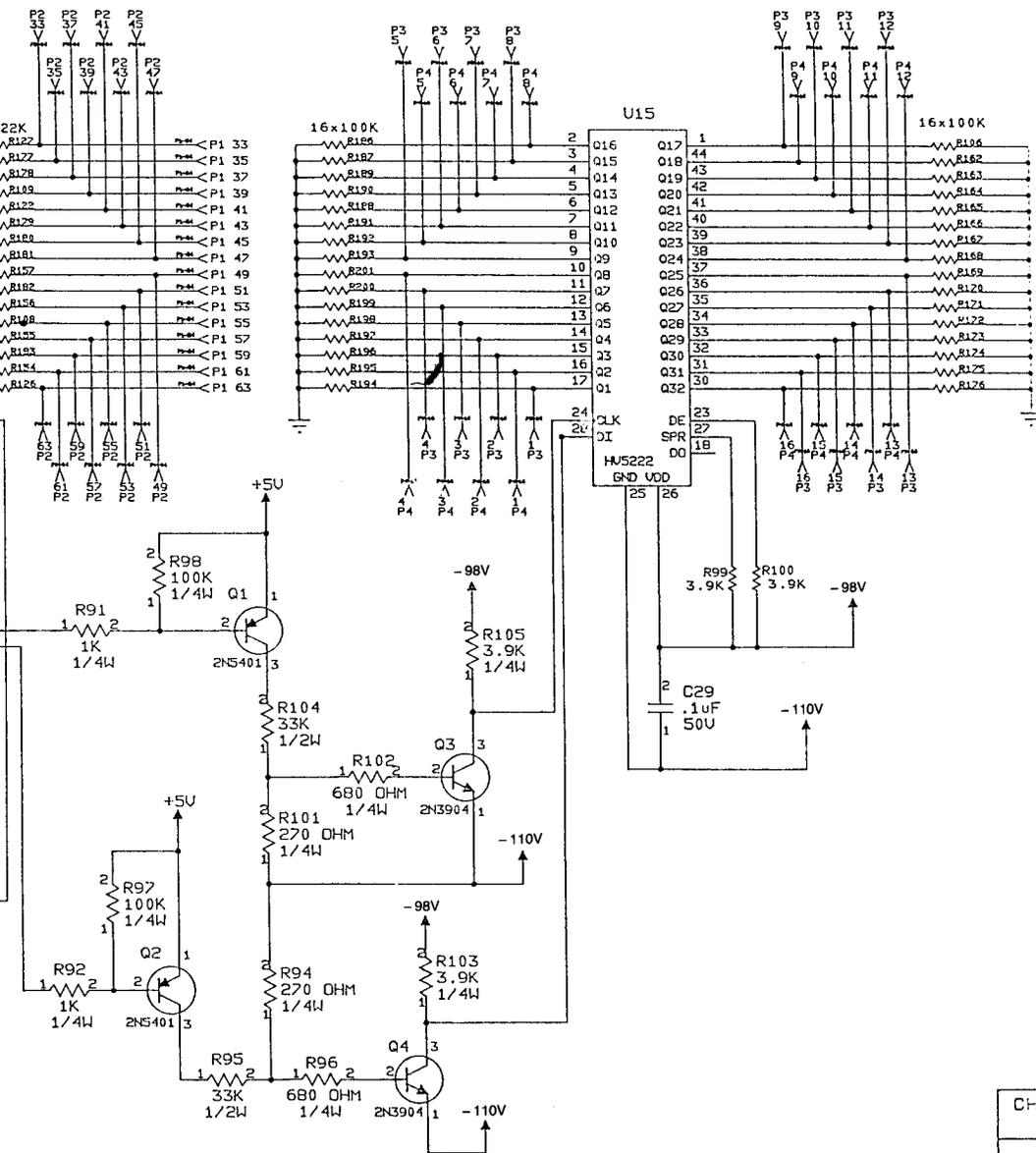
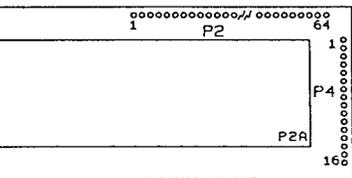


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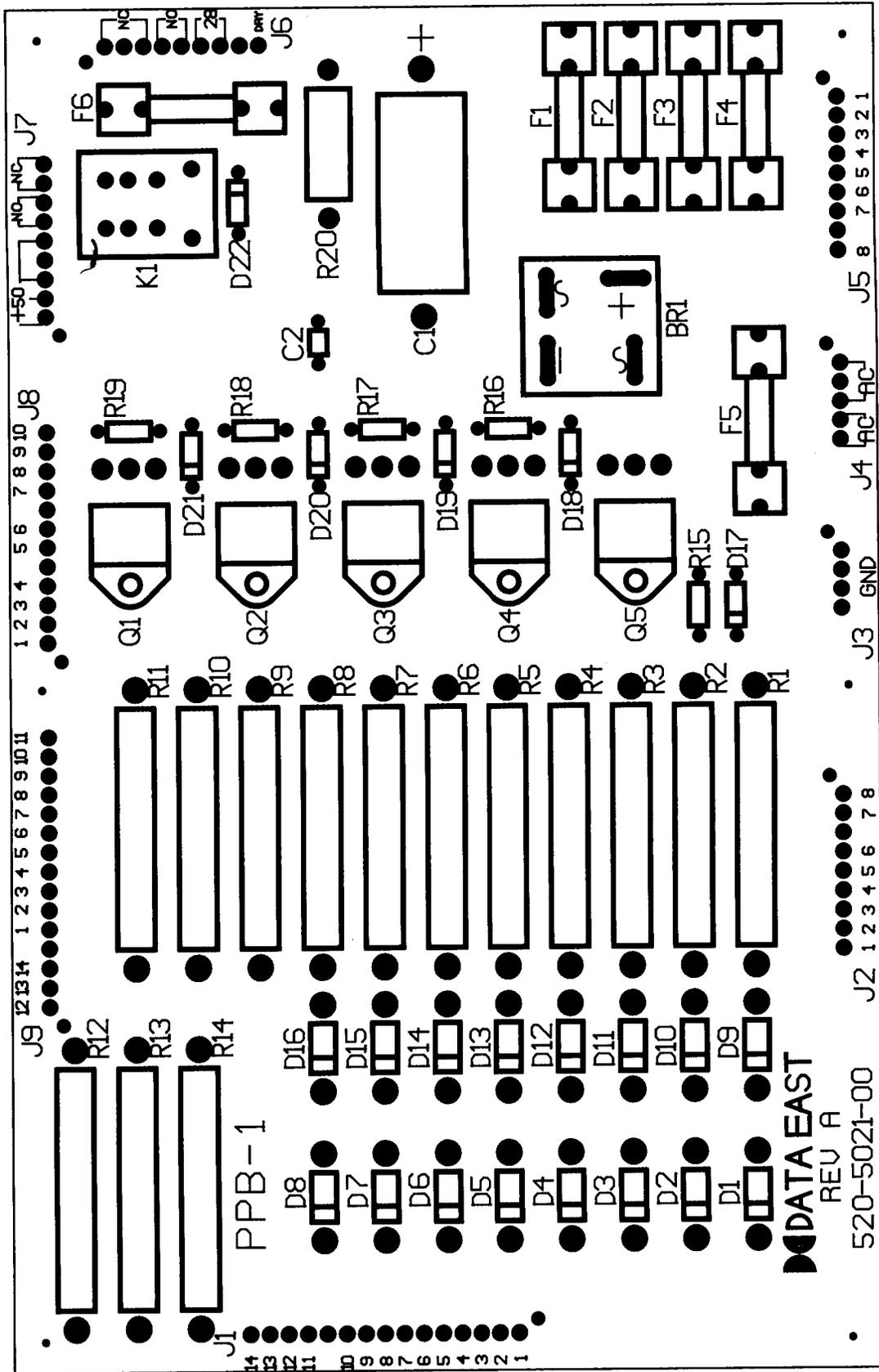
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2

1

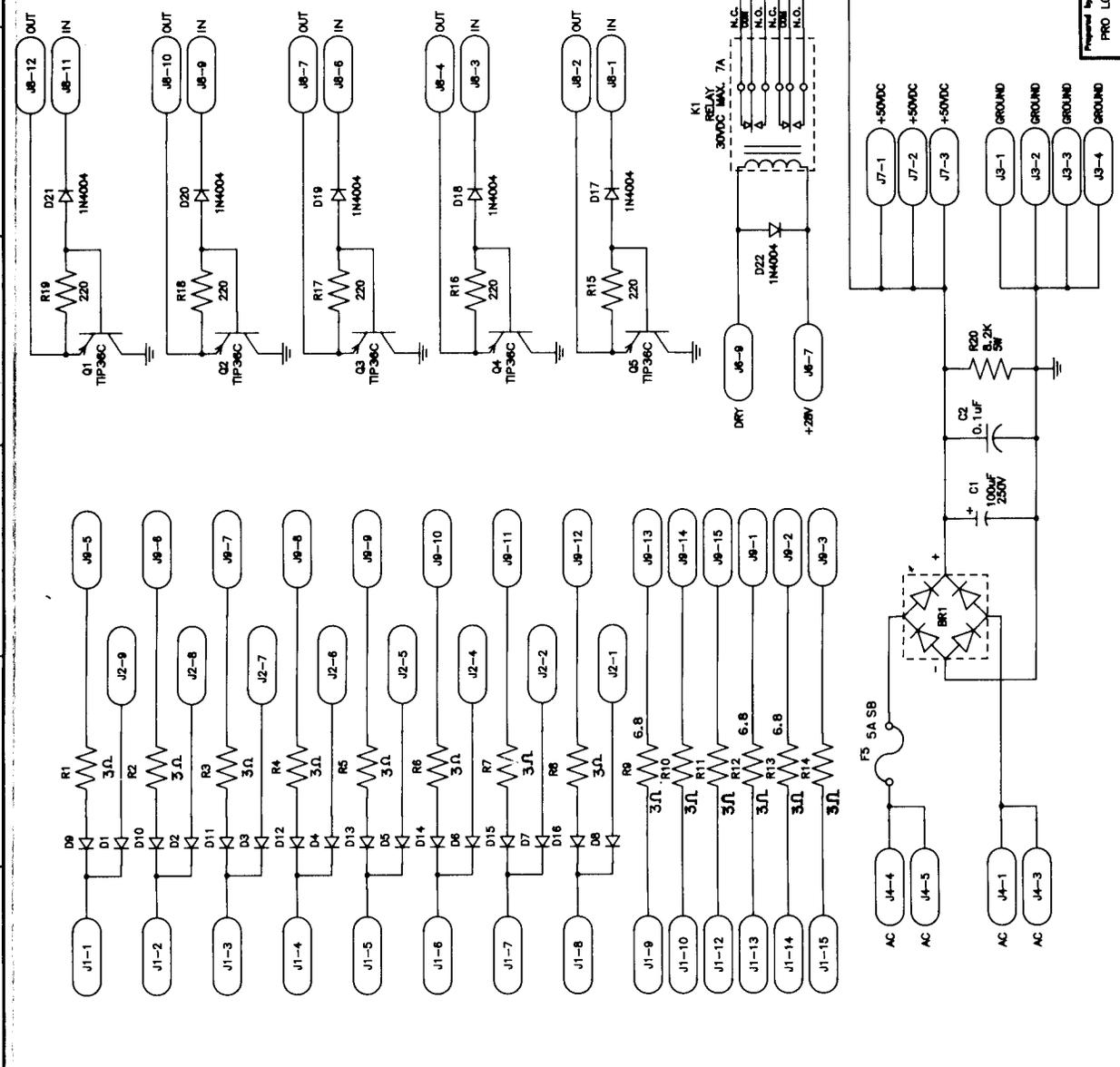


CHEFFY ELECTRICAL PRODUCTS ELECTRONICS DIVISION		
DATA EAST DOT MATRIX DISPLAY		
D	11-90	0120-4152
SHEET 2 of 2		REV. 2



G	F	E	D	C	B	A
---	---	---	---	---	---	---

REV	DESCRIPTION	DATE	APPROVED



DATE EAST	
REV	
PPB-1	

REV	DATE	APPROVED

REV	DATE	APPROVED

Prepared by: PRO LOGIC LTD.

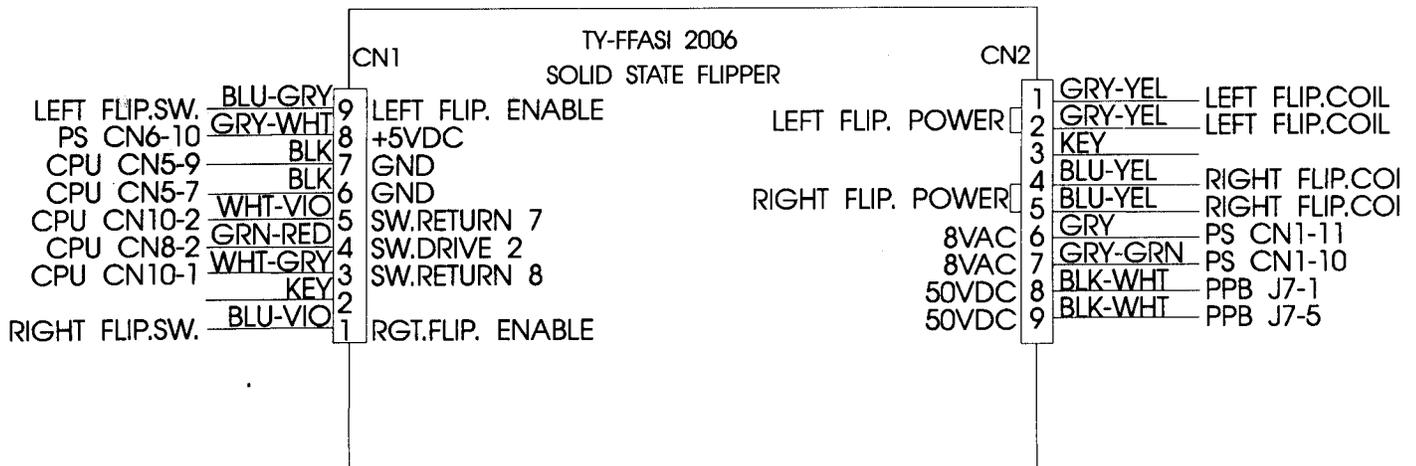


Theory of Operation for the Solid State Flippers

- 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.



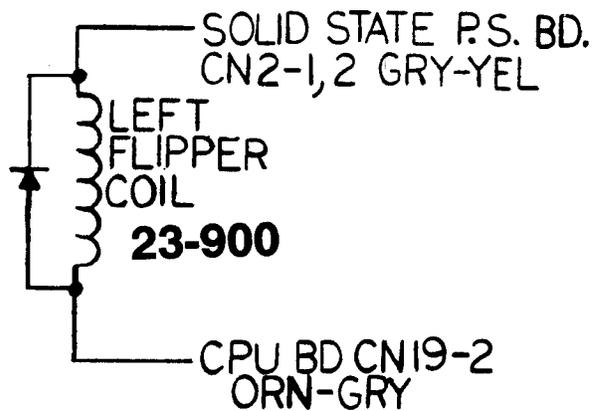
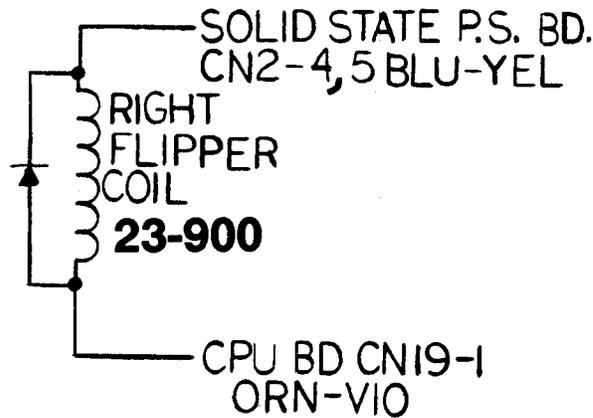
Solid State Flippers
PCB Wiring Diagram

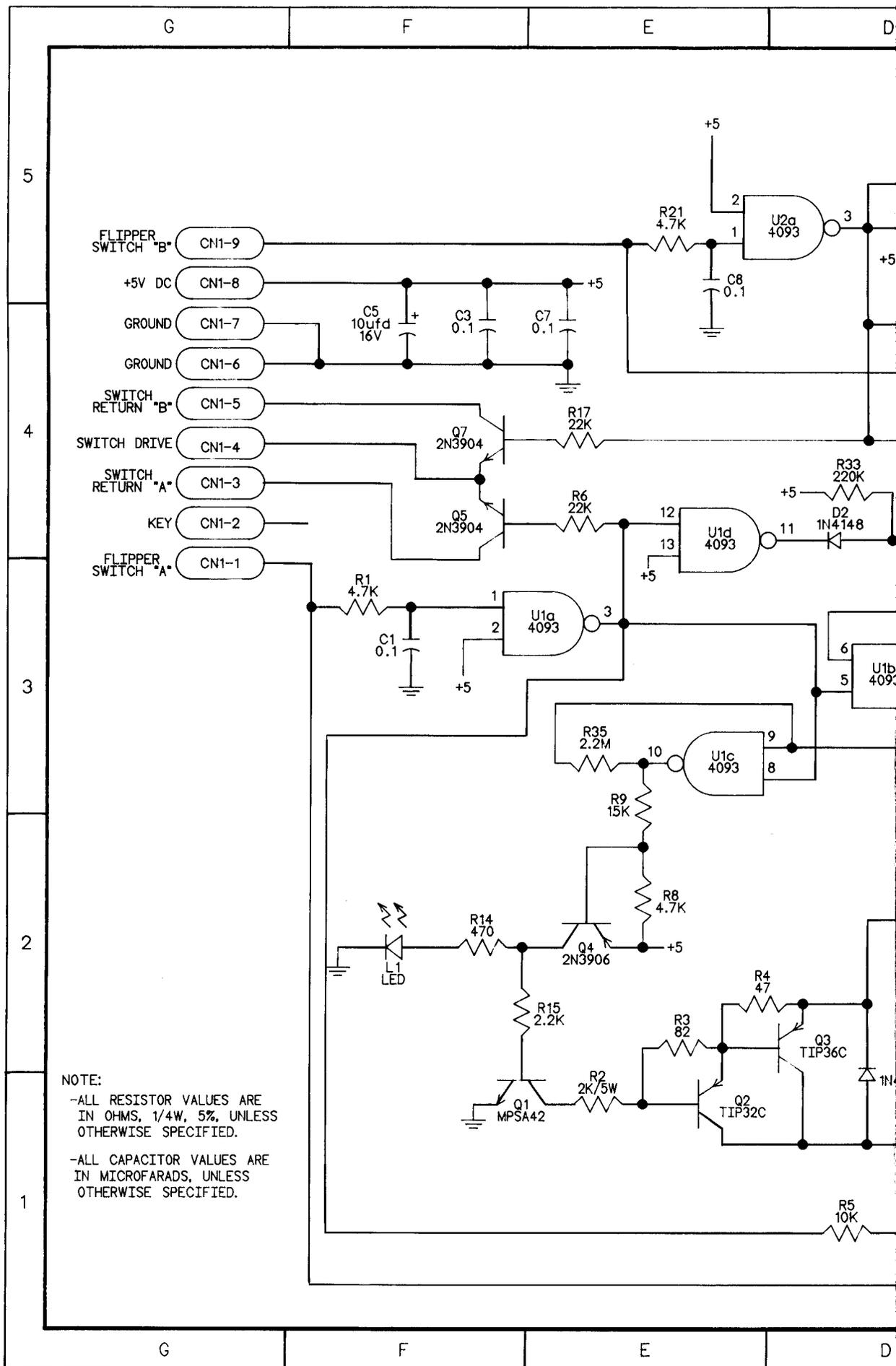
Connector CN 1

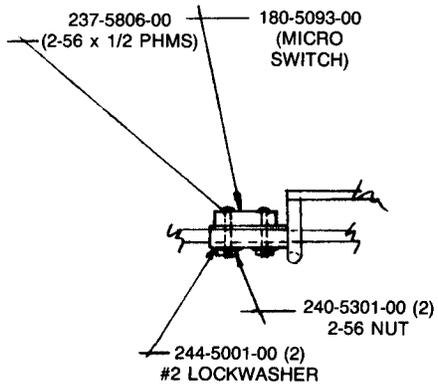
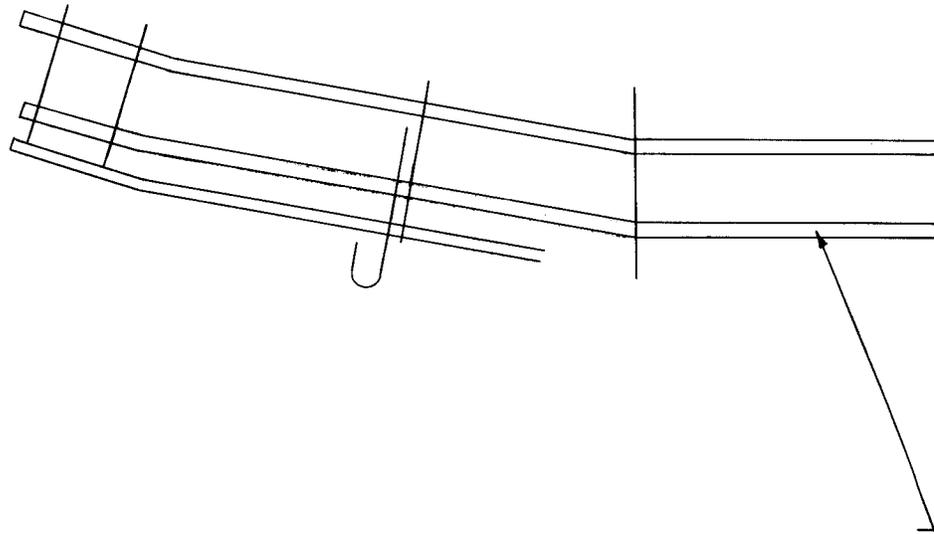
Pin #	Goes To	Wire Color	It Is
1	Rgt. Flipper Sw.	BLU-VIO	RGT. FLIP ENABLE
2			KEY
3	CPU CN10-1	WHT-GRY	SW. RET 8
4	CPU CN8-2	GRN-RED	SW. DRV 2
5	CPU CN10-2	WHT-VIO	SW. RET 7
6	CPU CN5-7	BLK	GND
7	CPU CN5-9	BLK	GND
8	PS CN6-10	GRY-WHT	+5VDC
9	Lft. Flipper Sw.	BLU-GRY	LFT. FLIP ENABLE

Connector CN 2

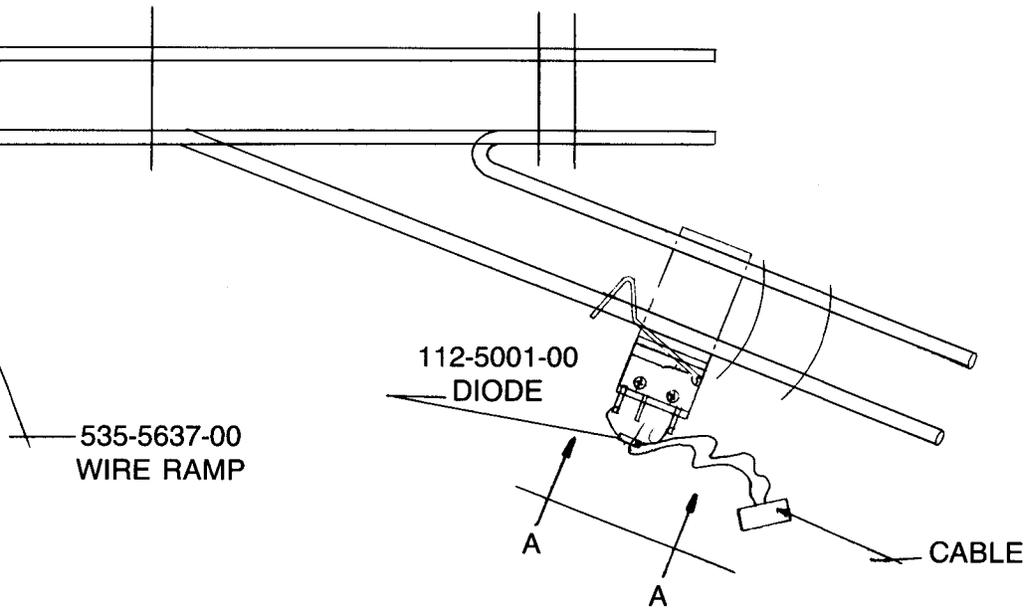
Pin #	Goes To	Wire Color	It Is
1	Lft. Flip Coil	GRY-YEL	LFT. FLIP POWER
2	"" "" "" ""	"" "" "" ""	"" "" "" ""
3			KEY
4	Rgt. Flip Coil	BLU-YEL	RGT. FLIP POWER
5	"" "" "" ""	"" "" "" ""	"" "" "" ""
6	PS CN1-11	GRY	9 VAC
7	PS CN1-10	GRY-GRN	9 VAC
8	PPB J7-1	BLK-WHT	50 VDC
9	PPB J7-5	BLK-WHT	50 VDC



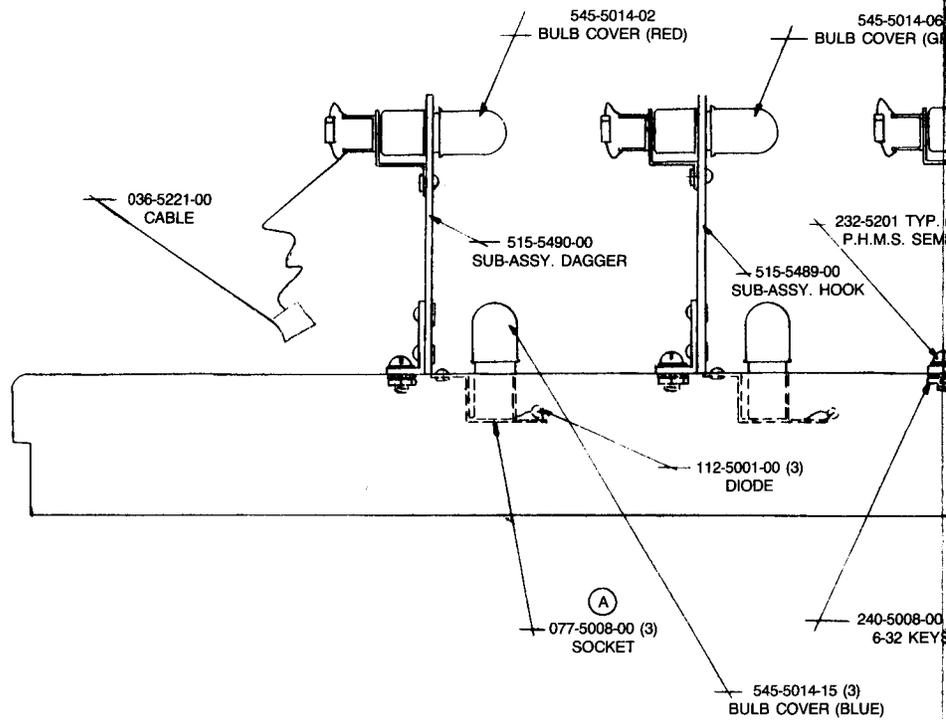
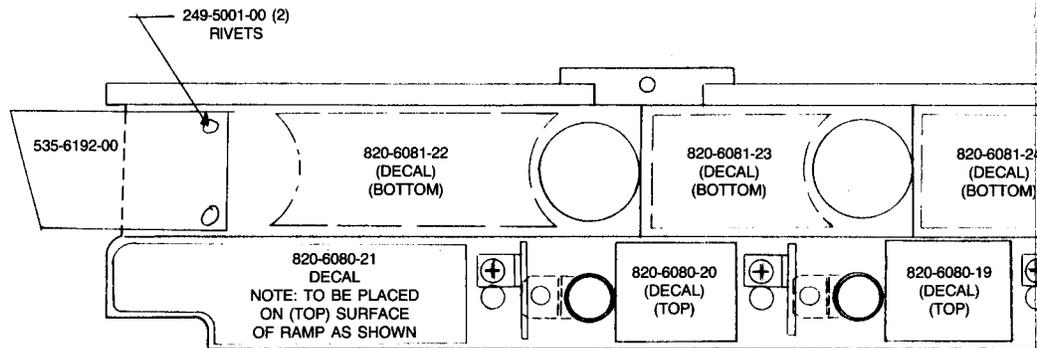


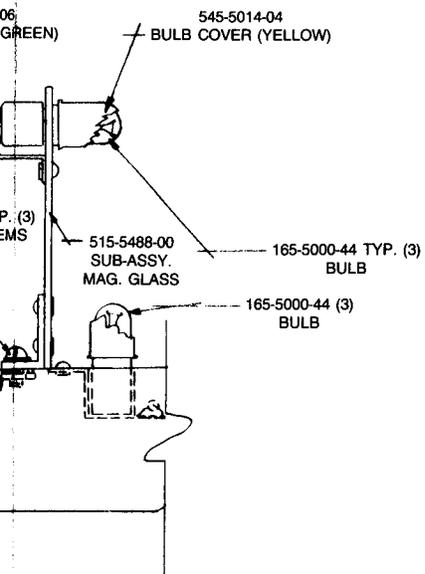
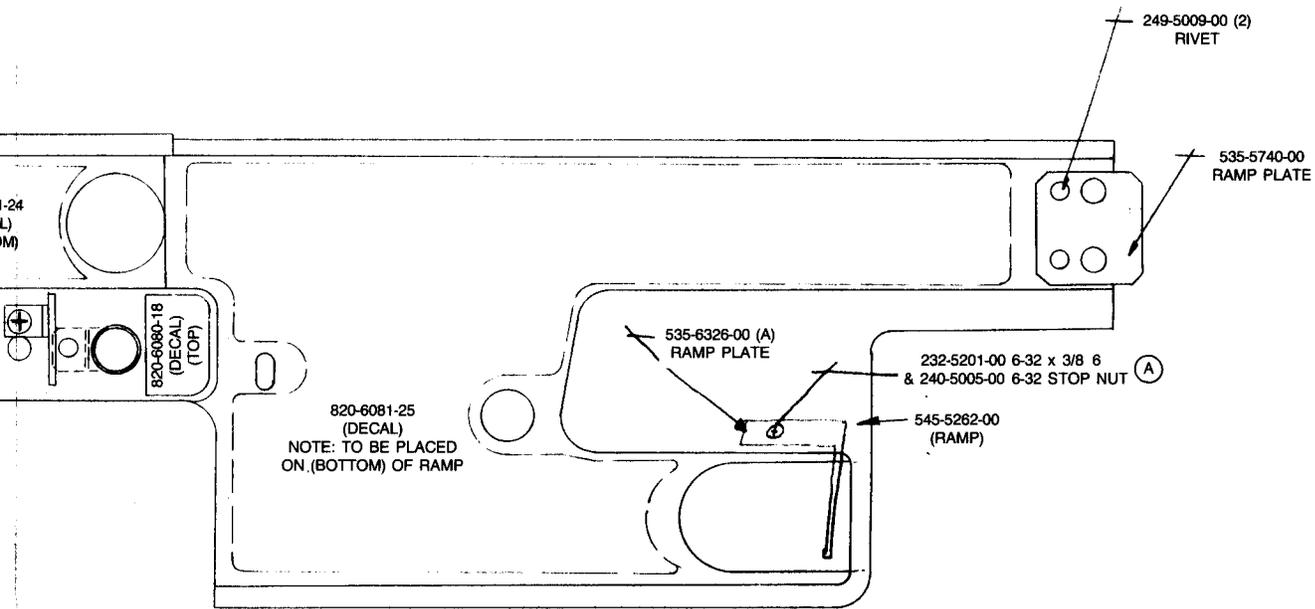


DETAIL A-A
SCALE: FULL



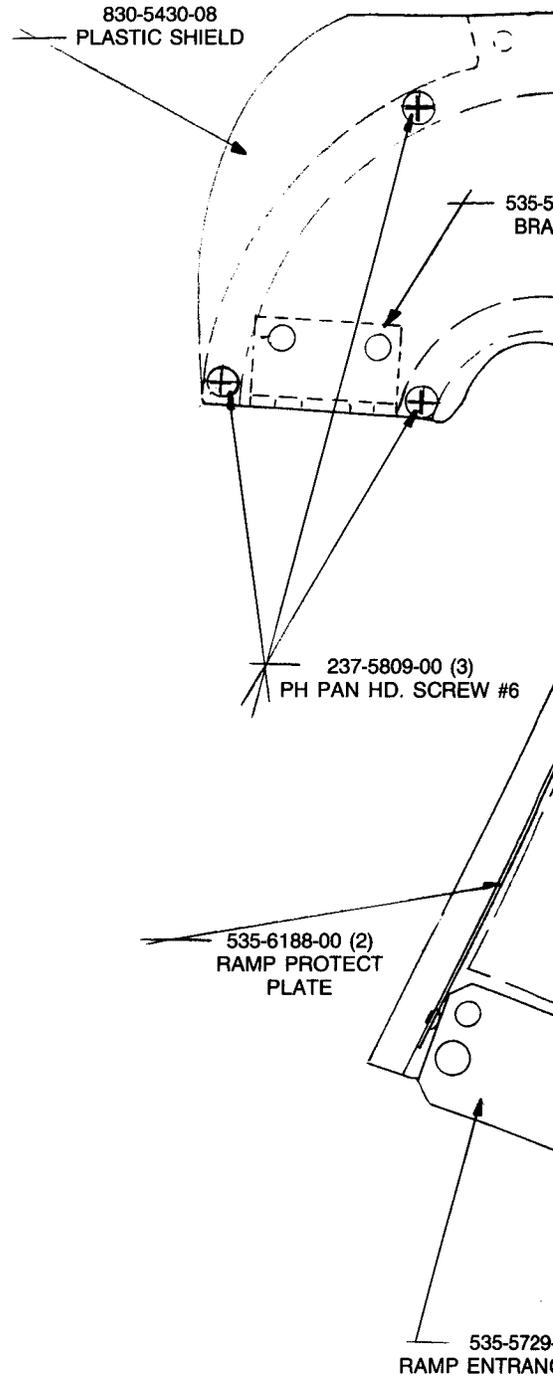
DATA EAST PINBALL		
SCALE: FULL	APPROVED BY: <i>[Signature]</i>	DRAWN BY: <i>[Signature]</i>
DATE: 8-15-91		
WIRE RAMP ASSY		
		DRAWING NUMBER SIS-SSIS-CV



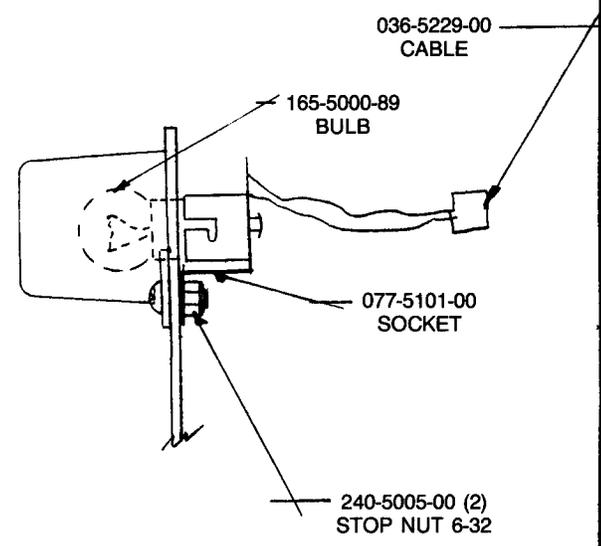
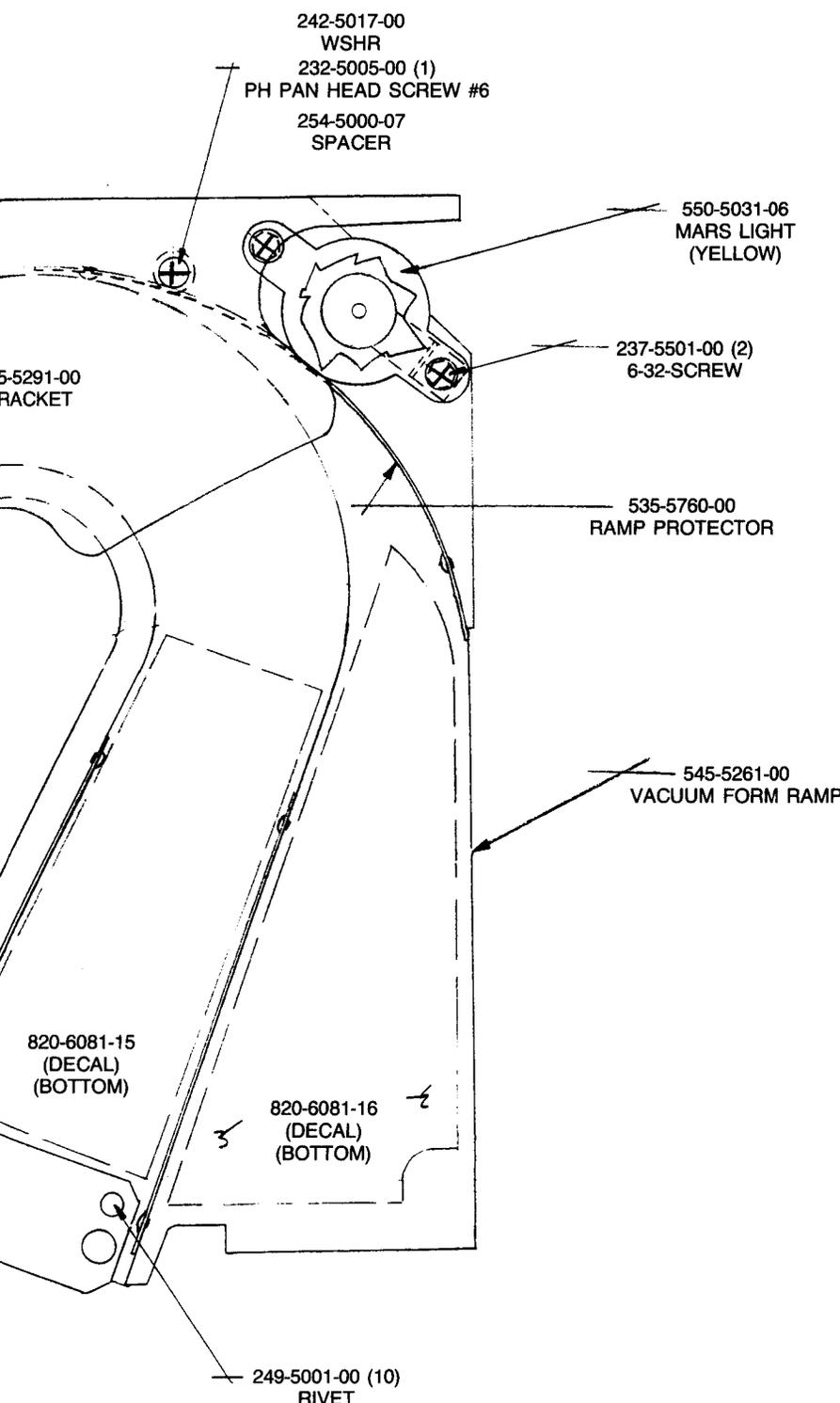


00 (3)
EYS

6053	B	ADDED (1) 535-6192-00 (2) 249-5001-00	12-17-91	DATA EAST PINBALL	
6053	A	ADDED 535-6326-00 PLATE ADDED 232-5201-00 SCREW ADDED 240-5005-00 NUT 077-5008-00 (WAS 077-5008-00)	12-23-91	SCALE: FULL DATE: 12-6-91	APPROVED BY: [Signature] DRAWN BY: TWS
EGN	REV	DESC.	DATE	DRAWING NUMBER 53-5520-00	



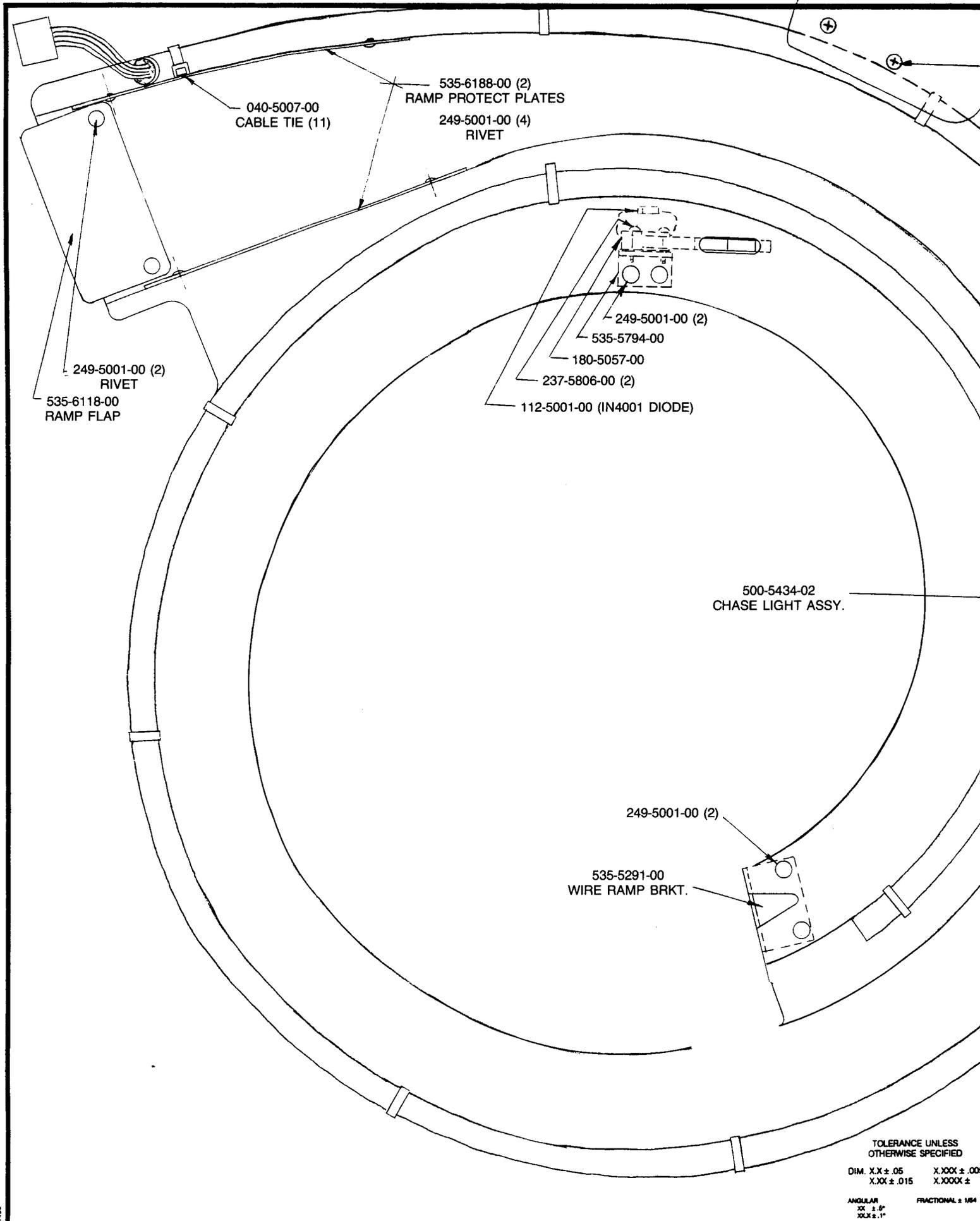
ECN.	REV	DESCRIPTION	BY	DATE	APP
	A	535-6192-00 ADDED	JWS	10-7-91	
6053	B	DELETED 237-5003-00 254-5000-01 535-6192-00 4(2)249-5001-00	JB	12-17-91	



29-00
FINANCE PLATE

TOLERANCE UNLESS OTHERWISE SPECIFIED
 DIM. XX ± .05 X.XXX ± .005
 X.XX ± .015 X.XXXX ±
 ANGULAR FRACTIONAL ± 1/64
 °X ± .5°
 °XX ± .1°

REQ.	NEXT ASSEM.	DWN TWS	DATE 8-6-91	TITLE TOP RIGHT RAMP ASSY
MAT.		CHKD JB	SCALE FULL	
H.T.	DE DATA EAST PINBALL, INC.			PART NO. 515-5519-00
FIN.	1990 JANICE AVE., MELROSE PARK, IL. 60160			

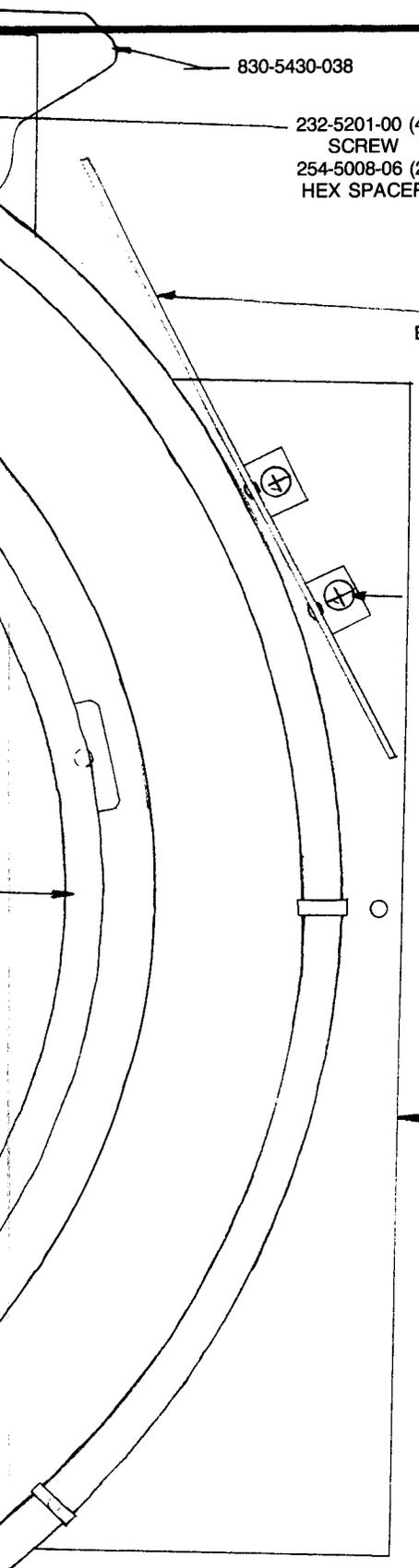


TOLERANCE UNLESS OTHERWISE SPECIFIED

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

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

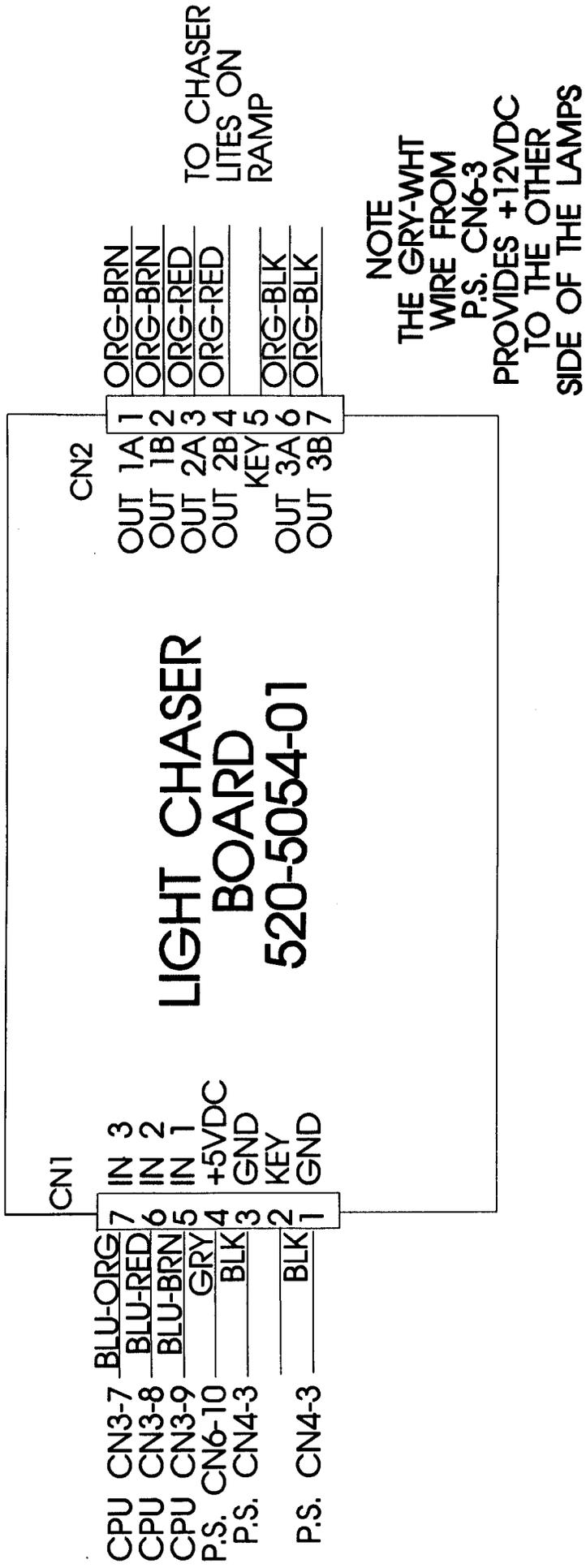
53148



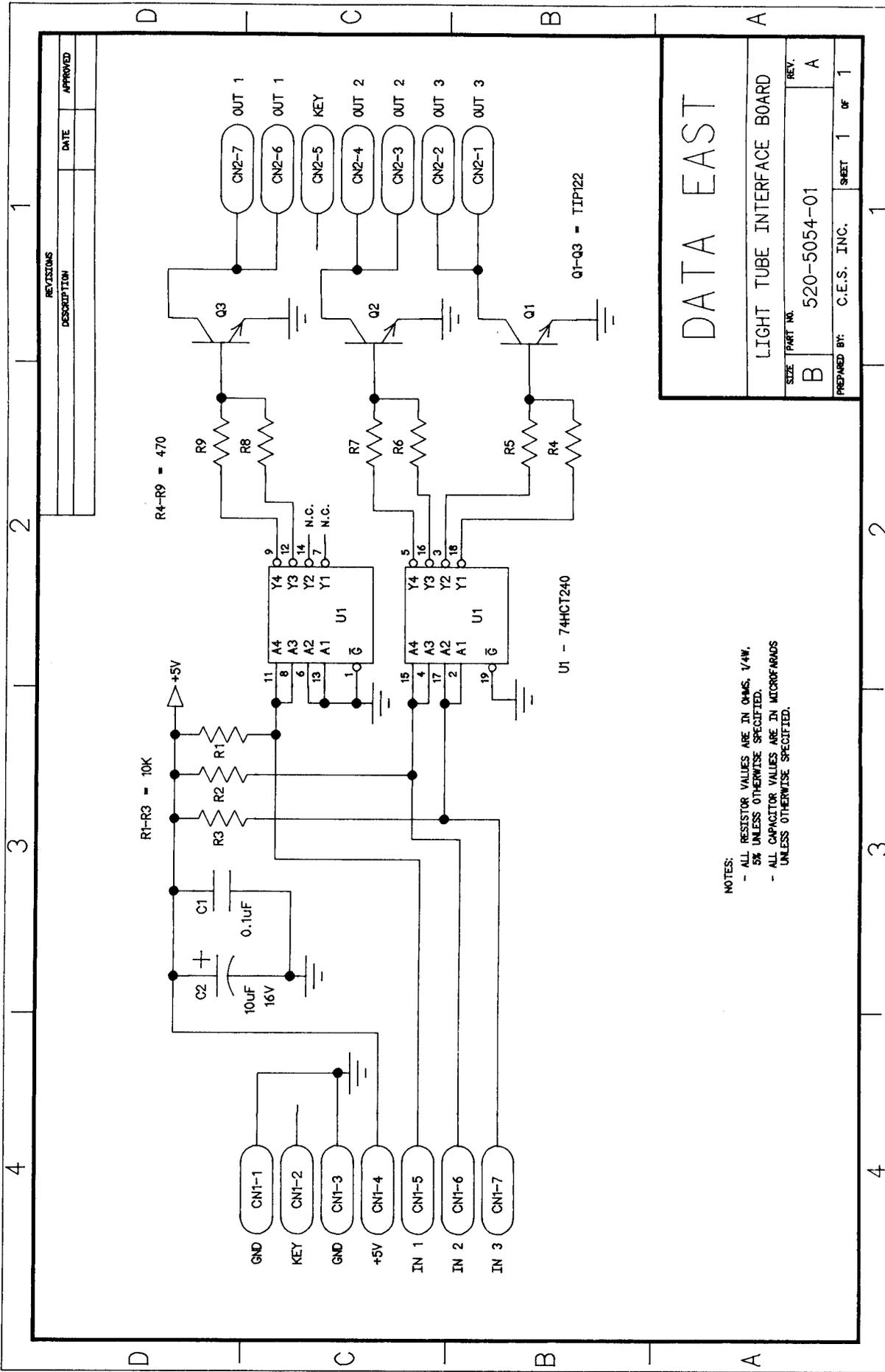
REV	DESCRIPTION	BY	DATE	APP
A	535-6188-00(2) + 249-5001-00(4) ADDED.	TWS	10/1/91	
B	CHANGE FROM RIVETS TO SCREW	TWS	1/6/92	

REQ.	NEXT ASSEM.	DWN.	DATE	TITLE
1		TWS	8.9.91	CIRCULAR RAMP ASSY
MAT.		CHKD.	SCALE	
			Full	
H.T.	DATA EAST PINBALL, INC.			PART NO.
FIN.	1990 JANICE AVE., MELROSE PARK, IL. 60160			515-5522-00

LIGHT CHASER BOARD 520-5054-01



NOTE
 THE GRY-WHT
 WIRE FROM
 P.S. CN6-3
 PROVIDES +12VDC
 TO THE OTHER
 SIDE OF THE LAMPS



REVISIONS	DATE	APPROVED
DESCRIPTION		

DATA EAST

LIGHT TUBE INTERFACE BOARD

SIZE	520-5054-01	REV.	A
PART NO.			
PREPARED BY:	C.E.S. INC.	SHEET	1 OF 1

- NOTES:
- ALL RESISTOR VALUES ARE IN OHMS. 1/4W.
 - 5% UNLESS OTHERWISE SPECIFIED.
 - ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

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.