

TEENAGE

MUTANT

NINJA



TURTLES

DATA EAST PINBALL®

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CPU JUMPER TABLE

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

*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 4A 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 5B, 5C

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

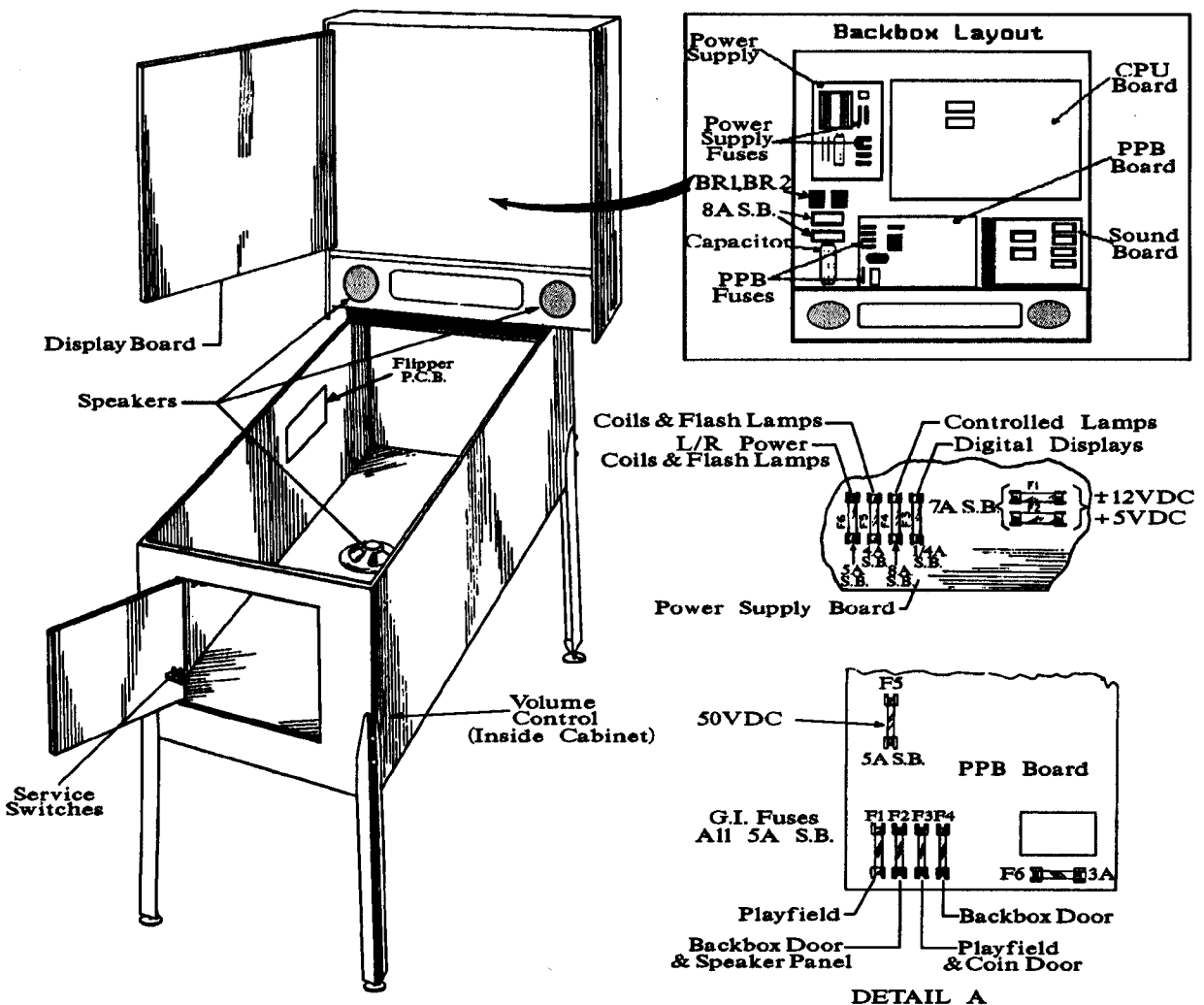
Display Board: Location U8

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 rear leg 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

Bodacious Skill Shots

From Plunger (1) Shoot Ramps (2) or (3) or both for 250K X Ball in Play per Ramp

Multiball

3 Ball can be obtained by completing three Turtle Spot Target Banks (4) followed by shooting Sewer hole (5).

At this point, Ninja Kicker (2) will automatically send 2 more balls to the playfield. The ball shot into the hole(5) will come out of the Sewer (17).

If one of the three balls drains, shoot hole (5) and the lost ball will be returned by the Ninja Kicker (2).

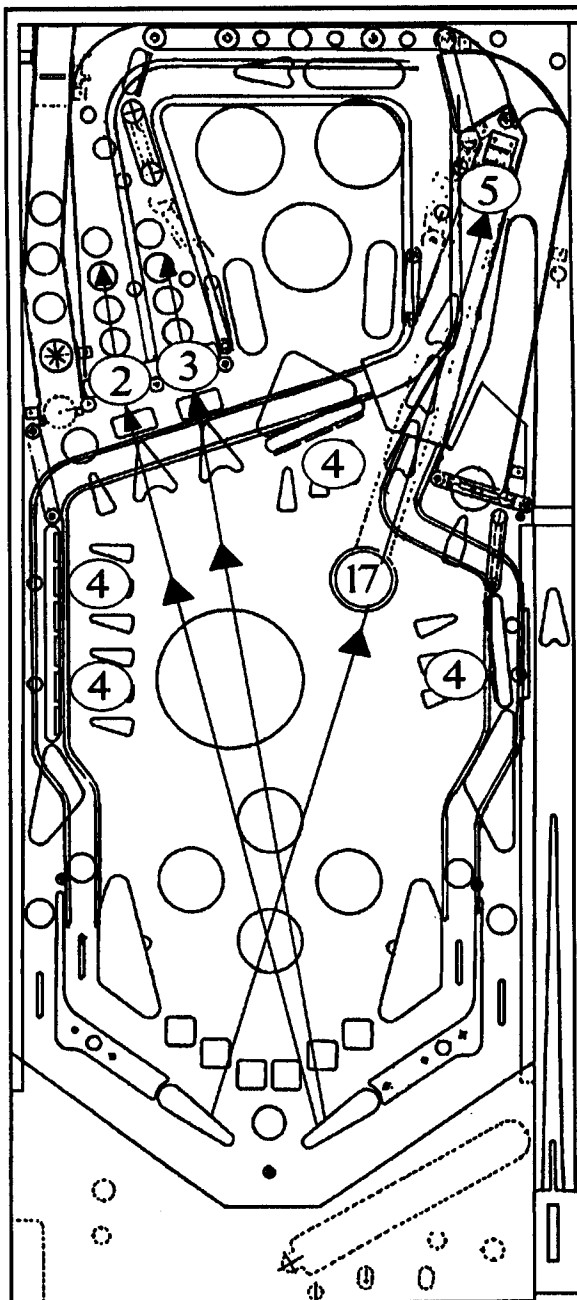
For 2nd, 3rd etc. Multiball the player will be required to complete four Turtle Spot Target Banks (4).

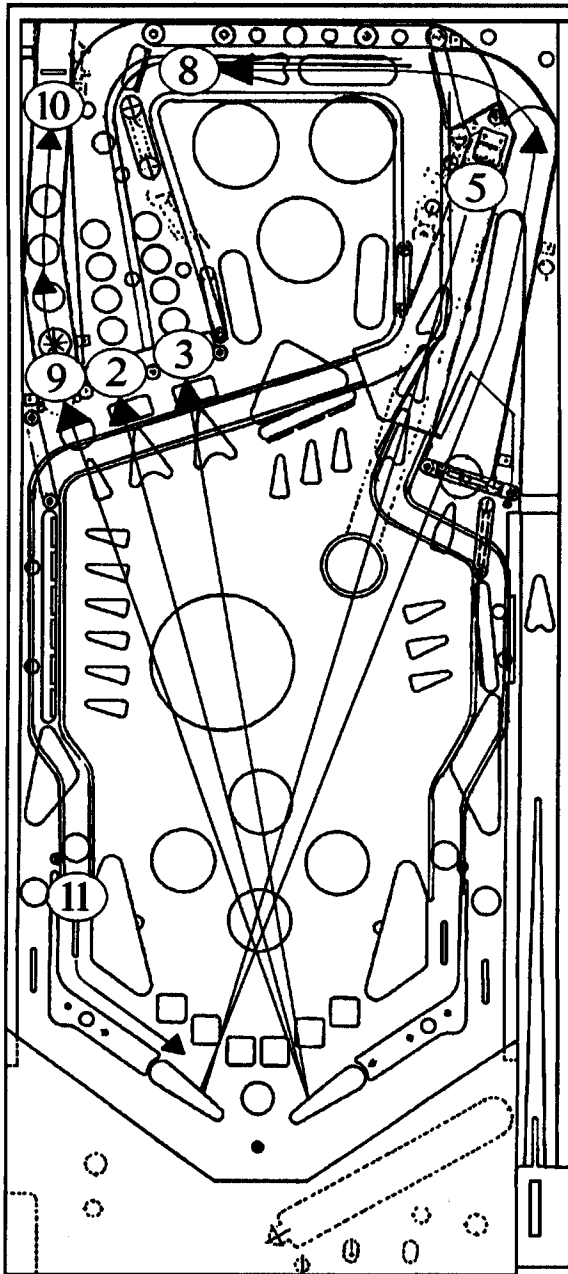
Jackpot

Once the player achieves 3 Ball Multiball, a shot into hole (5) will light Ramps (2) and (3) for two separate Jackpots. If both are collected, Jackpot can be re-lit by shooting the Sewer

Looping

Light Looping from Captive Ball. Shoot Loop Ramp to score 250K plus 50K for each consecutive shot for 20 seconds.





10 Million Points

Completing both 1 Million point Ramps (2) and (3) will light Sewer Hole (5) for 10 Million points. (See Captive Ball Values)

Captive Ball Values

Values displayed on the Speaker panel (see below) are obtained by hitting the Captive Ball (9) into the Target(10)

Mystery X	Instant 3-Ball	Lite Twin Million	Mystery Score	Lite Looping	Lite X Ball
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Save April

When Ball Rolls through Left Return Lane (11), Shoot Target (8) to collect 100K.

Twin Million

Each completion of Ramps (2) or (3) will add a letter to the word T-U-R-T-L-E-S .
When completed, Ramps (2) and (3) are each worth 1,000,000. (See 10 Million Shot)

Combo Shot

Shoot Left Ramp (2)
followed by Right Ramp (3)
followed by Sewer Hole(5)
Awards 250K

Awesome Scoring

Advance the 6 values (12) above the Flippers
2 different ways:

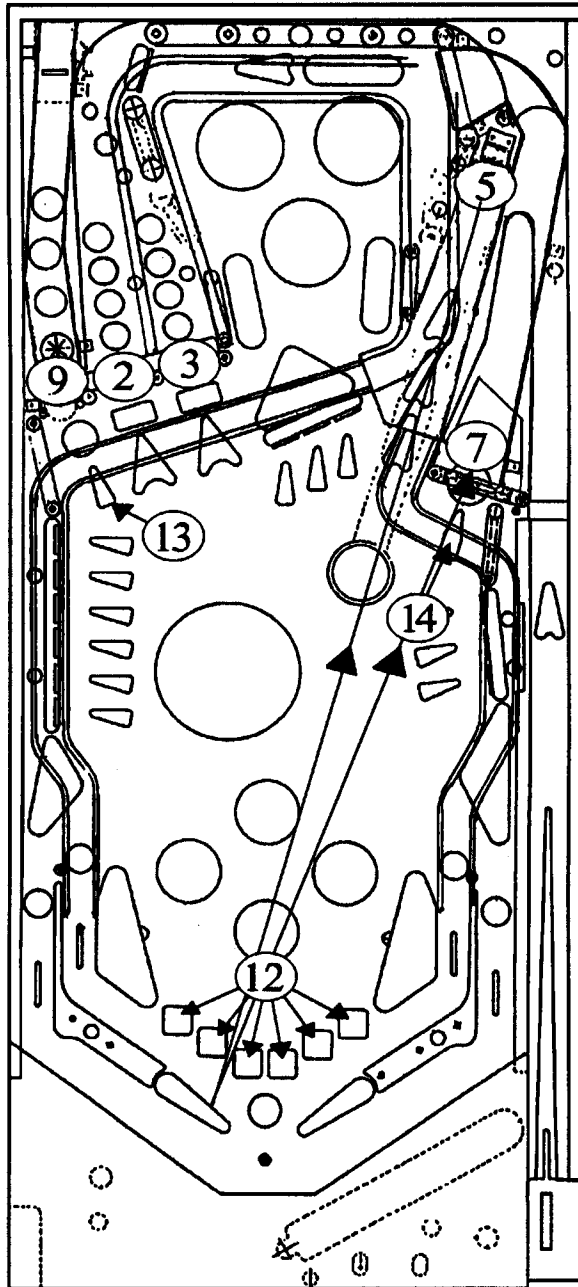
A.) The Right Return Lane (16) lights the
arrow (13), then shoot the Captive Ball (9)
into the Target (10) to step up one value.

B.) The Left Return Lane (11) lights the
arrow (14), then shoot the Spinner (7) to step
up one value.

When the player reaches the 5th value, shoot
the hole (5) to start (Timed)
Awesome scoring.
50K points per switch closure.

Super Awesome Scoring

Advance the six values (12) above the
Flippers as you would to achieve
Awesome Scoring.
(See Awesome Scoring)
when the player reaches the sixth value,
shoot the hole (5) to start (Timed)
Super Awesome Scoring
100K points per switch closure.



AUDIT FUNCTIONS

GENERAL

There are 89 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are eight most-used audits (AU01 through AU08) in a 'quick look' group and 80 less-used audits (E AU10 through E AU89), 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 Ad51) begin after the last audit function (AU09 or E AU89). 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, and 07) - These three audit totals are provided to show the amount of coins registered for the left, right, and center coin chutes, respectively.

Total Coins (AU08) is the total number of coins dropped through all 3 coin chutes.

Expand Audits (AU09) permits viewing of expanded audits.

Teenage Mutant Ninja Turtles 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)
	T.M.N.T. PROM ID		
AU 01	Total Paid Credits	E AU 46	2X
AU 02	Free Percent	E AU 47	3X
AU 03	Ball Time Average	E AU 48	4X
AU 04	Game Time Average	E AU 49	5X
AU 05	Coins Left	E AU 50	6X
AU 06	Coins Right	E AU 51	7X
AU 07	Coins Center	E AU 52	8X
AU 08	Total Coins	E AU 53	Skill Shot Made
AU 09	Expand Audits (ON/OFF)	E AU 54	# of Victory Shots
E AU 10	Balls Total	E AU 55	Last Chance Lit
E AU 11	Extra Balls Total	E AU 56	Last Chance Made
E AU 12	Extra Ball Percent	E AU 57	Million Lit
E AU 13	Replay 1 Awards	E AU 58	Left Million Awards
E AU 14	Replay 2 Awards	E AU 59	Rite Million Awards
E AU 15	Replay 3 Awards	E AU 60	Leonardo
E AU 16	Replay 4 Awards	E AU 61	Raphael
E AU 17	Total Replays	E AU 62	Donotello
E AU 18	Replay Percent	E AU 63	Michaelangelo
E AU 19	Total Specials	E AU 64	2 To 3 Ball Multiball
E AU 20	Special Percent	E AU 65	3 Ball Multiball
E AU 21	Total Matches	E AU 66	# Times Jackpot Lit
E AU 22	Hi Score Wins	E AU 67	1 Mil. Jackpot Award
E AU 23	High Score Percent	E AU 68	2 Mil. Jackpot Award
E AU 24	Total Free Plays	E AU 69	3 Mil. Jackpot Award
E AU 25	Total Games	E AU 70	4 Mil. Jackpot Award
E AU 26	0.0 - 1.4 Mil Games	E AU 71	Panel Mystery Scores
E AU 27	1.5 - 2.4 Mil Games	E AU 72	Panel Mystery X
E AU 28	2.5 - 3.4 Mil Games	E AU 73	Panel Million Lit
E AU 29	3.5 - 4.9 Mil Games	E AU 74	Panel X Ball Lit
E AU 30	5.0 - 9.9 Mil Games	E AU 75	Panel Multiball
E AU 31	10 Million plus Games	E AU 76	Panel Lite Looping
E AU 32	Average Scores	E AU 77	Manhole Bonus Hold
E AU 33	Games 1Player	E AU 78	Manhole Mystery Score
E AU 34	Games 2Player	E AU 79	Manhole XBall Lit
E AU 35	Games 3Player	E AU 80	Manhole Turtles Made
E AU 36	Games 4Player	E AU 81	Manhole Special Lit
E AU 37	Buy In Games	E AU 82	Manhole Advance X
E AU 38	Attract Minutes	E AU 83	Manhole Awesome Advance
E AU 39	Cycles H.S. Reset	E AU 84	Awesome Active
E AU 40	Coins No Credit	E AU 85	Super Awesome Active
E AU 41	Service Credits	E AU 86	Left Ramp Shots
E AU 42	Total Tickets	E AU 87	Rite Ramp Shots
E AU 43	Drain Left	E AU 88	10 Million Lit
E AU 44	Drain Center	E AU 89	10 Million Awarded
E AU 45	Drain Right		

EXPANDED FUNCTIONS

Balls Total (E AU10) is the total of regular and extra balls.

Extra Balls Total (E AU11) is the total number of extra balls awarded.

Extra Ball Percentage (AU12) is AU11 divided by Plays Total (AU25).

Replay Awards (E AU13 through 16) provide the total awards (credit, extra ball, or audit) for replay levels 1 through 4, respectively.

Total Replays (E AU17) is the total awards (credits, extra balls, or audit only) for exceeding replay score levels.

Replay Percentage (E AU18) is the Replay Total awards for exceeding replay score levels (E AU17) divided by Plays Total (E AU25).

Total Specials (E AU19) is the total awards (credits, extra balls, or scores) for making specials.

Special Percentage (E AU20) is Special Total (E AU19) divided by Plays total (E AU25).

Match Total (E AU21) 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 AU22) is the total credits awarded for exceeding the high-score-to-date scores.

High Score Percentage (E AU23) is High Score Wins (E AU22) divided by Plays Total (E AU25).

Total Free Plays (E AU24) is the total free credits for replays, high-score-to-date, specials, and match.

Total Games (E AU25) is the sum of Total Paid Credits (AU01) and Free Total (E AU24). Note that free credits are not recorded in the audits until they are actually used.

0.0 - 1.4 Mil Games (E AU26) provides the total number of games the Player's final score was between 0 and 1,499,990 points.

1.5 - 2.4 Mil Games (E AU27) provides the total number of games the Player's final score was between 1,500,000 and 2,499,990 points.

2.5 - 3.4 Mil Games (E AU28) provides the total number of games the Player's final score was between 2,500,000 and 3,499,990 points.

3.5 - 4.9 Mil Games (E AU29) provides the total number of games the Player's final score was between 3,500,000 and 4,999,990 points.

5.0 - 9.9 Mil Games (E AU30) provides the total number of games the Player's final score was between 5,000,000 and 9,999,990 points.

10 Mil Plus Games (E AU31) provides the total number of games the Player's final score was over 10,000,000 points.

Average Scores (E AU32) provides the Average Score by adding the Final Score of each game to a table and dividing this sum by the Total Plays (E AU24).

Games - Player (E AU33 through 36) provide individual totals of 1- player, 2-player, 3-player, and 4-player games, respectively.

Buy-In-Games (E AU37) provides the total number of times a game was bought into retaining lit game features.

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.*

Total Tickets (E AU42) provides the total number of tickets dispensed.

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

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

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

GAME SPECIFIC FUNCTIONS

2X (E AU46) provides the number of times 2X bonus was enabled.

3X (E AU47) provides the number of times 3X bonus was enabled.

4X (E AU48) provides the number of times 4X bonus was enabled.

5X (E AU49) provides the number of times 5X bonus was enabled.

6X (E AU50) provides the number of times 6X bonus was enabled.

7X (E AU51) provides the number of times 7X bonus was enabled.

8X (E AU52) provides the number of times 8X bonus was enabled.

Skill Shot Made (E AU53) provides the total number of times the Skill Shot Feature was accomplished.(Note- the feature is enabled at the start of each new ball.)

of Victory Shots (E AU54) provides the number of times the game awarded 3Million points, by completing the Right Ramp during Victory Mode.

Last Chance Lit (E AU55) provides the number of times the Left & Right outlane Extra Ball feature was enabled.

Last Chance Made (E AU56) provides the total number of times the Last Chance Feature awarded an Extra Ball.

Million Lit (E AU57) provides the total number of times the Ramp Million Lites were enabled.

Left Million Awards (E AU58) provides the total number of times the Left Million Feature was awarded.

Right Million Awards (E AU59) provides the total number of times the Right Million Feature was awarded.

Leonardo (E AU60) provides the total number of times the Blue Standup Targets were completed.

Raphael (E AU61) provides the total number of times the Red Standup Targets were completed.

Donotello (E AU62) provides the total number of times the Purple Standup Targets were completed.

Michaelangelo (E AU63) provides the total number of times the Amber Standup Targets were completed.

2 To 3 Ball Multiball (E AU64) provides the total number of times 3 Ball Multiball was regained, by completing the Sewer shot immediately after losing a ball, during 3 Ball Multiball.

3 Ball Multiball (E AU65) provides the total number of times 3 Ball Multiball was achieved.

Times Jackpot Lit (E AU66) provides the total number of times the Jackpot feature was active during Multiball.

1 Million Jackpot (E AU67) provides the total number of times the Jackpot Feature awarded 1 Million Points

2 Million Jackpot (E AU68) provides the total number of times the Jackpot Feature awarded 2 Million Points

3 Million Jackpot (E AU69) provides the total number of times the Jackpot Feature awarded 3 Million Points

4 Million Jackpot (E AU70) provides the total number of times the Jackpot Feature awarded 4 Million Points

Panel Mystery Scores (E AU71) provides the total number of times the Captive Ball Feature awarded a Mystery point Value.

Panel Mystery X (E AU72) provides the total number of times the Captive Ball Shot increased the Bonus Multiplier

Panel Million Lit (E AU73) provides the total number of times the Captive Ball Shot enabled the Millions Feature on the Ramps.

Panel X Ball Lit (E AU74) provides the total number of times the Captive Ball Shot Lites the Lite Extra Ball Lamp.

Panel Multiball (E AU75) provides the total number of times the Captive Ball Shot awards instant Multiball.

Panel Lite Looping (E AU76) provides the total number of times the Captive Ball Shot enabled the Looping Feature on the Ramps.

Manhole Bonus Hold (E AU77) provides the total number of times that, entering the Manhole, enabled the Bonus Hold Feature.

Manhole Mystery Score (E AU78) provides the total number of times that, entering the Manhole, awarded a Mystery point Value.

Manhole X Ball Lit (E AU79) provides the total number of times that, entering the Manhole, Lites the Captive Ball "Lite Extra Ball" Lamp.

Manhole Turtles Made (E AU80) provides the total number of times that, entering the Manhole, causes a 3 Bank Target (Red, Purple, Blue or Amber) to be completed.

Manhole Special (E AU81) provides the total number of times that, entering the Manhole, Lites the Spinner Special.

Manhole Advance X (E AU82) provides the total number of times that, entering the Manhole, advances the Bonus Multiplier.

Manhole Advance Awesome (E AU83) provides the total number of times that, entering the Manhole, advances the "Awesome Feature" located above the flippers.

Awesome Active (E AU84) provides the total number of times the Awesome feature is activated, awarding 50K points per switch closure.

Super Awesome Active (E AU85) provides the total number of times the Super Awesome feature is activated, awarding 100K points per switch closure.

Left Ramp Shots (E AU86) provides the total number of times the Left Ramp was completed.

Right Ramp Shots (E AU86) provides the total number of times the Right Ramp was completed.

10 Million Lit (E AU88) provides the total number of times the 10 Millions Feature was lit.

10 Million Awarded (E AU88) provides the total number of times the 10 Millions Feature was collected.

GAME ADJUSTMENTS

GENERAL

There are 51 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 Ad51 (Expanded Adjustment 51) 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 AU09 (or expanded E AU89) 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.

Teenage Mutant Ninja Turtles Game Adjustment Table

Adjustment Number (Player 3)	Description (Players 1 & 2)	Factory Setting (Player 4)
Ad 01	Replay/Manual	10%
Ad 02	Start Replay	9,200,000
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	Buy In Allowed	NO
E Ad 18	Replay Boost	NO
E Ad 19	Credits Limit	30
E Ad 20	High Scores Allowed	YES
E Ad 21	Hiscore 1 Awards	03
E Ad 22	Hiscore 2 Awards	01
E Ad 23	Hiscore 3 Awards	00
E Ad 24	Hiscore 4 Awards	00
E Ad 25	Backup World Record	11,000,000
E Ad 26	Backup Hiscore 1	10,000,000
E Ad 27	Backup Hiscore 2	9,000,000
E Ad 28	Backup Hiscore 3	8,000,000
E Ad 29	Backup Hiscore 4	7,000,000
E Ad 30	Backup Hiscore 5	6,000,000
E Ad 31	Reset H.S.T.D. Every	700
E Ad 32	Clean Game Every	1500
E Ad 33	Free Play	NO
E Ad 34	Custom Message	ON
E Ad 35	Attract Mode Music	ON
E Ad 36	Flash Lamps	NORMAL
E Ad 37	Coils Pulse	NORMAL
E Ad 38	Level Adjust By	ANY
E Ad 39	Install Country	USA
E Ad 40	Ticket Dispenser	OFF
E Ad 41	# Tickets Per Award	1
E Ad 42	Outlane Toggle	BOTH
E Ad 43	Turtles Style	FACTORY
E Ad 44	Million Timer	FACTORY
E Ad 45	Locks Qualify	FACTORY
E Ad 46	Targets Style	EASY
E Ad 47	Awesome Scoring	FACTORY
E Ad 48	2 to 3 Multiball	EASY
E Ad 49	Winners Circle	ON
E Ad 50	Recall Awesome Lights	FACTORY
E Ad 51	Factory Restore	NO

* 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**.

Install Adjustment	E Ad07 Extra Easy	E Ad07 Easy	E Ad07 Factory	E Ad07 Hard	E Ad07 Extra Hard
E Ad 42 Outlane Toggle	FLIPPER	BOTH	BOTH	SLING	SLING
E Ad 43 Turtles Style	EASY	EASY	FACTORY	FACTORY	HARD
E Ad 44 Million Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 45 Locks Qualify	EASY	FACTORY	FACTORY	HARD	HARD
E Ad 46 Targets Style	EASY	EASY	EASY	FACTORY	HARD
E Ad 47 Awesome Scoring	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 48 2 to 3 Multiball	EASY	EASY	EASY	HARD	HARD
E Ad 50 Recall Awesome Lights	EASY	EASY	FACTORY	HARD	HARD

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 = 15,000,000
 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 42 Outlane Toggle = Slings
 E Ad 43 Turtles Style = Factory

E Ad 44 Million Timer = Factory
 E Ad 45 Locks Qualify = Hard
 E Ad 46 Targets Style = Hard
 E Ad 47 Awesome Scoring = Hard
 E Ad 48 2 to 3 Multiball = Hard
 E Ad 49 Winners Circle = 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.

CUSTOM PRICING TABLE

Coin Mechs			Plays/Coins	Ad08	Adjustments				
Left	Right	Center			Left P	Right P	Mid P	Pulse/1Cr	Puls/bon
25¢	25¢	\$1.00	1/25¢ 3/50¢	Custom	01	01	04	01	02
			1/25¢ 5/\$1.00	Custom	01	01	04	01	04
			1/25¢/ 6/\$1.00	Custom	05	05	20	04	20
5SCH	10SCH	10SCH	1/10 SCH	Custom	01	02	02	02	00
			1/10 SCH 4/30SCH	Custom	04	08	08	06	00
20¢	\$1.00	--	1/20¢	Custom	01	05	00	01	00
			1/60¢ 2/\$1.00	Custom	01	05	00	03	05
10P	10P	50P	1/10P 6/50P	Custom	01	01	05	01	05
			1/20P 3/50P	Custom	01	01	05	02	05

STANDARD PRICING TABLE

Ad 08 Standard Pricing Select			Coin Mechs			Plays/Coins		
						Left	Center	Right
1	2	4	Left	Center	Right	Left	Center	Right
USA1	1COIN	1PLAY	25¢	\$1.00	25¢	1 PLAY/ 1COIN	4 PLAY/ 1COIN	1 PLAY/ 1COIN
USA2	4 COINS	3PLAYS	25¢	\$1.00	25¢	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN	3 PLAY/ 1COIN	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN
USA3	2 COINS	1 PLAY	25¢	\$1.00	25¢	1 PLAY/ 2COIN	2 PLAY/ 1COIN	1 PLAY/ 2COIN
USA4	2COINS	1 PLAY 1COIN BUY-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	2 PLAY/ 1COIN 3 PLAY/ 2COIN	2 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	7 PLAYS 1	1DM	2DM	5DM	1 PLAY/ 1COIN 7 PLAY/ 5COIN	2 PLAY/ 1COIN 8 PLAY/ 3COIN	7 PLAY/ 1COIN
GERMAN	5DM	9 PLAYS 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			25P		100P	1 PLAY/ 1COIN		5 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 Green light 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 45, FACTORY RESTORE. When set to **YES**, depressing the STEP push-button sequences through the expanded adjustments. When exiting from expanded adjustments, this function is reset to **OFF** for the next time that adjustments are required.

E Ad 14 Match Percent- Set Match percent from **00%** to **10%** or **OFF**. At **00%** the match display occurs at the end of the game but never awards a credit.

E Ad 15 Balls Per Game - Adjust the number of balls per game; **2** to **5**.

E Ad 16 Tilt Warnings - Adjust the number of plumb bob tilt switch closures before the ball in play is tilted; **1** to **3** or **OFF**.

E Ad 17 Buy In Allowed-Set to **YES** or **NO**. Determines if starting another game immediately after the Match feature will retain accumulated lit playfield features.

E Ad 18 Replay Boost - Set to **YES** or **NO**. When set to **YES**, exceeding a replay will set a temporary replay level for each time a replay level is surpassed. This new level will equal the player's final score (when the replay was awarded) for each following game, until the replays have all been played. At this time the previous level is resumed.

E Ad 19 Credits Limit - Adjust the maximum number of credits that may be posted; **4** to **50**.

HIGH SCORE LEVELS (E Ad 19 through 30)

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

E Ad 20 Hiscores Allowed - Set to enable or disable the four high score levels; **YES** or **NO**.

E Ad 21 World Record - Adjust the number of credits awarded for exceeding level 1 (the highest of the four levels); **0** to **5**.

E Ad 22 Highscore 1 Award- Adjust the number of credits awarded for exceeding level 1; **0** to **3**.

E Ad 23 Highscore 2 Award - Adjust the number of credits awarded for exceeding level 2; **0** to **2**.

E Ad 24 Highscore 3 Award - Adjust the number of credits awarded for exceeding level 3; **0** to **1**.

E Ad 25 Backup World Record - Adjust the score level to which the world record (the highest of the four levels) may be altered. This adjustment is not affected by E Ad30 (Factory Reset defaults to 7,500,000).

E Ad 26 Backup Highscore 1 - Adjust the backup score level to which level 1 may be reset.

E Ad 27 Backup Highscore 2- Adjust the backup score level to which level 2 may be reset.

E Ad 28 Backup Highscore 3- Adjust the backup score level to which level 3 may be reset.

E Ad 29 Backup Highscore 4- Adjust the backup score level to which level 4 may be reset.

E Ad 30 Backup Highscore 5- Adjust the backup score level to which level 5 may be reset.

E Ad 31 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 32 Clean Game Every- Adjust the number of games in which the Green Light turns on to indicate the playfield needs cleaning. Adjustable from 100 to 2000.

E Ad 33 Free Play - When set to **YES**, no coins are required for games.

E Ad 34 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 35.

E Ad 35 Attract Mode Music - Set to **ON** (approximately every 3 minutes), or **OFF**.

E Ad 36 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 37 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 38 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 39 Install Country- Set to **USA**, **FRENCH** or **GERMAN**. Determines the default settings for the respective country for game pricing etc.

E Ad 51 Factory Restore-Depressing **STEP** without changing the value shown in the Player 4 Display locks in any custom message set with E Ad34 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 40 TO E Ad 50)

E Ad 40 Ticket dispenser- Set to **ON** or **OFF**. When set to **ON**, the game will dispense ticket(s) (optional) when each replay award levels is attained. When set to **OFF**, no tickets will be dispensed.

E Ad41 # Tickets per Award- Set from 1 thru 5. The game will dispense the selected number of tickets for each award level.

E Ad 42 Outlane Toggle- Set to **FLIPPER, SLING** or **BOTH**. This feature controls how the lit Outlane Special 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 will 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.

E Ad 43 Turtles Style- Set to **EASY, FACTORY** or **HARD**. When set to **EASY** the lit letters in **TURTLES** are retained in memory from player to player. When set to **FACTORY** the letters are retained in memory from ball to ball for each individual player. When set to **HARD** the lit letters are reset at the end of each ball.

E Ad 44 Million Timer- Set to **EXEASY, EASY, FACTORY, HARD** or **EXHARD**. Determines how long the **MILLIONS** feature remains enabled in seconds. Each time the feature is reenabled in the same game, the starting timer decreases by 2 x (number of Millions Awarded) down to a minimum of 5 seconds

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

E Ad 45 Locks Qualify- Set to **EASY,FACTORY** or **HARD**. Determines the number of Turtle Target Banks that must be completed to qualify for multiball.

EASY	FACTORY	HARD
2 Banks	3 Banks	4 Banks

E Ad 46 Targets Style- Set to **EASY, FACTORY,** or **HARD**. Determines how the Turtles Targets are completed. When set to **EASY**, striking the single flashing target will complete the bank. When Set to **FACTORY**, all 3 targets must be completed in any order. When set to **HARD**, the 3 Targets in a bank must be completed in sequence by shooting at the target that's flashing.

E Ad 47 Awesome Scoring- Set to **EXEASY, EASY, FACTORY, HARD** or **EXHARD**. Determines how long the Awesome Scoring feature remains enabled in seconds.

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

E Ad 48 2 to 3 Multiball- Set to **EASY,** or **HARD**. When set to **EASY**, the game allows the player to regain 3 ball Multiball when one of the three balls drain, by immediately shooting a remaining ball into the Sewer Entrance. When set to **HARD**, the option is turned off.

E Ad 49 Winners Circle- Set to **YES** or **NO**. When set to **YES**, at the end of the game, in a multiplayer game, the higher scoring player will be highlighted on the display and receive an additional 20 seconds of unlimited balls. (This will allow the player to build up his score and attempt to gain replays etc.) When set to **NO** the game will end normally.

E Ad 50 Recall Awesome Lites- Set to **EASY, FACTORY** or **HARD**. When set to **EASY**, the lit Awesome Lites are carried over in memory from ball to ball. When set to **FACTORY** the lit awesome lites are carried over in memory to the next ball only if the "Awesome Feature" was not collected. When Set to **HARD**, all the lit Awesome Lites reset at the end of each ball.

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 32.

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 51.

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 F6) VOICE ROM2 (Loc F4) MUSIC TEST (Sound ROM Loc F7)	Left Sine (Left Speaker Only) Center Sine (All speakers) Right Sine (Right Speaker Only) "Teenage ..Mutant... Ninja...Turtles!!!" "Bodacious Skill Shot Man!" 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 it's 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

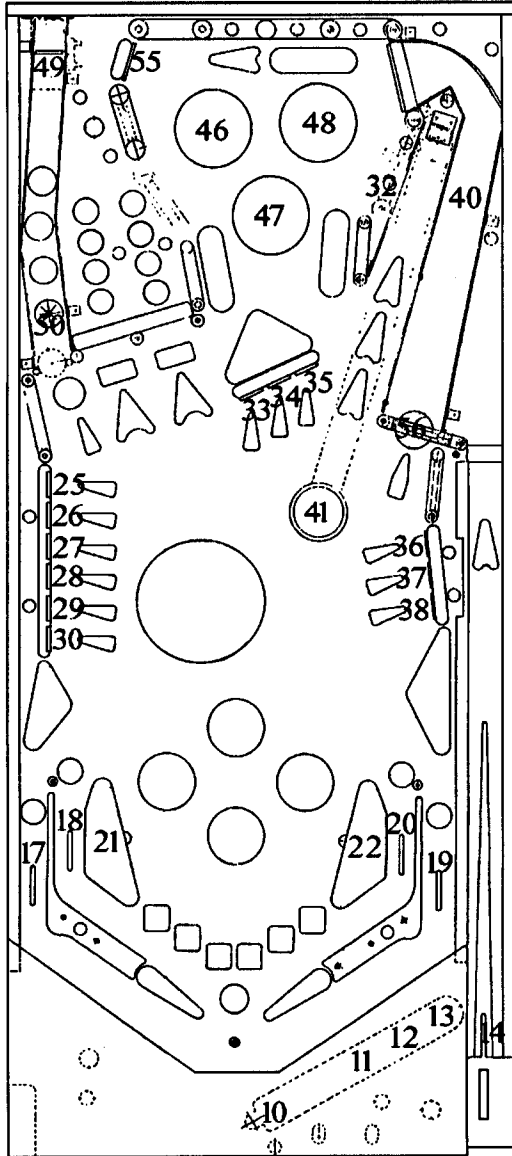
Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors,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

COLUMN \ ROW	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 Outlane 17	Red Arrow Top 25	Amber Arrow Left 33	Manhole VUK 41	Captive Ball Target 49	Not Used 57
2 WHT-RED CN10-8	Not Used 2	Outhole 10	Left Return 18	Red Arrow Center 26	Amber Arrow Center 34	Not Used 42	Rollover #1 Bottom 50	Not Used 58
3 WHT-ORN CN10-7	Credit Button 3	Trough #1 Left 11	Right Outlane 19	Red Arrow Bottom 27	Amber Arrow Right 35	Not Used 43	Not Used 51	Not Used 59
4 WHT-YEL CN10-6	Right Coin 4	Trough #2 Center 12	Right Return 20	Purple Arrow Top 28	Blue Arrow Top 36	Not Used 44	Not Used 52	Not Used 60
5 WHT-GRN CN10-5	Center Coin 5	Trough #3 Right 13	Left Slingshot 21	Purple Arrow Center 29	Blue Arrow Center 37	Not Used 45	Not Used 53	Not Used 61
6 WHT-BLU CN10-3	Left Coin 6	Shooter Lane 14	Right Slingshot 22	Purple Arrow Bottom 30	Blue Arrow Bottom 38	Left Turbo Bumper 46	Not Used 54	Not Used 62
7 WHT-VIO CN10-2	Slam Tilt 7	Left EOS 15	Not Used 23	Not Used 31	Not Used 39	Center Turbo Bumper 47	Ransom Target 55	Not Used 63
8 WHT-GRY CN10-1	Not Used 8	Right EOS 16	Not Used 24	Left Ramp Exit Yellow 32	Right Ramp Exit Green 40	Right Turbo Bumper 48	Spinner 56	Not Used 64

Teenage Mutant Ninja Turtles - Switch Part Numbers

Number	Description	Part No.	Number	Description	Part No.
01*	Plumb Tilt	See Cabinet	10	Out Hole	180-5011-00
02	Not Used	-	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	500-5303-00
06*	Left Coin	180-5024-00	15	Left Flip. Cab. Switch	180-5067-00
07*	Slam Tilt	180-5022-00	16	Right Flip. Cab. Switch	180-5067-00
08	Not Used	-	17	Left Outlane	500-5142-00
09	Not Used	-	18	Left Return Lane	515-5138-00
			19	Right Outlane	500-5142-00
			20	Right Return Lane	500-5142-00
			21	Left Slingshot Sw. (2)	180-5054-00
			22	Right Slingshot Sw. (2)	180-5054-00
			23	Not Used	-
			24	Not Used	-
			25	Red Arrow Top	515-5124-12
			26	Red Arrow Center	515-5124-12
			27	Red Arrow Bottom	515-5124-12
			28	Purple Arrow Top	515-5124-19
			29	Purple Arrow Center	515-5124-19
			30	Purple Arrow Bottom	515-5124-19
			31	Not Used	-
			32	Left Ramp Exit (Yellow)	180-5080-00
			33	Amber Arrow Left	515-5124-13
			34	Amber Arrow Center	515-5124-13
			35	Amber Arrow Right	515-5124-13
			36	Blue Arrow Top	515-5124-15
			37	Blue Arrow Center	515-5124-15
			38	Blue Arrow Bottom	515-5124-15
			39	Not Used	-
			40	Right Ramp Exit (Green)	180-5080-00
			41	Manhole VUK	180-5072-00
			42	Not Used	-
			43	Not Used	-
			44	Not Used	-
			45	Not Used	-
			46	Bumper Left	180-5015-00
			47	Bumper Center	180-5015-00
			48	Bumper Right	180-5015-00
			49	Captive Ball Target	500-5036-05
			50	Rollover #1	180-5003-00
			51	Not Used	-
			52	Not Used	-
			53	Not Used	-
			54	Not Used	-
			55	Ransom Target	500-5321-06
			56	Spinner	500-5193-00
			57	Not Used Through 64	



Switch Locations

* Indicates Cabinet Switches

LAMP TESTS

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

All Lamps

From the 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

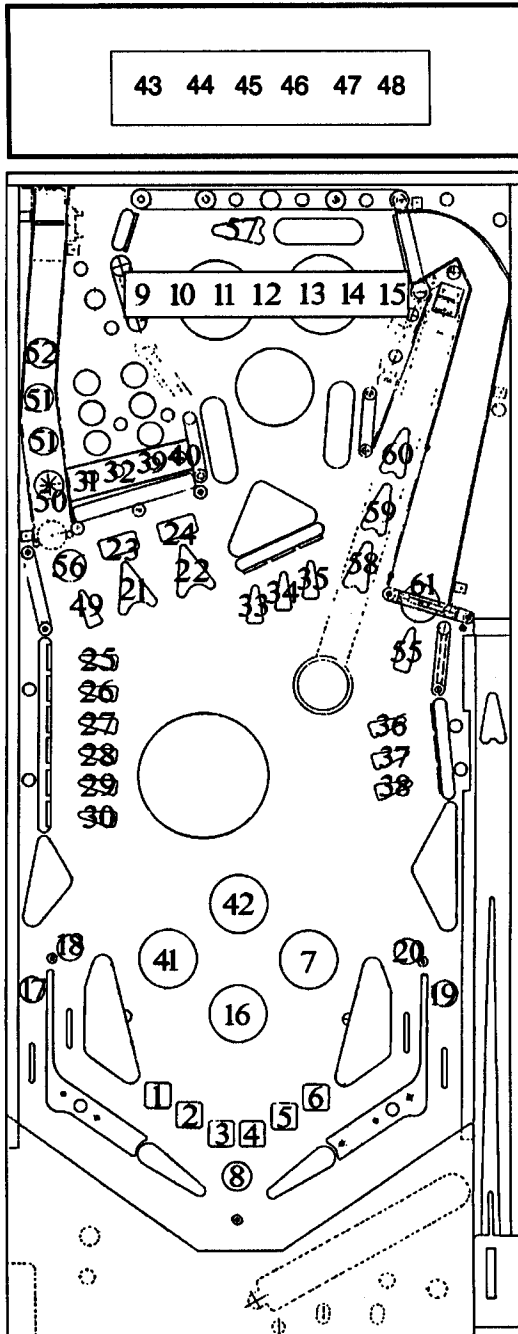
From the LAMP DRIVES test, depress the STEP push-button switch. The top display indicates lamp name. The bottom display indicates the row and column wire colors and the lamp matrix number. Lamp 01 should light. With the FORWARD/REVERSE push-button switch in the FORWARD (up) position, operating the Game 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	75K 1	TURTLES 9	Last Chance Left 17	Red Arrow Top 25	Amber Arrow Left 33	Donatello 41	Captive Ball Arrow 49	Ransom 57
2 Q73 RED-BLK CN6-2	100K 2	TURTLES 10	Left Return 18	Red Arrow Center 26	Amber Arrow Center 34	Michael- angelo 42	Rollover #1 Bottom 50	Lite Ten Million 58
3 Q74 RED-ORN CN6-3	125K 3	TURTLES 11	Last Chance Right 19	Red Arrow Bottom 27	Amber Arrow Right 35	Panel Mystery X 43	Rollover #2/#3 51	Lock Release Jackpot 59
4 Q75 RED-YEL CN6-5	150K 4	TURTLES 12	Return Right 20	Purple Arrow Top 28	Blue Arrow Top 36	Panel Instant 3 Ball 44	Rollover #4 52	Start Awesome 60
5 Q76 RED-GRN CN6-6	Lite Awesome 5	TURTLES 13	Jackpot Left 21	Purple Arrow Center 29	Blue Arrow Center 37	Panel Lite Million 45	Not Used 53	Spinner Special 61
6 Q77 RED-BLU CN6-7	Lite Super Awesome 6	TURTLES 14	Jackpot Right 22	Purple Arrow Bottom 30	Blue Arrow Bottom 38	Panel Mystery Scores 46	Not Used 54	Not Used 62
7 Q78 RED-VIO CN6-8	Leonardo 7	TURTLES 15	Million Left 23	Left Ramp Looping 31	Right Ramp 250K 39	Panel Looping 47	Spinner Arrow 55	Not Used 63
8 Q79 RED-GRY CN6-9	Shoot Again 8	Raphael 16	Million Right 24	Left Ramp 250K 32	Right Ramp Victory 40	Panel-Lite Extra Ball 48	Captive Extra Ball 56	Not Used 64

Lamp Number	Description
01.	75k
02.	100K
03.	125K
04.	150K
05.	Lite Awesome
06.	Lite Super Awesome
07.*	Leonardo
08.*	Shoot Again
09.	TURTLES

10.	TURTLES
11.	TURTLES
12.	TURTLES
13.	TURTLES
14.	TURTLES
15.*	TURTLES
16.*	Raphael
17.	Last Chance Left
18.	Left Return
19.	Last Chance Right
20.	Return Right
21.	Jackpot Left
22.	Jackpot Right
23.	Million Left
24.	Million Right
25.	Red Arrow Top
26.	Red Arrow Center
27.	Red Arrow Bottom
28.	Purple Arrow Top
29.	Purple Arrow Center
30.	Purple Arrow Bottom
31.	Left Ramp Looping
32.	Left Ramp 205K
33.	Amber Arrow Left
34.	Amber Arrow Center
35.	Amber Arrow Right
36.	Blue Arrow Top
37.	Blue Arrow Center
38.	Blue Arrow Bottom
39.	Right Ramp 250K
40.	Right Ramp Victory
41.	Donatello
42.	Michaelangelo
43.*	Panel-Mystery X
44.*	Panel-Instant 3 Ball
45.*	Panel-Lite Millions
46.*	Panel-Mystery Scores
47.*	Panel-Looping
48.*	Panel-Lite Extra Ball
49.	Captive Ball Arrow
50.	Rollover #1 Bottom
51.	Rollover #2/#3
52.	Rollover #4
53.	Not Used
54.	Not Used
55.	Spinner Arrow
56.	Captive Extra Ball
57.	Ransome
58.	Lite Ten Million
59.	Lock Release Jackpot
60.	Start Awesome
61.	Spinner Special
62.	Not Used
63.	Not Used
64.	Not Used



Lamp Locations

* Indicates Speaker 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

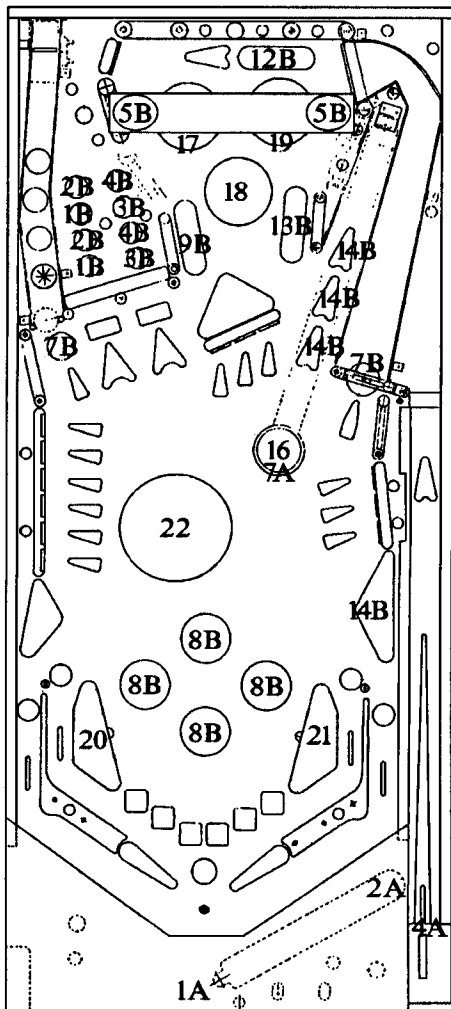
From the Flash Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate ALL COILS. The test pulses each regular solenoid or flash lamp sequentially with the coil/flash lamp name indicated in the Player 1 and 2 displays and the wire colors in the Player 3 and 4 displays.

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.

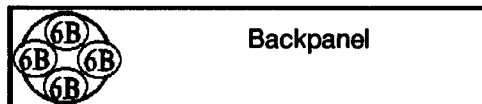
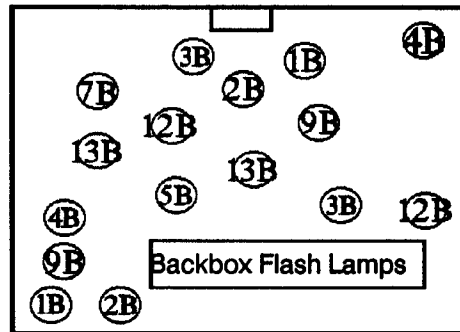


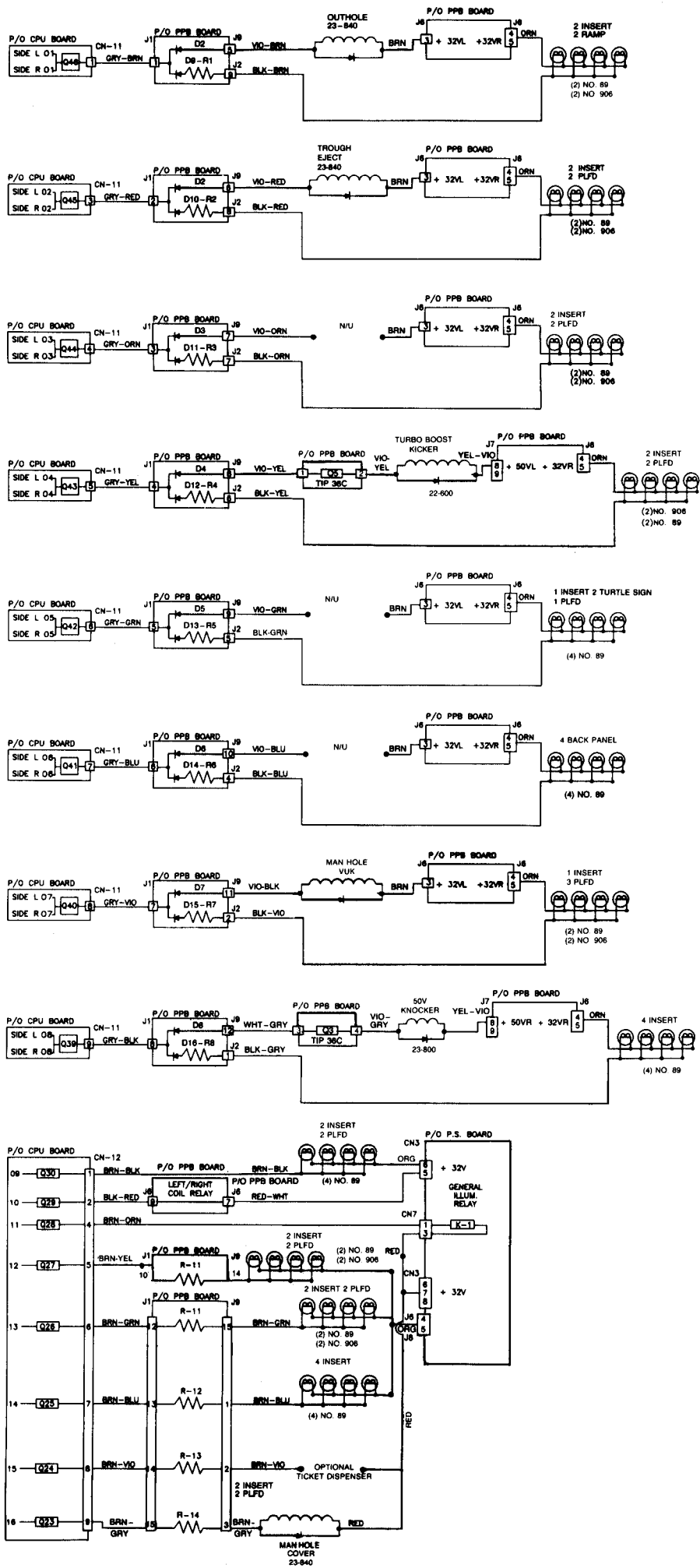
CPU Controlled Auxillary Solenoids

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

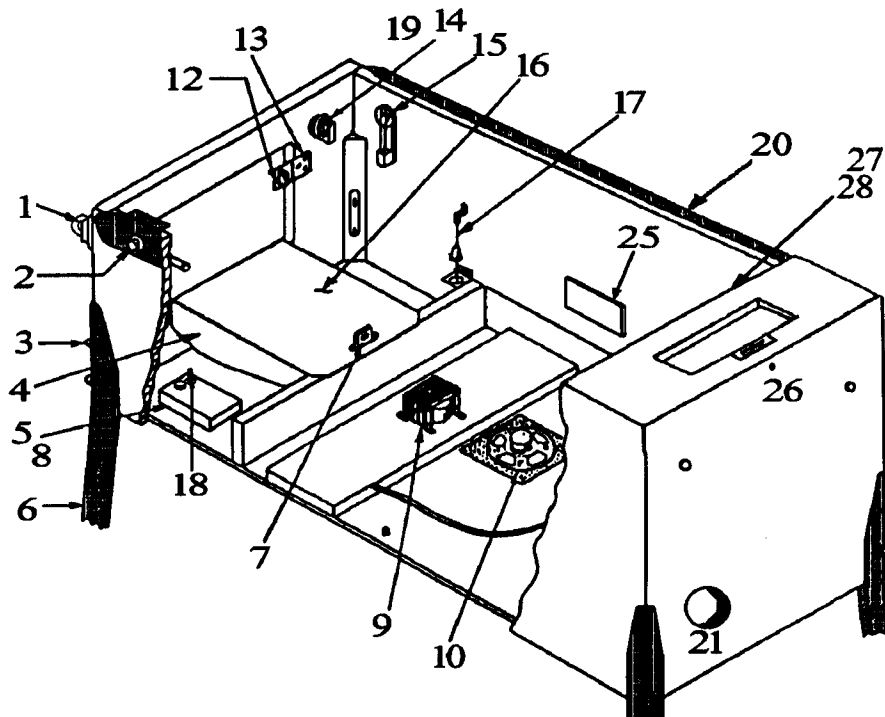
Flipper Solenoids

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



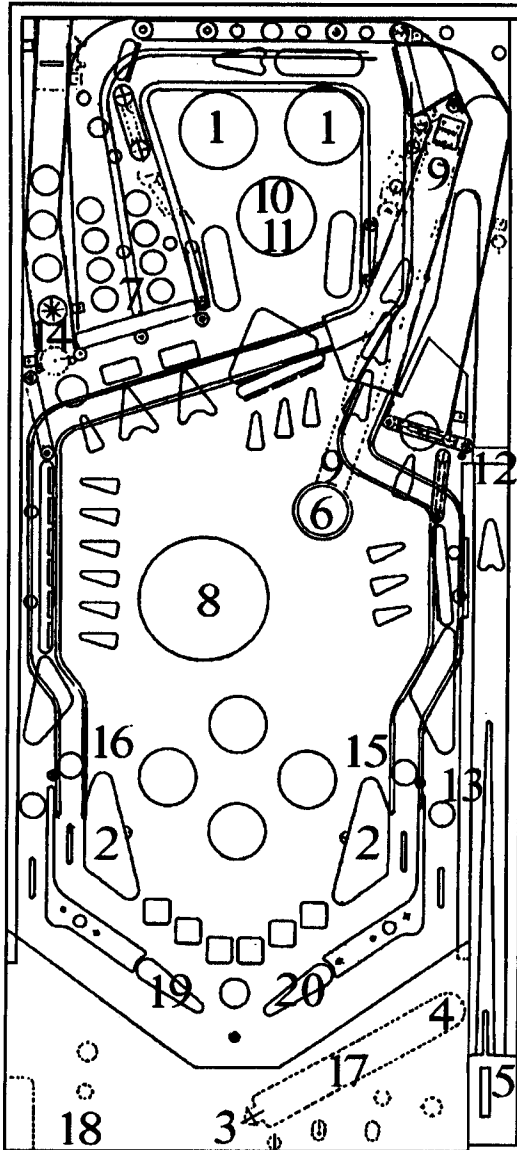


CABINET PARTS ILLUSTRATION



Item	Description	Part No.
1	Ball-Shooter Assy	500-5300-00
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(Not Shown)	535-5010-31
12	Memory Protect Switch	180-5000-00
13	Memory Protect Switch Bracket	535-5225-01
14	Start Switch Assembly	500-5097-02
15	Flipper Micro Switch	180-5067-00
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 (Not Shown)	500-5021-10
25	S.S.Flipper P.C.B.	520-5033-00
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

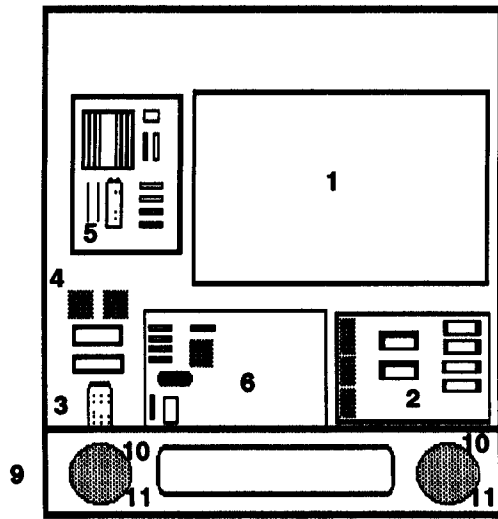
Playfield - Major Assemblies



Item	Description	Part Number
1.	Pop Bumper	500-5227-00
2.	Slingshots	500-5226-00
3.	Outhole Kicker	500-5082-00
4.	Trough Eject Kicker	500-5012-01
5.	Turbo Boost Kicker	500-5334-01
6.	Super Vertical Up Kicker	500-5320-00
7.	Plastic Ramp	500-5337-00
8.	Spinning Motor Assembly	515-5398-00
9.	Under Chute Assembly	500-5332-00
10.	Jump Pop Bumper	500-5227-01
11.	Turtles Figure (Orange)	545-5270-01
12.	Turtles Figure (Blue)	545-5270-02
13.	Turtles Figure (Purple)	545-5270-03
14.	Turtles Figure (Red)	545-5270-04
15.	Wire Ramp Right (Yellow)	535-5618-00
16.	Wire Ramp Left (Green)	535-5619-00
17.	Ball Trough Assembly	500-5044-00
18.	Bottom Arch Assy.	545-5170-00
19.	Flipper Assembly Left	500-5 177-32
20.	Flipper Assembly Right	500-5 177-31

Individual part breakdowns for most of these assemblies can be found on pages 35 through 40 & 63.

BACKBOX PARTS ILLUSTRATION



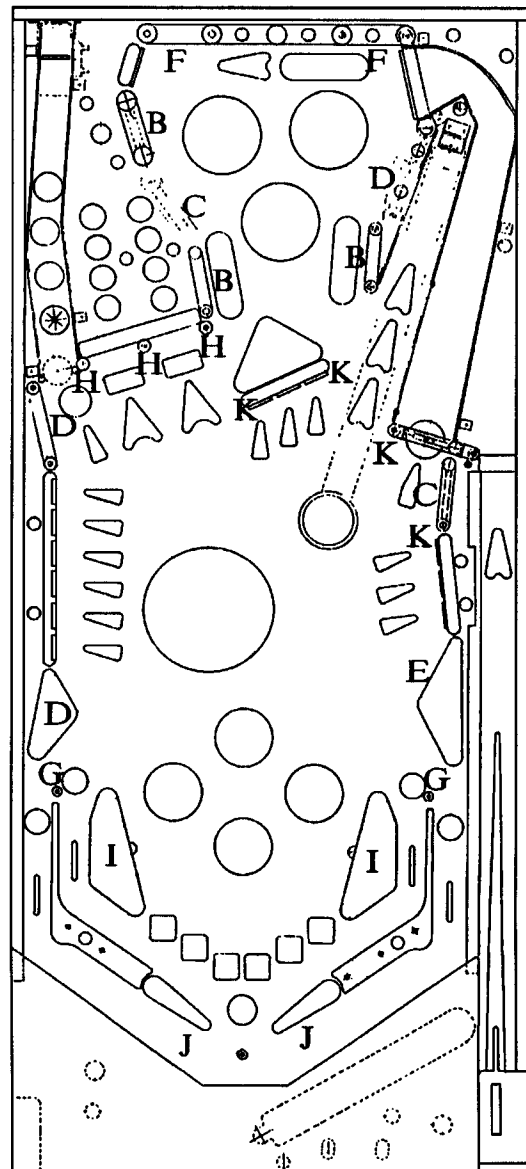
Item	Description	Part No.
1	CPU Board Assy.(Non-Reflex)	520-5003-03 †
2	Sound Board Assy	520-5002-03 †
3	Capacitor 2C1	125-5000-00
4	Bridge Rectifiers	112-5000-00
5	Power Supply Bd. Assy	520-5047-00
6	PPB Board	520-5021-04
7	Dot Matrix Display Bd*	520-5042-00 †
8	Display Ribbon Cable*	036-5000-24-10
9	Speaker Housing	500-5231-00-10
10	Speakers (2)	031-5004-00
11	Speaker Grill (2)	830-5607-00
12	Back Box Glass*	830-5217-00
13	Roto-Lock Top*	355-5006-02

* Not Shown

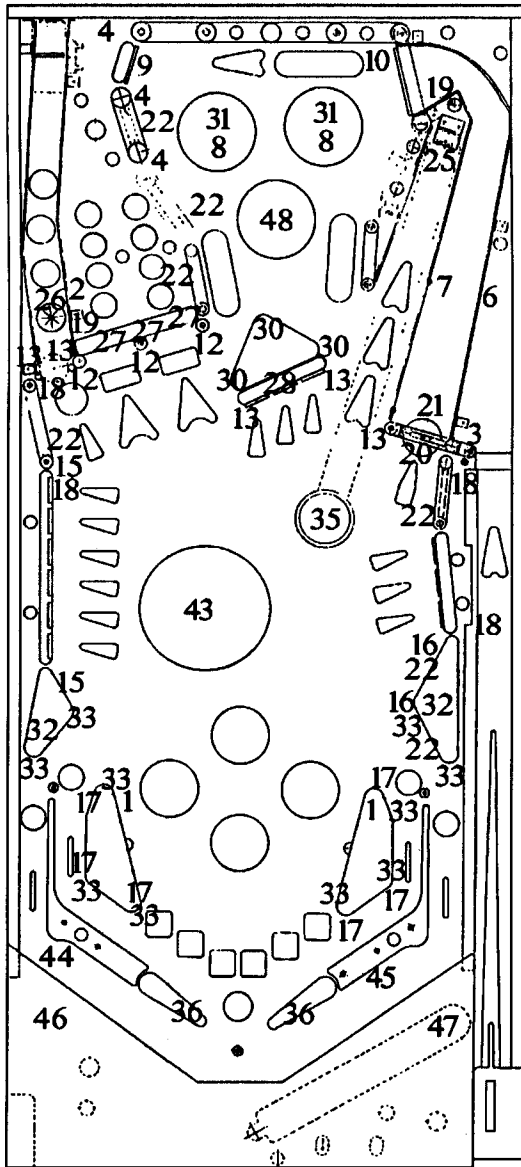
† When ordering PC Boards with ROMs please specify game name

RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A.	Rubber Post-Long (3)	545-5009-00
B.	1 1/4" (2)	545-5025-06
C.	1 1/2" (2)	545-5025-07
D.	2" (3)	545-5025-08
E.	2 1/2" (1)	545-5025-09
F.	4 1/2" (2)	545-5025-13
G.	7/16" Outer Diameter (2)	545-5025-17
H.	3/8" Outer Diameter (3)	545-5025-19
I.	2 3/4" (2)	545-5025-20
J.	Red Flipper (2)	545-5024-02
K.	Rubber Post -Short (4)	545-5151-00
L.	Shooter Tip (1)	545-5027-00



Playfield Parts

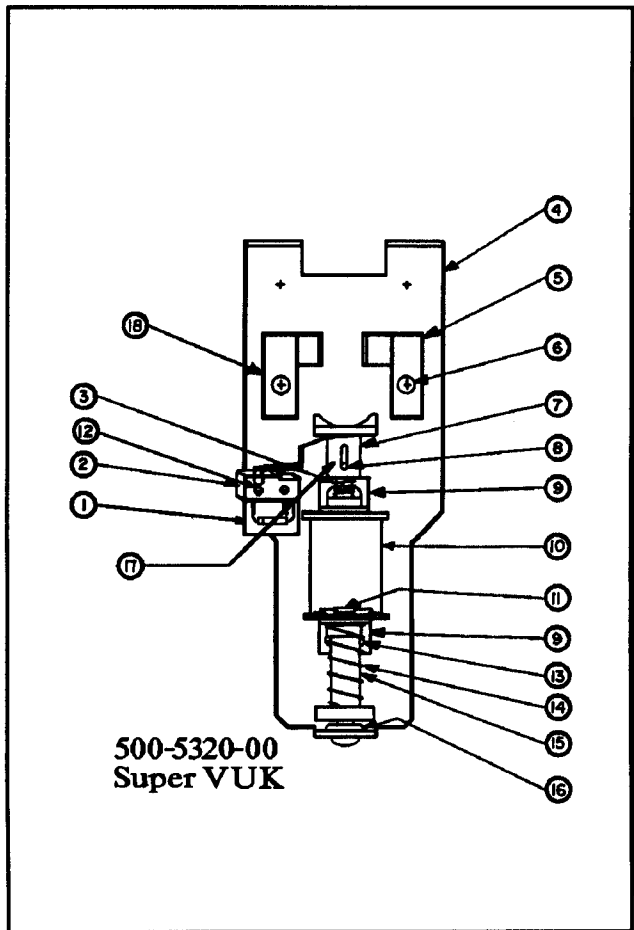
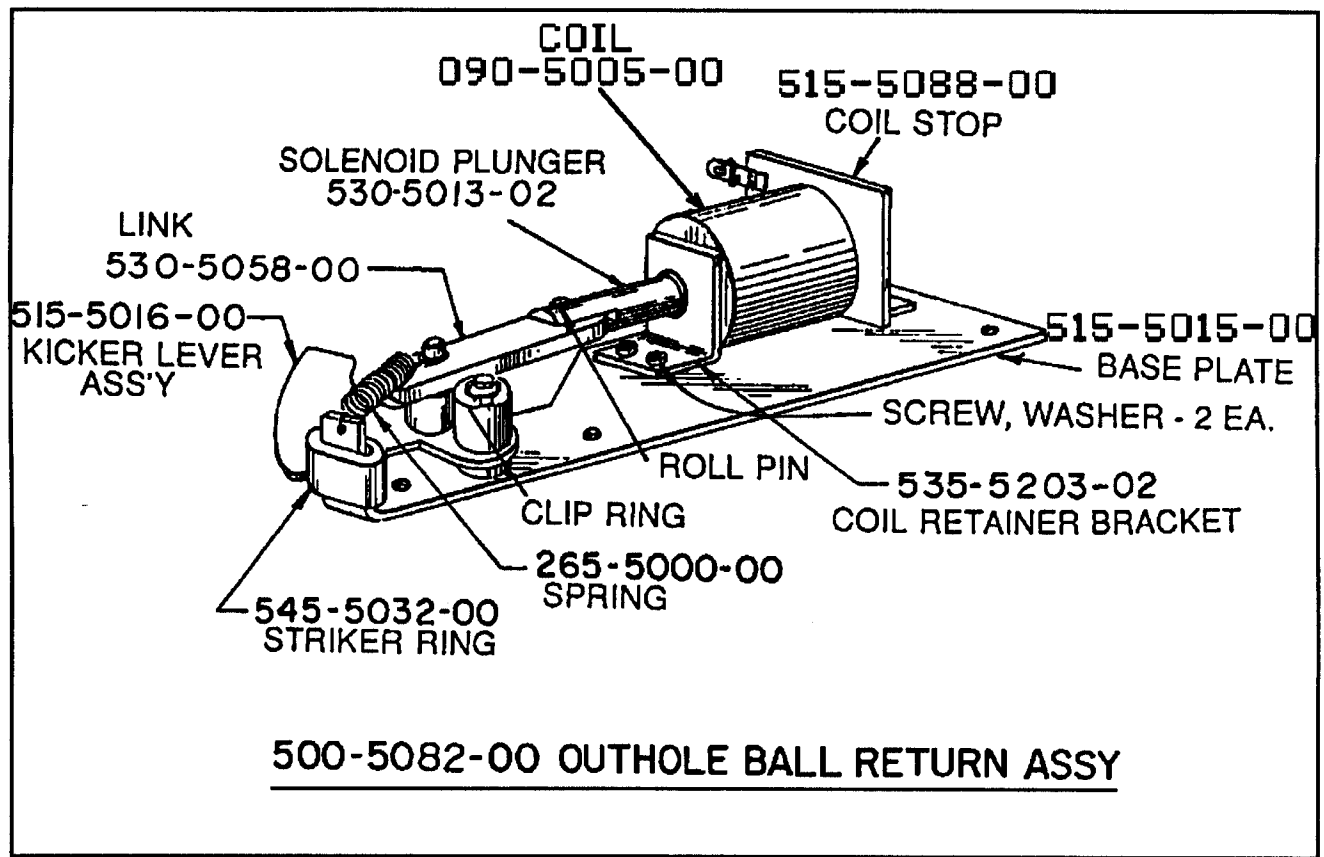


Note:
See page 25 for switch part numbers

No.	Description	Part No.
1.	Plastic Spacer (2)	254-5000-02
2.	Plastic Spacer (1)	254-5000-04
3.	Plastic Spacer (1)	254-5000-06
4.	1/2"Hex Spacer (2)	254-5008-03
*5.	Ramp Entrance Plate	535-5972-00
6.	Ball Guide	500-5308-00
7.	Ball Guide	500-5310-00
8.	Turbo Bumper Decal	820-5313-00
9.	April Target Decal	820-5118-00
10.	Wire Gate	535-5307-01
*11.	Screened Plastic Assy.	515-5372-00-17
12.	Mini Post (3)	530-5004-00
13.	Mini Post (5)	530-5005-00
14.	Bumper Post (3)	530-5007-00
15.	Machine Post (1)	530-5008-00
16.	Wood Post (2)	530-5010-00
17.	Machine Post (6)	530-5012-02
18.	Metal Standoff (4)	530-5035-01
19.	Ball Guide Brkt.	535-5208-00
20.	Spinning Brkt.	535-5249-00
21.	Spinning Target	515-5236-00
22.	1" Wire Form (6)	535-5300-01
*23.	Spinner Target Washer (2)	535-5307-01
*24.	Actuator Wire	535-5387-00
25.	Ball Deflector	535-5380-00
26.	Star for Rollover Switch	545-5015-00
27.	Side Rail Guard	535-5795-00
*28.	Deflector Shield	535-5998-00
29.	Bumper Post (3)	545-5009-00
30.	Double Rubber Post	545-5209-11
31.	Turbo Bumper Cap (2)	545-5225-11
32.	Star Burst Hat Mars	550-5032-06
33.	Small Post (10)	550-5034-11
*34.	Mini Mars	550-5039-00
35.	Manhole Decal	820-5054-00
36.	Ultimate Flipper Decal	820-5058-00
*37.	Ramp Decal	820-5069-00
*38.	Spinner Decal Back	820-5212-01
*39.	Spinner Decal Front	820-5212-02
*40.	P/F Mylar	820-5814-00
*41.	Silk Screen Turtles	830-5117-00
*42.	Acorn Nut	240-5006-00
43.	Pizza Decal	830-5608-00
44.	Ball Guide Left	550-5037-11
45.	Ball Guide Right	550-5038-11
46.	Bottom Arch Decal Left	820-5053-01
47.	Bottom Arch Decal Right	820-5053-02
48.	Jump Bumper Cap	545-5271-02

* Indicates not shown

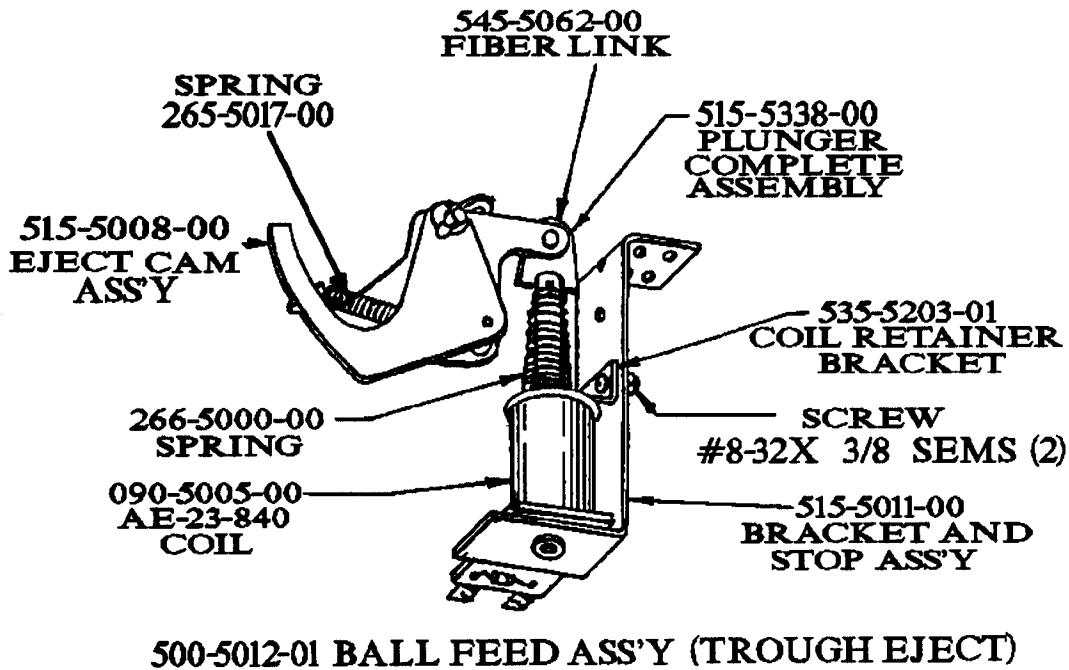
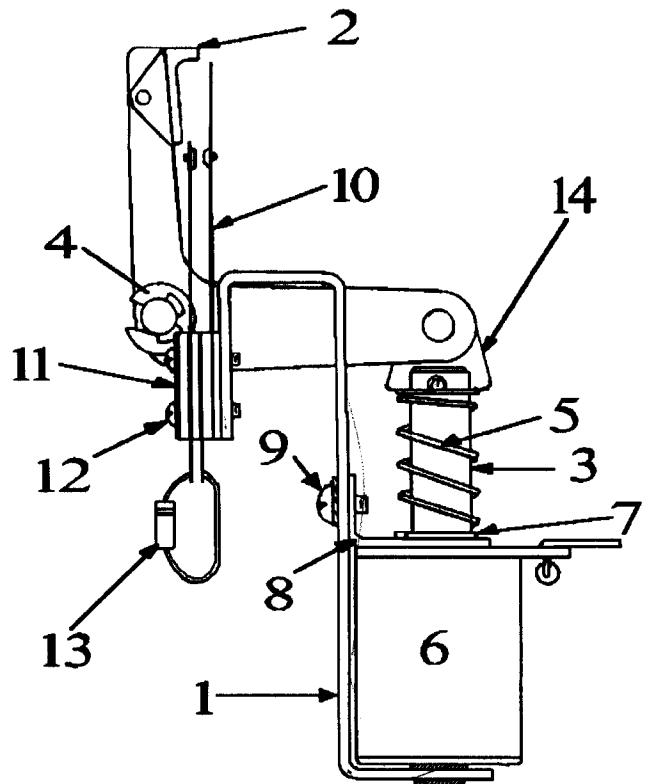
NOTES



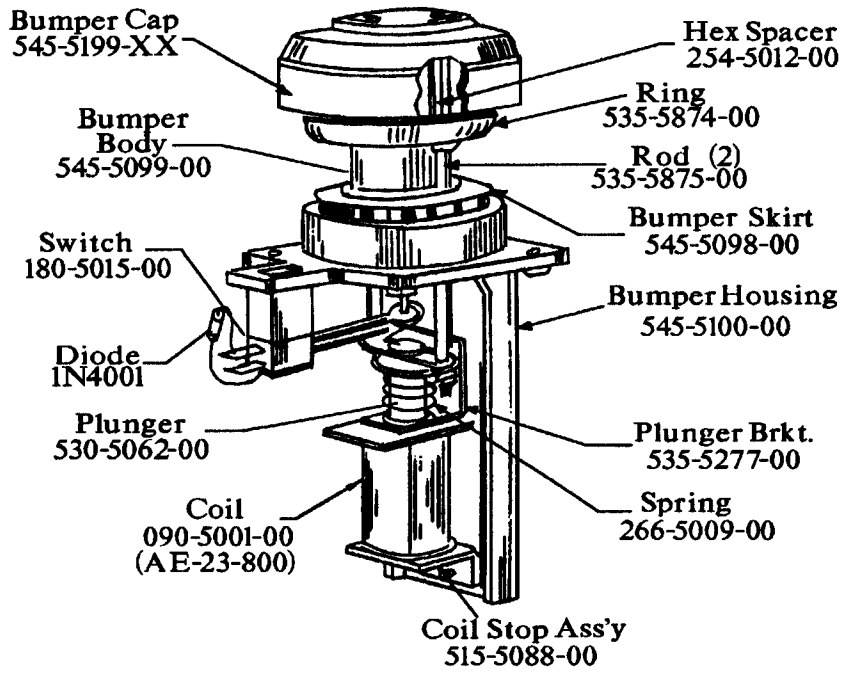
Item	Part #	Description
1	545-5193-00	Sw. Insulator
2	180-5064-00	Micro Switch
3	266-5025-00	Cap Spring
4	535-5974-00	Ball Kickup Mtg. Brkt
5	535-6089-00	Trough Deflector (L)
6	232-5201-00	#6-32x ³ / ₈ SEMS(2)
7	545-5227-00	Vert. Kick. Cap
8	535-5111-00	Pin ³ / ₃₂ x ⁷ / ₁₆
9	535-5203-01	Coil Retainer Brkt. (2)
10	090-5023-00	Coil 22-600
11	112-5003-00	1N4004 Diode
12	237-5806-00	2-56x ¹ / ₂ Screw(2)
13	232-5200-00	#6-32x ¹ / ₄ Phil. M.S.
14	266-5009-00	Spring
15	515-5352-00	Plunger Assy.
16	280-5003-00	Bumper
17	270-5010-00	Compression Ring(3)
18	535-6088-00	Trough Deflector (R)

Slingshot Assembly 500-5226-00

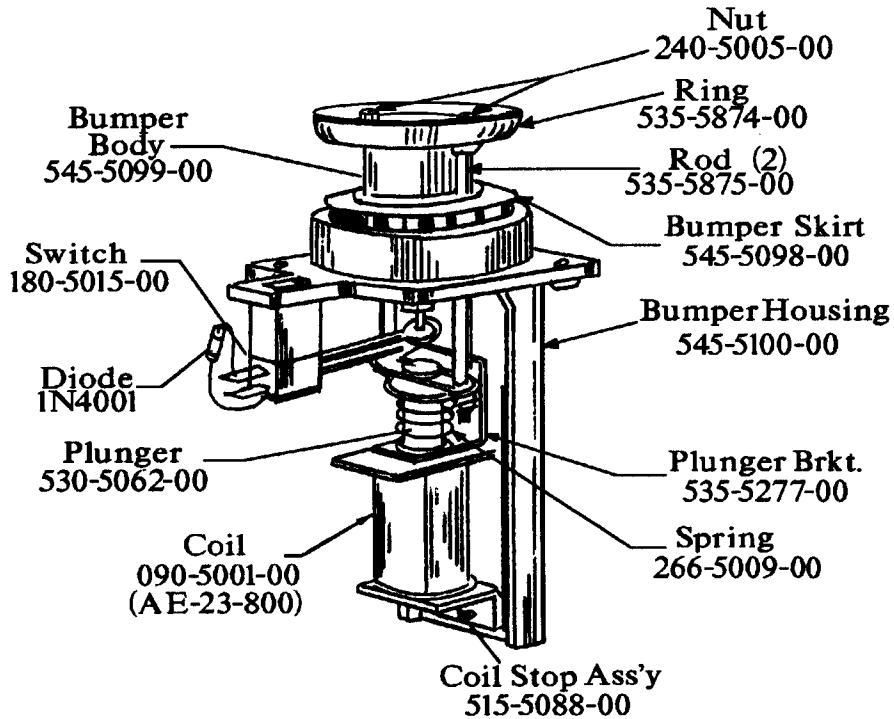
Item	Description	Part No.
1	Slingshot Bracket	515-5339-00
2	S.S. Arm & Tip Assy.	515-5340-00
3	Plunger & Link Assy.	515-5338-00
4	1/4 Retaining Ring (2)	270-5002-00
5	Spring	266-5020-00
6	23-800 Coil	090-5001-02
7	Coil Sleeve	260-0004-00
8	Coil Retainer	535-5203-01
9	#8-32 X 1/4" Screw (2)	232-5300-00
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, Plunger	545-5062-00

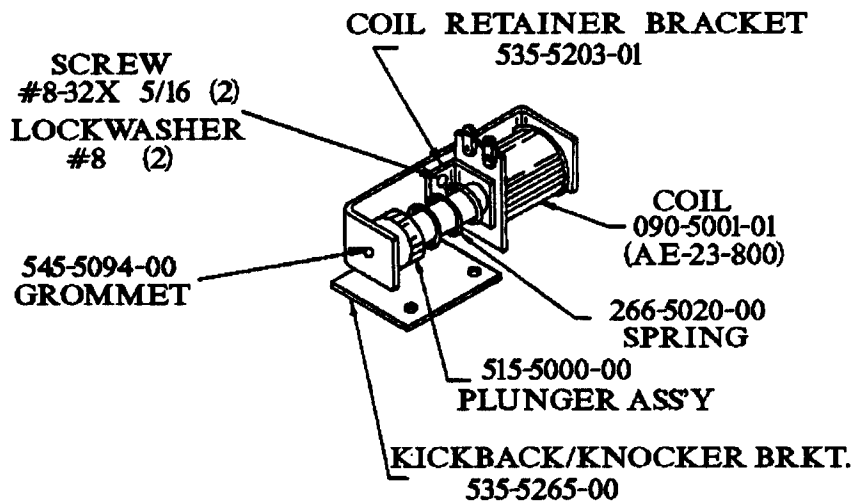


Jump Pop Bumper
500-5227-01

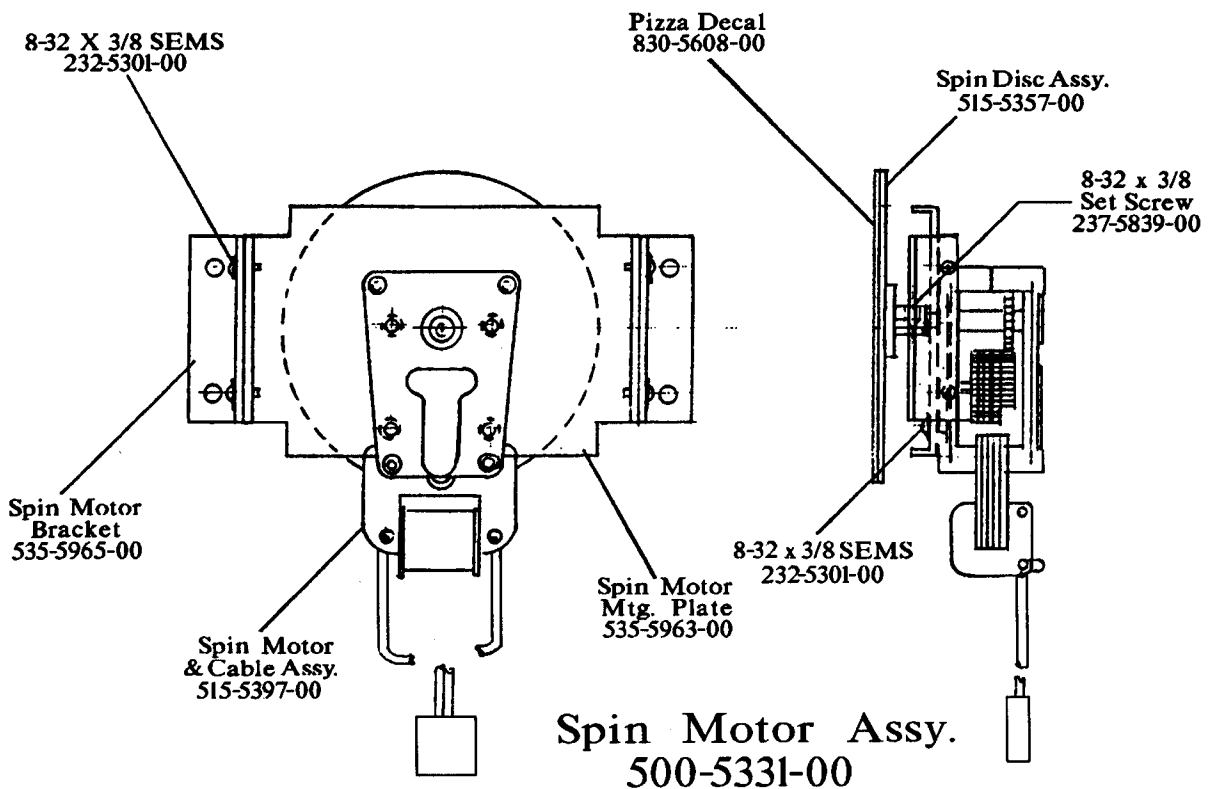


Turbo Bumper
500-5227-00



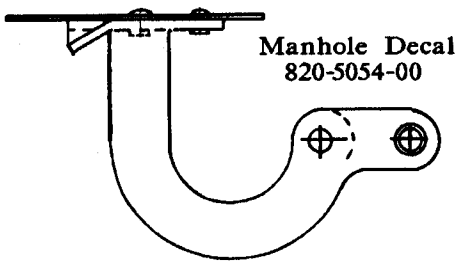


KICKBACK ASSEMBLY 500-5080-00 (COIL LUGS ON THE SIDE)
KNOCKER ASSEMBLY 500-5081-00 (PICTURED)



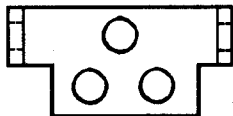
Manhole Parts

Manhole Cover Ass'y.
515-5359-00



Manhole Decal
820-5054-00

Swivel Mtg.Brkt.
535-5967-00



Brkt.&Stop
Ass'y.
515-5011-00

Use 2 E-Rings
270-5001-00
to Connect

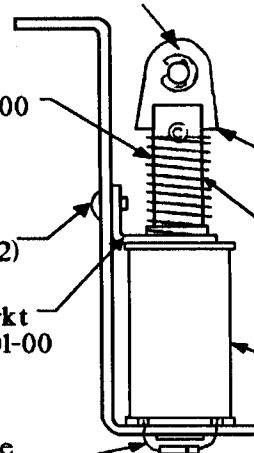
Hinge Pin
530-5131-00

Spring
266-5000-00

8-32x3/8
S.E.M.S. (2)

Coil
Mtg.Brkt
535-5201-00

Diode
1N4004

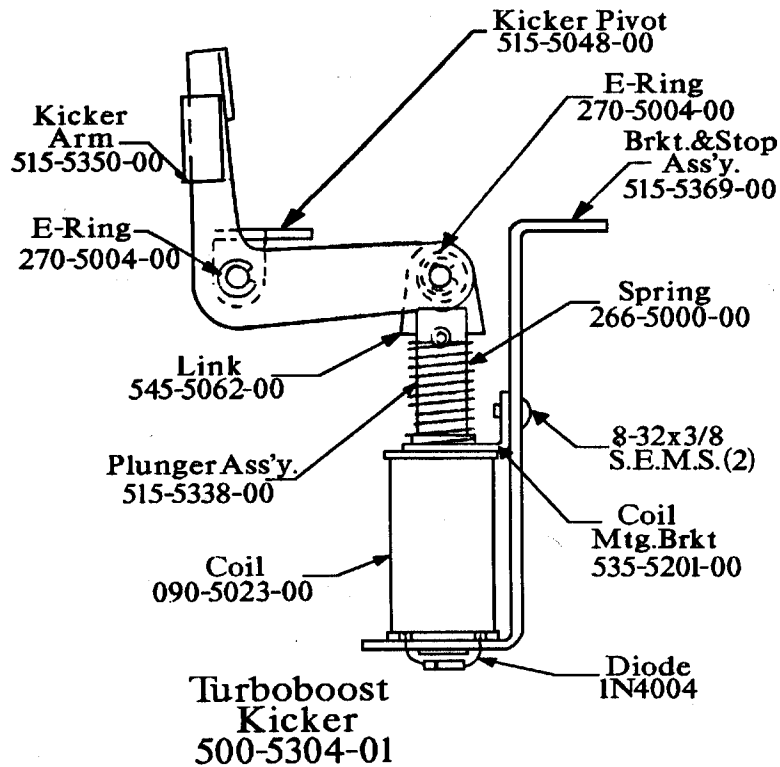


Link
545-5062-00

Plunger Ass'y.
515-5338-00

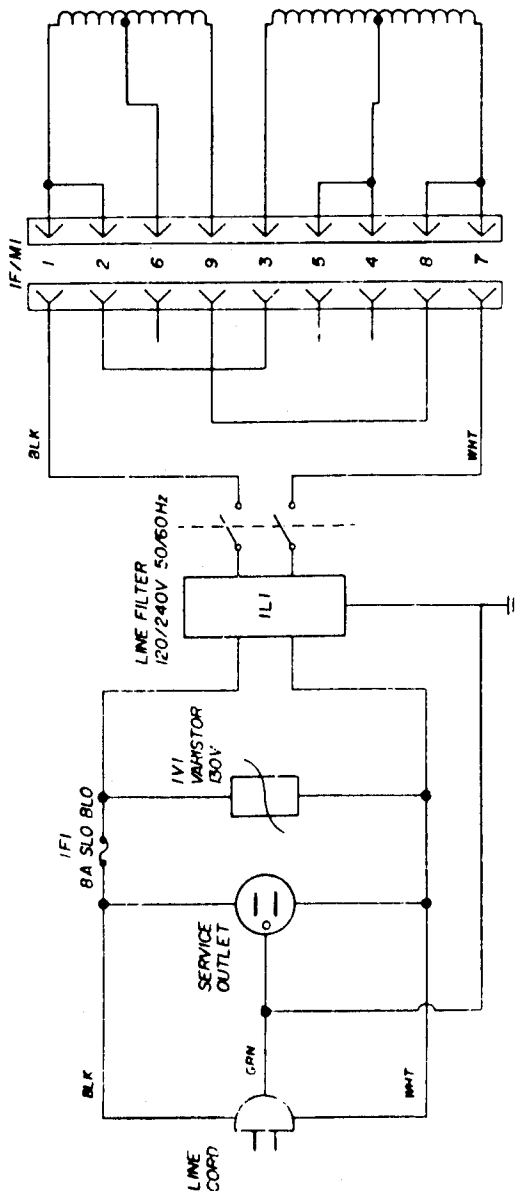
23-800 Coil
090-5001-00

Coil Bracket
& Plunger Ass'y.
515-5369-01



THIS CONFIGURATION FOR 115V

FOR LOWER LINE VOLTAGES
OR 230 VOLT OPERATION
SEE SAMPLES BELOW

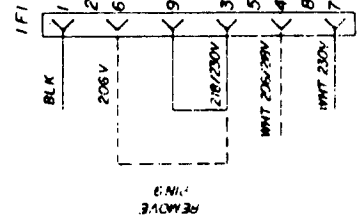


JUMPERS FOR VOLTAGE VARIATION

230/218/206 VOLTS

IF1 - 4A SLO BLO

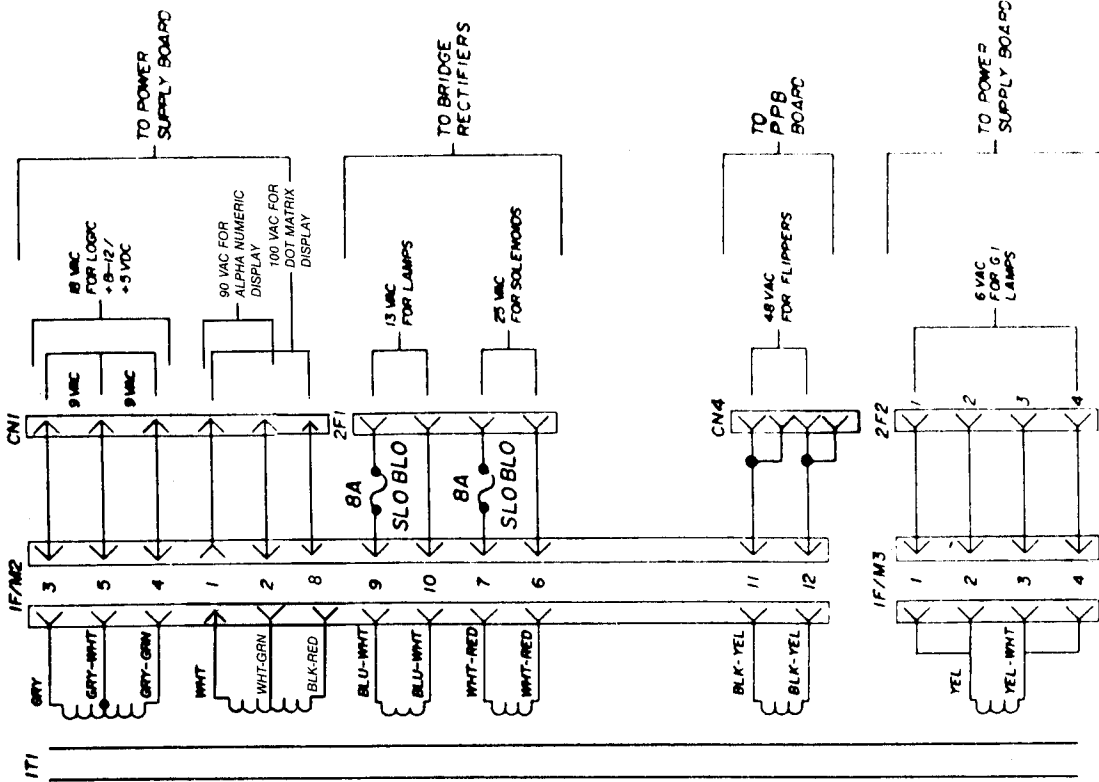
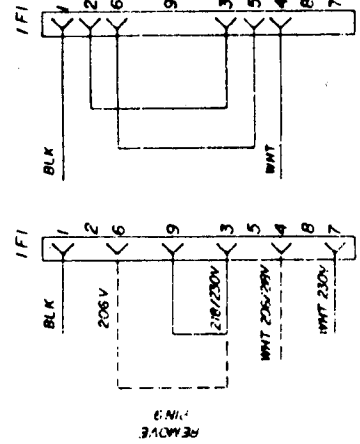
IV1 - 275V VARIATOR

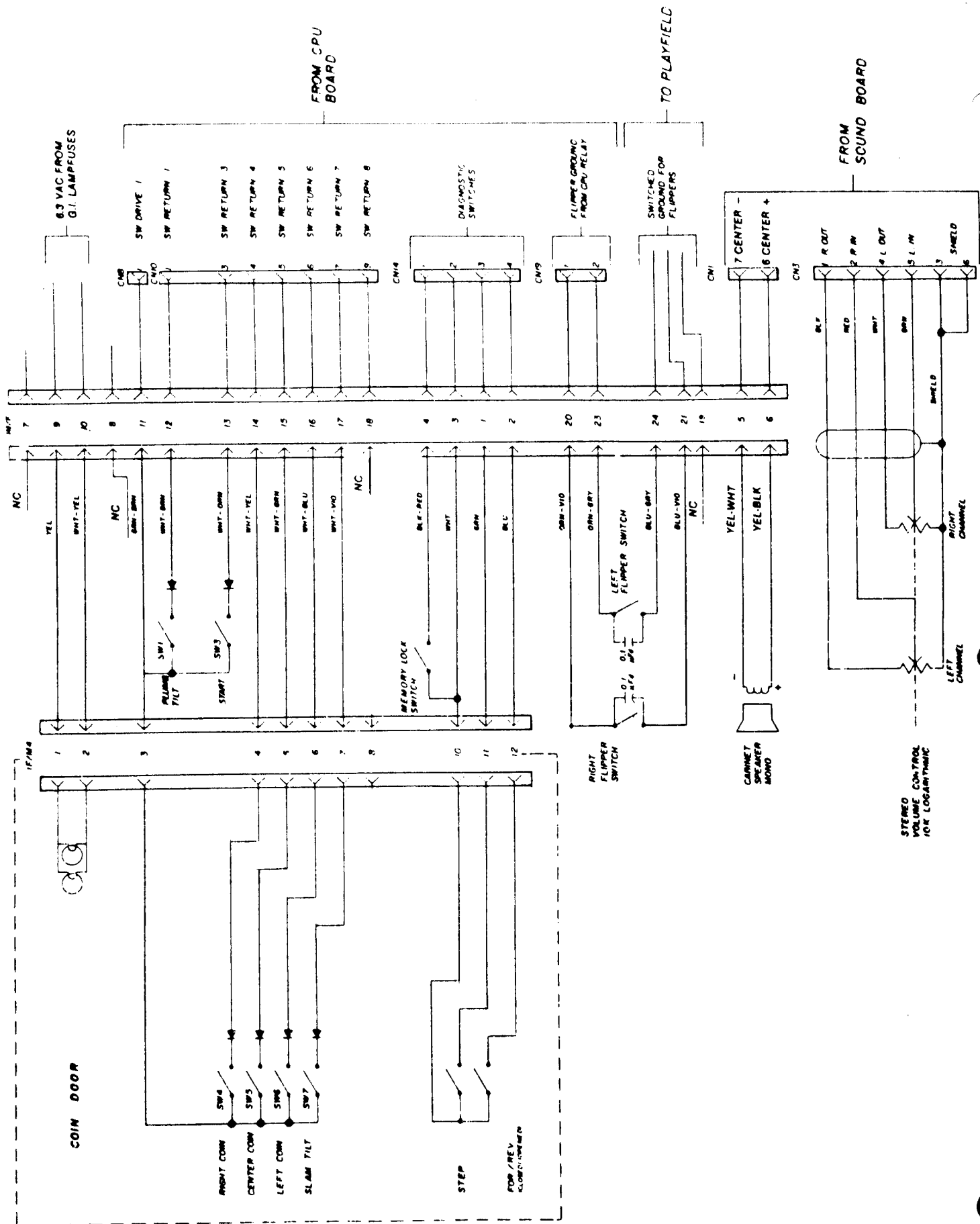


100/105 VOLTS

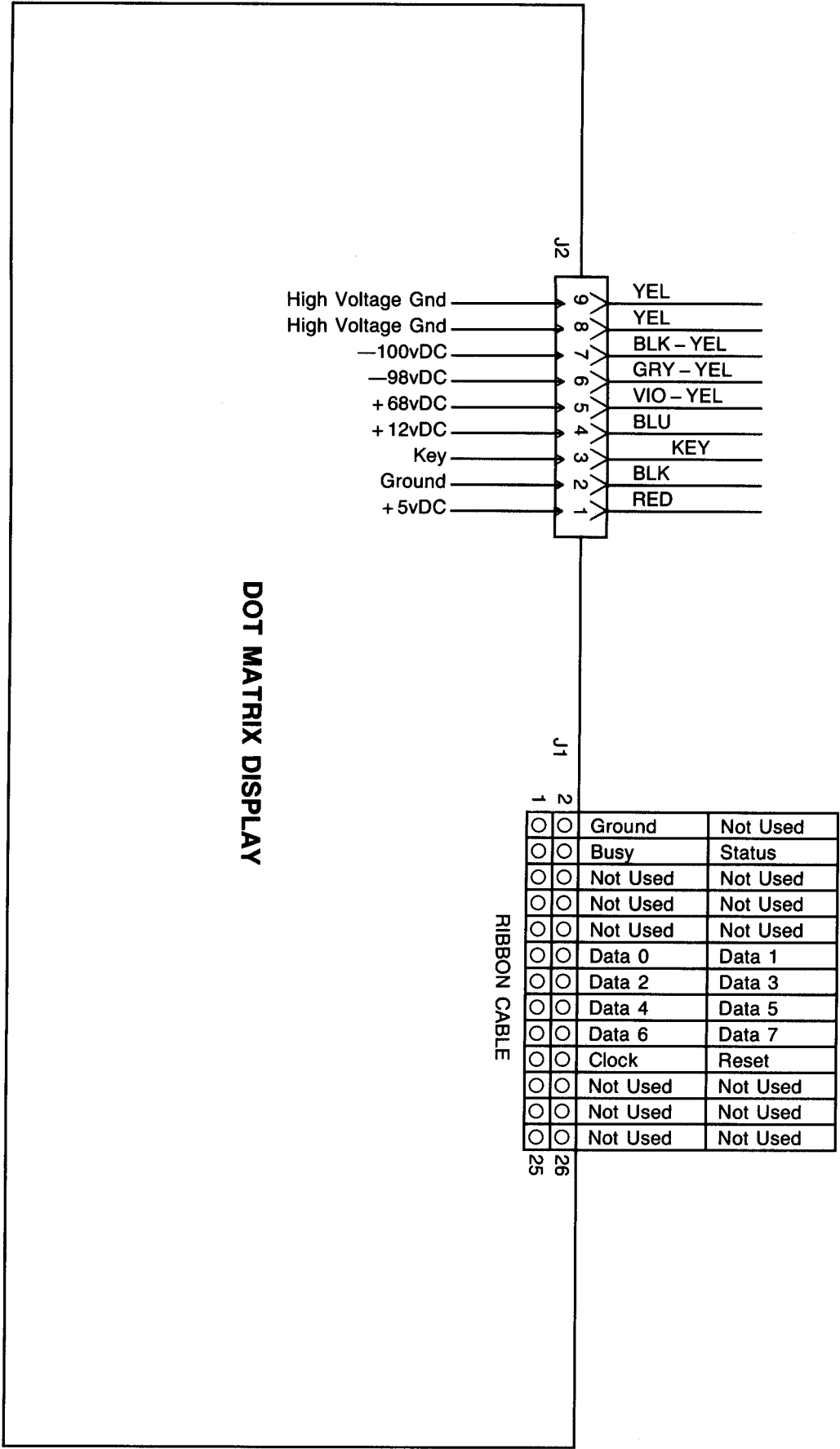
IF1 - 8A SLO BLO

IV1 - 130V VARIATOR

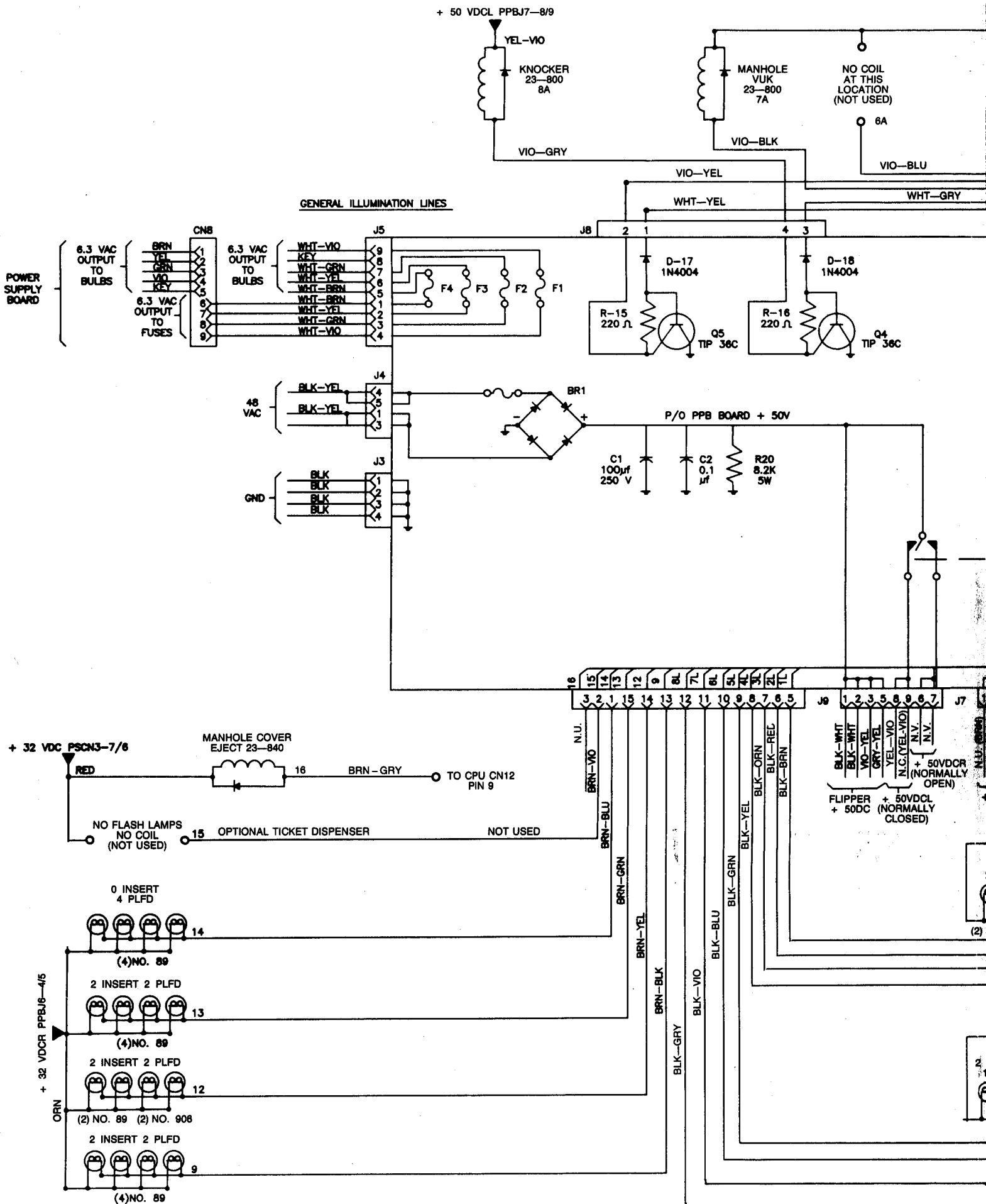




42 Cabinet Wiring Diagram



NOTES



46 Playfield Coil / Flash Lamp Wiring Diagram

+50 VDCL PPBJ7-8/9

+ 32 VDCL PPB J6-1/2/3

ORN

TURBO BOOST KICKER 22-800 4A

NO COIL AT THIS LOCATION (NOT USED)

TROUGH EJECT 23-840 2A

OUTHOLE 23-840 1A

VIO-ORN 3A

VIO-RED

VIO-BRN

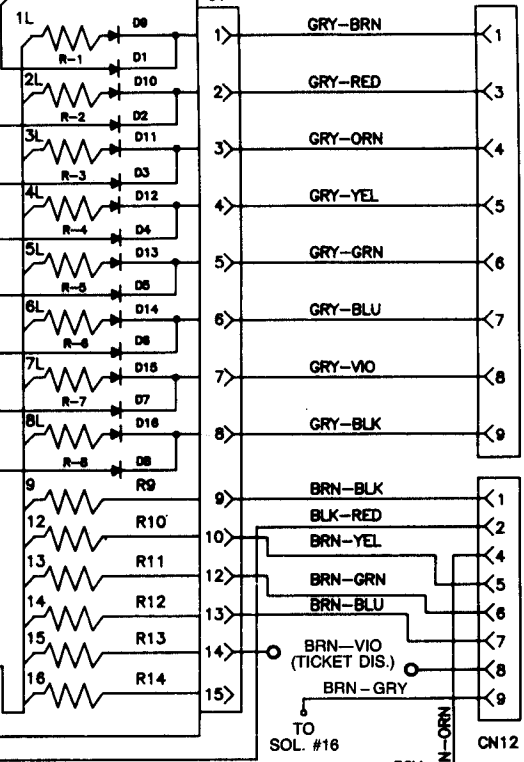
A/B RELAY

NORMALLY CLOSED SIDE = "N.C." = "L"LEFT = "A" SIDE
NORMALLY OPEN SIDE = "N.O." = "R"IGHT = "B" SIDE
N.U. MEANS "NOT USED"

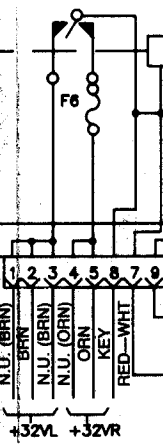
J2 1 2 3 4 5 6 7 8 9

J1

CN11



C.P.U. BOARD



K1 D22 SOL 10

+ 32 FROM P.S. CN3 PIN5

+ 32V

KEY

BRN-ORN

P.S. CN7

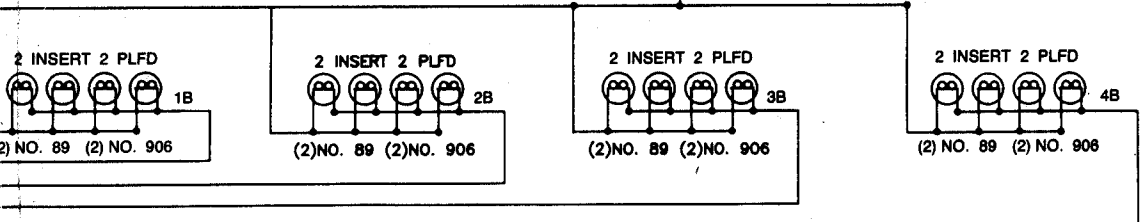
SOL. II

RY1 GENERAL ILLUMINATION RELAY

POWER SUPPLY BOARD

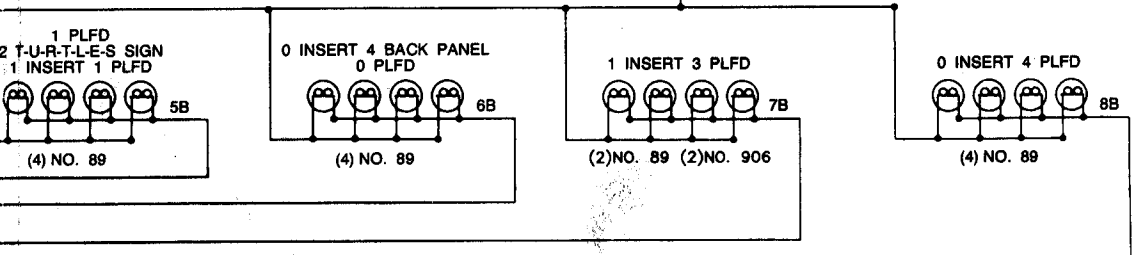
+ 32 VDCL PPB J6-4/5

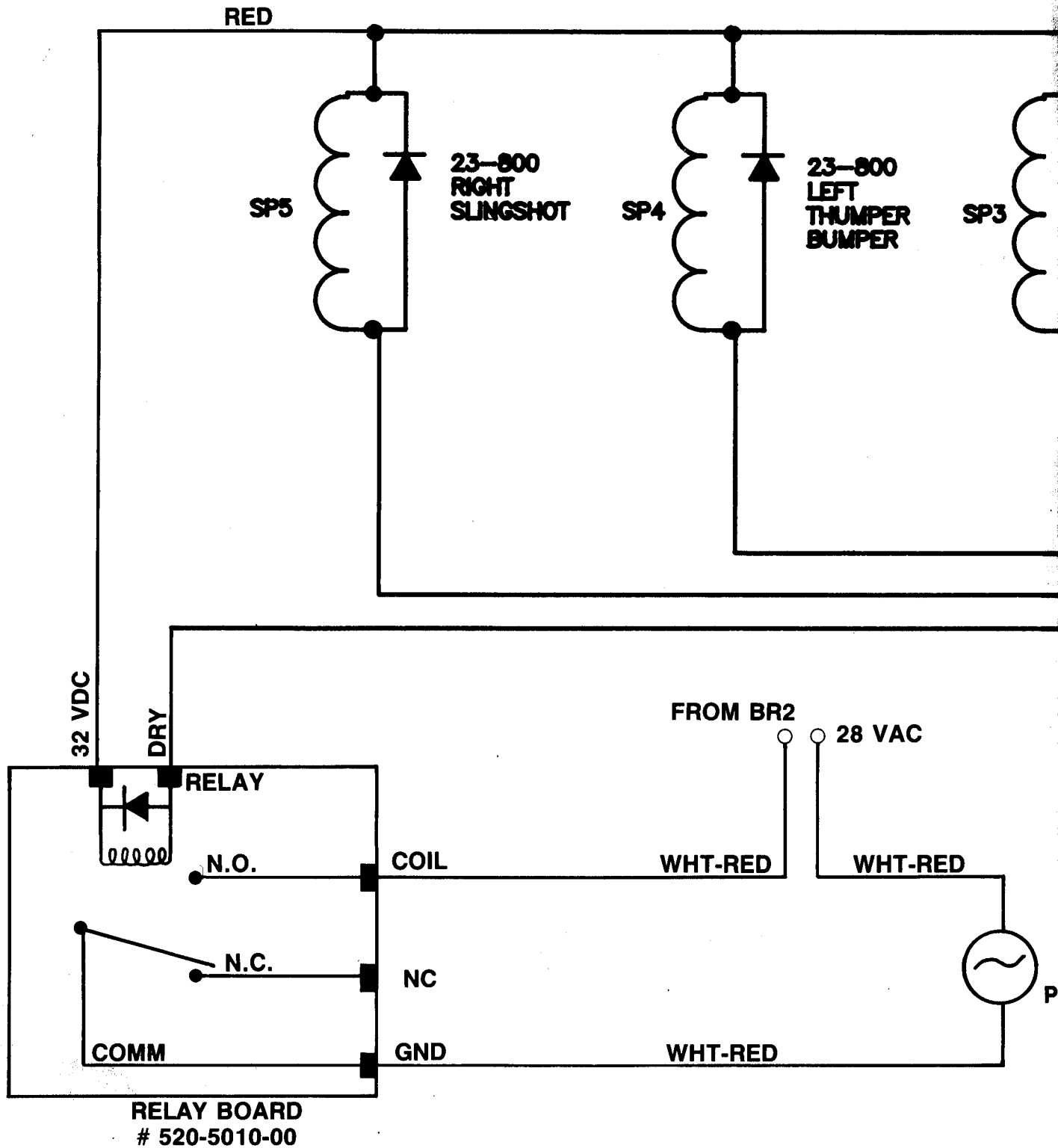
ORN



+ 32 VDCL PPB J6-4/5

ORN





RED

SP5

23-800
RIGHT
SLINGSHOT

SP4

23-800
LEFT
THUMPER
BUMPER

SP3

32 VDC

DRY

RELAY

N.O.

COIL

FROM BR2

WHT-RED

28 VAC

WHT-RED

N.C.

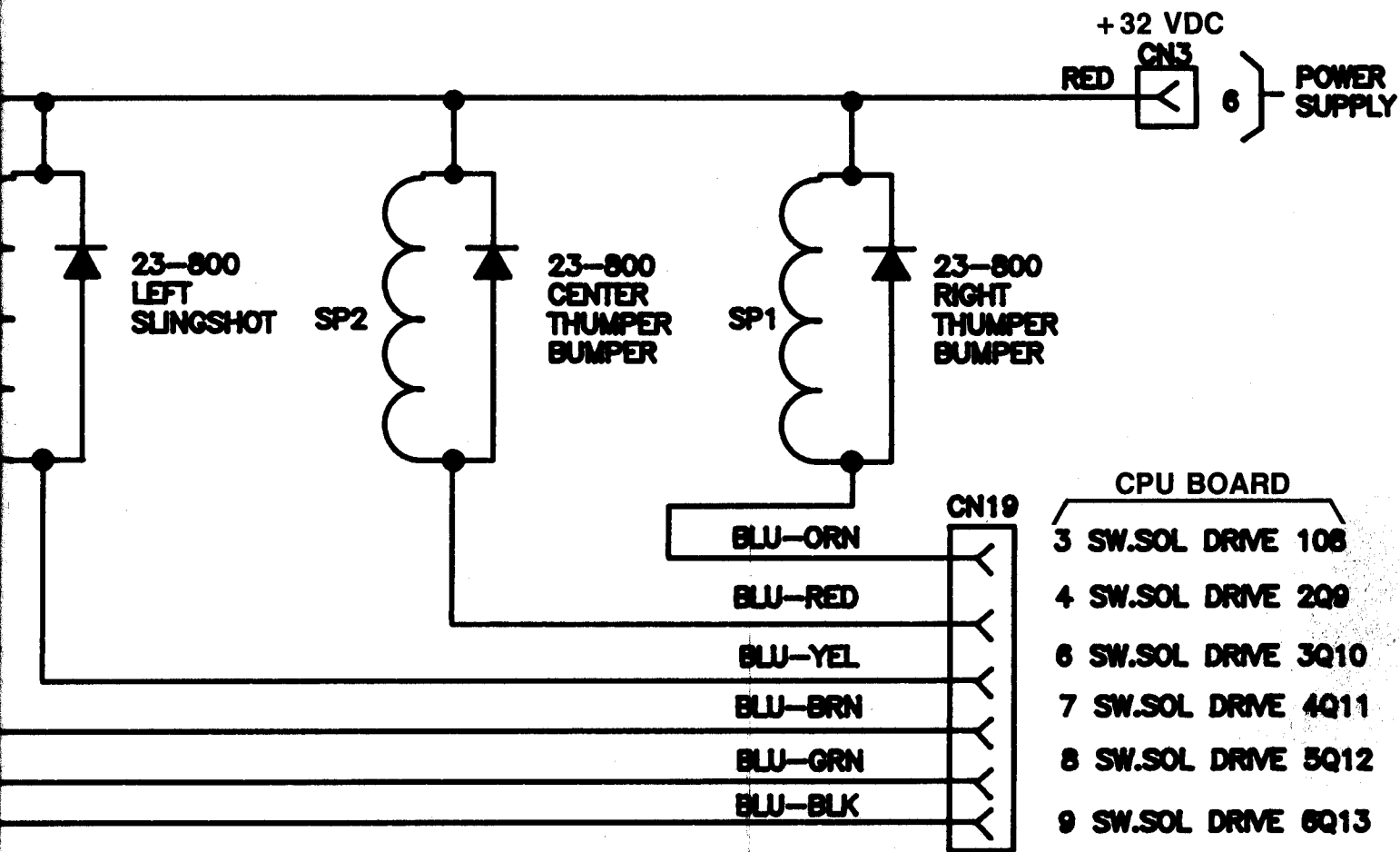
NC

COMM

GND

WHT-RED

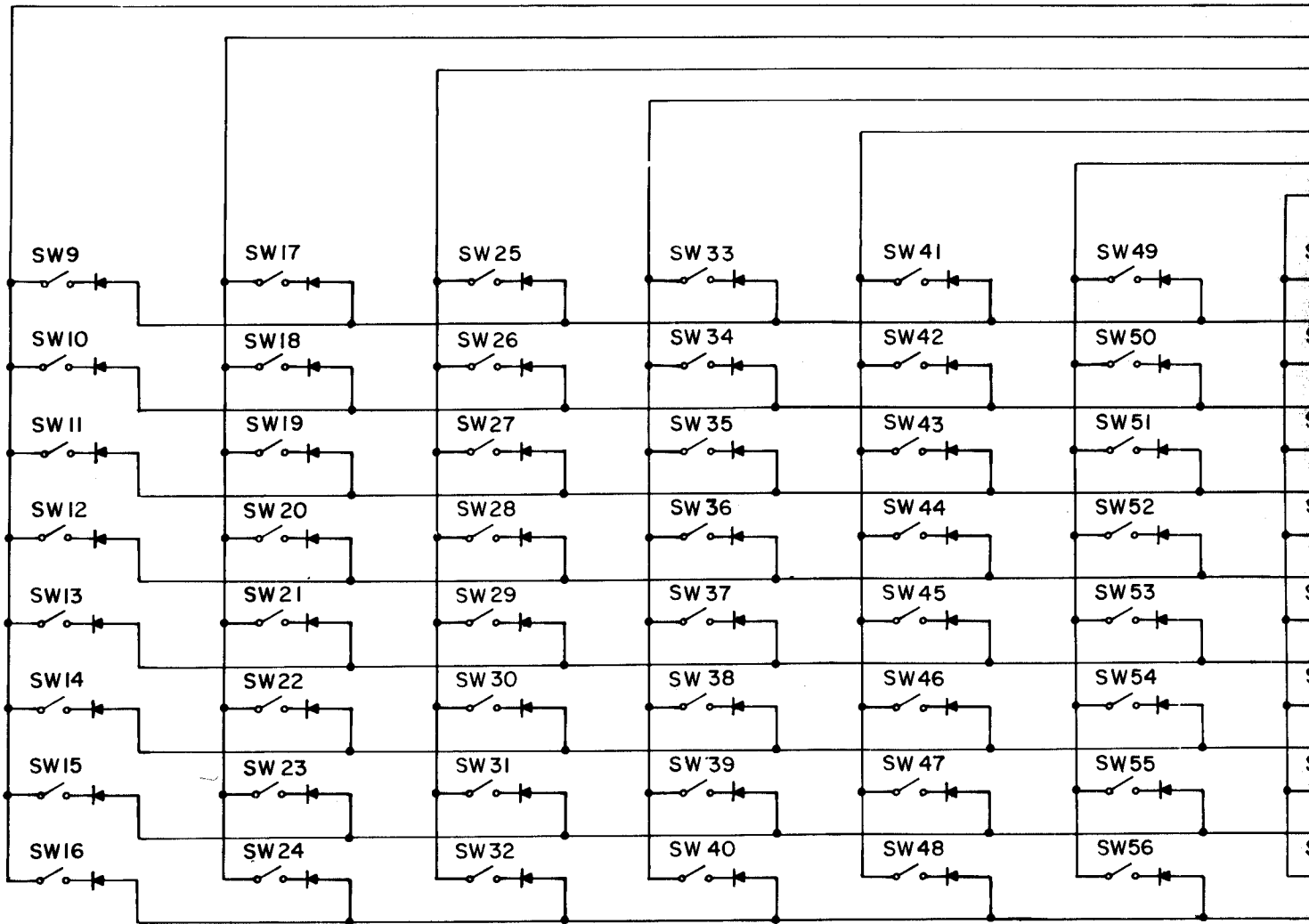
RELAY BOARD
520-5010-00



SPINNING PIZZA
24 VAC MOTOR
PART #515-5397-00

**Switch
Number Description**

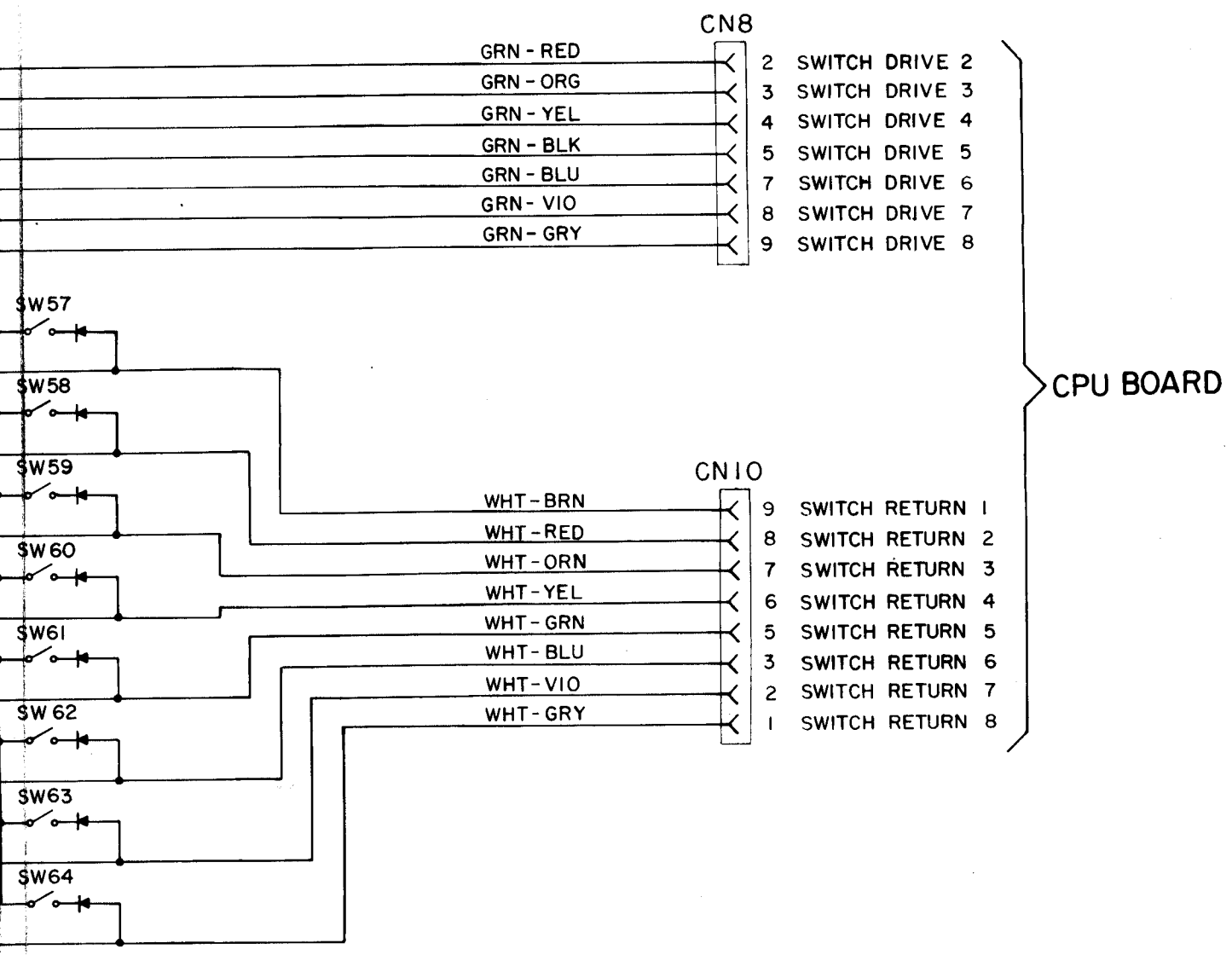
01*	Plumb Tilt	16	Right Flip. Cab. Switch	31
02	Not Used	17	Left Outlane	32
03	Credit Button	18	Left Return Lane	33
04*	Right Coin	19	Right Outlane	34
05*	Center Coin	20	Right Return Lane	35
06*	Left Coin	21	Left Slingshot Sw. (2)	36
07*	Slam Tilt	22	Right Slingshot Sw. (2)	37
08	Not Used	23	Flat tire	38
09	Not Used	24	VUK Entrance	39
10	Out Hole	25	Top Lane "L"	40
11	Trough #1(Left)	26	Top Lane "A"	41
12	Trough #2(Center)	27	Top Lane "P"	42
13	Trough #3(Right)	28	Ramp Entrance	43
14	Shooter Lane	29	Ramp Exit	44
15	Left Flip. Cab. Switch	30	VUK Eject	45



Not Used
 Not Used
 Drop Target CARRERA
 Drop Target CARRERA
 Drop Target CARRERA
 Drop Target CARRERA
 Pitstop Eject
 Spinner
 Not Used
 Not Used
 Drop Target CARRERA
 Drop Target CARRERA
 Drop Target CARRERA
 Single Drop Target
 Collect Energy

46 Bumper Left
 47 Bumper Center
 48 Bumper Right
 49 Not Used Thru 64

* Indicates cabinet switches.

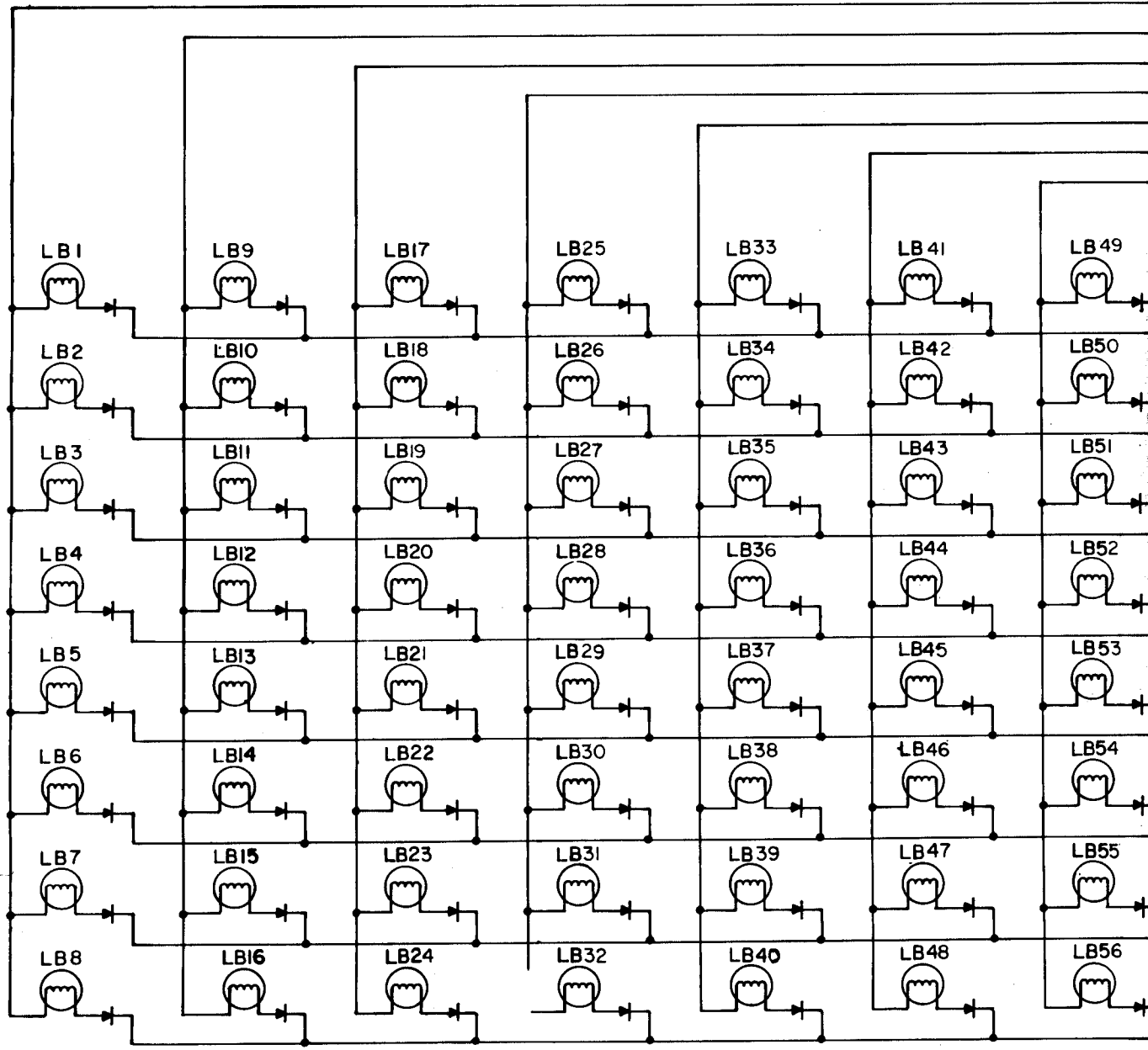


Lamp Number	Description
01.	Pitstop Red
02.	Pitstop Green
03.	Checkpoint Red
04.	2000 RPM
05.	3000 RPM
06.	Race Again
07.*	Jackpot 2 Million
08.*	Jackpot 3 Million
09.	Bluelite Million Lit
10.	Bluelite Redline
11.	Bluelite Ex.Ball
12.	Bluelite Catchup
13.	Bluelite Special
14.	Bluelite Double Scores
15.*	Jackpot 4 Million
16.*	Double Jackpot Grand Prix

17.	Million
18.	4000 RPM
19.	5000 RPM
20.	6000 RPM
21.	7000 RPM
22.	8000 RPM
23.	Hot Nitro Active.
24.	Check Point Green
25.	Drop Target "C"
26.	Drop Target "A"
27.	Drop Target "R"
28.	Drop Target "R"
29.	Drop Target "E"
30.	Drop Target "R"
31.	Drop Target "A"
32.	Return Right

*Indicates Speaker or Back

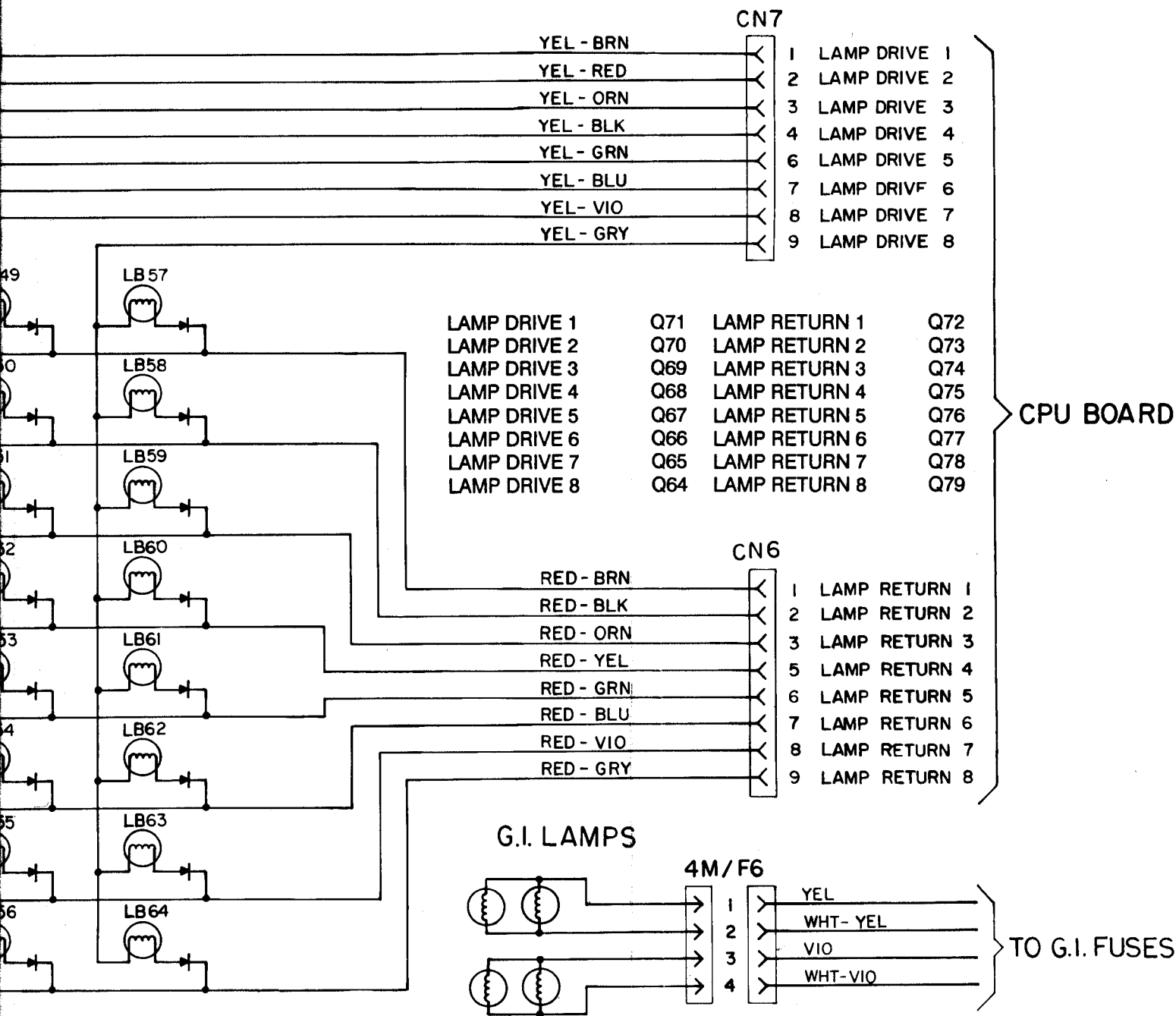
33.	
34.	
35.	
36.	
37.	
38.	
39.	
40.	
41.	
42.	
43.	
44.	
45.	
46.	
47.	
48.	



Backbox Lamp

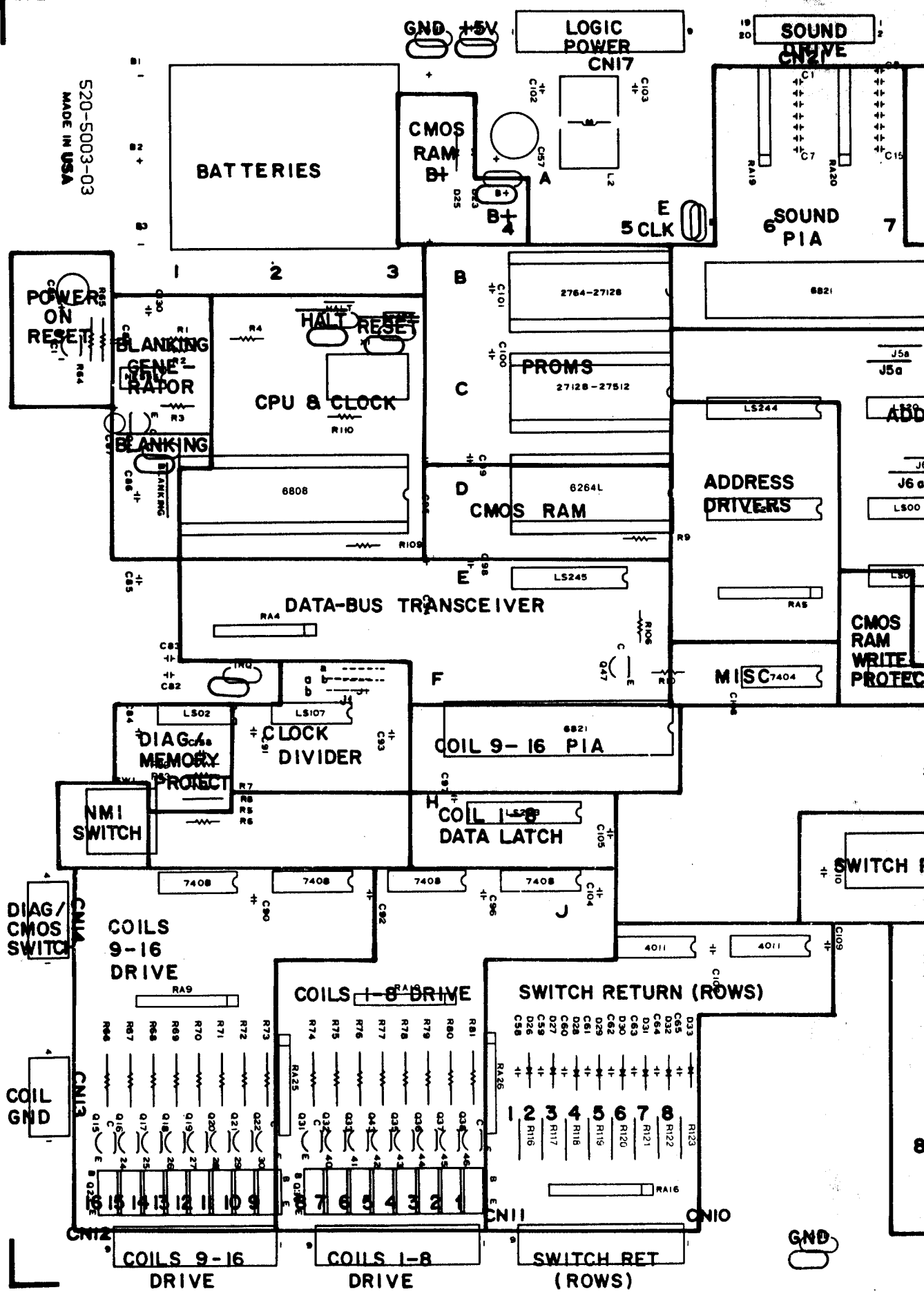
- Flag U.S.A.
- Flag Germany
- Flag France
- Flag Japan
- Flag Belgium
- Flag Swiss
- Flag Italy
- Flag England
- Top Lane "L"
- Top Lane "A"
- Top Lane "P"
- Spinner Mystery RPM
- Spinner Lite Extra Ball
- Spinner Mystery Scores
- Spinner Hot Nitro
- Spinner 1 Million

- 49.* Fast "F"
- 50.* Fast "A"
- 51.* Fast "S"
- 52.* Fast "T"
- 53. Ramp Jackpot
- 54. Ramp Skill Shot
- 55. Return Left
- 56. Outlane Left
- 57. Release
- 58. Instant Rerace
- 59. Activate "Fast" Scores
- 60. Ramp Extra Ball
- 61. Bumper Left
- 62. Bumper Center
- 63. Bumper Right
- 64. Outlane Left



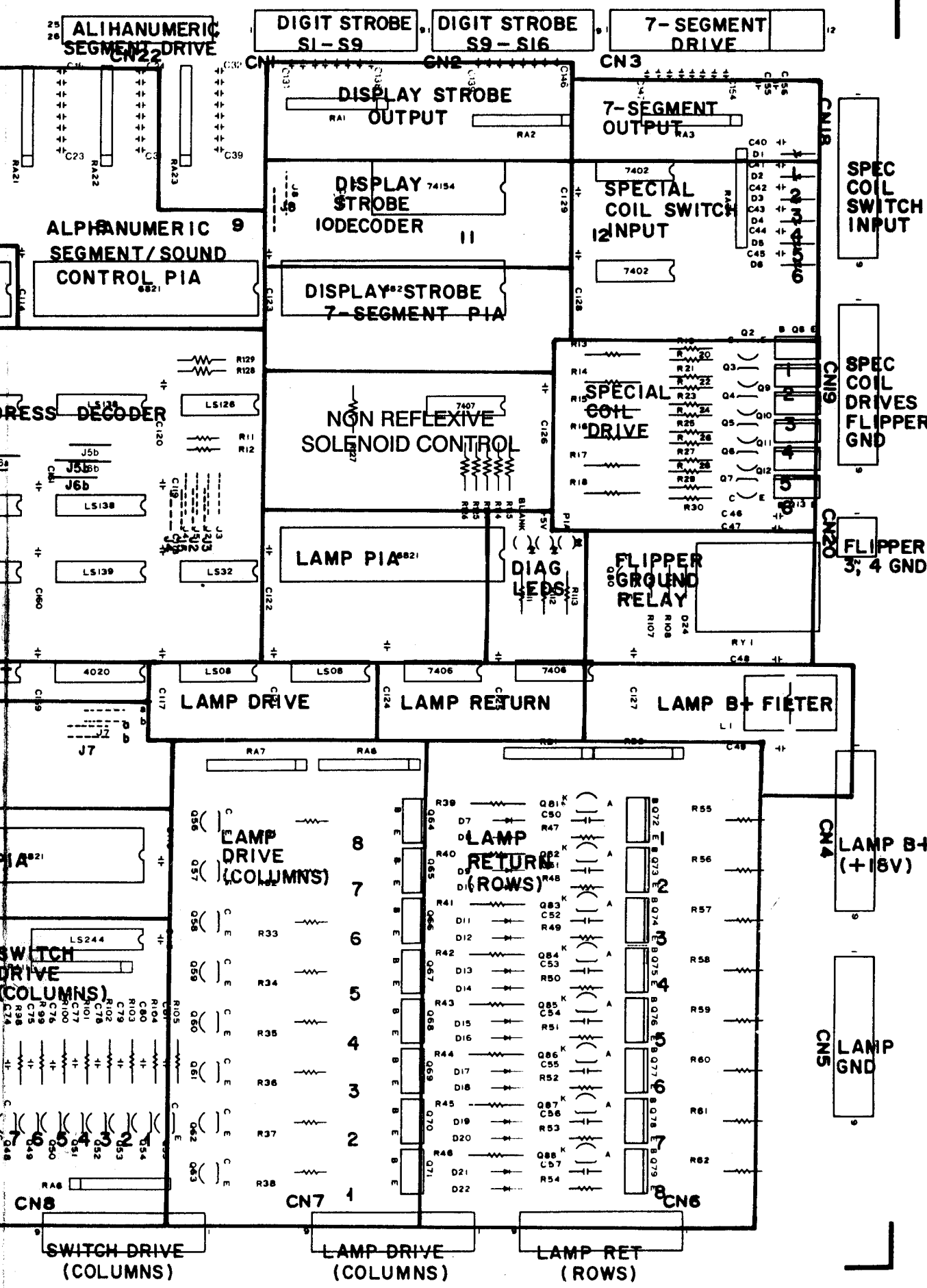


520-5003-03
MADE IN USA



520-5003-03 REV. A
0E-0262-3A

50 CPU Board Assembly Diagram



25 ALPHANUMERIC
26 SEGMENT DRIVE
CN22

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
IODECODER

SPECIAL
COIL SWITCH
INPUT

DISPLAY STROBE
7-SEGMENT PIA

NON REFLEXIVE
SOLENOID CONTROL

SPECIAL
COIL
DRIVE

SPEC
COIL
SWITCH
INPUT

SPEC
COIL
DRIVES
FLIPPER
GND

LAMP PIA

DIAG
LEDS

FLIPPER
GROUND
RELAY

FLIPPER
3, 4 GND

LAMP DRIVE

LAMP RETURN

LAMP B+ FILTER

LAMP
DRIVE
(COLUMNS)

LAMP
RETURN
(ROWS)

LAMP B+
(+18V)

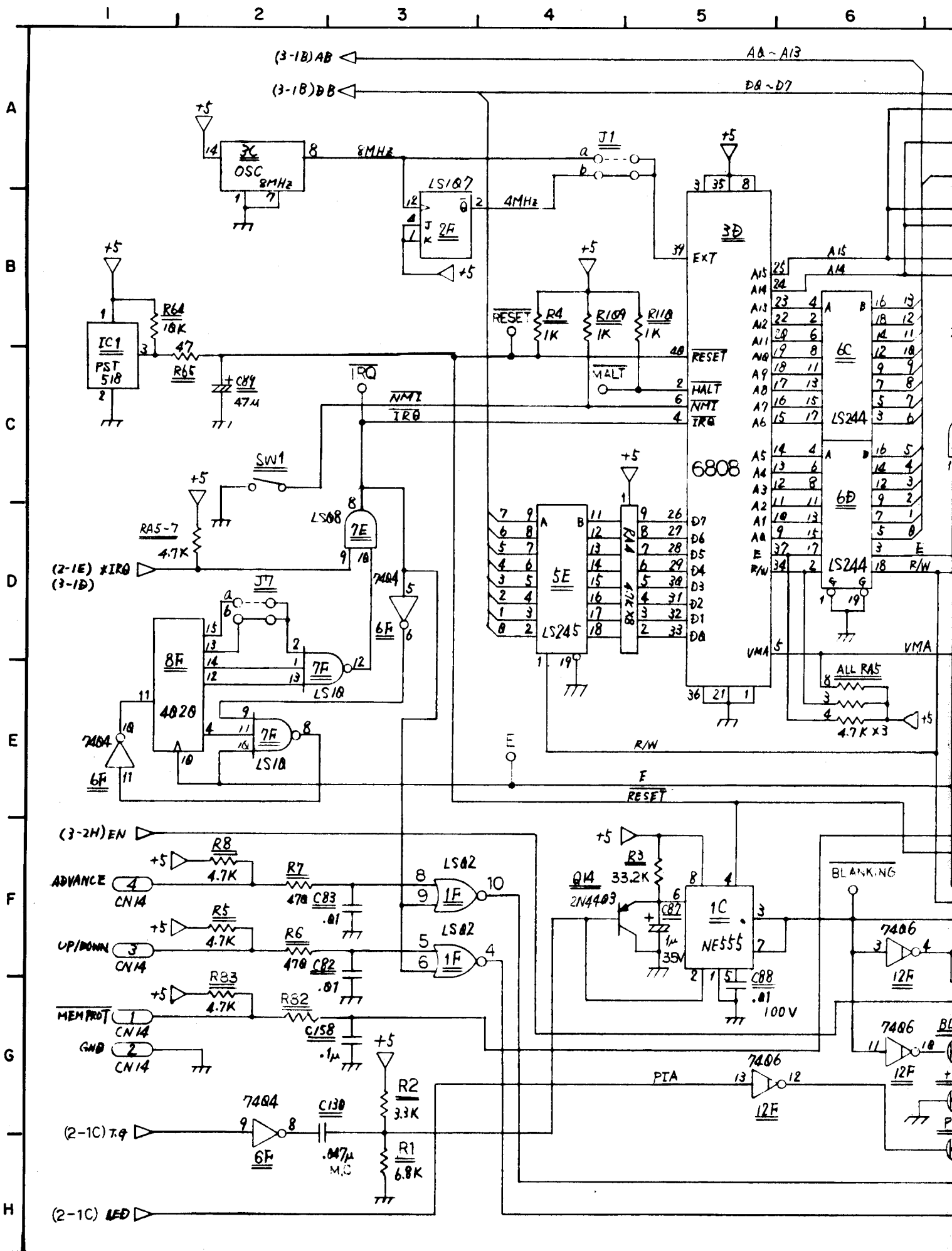
SWITCH
DRIVE
(COLUMNS)

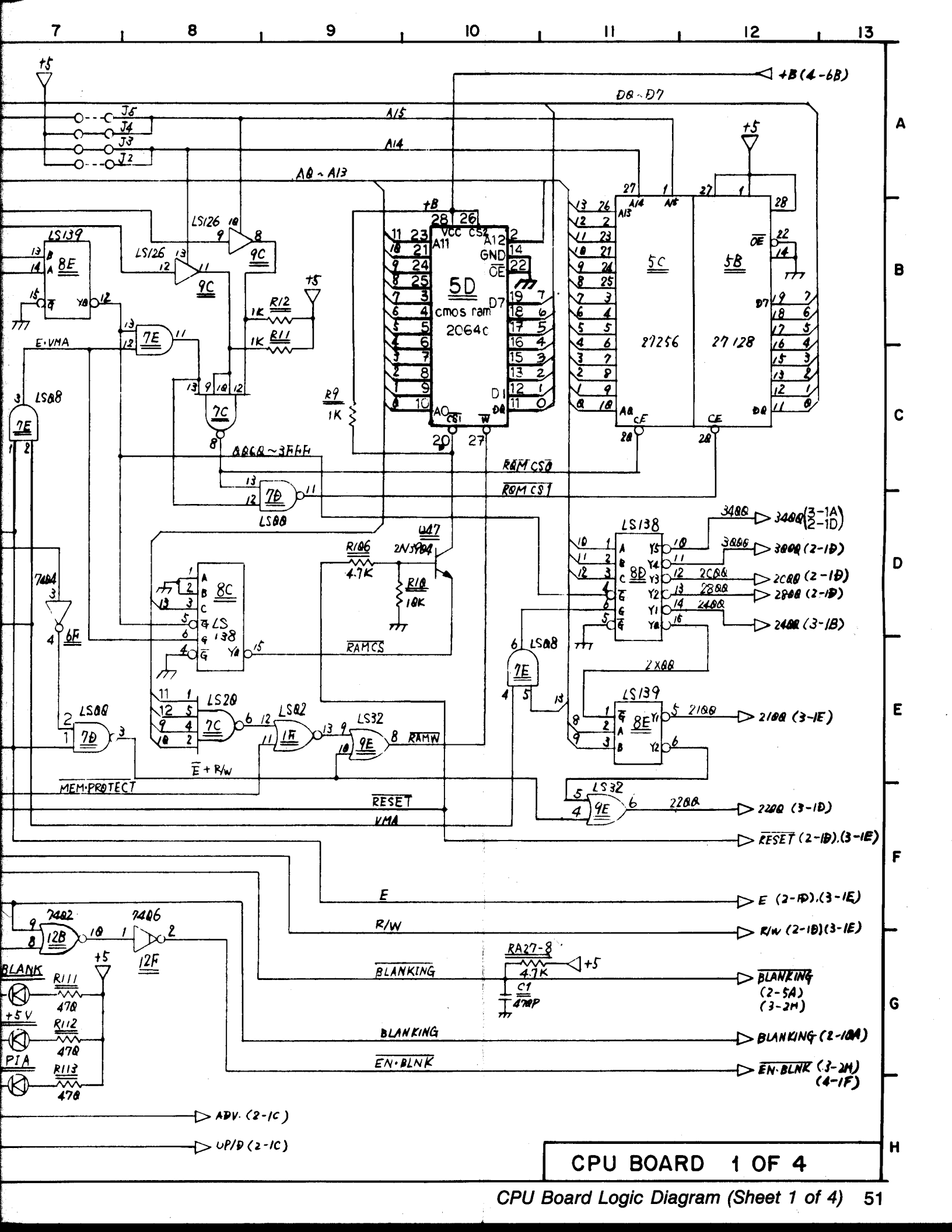
LAMP
GND

SWITCH DRIVE
(COLUMNS)

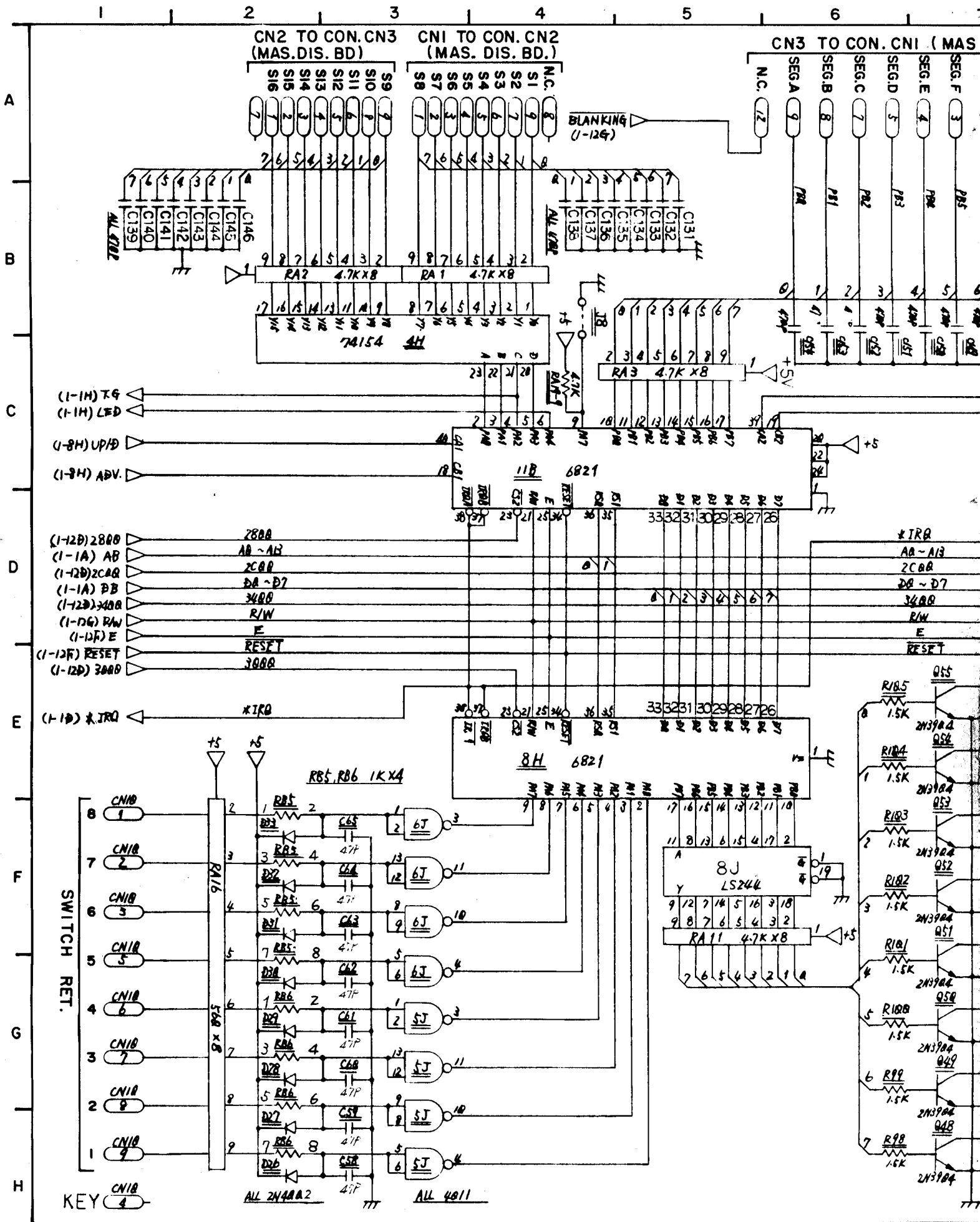
LAMP DRIVE
(COLUMNS)

LAMP RET
(ROWS)



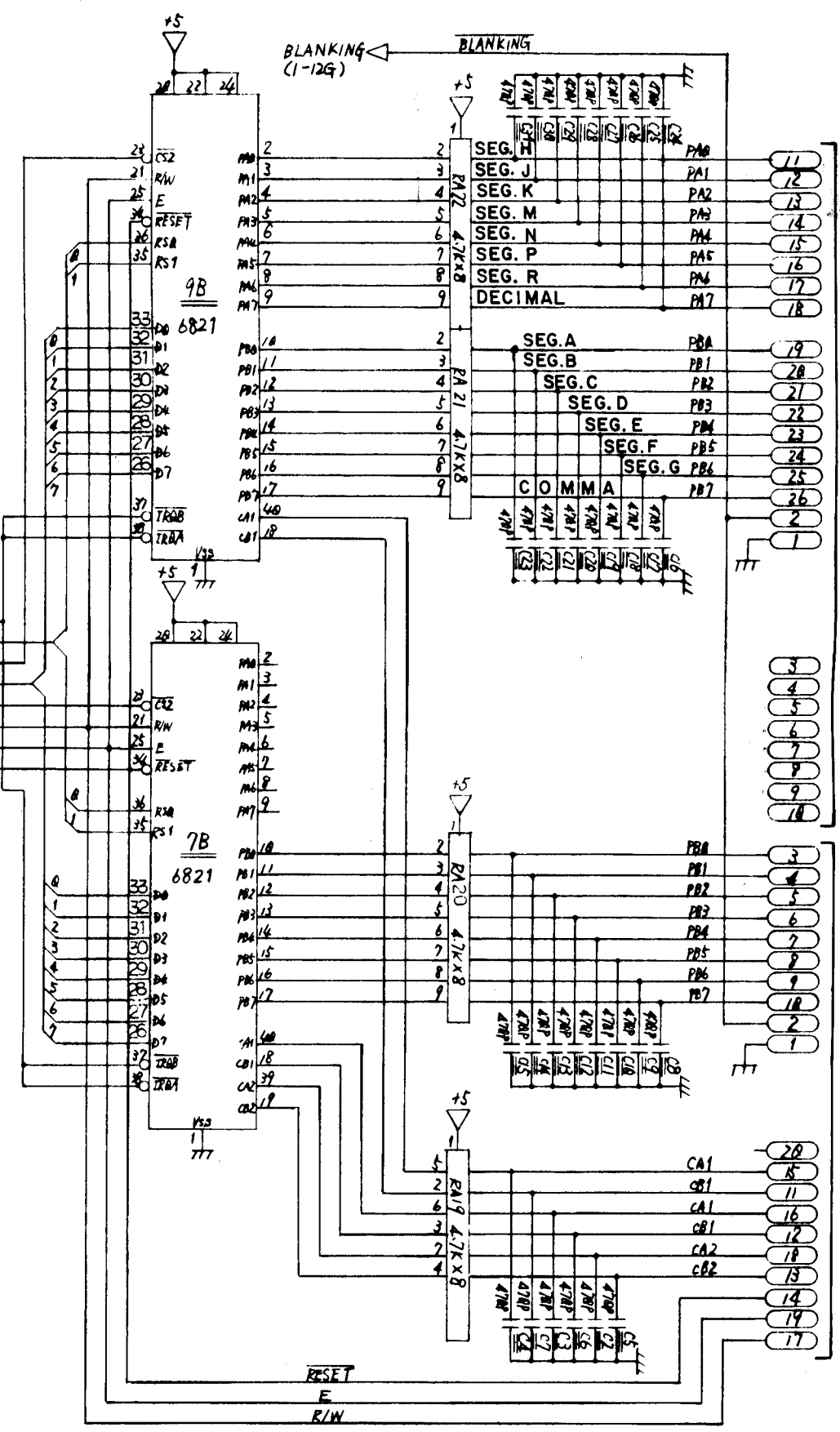
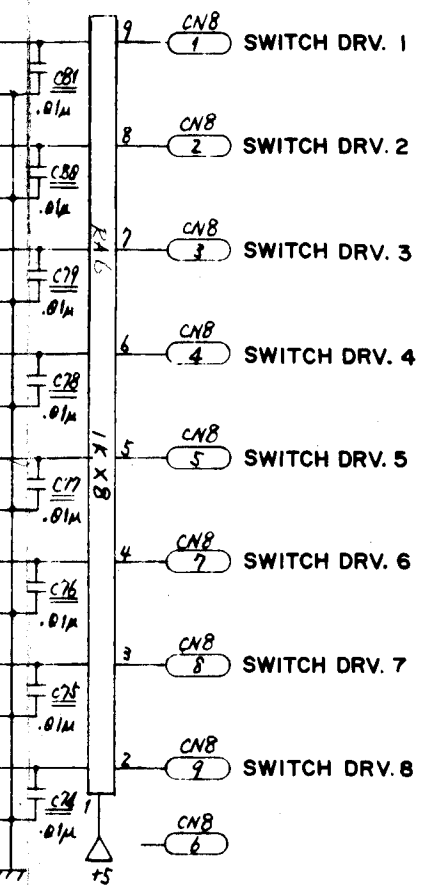
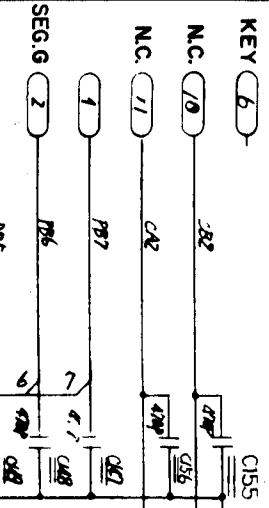


CPU BOARD 1 OF 4



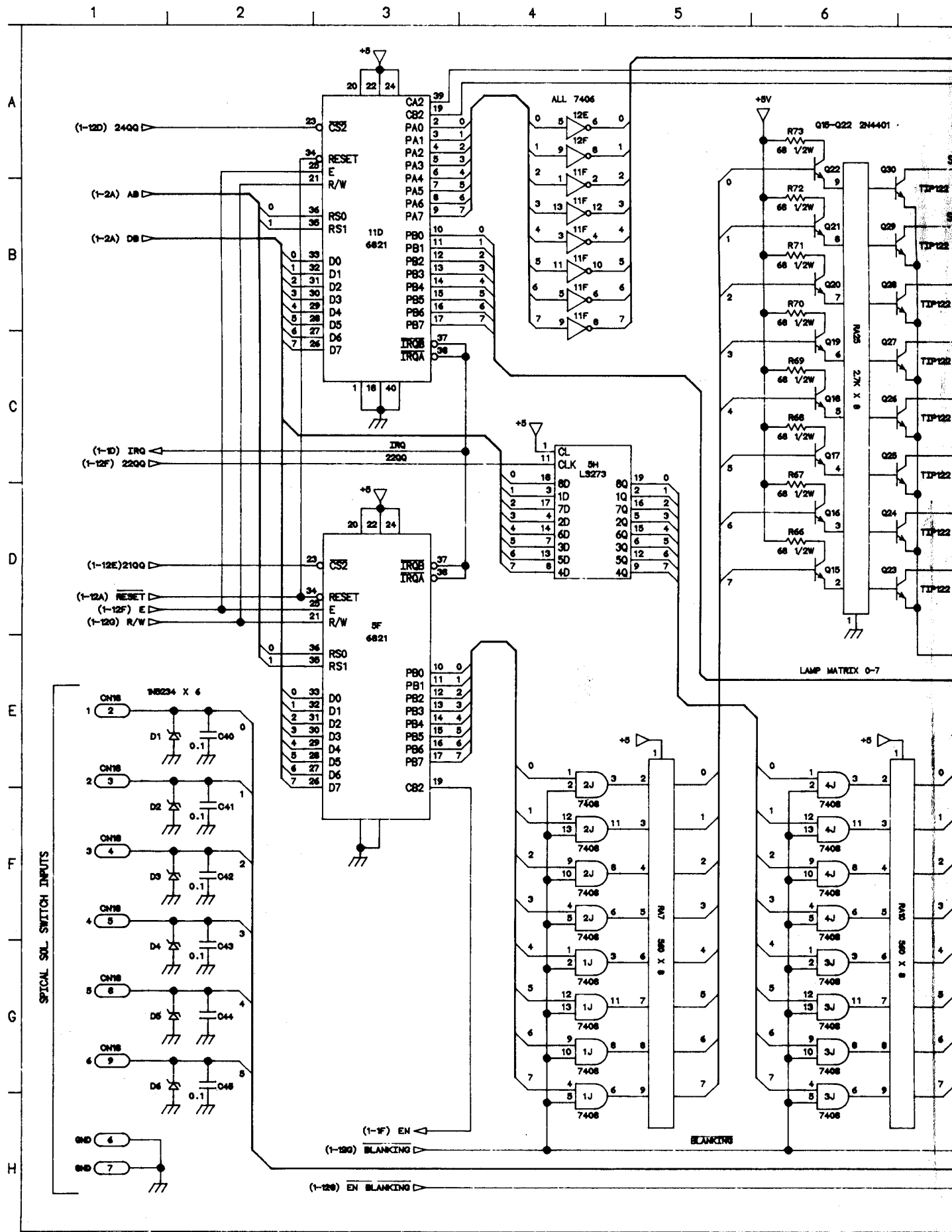
52 CPU Board Logic Diagram (Sheet 2 of 4)

S DIS. BD)



CN2 ALPHANUMERIC SEGMENT DRIVERS

CN21 SOUND DRIVERS



A
B
C
D
E
F
G
H

1 2 3 4 5 6

OPTICAL SWITCH INPUTS

LAMP MATRIX 0-7

BLANKING

(1-12G) EN BLANKING

(1-1F) EN

(1-12D) 2400

(1-2A) AB

(1-2A) DB

(1-1D) IRQ

(1-12F) 2200

(1-12E) 2100

(1-12A) RESET

(1-12F) E

(1-12G) R/W

EN 6

EN 7

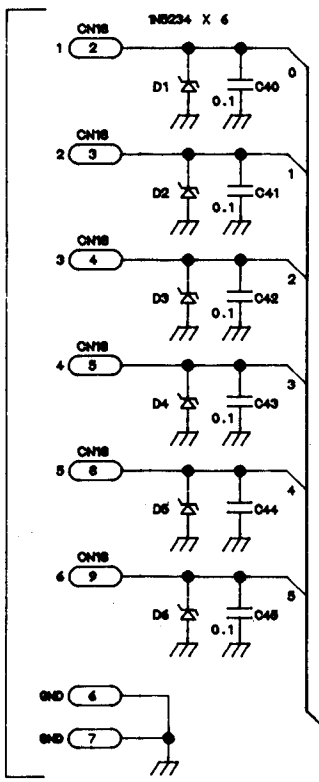
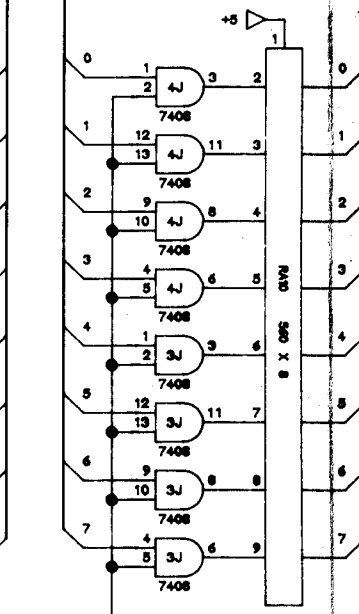
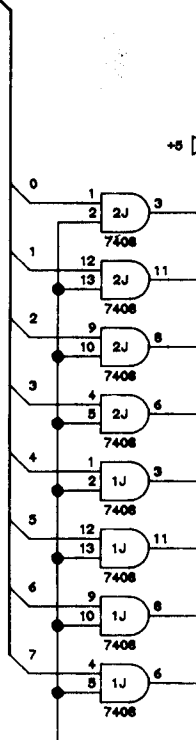
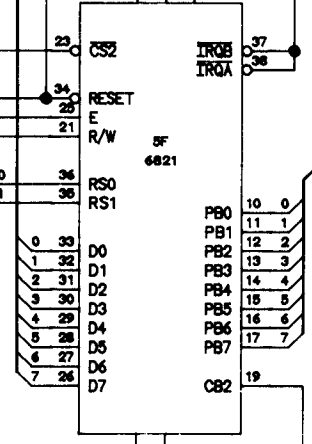
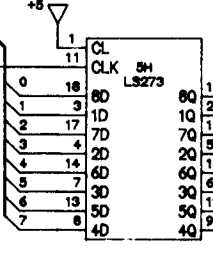
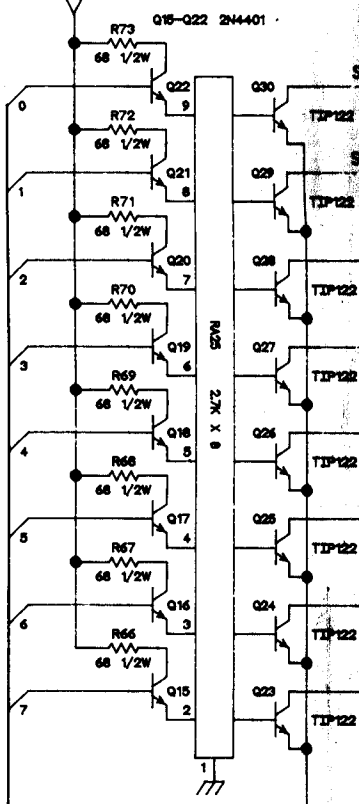
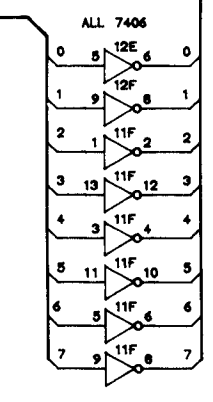
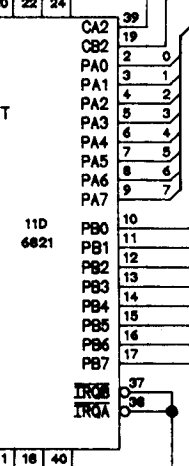
+5

+5V

+5

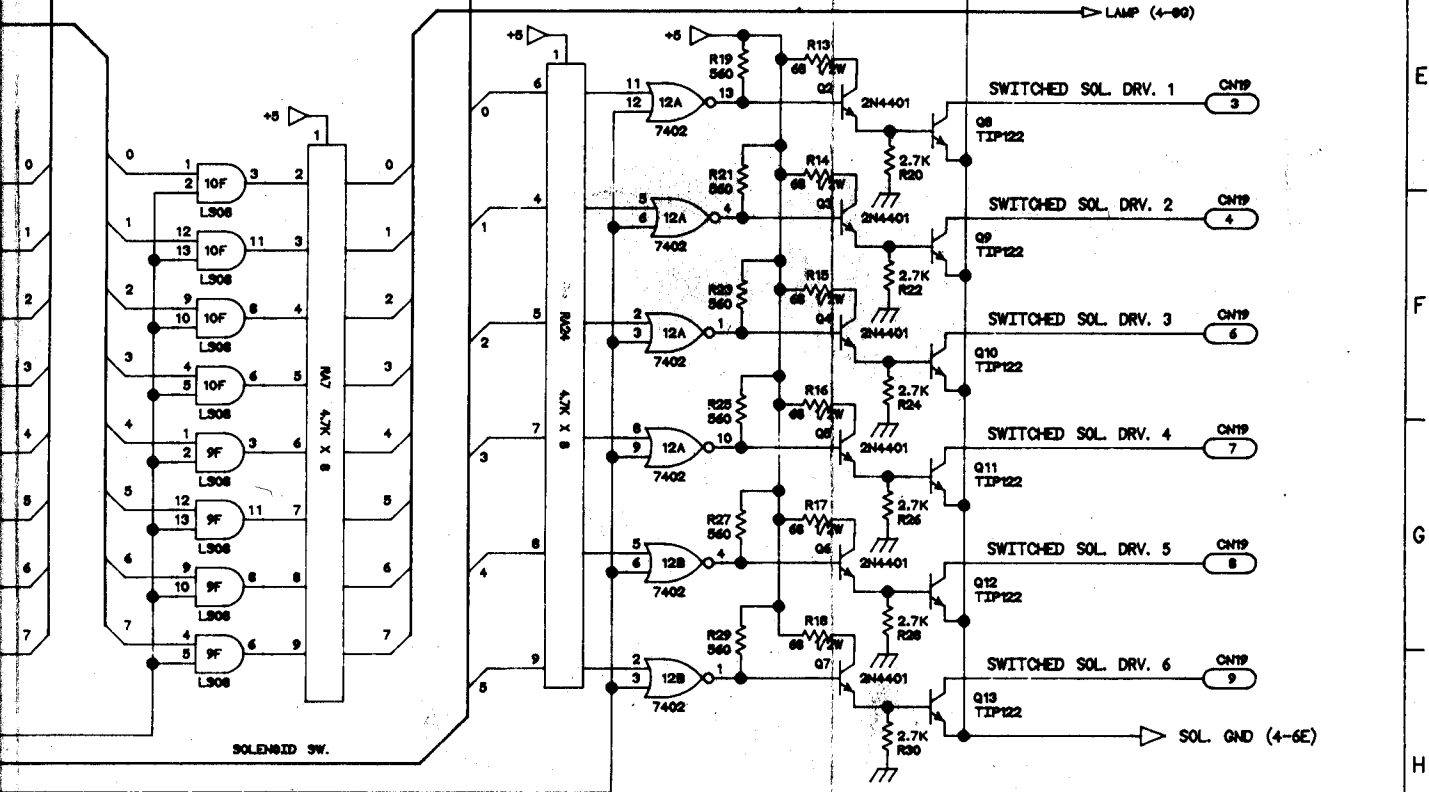
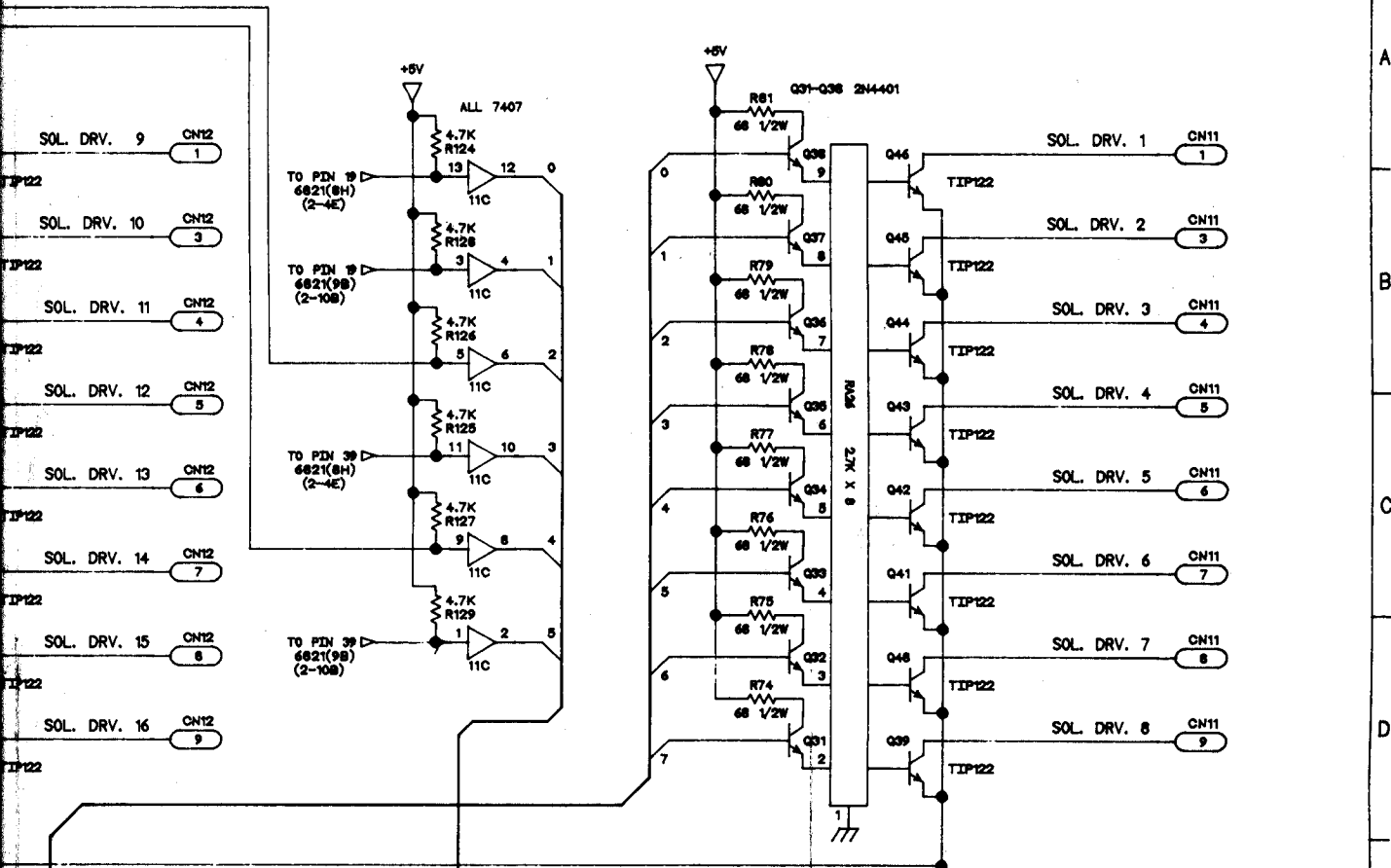
+5

+5

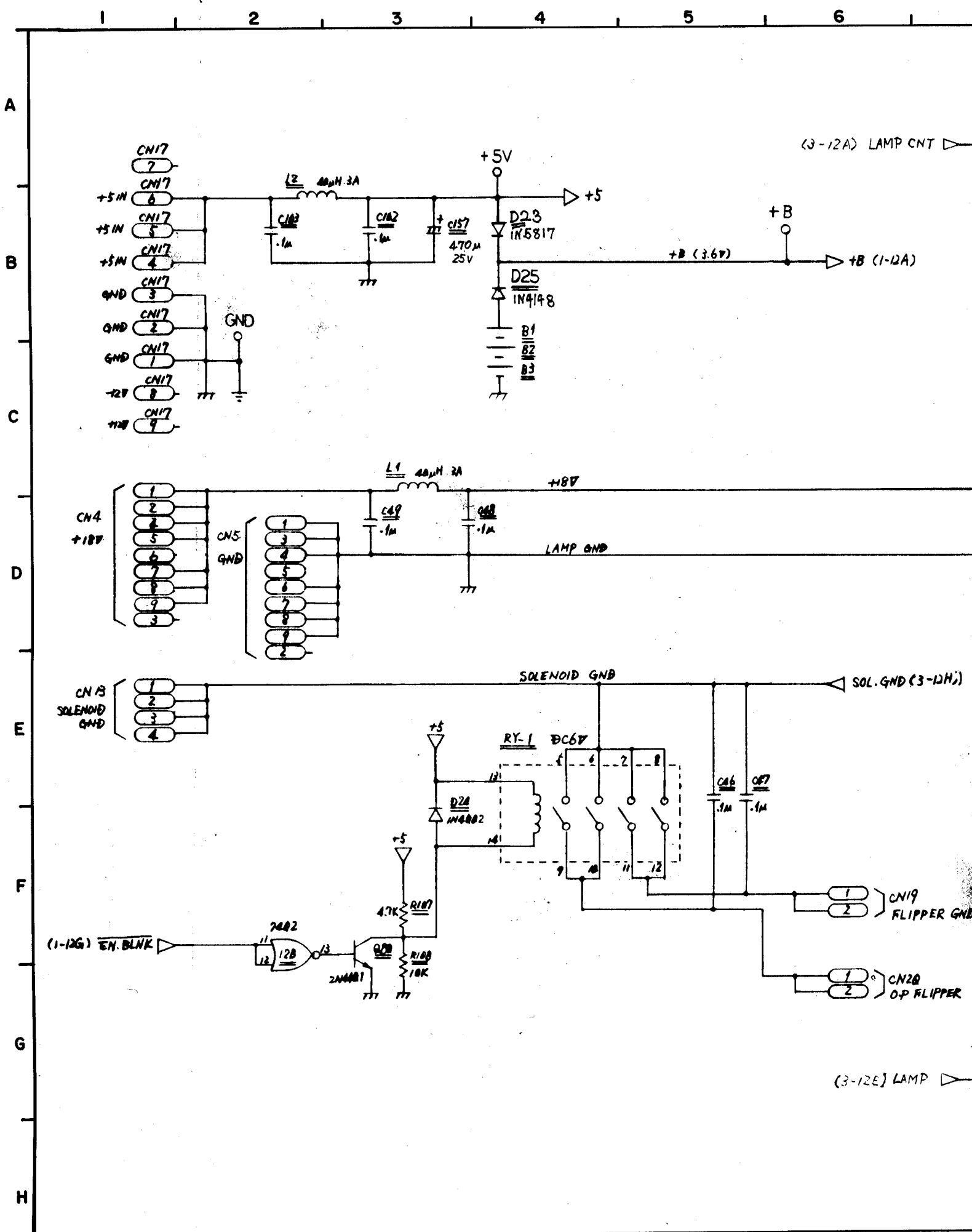


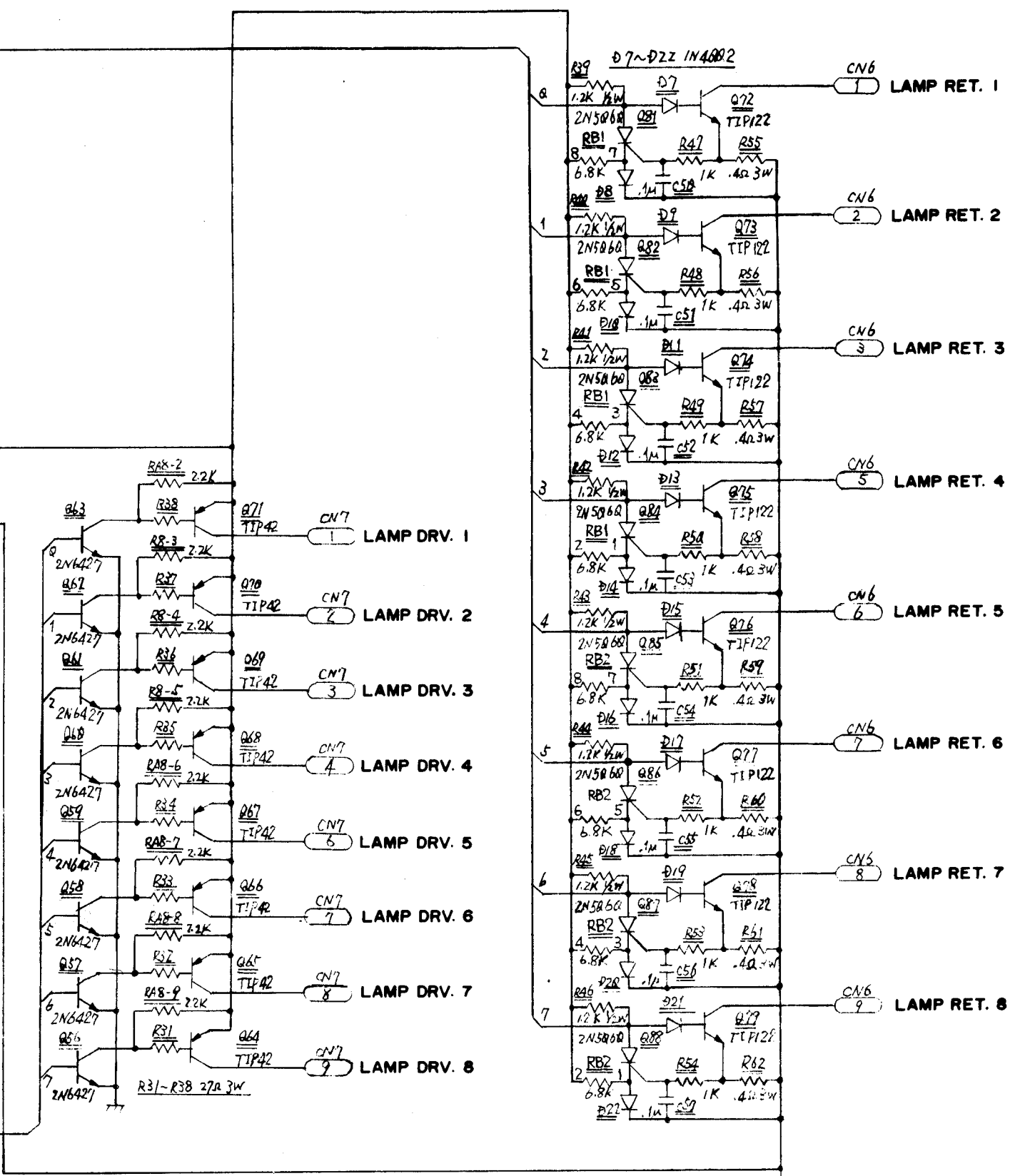
LAMP MATRIX CONT. 0-7

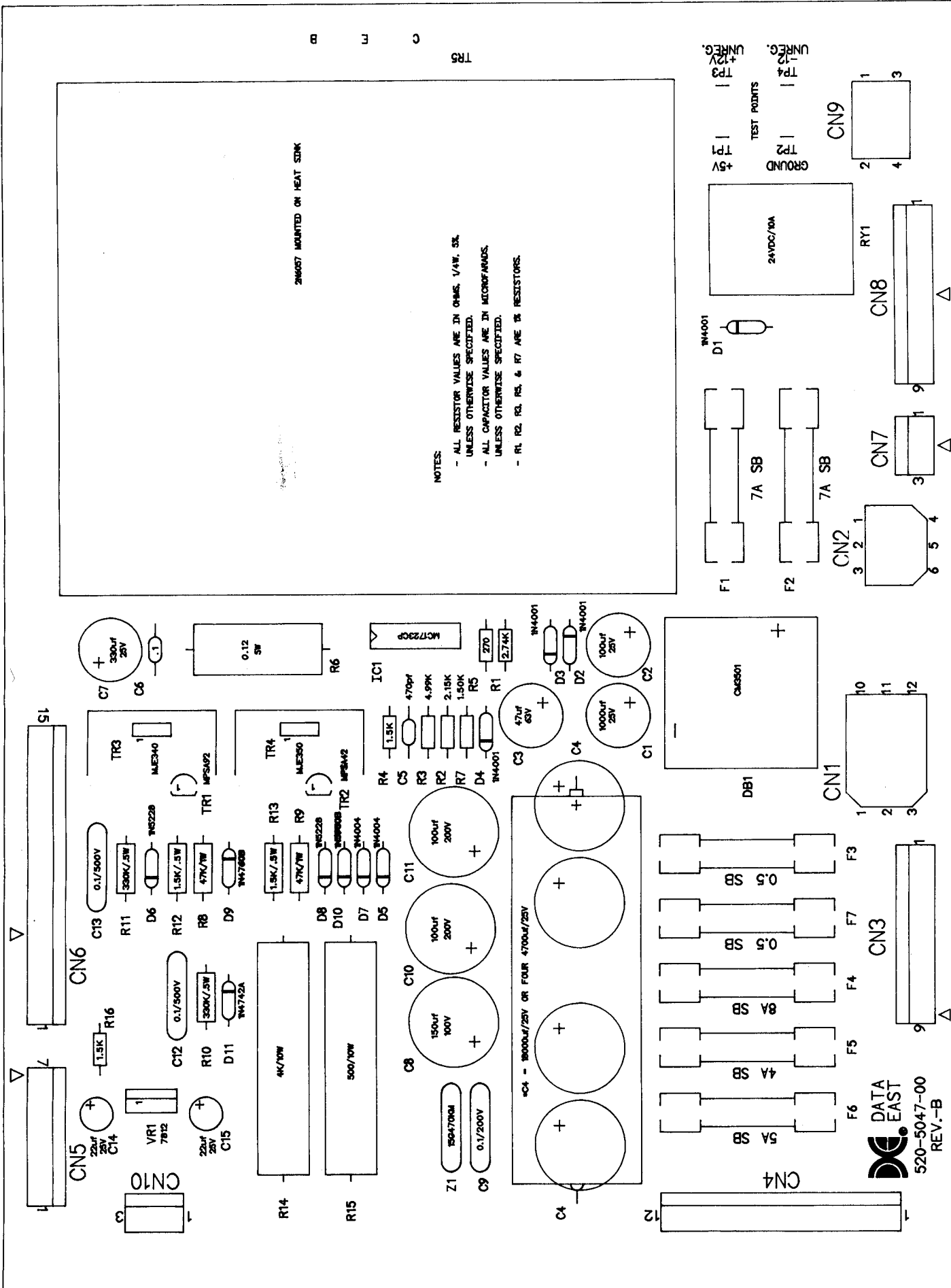
LAMP CNT (4-8A)



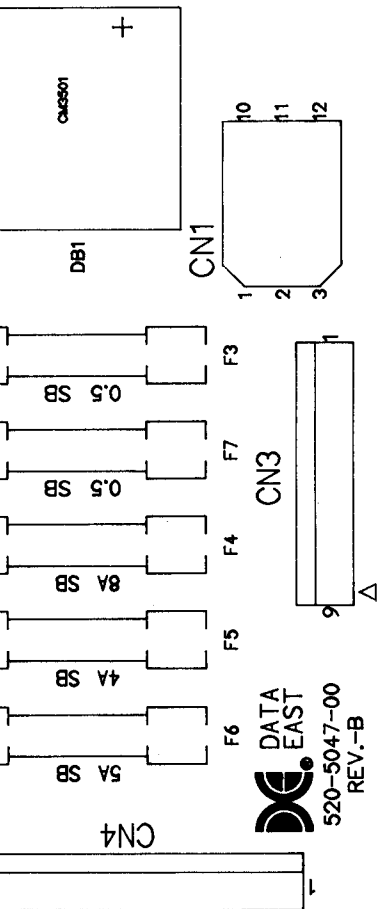
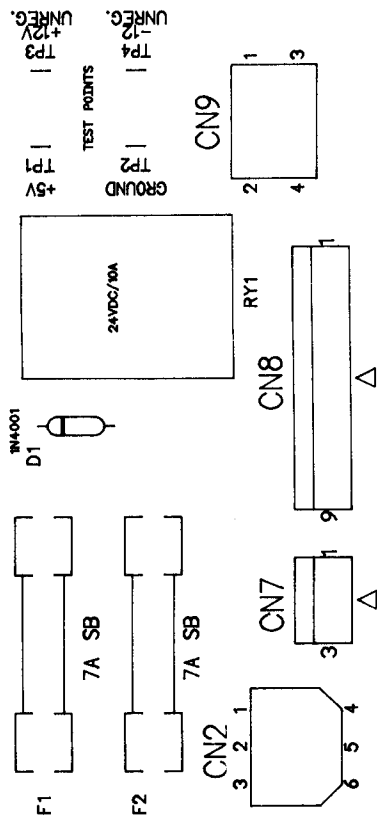
CPU BOARD 3 OF 4 REV.B

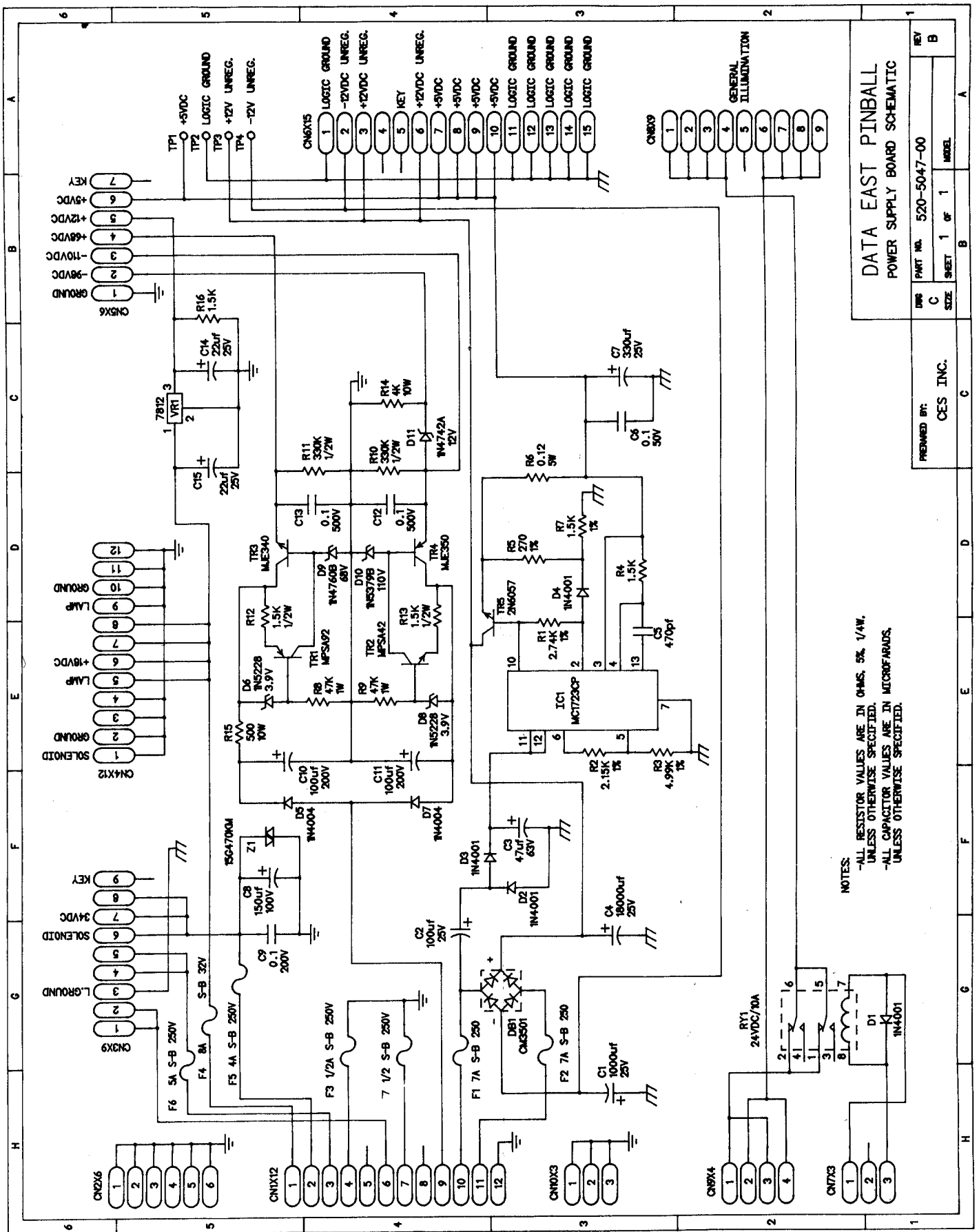






NOTES:
 - ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
 - ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
 - R1, R2, R3, R5, & R7 ARE 1% RESISTORS.

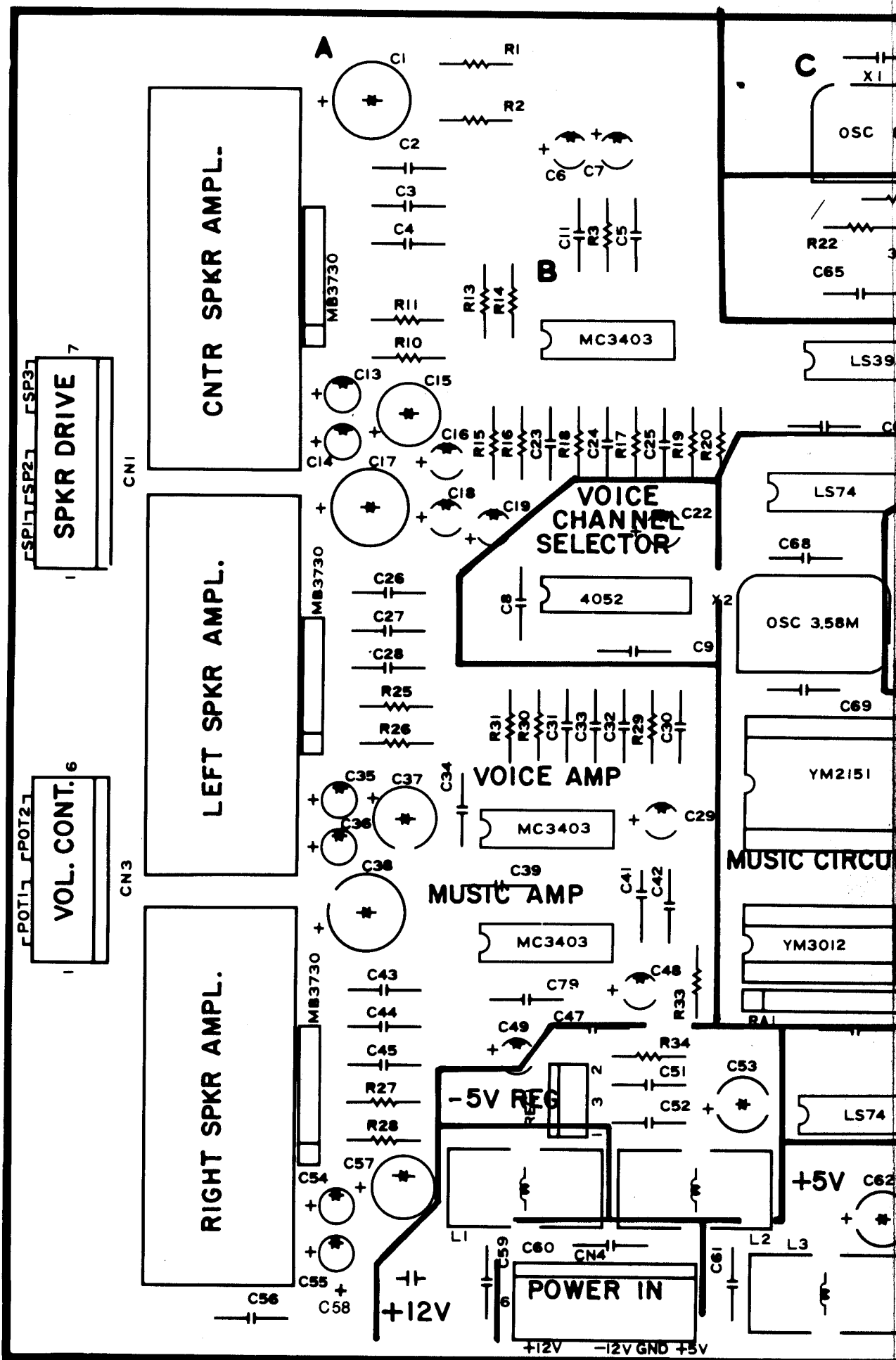




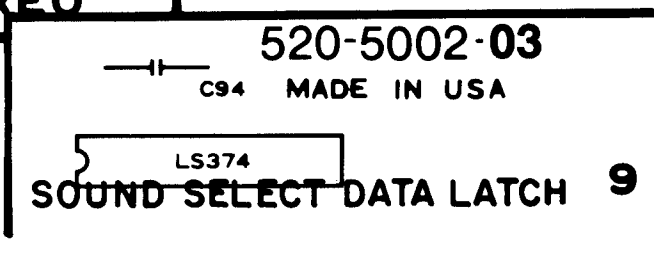
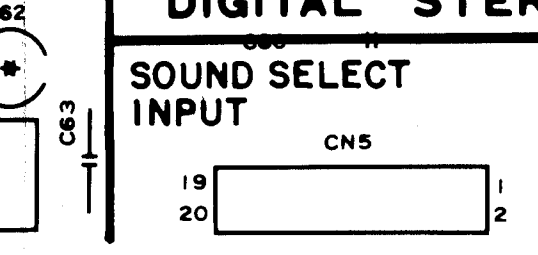
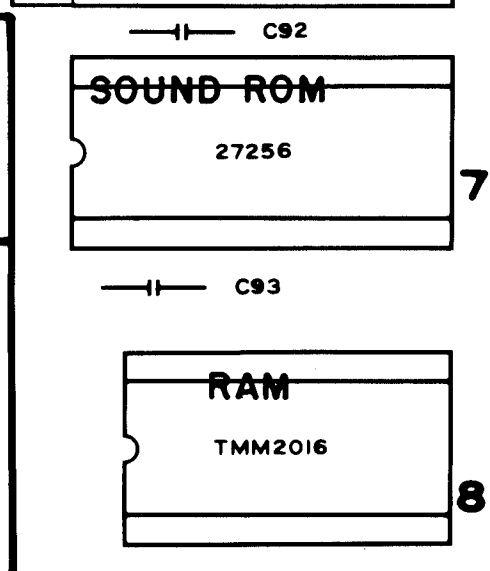
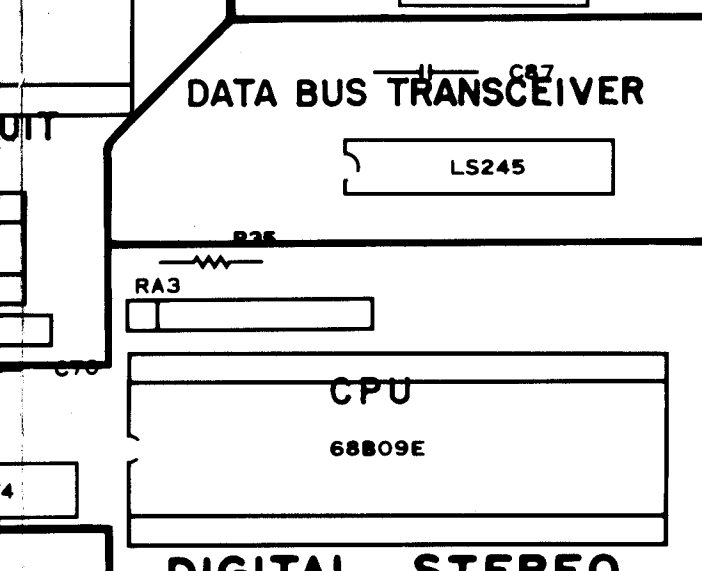
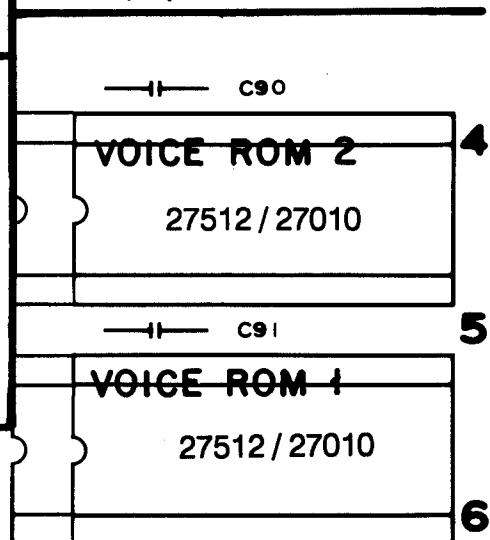
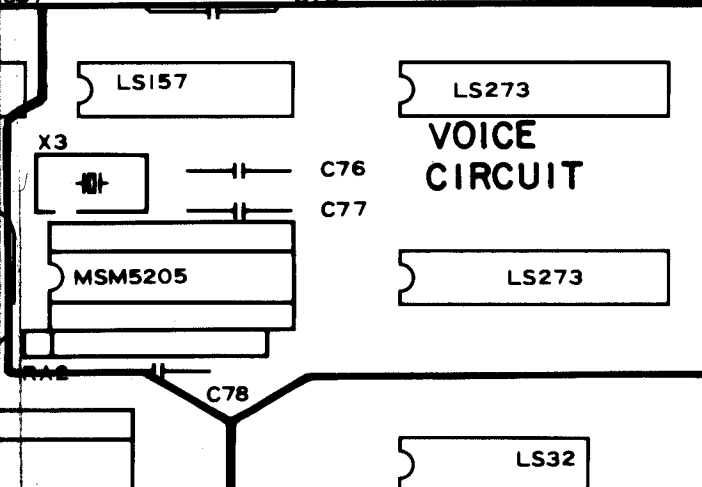
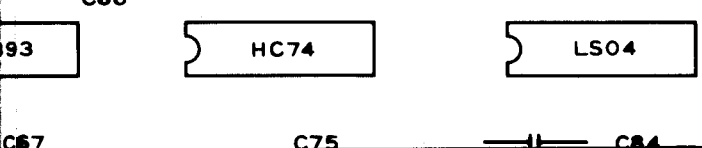
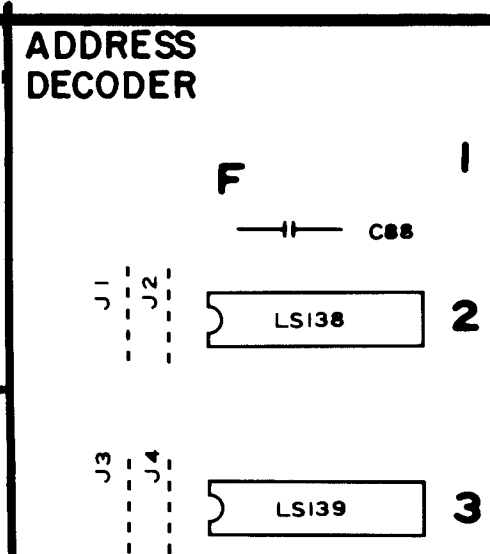
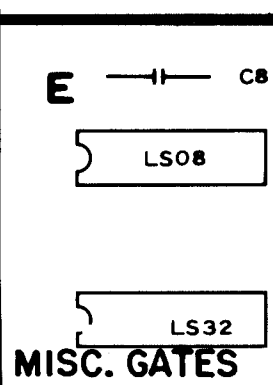
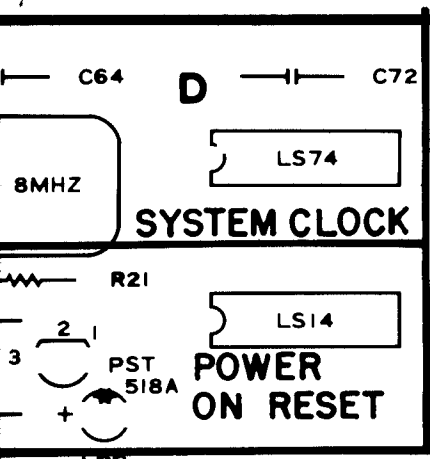
NOTES:
 -ALL RESISTOR VALUES ARE IN OHMS, 5% 1/4W, UNLESS OTHERWISE SPECIFIED.
 -ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

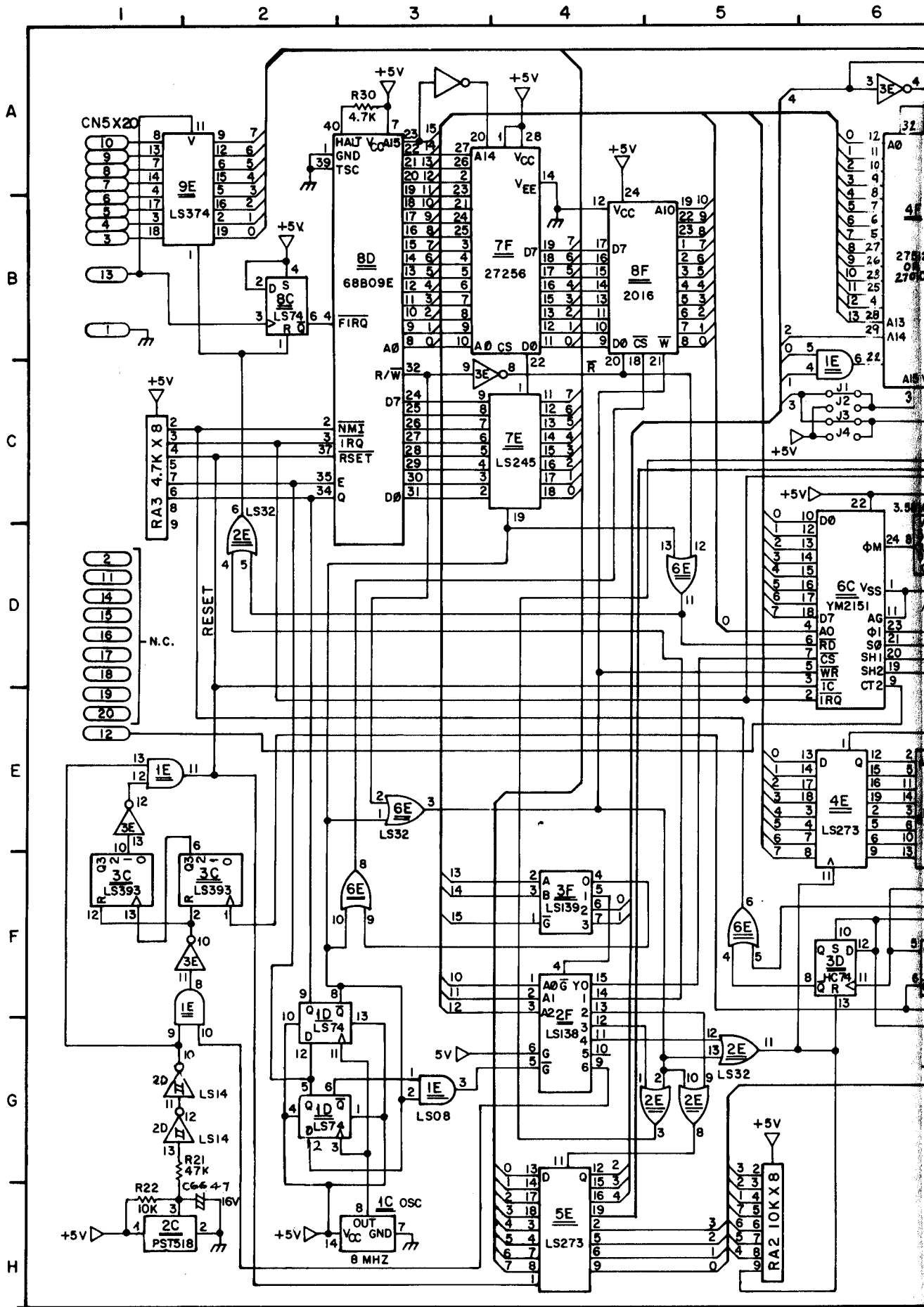
**DATA EAST PINBALL
 POWER SUPPLY BOARD SCHEMATIC**

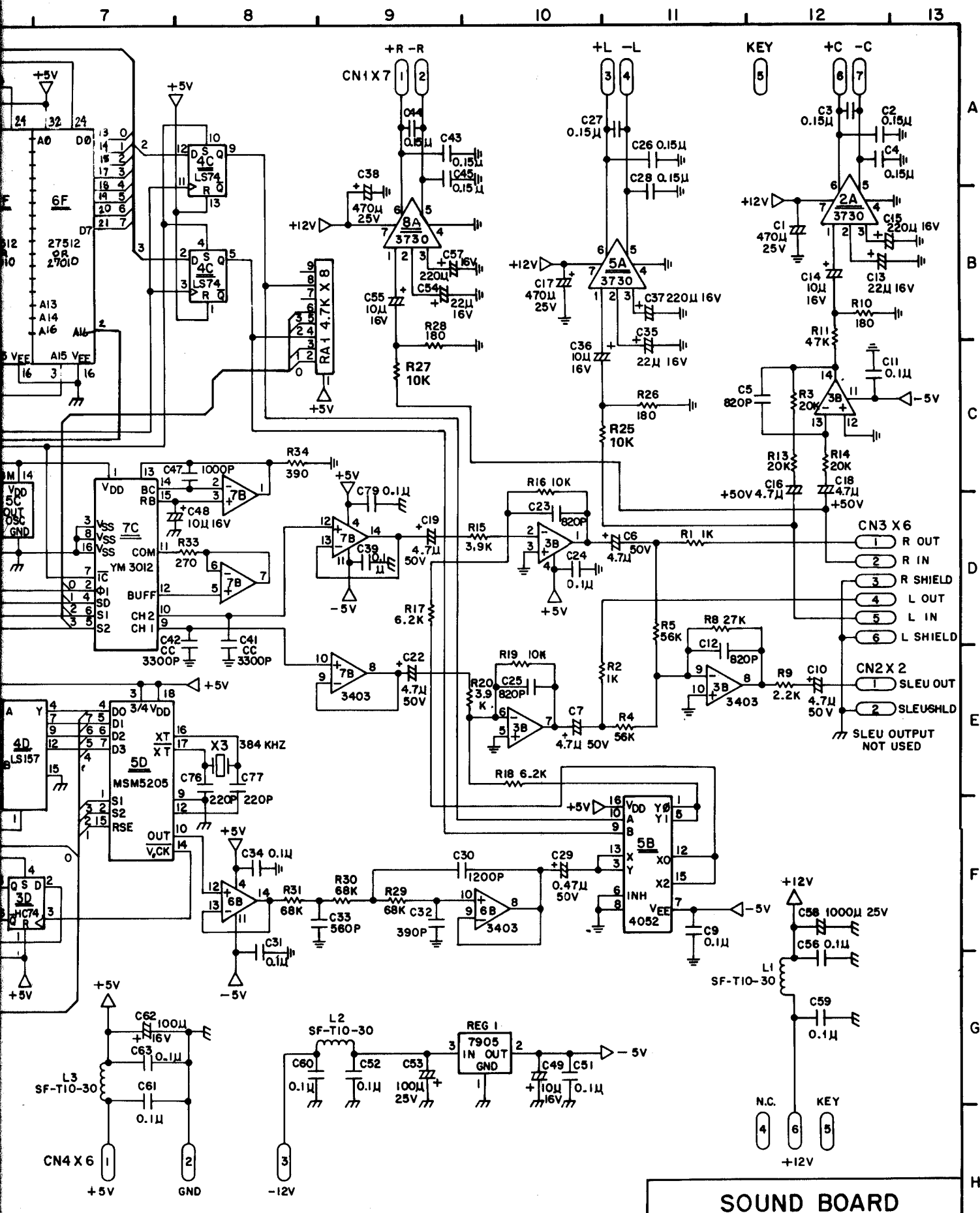
PREPARED BY:	CES INC.
DWG PART NO.	520-5047-00
SIZE	SHEET 1 OF 1
MODEL	



56 Sound Board Assembly Drawing

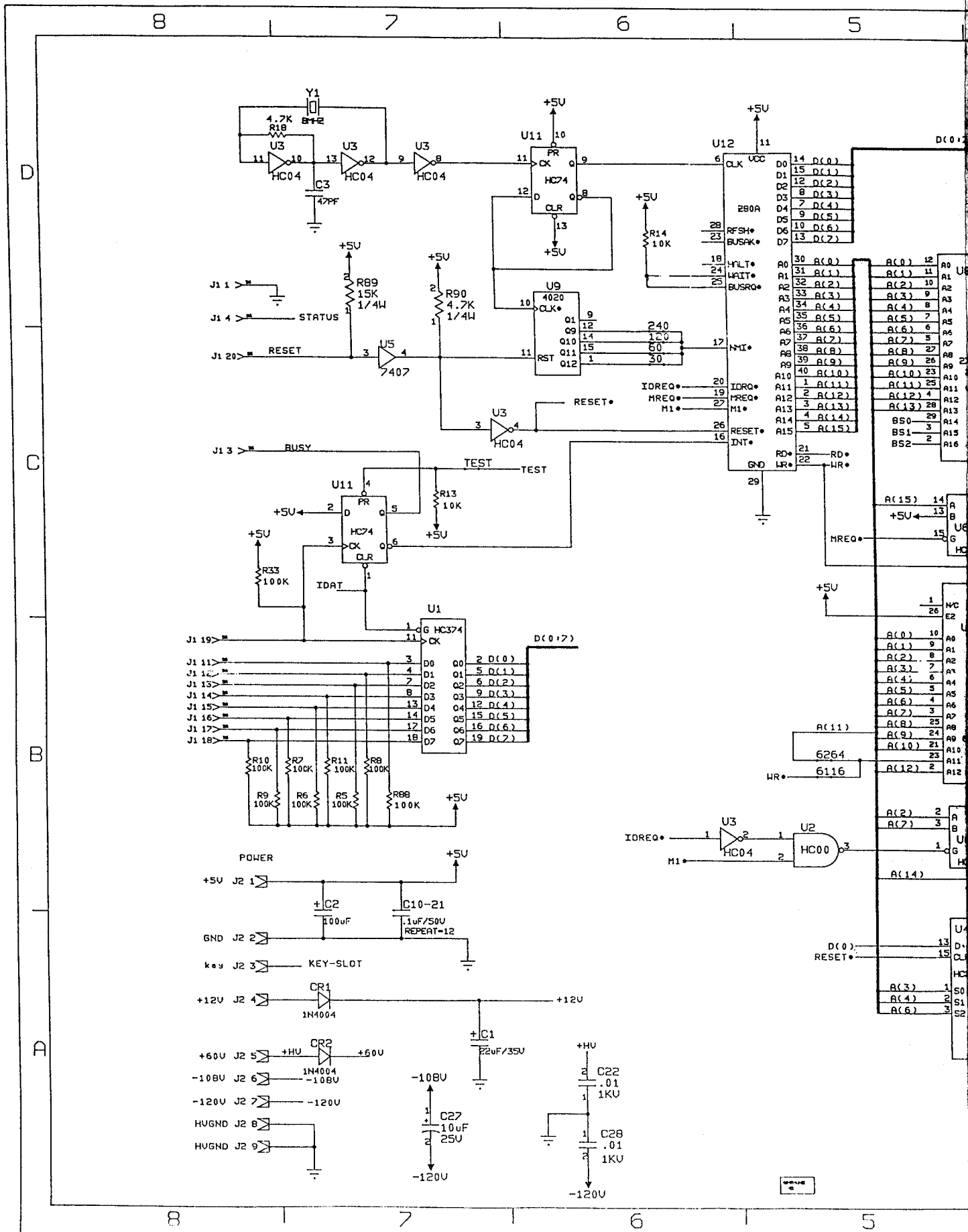


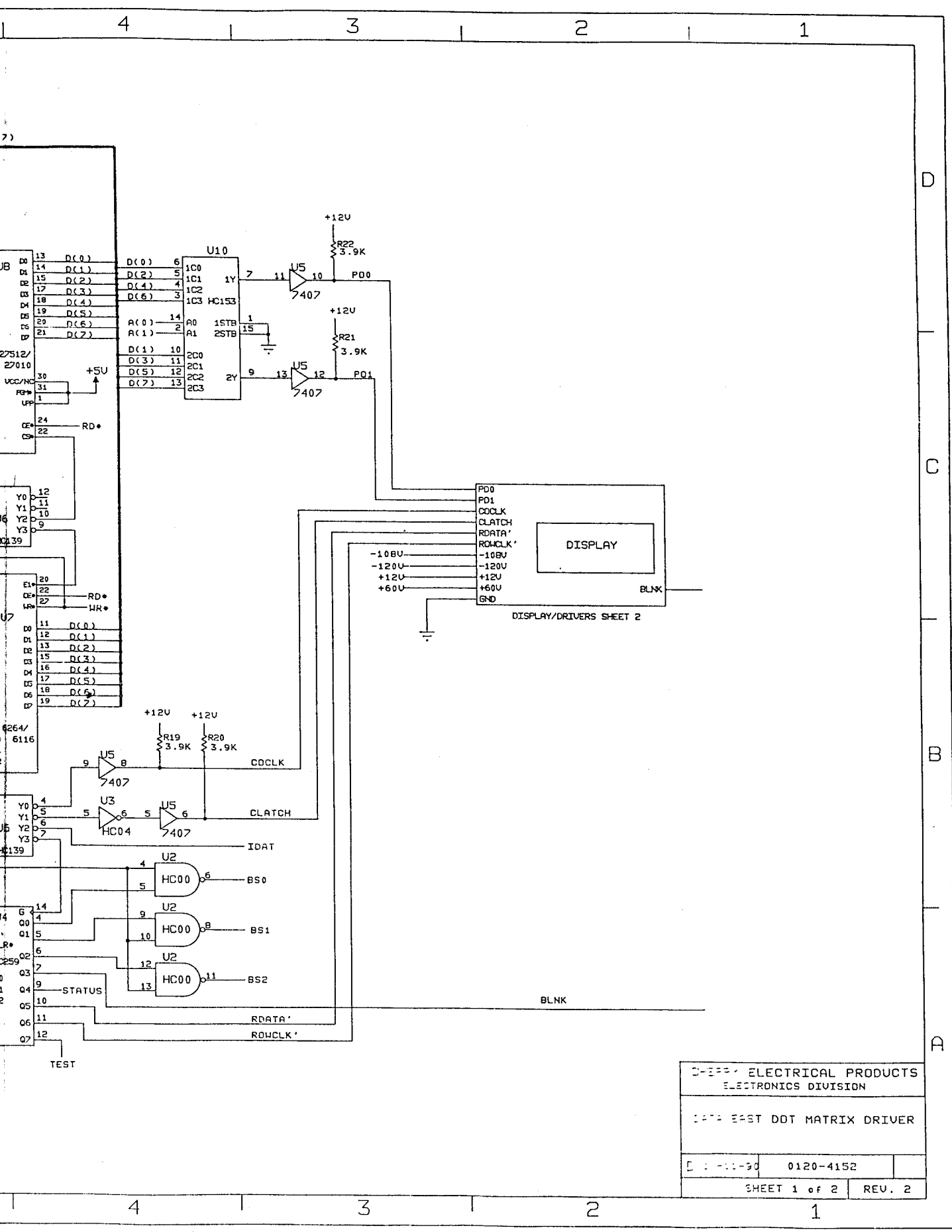




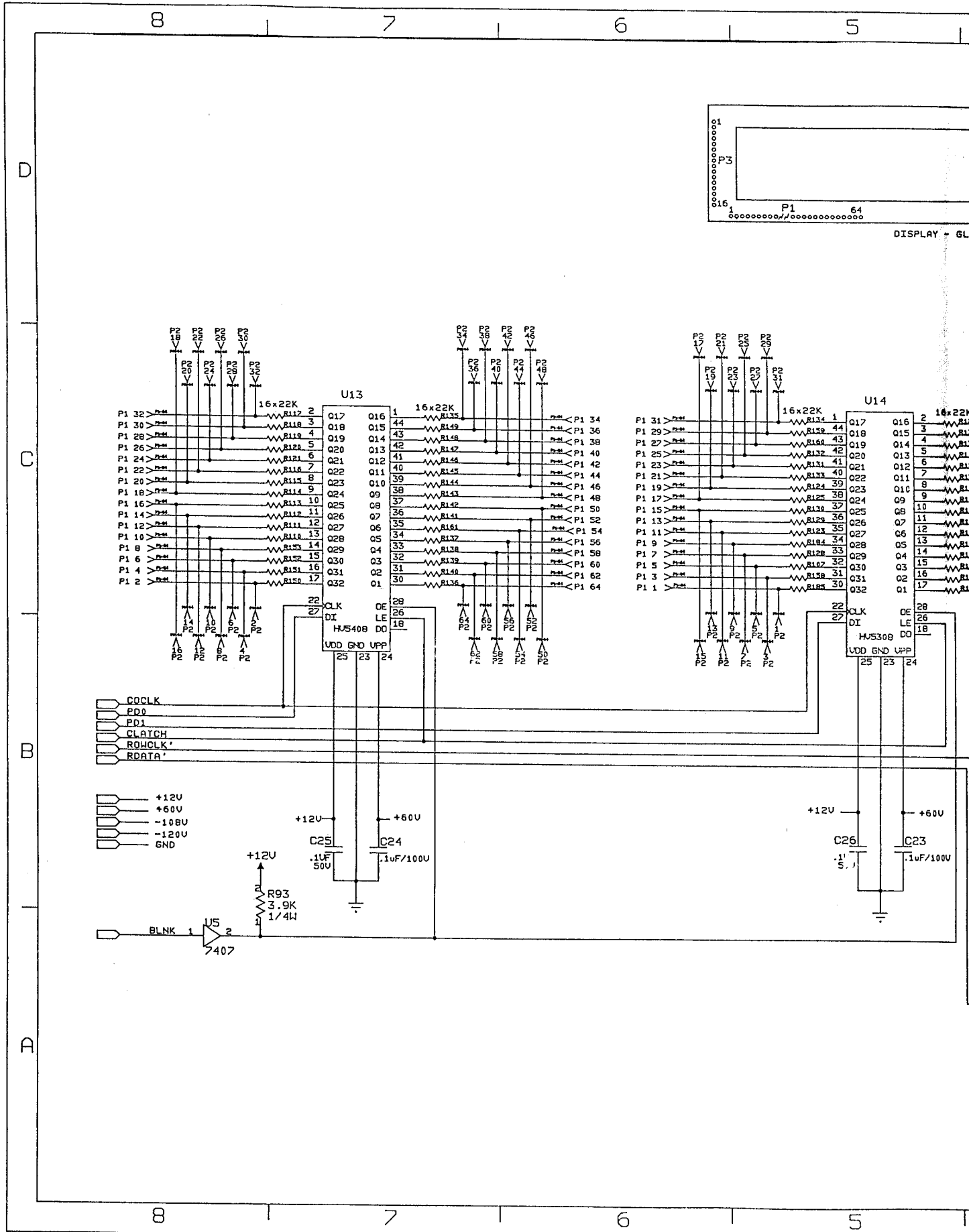
SOUND BOARD

Sound Board Logic Diagram 57





D-EPP ELECTRICAL PRODUCTS ELECTRONICS DIVISION	
DATE EAST DOT MATRIX DRIVER	
01-10-90	0120-4152
SHEET 1 of 2	REV. 2

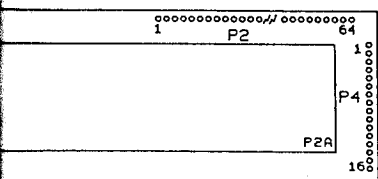


4

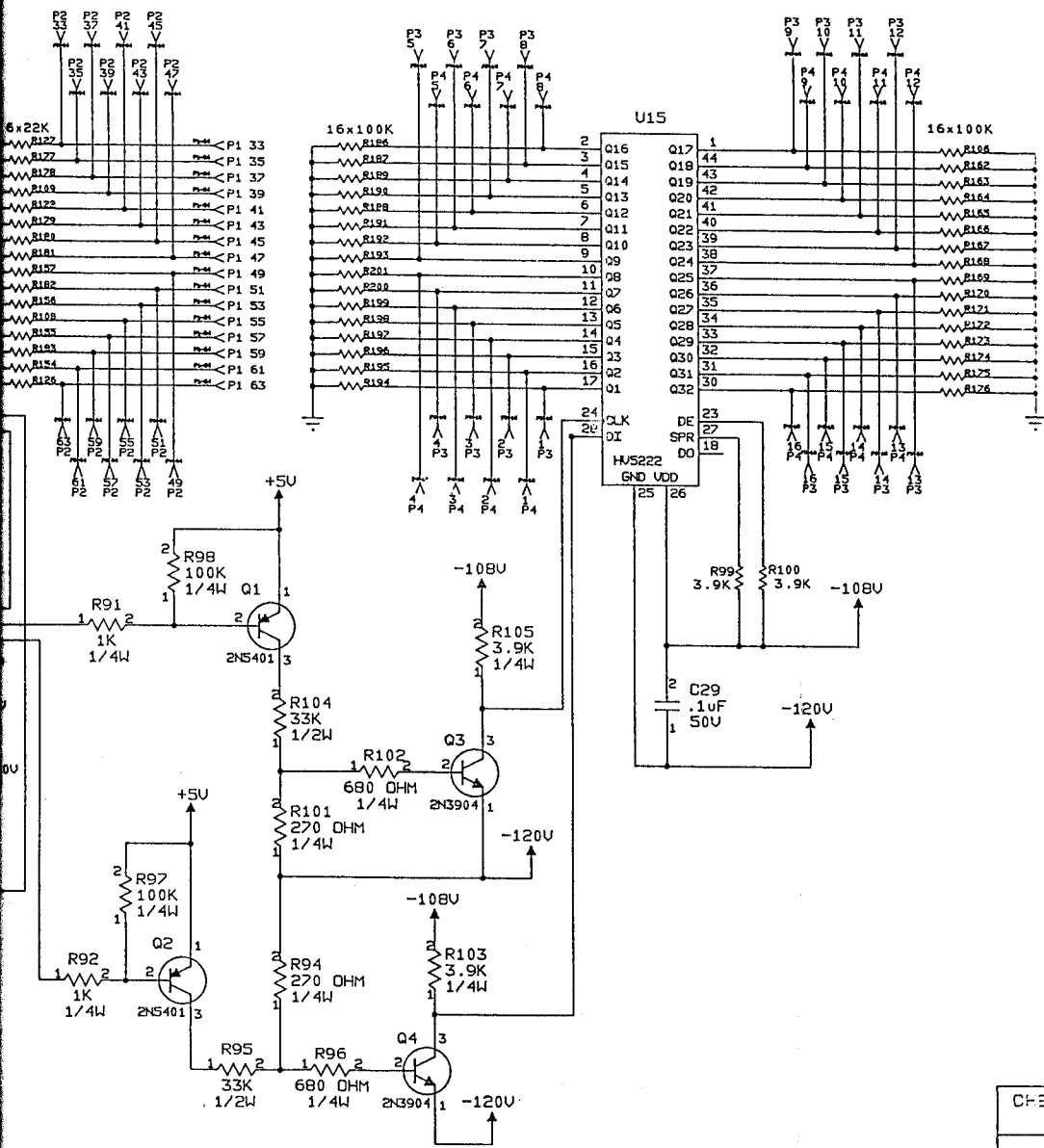
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2

1



- GLASS VIEW



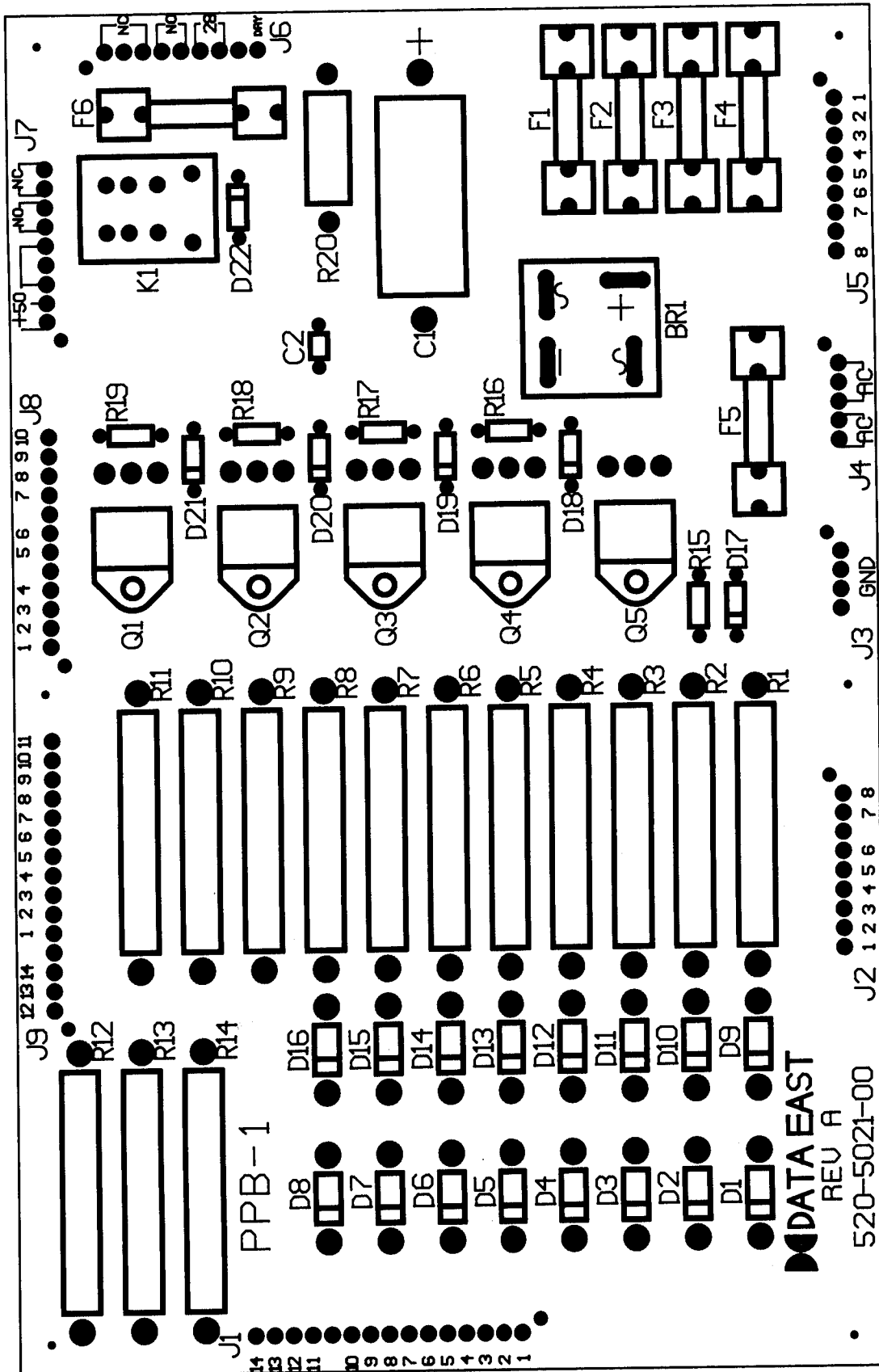
CHERRY ELECTRICAL PRODUCTS ELECTRONICS DIVISION		
DATA EAST DOT MATRIX DISPLAY		
D 11-11-90	0120-4152	
SHEET 2 of 2		REV. 2

4

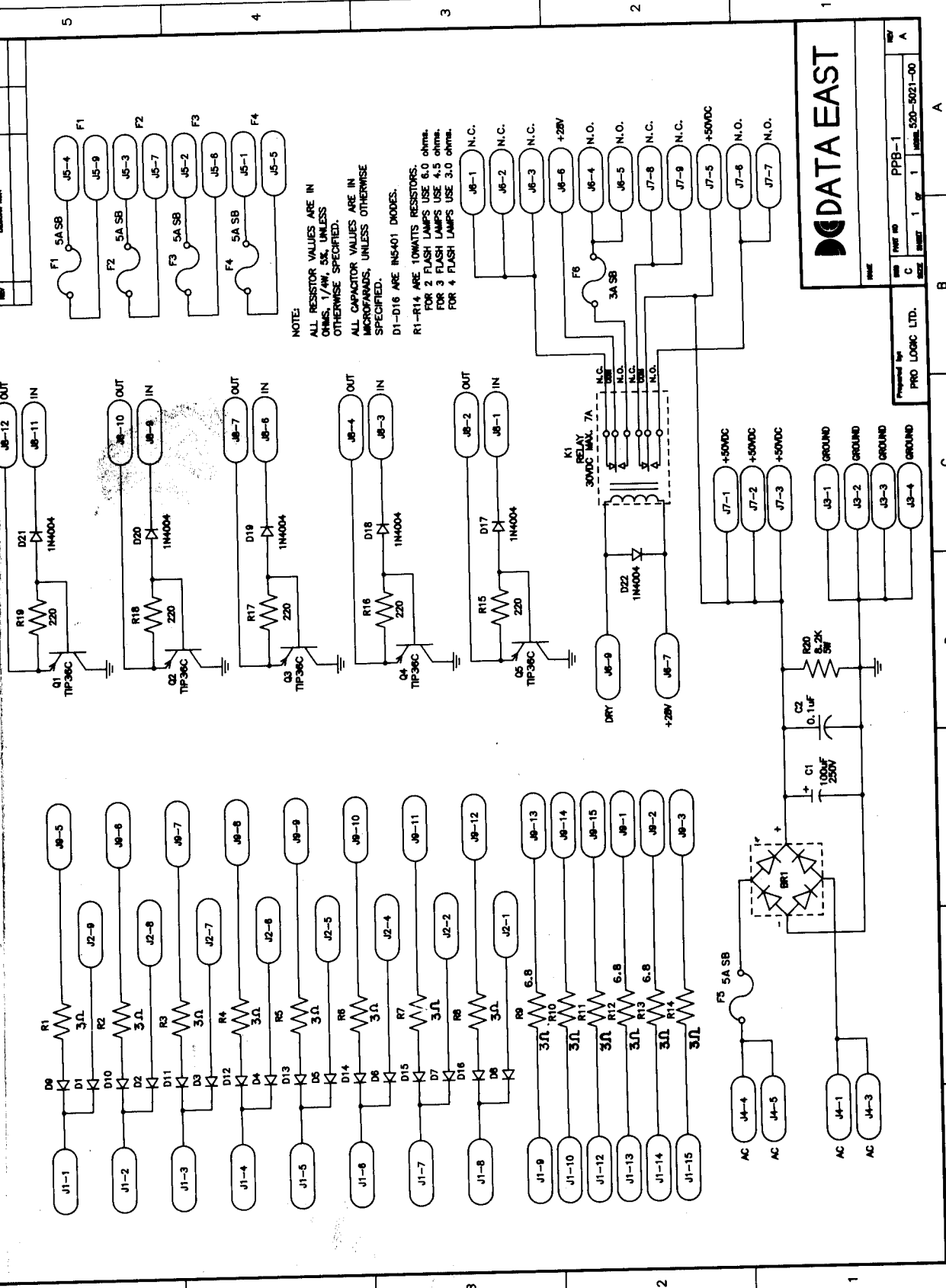
3

2

1



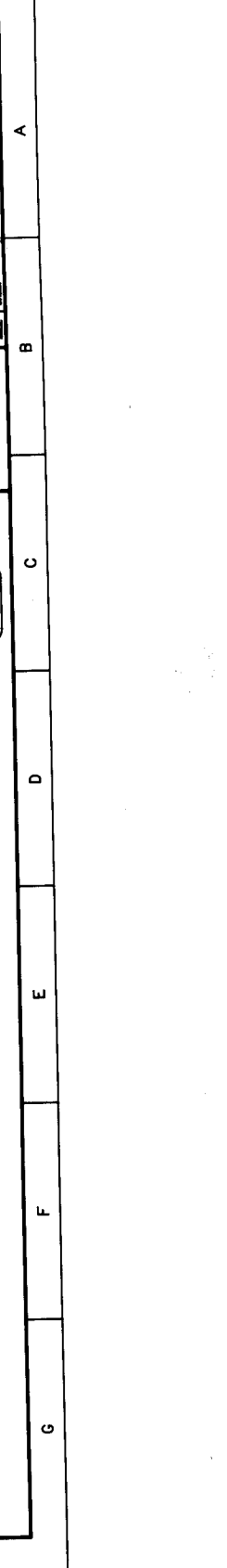
REV	DESCRIPTION	DATE	APPROVED



NOTE:
 ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
 ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
 R1-R14 ARE 10WATTS RESISTORS.
 FOR 2 FLASH LAMPS USE 6.0 ohms.
 FOR 3 FLASH LAMPS USE 4.5 ohms.
 FOR 4 FLASH LAMPS USE 3.0 ohms.
 D1-D16 ARE IN-401 DIODES.

DATA EAST

PROJECT NO	PPB-1
ISSUE	1 of 1
DATE	1965-5021-00



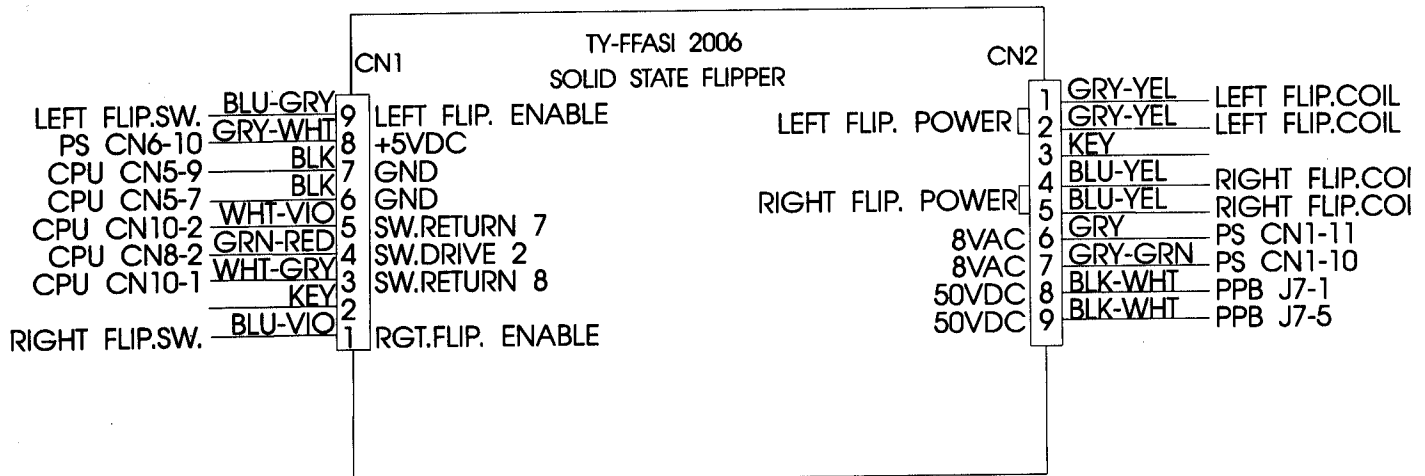


Theory of Operation for the Solid State Flippers

- 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.



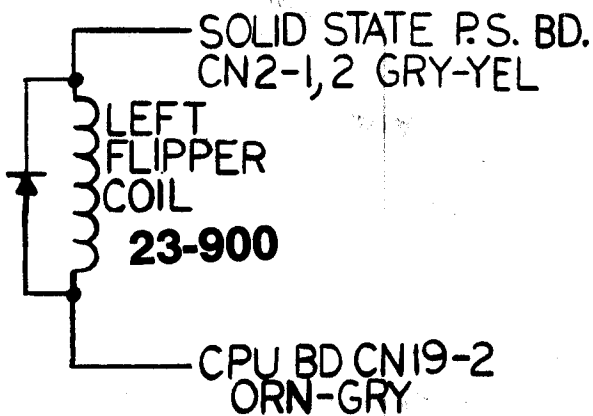
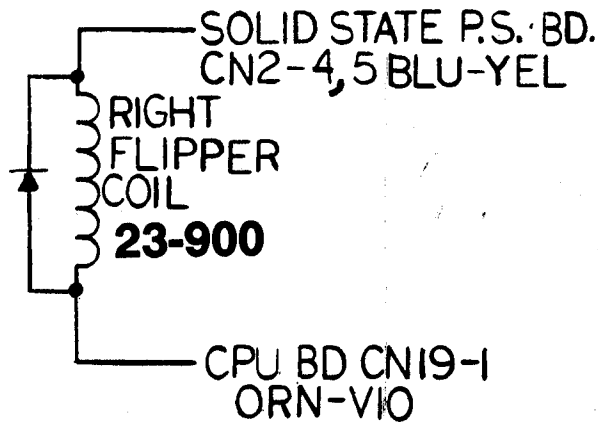
Solid State Flippers
PCB Wiring Diagram

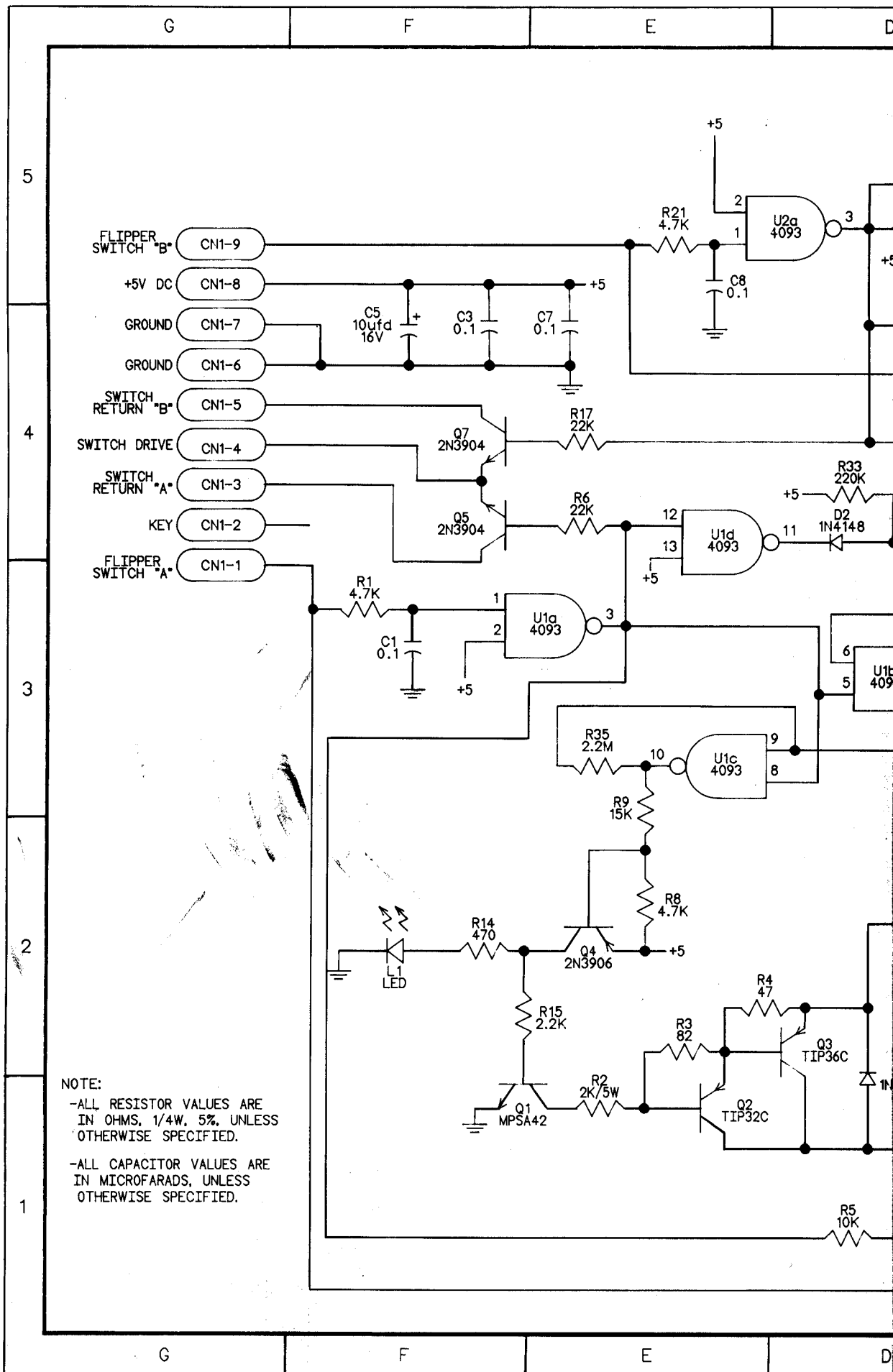
Connector CN 1

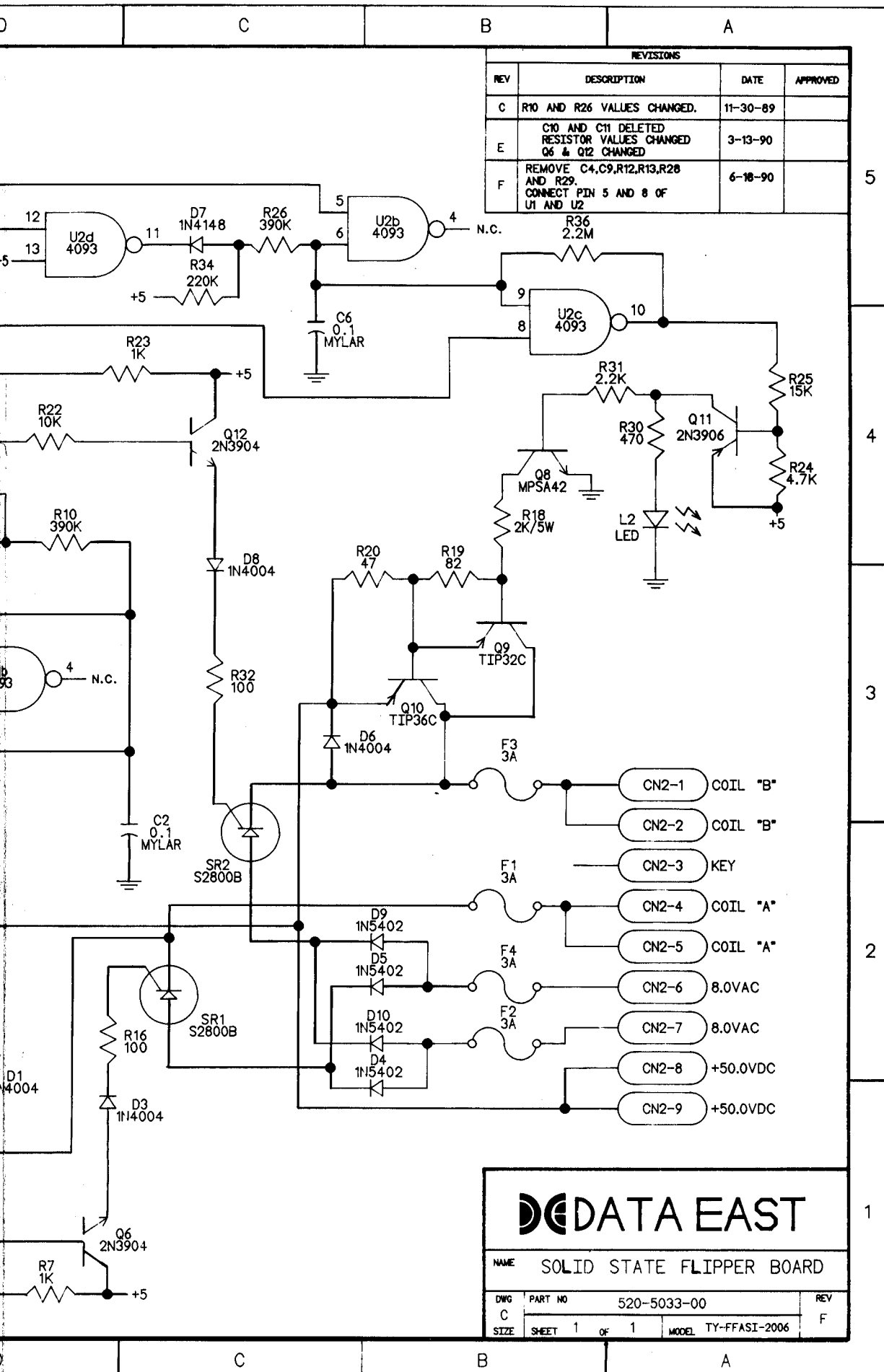
Pin #	Goes To	Wire Color	It Is
1	Rgt. Flipper Sw.	BLU-VIO	RGT. FLIP ENABLE
2			KEY
3	CPU CN10-1	WHT-GRY	SW. RET 8
4	CPU CN8-2	GRN-RED	SW. DRV 2
5	CPU CN10-2	WHT-VIO	SW. RET 7
6	CPU CN5-7	BLK	GND
7	CPU CN5-9	BLK	GND
8	PS CN6-10	GRY-WHT	+5VDC
9	Lft. Flipper Sw.	BLU-GRY	LFT. FLIP ENABLE

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







REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
C	R10 AND R26 VALUES CHANGED.	11-30-89	
E	C10 AND C11 DELETED RESISTOR VALUES CHANGED Q6 & Q12 CHANGED	3-13-90	
F	REMOVE C4,C9,R12,R13,R28 AND R29. CONNECT PIN 5 AND 8 OF U1 AND U2	6-18-90	

DATA EAST

NAME SOLID STATE FLIPPER BOARD

DWG	PART NO	520-5033-00	REV
C	SHEET	1 OF 1	F
SIZE	MODEL		
	TY-FFASI-2006		

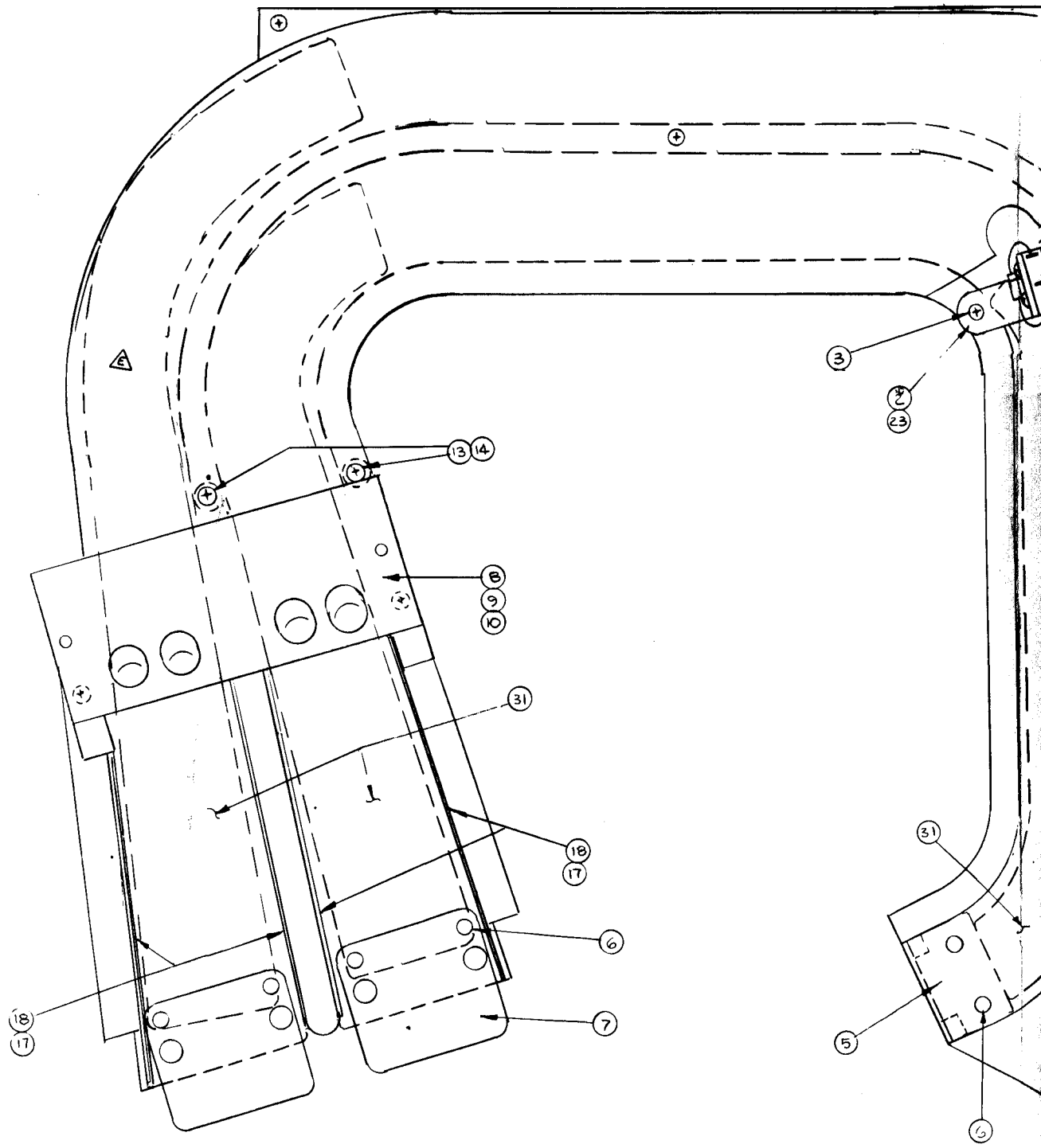
5

4

3

2

1

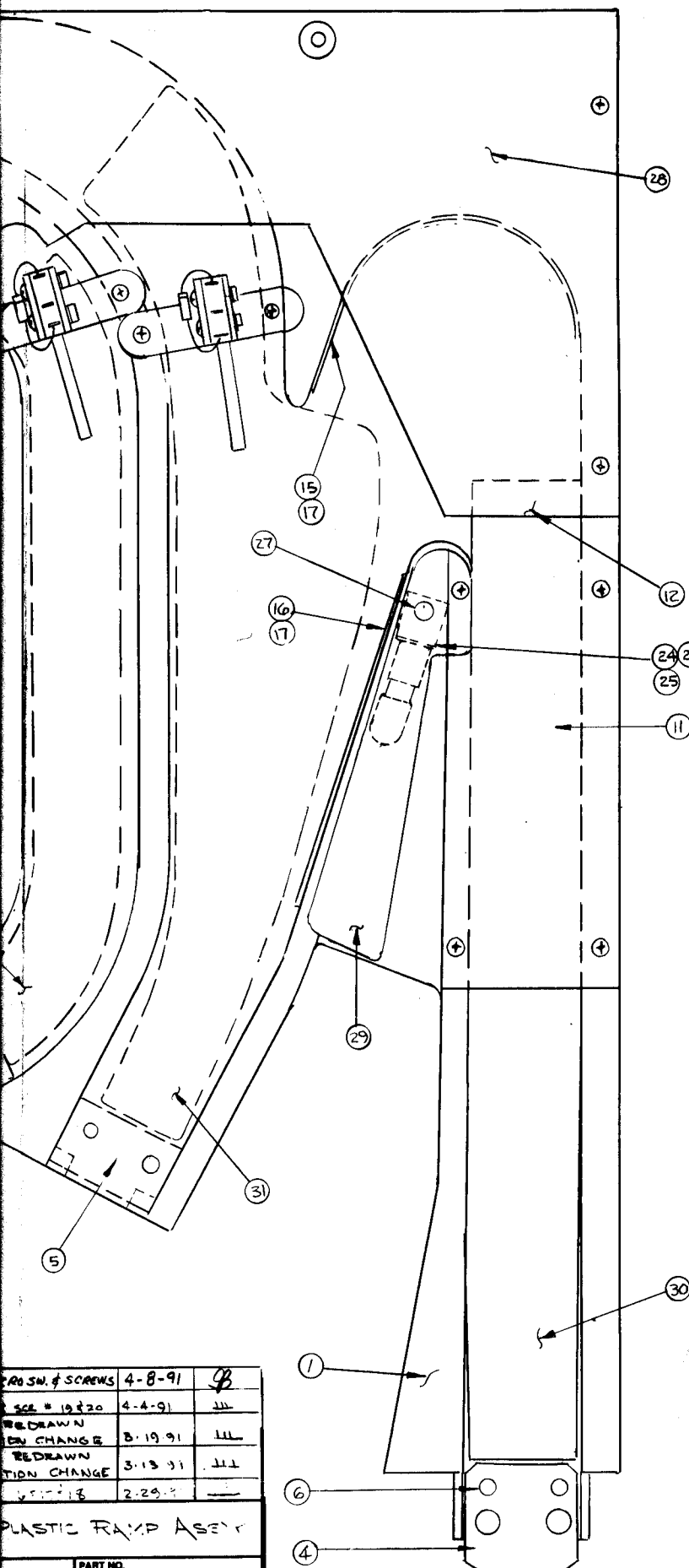


TOLERANCE UNLESS OTHERWISE SPECIFIED
 DIM XX ± .05 XXX ± .005
 XX ± .015 XXXX ±
 ANGULAR FRACTIONAL - 1/64
 XX - 1/2"
 XX - 1"

REQ.	1	NEXT ASSEM.		DWN.	JLL	DATE	3-21-91	TITLE	PLAS
MAT.				CHKD.		SCALE	1:1		
H.T.									
FIN.									

E	DELETE (2) MICRO SW
D	DELETE POST & SCL
C	REVISED & RECONFIGURATION
B	REVISED & RECONFIGURATION
A	ADD ITEMS

DE DATA EAST PINBALL, INC.
 1990 JANICE AVE., MELROSE PARK, IL. 60166



ITEM	PART No.	DESCRIPTION	QTY
1	545-5233-00	PLASTIC RAMP	1
2	500-5335-00	MICRO SWIT. ASS'Y	2
3	237-5809-00	*6x1/2 SMS	12
4	535-5740-00	RAMP PLATE	1
5	535-5962-00	RAMP CONN PLATE	2
6	249-5009-00	1/8x5/8R RIVET	10
7	535-5972-00	RAMP PLATE	2
8	500-5317-00	RAMP ENTRANCE SIGN	1
9	232-5201-00	*6-32x3/8 SCR.	2
10	240-5004-00	*6- NUT	2
11	830-5420-22	BUTYRATE - 22	1
12	830-5420-12	BUTYRATE - 12	1
13	254-5000-02	SPACER 1/4	2
14	237-5003-00	*6 x 7/8 SMS	2
15	535-5995-01	REINFORCE. PLT.	1
16	535-5995-00	REINFORCE. PLT.	1
17	626-5015-00	PR. SEN. TAPE	0.16 FT
18	535-5442-00	RAMP SIDE PLATE	4
19			
20			
21			
22			
23	036-5159-00	RAMP SWT CABLE	1
24	077-5003-00	SOCKET	1
25	165-5000-44	BULB	1
26	036-5172-01	CABLE ASSY	1
27	249-5001-00	RIVET	
28	820-5055-00	DECAL TOP	
29	820-5055-00	DECAL - SMALL	
30	820-5056-00	DECAL - RIGHT R	
31	820-5069-00	RAMP DECALS (4)	1

PRO SW. & SCREWS	4-8-91	B
SCRE # 19220	4-4-91	III
REDRAWN		
REV CHANGE	8-19-91	III
REDRAWN		
REVISION CHANGE	3-13-91	III
REVISION	2-25-91	

PLASTIC RAMP ASSEMBLY

ALL, INC. PART NO. 500-533700
 ILL. 60160

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.