



Checkpoint

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1-800-KICKERS

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

*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 4A Slo-Blo PPB Solenoids/Flash Lamps (34VDC)

POWER SUPPLY BOARD

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

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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)

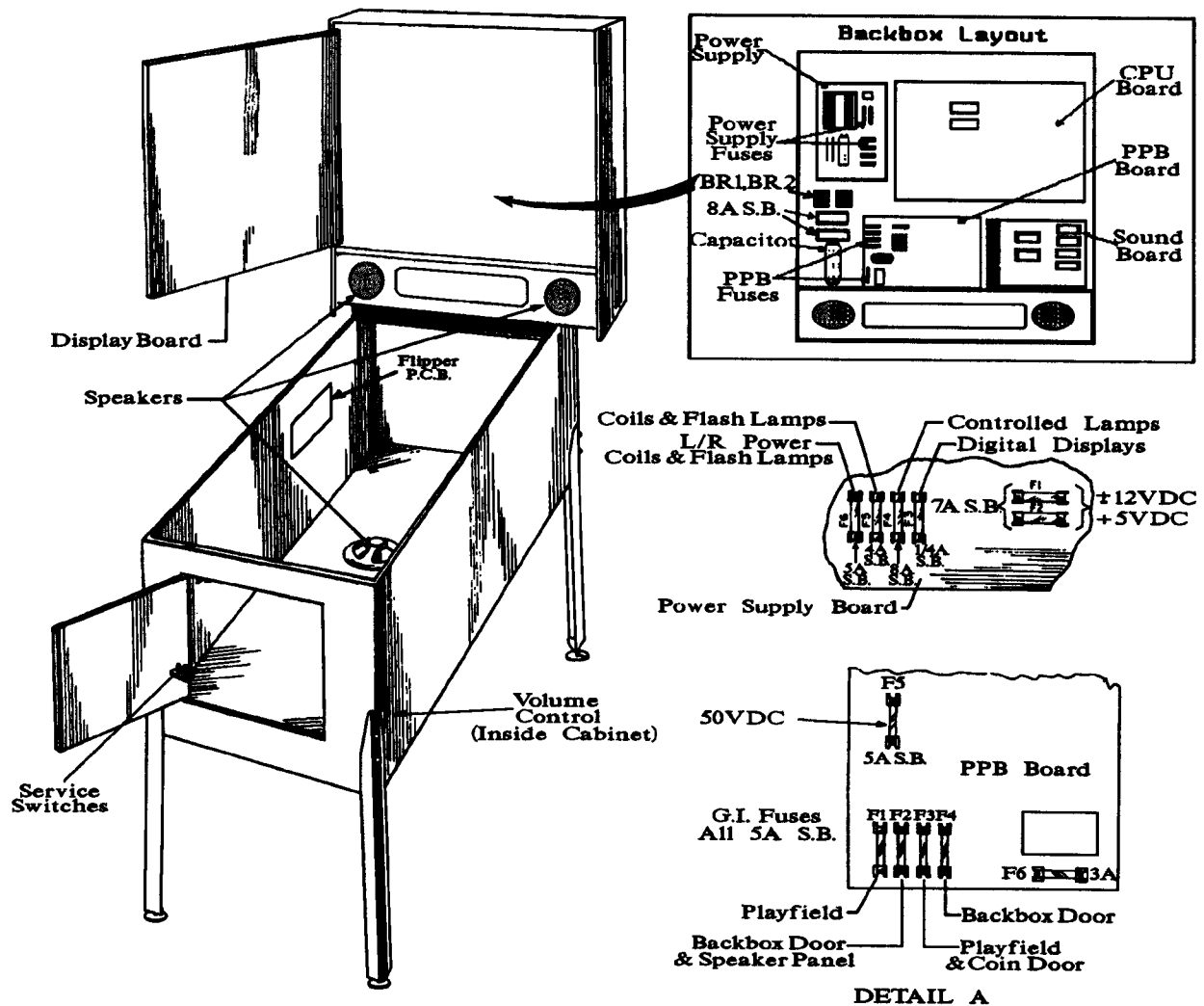
Display Board: Location U8

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 rearleg levelers approximately half way out. Readjust side-to-side level as required.

NOTE

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

17. Check the plumb tilt and adjust as required.

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

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

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

GAME OPERATION

STANDARD FEATURES

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

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

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

MANUAL PERCENTAGING

This game is equipped with Manual Percentage Adjustment.

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

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

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

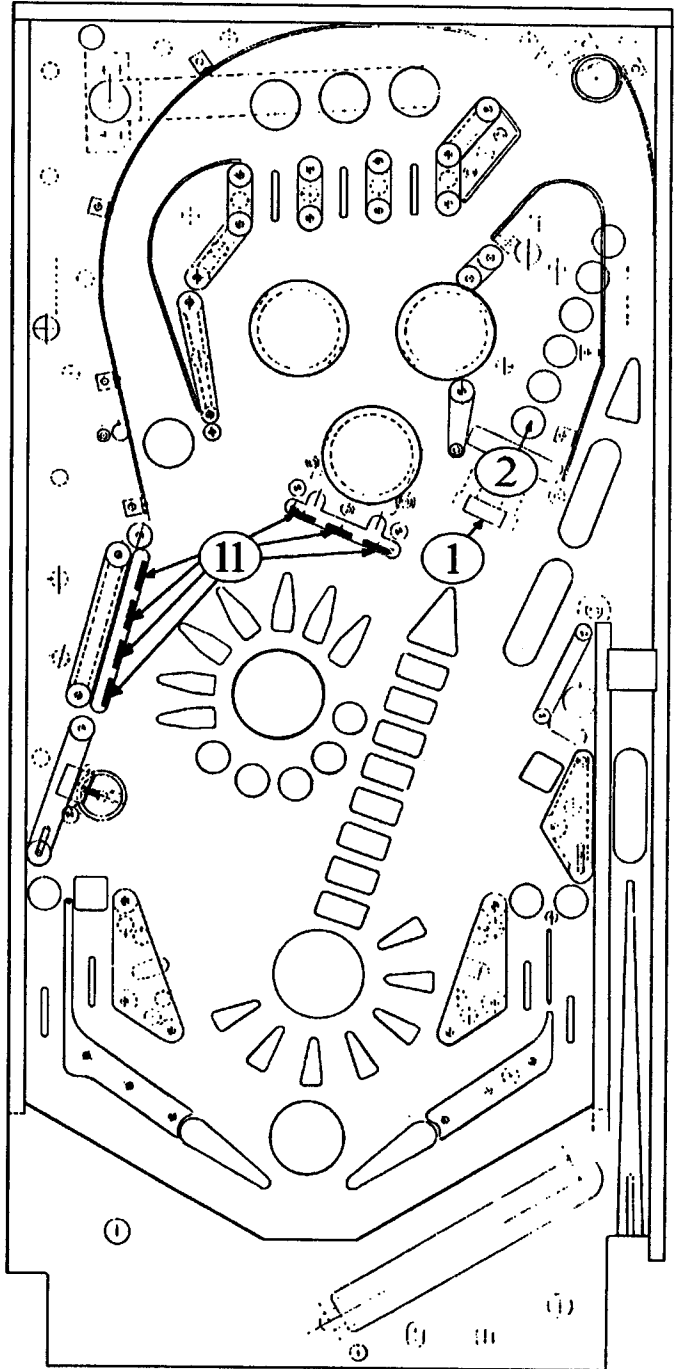
GAME SPECIFIC FEATURES

Jackpot

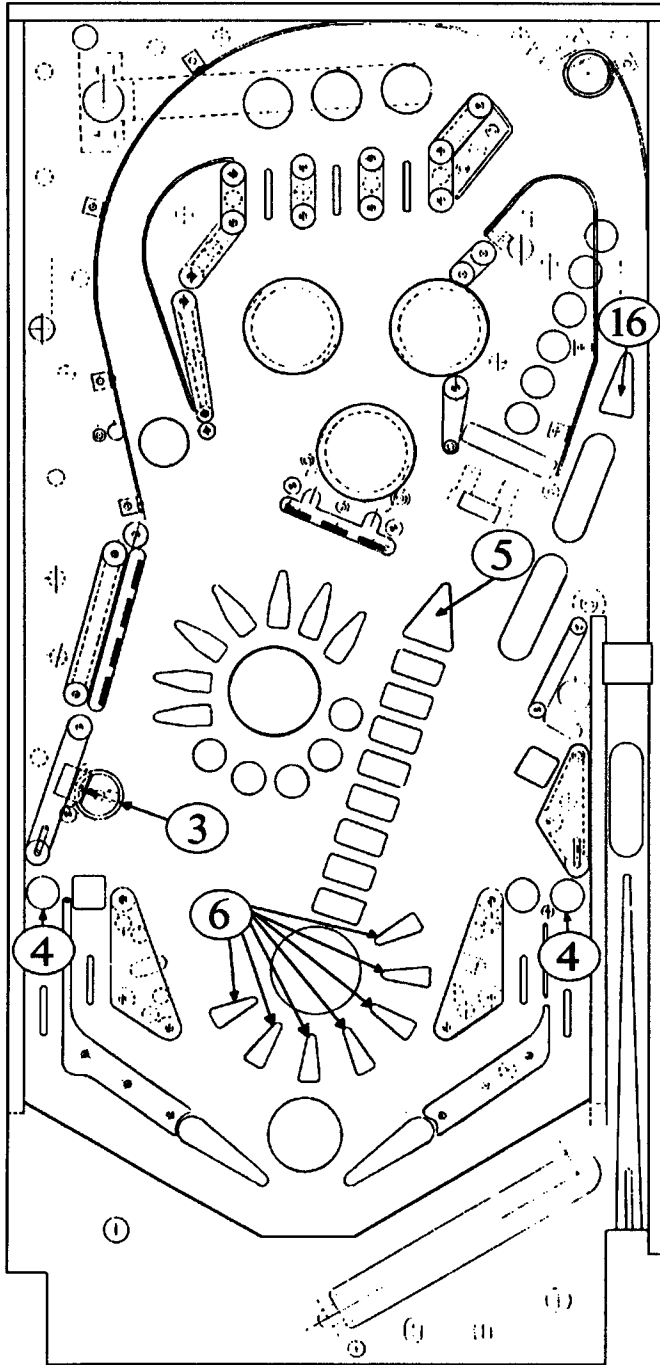
The Jackpot can be obtained in 2 or 3 Ball play only after 3 Ball play has been achieved.

When the Jackpot mode starts, the large Drop Target (1) will raise. Shoot the Drop Target down and shoot the ramp (2) before the Timer resets the Target. Advance the Jackpot by shooting Carrera (11). Light the Double Jackpot by shooting Checkpoint when the Single Drop Target (1) is down and shoot the ramp for Jackpot. Values below are displayed on the speaker panel.

2 Million	3 Million	4 Million	Double Jackpot Grand Priz
--------------	--------------	--------------	------------------------------------



F A S T
16



Pit Stop

When the ball enters the Pit Stop Hole(3) the player is awarded one of the following:

(4) Lite Outlane Special

(5) Lite Extra Ball

Mystery Point Value

(6) Advance Tach 1,000 RPM

(16) Advance FAST

Miles Hold

In 2-Ball Multiball

The Pit Stop Hole will start Automatic 3-Ball when Green lamp is lit.

Multiball

Multiball is achieved by advancing the Tach. The Tach is advanced in increments of 1,000 RPM by shooting the Ramp and achieving speeds of (see Instant Info. on the Display) or above, Pop Bumpers (9) Pit Stop Mystery (3) & completing Carrera Targets

Tach (6) Reads as follows:

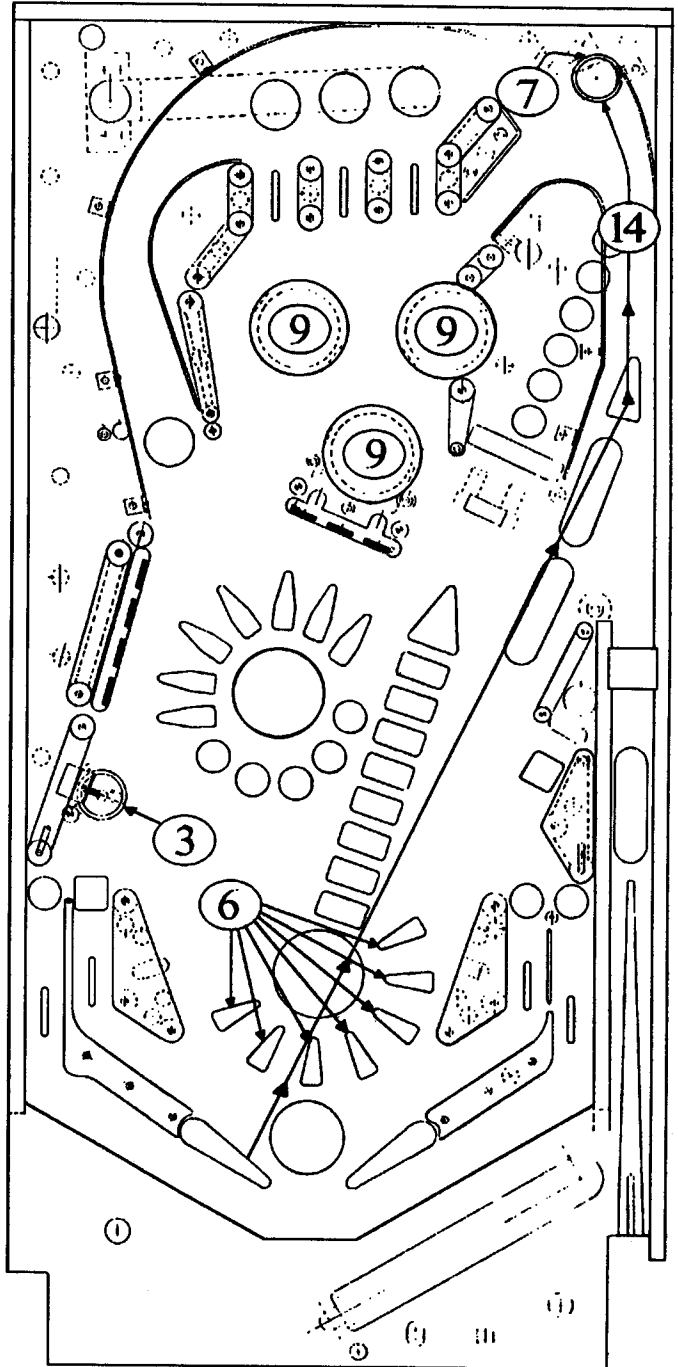
2,000 RPM
3,000 RPM
4,000 RPM
5,000 RPM

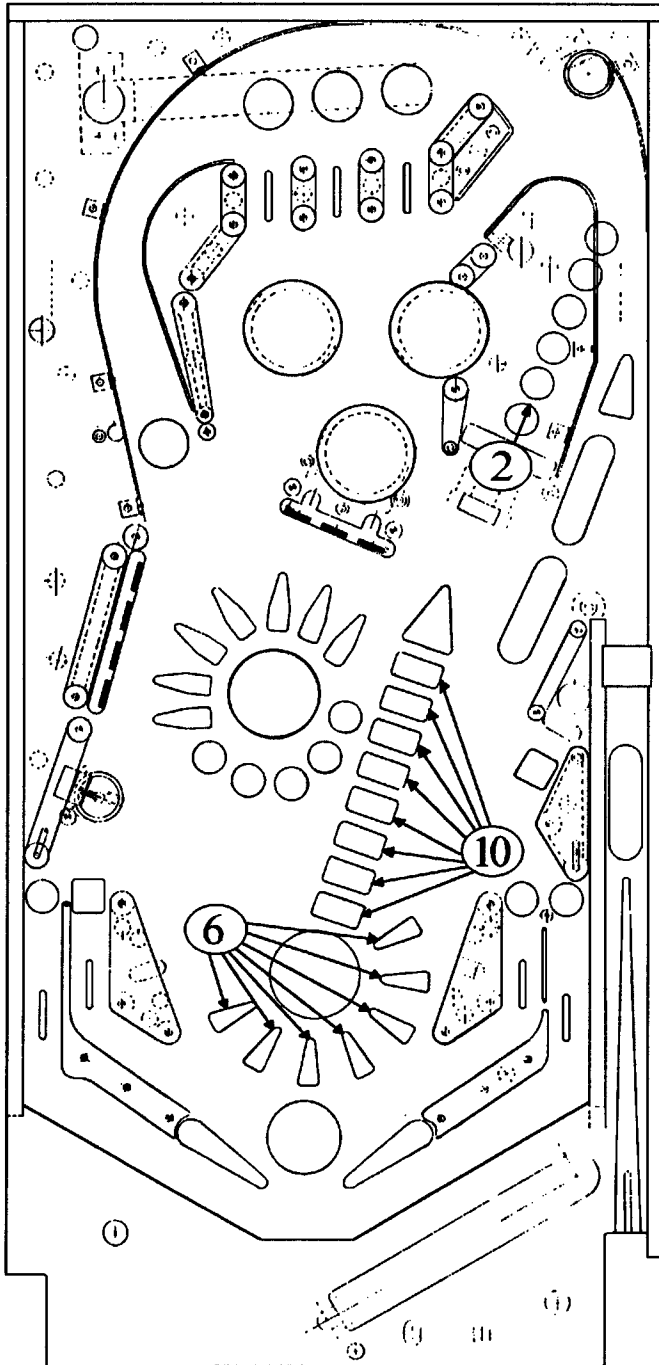
6,000 RPM & Light CHECKPOINT (14)

7,000 RPM & Light Pit Stop (3)

Redline & Instant 3-Ball

In 2-Ball Multiball a Shot Into the Pit Stop Hole(3) will start Automatic 3-Ball.
During 2-Ball Play a Shot Into Hole (7) will start Auto 3-Ball.





Lazermatic Speed Ramp

Shoot Ramp (2) for High Speed Record.
After each completion the Palyers Lazermatic
Speed will be read and placed on the Dot
Matrix Display.

Speeds of (See Instant Info. In Player Display)
will advance players Tach (6) from 2,000 to
Redline. (See Multiball)

Each Ramp shot lights a Flag (10).
After completing the 8th Flag the Ramp is lit
for 1 Million points on a 10 second timer.

8 consecutive Ramp shots lights the Ramp for
10 Million points on a 10 second timer.

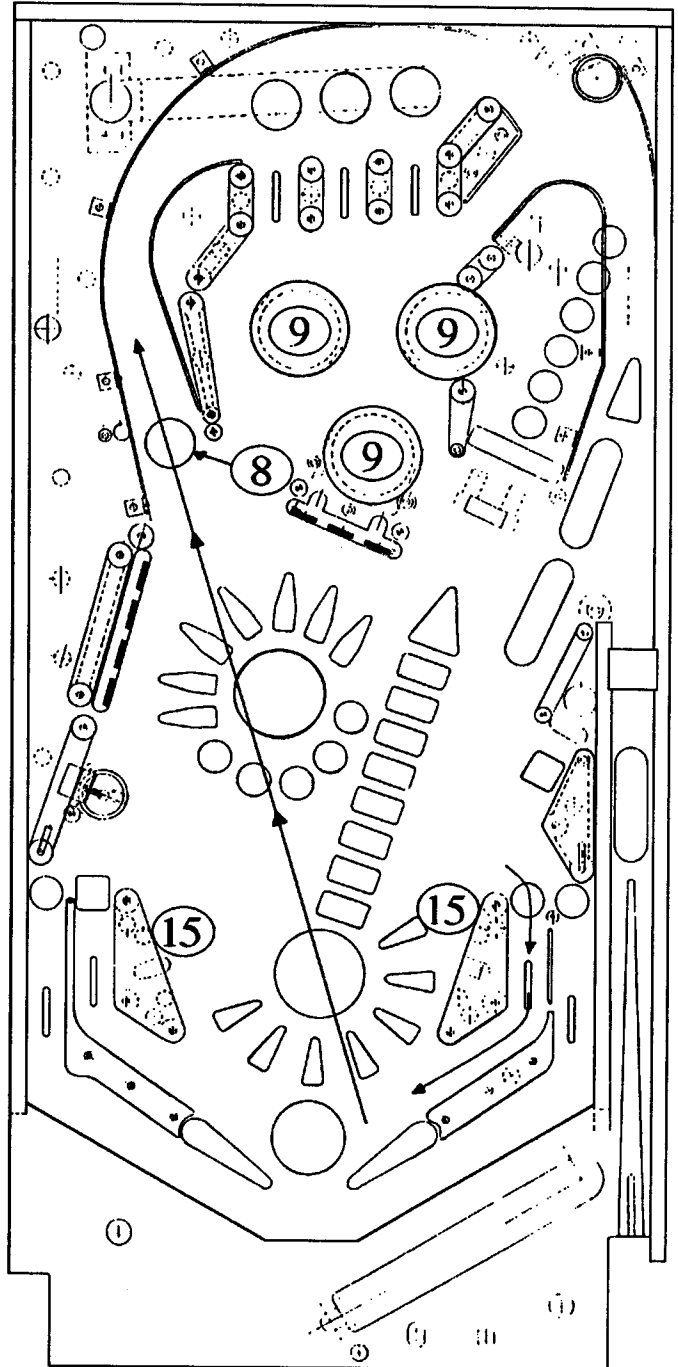
Spin & Win

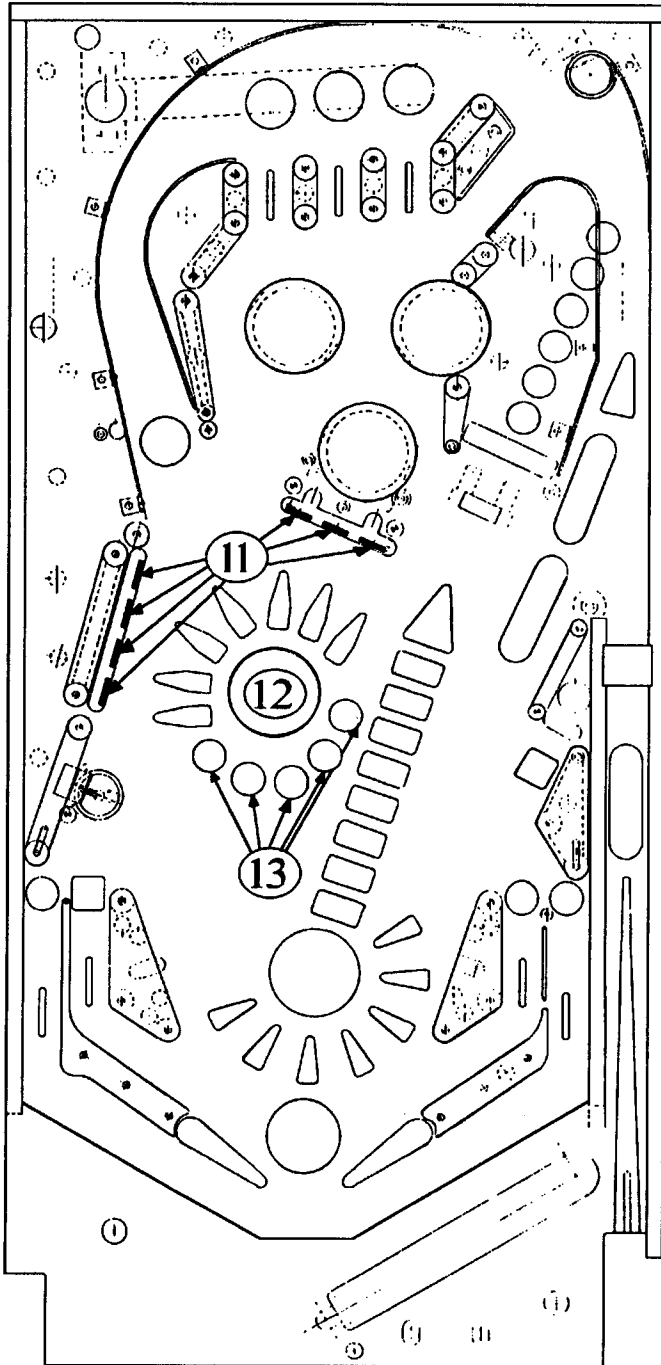
The Spin & Win Feature is always active.

Values (below) toggle each time a Pop Bumper (9) or Slingshot (15) is activated.

Spin & Win values are collected by shooting through the Spinner (8).

1 Million
Hot Nitro
Mystery Points
Light Extraball
Advance RPM





Blue Light Special

When the Random Blue Light Special (12) comes on, completing the remaining targets will award one of the five values(13):

- 1 Million
- Redline
- Extra Ball
- Take High Score
- Double Score

Carrera

Completing Carrera Targets (11) will advance Tach 1,000 RPM & advance Jackpot Value.

Skill Shot

1st shot into ramp (2) from plunger scores
250K times Ball in play.

Nitro Value

Left Return Lane lights target (17). Completing
Target (17) collects the value built up by the
Pop Bumpers

Hot Nitro

The Hot Nitro Round is 1 of 5 features
collected at Spin & Win.
When Hot Nitro is Active a Yellow light will
flash at the car above the Target.
At this time the Target is worth 200K per hit
and each hit advances the (2) Lazeromatic
Ramp Speeds by 20MPH.

Combo Shot

Step 1

Shoot the ball through the Spinner (8) and
into the Hole (7).

Step 2

When the ball returns to the left Flipper Shoot
the Ramp (2).

Step 3

Next Shoot the ball into the Hole (7) via the
Lane (16).

Step 4

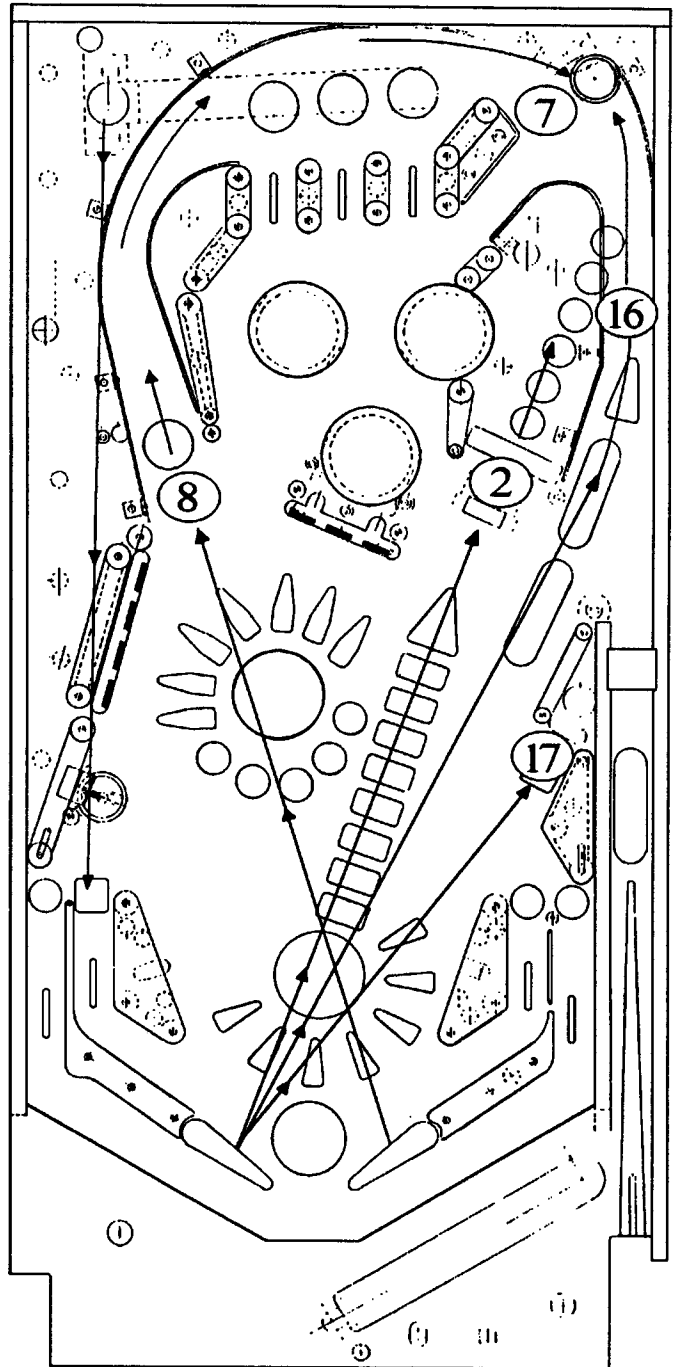
Shoot the ball returned to the left Flipper into
the Car target.

Scoring occurs in the following order:

Steps 1 & 2 = 50K

Steps 1, 2 & 3 = 100K

Steps 1, 2, 3, & 4 = 150K



AUDIT FUNCTIONS

GENERAL

There are 88 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 79 less-used audits (E AU10 through E AU88), 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 AU88). 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.

Checkpoint Audit Table

Audit Number (Player 3 Display)	Audit Description (Players 1 & 2 Displays: totals in Player 4 Display)	Audit Number (Player 3 Display)	Audit Description (Players 1 & 2 Displays: totals in Player 4 Display)
AU 01	Checkpoint PROM ID	E AU 45	Outlane Special
AU 02	Total Paid Credits	E AU 46	2K RPM
AU 03	Percent Free	E AU 47	3K RPM
AU 04	Ball Time Average	E AU 48	4K RPM
AU 05	Average Game Time	E AU 49	5K RPM
AU 06	Coins Left	E AU 50	6K RPM
AU 07	Coins Right	E AU 51	7K RPM
AU 08	Coins Center	E AU 52	8K RPM
AU 09	Total Coins	E AU 53	Carrera Complete
E AU 10	Expand Audits (ON/OFF)	E AU 54	2 Ball Multiball
E AU 11	Balls Total	E AU 55	3 Ball Multiball
E AU 12	Extra Ball Total	E AU 56	Spin/Win RPM
E AU 13	Extra Ball Percent	E AU 57	Spin/Win ExBall
E AU 14	1 Replay Awards	E AU 58	Spin/Win Myst Scr
E AU 15	2 Replay Awards	E AU 59	Spin/Win Hot Nitro
E AU 16	3 Replay Awards	E AU 60	Spin/Win Millions
E AU 17	4 Replay Awards	E AU 61	Blue Light Active
E AU 18	Replay Total	E AU 62	Blue Million
E AU 19	Replay Percent	E AU 63	Blue Redline
E AU 20	Special Total	E AU 64	Blue Xball
E AU 21	Special Percent	E AU 65	Blue Catchup
E AU 22	Match Total	E AU 66	Blue Double
E AU 23	Hi Score Wins	E AU 67	Ramp Xball
E AU 24	High Score Percent	E AU 68	Pitstop Special
E AU 25	Free Total	E AU 69	Pitstop Xball
E AU 26	Plays Total	E AU 70	Pitstop RPM
E AU 27	0.0 - 1.4 Mil Games	E AU 71	Pitstop Bns Hld
E AU 28	1.5 - 2.4 Mil Games	E AU 72	Pitstop Inc Fast
E AU 29	2.5 - 3.4 Mil Games	E AU 73	Pitstop Country
E AU 30	3.5 - 4.9 Mil Games	E AU 74	Pitstop Scores
E AU 31	5.0 - 9.9 Mil Games	E AU 75	Rock Music
E AU 32	10 + Mil Games	E AU 76	Soul Music
E AU 33	Average Scores	E AU 77	Jazz Music
E AU 34	Games 1Player	E AU 78	Classical Music
E AU 35	Games 2Player	E AU 79	Rap Music
E AU 36	Games 3Player	E AU 80	Country Music
E AU 37	Games 4Player	E AU 81	Jackpot Active
E AU 38	Buy In Games	E AU 82	Jackpot 2 Mill
E AU 39	Attract Minutes	E AU 83	Jackpot 3 Mill
E AU 40	Cycles H.S. Reset	E AU 84	Jackpot 4 Mill
E AU 41	Coin No Credit	E AU 85	Jackpot 6 Mill
E AU 42	Service Credits	E AU 86	Jackpot 8 Mill
E AU 43	Drain Left	E AU 87	Skill Shot Made
E AU 44	Drain Center	E AU 88	Rerace Again
E AU 44	Drain Right		

EXPANDED FUNCTIONS

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

Extra Ball 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.

Replay Total (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).

Special Total (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).

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

Plays Total (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 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 (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.*

Drain Left (E AU42) provides the number of times the ball drained out the left drain.

Drain Center (E AU43) provides the number of times the ball drained out the center drain.

Drain Right (E AU44) provides the number of times the ball drained out the right drain.

GAME SPECIFIC FUNCTIONS

Outlane Special (E AU45) provides the number of times the Outlane Special was collected .

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

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

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

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

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

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

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

Carrera Complete (E AU53) provides the number of times the Carrera Targets were completed.

2 Ball Multiball (E AU54) provides the total number of times 2 Ball Multiball was achieved.

3 Ball Multiball (E AU55) provides the total number of times 3 Ball Multiball was achieved.

Spin & Win RPM (E AU56) provides the total number of times the RPM was increased by the Spin & Win Feature.

Spin & Win Ex Ball (E AU57) provides the total number of times the Ramp Extra Ball Lite was enabled by the Spin & Win Feature.

Spin & Win Mystery Score (E AU58) provides the total number of times Mystery Score was awarded by the Spin & Win Feature.

Spin & Win Hot Nitro (E AU59) provides the total number of times Hot Nitro Feature was activated by the Spin & Win Feature.

Spin & Win Millions (E AU60) provides the total number of times 1 Million points was awarded by the Spin & Win Feature.

Blue Lite Special (E AU61) provides the total number of times the Blue Light Special Feature was activated.

Blue Lite Million (E AU62) provides the total number of times 1 Million points was awarded by the Blue Light Special Feature.

Blue Lite Redline (E AU63) provides the total number of times Redline was awarded by the Blue Light Special Feature.

Blue Lite Xball (E AU64) provides the total number of times an Extra Ball was awarded by the Blue Light Special Feature.

Blue Lite Catchup (E AU65) provides the total number of times Catchup (tying the highest current game Score) was awarded by the Blue Light Special Feature.

Blue Lite Double (E AU66) provides the total number of times the Player's Score was doubled by the Blue Light Special Feature.

Ramp Extra Ball (E AU67) provides the total number of times an Extra Ball was awarded from the Ramp Shot.

Pitstop Special (E AU68) provides the total number of times that, entering the Pitstop Hole, lit the Outlane Special.

Pitstop Xball (E AU69) provides the total number of times that, entering the Pitstop Hole, lit the Ramp Extra Ball.

Pitstop RPM (E AU70) provides the total number of times that, entering the Pitstop Hole, advanced the RPM Feature (Bonus Multiplier).

Pitstop Bns Hld (E AU71) provides the total number of times that, entering the Pitstop Hole, enabled the Bonus Hold Feature.

Pitstop Inc FAST (E AU72) provides the total number of times that, entering the Pitstop Hole, spots the next letter in the F-A-S-T feature.

Pitstop Country (E AU73) provides the total number of times that, entering the Pitstop Hole, spots the another Country Flag.

Pitstop Scores (E AU74) provides the total number of times that, entering the Pitstop Hole, awarded a Mystery Score.

Rock Music (E AU75) provides the total number of times that Rock Music was selected by the player at the beginning of the game.

Soul Music (E AU76) provides the total number of times that Soul Music was selected by the player at the beginning of the game.

Jazz Music (E AU77) provides the total number of times that Jazz Music was selected by the player at the beginning of the game.

Classical Music (E AU78) provides the total number of times that Classical Music was selected by the player at the beginning of the game.

Rap Music (E AU79) provides the total number of times that Rap Music was selected by the player at the beginning of the game.

Country Music (E AU80) provides the total number of times that Country Music was selected by the player at the beginning of the game.

Jackpot Active (E AU81) provides the total number of times the Jackpot feature was active during Multiball.

Jackpot 2 Million (E AU82) provides the total number of times the Jackpot Feature awarded 2 Million Points

Jackpot 3 Million (E AU83) provides the total number of times the Jackpot feature awarded 3 Million Points

Jackpot 4 Million (E AU84) provides the total number of times the Jackpot feature awarded 4 Million Points

Jackpot 6 Million (E AU85) provides the total number of times the Jackpot feature awarded 6 Million Points

Jackpot 8 Million (E AU86) provides the total number of times the Jackpot feature awarded 8 Million Points

Skill Shot Made (E AU87) provides the total number of times the Skill Shot Feature was accomplished. (Note- the feature is enabled at the start of each new ball.)

ReRace Again (E AU88) provides the number of times the Multiball Feature was re-enabled by the program. (Note- in the early stages of Multiball, a safety timer is used re-establish the feature, should a ball exit prematurely.)

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 AU88) 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.

Checkpoint Game Adjustment Table

Adjustment Number (Player 3)	Description (Players 1 & 2)	Factory Setting (Player 4)
Ad 01	Replay/Manual	10%
Ad 02	Start Replay	5,500,000
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	Coinage*	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/Game	03
E Ad 16	Warning Tilt	01
E Ad 17	Buy In Allowed	NO
E Ad 18	Replay Boost	NO
E Ad 19	Credits Limit	30
E Ad 20	Scores Highest	YES
E Ad 21	World Record Awards	03
E Ad 22	Todays 1 Award	01
E Ad 23	Todays 2 Award	00
E Ad 24	Todays 3 Award	00
E Ad 25	Backup World Record	9,000,000
E Ad 26	Backup Todays 1	8,000,000
E Ad 27	Backup Todays 2	7,000,000
E Ad 28	Backup Todays 3	6,000,000
E Ad 29	Backup Todays 4	5,000,000
E Ad 30	Backup Todays 5	4,000,000
E Ad 31	H.S.T.D. Every	700
E Ad 32	Clean Game Every	1500
E Ad 33	Free Play	NO
E Ad 34	Message Custom	ON
E Ad 35	Language	ENGLISH
E Ad 36	Attract Mode Music	ON
E Ad 37	Flash Lamps	NORMAL
E Ad 38	Coils Pulse	NORMAL
E Ad 39	Operator/Any	ANY
E Ad 40	Game Music	ROCK
E Ad 41	Outlane Toggle	BOTH
E Ad 42	Recall Flags	NO
E Ad 43	Million Timer	FACTORY
E Ad 44	No Limit Million	YES
E Ad 45	Multiball	FACTORY
E Ad 46	Rerace Timer	FACTORY
E Ad 47	"FAST" Timer	FACTORY
E Ad 48	Shaker Motor	FAST
E Ad 49	Winners Circle	ON
E Ad 50	Ball Kick Animation	OFF
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 40 Outlane Toggle	FLIPPER	BOTH	BOTH	SLING	SLING
E Ad 41 Recall Flags	YES	YES	YES	NO	NO
E Ad 42 Million Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 43 No Limit Million	YES	YES	NO	NO	NO
E Ad 44 Multiball	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 45 Rerace Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 46 Fast Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 47 Spin & Win Timer	EXEASY	EASY	FACTORY	HARD	EXHARD

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 = 7,000,000
 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 40 Outlane Toggle = Flipper
 E Ad 41 Recall Flags = No

E Ad 42 Million Timer = Factory
 E Ad 43 No Limit Million = No
 E Ad 44 Multiball = Factory
 E Ad 45 Rerace Timer = Factory
 E Ad 46 FAST Timer = Factory
 E Ad 47 Spin & Win Timer = Hard

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		
			1	2	4	Left	Center	Right
USA1	1 COIN	1 PLAY	25¢	\$1.00	25¢	1 PLAY/ 1 COIN	4 PLAY/ 1 COIN	1 PLAY/ 1 COIN
USA2	4 COINS	3 PLAYS	25¢	\$1.00	25¢	1 PLAY/ 2 COIN 2 PLAY/ 3 COIN 3 PLAY/ 4 COIN	3 PLAY/ 1 COIN	1 PLAY/ 2 COIN 2 PLAY/ 3 COIN 3 PLAY/ 4 COIN
USA3	2 COINS	1 PLAY	25¢	\$1.00	25¢	1 PLAY/ 2 COIN	2 PLAY/ 1 COIN	1 PLAY/ 2 COIN
USA4	2 COINS	1 PLAY 1 COIN BUY-IN	25¢		25¢	2 COINS FOR THE 1st PLAY 1 PLAY/ 1 COIN ONLY DURING BUY-IN		
AUSTRIA COINAGE			5 SCH	10 SCH	10SCH	1 PLAY/ 2 COIN 2 PLAY/ 3 COIN 3 PLAY/ 4 COIN	2 PLAY/ 1 COIN 3 PLAY/ 2 COIN	2 PLAY/ 1 COIN 3 PLAY/ 2 COIN
AUSTRALIA COINAGE			20¢	\$1.00	\$2.00	1 PLAY/ 3 COIN	2 PLAY/ 1 COIN	4 PLAY/ 1 COIN
UK COINAGE			10P	50P	£1	1 PLAY/ 3 COIN	2 PLAY/ 1 COIN	5 PLAY/ 1 COIN
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/ 1 COIN	3 PLAY/ 1 COIN	1 PLAY/ 1 COIN
GERMAN 1	5DM	7 PLAYS	1DM	2DM	5DM	1 PLAY/ 1 COIN 7 PLAY/ 5 COIN	2 PLAY/ 1 COIN 8 PLAY/ 3 COIN	7 PLAY/ 1 COIN
GERMAN 2	5DM	9 PLAYS	1DM	2DM	5DM	1 PLAY/ 1 COIN 3 PLAY/ 2 COIN 5 PLAY/ 3 COIN 7 PLAY/ 4 COIN 9 PLAY/ 5 COIN	3 PLAY/ 1 COIN 7 PLAY/ 2 COIN 10 PLAY/ 3 COIN 14 PLAY/ 4 COIN	9 PLAY/ 1 COIN
NETHERLAND COINAGE			1 Guilder	1 Guilder	2.5 Guilder	1 PLAY/ 1 COIN	1 PLAY/ 1 COIN	3 PLAY/ 1 COIN
SWEDEN COINAGE			1KR	5KR	5KR	1 PLAY/ 3 COIN 2 PLAY/ 5 COIN	2 PLAY/ 1 COIN	2 PLAY/ 1 COIN
FRANCE 1 COINAGE			1f	5f	10f	1 PLAY/ 3 COIN 2 PLAY/ 5 COIN	2 PLAY/ 1 COIN	5 PLAY/ 1 COIN
FRANCE 2 COINAGE			1f	5f	10f	1 PLAY/ 5 COIN	1 PLAY/ 1 COIN	3 PLAY/ 1 COIN
ITALY COINAGE			500L		500L	1 PLAY/ 1 COIN		1 PLAY/ 1 COIN
SPAIN COINAGE			25P		100P	1 PLAY/ 1 COIN		5 PLAY/ 1 COIN
JAPAN COINAGE					100¥			1 PLAY/ 1 COIN 3 PLAY/ 2 COIN

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

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

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

E Ad 24 Todays 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 Todays 1 - Adjust the backup score level to which level 1 may be reset.

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

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

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

E Ad 30 Backup Todays 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 Message Custom - When desired, this function is used to establish a custom message periodically displayed during the attract mode. Set the feature to **CHANGE** using the Credit button and depress STEP. The letter **A** is indicated in the first position of the Player 1 display. Vary the letter by operating the left and right flippers. With the desired letter indicated, depress the CREDIT button to lock in the letter and advance to the next display character. Repeat this procedure until the desired message is indicated in the Player 1 and 2 displays. At this time, depress the STEP push-button switch to advance to E Ad 35.

NOTE

To lock in the custom message, the game must be returned to Game Over by depressing STEP with E Ad 48 displayed.

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 Operator/Any Feature - 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 Ad39 Language- Set to **ENGLISH, FRENCH** or **GERMAN**. Determines the language of the text used in Audits, Adjustments and Game Diagnostics.

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 39 TO E Ad48)

E Ad 40 Game Music- Set to **ROCK, COUNTRY, CLASSICAL, JAZZ, SOUL** or **RAP**. Determines the style of music played at the start of each game. Note: The player may alter the music for his game by using the Flipper buttons prior to shooting the first ball or the Timer counting down to 0.

E Ad 41 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 42 Recall Flags- Set to **YES**, or **NO**. When set to **YES**, all the lit Country Flags are carried over in memory from ball to ball. When Set to **NO**, all the lit Flags reset at the end of each ball.

E Ad 43 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 44 No Limit Million- Set to **YES** or **NO**. When set to **YES**, each ramp shot completed during the **MILLION** countdown awards 1,000,000 points. When set to **NO**, only the first ramp shot completed during the **MILLION** countdown awards 1,000,000 points.

E Ad 45 Multiball- Set to **EXEASY**, **EASY**, **FACTORY**, **HARD** or **EXHARD**. Determines how certain features increase the **RPM** feature, which when completed awards Multiball.

Increases RPM/Setting	EXEASY	EASY	FACTORY	HARD	EXHARD
Number of Bumper Hits	12	18	24	30	36
Completed Skill Shots	YES	YES	YES	YES	NO
MPH Speed	165	175	185	195	205

E Ad 46 Rerace Timer- Set to **EXEASY**, **EASY**, **FACTORY**, **HARD** or **EXHARD**. Determines how long the **Rerace** feature remains enabled in seconds.

EXEASY	EASY	FACTORY	HARD	EXHARD
14 Seconds	12 Seconds	10 Seconds	8 Seconds	6 Seconds

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

EXEASY	EASY	FACTORY	HARD	EXHARD
25 Seconds	20 Seconds	15 Seconds	10 Seconds	8 Seconds

E Ad 48 Shaker Motor - Set to **OFF**, **SLOW** or **FAST**. Determines the speed of the vibrating Shaker Motor during certain events in game play. (The speed is varied by the rate it's drive relay is pulsed.)

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 Ball Kick Animation- Set to **ON** or **OFF**. When set to **ON**, in game over attract mode, once every 30 minutes all 3 balls will be kicked out to the playfield to attract attention to the game.

GAME DIAGNOSTICS

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

During game play, activation of switches and operation of coils with associated switches are monitored. If a switch is not made for 50 games it is considered bad. When operation of a coil should close or open a switch and does not, the coil is considered bad. In Game over attract mode, bad switches and coils (if any) are reported (See Tech Alert Description below). Note that reporting of an unused switch does not constitute a problem and that a bad coil could mean that the associated switch requires adjustment.

Wiring to switches, solenoids and controlled lamps uses color-coded wires that basically follows a resistor color-code scheme for the eight rows and eight columns. During the switch tests and during the discrete lamp test, identification of the color of the row and column wires are indicated in the Player 3 & 4 Displays. For example, making the right coin switch during the Switch Test results in the switch functional name (RIGHT COIN) shown in the Player 1 and 2 Displays, the row (WH-YE) and column (GR-BR) wire color codes shown in the Player 3 display, and the switch number shown in the Player 4 display.

BK = Black
BR = Brown
RE = Red
OR = Orange
YE = Yellow

GR = Green
BL = Blue
VI = Violet
GY = Grey
WH = 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. It should also be noted that the Tech Alert works in conjunction with the RED " Tech Check" and GREEN "Clean me Lights" located under the Start Button on the front of the game.

The Following conditions may occur in Game Over Attract Mode.

Red light- ON Indicates a non critical switch (ie. Outlane switch) is either stuck or has not been closed for 50 games.

Red light- FLASHING Indicates a critical switch (ie. Drop Target switch) is either stuck or has not been closed for 50 games.

Green light- ON Indicates 1500 games (operator adjustable E Ad 32) have been played and playfield cleaning is recommended.

Green light- FLASHING Indicates 2250 games (1.5 X E Ad 32) have been played and playfield cleaning is strongly recommended.

The Red Light will go off automatically after the bad switch(s) have been repaired. To turn the Green Light off you must enter Game Cleaned Ad 09 and change its setting from NO to YES by depressing the start button. Doing so will reset the Clean Game counter to 0.

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 49.

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) "....Checkpoint!....." "REDLINE!!!!!!" Level 1 Through Level 6 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 has been individually lit, while the other rows are off. The next test begins with every other dot lit, in both the rows and columns. These dots then go out, and the unlit dots light, resulting in an alternating checkerboard pattern. The test concludes with the words "DOT MATRIX LIVES". (Please Note- these tests may be interrupted at any time by operating the STEP push-button switch to advance to the next test.

Switches

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

Switch Test

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

Active Switches

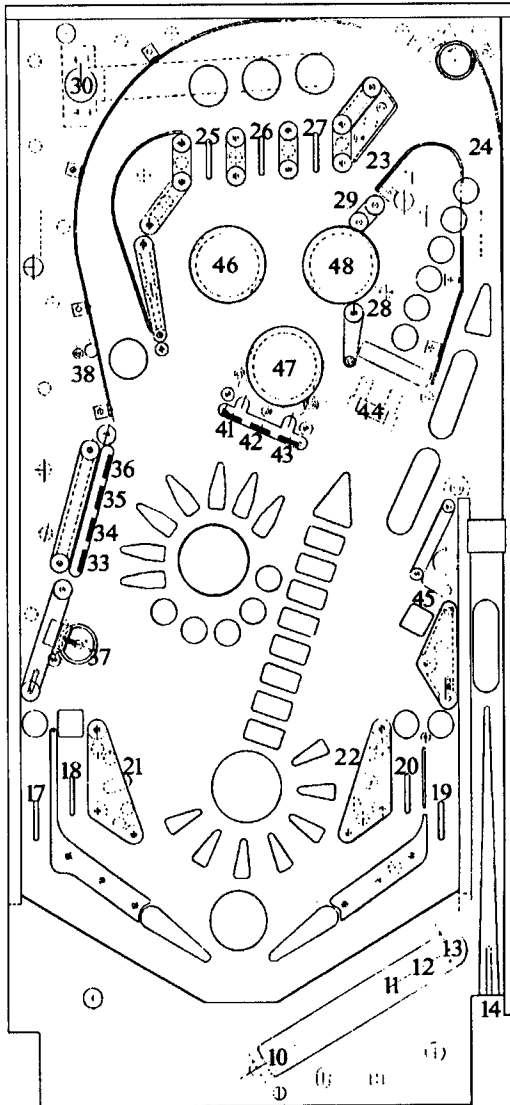
Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors,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

SWITCH MATRIX CHART

ROW \ COLUMN	1 Q55 GRN-BRN CN8-1	2 Q54 GRN-RED CN8-2	3 Q53 GRN-ORN CN8-3	4 Q52 GRN-YEL CN8-4	5 Q51 GRN-BLK CN8-5	6 Q50 GRN-BLU CN8-7	7 Q49 GRN-VIO CN8-8	8 Q48 GRN-GRY CN8-9
1 WHT-BRN CN10-9	Plumb Tilt 1	Not Used 9	Left Outlane 17	Top Lane L 25	Drop Target "C" 33	Drop Target "E" 41	Not Used 49	Not Used 57
2 WHT-RED CN10-8	Not Used 2	Outhole 10	Left Return 18	Top Lane A 26	Drop Target "A" 34	Drop Target "R" 42	Not Used 50	Not Used 58
3 WHT-ORN CN10-7	Credit Button 3	Trough #1 Left 11	Right Outlane 19	Top Lane P 27	Drop Target "R" 35	Drop Target "A" 43	Not Used 51	Not Used 59
4 WHT-YEL CN10-6	Right Coin 4	Trough #2 Center 12	Right Return 20	Ramp Entrance 28	Drop Target "R" 36	Checker Drop Target 44	Not Used 52	Not Used 60
5 WHT-GRN CN10-5	Center Coin 5	Trough #3 Right 13	Left Slingshot 21	Ramp Exit 29	Pitstop Eject 37	Nitro Target 45	Not Used 53	Not Used 61
6 WHT-BLU CN10-3	Left Coin 6	Shooter Lane 14	Right Slingshot 22	VUK Eject 30	Spinner 38	Left Turbo Bumper 46	Not Used 54	Not Used 62
7 WHT-VIO CN10-2	Slam Tilt 7	Left EOS 15	Flat Tire 23	Not Used 31	Not Used 39	Center Turbo Bumper 47	Not Used 55	Not Used 63
8 WHT-GRY CN10-1	Not Used 8	Right EOS 16	VUK Entrance 24	Not Used 32	Not Used 40	Right Turbo Bumper 48	Not Used 56	Not Used 64

Checkpoint 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)	180-5009-00
05*	Center Coin	180-5024-00	14	Shooter Lane	500-5143-00
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	515-5138-00
09	Not Used	-	18	Left Return Lane	515-5138-00
			19	Right Outlane	515-5138-00
			20	Right Return Lane	515-5138-00
			21	Left Slingshot Sw. (2)	180-5054-00
			22	Right Slingshot Sw. (2)	180-5054-00
			23	Flat Tire Target	500-5035-00
			24	VUK Entrance	515-5138-00
			25	Top Lane "L"	515-5138-00
			26	Top Lane "A"	515-5138-00
			27	Top Lane "P"	515-5138-00
			28	Ramp Entrance	500-5354-00
			29	Ramp Exit	500-5292-00
			30	VUK Eject	180-5064-00
			31	Not Used	-
			32	Not Used	-
			33	Drop Target CARRERA	180-0030-00
			34	Drop Target CARRERA	180-0030-00
			35	Drop Target CARRERA	180-0030-00
			36	Drop Target CARRERA	180-0030-00
			37	Pitstop Eject	180-5027-00
			38	Spinner	500-5193-00
			39	Not Used	-
			40	Not Used	-
			41	Drop Target CARRERA	180-0030-00
			42	Drop Target CARRERA	180-0030-00
			43	Drop Target CARRERA	180-0030-00
			44	Single Drop Target	180-0030-00
			45	Collect Energy	515-5293-00
			46	Bumper Left	180-5015-00
			47	Bumper Center	180-5015-00
			48	Bumper Right	180-5015-00
			49	Not Used Thru 64	



* Indicates Cabinet Switches

Switch Locations

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

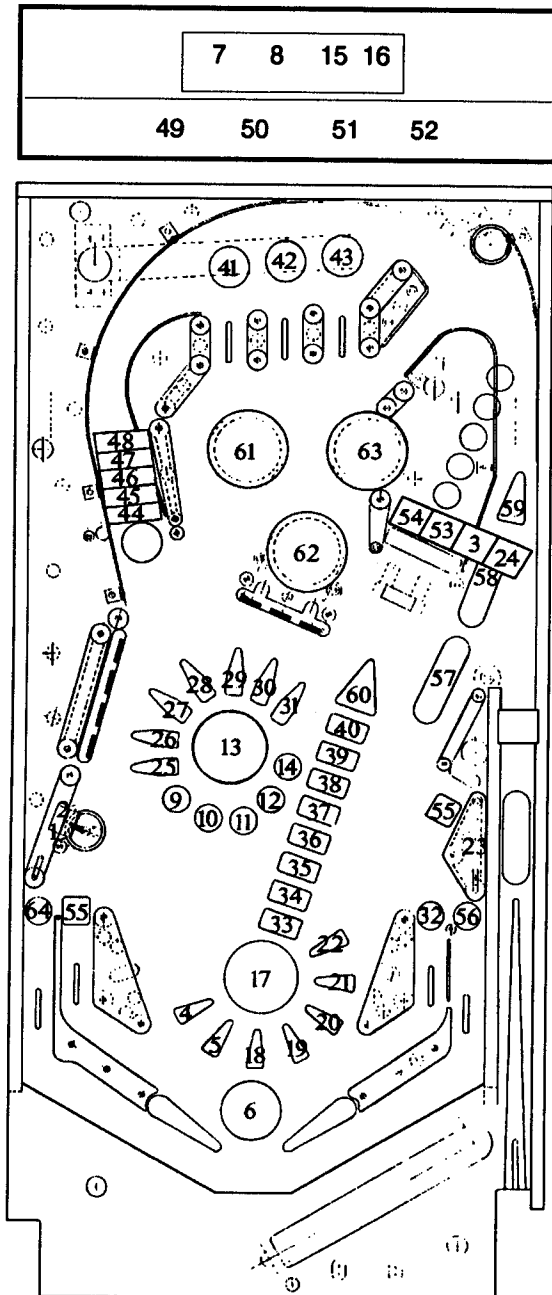
From the LAMP DRIVES test, depress the STEP push-button switch. The top display indicates lamp name. The bottom display indicates the row and column wire colors and the lamp matrix number. Lamp 01 should light. With the FORWARD/REVERSE push-button switch in the FORWARD (up) position, operating the Game 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	Pitstop Red 1	BLUELITE Million Lit 9	MILLION 17	Drop Target "C" 25	Flag USA 33	Top Lane "L" 41	FAST "F" 49	Release 57
2 Q73 RED-BLK CN6-2	Pitstop Green 2	BLUELITE Redline 10	4000 RPM 18	Drop Target "A" 26	Flag Germany 34	Top Lane "A" 42	FAST "A" 50	Instant Re-Race 58
3 Q74 RED-ORN CN6-3	CHECK POINT Red 3	BLUELITE Extra Ball 11	5000 RPM 19	Drop Target "R" 27	Flag France 35	Top Lane "P" 43	FAST "S" 51	Activate "Fast" Scores 59
4 Q75 RED-YEL CN6-5	2000 RPM 4	BLUELITE Catch Up 12	6000 RPM 20	Drop Target "R" 28	Flag Japan 36	Spinner Mystery RPM 44	FAST "T" 52	Ramp Extra Ball 60
5 Q76 RED-GRN CN6-6	3000 RPM 5	BLUELITE Special 13	7000 RPM 21	Drop Target "E" 29	Flag Belgium 37	Spinner Lite Extra Ball 45	Ramp Jackpot 53	Bumper Left 61
6 Q77 RED-BLU CN6-7	Race Again 6	BLUELITE Double Scores 14	8000 RPM 22	Drop Target "R" 30	Flag Swiss 38	Spinner Mystery Scores 46	Ramp Skill Shot 54	Bumper Center 62
7 Q78 RED-VIO CN6-8	Jackpot 2 Million 7	Jackpot 4 Million 15	Hot Nitro Active 23	Drop Target "A" 31	Flag Italy 39	Spinner Hot Nitro 47	Left Return 55	Bumper Right 63
8 Q79 RED-GRY CN6-9	Jackpot 3 Million 8	Double Jackpot Grand Prix 16	CHECK POINT Green 24	Return Right 32	Flag England 40	Spinner 1 Million 48	Outlane Right 56	Outlane Left 64

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 Million
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
33.	Flag U.S.A.
34.	Flag Germany
35.	Flag France
36.	Flag Japan
37.	Flag Belgium
38.	Flag Swiss
39.	Flag Italy
40.	Flag England
41.	Top Lane "L"
42.	Top Lane "A"
43.	Top Lane "P"
44.	Spinner Mystery RPM
45.	Spinner Lite Extra Ball
46.	Spinner Mystery Scores
47.	Spinner Hot Nitro
48.	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



Lamp Locations

* Indicates Speaker 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

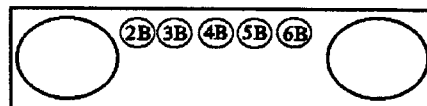
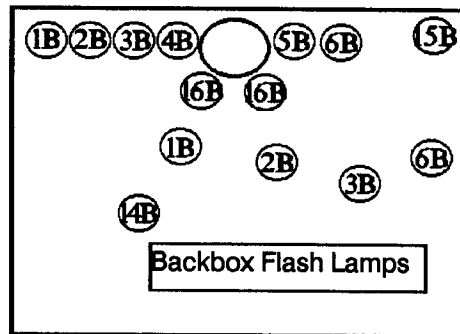
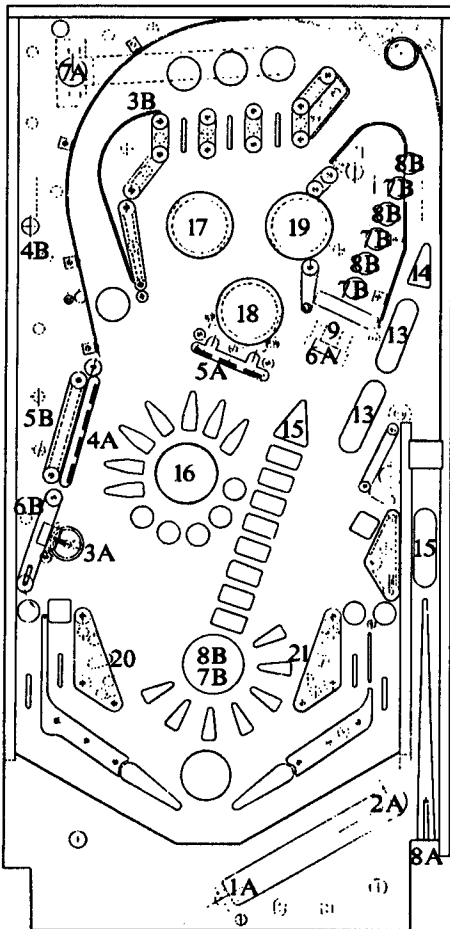
From the Select Coil test, depress the STEP push-button switch once. The game returns to the game-over mode.

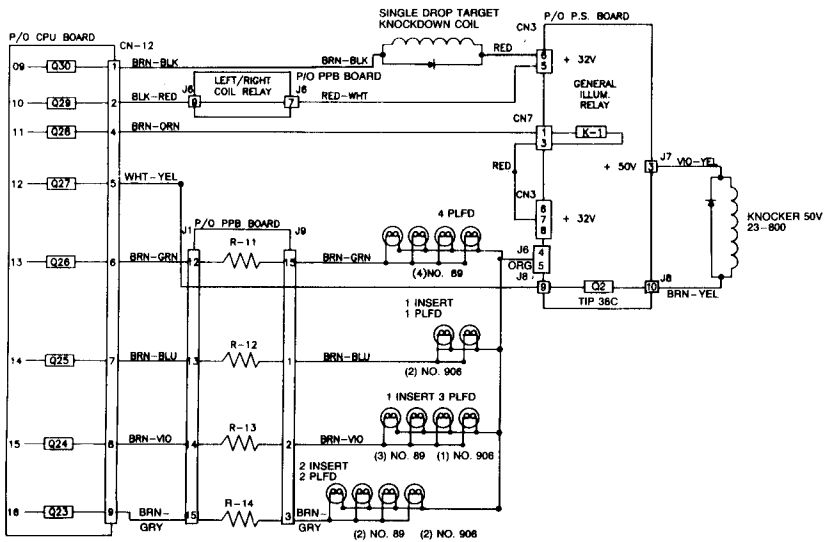
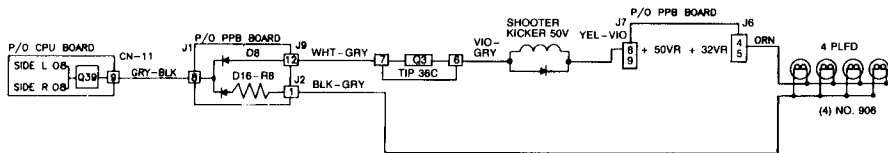
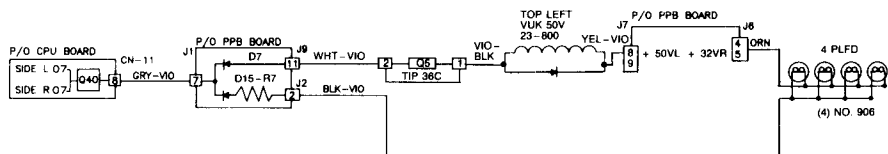
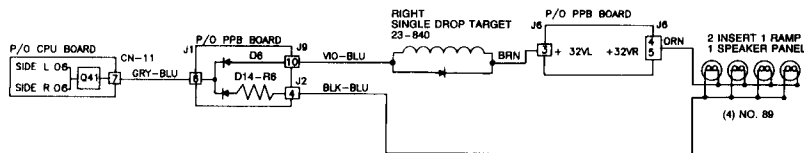
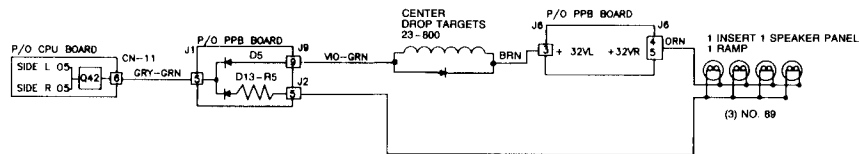
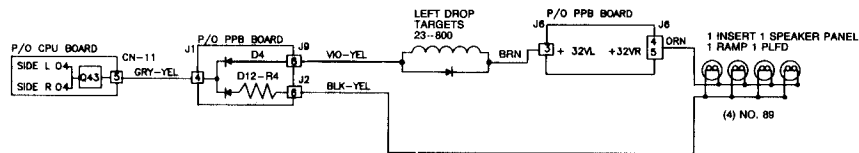
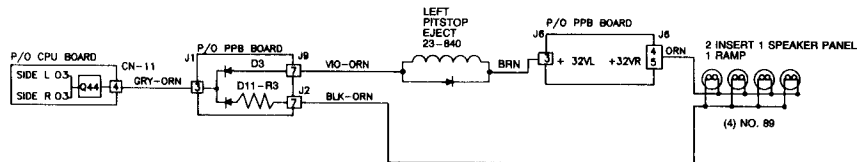
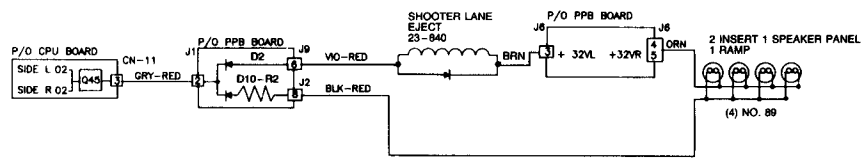
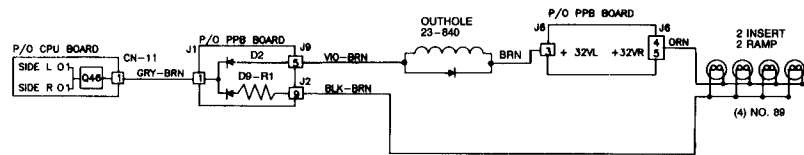
CPU Controlled Auxillary Solenoids

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 CN3-8	Q8	23-800
18	Center Turbo Bumper	BLU-RED CPU CN19-4	RED PS CN3-8	Q9	23-800
19	Right Turbo Bumper	BLU-YEL CPU CN19-6	RED PS CN3-8	Q10	23-800
20	Left Slingshot	BLU-BRN CPU CN19-7	RED PS CN3-8	Q11	23-800
21	Right Slingshot	BLU-GRN CPU CN19-8	RED PS CN3-8	Q12	23-800
22	Motor Circuit (See Schematic)	CPU CN19-9	PS CN3-8	Q13	-

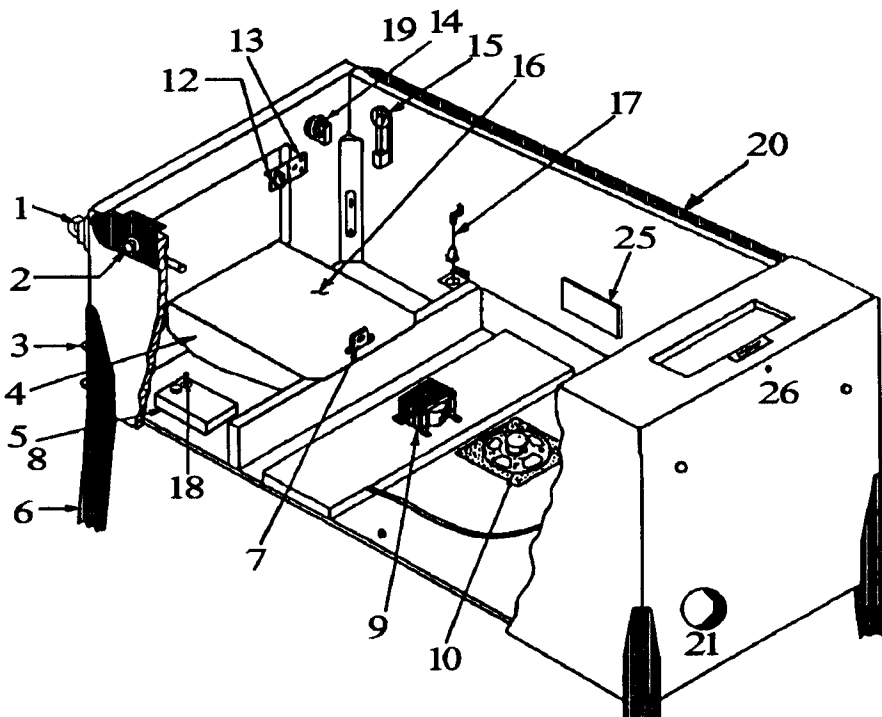
Flipper Solenoids

Coil Description	Flipper GND CPU to Coil	Flipper GND Sw. to Flip.PCB	Power Lines FlipPc toCoil	Coil Type	Power Input To Flip PCB
Left Flipper	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



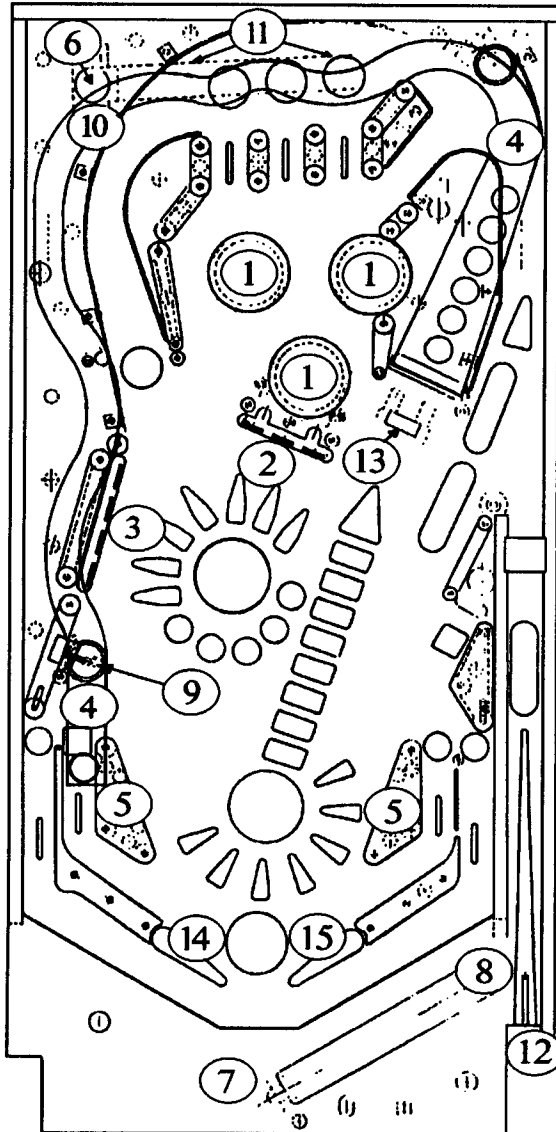


CABINET PARTS ILLUSTRATION



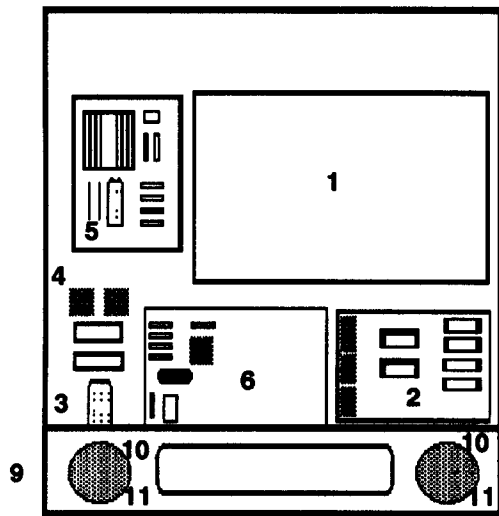
Item	Description	Part No.
1	Ball-Shooter Assy	500-5300-00
2	Flipper Button	500-5026-18
3	Leg Bolt (Black)	231-5000-01
4	Cash Box Bottom	545-5090-00
5	On/Off Switch DP/ST	180-5001-00
6	Leg (Black)	535-5020-30
7	Lock Bracket-Cash Box	535-5215-00
8	Power Input Box Assy	515-5360-00-10
9	Transformer	010-5002-00
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	Key Start Switch	500-5223-00
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	Shaker Motor (Not Shown)	500-5228-00

Playfield - Major Assemblies



Item	Description	Part Number
1	Turbo Bumpers	500-5275-00
2	3 Bank Drop Targets	500-5196-31
3	4 Bank Drop Targets	5005239-00
4	Plastic Ramp	500-5245-00
5	Slingshots	500-5226-00
6	Super Vertical Up Kicker	500-5307-00
7	Outhole	500-5082-00
8	Trough Eject	500-5012-01
9	Saucer Eject	500-5051-06
10	Ball Eject Chute	500-5229-00
11	Ball Return Chute (Subway)	535-5825-01
12	Turboboost Kicker	500-5304-00
13	Single Drop Target Assy.	500-5240-00
14	Left Flipper Assembly	500-5177-32
15	Right Flipper Assembly	500-5177-31

BACKBOX PARTS ILLUSTRATION



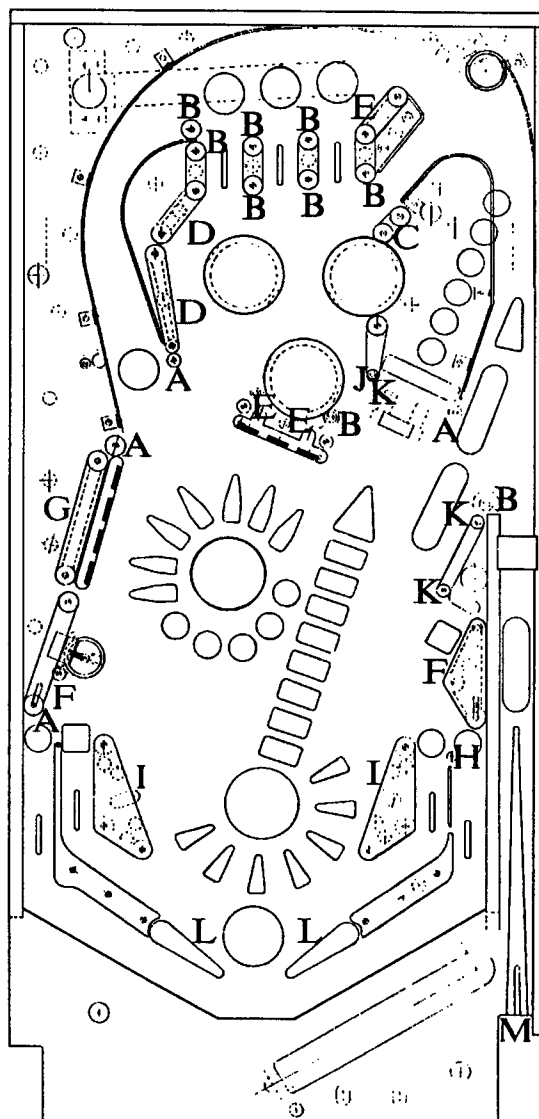
Item	Description	Part No.
1	CPU Board Assy.(Non-Refix)	520-5003-03 †
2	Sound Board Assy	520-5002-03 †
3	Capacitor 2C1	125-5000-00
4	Bridge Rectifiers	112-5000-00
5	Power Supply Bd. Assy	520-5047-00
6	PPB Board	520-5021-04
7	Dot Matrix Display Bd*	520-5042-00 †
8	Display Ribbon Cable*	036-5000-24-10
9	Speaker Housing	500-5231-00-10
10	Speakers (2)	031-5004-00
11	Speaker Grill (2)	830-5606-00
12	Back Box Glass*	830-5210-00
13	Roto-Lock Top*	355-5006-02

* Not Shown

† When ordering PC Boards with ROMs
please specify game name

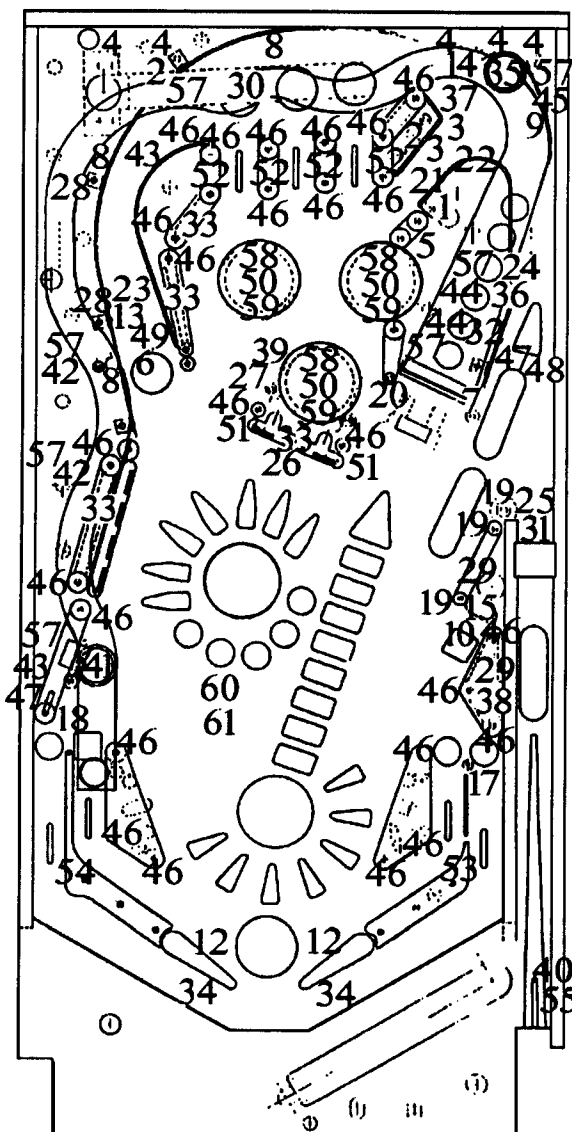
RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A.	Rubber Post-Long (4)	545-5009-00
B.	$\frac{5}{16}$ " (9)	545-5025-02
C.	$\frac{3}{4}$ " (1)	545-5025-04
D.	$1\frac{1}{4}$ " (2)	545-5025-06
E.	$1\frac{1}{2}$ " (3)	545-5025-07
F.	2" (2)	545-5025-08
G.	$2\frac{1}{2}$ " (1)	545-5025-09
H.	$\frac{7}{16}$ " Outer Diameter (1)	545-5025-17
I.	$2\frac{3}{4}$ " (2)	545-5025-20
J.	Rubber Post -Short (1)	545-5190-00
K.	Rubber Post -Short (3)	545-5191-00
L.	Red Flipper (2)	545-5024-02
M.	Shooter Tip (1)	545-5027-00

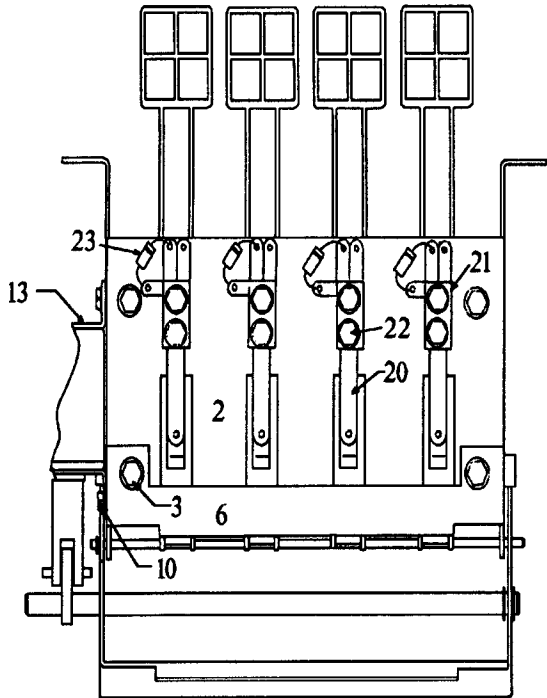
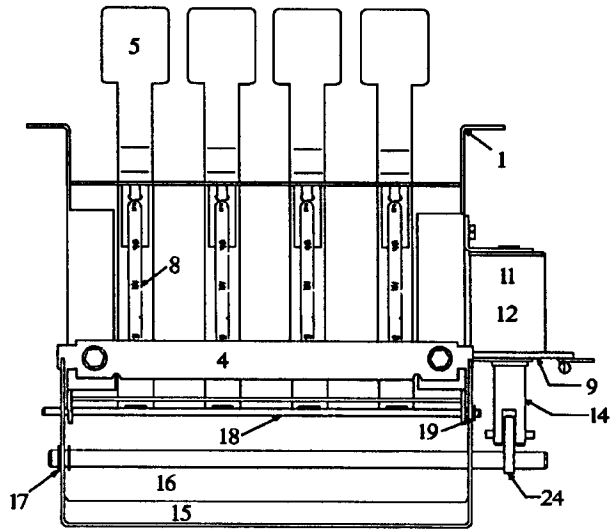


Playfield Parts

No.	Description	Part Number		
1.	1/2" Hex Spacer	254-5001-01	14.	Ball Deflector
2.	Plastic Spacer (3)	254-5000-02	15.	Standup Target for Porche
3.	Plastic Spacer (2)	254-5000-00	16.	Butryte Assembly
4.	Plastic Spacer (5)	254-5006-00	17.	Mini Post Wood Threaded (2)
5.	5/8" Hex Spacer	254-5008-02	18.	Bumper Post
6.	Spinner Target	500-5060-00-10	19.	Metal Standoff
7.	Flat Rail	500-5217-00	20.	Metal Standoff
8.	Flat Rail	500-5218-00	21.	Ball Guide
9.	Flat Rail	500-5244-00	22.	Ball Guide Brkt
10.	Porsche Car	500-5236-00	23.	Spinner Brkt.
11.	Comp. Playfield Ass.	505-6004-10-10	24.	Mounting Brkt. (Wire Gate)
12.	Flipper Bat & Shaft (2)	515-5133-01	25.	Hat Bracket for Wire Gate
13.	Spinner assembly	515-5236-00	26.	Ballstop Brkt.
			27.	Wire form
			28.	Ball Guide Brk.
			29.	1" Wire form
			30.	Wire Gate
			31.	Wire Gate
			32.	Wire Gate
			33.	Ball Guide Wire
			34.	Snubber Wire
			35.	Ball Deflector
			36.	Actuator Wire
			37.	Ball Guide
			38.	Ball Guide
			39.	Ball Catch Spring Wire
			40.	Ball Shooter Rail Guard
			41.	Ball Deflector
			42.	Mini Mars (Fluorescent) (2)
			43.	Mini Mars (Clear) (2)
			44.	Mini Mars (Red) (2)
			45.	Mini Mars (Yellow)(1)
			46.	Mini Post Flour Orange (25)
			47.	Red #44 Lamp Cover (2)
			48.	Green #44 Lamp Cover (2)
			49.	Spinner Washer (2)
			50.	Jump Bumper Cap (3)
			51.	Flour Orange Double Rubber Post
			52.	Light Hood Flour Orange (4)
			53.	Return Lane Guide (Right)
			54.	Return Lane Guide (Left)
			55.	Pressure Sensitive Tape
			56.	P/F Glass
			57.	Mini Decal (7)
			58.	Pop Bumper Decal (3)
			59.	Pop Bumper Decal (3)
			60.	P/F Mylar
			61.	Screened Playfield

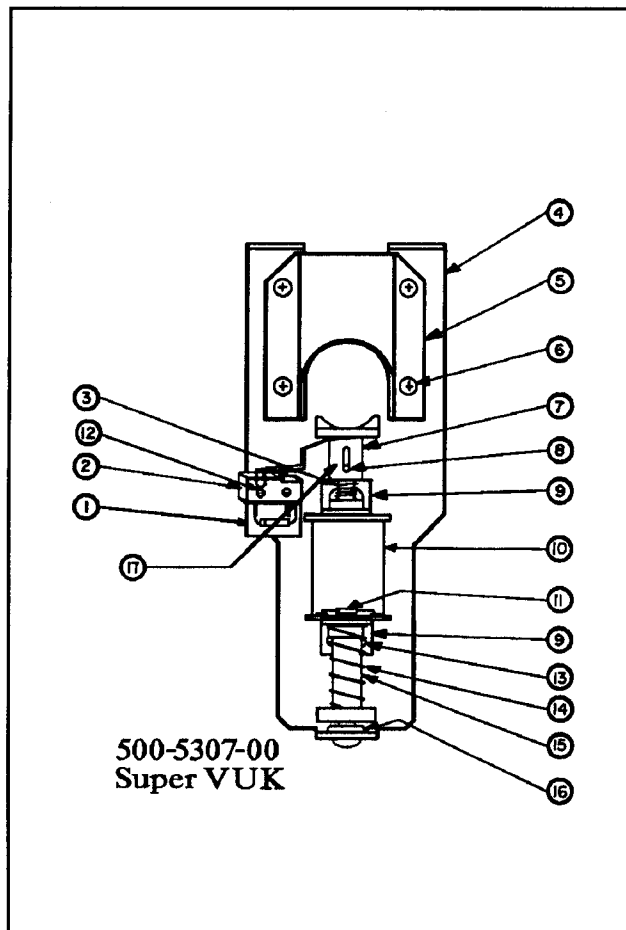
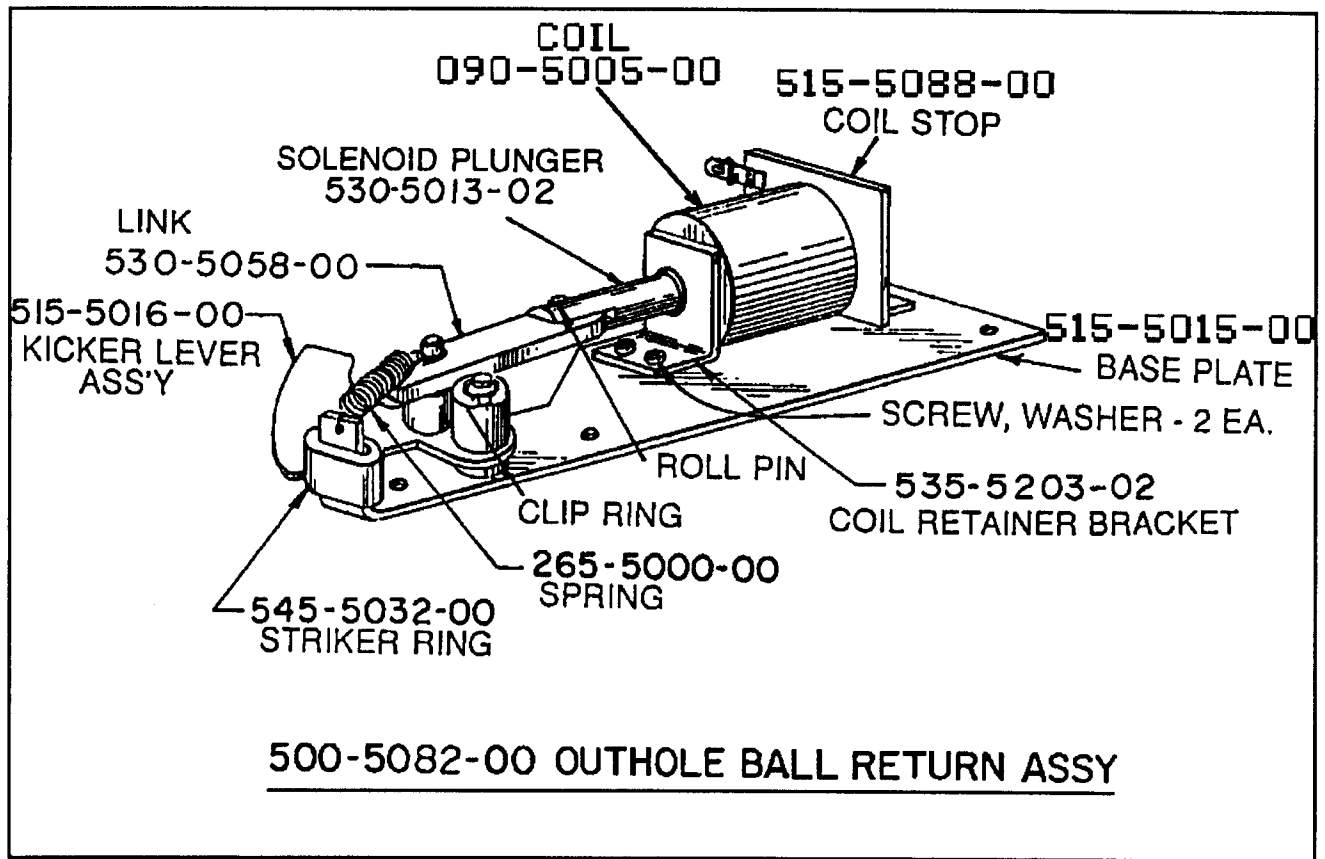


Item	Description	Part No.
1	Target End Plate (2)	535-0152-00
2	Bank Target Frame	535-6023-00
3	#8-32 X 3/8 Screw (6)	31-802
4	Spring Mounting Plate	535-6025-00
5	Target (4)	545-5048-01
6	Drop Tgt.Retain.Brkt.	535-6024-00
7	Washer 13/64 X 1/2 (2)	3-103
8	Target Reset Spring (3)	265-5003-00
9	Coil Support Bracket	535-5203-02
10	#6-32 X 3/8 Screw (4)	237-5501-00
11	23-800-Coil	090-5001-00
12	Coil Sleeve	260-0004-00



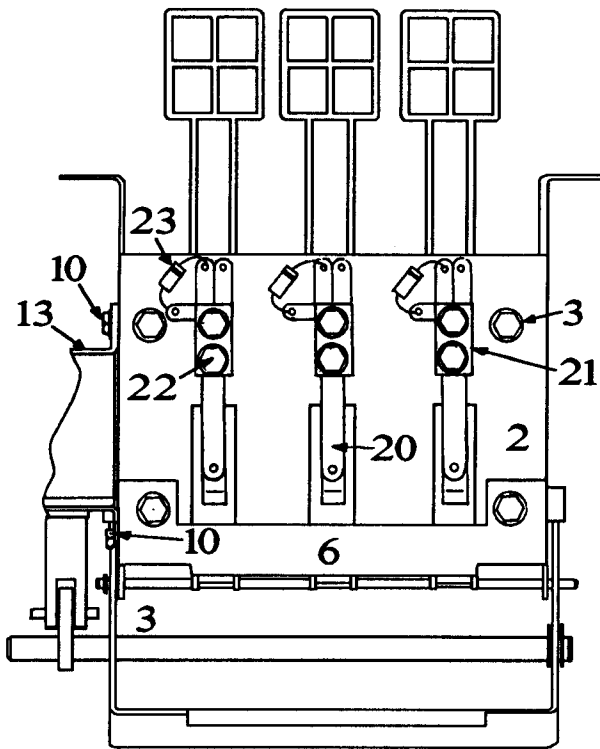
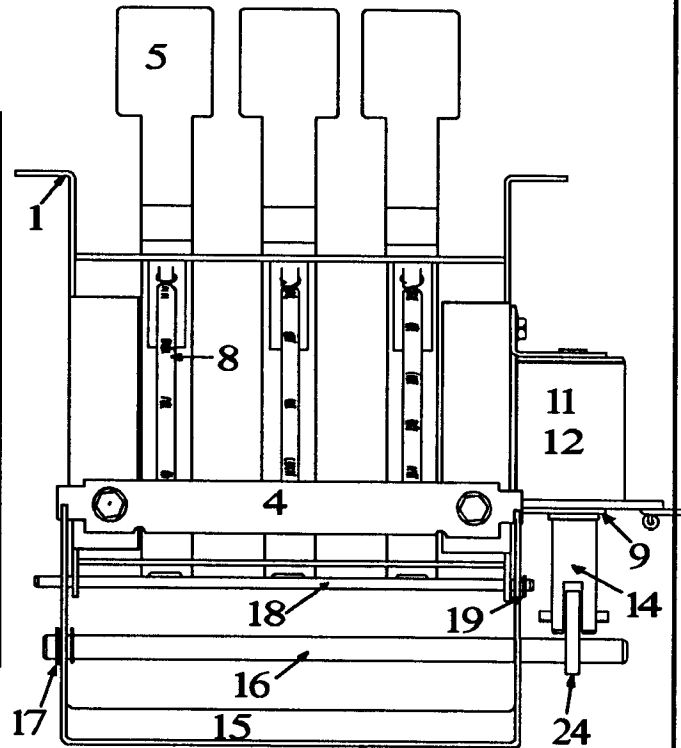
Item	Description	Part No.
13	Plunger Stop Assy.	515-5088-00
14	Plunger & Link Assy.	515-5338-00
15	Target Lift Bracket	535-6022-00
16	Target Shaft	530-5143-00
17	Retaining Ring (2)	17-100-12
18	Pivot Shaft	530-5144-00
19	Retaining Ring (2)	250-0008-00
20	Switch (4)	180-0030-00
21	SwitchPlate (3)	1-230
22	#6-32 X 1/2" (8)	237-5805-00
23	Diode 1N4001	112-5001-00
24	Link,Plunger	545-5062-00

4 Bank Drop Target Ass'y
500-5239-00



Item	Part #	Description
1	545-5193-00	Sw. Insulator
2	180-5063-00	Micro Switch
3	266-5025-00	Cap Spring
4	535-5298-00	Ball Kickup Mtg. Brkt
5	535-5427-00	Ball Guide
6	232-5300-00	#8-32X ¹ / ₄ Phil. (4)
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	090-5001-01	Coil 23-800
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)

Item	Description	Part No.
1	Target End Plate (2)	535-0152-00
2	Bank Target Frame	1-309-3
3	#8-32 X $\frac{3}{8}$ Screw (6)	31-802
4	Spring Mounting Plate	535-0153-00
5	Target (3)	545-5048-01
6	Drop Tgt.Retain.Brkt.	535-5042-01
7	Washer $\frac{13}{64}$ X $1\frac{1}{2}$ (2)	3-103
8	Target Reset Spring (3)	265-5003-00
9	Coil Support Bracket	535-5203-02
10	#6-32 X $\frac{3}{8}$ Screw (4)	237-5501-00
11	23-800-Coil	090-5001-00
12	Coil Sleeve	260-0004-00

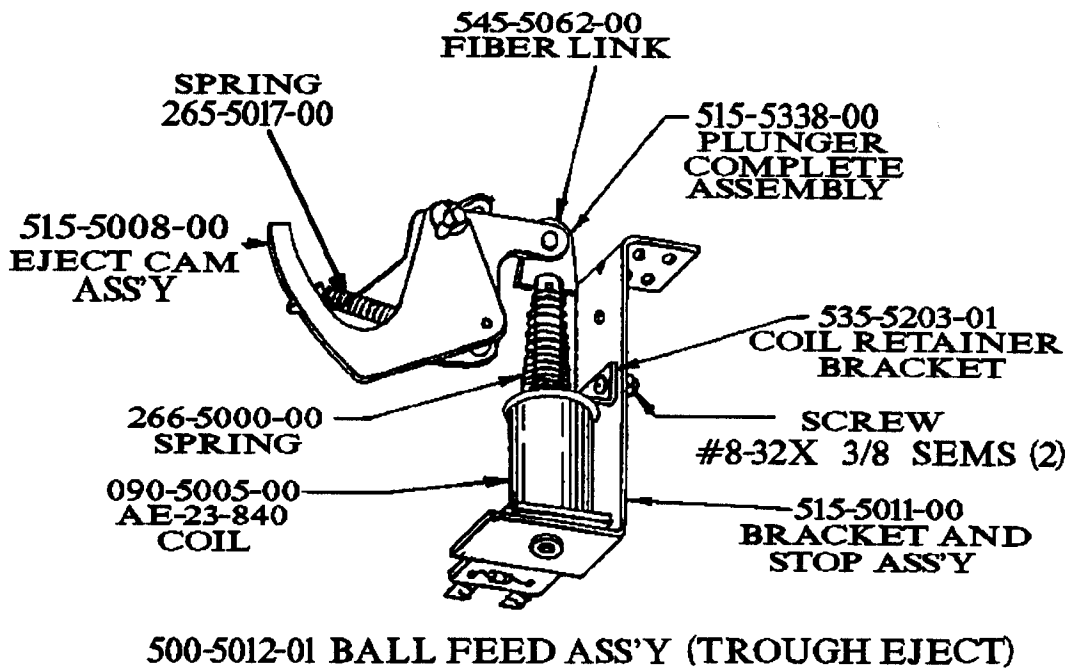
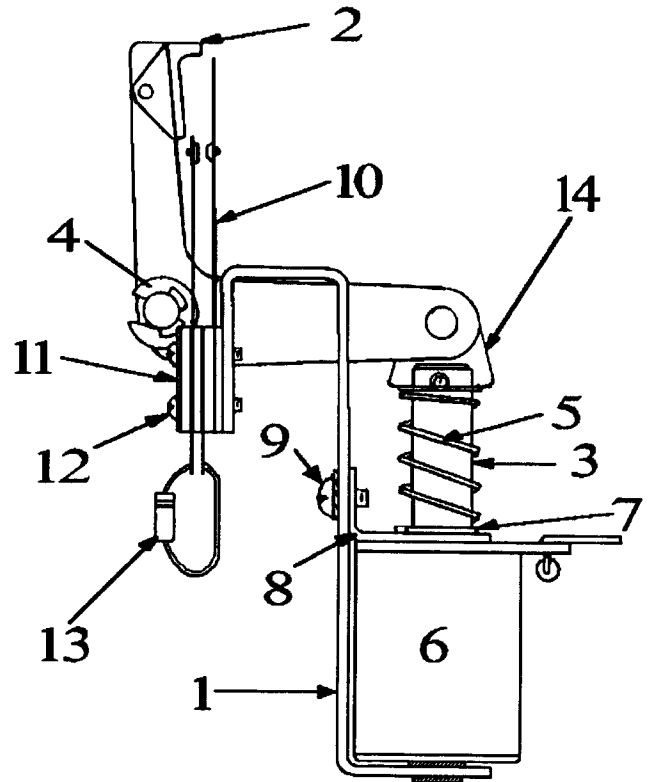


Item	Description	Part No.
13	Plunger Stop Assy.	515-5088-00
14	Plunger & Link Assy.	515-5338-00
15	Target Lift Bracket	535-0154-00
16	Target Shaft	530-0030-00
17	Retaining Ring (2)	17-100-12
18	Pivot Shaft	530-0031-00
19	Retaining Ring (2)	250-0008-00
20	Switch (3)	180-0030-00
21	SwitchPlate (3)	1-230
22	#6-32 X $1\frac{1}{2}$ " (6)	237-5805-00
23	Diode 1N4001	112-5001-00
24	Link,Plunger	545-5062-00

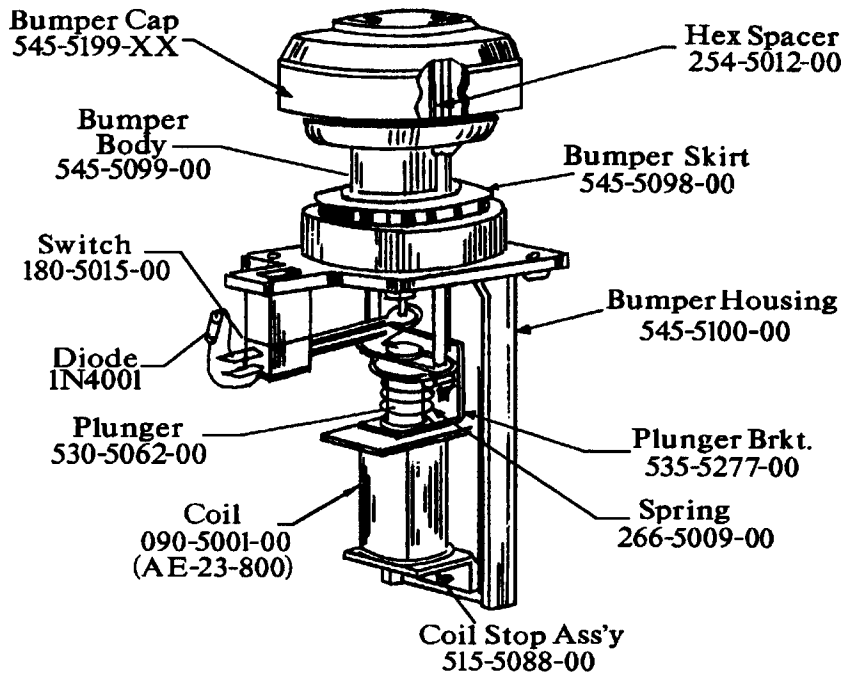
**3 Bank Drop Target
Assembly
Both Front & Rear Views
500-5196-31**

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

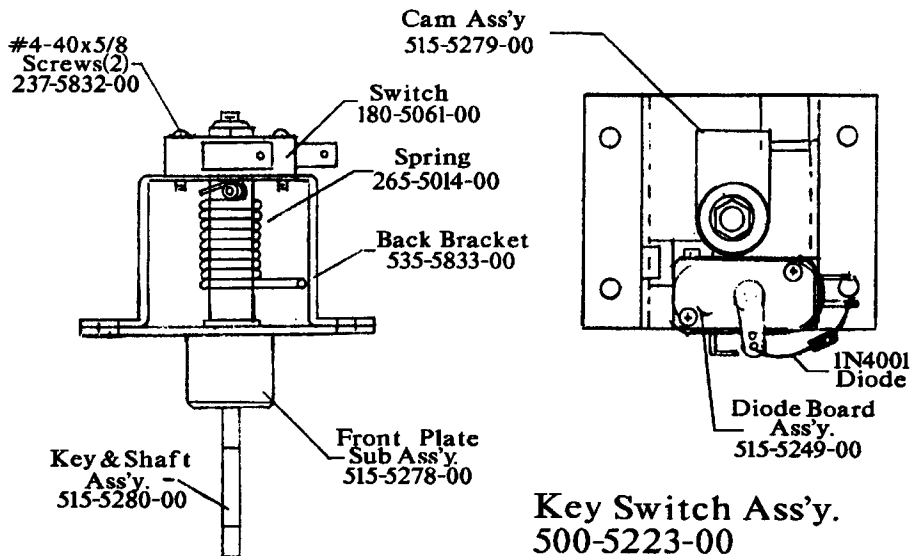


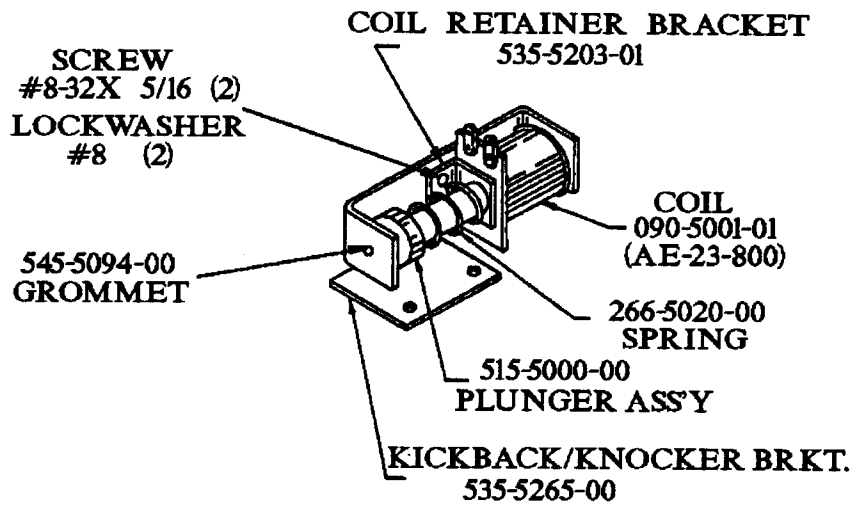
Jump Pop Bumper
500-6227-01



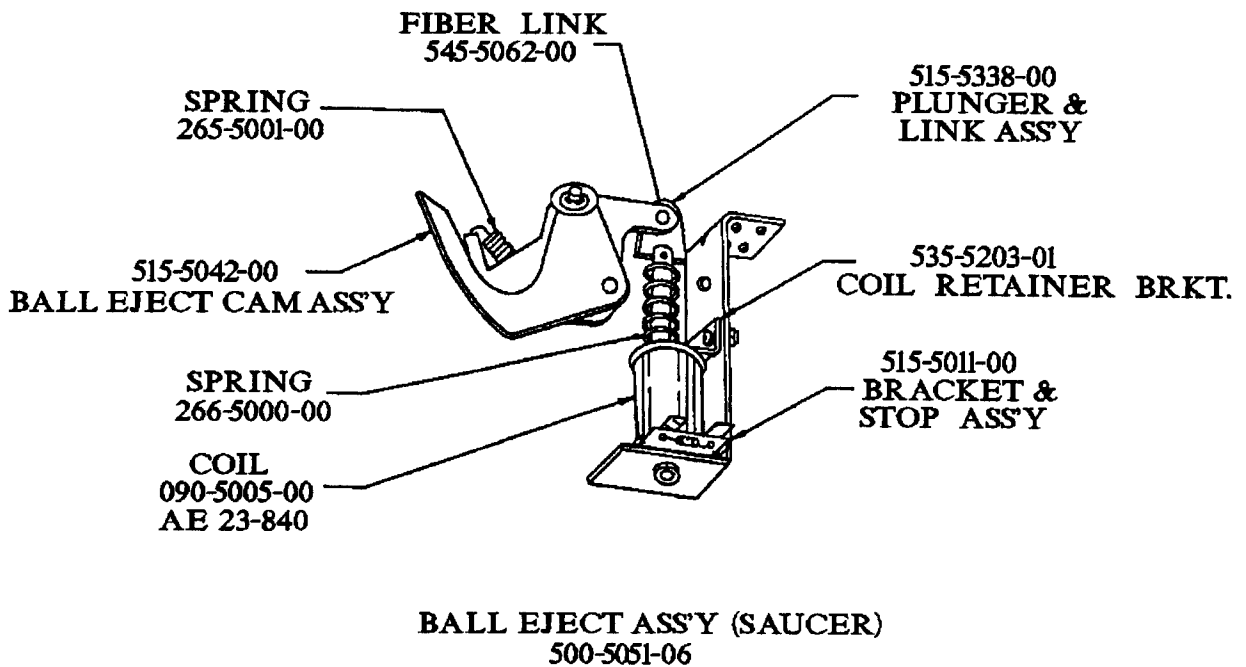
Top View

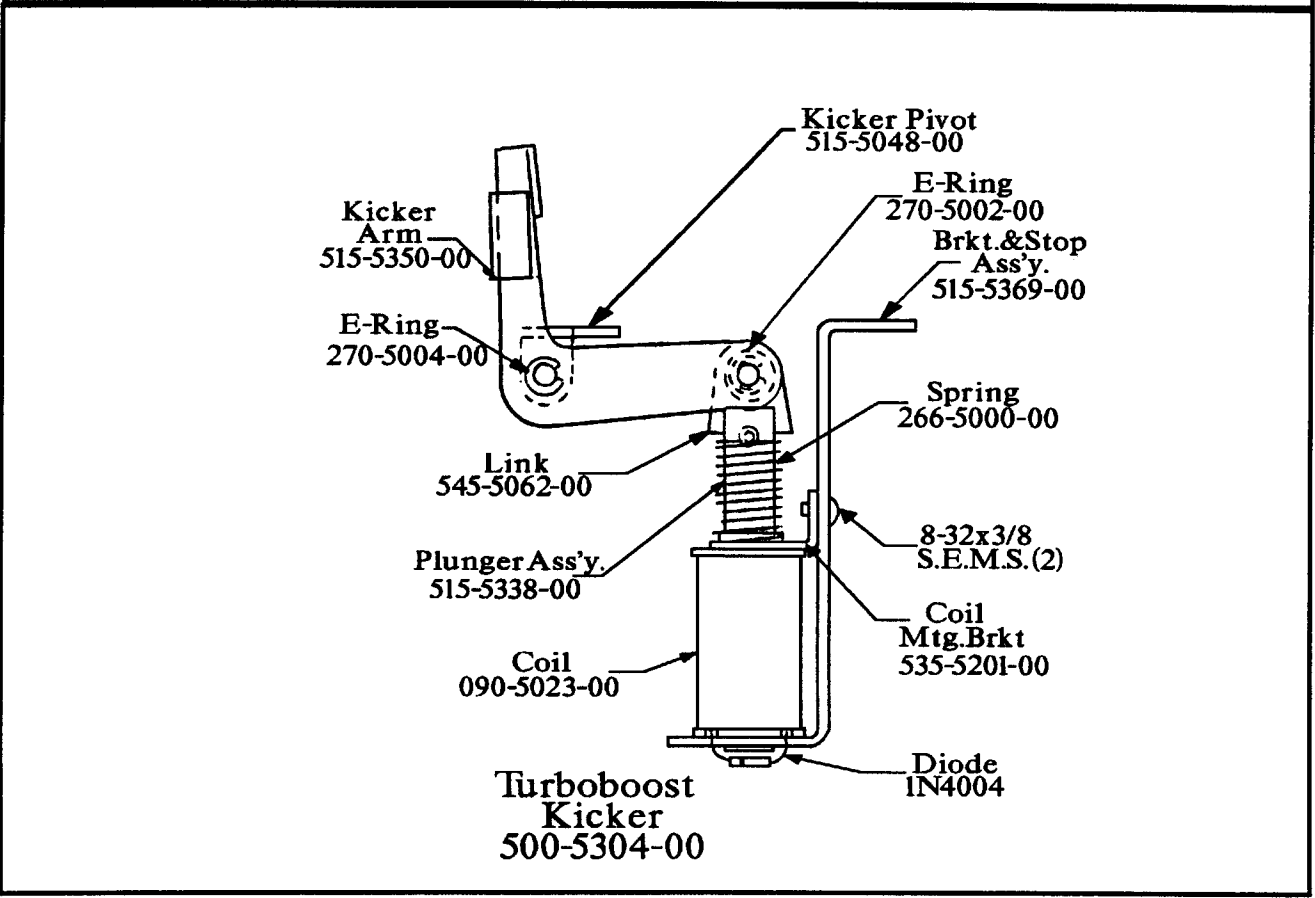
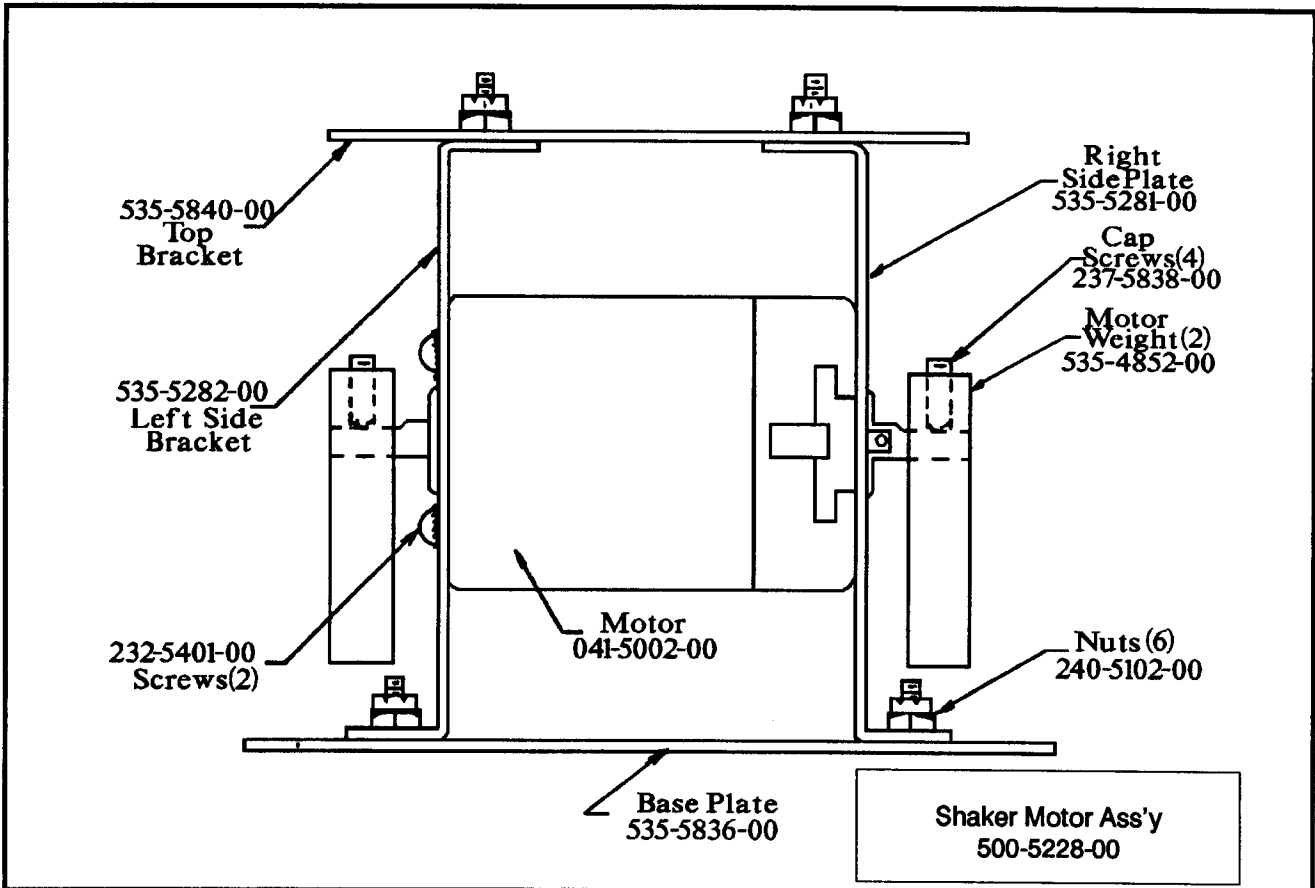
Back View

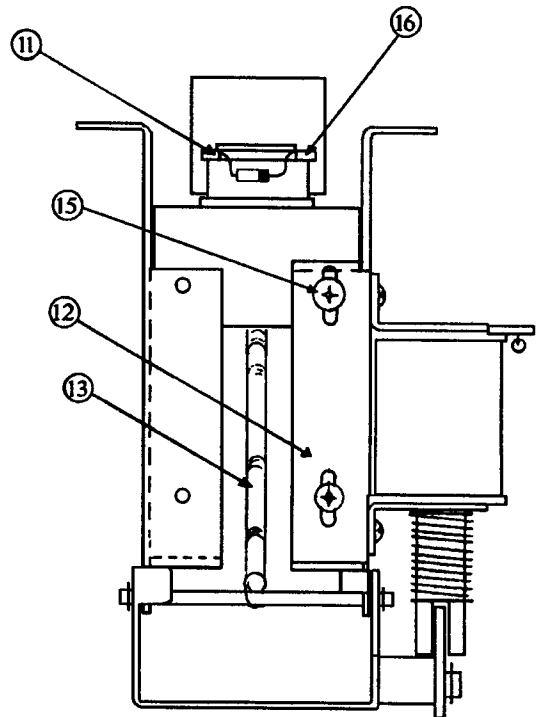
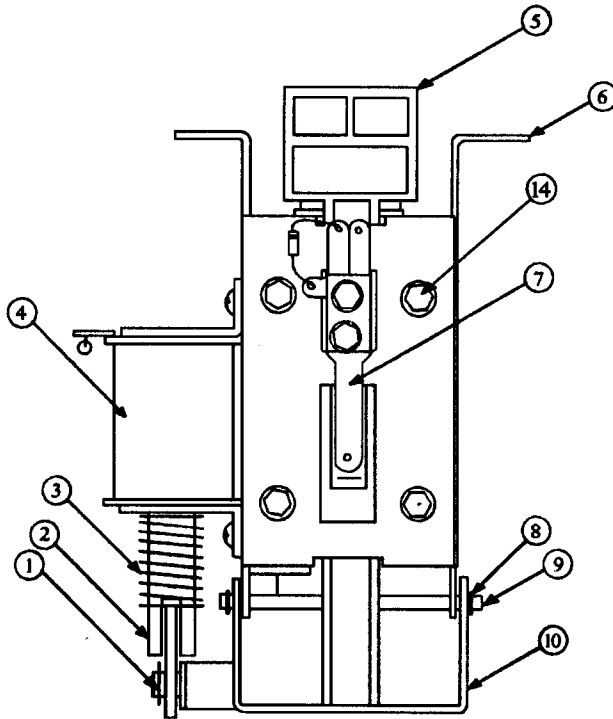




KICKBACK ASSEMBLY 500-5080-00 (COIL LUGS ON THE SIDE)
KNOCKER ASSEMBLY 500-5081-00 (PICTURED)



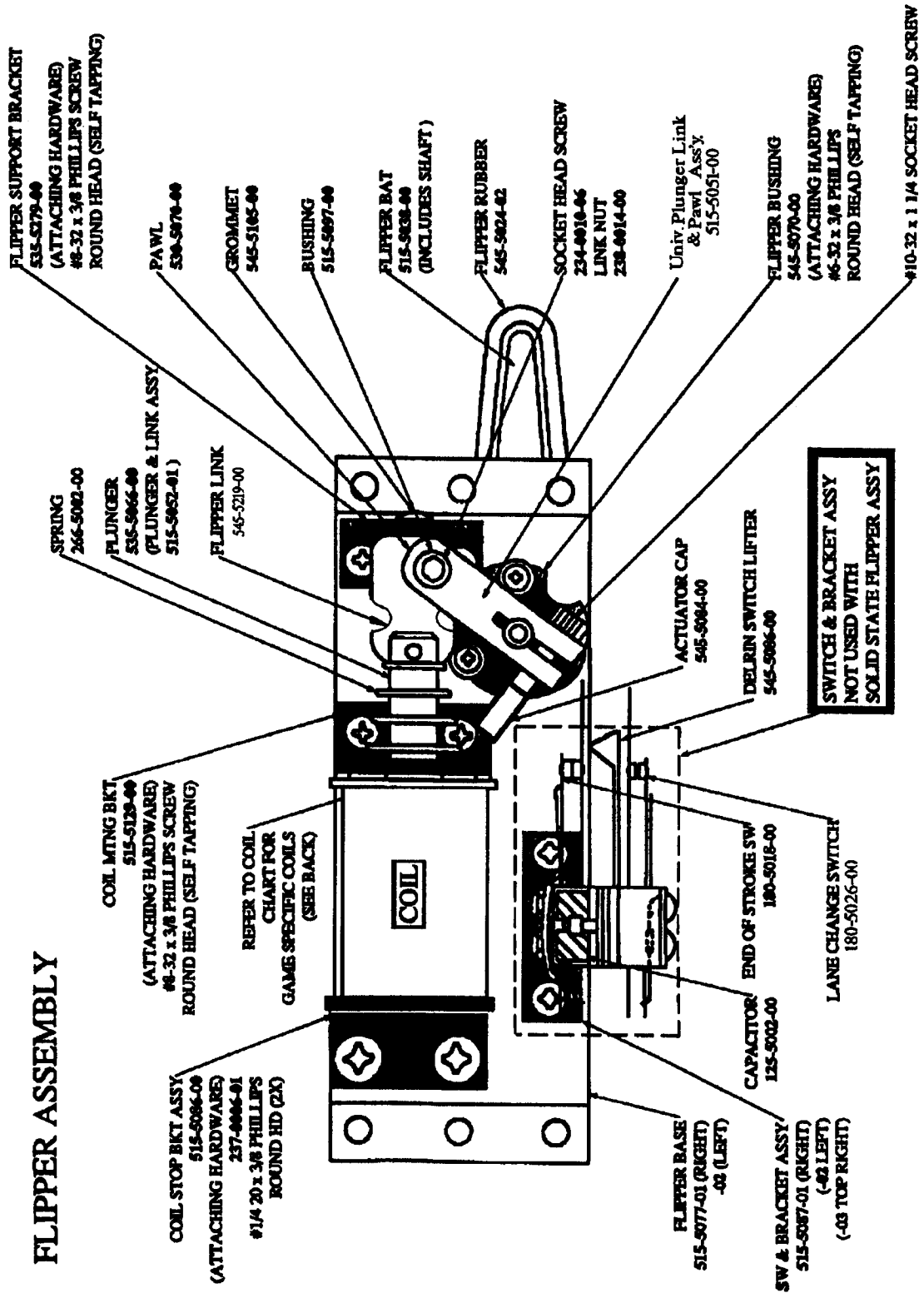


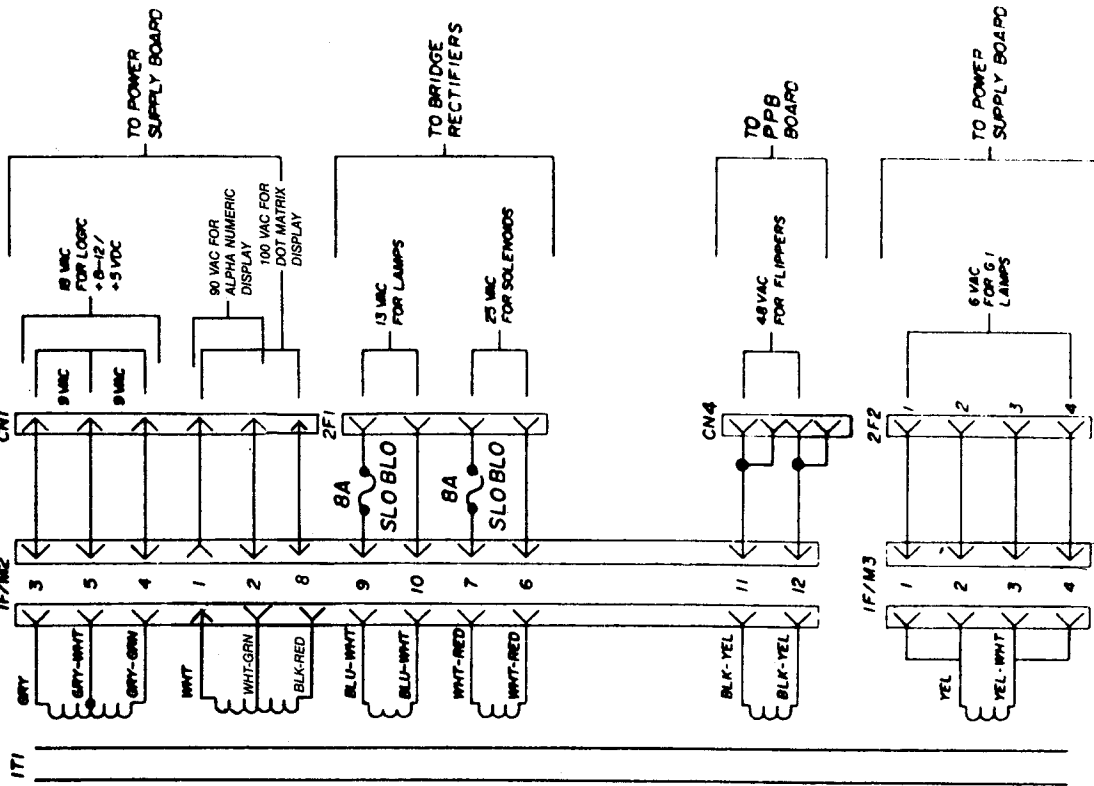


**Single Bank Memory Target
500-5240-00**

Item	Description	Part No.
1	Truarc $\frac{1}{4}$	270-5002-00
2	Plunger Ass'y.	515-5338-00
3	Spring	266-5000-00
4	Coil 23-800	090-5001-01
5	Target	545-5244-00
6	End Plate (2)	535-0152-00
7	Switch	180-0030-00
8	Truarc $\frac{1}{8}$ (2)	270-5000-00
9	Shaft	530-5037-00
10	Reset Arm	515-5379-00
11	Trip Coil Ass'y.	515-5387-00
12	Adjustment Lever	535-6007-00
13	Spring	265-5003-00
14	#6-32x $\frac{1}{2}$	237-5805-00
15	#6-32x $\frac{3}{8}$	237-5501-00
16	Trip Coil	090-5026-00

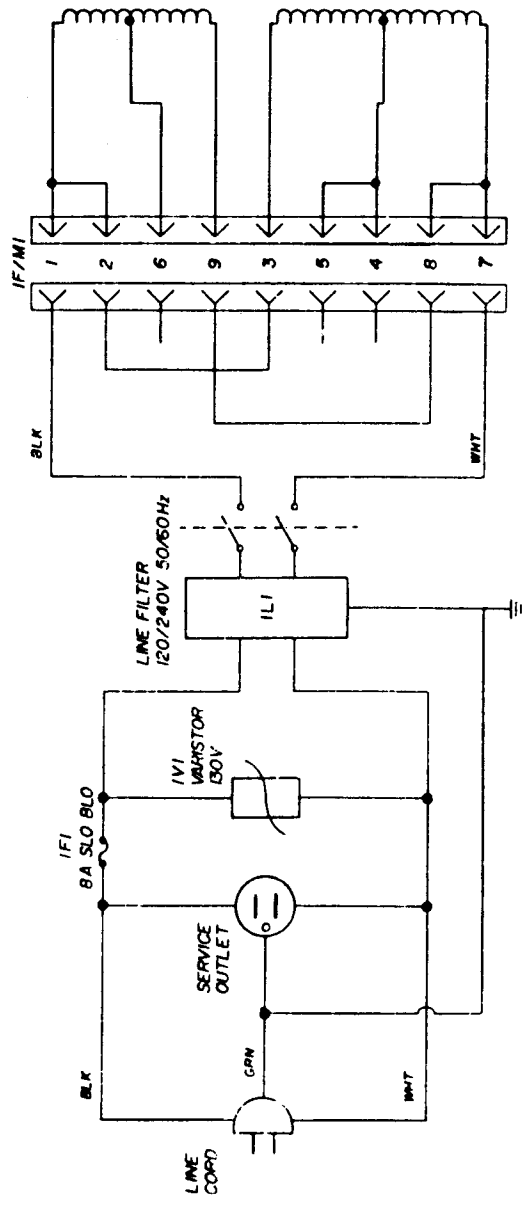
FLIPPER ASSEMBLY





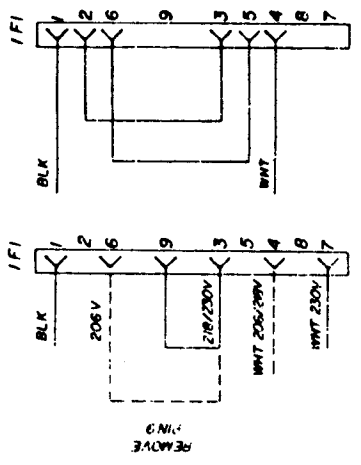
THIS CONFIGURATION FOR 115V

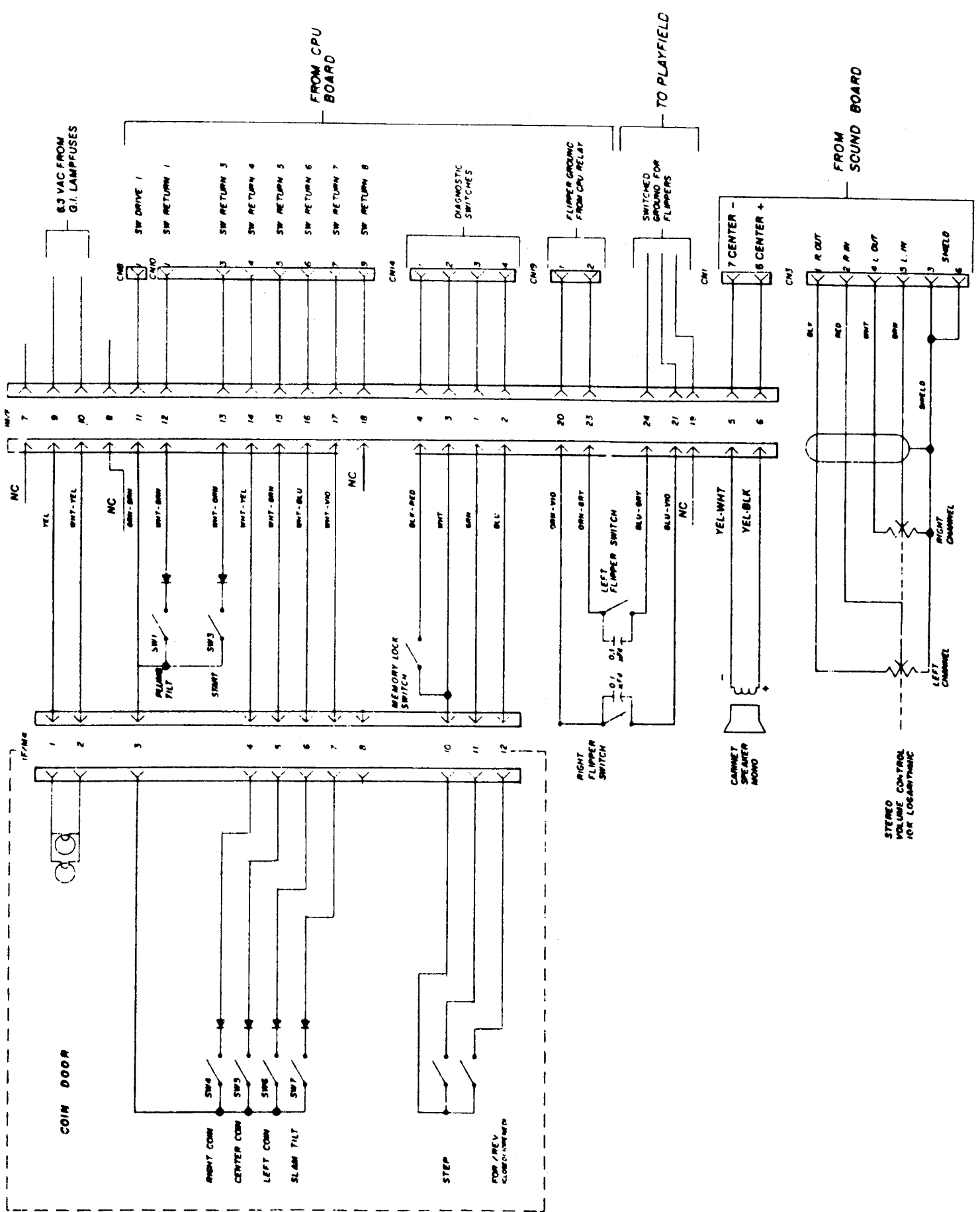
FOR LOWER LINE VOLTAGES OR 230 VOLT OPERATION SEE SAMPLES BELOW



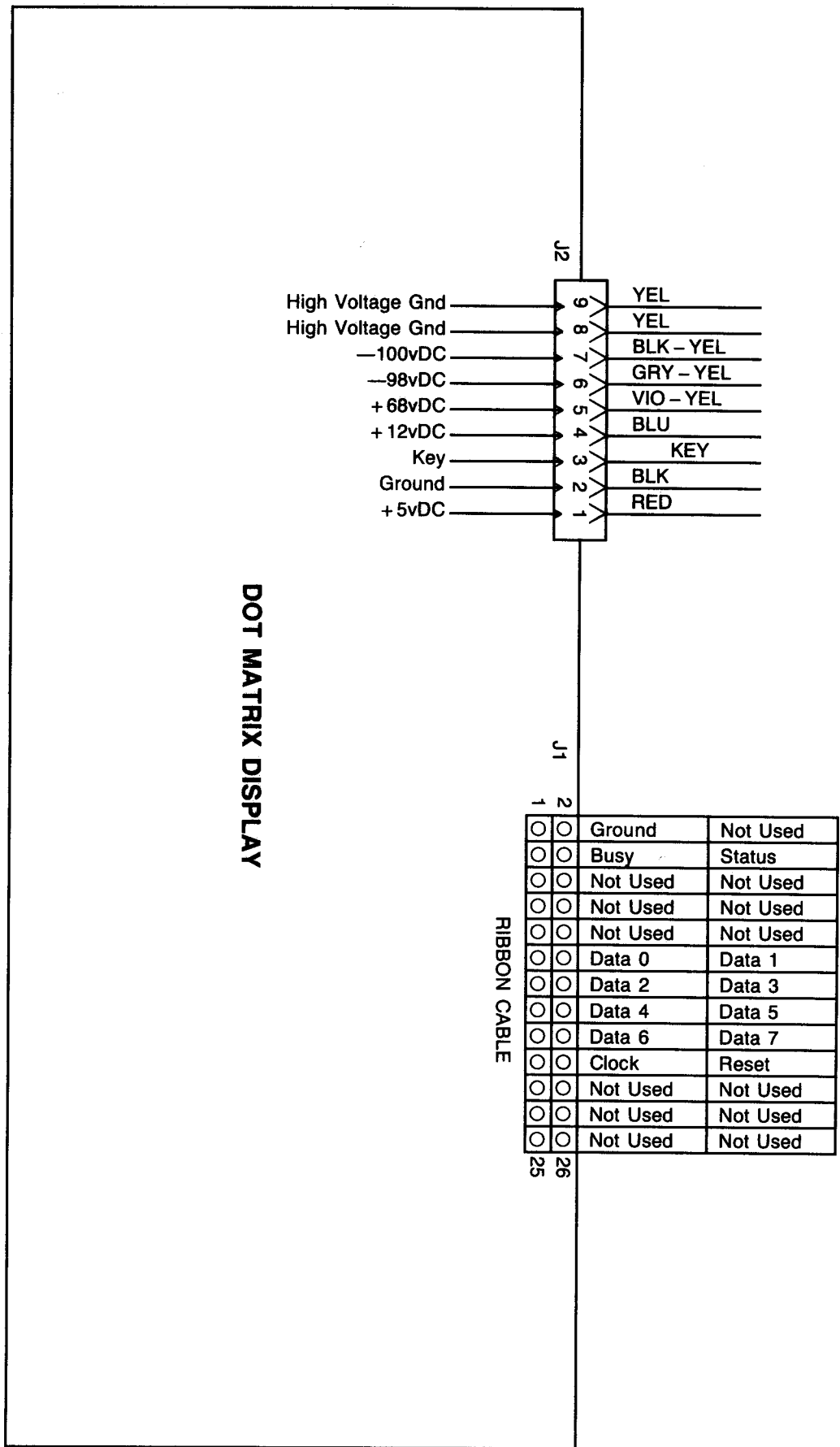
JUMPERS FOR VOLTAGE VARIATION

- 230/218/206 VOLTS: IF1 - 4A SLO BLO, I/V1 - 275V VARIATOR
- 100/105 VOLTS: IF1 - 8A SLO BLO, I/V1 - 130V VARIATOR

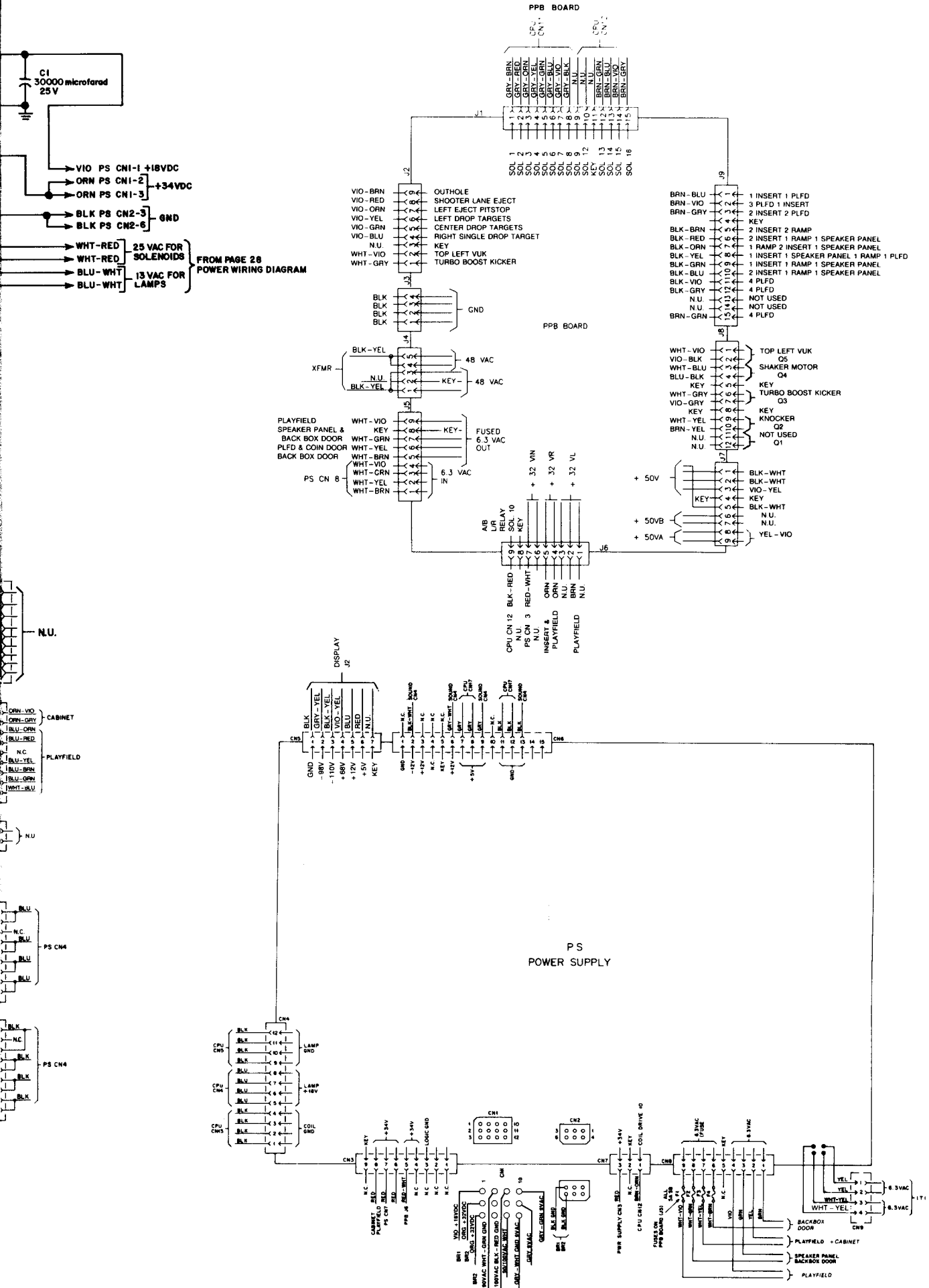




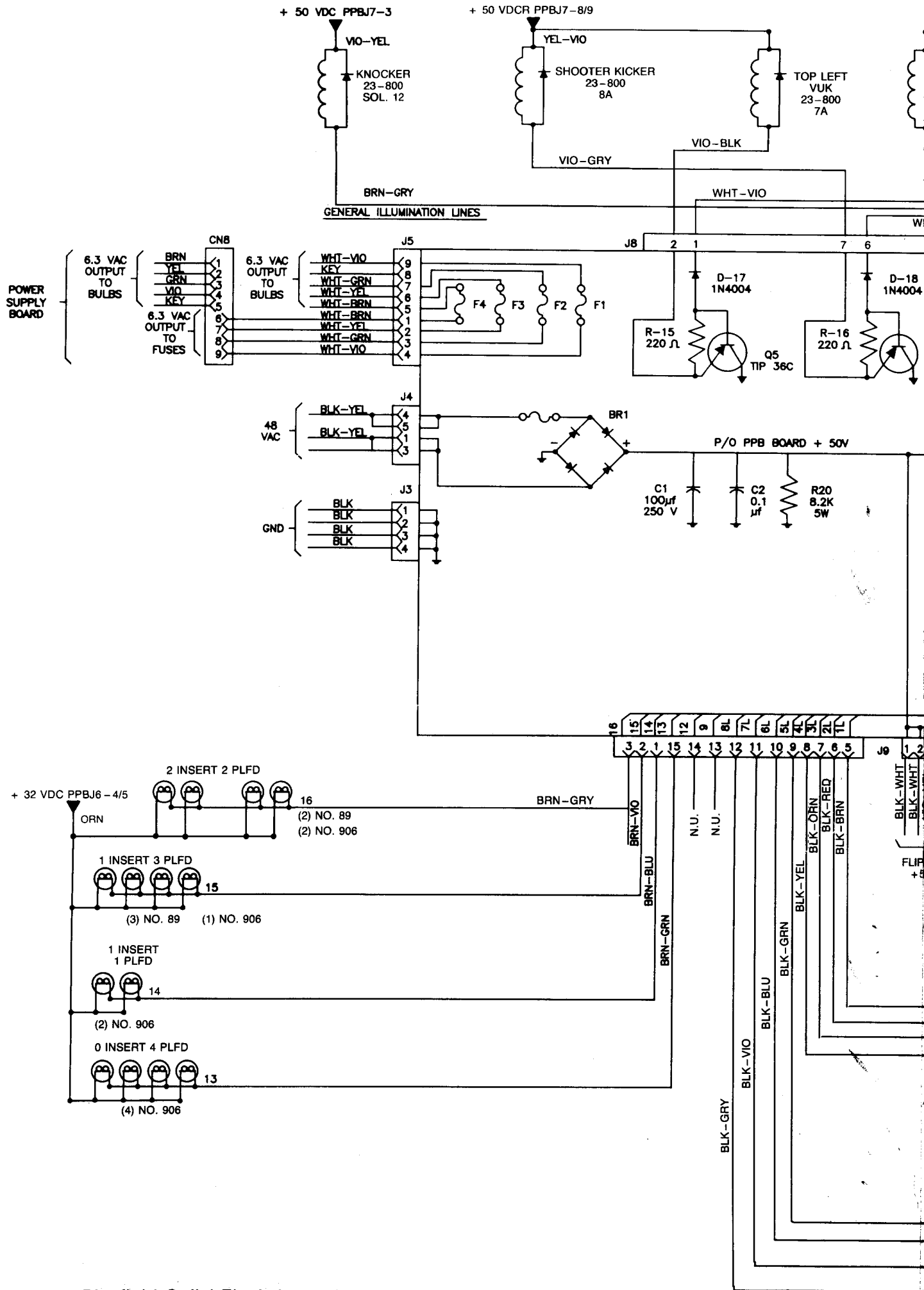
48 Cabinet Wiring Diagram



NOTES

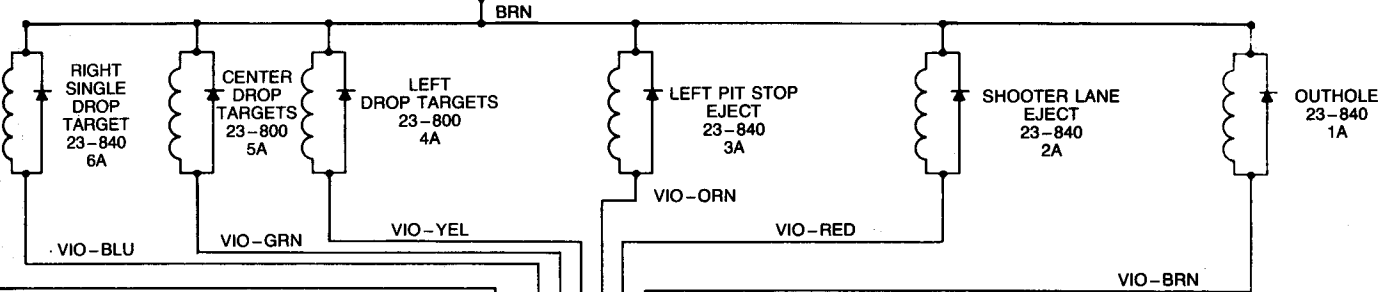


Backbox Wiring Diagram 51

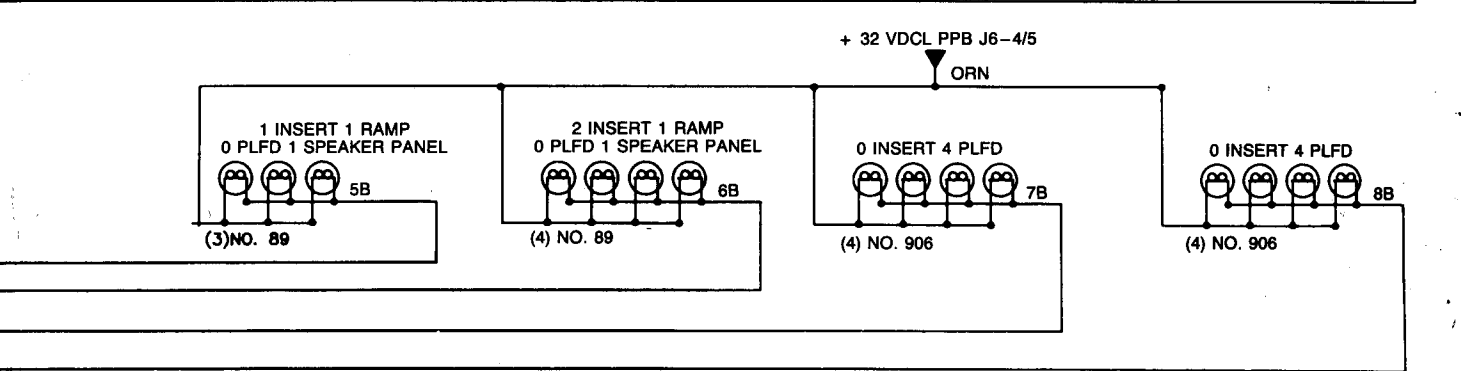
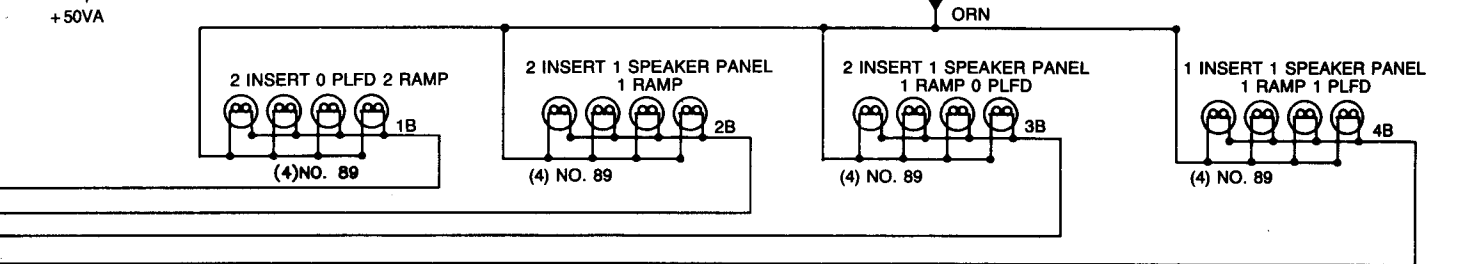
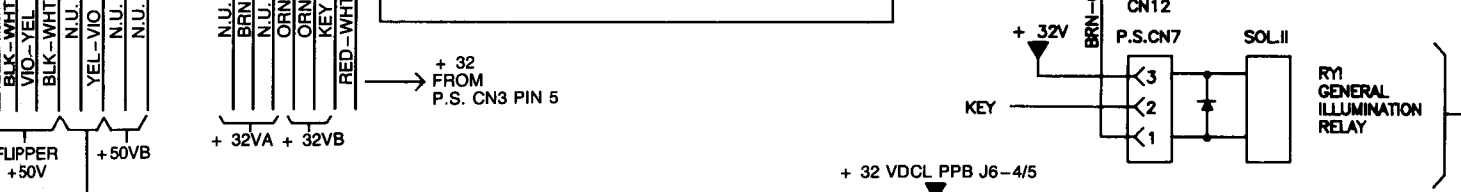
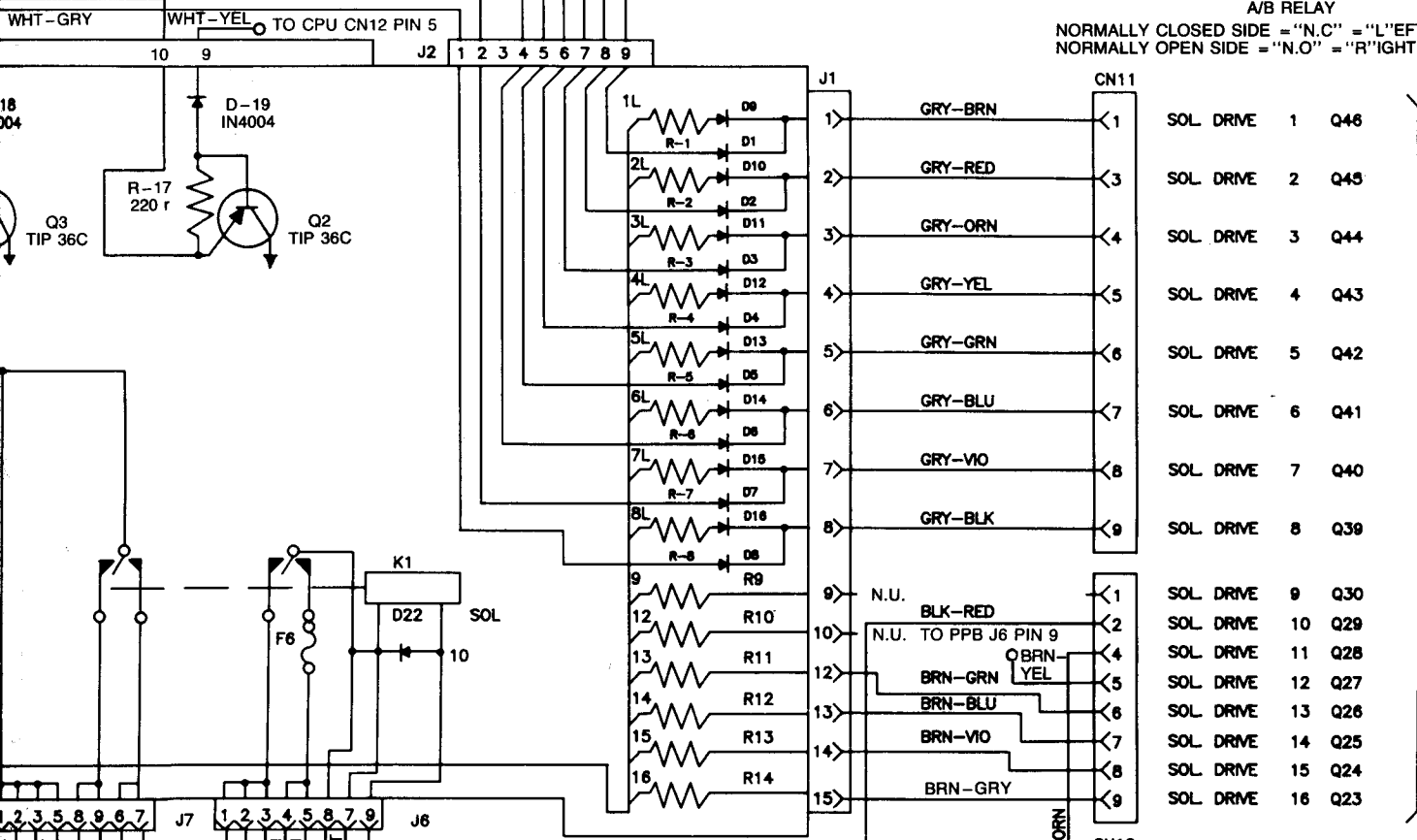


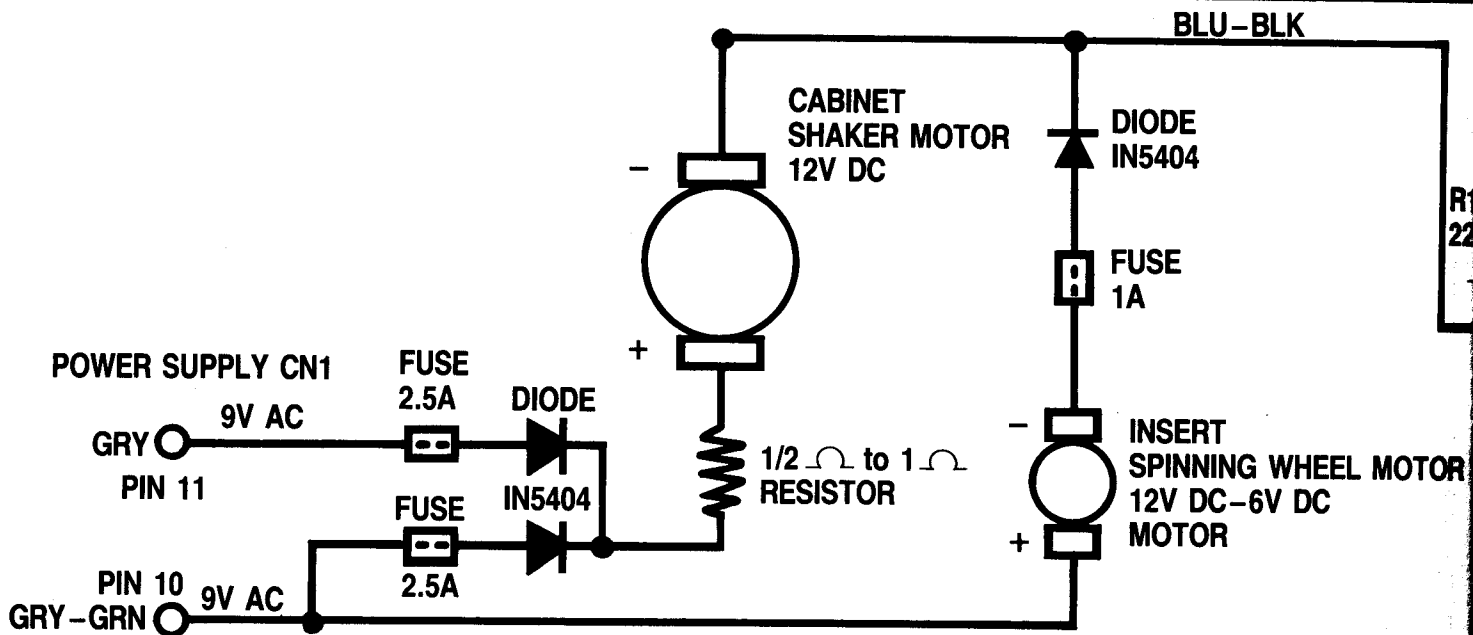
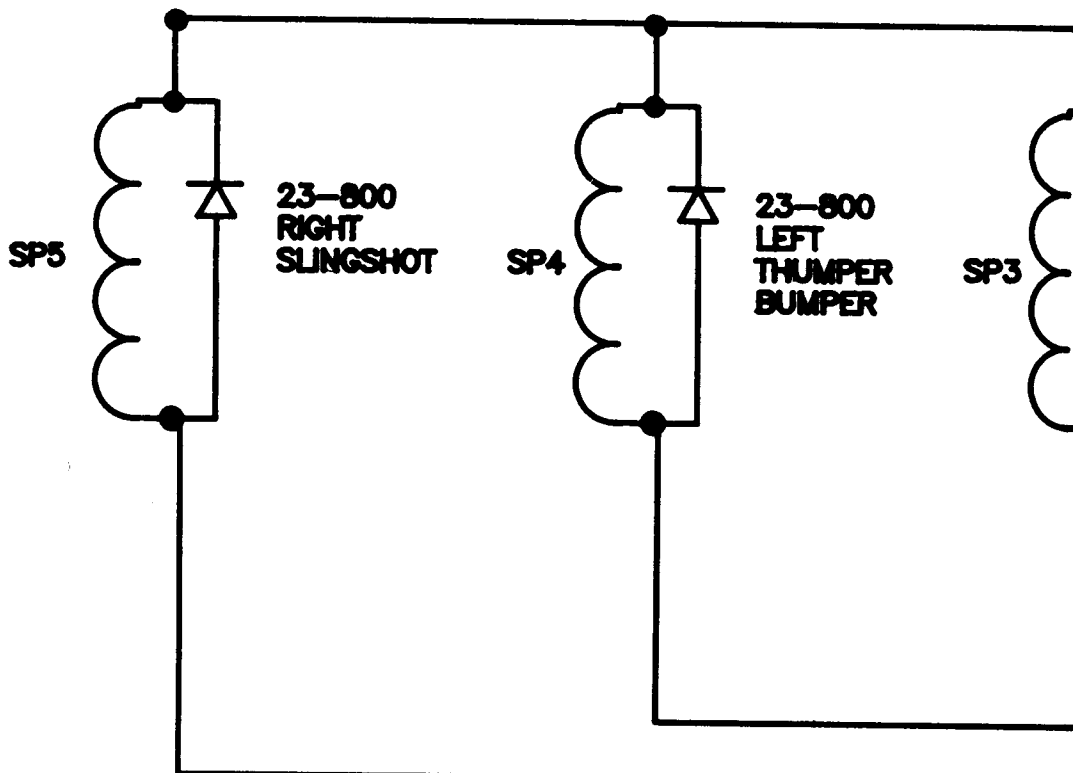
52 Playfield Coil / Flash Lamp Wiring Diagram

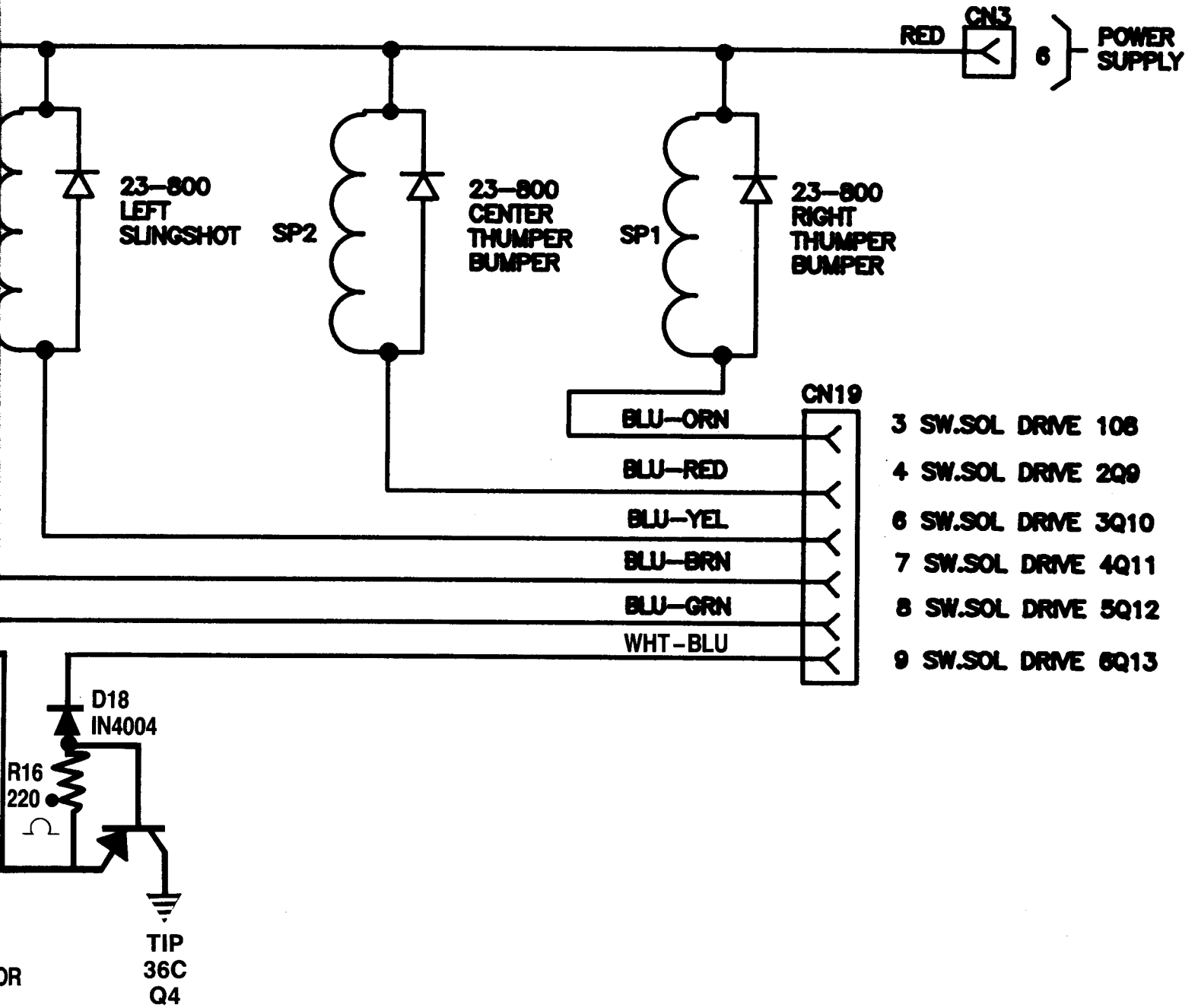
+ 32 VDCR PPB J6-1/2/3



A/B RELAY
 NORMALLY CLOSED SIDE = "N.C." = "LEFT" = "A" SIDE
 NORMALLY OPEN SIDE = "N.O." = "RIGHT" = "B" SIDE

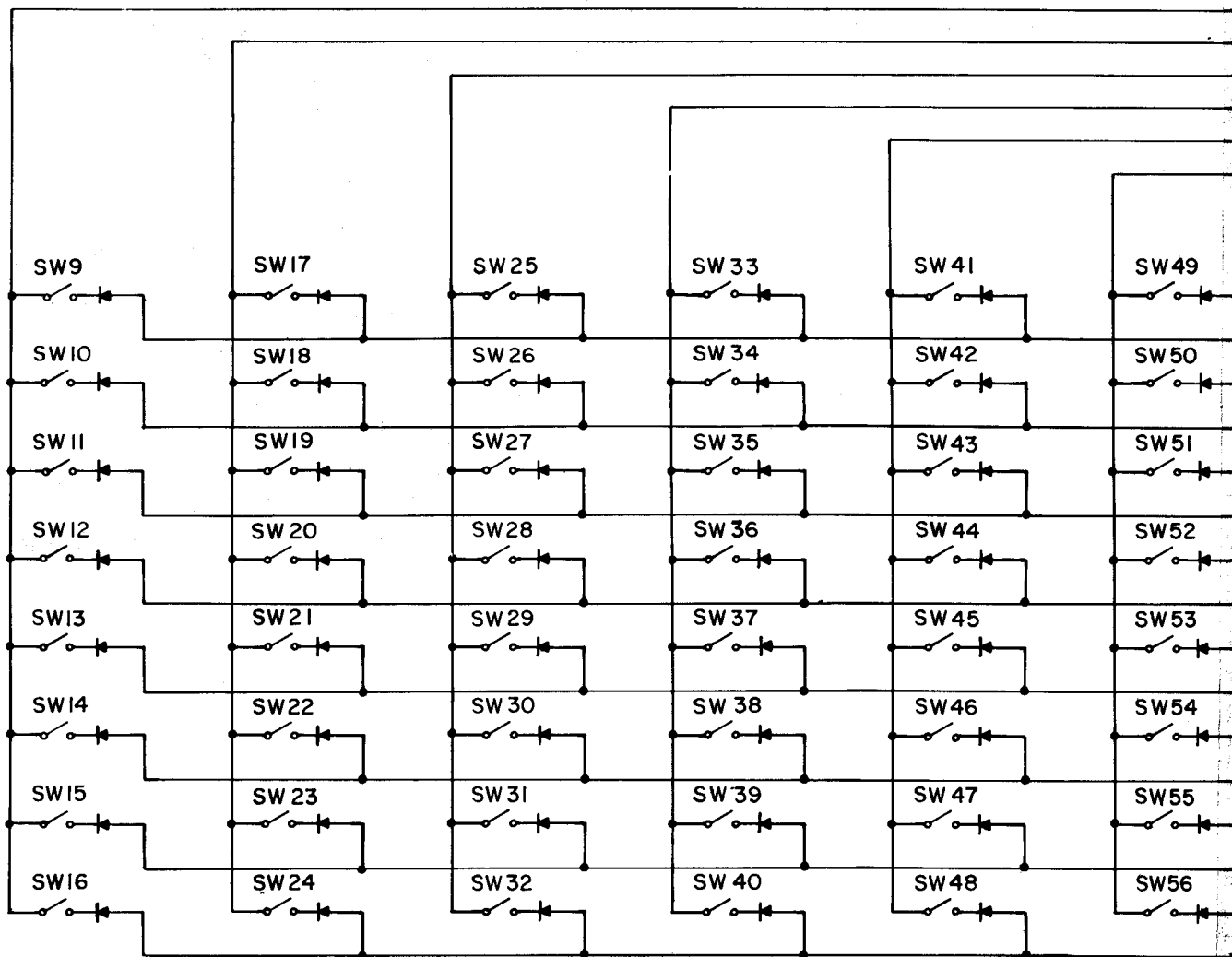






**Switch
Number Description**

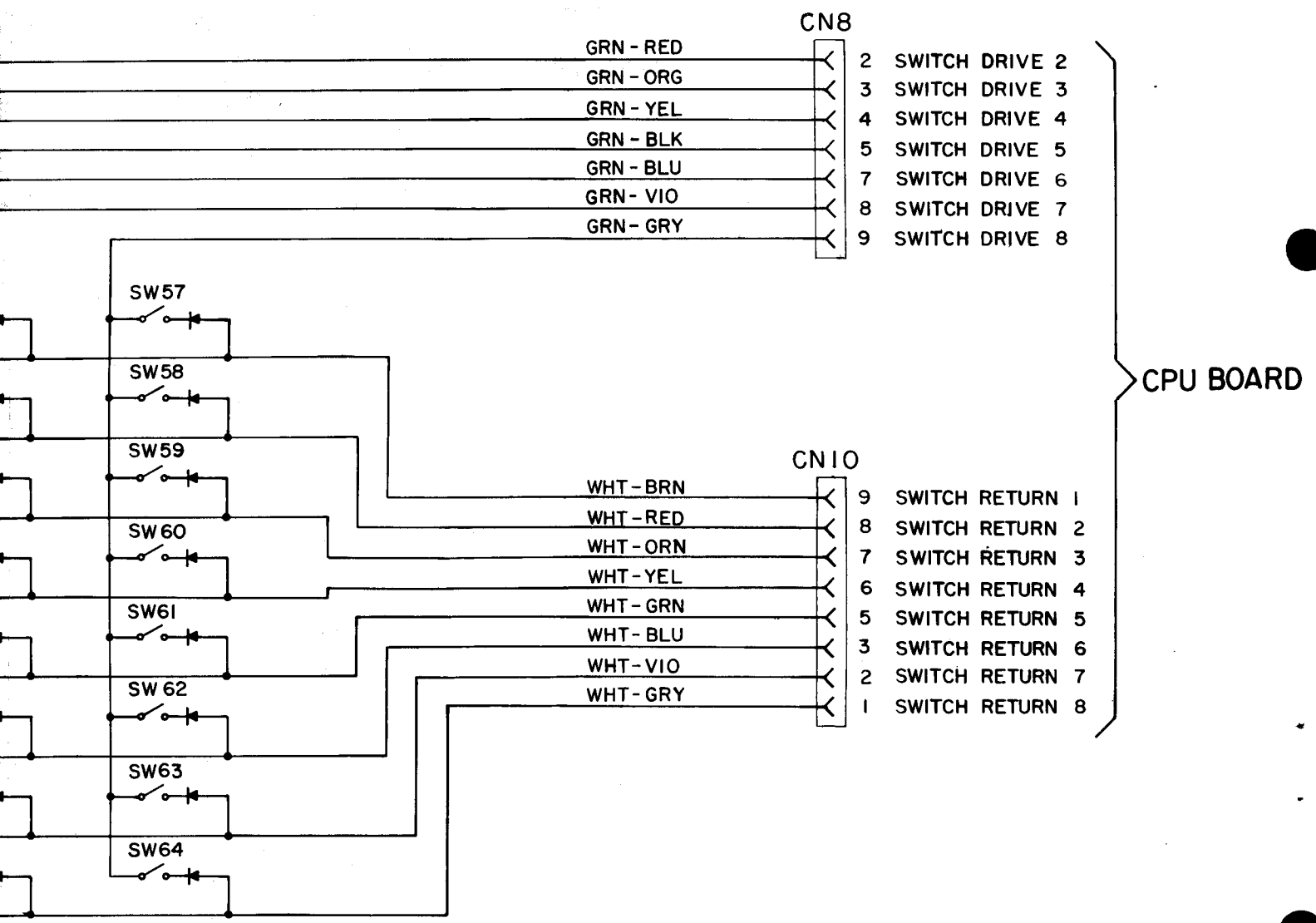
01*	Plumb Tilt	16	Right Flip. Cab. Switch
02	Not Used	17	Left Outlane
03	Credit Button	18	Left Return Lane
04*	Right Coin	19	Right Outlane
05*	Center Coin	20	Right Return Lane
06*	Left Coin	21	Left Slingshot Sw. (2)
07*	Slam Tilt	22	Right Slingshot Sw. (2)
08	Not Used	23	Flat tire
09	Not Used	24	VUK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



- 31 Not Used
- 32 Not Used
- 33 Drop Target CARRERA
- 34 Drop Target CARRERA
- 35 Drop Target CARRERA
- 36 Drop Target CARRERA
- 37 Pitstop Eject
- 38 Spinner
- 39 Not Used
- 40 Not Used
- 41 Drop Target CARRERA
- 42 Drop Target CARRERA
- 43 Drop Target CARRERA
- 44 Single Drop Target
- 45 Collect Energy

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

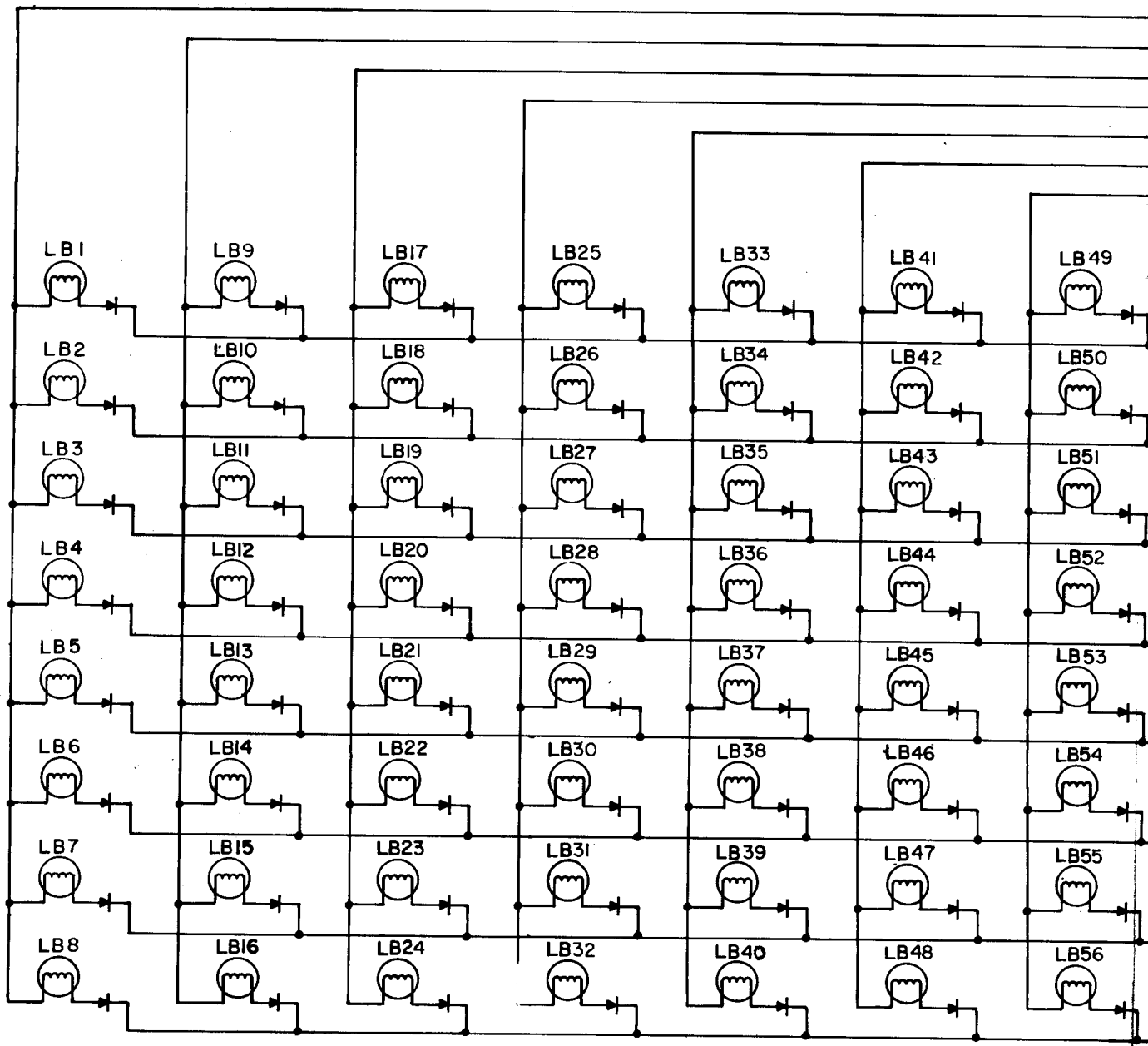
* Indicates cabinet switches.



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

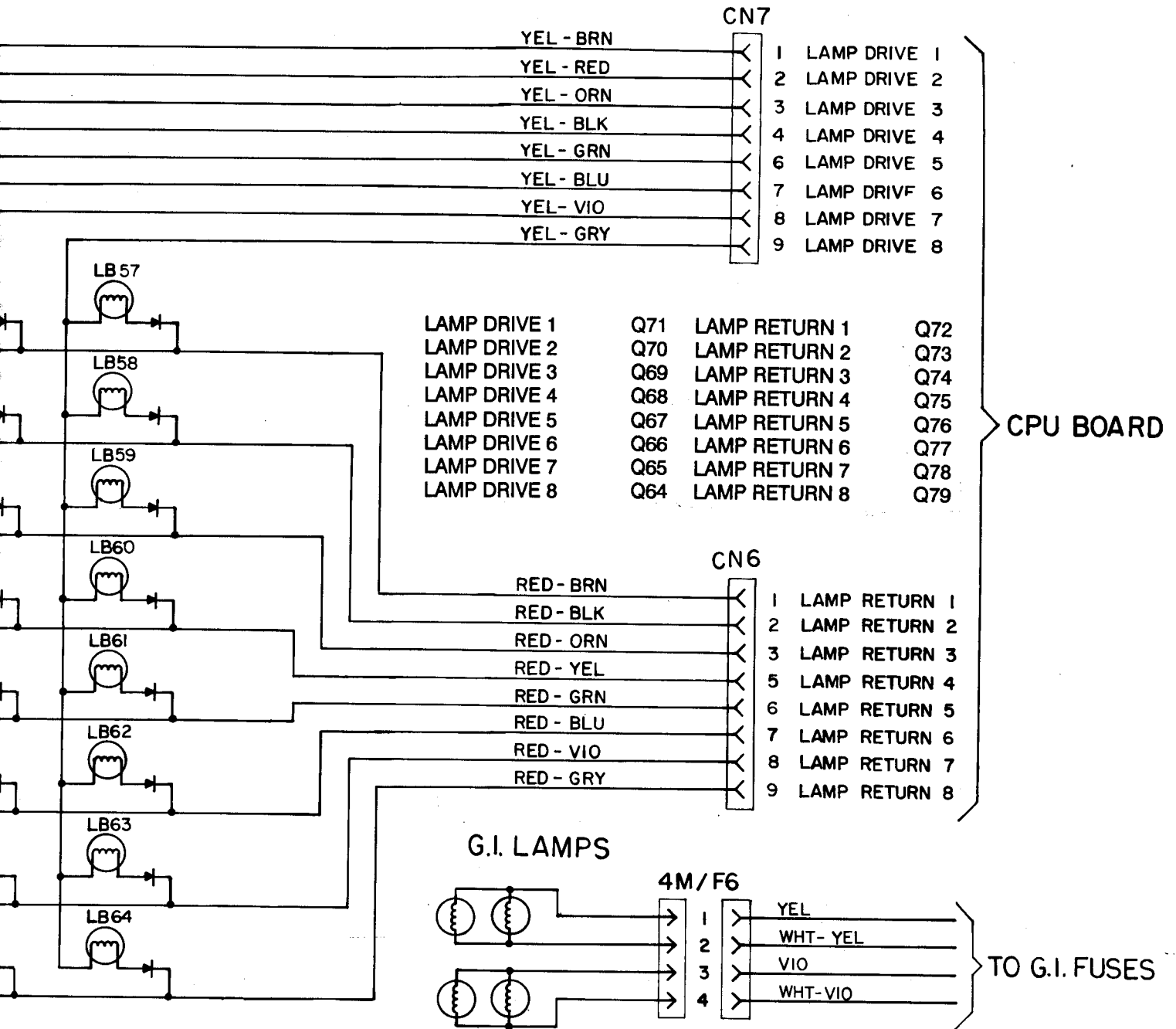
33.	
34.	
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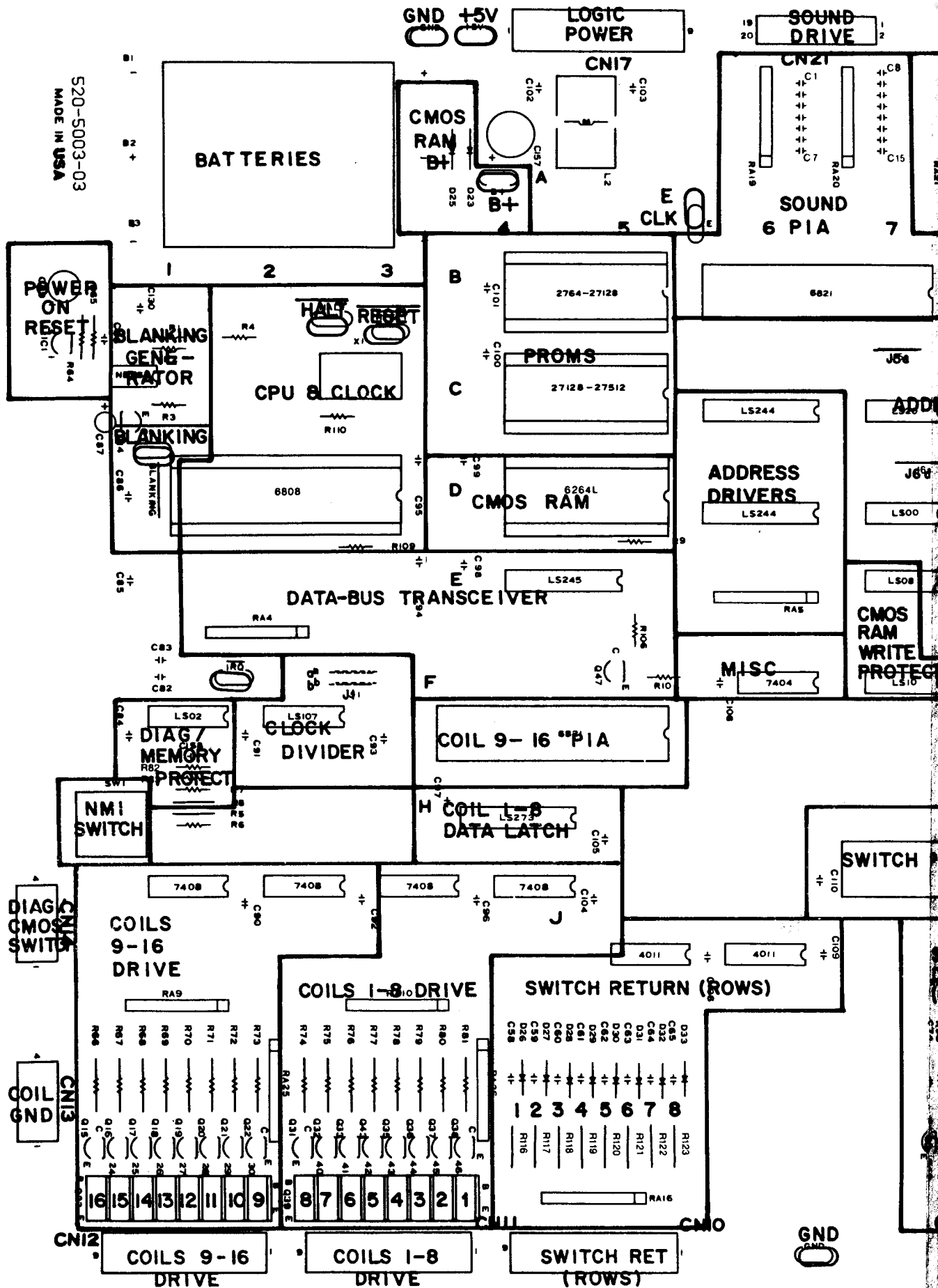


Backbox Lamp

- 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

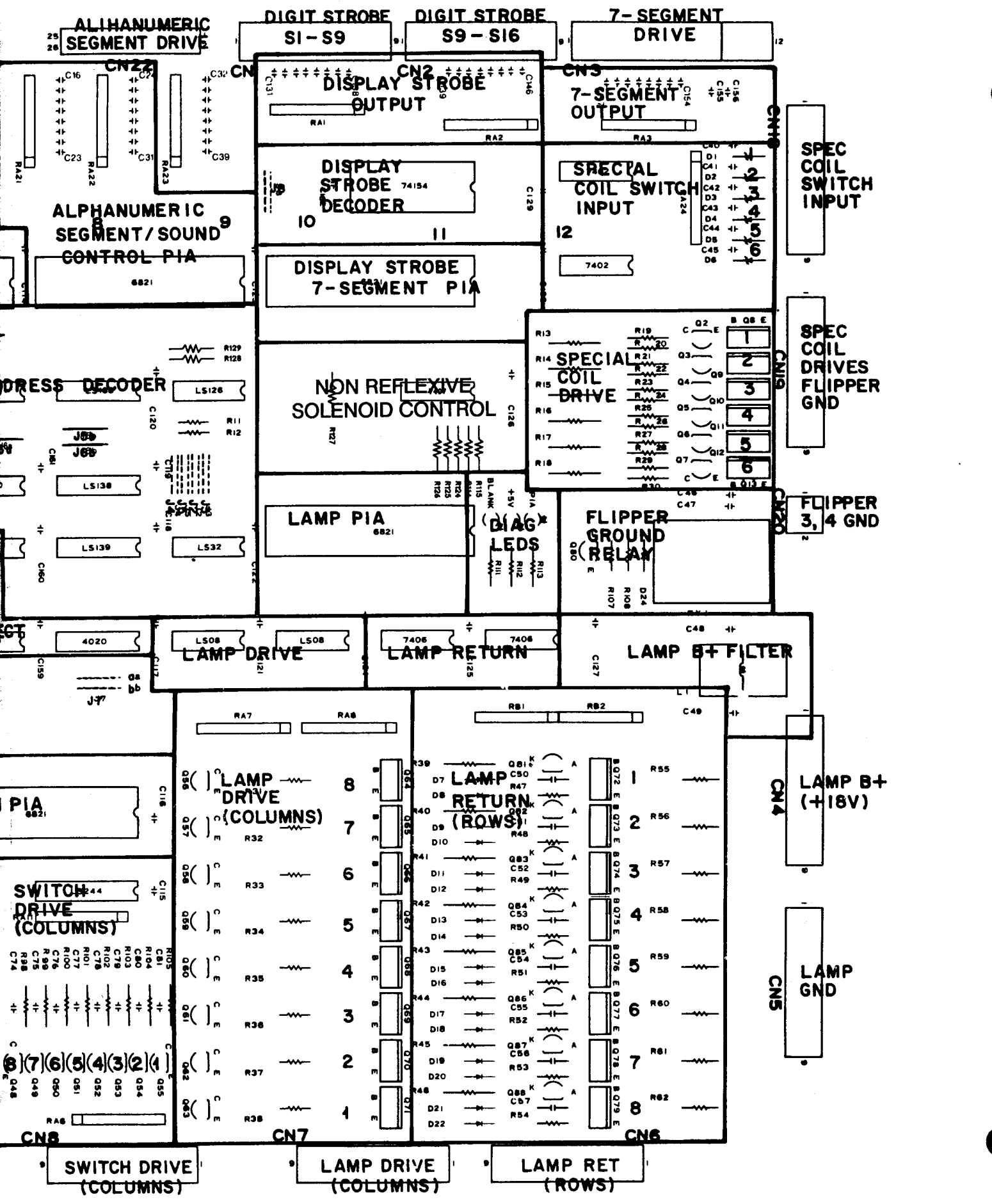
- 49.* Fast "F"
- 50.* Fast "A"
- 51.* Fast "S"
- 52.* Fast "T"
- 53. Ramp Jackpot
- 54. Ramp Skill Shot
- 55. Return Left
- 56. Outlane Left
- 57. Release
- 58. Instant Rerace
- 59. Activate "Fast" Scores
- 60. Ramp Extra Ball
- 61. Bumper Left
- 62. Bumper Center
- 63. Bumper Right
- 64. Outlane Left





520-5003-03 REV.-A
DE-0282-3A

56 CPU Board Assembly Diagram



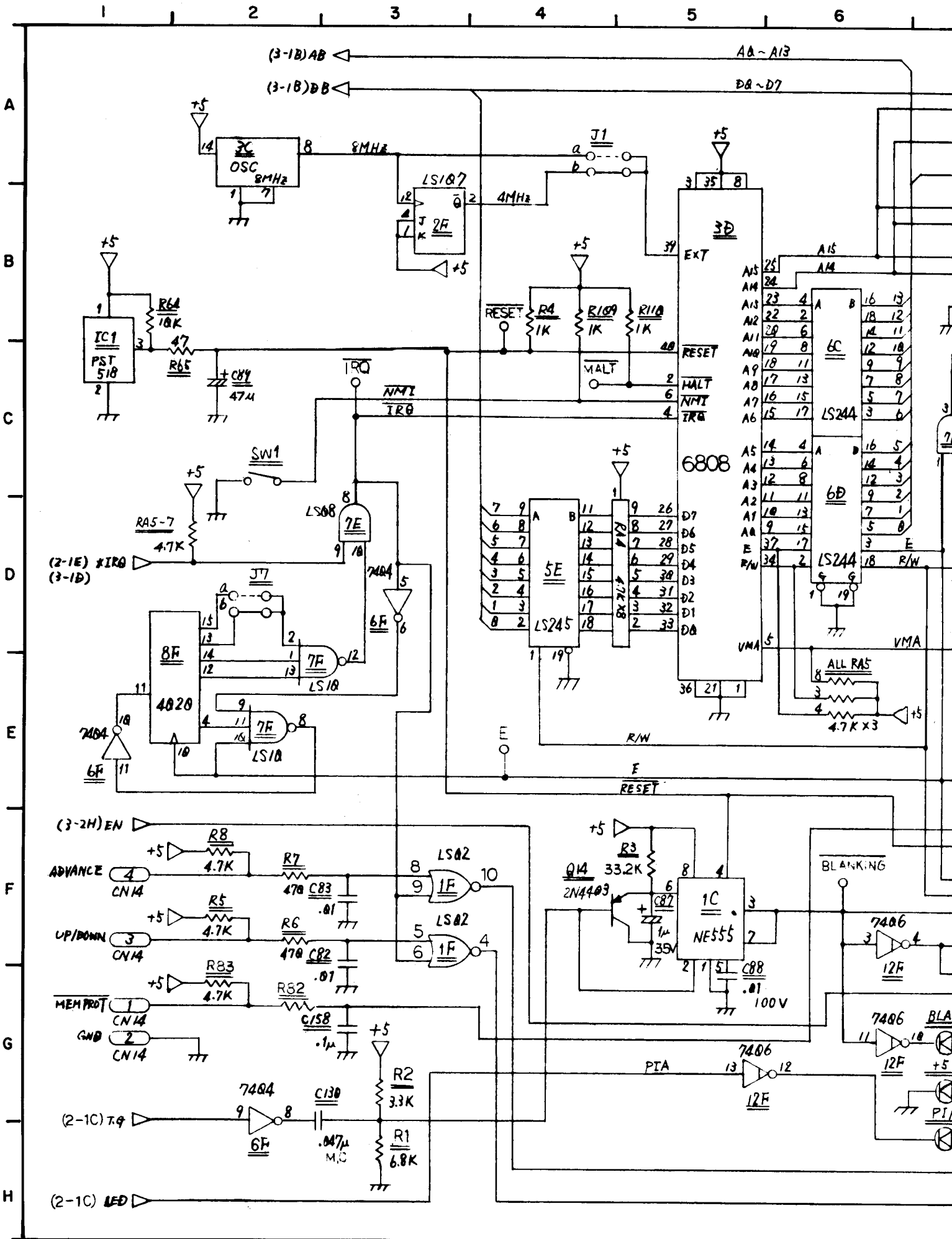
SWITCH DRIVE (COLUMNS)

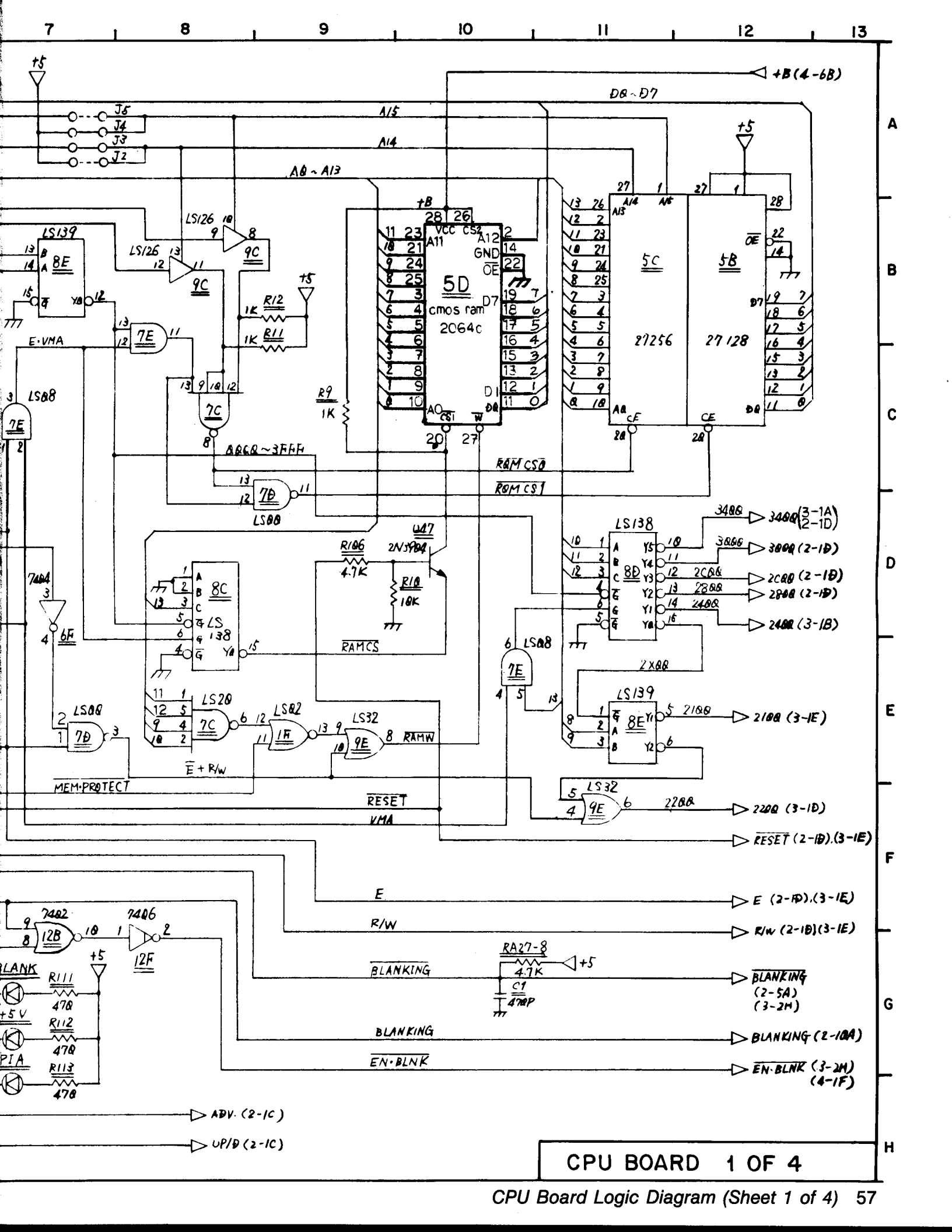
LAMP DRIVE (COLUMNS)

LAMP RET (ROWS)

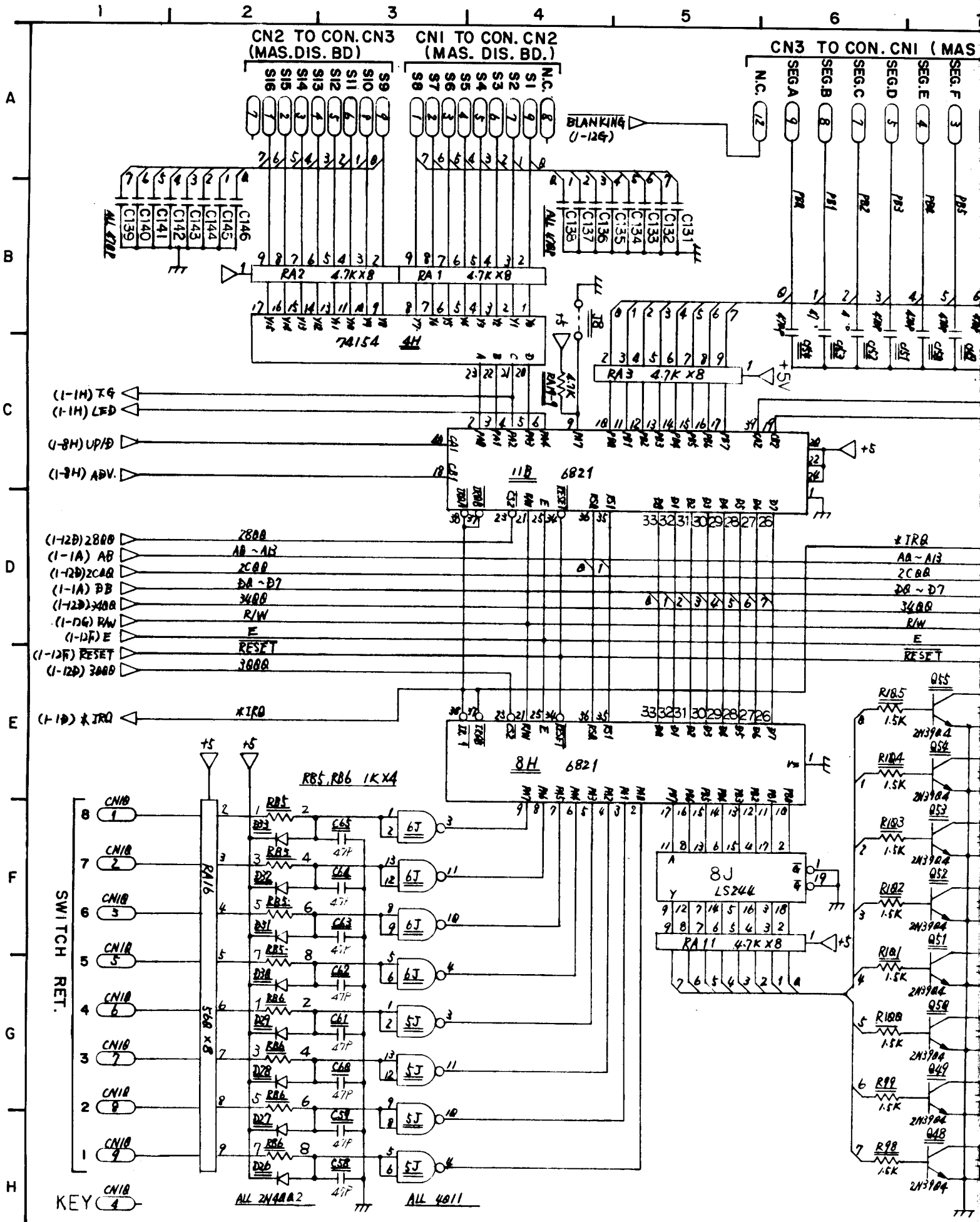
LAMP B+ (+18V)

LAMP GND



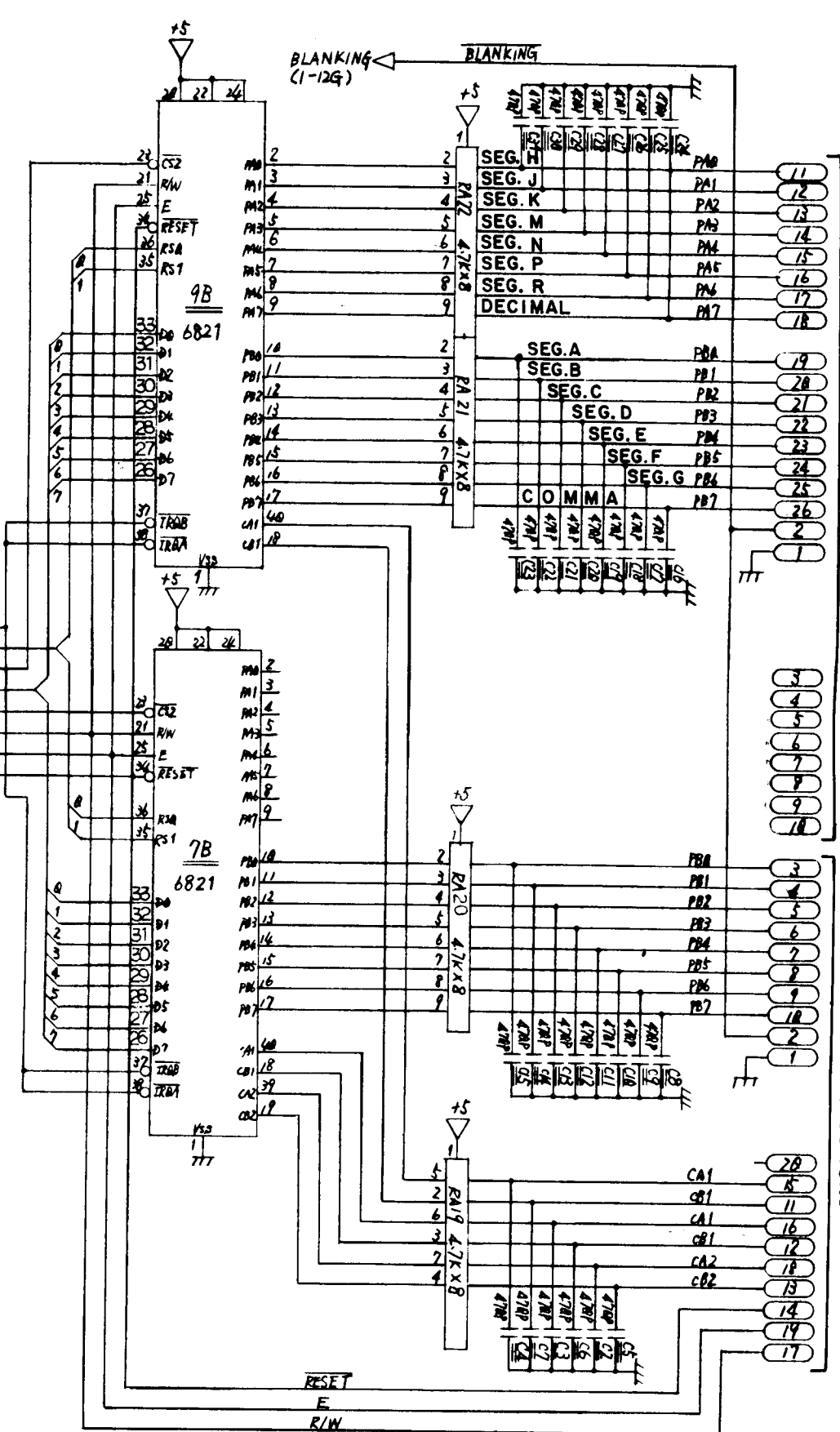
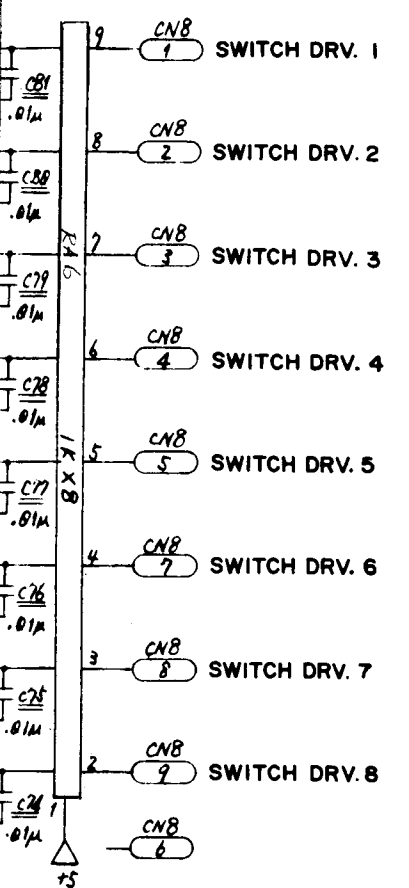
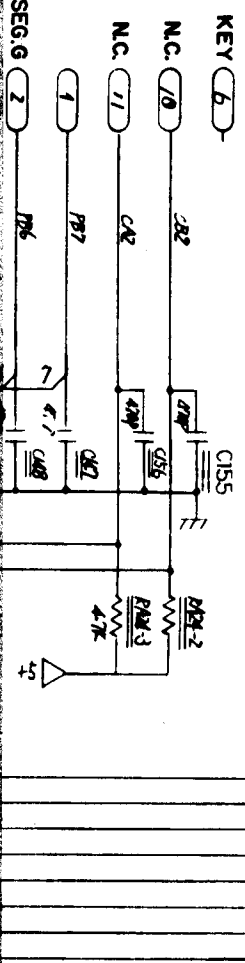


CPU BOARD 1 OF 4



58 CPU Board Logic Diagram (Sheet 2 of 4)

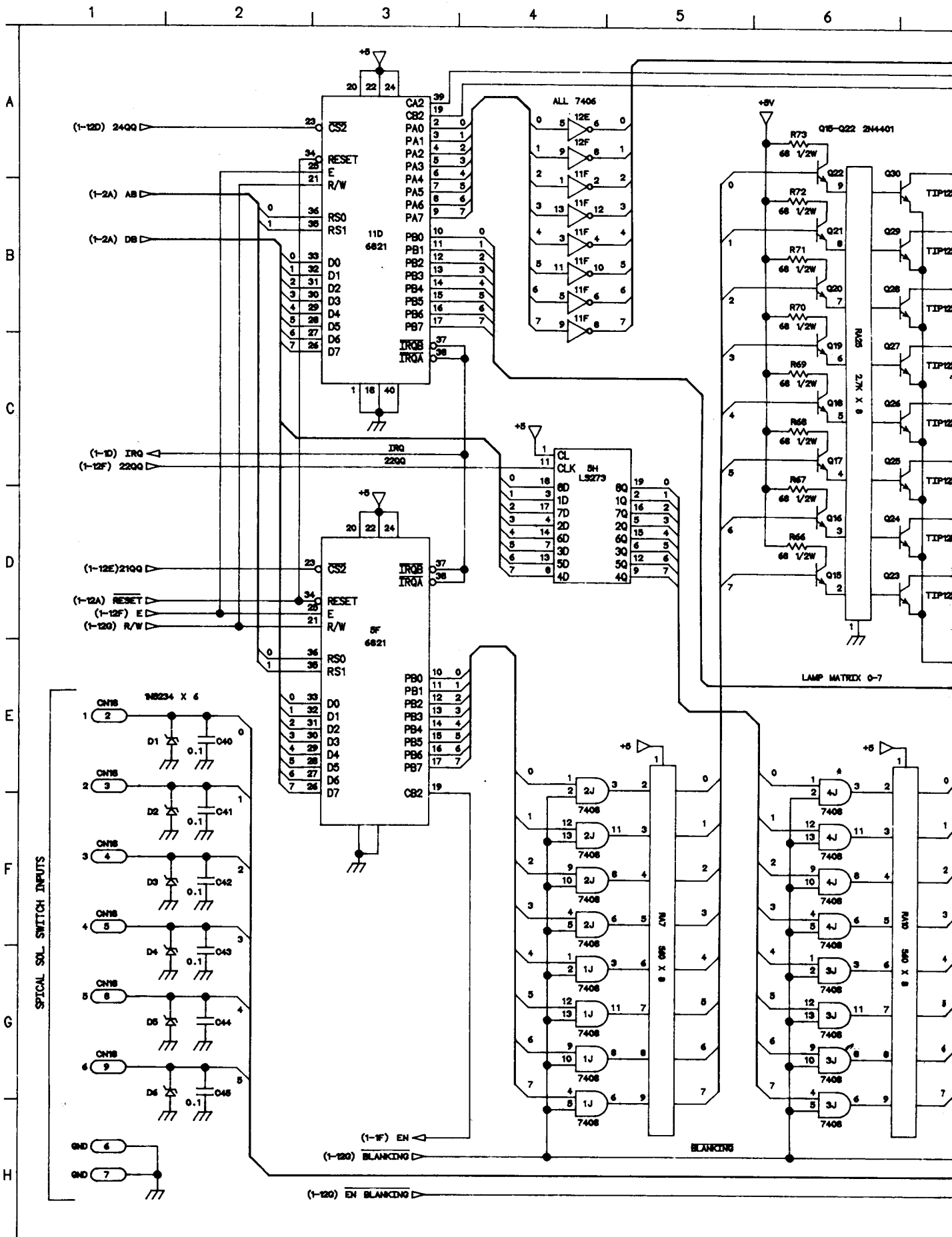
DIS. BD)



CN2 ALPHANUMERIC SEGMENT DRIVERS

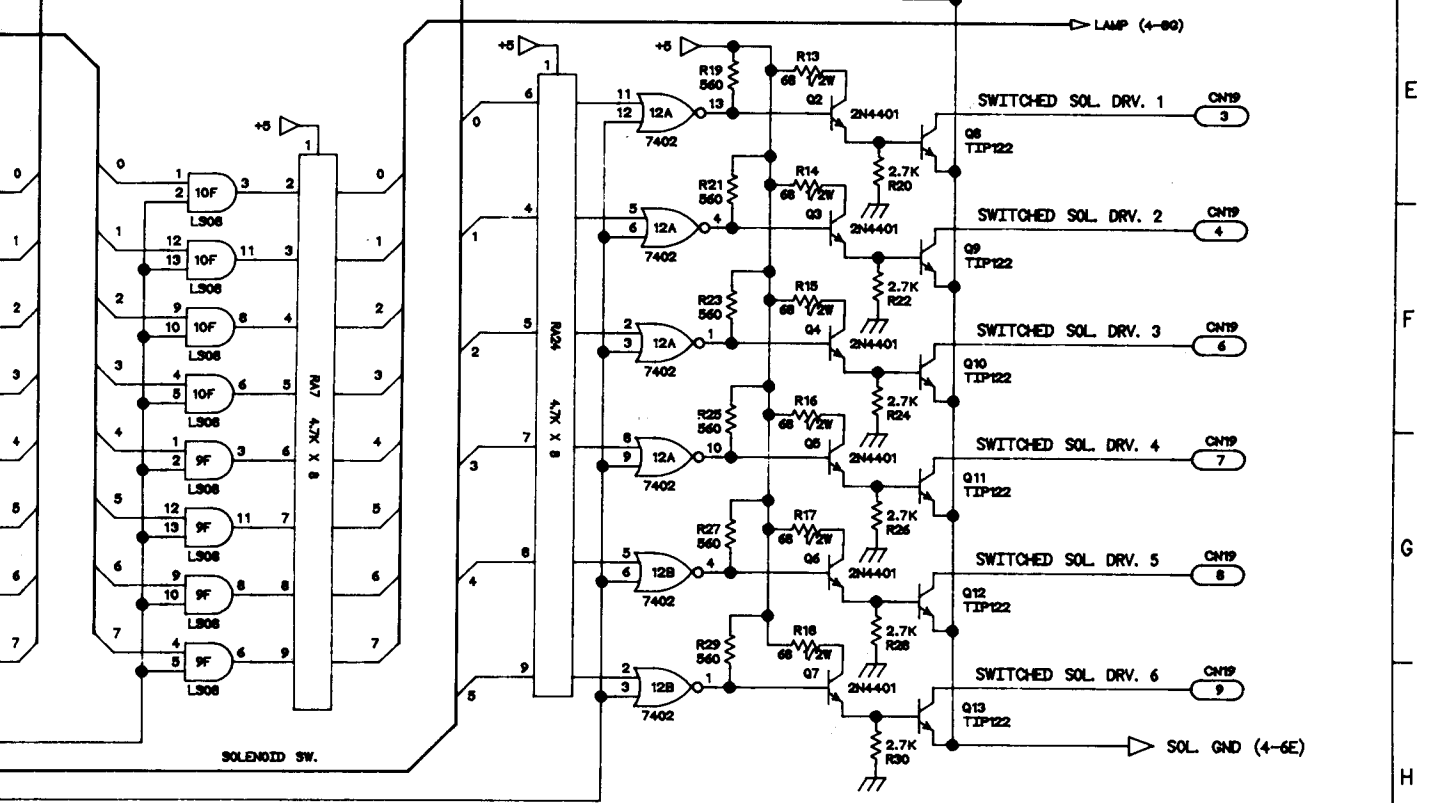
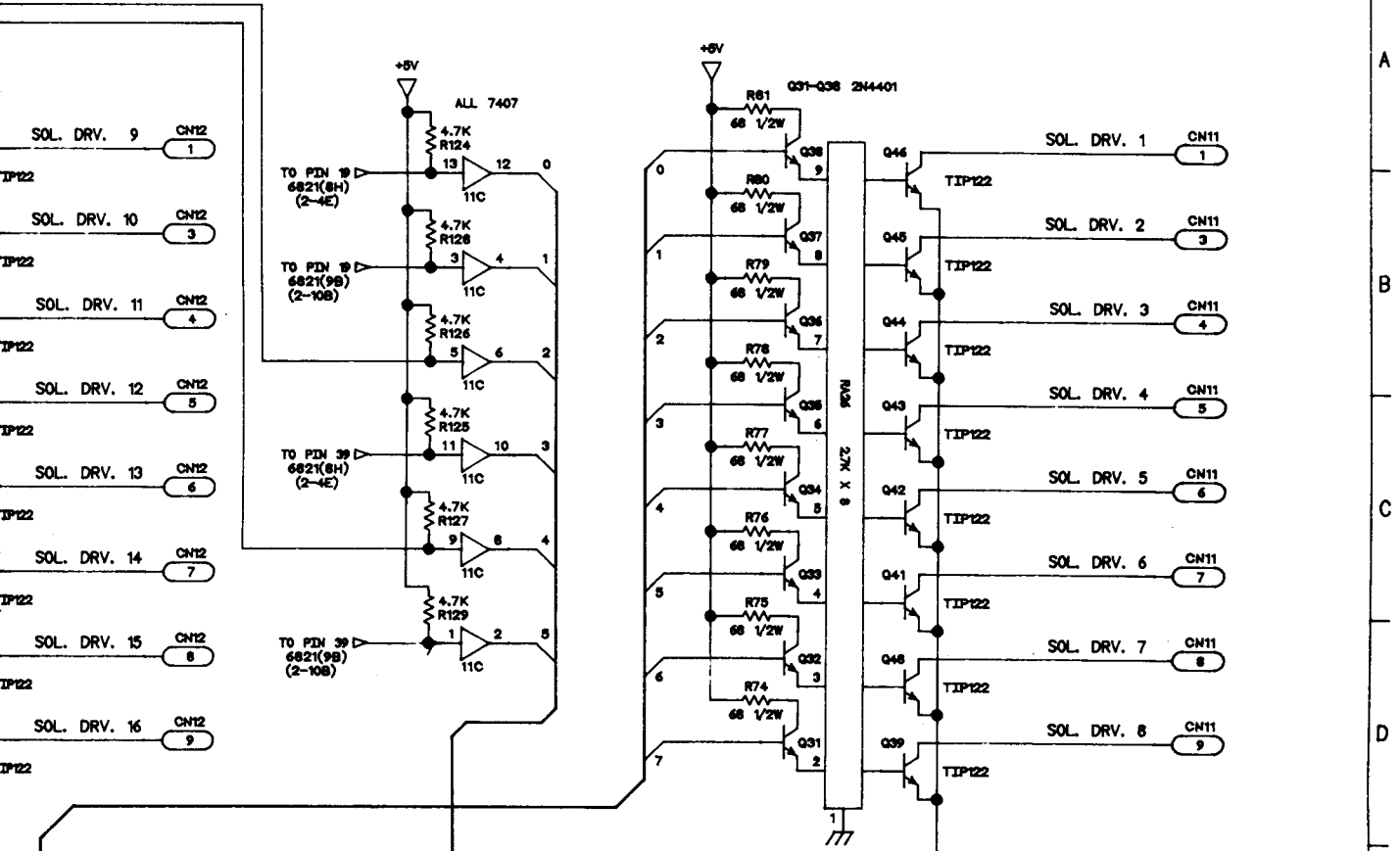
CN21 SOUND DRIVERS

CPU BOARD SHT 2 OF 4

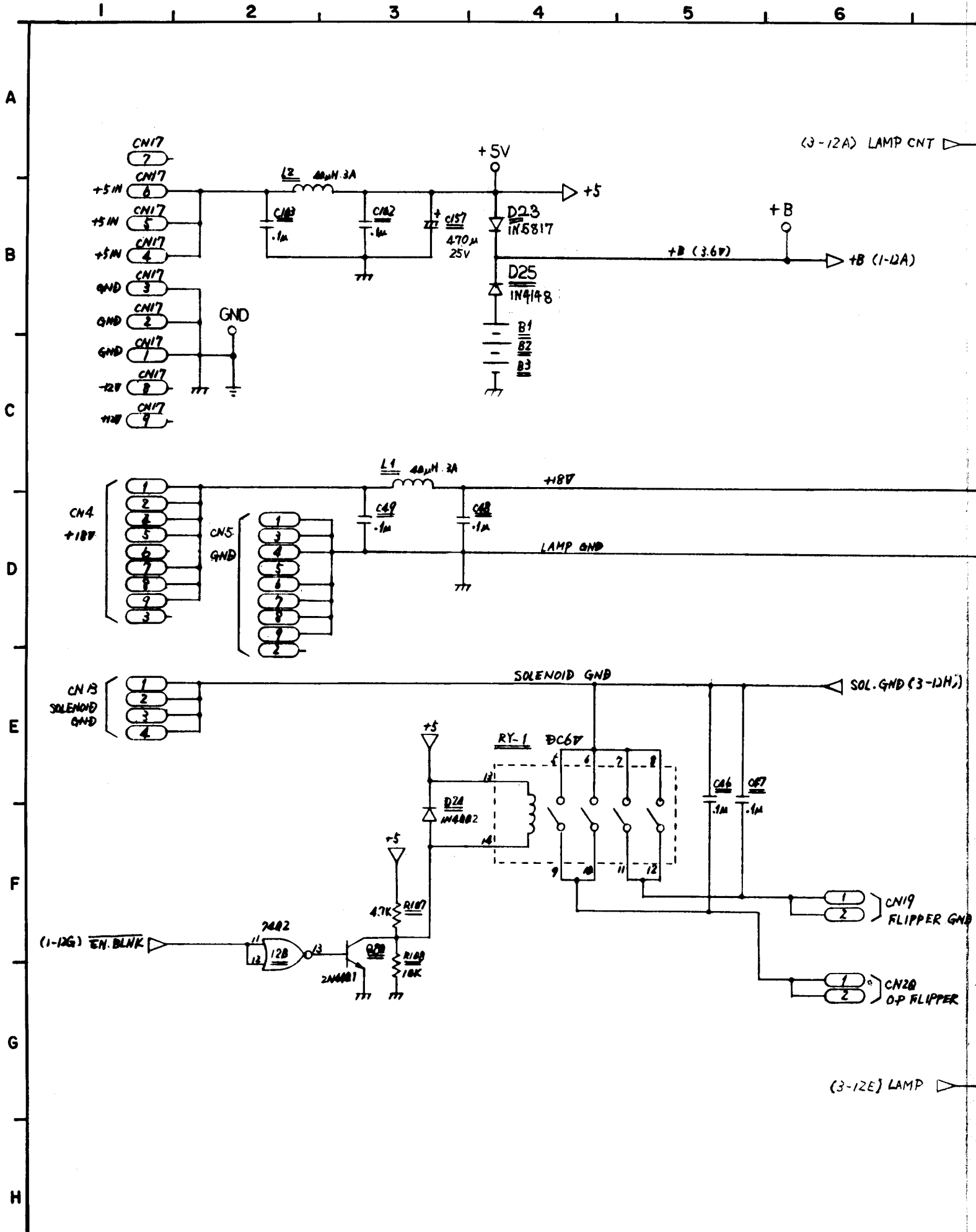


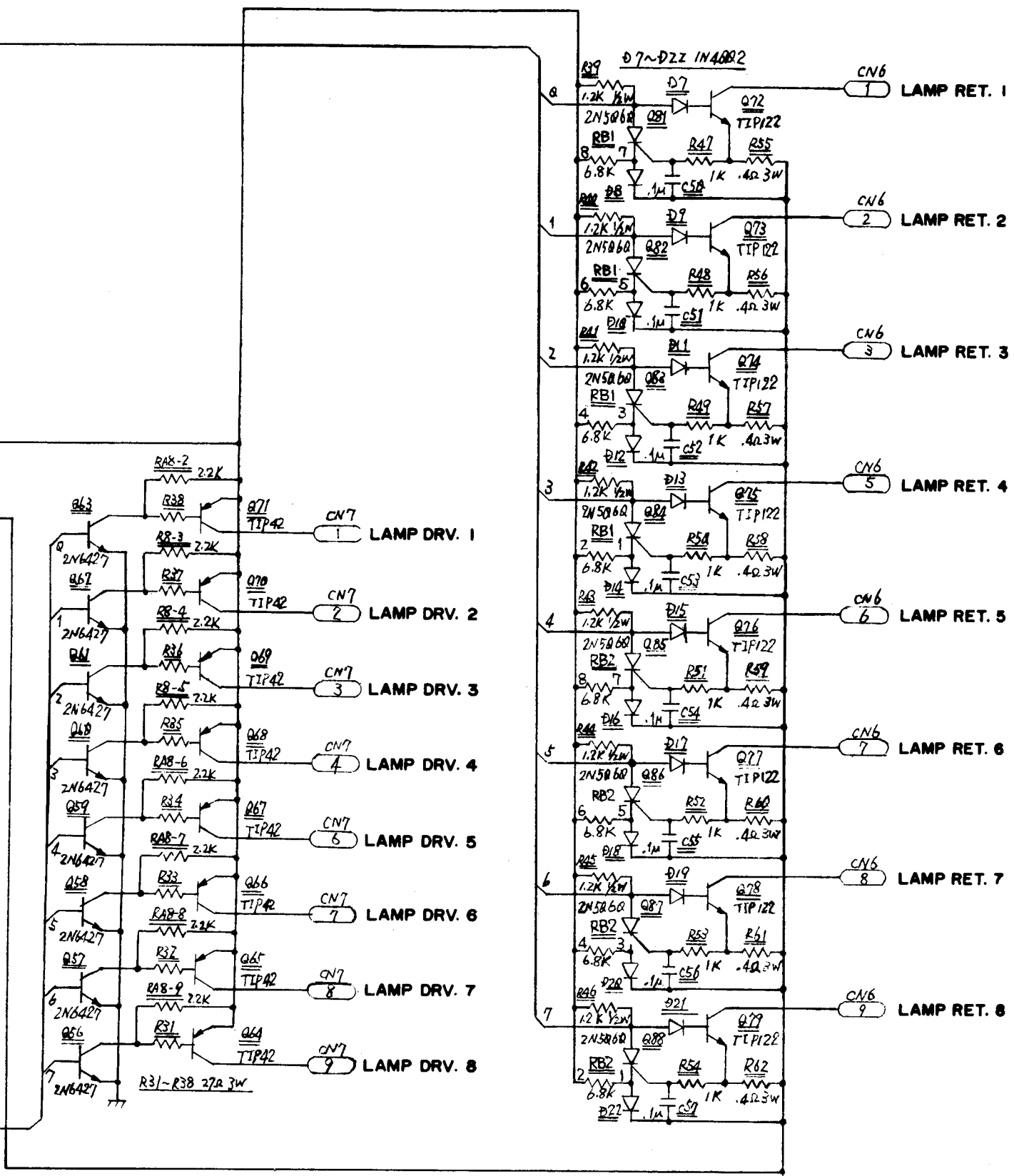
LAMP MATRIX CONT. 0-7

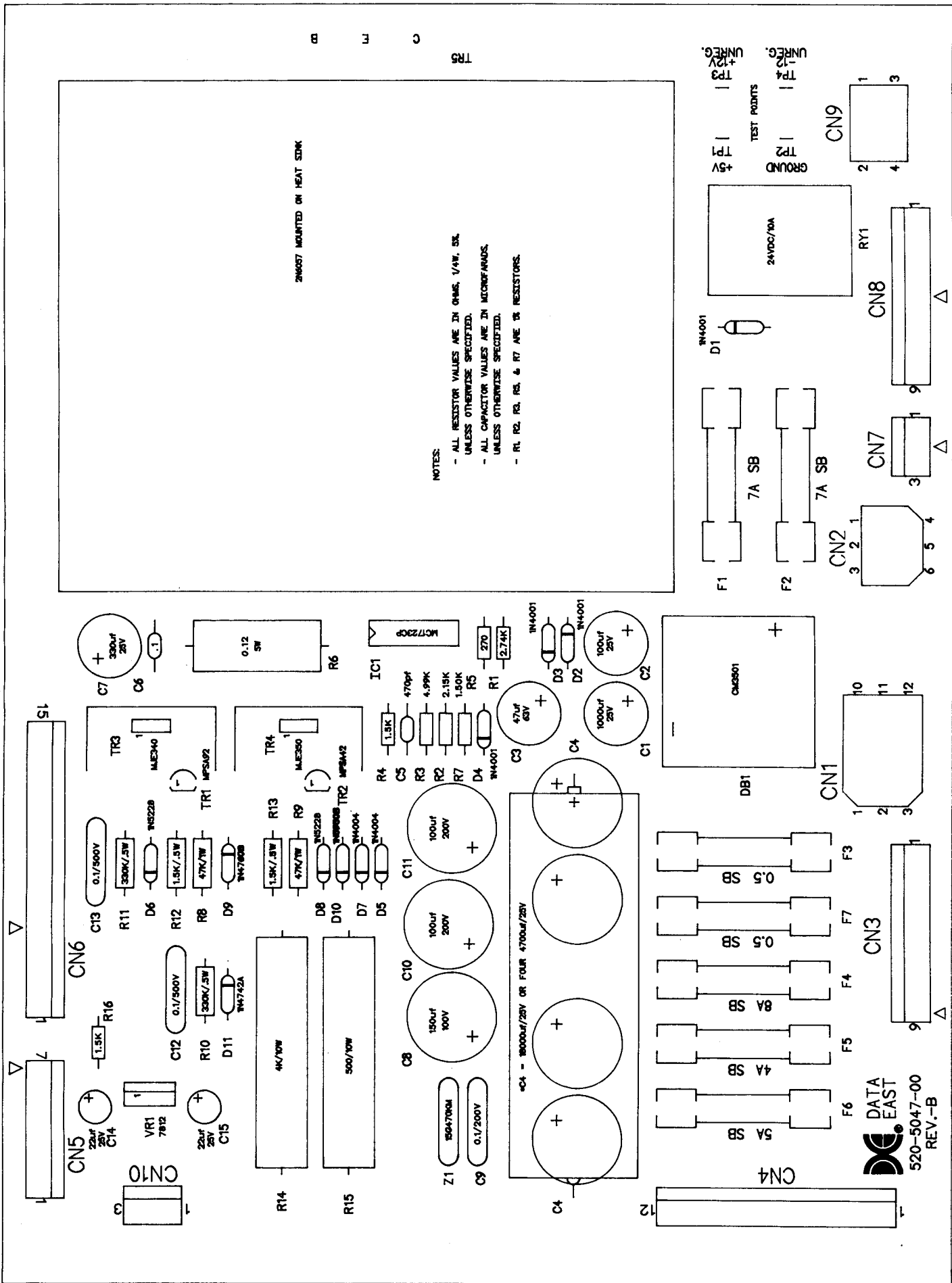
LAMP CNT (4-8A)



CPU BOARD 3 OF 4 REV.B



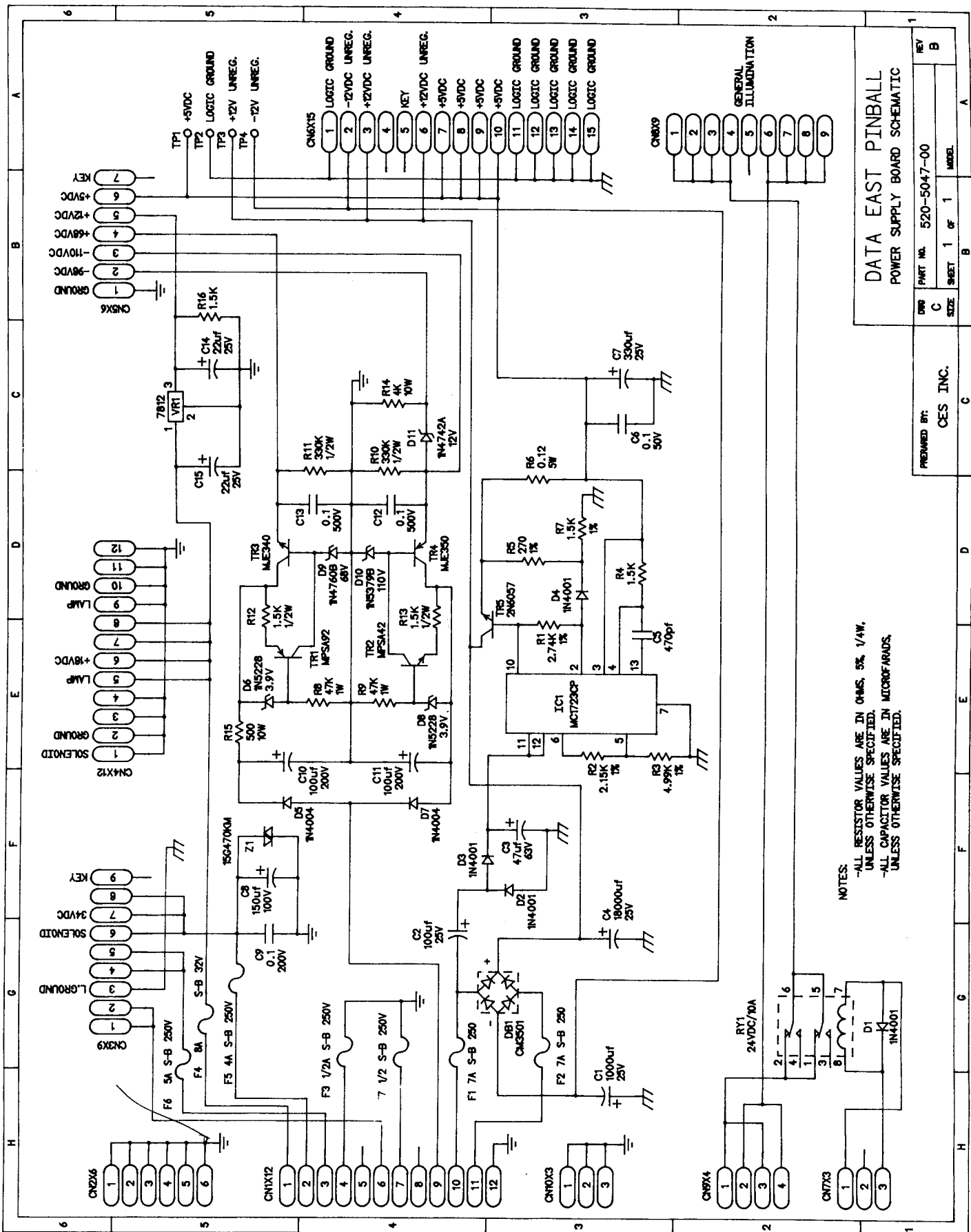




2M657 MOUNTED ON HEAT SINK

NOTES:

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

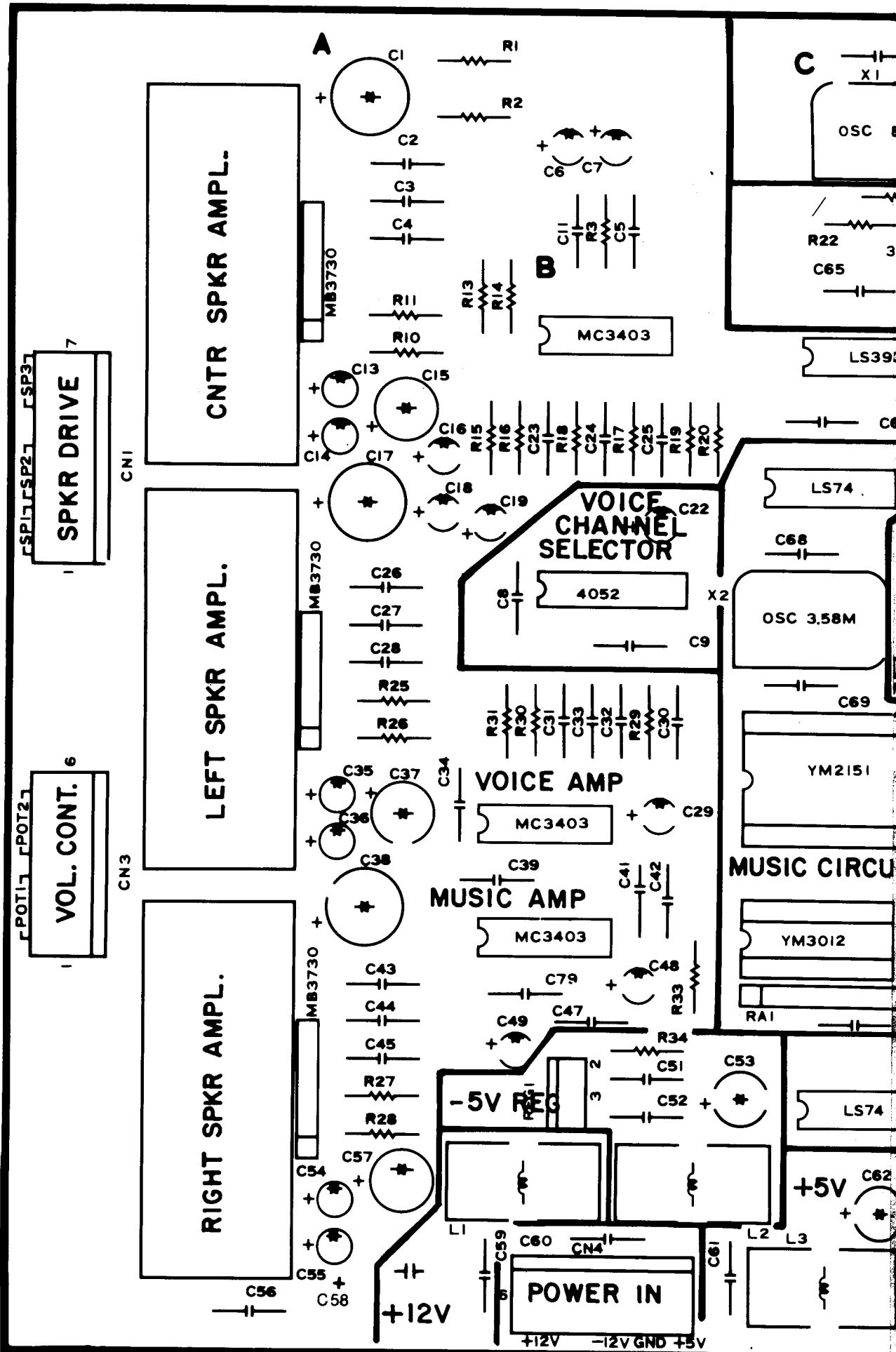


**DATA EAST PINBALL
POWER SUPPLY BOARD SCHEMATIC**

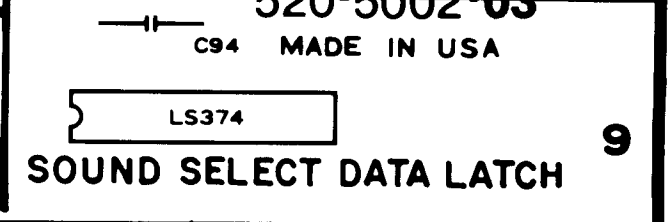
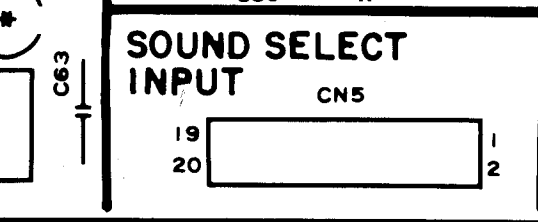
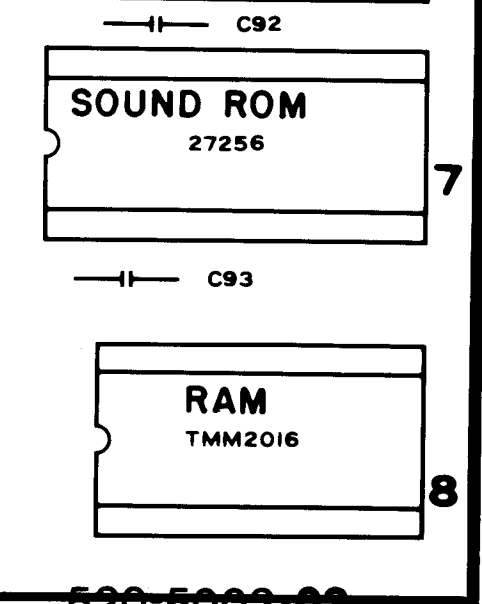
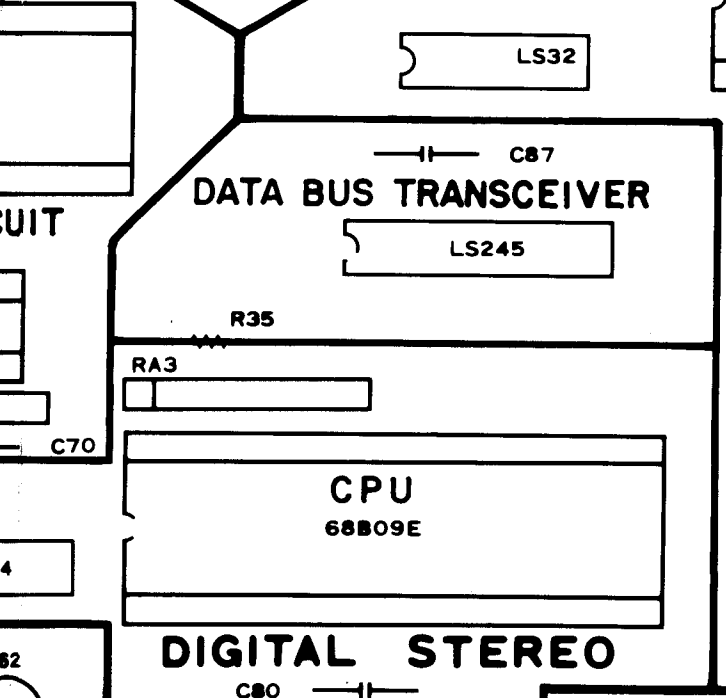
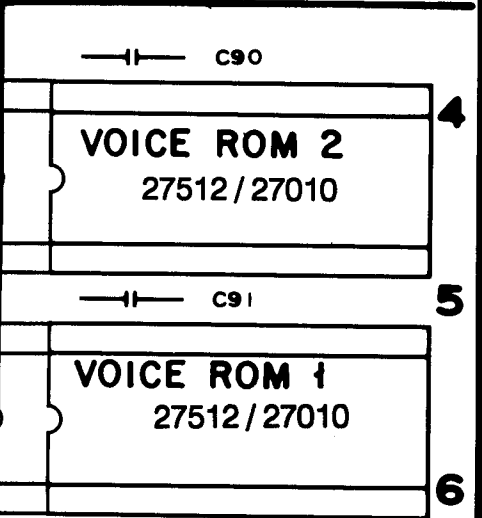
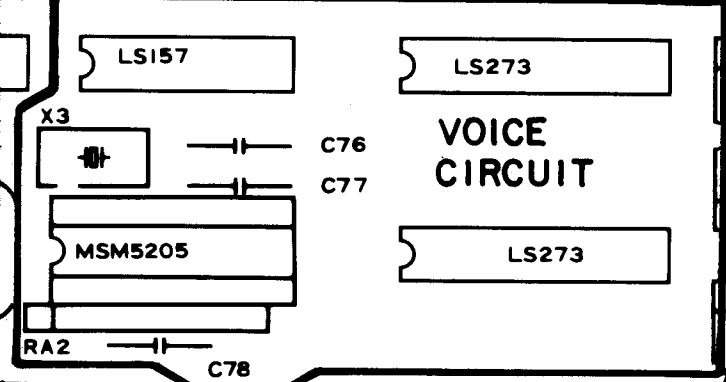
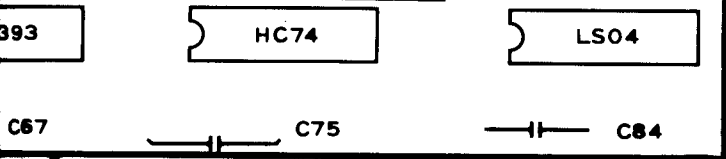
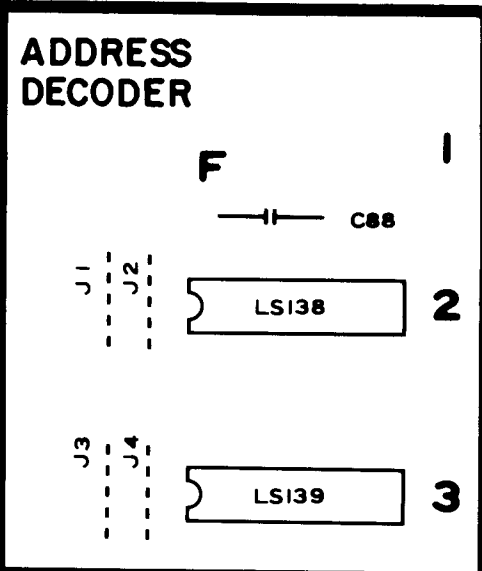
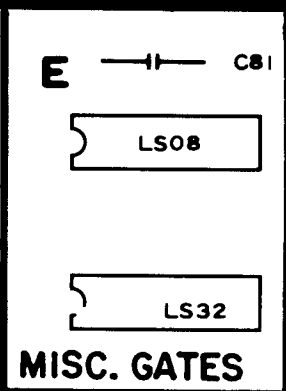
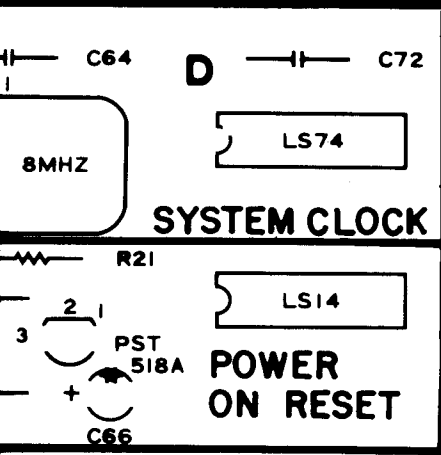
REV	B
DATE	520-5047-00
SIZE	1 of 1
MODEL	A

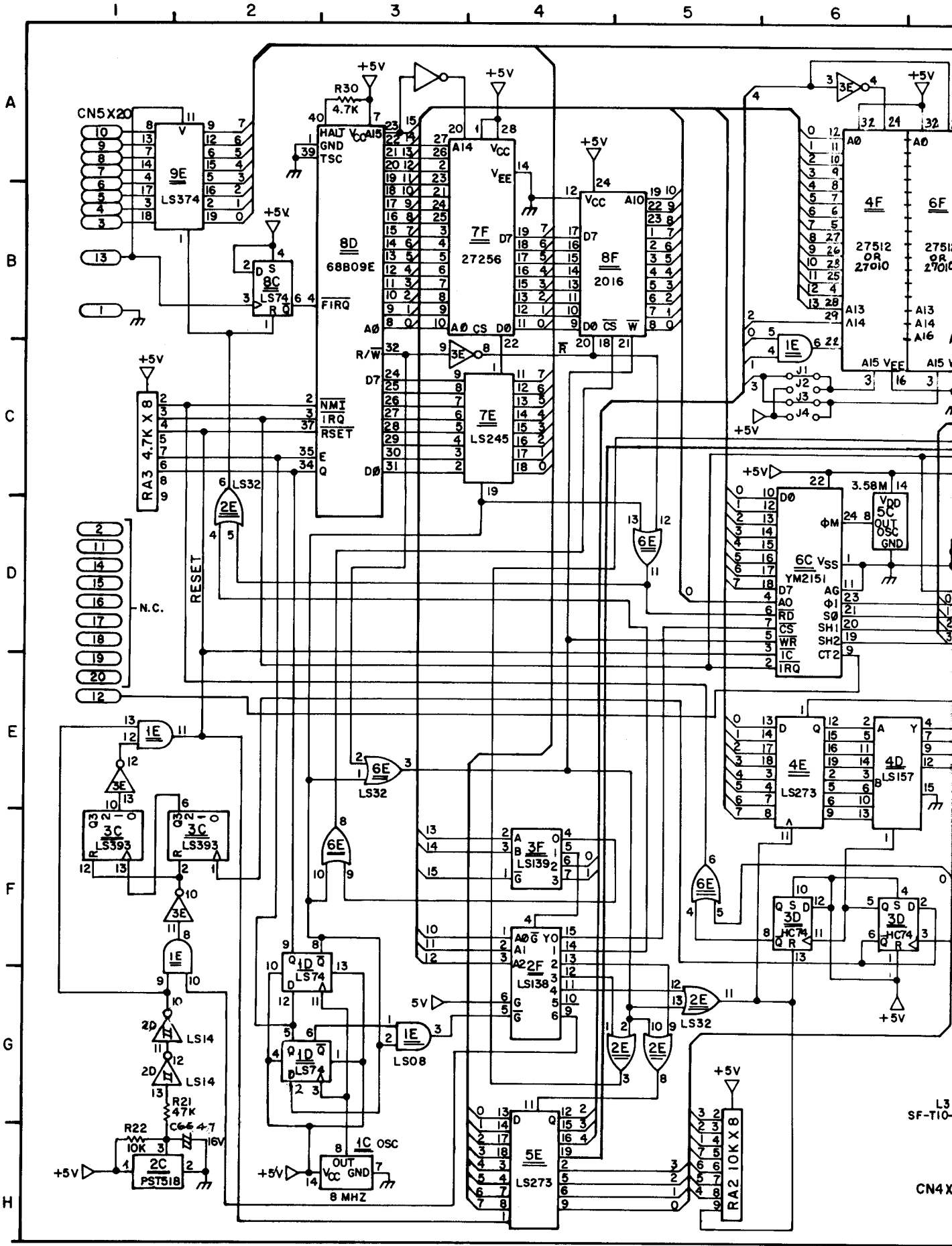
PREPARED BY:
CES INC.

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



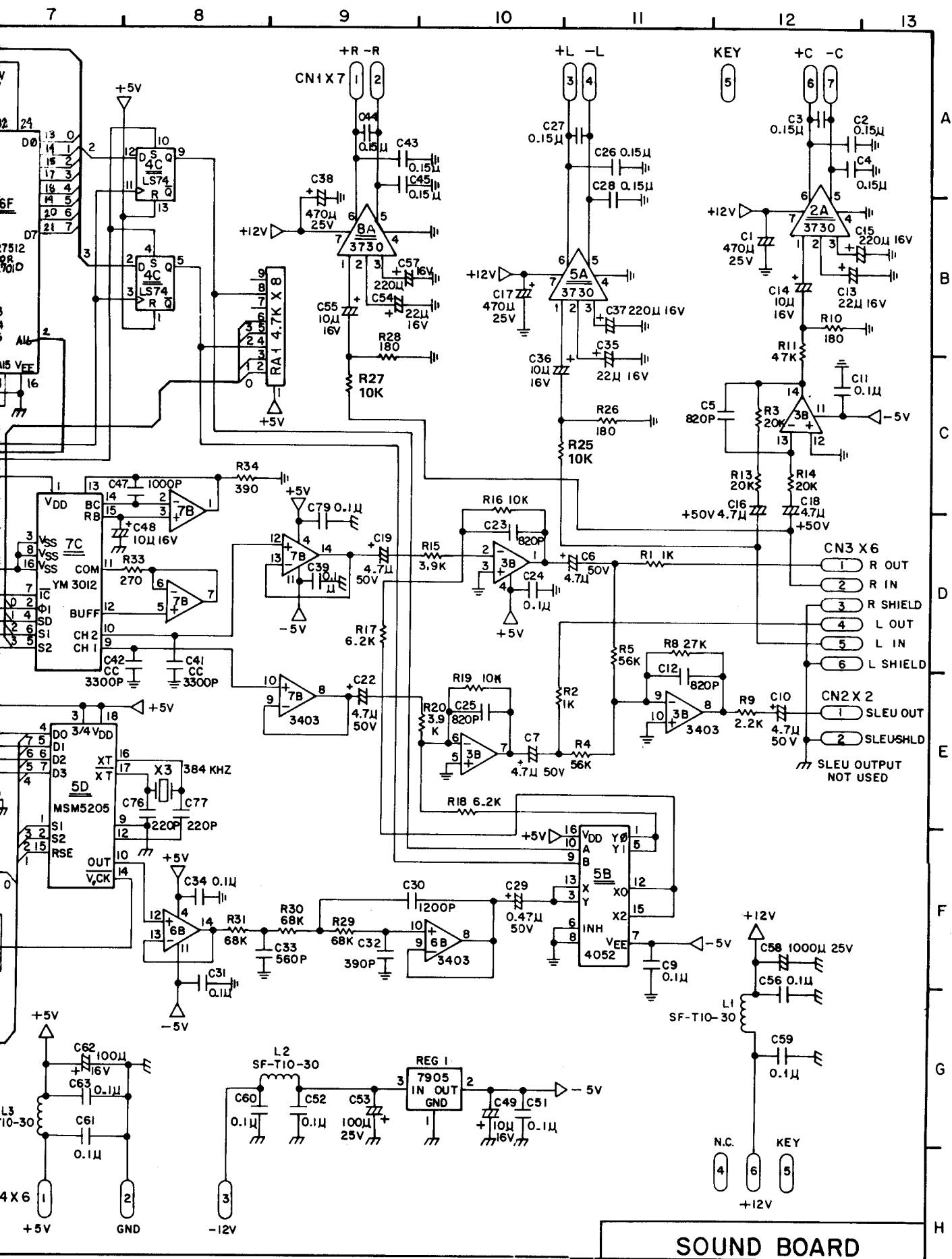
62 Sound Board Assembly Drawing



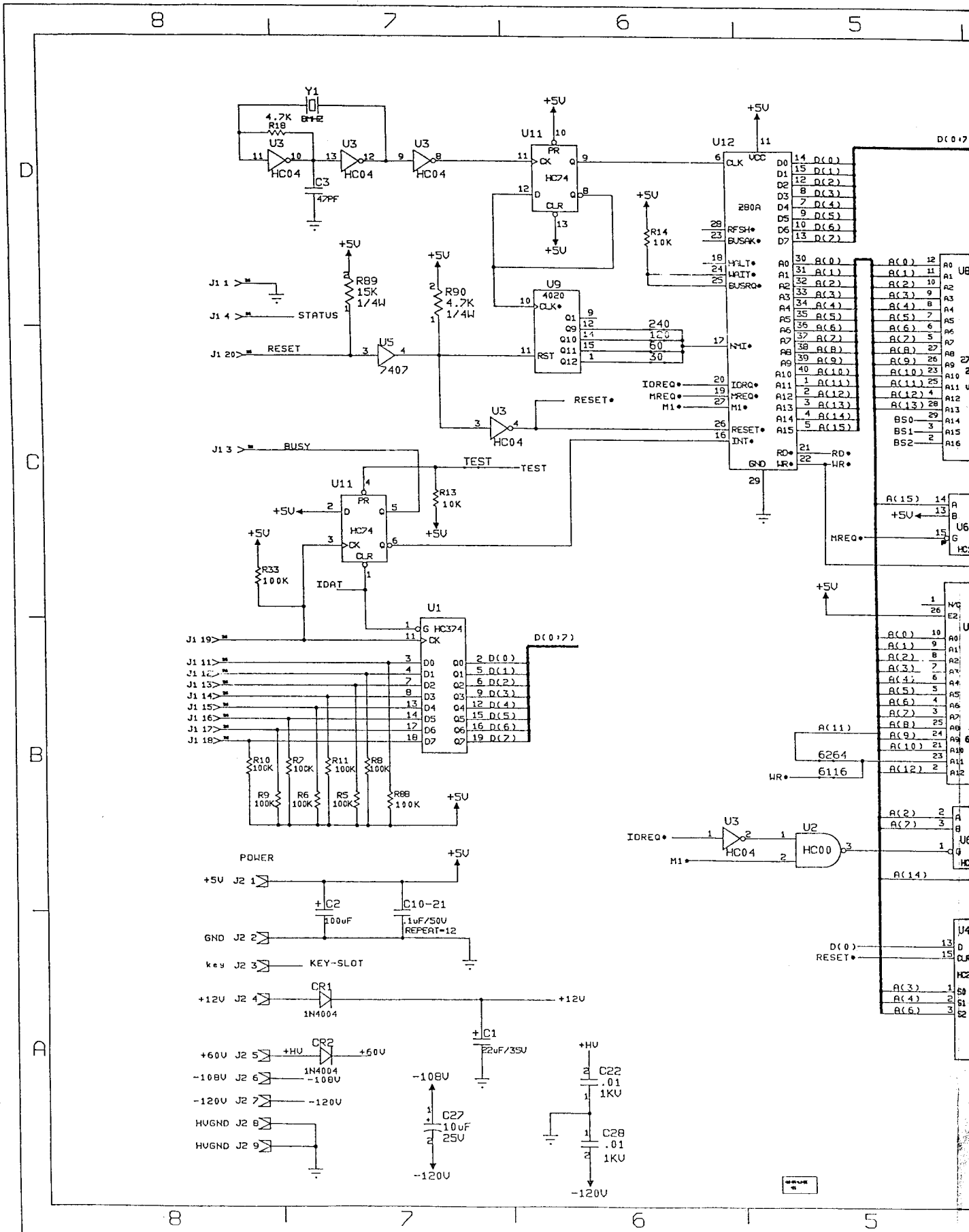


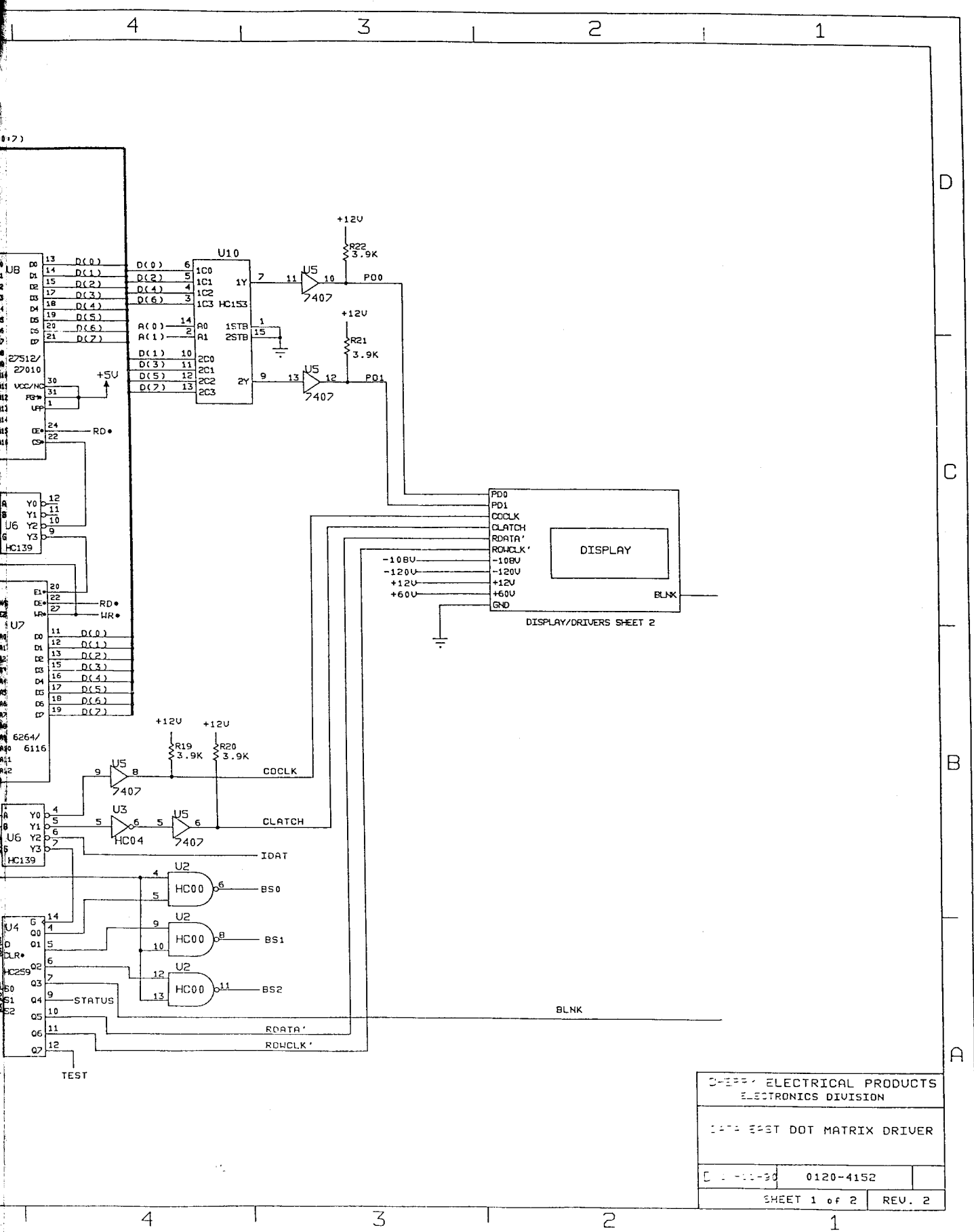
L3
SF-T10-

CN4X



Sound Board Logic Diagram 63





0-EP-1 ELECTRICAL PRODUCTS
 ELECTRONICS DIVISION
 1275 EAST DOT MATRIX DRIVER
 01-11-80 0120-4152
 SHEET 1 of 2 REV. 2

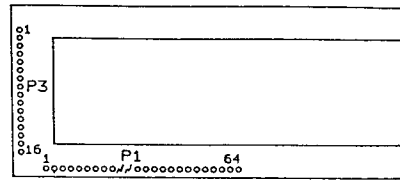
8 7 6 5

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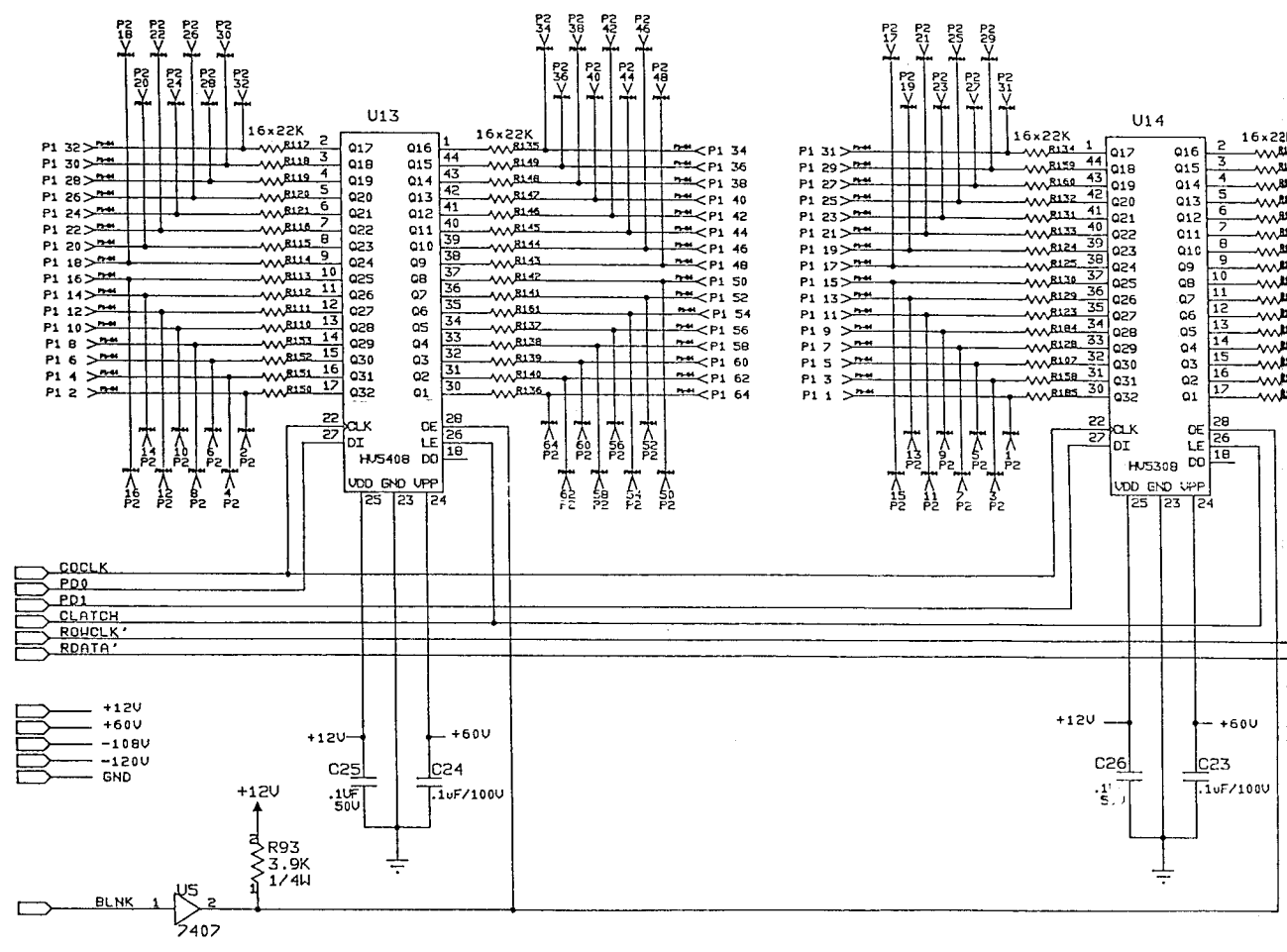
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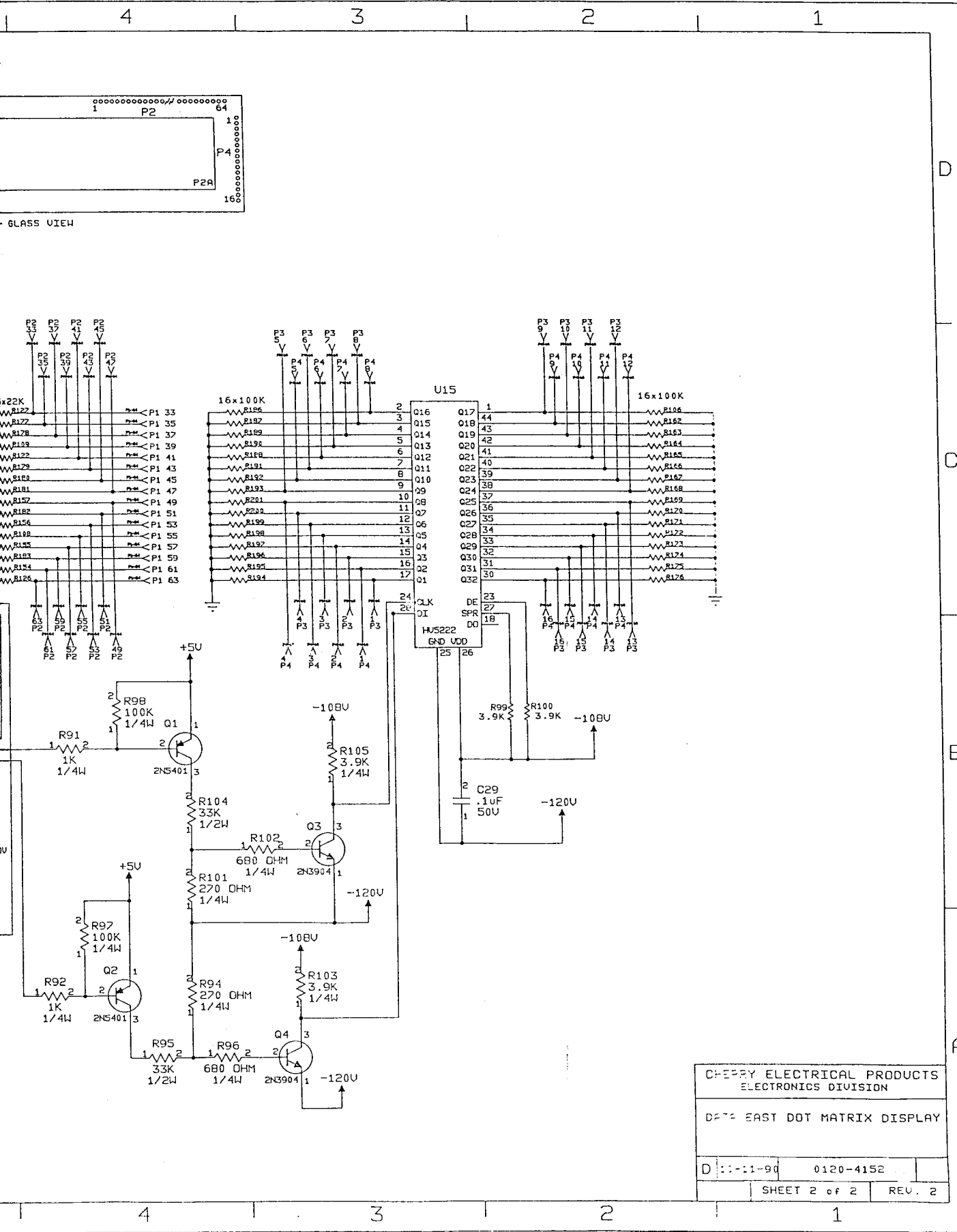
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A



DISPLAY - G1

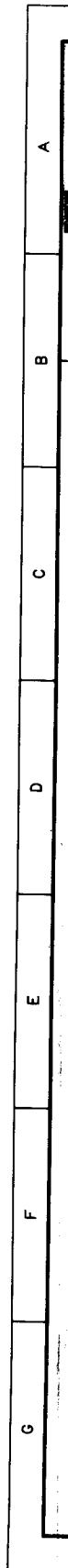
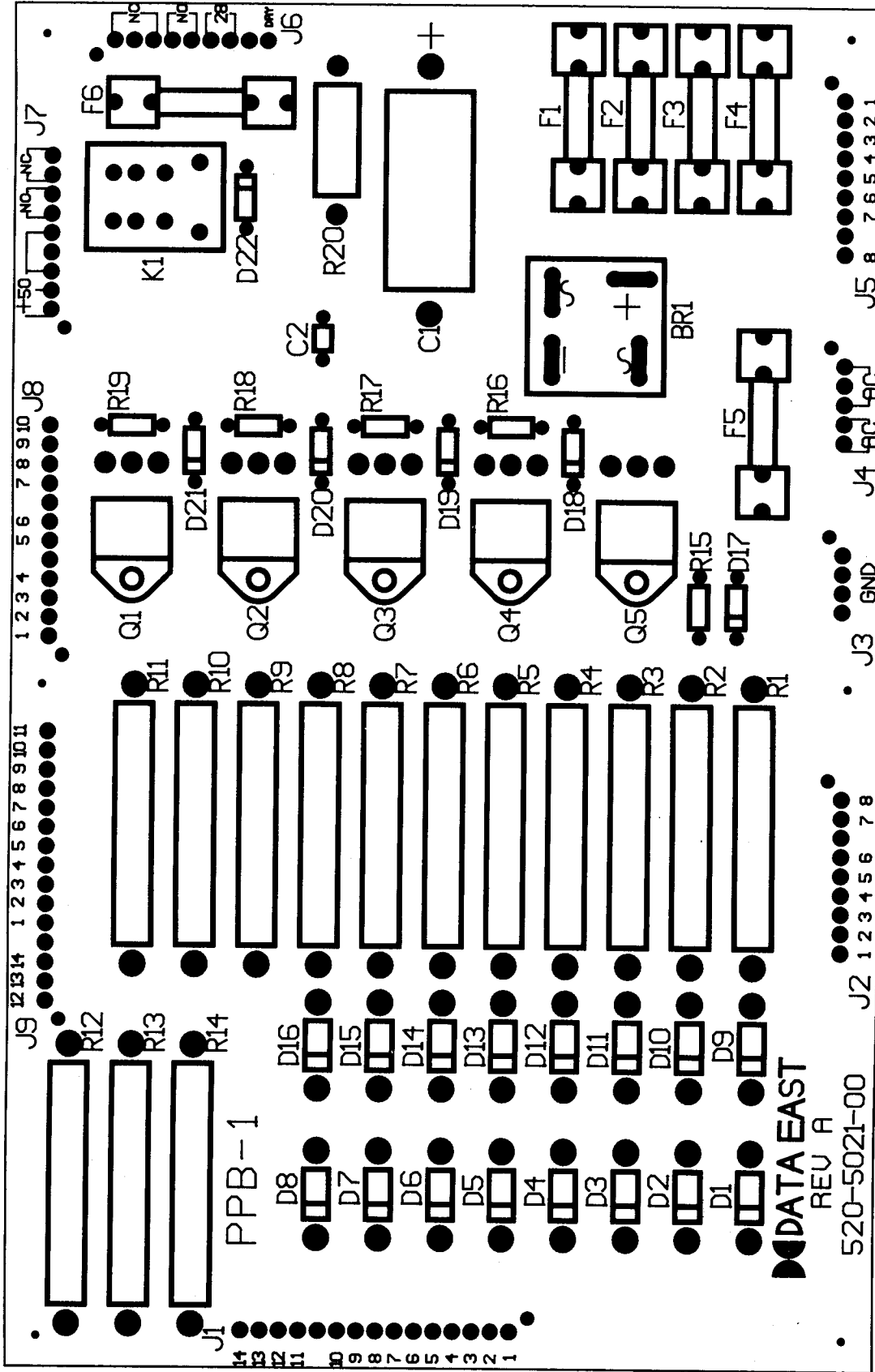


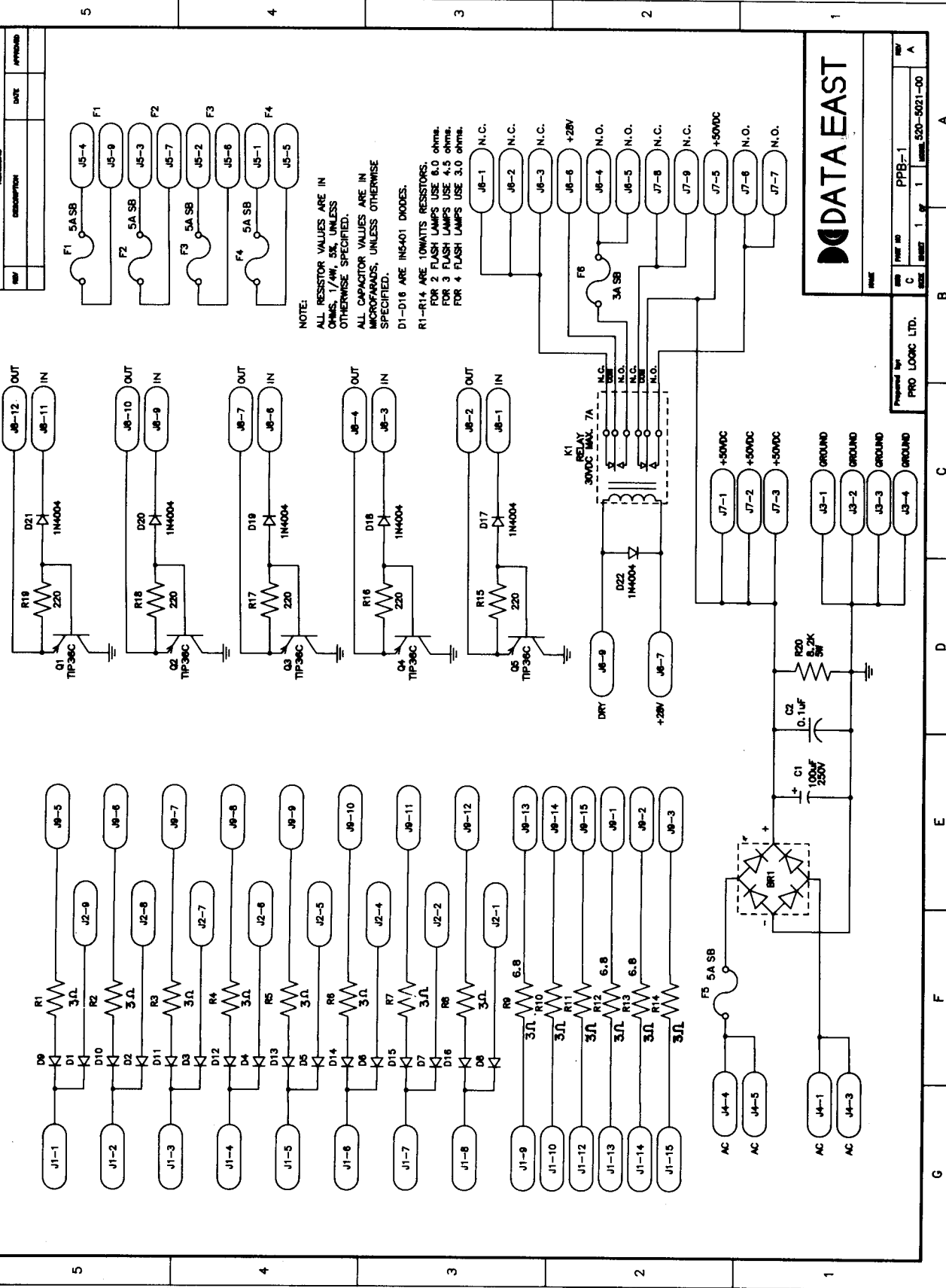


CHERRY ELECTRICAL PRODUCTS
ELECTRONICS DIVISION

DATE EAST DOT MATRIX DISPLAY

D	11-11-90	0120-4152
SHEET 2 of 2		REV. 2





NOTE:
 ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
 ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
 D1-D16 ARE 1N5401 DIODES.
 R1-R14 ARE 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.

DATA EAST

Prepared by: PRO LOGIC LTD.

PPB-1

1 of 1

520-8021-00

A

5 4 3 2 1

G F E D C B A



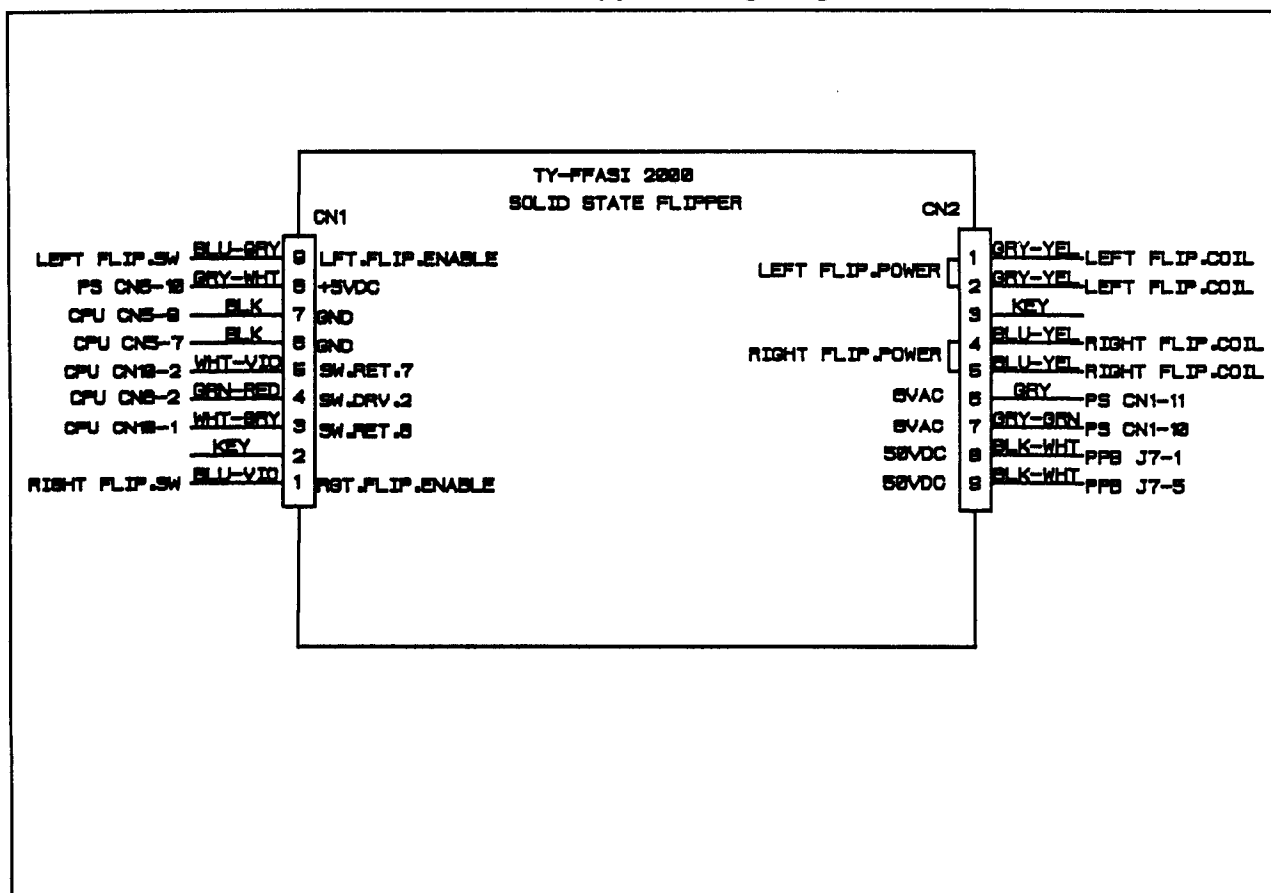
Theory of Operation for the Solid State Flippers

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

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

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

Solid State Flipper Wiring Diagram



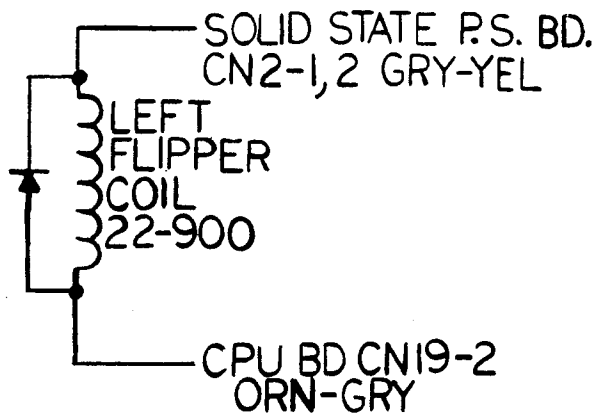
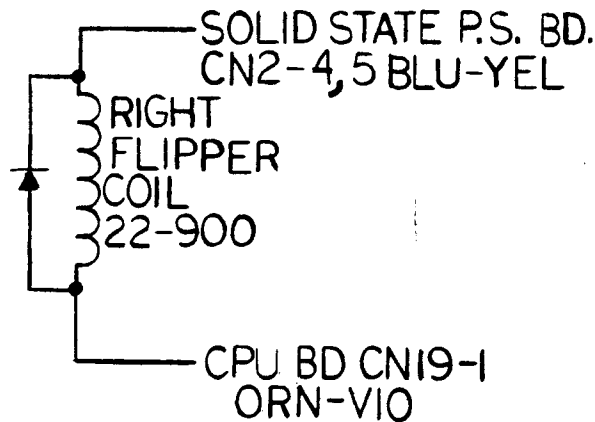
Solid State Flippers
PCB Wiring Diagram

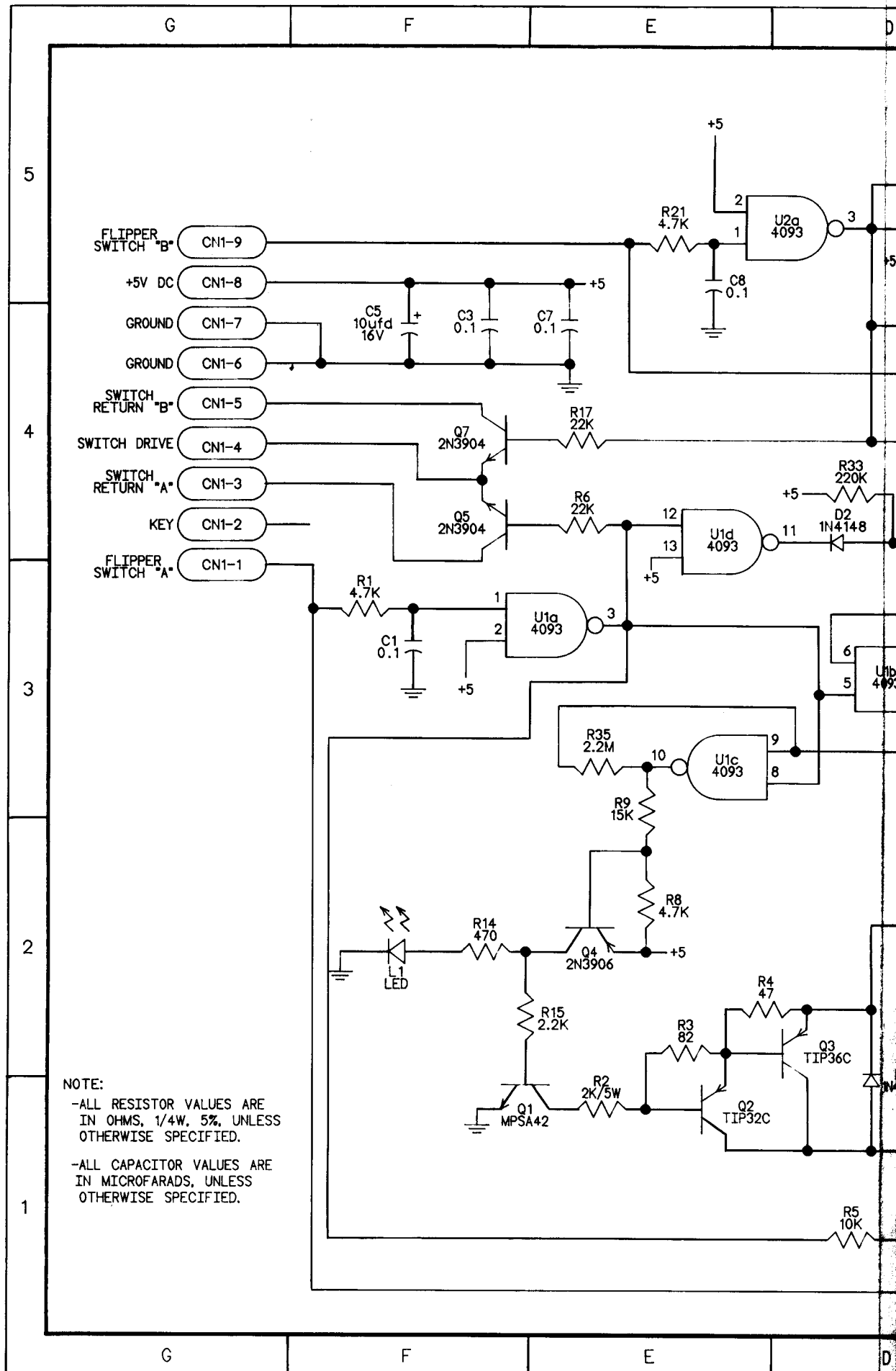
Connector CN 1

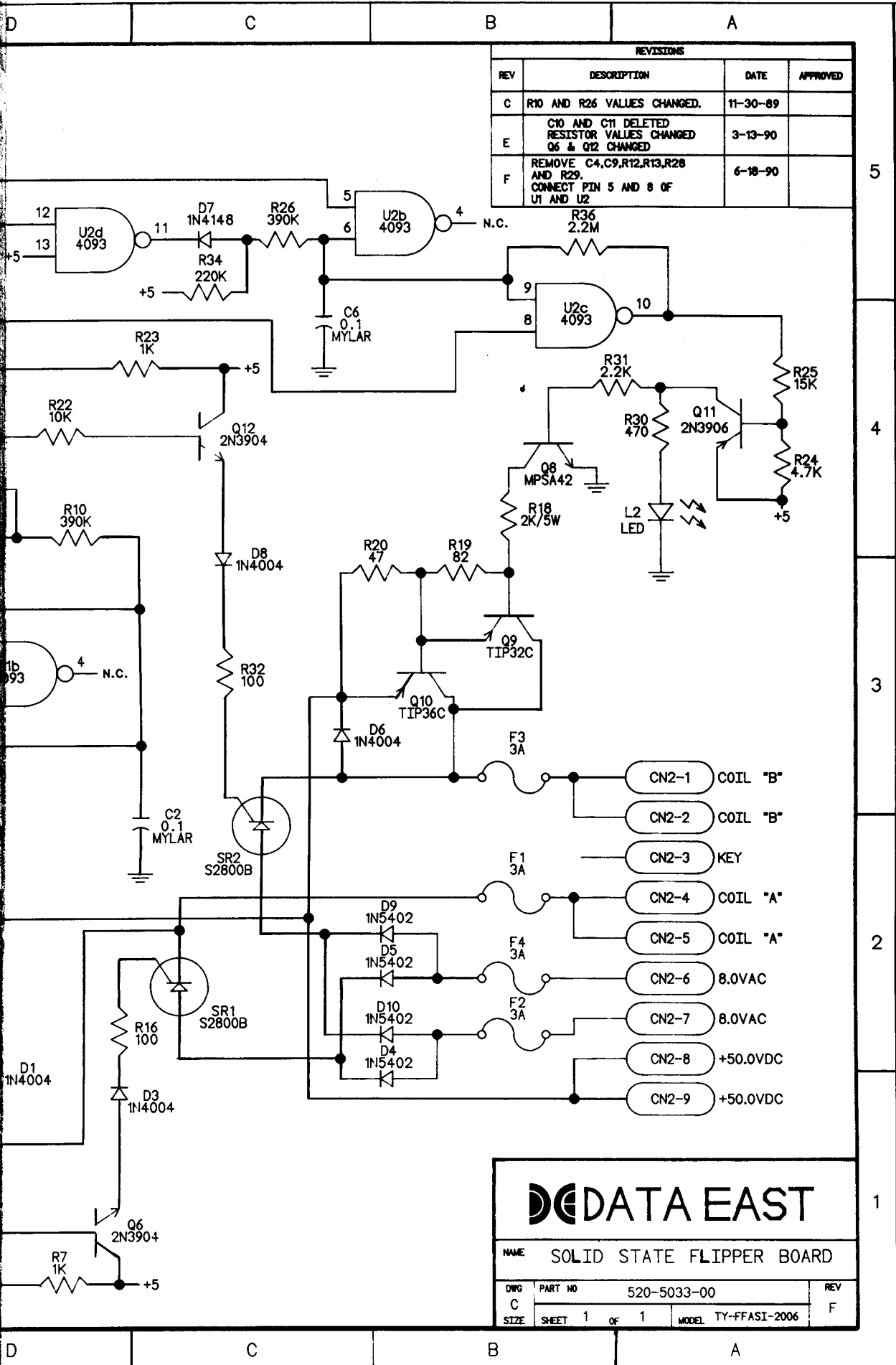
Pin #	Goes To	Wire Color	It Is
1	Rgt. Flipper Sw.	BLU-VIO	RGT. FLIP ENABLE
2			KEY
3	CPU CN10-1	WHT-GRY	SW. RET 8
4	CPU CN8-2	GRN-RED	SW. DRV 2
5	CPU CN10-2	WHT-VIO	SW. RET 7
6	CPU CN5-7	BLK	GND
7	CPU CN5-9	BLK	GND
8	PS CN6-10	GRY-WHT	+5VDC
9	Lft. Flipper Sw.	BLU-GRY	LFT. FLIP ENABLE

Connector CN 2

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







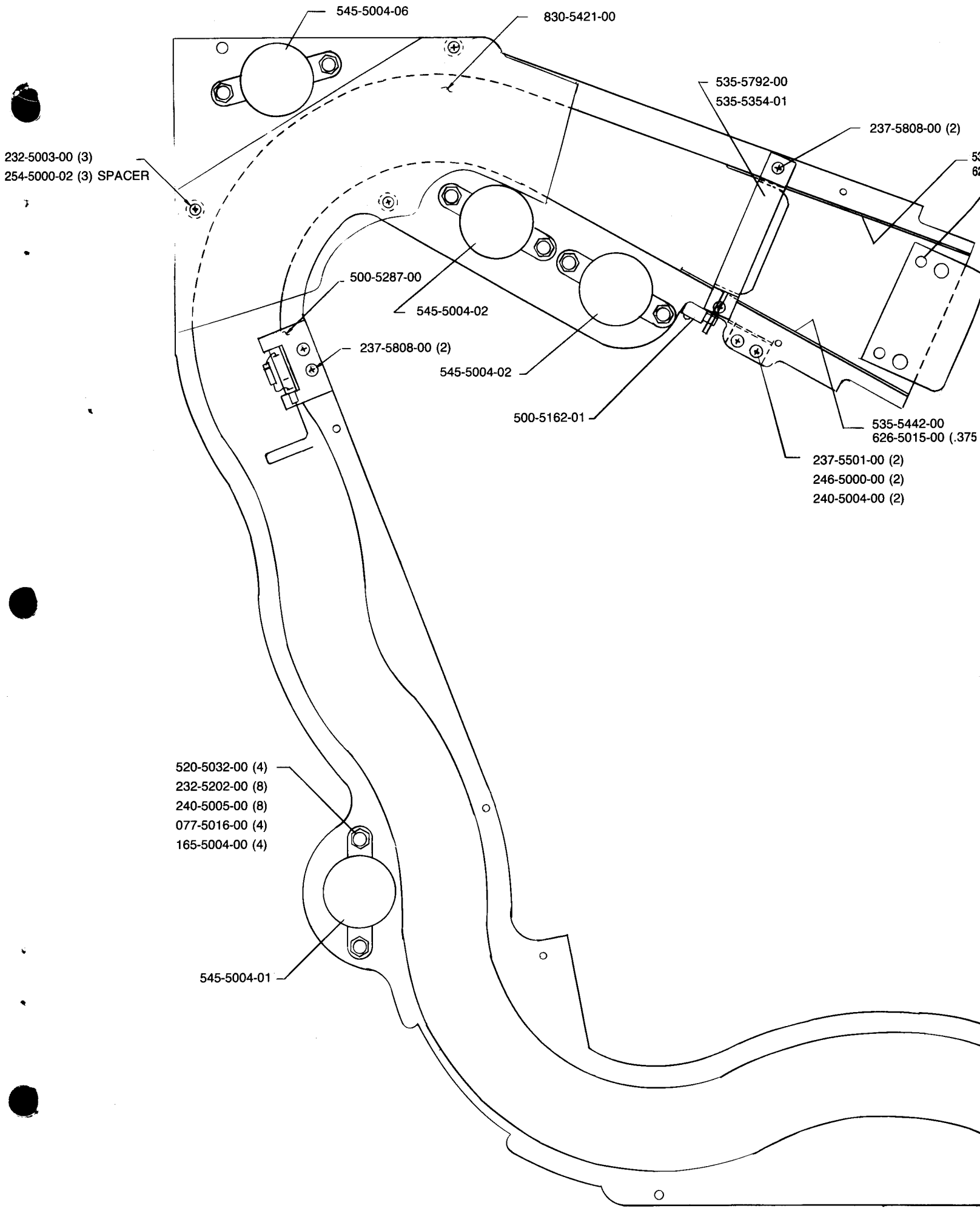
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
C	R10 AND R26 VALUES CHANGED.	11-30-89	
E	C10 AND C11 DELETED RESISTOR VALUES CHANGED Q6 & Q12 CHANGED	3-13-90	
F	REMOVE C4,C9,R12,R13,R28 AND R29. CONNECT PIN 5 AND 8 OF U1 AND U2	6-18-90	

5
4
3
2
1

DATA EAST

NAME SOLID STATE FLIPPER BOARD

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



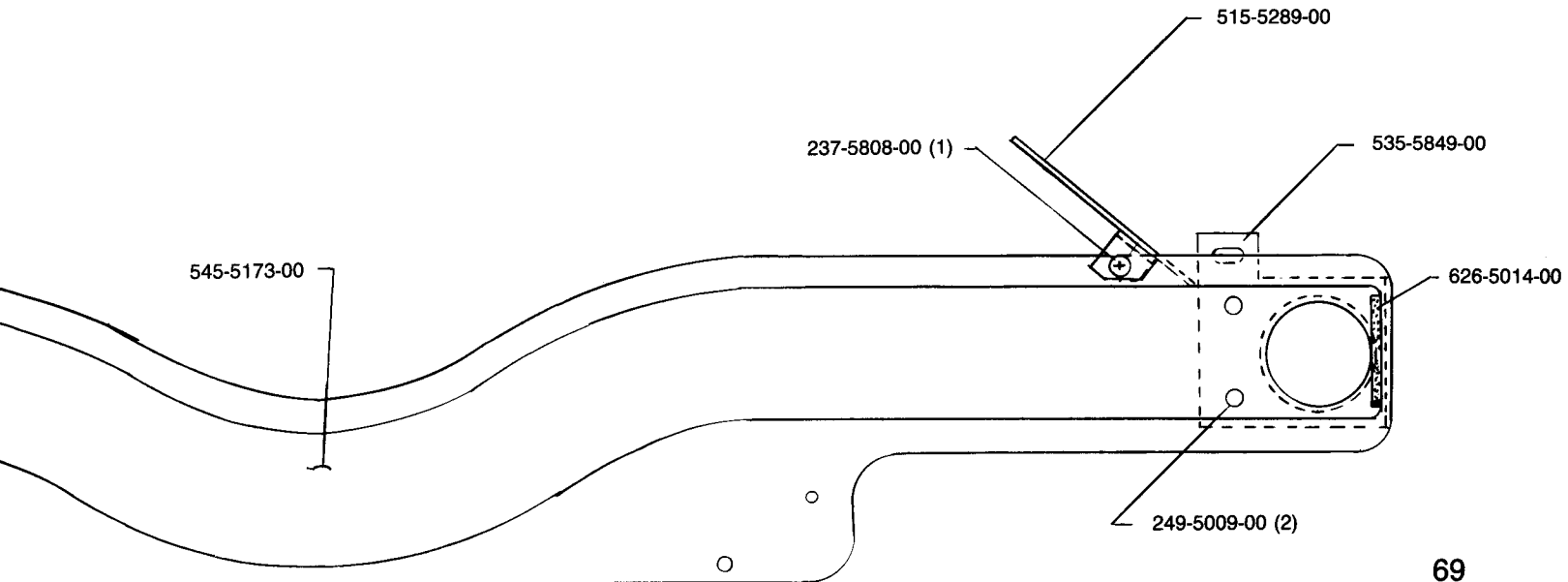
TOLERANCE UNLESS OTHERWISE SPECIFIED
 DIM X.X ± .05 X.XXX ± .005
 X.XX ± .015 X.XXXX ±
 ANGULAR XX' - 5"
 XX' ± 1"
 FRACTIONAL: 1/64

REQ. ONE	NEXT ASSEM.	DWN. E.D.C.	DATE 1-2-90	TITLE TRAMP ASSY -
MAT. NOTED		CHKD.	SCALE	
H.T.	DATA EAST PINBALL, INC.			PART NO. 500-5245-00
FIN.	1990 JANICE AVE., MELROSE PARK, IL 60160			

CHECK POINT

535-5442-00
 626-5015-00 (375 FT.)
 626-5015-00 (.187 FT.)
 535-5139-00

75 FT.)



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.

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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.

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