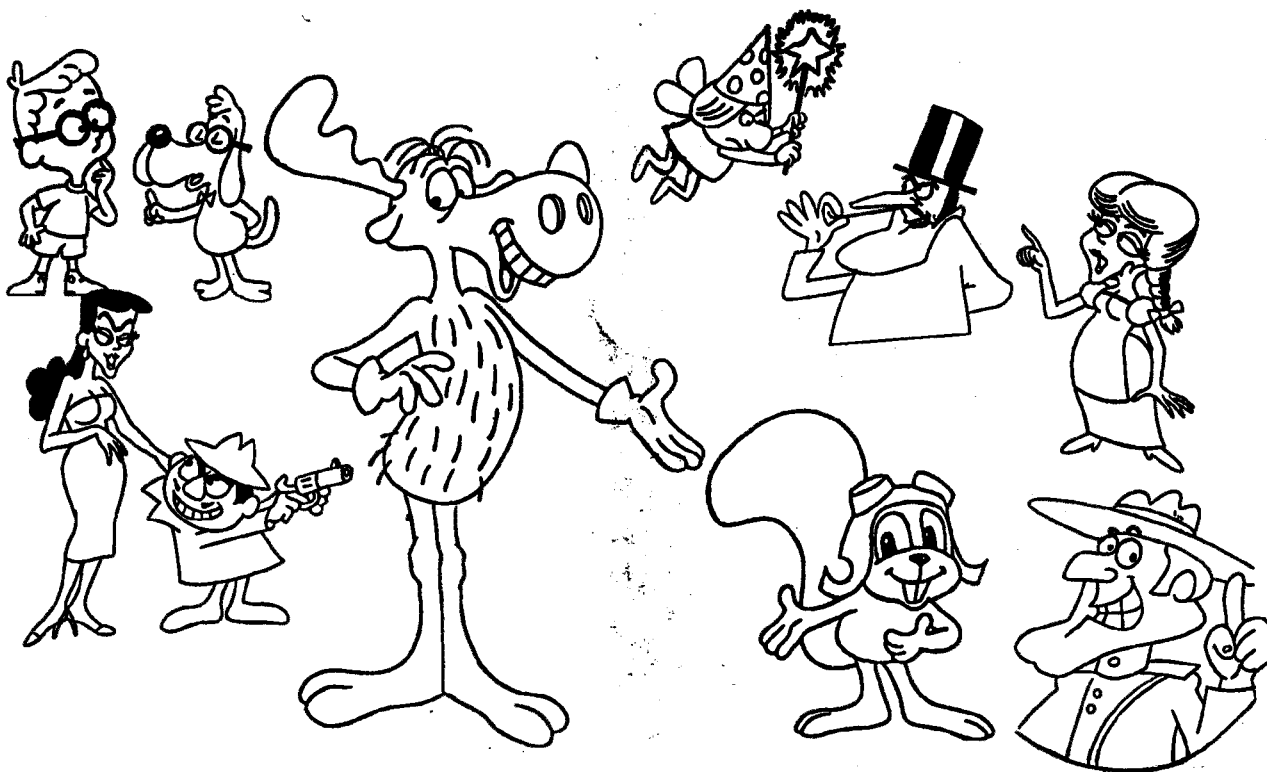


**DE** DATA  
EAST

The Adventures of  
**ROCKY**  
AND  
**BULLWINKLE**  
AND  
**FRIENDS™**



**DATA EAST PINBALL®**

1990 Janice Avenue  
Melrose Park, IL 60160  
708-345-7700  
FAX 708-345-7718  
**1-800-KICKERS**

## CPU JUMPER TABLE

| Game                     | CPU*    | ROM      | Jumpers                   |                        |
|--------------------------|---------|----------|---------------------------|------------------------|
|                          | Version | Location | Installed                 | Removed                |
| Time Machine             | Ver 2   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Playboy                  | Ver 2   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| ABC M.N. Football        | Ver 2   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Robocop                  | Ver 2   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Phantom of the Opera     | Ver 2   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Back to the Future       | Ver 3   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| The Simpsons             | Ver 3   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Checkpoint               | Ver 3   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Teen. Mut. Ninja Turtles | Ver 3   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Batman                   | Ver 3   | 5B,5C    | J1b,J3,J4,J5b,J6b,J7b,&J8 | J1a,J2,J5,J5a,J6a,&J7a |
| Star Trek                | Ver 3   | 5C       | J1b,J3,J5,J5b,J6b,J7b,&J8 | J1a,J2,J4,J5a,J6a,&J7a |
| Hook                     | Ver 3   | 5C       | J1b,J3,J5,J5b,J6b,J7b,&J8 | J1a,J2,J4,J5a,J6a,&J7a |
| Lethal Weapon 3          | Ver 3   | 5C       | J1b,J3,J5,J5b,J6b,J7b,&J8 | J1a,J2,J4,J5a,J6a,&J7a |
| Star Wars                | Ver 3   | 5C       | J1b,J3,J5,J5b,J6b,J7b,&J8 | J1a,J2,J4,J5a,J6a,&J7a |
| Rocky & Bullwinkle       | Ver 3   | 5C       | J1b,J3,J5,J5b,J6b,J7b,&J8 | J1a,J2,J4,J5a,J6a,&J7a |

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

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

### Power-up CPU Self Tests

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

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

#### PIA LED

Stays On  
Flashes 1 Time  
Flashes 2 Times  
Flashes 3 Times

#### SUSPECT COMPONENT

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

### QUICK REFERENCE FUSE CHART

#### PPB BOARD

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

#### POWER SUPPLY BOARD

F1 7A Slo-Blo +5VDC Regulator Input (9VAC)  
F2 7A Slo-Blo +5VDC Regulator Input (9VAC)  
F3 Not Used  
F4 8A Slo-Blo Switched Illumination Buss (18VDC)  
F5 5A Slo-Blo Solenoid Buss (34VDC)  
F6 5A Slo-Blo Solenoid Buss (34VDC)  
F7 0.5A Slo-Blo Display Reg. Input (90VAC)

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# GAME SPECIFICATIONS

## POWER REQUIREMENTS

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

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

**High Line:** (226 to 235 Vac)

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

## MAJOR ASSEMBLY AND FUSE LOCATIONS

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

## PROM SUMMARY

CPU Board: Location 5C

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

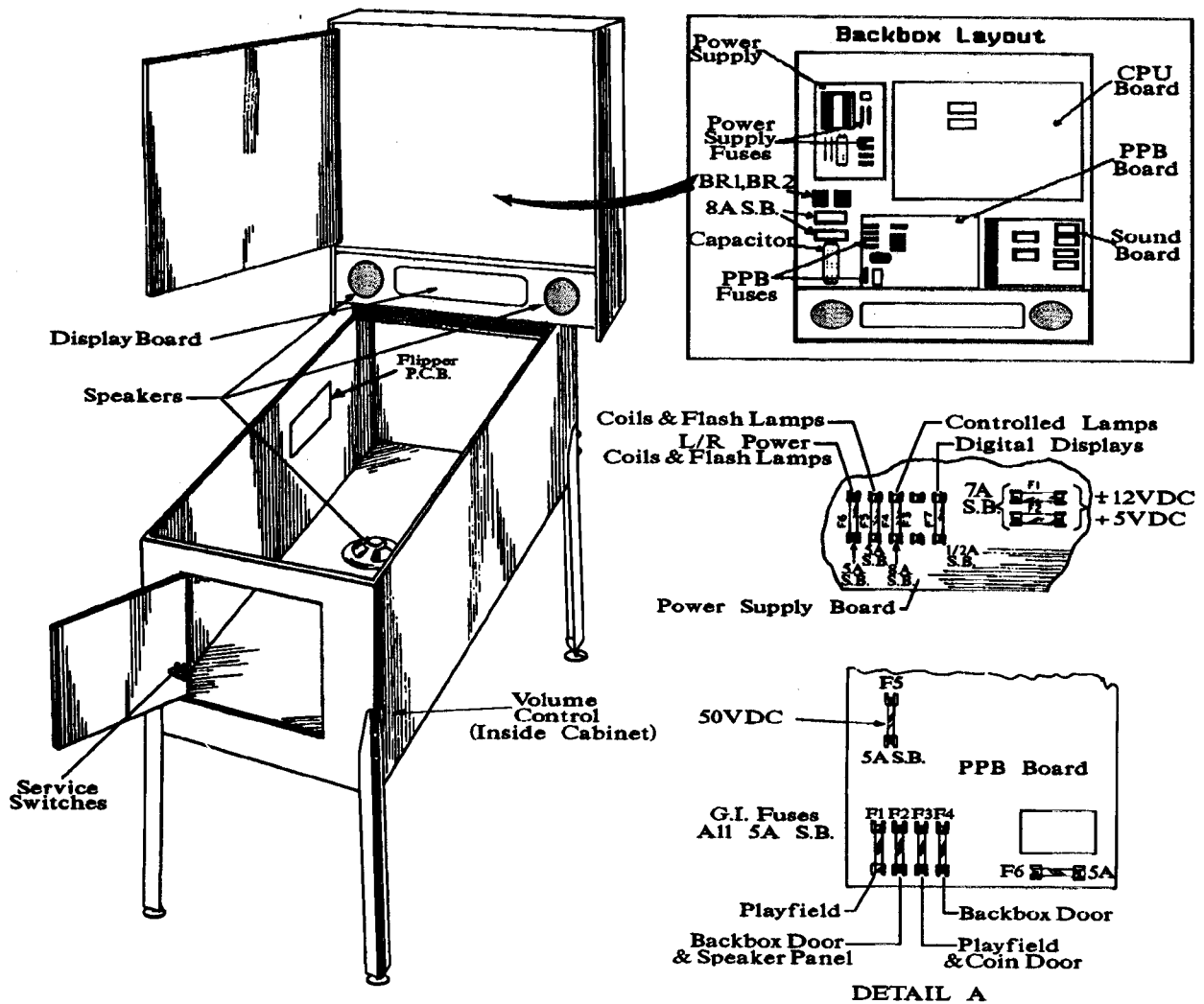
Display Controller Board: Locations U12 & U14

## 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 support it, by connecting the strap located in the left rear of the cabinet, to the eyebolt on the playfield. (Use the instruction sheet provided in the game to see alternative methods of accessing the playfield bottom.)
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 and using the 2 Way Level located beneath the pricing card on the bottom arch.

16. Using the 2 Way Level below the pricing card, adjust the pitch of the playfield to approximately 6.5 degrees.

### **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

## 1.) Laser Kick

The Laser Kick value is increased by rolling over flashing Return Lanes. Laser Kick is relit by shooting the right orbit a 1st time and collected by shooting the right orbit a 2nd time.

## 2.) HAT TRICK

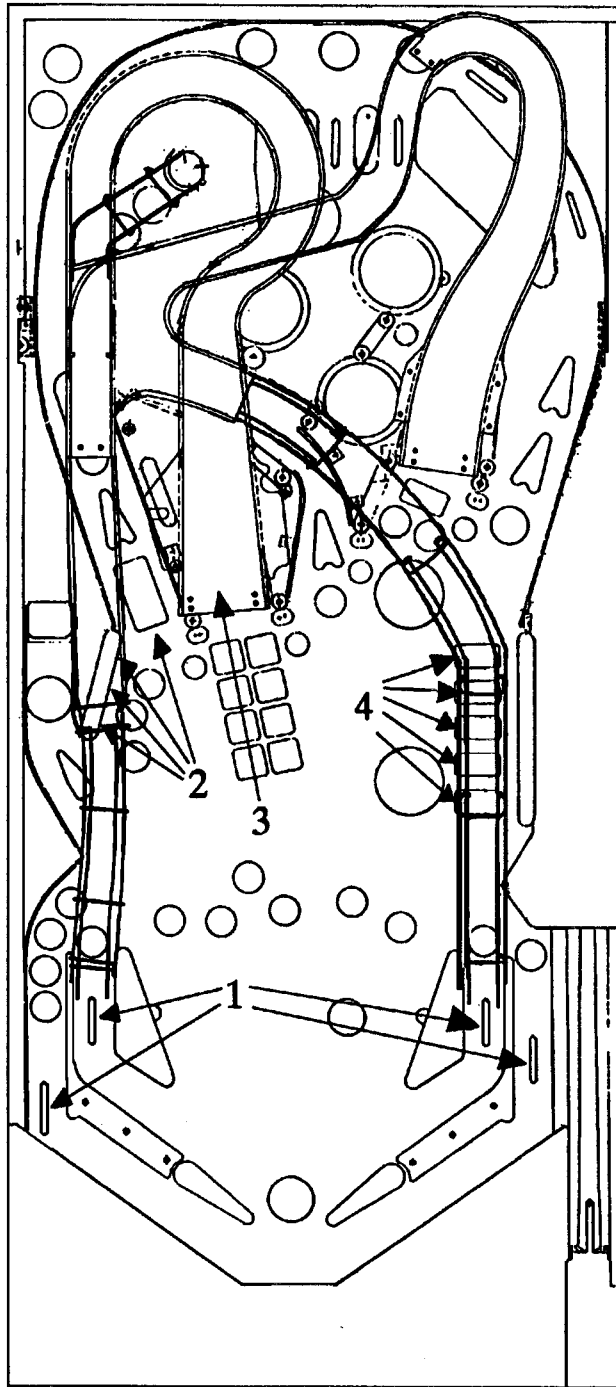
Shoot 3 Hat Targets to lite Hat Trick. Shooting left orbit into hole allows Bullwinkle to pull animals out of his hat.  
Rocky - Lites Extra Ball.  
Rhino- Starts Rhino Bonus Countdown.  
Lion - Start Jackpot.  
In Tri-ball Hat Trick starts and doubles Jackpot. Complete Hat Targets to award 3rd ball during Two Ball Play.

## 3.) BACK IN TIME

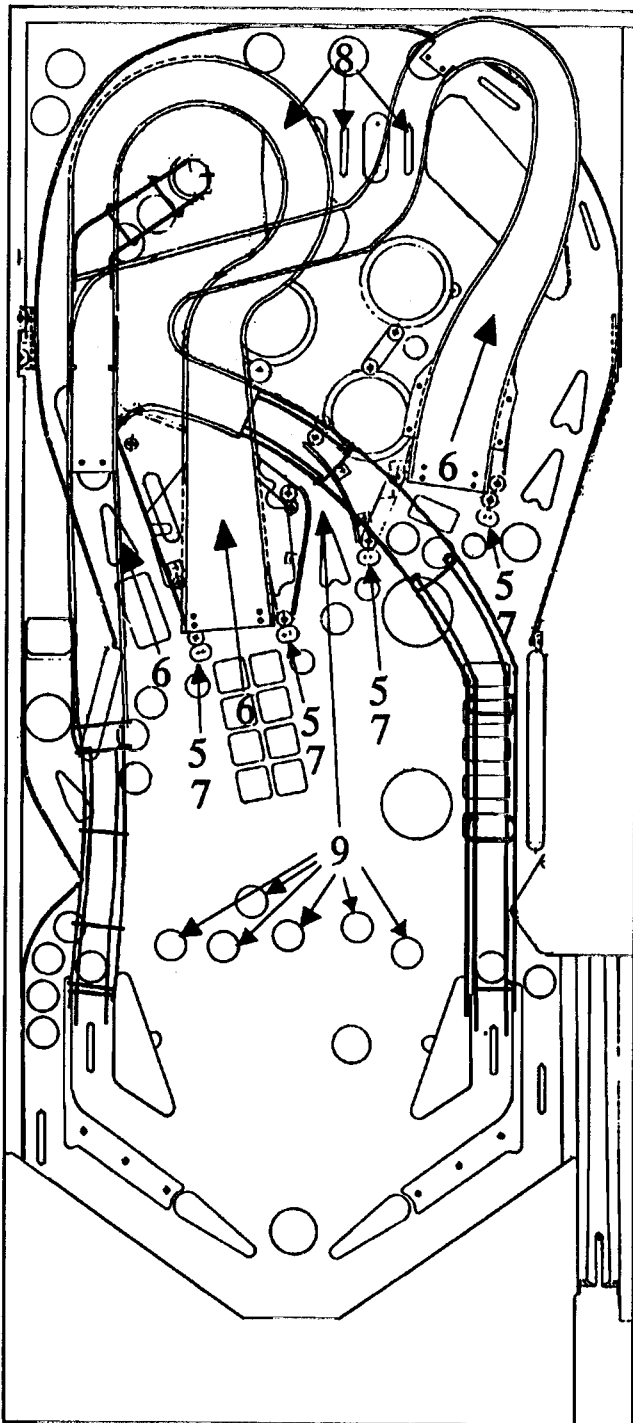
Shoot left ramp to collect flashing WABAC value. Collect all eight flashing values to start "Back In Time". Shoot left ramp to go back one century. The player will be prompted to enter initials for best time traveler.

## 4.) SAVE NELL

Completing Drop Targets advances value (5-4-3-2-1). When all lites are flashing Nell Timer begins. Hit Drop Targets to save Nell before time expires.







### **5.) TRI-BALL**

Complete colored pie by hitting consecutive B.O.M.B. Targets. Shooting Alternating ramps without missing, spots piece of pie. Shoot right ramp to start TRI-BALL.

### **6.) Jackpot**

Shoot "Hat Trick" during TRI-BALL to lite Jackpot on right ramp. Shooting Hat Trick while Jackpot is lit, will start Double Jackpot Timer. Shoot Right ramp to collect Jackpot. Left ramp increases Jackpot value by one Million for each ramp.

### **7.) Treasure Jackpot**

Complete colored pie during TRI-BALL to start Treasure Timer. Shoot right ramp for One Hundred Million points.

### **8.) Skill Shot**

Hit flashing Top Lane to collect value. Flippers change flashing lane.

### **9.) Mystery Moose Select**

Shooting left or right Orbit spots Daisy. Completing 6 Daisies lites center hole for Mystery Select. Select using left or right flipper. Super Mystery Moose Is lit by completing 12 Daisies then shooting center hole.

---

**10.) Looping**

---

Shooting left and right ramps increases Looping Award during timer.

---

**11.) Loose Moose**

---

All targets are worth 500k during timer.

---

**12.) Super Pops**

---

Each Bumper and Slingshot scores 500k per lit during timer. 10 pops advance to Duper Pops.

---

**13.) Duper Pops**

---

Each Bumper and Slingshot scores 1 Million per lit during timer. 10 pops advance to Super Duper Pops.

---

**14.) Super Duper Pops**

---

Each Bumper and Slingshot scores 2 Million during timer.

---

**15.) Spin And Win**

---

Shoot right ramp to collect Spinning value.

---

**16.) Puzzle**

---

Complete Puzzle Feature by shooting either left or center hole. Puzzles start Rocket Shots, Spin and Win, 2 Mil Drops, Special or Extra Ball.

---

**17.) Rocket Shots**

---

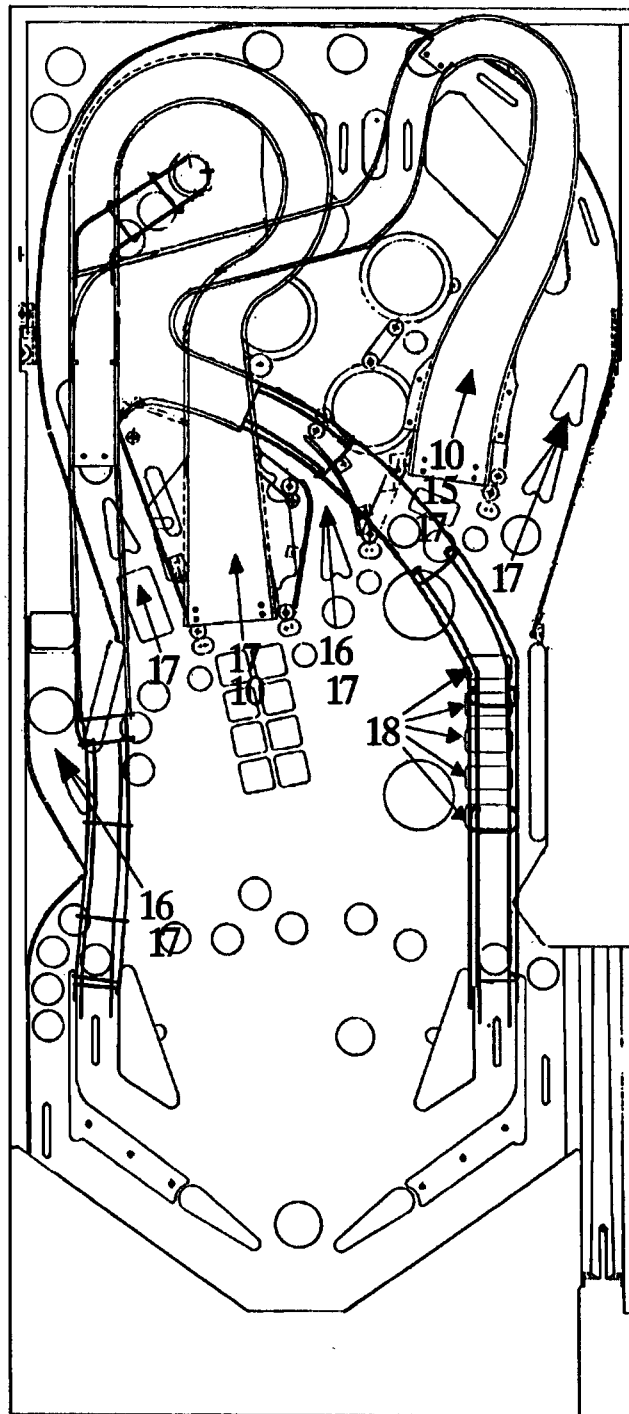
Ramps, holes, and Orbits score 5 Million during timer.

---

**18.) 2 Million Drops**

---

Each Drop Target is worth 2 Million during timer.



# AUDIT FUNCTIONS

## GENERAL

There are 99 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are nine most-used audits (1 through 9) in a 'quick look' group and 89 less-used audits (11 through 99), 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 top of the display, the *Description* is shown next and the *Audit Total* in the display. bottom 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 display indicates AUDITS & ADJUSTMENTS. 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 AUDIT 10, EXPAND AUDITS is displayed. Set the choice to YES as indicated in the lower display by depressing the Game Start push-button and then depress the step push-button. The request is installed and Audit 11 is displayed. When you exit audits and adjustments, the Audit 10 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 **ADJUSTMENT 11, AUDITS RESET**. Game adjustments (1 to 13 and 14 to 53) begin after the last audit function (10 or 99). 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** (AUDIT 1) - the total number of paid credits is displayed.

**Free Percent** (AUDIT 2) is Free Total (E AUDIT 24) divided by Plays Total (E AUDIT 25).

**Ball Time Average** (in seconds) (AUDIT 3) is Total Play Time divided by Total Balls Played (AUDIT10) .

**Average Game Time** (AUDIT 4) is the Average Game Time expressed in minutes and seconds.

**Coins** (AUDIT 5, 6, 7 and 8) - These four audit totals are provided to show the amount of coins registered for the left, right, center, and 4th coin chutes, respectively.

**Total Coins** (AUDIT 9) is the total number of coins dropped through all 4 coin chutes.

**Expand Audits** (AUDIT 10) permits viewing of expanded audits.

# Rocky & Bullwinkle

## Audit Table

| Audit Number | Audit Description          | Audit Number | Audit Description     |
|--------------|----------------------------|--------------|-----------------------|
|              | Rocky & Bullwinkle PROM ID |              |                       |
| 1            | Total Paid Credits         | 51           | Slam Tilts            |
| 2            | Free Game Percentage       | 52           | Special Lit           |
| 3            | Average Ball Time          | 53           | Extraball Lit         |
| 4            | Av Game Time               | 54           | Laser Kick Used       |
| 5            | Coins Left                 | 55           | Freeze Used           |
| 6            | Coins Right                | 56           | Victory Ramps Awarded |
| 7            | Coins Center               | 57           | # of 10X Made         |
| 8            | Coins 4th Chute            | 58           | # of Bonus Holds      |
| 9            | Total Coins                | 59           | Left Orbits           |
| 10           | Expand Audits (ON/OFF)     | 60           | Right Orbits          |
| 11           | Balls Total                | 61           | Left Ramp             |
| 12           | Extra Balls Total          | 62           | Right Ramp            |
| 13           | Extra Ball Percent         | 63           | TRIBALL Ready         |
| 14           | Replay 1 Awards            | 64           | TRIBALL Award         |
| 15           | Replay 2 Awards            | 65           | 2 Ball to 3 Ball      |
| 16           | Replay 3 Awards            | 66           | Rerace Award          |
| 17           | Replay 4 Awards            | 67           | Jackpot Lit           |
| 18           | Total Replays              | 68           | Jackpot Awards        |
| 19           | Replay Percent             | 69           | Double Jackpots       |
| 20           | Total Specials             | 70           | Start Treasure Pot    |
| 21           | Special Percent            | 71           | Award Treasure Pot    |
| 22           | Total Matches              | 72           | Super Pops            |
| 23           | Hi Score Wins              | 73           | Duper Pops            |
| 24           | High Score Percent         | 74           | Super Duper Pops      |
| 25           | Total Free Plays           | 75           | Got Level 1 Pick      |
| 26           | Total Games                | 76           | Got Level 2 Pick      |
| 27           | 0.0 - 9.9 Million          | 77           | Start Nell            |
| 28           | 10.0 - 24.9 Million        | 78           | Award Nell            |
| 29           | 25.0 - 49.9 Million        | 79           | Abridged Hat Trick    |
| 30           | 50.0 - 74.9 Million        | 80           | Start Lion Jackpot    |
| 31           | 75.0 - 99.9 Million        | 81           | Award Lion Jackpot    |
| 32           | Over 100 Million           | 82           | Start Rhino Jackpot   |
| 33           | Average Scores             | 83           | Award Rhino Jackpot   |
| 34           | Games 1Player              | 84           | Start Spin & Win      |
| 35           | Games 2Player              | 85           | Max Spin & Win        |
| 36           | Games 3Player              | 86           | Start Looping         |
| 37           | Games 4Player              | 87           | Max Loop Award        |
| 38           | Attract Minutes            | 88           | Start Fast Scoring    |
| 39           | Cycles H.S. Reset          | 89           | Max Fast Targets      |
| 40           | Coins No Credit            | 90           | Started Travel        |
| 41           | Service Credits            | 91           | Max Travel Loops      |
| 42           | Proprietary                | 92           | Start 2 M Drops       |
| 43           | Proprietary                | 93           | Max 2 M Drops         |
| 44           | Proprietary                | 94           | Start Rocket Shots    |
| 45           | Proprietary                | 95           | Max Rocket Shots      |
| 46           | Proprietary                | 96           | Fuse Lit              |
| 47           | Total Buyin Games          | 97           | Put Out Fuse          |
| 48           | Drains Left                | 98           | Puzzle Awarded        |
| 49           | Drains Center              | 99           | Full Hat Trick        |
| 50           | Drains Right               |              |                       |

## EXPANDED FUNCTIONS

**Balls Total** (Audit 11) is the total of regular and extra balls.

**Extra Balls Total** (Audit12) is the total number of extra balls awarded.

**Extra Ball Percentage** (Audit13) is Audit12 divided by Plays Total (Audit 26).

**Replay Awards** (Audit 14 through 17) provide the total awards (credit, extra ball, or audit) for replay levels 1 through 4, respectively.

**Total Replays** (Audit 18) is the total awards (credits, extra balls, or audit only) for exceeding replay score levels.

**Replay Percentage** (Audit 19) is the Replay Total awards for exceeding replay score levels (Audit 18) divided by Plays Total (Audit 26).

**Total Specials** (Audit 20) is the total awards (credits, extra balls, or scores) for making specials.

**Special Percentage** (Audit 21) is Special Total (Audit20) divided by Plays total (Audit 26).

**Total Matches** (Audit 22) 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 Adj. 14 if enabled.

**High Score Wins** (Audit 23) is the total credits awarded for exceeding the high-score-to-date scores.

**High Score Percentage** (Audit 24) is High Score Wins (Audit 23) divided by Plays Total (Audit 26).

**Total Free Plays** (Audit 25) is the total free credits for replays, high-score-to-date, specials, and match.

**Total Games** (Audit 26) is the sum of Total Paid Credits (Audit 1) and Free Total (Audit 25). Note that free credits are not recorded in the Audit until they are actually used.

**0.0- 9.9 Million** (Audit 27) provides the total number of games the Player's final score was between 0 and 9,999,990 points.

**10.0 - 24.9 Million** (Audit 28) provides the total number of games the Player's final score was between 10,000,000 and 24,999,990 points.

**25.0 - 49.9 Million** (Audit 29) provides the total number of games the Player's final score was between 25,000,000 and 49,999,990 points.

**50.0 - 74.9 Million** (Audit 30) provides the total number of games the Player's final score was between 50,000,000 and 74,999,990 points.

**75.0 - 99.9 Million** (Audit 31) provides the total number of games the Player's final score was between 75,000,000 and 99,999,990 points.

**Over 100 Million** (Audit 32) provides the total number of games the Player's final score was over 100,000,000 points.

**Average Scores** (Audit 33) provides the Average Score by adding the Final Score of each game to a table and dividing this sum by the Total Plays .

**Games - Player** (Audit 34 through 37) provide individual totals of 1- player, 2-player, 3-player, and 4-player games, respectively.

**Attract Minutes** (Audit 38) provides the number of minutes the game is in Attract Mode (Factory use).

**Cycles High Score Reset** (Audit 39) provides the number of times that the high score levels have been automatically reset (if enabled).

**Coin No Credit** (Audit 40) 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** (Audit 41) provides the total number of Service credits added to the game. *See Game Diagnostics on page 19 for instructions regarding entry of Service Credits.*

**Proprietary** (Audit 42 - Audit 46) provide information to the game designer to aid in design development. (Factory use only.)

**Total BuyIn Games** (Audit 47) provides the number of times a player utilized the Buy In Feature. (See E Ad 40)

**Drains Left** (Audit 48) provides the number of times the ball drained out the left drain.

**Drains Center** (Audit 49) provides the number of times the ball drained out the center drain.

**Drains Right** (Audit 50) provides the number of times the ball drained out the right drain.

**Slam Tilts** (Audit 51) provides the number of times the Slam Tilt switch was activated.

## **GAME SPECIFIC FUNCTIONS**

**Special Lit** (Audit 52) provides the total number of times the Special light was enabled.

**Extra Ball Lit** (Audit 53) provides the total number of times Extra Ball light skill shot was enabled.

**Laser Kick Used** (Audit 54) provides the number of times the Laser Kick returned a ball into play.

**Freeze Used** (Audit 55) provides the number of times the Freeze Feature was enabled.

**Victory Ramps Awarded** (Audit 56) provides the number of times the Victory Ramp was Awarded.

**# of 10X Made** (Audit 57) provides the number of times the 10X feature was enabled.

**# of Bonus Holds** (Audit 58) provides the number of times Bonus Hold was enabled.

**Left Orbits** (Audit 59) provides the total number of left orbits completed.

**Right Orbits** (Audit 60) provides the total number of right orbits completed.

**Left ramp** (Audit 61) provides the total number of left ramps completed.

**Right ramp** (Audit 62) provides the total number of right ramps completed.

**TRI-BALL Lit** (Audit 63) provides the number of times the TRI-BALL Feature was lit.

**TRI-BALL Award** (Audit 64) provides the number of times the TRI-BALL Feature was awarded.

**2 to 3 Ball** (Audit 65) provides the number of times the TRI-BALL Feature was re-enabled by completing the Hat Trick Targets while 2 balls are still in play.

**Rerace Award** (Audit 66) provides the number of times the Rerace Feature was awarded.

**Jackpot Lit** (Audit 67) provides the number of times the Jackpot Feature was lit.

**Jackpot Awards** (Audit 68) provides the number of times the Jackpot was awarded.

**Double Jackpots** (Audit 69) provides the number of times the Double Jackpot was awarded.

**Start Treasure Pot** (Audit 70) provides the number of times the 100 Million Treasure was enabled.

**Award Treasure Pot** (Audit 71) provides the number of times the 100 Million Treasure was achieved.

**Super Pops** (Audit 72) provides the number of times the Super Pops Feature was achieved.

**Duper Pops** (Audit 73) provides the number of times the Duper Pops Feature was achieved.

**Super Duper Pops** (Audit 74) provides the number of times the Super Duper Pops Feature was achieved.

**Got Level 1 Pick** (Audit75) provides the number of times that Level 1 was achieved by completing the letters in the word SELECT.

**Got Level 2 Pick** (Audit76) provides the number of times that Level 2 was achieved by completing the letters in the word SELECT.

**Start Nell** (Audit 77) provides the number of times that the Sawmill Feature was enabled.

**Award Nell** (Audit 78) provides the number of times that Nell was successfully saved on the Sawmill Feature.

**Abridged Hat Trick** (Audit 79) provides the number of times that the Hat Trick was completed without entering the Vertical Up Kicker.

**Start Lion Jackpot** (Audit 80) provides the number of times that the Lion Jackpot Feature was enabled.

**Award Lion Jackpot** (Audit 81) provides the number of times that the Lion Jackpot Feature was awarded.

**Start Rhino Jackpot** (Audit 82) provides the number of times that the Rhino Jackpot Feature was enabled.

**Award Rhino Bonus** (Audit 83) provides the number of times that the Rhino Bonus Feature was awarded.

**Start Spin & Win** (Audit 84) provides the number of times that the Spin & Win Feature was enabled.

**Max Spin & Win** (Audit 85) provides the maximum number of times that the Spin & Win Feature was completed.

**Start Looping** (Audit 86) provides the number of times that the Looping Feature was enabled.

**Max Loop Award** (Audit 87) provides the maximum number of times that the Looping Feature was completed.

**Start Fast Scoring** (Audit 88) provides the number of times that the Fast Scoring (Loose Moose) Feature was enabled.

**Max Fast Targets** (Audit 89) provides the maximum number of switches closed during the Fast Scoring Mode.

**Started Travel** (Audit 90) provides the number of times that the Back in Time Feature was enabled.

**Max Travel Loops** (Audit 91) provides the maximum number of Loops completed while the Back in Time Feature was enabled.

**Start 2M Drops** (Audit 92) provides the number of times that the 2 Million Drop Target Feature was enabled.

**Max 2M Drops** (Audit 93) provides the maximum number of Targets completed while the 2 Million Drop Target Feature was enabled.

**Start Rocket Shots** (Audit 94) provides the number of times that the Rocket Shots Feature was enabled.

**Max Rocket Shots** (Audit 95) provides the maximum number of holes, loops and ramps completed while the Rocket Shots Feature was enabled.

**Fuse Lit** (Audit 96) provides the number of times that the Fuse Feature is enabled on the display.

**Put Out Fuse (Audit 97)** provides the number of times that the Fuse was successfully extinguished by pressing the fire button.

**Puzzle Completed (Audit 98)** provides the number of times that the Display Puzzle was completed.

**Full Hat Trick (Audit 99)** provides the number of times that the VUK Hat Trick feature awarded the Lion Jackpot, Rhino Bonus or an Extra Ball for Rocky.



# GAME ADJUSTMENTS

## GENERAL

There are 53 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 top of the display, the *Description* is shown next, and the setting, in the bottom of the 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 AUDIT 1 and the FORWARD/REVERSE switch in the REVERSE (down) position, depress the STEP switch and ADJUSTMENT 53 is shown at the top of the display, FACTORY RESTORE is shown in the middle of the display, and NO is shown in the bottom of the display. With the audits displaying AUDIT 10 or 99) and the FORWARD/REVERSE switch in the FORWARD (up) position, depress the STEP switch and ADJUSTMENT 1 is shown in the top of the display, REPLAY/MANUAL is shown in the middle of the display, and the setting is shown in the bottom of the 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 display indicates 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 (Adjustment 1 through 6)

### ADJ.1 Replay Manual/Fixed

- **Manual:** Adjust for percentage of awards for replay levels (1% through 50%). Proceed to ADJ.02 and 03 for starting replay levels.
- **Fixed:** Lower the automatic value below 1% and Player 1 display indicates FIXED. Proceed to ADJ. 2 and 3 for fixed replay levels.

### ADJ. 2 Start Replay

- **Manual:** Adjust the starting Replay 1 setting to between 20,000,000 and 9,999,000,000.

### ADJ. 3 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 20,000,000 and 9,999,000,000. (Same as Start Replay)  
If ADJ. 3 is set for 2, adjust Replay 2 level to between 20,000,000 and 9,999,000,000.  
If ADJ. 3 is set for 3, adjust Replay 3 level to between 20,000,000 and 9,999,000,000.  
If ADJ. 3 is set for 4, adjust Replay 4 level to between 20,000,000 and 9,999,000,000.

## Rocky & Bullwinkle Game Adjustment Table

| Adjustment Number | Description           | Factory Setting |
|-------------------|-----------------------|-----------------|
| 1                 | Replay/Manual         | 10%             |
| 2                 | Start Replay          | 200,000,000     |
| 3                 | Levels Replay *       | 01              |
| 4                 | Game Awards           | CREDIT          |
| 5                 | Limit Freegame        | 03              |
| 6                 | Limit Extraball       | 03              |
| 7                 | Game Rules            | FACTORY         |
| 8                 | Game Price*           | USA2            |
| 9                 | Game Cleaned          | NO              |
| 10                | Coin Reset            | NO              |
| 11                | Audits Reset          | NO              |
| 12                | Restore Hi Scores     | NO              |
| 13                | Expand Adjustments    | NO              |
| 14                | Match Percent         | 08              |
| 15                | Balls Per Game        | 03              |
| 16                | Tilt Warnings         | 01              |
| 17                | Replay Boost          | NO              |
| 18                | Credits Limit         | 30              |
| 19                | High Scores Allowed   | YES             |
| 20                | Hiscore 1 Awards      | 03              |
| 21                | Hiscore 2 Awards      | 01              |
| 22                | Hiscore 3 Awards      | 00              |
| 23                | Hiscore 4 Awards      | 00              |
| 24                | Backup World Record   | 300,000,000     |
| 25                | Backup Hiscore 2      | 275,000,000     |
| 26                | Backup Hiscore 3      | 250,000,000     |
| 27                | Backup Hiscore 4      | 225,000,000     |
| 28                | Backup Hiscore 5      | 125,000,000     |
| 29                | Backup Hiscore 6      | 150,000,000     |
| 30                | Reset H.S.T.D. Every  | 700             |
| 31                | Clean Game Every      | 1500            |
| 32                | Free Play             | NO              |
| 33                | Custom Message        | ON              |
| 34                | Attract Mode Music    | ON              |
| 35                | Flash Lamps           | NORMAL          |
| 36                | Coils Pulse           | NORMAL          |
| 37                | Level Adjust By       | ANY             |
| 38                | Install Country       | USA             |
| 39                | Next Game Promo       | ON              |
| 40                | Buy In Allowed        | NO              |
| 41                | Restart Game          | NO              |
| 42                | Extra Ball Percentage | 25              |
| 43                | Background Volume     | 100             |
| 44                | Bill Validator        | NO              |
| 45                | Tournament Style      | NONE            |
| 46                | Learnt Style          | 50              |
| 47                | Trigger Enable        | YES             |
| 48                | Spot Bomb Style       | EASY            |
| 49                | Rerace Criterion      | HARD            |
| 50                | Jackpot Criterion     | EASY            |
| 51                | Any Drop Wins Nell    | YES             |
| 52                | Spot Nell Style       | FACTORY         |
| 53                | Factory Restore       | NO              |

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

**Adj. 4 Game Awards** Set for replays to award: **CREDIT, EXTRA BALL, NONE** or **SPECIAL** (when score threshold is achieved a playfield special is lit).

**Adj. 5 Limit FreeGame** - Adjust for the maximum number of free games that may be accumulated per game; 0 to 9.

**Adj. 6 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 (Adj. 7)

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.

**Adj. 07 Game Rules** - Set to **EXTRA EASY, EASY, FACTORY, HARD** or **EXTRA HARD**.  
(Note - Additional game features not variable by the Expanded Adjustments may also change using this setting.)

| Install Adjustment        | Adj. 7 Extra Easy | Adj. 7 Easy | Adj. 7 Factory | Adj. 7 Hard | Adj. 7 Extra Hard |
|---------------------------|-------------------|-------------|----------------|-------------|-------------------|
| Adj.48 Spot Bomb Style    | EASY              | EASY        | EASY           | FACTORY     | FACTORY           |
| Adj.49 Rerace Criterion   | EXEASY            | EXEASY      | HARD           | EXHARD      | EXHARD            |
| Adj.50 Jackpot Criterion  | EASY              | EASY        | EASY           | HARD        | HARD              |
| Adj.51 Any Drop Wins Nell | YES               | YES         | YES            | NO          | NO                |
| Adj.52 Spot Nell Style    | 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:

Adj. 1 Manual Replay = Fixed  
Adj. 2 Start Replay = 00  
Adj. 3 Levels Replay = None  
Adj. 4 Game Awards = None  
Adj. 5 Limit Freegame = 0

Adj. 6 Limit Extra Balls = 0  
Adj. 14 Match Percent = Off  
Adj. 20 World Record Awards=0  
Adj. 21-23 Todays 1-3 Awards= 0

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

Adj. 1 Manual Replay = 07%  
Adj. 2 Replay Start = 145,000,000  
Adj. 3 Replay Levels = 01  
Adj. 4 Game Awards = Credit  
Adj. 5 Limit Freegame = 3  
Adj. 6 Limit Extra Balls = 3

Adj. 14 Match Percent = 04  
Adj. 15 Balls/Game = 5  
Adj. 20 World Record Awards = 3  
Adj. 21 Todays 1 Award = 1  
Adj. 48 Spot BOMB Style = Factory  
Adj. 49 Rerace Criterion = Hard

Adj. 50 Jackpot Criterion = Hard  
Adj. 51 Any Drop Wins Nell = No  
Adj. 52 Spot Nell Style = Hard

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

Adj. 4 Game Awards = Extra Ball  
Adj. 5 Limit Freegame = 0  
Adj. 14 Match Percent = OFF

Adj. 19 Scores Highest = No  
Adj. 20 to 23 World Record & Todays High Awards = 0

## GAME PRICING (Adj. 8)

There are two methods available for coin switch programming; Standard and Custom. Standard pricing uses a single adjustment (Adj. 8) to select a pricing scheme shown in the **Standard /Custom Pricing Table**. Custom pricing is used to select additional pricing schemes defined by a Drop Down menu .

With Adj. 8 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 the 1st bonus credit(s); 00 to 99.

**Coin Switch Pulses Required for 2nd Bonus Credit**- Set the number of coin switch pulses required to award the 2nd bonus credit; 00 to 99.

**Credits awarded for 1st Bonus** - Set the number of credits awarded for achieving the first Bonus level; 00 to 99.

## CUSTOM PRICING TABLE

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

## STANDARD PRICING TABLE

| Adj. & Standard Pricing Select | Coin Mechs |            |            |      | Plays Per Coin                              |   |   |   |
|--------------------------------|------------|------------|------------|------|---|---|---|---|
|                                | Left 1st   | Center 2nd | Right 3rd  | 4th  | 1st   | 2nd   | 3rd   | 4th                                       |
| USA 1-1 Coin 1 Play            | 25¢        | \$1.00     | 25¢        |      | 1PLAY/1COIN                                 | 4PLAY/1COIN   | 1PLAY/1COIN                                 |   |
| USA 2-4 Coin 3 Play *          | 25¢        | \$1.00     | 25¢        |      | 1PLAY/2COIN<br>2PLAY/3COIN<br>3PLAY/4COIN   | 3PLAY/1COIN<br>6PLAY/2COIN<br>9PLAY/3COIN                 | 1PLAY/2COIN<br>2PLAY/3COIN<br>3PLAY/4COIN   |   |
| USA 3-2 Coin 1 Play            | 25¢        | \$1.00     | 25¢        |      | 1PLAY/2COIN                                 | 2PLAY/1COIN   | 1PLAY/2COIN                                 |   |
| USA 4-2 Coin 1 Play            | 25¢        |            | 25¢        |      |   | 1PLAY/2COIN For the 1st Play<br>1PLAY/1COIN during BUY-IN |   |   |
| USA 5-\$2.00 5 Plays           | 25¢        | \$1.00     | 25¢        |      | 1PLAY/2COIN<br>5PLAY/8COIN                  | 2PLAY/1COIN<br>5PLAY/2COIN                                | 1PLAY/2COIN<br>5PLAY/8COIN                  |   |
| USA 6- 50¢ - 3/\$1Bill         | 25¢        | \$1.00     | 25¢        |      | 1PLAY/2COIN<br>2PLAY/4COIN                  | 3PLAY/1COIN<br>6PLAY/2COIN                                | 1PLAY/2COIN<br>2PLAY/4COIN                  |   |
| USA 7-\$2.00 6 Plays           | 25¢        | \$1.00     | 25¢        |      | 1PLAY/2COIN<br>2PLAY/4COIN                  | 2PLAY/1COIN<br>6PLAY/2COIN                                | 1PLAY/2COIN<br>2PLAY/4COIN                  |   |
| Austria                        | 5 SCH      | 10 SCH     | 10 SCH     |      | 1PLAY/2COIN<br>2PLAY/3COIN<br>3PLAY/4COIN   | 1PLAY/1COIN<br>3PLAY/2COIN                                | 1PLAY/1COIN<br>3PLAY/2COIN                  |   |
| Australia                      | 20¢        | \$1.00     | \$2.00     |      | 1PLAY/5COIN                                 | 1PLAY/1COIN   | 2PLAY/1COIN                                 |   |
| Belgium                        | 5f         | 20f        | 50f        |      | 1PLAY/4COIN                                 | 1PLAY/1COIN   | 5PLAY/2COIN                                 |   |
| Canada                         | 25¢        | 25¢        | \$1.00     |      | 1PLAY/2COIN<br>2PLAY/3COIN<br>3PLAY/4COIN   | 1PLAY/2COIN<br>2PLAY/3COIN<br>3PLAY/4COIN                 |   |   |
| Denmark                        | 1Kr        | 5Kr        | 10Kr       | 20Kr | 1PLAY/3COIN                                 | 2PLAY/1COIN   | 4PLAY/1COIN                                 | 8PLAY/1COIN                               |
| French 1 *                     | 1f         | 5f         | 10f        | 20f  | 1PLAY/3COIN<br>2PLAY/5COIN<br>5PLAY/10COIN  | 2PLAY/1COIN<br>5PLAY/2COIN<br>11PLAY/4COIN                | 5PLAY/1COIN<br>11PLAY/2COIN                 | 11PLAY/1COIN                              |
| French 2                       | 1f         | 5f         | 10f        | 20f  | 1PLAY/5COIN<br>3PLAY/10COIN<br>7PLAY/20COIN | 1PLAY/1COIN<br>3PLAY/2COIN<br>7PLAY/4COIN                 | 3PLAY/1COIN<br>7PLAY/2COIN                  | 7PLAY/1COIN                               |
| French 3                       | 1f         | 5f         | 10f        | 20f  | 1PLAY/3COIN<br>2PLAY/5COIN<br>4PLAY/10COIN  | 2PLAY/1COIN<br>4PLAY/2COIN<br>9PLAY/4COIN                 | 4PLAY/1COIN<br>9PLAY/2COIN                  | 9PLAY/1COIN                               |
| German 1                       | 1 DM       | 2 DM       | 5 DM       |      | 1PLAY/1COIN<br>2PLAY/2COIN<br>3PLAY/3COIN   | 2PLAY/1COIN<br>4PLAY/2COIN<br>6PLAY/3COIN                 | 6PLAY/1COIN                                 |   |
| German 2                       | 1 DM       | 2 DM       | 5 DM       |      | 1PLAY/1COIN<br>2PLAY/2COIN<br>3PLAY/3COIN   | 2PLAY/1COIN<br>4PLAY/2COIN<br>6PLAY/3COIN                 | 7PLAY/1COIN<br>21PLAY/3COIN                 |   |
| German 3 *                     | 1 DM       | 2 DM       | 5 DM       |      | 1PLAY/2COIN<br>2PLAY/3COIN<br>3PLAY/4COIN   | 1PLAY/1COIN<br>3PLAY/2COIN<br>5PLAY/3COIN                 | 5PLAY/1COIN<br>10PLAY/2COIN<br>15PLAY/3COIN |   |
| Italy 1                        | 500L       |            | 500L       |      | 1PLAY/1COIN                                 |   | 1PLAY/1COIN                                 |   |
| Italy 2                        | 500L       |            | 500L       |      | 1PLAY/2COIN<br>3PLAY/4COIN                  |   | 1PLAY/2COIN<br>3PLAY/4COIN                  |   |
| Japan                          |            |            | 100¥       |      |   |   | 1PLAY/1COIN<br>3PLAY/2COIN                  |   |
| Korea                          | 100 Won    |            | 100 Won    |      | 1PLAY/1COIN                                 |   | 1PLAY/1COIN                                 |   |
| Netherland 1                   | 1 Guilder  | 1 Guilder  | 2.5Guilder |      | 1PLAY/1COIN                                 | 1PLAY/1COIN   | 3PLAY/1COIN                                 |   |
| Netherland 2                   | 1 Guilder  | 2.5Guilder | 5 Guilder  |      | 1PLAY/1COIN                                 | 3PLAY/1COIN   | 6PLAY/1COIN                                 |   |
| New Zealand 1                  | \$1.00     |            | \$2.00     |      | 1PLAY/1COIN                                 |   | 2PLAY/1COIN                                 |   |
| New Zealand 2                  | \$1.00     |            | \$2.00     |      | 1PLAY/1COIN                                 |   | 3PLAY/1COIN                                 |   |
| Spain                          | 100Pts     |            | 500Pts     |      | 1PLAY/1COIN                                 |   | 6PLAY/1COIN                                 |   |
| Sweden                         | 1 Skr      | 5 Skr      | 10 Skr     |      | 1PLAY/3COIN                                 | 2PLAY/1COIN   | 4PLAY/1COIN                                 |   |
| Swiss 1                        | 1 SFR      | 2 SFR      | 5 SFR      |      | 1PLAY/1COIN                                 | 2PLAY/1COIN   | 6PLAY/1COIN                                 |   |
| Swiss 2                        | 1 SFR      | 2 SFR      | 5 SFR      |      | 1PLAY/1COIN                                 | 3PLAY/1COIN   | 9PLAY/1COIN                                 |   |
| UK 1                           | 10P        | 50P        | £1         | 20P  | 1PLAY/5COIN<br>3PLAY/10COIN                 | 1PLAY/1COIN<br>3PLAY/2COIN                                | 3PLAY/1COIN                                 | 3PLAY/5COIN                               |
| UK 2                           | 10P        | 50P        | £1         | 20P  | 1PLAY/4COIN<br>2PLAY/8COIN<br>3PLAY/10COIN  | 1PLAY/1COIN<br>3PLAY/2COIN                                | 3PLAY/1COIN                                 | 1PLAY/2COIN<br>2PLAY/4COIN<br>3PLAY/5COIN |
| UK 3                           | 10P        | 50P        | £1         | 20P  | 1PLAY/5COIN<br>2PLAY/10COIN                 | 1PLAY/1COIN<br>2PLAY/2COIN                                | 2PLAY/1COIN                                 | 2PLAY/5COIN                               |
| Yugoslavia                     | 5 Dur      |            | 5 Dur      |      | 1PLAY/1COIN                                 |   | 1PLAY/1COIN                                 |   |

## **ADDITIONAL GENERIC FEATURES**

**Adj. 9 Game Cleaned** - When enabled (set to **YES**) the game cleaning counter will be reset to zero and Game Clean-Me message in Tech Alert will go out when STEP is depressed.(Also see Adj.31.)

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

**Adj. 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.

**Adj. 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 .

**Adj. 13 Expand Adjustments** - When set to **NO**, depressing the STEP push-button advances directly to Adj. 46, **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.

**Adj. 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.

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

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

**Adj. 17 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.

**Adj. 18 Credits Limit** - Adjust the maximum number of credits that may be posted; 4 to 50.

## **HIGH SCORE LEVELS (Adj. 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.

**Adj. 19 Hiscores Allowed** - Set to enable or disable the four high score levels; **YES** or **NO**.

**Adj. 20 World Record** - Adjust the number of credits awarded for exceeding level 1 (the highest of the four levels); 0 to 5.

**Adj. 21 Highscore 2 Award-** Adjust the number of credits awarded for exceeding level 1; 0 to 3.

**Adj. 22 Highscore 3 Award** - Adjust the number of credits awarded for exceeding level 2; 0 to 2.

**Adj. 23 Highscore 4 Award** - Adjust the number of credits awarded for exceeding level 3; 0 to 1.

**Adj. 24 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 Adj.30 (Factory Reset defaults to 7,500,000).

**Adj. 25 Backup Highscore 2** - Adjust the backup score level to which level 1 may be reset.

**Adj. 26 Backup Highscore 3-** Adjust the backup score level to which level 2 may be reset.

**Adj. 27 Backup Highscore 4-** Adjust the backup score level to which level 3 may be reset.

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

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

**Adj. 30 High Score Reset Every -** Adjust the number of games between automatic resets of high score levels to backup settings and ball time averager adjustments; 100 to 900 or OFF (no reset or adjustment).

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

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

**Adj. 33 Custom Message -** When desired, this function is used to establish a custom message periodically displayed during the attract mode. Set the feature to **CHANGE** using the Credit button and depress **STEP**. The letter **A** is indicated in the first position of the Player 1 display. Vary the letter by operating the left and right flippers. With the desired letter indicated, depress the **CREDIT** button to lock in the letter and advance to the next display character. Repeat this procedure until the desired message is indicated in the Player 1 and 2 displays. At this time, depress the **STEP** push-button switch to advance to Adj. 34.

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

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

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

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

**Adj. 38 Install Country-** Set to **USA**, **GERMAN**, **FRENCH**, **AUSTRIA**, **BELGIUM**, **SWISS** or **CANADA**. Determines the default settings for the respective country for game pricing etc.

**Adj. 53 Factory Restore-**Depressing **STEP** without changing the value shown in the Player 4 Display locks in any custom message set with Adj.33 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 (Adj. 39 TO Adj. 52)**

**Adj. 39 Next Game Promo-** Set to **ON** or **OFF**. When set to **ON**, the game, in attract mode will randomly display a short promotion for our next game. When set to **OFF**, the game in attract mode will not generate any sounds or graphics referring to the next game.

**Adj. 40 Buy In Allowed -** Set to **YES** or **NO**. When set to **YES**, the game will display a countdown timer at the end of each game allowing the player to "Buy in" most of the features accumulated during the previous game. When set to **NO**, none of the previous game features will be retained and no countdown timer will appear.

**Adj. 41 Game Restart -**Set to **YES** or **NO**. When set to **YES**, a new game may be started during any ball after the first ball is completed. (Note-Pressing start during the first ball will add additional players.) When set to **NO**, The game disables the start button after the first ball until the final ball is in play.

**Adj. 42 Extra Ball Percentage -**Set from **0** to **50**. Allows the operator to adjust how frequently the Extra Ball feature is made available to the player.

**Adj. 43 Background Volume -** Set to **0**, **25**, **50**, **75** or **100** percent. Allows the operator to adjust the background music volume independantly from the normal game sounds.

**Adj. 44 Bill Validator** - Set to YES or NO. When set to YES , the display, in game attract mode, will show an "Insert Bill Animation". When set to NO, the display, in game attract mode will show "Insert Coin Animation".

**Adj. 45 Tournament Style** - Set to NONE, PINBALL EXPO, IFPA-PAPA or HOME. This function determines the default conditions to quickly prepare a game for tournament play. When this setting is changed all audits will be reset and all adjustments will be initiated to the particular style selected. The game will then return to game over attract mode, as if a Factory Restore had been performed.

**NONE** - Same as a Factory Reset conditions.

**IFPA-PAPA** - Straight 50¢ play, no replay, no Extra Ball, no High Scores , 2 Tilt Warnings and No Match.

**PINBALL EXPO**- Same as IFPA-PAPA settings except Free Play is enabled.

**HOME**-Sets game for Free Play, extra ball play, no replay, 10% Match and Extra Ball percentage = 30%.

**Adj. 46 Learnit Style** - Set from 0 to 9,990 games in increments of 10. Determines how frequently the Manual Percentage adjustment evaluates whether or not to recommend a change to the score. When set to 0, a change may be recommended at the end of each game.

**Adj. 47 Trigger Enabled** - Set to YES or NO. When set to YES , the ball launch kicker will fire, during the Bomb Fuse animation, each time the launch button is pressed. When set to NO, the ball launch kicker will not operate during the Bomb Fuse animation.

**Adj. 48 Spot Bomb Style** -Set to EASY,FACTORY,or HARD. Determines how the ramps will spot the Targets that spell the word BOMB.

|                                  |                                  |             |
|----------------------------------|----------------------------------|-------------|
| <b>EASY</b>                      | <b>FACTORY</b>                   | <b>HARD</b> |
| 2 Alternate Ramps in<br>sequence | 3 Alternate Ramps in<br>sequence | Never       |

**Adj. 49 Rerace Criterion** -Set to EXEASY,EASY,FACTORY, HARD or EXHARD. Determines during TRI-BALL, when a drained ball will be kicked back into play.

|  |                                |                             |   |               |
|--|--------------------------------|-----------------------------|---|---------------|
| <b>EXEASY</b>  | <b>EASY</b>                    | <b>FACTORY</b>              | <b>HARD</b>   | <b>EXHARD</b> |
| If no Jackpot was<br>completed or<br>TRI-BALL time is low. | If no Jackpot was<br>completed | If TRI-BALL time is<br>low. | If no Jackpot was<br>completed and<br>TRI-BALL time is low. | Never         |

**Adj. 50 Jackpot Criterion** -Set to EASYor HARD. When set to EASY, the Hat Trick shot is enabled immediatly upon entering TRI-BALL. When set to HARD, the 3 Hat Trick Targets must be completed in TRI-BALL to enable the Hat Trick Shot. Completing the Hat Trick shot awards Jackpot.

**Adj. 51 Any Drop Wins Nell** - Set to YES or NO. When set to YES, striking any Drop Target saves Nell from the saw blade. When set to NO, all the Drop Targets must be completed to save Nell.

**Adj. 52 Spot Nell Style** -Set to EXEASY,EASY,FACTORY, HARD or EXHARD. Determines how many lamps are spotted at the beginning of the first ball. Each additional ball in play will spot an additional lamp if the Sawmill feature is not enabled.

|               |             |                |             |               |
|---------------|-------------|----------------|-------------|---------------|
| <b>EXEASY</b> | <b>EASY</b> | <b>FACTORY</b> | <b>HARD</b> | <b>EXHARD</b> |
| 4 Lamps       | 4 Lamps     | 3 Lamps        | 2 Lamps     | 1 Lamp        |



## GAME DIAGNOSTICS

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

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

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

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

**GRN=Green**  
**BLU=Blue**  
**VIO=Violet**  
**GRY=Grey**  
**WHT=White**

### ENTERING DIAGNOSTICS

With the game in the game-over mode, open the coin door and make sure that the FORWARD/REVERSE push-button switch is set to REVERSE (down) and depress the STEP push-button switch. The Player displays will show the tollfree Customer Service number 1-800-KICKERS, that is 1-800-542-5377 ( U.S. including Illinois) and the toll number (708) 345-7700 (Outside the United States). this indicates entry into game diagnostics.

### Service Credits

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

### Tech Alert

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

### Burn-In Minutes

Pressing the step button while in Tech Alert mode will step game into Burn-in Mode(Factory use). At this stage pressing the game start button will cause the game to exercize 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 Adj. 11 or a Factory Restore E Ad 43.

## 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<br>(Player 1 & 2)  | Sounds Produced   |
|--|---|
| LEFT SPEAKER<br>CENTER SPEAKER<br>RIGHT SPEAKER<br>VOICE ROM1 (Loc U17)<br>VOICE ROM2 (Loc U21)<br>MUSIC TEST (Sound ROM Loc U7) | Left Sine (Left Speaker Only)<br>Center Sine (All speakers)<br>Right Sine (Right Speaker Only)<br>"Hello there!"<br>"Oh ...Boy!"<br>Level 1 Through Level 3 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

The Digital display utilizes a Dot Matrix Display Control board mounted in piggyback fashion to the display driver Board. The purpose behind this board is to provide more information (32 X 128 Dots) to the operator as well as displaying graphics to the player.

The board is controlled by a 68B09E microprocessor and it's personality ROMs (Unique to the Game) . It receives Data, Reset & Clock information from the CPU Board via the ribbon cable and sends back multiple Status and Busy signals to the CPU . This is to insure synchronized communication between the CPU and the Display Controller board.

The Drivers for the rows and columns are provided on 4 surface mounted integrated circuits on the Display driver board.

### Automatic Test

To enter Display tests, operate the STEP push-button switch from the Sound Manual test. The displays will first illuminate one vertical column of dots in the Display. After a slight delay it will cycle one column from left to right. After a period of time, it will begin the Row test by lighting the top row of the display, then turning it off and illuminating the next row, until each row has been individually lit, while the other rows are off. The test will then turn all the dots in the display on except for one column. It will then cycle this blank column from left to right. After a period of time, it will begin the second Row test by blanking the top row of the display, then turning it on and blanking the next row, until each row has been individually blanked, while the other rows are on. 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 will then repeat these cycles again until advanced to the next test or until the power is removed. ( Please Note- these tests may be interrupted at any time by operating the STEP push-button switch to advance to the next test.)

### Laser Kick Test

This test provided to insure proper interaction between certain switches and their associated solenoids without entering game play. For example, by rolling the ball over the left outlane switch the Laser Kick should fire. If it kicks too early or too late, the switch actuator should be adjusted to compensate for this error. If it fails to fire, use the switch test or coil test to help determine the the cause of failure. Note: During this function, similar tests may be performed on Vertical Up Kickers or Saucers in the game.

# 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 Laser Kick 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.

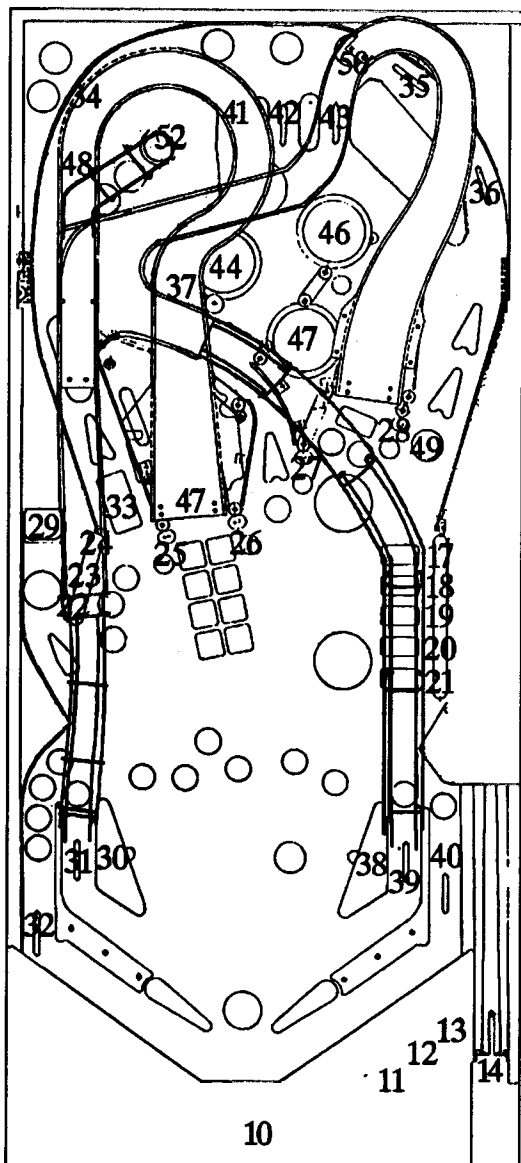
## SWITCH MATRIX CHART

| ROW \ COLUMN           | 1 Q55<br>GRN-BRN<br>CN8-1 | 2 Q54<br>GRN-RED<br>CN8-2 | 3 Q53<br>GRN-ORN<br>CN8-3   | 4 Q52<br>GRN-YEL<br>CN8-4    | 5 Q51<br>GRN-BLK<br>CN8-5   | 6 Q50<br>GRN-BLU<br>CN8-7    | 7 Q49<br>GRN-VIO<br>CN8-8 | 8 Q48<br>GRN-GRY<br>CN8-9 |
|------------------------|---------------------------|---------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|---------------------------|---------------------------|
| 1<br>WHT-BRN<br>CN10-9 | Plumb<br>Tilt 1           | Launch<br>Button 9        | #1<br>DropTar.<br>Top 17    | "B"<br>Stand-Up<br>Target 25 | Left<br>Orbit<br>Bottom 33  | Left<br>Top<br>Lane 41       | Right<br>Ramp<br>Entr. 49 | Not Used<br>57            |
| 2<br>WHT-RED<br>CN10-8 | 4th<br>Coin 2             | Outhole<br>10             | #2<br>DropTar.<br>18        | "0"<br>Stand-Up<br>Target 26 | Left<br>Orbit<br>Top 34     | Center<br>Top<br>Lane 42     | Right<br>Ramp<br>Exit 50  | Not Used<br>58            |
| 3<br>WHT-ORN<br>CN10-7 | Credit<br>Button 3        | Trough<br>#1<br>Left 11   | #3<br>DropTar.<br>19        | "M"<br>Stand-Up<br>Target 27 | Right<br>Orbit<br>Top 35    | Right<br>Top<br>Lane 43      | Not Used<br>51            | Not Used<br>59            |
| 4<br>WHT-YEL<br>CN10-6 | Right<br>Coin 4           | Trough<br>#2<br>Center 12 | #4<br>DropTar.<br>20        | "B"<br>Stand-Up<br>Target 28 | Right<br>Orbit<br>Bottom 36 | Left<br>Turbo<br>Bumper 44   | VUK<br>52                 | Not Used<br>60            |
| 5<br>WHT-GRN<br>CN10-5 | Center<br>Coin 5          | Trough<br>#3<br>Right 13  | #5<br>DropTar.<br>Bottom 21 | Super<br>VUK 29              | Under<br>Trough 37          | Center<br>Turbo<br>Bumper 45 | Not Used<br>53            | Not Used<br>61            |
| 6<br>WHT-BLU<br>CN10-3 | Left<br>Coin 6            | Shooter<br>Lane 14        | Hat<br>Target<br>Bottom 22  | Left<br>Slingshot<br>30      | Right<br>Slingshot<br>38    | Right<br>Turbo<br>Bumper 46  | Not Used<br>54            | Not Used<br>62            |
| 7<br>WHT-VIO<br>CN10-2 | Slam<br>Tilt 7            | Left<br>EOS 15            | Hat<br>Target<br>Middle 23  | Left<br>Return 31            | Right<br>Return 39          | Left<br>Ramp<br>Entr. 47     | Not Used<br>55            | Not Used<br>63            |
| 8<br>WHT-GRY<br>CN10-1 | Not Used<br>8             | Right<br>EOS 16           | Hat<br>Target<br>Top 24     | Left<br>Outlane<br>32        | Right<br>Outlane<br>40      | Left<br>Ramp<br>Exit 48      | Not Used<br>56            | Not Used<br>64            |

## Rocky & Bullwinkle - Switch Part Numbers

| Switch Number | Description   | Part No.    |
|---------------|---------------|-------------|
| 01*           | Plumb Tilt    | See Cabinet |
| 02*           | 4th Coin      | -           |
| 03*           | Credit Button | 500-5097-02 |
| 04*           | Right Coin    | 180-5024-00 |
| 05*           | Center Coin   | 180-5024-00 |
| 06*           | Left Coin     | 180-5024-00 |
| 07*           | Slam Tilt     | 180-5022-00 |
| 08            | Not Used      | -           |
| 09*           | Launch Button | 500-5410-02 |

| Switch Number | Description         | Part No.    |
|---------------|---------------------|-------------|
| 10            | Outhole             | 180-5011-00 |
| 11            | Left Trough         | 180-5009-00 |
| 12            | Center Trough       | 180-5009-00 |
| 13            | Right Trough        | 180-5010-00 |
| 14            | Shooter Lane        | 180-5100-01 |
| 15*           | Left Flip. Cab.     | 180-5048-01 |
| 16*           | Right Flip. Cab.    | 180-5048-01 |
| 17            | Drop Target Top     | 180-5092-01 |
| 18            | Drop Target Top/Mid | 180-5092-01 |
| 19            | Drop Target Middle  | 180-5092-01 |
| 20            | Drop Target Bot/Mid | 180-5092-01 |
| 21            | Drop Target Bottom  | 180-5092-01 |
| 22            | Hat Target Bottom   | 500-5640-36 |
| 23            | Hat Target Middle   | 500-5640-36 |
| 24            | Hat Target Top      | 500-5640-36 |
| 25            | Small Target "B"    | 500-5607-05 |
| 26            | Small Target "O"    | 500-5607-06 |
| 27            | Small Target "M"    | 500-5607-02 |
| 28            | Small Target "B"    | 500-5607-04 |
| 29            | Super VUK           | 180-5064-00 |
| 30            | Left Slingshot      | 180-5054-00 |
| 31            | Left Return Lane    | 500-5142-00 |
| 32            | Left Outlane        | 500-5142-00 |
| 33            | Left Orbit Bottom   | 180-5090-00 |
| 34            | Left Orbit Top      | 500-5142-00 |
| 35            | Right Orbit Top     | 500-5142-00 |
| 36            | Right Orbit Bottom  | 500-5142-00 |
| 37            | Under Trough        | 500-5633-00 |
| 38            | Right Slingshot     | 180-5054-00 |
| 39            | Right Return Lane   | 500-5142-00 |
| 40            | Right Outlane       | 500-5142-00 |
| 41            | Left Top Lane       | 500-5142-00 |
| 42            | Center Top Lane     | 500-5142-00 |
| 43            | Right Top Lane      | 500-5142-00 |
| 44            | Left Turbo Bumper   | 180-5015-00 |
| 45            | Center Turbo Bumper | 180-5015-00 |
| 46            | Right Turbo Bumper  | 180-5015-00 |
| 47            | Left Ramp Enter     | 500-5382-00 |
| 48            | Left Ramp Exit      | 500-5633-00 |
| 49            | Right Ramp Enter    | 500-5382-00 |
| 50            | Right Ramp Exit     | 500-5633-00 |
| 51            | Not Used            | -           |
| 52            | VUK                 | 180-5063-00 |
| 53            | Not Used Through 64 | -           |



**Switch Locations**

\* Indicates Cabinet Switches

## LAMP TESTS

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

### All Lamps

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

### Lamp Returns

From the ALL LAMPS test, depress the STEP push-button switch. The top display indicates LAMP RETURNS and the Bottom display indicates wire color and the LAMP RETURN driver transistor. All controlled lamps in row 1 should be lit. Operating the Game Start push-button switch cycles through each of the rows separately.

### Lamp Drives

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

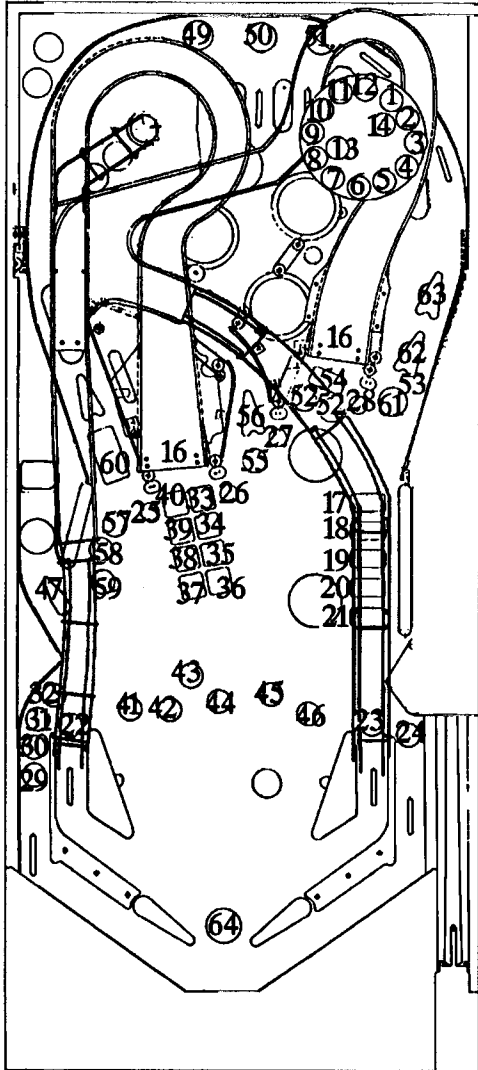
### Single Lamp

From the LAMP DRIVES test, depress the STEP push-button switch. The top display indicates lamp name. The bottom display indicates the row and column wire colors and the lamp matrix number. Lamp 01 should light. With the FORWARD/REVERSE push-button switch in the FORWARD (up) position, operating the Game Start push-button switch selects higher-numbered lamps; with it in the REVERSE (down) position, Game Start selects lower-numbered lamps.

## LAMP MATRIX CHART

| COLUMN<br>ROW             | 1 Q71<br>YEL-BRN<br>CN7-1 | 2 Q70<br>YEL-RED<br>CN7-2 | 3 Q69<br>YEL-ORN<br>CN7-3 | 4 Q68<br>YEL-BLK<br>CN7-4 | 5 Q67<br>YEL-GRN<br>CN7-6 | 6 Q66<br>YEL-BLU<br>CN7-7 | 7 Q65<br>YEL-VIO<br>CN7-8 | 8 Q64<br>YEL-GRY<br>CN7-9 |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| 1 Q72<br>RED-BRN<br>CN6-1 | Top Blue 1                | Top Red 9                 | Drop Target 1 17          | B Light 25                | WABAC ??? 33              | Daisy S 41                | Left Top Lane 49          | Top Hat Target 57         |
| 2 Q73<br>RED-BLK<br>CN6-2 | Middle Blue 2             | Bottom Green 10           | Drop Target 2 18          | O Light 26                | Looping 34                | Daisy E 42                | Center Top Lane 50        | Middle Hat Target 58      |
| 3 Q74<br>RED-ORN<br>CN6-3 | Bottom Blue 3             | Middle Green 11           | Drop Target 3 19          | M Light 27                | Instant TRI-BALL 35       | Daisy L 43                | Right Top Lane 51         | Bottom Hat Target 59      |
| 4 Q75<br>RED-YEL<br>CN6-5 | Top Yellow 4              | Top Green 12              | Drop Target 4 20          | B Light 28                | 10 Million 36             | Daisy E 44                | TRI-BALL 52               | Hat Trick 60              |
| 5 Q76<br>RED-GRN<br>CN6-6 | Middle Yellow 5           | Pie TRI-BALL 13           | Drop Target 5 21          | Laser Kick 1 Mil 29       | Lite Mystery Select 37    | Daisy C 45                | Right Ramp Entr. 53       | Rhino Bonus 61            |
| 6 Q77<br>RED-BLU<br>CN6-7 | Bottom Yellow 6           | Spin & Win 14             | Left Return Lane 22       | Laser Kick 3 Mil 30       | Loose Moose 38            | Daisy T 46                | Jackpot 54                | Lite Laser Kick 62        |
| 7 Q78<br>RED-VIO<br>CN6-8 | Bottom Red 7              | Credit Button 15          | Right Return Lane 23      | Laser Kick 5 Mil. 31      | Bomb Millions 39          | Extra Ball 47             | Lite WABAC 55             | Special 63                |
| 8 Q79<br>RED-GRY<br>CN6-9 | Middle Red 8              | Left Ramp Entr. 16        | Right Outlane 24          | Advance X 32              | Super Pops 40             | Launch Button 48          | Mystery Select 56         | Shoot Again 64            |

| Lamp Number | Description   |
|-------------|---------------|
| 01          | Top Blue      |
| 02          | Middle Blue   |
| 03          | Bottom Blue   |
| 04          | Top Yellow    |
| 05          | Middle Yellow |
| 06          | Bottom Yellow |
| 07          | Bottom Red    |
| 08          | Middle Red    |
| 09          | Top Red       |
| 10          | Bottom Green  |
| 11          | Middle Green  |



Lamp Locations

- 12 Top Green
- 13 Pie TRI-BALL
- 14 Spin & Win
- 15 Credit Button
- 16 Left Ramp Entrance
- 17 Drop Target 1
- 18 Drop Target 2
- 19 Drop Target 3
- 20 Drop Target 4
- 21 Drop Target 5
- 22 Left Return Lane
- 23 Right Return Lane
- 24 Right Outlane
- 25 BOMB Light
- 26 BOMB Light
- 27 BOMB Light
- 28 BOMB Light
- 29 Laser Kick 1 Mil
- 30 Laser Kick 3 Mil
- 31 Laser Kick 5 Mil
- 32 Advance X
- 33 WABAC ???
- 34 Looping
- 35 Instant TRI-BALL
- 36 10 Million
- 37 Lite Mystery Select
- 38 Loose Moose
- 39 Bomb Millions
- 40 Super Pops
- 41 Daisy SELECT
- 42 Daisy SELECT
- 43 Daisy SELECT
- 44 Daisy SELECT
- 45 Daisy SELECT
- 46 Daisy SELECT
- 47 Extra Ball
- 48 Launch Button
- 49 Left Top Lane
- 50 Center Top Lane
- 51 Right Top Lane
- 52 TRI-BALL
- 53 Right Ramp Entrance
- 54 Jackpot
- 55 Lite WABAC
- 56 Mystery Select
- 57 Top Hat Target
- 58 Middle Hat Target
- 59 Bottom Hat Target
- 60 Hat Trick
- 61 Rhino Bonus
- 62 Lite Laser Kick
- 63 Special
- 64 Shoot Again

# FLASH LAMP / COIL TESTS

Twenty-Two regular (pulsed under microprocessor control) coil drivers are provided to switch ground to coils. The Left/Right relay is used in conjunction with drives 1 through 8 to switch +32 volts between coils or flash lamps; these sets are termed "left" and "right". This relay is located on the PPB board which provides isolation diodes and current limiting resistors. This effectively provides 29 regular coils.

## Flash Lamp

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

## Automatic Test

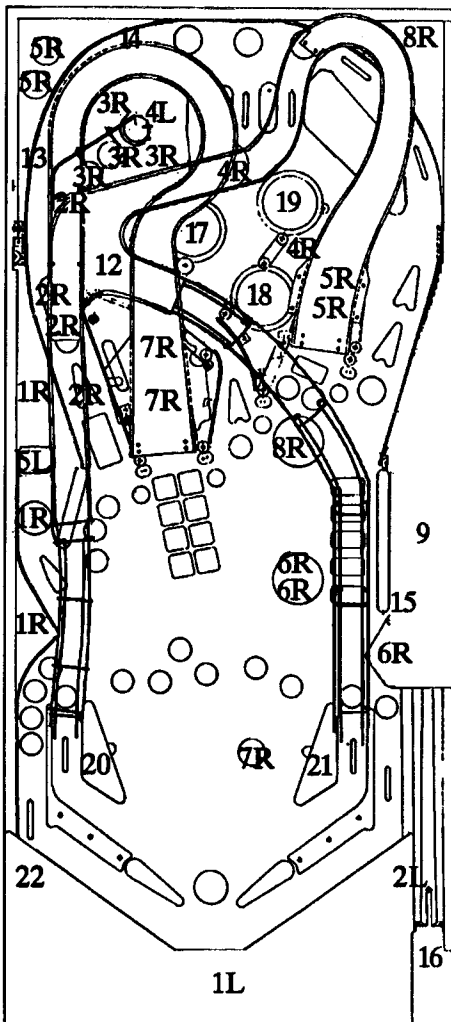
From the Flash Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate ALL COILS. The test pulses each regular solenoid or flash lamp sequentially with the coil/flash lamp name indicated in the Player 1 and 2 displays and the wire colors in the Player 3 and 4 displays.

## Select Coil

From the Coil Test, depress the STEP push-button switch. Player 1 and 2 displays indicate SELECT COIL and then the name of 1st drive, the wire colors are indicated in the Player 3 and 4 displays. Operate either Flipper push-button switch to select the coil or flash lamp to be tested. With the desired drive number indicated in the Player 4 display, depress the START push-button switch to cause it to be pulsed repeatedly.

## RETURN TO GAME OVER

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

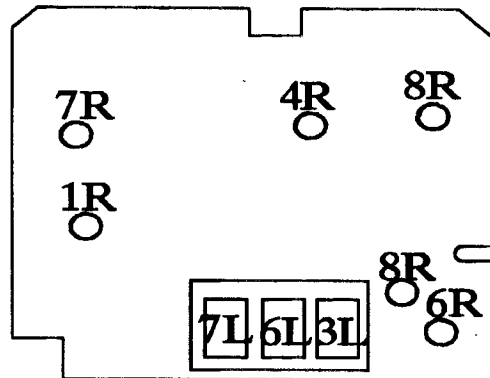


### CPU Controlled Auxillary Solenoids

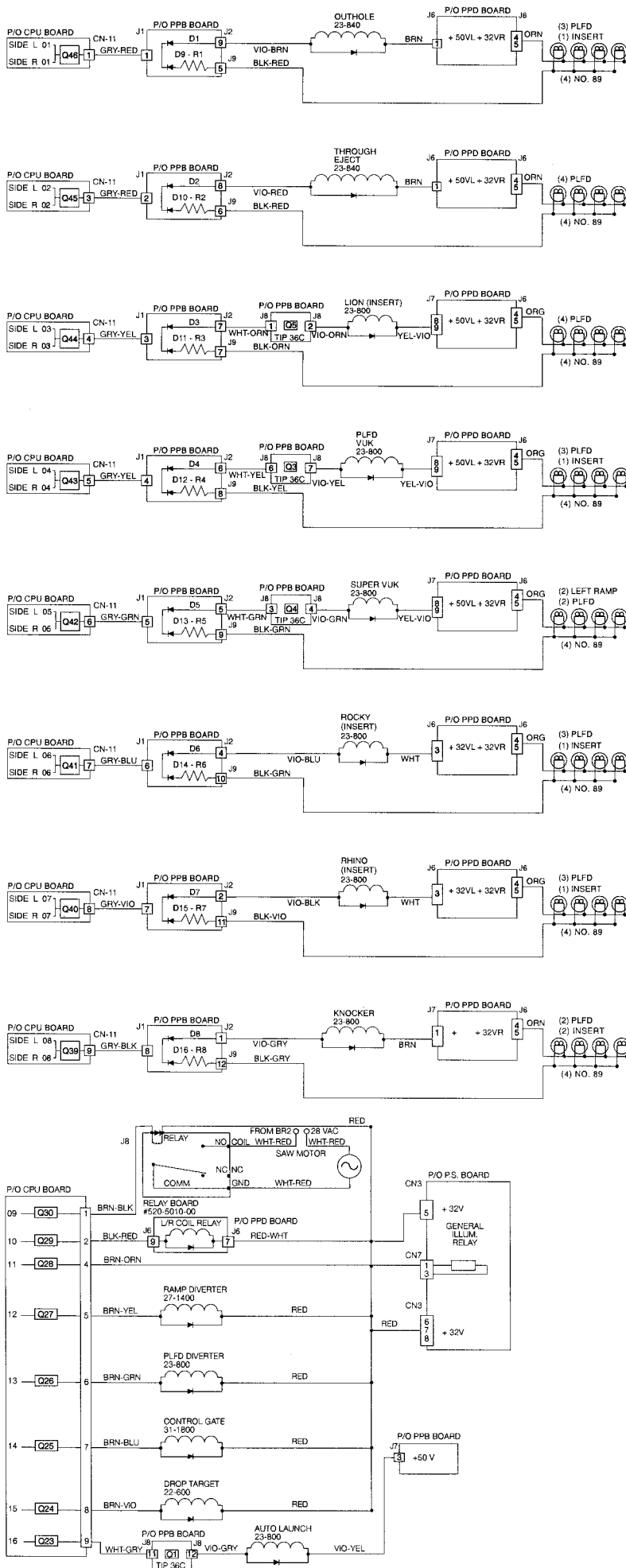
| Coil Number | Coil Description           | Control Line (CPU to Coil) | Power Line (PS to Coil) | Drive Transistor | Coil Type |
|-------------|----------------------------|----------------------------|-------------------------|------------------|-----------|
| 17          | Left Turbo Bumper          | BLU-BRN<br>CPU CN19-7      | RED<br>PS CN3-6         | Q11              | 23-800    |
| 18          | Center Turbo Bumper        | BLU-RED<br>CPU CN19-4      | RED<br>PS CN3-6         | Q9               | 23-800    |
| 19          | Right Turbo Bumper         | BLU-ORN<br>CPU CN19-3      | RED<br>PS CN3-6         | Q8               | 23-800    |
| 20          | Left Slingshot             | BLU-YEL<br>CPU CN19-6      | RED<br>PS CN3-6         | Q10              | 23-800    |
| 21          | Right Slingshot            | BLU-GRN<br>CPU CN19-8      | RED<br>PS CN3-6         | Q12              | 23-800    |
| 22          | Laser Kick (See Schematic) | BLU-BLK<br>CPU CN19-9      | VIO-YEL<br>PPB J7-3     | Q13              | 23-800    |

### Flipper Solenoids

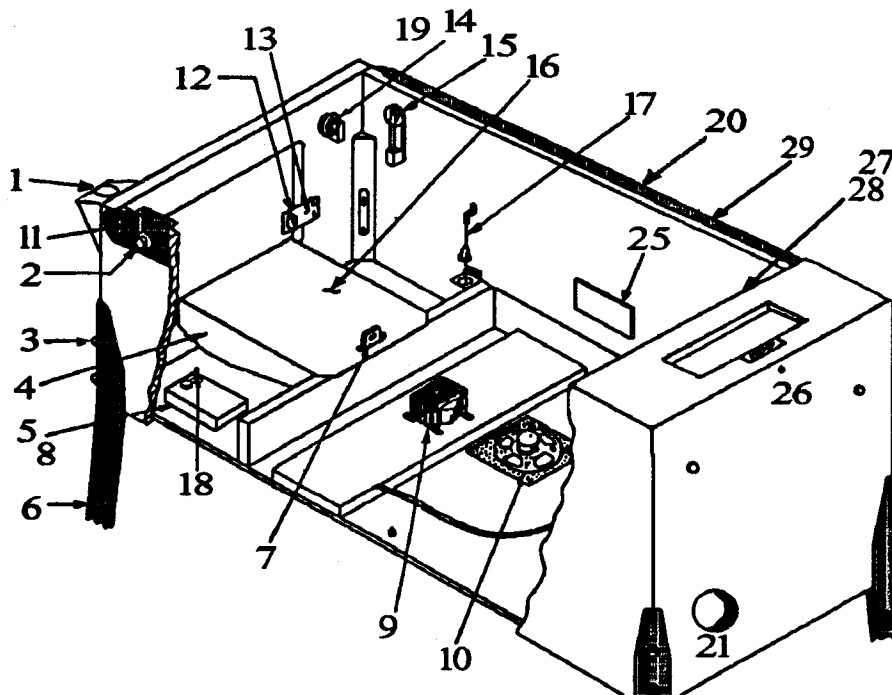
| Coil Description          | Flipper GND CPU to Coil | Flipper GND Sw. to Flip.PCB | Power Lines FlipPc toCoil | Coil Type | Power Input To Flip PCB |
|---------------------------|-------------------------|-----------------------------|---------------------------|-----------|-------------------------|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





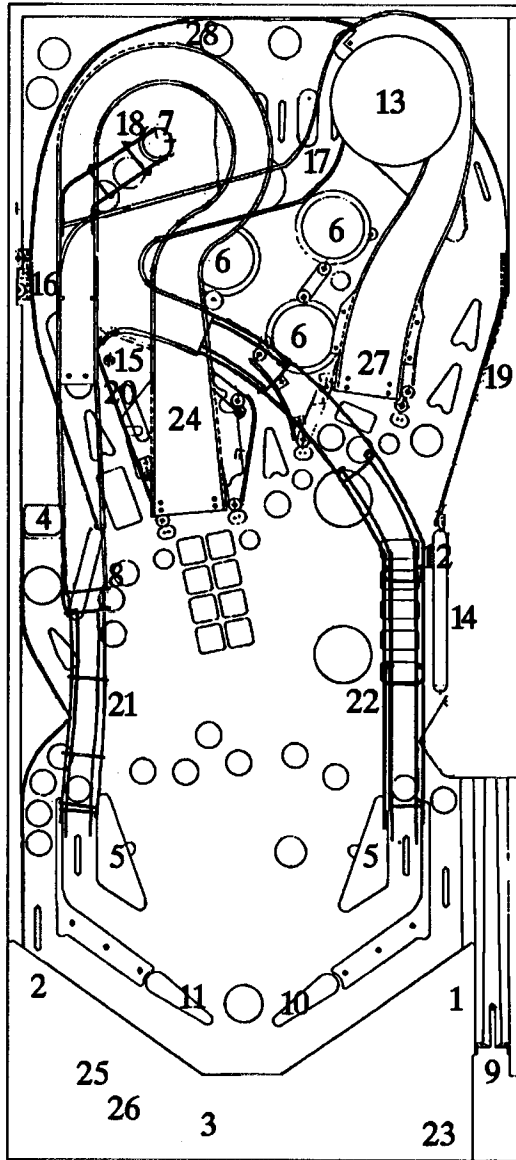


# CABINET PARTS ILLUSTRATION



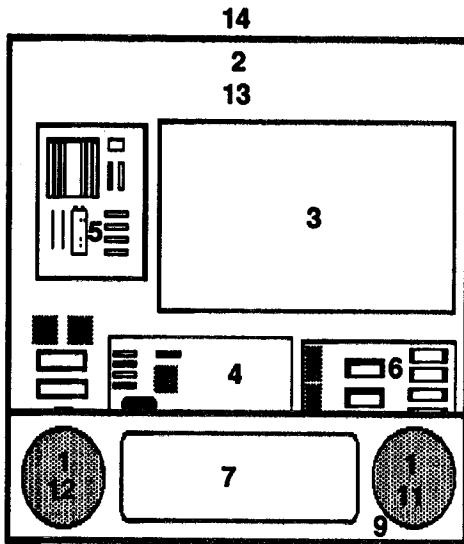
| Item | Description                                | Part No.    |
|------|--|-------------|
| 1    | Push Button Assy.                          | 500-5410-01 |
| 2    | Flipper Button                             | 500-5026-38 |
| 3    | Leg Bolt (Black)                           | 231-5000-01 |
| 4    | 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 |
| 9    | Transformer                                | 010-5003-00 |
| 10   | Speaker-Round (8")                         | 031-5005-00 |
| 11   | Side Armor-Right                           | 535-5010-31 |
| 12   | Memory Protect Switch                      | 180-5000-00 |
| 13   | Memory Protect Switch Bracket              | 535-6409-00 |
| 14   | Start Switch                               | 180-0028-00 |
| 15   | Flipper Leaf Switch                        | 180-5048-01 |
| 16   | Cash Box Top                               | 535-5013-03 |
| 17   | Plumb Bob Tilt Assembly                    | 500-5023-00 |
| 18   | Volume Control                             | 123-5000-00 |
| 19   | Playfield Glass (Tempered) *               | 660-5001-00 |
| 20   | Side Armor -Left                           | 535-5010-32 |
| 21   | Recessed cup for Line cord                 | 545-5122-00 |
| 22   | Service Switch (Not Shown)                 | 180-5012-00 |
| 23   | Front Molding Lockdown Assy.*              | 500-5020-00 |
| 24   | Front Molding -Black *                     | 500-5021-10 |
| 25   | S.S.Flipper P.C.B.                         | 520-5033-02 |
| 26   | Roto Lock Bottom                           | 355-5006-01 |
| 27   | Rear Plastic Extrusion for Playfield Glass | 545-5038-00 |
| 28   | Mounting Foam for Extrusion                | 626-5004-00 |
| 29   | Plastic Channel (Right & Left)             | 545-5017-00 |
| 30   | Backbox Hinge Left *                       | 535-6172-00 |
| 31   | Backbox Hinge Right *                      | 535-6172-01 |
| 32   | Leg Leveler *                              | 500-5017-00 |
| 33   | Coin Door with Validator Blank*            | 500-5018-17 |

## Playfield - Major Assemblies



| Item | Description                  | Part No.    |
|------|------------------------------|-------------|
| 1.   | Ball Feed Assy(Trough Eject) | 500-5012-01 |
| 2.   | Kick Back Assembly           | 500-5080-00 |
| 3.   | Outhole Assy.                | 500-5082-00 |
| 4.   | Super VUK                    | 500-5116-04 |
| 5.   | Sling Shot Assy              | 500-5226-00 |
| 6.   | Turbo Bumper Assy.           | 500-5227-00 |
| 7.   | Vertical Up Kicker           | 500-5326-00 |
| 8.   | 3 Bank Standup               | 500-5384-01 |
| 9.   | Ball Launch Assy.            | 500-5477-01 |
| 10.  | Flipper Assy. Right          | 500-5606-75 |
| 11.  | Flipper Assy Left            | 500-5606-76 |
| 12.  | 5 Bank Drop Target Assy      | 500-5621-05 |
| 13.  | Clock Assembly               | 500-5627-00 |
| 14.  | Nell's Log Assembly          | 500-5638-00 |
| 15.  | Diverter Assembly            | 515-5704-00 |
| 16.  | Diverter Assembly            | 515-5733-01 |
| 17.  | Ball Return Ramp             | 500-5634-00 |
| 18.  | VUK Ramp                     | 535-6363-00 |
| 19.  | Shooter Lane Ramp            | 535-6391-00 |
| 20.  | Underchute Ramp              | 535-6407-00 |
| 21.  | Wire Ramp (Left)             | 535-6416-00 |
| 22.  | Wire Ramp (Right)            | 535-6417-00 |
| 23.  | Bottom Arch Assy.            | 545-5302-04 |
| 24.  | WABAC Ramp (Plastic )        | 500-5632-00 |
| 25.  | Level (Horizontal)           | 670-5000-00 |
| 26.  | Level (Vertical)             | 670-5001-00 |
| 27.  | Ball Entrance Ramp           | 500-5637-00 |
| 28.  | Gate Lift Coil               | 515-5711-00 |

Individual part breakdowns for most of these assemblies can be found on pages 34 through 41 and 65 through 71.



| Item | Description                | Part No.    |
|------|----------------------------|-------------|
| 1    | Speakers                   | 031-5004-00 |
| 2    | Back Box Lock              | 355-5008-00 |
| 3    | CPU †                      | 520-5003-03 |
| 4    | PPB Board                  | 520-5021-05 |
| 5    | Power Supply               | 520-5047-01 |
| 6    | Sound Board †              | 520-5050-01 |
| 7    | Dot Matrix ‡               | 520-5052-XX |
| 8    | Display Controller Board † | 520-5055-00 |
| 9    | Speaker Housing            | 545-5180-01 |
| 10   | ScreenedBackGlass *        | 830-5222-00 |
| 11   | Speaker Grill (Right)      | 830-5619-01 |
| 12   | Speaker Grill (Left)       | 830-5619-00 |
| 13   | Back Box Lock Plate        | 535-5860-00 |
| 14   | Bullwinkle Antler Plastic  | 830-5438-00 |

\* Not Shown

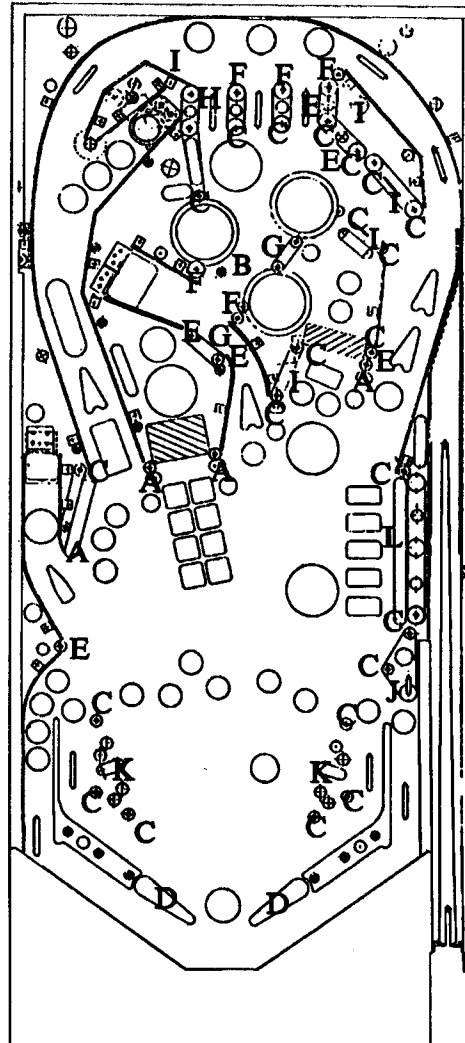
‡ Indicate Manufacturer

† When ordering PC Boards with ROMs please specify game name

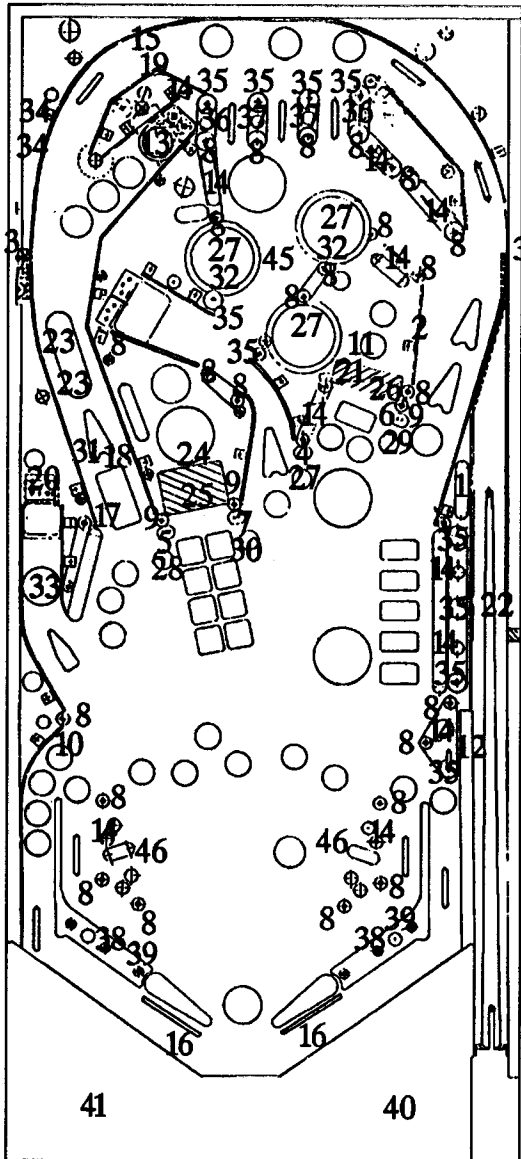
See Page 67 for Insert assembly.

## RUBBER PARTS ILLUSTRATION

| Item | Description            | Part #      |
|------|------------------------|-------------|
| A    | Bumper Post (4)        | 545-5009-00 |
| B    | Bumper Rubber (1)      | 545-5105-00 |
| C    | Post Rubber (24) Short | 545-5151-00 |
| D    | Flipper Rubber (2)     | 545-5277-00 |
| E    | 3/16" (6)              | 545-5348-01 |
| F    | 5/16" (5)              | 545-5348-02 |
| G    | 3/4" (2)               | 545-5348-04 |
| H    | 1" (1)                 | 545-5348-05 |
| I    | 1 1/4" (4)             | 545-5348-06 |
| J    | 1 1/2" (1)             | 545-5348-07 |
| K    | 2 1/2" (2)             | 545-5348-09 |
| L    | 3" (1)                 | 545-5348-10 |



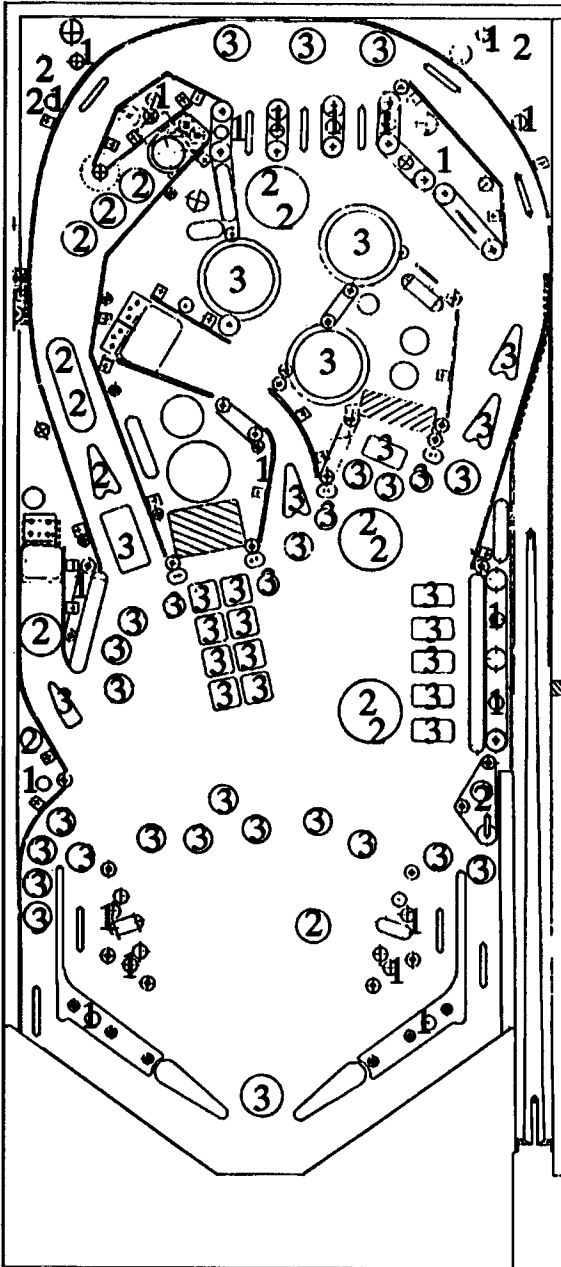
# Playfield Parts



**Note:**  
See page 25 for switch part numbers

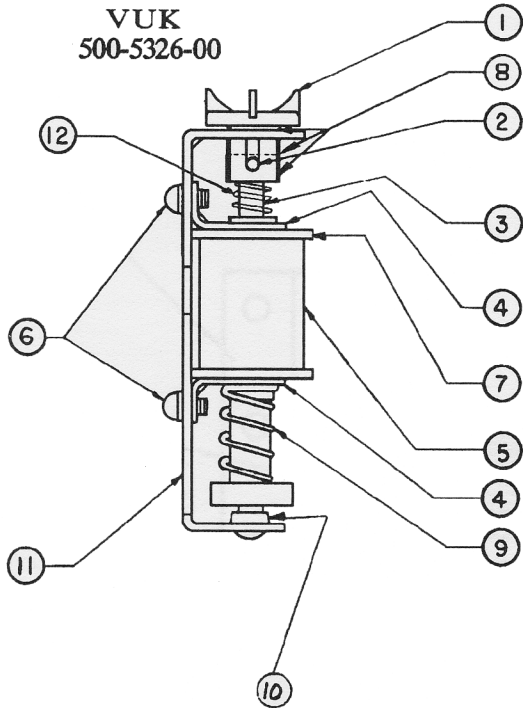
| No. | Description              | Part No.    |
|-----|--------------------------|-------------|
| 1.  | Spacer 1"                | 254-5000-04 |
| 2.  | Wire Form                | 500-5042-00 |
| 3.  | Pivot Brkt Assy          | 500-5329-00 |
| 4.  | Narrow Target            | 500-5607-02 |
| 5.  | Narrow Target            | 500-5607-04 |
| 6.  | Narrow Target            | 500-5607-05 |
| 7.  | Narrow Target            | 500-5607-06 |
| 8.  | Metal Standoff (23)      | 530-5035-01 |
| 9.  | Bumper Post (3)          | 530-5127-00 |
| 10. | Side Rail Guard          | 535-5008-02 |
| 11. | Ball Return Ramp         | 535-5026-00 |
| 12. | Outlane Adjustable Plate | 535-5091-01 |
| 13. | Ball Stop Brkt           | 535-5273-00 |
| 14. | Wire Form 1" (11)        | 535-5300-05 |
| 15. | Rebound Hinge            | 535-5372-00 |
| 16. | Snubber Wire             | 535-5373-01 |
| 17. | Switch Protector         | 535-6539-00 |
| 18. | Rebound Mtg Brkt         | 535-5742-00 |
| 19. | Ball Gate Flap           | 535-6043-00 |
| 20. | Ball Deflector           | 535-6424-00 |
| 21. | Ramp Entrance Plate      | 535-6428-00 |
| 22. | Sliding Brkt Nell's Log  | 535-6483-00 |
| 23. | Slotted Brkt.            | 535-6518-00 |
| 24. | Gate Mtg Brkt.           | 535-6522-00 |
| 25. | Ramp Gate                | 535-6523-00 |
| 26. | Ramp Gate                | 535-6523-01 |
| 27. | Lite Cover RED           | 545-5014-02 |
| 28. | Lite Cover Green         | 545-5014-04 |
| 29. | Lite Cover Blue          | 545-5014-05 |
| 30. | Lite Cover Yellow        | 545-5014-06 |
| 31. | Wire Gate Mntg. Brkt.    | 535-6488-01 |
| 32. | Bumper Cap               | 545-5225-01 |
| 33. | Ball Guide Rail          | 535-6492-06 |
| 34. | SB Mini Mars             | 550-5031-02 |
| 35. | Small Plastic Post (10)  | 550-5034-01 |
| 36. | Lite Hood Clear One Side | 550-5035-01 |
| 37. | Lite Hood Clear          | 550-5036-01 |
| 38. | Return Lane Guide        | 550-5037-01 |
| 39. | Return Lane Lower        | 550-5042-01 |
| 40. | Pricing Card             | 755-5040-00 |
| 41. | Instruction Card         | 755-5042-00 |
| 42. | Decal                    | 820-5083-01 |
| 43. | B/W Decals               | 820-5083-XX |
| 44. | B/W Ramp Decals          | 820-5086-XX |
| 45. | Mylar Pad                | 820-5815-00 |
| 46. | Slingshot protectent     | 820-5821-00 |
| 47. | Mylar protectant         | 820-5827-00 |
| 48. | Screened Playfields      | 830-5122-00 |
| 49. | Screened Plastic Sets    | 830-5445-XX |

# Lamp Bulb Part Numbers



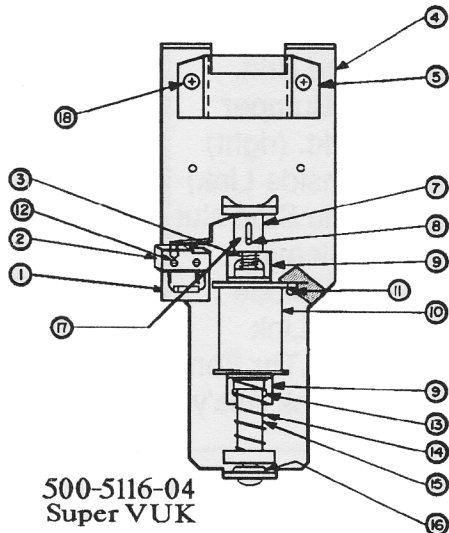
| Item | Description | Part Number |
|------|-------------|-------------|
| 1    | #44 Bulb    | 165-5000-44 |
| 2    | #89 Bulb    | 165-5000-89 |
| 3    | #555 Bulb   | 165-5002-00 |
| 4    | # 906 Bulb  | 165-5004-00 |

VUK  
500-5326-00



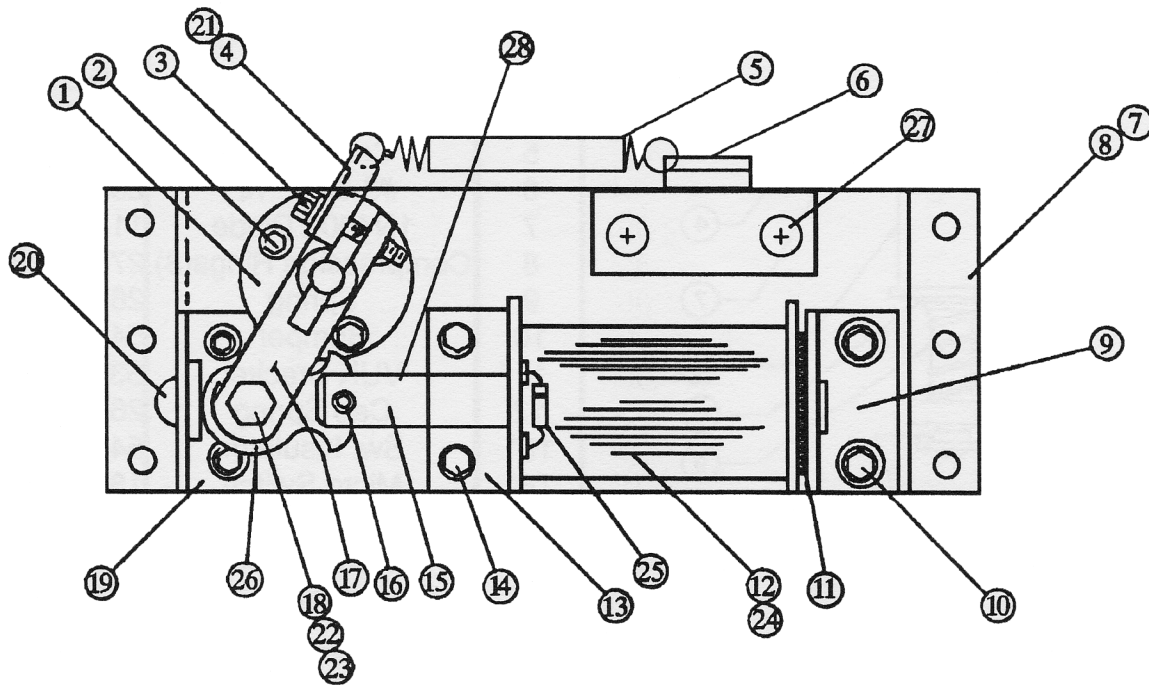
| Item | Description                         | Part No.    |
|------|-------------------------------------|-------------|
| 1    | Vert. Kick. Cap                     | 545-5227-00 |
| 2    | Pin $\frac{3}{32}$ X $\frac{7}{16}$ | 251-5004-00 |
| 3    | Plunger Assy.                       | 515-5352-00 |
| 4    | Coil Retainer Brkt.(2)              | 535-5203-01 |
| 5    | Coil 23-800                         | 090-5001-01 |
| 6    | #8-32 X $\frac{1}{4}$ "             | 232-5300-00 |
| 7    | 1N4004 Diode                        | 112-5003-00 |
| 8    | Compression Rings(3)                | 270-5010-00 |
| 9    | Spring                              | 266-5009-00 |
| 10   | Bumper                              | 545-5105-00 |
| 11   | VUK Bracket                         | 535-0230-00 |
| 12   | Cap Spring                          | 266-5025-00 |
| 13*  | Sw. Insulator                       | 545-5193-00 |
| 14*  | Micro Switch                        | 180-5063-00 |
| 15*  | 2-56 X $\frac{1}{2}$ Screw(2)       | 237-5806-00 |
| 16*  | Lock Washer                         | 242-1201-00 |
| 17*  | Hex Nut                             | 238-1101-00 |

\* Indicates not shown



500-5116-04  
Super VUK

| Item | Description                         | Part #      |
|------|-------------------------------------|-------------|
| 1    | Sw. Insulator                       | 545-5193-00 |
| 2    | Micro Switch                        | 180-5064-00 |
| 3    | Cap Spring                          | 266-5025-00 |
| 4    | Ball Kickup Mtg. Brkt.              | 535-5298-00 |
| 5    | Ball Guide Brkt.                    | 535-6047-00 |
| 6    | # 6-32 x $\frac{3}{8}$ SEMS (2)*    | 232-5201-00 |
| 7    | Vert. Kick. Cap                     | 545-5227-00 |
| 8    | Pin $\frac{3}{32}$ x $\frac{7}{16}$ | 251-5004-00 |
| 9    | Coil Retainer Brkt.(2)              | 535-5203-00 |
| 10   | Coil 23-800                         | 090-5001-01 |
| 11   | 1N4004 Diode                        | 112-5003-00 |
| 12   | 2-56 x $\frac{1}{2}$ Screw (2)      | 237-5806-00 |
| 13   | # 6-32 x $\frac{1}{4}$ Phil.M.S.    | 232-5200-00 |
| 14   | Spring                              | 266-5009-00 |
| 15   | Plunger Assy.                       | 515-5352-00 |
| 16   | Bumper                              | 545-5105-00 |
| 17   | Compression Ring (3)                | 270-5010-00 |
| 18   | #6-32 x $\frac{1}{4}$ SEMS          | 232-5200-00 |



| Item | Description                                      | Part #      | Item | Description                                      | Part #      |
|------|--|-------------|------|--|-------------|
| 1    | Flipper Bushing                                  | 545-5070-00 | 15   | Plunger, Link & Pawl                             | 515-5051-00 |
| 2    | #6 x <sup>3</sup> / <sub>8</sub> Hex Hd.scr.     | 234-5000-00 | 16   | Pin  | 251-5000-00 |
| 3    | #10-32 x <sup>3</sup> / <sub>4</sub> Soc.Hd.scr. | 232-2206-12 | 17   | Pawl   | 530-5070-00 |
| 4    | Spring Brkt. (left)                              | 535-6431-00 | 18   | 10-32x <sup>3</sup> / <sub>4</sub> Shoulder Bolt | 231-5019-00 |
| 5    | Flipper Return Spring                            | 265-5029-02 | 19   | Rebound Brkt.                                    | 535-5279-00 |
| 6    | Spring Bracket                                   | 535-6469-00 | 20   | Rubber Bumper                                    | 545-5105-00 |
| 7    | Flipper Base (left)                              | 515-5077-02 | 21   | Spring Brkt. (right)                             | 535-6422-00 |
| 8    | Flipper Base (right)                             | 515-5077-01 | 22   | Bushing (inside Link)                            | 530-5139-00 |
| 9    | Coil Stop Brkt.                                  | 515-5346-00 | 23   | 10-32 Elastic Stop Nut                           | 238-1306-00 |
| 10   | 1/4-20x <sup>3</sup> / <sub>8</sub> Soc.Hd.scr.  | 231-2507-06 | 24   | Coil Sleeve                                      | 260-0003-00 |
| 11   | Spring Washer                                    | 269-5002-00 | 25   | 1N4004 Diode                                     | 112-5003-00 |
| 12   | Coil 23-900                                      | 090-5020-30 | 26   | Flipper Link                                     | 545-5219-00 |
| 13   | Front Brkt.                                      | 515-5129-00 | 27   | #8 <sup>3</sup> / <sub>8</sub> Pan Hd.Thr.Form   | 237-5821-00 |
| 14   | #8 x <sup>3</sup> / <sub>8</sub> Hex Hd.Scr.     | 234-5100-00 | 28   | Plunger & Link Ass'y.                            | 515-5052-01 |

## Flipper Assemblies

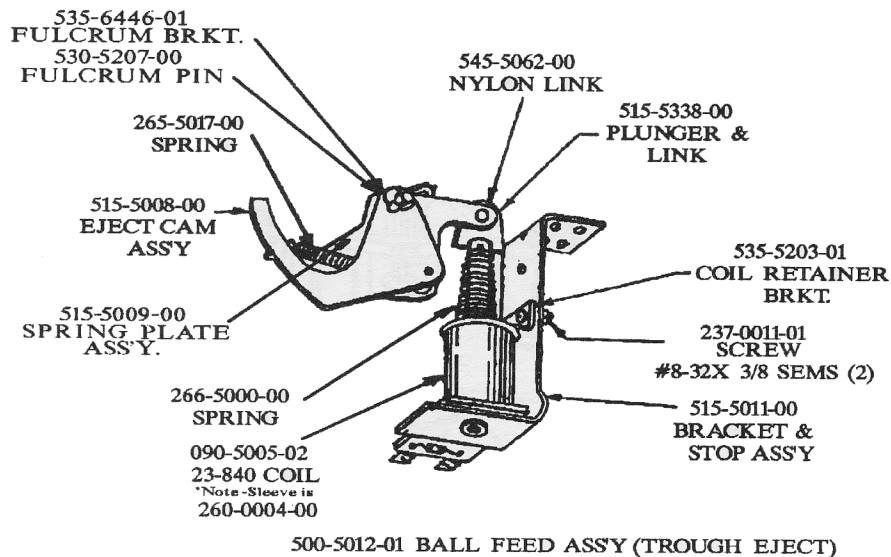
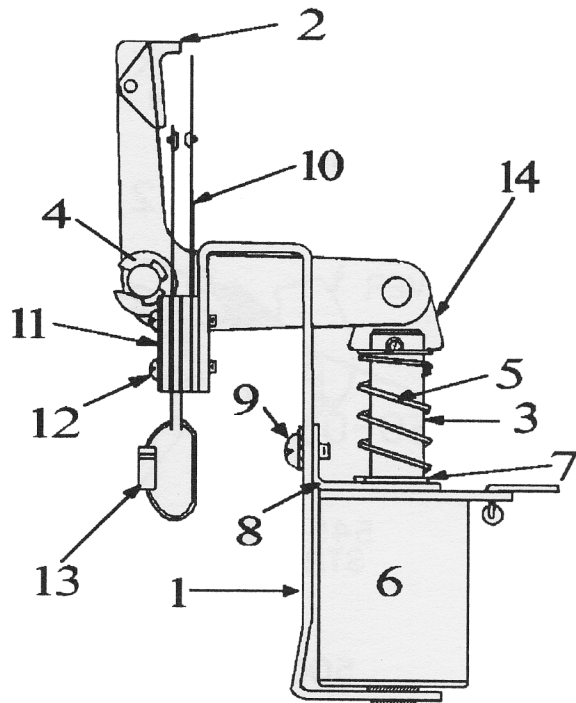
**500-5606-75 Right**

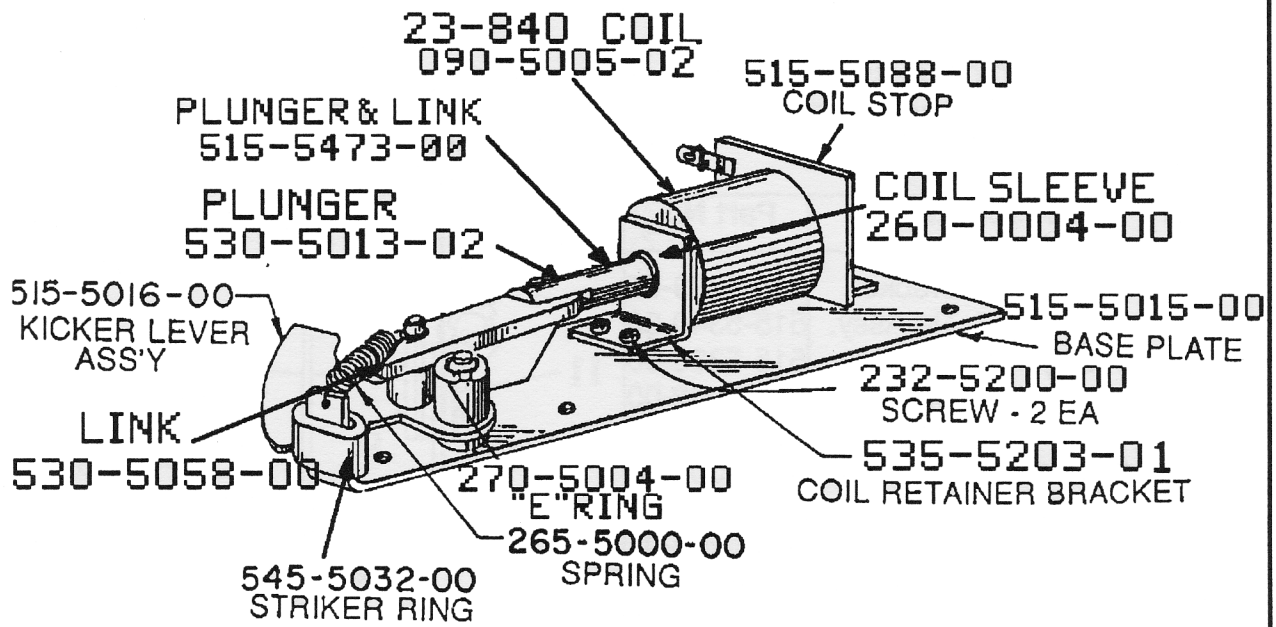
**500-5606-76 Left**



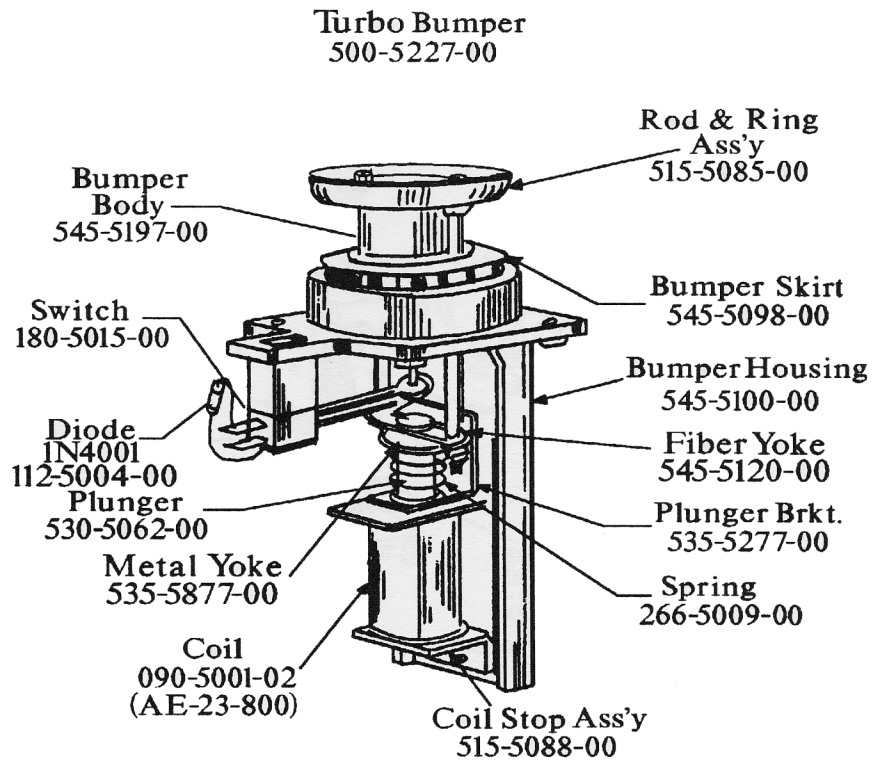
# Slingshot Assembly 500-5226-00

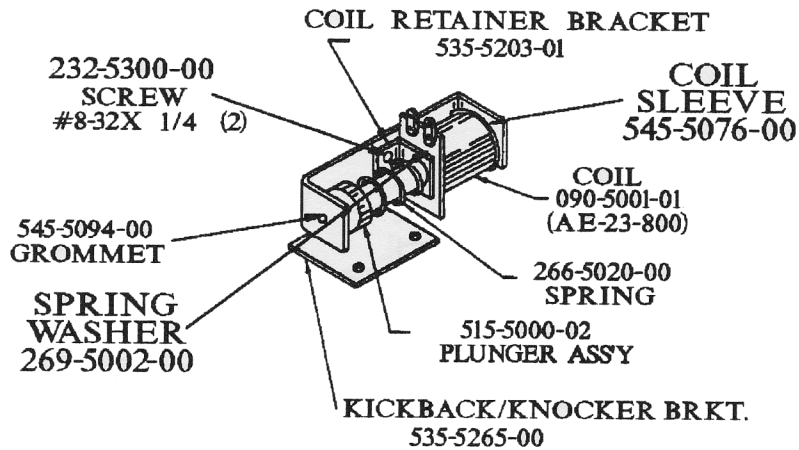
| Item | Description            | Part No.    |
|------|------------------------|-------------|
| 1    | Slingshot Bracket      | 515-5339-00 |
| 2    | S.S. Arm & Tip Assy.   | 515-5340-00 |
| 3    | Plunger & Link Assy.   | 515-5338-00 |
| 4    | 1/4 Retaining Ring (2) | 270-5002-00 |
| 5    | Spring                 | 266-5020-00 |
| 6    | 23-800 Coil w/Sleevel  | 090-5001-02 |
| 7    | Coil Sleeve            | 260-0004-00 |
| 8    | Coil Retainer          | 535-5203-01 |
| 9    | #8-32 X 1/4" Screw (2) | 232-5300-00 |
| 10   | Slingshot Switch (2)   | 180-5054-00 |
| 11   | Tension Plate (2)      | 535-5846-00 |
| 12   | #4-40 X 1/2" Screw (4) | 237-5837-00 |
| 13   | Diode 1N4004 (2)       | 112-5004-00 |
| 14   | Link                   | 545-5062-00 |



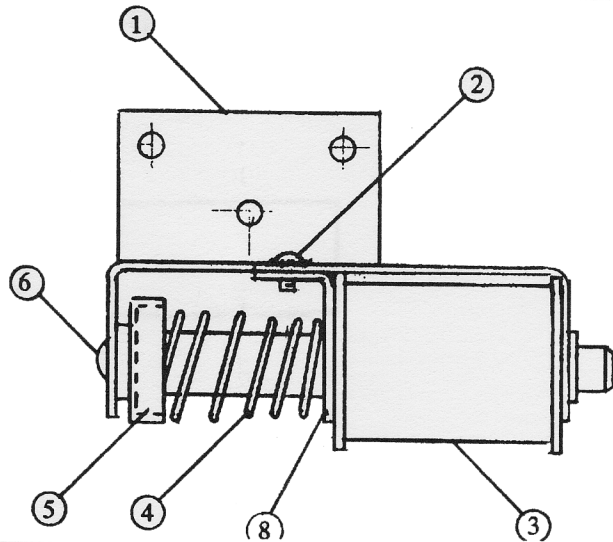


500-5082-00 OUTHOLE BALL RETURN ASSY



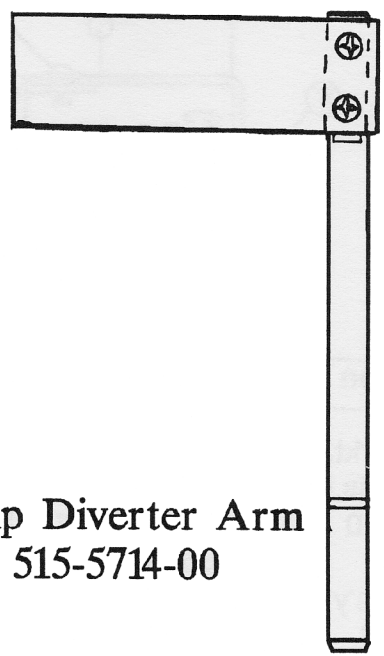
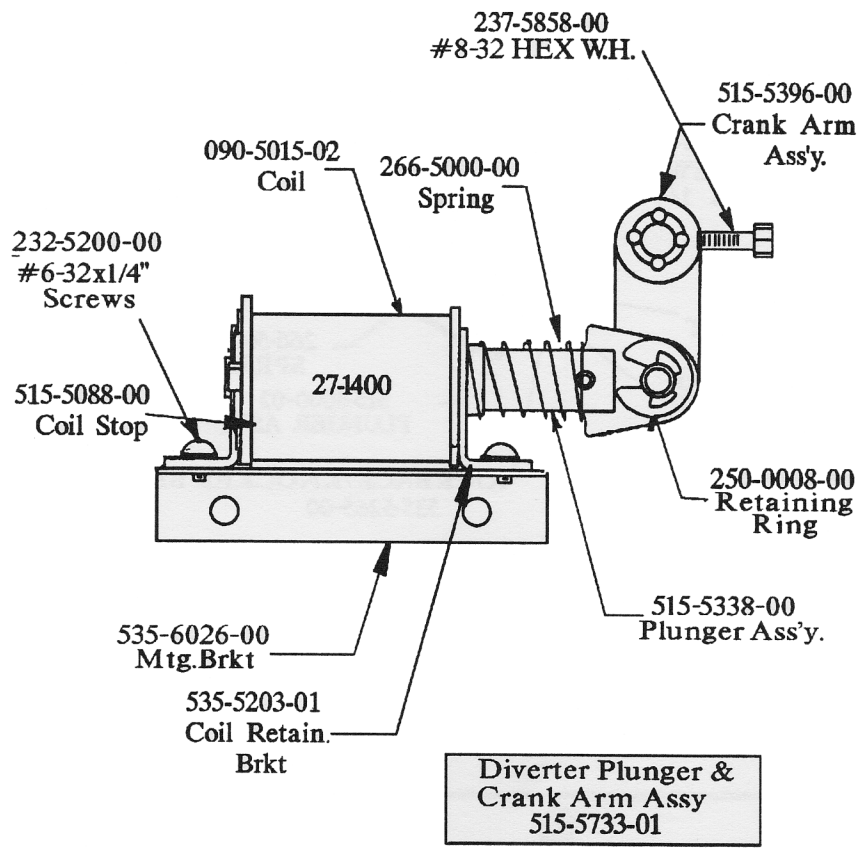


**KICKBACK &  
KNOCKER ASSEMBLY 500-5081-00**

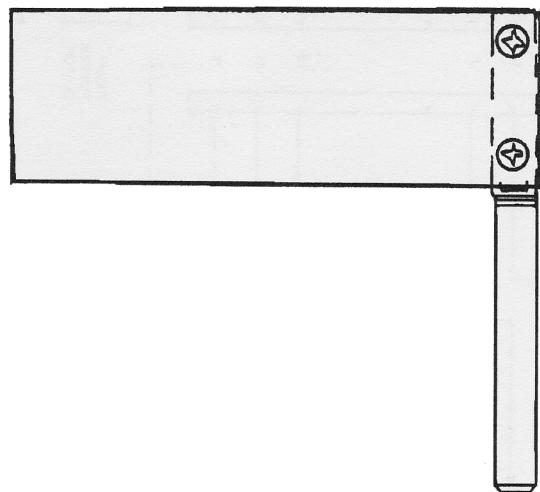
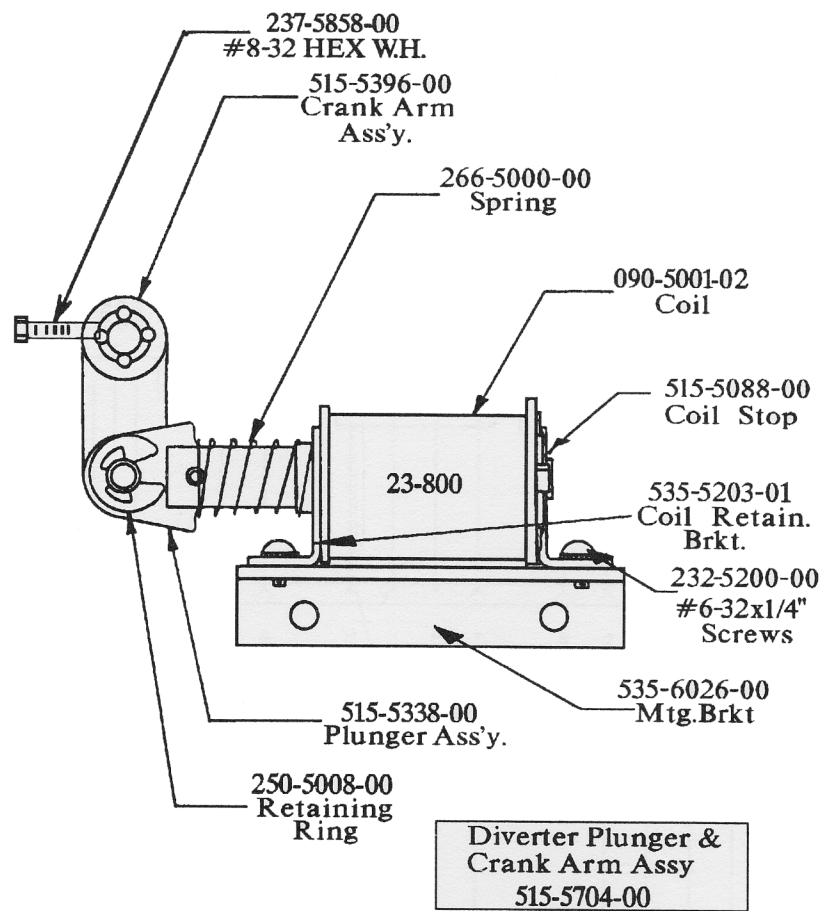


| Item | Description         | Part #      |
|------|---------------------|-------------|
| 1    | Coil Mtg. Brkt.     | 535-6385-00 |
| 2    | 8-32x1/4 Sems.(2)   | 232-5300-04 |
| 3    | Coil 24-940         | 090-5036-01 |
| 4    | Spring              | 266-5020-00 |
| 5    | Plunger Ass'y.      | 515-5000-02 |
| 6    | Grommet             | 545-5105-00 |
| 7    | 1N4004 Diode        | 112-5003-00 |
| 8    | Coil Retainer Brkt. | 535-5203-01 |

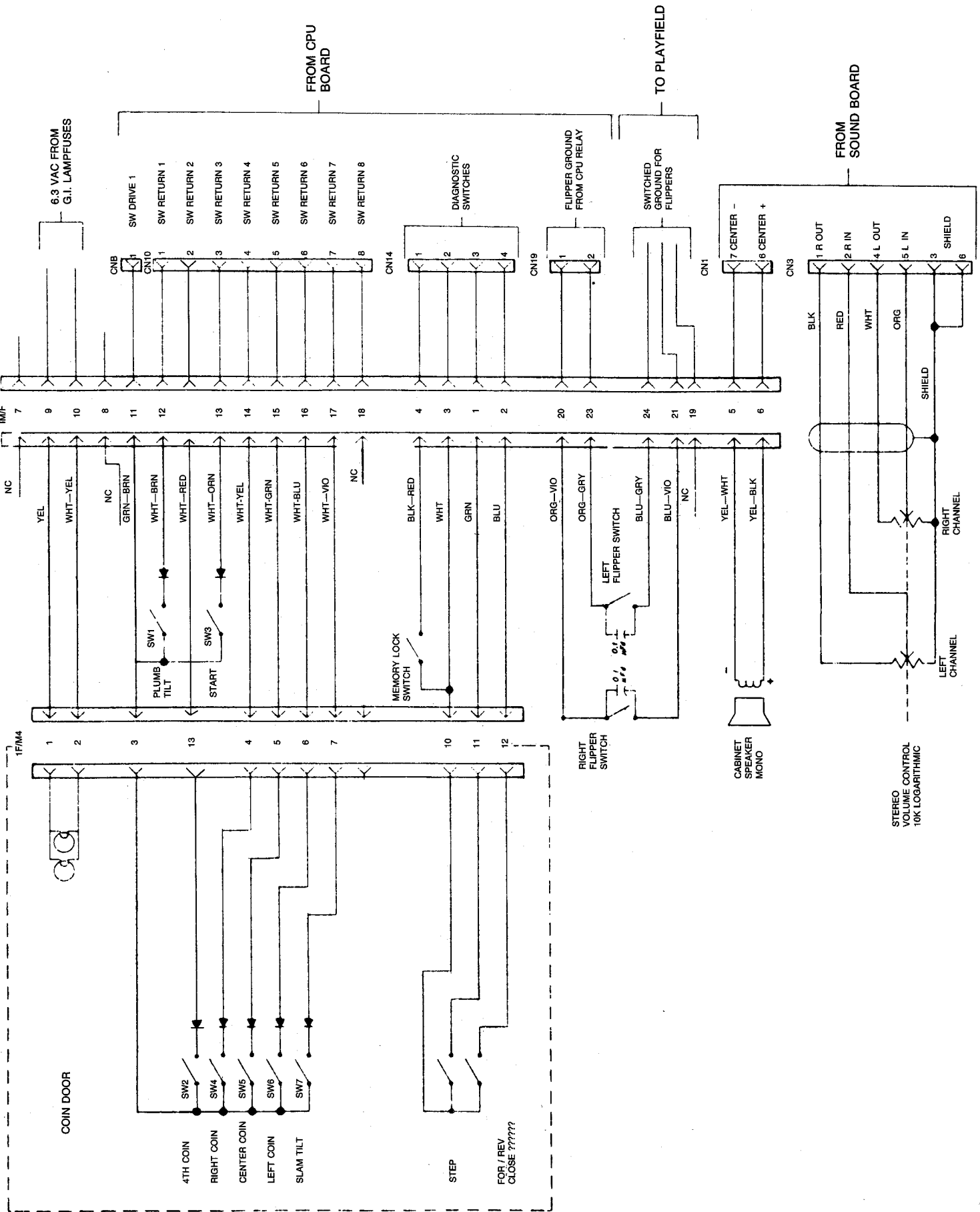
**Ball Launch Ass'y  
500-5477-01**



**Ramp Diverter Arm  
515-5714-00**



**Playfield Diverter Arm**  
**515-5708-00**



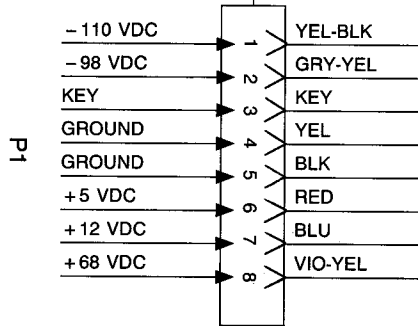
42 Cabinet Wiring Diagram

# DOT MATRIX BOARD

## 520-5052-00

# CONTROLLER BOARD

## 520-5055-00



RIBBON CABLE P2

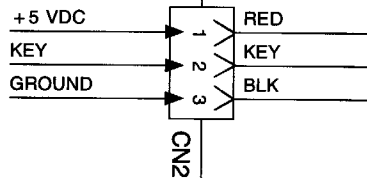
|    |    |   |   |                |          |
|----|----|---|---|----------------|----------|
| 1  | 2  | 0 | 0 | DISPLAY ENABLE | GROUND   |
| 0  | 0  | 0 | 0 | ROW DATA       | GROUND   |
| 0  | 0  | 0 | 0 | ROW CLOCK      | GROUND   |
| 0  | 0  | 0 | 0 | COL. LATCH     | GROUND   |
| 0  | 0  | 0 | 0 | PIX CLOCK      | GROUND   |
| 0  | 0  | 0 | 0 | SER. DATA      | GROUND   |
| 0  | 0  | 0 | 0 | NOT USED       | NOT USED |
| 13 | 14 |   |   |                |          |

RIBBON CABLE CN1

|    |    |   |   |                |          |
|----|----|---|---|----------------|----------|
| 1  | 2  | 0 | 0 | DISPLAY ENABLE | GROUND   |
| 0  | 0  | 0 | 0 | ROW DATA       | GROUND   |
| 0  | 0  | 0 | 0 | ROW CLOCK      | GROUND   |
| 0  | 0  | 0 | 0 | COL. LATCH     | GROUND   |
| 0  | 0  | 0 | 0 | PIX CLOCK      | GROUND   |
| 0  | 0  | 0 | 0 | SER. DATA      | GROUND   |
| 0  | 0  | 0 | 0 | NOT USED       | NOT USED |
| 13 | 14 |   |   |                |          |

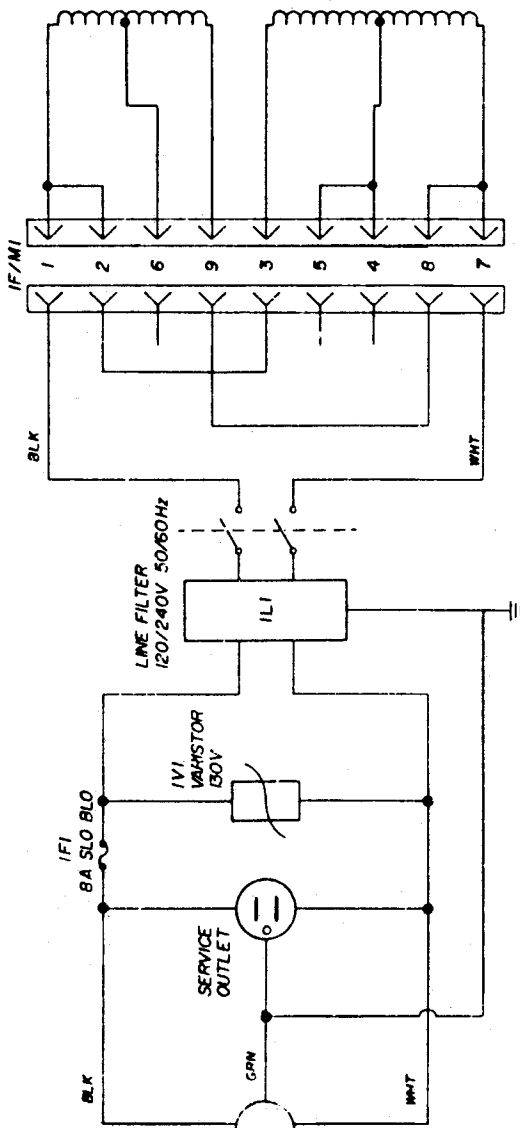
RIBBON CABLE CN3

|    |    |   |   |          |          |
|----|----|---|---|----------|----------|
| 1  | 2  | 0 | 0 | NOT USED | NOT USED |
| 0  | 0  | 0 | 0 | SWITCH 1 | SWITCH 2 |
| 0  | 0  | 0 | 0 | SWITCH 3 | SWITCH 4 |
| 0  | 0  | 0 | 0 | SWITCH 5 | SWITCH 6 |
| 0  | 0  | 0 | 0 | SWITCH 7 | SWITCH 8 |
| 0  | 0  | 0 | 0 | DATA 0   | DATA 1   |
| 0  | 0  | 0 | 0 | DATA 2   | DATA 3   |
| 0  | 0  | 0 | 0 | DATA 4   | DATA 5   |
| 0  | 0  | 0 | 0 | DATA 6   | DATA 7   |
| 0  | 0  | 0 | 0 | STB      | RESET    |
| 0  | 0  | 0 | 0 | NOT USED | STAT 0   |
| 0  | 0  | 0 | 0 | STAT 1   | STAT 2   |
| 0  | 0  | 0 | 0 | STAT 3   | BUSY     |
| 25 | 26 |   |   |          |          |



**THIS CONFIGURATION FOR 115V**

FOR LOWER LINE VOLTAGES  
OR 230 VOLT OPERATION  
SEE SAMPLES BELOW

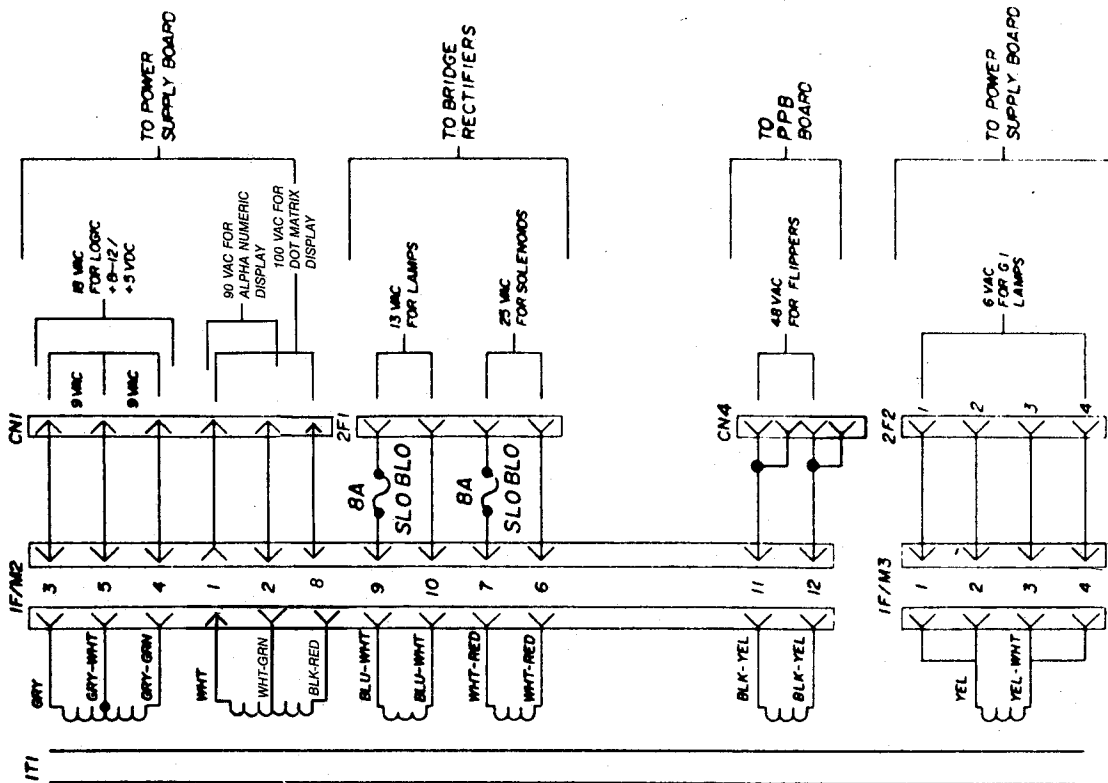
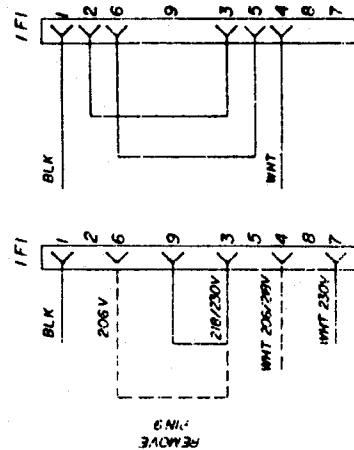


**JUMPERS FOR VOLTAGE VARIATION**

230/218/206 VOLTS

IF1 - 4A SLO BLO

IV1 - 275V VARIATOR



TO POWER SUPPLY BOARD

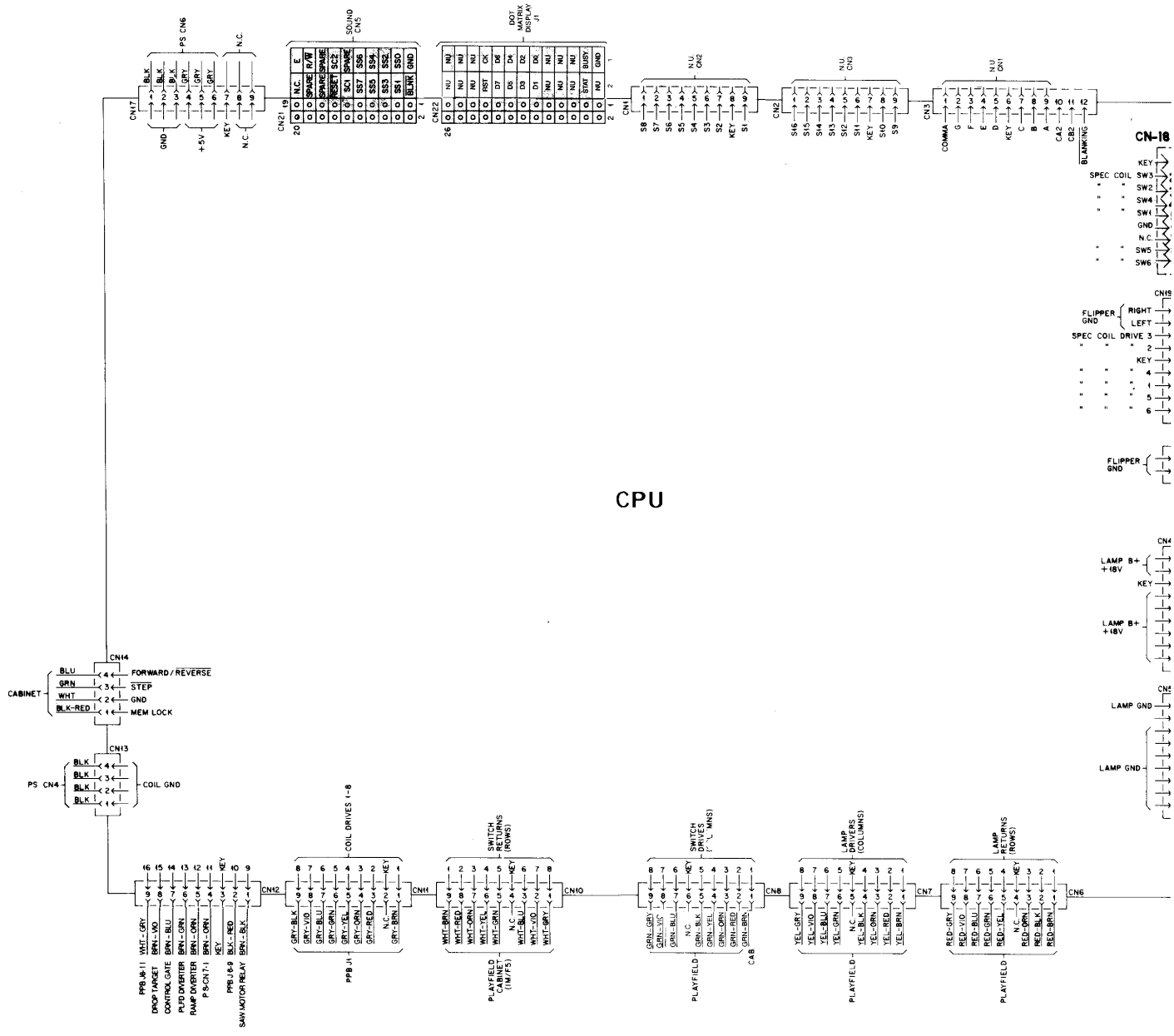
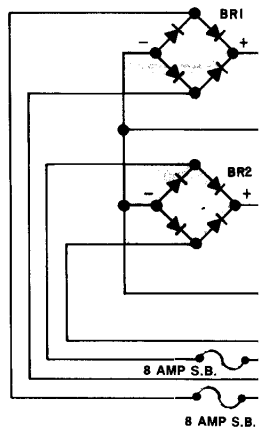
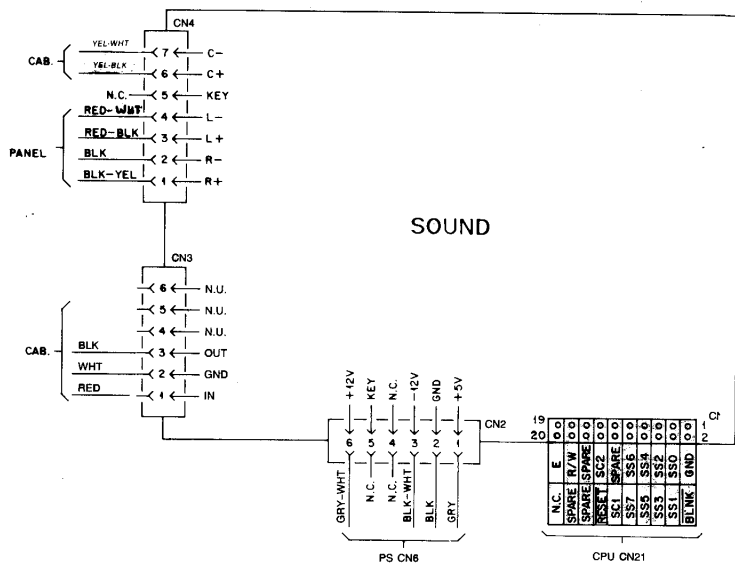
TO BRIDGE RECTIFIERS

TO PPB BOARD

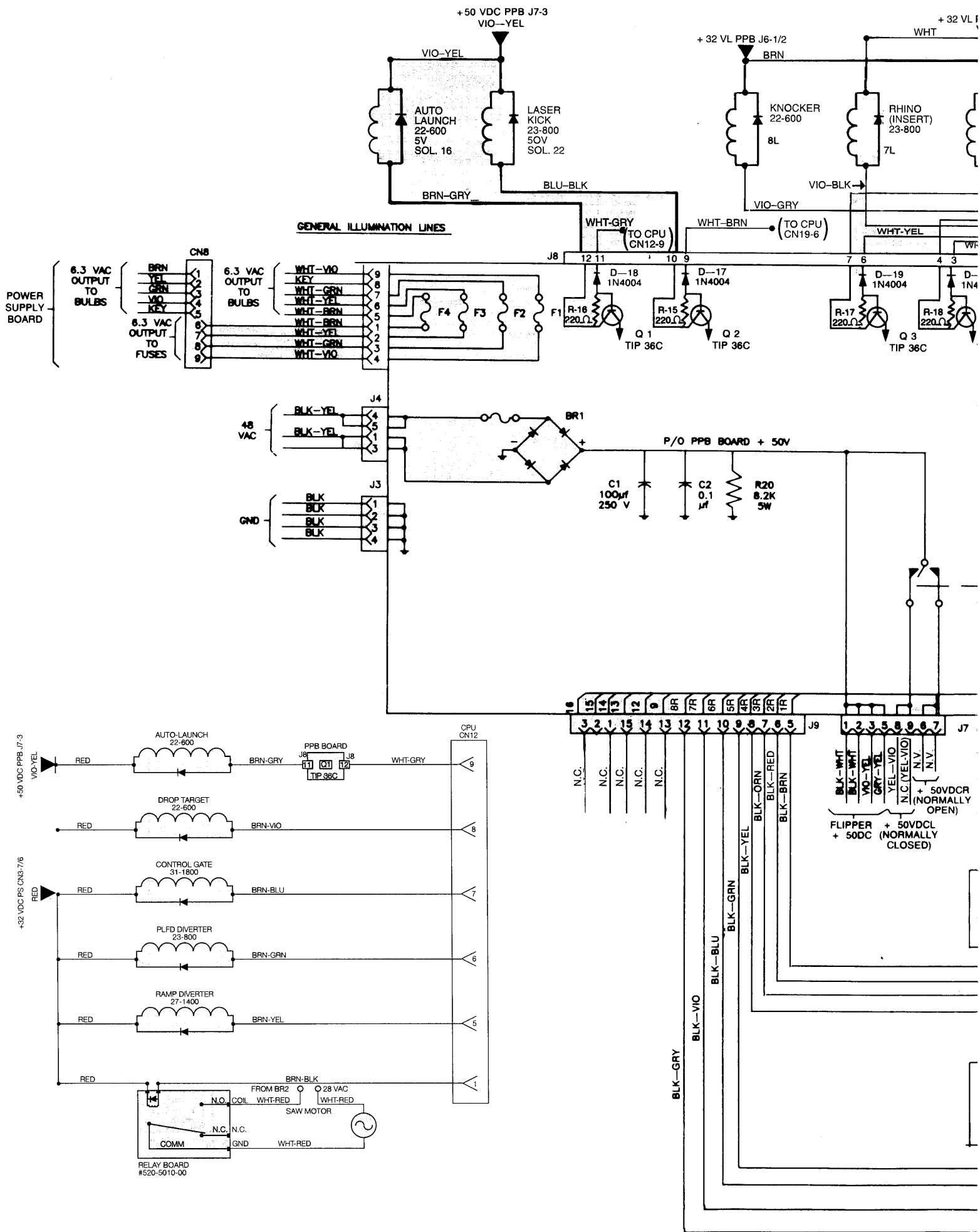
TO POWER SUPPLY BOARD

IT1

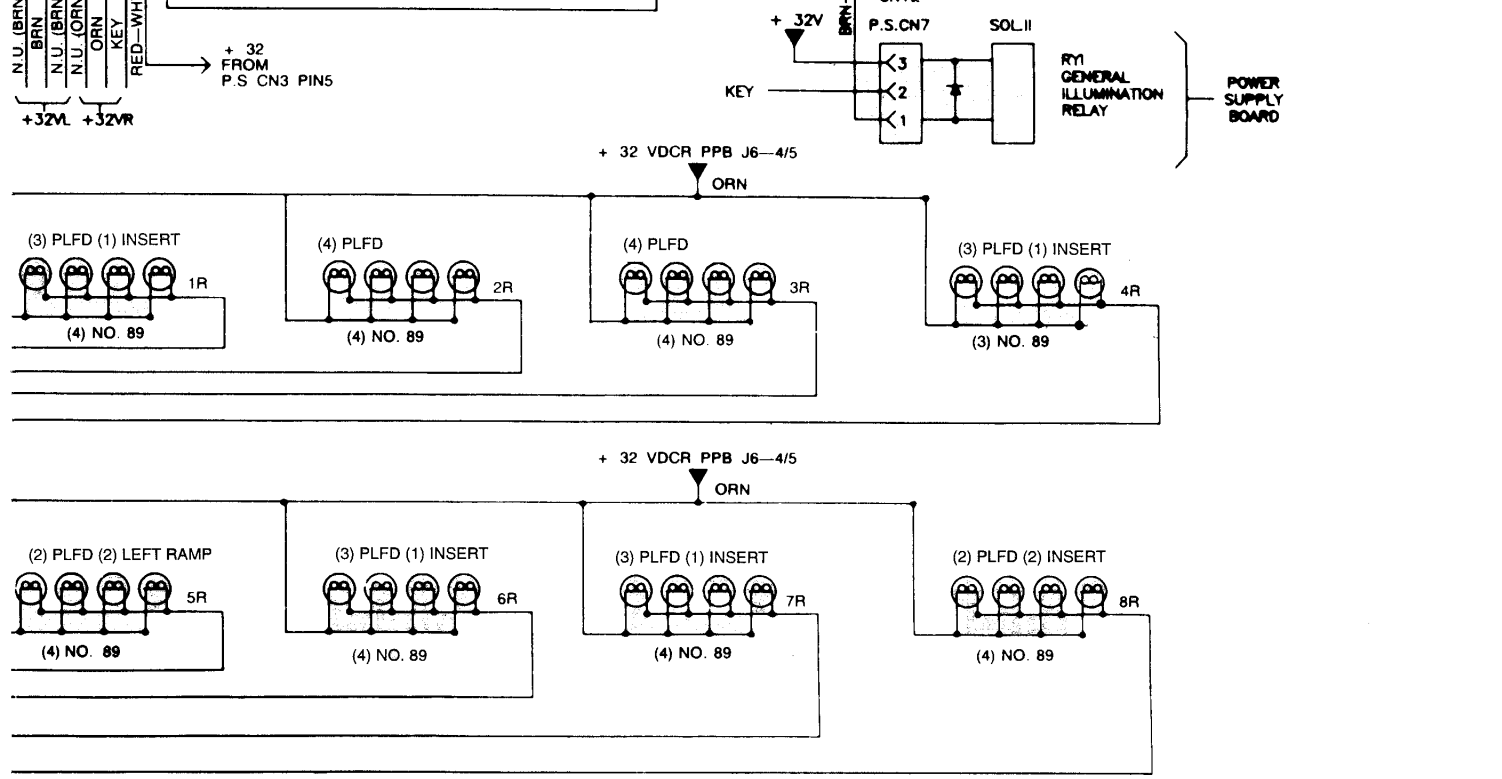
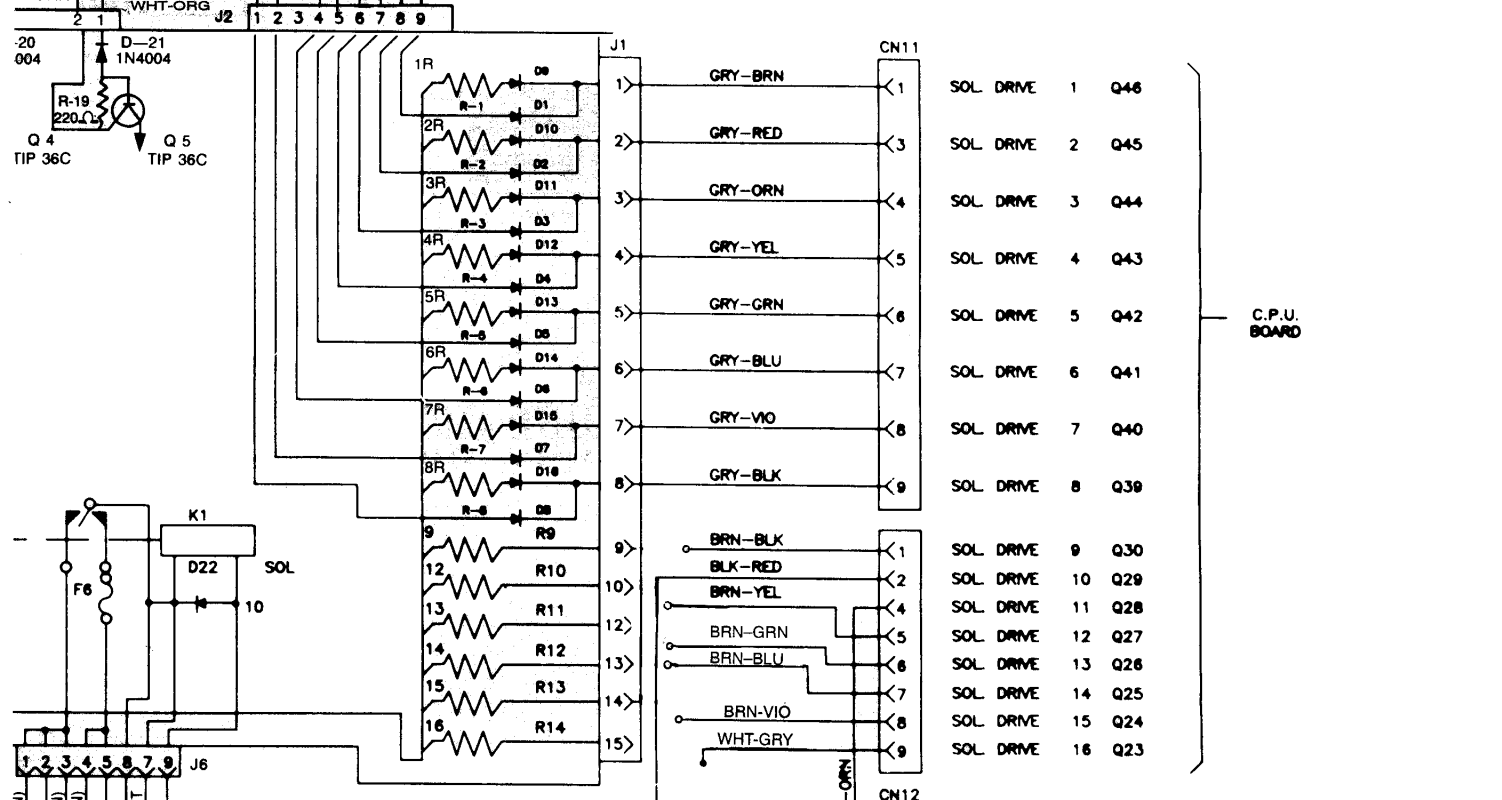
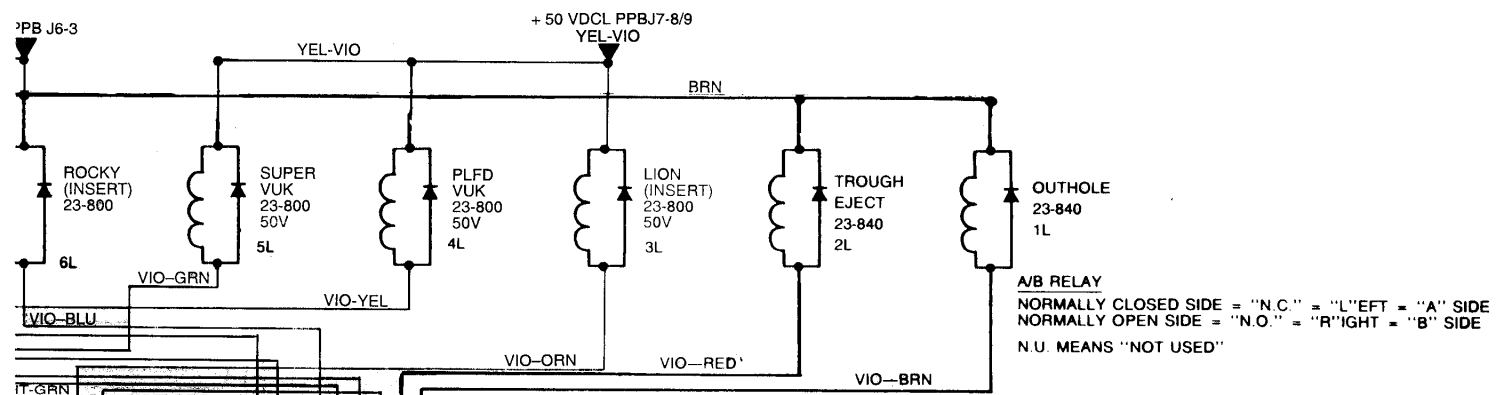


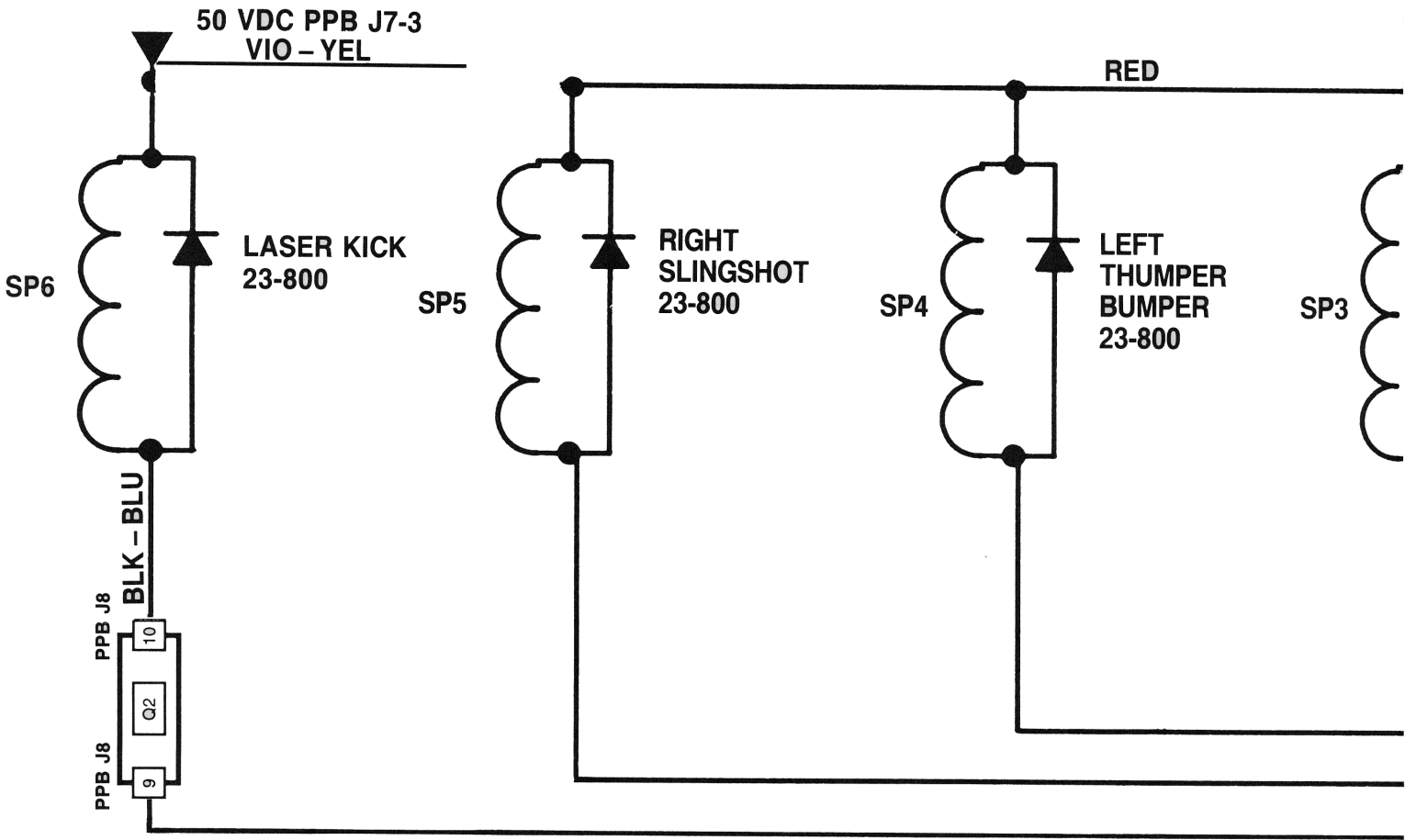


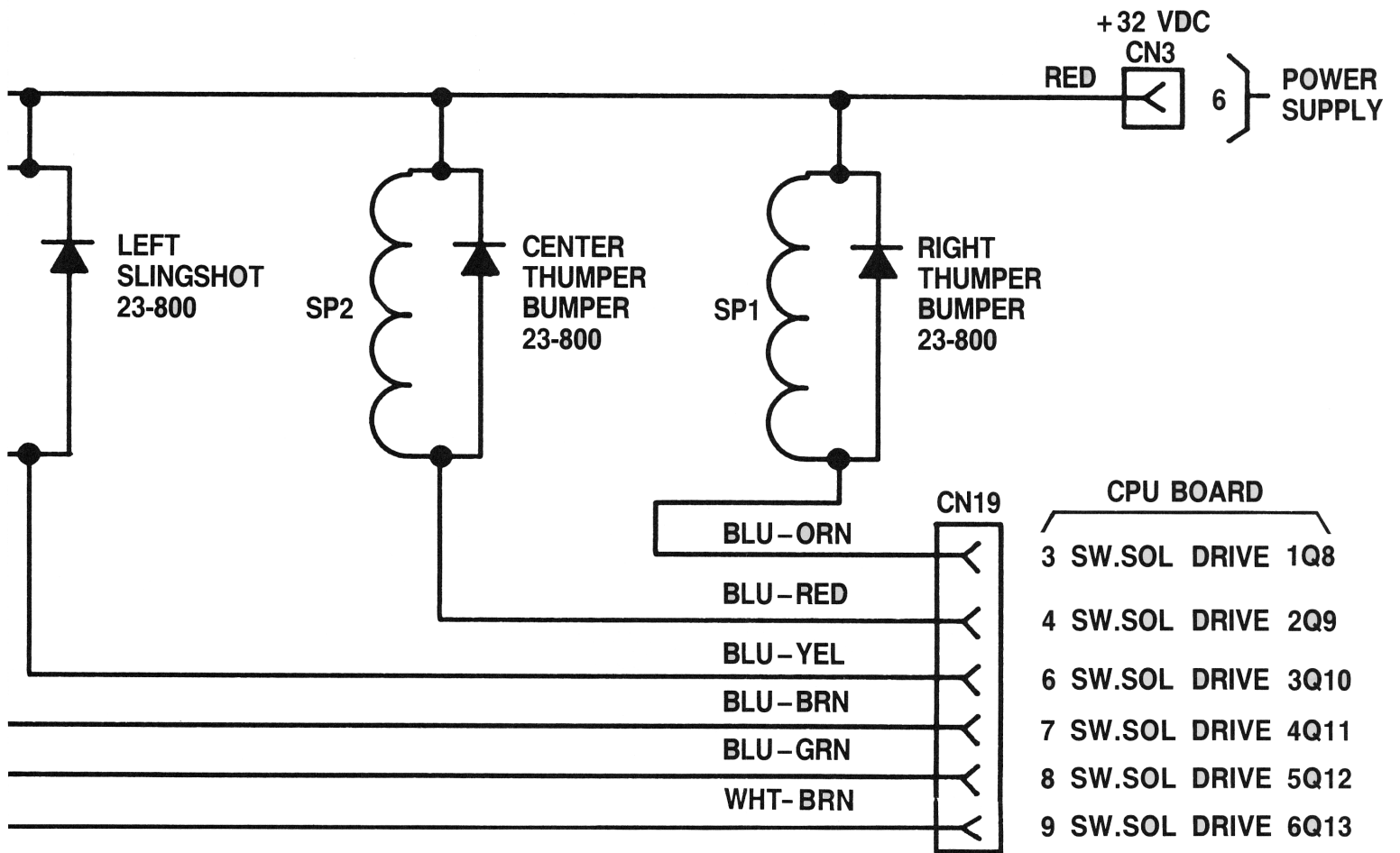




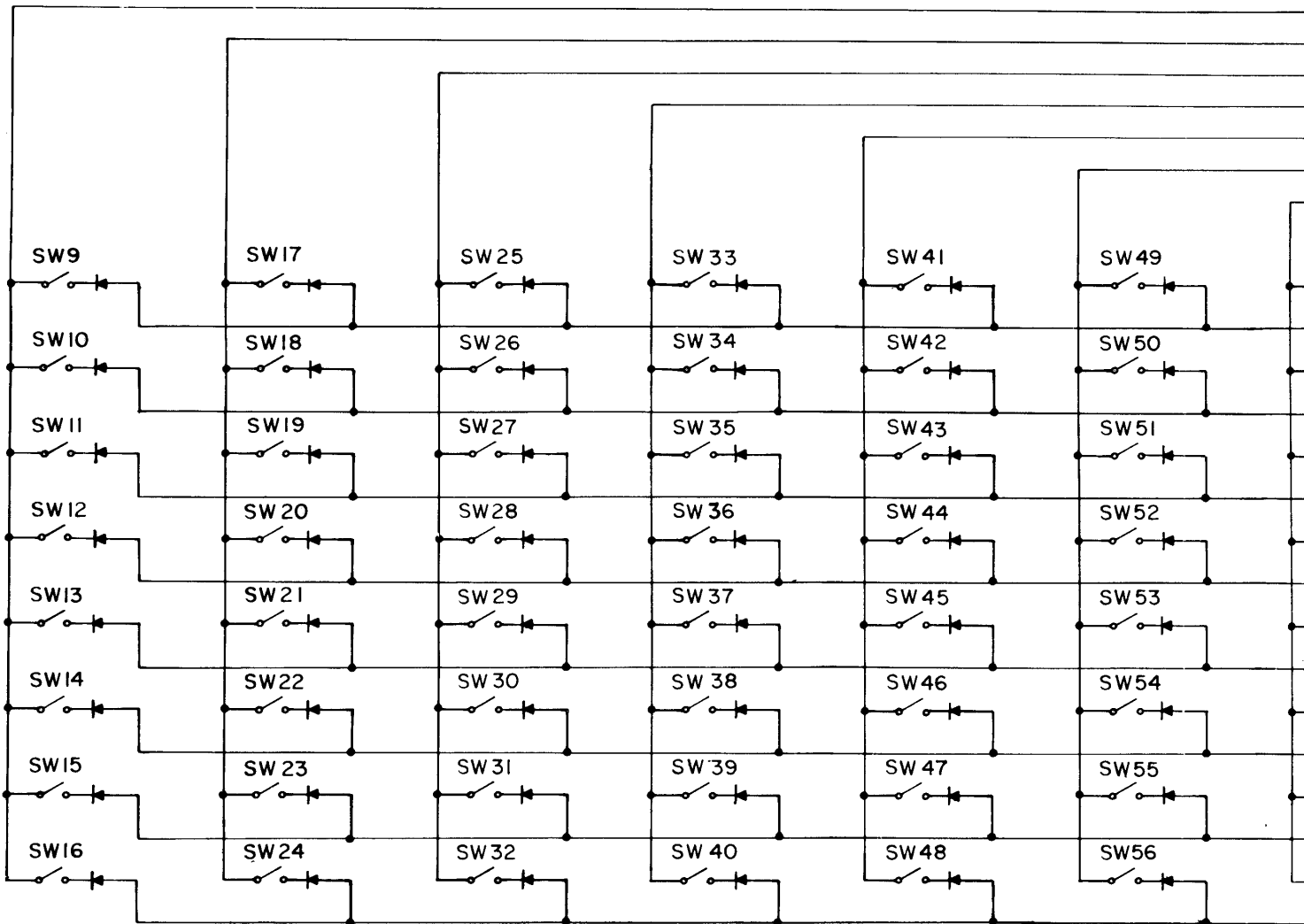
46 Playfield Coil / Flash Lamp Wiring Diagram







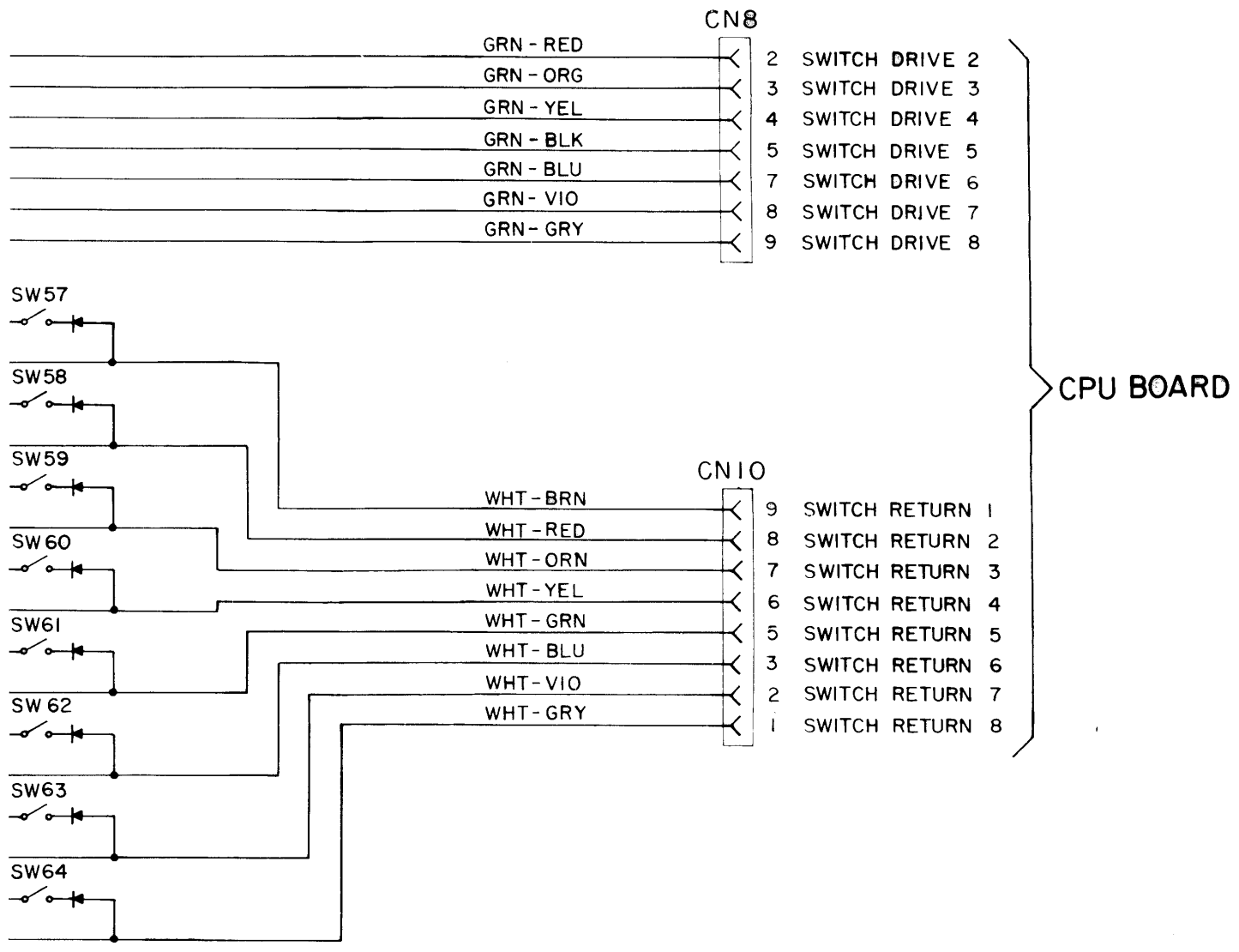
| Switch Number | Description    | Part No.    |     |                     |             |    |       |
|---------------|----------------|-------------|-----|---------------------|-------------|----|-------|
| 01*           | Plumb Tilt     | See Cabinet | 16* | Right Flip. Cab.    | 180-5048-01 | 31 | Left  |
| 02*           | 4th Coin       | -           | 17  | Drop Target Top     | 180-5092-01 | 32 | Left  |
| 03*           | Credit Button  | 500-5097-02 | 18  | Drop Target Top/Mid | 180-5092-01 | 33 | Left  |
| 04*           | Right Coin     | 180-5024-00 | 19  | Drop Target Middle  | 180-5092-01 | 34 | Left  |
| 05*           | Center Coin    | 180-5024-00 | 20  | Drop Target Bot/Mid | 180-5092-01 | 35 | Right |
| 06*           | Left Coin      | 180-5024-00 | 21  | Drop Target Bottom  | 180-5092-01 | 36 | Right |
| 07*           | Slam Tilt      | 180-5022-00 | 22  | Hat Target Bottom   | 500-5640-36 | 37 | Und   |
| 08            | Not Used       | -           | 23  | Hat Target Middle   | 500-5640-36 | 38 | Right |
| 09*           | Launch Button  | 500-5410-02 | 24  | Hat Target Top      | 500-5640-36 | 39 | Right |
| 10            | Outhole        | 180-5011-00 | 25  | Small Target "B"    | 500-5607-05 | 40 | Right |
| 11            | Left Trough    | 180-5009-00 | 26  | Small Target "O"    | 500-5607-06 | 41 | Left  |
| 12            | Center Trough  | 180-5009-00 | 27  | Small Target "M"    | 500-5607-02 | 42 | Cent  |
| 13            | Right Trough   | 180-5010-00 | 28  | Small Target "B"    | 500-5607-04 | 43 | Right |
| 14            | Shooter Lane   | 180-5100-01 | 29  | Super VUK           | 180-5064-00 | 44 | Left  |
| 15*           | Left Flip. Cab | 180-5048-01 | 30  | Left Slingshot      | 180-5054-00 | 45 | Cent  |



48 Playfield Switch Wiring Diagram

|                    |             |    |                     |             |
|--------------------|-------------|----|---------------------|-------------|
| Return Lane        | 500-5142-00 | 46 | Right Turbo Bumper  | 180-5015-00 |
| Outlane            | 500-5142-00 | 47 | Left Ramp Enter     | 500-5382-00 |
| Orbit Bottom       | 180-5090-00 | 48 | Left Ramp Exit      | 500-5633-00 |
| Orbit Top          | 500-5142-00 | 49 | Right Ramp Enter    | 500-5382-00 |
| Orbit Bottom       | 500-5142-00 | 50 | Right Ramp Exit     | 500-5633-00 |
| Orbit Trough       | 500-5633-00 | 51 | Not Used            | -           |
| Orbit Slingshot    | 180-5054-00 | 52 | VUK                 | 180-5063-00 |
| Return Lane        | 500-5142-00 | 53 | Not Used Through 64 | -           |
| Outlane            | 500-5142-00 |    |                     |             |
| Top Lane           | 500-5142-00 |    |                     |             |
| Outer Top Lane     | 500-5142-00 |    |                     |             |
| Inner Top Lane     | 500-5142-00 |    |                     |             |
| Turbo Bumper       | 180-5015-00 |    |                     |             |
| Outer Turbo Bumper | 180-5015-00 |    |                     |             |

\*Indicates Cabinet Switches.

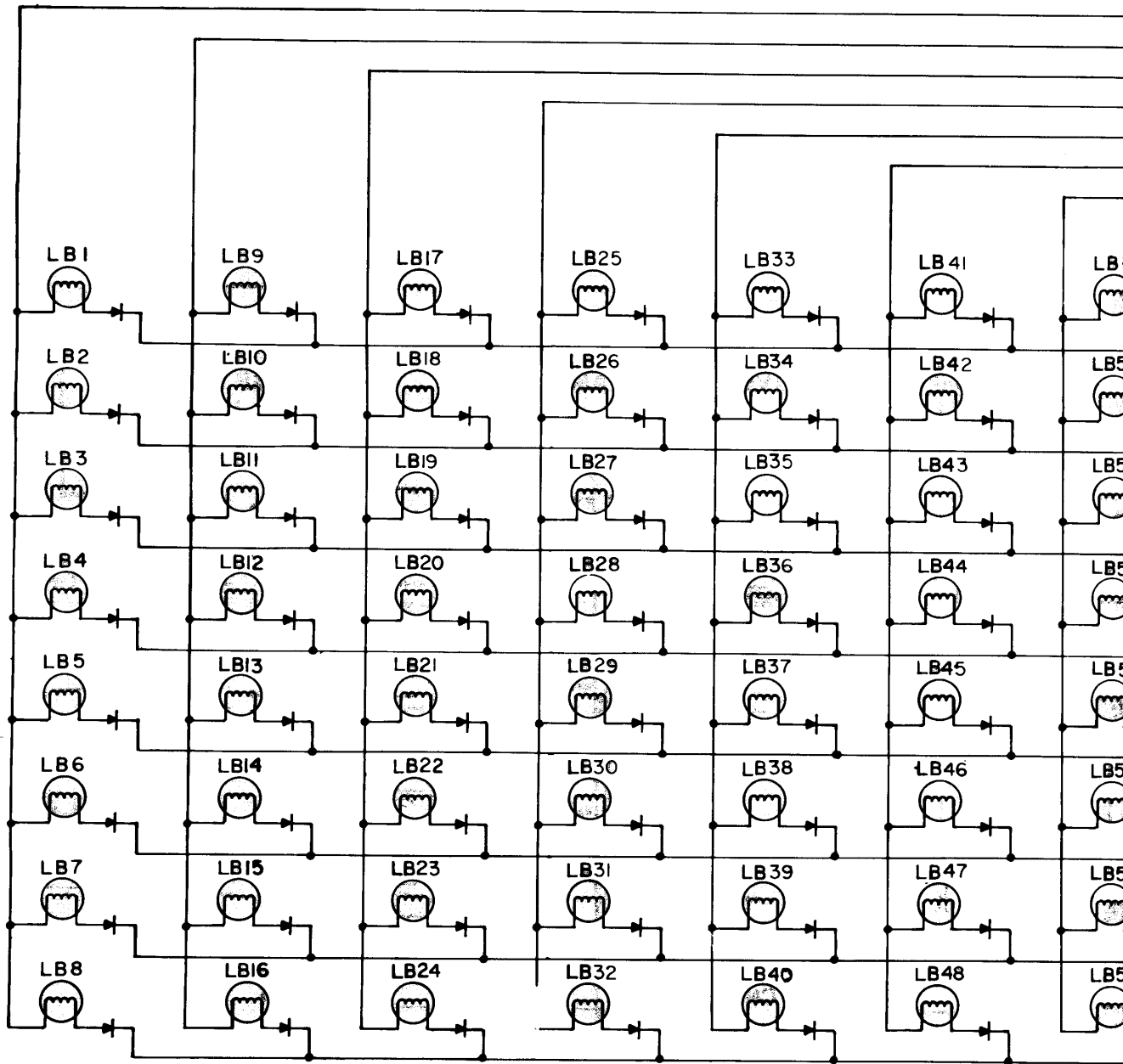




| Lamp Number | Description        |
|-------------|--------------------|
| 01          | Top Blue           |
| 02          | Middle Blue        |
| 03          | Bottom Blue        |
| 04          | Top Yellow         |
| 05          | Middle Yellow      |
| 06          | Bottom Yellow      |
| 07          | Bottom Red         |
| 08          | Middle Red         |
| 09          | Top Red            |
| 10          | Bottom Green       |
| 11          | Middle Green       |
| 12          | Top Green          |
| 13          | Pie TRI-BALL       |
| 14          | Spin & Win         |
| 15          | Credit Button      |
| 16          | Left Ramp Entrance |

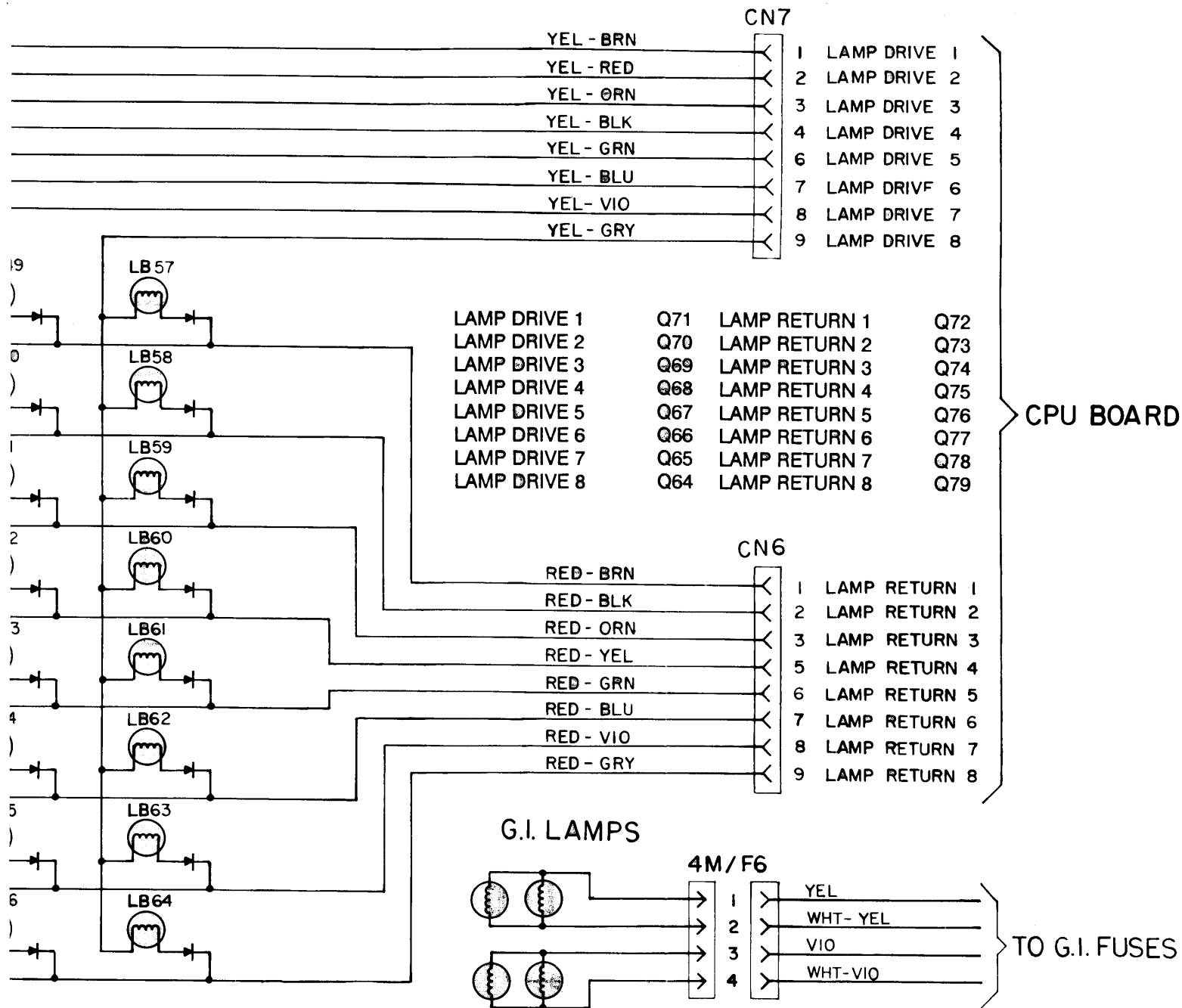
|    |                   |    |
|----|-------------------|----|
| 17 | Drop Target 1     | 33 |
| 18 | Drop Target 2     | 34 |
| 19 | Drop Target 3     | 35 |
| 20 | Drop Target 4     | 36 |
| 21 | Drop Target 5     | 37 |
| 22 | Left Return Lane  | 38 |
| 23 | Right Return Lane | 39 |
| 24 | Right Outlane     | 40 |
| 25 | BOMB Light        | 41 |
| 26 | BOMB Light        | 42 |
| 27 | BOMB Light        | 43 |
| 28 | BOMB Light        | 44 |
| 29 | Laser Kick 1 Mil  | 45 |
| 30 | Laser Kick 3 Mil  | 46 |
| 31 | Laser Kick 5 Mil  | 47 |
| 32 | Advance X         | 48 |

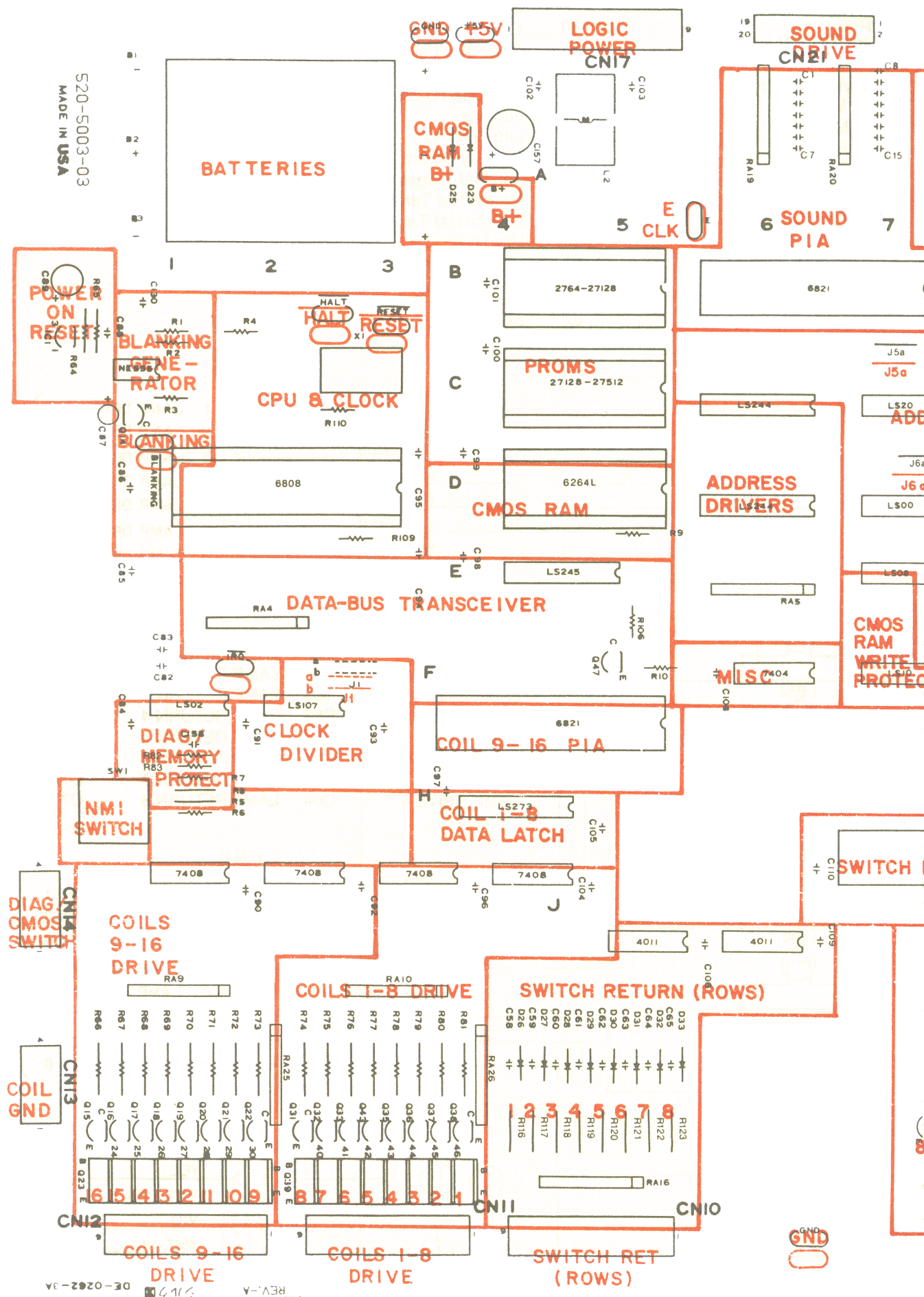
\*Indicates Speaker or Backbox I



- |                     |    |                     |
|---------------------|----|---------------------|
| WABAC ???           | 49 | Left Top Lane       |
| Looping             | 50 | Center Top Lane     |
| Instant TRI-BALL    | 51 | Right Top Lane      |
| 10 Million          | 52 | TRI-BALL            |
| Lite Mystery Select | 53 | Right Ramp Entrance |
| Loose Moose         | 54 | Jackpot             |
| Bomb Millions       | 55 | Lite WABAC          |
| Super Pops          | 56 | Mystery Select      |
| Daisy SELECT        | 57 | Top Hat Target      |
| Daisy SELECT        | 58 | Middle Hat Target   |
| Daisy SELECT        | 59 | Bottom Hat Target   |
| Daisy SELECT        | 60 | Hat Trick           |
| Daisy SELECT        | 61 | Rhino Bonus         |
| Extra Ball          | 62 | Lite Laser Kick     |
| Launch Button       | 63 | Special             |
|                     | 64 | Shoot Again         |

.amp

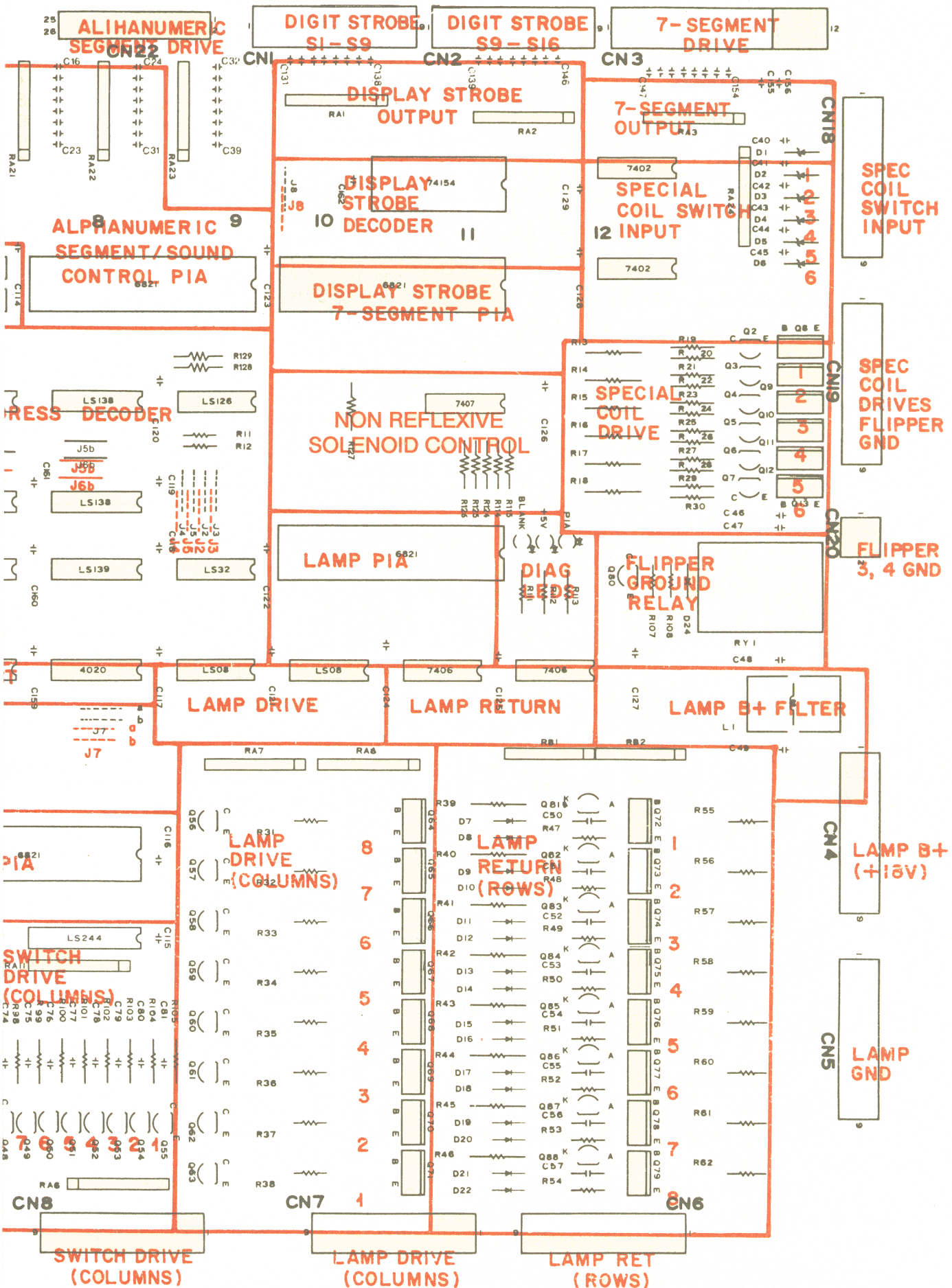


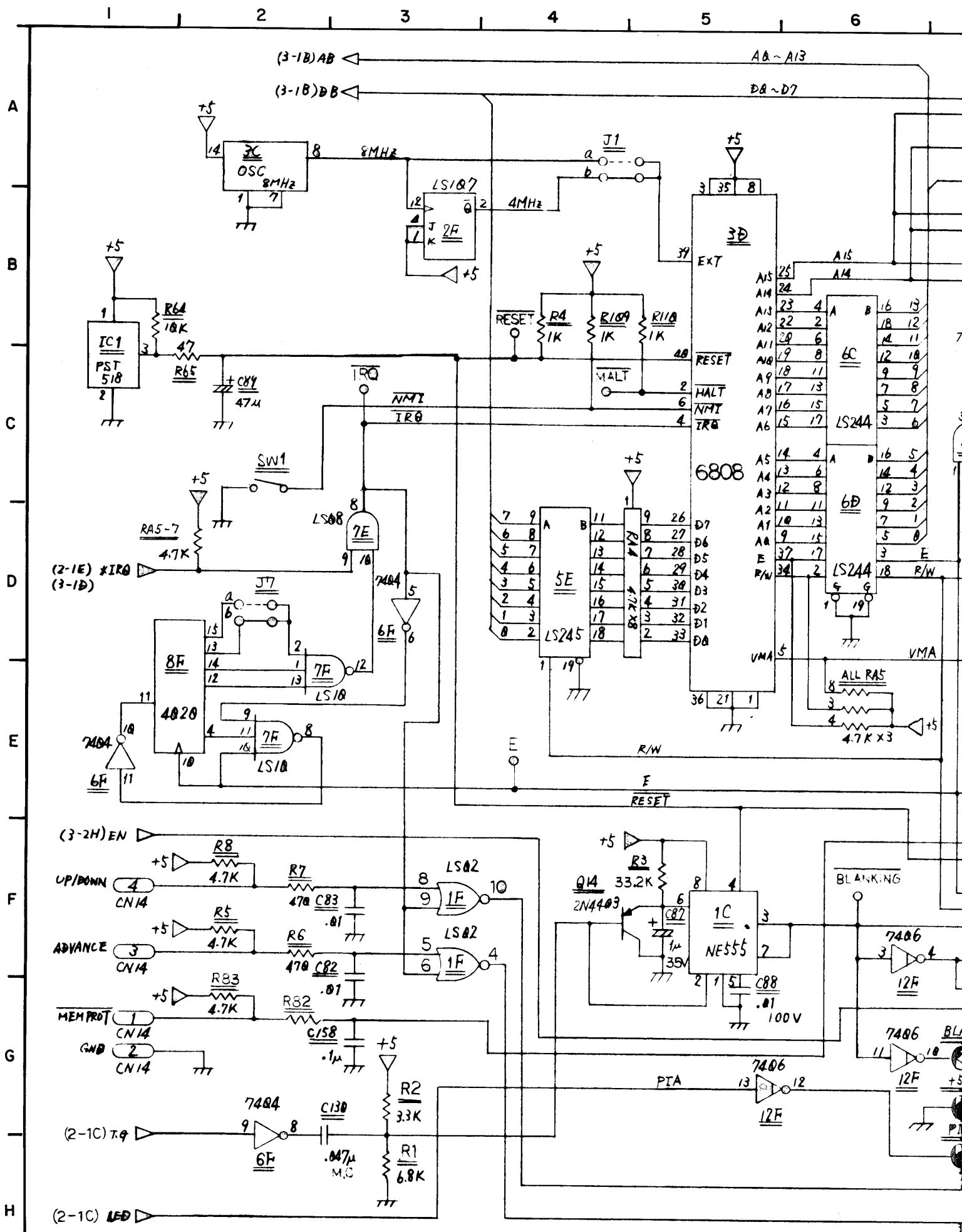


520-5003-03  
MADE IN USA

520-5003-03 REV. A  
DE-0262-3A

50 CPU Board Assembly Diagram

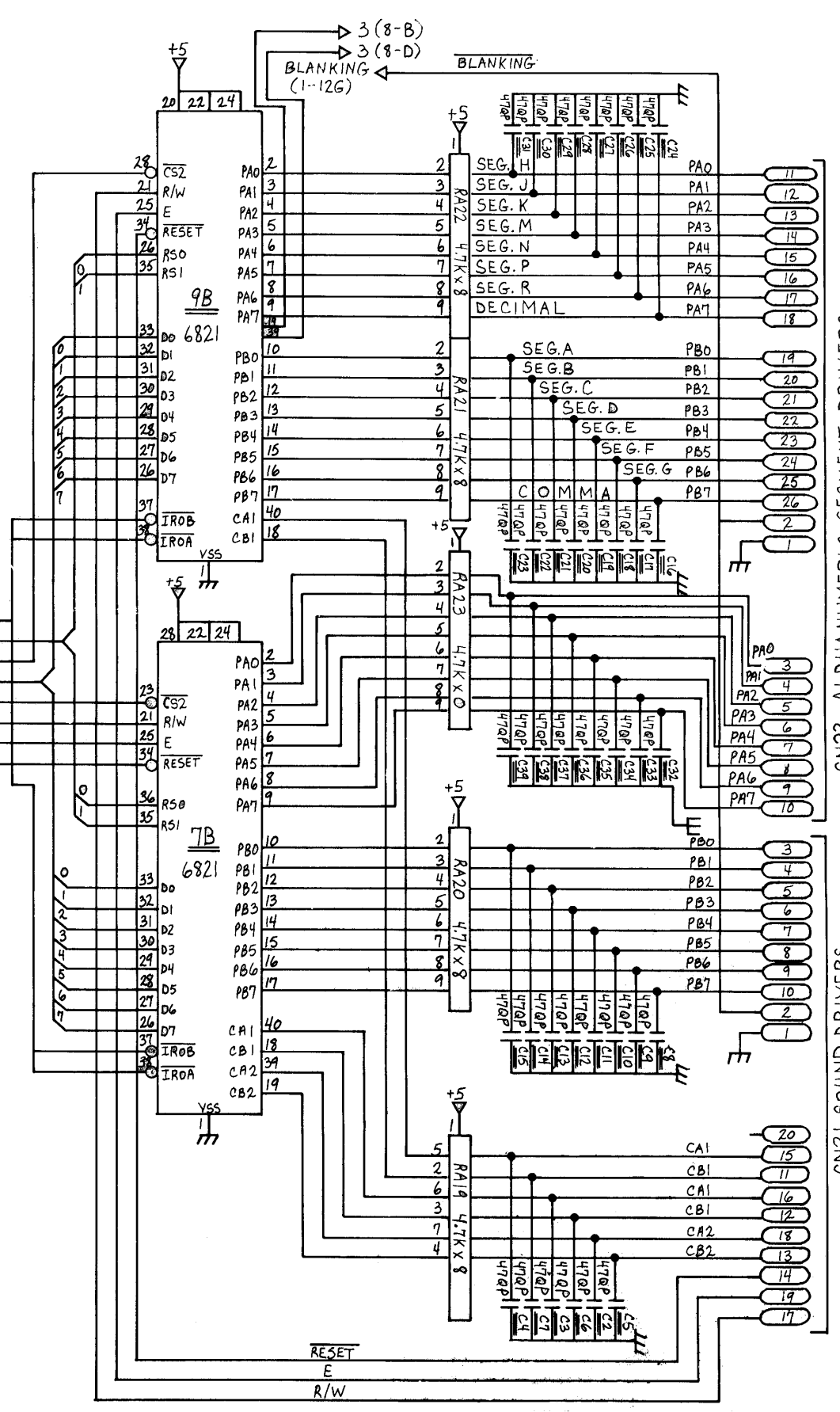
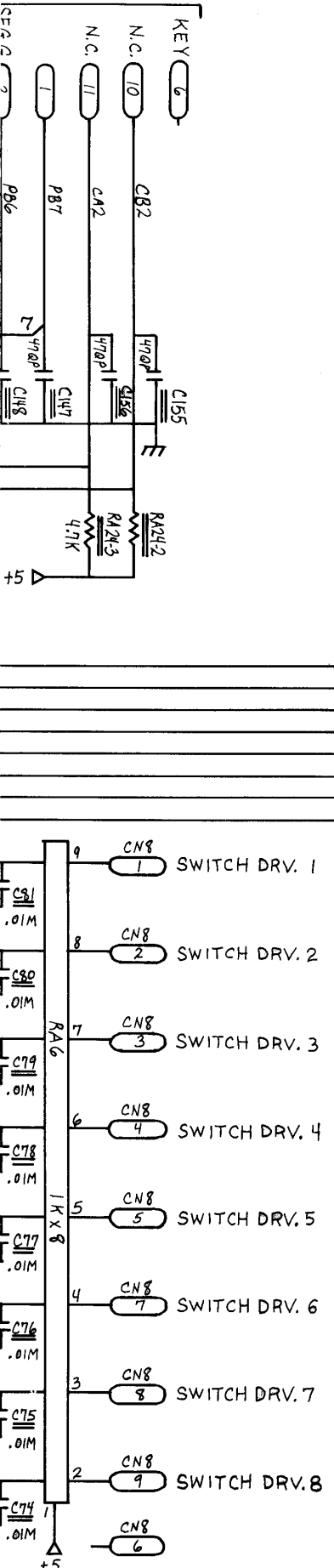








DIS. BD)

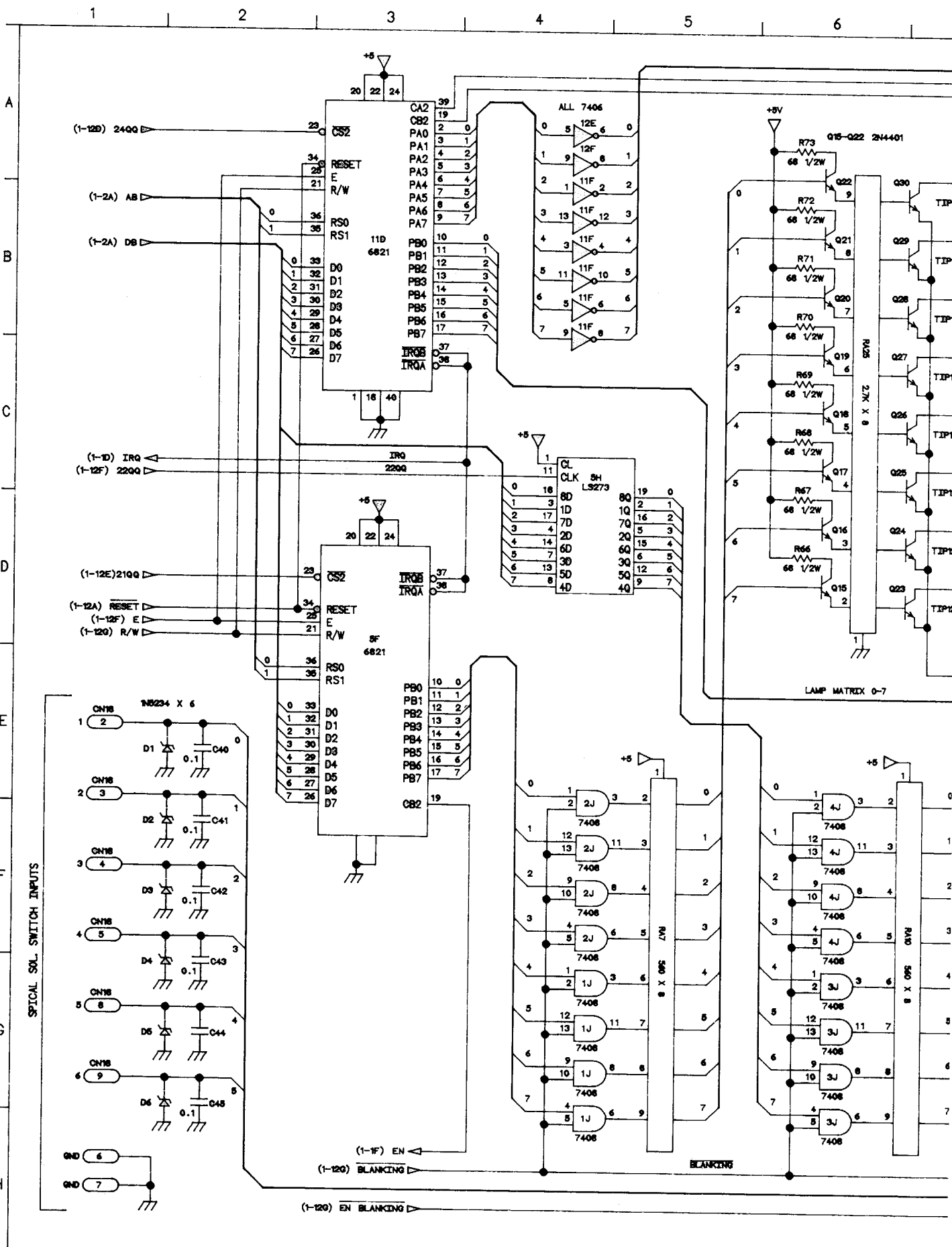


A  
B  
C  
D  
E  
F  
G  
H

CN22 ALPHANUMERIC SEGMENT DRIVERS

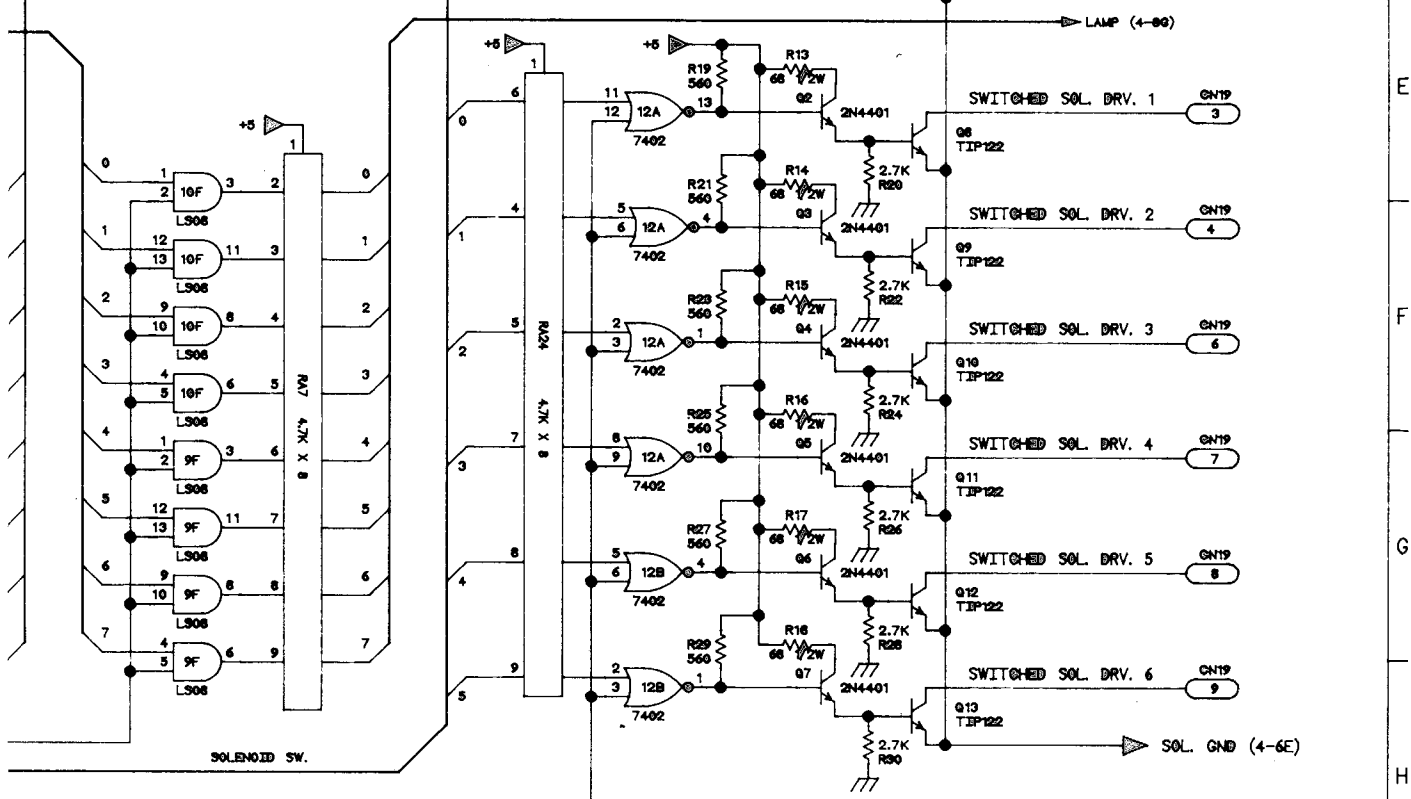
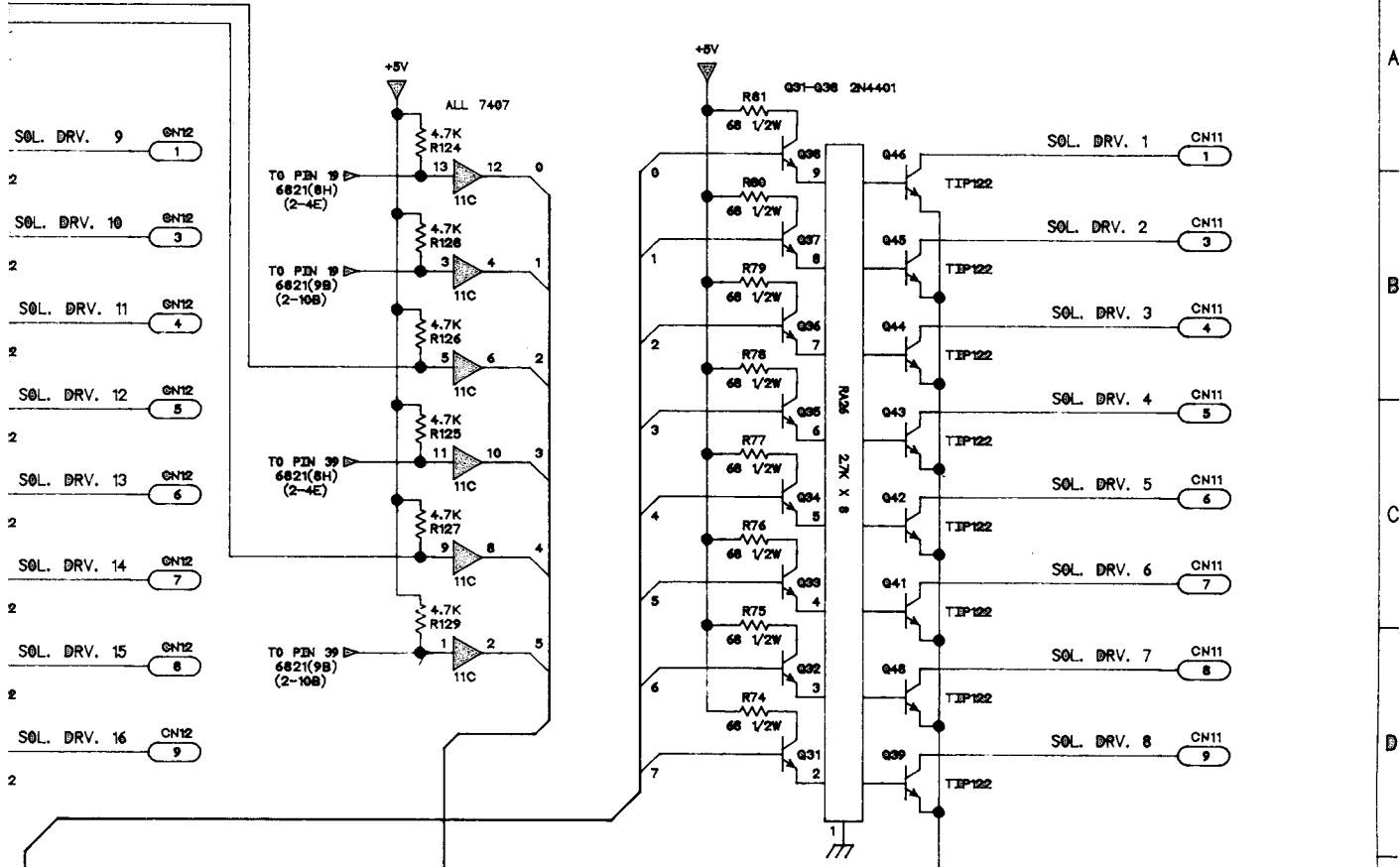
CN21 SOUND DRIVERS

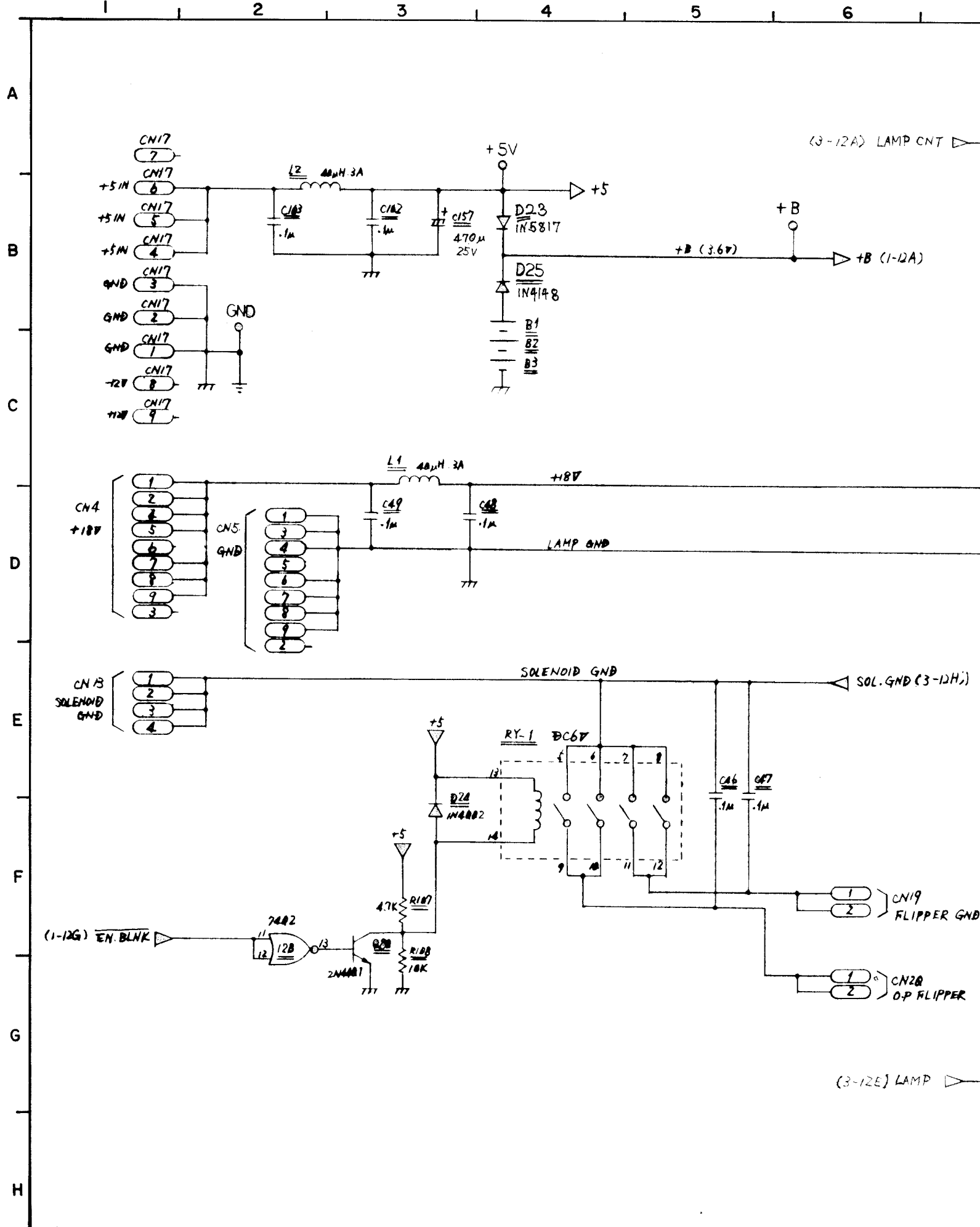


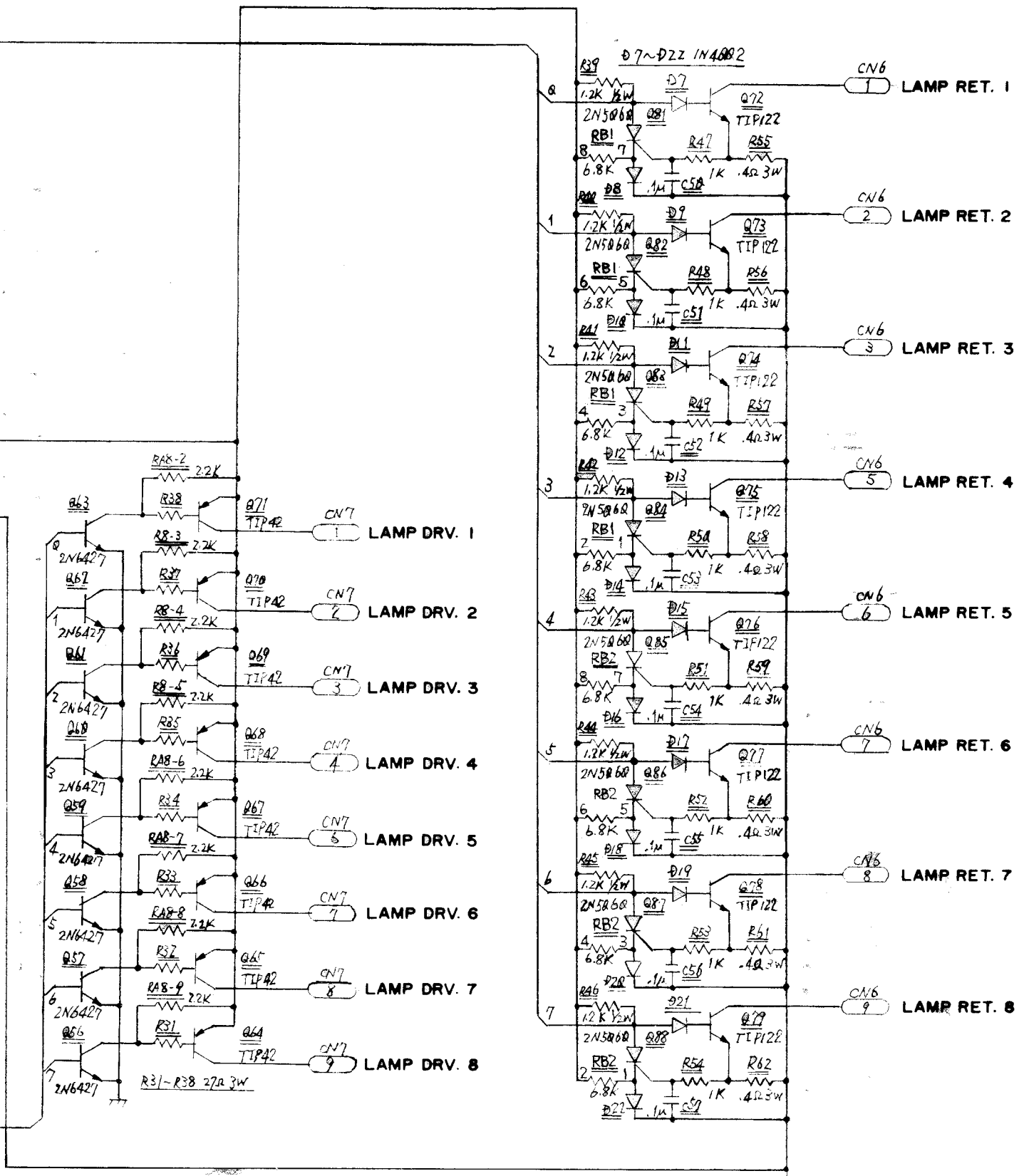


LAMP MATRIX CONT. 0-7

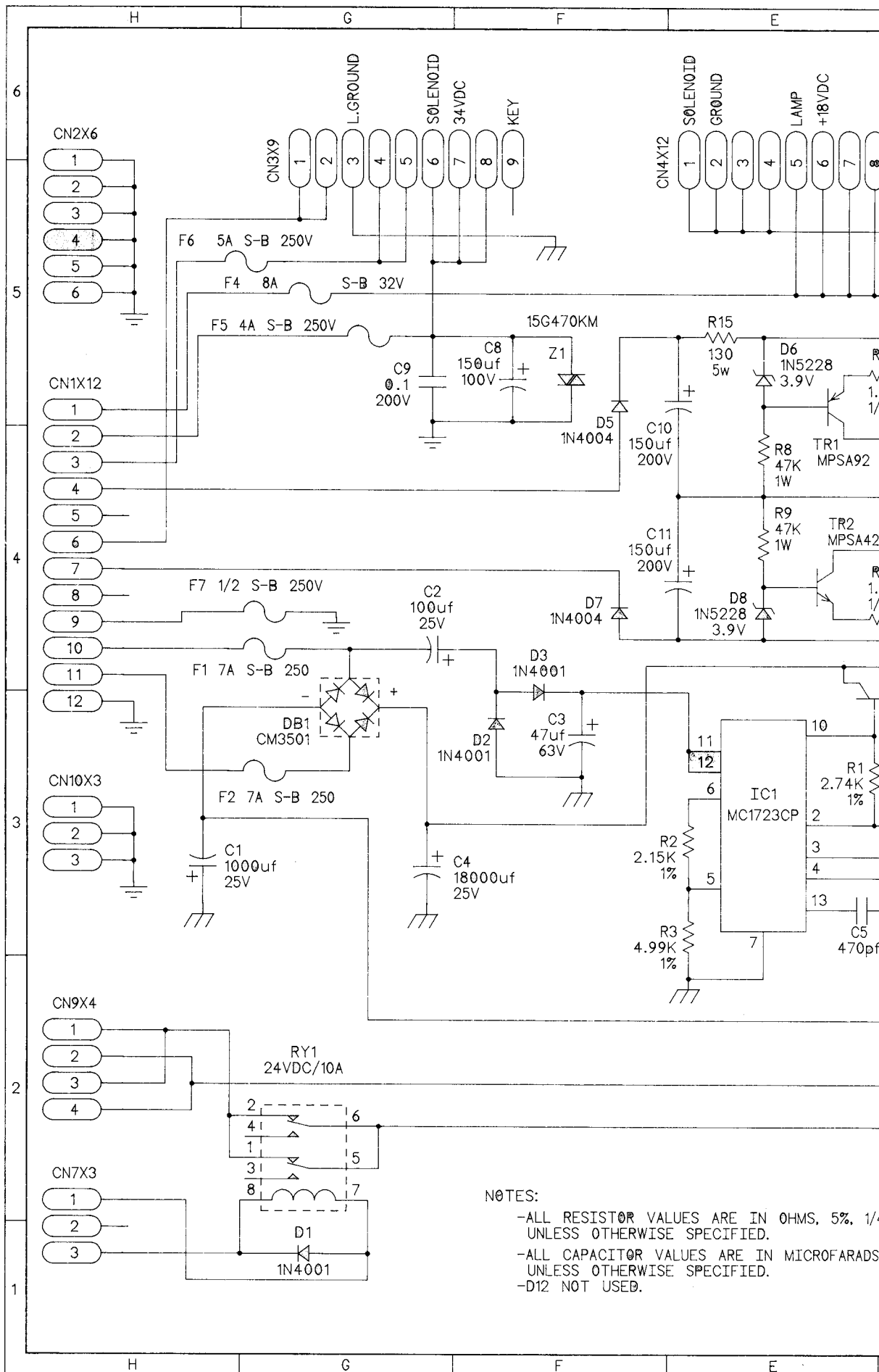
LAMP CNT (4-8A)





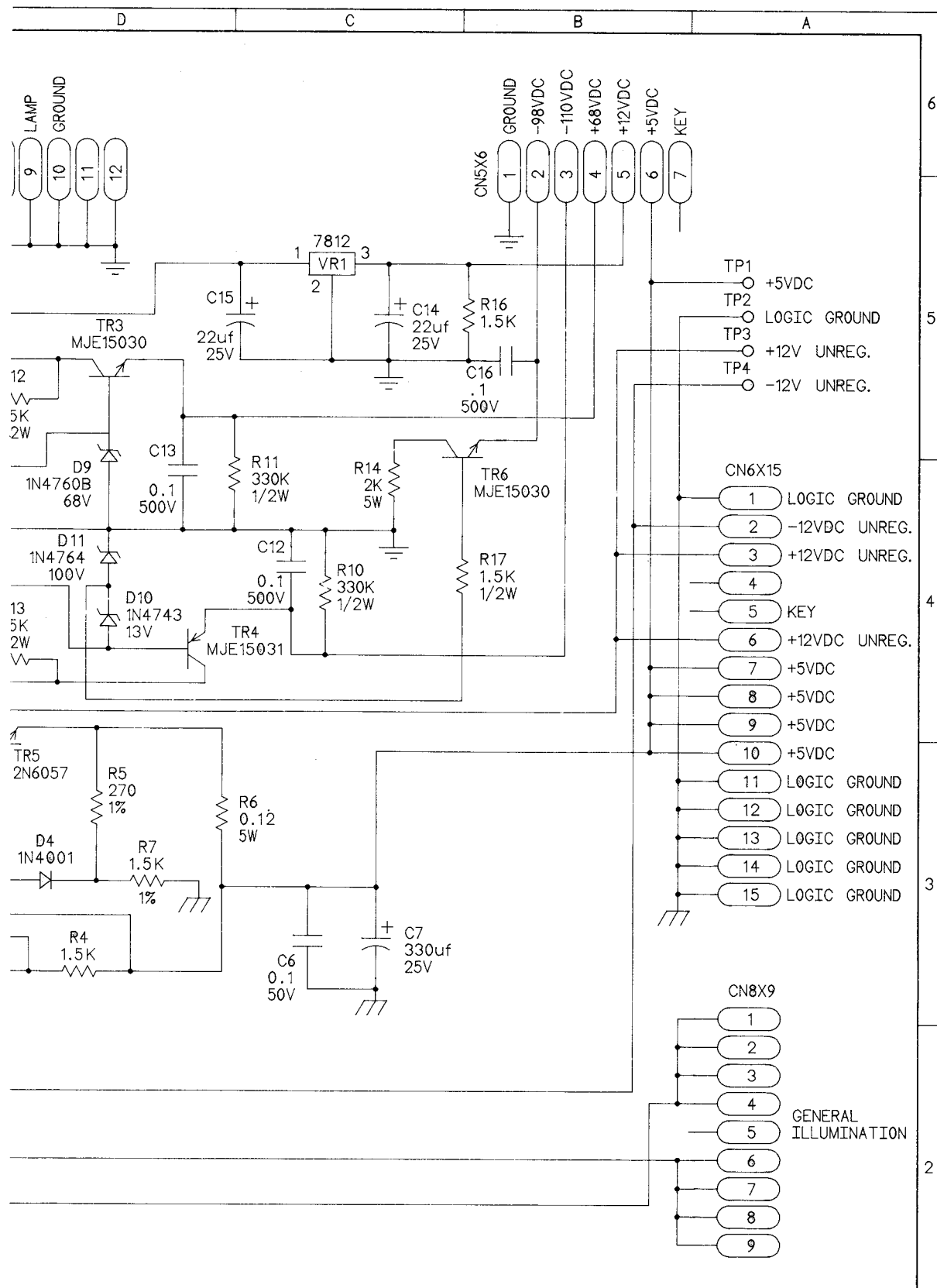


777



NOTES:

- ALL RESISTOR VALUES ARE IN OHMS, 5%, 1/4% UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
- D12 NOT USED.



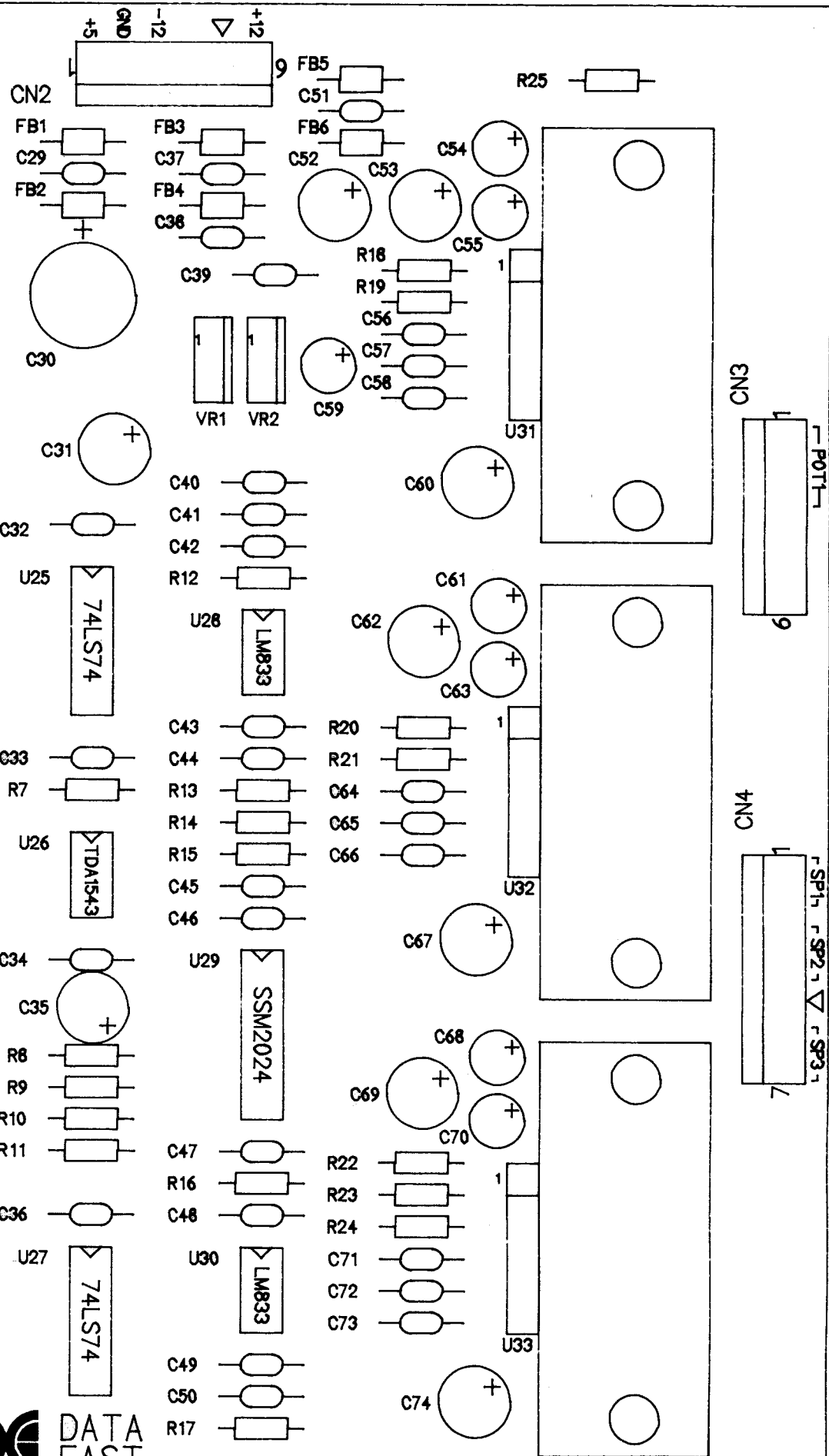
DATA EAST PINBALL  
POWER SUPPLY BOARD SCHEMATIC

PREPARED BY:  
CES INC.

DWG PART NO. 520-5047-01  
C SHEET 1 OF 1  
SIZE MODEL

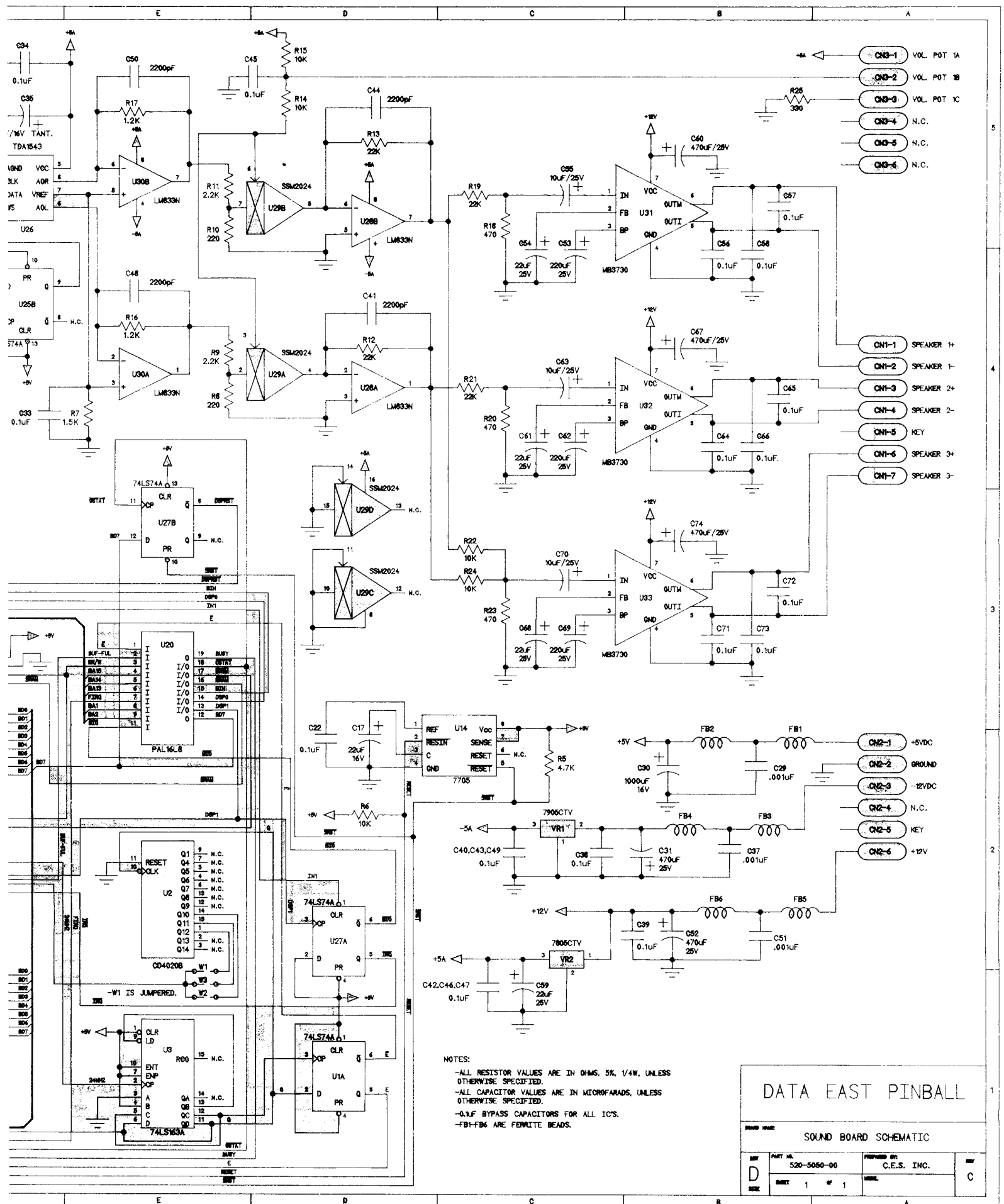
REV  
B







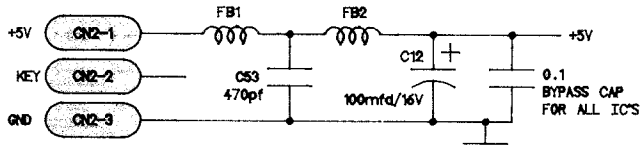




NOTES:  
 -ALL RESISTOR VALUES ARE IN OHMS, 5%, 1/4W, UNLESS OTHERWISE SPECIFIED.  
 -ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.  
 -0.1uF BYPASS CAPACITORS FOR ALL IC'S.  
 -FB1-FB6 ARE FERRITE BEADS.

### DATA EAST PINBALL

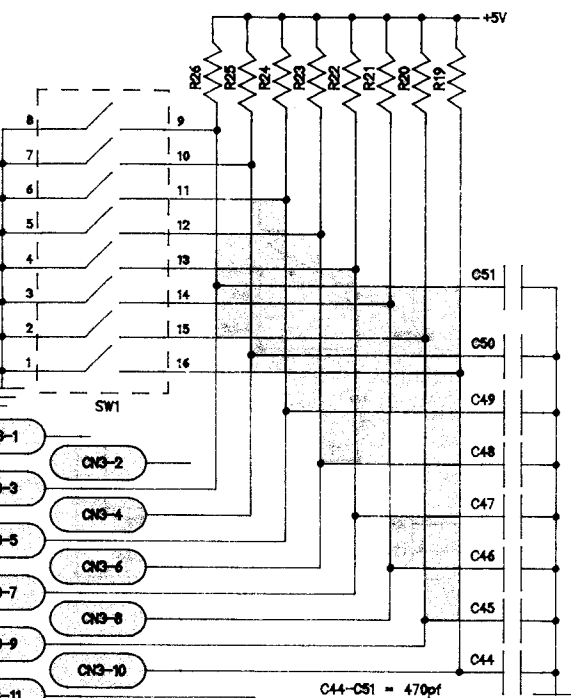
|                       |             |             |     |
|-----------------------|-------------|-------------|-----|
| BOARD NAME            |             |             |     |
| SOUND BOARD SCHEMATIC |             |             |     |
| REV                   | PART NO.    | PREPARED BY | REV |
| D                     | 520-5050-00 | C.E.S. INC. | C   |
| DATE                  | SHEET 1     | OF 1        |     |



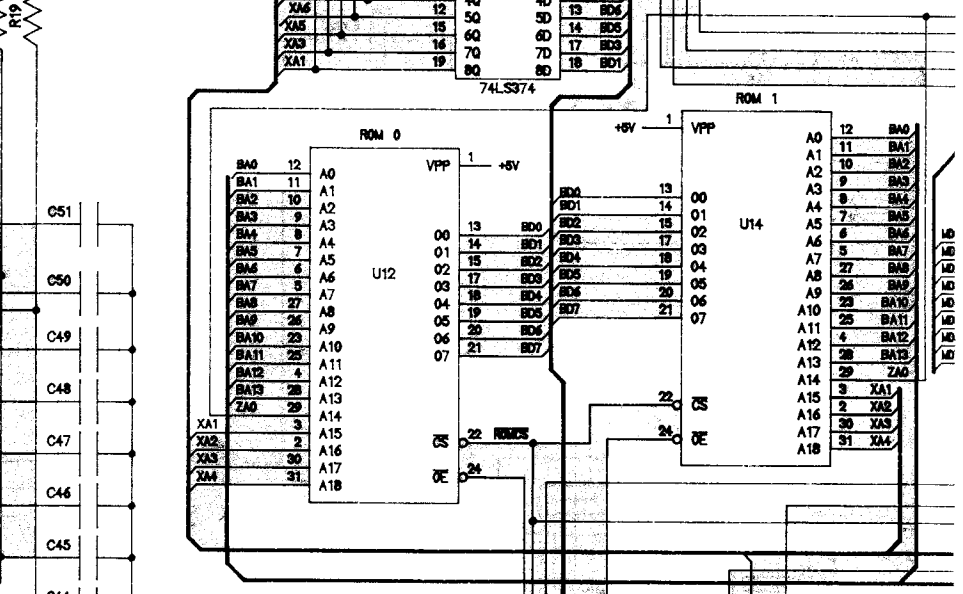
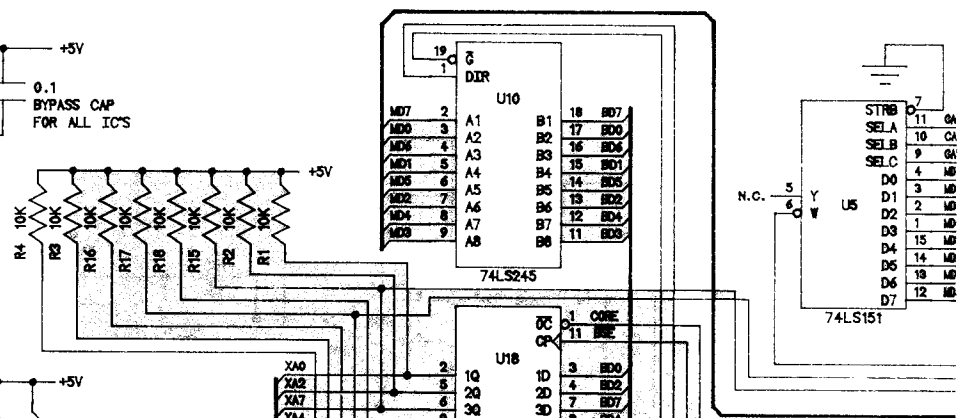
NOTES

- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- FB1 AND FB2 ARE FERRITE BEADS.

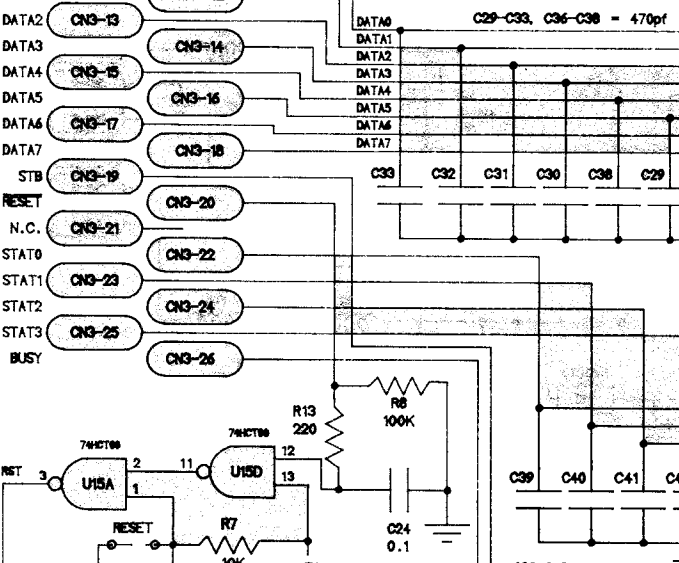
R19-R26 = 4.7K



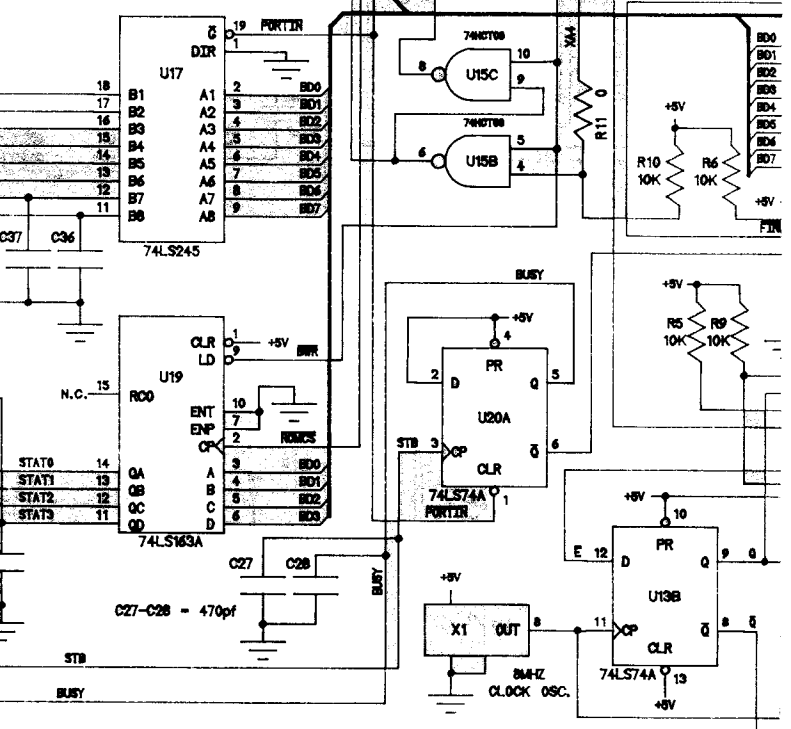
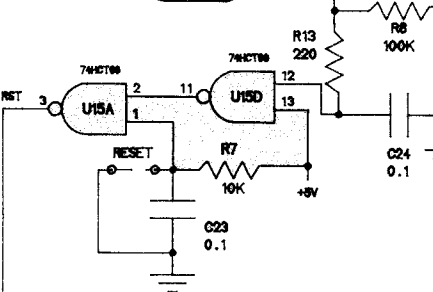
- N.C. CN3-1
- N.C. CN3-2
- SW1 CN3-3
- SW2 CN3-4
- SW3 CN3-5
- SW4 CN3-6
- SW5 CN3-7
- SW6 CN3-8
- SW7 CN3-9
- SW8 CN3-10
- DATA0 CN3-11
- DATA1 CN3-12
- DATA2 CN3-13
- DATA3 CN3-14
- DATA4 CN3-15
- DATA5 CN3-16
- DATA6 CN3-17
- DATA7 CN3-18
- STB CN3-19
- RESET CN3-20
- N.C. CN3-21
- STAT0 CN3-22
- STAT1 CN3-23
- STAT2 CN3-24
- STAT3 CN3-25
- BUSY CN3-26

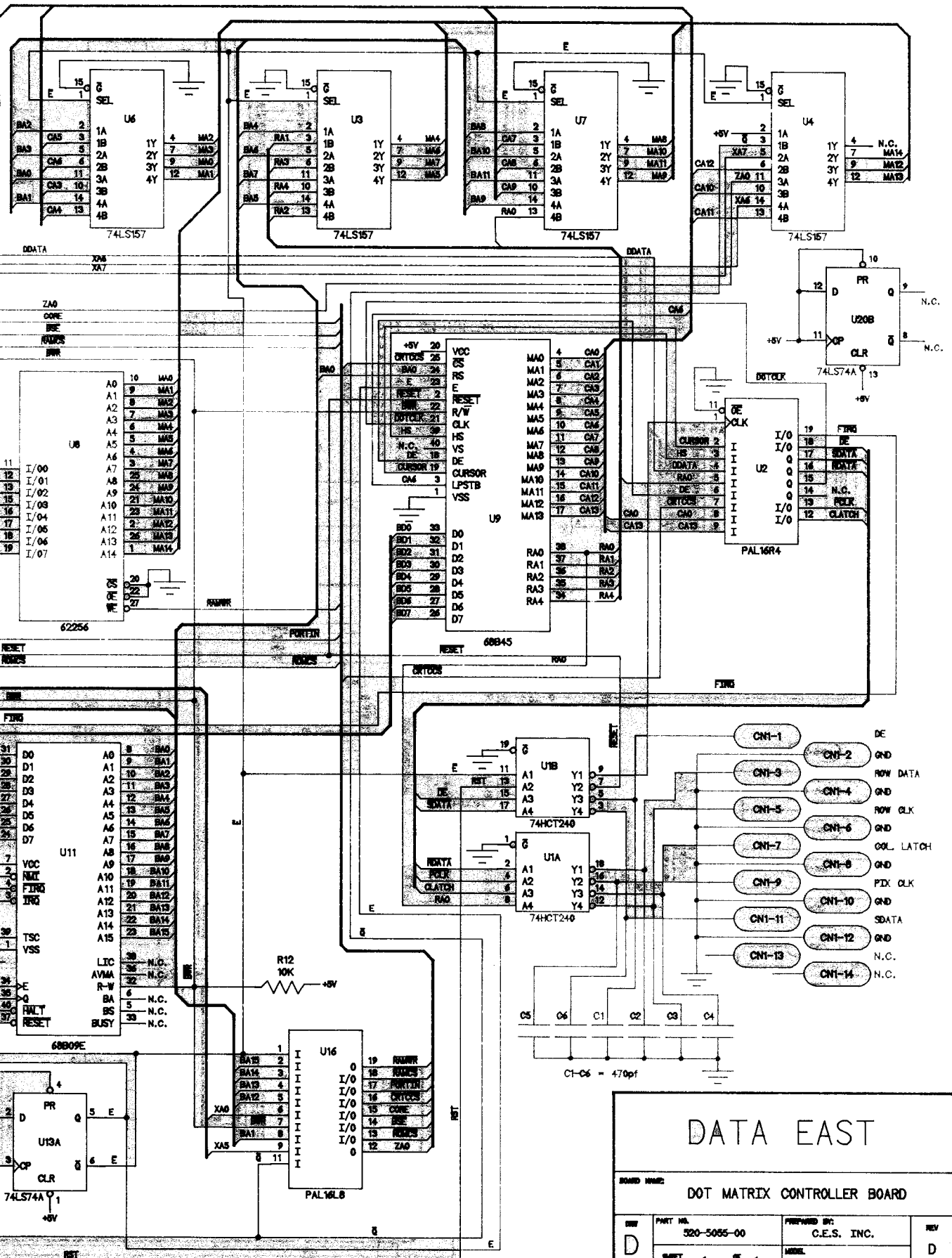


B



A

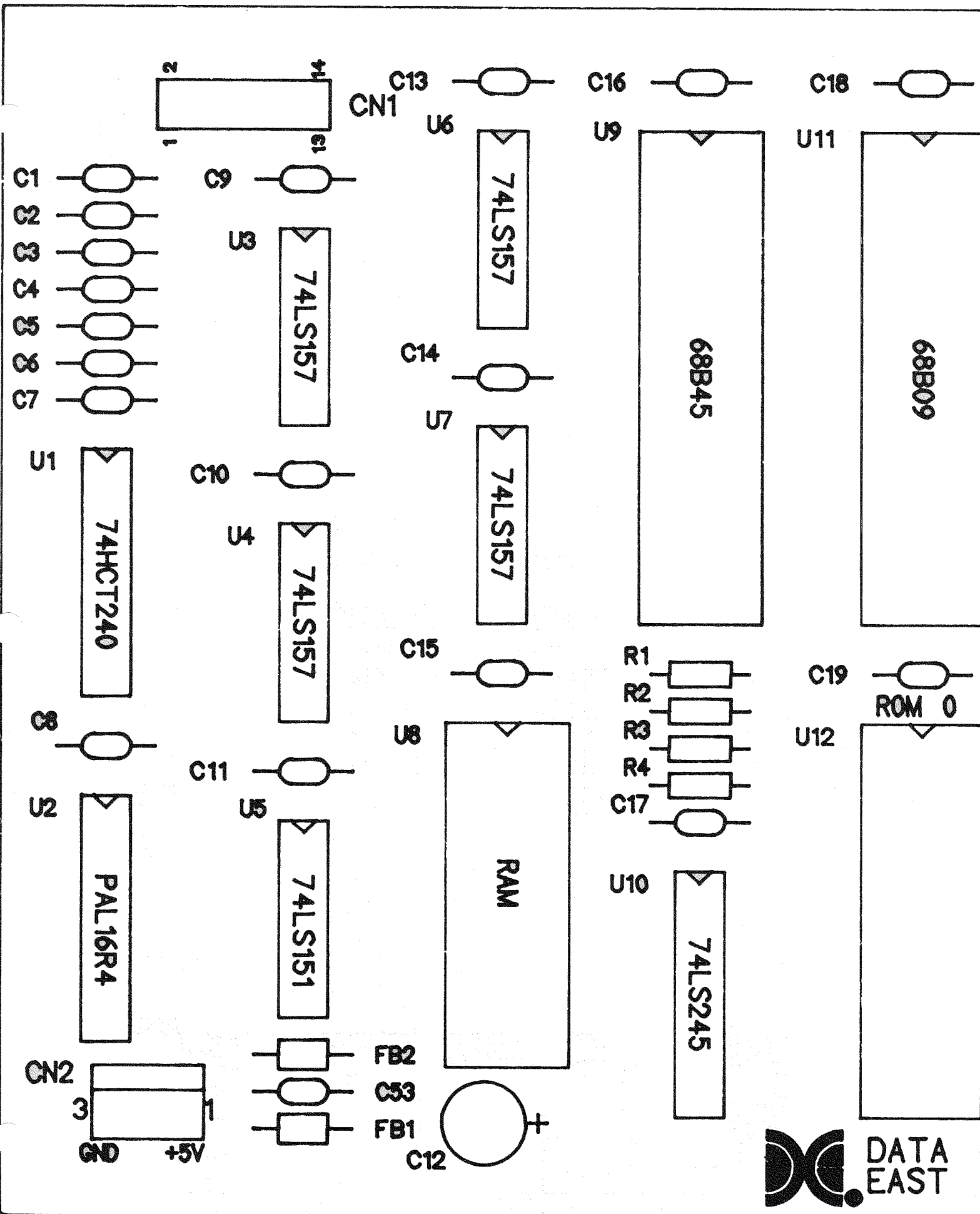


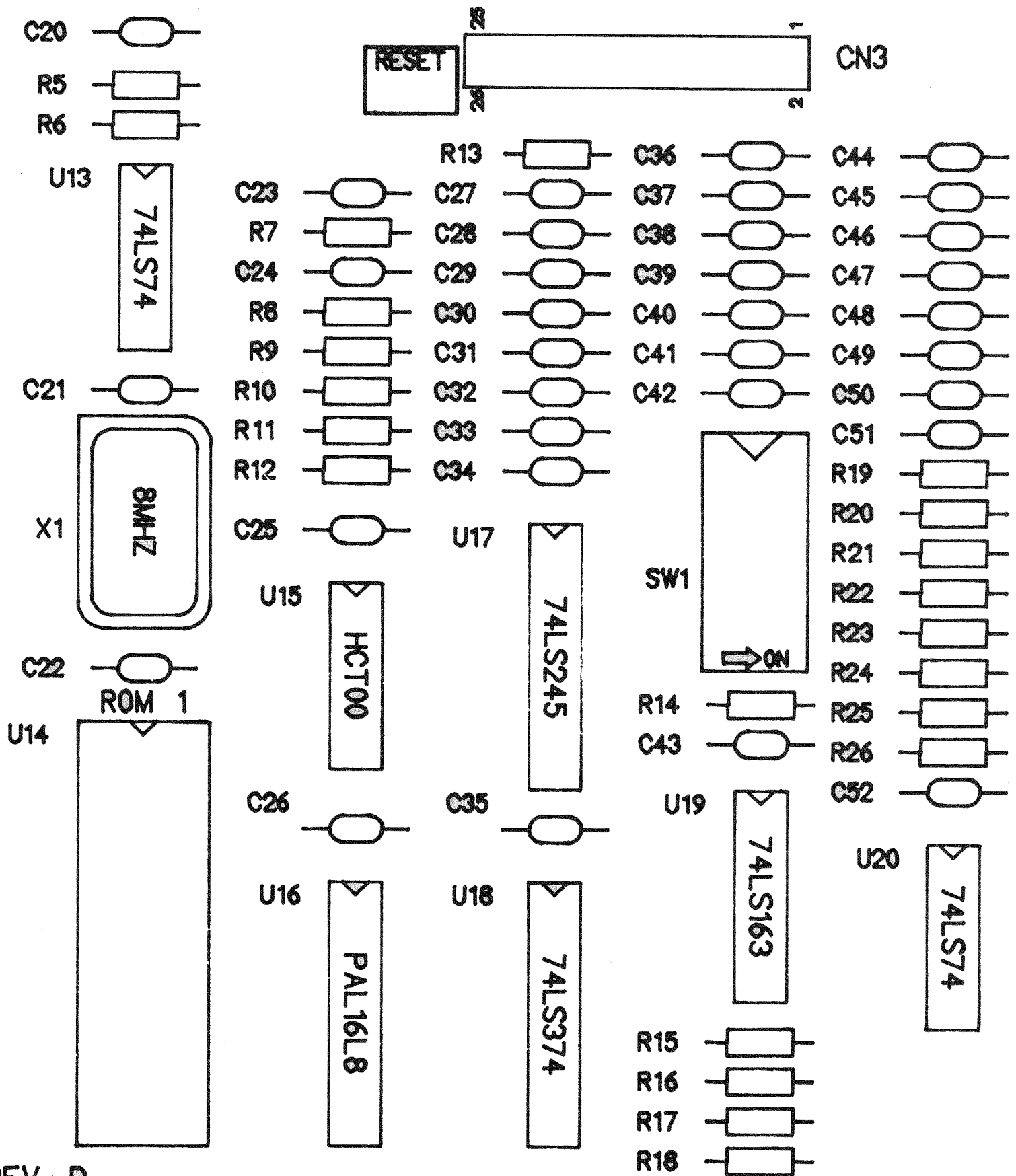


**DATA EAST**

BOARD NAME:  
**DOT MATRIX CONTROLLER BOARD**

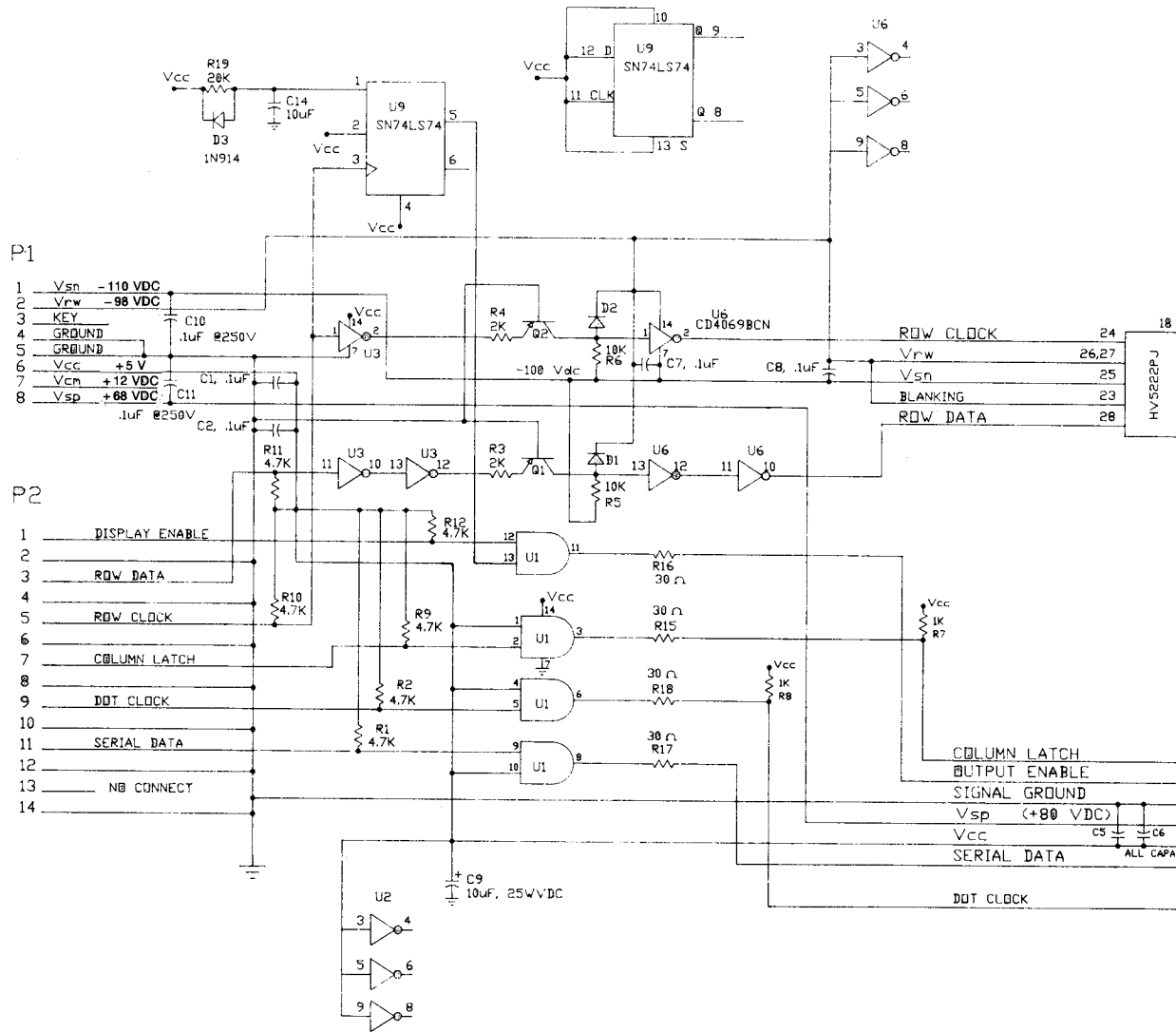
|      |              |              |     |
|------|--------------|--------------|-----|
| REV  | PART NO.     | PREPARED BY: | REV |
| D    | 520-5055-00  | C.E.S. INC.  | D   |
| SIZE | SHEET 1 OF 1 | MODEL        |     |





REV.-D  
520-5055-00

| PART NO.  | INTL CODE |
|-----------|-----------|
| 281103-01 | S         |
|           |           |
|           |           |
|           |           |



NOTES

| REVISIONS |     |             |      |          |
|-----------|-----|-------------|------|----------|
| ZONE      | SYM | DESCRIPTION | DATE | APPROVED |
|           |     |             |      |          |
|           |     |             |      |          |
|           |     |             |      |          |

D

C

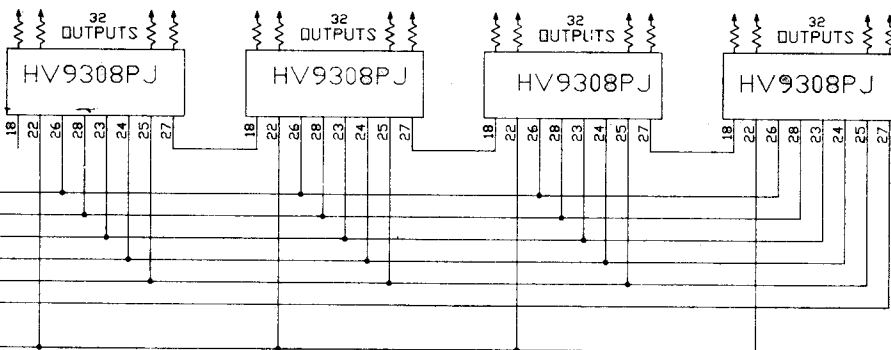


CATHODE CONNECTIONS

DALE PLASMA DISPLAY PD-128G032

ANODE CONNECTIONS

ANODE CONNECTIONS



ALL RESISTORS ARE 27K OHM X 128 RESISTORS

C4 C3 CAPACITORS ARE .1uF.

FOLD B

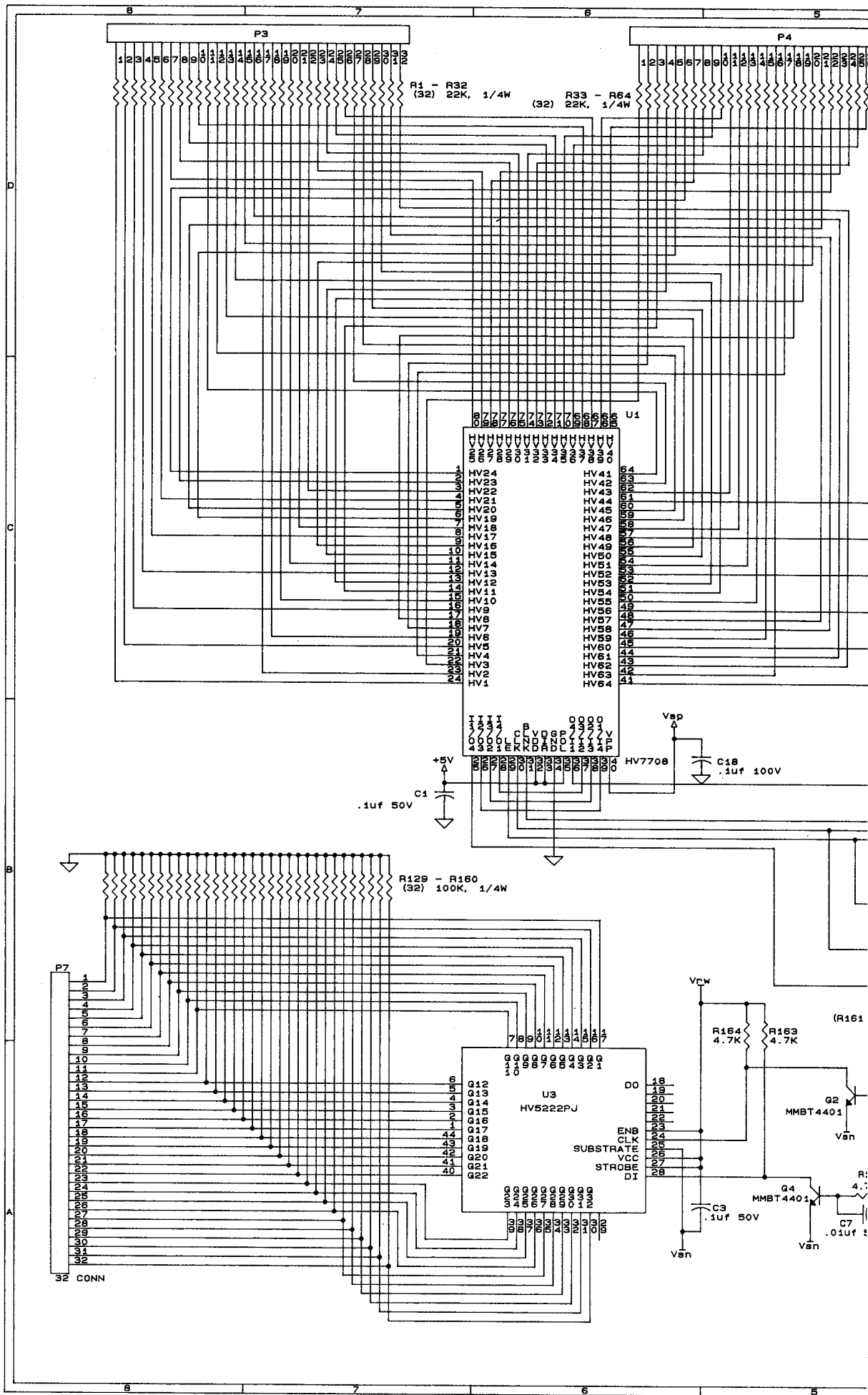
281103

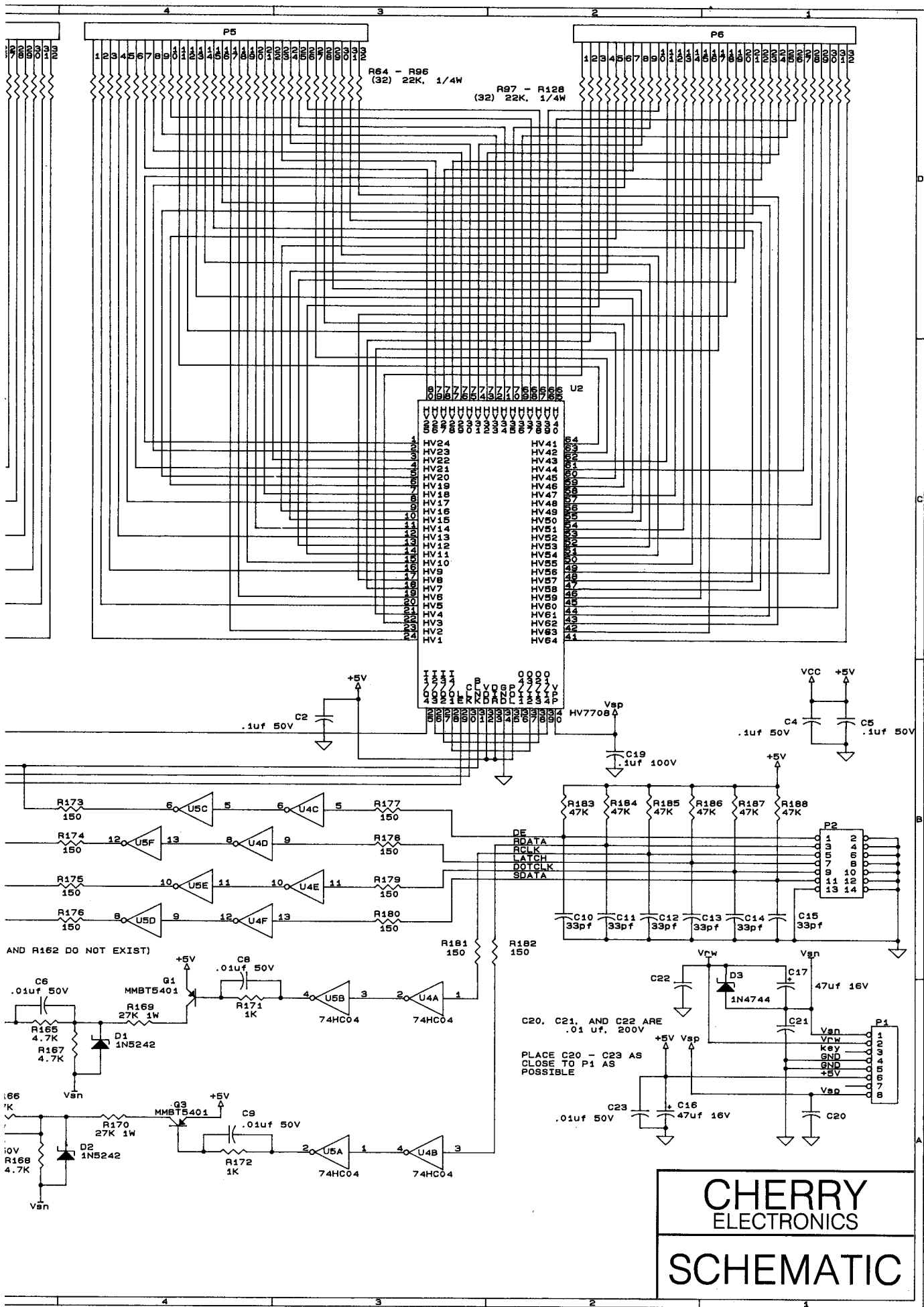
CLASS 2

|  |  |   |  |  |
|--|--|---|--|--|
| <small>THESE DIMENSIONS AND SPECIFICATIONS ARE THE PROPERTY OF DALE ELECTRONICS, INC. AND IS MADE IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED BY COPY OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT PERMISSIVE WRITING.</small> | <small>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES</small><br><small>TOLERANCES ON FRACTIONS DECIMALS ANGLES HOLE DIMENSIONS</small><br><small>1/16 1/32 1/64 .005 .0025 0.30 .0001-.0002</small>  | <small>SIGNATURES</small><br><small>DATE</small><br>DR <i>John Matijka</i> 92-02-21<br>CHKD <i>Vasa Kocman</i> 92-03-08<br>DSGN <i>Z. SHANK</i> 92-02-06<br>SR PROJ<br>ENGR<br>SECT<br>SUPER<br>APPD <i>KEITH R. GYSEY</i> 92-03-07 | <b>DALE ELECTRONICS, INC.</b><br>A COMPANY OF VISHAY<br>COLUMBUS, NEBRASKA |  |
|  | <small>BREAK SHARP CORNERS AND ROUNDS</small><br><small>LIMITS APPLY OVER NON-PAINTED FINISHES</small><br><small>COMMERCIAL TOLERANCES APPLY TO STOCK SIZES</small><br><small>GEOMETRIC SYMBOLS PER ANSI Y14.5</small><br><small>ALL MACHINED SURFACES</small> <input checked="" type="checkbox"/> | <small>MATERIAL</small><br><br><small>FINISH</small><br><br><small>SPECIFICATIONS IN BRACKETS IS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.</small>   | <small>TITLE</small><br><b>ELECTRICAL SCHEMATIC</b><br><b>APD-128G032</b>  | <small>SIZE (CODE IDENT NO.)</small><br><b>D 91637</b> |
|  | <small>SCALE</small> NONE  | <small>DRAWING NO.</small><br><b>281103</b>   | <small>SHEET</small> 1 OF 1  |  |
|  |  |   |  |  |

A

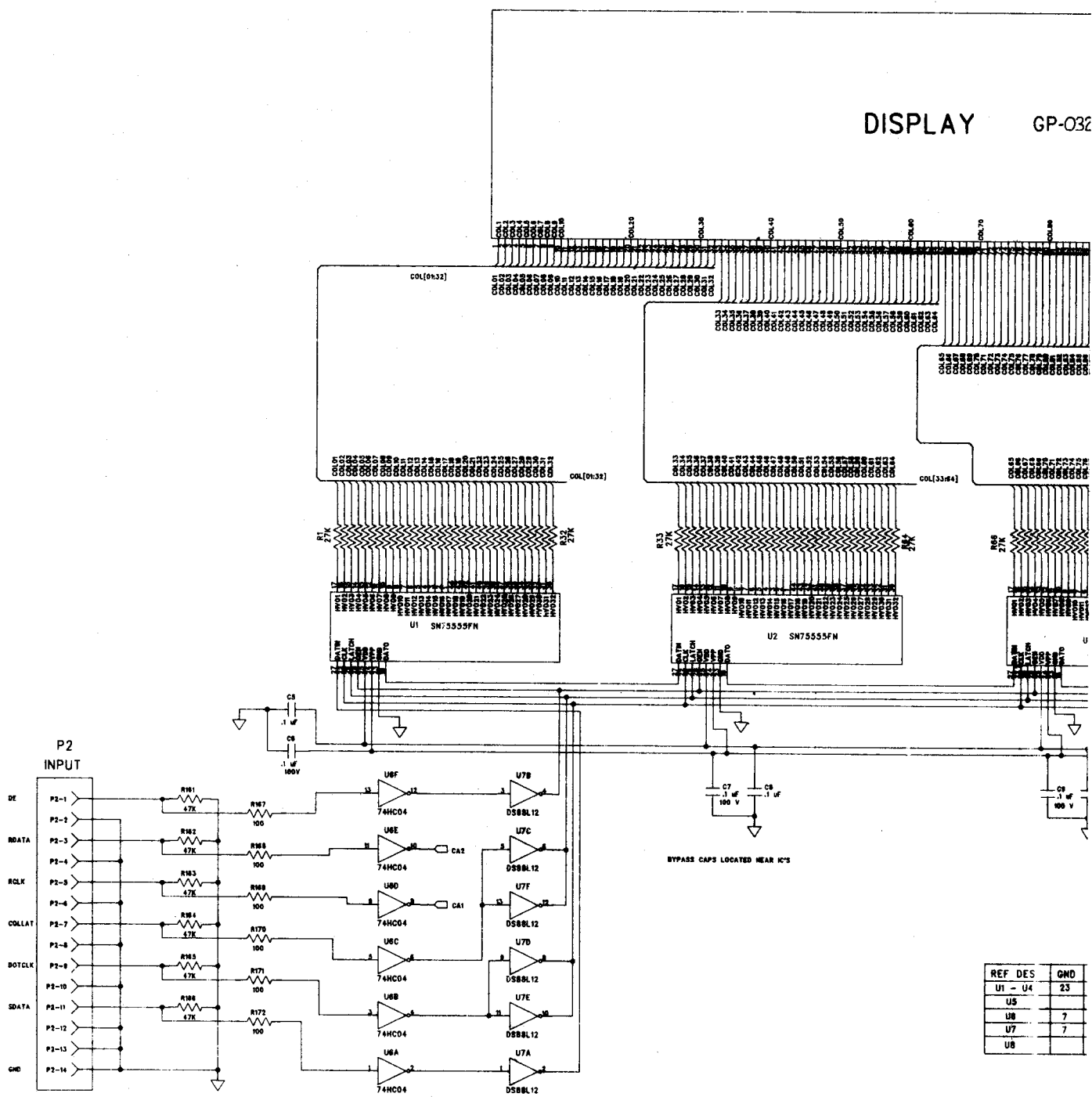






**CHERRY**  
ELECTRONICS  
**SCHEMATIC**

DISPLAY GP-032



| REF     | DES | QND |
|---------|-----|-----|
| U1 - U4 |     | 23  |
| U5      |     | 7   |
| U6      |     | 7   |
| U7      |     | 7   |
| U8      |     |     |

2. RESISTOR VALUES ARE IN OHMS, 1/8 WATT, 5%.
1. CAPACITOR VOLTAGES ARE 50V, 20%.
- NOTES: UNLESS OTHERWISE SPECIFIED.

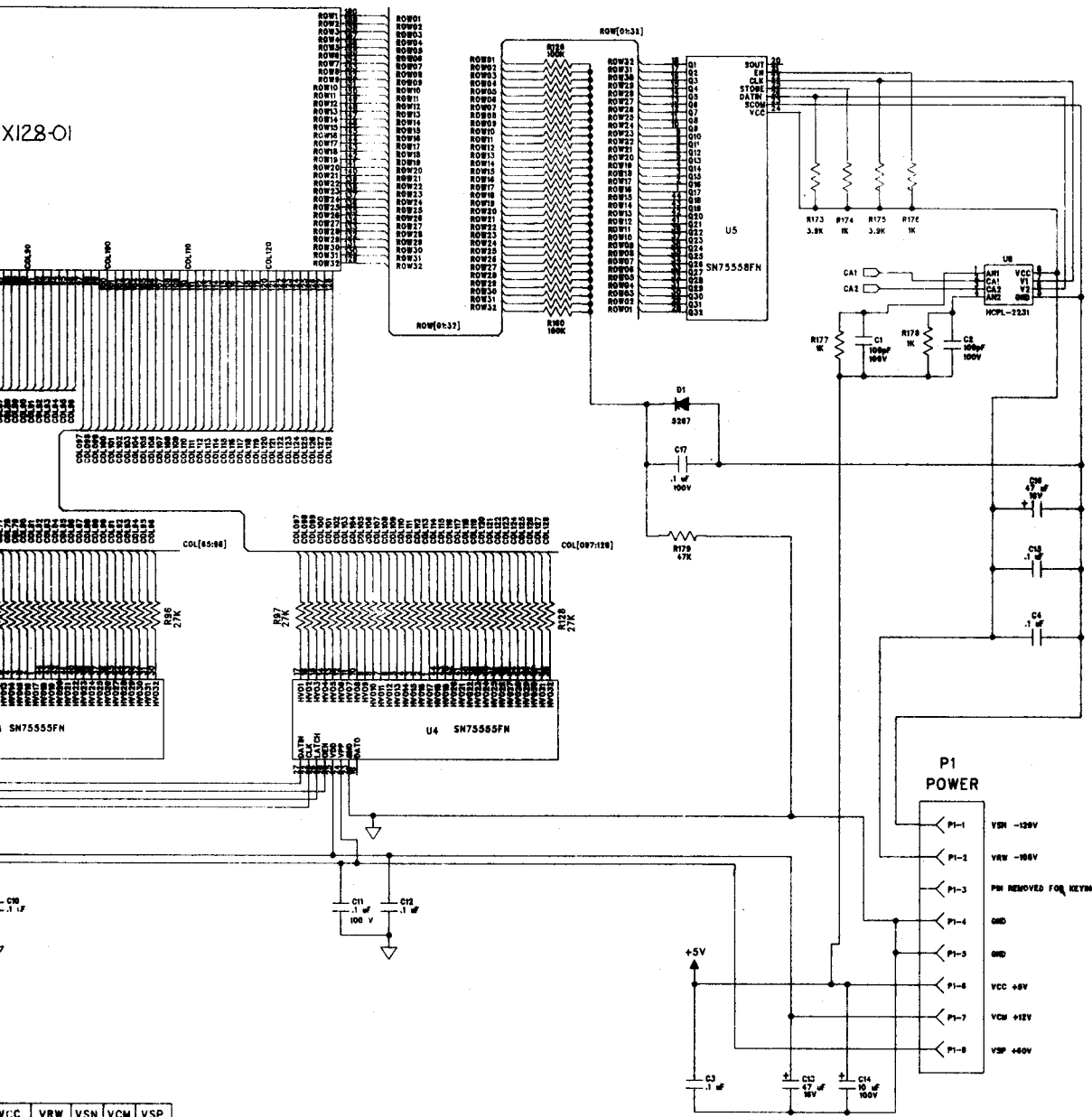
D

C

B

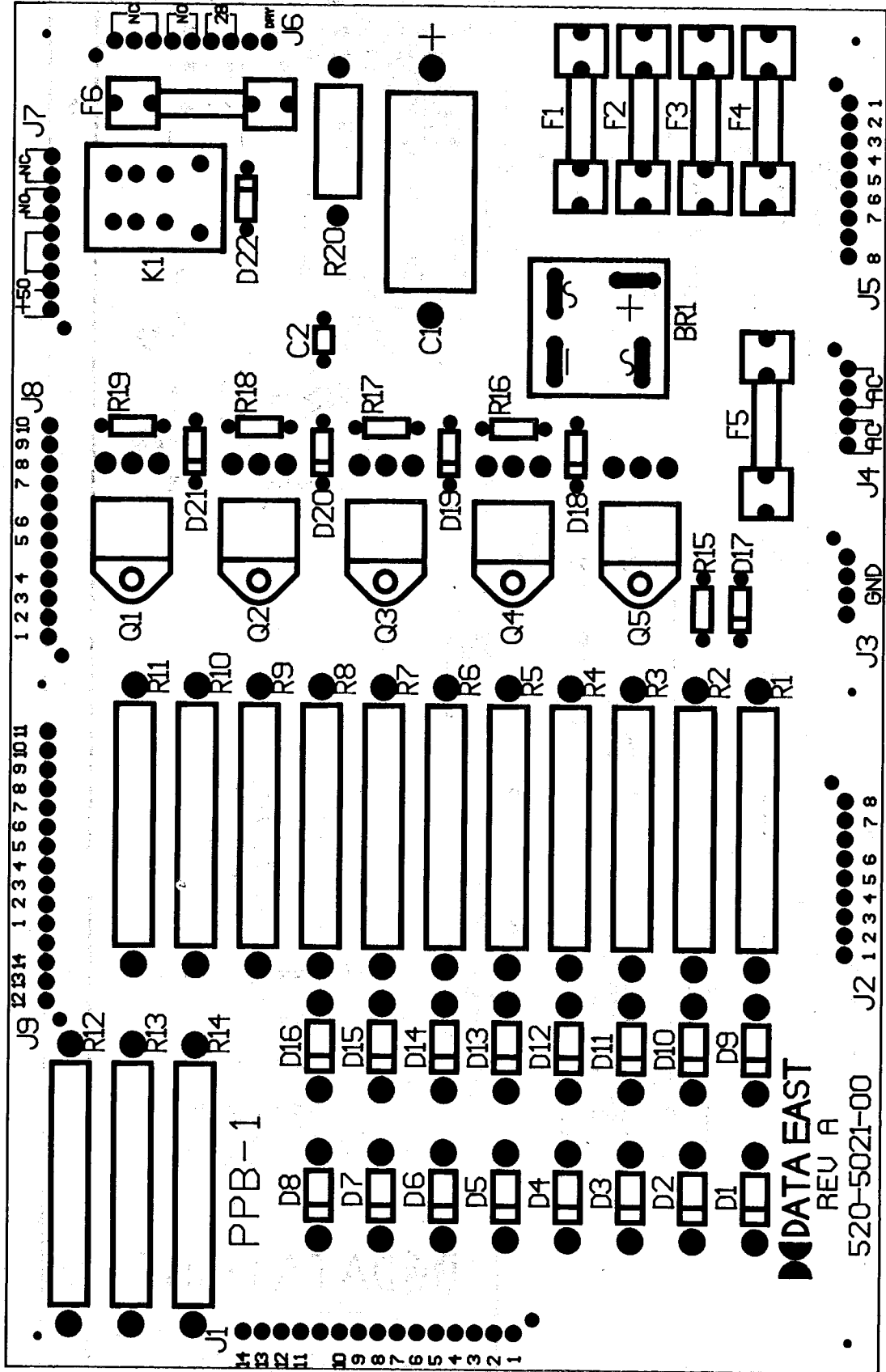
A

X128-01



| VCC | VRW | VSN | VCM | VSP |
|-----|-----|-----|-----|-----|
|     | 24  | 23  | 25  | 24  |
| 14  |     |     | 14  |     |
|     | 8   | 5   |     |     |

|   |   |              |  |                     |
|---|---|--------------|--|---------------------|
| PADS LOGIC VER. 2.03<br>FILE: DM32128.SCH | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES.<br>TOLERANCES: MILX ±.005<br>XR ±.020<br>ANGLES 2 | CONTR NO.    | DRAWN BY<br>RAY DEESE<br>CHECK BY  | DATE<br>10-15-91    |
|   |   |              |  | DATE                |
|   | MATL  |              | APPR BY  | DATE                |
|   |   |              | DO NOT SCALE PRINT   |                     |
|   |   |              | THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF BARCOCK AND IS FORWARDED SUBJECT TO THE CONDITIONS THAT THE INFORMATION (A) BE RETAINED IN CONFIDENCE, (B) NOT BE REPRODUCED OR COPIED IN WHOLE OR IN PART AND (C) NOT BE USED OR INCORPORATED IN ANY PRODUCT, EXCEPT UNDER AN EXPRESS WRITTEN AGREEMENT WITH BARCOCK. |                     |
| NEXT ASSY                                 | USED ON   | 6D-082028-01 | CODE IDENT.<br>68846   | 1510-0106           |
| APPLICATION                               |   |              | SCALE  | SIZE D SHEET 1 OF 1 |



DATA EAST  
REV A

520-5021-00

J2 1 2 3 4 5 6 7 8

J3 GND

J4 AC FAC

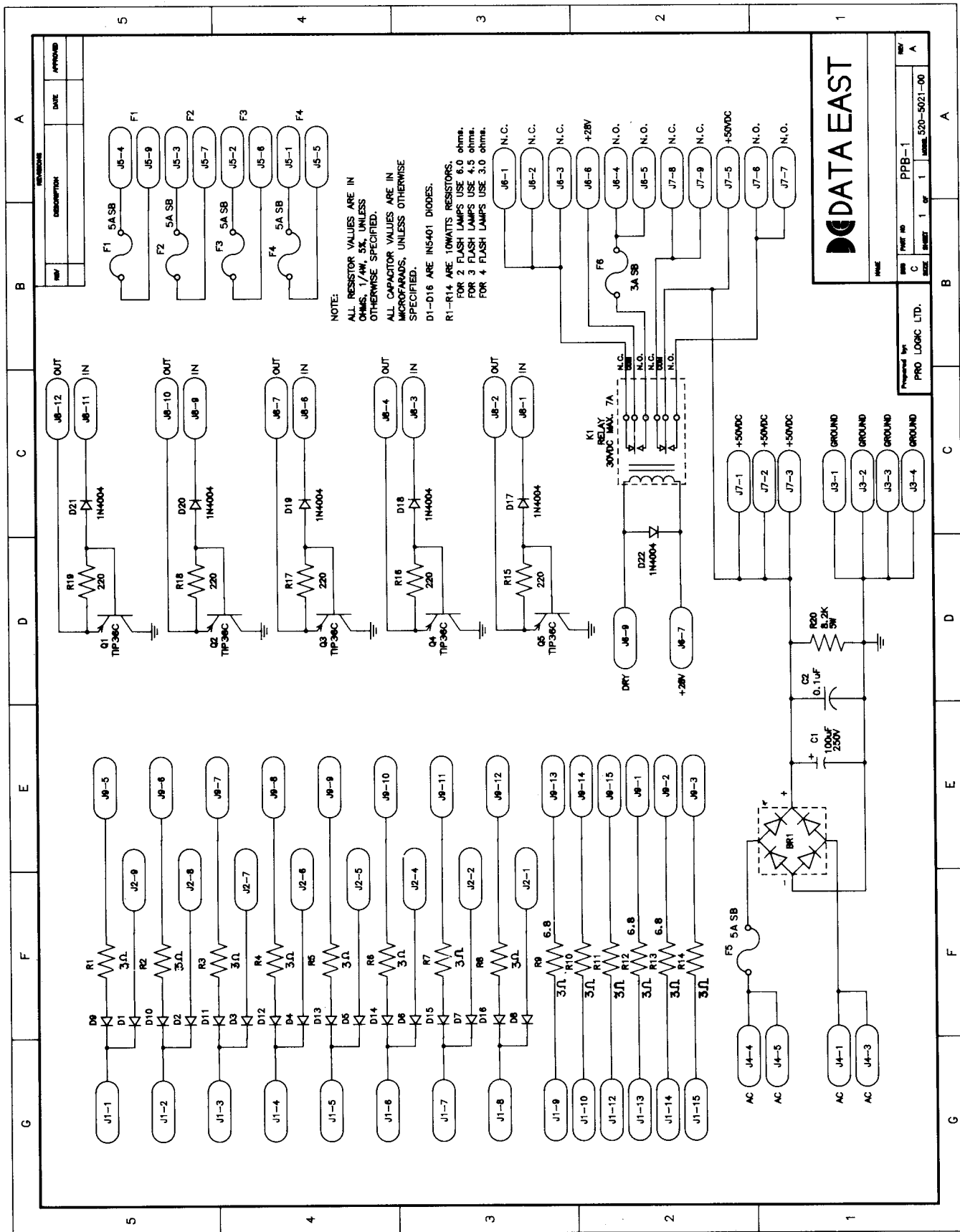
J5 8 7 6 5 4 3 2 1

J9 12 13 14 1 2 3 4 5 6 7 8 9 10 11

J8 1 2 3 4 5 6 7 8 9 10

J7 1 50 NO NC

J1 14 13 12 11 10 9 8 7 6 5 4 3 2 1



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**

NAME: \_\_\_\_\_

REV: \_\_\_\_\_

PPB-1

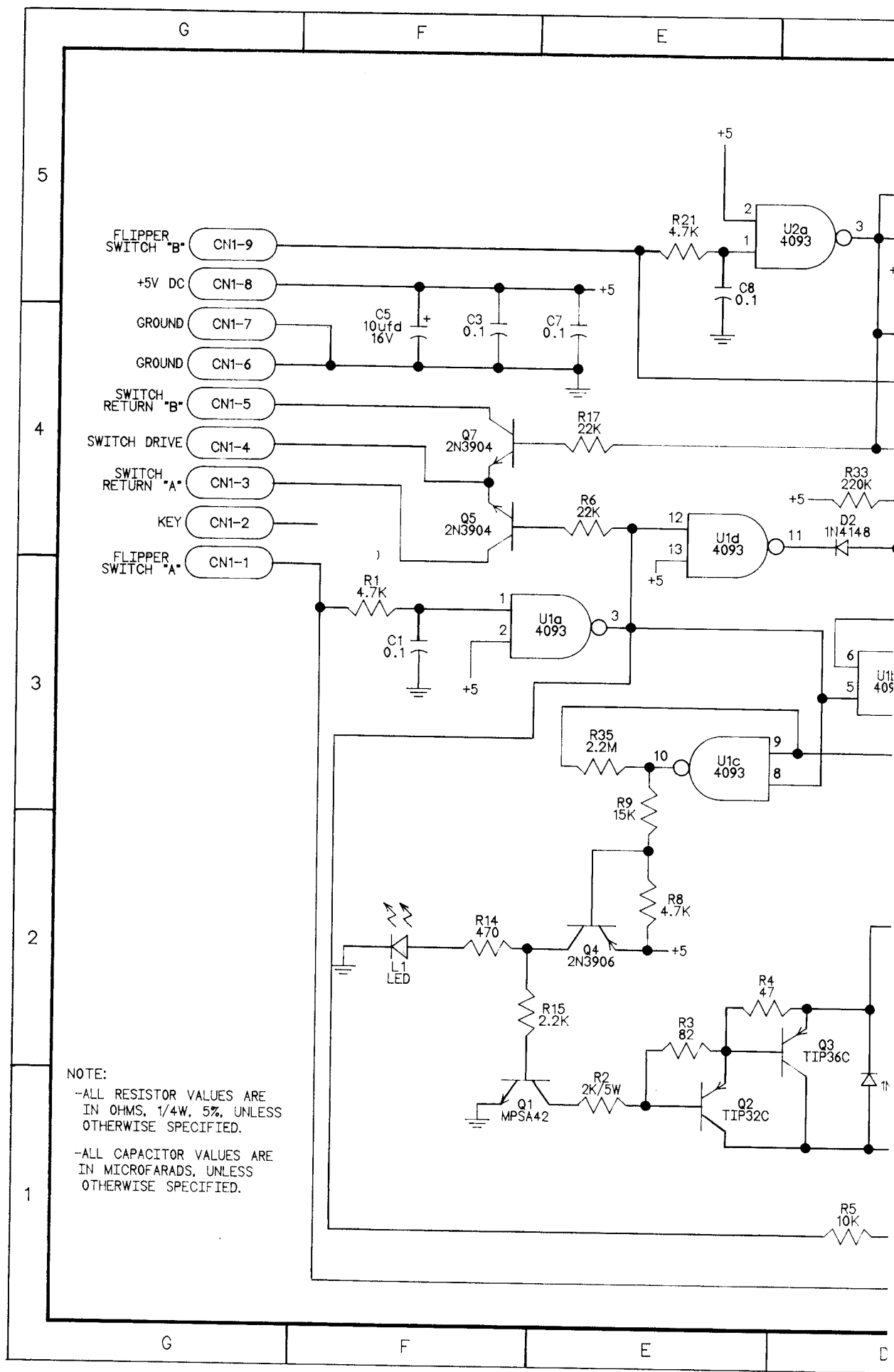
PRO LOGIC LTD.

1 of 1

ISSUE 520-5021-00

DATE: \_\_\_\_\_

APPROVED: \_\_\_\_\_



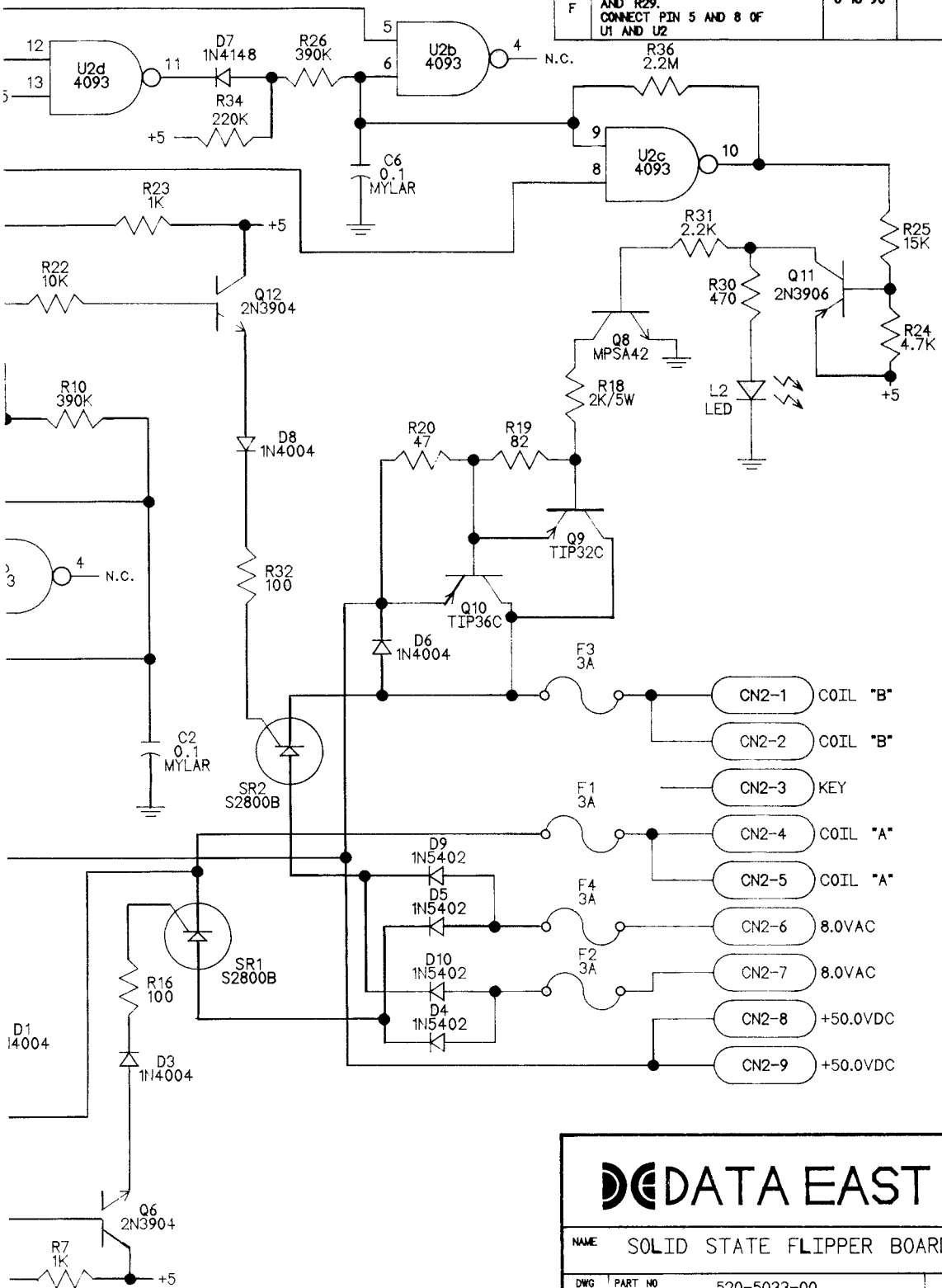
C

B

A

REVISIONS

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



**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 |       |

C

B

A

5

4

3

2

1





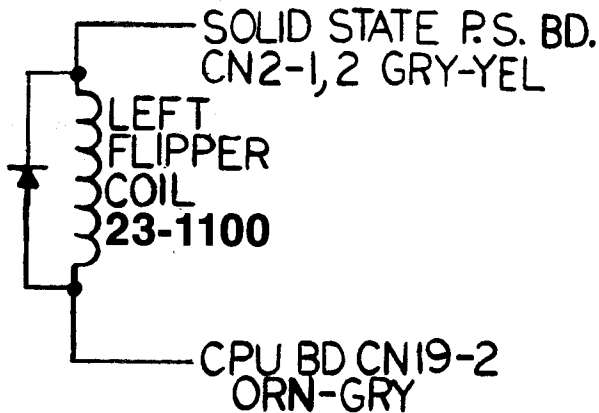
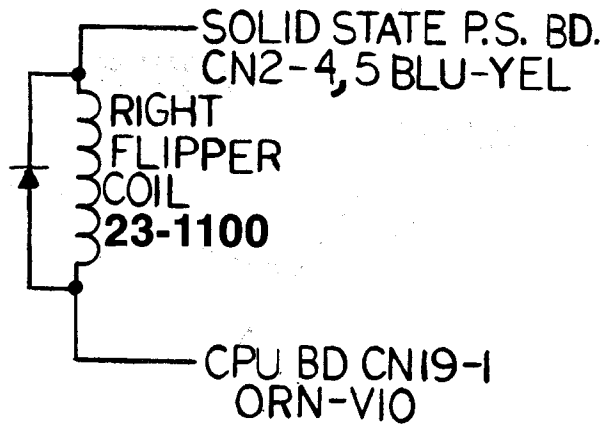
Solid State Flippers  
PCB Wiring Diagram

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          |



232-5200-00  
6-32 X 1/4 PH PAN (2)

6-32 X 3/8 PH

535-6485-00  
MTG. BRKT.

545-5315-00  
O-RING DRIVE

535-5172-00  
DRIVE BRKT.

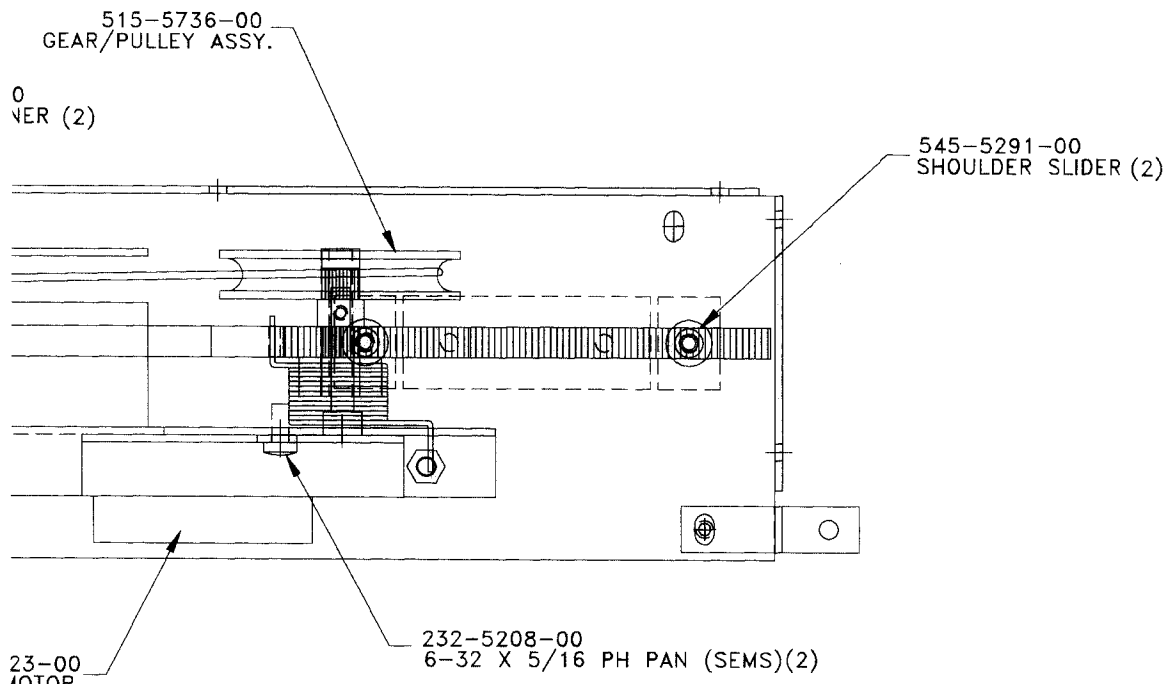
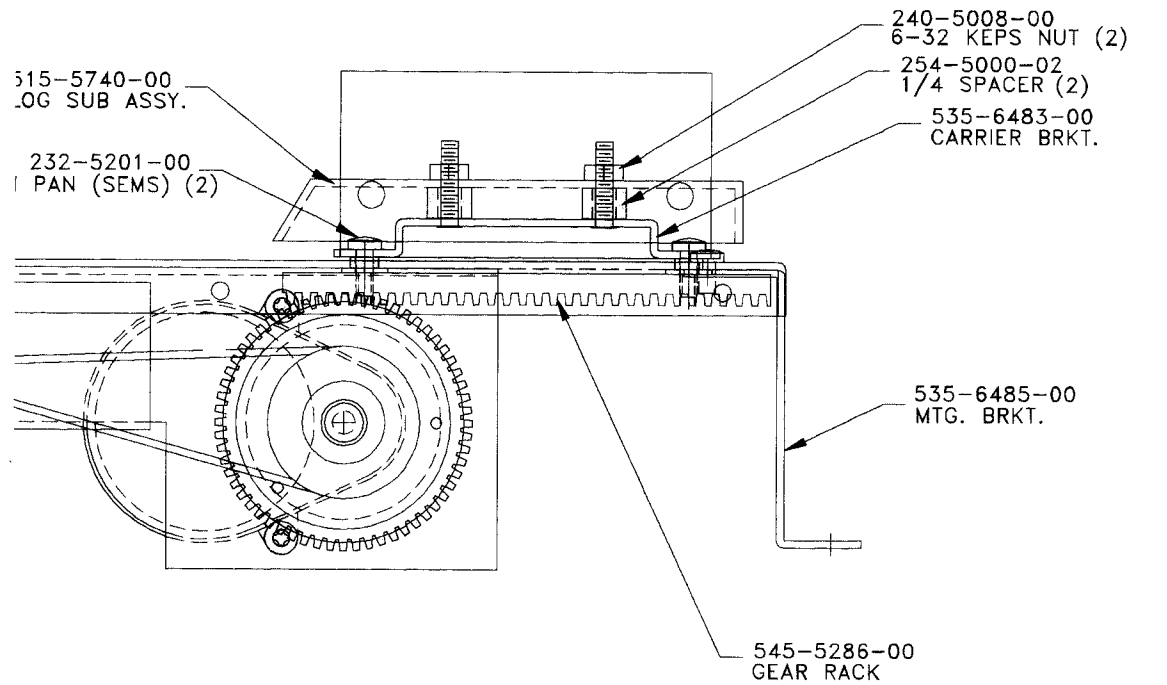
535-6481-00  
MTG. PLATE

515-5737-00  
SAW/SHAFT ASSY.

545-5237-0  
1/4 ID NYLI

240-5008-00  
6-32 KEPS NUT (2)

041-50  
DRIVE M

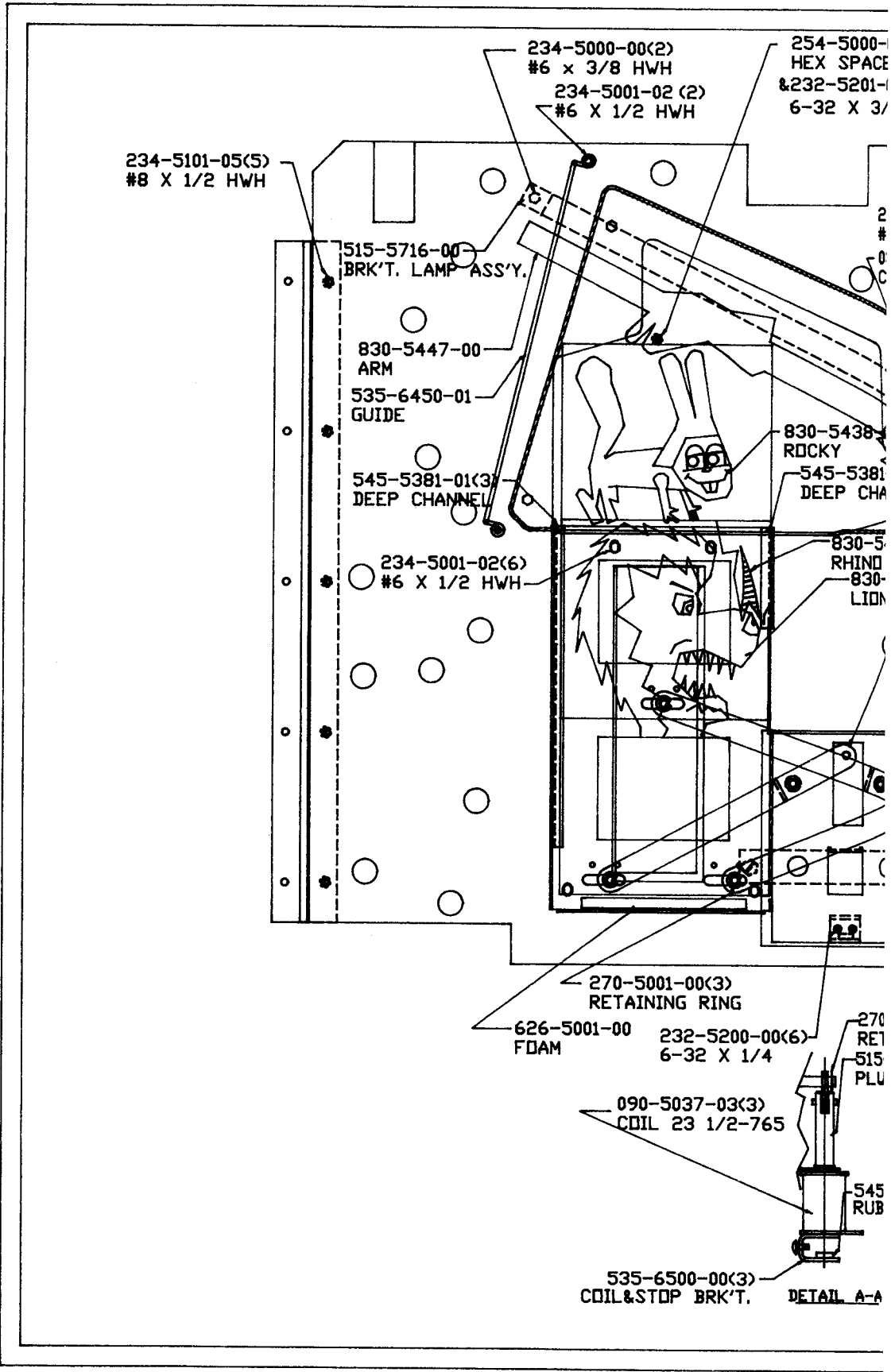


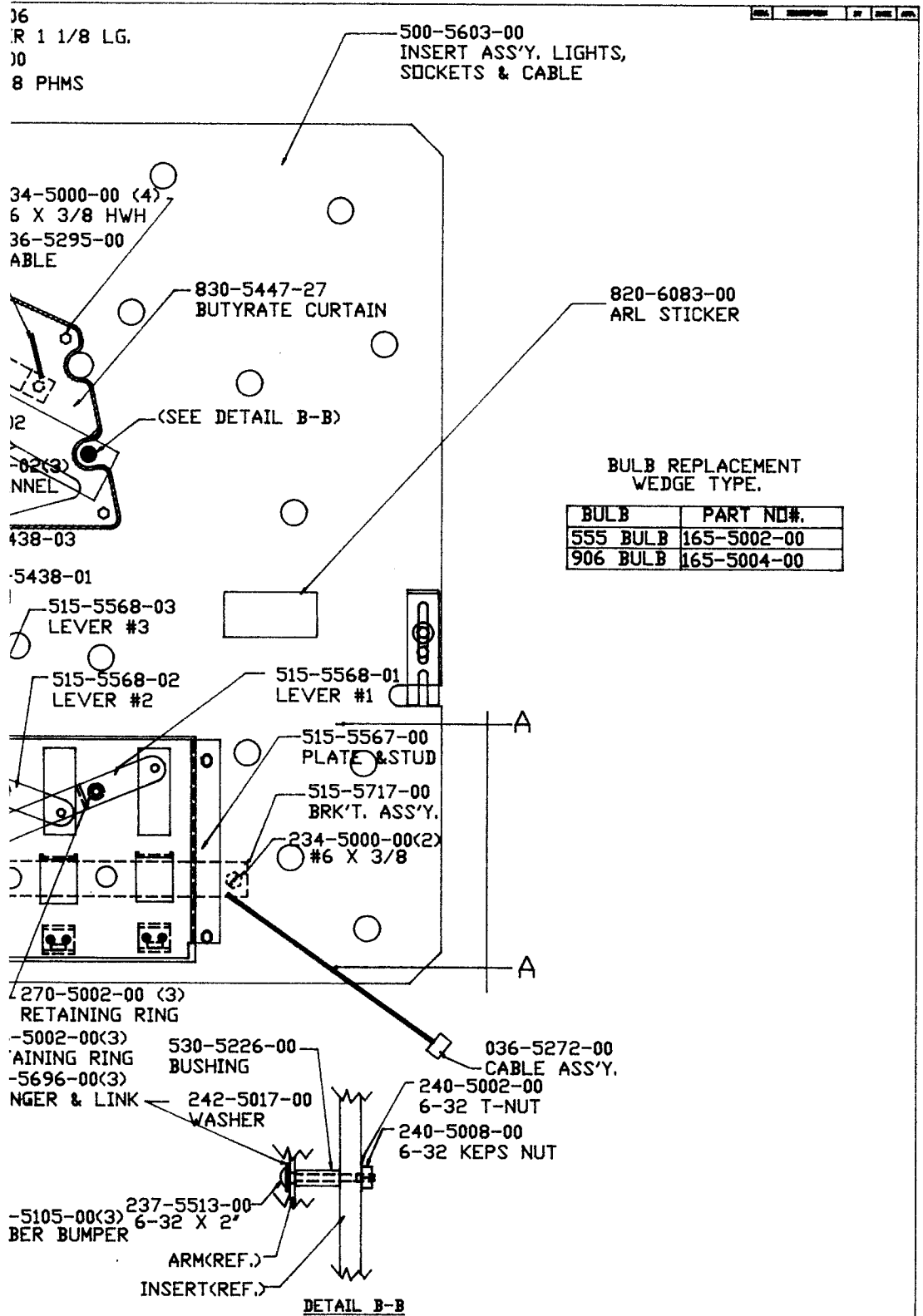
TOLERANCE UNLESS OTHERWISE NOTED

DIMENSION  
 XX ± .015  
 XXX ± .010  
 XXXX ± .005

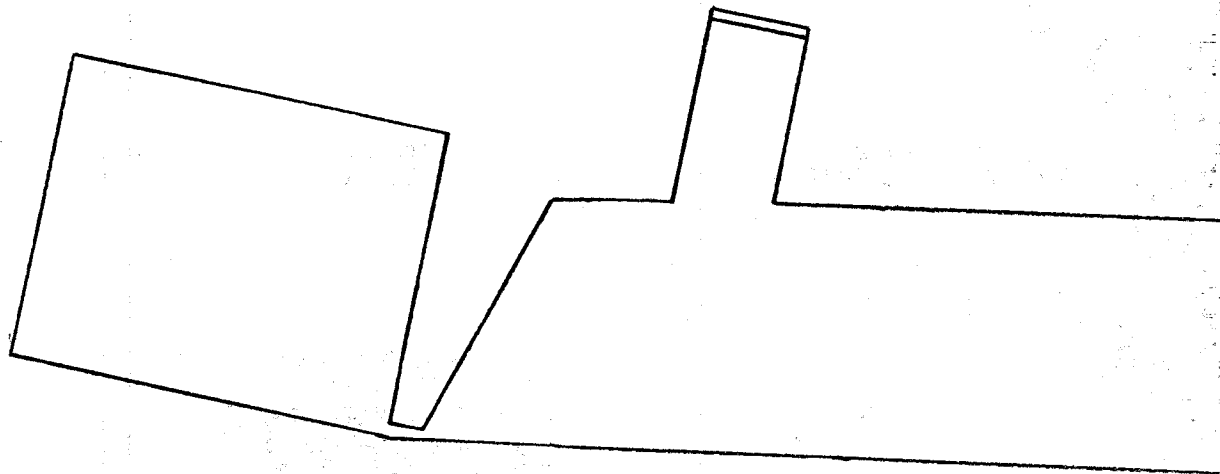
FRACTIONAL ± 1/64  
 ANGULAR ± 1/2°

|      |            |  |                 |                         |
|------|------------|--|-----------------|-------------------------|
| REQ. | NEXT ASSY. | DWN.<br>BALCER                           | DATE<br>1-14-93 | TITLE<br>NELL LOG ASSY. |
| MAT. |            | CH'KD                                    | SCALE<br>FULL   |                         |
| H.T. |            | DATA EAST PINBALL, INC.                  |                 | PART NO.                |
| FIN. |            | 1990 JANICE AVE, MELROSE PARK, IL. 60160 |                 | 500-5638-00             |





|      |      |    |       |        |   |
|------|------|----|-------|--------|---|
| DATE | REV. | BY | CHKD. | APP'D. | DESCRIPTION                             |
|      |      |    |       |        | HAT TRICK                               |
|      |      |    |       |        | DATA EAST PERRALL, INC.                 |
|      |      |    |       |        | 300 JONES AVE., WASHINGTON, D. C. 20001 |
|      |      |    |       |        | 300-5683-00                             |



244-5001-C  
#2 LOCK WASHER

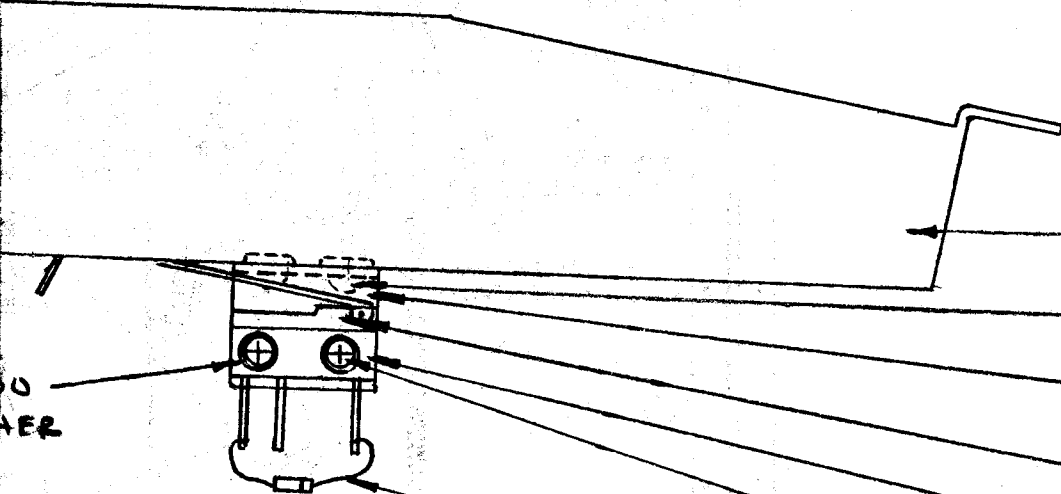
TOLERANCE UNLESS  
OTHERWISE SPECIFIED

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


ANGULAR  
XX ± .5°  
XX.X ± .1°

FRACTIONAL ± 1/64

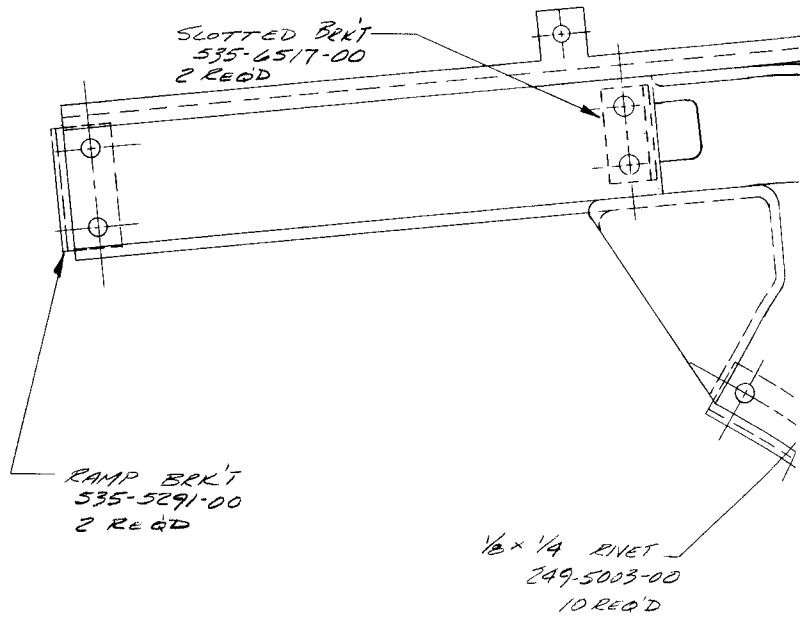
|  |  |     |             |    |      |     |
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|  |  | REV | DESCRIPTION | BY | DATE | APP |
|--|--|-----|-------------|----|------|-----|

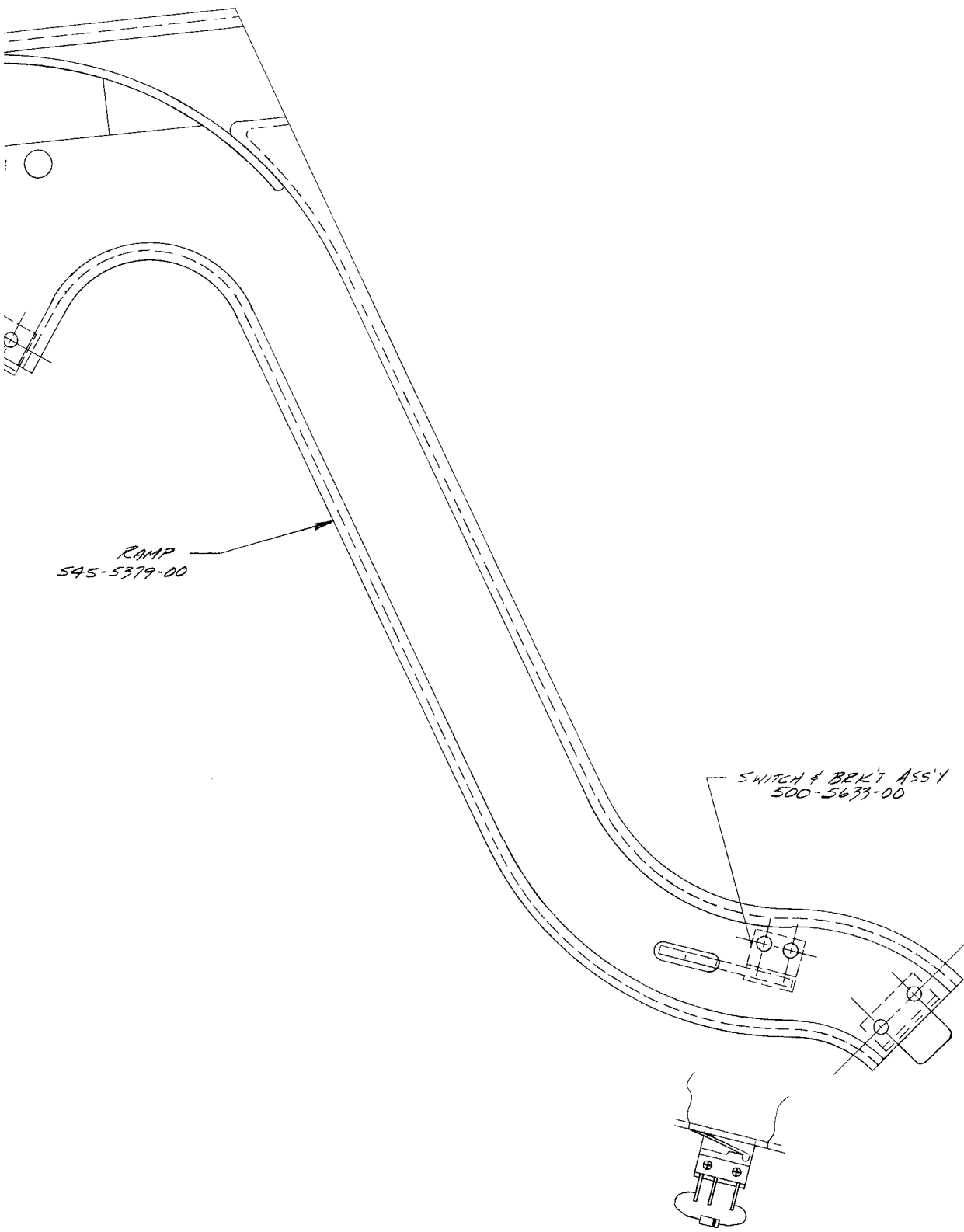


- 535-6407-00  
UNDER TROUGH
- 249-5001-00  
1/8 x 5/32 RIVET (2)
- 535-5794-00  
SWITCH BRKT.
- 180-5100-01  
SWITCH (DA3)
- 535-6539-00  
SWITCH PROTECTOR
- 237-5806-00 (2)
- 2-56 x 1/2 PAN MS
- 112-5001-00  
1N4001 DIODE

|      |   |             |   |     |       |          |          |                    |
|------|---|-------------|---|-----|-------|----------|----------|--------------------|
| REQ. | 1 | NEXT ASSEM. | DWN.  | TWS | DATE  | 12.30.92 | TITLE    | UNDER TROUGH ASSY. |
| MAT. |   |             | CH'KD.  |     | SCALE |          |          |                    |
| H.T. |   |             |  <b>DATA EAST PINBALL, INC.</b><br>1990 JANICE AVE., MELROSE PARK, IL. 60160 |     |       |          | PART NO. | 500-5630-00-       |
| FIN. |   |             |   |     |       |          |          |                    |







RAMP  
545-5379-00

SWITCH & BELT ASS'Y  
500-5633-00

TOLERANCE UNLESS  
OTHERWISE SPECIFIED

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

ANGULAR  
 XX ± 5°  
 XX.X ± 1°

FRACTIONAL ± 1/64

|      |             |  |                |                                   |
|------|-------------|--|----------------|-----------------------------------|
| REQ. | NEXT ASSEM. | DWN<br>R.K.W.42  | DATE<br>1-2-98 | TITLE<br>PLASTIC RAMP<br>ASSEMBLY |
| MAT. |             | CHKD.  | SCALE<br>1/2"  |                                   |
| H.T. |             | DATA EAST PINBALL, INC.<br>1990 JANICE AVE., MELROSE PARK, IL. 60160 |                | PART NO.<br>500-5634-00           |
| FIN. |             |  |                |                                   |

500-SWITC

249-5011-00  
1/8 X 5/16 RIVET (2)

535-6518-00  
SLOTTED BRKT.

535-6018-00  
ASSY. SHIM

820-5086-00  
DECAL

535-6358-00  
RAMP FLAP

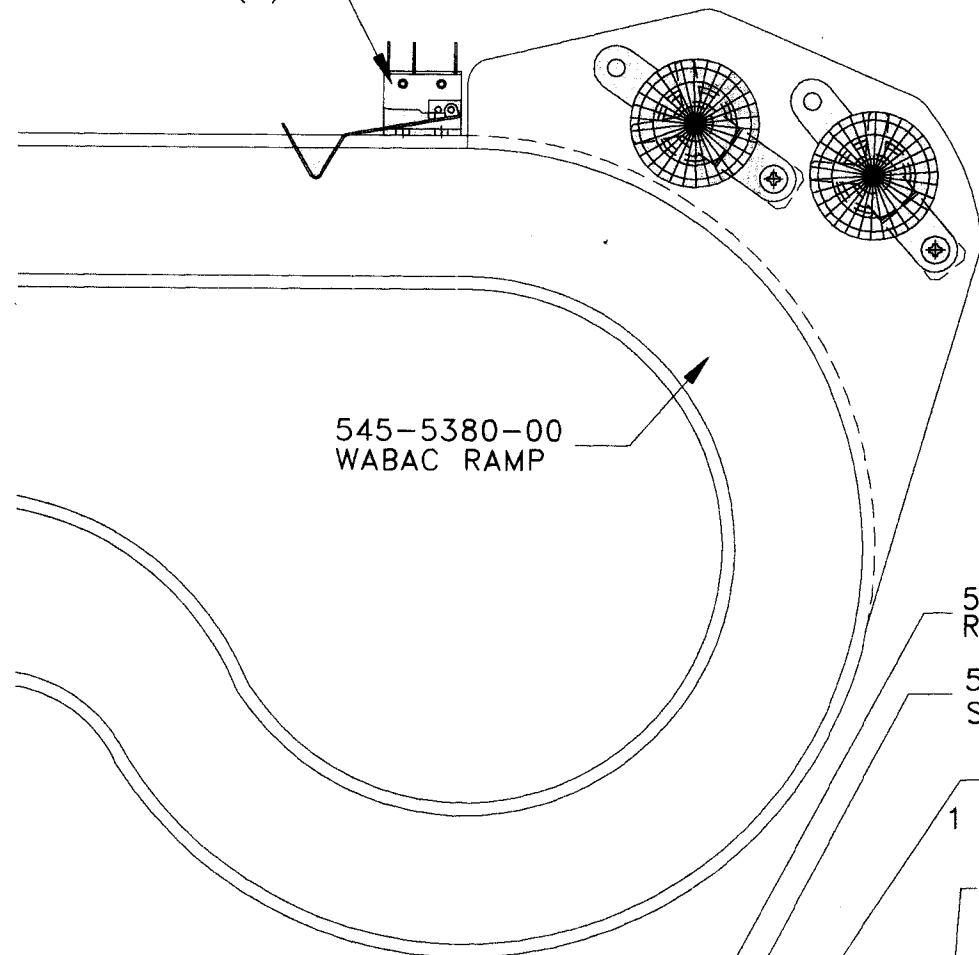
249-5007-00  
1/8 X 7/32 RIVET (2)

1/8

TOLERANCE UNLESS  
OTHERWISE NOTED

|              |                   |
|--------------|-------------------|
| DIMENSION    | FRACTIONAL ± 1/16 |
| X.X ± .015   | ANGULAR ± 1/2°    |
| X.XX ± .010  |                   |
| X.XXX ± .005 |                   |

-5633-00-22  
H SUB ASSY.(1)



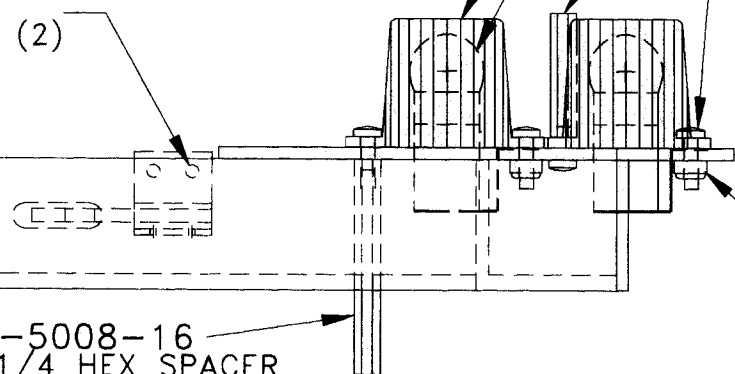
550-5031-02  
RED MINI-MARS(2)

518-5101-01-22  
SOCKET & BULB ASSY.(2)

254-5008-09 (A)  
1 1/2 L 1/4 HEX SPACER

232-5202-00  
6-32 X 1/2 PH PAN (4)

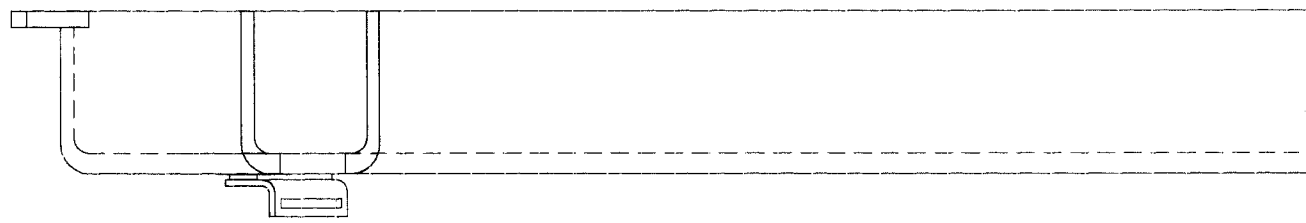
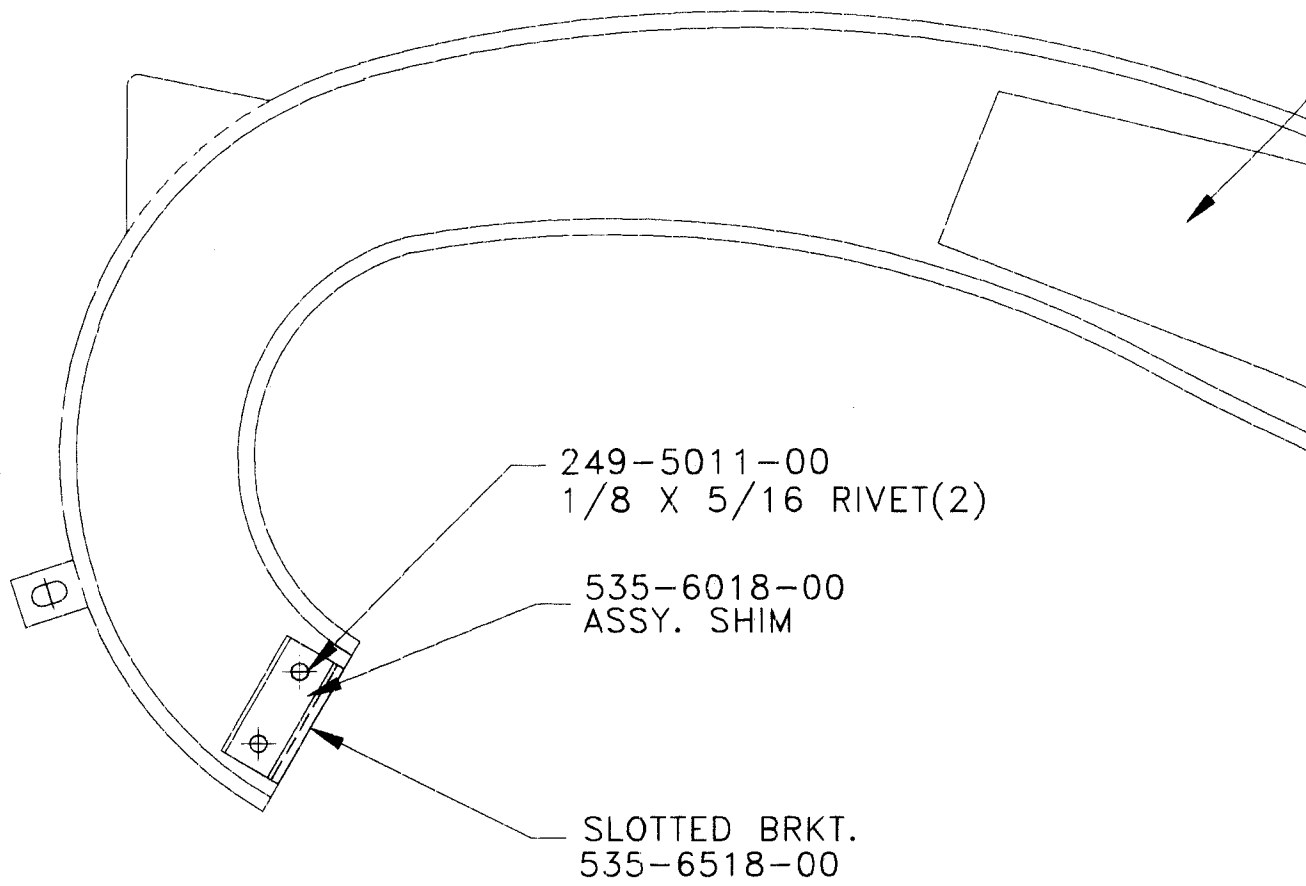
249-5001-00  
X 3/16 RIVET (2)



240-5005-00  
6-32 NYLOC (2) (A)

(A) 254-5008-16  
2 1/2 L 1/4 HEX SPACER

|      |            |   |                  |                  |
|------|------------|---|------------------|------------------|
| REQ. | NEXT ASSY. | DWN.<br>BALCER                            | DATE<br>12-23-92 | TITLE            |
| MAT. |            | CH'KD                                     | SCALE<br>NONE    | WABAC RAMP ASSY. |
| H.T. |            | DATA EAST PINBALL, INC.                   |                  | PART NO.         |
| FIN. |            | 1990 JANICE AVE., MELROSE PARK, IL. 60160 |                  | 500-5632-00      |



TOLERANCE UN  
 OTHERWISE N

| DIMENSION    | FRACTION | ANGULAR |
|--------------|----------|---------|
| XX ± .015    |          |         |
| X.XX ± .010  |          |         |
| X.XXX ± .005 |          |         |

RAMP DECAL  
820-5068-02

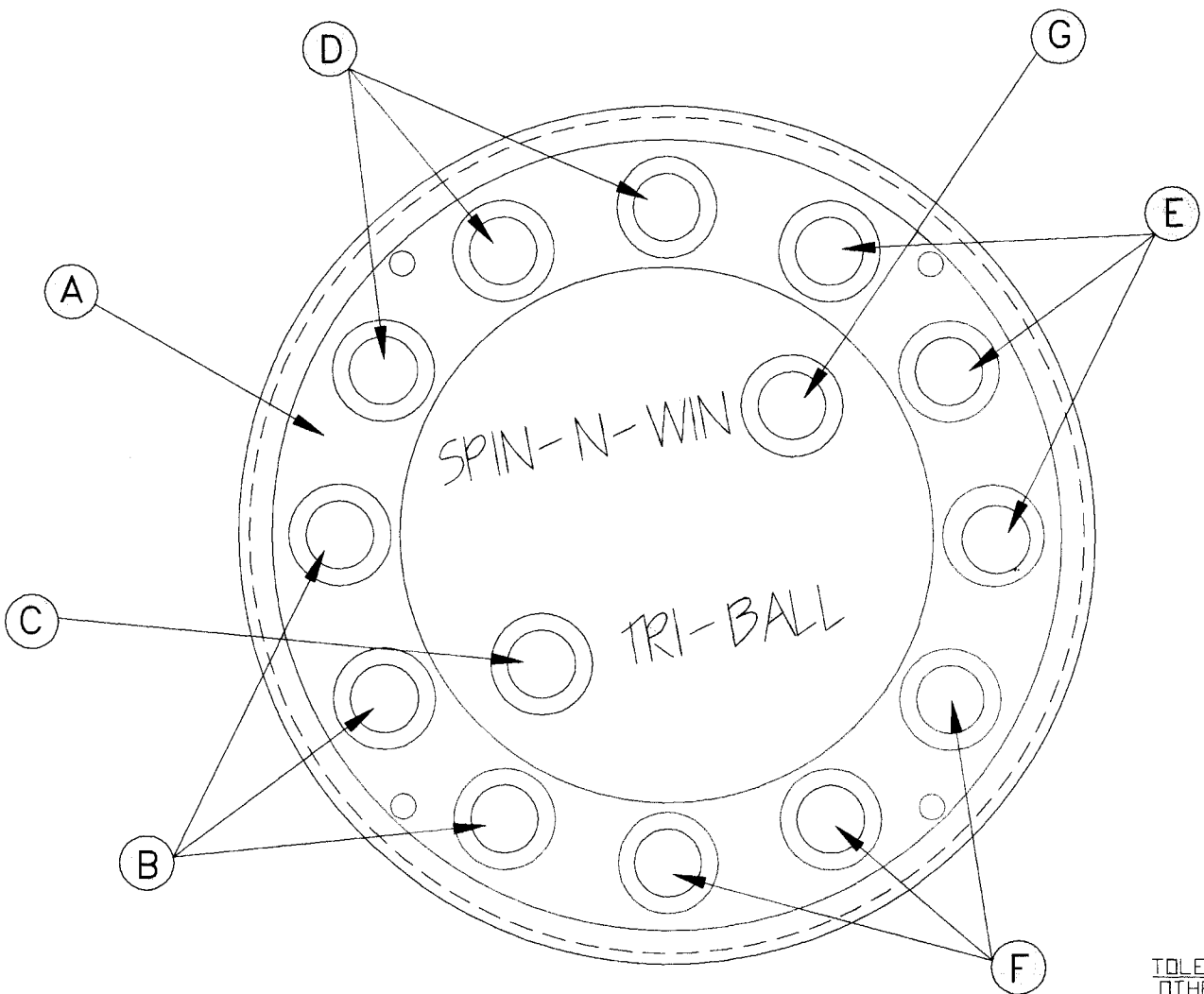
535-6428-00  
ENTRANCE PLATE

545-5379-01  
PLASTIC RAMP ENTRANCE

249-5007-00  
1/8 X 7/32 RIVET (2)

|      |   |                |                  |                     |
|------|---|----------------|------------------|---------------------|
| REQ. | NEXT ASSY.                                | DWN.<br>BALCER | DATE<br>12-14-92 | TITLE               |
| MAT. |   | CH'KD          | SCALE<br>NONE    | RAMP ENTRANCE ASSY. |
| H.T. | DATA EAST PINBALL, INC.                   |                |                  | PART NO.            |
| FIN. | 1990 JANICE AVE., MELROSE PARK, IL. 60160 |                |                  | 500-5637-00         |

| ITEM | PART #      | DESCRIPTION          | QTY. |
|------|-------------|----------------------|------|
| A    | 820-5083-01 | DECAL                | 1    |
| B    | 545-5014-02 | LIGHT COVER (RED)    | 3    |
| C    | 545-5014-03 | LIGHT COVER (AMBER)  | 1    |
| D    | 545-5014-04 | LIGHT COVER (GREEN)  | 3    |
| E    | 545-5014-05 | LIGHT COVER (BLUE)   | 3    |
| F    | 545-5014-06 | LIGHT COVER (YELLOW) | 3    |
| G    | 545-5014-07 | LIGHT COVER (ORANGE) | 1    |
| H    | 545-5282-06 | PANEL SPACER         | 4    |
| J    | 545-5364-00 | CLOCK FACE           | 1    |
| K    | 237-5504-00 | 6-32 X 3/4 PH PAN    | 2    |
| L    | 254-5000-01 | 1/2 SPACER           | 2    |
| M    | 535-6476-00 | CLOCK SUPPORT BRKT   | 1    |
| N    | 520-5061-01 | LIGHT BOARD          | 1    |
| P    | 036-5267-00 | CABLE ASSY.          | 1    |

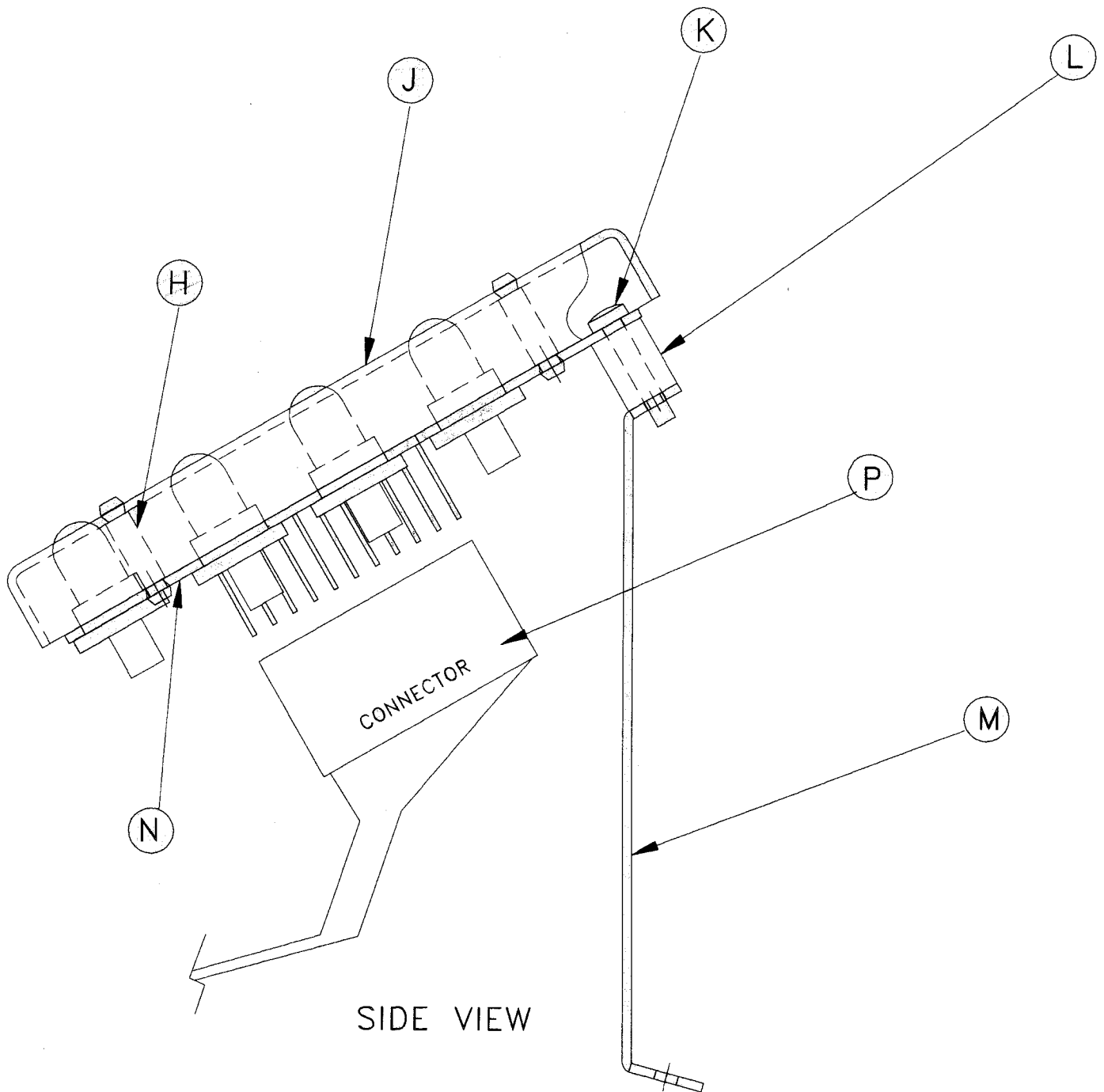


TOP FRONT VIEW

TOLERANCE UNLESS OTHERWISE NOTED

DIMENSION FRACTIONAL ± 1/16  
 X.X ± .015 ANGULAR ± 1/2°  
 X.XX ± .010  
 X.XXX ± .005

| REV. | DESCRIPTION | BY | DATE | APP. |
|------|-------------|----|------|------|
|------|-------------|----|------|------|



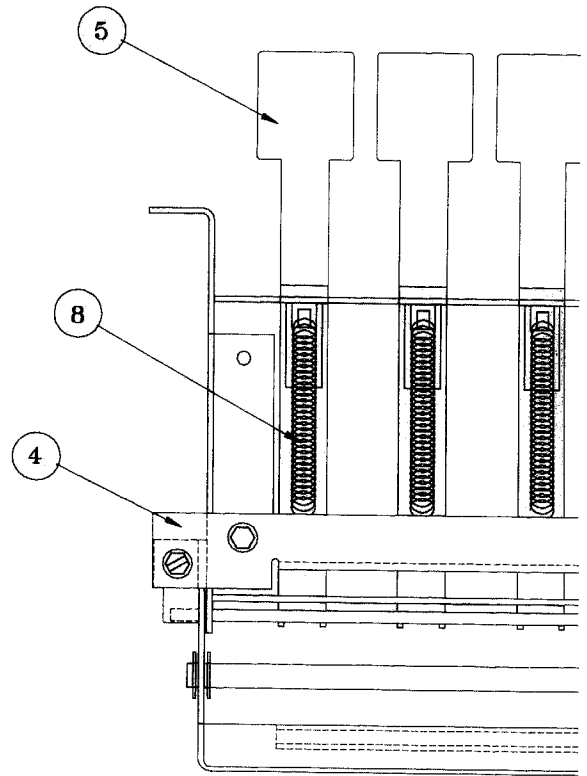
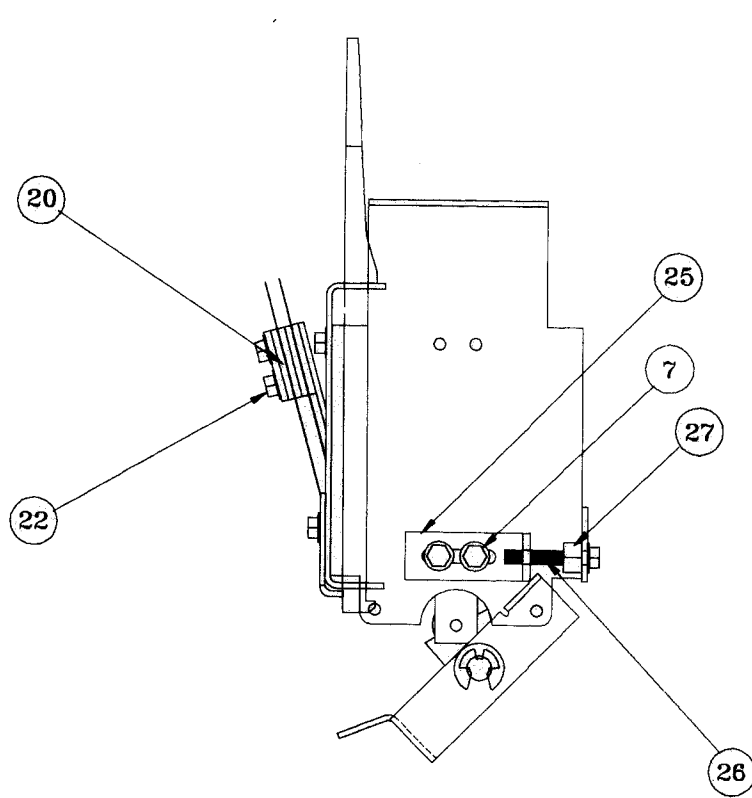
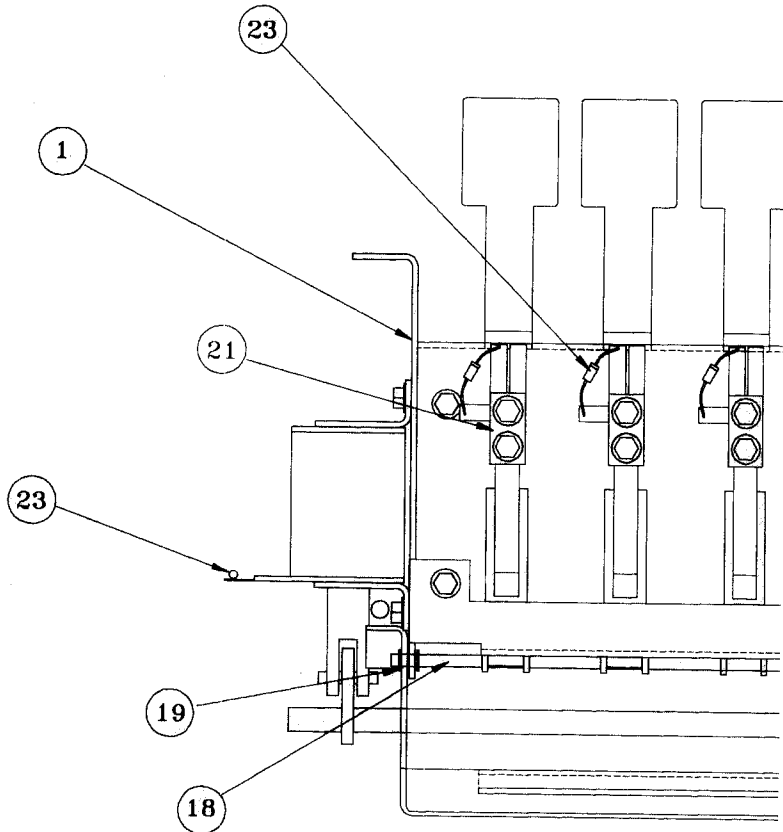
SIDE VIEW

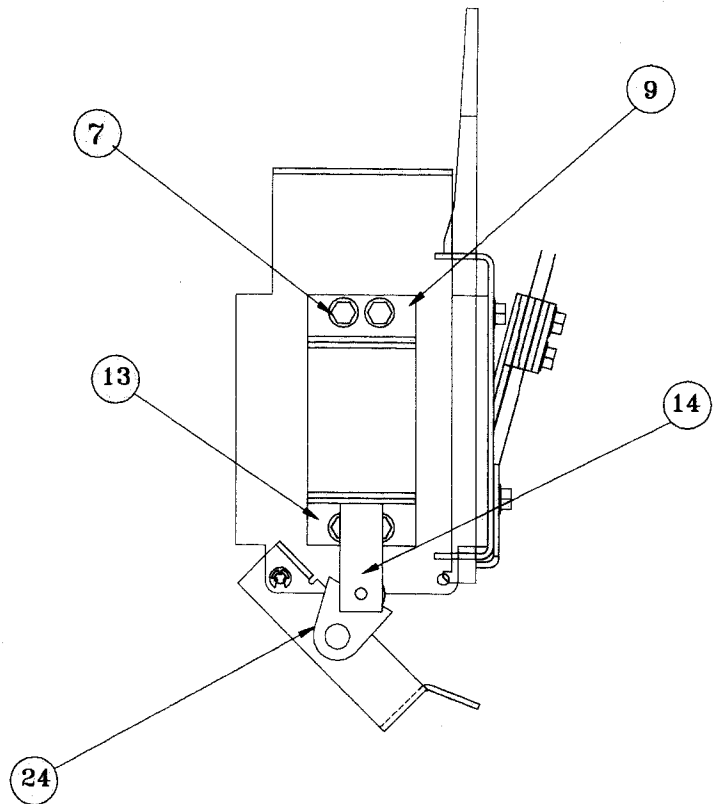
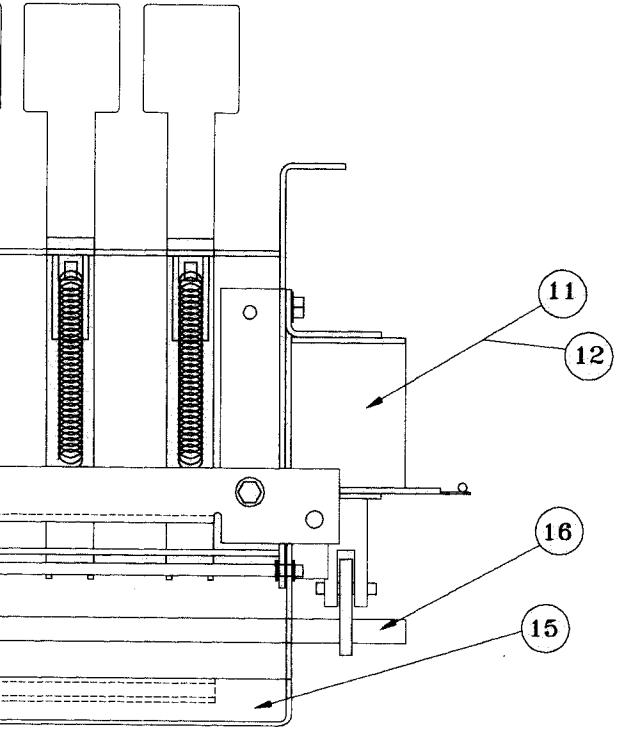
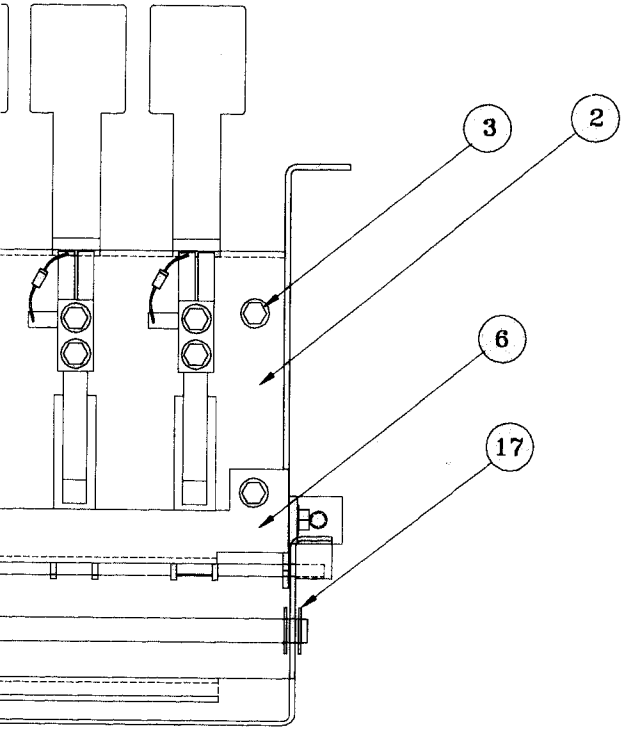
|            |   |             |               |                |
|------------|---|-------------|---------------|----------------|
| REQ. 1 PER | NEXT ASSY.                                | DWN. BALCER | DATE 11-20-92 | TITLE          |
| MAT.       |   | CH'KD       | SCALE 1=1     | CLOCK ASSEMBLY |
| H.T.       | DATA EAST PINBALL, INC.                   |             |               | PART NO.       |
| FIN.       | 1990 JANICE AVE., MELROSE PARK, IL. 60160 |             |               | 500-5627-00    |



| #  | DESCRIPTION                    | PART #      |
|----|--------------------------------|-------------|
| 1  | TRGT. END PLATE (2)            | 535-6182-00 |
| 2  | TRGT. FRAME                    | 535-6159-03 |
| 3  | 8-32 X 3/8 (6)                 | 237-5879-00 |
| 4  | SPRING MTG. PLATE              | 535-6510-05 |
| 5  | TARGET                         | 545-5048-01 |
| 6  | TRGT. RETAIN BRKT.             | 535-5042-03 |
| 7  | 6-32 X 3/8 SEWINGS TYPE 23 (6) | 237-5891-00 |
|    | TRGT. RESET SPRING             | 265-5003-00 |
|    | COIL SUPPORT BRKT.             | 535-6154-00 |
| 10 |                                |             |
| 11 | 23-700 COIL                    | 090-5022-00 |
| 12 | COIL SLEEVE                    | 545-5031-00 |
| 13 | PLUNGER STOP BRKT.             | 515-5088-00 |
| 14 | PLUNGER/LINK ASSY.             | 515-5338-00 |
| 15 | TRGT. LIFT BRKT.               | 535-6509-05 |
| 16 | TRGT. SHAFT                    | 530-5179-03 |
| 17 | E-RING (1/4)                   | 270-5002-00 |
| 18 | PIVOT SHAFT                    | 530-5180-03 |
| 19 | E-RING (1/8)                   | 270-5000-00 |
| 20 | SWITCH ASSY.                   | 180-5092-01 |
| 21 | SWITCH PLATE                   | 535-5045-00 |
| 22 | 6-32 X 1/2                     | 237-5878-00 |
| 23 | IN 4004 DIODE                  | 112-5003-00 |
| 24 | PLUNGER LINK                   | 545-5062-00 |
| 25 | ADJ. BRKT.                     | 535-6508-00 |
| 26 | 8-32 X 7/8 (1)                 | 237-5890-00 |
| 27 | 8-32 NYLOC                     | 240-5102-00 |

\*QUANTITY IS DESIGNATED BY BANK SIZE





TOLERANCE UNLESS OTHERWISE NOTED

DIMENSION FRACTIONAL ± 1/64  
 XX ± .015 ANGULAR ± 1/2°  
 XXX ± .010  
 XXXX ± .005

|      |            |   |                      |   |
|------|------------|---|----------------------|---|
| REQ. | NEXT ASSY. | DWN. <b>BALCER</b>                        | DATE <b>12-02-92</b> | TITLE                                       |
| MAT. |            | CHKD                                      | SCALE <b>1=1</b>     | <b>5-BANK DROP TRGT. ASSY. (ADJUSTABLE)</b> |
| H.T. |            | DATA EAST PINBALL, INC.                   |                      | PART NO.                                    |
| FIN. |            | 1990 JANICE AVE., MELROSE PARK, IL. 60160 |                      | <b>500-5621-05</b>                          |

PARTEC # PB-1126