

# AIRBORNE™



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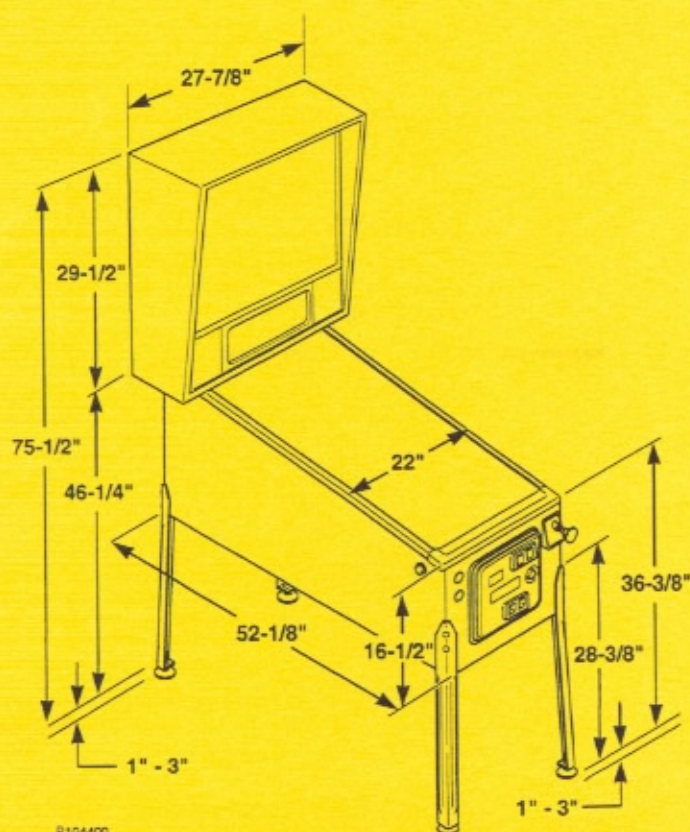
OPERATORS MANUAL  
PM00131  
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## GAME SPECIFICATIONS

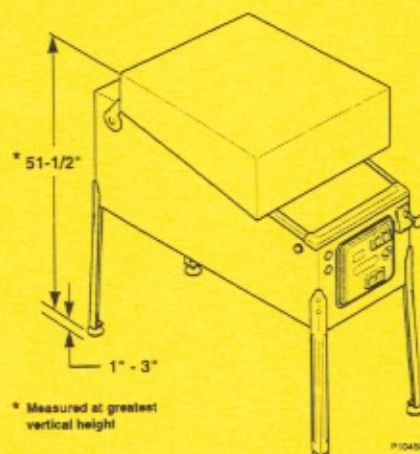
| CHARACTERISTIC              | DESCRIPTION                                                                                                                                                                                                                                                                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ELECTRICAL INPUT RATINGS    | 100 to 115V AC 50/60HZ 8 AMPS<br>200 to 230V AC 50/60HZ 4 AMPS                                                                                                                                                                                                                                                                       |
| CIRCUIT PROTECTION          | Slow-Blo fuses, Varistor Surge Protection, IEC-Type Grounded Receptacle                                                                                                                                                                                                                                                              |
| SHIPPING CARTON INFORMATION | Height: 55-1/2"(1.41M) Width: 30-1/2"(0.77M) Depth: 30-1/2"(0.77M)<br>Weight: 250 Pounds (113.1Kg)                                                                                                                                                                                                                                   |
| PRODUCT APPROVALS           | FCC, Part 15, Class A Digital Device<br>CE Marking                                                                                                                                                                                                                                                                                   |
| AUDIO SYSTEM                | MPEG Digital 3 Channel Mono Output (Left, Center, Right) Rated at 10 Watts RMS <ul style="list-style-type: none"> <li>• Two 4" 2-way Speakers for Mid &amp; High Frequencies</li> <li>• One 8" Bass Speaker for Low Frequencies</li> </ul>                                                                                           |
| DISPLAY                     | 128 X 32 Character Dot Matrix                                                                                                                                                                                                                                                                                                        |
| COIN DOOR                   | Standard: 2 Coin Acceptors Optional: Additional 2 Coin Acceptor or Bill Acceptor                                                                                                                                                                                                                                                     |
| OPERATOR ADJUSTABLES        | Audio: Volume Control, Sound Effects<br>Visual: Standard or Custom Display Messages<br>Coinage: U. S. Standard; Custom Configuration for Foreign Currencies<br>Play Mode: Free Play, Tournament, and Game Difficulty Level<br>Game Play: Replay Percentage, Match Credits, Game Restart<br>Password Protection: 3 Levels of Security |
| SPECIAL SOFTWARE FEATURES   | •186 Individual Audits •11 Self-Test Modes •Adjustable Flipper Strength<br>•6 Internal Diagnostic Levels •Automated Software Troubleshooting                                                                                                                                                                                         |

## CABINET DIMENSIONS



## NOTE:

DIMENSIONS DO NOT INCLUDE CABINET PROTRUSIONS, SUCH AS THE BALL SHOOTER, COIN DOOR, FLIPPER BUTTONS, OR BACKBOX LATCH.





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## PACKING LIST

The following parts are included in the packing box of the game container. Some parts are required for assembly of the game while others are included as spare parts. If any part(s) are missing, contact your local Capcom® distributor.

| ITEM                                      | QTY      | PART NUMBER        |
|-------------------------------------------|----------|--------------------|
| PINBALLS                                  | 3        | BL00103            |
| PLATE, LINE CORD BACKING                  | 1        | MT00325            |
| LEVELERS, LEG                             | 4        | MS00101-1          |
| NUT, LEG, LEVELERS, 3/8-16 X 3.0          | 8        | NT00100-13         |
| CORD, LINE                                | 1        | *SEE NOTE          |
| CARD, BUSINESS REPLY                      | 1        | PM00117            |
| SCREW, 8-13 X 1 MACHINE, CABINET          | 2        | SC00101-08         |
| BUSHING, CORD INSULATION, CABINET         | 1        | PL00259-05         |
| BOB, TILT MECH PLUMB, CABINET             | 1        | MS00102-1          |
| WIRE, PLUMB BOB HOOK, CABINET             | 1        | MS00105-1          |
| COVER, 3 SLOT CASH BOX, CABINET           | 1        | A-00143-1          |
| BOX, CASH, CABINET                        | 1        | PL00238            |
| LEGS, PINBALL, CABINET                    | 4        | MT00231            |
| SCREW, 3/8 - 16 X 2 - 1/2, THUMB, BACKBOX | 2        | SC00154-20         |
| WASHER, FLAT # 3/8, BACKBOX               | 2        | WS00100-12         |
| WASHER, LOCK # 3/8, BACKBOX               | 2        | WS00104-15         |
| <b>**BAG, SPARE PARTS</b>                 | <b>1</b> | <b>A-00486-PB4</b> |

**\*NOTE:** There are several types of line cords available. If this item is missing, contact your Capcom® distributor with the model number of your game.

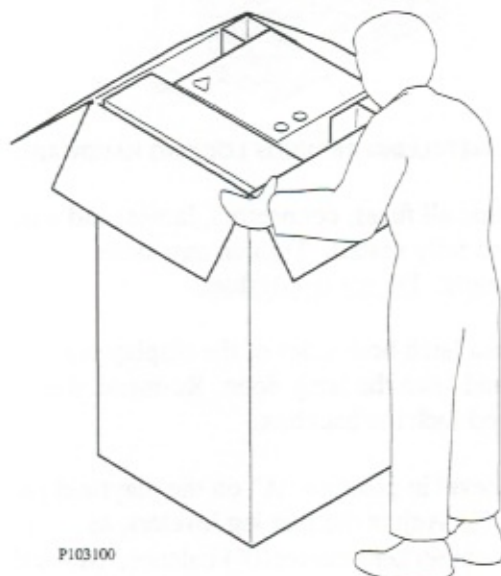
### **\*\*INCLUDED IN THE SPARE PARTS BAG:**

| ITEM                     | QTY | PART NUMBER |
|--------------------------|-----|-------------|
| PLASTIC, LEFT SLINGSHOT  | 1   | AW00125-1   |
| PLASTIC, RIGHT SLINGSHOT | 1   | AW00125-2   |
| DECAL, DROP TARGET       | 1   | AW00164-1   |
| COIL, 23 800T            | 1   | CL00109     |
| COIL, 22 1100T           | 1   | CL00111     |
| DIODE, 1N4004            | 1   | DI00100     |
| FUSE, 3 AMP SLO-BLO      | 1   | FS00100-03  |
| FUSE, 4 AMP SLO-BLO      | 1   | FS00100-04  |
| FUSE, 5 AMP SLO-BLO      | 1   | FS00100-05  |
| FUSE, 7 AMP SLO-BLO      | 1   | FS00100-07  |
| FUSE, 8 AMP SLO-BLO      | 1   | FS00100-08  |
| FUSE, 10 AMP SLO-BLO     | 1   | FS00100-10  |
| TARGET, DROP (WHITE)     | 1   | PL00325-W   |
| LINK, FLIPPER PLUNGER    | 1   | PL00202-1   |



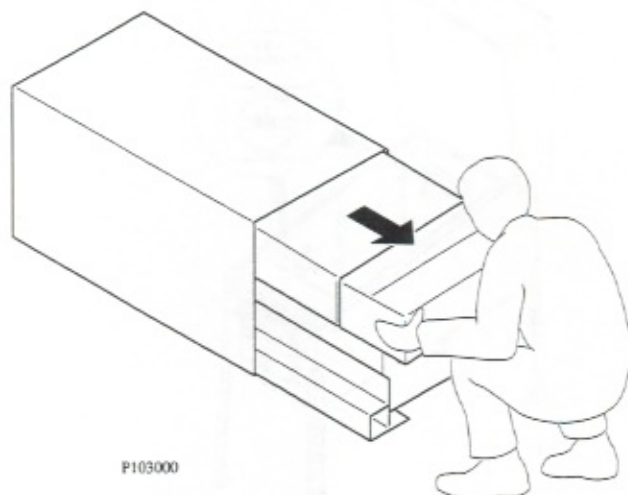
## INSTALLATION INSTRUCTIONS

1) To open carton, remove staples and open top flaps (see Figure 1).



**FIGURE 1: OPENING SHIPPING CARTON**

2) Two or more people should lay the carton on its side. Slide game and packing materials out from carton (see Figure 2). Open the parts box.

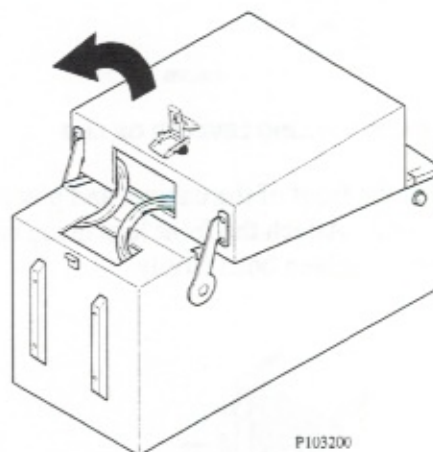


**FIGURE 2: REMOVING GAME AND PARTS BOX**

3) Check loose parts against packing list. Report any damaged or missing parts.

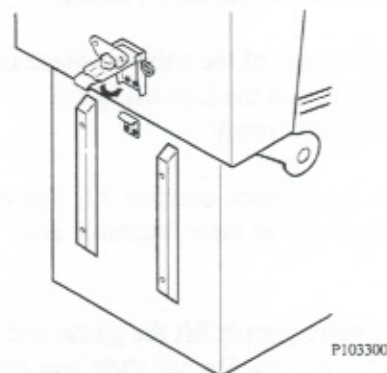
4) Keys are attached to the ball shooter. Open coin door and install cash box.

5) Raise the backbox to its upright position. Ensure that cables are not pinched (see Figure 3).



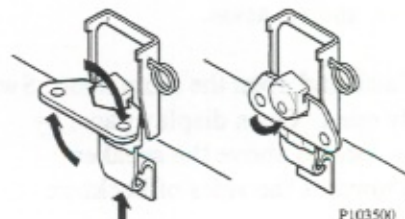
**FIGURE 3: RAISING BACKBOX UPRIGHT**

6) Lift the cabinet latch and flip key upwards to the upright position. Turn the key counter clockwise (to the left) (see Figure 4).



**FIGURE 4: LATCH ON BACKBOX**

7) Engage the latch and turn key fully clockwise (to the right). Flip the key down to lock (see Figure 5).



**FIGURE 5: LOCKING THE LATCH**



- 8) Install the hex nut half-way up on each leveler. Install leveler with nut onto each leg (see figure 6).

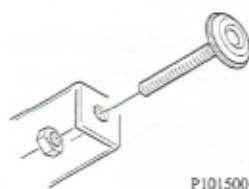


FIGURE 6: INSTALLING LEVELER ON LEG

- 9) Carefully lift the front of the cabinet and place on a sturdy support. Attach the front legs using two acorn-head bolts. Tighten bolts firmly (see Figure 7).



FIGURE 7: INSTALLING LEGS ON CABINET

- 10) Carefully lift the rear of the cabinet, place on a sturdy support, and attach the legs using the supplied bolts. Tighten firmly.

- 11) At the rear of the cabinet, connect AC line cord to receptacle. Install cover plate, bushing, and screws.

- 12) Using two or more people lift the game and move to intended play area. Do not slide legs on floor.

- 13) Insert key into the lock at the top of the backbox and turn fully clockwise. Lift up on backglass and swing out towards front of game. **CAREFULLY** remove backglass and set aside.

- 14) Lift up on latch and open the lamp door. Swing door completely open. Open display panel by pushing latches, located above the speaker enclosures, out towards the sides of backbox.

- 13) Attach lock washer and flat washer to thumb screw and fasten to cabinet tee nuts (see figure 8). Tighten firmly.

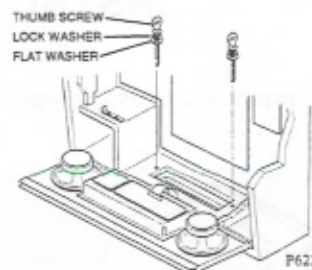


FIGURE 8: INSTALLING BACKBOX LOCKING HARDWARE

- 16) Check that all fuses, connectors, lamps, and wire harnesses are fully seated. Tighten any loose fasteners snugly. Do not overtighten.

- 17) Close and latch both sides of the display panel; then close and latch the lamp door. Re-install the backglass and lock the backbox.

- 18) Place a level in position "A" on the playfield glass (see Figure 9). Adjust the rear leg levelers, as required, to obtain zero degree(0°) balance. Move the level to position "B" and repeat front & rear adjustments until cabinet appears level. **DO NOT** tighten leveler nuts firmly at this stage; an additional adjustment is required.



FIGURE 9: CABINET LEVELING

- 19) Open the coin door. Locate lock lever and pull towards center of cabinet; remove handrail and set aside. Remove playfield glass by sliding down and out of armor guides. **CAREFULLY** set glass aside (see Figure 10).



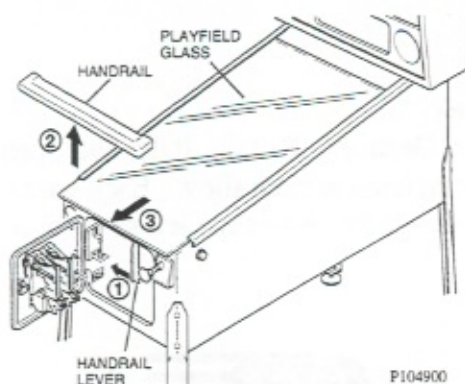


FIGURE 10: REMOVING PLAYFIELD GLASS

20) Lift playfield straight-up until it reaches the locked position. Verify that solenoids, connectors, lamps, and harnesses are fully seated. Tighten any loose fasteners snugly. Do not overtighten.

21) Locate plumb bob parts. Install thumbscrew into threaded hole on lead weight. Insert hook wire into tapered end of lead weight. Raise wire & weight up into bottom tilt bracket and hang from top bracket. Adjust and tighten screw firmly (see Figure 11).

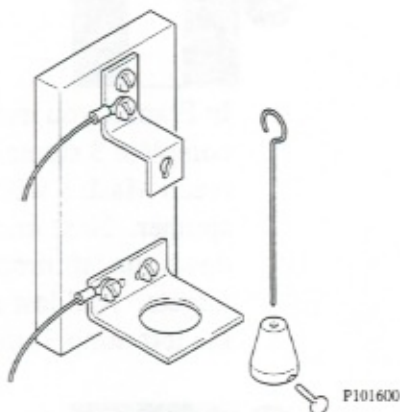


FIGURE 11: PLUMB BOB TILT ASSEMBLY

22) Lower the playfield into the cabinet. Ensure that cables are not pinched when playfield is seated.

23) Place a level or protractor on the playfield surface (see Figure 12). Adjust front and/or rear leg levelers to obtain a 6-1/2° incline. Tighten leg leveler nuts firmly.

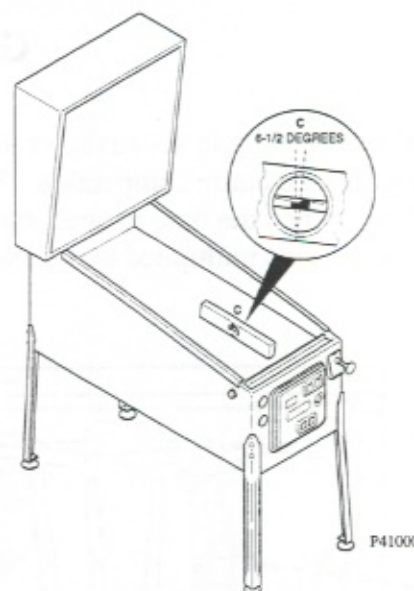


FIGURE 12: PLAYFIELD LEVELING

24) Connect AC line cord to power outlet. Route cord away from foot traffic. Turn the game power ON (switch is under cabinet near right front leg).

25) Open the coin door. Dot matrix display will show the system menu. Follow directions in this manual for changing factory settings.

26) Refer to the TROUBLESHOOTING GUIDE section of the manual for assistance in locating faults, clearing errors, etc.

27) Upon completion, system menu should report "FOUND: 0 ERRORS, 0 INFO" to indicate the game is ready for use.

28) Install required number of balls.

29) Clean both sides of playfield glass. Install glass. Install handrail. Ensure that lever snaps in and locks.

30) Close the coin door. Insert currency or tokens as necessary. Press the START button. Game should begin.

31) Open coin door and retrieve currency or tokens. Set custom messages, difficulty, pricing, replays, etc.

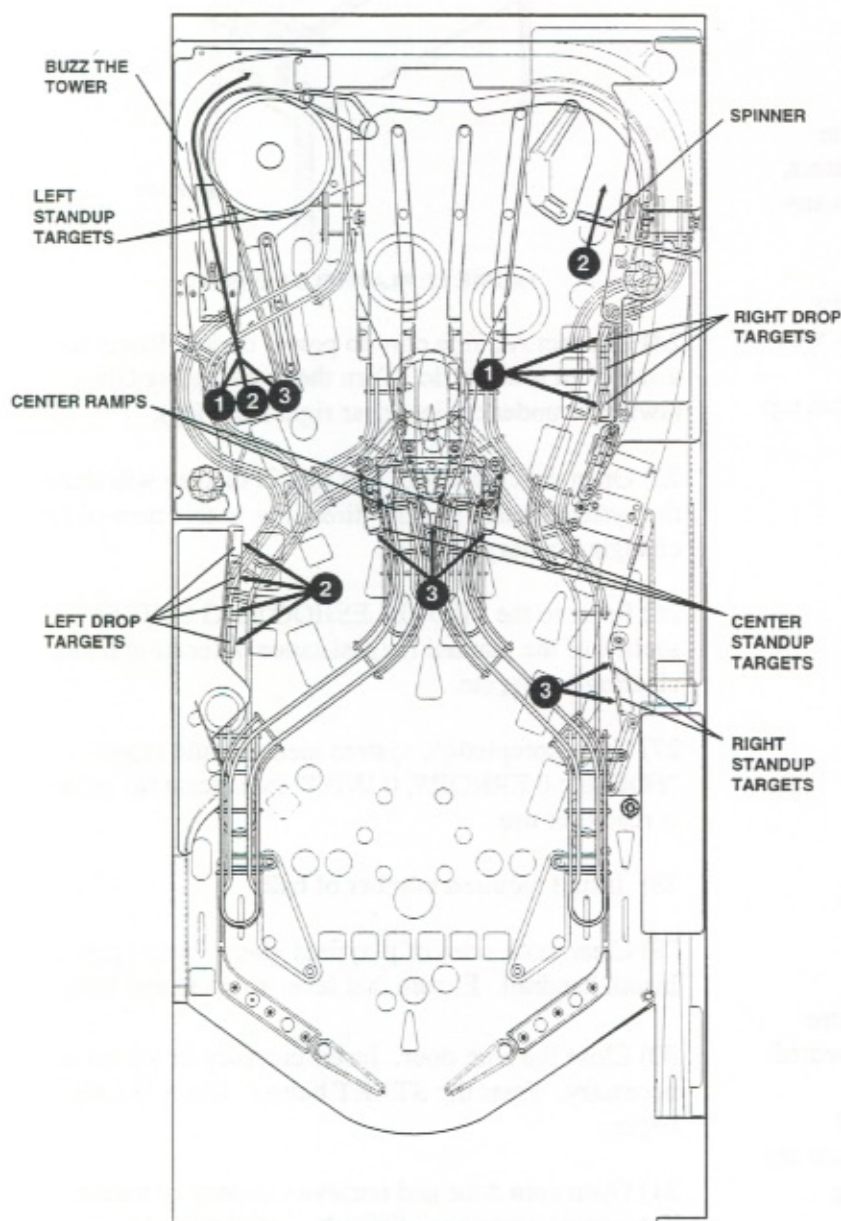
32) Reset all counters to zero. Close and lock coin door. Ensure that the backbox is locked.

AIRBORNE begins!



## GAME RULES

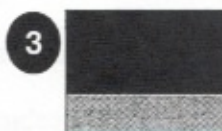
You are a pilot competing in six airshows located in the US, France, Germany, Britain, Italy, and Spain. You fly one jet for the entire competition. There are stunts to be completed at each show. Each country has a time limit. When the time expires, the pilot moves to the next country. Any time left over for a completed country gets multiplied by a point value.



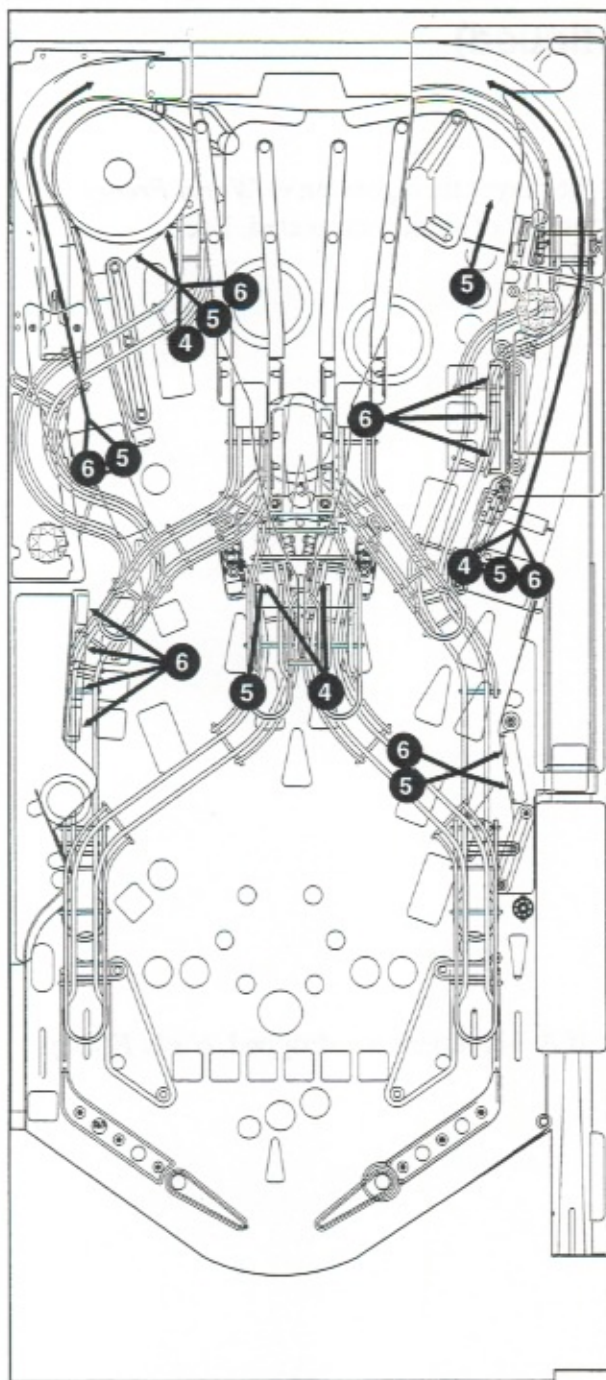
**1** In the United States of America, you must perform 2 stunts. First you must make the left ramp to "Buzz the Tower". Second you must hit the right drop targets.



**2** In France, you must complete 3 stunts. First reach Mach 1 with the spinner. Next knock down the left drop targets. And last make the left ramp 3 times.



**3** In Germany, you have to perform 3 stunts. First hit the 3 center standup targets without hitting the center scoops (otherwise the stunt is over and the plane crashes). Then "Buzz the Tower". And the last trick to perform is to hit the right standup targets.



In Britain, you must complete 3 stunts. First, make any of the center loops 4 times. Next, hit the 2 left standups. And last, make the right ramp 3 times.



In Italy, there are 4 stunts to complete. First "Buzz the Tower". Second, hit both the right and the left standups. Next, reach Mach 3 with the spinner. And the last stunt that you must complete is a 3 hit combo. You must do these stunts in this exact order: 1) make the left center ramp. 2) make the right ramp; 3) hit the spinner.



The last stunt show is in Spain. There are a total of 6 stunts to complete and all of these stunts may be completed in any order: 1) knock down the left drop targets; 2) make the left ramp to "Buzz the Tower"; 3) hit the left standup targets; 4) knock down the right drop targets; 5) make the right ramp. 6) hit the right standup targets.



## GAME RULES (continued)

### END OF WORLD

Once the player has completed all of the 6 previous airshows, the player then goes on to *World Frenzy* (see Feature Rules). Points are then awarded based upon the number of stunts completed. Each completed stunt raises the player's rank by one, as follows:

|                   |                       |
|-------------------|-----------------------|
| Start at:         | 6th place: Sergeant   |
| Advance to:       | 5th place: Lieutenant |
| Advance again to: | 4th place: Captain    |
| Advance again to: | 3rd place: Major      |
| Advance again to: | 2nd place: Colonel    |
| Finish with:      | 1st place: Ace        |

Upon reaching Ace, the player is awarded the following:

|            |   |                       |
|------------|---|-----------------------|
| 1st Time   | - | Light extra ball      |
| 2nd Time   | - | Give extra ball       |
| 3rd Time   | - | Light 1 special lamp  |
| 4th Time   | - | Light 2 special lamps |
| 5th Time + | - | 30 Mil                |

### LEFT DROP TARGETS (S-H-O-W)

Hitting all of the targets enables the left saucer lock & points. If A-I-R targets are dropped, *Night Flying Mode* is activated.

### LEFT SAUCER

Points are determined by the left drop targets:

|          |   |                         |
|----------|---|-------------------------|
| No Drop  | - | 800 K                   |
| 1st Drop | - | 1.5 Mil                 |
| 2nd Drop | - | 2.5 Mil                 |
| 3rd Drop | - | 5 Mil, light extra ball |

### LEFT STANDUP TARGETS

Hitting both targets will enable the left outlane eject lock. If the ball drains out the left outlane, it will act as an ordinary locked ball. However, if the player drains, this ball will release and give him a free ball. The left outlane lock acts as a kickback on the first ball.

## GAME RULES (continued)

### LEFT RAMP - TOWER

The left ramp is lowered by hitting an orbit shot on the playfield. Dropping the left ramp during a stunt is a "Tower Buzz" whereby the ball is fed to the left flipper. If not part of a stunt, it results in a "Tower Flyby" and the ball is then directed towards the right flipper. Making the ramp repeatedly will result in increased scoring of 3 Mil, 4 Mil, 5 Mil, and 6 Mil.

### LEFT RAMP STANDUP TARGET

Each time the target is hit, the letter is added to the dot matrix display to spell A-I-R-B-O-R-N-E. When completed, the player is awarded a random award of Light Special, Light Extra Ball, Upgrade, *Night Flying*, Spot Stunt, 12 Mil, or 20 Mil.

### RIGHT DROP TARGETS (A-I-R)

Hitting all of the targets enables the back right saucer lock. The player then has an opportunity to drop the S-H-O-W targets for *Night Flying Mode*. After the player gets the mode once, the player must hit the A-I-R, and then the S-H-O-W targets at an increasing level of difficulty (the timer speeds-up).

### RIGHT STANDUP TARGETS

Hitting the right standup targets will enable the right outlane diverter for a ball save. The diverter gate is active until 'ball save' or 'ball end' occurs.

### RIGHT RAMP

When the ball is shot up the right ramp, the injector may be used to guide the ball into any of the Jet lanes or may be shot all the way around for a "Tower Flyby". Each of the 4 shots starts at a base value of 1 Mil. Each time the ball is hit in the same lane, the value increases by 1 Mil.

### INJECTOR

The movable injector, at the back of the jet, will guide the ball into one of the three Jet Lanes. It is activated by hitting the flipper buttons at any time the ball goes up the right ramp or off the plunger shot. It is not active during *Air Mayhem*.

### BUMPERS

Star bumpers start at a base value of 200 K. This value is doubled after every 16 hits. The maximum value is 1.25 Mil.

### MACH SPINNER

The spinner starts at a base value of 55 K. Each time the spinner is hit, the jet increases its speed. This results in more bonus points and the jet reaching Mach speed. At Mach 1, the spinner value is 200 K, Mach 2 is 350 K, and Mach 3 is 500 K.



## GAME RULES (continued)

### SKILL SHOT

The skill shot is made by shooting the ball into any of the Jet lanes. The center lane will lock the ball and give the player another ball. The left and right lanes award 1 Mil and 4 Mil points which alternate every ball. If the first ball is locked, the player has an opportunity to start *2-Ball Mayhem* by hitting the center lane and locking the second ball. If a ball has been left in the lock by a previous game, *2-Ball Mini Mayhem* can start with only one shot off the plunger.

### HURRY UP!!!

When the country timer reaches 10 seconds times the number of stunts left, the player has this much time to hit the next stunt. If the stunt is completed, the timer is then reset to the number of stunts now remaining times 10 seconds. The process is repeated until all country stunts are made, or time runs out.

### NIGHT FLYING MODE

Hitting the right targets (A-I-R) and then the left targets (S-H-O-W) starts the *Night Flying Mode*. All shots are then worth 500 K and additional time is added to the airshow timer. The player still has the opportunity to complete stunts for an additional 1 Mil and may advance to the next country (even though the timer for that country has stopped).

### AIR MAYHEM

Only one ball can be stored in the center Jet ball lock. Another two balls may be locked in other locations on the playfield. Shooting your last ball at the Jet lock will release any previous locked ball held there, however, it remains locked and available for the next player.

*2-Ball Mini Mayhem* (Dogfight Mayhem) - The object is to defeat two other jets in a dogfight by shooting each of the center ramps three times. The loops are worth 1.5 Mil to start. After 3 loops on one side are made, the opposing plane is shot down. That ramp then increases value to 4 Mil for the remainder of *Mayhem*. When one ball is lost, *Mayhem* ends.

*3-Ball Air Frenzy* - Three-ball *Mayhem* starts when three balls are locked in any of the four locks. The jackpot values are doubled for 3 balls on the playfield. *Mayhem* has a climbing altitude theme. Four jackpots of increasing value. First, shoot the ground orbit under tower for 4 Mil or 8 Mil. Second, the right center loop at level 2 for 5 Mil or 10 Mil. Third, the left center loop at level two for 6 Mil or 12 Mil. Fourth is the Super Jackpot for the right ramp at level 4 for 10 Mil or 20 Mil.

The jackpot cycle repeats until 1 ball remains.

*World Frenzy* - This mode starts after completion of all countries. The game will wait until a ball is locked in any ball lock. Once a ball is locked, *World Frenzy* starts. The jackpots are the left ramp - 5 Mil, and the right ramp - 15 Mil all the way around, 10 Mil for the Jet lanes.

## GAME RULES (continued)

### BLUE ANGELS FORMATION

The Blue Angel Formation is made by completing the following five shots at any time during the game: left stand up, left loop, center standup, right loop, right standup, and the center standup. The formation resets at the beginning of the ball and additional time is added to the airshow timer. Once the 5 shots are made, the center standup target is qualified for the following award(s):

- 1st formation - 7 Mil
- 2nd formation - 13 Mil
- 3rd formation - 19 Mil, Lights extra ball
- 4th formation - Lights special

### PLANE UPGRADES

Plane upgrades are available after making all of the 3 jet lanes. The copilot is added after the first stunt and may be ejected when the ball is locked in the far right saucer or the near left lock. All plane upgrades will remain for the entire game and are awarded in this order:

- 1) Copilot - The player receives a copilot to help guide him to the next target;
- 2) Jet Refueling - Adds 20 seconds to current airshow time, 5 seconds to all additional shows;
- 3) Targeting Capabilities - This suspends all other game play. Random single shots will be illuminated one at a time. The first one is illuminated for 20 seconds. Each additional shot is illuminated for two seconds less. The mode ends when the player does not hit the target in the allotted time. Target Points start at 7 Mil and increase by 1 Mil after every hit.
- 4) Engine Upgrade - The spinner is multiplied by a factor of 3.

### END OF BALL BONUS

Spelling the J-E-T lanes at the top of the playfield advances Bonus to 2x, 3x, 5x, 7x, 8x and 10x. This Bonus is then used to multiply the sum of the other bonuses, shown below, to arrive at a "total" bonus:

- Base Bonus - Get this for not tilting - 100 K
- Drop Bonus - Completing drop targets - 200 K for each time dropped
- Flyby Bonus - Number of flybys - 350 K per flyby
- Stunt Bonus - Number of completed stunts - 200 K per stunt
- Jet Speed Bonus - Increased by hitting the spinner - 1K times speed

### HIGH SCORE TABLES

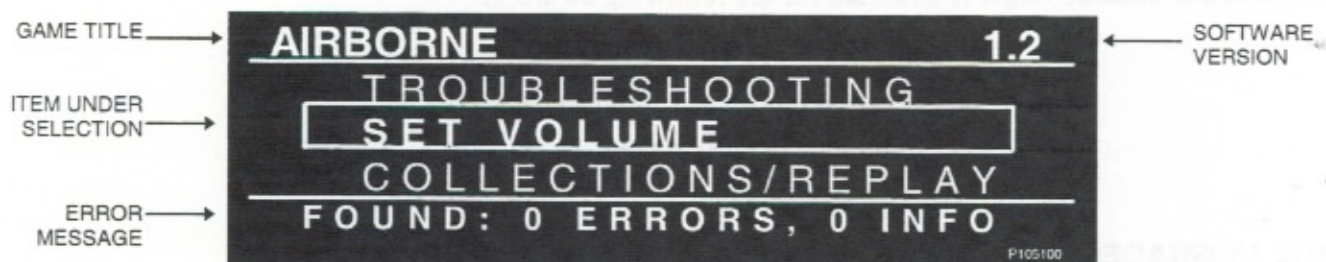
- Flyby King - Most consecutive loops.
- High Scores
- Buy-in High Scores



## MENU SYSTEM

The menu system is started when the coin door is opened. When the coin door is closed, the game will return to the Attract mode. If a game is in progress when the coin door is opened, the game will be restored when the coin door is closed again unless an adjustment (except volume or service credit adjustment) is made or a diagnostic function is performed.

When the coin door is opened, the dot matrix display typically shows the following Main Menu:



The Main Menu displays the number of **ERRORS** or problems that were found during game play or while in the Attract Mode. **ERRORS** are major problems, such as non-operative switches, that should be repaired/replaced before game play is resumed. **INFO** items are minor problems, such as burned-out lamps, that need repair/replacement during the next regular maintenance cycle.

The menu system is controlled by the use of the left & right flipper buttons and the Start button. Pressing these button(s) will result in the following menu actions:

- |                                          |                                                  |
|------------------------------------------|--------------------------------------------------|
| 1) Right Flipper button                  | increment, or move to the next field             |
| 2) Left Flipper button                   | decrement, or move to the previous field         |
| 3) Left & Right Flipper buttons together | cancel, back-up, or restore the original setting |
| 4) Start button                          | accept, enter, or keep new setting               |

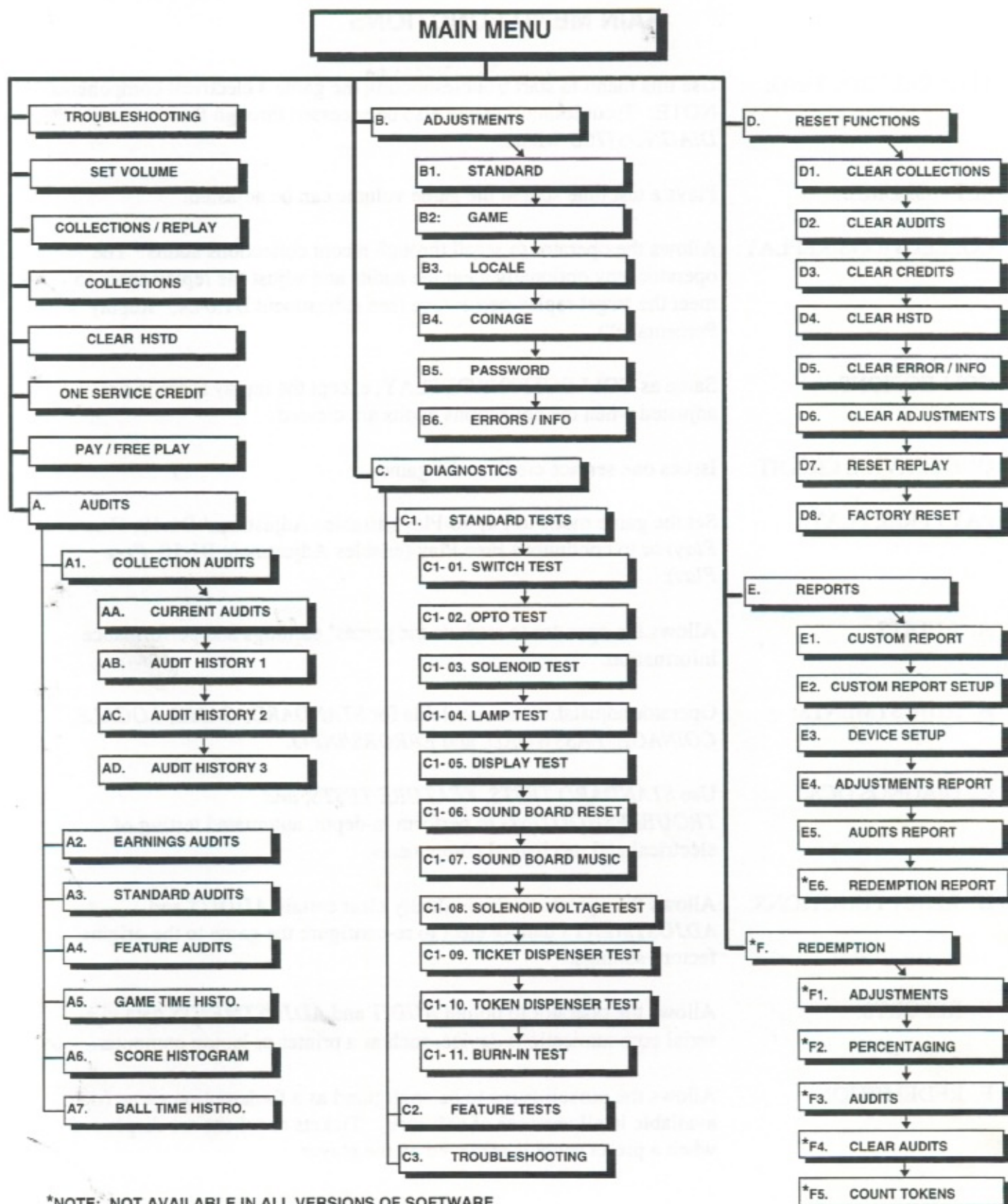
If the game has been in operation for some period of time, the operator may notice that the following Reset Replay Menu appears *before* the Main Menu:



The operator can elect to accept the suggested replay score, by pushing the start button, or ignore the change in score by pushing both flipper buttons simultaneously. This action will return the system to the Main Menu. Additional information regarding Replay credits and scores can be found in the *B1 : Standard Adjustments* section of this manual.

### MENU SYSTEM LAYOUT

The Menu System consists of the following Main Menu and sub-menus:





## MAIN MENU FUNCTIONS

|                     |                                                                                                                                                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TROUBLESHOOTING:    | Use this menu to start troubleshooting the game's electrical components.<br>NOTE: Troubleshooting can also be accessed through the <i>DIAGNOSTICS</i> Menu.                                                                  |
| SET VOLUME:         | Plays a test tune so that the game volume can be adjusted.                                                                                                                                                                   |
| COLLECTIONS/REPLAY: | Allows the operator to scroll through recent collections audits. The operator may optionally clear the audits and adjust the replay score to meet the target replay percentage (see Adjustment B1:04A, "Replay Percentage"). |
| COLLECTIONS:        | Same as COLLECTIONS/REPLAY, except the replay score is <b>not</b> adjusted when the collections audits are cleared.                                                                                                          |
| ONE SERVICE CREDIT: | Issues one service credit to the game.                                                                                                                                                                                       |
| PAY / FREE PLAY:    | Set the game mode to Pay-to-Play (disables Adjustment B1:10, <i>Free Play</i> ) or to continuous Free Play (enables Adjustment B1:10, <i>Free Play</i> ).                                                                    |
| A. AUDITS:          | Allows the operator to retrieve the games' earnings and performance information.                                                                                                                                             |
| B. ADJUSTMENTS:     | Operator adjustables are available for <i>STANDARD</i> , <i>GAME</i> , <i>LOCALE</i> , <i>COINAGE</i> , <i>PASSWORD</i> , and <i>ERRORS/INFO</i> .                                                                           |
| C. DIAGNOSTICS:     | Use <i>STANDARD TESTS</i> , <i>FEATURE TESTS</i> , and <i>TROUBLESHOOTING</i> to perform in-depth, automated testing of electrical and mechanical components.                                                                |
| D. RESET FUNCTIONS: | Allows the operator to individually clear certain <i>AUDITS</i> and <i>ADJUSTMENTS</i> data or elect to re-configure the game to the original factory settings.                                                              |
| E. REPORTS:         | Allows the operator to output <i>AUDIT</i> and <i>ADJUSTMENTS</i> data to a serial communications device, such as a printer or laptop computer.                                                                              |
| F. REDEMPTION       | Allows the pinball game to be configured as a Redemption game (not available in all versions of software). Tickets or tokens are dispensed when a preset score is achieved by the player.                                    |



## AUDITS DATA TABLE

| REF                           | AUDIT #  | DESCRIPTION                        | TOTALS      | PERCENTAGES         | AVERAGE PER GAME |
|-------------------------------|----------|------------------------------------|-------------|---------------------|------------------|
| <b>A1 : COLLECTION AUDITS</b> |          |                                    |             |                     |                  |
| 1                             | A1:AA:01 | CURRENT : RECENT EARNINGS          |             |                     |                  |
| 2                             | A1:AA:02 | CURRENT : RECENT 1ST COIN CHUTE    |             | % OF RECENT COINS   |                  |
| 3                             | A1:AA:03 | CURRENT : RECENT 2ND COIN CHUTE    |             | % OF RECENT COINS   |                  |
| 4                             | A1:AA:04 | CURRENT : RECENT 3RD COIN CHUTE    |             | % OF RECENT COINS   |                  |
| 5                             | A1:AA:05 | CURRENT : RECENT 4TH COIN CHUTE    |             | % OF RECENT COINS   |                  |
| 6                             | A1:AA:06 | CURRENT : RECENT CREDITS           |             |                     |                  |
| 7                             | A1:AA:07 | CURRENT : RECENT COIN CREDITS      |             | % OF RECENT CREDITS |                  |
| 8                             | A1:AA:08 | CURRENT : RECENT SERVICE CREDITS   |             | % OF RECENT CREDITS |                  |
| 9                             | A1:AA:09 | CURRENT : RECENT FREE CREDITS      |             | % OF RECENT CREDITS |                  |
| 10                            | A1:AA:10 | CURRENT : RECENT TOURNT CREDITS    |             | % OF RECENT CREDITS |                  |
| 11                            | A1:AB:01 | HISTORY 1 : RECENT EARNINGS        |             |                     |                  |
| 12                            | A1:AB:02 | HISTORY 1 : RECENT 1ST COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 13                            | A1:AB:03 | HISTORY 1 : RECENT 2ND COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 14                            | A1:AB:04 | HISTORY 1 : RECENT 3RD COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 15                            | A1:AB:05 | HISTORY 1 : RECENT 4TH COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 16                            | A1:AB:06 | HISTORY 1 : RECENT EARNINGS        |             |                     |                  |
| 17                            | A1:AB:07 | HISTORY 1 : RECENT COIN CREDITS    |             | % OF RECENT CREDITS |                  |
| 18                            | A1:AB:08 | HISTORY 1 : RECENT SERVICE CREDITS |             | % OF RECENT CREDITS |                  |
| 19                            | A1:AB:09 | HISTORY 1 : RECENT FREE CREDITS    |             | % OF RECENT CREDITS |                  |
| 20                            | A1:AB:10 | HISTORY 1 : RECENT TOURNT CREDITS  |             | % OF RECENT CREDITS |                  |
| 21                            | A1:AC:01 | HISTORY 2 : RECENT EARNINGS        |             |                     |                  |
| 22                            | A1:AC:02 | HISTORY 2 : RECENT 1ST COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 23                            | A1:AC:03 | HISTORY 2 : RECENT 2ND COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 24                            | A1:AC:04 | HISTORY 2 : RECENT 3RD COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 25                            | A1:AC:05 | HISTORY 2 : RECENT 4TH COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 26                            | A1:AC:06 | HISTORY 2 : RECENT EARNINGS        |             |                     |                  |
| 27                            | A1:AC:07 | HISTORY 2 : RECENT COIN CREDITS    |             | % OF RECENT CREDITS |                  |
| 28                            | A1:AC:08 | HISTORY 2 : RECENT SERVICE CREDITS |             | % OF RECENT CREDITS |                  |
| 29                            | A1:AC:09 | HISTORY 2 : RECENT FREE CREDITS    |             | % OF RECENT CREDITS |                  |
| 30                            | A1:AC:10 | HISTORY 2 : RECENT TOURNT CREDITS  |             | % OF RECENT CREDITS |                  |
| 31                            | A1:AD:01 | HISTORY 3 : RECENT EARNINGS        |             |                     |                  |
| 32                            | A1:AD:02 | HISTORY 3 : RECENT 1ST COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 33                            | A1:AD:03 | HISTORY 3 : RECENT 2ND COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 34                            | A1:AD:04 | HISTORY 3 : RECENT 3RD COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 35                            | A1:AD:05 | HISTORY 3 : RECENT 4TH COIN CHUTE  |             | % OF RECENT COINS   |                  |
| 36                            | A1:AD:06 | HISTORY 3 : RECENT EARNINGS        |             |                     |                  |
| 37                            | A1:AD:07 | HISTORY 3 : RECENT COIN CREDITS    |             | % OF RECENT CREDITS |                  |
| 38                            | A1:AD:08 | HISTORY 3 : RECENT SERVICE CREDITS |             | % OF RECENT CREDITS |                  |
| 39                            | A1:AD:09 | HISTORY 3 : RECENT FREE CREDITS    |             | % OF RECENT CREDITS |                  |
| 40                            | A1:AD:10 | HISTORY 3 : RECENT TOURNT CREDITS  |             | % OF RECENT CREDITS |                  |
| <b>A2 : EARNINGS AUDITS</b>   |          |                                    |             |                     |                  |
| 41                            | A2:01    | TOTAL EARNINGS                     |             |                     |                  |
| 42                            | A2:02    | TOTAL 1ST COIN CHUTE               |             | % OF TOTAL COINS    |                  |
| 43                            | A2:03    | TOTAL 2ND COIN CHUTE               |             | % OF TOTAL COINS    |                  |
| 44                            | A2:04    | TOTAL 3RD COIN CHUTE               |             | % OF TOTAL COINS    |                  |
| 45                            | A2:05    | TOTAL 4TH COIN CHUTE               |             | % OF TOTAL COINS    |                  |
| 46                            | A2:06    | TOTAL CREDITS                      |             |                     |                  |
| 47                            | A2:07    | TOTAL COIN CREDITS                 |             | % OF TOTAL CREDITS  |                  |
| 48                            | A2:08    | TOTAL SERVICE CREDITS              |             | % OF TOTAL CREDITS  |                  |
| 49                            | A2:09    | TOTAL FREE CREDITS                 |             | % OF TOTAL CREDITS  |                  |
| 50                            | A2:10    | TOTAL TOURNAMENT CREDITS           |             | % OF TOTAL CREDITS  |                  |
| <b>A3 : STANDARD AUDITS</b>   |          |                                    |             |                     |                  |
| 51                            | A3:01    | AVERAGE BALL TIME                  | HRS MIN SEC |                     |                  |
| 52                            | A3:02    | 1 PLAYER GAMES                     |             | % OF ALL GAMES      |                  |
| 53                            | A3:03    | 2 PLAYER GAMES                     |             | % OF ALL GAMES      |                  |
| 54                            | A3:04    | 3 PLAYER GAMES                     |             | % OF ALL GAMES      |                  |
| 55                            | A3:05    | 4 PLAYER GAMES                     |             | % OF ALL GAMES      |                  |
| 56                            | A3:06    | TOTAL STARTED CREDITS              |             |                     |                  |
| 57                            | A3:07    | TOTAL FINISHED CREDITS             |             |                     |                  |
| 58                            | A3:08    | REPLAY AWARDS                      |             | % OF GAMES          |                  |
| 59                            | A3:09    | TOTAL STARTED BALLS                |             |                     |                  |



## AUDITS DATA TABLE

| REF                              | AUDIT # | DESCRIPTION          | TOTALS |     |     |     | PERCENTAGES        | AVERAGE<br>PER GAME |
|----------------------------------|---------|----------------------|--------|-----|-----|-----|--------------------|---------------------|
| A3 : STANDARD AUDITS (CONTINUED) |         |                      |        |     |     |     |                    |                     |
| 60                               | A3:10   | TOTAL FINISHED BALLS |        |     |     |     |                    |                     |
| 61                               | A3:11   | MATCH AWARDS         |        |     |     |     | % OF GAMES         |                     |
| 62                               | A3:12   | EXTRA BALLS          |        |     |     |     |                    |                     |
| 63                               | A3:13   | LEFT DRAINS          |        |     |     |     | % OF ALL DRAINS    |                     |
| 64                               | A3:14   | RIGHT DRAINS         |        |     |     |     | % OF ALL DRAINS    |                     |
| 65                               | A3:15   | CENTER DRAINS        |        |     |     |     | % OF ALL DRAINS    |                     |
| 66                               | A3:16   | TILTS                |        |     |     |     |                    |                     |
| 67                               | A3:17   | SLAM TILTS           |        |     |     |     |                    |                     |
| 68                               | A3:18   | HSTD CREDITS         |        |     |     |     | % OF GAMES         |                     |
| 69                               | A3:19   | BUY-IN 1             |        |     |     |     |                    |                     |
| 70                               | A3:20   | BUY-IN 2             |        |     |     |     |                    |                     |
| 71                               | A3:21   | BUY-IN 3 +           |        |     |     |     |                    |                     |
| 72                               | A3:22   | HSTD RESET COUNT     |        |     |     |     |                    |                     |
| 73                               | A3:23   | TOTAL TIME ON        | DAYS   | HRS | MIN | SEC |                    |                     |
| 74                               | A3:24   | TOTAL GAME TIME      |        | HRS | MIN | SEC | % OF TOTAL TIME ON |                     |
| 75                               | A3:25   | AVERAGE GAME TIME    |        | HRS | MIN | SEC |                    |                     |
| 76                               | A3:26   | TOTAL BURN-IN TIME   |        | HRS | MIN | SEC |                    |                     |
| 77                               | A3:27   | TOTAL TICKETS        |        |     |     |     |                    |                     |
| 78                               | A3:28   | TOTAL TOKENS         |        |     |     |     |                    |                     |
| A4 : FEATURE AUDITS              |         |                      |        |     |     |     |                    |                     |
| 79                               | A4:01   | PLANE REFUELING      |        |     |     |     |                    |                     |
| 80                               | A4:02   | TARGETTING MODE      |        |     |     |     |                    |                     |
| 81                               | A4:03   | UPGRADE SPINNER      |        |     |     |     |                    |                     |
| 82                               | A4:04   | COMPLETED STUNTS     |        |     |     |     |                    |                     |
| 83                               | A4:05   | NIGHT VISION         |        |     |     |     |                    |                     |
| 84                               | A4:06   | BLUE ANGELS          |        |     |     |     |                    |                     |
| 85                               | A4:07   | DOG FIGHT            |        |     |     |     |                    |                     |
| 86                               | A4:08   | AIR MAYHEM           |        |     |     |     |                    |                     |
| 87                               | A4:09   | USA BUZZ TOWER       |        |     |     |     |                    |                     |
| 88                               | A4:10   | USA BARREL ROLL      |        |     |     |     |                    |                     |
| 89                               | A4:11   | FRANCE MACH 1        |        |     |     |     |                    |                     |
| 90                               | A4:12   | FRANCE SNAP ROLL     |        |     |     |     |                    |                     |
| 91                               | A4:13   | FRANCE ARROW ROLL 1  |        |     |     |     |                    |                     |
| 92                               | A4:14   | FRANCE ARROW ROLL 2  |        |     |     |     |                    |                     |
| 93                               | A4:15   | FRANCE ARROW ROLL 3  |        |     |     |     |                    |                     |
| 94                               | A4:16   | GERMANY NEAR MISS 1  |        |     |     |     |                    |                     |
| 95                               | A4:17   | GERMANY NEAR MISS 2  |        |     |     |     |                    |                     |
| 96                               | A4:18   | GERMANY NEAR MISS 3  |        |     |     |     |                    |                     |
| 97                               | A4:19   | GERMANY BUZZ TOWER   |        |     |     |     |                    |                     |
| 98                               | A4:20   | GERMANY REVERSE 8    |        |     |     |     |                    |                     |
| 99                               | A4:21   | BRITIAN LOOPS        |        |     |     |     |                    |                     |
| 100                              | A4:22   | BRITIAN HAMMERHEAD   |        |     |     |     |                    |                     |
| 101                              | A4:23   | BRITIAN BREAK 1      |        |     |     |     |                    |                     |
| 102                              | A4:24   | BRITIAN BREAK 2      |        |     |     |     |                    |                     |
| 103                              | A4:25   | BRITIAN BREAK 3      |        |     |     |     |                    |                     |
| 104                              | A4:26   | ITALY BUZZ TOWER     |        |     |     |     |                    |                     |
| 105                              | A4:27   | ITALY STALL DIVE     |        |     |     |     |                    |                     |
| 106                              | A4:28   | ITALY CORKSCREW      |        |     |     |     |                    |                     |
| 107                              | A4:29   | ITALY MACH 3         |        |     |     |     |                    |                     |
| 108                              | A4:30   | ITALY HALF ROLL      |        |     |     |     |                    |                     |
| 109                              | A4:31   | ITALY HALF LOOP      |        |     |     |     |                    |                     |
| 110                              | A4:32   | ITALY VERTICAL       |        |     |     |     |                    |                     |
| 111                              | A4:33   | SPAIN SQUARE         |        |     |     |     |                    |                     |
| 112                              | A4:34   | SPAIN TOWER          |        |     |     |     |                    |                     |
| 113                              | A4:35   | SPAIN SLOW ROLL      |        |     |     |     |                    |                     |
| 114                              | A4:36   | SPAIN BARREL ROLL    |        |     |     |     |                    |                     |
| 115                              | A4:37   | SPAIN VERTICAL ROLL  |        |     |     |     |                    |                     |
| 116                              | A4:38   | SPAIN 8 POINT ROLL   |        |     |     |     |                    |                     |
| 117                              | A4:39   | REACHED FRANCE       |        |     |     |     |                    |                     |
| 118                              | A4:40   | REACHED GERMANY      |        |     |     |     |                    |                     |
| 119                              | A4:41   | REACHED BRITAIN      |        |     |     |     |                    |                     |
| 120                              | A4:42   | REACHED ITALY        |        |     |     |     |                    |                     |
| 121                              | A4:43   | REACHED SPAIN        |        |     |     |     |                    |                     |
| 122                              | A4:44   | FINISHED WORLD       |        |     |     |     |                    |                     |
| 123                              | A4:45   | FLYBYS               |        |     |     |     |                    |                     |
| 124                              | A4:46   | FLYBY HSTD CREDITS   |        |     |     |     |                    |                     |
| 125                              | A4:47   | SPECIALS GIVEN       |        |     |     |     |                    |                     |



## AUDITS DATA TABLE

| REF                            | AUDIT # | DESCRIPTION                        | TOTALS | PERCENTAGES | AVERAGE<br>PER GAME |
|--------------------------------|---------|------------------------------------|--------|-------------|---------------------|
| <b>A5: GAME TIME HISTOGRAM</b> |         |                                    |        |             |                     |
| 126                            | A5      | GAME TIME HISTOGRAM 0.0 - 0.9 MINS |        |             |                     |
| 127                            | A5      | GAME TIME HISTOGRAM 1.0 - 1.9 MINS |        |             |                     |
| 128                            | A5      | GAME TIME HISTOGRAM 2.0 - 2.9 MINS |        |             |                     |
| 129                            | A5      | GAME TIME HISTOGRAM 3.0 - 3.9 MINS |        |             |                     |
| 130                            | A5      | GAME TIME HISTOGRAM 4.0 - 4.9 MINS |        |             |                     |
| 131                            | A5      | GAME TIME HISTOGRAM 5.0 - 5.9 MINS |        |             |                     |
| 132                            | A5      | GAME TIME HISTOGRAM 6.0 - 6.9 MINS |        |             |                     |
| 133                            | A5      | GAME TIME HISTOGRAM 7.0 - 7.9 MINS |        |             |                     |
| 134                            | A5      | GAME TIME HISTOGRAM 8.0 - 8.9 MINS |        |             |                     |
| 135                            | A5      | GAME TIME HISTOGRAM 9.0 - 9.9 MINS |        |             |                     |
| 136                            | A5      | GAME TIME HISTOGRAM 10 - 11 MINS   |        |             |                     |
| 137                            | A5      | GAME TIME HISTOGRAM 11 - 12 MINS   |        |             |                     |
| 138                            | A5      | GAME TIME HISTOGRAM 12 - MINS      |        |             |                     |
| <b>A6: SCORE HISTOGRAM</b>     |         |                                    |        |             |                     |
| 139                            | A6      | SCORE HISTOGRAM 0 - 19 MILLION     |        |             |                     |
| 140                            | A6      | SCORE HISTOGRAM 20 - 39 MILLION    |        |             |                     |
| 141                            | A6      | SCORE HISTOGRAM 40 - 59 MILLION    |        |             |                     |
| 142                            | A6      | SCORE HISTOGRAM 60 - 79 MILLION    |        |             |                     |
| 143                            | A6      | SCORE HISTOGRAM 80 - 99 MILLION    |        |             |                     |
| 144                            | A6      | SCORE HISTOGRAM 100 - 119 MILLION  |        |             |                     |
| 145                            | A6      | SCORE HISTOGRAM 120 - 139 MILLION  |        |             |                     |
| 146                            | A6      | SCORE HISTOGRAM 140 - 159 MILLION  |        |             |                     |
| 147                            | A6      | SCORE HISTOGRAM 160 - 179 MILLION  |        |             |                     |
| 148                            | A6      | SCORE HISTOGRAM 180 - 199 MILLION  |        |             |                     |
| 149                            | A6      | SCORE HISTOGRAM 200 - 219 MILLION  |        |             |                     |
| 150                            | A6      | SCORE HISTOGRAM 220 - 239 MILLION  |        |             |                     |
| 151                            | A6      | SCORE HISTOGRAM 240 - 259 MILLION  |        |             |                     |
| 152                            | A6      | SCORE HISTOGRAM 260 - 279 MILLION  |        |             |                     |
| 153                            | A6      | SCORE HISTOGRAM 280 - 299 MILLION  |        |             |                     |
| 154                            | A6      | SCORE HISTOGRAM 300 - 319 MILLION  |        |             |                     |
| 155                            | A6      | SCORE HISTOGRAM 320 - 339 MILLION  |        |             |                     |
| 156                            | A6      | SCORE HISTOGRAM 340 - 359 MILLION  |        |             |                     |
| 157                            | A6      | SCORE HISTOGRAM 360 - 379 MILLION  |        |             |                     |
| 158                            | A6      | SCORE HISTOGRAM 380 - 399 MILLION  |        |             |                     |
| 159                            | A6      | SCORE HISTOGRAM 400 - 419 MILLION  |        |             |                     |
| 160                            | A6      | SCORE HISTOGRAM 420 - 439 MILLION  |        |             |                     |
| 161                            | A6      | SCORE HISTOGRAM 440 - 459 MILLION  |        |             |                     |
| 162                            | A6      | SCORE HISTOGRAM 460 - 479 MILLION  |        |             |                     |
| 163                            | A6      | SCORE HISTOGRAM 480 - 499 MILLION  |        |             |                     |
| 164                            | A6      | SCORE HISTOGRAM 500 - MILLION      |        |             |                     |
| <b>A7: BALL TIME HISTOGRAM</b> |         |                                    |        |             |                     |
| 165                            | A7      | BALL TIME HISTOGRAM 0 - 9 SECS     |        |             |                     |
| 166                            | A7      | BALL TIME HISTOGRAM 10 - 19 SECS   |        |             |                     |
| 167                            | A7      | BALL TIME HISTOGRAM 20 - 29 SECS   |        |             |                     |
| 168                            | A7      | BALL TIME HISTOGRAM 30 - 39 SECS   |        |             |                     |
| 169                            | A7      | BALL TIME HISTOGRAM 40 - 49 SECS   |        |             |                     |
| 170                            | A7      | BALL TIME HISTOGRAM 50 - 59 SECS   |        |             |                     |
| 171                            | A7      | BALL TIME HISTOGRAM 60 - 69 SECS   |        |             |                     |
| 172                            | A7      | BALL TIME HISTOGRAM 70 - 79 SECS   |        |             |                     |
| 173                            | A7      | BALL TIME HISTOGRAM 80 - 89 SECS   |        |             |                     |
| 174                            | A7      | BALL TIME HISTOGRAM 90 - 99 SECS   |        |             |                     |
| 175                            | A7      | BALL TIME HISTOGRAM 100 - 109 SECS |        |             |                     |
| 176                            | A7      | BALL TIME HISTOGRAM 110 - 119 SECS |        |             |                     |
| 177                            | A7      | BALL TIME HISTOGRAM 120 - 129 SECS |        |             |                     |
| 178                            | A7      | BALL TIME HISTOGRAM 130 - 139 SECS |        |             |                     |
| 179                            | A7      | BALL TIME HISTOGRAM 140 - 149 SECS |        |             |                     |
| 180                            | A7      | BALL TIME HISTOGRAM 150 - 159 SECS |        |             |                     |
| 181                            | A7      | BALL TIME HISTOGRAM 160 - 169 SECS |        |             |                     |
| 182                            | A7      | BALL TIME HISTOGRAM 170 - 179 SECS |        |             |                     |
| 183                            | A7      | BALL TIME HISTOGRAM 180 - 189 SECS |        |             |                     |
| 184                            | A7      | BALL TIME HISTOGRAM 190 - 199 SECS |        |             |                     |
| 185                            | A7      | BALL TIME HISTOGRAM 200 - 209 SECS |        |             |                     |
| 186                            | A7      | BALL TIME HISTOGRAM 210 - SECS     |        |             |                     |



## B. ADJUSTMENTS

### B1: STANDARD ADJUSTMENTS

| AUDIT REF. | AUDIT NAME              | RANGE                      | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                                                                 |
|------------|-------------------------|----------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B1-01      | BALLS PER GAME          | 1 - 10 BALLS               | 3 BALLS         | THE NUMBER OF BALLS GIVEN IN A GAME.                                                                                                                                                                                                        |
| B1-02      | TILT WARNINGS           | 0 - 10                     | 2               | THE NUMBER OF TIMES THE GAME CAN "TILT" BEFORE ENDING THE CURRENT BALL IN PLAY.                                                                                                                                                             |
| B1-03      | ATTRACT MODE SOUNDS     | YES, NO                    | YES             | SELECT WHETHER SOUNDS & MUSIC ARE PLAYED DURING ATTRACT MODE.                                                                                                                                                                               |
| B1-04+     | ALLOW REPLAY            | YES, NO                    | YES             | SELECT WHETHER REPLAY CREDITS ARE AWARDED. IF YES IS SELECTED, ADDITIONAL REPLAY ADJUSTMENTS CAN BE SET (SEE B1-04A,B,C,D).                                                                                                                 |
| B1-04A     | REPLAY PERCENT          | 5 - 50 %                   | 10%             | THE "IDEAL" PERCENTAGE OF GAMES THAT RECEIVE A REPLAY. THIS VALUE IS THEN USED TO SUGGEST ACTUAL REPLAY SCORE VALUES ONCE A HISTORY OF GAME SCORES IS ACCUMULATED.                                                                          |
| B1-04B     | REPLAY START SCORE      | 0 - 4,000,000,000          | 100,000,000     | THE INITIAL SCORE AT WHICH A REPLAY CREDIT IS AWARDED.                                                                                                                                                                                      |
| B1-04C     | REPLAY MINIMUM          | 0 - 4,000,000,000          | 70,000,000      | THE MINIMUM SCORE, DURING A REPLAY CREDIT GAME, THAT MUST BE ACCOMPLISHED BEFORE AN ADDITIONAL REPLAY CREDIT IS AWARDED.                                                                                                                    |
| B1-04D     | REPLAY BUMP             | 0 - 4,000,000,000          | 10,000,000      | THE AMOUNT BY WHICH THE REPLAY START SCORE IS INCREASED AFTER A REPLAY CREDIT IS AWARDED.                                                                                                                                                   |
| B1-04E     | REPLAY INDICATOR        | ON, OFF                    | OFF             | WHEN SET TO ON, AN INDICATOR (★) APPEARS IN EACH CORNER OF THE DISPLAY DURING ATTRACT MODE (REPLAY AT...) TO SHOW A NEW REPLAY VALUE HAS BEEN REACHED (SEE B1-04A).                                                                         |
| B1-04F     | COIN DOOR REPLAY        | ON, OFF                    | ON              | WHEN SET TO ON, THE OPERATOR WILL BE PROMPTED (WHEN OPENING THE COIN DOOR) TO CHANGE THE REPLAY SCORE IN ORDER TO SATISFY THE REPLAY PERCENT (B1-04A). NOTE: THE MENU SYSTEM IS INTERRUPTED UNTIL THIS PROMT IS ANSWERED                    |
| B1-05+     | ALLOW HSTD              | YES, NO                    | YES             | SELECT WHETHER THE HIGH SCORE TO DATE FEATURE IS ENABLED. IF YES IS SELECTED, ADDITIONAL HSTD ADJUSTMENTS CAN BE SET (SEE B1-05A,B,C,D).                                                                                                    |
| B1-05A     | HSTD FIRST SCORE        | 0 - 42,999,000,000         | 500,000,000     | THE HIGHEST SCORE WRITTEN TO THE HSTD TABLE AFTER THE TABLE IS CLEARED BY THE RESET FUNCTION (D4). THE GAME WILL AUTOMATICALLY GENERATE SCORES BETWEEN THE HSTD FIRST SCORE AND THE HSTD LAST SCORE TO FILL-IN MIDDLE ENTRIES IN THE TABLE. |
| B1-05B     | HSTD LAST SCORE         | 0 - 42,999,000,000         | 250,000,000     | THE LOWEST SCORE WRITTEN TO THE HSTD TABLE AFTER THE TABLE IS CLEARED BY THE RESET FUNCTION (D4). THE GAME WILL AUTOMATICALLY GENERATE SCORES BETWEEN THE HSTD FIRST SCORE AND THE HSTD LAST SCORE TO FILL-IN MIDDLE ENTRIES IN THE TABLE.  |
| B1-05C     | CREDITS FOR GRAND CHAMP | 0 - 99 CREDITS             | 3 CREDITS       | THE NUMBER OF CREDITS AWARDED FOR EXCEEDING THE GRAND CHAMP.                                                                                                                                                                                |
| B1-05D     | CREDITS FOR #1-4 SCORES | 0 - 99 CREDITS             | 1 CREDIT        | THE NUMBER OF CREDITS AWARDED FOR EXCEEDING THE #1 -#4 HIGH SCORES.                                                                                                                                                                         |
| B1-06      | MATCH PERCENT           | 0 - 95%                    | 8%              | THE PERCENTAGE OF GAMES THAT AWARD A MATCH CREDIT AT THE END OF THE GAME.                                                                                                                                                                   |
| B1-07      | REPLAY AWARD            | CREDIT, EXTRA BALL, POINTS | CREDIT          | THE TYPE OF AWARD ISSUED WHEN A REPLAY IS EARNED BY THE PLAYER.                                                                                                                                                                             |
| B1-08      | EXTRA BALL AWARD        | EXTRA BALL, POINTS         | EXTRA BALL      | THE TYPE OF AWARD ISSUED WHEN AN EXTRA BALL IS EARNED BY THE PLAYER.                                                                                                                                                                        |

**B1: STANDARD ADJUSTMENTS (CONTINUED)**

| AUDIT REF. | AUDIT NAME                  | RANGE                   | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|-----------------------------|-------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B1-09      | SET GAME LOCATION           | 0 - 99,999              | 0               | A TRACKING NUMBER USED TO INDICATE THE PHYSICAL LOCATION OF A GAME.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| B1-10      | SET MACHINE ID              | 0 - 99,999              | 0               | ASSIGN A SECONDARY ID TO A GAME WHERE MULTIPLE GAMES MAY EXIST IN THE SAME LOCATION.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| B1-11      | FREE PLAY                   | YES, NO                 | NO              | ENABLES / DISABLES <i>FREE PLAY</i> MODE. ALSO CONTROLS THE MAIN MENU SETTINGS FOR <i>PAY-TO-PLAY</i> AND <i>FREE PLAY</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| B1-12      | PLAY MODE                   | NORMAL, TOURNAMENT      | NORMAL          | SELECT <i>NORMAL</i> OR <i>TOURNAMENT</i> MODE. <i>TOURNAMENT</i> MODE EQUALIZES THE SCORING OF CERTAIN FEATURES AMONGST PLAYERS IN MULTI-PLAYER GAMES.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| B1-13      | SOL.(ENOID) VOLTAGE PERCENT | 0 - 90%                 | 10%             | SELECT THE PERCENTAGE OF SOLENOID VOLTAGE REGULATION (FOR DISPLAY PURPOSES ONLY). <b>DOES NOT</b> ACTIVELY REGULATE THE GAMES' SOLENOIDS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| B1-14      | SHOW MESSAGE OF THE DAY     | YES, NO, VIEW/EDIT      | NO              | SELECT A MESSAGE FOR DISPLAY DURING ATTRACT MODE. THIS MESSAGE MAY BE CUSTOMIZED BY CHOOSING <i>VIEW/EDIT</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| B1-15      | FLIPPER STRENGTH            | 1 - 16                  | 12              | SELECT RELATIVE STRENGTH OF FLIPPER COILS. A SETTING OF 12 REPRESENTS 3/4 STRENGTH (12/16). MAY BE USED TO ADJUST THE AMOUNT OF BALL TRAVEL WHEN PLAYFIELD PITCH IS CHANGED.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| B1-16+     | TICKET DISPENSER            | NONE<br>STANDARD TICKET | NONE            | <p>SELECT THE TYPE OF TICKET DISPENSER (IF INSTALLED ON THE GAME). AFTER <i>TICKET DISPENSER</i> IS ENTERED, AUDIT A3:27, <i>TOTAL TICKETS</i>, IS INCREMENTED AND THE TICKET MOTOR DRIVE IS PULSED</p> <p>TICKET DISPENSERS CURRENTLY SUPPORTED:</p> <ol style="list-style-type: none"> <li>1) DELTRONICS, MODEL 1275;</li> <li>2) COIN CONTROLS, MODEL CTD10.</li> </ol> <p><b>NOTE:</b> AFTER SERVICING AN "OUT OF TICKETS" CONDITION OR A DISPENSER JAM, YOU CAN EITHER:</p> <p>A) <i>CONTINUE</i> DISPENSING TICKETS FROM THE GAME-IN-PROGRESS BY CLOSING THE COIN DOOR, OR</p> <p>B) <i>CLEAR</i> DISPENSER MEMORY BY INTERRUPTING POWER TO THE GAME (OFF, THEN ON).</p> |
| B1-16A     | TICKETS / CREDIT            | 0, 1 - 99               | 0               | <p>SELECT THE NUMBER OF TICKETS TO BE DISPENSED FOR EACH <i>FREE CREDIT</i> AWARDED (REPLAYS, SPECIALS, MATCH, AND HSTD). NO CREDITS WILL THEN BE ISSUED TO THE PLAYER, ONLY DISPENSED TICKETS.</p> <p>IF YOUR GAME IS <b>NOT</b> EQUIPPED WITH A TICKET DISPENSER, SELECT "0", OTHERWISE, SELECT FROM 1 TO 99 TICKET(S) TO BE DISPENSED PER <i>FREE CREDIT</i> AWARDED (EXAMPLE: IF THIS OPTION IS SET TO "6" AND "3" <i>FREE CREDITS</i> ARE EARNED, "18" <i>TOTAL TICKETS</i> WILL BE DISPENSED)</p>                                                                                                                                                                        |



**B1: STANDARD ADJUSTMENTS (CONTINUED)**

| AUDIT REF. | AUDIT NAME      | RANGE                                                                                                                                                                                                                                                                                                             | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B1-17+     | TOKEN DISPENSER | NONE<br><br>BALLYWULFF DISPENSER<br><br>COIN CONTROLS DISPENSER<br><br>COIN CONTROLS COMPACT HOPPER (RED DISC)<br><br>COIN CONTROLS COMPACT HOPPER (PURPLE OR GREEN DISCS)<br><br>COIN CONTROLS COMPACT HOPPER (GRAY, BLACK, BROWN, OR BLUE DISCS)<br><br>COIN CONTROLS COMPACT HOPPER (5 AWP DISC USED IN ITALY) | NONE            | SELECT THE TYPE OF TOKEN DISPENSER (IF INSTALLED ON THE GAME). AFTER <i>TOKEN DISPENSER</i> IS ENTERED, AUDIT A3:28, <i>TOTAL TOKENS</i> , IS INCREMENTED AND THE TOKEN METER DRIVE IS PULSED<br><br><b>NOTE:</b> AFTER SERVICING AN "OUT OF TOKENS" CONDITION OR A DISPENSER JAM, YOU CAN EITHER:<br>A) <i>CONTINUE</i> DISPENSING TOKENS FROM THE GAME-IN-PROGRESS BY CLOSING THE COIN DOOR, OR<br>B) <i>CLEAR</i> DISPENSER MEMORY BY INTERRUPTING POWER TO THE GAME (OFF, THEN ON). |
| B1-17A     | TOKENS / CREDIT | 0, 1 - 99                                                                                                                                                                                                                                                                                                         | 0               | SELECT THE NUMBER OF TOKENS TO BE DISPENSED FOR EACH <i>FREE CREDIT</i> AWARDED (REPLAYS, SPECIALS, MATCH, AND HSTD). NO CREDITS WILL THEN BE ISSUED TO THE PLAYER, ONLY DISPENSED TOKENS.<br><br>IF YOUR GAME IS <b>NOT</b> EQUIPPED WITH A TOKEN DISPENSER, SELECT "0", OTHERWISE, SELECT FROM 1 TO 99 TOKEN(S) TO BE DISPENSED PER FREE CREDIT AWARDED (EXAMPLE: IF THIS OPTION IS SET TO "6" AND "3" FREE CREDITS ARE EARNED, "18" TOTAL TOKENS WILL BE DISPENSED)                  |

**B2: GAME ADJUSTMENTS**

| AUDIT REF. | AUDIT NAME              | RANGE                                      | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                                                                                                                                                                    |
|------------|-------------------------|--------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B2-01      | GAME DIFFICULTY         | EXTRA EASY, EASY, NORMAL, HARD, EXTRA HARD | NORMAL          | SETS THE OVERALL DIFFICULTY OF THE GAME. THIS OPTION WILL AUTOMATICALLY CONFIGURE THE SETTINGS FOR B2-02,03,04.                                                                                                                                                                                                                                |
| B2-02      | BALL SAVER TIME         | 0-15 SECONDS                               | 7 SECONDS       | SETS A GRACE PERIOD FOR "QUICK DRAIN" BALLS. ANY BALL "LOST" BEFORE THE TIMER EXPIRES WILL BE RETURNED TO THE PLAYER.                                                                                                                                                                                                                          |
| B2-03      | CREDITS FOR FLYBY TABLE | 0-99                                       | 1               | SETS THE NUMBER OF CREDITS AWARDED FOR EXCEEDING THE FLYBY HSTD.                                                                                                                                                                                                                                                                               |
| B2-04      | LEFT RAMP RELAXES DOWN  | YES, NO                                    | YES             | SETS THE INITIAL LEFT RAMP POSITION AS EITHER <i>DOWN</i> (YES) OR <i>UP</i> (NO).<br><br><b>NOTE:</b> PRE-PRODUCTION GAMES FEATURED AN "UP" STYLE RAMP, THAT IS, WHEN THE GAME IS INITIALIZED, THE RAMP IS IN THE "UP" POSITION. LATER PRODUCTION GAMES SUPPORTED A "DOWN" STYLE RAMP (THE GAME STARTS WITH THE RAMP IN THE "DOWN" POSITION). |

**B3: LOCALE ADJUSTMENTS**

| AUDIT REF. | AUDIT NAME      | RANGE                                                                                                                                                                                   | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                             |
|------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B3-01      | COUNTRY         | UNITED STATES, FRANCE, GERMANY, SPAIN, MEXICO, CANADA (ENGLISH), CANADA (FRENCH), SWITZERLAND (GERMAN), SWITZERLAND (FRENCH), SWITZERLAND (ITALIAN); ITALY, UNITED KINGDOM, NETHERLANDS | UNITED STATES   | SETS THE COUNTRY LOCATION OF THE GAME. THIS SETTING CONTROLS NUMBERS, TIMES, DATES, AND MONETARY VALUES SHOWN ON THE DOT MATRIX DISPLAY. THIS OPTION WILL ALSO CHANGE THE SETTINGS FOR B3-02 AND B3-03. |
| B3-02      | TEXT LANGUAGE   | ENGLISH, FRENCH, GERMAN, SPANISH, <b>ITALIAN</b> , DUTCH                                                                                                                                | ENGLISH         | SETS THE LANGUAGE USED FOR TEXT SHOWN ON THE DOT MATRIX DISPLAY.                                                                                                                                        |
| B3-03      | SPEECH LANGUAGE | ENGLISH, FRENCH, GERMAN, SPANISH, <b>ITALIAN</b> , DUTCH                                                                                                                                | ENGLISH         | SETS THE LANGUAGE USED FOR SOUND EFFECTS.                                                                                                                                                               |
|            |                 | NOTE: LANGUAGES AND SPEECH IN <b>BOLD</b> ARE NOT CURRENTLY IMPLEMENTED.                                                                                                                |                 |                                                                                                                                                                                                         |

**B4: COINAGE ADJUSTMENTS**

| AUDIT REF. | AUDIT NAME           | RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | FACTORY SETTING                  | DESCRIPTION                                                                                                                                                     |
|------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B4-01      | CONFIGURE COINAGE TO | 1 GAME / 1 COIN<br>1 GAME / 2 COINS<br>1 GAME / 3 COINS<br>2 GAMES / 1 COIN<br>1/1 3/2 GAMES/COINS<br>1/2 3/4 GAMES/COINS<br>1/2 2/3 3/4<br>1/2 2/4 3/6 5/8<br>USA, 50c, 5/\$2.00<br>USA, 50c, 2/75c 3/\$1.00<br>FR 3/1 5/2 10/5 20/11<br>FR 5/1 10/3 20/7<br>FR 3/1 5/2 10/4 20/9<br>GERMAN 1/2 2/3 3/4 5/5<br>GERMAN 1/2 2/3 3/4 4/5<br>GERMAN 1/1 6/5<br>SPAIN, 1/100 6/500<br>U. K., 3/L1<br>U. K., 1/50p<br>SWISS, 1/1 2/2 6/5<br>SWISS, 1/1 3/2 8/5<br>SWISS, 1/1<br>ITALY 1/2X500L 3/4X500L<br>ITALY 1/500L<br>ITALY 1/2X500L<br>HOLL. 1/1G 3/2.5G 6/5G<br>GREECE 1/100Dr.<br>GREECE 1/200Dr. 2/300<br>GREECE 1/100Dr. 2/150<br>SWEDEN 1/10Kr. 2/15 3/20<br>SWEDEN 1/ 5Kr. 2/10 5/20<br>AUSTRALIA 1/\$1 3/2<br>CUSTOM PRICING | SET ACCORDING TO COUNTRY DEFAULT | SETS THE RATIO OF NUMBER OF COINS TO THE NUMBER OF CREDITS. SELECT THE <b>CUSTOM PRICING</b> FEATURE AND CHOOSE UP TO FOUR SEPARATE COIN/CREDIT CONFIGURATIONS. |



**B4: COINAGE ADJUSTMENTS (CONTINUED)**

| AUDIT REF. | AUDIT NAME           | RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | FACTORY SETTING                  | DESCRIPTION                                                                                                                                                       |
|------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B4-02+     | COIN DOOR TYPE       | CUSTOM<br><br>ALL CHUTE UNITS 1 COIN<br>USA 25-25<br>USA 25 W/MULTIPULSE DBV<br>FRANCE ELEC1-5-10-20<br>FRANCE MECH 5-10<br>GERMANY ELEC 1-2-5<br>GERMANY MECH 1-2-5<br>UK ELEC L1-50-20-10<br>ITALY MECH 500-500<br>N.Z. MECH 1-2<br>SPAIN MECH 100-500<br>JAPAN MECH 100-100<br>JAPAN MECH 100<br>PORT MECH 100-200<br>GREECE MECH 50-100<br>HUNGARY MECH 20-20<br>AUSTRIA MECH 5-10-10<br>AUSTRIA MECH 5-10<br>KOREA MECH 100-100<br>HONG KONG MECH 1-2<br>SWISS MECH 1-2-5<br>SWISS MECH 1-5<br>SWISS MECH 1-1-1<br>HOLLAND MECH 1-1<br>HOLLAND MECH 1-2,5-5<br>CANADA MECH .25-1<br>CANADA MECH .25-.25-1<br>NORWAY MECH 5-10<br>NORWAY MECH 10-5-20<br>NORWAY ELEC 5-10-20<br>DENMARK ELEC 1-5-10-20<br>AUSTRALIA MECH .20-1<br>AUSTRALIA MECH 1-2<br>AUSTRALIA ELEC .20-1-2-M1<br>FINLAND ELEC 1-5<br>FINLAND ELEC 5-1<br>BELGIUM MECH 20-20<br>BELGIUM ELEC 5-20-50<br>SWEDEN ELEC 1-5-10<br>SINGAPORE MECH 1-1<br>ITALY ELEC 500 | SET ACCORDING TO COUNTRY DEFAULT | SETS THE COIN DOOR TYPE AND THE COIN UNITS FOR EACH CHUTE. SELECT <b>CUSTOM</b> FOR INDIVIDUAL DOOR TYPE CONFIGURATIONS AND CHUTE UNITS (SEE B4-02A THRU B4-02I). |
| B4-02A     | 1ST COIN CHUTE UNITS | 0 - 65,535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0                                | THE NUMBER OF COIN UNITS USED FOR THE 1ST CHUTE.                                                                                                                  |
| B4-02B     | 2ND COIN CHUTE UNITS | 0 - 65,535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0                                | THE NUMBER OF COIN UNITS USED FOR THE 2ND CHUTE.                                                                                                                  |
| B4-02C     | 3RD COIN CHUTE UNITS | 0 - 65,535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0                                | THE NUMBER OF COIN UNITS USED FOR THE 3RD CHUTE.                                                                                                                  |
| B4-02D     | 4TH COIN CHUTE UNITS | 0 - 65,535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0                                | THE NUMBER OF COIN UNITS USED FOR THE 4TH CHUTE.                                                                                                                  |
| B4-02E     | CHUTE 1 TYPE         | MECHANICAL, ELECTRICAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | MECHANICAL                       | SELECT THE CHUTE TYPE.                                                                                                                                            |
| B4-02F     | CHUTE 2 TYPE         | MECHANICAL, ELECTRICAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | MECHANICAL                       | SELECT THE CHUTE TYPE                                                                                                                                             |
| B4-02G     | CHUTE 3 TYPE         | MECHANICAL, ELECTRICAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | MECHANICAL                       | SELECT THE CHUTE TYPE                                                                                                                                             |
| B4-02H     | CHUTE 4 TYPE         | MECHANICAL, ELECTRICAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | MECHANICAL                       | SELECT THE CHUTE TYPE                                                                                                                                             |
| B4-02I     | COIN METER UNITS     | 0 - 65,535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1                                | SELECT THE NUMBER OF COIN CHUTE UNITS THAT ARE <b>EQUIVALENT</b> TO ONE PULSE OF THE *SOFTWARE-CONTROLLED COIN METER #5 (NOT CURRENTLY IMPLEMENTED IN HARDWARE).  |

**B4: COINAGE ADJUSTMENTS (CONTINUED)**

| AUDIT REF. | AUDIT NAME            | RANGE                | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                                                                                        |
|------------|-----------------------|----------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B4-03      | COIN VALUE            | NOT APPLICABLE       | 0.25            | SETS THE MULTIPLIER (COIN VALUE) FOR DETERMINING COIN CHUTE TOTALS IN A1: COLLECTION AUDITS. DEFAULTS TO BASE VALUE AS SET IN B4-01 : COINAGE ADJUSTMENT                                                                                                           |
| B4-04      | SHOW CREDIT FRACTIONS | YES, NO              | YES             | DISPLAY FRACTIONAL CREDITS AS COINS ARE INSERTED (TYPICALLY USED IN COUNTRIES WHERE ONE COIN RESULTS IN LESS THAN ONE CREDIT).                                                                                                                                     |
| B4-05+     | ALLOW BUY-IN          | YES, NO              | YES             | SELECT WHETHER BUY-INS ARE ALLOWED DURING THE GAME (UNLIMITED).                                                                                                                                                                                                    |
| B4-05A     | BUY-IN CREDITS        | 1/255 TO 255 CREDITS | 1 CREDIT        | DETERMINES THE NUMBER OF BUY-IN CREDITS REQUIRED TO CONTINUE THE GAME.<br>EX. A GAME REQUIRES 50¢, OR ONE CREDIT, TO START. BUY-INS CAN NOW BE SET AT LESS OR MORE THAN THE ONE CREDIT REQUIREMENT, PERHAPS A 1/2 CREDIT (25¢).                                    |
| B4-05B     | MAXIMUM BUY-INS       | 0 - 99               | 10              | SETS THE MAXIMUM NUMBER OF BUY-INS ALLOWED DURING A GAME.                                                                                                                                                                                                          |
| B4-06      | MAXIMUM CREDITS       | 1 - 99               | 20              | SETS THE MAXIMUM NUMBER OF CREDITS ALLOWED DURING A GAME.                                                                                                                                                                                                          |
| B4-07      | ENABLE CREDIT BONUSES | YES, NO              | YES             | ALLOW MULTIPLE COINS (YES) OR SINGLE COINS (NO) TO BE USED IN CALCULATING CREDIT BONUSES.<br>EX. GAME PRICING IS ONE TOKEN PER PLAY, 2 TOKENS FOR 3 PLAYS. IF YES IS SELECTED, THE SECOND TOKEN WILL GIVE 3 CREDITS; IF NO, THE SECOND TOKEN WILL YIELD 2 CREDITS. |

**B5 : PASSWORD**

| AUDIT REF. | AUDIT NAME          | RANGE           | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------|---------------------|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B5-01+     | PASSWORD            | OFF, ON, CHANGE | OFF             | SETS THE PASSWORD USED BY THE OPERATOR. SELECT <b>CHANGE</b> FOR A NEW OR REVISED PASSWORD; SELECT <b>ON</b> TO SET ADDITIONAL PASSWORD PROTECTION (SEE B5-01A,B).<br><br><b>CAUTION:</b> IF THE PASSWORD HAS BEEN SET <b>ON</b> AND CAN'T BE REMEMBERED BY THE OPERATOR, THE GAME MUST BE FACTORY RESET (SEE D7: FACTORY RESET). THIS ACTION DESTROYS ANY PREVIOUS AUDIT INFORMATION AND OPERATOR ADJUSTMENTS TO THE GAME. |
| B5-01A     | HIDE EARNINGS       | YES, NO         | NO              | ALLOW EARNINGS INFO (AUDITS MENU) TO APPEAR/NOT APPEAR ON THE DOT MATRIX DISPLAY.                                                                                                                                                                                                                                                                                                                                           |
| B5-01B     | PROTECT ADJUSTMENTS | YES, NO         | NO              | SELECT <b>YES</b> TO PROTECT OPERATOR-SET ADJUSTMENTS FROM RESET (D8:FACTORY RESET).                                                                                                                                                                                                                                                                                                                                        |
| B5-01C     | PROTECT AUDITS      | YES,NO          | NO              | SELECT <b>YES</b> TO PROTECT OPERATOR-SET AUDITS FROM RESET (SEE D8:FACTORY RESET).                                                                                                                                                                                                                                                                                                                                         |



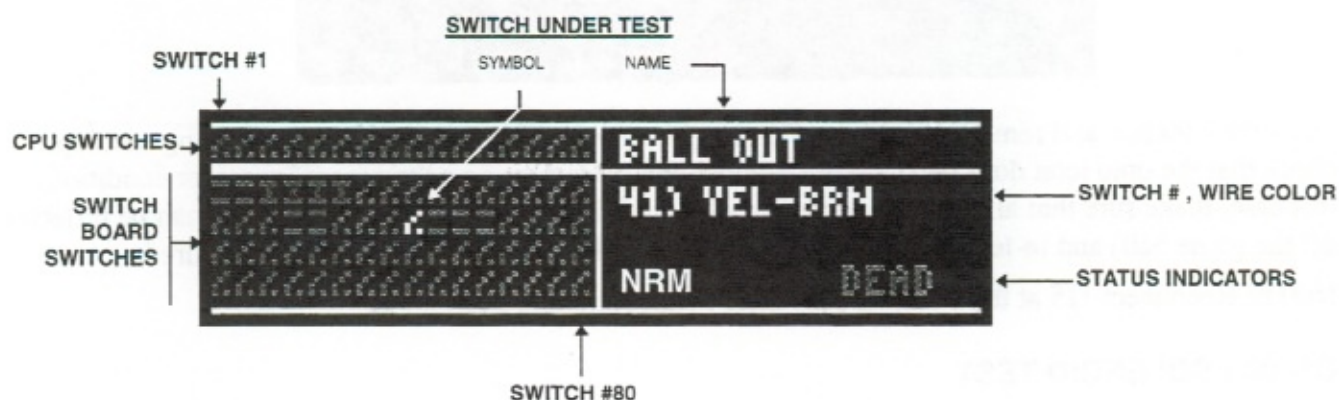
**B6 : ERRORS/INFO**

| AUDIT REF. | AUDIT NAME        | RANGE                                        | FACTORY SETTING | DESCRIPTION                                                              |
|------------|-------------------|----------------------------------------------|-----------------|--------------------------------------------------------------------------|
| B6-01      | SWITCH ERRORS     | REPORT ALL, DISABLE MOMENTARIES, DISABLE ALL | REPORT ALL      | SETS THE OPTION TO DISPLAY OR HIDE ERROR MESSAGES ON-THE SCREEN DISPLAY. |
| B6-02      | SWITCH INFO MSG   | REPORT ALL, DISABLE MOMENTARIES, DISABLE ALL | REPORT ALL      | SETS THE OPTION TO DISPLAY OR HIDE INFO MESSAGES ON-THE SCREEN DISPLAY.  |
| B6-03      | SOLENOID ERRORS   | REPORT ALL, DISABLE MOMENTARIES, DISABLE ALL | REPORT ALL      | SETS THE OPTION TO DISPLAY OR HIDE ERROR MESSAGES ON-THE SCREEN DISPLAY. |
| B6-04      | SOLENOID INFO MSG | REPORT ALL, DISABLE MOMENTARIES, DISABLE ALL | REPORT ALL      | SETS THE OPTION TO DISPLAY OR HIDE INFO MESSAGES ON-THE SCREEN DISPLAY.  |
| B6-05      | LAMP ERRORS       | REPORT ALL, DISABLE MOMENTARIES, DISABLE ALL | REPORT ALL      | SETS THE OPTION TO DISPLAY OR HIDE ERROR MESSAGES ON-THE SCREEN DISPLAY. |
| B6-06      | LAMP INFO MSG     | REPORT ALL, DISABLE MOMENTARIES, DISABLE ALL | REPORT ALL      | SETS THE OPTION TO DISPLAY OR HIDE INFO MESSAGES ON THE SCREEN DISPLAY.  |

## C. DIAGNOSTICS

### C1: STANDARD TESTS

#### C1- 01 : SWITCH TEST

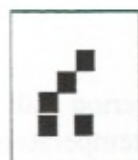


The Switch Test displays a graphical representation of the switch, indicating which switches are seen as open and which are seen as closed. Also shown is information about the switch under test (name, number, wire color and status indicators). The status indicators, when highlighted, show:

**NRM** - Normal operation; no problems are detected;

**DEAD** Indicates when a switch has not been activated in past games.

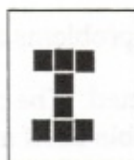
The Switch icons are:



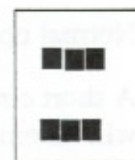
OPEN SWITCH



CLOSED SWITCH



OPTO WITH VERTICAL  
BEAM OF LIGHT



OPTO WITHOUT  
BEAM OF LIGHT  
(BLOCKED OPTO)

NOTE: If a status indicator is blinking, it is indicative of a problem area.



**C1- 02 : OPTO TEST**

The Opto Test is used to verify opto operation by blinking the controlled lamps and flashers. The dot matrix display screen is similar to the Switch Test (C1-01) above, however, when selected, the following screen appears:



Open the backbox and remove connector J15 from the Power Board. Then, when verifying each opto, check that the opto icon does NOT have a vertical line (representing a “triggered” receiver condition). In this case, make sure that all balls are secure in a ball holding device (since infrared light can be reflected off the game ball) and re-test. If the opto continues to fail this test, repair/replace as required.

NOTE: Reconnect J15 at the Power Board after completing this test.

**C1- 03 : SOLENOID TEST****CAUTION**

***THE FOLLOWING TEST SHOULD BE PERFORMED ONLY BY QUALIFIED SERVICE PERSONNEL.*** TO START THE TEST, THE COIN DOOR MUST BE OPEN AND THE STEM OF THE 50V INTERLOCK SWITCH MUST BE PULLED-OUT (ENABLED).

The Solenoid Test will test solenoids, motors, and flashers on the game. The screen displays information on the name of the device, a representative icon for the device, wire colors, driver board connector & pin number, power board wire color, and status indicators (NRM, OFF). For each test, the device will be energized and the icon will pulse.

The status indicators, when highlighted, represent the following conditions:

|             |                                                                                                                                                                        |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NRM</b>  | Normal operation; no problems are detected;                                                                                                                            |
| <b>OFF</b>  | A short circuit is detected. The device may be in a cooling-down period and will automatically enable itself after reaching the proper operating temperature;          |
| <b>OFF?</b> | Momentary short circuit (e.g. at some point the device had been detected as shorted, although it may be fine now). This is a good way to detect intermittent problems. |

Use the flipper buttons to cycle from solenoid-to-solenoid. Press both flipper buttons to exit the Solenoid Test.

NOTE: If an indicator is blinking, there is a software-detected problem with this device.

## C1-04 : LAMP TEST



The Lamp Test will start all game lamps flashing. The flippers can then be used to get detailed information about any individual lamp. This information includes the lamp name and number, row and column information from the lamp matrix, its' wire colors, and an icon indicating whether the lamp is active.

The lamp's indicators report:

**NRM** = If BRIGHT, no electrical problems have been detected.

**CONN** = If this indicator is BRIGHT, an electrical connection is detected. If this indicator is dim, there is a break in the wiring to the lamp.

**CONN?** = At some point the device had been detected as not connected, although it may be fine now. This is a good way to find intermittent problems.

**ROW.OFF** = A row driver is disabled from a ROW or BULB short circuit -- The device was shorted and is now inactive (may be in a 15 second cool-down period).

**ROW.OFF?** = Indicates a momentary row short. At some point the device had been detected as shorted, although it may be fine now. This is a good way to find intermittent problems.

**COLUMN** = A column driver can be overheated and thermally shutdown, most likely from a column short-to-ground or an entire column without lamps (i.e. loose or disconnected column wire at the driver board or burned-out lamps).

**COLUMN?** = Indicates a momentary column problem. At some point the device had a column problem, although it may be fine now. This is a good way to find intermittent problems.

**NOTE:** If an indicator is blinking, this is the the problem area. Use the flippers to cycle from lamp to lamp. Press both flipper buttons to exit the Lamp Test.



**ADDITIONAL NOTES ON LAMP INDICATORS:**

**CONN:** A bright indicator shows that at least 1 bulb is connected and is lit. For 2 bulbs at a single location, both bulbs must be burned-out (or disconnected) before this indicator is made bright.

**SERVICE TIP :** Fix column problems *BEFORE* using this indicator to troubleshoot bulb problems.

**ROW.OFF:** A bright indicator reflects the drive is cooling from an unknown voltage short on the row side of a column/row matrix OR a short across the bulb. The "?" after this indicator helps to isolate either a bulb short or a row short. If all or multiple "?" are on the same row of the same matrix, then this would tend to indicate a row-short-to-power supply. **Row-shorts-to-ground are not detectable** (the only symptom is that all the bulbs in a particular row are extremely bright). If there is only one "?" in a row, then most likely a short exists at the bulb, socket, or terminals.

**COLUMN:** A bright indicator usually reflects a thermally-shutdown column driver caused by a short-to-ground condition, or all lamps in the column are burned-out, or a loose/broken column wire. A column shorted to a power source (i.e. any 50 volt supply) usually just burns-out all the bulbs in the column or blows a fuse.

**WARNING: TO AVOID RISK OF PERSONAL INJURY, DO NOT TOUCH A COLUMN DRIVER DURING A THERMAL SHUTDOWN.**

**C1- 05 : DISPLAY TEST**

The Display Test can assist the operator in checking the dot matrix display for proper illumination of individual pixel elements. It has six continuous test modes that move across the display:

- 1) A light diagonal bar illuminated against a dark background;
- 2) A light vertical bar illuminated against a dark background;
- 3) A light horizontal bar illuminated against a dark background;
- 4) A dark vertical bar illuminated against a light background;
- 5) A dark horizontal bar illuminated against a light background;
- 6) An intensity checker.

In the first five modes, use the flipper buttons to move the bar across the display. If you hold either flipper button "in" continuously, you will notice that the bar will run off the screen and the display will show the next (or previous) mode. The start button can be used at any time to change the intensity of the bar from normal to medium, dim, and off.

The sixth mode will light every pixel to full intensity. Pressing the flipper button will change the intensity to medium, dim, and off. After the sixth mode, the test cycles back to the first mode.

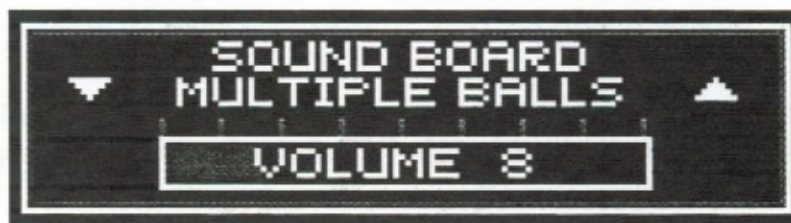
Press both flippers to exit the Display Test.

#### C1- 06 : SOUND BOARD RESET



The Sound Board Test resets the sound board and causes it to report its powerup status. Press the start button to restart the test.

#### C1- 07 : SOUND BOARD MUSIC TEST



The Sound Board Music Test plays several samples of music which fully tests the capabilities of the sound board hardware. The selection of the tune and its' volume level can be changed by the use of the flippers and start button.

#### C1- 08 : SOL(ENOID) VOLTAGE



This test will measure and display signal strength from the power board (connector J3) to the CPU board (connector J2). The zero cross detection circuit should report the correct non-zero line frequency (top line of display) for this location . The second line of the display reports the flipper's 50 Volt A/D converter voltage to within  $\pm 2$  volts along with the current percent tolerance.

**CAUTION:** If any of the following conditions exist, the message "**CHECK 50V INTERLOCK SW.**" will be displayed:

- 1) the 50V coin door interlock switch is "off" (the stem is pushed-in instead of "out");
- 2) the 50V fuse (F6) on the Power Board is blown;
- 3) the connection from the Power Board to the CPU is disconnected;
- 4) a power circuit or cabling is not operating properly.



Since the solenoid voltage is unregulated and unloaded at the time of this particular test, this measurement is an excellent indicator of the actual line voltage. The bottom line can display:

"SUPPLY WITHIN 10%" (10% is user-selected in Adjustment B1-13)  
"SUPPLY IS HIGH"  
"SUPPLY IS LOW"

The normal range of tolerance for the line voltage (not solenoid voltage) is -15% to +10%, for example, 120VAC can measure between 102VAC to 132VAC. The solenoid voltage is dependent upon the line voltage, and the transformer "taps" convert certain line voltages to a nominal non-loaded solenoid voltage of about 76 Volts. If your game is not within the 10% range, you might consider re-tapping the transformer to a high-line or low-line tap (depending if your solenoid voltage is high or low). The extra "cushion" of 5% (for the -15% tolerance) is highly recommended for temporary low-line conditions.

## C1- 09 : TICKET DISPENSER TEST

**NOTE:** Before performing this test, return to the Menu System, Standard Adjustment B1-16, *TICKET DISPENSER*, and verify that the installed dispenser is configured properly. Ticket audit totals are not affected by this test.

Tickets should be loaded and ready to dispense. This test will check the operation of the ticket dispenser motor, notch switch, and meter.

When the test starts, the motor will try to dispense a ticket and increment the ticket meter. If successful, the message "DISPENSED" will appear on the display; if unsuccessful, an "ERROR" is reported to the display. Possible "ERROR" conditions are discussed in the Troubleshooting section of this manual. This test can be repeated at any time by pressing the "START" button.

**NOTE:** After servicing an "Out of Tickets" condition or a dispenser jam, you can either:

- a) *Continue* dispensing tickets from the game-in-progress by closing the coin door, or
- b) *Clear* dispenser memory by interrupting power to the game (off, then on).

## C1- 10 : TOKEN DISPENSER TEST

**NOTE:** Before performing this test, return to the Menu System, Standard Adjustment B1-17, *TOKEN DISPENSER*, and verify that the installed dispenser is configured properly. Token audit totals are not affected by this test.

Tokens should be loaded and ready to dispense. This test will activate the dispenser solenoid and pulse the ticket meter. The operator must confirm that the actual number of tokens dispensed agrees with the number of test(s) performed (one token per test). This test will typically display a successful "DISPENSED" (no "ERROR" will be reported) since most dispenser solenoids lack provisions for feedback circuitry (switches).

**NOTE 1:** For dispensers that are equipped with switch feedback, the test message "ERROR" will be reported to the display. Possible "ERROR" conditions are discussed in the Troubleshooting section of this manual. This test can be repeated at any time by pressing the "START" button.

**NOTE 2:** After servicing an "Out of Tokens" condition or a dispenser jam, you can either:  
a) *Continue* dispensing tokens from the game-in-progress by closing the coin door, or  
b) *Clear* dispenser memory by interrupting power to the game (off, then on).

## C1- 11 : BURN-IN TEST

A rectangular display screen with a black background and white, pixelated text. The text is arranged in four lines: "STARTING BURN-IN", "RUNNING FOR 24 HOURS", and "HOLD BOTH FLIPPERS TO STOP". The screen is framed by a thick black border.

STARTING BURN-IN  
RUNNING FOR 24 HOURS  
HOLD BOTH FLIPPERS TO STOP

The Burn-In Test energizes all of the machine hardware in a sequenced pattern. All the solenoids are fired, motors run, and lamps flashed. The dot matrix display and sound system are also activated as well. This test is primarily intended for factory use to assure that all electronic and mechanical features are operating when the game leaves the factory.

To end the Burn-In test, press both flipper buttons at any time. Also, see the *Audit* section for the total cumulative time that Burn-In Tests have been run on the game.

## C2: FEATURE TESTS



# CAUTION

**THE FOLLOWING TEST SHOULD BE PERFORMED ONLY BY QUALIFIED SERVICE PERSONNEL.** TO START THE TEST, THE COIN DOOR MUST BE OPEN AND THE STEM OF THE 50V INTERLOCK SWITCH MUST BE PULLED-OUT (ENABLED).

### C2- 01 : CLEAR OUT BALLS



This test will eject all balls present in the game troughs. It cycles through all 3 ball troughs and highlights (on the display) the current switch being activated.

| CLEARING BALLS |                |
|----------------|----------------|
| TROUGH 1       | TROUGH OUTHOLE |
| TROUGH 2       | SHOOTER LANE   |
| TROUGH 3       |                |

If this test is started with no balls present in the troughs or re-tested after a previous attempt, the message "*BALL TROUGH IS NOW EMPTY*" will be displayed. Also, if the game is unable to eject a ball from any trough, the message "*BALL TROUGH PROBLEM SUSPECTED*" will be displayed.

### C3: TROUBLESHOOTING

The Troubleshooting diagnostic is a shortcut tool to get to the games' troublespots as quickly and conveniently as possible. This diagnostic scans all the switches, solenoids, and lamps for problems and presents a summary of what was found. Use the flipper buttons to automatically step to the appropriate test for each error condition. The tests used (switch, lamp and solenoid) are described in Section C1, Standard Tests.

**NOTE:** The troubleshooting diagnostic continuously gathers and updates information, in real time, about switches, lamps and solenoids. A sound is made when any of this information changes. This allows the operator to make repairs or find loose connections in the game and check his/her results by viewing the display.

There are two categories of troubleshooting, Errors and Information. *Errors* are considered important to game play and should be fixed at the earliest opportunity. *Information* messages (for example, a lamp behind the backglass is burned-out) are considered less critical and can be serviced as part of a routine maintenance schedule. Errors and Information messages can also be selectively disabled from viewing by Adjustment B6, Errors/Info. Additionally, all Errors and Information messages can be cleared by the reset function D5, Clear Errors/Info.

**NOTE:** Refer to the previous individual tests (C1-01 to C1-04) for information on indicator status and troubleshooting tips.

**ADDITIONAL NOTE:** Individual momentaries for a lamp, switch, or solenoid are always "forgotten" when you leave this test.

## D. RESET FUNCTIONS

### \*D1: CLEAR COLLECTIONS

This function clears all Collection Audits (A1) and moves all Histories down one level in the collections history log (Example: Current audits become History 1 audits, History 1 audits become History 2 audits, etc.).

### \*D2: CLEAR AUDITS

This action clears all other audits, from A2:Earnings Audits to A7:Ball Time Histogram.

### D3: CLEAR CREDITS

Reset the Credits counter to zero.

### D4: CLEAR HIGH SCORE TO DATE (HSTD)

Used to reset the game's HSTD table based on the settings in Adjustments B1-05A: HSTD High Score and B1-05B: HSTD Last Score.

### D5: CLEAR ERRORS/INFO

Clears all troubleshooting errors and info. Always use this after repair or replacement of PC boards.

### \*D6: CLEAR ADJUSTMENTS

Returns all B: Adjustments(6) to their factory-set defaults (A:Audits are not affected by this function).

### D7: RESET REPLAY

Resets the replay score to meet the target replay percentage (see Adjustment B1-04A:Replay Percent).

### D8: FACTORY RESET

Clears ALL audits and adjustments information and returns the game to the original factory default settings. The operator is prompted to select a country for which the locale, language, and coin door adjustments are set (default country is the *United States*, Adjustment B3-01).

**\*NOTE:** WHEN PASSWORD-PROTECTED, THESE FUNCTIONS WILL NOT CLEAR  
( SEE SECTION B5 , PASSWORD )



## E. REPORTS

### THEORY OF OPERATION

The Reports utility permits the operator the ability to “dump” all *Audits* and *Adjustments* data to a serial communications device, such as a printer or a laptop computer. A Report can be generated using one of the the following methods:

1) Automatically, via the “Hot Plug” (“energized” serial port). When the “Hot Plug” method is used, the system software will automatically detect the presence of the printer when the coin door is opened and the printer cable is connected to the serial port of the Interface PCB. The Report will then start printing. The progress of the print job will be shown on the dot matrix display, along with any error messages. When a “Hot Plug” print job is successfully completed, all current audits data will be cleared, replay award levels reset, and the printout counter will be incremented. The operator must close the coin door and re-open it again to generate another “Hot Plug” Report.

2) Manually, through the Menu System using *E1: Custom Report* The operator can also elect to disable the “Hot Plug” method of reporting (see *E3-01B: Hotplug Custom Report*), and configure the printer/computer for mode of operation, communications protocol, and customization features of the report. When a “Custom” print job is successfully completed, the printout counter will be incremented and audits data and replay award levels will also be cleared/reset unless the operator elects otherwise (see *E2-01,02: Clear Collections, Reset Replay*).

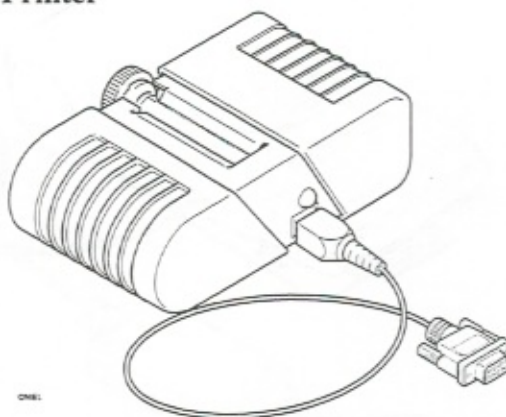
**CAUTION:** The “Hot Plug” (serial port) is active when the coin door is opened. For a *Custom Report*, the printer plug must NOT be inserted in the serial port until *E1: Custom Report* is selected and the START button is pushed. Any attempt to generate a *Report* prior to this sequence will always result in a “Hot Plug” *Report*.

### PRINTERS and COMPUTERS CURRENTLY SUPPORTED:

- O'Neil microFlash Receipt Printer;
- NSM Datapoint 3000 Printer/Recorder;
- Citizen Dot-Matrix Printer, Models IDP 560 or 562;
- Any serial printer supporting an ASCII format;
- Any desktop/laptop computer capable of supporting an ASCII format.

## PRINTER/COMPUTER CONFIGURATION AND INSTALLATION

## I. O'Neil microFlash Receipt Printer



NOTE: If your game is not equipped with a printer interface PCB, contact your local CAPCOM® distributor for Field Kit K-008-2. Install all necessary hardware and cables using the enclosed instructions.

1) Using the O'Neil Configuration Utility, open to the following sub-menus and configure the printer for the following settings:

a. *Communication Parameters-*

PORT = COM1;  
BAUD RATE = 19200;  
DATA BITS = 8;  
PARITY = NONE;  
HANDSHAKING = XON/XOFF.

b. *Printer Options -*

BEEPER = ON;  
TIMEOUT = 10 SECONDS;  
INFRARED CRC = OFF.

c. *Paper, Fonts, and Graphics Options -*

SET PER USER REQUIREMENTS.

2) Configure the games' *Reports* software as follows:

E3 - 01+: Select O'NEIL MICROFLASH;

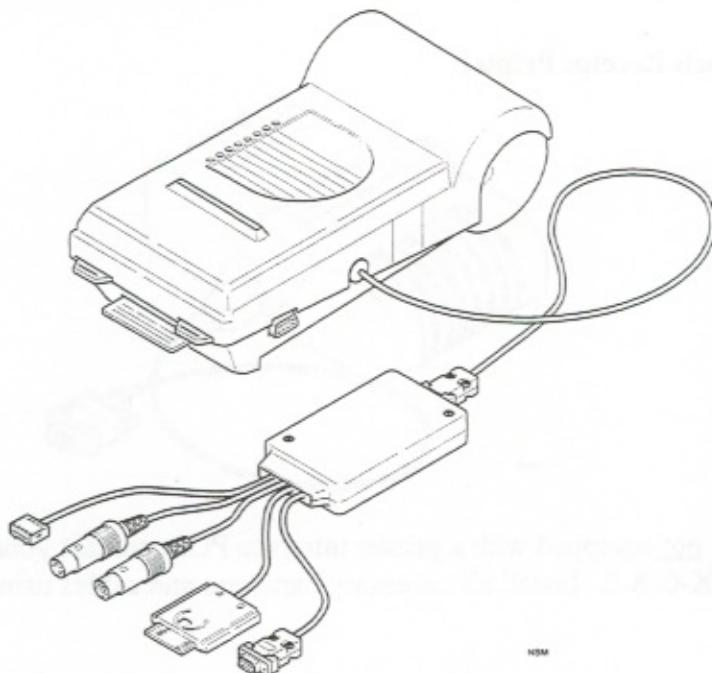
E2 -01 thru 17: Select per user requirements for a *Custom Report* (optional).

3) Determine the method of generating the Report. For a "Hot Plug" Report, connect the DB9 female connector (supplied with the printer) to the DB9 male connector now located on the switch bracket inside the coin door. The *Report* will start printing after this connection is made. The *Report* can be repeated, if necessary, by removing the cable, closing and re-opening the coin door, and re-installing the printer cable to the serial port.

4) For a *Custom Report*, scroll through the Menu System to *E1 : Custom Report*. Press the START button and install the printer cable to the serial port. The Custom Report will now begin printing. Remove the printer cable when the print job is finished and close the coin door.



## II. NSM Datapoint 3000 Printer



NOTE: If your game is not equipped with a printer interface PCB, contact your local CAPCOM® distributor for Field Kit K-008-5. Install all necessary hardware and cables using the enclosed instructions.

1) Configure the games' *Reports* software as follows:

E3 - 01+: Select NSM DATAPRINTER, PRINT;

E2 -01 thru 17: Select per user requirements for a *Custom Report* (optional).

2) Check that the NSM Memory Card is fully inserted into its' slot.

3) Determine the method of generating the Report. For a "Hot Plug" Report, connect the DB9 female connector (supplied with the printer) to the DB9 male connector now located on the switch bracket inside the coin door. The Report should start printing automatically. The *Report* will start printing after this connection is made. The *Report* can be repeated, if necessary, by removing the cable, closing and re-opening the coin door, and re-installing the printer cable to the serial port.

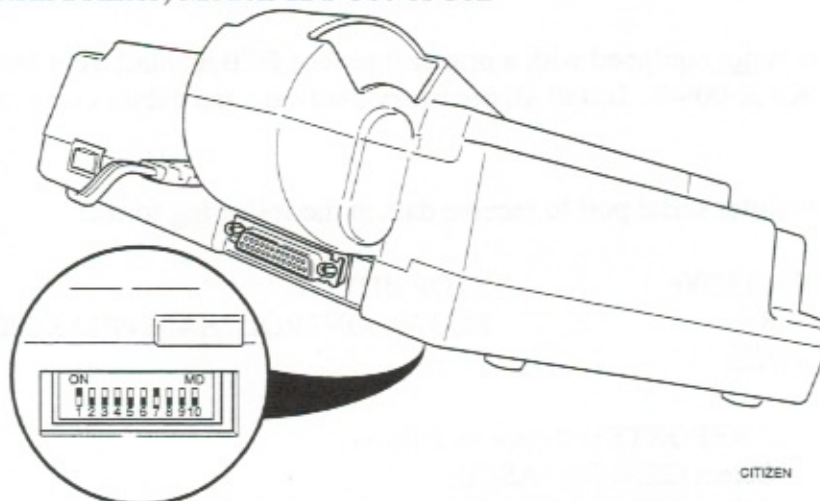
4) For a *Custom Report*, scroll through the Menu System to *E1 : Custom Report*. Press the START button and install the printer cable to the serial port. The Custom Report will now begin printing. Remove the printer cable when the print job is finished and close the coin door.

## III. NSM Datapoint 3000 Recorder

Same as the NSM Datapoint 3000 Printer above except that the printer is configured through *Reports* software as a memory storage device. The *Reports* data is saved to the NSM memory card and downloaded to a computer through the use of NSM-compatible software, such as DATACONTACT 3000©.

You must configure the games' *REPORTS* software, in section E3 - 01+, for **NSM DATAPRINTER, SAVE**. Follow the above NSM Printer steps 2 through 4 to capture a *Report* to the memory card.

## IV. Citizen Dot-Matrix Printer, Models IDP 560 or 562



NOTE: If your game is not equipped with a printer interface PCB, contact your local CAPCOM® distributor for Field Kit K-008-2. Install all necessary hardware and cables using the enclosed instructions.

1) Set the printer's DIP switches as follows:

| DIP SWITCH # |     |     |     |     |     |    |     |     |     |
|--------------|-----|-----|-----|-----|-----|----|-----|-----|-----|
| 1            | 2   | 3   | 4   | 5   | 6   | 7  | 8   | 9   | 10  |
| ON           | OFF | OFF | OFF | OFF | OFF | ON | OFF | OFF | OFF |

2) Configure the games' *Reports* software as follows:

E3 - 01+: Select CITIZEN 560/562;

E2 -01 thru 17: Select per user requirements for a *Custom Report* (optional).

3) Determine the method of generating the Report. For a "Hot Plug" Report, obtain a standard serial printer cable (purchase locally) with DB25 male/ DB9 female connector leads. Connect the DB25 male connector to the printer I/O port and attach the DB9 female connector to the male connector now located on the switch bracket inside the coin door. The Report should start printing automatically. The *Report* will start printing after this connection is made. The *Report* can be repeated, if necessary, by removing the cable, closing and re-opening the coin door, and re-installing the printer cable to the serial port.

4) For a *Custom Report*, scroll through the Menu System to *E1 : Custom Report*. Press the START button and install the printer cable (as described above) to the serial port. The Custom Report will now begin printing. Remove the printer cable when the print job is finished and close the coin door.



## V. Generic ASCII

NOTE: If your game is not equipped with a printer interface PCB, contact your local CAPCOM® distributor for Field Kit K-008-2. Install all necessary hardware and cables using the enclosed instructions.

1) Set the printer/computer serial port to receive data in the following format:

|                    |                              |            |
|--------------------|------------------------------|------------|
| BAUD RATE = 19200; | STOP BIT(S) = 1;             |            |
| DATA BITS = 8;     | FLOW CONTROL (HANDSHAKING) = | CTS and/or |
| PARITY = NONE;     |                              | XON/XOFF   |

2) Configure the games' REPORTS software as follows:

E3 - 01+: Select GENERIC ASCII;

E3 - 02+: Select DELIMITED if data is used for importation into a spreadsheet program, such as Microsoft® Excel.

E2 - 01 thru 17: Select per user requirements for a *Custom Report* (optional).

3a) For a printer, determine the method of generating the Report. For a "Hot Plug" Report, obtain a standard serial printer cable (purchase locally) with DB25 male/ DB9 female connector leads. Connect the DB25 male connector to the printer I/O port and attach the DB9 female connector to the male connector now located on the switch bracket inside the coin door. The Report should start printing after this connection is made. The *Report* can be repeated, if necessary, by removing the cable, closing and re-opening the coin door, and re-installing the printer cable to the serial port.

For a *Custom Report*, scroll through the Menu System to *E1 : Custom Report*. Press the START button and install the printer cable to the serial port. The Custom Report will now begin printing. Remove the printer cable when print job is finished and close the coin door.

3b) For computers, the pinball game is configured as a data terminal device (DTE) and the receiver is assumed to be a communications device (DCE). This configuration normally requires the use of a null modem cable with DB9 female and DB9/DB25 female terminations. Connect the DB9/DB25 female connector to the computer serial port (COM1 or COM2).

Prepare the computer to receive the ASCII text by opening to a serial port (modem) capture program, such as PROCOMM PLUS® or Microsoft® Windows TERMINAL (look under Program Manager, Accessories Group). Scroll through the Menu System to *E1 : Custom Report*. and press the START button. Connect the DB9 female connector to the male connector now located on the switch bracket inside the coin door. The Report should begin downloading to the computer terminal. Remove the printer/computer cable when the job is finished and close the coin door.

## E1: Custom Report

The *Custom Report* is an operator-defined report which will be generated according to the settings defined in *E2: Custom Report Setup*. For printing a *Custom Report*, the operator must scroll through the Menu System to *E1 : Custom Report* and press the START button. The printer cable should now be connected to the serial port. The *Custom Report* will begin printing. Remove the printer cable when the print the job is finished and close the coin door.

## E2 Custom Report Setup

This menu is used to configure the *Custom Report*. Each device, as described in *Printer/Computer Configuration and Installation*, is pre-configured according to the settings in *E3-01: Install Device*. The user can also customize the Report according to the following table:

| REF.   | NAME                   | RANGE                                        | INSTALLED DEVICE SETTINGS |           |          |         |         | DESCRIPTION                                                                                                                                                                |
|--------|------------------------|----------------------------------------------|---------------------------|-----------|----------|---------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                        |                                              | O'NEIL                    | NSM-PRINT | NSM-SAVE | CITIZEN | GENERIC |                                                                                                                                                                            |
| E2-01  | CLEAR COLLECTIONS      | NO, LEAVE COLLECTIONS<br>YES, WHILE PRINTING | YES                       | YES       | YES      | YES     | YES     | SELECT WHETHER <i>CURRENT AUDITS</i> SHOULD BE CLEARED AFTER THE PRINT JOB IS COMPLETE.                                                                                    |
| E2-02  | RESET REPLAY           | NO, LEAVE REPLAY<br>YES, WHILE PRINTING      | YES                       | YES       | YES      | YES     | YES     | SELECT WHETHER <i>REPLAY AWARDS</i> SHOULD BE CLEARED AFTER THE PRINT JOB IS COMPLETE.                                                                                     |
| E2-03+ | COLLECTION AUDITS      | YES, NO                                      | YES                       | NO        | NO       | YES     | YES     | SELECT WHETHER <i>COLLECTION AUDITS</i> SHOULD APPEAR ON THE REPORT. IF YES, EACH <i>COLLECTION AUDIT</i> IS SELECTED INDIVIDUALLY (E3-03A THROUGH E3-03D) FOR THE REPORT. |
| E2-03A | CURRENT AUDITS         | YES, NO                                      | YES                       | NO        | NO       | YES     | YES     | SHOULD <i>CURRENT AUDITS</i> APPEAR ON THE REPORT?                                                                                                                         |
| E2-03B | AUDIT HISTORY 1        | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>AUDIT HISTORY 1</i> APPEAR ON THE REPORT?                                                                                                                        |
| E2-03C | AUDIT HISTORY 2        | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>AUDIT HISTORY 2</i> APPEAR ON THE REPORT?                                                                                                                        |
| E2-03D | AUDIT HISTORY 3        | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>AUDIT HISTORY 3</i> APPEAR ON THE REPORT?                                                                                                                        |
| E2-04  | EARNINGS AUDITS        | YES, NO                                      | YES                       | NO        | NO       | YES     | YES     | SHOULD <i>EARNINGS AUDITS</i> APPEAR ON THE REPORT?                                                                                                                        |
| E2-05  | STANDARD AUDITS        | YES, NO                                      | YES                       | NO        | NO       | YES     | YES     | SHOULD <i>STANDARD AUDITS</i> APPEAR ON THE REPORT?                                                                                                                        |
| E2-06  | FEATURE AUDITS         | YES, NO                                      | YES                       | NO        | NO       | YES     | YES     | SHOULD <i>FEATURE AUDITS</i> APPEAR ON THE REPORT?                                                                                                                         |
| E2-07  | STANDARD ADJUSTMENTS   | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>STANDARD ADJUSTMENTS</i> APPEAR ON THE REPORT?                                                                                                                   |
| E2-08  | GAME ADJUSTMENTS       | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>GAME ADJUSTMENTS</i> APPEAR ON THE REPORT?                                                                                                                       |
| E2-09  | LOCALE ADJUSTMENTS     | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>LOCALE ADJUSTMENTS</i> APPEAR ON THE REPORT?                                                                                                                     |
| E2-10  | PASSWORD ADJUSTMENTS   | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>PASSWORD ADJUSTMENTS</i> APPEAR ON THE REPORT?                                                                                                                   |
| E2-11  | ERROR/INFO ADJUSTMENTS | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>ERROR/INFO ADJUSTMENTS</i> APPEAR ON THE REPORT?                                                                                                                 |
| E2-12  | COINAGE ADJUSTMENTS    | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>COINAGE ADJUSTMENTS</i> APPEAR ON THE REPORT?                                                                                                                    |
| E2-13  | REPORT SETTINGS        | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>REPORT SETTINGS</i> APPEAR ON THE REPORT?                                                                                                                        |
| E2-14  | DEVICE SETTINGS        | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>DEVICE SETTINGS</i> APPEAR ON THE REPORT?                                                                                                                        |
| E2-15  | GAME TIME HISTOGRAMS   | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>GAME TIME HISTOGRAMS</i> APPEAR ON THE REPORT?                                                                                                                   |
| E2-16  | SCORE HISTOGRAMS       | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>SCORE HISTOGRAMS</i> APPEAR ON THE REPORT?                                                                                                                       |
| E2-17  | BALL TIME HISTOGRAMS   | YES, NO                                      | NO                        | NO        | NO       | NO      | NO      | SHOULD <i>BALL TIME HISTOGRAMS</i> APPEAR ON THE REPORT?                                                                                                                   |



## E2 Custom Report Setup (Continued)

| REF.   | NAME                    | RANGE   | INSTALLED DEVICE SETTINGS |           |          |         |         | DESCRIPTION                                                              |
|--------|-------------------------|---------|---------------------------|-----------|----------|---------|---------|--------------------------------------------------------------------------|
|        |                         |         | O'NEIL                    | NSM-PRINT | NSM-SAVE | CITIZEN | GENERIC |                                                                          |
| *E2-18 | REDEMPTION ADJUSTMENTS  | NO, YES | NO                        | NO        | NO       | NO      | NO      | SELECT WHETHER REDEMPTION ADJUSTMENTS (F1) SHOULD APPEAR ON THE REPORT.  |
| *E2-19 | REDEMPTION PERCENTAGING | NO, YES | NO                        | NO        | NO       | NO      | NO      | SELECT WHETHER REDEMPTION PERCENTAGING (F2) SHOULD APPEAR ON THE REPORT. |
| *E2-20 | REDEMPTION AUDITS       | NO, YES | NO                        | NO        | NO       | NO      | NO      | SELECT WHETHER REDEMPTION AUDITS (F3) SHOULD APPEAR ON THE REPORT.       |

\* NOTE: NOT AVAILABLE IN ALL VERSIONS OF SOFTWARE

## E3: Device Setup

This menu is used to configure the serial communications between the game and the output device. Each device, as described in *Printer/Computer Configuration and Installation*, is pre-configured at the factory according to the country setting of the game (see B3 : *Locale Adjustments*). In the chart below, the Country Settings are described as follows:

- I - used as the factory default for the U.S. and all other countries other than France and Germany;
- II - used as the factory default for Germany;
- III - optional configuration (not used as the factory default for any specific country);
- IV - used as the factory default for France;
- V - optional configuration (not used as the factory default for any specific country).

The user can also customize a device according to the following table:

| REF.   | NAME                  | RANGE                                                                                                                    | COUNTRY SETTING  |               |              |              |         | DESCRIPTION                                                                                                                                          |
|--------|-----------------------|--------------------------------------------------------------------------------------------------------------------------|------------------|---------------|--------------|--------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                       |                                                                                                                          | I.               | II.           | III.         | IV.          | V.      |                                                                                                                                                      |
| E3-01+ | INSTALL DEVICE        | CUSTOM<br>GENERIC ASCII<br>O'NEIL MICROFLASH<br>NSM DATAPRINTER,<br>PRINT<br>NSM DATAPRINTER,<br>SAVE<br>CITIZEN 560/562 | O'NEIL           | NSM-<br>PRINT | NSM-<br>SAVE | CITIZEN      | GENERIC | SELECT THE TYPE OF DEVICE CONNECTED TO THE SERIAL PORT. IF CUSTOM IS SELECTED, ADDITIONAL PRINTER SETTINGS (E3-01A THROUGH E3-01K) MUST BE SELECTED. |
| E3-01A | DEVICE TYPE           | GENERIC ASCII<br>O'NEIL MICROFLASH<br>NSM DATAPRINTER<br>CITIZEN 560/562                                                 | O'NEIL           | NSM-          | NSM-         | CITIZEN      | GENERIC | SELECT THE TYPE OF DEVICE CONNECTED TO THE SERIAL PORT.                                                                                              |
| E3-01B | HOTPLUG CUSTOM REPORT | YES, NO                                                                                                                  | YES              | YES           | YES          | YES          | YES     | SELECT WHETHER TO ENABLE (YES) OR DISABLE (NO) CUSTOM REPORTS FROM THE MAIN MENU.                                                                    |
| E3-01C | HOTPLUG QUERY         | NONE<br>3 ASCII NULLS<br>ASCII DC1                                                                                       | 3 ASCII<br>NULLS | NONE          | NONE         | ASCII<br>DC1 | NONE    | SELECT THE INITIALIZATION STRING FOR YOUR PRINTER AFTER THE CONNECTION IS MADE ACTIVE.                                                               |
| E3-01D | HOT PLUG RESPONSE     | NONE<br>CTS ACTIVE<br>DSR ACTIVE                                                                                         | CTS              | CTS           | CTS          | CTS          | CTS     | SELECT WHETHER A HARDWARE HANDSHAKE IS REQUIRED.                                                                                                     |
| E3-01E | SAVE REPORT           | YES, NO                                                                                                                  | NO               | NO            | YES          | NO           | NO      | SELECT WHETHER TO SAVE THE REPORT TO PRINTER MEMORY (IF SO EQUIPPED).                                                                                |
| E3-01F | BAUD RATE             | 300, 600, 1200, 2400,<br>4800, 9600, 19200                                                                               | 19200            | 9600          | 9600         | 9600         | 19200   | SELECT THE BAUD RATE OF THE SERIAL PORT.<br>NOTE: ONLY 8N1 (8-BIT, NO PARITY, 1 STOP BIT) IS SUPPORTED.                                              |

## Device Setup Table (continued)

| REF.   | NAME                | RANGE                               | COUNTRY SETTING |         |         |         |         | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                 |
|--------|---------------------|-------------------------------------|-----------------|---------|---------|---------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                     |                                     | I.              | II.     | III.    | IV.     | V.      |                                                                                                                                                                                                                                                                                                                                                             |
| E3-01G | END OF LINE         | CR, LF, CR & LF                     | CR & LF         | CR & LF | CR & LF | CR & LF | CR & LF | SELECT THE END OF LINE (EOL) ASCII CHARACTERS TO BE USED:<br>CR- CARRIAGE RETURN LF-LINE FEED                                                                                                                                                                                                                                                               |
| E3-01H | CHARACTERS PER LINE | 24 TO 80                            | 42              | 24      | 24      | 40      | 80      | SELECT THE MAXIMUM NUMBER OF CHARACTERS PER LINE OF PRINT.                                                                                                                                                                                                                                                                                                  |
| E3-01I | RS232 CTS HANDSHAKE | YES,NO                              | NO              | NO      | YES     | YES     | YES     | SELECT WHETHER A RS232 CTS HANDSHAKE IS REQUIRED BY THE PRINTER DEVICE.                                                                                                                                                                                                                                                                                     |
| E3-01J | XON/XOFF HANDSHAKE  | YES, NO                             | YES             | NO      | NO      | NO      | YES     | SELECT WHETHER AN ASCII HANDSHAKE (XON/XOFF) IS REQUIRED BY THE PRINTER DEVICE.                                                                                                                                                                                                                                                                             |
| E3-01K | RS232 DSR HANDSHAKE | YES, NO                             | NO              | NO      | NO      | NO      | NO      | SELECT WHETHER A RS232 DSR HANDSHAKE IS REQUIRED BY THE PRINTER DEVICE.                                                                                                                                                                                                                                                                                     |
| E3-01L | EOL/CTS HANDSHAKE   | YES, NO                             | NO              | YES     | NO      | NO      | NO      | SELECT WHETHER A COMBINATION OF EOL & CTS SIGNALS ARE REQUIRED BY THE PRINTER DEVICE.                                                                                                                                                                                                                                                                       |
| E3-02+ | OUTPUT FORMAT       | FORMATTED, DELIMITED                | FORM.           | FORM.   | FORM.   | FORM.   | FORM.   | SELECT THE FORMAT FOR DATA OUTPUT. <i>DELIMITED</i> (TEXT) OUTPUT WILL GENERALLY BE CAPTURED BY A TERMINAL SOFTWARE PACKAGE AND IMPORTED INTO A SPREADSHEET APPLICATION. IF <i>DELIMITED</i> IS CHOSEN ADDITIONAL CRITERIA (E3-02A,B) MUST BE SELECTED.<br><br><i>FORMATTED</i> DATA IS IN A PRINTER-READY, READABLE USER FORMAT, SUCH AS SEEN ON A RECEIPT |
| E3-02A | DELIMITOR           | TAB<br>SPACE<br>COMMA<br>SEMI-COLON | TAB             | TAB     | TAB     | TAB     | TAB     | SELECT THE DELIMITOR TO BE INSERTED BETWEEN THE 3 FIELDS (TITLE, VALUE, PERCENTAGE) OF THE REPORT.                                                                                                                                                                                                                                                          |
| E3-02B | TEXT QUALIFIER      | DOUBLE QUOTE<br>SINGLE QUOTE        | DOUBL           | DOUBL   | DOUBL   | DOUBL   | DOUBL   | SPECIFY THE BEGINNING AND ENDING CHARACTER OF A FIELD.                                                                                                                                                                                                                                                                                                      |

## E4: Adjustments Report

Generates a complete listing of ALL of the games' adjustments information. Any sensitive adjustments which are password-protected will not be shown on the report (only the title of the adjustment will appear with the message "PASSWORD PROTECTED"). This report can only be generated through the Menu System (see E2-01: *Custom Report*).

## E5: Audits Report

Generates a complete listing of ALL of the games' audit information. Any sensitive audits which are password protected will not be shown on the report (only the title of the audit will appear with the message "PASSWORD PROTECTED"). This report can only be generated through the Menu System (see E2-01: *Custom Report*).



## STATUS MESSAGES

NOTE: All of the following Status Messages are shown on the dot matrix display and do not appear on the printed report:

- 1) **PLEASE DISCONNECT PRINTER** - This message appears after an automatic report has been completed using the "Hot Plug" method.
- 2) **SEARCHING FOR PRINTER...** - This message appears at the beginning of each print job.
- 3) **ONE MOMENT, PRINTING <type>** - This message appears during a print job where <type> is the title or the section currently being printed.
- 4) **ONE MOMENT, PRINTING ALL ADJUSTMENTS, <type>** - This message appears during the Adjustments Report where <type> is the title of the section currently being printed.
- 5) **ONE MOMENT, PRINTING ALL AUDITS, <type>** - This message appears during the Audits Report where <type> is the title of the section currently being printed.
- 6) **ONE MOMENT, PRINTING CUSTOM REPORT, <type>** - This message appears during the Custom Report where <type> is the title of the section currently being printed.
- 7) **PRINT JOB COMPLETE** - This message appears after the completion of the current print job.
- 8) **PRINT JOB CANCELLED** - This message appears when the operator cancels a print job in progress by pressing both flippers simultaneously.
- 9) **RESET COLLECTION AUDITS COMPLETE** - This message appears after the *COLLECTIONS* Audits have been cleared.
- 10) **RESET REPLAY PERCENTAGE COMPLETE** - This message appears after the replay setting has been changed to the recommended settings.

## ERROR MESSAGES

NOTE: All of the following Error Messages are shown on the dot matrix display and do not appear on the printed report:

- 1) **ERROR: PRINTER NOT RESPONDING, CHECK CONNECTION AND TRY AGAIN -** This message appears after a print job is activated and the system is not able to detect the presence of a printer device. Check the printer cable for a loose connection and verify that it is the correct type of serial cable.
- 2) **ERROR: PRINT JOB INTERRUPTED, CHECK PRINTER AND TRY AGAIN -** This message will appear during a print job if the printer cable becomes disconnected, the printer goes off-line or runs out of paper, or an undetermined error occurs.
- 3) **PLEASE DISCONNECT PRINTER -** This message will appear after one of the above error messages was previously displayed and the re-connection attempt was unsuccessful. You must unplug the printer cable to remove the message from the display and return to the System Menu.



## F. REDEMPTION

### (NOT AVAILABLE IN ALL VERSIONS OF SOFTWARE)

#### DESCRIPTION

The Redemption Menu is used in configuring the game for a redemption mode of operation when the game is equipped with an optional ticket or token dispenser. The redemption mode has five levels of scoring, payout, mechanism selection (token and/or token dispenser), and percentaging. The number and type of prizes (tickets, tokens, free credits, extra balls) that are awarded are operator adjustable and can be set for increasing levels of scoring difficulty. Prizes are awarded incrementally during the game after each scoring level is reached by the player. The player must also score within a preset time limit. After the timer expires, the current game will continue but the dispenser is disabled and prizes are no longer awarded.

#### F1 : ADJUSTMENTS

| AUDIT REF. | AUDIT NAME      | RANGE                        | FACTORY SETTING | DESCRIPTION                                                                                                                                                                                                                     |
|------------|-----------------|------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F1-01+     | REDEMPTION MODE | ON, OFF                      | OFF             | SELECT WHETHER GAME OPERATES IN REDEMPTION MODE (ON).                                                                                                                                                                           |
| F1-01A     | SCORE 1         | 0 - 4,000,000                | 50,000,000      | SET THE FIRST LEVEL OF SCORING THAT WILL DISPENSE A PRIZE(S).                                                                                                                                                                   |
| F1-01B     | PAYOUT 1        | 0 - 100                      | 1               | SET THE AMOUNT OF PRIZE(S) TO BE AWARDED WHEN REACHING A LEVEL 1 SCORE.                                                                                                                                                         |
| F1-01C     | MECHANISM 1     | TOKEN, TICKET, CREDIT, XBALL | TOKEN           | SELECT THE TYPE OF AWARD TO BE ISSUED WHEN REACHING A LEVEL 1 SCORE.                                                                                                                                                            |
| F1-01D     | PERCENTAGE 1    | 1 - 99                       | 40              | SET THE "IDEAL" PERCENTAGE OF GAMES THAT SHOULD REACH A LEVEL 1 SCORE. WHEN A HISTORY OF GAME SCORES HAS BEEN ACCUMULATED, THIS PERCENTAGE WILL THEN BE USED IN DETERMINING A "SUGGESTED" LEVEL 1 SCORE (SEE F2, PERCENTAGING). |
| F1-01E     | SCORE 2         | 0 - 4,000,000                | 100,000,000     | SET THE SECOND LEVEL OF SCORING THAT WILL DISPENSE A PRIZE(S).                                                                                                                                                                  |
| F1-01F     | PAYOUT 2        | 0 - 100                      | 3               | SET THE AMOUNT OF PRIZE(S) TO BE AWARDED WHEN REACHING A LEVEL 2 SCORE.                                                                                                                                                         |
| F1-01G     | MECHANISM 2     | TOKEN, TICKET, CREDIT, XBALL | TOKEN           | SELECT THE TYPE OF AWARD TO BE ISSUED WHEN REACHING A LEVEL 2 SCORE.                                                                                                                                                            |
| F1-01H     | PERCENTAGE 2    | 1 - 99                       | 20              | SET THE "IDEAL" PERCENTAGE OF GAMES THAT SHOULD REACH A LEVEL 2 SCORE. WHEN A HISTORY OF GAME SCORES HAS BEEN ACCUMULATED, THIS PERCENTAGE WILL THEN BE USED IN DETERMINING A "SUGGESTED" LEVEL 2 SCORE (SEE F2, PERCENTAGING). |
| F1-01I     | SCORE 3         | 0 - 4,000,000                | 200,000,000     | SET THE THIRD LEVEL OF SCORING THAT WILL DISPENSE A PRIZE(S).                                                                                                                                                                   |
| F1-01J     | PAYOUT 3        | 0 - 100                      | 6               | SET THE AMOUNT OF PRIZE(S) TO BE AWARDED WHEN REACHING A LEVEL 3 SCORE.                                                                                                                                                         |
| F1-01K     | MECHANISM 3     | TOKEN, TICKET, CREDIT, XBALL | TOKEN           | SELECT THE TYPE OF AWARD TO BE ISSUED WHEN REACHING A LEVEL 3 SCORE.                                                                                                                                                            |
| F1-01L     | PERCENTAGE 3    | 1 - 99                       | 10              | SET THE "IDEAL" PERCENTAGE OF GAMES THAT SHOULD REACH A LEVEL 3 SCORE. WHEN A HISTORY OF GAME SCORES HAS BEEN ACCUMULATED, THIS PERCENTAGE WILL THEN BE USED IN DETERMINING A "SUGGESTED" LEVEL 3 SCORE (SEE F2, PERCENTAGING). |

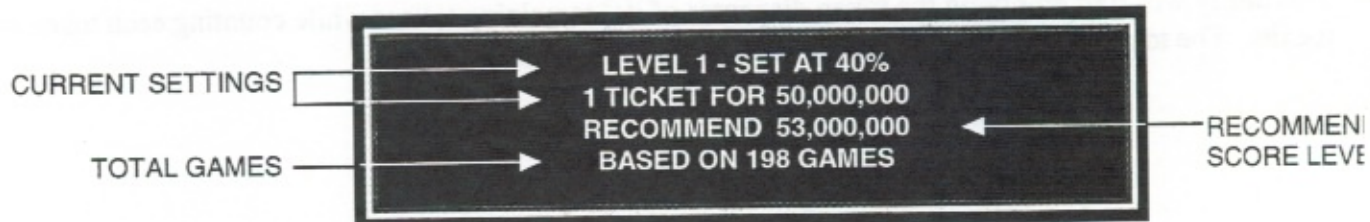


**F1 : ADJUSTMENTS (CONTINUED)**

|        |              |                              |             |                                                                                                                                                                                                                                 |
|--------|--------------|------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F1-01M | SCORE 4      | 0 - 4,000,000                | 300,000,000 | SET THE FOURTH LEVEL OF SCORING THAT WILL DISPENSE A PRIZE(S).                                                                                                                                                                  |
| F1-01N | PAYOUT 4     | 0 - 100                      | 10          | SET THE AMOUNT OF PRIZE(S) TO BE AWARDED WHEN REACHING A LEVEL 4 SCORE.                                                                                                                                                         |
| F1-01O | MECHANISM 4  | TOKEN, TICKET, CREDIT, XBALL | TOKEN       | SELECT THE TYPE OF AWARD TO BE ISSUED WHEN REACHING A LEVEL 4 SCORE.                                                                                                                                                            |
| F1-01P | PERCENTAGE 4 | 1 - 99                       | 5           | SET THE "IDEAL" PERCENTAGE OF GAMES THAT SHOULD REACH A LEVEL 4 SCORE. WHEN A HISTORY OF GAME SCORES HAS BEEN ACCUMULATED, THIS PERCENTAGE WILL THEN BE USED IN DETERMINING A "SUGGESTED" LEVEL 4 SCORE (SEE F2, PERCENTAGING). |
| F1-01Q | SCORE 5      | 0 - 4,000,000                | 400,000,000 | SET THE FIFTH LEVEL OF SCORING THAT WILL DISPENSE A PRIZE(S).                                                                                                                                                                   |
| F1-01R | PAYOUT 5     | 0 - 100                      | 1           | SET THE AMOUNT OF PRIZE(S) TO BE AWARDED WHEN REACHING A LEVEL 5 SCORE.                                                                                                                                                         |
| F1-01S | MECHANISM 5  | TOKEN, TICKET, CREDIT, XBALL | TICKET      | SELECT THE TYPE OF AWARD TO BE ISSUED WHEN REACHING A LEVEL 5 SCORE.                                                                                                                                                            |
| F1-01T | PERCENTAGE 5 | 1 - 99                       | 1           | SET THE "IDEAL" PERCENTAGE OF GAMES TO REACH LEVEL 5 SCORING. WHEN A HISTORY OF GAME SCORES HAS BEEN ACCUMULATED, THIS PERCENTAGE WILL THEN BE USED IN DETERMINING A "SUGGESTED" LEVEL 5 SCORE (SEE F2, PERCENTAGING).          |
| F1-01U | TIMER        | 10 - 300 SECONDS             | 200 SECONDS | SET THE AMOUNT OF TIME ALLOWED FOR REACHING SCORING LEVELS 1 - 5.                                                                                                                                                               |

**F2 : PERCENTAGING**

The Percentaging menu suggests to the operator a recommended scoring level that will better approximate the "target replay" percentage as set forth in F1, *Adjustments*. When selected, the following screen appears:



To accept the recommended new score level, press the START button. To cycle through the remaining score levels, press either FLIPPER button. To cancel, back-up, or restore the original setting, press both FLIPPER buttons simultaneously.



### F3 : AUDITS

The Audits menu will display awards information accumulated from previous games. A sample Audits screen is shown:



To cycle through the remaining award levels, press either FLIPPER button. To cancel or back-up to a previous menu, press both FLIPPER buttons simultaneously.

### F4 : CLEAR AUDITS

Clears Totals and Percentaging values from the above F3, AUDITS.

### F5 : COUNT TOKENS

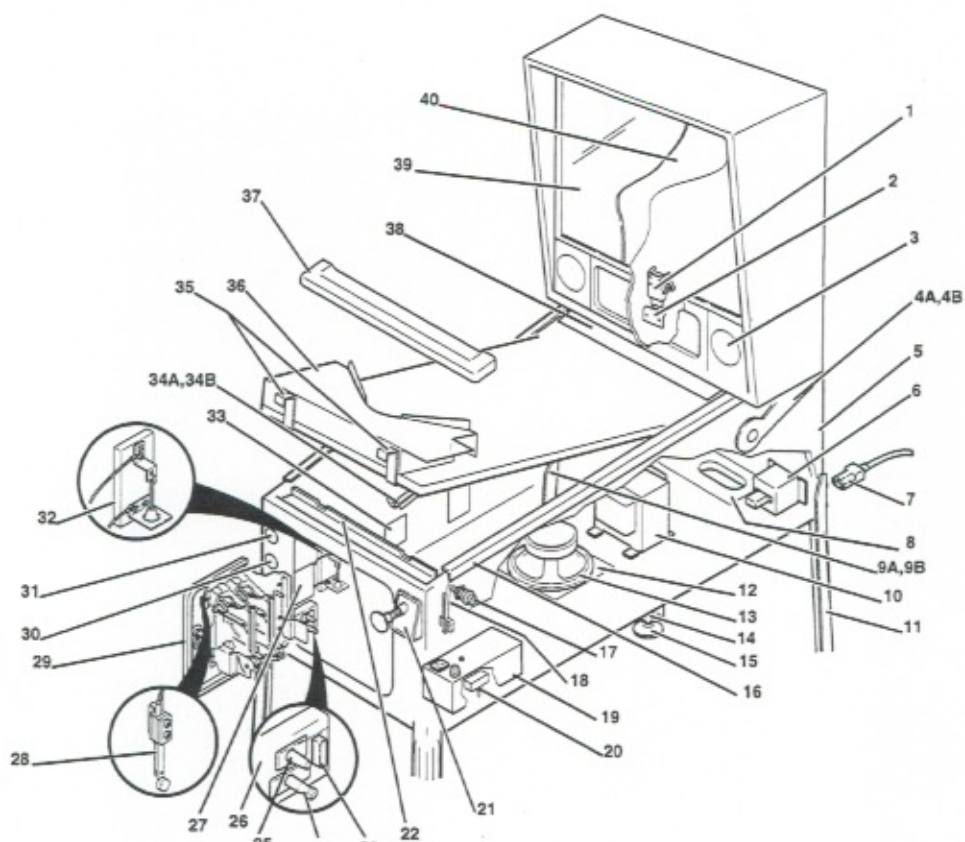
**NOTE:** This test is intended only for token dispensers equipped with a token switch. **Prior to starting this test, remove all existing tokens from the collection drawer (bin) in order to prevent a backup of tokens into the dispenser mechanism.**

This utility will start emptying the token dispenser of its' remaining tokens while counting each token as it exits. The token count will be continually displayed to the screen.

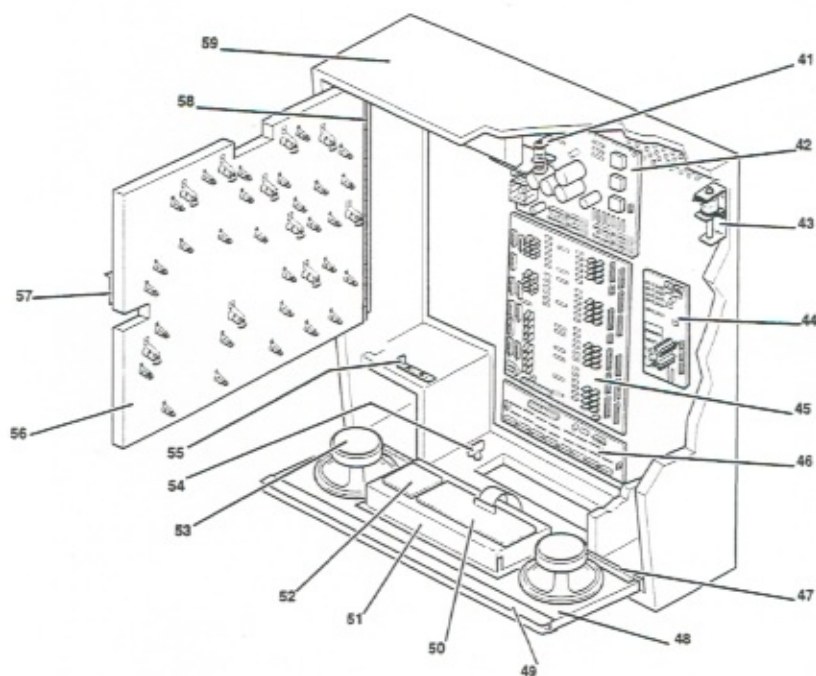
## NOTES



# CABINET AND BACKBOX IDENTIFICATION



P102702



P40451

## CABINET AND BACKBOX PARTS LIST

| REF. | DESCRIPTION                                                   | PART NUMBER   |
|------|---------------------------------------------------------------|---------------|
| 1    | LATCH, LINK LOCK, HEX, CAM (CONNECTED TO CABINET)             | MT00428       |
| 2    | PLATE, KEEPER, LATCH (CONNECTED TO BACKBOX)                   | MT00428-1     |
| 3    | GRILLE, SPEAKER                                               | AW00162       |
| 4A   | HINGE-LEFT, BACKBOX                                           | MT00173-L     |
| 4B   | HINGE-RIGHT, BACKBOX                                          | MT00173-R     |
| 5    | CABINET, WITH ARTWORK                                         | WD00157-PB4   |
| 6    | FILTER, LINE                                                  | LF00100       |
| 7    | CORD, LINE (POWER)                                            | LC0010*       |
| 8    | GRILLE, VENT, 10 X 16                                         | PL00310       |
| 9A   | ASSEMBLY, LEFT, ARM, PLAYFIELD LIFT                           | A-00351-L     |
| 9B   | ASSEMBLY, RIGHT, ARM, PLAYFIELD LIFT                          | A-00351-R     |
| 10   | TRANSFORMER, POWER                                            | XF00105       |
| 11   | LEG, PINBALL, 28-1/2"L                                        | MT00231       |
| 12   | GRILLE, SPEAKER, 7-1/2"                                       | PL00173       |
| 13   | SPEAKER, 8.0", 4 OHM, 20 WATT                                 | SP00101       |
| 14   | NUT, 10-24 KEPS HEX                                           | NT00101-10    |
| 15   | LEVELER, LEG, 3/8-16 X 3.0 WITH NUT                           | MS00101       |
| 16   | ARMOR, SIDE PANEL, PINBALL, BLACK                             | MT00163-BK    |
| 17   | PUSHBUTTON, 1-9/16"L, YELLOW                                  | PL00178-Y     |
| 18   | ASSEMBLY, SWITCH & CABLE, FLIPPER BUTTON SINGLE               | A-00455       |
| 19   | ASSEMBLY, CHASSIS, SERVICE                                    | A-00414-*     |
| 20   | ASSEMBLY, SWITCH & PLATE, ON / OFF                            | A-00413       |
| 21   | ASSEMBLY, BALL SHOOTER                                        | A-00192-02    |
| 22   | ASSEMBLY, LOCK, HANDRAIL                                      | A-00125       |
| 23   | CABLE, PRINTER, TICKET DISPENSER, METER PCB WITH CONNECTOR    | C-00198       |
| 24   | SWITCH, INTERLOCK, PANEL MOUNTING                             | SW00119       |
| 25   | SWITCH, MOMENTARY, 0.1 AMPS 125 VAC                           | SW00132       |
| 26   | BRACKET, SWITCH, INTERRUPT, 3-POSITION WITH PRINTER CONNECTOR | MT00321-2     |
| 27   | ASSEMBLY, PCB, PRINTER/METER/T.D. (OPTIONAL)                  | A0019501      |
| 28   | SWITCH, LEAF, ANTI-SLAM                                       | SW00121       |
| 29   | DOOR, COIN                                                    | A-00492-*     |
| 30   | SWITCH, CONTINUE BUTTON                                       | SW00131       |
| 31   | SWITCH, START BUTTON                                          | SW00130       |
| 32   | ASSEMBLY, TILT, PLUMB BOB, WITH CABLE                         | A-00065-1     |
| 33   | ASSEMBLY, PCB, DIODE                                          | A0016900      |
| 34A  | RAIL-LEFT, CABINET                                            | MT00357-L     |
| 34B  | RAIL-RIGHT, CABINET                                           | MT00357-R     |
| 35   | BRACKET, HANGER, PLAYFIELD                                    | MT00162       |
| 36   | ASSEMBLY, BOTTOM ARCH                                         | A-00211-PB4   |
| 37   | ASSEMBLY, HANDRAIL, BLACK                                     | A-00124       |
| 38   | BRACKET, GLASS, PLAYFIELD, REAR, BLACK                        | MT00177-BK    |
| 39   | GLASS, 26-1/8 X 19-3/4 X 1/8 (BACKBOX)                        | GL00106       |
|      | GLASS, 21.0 X 43.0 X 3/16 (PLAYFIELD) (NOT SHOWN)             | GL00102       |
| 40   | FILM, BACKGLASS                                               | AW00161       |
| 41   | CYLINDER, LOCK                                                | LK00101       |
| 42   | ASSEMBLY, PCB, POWER                                          | A0015205      |
| 43   | ASSEMBLY, KNOCKER                                             | A-00150       |
| 44   | ASSEMBLY, PCB, SOUND                                          | A-0015003-PB4 |
| 45   | ASSEMBLY, PCB, DRIVER                                         | A0015106      |
| 46   | ASSEMBLY, PCB, SWITCH                                         | A0015302      |
| 47   | ASSEMBLY, HINGE, SPEAKER PANEL                                | A-00163       |
| 48   | ASSEMBLY, PANEL, SPEAKER                                      | A-00301-PB4   |
| 49   | CHANNEL, GLASS                                                | PL00214-01    |
| 50   | ASSEMBLY, PCB, CPU SYSTEM                                     | A0015405-PB4  |
| 51   | DISPLAY, DOT MATRIX 128 X 32                                  | DP00102       |
| 52   | ASSEMBLY, PCB, DISPLAY SWITCHING POWER SUPPLY                 | A0015505      |
| 53   | SPEAKER, 4.0" D, 4.0 OHM                                      | SP00100       |
| 54   | THUMBSCREW, 3/8-16 X 3.0 WITH SHOULDER                        | SC00154-24    |
| 55   | BRACKET, SLIDE, PANEL LATCH                                   | MT00221       |
| 56   | ASSEMBLY, INSET                                               | A-00309-PB4   |
| 57   | BRACKET, LATCH, INSERT, DOOR                                  | MT00221       |
| 58   | HINGE, INSERT PANEL                                           | MT00158       |
| 59   | BACKBOX WITH ARTWORK                                          | WD00132-PB4   |

\*NOTE: When ordering for service, please indicate model number of your game.



Modo in USA **CAPCOM** 1986 (C)  
COIN-OP, Inc.

ACIAC  
CAB  
CT  
B.B.

J1  
J2  
J3

F15  
F14

D11  
D7  
D16  
D9

U35  
U34  
POWER  
LED2  
R81  
R86

U27

U31

U30

U29

U28

U24

U36  
U6  
U25

U2  
U18  
U33  
U37  
U26  
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U3

U23  
U22

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U8  
U12  
U13

C20  
C2

C30  
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R48  
R49  
R50  
R51  
R52

X1

L1  
L2

J4  
J5

+5V  
GND  
GND  
+5V

QTS  
RTS  
TAD  
RMD  
GRES

PINBALL SOUND PCB

# SOUND BOARD ASSEMBLY A0015003

## PARTS LIST

| DES.                                                                                   | DESCRIPTION                                    | PART NUMBER |
|----------------------------------------------------------------------------------------|------------------------------------------------|-------------|
| C1,C4                                                                                  | CAPACITOR , CERAMIC 100V .001UF 10% SMT 1206   | CP00055-SMT |
| C2,C20                                                                                 | CAPACITOR , ELECTROLYTIC 25V 4700UF 20% RAD    | CP00020     |
| C3                                                                                     | CAPACITOR , CERAMIC 50V .22UF 20% SMT 1210     | CP00051-SMT |
| C6-7,C24-25, C63-64, C73-75, C77                                                       | CAPACITOR , TANTILUM 35V 1.0UF 10% SMT         | CP00012-SMT |
| C8,C10,C38                                                                             | CAPACITOR , TANTILUM 25V 4.7UF 20% SMT         | CP00050-SMT |
| C9,C11-17 C21,C42, C45,C51-52, C54-56,C59-61,C67-C69, C71-72,C76, C79-81, C83, C88-C96 | CAPACITOR , CERAMIC 50V .1UF 10% SMT 1206      | CP00056-SMT |
| C18                                                                                    | CAPACITOR , CERAMIC 100V .022UF 20% SMT 1206   | CP00063-SMT |
| C19,C22, C44,C50, C65,C70                                                              | CAPACITOR , CERAMIC 50V .033UF 5% SMT 1206     | CP00061-SMT |
| C23,C49, C66                                                                           | CAPACITOR , CERAMIC 100V 3300PF 20% SMT 1206   | CP00064-SMT |
| C30,C78                                                                                | CAPACITOR , TANTILUM 16V 22UF 20% SMT          | CP00045-SMT |
| C43                                                                                    | CAPACITOR , CERAMIC 100V 470PF 5% SMT 1206     | CP00060-SMT |
| C82                                                                                    | CAPACITOR , ELECTROLYTIC 16V 470UF 20% RAD     | CP00054     |
| C84-87                                                                                 | CAPACITOR , CERAMIC 100V 100PF 10% SMT 1206    | CP00058-SMT |
| D1-6,D12-13                                                                            | DIODE 1N4004 RECTIFIER 1.0A 400VR              | DI00100     |
| D7,D9-11                                                                               | DIODE 1N5402 RECTIFIER 3.0A 200VR              | DI00106     |
| D8                                                                                     | DIODE 1N4148 SW 200MA 75VR                     | DI00104     |
| J1                                                                                     | CONNECTOR HEADER .156 STRAIGHT 7-PIN LOCK      | CN00100-07  |
| J2,J3                                                                                  | CONNECTOR HEADER .156 STRAIGHT 4-PIN LOCK      | CN00100-04  |
| J4                                                                                     | CONNECTOR HEADER .156 STRAIGHT 5-PIN LOCK      | CN00100-05  |
| J5                                                                                     | CONNECTOR HEADER .100 STRAIGHT 6-PIN LOCK      | CN00104-06  |
| L1-2                                                                                   | IND CHOKE 4.7UH 3A AXIAL                       | IN00100     |
| LED1-2                                                                                 | LED LTL4201 RED 20MA T-1 70°                   | DI00105     |
| F14-F15                                                                                | FUSE HOLDER 3AG PC MTG                         | FS00101     |
| F14,F15                                                                                | FUSE SLO BLO 3.0A 250V 3AG                     | FS00100-03  |
| R1                                                                                     | RESISTOR CARBON FILM 1/4W 5% 1 OHM             | RS00100-23  |
| R2                                                                                     | RESISTOR CARBON FILM 1/8W 5% 100 OHM SMT 1206  | RS00102-02S |
| R3,R5                                                                                  | RESISTOR CARBON FILM 1/8W 5% 12K OHM SMT 1206  | RS00102-18S |
| R4,R85                                                                                 | RESISTOR CARBON FILM 1/8W 5% 1K OHM SMT 1206   | RS00102-05S |
| R6,R17                                                                                 | RESISTOR CARBON FILM 1/8W 5% 22K OHM SMT 1206  | RS00102-21S |
| R7,R20,R88                                                                             | RESISTOR CARBON FILM 1/8W 5% 3.3K OHM SMT 1206 | RS00102-27S |

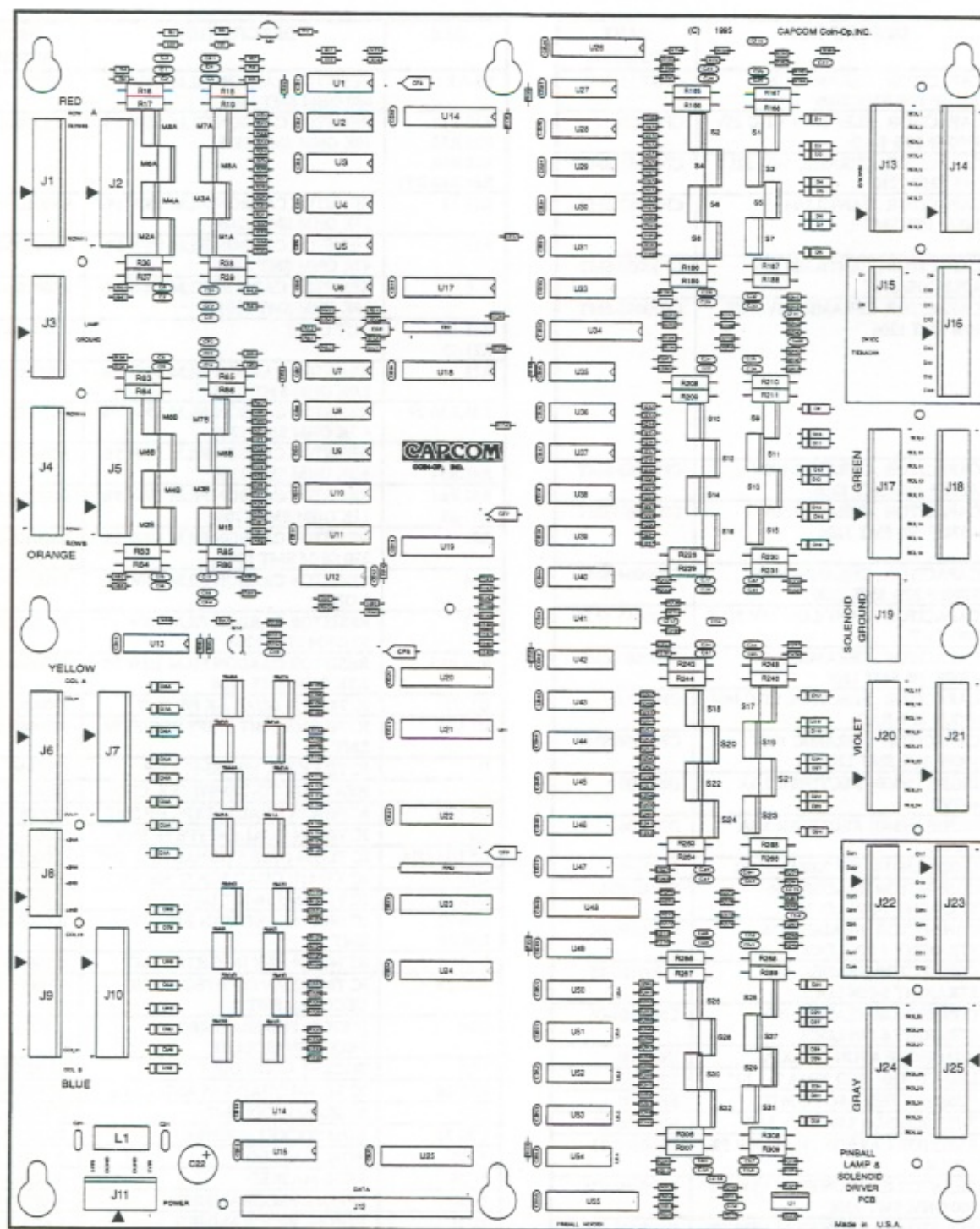
| DES.                                   | DESCRIPTION                                    | PART NUMBER |
|----------------------------------------|------------------------------------------------|-------------|
| R8-9,R11                               | RESISTOR CARBON FILM 1/8W 5% 680 OHM SMT 1206  | RS00102-13S |
| R10,R12, R25,R53, R56,R66, R86,R90-R93 | RESISTOR CARBON FILM 1/8W 5% 10K OHM SMT 1206  | RS00102-07S |
| R13-14                                 | RESISTOR CARBON FILM 1/8W 5% 27K OHM SMT 1206  | RS00102-40S |
| R15                                    | RESISTOR CARBON FILM 1/8W 5% 47K OHM SMT 1206  | RS00102-20S |
| R16                                    | RESISTOR CARBON FILM 1/8W 5% 39K OHM SMT 1206  | RS00102-19S |
| R18-19, R21-22                         | NOT USED                                       | -----       |
| R23                                    | RESISTOR CARBON FILM 1/8W 5% 2.0K OHM SMT 1206 | RS00102-22S |
| R24,R26-27                             | RESISTOR CARBON FILM 1/8W 5% 4.7K OHM SMT 1206 | RS00102-26S |
| R34,R38, R46,R51                       | RESISTOR CARBON FILM 1/8W 5% 1.2K OHM SMT 1206 | RS00102-08S |
| R52,R61, R67-68                        | RESISTOR CARBON FILM 1/8W 5% 11K OHM SMT 1206  | RS00102-38S |
| R81                                    | RESISTOR CARBON FILM 1/8W 5% 270 OHM SMT 1206  | RS00102-03S |
| R84                                    | RESISTOR CARBON FILM 1/4W 5% 0 OHM             | RS00100-10  |
| R87                                    | RESISTOR CARBON FILM 1/8W 5% 33 OHM SMT 1206   | RS00102-41S |
| R94,R95                                | RESISTOR CARBON FILM 1/8W 5% 2.2K OHM SMT 1206 | RS00102-23S |
| U1,U3                                  | IC 74LS112 DUAL J-K F/F SMT                    | IC00093-SMT |
| U2,U37                                 | IC 74LS165 8-BIT SHIFT REGISTER SMT            | IC00089-SMT |
| U4                                     | IC TDA2030A 18W HI-FI AMP                      | IC00056     |
| U4                                     | HEATSINK TO-220 W/KOOL CLIP                    | HS00102     |
| U5,U32                                 | IC 74HC74 DUAL D-TYPE F/F SMT                  | IC00087-SMT |
| U6                                     | IC 74LS74 DUAL D-TYPE FF SMT                   | IC00042-SMT |
| U8,U11,U14                             | IC TLO84 OPERATIONAL AMP SMT                   | IC00037-SMT |
| U10                                    | IC X9241U QUAD E2POT 50K SMT                   | IC00061-SMT |
| U12-13                                 | IC TDA1545 16-BIT DAC SMT                      | IC00091-SMT |
| U16-17, U38-39                         | IC 74LS161 4-BIT SYN BIN CTR SMT               | IC00083-SMT |
| U18-19                                 | IC 74LS04 HEX INVERTER SMT                     | IC00048-SMT |
| U22-23                                 | IC TMS320AV120 MPEG AUDIO DECODER SMT          | IC00086-SMT |
| U24                                    | IC87C52 PROGRAMMED MICROCONTROLLER             | A-00566-U24 |
| U24                                    | SOCKET 40-PIN DIP                              | SK00112-40  |
| U25-26                                 | IC 74LS08 QUAD 2-IN AND GATE                   | IC00088-SMT |
| U27                                    | IC SRAM32KX8 SMT                               | IC00090-SMT |
| U28-31                                 | ROM SOCKET 32PIN600                            | SK00112-32  |
| *U28                                   | ROM, MASKED                                    | A-00567-U28 |
| *U29                                   | ROM, MASKED                                    | A-00567-U29 |
| *U30                                   | EPROM, PROGRAMMED                              | A-00567-U30 |
| *U31                                   | EPROM, PROGRAMMED                              | A-00567-U31 |
| U33                                    | IC 74LS00 QUAD 2-IN NAND GATE SMT              | IC00084-SMT |
| U34-36                                 | IC 74LS373 OCT D-TYPE LATCH SMT                | IC00092-SMT |
| X1                                     | CLOCK OSCILLATOR 24MHZ                         | OS00101     |

NOTE: C57 &amp; 58 are replaced with jumper wires.

\* NOTE: Game ROMs are not included with A0015003: must be purchased separately.



## DRIVER BOARD



## DRIVER BOARD ASSEMBLY A0015106

### PARTS LIST

| DES.                                                                                           | DESCRIPTION                              | PART NUMBER |
|------------------------------------------------------------------------------------------------|------------------------------------------|-------------|
| C1-11,C13-19,<br>C23-59                                                                        | CAPACITOR CERAMIC<br>50V .22UF 20% AX    | CP00024     |
| C20-21                                                                                         | CAPACITOR CERAMIC<br>50V 100P 10% AX     | CP00068     |
| C22                                                                                            | CAPACITOR ELECT 16V<br>470UF 20% RAD     | CP00054     |
| CB14-26,CB34,<br>CB41,CB48,CB55                                                                | CAPACITOR CERAMIC<br>50V .01UF 10% AX    | CP00048     |
| CB42-47,CB49-54                                                                                | CAPACITOR CERAMIC<br>50V .001UF 10% AX   | CP00049     |
| CF1-4,CF10-14                                                                                  | CAPACITOR CERAMIC<br>50V .01UF 10% AX    | CP00048     |
| CF5-9                                                                                          | CAPACITOR TANTILUM<br>35V 1.0UF 5% AX    | CP00012     |
| D1-32,D1A,D1B,<br>D2A,D2B,D3A,<br>D3B,D4A,D4B,<br>D5A,D5B,D6A,<br>D6B,D7A,D7B,<br>D8A,D8B-1    | DIODE 1N4004 RECT<br>1.0A 400VR          | DI00100     |
| J15                                                                                            | CONNECTOR HEADER<br>.156 STR 3 PIN LOCK  | CN00100-03  |
| J11                                                                                            | CONNECTOR HEADER<br>.156 STR 5-PIN LOCK  | CN00100-05  |
| J8,J19                                                                                         | CONNECTOR HEADER<br>.156 STR 6-PIN LOCK  | CN00100-06  |
| J3                                                                                             | CONNECTOR HEADER<br>.156 STR 7-PIN LOCK  | CN00100-07  |
| J1-2,J4-7,J9-10,<br>J13-14,J16-18,<br>J20-25                                                   | CONNECTOR HEADER<br>.156 STR 9 PIN LOCK  | CN00100-09  |
| J12                                                                                            | CONNECTOR HEADER<br>.100 STR 50-PIN 2X25 | CN00101-50  |
| L1                                                                                             | IND 4.7UH 3.4A 15%AX                     | IN00100     |
| M1A,M1B, M2A,<br>M2B,M3A, M3B,<br>M4A,M4B, M5A,<br>M5B, M6A,M6B,<br>M7A,M7B, M8A,<br>M8B,S1-32 | TRANSISTOR STP20N10L<br>MOSFET N-CH      | TR00101     |
| M9-10                                                                                          | TRANSISTOR 2N7000<br>MOSFET N-CH         | TR00109     |
| Q1                                                                                             | TRANSISTOR TIP102 NPN                    | TR00102     |
| R1,R100                                                                                        | RESISTOR METAL FILM<br>1/4W 1% 200 OHM   | RS00113-11  |
| R2,R101,R162,<br>R204,R235,<br>R282,R317                                                       | RESISTOR METAL FILM<br>1/4W 1% 7.50K OHM | RS00113-08  |
| R3-4,R8-9,<br>R40-43,R58-61,<br>R87-88,R90-91                                                  | RESISTOR CARBON<br>FILM 1/4W 5% 680 OHM  | RS00100-13  |
| R5,R97                                                                                         | RESISTOR METAL FILM<br>1/4W 1% 270 OHM   | RS00113-12  |
| R6,R15,R62,R94,<br>R102,R135,R140,<br>R150-151,R153,<br>R160,R205,R236,<br>R283,R318           | RESISTOR CARBON<br>FILM 1/4W 5% 100 OHM  | RS00100-02  |

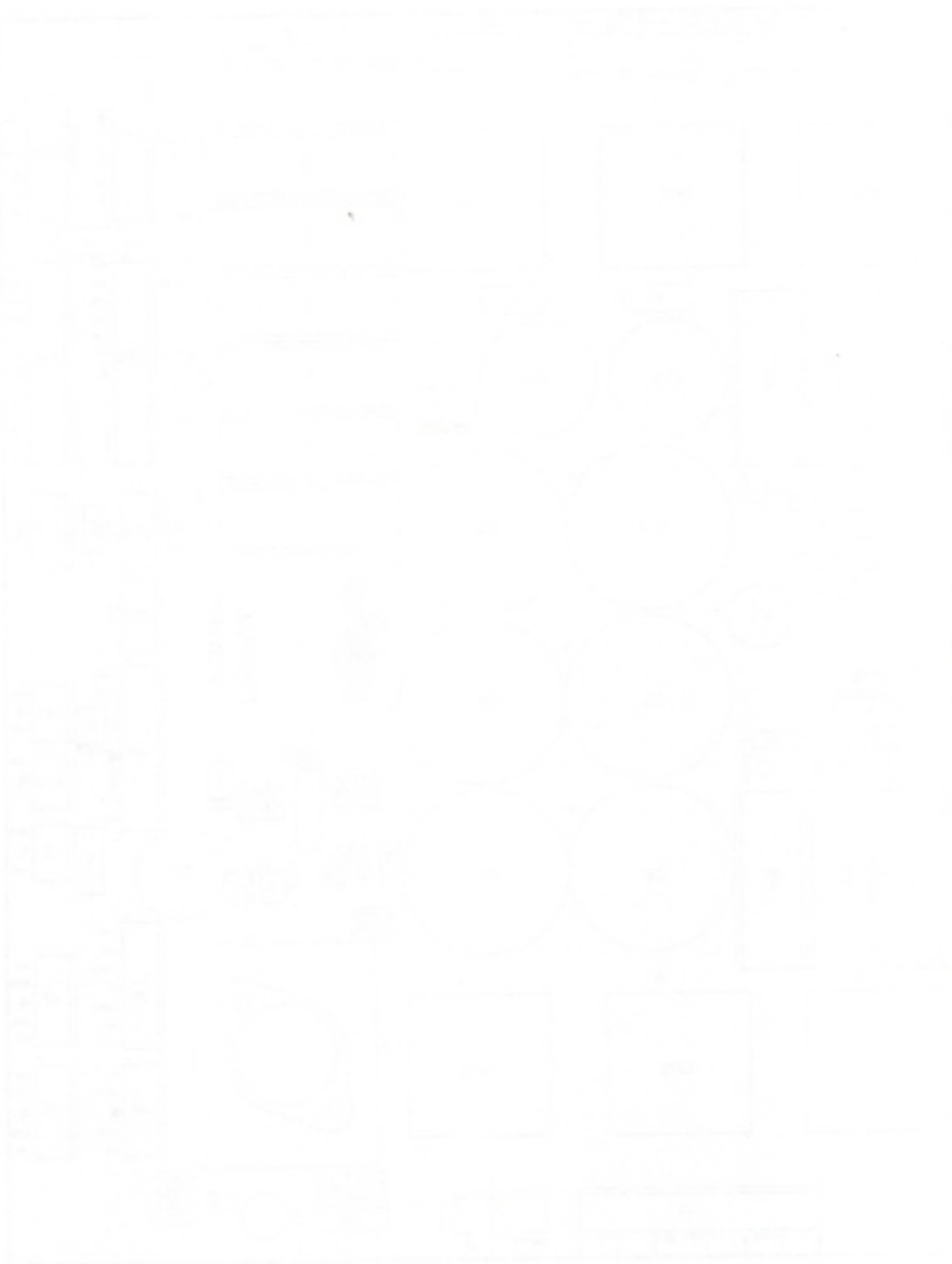
| DES.                                                                                                                                                                                                                                                                                                                                     | DESCRIPTION                              | PART NUMBER |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------|
| R7,R21,R23,R25,<br>R27,R29,R31,R33,<br>R35,R51,R68,R70,<br>R72,R74,R76,<br>R78,R80,R82,R89,<br>R98,R136-139,<br>R141,R152,R169,<br>R172-173,R176-177,<br>R180-181,R184,<br>R212,R215-216,<br>R219-220,<br>R223-224,R227,<br>R247,R250-251,<br>R254-255,R258-259,<br>R262,R290,<br>R293-294,<br>R297-298,<br>R301-302, R305,<br>RR321-322 | RESISTOR CARBON<br>FILM 1/4W 5% 4.7K OHM | RS00100-26  |
| R10,R99                                                                                                                                                                                                                                                                                                                                  | RESISTOR CARBON<br>FILM 1/4W 5% 330 OHM  | RS00100-12  |
| R11-14,R49-50,<br>R52-57,R92-93,<br>R95-96,R104,<br>R106,R108,R110,<br>R112,R114,R116,<br>R118,R120,R122,<br>R124,R126,R128,<br>R130,R132,R134,<br>R142-149,R154-155,<br>R158-159,R191-194,<br>R197-200,R269-272,<br>R275-278,R312-315                                                                                                   | RESISTOR CARBON<br>FILM 1/4W 5% 10K OHM  | RS00100-07  |
| R16-19,R36-39,<br>R63-66,R83-86,<br>R165-168,R185-188,<br>R208-211,R228-231,<br>R243-246,R263-266,<br>R286-289, R306-309                                                                                                                                                                                                                 | RESISTOR CARBON<br>FILM 1W 5% .020 OHM   | RS00112-01  |
| R20,R22,R24,R26,<br>R28,R30,R32,R34,<br>R67,R69,R71,R73,<br>R75,R77,R79,R81,<br>R170-171,R174-175,<br>R178-179,R182-183,<br>R213-214,R217-218,<br>R221-222,R225-226,<br>R248-249,R252-253,<br>R256-257,R260-261,<br>R291-292,R295-296,<br>R299-300, R303-304                                                                             | RESISTOR CARBON<br>FILM 1/4W 5% 750 OHM  | RS00100-42  |
| R103,R105,R107,<br>R109,R111,R113,<br>R115,R117,R119,<br>R121,R123,R125,<br>R127,R131,R133                                                                                                                                                                                                                                               | RESISTOR CARBON<br>FILM 1/4W 5% 1K OHM   | RS00100-05  |



## DRIVER BOARD ASSEMBLY A0015106 PARTS LIST (CONT.)

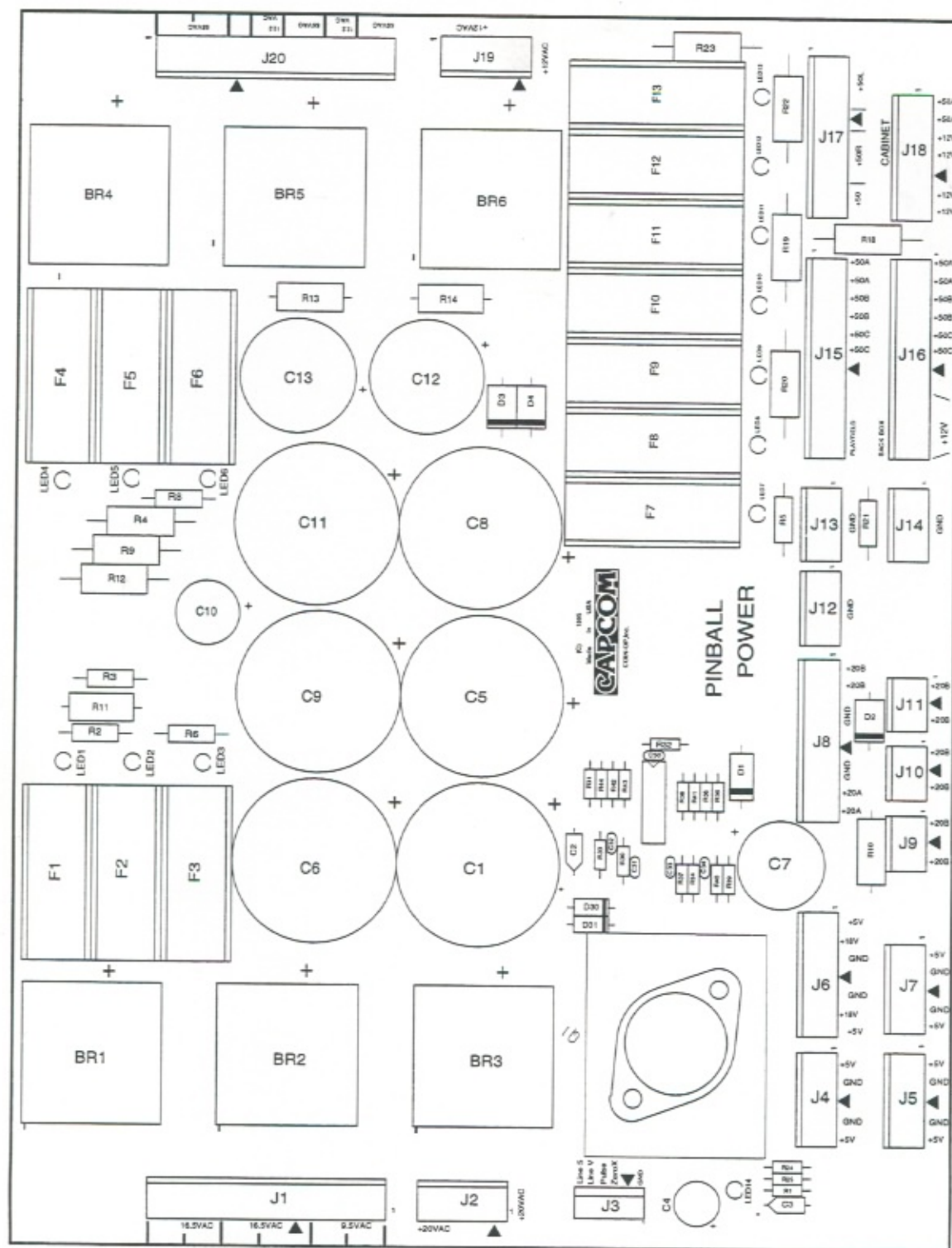
| DES.                                                                                                                                                  | DESCRIPTION                            | PART<br>NUMBER |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------|
| R156-157,R163-164,<br>R189-190,R195-196,<br>R201-202,R206-207,<br>R232-233,R237-242,<br>R267-268,R273-274,<br>R279-280,R284-285,<br>R310-311,R319-320 | RESISTOR CARBON<br>FILM 1/4W 5% 56 OHM | RS00100-41     |
| R161,R203,R234,<br>R281,R316                                                                                                                          | RESISTOR METAL FILM<br>1/4W 1% 470 OHM | RS00113-06     |
| RN1-2                                                                                                                                                 | RESISTOR SIP 10K X 9R<br>2% BUSSED     | RS00104        |
| SM1A,SM1B,SM2A,<br>SM2B,SM3A,SM3B,<br>SM4A,SM4B,SM5A,<br>SM5B,SM6A,SM6B,<br>SM7A,SM7B,SM8A,<br>SM8B-1                                                 | TRANSISTOR VN02N<br>MOSFET RELAY       | TR00105        |
| U1,U6-7,U12, U27,<br>U33,U35,U40 U42,<br>U47,U49,U54                                                                                                  | IC LM339 VOLTAGE<br>COMPARATOR         | IC00036        |
| U2-5,U8-11, U13,<br>U28-31,U36-39,<br>U43-46,                                                                                                         | IC 74LS74 DUAL D-TYPE<br>FF            | IC00042        |
| U14-15                                                                                                                                                | IC 74LS138 3 OF 8 LINE<br>DECODER      | IC00047        |
| U16-20,U22,U24-26,<br>U34,U41,U48,U55                                                                                                                 | IC 74LS244 OCT<br>BFFR/LINE DR         | IC00057        |
| U21,U23                                                                                                                                               | IC 74LS273 OCTAL D-<br>TYPE FF         | IC00041        |

## NOTES





## POWER BOARD



## POWER BOARD ASSEMBLY A0015205

### PARTS LIST

| DES.                 | DESCRIPTION                                      | PART NUMBER |
|----------------------|--------------------------------------------------|-------------|
| BR1-6                | RECTIFIER MB352W<br>BRIDGE 35A 200V              | + *DI00101  |
| C1,C5-6,<br>C8-9,C11 | CAPACITOR<br>ELECTROLYTIC 35V<br>15000UF 20% RAD | CP00065     |
| C2-3                 | CAPACITOR TANTILUM<br>35V 1.0UF 5% AX            | CP00012     |
| C4                   | CAPACITOR<br>ELECTROLYTIC 10V<br>470UF 20% RAD   | CP00016     |
| C10                  | CAPACITOR<br>ELECTROLYTIC 100V<br>100UF 20% RAD  | CP00011-01  |
| C12-13               | CAPACITOR<br>ELECTROLYTIC 100V<br>2200UF 20% RAD | CP00046     |
| C30                  | CAPACITOR CERAMIC<br>50V .1UF 10% AX             | CP00019     |
| C31                  | CAPACITOR CERAMIC<br>50V .033UF 5% AX            | CP00047     |
| C32                  | CAPACITOR CERAMIC<br>50V .01UF 10% AX            | CP00048     |
| C33-34               | CAPACITOR CERAMIC<br>100V .001UF 10% AX          | CP00066     |
| D1                   | RESISTOR, METAL FILM<br>JUMPER                   | RS00117-01  |
| D2-4                 | DIODE IN5402<br>RECTIFIER 20MA T-1 70 °          | DI00106     |
| D30-31               | DIODE IN4004<br>RECTIFIER 1.0A 400VR             | DI00100     |
| F1-2,6               | FUSE SLO-BLO 10.0A<br>250V 3AG                   | FS00100-10  |
| F3                   | FUSE SLO-BLO 7.0A 250V<br>3AG                    | FS00100-07  |
| F4                   | FUSE SOL-BLO 8.0A 250V<br>3AG                    | FS00100-08  |
| F5,F7-8              | FUSE SLO-BLO 3.0A 250V<br>3AG                    | FS00100-03  |
| F9-13                | FUSE SLO-BLO 4.0A 250V<br>3AG                    | FS00100-04  |
| FH1-13               | FUSE HLDR 3AG PC MTG                             | FS00101     |
| HS1                  | HEAT SINK TO-3 HEAVY<br>DUTY 2"                  | *HS00106    |
| J1,J20               | CONNECTOR HEADER<br>.156 STR 13-PIN LOCK         | CN00100-13  |
| J2,J4-5,<br>J7,J19   | CONNECTOR HEADER<br>.156 STR 5-PIN LOCK          | CN00100-05  |
| J3                   | CONNECTOR HEADER<br>.100 STR 6-PIN LOCK          | CN00104-06  |
| J6,J18               | CONNECTOR HEADER<br>.156 STR 7-PIN LOCK          | CN00100-07  |
| J8,J17               | CONNECTOR HEADER<br>.156 STR 9 PIN LOCK          | CN00100-09  |
| J9-11                | CONNECTOR HEADER<br>.156 STR 3 PIN LOCK          | CN00100-03  |
| J12-14               | CONNECTOR HEADER<br>.156 STR 4-PIN LOCK          | CN00100-04  |
| J15-16               | CONNECTOR HEADER<br>.156 STR 11-PIN LOCK         | CN00100-11  |

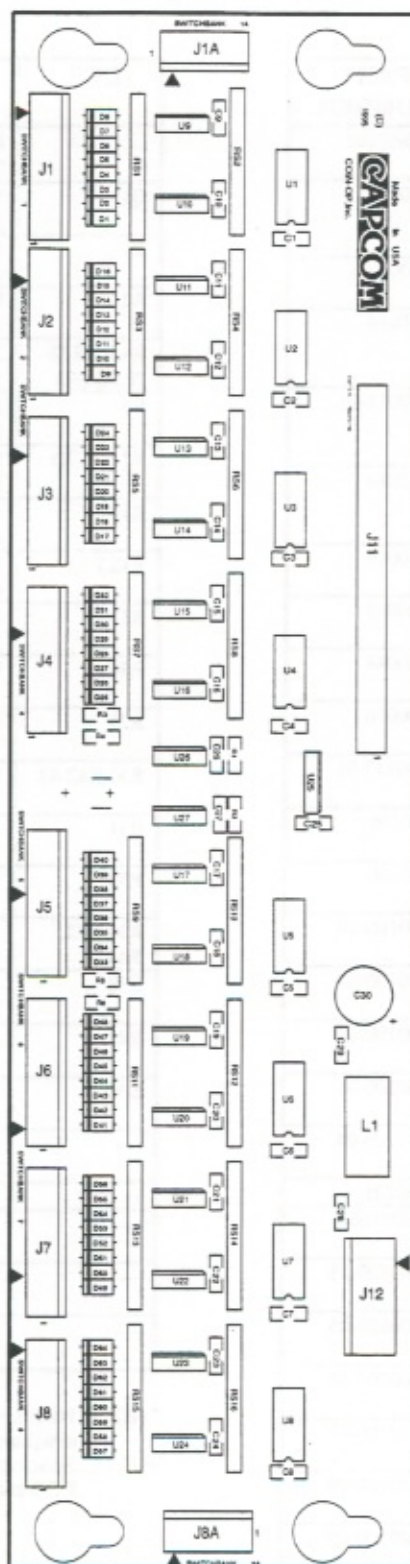
| DES.                    | DESCRIPTION                              | PART NUMBER |
|-------------------------|------------------------------------------|-------------|
| LED1-14                 | LED LTL4501 RED 20MA<br>T-1 70°          | DI00105     |
| Q1                      | VOLTAGE REGULATOR<br>5A LOW DROP ADJ     | *VR00100    |
| R1                      | RESISTOR CARBON<br>FILM 1/4W 5% 330 OHM  | RS00100-12  |
| R2-3                    | RESISTOR CARBON<br>FILM 1/2W 5% 1.5K OHM | RS00101-09  |
| R4,R9,R18-<br>20,R22-23 | RESISTOR MOF 2W 5%<br>5.6K OHM           | RS00114     |
| R6                      | RESISTOR CARBON<br>FILM 1/4W 5% 820 OHM  | RS00100-30  |
| R8,R21,R5               | RESISTOR CARBON<br>FILM 1/2W 5% 1.2K OHM | RS00102-11  |
| R10-11                  | RESISTOR MOF 2W 5%<br>620 OHM            | RS00114-01  |
| R12,R14                 | RESISTOR MOF 2W 5%<br>6.2K OHM           | RS00114-02  |
| R13                     | RESISTOR MOF 2W 5%<br>270 OHM            | RS00114-03  |
| R24                     | RESISTOR METAL FILM<br>1/4W 1% 121 OHM   | RS00113-01  |
| R25                     | RESISTOR METAL FILM<br>1/4W 1% 374 OHM   | RS00113     |
| R30,R42-43              | RESISTOR METAL FILM<br>1/4W 1% 11K OHM   | RS00113-02  |
| R31                     | RESISTOR METAL FILM<br>1/4W 1% 56.2K OHM | RS00113-10  |
| R33                     | RESISTOR METAL FILM<br>1/4W 1% 2K OHM    | RS00113-03  |
| R36,R32,<br>R44         | RESISTOR CARBON<br>FILM 1/4W 5% 3.3K OHM | RS00100-27  |
| R38                     | RESISTOR CARBON<br>FILM 1/4W 5% 27K OHM  | RS00100-40  |
| R41                     | RESISTOR CARBON<br>FILM 1/4W 5% 1K OHM   | RS00100-05  |
| U30                     | IC LM339 VOLTAGE<br>COMPARATOR           | IC00036     |
| ----                    | MACHINE SCREW 6-32 X<br>1/2 PPH SEMS ZC  | SC00100-04  |
| ---                     | NUT 6-32 HEX KEPS                        | NT00101-06  |
| ----                    | HEAT SINK 1.5 X 4.5<br>EXTRUSION         | *HS00105    |
| ----                    | MACHINE SCREW 6-32 X<br>3/4 PPH SEMS ZC  | SC00100-06  |
| ----                    | CIRCUIT BOARD<br>SUPPORT                 | PL00287-05  |

\* NOTE: Heat sink compound should be applied to ALL heat sink/semi-conductor surfaces

+NOTE: Spacing between the bottom of the bridge and the PCB shall be 1/4".



## SWITCH BOARD



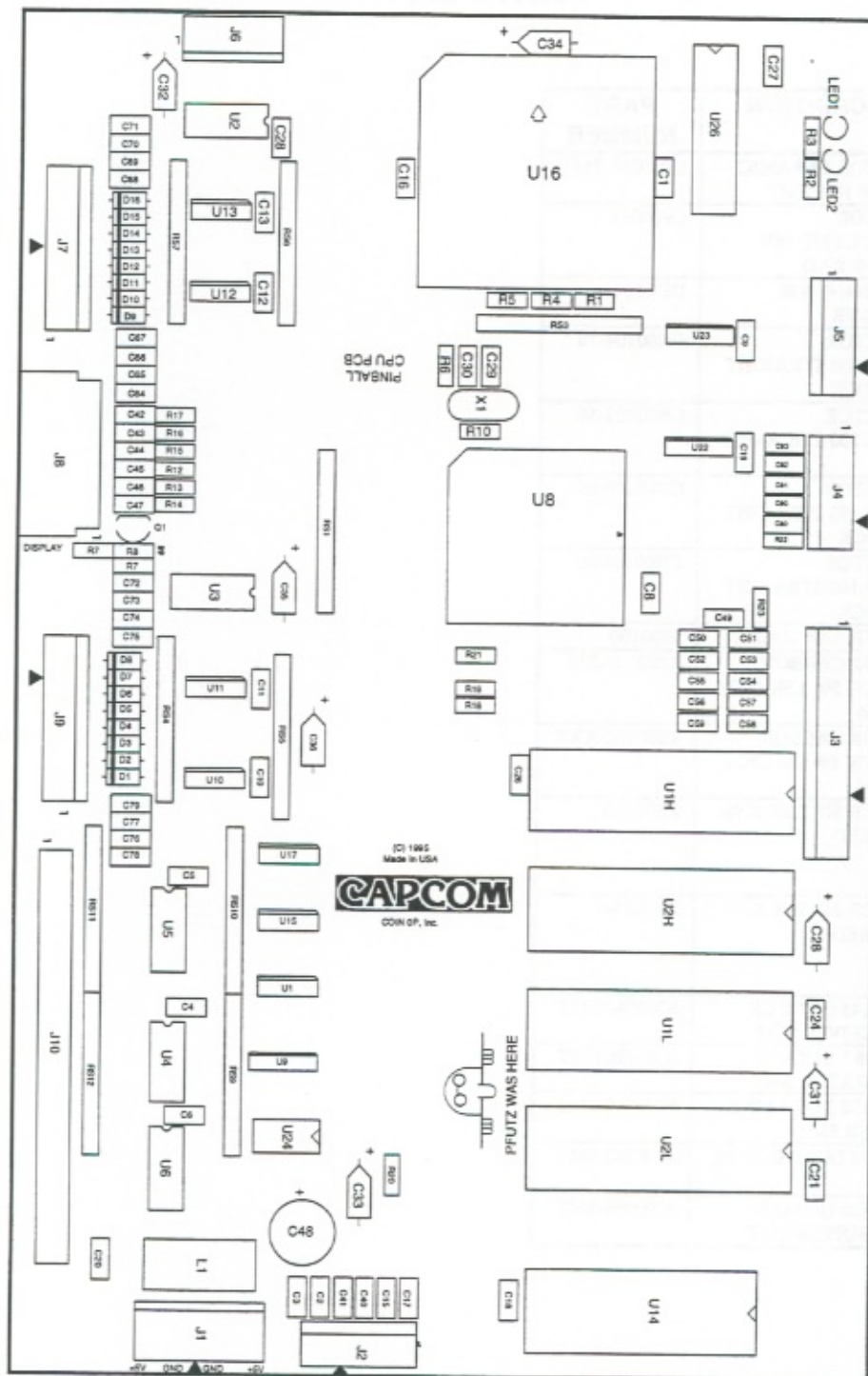
## SWITCH BOARD ASSEMBLY A0015302

### PARTS LIST

| DES.                                           | DESCRIPTION                                          | PART NUMBER |
|------------------------------------------------|------------------------------------------------------|-------------|
| C1-29                                          | CAPACITOR CERAMIC<br>50V 0.1UF 10% SMT               | CP00019-SMT |
| C30                                            | CAPACITOR<br>ELECTROLYTIC 16V<br>470UF 20% RAD       | CP00054     |
| D1-64                                          | DIODE 1N4148 SW<br>200MA 75VR                        | DI00104     |
| J1-8                                           | CONNECTOR<br>HEADER.100 STRAIGHT<br>10-PIN LOCK      | CN00104-10  |
| J11                                            | CONNECTOR<br>HEADER.100 STR 50-PIN<br>2X25           | CN00101-50  |
| J12                                            | CONNECTOR<br>HEADER.156 STRAIGHT<br>5-PIN LOCK       | CN00100-05  |
| J1A,J8A-1                                      | CONNECTOR<br>HEADER.100 STRAIGHT<br>6-PIN LOCK       | CN00104-06  |
| L1                                             | IND 4.7UH 3.4A 15%AX                                 | IN00100     |
| R1-2,R4,<br>R6                                 | RESISTOR CARBON<br>FILM 1/8W 5% 3.3K OHM<br>SMT 1206 | RS00102-27S |
| R3,R5                                          | RESISTOR CARBON<br>FILM 1/8W 5% 620 OHM<br>SMT 1206  | RS00102-XXX |
| RS1,RS3,<br>RS5,RS7,<br>RS9,RS11,<br>RS13,RS15 | RESISTOR SIP 2.2K X 9R<br>2% BUSSED                  | RS00103     |
| RS2,RS4,<br>RS6,RS8,<br>RS10,RS12<br>RS14,RS16 | RESISTOR SIP 10K X 9R<br>2% BUSSED                   | RS00104     |
| U1-8                                           | IC 74LS245 OCT BUS<br>TRANSCIEVER SMT                | IC00044-SMT |
| U9-24                                          | IC LM339 VOLTAGE<br>COMPARATOR SMT                   | IC00036-SMT |
| U25                                            | IC 74LS138 3 OF 8 LINE<br>DECODER SMT                | IC00047-SMT |
| U26                                            | IC 74LS74 DUAL D-TYPE<br>FF SMT                      | IC00042-SMT |
| U27                                            | IC 74LS126 QUAD 3-<br>STATE BUFFER SMT               | IC00099-SMT |



## CPU BOARD



## CPU BOARD ASSEMBLY A0015404

### PARTS LIST

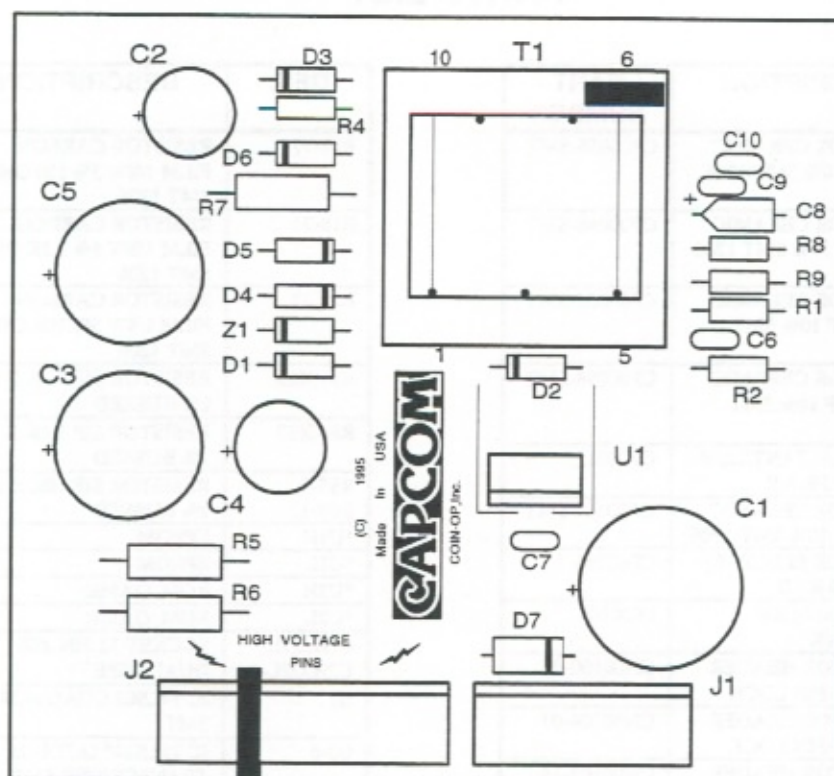
| DES.                                    | DESCRIPTION                                          | PART NUMBER |
|-----------------------------------------|------------------------------------------------------|-------------|
| C1,C8,C16,<br>C18,C20-21,<br>C24,C26-27 | CAPACITOR CERAMIC<br>50V .1UF 10% SMT 1206           | CP00056-SMT |
| C2-6, C9,<br>C19,C23,<br>C24,C64-79     | CAPACITOR CERAMIC<br>50V .01UF 10% SMT 1206          | CP00048-SMT |
| C10-13                                  | CAPACITOR CERAMIC<br>50V .001UF 10% SMT<br>1206      | CP00055-SMT |
| C15,C17,<br>C40-41,<br>C49-63,C80       | CAPACITOR CERAMIC<br>100V 100PF 10% SMT<br>1206      | CP00058-SMT |
| C28,C31-36                              | CAPACITOR TANTILUM<br>35V 1.0UF 5% AX                | CP00012     |
| C29-30,<br>C42-47                       | CAPACITOR CERAMIC<br>100V 10PF 10% SMT 1206          | CP00017-SMT |
| C48                                     | CAPACITOR ELECT 16V<br>470UF 20% RAD                 | CP00054     |
| D1-16                                   | DIODE 1N4148 SW<br>200MA 75VR                        | DI00104     |
| J1                                      | CONNECTOR HEADER<br>.156 STR 5-PIN LOCK              | CN00100-05  |
| J2,J4                                   | CONNECTOR HEADER<br>.100 STR 7-PIN LOCK              | CN00104-07  |
| J3                                      | CONNECTOR HEADER<br>.100 STR 14-PIN LOCK             | CN00104-14  |
| J6                                      | CONNECTOR HEADER<br>.100 STR 6-PIN LOCK              | CN00104-06  |
| J7,J9                                   | CONNECTOR HEADER<br>.100 STR 10-PIN LOCK             | CN00104-10  |
| J8                                      | CONNECTOR HEADER<br>.100 RT 14-PIN 2X7 4W            | CN00137-14  |
| J10                                     | CONNECTOR HEADER<br>.100 STR 50-PIN 2X25             | CN00101-50  |
| L1                                      | IND 4.7UH 3.4A 15% AX                                | IN00100     |
| LED1-2                                  | LED LTL4201 RED 20MA<br>T-1 70°                      | DI00105     |
| Q1                                      | TRANSISTOR 2N3904<br>NPN G.P. AMP                    | TR00106     |
| R1,R10                                  | RESISTOR CARBON<br>FILM 1/8W 5% 33 OHM<br>SMT 1206   | RS00102-41S |
| R2-3                                    | RESISTOR CARBON<br>FILM 1/8W 5% 270 OHM<br>SMT 1206  | RS00102-03S |
| R4-7                                    | RESISTOR CARBON<br>FILM 1/8W 5% 4.7K OHM<br>SMT 1206 | RS00102-26S |
| R8                                      | RESISTOR CARBON<br>FILM 1/8W 5% 1K OHM<br>SMT 1206   | RS00102-05S |
| R9                                      | RESISTOR CARBON<br>FILM 1/8W 5% 1.2K OHM<br>SMT 1206 | RS00102-08S |

| DES.                  | DESCRIPTION                                          | PART NUMBER |
|-----------------------|------------------------------------------------------|-------------|
| R12-17                | RESISTOR CARBON<br>FILM 1/8W 5% 100 OHM<br>SMT 1206  | RS00102-02S |
| R18-21                | RESISTOR CARBON<br>FILM 1/8W 5% 3.3K OHM<br>SMT 1206 | RS00102-27S |
| R22-23                | RESISTOR CARBON<br>FILM 1/8W 5% 10K OHM<br>SMT 1206  | RS00102-07S |
| RS1,RS3               | RESISTOR SIP 4.7K X 9R<br>2% BUSSED                  | RS00111     |
| RS4,RS7               | RESISTOR SIP 1.2K X 9R<br>2% BUSSED                  | RS00103     |
| RS5-6,<br>RS9-12      | RESISTOR SIP 10K X 9R<br>2% BUSSED                   | RS00104     |
| *U1H                  | EPROM                                                | A-00567-U1H |
| *U1L                  | EPROM                                                | A-00567-U1L |
| *U2H                  | ROM, GAME                                            | A-00567-U2H |
| *U2L                  | ROM, GAME                                            | A-00567-U2L |
| U1H,U1L,<br>U2H,U2L-1 | SOCKET 32 PIN .600<br>DUAL WIPE                      | SK00112-32  |
| U1                    | IC 74LS02 QUAD NOR<br>SMT                            | IC00098-SMT |
| U2-6                  | IC 74LS245 OCT BUS<br>TRANSCIEVER SMT                | IC00044-SMT |
| U8                    | IC XC68306 MPU 16-BIT                                | IC00046     |
| U9                    | IC 74LF139 DUAL 2-4<br>DECODER SMT                   | IC00117-SMT |
| U10-13                | IC LM339 VOLTAGE<br>COMPARATOR SMT                   | IC00036-SMT |
| U14                   | IC SRAM 8K X 8 100NS<br>BAT                          | IC00035     |
| U15                   | IC 74LS14 HEX SCHMITT<br>TRIG SMT                    | IC00063-SMT |
| U16                   | SOCKET IC 84-PIN PLCC                                | SK00101-84  |
| U16                   | ACTEL 1020<br>PROGRAMMED                             | IC00106     |
| U17                   | IC 74LS74 DUAL D-TYPE<br>FF SMT                      | IC00042-SMT |
| U22-23                | IC 74LS257 QUAD 2-IN<br>MUX SMT                      | IC00045-SMT |
| U24                   | IC MAX699 RESET CHIP                                 | IC00097     |
| U25                   | IC DRAM 256K X 16<br>100NS                           | IC00074-SMT |
| X1                    | CRYSTAL 16.67 MHZ                                    | CR00103     |

\*NOTE: Game ROMs are not included with A0015404:  
Must be purchased separately.



## DISPLAY POWER SUPPLY BOARD A0015505



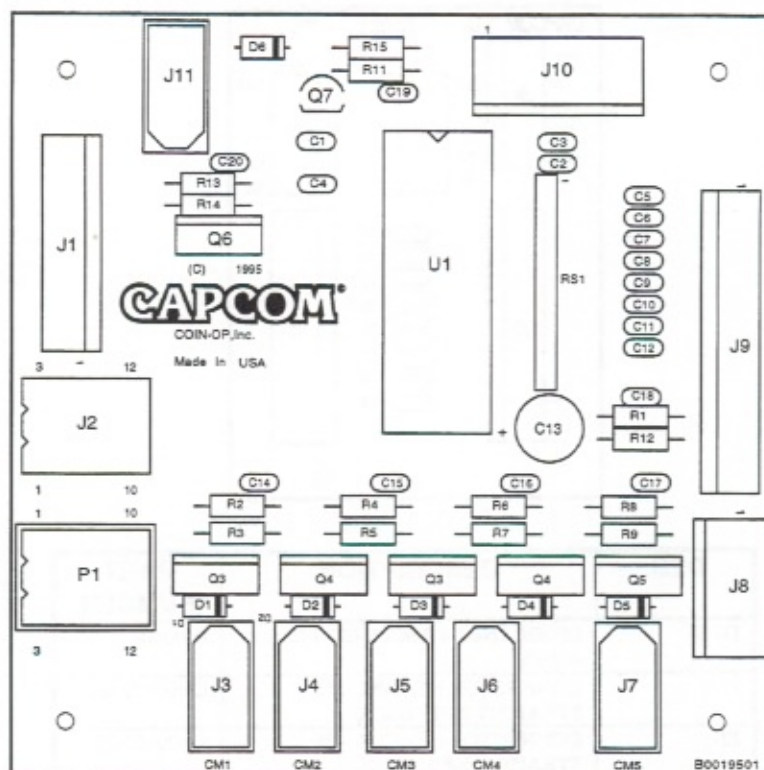
B0015505

| DES.   | DESCRIPTION                                  | PART NUMBER |
|--------|----------------------------------------------|-------------|
| *C1    | CAPACITOR ELECTROLYTIC<br>25V 4700UF 20% RAD | CP00020     |
| *C2    | CAPACITOR ELECTROLYTIC<br>25V 220UF 20% RAD  | CP00041     |
| *C3,C5 | CAPACITOR ELECTROLYTIC<br>160V 47UF 20% RAD  | CP00034     |
| *C4    | CAPACITOR ELECTROLYTIC<br>200V 6.8UF 20% RAD | CP00042     |
| C7     | CAPACITOR CERAMIC 50V<br>.1UF 10% AX         | CP00019     |
| C8     | CAPACITOR TANTILUM 35V<br>1.0UF 5% AX        | CP00012     |
| D1-3   | DIODE 1N5819 1A 40V<br>SCHOTTKY              | DI00108     |
| D4-6   | DIODE MUR160 1A 600V<br>ULTRA FAST RECOVERY  | DI00113     |
| D7     | DIODE, 1N5402 RECTIFIER<br>3.0A 200vR        | DI00106     |
| HS1    | HEAT SINK TO220 0.5 X<br>0.75W               | HS00103     |
| J1     | CONNECTOR HEADER .156<br>STR 6-PIN LOCK      | CN00100-06  |
| J2     | CONNECTOR HEADER .156<br>STR 8 PIN LOCK      | CN00100-08  |

| DES. | DESCRIPTION                              | PART NUMBER |
|------|------------------------------------------|-------------|
| R1   | RESISTOR METAL FILM<br>1/4W 1% 64.9K OHM | RS00113-04  |
| R2   | RESISTOR METAL FILM<br>1/4W 1% 1.24K OHM | RS00113-05  |
| R4   | RESISTOR CARBON FILM<br>1/4W 5% 1.5K OHM | RS00100-09  |
| R5   | RESISTOR CARBON FILM<br>1/2W 5% 47K OHM  | RS00100-20  |
| R6   | RESISTOR CARBON FILM<br>1.0W 5% 15K OHM  | RS00112-03  |
| R7   | RESISTOR CARBON FILM<br>1/2W 5% 12K OHM  | RS00100-18  |
| R8   | RESISTOR CARBON FILM<br>1/4W 5% 330 OHM  | RS00100-12  |
| T1   | XFMR FLYBACK 47UH 30VA<br>13-23VDC       | XF00103     |
| U1   | SWITCHING REGULATOR<br>LT1271CT HI EFF   | IC00082     |
| Z1   | DIODE 1N4748 ZENER 1W<br>22V             | DI00110     |

\* CAPS: C1-C5 are special capacitors for switching power supplies, they are low impedance, high ripple current capacitors.

## INTERFACE BOARD ASSEMBLY A0019501

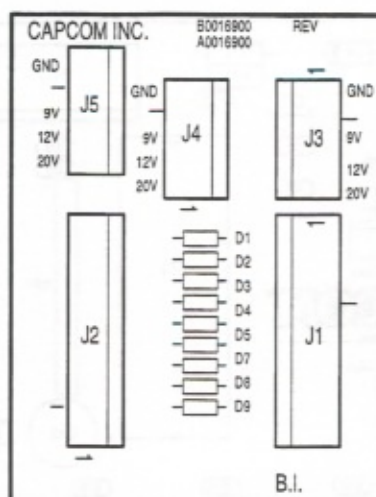


| DES.      | DESCRIPTION                                | PART NUMBER |
|-----------|--------------------------------------------|-------------|
| C1-4      | CAPACITOR CERAMIC 50V .22UF 10% AX         | CP00024     |
| C5-12     | CAPACITOR CERAMIC 100V 100PF 10% AX        | CP00058     |
| C13       | CAPACITOR ELECTROLYTIC 100UF 25V 20% RAD   | CP00067     |
| C14-20    | CAPACITOR CERAMIC 50V .1UF 10% AX          | CP00019     |
| D1-6      | DIODE 1N4004 RECTIFIER 1.0A 400vR          | DI00100     |
| J1        | CONNECTOR HEADER .100 STRAIGHT 10-PIN LOCK | CN00104-10  |
| J2        | CONNECTOR .062, 12-PIN FEMALE, RECEPTACLE  | CN00111-12  |
| J3-7, J11 | CONNECTOR, .062, 3-PIN FEMALE, RECEPTACLE  | CN00112-03  |
| J8        | CONNECTOR HEADER .156 STRAIGHT 4-PIN LOCK  | CN00100-04  |
| J9        | CONNECTOR HEADER .100 STRAIGHT 14-PIN LOCK | CN00104-14  |

| DES.                | DESCRIPTION                               | PART NUMBER |
|---------------------|-------------------------------------------|-------------|
| J10                 | CONNECTOR HEADER .156 STRAIGHT 5-PIN LOCK | CN00100-05  |
| P1                  | CONNECTOR .062, 12-PIN MALE, PLUG         | CN00112-12  |
| P1                  | TERMINAL MALE PC TAIL .062                | CN00139-M   |
| R1, R11-14          | RESISTOR CARBON FILM 1/4W 5% 10K OHM      | RS00100-07  |
| R2, R4, R6, R8, R15 | RESISTOR CARBON FILM 1/4W 5% 4.7K OHM     | RS00100-26  |
| R3, R5, R7, R9      | RESISTOR CARBON FILM 1/4W 5% 12K OHM      | RS00100-18  |
| RS1                 | RESISTOR SIP 10K X 9R 5% BUSSED           | RS00103     |
| Q1-4                | TRANSISTOR TIP-107 PNP                    | TR00103     |
| Q5-6                | TRANSISTOR TIP-102 NPN                    | TR00102     |
| Q7                  | TRANSISTOR 2N3906 PNP                     | TR00108     |
| U1                  | IC LT1337ACN 5V RS232 DRIVER              | IC00114     |

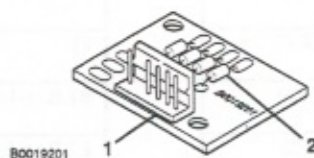


## DIODE BOARD A0016900



| DES. | DESCRIPTION                               | PART NUMBER |
|------|-------------------------------------------|-------------|
| D1-9 | DIODE 1N4004 RECTIFIER 1.0A 400VR         | DI00100     |
| J1-2 | CONNECTOR HEADER .156 STRAIGHT 9-PIN LOCK | CN00100-09  |
| J3-5 | CONNECTOR HEADER .156 STRAIGHT 5-PIN LOCK | CN00100-05  |

## STAR BUMPER DIODE BOARD A0019201

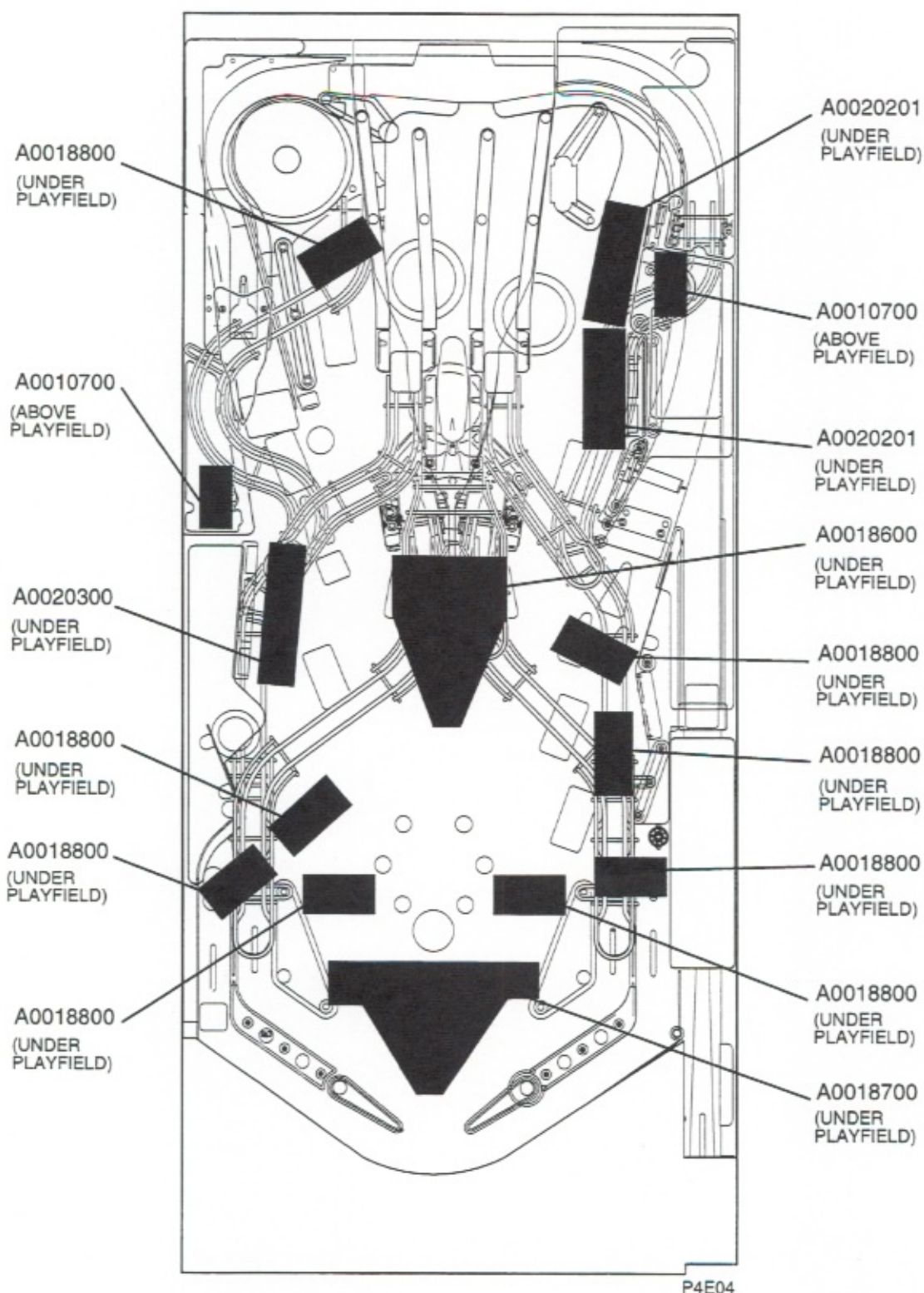


| NO.   | DESCRIPTION                    | PART NUMBER |
|-------|--------------------------------|-------------|
| ----- | ASSEMBLY, PCB, STAR BUMPER     | A0019201    |
| 1     | CONNECTOR HEADER .156 STRAIGHT | CN00100-06  |
| 2     | DIODE, 1N4004, RECTIFIER       | DI00100     |

## NOTES

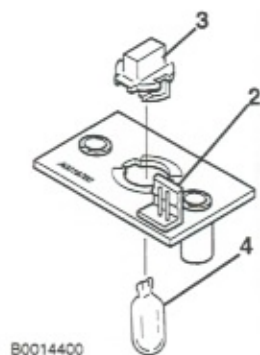


## LAMP BOARD IDENTIFICATION

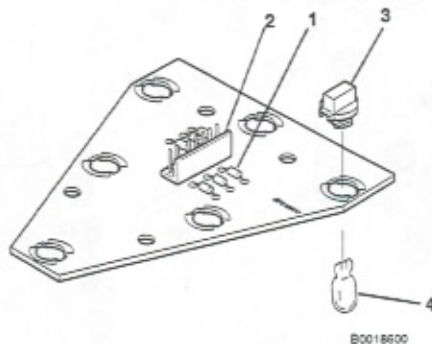


## LAMP BOARD ASSEMBLIES

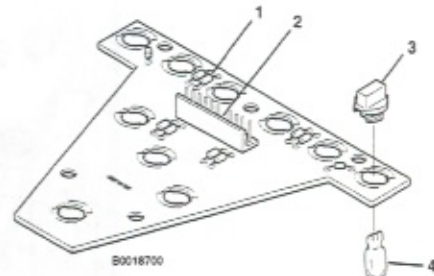
A0010700



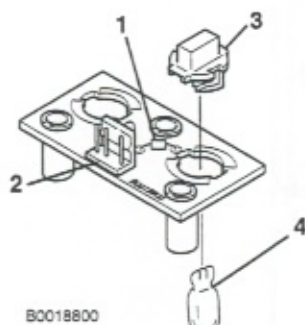
A0018600



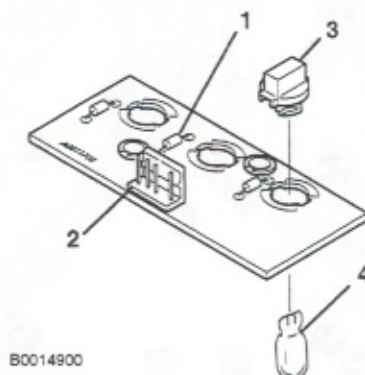
A0018700



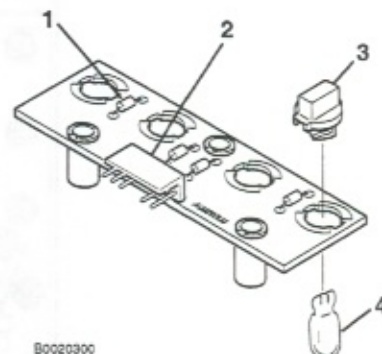
A0018800



A0020201



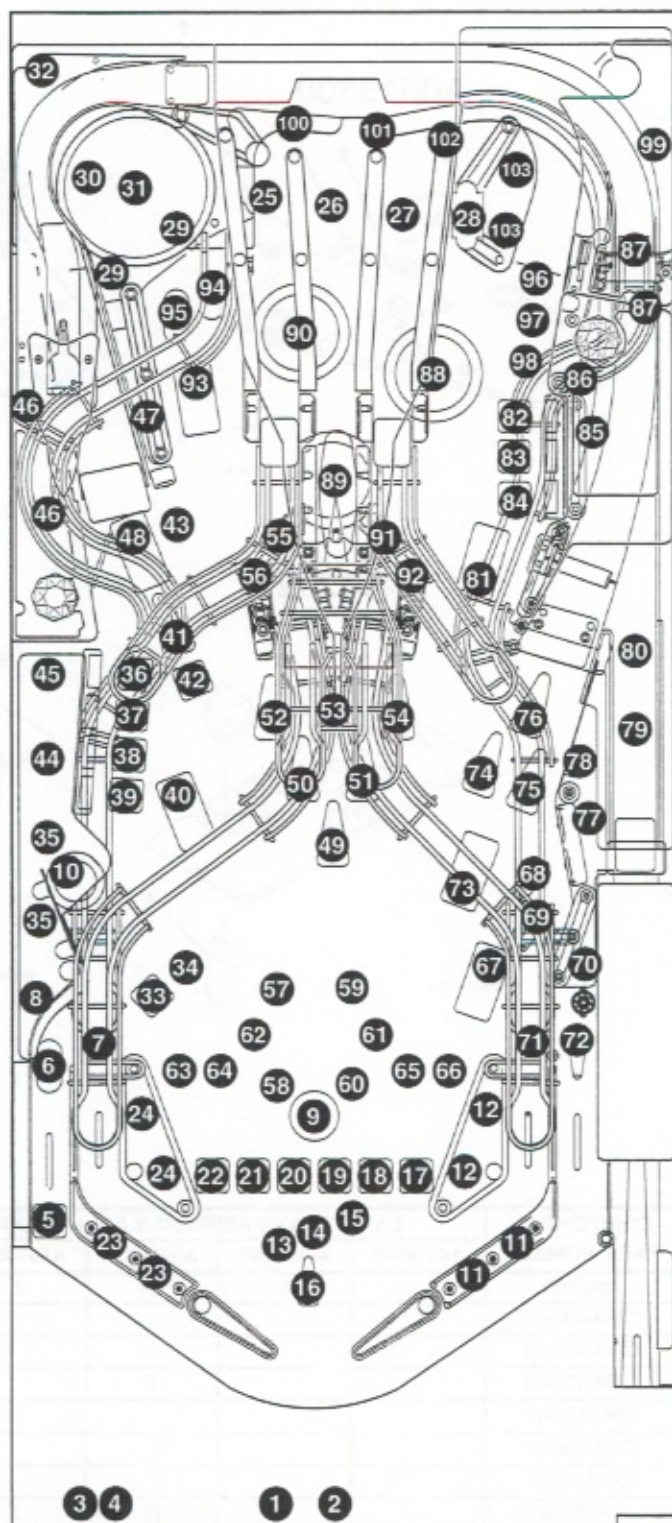
A0020300



| REF. | DESCRIPTION             | COMPONENT<br>PART NUMBER | LAMP BOARD ASSEMBLY P/N AND COMPONENT PART QTY. |          |          |          |          |          |
|------|-------------------------|--------------------------|-------------------------------------------------|----------|----------|----------|----------|----------|
|      |                         |                          | A0010700                                        | A0018600 | A0018700 | A0018800 | A0020201 | A0020300 |
| 1    | DIODE, IN4004 RECTIFIER | DI00100                  |                                                 | 6        | 10       | 2        | 3        | 4        |
| 2    | CONNECTOR, HEADER       | CN00100-03               | 1                                               |          |          |          |          |          |
| 2    | CONNECTOR, HEADER       | CN00100-08               |                                                 | 1        |          |          |          |          |
| 2    | CONNECTOR, HEADER       | CN00100-10               |                                                 |          | 1        |          |          |          |
| 2    | CONNECTOR, HEADER       | CN00100-04               |                                                 |          |          | 1        |          |          |
| 2    | CONNECTOR, HEADER       | CN00100-05               |                                                 |          |          |          | 1        |          |
| 2    | CONNECTOR, HEADER       | CN00100-06               |                                                 |          |          |          |          | 1        |
| 3    | SOCKET, LAMP            | SK00102                  |                                                 | 6        | 10       | 2        | 3        | 4        |
| 3    | SOCKET, LAMP            | SK00103                  | 1                                               |          |          |          |          |          |
| 4    | LAMP, #555, 6.3V WEDGE  | LP00100                  |                                                 | 6        | 10       | 2        | 3        | 4        |
| 4    | LAMP, #906, 13V WEDGE   | LP00101                  | 1                                               |          |          |          |          |          |



## PLAYFIELD LAMPS



P4E02



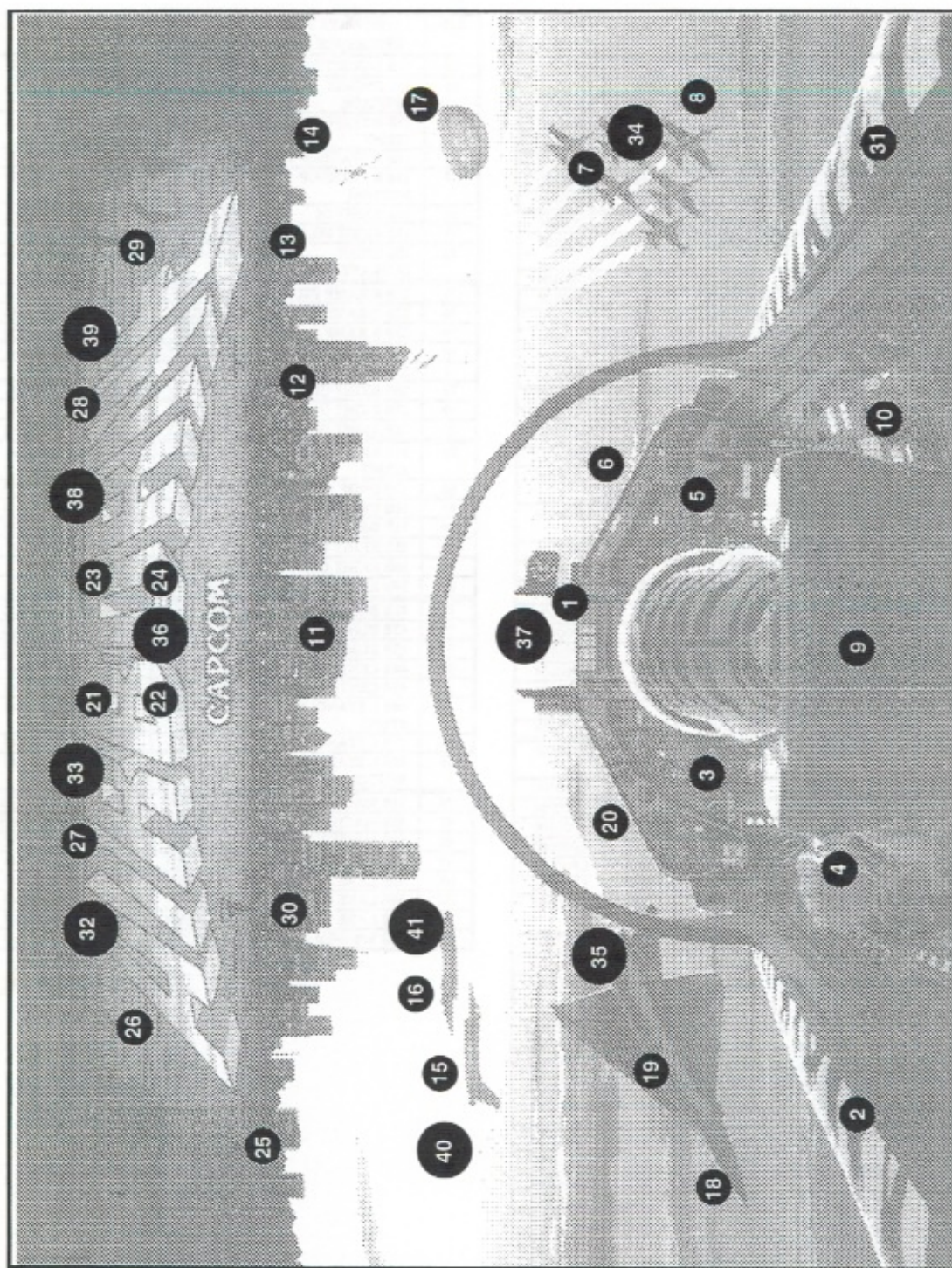
## PLAYFIELD LAMPS

| REF | SOFTWARE TEST<br>REFERENCE C1-04 | WIRE COLOR |         | BULB | PART<br>NUMBER |
|-----|----------------------------------|------------|---------|------|----------------|
|     |                                  | COLUMN     | ROW     |      |                |
| 1   | 11A COIN DOOR 1&2                | YEL/GRY    | RED/BRN | 259  | LP00113        |
| 2   | 12A COIN DOOR 3&4                | YEL/GRY    | RED/BLK | 259  | LP00113        |
| 3   | 13A START                        | YEL/GRY    | RED/ORG | 555  | LP00100        |
| 4   | 14A BUYIN                        | YEL/GRY    | RED/YEL | 555  | LP00100        |
| 5   | 15A EJECT LOCK                   | YEL/GRY    | RED/GRN | 44   | LP00104        |
| 6   | 16A LEFT OUTLANE                 | YEL/GRY    | RED/BLU | 555  | LP00100        |
| 7   | 17A LEFT INLANE                  | YEL/GRY    | RED/VIO | 555  | LP00100        |
| 8   | 18A LEFT GI 1                    | YEL/GRY    | RED/GRY | 44   | LP00104        |
| 9   | 21A NIGHT FLYING                 | YEL/RED    | RED/BRN | 44   | LP00104        |
| 10  | 22A LEFT GI 2<br>(SAUCER)        | YEL/RED    | RED/BLK | 44   | LP00104        |
| 11  | 23A R LANE GI 1&2                | YEL/RED    | RED/ORG | 44   | LP00104        |
| 12  | 24A R SLING GI 1&2               | YEL/RED    | RED/YEL | 44   | LP00104        |
| 13  | 25A BONUS 2X                     | YEL/RED    | RED/GRN | 555  | LP00100        |
| 14  | 26A BONUS 3X                     | YEL/RED    | RED/BLU | 555  | LP00100        |
| 15  | 27A BONUS 5X                     | YEL/RED    | RED/VIO | 555  | LP00100        |
| 16  | 28A FLY AGAIN                    | YEL/RED    | RED/GRY | 555  | LP00100        |
| 17  | 31A RANK ACE                     | YEL/ORG    | RED/BRN | 555  | LP00100        |
| 18  | 32A RANK COLONEL                 | YEL/ORG    | RED/BLK | 555  | LP00100        |
| 19  | 33A RANK MAJOR                   | YEL/ORG    | RED/ORG | 555  | LP00100        |
| 20  | 34A RANK CAPTAIN                 | YEL/ORG    | RED/YEL | 555  | LP00100        |
| 21  | 35A RANK<br>LIEUTENANT           | YEL/ORG    | RED/GRN | 555  | LP00100        |
| 22  | 36A RANK<br>SERGEANT             | YEL/ORG    | RED/BLU | 555  | LP00100        |
| 23  | 37A L LANE GI 1&2                | YEL/ORG    | RED/VIO | 44   | LP00104        |
| 24  | 38A SLING GI 1&2                 | YEL/ORG    | RED/GRY | 44   | LP00104        |
| 25  | 41A JET LANE GI 1                | YEL/BLK    | RED/BRN | 44   | LP00104        |
| 26  | 42A JET LANE GI 2                | YEL/BLK    | RED/BLK | 44   | LP00104        |
| 27  | 43A JET LANE GI 3                | YEL/BLK    | RED/ORG | 44   | LP00104        |
| 28  | 44A JET LANE GI 4                | YEL/BLK    | RED/YEL | 44   | LP00104        |
| 29  | 45A TOWER GI 1&2                 | YEL/BLK    | RED/GRN | 44   | LP00104        |
| 30  | 46A LEFT GI 9                    | YEL/BLK    | RED/BLU | 44   | LP00104        |
| 31  | 47A TOWER TOP                    | YEL/BLK    | RED/VIO | 44   | LP00104        |
| 32  | 48A LEFT GI 10                   | YEL/BLK    | RED/GRY | 44   | LP00104        |
| 33  | 51A LEFT SAUCER<br>LOCK          | YEL/GRN    | RED/BRN | 555  | LP00100        |
| 34  | 52A EXTRA BALL                   | YEL/GRN    | RED/BLK | 555  | LP00100        |
| 35  | 53A LEFT GI 3                    | YEL/GRN    | RED/ORG | 44   | LP00104        |
| 36  | 54A DROP S                       | YEL/GRN    | RED/YEL | 555  | LP00100        |
| 37  | 55A DROP H                       | YEL/GRN    | RED/GRN | 555  | LP00100        |
| 38  | 56A DROP O                       | YEL/GRN    | RED/BLU | 555  | LP00100        |
| 39  | 57A DROP W                       | YEL/GRN    | RED/VIO | 555  | LP00100        |
| 40  | 58A LEFT DROP<br>STUNT           | YEL/GRN    | RED/GRY | 44   | LP00104        |
| 41  | 61A TOWER FLYBY                  | YEL/BLU    | RED/BRN | 44   | LP00104        |
| 42  | 62A BACK LOCK                    | YEL/BLU    | RED/BLK | 44   | LP00104        |
| 43  | 63A LEFT RAMP<br>STANDUP         | YEL/BLU    | RED/ORG | 44   | LP00104        |
| 44  | 64A LEFT GI 4                    | YEL/BLU    | RED/YEL | 44   | LP00104        |
| 45  | 65A LEFT GI 5                    | YEL/BLU    | RED/GRN | 44   | LP00104        |
| 46  | 66A LEFT GI 6&7                  | YEL/BLU    | RED/BLU | 44   | LP00104        |
| 47  | 67A LEFT GI 8                    | YEL/BLU    | RED/VIO | 44   | LP00104        |
| 48  | 68A LEFT RAMP<br>STUNT           | YEL/BLU    | RED/GRY | 44   | LP00104        |
| 49  | 71A ANGEL 6                      | YEL/VIO    | RED/BRN | 555  | LP00100        |
| 50  | 72A ANGEL 4                      | YEL/VIO    | RED/BLK | 555  | LP00100        |
| 51  | 73A ANGEL 5                      | YEL/VIO    | RED/ORG | 555  | LP00100        |
| 52  | 74A ANGEL 1                      | YEL/VIO    | RED/YEL | 555  | LP00100        |
| 53  | 75A ANGEL 2                      | YEL/VIO    | RED/GRN | 555  | LP00100        |
| 54  | 76A ANGEL 3                      | YEL/VIO    | RED/BLU | 555  | LP00100        |
| 55  | 77A CENTER GI 3                  | YEL/VIO    | RED/VIO | 44   | LP00104        |
| 56  | 78A CENTER GI 4                  | YEL/VIO    | RED/GRY | 44   | LP00104        |
| 57  | 81A ENGLAND                      | YEL/GRY    | RED/BRN | 44   | LP00104        |
| 58  | 82A SPAIN                        | YEL/GRY    | RED/BLK | 44   | LP00104        |
| 59  | 83A GERMANY                      | YEL/GRY    | RED/ORG | 44   | LP00104        |
| 60  | 84A ITALY                        | YEL/GRY    | RED/YEL | 44   | LP00104        |
| 61  | 85A FRANCE                       | YEL/GRY    | RED/GRN | 44   | LP00104        |
| 62  | 86A USA                          | YEL/GRY    | RED/BLU | 44   | LP00104        |
| 63  | 87A COPILOT                      | YEL/GRY    | RED/VIO | 555  | LP00100        |
| 64  | 88A REFUEL                       | YEL/GRY    | RED/GRY | 555  | LP00100        |

| REF | SOFTWARE TEST<br>REFERENCE C1-04 | WIRE COLOR |         | BULB | PART<br>NUMBER |
|-----|----------------------------------|------------|---------|------|----------------|
|     |                                  | COLUMN     | ROW     |      |                |
| 65  | 11B TARGETING                    | BLU/BRN    | ORG/BRN | 555  | LP00100        |
| 66  | 12B ENGINE<br>UPGRADE            | BLU/BRN    | ORG/RED | 555  | LP00100        |
| 67  | 13B R STANDUP<br>STUNT           | BLU/BRN    | ORG/BLK | 44   | LP00104        |
| 68  | 14B R STANDUP TOP                | BLU/BRN    | ORG/YEL | 555  | LP00100        |
| 69  | 15B R STANDUP<br>BOTTOM          | BLU/BRN    | ORG/GRN | 555  | LP00100        |
| 70  | 16B RIGHT GI                     | BLU/BRN    | ORG/BLU | 44   | LP00104        |
| 71  | 17B RIGHT INLANE                 | BLU/BRN    | ORG/VIO | 555  | LP00100        |
| 72  | 18B RIGHT<br>OUTLANE             | BLU/BRN    | ORG/GRY | 555  | LP00100        |
| 73  | 21B R RAMP STUNT                 | BLU/RED    | ORG/BRN | 44   | LP00104        |
| 74  | 22B R RAMP 1                     | BLU/RED    | ORG/RED | 555  | LP00100        |
| 75  | 23B R RAMP 2                     | BLU/RED    | ORG/BLK | 555  | LP00100        |
| 76  | 24B R RAMP 3                     | BLU/RED    | ORG/YEL | 44   | LP00104        |
| 77  | 25B RIGHT GI 2                   | BLU/RED    | ORG/GRN | 44   | LP00104        |
| 78  | 26B RIGHT GI 3                   | BLU/RED    | ORG/BLU | 44   | LP00104        |
| 79  | 27B RIGHT GI 4                   | BLU/RED    | ORG/VIO | 44   | LP00104        |
| 80  | 28B RIGHT GI 5                   | BLU/RED    | ORG/GRY | 44   | LP00104        |
| 81  | 31B RIGHT DROP<br>STUNT          | BLU/ORG    | ORG/BRN | 44   | LP00104        |
| 82  | 32B DROP A                       | BLU/ORG    | ORG/RED | 555  | LP00100        |
| 83  | 33B DROP I                       | BLU/ORG    | ORG/BLK | 555  | LP00100        |
| 84  | 34B DROP R                       | BLU/ORG    | ORG/YEL | 555  | LP00100        |
| 85  | 35B RIGHT GI 6                   | BLU/ORG    | ORG/GRN | 44   | LP00104        |
| 86  | 36B RIGHT GI 7                   | BLU/ORG    | ORG/BLU | 44   | LP00104        |
| 87  | 37B RIGHT GI 8&9                 | BLU/ORG    | ORG/VIO | 44   | LP00104        |
| 88  | 41B BUMPER R                     | BLU/YEL    | ORG/BRN | 555  | LP00100        |
| 89  | 42B BUMPER C                     | BLU/YEL    | ORG/RED | 555  | LP00100        |
| 90  | 43B BUMPER L                     | BLU/YEL    | ORG/BLK | 555  | LP00100        |
| 91  | 44B CENTER GI 1                  | BLU/YEL    | ORG/YEL | 44   | LP00104        |
| 92  | 45B CENTER GI 2                  | BLU/YEL    | ORG/GRN | 44   | LP00104        |
| 93  | 46B L STANDUP<br>STUNT           | BLU/YEL    | ORG/BLU | 44   | LP00104        |
| 94  | 47B L STANDUP TOP                | BLU/YEL    | ORG/VIO | 44   | LP00104        |
| 95  | 48B L STANDUP<br>BOTTOM          | BLU/YEL    | ORG/GRY | 44   | LP00104        |
| 96  | 51B MACH 1                       | BLU/GRN    | ORG/BRN | 555  | LP00100        |
| 97  | 52B MACH 2                       | BLU/GRN    | ORG/RED | 555  | LP00100        |
| 98  | 53B MACH 3                       | BLU/GRN    | ORG/BLK | 555  | LP00100        |
| 99  | 55B RIGHT GI 10                  | BLU/GRN    | ORG/YEL | 44   | LP00104        |
| 100 | 55B LANE J                       | BLU/GRN    | ORG/GRN | 44   | LP00104        |
| 101 | 56B LANE E                       | BLU/GRN    | ORG/BLU | 44   | LP00104        |
| 102 | 57B LANE T                       | BLU/GRN    | ORG/VIO | 44   | LP00104        |
| 103 | 58B SPINNER GI 1&2               | BLU/GRN    | ORG/GRY | 44   | LP00104        |



## BACKBOX LAMPS



P4E0100



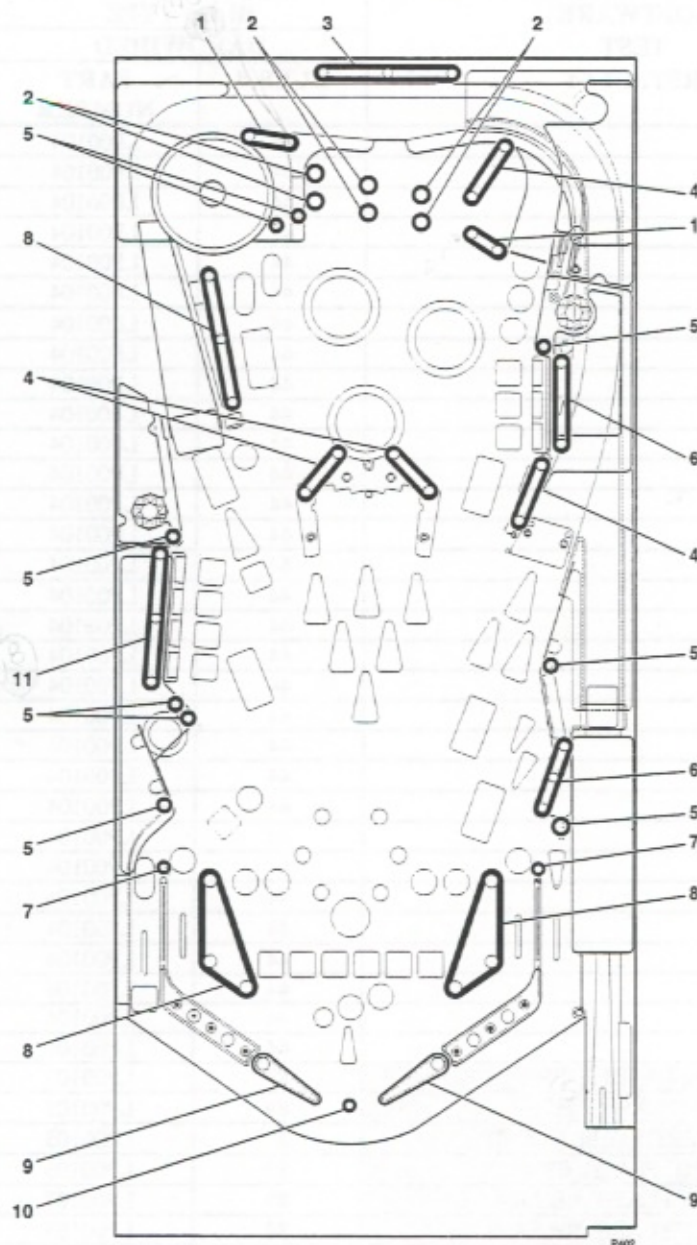
## LAMP BOARD (BACKBOX) REFERENCE &amp; PARTS LIST

| LAMP<br>BOARD<br>REF. DES. | SOFTWARE<br>TEST<br>REF. C1-04    | BULB TYPE |                | ROW DRIVER  TO LAMP |
|----------------------------|-----------------------------------|-----------|----------------|--------------------------------------------------------------------------------------------------------|
|                            |                                   | HARDWIRED |                |                                                                                                        |
|                            |                                   | BULB #    | PART<br>NUMBER |                                                                                                        |
| DIODE<br>REQUIRED          |                                   |           |                |                                                                                                        |
| 1                          | 61B - BB 21                       | 44        | LP00104        | YES                                                                                                    |
| 2                          | 62B - BB 22                       | 44        | LP00104        | YES                                                                                                    |
| 3                          | 63B - BB 23                       | 44        | LP00104        | YES                                                                                                    |
| 4                          | 64B - BB 24                       | 44        | LP00104        | YES                                                                                                    |
| 5                          | 65B - BB 25 & 26                  | 44        | LP00104        | YES                                                                                                    |
| 6                          | 65B - BB 25 & 26                  | 44        | LP00104        | YES                                                                                                    |
| 7                          | 66B - BB 27 & 28                  | 44        | LP00104        | YES                                                                                                    |
| 8                          | 66B - BB 27 & 28                  | 44        | LP00104        | YES                                                                                                    |
| 9                          | 67B - BB 29                       | 44        | LP00104        | YES                                                                                                    |
| 10                         | 68B - BB 30                       | 44        | LP00104        | YES                                                                                                    |
| 11                         | 71B - BB 11                       | 44        | LP00104        | YES                                                                                                    |
| 12                         | 72B - BB 12                       | 44        | LP00104        | YES                                                                                                    |
| 13                         | 73B - BB 13 & 14                  | 44        | LP00104        | YES                                                                                                    |
| 14                         | 73B - BB 13 & 14                  | 44        | LP00104        | YES                                                                                                    |
| 15                         | 74B - BB 14 & 15                  | 44        | LP00104        | YES                                                                                                    |
| 16                         | 74B - BB 14 & 15                  | 44        | LP00104        | YES                                                                                                    |
| 17                         | 75B - BB 17                       | 44        | LP00104        | YES                                                                                                    |
| 18                         | 76B - BB 18                       | 44        | LP00104        | YES                                                                                                    |
| 19                         | 77B - BB 19                       | 44        | LP00104        | YES                                                                                                    |
| 20                         | 78B - BB 20                       | 44        | LP00104        | YES                                                                                                    |
| 21                         | 81B - BB 1 & 2                    | 44        | LP00104        | YES                                                                                                    |
| 22                         | 81B - BB 1 & 2                    | 44        | LP00104        | YES                                                                                                    |
| 23                         | 82B - BB 3 & 4                    | 44        | LP00104        | YES                                                                                                    |
| 24                         | 82B - BB 3 & 4                    | 44        | LP00104        | YES                                                                                                    |
| 25                         | 83B - BB 5                        | 44        | LP00104        | YES                                                                                                    |
| 26                         | 84B - BB 6                        | 44        | LP00104        | YES                                                                                                    |
| 27                         | 85B - BB 7                        | 44        | LP00104        | YES                                                                                                    |
| 28                         | 86B - BB 8                        | 44        | LP00104        | YES                                                                                                    |
| 29                         | 87B - BB 9                        | 44        | LP00104        | YES                                                                                                    |
| 30                         | 88B - BB 10                       | 44        | LP00104        | YES                                                                                                    |
| 31                         | 38B - BB 31                       | 44        | LP00104        | YES                                                                                                    |
| 32                         | *S20 LEFT RAMP FLASHER, BB 1      | 89        | LP00103        | NO                                                                                                     |
| 33                         | *S21 DROP SHOW FLASH, BB 2        | 89        | LP00103        | NO                                                                                                     |
| 34                         | *S22 RIGHT LEFT STUNT FLASH, BB 3 | 89        | LP00103        | NO                                                                                                     |
| 35                         | *S23 RIGHT STAND FLASH, BB 4      | 89        | LP00103        | NO                                                                                                     |
| 36                         | *S24 RIGHT RAMP FLASH, BB 5 & 6   | 89        | LP00103        | NO                                                                                                     |
| 37                         | *S24 RIGHT RAMP FLASH, BB 5 & 6   | 89        | LP00103        | NO                                                                                                     |
| 38                         | *S25 RIGHT DROP FLASH, BB 7       | 89        | LP00103        | NO                                                                                                     |
| 39                         | *S26 RIGHT REAR FLASH, BB 8       | 89        | LP00103        | NO                                                                                                     |
| 40                         | *S28 LEFT STAND FLASH, BB 9 & 10  | 89        | LP00103        | NO                                                                                                     |
| 41                         | *S28 LEFT STAND FLASH, BB 9 & 10  | 89        | LP00103        | NO                                                                                                     |

**\*NOTE** SEE SOFTWARE TEST C1-03 (SOLENOIDS).

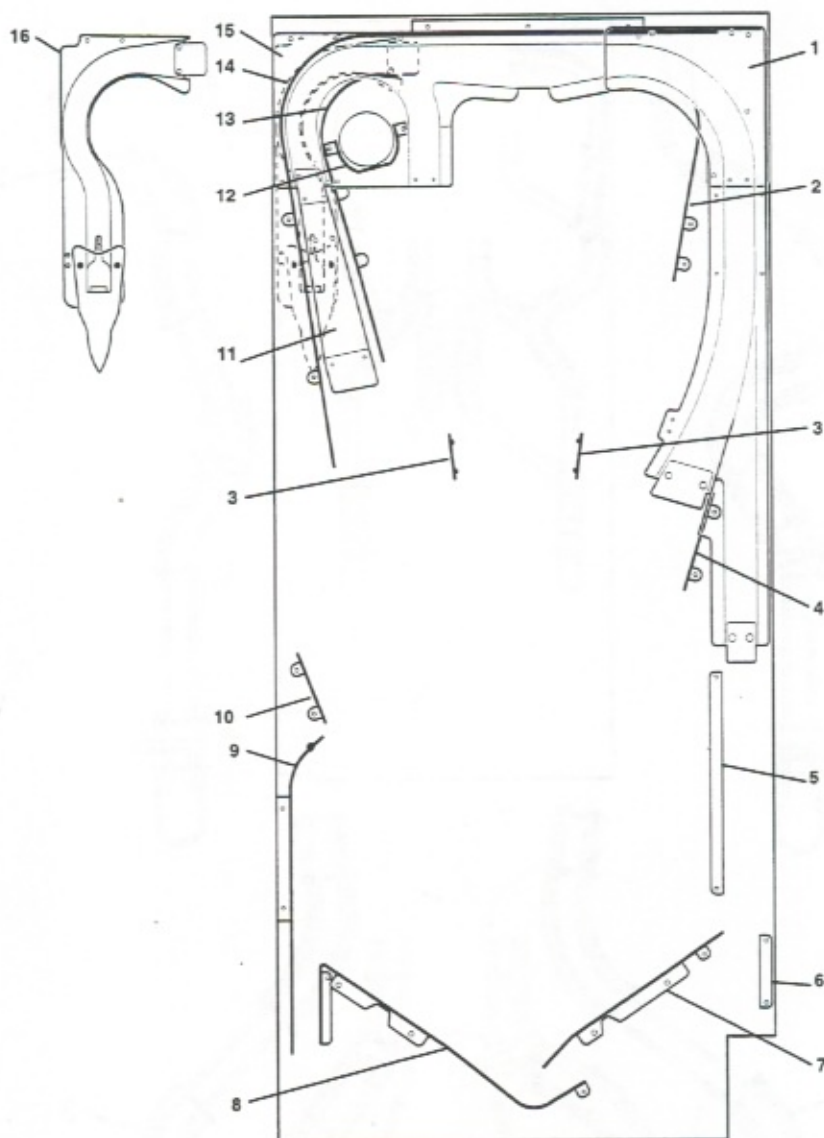


## RUBBER RINGS



| NO. | DESCRIPTION                       | PART NUMBER |
|-----|-----------------------------------|-------------|
| 1   | RING, RUBBER 3/4 ID BLACK         | RB00108-05  |
| 2   | RING, RUBBER 5/16 ID BLACK        | RB00108-02  |
| 3   | RING, RUBBER 2 1/2 ID BLACK       | RB00108-10  |
| 4   | RING, RUBBER 1 1/4 ID BLACK       | RB00108-07  |
| 5   | RING, RUBBER 3/16 ID BLACK        | RB00108-01  |
| 6   | RING, RUBBER 1 1/2 ID BLACK       | RB00108-08  |
| 7   | POST, MINI, BUMPER 3/8 OD BLACK   | RB00117-01  |
| 8   | RING, RUBBER 2 3/4 ID BLACK       | RB00108-11  |
| 9   | RING, RUBBER 1 1/2 ID 1/2 W BLACK | RB00114-BK  |
| 10  | POST, MINI, BUMPER, 7/16 OD BLACK | RB00117-02  |

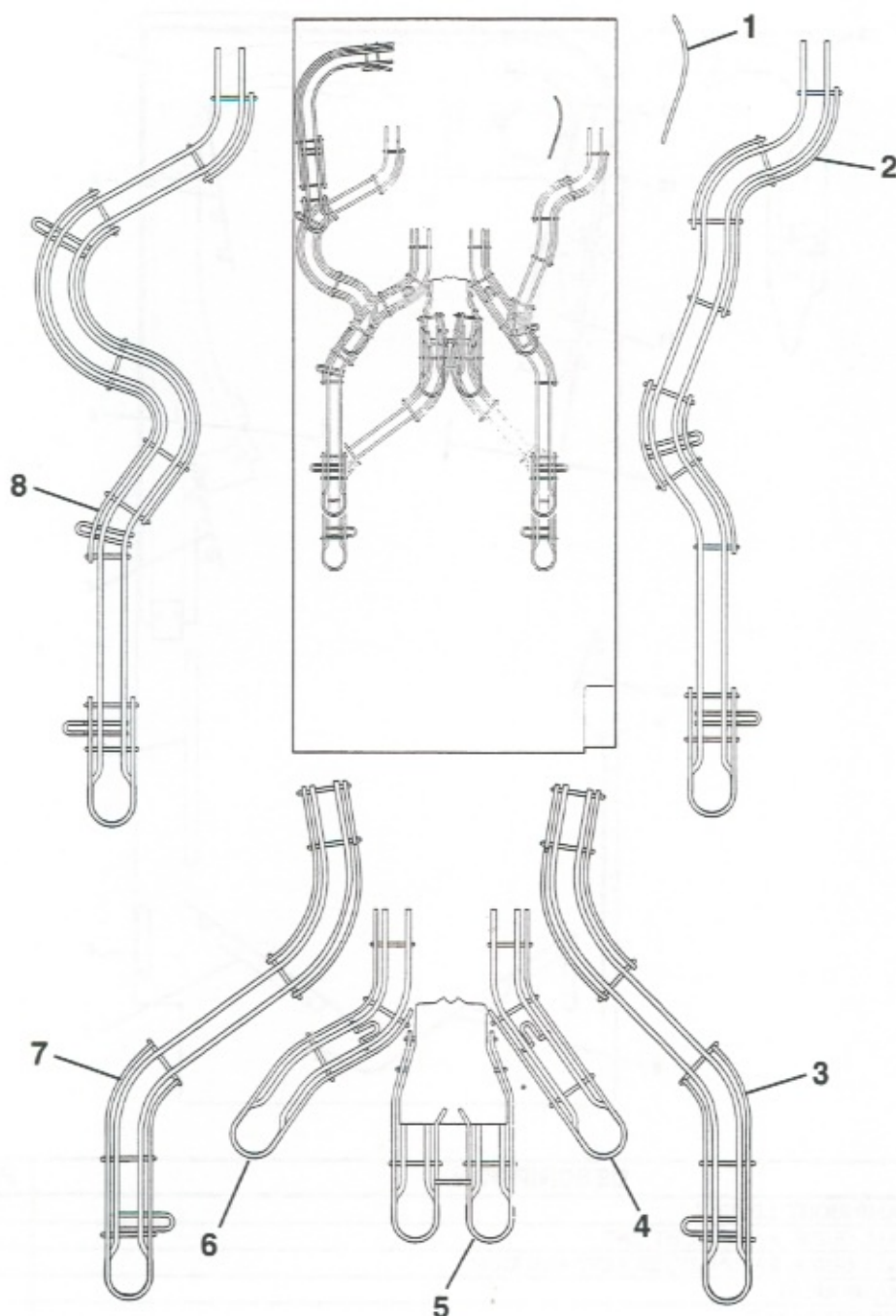
## PLAYFIELD RAMPS &amp; BALL GUIDES



| NO. | DESCRIPTION                                       | PART NUMBER |
|-----|---------------------------------------------------|-------------|
| 1   | ASSEMBLY, RAMP RIGHT, LEVEL 4                     | A-00485     |
| 2   | ASSEMBLY, BALL GUIDE, RAMP RIGHT, END             | A-00463     |
| 3   | ASSEMBLY, BALL GUIDE, RAMP CENTER, LEFT AND RIGHT | A-00464     |
| 4   | BALL GUIDE, RAMP RIGHT                            | MT00453     |
| 5   | BALL GUIDE, SHOOTER LANE                          | MT00590     |
| 6   | PLATE, STRIKE, BALL DELIVERY                      | MT00369     |
| 7   | ASSEMBLY, BALL GUIDE, BOTTOM ARCH, RIGHT          | A-00422-R   |
| 8   | ASSEMBLY, BALL GUIDE, BOTTOM ARCH, LEFT           | A-003171    |
| 9   | ASSEMBLY, BALL GUIDE, RAIL, BOTTOM, LEFT          | A-00296     |
| 10  | BALL GUIDE, EJECT- LEFT, BALL                     | MT00303     |
| 11  | ASSEMBLY, RAMP, UP/DOWN                           | A-00627     |
| 12  | ASSEMBLY, BASE & HOUSING, CONT. TOWER             | A-00530     |
| 13  | ASSEMBLY, BALL GUIDE, RAMP-RIGHT                  | A-00295     |
| 14  | ASSEMBLY, BALL GUIDE, RAMP-LEFT                   | A-002971    |
| 15  | ASSEMBLY, RAMP, LEVEL 3                           | A-00489     |
| 16  | ASSEMBLY, RAMP-LEFT, LEVEL-4                      | A-00626     |

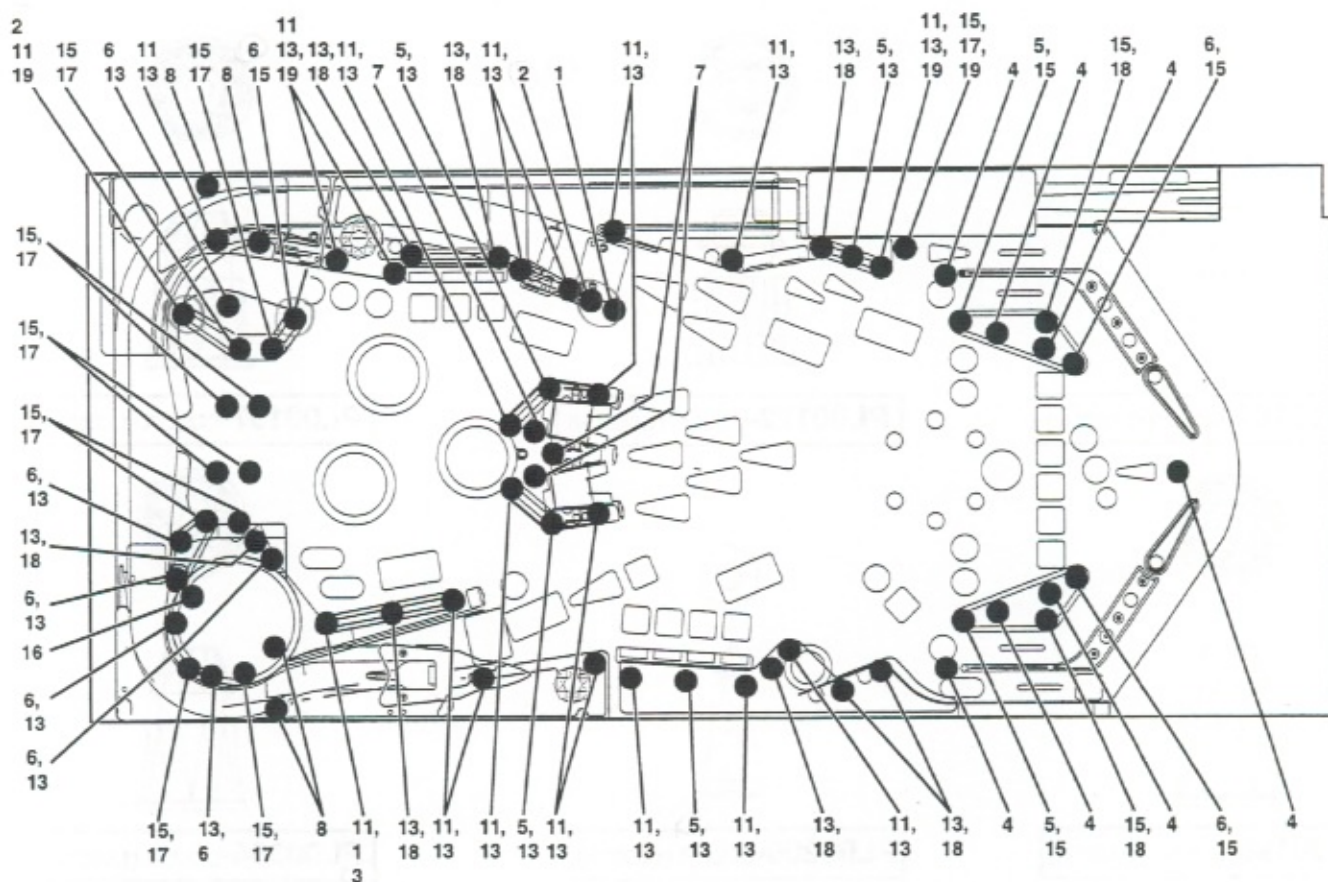


## PLAYFIELD WIREFORMS



| NO. | DESCRIPTION                               | PART NUMBER |
|-----|-------------------------------------------|-------------|
| 1   | WIREFORM, BALL GUIDE, TOP-RIGHT           | WF00130     |
| 2   | ASSEMBLY, RAMP-RIGHT, WITH WIREFORM, MAIN | WF00129-R   |
| 3   | WIREFORM, RIGHT, RAMP, JET                | WF00128-R   |
| 4   | WIREFORM, RETURN-RIGHT, RAMP-CENTER       | WF00134-R   |
| 5   | ASSEMBLY, RAMP, WIREFORM, JET NOSE        | A-00467     |
| 6   | WIREFORM, RETURN-LEFT, RAMP-CENTER        | WF00134-L   |
| 7   | WIREFORM, LEFT, RAMP, JET                 | WF00128-L   |
| 8   | WIREFORM, RAMP, MAIN                      | WF00129-L   |

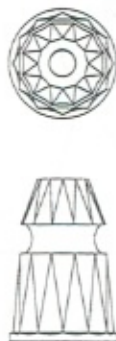
## PLAYFIELD POSTS



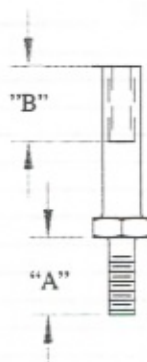
| NO. | DESCRIPTION                               | PART NUMBER |
|-----|-------------------------------------------|-------------|
| 1   | POST, BUMPER, 1.00 M-F, 1/2 X 0           | SM00145-02  |
| 2   | POST, BUMPER, 1.00 M-F, 7/8 X 1/2         | SM00145-04  |
| 3   | POST, BUMPER, 1.00 M-F, 7/8 X 0           | SM00145-05  |
| 4   | POST, BUMPER, 1.00 M-F, 7/8 X 1/2         | SM00151     |
| 5   | SCREW, POST, 8/32, 1-1/2 X 1/2            | SM00152-02  |
| 6   | SCREW, POST, 8/32, 1-1/2 X 3/8            | SM00152-03  |
| 7   | STANDOFF, HEX, M-F, 3.607, 1/2 X 1/2      | SM00154-09  |
| 8   | STANDOFF, HEX, M-F, 3.930, 1/2 X 1/2      | SM00154-10  |
| 9   | STANDOFF, HEX, M-F, 3.264, 1/2 X 1/4      | SM00154-11  |
| 10  | STANDOFF, HEX, F-F, 1.360, 1/2 X 1/2      | SM00155-02  |
| 11  | SCREW, POST, #8 WOOD SCREW, 1-1/2 X 3/8   | SM00176-03  |
| 12  | POST, SINGLE, 1.000, #8 HOLE, T/GREEN     | PL00164-GT  |
| 13  | POST, SINGLE, 1.000, #8 HOLE, T/ORANGE    | PL00164-OT  |
| 14  | POST, SINGLE, 1.000, #8 HOLE, T/YELLOW    | PL00164-YT  |
| 15  | POST, BUMPER, 1.000, S/B/T/ORANGE         | PL00172-OT  |
| 16  | POST, BUMPER, 1.000, #6, CLEAR            | PL00200-N   |
| 17  | SCREW, MACHINE 8-32 X 1-3/4 PPH SEMS ZC   | SC00101-14  |
| 18  | SCREW, SELF TAPPING, #8 X 1/2 PPH "AB" ZC | SC00104-12  |
| 19  | WASHER, FLAT, #8 .375" OD .032T           | WS00100-05  |



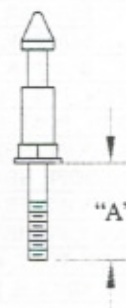
## PLAYFIELD POST IDENTIFICATION

**PL00164**-COLOR (1.000" H)**PL00172**-COLOR (1.000" H)**PL00197**-COLOR (1.000" H)**PL00198**-COLOR (1.188" H)**PL00200**-COLOR (1.000" H)**PL00304**-COLOR (1.063" H)**SM00144-**

| DASH# | "A"  | "B" |
|-------|------|-----|
| -01   | .875 | .50 |
| -02   | .50  | .50 |

**SM00145-**

| DASH# | "A"  | "B" |
|-------|------|-----|
| -01   | .50  | .50 |
| -02   | .50  | 0   |
| -03   | 1.25 | 0   |
| -04   | .875 | .50 |
| -05   | .875 | 0   |

**SM00150-**

| DASH# | "A" |
|-------|-----|
| -01   | .50 |
| -02   | .75 |

**SM00151****SM00152-**

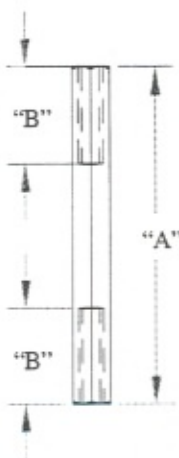
| DASH# | "A"  | "B" |
|-------|------|-----|
| -01   | 1.00 | .50 |
| -02   | .50  | .50 |
| -03   | .375 | .50 |
| -04   | .875 | .50 |
| -05   | .750 | .50 |

**SM00153-**

| DASH# | "A" | "B" |
|-------|-----|-----|
| -01   | .50 | 0   |
| -02   | .50 | .50 |

**SM00154-**

| DASH# | "A"   | "B" | "C"  |
|-------|-------|-----|------|
| -01   | 1.36  | .50 | .50  |
| -02   | 1.65  | .50 | .50  |
| -03   | 5.19  | .50 | .50  |
| -04   | 1.82  | .50 | .50  |
| -05   | 1.58  | .50 | .50  |
| -06   | 1.46  | .50 | .50  |
| -07   | 1.36  | .50 | .625 |
| -08   | 1.245 | .50 | .50  |
| -09   | 3.607 | .50 | .50  |
| -10   | 3.93  | .50 | .50  |
| -11   | 3.264 | .50 | .50  |
| -12   | 1.36  | .50 | .75  |

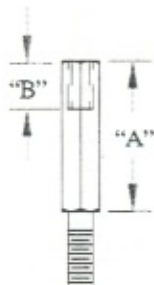
**SM00155- (1/4" HEX)**

| DASH# | "A"  | "B"  |
|-------|------|------|
| -01   | .612 | .612 |
| -02   | 1.36 | .50  |
| -03   | 1.65 | .50  |
| -04   | 1.06 | .38  |

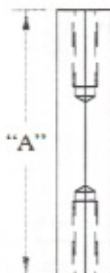
**SM00176- (1/4" HEX)**

| DASH# | "A"  | "B" |
|-------|------|-----|
| -01   | 1.00 | .50 |
| -02   | .50  | .50 |
| -03   | .375 | .50 |
| -04   | .75  | .50 |

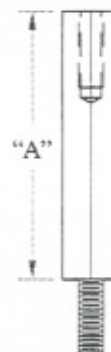


**SM00229- (1/4" HEX) (6-32)**

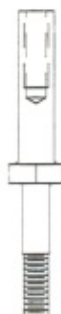
| DASH# | "A"  | "B"       |
|-------|------|-----------|
| -01   | .250 | .130/.150 |
| -02   | .375 | .250      |
| -03   | .500 | .375      |
| -04   | .625 | .375      |
| -05   | .750 | .375      |
| -06   | .875 | .375      |
| -07   | 1.00 | .375      |

**SM00235- (3/8" HEX)**

| DASH# | "A"            |
|-------|----------------|
| -01   | .544 +.01/-.00 |
| -02   | 4.94 +.00/-.01 |
| -03   | 2.68 +.01/-.00 |
| -04   | 2.62 +.00/-.01 |
| -05   | 2.50 +.00/-.01 |

**SM00236- (3/8" HEX)**

| DASH# | "A"            |
|-------|----------------|
| -01   | 3.85 +.01/-.00 |
| -02   | 2.66 +.01/-.00 |

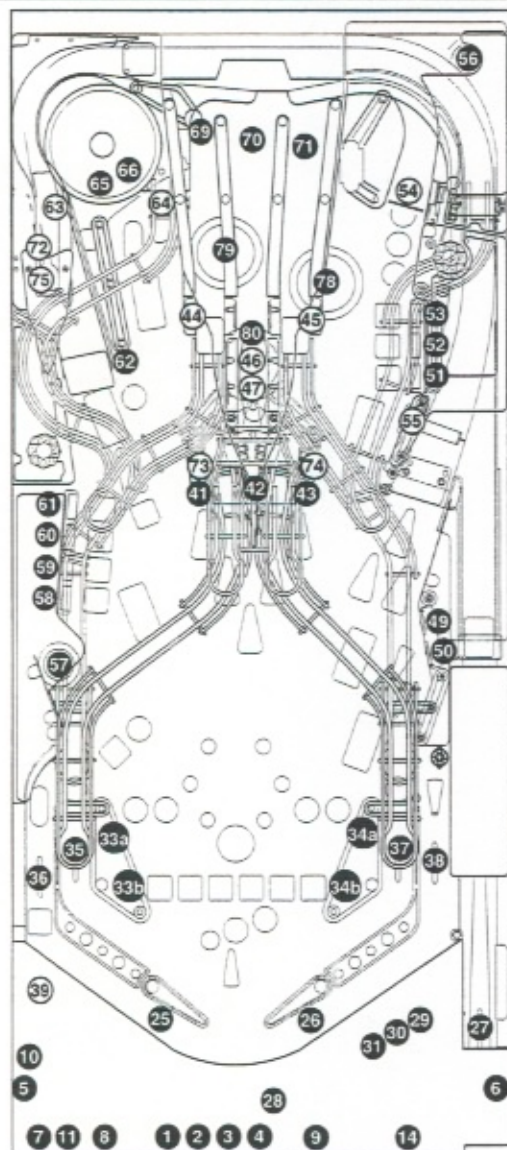
**SM00237**

## NOTES



## LOCATION OF SWITCHES &amp; OPTO DETECTORS

| REF. NO. | DESCRIPTION           | SWITCH PART NUMBER |
|----------|-----------------------|--------------------|
| *1       | COIN DOOR-CHUTE 1     | **                 |
| *2       | COIN DOOR-CHUTE 2     | **                 |
| *3       | COIN DOOR-CHUTE 3     | **                 |
| *4       | COIN DOOR-CHUTE 4     | **                 |
| *5       | LEFT FLIPPER BUTTON   | SW00127            |
| *6       | RIGHT FLIPPER BUTTON  | SW00127            |
| *7       | "START" BUTTON        | SW00130            |
| *8       | COIN DOOR OPEN (MODE) | SW00132            |
| *9       | COIN DOOR - SLAM TILT | SW00121            |
| *10      | TILT BOB              | A-00065-1          |
| *11      | "CONTINUE" BUTTON     | SW00131            |
| 12-13    | NOT USED              |                    |
| *14      | TICKET NOTCH          | **                 |
| 15-24    | NOT USED              |                    |
| 25       | LEFT FLIPPER EOS      | SW00127            |



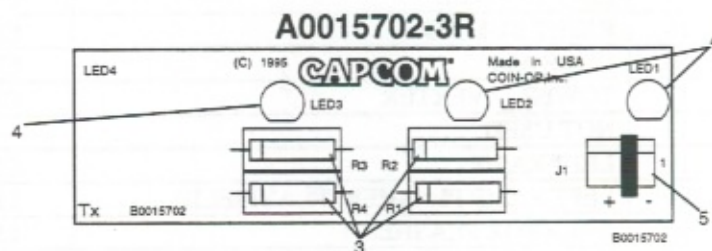
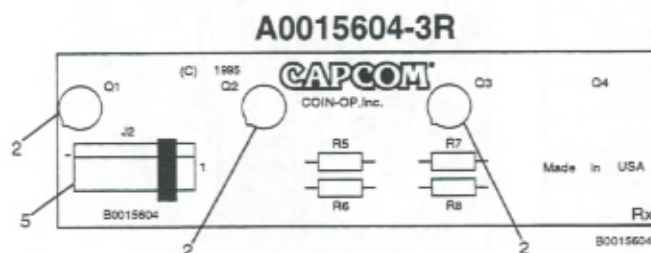
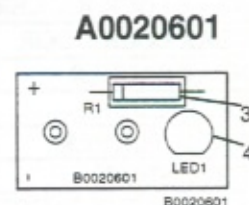
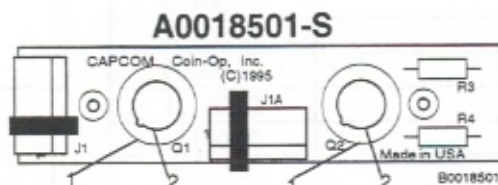
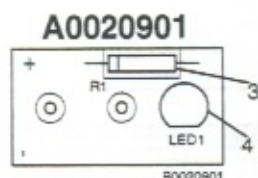
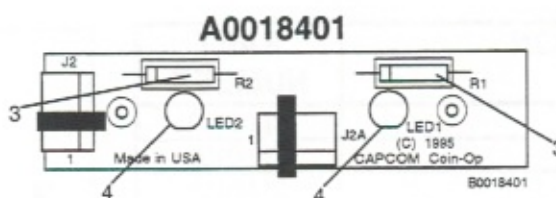
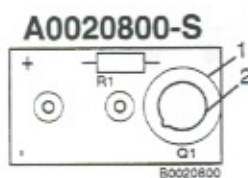
P4E01

| REF. NO. | DESCRIPTION         | SWITCH PART NUMBER | OPTO RECEIVER P/N | OPTO XMTR. P/N |
|----------|---------------------|--------------------|-------------------|----------------|
| 26       | RIGHT FLIPPER EOS   | SW00127            |                   |                |
| 27       | SHOOTER LANE        | SW00112            |                   |                |
| 28       | OUTHOLE             | SW00113            |                   |                |
| 29       | TROUGH 1 OPTO       |                    | A0015604-3R       | A0015702-3R    |
| 30       | TROUGH 2 OPTO       |                    |                   |                |
| 31       | TROUGH 3 OPTO       |                    |                   |                |
| 32       | NOT USED            |                    |                   |                |
| 33a      | LEFT SLING -TOP     | A-00539-2          |                   |                |
| 33b      | LEFT SLING-BOTTOM   | A-00539-1          |                   |                |
| 34a      | RIGHT SLING-TOP     | A-00539-1          |                   |                |
| 34b      | RIGHT SLING-BOTTOM  | A-00539-2          |                   |                |
| 35       | LEFT INLANE         | SW00111            |                   |                |
| 36       | LEFT OUTLANE        | SW00111            |                   |                |
| 37       | RIGHT INLANE        | SW00111            |                   |                |
| 38       | RIGHT OUTLANE       | SW00111            |                   |                |
| 39       | LEFT LOCK OPTO 1    |                    | A0020500-R        | A0020601       |
| 40       | NOT USED            |                    |                   |                |
| 41       | RAMP C STAND L      | SW00117            |                   |                |
| 42       | RAMP C STAND C      | SW00117            |                   |                |
| 43       | RAMP C STAND R      | SW00117            |                   |                |
| 44       | JET LANE LEFT OPTO  |                    | A0020800-S        | A0020601       |
| 45       | JET LANE RIGHT OPTO |                    | A0020800-S        | A0020601       |
| 46       | JET LOCK BACK OPTO  |                    | A0018501-S        | A0018401       |
| 47       | JET LOCK FRONT OPTO |                    |                   |                |
| 48       | NOT USED            |                    |                   |                |
| 49       | STAND RIGHT TOP     | SW00115            |                   |                |
| 50       | STAND RIGHT BOTTOM  | SW00115            |                   |                |
| 51       | DROP R              | SW00106            |                   |                |
| 52       | DROP I              | SW00106            |                   |                |
| 53       | DROP A              | SW00106            |                   |                |
| 54       | SPINNER             | SW00107            |                   |                |
| 55       | RAMP RIGHT          | SW00117            |                   |                |
| 56       | SAUCER LOCK RIGHT   | SW00135            |                   |                |
| 57       | LEFT SAUCER LOCK    | SW00135            |                   |                |
| 58       | DROP W              | SW00106            |                   |                |
| 59       | DROP O              | SW00106            |                   |                |
| 60       | DROP H              | SW00106            |                   |                |
| 61       | DROP S              | SW00106            |                   |                |
| 62       | RAMP LEFT STAND     | SW00115            |                   |                |
| 63       | RAMP LEFT OPTO      |                    | A0020800-S        | A0020901       |
| 64       | TOWER EXIT OPTO     |                    | A0020800-S        | A0020901       |
| 65       | STAND LEFT TOP      | SW00115            |                   |                |
| 66       | STAND LEFT BOTTOM   | SW00115            |                   |                |
| 67-68    | NOT USED            |                    |                   |                |
| 69       | LANE J              | SW00111            |                   |                |
| 70       | LANE E              | SW00111            |                   |                |
| 71       | LANE T              | SW00111            |                   |                |
| 72       | UNDER RAMP OPTO     |                    | A0020800-S        | A0020901       |
| 73       | LEFT SCOOP OPTO     |                    | A-00037-R         | A-00037-T      |
| 74       | RIGHT SCOOP OPTO    |                    | A-00037-R         | A-00037-T      |
| 75       | HIGH ORBIT OPTO     |                    | A0020800-S        | A0020901       |
| 76-77    | NOT USED            |                    |                   |                |
| 78       | STAR BUMPER RIGHT   | SW00126            |                   |                |
| 79       | STAR BUMPER LEFT    | SW00126            |                   |                |
| 80       | STAR BUMPER CENTER  | SW00126            |                   |                |

\* NOTE: SWITCH IS LOCATED IN CABINET.

\*\* NOTE: NOT SERVICED SEPARATELY.

## OPTO BOARDS

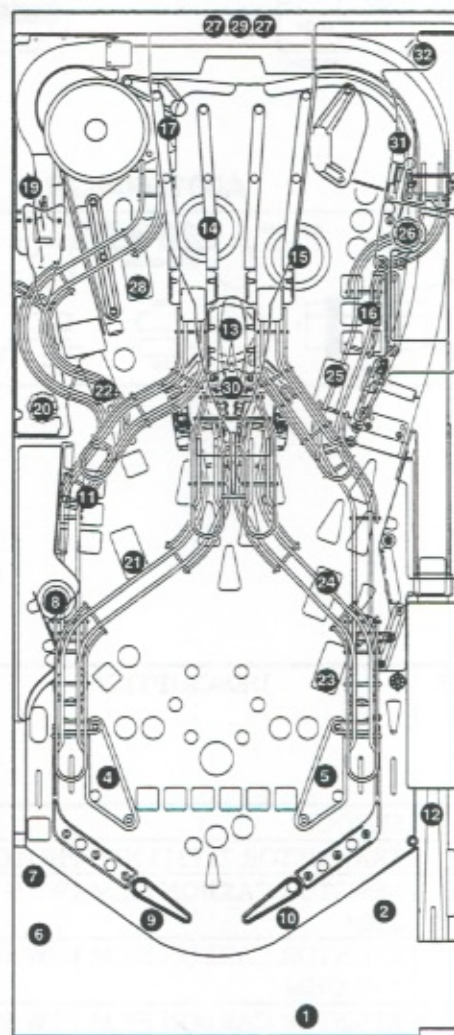
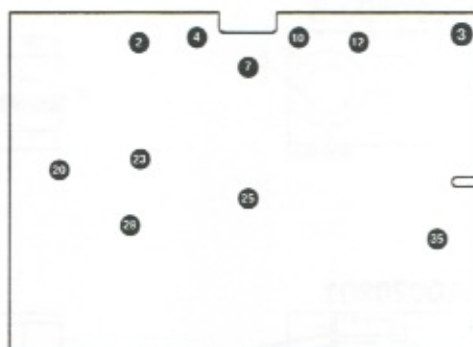


| REF. | DESCRIPTION                           | COMPONENT<br>PART<br>NUMBER | OPTO BOARD ASSEMBLY P/N & COMPONENT |          |          |            |            |          |             |             |
|------|---------------------------------------|-----------------------------|-------------------------------------|----------|----------|------------|------------|----------|-------------|-------------|
|      |                                       |                             | A0020800-S                          | A0020901 | A0018401 | A0018501-S | A0020500-R | A0020601 | A0015604-3R | A0015702-3R |
| 1    | SHROUD                                | PL00284                     | 1                                   |          |          | 2          | 1          |          |             |             |
| 2    | TRANSISTOR 21T313 NPN PHOTO           | TR00104                     | 1                                   |          |          | 2          | 1          |          | 3           |             |
| 3    | RESISTOR CARBON FILM 1W 5% 560 OHM    | RS00112-02                  |                                     | 1        | 2        |            |            | 1        |             |             |
| 3    | RESISTOR CARBON FILM 1/4W 5% 2.7K OHM | RS00100-35                  |                                     |          |          |            | 1          |          |             |             |
| 3    | RESISTOR CARBON FILM 1/2W 5% 620 OHM  | RS00101-10                  |                                     |          |          |            |            |          |             | 1           |
| 4    | LED 21E187 100MA T-1 3/4              | DI00103                     |                                     | 1        | 1        |            |            | 1        |             | 3           |
| 5    | CONNECTOR HEADER .100 R/A 7-PIN       | CN00137-07                  |                                     |          |          |            |            |          | 1           |             |
| 5    | CONNECTOR HEADER .100 R/A 4-PIN       | CN00137-04                  |                                     |          |          |            |            |          |             | 1           |

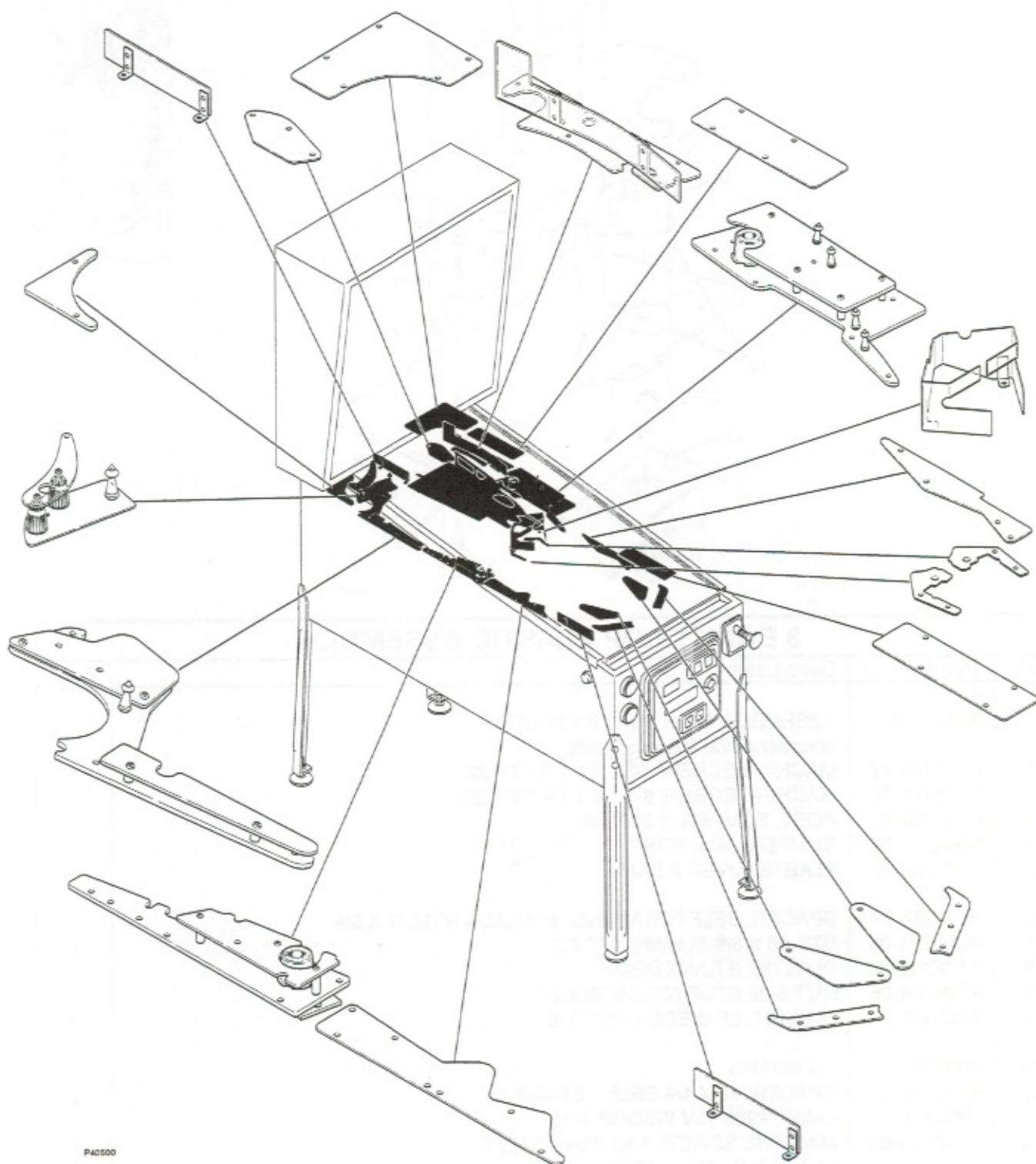


## LOCATION OF SOLENOIDS, AND FLASHERS

| REF | DESCRIPTION                          | PART NUMBER |
|-----|--------------------------------------|-------------|
| 1   | OUTHOLE                              | CL00109     |
| 2   | TROUGH                               | CL00109     |
| 3   | KNOCKER                              | CL00109     |
| 4   | LEFT SLING                           | CL00109     |
| 5   | RIGHT SLING                          | CL00109     |
| 6   | NEAR LOCK KICKER                     | CL00109     |
| 7   | NEAR LOCK DOOR                       | CL00109     |
| 8   | NEAR SAUCER                          | CL00109     |
| 9   | LEFT FLIPPER                         | CL00111     |
| 10  | RIGHT FLIPPER                        | CL00111     |
| 11  | DROP SHOW                            | CL00109     |
| 12  | NEAR RIGHT SAUCER                    | CL00109     |
| 13  | CENTER BUMPER                        | CL00109     |
| 14  | LEFT BUMPER                          | CL00109     |
| 15  | RIGHT BUMPER                         | CL00109     |
| 16  | DROP AIR                             | CL00109     |
| 17  | TOWER DIVERTER                       | CL00109     |
| 18  | NOT USED                             | -----       |
| 19  | LEFT RAMP                            | CL00109     |
| 20  | LEFT RAMP FLASHER (PLAYFIELD)        | LP00101     |
| 20  | BACKBOX FLASHER 1                    | LP00103     |
| 21  | DROP SHOW FLASH (PLAYFIELD)          | LP00101     |
| 21  | NOT USED                             | -----       |
| 22  | RIGHT, LEFT, STUNT FLASH (PLAYFIELD) | LP00101     |
| 22  | TOWER FLASHER                        | LP00101     |
| 22  | BACKBOX FLASHER 3                    | LP00103     |
| 23  | RIGHT STAND FLASH (PLAYFIELD)        | LP00101     |
| 23  | BACKBOX FLASHER 4                    | LP00103     |
| 24  | RIGHT RAMP FLASH (PLAYFIELD)         | LP00101     |
| 24  | BACKBOX 5 AND 6                      | LP00103     |
| 25  | RIGHT DROP FLASH (PLAYFIELD)         | LP00101     |
| 25  | BACKBOX FLASHER 7                    | LP00103     |
| 26  | RIGHT REAR FLASH (PLAYFIELD)         | LP00101     |
| 26  | BACKBOX FLASHER 8                    | LP00103     |
| 27  | LEFT BACK FLASH                      | LP00101     |
| 28  | LEFT STAND FLASH (PLAYFIELD)         | LP00101     |
| 28  | BACKBOX FLASHER 9 AND 10             | LP00103     |
| 29  | BACK KICKER                          | CL00109     |
| 30  | CENTER LOCK                          | CL00109     |
| 31  | RIGHT DIVERTER                       | CL00109     |
| 32  | RIGHT LOCK                           | CL00109     |

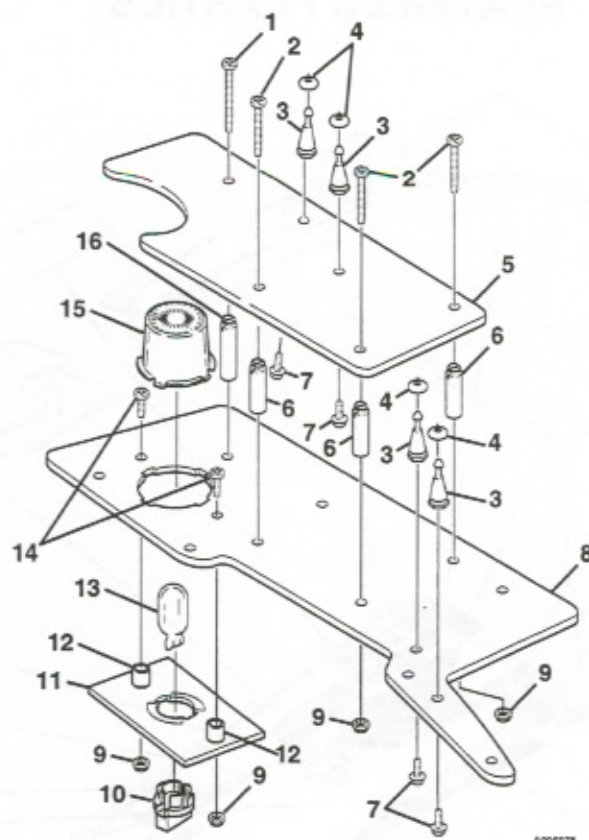


## PLAYFIELD PLASTICS



P40500



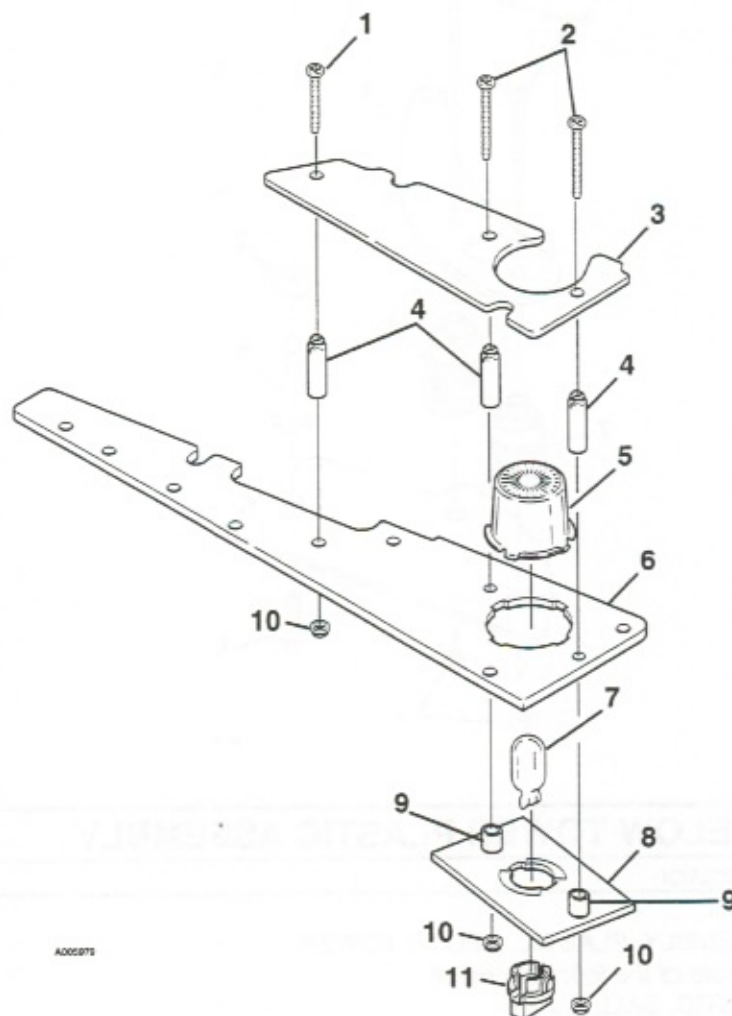


A005978

### 3 BANK DROP PLASTIC ASSEMBLY

| No. | Part Number | Description                                                               | Req. |
|-----|-------------|---------------------------------------------------------------------------|------|
|     | A-00597-8   | ASSEMBLY, PLASTIC, 3 BANK DROP<br><i>consists of the following parts:</i> |      |
| 1   | SC00165-12  | MACHINE SCREW 8-32 X 1-1/2 PTH ZC                                         | 1    |
| 2   | SC00165-10  | MACHINE SCREW 8-32 X 1-1/4 PTH ZC                                         | 3    |
| 3   | PL00200-N   | POST, BUMPER, 1.000" #6                                                   | 4    |
| 4   | RB00117-02  | BUMPER, MINI-POST                                                         | 4    |
| 5   | AW00125-27  | PLASTIC OVER 3 BANK                                                       | 1    |
| 6   | PL00237-05  | SPACER, SELF RETAINING, #8 BLACK NYLON X 3/4                              | 3    |
| 7   | SC00121-03  | STS #6 X 3/8 SLHWH "AB" ZC                                                | 4    |
| 8   | AW00125-11  | PLASTIC, 3 BANK DROP                                                      | 1    |
| 9   | NT00104-08  | NUT 8-32 STOP NYLON INS ZC                                                | 6    |
| *10 | SK00103     | SOCKET, LP WEDGE PCB T-5                                                  | 1    |
| 11  | A0010700    | PC BOARD                                                                  | 1    |
| 12  | PL00108-01  | SPACER, #8 X 1/4 SELF RETAINING                                           | 2    |
| *13 | LP00101     | LAMP, #906 13V WEDGE T-15                                                 | 1    |
| 14  | SC00165-06  | MACHINE SCREW 8-32 X 3/4 PTH ZC                                           | 2    |
| 15  | PL00165-YT  | LITE DOME, MINI-MARS, T-YEL                                               | 1    |
| 16  | PL00237-07  | SPACER, SELF RETAINING, #8 X 1.0, BLACK                                   | 1    |

\*NOTE: REFERENCE ONLY- NOT INCLUDED WITH ASSEMBLY. MUST BE PURCHASED SEPARATELY.



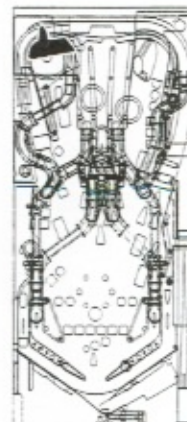
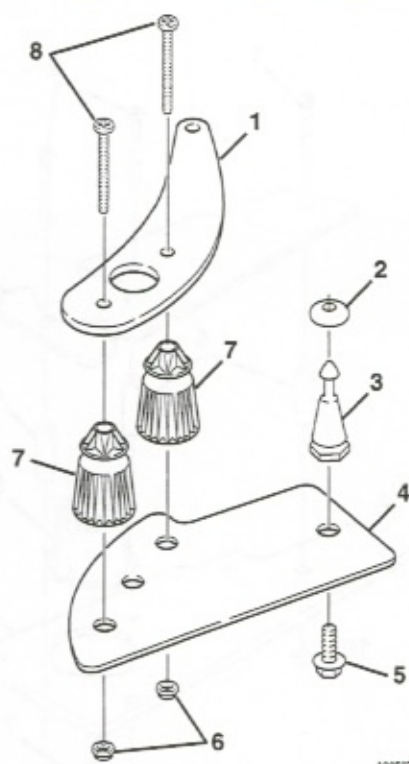
A000975

## UP/DOWN RAMP-LEFT PLASTIC ASSEMBLY

| No. | Part Number | Description                                                                     | Req. |
|-----|-------------|---------------------------------------------------------------------------------|------|
|     | A-00597-9   | ASSEMBLY, PLASTIC, UP/DOWN RAMP-LEFT<br><i>consists of the following parts:</i> |      |
| 1   | SC00165-12  | MACHINE SCREW 8-32 X 1-1/2 PTH ZC                                               | 1    |
| 2   | SC00165-16  | MACHINE SCREW 8-32 X 2.00 PTH ZC                                                | 2    |
| 3   | AW00125-9   | PLASTIC, OVER UP & DOWN RMP, LEFT                                               | 1    |
| 4   | PL0237-06   | SPACER, SELF RETAINING, #8 SLACK NYLON                                          | 3    |
| 5   | PL00165-YT  | LITE DOME, MINI-MARS, T/YEL                                                     | 1    |
| 6   | AW00125-7   | PLASTIC, LEFT UP AND DOWN RAMP                                                  | 1    |
| *7  | LP00101     | LAMP, #906 13V WEDGE T-15                                                       | 1    |
| 8   | A0010700    | ASSEMBLY, PCB BOARD                                                             | 1    |
| 9   | PL00108-01  | SPACER, #8 X 1/4 SELF RETAINING                                                 | 2    |
| 10  | NT00104-08  | NUT 8-32 STOP NYLON INS ZC                                                      | 3    |
| *11 | SK00103     | SOCKET, LP WEDGE PCB T-5                                                        | 1    |

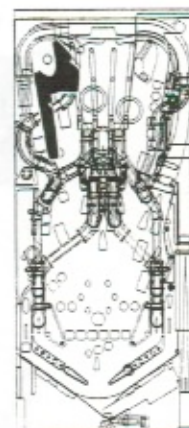
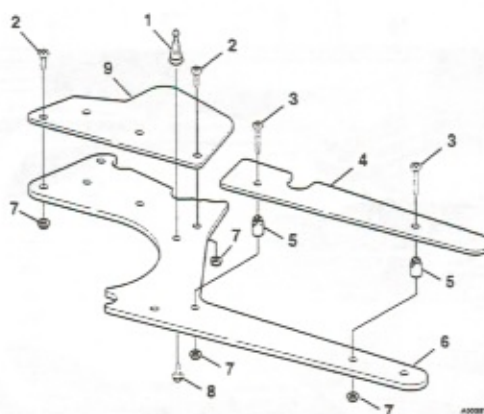
\*NOTE: REFERENCE ONLY- NOT INCLUDED WITH ASSEMBLY. MUST BE PURCHASED SEPARATELY.





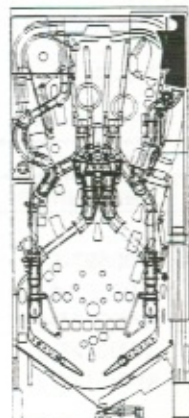
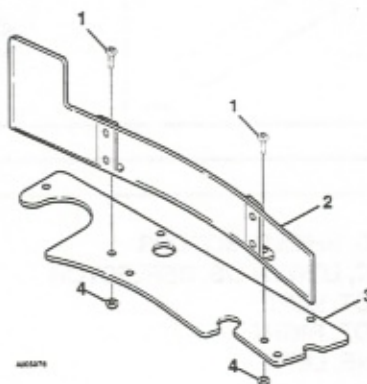
### BELOW TOWER PLASTIC ASSEMBLY

| No. | Part Number | Description                                                               | Req. |
|-----|-------------|---------------------------------------------------------------------------|------|
|     | A-00597-1   | ASSEMBLY, PLASTIC, BELOW TOWER<br><i>consists of the following parts:</i> |      |
| 1   | AW00125-43  | PLASTIC, BALL GUIDE                                                       | 1    |
| 2   | RB00117     | BUMPER, MINI-POST                                                         | 1    |
| 3   | PL00200-N   | POST, BUMPER, 1.000" #6                                                   | 1    |
| 4   | AW00125-22  | PLASTIC, UNDER TOWER                                                      | 1    |
| 5   | SC00121-03  | STS #6 X 3/8 SLHWH "AB" ZC                                                | 1    |
| 6   | NT00104-08  | NUT 8-32 STOP NYLON INS ZC                                                | 2    |
| 7   | PL00172-0T  | POST, BUMPER, 1.000, S/B, T/ORG                                           | 2    |
| 8   | SC00101-13  | MACHINE SCREW 8-32 X 1 5/8 PPH SEMS ZC                                    | 2    |



### RIGHT SIDE LEFT RAMP PLASTIC ASSEMBLY

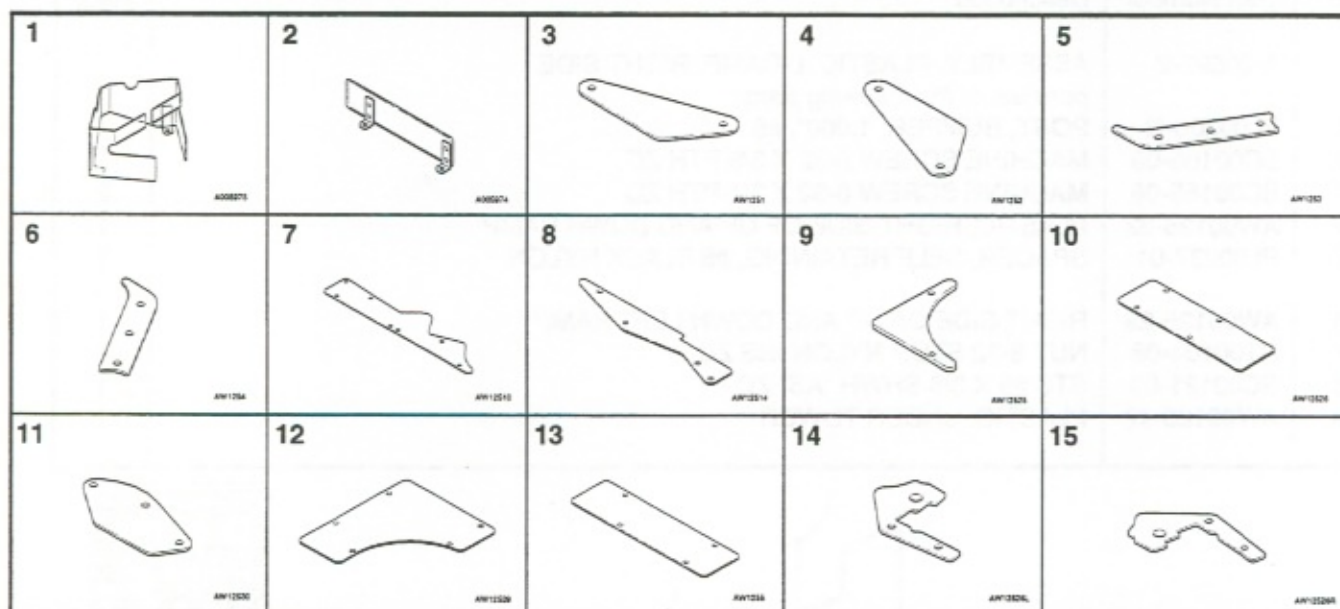
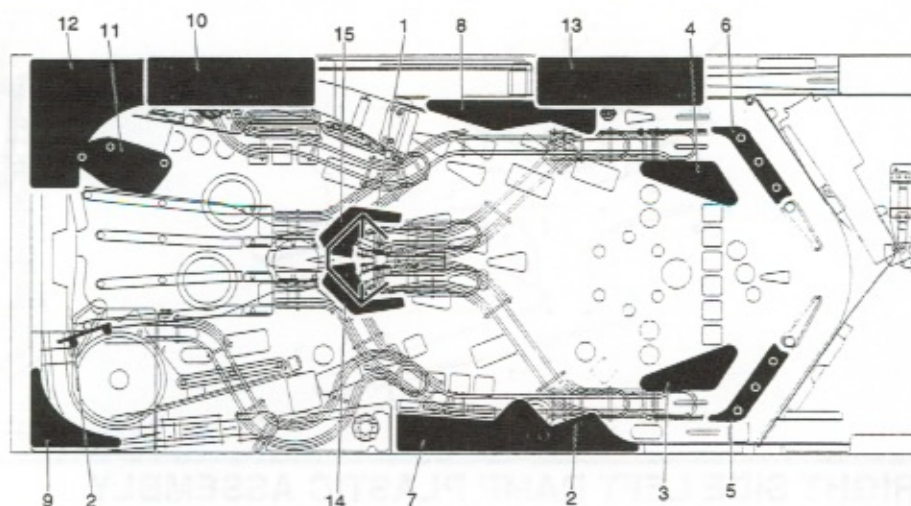
| No. | Part Number | Description                                                                      | Req. |
|-----|-------------|----------------------------------------------------------------------------------|------|
|     | A-00597-2   | ASSEMBLY, PLASTIC, L-RAMP, RIGHT SIDE<br><i>consists of the following parts:</i> |      |
| 1   | PL00200-N   | POST, BUMPER, 1.000", #6                                                         | 1    |
| 2   | SC00165-03  | MACHINE SCREW 8-32 X 3/8 PTH ZC                                                  | 2    |
| 3   | SC00165-06  | MACHINE SCREW 8-32 X 3/4 PTH ZC                                                  | 2    |
| 4   | AW00125-32  | PLASTIC, RIGHT SIDE OF UP AND DOWN RAMP                                          | 1    |
| 5   | PL00237-01  | SPACER, SELF RETAINING, #8 BLACK NYLON                                           | 2    |
| 6   | AW00125-29  | RIGHT SIDE OF UP AND DOWN LEFT RAMP                                              | 1    |
| 7   | NT00104-08  | NUT 8-32 STOP NYLON INS ZC                                                       | 4    |
| 8   | SC00121-03  | STS #6 X 3/8 SHWH "AB" ZC                                                        | 1    |
| 9   | AW00125-42  | PLASTIC, UNDER TOWER                                                             | 1    |



### TOP RIGHT EJECT PLASTIC ASSEMBLY

| No. | Part Number | Description                                                                    | Req. |
|-----|-------------|--------------------------------------------------------------------------------|------|
|     | A-00597-6   | ASSEMBLY, PLASTIC, EJECT, TOP RIGHT<br><i>consists of the following parts:</i> |      |
| 1   | SC00101-03  | MACHINE SCREW 8-32 X 3/8 SEMS ZC                                               | 2    |
| 2   | A-00597-7   | ASSEMBLY, SUB, PLASTIC, TOP RIGHT                                              | 1    |
| 3   | AW00125-8   | PLASTIC, TOP RIGHT EJECT                                                       | 1    |
| 4   | NT00104-08  | NUT, 8-32 STOP NYLON INS ZC                                                    | 1    |



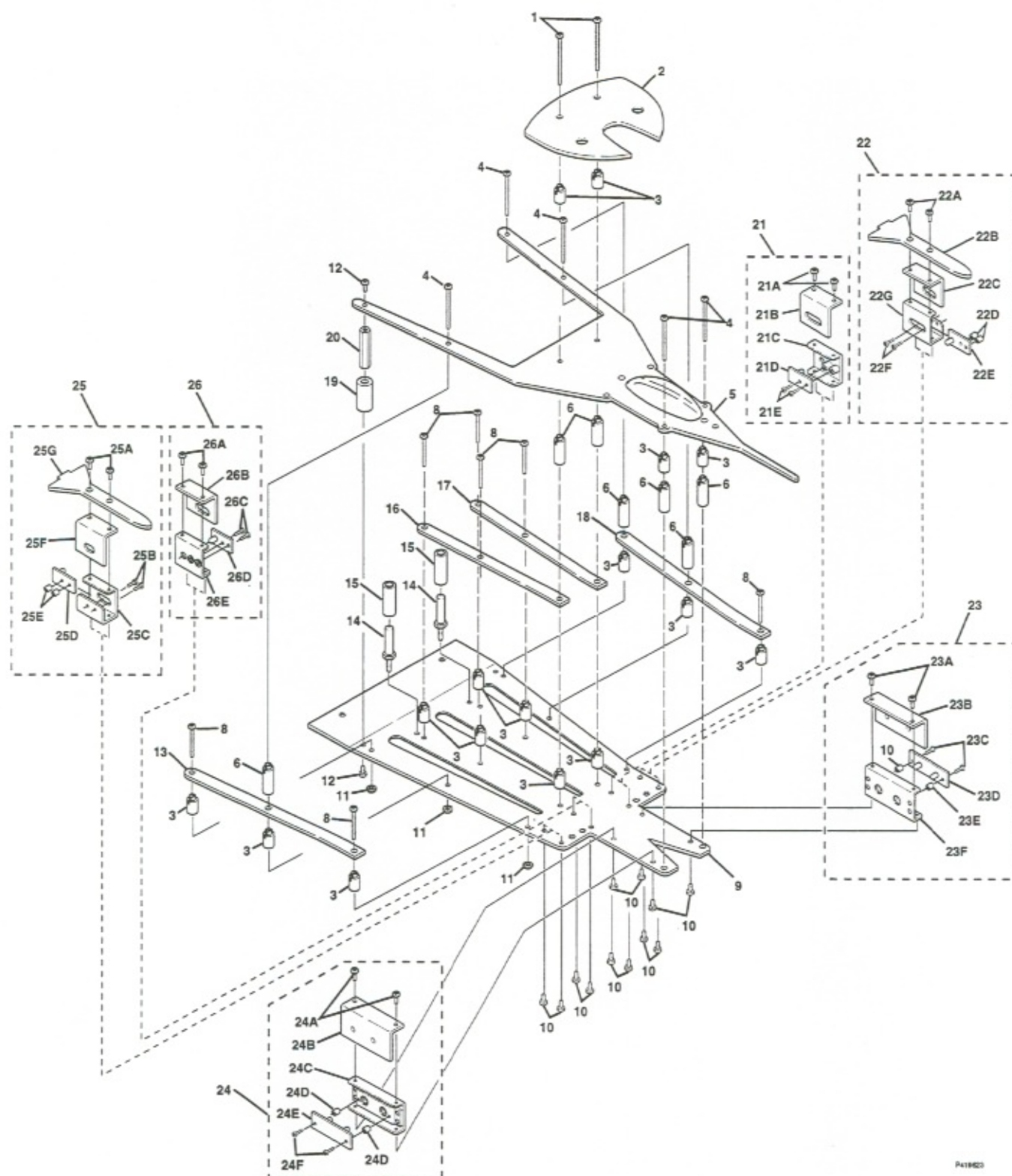


| No. | Part Number | Description                             | Req. |
|-----|-------------|-----------------------------------------|------|
| 1   | A-00597-5   | ASSEMBLY, PLASTIC, SHIELD, SCOOPS       | 1    |
| 2   | A-00597-4   | ASSEMBLY, PLASTIC, LOWER-L/S, DEFLECTOR | 1    |
| 3   | AW00125-1   | PLASTIC, SLING SHOT, LEFT               | 1    |
| 4   | AW00125-2   | PLASTIC, SLING SHOT, RIGHT              | 1    |
| 5   | AW00125-3   | PLASTIC, DRAIN LANE, LEFT               | 1    |
| 6   | AW00125-4   | PLASTIC, DRAIN LANE, RIGHT              | 1    |
| 7   | AW00125-10  | PLASTIC, 4-BANK DROP                    | 1    |
| 8   | AW00125-14  | PLASTIC, GATE LOWER RIGHT               | 1    |
| 9   | AW00125-25  | PLASTIC, CORNER TOP LEFT                | 1    |
| 10  | AW00125-26  | PLASTIC, RAMP COVER                     | 1    |
| 11  | AW00125-30  | PLASTIC, SPINNER                        | 1    |
| 12  | AW00125-39  | PLASTIC, UPPER RIGHT RAMP               | 1    |
| 13  | AW00125-5   | PLASTIC, SHOOTER LANE                   | 1    |
| 14  | AW00125-6L  | PLASTIC, CENTER SCOOP, LEFT             | 1    |
| 15  | AW00125-6R  | PLASTIC, CENTER SCOOP, RIGHT            | 1    |

## NOTES



## JET ASSEMBLY



Pc18423

## JET ASSEMBLY

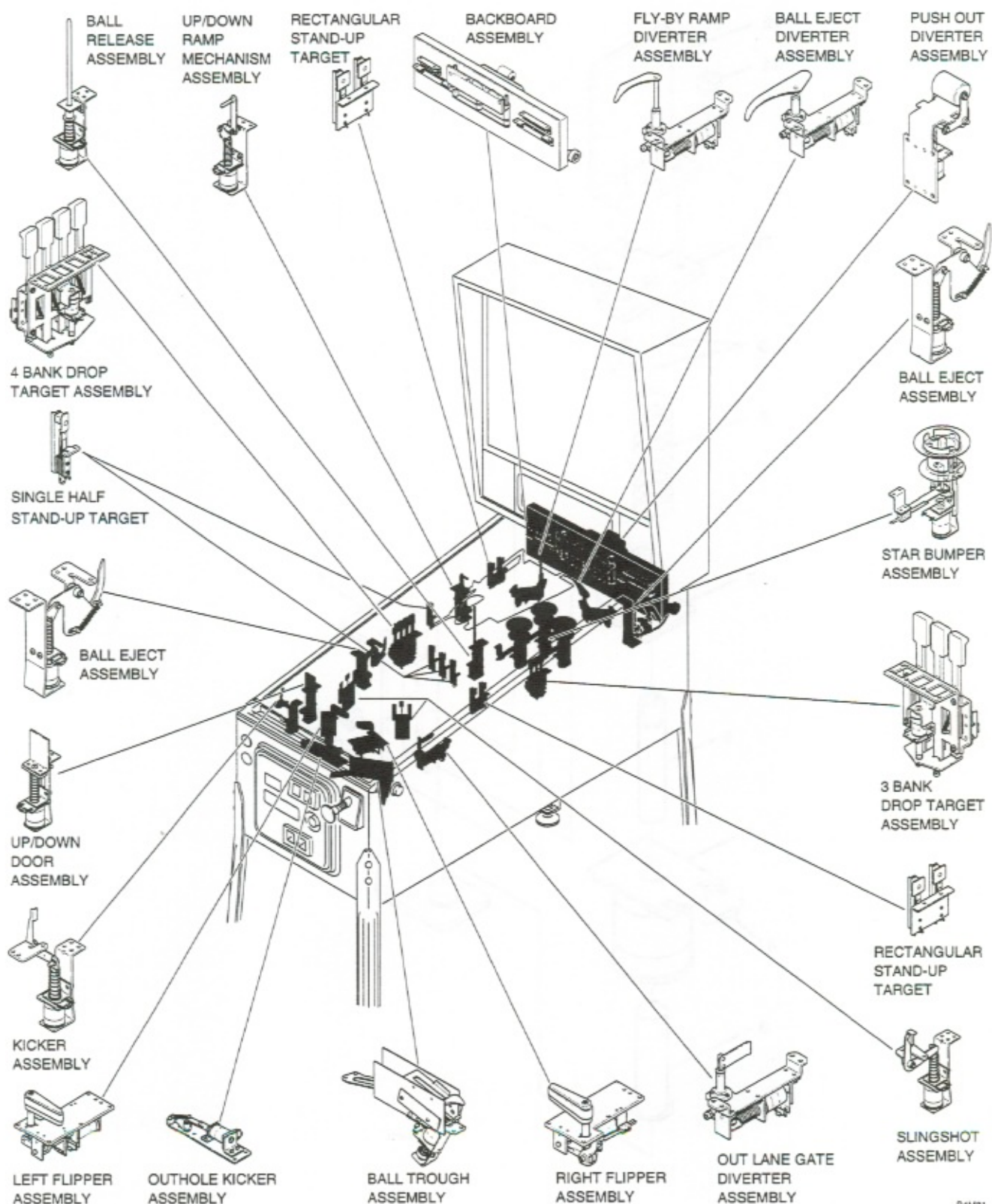
| No. | Part Number | Description                                                                                             | Req. |
|-----|-------------|---------------------------------------------------------------------------------------------------------|------|
|     | A-00531     | ASSEMBLY, JET<br><i>consists of the following parts:</i>                                                |      |
| 1   | SC00146-20  | MACHINE SCREW 8-32 X 2 1/2 PPH ZC                                                                       | 2    |
| 2   | AW00125-38  | PLASTIC, BALL DEFLECTOR, JET TOP                                                                        | 1    |
| 3   | PL00237-03  | SPACER, SELF-RETAINING, #8 X 1/2, BLACK                                                                 | 16   |
| 4   | SC00146-16  | MACHINE SCREW 8-32 X 2.0 PPH ZC                                                                         | 5    |
| 5   | A-00454     | SUB-ASSEMBLY, JET                                                                                       | 1    |
| 6   | PL00327-05  | SPACER, SELF-RETAINING, #8 X 3/4, BLACK                                                                 | 7    |
| 7   |             |                                                                                                         |      |
| 8   | SC00146-08  | MACHINE SCREW 8-32 X 1.0 PPH ZC                                                                         | 8    |
| 9   | AW00125-36  | PLASTIC, JET, BOTTOM HALF                                                                               | 1    |
| 10  | SC00127-02  | MACHINE SCREW 6-32 X 1/4 PPH ZC                                                                         | 12   |
| 11  | NT00104-08  | NUT 8-32 STOP NYLON INS ZC                                                                              | 14   |
| 12  | SC00146-03  | MACHINE SCREW 8-32 X 3/8 PPH ZC                                                                         | 2    |
| 13  | AW00125-21  | PLASTIC, JET, OUTSIDE RIGHT-LANE                                                                        | 1    |
| 14  | SM00145-02  | POST, BUMPER, 1.000, M-F, 1/2 X 0                                                                       | 2    |
| 15  |             |                                                                                                         |      |
| 16  | AW00125-19  | PLASTIC, JET, INSIDE LEFT-LANE                                                                          | 1    |
| 17  | AW00125-18  | PLASTIC, JET, INSIDE RIGHT-LANE                                                                         | 1    |
| 18  | AW00125-20  | PLASTIC, JET OUTSIDE RIGHT-LANE                                                                         | 1    |
| 19  | RB00113     | BUMPER, 1/4ID, 7/16OD, 1.L, BLACK                                                                       |      |
| 20  | SM00155-02  | STANDOFF, HEX F-F, 1.360, 1/2 X 1/2                                                                     | 1    |
| 21  | A-00503-1R  | ASSEMBLY, GUIDE, JET, TOP-RIGHT, LEFT SIDE, OPTO TRANSMITTER<br><i>consists of the following parts:</i> | 1    |
| 21A | SC00127-02  | MACHINE SCREW 6-32 X 1/4 PPH ZC                                                                         | 2    |
| 21B | AW00125-16R | PLASTIC, OPTO COVER REAR RIGHT                                                                          | 1    |
| 21C | MT00480-1R  | GUIDE, JET, TOP-RIGHT, LEFT SIDE                                                                        | 1    |
| 21D | A-0020601   | ASSEMBLY, PCB, OPTO, SINGLE, TRANSMITTER .125 DUAL MOUNTING                                             | 1    |
| 21E | SC00171-02  | MACHINE SCREW 4-40 X 1/4 PPH ZC                                                                         | 2    |
| 22  | A-00504-1R  | ASSEMBLY, GUIDE, JET, TOP-RIGHT, RIGHT SIDE OPTO RECEIVER<br><i>consists of the following parts:</i>    | 1    |
| 22A | SC00127-03  | MACHINE SCREW 6-32 X 3/8 PPH ZC                                                                         | 2    |
| 22B | AW00125-13  | PLASTIC, MISSILE RIGHT                                                                                  | 1    |
| 22C | AW00125-35R | PLASTIC, MISSILE RIGHT OPTO COVER                                                                       | 1    |
| 22D | PL00181-01  | SPACER, #4 X 1/8 SELF-RETAINING                                                                         | 2    |
| 22E | A0020800    | ASSEMBLY, PCB, OPTO, SINGLE, RECEIVER .187 DUAL MOUNTING<br>WITHOUT SHROUD AND RESISTOR                 | 1    |
| 22F | SC00171-03  | MACHINE SCREW 4-40 X 3/8 PPH ZC                                                                         | 2    |
| 22G | MT00481-1R  | GUIDE, JET, TOP-RIGHT, RIGHT SIDE                                                                       | 1    |
| 23  | A-00501-R   | ASSEMBLY, GUIDE, JET, CENTER-RIGHT<br><i>consists of the following parts:</i>                           | 1    |
| 23A | SC00127-02  | MACHINE SCREW 6-32 X 1/4 PPH ZC                                                                         | 2    |
| 23B | AW00125-12R | PLASTIC, OPTO COVER FRONT RIGHT                                                                         | 1    |
| 23C | SC00171-03  | MACHINE SCREW 4-40 X 3/8 PPH ZC                                                                         | 2    |



## JET ASSEMBLY (cont.)

| No. | Part Number | Description                                                                                             | Req. |
|-----|-------------|---------------------------------------------------------------------------------------------------------|------|
| 23D | A0018401    | ASSEMBLY, PCB, OPTO, DUAL, TRANSMITTER .187 MOUNTING                                                    | 1    |
| 23E | PL00181-02  | SPACER, #4 3/16 SELF-RETAINING                                                                          | 2    |
| 23F | MT00478     | GUIDE, JET, CENTER-LEFT/RIGHT                                                                           | 1    |
| 24  | A-00501-L   | ASSEMBLY, GUIDE, JET, CENTER-LEFT<br><i>consists of the following parts:</i>                            | 1    |
| 24A | SC00127-02  | MACHINE SCREW 6-32 X 1/4 PPH ZC                                                                         | 2    |
| 24B | AW00125-12L | PLASTIC, OPTO COVER FRONT LEFT                                                                          | 1    |
| 24C | MT00478     | GUIDE, JET, CENTER-LEFT/RIGHT                                                                           | 1    |
| 24D | PL00181-02  | SPACER, #4 3/16 SELF-RETAINING                                                                          | 2    |
| 24E | A0018501    | ASSEMBLY, PCB, OPTO, DUAL, RECEIVER .187 MOUNTING, WITHOUT SHROUD AND RESISTOR                          | 1    |
| 24F | SC00171-03  | MACHINE SCREW 4-40 X 3/8 PPH ZC                                                                         | 2    |
| 25  | A-00504-1L  | ASSEMBLY, GUIDE, JET, TOP-LEFT, LEFT SIDE, OPTO RECEIVER<br><i>consists of the following parts:</i>     | 1    |
| 25A | SC00127-03  | MACHINE SCREW 6-32 X 3/8 PPH ZC                                                                         | 2    |
| 25B | SC00171-03  | MACHINE SCREW 4-40 X 3/8 PPH ZC                                                                         | 2    |
| 25C | MT00481-1L  | GUIDE, JET, TOP-LEFT LEFT SIDE                                                                          | 1    |
| 25D | A0020800    | ASSEMBLY, PCB, OPTO, SINGLE, RECEIVER .187 DUAL MOUNTING WITHOUT SHROUD AND RESISTOR                    | 1    |
| 25E | PL00181-01  | SPACER, #4 1/8 SELF-RETAINING                                                                           | 2    |
| 25F | AW00125-35L | PLASTIC, MISSILE LEFT OPTO COVER                                                                        | 1    |
| 25G | AW00125-17  | PLASTIC, MISSILE LEFT                                                                                   | 1    |
| 26  | A-00503-1L  | ASSEMBLY, GUIDE, JET, TOP-LEFT, RIGHT SIDE, OPTO TRANSMITTER<br><i>consists of the following parts:</i> | 1    |
| 26A | SC00127-02  | MACHINE SCREW 6-32 X 1/4 PPH ZC                                                                         | 2    |
| 26B | AW00125-16L | PLASTIC, OPTO COVER REAR LEFT                                                                           | 1    |
| 26C | SC00171-02  | MACHINE SCREW 4-40 X 1/4 PPH ZC                                                                         | 2    |
| 26D | A0020601    | ASSEMBLY, PCB, OPTO, SINGLE, TRANSMITTER .125 DUAL MOUNTING                                             | 1    |
| 26E | MT00480-1L  | GUIDE, JET, TOP-LEFT, RIGHT SIDE                                                                        | 1    |

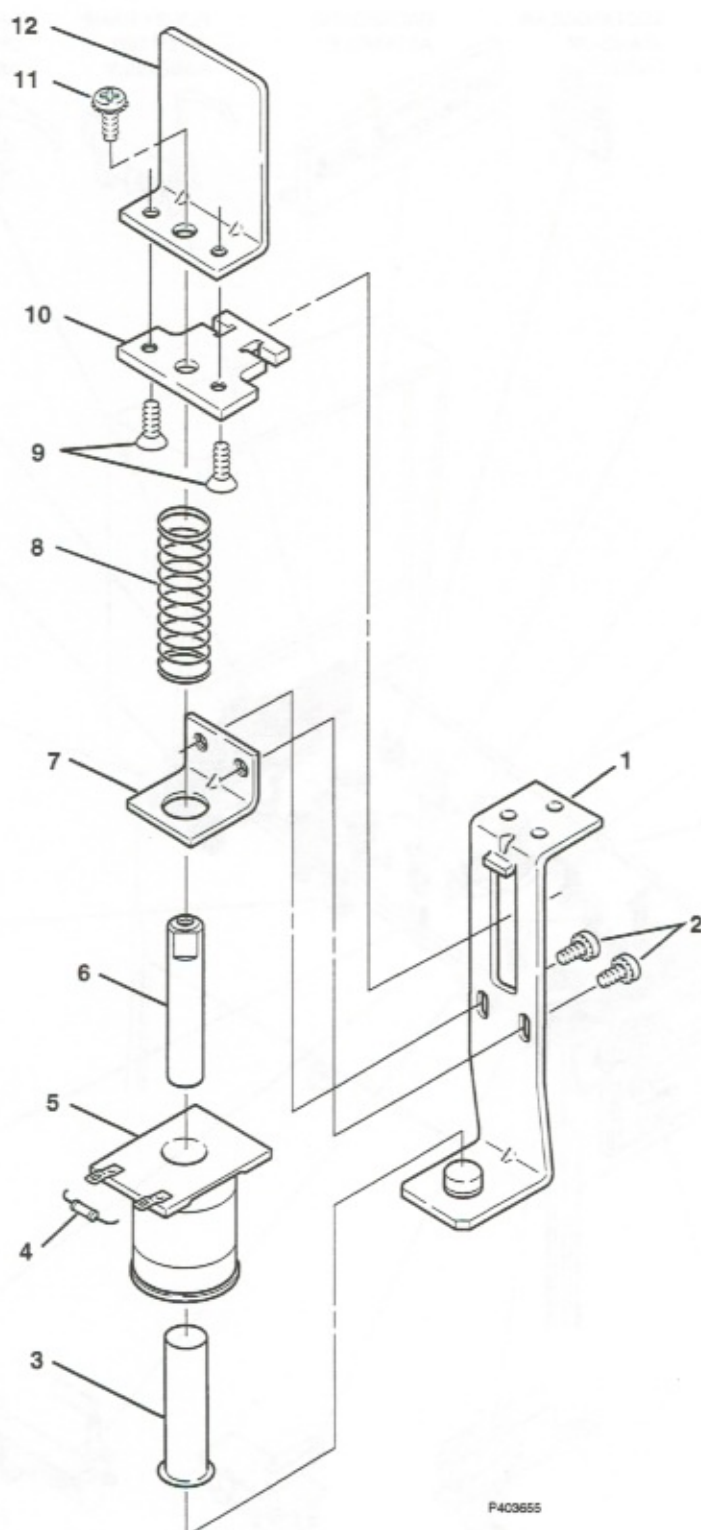
# COMPONENT IDENTIFICATION - PLAYFIELD MECHANISMS



P4M21



## UP / DOWN DOOR ASSEMBLY



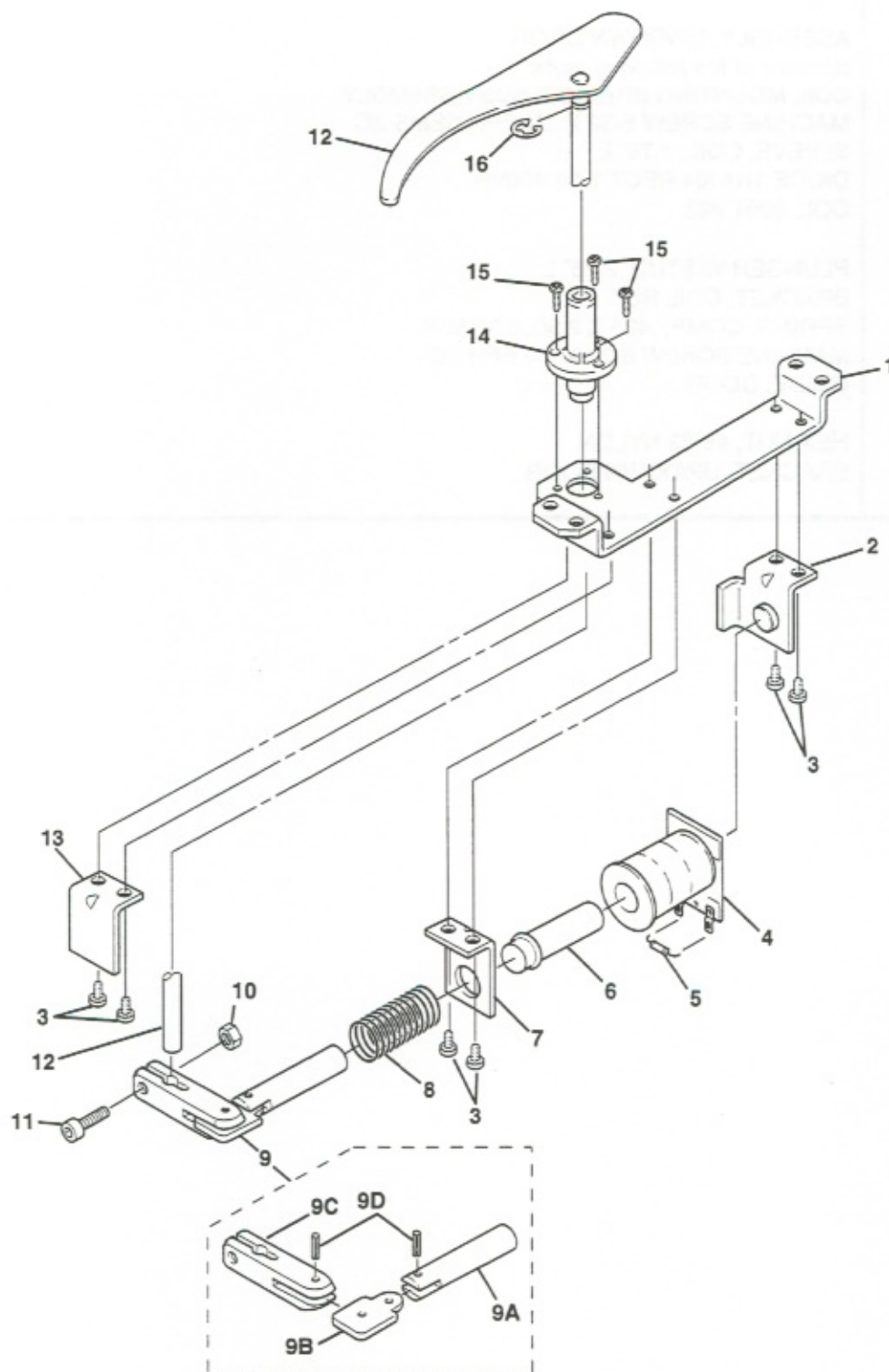
P409655

## UP/DOWN DOOR ASSEMBLY

| No. | Part Number | Description                                                       | Req. |
|-----|-------------|-------------------------------------------------------------------|------|
|     | A-00443     | ASSEMBLY, UP/DOWN DOOR<br><i>consists of the following parts:</i> |      |
| 1   | A-00444     | COIL MOUNTING BRACKET SUB ASSEMBLY                                | 1    |
| 2   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                              | 2    |
| 3   | PL00132-01  | SLEEVE, COIL, 1.75" L                                             | 1    |
| 4   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                      | 1    |
| 5   | CL00109     | COIL 800T #23                                                     | 1    |
| 6   | SM00118     | PLUNGER W/STUD, 2.75" L                                           | 1    |
| 7   | MT00198     | BRACKET, COIL RET                                                 | 1    |
| 8   | SG00127     | SPRING, COMP, .485 X 2.50, 0.35 MW                                | 1    |
| 9   | SC00106-02  | MACHINE SCREW 6-32 X 1/4 PFH ZC                                   | 2    |
| 10  | PL00337     | GUIDE, DOOR                                                       | 1    |
| 11  | NT00104-08  | HEX NUT, #8-32 NYLON                                              | 1    |
| 12  | MT00435-1   | BRACKET, UP/DOWN DOOR                                             | 1    |



## FLY-BY RAMP DIVERTER ASSEMBLY



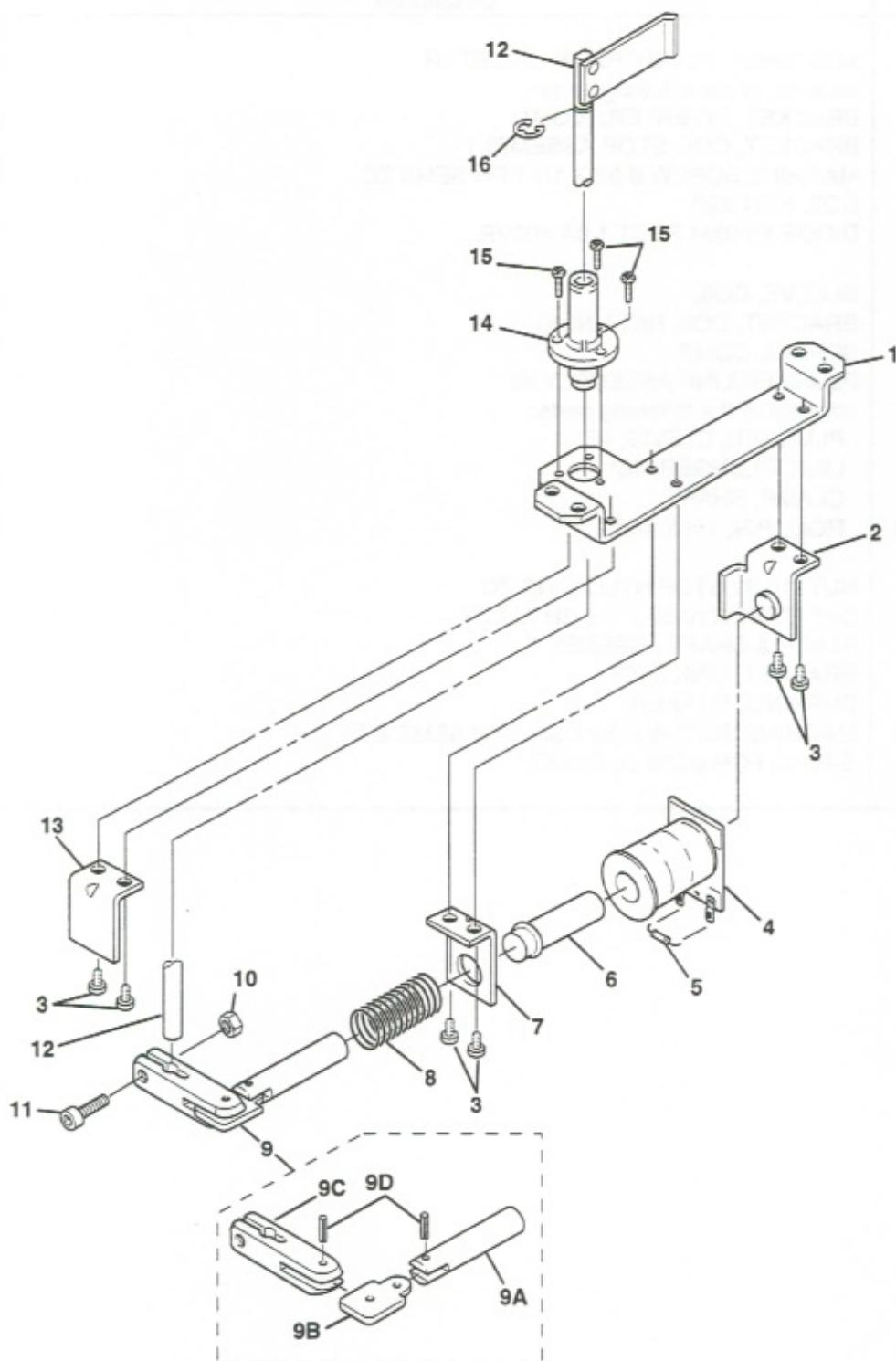
P4M05E

## FLY-BY RAMP DIVERTER ASSEMBLY

| No. | Part Number | Description                                                               | Req. |
|-----|-------------|---------------------------------------------------------------------------|------|
|     | A-00607     | ASSEMBLY, FLY-BY RAMP DIVERTER<br><i>consists of the following parts:</i> |      |
| 1   | MT00181-R   | BRACKET, DIVERTER, RIGHT                                                  | 1    |
| 2   | A-00134-1   | BRACKET, COIL STOP ASSEMBLY                                               | 1    |
| 3   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                      | 6    |
| 4   | CL00109     | COIL 800T #23                                                             | 1    |
| 5   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                              | 1    |
| 6   | PL00132-03  | SLEEVE, COIL                                                              | 1    |
| 7   | MT00185-1   | BRACKET, COIL RETAINING                                                   | 1    |
| 8   | SG00104-1   | SPRING, COMP.                                                             | 1    |
| 9   | A-00230     | PLUNGER/LINK ASSEMBLY 45°<br><i>consists of the following parts:</i>      | 1    |
| 9A  | SM00143     | PLUNGER, CLEVIS, 45°                                                      | 1    |
| 9B  | FB00102     | LINK, PLUNGER, 45°                                                        | 1    |
| 9C  | MT00183-1   | CLAMP, SHAFT                                                              | 1    |
| 9D  | RP00100-04  | ROLL PIN, 1/8 X 1/2" L                                                    | 2    |
| 10  | NT00104-11  | NUT, 10-32 STOP NYLON INS ZC                                              | 1    |
| 11  | SC00135-05  | CAP SCREW 10-32 X 5/8 SH ALLOY                                            | 1    |
| 12  | A-00229     | BLADE & SHAFT ASSEMBLY                                                    | 1    |
| 13  | MT00323     | BRACKET, LINK STOP                                                        | 1    |
| 14  | PL00149     | BUSHING, FLIPPER                                                          | 1    |
| 15  | SC00100-03  | MACHINE SCREW 6-32 X 3/8 PPH SEMS ZC                                      | 3    |
| 16  | RR00100-25  | E-RING FOR 0.250 D. SHAFT                                                 | 1    |



## OUTLANE GATE DIVERTER ASSEMBLY



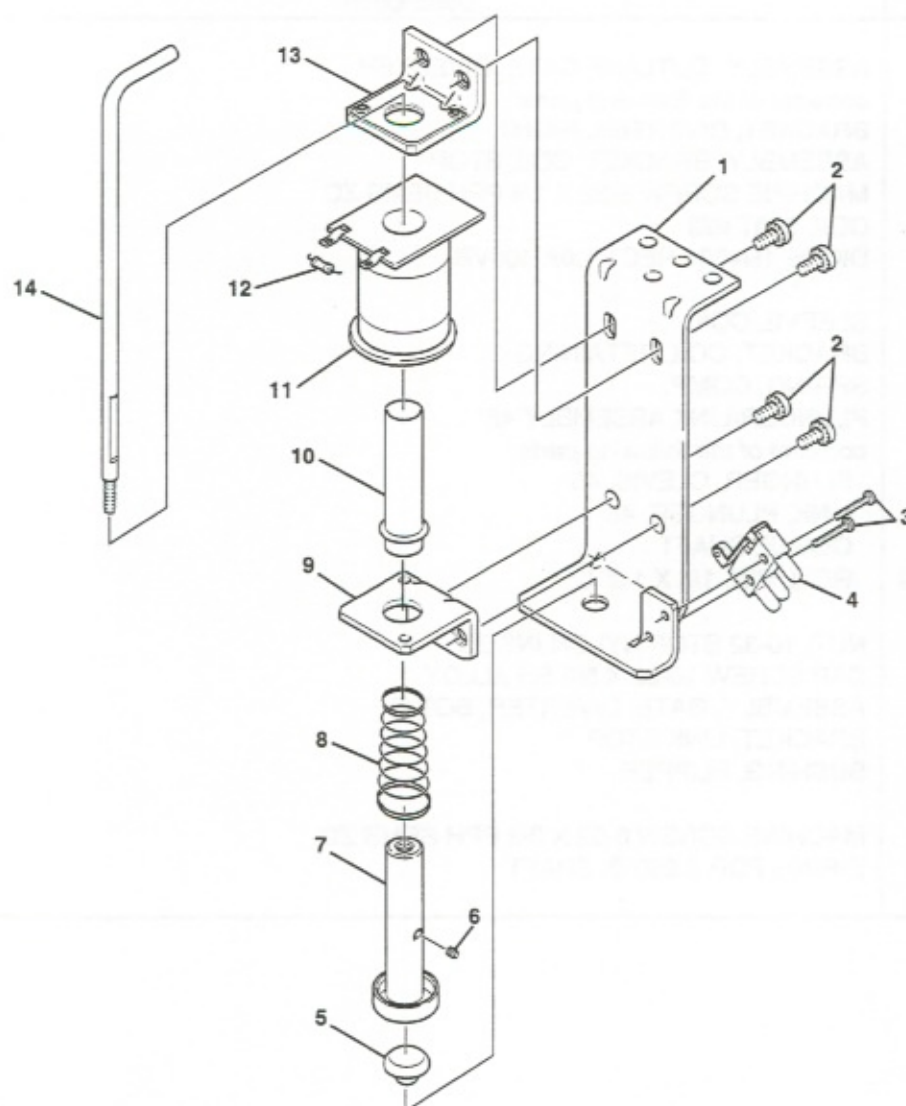
P406634

## OUTLANE GATE DIVERTER ASSEMBLY

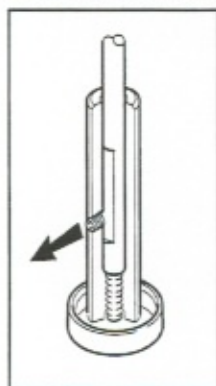
| No. | Part Number | Description                                                                 | Req. |
|-----|-------------|-----------------------------------------------------------------------------|------|
|     | A-00606     | ASSEMBLY, OUTLANE GATE, DIVERTER<br><i>consists of the following parts:</i> |      |
| 1   | MT00181-R   | BRACKET, DIVERTER, RIGHT                                                    | 1    |
| 2   | A-00314-1   | ASSEMBLY, BRACKET, COIL STOP                                                | 1    |
| 3   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                        | 6    |
| 4   | CL00109     | COIL 800T #23                                                               | 1    |
| 5   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                                | 1    |
| 6   | PL00132-03  | SLEEVE, COIL                                                                | 1    |
| 7   | MT00185-1   | BRACKET, COIL RETAINING                                                     | 1    |
| 8   | SG00104-1   | SPRING, COMP.                                                               | 1    |
| 9   | A-00230     | PLUNGER/LINK ASSEMBLY 45°<br><i>consists of the following parts:</i>        | 1    |
| 9A  | SM00143     | PLUNGER, CLEVIS, 45°                                                        | 1    |
| 9B  | FB00102     | LINK, PLUNGER, 45°                                                          | 1    |
| 9C  | MT00183-1   | CLAMP, SHAFT                                                                | 1    |
| 9D  | RP00100-04  | ROLL PIN, 1/8 X 1/2" L                                                      | 2    |
| 10  | NT00104-11  | NUT, 10-32 STOP NYLON INS ZC                                                | 1    |
| 11  | SC00135-05  | CAP SCREW 10-32 X 5/8 SH ALLOY                                              | 1    |
| 12  | A-00233-1   | ASSEMBLY, GATE, DIVERTER, BOT-R                                             | 1    |
| 13  | MT00323     | BRACKET, LINK STOP                                                          | 1    |
| 14  | PL00149     | BUSHING, FLIPPER                                                            | 1    |
| 15  | SC00100-03  | MACHINE SCREW 6-32 X 3/8 PPH SEMS ZC                                        | 3    |
| 16  | RR00100-25  | E-RING FOR 0.250 D. SHAFT                                                   | 1    |



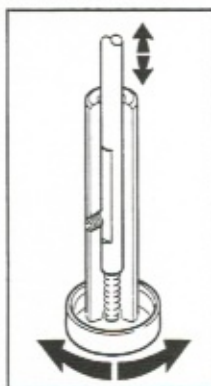
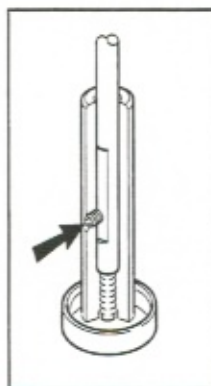
## UP / DOWN RAMP MECH ASSEMBLY



## UP/DOWN RAMP ADJUSTMENT



LOOSEN SET SCREW.

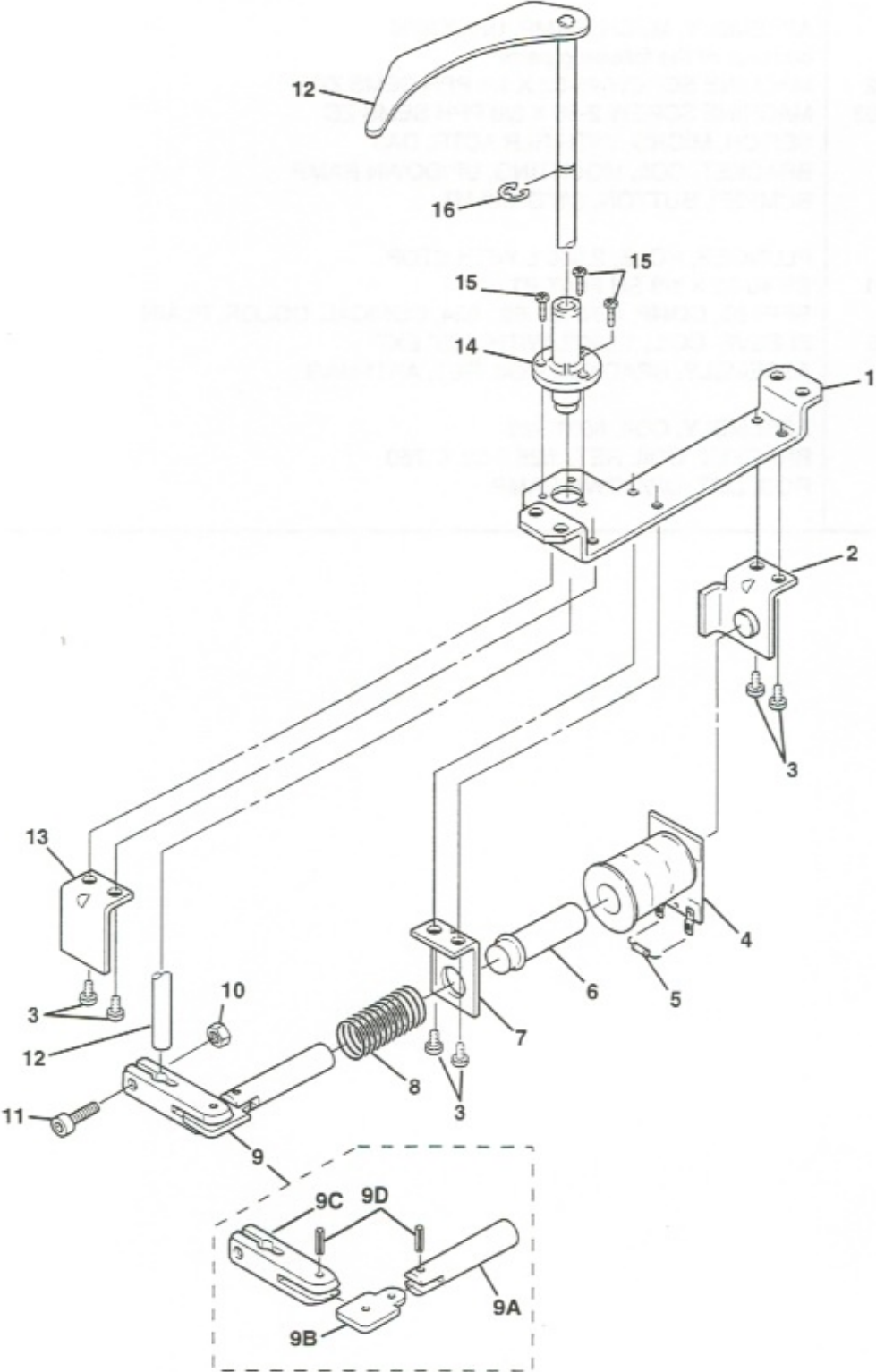
ADJUST POSITION OF  
UP/DOWN RAMP BY  
ROTATING PLUNGER.TIGHTEN SET SCREW  
AGAINST EITHER FLAT  
SURFACE OF LIFT ROD.

P4M701

| UP/DOWN RAMP MECH ASSEMBLY |             |                                                                          |      |
|----------------------------|-------------|--------------------------------------------------------------------------|------|
| No.                        | Part Number | Description                                                              | Req. |
|                            | A-00642     | ASSEMBLY, MECH, RAMP, UP/DOWN<br><i>consists of the following parts:</i> |      |
| 1                          | SC00101-02  | MACHINE SCREW #8-32 X 1/4 PPH SEMS ZC                                    | 4    |
| 2                          | SC00157-03  | MACHINE SCREW 2-56 X 3/8 PPH SEMS ZC                                     | 2    |
| 3                          | SW00101     | SEITCH, MICRO, WITH RLR ACTR, DA3                                        | 1    |
| 4                          | MT00586     | BRACKET, COIL MOUNTING, UP/DOWN RAMP                                     | 1    |
| 5                          | RB00103     | BUMPER, BUTTON, 5/8"D 1/8" HT                                            | 1    |
| 6                          | SM00244     | PLUNGER, HOLE, 2.000"L WITH STOP                                         | 1    |
| 7                          | SC00133-01  | SS #8-32 X 1/8 SH FLAT PT                                                | 1    |
| 8                          | SG00105     | SPRING, COMP, 0.70 X 1.62, .024, CONICAL, COLOR, PLAIN                   | 1    |
| 9                          | PL00133-05  | SLEEVE, COIL, 1.880"L WITH .188" EXT                                     | 1    |
| 10                         | A-00614     | ASSEMBLY, BRACKET, COIL RET, ANTI-MAG                                    | 1    |
| 11                         | CL00109     | ASSEMBLY, COIL 800T #23                                                  | 1    |
| 12                         | MT00584     | BRACKET, COIL RET, .625 8-32 X .750                                      | 1    |
| 13                         | SM00245     | ROD, LIFT, UP/DOWN RAMP                                                  | 1    |



BALL EJECT DIVERter ASSEMBLY

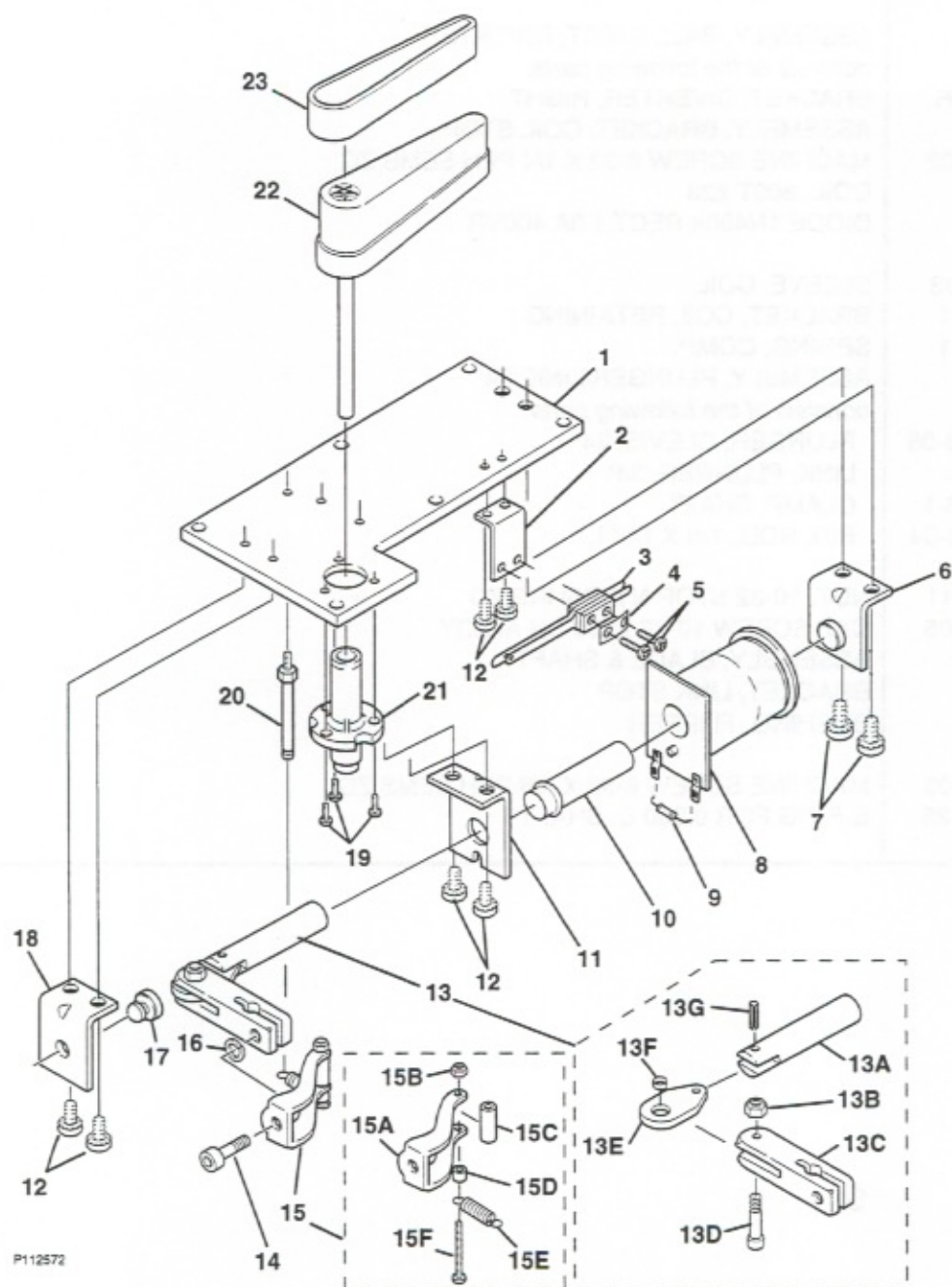


P4M08E

| BALL EJECT DIVERter ASSEMBLY |             |                                                                           |      |
|------------------------------|-------------|---------------------------------------------------------------------------|------|
| No.                          | Part Number | Description                                                               | Req. |
|                              | A-00605     | ASSEMBLY, BALL EJECT, DIVERter<br><i>consists of the following parts:</i> |      |
| 1                            | MT00181-R   | BRACKET, DIVERter, RIGHT                                                  | 1    |
| 2                            | A-00134-1   | ASSEMBLY, BRACKET, COIL STOP                                              | 1    |
| 3                            | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                      | 6    |
| 4                            | CL00109     | COIL, 800T #23                                                            | 1    |
| 5                            | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                              | 1    |
| 6                            | PL00132-03  | SLEEVE, COIL                                                              | 1    |
| 7                            | MT00185-1   | BRACKET, COIL RETAINING                                                   | 1    |
| 8                            | SG00104-1   | SPRING, COMP.                                                             | 1    |
| 9                            | A-00228     | ASSEMBLY, PLUNGER/LINK, 34°<br><i>consists of the following parts:</i>    | 1    |
| 9A                           | SM00113-05  | PLUNGER, CLEVIS, 34°                                                      | 1    |
| 9B                           | PL00150     | LINK, PLUNGER, 34°                                                        | 1    |
| 9C                           | MT00183-1   | CLAMP, SHAFT                                                              | 1    |
| 9D                           | RP00100-04  | PIN, ROLL 1/8 X 1/2" L                                                    | 2    |
| 10                           | NT00104-11  | NUT, 10-32 STOP NYLON INS ZC                                              | 1    |
| 11                           | SC00135-05  | CAP SCREW 10-32 X 5/8 SH ALLOY                                            | 1    |
| 12                           | A-00227     | ASSEMBLY, BLADE & SHAFT                                                   | 1    |
| 13                           | MT00323     | BRACKET, LINK STOP                                                        | 1    |
| 14                           | PL00149     | BUSHING, FLIPPER                                                          | 1    |
| 15                           | SC00100-03  | MACHINE SCREW 6-32 X 3/8 PPH SEMS ZC                                      | 3    |
| 16                           | RR00100-25  | E-RING FOR 0.250 D. SHAFT                                                 | 1    |



## RIGHT FLIPPER ASSEMBLY

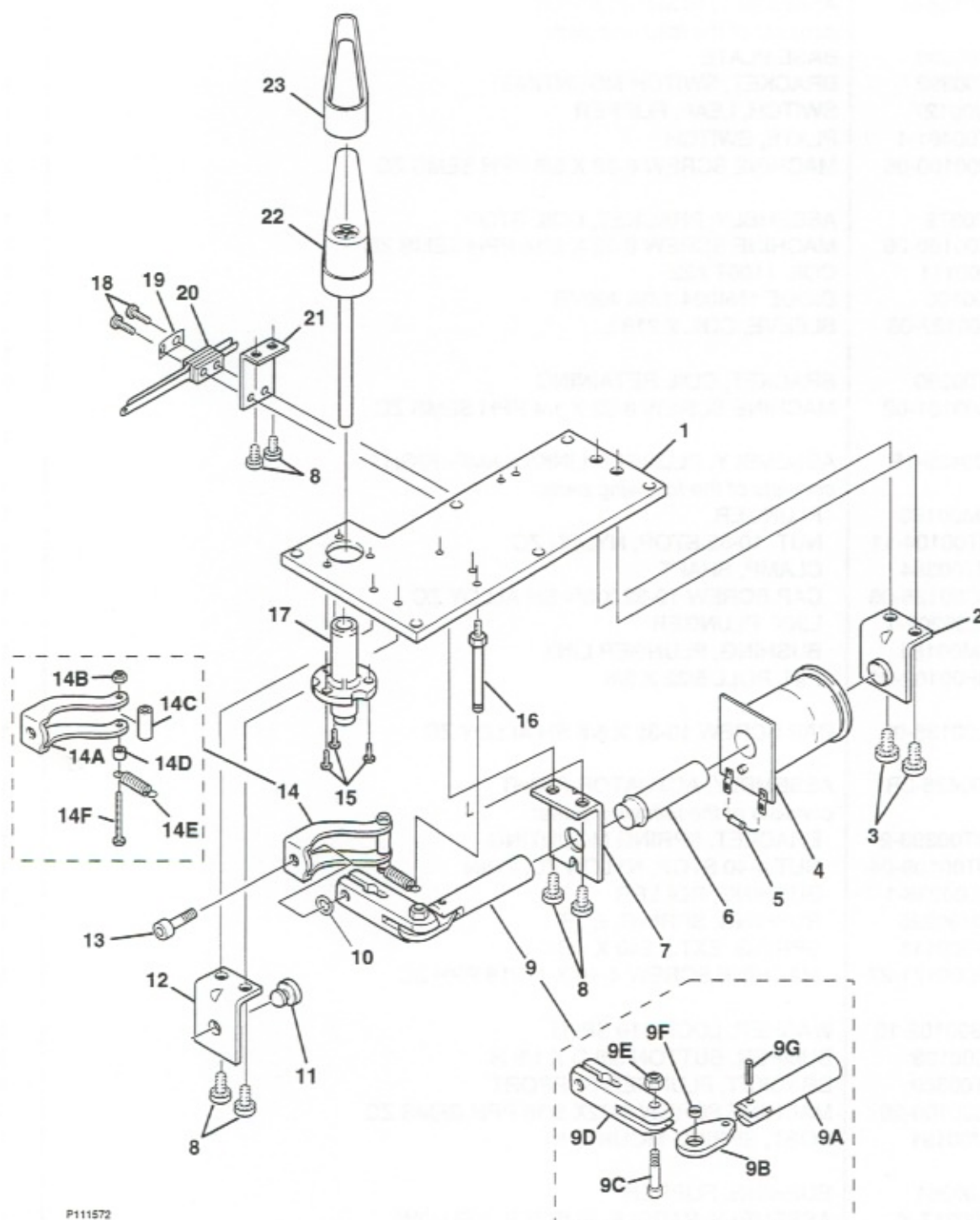


## RIGHT FLIPPER ASSEMBLY

| No. | Part Number | Description                                                                    | Req. |
|-----|-------------|--------------------------------------------------------------------------------|------|
|     | A-00155-R   | ASSEMBLY, RIGHT FLIPPER<br><i>consists of the following parts:</i>             |      |
| 1   | MT00388     | BASE PLATE                                                                     | 1    |
| 2   | MT00392     | BRACKET, SWITCH MOUNTING                                                       | 1    |
| 3   | SW00127     | SWITCH, LEAF, FLIPPER                                                          | 1    |
| 4   | MT00461-1   | PLATE, SWITCH                                                                  | 1    |
| 5   | SC00100-05  | MACHINE SCREW 6-32 X 5/8 PPH SEMS ZC                                           | 2    |
| 6   | A-00378     | ASSEMBLY, BRACKET, COIL STOP                                                   | 1    |
| 7   | SC00160-26  | MACHINE SCREW 8-32 X 5/16 PPH SEMS ZC                                          | 2    |
| 8   | CL00111     | COIL 1100T #22                                                                 | 1    |
| 9   | DI00100     | DIODE 1N4004 1.0A 400VR                                                        | 1    |
| 10  | PL00132-05  | SLEEVE, COIL 2.218 L                                                           | 1    |
| 11  | MT00390     | BRACKET, COIL RETAINING                                                        | 6    |
| 12  | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                           | 1    |
| 13  | A-00429-1R  | ASSEMBLY, PLUNGER/LINK/CLAMP- RIGHT<br><i>consists of the following parts:</i> | 1    |
| 13A | SM00183     | PLUNGER                                                                        | 1    |
| 13B | NT00104-11  | NUT, 10-32 STOP, NYLON ZC                                                      | 1    |
| 13C | MT00394     | CLAMP, SHAFT                                                                   | 1    |
| 13D | SC00135-06  | CAP SCREW 10-32 X 3/4 SH ALLOY ZC                                              | 1    |
| 13E | PL00202-1   | LINK, PLUNGER                                                                  | 1    |
| 13F | SM00184     | BUSHING, PLUNGER LINK                                                          | 1    |
| 13G | RP00102-01  | PIN, ROLL 5/32 X 3/8                                                           | 1    |
| 14  | SC00135-05  | CAP SCREW 10-32 X 5/8 SH ALLOY ZC                                              | 1    |
| 15  | A-00425-2R  | ASSEMBLY, ACTUATOR-RIGHT<br><i>consists of the following parts:</i>            | 1    |
| 15A | MT00393-2   | BRACKET, SPRING MOUNTING                                                       | 1    |
| 15B | NT00109-04  | NUT 4-40 STOP, NYLON ZC, THIN                                                  | 1    |
| 15C | PL00288-1   | BUSHING, ROLLER                                                                | 1    |
| 15D | SM00225     | BUSHING, SPRING, EOS                                                           | 1    |
| 15E | SG00111     | SPRING, EXT., .240 X .834" L                                                   | 1    |
| 15F | SC00171-27  | MACHINE SCREW 4-40 X 1 1/16 PPH ZC                                             | 1    |
| 16  | WS00102-10  | WASHER, LOCK #10 SPLIT                                                         | 1    |
| 17  | RB00103     | BUMPER, BUTTON 5/8 D X 1/8 H                                                   | 1    |
| 18  | MT00389     | BRACKET, PLUNGER SUPPORT                                                       | 1    |
| 19  | SC00100-26  | MACHINE SCREW 6-32X 5/16 PPH SEMS ZC                                           | 3    |
| 20  | SM00191     | POST, SPRING MOUNTING                                                          | 1    |
| 21  | PL00264     | BUSHING, FLIPPER                                                               | 1    |
| 22  | A-00217-Y   | ASSEMBLY, PADDLE, FLIPPER, YELLOW                                              | 1    |
| 23  | RB00114-BK  | RUBBER, PADDLE, BLACK                                                          | 1    |



## LEFT FLIPPER ASSEMBLY



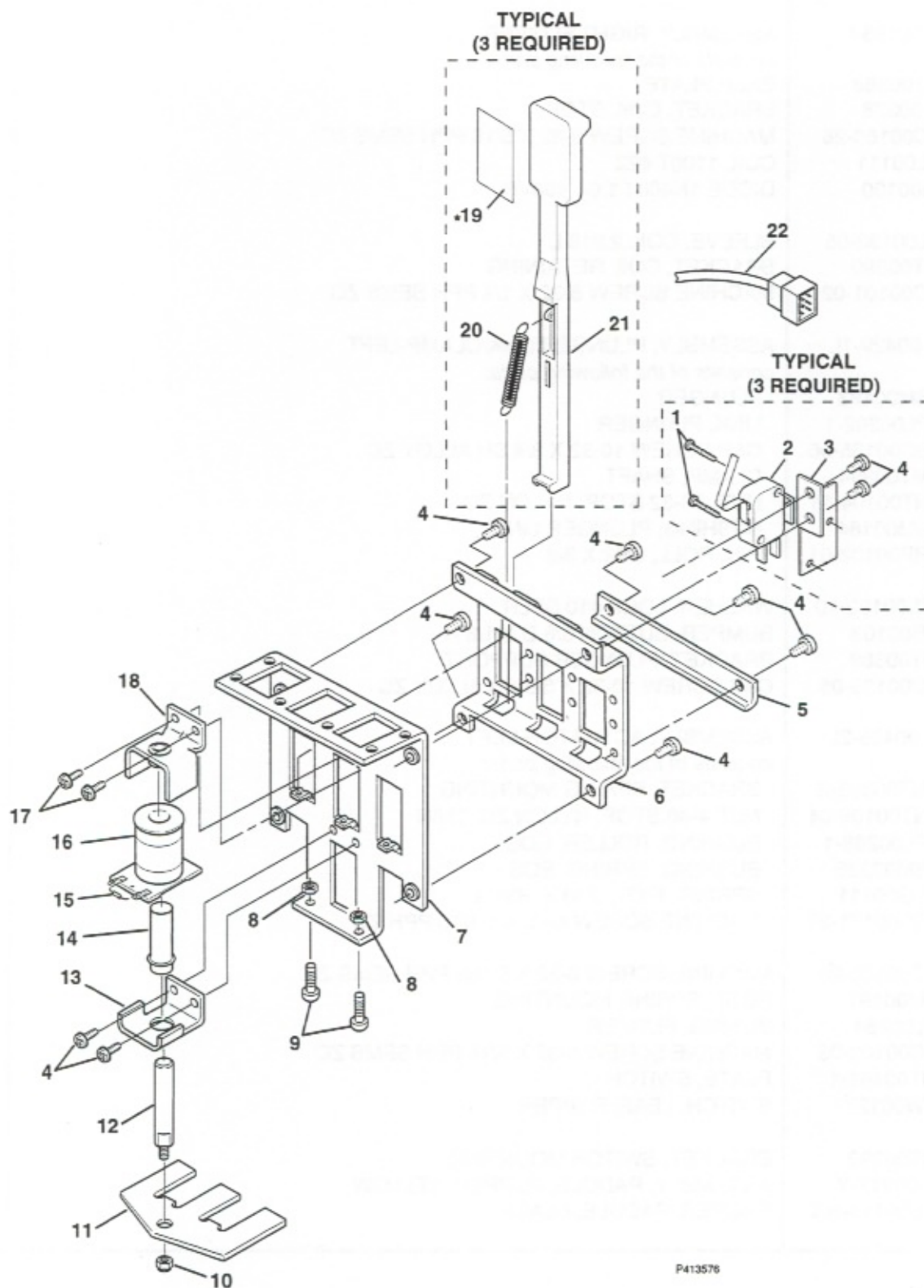
P111572

## LEFT FLIPPER ASSEMBLY

| No. | Part Number | Description                                                                  | Req. |
|-----|-------------|------------------------------------------------------------------------------|------|
|     | A-00155-L   | ASSEMBLY, RIGHT FLIPPER<br><i>consists of the following parts:</i>           |      |
| 1   | MT00388     | BASE PLATE                                                                   | 1    |
| 2   | A-00378     | BRACKET, COIL STOP                                                           | 1    |
| 3   | SC00160-26  | MACHINE SCREW 8-32 X 5/16 PPH SEMS ZC                                        | 2    |
| 4   | CL00111     | COIL 1100T #22                                                               | 1    |
| 5   | DI00100     | DIODE 1N4004 1.0A 400VR                                                      | 1    |
| 6   | PL00132-05  | SLEEVE, COIL 2.218 L                                                         | 1    |
| 7   | MT00390     | BRACKET, COIL RETAINING                                                      | 1    |
| 8   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                         | 6    |
| 9   | A-00429-1L  | ASSEMBLY, PLUNGER/LINK/CLAMP-LEFT<br><i>consists of the following parts:</i> | 1    |
| 9A  | SM00183     | PLUNGER                                                                      | 1    |
| 9B  | PL00202-1   | LINK, PLUNGER                                                                | 1    |
| 9C  | SC00135-06  | CAP SCREW 10-32 X 3/4 SH ALLOY ZC                                            | 1    |
| 9D  | MT00394     | CLAMP, SHAFT                                                                 | 1    |
| 9E  | NT00104-11  | NUT, 10-32 STOP, NYLON ZC                                                    | 1    |
| 9F  | SM00184     | BUSHING, PLUNGER LINK                                                        | 1    |
| 9G  | RP00102-01  | PIN, ROLL, 5/32 X 3/8                                                        | 1    |
| 10  | WS00102-10  | WASHER, LOCK #10 SPLIT                                                       | 1    |
| 11  | RB00103     | BUMPER, BUTTON 5/8 D X 1/8 H                                                 | 1    |
| 12  | MT00389     | BRACKET, PLUNGER SUPPORT                                                     | 1    |
| 13  | SC00135-05  | CAP SCREW 10-32 X 5/8 SH ALLOY ZC                                            | 1    |
| 14  | A-00425-2L  | ASSEMBLY, ACTUATOR-LEFT<br><i>consists of the following parts:</i>           | 1    |
| 14A | MT00393-2   | BRACKET, SPRING MOUNTING                                                     | 1    |
| 14B | NT00109-04  | NUT 4-40 STOP, NYLON ZC, THIN                                                | 1    |
| 14C | PL00288-1   | BUSHING, ROLLER, EOS                                                         | 1    |
| 14D | SM00225     | BUSHING, SPRING, EOS                                                         | 1    |
| 14E | SG00111     | SPRING, EXT., .240 X .834" L                                                 | 1    |
| 14F | SC00171-27  | MACHINE SCREW 4-40 X 1 1/16 PPH ZC                                           | 1    |
| 15  | SC00100-26  | MACHINE SCREW 6-32 X 5/16 PPH SEMS ZC                                        | 3    |
| 16  | SM00191     | POST, SPRING MOUNTING                                                        | 1    |
| 17  | PL00264     | BUSING, FLIPPER                                                              | 1    |
| 18  | SC00100-05  | MACHINE SCREW 6-32 X 5/16 PPH SEMS ZC                                        | 2    |
| 19  | MT00461-1   | PLATE, SWITCH                                                                | 1    |
| 20  | SW00127     | SWITCH, LEAF, FLIPPER                                                        | 1    |
| 21  | MT00392     | BRACKET, SWITCH MOUNTING                                                     | 1    |
| 22  | A-00217-Y   | ASSEMBLY, PADDLE, FLIPPER, YELLOW                                            | 1    |
| 23  | RB00114-BK  | RUBBER, PADDLE, BLACK                                                        | 1    |



## THREE BANK DROP TARGET ASSEMBLY



P413576

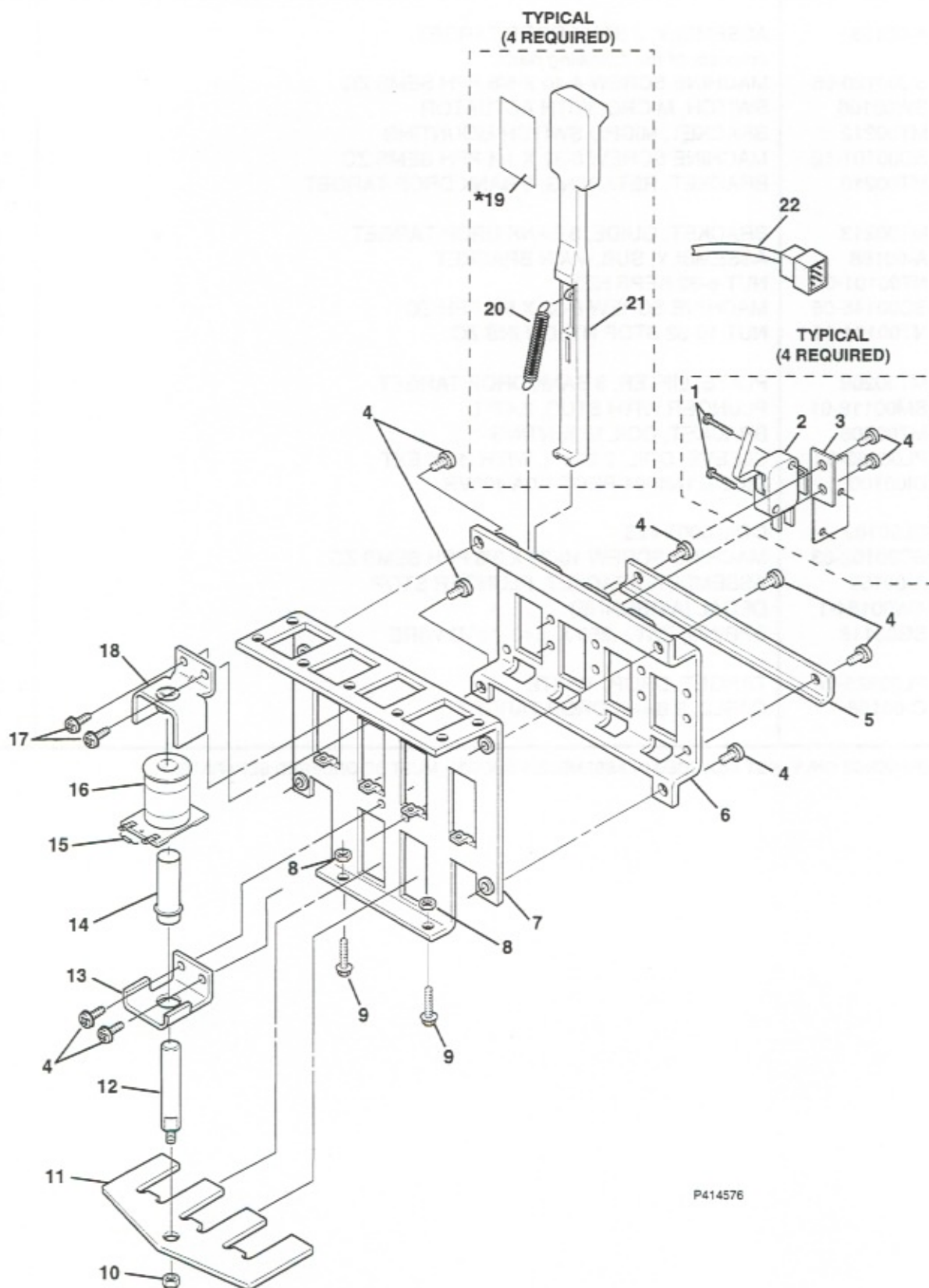
## THREE BANK TARGET ASSEMBLY

| No. | Part Number | Description                                                             | Req. |
|-----|-------------|-------------------------------------------------------------------------|------|
|     | A-00153     | ASSEMBLY, 3 BANK DROP TARGET<br><i>consists of the following parts:</i> |      |
| 1   | SC00120-05  | MACHINE SCREW 4-40 X 5/8 PPH SEMS ZC                                    | 6    |
| 2   | SW00106     | SWITCH, MICRO, WITH ACTUATOR                                            | 3    |
| 3   | MT00212     | BRACKET, MICRO SWITCH MOUNTING                                          | 3    |
| 4   | SC00101-12  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                    | 14   |
| 5   | MT00210     | BRACKET, RETAINING, 3 BANK DROP TARGET                                  | 1    |
| 6   | MT00213     | BRACKET, GUIDE, 3 BANK DROP TARGET                                      | 1    |
| 7   | A-00158     | ASSEMBLY, SUB, MAIN BRACKET                                             | 1    |
| 8   | NT00101-08  | NUT 8-32 KEPS HEX                                                       | 2    |
| 9   | SC00146-05  | MACHINE SCREW 8-32 X 5/8 PPH ZC                                         | 2    |
| 10  | NT00104-11  | NUT 10-32 STOP NYLON INS ZC                                             | 1    |
| 11  | MT00209     | PLATE, LIFTER, 3 BANK DROP TARGET                                       | 1    |
| 12  | SM00118-01  | PLUNGER WITH STUD, 2.47" L                                              | 1    |
| 13  | MT00208     | BRACKET, COIL MOUNTING                                                  | 1    |
| 14  | PL00133-03  | SLEEVE, COIL, 2.094" L WITH .188" EXT                                   | 1    |
| 15  | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                            | 1    |
| 16  | CL00109     | COIL 800T #23                                                           | 1    |
| 17  | SC00102-03  | MACHINE SCREW 10-32 X 3/8 PPH SEMS ZC                                   | 2    |
| 18  | A-00159     | ASSEMBLY, BRACKET, PLUNGER STOP                                         | 1    |
| *19 | AW00164-1   | DECAL (AIRBORNE)                                                        | 3    |
| 20  | SG00118     | SPRING, EXT., .250 X .440 .16" D WIRE                                   | 3    |
| 21  | PL00325-W   | TARGET, DROP, WHITE                                                     | 3    |
| 22  | C-00158     | CABLE, 3 BANK DROP TARGET                                               | 1    |

\*NOTE: REFERENCE ONLY- NOT INCLUDED IN ASSEMBLIES SHOWN. MUST BE ORDERED SEPARATELY.



## FOUR BANK DROP TARGET ASSEMBLY



P414576

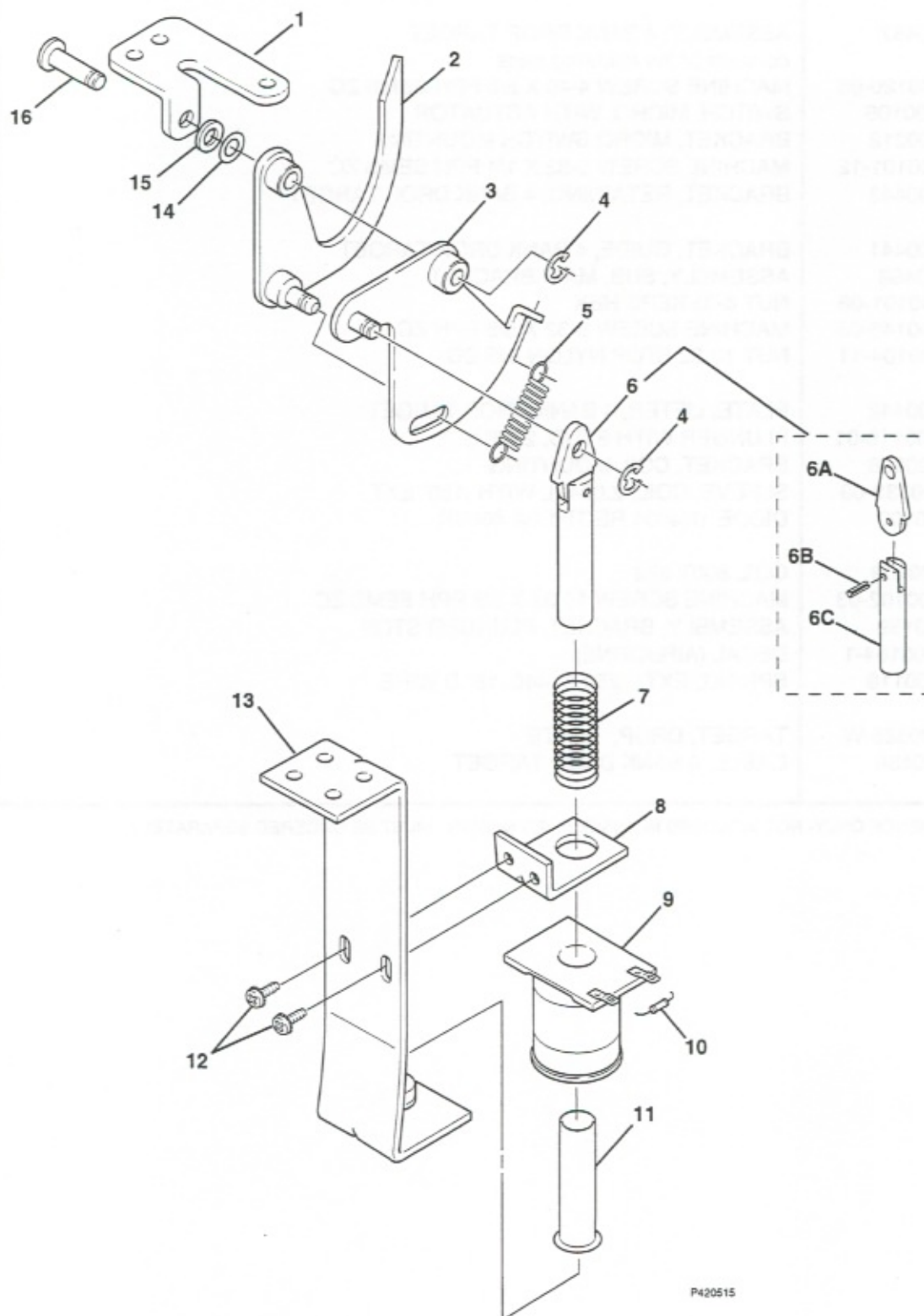
## FOUR BANK TARGET ASSEMBLY

| No. | Part Number | Description                                                             | Req. |
|-----|-------------|-------------------------------------------------------------------------|------|
|     | A-00457     | ASSEMBLY, 4 BANK DROP TARGET<br><i>consists of the following parts:</i> |      |
| 1   | SC00120-05  | MACHINE SCREW 4-40 X 5/8 PPH SEMS ZC                                    | 8    |
| 2   | SW00106     | SWITCH, MICRO, WITH ACTUATOR                                            | 4    |
| 3   | MT00212     | BRACKET, MICRO SWITCH MOUNTING                                          | 4    |
| 4   | SC00101-12  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                    | 16   |
| 5   | MT00443     | BRACKET, RETAINING, 4 BANK DROP TARGET                                  | 1    |
| 6   | MT00441     | BRACKET, GUIDE, 4 BANK DROP TARGET                                      | 1    |
| 7   | A-00456     | ASSEMBLY, SUB, MAIN BRACKET                                             | 1    |
| 8   | NT00101-08  | NUT 8-32 KEPS HEX                                                       | 2    |
| 9   | SC00146-05  | MACHINE SCREW 8-32 X 5/8 PPH ZC                                         | 2    |
| 10  | NT00104-11  | NUT 10-32 STOP NYLON INS ZC                                             | 1    |
| 11  | MT00442     | PLATE, LIFTER, 4 BANK DROP TARGET                                       | 1    |
| 12  | SM00118-01  | PLUNGER WITH STUD, 2.47" L                                              | 1    |
| 13  | MT00208     | BRACKET, COIL MOUNTING                                                  | 1    |
| 14  | PL00133-03  | SLEEVE, COIL, 2.094" L WITH .188" EXT                                   | 1    |
| 15  | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                            | 1    |
| 16  | CL00109     | COIL 800T #23                                                           | 1    |
| 17  | SC00102-03  | MACHINE SCREW 10-32 X 3/8 PPH SEMS ZC                                   | 2    |
| 18  | A-00159     | ASSEMBLY, BRACKET, PLUNGER STOP                                         | 1    |
| *19 | AW00164-1   | DECAL (AIRBORNE)                                                        | 4    |
| 20  | SG00118     | SPRING, EXT., .250 X .440 .16" D WIRE                                   | 4    |
| 21  | PL00325-W   | TARGET, DROP, WHITE                                                     | 4    |
| 22  | C-00158     | CABLE, 4 BANK DROP TARGET                                               | 1    |

\*NOTE: REFERENCE ONLY- NOT INCLUDED IN ASSEMBLIES SHOWN. MUST BE ORDERED SEPARATELY.



## BALL EJECT ASSEMBLY

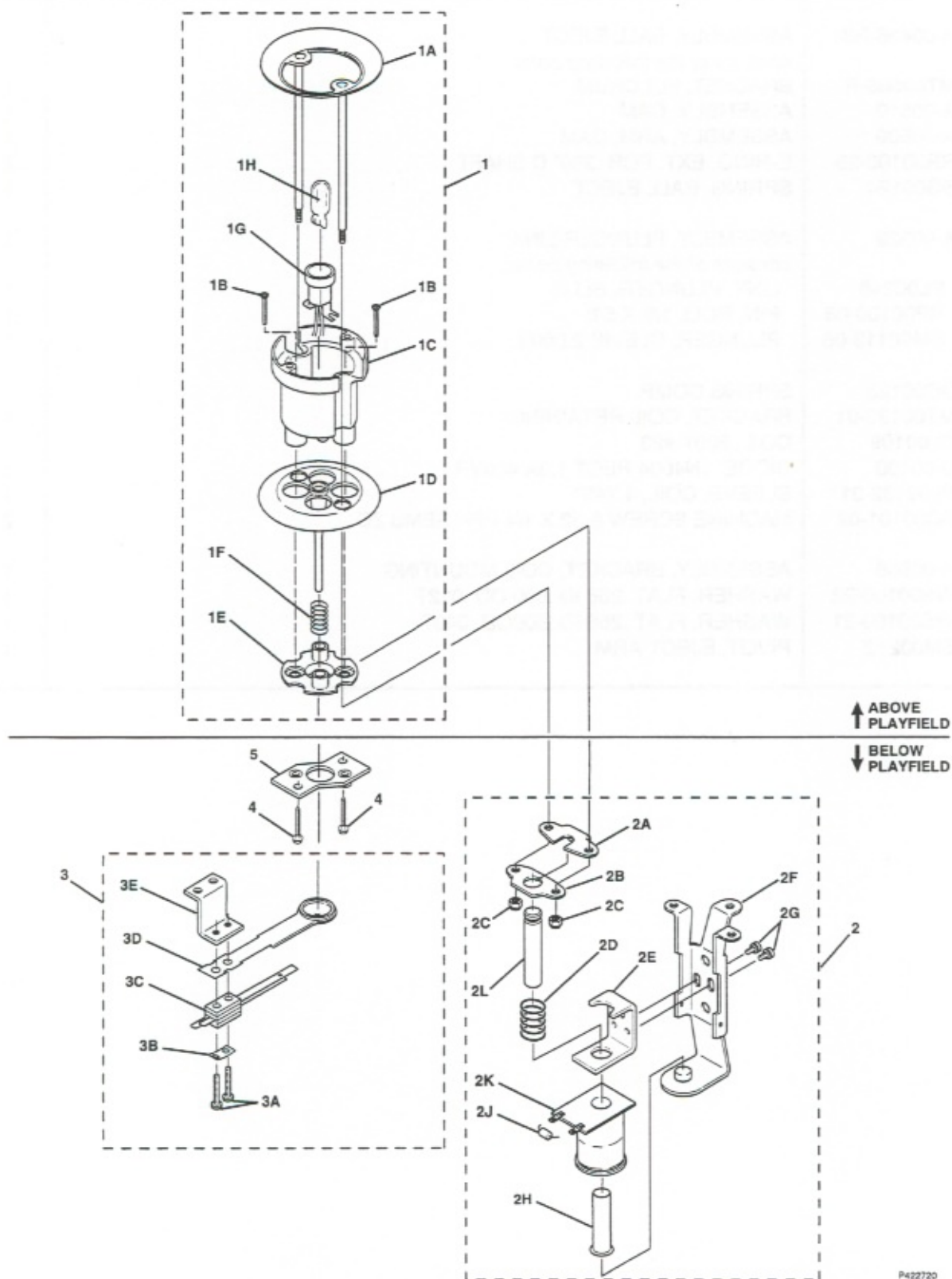


**BALL EJECT ASSEMBLY**

| No. | Part Number | Description                                                       | Req. |
|-----|-------------|-------------------------------------------------------------------|------|
|     | A-00436-R3  | ASSEMBLY, BALL EJECT<br><i>consists of the following parts:</i>   |      |
| 1   | MT00585-R   | BRACKET, FULCRUM                                                  | 1    |
| 2   | A-00510     | ASSEMBLY, CAM                                                     | 1    |
| 3   | A-00509     | ASSEMBLY, ARM, CAM                                                | 1    |
| 4   | RR00100-25  | E-RING, EXT. FOR .250" D SHAFT                                    | 2    |
| 5   | SG00124     | SPRING, BALL EJECT                                                | 1    |
| 6   | A-00329     | ASSEMBLY, PLUNGER/LINK<br><i>consists of the following parts:</i> | 1    |
| 6A  | PL00246     | LINK, PLUNGER, BLUE                                               | 1    |
| 6B  | RP00100-06  | PIN, ROLL 1/8 X 5/8                                               | 1    |
| 6C  | SM00113-06  | PLUNGER, CLEVIS 2.000"L                                           | 1    |
| 7   | SG00123     | SPRING COMP.                                                      | 1    |
| 8   | MT00136-01  | BRACKET, COIL RETAINING                                           | 1    |
| 9   | CL00109     | COIL, 800T #23                                                    | 1    |
| 10  | DI00100     | DIODE, 1N4004 RECT 1.0A 400VR                                     | 1    |
| 11  | PL00132-01  | SLEEVE, COIL, 1.745"                                              | 1    |
| 12  | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                              | 2    |
| 13  | A-00508     | ASSEMBLY, BRACKET, COIL MOUNTING                                  | 1    |
| 14  | WS00100-22  | WASHER, FLAT .266 ID .500 OD .012T                                | 1    |
| 15  | WS00100-21  | WASHER, FLAT .266 ID .500OD .040T                                 | 1    |
| 16  | SM00212     | PIVOT, EJECT ARM                                                  | 1    |



## STAR BUMPER ASSEMBLY



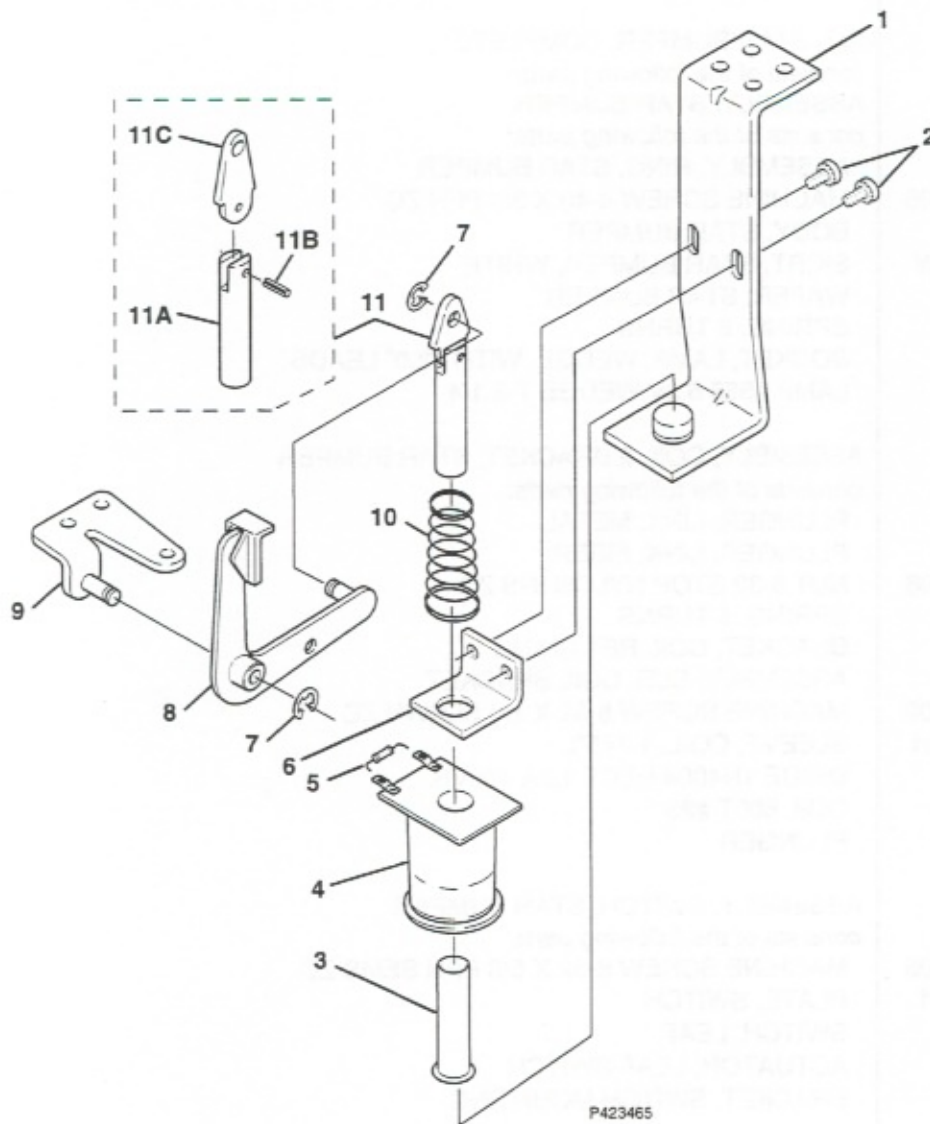
P422720

| STAR BUMPER ASSEMBLY |             |                                                                                                      |      |
|----------------------|-------------|------------------------------------------------------------------------------------------------------|------|
| No.                  | Part Number | Description                                                                                          | Req. |
|                      | K-012       | KIT, STAR BUMPER, COMPLETE                                                                           |      |
| 1                    | A-00376     | consists of the following parts:<br>ASSEMBLY, STAR BUMPER<br><i>consists of the following parts:</i> | 1    |
| 1A                   | A-00374     | ASSEMBLY, RING, STAR BUMPER                                                                          | 1    |
| *1B                  | SC00130-06  | MACHINE SCREW 4-40 X 3/4 PFH ZC                                                                      | 2    |
| 1C                   | PL00265     | BODY, STAR BUMPER                                                                                    | 1    |
| 1D                   | PL00229-W   | SKIRT, STAR BUMPER, WHITE                                                                            | 1    |
| 1E                   | PL00261     | WAFER, STAR BUMPER                                                                                   | 1    |
| 1F                   | SG00115     | SPRING, 6 TURNS                                                                                      | 1    |
| 1G                   | SK00113     | SOCKET, LAMP, WEDGE, WITH 12.0" LEADS                                                                | 1    |
| 1H                   | LP00100     | LAMP #555 6.3V WEDGE T-3 1/4                                                                         | 1    |
| 2                    | A-00375     | ASSEMBLY, COIL & BRACKET, STAR BUMPER<br><i>consists of the following parts:</i>                     | 1    |
| 2A                   | MT00379     | PLUNGER, LINK, METAL                                                                                 | 1    |
| 2B                   | FB00104     | PLUNGER, LINK, FIBER                                                                                 | 1    |
| 2C                   | NT00104-06  | NUT 6-32 STOP NYLON INS ZC                                                                           | 2    |
| 2D                   | SG00114     | SPRING, 5 TURNS                                                                                      | 1    |
| 2E                   | MT00380     | BRACKET, COIL RETAINING                                                                              | 1    |
| 2F                   | A-00373     | ASSEMBLY, SUB, COIL BRACKET                                                                          | 1    |
| 2G                   | SC00131-02  | MACHINE SCREW 6-32 X 1/4 SLHWH ZC                                                                    | 2    |
| 2H                   | PL00132-01  | SLEEVE, COIL, 1.745"L                                                                                | 1    |
| 2J                   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                                                         | 1    |
| 2K                   | CL00109     | COIL 800T #23                                                                                        | 1    |
| 2L                   | SM00179     | PLUNGER                                                                                              | 1    |
| 3                    | A-00381     | ASSEMBLY, SWITCH, STAR BUMPER<br><i>consists of the following parts:</i>                             | 1    |
| 3A                   | SC00100-05  | MACHINE SCREW 6-32 X 5/8 PPH SEMS ZC                                                                 | 2    |
| 3B                   | MT00461-1   | PLATE, SWITCH                                                                                        | 1    |
| 3C                   | SW00126     | SWITCH, LEAF                                                                                         | 1    |
| 3D                   | PL00263     | ACTUATOR, LEAF SWITCH                                                                                | 1    |
| 3E                   | MT00384     | BRACKET, SWITCH MOUNTING                                                                             | 1    |
| 4                    | SC00121-04  | SCREW, WOOD #6 X 1/2                                                                                 | 2    |
| 5                    | A-00648     | PLATE, SUPPORT                                                                                       | 1    |

\*NOTE: REFERENCE ONLY - NOT INCLUDED IN ASSEMBLIES SHOWN. MUST BE ORDERED SEPARATELY.



## SLINGSHOT ASSEMBLY

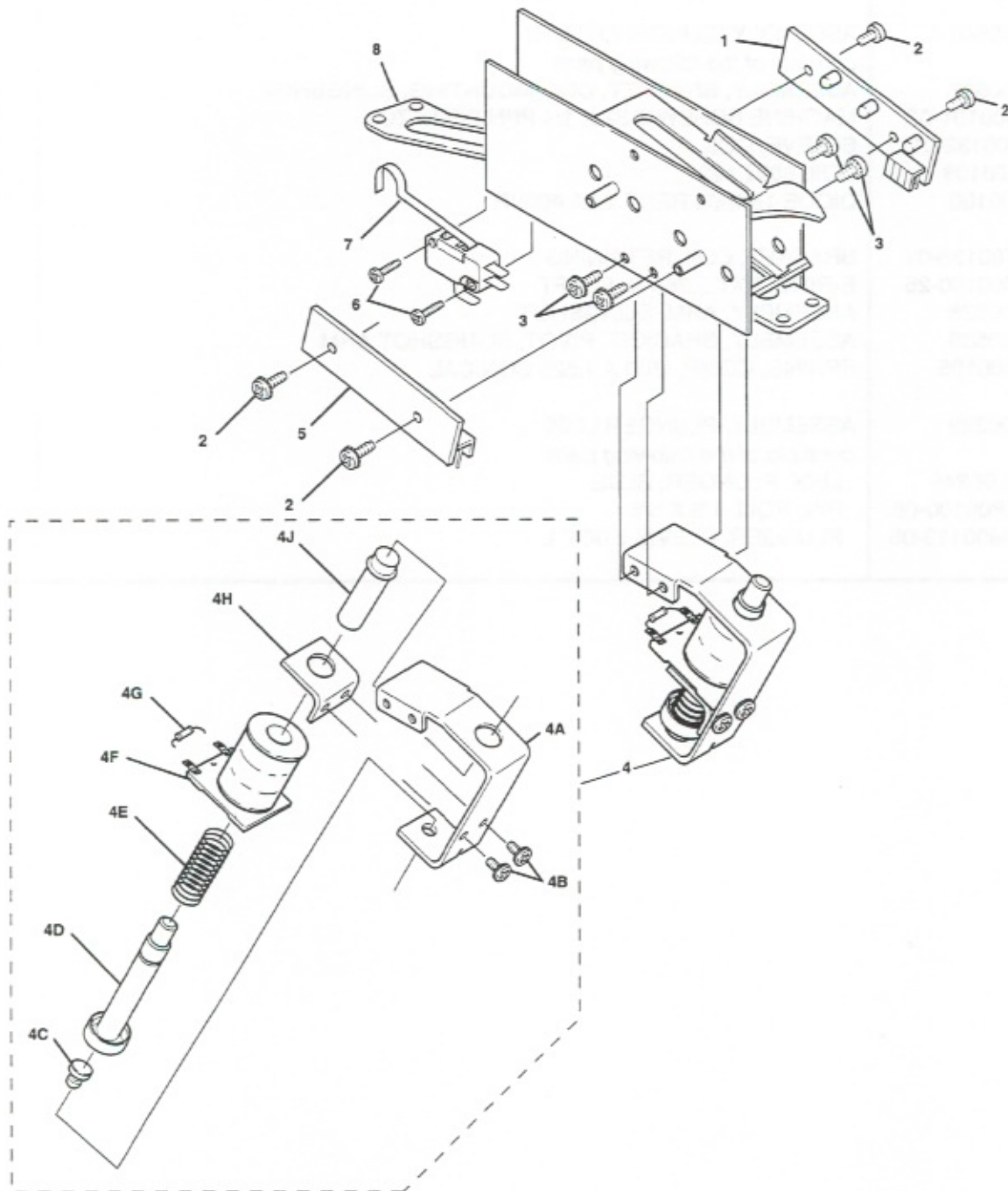


## SLINGSHOT ASSEMBLY

| No. | Part Number | Description                                                         | Req. |
|-----|-------------|---------------------------------------------------------------------|------|
|     | A-00540-1   | ASSEMBLY, SLINGSHOT, STD<br><i>consists of the following parts:</i> |      |
| 1   | A-00537     | ASSEMBLY, BRACKET, COIL MOUNTING, SLINGSHOT                         | 1    |
| 2   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                | 2    |
| 3   | PL00132-01  | SLEEVE, COIL                                                        | 1    |
| 4   | CL00109     | COIL 800T #23                                                       | 1    |
| 5   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                        | 1    |
| 6   | MT00136-01  | BRACKET, COIL RETAINING                                             | 1    |
| 7   | RR00100-25  | E-RING, EXT., .250 D. SHAFT                                         | 1    |
| 8   | A-00328     | ASSEMBLY, ARM, SLINGSHOT                                            | 1    |
| 9   | A-00538     | ASSEMBLY, BRACKET, PIVOT, SLINGSHOT ARM                             | 1    |
| 10  | SG00105     | SPRING, COMP, .700 X 1.625 CONICAL                                  | 1    |
| 11  | A-00329     | ASSEMBLY, PLUNGER/LINK<br><i>consists of the following parts:</i>   | 1    |
| 11A | PL00246     | LINK, PLUNGER, BLUE                                                 | 1    |
| 11B | RP00100-06  | PIN, ROLL 1/8 X 5/8                                                 | 1    |
| 11C | SM00113-06  | PLUNGER, CLEVIS 2.000" L                                            | 1    |



## BALL TROUGH ASSEMBLY



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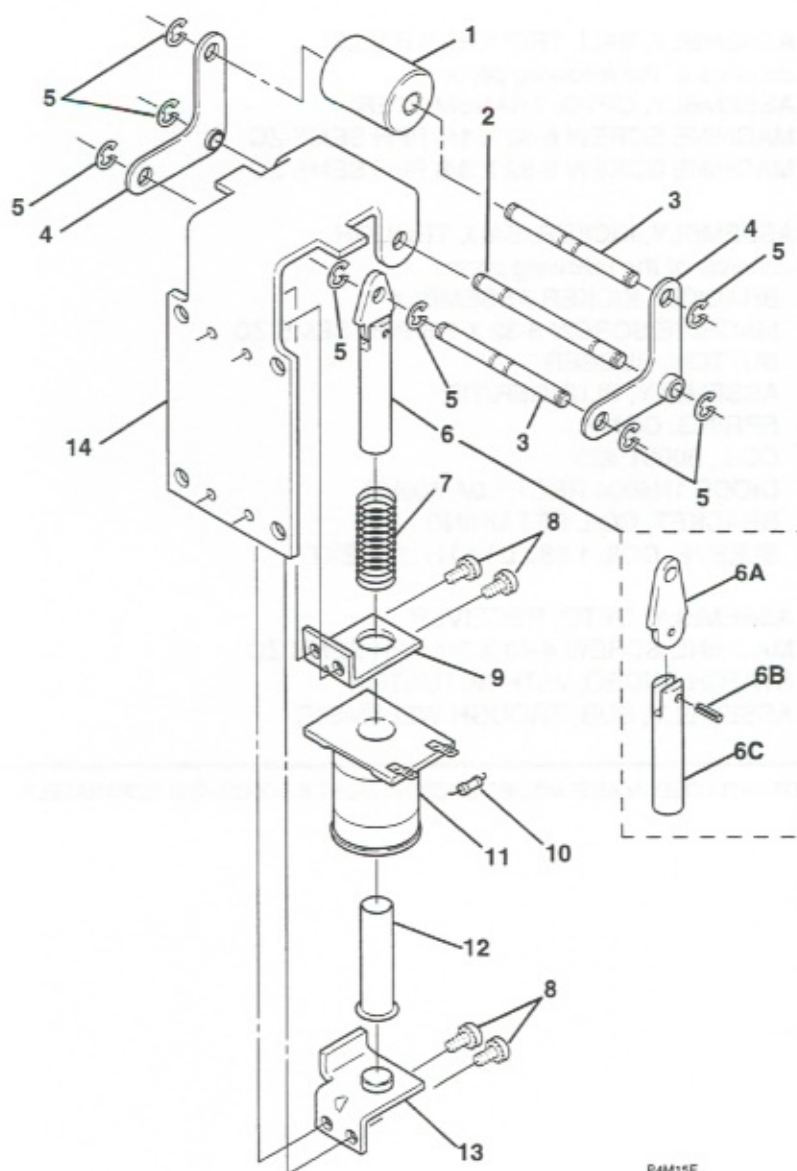
**BALL TROUGH ASSEMBLY, 3 BALLS**

| No. | Part Number  | Description                                                               | Req. |
|-----|--------------|---------------------------------------------------------------------------|------|
|     | A-00411-3R   | ASSEMBLY, BALL TROUGH, 3 BALLS<br><i>consists of the following parts:</i> |      |
| 1   | *A0015702-3R | ASSEMBLY, OPTO, TRANSMITTER                                               | 1    |
| 2   | SC00100-04   | MACHINE SCREW 6-32 X 1/4 PPH SEMS ZC                                      | 4    |
| 3   | SC00101-03   | MACHINE SCREW 8-32 X 3/8 PPH SEMS ZC                                      | 4    |
| 4   | A-00371      | ASSEMBLY, KICKER, BALL TROUGH<br><i>consists of the following parts:</i>  | 1    |
| 4A  | MT00378      | BRACKET, KICKER ASSEMBLY                                                  | 1    |
| 4B  | SC00101-03   | MACHINE SCREW 8-32 X 3/8 PPH SEMS ZC                                      | 2    |
| 4C  | RB00103      | BUTTON, RUBBER                                                            | 1    |
| 4D  | A00369       | ASSEMBLY, PLUNGER/TIP                                                     | 1    |
| 4E  | SG00103      | SPRING, COMP.                                                             | 1    |
| 4F  | CL00109      | COIL, 8000T #23                                                           | 1    |
| 4G  | DI00100      | DIODE 1N4004 RECT 1.0A 400VR                                              | 1    |
| 4H  | MT00191      | BRACKET, COIL RETAINING                                                   | 1    |
| 4J  | PL00133-05   | SLEEVE, COIL 1.880"L WITH .188 EXT                                        | 1    |
| 5   | *A0015603-3R | ASSEMBLY, OPTO, RECEIVER                                                  | 1    |
| 6   | SC00120-06   | MACHINE SCREW 4-40 X 3/4 PPH SEMS ZC                                      | 2    |
| 7   | SW00113      | SWITCH, MICRO, WITH ACTUATOR                                              | 1    |
| 8   | A-00370      | ASSEMBLY, SUB, TROUGH WELDMENT                                            | 1    |

\*NOTE: REFERENCE ONLY- NOT INCLUDED IN ASSEMBLIES SHOWN. MUST BE ORDERED SEPARATELY.



## PUSHOUT DIVERTER ASSEMBLY



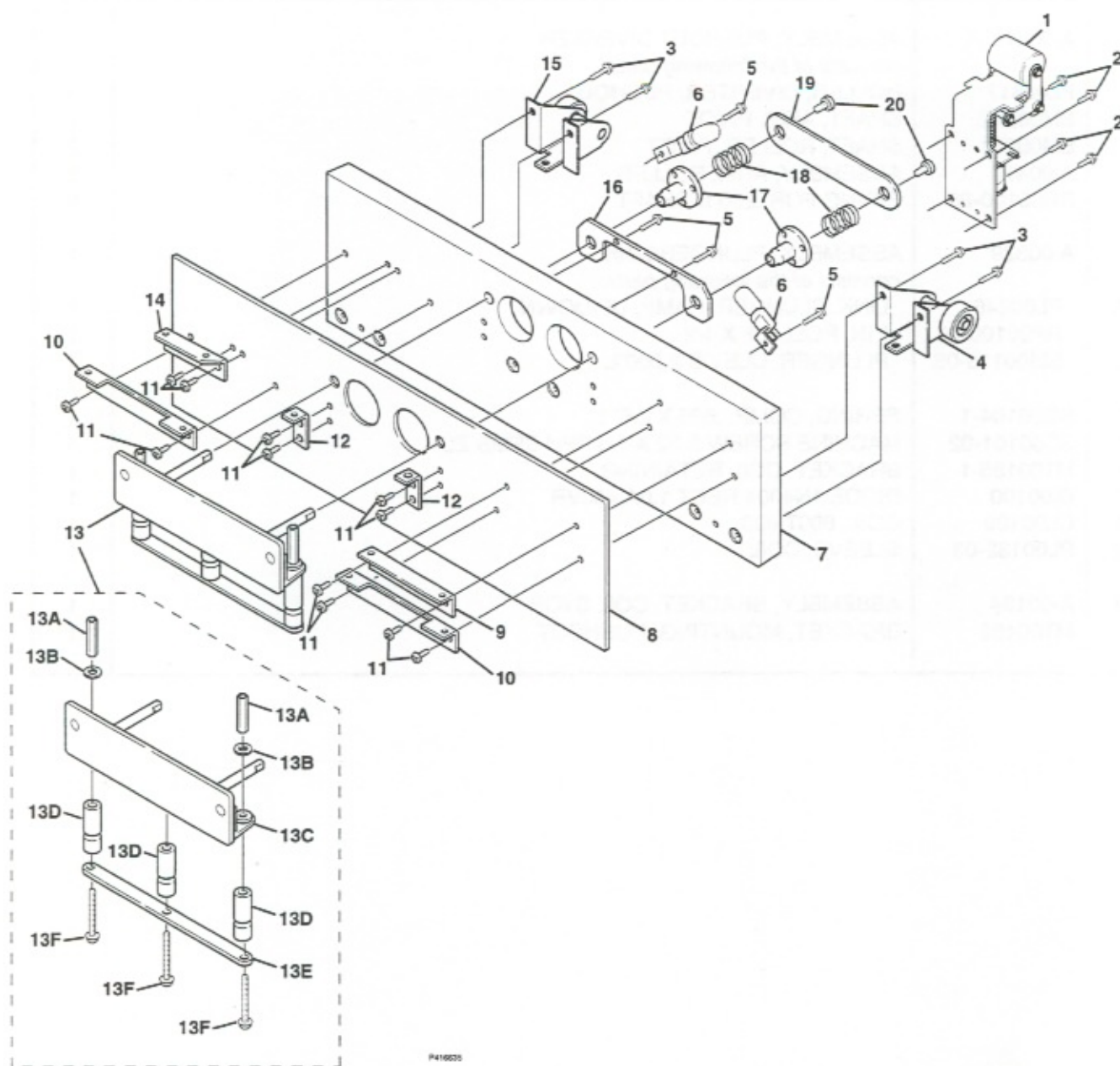
P4M15E

## PUSHOUT DIVERTER ASSEMBLY

| No. | Part Number | Description                                                           | Req. |
|-----|-------------|-----------------------------------------------------------------------|------|
|     | A-00479     | ASSEMBLY, PUSHOUT DIVERTER<br><i>consists of the following parts:</i> |      |
| 1   | PL00317     | ROLLER, DIVERTER, PUSHOUT                                             | 1    |
| 2   | SM00202     | SHAFT, ARM, PIVOT                                                     | 1    |
| 3   | SM00201     | SHAFT, ROLLER, PIVOT                                                  | 2    |
| 4   | A-00478     | ASSEMBLY, ARM, ROLLER                                                 | 2    |
| 5   | RR00100-25  | E-RING FOR .250 D SHAFT                                               | 8    |
| 6   | A-00329     | ASSEMBLY, PLUNGER/LINK<br><i>consists of the following parts:</i>     | 1    |
| 6A  | PL00246     | LINK, PLUNGER, RAMP, UP/DOWN                                          | 1    |
| 6B  | RP00100-06  | PIN, ROLL 1/8 X 1/2                                                   | 1    |
| 6C  | SM00113-06  | PLUNGER, CLEVIS 2.000"L                                               | 1    |
| 7   | SG00104-1   | SPRING, COMP. .625 X 2.6" L                                           | 1    |
| 8   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                                  | 4    |
| 9   | MT00185-1   | BRACKET, COIL RETAINING                                               | 1    |
| 10  | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                          | 1    |
| 11  | CL00109     | COIL, 800T #23                                                        | 1    |
| 12  | PL00132-03  | SLEEVE, COIL                                                          | 1    |
| 13  | A-00134     | ASSEMBLY, BRACKET, COIL STOP                                          | 1    |
| 14  | MT00462     | BRACKET, MOUNTING, PUSHOUT                                            | 1    |



## BACKBOARD ASSEMBLY

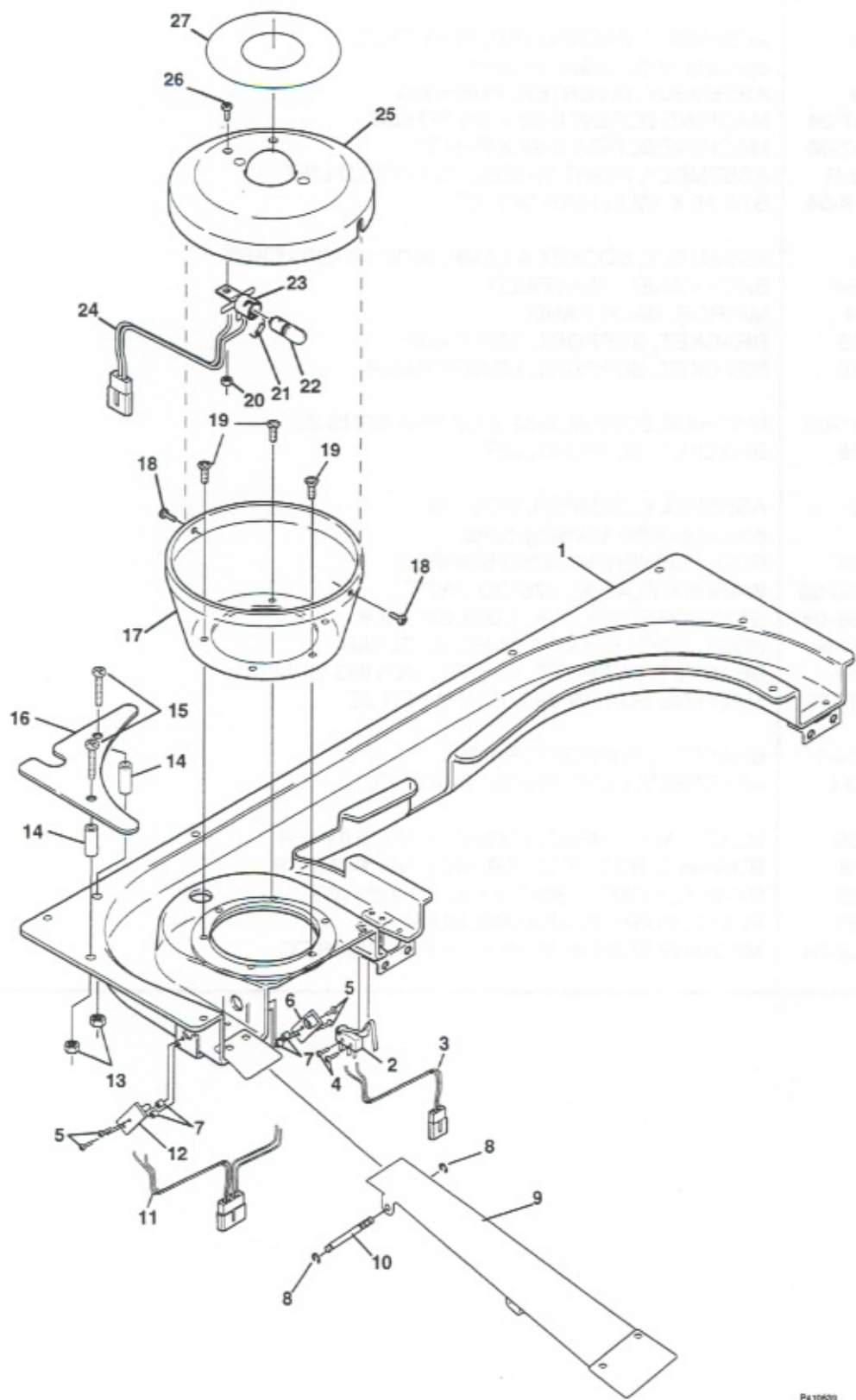


## BACKBOARD ASSEMBLY

| No. | Part Number | Description                                                               | Req. |
|-----|-------------|---------------------------------------------------------------------------|------|
|     | A-00346     | ASSEMBLY, BACKBOARD, PLAYFIELD<br><i>consists of the following parts:</i> |      |
| 1   | A-00479     | ASSEMBLY, DIVERTER, PUSHOUT                                               | 1    |
| 2   | SC00107-04  | MACHINE SCREW 8-32 X 3/4 PFH ZC                                           | 4    |
| 3   | SC00107-06  | MACHINE SCREW 8-32 X PFH ZC                                               | 4    |
| 4   | A-00353-R   | ASSEMBLY, RIGHT WHEEL, PLAYFIELD LIFT                                     | 1    |
| 5   | SC00118-04  | STS #8 X 1/2 SLHWH "AB" ZC                                                | 4    |
| 6   | A-00150     | ASSEMBLY, SOCKET & LAMP, #906 1/4" BRACKET                                | 2    |
| 7   | WD00154     | BACK PANEL, PLAYFIELD                                                     | 1    |
| 8   | PL00314     | MIRROR, BACK PANEL                                                        | 1    |
| 9   | MT00455     | BRACKET, SUPPORT, TOP RAMP                                                | 1    |
| 10  | MT00445     | BRACKET, SUPPORT, LOWER RAMP                                              | 1    |
| 11  | SC00101-05  | MACHINE SCREW, 6-32 X 5/8 PPH SEMS ZC                                     | 12   |
| 12  | MT00446     | BRACKET, SUPPORT, JET                                                     | 1    |
| 13  | A-00483     | ASSEMBLY, BUMPER, MOVING<br><i>consists of the following parts:</i>       | 1    |
| 13A | SM00204     | ROD, PUSHER, MOVING BUMPER                                                | 2    |
| 13B | WS00100-05  | WASHER FLAT #8 .375"OD .032"T                                             | 2    |
| 13C | SM00155-04  | STANDOFF, HEX, F-F, 1.060, 3/8 X 3/8                                      | 2    |
| 13D | PL00164-N   | POST, SINGLE, 1.000, #8 HOLE, CLEAR                                       | 3    |
| 13E | MT00465     | BRACKET, SUPPORT, LOWER, MOVING BUMPER                                    | 1    |
| 13F | SC00107-12  | MACHINE SCREW 8-32 X 1-1/2 PFH ZC                                         | 3    |
| 14  | MT00454-1   | BRACKET, SUPPORT, RAMP-L                                                  | 1    |
| 15  | A-00353-L   | ASSEMBLY, LEFT WHEEL, PLAYFIELD                                           | 1    |
| 16  | MT00466     | PLATE, ALIGNMENT, BUSHING, M / BUMPER                                     | 1    |
| 17  | PL00318     | BUSHING, ROD, PUSHER, MOVING, BUMPER                                      | 2    |
| 18  | SG00122     | SPRING, COMP., .300OD 1.25 LG .022 WD                                     | 2    |
| 19  | MT00467     | PLATE, PUSHER, MOVING, BUMPER                                             | 1    |
| 20  | SC00102-04  | MACHINE SCREW 10-32 X 3/8 PPH SEMS ZC                                     | 2    |



LEVEL 3 RAMP ASSEMBLY



P410609

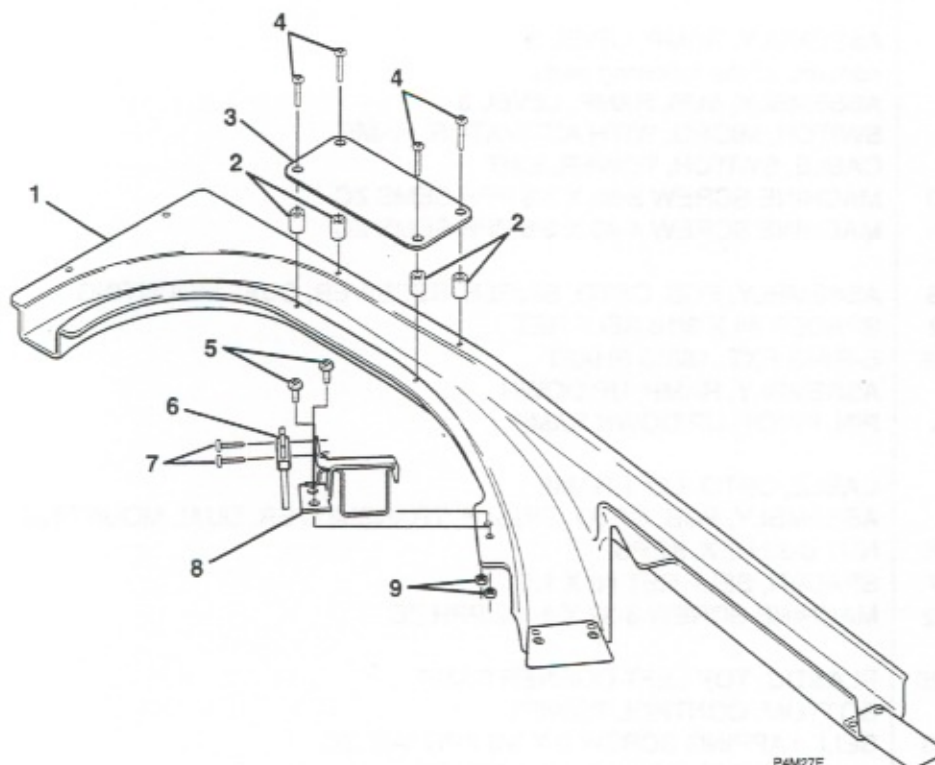
## LEVEL 3 RAMP ASSEMBLY

| No. | Part Number | Description                                                        | Req. |
|-----|-------------|--------------------------------------------------------------------|------|
|     | A-00489     | ASSEMBLY, RAMP, LEVEL 3<br><i>consists of the following parts:</i> |      |
| 1   | A-00488     | ASSEMBLY, SUB, RAMP, LEVEL 3                                       | 1    |
| 2   | SW00134     | SWITCH, MICRO, WITH ACTIVATOR, RAMP                                | 1    |
| 3   | C-00210     | CABLE, SWITCH, TOWER, EXIT                                         | 1    |
| 4   | SC00157-03  | MACHINE SCREW 2-56 X 3/8 PPH SEMS ZC                               | 2    |
| 5   | SC00120-03  | MACHINE SCREW 4-40 X 3/8 PPH SEMS ZC                               | 4    |
| 6   | A0020800-S  | ASSEMBLY, PCB, OPTO, SINGLE, RECEIVER, DUAL MOUNTING               | 1    |
| 7   | PL00181-02  | SPACER #4 X 3/16 SELF RET                                          | 4    |
| *8  | RR00100-18  | E-RING EXT .188"D SHAFT                                            | 2    |
| *9  | A-00627     | ASSEMBLY, RAMP, UP/DOWN                                            | 1    |
| *10 | SM00246     | PIN, PIVOT, UP/DOWN RAMP                                           | 1    |
| 11  | C-00209     | CABLE, OPTO, LEFT RAMP                                             | 1    |
| 12  | A0020901    | ASSEMBLY, PCB, OPTO, SINGLE, TRANSMITTER, DUAL MOUNTING            | 1    |
| 13  | NT00101-06  | NUT 6-32 HEX, KEPS                                                 | 1    |
| 14  | PL00237-07  | SPACER, SELF RET #8 X 1.0                                          | 2    |
| 15  | SC00127-12  | MACHINE SCREW 6-32 X 1-1/2 PPH ZC                                  | 2    |
| 16  | AW00125-25  | PLASTIC, TOP LEFT CORNER RAMP                                      | 1    |
| 17  | PL00296-B   | BOTTOM, CONTROL TOWER                                              | 1    |
| 18  | SC00103-03  | SELF TAPPING SCREW 6 X 3/8 PPH "AB" ZC                             | 2    |
| 19  | SC00106-02  | MACHINE SCREW 6-32 X 1/4 PFH ZC                                    | 3    |
| 20  | NT00104-06  | NUT 6-32 STOP, NYLON INS                                           | 1    |
| 21  | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                       | 1    |
| 22  | LP00104     | LAMP, #44 6.3V MINI-BAY, T-3 1/4                                   | 1    |
| 23  | SK00115     | SOCKET, MINI-BAY, "L 5/16"                                         | 1    |
| 24  | C-00212     | CABLE, LAMP, GI, TOWER                                             | 1    |
| 25  | PL00296-T   | TOP, CONTROL TOWER                                                 | 1    |
| 26  | SC00127-03  | MACHINE SCREW 6-32 X 3/8 PPH ZC                                    | 1    |
| 27  | AW00164-6   | DECAL, CONTROL TOWER TOP                                           | 1    |

\*NOTE: Reference only - not included in assemblies shown. Must be ordered separately.



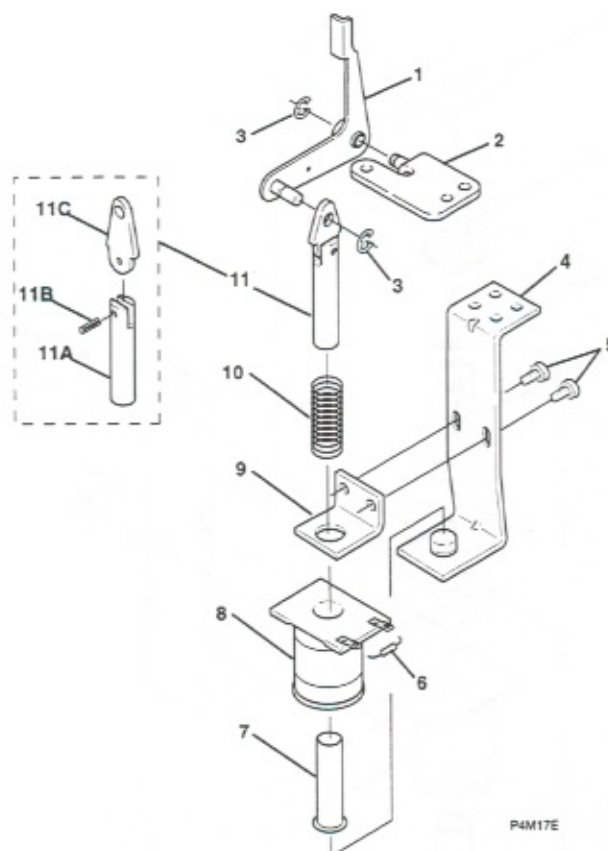
## LEVEL 4 RIGHT RAMP



### LEVEL 4 RAMP ASSEMBLY (RIGHT)

| No. | Part Number | Description                                                              | Req. |
|-----|-------------|--------------------------------------------------------------------------|------|
|     | A-00485     | ASSEMBLY, RAMP-RIGHT, LEVEL 4<br><i>consists of the following parts:</i> |      |
| 1   | A-00484     | ASSEMBLY, SUB, RAMP-RIGHT, LEVEL 4                                       | 1    |
| 2   | PL00237-02  | SPACER, SELF RET, #8 X 3/8 BLACK                                         | 4    |
| 3   | AW00125-26  | PLASTIC, RAMP COVER                                                      | 1    |
| 4   | SC00100-06  | MACHINE SCREW 6-32 X 3/4 PPH SEMS ZC                                     | 4    |
| 5   | SC00101-03  | MACHINE SCREW 8-32 X 3/8 PPH SEMS ZC                                     | 2    |
| 6   | SW00117     | SWITCH, MICRO WITH ACTUATOR 1.625                                        | 1    |
| 7   | SC00157-04  | MACHINE SCREW 2-56 X 1/2 PPH SEMS ZC                                     | 2    |
| 8   | MT00471     | BRACKET, SWITCH, RAMP                                                    | 1    |
| 9   | NT00101-06  | NUT 6-32 HEX KEPS                                                        | 2    |

## BIG KICKER ASSEMBLY

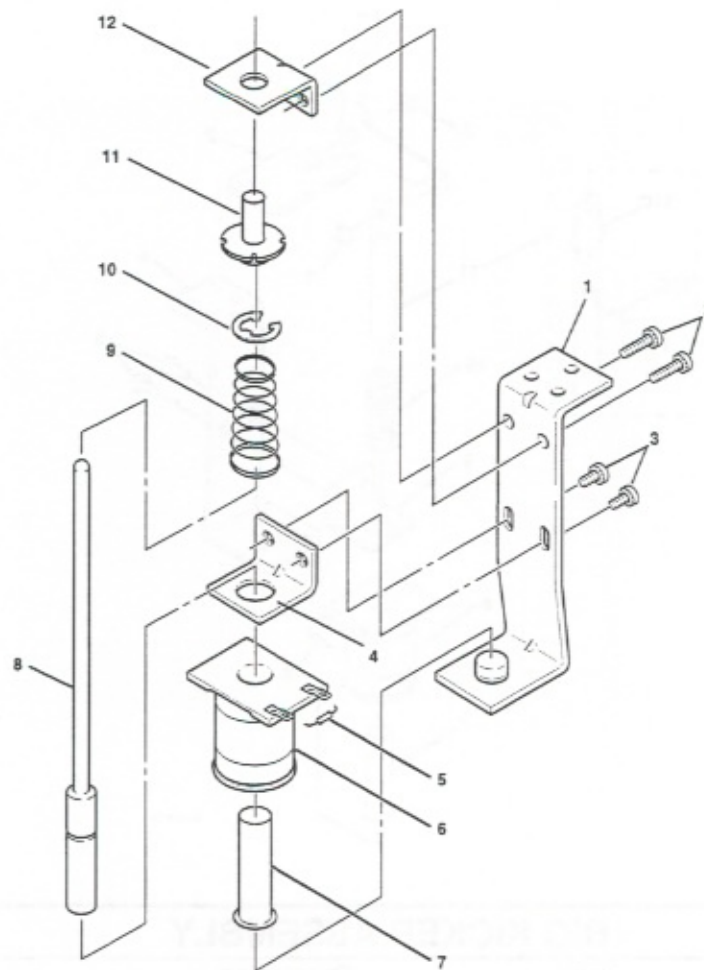


## BIG KICKER ASSEMBLY

| No. | Part Number | Description                                                       | Req. |
|-----|-------------|-------------------------------------------------------------------|------|
|     | A-00435     | ASSEMBLY, BIG KICKER<br><i>consists of the following parts:</i>   |      |
| 1   | A-00514     | ASSEMBLY, ARM, KICKER                                             | 1    |
| 2   | A-00515     | ASSEMBLY, BRACKET, ARM, KICKER                                    | 1    |
| 3   | RR00100-25  | E-RING FOR .250 D SHAFT                                           | 2    |
| 4   | A-00508     | ASSEMBLY, BRACKET, COIL MOUNTING                                  | 1    |
| 5   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                              | 2    |
| 6   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                      | 1    |
| 7   | PL00132-03  | SLEEVE, COIL                                                      | 1    |
| 8   | CL00109     | COIL 800T #23                                                     | 1    |
| 9   | MT00136     | BRACKET, COIL RETAINING                                           | 1    |
| 10  | SG00123     | SPRING, COMP.                                                     | 1    |
| 11  | A-00329     | ASSEMBLY, PLUNGER/LINK<br><i>consists of the following parts:</i> | 1    |
| 11A | SM00113-06  | PLUNGER, CLEVIS 2.000"L                                           | 1    |
| 11B | RP00100-06  | PIN, ROLL 1/8 X 5/8                                               | 1    |
| 11C | PL00246     | LINK, PLUNGER, BLUE                                               | 1    |



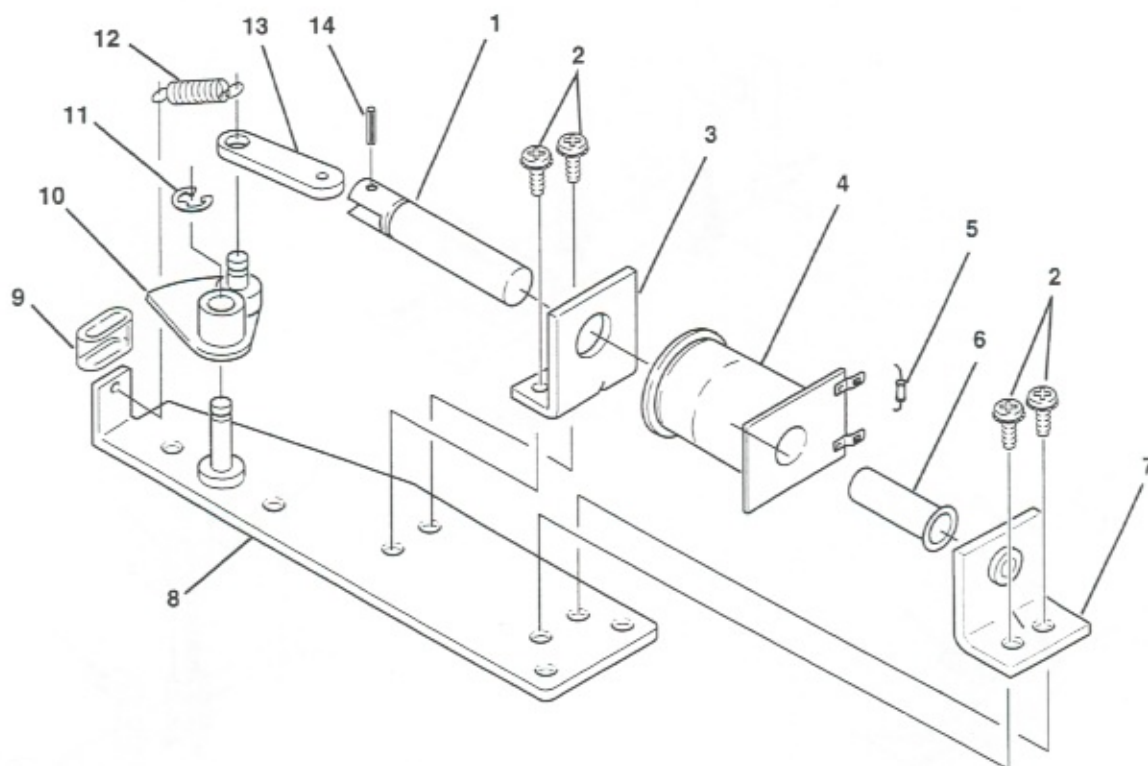
## BALL RELEASE ASSEMBLY



### BALL RELEASE ASSEMBLY

| No. | Part Number | Description                                                       | Req. |
|-----|-------------|-------------------------------------------------------------------|------|
|     | A-00293     | ASSEMBLY, BALL RELEASE<br><i>consists of the following parts:</i> |      |
| 1   | A-00446     | ASSEMBLY, SUB, COIL MOUNTING BRACKET                              | 1    |
| 2   | SC00101-04  | MACHINE SCREW 8-32 X 1/2 PPH SEMS ZC                              | 2    |
| 3   | SC00101-02  | MACHINE SCREW 8-32 X 1/4 PPH SEMS ZC                              | 2    |
| 4   | MT00198     | BRACKET, COIL RETURN                                              | 1    |
| 5   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                      | 1    |
| 6   | CL00109     | COIL, 800T #23                                                    | 1    |
| 7   | PL00132-01  | SLEEVE, COIL, 1.75"L                                              | 1    |
| 8   | SM00178     | SHAFT, BALL RELEASE                                               | 1    |
| 9   | SG00105-2   | SPRING, COMP, .70 X 1.62, .29 BLUE                                | 1    |
| 10  | RR00100-43  | E-RING, EXT. .437 D SHAFT                                         | 1    |
| 11  | PL00318     | BUSHING                                                           | 1    |
| 12  | MT00583     | BRACKET, COIL RETURN                                              | 1    |

## OUTHOLE KICKER ASSEMBLY



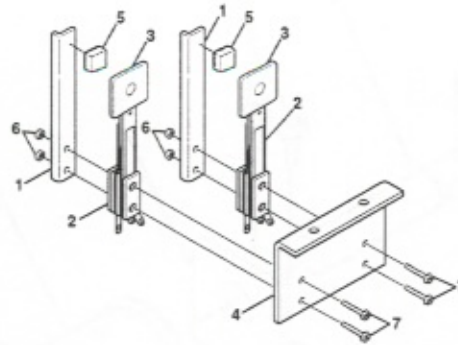
P116523

### OUTHOLE KICKER ASSEMBLY

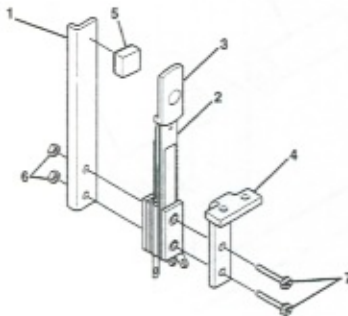
| No. | Part Number | Description                                                               | Req. |
|-----|-------------|---------------------------------------------------------------------------|------|
|     | A-00372     | ASSEMBLY, BALL RETURN, OUTHOLE<br><i>consists of the following parts:</i> |      |
| 1   | SM00216     | PLUNGER, BALL RETURN, OUTHOLE                                             | 1    |
| 2   | SC00100-02  | MACHINE SCREW 6-32 X 1/4 PPHS EXT/SEMS                                    | 4    |
| 3   | MT00494     | BRACKET, COIL RETURN. .625 #6 X .375                                      | 1    |
| 4   | CL00109     | COIL 800T #23                                                             | 1    |
| 5   | DI00100     | DIODE 1N4004 RECT 1.0A 400VR                                              | 1    |
| 6   | PL00132-03  | SLEEVE, COIL 1.686"L                                                      | 1    |
| 7   | A-00523     | ASSEMBLY, BRACKET, PLUNGER STOP #6 X .375                                 | 1    |
| 8   | A-00522     | ASSEMBLY, PLATE, MOUNTING, BALL RETURN, OUTHOLE                           | 1    |
| 9   | MS00164     | BUMPER, CAM ARM, BALL RETURN                                              | 1    |
| 10  | A-00524     | ASSEMBLY, CAM ARM, BALL RETURN, OUTHOLE                                   | 1    |
| 11  | RR00100-25  | RETAINING E-RING .25 D SHAFT                                              | 1    |
| 12  | SG00125     | SPRING, EXT., BALL RETURN, OUTHOLE                                        | 1    |
| 13  | PL00285     | LINK, PLUNGER, BALL RETURN, OUTHOLE                                       | 1    |
| 14  | RP00100     | PIN, ROLL 1/8 X 5/8 L                                                     | 1    |



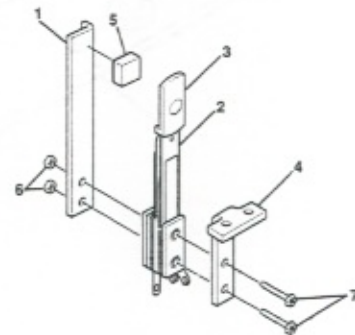
## STAND UP TARGET ASSEMBLIES



A-00498-



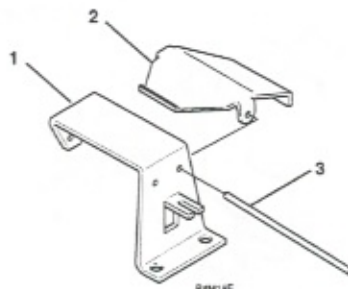
A-00330-



A-00507-

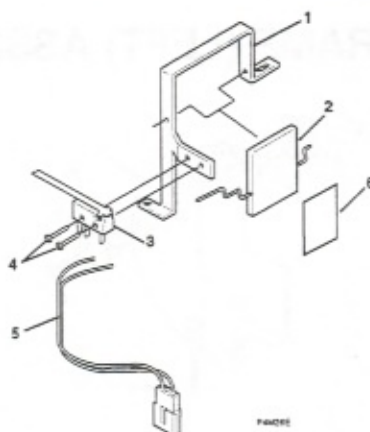
| REF | DESCRIPTION                                       | COMPONENT PART NUMBER | STAND UP TARGET ASSEMBLY P/N & COMPONENT PART QUANTITY |           |           |           |           |
|-----|---------------------------------------------------|-----------------------|--------------------------------------------------------|-----------|-----------|-----------|-----------|
|     |                                                   |                       | A-00498-W                                              | A-00498-Y | A-00330-Y | A-00330-G | A-00507-Y |
| 1   | PLATE, BACK-UP, STAND-UP TARGET, RIGHT            | MT00275-R             |                                                        |           |           |           | 1         |
| 1   | PLATE, BACK-UP, STAND-UP TARGET, LEFT             | MT00275               | 1                                                      | 1         | 1         | 1         |           |
| 2   | SWITCH, LEAF, STAND-UP, TARGET                    | SW00115               | 2                                                      | 2         | 1         | 1         | 1         |
| 3   | TARGET, STAND-UP, 1.0 X .875 RECT YELLOW X 2      | PL00230-Y             |                                                        | 2         |           |           |           |
| 3   | TARGET, STAND-UP, 1.0 X .875 RECT WHITE X 2       | PL00230-W             | 2                                                      |           |           |           |           |
| 3   | STAND-UP TARGET HALF, YELLOW                      | PL00237-Y             |                                                        |           | 1         |           | 1         |
| 3   | STAND-UP TARGET HALF, GREEN                       | PL00237-G             |                                                        |           |           | 1         |           |
| 4   | BRACKET, MOUNTING, STAND-UP TARGET 2-BANK         | MT00274-2             | 1                                                      | 1         |           |           |           |
| 4   | BRACKET, MOUNTING, STAND-UP TARGET, FRONT, SINGLE | MT00279               |                                                        |           | 1         | 1         | 1         |
| 5   | PAD, FOAM, ADH, 3/8 X 3/8 X 7/32                  | MS00134               | 2                                                      | 2         | 1         | 1         | 1         |
| 6   | NUT 6-32 KEPS HEX                                 | NT00101-06            | 4                                                      | 4         | 2         | 2         | 2         |
| 7   | MACHINE SCREW 6-32 X 3/4 SLHWH ZC                 | SC00101-06            | 4                                                      | 4         | 2         | 2         | 2         |

## GATE ASSEMBLY, 1 WAY, RIGHT ASSEMBLY



| GATE ASSEMBLY, 1WAY, RIGHT |             |                                                                         |      |
|----------------------------|-------------|-------------------------------------------------------------------------|------|
| No.                        | Part Number | Description                                                             | Req. |
|                            | A-00526-R   | ASSEMBLY, GATE, 1 WAY, RIGHT<br><i>consists of the following parts:</i> |      |
| 1                          | MT00498     | BRACKET, MOUNTING, GATE, 1 WAY                                          | 1    |
| 2                          | MT00477     | GATE, POWER                                                             | 1    |
| 3                          | SM00217     | SHAFT, GATE, 1 WAY                                                      | 1    |

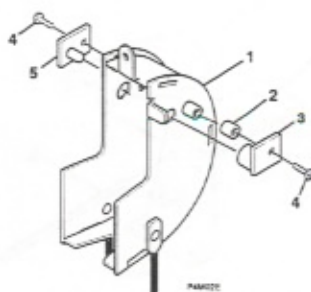
## SPINNING TARGET ASSEMBLY



| SPINNING TARGET ASSEMBLY |             |                                                                      |      |
|--------------------------|-------------|----------------------------------------------------------------------|------|
| No.                      | Part Number | Description                                                          | Req. |
|                          | A-00169     | ASSEMBLY, SPINNING TARGET<br><i>consists of the following parts:</i> |      |
| 1                        | MT00225     | BRACKET, SPINNING                                                    | 1    |
| 2                        | A-00170     | ASSEMBLY, SPINNING TARGET BODY                                       | 1    |
| 3                        | SW00107     | SWITCH, MICRO, WITH ACTUATOR                                         | 1    |
| 4                        | SC00113-26  | MACHINE SCREW 2-56 X 5/16 PPH SEMS ZC                                | 1    |
| 5                        | C-00185     | CABLE, SWITCH, SPINNING TARGET                                       | 2    |
| 6                        | AW00164-2   | DECAL, SPINNER                                                       | 2    |



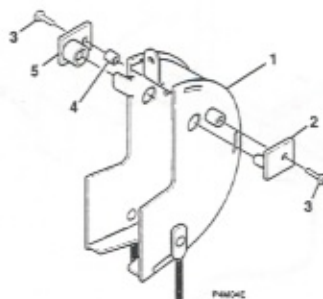
## CENTER RAMP (RIGHT) ASSEMBLY



### CENTER RAMP ASSEMBLY (RIGHT)

| No. | Part Number | Description                                                            | Req. |
|-----|-------------|------------------------------------------------------------------------|------|
|     | A-00439-R   | ASSEMBLY, RIGHT CENTER RAMP<br><i>consists of the following parts:</i> |      |
| 1   | A-00440-R   | ASSEMBLY, RIGHT CENTER                                                 | 1    |
| 2   | PL00181-02  | SPACER, PCB                                                            | 1    |
| 3   | A-00037-1R  | ASSEMBLY, OPTO, PCB, SINGLE, RECEIVER                                  | 1    |
| 4   | SC00120-03  | MACHINE SCREW 4-40 X 3/8 PPH SEMS ZC                                   | 2    |
| 5   | A-00037-1T  | ASSEMBLY, OPTO, PCB, SINGLE, TRANSMITTER                               | 1    |

## CENTER RAMP (LEFT) ASSEMBLY



### CENTER RAMP ASSEMBLY (LEFT)

| No. | Part Number | Description                                                           | Req. |
|-----|-------------|-----------------------------------------------------------------------|------|
|     | A-00439-L   | ASSEMBLY, LEFT CENTER RAMP<br><i>consists of the following parts:</i> |      |
| 1   | A-00440-L   | ASSEMBLY, LEFT CENTER                                                 | 1    |
| 2   | A-00037-1T  | ASSEMBLY, OPTO, PCB, SINGLE, TRANSMITTER                              | 1    |
| 3   | SC00120-03  | MACHINE SCREW 4-40 X 3/8 PPH SEMS ZC                                  | 2    |
| 4   | PL00181-02  | SPACER, PCB                                                           | 1    |
| 5   | A-00037-1R  | ASSEMBLY, OPTO, PCB, SINGLE, RECEIVER                                 | 1    |

## NOTES

## TROUBLESHOOTING GUIDE

## POWER-UP PROBLEMS

| SYMPTOM                                                                                                    | POSSIBLE CAUSE                                                   | PROBABLE SOLUTION                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Game Is Completely Dead<br>-No Lights, No Sound, No Pushbuttons, No Display                                | Main Power Switch not set to ON position.                        | 1. Set Main Power Switch to the ON position.<br>(Switch located under cabinet near right front leg.)                                                                                                                                                                                                                                                     |
|                                                                                                            | Broken Plug or Power Cord.                                       | 1. Inspect Cord and Plug for defects and repair or replace the entire cord set.<br>2. Check Plug for loose wires and tighten as required.                                                                                                                                                                                                                |
|                                                                                                            | No AC Power.                                                     | 1. Connect Plug to AC power outlet.<br>2. Check building circuit breakers or fuses.<br>3. Check Power Transformer, Line Filter assemblies.                                                                                                                                                                                                               |
|                                                                                                            | Main Power Fuse defective.                                       | 1. Replace fuse with another of the exact same type.<br>2. Check Power Transformer, Line Filter assemblies.<br>(Fuse located inside cabinet near right front leg.)                                                                                                                                                                                       |
|                                                                                                            | Low Voltage AC Fuse defective.                                   | 1. Replace fuse with another of the exact same type.<br>2. Check Low Voltage DC Power rectifiers.<br>(Fuse located inside backbox on top circuit board.)                                                                                                                                                                                                 |
|                                                                                                            | Low Voltage DC Fuse defective.                                   | 1. Replace fuse with another of the exact same type.<br>2. Check Low Voltage DC Voltage Regulator.                                                                                                                                                                                                                                                       |
|                                                                                                            | Low Voltage DC Wiring Harness unplugged or damaged.              | 1. Check Low Voltage DC Wiring Harness Connectors.<br>2. Test Low Voltage DC Wiring Harness for continuity.                                                                                                                                                                                                                                              |
| Game Accepts Currency Or Tokens, But Does Not Start.                                                       | Game set up for incorrect AC Line Voltage.                       | 1. Check Power Transformer Line Voltage Wiring<br>(Connector located near transformer in cabinet.)                                                                                                                                                                                                                                                       |
|                                                                                                            | Acceptor Mechanism not seated fully on its own mounting bracket. | 1. Open Coin Door and check each Acceptor by hand to ensure proper mounting. Ensure that each of the release latches is in the closed and locked position.<br>2. Check for switch activation when known good token or currency is inserted into Acceptor. Adjust switch or carefully bend lever to improve alignment if necessary.                       |
| Game Accepts Currency Or Tokens And Gives Players Instructions, But Does Not Produce A Ball To Begin Play. | Faulty or intermittent Coin Door Wiring Harness connections.     | 1. Open coin door to enter System Menu, then select <i>Standard Tests</i> and go to the <i>Switches</i> routine. Check each device independently to locate trouble.<br>2. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.                                                                     |
|                                                                                                            | High Voltage DC Power disabled.                                  | 1. Open coin door to enter System Menu, then select <i>Standard Tests</i> and go to <i>Voltage</i> to look for Check Interlock report. Pull out on switch actuator to reset. (Interlock Switch is located at left side of Coin Door.)<br>2. Switch damaged or broken. Replace Interlock Switch.<br>(NOTE: The Switch routine will not test this switch!) |
|                                                                                                            | High Voltage AC Fuse defective.                                  | 1. Replace fuse with another of the exact same type.<br>2. Check High Voltage DC Power rectifiers.                                                                                                                                                                                                                                                       |
|                                                                                                            | High Voltage DC Fuse defective.                                  | 1. Replace fuse with another of the exact same type.<br>2. Check High Voltage DC Power filter capacitor.                                                                                                                                                                                                                                                 |
|                                                                                                            | High Voltage DC Wiring Harness unplugged or damaged.             | 1. Check all High Voltage DC Power Wiring Connectors.<br>2. Check High Voltage DC Wiring Harness for continuity.                                                                                                                                                                                                                                         |



## COIN DOOR PROBLEMS

| SYMPTOM                                                                          | POSSIBLE CAUSE                                 | PROBABLE SOLUTION                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Game Will Not Start When Coins, Bills, Tokens, Etc. Are Inserted Into Acceptors. | Coin Door Wiring Harness unplugged or damaged. | 1. Check Coin Door Wiring Harness Connectors.<br>2. Test Coin Door Wiring Harness for continuity.                                                                                                                                                                                                       |
|                                                                                  | Acceptor Mechanism is jammed.                  | 1. Open Coin Door, unlatch and remove Acceptor Mechanism, inspect and clear currency path as needed.<br>2. Object in cabinet blocking currency at Cash Box.                                                                                                                                             |
|                                                                                  | Acceptor not level.                            | 1. Repair or replace Coin Door if bent or damaged.<br>2. Adjust Game using internal Bubble Level.                                                                                                                                                                                                       |
|                                                                                  | Cash Box filled to maximum capacity.           | 1. Check Cash Box for presence of counterfeit currency.<br>2. Remove currency from game more frequently.                                                                                                                                                                                                |
|                                                                                  | Acceptor Switch defective.                     | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to Switches to look for Dead reports. If manual switch activation does not change the Dead report then there is an electrical problem.                                                                                        |
|                                                                                  | Acceptor Assembly defective.                   | 1. Clean and lubricate Acceptor Mechanism following specific manufacturer's detailed instructions.<br>2. Substitute known good Acceptor to verify that problem is not external to Acceptor.                                                                                                             |
| Acceptor Mechanism Rejects Known Good Currency, Tokens, Etc.                     | Dirt or Debris in Acceptor Mechanism.          | 1. Open Coin Door, unlatch and remove Acceptor Mechanism, inspect and clear currency path as needed<br>2. Clean and lubricate Acceptor Mechanism following specific manufacturer's detailed instructions.                                                                                               |
|                                                                                  | Acceptor Mechanism out of adjustment.          | 1. Ensure that all removable parts are installed correctly and fully seated against the chassis of the Acceptor.<br>2. Clean and adjust Acceptor Mechanism following specific manufacturer's detailed instructions.                                                                                     |
|                                                                                  | Acceptor Mechanism defective.                  | 1. Substitute known good unit to verify that problem is not external to Acceptor.<br>2. Repair or replace Acceptor assembly.                                                                                                                                                                            |
| External Acceptor Indicators (Pricing, Flashing Arrows, Etc.) Not Illuminated.   | No DC Power to indicator circuits.             | 1. Check Coin Door Wiring Connectors.<br>2. Test Coin Door Wiring Harness for continuity.                                                                                                                                                                                                               |
|                                                                                  | Defective indicator lamp.                      | 1. Go to System Menu and perform Lamp Test.<br>2. Substitute known good lamp to verify that problem is not external to Acceptor.                                                                                                                                                                        |
| Acceptor Takes Known Good Currency But Game Will Not Start Or Continue.          | Acceptor Switch out of adjustment.             | 1. Go to System Menu and perform Switch Test.<br>2. Clean and adjust Acceptor Switch following specific manufacturer's detailed instructions.                                                                                                                                                           |
|                                                                                  | Acceptor Switch defective.                     | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to Switches to look for Dead reports. If manual switch activation does not change the Dead report then there is an electrical problem.<br>2. Substitute known good switch to verify that problem is not external to Acceptor. |

## DOT MATRIX DISPLAY PROBLEMS

| SYMPTOM                                                                                                         | POSSIBLE CAUSE                                 | PROBABLE SOLUTION                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Game Plays But Message Center (Dot Matrix Display) Is Completely Blank.                                         | System Communication failure.                  | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.                                                                                                                                                                                 |
|                                                                                                                 | Display Power Harness unplugged or damaged.    | 1. Check Display Power Wiring Harness Connectors.<br>2. Test Display Power Wiring Harness for continuity.                                                                                                                                                                                 |
|                                                                                                                 | Display Power AC Fuse defective.               | 1. Replace fuse with another of exact same type.<br>2. Check Display Power DC rectifiers, decoupling diode. (Fuse located inside backbox on top circuit board.)                                                                                                                           |
|                                                                                                                 | Display Board Assembly defective.              | 1. Check if any dot matrix display pixels are illuminated.<br>2. Inspect display glass for cracks, chips, darkened areas.                                                                                                                                                                 |
|                                                                                                                 | Display Power Supply Board Assembly defective. | 1. Test Display Power Supply diodes, transformer, caps.<br>2. Check Display Power Supply Switching Regulator IC.                                                                                                                                                                          |
| Game Plays But Part Of Message Center Is Blank Or Illuminated All The Time.                                     | System Communication failure.                  | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.                                                                                                                                                                                 |
|                                                                                                                 | Display Board Assembly defective.              | 1. Inspect display glass for cracks, chips, darkened areas.<br>2. Check soldered connections between glass panel and printed circuit board, and resolder using minimum heat.                                                                                                              |
| Random Patterns On Message Center (Some Images May Be Correct While Others Are Corrupted).                      | Incorrect Display Program.                     | 1. Game or Image Memory IC installed in wrong order.<br>2. Music or Voice Memory IC installed on Processor Board Assembly (i.e., right chip, wrong socket).<br>3. Display or Game Memory IC defective.<br>4. Custom Control (FPGA) IC defective.<br>5. Microprocessor (MPU) IC defective. |
|                                                                                                                 | Display Board Assembly defective.              | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to the Display routine. Check each pixel independently to locate trouble.                                                                                                                                       |
| Checkerboard Pattern On Message Center (Display Never Changes).                                                 | No Display Program.                            | 1. Game or Image Memory IC removed from socket.<br>2. Game or Image Memory IC defective.                                                                                                                                                                                                  |
| Messages Appear Normal, Then Display Locks Up In The Same Place Every Time.                                     | Corrupt Display Program.                       | 1. Bent, broken, shorted pins on Memory IC.<br>2. Game or Image Memory IC defective.                                                                                                                                                                                                      |
| Message Center Always In Game Menu And Troubleshooting Mode; Will Not Return To Game Play.                      | Coin Door open.                                | 1. Close and lock Coin Door to go to normal game play.                                                                                                                                                                                                                                    |
|                                                                                                                 | Mode Switch defective.                         | 1. Switch Mounting Bracket bent, loose, or missing.<br>2. Mode Switch Wiring Harness may be faulty.                                                                                                                                                                                       |
|                                                                                                                 | Dirty or intermittent Mode circuit connection. | 1. Check Mode Switch Wiring Harness Connectors.<br>2. Check Mode Switch Wiring Harness for continuity.                                                                                                                                                                                    |
| Game Will Not Retain Audit Information Or Custom Settings When Turned OFF. (An Error Message May Be Displayed). | Memory Back Up Battery or Memory IC defective. | 1. Set Main Power Switch to the OFF position for one minute, then restore power to game. If RAM ERROR message appears, replace Processor Board Assembly.<br>NOTE: The battery is integrated onto the Memory IC; it cannot be repaired or replaced separately.                             |



## SOUND PROBLEMS

| SYMPTOM                                                                                     | POSSIBLE CAUSE                                    | PROBABLE SOLUTION                                                                                                                                                          |
|---------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Game Plays But No Sound Is Heard At Any Time.                                               | Volume set to zero loudness.                      | 1. Open Coin Door to enter System Menu, then select SET VOLUME from the menu and use Flipper Buttons to adjust the sound to a comfortable loudness.                        |
|                                                                                             | Loudspeaker Wiring Harness unplugged or damaged.  | 1. Check Loudspeaker Wiring Connectors.<br>2. Test Loudspeaker Wiring Harnesses for continuity.                                                                            |
|                                                                                             | Audio Power AC Fuse defective.                    | 1. Replace fuse with another of exact same type.<br>2. Check Audio Power DC rectifiers.<br>(Fuse located inside backbox on right side circuit board.)                      |
|                                                                                             | Faulty Loudspeaker.                               | 1. Test each Loudspeaker for continuity.<br>2. Check each Loudspeaker for voice coil binding.                                                                              |
|                                                                                             | System Communication failure.                     | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.                                                                  |
|                                                                                             | Sound Board Assembly defective.                   | 1. Verify that the Light Emitting Diodes are functional.<br>2. Check Spike Protection Diodes, Audio Amplifier IC.                                                          |
| Game Plays But Sound Is Limited To Hum (Low Frequency Buzzing Noise) From All Loudspeakers. | Audio Power AC Fuse defective.                    | 1. Replace fuse with another of exact same type.<br>2. Check Audio Power DC rectifiers, Filter Capacitors.<br>(Fuse located inside backbox on right side circuit board.)   |
|                                                                                             | Sound Board Assembly defective.                   | 1. Check Audio Amplifier IC.                                                                                                                                               |
| Weak Or Distorted Sound From One Or Two Loudspeakers.                                       | Faulty Loudspeaker.                               | 1. Check Loudspeakers for torn paper, liquid spills, etc.<br>2. Inspect speaker boxes for loose screws, dirt or debris                                                     |
|                                                                                             | Dirty or intermittent audio connections.          | 1. Carefully unplug and reseal each loudspeaker wire.<br>2. Check Loudspeaker Wiring Harnesses for continuity.                                                             |
| Little Or No High Frequency (Treble), Muffled Or Distant Sound Quality.                     | Loudspeakers disconnected.                        | 1. Check small Loudspeakers in backbox for operation.<br>2. Test each small Loudspeaker for continuity.<br>3. Check Loudspeaker Wiring Harnesses for continuity.           |
| Little Or No Low Frequency (Bass), Weak Or Hollow Sound Quality.                            | Loudspeakers disconnected or wired out of phase.  | 1. Check large Loudspeaker in cabinet for operation.<br>2. Connectors on small Loudspeakers installed in reverse.<br>3. Check Loudspeaker Wiring Harnesses for continuity. |
| Unintelligible Voice Messages, Strange Noises, Unrecognizable Music.                        | Incorrect Sound Program.                          | 1. Music or Voice Memory ICs installed in wrong order.<br>2. Display or Game Memory ICs installed on audio board.<br>3. Defective Voice or Music Memory IC.                |
| Continuous Medium Pitch Tone (Middle Frequency).                                            | No Sound Program (1khz Self Test Tone is active). | 1. Music or Voice Memory ICs removed from sockets.<br>2. Defective Music or Voice Memory IC.                                                                               |



## PLAYFIELD PROBLEMS - MECHANICAL

| SYMPTOM                                                                           | PROBABLE CAUSE                                                                                              | PROBABLE SOLUTION                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Game Plays But One Or More Balls Continually Stick In One Area Of The Playfield.  | Build up of dirt or debris.                                                                                 | 1. Clean the playfield to remove any spills or sticky substances. Check for depressions on playfield surface.<br>2. Replace cracked cabinet glass or other sources of leaks.                                                                                                                                                                                                                                                     |
|                                                                                   | Loose screws cause parts to shift out of alignment.                                                         | 1. Reposition parts and retighten screws firmly.<br>2. Apply removable threadlocking adhesive to fasteners.                                                                                                                                                                                                                                                                                                                      |
|                                                                                   | Damaged or broken guides, troughs, forms, etc.                                                              | 1. Cracked or deformed items should be replaced.<br>2. Broken joints may be brazed or welded as a repair.                                                                                                                                                                                                                                                                                                                        |
|                                                                                   | Binding trip lever on position detection switch.                                                            | 1. Move wiring harness out of lever path.<br>2. Loosen mounting screws and adjust switch position.<br>3. Carefully bend trip lever to improve alignment.<br>4. Repair or replace detection switch.                                                                                                                                                                                                                               |
|                                                                                   | Insufficient solenoid force to eject ball from assembly.                                                    | 1. Clean and lubricate assembly linkages, bearings, etc.<br>2. Ensure that correct solenoid return spring is installed.<br>3. Open Coin Door to enter System Menu, then select Standard Tests and go to Sol. Volts to look for Low Voltage report. Check Power Transformer Line Voltage Wiring. (Connector located near transformer in cabinet.)<br>4. Check playfield angle using a protractor or level.                        |
| Game Plays OK But Balls Hit Hard And Bounce Too Much.                             | Excessive solenoid force.                                                                                   | 1. Rubber bumper button damaged or missing from one or more solenoid assemblies.<br>2. Ensure that correct solenoid return spring is installed.<br>3. Open Coin Door to enter System Menu, then select Standard Tests and go to Sol. Volts to look for Hi Voltage report. Check Power Transformer Line Voltage Wiring. (Connector located near transformer in cabinet.)<br>4. Check playfield angle using a protractor or level. |
| Premature Breakage Of Posts, Targets, Buttons, Or Other Plastic Parts.            | Aftermarket replacement parts installed during previous game repair.                                        | 1. Use only new <i>factory</i> parts and assemblies for repairs. Other parts may fit and function but they will not last.<br>2. Fasteners tightened excessively, cracking parts during installation. Do not use too much force when tightening.                                                                                                                                                                                  |
| One Or More Balls Are Missing When The Game Is Started Or In Play                 | Mechanical part failure or poor alignment (ball dropped in cabinet, stuck somewhere on the playfield, etc.) | 1. Game will automatically initiate its own "ball search" by cycling through each solenoid and motor assembly a few times to dislodge a ball stuck on the playfield.<br>2. After an unsuccessful attempt at freeing a missing ball, the game will resume operation with fewer balls. A game will continue with only one ball.                                                                                                    |
|                                                                                   | Ball removed from game or placed in cabinet during service.                                                 | 1. Locate missing ball in cabinet and return to playfield. Game will accept ball and return to normal operation.<br>2. Check your pockets!                                                                                                                                                                                                                                                                                       |
| Ball Trough Is Inoperative (Jams, Not Able To Eject A Ball For The Shooter, Etc.) | Binding trip lever on position detection switch.                                                            | 1. Check harness for wires caught in lever path. Relocate wires so they can not get into switch lever path again.<br>2. Loosen mounting screws and adjust switch position. Carefully bend lever to improve alignment if necessary.<br>3. Repair or replace detection switch.                                                                                                                                                     |
|                                                                                   | Loose part caught in Ball Trough Assembly.                                                                  | 1. Remove Bottom Arch from playfield to expose the interior of the Ball Trough Assembly. Extract loose part and realign as necessary to restore proper operation.<br>2. Reinstall Bottom Arch and loose part onto playfield.                                                                                                                                                                                                     |



## PLAYFIELD PROBLEMS - MECHANICAL (CONT.)

| SYMPTOM                                                     | PROBABLE CAUSE                                                                                  | POSSIBLE SOLUTION                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tilt Or Slam Switches Are Stuck, Causing Constant Game Tilt | An item in the cabinet is pressing against the switch, causing a false Tilt or Slam indication. | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to the Switches routine. Check each device independently to locate trouble.<br>2. Look for objects that can touch either switch when the Coin Door would be in its closed and locked position. |
|                                                             | Loose part caught in mechanism.                                                                 | 1. Check Tilt Switch Assembly for loose thumbscrew on weight or hookwire separated from hanger bracket.<br>2. Make sure that playfield bottom assemblies do not contact either switch. Realign and tighten fasteners.                                                    |

## PLAYFIELD PROBLEMS - SOLENOIDS &amp; MOTORS

| SYMPTOM                                                                  | PROBABLE CAUSE                                       | POSSIBLE SOLUTION                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solenoids Firing Randomly, Sometimes Two At One Time.                    | Faulty or intermittent solenoid connections.         | 1. Open coin door to enter System Menu, then select Standard Tests and go to the Solenoids routine. Check each device independently to locate trouble.<br>2. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.<br>3. Damaged or missing diodes on solenoid coils.<br>4. Test Communication Wiring Harness for continuity. |
|                                                                          | Driver Board Assembly defective.                     | 1. Damaged or missing diodes on Driver Board Assembly. Repair or replace Driver Board Assembly.                                                                                                                                                                                                                                                                                    |
| Motors Running Too Long Or Not Long Enough When Game Assembly Is Active. | Limit Switches not activated at the correct time.    | 1. Check motorized assembly for dirt and debris blocking motion. Clean and lubricate linkages, bearings, etc.<br>2. Open coin door to enter System Menu, then select Feature Tests and go to the Wand or Stage routine. Check each device independently to locate trouble.<br>3. Carefully bend trip lever to improve alignment.                                                   |
|                                                                          | Gearmotor Assembly defective.                        | 1. Gears worn or teeth broken. Replace entire assembly.                                                                                                                                                                                                                                                                                                                            |
| Flippers Respond Too Slowly Or Do Not Reset Quickly.                     | Flipper Assembly binding or defective.               | 1. Clean and lubricate assembly linkages, bearings, etc.<br>2. Ensure that correct solenoid return spring is installed.<br>3. Open coin door to enter System Menu, then select Standard Tests and go to the Solenoids routine. Check each device independently to locate trouble.                                                                                                  |
| None Of The Solenoids Work.                                              | High Voltage DC Power disabled.                      | 1. Open coin door to enter System Menu, then select Standard Tests and go to Voltage to look for Check Interlock report. Pull out on switch actuator to reset. (Interlock Switch is located at left side of Coin Door.)<br>2. Switch damaged or broken. Replace Interlock Switch. (NOTE: The Switch routine will not test this switch!)                                            |
|                                                                          | High Voltage AC Fuse defective.                      | 1. Replace fuse with another of the exact same type.<br>2. Check High Voltage DC Power rectifiers.                                                                                                                                                                                                                                                                                 |
|                                                                          | High Voltage DC Fuse defective.                      | 1. Replace fuse with another of the exact same type.<br>2. Check High Voltage DC Power filter capacitor.                                                                                                                                                                                                                                                                           |
|                                                                          | High Voltage DC Wiring Harness unplugged or damaged. | 1. Check all High Voltage DC Power Wiring Connectors.<br>2. Check High Voltage DC Wiring Harness for continuity.                                                                                                                                                                                                                                                                   |



## PLAYFIELD PROBLEMS - SOLENOIDS &amp; MOTORS (CONT.)

| SYMPTOM                                                                     | PROBABLE CAUSE                                         | POSSIBLE SOLUTION                                                                                                   |
|-----------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| None Of The Solenoids Work.                                                 | System Communication failure.                          | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.           |
|                                                                             | Driver Board Assembly defective.                       | 1. Check Low Voltage DC Power filter capacitor and coil.                                                            |
| Game Plays But A Small Group Of Solenoids Do Not Operate.                   | Solenoid Assembly Wiring Harness unplugged or damaged. | 1. Check Solenoid Assembly Wiring Harness Connectors.<br>2. Test Solenoid Assembly Wiring Harnesses for continuity. |
|                                                                             | System Communication failure.                          | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.           |
| One Or More Solenoids, Lamps, Or Motors Is Always On When Main Power Is ON. | Cross connection between two DC Voltage sources.       | 1. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.       |
|                                                                             | Driver Board Assembly defective.                       | 1. Check Smart Solid State Relays (Power IC devices).                                                               |
| Solenoids Or Motors Repeatedly Burn Out.                                    | System Communication failure.                          | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.           |

## PLAYFIELD PROBLEMS - SWITCHES

| SYMPTOM                                                                                                    | PROBABLE CAUSE                                                                     | POSSIBLE SOLUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Premature Failure Of A Few Switches, Causing Irregular Scoring Or Inability To Complete All Steps In Game. | Excessive solenoid force.                                                          | 1. Use only new factory parts and assemblies for repairs. Other parts may fit and function but they will not last.<br>2. Fasteners tightened excessively, cracking parts during installation. Do not use too much force when tightening.<br>3. Open Coin Door to enter System Menu, then select Standard Tests and go to Sol. Volts to look for Hi Voltage report. Check Power Transformer Line Voltage Wiring. (Connector located near transformer in cabinet.)<br>4. Check playfield angle using built-in bubble level. |
| Switches Firing Randomly, Sometimes Two At One Time.                                                       | Faulty or intermittent switch connections.                                         | 1. Open coin door to enter System Menu, then select Standard Tests and go to the Switches routine. Check each device independently to locate trouble.<br>2. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.<br>3. Test Communication Wiring Harness for continuity.                                                                                                                                                                                            |
| Too Many Or Not Enough Tilt Or Slam Detections.                                                            | Incorrect switch adjustment.                                                       | 1. Slam Switch caught on clothing or cash box and bent. Refer to Slam Switch Sensitivity Adjustment instructions.<br>2. Tilt Switch caught on wiring or aligned incorrectly. Refer to Tilt Switch Sensitivity Adjustment instructions.                                                                                                                                                                                                                                                                                    |
| A Standard Switch Has Not Been Activated In Several Games.                                                 | Players are concentrating on other shots or not skilled enough to activate switch. | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to Switches to look for Dead reports. If manual switch activation changes the report to OK then players are the cause of this condition.                                                                                                                                                                                                                                                                                                        |
|                                                                                                            | Switch defective.                                                                  | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to Switches to look for Dead reports. If manual switch activation does not change the Dead report then there is an electrical problem.                                                                                                                                                                                                                                                                                                          |

**PLAYFIELD PROBLEMS - SWITCHES (CONT.)**

| <b>SYMPTOM</b>                                             | <b>PROBABLE CAUSE</b>                                                    | <b>POSSIBLE SOLUTION</b>                                                                                                                                                                                                                                                            |
|------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An Optical Switch Has Not Been Activated In Several Games. | External light leakage is enough to prevent normal activation of switch. | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to Switches to look for Dead reports. If manual switch path blockage changes the report to OK then leakage is the cause of this condition.<br>2. Check for missing light shields or misalignment.         |
|                                                            | Switch defective.                                                        | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to Switches to look for Dead reports. If manual switch activation does not change the Dead report then there is an electrical problem.<br>2. Ensure that Optodetector Board Assembly is oriented properly |
|                                                            | Faulty or intermittent switch connections.                               | 1. Open Coin Door to enter System Menu, then select Standard Tests and go to the Switches routine. Check each device independently to locate trouble.<br>2. Look for pinched or cut wires where harness touches moving parts. Repair or reroute wires away from area.               |
| None Of The Switches Work.                                 | Low Voltage DC Wiring Harness unplugged or damaged.                      | 1. Check Low Voltage DC Power Wiring Connectors.<br>2. Test Low Voltage DC Wiring Harness for continuity.                                                                                                                                                                           |
|                                                            | System Communication failure.                                            | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.                                                                                                                                                                           |
|                                                            | Switch Board Assembly defective.                                         | 1. Check Low Voltage DC Power filter capacitor and coil.<br>2. Repair or replace Switch Board Assembly.                                                                                                                                                                             |
| System Menu Is Not Displayed When Opening Coin Door.       | Cabinet Switch Wiring Harness unplugged or damaged.                      | 1. Check Cabinet Switch Wiring Harness Connectors.<br>2. Test Cabinet Switch Wiring Harness for continuity.                                                                                                                                                                         |
|                                                            | Switch defective.                                                        | 1. Temporarily jumper switch to get into System Menu.<br>2. Test System Menu Switch for continuity.                                                                                                                                                                                 |
|                                                            | Processor Board Assembly defective.                                      | 1. Check signal diodes for rectification and leakage.                                                                                                                                                                                                                               |

**PLAYFIELD & BACKBOX PROBLEMS - ILLUMINATION**

| <b>SYMPTOM</b>                                                                     | <b>PROBABLE CAUSE</b>                                                    | <b>POSSIBLE SOLUTION</b>                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Premature Burn Out Of Many Lamps (Bulbs May Or May Not Appear Excessively Bright). | Higher than normal line voltage or excessive temperature stresses bulbs. | 1. Open coin door to enter System Menu, then select Standard Tests and go to Sol. Volts to look for Hi Line report. Check Power Transformer Line Voltage Wiring. (Connector located near transformer in cabinet.)<br>2. Move game away from sources of heat such as heat registers and high intensity lighting. Ensure that air flows freely around cabinet and backbox ventilation holes. |
|                                                                                    | Incorrect bulbs used as a replacement during a previous game repair.     | 1. Use only new factory parts and assemblies for repairs. Other parts may fit and function but they will not last.                                                                                                                                                                                                                                                                         |



## PLAYFIELD &amp; BACKBOX PROBLEMS - ILLUMINATION (CONT.)

| SYMPTOM                                                                        | PROBABLE CAUSE                                                       | POSSIBLE SOLUTION                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lamps Firing Randomly, Sometimes Two At One Time.                              | Faulty or intermittent lamp connections.                             | 1. Open coin door to enter System Menu, then select Standard Tests and go to the Lamps routine. Check each device independently to locate trouble. NOTE: Some lamps are wired in pairs; refer to Lamp Matrix charts.<br>2. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.<br>3. Damaged or missing diodes on lamp sockets.<br>4. Test Communication Wiring Harness for continuity. |
|                                                                                | Driver Board Assembly defective.                                     | 1. Damaged or missing diodes on Driver Board Assembly. Repair or replace Driver Board Assembly.                                                                                                                                                                                                                                                                                                                                                |
|                                                                                | Medium Voltage DC Wiring Harness unplugged or damaged.               | 1. Check Medium Voltage DC Wiring Harness Connectors.<br>2. Test Medium Voltage DC Wiring Harness for continuity.                                                                                                                                                                                                                                                                                                                              |
| Game Plays But About Half Of The Lamps Are Not Illuminated.                    | Medium Voltage AC Fuse defective.                                    | 1. Replace fuse with another of the exact same type.<br>2. Check Medium Voltage DC Power rectifiers.                                                                                                                                                                                                                                                                                                                                           |
|                                                                                | Medium Voltage DC Fuse defective.                                    | 1. Replace fuse with another of the exact same type.<br>2. Check Medium Voltage DC Power filter capacitor.                                                                                                                                                                                                                                                                                                                                     |
| Game Plays But A Small Group Of Lamps Are Not Illuminated.                     | Lamp Matrix Row or Column Wiring Harness unplugged or damaged.       | 1. Check Lamp Matrix Wiring Harness Connectors.<br>2. Test Lamp Matrix Wiring Harnesses for continuity.                                                                                                                                                                                                                                                                                                                                        |
|                                                                                | System Communication failure.                                        | 1. Check Communication Wiring Harness Connectors.<br>2. Test Communication Wiring Harness for continuity.                                                                                                                                                                                                                                                                                                                                      |
| Game Plays But A Small Group Of Lamps Are Constantly Illuminated.              | One Lamp Matrix Row or Column stuck ON (continuously powered).       | 1. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.                                                                                                                                                                                                                                                                                                                                  |
|                                                                                | Driver Board Assembly defective.                                     | 1. Check Smart Solid State Relays (Power IC devices).<br>2. Check Field Effect Transistors (Power Transistors).                                                                                                                                                                                                                                                                                                                                |
| One Or More Lamps Very Dim But Still Illuminated.                              | Incorrect bulbs used as a replacement during a previous game repair. | 1. Use only new factory parts and assemblies for repairs. Other parts may fit and function but they will not last.                                                                                                                                                                                                                                                                                                                             |
|                                                                                | Blackened glass, weak or old bulb filament, etc.                     | 1. Replace bulb with another of the exact same type.<br>2. Test lamp diode for rectification and leakage.                                                                                                                                                                                                                                                                                                                                      |
| Several Lamps Illuminate When Only One Or Two Should Be On ("Phantom" Effect). | Lamp Matrix defective.                                               | 1. Open coin door to enter System Menu, then select Standard Tests and go to Lamps routine. Check each device independently to locate trouble.<br>2. Test lamp diode for rectification and leakage.                                                                                                                                                                                                                                            |
|                                                                                | Lamp Wiring Harness damaged.                                         | 1. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.                                                                                                                                                                                                                                                                                                                                  |
| One Or More Large Lamps ("Flashers") Are Constantly Illuminated.               | Lamp Wiring Harness damaged.                                         | 1. Look for pinched or cut wires where harness touches moving parts. Repair and reroute wires away from area.                                                                                                                                                                                                                                                                                                                                  |
|                                                                                | Driver Board Assembly defective.                                     | 1. Check Field Effect Transistors (Power Transistors).<br>2. Test lamp diode for rectification and leakage.                                                                                                                                                                                                                                                                                                                                    |



## THEORY OF OPERATION

### POWER SUPPLY CIRCUIT AND RELATED COMPONENTS

#### AC POWER CIRCUITS

The AC line cord may be any one of several domestic or international grounding type cordsets. Power enters the machine through a shielded I.E.C. (International Electrotechnical Commission) connector and passes through an electromagnetic interference filter. This filter reduces both common mode and differential conducted noise on the AC power wires. Power then travels through the main fuse to the unswitched convenience outlet and the OFF/ON switch. Both sides of the line are switched to prevent shock hazard during machine maintenance. The power transformer has dual tapped primary windings which must be connected in parallel for AC voltages less than 200 and in series for voltages more than 200. Multiple secondary windings provide low, medium, and high voltage power to the power supply circuit board for rectification, filtering, regulation, and protection. The high voltage power goes through a standard interlock switch to protect against shock or accidental equipment damage during routine maintenance or service. Note that the main fuse must be changed when switching between series and parallel configuration.

#### DC POWER CIRCUITS

All power sources are fused at their point of entry onto this board. Each power source is rectified by a full wave diode bridge and filtered by an electrolytic capacitor and a bleeder resistor to discharge the voltages during equipment service. Immediately following the capacitor is a light emitting diode with a current limiting resistor which indicates the presence of voltage. Additional fuses and LED indicators are used for branch circuits, and the low and medium voltage sources have series diodes to protect against power cross with higher voltages. All power supply voltages are positive with respect to ground to reduce noise sensitivity.

The lowest voltage source is the most critical since it runs the system microprocessors, the digital logic circuits, memory, and the interface circuits, so it gets its own three-terminal voltage regulator and filter capacitors. A voltage divider is used to provide the minimum load for regulator operation and at the same time set the output to five volts. This regulator has thermal shutdown to avoid damage due to overheating. Short-circuit protection is automatic, so there is no separate fuse required for the regulated low voltage.

#### DC SIGNAL CIRCUITS

Four voltage comparators are used to monitor the critical power supply characteristics. Two of the devices act as detectors for Alternating Current. One triggers on positive voltages, the other on negative voltages. The output of the circuit is a series of narrow pulses at twice the frequency of the AC Line Voltage. These pulses are used by the processor to determine the AC frequency and zero cross points.

The remaining two voltage comparators are used to check analog voltages against a processor generated reference signal. One circuit monitors regulated low voltage; the other an unregulated high voltage source. Since the high voltage power supply is not regulated, it will rise or fall with changes in the AC Line Voltage. The microprocessor varies the reference signal to determine the value of these DC voltage sources.



## **AUDIO CIRCUITS AND RELATED COMPONENTS**

All audio information is compressed using the MPEG digital signal processing standard and stored in Read Only Memory.

Once the digital signals have been expanded and converted to analog audio signals, the remainder of the circuitry is used to amplify the sound and provide volume and tone control functions.

## **PROCESSOR BOARD AND RELATED COMPONENTS**

A MC68306 Microprocessor is used to control the game functions, the diagnostics, the adjustable features, and the system communications. In addition, this processor has indirect control of display functions through a Programmable Logic Device and sound (the Sound Board has its own dedicated microprocessor). This 16-bit device was selected because it has common elements with the well known MC68000 family of integrated processors. The MC68306 is optimized for use with memory and communications.

## **INPUT / OUTPUT CIRCUITS**

Each time power is applied to the game, a timer circuit generates a reset signal to start the microprocessor. The DC signals from the Power Supply circuit generate interrupt messages, allowing the processor to identify the AC power line characteristics. Cabinet switches create input signals used to control game play, system operating mode, menu item selection, etc. The remainder of the input signals are collected from other boards through a mixture of serial and parallel communications channels.

One output from the microprocessor is used for the display. The characters and images are stored in Read Only Memory. The Field Programmable Gate Array temporarily saves this data to Random Access Memory and converts this information to row and column signals for the display dot matrix. The Sound Board receives data commands from the processor and then generates the voices, music, and sound effects to go along with the display images and messages. Lamp, motor, and solenoid drive circuits receive control signals from the processor through a parallel communication port.

In system diagnostic mode, more circuits become active. The microprocessor sends test signals through the drive and switch circuits to determine the state (normal operation, fault conditions, etc.) of the switches, lamps, motors, and solenoids. The processor is also able to recognize cable disconnections, communication errors, switch related problems, etc., and issues messages or reports as necessary.

## **MEMORY CIRCUITS**

Game parameters, custom messages, adjustable features, intermittent conditions, etc., are saved in Static Random Access Memory. This circuit has a built-in back up battery to prevent data corruption or loss.



## INDICATOR CIRCUITS

There are two Light Emitting Diodes located on the Processor Board. One LED indicates the presence of regulated low voltage DC power. The other LED serves as a low level status indicator for the microprocessor. Internal fault conditions generate an error code which can be useful when the display circuits malfunction or system diagnostics are not available.

## POWER CIRCUITS

Two types of filter circuits are used on the Processor Board. Small bypass capacitors are used on the data lines to reduce the effects of noise. The regulated low voltage DC power source uses a more complex filter network (two capacitors and an inductor) to eliminate interference present on the power supply wiring.

## SWITCH BOARD AND RELATED COMPONENTS

The Switch Board has two main functions. Switches close and open very rapidly in the course of a pinball game, and there are instances where several switches may operate simultaneously. During game play, momentary switch connections are tracked and turned into signals which the microprocessor uses to determine the location of the balls. These input signals allow interaction with the players by increasing point score, illuminating indicator lamps, activating solenoids or motors, and by triggering images or sounds at the appropriate times. When the diagnostics routines are in use, the Switch Board circuits test the continuity of each switch device and its associated wiring. This permits the system to locate faults and provide service information on demand.

### SWITCH SENSE CIRCUITS

Each switch has its own dedicated line to the Switch Board. The inputs have series diodes to protect against power cross with higher voltages. Each comparator has one switch input signal and one from a fixed DC voltage obtained from a voltage divider on the low voltage regulated power source. Any switch closure causes one comparator to change its output state; this signal is then buffered before being sent off board. Independent output lines prevent a single fault from disabling more than one switch signal.

One contact of each switch is connected to system ground. This is done to reduce the effects of noise on the switch and processor circuits when a switch is activated.

The addition of a resistor directly to each set of switch contacts allows the switch circuits to detect the difference between a normal circuit path and a faulty condition. This resistor forms a voltage divider with others located on the circuit board. This resistor has no effect on the normal operation of the switch.

When the system is operating in its Diagnostic or Troubleshooting modes, the microprocessor sends a digital message to the Switch Board to activate the test circuits. This message is decoded and turned into two signals, one for each switch group. These test signals go through flip-flop circuits wired as latches and then on to individual driver circuits. The outputs of the drivers effectively bypass one of the resistors in the voltage divider, changing the value of the reference voltage to a higher threshold during switch tests. Under this condition, the processor can detect whether a switch is normally open or the circuit is defective.



## POWER CIRCUITS

Two types of filter circuits are used on the Switch Board. Small bypass capacitors are used on the integrated circuits to reduce the effects of noise caused by solenoids and motors operating. The regulated low voltage DC power source uses a more complex filter network consisting of two capacitors and an inductor to eliminate any interference which might be present on the power supply wiring.

## DRIVER BOARD AND RELATED COMPONENTS

Two types of drive circuits are used on this board. Low power loads (indicator and illuminator lamps) are connected in a typical row and column matrix configuration to reduce the number of components and wires needed. High power loads (flashing lamps, motors, or solenoids) have individual independent control circuitry. Both circuit types feature protection from electrical noise, thermal overload, and short circuits.

The majority of the lamps used in the game are connected in two identical matrices. Each matrix has eight rows and eight columns for a total of sixty four controlled positions; however, some of the positions have two lamps wired in parallel. The maximum number of lamps supported by one matrix is eighty.

Motors, solenoids, and flashing lamps have their own dedicated drive devices. By maintaining separate circuit paths many loads can operate simultaneously, but interaction with other game functions is eliminated.

## INPUT / OUTPUT CIRCUITS

The Processor must send an enable signal to the Driver Board before any of the circuits will respond. This signal allows control data to pass through flip-flop circuits and into the driver devices. Lamp data from the microprocessor is decoded and turned into signals for rows and columns. In addition to lamp location, the program changes lamp brightness independently by varying how long each selected position is active. A lamp warming routine in the program keeps each location continuously powered at a very low level to reduce filament inrush current, turn on time, and voltage fluctuations on the power supply circuits.

Power for each matrix is delivered by eight row drivers and eight column drivers. The lamp row drives use conventional devices with comparator circuits to sense excessive current and provide circuit protection. So called Smart Power Solid State Relays are used for the lamp columns and the independent drive circuits. These devices have built-in overtemperature protection circuitry and a status output signal. Diodes are connected in series with these output circuits to prevent damage from power cross with higher voltages.

At the end of each complete pass through all of the lamps in a matrix, the microprocessor sends a digital message to the Driver Board to activate the test circuits. This message is decoded and turned into two signals, one for each lamp group. These test signals go through flip-flop circuits wired as latches and then on to individual driver circuits. The outputs of the drivers effectively bypass one of the resistors in the voltage divider, changing the value of the reference voltage to a lower threshold during lamp tests. Under this condition, the processor can detect whether a lamp is shorted or the circuit is defective.

## POWER CIRCUITS

Two types of filter circuits are used on the Switch Board. Small bypass capacitors are used on the integrated circuits to reduce the effects of noise caused by solenoids and motors operating. The regulated low voltage DC power source uses a more complex filter network consisting of two capacitors and an inductor to eliminate any interference which might be present on the power supply wiring.



## NOTES

## NOTES



## FUSE INFORMATION

| LOCATION  | COMPONENT          | REF.    | FUSE TYPE              | CAPCOM® P/N |
|-----------|--------------------|---------|------------------------|-------------|
| BACKBOX   | POWER DRIVER BOARD | F1      | SLO-BLO 7.0A 250V 3AG  | FS00100-07  |
| BACKBOX   | POWER DRIVER BOARD | F2-F3   | SLO-BLO 10.0A 250V 3AG | FS00100-10  |
| BACKBOX   | POWER DRIVER BOARD | F4-F6   | SLO-BLO 3.0A 250V 3AG  | FS00100-03  |
| BACKBOX   | POWER DRIVER BOARD | F7-10   | SLO-BLO 4.0A 250V 3AG  | FS00100-04  |
| BACKBOX   | SOUND BOARD        | F14-F15 | SLO-BLO 3.0A 250V 3AG  | FS00100-03  |
| *CABINET  | LINE FUSE          | -----   | SLO-BLO 8.0A 250V 3AG  | FS00100-08  |
| **CABINET | LINE FUSE          | -----   | SLO-BLO 5.0 A 250V 3AG | FS00100-05  |

\* NOTE: FOR GAMES CONFIGURED FOR 100V AC OR 115V AC SOURCE VOLTAGES.

\*\* NOTE: FOR GAMES CONFIGURED FOR 200V AC, 215V AC, OR 230V AC SOURCE VOLTAGES.

## QUICK REFERENCE GUIDE TO PROGRAMMED MEMORY

| COMPONENT   | DESIGNATOR   | FUNCTION               | CAPCOM® P/N |
|-------------|--------------|------------------------|-------------|
| SOUND BOARD | U24 (40 PIN) | MICROCONTROLLER 87C52  | A-00566-U24 |
| SOUND BOARD | U28 (32 PIN) | MUSIC / SOUND / SPEECH | A-00567-U28 |
| SOUND BOARD | U29 (32 PIN) | MUSIC / SOUND / SPEECH | A-00567-U29 |
| SOUND BOARD | U30 (32 PIN) | MUSIC / SOUND / SPEECH | A-00567-U30 |
| SOUND BOARD | U31 (32 PIN) | MUSIC / SOUND / SPEECH | A-00567-U31 |
| CPU BOARD   | U1H (32 PIN) | BOOT, GAME, IMAGES     | A-00567-U1H |
| CPU BOARD   | U1L (32 PIN) | BOOT, GAME, IMAGES     | A-00567-U1L |
| CPU BOARD   | U2H (32 PIN) | IMAGES FOR GAME        | A-00567-U2H |
| CPU BOARD   | U2L (32 PIN) | IMAGES FOR GAME        | A-00567-U2L |



## LAMP MATRIX "A"

| Column<br>Row            | Column 1<br>J7.1<br>YEL/BRN | Column 2<br>J7.2<br>YEL/RED     | Column 3<br>J7.3<br>YEL/ORG    | Column 4<br>J7.4<br>YEL/BLK | Column 5<br>J7.5<br>YEL/GRN | Column 6<br>J7.7<br>YEL/BLU  | Column 7<br>J7.8<br>YEL/VIO   | Column 8<br>J7.9<br>YEL/GRY |
|--------------------------|-----------------------------|---------------------------------|--------------------------------|-----------------------------|-----------------------------|------------------------------|-------------------------------|-----------------------------|
| Row 1<br>J2.1<br>RED/BRN | (1)<br>Coin 1 & 3           | (9)<br>Night Flying             | (17)<br>Rank<br>Ace            | (25)<br>JET<br>Lane gi 1    | (33)<br>Left<br>Saucer Lock | (41)<br>Flyby                | (49)<br>Blue Angel<br>Bottom  | (57)<br>Britain             |
| Row 2<br>J2.2<br>RED/BLK | (2)<br>Coin 2 & 4           | (10)<br>Saucer gi               | (18)<br>Rank<br>Colonel        | (26)<br>JET<br>Lane gi 2    | (34)<br>Extra Ball          | (42)<br>Back Saucer<br>Lock  | (50)<br>Left Scoop            | (58)<br>Spain               |
| Row 3<br>J2.3<br>RED/ORG | (3)<br>Start                | (11)<br>Right Lane<br>gi 1 & 2  | (19)<br>Rank<br>Major          | (27)<br>JET<br>Lane gi 3    | (35)<br>Left gi 2 & 3       | (43)<br>Left Ramp<br>Standup | (51)<br>Right Scoop           | (59)<br>Germany             |
| Row 4<br>J2.5<br>RED/YEL | (4)<br>Buyin                | (12)<br>Right Sling<br>gi 1 & 2 | (20)<br>Rank<br>Captain        | (28)<br>JET<br>Lane gi 4    | (36)<br>Drop S              | (44)<br>Left gi 4            | (52)<br>Scoop<br>Left Standup | (60)<br>Italy               |
| Row 5<br>J2.6<br>RED/GRN | (5)<br>Eject Lock           | (13)<br>Multiplier<br>x 2       | (21)<br>Rank<br>Lieutenant     | (29)<br>Tower<br>gi 1 & 2   | (37)<br>Drop H              | (45)<br>Left gi 5            | (53)<br>Scoop<br>Cen Standup  | (61)<br>France              |
| Row 6<br>J2.7<br>RED/BLU | (6)<br>Left<br>Outlane      | (14)<br>Multiplier<br>x 3       | (22)<br>Rank<br>Sergeant       | (30)<br>Left gi 9           | (38)<br>Drop O              | (46)<br>Left gi 6 & 7        | (54)<br>Scoop<br>Rt Standup   | (62)<br>USA                 |
| Row 7<br>J2.8<br>RED/VIO | (7)<br>Left<br>Inlane       | (15)<br>Multiplier<br>x 5       | (23)<br>Left Lane<br>gi 1 & 2  | (31)<br>Tower Top           | (39)<br>Drop W              | (47)<br>Left gi 8            | (55)<br>Center gi 3           | (63)<br>Copilot             |
| Row 8<br>J2.9<br>RED/GRY | (8)<br>Left gi 1            | (16)<br>Fly Again               | (24)<br>Left Sling<br>gi 1 & 2 | (32)<br>Left gi 10          | (40)<br>Left Drop<br>Stunt  | (48)<br>Left Ramp<br>Stunt   | (56)<br>Center gi 4           | (64)<br>Refuel              |

## LAMP MATRIX "B"

| Column<br>Row            | Column 1<br>J9.1<br>BLU/BRN  | Column 2<br>J9.2<br>BLU/RED   | Column 3<br>J9.3<br>BLU/ORG | Column 4<br>J9.4<br>BLU/YEL    | Column 5<br>J9.5<br>BLU/GRN  | Column 6<br>J9.6<br>BLU/BLK | Column 7<br>J9.8<br>BLU/VIO | Column 8<br>J9.9<br>BLU/GRY |
|--------------------------|------------------------------|-------------------------------|-----------------------------|--------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| Row 1<br>J4.1<br>ORG/BRN | (65)<br>Engine<br>Upgrade    | (73)<br>Rt Ramp<br>Stunt      | (81)<br>Drop AIR<br>Stunt   | (89)<br>Right<br>Bumper        | (97)<br>Mach 1               | (105)<br>Backbox 21         | (113)<br>Backbox 11         | (121)<br>Backbox<br>1 & 2   |
| Row 2<br>J4.2<br>ORG/RED | (66)<br>Targetting           | (74)<br>Rt Ramp<br>Jet Left   | (82)<br>Drop A              | (90)<br>Center<br>Bumper       | (98)<br>Mach 2               | (106)<br>Backbox 22         | (114)<br>Backbox 12         | (122)<br>Backbox<br>3 & 4   |
| Row 3<br>J4.4<br>ORG/BLK | (67)<br>Rt Standup<br>Stunt  | (75)<br>Rt Ramp<br>Jet Right  | (83)<br>Drop I              | (91)<br>Left Bumper            | (99)<br>Mach 3               | (107)<br>Backbox 23         | (115)<br>Backbox<br>13 & 14 | (123)<br>Backbox 5          |
| Row 4<br>J4.5<br>ORG/YEL | (68)<br>Rt Standup<br>Top    | (76)<br>Rt Ramp<br>Jet Center | (84)<br>Drop R              | (92)<br>Center gi 1            | (100)<br>Right gi 10         | (108)<br>Backbox 24         | (116)<br>Backbox<br>15 & 16 | (124)<br>Backbox 6          |
| Row 5<br>J4.6<br>ORG/GRN | (69)<br>Rt Standup<br>Bottom | (77)<br>Right gi 2            | (85)<br>Right gi 6          | (93)<br>Center gi 2            | (101)<br>Lane J              | (109)<br>Backbox<br>25 & 26 | (117)<br>Backbox 17         | (125)<br>Backbox 7          |
| Row 6<br>J4.7<br>ORG/BLU | (70)<br>Right gi 1           | (78)<br>Right gi 3            | (86)<br>Right gi 7          | (94)<br>Left Standup<br>Stunt  | (102)<br>Lane E              | (110)<br>Backbox<br>27 & 28 | (118)<br>Backbox 18         | (126)<br>Backbox 8          |
| Row 7<br>J4.8<br>ORG/VIO | (71)<br>Right Inlane         | (79)<br>Right gi 4            | (87)<br>Right gi<br>8 & 9   | (95)<br>Left Standup<br>Top    | (103)<br>Lane T              | (111)<br>Backbox 29         | (119)<br>Backbox 19         | (127)<br>Backbox 9          |
| Row 8<br>J4.9<br>ORG/GRY | (72)<br>Right<br>Outlane     | (80)<br>Right gi 5            | (88)<br>Backbox 31          | (96)<br>Left Standup<br>Bottom | (104)<br>Spinner<br>gi 1 & 2 | (112)<br>Backbox 30         | (120)<br>Backbox 20         | (128)<br>Backbox 10         |

Cabinet

Backbox

Playfield



## NOTICE

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# FBI



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