New! Find-It-In-Front Dr. Pinball Section

APOLLO XIII
EX LUNA SCIENTIA

THIS IS A SAMPLE GAME MANUAL PHOTOCOPY. SOME TECHNICAL INFORMATION, DRAWINGS AND/OR SCHEMATICS MAY NOT YET BE AVAILABLE.

APOLLO 13

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Overview

Below is the Apollo 13™ Playfield with all of its component locations indicated (for details on these parts, see Section 4). Read over the components below to help in understanding the effects of the game rules. The rules are numbered and divided into four groups: Single Ball Play, Multiball & Jackpots, A13 Missions, and Mission Control Game Rule Notes.

Playfield Overview
& Game Rules

Section 2
Chapter 2 of 2

Game Rules

Shooter Lane Wire Ramp

Up/Down Metal Ramp Assembly When the ramp is down, a ball shot via the left orbit will roll up onto this ramp and exit onto the dual wire ramp dropping the ball over the left return lane. Otherwise left or right orbit shot can be made.

Up/Down Ramp Plunger Assembly Used to move the ramp into the up or down position.

Moon Assembly When a ball is shot up the plastic ramp (magnet is activated) the magnet will grab the ball, rotate forward and the ball drops onto the exit hole into the trough.

Center Eject Assembly This eject is located (hidden) under the plastic ramp by the top lanes.

Pop Bumpers The bottom pop bumper is hidden under the plastic ramp exit area.

Right Eject Assembly This eject is located (hidden) under the LEM and butyrate.

Plastic Ramp & Exit Ramp Ball Diverter Assemblies When the ball exits, the diverter will move closing the left or right exit.

Stand-Up Target "Water" by ramp entrance.

Adjustable Post Right Outline Widens/shortens outline.

Stand-Up Targets "Moon"

Stand-Up Targets "Battery"

Right Outline (Drain)

Exit to Right Return Lane Wire Ramp

Dual Exit to Left Return Lane Wire Ramp

Right Return Lane

5-Ball Trough & Exit Scoop Assemblies

Auto Ball Launch Assembly Under Butyrate.

Right Slingshot Assembly

Bottom Arch Assembly
Game Rules

Instruction Card

Below is a copy of the game instruction card which is included with every game. If this card is lost or damaged, simply copy this page and cut out the instruction card as a temporary replacement until a new card is ordered. (Suggestion: Copy & cut along the dotted line and fold in the center. This will keep the "copy" sturdy.)

APOLLO 13 FEATURING 13 BALL MULTIBALL!

TO START MULTIBALL, SHOOT ROCKET UNTIL COUNTDOWN IS 0.

FOR 13 BALL PLAY, FIRST SHOOT RAMP TO SCORE BLASTOFF LETTERS. WHEN BLASTOFF IS COMPLETE, SHOOT ROCKET UNTIL 13 BALL COUNTDOWN REACHES 0.

TO START APOLLO 13 MISSIONS, SHOOT RIGHT HOLE. FOLLOW INSTRUCTIONS GIVEN IN DOT DISPLAY TO COMPLETE MISSION.

BEGINNERS' GUIDE TO SEGA PINBALLS:
• SELECT NOVICE RULES FOR GUARANTEED PLAY TIME.
• TO SCORE MORE, SHOOT WHAT'S FLASHING!
• PLAY MULTIBALL AS OFTEN AS POSSIBLE!
• GLANCE AT DOT DISPLAY DURING GAME!

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The remainder of this chapter is Apollo 13 Game Rules. Please read through for a better understanding of the operation of this game. Some game rules, point values and/or features may change as production continues. The changes, if any, will be describe in manual addendums, if warranted. Please note, that some adjustments (see Section 3, Chapter 4, Adjustments) are designed to customize game play, (i.e. making it harder or easier as players get more familiar with the game).

Code revisions and updates may change as production continues. Code updates will be made available to distributors via ROM, diskette or modem. Changes, if any, will be described with the code updates. See the end of this manual for "Appendix A - Pinball Game Firmware," for the latest revision code for all games prior to this game.

See the end of this manual for "Glossary of Terms," for words or acronyms you may not understand. If an acronym or expression is not in this glossary, please call our Technical Support Department, so we may add it in the next game manual. Any other suggestions or comments are always welcome!
**S I N G L E  B A L L  P L A Y**

**GAME RULES**

1. **SELECT:**
   - Select REGULAR GAME rules or NOVICE GAME rules with the flipper buttons. If the player does not select rules, the game will default to Regular Rules. (Note: Subsequent players will play the game style chosen by player 1.)

NOVICE GAME rules give the player a guaranteed minimum game time - if the ball drains before this time is up, it will be returned to the player. When the ball drains after time is up, the game ends.

2. **SKILL SHOT SELECT:**
   - Select one of the three items shown in the display:
     - START MISSION - Starts Apollo 13 Mission.
     - MYSTERY - Gives Mystery Award.
     - MULTIBALL COUNTDOWN - With B L A S T O F F incomplete puts player 1 shot closer to starting Multiball. or
     - 13 MILLION - With B L A S T O F F or MULTIBALL READY complete gives player 13M points.

3. **TOP LANES:**
   - Complete the Top Lanes "1" & "3" to advance Spinner and Turbo Bumper values up to a maximum of 2M.

4. **MOON TARGETS & MOON HURRY UP**
   - Complete the Moon Targets from left to right to light the Ramp for Moon Hurry Up. The Turbo Bumpers and Spinner advance the Moon Hurry Up value.

5. **DOCK TARGETS & MYSTERY**
   - Complete the D-O-C-K Targets to light Mystery, collected at the Center Eject. A Mystery Award may also be collected at Skill Shot Select. Mystery Awards include:
     - 13 BALL PLAY
     - EXTRA BALL
     - MYSTERY 3-BALL
     - BIG POINT VALUES
     - HOLD BONUS
     - LIGHT SPECIAL
     - DOUBLE BONUS
     - HIDDEN VIDEO MODE

6. **BATTERY TARGETS**
   - Shoot the Battery Targets to recharge the battery. Fully charging the battery scores POINTS, or LIGHTS EXTRA BALL or SPECIAL.

7. **FOOD & WATER TARGETS**
   - The Food & Water Targets score increasing millions when hit.

**S I N G L E  B A L L  P L A Y**

8. **ORBIT FEATURES**
   - Shooting lit Orbits advances the Spacecraft Lamps in the center of the playfield. Then...
     - Scoring two Orbits will light the LANDER VIDEO MODE at the Right Eject.
     - Scoring five Orbits starts POWER DOWN - shoot all Flashing Shots before *AMPS=0*.
     - Scoring eight Orbits starts POWER UP - shoot Flashing Shots in order.
     - Scoring twelve Orbits starts SPLASHDOWN, a timed Multiball Feature where the Orbits score Jackpots.

9. **VIDEO MODE**
   - Shoot Right Eject when lit to play video mode. Land Spacecraft on the moon before fuel runs out. Use the Left Flipper to fire the left thruster (move right), the Right Flipper to fire the right thruster (move left), and Both Flippers to fire the bottom thruster (move up). Use the Ball Launch to 'zero' sideways velocity & thrust up hard.

10. **EXTRA BALL**
    - Shoot Right Eject when lit to collect an Extra Ball. If the maximum number of Extra Balls have already been awarded, the player will score points instead. The Extra Ball can be lit from • MISSION START • MYSTERY • THE BATTERY or • VIA PERCENTAGING.

11. **SPECIAL**
    - Lit Outlanes score a Special. A Special is lit from • MYSTERY or • VIA PERCENTAGING.
**MULTI-BALL & JACKPOTS**

### Starting Multiball:
Shoot the Rocket until the Countdown on the LED reaches zero [0]. The Rocket will elevate, kick the ball out, and the remaining balls will be issued from the 8-Ball Lock Trough.

### Regular Multiball Jackpots:
If Multiball is started and Blast Off is not complete, the player will receive 2-4 balls in play. Four (4) Jackpots will be lit at the Left Orbit, Spinner, Right Orbit, and the Right Eject. The Starting Jackpot value is a base value multiplied by the number of balls in play. The Jackpot value can be increased by shooting the Rocket during Multiball—the Jackpot will increase by 1M times the value shown on the LED when the Rocket is hit. Switch closures may also increase the Jackpot.

### Regular Multiball Super Jackpots:
The timed Super Jackpot is lit when all four Moon Targets are completed or all 4 (four) Jackpots are scored. During Multiball, the Moon Targets must be completed from left to right when no targets are lit, the left most target is available. When that target is hit, the 2nd target is available, etc.

### Starting 13 Ball Multiball & Blastoff Letters:
During Single Ball Play, two combination shots award letters in Blast Off.
- Ramp ⇔ Left Flipper ⇔ Ramp and
- Ramp ⇔ Right Flipper ⇔ Orbit Up/Down Ramp ⇔ Left Flipper ⇔ Ramp

When Blast Off is completed, the Next player to start Multiball will be awarded 13 Ball Multiball.

Easier difficulty settings allow the player to score a Blast Off letter the first time the Ramp is shot for each ball played or in each game played.

Blast Off letters carry over from player to player, game to game.

### 13 Ball Multiball Rocket Jackpots:
During 13 Ball Multiball, shoot the Rocket for Jackpots. The starting Jackpot value is equal to a base value multiplied by the number of balls in play. Every 10 switch closures increase the Jackpot value by 1M. Scoring 5 (five) Jackpots will qualify the Super Jackpot. The Up/Down Bumper Post remains up for about the first 10 seconds of 13 Ball Play, allowing the player to enjoy all of those balls!
**APOLLO 13 MISSIONS**

**STARTING MISSIONS**

14. **Shooting the Right Eject or Center Eject when lit will start the flashing Apollo 13 Mission.** Mission objectives are listed below (14a - 14j). Pop Bumpers cycle flashing mission. Turn the Abort Handle (Ball Launch) to lock/unlock Missions. Missions may also be started from Skill Shot Select.

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14a. **Orbiter**

A Hurry-Up Countdown starts on the Left Orbit. Shoot the Left Orbit to score the Countdown, then shoot the Right Orbit to triple scored value. This can be repeated until the Mission is over.

14b. **CO₂**

Shoot the Spinner to collect items to repair the CO₂ scrubbers before the CO₂ level reaches 20. Scoring all items scores a bonus based on switch closures during the Mission.

14c. **Manual Burn**

Shoot the Flashing Shots to fire thrusters to get the Spacecraft back on course. Flashing shots closer to the edges of the playfield provide more thrust than shots closer to the center.

14d. **Rocket 2 Ball**

Shoot the Rocket repeatedly for increasing Jackpots.

14e. **Moon's Gravity**

Shoot the Ramp 3 times and watch what happens next!

14f. **Under Volt**

Shoot a Battery Target to lock in a Hurry-Up value — all shots are lit for this value. Battery Targets add time.

14g. **Life Support**

Shoot the Food & Water Targets to nourish Fred. 4 (four) shots earns a Completion Bonus.

14h. **Docking**

Shoot the roving D-O-C-K Targets for points and awards.

14i. **Lite Extra Ball**

Light the Extra Ball at the Right Eject.

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**MASTER ALARM**

The Master Alarm is not available until all other Missions have been played. All shots are lit for big points and the Ramp scores Jackpots. Score as many points as possible before the time expires.
MISSION CONTROL
GAME RULE NOTES

COMBINATION SHOTS
Apollo 13 features several Multi-Way Combos. These Combo Shots involve natural sequences of key shots in the game. Several undocumented difficult combos may also be present.

END-OF-BALL BONUS CALCULATION
The BONUS is calculated as the sum of:
ROCKET BONUS + MOON BONUS + ORBIT BONUS + MISSION BONUS = TOTAL BONUS
There is no cap on the TOTAL BONUS. However, if all of the above are zero, a TOTAL BONUS of 1M will be awarded. There is no Bonus Multiplier in this game, though players can earn a DOUBLE BONUS (2x Bonus at the end of the current ball only). Normally, Bonus Totals will reset at the start of each new ball, but a HOLD BONUS is available from Mystery.

MISSION WARNING!
Just like any Mission, rules and point values are subject to change without notice. *Call Houston if you have a problem!*

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APOLLO 13
MISSION STATEMENT

Crew:
Jim Lovell, Commander
Jack Swigert, Command Module Pilot
Fred Haise, Lunar Module Pilot

Launched: April 11, 1970
Splashdown: April 17, 1970
Mission: Third attempted lunar landing. At 55 hours, 54 minutes, and 53 seconds into the mission, a cryogenic tank explodes, causing a loss of breathable oxygen and power in the command-service module. Crew abandons ship and survive in the LEM until just a few hours before splashdown, when they return to the command module, jettison the LEM, and re-enter the atmosphere.
GO TO SWITCH MENU

From the DIAGNOSTICS MENU, select the "SW" Icon with either Red "LEFT" or Green "RIGHT" Button and press the Black "ENTER" Button. Switches are configured in an 8 x 8 Matrix of Columns (Switch Drives) and Rows (Switch Returns) with up to 64 switches possible. The Switch Test Menu consists of two parts: Switch Test & Active Switches. (Flipper & Start Buttons are deactivated during Sw. Tests.)

Switch Test

To initiate, from the SWITCH MENU, select the "TST" Icon with the Red or Green Button & press the Black Button. In Switch Test, close each switch and observe the display. The display will describe the switch in the Switch Matrix, which includes the switch name, Return (Row) Wire, Drive (Column) Wire, Part N°, and the "Pin-Outs" from the CPU/SOUND Board. When the switch is released, the information of the last switch closed will remain in the display until another switch is closed or the test is exited. To view the switch schematic, select the mini "DRAW" Icon with the Red or Green Button & press the Black Button.

Active Switch Test

To initiate, from the SWITCH MENU, select the "ACT" Icon with either Red or Green Button & press the Black Button. If still in a previous test, select the "PREV" Icon to return to Switch Menu or selecting either of the "ARROW" Icons will move through the tests. If any switches are stuck closed (or made from the presence of a pinball), the display sequences through the switch names, Return (Row) Wire, Drive (Column) Wire, drive transistor, Part N°, and the "Pin-Outs" from the CPU/SOUND Board. This cycle continues until all switches are cleared or until the test is exited.

Dip Switch Test

To initiate, from the SWITCH MENU, select the "DIP" Icon with either Red or Green Button & press the Black Button. The display will indicate the Dip Switch Positions & the country setting the game is set to (e.g. USA, Germany, England, etc.). REFERENCE THE BEGINNING OF THIS MANUAL FOR DIP SWITCH SETTINGS.

Dedicated Switch Test

To initiate, from the SWITCH MENU, select the "DED" Icon with either Flipper Button & press the Start Button (The service switches are deactivated during this test.). The display will describe the switch which includes the switch name, Return (Row) Wire, Column Wire, Part N°, and the "Pin-Outs" from the CPU/SOUND Board.

Typical Switch Schematic & Side View

Dedicated Switch Schematic

**SWITCH MATRIX GRID**

<table>
<thead>
<tr>
<th>Column (Drive)</th>
<th>(1) GRN-BRN CN-5-1</th>
<th>(2) GRN-ROY CN-4-1</th>
<th>(3) GRN-ORG-CN-5</th>
<th>(4) GRN-YEL-CN-5</th>
<th>(5) GRN-BLK-CN-5-6</th>
<th>(6) GRN-VIO-CN-5-7</th>
<th>(7) GRN-VIO-CN-5-8</th>
<th>(8) GRN-BRN-CN-5-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) WHT-GRY CN-7-1</td>
<td>PLUMB BOB TILT</td>
<td>ABORT HANDLE BALL</td>
<td>L-LOCK (TOP)</td>
<td>D-D-0-2 (K) 4-BANK S-U</td>
<td>LEFT TURBO BUMPER</td>
<td>BATTERY 3-BANK S (ALL 3)</td>
<td>LEFT OUTLINE</td>
<td>(1) DED DED-CN-5-9</td>
</tr>
<tr>
<td>(2) WHT-VIO-CN-7-2</td>
<td>4TH CIRD-SLOT</td>
<td>5-BALL TROUGH #1 (LEFT)</td>
<td>8-BALL TROUGH #1</td>
<td>D-D-0-2 (C) 4-BANK S-U</td>
<td>BOTTOM TURBO EJECT</td>
<td>BULLET HOME POSITION</td>
<td>RIGHT OUTLINE</td>
<td></td>
</tr>
<tr>
<td>(3) WHT-BLU-CN-7-3</td>
<td>START BUTTON</td>
<td>5-BALL TROUGH #2</td>
<td>8-BALL TROUGH #2</td>
<td>D-D-0-2 (C) 4-BANK S-U</td>
<td>RIGHT TURBO BUMPER</td>
<td>ROCKET BALL EJECT</td>
<td>LEFT RETURN LANE</td>
<td></td>
</tr>
<tr>
<td>(4) WHT-GRN-CN-5-4</td>
<td>RIGHT CIRD-SLOT</td>
<td>5-BALL TROUGH #3</td>
<td>8-BALL TROUGH #3</td>
<td>D-D-0-2 (C) 4-BANK S-U</td>
<td>MOON HOME POSITION</td>
<td>RIGHT RAMP EXIT LEFT</td>
<td>RIGHT RETURN LANE</td>
<td></td>
</tr>
<tr>
<td>(5) WHT-YEL-CN-5-5</td>
<td>CENTER CIRD-SLOT/DBA</td>
<td>5-BALL TROUGH #4</td>
<td>8-BALL TROUGH #4</td>
<td>D-D-0-2 (C) 4-BANK S-U</td>
<td>LEFT ORBIT</td>
<td>RIGHT TOP LANE</td>
<td>RIGHT SLENGSHOT</td>
<td></td>
</tr>
<tr>
<td>(6) WHT-ORG-CN-7-7</td>
<td>LEFT CIRD-SLOT</td>
<td>5-BALL TROUGH #5 (RIGHT)</td>
<td>8-BALL TROUGH #5 (LEFT)</td>
<td>MOON 4-BANK S-U (LEFT)</td>
<td>FORWARD ORBIT</td>
<td>CENTER L-VUK</td>
<td>RIGHT SLENGSHOT</td>
<td></td>
</tr>
<tr>
<td>(7) WHT-RED-CN-7-8</td>
<td>SLAM TILT</td>
<td>5-BALL TROUGH VUK/OPTO</td>
<td>8-BALL TROUGH #6</td>
<td>MOON 4-BANK S-U (MID-LT)</td>
<td>FOOD SINGLE STAND-UP</td>
<td>RIGHT ORBIT</td>
<td>LT FLIPPER BUTTON VIA Q7 (ON SFB)</td>
<td></td>
</tr>
<tr>
<td>(8) WHT-BRN-CN-7-9</td>
<td>NOT USED</td>
<td>SHOOTER LANE</td>
<td>8-BALL TROUGH #7 (BOTTOM)</td>
<td>MOON 4-BANK S-U (RIGHT)</td>
<td>WATER SINGLE STAND-UP</td>
<td>RIGHT RAMB EXIT RIGHT RT FLIPPER BUTTON VIA Q5 (ON SFB)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Switch Matrix Descriptions with Part Numbers and Locations

The switch locations correspond with the Switch No. in the table below and the Switch Matrix Grid.

<table>
<thead>
<tr>
<th>Sw. N°</th>
<th>Col.</th>
<th>Row</th>
<th>Switch Matrix Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>* PLUMB BOB TILT (See Section 4, Chapter 1)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td>* 4TH COIN SLOT (On Coin Door)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>3</td>
<td>START BUTTON (Left of Coin Door) RED</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>4</td>
<td>* RIGHT COIN SLOT (On Coin Door)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>5</td>
<td>CENTER COIN SLOT / DBA</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>6</td>
<td>* LEFT COIN SLOT (On Coin Door)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>7</td>
<td>* SLAM TILT</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>8</td>
<td>[Note: All 8 positions are included in this special membrane switch.]</td>
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</tr>
<tr>
<td>9</td>
<td>2</td>
<td>1</td>
<td>ABORT HANDLE BALL LAUNCH</td>
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<td>10</td>
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<td>2</td>
<td>5-BALL TROUGH #1 (LEFT)</td>
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<td>6</td>
<td>5-BALL TROUGH #5 (RIGHT)</td>
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<td>15</td>
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<td>7</td>
<td>#5-BALL TROUGH VUK OPTO (TRANS) (REC)</td>
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<td>8</td>
<td>SHOOTER LANE AUTO BALL LAUNCH</td>
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<td>3</td>
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<td>8-BALL LOCK TROUGH #1 (TOP)</td>
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<td>8-BALL LOCK TROUGH #2</td>
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<td>8-BALL LOCK TROUGH #3</td>
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<td>24</td>
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<td>8</td>
<td>8-BALL TROUGH #8 (BOTTOM)</td>
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<td>25</td>
<td>4</td>
<td>1</td>
<td>D-O-C-(K) 4-BANK STAND-UP (TOP)</td>
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<td>26</td>
<td>4</td>
<td>2</td>
<td>D-O-(C)-K 4-BANK STAND-UP (MID-TOP)</td>
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<td>4</td>
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<td>D-O-(C)-K 4-BANK STAND-UP (MID-BOTTOM)</td>
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<td>28</td>
<td>4</td>
<td>4</td>
<td>(D-O-C-K) 4-BANK STAND-UP (BOTTOM)</td>
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<tr>
<td>29</td>
<td>4</td>
<td>5</td>
<td>MOON 4-BANK STAND-UP (LEFT)</td>
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<tr>
<td>30</td>
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<td>6</td>
<td>MOON 4-BANK STAND-UP (MIDDLE LEFT)</td>
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<td>7</td>
<td>MOON 4-BANK STAND-UP (MIDDLE RIGHT)</td>
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<td>32</td>
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<td>MOON 4-BANK STAND-UP (RIGHT)</td>
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<td>33</td>
<td>5</td>
<td>1</td>
<td>LEFT TURBO BUMPER</td>
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<td>BOTTOM TURBO BUMPER</td>
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<td>35</td>
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<td>36</td>
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<td>MOON HOME POSITION</td>
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<td>37</td>
<td>5</td>
<td>5</td>
<td>MOON FORWARD POSITION</td>
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<td>38</td>
<td>5</td>
<td>6</td>
<td>FOOD SINGLE STAND-UP (LEFT)</td>
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<td>39</td>
<td>5</td>
<td>7</td>
<td>[Note: Reserved for Label.]</td>
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<tr>
<td>40</td>
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<td>WATER SINGLE STAND-UP (RIGHT)</td>
<td></td>
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<tr>
<td>41</td>
<td>6</td>
<td>1</td>
<td>SPINNER</td>
<td></td>
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<td>42</td>
<td>6</td>
<td>2</td>
<td>[Note: Required.]</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>6</td>
<td>3</td>
<td>ROCKET BALL EJECT</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>6</td>
<td>4</td>
<td>RIGHT RAMP EXIT LEFT</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>6</td>
<td>5</td>
<td>LEFT ORBIT</td>
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<tr>
<td>46</td>
<td>6</td>
<td>6</td>
<td>RIGHT ORBIT</td>
<td></td>
</tr>
<tr>
<td>47</td>
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<td>7</td>
<td>RIGHT BALL EJECT</td>
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<td>48</td>
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<td>SUPER VUK (UNDER ARCH)</td>
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<td>BATTERY 3-BANK STAND-UP (ALL 3)</td>
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<tr>
<td>50</td>
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<td>ROCKET HOME POSITION</td>
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<tr>
<td>51</td>
<td>7</td>
<td>3</td>
<td>ROCKET UP POSITION</td>
<td></td>
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<tr>
<td>52</td>
<td>7</td>
<td>4</td>
<td>LEFT TOP LANE</td>
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<tr>
<td>53</td>
<td>7</td>
<td>5</td>
<td>RIGHT TOP LANE</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>7</td>
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<td>CENTER BALL EJECT</td>
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<td>55</td>
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<td>RIGHT RAMP ENTER</td>
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<td>56</td>
<td>7</td>
<td>8</td>
<td>RIGHT RAMP EXIT RIGHT</td>
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<tr>
<td>57</td>
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<td>1</td>
<td>LEFT OUTLNE</td>
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<td>58</td>
<td>8</td>
<td>2</td>
<td>RIGHT OUTLNE</td>
<td></td>
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<tr>
<td>59</td>
<td>8</td>
<td>3</td>
<td>LEFT RETURN LANE</td>
<td></td>
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<td>60</td>
<td>8</td>
<td>4</td>
<td>RIGHT RETURN LANE</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>8</td>
<td>5</td>
<td>LEFT SLINGSLOT</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>8</td>
<td>6</td>
<td>RIGHT SLINGSLOT</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>8</td>
<td>7</td>
<td>* LT FLIPPER PWR SW (BUTTON VIA O7)</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>8</td>
<td>8</td>
<td>* RT FLIPPER PWR SW (BUTTON VIA O5)</td>
<td></td>
</tr>
</tbody>
</table>

Legend Note:
- = Switches located above playfield.
- = Switches located below playfield.

The following switches are located in the cabinet and are not noted in the diagram above:
1 2 4 5 6 7 63 64

The following switches are not used:
8 39 42
GO TO COIL MENU

From the DIAGNOSTICS MENU, select the "COIL" icon with either Red "LEFT" or Green "RIGHT" Button and press the Black "ENTER" Button. The coils are listed in groups. The first 2 groups are the High Current Coils. The next group is the Low Current Coils. The next group is the Flash Lamps. The remaining coils are special coils. These coils are listed in a Coils Detailed Chart Table following the Playfield Coil & Flash Lamp Locations.

Coil Test

To initiate, from the COIL MENU, select the "TST" icon with either Red or Green Button and press the Black Button. Ensure the Power Interlock Switch is pulled out. Select either the "-" or "+" icons. Start with the "+" icon to start the manual Coil Test from #1 (The test runs through #1 - #34 +). Press the Black Button on the "+" icon, as each coil is selected, the display will describe the coil or flash lamp name with the corresponding number, the wire with colors, the "Pin-Outs" from the I/O Power Driver Board, the coil voltage and gauge-turns (e.g. 23-800). Press the Black Button again to move forward in the test. To test and view a particular coil or flash lamp, select the "RUN" icon and press the Black Button. Each time the Black Button is pushed, the coil or flash lamp will fire on the playfield and/or backbox, with the display indicating the coil or flash lamp information. Continue with the same procedure to run through the entire test.

Cycling Coil Test

To initiate, from the COIL MENU, select the "CYC" icon with either Red or Green Button and press the Black Button. If still in a previous test, select the "PREV" icon to return to Coil Menu or selecting either of the "ARROW" icons will move to Cycling Coil Test (selecting again will return to Coil Test). The test pulses each regular coil or flash lamp sequentially (cycling) on the playfield and backbox. The display indicates "CYCLING COILS".

Backbox Insert Flash Lamp Locations

Below are the flash lamp locations in the Backbox Insert (General Illumination (Gl) Lamps are also shown for reference). The flash lamp locations correspond with the coil numbers as seen in the Coil Test. The table below indicates the numbers for the flash lamps in the backbox. See the next page for flash lamps on the playfield.
**GO TO LAMP MENU**

From the DIAGNOSTICS MENU, select the "LAMP Icon with either Red "LEFT" or Green "RIGHT" Button and press the Black *ENTER* Button. Controlled lamps are configured in and 8 x 8 Matrix of Columns (Lamp Drives) and Rows (Lamp Returns) with up to 64 lamps possible. The Lamp Test Menu consists of four parts: Single Lamp Test, Test All Lamps, Row Lamp Test and Column Lamp Test.

---

**Single Lamp Test**

To initiate, from the LAMP MENU, select the "ONE" Icon with either Red or Green Button and press the Black Button. Select either the "-" or "+" Icons. Start with the "+" Icon to start the manual Lamp Test from Column 1, Row 1, Switch 1. Press the Black Button on the "+" Icon, as each lamp is selected, the lamp will light at its location on the playfield as well as the display, indicating the Lamp Matrix Grid position, lamp name with the corresponding number, Return (Row) Wire & Color, Drive (Column) Wire & Color, and associated drive transistors. Press the Black Button again to move forward in the test. To test and view a particular lamp, select the "RUN" Icon and press the Black Button. Each time the Black Button is pushed, the lamp will light-up on the playfield, with the display indicating the lamp information. Continue with the same procedure to run through the entire test.

---

**Test All Lamps**

To initiate, from the LAMP MENU, select the "ALL" Icon with either Red or Green Button and press the Black Button. If still in Single Lamp Test (or any 1 of the 4 tests), select the "PREV" Icon to return to Lamp Menu or selecting either of the "ARROW" Icons will move through the tests, keep activating until Test All Lamps is displayed. The display will indicate "ALL LAMPS ON" and the lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix.

---

**Typical Lamp Schematic & Side View**

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**LAMP MATRIX GRID**

<table>
<thead>
<tr>
<th>Column (18v)</th>
<th>Row (GRN)</th>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
<th>Column 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2: Q34 RED-BLK</td>
<td>J12-2</td>
<td>Q33</td>
<td>RED-BRN</td>
<td>J12-1</td>
<td>U10.5</td>
<td>RED-BRN</td>
<td>J12-1</td>
<td>RED-BRN</td>
<td>J12-1</td>
</tr>
</tbody>
</table>

---

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**Section 3**

**Chapter 2**

**Portals™ Service Menu Diagnostics**
Row and Column Lamp Tests

To initiate, from the LAMP MENU, select the "COL" icon with either Flipper Button and press the Black Button. If still in a previous test, select the "PREV" icon to return to Lamp Menu or selecting either of the "ARROW" icons will move through the tests, keep activating until Row or Column Lamp Test (whichever desired) is displayed. In this test, each set of lamps in each row or column of the Lamp Matrix (respective to each test) will light-up on the playfield and is indicated in the display.

Lamp Matrix Location

The lamp locations correspond with the Lamp Number in the Lamp Matrix Grid on the previous page.

Legend Note:

☐ = Lamps located above playfield.
■ = Lamps located below playfield.

The following Lamps are not used:

14 58 59 73
74 75 76 77
78 79 80

The following Bulb is used on the Lamp Boards, Turbo Bumpers, & Ramp Entrance Sign.

#555 Bulb (Wedge)
165-5002-00

The following Bulb is used in the remainder of the matrix:

#44 Bulb (Bayonet)
165-5000-44