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Dr. Pinball Section

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

APOLLO 13™

Joe Blackwell
Technical Support
Manager

Eric Winston
Technical Support
Engineer

Ted Kilpin
Technical Support
Engineer

Jay Alfer
Tech. Documentation
Administrator

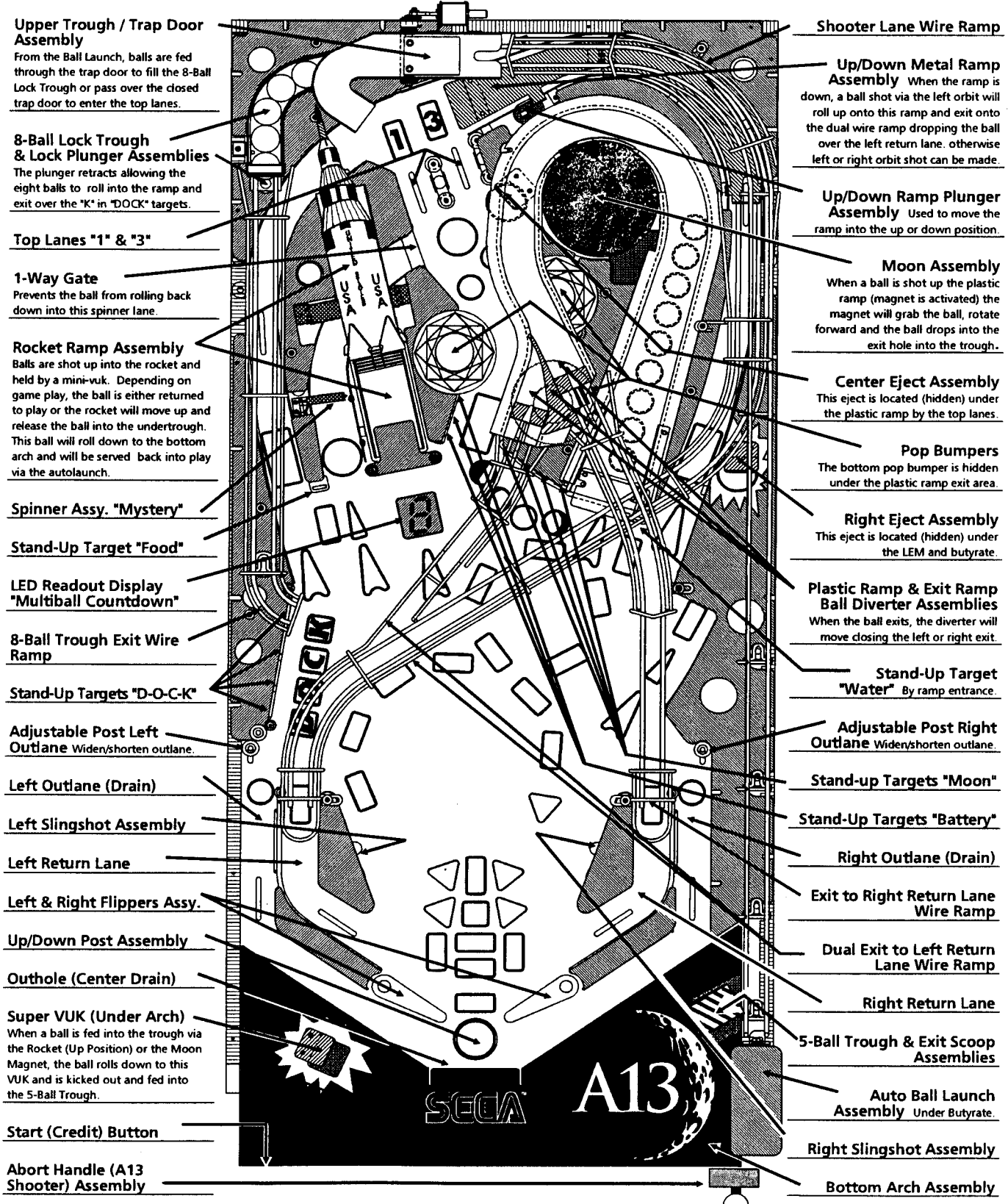
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Game Rules

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.



- Upper Trough / Trap Door Assembly**
From the Ball Launch, balls are fed through the trap door to fill the 8-Ball Lock Trough or pass over the closed trap door to enter the top lanes.
- 8-Ball Lock Trough & Lock Plunger Assemblies**
The plunger retracts allowing the eight balls to roll into the ramp and exit over the "K" in "DOCK" targets.
- Top Lanes "1" & "3"**
- 1-Way Gate**
Prevents the ball from rolling back down into this spinner lane.
- Rocket Ramp Assembly**
Balls are shot up into the rocket and held by a mini-vuk. Depending on game play, the ball is either returned to play or the rocket will move up and release the ball into the undertrough. This ball will roll down to the bottom arch and will be served back into play via the autolaunch.
- Spinner Assy. "Mystery"**
- Stand-Up Target "Food"**
- LED Readout Display "Multiball Countdown"**
- 8-Ball Trough Exit Wire Ramp**
- Stand-Up Targets "D-O-C-K"**
- Adjustable Post Left Outlane** Widen/shorten outlane.
- Left Outlane (Drain)**
- Left Slingshot Assembly**
- Left Return Lane**
- Left & Right Flippers Assy.**
- Up/Down Post Assembly**
- Outhole (Center Drain)**
- Super VUK (Under Arch)**
When a ball is fed into the trough via the Rocket (Up Position) or the Moon Magnet, the ball rolls down to this VUK and is kicked out and fed into the 5-Ball Trough.
- Start (Credit) Button**
- Abort Handle (A13 Shooter) Assembly**

- 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 into 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 Outlane** Widen/shorten outlane.
- Stand-up Targets "Moon"**
- Stand-Up Targets "Battery"**
- Right Outlane (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**

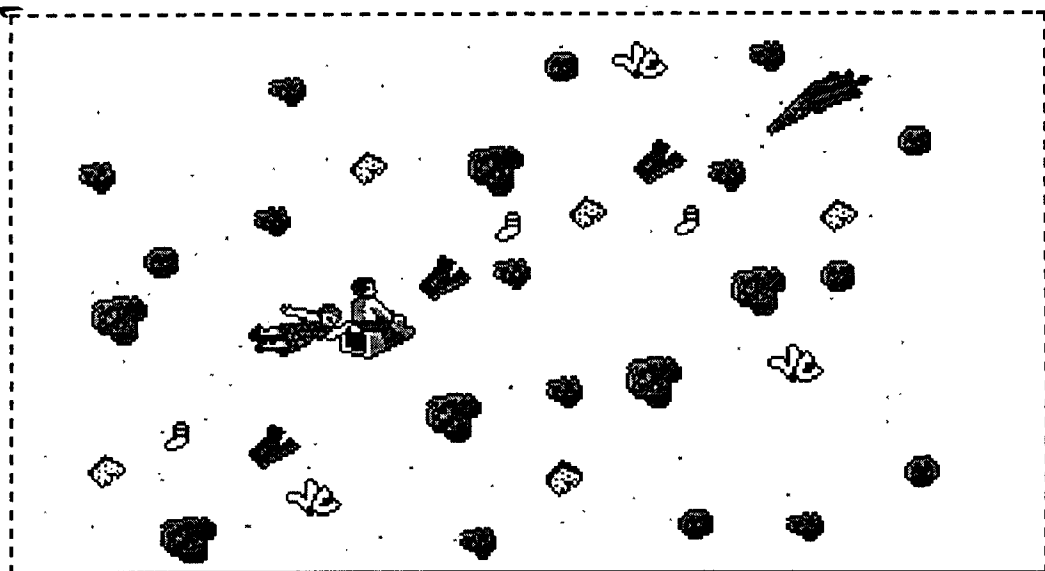
Section 2 | Rules

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.)

Copy & Cut



Fold

Fold

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 acronymns you may not understand. If an acronym or expression is not in this glossary, please call our Technical Support Department, so we made add it in the next game manual. Any other suggestions or comments are always welcome!

Section 2 | Rules

SINGLE BALL PLAY



GAME RULES 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.



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.



TOP LANES:

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



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.



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 | • HOLD BONUS |
| • EXTRA BALL | • LIGHT SPECIAL |
| • MYSTERY 3-BALL | • DOUBLE BONUS |
| • BIG POINT VALUES | • HIDDEN VIDEO MODE |



BATTERY TARGETS

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



FOOD & WATER TARGETS

The *Food & Water Targets* score increasing millions when hit.

SINGLE BALL PLAY



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*.



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.



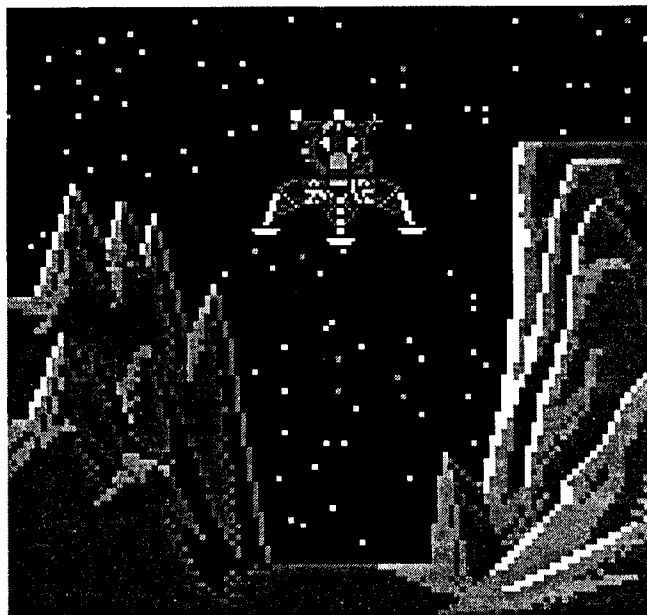
EXTRA BALL

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**.



SPECIAL

Lit *Outlanes* score a *Special*. A *Special* is lit from • **MYSTERY** or • **VIA PERCENTAGING**.



MULTIBALL & 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 **B L A S T O F F** 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 **B L A S T O F F**.

These shots are:

- Ramp ⇨ Left Flipper ⇨ Ramp and
- Ramp ⇨ Right Flipper ⇨ Orbit Up/Down Ramp ⇨ Left Flipper ⇨ Ramp

When **B L A S T O F F** is completed, the *NEXT* player to start *Multiball* will be awarded *13 Ball Multiball*.

Easier difficulty settings allow the player to score a **B L A S T O F F** letter the first time the Ramp is shot for each ball played or in each game played.

B L A S T O F F 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!

MULTIBALL & JACKPOTS



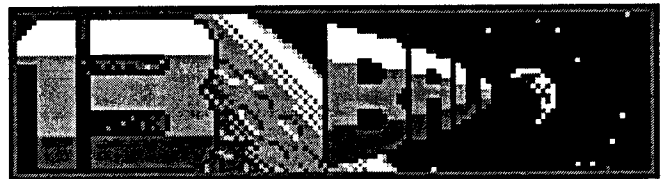
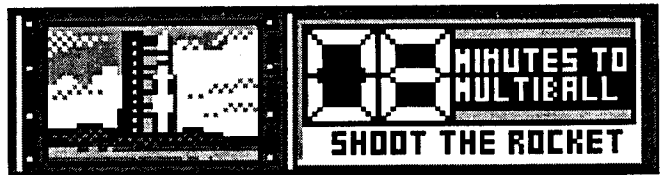
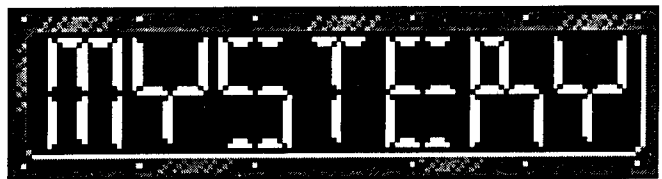
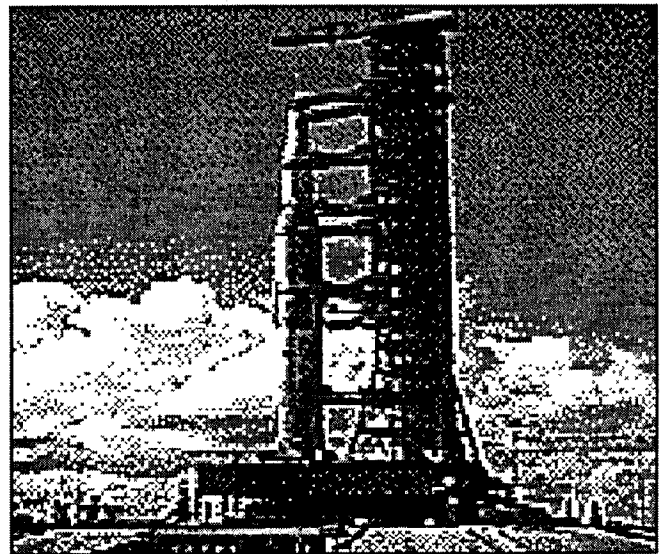
13 BALL MULTIBALL SUPER JACKPOT:

If a set number of Rocket Jackpots are scored, the ramp will light for a timed Super Jackpot. After Super Jackpot is scored or the timer expires, the player continues with *Regular Multiball* rules — 4 (four) Jackpots lit, etc.



ABORTING MULTIBALL

At *Multiball* start, the player has the option of turning the Abort Handle (Ball Launch) to bypass *Multiball* start. This option is for the advanced player who is trying to complete **B L A S T O F F** before starting *Multiball*. The first time that abort is used, the Countdown will reset to [1]. If the player aborts again before starting *Multiball*, the Countdown resets to [2], etc.



APOLLO 13 MISSIONS



STARTING MISSIONS

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*.



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



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*.



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.



ROCKET 2 BALL

Shoot the Rocket repeatedly for increasing Jackpots.



MOON'S GRAVITY

Shoot the Ramp 3 times and watch what happens next!



UNDER VOLT

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



LIFE SUPPORT

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



DOCKING

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



LITE EXTRA BALL

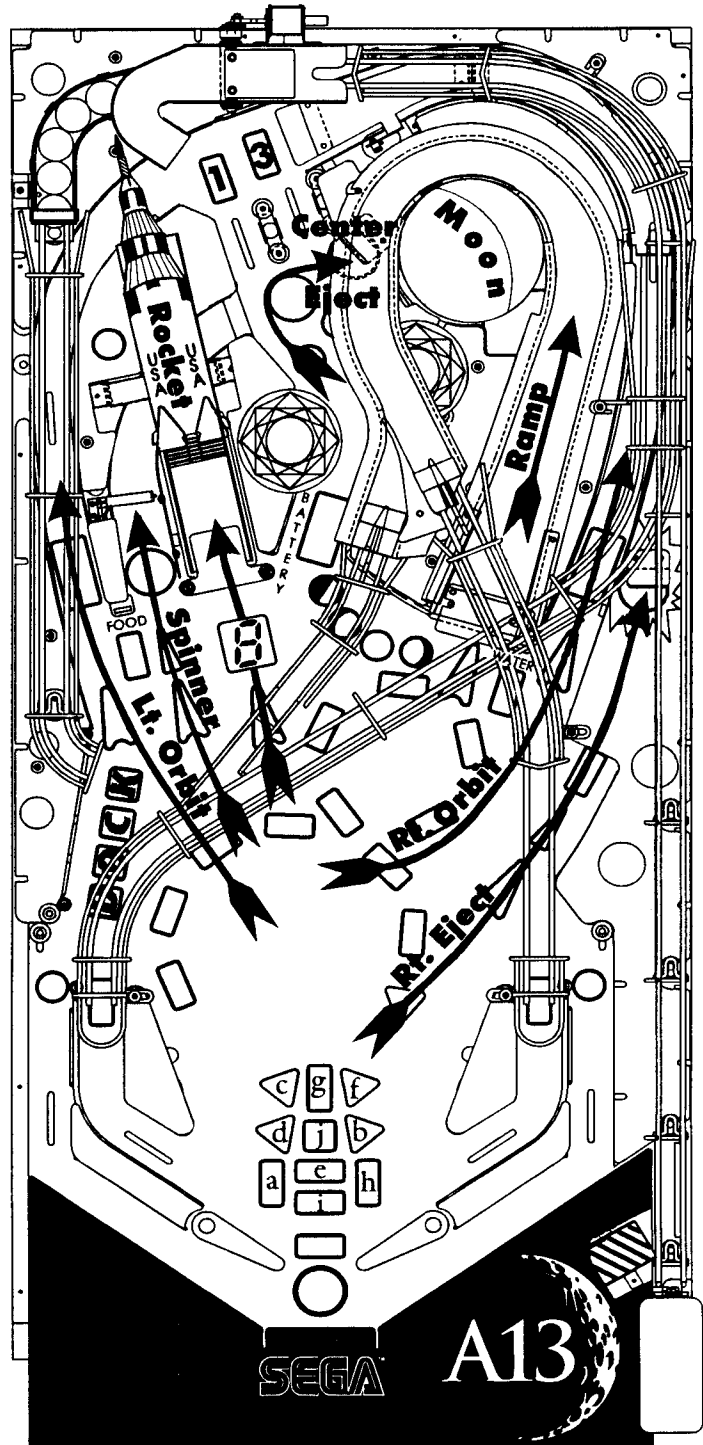
Light the Extra Ball at the Right Eject.

APOLLO 13 MISSIONS



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.



Section 2 | Rules

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!*



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^o, 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^o, 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

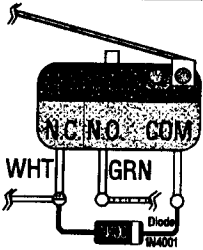
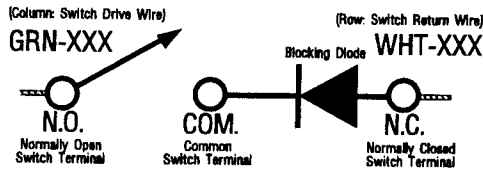
To initiate, from the **SWITCH MENU**, select the "DIP" *Icon* with either Red or Green Button & press the Black Button. The display will indicate the Dip Switch Positions & the country setting the game is set to (e.g. USA, Germany, England, etc.). *REFERENCE THE BEGINNING OF THIS MANUAL FOR DIP SWITCH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



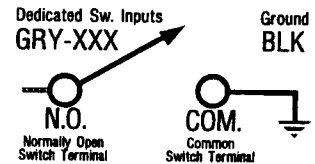
Dedicated Switch Test

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^o, and the "Pin-Outs" from the CPU/SOUND Board.

Typical Switch Schematic & Side View



Dedicated Switch Schematic



SWITCH MATRIX GRID

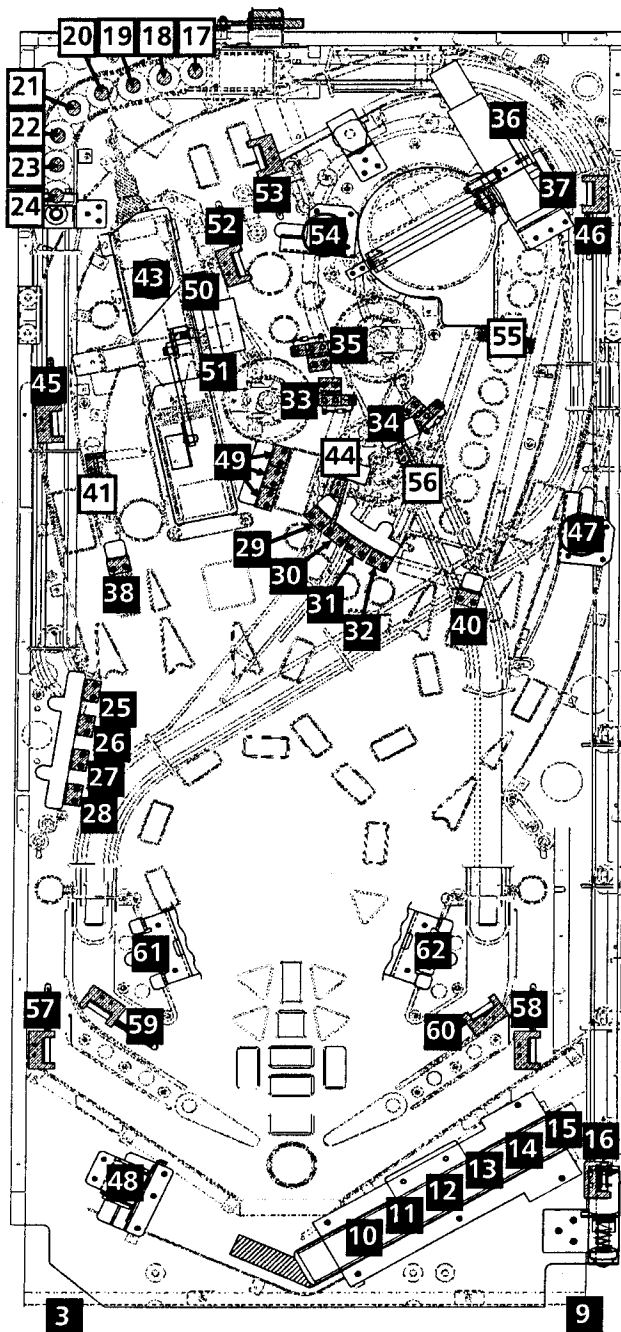
Column (Drive)	1 Q1 GRN-BRN CN5-1	2 Q2 GRN-RED CN5-3	3 Q3 GRN-ORG CN5-4	4 Q4 GRN-YEL CN5-5	5 Q5 GRN-BLK CN5-6	6 Q6 GRN-BLU CN5-7	7 Q7 GRN-VIO CN5-8	8 Q8 GRN-GRY CN5-9
1 WHT-GRY CN7-1	PLUMB BOB TILT	ABORT HANDLE BALL LAUNCH	8-BALL LOCK #1 (TOP)	D-O-C-(K) 4-BANK S-U	LEFT TURBO BUMPER	SPINNER	BATTERY 3-BANK S-U (ALL 3)	LEFT OUTLANE
2 WHT-VIO CN7-2	4TH COIN SLOT	5-BALL TROUGH #1 (LEFT)	8-BALL LOCK #2	D-O-(C)-K 4-BANK S-U	BOTTOM TURBO BUMPER	NOT USED	ROCKET HOME POSITION	RIGHT OUTLANE
3 WHT-BLU CN7-3	START BUTTON	5-BALL TROUGH #2	8-BALL LOCK #3	D-(O)-C-K 4-BANK S-U	RIGHT TURBO BUMPER	ROCKET BALL EJECT	ROCKET UP POSITION	LEFT RETURN LANE
4 WHT-GRN CN7-5	RIGHT COIN SLOT	5-BALL TROUGH #3	8-BALL LOCK #4	(D)-O-C-K 4-BANK S-U	MOON HOME POSITION	RIGHT RAMP EXIT LEFT	LEFT TOP LANE	RIGHT RETURN LANE
5 WHT-YEL CN7-6	CENTER COIN SLOT / DBA	5-BALL TROUGH #4	8-BALL LOCK #5	MOON 4-BANK S-U (LEFT)	MOON FORWARD POSITION	LEFT ORBIT	RIGHT TOP LANE	LEFT SLINGSHOT
6 WHT-ORG CN7-7	LEFT COIN SLOT	5-BALL TROUGH #5 (RIGHT)	8-BALL LOCK #6	MOON 4-BANK S-U (MID-LT)	FOOD SINGLE STAND-UP	RIGHT ORBIT	CENTER BALL EJECT	RIGHT SLINGSHOT
7 WHT-RED CN7-8	SLAM TILT	5-BALL TROUGH VUK OPTO	8-BALL LOCK #7	MOON 4-BANK S-U (MID-RT)	NOT USED	RIGHT BALL EJECT	RIGHT RAMP ENTER	LT FLIPPER BUTTON VIA Q7 (ON SSFB)
8 WHT-BRN CN7-9	NOT USED	SHOOTER LANE	8-BALL LOCK #8 (BOTTOM)	MOON 4-BANK S-U (RIGHT)	WATER SINGLE STAND-UP	SUPER VUK (UNDER ARCH)	RIGHT RAMP EXIT RIGHT	RT FLIPPER BUTTON VIA Q5 (ON SSFB)

Dedicated Switches

IC U206 INPUTS	Ground
1 GRY-BRN CN6-2	NOT USED DS-1
2 GRY-RED CN6-3	NOT USED DS-2
3 GRY-ORG CN6-4	NOT USED DS-3
4 GRY-YEL CN6-6	NOT USED DS-4
5 GRY-GRN CN6-7	NOT USED DS-5
6 GRY-BLU CN6-8	Normal: Volume In Test: Left RED BUTTON DS-6
7 GRY-VIO CN6-9	Normal: Service Credits In Test: Right GRN BUTTON DS-7
8 GRY-BLK CN6-10	Normal: Begin Test In Test: Enter BLK BUTTON DS-8

Switch Matrix Descriptions with Part Numbers and Locations †

The switch locations correspond with the Switch N^o in the table below and the Switch Matrix Grid.



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:

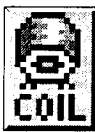
1 2 4 5 6 7 63 64

The following switches are not used:

8 39 42

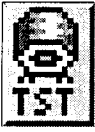
Sw. N ^o	Col. N ^o	Row N ^o	Switch Matrix Description	Part N ^o
1	1	1	* PLUMB BOB TILT (See Section 4, Chapter 1)	
2	1	2	* 4TH COIN SLOT (On Coin Door)	
3	1	3	START BUTTON (Left of Coin Door) RED	500-5026-07
4	1	4	* RIGHT COIN SLOT (On Coin Door)	180-5024-00
5	1	5	* CENTER COIN SLOT / DBA	180-5024-00
6	1	6	* LEFT COIN SLOT (On Coin Door)	180-5024-00
7	1	7	* SLAM TILT	180-5022-00
8	1	8	Not Used	
9	2	1	ABORT HANDLE BALL LAUNCH	180-5061-00
10	2	2	5-BALL TROUGH #1 (LEFT)	180-5119-00
11	2	3	5-BALL TROUGH #2	180-5119-00
12	2	4	5-BALL TROUGH #3	180-5119-00
13	2	5	5-BALL TROUGH #4	180-5119-00
14	2	6	5-BALL TROUGH #5 (RIGHT)	180-5119-00
15	2	7	#5-BALL TROUGH VUK OPTO (TRANS) (REC)	520-5124-00 520-5125-00
16	2	8	SHOOTER LANE (AUTO BALL LAUNCH)	515-6514-00
17	3	1	8-BALL LOCK TROUGH #1 (TOP)	181-5000-00
18	3	2	8-BALL LOCK TROUGH #2	
19	3	3	8-BALL LOCK TROUGH #3	
20	3	4	8-BALL LOCK TROUGH #4	
21	3	5	8-BALL LOCK TROUGH #5	
22	3	6	8-BALL LOCK TROUGH #6	
23	3	7	8-BALL LOCK TROUGH #7	
24	3	8	8-BALL TROUGH #8 (BOTTOM)	
25	4	1	D-O-C-(K) 4-BANK STAND-UP (TOP)	515-5966-02
26	4	2	D-O-(C)-K 4-BANK STAND-UP (MID-TOP)	515-5966-02
27	4	3	D-(O)-C-K 4-BANK STAND-UP (MID-BOT)	515-5966-02
28	4	4	(D)-O-C-K 4-BANK STAND-UP (BOTTOM)	515-5966-02
29	4	5	MOON 4-BANK STAND-UP (LEFT)	515-5967-08
30	4	6	MOON 4-BANK STAND-UP (MIDDLE-LEFT)	515-5967-08
31	4	7	MOON 4-BANK STAND-UP (MIDDLE-RIGHT)	515-5967-08
32	4	8	MOON 4-BANK STAND-UP (RIGHT)	515-5967-08
33	5	1	LEFT TURBO BUMPER	180-5015-03
34	5	2	BOTTOM TURBO BUMPER	180-5015-03
35	5	3	RIGHT TURBO BUMPER	180-5015-03
36	5	4	MOON HOME POSITION	180-5019-00
37	5	5	MOON FORWARD POSITION	180-5019-00
38	5	6	FOOD SINGLE STAND-UP (LEFT)	515-5967-04
39	5	7	Not Used	
40	5	8	WATER SINGLE STAND-UP (RIGHT)	515-5967-05
41	6	1	SPINNER	180-5010-04
42	6	2	Not Used	
43	6	3	ROCKET BALL EJECT	180-5116-00
44	6	4	RIGHT RAMP EXIT LEFT	515-6469-00
45	6	5	LEFT ORBIT	500-5707-00
46	6	6	RIGHT ORBIT	500-5707-00
47	6	7	RIGHT BALL EJECT	180-5116-00
48	6	8	SUPER VUK (UNDER ARCH)	180-5116-00
49	7	1	BATTERY 3-BANK STAND-UP (ALL 3)	515-5967-06
50	7	2	ROCKET HOME POSITION	180-5052-00
51	7	3	ROCKET UP POSITION	180-5052-00
52	7	4	LEFT TOP LANE	500-5707-00
53	7	5	RIGHT TOP LANE	500-5707-00
54	7	6	CENTER BALL EJECT	180-5116-00
55	7	7	RIGHT RAMP ENTER	180-5090-00
56	7	8	RIGHT RAMP EXIT RIGHT	515-6469-00
57	8	1	LEFT OUTLANE	500-5707-00
58	8	2	RIGHT OUTLANE	500-5707-00
59	8	3	LEFT RETURN LANE	500-5707-00
60	8	4	RIGHT RETURN LANE	500-5707-00
61	8	5	LEFT SLINGSHOT	180-5054-00
62	8	6	RIGHT SLINGSHOT	180-5054-00
63	8	7	* LT FLIPPER PWR SW (BUTTON VIA Q7)	180-5122-00
64	8	8	* RT FLIPPER PWR SW (BUTTON VIA Q5)	180-5122-00

Note: All 8 positions are included in this special membrane switch.



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.

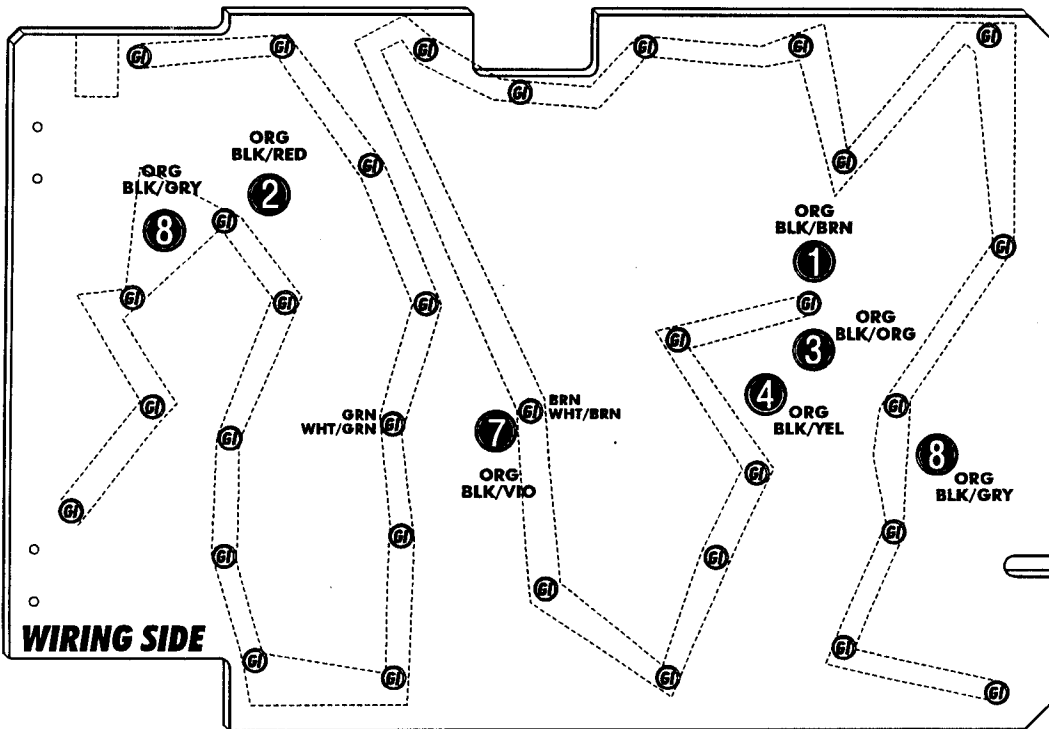


Cycling Coil Test

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 (GIs) 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.



GI = General Illumination



#44 Bulb
(Bayonet)
165-5000-44

#44 Bulb uses
2-Lug Socket
(077-5000-00).

= Flash Lamp
(FLAMP)



#89 Bulb
(Bayonet)
165-5000-89

#89 Bulb uses a
Stand-Up
Short Socket
(077-5101-00).

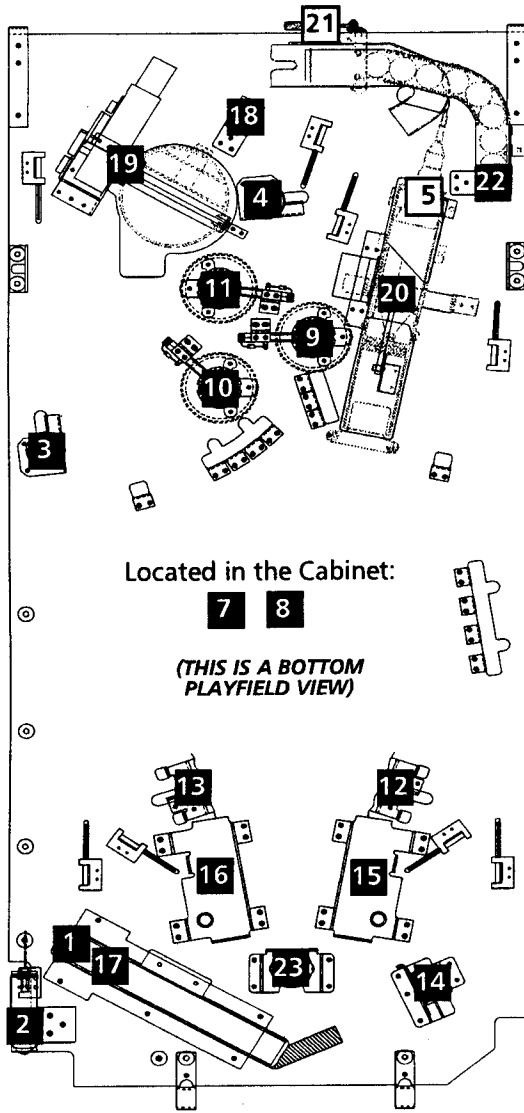
Type	Qty.
FLAMP 1	Insert X1
FLAMP 2	Insert X1

Type	Qty.
FLAMP 3	Insert X1
FLAMP 4	Insert X1

Type	Qty.
FLAMP 5	Not used.
FLAMP 6	Not used.

Type	Qty.
FLAMP 7	Insert X1
FLAMP 8	Insert X2

Playfield Coil Locations

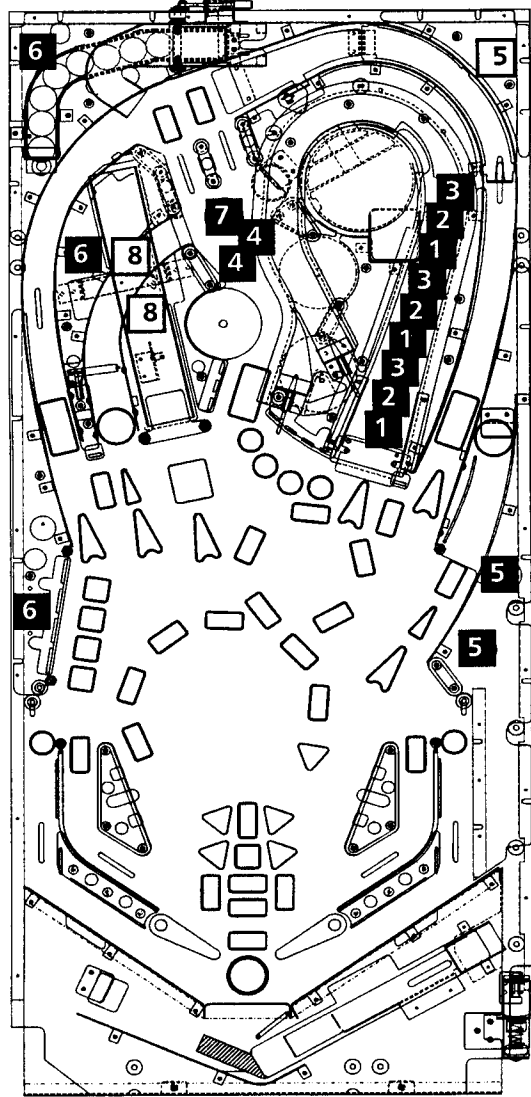


Located in the Cabinet:

7 8

(THIS IS A BOTTOM
PLAYFIELD VIEW)

Playfield Flash Lamp Locations



Flash Lamp (FLAMP)



#89 Bulb
(Bayonet)
165-5000-89



#906 Bulb
(Wedge Base)
165-5004-00

Legend Note:

□ = Coils or Flash Lamps located above playfield.

■ = Coils or Flash Lamps located below playfield.

The following coils are not used:

6 24

Type	Coil Description
COIL 1	5-Ball Trough Up-Kicker (VUK) (24-940)
COIL 2	Auto Ball Launch 50v (24-940)
COIL 3	Right Ball Eject (27-1500)
COIL 4	Center Ball Eject (27-1500)
COIL 5	Rocket Ball Eject (28-1050)
COIL 6	Not Used
COIL 7	Shaker Motor
COIL 8	Knocker (23-800)
COIL 9	Left Turbo Bumper (23-700)
COIL 10	Bottom Turbo Bumper (23-700)
COIL 11	Right Turbo Bumper (23-700)
COIL 12	Left Slingshot (23-800)
COIL 13	Right Slingshot (23-800)
COIL 14	Super VUK (Under Arch) 50v (24-940)
COIL 15	Left Side Flipper Enable
COIL 16	Right Side Flipper Enable
COIL 17	5-Ball Trough Lock Ball (25-1240)
COIL 18	Up-Down Ramp Plunger (27-1500)
COIL 19	Moon Motor Relay
COIL 20	Rocket Motor Relay
COIL 21	Upper Trough Trap Door (28-1050)
COIL 22	8-Ball Lock Plunger (27-1500)
COIL 23	Up-Down Post (27-1500)
COIL 24	Not Used

Type	Flash Lamps Description & Qty.
FLAMP 1	RAMP X3 (Under Right Ramp), INSERT X1
FLAMP 2	RAMP X3 (Under Right Ramp), INSERT X1
FLAMP 3	RAMP X3 (Under Right Ramp), INSERT X1
FLAMP 4	POPS X2, BP (Backpanel) X1, INSERT X1
FLAMP 5	UPR-RT X1, LWR-RT X2, BP (Backpanel) X1
FLAMP 6	UPR-LT X1, LWR-LT X1, BP (Backpanel) X1
FLAMP 7	POPS X1, BP (Backpanel) X1, INSERT X1
FLAMP 8	ROCKET X2, INSERT X2

See previous pg. for Backbox Insert Flash Lamp Locations.



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 an 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.

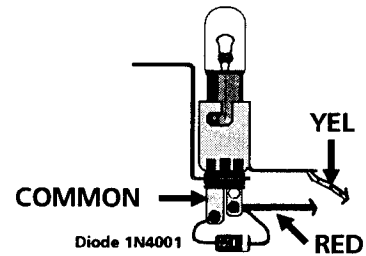
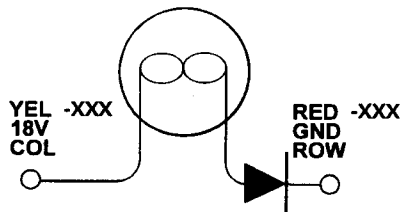


Test All Lamps

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.

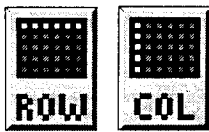
Continued on the next page with Row & Column Lamp Tests.

Typical Lamp Schematic & Side View



LAMP MATRIX GRID

Column (18V) Row (GND)	1: U10 YEL-BRN J13-1	2: U11 YEL-RED J13-3	3: U12 YEL-ORG J13-4	4: U13 YEL-BLK J13-5	5: U14 YEL-GRN J13-6	6: U15 YEL-BLU J13-7	7: U16 YEL-VIO J13-8	8: U17 YEL-GRY J13-9
1: Q33 RED-BRN J12-1	GRID: Life Support #555 Bulb 1	GRID: Manual Burn #555 Bulb 2	GRID: CO ₂ #555 Bulb 3	GRID: Master Alarm #555 Bulb 4	GRID: Rocket 2-Ball #555 Bulb 5	GRID: Docking #555 Bulb 6	GRID: Moon's Gravity #555 Bulb 7	GRID: Orbiter #555 Bulb 8
2: Q34 RED-BLK J12-2	SHOOT AGAIN #44 Bulb 9	SPECIAL (Right Outlane) #44 Bulb 10	LITE ORBIT (Rt Return) #44 Bulb 11	LITE ORBIT (Lt Return) #44 Bulb 12	SPECIAL (Left Outlane) #44 Bulb 13	NOT USED #44 Bulb 14	GRID: Lite Extra Ball #555 Bulb 15	GRID: Under Volt #555 Bulb 16
3: Q35 RED-ORG J12-3	ORBIT PROGRESS #8 #555 Bulb 17	ORBIT PROGRESS #7 #555 Bulb 18	ORBIT PROGRESS #6 #44 Bulb 19	ORBIT PROGRESS #5 #44 Bulb 20	ORBIT PROGRESS #4 #44 Bulb 21	ORBIT PROGRESS #3 #44 Bulb 22	ORBIT PROGRESS #2 #44 Bulb 23	ORBIT PROGRESS #1 #44 Bulb 24
4: Q36 RED-YEL J12-4	VIDEO #44 Bulb 25	EXTRA BALL #44 Bulb 26	Right Eject Flame #44 Bulb 27	START MISSION (LEM) #44 Bulb 28	ORBIT PROGRESS #12 #44 Bulb 29	ORBIT PROGRESS #11 #44 Bulb 30	ORBIT PROGRESS #10 #44 Bulb 31	ORBIT PROGRESS #9 #44 Bulb 32
5: Q37 RED-GRN J12-5	MOON 4-Bank (Left) #555 Bulb 33	MOON 4-Bank (Mid-Lt) #555 Bulb 34	MOON 4-Bank (Mid-Rt) #555 Bulb 35	MOON 4-Bank (Right) #555 Bulb 36	(D)OCK #44 Bulb 37	D (O)CK #555 Bulb 38	DO (C)K #555 Bulb 39	DOC (K) #555 Bulb 40
6: Q38 RED-BLU J12-6	Left ORBIT #44 Bulb 41	FOOD #555 Bulb 42	Right Orbit Flame #44 Bulb 43	Right Ramp Flame #555 Bulb 44	Rocket Flame #555 Bulb 45	Spinner Flame #555 Bulb 46	Left Orbit Flame #44 Bulb 47	BATTERY #555 Bulb 48
7: Q39 RED-VIO J12-8	Moon Hurry-Up (Ramp) #555 Bulb 49	1-(3) Top Lane Right #44 Bulb 50	(1)-3 Top Lane Left #44 Bulb 51	A13 Spinner Lane #44 Bulb 52	Right ORBIT #555 Bulb 53	Right Turbo Bumper #555 Bulb 54	Bottom Turbo Bumper #555 Bulb 55	Left Turbo Bumper #555 Bulb 56
8: Q40 RED-GRY J12-9	START BUTTON #44 Bulb 57	NOT USED #58	NOT USED #59	WATER #555 Bulb 60	Up-Down Post #44 Bulb 61	MYSTERY #555 Bulb 62	13 BALL BLASTOFF #44 Bulb 63	BLASTOFF LETTER (Ramp) #555 Bulb 64
9: Q41 RED-WHT J12-10	(B)LASTOFF #44 Bulb 65	B (L)ASTOFF #44 Bulb 66	BL (A)STOFF #44 Bulb 67	BLA (S)TOFF #44 Bulb 68	BLAS (T)OFF #44 Bulb 69	BLAST (O)FF #44 Bulb 70	BLASTO (F)F #44 Bulb 71	BLASTOF (F) #44 Bulb 72
10: Q42 RED J12-11	NOT USED #73	NOT USED #74	NOT USED #75	NOT USED #76	NOT USED #77	NOT USED #78	NOT USED #79	NOT USED #80



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 (relative to each test) will light-up on the playfield and is indicated in the display.

lamps in each row or column of the Lamp Matrix (relative 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.

65 66 67 68 69 70 71 72

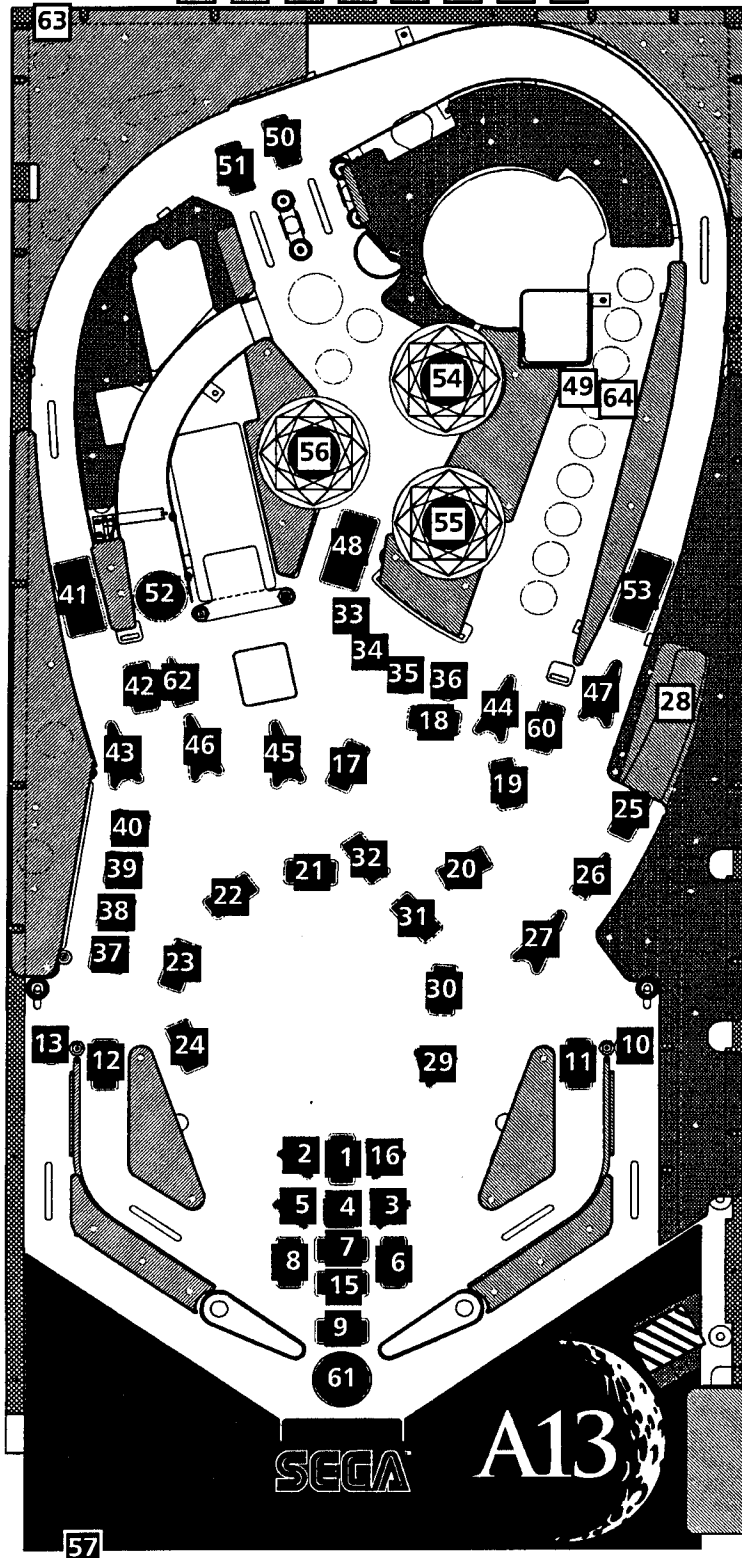
Legend Note:

□ =
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

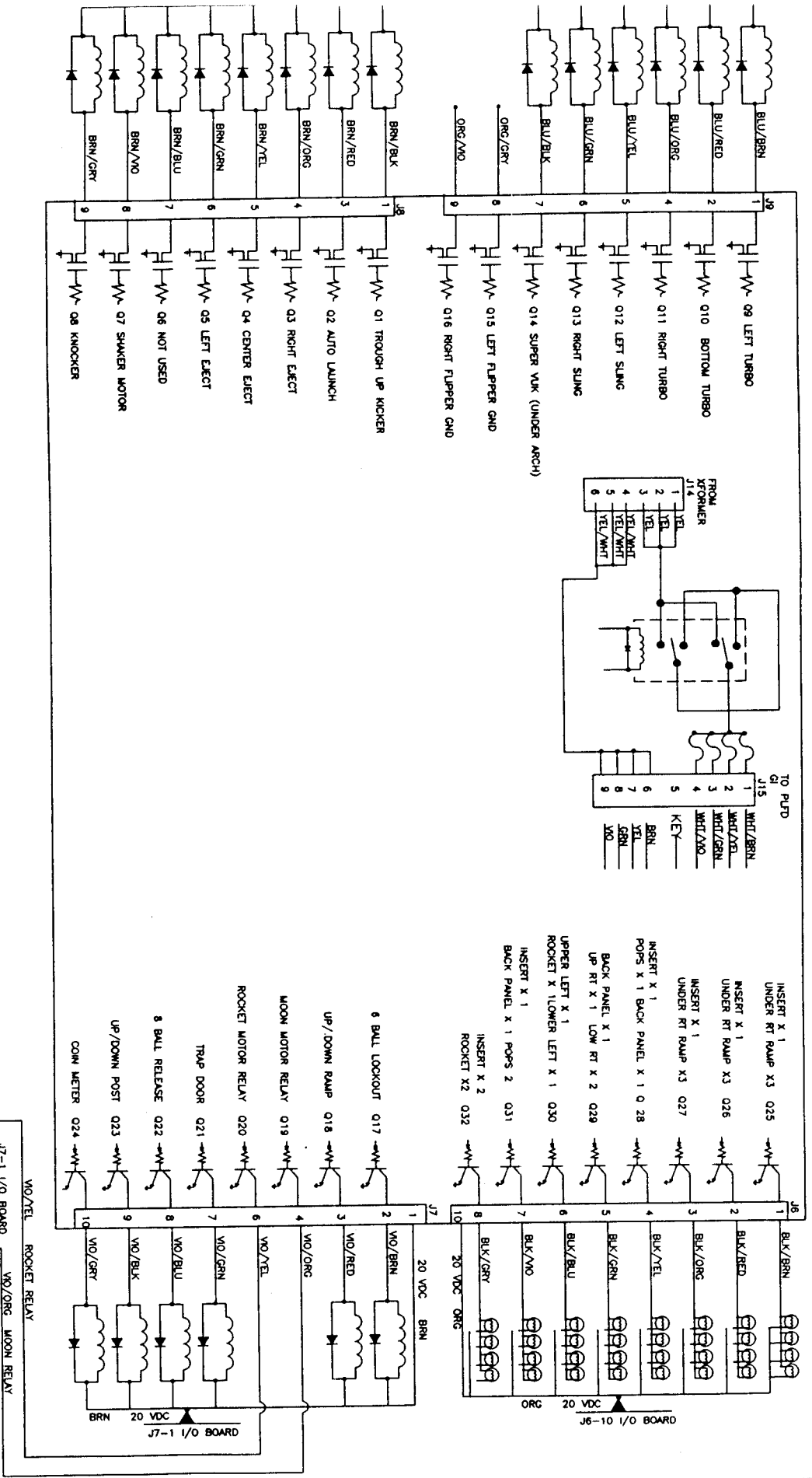
The following Bulb
is used in the
remainder of the
matrix:



#44 Bulb
(Bayonet)
165-5000-44

Section 3 | Diags.

PLAYFIELD COIL/FLASH WIRING



PLAYFIELD COIL/FLASH WIRING

