Please visit www.sternpinball.com
For part numbers and mechanical drawings.

Stern Pinball machines are assembled in Melrose Park, Illinois, USA; each pinball machine has unique characteristics that make it a one of a kind American made product. Each machine will have variations in appearance resulting from differences in the machine's particular wood parts, individual silk screened art and mechanical assemblies. Stern Pinball has inspected each game element to insure it meets our quality standards.
HOW TO UPDATE YOUR GAME CODE FOR S.A.M. SYSTEM MACHINES

USB Compatible Data Storage Device (Thumb, Flash or Jump Drives) required to copy game code into system.
S.A.M. System compatible, tested & SPI approved USB Data Storage Devices 128MB+
available through your local distributor. Ask for SPI Part Number 970-0128-00
* to get the Data Storage Device with the latest Game Code copied to it, add "game title" to above part number.

STYLE, COLOR, SIZE AND MANUFACTURER SUBJECT TO CHANGE.

Game Code is subject to change. Update this game with the latest code downloaded from our website, from another game or order through your local distributor (use SPI PN + name above).
Upon power-up the display will describe the version of code installed in your game. When directed to do so (via Service Bulletin or website announcement) you will need to update your code ... with the BOOT FLASH EPROM™ installed, here's how:

STEP 1 Open the Back Box and locate the 8-Position Dip Switch (SW1 on the CPU/Sound Board).
STEP 2 Switch Dip Switch #8 to 'ON'.
   (*BOOT FLASH EPROM must be installed.)
STEP 3 Press the White Reset Button (S1 RESET on the CPU/Sound Board) or Power Cycle the game OFF/ON
   (OFF/ON Switch is located on the outside of the cabinet bottom, front right).

STEP 4 Using the 4-Button Service Switch Set (inside the Coin Door):
   4A } Press [SELECT] to begin.
   4B } With the "UPDT" Icon highlighted, press [SELECT].
   4C } Insert the Data Storage Device [w/latest file(s)] into the USB Port.
   4D } If more than one file is present on the Data Storage Device, press [<] or [>] to locate your file. Press [SELECT] to update.
   4E } Follow on-screen prompts.

CPU/Sound Board (S.A.M. System)

STEP 3

STEP 1

STEP 2

STEP 4

STEP 4A

STEP 4B

STEP 4C

STEP 4D

STEP 4E

You can also retrieve your latest code from another game! From the USB Menu via the UTILITIES MENU, select the "BKUP" Icon instead and download to your Data Storage Device.

Quick Tip - Try backing up your current code prior to installing your new code, just in case your Data Storage Device file was corrupted by a computer glitch while you were copying!

For proper operation of this Pinball Game, < 4 > Pinballs must be installed in the 4-Ball Trough!

**Quick Reference Fuse Chart**

**Backbox Fuses**, **Cabinet Fuses**, **Playfield Fuses**, and **Cabinet Switches**

*Note: The CPU/Sound PCB does not have fuses.*

---

**Cabinet Fuses**

- **Power (Service Outlet) Box**
  - 110-120V Main Line US / Canada / Japan
  - 220-240V Main Line International

**Playfield Fuses**

- **Flipper or Special Application**
  - Fuse Fuses are located under the playfield near assembly
- **Flipper or Special Application**
  - 50VDC R. Flipper (Blu+Red+Red)
- **Flipper or Special Application**
  - 50VDC I. Flipper (Grn+Red+Red)
- **Flipper or Special Application**
  - 50VDC Additional Flipper Coil if used
- **Flipper or Special Application**
  - 50VDC Special Application Coil if used

---

**Fuse Chart**

- **F1** 5A S.B. 5.7VAC G.I. Lamps / BROWN-WHITE-WHT-BRN
- **F2** 5A S.B. 5.7VAC G.I. Lamps / YELLOW-WHT-YEL-Circuit
- **F3** 5A S.B. 5.7VAC G.I. Lamps / GREEN-WHT-GRN Circuit
- **F4** 5A S.B. 5.7VAC G.I. Lamps / VIOLET-WHT-VIO Circuit
- **F5** 7A S.B. 50VDC Coils / Flippers / 46VAC feed to BRDG 1
- **F6** 3A S.B. 24VAC Motor or Special Application
- **F7** 4A S.B. 50VDC Magnet(s) or Special Application
- **F8** 3A S.B. 50VDC Coils
- **F9** 8A S.B. 18VDC Control Lamps / 13VAC feed to BRDG 4
- **F10** 5A S.B. 20VDC Coils / Flashers / 16VAC feed to BRDG 2
- **F11** 4A S.B. 5VDC Logic Power / 5VAC feed to BRDG 5
- **F12** 5A S.B. 12VDC Audio / 10VAC feed to BRDG 3
- **F13** 5A S.B. 12VDC Audio / 10VAC feed to BRDG 3

---

**Inside Coin Door**

- **Playfield Power Interlock Switch**
- **4-Button Switch Set**
- **On/Off Switch (Under Cabinet)**
- **4-Button Switch Set (Under Cabinet)**
- **Playfield Power Interlock Switch**
- **Transformer on \(^\wedge\) Cabinet Bottom**

---

*Stern Pinball, Inc. © 2003*
Service Switch X4 Set Access & Use

The 4-Button Service Switch Set provides access for three (3) functions available for your use: 1: SERVICE CREDIT, 2: VOLUME [-] / [+] and 3: SERVICE MENU.

To access any of these three (3) functions you must first open the Coin Door (see pictorial above) with the Game in the Attract Mode (not already in any Function or Menu stated below) and then follow below.

▲ Function 1: SERVICE CREDITS MENU ▲

Pushing the Green [SERVICE CREDIT] Button first, adds a Service Credit per push (will not affect your audits as "paid" credits). This is useful for the technician to test games in regular play without affecting the game audits. Each depression adds 1 credit; up to 50 credits can be applied. Standard Adjustment 23, Credit Limit, determines this, however, it can be changed from 04-50; for details see the Adjustments Section.

Note: Once your credits are added, this menu will automatically exit a few seconds after the last button depression or when the Green [BACK] or Black [SELECT] Button is pushed. This function is disabled if Standard Adjustment 38, Free Play, is set to YES. The Service Credits are limited to the Credit Limit in addition to any paid credits present in the game (e.g. If the Credit Limit is 30, with 8 paid credits present, only 22 Credits can be applied.).

▲ Function 2: VOLUME MENU ▲

Pushing either of the Red [VOLUME] Buttons first, enters the VOLUME MENU. While in this Mode, to DECREASE the volume, hold down or depress the 1st Red [< - ] Button until desired the volume is achieved; to INCREASE the volume, hold down or depress the 2nd Red [ + > ] Button until the desired volume is achieved.

Note: The volume can be set between 0-63; Once your adjustments are made, this menu will automatically exit a few seconds after the last button depression or when the Green [BACK] or Black [SELECT] Button is pushed.

▲ Function 3: SERVICE MENU ▲

Pushing the Black [SELECT] Button first, enters the SERVICE MENU. Once in, navigate through all menus by depressing the Service Menu Buttons. Use the Red [< - ] or [ + > ] Buttons to move LEFT / RIGHT, NEXT/PREVIOUS (audits/adjustments) or to INCREASE / DECREASE an adjustment (setting). Use the Black [SELECT] Button to select a highlighted Icon, move to the next line of text or to answer "OK" where applicable. Use the Green [BACK] Button to exit or escape back.
DIAGNOSTIC AIDS

50V / 20V DISABLED
CLOSE COIN DOOR
OR PULL INTERLOCK SWITCH
TO RESTORE POWER

'escape' Green [ BACK ] Button will remove the audible tones (the bright display warning will go dim after approximately 30 seconds).

OPERATOR ALERT!
AUTO PLUNGER
DEVICE MALFUNCTION

This audible / visual alert display is shown when the 50V / 20V Power is disabled (by opening the Coin Door). PULL OUT THE INTERLOCK SWITCH ONLY WHILE IN THE SERVICE MENU FOR COIL, SWITCH OR PLAY TESTING WHEN THE COIN DOOR IS REQUIRED TO STAY OPEN FOR SERVICE BUTTON USE! Pulling out the Power Interlock Switch or pressing the alert display. Initial display presentation is accompanied by 3 audible tones (the bright display warning will go dim after approximately 30 seconds).

GAME NAME
SYS. 0.00
HDW. 0
SERVICE MENU *
USE +/- TO VIEW TECH. ALERTS

Upon entering the SERVICE MENU, if an asterisk "*" is displayed after the words "SERVICE MENU," the game has detected possible faulty devices, switches and/or missing pinballs. Press the either of the Red Buttons (short-cut to the TECHNICIAN ALERTS MENU) or continue into the SERVICE MENU (press the Black Button again), select the *DIAG* Icon and "TECH" Icon for the Technician Alerts information.

CPU DIP SWITCH SETTINGS

The 8-Pos. Dip Switch [SW1] is on the CPU/Sound Board (between Conn. J3 & J13, lower left corner)

<table>
<thead>
<tr>
<th>Country Setting</th>
<th>Setting</th>
<th>CPU Setting</th>
<th>Setting</th>
<th>Setting</th>
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<tr>
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<tr>
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<td>1 2 3 4 5 6 7 8</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Note: Slide Dip Switch 8 to Position ON (with Dip Switches 1-7 in the OFF Position) only to reboot the game with the latest version BOOT EPROM installed at U9 on the CPU/Sound Board (S.A.M. System only). Currently, this is also the procedure to update your game with the latest software code update file. For the latest version, visit our website. If you have questions about updating your game code, call Technical Support for assistance.
Service Menu Introduction

Important: The Switch Bracket holds the Playfield Power Interlock. It is located just inside the Coin Door frame (see pictorial of the Coin Door on the previous page). The Button Switch for the Playfield Power Interlock Switch must be pulled out for electro-mechanical device testing or diagnostic purposes (this is required). If this button is pushed in, the Playfield Power is disabled while the Coin Door is OPEN.

To get into the SERVICE MENU MODE review "Function 3: SERVICE MENU" on the next page. After Power-Up, push down the Black [SELECT] Button to begin. Looking at the display you will momentarily see "SERVICE MENU" followed by the MAIN MENU:

![SERVICE MENU](image)

Use the Red [< - ] / [ + > ] Buttons to move the selected Icon left or right, and the Black [SELECT] Button to activate the selected Icon.

The MAIN MENU now appears with the "DIAG" Icon (GO TO DIAGNOSTICS MENU) highlighted:

![MAIN MENU](image)

As the operator views the Menu Screen(s), the MORE symbols indicates that there are more Icons to select in each direction. The Icon selected will blink. Pushing the Black [SELECT] Button will select the Icon and the Menu Screen will change to the menu selected. Select the Green [BACK] Button to move backwards through the menu levels. Press the Green [BACK] Button repeatedly or select the "QUIT" Icon to completely exit the SERVICE MENU Mode.

View the SERVICE MENU Icon Tree on the next pages for a complete overview of all menus used in this system. The "HELP" Icon provides an explanation of Icon usage or any other information in the Menu where the "HELP" Icon was selected (when available).

**DIAG:** GO TO DIAGNOSTICS MENU
**AUD:** GO TO AUDITS MENU
**ADJ:** GO TO ADJUSTMENTS MENU
**UTIL:** GO TO UTILITIES MENU (INSTALLS, CUSTOM MSG., CUSTOM PRICING, SET TIME, RESET & USB)
**TOUR:** GO TO TOURNAMENT MENU (START TOURNAMENT, VIEW TOURNAMENT DATA, SIGN MESSAGES)

>> TO UPDATE THE GAME CODE, REVIEW THE STEPS ON THE INSIDE FRONT COVER OF THIS MANUAL.

Use both the manual and the display to help customize, troubleshoot and/or diagnose faults, if any.
NOTE: Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some icons may appear non-functional or may not appear at all. Some icons change depending on selections (e.g. Selecting and activating the "STRT" icon [Start Tournament] will be replaced with the "STOP" icon [Stop Tournament]). In displays where changes can be made or to perform a function, remember, use the GREEN Button to go [BACK], exit or escape, the RED Buttons to [</-] DECREASE [//+/>] INCREASE a value or setting, and the BLACK Button to [SELECT] next or as 'OK' 'ENTER'.

Installs Menu

Note: Press [SELECT] to Install; Press [BACK] to cancel. After selection of any of the Install Icons, the request is installed and returns to the Install Menu. The last icon activated before exiting this menu will supercede any previous icon selected in the group.
Exit Service Menu

In the MAIN MENU and in all SUB-MENUS (where the "QUIT" Icon is present), if the "QUIT" Icon is selected and activated, or the Green [ BACK ] Button is selected repeatedly (depending on which sub-menu you're in...), the SERVICE MENU Session will be exited and returned to the Attract Mode.

Turning the game on/off will start the Power-Up Routine. Upon Power-Up, the DISPLAY will indicate the COUNTRY, FILE VERSION and LANGUAGE(S) installed. LANGUAGE/COUNTRY: change via Dip Switch.

The below Problem / Solution Table was designed to answer some common problems frequently asked.

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>SOLUTION</th>
</tr>
</thead>
</table>
| Will not enter the SERVICE MENU after depressing the Black [ SELECT ] Button. | - Check the Service Switches [ GREEN, RED (x2) & BLACK Buttons ] for loose connections or bad ground.  
- Check the associated wiring harness to/from the CPU/Sound Board, Connector J13.  
- Check CPU/Sound Board for possible failure. |
| All Service Buttons [ •••• Buttons ] appear non-functional. | - Check the Service Switches wiring harness for poor or no connection and/or broken wires. |
| The Green Button in the Attract Mode will not enter the SERVICE CREDITS MENU to add Service Credits. | - Check to make sure the Game is not in "Free Play." If the game is set to Free Play, adding Service Credits is not required.  
- Check the Service Switches wiring harness for poor or no connection and/or broken wires. |
| The Display "blanks out." | - Check the Dot Matrix Display for loose wiring harness for poor or no connection and/or broken wires.  
- Check F1 (3/4A Fuse) or the Display Power Supply Board. Refer to the Yellow Pages (SCHEMATICS & TROUBLESHOOTING). |
| Icons "scroll" along continuously in the MAIN MENU. | - Check for a stuck switch on either of the Red Buttons. |
| The Start and Flipper Buttons do not select or activate Icons in the SWITCH TEST MENU. | - This is normal. These switches are deactivated, as they are a part of the Switch Test. Refer to the Diagnostics Section (GO TO DIAGNOSTICS MENU, Switch Test). |
| Can't move selection of Icon with the Left and/or Right Flipper Buttons. | - Check the Flipper Buttons for loose connections or bad Ground and refer to Section 5, Chapter 2, Playfield Wiring, #-Flipper Circuit Wiring Diagram.  
- This is normal only in Diagnostic's Switch & Active Switch Tests (see previous Problem). |
| Some Icons appear non-functional in the MENU or missing. | - Some functionality of the Service Menu may not have been completed during development. If exists, it should only be a non-critical function, such as the "HELP" Icon, which will explain the usage of Icons. When completed, a software update will correct the problem. Software updates are announced via Service Bulletins (if critical) and on our website http://www.sternpinball.com/GAME-code.shtml; view the Game Code Library Message Board Marquee or click Previous Messages for past announcements. |
| In COIL TEST MENU, the coils and flashlights do not fire after pressing the Black [ SELECT ] Button. | - Ensure the POWER INTERLOCK SWITCH is pulled out (see the start of this Chapter). |
| In the SERVICE MENU, the volume cannot be adjusted with either of the Red Buttons. | - The Volume adjustment can only be made when in the Attract Mode (see the start of this Chapter). |
| In the SERVICE MENU, the display seems to lock up, or the Help Display appears to be non-functional. | - If you cannot clear the situation by exiting back one Menu, exit completely out of the SERVICE MENU, and re-enter. If the problem persists, call Technical Support for additional help. |

IF YOU NOTE ANY OTHER PROBLEMS or HAVE ANY SYMPTOMS NOT DESCRIBED ABOVE, PLEASE CALL TECHNICAL SUPPORT 800-542-5377 (708-345-7700 OPTION #1), SO WE MAY ASSIST YOU.
To initiate, from the MAIN MENU, select the "DIAG" Icon. The DIAGNOSTICS MENU provides tests for switches, coils, flash lamps, lamps, sounds and dots in the Dot Matrix Display. Each feature may be tested manually or automatically after entering the SERVICE MENU (see Service Menu Introduction Section). The [ CYCLING COIL TEST ] / [FLASH LAMP TEST] may be used for a quick verification of automatic test functions. The [SWITCH TEST] / [SINGLE COIL TEST] / [SINGLE LAMP TEST] / [ALL LAMPS TEST] / [ROW LAMPS TEST] / [COLUMN LAMPS TEST] / [FLASH LAMP TEST] may be used for troubleshooting.

All DIAGNOSTICS MENU Icons and there usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. NOTE: Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some Icons may appear non-functional or may not appear at all. Some Icons change depending on selections (e.g. Selecting and activating the "STRT" Icon [Start Tournament] will be replaced with the "STOP" Icon [Stop Tournament]). Icons and/or functions, order and operation are subject to change.

In displays where changes can be made or to perform a function, use the GREEN Button to go [BACK], exit or escape, the RED Buttons to [< / >] MOVE BACK / LEFT / DECREASE / [+ / -] MOVE FORWARD / RIGHT / INCREASE a value or setting, and the BLACK Button to [SELECT] next or as "OK / ENTER / ENERGIZE."

Important: Upon Power-Up (Game CPU Reset) or opening the Coin Door watch the Display for any Alerts.*

This audible / visual alert display is shown when the 50V / 20V Power is disabled (by opening the Coin Door). PULL OUT THE INTERLOCK SWITCH ONLY WHILE IN THE SERVICE MENU FOR COIL OR SWITCH TESTING & BURN-IN WHEN THE COIN DOOR IS REQUIRED TO STAY OPEN FOR SERVICE BUTTON USE! Pulling out the Power Interlock Switch or pressing the 'escape' Green [BACK] Button will remove the alert display. Initial display presentation is accomplished by 3 audible tones (the bright display warming will go dim after approximately 30 seconds).

This alert display is shown momentarily during Game Mode or Power-Up to alert the operator of a device malfunction (device or mechanism doesn’t energize or is energized repeatedly). OPERATOR ALERT! works by monitoring any switch activated device that has the potential to trap a ball when disabled (e.g. in the Shooter Lane, Scoop or Eject Holes, etc.). This alert can (e.g. Ball Trough, Auto Plunger, etc.) is stuck closed (caused by a switch jam or stuck ball); the game will activate the device a predetermined number of times and if the problem is still detected, this device or switch will be noted in Switch Alerts (next page) and/or Technician Alerts.

Upon entering the SERVICE MENU, if an asterisk " * " is displayed after the words "SERVICE MENU," the game has detected possible faulty devices, switches and/or missing pinballs. Press the either of the Red Buttons (short-cut to the TECHNICIAN ALERTS MENU) or continue into the SERVICE MENU (press the Black Button again), select the "DIAG" Icon and "TECH" Icon for the Technician Alerts information.

CAUTION! Remove all pinballs from the Ball Trough prior to lifting the playfield to it's full upright position for servicing. PULL OUT the Power Interlock Switch for operation. To eject pinballs, select the "DIAG" Icon from the MAIN MENU to enter the DIAGNOSTICS MENU. Select the "CLR" Icon to enter the BALL TROUGH TEST MENU. Press the Black [SELECT] Button. To return to the DIAGNOSTICS MENU, press the Green [BACK] Button. This feature also useful to retrieve a pinball for game testing in Switch or Coil Tests.
Go To Switch Menu

To initiate, from the DIAGNOSTICS MENU, select the "SW" Icon. Switches are configured in an 4 X 16 Matrix of Rows [Switch Drives] and Columns [Sw. Returns] with up to 64 possible switches. Dedicated Switches are configured in a 2 X 16 Matrix of Rows [Dedicated Sws. Drives / Ground] and Column [Dedicated Sw. Returns] with up to 32 possible dedicated switches (includes the 8 dip switch positions). The SWITCH TEST MENU consists of three (3) parts: Switch & Active Switch Tests and Switch Alerts to test all switches.

Reminder: The Flipper & Start Buttons (part of Switch Tests) are temporarily disabled as Service Menu Navigation Buttons during these tests so they can be tested and shown on-screen. Pressing the Green [BACK] Button (Dedicated Switch D-21), Light Green-Black / Black (GND), will exit Switch Test or Active Switch Test.

Switch Test

To initiate, from the SWITCH MENU, select the "TEST" Icon. Ensure the Power Interlock Switch is pulled out if testing with the Coin Door open and the activation of coils is required. Upon entering Switch Test, you will notice that some switches are already indicated as closed. In the examples, the 4-Ball Trough Switches #18, #19, #20 & #21 are shown closed (pinballs at rest in the ball trough), along with the Flipper E.O.S. Dedicated Switches D-10 & D-12 (End-of-Stroke Switches are "normally closed"). If the game has more flippers with E.O.S. Dedicated Switches, CPU Dip Switch Setting other than 1-8 OFF or switches stuck closed, more dots will be indicated (enter Active Switch Test to reveal the names).

In Switch Test, close each switch and observe the display (switch closure is accompanied by a short audible tone). In the example, the Black [SELECT] Button Dedicated Switch D-24 is pressed. The Dot Matrix Display light up (highlight) the corresponding dot in the on-screen matrix, display the switch name, switch number and the Switch Drive / Return wire colors. When not closing a switch, the display indicates NONE and the last switch number closed. For the Switch Matrix Grid and Dedicated Switch Grid, see Find-It-In-Front: Dr. Pinball, DR. 4 or escape out of this test and enter Active Switch Test (described below) to view the names of the switches closed. Note: Pressing the Green [BACK] Button (Ded. Switch D-21), Lt. Green-Black / Black (GND), will exit the Switch Test.

CAUTION! COIL MECHANISMS WHEN ACTIVATED HAVE FAST MOVING PARTS! While performing Switch Test with the Coin Door closed or open (with the Power Interlock Switch is pulled out), DO NOT USE YOUR FINGER to test switches which are associated with a coil mechanism such as a Vertical Up-Kicker (hole with a switch), Slingshots, Bumpers, etc..

Active Switch Test

To initiate, from the SWITCH MENU, select the "ACT" Icon. In Active Switch Test, if any switches are stuck closed (or normally closed from the presence of pinball(s) as in the Ball Trough), the display will flash the corresponding dot(s) in the on-screen matrix, display the name and the Switch Drive / Return wire colors. If more than one switch is closed, the switch information will change with each switch. This cycle continues until all switches are cleared or until Active Switch Test is exited. In the example, the Black [SELECT] Button Dedicated Switch D-24 is pressed and held down. The display will cycle and flash each dot, naming each switch which is closed. To determine the switch number, compare the highlighted dot to the same position in the Switch Matrix Grid at the beginning of this manual.

Switch Alerts

To initiate, from the SWITCH MENU, select the "ALRT" Icon. In Switch Alerts Menu, possible inoperable switches are marked with an "X" (OUT OF SERVICE). Mark switches IN or OUT OF SERVICE by pressing the Black Button while the intended switch is highlighted and change with either of the Red Buttons. Switches which are determined as "OUT OF SERVICE" by the game or manually, will be automatically marked as "IN SERVICE" as soon as the game determines a valid switch closure (after adjusting, fixing or replacing the switch, then testing/actuating the switch). Note: A Factory Reset will also put the switch back "IN SERVICE" in which the game will need to re-determine if the switch should be marked OUT OF SERVICE.
### SWITCH MATRIX GRID [ #1 - #64] (Switch Locations: next page)

<table>
<thead>
<tr>
<th>CPU/Sound Board</th>
<th>SW. #1</th>
<th>SW. #2</th>
<th>SW. #3</th>
<th>SW. #4</th>
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<th>SW. #6</th>
<th>SW. #7</th>
<th>SW. #8</th>
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<th>SW. #12</th>
<th>SW. #13</th>
<th>SW. #14</th>
<th>SW. #15</th>
<th>SW. #16</th>
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</thead>
<tbody>
<tr>
<td>Q1</td>
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<td>THOR</td>
<td>THOR</td>
<td>THOR</td>
<td>TRESSER STANDUP #1</td>
<td>TRESSER STANDUP #2</td>
<td>TRESSER STANDUP #1</td>
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<td>TRESSER STANDUP #1</td>
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<td>TRESSER STANDUP #1</td>
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<td>TRESSER STANDUP #1</td>
<td>TRESSER STANDUP #1</td>
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<tr>
<td>DRIVE</td>
<td>#7</td>
<td>#8</td>
<td>#9</td>
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<td>#13</td>
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<td>#21</td>
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### Dedicated Switches [ #D-1 - #D-32] (Dedicated Switch Locations: next page)

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<tbody>
<tr>
<td>GROUND (BLK)</td>
<td>J-13-P10 &amp; J-3-P10</td>
<td>LEFT COIN SLOT</td>
<td>CENTER COIN SLOT</td>
<td>RIGHT COIN SLOT</td>
<td>FORTH COIN SLOT</td>
<td>FIFTH COIN SLOT</td>
<td>IF USED</td>
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<td>500-6889-01 CABINET</td>
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### CPU/SOUND BD. SW1 DIP SWITCH (located between Connectors J3/J13)

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<tr>
<th>CPU/SOUND BD</th>
<th>SW1 DIP</th>
<th>SW2 DIP</th>
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<th>SW8 DIP</th>
<th>SW9 DIP</th>
<th>SW10 DIP</th>
<th>SW11 DIP</th>
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<th>SW13 DIP</th>
<th>SW14 DIP</th>
<th>SW15 DIP</th>
<th>SW16 DIP</th>
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<tbody>
<tr>
<td>GROUND (BLK)</td>
<td>J-13-P10</td>
<td>TILT PENDULUM</td>
<td>SLAM TILT</td>
<td>TICKET NOTCH</td>
<td>IF USED</td>
<td>BACK (GREEN)</td>
<td>MINUS (RED)</td>
<td>PLUS (RED)</td>
<td>SELECT (BLACK)</td>
<td>DIP (124406578)</td>
<td>DIP (124406578)</td>
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<td>DIP (124406578)</td>
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</table>

### Wire Color Abbreviations:
- BLK: Black
- BLU: Blue
- BRO: Brown
- GRY: Grey
- Green
- LG: Light Green
- ORA: Orange
- PINK: Pink
- RED: Red
- TAN: Tan
- WHT: White
- YEL: Yellow

For more about the use of terminal strips, see section 12.1 in "The Tome of Artifacts."
Go To Coil Menu
To initiate, from the DIAGNOSTICS MENU, select the "COIL" icon. Coils #01 – #16 are typically High Current Coils (although Low Current Coils may be used in these positions & will be noted). Coils #17 – #32 are typically Low Current Coils. Flash Lamps are typically used in positions #25 – #32 (although Flash Lamps may be used in any position and will be noted). Auxiliary Coils may be used in positions #33 – #35.

Remember, use the GREEN Button to go [ BACK ], exit or escape, the RED Buttons to [ < / > ] GO BACK [+ / -] GO FORWARD, and the BLACK Button to [ SELECT ] ENERGIZE the coil (solenoid) or flash lamp.

Single Coil Test
To initiate, from the COIL MENU, select the "TEST" icon. Ensure the Power Interlock Switch is pulled out if testing with the Coin Door open. Upon entering Single Coil Test, you will notice the #1 coil is shown. The Dot Matrix Display will indicate the coil or flash lamp name, coil (solenoid) or flash lamp number and the Coil or Flash Lamp Power Line / Drive Transistor Control Line wire colors. To determine the "Pin-Outs" from the I/O Power Driver Board, the Coil Voltage Gauge-Turns (e.g. 23-500) or lamp type (e.g. #89 or #906 D-B), view the Coils Detailed Chart Table at the beginning of this manual or for more on troubleshooting and diagnosing, see the Yellow Pages (Schematics & Wiring).

Cycling Coil Test
To initiate, from the COIL MENU, select the "CYC" icon. Ensure the Power Interlock Switch is pulled out if testing with the Coin Door open. The test pulses each regular coil or flash lamp sequentially (cycling) on the Playfield and in the Backbox (if coils or flash lamps are used). The Dot Matrix Display indicates the same information you will find in Single Coil Test.

Go To Flash Lamps Menu
To initiate, from the DIAGNOSTICS MENU, select the "FLASH" icon. The two tests allows the technician to easily spot any burned-out flash lamps and replace them. Unlike Single Coil Test, which tests all coil (solenoids), including flash lamps, Single and Cycling Flash Lamp Tests, test only the flash lamps used in the game. Flash Lamps are typically used in positions #25 – #32 (although Flash Lamps may be used in any position and will be noted).

Remember, use the GREEN Button to go [ BACK ], exit or escape, the RED Buttons to [ < / > ] GO BACK [+ / -] GO FORWARD, and the BLACK Button to [ SELECT ] ENERGIZE the flash lamp.

Single Flash Lamp Test
To initiate, from the FLASH LAMPS MENU, select the "TEST" icon. Ensure the Power Interlock Switch is pulled out if testing with the Coin Door open. Upon entering Single Flash Lamp Test, you will notice the first Flash Lamp is shown. The Dot Matrix Display will indicate the flash lamp name, flash lamp number and the Flash Lamp Power Line / Drive Transistor Control Line wire colors. To determine the "Pin-Outs" from the I/O Power Driver Board or lamp type (e.g. #89 or #906 Bulb), view the Coils Detailed Chart Table at the beginning of this manual or for more on troubleshooting and diagnosing, see the Yellow Pages (Schematics & Wiring).

Cycling Flash Lamp Test
To initiate, from the FLASH LAMPS MENU, select the "CYC" icon. Ensure the Power Interlock Switch is pulled out if testing with the Coin Door open. The test pulses each flash lamp sequentially (cycling) on the Playfield and in the Backbox (if flash lamps are used). The Dot Matrix Display indicates the same information you will find in Single Flash Lamp Test.
<table>
<thead>
<tr>
<th>High Current Coils Group 1</th>
<th>Drive Translator</th>
<th>Power Line Color</th>
<th>Power Line Voltage</th>
<th>D.T. Control Line Color</th>
<th>Coil GA-Turn or Batch Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 TROUGH UP-KICKER</td>
<td>Q1</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BRN-BLK</td>
<td>J8-P1</td>
</tr>
<tr>
<td>#2 AUTO LAUNCH</td>
<td>Q2</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BRN-RED</td>
<td>J8-P3</td>
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<tr>
<td>#3 HULK COUNTER CLOCKWISE</td>
<td>Q3</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BRN-ORG</td>
<td>J8-P4</td>
</tr>
<tr>
<td>#4 HULK CLOCKWISE</td>
<td>Q4</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BRN-YEL</td>
<td>J8-P5</td>
</tr>
<tr>
<td>#5 HULK EJECT</td>
<td>Q5</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BRN-GRN</td>
<td>J8-P6</td>
</tr>
<tr>
<td>#6 CENTER 4-BANK DROP RESET</td>
<td>Q6</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BRN-BLU</td>
<td>J8-P7</td>
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<tr>
<td>#7 ORBIT CONTROL GATE (LEFT)</td>
<td>Q7</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BRN-VIO</td>
<td>J8-P8</td>
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<tr>
<td>#8 SHAKER MOTOR (OPTIONAL)</td>
<td>Q8</td>
<td>RED-WHT</td>
<td>16VAC</td>
<td>BRN-GRY</td>
<td>J8-P9</td>
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</table>

<table>
<thead>
<tr>
<th>High Current Coils Group 2</th>
<th>Drive Translator</th>
<th>Power Line Color</th>
<th>Power Line Voltage</th>
<th>D.T. Control Line Color</th>
<th>Coil GA-Turn or Batch Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>#9 LEFT POP BUMPER</td>
<td>Q9</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BLU-BRN</td>
<td>J8-P1</td>
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<tr>
<td>#10 RIGHT POP BUMPER</td>
<td>Q10</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BLU-RED</td>
<td>J8-P2</td>
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<tr>
<td>#11 BOTTOM POP BUMPER</td>
<td>Q11</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BLU-ORG</td>
<td>J8-P4</td>
</tr>
<tr>
<td>#12 RAMP CONTROL GATE (LEFT)</td>
<td>Q12</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BLU-YEL</td>
<td>J8-P5</td>
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<tr>
<td>#13 LEFT SLINGSHOT</td>
<td>Q13</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BLU-GRN</td>
<td>J8-P6</td>
</tr>
<tr>
<td>#14 RIGHT SLINGSHOT</td>
<td>Q14</td>
<td>YEL-VIO</td>
<td>50VDC</td>
<td>BLU-BLU</td>
<td>J8-P7</td>
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<tr>
<td>#15 LEFT FLIPPER (50V RED/YEL)</td>
<td>Q15</td>
<td>GRY-YEL-2A</td>
<td>50VDC</td>
<td>ORG-GRY</td>
<td>J8-P8</td>
</tr>
<tr>
<td>#16 RIGHT FLIPPER (50V RED/YEL)</td>
<td>Q16</td>
<td>GRY-YEL-2A</td>
<td>50VDC</td>
<td>ORG-VIO</td>
<td>J8-P9</td>
</tr>
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<table>
<thead>
<tr>
<th>Low Current Coils Group 1</th>
<th>Drive Translator</th>
<th>Power Line Color</th>
<th>Power Line Voltage</th>
<th>D.T. Control Line Color</th>
<th>Coil GA-Turn or Batch Type</th>
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</thead>
<tbody>
<tr>
<td>#17 HULK ARMS (Step-Up Dr. Bd.)</td>
<td>Q17</td>
<td>BRN</td>
<td>20VDC</td>
<td>VIO-GRY</td>
<td>J7-P2</td>
</tr>
<tr>
<td>#18 FLASH: LEFT SIDE</td>
<td>Q18</td>
<td>ORG</td>
<td>20VDC</td>
<td>VIO-RED</td>
<td>J7-P3</td>
</tr>
<tr>
<td>#19 FLASH: RIGHT SIDE</td>
<td>Q19</td>
<td>ORG</td>
<td>20VDC</td>
<td>VIO-VLT</td>
<td>J7-P6</td>
</tr>
<tr>
<td>#20 FLASH: SLINGSHOT (X2)</td>
<td>Q20</td>
<td>ORG</td>
<td>20VDC</td>
<td>VIO-GRN</td>
<td>J7-P7</td>
</tr>
<tr>
<td>#21 FLASH: HULK</td>
<td>Q21</td>
<td>BRN</td>
<td>20VDC</td>
<td>VIO-BLU</td>
<td>J7-P8</td>
</tr>
<tr>
<td>#22 LOKI LOCKUP (Step-Up Dr. Bd.)</td>
<td>Q22</td>
<td>VIO-YEL</td>
<td>50VDC</td>
<td>VIO-BLU</td>
<td>J7-P9</td>
</tr>
<tr>
<td>#23 HULK MAGNET (Step-Up Dr. Bd.)</td>
<td>Q23</td>
<td>RED</td>
<td>5VDC</td>
<td>VIO-GRY</td>
<td>J7-P10</td>
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<th>Low Current Coils Group 2</th>
<th>Drive Translator</th>
<th>Power Line Color</th>
<th>Power Line Voltage</th>
<th>D.T. Control Line Color</th>
<th>Coil GA-Turn or Batch Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>#25 FLASH: POP BUMPER</td>
<td>Q25</td>
<td>ORG</td>
<td>20VDC</td>
<td>BLK-BRN</td>
<td>J6-P1</td>
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<tr>
<td>#26 FLASH: TESSERACT</td>
<td>Q26</td>
<td>ORG</td>
<td>20VDC</td>
<td>BLK-RED</td>
<td>J6-P2</td>
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<td>#27 FLASH: BACK PANEL (LEFT)</td>
<td>Q27</td>
<td>ORG</td>
<td>20VDC</td>
<td>BLK-ORG</td>
<td>J6-P3</td>
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<td>#28 FLASH: BACK PANEL # 2</td>
<td>Q28</td>
<td>ORG</td>
<td>20VDC</td>
<td>BLK-YEL</td>
<td>J6-P4</td>
</tr>
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<td>#29 FLASH: BACK PANEL # 3</td>
<td>Q29</td>
<td>ORG</td>
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<td>BLK-GRN</td>
<td>J6-P5</td>
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<td>#30 FLASH: BACK PANEL # 4</td>
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<td>#31 FLASH: BACK PANEL # 5</td>
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<td>#32 FLASH: BACK PANEL (RIGHT)</td>
<td>Q32</td>
<td>ORG</td>
<td>20VDC</td>
<td>BLK-GRY</td>
<td>J6-P8</td>
</tr>
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</table>
Go To Lamp Menu

To initiate, from the DIAGNOSTICS MENU, select the "LAMP" Icon. Controlled lamps are configured in and 8 X 10 Matrix of Rows [Lamp Returns / Ground] and Columns [Lamp Drives / 18VDC] with up to 80 lamps possible. The LAMP TEST MENU consists of five (5) parts: Single Lamp Test, Test All Lamps, Row Lamps Test, Column Lamps Test and Ordered Lamps Test to test all lamps.

Remember, use the GREEN Button to go [BACK], exit or escape, the RED Buttons to [< / - ] GO BACK / LEFT / [+ / >] GO FORWARD / RIGHT, and the BLACK Button to [SELECT] next or as "OK / ENTER."

Single Lamp Test

To initiate, from the LAMP MENU, select the "ONE" Icon. As each lamp is selected, the lamp will light at its location on the playfield as well as the Dot Matrix Display. Upon entering Single Lamp Test, you will notice the #1 lamp is shown. The Dot Matrix Display will light up (highlight) the corresponding dot in the on-screen matrix, display the lamp name, lamp number and the Lamp Return / Drive wire colors. For the Lamp Matrix Grid, see the beginning section of this Service Game Manual.

All Lamps Test

To initiate, from the LAMP MENU, select the "ALL" Icon. Upon entering All Lamps Test, you will notice the Dot Matrix Display is flashing ALL LAMPS ON. The lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix Grid. The Dot Matrix Display will light up (highlight) all of the dots in the on-screen matrix.

Row Lamps Test

To initiate, from the LAMP MENU, select the "ROW" Icon. As each lamp row is selected, the lamps in the row will light on the playfield as well as the Dot Matrix Display. Upon entering Row Lamps Test, you will notice the #1 lamp row is shown. The Dot Matrix Display will light up (highlight) the corresponding row of dots in the on-screen matrix, display the lamp row number, the Lamp Return wire colors, the I/O PCB Connector and transistor number.

Column Lamps Test

To initiate, from the LAMP MENU, select the "COL" Icon. As each lamp column is selected, the lamps in the column will light on the playfield as well as the Dot Matrix Display. Upon entering Column Lamps Test, you will notice the #1 lamp column is shown. The Dot Matrix Display will light up (highlight) the corresponding row of dots in the on-screen matrix, display the lamp column number, the Lamp Drive (18VDC) wire colors, the I/O PCB Connector and IC number.

Bulb Types used for Control Lamps

Typical Lamp Wiring & Schematic

Ordered Lamps Test

To initiate, from the LAMP MENU, select the "ORD" Icon. If required, this icon will appear in the LAMP MENU. Identical to Single Lamp Test, however, the lamps lit are not in the Lamp Matrix numeric order, but ordered or arranged in separate localized grouping(s) for easier lamp checking.

* If not required in this game, Icon will not be shown.
# LAMP MATRIX GRID [#1 - #80] (Lamp Locations: next page)

<table>
<thead>
<tr>
<th>I/O Power Driver Board</th>
<th>IC-U17</th>
<th>IC-U16</th>
<th>IC-U15</th>
<th>IC-U14</th>
<th>IC-U13</th>
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<tr>
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</table>

- **START BUTTON**: #555 LAMP L.P. #14
- **TOURNE BUTTON**: #555 LAMP L.P. #12
- **SHOOT AGAIN**: #555 LAMP L.P. #10
- **LEFT OUTLINE**: #555 LAMP L.P. #8
- **LEFT RETURN LANE**: #555 LAMP L.P. #6
- **RIGHT RETURN LANE**: #555 LAMP L.P. #4
- **CAPTAIN AMERICA**: #555 LAMP L.P. #2
- **BLACK WIDOW**: #555 LAMP L.P. #0
- **HAWKEYE #1 (BOT)**: #555 LAMP L.P. #2
- **HAWKEYE #2**: #555 LAMP L.P. #2
- **HAWKEYE #3**: #555 LAMP L.P. #2
- **LEFT INNER LOOP (RED)**: #555 LAMP L.P. #2
- **RT. 2 BANK TARGET-TOP**: #555 LAMP L.P. #2
- **RT. 2 BANK TARGET-BOT**: #555 LAMP L.P. #2
- **HULK TARGET ARROW**: #555 LAMP L.P. #2
- **BLACK WIDOW #1 (BOT)**: #555 LAMP L.P. #2
- **BLACK WIDOW #2**: #555 LAMP L.P. #2
- **TOP LANE (HAWKEYE)**: #555 LAMP L.P. #2
- **TOP LANE (BLACK WIDOW)**: #555 LAMP L.P. #2

- **CAPTAIN AMERICA #2**: #555 LAMP L.P. #4
- **CAPTAIN AMERICA #3**: #555 LAMP L.P. #4
- **CAPTAIN AMERICA #4**: #555 LAMP L.P. #4
- **LEFT RAMP (RED)**: #555 LAMP L.P. #4
- **LEFT RAMP (GRN)**: #555 LAMP L.P. #4
- **RIGHT OBBIT (RED)**: #555 LAMP L.P. #4
- **IRON MAN #4**: #555 LAMP L.P. #4
- **IRON MAN #3**: #555 LAMP L.P. #4
- **BOTTOM POP BUMPER**: #555 LAMP L.P. #4
- **TOP LANE (HULK)**: #555 LAMP L.P. #4
- **LOCK 1**: #555 LAMP L.P. #4

- **IRON MAN #1 (BOT)**: #555 LAMP L.P. #4
- **SHIELD AGENT**: #555 LAMP L.P. #4
- **LEFT POP BUMPER**: #555 LAMP L.P. #4
- **RIGHT POP BUMPER**: #555 LAMP L.P. #4
- **TOP LANE (CAPTAIN AMERICA)**: #555 LAMP L.P. #4
- **TOP LANE (THOR)**: #555 LAMP L.P. #4
- **TOP LANE (IRON MAN)**: #555 LAMP L.P. #4
- **44 LAMP**: #555 LAMP L.P. #4

- **HULK (K)**: #555 LAMP L.P. #4
- **HU(L)K**: #555 LAMP L.P. #4

- **CO(S)MIC**: #44 LAMP L.P. #4
- **C(OS)MIC**: #44 LAMP L.P. #4
- **COSM(I)C**: #44 LAMP L.P. #4
- **COSM(II)C**: #44 LAMP L.P. #4
- **H(U)LK**: #44 LAMP L.P. #4

Wire Color Abbreviations used:
- **BLK**: Black
- **RED**: Red
- **VIO**: Violet
- **WHI**: White
- **YEL**: Yellow
- **ORG**: Orange
- **BRN**: Brown
- **GRN**: Green
- **Olive**: Olive
- **BLN**: Blue
- **GRY**: Grey

*For more about D.O.D.E. see T.E.R.M.I.N.A.L. STRIPS 101-105*
Game-Specific Tests

To initiate, from the DIAGNOSTICS MENU, select the "GAME" icon. Ensure the Power Interlock Switch is pulled out when testing with the Coin Door open. This Menu is provided to allow the technician a simple method of testing game specific coils and/or switches, if required. If used, select the icon (and Sub-Menu Icons, if any) and follow on-screen prompts.

Ball Trough Test

To initiate, from the DIAGNOSTICS MENU, select the "CLR" icon. Ensure the Power Interlock Switch is pulled out if testing with the Coin Door open. This Menu is provided to allow the technician a simple method of removing the balls from the trough and also, to test functionality of the trough, ensuring proper trough operation. Upon entering Ball Trough Test, you will notice that four switches are already indicated as closed. In the example, the 4-Ball Trough Switches #18, #19, #20 & #21 are shown closed (pinballs at rest in the ball trough). To return to the DIAGNOSTICS MENU, press the Green [ BACK ] Button.

Press the Black [ SELECT ] Button to eject the ball in the first position Switch #21 (VUK OPTO Trough #1 (R)). Simultaneously, the Dot Matrix Display and the playfield will eject the ball to the Trough Up-Kicker, eject from the Trough Up-Kicker into the Shooter Lane, momentarily closing Switch #23 (Shooter Lane), and is ejected onto the playfield where the technician can easily retrieve the pinball or allow the ball(s) to re-enter the trough to continue Ball Trough Test. The Dot Matrix Display indicates Switch #18 (4-Ball Trough #4 (L)) as open as the remaining three (3) pinballs shift over one (1) position to the right. If the technician allows the ejected pinball to re-enter the ball trough, the Dot Matrix Display will indicate Switch #18 as closed. REMINDER: Switch #22 is the stacking OPTO switch; if more than five (5) pinballs are used, the additional switches will be noted. Typically, four (4) pinballs are used and required for proper operation; if this amounts differs, it will be noted on the front page of this Service Game Manual.

CAUTION! Continuous use off the above test may overheat the Trough Up-Kicker Coil.

Technician Alerts

To initiate, from the DIAGNOSTICS MENU, select the "TECH" icon. This Menu is provided to show any switch or solenoid problems and/or missing pinballs. If upon entering the SERVICE MENU the display indicated an asterisk (*) and "USE +/− VIEW TECH. ALERTS", alerts are present.

After pressing either Red [ < / − ] [ + / > ] Button or selecting this icon in the DIAGNOSTICS MENU, the display will indicate the alert(s). If there are 2 alerts present, the display will indicate (1/2) with the 1st alert on the display. Press the Red [ + / > ] Button to view the second alert (2/2). The second number in the parenthesis ( ) after the slash (/) indicates how many alerts are present. Refer to the start of this chapter regarding "Upon entering the SERVICE MENU +/− indication and to SWITCH ALERTS. To return to the DIAGNOSTICS MENU, press the Green [ BACK ] Button. Note: While in this menu, an option may be present to jump (short-cut) to the appropriate Testing Menu (e.g. Coil Test, Switch Test, Game Specific Test or Ticket Dispenser Test, if installed).

NOTE ON SWITCH DETECTION: During game play, activation of switches are continuously monitored. For a switch to be determined as inoperative or OUT OF SERVICE, up to twenty games or so must be played for a switch to be automatically marked as OUT OF SERVICE. In programming, if a switch is determined to be faulty, game play is compensated. Switches noted as OUT OF SERVICE are determined to be stuck closed or open depending on switch usage. Free up the switch actuator, adjust or replace, if necessary. Performing a valid switch closure will put the switch back "IN SERVICE."

Determination of switch usage can be checked in Audits (review the Audits Section). Find the associated Audit with the switch in question and check usage; compare the numbers to commonly used switches. After any switch is checked and repaired or replaced, it's suggested to test the switch in the Switch Test or Single Coil Test (reviewed earlier in this section) where the associated coil to the switch can be tested as well. After correcting the problem, the switch will marked "IN SERVICE" and the switch is again monitored as specified above. Only you can determine if a switch marked OUT OF SERVICE is actually inoperative, or if it is just not getting actuated during game play.

NOTE ON PINBALL DETECTION: While in TECHNICIAN ALERTS MENU, if the following is displayed, the game has detected one (1) or more pinball(s) missing and has compensated for the lost pinball(s) to provide normal game play.

Technician Alerts continued on the next page.
During game play, a pinball can get trapped or stuck. If after approximately 15 seconds of inactivity or “no scoring,” Ball Search is started. Note: If the pinball is in the Plunger Lane or “held” on the flipper, no Ball Search will be performed. The game will perform one Ball Search in an attempt to “find” or free-up the pinball.

If the game does not see a switch closure (indicating the pinball has not been found), the Dot Matrix Display may indicate [ LOCATING PINBALLS PLEASE WAIT ... ], during which Ball Search will continue until the timer runs out (this feature will not happen if the game is in Competition Mode; Ball Search will continue until the pinball is found, unstuck and/or replaced manually). The display will momentarily acknowledge the missing pinball(s). The game will provide another pinball into play and will compensate for the lost pinball. Game play will appear normal.

Note: This detection and compensation will happen with every pinball, if each suffers the same fate of a ball trap. If all balls get trapped, the game cannot be played or started until the situation is rectified.

Important: Determine where the pinball is! Do not add pinball(s) until it is determined the pinball(s) are indeed missing and not just stuck. The most common places for a pinball to be stuck is in device holes (ejects and VUKs) or ball troughs. Determine that all devices are functionally properly. Check around plastic pieces and ramps to see if the pinball got jammed or stuck.

When the found pinball or a replacement pinball is added to the Ball Trough, the Technician Alert will immediately clear and will then indicate any remaining alerts (if present) or NO TECHNICIAN ALERTS.

Enter the BALL TROUGH TEST (review the previous page) to cycle the pinballs and to check proper switch and coil operation. If a pinball was added, and the originally stuck pinball has freed itself at a later time, the game will not operate correctly.

NOTE ON DEVICE MALFUNCTION: While in TECHNICIAN ALERTS MENU, if the following is displayed, the game has detected a “device malfunction.” Check the device indicated (coil and/or switch).

Knocker Test
To initiate from the DIAGNOSTICS MENU, select the "KNOCKED" icon. The digitally mastered "Knocker" is sounded. The Knocker sound is used to alert the player if he/she has received a special, replay or a credit from the Match Award feature. Press the Black [ SELECT ] Button to activate the knocker. To return to the DIAGNOSTICS MENU, press the Green [ BACK] Button.

FACTOID: The knocker got its name from the ‘original knocker’ (20th century pinball games), which used a coil and when energized (fired), the plunger would strike a wood panel inside the cabinet.

Sound / Speaker Test
To initiate from the DIAGNOSTICS MENU, select the "SPKR" icon. This system produces true digital stereo sound from Backbox & Cabinet Speakers or "Mono" on the Cabinet Speaker (when used itself). This Menu is provided to allow the technician a simple method of testing the speakers if rewired or replaced.

Upon entering Sound / Speaker Test, you will notice the Dot Matrix Display indicating the first option of available music and/or sound(s) in this test. Press the Red [ + / - ] Button to cycle through the available music and/or sounds, and press the Black [ SELECT ] Button to play the option shown in the Dot Matrix Display. Press the Green [ BACK ] Button to exit.

Speaker Phase Testing
Connections to each of speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other one, bass frequencies will not be produced properly and the overall sound quality will be poor. To test for proper speaker phasing, use the Sound / Speaker Test to cycle through the available music and sound.

Speaker Phase Testing cont. next page.
Begin Burn-In

To initiate, from the DIAGNOSTICS MENU, select the "BURN" Icon. After selecting this Icon, press the Black [ SELECT ] Button to begin (initiate) the Burn-In Test. Ensure the Power Interlock Switch is pulled out if testing with the Coin Door open (required for coil function). Upon entering Burn-In Test, the game will exercise all CPU I/O Functions: Dot Matrix Display Test, Coil Cycling Testing, All Lamps Test and Sound / Speaker Test. Press the Green [ BACK ] Button, to pause and to view the cumulative Burn-In minutes. Press the Green [ BACK ] Button again to return to the DIAGNOSTICS MENU.

Note: To reset Burn-In minutes back to 0:00, see Section 3, Chapter 5, GO TO RESET MENU (via the UTILITIES MENU), Reset Factory Settings. ▲ CAUTION: Performing a FACTORY RESET will reset all other information as well (read the Utilities Section (GO TO RESET MENU), for more information).

Dot Matrix Test

To initiate, from the DIAGNOSTICS MENU, select the "DOT TEST" Icon. After selecting this Icon the Dot Matrix Test immediately begins. The Dot Matrix Display will immediately and continuously illuminate and cycle each of the 5 Tests for 1 pass each. To return to the DIAGNOSTICS MENU, press the Green [ BACK ] Button.

Test 1: Illuminates 1 vertical column of dots, turning it off & illuminating the next column, until each column has been individually lit, while the other columns are off.

Test 2: Illuminates 1 horizontal row of dots, turning it off & illuminating the next row, until each row has been individually lit, while the other rows are off.

Test 3: Illuminates all the dots, except for one column from left to right.

Test 4: Illuminates all the dots, except for one row from top to bottom.

Test 5: Illuminates all the dots alternating even & odd, in both the rows and columns.
Ticket Dispenser Test

To initiate, from the DIAGNOSTICS MENU, select the "TX" Icon. This Menu (Icon) will only appear if Standard Adjustment 56, Ticket Dispenser, is set to YES (Default = NO*). *Note: Some games shipped from the factory with a unique Dip Switch Setting will default to YES). To view and/or change your setting, see Adjustments Section (GO TO ADJUSTMENTS MENU). Please remember, if you install an optional Ticket Dispenser, and your default setting is "NO," you will have to reset it back to "YES" if a Factory Reset is performed.

After selecting this Icon, the Ticket Dispenser Test will start. With the Ticket Dispenser properly installed, manually feed your tickets into the dispenser. The dispenser will activate and pull in the first ticket. Press the Black [ SELECT ] Button (which energizes Coil #35, Aux 3: Switched Ground) to advance a ticket. Feeding your Tickets into the dispenser works because Coil #33, Aux 1: Ticket Advance (Enable) is always 'energized'. With a Ticket Meter installed, as one Ticket Passes through the Ticket Dispenser, one 'click' is fired to the Meter (Coil #34, Aux 2: Ticket Meter) for each ticket passing through. Dedicated Switch D-19, Ticket Notch, will also be indicated on-screen (in combination with a audible sound) as "closing" as the notch between the tickets passes through. In this test you can clear ticket jams and check and/or clear tickets in Escrow, if necessary. To return to the DIAGNOSTICS MENU, press the Green [ BACK ] Button.
GO TO AUDITS MENU: EARNINGS AUDITS [#1 – #13] / STANDARD AUDITS [#1 – #59]

Perform the below steps to review the audits. Enter the SERVICE MENU, then enter the EARNINGS AUDITS or STANDARD AUDITS MENUS. For audit definitions or summary, review the Audits Section (GO TO AUDITS MENU). Try the "DUMP AUDITS TO USB" Feature to create a text file of your audits. Don’t forget to set the DATE & TIME in the UTILITIES MENU. See the Utilities Section (GO TO UTILITIES MENU).

Step 1 Press [SELECT]. Press [BACK] to exit for escape at any time.

Step 2 Press [ > ]. Go to the "AUD" icon. Press [SELECT].

Step 3 Press [ > ]. Go to the "EARN" or "S.P.I." icon. Press [SELECT].

Step 4 Press [<] [>] to move between audits.

### EARNINGS AUDITS [#1 – #13]

<table>
<thead>
<tr>
<th>Nr.</th>
<th>EARNINGS AUDIT NAME</th>
<th>YOUR RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TOTAL PAID CREDITS</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>FREE GAME PERCENTAGE</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>AVERAGE BALL TIME</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>AVERAGE GAME TIME</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>COINS THROUGH LEFT SLOT</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>COINS THROUGH RIGHT SLOT</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>COINS THROUGH CENTER SLOT</td>
<td></td>
</tr>
</tbody>
</table>

### STANDARD AUDITS [#1 – #59]

<table>
<thead>
<tr>
<th>Nr.</th>
<th>STANDARD AUDIT NAME</th>
<th>YOUR RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TOTAL BALLS PLAYED</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TOTAL EXTRA BALLS</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>EXTRA BALL PERCENTAGE</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>REPLAY 1 AWARDS</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>REPLAY 2 AWARDS</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>REPLAY 3 AWARDS</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>REPLAY 4 AWARDS</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>TOTAL REPLAYS</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>REPLAY PERCENTAGE</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>TOTAL SPECIALS</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>SPECIAL PERCENTAGE</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>TOTAL MATCHES</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>HIGH SCORE AWARDS</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>HIGH SCORE PERCENT</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>TOTAL FREE PLAYS</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>TOTAL PLAYS</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>0.0M – 1.99M SCORES</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>2.0M – 3.99M SCORES</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>4.0M – 5.99M SCORES</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>6.0M – 7.99M SCORES</td>
<td></td>
</tr>
</tbody>
</table>

Note: Audits are subject to change (with or without notice).
### Feature Adjustments [ #1 - #1 ]

**GAME**

To initiate, from the **ADJUSTMENTS MENU**, select the "GAME" Icon. The Dot Matrix Display will indicate the adjustment number (in this group), adjust. name, adjust. setting and comment line. The current adjustment will remain on the display until the next adjustment is viewed or when this sub-menu is exited.

### FACTORY RESET or CODE UPDATE NOTE: Don’t forget, any changes you make to your adjustments will revert back to the Factory Default settings if you perform a Factory Reset or update your Game Code. See Utilities Section (GO TO RESETS MENU and GO TO USB MENU).

View the Coils Detailed Chart Menu to see if this game is Shaker Motor Enabled. If it is, set the options in the Feature Adjustment as seen below. (typically the last one).

**SHAKER MOTOR (OPTIONAL):** Set to NONE, MINIMAL USE, MODERATE USE or MAXIMAL USE.

Factory Default = MODERATE USE. Set to any of the varying "...USES" if an Optional Shaker Motor Kit (SPI Part Number 502-5027-00) was installed correctly in this pinball machine. See the assembly (kit) on the last page of Blue Pages (Major Assemblies). Also see Shaker Motor Coil (#8) in the Coils Detailed Chart Table at the beginning of this Service Game Manual or the beginning of the Yellow Pages.
### USA & International (non-Euro) Standard Pricing Select Table

<table>
<thead>
<tr>
<th>Country</th>
<th>Coin Mechanisms (Switches)</th>
<th>Pricing Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
<td>Center</td>
</tr>
<tr>
<td>Default Highlighted</td>
<td>0.25</td>
<td>1.00</td>
</tr>
</tbody>
</table>

#### USD // UNITED STATES DOLLAR // [#$]

- 1/0.25
- 1/0.50
- 1/1.00
- 1/2.00
- 1/3.00
- 1/5.00
- 2/1.00
- 4/1.00
- 6/1.00
- 8/1.00
- 10/1.00
- 2/2.00
- 4/2.00
- 6/2.00
- 8/2.00
- 10/2.00

#### AUD // AUSTRALIAN DOLLARS // [#SAUS]

- 1/0.00
- 1/0.20
- 1/0.50
- 1/1.00
- 2/2.00
- 3/3.00
- 4/4.00
- 5/5.00
- 6/6.00
- 7/7.00
- 8/8.00
- 9/9.00
- 10/10.00

#### CAD // CANADIAN DOLLARS // [#SCAN]

- 1/0.50
- 1/1.00
- 1/2.00
- 1/3.00
- 1/5.00
- 2/2.00
- 3/3.00
- 4/4.00
- 5/5.00
- 6/6.00
- 7/7.00
- 8/8.00
- 9/9.00
- 10/10.00

#### NZD // NEW ZEALAND DOLLAR // [#NZD]

- 1/0.00
- 1/0.10
- 1/0.20
- 1/0.50
- 1/1.00
- 1/2.00
- 1/3.00
- 1/5.00
- 2/2.00
- 3/3.00
- 4/4.00
- 5/5.00
- 6/6.00
- 7/7.00
- 8/8.00
- 9/9.00
- 10/10.00

#### RUB // RUSSIAN RUBLE // [#Ruble]

- 1/0.20
- 2/2.00
- 3/3.00
- 4/4.00
- 5/5.00
- 6/6.00
- 7/7.00
- 8/8.00
- 9/9.00
- 10/10.00

#### CHF // SWISS FRANC // [#Fr] (use Side 1)

- 0.50
- 1.00
- 2.00
- 5.00
- 10.00
- 20.00
- 50.00
- 100.00
- 200.00
- 500.00
- 1000.00

#### SEK // SWEDISH KRONOR // [#Kr] (use Side 1)

- 1/0.25
- 1/0.50
- 1/1.00
- 1/2.00
- 1/3.00
- 1/5.00
- 2/2.00
- 3/3.00
- 4/4.00
- 5/5.00
- 6/6.00
- 7/7.00
- 8/8.00
- 9/9.00
- 10/10.00

#### GBP // UNITED KINGDOM POUNDS // [#£] (use Side 1)

- 0.10
- 0.50
- 1.00
- 2.00
- 5.00
- 10.00
- 20.00
- 50.00
- 100.00
- 200.00
- 500.00
- 1000.00

#### ATENTION: UK 5TH COIN SLOT TIED TO 6TH CHANNEL ON ELECT.
## Game Pricing

### Euro 1-12 Summary & International (Euro) Standard Pricing Select Table

<table>
<thead>
<tr>
<th>CPU/SOUND FCB</th>
<th>DIP SWITCH SW1</th>
<th>COUNTRY SETTING</th>
<th>OPTION(S)</th>
<th>PRICING SCHEME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>SEE BELOW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFF</td>
<td>SETTINGS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use Euro 1-12 are alternate settings for countries using the Euro.  

- **HIGHLIGHTED** = Factory Default  
- **HIGHLIGHTED** = Not shown on Coin Card

<table>
<thead>
<tr>
<th>COIN MECHANISMS (SWITCHES)</th>
<th>COINS THRU...</th>
<th>SLOT:</th>
<th>EUR / EUROPEAN UNION EUROS // €1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LEFT</td>
<td>CENTER</td>
<td>0.50, 1.00, 2.00, 0.20, 0.10</td>
</tr>
<tr>
<td></td>
<td>RIGHT</td>
<td></td>
<td>Optional</td>
</tr>
</tbody>
</table>

- **1/0.50**  
- **1/0.50 | 1/2.00 | 3/1.50 | 5/2.00**  
- **1/0.50 | 3/1.50 |**  
- **1/0.50 | 1/2.00 | 3/1.50 | 5/2.00**  
- **1/0.50 | 3/1.50 | 7/2.00**  
- **1/0.50 | 2/0.50 |**  
- **1/1.00 | 2/2.00 | 3/1.50 | 5/4.00**  
- **1/1.00 | 3/2.00 |**  
- **1/1.00 | 2/1.50 | 3/2.00 | 5/4.00**  
- **1/1.00 | 3/2.00 | 7/3.00**  
- **1/1.00 | 4/2.00 |**  
- **2/1.00 | 4/2.00 | 6/3.00 | 9/4.00**  
- **2/1.00 | 4/2.00 | 9/4.00**  

For a different Euro Pricing Scheme (other than Factory Default listed below), scroll through Standard Adjustment 18: Euro 1-12 or CUSTOM for new setting (reference above Euro 1-12 Summary). Keep the Country Dip Switch Setting the same as listed below.

<table>
<thead>
<tr>
<th>ADJUSTMENTS</th>
<th>EUR / EUROPEAN UNION EUROS // €1</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRIA</td>
<td>1/1.00, 2/1.50, 3/2.00</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>1/0.50</td>
</tr>
<tr>
<td>FINLAND</td>
<td>1/1.00, 3/2.00</td>
</tr>
<tr>
<td>FRANCE</td>
<td>1/1.00, 3/2.00, 7/3.00</td>
</tr>
<tr>
<td>GERMANY 1</td>
<td>1/0.50</td>
</tr>
<tr>
<td>GERMANY 2</td>
<td>1/0.50, 2/1.00, 3/1.50, 5/2.00</td>
</tr>
<tr>
<td>GERMANY 3</td>
<td>1/0.50, 2/1.00, 3/1.50, 5/2.00</td>
</tr>
<tr>
<td>GREECE</td>
<td>1/1.00, 3/2.00</td>
</tr>
<tr>
<td>ITALY 1</td>
<td>1/0.50</td>
</tr>
<tr>
<td>ITALY 2</td>
<td>1/1.00, 3/2.00</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>1/0.50, 3/1.00</td>
</tr>
<tr>
<td>PORTUGAL</td>
<td>1/0.50</td>
</tr>
<tr>
<td>SPAIN</td>
<td>1/1.00, 3/2.00</td>
</tr>
</tbody>
</table>

For the associated Coinage Card required if the Factory Default Setting was changed, view on-line at:  
http://www.sternpinball.com/coinagecards.shtml

You can download and print the replacement card. Adobe® Reader 5.0 or higher required (links on site). Use Yellow Card Stock:  
ASTROBRIGHT® SOLAR YELLOW #65 FROM WAUGH PAPER PRODUCTS (Stock #22731).
To initiate, from the MAIN MENU, select the "UTIL" Icon. The UTILITIES MENU provides ways to quickly and easily customize your game with Installs (pre-sets for game Standard & Feature Adjustments), set-up a Custom Message (short-cut to Standard Adjustment 41, Custom Message), set-up Custom Pricing (short-cut to Standard Adjustment 18, to the Custom Pricing Sub-Menu), set-up the Date and Time (required if the date and time is needed to be accurate for data dumps and for tournaments), reset certain particular game data or perform a complete Factory Reset and to download game data, update or backup game code in the USB MENU.

All UTILITIES, Installs, Resets MENU and USB MENU icons and there usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. NOTE: Depending on Game Type, Version, selections made, Dip switch settings, location and/or areas, some icons may appear non-functional or may not appear at all. Installs (Adjustments), Icons and/or functions, order and operation are subject to change. If in doubt use the Factory Default Settings (review Install Factory on the next page).

In displays where changes can be made or to perform a function, use the GREEN Button to go [ BACK ], exit or escape, the RED Buttons to [ < / - ] MOVE BACK / LEFT / [ + / > ] MOVE FORWARD / RIGHT to view the next audit in the group, and the BLACK Button to [ SELECT ] the sub-menus.

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To initiate, from the UTILITIES MENU, select the "INST" Icon. The INSTALLS MENU provides 13 Installs to vary Game Play Difficulty (set with Feature Adjustments) or Game Play Type and Install Factory (restores all adjustments to Factory Defaults).

For detailed customization or to check current Adjustments Defaults (either changed by YOU in the Adjustments Menu or by this INSTALLS MENU or for Factory Default Settings), see Section 3, Chapter 4, GO TO ADJUSTMENTS MENU. After completing one or more of the Installs in this chapter, go back to the ADJUSTMENTS MENU to see which Standard and/or Feature Adjustments have changed (Feature Adjustments and/or settings are subject to change during production, and may differ than what is described in the tables at the end of this chapter). The Dot Display will indicate if a setting is a Factory Default or not. If the settings are not to your liking, perform one of the following:

1.: Manually change the Standard & Feature Adjustments Settings (perform this task in the ADJUSTMENTS MENU, see the Adjustments Section).

2.: Install Factory (see the last install) on how to reset all of the Standard & Feature Adjustments back to the Factory Default Settings.

Multiple Installs can be set to vary game play; however, for Installs that have one or more Adjustments in common, the last "Install" selected & activated, will supersede any previously changed Adjustment(s) from any prior Installs. Any adjustments which you changed and are not affected by the Install will remain as set.

For example, if you want a 5-BALL Game set to EXTRA EASY: Select and activate the "5BAL" Icon first (which will typically change any Feature Difficulty Adjustments to HARD), then select & activate the "X.EZ" Icon to change back the Difficulty Adjustments to EXTRA EASY. However, if the "X.EZ" Icon was selected & activated first, then the "5BAL" Icon was selected & activated, the game will be set to a 5-BALL Game set to HARD.

Remember, use the GREEN Button to go [ BACK ], exit or escape and the BLACK Button to [ SELECT ] to INSTALL your new setting(s).

---

To initiate from the INSTALLS MENU, select the "X.EZ" Icon. The Dot Matrix Display will indicate the INSTALL EXTRA EASY. Follow the on-screen prompts to perform the Install. Set the Game Play Difficulty level.

Installs Menu continued on the next page.
Installs Menu continued from previous page.

**Install Easy**
To initiate, from the INSTALLS MENU, select the "EASY" Icon. The Dot Matrix Display will indicate the INSTALL EASY. Follow the on-screen prompts to perform the Install. Set the Game Play Difficulty level.

**Install Medium (Normal or Factory Settings)**
To initiate, from the INSTALLS MENU, select the "FACT" Icon. The Dot Matrix Display will indicate the INSTALL MEDIUM. Follow the on-screen prompts to perform the Install. Set the Game Play Difficulty level.

**Install Hard**
To initiate, from the INSTALLS MENU, select the "HARD" Icon. The Dot Matrix Display will indicate the INSTALL HARD. Follow the on-screen prompts to perform the Install. Set the Game Play Difficulty level.

**Install Extra Hard**
To initiate, from the INSTALLS MENU, select the "X.HD" Icon. The Dot Matrix Display will indicate the INSTALL EXTRA HARD. Follow the on-screen prompts to perform the Install. Set the Game Play Difficulty level.

**Install 3-Ball or 5-Ball**
To initiate, from the INSTALLS MENU, select either the "3BAL" or "5BAL" Icons. The Dot Matrix Display will indicate the INSTALL 3-BALL or 5-BALL depending on choice. Follow the on-screen prompts to perform the Install. Set the Game Play Type to 3 Balls per game (Factory Default is 3 Balls per game, not including extra balls earned by the player, if any).

**Install Competition**
To initiate, from the INSTALLS MENU, select the "COMP" Icon. The Dot Matrix Display will indicate the INSTALL COMPETITION. Follow the on-screen prompts to perform the Install. Set the Game Play Type to "Tournament" Rules. Programming varies and is subject to change.

**Install Director's Cut**
To initiate, from the INSTALLS MENU, select the "DCUT" Icon. The Dot Matrix Display will indicate the INSTALL DIRECTOR'S CUT. Follow the on-screen prompts to perform the Install. Set the Game Play Type to programmer's choice. Programming varies and is subject to change.

**Install Home Play**
To initiate, from the INSTALLS MENU, select the "HOME" Icon. The Dot Matrix Display will indicate the INSTALL HOME PLAY. Follow the on-screen prompts to perform the Install. Set the Game Play Type to "Home" Rules. Programming varies and is subject to change.

**Install Novelty**
To initiate, from the INSTALLS MENU, select the "NOV" Icon. The Dot Matrix Display will indicate the INSTALL NOVELTY. Follow the on-screen prompts to perform the Install. This setting is recommended where local laws restrict certain game features. Set the Game Play Type to " Restricted" Rules. Programming varies and is subject to change.

**Install Add-A-Ball**
To initiate, from the INSTALLS MENU, select the "A.A.B." Icon. The Dot Matrix Display will indicate the INSTALL ADD-A-BALL. Follow the on-screen prompts to perform the Install. This setting is recommended where local laws restrict certain game features. Set the Game Play Type to " Restricted" Rules. Programming varies and is subject to change.

**Install Factory**
To initiate, from the INSTALLS MENU, select the "FACT" Icon. The Dot Matrix Display will indicate the INSTALL FACTORY. Follow the on-screen prompts to perform the Install. CAUTION! All Standard and Feature Adjustments which were changed in the INSTALLS MENU or ADJUSTMENTS MENU are returned to the Factory Defaults (as indicated in the Dot Display in the ADJUSTMENTS MENU). Note: To perform a complete Factory Reset, GO TO THE RESETS MENU. Escape back to the UTILITIES MENU, select the "RESET" Icon, then select the "FACT" Icon in the RESETS MENU (review the end of this section, Reset Factory Settings).
Enter Custom Message
To initiate, from the UTILITIES MENU, select the "ABCD CUST MSG" icon. The SET CUSTOM MESSAGE (a short-cut for Standard Adjustment 41, Custom Message) provides an opportunity to have a text message appear in the the Attract Mode. Follow the on-screen prompts to complete [ END ].

Remember, use the GREEN Button to go [ BACK ], exit or escape, the RED Buttons to [ < / > ] MOVE LEFT / CHOOSE NEXT [ + / > ] MOVE RIGHT / CHOOSE PREVIOUS, and the BLACK Button to [ SELECT ] as 'OK'.

Set Custom Pricing
To initiate, from the UTILITIES MENU, select the "PRIC" icon. The CUSTOM PRICING MENU (a short-cut for Standard Adjustment 18, Game Pricing, and setting selected is CUSTOM) provides an opportunity to set Custom Pricing.

Note! MONETARY AMOUNT MUST BE SELECTED FIRST! Press [ BACK ] to - DECREASE or [ SELECT ] to + INCREASE the [ < $ > ] monetary amount (e.g. look at the right side of the display from $0.25 to $0.50 ). Press [ < / > ] to - DECREASE or [ + / > ] to + INCREASE the credit quantity (e.g. look at the left side of the display from 0 CREDITS AT: to 1 CREDIT AT:).

IF EXAMPLE CUSTOM PRICING SETTING DESIRED IS:
1 Play for $0.50, 3 Plays for $1.00 and 7 Plays for $2.00

THEN YOU WILL NEED TO PERFORM THE FOLLOWING:

Step 1 The starting display appears as below if no prior Custom Pricing was installed.

Step 2 Press [ SELECT ] to + INCREASE to $0.50.
Press [ + / > ] to + INCREASE to 1 CREDIT AT:

Step 3 Press [ SELECT ] to + INCREASE to $1.00.
Press [ + / > ] to + INCREASE to 2 CREDITS AT:

Step 4 Press [ SELECT ] to + INCREASE to $2.00.
Press [ + / > ] to + INCREASE to 4 CREDITS AT:

Step 5 Press [ SELECT ] to + INCREASE the amount once (example = $2.25).

Step 6 Press [ SELECT ] to INSTALL.
Press [ < / > ] or [ BACK ] to edit.

Step 7 Press [ SELECT ], press [ BACK ] twice to exit the SERVICE MENU with your Custom Pricing installed.

To correct or make new changes, reenter, which brings you to Step 6. Press [ BACK ] repeatedly until the monetary amount shown is the desired amount and then continue following the above steps with your new or corrected settings. If you are still having difficulty or if you have any questions, please call Technical Support 800-542-5377 or 708-345-7700, option 1.
### Set Date / Time

To initiate, from the **UTILITIES** menu, select the "TIME" icon. The **SET TIME** menu appears with the **MONTH** flashing. Setting the date and time is required for 'Data Dumps' and Tournament Start and End Dates. If the setting of Standard Adjustment 61, **Time Format**, is set to 12-HOUR (Factory Default) the time will be expressed in the AM / PM format. If Standard Adjustment 61, **Time Format**, is set to 24-HOUR the time will be expressed in the 24-hour format.

### Go To Resets Menu

To initiate, from the **UTILITIES** menu, select the "RESET" icon. The **RESETS** menu provides six (6) functions to reset only the **Coin** audits, reset only the **Game** audits, reset only the **Grand Champion Score**, reset only the **High Score(s)**, reset only the paid **Credits** (includes **Service Credits**) or to reset **ALL DATA** back to the Factory Default Settings.

#### Reset Coin Audits

To initiate, from the **RESET** menu, select the "COIN" icon. **ONLY** the Coin Audits (Earnings Audits 5–12), will be reset to zero (0), Factory Default Settings. Follow the on-screen prompts to perform the **Reset**.

#### Reset Game Audits

To initiate, from the **RESET** menu, select the "AUD" icon. **ONLY** the Game Audits (Earnings Audits 1–4, Standard Audits 1–59 and Feature Audits 1–XX*), will be reset to zero (0), Factory Default Settings. Follow the on-screen prompts to perform the **Reset**. *varies per game title.*

#### Reset Grand Champion (Score)

To initiate, from the **RESET** menu, select the "GC" icon. **ONLY** the Grand Champion Score (adjustable via Standard Adjustment 31), will be reset to Factory Default Setting. Follow the on-screen prompts to perform the **Reset**.

#### Reset High Scores

To initiate, from the **RESET** menu, select the "HSTD" icon. **ONLY** the High Score(s) [adjustable via Standard Adjustments 32–35], will be reset to Factory Default Setting(s). Follow the on-screen prompts to perform the **Reset**. **Note:** High Scores (but not Grand Champion Score) are reset automatically every 2,000 games (Factory Default Setting) [adjustable via Standard Adjustment 37, **HSTD Reset Count**].

#### Reset Credits

To initiate, from the **RESET** menu, select the "CRED" icon. **ONLY** the Credits (includes **Service Credits**) [adjustable via Standard Adjustment 23, **Credit Limit**], will be reset to zero (0), Factory Default Settings. Follow the on-screen prompts to perform the **Reset**.

#### Reset Factory Settings

To initiate, from the **RESET** menu, select the "FACT" icon. **ALL GAME DATA IS RESET!** (with the exception of Earnings Audit 13, Software Meter). **Note:** IF YOU HAD SET-UP CUSTOM PRICING OR HAD CHANGED ANY ADJUSTMENTS OR PERFORMED INSTALLS, IT IS SUGGESTED TO WRITE DOWN YOUR CHANGES PRIOR TO THE FACTORY RESET. Follow the on-screen prompts to perform the **Reset**.

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### Go To USB Menu

To initiate, from the **UTILITIES** menu, select the "USB" icon. The **USB** menu provides three (3) functions to download game data, update your game code or backup your code onto a USB Memory Stick. Review the inside cover for information on how to update your game code.

#### Update Game Code

To initiate, from the **USB** menu, select the "UPDT" icon. Follow the on-screen prompts or review the inside cover for more information.

#### Dump Audits to USB

To initiate, from the **USB** menu, select the "DUMP" icon. Follow the on-screen prompts to perform a **Data Dump** (download). **Note:** If icon is not present, access via the Audits Menu, see the Audits Section.

#### Backup to USB Memory Stick

To initiate, from the **USB** menu, select the "BKUP" icon. Follow the on-screen prompts to perform a **Backup** (game code only). This backup feature does not retain adjustments and/or settings changes made.
To initiate, from the MAIN MENU, select the "TOUR" icon. The TOURNAMENT MENU provides ways to quickly and easily start and stop a tournament. Also, tournament data can be viewed (audit, prize info, etc.).

All TOURNAMENT MENU icons and their usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. NOTE: Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some icons may appear non-functional or may not appear at all. Icons and/or functions, order and operation are subject to change.

In displays where changes can be made or to perform a function, use the GREEN Button to go [ BACK ], exit or escape, the RED Buttons to [ < / > ] HIGHLIGHT PREVIOUS or DECREASE /[ + / ] HIGHLIGHT NEXT or INCREASE to highlight the desired option, and the BLACK Button to [ SELECT ] it or activate.

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Start Tournament
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To initiate, from the TOURNAMENT MENU, select the "STRT" icon. The START TOURNAMENT MENU allows the operator to start a tournament. Select QUICK START or CUSTOM Tournament Start. For the first time Tournament Set-Up, it is recommended to select CUSTOM. Follow the on-screen prompts. After completion of all options in QUICK START or CUSTOM, the Tournament is started, the START TOURNAMENT MENU is exited and returns to the TOURNAMENT MENU.

**QUICK START:**

Increase or decrease the:
- DAYS, HOURS and MINUTES
- PRIZE POOL $ (DOLLAR) and ¢ (CENT) AMOUNT
- INCREMENT THE PRIZE POOL PER PLAY INCREASES $ and ¢ AMOUNT

**CUSTOM START:**

- Confirm the current date and time (if it was not set previous via the UTILITIES MENU it can be set-up in this display as well). Enter the MONTH, DAY, YEAR and TIME.
- Choose the Tournament Start Date: MONTH, DAY, YEAR and TIME
- Choose the Tournament End Date: MONTH, DAY, YEAR and TIME

- Choose the CREDITS per play desired (01-10). Set the maximum number of Credits that may be accumulated per game. Note: The current pricing is displayed; to change pricing GO TO THE ADJUSTMENTS MENU.

Increase or decrease the:
- PRIZE POOL $ (DOLLAR) and ¢ (CENT) AMOUNT
- INCREMENT THE PRIZE POOL PER PLAY INCREASES $ and ¢ AMOUNT
- MAXIMUM (CAP) PRIZE POOL $ and ¢ AMOUNT.

- Increase or decrease the number of PRIZES (01-05 HIGH SCORE; 02-05 B’N’W). Set the maximum # of Prize Positions to be awarded during a Tournament. Selections are as follows (% distribution cannot be changed):
  - BUMP N’ WIN:
  - Cannot set to 01. Minimum of 2 winners required.

<table>
<thead>
<tr>
<th>Set to 01</th>
<th>1 Winner</th>
<th>100% (1) Prize Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set to 02</td>
<td>2 Winners</td>
<td>65% (1) 35% (2)</td>
</tr>
<tr>
<td>Set to 03</td>
<td>3 Winners</td>
<td>50% (1) 30% (2) 20% (3)</td>
</tr>
<tr>
<td>Set to 04</td>
<td>4 Winners</td>
<td>50% (1) 25% (2) 15% (3) 10% (4)</td>
</tr>
<tr>
<td>Set to 05</td>
<td>5 Winners</td>
<td>50% (1) 20% (2) 15% (3) 10% (4) 5% (5)</td>
</tr>
</tbody>
</table>

- Select the AWARD TYPE (CASH, POINTS, PRIZE, TICKETS or NONE). Select CASH for the displays to represent the Prize Pool amount (based on Jackpot Base and Max.) in $Dollars. Select POINTS for the display to represent the Prize Pool amount in Points. Select PRIZE, if applicable. Select TICKET for the display to represent the Prize Pool amount in Tickets. Select NONE NOT TO represent anything.

Custom Start continued on the next page.
POWER REQUIREMENTS

This game must be connected to a properly grounded outlet to reduce shock hazard and insure proper game operation. See the Yellow Pages (Schematics & Wiring), for transformer connections required for Normal, High, and Low Line conditions.

<table>
<thead>
<tr>
<th>Normal Line:</th>
<th>110V AC - 125V AC @ 60Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td></td>
</tr>
<tr>
<td>use an 8amp 250v Sloc-Blo Fuse.</td>
<td></td>
</tr>
<tr>
<td>AVG OPERATION</td>
<td>MAX OPERATION</td>
</tr>
<tr>
<td>CURRENT: 2.8AMP</td>
<td>CURRENT: 8AMP</td>
</tr>
<tr>
<td>WATTAGE: 329w</td>
<td>WATTAGE: 940w</td>
</tr>
<tr>
<td>High Line:</td>
<td></td>
</tr>
<tr>
<td>Export</td>
<td></td>
</tr>
<tr>
<td>use 2x 5amp 250v Sloc-Blo Fuses.</td>
<td>(&quot;England &amp; Hong Kong use an 8amp 250v Sloc-Blo Fuse.)</td>
</tr>
<tr>
<td>AVG OPERATION</td>
<td>MAX OPERATION</td>
</tr>
<tr>
<td>CURRENT: 1.8AMP</td>
<td>CURRENT: 5AMP 8AMP*</td>
</tr>
<tr>
<td>WATTAGE: 412w</td>
<td>WATTAGE: 1145w 1832w*</td>
</tr>
<tr>
<td>Low Line:</td>
<td></td>
</tr>
<tr>
<td>Export Japan Only</td>
<td></td>
</tr>
<tr>
<td>use an 8amp 250v Sloc-Blo Fuse.</td>
<td></td>
</tr>
<tr>
<td>AVG OPERATION</td>
<td>MAX OPERATION</td>
</tr>
<tr>
<td>CURRENT: 2.6AMP</td>
<td>CURRENT: 8AMP</td>
</tr>
<tr>
<td>WATTAGE: 264w</td>
<td>WATTAGE: 812w</td>
</tr>
</tbody>
</table>

GAME DIMENSIONS

The overall Front / Back Height dimensions include the added 1" with the Leg Levelers turned all the way in.

PLEASE NOTE:
The TOURNAMENT PLAY Sign or betaBRITE Color Dot Display will add up to 4½" to the overall Back Height for a total of 79½".

Ceiling Height Requirement:
An additional 1½" is required for the rotation (5) of the Backbox to the upright position.
The complete Back Height required with Sign or Dot Display and rotation: 81½".

TOURNAMENT PLAY

Back Height:

27⅝" + 4½"

Back Width:

28"

Front Height:

22"

Leg Length = 30½"

36"

51½"

55"

The Cabinet is designed to give the recommended 6.5" pitch to the Playfield when all four (4) Legs are installed with the Leg Levelers turned all the way in.

With the Leg Levelers turned all the way out (not recommended), an additional 1½" should be added to the respective Back or Front Height dimensions.

BEFORE TRANSPORTING

To reduce the possibility of damage, observe ALL precautions whenever transporting the game.

Read & follow the next page on How to Secure the Backbox for Transporting.
Remove the legs and secure the game within the transporting vehicle.

SAVE AND RETAIN ALL PRINTED INFORMATION INSIDE THE CABINET!

Shipping Box Dimensions

Height 56" Width 31"
Depth 31"
Approx. Unboxed Weight: 260lbs. (+/- 10)
Boxed Weight: 290lbs. (+/- 15)

CAUTION

At least 2 people are required to move and maneuver this game.
Use proper moving equipment & extreme care while handling!