REPLACEMENT BOARDS
for all Gottlieb™ « SYSTEM 1 » Series pinballs
and their derivative kit games:

A. Cleopatra
B. Sinbad
C. Joker Poker
D. Dragon
E. Solar Ride
F. Countdown
G. Close Encounters
H. Charlie’s Angels

I. Pinball Pool
J. Totem
K. Hulk
L. Genie
N. Buck Rogers
P. Torch
R. Roller Disco
S. Asteroid Annie

KITS:
Kit 1. Sky Warrior
Kit 2. Sahara Love
Kit 3. Jungle Queen
Kit 4. Hexagone
Kit 5. Movie
Kit 6. Hell's Queen
Kit 7. Tiger Woman

MENUS AVAILABLE IN:

FRENCH
ENGLISH
GERMAN
SPANISH
ITALIAN
PORTUGUESE(*)

(*) available till 2014
All boards are designed and programmed by Pascal Janin, then assembled, soldered and tested in France by professional companies.

Everything, including the solder stations and test hardware, is new and bought from professional electronics retailers; the programming equipment is purchased from a professional manufacturer in Germany.

All components are bought in France thru professional distributors, with very rare exceptions for very specific components when not available locally.

The PCBs (printed circuit boards) are made in France or Germany with the highest quality.

The manual is printed in France on recycled paper or on paper coming from forests which are responsibly managed.

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Pagesetting done on OpenOffice 4.1.7 (thanks Béatrice!).
The pictures on the page dedicated to “Asteroid Annie” game are from Max and Michael.

MANUAL ORGANIZATION

Most of the instructions given in this manual apply to both the PI-1 and PI-X4 boards, with some exceptions clearly marked with the following symbols:

- This sign shows very important instructions to be closely followed.
- This sign shows a new feature, modification or improvement, over the previous revision.

Pascal JANIN – SAS FLIPPP
THE ULTIMATE BOARDS!!

First of all, dear reader, a big thank-you for your purchase. I really appreciate your business!

Both the PI-1 and the PI-1 X4 boards give your System-1 game a new lease of life that adds value to your game through the many enhancements and the improved reliability they provide.

Here are my two boards described together in the same manual: the “classic” PI-1 and the “combo” PI-1 X4 (stands for ‘4X more features’).

You will find in the following pages all the necessary instructions and respective drawings for you to:

- Install either board in your pinball game, as a replacement for the original one(s)
- Configure it to work in your game
- Understand how to make your way through the various setting menus
- Get a clear idea about all the displayed messages
- … plus a few examples to adjust some of the most common settings

Should you decide to sell your game, remember then that the installation of either a PI-1 or a PI-1 X4 board provides a strong selling point.

➔ Remember though that the terms of the guarantee only apply to the original purchaser of the board. Refer to “Guarantee” chapter at the end of this manual.

Are you happy with my PI-1 or PI-1 X4 board?..

..Spread the word!
(should you be unhappy, email me first! ;-))

Are you selling a game with my board inside?..

..Please do!
And let buyers know that it is installed inside!!

WHAT’S NEW? (since the last revision 1.12)

- New DIPSW+ 63 and 64
- Added « stuck pop bumper » error
- Major updates : pictures, descriptions, status LEDs, loudspeakers connection to the PI-1 X4
- Coils assignments chart for all games
ACKNOWLEDGEMENTS

None of these boards would have seen the light of day without all the people that contributed to their launching, that I want to expressly thank today. A big thank-you to those who put faith in me and gave me their support, not only money-wise, and often with much enthusiasm.

My warmest and VERY SPECIAL thanks to:

✔ my very first subscribers who « initiated » the whole project: Yannick, Bruno, Gilles & Béatrice, Gilles, Lionel, Samuel, Frédéric, Didier, Philippe, James, Thierry, Max, Pierre, Lionel, Cyril, Christian, Pascal, Hervé, Keith (from England) and Anthony (from Australia)!

✔ Thierry and Jean-René, who gave me the initial “boost” to start the whole project and provided help and documents.

✔ Yann who widely contributed to the success of my boards by means of his superb web site http://www.flipjuke.fr

✔ Christophe and Peter, « beta-testers », faithful friends, tireless supporters, and even translators at times.

✔ Rob Craig for having reviewed my boards; his comparative tests are available at http://www.popbumper.com

✔ Jim Frontiero for lending me his awesome LED replacement displays, whose description is available at http://www.bostonpinballcompany.com

✔ Derek Vogelpohl from “The Lab” (http://www.apostrophiclab.com/) for letting me use his great looking DIGITAL READOUT font

✔ Jean-Paul and my former soldering team at Dieppe : Benjamin, Roger, Christelle, Sandrine, Lina, Thomas, Dominique, Tony..

✔ company Segger (Germany) for providing me with the specific programmer

TRANSLATORS-PROOFREADERS

English

Peter, Aunt Izzy

German

Peter, Toni, Michael, Ingo

Spanish

Peter, Eric

French

Everyone!

Italian

Béa, Dad, Laurence

Portuguese (available till year 2014)

Alexandre, Tonio and Marie-Paule

RULES AND TESTS OF ALL GAMES

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<th>Game</th>
<th>Writer</th>
<th>Writer</th>
</tr>
</thead>
<tbody>
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<td>Cleopatra</td>
<td>Max</td>
<td>Genie</td>
</tr>
<tr>
<td>Sinbad</td>
<td>Peter</td>
<td>Stéphane</td>
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<td>Joker Poker</td>
<td>James, Peter</td>
<td>Buck Rogers</td>
</tr>
<tr>
<td>Dragon</td>
<td>Bruno, Mark</td>
<td>Christophe, Christian</td>
</tr>
<tr>
<td>Solar Ride</td>
<td>Yannick, John</td>
<td>Torch</td>
</tr>
<tr>
<td>Countdown</td>
<td>Christophe</td>
<td>Pierre, James</td>
</tr>
<tr>
<td>Close Encounters</td>
<td>Gilles, Michel, Didier, JC..</td>
<td>Roller Disco</td>
</tr>
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<td>Charlie's Angels</td>
<td>Thibaud, Reiner</td>
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<tr>
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<td>Christophe, Michael, Thierry</td>
<td>Sky Warrior (kit)</td>
</tr>
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<td>Totem</td>
<td>Yannick, Michael, JC</td>
<td>Sahara Love (kit)</td>
</tr>
<tr>
<td>Hulk</td>
<td>Peter, Christophe, Pierre</td>
<td>Jungle Queen (kit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hexagone (kit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Movie, Hell's Queen, Tiger Woman (kits)</td>
</tr>
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</table>

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ANNEX: Charts of all games coils, menus and sub-menus

Pascal JANIN – SAS FLIPPP
PI-1 or PI-1 X4 SET UP

IMPORTANT INSTRUCTIONS PRIOR TO INSTALLING EITHER BOARD

Prior to installing either a PI-1 or a PI-X4 board in your game, it is essential to make sure that the game's other existing boards won't damage it.

The following ‘common sense’ checklist should then be carefully followed, and all problems fixed:

1. The pinball must be turned off before any removal of the boards and/or attached connectors. In case of doubt, unplug the mains cord.
2. All pins of the various connectors around the main board A1 (see below) must be clean and corrosion-free (no green dust) due to excess humidity and/or due to the original backup battery, growing old and leaking devastating acid onto neighboring components, tracks and connectors
   - In case of corrosion, replace all the damaged pins and their close neighbors for safety. Otherwise they may generate all kind of failures obviously not covered by the guarantee!
   - The most exposed connectors to check with absolute priority are A1J1, A1J5, A1J6 and A1J7 (as on the drawings below)
3. If installing the PI-1 board, the power supply board A2 and all displays boards are assumed to be in perfect working condition. Make sure they are!
   - The +5V supply voltage coming from the power board A2 must stay within the limit of 5V +/- 5% (from 4.75V min to 5.25V max).
   - If damaged, the other boards could drain high voltages that may damage the new board despite its advanced hardware protections. In case of doubt, swap the suspected boards with some other ones tested as good in another game.
4. The electronic boards must be handled by their edges. Do NOT touch the components, tracks or connectors to avoid any damage due to static electricity.

IN THE EVENT THAT THE BOARD IS DAMAGED FOLLOWING ITS INSTALLATION IN A GAME IN UNKNOWN CONDITION WITHOUT MAKING BASIC CHECKS, THE GUARANTEE MAY BE INVALIDATED.

STEP 1

Open the top head, with the key on the left hand side.

The wooden frame, that holds the backglass, swings to the right, unveiling the displays.
**STEP 2**

Pull the handle and the wooden panel holding displays and lamps will swing to the right:

**STEP 3**

Locate the 3 boards already present in the head:

- The main board (A1), the biggest one
- The power supply board (A2), the smallest on the bottom left corner, affixed to a metal bracket
- The lamps and coils driver board (A3), on the bottom right corner

The **PI-1** board will replace the main board **A1**. The **PI-1 X4** board will replace all 3 boards.

**STEP 4**

On board **A1**, locate the 6 connectors plugged on the sides, each being identified by a small sticker originally placed on the plastic case of the connector:
- A1J1 (center left) connecting to the power supply A2
- A1J2 (top right) and A1J3 (bottom right) connecting to the displays
- A1J5 (bottom center) connecting to the driver board A3
- A1J6 and A1J7 (lower left) connecting to the playfield

Write down the way they are inserted, then remove them following the arrows below: pull on the plastic case of the connector, and not on the wires!

**STEP 5**

The board A1 is fastened to the head by 6 nylon spacers, each equipped with a little « clip » tip. With your fingertips (or flat pliers), gently push onto each « clip » then pull the board towards you. Once the 6 « clips » are released, the board can be easily removed by pulling it by its edges.

Finally, put it aside in an anti-static bag (aluminium foil for example).

→ **SKIP TO STEP 8-X4**
STEP 6

Take the PI-1 board out of its antistatic bag. Hold the PI-1 board carefully and from the sides.

➢ Store this bag in a safe place, in case the board should be returned for maintenance!

The PI-1 board fits exactly in the old board’s space, but on the 3 bottom right spacers.

The 2 topmost spacers and the one on the bottom left corner are no longer used (crossed out on the drawing below).

STEP 7

Plug back all connectors (A1J1 through A1J7) on the new PI-1 board.

Note that the location of 2 connectors has changed:

- A1J7 is now located on the left hand side, just below A1J1
- A1J2 is now located on the top edge

To put them back in place, gently bend the cabling between them to form a right angle allowing the connector to fit to the proper side of the PI-1 board.

This does not change anything regarding the PI-1 board’s operation nor does it damage wires and connectors.

CONTINUE TO STEP 13.
STEP 8-X4

In the same way as for the A1 board at step 5, locate on the A3 board its 5 connectors:

- A3J1 (center top): to the main board A1
- A3J5, A3J4, A3J3 and A3J2 (from left to right) bottom side: to the playfield

Write down the way they are inserted, then remove them following the arrows below: pull on the plastic case of the connector, and not on the wires!

Then remove the board the same way as the A1 board at step 6, held in place by 6 nylon spacers.

STEP 9-X4

Locate on the A2 board the 3 male header connectors:

- A2P1 (bottom side): to the transformers and fuses assembly in the cabinet
- A2P2 (top side): to former A1 board
- A2P3 (right side): to the displays

Write down the way they are inserted, especially the green ground wire (*) on A2P1 and A2P3, then remove them by pulling on the plastic case of the connector, and not on the wires!

Then remove the board by unscrewing the 4 screws that hold it to its metal bracket.
**STEP 10-X4**

Take the **PI-1 X4** board out of its antistatic bag.

Hold the **PI-1 X4** board carefully and from the sides.

> Store this bag in a safe place, in case the board should be returned for maintenance!

The **PI-1 X4** board fits exactly in the old **A3** board’s space, but on its 6 spacers.

In the 7th mounting hole on the center right, first insert the provided adhesive nylon spacer.

Peel the protective film off the sticky side, then insert the **PI-1 X4** board on the 6 spacers:

Firmly press on the 7th spacer to make it stick to the metal backplate of the head.

Then re-insert all the connectors of the former **A1**, **A2** and **A3** boards as follows, clockwise from top left corner:

- **A2P1** with a 90° clockwise turn (refer to the arrow showing the green –or black- ground wire as identified at step 9)
- **A1J7** with a 180° turn
- **A1J2** and **A1J3**, with a 180° turn and aligned
- **A3J2 A3J3 A3J4** and **A3J5**, aligned
- **A1J6**
- and finally **A2P3**, same orientation, on the bottom left corner (as for **A2P1**, refer to the arrow showing the green –or black- ground wire as identified at step 9)

There is no possible risk of mistake or confusion of the connectors: each connector has its own specific size, and some have notches (blockers), making mix-ups impossible.

Connection harnesses **A2P2-A1J1** and **A1J5-A3J3** are now useless, to be put aside.
Double-check the location and position of each connector on the following **PI-1 X4** board overview, once the board is installed in the game's head:

**Overview of the power supply section:**

**LEFT SIDE:**
- connector **A2P1** on top left corner; green -or black- wire at pin 3
- the status LED showing correct **A2P1** connector insertion
- connector **A2P3** on bottom left corner; green -or black- wire at pin 5

**BOTTOM SIDE:**
- the 3 power supply status LEDs:  
  - +60V / +42V / +8V  
  - +12V  
  - +5V
- the CPU activity LED (the rightmost)

The **PI-1 X4** board is now installed!

Remain to be done:
- loudspeaker connection (*refer to Step 11-X4*),
- menus language and game selection upon 1st power-up.
The « Asteroid Annie » game requires a specific set-up: the original boards are mounted on the back of the wooden panel holding displays and lamps, therefore the A2P3 wire harness is too short to plug into the PI-1 X4 board.

**SOLUTION #1**

A small wire harness to « extend » the original A2P3 harness must be built.

On this picture, the extension has been made with wires of different colors; this is to avoid mixing the wires by all means!

Each extension wire is soldered onto the original wire, then the join is isolated with insulating scotch tape (*chatterton*) or heat-shrink tube. The wires are held together by small cable ties (here, in red) to keep it neat.

**SOLUTION #2**

The original wire harness is preserved. The 6 spacers of the original « driver » board must be moved upwards to install the PI-1 X4 board a bit higher, within reach of the original A2P3 harness:

Those spacers must be unscrewed, then the wooden panel must be drilled with a small drill to reinstall the spacers. The correct drilling spots must be found which do not touch the lamps sockets or the connecting wires, to avoid making short-circuits!
**STEP 11-X4 : LOUDSPEAKERS WIRING**

A 3-pin screw-clamp connector allows to connect 1 or 2 loudspeakers to the built-in audio amplifier.

Each loudspeaker is to be connected with the cable provided (to strip if needed) between « + » and « - » (the ground) on the screw-clamp connector, as shown on this picture (example: loudspeaker output #1).

<table>
<thead>
<tr>
<th>Left</th>
<th>Center</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loudspeakers « - » outputs (ground)</td>
<td>Loudspeaker #1 « + » output Min. impedance: 8 ohms</td>
<td>Loudspeaker #2 « + » output Min. impedance: 8 ohms</td>
</tr>
</tbody>
</table>

The two **SOUND1** and/or **SOUND2** LEDs flash when a sound is played.

**STEP 12-X4 : CONFIGURING THE BUILT-IN 3-TONE SOUND BOARD**

The **PI-1 X4** board embeds the 3-tone sound board, used by all games from *Cleopatra* through to *Pinball Pool*. It is located on the right hand side of the coils protection relay status LED:

The 2 jumpers, on the left 4 pins of **J17**, enable (if installed) or disable each of the 2 loudspeakers outputs #1 and #2, depending on the number of loudspeakers connected (*refer to previous Step 11-X4*).

The adjustable potentiometer **R67** adjusts the 3-tone volume on output #1. Use a small flat screwdriver to turn the knob, anticlockwise to increase the volume.

**ADVANCED PI-FX/X4 SOUND DAUGHTERBOARD**

The 2 male header rows, **J16** (EXTFX1) and **J17** (EXTFX2), are designed for the **PI-FX/X4** add-on sound board which reproduces the more complex sounds of the following games: *Totem, Hulk, Genie, Buck Rogers, Torch, Roller Disco and Asteroid Annie.*
STEP 13: UPON FIRST POWER-UP

Upon the very first power-up after the first installation, or upon return from repair:
1. First, the desired language for all messages is asked for
   (refer to menu 5 “LANGUAGE”, except that timeout is 5s and there is no exit entry)
2. Then the entire memory contents are wiped out then reprogrammed
   (same as option 44 « ERASE » of menu 4 “PRESET”)
   ➢ The display frequency, 50Hz by default (DIPSW 26 ON), may need to be changed
3. Finally, the selected game defaults to « GENIE » (letter « L ») and may be changed as follows

GAME POWER-UP SEQUENCE

Upon turning the pinball game on, it will follow this precise startup sequence:

1. Display a welcome message (board name, copyright and year of making)
2. Turn on all power status and MCU status lights (LEDs)
3. Select the desired game
4. Flash both « GAME OVER » and « TILT » relays briefly, along with the playfield general illumination lamps
5. Check certain switches on the front door and the playfield
6. Check playfield coils

Upon completion of this sequence, the game is then fully operational (refer to chapter « Game Play »).
The complete startup sequence chart is also remembered on a later page.

GAME SELECTION

The full name of the selected game and its identifier (a single letter that corresponds to the old “GAME PROM” of the original board) are displayed for 5 seconds, as shown on the example below:

- **PLAYER1 display:**
  « GAME » + letter from « A » (Cleopatra) to « S » (Asteroid Annie) and derivative kit games with a leading « + »

- **PLAYER3/PLAYER4 displays:** game’s name in full

- **PLAYER2 and CREDIT/BALL IN PLAY displays:** remain empty

To change the game, press the white [TEST] button located inside the front coin door within 5 seconds of power-up, whilst the game name is being displayed: the PLAYER1 display then flashes.

Every time [TEST] is pressed, the next game in the list is displayed (as listed on the front page).
To select the displayed game, press the red [CREDIT] button (the one that starts a game) on the front of the coin door. By default the game displayed will be automatically selected 5 seconds after the user last pressed either button.

**DERIVATIVE KIT GAMES?**

Certain games, called « Kits », are also supported. They were not part of the original 16 Gottlieb « System-1 » games series, and were produced by other European manufacturers, but based on the same electronics and on common game rules, whilst proposing a new cabinet, a new front head & glass and sometimes an innovative playfield.

Those 'custom-built' games are assigned to numbers « 1 » and up, with a « + » prefix to distinguish them from the other games of the original Gottlieb series:

<table>
<thead>
<tr>
<th>Selected Kit #</th>
<th>Game</th>
<th>Year</th>
<th>Maker</th>
<th>Country</th>
<th>Derivative Gottlieb Playfield</th>
<th>Derivative Gottlieb Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>+1</td>
<td>Sky Warrior</td>
<td>1983</td>
<td>I.D.I.</td>
<td>Italy</td>
<td>Fast Draw (EM)</td>
<td>Pinball Pool</td>
</tr>
<tr>
<td>+2</td>
<td>Sahara Love</td>
<td>1984</td>
<td>C. Tabart</td>
<td>France</td>
<td>New</td>
<td>Sinbad</td>
</tr>
<tr>
<td>+3</td>
<td>Jungle Queen</td>
<td>1985</td>
<td>J. Martina</td>
<td>France</td>
<td>Jungle Queen (EM)</td>
<td>Pinball Pool</td>
</tr>
<tr>
<td>+4</td>
<td>Hexagone</td>
<td>1986</td>
<td>C. Tabart</td>
<td>France</td>
<td>New</td>
<td>Genie</td>
</tr>
<tr>
<td>+5</td>
<td>Movie</td>
<td>1982</td>
<td>Bell Games</td>
<td>Italy</td>
<td>Pinball Champ (Zaccaria)</td>
<td>Torch</td>
</tr>
<tr>
<td>+6</td>
<td>Hell's Queen</td>
<td>1980</td>
<td>J. Martina</td>
<td>France</td>
<td>Totem</td>
<td>Totem</td>
</tr>
<tr>
<td>+7</td>
<td>Tiger Woman</td>
<td>1979</td>
<td>I.D.I.</td>
<td>Italy</td>
<td>Jungle Queen (EM)</td>
<td>Pinball Pool</td>
</tr>
</tbody>
</table>

Other games will be implemented on demand in the future, should the owner of one of these very rare games ask for support.

**SAFE GAME SELECTION**

Pressing the [TEST] button is the only way to select another game.

It is therefore impossible if the coin door is locked closed (for example on a game installed at a game room location).

**SELECTION UPON POWER-UP ONLY**

Also, this selection may only take place upon power-up, since the board will obviously be removed, all its connectors unplugged and the pinball itself is turned off, to move from one game to another.

➢ None of the settings menus can select another game once the pinball is turned on.
**STATUS LIGHTS**

Several lights (LED), of different colors, give information on the overall status of the board and help diagnose failures. Colors may vary depending on manufacturing and version.

### STATUS LED on PI-1 BOARD

The « +5V » LED remains steadily lit upon power-up.

The « CPU » LED briefly flashes, then remains dimly lit.

The PI-1 boards from the « 10th anniversary edition » version 2.3 are equipped with a 10-LED bar on the bottom right corner which gives additional information:

- « Outhole » switch closed (end of ball in play)
- « SLAM » switch closed (coin door + cabinet)
- SOL1 « Outhole » coil energized
- SOL2 « Knocker » coil energized
- SOL3 « 10 points » coil energized
- SOL4 « 100 points » coil energized
- SOL5 « 1000 points » coil energized
- SOL6 coil (depends on game) energized
- SOL7 coil (depends on game) energized
- SOL8 coil (depends on game) energized

### STATUS LED on PI-1 X4 BOARD

The 3 power supply control lights must be immediately lit upon power-up:

- « +60V/+42V/+8V » (if unlit: failure around U2 chip, or protection fuse blown beside A2P3 due to a faulty display)
- « +12V » (if unlit: wires running to pins 1 2 and 3 of A2J1 connector must be inspected)
- « +5V » (if unlit: failure around U1 chip, or general +12V power supply missing if +12V LED is unlit)

The « CPU » LED briefly flashes, then remains dimly lit.

### COILS TEST

Depending on the game settings, all the coils assigned to the currently selected game are fired once (the name of each tested coil is briefly displayed) at power-up, and checked against possibly stuck switches on the playfield.

- Refer to DIPSW 40, 48 and 49 in menu ‘3’ DIPSW+
The LED on the center right of the board, with the electrical symbol of a coil (spiral), shows that the coil protection relay \textbf{RLY1} is on and that power is fed to the playfield coils. It should be normally unlit, and lit during a game.

The \textbf{PI-1 X4} board makes an electrical test of the current that flows thru the following coils, to make sure that each coil and its associated driving transistor are working well:

<table>
<thead>
<tr>
<th>Coil</th>
<th>Function</th>
<th>Driving transistor</th>
<th>Connector and pin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outhole</strong></td>
<td>End of ball in play</td>
<td>Q2</td>
<td>A3J4 pin 6</td>
</tr>
<tr>
<td><strong>Knocker</strong></td>
<td>“Knocks” when beating a score</td>
<td>Q1</td>
<td>A3J2 pin 1</td>
</tr>
<tr>
<td>SOL 6</td>
<td>Depends on game</td>
<td>Q3</td>
<td>A3J4 pin 5</td>
</tr>
<tr>
<td>SOL 7</td>
<td>Refer to the coils chart at the end of the manual</td>
<td>Q5</td>
<td>A3J4 pin 4</td>
</tr>
<tr>
<td>SOL 8</td>
<td></td>
<td>Q7</td>
<td>A3J4 pin 2</td>
</tr>
</tbody>
</table>

This coil current is displayed on the \textbf{PI-1 X4} board by an additional \textbf{COIL CURRENT} status LED. In case of trouble, the \textbf{PI-1 X4} board displays a specific error message along with the problem source, and if needed, the coil protection relay \textbf{RLY1} and its status LED are turned off to shut all coils down and avoid further damage.

- Refer to ERROR MESSAGES chapter, and also DIPSW+ 55

A special \textbf{TEST} LED is also available to the far right of the \textbf{PI-1 X4} board. Normally unlit, it is only used to test a transistor. With a grip wire, connect the TPT test point (below the LED) to the desired \textbf{Txx} coil test point, located above each of the 12 power transistors above A3J2 A3J4 and A3J5: this will energize the corresponding coil output.

- If the LED is on: the tested transistor is \textbf{most likely} good (base-emitter junction flowing).
- If the LED and/or the coil output remains off: the tested transistor is defective.

**SWITCHES TEST**

In the event that one or more of the following switch failures is detected:

<table>
<thead>
<tr>
<th>Tested Switch</th>
<th>Location</th>
<th>Error Condition</th>
<th>Error Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>[TEST] button</td>
<td>Coin Door</td>
<td>Pressed</td>
<td>TEST STUCK SWITCH</td>
</tr>
<tr>
<td>Left coin slot</td>
<td></td>
<td>Closed</td>
<td>COIN1 STUCK SWITCH</td>
</tr>
<tr>
<td>Right coin slot</td>
<td></td>
<td>Closed</td>
<td>COIN2 STUCK SWITCH</td>
</tr>
<tr>
<td>[CREDIT] button</td>
<td></td>
<td>Pressed</td>
<td>CREDIT STUCK SWITCH</td>
</tr>
<tr>
<td>TILT switches (pendulum + under the playfield)</td>
<td>Cabinet + Playfield</td>
<td>Closed</td>
<td>TILT STUCK SWITCH</td>
</tr>
<tr>
<td>SLAM switches (captive ball + inside coin door)</td>
<td>Cabinet + Coin Door</td>
<td>Open</td>
<td>SLAM STUCK SWITCH</td>
</tr>
<tr>
<td>Outhole switch</td>
<td>Playfield</td>
<td>Open</td>
<td>OUTHOL EMPTY</td>
</tr>
</tbody>
</table>

..then the « TILT » relay quickly flashes twice (and all illumination lamps with it), and a message describing each error condition will be displayed in PLAYER1. Each tested switch is related to a different signal on the connector A1J6, except the \textbf{outhole} switch at pin 1 of A1J7. If several problems are detected, the error messages will be displayed one after the other.

If **ALL** coin door switches are faulty: check the **RETURN0** signal (A1J6 pin 3).
**COMPLETE STARTUP SEQUENCE FLOWCHART**

1. **Game Power-Up**
   - Power LED(s) lit?
     - No → **Power Supply Problem**
     - Yes → **Welcome Message displayed?**
   - Yes → **Microprocessor Problem**
   - No → **Display selected game (letter + name)**

2. **Display selected game (letter + name)**
   - Press «TEST» button?
     - Yes → **Selected game flashes**
     - No → **5 seconds wait**
   - Yes → **Next game in list**
     - Press «CREDIT» button?
       - No → **5 seconds wait**
       - Yes → **Switches test Playfield coils test**
   - No → **end**

3. **Switches test Playfield coils test**
   - **Game Ready!**
OPTIONAL DISABLING OF “SLAM” SWITCHES

The so-called ‘SLAM’ is the feature that immediately puts an end to the game in play when for example the coin door is banged, or when the game was lifted up too high to bring a lost ball back into play:

1. The kick in the coin door is detected by a classical switch, normally closed, with a tiny weight on its tip, located on the inside of the door. Following a too strong kick, the weight opens the switch and triggers the ‘SLAM’.

2. The excess game lift is detected by the ball on its captive rail, located on the left side of the cabinet, near the ‘TILT’ pendulum. If the game is lifted too high, the ball rolls over the end of course switch which opens and also triggers the ‘SLAM’.

It is therefore very important, to allow the game to run, that the two contacts above are duly closed. Very often, the switch blades are dirty or too wide open, making a game start impossible. As a matter of fact, the board detects that failing condition by a specific message upon power-up (refer to chapter SWITCHES TEST).

For normal home usage, the ‘SLAM’ feature can be disabled. A clothes peg is enough to keep the contacts well closed, but it can also be done on the board: simply by inserting a jumper between the 2 rightmost pins of the male header above A1J6:

The pins are well identified on both PI-1 and PI-1 X4 boards.
GAME PLAY

Once the game is selected (or when the initial 5 seconds delay has elapsed) and all automatic tests passed successfully:

- The 4 displays PLAYER1 to PLAYER4 revert to scores display
- The CREDIT display shows the remaining credits number (up to 99 theoretically)
- The BALL IN PLAY display shows «67» as all-good check code
- Every 5 seconds, the highest game to date is displayed over the 4 displays PLAYER1 to PLAYER4 and the lamp «HIGH GAME TO DATE» lights
  - If DIPSW 46 is enabled, the top 5 high scores table is displayed cyclically instead of the unique high score, refer to paragraph ‘ENTER NAME..’ for all details

A new game starts by pressing the CREDIT button if there are enough plays left (as displayed on the credits display) and if no problem with the coils was detected before.

A game in play can be aborted by pressing that same CREDIT button and holding it pressed for 1 second to confirm, otherwise the game resumes.

By default, the game starts in its configuration compatible with the original board, so that the user may play the pinball just like they used to. No liberty was taken over the game rules, so as to strictly ‘stick’ to the original board & game play.

But considering that this new PI-1 board has much more to offer than a mere ‘rebirth’, all the available menus & settings will now be reviewed.

ABOUT THE ALPHANUMERICAL DISPLAY

The PI-1 board displays clear messages with real letters in the selected language over all those available, but there were some constraints related to the displays themselves:

- All figures, some symbols and most of the letters show up very legibly, except letters «K», «V», «X» and «Z» (this last letter is displayed like a «2»):
  
  ![K V X Z]

- Figure «1» and letter «I» are identical
  
  ![1 4 4 2]

- Figure «5» and letter «S» are identical

- The limited message length per display (6 characters for each of the 4 players, 4 for the CREDIT/BALL IN PLAY display) forced me to compress certain messages and take some liberty with the grammar and spelling of the chosen language. Be forgiving!

The special font used in this manual replicates as closely as possible the way the messages are displayed.
ERROR MESSAGES

The main microprocessor of the board can display several error messages in case of trouble. The message is then displayed in PLAYER1 in a cyclic way. Depending on the error, additional information may also be displayed in PLAYER3 and PLAYER4.

With an [L], the game remains [L]ocked for safety reasons: the game currently in play will be aborted and no new game can be started.

The steps to follow depend on the problem:

- [L] ERROR (STP=.. ERR=.. SR1=.. CTL=.. WR=.. RD=..)
  Shows a problem when updating data in the non-volatile backup memory (EEPROM).
  ➢ Switch the game off and on should restore normal operation
  ➢ Otherwise send the board back for testing & fixing, if needed
  ➢ Please write down all the displayed messages and e-mail them back to us for analysis

- [L] NO EEPROM
  The non-volatile backup memory (EEPROM) is missing or not responding.
  ➢ Send the board back for testing & fixing if needed

- STUCK SWITCH + TEST / COIN1 / COIN2 / CREDIT / TILT / SLAM
  This switch was detected in error condition (open or closed, depends) upon game startup.
  ➢ Refer to chapter SWITCHES TEST

- OUTHOLE EMPTY
  No ball is in the outhole (or the associated outhole switch is broken).
  ➢ Displayed only if DIPSW+ 30 is enabled

- STUCK POP BUMPER + “Pb” in small display
  One of the game's pop bumpers is stuck in lower position: if permanently driven
due to stuck cup switch, its coil may overheat and eventually catch fire.
  ➢ Displayed only if DIPSW+ 64 is enabled

- [L] TEST + coil name + STUCK SWITCH
  After firing a coil, one of its associated switches remains stuck permanently (for example a
drop target that never stands back up).
  ➢ Error only displayed if DIPSW+ 48 is enabled

PI-1 X4 SPECIFIC MESSAGES

- [L] TEST + coil name + LOCKED ON or STILL DRIVEN
  Coil permanently powered (for example due to the shorted driving transistor).
  ➢ In that case, the protection relay immediately turns the coil off.
  ➢ Error only displayed if DIPSW+ 55 is enabled

  TEST + coil name + CANNOT DRIVE
  Impossible to fire a coil (for example fuse or driving transistor dead open).
  ➢ Error only displayed if DIPSW+ 55 is enabled
SETTINGS

The user is granted free and unrestricted access to the complete settings of the PI-1 board’s operation, and the whole pinball game, in order to:

- Fine-tune the PI-1 board to the user’s preferences and choose the options for the game play, the display, the storage, test modes etc. that suit her/him the best
- Collect all data regarding the number of played games, the highest scores, the number of coins through each coin chute etc.
- Test precisely the switches, coils, lamps and displays for maintenance purposes
- Choose the language to display all the messages

All those parameters are saved **even when the pinball is switched off** thanks to a dedicated back-up memory that will retain all the data for at least 40 years, without the need for a battery, and with none of the original board’s drawbacks due to the leaky & highly destructive NiCd battery.

NAVIGATING THROUGH THE MENUS

To move from one menu to another, change a value, select the displayed item, or any other action, only 2 keys are required:

- The [TEST] button:
  - Enters the main menu
  - Moves to the next selection
  - Cancels an action

- The [CREDIT] button:
  - Enables/Uses the currently displayed selection
  - Changes the current value
  - Runs the displayed action

Depending on the context, each of those 2 keys may be assigned to a different action described case by case below.

USING AN INFRARED REMOTE CONTROL

The navigation can also be done thanks to an infrared remote control, provided that the infrared sensor is installed. This also adds new navigation features, such as a direct access to any menu, sub-menu or parameter (**refer to the infrared add-on manual available separately**).

- The PI-1 board requires a microprocessor bearing the following logo:
- All versions of the **PI-1 X4** board manage the remote control.
DISPLAY IN THE MENUS

The general rule is as follows:

- **PLAYER1** display shows the most important information regarding the current selection: parameter or sub-menu, selected item action etc., so that the displays always mean something even on the game « Asteroid Annie » that has only a single display.
  - The first time the data is displayed, it \textcolor{red}{flashes} to show that it has not been modified yet.

- **PLAYER2** display shows additional information (details of a setting for example) that is useful but not absolutely necessary to a proper understanding of the selection.

- **PLAYER3** and **PLAYER4** displays combined together show longer messages (up to 12 characters) on the current selection, often the full name of the selection. Like **PLAYER2**, they are useful but not absolutely necessary.

- **CREDIT** display shows the step number of the current menu or sub-menu
  \( A «--» \) means that the selection quits the current sub-menu

- **BALL IN PLAY** display, for the same reason as **PLAYER1**, shows important information (usually a value) that cannot be displayed anywhere else.

The example across shows the sub-menu for language selection:

- Menu « LANGUAGE »
- Sélection « ENGLISH »
- Step N. 51
MAIN MENU

The user enters the main menu by pressing [TEST] button at any time, while a game is in progress or in idle mode.

If a game is in progress, it automatically comes to an end for all players.

Several menus become available:

AUDITS: all the cumulated data regarding the number of games played or won, the number of coins inserted in each coin chute, the scores to beat etc. This menu is almost identical to the original one, with some exceptions.

TESTS: test modes to troubleshoot the displays, coils, lamps and playfield switches

DIP SW: standards settings corresponding to the 24 ‘dip switches’ found on the original MPU board A1

DIPSW+: extended settings that allow full control over the board’s many new features

PRESET: preset or erase a whole range of settings at a time, in the following menus: AUDITS, DIP SW and DIPSW+

LANGUAGE: choose in which language all the messages should be displayed

END: exit from main menu and return to idle mode.
Any game in progress is lost.
For each of the menus listed previously:

- The shortcut name is displayed in PLAYER1 and flashes
- The name in full is displayed in PLAYER3 and PLAYER4
- The step number in the list followed by « - » is displayed in CREDIT (for example « 4- » for the menu PRESET) and flashes

### IMMEDIATE EXIT FROM A MENU OR SUB-MENU

Unless specified otherwise, any menu or sub-menu may be quit at once and the user is brought back to the main menu, like on the original board, in case of:

- TILT closure
- SLAM opening
- 60 seconds have elapsed after the user’s last action

This prevents the game from remaining locked up in that status.

Also, a « -- » being displayed in CREDIT means that the next time [CREDIT] button is pressed, it will quit the current menu or sub-menu.

### IN CASE OF DEFECTIVE “SLAM” SWITCHES

Until now, entering the main menu was impossible in the case of an open slam switch, and the game immediately exited the menus without any warning message.

Now, upon entering the main menu, the SLAM message flashes in all displays for 2 seconds (to warn the user that the SLAM switches are defective). But the detection of the opened SLAM switches is disabled until the main menu is exited, allowing the user to navigate through all the menus.

In the SWITCHES sub-menu of TEST menu, opened SLAM switches are still detected and will display « SL » or « SLm » as usual (refer to menu 1).

The complete list of all menus, sub-menus, displayed messages and corresponding actions is available in the charts at the end of the manual.

Only the major differences from the original board, or certain steps requiring specific explanations, will be recapitulated in details hereafter.
MENU ‘0’: AUDITS

This menu (also called ‘bookkeeping’) manages & computes the statistical data as well as the values of the 3 replays and the highest game to date:

- 0: strictly identical to the original board
- 1: number of times the highest score has been beaten
- 2: won replays percentage = (number of won replays) / (number of played games) x 100
- 3: average game time per player in minutes and seconds (up to 99 min 59 sec)
  - the game time is counted after the first points are scored, not after the ball release
- 4: software release, identified by:
  - month (3 letters) and day in PLAYER1
  - year in PLAYER2
  - the year’s last 2 digits in BALL IN PLAY

« -- »: exit from menu

The difference from the original board A1 is that there is no more [RESET] button. The same action is performed by the [CREDIT] button.

For all steps requiring a value (steps 7, 8, 9 and 10), pressing [CREDIT] once resets the value; each following press increments the value by 10’000 points. Holding the button speeds up the incrementing (10’000 points every ¼ second).

- Resetting the high game to date value (step 10) also resets the other 4 high scores and empties the names in the top 5 hiscores table, should this feature be enabled
  - See DIPSW 46
- The 3 replays (steps 7, 8 and 9) may be set to any value, not necessarily in an increasing order
- Also, to disable a replay, it must be set to 0.

For all steps allowing only a reset (steps 0 to 6, 11 and 13), since the count-in is performed automatically during the games, there is only need to press [CREDIT] once.

- Resetting the number of played games (step 2) also resets the average game time per player (step 13).

**NOTE**

The step #15, which used to give the list of all available games implemented in the current board’s release, has been removed, since all games of the series are now supported.
MENU ‘1’: TEST MODES

This menu groups all the tests needed to track down the failures of all the devices driven or read by the main board: displays, coils, lamps and switches.

(Display: tests all players’ displays
- Numbers 000000 to 999999 are displayed cyclically over the 4 displays
- Pressing [CREDIT] switches to single digit mode. Each figure is only displayed over one digit at a time, and scrolling from leftmost digit (PLAYER1 and PLAYER3) toward rightmost digit (PLAYER2 and PLAYER4); simultaneously, the digit number (corresponding to signal Dx of A1J3) is displayed in BALL IN PLAY; this allows individual digit testing
- A second action on [CREDIT] brings back to the initial mode
- Pressing [TEST] quits.

(coils: tests all coils, including those specific to certain games
- Pressing [TEST] proceeds to the next coil; they scroll in the following order:
  - GAME OVER relay
  - TILT relay
  - Coil #1 OUTHOLE (launcher)
  - Coil #2 KNOCKER (replay)
  - Coil #3 10 POINTS (chimes or tones, depending on the game)
  - Coil #4 100 POINTS (chimes or tones, depending on the game)
  - Coil #5 1'000 POINTS (chimes or tones depending on the game)
  - Coils specific to the game if used: #6, #7, #8 or others driven by lamps outputs (as on Dragon, Countdown, Buck Rogers etc.)
  - « -END- » to quit
- The coil number (or its full name) is displayed on PLAYER1
- The number (preceded by « n » for ‘number’) is also displayed in BALL IN PLAY
  - There is no « n » for lamps-driven coils
- Pressing [CREDIT] fires the selected coil, or quits if « -END- »

(lamps: tests all the playfield lamps driven by the game
- The lamps lit successively in an increasing numerical order
- The currently lit lamp number is displayed in BALL IN PLAY
- A 1st action on [CREDIT] switches to single lamp mode: the scrolling stops and the current lamp flashes rapidly
- All further actions on [CREDIT] move to the next lamp, still in the increasing order; this allows individual testing of all lamps
- Pressing [TEST] quits.
13. **SWITCH**: tests all playfield switches and also those on the coin door (TILT, SLAM, CREDIT, coin chutes, OUTHOLE)

- Each display from PLAYER1 to PLAYER4 is split into 2 zones of 3 characters
- The current zone flashes « --- » until switch closure detection (or opening for SLAM)
- The detected switch number is then displayed instead of « --- »
- If OUTHOLE is closed, « OH » is displayed
- If SLAM is open, « SL » is displayed
- If the switch is held for more than ¼ of second, a trailing « M » is appended to its number
- Once the switch number is displayed, the next zone flashes « --- »
- When held down, [CREDIT] fires briefly all coils assigned to the selected game; this allows to test entire drop targets banks for example, by taking them up all at a time, Vari-targets, holes etc..
- Pressing [TEST] displays its own number « 0 » during 1 second (to check that it works fine) then quits.

14. **DRIVER**: tests successively all coils and lamps outputs thanks to a dedicated test board plugged into connectors A3J2 A3J3 A3J4 A3J5 on the original 'driver' board (driven in this case by the PI-1 board) or on the PI-1 X4 board:

![Image of the test board]

The mounted board is on sale on my web site [www.flippp.com](http://www.flippp.com). Detailed schematics of this test board are freely available here (in french): [http://www.flipjuke.fr/banc-test-driver-gottlieb-system-retour-t99348.html](http://www.flipjuke.fr/banc-test-driver-gottlieb-system-retour-t99348.html)

The test runs in a loop fashion and stops by itself after 60 seconds, then returns to the previous menu.

If this test is started with connectors A3J2 A3J3 A3J4 A3J5 still plugged into the pinball game, the driving of some outputs may damage the game.

**Start this test when connected to the above test board ONLY!!**
MENU ‘2’: ORIGINAL DIP SWITCHES

This menu allows to set all the configuration switches of the original MPU board A1, commonly referred to as ‘dip switches’:

- The current DIPSW number (from 1 to 23) is displayed in CREDIT
  - Selecting « -- » quits the menu
- [TEST] button moves from one switch to another
- The current DIPSW value (ON – closed- or OFF – open-) is displayed in PLAYER2 and in BALL IN PLAY
  - Except for DIPSW 1 to 8, 17 and 18 (read on)
- The DIPSW value toggles by pressing [CREDIT]
- The full name of the controlled DIPSW feature is displayed in PLAYER3 and PLAYER4
- The action corresponding to the current DIPSW value is displayed in PLAYER1

There are 24 different DIPSW but #15, 16 and 24 are not used (as on the original board) and are automatically skipped. Each DIPSW action is identical to the one on the original board, as described in details in the corresponding original game manual and also in the charts at the end of this manual. A few remarks about some settings:

1. The left (DIPSW 1 to 4) and right (DIPSW 5 to 8) coin chutes are configured as per the game’s original manual; the chosen setting number (from CONF 1 to CONF 16) is displayed in PLAYER2 and BALL IN PLAY; the complete setting « - COIN » is displayed in PLAYER3 and « - PLAY » in PLAYER4; this allows to configure the coin chutes in an easier way than if the 4 DIPSW were to be set separately:
   - #1: 1 coin 1 play
   - #2: 1 coin 2 plays
   - #3: 1 coin 3 plays
   - #4: 1 coin 4 plays
   - #5: 1 coin 5 plays
   - #6: 1 coin 6 plays
   - #7: 1 coin 7 plays
   - #8: 1 coin 8 plays
   - #9: 1 coin 9 plays
   - #10: 2 coins 1 play
   - #11: 2 coins 2 plays
   - #12: 2 coins 3 plays
   - #13: 2 coins 4 plays
   - #14: 2 coins 5 plays
   - For #10 to #14, no play is earned until the 2nd coin is inserted
   - #15: 2 coins 3 plays; 1 play is added after the 1st coin, the other 2 after the 2nd coin unless some points have been scored in the mean time (the 2nd coin becomes the 1st)
   - #16: 3 coins 1 play; no play is earned until the 3rd coin is inserted

11. In Extraball mode, beating any of the 3 replay scores (steps 7, 8 and 9 of menu 0), scoring 1,000,000 points (if DIPSW 34 is ON) or scoring playfield Special fires the knocker but an Extraball is awarded instead of a replay; match feature or beating any high score give no award
  - This setting has therefore priority over DIPSW 22, 47 and 52

17. The maximum number of credits (DIPSW 17 and 18) is set by global number; this allows to configure it in an easier way than if the 2 DIPSW were to be set separately:
   - 8, 15, or 25: maximum number of credits; the « KNOCKER » keeps ‘knocking’ at every earned credit but the credits counter stops increasing when reaching this number
   - 99: free play mode; the credits counter value is fixed to 99 even if new credits are awarded (beaten scores to beat, match, Special..).
MENU ‘3’: DIP SWITCHES « PLUS » (EXTENDED)

This 2\textsuperscript{nd} configuration menu allows the user to navigate through all the new settings of the PI-1 board and select those desired. It works exactly like the previous menu:

- The current DIPSW number (starting at $25$) is displayed in CREDIT
  - Selecting « -- » quits the menu
- [TEST] button moves from one switch to another
- The current DIPSW value (\texttt{ON} – closed- or \texttt{OFF} – open-) is displayed in PLAYER2 and in BALL IN PLAY
- The DIPSW value toggles by pressing [CREDIT]
- The full name of the controlled DIPSW feature is displayed in PLAYER3 and PLAYER4
- The action corresponding to the current DIPSW value is displayed in PLAYER1

Each new feature is associated to a new, dedicated DIPSW, so that the user may control it at will. They are now described in details:

- $25$ animates the playfield lamps between 2 games (in idle mode).
- $26$ sets the display frequency as a multiple of 50Hz (Europe) or 60Hz (North America) to minimize the flickering effects under artificial light.
- $27$ adds segment « a » to figure 6 and segment « d » to figure 9. This gives a ‘round’ display for those 2 figures.
- $28$ re-reads the last scores (before last power-off) that have been stored in memory. If not enabled, displays 000000 for all scores.
- $29$ certain playfield lamps associated to switches (bulls-eye, rollover…) are unlit after a brief fast flashing effect instead of simply being turned off ; not all lamps allow it (for example if the same switch extinguishes 2 separate lamps).
- $30$ waits for the ball to be effectively in the OUTHOLE to eject it and start the game. Without the ball, a message OUTHOLE EMPTY is displayed in PLAYER1. This may be useful to detect a ball locked up on the playfield.
- $31$ enables the skill shot ; a precise goal must be scored upon ball launch, which earns an extra bonus. The implementation of this feature closely depends on the game (if possible).
  - see also the ‘SKILL SHOT’ chapter for more details.
- $32$ enables cumulating several Extraball during the same ball in play. All Extraball lamps may be re-lit several times in a row with the same ball ; if more than 1 Extraball is earned, the ‘Shoot again’ lamps on the playfield and behind the backglass flash to show that the player has won several Extraballs; the implementation of this feature closely depends on the game.
  - see also the ‘MULTIPLE EXTRABALL’ chapter for more details.
- $33$ Once 900,000 points are scored, all additional earned scores on the playfield are divided by 10 (except 10 points switches that remain the same) to make the 1’000’000 points more difficult to reach.
- $34$ gives a free play if the player scores 1,000,000 points.
  - This gives an Extraball instead, if previous DIPSW 11 is OFF (Extraball mode).
- $35$ enables a change in the game rules of certain games:
  - Genie and Dragon: the spin target scrolls ABCD top and bottom rollovers lamps
  - Totem and Pinball Pool: the star rollovers scroll top and bottom rollovers lamps, and also the drop targets (Totem)
36 gives a 2nd chance to the player if the ball falls into the OUTHOLE less than 5 seconds after launch. The ball is then ejected a 2nd time, even if some points have been earned

- the chance ball works only once per ball in play
- it is cancelled if tilted
- the 5 seconds countdown starts after the first scored points (and not after the ball is ejected)
- the ‘Shoot again’ lamps on the playfield and behind the backglass flash very quickly until the chance delay has expired; upon expiry, they show again the number of Extraballs earned (refer to DIPSW32)

37 ‘tilts’ the ball in play only after 2 TILT hits (instead of 1 usually). After the 1st TILT hit, a flashing message « DANGER » is displayed on all displays.

38 patches some inherent bugs in the original game rules; those little problems are not critical, patched or not.

➢ see also the ‘BUGS PATCH’ chapter for more details.

39 animates the game play upon certain events with all playfield lamps flashed briefly when:

- the ball is ejected. Also, the high game to date is displayed in all displays;
- the ball falls into the OUTHOLE without scoring any point. The message « NOSCOR » is also displayed in all displays;
- a chance ball is awarded. The message « CHANCE » is also displayed in all displays, also refer to previous DIPSW 36;
- the ‘high game to date’ lamp behind the backglass flashes instead of being steady lit.

40 fires all playfield coils (that take up drop targets, Vari-targets, eject balls from holes etc..):

- upon pinball power-up
- at end of game

41 the ‘SPECIAL’ playfield lamp(s) flash instead of being steadily lit.

42 the ‘EXTRABALL’ playfield lamp(s) flash instead of being steadily lit.

43 the maximum bonus to earn per ball in play goes up to 39 (10,000 and 20,000 bonus lamps are lit together) instead of 20 or 29, and only on the following games that allow it:

- Solar Ride
- Countdown
- Close Encounters
- Totem
- Hulk
- Genie
- Buck Rogers
- Torch
- Roller Disco

44 changes the way the bonus is displayed: lamps <<1’000>> to <<9’000>> lit with a ramped effect instead of via just a single spot lamp.

45 the ‘SCORE BONUS’ playfield lamp flashes when lit and during bonus countdown, instead of being steadily lit; this lamp is only found on certain games (Hulk, Genie etc..)

46 the unique high score is replaced by a top 5 scores table with players’ initials/names:

- the highest of all 5 scores still earns 3 credits (according to DIPSW 22)
- the 2nd to 5th top scores earn 1 credit (according to DIPSW 47)
  ➢ no credit is awarded in any case, if the previous DIPSW 11 is OFF (Extraball mode)
- when game ends, if the score qualifies, the player’s name is to be input (4 characters).
  ➢ see also the ‘ENTER PLAYER NAME..’ chapter for more details.

47 gives 1 credit for 2nd to 5th top high scores in the table (if enabled by DIPSW 46).

➢ This setting is skipped if previous DIPSW 46 is disabled (OFF)
48 forces a thorough check of all playfield switches associated to a given coil when this coil is fired:
- all the drop targets of a bank;
- all course switches of a Vari-target;
- the switch of a hole;
- the OUTHOLE switch, etc..
- in case of trouble (if at least one of the switches is found closed despite the firing of the coil), the coil is fired again up to 5 consecutive times:
  - at the 5th failing attempt, an error message giving the faulty coil’s number is displayed in PLAYER1 (and the coil number in BALL IN PLAY as for the COILS test mode);
  - in case of trouble, the current game in progress is immediately ended, and no new game may be started; entering main menu is allowed only for diagnostics and repair; at the next power-up, a new check will be performed, and may re-enable game play if no new failure is detected.

49 enables the “eco” coil mode in addition to the thorough check above: the coils are then triggered only if at least 1 of their associated switches is detected closed beforehand; for example, this will trigger a coil that resets a drop targets bank only if at least 1 of the drop targets has been hit by the previous ball in play;
the coils being no longer triggered systematically between consecutive balls, this prevents the player from having earache (less mechanical noise) and especially spares the fuses and the transistors that drive the coils (electronics will last longer).
- This setting is skipped if previous DIPSW 48 is disabled (OFF).
- A varitarget coil is always fired once, to prevent lockup between 2 positions.

50 increases the skill shot award value by 5,000 or 10,000 points each time the selected target (rollover, bulls-eye etc.) has been hit; this bonus increases up to max. 90,000 points.
- This setting is skipped if previous DIPSW 31 is disabled (OFF).

51 flashes very briefly the lamp associated to certain targets or rollovers, when the ball hits them or passes through them; it emphasizes the ball path instead of letting those lamps remain lit or unlit permanently.
- This setting gives similar results to DIPSW 29 but the result is different and the lamp flashes for a shorter time.

52 the Special target scores 50,000 points instead of a replay (but the knocker still works); outside an arcade game room or in free plays mode, earning a replay is far less important than outrunning the other players!
- This setting is skipped if previous DIPSW 11 is OFF (Extraball mode).

53 all playfield lamps flash once or 3 times when the skill shot is scored; the “short” setting (flash once) is fitted for games with one or several pop bumpers just below the rollover to score, otherwise the pop bumper hit by the ball may not always fire.
- This setting is skipped if previous DIPSW 31 is disabled (OFF).

54 during bonus countdown (target, hole or at the end of ball in play), each earned bonus is added to the current player’s score as one lumpsum of «n » * 1,000 points, instead of 1,000 points «n » times, where «n » is the multiplier’s value (2X to 5X); this speeds up the bonus countdown drastically, especially for high multiplier values and with games using the 3-tone sound board (games up to Pinball Pool);
For example, if the bonus is 15,000 points and the multiplier set to 5X, the bonus will be added as **15x 5,000 points** instead of 75x 1,000 points.

55 coils #6, 7, 8, ‘OUTHOLE’ and ‘KNOCKER’ are under permanent supervision each time they must be fired (upon game powerup, and during a game in play) without perturbing the game in play.

A current measurement is systematically made to know if there is a problem:
1. no current : the driving transistor or the fuse is dead open
2. permanent current : the driving transistor is dead shorted

An error message is then displayed and, in the 2nd case, the protection relay shuts down all coils to avoid that the transistor overheats and makes the board ‘smoke’ (it was one of the most common failures of the original Gottlieb ‘driver’ board); the associated orange LED is also unlit.

The coils’ driving transistors are fully protected that way.

If this DIPSW is disabled, the relay is always on, no current measurement is done on any coil.

**NOTE**: Neither the *vari-target* coils, nor the coils driven by a transistor under the playfield (on Close Encounters, Hulk, Torch, Roller Disco, Asteroid Annie), are tested.

56 switches to « power saving » mode (>30%) and turns off all playfield lamps around 30 seconds after the game is over, by activating the TILT relay; the playfield is turned back on immediately when a coin is inserted, a game is started or upon entering the test mode.

- On Totem and later games, energizing the TILT relay also plays the TILT tune.

57 manages scores above 999,990 points; such scores are displayed alternately with the number of millions (for example “2-MILL” and “311450” if score is 2,311,450 points)
  - Current scores and high scores are managed up to 9,999,990 points
  - A free play can still be earned every million points scored if DIPSW34 is enabled
  - Scores to beat can be set up to 2,500,000 points
  - When set to “enable”, the current scores, high scores and scores to beat are all remembered, but are all reset if set back to “disable”

58 sets the font used for the players displays:
  - either the normal font, that uses the 8 segments « a » to « h »
  - or the specific font, that uses the 7 segments « a » to « g » only, to drive some replacement LED displays that lack the 8th segment « h »

59 selects the way the bonus lamp is lit (in « ramp » mode: the lamp with the highest bonus value): either steadily lit or flashing

60 awards 10,000 points instead of an « extraball »
  - in this mode, the « shoot again » lamp is never lit

61 disables the « KNOCKER » coil which is usually energized when a free play is earned: by beating a given score or one of the highest scores, by scoring *special*, match etc..
in this mode, the « KNOCKER » coil can even be removed (not wired) from the game, the PI-1 X4 board will not report any error

62 issues a longer driving pulse to the 3 sound outputs (10, 100 and 1000 points), if a chimes unit is installed in the game instead of a sound board; this allows the chimes to « ring » loud and clear during scoring, especially during bonus countdown

62 if this mode is enabled while a sound board is installed instead of a chimes unit, scoring will be done at a slower pace

63 SINGLE PLAYER mode, only one player can play at a time, pressing CREDIT will not add more players

64 checks the game's pop bumpers during the game in play; if one of them remains stuck in lower position (coil is energized), an error message will be displayed and the game in play is ended.

« -- »: quits
ENTER PLAYER NAME IN HIGH SCORES TABLE

The sequence described below may seem a bit complex but it is just a matter of getting used to it. There was not much choice, actually; since the user only has access to the CREDIT button, to pick up the letter, move to the next one and validate the name, a good compromise had to be made.

If DIPSW 46 is enabled, and if at the end of the game the score earned in turn by each player is high enough to rank among the top 5, the player’s name is asked for (4 characters) in PLAYER4, even in Extraball mode (DIPSW11 is OFF).

The name previously entered at this position is recalled first:

- the currently edited letter flashes
- if the [CREDIT] button is held pressed more than ½ second, it scrolls to the next letter in the following list:
  A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
  then « » (space)
  then « [ » (left bracket) = backspace
  then back to A
- if the [CREDIT] button is released, the scrolling stops onto the currently displayed letter which flashes again
- if the [CREDIT] button is pressed briefly, the current letter is stored and the cursor moves to the next character which displays a flashing « A », and so forth for all 4 positions
- if the [CREDIT] is released on « [ » sign during scrolling, this erases the current letter and brings back to the previous one (unless the display is already set on the 1st letter)
- after the 4th position, the final name (e.g. « GENI ») is stored in the table
- if no action from the player for 5 seconds, the displayed name is automatically stored

The top 5 high scores are displayed cyclically when the game is over:
- the ranking (1st to 5th) is displayed in PLAYER2 and MATCH
- the player’s score is displayed in PLAYER3
- the player’s name is displayed in PLAYER4

GAME ASTEROID ANNIE

Being a single player game, all data related to the high scores described above are displayed in a sequence in the unique display PLAYER1, while the ranking (1st to 5th) is displayed in MATCH.
MENU ‘4’: DATA PRESETS

The configuration of all the previous settings (menus AUDITS, DIP SW and DIPSW+) requires quite some patience if they are to be changed one by one.

Considering that an unfortunate action on [CREDIT] button may overwrite in part or totally a game’s data, confirmation is systematically asked for in all the submenus below:

- The flashing message **SURE** is displayed in PLAYER1
- To confirm the action, press [CREDIT]
  - The flashing message **WRITING** is displayed for a few seconds
  - Do not turn the game off while writing is in progress!!
  - The confirmation message « **DONE** » is displayed once completed
- To cancel, press [TEST]

Some groups of settings may then be loaded with preset data:

- **ORIGIN**: sets all DIPSW in original mode to make the game totally compatible with the original board:
  - Left coin chute is set for 1 coin 1 play
  - Right coin chute is set for 1 coin 7 plays
  - 3 balls per game (DIPSW 9 ON)
  - Match is enabled (DIPSW 10 ON)
  - Normal game mode: Special awards a credit (DIPSW 11 ON)
  - TILT disqualifies the ball in play only (DIPSW 12 ON)
  - The number of remaining credits is displayed (DIPSW 13 ON)
  - [CREDIT] button plays the corresponding tune (DIPSW 14 ON)
  - Maximum number of credits is 15 (DIPSW 17 OFF, DIPSW 18 ON)
  - Coin chutes have separate settings (DIPSW 19 OFF)
  - Tones are played during game (DIPSW 20 ON)
  - The high game to date is displayed (DIPSW 21 ON)
  - Beating the high game to date awards 3 credits (DIPSW 22 ON)
  - Insert a coin plays the corresponding tune (DIPSW 23 ON)
  - **All ‘extras’ DIPSW of menu DIPSW+ are disabled (OFF)** except DIPSW 26, 50, 58 and 61 (and 55 for the PI-1 X4)

- **WIZARD**: same as above (except DIPSW 17, see below) but also enables nearly all the ‘extras’ DIPSW of menu DIPSW+ ; refer to the table on the next page and annexes
  - The maximum number of credits is **99** (unlimited credits, DIPSW 17 & 18 ON).
  - This means enabling nearly all the board’s new features at the same time!

The following chart shows both configuration settings in details.
### DIP SW Presets ORIGIN Presets WIZARD

<table>
<thead>
<tr>
<th>DIP SW</th>
<th>Presets ORIGIN</th>
<th>Presets WIZARD</th>
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</thead>
<tbody>
<tr>
<td>1..4</td>
<td>Conf. 1 : 1 coin, 1 play</td>
<td></td>
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<tr>
<td>5..8</td>
<td>Conf. 7 : 1 coin, 7 plays</td>
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<td>9</td>
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<td>17,18</td>
<td>Up to 15</td>
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<td>19</td>
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### DIP SW Presets ORIGIN Presets WIZARD

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<tr>
<th>DIP SW</th>
<th>Presets ORIGIN</th>
<th>Presets WIZARD</th>
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</table>

**42 AUDITS:** zeroes the value of all steps 0 to 11 and 13 of menu AUDITS, as well as the 5 top hi scores table (both names and scores).

**43 SCORES:** writes into steps 7, 8, 9 and 10 of menu AUDITS and the 5 top hi scores table some predefined values (see complete summary tables at the end of the manual).

**44 ERASE:** the entire settings (menus AUDITS, DIP SW and DIPSW+) can be reset (and not only some groups of settings).

Erasing the data means making the following actions:
- Submenu 42 « ORIGIN » of current menu PRESET
- Submenu 42 « AUDITS» of current menu PRESET
- Submenu 43 « SCORES » of current menu PRESET
  - EXCEPTION: the top 5 hi-scores table is **erased**: all hi-scores are set to 0, and names are emptied (and not programmed to default values)

Note: the number of remaining credits, the messages language and the current game name are **preserved** during erasure.

« -- » to quit
MENU ‘5’: LANGUAGE

All messages in all menus, including those displayed during game play, may be set to one of the available languages:

- 50 FRANÇAIS
- 51 ENGLISH
- 52 DEUTSCH
- 53 ESPAÑOL
- 54 ITALIANO
- 55 PORTUGUES (available till 2014)

« -- »: to quit

Upon entering this menu, the submenu corresponding to the current language is displayed first and flashes in PLAYER1.

The next available language among the above list is displayed by pressing [TEST] button.
If the current language setting is ever selected again, it flashes in PLAYER1.

The selected language is enabled immediately by pressing [CREDIT] button, then the menu is quit.

MENU ‘-‘: EXIT FROM MAIN MENU

Pressing [CREDIT] button quits immediately the main menu and returns to what was in progress before entering the main menu.

- If a game was in progress, it ends immediately; neither the high scores nor match will be checked

NOTE

All settings modifications that have been made, whatever they may be, are immediately taken into account upon leaving the main menu.

There is no need to turn the pinball off and on to enable the new settings!
HOW TO…?

Some detailed examples of navigating through the menus are listed hereafter:

**Set the game to FREE PLAY mode**

This setting belongs to menu ‘2’ **DIPSW**.

11. Press [TEST]: entering main menu
12. Press [TEST] 2 more times: menu **DIPSW** is displayed (number « 2 » in CREDIT)
13. Press [CREDIT]: entering menu **DIPSW**
14. Press [TEST] several times to scroll through all available settings till **DIPSW 17** (number « 17 » in CREDIT)
15. Press [CREDIT] to scroll through the available values till « **FREE PLAYS** » is displayed across PLAYER1 and PLAYER2 displays.
16. Press [TEST] until menu **EXIT DIPSW** is displayed (« -- » in CREDIT)
17. Press [CREDIT] to quit and return to main menu
18. Press [TEST] until menu **EXIT MENUS** is displayed (« -- » in CREDIT)
19. Press [CREDIT]: exits main menu, resumes normal game operation (if a game was in progress, it ends immediately)

**Enable all the board’s new features at the same time**

They are grouped under menu ‘3’ **DIPSW+** but it is under the menu ‘4’ **PRESET** that they may all be enabled together.

1. Press [TEST]: entering main menu
2. Press [TEST] 4 more times: menu **PRESET** is displayed (number « 4 » in CREDIT)
3. Press [CREDIT]: entering menu **PRESET**
4. Press [TEST]: submenu « **WIZARD** » is displayed (number « 41 » in CREDIT)
5. Press [CREDIT] to run the programming: flashing message « **SURE** » is displayed
6. Press [CREDIT] a 2nd time to confirm: messages « **WRITING** » then « **DONE** » are displayed and the user is brought back to the main menu
7. Press [TEST] until menu **EXIT MENUS** is displayed (« -- » in CREDIT)
8. Press [CREDIT]: exits main menu, resumes normal game operation (if a game was in progress, it ends immediately)

**Change the language of all displayed messages**

All the available languages are grouped under menu ‘5’ **LANGUAGE**.

1. Press [TEST]: entering main menu
2. Press [TEST] until menu **LANGUAGE** is displayed (number « 5 » in CREDIT)
3. Press [CREDIT]: entering menu LANGUAGE, the currently used language is displayed in PLAYER1
4. Press [TEST] several times to scroll through all available languages in PLAYER1 until the desired one is found
5. Press [CREDIT] to enable it, the user is brought back to the main menu
6. Press [TEST]: menu EXIT MENUS is displayed (« – » in CREDIT)
7. Press [CREDIT]: exits main menu, resumes normal game operation (if a game was in progress, it ends immediately)

**Set the 1st replay score to 50,000 points**

This setting is part of backed-up data in menu ‘0’ AUDITS.

1. Press [TEST]: entering main menu, menu AUDITS is displayed (number « 0 » in CREDIT)
2. Press [CREDIT]: entering menu AUDITS
3. Press [TEST] 7 times: submenu « 1-ST REPLAY » is displayed (step « 7 » displayed in CREDIT)
4. Press [CREDIT] a 1st time to reset the value
5. Press and hold [CREDIT] to increment the value by 10,000 points steps ; release the button when the desired value (50,000 points) is reached
6. Press [TEST] until submenu EXIT AUDITS is displayed (« – » in CREDIT)
7. Press [CREDIT] to quit and return to main menu
8. Press [TEST] until menu EXIT MENUS is displayed (« – » in CREDIT)
9. Press [CREDIT]: exits main menu, resumes normal game operation (if a game was in progress, it ends immediately)

**Reset all backed-up data at the same time and put the game back in « original compatible » mode**

Submenu ERASE of menu ‘4’ PRESET is to be called.

1. Press [TEST]: entering main menu
2. Press [TEST] until menu PRESET is displayed (number « 4 » in CREDIT)
3. Press [CREDIT]: entering menu PRESET, submenu « ORIGIN » is displayed (number « 40 » in CREDIT)
4. Press [TEST] 4 times: submenu ERASE is displayed (number « 44 » in CREDIT)
5. Press [CREDIT] to run the erasure: flashing message « SURE » is displayed
6. Press [CREDIT] a 2nd time to confirm: messages « ERASE », « WRITING » then « ~ DONE ~ » are displayed and the user is brought back to the main menu
7. Press [TEST] until menu EXIT MENUS is displayed (« – » in CREDIT)
8. Press [CREDIT]: exits main menu, resumes normal game operation (if a game was in progress, it ends immediately)
MULTIPLE EXTRABALL

Once enabled, the DIPSW 32 from menu ‘3’ allows gaining several Extraballs per ball in play. However, this feature strongly depends on the selected game, whose details follow:

**CLEOPATRA**

The left and right bull’s-eye targets do not mutually exclude each other. This gives a theoretical maximum number of 2 Extraballs per ball in play.

**SINBAD**

The top purple rollover is re-lit each time all purple drop targets are down. This gives a theoretically unlimited number of Extraballs per ball in play.

**JOKER POKER**

Scoring ABC rollovers lights Extraball a 1\textsuperscript{st} time. Scoring all 4 « Ace » drop targets + the « Joker » drop target lights Extraball a 2\textsuperscript{nd} time. This gives a theoretical maximum number of 2 Extraballs per ball in play.

*Note:* The 2 conditions above do not mutually exclude each other: if the Extraball is lit upon scoring either condition, and the other condition is met while the 1\textsuperscript{st} Extraball has not been scored yet, then the 2\textsuperscript{nd} Extraball is remembered and the Extraball target will re-lit later on.

**DRAGON**

The left and right bull’s-eye targets do not mutually exclude each other. This gives a theoretical maximum number of 2 Extraballs per ball in play.

**SOLAR RIDE**

The bottom right rollover is lit at each 5’000, 10’000 and 15’000 bonus points. This gives a theoretical maximum number of 3 Extraballs per ball in play.

**COUNTDOWN**

The rollover is lit when 1 bank of drop targets (3 balls) or 2 banks of drop targets (5 balls) are down. This gives a theoretical maximum number of respectively 4 and 2 Extraballs per ball in play.

**CLOSE ENCOUNTERS**

Once the Extraball is scored, A B C rollovers are re-lit. Once all unlit, the Extraball is re-lit. This gives a theoretically unlimited number of Extraballs per ball in play.
**CHARLIE’S ANGELS**

The *Extraball* is re-lit each time all white drop targets are down, or when top H rollover is scored while bonus is equal or greater than 11’000.
This gives a theoretically unlimited number of *Extraballs* per ball in play.

**PINBALL POOL**

Once the *Extraball* is scored, A B C rollovers are re-lit.
Once all unlit, the *Extraball* is re-lit.
This gives a theoretically unlimited number of *Extraballs* per ball in play.

**TOTEM**

Scoring the *Extraball* re-lits the top A B C D rollovers (for an increased difficulty).
The *Extraball* is then re-lit each time all yellow drop targets are down.
This gives a theoretically unlimited number of *Extraballs* per ball in play.

**HULK**

Once the *Extraball* is scored, 1 2 3 bull’s-eye targets are re-lit.
Once all unlit, the *Extraball* is re-lit.
This gives a theoretically unlimited number of *Extraballs* per ball in play.

**GENIE**

When the left *Extraball* is scored, A B C D rollovers are re-lit.
Once all unlit, the left *Extraball* is re-lit.
The right *Extraball* is re-lit each time all white drop targets are down.
The two bull’s-eye targets do not mutually exclude each other.
This gives a theoretically unlimited number of *Extraballs* per ball in play.

**BUCK ROGERS**

The *Extraball* is re-lit each time the Vari-target is kicked full stroke in 1 hit.
This gives a theoretically unlimited number of *Extraballs* per ball in play.

**TORCH**

The two left and right bottom rollovers give 1 *Extraball* each.
This gives a theoretical maximum number of 2 *Extraballs* per ball in play.

**ROLLER DISCO**

The left and right bull’s-eye center targets do not mutually exclude each other.
This gives a theoretical maximum number of 2 *Extraballs* per ball in play.
ASTEROID ANNIE

The Extraball bull’s-eye target is re-lit each time both left and right drop target banks are down, but only after the currently lit Extraball target has been scored (otherwise a full bank, if down, is not taken into account).
This gives a theoretically unlimited number of Extraballs per ball in play.

SKY WARRIOR (kit)

Once the Extraball is scored, A B C rollovers are re-lit.
Once all unlit, the Extraball is re-lit.
This gives a theoretically unlimited number of Extraballs per ball in play.

SAHARA LOVE (kit)

The top purple rollover is re-lit each time all purple drop targets are down.
This gives a theoretically unlimited number of Extraballs per ball in play.

JUNGLE QUEEN (kit)

Once the Extraball is scored, A B C rollovers are re-lit.
Once all unlit, the Extraball is re-lit.
This gives a theoretically unlimited number of Extraballs per ball in play.

HEXAGONE (kit)

When the bottom left Extraball is scored, top 1 7 8 rollovers and “9” star are re-lit. Once all unlit, the bottom left Extraball is re-lit.
The top left Extraball (behind the pop bumper) is re-lit each time the 3 blue, white and red drop targets are down.
The two Extraball targets do not mutually exclude each other.
This gives a theoretically unlimited number of Extraballs per ball in play.

MOVIE (kit)

The only center target gives 1 extraball. Earning multiple extraballs is not available.

HELL’S QUEEN (kit)

Scoring the Extraball re-lits the top H E L L rollovers (for an increased difficulty).
The Extraball is then re-lit each time all « trident » drop targets are down.
This gives a theoretically unlimited number of Extraballs per ball in play.

TIGER WOMAN (kit)

Once the Extraball is scored, A B C rollovers are re-lit.
Once all unlit, the Extraball is re-lit.
This gives a theoretically unlimited number of Extraballs per ball in play.
BUGS PATCH

As each game was minutely developed and tested, certain bugs found in the original implementation were also patched. However, those little problems are not critical, patched or not.

The main problems met on nearly all games, and patched by means of DIPSW 38, are:

- The sound board bug is fixed on games Totem and up: the TILT and GAME OVER tunes were not played if no points had been scored beforehand
- In case of single Extraball (DIPSW32 OFF), upon the 1st Extraball scored, the other Extraball lamps (if applicable, for example on Genie) are automatically unlit
- In addition to the previous case, the Special lamp is also unlit in Extraball mode (also called novelty mode, DIPSW11 OFF) since it gives an Extraball in that mode
  - If several Special lamps coexist (Hulk) or if the Special is relit several times (Totem, Asteroid Annie), the Special lamps are also unlit or remain unlit upon the 1st Extraball or Special scored
  - In this configuration, beating any of the 3 replay scores (steps 7, 8 and 9 of menu AUDITS) or scoring 1,000,000 points (if DIPSW 34 is ON) give an Extraball, therefore the Extraball and Special lamps are also unlit

Furthermore, some games had a specific problem that required a specific patch:

CLEOPATRA

The 2 left and right holes extinguish one of the top rollover colours. In the rules, the rollover to extinguish is picked up at random, while in actual fact the chosen rollover depends on the number of left or right pop bumpers hits (0=yellow, 2=white, 4=red, 6=blue, 8=green).

The patch (DIPSW 38 ON) allows switching between the original mode and the «true random» mode as per the rules.

TOTEM

The PI-1 and PI-1 X4 boards run much faster than the original MPU board. As the top 2 positions of the vari-target are wired together to the playfield SW 51, the boards may take into account 2 consecutive switch closures of the SW 51 when the switch blade moves from position #5 to #6, doubling the points and bonus awarded to the player (5,000 points + 5 bonuses + multiplier advance).

The patch, as for the rollunder gate of game Torch, filters out any new SW 51 switch closure for an extended period (about 1.5 second) after the 1st closure.

This patch is always enabled and does not depend on DIPSW 38 setting.
**HULK**

The ball often bounces against the kicker arm when it enters either the A or B upkickers with some speed. As such, the upkicker may be triggered when the ball is not resting against the kicker arm, resulting in a failed or weak kick of the ball back into play.

The patch (DIPSW 38 ON) adds a short delay (0.5s) between activation of the upkicker contact switch and the triggering of the kicker arm, so as to allow time for the ball to settle and be resting against the kicker arm.

**TORCH**

Each time the ball goes through the rollunder gate on top right corner of the playfield, this spins the roto-target again. The problem is that the switch of that gate is difficult to adjust properly and often spins the roto-target several times in a row.

This is particularly stressful if the ball has fallen back in play since it’s impossible to aim at the spinning targets.

Moreover, the transistor that drives the roto coil is also energized repeatedly and may overheat (and eventually burn).

The patch (DIPSW 38 ON) filters out any new rollunder switch closure for an extended period (about 2 seconds) after the 1st closure. The other playfield switches are not filtered out and are processed as usual.

**ASTEROID ANNIE**

Once all the center cards are lit, the Special is lit and can be scored endlessly in the right hole as long as the ball is kept in play. If the Special is never scored, it is re-lit on the next ball but for 1 hit only.

But if on the next ball, all the center cards are lit again while the Special was still lit, the Special is re-lit just for 1 hit, not for an unlimited number of hits.

The patch (DIPSW 38 ON) allows to switch between the « one-time Special » mode (OFF) and the « unlimited Special » mode (ON) in that case only (which is very rare because scoring all center cards in 1 ball, over 2 consecutive balls, is extremely difficult if not impossible to achieve).
SKILL SHOT

Once enabled, the DIPSW 31 from menu ‘3’ allows scoring an additional bonus award, which increments after each ball upon success, for each ball in play. To score it, the ball must first hit a given target (rollover, drop target etc) randomly chosen among all those available for the selected game. If only one target is available, it will obviously be selected.

Once the chosen target is hit before any other one, a specific tune is played (depending on DIPSW 53) and the skill shot bonus is awarded, along with the normal bonus for the scored target.

However, this feature strongly depends on the selected game, whose details follow:

CLEOPATRA

Only top white, red and blue rollovers qualify.

SINBAD

4 top rollovers.

JOKER POKER

Only top rollovers A and C qualify. Top rollover B is excluded as it is found twice at the bottom the playfield on the return lanes.

DRAGON

4 top rollovers A B C and D.

SOLAR RIDE

4 top rollovers.

COUNTDOWN

Upper hole.

CLOSE ENCOUTERS

3 top rollovers A B and C.

CHARLIE’S ANGELS

Only top rollovers H and I qualify. Top rollover C is excluded as it is found in duplicate.

PINBALL POOL

Only top rollover B qualifies. Top rollovers A and C are excluded as they are found in duplicate at the bottom of the playfield.

TOTEM

4 top rollovers A B C and D.
HULK
4 top rollovers 2X 3X 4X and 5X.

GENIE
4 top rollovers A B C and D.

BUCK ROGERS
4 top rollovers B U C and K.

TORCH
2 pairs of top blue and green rollovers.

ROLLER DISCO
4 top rollovers A B C and D.

ASTEROID ANNIE
All 4 heart, clubs, diamond and spade top rollovers.

SKY WARRIOR (kit)
Only top rollover B qualifies.
Top rollovers A and C are excluded as they are found in duplicate at the bottom of the playfield.

SAHARA LOVE (kit)
Cannot be implemented since the top 2 rollovers are wired together and cannot be told apart.

JUNGLE QUEEN (kit)
Only top rollover B qualifies.
Top rollovers A and C are excluded as they are found in duplicate at the bottom of the playfield.

HEXAGONE (kit)
3 top rollovers 1 7 and 8.

MOVIE (kit)
Cannot be implemented since there is no top rollover to aim at.

HELL'S QUEEN (kit)
4 top rollovers H E L and L.

TIGER WOMAN (kit)
Only top rollover B qualifies.
Top rollovers A and C are excluded as they are found in duplicate at the bottom of the playfield.
## COILS CHART

### Coils Outputs

<table>
<thead>
<tr>
<th>SOL</th>
<th>Output</th>
<th>Connector + Pin number</th>
<th>Driving Components On PI-1 X4 Board</th>
<th>Name</th>
<th>Dedicated Fuse</th>
<th>Gottlieb Fuse</th>
<th>Coil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A5H-4</td>
<td>Q2</td>
<td>Outhole</td>
<td></td>
<td>Depends on game</td>
<td>A-18102</td>
<td>A-18102</td>
</tr>
<tr>
<td>2</td>
<td>A3H-5</td>
<td>Q2</td>
<td>Knockout</td>
<td></td>
<td>Depends on game</td>
<td>A-18102</td>
<td>A-18102</td>
</tr>
<tr>
<td>3</td>
<td>A3J-2</td>
<td>Q10</td>
<td>Target</td>
<td>none</td>
<td>Depends on game</td>
<td>A-18102</td>
<td>A-18102</td>
</tr>
<tr>
<td>4</td>
<td>A3J-4</td>
<td>Q12</td>
<td>Hundreds</td>
<td>none</td>
<td>Depends on game</td>
<td>A-18102</td>
<td>A-18102</td>
</tr>
<tr>
<td>5</td>
<td>A3J-2</td>
<td>Q13</td>
<td>Thousands</td>
<td>none</td>
<td>Depends on game</td>
<td>A-18102</td>
<td>A-18102</td>
</tr>
<tr>
<td>6</td>
<td>A3J-5</td>
<td>Q3</td>
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<td>A-18102</td>
<td>A-18102</td>
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<tr>
<td>7</td>
<td>A3J-4</td>
<td>Q7</td>
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<td>Depends on game</td>
<td>A-18102</td>
<td>A-18102</td>
</tr>
<tr>
<td>L7</td>
<td>U12</td>
<td>U12 + U15</td>
<td>Depends on game</td>
<td></td>
<td>Depends on game</td>
<td>A-18102</td>
<td>A-18102</td>
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### SOL 6 and SOL 1 (Outhole) Coils

<table>
<thead>
<tr>
<th>Game</th>
<th>Game Name</th>
<th>SOL 6 Name</th>
<th>Dedicated Fuse</th>
<th>Gottlieb Fuse</th>
<th>Outhole Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cleopatra</td>
<td>Left Hole</td>
<td>none</td>
<td>A-5195</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Sinbad</td>
<td>White-Yellow Drop Target Bank Reset 1A SB</td>
<td>A-18102</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Joker Poker</td>
<td>10-J Drop Target Bank</td>
<td>A-18102</td>
<td>1/2A SB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dragon</td>
<td>Right Varn-Target</td>
<td>none</td>
<td>A-17891</td>
<td>1/2A SB</td>
</tr>
<tr>
<td></td>
<td>Solar Ride</td>
<td>Right Hole</td>
<td>none</td>
<td>A-5195</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Countdown</td>
<td>Hole</td>
<td>none</td>
<td>A-16570</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Buck Rogers</td>
<td>Kickout Hole</td>
<td>none</td>
<td>A-16570</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Torch</td>
<td>Left Target Bank Reset</td>
<td>2A SB + PNP</td>
<td>A-17891</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Roller Disco</td>
<td>Kickout Hole</td>
<td>none</td>
<td>A-16570</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Asteroid Annie</td>
<td>Kickout Hole</td>
<td>2A SB</td>
<td>A-16570</td>
<td>2A SB</td>
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### SOL 7 Coil

<table>
<thead>
<tr>
<th>Game</th>
<th>Game Name</th>
<th>SOL 7 Name</th>
<th>Dedicated Fuse</th>
<th>Gottlieb Fuse</th>
<th>Outhole Fuse</th>
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</thead>
<tbody>
<tr>
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<td>Cleopatra</td>
<td>Left Hole</td>
<td>none</td>
<td>A-5195</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Sinbad</td>
<td>Purple Drop Target Bank Reset 1A SB</td>
<td>A-18102</td>
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</tr>
<tr>
<td></td>
<td>Joker Poker</td>
<td>10-J Drop Target Bank</td>
<td>A-18102</td>
<td>1/2A SB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dragon</td>
<td>Left Varn-Target</td>
<td>none</td>
<td>A-17891</td>
<td>1/2A SB</td>
</tr>
<tr>
<td></td>
<td>Solar Ride</td>
<td>Left Hole</td>
<td>none</td>
<td>A-16570</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Countdown</td>
<td>Green Target Bank Reset 2A SB</td>
<td>A-181318</td>
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</tr>
<tr>
<td></td>
<td>Close Encounters</td>
<td>Roto Unit</td>
<td>2A SB + PNP</td>
<td>A-17891</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Charlie's Angels</td>
<td>White Target Bank Reset 1A SB</td>
<td>A-18102</td>
<td>none</td>
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</tr>
<tr>
<td></td>
<td>Pinball Pool</td>
<td>Left Hole Kicker</td>
<td>none</td>
<td>A-16570</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Totem</td>
<td>Varn-Target Reset</td>
<td>none</td>
<td>A-17894</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Hub</td>
<td>A Shooter</td>
<td>2A SB + PNP</td>
<td>A-5194</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Genie</td>
<td>Kickout Hole</td>
<td>none</td>
<td>A-16570</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Buck Rogers</td>
<td>Kickout Hole</td>
<td>none</td>
<td>A-16570</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Torch</td>
<td>Left Target Bank Reset</td>
<td>2A SB + PNP</td>
<td>A-17891</td>
<td>none</td>
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<tr>
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<td>Roller Disco</td>
<td>Kickout Hole</td>
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<td>A-16570</td>
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</tr>
<tr>
<td></td>
<td>Asteroid Annie</td>
<td>Left Target Bank Reset</td>
<td>1A SB + PNP</td>
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### SOL 8 Coil

<table>
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<tr>
<th>Game</th>
<th>Game Name</th>
<th>SOL 8 Name</th>
<th>Dedicated Fuse</th>
<th>Gottlieb Fuse</th>
<th>Coil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cleopatra</td>
<td>Drop Target Bank Reset</td>
<td>2A SB</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sinbad</td>
<td>Red Target Bank Reset</td>
<td>2A SB</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Joker Poker</td>
<td>A Drop Target Reset Bank</td>
<td>2A SB</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dragon</td>
<td>Target Bank Reset</td>
<td>2A SB</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solar Ride</td>
<td>Target Bank Reset</td>
<td>2A SB</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Countdown</td>
<td>Red Target Bank Reset</td>
<td>2A SB</td>
<td>A-181318</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Charlie's Angels</td>
<td>Red Target Bank Reset</td>
<td>2A SB</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pinball Pool</td>
<td>Right Target Bank Reset</td>
<td>2A SB</td>
<td>A-18102 (x2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Torch</td>
<td>Right Target Bank Reset</td>
<td>2A SB</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roller Disco</td>
<td>Right Target Bank Reset</td>
<td>2A SB + PNP</td>
<td>A-17891</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asteroid Annie</td>
<td>Right Target Bank Reset</td>
<td>1A SB</td>
<td>A-17891</td>
<td></td>
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</table>

### Coil connected to lamp output 17

<table>
<thead>
<tr>
<th>Game</th>
<th>Game Name</th>
<th>L17</th>
<th>Dedicated Fuse</th>
<th>Gottlieb Fuse</th>
<th>Coil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Joker Poker</td>
<td>&quot;K&quot; Target Bank Reset</td>
<td>2A SB + PNP</td>
<td>A-181318</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Countdown</td>
<td>Yellow Target Bank Reset</td>
<td>2A SB + PNP</td>
<td>A-181318</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pinball Pool</td>
<td>Left Target Bank Reset</td>
<td>2A SB + PNP</td>
<td>A-18102 (x2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Buck Rogers</td>
<td>Var-target</td>
<td>Non + PNP</td>
<td>A-17864</td>
<td></td>
</tr>
</tbody>
</table>

### Coil connected to lamp output 18

<table>
<thead>
<tr>
<th>Game</th>
<th>Game Name</th>
<th>L18</th>
<th>Dedicated Fuse</th>
<th>Gottlieb Fuse</th>
<th>Coil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Countdown</td>
<td>Blue Target Bank Reset</td>
<td>2A SB + PNP</td>
<td>A-181318</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pinball Pool</td>
<td>Drop Target Control Relay 'B'</td>
<td>none</td>
<td>?</td>
<td></td>
</tr>
</tbody>
</table>

---

*SB* Slow Blow Fuse (delayed action)

*PNP* Additional PNP transistor (2N6875 or similar) remotely installed under the playfield

---

**A3J2-3, A3J4-5, A3J4-6, A3J4-4, A3J4-2, A3J5-2, A3J5-1, A5H-6**

---

**Driving Components on PI-1 X4 Board**

- **SOL 6**
  - Outhole
  - Dedicated Fuse: Depends on game
  - Gottlieb Fuse: A-18102
  - Coil Type: A-18102

- **SOL 7**
  - Outhole
  - Dedicated Fuse: Depends on game
  - Gottlieb Fuse: A-18102
  - Coil Type: A-18102

- **SOL 8**
  - Outhole
  - Dedicated Fuse: Depends on game
  - Gottlieb Fuse: A-18102
  - Coil Type: A-18102

---

**Connector + Pin number**

- **Q2**
- **Q3**
- **Q7**
- **U12**
- **U12 + U15**

---

**A5H-6, A3H-5, A3J-4, A3J-2, A3J-5, A3J-4, A3J-2**

---

**Driving Components**

- **Outhole**
  - Depends on game
  - Gottlieb Fuse: A-18102
  - Coil Type: A-18102

- **Knockout**
  - Depends on game
  - Gottlieb Fuse: A-18102
  - Coil Type: A-18102

- **Target**
  - Depends on game
  - Gottlieb Fuse: A-18102
  - Coil Type: A-18102

---

**Coil connected to lamp output 17**

- **Blue Target Bank Reset**
  - 2A SB + PNP
  - A-181318

---

**Coil connected to lamp output 18**

- **Drop Target Control Relay 'B'**
  - none
  - ?
GUARANTEE

Both PI-1 and PI-1 X4 boards are guaranteed for **SIX MONTHS** (parts and labour) starting from the date of purchase against all failures of the components and/or the manufacturing; this guarantee is meant to protect you against the kind of failures that can show up soon after starting during normal use.

During that period, or for any repair request out of the guarantee, **contact us to know how to return a defective board**.

No board shall be returned without any prior contact, because the boards to repair are handled at a different address. Otherwise, **additional shipping fees could be billed**.

The board will then be either replaced or repaired and sent back as soon as possible.

**In no case** does the guarantee cover any damage due to:

- Direct or indirect damages caused by a failure, and consequences of such damages
- A careless installation, performed without following all the important instructions listed at the beginning of this manual (especially if the pinball game was previously broken, or if badly adjusted boards damaged it)
- Any hack, « self-made fix », incorrect use or handling mistake
- Any damage that occurred during transportation (go for registered and insured shipment!)

It does not apply either if the board has been re-sold to a 3rd party during the guarantee period: in that case, it applies only to the original buyer whom arrangements will be made with.

**In all cases, never hesitate to contact us, even if the board is no longer covered by the guarantee!**

---

**On top of everything, the board should only ever be repaired by professional and skilled technicians.**

We absolutely discourage owners attempting their “own” repairs not supervised by us. Any failures or consequences of such self-repairs are at their own risk and liability, and will void the guarantee.

---

**Pi-1 & Pi-1 X4**

Pascal JANIN

SAS FLIPPP - FRANCE

Orders, manuals, FAQ, contact.. and more! :

[www.flippp.com](http://www.flippp.com) (bilingual)
**Audits**

<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Full Name (Player3 / Player4)</th>
<th>Short Name (Player1)</th>
<th>Sub-menu (Player3 / Player4)</th>
<th>Action</th>
<th>Switch CREDIT</th>
<th>Step (Credit)</th>
<th>Value (Player1)</th>
<th>Value (Match)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-</td>
<td>BOOKKEEP DATA</td>
<td>AUDITS</td>
<td>COINS CHUTE1</td>
<td>reset</td>
<td>0</td>
<td></td>
<td>Number of inserted coins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>COINS CHUTE2</td>
<td>reset</td>
<td>1</td>
<td></td>
<td>Number of inserted coins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL PLAYS</td>
<td>reset</td>
<td>2</td>
<td></td>
<td>Number of games played</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL REPLAY</td>
<td>reset</td>
<td>3</td>
<td></td>
<td>Number of replays scored</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL SLAMS</td>
<td>reset</td>
<td>4</td>
<td></td>
<td>Number of « SLAM » hits</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL EXBALL</td>
<td>reset</td>
<td>5</td>
<td></td>
<td>Number of extraball scored</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL TILTS</td>
<td>reset</td>
<td>6</td>
<td></td>
<td>Number of « TILT » hits</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-ST REPLAY</td>
<td>reset, then +10,000 (repeat)</td>
<td>7</td>
<td></td>
<td>Score to beat to earn 1st replay</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-ND REPLAY</td>
<td>reset, then +10,000 (repeat)</td>
<td>8</td>
<td></td>
<td>Score to beat to earn 2nd replay</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3-RD REPLAY</td>
<td>reset, then +10,000 (repeat)</td>
<td>9</td>
<td></td>
<td>Score to beat to earn 3rd replay</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HIGH GAME</td>
<td>reset, then +10,000 (repeat)</td>
<td>10</td>
<td></td>
<td>High score to beat (if beaten, the award depends on DipSw 22)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HISCOR BEATEN</td>
<td>reset</td>
<td>11</td>
<td></td>
<td>Number of times high score has been beaten</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GAME PERCNT</td>
<td></td>
<td>12</td>
<td>(Plays / Replays) in %</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AVERAG TIME</td>
<td>reset</td>
<td>13</td>
<td>In Minutes and Seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PROG RELEASE</td>
<td></td>
<td>14</td>
<td>Month (MMM) Day (DD) Player2 = Year (YYYY) Year (YY)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EXIT AUDITS</td>
<td>back to menu</td>
<td>--</td>
<td>-END-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Full Name (Player3/Player4)</td>
<td>Short Name (Player1)</td>
<td>1st Sub-menu</td>
<td>CREDIT Switch Action</td>
<td>Step (Credit)</td>
<td>Value (Match)</td>
<td>TEST Switch Action</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
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<td>--------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>1-</td>
<td>TEST MODES</td>
<td></td>
<td>TESTS</td>
<td></td>
<td></td>
<td></td>
<td>Next Test</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DISPLA</td>
<td>Run displays test</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>COILS</td>
<td>Run coils test</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LAMPS</td>
<td>Run lamps test</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SWITCH</td>
<td>Run switches test</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DRIVER</td>
<td>Run test on specific «driver » test bench</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-END-</td>
<td>Back to main menu</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2nd Sub-menu

<table>
<thead>
<tr>
<th>Value (Player1)</th>
<th>1st Action</th>
<th>CREDIT Switch Next Actions</th>
<th>Value (Match)</th>
<th>TEST Action</th>
</tr>
</thead>
</table>

#### DISPLA
- Scrolling from «000000» to «999999» in a loop fashion on Player1/2/3/4
- 1 digit at a time on Player1/3 then Player2/4
- Resume scrolling «000000» to «999999»
- Digit Number (1…14)
- Exit

#### COILS
- Coil name or associated lamp output
- Coil fired once, or exit if «-END-»
- same
- «Cx»: Coil X
- «X»: Lamp X
- «--»: Exit
- Next Coil

#### LAMPS
- Lamp number
- All lamps scroll by increasing numbers
- Freeze scrolling.
- Flash currently selected lamp (step by step).
- Proceeds to next lamp by increasing number
- Lamp Number. Flash in step by step mode.
- Exit

#### SWITCH
- «---» flashes while waiting for switch closure
- Switch number or «OH» for OutHole or «SL» for Slam, plus «M» if Maintained
- 8 switches max. at a time across Player1…4
- Fire playfield coils (drop targets, eject holes etc) if «CREDIT» switch is held pressed.
- Also done when the test begins.
- same
- Switch Number
- Exit

#### DRIVER
- None
- Start lamps & coils outputs scrolling
- None
- None
- Exit at end of sequence
## DipSw Settings (1/2)

<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Full Name (Player3 / Player4)</th>
<th>Short Name (Player1)</th>
<th>Dip Sw name (Player3 / Player4)</th>
<th>Dip Sw feature</th>
<th>« On » value (Player1)</th>
<th>« Off » value (Player1)</th>
<th>Step (Credit)</th>
<th>Value (Match and Player2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-</td>
<td>STAND DSW</td>
<td>DIP SW</td>
<td>« x » COIN « y » PLAY</td>
<td>Number of coins to insert on coin chute #1 (left) to get a given number of credits</td>
<td>CHUTE1</td>
<td></td>
<td>1</td>
<td>CONF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>« x » COIN « y » PLAY</td>
<td>Number of coins to insert on coin chute #2 (right) to get a given number of credits</td>
<td>CHUTE2</td>
<td></td>
<td>5</td>
<td>« xx » : configuration number among the 16 available (see manual)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BALLS P GAME</td>
<td>Number of balls per game</td>
<td>3 BALL</td>
<td>5 BALL</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MATCH FEATUR</td>
<td>Match feature at the end of the game; 1 play award</td>
<td>ENABLE</td>
<td>DISABL</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GAME MODE (also called « NOVELTY »)</td>
<td>Replaces all free plays (usually earned by hitting a lit Special target or beating one of the 3 replay scores) by extraballs. No free play may then be earned.</td>
<td>REPLAY</td>
<td>EXBALL</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TILT EFFECT</td>
<td>TILT terminates the ball in play or the whole game (like a SLAM)</td>
<td>BALL</td>
<td>GAME</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DISP CREDIT</td>
<td>Displays number of remaining credits (CREDIT)</td>
<td>YES</td>
<td>NO</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

- **TEST** = Next Dip Sw
- **CREDIT** = Toggles On / Off, or next value (for steps 1 and 5)
<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Full Name (Player3 / Player4)</th>
<th>Short Name (Player3 / Player4)</th>
<th>Dip Sw Name (Player1)</th>
<th>Dip Sw Feature</th>
<th>«On » Value (Player1)</th>
<th>«Off » Value (Player1)</th>
<th>Step (Credit)</th>
<th>Value (Match and Player2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-TEST = Next Dip Sw</td>
<td>STANDARD SW</td>
<td>DIP SW</td>
<td>CREDIT TUNE</td>
<td>Play the tune when a new game is started</td>
<td>YES play the tune</td>
<td>NO Silent</td>
<td>14</td>
<td>«On » or «Off»</td>
</tr>
<tr>
<td>CREDIT = Toggles On / Off, or next value (for Step 17)</td>
<td>MAXI CREDIT</td>
<td></td>
<td>Maximum number of credits</td>
<td>• UP TO (8, 15, 25) CREDits</td>
<td>• FREE PLAYS: gives 99 plays always</td>
<td>17</td>
<td>8, 15, 25 or «99»</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COIN CHUTES</td>
<td></td>
<td>Set both chutes to the same value</td>
<td>SAME same value</td>
<td>SEPARA separate values</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TONE SCORE</td>
<td></td>
<td>Play tones during a game</td>
<td>YES play tones</td>
<td>NO silent scoring</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DISP HISCOR</td>
<td></td>
<td>Display the highest score (high game to date)</td>
<td>YES display the highest score every 5 seconds when game is over</td>
<td>NO highest score is stored in memory but not displayed and gives no free plays</td>
<td>21</td>
<td>«On » or «Off»</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HISCOR AWARDS</td>
<td></td>
<td>Award for beating the highest score</td>
<td>3 PLAY 3 free plays</td>
<td>NONE stored but no award</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COIN TUNE</td>
<td></td>
<td>Play the tune when a coin is inserted in either chute</td>
<td>YES play the tune</td>
<td>NO silent</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EXIT DIPSW</td>
<td></td>
<td>Back to main menu</td>
<td>-END-</td>
<td>-END-</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Long Name (Player3 / Player4)</td>
<td>Short Name (Player1)</td>
<td>Dip Sw Name (Player3 / Player4)</td>
<td>Dip Sw Feature</td>
<td>«On » Value (Player1)</td>
<td>«Off » Value (Player1)</td>
<td>Step (Credit)</td>
<td>Value (Match and Player2)</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------</td>
<td>---------------------</td>
<td>-------------------------------</td>
<td>----------------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>---------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>3</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>IDLE ATTRACT</td>
<td>Animate controlled lamps on the playfield once the game is over (in idle mode)</td>
<td>ENABLE animate controlled lamps</td>
<td>DISABL all controlled lamps off</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OUTLET FREQ</td>
<td>Set display refresh rate to minimize flickering indoors. It must match the AC outlet frequency.</td>
<td>50 HZ such as for Europe</td>
<td>60 HZ such as for North America</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ROUND 6 + 9</td>
<td>Round aspect of figures « 6 » (top segment ‘a ’ added) and « 9 » (bottom segment ‘d ’ added)</td>
<td>ENABLE round aspect</td>
<td>DISABL original digits, more square-looking</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RELOAD SCORES</td>
<td>At power-on, game scores made before last power-off are re-displayed</td>
<td>ENABLE reload past scores</td>
<td>DISABL all scores default to « 000,000 »</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>UNLIT FLASH</td>
<td>Given lamps on the playfield flash quickly when feature made (cool visual effect)</td>
<td>ENABLE quick flash when feature made</td>
<td>DISABL immediately unlit</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>
## DipSw+ Settings (2/8)

<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Long Name (Player3 / Player4)</th>
<th>Short Name (Player1)</th>
<th>Dip Sw Name (Player3 / Player4)</th>
<th>Dip Sw Feature</th>
<th>«On » Value (Player1)</th>
<th>«Off » Value (Player1)</th>
<th>Step (Credit)</th>
<th>Value (Match and Player2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>LAUNCH BALL</td>
<td>Wait until ball is in the outhole before kicking it in play</td>
<td>WAIT wait for ball and display a warning message</td>
<td>NOWAIT energize outhole even if empty</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SKILL SHOT</td>
<td>Give a skill bonus when a designated target if it before any other one (GAME DEPENDENT)</td>
<td>ENABLE skill bonus active</td>
<td>DISABL no skill bonus</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>
|                      |                               |                      | EXBALL MODE                    | Allow more than 1 extra ball during the same ball in play | MULTI multi-extraball possible per ball in play  
  - The « EXTRABALL » lamp(s) may be re-lit several times  
  - The « SHOOT AGAIN » lamp flashes when 2 or more extraballs have been earned | SINGLE maximum 1 extraball possible per ball in play | 32            | « On » or « Of » |
<p>|                      |                               |                      | PLAYER LEVEL                    | All scores are divided by 10 (except 10 pts switches) | EXPERT automatically activated beyond 900,000 points | NORMAL normal scoring | 33            |                             |</p>
<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Long Name (Player3 / Player4)</th>
<th>Short Name (Player1)</th>
<th>Dip Sw Name (Player3 / Player4)</th>
<th>Dip Sw Feature</th>
<th>«On » Value (Player1)</th>
<th>«Off » Value (Player1)</th>
<th>Step (Credit)</th>
<th>Value (Match and Player2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>1-MILL AWARD</td>
<td>Extra award when score reaches 1,000,000 points (when it rolls back to 000000)</td>
<td>1 PLAY gives 1 free play</td>
<td>NONE no award</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GAME RULES</td>
<td>Use different game rules than the original (Genie, Dragon, Totem, Pinball Pool only so far)</td>
<td>SPIN+ the spinning target or star rollovers scroll ABC(D) rollover lamps</td>
<td>NORMAL original rules</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CHANCE BALL</td>
<td>Kick ball back in play if play time was shorter than 5 seconds</td>
<td>ENABLE kick ball back in play and display a message</td>
<td>DISABL ball is counted as played</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TILT HITS</td>
<td>Number of « TILT » hits needed to disqualify the ball in play</td>
<td>2 HITS 2 TILT hits; « DANGER » is displayed at 1st TILT hit</td>
<td>1 HIT normal TILT after 1 hit</td>
<td>37</td>
<td>« On » or « Of »</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PATCH BUGS</td>
<td>Fix some problems in the original game rules (SUBJECT TO IMPLEMENTATION)</td>
<td>ENABLE fix tunes for TILT + GAME OVER and unlit concurrent extraball lamps if DIPSW32=OFF</td>
<td>DISABL 100% original game</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GAME ATTRACT</td>
<td>All playfield lamps flash quickly when ball is kicked in play (cool visual effect), a flashing message or the highest score is displayed for all players</td>
<td>ENABLE quick flash + message : 1st initial kick + highest score if no score if CHANCE ball</td>
<td>DISABL nothing</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Long Name (Player3 / Player4)</td>
<td>Short Name (Player3 / Player4)</td>
<td>Dip Sw Name (Player3 / Player4)</td>
<td>Dip Sw Feature</td>
<td>«On » Value (Player1)</td>
<td>«Off » Value (Player1)</td>
<td>Step (Credit)</td>
<td>Value (Match and Player2)</td>
</tr>
<tr>
<td>---------------------</td>
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<td>--------------------------</td>
</tr>
<tr>
<td>3-</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>COILS RESET</td>
<td>Energize all coils (drop targets, vari targets, holes..) at power-up and at the end of every game. The behaviour of this feature depends on DIP SW 48 and 49</td>
<td>ENABLE energize the coils, depending on the setting of DIP SW 48 and 49</td>
<td>DISABLING no action</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SPECIAL LAMP</td>
<td>The « SPECIAL » lamp(s) flash instead of being steadily lit</td>
<td>FLASH</td>
<td>STEADY</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EXBALL L LAMP</td>
<td>The « EXTRABALL » lamp(s) flash instead of being steadily lit</td>
<td>FLASH</td>
<td>STEADY</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BONUS MAX 39</td>
<td>Let bonus go up to 39 only on the games whose bonus already reaches 20: Solar Ride, Countdown, Close Encounters, Totem, Hulk, Genie, Buck Rogers, Torch, Roller Disco</td>
<td>ENABLE bonus goes up to 39 by lighting both « 20 » et « 10 » bonus lamps together</td>
<td>DISABLING bonus stops at 19, 20 or 29 as usual, depending on the game</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DISP BONUS</td>
<td>Bonus display mode on the playfield</td>
<td>RAMP lamps from « 1000 » till the current bonus value are lit in a ramp fashion</td>
<td>NORMAL only the current bonus lamp is lit</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Long Name (Player3 / Player4)</td>
<td>Short Name (Player3 / Player4)</td>
<td>Dip Sw Name (Player3 / Player4)</td>
<td>Dip Sw Feature</td>
<td>«On » Value (Player1)</td>
<td>«Off » Value (Player1)</td>
<td>Step (Credit)</td>
<td>Value (Match and Player2)</td>
</tr>
<tr>
<td>---------------------</td>
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</tr>
<tr>
<td>3-</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>SCOREBONUS L</td>
<td>The « SCORE BONUS » lamp (if present, and if not shared with other bonus lamps as in <em>Hulk</em>) flashes when lit and during bonus countdown</td>
<td>FLASH the lamp flashes then goes off when count down ends</td>
<td>STEADY the lamp is steadily lit</td>
<td>45</td>
<td></td>
</tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td>HISCOR TABLE</td>
<td>Display mode for high scores table (when in game over)</td>
<td>TOP 5 5 highest scores are remembered along with players' names, 4 characters long</td>
<td>TOP 1 only the highest score is remembered, without any name</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-5 HI AWARD</td>
<td>Give an extra award if 2nd to 5th high score is achieved (if SW46 is « ON ») This setting is skipped if DIPSW46= OFF</td>
<td>1 PLAY award a free play</td>
<td>NONE no award</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COIL STATUS</td>
<td>Force check that none of the switches associated to a given coil remains stuck closed Retries up to 5 times</td>
<td>CHECK if one or more switches remain closed, display an error message and prohibit starting any new game</td>
<td>IGNORE energize the coil just once without checking its associated switches</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Long Name (Player3 / Player4)</td>
<td>Short Name (Player1)</td>
<td>Dip Sw Name (Player3 / Player4)</td>
<td>Dip Sw Feature</td>
<td>«On » Value (Player1)</td>
<td>«Off » Value (Player1)</td>
<td>Step (Credit)</td>
<td>Value (Match and Player2)</td>
</tr>
<tr>
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</tr>
<tr>
<td>3-</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>COIL MODE</td>
<td>The coil is energized only if at least 1 of its associated switches is detected closed beforehand; This spares transistors and fuses Setting skipped if DIPSW48= OFF</td>
<td>ECO if all switches are open, the coil is not energized; however, a varitarget will always be energized once, no matter the setting</td>
<td>NORMAL the coil is always energized</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>TEST = Next Dip Sw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>CREDIT = Toggle On / Off</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKILL SCORE</td>
<td></td>
<td></td>
<td></td>
<td>Set the increasing score award each time the designated target or rollover is scored in SKILL SHOT mode Setting skipped if DIPSW31= OFF</td>
<td>+5000 the skill shot award increases by steps of 5,000 points till 90,000 points maximum</td>
<td>+10000 the skill shot award increases by steps of 10,000 points till 90,000 points maximum</td>
<td>50</td>
<td>« On » or « Of »</td>
</tr>
<tr>
<td>HIT FLASH</td>
<td></td>
<td></td>
<td></td>
<td>Lamps of given targets or rollovers will flash briefly when the ball hits corresponding feature (cool visual effect)</td>
<td>ENABLE the lamp flashes quickly</td>
<td>DISABL the lamp remains steadily on or off</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>SPECIAL MODE</td>
<td></td>
<td></td>
<td></td>
<td>Once hit, a lit Special target gives 50,000 points instead of a replay Setting skipped if DIPSW11= OFF</td>
<td>+50000 « knocks » then gives 50,000 pts</td>
<td>NORMAL normal special</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Long Name (Player3 / Player4)</td>
<td>Short Name (Player1)</td>
<td>Dip Sw Name (Player3 / Player4)</td>
<td>Dip Sw Feature</td>
<td>«On » Value (Player1)</td>
<td>«Off » Value (Player1)</td>
<td>Step (Credit)</td>
<td>Value (Match and Player2)</td>
</tr>
<tr>
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</tr>
<tr>
<td>3-</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>SKILL FLASH</td>
<td>Set the number of times the entire playfield flashes after the skill shot has been scored Setting skipped if DIPSW31= OFF</td>
<td>SINGLE all playfield lamps flash only once</td>
<td>3 X all playfield lamps flash 3 times</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SCORE BONUS</td>
<td>Speeds up bonus countdown</td>
<td>FAST bonus countdown by 1,000 pts times multiplier</td>
<td>NORMAL normal countdown</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>COIL PROTEC</td>
<td>Monitors the coils’ current and opens the protection relay in case of trouble</td>
<td>ENABLE coils are monitored</td>
<td>DISABL no measurement</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>POWER IDLE</td>
<td>Without any user action, when a game is over, switches off all playfield lamps by turning TILT relay on</td>
<td>30 SEC switch all playfield lamps off after 30 seconds in game over mode</td>
<td>DISABL no action</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DISP 1-MILL</td>
<td>Scores can reach or exceed 1,000,000 points</td>
<td>ENABLE scores beyond 1,000,000 points are managed and stored in memory</td>
<td>DISABL regular scoring: score counter rolls back from 999,990 to 0</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Long Name (Player3 / Player4)</td>
<td>Short Name (Player3 / Player4)</td>
<td>Dip Sw Name (Player3 / Player4)</td>
<td>Dip Sw Feature</td>
<td>«On » Value (Player1)</td>
<td>«Off » Value (Player1)</td>
<td>Step (Credit)</td>
<td>Value (Match and Player2)</td>
</tr>
<tr>
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</tr>
<tr>
<td>3-</td>
<td>EXTRA SWITCH</td>
<td>DIPSW+</td>
<td>DISPLAY TYPE</td>
<td>Set the display font used to drive the players displays</td>
<td>NORMAL regular 8-segment font</td>
<td>7-SEG specific 7-segment font (without central « h ») fitted for some replacement LED displays</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>TEST = Next Dip Sw</td>
<td></td>
<td></td>
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<tr>
<td>CREDIT = Toggle On / Off</td>
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<td></td>
</tr>
<tr>
<td>BONUS RAMP</td>
<td></td>
<td></td>
<td></td>
<td>Select the way the bonus lamp is lit</td>
<td>FLASH the lamp is flashing</td>
<td>STEADY the lamp is steadily lit</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>EXBALL MODE</td>
<td></td>
<td></td>
<td></td>
<td>Extraball award</td>
<td>+10000 awards 10,000 points instead of an extraball</td>
<td>NORMAL awards a regular extraball</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>KNOCKER MODE</td>
<td></td>
<td></td>
<td></td>
<td>Disables the &quot;knocker&quot; coil</td>
<td>NORMAL coil behaves as usual</td>
<td>DISABL coil is disabled, and can be removed from the game</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>CHIMES MODE</td>
<td></td>
<td></td>
<td></td>
<td>Issues a longer pulse to drive a chimes unit</td>
<td>YES chimes unit installed</td>
<td>NO regular sound board installed</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>BUMPER STATUS</td>
<td></td>
<td></td>
<td></td>
<td>Checks the pop bumpers during game</td>
<td>CHECK end of game if pop bumper stuck</td>
<td>IGNORE no test</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>SINGLE PLAYER</td>
<td></td>
<td></td>
<td></td>
<td>Only allows 1 player at a time</td>
<td>YES 1 player only</td>
<td>NO up to 4 players</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>EXIT DIPSW</td>
<td></td>
<td></td>
<td></td>
<td>Back to main menu</td>
<td>-END-</td>
<td>-END-</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Menu Number (Credit)</td>
<td>Long Name (Player3 / Player4)</td>
<td>Short Name (Player1)</td>
<td>1st Sub-menu (Player1)</td>
<td>CREDIT Switch Action</td>
<td>Step (Credit)</td>
<td>TEST Switch Action</td>
<td></td>
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</tr>
<tr>
<td>4-</td>
<td>DATA PRESET</td>
<td>PRESET</td>
<td>ORIGIN</td>
<td>Set all DipSw to original values</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WIZARD</td>
<td>Set all DipSw so as to enable all new features</td>
<td>41</td>
<td>Next Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AUDITS</td>
<td>Reset all « AUDITS » data and top 5 high scores table</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SCORES</td>
<td>Reset top 5 high scores table and replay scores to default values</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ERASE</td>
<td>Erase all data</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>-END-</td>
<td>Back to main menu</td>
<td>--</td>
<td></td>
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</tr>
</tbody>
</table>

DO NOT TURN GAME OFF WHILE WRITING IS IN PROGRESS

2nd Sub-menu

<table>
<thead>
<tr>
<th>Action</th>
<th>CREDIT Switch 1st Action and Display (Player1)</th>
<th>CREDIT Switch 2nd Action</th>
<th>TEST Switch Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORIGIN</td>
<td>Set all Dip Sw to 100% original values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Dip Sw 6, 7, 9…16, 18, 20…23, 26, 50, 58, 61 « ON »</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● All other Dip Sw « OFF »</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIZARD</td>
<td>Set all Dip Sw so as to enable all the new features of the board:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Dip Sw 1…5, 8, 19, 52, 53, 56, 60 « OFF »</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● All other Dip Sw « ON »</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUDITS</td>
<td>Reset all values of menu « AUDITS » at steps 0 to 11 and 13 and top 5 high scores table</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Next Sub-menu, or cancel selected action
## Presets (2/2)

<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Long Name (Player3 / Player4)</th>
<th>Short Name (Player1)</th>
<th>Action</th>
<th>1st Action and Display (Player1)</th>
<th>2nd Action</th>
<th>Test Switch Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-</td>
<td>DATA PRESET</td>
<td>PRESET</td>
<td>2nd Sub-menu</td>
<td>CREDIT Switch</td>
<td>CREDIT Switch</td>
<td>TEST Switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SCORES</td>
<td>Put the following default values</td>
<td>Store values into</td>
<td>Action</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>in the 3 replays and the high scores table (the other settings remain unchanged) :</td>
<td>scores</td>
<td>Next Sub-menu, or</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1st replay = 220,000 points</td>
<td>Ask for confirmation,</td>
<td>cancel selected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2nd replay = 350,000 points</td>
<td>display flashing</td>
<td>action</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3rd replay = 490,000 points</td>
<td>« SURE »</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Highest score = 600,000 Name=PASC</td>
<td>Proceed with erase,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2nd high score = 500,000 Name=BEA</td>
<td>display flashing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3rd high score = 400,000 Name=QUEN</td>
<td>« ERASE » then</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4th high score = 300,000 Name=ARTH</td>
<td>« WRITIN » and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5th high score = 200,000 Name=ALEX</td>
<td>« -DONE- »</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>when completed</td>
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<td></td>
<td></td>
<td></td>
<td>END</td>
<td>-END- Back to main menu</td>
<td>Back to main menu</td>
<td></td>
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</tr>
</tbody>
</table>

**DO NOT TURN GAME OFF WHILE WRITING IS IN PROGRESS**
## Language & Exit

<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Long Name (Player3 / Player4)</th>
<th>Sub-Menu (Player1)</th>
<th>Action</th>
<th>CREDIT Switch Action</th>
<th>TEST Switch Action</th>
<th>Step (Credit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-</td>
<td>LANGUE MESSAG</td>
<td>FRANCA(is)</td>
<td>All messages (menus &amp; during game) are displayed in French</td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>6-</td>
<td>LANGUAGE</td>
<td>ENGLIS(h)</td>
<td>All messages (menus &amp; during game) are displayed in English</td>
<td></td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>7-</td>
<td>SPRACHE</td>
<td>DEUTSC(h)</td>
<td>All messages (menus &amp; during game) are displayed in German</td>
<td>Enable the selected language</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>8-</td>
<td>IDIOMA</td>
<td>ESPANO(l)</td>
<td>All messages (menus &amp; during game) are displayed in Spanish</td>
<td></td>
<td>Next Step</td>
<td>53</td>
</tr>
<tr>
<td>9-</td>
<td>LINGUA MESSAG</td>
<td>ITALIA(no)</td>
<td>All messages (menus &amp; during game) are displayed in Italian</td>
<td></td>
<td></td>
<td>54</td>
</tr>
<tr>
<td>10-</td>
<td>LINGUAGEM</td>
<td>PORTUG(ese)</td>
<td>All messages (menus &amp; during game) are displayed in Portuguese available till end of 2014</td>
<td></td>
<td></td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-END-</td>
<td>Back to main menu</td>
<td>Back to main menu</td>
<td></td>
<td>--</td>
</tr>
</tbody>
</table>

### NOTE: the current language setting flashes in Player1, and is displayed first upon entering the menu

<table>
<thead>
<tr>
<th>Menu Number (Credit)</th>
<th>Long Name (Player3 / Player4)</th>
<th>Short Name (Player1)</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EXIT MENUS</td>
<td>-END-</td>
<td>General exit from menus:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• All data that has been modified comes into effect immediately</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• If a game was in progress, it is terminated. The game goes in « GAME OVER » mode (idle mode), there is no match award, no comparison nor storage of the high score(s).</td>
</tr>
</tbody>
</table>