PI-1

PI-1 X4

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

A. Cleopatra	I. Pinball Pool	
B. Sinbad	J. Totem	*Kit 1.* Sky Warrior
C. Joker Poker	K. Hulk	*Kit 2.* Sahara Love
D. Dragon	L. Genie	*Kit 3.* Jungle Queen
E. Solar Ride	N. Buck Rogers	*Kit 4.* Hexagone
F. Countdown	P. Torch	*Kit 5.* Movie
G. Close Encounters	R. Roller Disco	
H. Charlie's Angels	S. Asteroid Annie	

MENUS AVAILABLE IN :

FRENCH	GERMAN	ITALIAN
ENGLISH	SPANISH	PORTUGUESE

REV. 1.11 E

To Béatrice, Quentin, Arthur and Alexandre.

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© Pascal JANIN

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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 <u>very important</u> instructions to be <u>closely followed.</u>

This sign shows a new feature, a modification or an improvement, over the <u>previous</u> revision.

THE *ULTIMATE* BOARDS!!

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

When the "**PI-1**" project started in April 2000, I wanted this board to be as simple as possible to use, install and repair, with a whole range of new innovative features (much more than a mere 'rebirth') and multiple hardware protections so that the original board's flaws and weaknesses belong to the past. Even after the **PI-1**'s arrival though, the original System 1 game's power supply remained a weakness, so I had the idea to create an advanced version of the board.

Ultimate goal now reached.. so 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

> # 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!!

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.

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.

N *WHAT'S NEW? (since the last revision)*

– New DIPSW+ 59 and 60

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.flippers-jukeboxes.com
✔ **Christophe** and **Peter**, « beta-testers », faithful friends, tireless supporters, and even translators at times. Peter also worked on the pictures of the front cover.
✔ **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.
✔ the **ACREPT** team and their manager **Jean-Paul Pilard** for manufacturing my boards with much enthusiasm; their various other projects can be seen at http://www.acrept.org/accueil.htm
✔ company **Segger** (Germany) for providing me with the specific programmer

TRANSLATORS-PROOFREADERS

English	Peter, Aunt Izzy
Deutsch	Peter, Toni, Michael, Ingo
Spanish	Peter, Eric
French	Everyone!
Italian	Béa, *Dad*, Laurence
Portuguese	Alexandre, Tonio and Marie-Paule

RULES AND TESTS OF ALL GAMES

Cleopatra	Max	**Hulk**	Peter, Christophe, Pierre..
Sinbad	Peter	**Genie**	Stéphane, myself
Joker Poker	James, Peter	**Buck Rogers**	Christophe, Christian
Dragon	Bruno, Mark	**Torch**	Pierre, James
Solar Ride	Yannick, John	**Roller Disco**	Tom
Countdown	Christophe	**Asteroid Annie**	Bernard
Close Encounters	Gilles, Michel, Didier, JC..	**Sky Warrior** (kit)	Gilles
Charlie's Angels	Thibaud, Reiner	**Sahara Love** (kit)	Pascal
Pinball Pool	Christophe, Michael, Thierry	**Jungle Queen** (kit)	Laurent
		Hexagone (kit)	Stéphane
Totem	Yannick, Michael, JC	**Movie** (kit)	Max

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ANNEX: Charts of all menus and submenus

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 possible 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!

PI-1 ➤
    *   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:
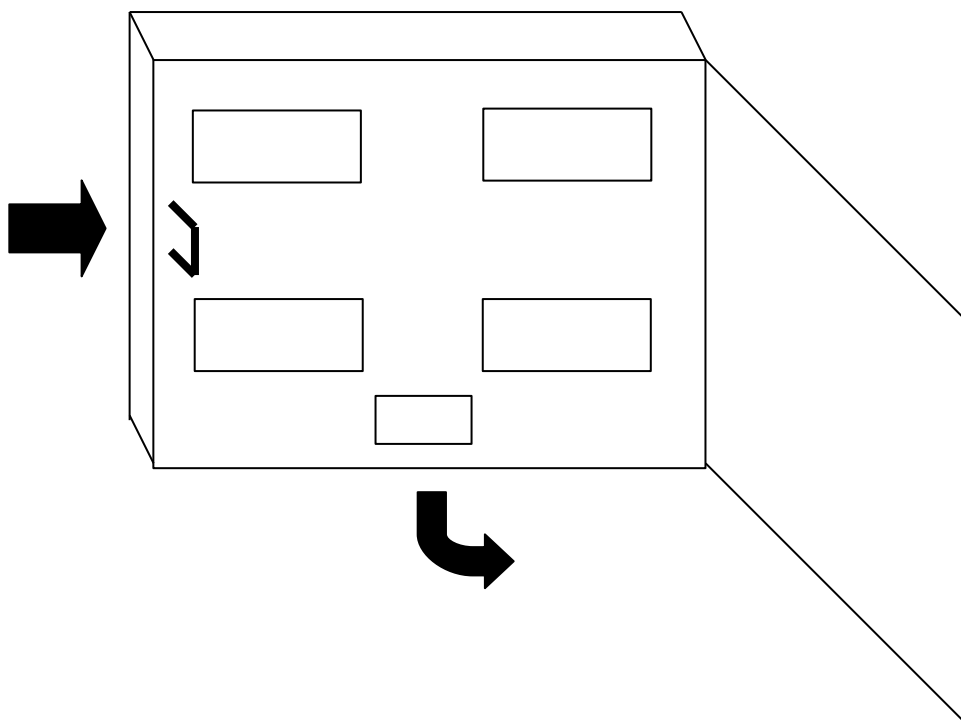
STEP 3

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.
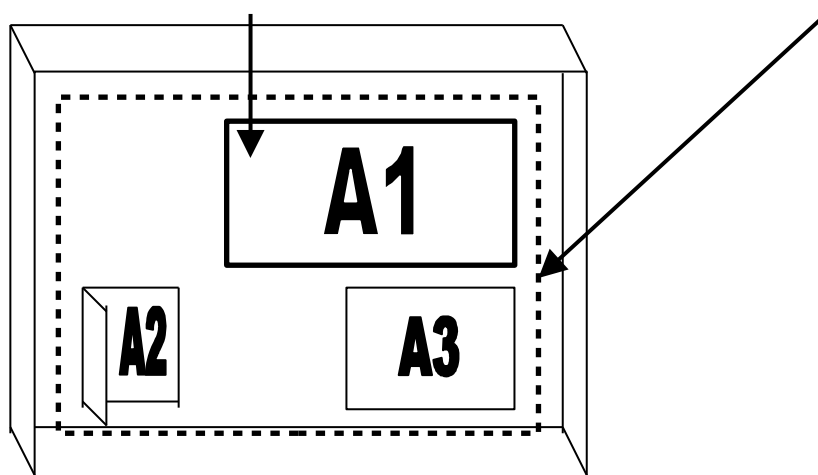
STEP 4

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**!
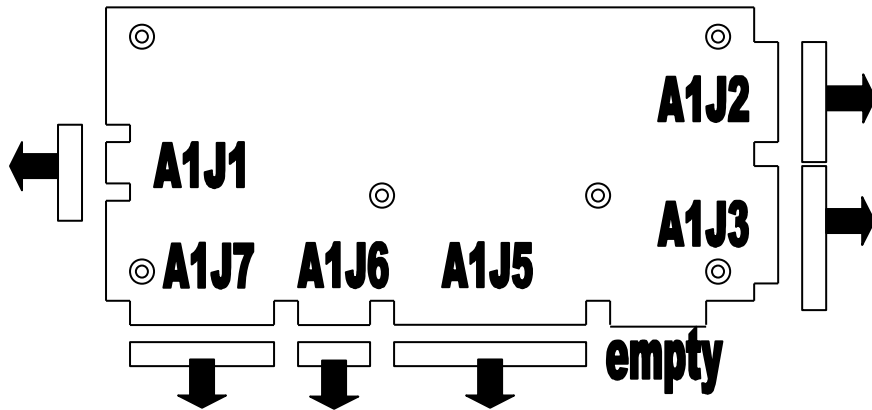
STEP 5

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).
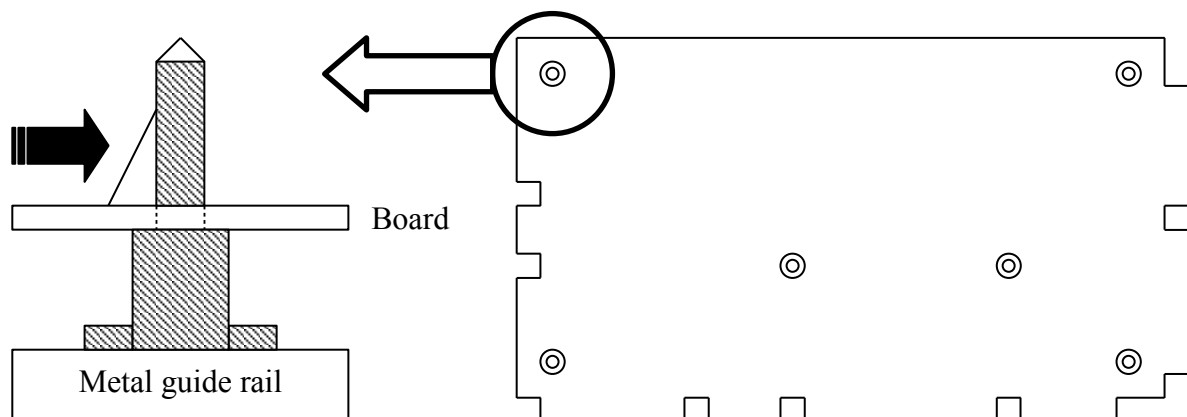
X4 ➡ **SKIP TO STEP 8-X4**

PI-1 ➡ *STEP 6*

Take the **PI-1** board out of its antistatic bag.
> ➢ **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).
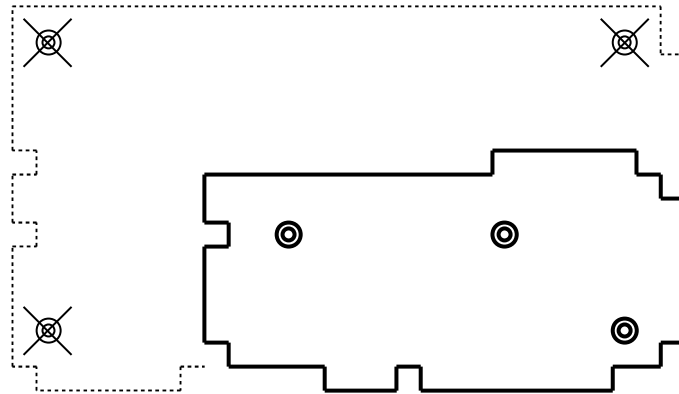
PI-1 ➡ *STEP 7*

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.
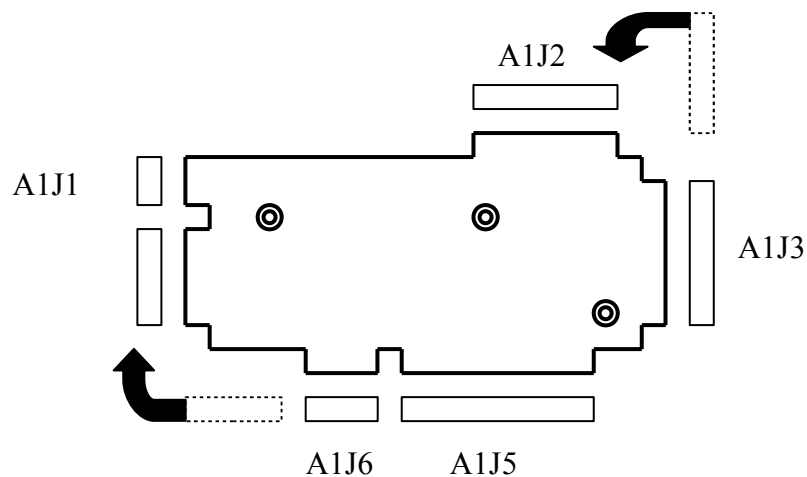
➡ **SKIP TO STEP 13.**

X4 ➡ *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!**
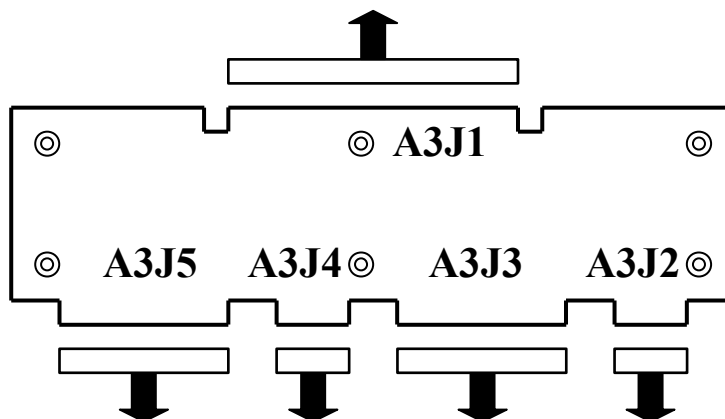
Then remove the board the same way as the **A1** board at step 6, held in place by 6 nylon spacers.

X4 ➡ *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!**
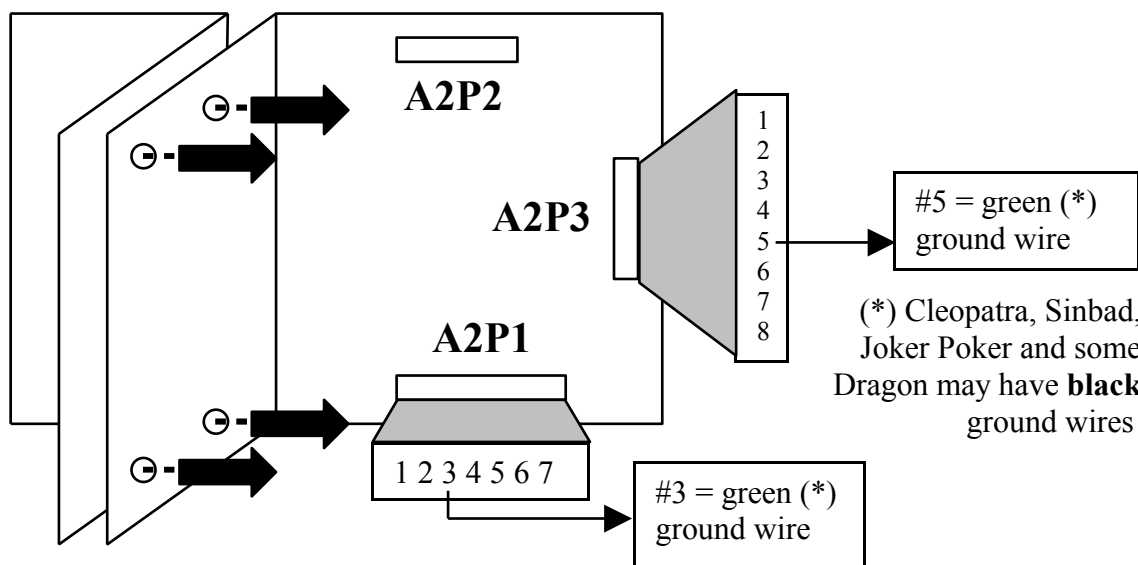
Then remove the board by unscrewing the 4 screws that hold it to its metal bracket.

X4 ➡ *STEP 10-X4*

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

Sticky side
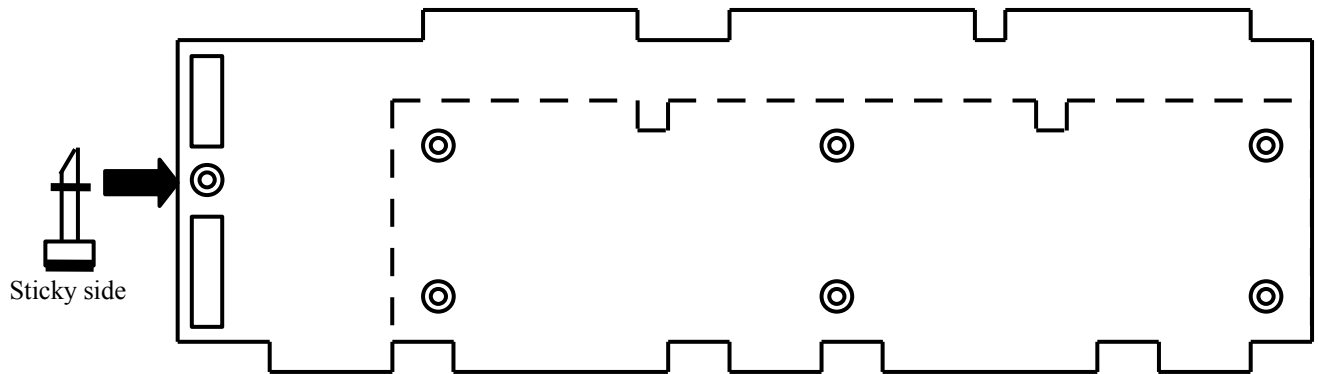
Firmly press on the 7th spacer to make it stick to the metal backplate of the head.
Then re-insert all the connectors of the former **A1**, **A2** and **A3** boards as follows, clockwise from top left corner:

- **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.
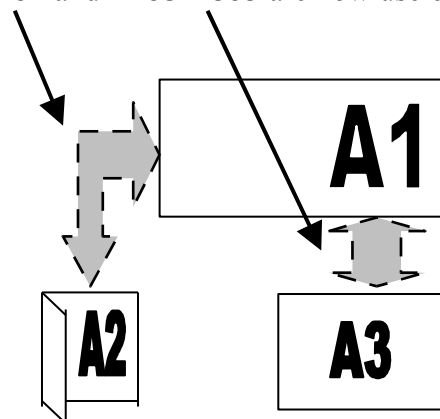
Double-check the location and position of each connector on the following **PI-1 X4** board overview, once the board is installed in the game's front head:
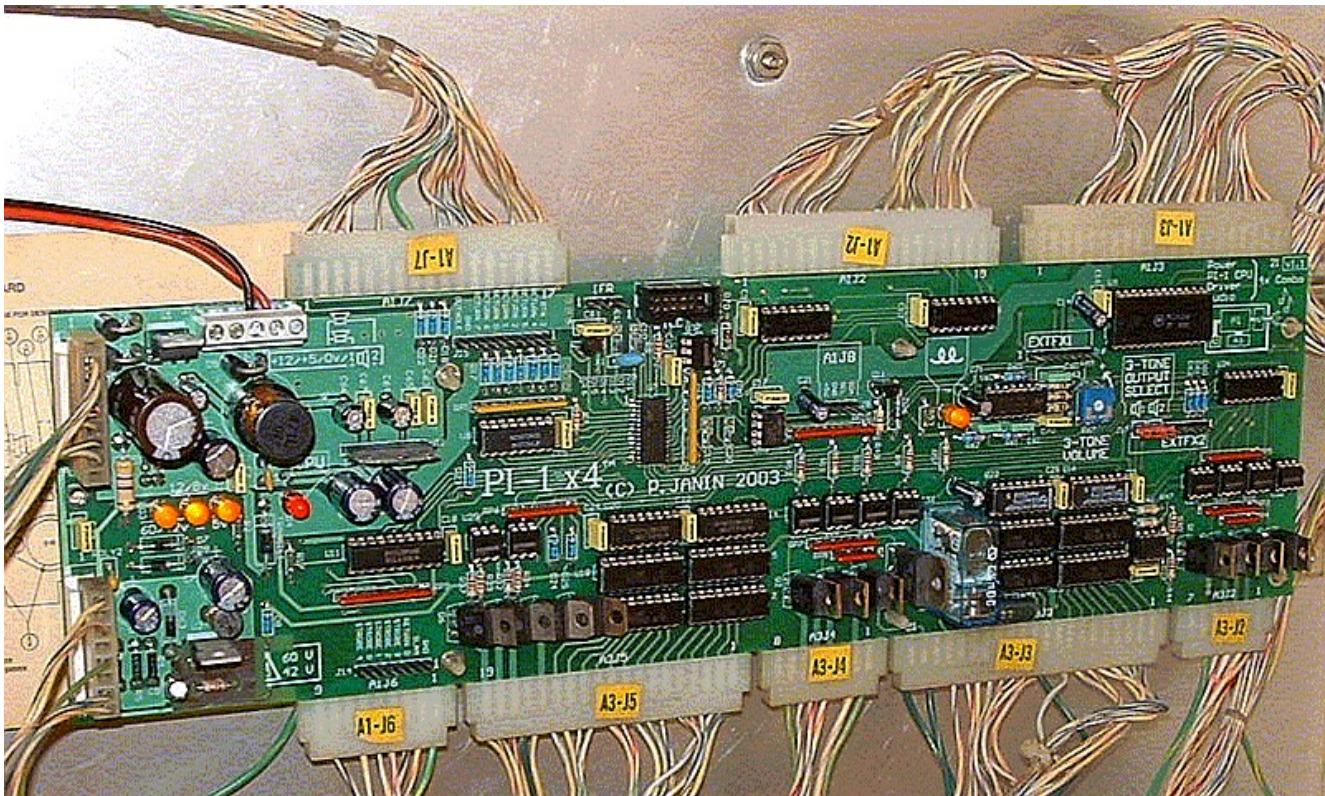
Here is an overview of the power supply section:

- connector **A2P1** on top left corner (note the green –or black- ground wire position)
- connector **A2P3** on bottom left corner (note the green –or black- ground wire position)
- the nylon spacer between those 2 connectors
- the 3 status LEDs:
  - +60V / +42V
  - +12V / +8V
  - +5V
- the CPU activity LED (to the right)
- the loudspeaker cable connected to audio output #1 on the screw-clamp connector

The board is now installed!

Two steps remain to be done: connecting the loudspeaker(s) and setting the language for the menus upon 1st power-up.
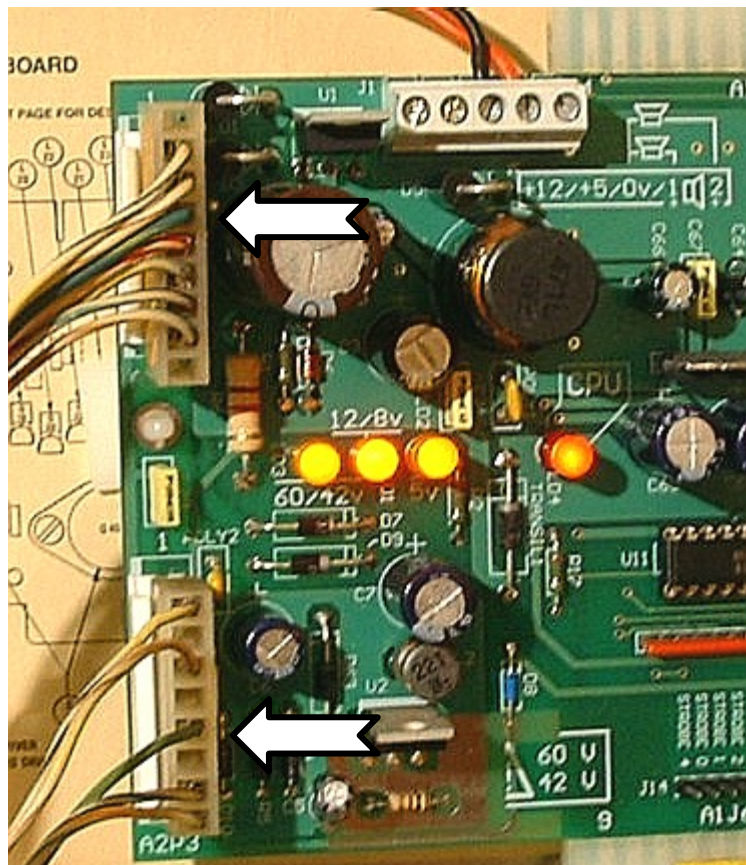
X4 ▶ ***STEP 11-X4 : EXTERNAL POWER AND LOUDSPEAKERS***

A 5-pin screw-clamp connector provides the following signals:

Pin 1 (left)	Pin 2	Pin 3	Pin 4	Pin 5 (right)
+12V power output max 1.5A **not fused!**	+5V power output max 0.7A protected	General ground (GND) and loudspeakers « - » outputs	Loudspeaker #1 « + » output Min. impedance: **8 ohms**	Loudspeaker #2 « + » output Min. impedance: **8 ohms**

Pins **#1** to **#3** may power additional external low-power boards (and within the current range limit mentioned above), such as the giant display.

Pins **#4** and **#5** allow the connection of 1 or 2 loudspeakers to the stereo audio amplifier on board. Each loudspeaker is to be connected with the cable provided (to strip if needed) between « + » and the ground on the screw-clamp connector, as on the picture (example: loudspeaker output #1).

X4 ▶ ***STEP 12-X4 : CONFIGURING THE BUILT-IN 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 orange status LED showing the status of the coils protection relay:
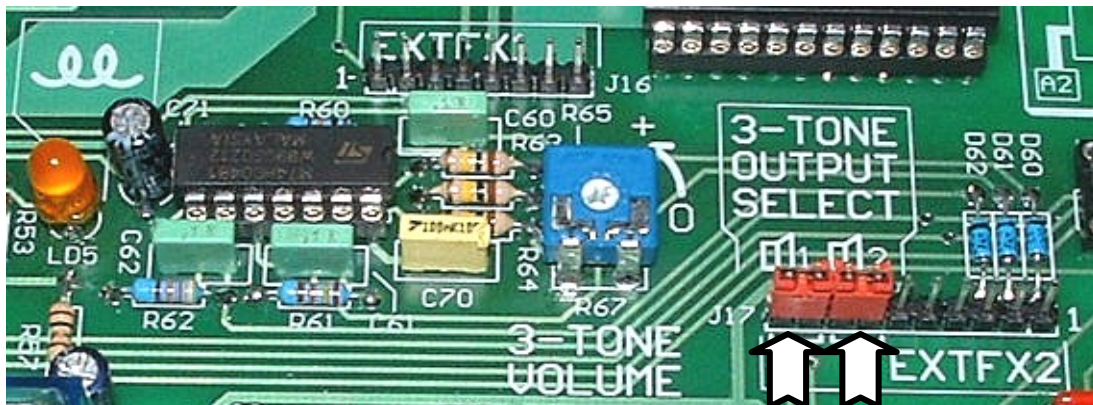
The 2 jumpers on the left 4 pins of **J17** enable (if installed) or disable each of the 2 loudspeakers outputs #1 and #2, depending on the number of loudspeakers connected (refer to previous step 11).

Adjustable potentiometer **R67** adjusts the output volume. 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 after the back-up memory has been replaced:
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 « *GEᴨIE* » (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
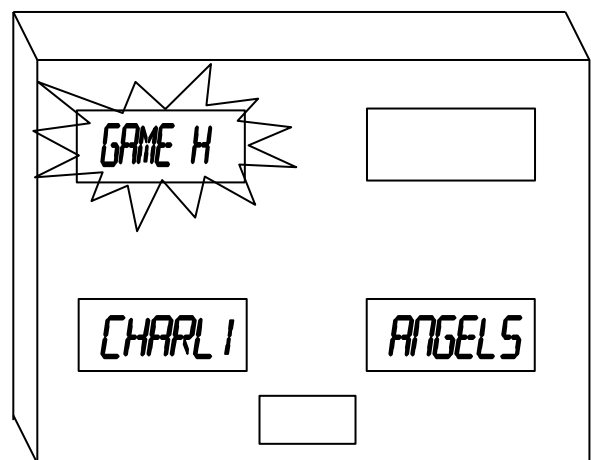
To change the game, press the white **[TEST]** button located inside the front coin door within **5 seconds** of power-up, whilst the game name is being displayed: the PLAYER1 display then flashes.

Every time **[TEST]** is pressed, the next game in the list is displayed (as listed on the front page).

To select the game displayed, 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:

Selected Kit #	Game	Year	Maker	Country	Derivative Gottlieb Playfield	Derivative Gottlieb Rules
+1	Sky Warrior	1983	I.D.I.	Italy	Amazon Hunt	Pinball Pool
+2	Sahara Love	1984	C. Tabart	France	*Original*	Sinbad
+3	Jungle Queen	1982	I.D.I.	Italy	Jungle Queen (EM version)	Pinball Pool
+4	Hexagone	1986	C. Tabart	France	*Original*	Genie
+5	Movie	1982	Bell Games	Italie	Pinball Champ (Zaccaria)	Torch

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

PI-1 ➡️ The red light (LED CPU) on the PI-1 board flashes briefly once, then follows PLAYER1 display (if nothing is displayed, it will be unlit) while the green light (LED +5V) on its left will remain lit.

X4 ➡️ The 3 power supply control lights (from left to right: +60V/+42V, +12V/+8V and +5V) must be lit. On their right, the « CPU » light flashes briefly twice.

The rightmost light, when lit, shows that the coils protection relay is on and that power is fed to the playfield coils.
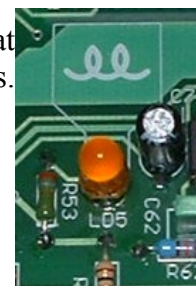
SWITCHES TEST

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

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

..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 for 2 seconds, one after the other if more than one problems were detected.

Each tested switch is related to a different signal on the connector A1J6, except the outhole switch at pin 1 of A1J7.

IN CASE OF SEVERAL SIMULTANEOUS ERRORS

If all of the first 5 messages above are displayed, the sole culprit is most probably the RETURN0 signal at pin 3 of A1J6 (which goes to those 5 switches).

COMPLETE STARTUP SEQUENCE FLOWCHART

```
                        ┌─────────────────────┐
                        │   Game Power-Up     │
                        └─────────────────────┘
                                  │
                                ◇ Power
                                  LED(s) lit ?      no ──────────┐
                                  │ yes                          │
                                ◇ Welcome                        ▼
                                  Message          no ──▶ ┌──────────────┐
                                  displayed ?             │ Power Supply │
                                  │ yes                   │  Problem     │
                                ◇ « CPU »                 └──────────────┘
                                  LED             no ──▶  ┌──────────────┐
                                  flashes ?               │Microprocessor│
                                  │ yes                   │  Problem     │
                        ┌─────────────────────┐           └──────────────┘
                        │ Display selected game (letter + name) │
                        └─────────────────────┘
```

Game Power-Up

Power LED(s) lit ? — **no** → **Power Supply Problem**

yes

Welcome Message displayed ? — **no** → **Power Supply Problem**

yes

« CPU » LED flashes ? — **no** → **Microprocessor Problem**

yes

Display selected game (letter + name)

Press « TEST » button ? — **yes** → Selected game flashes

no

5 seconds wait

end

Selected game flashes

Press « TEST » button ? — **yes** → Next game in list

no

Press « CREDIT » button ? — **yes** →

no

5 seconds wait — end →

Next game in list →

Switches test
Playfield coils test

Game Ready!

COILS TEST

Depending on the game settings, all the coils assigned to the currently selected game are fired once, and checked against possibly stuck switches on the playfield.

> ➢ **Refer to DIPSW 40, 48 and 49 in menu '3' DIPSW+**

X4 ➡ Moreover, the **PI-1 X4** board makes an electrical test of the current that flows thru coils #6, 7, 8, 'OUTHOLE' and 'KNOCKER', to make sure that each coil and its associated driver transistor are working well. At power-up, the name of each tested coil is briefly displayed. In case of trouble, the coil protection relay shuts all coils down, the relay status LED is unlit, and an error message is displayed along with the problem source.

> ➢ **Refer to chapter ERROR MESSAGES, and also DIPSW 55 of menu DIPSW+**

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** on **PI-1** (U18) and **PI-1 X4** (J14) :
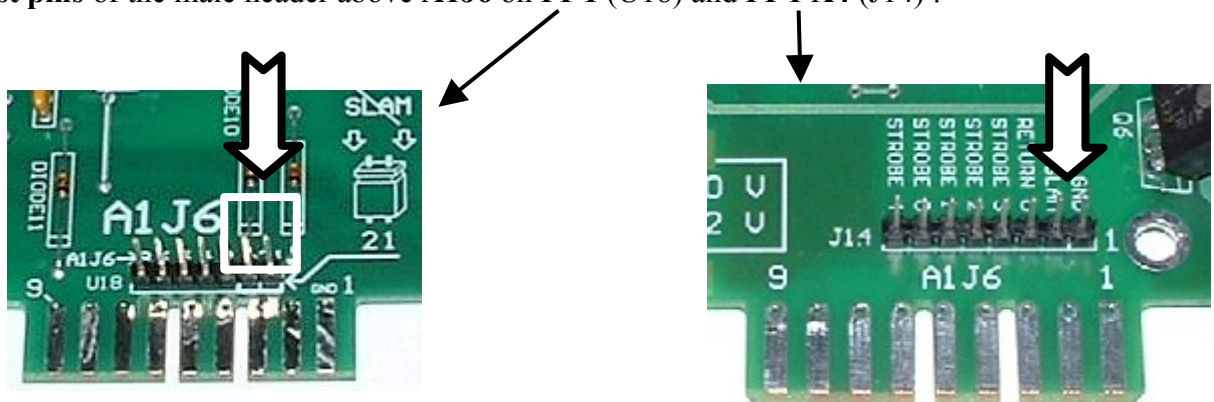
The pins are well identified on the **PI-1 X4** board and on the latest versions of the **PI-1** board.

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 « 57 » 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 »):

- Figure « 1 » and letter « I » are identical

- 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: any game 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 during a data transfer, such as with the non-volatile backup memory (also called EEPROM) for example when the microprocessor wants to store the new value of a parameter.
  May come from a faulty memory, or a transient spike on the power supply lines (e.g. a defective anti-return diode in parallel with a coil).
  ➢ In the latter case, switching 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 for analysis*

- **[L] NO EEPROM**
  The non-volatile backup memory (the EEPROM) is missing or not responding.
  The game remains locked because it needs a working backup memory to operate properly.
  ➢ 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

- **OUTHOL EMPTY**
  No ball is in the outhole (or the associated OUTHOLE switch is broken).

- **[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

X4 ▶ - **[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

X4 ▶ - **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
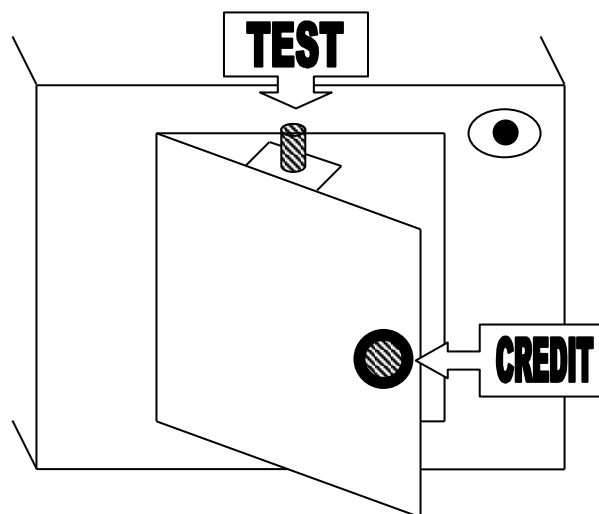
Depending on the context, each of those 2 keys may
be assigned to a different action described case by case below.

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 <u>most important information regarding the current selection:</u> 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.

  - o The first time the data is displayed, it ⟩flashes⟨ to show that it has not been modified yet.

- **PLAYER2** display shows <u>additional information</u> (details of a setting for example) that is useful but not absolutely necessary to a proper understanding of the selection.
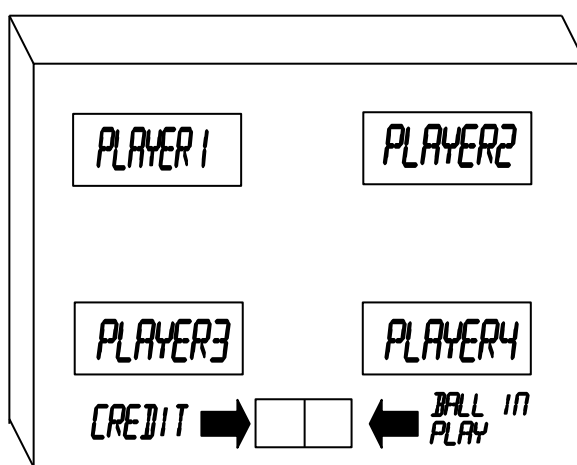
- **PLAYER3** and **PLAYER4** displays combined together show longer messages (up to 12 characters) on the current selection, often the full name of the selection. Like PLAYER2, they are useful but not absolutely necessary.

- **CREDIT** display shows <u>the step number of the current menu or sub-menu</u>
  - ➢ *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. 5**1**
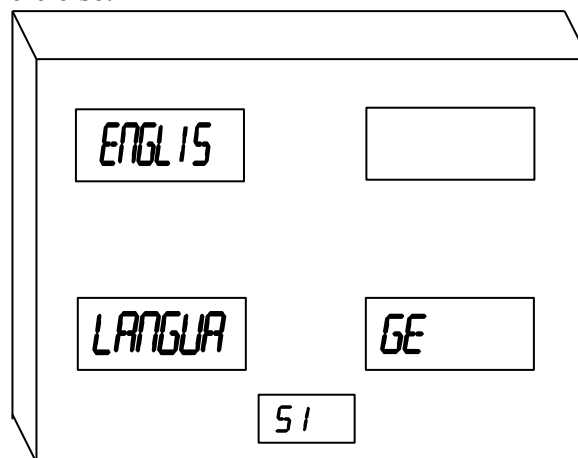
MAIN MENU

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

Press [TEST]

« AUDITS »
Menu #0 — *Press [CREDIT]* →

Press [TEST]

« TESTS »
Menu #1 — *Press [CREDIT]* →

Press [TEST]

« DIPSW »
Menu #2 — *Press [CREDIT]* →

Press [TEST]

« DIPSW+ »
Menu #3 — *Press [CREDIT]* →

Press [TEST]

« PRESET »
Menu #4 — *Press [CREDIT]* →

Press [TEST]

« LANGUAge »
Menu #5 — *Press [CREDIT]* →

Press [TEST]

« END » — *Press [CREDIT]* →

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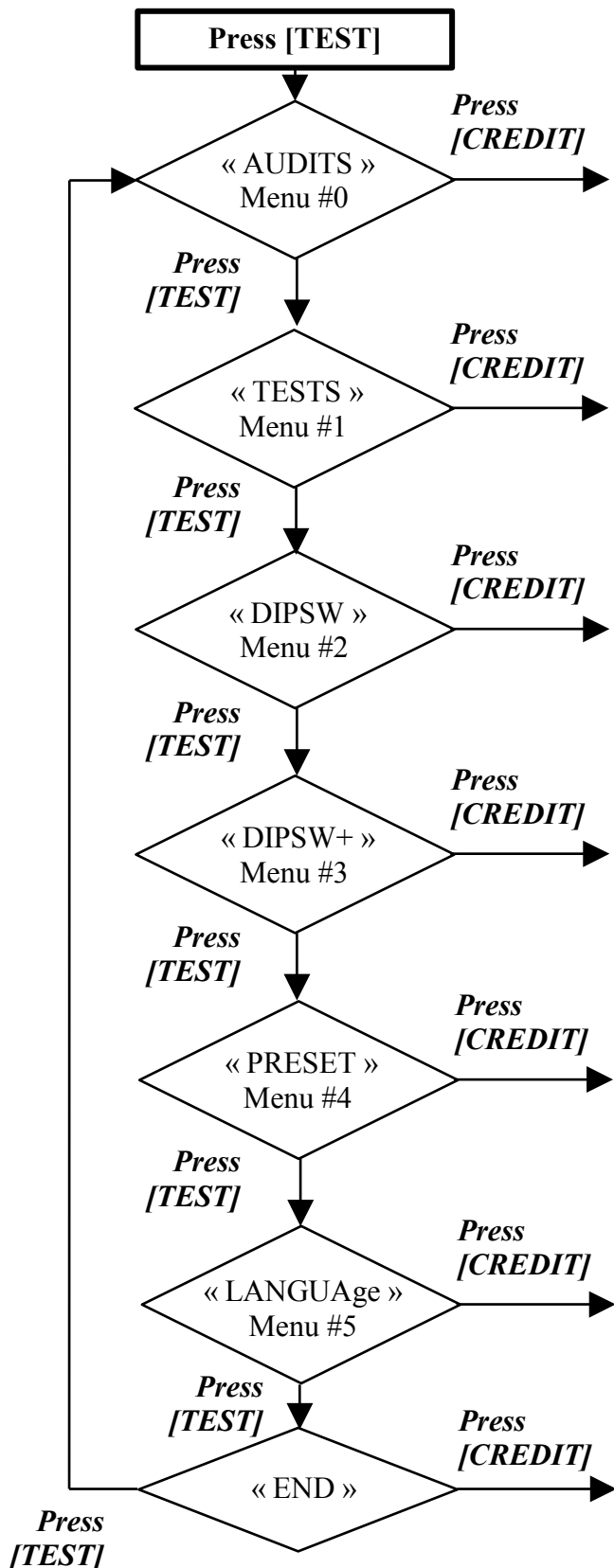
If a game is in progress, it automatically comes to an end for all players.

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 « ꟼ- » for the menu **PRESET**) and ⟩ flashes ⟨
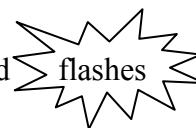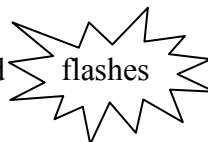
IMMEDIATE EXIT FROM A MENU OR SUB-MENU

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* to *10*: strictly identical to the original board
- *11* number of times the highest score has been beaten
- *12* won replays percentage = (number of won replays) / (number of played games) x 100
- *13* 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
- *14* 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.

l0. **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.

l l. **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- »

l2. **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 <u>all coils assigned to the selected game</u> ; 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:
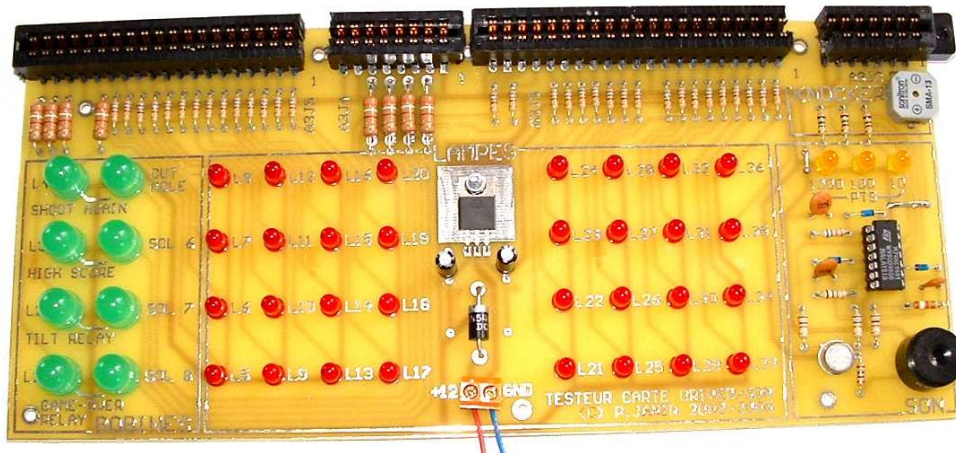
Detailed schematics of this test board are freely available here:
http://www.flippers-jukeboxes.net/viewtopic.php?t=11369

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 <u>damage the game</u>.

Start the 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 l to $\mathit{23}$) 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:

l and $\mathit{4}$: 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 $\mathit{COnF}\ l$ to $\mathit{COnF}\ \mathit{16}$) 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:
  - o #1: 1 coin 1 play
  - o #2: 1 coin 2 plays
  - o #3: 1 coin 3 plays
  - o #4: 1 coin 4 plays
  - o #5: 1 coin 5 plays
  - o #6: 1 coin 6 plays
  - o #7: 1 coin 7 plays
  - o #8: 1 coin 8 plays
  - o #9: 1 coin 9 plays
  - o #10: 2 coins 1 play
  - o #11: 2 coins 2 plays
  - o #12: 2 coins 3 plays
  - o #13: 2 coins 4 plays
  - o #14: 2 coins 5 plays
    - ▪ For #10 to #14, no play is earned until the 2nd coin is inserted
  - o #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)
  - o #16: 3 coins 1 play; no play is earned until the 3rd coin is inserted

$\mathit{11}$: 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 threrefore priority over DIPSW 22, 47 and 52

$\mathit{17}$: 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:
  - o $\mathit{8}$, $\mathit{15}$, or $\mathit{25}$: maximum number of credits; the « KNOCKER » keeps '*knocking*' at every earned credit but the credits counter stops increasing when reaching this number
  - o $\mathit{99}$: 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 2nd 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 (*ON* –closed- or *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 *OUTHOL 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.

!
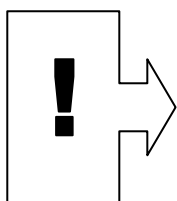
$49.$ enables the "eco" coil mode in addition to the thorough check above: the coils are then triggered only if at least 1 of their associated switches is detected closed beforehand; for example, this will trigger a coil that resets a drop targets bank only if at least 1 of the drop targets has been 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 :

> Normal countdown:
  1. 1,000+1,000+1,000+1,000+1,000 (15,000),
  2. 1,000+1,000+1,000+1,000+1,000 (14,000),
  3. 1,000+1,000+1,000+1,000+1,000 (13,000),
  4. 1,000+1,000+1,000+1,000+1,000 (12,000), etc..
> Faster countdown:
  1. 5,000 (15,000),
  2. 5,000 (14,000),
  3. 5,000 (13,000),
  4. 5,000 (12,000), etc..

X4 ►

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

« -- »: 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:

o the currently edited letter flashes

o 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 « L » (left bracket) = backspace
then back to A

o if the **[CREDIT]** button is **released**, the scrolling stops onto the currently displayed letter which flashes again

o 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

o if the **[CREDIT]** is released on « L » 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)

o after the 4th position, the final name (e.g. « GENI ») is stored in the table

o 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 :
   o the ranking (1st to 5th) is displayed in PLAYER2 and MATCH
   o the player's score is displayed in PLAYER3
   o 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 <u>confirm</u> the action, press **[CREDIT]**

    o The flashing message ⟨ *WRITIN* ⟩ is displayed for a few seconds

    Do **not** turn the game off while writing is in progress!!

    o The confirmation message « *-DONE-* » is displayed once completed

- To <u>cancel</u>, press **[TEST]**

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

40. **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 and 58 (and 55 for the **PI-1 X4**)

41. **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
1..4	Conf. 1 : 1 coin, 1 play	
5..8	Conf. 7 : 1 coin, 7 plays	
9	ON	
10		
11		
12		
13		
14		
17,18	Up to 15	Unlimited
19	OFF	
20	ON	
21		
22		
23		
25	OFF	ON
26	ON	
27	OFF	ON
28		
29		
30		
31		
32		
33		
34		
35		
36		

DIP SW	Presets ORIGIN	Presets WIZARD
37	OFF	ON
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50	ON	
51	OFF	ON
52	OFF	
53		
54	OFF	ON
55	ON	
56	OFF	
57	OFF	ON
58	ON	
59	OFF	ON
60	OFF	

(**X4** arrow points to rows 54 and below)

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 40 « 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. **FRANCA**is
    51. **ENGLIS**h
    52. **DEUTSC**h
    53. **ESPANO**l
    54. **ITALIA**no
    55. **PORTUG**ues
    « -- »: to quit

Upon entering this menu, the submenu corresponding to the current language is displayed <u>first</u> 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 <u>immediately</u> 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, <u>it ends immediately</u> ; neither the high scores nor match will be checked

NOTE

<u>All settings modifications that have been made, whatever they may be, are immediately taken into account</u> 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:

- **<u>Enable all the new features of the PI-1 board at the same time:</u>** 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 « *WRITIN* » 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)

- **<u>Change the language of all displayed messages:</u>** 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)

- **<u>Set 1st replay to 50,000 points:</u>** 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* », « *WRITIN* » 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 1st time.
Scoring all 4 « Ace » drop targets + the « Joker » drop target lights *Extraball* a 2nd 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 1st *Extraball* has not been scored yet, then the 2nd *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 ENCOUTERS

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

The *Extraball* is 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 rolllovers 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

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

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

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

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.

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 0) or scoring 1'000'000 points (if DIPSW 34 is ON) gives 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, which 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 S*pecial* is lit and can be scored endlessly in the right hole as long as the ball is kept in play. If the Sp*ecial* 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

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

Cannot be implemented since the top 2 rollovers are wired together and cannot be told apart.

JUNGLE QUEEN

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

3 top rollovers 1 7 and 8.

GUARANTEE

Both **PI-1** and **PI-1 X4** boards are guaranteed for <u>**SIX MONTHS**</u> (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, the board shall be returned at the address below, <u>**in its original anti-static bag**</u>, together with:

- A copy of the proof of purchase
- A detailed letter explaining all the observed symptoms, how to reproduce them (if applicable) and under which circumstances they showed up + displayed error messages (if applicable)
- **Prior to** any return shipment **outside of European Union**, a specific **proforma invoice**, to **attach** outside the parcel in **duplicate** in a pouch, must be provided by me for customs

The board will then be either replaced or repaired and sent back as soon as possible.
<u>In no case</u> 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 I will make arrangements with.

In all cases, never hesitate to contact me, even if the board is no longer covered by the warranty!
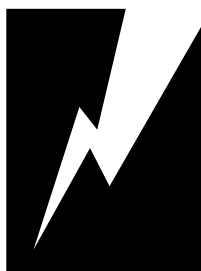
On top of everything, the board should only ever be repaired by professional and skilled technicians. I absolutely discourage owners attempting their own repairs. Any failures or consequences of such self-repairs are at their own risk and liability.

Pi-1 & Pi-1 X4

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Audits

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

Tests

Menu Number (Credit)	Full Name (Player3/ Player4)	Short Name (Player1)	1st Sub-menu (Player1)	CREDIT Switch Action		Step (Credit)	Value (Match)	TEST Switch Action
1-	TEST MODES	TESTS	DISPLA	Run displays test		10		Next Test
			COILS	Run coils test		11		
			LAMPS	Run lamps test		12		
			SWITCH	Run switches test		13		
			DRIVER	Run test on specific « driver » test bench		14		
			-END-	Back to main menu		--		

		2nd Sub-menu	Value (Player1)	1st Action CREDIT Switch	CREDIT Switch Next Actions	Value (Match)	TEST Action
		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)

Menu Number (Credit)	Full Name (Player3 / Player4)	Short Name (Player1)	Dip Sw name (Player3 / Player4)	Dip Sw feature	« On » value (Player1)	«Off » value (Player1)	Step (Credit)	Value (Match and Player2)
2- TEST = Next Dip Sw CREDIT = Toggles On / Off, or next value (for steps 1 and 5)	STANDARD SW	DIP SW	« x » COIN « y » PLAY	Number of coins to insert on coin chute #1 (left) to get a given number of credits	CHUTE1		1	CONF « xx » : configuration number among the 16 available (see manual)
			« x » COIN « y » PLAY	Number of coins to insert on coin chute #2 (right) to get a given number of credits	CHUTE2		5	
			BALLS P GAME	Number of balls per game	3 BALL	5 BALL	9	« On » or « Of »
			MATCH FEATUR	Match feature at the end of the game; 1 play award	ENABLE match enabled	DISABL no match, MATCH display is blank	10	
			GAME MODE (also called « NOVELTY »)	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.	REPLAY free plays earned as usual	EXBALL one extraball instead of a free play, no match, highest score stored but not displayed and no award if beaten	11	
			TILT EFFECT	TILT terminates the ball in play or the whole game (like a SLAM)	BALL only the ball in play	GAME the whole game, all players	12	
			DISP CREDIT	Displays number of remaining credits (CREDIT)	YES display in CREDIT	NO CREDIT remains blank but the number of remaining plays is remembered	13	

DipSw Settings (2/2)

Menu Number (Credit)	Full Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On » Value (Player1)	«Off » Value (Player1)	Step (Credit)	Value (Match and Player2)
2- TEST = Next Dip Sw CREDIT = Toggles On / Off, or next value (for Step 17)	STANDARD SW	DIP SW	CREDIT TUNE	Play the tune when a new game is started	YES play the tune	NO Silent	14	« On » or « Of »
			MAXI CREDIT	Maximum number of credits	● UP TO {8, 15, 25} CREDits ● FREE PLAYS: gives 99 plays always		17	8, 15, 25 or « 99 »
			COIN CHUTES	Set both chutes to the same value	SAME same value	SEPARA separate values	19	« On » or « Of »
			TONE SCORE	Play tones during a game	YES play tones	NO silent scoring	20	
			DISP HISCOR	Display the highest score (high game to date)	YES display the highest score every 5 seconds when game is over	NO highest score is stored in memory but not displayed and gives no free plays	21	
			HISCOR AWARDS	Award for beating the highest score	3 PLAY 3 free plays	NONE stored but no award	22	
			COIN TUNE	Play the tune when a coin is inserted in either chute	YES play the tune	NO silent	23	
			EXIT DIPSW	Back to main menu	-END-	-END-	--	

DipSw+ Settings (1/8)

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On» Value (Player1)	«Off» Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+	IDLE ATTRACT	Animate controlled lamps on the playfield once the game is over (in idle mode)	ENABLE animate controlled lamps	DISABL all controlled lamps off	25	
			OUTLET FREQ	Set display refresh rate to minimize flickering indoors. It must match the AC outlet frequency.	50 HZ such as for Europe	60 HZ such as for North America	26	
			ROUND 6 + 9	Round aspect of figures «6» (top segment 'a' added) and «9» (bottom segment 'd' added)	ENABLE round aspect	DISABL original digits, more square-looking	27	«On» or «Of»
			RELOAD SCORES	At power-on, game scores made before last power-off are re-displayed	ENABLE reload past scores	DISABL all scores default to «000,000»	28	
			UNLIT FLASH	Given lamps on the playfield flash quickly when feature made (cool visual effect)	ENABLE quick flash when feature made	DISABL immediately unlit	29	

DipSw+ Settings (2/8)

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On » Value (Player1)	«Off » Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+	LAUNCH BALL	Wait until ball is in the outhole before kicking it in play	WAIT wait for ball and display a warning message	NOWAIT energize outhole even if empty	30	
			SKILL SHOT	Give a skill bonus when a designated target if it before any other one (GAME DEPENDENT)	ENABLE skill bonus active	DISABL no skill bonus	31	
			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 »
			PLAYER LEVEL	All scores are divided by 10 (except 10 pts switches)	EXPERT automatically activated beyond 900,000 points	NORMAL normal scoring	33	

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On » Value (Player1)	«Off » Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+	1-MILL AWARD	Extra award when score reaches 1,000,000 points (when it rolls back to 000000)	1 PLAY gives 1 free play	NONE no award	34	« On » or « Of »
			GAME RULES	Use different game rules than the original (Genie, Dragon, Totem, Pinball Pool only so far)	SPIN+ the spinning target or star rollovers scroll ABC(D) rollover lamps	NORMAL original rules	35	
			CHANCE BALL	Kick ball back in play if play time was shorter than 5 seconds	ENABLE kick ball back in play and display a message	DISABL ball is counted as played	36	
			TILT HITS	Number of « TILT » hits needed to disqualify the ball in play	2 HITS 2 TILT hits; « DANGER » is displayed at 1st TILT hit	1 HIT normal TILT after 1 hit	37	
			PATCH BUGS	Fix some problems in the original game rules (SUBJECT TO IMPLEMENTATION)	ENABLE fix tunes for TILT + GAME OVER and unlit concurrent *extraball* lamps if DIPSW32=OFF	DISABL 100% original game	38	
			GAME ATTRACT	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	ENABLE quick flash + message : ● 1st initial kick + highest score ● if no score ● if CHANCE ball	DISABL nothing	39	

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On » Value (Player1)	«Off » Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+	COILS RESET	Energize all coils (drop targets, vari targets, holes..) at power-up and at the end of every game <u>The behaviour of this feature depends on DIP SW 48 and 49</u>	ENABLE energize the coils, depending on the setting of DIP SW 48 and 49	DISABL no action	40	
			SPECIAL LAMP	The « SPECIAL » lamp(s) flash instead of being steadily lit	FLASH	STEADY	41	
			EXBALL L LAMP	The « EXTRABALL » lamp(s) flash instead of being steadily lit	FLASH	STEADY	42	« On » or « Of »
			BONUS MAX 39	Let bonus go up to 39 <u>only</u> on the games whose bonus already reaches 20 : Solar Ride, Countdown, Close Encounters, Totem, Hulk, Genie, Buck Rogers, Torch, Roller Disco	ENABLE bonus goes up to 39 by lighting both « 20 » et « 10 » bonus lamps together	DISABL bonus stops at 19, 20 or 29 as usual, depending on the game	43	
			DISP BONUS	Bonus display mode on the playfield	RAMP lamps from « 1000 » till the current bonus value are lit in a ramp fashion	NORMAL only the current bonus lamp is lit	44	

DipSw+ Settings (5/8)

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On» Value (Player1)	«Off» Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+	SCOREBONUS L	The «SCORE BONUS» lamp (if present, and if not shared with other bonus lamps as in *Hulk*) flashes when lit and during bonus countdown	FLASH the lamp flashes then goes off when count down ends	STEADY the lamp is steadily lit	45	«On» or «Of»
			HISCOR TABLE	Display mode for high scores table (when in game over)	TOP 5 5 highest scores are remembered along with players' names, 4 characters long	TOP 1 only the highest score is remembered, without any name	46	
			2-5 HI AWARD	Give an extra award if 2nd to 5th high score is achieved (if SW46 is «ON») This setting is skipped if DIPSW46= OFF	1 PLAY award a free play	NONE no award	47	
			COIL STATUS	Force check that none of the switches associated to a given coil remains stuck closed Retries up to 5 times	CHECK if one or more switches remain closed, display an error message and prohibit starting any new game	IGNORE energize the coil just once without checking its associated switches	48	

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On » Value (Player1)	«Off » Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+	COIL MODE	The coil is energized only if at least 1 of its associated switches is detected closed *beforehand*; This spares transistors and fuses <u>Setting skipped if DIPSW48= OFF</u>	ECO if all switches are open, the coil is not energized; however, a varitarget will always be energized once, no matter the setting	NORMAL the coil is always energized	49	
			SKILL SCORE	Set the increasing score award each time the designated target or rollover is scored in SKILL SHOT mode <u>Setting skipped if DIPSW31= OFF</u>	+5000 the skill shot award increases by steps of 5,000 points till 90,000 points maximum	+10000 the skill shot award increases by steps of 10,000 points till 90,000 points maximum	50	« On » or « Of »
			HIT FLASH	Lamps of given targets or rollovers will flash briefly when the ball hits corresponding feature (cool visual effect)	ENABLE the lamp flashes quickly	DISABL the lamp remains steadily on or off	51	
			SPECIAL MODE	Once hit, a lit Special target gives 50,000 points instead of a replay <u>Setting skipped if DIPSW11= OFF</u>	+50000 « knocks » then gives 50,000 pts	NORMAL normal special	52	

DipSw+ Settings (7/8)

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On » Value (Player1)	«Off » Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+ **X4** ➤	SKILL FLASH	Set the number of times the entire playfield flashes after the skill shot has been scored <u>Setting skipped if DIPSW31= OFF</u>	SINGLE all playfield lamps flash only once	3 X all playfield lamps flash 3 times	53	« On » or « Of »
			SCORE BONUS	Speeds up bonus countdown	FAST faster countdown	NORMAL normal countdown	54	
			COIL PROTEC	Monitors the coils' current and opens the protection relay in case of trouble	ENABLE coils are monitored	DISABL no measurement	55	
			POWER IDLE	Without any user action, when a game is over, swiches off all playfield lamps by turning TILT relay on	30 SEC switch all playfield lamps off after 30 seconds in game over mode	DISABL no action	56	
			DISP 1-MILL	Scores can reach or exceed 1,000,000 points	ENABLE scores beyond 1,000,000 points are managed and stored in memory	DISABL regular scoring: score counter rolls back from 999,990 to 0	57	

DipSw+ Settings (8/8)

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Dip Sw Name (Player3 / Player4)	Dip Sw Feature	«On » Value (Player1)	«Off » Value (Player1)	Step (Credit)	Value (Match and Player2)
3- TEST = Next Dip Sw CREDIT = Toggle On / Off	EXTRA SWITCH	DIPSW+	DISPLAY TYPE	Set the display font used to drive the players displays	NORMAL regular 8-segment font	7-SEG specific 7-segment font (without central « h ») fitted for some replacement LED displays	58	« On » or « Of »
			BONUS RAMP	Select the way the bonus lamp is lit	FLASH the lamp is flashing	STEADY the lamp is steadily lit	59	
			EXBALL MODE	Extraball award	+10000 awards 10,000 points instead of an extraball	NORMAL awards a regular extraball	60	
			EXIT DIPSW	Back to main menu	-END-	-END-	--	

Presets (1/2)

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	1st Sub-menu (Player1)	CREDIT Switch Action	Step (Credit)	TEST Switch Action
4-	DATA PRESET	PRESET	ORIGIN	Set all DipSw to original values	40	Next Test
			WIZARD	Set all DipSw so as to enable all new features	41	
			AUDITS	Reset all « AUDITS » data and top 5 high scores table	42	
			SCORES	Reset top 5 high scores table and replay scores to default values	43	
			ERASE	Erase all data	44	
			-END-	**Back** to main menu	--	

		2nd Sub-menu	Action	CREDIT Switch 1st Action and Display (Player1)	CREDIT Switch 2nd Action	TEST Switch Action
		ORIGIN	Set all Dip Sw to 100% original values: ● Dip Sw 6, 7, 9…16, 18, 20…23, 26, 50, 58 « ON » ● All other Dip Sw « OFF »	Ask for confirmation, display flashing « SURE »	Set Dip Sw accordingly	Next Sub-menu, or cancel selected action
	DO NOT TURN GAME OFF WHILE WRITING IS IN PROGRESS	WIZARD	Set all Dip Sw so as to enable all the new features of the board: ● Dip Sw 1…5, 8, 19, 52, 53, 56, 60 « OFF » ● All other Dip Sw « ON »		Set Dip Sw accordingly	
		AUDITS	Reset all values of menu « AUDITS » at steps 0 to 11 and 13 and top 5 high scores table		Reset all values	

Presets (2/2)

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)				
4-	DATA PRESET	PRESET				
		2nd Sub-menu	Action	CREDIT Switch 1st Action and Display (Player1)	CREDIT Switch 2nd Action	TEST Switch Action
	DO NOT TURN GAME OFF WHILE WRITING IS IN PROGRESS	SCORES	Put the following default values in the 3 replays and the high scores table (the other settings remain unchanged) : ● 1st replay = 220,000 points ● 2nd replay = 350,000 points ● 3rd replay = 490,000 points ● Highest score = 600,000 Name=PASC ● 2nd high score = 500,000 Name=BEA ● 3rd high score = 400,000 Name=QUEN ● 4th high score = 300,000 Name=ARTH ● 5th high score = 200,000 Name=ALEX	Ask for confirmation, display flashing « SURE »	Store values into scores	Next Sub-menu, or cancel selected action
		ERASE	Data of menus : ● 1- (Audit) ● 3- (Dip Sw) ● 4- (DipSw+) are reset or set back to original values <u>for ALL games</u>. Selected game, language and number of remaining credits remain. It is like running the following sub-menus: 40 « ORIGIN » 42 « AUDITS » and 43 « SCORES » (except high scores table) of menu PRESET		Proceed with erase, display flashing « ERASE » then « WRITIN » and « -DONE- » when completed	
		-END-	Back to main menu	Back to main menu		Next sub-menu

Language & Exit

Menu Number (Credit)	Long Name (Player3 / Player4)	Sub-Menu (Player1)	Action	CREDIT Switch Action	TEST Switch Action	Step (Credit)
5-	LANGUE MESSAG LANGUAGE SPRACHE IDIOMA LINGUA MESSAG LINGUAGEM *NOTE: the current language setting flashes in Player1, and is displayed first upon entering the menu*	FRANCA(is)	All messages (menus & during game) are displayed in French	Enable the selected language	Next Step	50
		ENGLIS(h)	All messages (menus & during game) are displayed in English			51
		DEUTSC(h)	All messages (menus & during game) are displayed in German			52
		ESPANO(l)	All messages (menus & during game) are displayed in Spanish			53
		ITALIA(no)	All messages (menus & during game) are displayed in Italian			54
		PORTUG(ese)	All messages (menus & during game) are displayed in Portuguese			55
		-END-	Back to main menu	Back to main menu		--

Menu Number (Credit)	Long Name (Player3 / Player4)	Short Name (Player1)	Action
--	EXIT MENUS	-END-	General exit from menus: ● All data that has been modifed comes into effect <u>immediately</u> ● 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).

Notes