WELCOME TO CERTABO® WORLD!
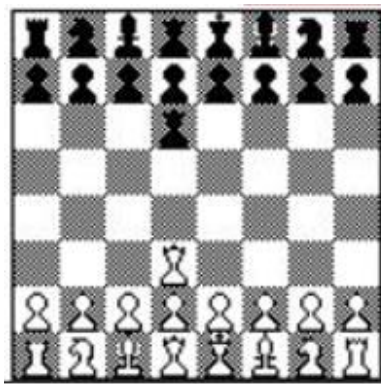## *Certabo Nano User Manual*

Thank you for purchasing Certabo Nano, the micro chess computer with e-ink display compatible with all Certabo chessboards.

Initial Setting

The use of Certabo Nano is very simple, please follow the steps below. At first boot Certabo Nano will automatically perform the calibration of the pieces. All function's setting on Certabo Nano is made by spare queens mainly, it is then necessary to calibrate the pieces first. We then recommend to place the pieces on the board including the spare queens before the first power-up to allow setting and play immediately. However, it is always possible to reconfigure the pieces at a later time.

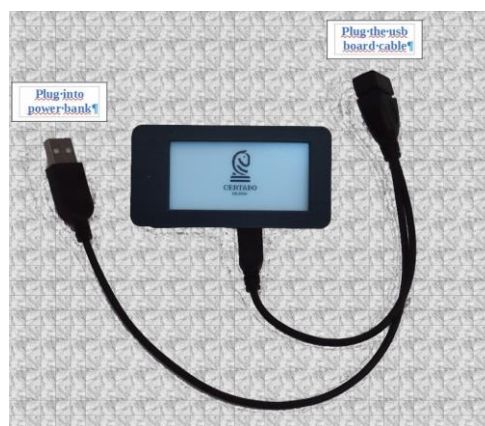**1-Initial placement of pieces on the chessboard**

With the chessboard's usb connector at the bottom right, place the pieces on the board the whites on the bottom and the blacks on the top, place the spare queens too respectively the white in d3 and the black in d6.

Place pieces on chessboard before first boot as depicted

2 Connect the chessboard to the Certabo Nano

Connect the provided OTG Y cable to the central micro usb of the Certabo Nano, then the chessboard cable into the female port of the OTG cable and finally connect the USB-A plug to a power bank or an external power supply to the second micro usb port of the Certabo Nano.

As soon as the Certabo Nano module is powered up it will automatically start, wait few seconds for it to start. All the LEDs of the 1,2,7,8 rows, d3 and d6 will light up and the calibration will start automatically. Wait a few seconds for the calibration to finish. The pieces are now stored and no additional calibration is necessary unless you want to change a set.

3- Remove spare queens from d3 and d6

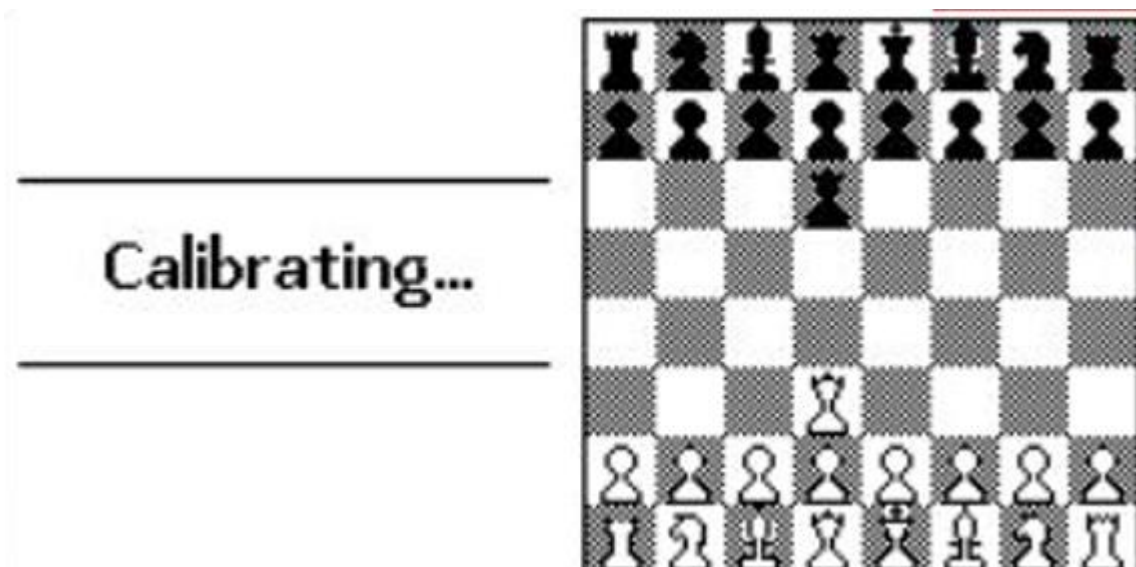Remove the spare queens from d3 and d6 it's now possible to start setting parameters.

Calibration of new pieces set after first boot

If you want to use a different set, for example a new set of pieces or if you need to carry out a new calibration, proceed as follows. Connect the board without the pieces and turn on the Certabo Nano waiting for it to start up.

As soon as the Certabo Nano module is powered up it will start automatically wait a few seconds for it to start. **All the LEDs of the 1,2,7,8 rows only will light up**. Place the pieces on the chessboard in the initial position and the LEDs will turn off the device is ready for the initial calibration. Now place the spare white and black queens in d3 and d6 respectively. Calibration will start automatically, the pieces will be recognized and stored. The calibration phase will be shown on the display for a few seconds.

If you want to change the set, repeat the above reported procedure with a new set of electronic pieces. _**Note that only one calibration can be performed at each startup. If you want to recalibrate restart the device and repeat the procedure**_.

Setting of the playing options

All settings can be simply done with the spare queens. To set any option, place a spare queen on the specific square relative to the desired chosen option. The four LEDs of the chessboard's four corners will briefly light up to confirm the correct registration. Confirmation of the selected option will also be highlighted on the display with a darker outline of the selected field. See the main screen of parameter's setting.

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Game modes

Certabo Nano features different game modes specifically the following three different types

1-Play vs. Maia (Human style Neural Network AI engine)

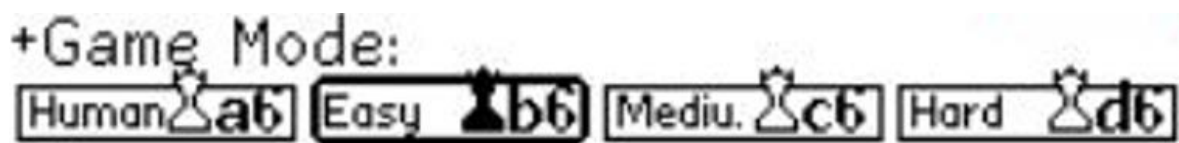**2-Play from any position of the chessboard**

3-Game between two humans with chessboard analysis support

1-Play vs Maia

Certabo Nano integrates the Maia chess engine the famous engine based on neural network and trained on millions of human games. With a playing style similar to a human Maia will make you enjoy every game.

Set difficulty level
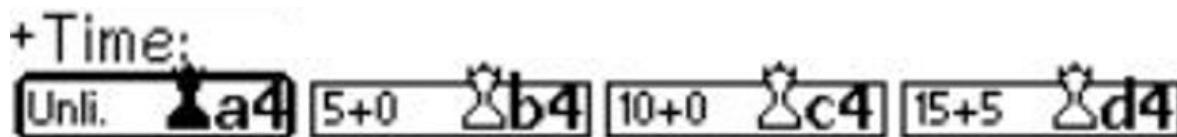
On the Certabo Nano it is possible to select three different levels of difficulty. Place one of the two spare queens to queen in b6 b6, d6; respectively for easy, medium and difficult level.

+Game Mode:
| Human ♟a6 | Easy ♟b6 | Mediu. ♟c6 | Hard ♟d6 |

Please note that increasing the level of difficulty, the computation time given to Maia will increase and may extend to several tens of seconds or minutes. However, it is always possible to have Maia performing the move at any time, see below how to trigger this function once game is started.
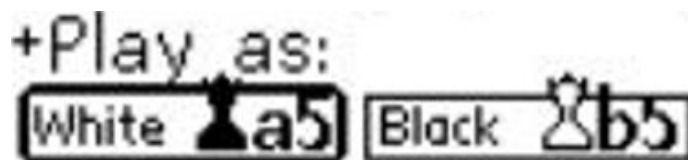
Time

By default, the games are set on unlimited. It is possible anyhow to select three different times for timed games. Place the queen in b4, c4, d4 for 5 + 0, 10 + 0, 15 + 5 respectively.

+Time:
| Unli. ♟a4 | 5+0 ♟b4 | 10+0 ♟c4 | 15+5 ♟d4 |

Color

To select the color to play with, place the spare queen in a5 or b5 to play with white (default) or black respectively. Note that white shall always be at the bottom so to play with black turn the board.

+Play as:
| White ♟a5 | Black ♟b5 |

Start the game

To start a game place one spare queen in a3 wait for the confirmation of the 4 LEDs remove the queen and, if playing with white, make the first move or wait for Maia to move if playing with black.

+Board Start:
| Initial ♟a3 | Pos.W ♟b3 | Pos.B ♟c3 |

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2-Play from any chessboard position

Play from position

To play from an any given position as white or black, place the queen on b3 or c3 respectively to enter the relative mode.

+Board Start:
Initial ♙a3   Pos.W ♙b3   Pos.B ♙c3

You will prompted to remove the kings from the board and place the pieces in the desired position.
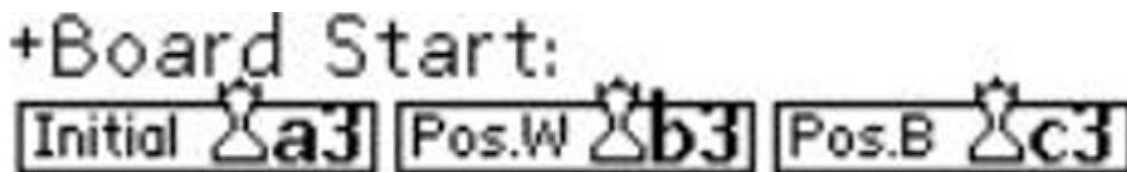
Starting from custom board position…
Remove Kings from board

Set board to custom position
Place back Kings when done

Afte removing the kings place all the pieces, place the kings on the board again and the game will start automatically.

3-Play between two humans

If you want to play a game between humans with the computational support of Certabo Nano, during all phases of the game, place the queen in a6 to select the option and then the queen in a3 to start the game.

+Game Mode:
Human ♙a6   Easy ♟b6   Mediu. ♙c6   Hard ♙d6

While playing

Once any game has started, the display will show the list of moves and the time on the display, with convenient time bars.

Move History

Human

1.♙c3 +40   ♟e5 −10
2.♘f3 −6   ♟e4 −69

MAIA

5min.   5min.

~Saragossa Opening~

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Training

Certabo Nano is designed to help you improve your game level and become familiar with the most popular openings. During any game you will be provided with specific information about the opening played if found in the database to help you understand if you are playing a particular book opening. See following pic as example guide

Move History

Human ♙ ▲

1. ♙d4 +40   ♟d5 +24
2. ♘f3 +25   ♟e6 +16
3. ♙e3 +32   ♟c6 +29

MAIA ♟

~Queen's Pawn Game: Zukertort Variation~

On top of that, you are continuously provided with the CP evaluation which will inform about your current advantage or disadvantage you may have over your opponent.

At each move it is also possible to analyze the position and ask for help to evaluate the advantage and the relative CP for any given move. If you want to use the training function during your turn, just lift a piece and wait a few seconds so that the chess engine start proceeding to deep analysis of the position.

As soon as the led of the lifted piece light up, the deep analysis has been completed and the best variant is calculated. Place the piece back in its position, and the best possible variant will be shown on the display and the expected CP will also be calculated. At the same time, all the possible moves for the piece under analysis will be shown on the chessboard by LEDs and the best one will be highlighted with a flashing. For example, the best variant for the white bishop is found in d3.

Move History

Human ♙ ▲

1. ♙d4 +40   ♟d5 +24
2. ♘f3 +25   ♟e6 +16
3. ♙e3 +32   ♟c6 +29

MAIA ♟

Hint: ♗d3+50cp ♞f6 0-0 ♟d6 ♗c4 ♟b6

If you want to run analysis for another piece or move repeat the same procedure by lifting another piece.

Wrong positioning / Offset of a piece

If during a game a piece is inadvertently moved or is offset from a square, its LED will light up to warn you, place/reposition on it square the led will go off.

Take back of the move

if during a game you want to go take back one or more moves, simply take the pieces back in the reverse sequence. In case you are playing against Maia, first wait for the completion of its move then bring back Maia's piece and then your own. The take back of your will also be shown by LEDs. It is possible to take back as many moves as you like by going back to the beginning if necessary.
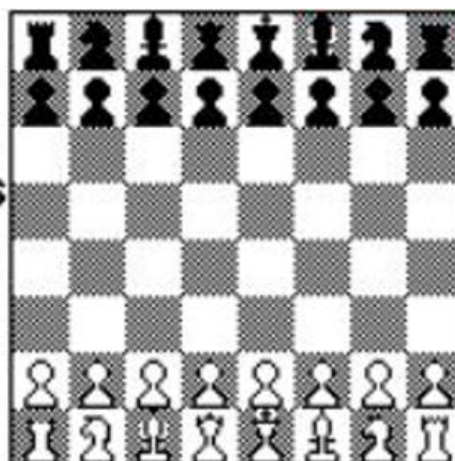
Force Maia's move

As said by increasing the difficulty level, the calculation time given to Maia will increase accordingly and could even extend to several tens of seconds or minutes. To force at anytime Maia to move, simply remove for a few seconds, a king from the chessboard and put it back Maia will immediately make its move by executing the best found one till that time.

End a game

To end a game or to return to the main screen, remove both kings from the board. All the LEDs will light up for a couple of times to allow you to go back if necessary, otherwise after a few seconds you will be invited to place the pieces back in the initial position to start a new game.

Software shutdown

To exit the application, first exit eventual game then place the kings in two central squares any of d4,d5,e4,e5 All the LEDs will flash for a couple of times to allow you to go back if necessary otherwise after a few seconds the software will be terminated on the display will show the Certabo logo. Wait about 15 seconds and then simply unplug the power from the device.

Upadate of Software

Certabo Nano can be simply updated by reflashing the microsd with new release as soon as they will be available. **Before removing the micro sd make sure that Certabo Nano is completely disconnected from the power bank or any power source!** Use a small tweezer for eyelashes to extract the micro sd from the slot on the left.

Microsd Slot →

ENJOY

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COMPLIANCE

https://pip.raspberrypi.com/public/categories/353

FCC COMPLIANCE

https://pip.raspberrypi.com/public/documents/RP-001425-CF/RP-001425-CF-1.pdf

https://pip.raspberrypi.com/public/documents/RP-001424-CF/RP-001424-CF-1.pdf

TCB

GRANT OF EQUIPMENT AUTHORIZATION

Certification

Issued Under the Authority of the
Federal Communications Commission
By:

UL International (UK) Ltd
Unit 1-3 Horizon Business Park Wade Road
Basingstoke, RG24 8AH
United Kingdom

Date of Grant: 10/28/2021

Application Dated: 10/28/2021

TCB

Raspberry Pi Trading Ltd
Maurice Wilkes Building
Cowley Road
Cambridge, Cambridgeshire, CB4 0DS
United Kingdom

Attention: Gordon Hollingworth , Dr

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2ABCB-RPIZ2
Name of Grantee: Raspberry Pi Trading Ltd
Equipment Class: Part 15 Spread Spectrum Transmitter
Notes: Radio module
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
CC	15C	2402.0 - 2480.0	0.0052		

Power is conducted. For satisfying FCC rule part 2.1091, RF exposure compliance; this device must be used at a distance of at least 20 cm from all persons. Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures. The host integrator must follow the integration instructions provided by the module manufacturer and ensure that the composite-system end product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules and to KDB Publication 996369 The module grantee is responsible for providing the documentation to the system integrator on restrictions of use, for continuing compliance of the module

CC: This device is certified pursuant to two different Part 15 rules sections.

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FCC IDENTIFIER: 2ABCB-RPIZ2
Name of Grantee: Raspberry Pi Trading Ltd
Equipment Class: Digital Transmission System
Notes: Radio module
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
CC	15C	2402.0 - 2480.0	0.0042		
CC	15C	2412.0 - 2462.0	0.3698		

Power is conducted. For satisfying FCC rule part 2.1091, RF exposure compliance; this device must be used at a distance of at least 20 cm from all persons. Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures. The host integrator must follow the integration instructions provided by the module manufacturer and ensure that the composite-system end product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules and to KDB Publication 996369 The module grantee is responsible for providing the documentation to the system integrator on restrictions of use, for continuing compliance of the module 20MHz channel operation.

CC: This device is certified pursuant to two different Part 15 rules sections.

CE COMPLIANCE

https://pip.raspberrypi.com/public/documents/RP-001438-CF/RP-001438-CF-3.pdf

DocuSign Envelope ID: C01E91CA-E510-4032-AFB3-70E645ADC09D

E.U. Declaration of Conformity

1 Product Name: **Raspberry Pi Zero 2 W**

2 Manufactured by: **Raspberry Pi Ltd**   Address: **Maurice Wilkes Building, Cowley Road, Cambridge, CB4 0DS, U.K.**

3 EU Authorised Representative: **Comply Express LDA**   Address: **StartUp Madeira, EV 141, Campus da Penteada, 9020 105 Funchal**

4 Object of this Declaration: With the Product Name [1] given above and appearing as below:

5 Declaration: I here by declare that the object [4] of this declaration is in conformity with the operation, material content and essential health and safety requirements of the following Union harmonised legislation:

5.1	Restriction of Hazardous Substance (RoHS)	**Directive 2011/65/EU** of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment and all addendums current to the date of issue of this declaration.
5.2	Radio Equipment (RED)	**Directive 2014/53/EU** of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and all addendums current to the date of issue of this declaration.

6 Conformity Assessment: This declaration is made following the Conformity Assessment Procedure contained within the directives [5.1] and [5.2] above. The procedure chosen is **Internal Production Control** pursuant to Annex II, Module A of Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products.

Page 1 of 2

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7	Harmonised Standards:	This declaration is made using the **Presumption of Conformity** granted to harmonised standards published within the Official Journal of the European Union pursuant to Article R8 of Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products. The following harmonised standards have been applied:		
	7.1	Radio Spectrum (2.4Gz): Article 3.2 RED	**ETSI EN 300 328 V2.2.2: 2019**	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum.
	7.2	Radio Spectrum (5Gz): Article 3.2 RED	**ETSI EN 301 893 V2.1.1: 2017**	5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
	7.3	EMC Compatibility Article 3.1b RED	**ETSI EN 301 489-1 V2.2.3: 2019**	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
	7.4	EMC Compatibility Article 3.1b RED	**ETSI EN 301 489-17 V3.1.1: 2017**	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
	7.5	Electrical Safety Article 3.1a RED	**IEC EN 62368-1: 2018**	Audio/video, information and communication technology equipment - Part 1: Safety requirements
	7.6	Electrical Safety Article 3.1b RED	**BS EN 62311: 2008**	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)
	7.7	RoHS	**IEC EN 63000: 2018**	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

9 Date of Issue: **25 January 2022**

10 Place of Issue: **Maurice Wilkes Building, Cowley Road, Cambridge, CB4 0DS, U.K.**

11 Signature:

James Adams - Chief Operating Officer Raspberry Pi Ltd

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