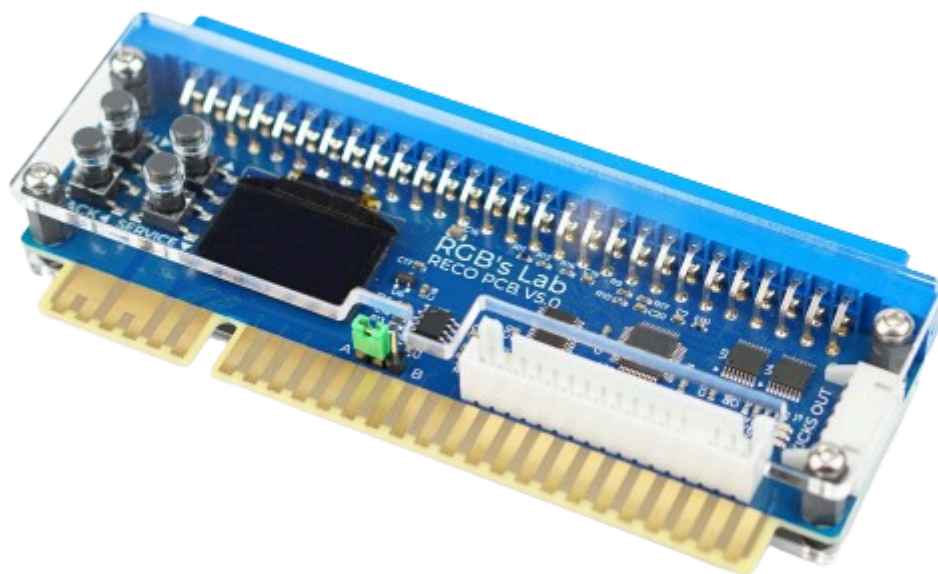


RGB's Lab

RECO PCB V5.0 - User Guide V0.3



Preface

The RECO is a PCB that connects in between your arcade cabinet/supergun and the JAMMA PCB game, offering features such as on-the-fly button layout remapping, rapid-fire, 5 profiles to store your settings, and more. As of version 5.0, the RECO is equipped with an OLED screen and an extensive Menu System, which offers a wide array of new possibilities.

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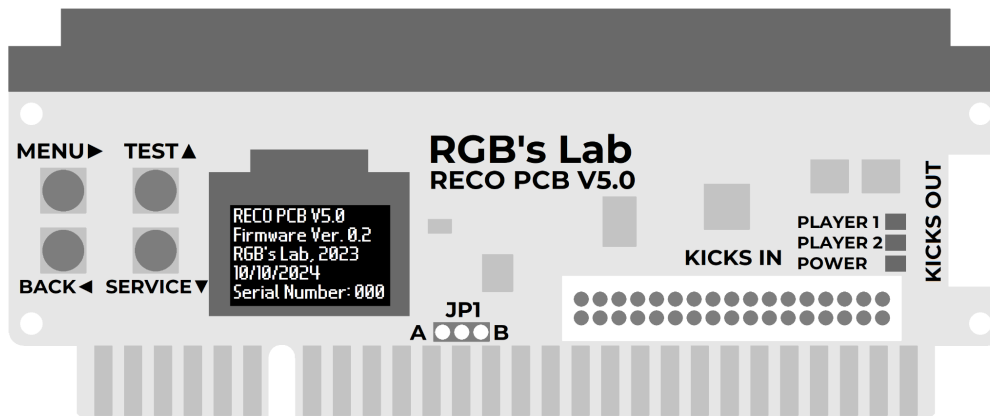
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1. Introduction

1.1. Features

- Hard-gold plated JAMMA edge
- JAMMA, JAMMA+ compatible.
- OLED screen
- Precise dual Voltmeter to monitor the +5 V and +12 V power rails
- Extensive Menu System
- Button Test mode to check the device I/O and layout mapping.
- Programmable Button Layout.
- Programmable Rapid-Fire (VSync synchronized or asynchronous, 6 different fire rates).
- Buttons 1-6 on the JAMMA connector (buttons 4-6 can be disabled), making it a "CHAMMA" compatible output.
- CPS-2 kick harness input for buttons 4-6 (accepts buttons 1-6 via the JAMMA edge).
- Buttons 4-6 on the JST-XH 6 pin "kick harness" connector that is compatible with the HAS kick harnesses.
- Test and Service buttons.
- 5 profiles per player to save the Button Layout and Rapid-Fire Configuration.
- 5 popular Layout Presets
- Ability to combine/merge Button Layouts.
- Selected buttons can work as ON-OFF switches. Can be applied even to Rapid-Fire enabled buttons.
- Special functions can be assigned to buttons, for example, you can make the buttons work as Coin, Test, a combination of A+B+C+Start, and more.
- You can assign a special function to Player 1 and Player Start buttons when pressed at the same time.
- The Start button can be used to coin up, either simultaneously, or with a delay.
- Automatic PICKnMIX trigger.
- Coin Chute Emulator for buttons assigned to work as Coin.
- 3 Device Profiles to store your settings.
- Tournament Mode for disabling the on-the-fly programming functionality.
- NeoGeo CP Mode allows you to play 6 button games using just a 4 button Control Panel.
- Selectable buffered CSync.
- Comes with a plexiglass case.

1.2. Device Overview



2. Getting Started

2.1. Installation

- Make sure your arcade cabinet/supergun is OFF.
- Plug in the RECO PCB to the JAMMA harness of your arcade cabinet/supergun, and then plug in the JAMMA PCB game to the RECO.
- The OLED Screen facing upwards indicates the top side of the RECO.
- Connect the kick harness for additional buttons if necessary.
- Power on the arcade cabinet/supergun.
- If everything works correctly, both Player status LEDs on the RECO PCB will blink rapidly for a second on the arcade cabinet/supergun start-up.

2.2. Quick Start

There are three types of operation:

1. **Game Mode**, when the OLED screen is OFF. This is the default mode of operation. Buttons TEST and SERVICE on the RECO are active.
2. **Voltmeter** which displays the +5 V and +12 V power rails voltage. Buttons TEST and SERVICE on the RECO are inactive and will have other functions (explained in [6.3.3](#)).
3. **Menu System**. Used for configuration of the device. The Menu System will affect the RECO PCB's I/O latency and Rapid-Fire or other timer-based functions; Legacy Mode will not work while in the Menu System. Buttons TEST and SERVICE on the RECO are inactive and will work as the menu navigation buttons UP and DOWN.

- The RECO boots to a Device Info page and then automatically switches to the Voltmeter. You can skip the Device Info page by pressing the MENU button.
- Pressing the MENU button on the RECO will take you to the Menu System.
- Changes made in the settings in the Menu System must be saved if you want to retain them after the power cycle (Main Menu -> Save & Exit). The exception is any change made in the Button Layout Configuration or Rapid-Fire Configuration (explained in [4.4](#)).
- You can go back/exit by pressing the BACK button on the RECO.
- The OLED screen will turn off after around 10 seconds of inactivity.
- You can bring back the voltmeter display by pressing the MENU button.

3. Voltmeter

The voltmeter displays +5 V and +12 V power rails voltage. The reading will be updated if the voltage changes by 0.04-0.05V.

It is possible to speed up and increase the sensitivity of the voltage reading by holding down the SERVICE button on the RECO.

If you press the TEST button, it will take you to the Status Page.

3.1. Status Page

The Status Page displays the basic information about the settings. The top half of the screen displays the currently used Profile for both players and the Device Profile. The bottom half displays individual settings.

- [R] - Indicates that Rapid-Fire is enabled for either Player 1 or Player 2.
- [S] - Indicates that Sticky Button is enabled for either Player 1 or Player 2.
- [C] - Indicates that one of the Players uses the combined button layout.
- [A] - Asynchronous Rapid-Fire is enabled.
- [N] - NeoGeo CP Mode is enabled.
- [TM] - Tournament Mode is enabled.
- [4&5] - JAMMA Button 4 & 5 output is enabled.
- [6] - JAMMA Button 6 output is enabled.
- [PnM] - PICKnMIX is enabled.
- [CC] - Coin Chute Emulator is enabled.
- [CS] - Coin on Start Button is enabled.

Press the BACK button to exit the Status Page and go directly to the Game Mode, or press the MENU button to enter the Menu System.

4. Menu System

4.1. Main Menu

- Controls
- Device
- Save & Exit

4.2. Controls Menu

4.2.1. Profile Load

Layout configuration profiles. Five profiles per player. These profiles store only the Button Layout and Rapid-Fire Configuration. Other settings are stored in the device profiles (explained in [4.6](#)).

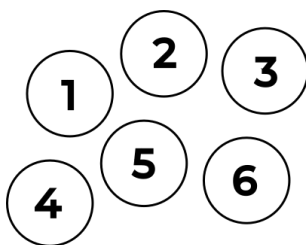
4.2.2. Button Test

It allows you to check button inputs of the RECO PCB and see their output mapping. Rapid-Fire is disabled in the Button Test mode. Exit the mode with MENU or BACK buttons.

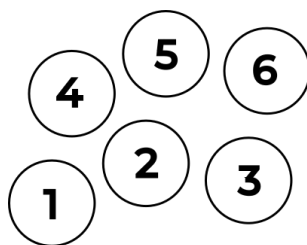
Warning: “Coin Chute Emulator” and “Coin on Start” with the “Hold for ~2 seconds” option will not work properly in the Button Test mode.

4.2.3. Layout Presets

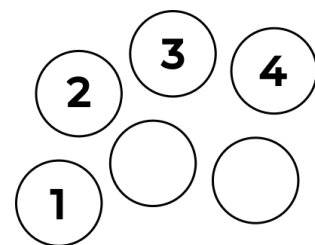
Five layout presets for quick loading. Choosing a Preset with the MENU button will replace the currently used Button Layout and Rapid-Fire Configuration with the chosen Preset and save it to the currently used Profile.



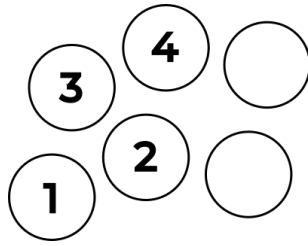
Preset 1



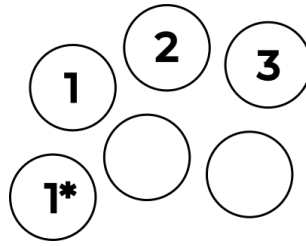
Preset 2



Preset 3



Preset 4



Preset 5

* Preset 5 uses Rapid-Fire rate 2 on the Button 1 clone.

4.2.4. Button Layout Config

This core feature allows you to set a custom button layout. The number of button presses corresponds to the button output and is displayed in real-time in the configuration menu. It is possible to press each button up to eight times; the ninth press will start the countdown over.

Since JAMMA uses only 6 buttons, the 7th and 8th presses give the button a special functionality (explained in [4.2.8-4.2.9](#)).

Pressing the MENU button on the RECO PCB, or the button Start on the controller will end the configuration and save the new configuration to the currently used Profile.

You can also set a temporary Button Layout by exiting the configuration mode with the BACK button. The configuration will be active only during the current session and will not be retained after you power off the RECO PCB.

4.2.5. Rapid-Fire Config

This core feature allows you to set a custom rapid-fire rate for each button. The number of button presses corresponds to the rapid-fire rate and is displayed in real-time in the configuration menu. Each button can be pressed up to 6 times for 6 different rapid-fire rates; the seventh press will start the countdown over.

Pressing the MENU button on the RECO PCB, or the button Start on the controller will end the configuration and save the new configuration to the currently used Profile.

You can also set a temporary Rapid-Fire Configuration by exiting the configuration mode with the BACK button. The configuration will be active only during the current session and will not be retained after you power off the RECO PCB.

4.2.6. Combine Layouts

This feature combines one of your custom Profiles or Presets with the currently used layout. It combines only the Button Layout, it does not add Rapid-Fire Configuration to the currently used one.

4.2.7. Sticky Button Config

This feature enables selected buttons to work as ON-OFF switches. Button status is displayed in real-time in the configuration menu. “1” means the button will work as an ON-OFF switch, and “0” means it will operate as a standard push button.

Exit the configuration mode with the MENU, BACK buttons, or the Start button on your controller.

4.2.8. 7th Press Function

This feature allows you to assign special functions to buttons that were pressed 7 times during the Button Layout Configuration. You can select one of the following functions:

- Start
- Coin
- A+B+C
- D+E+F
- A+B+C+Start
- P1+P2 Start
- Test
- Service

4.2.9. 8th Press Function

The same as above, but for buttons pressed 8 times.

4.2.10. P1+P2 Start Function

Pressing Player 1 and Player 2 Start buttons at the same time can trigger the following action:

- OFF (Default)
- Player 1 Coin
- Player 2 Coin
- Test
- Service
- P1 A+B+C+Start
- P2 A+B+C+Start

4.2.11. Coin on Start Button

This feature allows you to coin up using the Start button:

- OFF (Default)
- Simultaneous - Coin will be added the moment you press the Start button.
- Hold for 2 Seconds - Press the Start button for ~2 seconds to coin up. The Start button output will be disabled before the coin up happens so that the PCB game does not see the Start + Coin pressed at the same time.

4.2.12. NeoGeo CP Mode

This setting allows you to play 6 button games using just a 4 button Control Panel. The button combinations look as follows:

- Button 1 = Button 1 / Punch 1
 - Button 2 = Button 2 / Punch 2
 - Button 1 + 2 = Button 3 / Punch 3
 - Button 3 = Button 4 / Kick 1
 - Button 4 = Button 5 / Kick 2
 - Button 3 + 4 = Button 6 / Kick 3
-
- Button 1 + 2 + 3 = Button 1 + 2 + 3 / 3x Punch
 - Button 2 + 3 + 4 = Button 4 + 5 + 6 / 3x Kick

4.3. Device Menu

4.3.1. Profile Load

Device Profiles. Three profiles are available for use. These profiles store all Device settings except for the Button Layout and Rapid-Fire Configurations (explained in [4.4](#)).

The RECO will detect unsaved changes in the Menu System and ask you if you want to save the changes before loading another Profile.

4.3.2. Tournament Mode

When enabled, this setting locks the Legacy method of changing the Button Layout, Rapid-Fire, and Profiles (the Legacy Mode is explained in [5.1-5.3](#)).

4.3.3. Async Rapid-Fire

This setting disables the VSync synchronized Rapid-Fire rate and makes it asynchronous. It results in the following Rapid-Fire rates:

- 1 press ~ 30 Hz
- 2 presses ~ 20 Hz
- 3 presses ~ 15 Hz
- 4 presses ~ 12 Hz
- 5 presses ~ 10 Hz
- 6 presses ~ 7.5 Hz

4.3.4. JAMMA Button 4 & 5 Out

Enables buttons 4 and 5 output for both players through the JAMMA connector (JAMMA pins #c, #25, #d, #26). It does not affect buttons 4 and 5 output through the kick harness connector.

4.3.5. JAMMA Button 6 Out

Enables button 6 output for both players through the JAMMA connector (JAMMA pins #e, #27). This setting should be kept OFF unless your PCB game accepts 6 buttons through the JAMMA edge. It does not affect button 6 output through the kick harness connector.

4.3.6. Coin Chute Emulator

This feature emulates a real coin chute mechanism by sending only a single fast signal to the PCB game even when the Coin button is pressed and held down (either the 7/8th Press Function, P1+P2 Start Function, or “Coin on Start” feature).

4.3.7. PICKnMIX Config

This feature automatically presses and holds down the Start button or Button 5 for around 6 seconds during power on, to trigger the “PICKnMIX” feature of the Unibios modded NeoGeo systems. It was tested with the 161-in-1 Multicart Version 3 and the Unibios version 4.0. More information on the PICKnMIX - <http://unibios.free.fr/picknmix.html>.

4.3.8. OLED Brightness

This feature allows you to change the RECO PCB's OLED brightness. It offers three brightness levels.

4.3.9. Flip OLED Display

This feature flips the RECO PCB's OLED display. It also flips buttons TEST and SERVICE while in the Menu System. It does not alter buttons TEST and SERVICE position while in the Game Mode (OLED screen OFF).

4.3.10. Device Info

It displays basic device information like the Hardware Version, Firmware Version, Programming Date, and the unique device Serial Number.

4.3.11. Reset to Default

This feature allows you to reset the device to factory settings. Available for the currently used profile and all profiles. It does not reset the Button Layout and Rapid-Fire Configurations.

4.4. Save & Exit

Nearly all changes made to the settings in the Menu System are part of the Device Profile and must be saved if you want to retain them after the power cycle. The settings that must be saved are listed below:

- Combine Layouts
- Sticky Button Config
- 7th Press Config
- 8th Press Config
- P1+P2 Start Function
- Coin on Start Button
- NeoGeo CP Mode
- Tournament Mode
- Async Rapid-Fire
- JAMMA Button 4 & 5
- JAMMA Button 6 Out
- Coin Chute Emulator
- PICKnMIX Config
- OLED Brightness
- Flip OLED Display

Features that are saved automatically and are part of the Player 1 and Player 2 Profiles:

- Button Layout Config (unless you exit the config mode with the BACK button as explained in [4.2.4](#)).
- Rapid-Fire Config (unless you exit the config mode with the BACK button as explained in [4.2.5](#)).

5. Legacy Mode

The Legacy Mode allows for on-the-fly changes of the Button Layout, Rapid-Fire, and Profile. It can be disabled using the Tournament Mode setting (as explained in [4.3.2](#)).

5.1. Button Layout Configuration Mode

- Press and hold down two arbitrary buttons and the Start button for 3 or more seconds. After 3 seconds an appropriate status LED on the board will light up and buttons will no longer register – this means the RECO PCB has entered the button remapping mode, and you can release the buttons (including the Start button).
- Right after you release the last of the buttons held down, you can set a new button layout by pressing the buttons.
- Each button press corresponds to the JAMMA button number and is indicated by the status LED blink.

- If you press a button once, it will be JAMMA button 1, twice - button 2, thrice - button 3, and it works up to button 8. Since JAMMA uses only 6 buttons, the 7th and 8th presses give the button a special functionality (as explained in [4.2.8-4.2.9](#)). The ninth press starts the countdown over. No button press means the button will not be set.
- To exit the button configuration mode and save your new layout, press the Start button.

Note: Every time you access this mode, your previous layout will be erased and you will need to set your layout anew. This is an easy and fast way to reset your settings.

5.2. Rapid-Fire Configuration Mode

- Press and hold down one arbitrary button and the Start button for 3 or more seconds.
- After 3 seconds an appropriate status LED on the board will light up and buttons will no longer register – this means the RECO PCB has entered the rapid-fire configuration mode, and you can release the buttons (including the Start button).
- Right after you release the last of the buttons held down, you can enable the rapid-fire feature by pressing buttons. Each button press corresponds to the rapid-fire rate and is indicated by the status LED blink. There are 6 rapid-fire rates to choose from, the seventh press disables the rapid-fire; and the eighth press starts the countdown over. No button press means the rapid-fire will not be set.
- To exit the rapid-fire configuration mode and save the settings, press the Start button.

Note: Just like in the button remapping mode, your previous rapid-fire settings are erased the moment you access the rapid-fire mode. Consequently, if you want to reset all rapid-fire settings, just enter the rapid-fire mode and exit it without pressing any button.

5.3. Saving and Loading Profiles

- Press and hold down three arbitrary buttons and the Start button for 3 or more seconds. After 3 seconds an appropriate status LED on the board will light up and buttons will no longer register – this means the RECO PCB has entered the profile selection mode, and you can release the buttons (including the Start button).
- Right after you release the last of the buttons held down, you can select the profile by pressing one of the five buttons on your arcade cabinet's control panel. For example, by pressing button 1 while in the profile selection mode, the RECO will load and use profile 1. If you press button 2, it will load the profile 2, and so on; button 6 has no use. You will automatically leave the profile selection mode when you press a button. There are 5 profiles available for each player that store both the button layout and rapid-fire configurations. The RECO will remember the last used profile and automatically load it when you power on the RECO.

Note: By default, all profiles except for Profile 1 are blank. This means that when you switch to a new profile, you will need to create a new button layout using the button Layout Configuration Mode or by selecting a Preset.

6. Hardware User Guide

6.1. Video Sync Separator

Change the CSync using jumper JP1:

- A - Passthrough (unprocessed CSync) - Default Setting.
- B - Buffered.

6.2. Connectors

6.2.1. JAMMA Connector and Edge Pinout

The JAMMA edge accepts up to 5 buttons by default. If you add jumpers across pins #9+10 and #23+24 of the CPS-2 kick harness input connector (KICKS IN), the RECO will accept 6 buttons through the JAMMA edge.

The JAMMA connector outputs up to 6 buttons. Buttons 4-5 and 6 output can be configured in the Menu System.

6.2.2. KICKS IN Connector Pinout

Plug in the CPS-2 kick harness of your arcade cabinet for buttons 4-6 (depending on your JAMMA harness wiring).

6.2.3. KICKS OUT Connector Pinout

This connector is used to connect to PCB games that require kick harnesses for extra buttons. The connector used on the RECO is JST S6B-XH-A and the pinout is as follows.

- Pin #1 - Player 2 Button 6
- Pin #2 - Player 1 Button 6
- Pin #3 - Player 2 Button 5
- Pin #4 - Player 1 Button 5
- Pin #5 - Player 2 Button 4
- Pin #6 - Player 1 Button 4

The pinout is also printed on the backside of the RECO.

6.3. Peripherals

6.3.1. OLED Screen

6.3.2. Status LEDs

- The POWER LED is always ON if the device works properly.
- PLAYER 1 and PLAYER 2 LEDs turn on when you enter either of the Legacy mode configuration modes or when you enter the Button Layout Configuration and Rapid-Fire Configuration through the Menu System.

6.3.3. Buttons

The RECO is equipped with four buttons. The functions of the buttons are as follows:

Button	Game Mode	Voltmeter	Menu System
MENU	Brings up the Voltmeter	Forwards to the Menu System	Enter/Select
BACK	-	Turns off the OLED	Back/Exit/Cancel
TEST	Test Button	Shows the Status Page	Up
SERVICE	Service Button	Increases the speed and sensitivity of the Voltmeter when held down	Down

7. Care, Use, Safeguards

The RECO PCB, just like every other device with exposed electronic components, is ESD-sensitive and prone to physical damage. Improper handling can permanently damage the device. Below is a list of the most basic rules that can help you prevent damage:

- Please read the manual BEFORE you start setting up and using the RECO PCB.
- Do not use the RECO PCB without its acrylic glass covers.
- When connecting the RECO PCB to a PCB game, ensure the JAMMA connector is aligned correctly to avoid damage.
- Disconnect the RECO PCB slowly and carefully, do not force it.
- Do not wear any clothing that conducts electrical charge when you hold or touch the RECO PCB or your PCB game.
- Do not place the RECO PCB on fabric, or any other fibrous surface, like carpets, etc. Place it on a clean dry table, wooden floor, cardboard, etc.

- It is a good practice to wear an antistatic wrist strap whenever you are handling the RECO PCB or the PCB games in general. The end of the wrist strap should be attached to a good grounding point - the metal chassis of the PC, pipes, the radiator, etc.
- When not used, you should store your RECO PCB in an antistatic bag.
- Do not keep the RECO PCB in an antistatic bag when you are using it! The surface of the antistatic bag is conductive.
- Try to hold the acrylic case along its edges or at least near the bolts. Do not apply force directly to the center of the acrylic glass.
- Do not touch the contacts or surface mount components, especially the microcontroller.
- Never wipe the RECO PCB PCB, wiping can induce ESD. Use clean canned compressed air and an ESD-safe soft bristle brush instead.
- Do not change jumper positions or use built-in switches while the RECO PCB is powered ON.
- Never connect or disconnect cables, controllers, or adapters while the RECO PCB is powered ON. This may result in a short circuit or inrush current and can damage or even destroy the RECO PCB and your PCB game.
- Never leave your RECO PCB set up unattended, especially when it is powered ON!
- Make sure you read the PCB game instruction manual BEFORE you connect it to the RECO PCB.
- Make sure you read the Power Supply Unit instruction manual BEFORE you connect it to the RECO PCB.
- Keep the RECO PCB away from children and animals.
- Any modification to the RECO PCB is at your own risk and responsibility, you will be liable for any damage incurred.
- Do not use cheap hardware with the RECO PCB. Using subpar-quality hardware with the RECO PCB (be it the power supply unit, controller adapters, audio/video cables, JAMMA harness extension, and so on) will most likely result in equipment damage or more serious implications.
- The RECO PCB is not a toy. You must never give it to your children or allow them to use it.
- Non-adherence to the instructions may result in equipment damage or even more catastrophic failure, like electrocution or fire!

8. Document Revision History

Document Version	Date	Comments
0.3	22.01.2024	<ul style="list-style-type: none"> • Corrected descriptions.
0.2	19.01.2024	<ul style="list-style-type: none"> • Fixed formatting. • Sorted the sections. • Added missing descriptions.

0.1	12.01.2024	<ul style="list-style-type: none">Initial Document release.
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Customer Service

Technical Support is available through the Contact Form at:
<https://rgbslab.com/pages/contact>