



INTEGRATED PICO FIGHTING BOARD

A DESIGN BY JASEN HICKS - JASENSCUSTOMS.COM

User Guide Version 1.2

Updated 10.18.2023

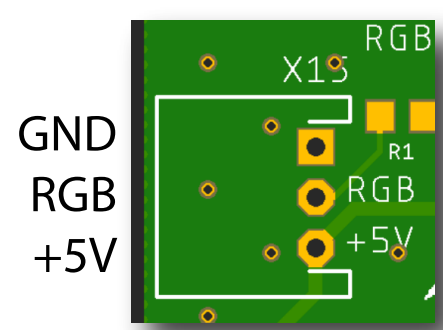
www.JasensCustoms.com

5V LED Compatible

Most, if not all, LED systems designed for use in Arcade/Fight Sticks use the WS2811B LEDs. The GP2040 Firmware has LED compatibility baked into it making additional LED controllers redundant. The system, thanks to the firmware, can use a number of addressable LEDs meaning you aren't tied into a single LED type!

NOTE: USB 2.0 is only rated to 500mA of total current, you can set LED brightness to reduce total current draw of the LEDs so you don't overload the USB port on your PC/Console.

NOTE: See Below for V2.0 LED PINOUT!



I2C Connection

While not used by a majority of the FGC, a number of I2C devices that can expand the board's functionality can be connected here. This includes an OLED screen and a coming GPIO expander!

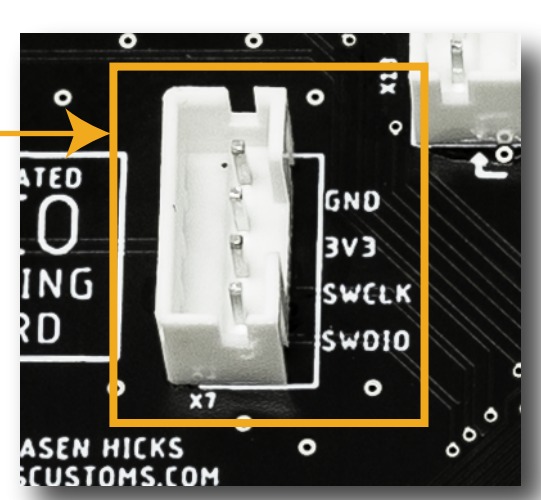
20 Pin Harness Connector

+5V	GND	3K	1K	4P	2P	START	SELECT	RIGHT	UP
+5V	GND	4K	2K	GND	3P	1P	HOME	LEFT	DOWN

The 20P header is standardized. This layout dates back to the AkiShop PS360 and has been adopted as the standard by most PCB makers that aren't trying to create their own ecosystem.

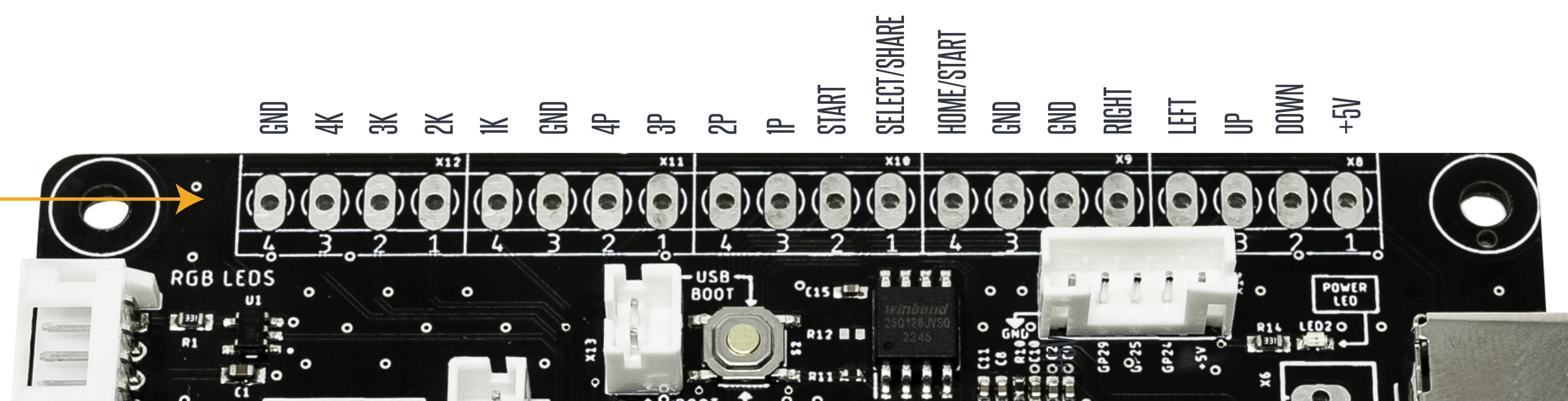
Debug Access

This is for advanced users only familiar with microprocessor design, coding, and programming. As a safeguard, this part will not be populated to minimize the risk of damaging the PCB. Generally, this is unsupported.



Screw Terminal Connections

Not installed in this picture, but standard on all boards. These are large 3.5mm pitch screw terminals to make install as easy as possible. They follow the standard layout as the PS360+ and most Brook PCBs.



Screw Terminal Connections (not shown in the picture) for custom harnesses and quick or simple wiring jobs where use of the 20P header isn't required.

Special GPIO Access

Connector X14 has access to GND (5), GPIO 29 (4), GPIO 25 (3), GPIO 24 (2), and +5V (1).

NOTE: Version 2.0 of the PCB has this populated to support USB ADDON PCBs that allow P55 controller passthrough.

USB BOOT Button (and 2P JST PH connector)

This is the same as the BOOTSEL button on a normal Raspberry Pi Pico. Press this to put your IPFB into MASS STORAGE DEVICE mode to drop new firmware to it. GP2040-CE firmware has a special button combo to do the same thing. See the community website for details. This JST 2 pin connector may not be populated as it is not necessary for normal use.

JST XH Connector (USB)

A number of fighting boards have adopted use of a secondary JST connector for USB connectors. The IPFB adopted this as well for maximum flexibility in your builds.

USB-B Female Connector

This is the most robust USB 2.0 connector available. It also allows interchangeability if you decide to swap this into an existing build.

On Board RESET button

When making web configuration updates, pressing this will let you reboot it without unplugging the USB. More than likely, you will never use this button.

Configurable Connections based on Firmware

The additional connectors here are configurable via firmware. Normally, Brook PCBs would have them mapped as: LED VCC, TURBO LED (-), TURBO KEY, and GND. Since the GP2040 firmware is open source, you can make changes to fit your needs. NOTE: the pin marked as TURBO LED has a 330Ω resistor inline with it to ensure LED safety in case you forget. This may cause issues if you attempt to use this GPIO for something other than the LED anode connection.

Player LEDs

Player LEDs: Each have a 330Ω resistor inline on the anode side. This allows you to hook up any LED that has a max forward current of 11mA without needing to add an additional resistor.

NOTE: VERSION 2.0 of the PCB removed the inline resistors. This will allow you to reassign the LED pins to other uses!

FIRMWARE NOTE: I RECOMMEND USING THE PICO FIGHTING BOARD VERSIONS OF THE GP2040-CE FIRMWARE WHEN UPDATING YOUR PCB. ITS PINOUT AND THIS BOARD'S PINOUT ARE CLOSEST AND REQUIRES THE LEAST CONFIGURATION AFTER UPDATE.

PCB Features

The IPFB uses the same mounting footprint as the PS360+ and all of the Brook PCBs. This was intentional as I helped Brook with their layout of the UFB originally. This was to ensure PS360+ users had an easy upgrade path upon the UFB's release. This has cemented the size and mounting points as community standard for all Fight Stick boards.

GP2040-CE OPEN SOURCE FIRMWARE

The IPFB uses the GP2040 Open Source Community Edition Firmware. There is a very talented group of individuals that maintain this firmware and make low cost, high performance boards like this possible. You can also contribute, write your own fork, or learn more about the project at www.GP2040-CE.info! FeralAI must also be thanked for the initial GP2040 firmware development and original Pico Fighting Board design.



www.GP2040-CE.info

Wiring Connectors

The IPFB intentionally uses JST PH connectors wherever possible. These have become the established connector of choice in the community due to their low price, high quality, and small footprints. Companies such as DigiKey even offer pre-crimped PH connector wires making custom wiring harnesses a breeze.

The only non JST PH connector is the alternate USB connection point. It uses a JST XH connector since it has become the connector of choice for USB wiring that isn't a USB connector itself.

HARDWARE DESIGN

The IPFB shares a lot of similarities with the Brook Fighting Board Series, the AkiShop PS360+, and even FeralAI's Pico Fighting Board. I developed this design starting in August 2022 to create a more streamlined Pico Fighting Board that didn't rely on obtaining Raspberry Pi Pico PCBs and "bolting" them on to a helper PCB. Those are perfectly awesome ways to accomplish a GP2040 CE hardware design but I wanted to have the flexibility to add more PCBs to it in a stacking fashion if needed and to make it similar to other PCBs the arcade and fight stick builders use.



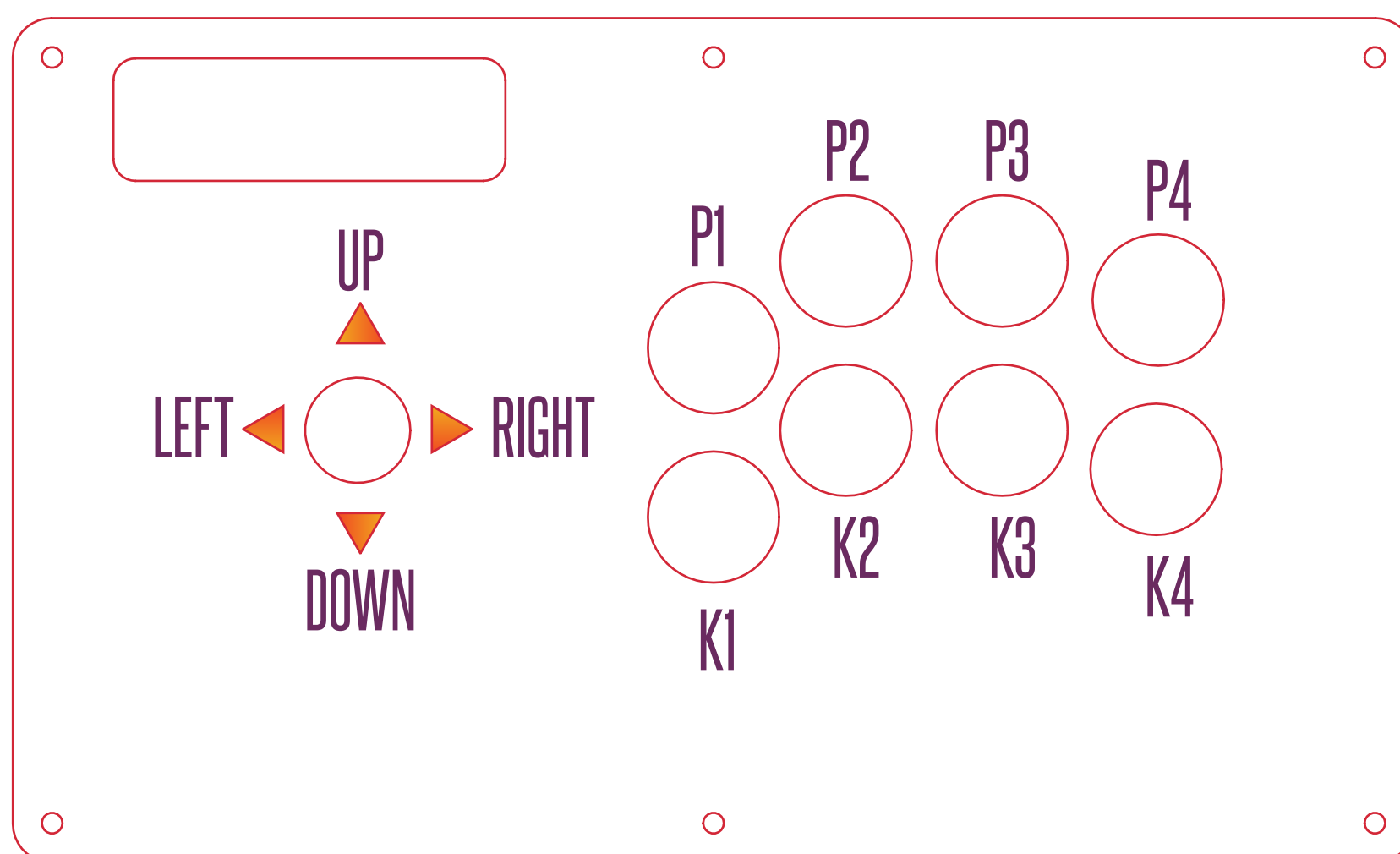
OpenStick Community Discord Server
<https://discord.gg/g87cDH3nVJ>



GP2040-CE Community Organizer
[@TheTrain24](https://twitter.com/TheTrain24)

GPIO Connections

- GPIO 0: LEFT
- GPIO 1: UP
- GPIO 2: DOWN
- GPIO 3: RIGHT
- GPIO 4: HOME
- GPIO 5: SELECT
- GPIO 6: START
- GPIO 7: Punch 1
- GPIO 8: Punch 2
- GPIO 9: Punch 3
- GPIO 10: Punch 4
- GPIO 11: Kick 1
- GPIO 12: Kick 2
- GPIO 13: Kick 3
- GPIO 14: Kick 4
- GPIO 15: RGB LED DATA
- GPIO 16: Player 1 LED
- GPIO 17: Player 2 LED
- GPIO 18: Player 3 LED
- GPIO 19: Player 4 LED
- GPIO 20: TP KEY
- GPIO 21: L3
- GPIO 22: R3
- GPIO 23: Turbo LED
- GPIO 24: Unassigned, accessible on connector X14 Pin 2
- GPIO 25: Unassigned, accessible on connector X14 Pin 3
- GPIO 26: I2C SDA Line
- GPIO 27: I2C SCL Line
- GPIO 28: Turbo
- GPIO 29: Unassigned, accessible on connector X14 Pin 4



XBOX Mapping

- X: P1
- Y: P2
- RB: P3
- LB: P4
- A: K1
- B: K2
- RT: K3
- LT: K4

PS Mapping

- Square: P1
- Triangle: P2
- R1: P3
- L1: P4
- CROSS: K1
- CIRCLE: K2
- R2: K3
- L2: K4

GPIO Mapping

- 7: P1
- 8: P2
- 9: P3
- 10: P4
- 11: K1
- 12: K2
- 13: K3
- 14: K4

Special Thanks to...

The small group of beta testers that helped during the testing and iteration phase of the IPFB. Without their keen insights and recommendations along the way this would have taken a long time to finish properly. These heroes include: The Real Phoenix, Wren, Paik4life, imbard3rin3, Black Majic, and neo702. Additional thanks to TheTrain for answering questions regarding the dev team, helping troubleshoot a minor issue along the way, and managing the GP2040-CE Community.

FeralAI for the original Pico Fighting Board Design and Firmware and those that helped him test, code, or supported him in anyway.

VISIT WWW.GP2040-CE.INFO FOR ALL FIRMWARE USAGE - FIRMWARE UPDATES - AND GREAT WORK THEY ARE DOING THAT MAKES THIS POSSIBLE.

Document Change Log

- Version 1.0 - Initial release.
- Version 1.1 - Fixed some spelling and grammar errors. Updated graphics. Added the official GP2040-CE links and logos provided by TheTrain. Clarified the usage of some GPIO pins that are reserved for internal RP2040 functions. Added the DEBUG warning. At the request of the GP2040-CE community manager, removed the donation plan as they opted to not accept donations or contributions for the project.
- Version 1.2 - Added information for the V2.0 IPFB. Specifically, RGB LED pinout connector has changed and the GPIO pins used for internal RP2040 have been verified as acceptable to use for GPIO. In this case, I have opted to connect USB Addon Passthrough PCBs to it. Other changes to the V2.0 of the board include: Fixed alignment on the screw terminals. All headers are populated. Switched from a crystal to an oscillator for timing input to the RP2040 chip. Added the JasensCustoms.com GatorEye logo to the PCB.