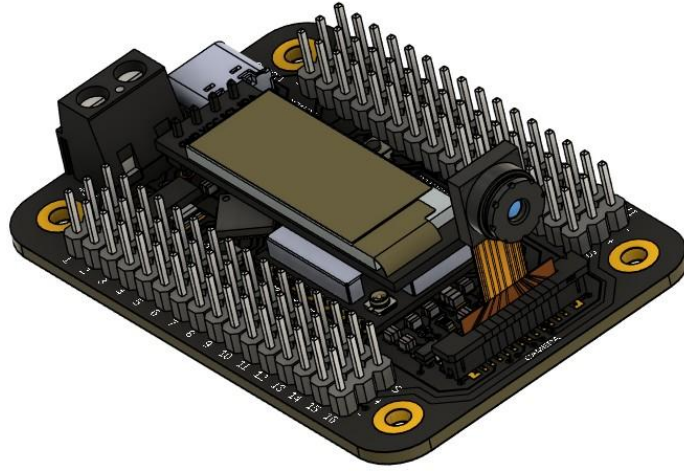


Endurance R/C LLC

32 Servo Controller Instructions



Index

Package Contents	3
Technical Specifications	4
Dimensions	5
Schematic	6
Operational Requirements	7
Quick Start Guide	8
Software	9
Firmware	10

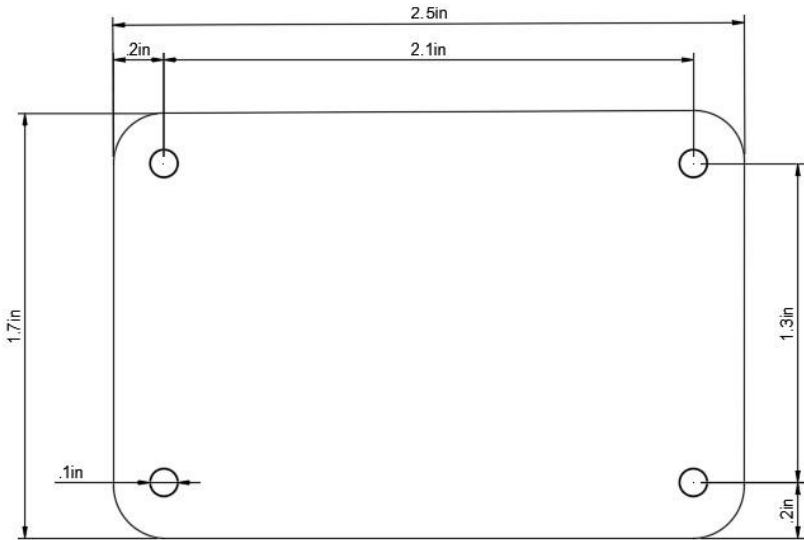
Package Contents

- 1 - 32 Servo Controller main board
- 1 - OV2640 camera module
- 1 - U.FL to SMA adapter
- 1 - 2.4GHz antenna
- 1 - 20" USB-C cable
- 1 - 5V 120W AC adapter (only available in the USA)

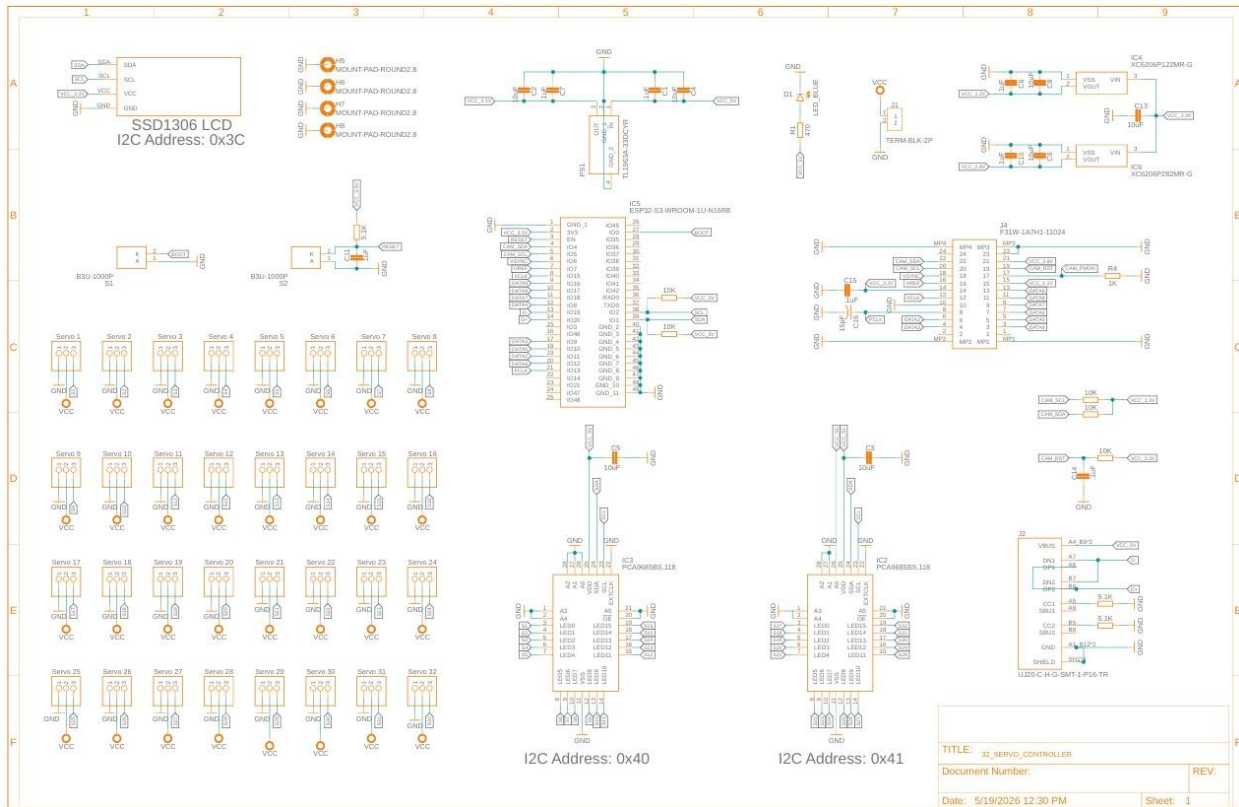
Technical Specifications

Microprocessor	ESP32-S3-WROOM-1U-N16R8, Xtensa 32-bit LX7 dual-core @ 240 MHz
Memory	512 KB SRAM, 384 KB ROM, 16 MB Flash and 8 MB of PSRAM
Connectivity	2.4 GHz 802.11 b/g/n Wi-Fi and USB-C
Display	0.91" 128x32 OLED LCD
Camera	OV2640, 2MP CMOS @ 1600x1200(max) resolution
Certifications	FCC and CE certified
Operating Conditions	-40 ~ 65 °C
PWM Drivers	Dual 16-CH, 12-BIT capable PWM drivers
Independent Servo Power Input	Servo power is completely isolated for clean operation
Open Source Hardware	Hardware design files and firmware available on GitHub.

Dimensions



Schematic



https://github.com/endurancerc/32_Servo_Controller/blob/main/PCB/32_Servo_Controller_Schematic.pdf

Operational Requirements

- **Power**

The 32 Servo Controller requires 5V DC via the USB-C port to operate. All servo channels are powered separately through the screw terminal. Normally you want to connect 5VDC but refer to your servos tech specs for what voltage to use.

- **Network and Devices**

The 32 Servo Controller requires an 802.11 b, g or n wireless access point for wireless infrastructure operation. A tablet, PC, standalone VR headset or phone is required for ad-hoc connectivity.

- **Output Devices**

Any PWM controlled device can be controlled with the 32 Servo Controller. Hobby servos, R/C switches, light controllers, and electronic speed controls can all be used.

Quick Start Guide – WIFI mode

1. Use a small flat head screwdriver to help push the top of the U.FL antenna plug into the controller. Screw the antenna into the SMA plug.
2. Locate the camera connector on the 32 Servo Controller and carefully lift up on both sides of the black flange. Insert the camera ribbon cable with the exposed contacts facing toward the LCD screen. Only light pressure is required. Once inserted, use slight pressure to move the black flange down on both sides to secure the ribbon cable.
3. The 32 Servo Controller has two main operating modes, HID and WIFI. If you only supply power, the controller will boot into WIFI mode. If power and data lines are present, it will boot into HID mode. Start by connecting the 32 Servo Controller to the supplied USB-C cable and A/C adapter. This will allow booting into WIFI mode for initial setup.
4. Once properly powered the POWER LED will glow blue. After 3 seconds the Endurance R/C logo will show on the LCD indicating that it is booting into WIFI mode.
5. On the first power up the controller will automatically start the WIFI access point named “32_SC”. In your devices WIFI connection settings scan for available WIFI networks and connect to this network. When prompted, enter the password: “12345678”.
6. After successfully adding the new network open a web browser on the device and enter the URL: <http://192.168.4.1> This page allows you to access the 32 Servo Controllers built in web server. From this page you can verify that your camera is working. If the camera is not detected a brief message will show in the LCD indicating this. The page will also show “Reconnecting...” if the camera is not detected.
7. All control channels are powered independently from the controller. This allows for servos or other devices to operate at whatever voltage is required. Connect the power source of your choosing to the black screw terminal on the controller. Connect a servo to channel 1 and move the slider on the web page to verify everything is working.

Quick Start Guide – HID mode

1. Using the supplied USB cable connect the 32 Servo Controller to a PC or Android device, it will boot it into HID mode. “USBMODE” will briefly show on the controller’s LCD followed by a real time visualization of all 32 channels.
2. If using a PC open a browser and go to: <https://www.endurance-rc.com/realsequencer.html> Click the connect button to scan for your controller. Select the controller and click connect.
3. Move the red timeline indicator on the web page to verify servos are moving as expected.

Software

- **Legacy Compatibility**

The 32 Servo Controller is backwards compatible with existing software such as Brookshire Software's VSA and RoboRealm.

Get VSA here: <https://www.brookshiresoftware.com/>

Get RoboRealm here: <https://www.roborealm.com/>

Anything written for Endurance R/C legacy devices such as the 25 Servo Controller or PCTx is also compatible with the 32 Servo Controller however channels may be limited to 9 or 25. Legacy software can be found at: <https://github.com/endurancerc>

- **Android App**

RealDriver is available as a native Android application. Source code can be found on GitHub: <https://github.com/endurancerc/RealDriver>

The RealDriver Android APK can be found at: <https://www.endurance-rc.com/RealDriver.apk>

- **Web Applications**

RealDriver is also available as a web application. Find it at <https://www.endurance-rc.com/realdriver.html>

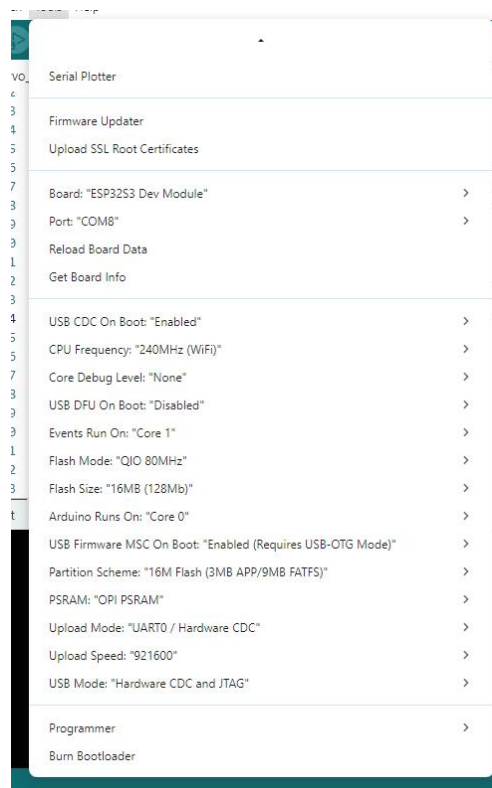
RealSequencer can be found at: <https://www.endurance-rc.com/realsequencer.html>

Firmware

The 32 Servo Controller is fully open source. The firmware can be found on GitHub:
https://github.com/endurancerc/32_Servo_Controller/tree/main/FIRMWARE

If you wish to modify the firmware you will need to download and install the latest Arduino IDE, configure the IDE for the 32 Servo Controller and then add the necessary libraries.

1. Go to: <https://www.arduino.cc/en/software/> and download the latest Arduino IDE and install it.
2. After installation configure the IDE to use the ESP32 module. In the Arduino IDE go to File -> Preferences, then look for the "Additional boards manager URLs:" text box and add in:
https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json
3. Next go to Tools -> Board and select the "ESP32S3 Dev Module"
4. Once the ESP32S3 is selected it will add module specifics to the menu. Open the Tools menu and set the settings at the bottom of the menu to what you see here:



5. To compile the 32 Servo Controller firmware you will need to install the following Arduino libraries:
 - a. Adafruit BusIO, v1.17.4
 - b. Adafruit GFX Library, v1.12.6
 - c. Adafruit SSD1306, v2.5.16
 - d. Adafruit PWM Servo Driver Library, v3.0.3
 - e. ESP32_New_ISR_Servo, v1.4.0
 - f. ESP32_New_TimerInterrupt, v1.5.0
6. At this point you should be able to compile the project successfully. If you wish to upload firmware to the 32 Servo Controller you must put it into bootloader mode. Plug in the controller to your PC using the

supplied USB-C cable. Using a small screwdriver, press and hold the “BOOT” button. Press and release the “RESET” button and then release the “BOOT” button. A new serial device will be added to your PC. Open the device manager and locate the “Ports (COM & LPT)” section. You will notice a new USB Serial Device (COMXX) here. In the Arduino IDE, open the Tools menu and Port and select this port as the output device location.