SkyCamOne HAT for Raspberry Pi 5 [Rev.C]

Quick Start Guide

Version 1.1, October 2024

Thank you for choosing a Titan Astro product! We hope you will enjoy it thoroughly and wish you many clear and dark skies!

⚠ Important
Your Titan Astro SkyCamOne HAT for Raspberry Pi 5 is a sensitive electronic device. Handle with care. Avoid exposure to extreme temperatures, moisture, or physical shock. Do not attempt to disassemble or modify the device. Improper handling may damage the device and void the warranty.

Warning
Do not supply power to your SkyCamOne HAT or Raspberry Pi before properly connecting both!

This guide will help you set up your SkyCamOne HAT for Raspberry Pi 5. Assembly, the loading of the software and connecting to the device.

This is a Quick Start Guide and it does not include everything there is to know.
We recommend you visit our website for more information, FAQs and troubleshooting tips: www.titanastro.com/support.

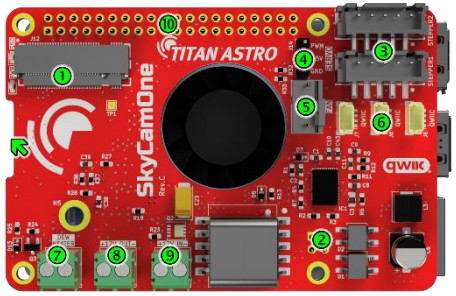
Package Contents

Please make sure your package contains all necessary components:

- One SkyCamOne HAT for Raspberry Pi 5
- One 40-pin (2x20) rising header
- One 4-pin (2x2) rising header
- One set of spacers (standoffs), nuts and screws (4 each)
- One 16-pin FFC ribbon cable
- This Quick Start Guide
- One Titan Astro sticker

If any of these components are missing or defective, please contact Titan Astro support.

Board Layout



1. M.2 2230 SSD PCIe NVMe slot
2. PoE (Power over Ethernet) IEEE 802.3bt class 4 with 30 Watt output
3. Double stepper motor control at 5 Volts
4. Servo motor control
5. Fan control for standard 4-pin PC fans at 5 Volts
6. Three I2C connectors (QWIIC) for sensors
7. Dome/dew heater control at 5 Volts and max. 3.5 Watt
8. Power output at 12 Volts
9. 12 Volts power in (car, battery etc)
10. 40-pin RPi header

Getting Started

Follow below steps to get started with your SkyCamOne HAT.

Note
Please note that the SkyCamOne HAT has been designed to be mounted on top of a Raspberry Pi 5 with the official Active Cooler for Raspberry. Titan Astro only supports this cooling configuration. If you have an Active Cooler, install it before installing the SkyCamOne HAT.

For more information on the Active Cooler visit https://www.raspberrypi.com/products/active-cooler/.

1. Unboxing and Inspection:

- Carefully unpack the SkyCamOne HAT and its components.
- Visually inspect the HAT and your Raspberry Pi for any physical damage.

2. Mounting the HAT:

- Disconnect the Raspberry Pi from power before beginning installation.
- Insert the ribbon cable into the slot on the SkyCamOne HAT (at the green arrow in the previous picture). Lift the ribbon cable holder, then insert the cable with the copper contact points facing down. With the ribbon cable fully and evenly inserted into the port, push the cable holder down to secure the ribbon cable firmly in place.
- Install the spacers using the four provided nuts. Firmly press the GPIO rising header on top of the Raspberry Pi GPIO pins; orientation does not matter as long as all pins fit into place. Do the same with the 4-pin PoE rising header.
- Align the HAT with the 40-pin GPIO header 10 and PoE header on the Raspberry Pi. Set the SkyCamOne HAT on top of the spacers, and use the four screws to secure it in place.
- Gently press down on the HAT to ensure a secure connection.
- Insert the loose end of the supplied ribbon cable into the PCIe port of your Raspberry Pi. Lift the ribbon cable holder from both sides, then insert the cable with the copper contact points facing inward, towards the USB ports. With the ribbon cable fully and evenly inserted into the PCIe port, push the cable holder down from both sides to secure the ribbon cable firmly in place.

3. Connecting Power, SSD Drive and Peripherals:

- **Power:**
  - **With a 12V Power Supply:**
    Ensure the SkyCamOne is connected to a 12V DC power source via the **12V IN** 9 terminal block. *Connect the positive lead to the left terminal and the negative lead to the right side terminal.* Your Raspberry Pi 5 will draw power from the SkyCamOne HAT's 5V power rail.

Caution
Make sure your power source does not exceed 15 Volts or the SkyCamOne HAT might suffer irreparable damage!

  - **With PoE (Power over Ethernet):**
    Connect a CAT5 or CAT6 ethernet cable from your PoE power injector or PoE switch to the Ethernet port of the Raspberry Pi 5. The SkyCamOne HAT will draw power from PoE and supply it to the Raspberry Pi 5.

Tip
Be aware that on some PoE capable switches, not all ports provide power - some are regular (non-powered) ethernet ports. Consult the user manual of your switch for more information.
Also, make sure your PoE injector or switch is capable of delivering at least 15 Watts. With most switches, the advertised power is divided over the PoE ports and might thus be insufficient. The more peripherals you connect to the SkyCamOne HAT, the more power you will require.

Note
The SkyCamOne HAT for Raspberry Pi 5 is capable of handling up to a maximum of 30 Watt of power through PoE.

- **SSD Drive:** Connecting an SSD drive is optional;
  - Remove the drive attachment screw by turning the screw counter-clockwise. Insert your M.2 SSD into the M.2 key edge connector, sliding the drive into the slot at a slight upward angle. Do not force the drive into the slot: it should slide in gently.

- Push the notch on the drive attachment screw into the slot at the end of your M.2 drive. Push the drive flat against the SkyCamOne HAT and insert the SSD attachment screw by turning the screw clockwise until the SSD feels secure. Do not over-tighten the screw.
- **Peripherals:** Connect any necessary peripherals;
- **Stepper motors:**
  Connect up to to stepper motors to the headers marked as **STEPPER1** and **STEPPER2**. The steppers can only be connected in one way for the connector to fit into the header.
- **Servo:**
  Connect a servo to the header marked as **SERVO**. The servo can be connected in two ways, as the connector can be reversed. *If your servo does not work, turn this connector around.*
- **Sensors:**
  Connect any I2C QWIIC capable sensor using a QWIIC cable to either one of the three available headers marked as **QWIIC**. You can also chain sensors that have two QWIIC connectors on board. You can connect up to a maximum of 255 sensors to the SkyCamOne HAT.
- **5V PC Fan:**
  Connect a 5V PWM PC Fan (any size) to the 4-pin header marked **FAN**.

4. Software Installation:

First, ensure that your Raspberry Pi runs the latest software. Run the following command to update:

```
$ sudo apt update && sudo apt full-upgrade
```

Next, ensure hat your Raspberry Pi firmware is up-to-date. Run the following command to update your firmware to the latest version:

```
$ sudo rpi-eeprom-update -a
```

Then, reboot with `sudo reboot`.

5.Booting from NVMe

To boot from an NVMe drive attached to the SkyCamOne HAT, complete the following steps:

1. Format your NVMe drive using Raspberry Pi Imager. You can do this from your Raspberry Pi if you already have an SD card with a Raspberry Pi OS image. Otherwise, usa a PC and suitable USB adapter.
2. Boot your Raspberry Pi into Raspberry Pi OS using an SD card or USB drive to alter the boot order in the persistent on-board EEPROM configuration.
3. In a terminal on your Raspberry Pi, run

```
sudo raspi-config
```

to open the Raspberry Pi Configuration CLI.
4. Under `Advanced Options` > `Boot Order`, choose `NVMe/USB boot`. Then, exit `raspi-config` with `Finish` or the **Escape** key.
5. Reboot your Raspberry Pi with

```
sudo reboot
```

Troubleshooting

Check our webpage for our most up-to-date help and troubleshooting tips.

Additional Tips:

- **Heat Dissipation:** Ensure proper airflow around the HAT to prevent overheating.
- **Cable Management:** Keep cables organized and away from moving parts to avoid damage.
- **Power Supply:** Use a reliable power supply capable of delivering sufficient power to the Raspberry Pi and the HAT.

> **ⓘ Note**
> Depending on when your SkyCamOne HAT was produced, your HAT can be of a different color then depicted in this manual. It can be blue or green instead of red.
>
> What is important is the revision of your HAT. You can find the revision number on the top side of your HAT.
>
> *For the SkyCamOne HAT for Raspberry Pi 5, the revision should be Rev.C or higher.*

Reference: pinout

The following table shows the Raspberry Pi GPIO pin numbers that you need to use in your allsky software or scripts. For the steppers, each line represents a stepper coil. You should use them in sequence (A,B,C,D). The dew heater can be used with a simple ON/OFF or with PWM.

FUNCTION	PIN	GPIO/BCM	WIRINGPI
STEPPER1 A	38	GPIO20	28
STEPPER1 B	40	GPIO21	29
STEPPER1 C	37	GPIO26	25
STEPPER1 D	35	GPIO19	24
STEPPER2 A	33	GPIO13	23
STEPPER2 B	32	GPIO12	26
STEPPER2 C	31	GPIO6	22
STEPPER2 D	29	GPIO5	21
DEW HEATER	11	GPIO17	0
FAN TACH	24	GPIO8	10
FAN PWM	26	GPIO7	11
SERVO	12	GPIO18	1

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