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RunCam C-20T O3 Version

RunCam C-20T 3-Axis FPV Camera Gimbal (O3 Version) User Manual

Model: C-20T O3 Version | Brand: RunCam

1. Introduction

The RunCam C-20T 3-Axis FPV Camera Gimbal (O3 Version) is an advanced stabilization system designed to enhance your First-Person View (FPV) experience. It provides stable camera footage by compensating for movement across three axes, making it suitable for various remote-controlled platforms such as drones, airplanes, and RC vehicles. This manual provides essential information for the proper setup, operation, and maintenance of your C-20T gimbal.

2. Safety Information

- Always ensure the gimbal is securely mounted before operation.
- Avoid exposing the gimbal to extreme temperatures, moisture, or dust.
- Do not attempt to disassemble or modify the gimbal beyond the instructions provided in this manual. Unauthorized modifications may void the warranty and cause damage.
- Handle with care to prevent physical damage to the motors or sensors.
- Ensure proper power supply voltage as specified in the technical specifications to prevent electrical damage.

3. Product Overview

3.1 Package Contents

The RunCam C-20T Gimbal package typically includes:

- RunCam C-20T 3-Axis FPV Camera Gimbal (O3 Version)
- Necessary cables for connection (e.g., UART, PWM)
- Mounting hardware
- USB programming adapter (may be included or available separately)

3.2 Key Features

- **Wide Compatibility:** Supports digital FPV Camera systems such as DJI O3, Walksnail Avatar, Walksnail Moonlight, RunCam Link Wasp, and 19mm wide analog cameras.
- **Immersive FPV Head Tracking:** Equipped with Headtracker for enhanced first-person control. Supports UART, PWM, S.BUS, private protocol, and MAVLink protocol.
- **Durable & Lightweight:** Constructed from aluminum magnesium alloy for a compact and lightweight design.
- **Advanced Stabilization:** Features a 3-axis nonorthogonal mechanical stabilization structure and high-torque motors for extreme vibration and high-speed air impact stabilization.
- **Versatile Use:** Supports multiple stabilization modes, suitable for RC cars, RC crawlers, RC trucks, FPV airplanes, and FPV drones.

3.3 Product Diagram



Figure 3.1: Front view of the RunCam C-20T 3-Axis FPV Camera Gimbal.

This image displays the main unit of the RunCam C-20T gimbal, showcasing its compact design and the three-axis articulation points for camera stabilization.



Figure 3.2: Front and rear views of the RunCam C-20T Gimbal.

This image provides a dual perspective of the gimbal, showing both the front and rear aspects, highlighting its overall structure and mounting points.

4. Setup and Installation

4.1 Camera Compatibility

The C-20T gimbal is available in three versions: O3, Universal, and Analog. The O3 version is specifically designed for the DJI O3 video transmission system and can be equipped with an O3 camera. The universal version can be equipped with all small cameras (except Nano models), Caddx Vista cameras (camera width 19mm), and RunCam Link cameras (camera width 19mm). The analog version can be fitted with an analog FPV camera with a camera width of 19mm, such as the Caddex flathead, etc.



Figure 4.1: Overview of FPV camera system compatibility for the C-20T gimbal.

This diagram illustrates the various FPV camera systems compatible with different versions of the C-20T gimbal, including DJI O3, RunCam Link, Walksnail Avatar/Moonlight, and Caddx FPV Polar/Nebula.

4.2 Installing the Camera (DJI O3 Air Unit Example)

Follow these steps to install your camera into the gimbal. This example uses the DJI O3 Air Unit.

1. Separate the front and rear housing of the camera.
2. Carefully take the lens module out.
3. Fix the lens into the new lens mount provided with the gimbal.
4. Fix the camera onto the gimbal structure.
5. Replace the coaxial cable from the air unit, connecting it to the gimbal.

1. What cameras can the C 20T be compatible with?
The C-20T is available in three versions, 03, Universal and Analog. The O3 version is specially designed for the DJI O3 video transmission system and can be equipped with an O3 camera. The universal version can be equipped with all Snail cameras (except Nano models), Caddex vista cameras (camera width 19mm), and Runcam Link cameras (camera width 19mm). The analog version can be fitted with an analog FPV camera with a camera width of 19mm, such as the Caddex flathead, etc.

2. Can DJI's first generation FPV Air Unit be installed?
If you can't match your original DJI camera, you can replace it with a Caddex Vista or Rumcam Link camera.

3. Does the C-20T gimbal need software settings?
The gimbal control interface has reserved 4 PWM signal inputs, including gimbal mode, gimbal sensitivity, pointing rotation control and pitch rotation control, no need to set it in the software.
In addition, the upright and upside installation of the gimbal does not require software settings, and after the gimbal is powered on, it will automatically determine the installation status and automatically switch between upright or inverted mode. However, if you need to switch the installation mode after that, you will need to power the gimbal back on.

4. What is gimbal sensitivity adjustment?
The sensitivity of the gimbal is the speed of the gimbal response in the mode of tracking the axis angle of the gimbal. When the sensitivity of the gimbal is lowered, the gimbal responds sluggishly to the shaking of the fuselage, and more fuselage shaking can be filtered out. When the sensitivity of the gimbal is increased, the gimbal responds sensitively to the shaking of the fuselage, and the gimbal filters out less fuselage shaking.
The C-20T supports gimbal sensitivity, which can be adjusted in real time through the sensitivity PWM channel.

Examples of use cases:
The gimbal is mounted on a fixed-wing aircraft, and when taking off and landing, the sensitivity of the gimbal can be increased, and the gimbal response is sensitive, which is conducive to judging the fuselage attitude through the screen and facilitating the control of the aircraft. When cruising in the air, you can turn down the sensitivity of the gimbal so that the image doesn't shake much, making it easy to shoot silky smooth videos.
The gimbal is mounted on the remote control car, which can reduce the sensitity of the gimbal, which is more conducive to the gimbal to filter out more body shaking.

Figure 4.2: Step-by-step diagram for installing a DJI O3 Air Unit camera into the C-20T gimbal.

This visual guide illustrates the five key steps for integrating the DJI O3 Air Unit camera with the gimbal, from disassembling the camera to securing it and connecting the coaxial cable.

4.3 Installing the Camera (General FPV Camera Example)

For other FPV cameras, follow these general installation steps:

1. Separate the front and rear housing of the camera.
2. Replace the coaxial cable from the camera.
3. Fix the camera on the gimbal.
4. Replace the coaxial cable from the air unit.

5. After the gimbal is powered on, the picture is not level, and it is a little crooked, how to deal with it?
After the gimbal is powered on, the default working mode is follow mode, in this mode, the gimbal takes its own base as the coordinate system, if the gimbal base is not horizontal, the camera is not horizontal. When the gimbal switches the working mode to the roll lock mode, the earth is used as the coordinate system, and the camera remains horizontal.

6. When the plane disc rotates and bends, the picture is not level, how to deal with this?
When the aircraft or model car turns quickly or pans sideways, the gimbal roll axis will be offset at a certain angle, which is normal.

7. Is it normal for the gimbal to heat up on the surface after working for a period of time?
The gimbal IMU sensor has a constant temperature control, and there will be a certain amount of heat during normal operation, which will cause the surface of the gimbal body to heat up, which is normal.

8. Is the gimbal waterproof and dustproof?
The gimbal is not waterproof, if it rains or splashes water on the surface, it should be wiped clean in time to prevent water from entering the inside of the gimbal, resulting in the gimbal not working properly.
The slight dust of the gimbal will not affect the use, but it should be avoided in places with a lot of fine sand and gravel to prevent sand and dust from entering the gimbal motor, causing the motor to fail to work normally, or the sand and dust on the surface of the gimbal should be blown off immediately after use.

9. When the gimbal is working stationary, the pointing axis slowly drifts and rotates, how to deal with this?
Use the software to recalibrate the gimbal gyroscope, how to calibrate it please refer to the gimbal manual.

10. Does the gimbal control interface support S.Bus?
Later support through firmware upgrades.

11. Does the PTZ control interface support the CRSF protocol?
Later support through firmware upgrades.

Figure 4.3: Step-by-step diagram for mounting a general FPV camera onto the C-20T gimbal.

This diagram outlines the four steps for mounting a standard FPV camera onto the gimbal, including cable replacement and secure attachment.

4.4 Connectivity and Control Interfaces

The gimbal supports various control interfaces for integration with your flight controller or remote control system:

- **UART:** For advanced communication, including private protocols and MAVLink.
- **PWM:** Pulse Width Modulation for direct control of gimbal axes.

- **S.BUS:** Serial Bus protocol for simplified wiring.
- **Private Protocol:** Specific to RunCam systems.
- **MAVLink Protocol:** For integration with MAVLink-compatible flight controllers.

The gimbal control interface has reserved 4 PWM signal inputs, including gimbal mode, gimbal sensitivity, pointing rotation control, and pitch rotation control. No software settings are required for these basic functions.

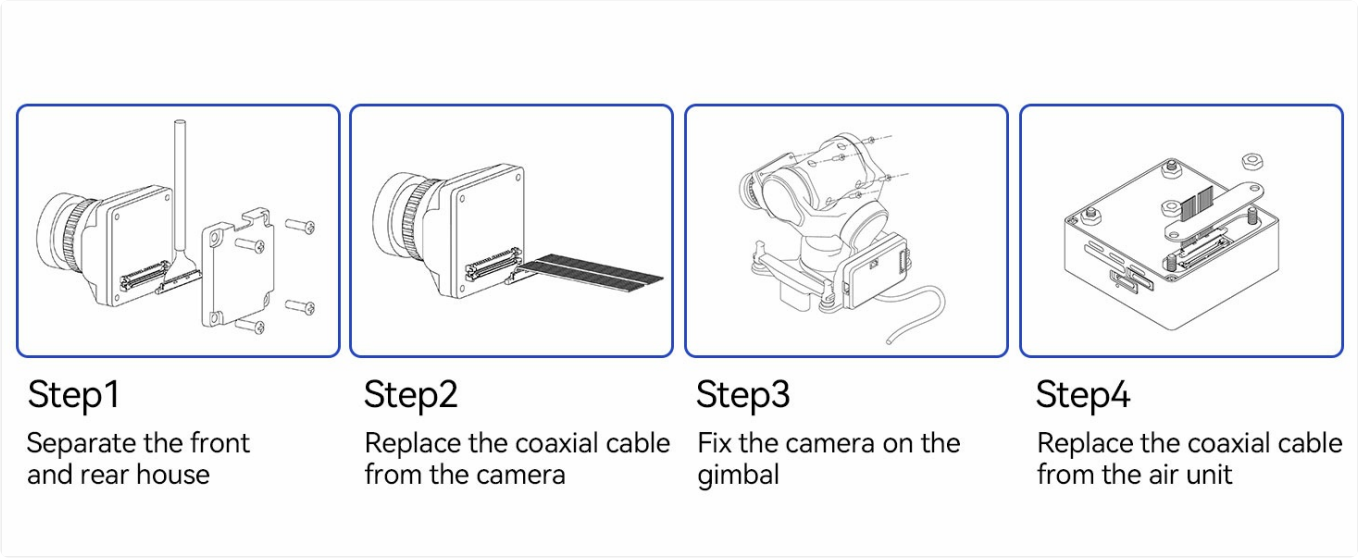

Figure 4.4: Diagram illustrating the various control interfaces available on the C-20T gimbal.

This image shows the gimbal's connection points for PWM, S.BUS, and UART (private protocol/MAVLink), indicating its versatility for integration with different control systems.

5. Operation

5.1 Stabilization Modes

The C-20T gimbal offers multiple stabilization modes to suit different flight or driving conditions:

- **Horizon Mode:** Keeps the image level stable, maintaining a consistent horizon regardless of vehicle tilt.
- **Pitch-lock Mode:** The roll and yaw axes follow the carrier's movement, while pitch remains locked or controlled independently.
- **FPV Mode:** Provides a 3D follow function, allowing for dynamic camera movements that track the vehicle's orientation.



Figure 5.1: Illustration of the C-20T gimbal's multiple stabilization modes.

This image visually explains the Horizon, Pitch-lock, and FPV modes, detailing how each mode affects camera stability and movement relative to the platform.

5.2 Head Tracking Control

For an immersive FPV experience, the C-20T supports 3-axis head tracking control, allowing the camera to perfectly follow your head's rotation angle.

- **Pitch:** ±120°
- **Roll:** ±60°
- **Yaw:** ±160°

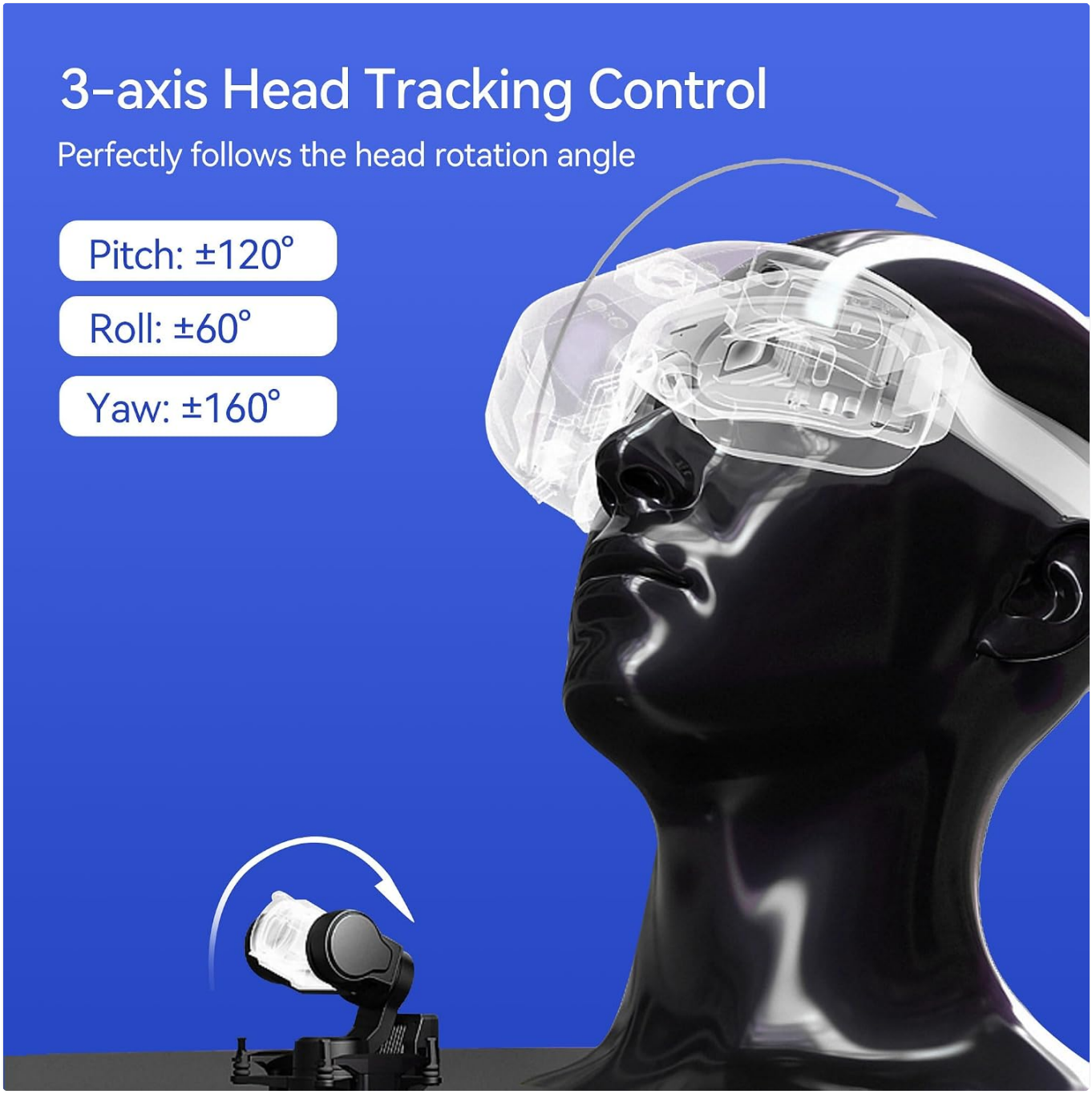

Figure 5.2: Diagram demonstrating the 3-axis head tracking capabilities of the C-20T gimbal.

This image illustrates how the gimbal's camera movement mirrors head movements, showing the angular ranges for Pitch, Roll, and Yaw for precise control.

5.3 Gimbal Sensitivity Adjustment

The sensitivity of the gimbal refers to the speed of its response in tracking the axis angle. When the sensitivity of the gimbal is lowered, the gimbal responds sluggishly to shaking of the fuselage, and more fuselage shaking can be filtered out. When the sensitivity is increased, the gimbal responds sensitively to the shaking of the fuselage, and the gimbal filters out less fuselage shaking.

The C-20T supports gimbal sensitivity, which can be adjusted in real-time through the sensitivity PWM channel.

Examples of use cases:

- If the gimbal is mounted on a fixed-wing aircraft, and when taking off and landing, the sensitivity of the gimbal can be increased. The gimbal response is sensitive, which is conducive to judging the fuselage attitude through the screen and facilitating the control of the aircraft. When cruising in the air, you can turn down the sensitivity of the gimbal so that the image doesn't shake much, making it easy to shoot silky smooth videos.
- If the gimbal is mounted on a remote control car, you can reduce the sensitivity of the gimbal, which is more

conducive to the gimbal filtering out more body shaking.

6. Maintenance

- **Cleaning:** Use a soft, dry cloth to clean the gimbal. Avoid using liquid cleaners or solvents. If the gimbal gets wet, especially with saltwater, wipe it clean immediately with a dry cloth to prevent corrosion.
- **Storage:** Store the gimbal in a dry, dust-free environment when not in use.
- **Inspection:** Regularly inspect cables and connectors for wear or damage. Ensure all mounting screws are tight.
- **Firmware Updates:** Check the manufacturer's website for available firmware updates to ensure optimal performance and access to new features. A USB adapter may be required for firmware updates.

7. Troubleshooting

This section addresses common issues and their potential solutions.

7.1 Frequently Asked Questions (FAQ)

1. **What cameras can the C-20T be compatible with?**
   The C-20T is available in three versions: O3, Universal, and Analog. The O3 version is specially designed for the DJI O3 video transmission system and can be equipped with an O3 camera. The universal version can be equipped with all small cameras (except Nano models), Caddx Vista cameras (camera width 19mm), and RunCam Link cameras (camera width 19mm). The analog version can be fitted with an analog FPV camera with a camera width of 19mm, such as the Caddex flathead, etc.

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10. **Does the gimbal control interface support S.Bus?**
    Later support through firmware upgrades.
11. **Does the PTZ control interface support the CRSF protocol?**
    Later support through firmware upgrades.

7.2 Common Issues and Solutions

- **Issue:** Gimbal not tracking or correcting for tilt and yaw.
  Solution: Ensure all connections are secure. Update firmware and recalibrate the gyroscope using the gimbal software. Verify correct control signal input (UART/PWM).
- **Issue:** Camera not powering up when connected to the air unit.
  Solution: Check all power connections and cables. Ensure the air unit is providing sufficient power. Verify the camera is correctly seated in the gimbal and all internal ribbon cables are connected.
- **Issue:** Incorrect power cable included in the package.
  Solution: Contact RunCam support or your retailer for the correct power cable. Ensure you have the appropriate cable for your specific camera and air unit setup.

8. Specifications

Feature	Detail
Model Number	C-20T O3 Version
Brand	RunCam
Item Weight	1.62 ounces (approximately 46 grams)
Package Dimensions	1.97 x 1.18 x 0.59 inches
Color	Black
Special Features	Shock Resistant
Compatible Devices	FPV Camera (DJI O3, Walksnail Avatar, Moonlight, RunCam Link Wasp, 19mm analog cameras)
Mounting Type	Seat Mount
Manufacturer	XF



Figure 8.1: Visual representation of the C-20T gimbal's dimensions and weight.

This image provides a visual context for the gimbal's compact size (1.84x1.82x2.1 inches) and lightweight nature (0.1 lb / 1.62 oz), along with an illustration of its aluminum-magnesium alloy body.

9. Warranty and Support

9.1 Warranty Information

Specific warranty details for the RunCam C-20T Gimbal are typically provided at the point of purchase or on the official RunCam website. Please retain your proof of purchase for warranty claims. The warranty generally covers manufacturing defects under normal use conditions.

9.2 Customer Support

For technical assistance, troubleshooting beyond this manual, or warranty inquiries, please contact RunCam customer support through their official website or the retailer from whom you purchased the product. Always provide your product model number (C-20T O3 Version) and proof of purchase when seeking support.

10. Official Product Videos

No official product videos matching the specified criteria (creator_type: "Seller") were found in the provided data to embed in this manual.

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