CubePilot Cube Orange+ Standard Set

The Cube Orange+ Standard Set User Manual

Brand: CubePilot | Model: Cube Orange+

1. Introduction and Overview

The Cube Orange+ Standard Set is a high-performance autopilot system designed for various unmanned aerial vehicle (UAV) applications. It features an advanced H7 processor and an integrated 1090MHz ADS-B receiver from uAvionix, enhancing situational awareness by detecting nearby aircraft.

This system includes upgraded Inertial Measurement Units (IMUs) and the STM32H757 MCU, providing robust and reliable flight control. The autopilot can be configured to automatically avoid detected aircraft within a pilot-defined exclusion zone, significantly improving flight safety. The Cube Orange+ is the successor to the Pixhawk 2.1, offering enhanced capabilities and performance.



Figure 1.1: The Cube Orange+ Standard Set, illustrating the compact design of the flight controller and its carrier board.

2. What's in the Box

The Cube Orange+ Standard Set package includes all necessary components to get started with your autopilot system. Please verify that all items listed below are present in your package:

- 1x Cube Orange+ Flight Controller
- 1x ADSB Carrier Board
- 1x Power Brick Mini
- Cables (various types for connectivity)
- Mounting Hardware (screws, 3M stickers)



Figure 2.1: Contents of the Cube Orange+ Standard Set package.

3. Setup and Installation

Proper setup is crucial for the safe and reliable operation of your Cube Orange+ system. Follow these steps carefully:

1. **Mounting the Cube Orange+:** Securely mount the Cube Orange+ and its ADSB Carrier Board to your airframe using the provided mounting hardware. Ensure it is placed away from strong magnetic fields and vibrations.
2. **Power Connection:** Connect the Power Brick Mini to the designated power input on the ADSB Carrier Board. Ensure the input voltage is within the specified range of 4.1-5.7 V.
3. **Peripheral Connections:** Refer to the connector assignments diagram to connect your peripherals such as GPS modules, telemetry radios, ESCs, servos, and other sensors.
4. **Firmware Installation:** Connect the Cube Orange+ to your computer via the Micro USB cable. Install the appropriate firmware (ArduPilot or PX4) using a ground control station software like Mission Planner.
5. **Initial Calibration:** Perform all necessary calibrations, including accelerometer, compass, and radio calibration, as guided by your chosen ground control station software.

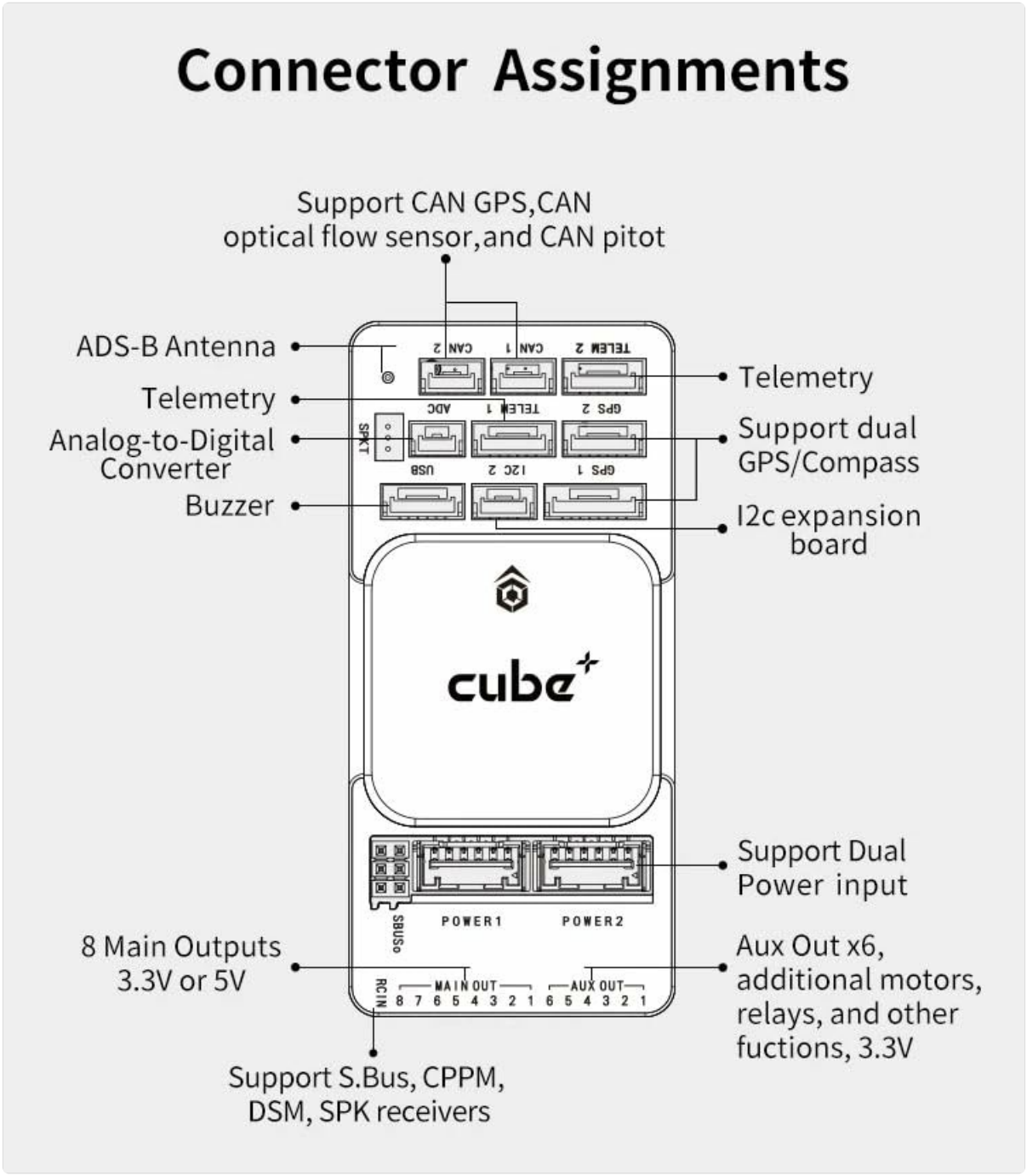


Figure 3.1: Connector Assignments on the ADSB Carrier Board.

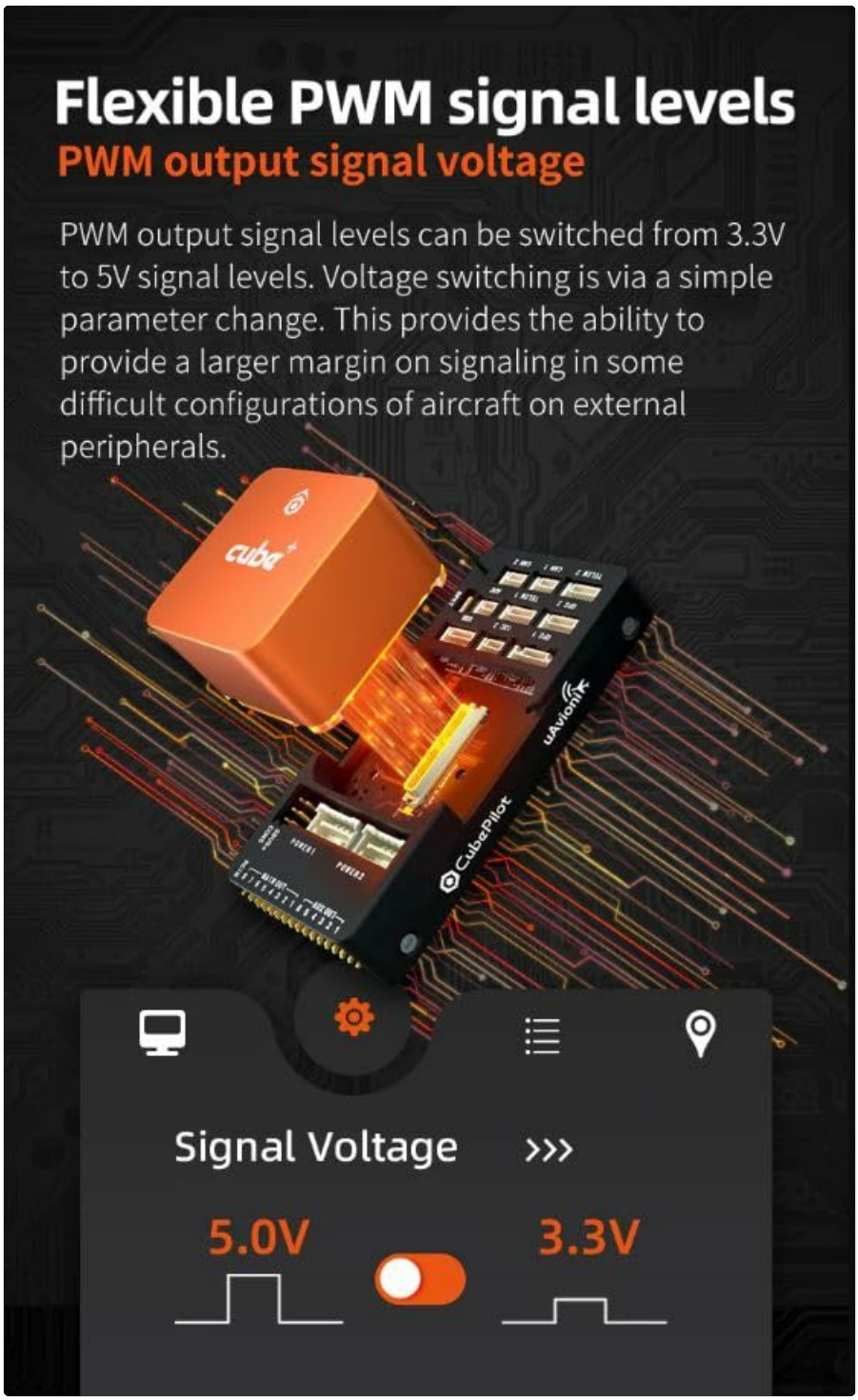


Figure 3.2: Flexible PWM Signal Level Configuration.

4. Operating Instructions

Once the Cube Orange+ is set up and calibrated, you can proceed with operation. Always ensure you are familiar with the flight characteristics of your vehicle and the capabilities of the autopilot system.

4.1 Flight Modes and Features

The Cube Orange+ supports multiple operational modes and features, including:

- **Loiter Mode:** Maintains position and altitude automatically.
- **Altitude Hold:** Maintains altitude while allowing horizontal control.
- **AUTO (with Waypoints):** Executes pre-programmed missions.
- **Guide Mode:** Allows for guided flight to specific points.

- **ADS-B Integration:** Automatic avoidance of detected aircraft in an exclusion zone.
- **Built-in Flight Logging:** Records flight data for analysis.
- **Smart RTL:** Intelligent Return-to-Launch functionality.
- **Battery Low Protection:** Automated actions upon low battery detection.
- **Geo-Fencing:** Defines virtual boundaries for flight.

4.2 Ground Control Station (GCS) Interaction

The Cube Orange+ is fully supported by ArduPilot and PX4 firmware, allowing seamless integration with ground control stations such as Mission Planner and QGroundControl. These software platforms enable:

- Real-time telemetry monitoring.
- Mission planning and execution.
- Parameter configuration and tuning.
- Firmware updates.
- Log analysis.

5. Maintenance and Care

To ensure the longevity and optimal performance of your Cube Orange+ Standard Set, adhere to the following maintenance guidelines:

- **Environmental Protection:** The Cube Orange+ is **not waterproof**. External waterproof protection is required if operating in wet conditions.
- **Operating Temperature:** Operate the device within the specified temperature range of -10 °C to 55 °C. Avoid extreme temperatures.
- **Physical Inspection:** Regularly inspect all cables and connectors for signs of wear or damage. Ensure all connections are secure before each use.
- **Cleaning:** Keep the unit clean and free from dust and debris. Use a soft, dry cloth for cleaning. Avoid using liquid cleaners.
- **Firmware Updates:** Periodically check for and install the latest firmware updates to benefit from performance improvements and bug fixes.

6. Troubleshooting

This section provides general guidance for common issues. For detailed troubleshooting, refer to the official CubePilot documentation and community forums.

6.1 Common Issues and Solutions

Problem	Possible Cause	Solution
No power to the unit	Incorrect power connection, faulty Power Brick Mini, low voltage.	Check power cable connections. Verify Power Brick Mini functionality. Ensure input voltage is within 4.1-5.7 V.
GPS not locking	Poor satellite visibility, incorrect GPS module connection, faulty GPS.	Operate in an open area with clear sky view. Check GPS cable connection to the carrier board. Test with another GPS module if available.

Problem	Possible Cause	Solution
Unstable flight behavior	Improper calibration, vibrations, incorrect PID tuning.	Perform full sensor calibration (accelerometer, compass). Ensure the unit is mounted securely to minimize vibrations. Adjust PID parameters if experienced.
No connection to GCS	Incorrect USB driver, faulty USB cable, incorrect COM port selection.	Install correct USB drivers. Try a different USB cable. Select the correct COM port in your GCS software.

7. Specifications

Detailed technical specifications for the Cube Orange+ Standard Set:

Category	Specification
Main Processor	STM32H757 Dual Core M7 + M4
Coprocessor	STM32F100
Supported RC Signals	PPM/SBUS/DSM
Power Redundancy	Triple IMU System
Sensors	Accelerometer, Gyroscope, Compass, Barometric Pressure Sensor
IMU Details	IMU1(Isolated) ICM42688 or ICM42688, IMU2(Isolated) ICM20948 or ICM20649, IMU3(Fixed) ICM45686, MSS5611-B.2 (Baro)
Supported Firmware	Ardupilot, PX4, and Hionos DO-178C
Supported Vehicle Types	Fixed-wing aircraft, Multicopters, Helicopters, VTOL-planes, Rover/boat/submarine
Weight	73g
Chassis Material	CNC Aluminum Alloy (Cube), ABS Molding (Carrier Board)
Dimensions (Product)	3.75 x 1.75 x 1.25 inches; 8.47 ounces
Operating Temperature	-10 °C to 55 °C (IMU with temperature control)
PWM I/Os	14
GPS/Serial Interfaces	4
Debug Interface	2
I2C Interface	2
CAN FD Interface	2
Power Input Voltage/Current	4.1-5.7 V / 2.5 A
Power Rated Output/Input Power	14 W

Category	Specification
USB Port Input Voltage/Current	4-5.7 V / 250 mA
Servo Rail Input Voltage	3.3 V / 5 V

Hardware specification	
Main Processor	STM32H757 Dual Core M7 + M4
Coprocessor	STM32F100
Supported RC signals	PPM/SBUS/DSM
Power redundecy	Triple redundency
Sensors	Triple IMU System
Sensors details	IMU1(Isolated) ICM42688 IMU2(Isolated) ICM20948 or ICM42688 IMU3(Fixed) ICM20649 or ICM45686 MS5611 x 2(Baro)
Supported firmware	Ardupilot, PX4, and Hionos DO-178C
Supported vehicle type	Fixed-wing plane Multicopters Helicopter VTOL-plane Rover/boat/submarine
Specification	
Weight	73g
Chassis Material	CNC Aluminum Alloy(cube)+ABS Molding(Carrier Board)
Size	cube 38.4x38.4x22mm Carrier Board 94.5x44.3x17.3mm
operating temperature	-10~+55° IMU with temperature control
PWM I/Os	14
GPS/Serial interfaces	4
Debug interface	2
I2C interface	2
CAN FD interface	2
Features	
Supports multiple modes such as Loiter, Altitude Hold, AUTO(With Waypoints), Guide mode, etc Supports Mission Planner and Qgroundcontrol ground control stations Built-in flight logging	
Extensibiliy	
Supports companion computers such as NVIDIA, Raspberry Pi, etc Supports OSD	
Protection Function	
Smart RTL battery low protection Geo-Fencing RC signal protection	

Figure 7.1: Detailed Hardware Specifications.

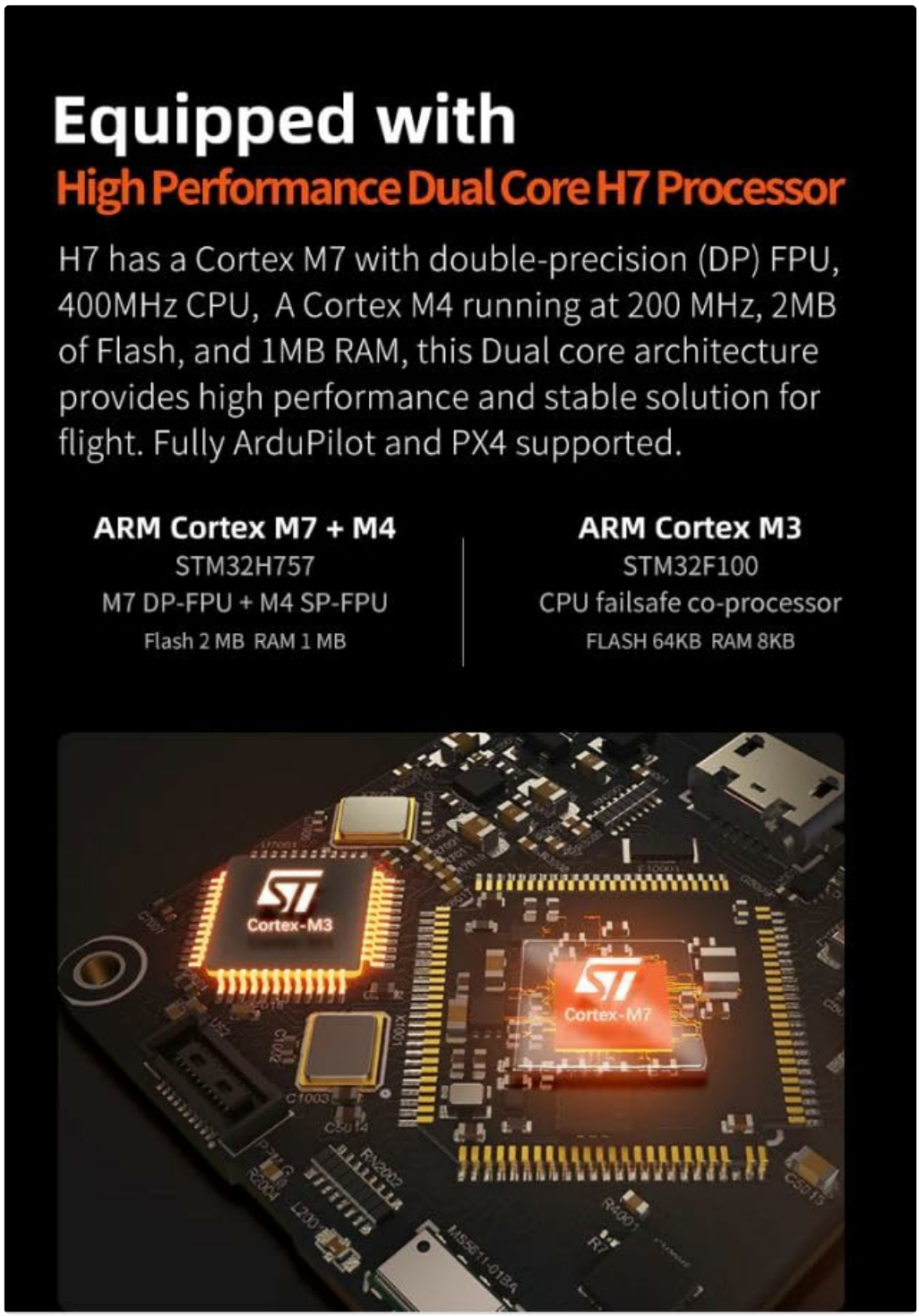


Figure 7.2: High Performance Dual Core H7 Processor Architecture.

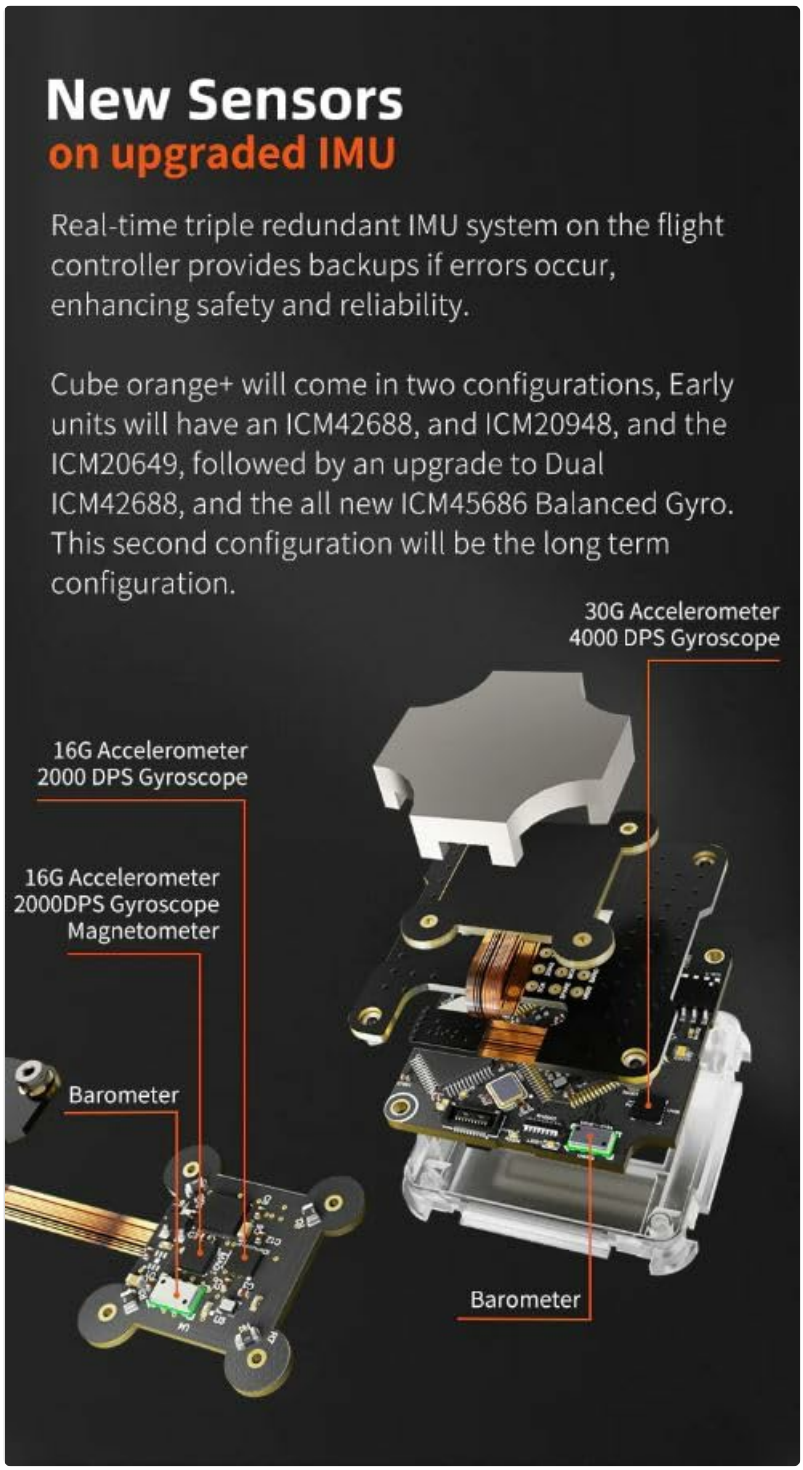


Figure 7.3: Upgraded IMU Sensor System.

8. Warranty and Support

For warranty information, please refer to the official CubePilot website or contact your authorized reseller. Warranty terms typically cover manufacturing defects for a specified period from the date of purchase.
For technical support, firmware updates, and detailed documentation, please visit the official CubePilot documentation website or their community forums. These resources provide comprehensive guides, troubleshooting tips, and a platform to connect with other users and experts.
Official CubePilot Website: https://www.cubepilot.org/

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Ask a question about this manual

Ask about setup, troubleshooting, compatibility, parts, safety, or missing instructions. Manuals+ will review the question and use this page's manual context to help answer it.

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Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question