RangePro® X8

User Manual (For A3 Flight Controlled Systems)

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Warranty Information

For warranty information, go to Appendix B, "Warranty" on page 66.

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About this Guide

This guide describes unpacking and readying for flight the TerraView RangePro® X8 multi-rotor unmanned aircraft system (UAS).

Audience

This guide is intended for operators and technicians who have experience in operating and/or servicing drone aircraft.

Structure

This guide contains the following chapters and appendices:

For best results, read the contents of this guide *before* you operate the UAS.

Precautions

Warnings, cautions, and notes, which have the following meanings, are used throughout this guide to help you become aware of potential problems. *Warnings* relate to personal injury issues, and *Cautions* refer to potential property damage.

Note Highlights a helpful tip to help the user work more efficiently.

The alert symbol and IMPORTANT heading calls attention to important information.

The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.

The shock hazard symbol and CAUTION heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.

The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.

Conventions/Terminology

CSC: Control Stick Combination. Holding the left and right control sticks down and in towards each other, typically for 3 or more seconds.

GCS: Ground Control Station. The transmitter and the tablet as a combined system

HUD: Heads Up Display

Payload: Any attachment connected to the RangePro X8. Supported payloads include Zenmuse X3, Z3, X5, Z30, and XT

RTH/RTL: Return to Home/Return to Launch

Transmitter: The controller that the pilot holds while flying the RangePro X8

UAS: Unmanned Aircraft System. Includes the UAV and all ground units for control and communication

UAV: Unmanned Aerial Vehicle (AKA a drone)

Reference Documents

Where applicable, this document references other documents that provide detailed notes on how to operate specific pieces of equipment included with the RangePro X8, safety regulations, and other information that will ensure your flight operations are safe and your RangePro X8 is well maintained.

Prior to flight operations be sure to familiarize yourself with this document and all the information in the reference documents noted below. If you have lost or cannot find a particular document referenced below an electronic copy may be found on the www.terraview.com support page.

- *DJI Lightbridge 2 User Manual*, v1.6
- *DJI A3 Pro Disclaimer*, v1.2
- *DJI A3 Pro In The Box*, v1.2
- *DJI A3 Pro Quick Start Guide*, v1.2
- *DJI A2 Pro User Manual*, v1.4
- *SkyRC D400 Charger Manual*, v1.2

- *SkyRC LiPoPal Instruction Manual*
- *Using the D400 Charger with RangePro RP6S24KHDA Battery*
- *Lithium Battery Shipping Notice or Appendix D,* "Shipping Lithium Polymer Batteries" on page 72

Chapter 1 General Information

Chapter Contents

RangePro X8 Overview

The RangePro X8 (see figure 1) is a small, lightweight, multi-rotor unmanned aircraft system (UAS) proudly engineered, designed, and assembled in the USA. The RangePro X8 is unique in its class and is an extremely cost-effective solution.

Figure 1. RangePro X8 UAV

With an ultra-strong carbon fiber body, lightweight design, and efficient motor and propeller pairings, the RangePro X8 is capable of flight times in excess of 70 minutes. The quad-arm coaxial motor octocopter design provides redundancy that permits safe flight operations to continue with as many as four damaged or inoperative motors.

RangePro X8 is capable of taking off and landing manually or autonomously while supporting a wide range of payloads. Highly portable and adaptable, a complete system can be transported easily and can be operated by only one person.

The RangePro X8 is available with a number of flight control systems, including A3 and Lightbridge 2 electronics, or a Pixhawk Blue Cube solution.

This document provides details on how to maintain and safely operate a RangePro X8 with A3 flight control systems.

Now that you have an overview of RangePro X8 capabilities, continue to Chapter 2, "What's in the Case?" on page 15.

Chapter 2 What's in the Case?

Chapter Contents

Introduction

Note To make it easier to move the RangePro X8 case, the extension handle (see figure 2) can be extended by pulling on the handle while pressing the release button. Stop pressing the button after the handle is at the desired length.

Figure 2. Case extension handle and release button

Inspect the case for damage. Open the case and verify that all equipment is secure and nothing was damaged during shipping or transport.

Table 1 describes RangePro X8 case contents. Figure 3 shows the locations of equipment in the case.

Table 1. RangePro X8 case contents

Callout	Description	Callout	Description	Callout	Description
1	RangePro X8 Drone	7	Charger Power Cable	13	Tablet Storage Area
2	RangePro X8 Landing Gear	8	Battery Charging Cable (under the drone)	14	Storage Area for Optional Gimbal
3	Transmitter	9	Battery Tester	15	Temporary Battery Storage Areas (remove the battery before shipping the case)
4	Transmitter Data Cable	10	Documentation (under the drone)		
5	Transmitter Charger	11	Battery Test Cable	16	Spare propellers (1 set of top propellers and 1 set of bottom propellers) and screws
6	Charger	12	Bubble Level		

Figure 3. RangePro X8 equipment locations

Where is the Battery?

The RangePro X8 battery was shipped separately. Be sure to save the shipping material that comes with the battery, because the materials can be reused for future shipments. See Appendix D, "Shipping Lithium Polymer Batteries" on page 72 or the *TerraView Lithium Battery Shipping Notice* for additional details.

Federal regulations prohibit the shipping of large Lithium based batteries with other equipment. Regulations may change so, regardless of whether you are shipping by air or by ground, be sure to check with your carrier before packing and labeling batteries for shipment.

Spares and Replacements

Your RangePro X8 comes with 1 set of top propellers and 1 set of bottom propellers. In the event of a crash, inspect your RangePro X8 for damage, including small cracks in the propellers and in the arms.

If there is ***any*** damage to the RangePro X8, do not fly the drone until it has been repaired.

If a propeller is damaged, it can be replaced with a spare propeller from the RangePro X8 case (see section "Replacing a Pair of Propellers" on page 60).

Now that you have verified that all UAS components and the battery were delivered, continue to Chapter 3, "Register Your Drone" on page 19.

Chapter 3 Register Your Drone

Chapter Contents

Introduction

In the US, current FAA regulations require registration of all drones that weigh in excess of 9 ounces (250 grams). The RangePro X8 with a battery and no payload weighs approximately 10 pounds (4.4 kilograms) and is therefore subject to registration requirements. To register your drone, visit the FAA website at **https://faadronezone.faa.gov**.

If you are a commercial operator of the RangePro X8 in the US, review the FAA Part 107 requirements and comply with all local and federal regulations.

If you are an operator outside of the US, contact your local authorities to ensure compliance with local laws and regulations.

Label Your Drone According to FAA Regulations

Comply with the current regulation for labeling your drone. In the US, refer to **https://faadronezone.faa.gov**.

Now that you have registered and labeled the UAV, continue to Chapter 4, "Cautions and Warnings" on page 21.

Chapter 4 Cautions and Warnings

Chapter Contents

Introduction

RangePro X8 is a sophisticated UAV. Flying it can be dangerous. Review and heed all warnings.

For best results, review section "Reference Documents" on page 11 of this manual ***before*** using the UAV.

To avoid the risk personal injury, DO NOT fly the RangePro X8 above or near large crowds.

In addition, heed the following cautions and warnings when operating or servicing the drone.

Motors and Propellers

The motors and rotating propellers of the aircraft can cause serious injury to yourself and others. Obey the following cautions and warnings for your safety and the safety of others:

To avoid the risk personal injury, be aware of the sharp edges of the propellers during pre-flight setup or when replacing the propellers. Wear gloves or take other protective measures when touching the propellers.

Stay away from rotating propellers and motors.

Keep foreign objects away from rotating motors and propellers.

Power off the aircraft before touching the propellers.

Burn risk: Motors may be hot after a flight. Do not touch or handle the motors until they have cooled down after a flight.

To avoid damaging the RangePro X8:

- **DO NOT** attempt to modify the structure of the motors.
- **DO NOT** stop the motors in mid-flight.
- **DO NOT** use aged, chipped or broken propellers.
- **DO NOT** turn the motors on when propellers are mounted and there are other people or animals in the immediate vicinity.
- **Verify** that the motors are securely mounted and rotating smoothly.
- **Verify** that the propellers and frame arms are properly positioned for flight.
- **Verify** that the propellers are in good condition and securely tightened and mounted to prevent them from falling off the motors.
- **Verify** there is nothing obstructing the motors before activating them.

The Aircraft

CAUTION

To avoid damaging the RangePro X8:

- **DO NOT** fly the RangePro X8 if any battery cell is below 4.2V. Full charge on the battery should be 4.35V per cell, or 26.1V total.
- **DO NOT** use RangePro X8 parts (i.e. batteries, flight controller, etc.) for anything other than their intended purpose.
- **Verify** that the gimbal mount lever is in the locked position before flight.
- **Verify** that there are no foreign objects (such as water, oil, soil, sand, etc.) inside of the aircraft fuselage or its components.
- **Verify** that there is sufficient room around the UAV (TerraView recommends a 30-foot or 9-meter radius around the aircraft) for takeoff and landing.
- **Only** use RangePro X8 replacement parts when servicing the UAV.
- **Perform** regular maintenance on your aircraft and its components (see Chapter 11, “Maintenance” on page 59) to ensure that everything is in good working order.

During a Flight

WARNING

To avoid the risk of personal injury and/or property damage, land immediately if severe drifting occurs (i.e. if the aircraft does NOT fly in straight lines) or if the aircraft does not properly respond to flight commands.

CAUTION

To avoid damaging the RangePro X8, before using the UAV, consult a weather service for local weather conditions. Avoid flying the drone if:

- Wind speeds may exceed 25 mph (40 kph)
- Precipitation will be more than a drizzle.
- Temperatures are below 14 °F or above 104 °F (below -10 °C or above 40 °C).

Comply with local regulations for piloting a small UAV.

Shipping Lithium Polymer Batteries

IMPORTANT

Federal regulations prohibit the shipping of large Lithium based batteries with other equipment. Regulations may change, so regardless of whether you are shipping by air or by ground, be sure to check with your carrier before packing and labeling batteries for shipment.

See Appendix D, “Shipping Lithium Polymer Batteries” on page 72 or the *TerraView Lithium Battery Shipping Notice* for additional details

Now that you have read and understood the cautions and warnings, continue to Chapter 5, “Assemble RangePro X8 for Flight” on page 24.

Chapter 5 Assemble RangePro X8 for Flight

Chapter Contents

Introduction

Refer to the following sections to assemble the UAV for flight:

- Aircraft Assembly
- Battery Installation (see page 31)
- Payload Installation (see page 35)

Aircraft Assembly

Do the following to assemble the UAV:

1. Remove landing legs from the case (see figure 4) and set them aside.

Figure 4. Removing landing leg from case

Until the landing legs have been installed, if you must place the UAV on a flat sturdy surface, do so carefully to avoid damaging the propellers.

2. While gripping the RangePro X8 firmly as shown in figure 5, carefully lift it from the case.

Figure 5. Removing RangePro X8 drone from case

3. Install a landing leg by first positioning it as shown in figure 6.

Figure 6. Installing a landing leg

4. Insert the landing leg into a socket on the airframe (see figure 7) by pressing the pin so the leg can enter the socket. Then fully insert the landing leg into the socket until the pin engages the hole (you may need to turn the leg in the socket until the pin aligns with the hole).

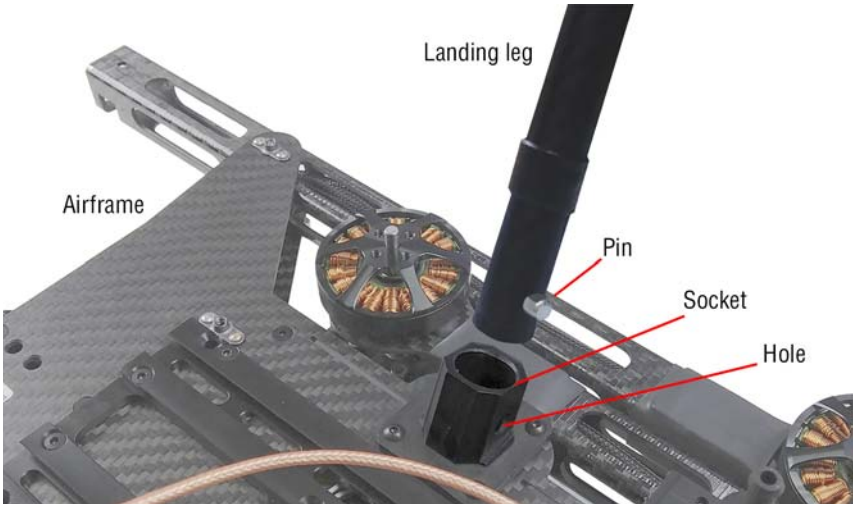

Figure 7. Installing a landing leg (close-up)

5. Repeat steps 3 and 4 to install the remaining landing leg into the other socket.
6. Attach an antenna clip onto a landing leg as shown in figure 8.

Figure 8. Attaching an antenna clip onto a landing leg

7. Repeat step 6 to attach the remaining antenna clip onto the other landing leg.

8. Stand the drone on its legs on a sturdy flat surface as shown in figure 9.

Figure 9. RangePro X8 standing on landing legs

9. Now you are ready to unfold the arms. Turn the props out of the way, then loosen the 4 wing fasteners about 1/4 turn as shown in figure 10.

Figure 10. Loosening wing fasteners

10. Unfold the rear arms, being careful not to damage the propellers (see figure 11).

Figure 11. Rear arms unfolded

11. Lift arm pins (see figure 12 on page 30) and continue to rotate arms into position (see figure 13 on page 30). Make sure the arm pin clears the arm flange and inserts into the arm. Wiggle arm slightly when the pin is seated into the threads, making sure the arms are locked in position.

Figure 12. Lifting arm pins

Figure 13. All arms unfolded

12. Once an arm is in position, lower the arm pin into place and lightly tighten. Repeat this process for the remaining arms.
13. Once aircraft arms are correctly positioned, tighten the arm and pivot pins securely by hand.

The drone is assembled. Continue to section "Battery Installation".

Battery Installation

Installing the battery consists of the following:

- Testing the battery charge and cell health
- Installing the battery into the airframe (see page 33)

Testing the Battery

Check the battery charge and cell health of battery sides B1 and B2 as follows:

1. Remove the battery tester (see figure 14) from the case.

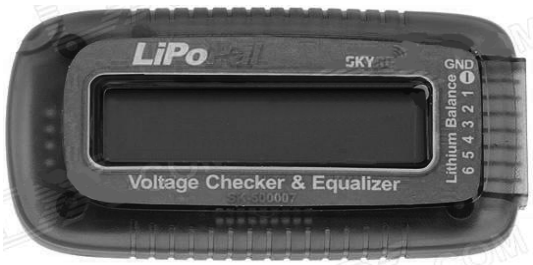

Figure 14. Battery tester

2. Remove the battery tester cable (see figure 15) from the case.

Figure 15. Battery tester cable

3. Connect the battery tester cable to the battery.
4. Plug connector B1 into the battery tester as shown in figure 16 on page 32 (position the connector so the black wire goes in the topmost pin of the battery tester connector as shown in figure 17 on page 32).

5. Verify that all battery cells are at least 4.2 V.
6. Disconnect B1 from the battery tester when finished.

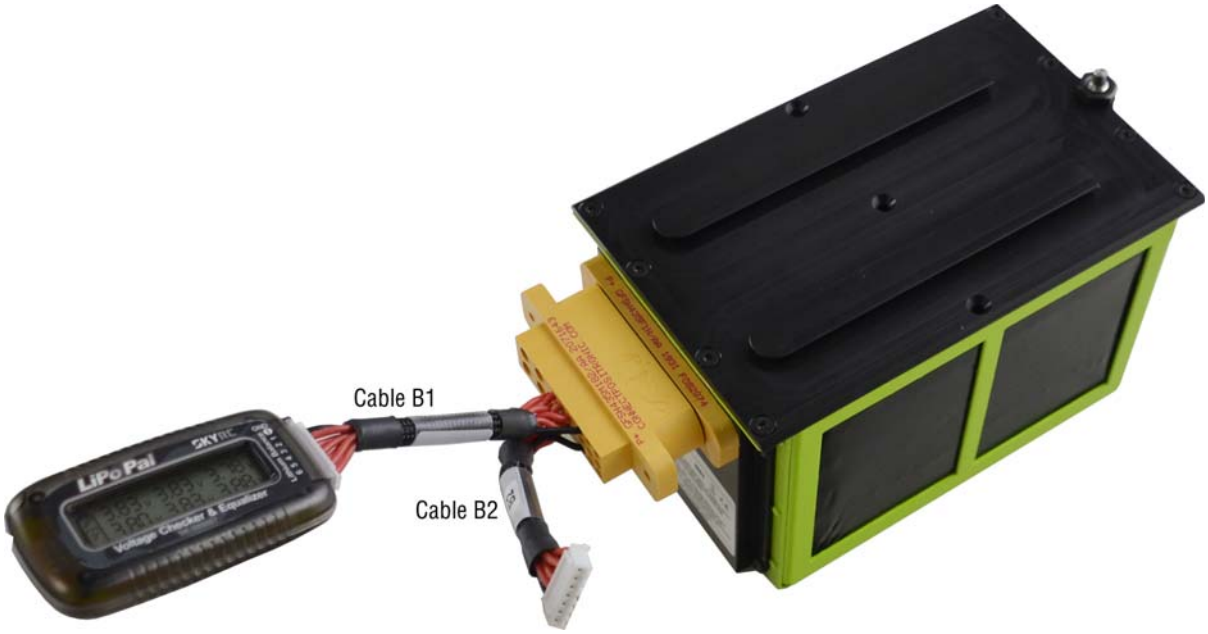

Figure 16. Battery tester connected to battery

Figure 17. Cable B1 connector black wire

CAUTION

DO NOT fly the RangePro X8 if the variation between cells exceeds 0.1 volts. Balance charging the battery typically results in all cells being within 0.03 volts of each other. If the variation between cells exceeds 0.1 volts this may be an indicator of a failing battery.

DO NOT attempt to fly the RangePro X8 if the total battery voltage is below 19.2 volts (3.2 volts per cell).

If the battery voltage is too low, or is reporting variation between cells in excess of 0.1 volts, refer to section “Charging the Battery” on page 56 to charge the battery.

7. Repeat steps 3 through 6 to plug connector B2 into the battery tester, and verify that all battery cells are at least 4.2 V.

IMPORTANT

DO NOT disconnect the battery tester cable from the battery by pulling on the cable wires. Instead, grasp the connector as shown in figure 18.

8. Disconnect the battery tester cable from the battery.

Figure 18. Disconnecting battery tester cable

Installing the Battery

Install the battery as follows:

1. While pulling down the battery locking pin (see figure 19 on page 34), slide the battery into the rails located under the fuselage. When the locking pin is just past the airframe edge, release the locking pin.

Figure 19. Installing the battery into the airframe rails

2. Continue inserting the battery into the rails until the spring-loaded pin engages the battery transport mode hole (see figure 20).

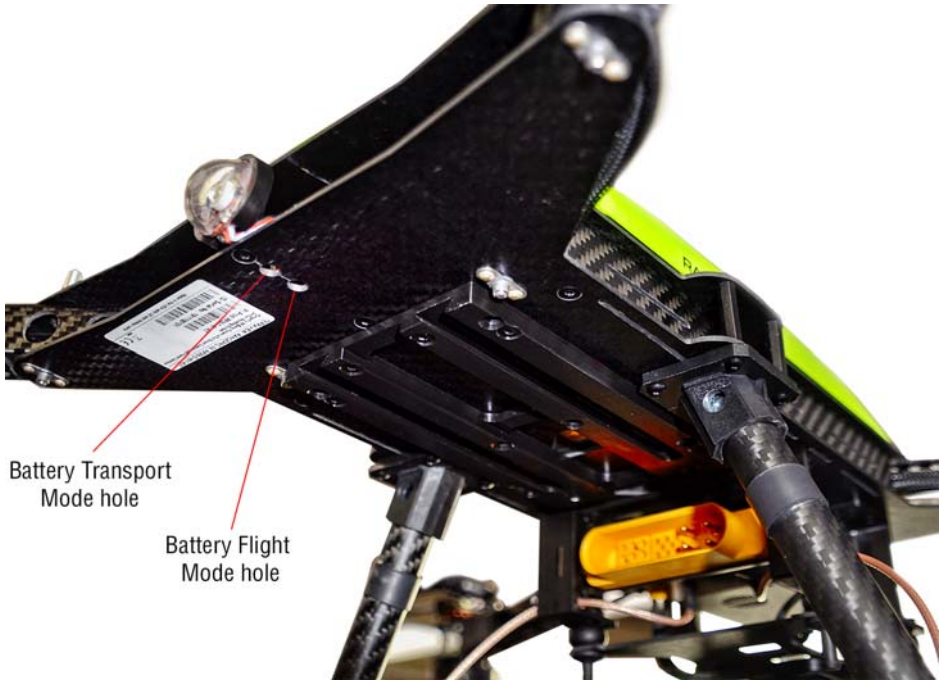

Figure 20. Battery transport mode hole and battery flight mode hole

Battery installation is complete. Continue to section "Payload Installation" on page 35.

Payload Installation

Note The Zenmuse Z30 and XT2 use a different gimbal mount than the one supplied with the RangePro X8. Contact **https://terraview.com/contact/** to purchase the mount.

If you are installing a payload other than the Zenmuse X3, X5/X5R/XT, install it using payload specific instructions. Otherwise, do the following to install the Zenmuse X3, X5/X5R/XT:

1. Slide the locking lever (see figure 21) so the white lines at the front of the drone are aligned vertically.

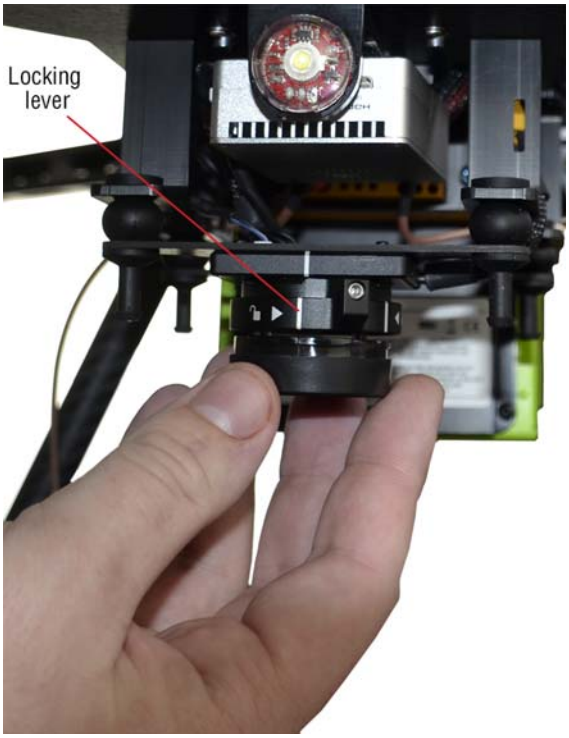

Figure 21. Gimbal mount locking lever

2. Insert the payload into the gimbal mount.
3. Slide the locking lever to the locked position.

The payload is installed. Continue to Chapter 6, “Ground Control Setup” on page 36.

Chapter 6 Ground Control Setup

Chapter Contents

Introduction

Refer to the following sections to set up ground control:

- Running the GO application
- Setting up the transmitter

Running the GO Application

Do the following to run the GO app:

1. Load the DJI GO app onto your user-supplied control device/tablet. Versions of the app are available for iOS and Android devices.

Figure 22. DJI GO app is available at the Apple App Store and Android stores

2. Sign in to your DJI account or create a user account if you don't already have one.

The app is running. Continue to section "Setting Up the Transmitter".

Setting Up the Transmitter

IMPORTANT

An AC power outlet must be available to charge the transmitter.

Verify that the transmitter is fully charged as follows:

1. Remove the transmitter (see figure 23) from the case.

Figure 23. Transmitter

2. Press and release the transmitter power button (see figure 24), then press and hold it for 3 seconds. The status indicator will be red since the UAV is not powered on. All 4 LEDs of the battery level indicator should be lit, showing that the battery is fully charged.

Figure 24. Transmitter power button and indicators

3. If the battery is charged, go to step 10 to continue setting up the transmitter. Otherwise, go to step 4 to charge the transmitter.
4. Remove the transmitter charger (see figure 25) from the case.

Figure 25. Transmitter charger

5. Plug the transmitter charger into the transmitter.
6. Connect one end of the AC power cord to the transmitter charger. Connect the other end to an AC power outlet.
7. When all 4 battery level indicators are lit, disconnect the transmitter charger from the transmitter.

8. Store the transmitter charger and AC power cord in the case.
9. Power down the transmitter by pressing and quickly releasing the power button, and then holding the power button down for 3 seconds.

Figure 26. Mobile device holder

10. Unfold the mobile device holder (see figure 26)
11. Press the button on the side of the mobile device holder (see figure 26) to release the clamp.
12. Place the tablet inside the clamp and adjust it to secure the tablet.
13. Adjust the antennas to the desired positions.
14. Connect one end of the transmitter data cable (see figure 27) to the transmitter USB port.

Figure 27. Transmitter data cable

15. Connect the other end of the transmitter data cable to the tablet USB port (see figure 28).

Figure 28. Connecting transmitter data cable

16. Verify that the tablet is properly charged (see Lightbridge 2 documentation for additional details).

Ground control has been set up. Continue to Chapter 7 to learn about emergency procedures you should know before your first flight.

Chapter 7 Emergency Procedures

Chapter Contents

Introduction

Refer to the appropriate sections for instructions on what to do in case of an emergency:

- Propeller loss
- Loss of power
- Loss of GPS
- Loss of video link (see page 43)
- Loss of data link (see page 43)
- Fly away (see page 43)

Propeller Loss

Do the following:

1. If you suspect that you have lost a propeller, slowly and carefully fly the aircraft to a reasonable landing area and land immediately.
2. You may also use the automated RTH function, but keep an eye on the aircraft and make sure it is heading in the correct direction to come back home. If the aircraft starts to deviate from the RTH flight path, initiate the automated RTH sequence again. Repeat this step until the aircraft comes home and lands.
3. If the unit is not able to return to home, manually land in the nearest unpopulated area.
4. If the aircraft loses a propeller and is flying out of control toward a populated area, initiating a "prop stop" (holding the sticks in the CSC position) until the props stop would be the safer recourse. Instructions for stopping the propellers in flight can be found on page 22 of the *A3 Pro User Manual*.

Note This feature is only enabled when the Stop Motor setting is set to its default position of ON. The Stop Motor setting can be found in the Basic Settings, ESC Settings page of the Assistant 2 for Autopilot application.

Loss of Power

Do the following:

1. If power loss occurs, the aircraft will drop from the sky and fall to the ground.
2. Verbally warn others in the operation area immediately.
3. After the aircraft has hit the ground, approach the crash site cautiously.
4. Look for debris as there may be sharp jagged pieces lying about. Also be cautious in case a damaged battery erupts into a fire.

Loss of GPS

Do the following:

1. If the GPS signal degrades until it is not working properly, or fails completely, you can still fly the aircraft in manual (A) mode, which the aircraft will enter automatically in the event of insufficient GPS.
2. Bring the aircraft back to the landing area if you are able and land immediately.
3. If you cannot return to your landing area, then land immediately in the area of GPS loss if the area is suitable and safe for landing.

Loss of Video Link

Do the following:

1. With a loss of video link you will still have command and control of the aircraft.
2. You may have flown too far away or have run into signal interference.
3. Try flying back toward your location to pick up signal again.
4. You may also try adjusting the antennas so that they are facing the aircraft. If this doesn't work, bring the aircraft back and land immediately using your instruments or by initiating the RTH function.

Loss of Data Link

Do the following:

1. If you lose your data link/command and control functionality of the aircraft, then after 3 seconds the aircraft will switch to fail-safe RTH. This will bring the aircraft back to the takeoff location and automatically land.
2. However, if the light on your RC controller is green, you still have the ability to control the aircraft.

Fly Away

Do the following:

1. If the aircraft doesn't respond to any pilot inputs and is flying without pilot commands, you may have a fly away situation.
2. If this occurs note the battery voltage, speed and direction of flight. Based on these factors determine where the aircraft will most likely end up.
3. Notify local authorities of the incident.

Now that you know what to do in the event of an emergency, continue to continue to Chapter 8, “Flight Ops” on page 44.

Chapter 8 Flight Ops

Chapter Contents

Introduction

Refer to the following sections for information about the phases of flight operations:

- Pre-Flight
- Ground Station Connection (see page 48)
- Takeoff (see page 49)
- In-Flight (see page 49)
- Landing (see page 50)
- Post-Flight (see page 50)

IMPORTANT

Emergencies such as the loss of a propeller; loss of power, GPS, video or data links; or a fly away condition can happen while operating the RangePro X8. Refer to Chapter 7, "Emergency Procedures" on page 41 to learn how to deal with these situations should they occur.

Pre-Flight

Do the following:

1. Place the RangePro X8 in a clear area absent of debris with direct access to satellites to obtain GPS lock.
2. Unfold propellers so they are fully extended and perpendicular with props below and repeat for each arm (see figure 29).

Figure 29. Positioning propellers for flight

3. Press and release the transmitter power button (see figure 24 on page 38), then press and hold it for 3 seconds. The status indicator will be red since the UAV is not powered on. All 4 LEDs of the battery level indicator should be lit, showing that the battery is fully charged.
4. Turn on the tablet.
5. Open the GO app.
6. Check to make sure the UAV arms are positioned properly by performing a quick check of the propeller tips. Make sure there is about 1.5 inches (3.8 cm) between tips as shown in figure 30.

Figure 30. Proper distance between propeller tips

7. Check all propellers to verify the mounting flanges are secure to the motors and that the tension on the individual props is fairly tight.
8. Check the arm pivot pin and arm mount thumb screws for tightness.

CAUTION

To avoid damaging the RangePro X8, **verify** that there is sufficient clear space (no loose debris on the ground) around the UAV (TerraView recommends a 30-foot or 9-meter radius around the aircraft, as shown in figure 31 on page 47) for takeoff and landing.

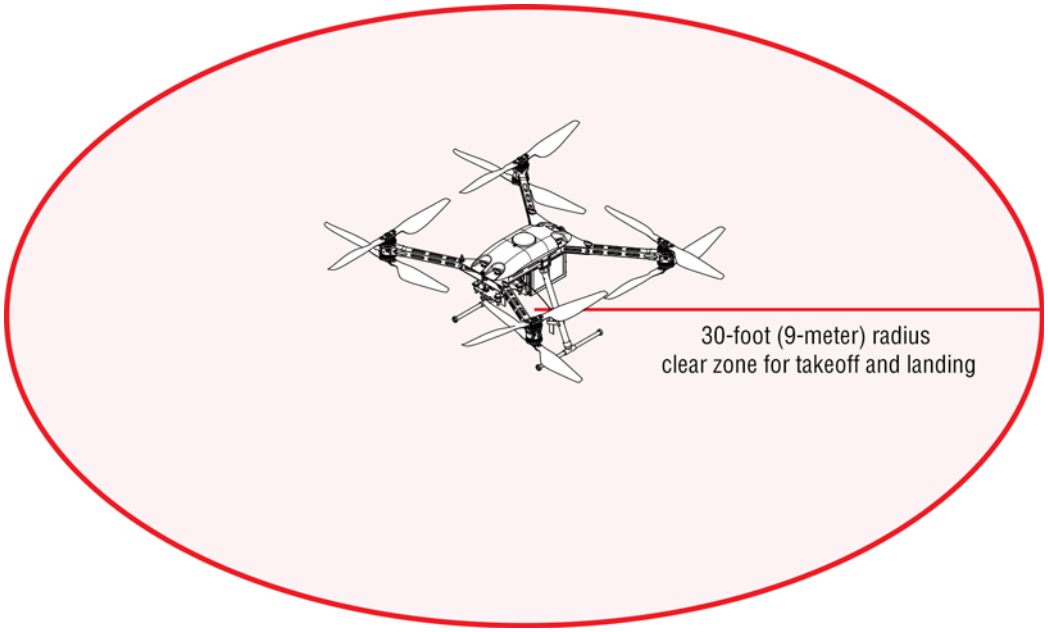

Figure 31. Clear zone around UAV

9. With the transmitter on, it's now time to turn on the RangePro X8. While pulling down the battery locking pin, press the battery into the rails far enough that the battery pin clears the battery transport mode hole (see figure 20 on page 34). When that happens, release the pin. Continue pressing the battery until the locking pin engages the battery flight mode hole, at which point the RangePro X8 will activate and power up. The UAV will emit 8 beeps to indicate the motors are operating normally.

Figure 32. UAV green and white position strobe lights

10. Verify that the white position strobe light on the UAV front (see figure 32), and the green position strobe light on the rear are flashing.

Pre-Flight ops are complete. Continue to section "Ground Station Connection" on page 48.

Ground Station Connection

Do the following:

1. Verify that the aircraft has connected to the ground station/radio and monitor telemetry.
2. If the *Firmware Requires Upgrade* message appears (see figure 33), you will have to upgrade the firmware before proceeding.

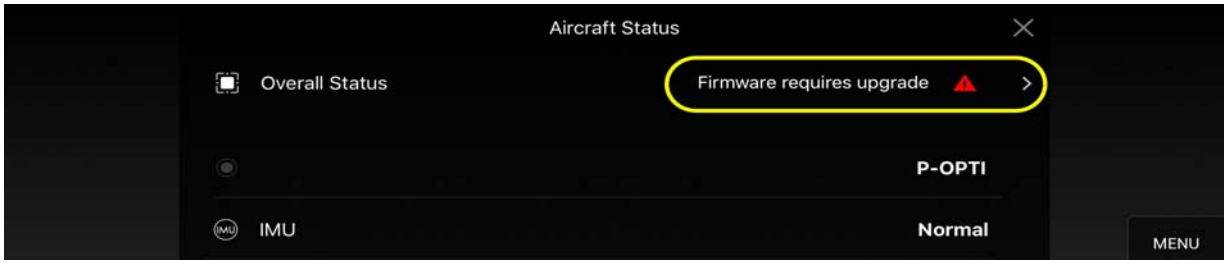

Figure 33. Firmware Requires Upgrade message

3. Verify that camera transmission is operational.
4. If applicable, insert the SD card into the slot in the payload.
5. If the *Calibrate the Compass* message appears on the GO app screen (see figure 34), calibration is needed, go to section "Calibration". Otherwise, go to section "Battery Health Monitor".

Figure 34. Calibrate the Compass message

Calibration

Check for compass error and recalibrate as needed. Follow the prompts on the GO app to recalibrate your compass.

Battery Health Monitor

Go into the battery menu. Make sure that the 5S battery is selected and that the RTH Warning #1 occurs at 18.3 volts and set Critical Landing to 18 volts.

Figure 35. GPS signal strength should be at least 15

GPS Satellite Connectivity

Verify that there is sufficient GPS (15 or higher on the GO app as shown in figure 35) to support flight operations.

If all indications are correct, continue to section "Takeoff".

Takeoff

Do the following:

1. Make sure the RangePro X8 is in a good takeoff location (free of debris and a safe distance from objects and structures like buildings and trees. TerraView recommends a 30-foot or 9-meter radius around the aircraft) for takeoff and landing (see figure 31 on page 47). Remember that this area will probably be the return-to-home (RTH) and landing location.
2. We also recommend using a flat and level surface for takeoffs and landings. Use of a takeoff mat may be needed for dusty sites.
3. Be aware of possible strong magnetic interference when choosing your takeoff location. Vehicles, buildings, dumpsters, street lights and even the rebar in the concrete you are standing on may cause issues. (Remember, this area will be the RTH location as well.)
4. Clear the area of personnel and notify participants of your intention to take off.
5. Double check the Heads-Up Display (HUD) on the tablet to make sure all systems are in the green and ready to go.
6. Command the aircraft to take off, manually or automated. (See *A3 User Manual* (Version 1.4), page 21 for instructions on manual take-off, and page 29 for automated take-off.)

The RangePro X8 is in flight. Continue to section "In-Flight" on page 49.

In-Flight

Do the following:

1. Once the RangePro X8 has taken flight, put it in a hover approximately 10 feet (3 meters) above the ground.
2. Make small left and right, up and down commands with the right stick.
3. Make small up and down, left and right commands with the left stick. Verify that the aircraft performs as expected. (See *A3 User Manual* (Version 1.4), page 21 for proper aircraft command responses.)
4. Start the timer, if needed.

5. Double check the HUD for vitals and make sure all is correct. Note the battery voltage and fly the drone to the area of operation.
6. Monitor the HUD for RangePro X8 system health and continually scan the area of operation for maximum situational awareness. Look for good GPS signal strength, a good data link signal, battery voltage, and other alert notification that may be displayed on the HUD screen. Be aware of other aircraft in the vicinity or for personnel that might enter the flight area.

When it is time to return to the take-off point, continue to section "Landing".

Landing

Do the following:

1. You may command the aircraft to return to home (RTH) manually or automated. (See *A3 User Manual* (Version 1.4), page 21 for manual landing, and page 29 for automated landing instructions.)
2. Verify that the landing area is clear of personnel and loose objects.
3. Announce your landing intentions to others in the area.
4. If the automated RTH command was given, allow the aircraft to land itself. Keep in mind that the aircraft might veer off from the exact landing location. Monitor the automated descent and make necessary lateral adjustments (right control stick) to ensure the aircraft lands in the desired area.
5. If the UAV is being manually flown, bring the aircraft down slow and steady. There are no ground sensors (such as a barometer) to assist with descent, so you are own your own. Be careful.
6. When the aircraft has landed, continue to hold down the left stick until the propellers have stopped spinning.

The UAV has safely landed. Continue to section "Post-Flight".

Post-Flight

Post-Flight consists of the following:

- Disassembling the RangePro X8 (see page 51)
- Disassembling the Ground Controller (see page 51)
- Packing up (see page 52)

Disassemble the RangePro X8

Essentially the disassembly of the aircraft is much like the assembly of the aircraft only in reverse order:

You can temporarily leave the battery inside the drone until it is time to ship the drone off-site.

Federal regulations prohibit the shipping of large Lithium based batteries with other equipment. Regulations may change, so regardless of whether you are shipping by air or by ground, be sure to check with your carrier before packing and labeling batteries for shipment.

See Appendix D, "Shipping Lithium Polymer Batteries" on page 72 or the *TerraView Lithium Battery Shipping Notice* for additional details

1. Remove the battery by pulling down on the battery pin with one hand while using the other hand to pull the front of the battery forward on its rails. Be careful not to pull the battery so far that you drop it. Alternatively, if you choose not to remove it completely, you can slide the battery just enough for the locking pin to engage in the battery transport mode hole.
2. Remove the payload. The method of doing this will depend on the payload you are using.
3. Fold the propellers and point them to the rear of the aircraft.
4. Fold the arms as follows: Loosen the pivot pin screw, and loosen and lift the arm pins before attempting to fold the arms. Front arms fold back first with props pointing to the rear. Back arms fold back second with props pointing to the rear.
5. Secure the arms using the pivot pin screws.
6. Detach the antenna clips from the landing gear struts.
7. Remove a landing leg from the frame by pushing the pin in and pulling the strut until it disconnects from the frame.
8. Repeat step 7 to remove the other landing leg.

To avoid damaging parts of the aircraft or the gimbal mount, avoid setting the aircraft on the ground if the landing legs are not installed.

9. Gently lower the aircraft into the case. While lowering the aircraft into the case, make sure the antennas are lying flat under the airframe in the foam cavity.

Disassemble the Ground Controller

Do the following:

1. Power down the tablet (the procedure for powering down the tablet will be tablet specific).
2. Power down the ground controller by pressing and quickly releasing the power button, and then holding the power button down for 3 seconds.

3. Disconnect the transmitter interface cable from the ground controller.
4. Disconnect the other end of the transmitter interface cable from the tablet.
5. Remove the tablet from the transmitter mobile device holder and fold down the holder.
6. Fold in the antennas.

Packing up

Place all components into their original locations in the case as shown in table 1 and figure 3 on page 17.

Verify that the battery or batteries have been removed from the temporary storage area in the case and/or the drone *before* shipping the case.

See Appendix D, "Shipping Lithium Polymer Batteries" on page 72 or the *TerraView Lithium Battery Shipping Notice* for additional details

Continue to Chapter 9, "Data Management" on page 53.

Chapter 9 Data Management

Chapter Contents

Introduction

Use the GO app and visit the DJI Academy for tutorials and a user manual. This will provide insight on the app itself, flight logging and telemetry access.

Downloading and Reviewing Flight Logs

To download Flight Logs use the GO App > Me > Flight Records command to review flight details.

Collecting Payload Data

See your payload documentation for details on extracting data or storage devices from the payload.

Collecting On-Board Flight Telemetry

To download On-Board Flight Telemetry, attach the SD card to a memory card reader on a PC, and run the Assistant 2 for Autopilot to transfer flight data for analysis.

Now that you know about data management, continue to Chapter 10, "Drone Battery Management" on page 55.

Chapter 10 Drone Battery Management

Chapter Contents

Introduction

Refer to the following sections for information on drone battery management:

- Charging the Battery
- Inspecting the Battery (see page 58)
- Storing the Battery (see page 58)
- End of Life Battery Processing Steps (see page 58)

Charging the Battery

Do the following:

7. Remove the battery charger AC power cord (see figure 36) from the case.

Figure 36. Battery charger AC power cord

1. Remove the battery charger (see figure 37) from the case.

Figure 37. Battery charger

2. Remove the battery charging cable (see figure 38) from the case.

Figure 38. Battery charging cable

DO NOT connect the battery charging cable to the battery at this time.

3. Connect the battery charging cable to the battery charger as shown in figure 39.

Figure 39. Connecting the battery charging cable to the battery charger

4. Connect one end of the AC power cord to the *AC INPUT* port on the back panel of the battery charger. Connect the other end to an AC wall outlet.
5. Connect the battery to the battery charging cable connector
6. Refer to the *Ultimate Duo 400W Charger with a Range Pro X8 RP6S24KHDA Battery Pack* guide for the remainder of the battery charging procedure.

Inspecting the Battery

Before and after every flight:

1. Check each cell and the battery frame for dents, punctures, or cell puffing.
2. Check connector pins to ensure pins are secure and there are no burn marks.

DO NOT use a battery that shows signs of damage. This includes damage to the cells, wires, and connectors associated with the battery.

See the document *Ultimate Duo 400W Charger with a Range Pro X8 RP6S24KHDA Battery Pack.*

Storing the Battery

Charge batteries to their storage level. (See *Ultimate Duo 400W Charger with a Range Pro X8 RP6S24KHDA Battery Pack* for a how-to guide).

Always store your batteries in a dry and temperate storage area.

If you will be shipping a battery or storing it for more than one week, check the battery voltage, and either charge or discharge the voltage so that all cells are balanced to 3.7 volts ±0.2 volts

End of Life Battery Processing Steps

Please check your local regulations for proper discharge and disposal of lithium polymer batteries upon end of life.

Now that you know about drone battery management, continue to Chapter 11, “Maintenance” on page 59.

Chapter 11 Maintenance

Chapter Contents

Introduction

Maintenance consists of user maintenance activities, and replacing a pair of propellers.

All other activities require factory maintenance from TerraView or an Authorized TerraView Service Center. These include activities such as arm replacement, correcting unexpected flight characteristics, motor or bearing replacement, power issues, and connectivity issues.

Note Additional spare components can be purchased by contacting us at **https://terraview.com/contact/**.

User Maintenance Activities

The following should be performed by the user before and after every flight:

- Keep it clean: The proper way to clean your RangePro X8 is to use a damp cloth to wipe down the cover and remove any debris from the visible carbon fiber components. Do NOT remove any components for cleaning. Store in a temperate and dry place.

  You can also use a can of compressed air to ensure there is no debris in the motors.
- Inspect for damage to propellers, loose screws, and other unusual indications.
- Replace damaged propellers.
- Replace broken landing gear.
- Tighten loose propeller mounts.
- Tighten loose propeller screws (use LOCTITE® 243 blue threadlocker or equivalent).
- Before every flight, rotate the motors while listening for noticeable noise. If you hear noise, the motors may need servicing. Do not fly if there is noticeable noise in a motor.

  Replace motors every 800 to 1000 hours or as needed. If a motor is making noise, contact us at **https://terraview.com/contact/**.

Replacing a Pair of Propellers

Each pair of propellers is balanced, so if one is damaged, both propellers in the pair must be replaced.

Your RangePro X8 comes with 1 set of replacement top propellers and 1 set of bottom propellers. You can replace a damaged propeller as follows:

1. Using a 2.5 mm Allen key wrench (or equivalent hex key), remove the 2 screws securing the mounting bracket to the motor, then detach the propellers.

   Note Propellers should be installed with the words on the propeller facing up.

2. Position the appropriate replacement propellers at the location on the motor where they will be installed, then lightly secure them in place with a replacement screw from the plastic bag located in the case. Leave the screw loose enough so that the propellers can easily be adjusted to accommodate the other screw.
3. Install the second screw.
4. Using the Allen key wrench, tighten both screws securely.

The replacement propellers are now installed.

If you need to contact TerraView for support, continue to Chapter 12, "Contacting TerraView for Support" on page 62.

Chapter 12 Contacting TerraView for Support

Chapter Contents

Support Options

In addition to standard warranty support, TerraView offers training, integration, and customization services, maintenance, repair, and extended warranty options. Contact your distributor or sales representative for more information.

For technical support, contact the TerraView Flight Support line at **1-800-628-3119** or e-mail **support@terraview.com**.

Appendix A Certifications/Compliance

Chapter Contents

Compliance

The RangePro X8 is compliant with the following standards for North America and the European Union. Subsystem specific certification and compliance statements can be found in their respective user manuals and documentation.

North America (United States and Canada)

FCC Part 15 Class B

This device generates and uses radio frequency energy, and if not installed and used properly - that is, in strict accordance with the manufacturer's instructions - may cause interference to radio and television reception. The device has been tested and found to comply with the limits for a Class B computing device in accordance with specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the device does cause interference to radio or television reception, which can be determined by disconnecting the battery in the unit, the user is encouraged to try to correct the interference by one or more of the following measures: moving the equipment away from the receiver or re-orienting the receiving antenna.

NRTL (Nationally Recognized Test Lab) Mark

This device is in compliance with UL 62368-1:2014 Ed.2, the standard for Audio/Video, Information And Communication Technology Equipment. The requirements of this standard do not consider Federal Regulations associated with the operation of commercial UAVs. The operation of commercial UAVs is intended to be in accordance with all Federal Regulations when the UAV is used.

Standards

UL 62368-1:2014 Ed.2 Standards

European Union

CE Mark

This device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EC relating to radio equipment, Directive 2014/35/EC relating to electrical equipment designed for use within certain voltage limits and Directives 2011/65/EU and 2015/863/EU relating to RoHS (Restrictions on Hazardous Substances) and REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) compliance.

The safety advice in the documentation accompanying this device shall be obeyed. The conformity to the above directive is indicated by CE mark on the device.

Standards

EN 301 489-1 V2.2.0 (2017-03)

EN 301 489-17 V3.1.1 (2017-02)

EN 62368-1 (2018)

EN 50581 (2012)

Appendix B **Warranty**

Chapter Contents

What Is Covered

TerraView 360, Inc (“TerraView”) warrants to the original retail purchaser that the TerraView product and associated accessories (not including batteries) covered by this limited warranty statement, if purchased new from TerraView or an authorized reseller and used in the United States or Canada under normal conditions in accordance with the handling instructions and general information and warnings appearing in the operating manual, conform to the manufacturer's specifications and will be free from defects in materials and workmanship for a period of one (1) year from the date of original purchase. Batteries are warranted to be free from defects in materials and workmanship for a period of three (3) months from the date of original purchase, such defects generally being defined as zero or extremely low voltage, battery swelling or outgassing, or failed connectors. Motors are warranted for 100 hours of flight. For warranty service, you must provide proof of the date of original purchase.

What TerraView Will Do To Correct Problems

Should your TerraView product prove defective during the warranty period, please call the TerraView Flight Support line at **1-800-628-3119** or e-mail **support@terraview.com** for warranty repair instructions and/or return authorization. A TerraView service technician will provide telephone or e-mail diagnostic service to determine whether the product requires service. If service is needed, TerraView will, at its option, replace or repair the product without charge for parts or labor.

If your product is being replaced or repaired, TerraView will direct you to send your product to TerraView or its authorized service center. You are responsible for securely packing the product and for shipping costs to the TerraView service center. TerraView will ship the repaired or replacement item(s) to you, freight prepaid, so long as you use an address in Canada or the U.S. (excluding Puerto Rico and U.S. Possessions). Shipments to other locations will be made freight collect.

When warranty service involves the exchange of the product or a part, item replaced becomes TerraView property. The replacement product or part may be new or refurbished to the TerraView standard of quality, and, at TerraView’s discretion may be another model of like kind and quality. TerraView's liability for replacement of the covered product will not exceed the original retail selling price of the covered product. Exchange products and parts assume the remaining warranty period of the original product covered by this limited warranty plus an additional 30 days.

What This Warranty Does Not Cover

This warranty does not apply to refurbished or reconditioned products. This warranty covers only normal use in the United States and Canada under normal conditions in accordance with the handling instructions and general information and warnings appearing in the operating manual. This warranty is not transferable.

Battery warranty does not cover typical reduced capacity that occurs as battery is used and recharged in standard operations or degradation caused by human error, overcharging, or improper battery storage or maintenance.

This warranty does not cover accessories, third party parts, components, or peripheral devices added to the TerraView product after its shipment from TerraView, e.g., dealer or user-added sensors, data recorders, etc.

TerraView is not responsible for warranty service should the TerraView label or logo or the rating label or serial number(s) be removed or should the product fail to be properly maintained or fail to function properly as a result of misuse, abuse, improper installation, improper or abnormal use, accident neglect, improper shipping, damage caused by disasters such as fire, flood, and lightning, improper electrical current, or service other than

by a TerraView authorized servicer. If a claimed defect cannot be identified or reproduced, you will be held responsible for the costs incurred.

THE WARRANTY AND REMEDY PROVIDED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. SOME LAWS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES. IF THESE LAWS APPLY, THEN ALL EXPRESS AND IMPLIED WARRANTIES ARE LIMITED TO THE WARRANTY PERIOD IDENTIFIED ABOVE. UNLESS STATED HEREIN, ANY STATEMENT OR REPRESENTATIONS MADE BY ANY OTHER PERSON OR FIRM ARE VOID. EXCEPT AS PROVIDED IN THIS WRITTEN WARRANTY, NEITHER TerraView NOR ITS AFFILIATES SHALL BE LIABLE FOR ANY LOSS, INCONVENIENCE, OR DAMAGE, INCLUDING DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OR INABILITY TO USE THE TerraView PRODUCT, WHETHER RESULTING FROM BREACH OF WARRANTY OR ANY OTHER LEGAL THEORY.

Some jurisdictions do not allow limitations on how long an implied warranty lasts, and some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from jurisdiction to jurisdiction.

TerraView recommends all original packing materials be retained in the event the product needs to be shipped again.

Appendix C Default RangePro A3 settings

Chapter Contents

Introduction

Use the Assistant 2 for Autopilot application (available from DJI) to access the following settings.

TerraView strongly recommends not changing these settings from their default values and provides this information primarily as a means for returning the unit to recommended factory settings following a firmware upgrade or reset of the A3 controller.

Basic Settings

Airframe: Coaxial Octocopter (X8)

Mounting:

- **Flight Controller Type:** A3
- **MC:** X = 24, Y = 0, Z = 0
- **Installation Direction:** Forward
- **GPS1:** X = 12, Y = 0, Z = -50
- **Unit:** Mm

Remote Controller:

- **Choose Receiver Type:** LB2
- **Mode:** Enable Multiple Flight Modes
- **Settings:** A = 0, E = 0, T = 0, R = 0
- **Control EXP:**
  - **Pitch / Roll:** 0.4
  - **Yaw:** 0.4
  - **Throttle:** 0.4
  - **m/s Max Ascent Speed:** 3.5
  - **Max Attitude Angle:** 25
  - **Max Yaw Angular Velocity:** 135
  - **m/s Max Descent Speed:** 2.5

ESC Settings;

- **Choose ESC Type:** Other ESC
- **Motor Idling:** Medium
- **Motor Test Speed:** 5%
- **Stop Motor:** ON
- **Start Method:** Normal Start

Flight Settings

Propulsion Configuration:

- **Aircraft Wheelbase:** User
- **Basic Gain: Pitch:** 120
- **Basic Gain: Roll:** 120
- **Basic Gain: Yaw:** 100
- **Basic Gain: Throttle:** 90
- **Propulsion System Bandwidth:** 80

Gains:

- **Advanced Gain:** 90
- **Sensitivity Gain: Brake:** 70
- **Sensitivity Gain: Attitude:** 70
- **Control Performance Parameters:** 100

Failsafe Settings:

- **Failsafe Action:** Return to Home
- **Return to Home Altitude:** 60m
- **Heading During Return to Home:** Heading Home Point

Battery Settings:

- **Battery Type:** Non DJI
- **Battery Cells:** 5S
- **Low Battery Warning Action:** Return Home
- **Critical Low Battery Warning Action:** Only LED Warning
- **Low Battery Warning Voltage:** 3.7

Flight Restriction:

- **Height:** 100 meters
- **Flight Distance:** ON
- **Distance:** 500 meters

Appendix D Shipping Lithium Polymer Batteries

Chapter Contents

Introduction

The TerraView RangePro X8 series of batteries, RP6S24KHDx are considered Class 9 Hazardous Material and must be shipped accordingly per UN3480. These are very strict regulations regarding shipment of batteries containing lithium.

IMPORTANT

Keep the shipping material that shipped with the batteries!

Basic Shipping Requirements

WARNING

If you are not properly trained and certified as a hazardous material shipper, consult a local shipping agency such as FedEx or UPS.

When shipping these batteries for return to TerraView or a third party, the following basic requirements must be met:

1. The shipping box must meet the U3480 regulation. The packaging in which the batteries shipped is appropriate and approved.
2. For Class 9 Hazardous Materials under UN3480, the label shown in figure 40 must be present on the shipping container.

Figure 40. Shipping container label

3. The capacity of these batteries does not allow for shipping on passenger aircraft. The label shown in figure 41 must also be present on the shipping container when shipping via air. When shipping via ground, this label is not required.

Figure 41. Cargo aircraft only label

4. Finally, UN3480 covers shipping lithium batteries shipped by themselves. To indicate this on the packaging, the label shown in figure 42 is also required. The shipper's phone number should be included on the label.

Figure 42. UN3480 label