TELEDYNE FLIR

SKYRANGER® R70

CARING FOR BATTERIES

Caring For Batteries

FLIR Unmanned Aerial Systems ULC
575 Kumpf Drive
Waterloo, ON N2V 1K3
Canada
www.flir.com/uis/uas
skyrangersupport@flir.com

KA-02302-R70en-005

Software numbering convention

The MCS software numbering follows this convention:

- The first two numbers denote the release.
- The last number denotes any service pack released for the software.

Manufacturer's disclaimers

- The content in this manual, and all other collateral documents, is subject to change at the manufacturer's sole discretion.
- The software and hardware are subject to change due to the manufacturer's continuous development process.
- The manufacturer shall not be liable for any damages, losses, costs, or expenses, direct, indirect or incidental, consequential or special, arising out of, or related to the use of this content or the products described herein including failure to heed warnings or cautions.
- You are solely and personally responsible for your conduct and control while operating this aircraft and any consequences as a result.

Symbols and conventions

This manual uses the following symbols and conventions:

This symbol indicates a note with recommendations from the manufacturer.

This symbol indicates a helpful tip or recommendation that can enhance the performance of the aircraft or software.

This symbol indicates a caution or warning. For safety purposes, always follow the instructions described.

This symbol indicates tasks that you must perform before completing the procedure described.

This type of box contains the steps required to complete a task.

Glossary

°C
Degrees Celsius; used as a measurement of temperature

°F
Degrees Fahrenheit; used as a measurement of temperature

ft
Feet; used as a measurement of distance

ft/s
Feet per second; used as a measurement of speed

g
Grams; used as a measurement of weight

GHz
Gigahertz; used as a measurement of frequency, where one GHz represents 1 billion cycles per second

GPS
Global Positioning System; used to determine the aircraft's geolocation and time information, including latitude and longitude coordinates

kg
Kilograms; used as a measurement of weight

km/h
Kilometers per hour; used as a measurement of speed

lb
Pounds; used as a measurement of weight

m
Meters; used as a measurement of distance

m/s
Meters per second; used as a measurement of speed

mph
Miles per hour; used as a measurement of speed

MHz
Megahertz; used as a measurement of frequency, where one MHz represents 1 million cycles per second

MSH
Minimum safe height

MSL
Mean sea level; used as a measurement of altitude

oz
Ounces; used as a measurement of weight

pitch
Used to describe the aircraft's movements around its lateral axis (nose up / nose down, where "nose" refers to the front EO/IR camera)

roll
Used to describe the angle of rotation around the longitudinal (tail / nose) axis of the aircraft

yaw
Used to describe the aircraft's movements around its vertical axis

CONTENTS

BATTERY CARE AND STORAGE

The system is powered by high-performance, lithium-ion batteries that require basic care to ensure their long-term health and performance.

- Use only the lithium-ion batteries provided by the manufacturer, specifically designed for the aircraft.
- Failure to use the correct batteries can cause personal injury or death or irreparable damage to the aircraft and components and will render warranty null and void.
- DO NOT PUNCTURE OR CRUSH THE BATTERIES. If the batteries are breached in any way, do not use them. Take all safety measures to dispose of the batteries according to local regulations.
- The lithium-ion cells store a great deal of energy and might combust, catch fire, or ignite if they are crushed, punctured, or if they sustain other severe damage.
- Check the cycle count and health of the batteries before each flight. You should only fly with batteries that have a cycle count of less than 400 or health greater than 80%.

Care for, maintain, and store your batteries

Follow these guidelines to take care of your batteries properly.

✓ If the battery power level is very low, the battery can enter a mode where it attempts to preserve battery power. In this mode, no lights turn on when you press the battery power button. To exit this mode, charge the battery.

Care for the aircraft batteries

- If you are using standard batteries, it takes approximately 2.5 hours to charge an aircraft battery fully from empty using the battery charger provided with your system. If you purchase the 8-Bay Battery Charger, it takes approximately 1.5 hours to charge a standard battery fully from empty. For more information on the 8-Bay Battery Charger, see the "*8-Bay Battery Charger Quick Start Guide*" in the Customer Self-Service Portal at https://selfservice.flir.com.
- If you are using XL batteries, it takes approximately 6 hours to charge the battery fully from empty using the battery charger provided with your system. If you are using the 8-Bay Battery Charger, it takes approximately 3 hours to charge a battery fully.

- After a flight, charge your batteries to 100% if you are going to use them again within a week. See "Charge the aircraft batteries" on page 12.
- If you are not going to use the batteries within a week, ensure that they are charged to approximately 50% (at least three of the LED lights are illuminated when you press the battery power button. For more information, see "Check the status of an aircraft battery" on page 13.
- If you drained the batteries completely after your flight, always charge them to the appropriate charge level described above within one week.
- If the battery power level is very low, the battery can enter a mode where it attempts to preserve battery power. In this mode, no lights turn on when you press the battery power button. To exit this mode, charge the battery for approximately 5 minutes. Ensure that you charge the batteries fully before flying with them.
- Check the status of the batteries every three months to ensure that they maintain at least a 40% charge. See "Check the power level of an aircraft battery" on page 13.
- Before transporting batteries on an airline, use the battery diverter to drain the batteries automatically to 30% (only two of the LED lights are illuminated when you press the battery power button). Alternatively, you can fly the aircraft to drain the batteries. When the LED on the diverter turns off, remove the battery from the diverter. For more information on using the diverter, see "Drain an aircraft battery using the battery diverter" on page 15.
- Do not expose the batteries to extreme heat (60°C / 140°F or higher).
- All lithium-ion batteries gradually lose their charge over time, even if they are not used. If a battery has a very low charge, it can enter a low-voltage mode, which prevents it from charging. If the battery enters this state, you cannot use it. To purchase new batteries, contact Support.

Store the aircraft batteries

Follow these guidelines to store your aircraft batteries properly:

Before storing batteries, always ensure that they are charged to approximately 40% (at least three of the LED lights are illuminated when you press the battery power button). Failing to do so can permanently degrade the battery capacity and reduce flight times.

- Store the batteries in a dry location in the mission case, a battery case, or a fireproof container, at a temperature between 0°C and 30°C / 32°F and 86°F and a humidity level of less than 50%.
- Do not store the batteries near any heat sources or in direct sunlight.
- DO NOT STORE BATTERIES IN THE AIRCRAFT FOR EXTENDED PERIODS OF TIME. The recommended maximum time to store batteries in the aircraft is two weeks.
- If you do store the batteries in the aircraft, do not lock them into place until you are going to fly. If the batteries are locked into place, they draw power, which can drain them faster.
- During cold months, if you store the batteries overnight in an aircraft, the batteries can get very cold. If the battery temperature is below -10°C / 14°F, the aircraft will not take off until the batteries warm up.
- The aircraft draws battery power during flight, which increases the battery temperature. If you store the batteries in an aircraft overnight during warm months, the starting battery temperature is higher than normal. When the aircraft estimates the remaining power available, it accounts for the higher battery temperature and reduces the amount of remaining flight time. Both battery and environmental temperature can increase or decrease flight time.
- Check the status of the batteries every three months to ensure that they maintain at least a 40% charge. See "Check the power level of an aircraft battery" on page 13.

Care for the base station battery

- It takes approximately 4 hours to charge the base station battery fully from empty.
- After a flight, charge the base station to 100% if you are going to use it again within a week. See "Charge the base station" on page 15.
- If you are not going to use the base station within a week, ensure it is charged to approximately 50%. To view the base station battery level, turn on the base station. The battery level appears on the LCD screen.
- Check the status of the base station at least monthly to ensure that it has at least a 50% charge. Charge the battery if it is below 50%.
- Before transporting the base station on an airline, drain the battery (by leaving it on to drain by itself or by flying) until it’s charged to approximately 30%.

- Do not expose the base station to extreme heat (60°C / 140°F or higher).
- If you drained the battery completely after your flight, always charge it to the appropriate charge level described above within one week.
- If the battery power level is very low, the battery can enter a mode where it attempts to preserve battery power. In this mode, the LCD screen does not turn on when you press the power button. To exit this mode, charge the battery for approximately 30 minutes. Ensure that you charge the base station battery fully before flying.
- All lithium-ion batteries gradually lose their charge over time, even if they are not used. If a battery has a very low charge, it can enter a low-voltage mode, which prevents it from charging. If the battery enters this state, contact Support.

Store the base station battery

Follow these guidelines to store your base station properly:

Before storing the base station, always ensure that it is charged to approximately 50%. Failing to do so can permanently degrade the battery capacity.

- Store the base station in a dry location in the mission case, at a temperature between 0°C and 30°C / 32°F and 86°F and a humidity level of less than 50%.
- Do not store the base station near any heat sources or in direct sunlight.
- Check the status of the base station at least monthly to ensure that it has at least a 50% charge. Charge the battery if it is below 50%.

Care for the tablet battery

- It takes approximately 2.5 hours to charge the tablet battery fully from empty (when the tablet is turned off.)
- After a flight, charge your tablet to 100% if you are going to use it again within a week. See "Charge the tablet" on page 17.
- If you are not going to use the tablet within a week, charge the battery to between 30% and 70%, then remove the battery. For more information, see "Remove the tablet battery" on page 17.
- Before shipping the tablet with the system, ensure that the battery is charged to 30%.
- Do not expose the tablet battery to extreme heat (60°C / 140°F or higher).

Store the tablet

Follow these guidelines to store your tablet properly:

Before storing the tablet, charge the battery to between 30% and 70%.

- Remove the battery. For more information, see "Remove the tablet battery" on page 17.
- Store the tablet battery in a dry location in the mission case, at a temperature between 0°C and 30°C / 32°F and 86°F and a humidity level of less than 50%.
- Do not store the tablet battery near any heat sources or in direct sunlight.

Battery diverter

- Use only the diverter available from the manufacturer. The diverter can get hot, so handle it with care.
- Depending on the battery level, it can take a long time to discharge the battery to 30%. Remove the battery from the diverter when the battery level is at 30%.
- Use the battery diverter in a dry, indoor location only.

Battery charger

- Use only the manufacturer's battery charger. Failure to use the manufacturer's charger will void the warranty, could result in injury or risk of fire, or could permanently damage the batteries or diminish performance of the aircraft.
- This equipment is not suitable for use in locations where children are likely to be present.
- Charging should only occur if the batteries and battery charger are between 4°C and 40°C / 39°F and 104°F.
- Use the battery charger in a dry location only.
- Do not disassemble the battery charger. Only Teledyne FLIR-authorized and trained personnel should service the battery charger. For more information, contact Support.

Battery disposal

- If the battery is not damaged, dispose of it safely, according to local regulations.
- If there is any damage to the battery, follow these precautions:
    - If there was a severe landing or crash that caused battery damage, contact Support.
    - Do not use or ship the damaged battery.
    - Keep the damaged battery outdoors. Immerse it in a bucket of sand to reduce the risk of fire.
    - Contact a local hazardous materials disposal service to dispose of the damaged battery.

MANAGING YOUR BATTERIES

Charge the aircraft batteries

You can use the battery charger that is provided with your system to charge four batteries at a time.

✓ With the 8-Bay Battery Charger, you can charge up to eight batteries at a time. For more information, contact your Teledyne FLIR representative.

1. Plug the power cord for the battery charger into its power adapter.
2. Plug the power adapter cord into the battery charger.

3. Plug the power cord into a power outlet.
4. Place each battery into a slot in the battery charger.
5. If necessary, to lock the battery in place, twist the gray battery latch counterclockwise, push down on the battery, and then release the gray battery latch.

The lights on the side of the batteries show the battery level. The light representing the highest charge level blinks to indicate that the battery is charging.

When the batteries are fully charged, all five lights appear on the side of the battery. If the lights do not appear, press . Contact Support if the lights do not appear after exceeding the approximate charge times outlined in "Care for the aircraft batteries" on page 6.

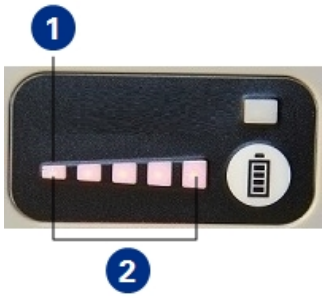
If the light on the battery charger flashes, there might be a problem with the charger itself. For more information, contact Support.

Check the power level of an aircraft battery

The lights on the side of the battery provide information about the battery's power level. You can check the lights when a battery is on or off the charger.

You should always check the power level of the batteries before each flight.

On the side of a battery, press .



1. First LED
2. LED lights

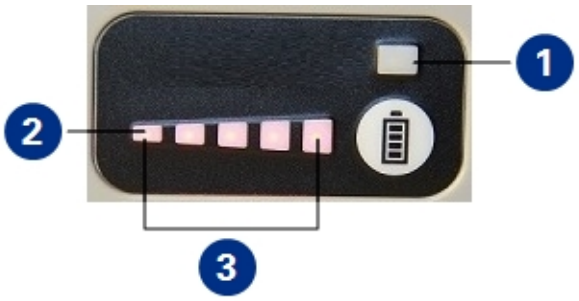
- Five lights indicate approximately 81% – 100% charge.
- Four lights indicate approximately 61% – 80% charge.
- Three lights indicate approximately 41% – 60% charge.
- Two lights indicate approximately 21% – 40% charge.
- One light indicates approximately 3% – 20% charge.
- If the battery is less than 2%, the first LED blinks.

Check the status of an aircraft battery

Not only do the lights on the side of the battery provide information about the battery's power level, but they also provide information on the status of the battery, its temperature, and health.

On the side of a battery, press  .

The status LED indicates the health of the battery. A combination of the LED lights and the status light indicates errors with the battery, such as temperature fluctuations or poor battery health.



1. Status LED
2. First LED
3. LED lights

Battery error codes

Battery activity	Description
Third LED blinks	The battery requires a software update.
Fourth LED blinks	The battery is too cold. Let the battery warm up before flying with it or charging it.
Fifth LED blinks	The battery is too hot. Let the battery cool down before flying with it or charging it.
Status LED blinks quickly	The battery health is less than 80%, meaning that the battery cannot be fully charged. The battery can only charge to less than 80% of the capacity of a new battery. The LED lights indicate the current charge level as a percentage of that reduced capacity. To see the battery health level, check the status in MCS. To replace the battery, contact Support.
Status LED blinks and any other LED blinks	There are problems with this battery. Contact Support.

Drain an aircraft battery using the battery diverter

Before shipping the aircraft batteries, use the battery diverter to drain the power level of each battery to approximately 30%.

You can use the battery diverter to drain the battery, but, depending on the battery level, it can take a long time to discharge the battery to 30%. Flying the aircraft is the fastest way to drain a battery.

Insert an aircraft battery into the battery diverter. The LED on the battery diverter turns red to indicate that the diverter is draining power from the battery.

If the aircraft battery is already below 30%, the LED on the battery diverter does not turn on when you insert the battery into the diverter.

When the battery is below 30%, the LED on the diverter turns off.

When the LED on the diverter turns off, remove the battery from the diverter. If you keep the battery on the diverter, the battery remains turned on, so it continues to drain lower than 30%.

Charge the base station

After a flight, you should charge the base station battery. You do not need to turn on the base station to charge its battery.

1. Plug the base station power cord into the charger port on the end of the base station.

1. Base station
2. Charger port

2. To secure the connector in place, turn the silver connector on the cord clockwise.
3. Plug the power cord into a power outlet.

The base station’s battery level appears on its LCD screen. The LCD screen also indicates that the battery is charging.

Charge the base station using the battery diverter

If necessary, you can use an aircraft battery and the battery diverter to charge the base station's battery.

✓ A fully charged standard aircraft battery can charge the base station battery from empty to approximately 60%. To charge the base station fully from empty, use two standard aircraft batteries. You can also use one fully charged XL battery to charge the base station battery from empty.

1. Insert one end of the battery diverter cord into the charger port on the end of the base station.

2. Insert an aircraft battery into the battery diverter.
3. Twist the gray battery latch counterclockwise to lock the battery in place.
4. Insert the other end of the battery diverter cord into the port on the side of the battery diverter.

When the battery diverter is charging the base station, the LED on the battery diverter turns blue. The base station's battery level appears on the base station's LCD screen. The LCD screen also indicates that the battery is charging.

> While the diverter uses an aircraft battery to charge the base station, it also drains the battery to approximately 30%.

Charge the tablet

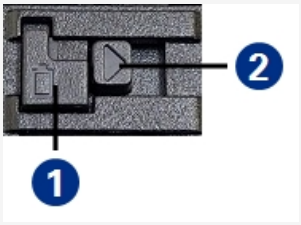
After a flight, you should charge the tablet to 100% if you are going to use it again soon.

1. Plug the tablet power cord into the charging port on the side of the tablet.
2. Plug the power cord into a power outlet.

Remove the tablet battery

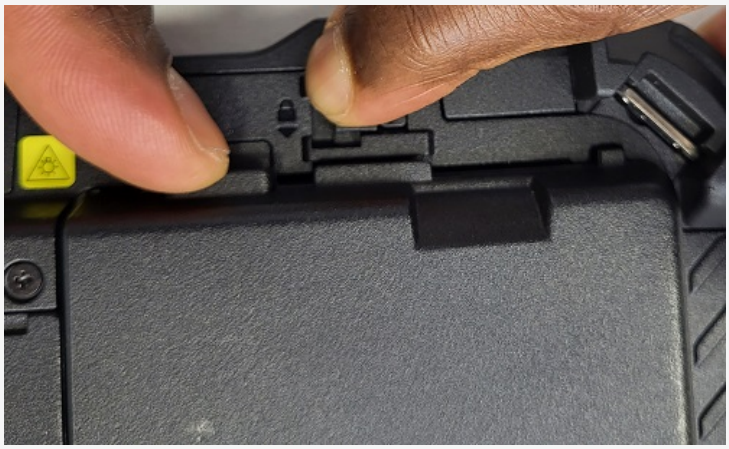
Before storing the tablet for more than a week, remove the battery.

1. On the back of the tablet, beside the battery lock switch, push the battery lock up.



1. Battery lock
2. Battery lock switch

2. While sliding the battery lock switch to the right, pull the battery latch down to remove the battery.



CONTACT SKYRANGER SUPPORT

- If you are a current customer, visit our Customer Self-Service Portal at https://selfservice.flir.com.
- Call:
  - USA customers: +1 602-883-8287. Press 4.
  - International customers: +1 519-489-6726. Press 4.
- Email the Support team at skyrangersupport@flir.com.