Vision Aerial

Payload | Thermal/Visual Sensor

FLIR Hadron™ 640R

Manual

Revision A.1
Publish Date: 2025.05.01

Table of Contents

What's Changed

Revision	Date	What's Changed
A.1	2025.05.01	• Added What's Changed section. • Added notes to Payload Operations related to the trigger interval for taking pictures when in 64MP.
A.0	2025.04.08	New manual

What's In The Box

If you purchased your Hadron as an add-on to an existing aircraft, it will come with its own pelican case. If you purchased it along with an aircraft, it will come in the same pelican case as the aircraft.

CAUTION: Be sure to read and follow the *Setup* instructions before connecting the payload to your aircraft. Also see the *Peripherals* section for more information.

Payload Specifications

Payload Specs	
Size	130mm x 140mm x 95mm
Weight	477g
Power Consumption	24 Watts
Operating Temperature	-10° C -> 50° C

Edge Computer	
Chipset	Qualcomm 5165RB - NDAA compliant
Storage	SD Card

Gimbal	
Brand	Gremsy
Model	G-Hadron
Angular Vibration Range	±0.01°
Controlled Rotation Range	Pan: ±175° Tilt: ±120° Roll: ±40°
Max Controllable Rotation Speed	Pan: 100°/s Tilt: 100°/s Roll: 100°/s
Mechanical End-point Range	Pan: ±170° Tilt: ±170° Roll: -260° to 80°
Operating Temperature	14° F ~ 120 °F (-10° C ~ 50° C)

Camera	
Brand	Teledyne FLIR
Model	Hadron 640R

Camera EO Sensor	
Resolution	64.2MP **Note:** To configure lower res, contact Service.
Field of View	67°
Aspect Ratio	4:3
Pixel Pitch	0.7 µm
Image Size	9248p x 6944p
F/#	1, 2.3
Zoom	1-12x Digital zoom (8x Optical zoom equivalent, Constant 1080p video downlink up to 8x zoom)

Camera IR Sensor	
Resolution	640 x 512p
Field of View	32°
Aspect Ratio	5:4
Pixel Pitch	12 µm
Image Size	640 x 512p
F/#	1.0
Temperature Accuracy	±5°
Zoom	1-8x Digital zoom

Compatibility

The FLIR Hadron 640R is compatible with:

Aircraft

- SwitchBlade-Elite Mark 2.4 and newer
- Vector Mark 2.4 and newer

Flight Deck

- Flight Deck version 3.0.21 and newer. See *Verifying / Installing the correct Flight Deck version* on page 6 for more details.

If your system does not meet the above requirements, please contact the Vision Aerial Service Department to receive details on how to upgrade your system to gain compatibility.

Setup

Take these 3 simple steps before making your first flight:

1. Verifying / Installing the correct Flight Deck version
2. Connecting the payload to the aircraft
3. Importing camera and lens specs into Flight Deck

1. Verifying / Installing the correct Flight Deck version

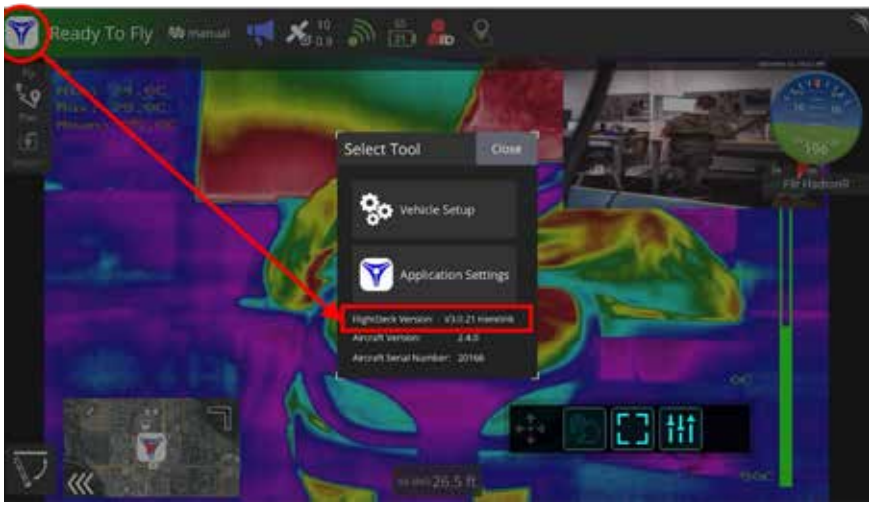
The Hadron 640R requires Flight Deck 3.0.21 or newer. If you have an older version of Flight Deck, the Hadron 640R and gimbal will not function correctly.

- **If you purchased the aircraft and Hadron 640R together**, the aircraft will have the right Flight Deck version already installed and you can skip this section, going directly to *2. Connecting the payload to the aircraft.*
- **If you purchased the Hadron 640R as a payload for an aircraft you already have**, continue with the instructions in this section because you may need to install the latest version of Flight Deck.

Verify Flight Deck Version

1. Ensure a) the aircraft is powered off by unplugging the battery power harness and b) the GCS is powered on via the toggle switch.

2. Verify what version Flight Deck you have. From the Flight Deck home screen, tap the *Vision Aerial logo* in the top left. From the bottom of the pop-up window, note the version number. Then tap *Close*.
   - **If you have Flight Deck V3.0.21 or newer**, skip the rest of this section and go directly to section *2. Connecting the payload to the aircraft*.
   - **If you have Flight Deck older than V3.0.21**, continue to the next section to uninstall the old Flight Deck.

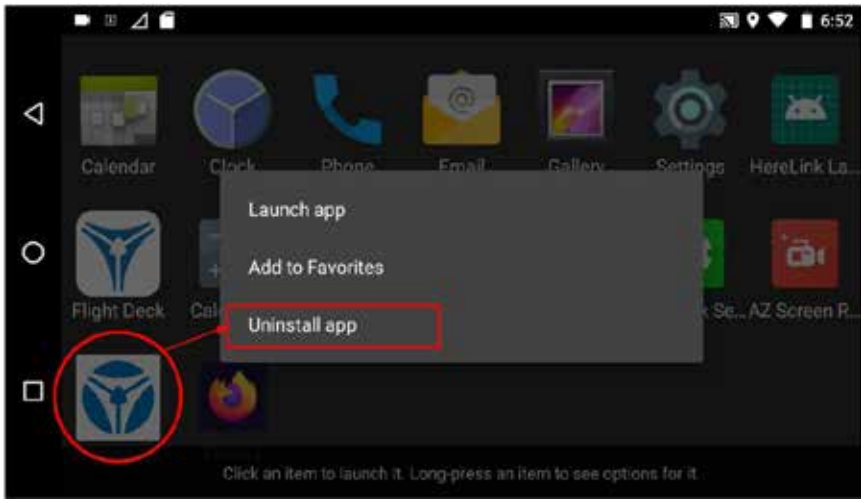


Uninstall the old Flight Deck

If you have Flight Deck older than V3.0.21, complete the rest of these steps to uninstall Flight Deck, install a newer version, and then reconfigure Remote ID.

1. On the homepage of your Herelink GCS, tap the *app launcher icon* in the lower right corner to open the full app list.

2. Long press the *Flight Deck icon* on the left side and tap *Uninstall app*. Be sure you've selected the icon where the Vision Aerial logo itself is white. If there are other Flight Deck icons, do not delete them.



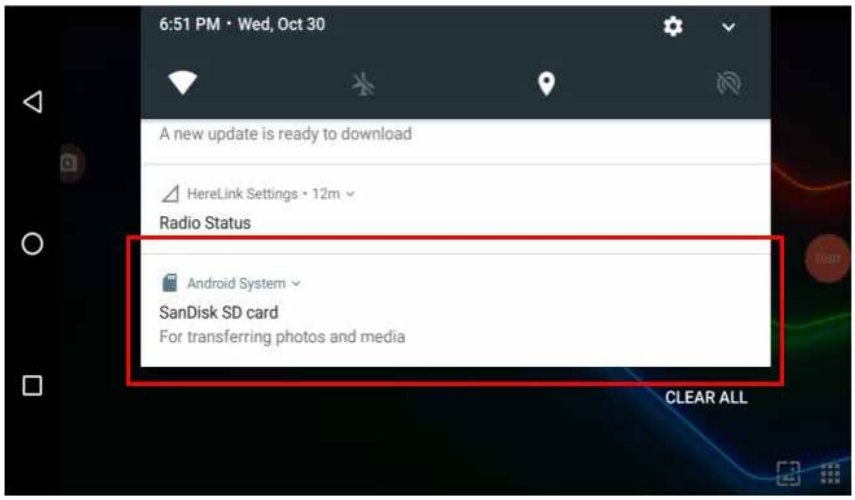
Install the new Flight Deck

3. From your computer, go to the Vision Aerial support website and download the latest version of Flight Deck (V3.0.21 or newer).

4. Transfer the downloaded file, *FlightDeck-Herelink-3.0.21.apk*, to a micro SD card.

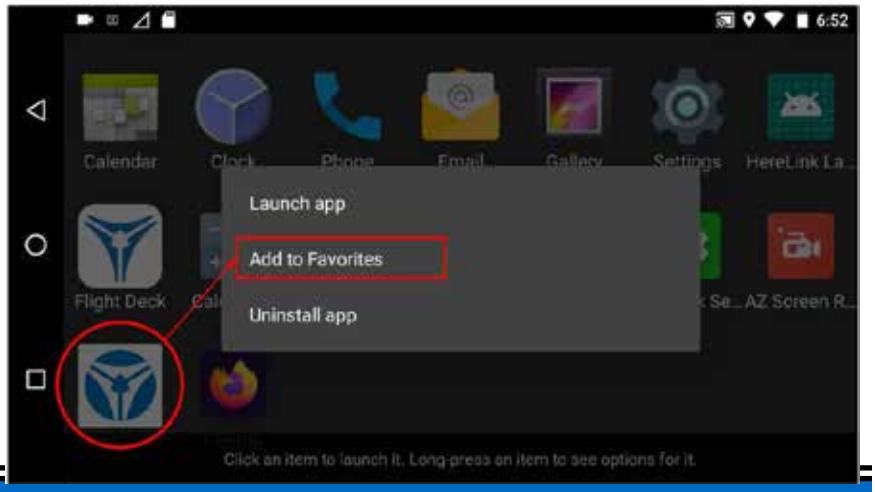
5. Insert the micro SD card into the SD slot on the bottom of the Herelink next to the charging port (NOT the SD slot on the camera).

6. From the Herelink GCS, swipe down from the top of the Herelink screen to view notifications and tap the SD card notification. This opens the SD card's files.



7. Tap the file you downloaded, *FlightDeck-Herelink-3.0.21.apk,* to start the installation.

8. When the installation is complete, add a shortcut to the home screen.
   From the Herelink GCS home screen, navigate to the full app list again by tapping the *app launcher icon* in the lower right corner. Scroll through the apps and find the new Flight Deck V3.0.21 (or newer) that you've just installed and tap *Add to Favorites*. This will place a shortcut to Flight Deck 3.0.21 on the home screen.

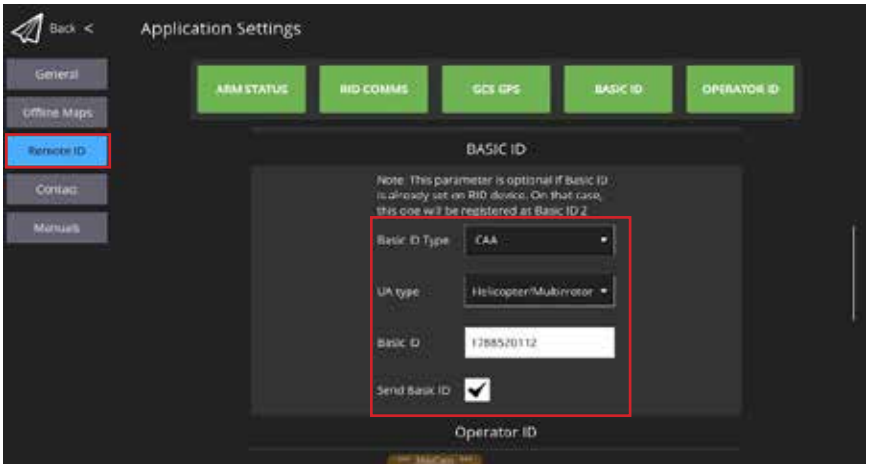


Reconfigure Remote ID

This is required every time after installing a new version of Flight Deck.

9. In the top left of the Flight Deck app, tap the *Vision Aerial logo,* then Application Settings > Remote ID > Basic ID.

10. Power on the aircraft by connecting it to the battery.
11. Verify that *Basic ID Type* is 'CAA', and that *UA type* is 'Helicopter/Multirotor.'
12. Type in your basic ID. This is 17885xxxxx, where xxxxx is your aircraft's serial number, located on the bottom of the aircraft, on the case, and on the back of the GCS.
13. Check the *Send Basic ID* check box.



Powercycle the aircraft and GCS

14. Powercycle the aircraft by disconnecting and reconnecting the battery power cable from the aircraft to the battery.
15. Powercycle the GCS using the power button.

2. Connecting the payload to the aircraft

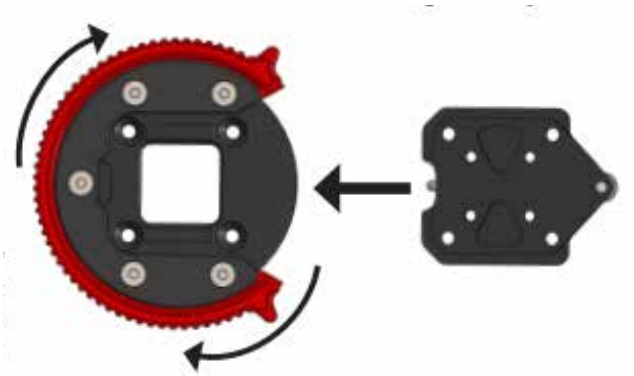
See the *Setting Up* section of your aircraft Flight Manual for general instructions about connecting a payload to the aircraft using the Payload Connection System (PCS). You can find all Flight Manuals on the Vision Aerial support page.

The Hadron 640R comes installed with a PCS insert and three connecting harnesses: yellow payload power harness (yellow two-pin connector), primary harness (round metallic connector), and HDMI cable.

1. Ensure the aircraft is powered on.
2. Ensure the camera/gimbal is right-side up.

   NOTE: If the camera is upside down at the time you connect the yellow payload power harness to the payload connection interface, the gimbal may not initialize. (You'll know the gimbal hasn't initialized if it hangs limp and you can move it by hand without resistance. Also, the LED lights on the gimbal won't get to the yellow system ready or green lock mode statuses.) If this happens, unplug the yellow payload power harness, make sure the camera and gimbal are upright, and then reconnect the yellow payload power harness from the gimbal to the payload connection interface.
3. Slide the PCS insert into the PCS lock mechanism and tighten the lock.
4. Connect the three payload harnesses to their respective electrical connectors on the payload connection interface (CI). The Hadron 640R automatically powers on because the aircraft is powered on.

   NOTE: On startup, the Hadron 640R will take 60-90 seconds to complete its boot sequence and begin displaying video feed and controls. The gimbal will display a Yellow Blink light when it is ready. See *Gimbal LED Status Lights* in the *Payload Operation* section.



3. Importing camera and sensor specs into Flight Deck

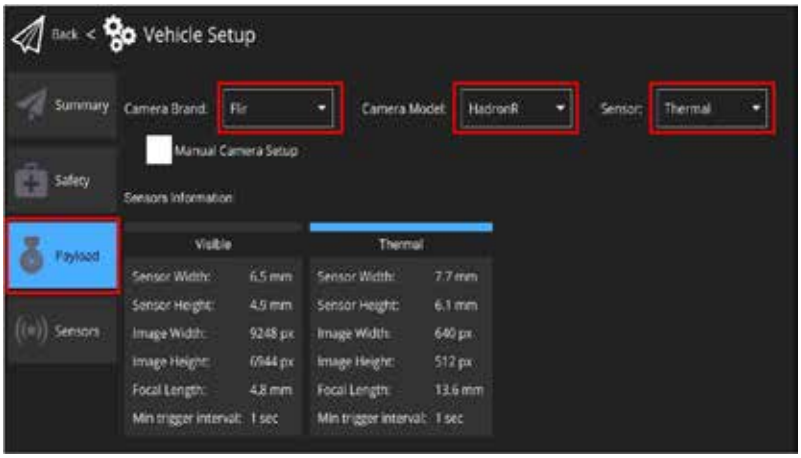
Once you've ensured you have the proper version of Flight Deck and connected the payload to the aircraft, you need to import the camera and sensor specs into Flight Deck. You do this at the start of any flight or when the GCS has been powered off / on. This is required for the aircraft to be able to control the camera and display camera settings to the user in Flight Deck. Flight Deck will also use this information to set settings such as camera trigger counts and overlap.

As long as the GCS stays powered on and Flight Deck is not closed, the aircraft can be powered off and on as needed (such as for a battery swap) without needing to go through this process again. This step is NOT needed between flights with the Hadron 640R.

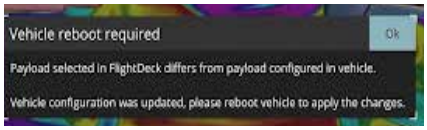
1. Open Flight Deck and tap the *Vision Aerial icon* in the top left side of the screen and then tap *Vehicle Setup and then the Payload* tab.

2. Select the *Camera Brand* as 'FLIR' and *Camera Mode* as 'Hadron 640R'.

3. Select the *Sensor* based on the type of images you are going to collect. Select 'Thermal' for IR and 'Visual' for EO. If you are going to take both types of images, select 'Thermal.'



4. When prompted, restart the aircraft by disconnecting and reconnecting the primary battery cable from the aircraft to the battery. (NOT the yellow payload power harness from the payload to the aircraft.).



CAUTION: Do not powercycle the GCS. If you do you will need to go back to step 1 of this section.

Payload Operations

This section identifies details and settings specific to the Hadron 640R. See the Flight Deck Manual for detailed instructions about using Flight Deck.

Gimbal LED Status Lights

The Gimbal displays various lights on startup and during operation that can help you identify what it is doing and how to troubleshoot. See the *Troubleshooting* section below for additional information.

Note: Because of limitations in the gimbal, Vision Aerial only supports Follow Mode. The rest of the LED status lights are listed here for reference but grayed out because they are appear in the Gremsy G-Hadron documentation.

No.	LED Status	Description
1	Red Blink	Low Battery
2	Red Solid	System Error (Motor or IMU
3	White Blink	Calibrating
4	White Solid	Initialize
5	Yellow Blink	System Ready
6	Green Blink	Lock Mode
7	Green Solid	Follow Mode
8	Dark Blue Blink	Remote with Lock Mode
9	Dark Blue Solid	Remote with Follow Mode
10	Red Blink & White Blink	Auto-tuning in Process
11	Pink Blink	Canlink with Lock Mode
12	Pink Solid	Canlink with Follow Mode

Flight Deck Fly Screen

This is the Flight Deck home screen, where you will watch video transmitting from the aircraft and take pictures.

1. Primary video feed, determined by the Camera View setting
2. Secondary video feed, determined by the Camera View setting

3. Scene temperature data
4. Selected payload, as selected from Vision Aerial icon > Vehicle Setup > Payload.
5. Flight Deck controls and settings, expand / close by tapping the Selected payload

	Camera icon -- Take a single photo. **Note:** When you tap the icon to take a photo, the icon dims and then goes back to normal, but there is not an audible 'camera click' noise. **Note:** Because of the size of the file at 64MP, the trigger interval (amount of time it takes to capture and store an image) is 3.5 seconds. You can achieve faster trigger interval at 8MP. Contact Service for assistance making this configuration change.
	Video camera icon - Start/stop video recording
	Magnifying glass icon - Toggle on/off Flight Deck zoom slider
	Hamburger menu icon (three bars) - Open Flight Deck payload settings

6. Video feed full screen/minimize

Flight Deck Payload Settings

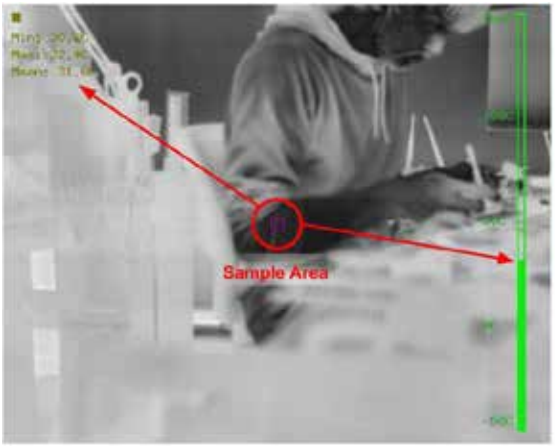
Access the Flight Deck payload settings by clicking the *hamburger menu* on the Fly screen. See the *Flight Deck Fly Screen* section above for details on the menu.

Operations Tab		
IR Palette	White Hot Black Hot Rainbow Rainbow HC Lava Arctic Globow Graded Fire Hottest	When IR is the primary video feed set in the settings Camera View (see below), the operations menu contains settings for the IR Palette. Your IR Palette controls how the camera will display the visual representation of temperature differences (i.e. the colors). See *IR Palette Options* below for visual samples of each option.
Settings Tab		
Camera View	EO and IR EO IR IR and EO	EO displays on the Primary video feed, IR on the Secondary video feed Fullscreen EO Fullscreen IR IR displays on the Primary video feed, EO on the Secondary video feed
Camera Record	EO and IR EO IR OSD	Choose whether to record images and video using both cameras or just one. OSD saves the thermal image with the overlay as shown below in *Hadron OSD Display*. **NOTE:** Recording both images or OSD increases card storage usage.
Isotherm Enable	Enable Disable	Enable or disable isotherms, which sets colors for temperature regions in the camera view and recording.
Isotherm Gain	Low High	Select to use the low or high temperature range. The settings of each are pre-defined based on common use cases. The low gain range is used to look at high temps, and the high gain range is used to look at low temps. Contact Vision Aerial Service for advanced instructions on changing the ranges. • Low - 290ºC + -- appropriate for use cases such as hotspot detection where there is high heat • High - 25º - 36ºC -- appropriate for use cases such as searching for missing persons in a typical outdoor environment
IR Zoom	1-8x	Infrared digital zoom level
EO Zoom	1-12x	Visual zoom level

Operations Tab		
Camera Optimizations	Disabled Face-priority Action Portrait Landscape Night Night-portrait Theatre Beach Snow Sunset Steady-photo Fireworks Sports Party Candlelight HDR	Camera optimizations are a set of presets that automatically adjust the camera's settings to optimize the image quality for different shooting scenarios. As an alternative to the presets you can define individual settings.
AE Compensation	-12 to +12	Auto-exposure compensation can be used to compensate for overexposure or underexposure.
White Balance	Manual outdoor Manual Indoor Auto (default) Shade Incandescent Fluorescent Daylight Cloudy daylight Twilight	The white balance setting controls the color temperature of the image. This setting is important for ensuring that colors are reproduced accurately.
ISO	Auto Deblur 100-3200	The ISO setting controls the camera's sensitivity to light. A higher ISO setting makes the camera more sensitive to light, which can be useful in low-light conditions. However, a higher ISO setting can also introduce noise into the image.
Sharpness	1-6 Default 2	The sharpness setting controls the amount of detail in the image. A higher sharpness setting can make the image look more crisp and defined, but it can also introduce noise.

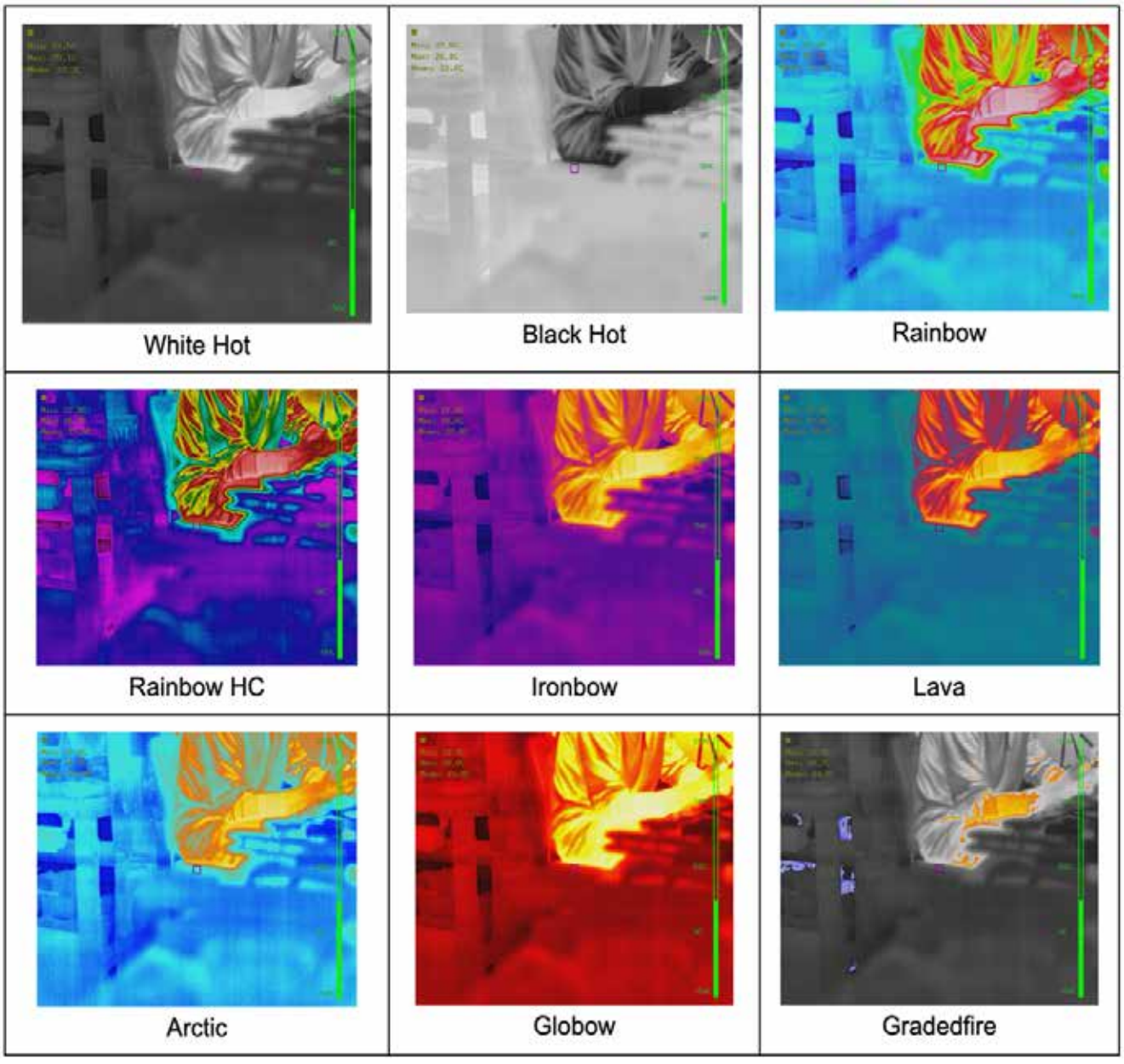
Hadron Thermal On Screen Display (OSD)

In addition to the full radiometric data available in captured images, the Hadron provides real-time temperature data in the on-screen display. Select ‘OSD’ as the *Camera Record* option to record the same image you see in the on-screen display.



IR Palette Options

Select palette options based on what gives you best visibility for your task, and what reduces glare and eye fatigue.



Peripherals

See *What's in the box* on page 3 for a labeled picture and additional details.

Payload Power Harness

The yellow power payload harness transmits power from the aircraft to the Hadron 640R.If the aircraft is powered on, the Hadron 640R will automatically power on when you plug in the harness.

HDMI Cable

The HDMI cable transmits the video signal from the Hadron 640R to the display. The video feed will output on the PRIMARY video stream of the aircraft's GCS.

Primary Harness

The primary harness is the main electrical interface between the Hadron 640R and any Vision Aerial aircraft. The primary harness transmits communication, location, and more to create a simple yet effective workflow and experience.

Troubleshooting

The gimbal for the Hadron 640R is limp or doesn't center after startup

If the gimbal is upside down at the time you connect the yellow payload power harness to the payload connection interface, the gimbal may not initialize or get all the way to green solid state LED light. To correct this:

1. Power down the Hadron 640R by disconnecting the yellow payload power harness.
2. Make sure the gimbal and Hadron 640R are upright.
3. Reconnect the yellow payload power harness from the gimbal to the payload connection interface.

The gimbal stops working

Make sure the yellow payload power harness (yellow two-pin harness) is firmly plugged into the payload connection interface. If it works loose you will lose power to the payload, causing the gimbal to stop working.

The gimbal shows a red solid LED light

Follow the same steps as for *The gimbal for the Hadron 640R is limp* above.

You lose video feed to the GCS

Make sure the HDMI cable is firmaly plugged into the payload connection interface. If it works loose you will lose the HDMI video feed to the GCS.

You're taking photos/videos but they're not showing up on the SD card

- Make sure the Flight Deck settings specify the type of video you'd like to record. Options are Thermal or Visible.
  1. Open Flight Deck and tap the Vision Aerial Icon in the top left side of the screen.
  2. Tap *Vehicle Setup* and then tap the *Payload* tab on the left side.
  3. Select the *Sensor* based on the type of images you are going to collect. Select Thermal for IR and Visual for EO. If you are going to take both, select Thermal.
- Make sure the SD card is formatted as FAT32 or EXFAT.

Further questions? Please contact the Vision Aerial Service Department

(406) 282-1284

service@VisionAerial.com