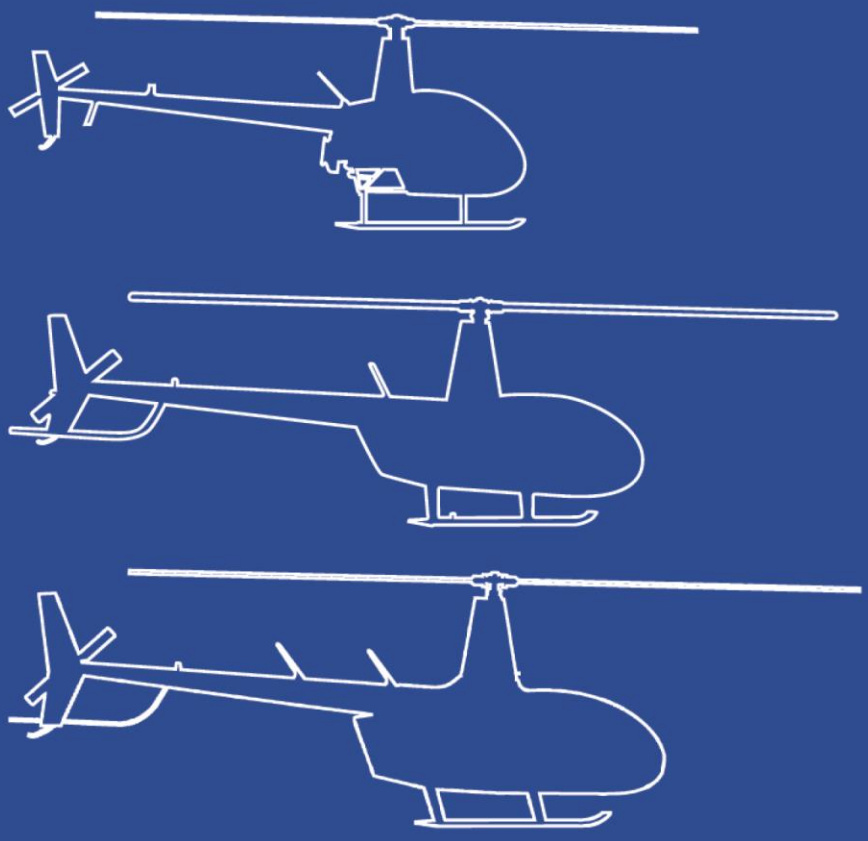
ROBINSON®

R22, R44, & R66 COCKPIT CAMERA

User Guide



ROBINSON HELICOPTER COMPANY, TORRANCE, CALIFORNIA

Cockpit Camera User Guide

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1 Overview

The cockpit camera records 4K video, intercom audio and radio communications, and GPS position both internally and to a removable flash drive inserted in the front of the camera housing. The internal memory retains only the most recent 3 hours of video and is not user accessible. Recording starts automatically when the helicopter battery switch is turned on and stops when it is turned off.

Recording to the flash drive can be stopped or audio muted using the record and audio switches on the front of the camera housing (see Figure 1 below). A switch in the down position turns off the associated function. Do not remove the flash drive while a recording is in progress as this will corrupt the video file. To remove a flash drive when the helicopter battery switch is on, first stop the recording using the record switch.

A blue flashing light on the camera housing indicates video is being recorded to the flash drive. A green steady light indicates the camera is powered and operating normally. The green light will change to an amber flashing light if an internal camera fault is detected, indicating the camera may not record properly.

User options include on-screen display of time & date and/or GPS position, time zone and daylight saving time status, and units for on-screen display of GPS altitude. Instructions for setting these preferences are provided in Section 3.

Video can be viewed on a Windows PC or Mac by removing the flash drive from the camera, inserting it into a USB port on a computer, and double clicking on the desired video file. Video is recorded in sequential 4 GB files with each file approximately 25 minutes in length. Video files are labeled HELICAM_*xxxx*.MP4, where *xxxx* is a sequential number. GPS position and altitude are recorded to files labeled HELICAM_*xxxx*.GPX located in the HELICAM_GPS folder on the flash drive, and are optionally displayed in the upper left hand corner of the video. A 128 GB flash drive (one supplied with each helicopter) will record approximately 10 hours of video. When full, the earliest video file is overwritten with the latest recording.

NOTE

Flash drives used with the camera must meet the criteria listed in Section 7 in order to function reliably.

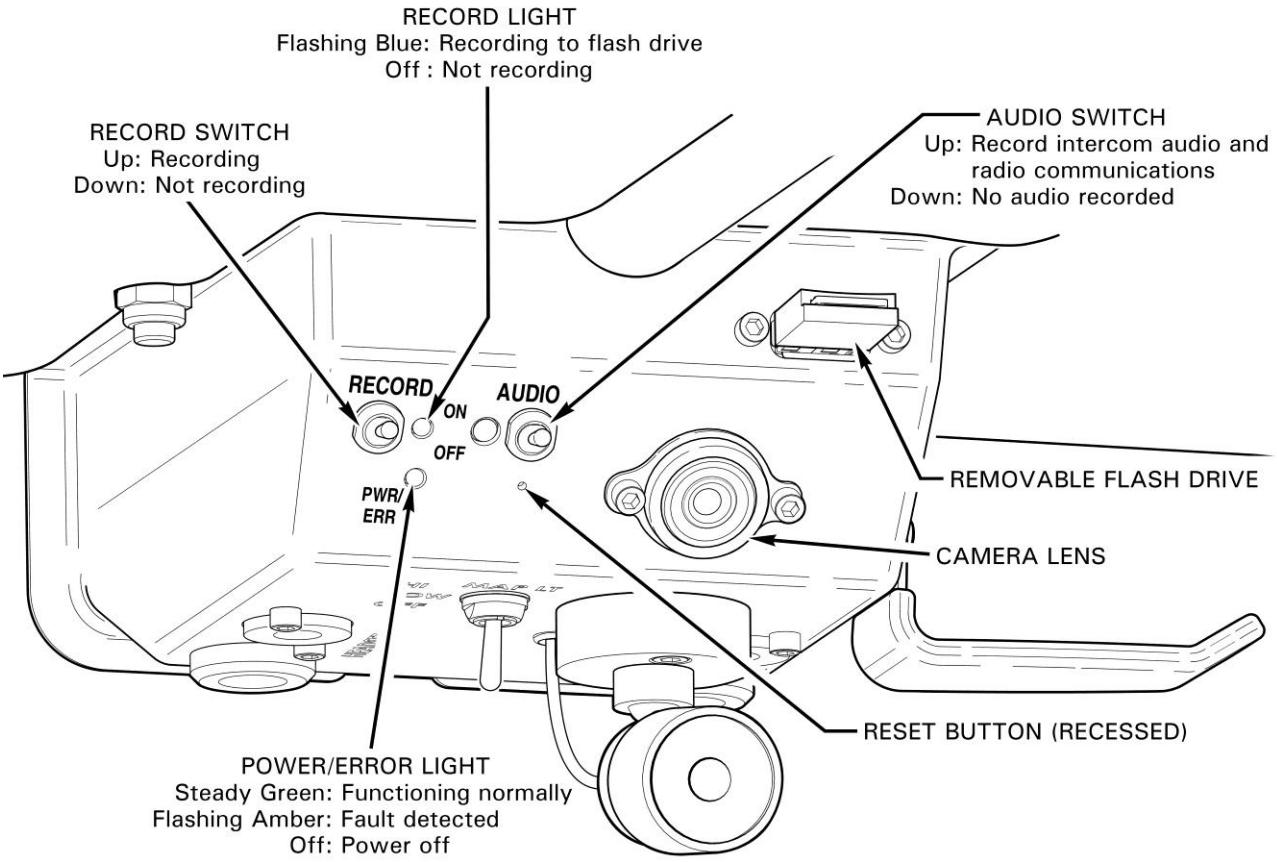

Figure 1: Cockpit Camera Features
(R22 installation shown, other installations similar)

2 Camera Operation and Video Playback

2.1 Recording Video in the Helicopter

1. Before flight, ensure the flash drive is inserted in the USB port on the front face of the camera. Replacement or additional flash drives must meet the requirements detailed in Section 7.
2. Ensure the record switch is in the on (up) position. If recording of intercom audio and radio communications is desired, ensure the audio switch is also in the on (up) position.
3. The camera will automatically start recording when the helicopter battery switch is turned on at the beginning of a flight, and stop recording when the battery switch is turned off.
4. After the helicopter battery switch is turned off, wait 5 seconds for the blue LED on the front face of the camera to stop flashing. The flash drive can then be removed from camera.
    a. Alternatively, the flash drive can be left in the camera for multiple flights and removed at a later date. In this scenario, the camera will retain older video files until they are automatically overwritten by new video after approximately 10 flight hours.

2.2 Playing Video on a Computer

1. Insert the flash drive into a USB port on a Windows PC or Mac computer. Note computers manufactured prior to 2014 may have difficulty delivering smooth playback.
2. A window should automatically open (File Explorer on Windows; Finder on Mac) showing the contents of the flash drive. If a window does not open automatically, open a File Explorer/Finder window and navigate to the flash drive.
3. Double-click on the HELICAM_*xxxx*.MP4 file to be viewed. The video should begin playing in the computer's default video playback program. Refer to the troubleshooting tips in Section 8 if video playback is not smooth, or if it does not playback at all.
4. Flight video is divided into 25 minute segments (4 GB file size). To continue watching video from a longer flight after the first 25 minute video ends, close the video file and double-click on the next HELICAM_*xxxx*.MP4 file.
5. To keep a copy of a video, copy the HELICAM_*xxxx*.MP4 files to a computer. If desired, copy the corresponding HELICAM_*xxxx*.GPX files (located in the HELICAM_GPS folder) to retain GPS data.
6. When finished watching/copying video, eject the flash drive from the computer and insert it into the USB port on the camera. On subsequent flights, the camera automatically overwrites old video and GPS files to make room for new files. It is not necessary to manually delete old video/GPS files from the flash drive.

2.3 Video Recording Tips

- RHC recommends always leaving a flash drive in the camera in case a noteworthy or unexpected event occurs during flight and for investigating intermittent maintenance concerns.
- For flights where a video recording is essential, verify the blue LED light on the camera is flashing before takeoff.
- The blue LED light will flash rapidly for a few seconds after the helicopter battery or record switch is turned off, indicating the video recording is still being written to the flash drive. To prevent corrupting the video recording, do not remove the flash drive until the blue light stops flashing.
- A flash drive can be inserted into the camera at any time while the helicopter is running. A recording will start automatically if the record switch is in the on (up) position.
- A small hole enclosing a reset button is present on the front of the camera enclosure. An unfolded paper clip or similar tool can be inserted into this hole to reboot the camera in the event that it malfunctions.
- RHC may release updated camera software (firmware) to add features and/or improve performance. Instructions for updating the camera software are provided in Section 4.
- The camera lens can be cleaned by wiping gently using a microfiber cleaning cloth. If required, a mild window cleaner or lens cleaner can be applied to the cloth, wiped on the lens, and buffed dry. Do not use harsh chemicals or industrial cleaners as these may damage the lens.

2.4 Video Playback Tips

- Use of the free video playback software VLC may improve performance if playback is not smooth using the default video playback software (see Section 8.1)
- The free video player MPC-HC, included as part of the K-Lite Codec Pack (Windows only; codecguide.com), allows stepping through cockpit camera video frame by frame, viewing video in slow motion or at high speed, and zooming in on a portion of the video.
- Most computers automatically “downscale” 4K video during playback to enable viewing on lower resolution monitors.
- Video editing software, if not already installed on your computer, can be downloaded or purchased (see Section 6) to perform tasks such as:
    - Trimming video files
    - Splicing video clips together
    - Overlaying text and narration
    - Creating time-lapse videos
    - Reducing video resolution for smoother playback and easier video file sharing
- If a video file is corrupted and playback is not possible, the video recovery software described in Section 8.4 can often repair the video to allow proper playback.
- If not displayed on the video recording, the time/date of a video file is indicated by the “Date Created” of the video file in “File Explorer” (Windows) or “Finder” (Mac). This entry lists the time and date (generally local time or UTC as determined by the user preferences discussed in Section 3) corresponding to the end of that video file.
- Software that can help visualize GPS data is described in Section 5.
- The camera creates a “HELICAM_LOG.log” text file on the flash drive that provides a record of the camera’s operation. This file can be emailed to RHC Technical Support to aid in troubleshooting.

3 Setting User Preferences

The cockpit camera has several configuration options that can be set by users, with default values as indicated in parentheses:

- On-screen display of time & date (on)
- On-screen display of GPS coordinates and GPS altitude (on)
- Units for GPS altitude in on-screen display (feet)
- Time zone (UTC)
- Daylight saving time status (inactive)

3.1 General Process for Updating Camera Configuration Settings

User preferences can be set as follows:

1. Download the configuration file HELICAM_SETTINGS.CFG to a computer from the RHC website www.robinsonheli.com.
2. Copy HELICAM_SETTINGS.CFG to the root/top level directory on the flash drive used for recording video with the cockpit camera (i.e., if the computer identifies the flash drive as the "D" drive, the path for the configuration file would be "D:\HELICAM_SETTINGS.CFG"). It is not necessary to delete video and GPS files that may already be on the flash drive.
3. Open HELICAM_SETTINGS.CFG with a text editor (double-clicking the file will usually open it in the default text editing program on the computer, generally Notepad in Windows or TextEdit on Mac).
4. Change the value for each configuration parameter to the value corresponding to the desired behavior, as defined below and in HELICAM_SETTINGS.CFG.
    a. For example, the text that enables on-screen display of time & date is shown below:

        "Time_Date_On_Screen_Display = 1 ;Options: 0 = off, 1 = on"

    b. To set this display to off, edit this text to read:

        "Time_Date_On_Screen_Display = 0 ;Options: 0 = off, 1 = on"

5. Save the configuration file. ***Do not change the name of the file, as configuration files must be named "HELICAM_SETTINGS.CFG" in order to be recognized by the camera.***
6. Eject the flash drive from your computer.
7. Insert the flash drive into the USB port in the cockpit camera. Turn the helicopter battery switch on, and leave it on for 2 minutes before turning off. The camera will detect the new/modified configuration file, then reboot with the new settings in place.
    a. Note the green/amber LED may not illuminate during this first recording after the settings are updated, but LED behavior will return to normal for subsequent recordings.
    b. ***Configuration settings are retained until overwritten by a new/modified configuration file. Therefore, including a configuration file on the flash drive for every flight is not required.***

c. While not required, RHC recommends deleting the configuration file from the flash drive after the update is complete in order to avoid inadvertently changing camera settings in the future.

3.2 On-Screen Display of Time & Date and/or GPS Position & Altitude

The camera can be configured to display the time & date and/or GPS position & altitude in the upper left corner of the video for easy reference. The time displayed in the video is either UTC or local time as determined by the Standard_UTC_Offset and Daylight_Saving_Time parameters discussed in Section 3.4.

Display of the time and date and/or GPS position is configured by editing the following lines in the HELICAM_SETTINGS.CFG file:

```
Time_Date_On_Screen_Display = 1          ;Options: 0 = off, 1 = on
GPS_Position_On_Screen_Display = 1       ;Options: 0 = off, 1 = on
```

By default, time & date and GPS position on-screen display are set to on.

Note the altitude displayed is in reference to MSL (mean sea level) as determined by the cockpit camera GPS receiver, as opposed to that determined by the helicopter (barometric) altimeter. Due to limitations inherent to GPS technology, GPS-derived altitude is generally less accurate than the altitude measured by the helicopter altimeter, so there may be a discrepancy between the GPS-derived altitude displayed in the upper left hand corner and the helicopter altimeter visible during video playback. The helicopter altimeter should generally be considered the more accurate measure of helicopter altitude when reviewing video recordings.

If enabled, GPS-derived altitude is given in units of feet or meters as determined by the configuration file settings described below.

3.3 Units for GPS Altitude in On-Screen Display

The camera can be configured to display GPS data for altitude using units of either feet or meters by editing the following line in the HELICAM_SETTINGS.CFG file:

```
GPS_Altitude_OSD_Units = 1       ;Options: 0 = meters, 1 = feet
```

By default, GPS altitude is set to display in units of feet.

3.4 Time Zone and Daylight Saving Time Settings

The camera has an internal clock that is set to UTC via the camera's GPS receiver. If desired, the parameters Standard _UTC_Offset and Daylight_Saving_Time enable the camera to convert from UTC to local time, which changes the recorded time in the following locations:

- The time displayed in the upper left corner of the video when time & date on-screen display is enabled
- The "date created" timestamp for the video and GPS files written to the flash drive

By default, time & date is set to UTC, as this avoids any ambiguity when crossing time zone boundaries and/or operating in areas where daylight saving time is observed. The disadvantages of recording with UTC are that determining the local time requires a calculation, people that are unfamiliar with UTC may be confused by UTC time, and video files may appear out of chronological order relative to other computer files when viewed in File Explorer (Windows) or Finder (Mac).

Users that may benefit from displaying/recording local time include those that operate primarily in one time zone, those that do not mind updating camera settings for daylight saving time changes, and those that frequently share video with people that are unfamiliar with UTC.

3.4.1 Displaying/Recording UTC

To display/record using UTC, set the time zone parameters to the following (default) values:

Standard_UTC_Offset = 0
Daylight_Saving_Time = 0

3.4.2 Converting to Local Time

To display/record using local time, Standard _UTC_Offset and Daylight_Saving_Time must be set as appropriate for your location as described below.

3.4.2.1 Standard_UTC_Offset Values for Selected Cities/Countries

The proper value for Standard_UTC_Offset for selected cities/countries is listed in Table 1 below, and a complete list and map of worldwide time zone offsets can be found here: https://en.wikipedia.org/wiki/List_of_UTC_time_offsets. ***Note that some locations are behind UTC time, and therefore need a minus sign (-) in front of the offset as indicated in the table.***

Table 1: Standard_UTC_Offset for Selected Locations

City/State/Country	Standard_UTC_Offset
New Zealand (main islands)	12
Sydney, Australia	10
Japan South Korea	9
China Perth, Australia	8
Moscow, Russia	3
Kiev, Ukraine South Africa	2
France (Metropolitan, not including overseas territories) Germany Italy Madrid, Spain	1
London, UK Dublin, Ireland Lisbon, Portugal	0
Rio de Janeiro, Brazil Argentina	-3
Montreal, Canada	-4
New York City, New York, USA (Eastern Time Zone) Toronto, Canada	-5
Chicago, Illinois, USA (Central Time Zone) Mexico City, Mexico Winnipeg, Canada	-6
Denver, Colorado, USA (Mountain Time Zone) Calgary, Canada Ciudad Juarez, Mexico	-7
Los Angeles, California, USA (Pacific Time Zone)	-8
Anchorage, Alaska	-9
Hawaii, USA	-10

For example, a user in Los Angeles, California, USA would set this parameter as follows:

Standard_UTC_Offset = -8

Note that users in time zones with partial hour UTC offsets must enter the offset in the format: "±HH:MM", with the quotation marks and a preceding "+" or "-" required. For example, the proper setting for Adelaide, Australia (9.5 hours offset) is:

Standard_UTC_Offset = "+9:30"

3.4.2.2 Daylight Saving Time

The Daylight_Saving_Time parameter instructs the camera to add 1 hour to the time when daylight saving time is in effect. To enable daylight saving time in the spring when it becomes active, set the Daylight_Saving_Time parameter as follows:

Daylight_Saving_Time = 1

Similarly, to disable daylight saving time in the fall when it becomes inactive, set the Daylight_Saving_Time parameter as follows:

Daylight_Saving_Time = 0

Note that if daylight saving time is observed in your location, the Daylight_Saving_Time parameter must be updated when daylight saving time takes effect in the spring, and updated again when it ceases to be in effect in the fall. The camera cannot automatically determine if daylight saving time is observed and in effect in your location.

4 Updating Camera Software (Firmware)

RHC may release updated camera software (firmware) to add features and/or improve performance. Users can update camera software by following the instructions below.

NOTE

The camera's internal battery needs adequate charge prior to performing a software update. To ensure adequate charge, if the helicopter has not flown within the last 30 days, turn on the helicopter battery switch for 20 minutes and then turn it off for at least 1 minute.

1. Download the latest cockpit camera software .ZIP update file from www.robinsonheli.com.
2. Unzip (uncompress) the update file, and copy all of the software update files to the root (top level) directory on an empty flash drive that is compatible with the camera (compatibility criteria are described in Section 7). The flash drive supplied with the helicopter/camera can be used if all files are first deleted from the drive.
3. Insert the flash drive into the cockpit camera.
4. Turn the helicopter battery switch on for approximately 10 minutes. The camera will automatically detect the update files and begin updating.
5. The blue and green LEDs on the camera face will flash simultaneously while the camera software is being updated.

CAUTION

Do not turn off the helicopter electrical power and/or remove the flash drive during this process, as the camera software will become corrupted.

6. When the camera has finished updating, the camera will reboot, and blue LED will flash slowly to indicate the camera is recording properly. Note the green/amber LED may not illuminate during this first recording after the update, but LED behavior will return to normal for subsequent recordings.
7. Turn the helicopter battery switch off. The update process is now complete. The flash drive can be used to record new videos without any additional preparation (i.e., there is no need to delete the update files from the flash drive).
8. If desired, confirm the software was updated properly by performing the following steps:
    a. Remove the flash drive, insert it into your computer, and open the HELICAM_LOG.log file located in the HELICAM_LOG folder. The log file can be opened with any standard text editor (i.e. Notepad in Windows or TextEdit on Mac).
    b. Scroll to the bottom of the log file, and look for the last entry that looks similar to that shown below. The software version is listed in the "[]" brackets; in this example, the software version is 1.1.0.6.

firmware version [1.1.0.6]
<2020-12-11><12:55:41> UTC:20201211 20:55:41
...

5 Visualizing GPS Data

GPS position and altitude data is recorded in HELICAM_*xxxx*.GPX files, located in the HELICAM_GPS folder, corresponding to the HELICAM_*xxxx*.MP4 files (GPS position and altitude data are also optionally displayed on the upper left portion of the video as described in Section 3). These files can be viewed with a text editor (Notepad on Windows, TextEdit on Mac) or Excel to review the numerical position data. Alternatively, GPX file data can be visualized using the following software:

- Drone Viewer - Displays the helicopter video alongside a map with the helicopter flight path. A marker on the flight path shows the position of the helicopter at the moment currently shown in the video. Drone Viewer is available for Windows and Mac: www.mydroneviewer.com
- GPS Visualizer - Website that displays the helicopter flight path on a customizable and downloadable map (video is not displayed): www.gpsvisualizer.com

Note that to view GPS data in Drone Viewer, the GPX files must first be copied to the same folder as the MP4 video files.

Detailed instructions for use of both software programs are provided on the respective websites.

6 Video Editing Software

While not required for recording and viewing camera video, users may want to edit video from the cockpit camera, performing such functions as:

- Basic video editing
  - Trimming videos
  - Overlaying text/music/audio
  - Splicing together different clips
- Creating time-lapse videos from cockpit camera video files
- Converting videos to lower resolution
  - Useful for improving playback on older computers and for producing smaller files for easier sharing

Video editing software capable of some or all of these tasks is preinstalled on many computers. If such software is not installed, the following video editing software is available.

6.1 Wondershare Filmora

Wondershare Filmora is a software package that can edit cockpit camera video, and is available for both Windows and Mac:

http://filmora.wondershare.com/

A free trial version is available to allow users to evaluate the software before purchasing. Extensive text and video tutorials are available on the Filmora website and YouTube.

6.2 VLC

The free VLC media player (http://www.videolan.org/vlc) can also be used to perform many video editing tasks, however the processes are more complicated. Instructions for using VLC for these tasks can be found online with a simple web search.

7 Selecting and Preparing Additional/Replacement Flash Drives

The flash drive supplied with the camera is a microSD to USB adapter with a 128 GB microSD card formatted to work with the camera. Additional/replacement microSD cards and USB adapters are available from RHC with the appropriate format preinstalled. Replacement flash drives can also be purchased from a third party, however they must meet strict criteria and be specially formatted using third party Windows software (not available for Mac) as described below.

7.1 Third Party Flash Drives

SanDisk Max Endurance microSD cards (16, 32, 64, 128, or 256 GB) housed in a Cablecc microSD to USB 3.0 adapter are supported by RHC.

Counterfeit hardware is commonplace and is not reliable. RHC recommends purchasing the hardware from authorized resellers. SanDisk Max Endurance microSD cards of 16, 32, 64, 128, or 256 GB size may be used with the cockpit camera, with larger sizes storing more video before the oldest video is overwritten. The approximate video storage capacity for drives of these sizes is as follows:

Flash Drive Storage Capacity	Recording Capacity (4K resolution)
16 GB	1.25 hours
32 GB	2.5 hours
64 GB	5 hours
128 GB (supplied with camera)	10.5 hours
256 GB	21 hours
512 GB (Alternate flash drive required – see Section 7.3)	42 hours

7.2 Formatting Flash Drives to FAT32

Flash drives must be formatted to “FAT32” with a specific disk allocation size in order to function properly with the cockpit camera. Flash drives supplied by RHC will be properly formatted, but flash drives purchased from a third party must be formatted using third party Windows software as described below.

Windows and Mac operating systems do not provide a simple method to apply the appropriate FAT32 format to flash drives greater than 32 GB in size. The following Windows software is recommended to format flash drives as required (RHC is not aware of any Mac software that can format flash drives to FAT32 with the appropriate disk allocation size):

EaseUS Partition Master: https://www.easeus.com/partition-manager/epm-free.html

Formatting steps:

1. Download and install EaseUS Partition Master to a Windows computer.
2. Insert the flash drive into the computer. **Note that all existing data on this drive will be permanently deleted after formatting.**

3. Launch EaseUS.
4. Select the flash drive to be formatted.
5. Click “Format” on the right side of the EaseUS window.
6. For “File system”, select “FAT32”.
7. For “Cluster size” (also known as disk allocation size), select as follows:

Flash Drive Size	Cluster Size
16 GB	8K
32 GB	16K
64 GB	32K
128 GB	64K
256 GB	64K
512 GB	64K

8. [optional] Enter desired text for “Partition label” (this is the “name” of the drive as it appears when inserted into a computer).
9. Click “OK”, then “OK” again.
10. Click “Execute 1 Operation” at the top of the EaseUS window.
11. Click “Apply”
12. Click “Finish” when formatting is complete.
13. Close EaseUS.
14. The flash drive is ready for use in the cockpit camera.

7.3 Alternative Flash Drives

RHC recommends operators use a flash drive of the type supplied with the camera/helicopter as these drives have proven reliable during extensive testing by RHC. Conversely, many alternate flash drives tested during camera development were unreliable when used with the cockpit camera.

For operators that wish to use a flash drive larger than the maximum 256 GB available with the SanDisk Max Endurance line, RHC has found the following flash drives to be reliable during limited testing. Note that these flash drives must be formatted to FAT32 with the proper disk allocation size as described in Section 7.2.

- PNY 512 GB Elite-X Fit USB 3.1 Flash Drive
- SanDisk 512 GB Ultra Fit USB 3.1 Flash Drive
- SanDisk Extreme 512 GB microSDXC card (inserted into Cablecc microSD to USB adapter supplied with camera)

For operators that wish to use lower cost individual flash drives for only a single flight, the SanDisk Ultra Flair line of flash drives is recommended. 16, 32, 64, or 128 GB capacity drives are compatible with the cockpit camera if formatted to FAT32 with the proper disk allocation size as described above. ***However, these flash drives may become unreliable after a few overwrite cycles (i.e., after 5-10 flight hours) and ARE NOT recommended for operators reusing flash drives for multiple flights.***

8 Troubleshooting

The following are some issues that may arise with video recordings and playback. For issues not addressed, or when these instructions do not correct the problem, contact Robinson Technical Support.

8.1 Video does not play back smoothly, or does not play back at all

If video playback using the default video player is not smooth and/or video does not play at all, it is likely due to the computer and/or software used for playback.

8.1.1 Video Playback Software

As a first step in troubleshooting video playback problems, download and install the widely used free video player VLC, available for both Windows and Mac:

http://www.videolan.org/vlc

Once installed, open VLC and play the selected video. If playback is still problematic, try the following:

- Ensure the computer operating system and video drivers are up to date
- Ensure VLC is up to date
- Close all other applications
- Copy video files to the computer hard drive before viewing them
- Check the VLC support webpage for troubleshooting tips: http://www.videolan.org/support
- Update camera software (firmware) as described in Section 4
- Download the sample cockpit camera video from the Robinson website www.robinsonheli.com. This video is known to play smoothly on a properly configured computer, and will help determine whether the playback problem is due to the camera or computer.

An alternative free video player is MPC-HC. This is included as part of the K-Lite Codec Pack (Windows only; codecguide.com), and in addition to regular playback, the software allows stepping through cockpit camera video frame by frame, viewing video in slow motion or at high speed, and zooming in on a portion of the video.

8.1.2 Other Software and Hardware Solutions

If the steps above do not result in smooth playback, the computer hardware may not be powerful enough to smoothly playback 4K video. This can be addressed by converting the videos to a lower resolution or using a lower resolution monitor for playback:

Converting Videos to Lower Resolution

Converting 4K video recordings to a lower resolution usually results in smoother playback due to reduced computer processing required for playback.

If your computer does not have software that is capable of converting 4K videos to a lower resolution, Wondershare Filmora, described in Section 6, has this capability.

Playback with Lower Resolution Monitor

Connecting a lower resolution monitor to the problem computer will often result in smoother playback, as playback at lower resolution is less computationally intensive.

8.2 Video is not recorded

8.2.1 General/Temperatures above -15 °C/+5 °F

- Ensure the record switch is on (up).
- Ensure the flash drive is inserted securely into the USB port on the camera.
- For flash drives consisting of a separate microSD card and USB adapter, ensure the microSD card is inserted securely into the USB adapter.
- Ensure the flash drive meets the criteria described in Section 7, including FAT32 formatting and proper disk allocation size.
- Reformat the flash drive and/or replace it as described in Section 7.
- Install/reinstall the latest camera software (firmware) as described in Section 4.
- If the helicopter engine is off for more than one hour while the helicopter battery switch is on, the camera will automatically stop recording and shut down. To reboot the camera and record video on a subsequent flight, turn the helicopter battery switch off for at least 60 seconds, and then turn the helicopter battery switch back on.

8.2.2 Temperatures below -15 °C/+5 °F

Troubleshooting steps for cold weather operations are dependent on the camera serial number as described below. The camera serial number can be found on a placard on the exterior of the camera enclosure.

Cameras with Serial Number 0001-0067, 0072-0109, 0117, 0118, 0132-0183, 0185-0193, or 0195-0217

If the helicopter is cold soaked in ambient temperatures below approximately -15 °C/+5 °F, these cockpit cameras may not function properly when the helicopter is started. To use the cockpit camera in low temperature conditions, proceed as follows:

1. Start the helicopter according to the instructions in the Normal Procedures section of the POH.
2. If the camera is not recording properly as indicated by the LED lights on the front of the camera (the top LED should be slowly flashing blue, and the bottom LED should be solid green), perform the following steps:
    a. Select maximum cabin heat.
    b. After 5-15 minutes, insert an unfolded paper clip or similar tool into the reset hole on the front face of the camera, and press and release the recessed button. The camera should turn on/reboot and start recording as indicated by the LED lights on the front of the camera; if it does not start recording properly, wait a few minutes for the cabin to warm further, and repeat this step (2b).

Cameras with Serial Number 0068-0071, 0110-0116, 0119-0131, 0184, 0194, or 0218 and above

These cameras are equipped with a thermostat that automatically turns the camera on once the cabin/camera has warmed to approximately -15 °C/+5° F or higher. If the camera does not record properly at temperatures above -15 °C/+5° F, refer to the instructions above in Section 8.2. Note that the camera is unable to function properly below approximately -15 °C/+5° F and will not turn on until the cabin/camera has warmed sufficiently.

8.3 Flash drive produces a "drive error" message when inserted in computer

- To playback video the first time this error is encountered:
  - If prompted, select "Repair drive".
    - If video files are playable after drive repair is complete, no further action is required.
    - If video files are corrupted and/or unplayable after drive repair is complete, follow the instructions in Section 8.4.
- To prevent errors in the future:
  - Ensure the flash drive meets the criteria described in Section 7, including FAT32 formatting and proper disk allocation size.
  - Reformat the flash drive and/or replace it, as described in Section 7.
  - Do not remove the flash drive while a recording is in progress.
    - Flash drive files are finalized approximately 3 seconds after the helicopter battery is switched off. The blue flashing LED on the front face of the camera will extinguish when the recording is finished writing to the flash drive.
    - To remove the flash drive without shutting off the helicopter battery switch, move the record switch to the off (down) position, wait for the blue LED to stop flashing, then remove the flash drive.
  - If the helicopter has not been operated for several months, short videos (such as turning the battery switch on briefly to check the fuel level) may be corrupted, and the computer may display a drive error. This is due to a rechargeable battery inside the camera that has discharged, preventing videos from being closed properly when the helicopter battery is switched off. The camera battery will recharge during flight, so flight video should be recorded properly even if preflight video is corrupted.

8.4 Video files are corrupted

Video files on the flash drive may become corrupted (unplayable even with proper playback software) if:

- The flash drive is removed from the camera while a recording is in progress
- The camera malfunctions

To prevent future video files from being corrupted, follow the steps in Section 8.3. To repair video files that are already corrupted, use video recovery software such as the following:

- Wondershare Recoverit (Windows and Mac): https://recoverit.wondershare.com/
- VLC: http://www.videolan.org/vlc

Repairing Video Files with Wondershare Recoverit

The “Advanced” version of Wondershare Recoverit is required to repair corrupted videos. Once installed, perform the following steps to repair a corrupted video file (steps listed are for Recoverit Version 8.7.4):

1. Launch Recoverit.
2. Select “Video repair”, and click “Start”.
3. Click “Add video and start repairing”, and select the video file you wish to repair.
4. Click “Repair”
5. This “simple” file recovery will likely fail. Click “OK”, then click “Advanced Repair” in the upper right hand corner.
6. Using the dialog box, select a cockpit camera video file that is NOT corrupted, and click “Repair”. Recoverit will use data from this file to repair the corrupted video.
7. A dialog box should indicate the repair was successful. Click “OK”, then “Save to Folder” in the upper right corner to save the repaired file.

8.5 Blue LED remains extinguished or flashes in an unusual manner when camera is turned on

- Ensure camera record switch is on (up).
- Ensure flash drive is inserted securely into the USB port on the camera.
- For the flash drives consisting of a separate microSD card and USB adapter, ensure the microSD card is inserted securely into the USB adapter.
- Momentarily insert an unfolded paper clip or similar tool into the reset hole on the front face of the camera to reboot the camera (previously recorded video will be retained).
- Reformat the flash drive and/or replace it as described in Section 7.
- Ensure the flash drive meets the criteria described in Section 7, including FAT32 formatting and proper disk allocation size.

8.6 On-screen display of time & date and/or GPS position is disabled/enabled

Use the configuration file to enable/disable on-screen display of time & date and/or GPS position as described in Section 3.

8.7 On-screen display time & date and/or video file timestamps are incorrect for your location

By default, the camera uses UTC for the on-screen display of time & date and for video file timestamps. To use local time for future recordings, use the configuration file to set/correct the time zone and daylight saving time parameters as described in Section 3.

8.8 Amber “error” light on camera is flashing

The amber light will flash for the duration of a flight plus an additional 30 seconds after the helicopter battery switch is turned off when it detects one of the following conditions:

- A GPS signal is not received for 15 minute period
- An internal camera error is detected

If the amber light flashes during a flight, but video and GPS data are recorded successfully and the amber light does not illuminate on future flights, the single error indication can be ignored. If video and GPS data are not recorded properly and/or the amber light persists for multiple flights, contact RHC Technical Support.

8.9 Video image is not level

The camera lens mounting can be adjusted along the helicopter roll axis to produce a level image. Refer to the helicopter Maintenance Manual for instructions.

Note: Previously recorded video can be rotated to appear level using video editing software such as Wondershare Filmora (see Section 6).

8.10 Some or all audio sources are not recorded, or the recorded playback volume is too low

- Ensure the audio switch is on (up).
- Check the audio control panel to ensure the audio sources are not muted or set to a low volume for the front left seat (the camera receives the same audio sources and volumes that are/would be received by the front left seat occupant's headset).

9 Camera Specifications

Video

- 4K30p resolution (3840 x 2160 pixels, 30 frames per second, progressive scan)
- H.264 encoding
- MP4 video file format
- Video is recorded in sequential 4 GB files approximately 25 minutes in length
- Flash drive storage capacity is 16-256 GB (1.25-21 hours) depending on flash drive chosen by operator (a 128 GB drive (10.5 hours) is supplied with the camera)
    - Connects to camera through USB-A port
    - Flash drives must meet criteria specified in Section 7 to ensure reliable performance

Audio

- Records all audio that is/would be heard in headset of front left seat occupant:
    - Intercom communications
    - Communication radio transmissions and receptions
    - Avionics tones and alerts
    - Navigation radio
    - Headset audio
- Audio recording specifications:
    - MPEG AAC Audio (mp4a)
    - Audio recorded as part of MP4 video file
    - ADC sample rate: 48 kHz
    - Encoded bit rate: 128 kbps
    - Bit depth: 16 bit

GPS

- GPS data recorded to separate GPX file on flash drive
- Data includes:
    - Latitude
    - Longitude
    - GPS-derived altitude
    - Groundspeed
    - Heading
- Data recorded at 10 Hz
- Latitude, longitude, and GPS-derived altitude can additionally be displayed on video recording as a user-configurable option
- Siretta Echo 27 antenna
    - Noise figure: <1.5 dB
- Accuracy
    - Horizontal positioning accuracy: < 2.5 m
    - Speed accuracy: <0.1 m/s

Environmental Limitations

- Meets applicable DO-160 test requirements
- Operating temperature range: -15 °C/+5 °F to +85 °C/+185 °F
- Survival temperature range: -40 °C/-40 °F to +95 °C/+203 °F