

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, DC 20594

May 27, 2020

Video Study

Specialist's Study Report
By Gerald Kawamoto

1. EVENT

Location: Independence, Iowa
Date: January 21, 2020
Aircraft: Guimbal Cabri G2, N715RK
Operator: Private
NTSB Number: CEN20CA064

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received video content from two security cameras:

File Name: **20200121.161436.Lotandhangers.mp4**

File Name: **20200121.161442.NorthGate.mp4**

3.1. Summary of Recording Contents

The videos were recorded at a resolution of 1920 by 1080 pixels at 15 frames per second (fps). The encoding and decoding algorithm, or codec, for the files was H.264, also referred to as MPEG-4 Advanced Video Coding (AVC) part 10.

H.264 is typically used for lossy compression, meaning that the encoding algorithm uses approximations and partial data discarding to represent the content to reduce data size. The end result is composed of various types of frames and/or slices called I frames/slices, P frames/slices, and B frames/slices, where frames are the complete image and slices are a region of the frame separately encoded from other regions of the same frame. I-frames (intra-coded picture) represent the complete image, P-frames (predicted picture) contain changes in the image from the previous frame, and B-frames (Bidirectional predicted picture) use changes between the current frame and both preceding and following frames.

Instances where likely visual compression artifacts are observed are described and illustrated in section 3.1.1.

The Lotsandhangers.mp4 file showed integrated timestamps of 16:14:35 to 16:15:05 on January 21, 2020, for a total of 450 frames. Figure 1 is a still frame depicting the field of view (FoV).



Figure 1. Lotsandhangers.mp4 FoV.

The NorthGate.mp4 file showed integrated timestamps of 16:14:42 to 16:15:00 on January 21, 2020 for a total of 270 frames. Figure 2 is a still frame depicting the FoV.



Figure 2. NorthGate.mp4 FoV.

3.1.1. Lotsandhangers.mp4

Full resolution still images of each individual frame were extracted in Adobe Premiere using a lossless bitmap export.

The following sequence depicts select frames from the first 14 frames of the video cropped to a region of 304 by 176 pixels, or approximately 2.6% of the full resolution. As the aircraft moves from right to left in the frame, compression artifacts of the tail rotor can be observed, resulting in a “trail” of darkened pixels following the path of the tail rotor.

FRAME	CROPPED IMAGE	
1		
7		



The following sequence depicts frames 32 through 42 of the video cropped to a region of 452 by 196 pixels, or approximately 4.3% of the full resolution. As the tail rotor transitions from the darker color of the hangar to the lighter color of the snow and sky, compression artifacts of the tail rotor can be observed from frame to frame. Artifacts are also observed in the main rotor. In the angle captured by the camera, the center of the tail rotor moves from right to left along the horizon. At the horizon line to the left of the hangar, there are dark objects between the ground and the sky.



34	 A white helicopter is parked on a snowy tarmac. In the background, there are two long, low buildings with dark roofs. The ground is covered in a layer of snow, and the sky is overcast.
35	 A white helicopter is parked on a snowy tarmac. In the background, there are two long, low buildings with dark roofs. The ground is covered in a layer of snow, and the sky is overcast.
36	 A white helicopter is parked on a snowy tarmac. In the background, there are two long, low buildings with dark roofs. The ground is covered in a layer of snow, and the sky is overcast.

37	 A white helicopter is parked on a snowy tarmac. In the background, there are two large blue hangars. The ground is covered in a layer of snow, and the sky is overcast.
38	 A white helicopter is parked on a snowy tarmac. In the background, there are two large blue hangars. The ground is covered in a layer of snow, and the sky is overcast.
39	 A white helicopter is parked on a snowy tarmac. In the background, there are two large blue hangars. The ground is covered in a layer of snow, and the sky is overcast.

40	 A white helicopter is parked on a snowy tarmac. In the background, there are two large blue hangars and a small white building. The ground is covered in a layer of snow, and the sky is overcast.
41	 A white helicopter is parked on a snowy tarmac. In the background, there are two large blue hangars and a small white building. The ground is covered in a layer of snow, and the sky is overcast.
42	 A white helicopter is parked on a snowy tarmac. In the background, there are two large blue hangars and a small white building. The ground is covered in a layer of snow, and the sky is overcast.

The following sequence depicts frames 96 through 98 and frames 105 through 112 of the video cropped to a region of 472 by 176 pixels, or approximately 4.0% of the full resolution. As the tail rotor moves from right to left in the frame, compression artifacts of the tail rotor can be observed from frame to frame.



105	 A military helicopter is parked on a snowy tarmac in front of a large hangar. The ground is covered in a layer of snow, and the hangar has a green roof. A tall antenna is visible on the hangar's roof.
106	 A military helicopter is parked on a snowy tarmac in front of a large hangar. The ground is covered in a layer of snow, and the hangar has a green roof. A tall antenna is visible on the hangar's roof.
107	 A military helicopter is parked on a snowy tarmac in front of a large hangar. The ground is covered in a layer of snow, and the hangar has a green roof. A tall antenna is visible on the hangar's roof.
108	 A military helicopter is parked on a snowy tarmac in front of a large hangar. The ground is covered in a layer of snow, and the hangar has a green roof. A tall antenna is visible on the hangar's roof.

109	 A white helicopter is hovering in front of a large, light-colored hangar. The ground is covered in snow, and there are other buildings and vehicles in the background.
110	 A white helicopter is hovering in front of a large, light-colored hangar. The ground is covered in snow, and there are other buildings and vehicles in the background.
111	 A white helicopter is hovering in front of a large, light-colored hangar. The ground is covered in snow, and there are other buildings and vehicles in the background.
112	 A white helicopter is hovering in front of a large, light-colored hangar. The ground is covered in snow, and there are other buildings and vehicles in the background.

The following sequence depicts frames 139 through 143 and frames 149 through 151 of the video cropped to a region of 628 by 248 pixels, or approximately 7.5% of the full resolution. Compression artifacts of the tail rotor can be observed from frame to frame.



142	45  A security camera still image showing a helicopter on a tarmac in front of hangars. The helicopter is a light-colored, multi-rotor aircraft, possibly a Black Hawk, positioned on a paved surface. In the background, there are several large, dark-colored hangars or industrial buildings. The sky is overcast and grey. The image is labeled with the number '45' in the top left corner.
143	45  A security camera still image showing a helicopter on a tarmac in front of hangars. The helicopter is a light-colored, multi-rotor aircraft, possibly a Black Hawk, positioned on a paved surface. In the background, there are several large, dark-colored hangars or industrial buildings. The sky is overcast and grey. The image is labeled with the number '45' in the top left corner.

149	45  A white helicopter is parked on a snowy field. In the background, there are several large hangars and a tall antenna tower. The ground is covered in snow with some patches of brown earth visible.
150	45  A white helicopter is parked on a snowy field. In the background, there are several large hangars and a tall antenna tower. The ground is covered in snow with some patches of brown earth visible.
151	45  A white helicopter is parked on a snowy field. In the background, there are several large hangars and a tall antenna tower. The ground is covered in snow with some patches of brown earth visible.

3.1.2. Northgate.mp4

Full resolution still images of each individual frame were extracted in Adobe Premiere using a lossless bitmap export.

Cropped portions of frames 104 through 106 are depicted in the following sequence. The integrated timestamps of the still images are 16:14:49.

FRAME	PIXELS SHOWN	CROPPED IMAGE
104	297 x 332	

105	271 x 332	
106	254 x 315	