**NATIONAL TRANSPORTATION SAFETY BOARD**
Vehicle Recorder Division
Washington, DC 20594

January 17, 2018

# Onboard Image Recorder

**Specialist's Factual Report**
**By Bill Tuccio, Ph.D.**

## 1. EVENT

| | |
|---|---|
| Location: | Front Royal, Virginia |
| Date: | October 7, 2017 |
| Aircraft: | Piper PA-25-235, N90866 |
| Operator: | Skyline Soaring Club |
| NTSB Number: | ERA18FA006 |

## 2. GROUP

A group was not convened.

## 3. SUMMARY

On October 7, 2017, about 1345 eastern daylight time, a Piper PA-25-235, N90866, was destroyed when it impacted terrain during initial climb from Front Royal-Warren County Airport (FRR), Front Royal, Virginia. The airline transport pilot was fatally injured. The airplane was operated by the Skyline Soaring Club as a glider-tow flight conducted under the provisions of 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the local flight.

## 4. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received two video files.

### 4.1. Recorder Description

The Investigator-in-Charge (IIC) indicated the files were from a GoPro Hero 5 video camera. This portable, digital video camera is capable of recording high definition video with time synchronized parametric data, including GPS position.

### 4.2. Video Files

The videos were recorded by the pilot of the glider being towed by N90866 at the time of the accident. While the glider was in flight, the vantage point of the video was stationary. Metadata describing each video file is shown in table 1. The

filenames and sizes were consistent with a user initiation of the second recording, as opposed to the first file reaching its maximum size and then sequencing to a new file.

**Table 1. Metadata of video files.**

| | File 1 | File 2 |
|---|---|---|
| **Filename** | GOPR0172.mp4 | GOPR0173.mp4 |
| **Length (hours:minutes:seconds)** | 00:01:03 | 00:08:42 |
| **Resolution (pixels)** | 1920x1080 | 1920x1080 |
| **Frame Rate (frames per second)** | 59 | 59 |
| **File Size** | 235 megabytes | 1.9 gigabytes |

## 4.3. Timing and Correlation

The times used in this report are expressed as elapsed time from the start of each video. Times in the narrative are expressed as hour:minute:second.frame, where frame is a number from 0 to 29.[1]

## 4.4. Summary of Recording Contents

In agreement with the Investigator-In-Charge, a video group did not convene and this summary report was prepared. All figures contain frames from the recorded video. Black areas are used to redact images of the glider occupants, including reflections.

### 4.4.1. Video Recording One: GOPR0172.mp4

[00:00:00.00] The glider was stationary on the ground, connected to the towplane via a slack towrope. The camera vantage point was behind and to the left of the front seat passenger, as shown in figure 1. The airspeed indicator read 0, the altimeter read 700 feet, and the g-meter read about 0. The control stick position remained in the neutral position until just before the takeoff roll began (about 30 seconds hence, as reported herein). The blue spoilers/brake handle was full aft. The sky had few high clouds, visibility greater than 20 miles. The towplane's propeller was turning. The glider pilot was seated in the back of the towplane and the passenger in the front. The glider pilot and passenger were talking, with the glider pilot explaining how the tow would proceed. Throughout the video, unless otherwise noted, the passenger did not touch the control stick.

[1] While the frame rate was 59 frames per second, the video transcription software operated on a 29 frame per second system.

**Figure 1. GOPR0172.mp4 at 00:00:00.00.**

[00:00:02.05] By this time, the towplane had moved forward and the towrope became taught. The glider's yawstring became visible at this point, and was about 90 degrees right.

[00:00:09.21] The blue spoilers/brake handle moved forward.

[00:00:10.24] The pilot explained to the passenger he would receive a "thumbs up" sign from someone outside the towplane (not visible, ostensibly a wing runner).

[00:00:11.05] The towplane pilot announced on the radio, "Front Royal Traffic, Pawnee eight six six, departing runway two eight, glider in tow."

[00:00:20.10] The glider pilot explained he was wagging his rudders, coincident with the sound of rudder movement and the passenger's legs moving slightly, consistent with rapid rudder movement left and right.

[00:00:24.20] The glider began to move forward and the control stick moved aft. The glider pilot explained he would hold the stick aft during the early part of the tow acceleration.

[00:00:31.15] At this time, a windsock was visible to the right of the runway. There was a left quartering headwind, as shown in figure 2. The glider's yawstring was about 45 degrees to the right.

**Figure 2. GOPR0172.mp4 at 00:00:31.15.**

[00:00:33.06] At about this time, the towplane's tailwheel lifted off the runway.

[00:00:33.25] The glider became airborne, just passed the number "28" runway marking. The control stick moved forward, and glider flew just above the runway and over the runway centerline. The towplane was still on the runway.

[00:00:35.00] - [00:00:40.22] The glider pilot said, "now we're gonna try and stay right- stay low like this. Don't- don't wanna pickup the wing of the towplane at all." The towplane was still on the runway, on the centerline, yawed about 10 degrees left. The glider was about 5 feet right of centerline, flying above and close to the runway. The glider airspeed indicated about 45 knots.

[00:00:39.22] The towplane became airborne (all three wheels were off the runway).

[00:00:44.14] By this time, the towplane and glider were climbing above the runway. The glider airspeed indicated 60 knots. The glider pilot continued to narrate the flight and tow, saying, "* we'll * in behind the towplane like this."[2]

[00:00:47.29] The glider pilot said, "now you-you can follow me on the controls."

[00:00:48.20] The glider's yawstring was fluctuating around the center position.

[00:00:51.12] The passenger moved her right hand onto the control stick (palm open). At this time, the towplane was over the centerline of the runway.

[2] * is a symbol for an unintelligible utterance.

[00:00:51.12] - [00:00:57.22] The glider moved up and down, consistent with encountering atmospheric/mechanical turbulence (as opposed to wake turbulence), momentarily obscuring the towplane from the vantage point of the camera (due to the passenger's head). The glider pilot commented it was a little bumpy.

[00:00:57.22] By this time the towplane was approximately over the west end of the paved surface of runway 28, and the glider was to the right of the paved surface (right of centerline); the passenger had removed her hand from near the control stick. Her hand remained clear of the control stick for the remainder of the flight.

[00:00:59.21] The glider pilot commented the flight would smooth out when they were higher. At this time, the altimeter indicated 900 feet.

[00:01:03.21] The video ended, as shown in figure 3. The glider altimeter indicated about 900 feet, and the airspeed indicated about 60 knots. There was a white house visible at about the 2 o'clock position of the glider. The position of the glider relative to the towplane was consistent with a high tow position.[3]

**Figure 3. GOPR0172.mp4 at 00:01:03.21.**

## 4.4.2. Video Recording Two: GOPR0173.mp4

[00:00:00.00] The video resumed, the first frame shown in figure 4. The white house had moved to about the 2:30 position of the glider. The altimeter indicated

[3] The FAA Glider Flying Handbook defines High Tow as "aerotow flight with the glider positioned slightly above the wake of the towplane."

about 950 feet and the airspeed indicated about 70 knots. The towplane was not visible to the camera's vantage point/field of view.

**Figure 4. GOPR0173.mp4 at 00:00:00.00.**

[00:00:00.15] The glider pilot said, "woop."

[00:00:01.21] The blue spoiler/brake handle began to move aft. The airspeed was indicating 70 knots.

[00:00:05.14] The indicated airspeed peaked at about 78 knots, the vertical speed at about 7.8 up (units not determined), and altimeter indicated about 960 feet. The blue spoiler/brake handle was nearly full aft. The yaw string was about 45 degrees to the right. The towplane's right wing came into view to the right of the glider's nose, and below the glider.

[00:00:05.28] The towplane was no longer visible, as the passenger's head was between the camera field of view and the towplane.

[00:00:07.03] The blue spoiler/brake handle remained full aft. The altimeter indicated about 950 feet, and the airspeed about 70 knots. The glider's nose yawed right, toward the aforementioned white house. The yaw string was nearly 90 degrees right, and the glider's nose (pitch) was slightly down. The vertical speed indicated about 0 (units not determined).

[00:00:08.19] The glider's yellow towrope release handle moved aft momentarily, as the blue spoiler/brake handle remained aft. The altimeter continued to read

about 950 feet, the airspeed indicated 70 knots, and the vertical speed indicated about 3 down (units unknown). The towplane's right wing became visible again, to the right of the glider, and low. The glider's yaw string was about 90 degrees right.

[00:00:08.23] The towplane's position at this moment is shown in figure 5. The tow plane was to the right of the glider and below the glider.

**Figure 5. GOPR0173.mp4 at 00:00:08.23.**

Figures 6 and 7 show enhancements of figure 5, with an emphasis on the towplane’s elevator. Image resolution was not sufficient to discern/identify the towrope.

**Figure 6. Elevator emphasis, image cropped and sharpened.**

**Figure 7. Elevator emphasis, image cropped, sharpened, and color balance adjusted.**

[00:00:08.28] Relative to the glider's movement, the right wingtip of the towplane moved down and left, out of the field of view of the camera. This was the last recorded image of the towplane.

[00:00:09.00] A snapping sound was recorded.

[00:00:10.01] The passenger's eyeglass lanyard, which had been lying flat on her back, momentarily moved up in the air (consistent with less than 1 g of normal force).

[00:00:10.29] The glider's yellow towrope release handle extended about 6 inches and dangled down, coincident with a loud snapping sound. The glider jostled abruptly, as the g-meter indicated 4 g. The altimeter indicated about 900 feet, the airspeed about 71 knots, and the vertical speed about 2 down (units unknown).

[00:00:11.13] The blue spoiler/brake handle moved forward, as the glider's nose moved left, the yaw string moved back towards center, the altimeter indicated 900 feet, the indicated airspeed was about 73 knots, and the vertical speed was about 10 down (units unknown). The yellow towrope release handle retracted.

[00:00:12.15] The nose of the glider moved up, above the horizon, and was banking left. The indicated airspeed reduced to about 65 knots. The pilot said "sorry."

[00:00:13.25] As the glider continued to turn left, the passenger asked, "too bumpy?"

[00:00:17.17] The passenger asked what happened, and the pilot responded as the glider continued to turn left, back towards the airport.

[00:00:21.17] The glider pilot said, "oh no, oh no" and the passenger asked what happened. At this time, runway 10 at the Front Royal airport was ahead and to the right of the glider.

[00:00:29.20] The glider headed back to the airport, as the glider pilot expressed concern for the towplane and the towplane's pilot.

[00:00:33.20] The glider pilot made a radio call that he was landing on runway 10 and reported the towplane had an issue (his exact transmission was not intelligible).

The glider continued and landed on runway 10. The recording continued after the glider stopped and the glider pilot exited the glider. The camera remained with the pilot, and continued to record as he walked to the FBO and discussed what had happened with other pilots.