NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

May 22, 2017

Personal Electronic Device

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

1. EVENT SUMMARY

Location:	Lee's Summit, Missouri
Date:	September 20, 2016
Aircraft:	Piper PA-28-235
Registration:	N8983W
Operator:	TEKO Air LLC
NTSB Number:	CEN16FA378

On September 20, 2016, about 1820 central daylight time, a Piper PA-28-235 airplane, N8983W, impacted terrain near Lee's Summit, Missouri. The private rated pilot and passenger were fatally injured, and the airplane was substantially damaged. The airplane was registered to and operated by TEKO Air LLC, Des Moines, Iowa, under the provisions of 14 *Code of Federal Regulations* Part 91 as a personal fight. Visual meteorological conditions prevailed and no flight plan had been filed. The cross country flight originated from the Ankeny Regional Airport (IKV), Des Moines, Iowa, and was en route to the Lee's Summit Municipal airport, (LXT), Lee's Summit, Missouri.

2. GROUP

A group was convened on April 28, 2017.

Chairman:	Dr. Bill Tuccio Aerospace Engineer National Transportation Safety Board (NTSB)
Member:	Craig Hatch Investigator-in-Charge NTSB
Member:	Dave Gerlach Senior Air Safety Investigator Federal Aviation Administration

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following personal electronic device (PED):

Device Manufacturer/Model:	Apple iPhone 6s
Serial Number:	Not determined

3.1. Device Description

PEDs are a category of devices comprised primarily of portable computing devices and mobile phones. Portable computing devices are typically capable of internet access, email, messaging services, and can run user-installed applications to perform specific tasks. Depending on the model, mobile phones can perform many of the same tasks as portable computing devices, plus have voice call and text messaging capabilities. PED user and system data is typically stored on non-volatile memory[1] and can be accessed through manufacturer-provided interfaces.

3.2. Data Recovery

Upon arrival at the NTSB Vehicle Recorder Division, it was evident that the iPhone had sustained minor structural damage. The phone was repaired and photo/video information was downloaded normally, and remaining information was photo documented.

4. DEVICE INVESTIGATION

The phone belonged to the only passenger on the accident flight. Text message activity during the flight were consistent with normal logistical and social messaging, including inflight photos. These inflight photos showed the passenger in the right seat, the pilot in the left seat, and both wearing headsets. Weather conditions in the photos were consistent with those observed in the passenger-taken video, as described in the following.

The group performed a detail description of the passenger-taken video of the accident approach and attempted landing. The video recording was 1-minute and 36.2 seconds duration and included sounds recorded in the cockpit. In the following description, times are elapsed time from the start of the recording, shown in [brackets] as hour:minute:second.tenths.

Figure 1 shows a reference image of the right side of the instrument panel of N8983W, taken on an unknown date by an unknown camera (this image was supplied by the IIC).

[1] Non-volatile memory is semiconductor memory that does not require external power for data retention.

Figure 1. Reference image of accident aircraft instrument panel.

[00:00:00.00] Video began, recorded from the right seat, facing forward with the airport (runway 18) ahead in the distance (about 2-3 miles ahead), as shown in figure 2. The visibility was greater than 10 miles, with haze and scattered, high cirrus clouds. The opening frame showed some aircraft instruments. Top row: propeller revolutions per minute (RPM) (at 1,650), exhaust gas temperature (at 1/8 deflection from the left), suction at 4.2 inches of Mercury. 2nd row: Fuel gauges: left tip just above 1/2 (1/2 marked as 10 gallons), left main at about 1/2 (1/2 marked as 10 gallons), right main at about 1/2 (1/2 marked as 10 gallons), right tip at about 7/8 to full (just above the highest marked number of 15 gallons). 3rd row: oil pressure (needle between yellow and green arc), oil temperature (about 1/4 deflected from left, in green arc), fuel pressure (about 5/8 deflection from left), and the amperage gauge (needle deflected about 3/8 from the left). There was a see-through sun visor extending from the top of the image to about 1/3 down the windscreen. There was a laminated piece of paper to the right of the windscreen (later identified in the video as an aircraft registration form). The audio was consistent with a piston engine operating at about 1,650 rpm.

Figure 2. Frame at [00:00:00.0].

[00:00:11.6] The camera angle remained substantially in the same position from [00:00:00.00] until this frame. By this frame, the VASI[2] on the left side of the runway was indicating white over white. The RPM was indicating 1,600. The audio of the engine remained constant (since [00:00:00.00]) and, starting with this frame, mostly unintelligible radio activity was recorded.

[00:00:12.7] Camera began to pan to the right, while audio recorded the same unchanged engine sound from the prior description. Audio also contained radio activity of a "Cherokee" aircraft calling a 1-mile final for an unintelligible runway; however, the call-sign of the hearable aircraft was not intelligible (note: there are at least three other airports in the vicinity of LXT using the same CTAF[3] frequency), nor was it possible to determine if the transmission originated from the accident aircraft or was received by the accident aircraft.

[2] VASI means visual approach slope indicator.
[3] CTAF means common traffic advisory frequency.

[00:00:18.6] Camera panning reached its maximum rightward extent (before panning left and forward), as shown in figure 3. This maximum right-rear angle provided a view of the right wing and outboard portion of the flap. Under the right wing, Lakewood Lakes were observed (these lakes are about 1.5 miles from runway 18 threshold). The right flap was deflected, consistent with the first notch of flaps. During the panning, the inward right fuel tank cap was on and aligned with the wing rib (i.e., wind stream). The right tip tank fuel tank cap was also observed in place. The visibility was greater than 10 miles, with less haze (than the forward-looking view), and a high broken cirrus layer (in the distance, the Kansas City skyline was identifiable) and the sun (observed during panning) was at the 2 o'clock horizontal position from the nose of the plane and about 30 degrees inclination above the horizon; the sun was reflecting off some lakes. The wind effect on the lakes was consistent with a light wind.

Figure 3. Frame at [00:00:18.6].

[00:00:19.7] As the camera panned back towards the nose of the plane, the audio recorded a clicking sound, similar to flap handle movement. Due to camera angle, it was not possible to discern if there was an associated aircraft pitch change (during the likely flap handle movement).

[00:00:22.3] By this time, the camera had panned back forward towards the runway. The aircraft was passing Woods Chapel Road, which placed the aircraft on a 1-mile final for runway 18. The VASI lights were white over white. The RPM was 1,550. The engine sound remained the same as previously described.

Between [00:00:22.3] and [00:00:37.9], the camera once again panned right and then back forward. When forward at [00:00:37.9], the aircraft was approaching Northeast Strother Road (also known as 83rd street), on a final for runway 18. Both VASI lights were still white over white. The engine sound remained the same as previously described. There was no other air traffic visible in the air or on the airport surface.

[00:00:39.3] RPM was about 1,475.

[00:00:40.7] The audio recorded the sound of a click, similar to flap handle movement. No associated aircraft pitch change was observed during the sound of the click.

Between [00:00:40.7] and [00:00:59.9] the camera panned right and then by [00:00:59.9] had panned back forward towards the runway. The VASIs were white over white. The audio recorded unintelligible talk, which may have been intracockpit or from the radio.

[00:01:08.9] The aircraft passed Northeast Strother Road (also known as 83rd street), which was about 500 feet from the runway 18 threshold. The closest VASI bar was white, the farther VASI bar left light was red, right light was white. There were no other aircraft visible on runway 18 or on the adjacent taxiways. The engine sound remained consistent from prior descriptions.

[00:01:10.0] This was the last frame where the near and distant VASI bars were visible; the near VASI bars where white, the far VASI bar appeared to have the left light red, and the right light amber.[4]

[00:01:12.1] The RPM was about 1,475. The aircraft lateral position was aligned with the extended centerline. The aircraft appeared to be either yawed or crabbed slightly left of the extended runway centerline. The aircraft descent rate was consistent with a normal approach.

[00:01:15.9] A sound of a click or audio static in the recording. No associated pitch change was visible.

[4] VASI lights are red or white; however, the group observed the color as amber (without attributing a reason for this color).

[00:01:16.5] The aircraft passed over the runway threshold at an estimated height of about 50 to 100 feet.

[00:01:21.9] The aircraft was close to the runway and in a pitch motion consistent with a flare to landing, as shown in figure 4. The aircraft was laterally over the runway centerline, still airborne, and about 2 centerline runway stripes (markings) before the runway aiming point markings. The engine sound remained consistent from prior descriptions. Right after this frame, the camera began to pan right.

Figure 4. Frame at [00:01:21.9].

[00:01:24.6] As the camera panned quickly right, a flock of birds were visible to the right of the runway, flying northwest (away from the runway). The camera then quickly panned back towards the runway.

[00:01:25.9] A sound of a click or audio static in the recording. No associated pitch change was visible.

[00:01:27.0] The camera had panned back forward. The aircraft was in the flare, laterally slightly right of centerline, and just over the start of the yellow taxiway line marking leading to taxiway Alpha-3. The RPM was about 1,300 (the entire gauge was not visible).

[00:01:28.6] The pitch angle increased. The aircraft was laterally right of centerline, with the aircraft nose pointed slightly left (relative to the centerline). The RPM was 1,300.

[00:01:29.4] Audio recorded the sound of a power increase followed immediately by a tire chirp, consistent with touchdown. The aircraft was laterally right of centerline, with the aircraft nose pointed slightly left (relative to the centerline). The pitch attitude decreased.

[00:01:29.9] The RPM increased to 1,900.

[00:01:30.6] The RPM increased to 2,200. About 4.5 inches of the right control tube shaft[5] was visible, consistent with an aft control input. The aircraft was airborne, slightly above the runway (within 50 feet), slight right wing down, and laterally right of the runway centerline, with a slight pitch up angle. The nose angle (yaw or crab) was slightly right compared to the runway centerline. Compared to the opening frame, the only engine gauge that changed (other than RPM), was the oil pressure, which was now indicating 3/4 from the left (half way into the green arc). The tachometer hours read 2883.6. The yoke was turned slightly left.

[00:01:32.0] The aircraft was banked right and the right bank angle appeared to increase. The yoke was turned slightly left and slightly more than in the prior description.

[00:01:32.5] The RPM was 2,300. About 4.5 inches of the right control tube shaft was visible, consistent with an aft control input. The yoke was turned rapidly about 70 degrees left.

[00:01:33.2] The RPM was 2,300. About 4.5 inches of the right control tube shaft was visible, consistent with an aft control input. The yoke was turned about 70 degrees left. Between [00:01:32.5] and [00:01:33.2], the rudder pedals were briefly visible on the right side, the passenger's feet were not on the rudder pedals, and the pedals did not appear to move.

[00:01:34.3] The camera panned up towards the sky (with no ground features visible). The RPM was 2,300.

[00:01:35.4] The camera panned down and right sufficient to see the ground. The aircraft nose was in a right bank with high pitch angle. By this time, the aircraft path was in a right hand turn and the aircraft longitudinal axis was west of the 180 degrees runway direction.

[5] The yokes (left and right) are connected to the control tube shaft, which extends into the hole in the instrument panel.

[00:01:36.2] The video ended with the aircraft nose up, in a right bank, climbing. The terminal building was visible forward of the plane. The background sound was consistent with the engine operating at high power.