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

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17 - Video Study Report

Specialist's Study Report
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A. EVENT

Location:	Scottsdale, Arizona
Date:	July 9, 2012
Aircraft:	Mooney M20L
Registration:	N137MP
Operator:	Private
NTSB Number:	WPR12FA297

B. GROUP - No Group

C. SUMMARY

On July 9, 2012, about 0930 mountain standard time, a Mooney M20L, N137MP, was substantially damaged when it experienced a hard landing followed by a loss of aircraft control at Scottsdale Airport, Scottsdale, Arizona. The flight instructor was seriously injured, and the pilot receiving instruction received minor injuries. The airplane was being operated by the pilot/owner under the provisions of 14 Code of Federal Regulations Part 91. A flight plan had not been filed for the local instructional flight, which had originated about 1 hour before the accident. Visual meteorological conditions prevailed at the time of the accident.

D. DETAILS OF INVESTIGATION

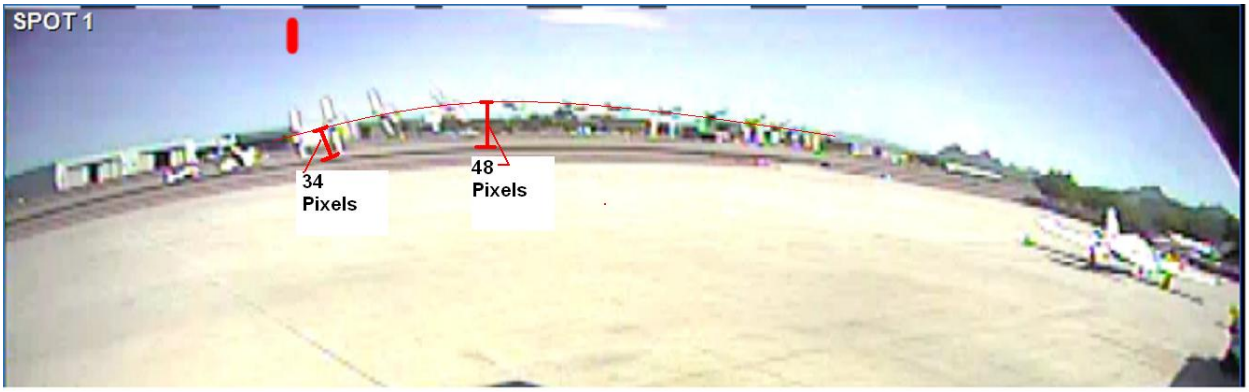
The purpose of this video study was to determine the maximum height the aircraft achieved during the event sequence. The study is based upon the still images described in the "Video Factual Report" from two video sources: (1) a FBO security video, and (2) a video recorded by the tower.

Height Study Methodology

The methodology used to determine the maximum height was to use the time lapse representation of the FBO security video as the primary source of the aircraft path. A curved line was superimposed over the images to establish an approximate

flight path. The known wingspan of the aircraft supplied by the investigator-in-charge (IIC) of 36 feet was combined with a photographic pixel measurement of the aircraft wingspan of 34 pixels from the time-lapse representation of the video. The flight path and pixel measurements are shown in figure 1.

Figure 1. FBO security video time-lapse representation with annotations of curved path and vertical measures.



Results

The pixel measurement and known wingspan create a baseline relationship of,

$$34 \text{ pixels} = (36/2) \text{ feet} \quad (1)$$

Or

$$1.89 \text{ pixels/feet} \quad (2)$$

The location of maximum height is shown in figure 1. This location was measured to be 48 pixels. Applying the relationship of equation 2,

$$48 \text{ pixels} / (1.89 \text{ pixels/feet}) = 25.4 \text{ feet}$$

Uncertainty

Major sources of uncertainty in the study were:

- The barrel distortion effects of the lens changing the relationship of equation 2 at different aircraft locations from the camera;
- The distortion and pixilation of the image making precise measurements difficult, including the wingspan and the location of the ground;
- The angle of bank is unknown causing less than 36 feet of wingspan to be exposed to the camera;

- The three dimensional nature of the flight path, which in fact curves towards the camera as shown in annotated figure 2. The annotated square in figure 2 highlights the aircraft location; the curved arrow line the directionality of the flight path; and the line within the rectangle the path of the aircraft;
- The uncertainties of barrel distortion and flight path make the flight path representation of figure 1 uncertain; further, the location of maximum height derived from the uncertain flight path may not be the proper location.

Figure 2. Tower video time-lapse representation annotated with approximate flight path.

Given these uncertainties, the relationship of equation 2 was varied from 1.67 to 2.07, and the maximum height measurement varied from 48 to 55 pixels. Using these varied parameters, the maximum height ranged from 24 feet to 37 feet.

Summary

The study suggests the maximum height was between 24 and 37 feet during the accident sequence.