

National Transportation Safety Board

Office of Research and Engineering

Washington, D.C. 20594

Performance Study

Specialist Report

Marie Moler

A. ACCIDENT

Location:	Ventura, California
Date:	June 1, 2017
Time:	1155 PDT
Airplane:	Cessna 180, N3683C
NTSB Number:	WPR17FA117

B. GROUP

No vehicle performance group was formed.

C. SUMMARY

On June 1, 2017, about 1155 Pacific daylight time, a Cessna 180 airplane, N3683C, experienced an inflight break up and was destroyed when it impacted terrain about 7 miles northeast of Ventura, California. The private pilot was fatally injured. The airplane was registered to and operated by the pilot under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91. Visual meteorological conditions (VMC) prevailed, and no flight plan had been filed. The local personal flight departed Santa Paula Airport (SZP), Santa Paula, California about 1110.

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D. PERFORMANCE STUDY

Radar data used in this study are from the ASR-9 (airport surveillance radar) at Point Mugu Naval Air Station (NTD) which sampled at a rate of once every 4.5 seconds. These radar data have approximately a 60 nautical mile (NM) range and an inherent uncertainty of ± 2 Azimuth Change Pulses (ACP) = $\pm (2 \text{ ACP}) \times (360^\circ / 4096 \text{ ACP}) = \pm 0.176^\circ$ in azimuth, and $\pm 1/16$ NM in range. The airplane wreckage was approximately 16 NM from the NTD radar. The airplane transponder was not responding to the radar interrogation signal. As a result, only primary radar data was available, and no altitude data was recorded. Times are reported in Pacific Daylight Time (PDT).

The radar path is shown in Figure 1 and Figure 2. The airplane's track from 11:52:42 to 11:55:31 was between 230° and 240° . After 11:55:31 the calculated track deviates considerably. The final radar points and the wreckage field are shown in Figure 3. The wreckage field is consistent with an in-flight breakup of the airplane and the radar points after 11:55:31 could be primary radar returns from individual pieces of the airplane after the in-flight breakup.

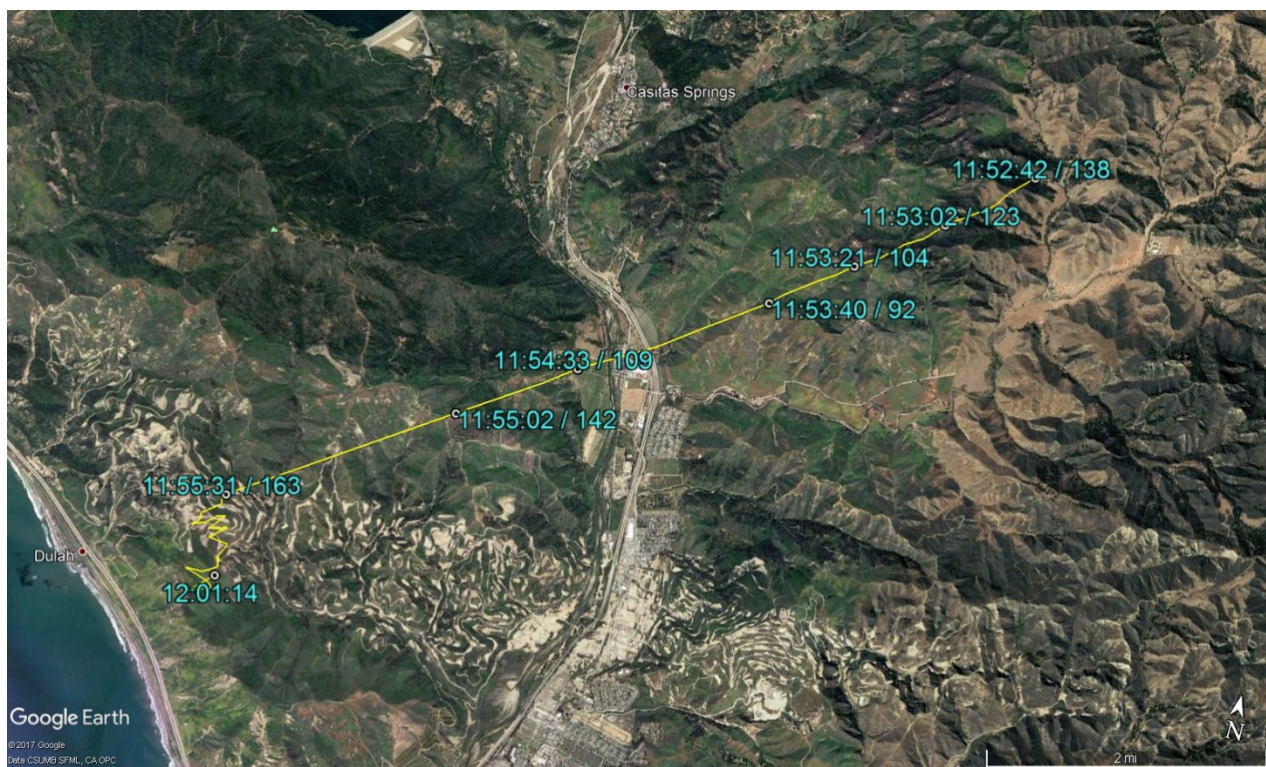


Figure 1. Aircraft flight path shown in yellow. Labels in blue indicate the time (PDT) and calculated groundspeed in knots.

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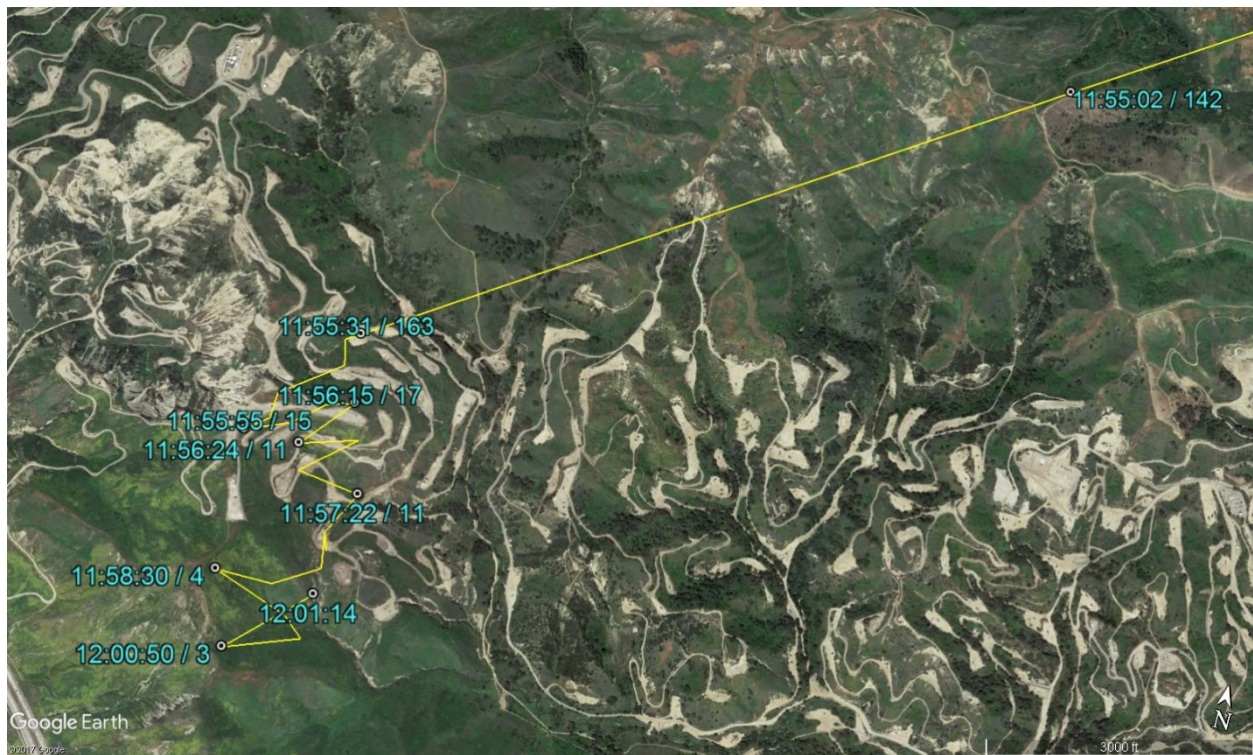


Figure 2. End of flight path. Last point is at 12:01:14. Radar points at the end of the flight path and wreckage locations.

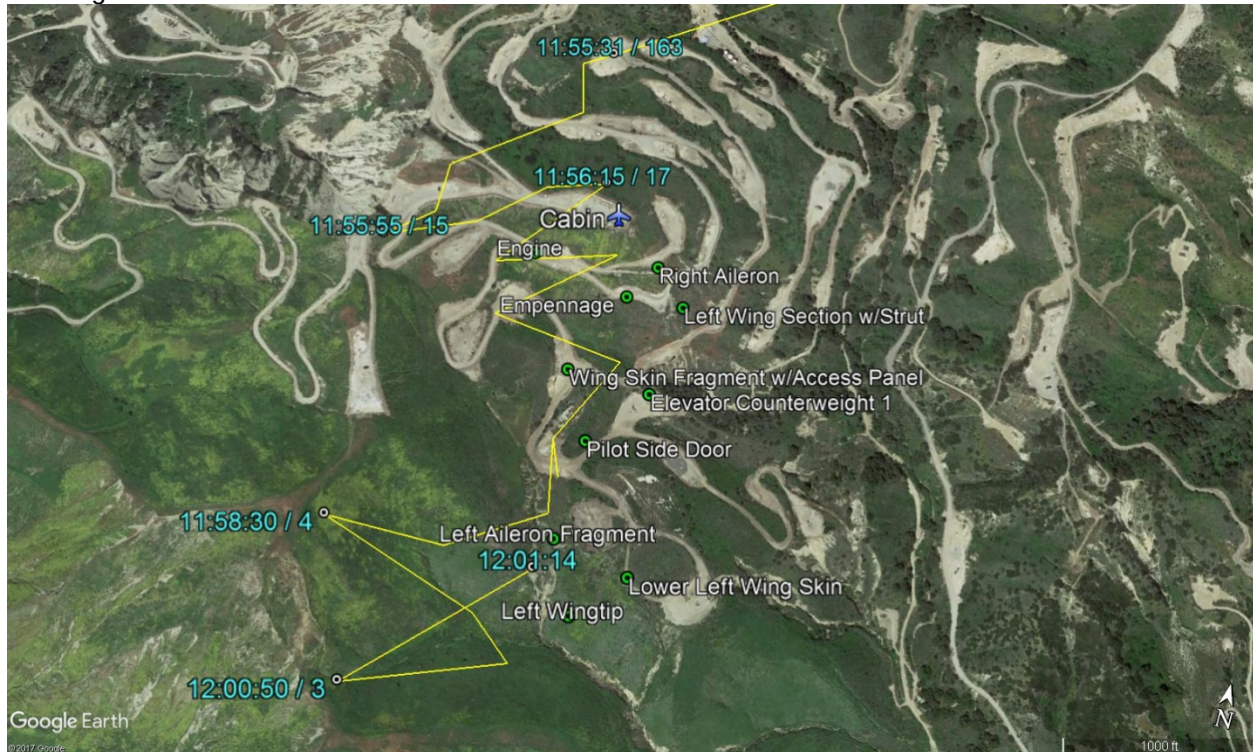


Figure 3. Radar points at the end of the flight path and wreckage locations.

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Weather Observations

Weather reported at Oxnard Airport (OXR), 10 NM from the wreckage, at 1151 PDT was 8 kts winds from 240°, clear skies, 68°F. Winds aloft were provided by the NTSB meteorology group and are shown in Table 1.

Table 1. Winds aloft.

		Wind	
Height, MSL (ft)	Temperature (°C)	Direction	Speed (kts)
269	17.9	233	5
297	17	233	5
381	16.5	232	6
549	15.9	231	6
803	15	228	7
1201	13.7	216	8
1719	13.1	210	8
2365	12.7	208	7
3057	13.2	346	2
3832	14.6	11	8
4728	14.6	16	11
5752	13.5	19	13
6914	11.6	22	14
8227	9.6	15	13

Aircraft Groundspeed and Airspeed Limitations

Groundspeed was calculated from the radar position data. Figure 4 shows the calculated groundspeed at each radar point, which are numbered sequentially. Points 1-20 show groundspeeds consistent with flight. After point 20 (11:55:31) the groundspeed drops significantly from 124 kts. Figure 5 shows the radar path of points 20-43. Points 20 and 21 were on the same heading as the first 19 points recorded by radar. However, points 22 through 43 do not describe a flight path and when paired with the wreckage shown in Figure 3 are likely primary radar returns from individual pieces of the broken-up airplane. This would also be consistent with the sudden drop in groundspeed as the individual pieces would no longer be propelled by the airplane's engine.

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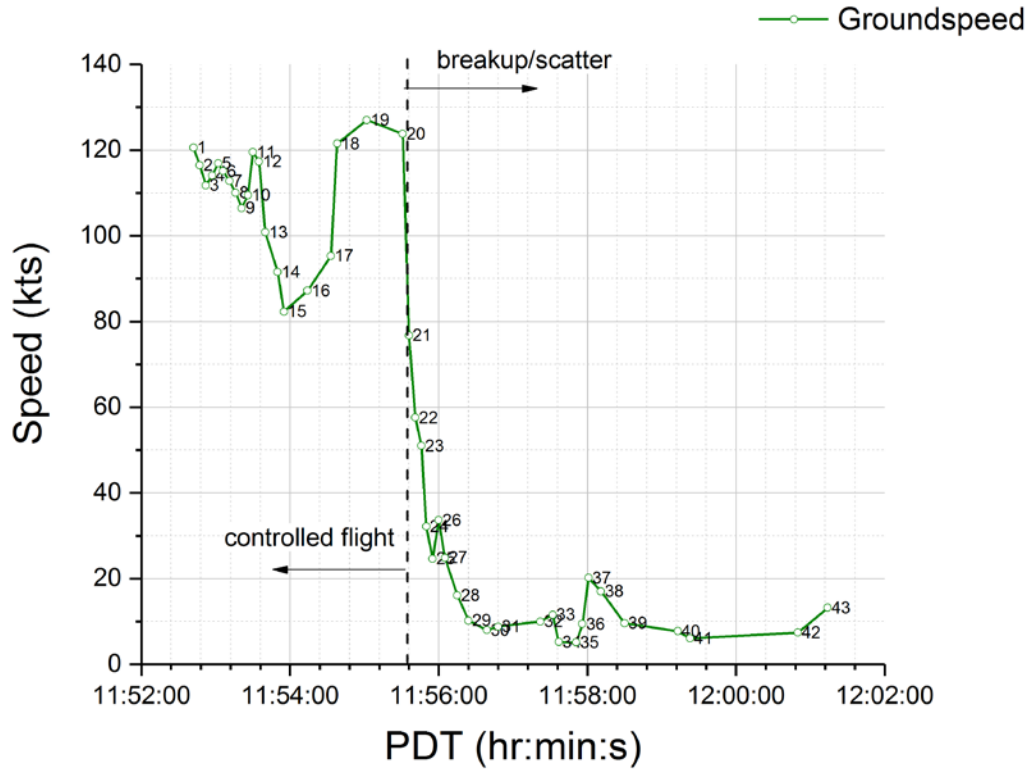


Figure 4. Calculated groundspeed from radar. Points are labeled 1-43.

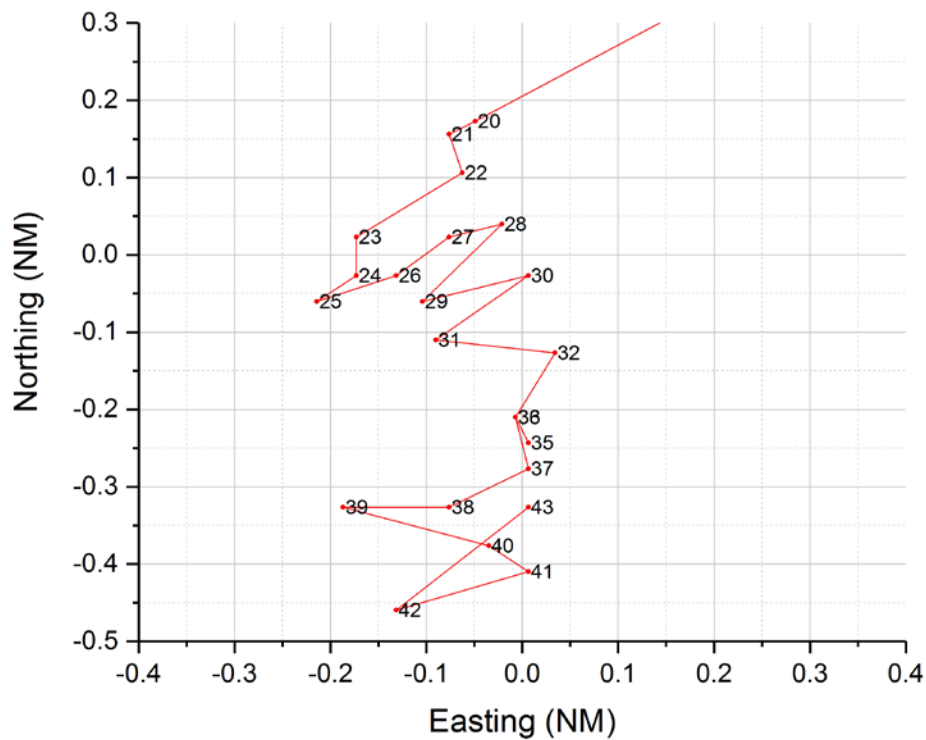


Figure 5. Radar path. Points 20-43 are shown.

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Starting at 11:53:55 the airplane gained groundspeed from 82 kts to 127 kts in 67 seconds. While the airspeed cannot be calculated with accuracy since the altitude is not known, the winds aloft data in Table 1 can be used to bracket possible airspeeds. The terrain the airplane was flying over had peak elevations between 1000 and 1500 ft. Winds over 1500 ft vary from 8 kts from 210° at 1700 ft to 13 kts from 15° above 8000 ft and are shown in Figure 6 in relation to the airplane on a heading of 235°. These winds translate into a possible 7 kts headwind at 1700 ft to a 12 kts tailwind at 8000 ft.

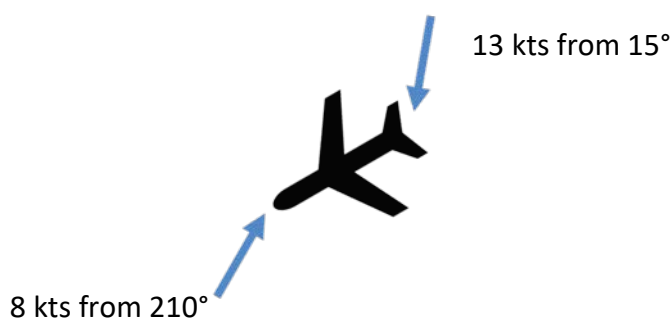


Figure 6. Wind direction and magnitude and airplane.

The airplane's maximum groundspeed was calculated to be 127 kts at about 11:55:02, 30 seconds before the sudden loss of groundspeed between points 20 and 21 (Figure 4). Using the possible winds, the true airspeed at this point could be between 115 kts and 134 kts. The calibrated airspeed at each of these points would be a function of altitude and true airspeed and were estimated to be 112 kts at 1700 ft and 121 kts at 8000 ft. However, the actual calibrated airspeed could be higher or lower depending on the combination of altitude and true airspeed.

Table 2 shows the airspeed limitations¹ for the airplane from the applicable Owner's Manual. The calibrated airspeeds calculated above are less than the maximum structural cruising speed, but higher than the airplane's reported maneuvering speed by between 6 kts and 15 kts. Any large control surface deflection would have put the airframe at risk for structural overstress.

Table 2. Airspeed limitations from Cessna 180 Owner's Manual [1].

	Indicated airspeed	
	mph (as reported)	kts
Never exceed speed	184	160
Maximum structural cruising speed (level flight or climb)	160	139
Maneuvering speed	122	106
Stall speed (flaps up, wings level)	60	52

¹ Airspeed limitations are in indicated airspeed which is within a few knots of calibrated airspeed.

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E. CONCLUSIONS

The primary radar data allowed for a calculation of the airplane's groundspeed. Between radar points 20 and 21 (11:55:31 and 11:55:36) there was a significant loss of groundspeed. Points 1 – 21 (11:52:42 to 11:55:36) were on a relatively constant track between 230° and 240°, but after point 21 the track does not reflect a coherent flight path. The loss in groundspeed and change in track along with the subsequent scattered radar returns and the widely dispersed wreckage field indicates that the airplane experienced an inflight breakup.

While the altitude of the airplane was not known, meaning that the airspeed was not able to be determined unambiguously from the groundspeed, possible airspeeds were calculated using winds aloft data. The airplane gained speed towards the end of the flight path and the calculated calibrated airspeeds were above the reported maximum maneuvering speed for the airplane, so any large control deflection would have put the airplane at risk of structural overstress.

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F. REFERENCES

1. Owner's Manual for Cessna 180. Cessna, 1953.