

National Transportation Safety Board
Office of Aviation Safety
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CEN21LA259

DCU DATA SUMMARY

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A. ACCIDENT

Location: Aspen, Colorado
Date: June 4, 2021
Time: 0954 Local Time
Airplane: Cessna 560XL, Serial Number 560-5016, N615RG

B. SUMMARY

On June 4, 2021, at 0954 mountain daylight time, a Cessna 560XL airplane, registration N615RG, was substantially damaged when it was involved in an accident at Aspen-Pitkin County Airport (ASE), Aspen, Colorado. The pilot, co-pilot, and 3 passengers were uninjured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The investigative group met at the Atlantic Aviation facility at the Aspen-Pitkin County Airport from September 14-16, 2021, to examine the airplane and download the data collection unit (DCU) from each engine. The files were submitted to Pratt & Whitney Canada (PWC), on September 16, 2021, for analysis. The following is a summary of the final report provided by PWC.

C. DETAILS OF THE DCU DATA EXTRACTION

1. Acronyms

ALT - Altitude
MN - Airspeed (Mach)
N1 - Low Pressure Rotor Speed (%)
N2 - High Pressure Rotor Speed (%)
TLA - Power Lever Angle as read at the RVDT
WOW - Weight On Wheels
EDS - Engine Diagnostic System
EEC - Engine Electronic Control
DCU - Data Collection Unit

2. DCU Details

The EDS consists of the EEC and the DCU. The DCU is essentially an electronic storage device. The EEC will write faults to the DCU when the pilot requests (presses the "Engine Data Scan" button) or when the EEC logic determines that fault criteria (faults or limitation exceedances) have been met. The data is captured as a trace recording. The trace recording consists of relevant system parameters (i.e. N1, N2, ambient conditions), which are captured for 200 seconds prior to the event and 20 seconds after the beginning of the event. The DCU has the capacity for 16 trace

recordings, thus for example trace No. 17 will overwrite trace No. 1. The EEC has an "engine running time" counting function, however there is no reference to calendar date or "actual" time. The only actual date that the DCU download contains is in the file name, and corresponds to the date the file was extracted from the DCU. The DCU contains the "engine running time" and a "flight" number. The "engine running time" is the time recorded from selection of the EEC power ON to power OFF, and not the time from engine start to engine stop and thus typically does not match the engine logbook times. The "flight" number is based on WOW OFF to WOW ON, to count 1 flight.

The data was obtained from the following files:

Engine No. 1 (LH): DB0035 (PW545A)*

Download file: DB0035_DCU_2021-09-14@15-10-25_PECCN9E991.gDC

*Note, data file title for RH engine shows DB0035, however data in file is for DB0034.

Engine No. 2 (RH): DB0026 (PW545A)

Download file: DB0026_DCU_2021-09-14@15-16-17_PECCN9E991.gDC

For DB0035 (LH), the data contained in the download covers a period from engine running time 4622.55/ flight 5323 to engine running time 4666.28/ flight 5341.

For DB0026 (RH), the data contained in the download covers a period from engine running time 4666.58/ flight 5334 to engine running time 4730.67/ flight 5366.

With no real time stamps, there is no way to synchronize the two sets of DCU data per the differing engine running time and the flight number references.

3. DCU Data Review

DB0026 (RH)

A majority of the recordings are associated with synchronization faults associated with either the ECC, airplane wiring and/or engine harness. These recordings occur over several flights, shortly after take-off. The last two trace recordings, engine running time of 4730.67 and flight 5366, are likely the "landing gear collapse" event. This is based on the data altitude and airplane Mach number, showing that the event occurs immediately after what appears to be an approach and landing, into an airport at approximately 7,600 ft (Aspen elevation 7,820 ft). There are two identical trace recordings that show the event, associated with Fault1_Bit12 (WOW cross check fault becoming latched) and Fault1_Bit13 (the thrust reverser fault becoming latched). The trace shows the following sequence of events:

- A. "Gear-Down" is "true" for the 3 minutes prior to the event (i.e. during the approach).
- B. As the airplane touches down, the WOW switch becomes "true", but only a few seconds later, the "Gear-Down" switch goes "false" (presumably because the right landing gear is no longer "down").
- C. Approximately 8 seconds later, the WOW then switches to "false" (presumably because the airplane is no longer applying any "load" on the landing gear).
- D. This triggers an "impending" thrust reverser fault (likely because the thrust reversers are ON, but the "Gear-Down" and WOW signals are "false"), and also an impending WOW cross-check fault (likely because the sister engine's WOW is still "true", and thus disagreeing with the signal from this engine).
- E. After the appropriate persistence time, the impending faults become "latched" (which triggers the trace recording).

DB0035 (LH)

There are no trace recordings associated with the accident event. However, there are several trace recordings from some earlier ground runs to high power, at approximately 1,300 ft elevation, starting at engine running time 4664.13/ flight 5341, where the WOW goes "false", in spite of the airplane remaining on the ground, per recorded altitude and Mach number.

The trace shows the following sequence of events:

- A. The WOW signal appears "intermittent" at first, which initially only triggers the impending WOW cross-check fault.
- B. Once the WOW signal is consistently "false" the WOW fault becomes "latched".

The WOW remains "false" for several trace recordings of that same ground run, up to engine running time of 4664.48. However, subsequent recordings in the fault/event log (i.e. for Long duration ITT operating temperature), engine running time of 4664.88 and greater, show further ground runs with the WOW now "true", and the cross-check fault now "cleared".

D. CONCLUSIONS

The data from DB0026, which was likely from the accident landing event, reveals that the "Gear-Down" signal goes "false" and then the noted WOW and thrust reverser faults were triggered as a result.

The data from DB0035 revealed that there were trace recordings for the accident landing event. The data from DB0035 does show that there appeared to be an "issue" with the WOW signal received by that engine's control system during a separate (earlier) ground run event (at a different airfield based on altitude data). The reason for this was not determined.

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