Aviation Investigation Final Report

Location:	Anchorage, Alaska	**Accident Number:**	ANC18LA072
Date & Time:	September 26, 2018, 19:07 Local	**Registration:**	N2571G
Aircraft:	Cessna 182	**Aircraft Damage:**	Substantial
Defining Event:	Turbulence encounter	**Injuries:**	2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

While the accident airplane was inbound for landing, the pilot received traffic and wake turbulence advisories from air traffic control for a crossing heavy Boeing C-17 on approach. The pilot acknowledged that he had the C-17 in sight and elected to execute a 360° turn. After completing the turn, he descended the airplane below the altitude of the C-17, ultimately crossing 3.66 miles behind and about 500 ft below the C-17's flightpath. Shortly after passing behind the C-17, the pilot reported entering an area of "severe turbulence," which he described as "one violent instantaneous motion." The airplane continued for a landing.

The pilot reported that, during a postflight inspection of the airplane, he discovered that both wings and the horizontal stabilizer exhibited signs of buckling. Further, the left wing had shifted aft, which reduced the gap between the trailing edge of the flap and the fuselage by 3/8 of an inch. A crack in the left wing spar was discovered during a subsequent, detailed postaccident examination. Federal Aviation Administration guidance indicates that pilots should fly at or above the preceding aircraft's flightpath, altering course as necessary, to avoid the area behind and below the generating aircraft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's failure to avoid wake turbulence from a crossing heavy airplane.

Findings

Personnel issues	Incorrect action selection - Pilot
Personnel issues	Decision making/judgment - Pilot
Environmental issues	Wake turbulence - Effect on operation

Factual Information

History of Flight

Enroute-descent	Turbulence encounter (Defining event)

On September 26, 2018, at 1907 Alaska daylight time, a Cessna 182 airplane, N2571G, sustained substantial damage during a wake turbulence encounter, about 3.5 miles northwest of Anchorage, Alaska. The airplane was registered to and operated by the pilot as a visual flight rules (VFR) cross-country flight under the provisions of Title 14 *Code of Federal Regulations* Part 91, when the accident occurred. The private pilot and passenger sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan had been filed.

The pilot stated that while southbound, enroute to Lake Hood Airstrip (LHD), he received a traffic advisory and wake turbulence cautionary advisory from air traffic control (ATC) regarding a Boeing C-17 (TREK324) that was on approach for runway 6 at Elmendorf Air Force Base (EDF). In an effort to avoid wake turbulence, the pilot executed a left 360° turn. Upon completion of the turn, he passed behind the C-17, and encountered "severe turbulence" which he described as "one violent instantaneous motion." After the event, the airplane continued for landing at LHD. During a postflight inspection of the airplane, he found both wings and the horizontal stabilizer exhibiting signs of buckling. Furthermore, it appeared the left wing had shifted aft, reducing the gap between the trailing edge of the flap and the fuselage by 3/8 of an inch. After removing an inspection panel and using a borescope to examine the left-wing spar, a crack was discovered.

A review of archived Federal Aviation Administration (FAA) radar and voice data revealed that the Cessna was VFR from Point MacKensie, inbound to LHD when issued a traffic and wake turbulence advisory. The Cessna pilot informed ATC that he had the C-17 in sight and executed a left 360° turn. Following the turn, the Cessna passed 3.66 miles behind, and 500 ft below, the C-17. On the inbound leg of the turn, the pilot descended from 900 ft GPS altitude to about 600 ft GPS altitude and which was below the altitude of the C-17, which was about 1,200ft GPS altitude.

Section 7 of FAA Advisory Circular AC90-23G, dated February 10, 2014 states in part: "Flight tests have shown that at higher altitude the vortices from large aircraft sink at a rate of several hundred feet per minute (fpm), slowing their descent and diminishing in strength with time and distance behind the wake-generating aircraft (see Figure 5, Descent of Vortices from Large Aircraft). Atmospheric turbulence hastens decay. Pilots should fly at or above the preceding aircraft's flightpath, altering course as necessary, to avoid the area behind and below the generating aircraft…The worst case atmospheric conditions are light winds, low atmospheric turbulence, and low stratification (stable atmosphere). In these atmospheric conditions, primarily in en route operations, vortices from Heavy and especially Super aircraft can descend more than 1,000 feet."

Section 8 of the above mentioned AC90-23G states in part: "Air traffic controllers apply procedures for separating instrument flight rules (IFR) aircraft that include required wake turbulence separations. However, if a pilot accepts a clearance to visually follow a preceding aircraft, the pilot accepts

responsibility for both separation and wake turbulence avoidance. The controllers will also provide a Wake Turbulence Cautionary Advisory to pilots of visual flight rules (VFR) aircraft, with whom they are in communication and on whom, in the controller's opinion, wake turbulence may have an adverse effect. This advisory includes the position, altitude and direction of flight of larger aircraft followed by the phrase "CAUTION–WAKE TURBULENCE." After issuing the caution for wake turbulence, the air traffic controllers generally do not provide additional information to the following aircraft." Also listed are two notes, one of which that states "Whether or not a warning or information has been given, the pilot is expected to adjust aircraft operations and flightpath as necessary to preclude wake encounters." The second note states "When any doubt exists about maintaining safe separation distances between aircraft to avoid wake turbulence, pilots should ask ATC for updates on separation distances and groundspeed." No such queries were made by the Cessna pilot. Furthermore, 8e. states that pilots should avoid flight below and behind a larger aircraft's flightpath and if a larger aircraft is observed above on the same track, airplane position should be adjusted, preferable upwind.

Pilot Information

Certificate:	Private	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	January 1, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 23, 2018
Flight Time:	2028.5 hours (Total, all aircraft), 280.2 hours (Total, this make and model), 2028.5 hours (Pilot In Command, all aircraft), 40.7 hours (Last 90 days, all aircraft), 18.1 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N2571G
Model/Series:	182	**Aircraft Category:**	Airplane
Year of Manufacture:	1959	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	51871
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	September 6, 2017 Annual	**Certified Max Gross Wt.:**	2348 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5324 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	C126 installed, not activated	**Engine Model/Series:**	O-470 SERIES
Registered Owner:		**Rated Power:**	230 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PANC,120 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:		**Direction from Accident Site:**	212°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	11°C / 5°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Big Lake, AK	**Type of Flight Plan Filed:**	None
Destination:	Anchorage, AK (LHD)	**Type of Clearance:**	VFR
Departure Time:		**Type of Airspace:**	FAR 93

Airport Information

Airport:	LAKE HOOD LHD	**Runway Surface Type:**	Dirt
Airport Elevation:	79 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	32	**IFR Approach:**	None
Runway Length/Width:	2200 ft / 75 ft	**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor	**Latitude, Longitude:**	61.235279,-149.943054(est)

Administrative Information

Investigator In Charge (IIC):	Williams, David
Additional Participating Persons:	
Original Publish Date:	June 8, 2020
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98385