Aviation Investigation Final Report

Location:	Maricopa, California	**Accident Number:**	WPR15FA195
Date & Time:	June 22, 2015, 09:30 Local	**Registration:**	N206PZ
Aircraft:	SHORT BROTHERS PLC S312 TUCANO T MK1	**Aircraft Damage:**	Destroyed
Defining Event:	Low altitude operation/event	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was performing airwork and was in contact with an air traffic controller. The pilot informed the controller that he would be performing airwork between 2,500 and 10,000 ft mean sea level (msl). The controller explained that he would probably lose radio contact and would not be able to provide flight following below 7,000 ft msl. About 1 hour later, the pilot advised the controller that he would be descending, then would climb to 9,000 ft msl and return to the airport, and the controller acknowledged. Subsequently, the controller made several attempts to contact the pilot, but no further response was received from him. Shortly thereafter, an airplane flying in the area of the accident site reported to air traffic control that a small fire was located in a river bed. Local authorities responded to the fire and confirmed that it was the accident site.

A review of Federal Aviation Administration radar data showed the airplane performing multiple turns and rapidly changing altitude and airspeed while performing the airwork. At one point, the airplane descended to less than 100 ft above a mountain ridgeline. The last radar targets showed the airplane heading eastbound about 1,600 ft agl while approaching the area of the accident site. Two witnesses located near the accident site stated that, as the airplane flew overhead, they noted no engine anomalies.

Postaccident examination of the wreckage did not reveal any preimpact malfunctions that would have precluded normal operation. Wreckage and impact signatures were consistent with a high-energy high-angle impact with terrain. It is likely that as the pilot continued to perform low level airwork, he did not properly gauge the airplane's distance from terrain and failed to control the airplane in time to avoid impacting terrain.

The pilot's high cholesterol and the medications he was using to treat it likely did not cause any acute symptoms. Limited samples were available for toxicology testing; therefore, it could not be determined whether the ethanol detected in the pilot's muscle tissue was due to ingestion or postmortem production nor whether impairment due to ethanol contributed to the accident. The testing also detected butalbital

and codeine, both of which are impairing. The butalbital was within the therapeutic level, indicating that he was likely impaired by it. The presence of both codeine and butalbital indicates that the pilot had likely recently used a combination product that contained at least these two medications. Therefore, it is likely that the pilot's mental and/or physical abilities required for the duration of the high workload flight performance was impaired by the combined effects of butalbital and codeine and that this impairment contributed to the accident.

Probable Cause and Findings

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

The pilot's failure to maintain clearance from terrain during low-level airwork, which resulted in uncontrolled collision with terrain. Contributing to the accident was the pilot's impairment from the combined effects of butalbital and codeine.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Altitude - Not attained/maintained
Personnel issues	Prescription medication - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Low altitude operation/event (Defining event)
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT)

On June 22, 2015, about 0930 Pacific daylight time, an experimental, exhibition-category Short Brothers PLC S312 Tucano T MK 1 airplane, N206PZ, impacted terrain about 16 miles south of Maricopa, California. The private pilot was fatally injured, and the airplane was destroyed. The airplane was registered to Tucano Flyer LLC and was being operated as a 14 Code of Federal Regulations Part 91 personal flight. Visual meteorological conditions existed near the accident site about the time of the accident, and a flight plan had not been filed. The flight originated from Camarillo Airport (CMA), Camarillo, California, at 0810.

According to the air traffic control (ATC) communications, the pilot was in contact with the Southern California Air Route Traffic Control Center and was receiving advisories while performing airwork. At 0823, the pilot informed the controller that he would be performing airwork between 2,500 and 10,000 ft mean sea level (msl). The controller explained that he would probably lose radio contact and would not be able to provide flight following below 7,000 ft msl. The pilot replied that he understood and would be performing airwork for about 1 hour before returning to CMA. The controller continued to monitor the airplane during the flight. At 0924, the pilot advised the controller that he would be descending and that he may lose him for a few minutes. He added that he would then climb to 9,000 ft msl and return to CMA, and the controller acknowledged. Subsequently, the controller made several attempts to contact the pilot, but no further response was received from him.

Review of radar data provided by the Federal Aviation Administration (FAA) revealed a primary target, consistent with the accident airplane, performing multiple turns and rapidly changing altitude and airspeed. At 0845, the airplane was traveling on an eastbound heading at 3,400 ft above ground level (agl), and during the next 2 minutes, it climbed over rising terrain. Over the next 8 minutes, the airplane's speed varied and reached 325 knots and continued to make multiple turns and rapid changes in altitude and descended to within less than 100 ft above a mountain ridgeline. The airplane then continued to the northwest over lower terrain before turning southbound. During the next 18 minutes, the airplane performed multiple turns at altitudes between 2,000 and 3,000 ft agl. During the last 6 minutes of the flight, the airplane performed a 360° descending right turn near a residence at the lower entrance of Quatal Canyon at an altitude of about 3,600 ft, descending to 1,600 ft agl. The airplane headed westbound for 3 minutes and then returned to the lower entrance of Quatal Canyon. At 0924, the last radar targets showed the airplane heading eastbound above the canyon's dry river bed about 1,600 ft agl.

At 0925 radar contact was lost. Shortly after, an airplane in the area of the accident site reported to ATC that a small fire was located in a river bed. Local authorities responded to the fire and confirmed that it was the accident site.

A witness, located about 1 1/2 miles west of the accident site, reported seeing the airplane circle near her house about 500 to 800 ft agl. She stated that the engine sound was "loud and consistent." She added that she last saw the airplane fly eastbound, parallel to Quatal Canyon Road, and that shortly after saw dust and smoke rise high above a nearby mountain.

Another witness, located about 2 3/4 miles west-southwest of the accident site, reported seeing the airplane fly directly over his house in straight-and-level flight between 500 and 750 ft agl. He added that the engine sounded different than other airplanes that fly in the area but that it did not sound like anything was wrong. The airplane continued to fly straight and level in an easterly direction toward Quatal Canyon Road.

Pilot Information

Certificate:	Private	**Age:**	61,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	5-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	June 19, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 31, 2013
Flight Time:	891.2 hours (Total, all aircraft), 76.9 hours (Total, this make and model)		

The pilot held a private pilot certificate with airplane single-engine land and rotorcraft ratings. He held an FAA second-class airman medical certificate, issued on June 19, 2015, with the limitation that he must wear corrective lenses.

According to the pilot's logbooks, he had accumulated 891.2 total flight hours in fixed wing aircraft and rotorcraft. He had accumulated 76.9 hours in the accident airplane make and model, 27.8 hours of which were in the previous 6 months. The pilot successfully completed his most recent flight review on January 14, 2015, in the accident airplane.

Aircraft and Owner/Operator Information

Aircraft Make:	SHORT BROTHERS PLC	**Registration:**	N206PZ
Model/Series:	S312 TUCANO T MK1 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1989	**Amateur Built:**	
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	T31
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	October 20, 2014 Annual	**Certified Max Gross Wt.:**	6613 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:	3358 Hrs as of last inspection	**Engine Manufacturer:**	GARRETT
ELT:	Installed, not activated	**Engine Model/Series:**	TPE331-12B
Registered Owner:		**Rated Power:**	0 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The two-seat, low-wing airplane, serial number (S/N) T31, was manufactured in 1989. It was powered by a Honeywell (Garrett) TPE331-12B-703A engine, S/N P-65617, rated at 1,100 shaft horsepower at a propeller speed of 2,000 rpm. The airplane was equipped with a Hartzell propeller, model HC-D4N-5C. Review of the maintenance records showed that an annual inspection was completed on October 20, 2014. The airplane was produced to meet stringent military requirements and was designed for high-g landing loads; advanced fatigue testing; and spin tests, including inverted spins, at all altitude.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KBFL,489 ft msl	**Distance from Accident Site:**	41 Nautical Miles
Observation Time:	15:54 Local	**Direction from Accident Site:**	25°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.01 inches Hg	**Temperature/Dew Point:**	24°C / 3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	CAMARILLO, CA (CMA)	**Type of Flight Plan Filed:**	None
Destination:	CAMARILLO, CA (CMA)	**Type of Clearance:**	VFR flight following
Departure Time:	08:10 Local	**Type of Airspace:**	Class E;Class G

Data recorded by the Meadows Field Airport, Bakersfield, California, automated weather observation station, located about 41 miles northeast of the accident site, included winds from 180° at 4 knots, visibility clear, temperature 24°C, dew point 3°C, and an altimeter setting of 30.01 inches of mercury.

Airport Information

Airport:	CAMARILLO CMA	**Runway Surface Type:**	
Airport Elevation:	77 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	34.821109,-119.407775

Examination of the accident site revealed that the airplane was destroyed by high-impact forces and postimpact fire, which was observed along the debris path; the fire burned about 1 acre of land surrounding the accident site. The wreckage, including all major structural airplane components and primary flight controls, was located in a dry creek bed and was contained within a debris path that was about 641 ft long and 355 ft wide.

The first identified point of contact (FIPC) was a trough of disturbed ground about 2 ft wide, 20 ft long, and 1 ft deep, consistent with an airplane attitude of 45-degrees nose down and right wing downward about 90-degrees from level flight. The wreckage debris path was oriented along a magnetic heading of about 360° from the FIPC to the main wreckage. A green light emitting diode navigation light was found near the FIPC. At the end of the trough was a crater, about 11 ft in diameter and 5 ft deep. Two separated propeller blades, a landing gear strut with the wheel attached, and distorted pieces of sheet metal were found in and near the crater. The dirt in the crater was discolored and smelled of fuel. A third propeller blade, the wing and fuselage sections, and the engine bull gear assembly were found between the crater and the main wreckage.

The main wreckage was located about 180 ft from the FIPC and included the empennage, aft fuselage, firewall, and engine, and the wreckage was twisted and distorted. Wire bundles and cabin instrumentation were found with the main wreckage, and all of it was burned and crushed. The fourth propeller blade was located about 80 ft past the main wreckage. All four propeller blades revealed S-type bending, chordwise scoring, and leading-edge gouging near the tips.

The attached parachute and canopy were found in several sections past the main wreckage and in line with the center of the debris field. A single-point refueling port was found 641 ft from the FIPC and was the last piece of wreckage found along the debris path.

The aft fuselage and tail section structure were partially intact, and cable control continuity was confirmed to the midsection of the fuselage. The aileron control cables were found with the main wreckage. All primary flight controls were found in the debris field.

The engine exhibited thermal discoloration and impact damage. The first stage of the compressor section was visible, and all of the blades exhibited rotational signatures. The third stage was also visible from the damaged housing and exhibited rotational signatures.

Follow-up Examination

The wreckage was relocated to a secure facility where a layout examination took place. The examination of the wreckage revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation. The wing sections exhibited leading edge crush damage. The main spar was found in several sections with bending near the midsection. Each of the ailerons were found in two 3-ft sections. The wing flaps exhibited signatures suggesting that they were in the retracted position during impact. Both elevators and horizontal stabilizers were impact damaged and crushed. The trim actuator shaft had separated midspan, and 45° shear lips were observed on the separation surfaces. The trim actuator shaft was measured from the shaft bolt to the rubber seal and was 3.845 inches long, which equated to about a 0.5° (near neutral) pitch trim position. The rudder and vertical stabilizer sustained impact damage and remained attached via the rudder control cables. The vertical stabilizer and aft

fuselage remained secure at all the attachment points.

The propeller assembly, which had separated from the engine during the accident sequence, was impact damaged. The cylinder, piston, feathering spring, and hub were found separated into numerous sections. Hub sections were removed from two of the four blade shanks. The blades revealed leading edge gouging and chordwise scoring from the shank areas to the tips. Two of the blades were bent rearward from the midsection to the tip and had a decreased pitch twist from the midsection to the tip. Another blade had a slight rearward bend, and the last blade was bent forward from the midsection to the tip. For further information, refer to the Hartzell Propeller Teardown Report in the public docket for this accident.

The engine was found separated in three major sections: the bull gear, second-stage compressor housing and impeller, and the turbine stator outer vane support housing. Other loose engine parts were found in the debris field. The engine exhibited damage signatures consistent with the engine operating during impact. For further information, refer to the Honeywell Aerospace Engine Wreckage Examination Notes in the public docket for this accident.

The cabin instruments had separated from the instrument panel and were impact damaged. The rpm gauge face had separated from the instrument housing and was bent; white paint transfer marks were visible near the '100' displayed on the face. The torque gauge face had white paint transfer marks between the '80' and '100' displayed on the face.

Medical and Pathological Information

The pilot was ejected from the airplane during the accident sequence. The Ventura County Coroner's Office did not conduct an autopsy on the pilot because of the condition of the body. The pilot had reported high cholesterol and the use of the prescription drugs rosuvastatin and fenofibrate to treat it to the FAA.

The FAA's Bioaeronautical Sciences Research Laboratory performed toxicology testing of the pilot's muscle tissue. The testing detected 0.046 gm/dl of ethanol, 2.033 ug/g of butalbital (the therapeutic range is between 1 and 10 ug/ml), and 0.033 ug/g of codeine.

Ethanol may be detected due to ingestion, or it may also be produced by postmortem microbial activity in the body. Ethanol significantly impairs pilots' performance even at low levels. FAA regulations prohibit any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more ethanol in the blood.

Butalbital and codeine are frequently combined with acetaminophen, aspirin, and/or caffeine in prescription medications to treat pain or headaches. The combination of the two drugs carries the following warning: "Butalbital, Acetaminophen, Caffeine, and Codeine Phosphate Capsules may impair mental and/or physical abilities required for the performance of potentially hazardous tasks such as driving a car or operating machinery. Such tasks should be avoided while taking this combination product. Alcohol and other CNS [central nervous system] depressants may produce an additive CNS depression when taken with this combination product and should be avoided."

Administrative Information

Investigator In Charge (IIC):	Swick, Andrew
Additional Participating Persons:	Sean T Kaveney; FAA FSDO; Van Nuys, CA Marlin J Kruse; Honeywell; Phoenix, AZ Les Doud; Hartzell Propeller; Piqua, OH Thomas Rowe; RS Warbirds; Phoenix, AZ
Original Publish Date:	July 20, 2017
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=91413