Aviation Investigation Final Report

Location:	Englewood, Colorado	**Accident Number:**	DEN01FA075
Date & Time:	March 26, 2001, 07:19 Local	**Registration:**	N300WC
Aircraft:	Socata TBM 700	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

The airplane was fueled to capacity and placed in a heated hangar about one hour before departure. The instrument rated pilot obtained a weather briefing, filed an IFR flight plan, and obtained an IFR clearance. Low ceiling, reduced visibility, and ice fog prevented control tower personnel from observing the takeoff. Radar (NTAP) and on-board GPS data indicated the airplane began drifting to the left of runway centerline almost immediately after takeoff. The airplane made a climbing left turn, achieving a maximum altitude of 7,072 feet and completing 217 degrees of turn, before beginning a descending left turn. The airplane impacted terrain on airport property. Autopsy/toxicology protocols were unremarkable. There was no evidence of preimpact failure/malfunction of the airframe, powerplant, propeller, or flight controls. The autopilot and servos, pitot-static system, and flight instruments were tested and all functioned satisfactorily. The pilot's shoulder harness was found attached to the seatbelt, but the male end of the seatbelt buckle was broken.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's spatial disorientation, which led to his failure to maintain aircraft control. A contributing factor was the pilot's decision to intentionally fly into known adverse weather that consisted of low ceilings, obscuration, and ice fog.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (F) WEATHER CONDITION - LOW CEILING
2. (F) WEATHER CONDITION - OBSCURATION
3. (F) WEATHER CONDITION - ICE FOG
4. (F) FLIGHT INTO KNOWN ADVERSE WEATHER - INTENTIONAL - PILOT IN COMMAND
5. (C) SPATIAL DISORIENTATION - PILOT IN COMMAND
6. (C) AIRCRAFT CONTROL - NOT OBTAINED/MAINTAINED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
7. TERRAIN CONDITION - OPEN FIELD
8. MISC EQPT/FURNISHINGS,SEAT BELT - FAILURE,TOTAL

Factual Information

HISTORY OF FLIGHT

On March 26, 2001, at 0719 mountain standard time, a Socata TBM 700, N300WC, owned and operated by Technical Leasing, Inc., of Cincinnati, Ohio, was destroyed when it impacted terrain following a loss of control on takeoff at Centennial Airport, Englewood, Colorado. The instrument rated private pilot, the sole occupant aboard, was fatally injured. Instrument meteorological conditions prevailed, and an IFR (instrument flight rules) flight plan had been filed for the business flight being conducted under Title 14 CFR (Code of Federal Regulations) Part 91. The flight originated from Centennial Airport at 0718.

The pilot landed at Centennial Airport on the afternoon before the accident (data downloaded from the Garmin GPSMAP 295 that was on board the airplane indicates the arrival was some time after 1341). He instructed Jet Center officials to refuel the airplane to capacity. This was done at 1430 and required 136 gallons of Jet-A fuel. The pilot was met by friends, who took him to dinner and a movie that evening. They said the pilot retired approximately 2300.

According to these friends, the pilot did not eat breakfast the next morning. He telephoned the FBO about 0515 and asked that the airplane be brought inside a hanger and preheated (it had been parked outdoors on the ramp overnight). This was done and the airplane was in the heated hangar approximately 45 to 60 minutes. According to FAA documents, the pilot telephoned the Denver Automated Flight Service Station (AFSS) at 0608 and obtained a standard weather briefing. He then filed an IFR flight plan to Santa Monica Airport in California. The pilot's host said he dropped the pilot off at the airport approximately 0615. He said it was snowing at the time, and visibility was poor. Jet Center linemen said the pilot did not perform a preflight inspection, but boarded the airplane, started the engine, and did a 20 minute engine run at "high rpm" on the ramp.

At 0647, the pilot received his IFR clearance, and at 0708 he was cleared to taxi. Because the wind was calm, the pilot was given his choice of runways. "Which one would you recommend," the pilot asked. "One seven will take me down to Blue Mesa, won't it?" When he was told it would, the pilot taxied to runway 17L and advised the control tower that he had ATIS (Automatic Terminal Information Service) Zulu and would need to do an engine runup. At 0712, he asked if there were any pilot reports, and was told that one pilot reported encountering no ice during climbout and that the cloud tops were at 7,200 feet. At 0717, the pilot was cleared for takeoff, but reduced visibility prevented control tower personnel from observing the airplane.

At 0719:27, the pilot said, "Whiskey Charlie, lookin' for higher." (According to the tower controller's statement, he had been watching the BRITE radar for the airplane's data tag to

appear and when the pilot asked for a higher altitude, he observed a primary target, then a limited data tag, northbound and east of runway 17L). The controller asked the pilot for his heading, and he replied, "Whiskey Charlie, apologi . . ." He was then instructed to fly a heading of 170 degrees and to contact departure control. The pilot never responded. When it was determined that radio and radar contact had been lost with the airplane, the runway was closed and departures were temporarily suspended. The tower controller told the radar controller, "[Visibility is a] quarter mile. We cannot see the runway . . .we heard a noise . . . we heard the airplane." Another controller said she "heard a noise and felt a movement or 'thud' in the tower." At 0736, an airport maintenance vehicle reported he was investigating a report of smoke south of the airport. At 0740, the airport maintenance vehicle confirmed the airplane was down approximately 1/4-mile south of runways 10-28.

PERSONNEL INFORMATION

The pilot, age 49, held a private pilot certificate with airplane single-engine land and instrument ratings. He also held a first class airman medical certificate, dated March 11, 1999, with no limitations or restrictions. His logbook, which was recovered from the wreckage, contained entries from August 23, 1995, (when the pilot took his first instructional flight), to January 21, 2001 (the last recorded entry). According to the logbook, the pilot received his private pilot license and instrument rating on August 14, 1998. The airplane's flight time logbook was also recovered from the wreckage. Combining those entries made after January 21, 2001, with the entries made in the pilot's logbook, the following flight times were derived:

Total time: 1,024 hrs.
Airplane single-engine, land: 1,019.5 hrs.
Pilot-in-command: 719.4 hrs.
Instruction received: 412.3 hrs.
Cross-country: 987.8 hrs.
Night: 85.7 hrs.
Actual instruments: 94.3 hrs.
Simulated instruments: 9.7 hrs.
By make/model: Cessna 150: 2.8 hrs.
Cessna 172: 8.5 hrs.
Piper PA-28-161: 3.2 hrs.
Piper PA-28R-201RT: 6.3 hrs.
Piper PA-46-350: 488.4 hrs.
Beech A36TC: 376.7 hrs.
Socata TBM-700: 136.3 hrs.

The pilot's logbook also contained the following instrument proficiency checks, biennial flight reviews, and pilot proficiency endorsements:

November 7, 1998*#
(given by an individual flight instructor)

November 22, 1998#
Recurrent Training Center, Inc.

June 26, 1999+
(given by an individual flight instructor)

March 20, 2000*#
(given by an individual flight instructor)

August 25, 2000#+
SIMCOM Training Center

* Biennial Flight Review, BFR [FAR 61.56(a)(1)(2)].
# Instrument proficiency check (FAR 61.57).
+ Pilot Proficiency Award Program (AC61-91H).

AIRCRAFT INFORMATION

N300WC (s/n 82), a model TBM-700, was manufactured by Socata Aircraft Company and was given an FAA standard airworthiness certificate, normal category, on February 15, 1993. It was equipped with a Pratt & Whitney PT6A-64 engine (s/n PS 111074), rated at 700 shaft horsepower, and a Hartzell 4-blade composite, constant speed, full feathering propeller (m/n HC-E4N-3).

According to the aircraft maintenance records, the last annual inspection was completed on February 9, 2001, at a Hobbs meter time (airframe and propeller) of 5,098.7 hours (engine total time 4,885.7 hours). The last static system, automatic pressure altitude reporting and transponder system checks were made on October 20, 2000, at a Hobbs meter time of 4,978.3 hours. At the accident site, the Hobbs meter read 5,139.0 hours.

METEOROLOGICAL INFORMATION

METAR (Aviation Routine Weather Report) observations recorded at Centennial Airport before and after the accident were as follows:

0653: Wind, calm; visibility, 1/4 statute mile; freezing fog; vertical visibility, 100 feet; temperature, -1 degree C.; dew point, -1 degree C.; altimeter setting, 30.02 in.; sea level pressure, 1019.5 mb.

0730: Wind, calm; visibility, 1/8 statute mile; freezing fog; vertical visibility, 100 feet; temperature, -1 degree C.; dew point, -1 degree C.; altimeter setting, 30.02 in.

0753: Wind, calm; visibility, 1/4 statute mile; freezing fog; vertical visibility, 100 feet; temperature, -1 degree C.; dew point, -1 degree C.; altimeter setting, 30.03 in.; sea level pressure, 1019.7 mb.

AERODROME INFORMATION

Centennial Airport (APA) is situated at an elevation of 5,883 feet msl (above mean sea level). The departure runway, 17L, is of asphalt construction, 10,002 feet long and 100 feet wide, and grooved. The runway is equipped with medium intensity runway lights (MIRL). They were operating at the time of takeoff. The airport also has a control tower, Automatic Terminal Information Service (ATIS), and an Automated Flight Service Station (AFSS) that is operational 24 hours a day. At the time of departure, the rotating beacon was operating. The airport has several instrument approaches, including GPS (Global Positioning System), ILS (Instrument Landing System), NDB (Non-Directional Beacon), and VOR/DME RNAV (Very high frequency Omnidirectional Radio range/Distance Measuring Equipment aRea NAVigation). All of the instrument approaches were operational at the time of the accident. IFR arrivals and departures were being handled by Denver TRACON (terminal radar approach control).

WRECKAGE AND IMPACT INFORMATION

The on-scene investigation commenced and concluded on March 26, 2001.

The airplane first struck a newly planted pine tree (N39 degrees, 33.992', W104 degrees, 50.486'). Red lens fragments were found embedded in the bark approximately 5 feet above the ground. There was a faint ground scar from the tree leading up to the top of an embankment. There, 14 slashes were noted on the ground (N39 degrees, 33.993", W104 degrees, 50.476"). The distance between the first slash mark and second slash mark was 2 feet, 3 inches. Just beyond these marks was a small crater, aligned on a magnetic heading of 109 degrees, containing pieces identified as portions of the left wing tip fairing and the socket for a navigation light. At a point 6 feet beyond this crater was a large ground scar, containing a propeller blade tip (N39 degrees, 34.008', W104 degrees, 50.424'). This ground scar curved to the left from a magnetic heading of 082 degrees to 047 degrees. Indications of a flash fire encompassed approximately the last third of the first ground scar and extended through the first half of the second ground scar. Forty-eight feet from the beginning of this second ground scar was the right wing. At the 210 foot mark, where the ground scar curved to a magnetic heading of 055 degrees, was the right aileron. The vertical stabilizer (N39 degrees, 34.019', W104 degrees, 50.400') and right main landing gear (N39 degrees, 34.023', W104 degrees, 50.397') were found near the end of the fire area. The ground scar then curved to a magnetic heading of 047 degrees and terminated at a large dirt embankment at the 489 foot mark. The top of the embankment was at a GPS (Global Positioning System) elevation of 5,817 feet. Ninety feet to the left was the left horizontal stabilizer and empennage (N39 degrees, 34.042', W104 degrees, 50.367', elevation of 5,654 feet). The empennage had separated at the aft pressure bulkhead splice. At the 717 foot mark, or 228 feet past the dirt embankment, was the

left wing (N39 degrees, 34.049', W104 degrees, 50.353'). At the 1,059 foot mark, or 342 feet past the embankment, was the fuselage (N39 degrees, 34.052', W104 degrees, 50.315'). It lay on its left side on a magnetic heading of 215 degrees and at an elevation of 5,654 feet.

The engine remained attached to the nose section, but the propeller assembly and hub separated from the engine and were found a short distance away (N39 degrees, 34.033', W104 degrees, 50.338'). All four propeller blades were curled aft midspan, and bore leading edge gouges and 90 degree chordwise scratches. The nose and main landing gears were against their uplocks, and the turnbuckle was turned in the retract position. The flaps were extended 10 degrees, which according to Socata Aircraft, is the takeoff setting.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy (#AP01-75) and a toxicological screen were performed on the pilot at the request of the Arapahoe County Coroner. A toxicological screen (#200100077001) was also performed by FAA's Civil Aeromedical Institute (CAMI). Both tests yielded negative findings for carbon monoxide, alcohol, and drugs.

TESTS AND RESEARCH

Centennial Airport's lighting systems and radio navigational facilities were functionally checked shortly after the accident. They functioned satisfactorily.

Examination of the airframe, engine, and avionics was conducted at the facilities of Beegles Aircraft Service, Inc., Greeley, Colorado, on March 29 and May 8 and 9, 2001. All major airframe components were accounted for and documented.

Electrical power was applied to the airplane and all systems came on line. There was no electrical fire and, other than the aileron trim and flaps circuit breakers that were already open, no additional circuit breakers opened. The ESS BUS TIE was guarded in the NORMAL position. On the overhead panel, the voltmeter registered 26 volts (direct current), and the amp meter registered a slight discharge. The left and right landing and taxi, navigation, and strobe exterior lights were off. The turn coordinator, HSI/RMI, and ADI 2 switches were off. The radar altimeter switch was on. The battery, main generator, and starter switches were on, and the ignition switch was in the AUTO position. On the instrument panel, the annunciator lights on the advisory panel tested normally. The fuel gauges registered empty, and the fuel pressure gauge needle was against the high end stop. The auxiliary boost pump and sequencer control were in the AUTO positions. Examination of the environmental control panel disclosed the bleed valve was ON/LOW, and the dump valve was still guarded. The altitude was 5,000 feet, the differential pressure was 0, and the rate of climb was 200 fpm up. The outflow valve controller was set to 4,500 feet cabin altitude and 22,000 feet aircraft altitude. The cabin temperature and defog rheostats were in the 1 o'clock and 11 o'clock positions, respectively. The airframe deice panel showed the ice light, propeller deice, left windshield heat, and inertial separator

switches were on. The pitot 1, pitot 2, and stall heaters were on, but the switches were bent to the right. The airframe deice switch was off. The autopilot trim master switch was off, and the radio master switch was on. The instrument and panel light rheostats were dimmed, and the cabin and accessory switches were off.

Examination of the horizontal situation indicator (HSI) disclosed the aircraft's heading was 120 degrees, the course selected was 130 degrees, and the heading selector bug was set 210 degrees (Centennial Airport's runway 17L is aligned on a magnetic heading of 167 degrees). The pilot's and copilot's altimeters registered 5,980 and 4,920 feet, and were set to 30.03 and 30.10 inches of mercury, respectively (the altimeter setting at the time of the accident was 30.02 inches of mercury). The radar altimeter registered 0 feet and the DH bug was set to 200 feet. The power lever and manual override were retarded; the propeller governor and condition lever were full forward. The landing gear was up, and the flaps were in the takeoff detent. The fuel selector was on the left tank.

The number 1 communications radio was tuned to 118.9 (active) and 120.3 (standby) mHz (these are the same frequencies for Centennial tower and ATIS, respectively). The number 2 communications radio was tuned to 132.75 (active) and 123.85 (standby) mHz (the former is the frequency for Denver departure control; the latter frequency was not identified). The number 1 navigation receiver was tuned to 117.9 mHz, which is the frequency for the Denver VORTAC. The number 2 navigation radio was tuned to 114.9 (active) and 111.3 (standby) mHz. The former is the frequency for the Blue Mesa VORTAC; the latter frequency was not identified. The ADF (automatic direction finder) was tuned to 260 kHz, which is the frequency as the Casse LOM (compass locator outer marker, associated with the ILS runway 35R instrument approach). The panel-mounted GPS was placarded, "GPS approved for IFR en route, terminal, and non-precision approach operations." After downloading its memory, only en route navigational fixes were displayed.

On October 15, 2001, the pitot-static system was tested. No anomalies were noted.

The autopilot flight computer (KCP 220), autopilot mode controller (KMC 321), autopilot/flight director annunciator (KA 185A), air data computer (KDC 222), directional gyro/heading indicator (KG 102A), artificial horizon/attitude indicator (KI 256), horizontal situation indicator (KI 525A), and altitude/vertical speed preselect (KAS 297C) were removed and hand-carried to Honeywell Avionics in Olathe, Kansas, where, on June 19 and 20, 2001, they were functionally tested. All units tested satisfactorily. On August 16, the autopilot gyros and servos tested within specified limits.

On September 6, the hand-held GPSMAP 295 (that was found lying in the copilot's seat) was examined at Garmin International in Olathe. Stored data was downloaded and presented pictorially. The aircraft can be seen taxiing out of Jet Center's facility, turning right and proceeding north along taxiway Alpha. It then turns left onto runway 17L and takes off. Examination of the data revealed that at 0718:30, the airplane was heading 169 degrees at 103 mph. Twenty seconds later, the airplane began drifting to the left. The airplane made a

climbing left turn, achieving a maximum altitude of 7,072 feet and completing 217 degrees of turn, before beginning a descending left turn. The last recorded position was at 39 degrees, 33.961 minutes north latitude, and 104 degrees, 50.554 minutes west longitude. The last recorded data was at 0719:44 when the airplane was at 5,717 feet, heading 084 degrees at a ground speed of 198 mph.

NTAP (National Track Analysis Program) radar data was retrieved from the Denver TRACON. The first radar contact was at 0718:38.69, when the airplane was in a climbing left turn at an encoded altitude of 5,800 feet and at a ground speed of 109 knots. The data showed the airplane achieving a maximum encoded altitude of 7,000 feet before entering a descending left turn. The last recorded contact was at 0719:38.62 when the airplane was at 6,700 feet.

According to the Airplane Flight Manual, a constant 2,000 rpm is used for takeoff and climb. Using the distance between the first two slash marks found at the accident site, a rough estimate of ground speed at impact was computed by using the following formula:

Ground speed (knots) = rpm x distance between strike marks (in feet) x number of propeller blades/101

Therefore, = 2,000 x 2.2 x 4/101

Or, = 17,600/101

= 174 knots

ADDITIONAL INFORMATION

The pilot was found lying in the aft portion of the cabin. His shoulder harness was found attached to the seatbelt, but the male end of the seatbelt buckle was broken. The seatbelt, type 343 1, was manufactured by Anjou Aeronautique S.A. of Tierce, France, and was FAA approved under TSO C22f. The seatbelts on the remaining four seats were tested using the following protocol: After buckling the seatbelt, the short end of the belt was anchored and the long end was given a sharp yank to simulate an impact. Each and every seatbelt buckle snapped open. A visit was made to a local Socata repair facility. Several TBM-700s were in the hangar. An early model and a late model TBM-700 were selected at random. Several of the seatbelts were subjected to this same test previously mentioned. All of the seatbelts snapped open. A similar seatbelt installed in a Eurocopter AS332 Super Puma helicopter was tested and it, too, snapped open.

In addition to the Federal Aviation Administration, parties to the investigation were Socata Aircraft, Pratt & Whitney, Honeywell, and Technical Leasing, Inc.

The wreckage was released to Technical Leasing's chief pilot on October 15, 2001.

Pilot Information

Certificate:	Private	**Age:**	49,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	March 11, 1999
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 20, 2000
Flight Time:	1024 hours (Total, all aircraft), 136 hours (Total, this make and model), 719 hours (Pilot In Command, all aircraft), 37 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Socata	**Registration:**	N300WC
Model/Series:	TBM 700	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	82
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	February 9, 2001 Annual	**Certified Max Gross Wt.:**	6579 lbs
Time Since Last Inspection:	40 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	5139 Hrs at time of accident	**Engine Manufacturer:**	P&W Canada
ELT:	Installed	**Engine Model/Series:**	PT6A-64
Registered Owner:	Technical Leasing, Inc.	**Rated Power:**	700 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	APA,5883 ft msl	**Distance from Accident Site:**	
Observation Time:	07:30 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	0.13 miles
Lowest Ceiling:	100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	-1°C / -1°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	Englewood, CO (APA)	**Type of Flight Plan Filed:**	IFR
Destination:	Santa Monica, CA (SMO)	**Type of Clearance:**	IFR
Departure Time:	07:18 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Centennial APA	**Runway Surface Type:**	Asphalt
Airport Elevation:	5883 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	17L	**IFR Approach:**	Unknown
Runway Length/Width:	10002 ft / 100 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.566665,-104.842781

Administrative Information

Investigator In Charge (IIC):	Scott, Arnold
Additional Participating Persons:	Michael F Davey; FAA Flight Standards District Office; Denver, CO
Original Publish Date:	February 20, 2002
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=51960