Aviation Investigation Final Report

Location:	Jacksonville, Florida	**Accident Number:**	MIA05FA017
Date & Time:	October 30, 2004, 12:06 Local	**Registration:**	N2588X
Aircraft:	Cessna P206	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Fatal, 4 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Skydiving		

Analysis

The pilot did not perform weight and balance calculations for the accident flight; though, postaccident calculations indicated that the airplane was under gross weight and the center of gravity was within limits. The pilot reported that he did not have any memory of the accident flight. The accident flight was the second flight of the day for the pilot and began immediately after landing from the previous skydive drop flight. The passengers were loaded and the pilot taxied to runway 11 where he began the takeoff. Witnesses and a pilot-rated passenger in the airplane reported that after rotation, the airplane pitched up. The pilot-rated passenger who was seated behind the pilot moved forward and noted the pilot moving the manual elevator trim wheel in the nose-down direction. The airplane was observed to stall, pitch nose down, and collide with terrain. The flaps were extended 20 degrees, and the elevator trim was found set 10 degrees trailing edge tab down, or aircraft nose-up. The maximum elevator trim trailing edge down takeoff setting is 4 degrees. The airplane "Owner's Manual" before takeoff checklist indicates to set the elevator trim to the takeoff setting. The pilot reported that he had performed a takeoff in the accident airplane 2 times previously in which the elevator trim was position full nose-up. During those occasions, he moved the elevator trim to the nose-down direction and continued the takeoff. No evidence of preimpact failure or malfunction was noted to the flight controls for roll, pitch, yaw, or pitch trim. Examination of the engine revealed no evidence of preimpact failure or malfunction.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The improper setting of the elevator trim by the pilot-in-command, his failure to follow the checklist related to elevator trim setting, and his failure to maintain VS during climb after

takeoff resulting in an inadvertent stall, uncontrolled descent, and in-flight collision with terrain.

Findings

Occurrence #1: ABRUPT MANEUVER
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) ELEVATOR TRIM - IMPROPER - PILOT IN COMMAND
2. (C) CHECKLIST - NOT FOLLOWED - PILOT IN COMMAND
3. (C) AIRSPEED(VS) - NOT MAINTAINED - PILOT IN COMMAND
4. STALL - INADVERTENT - PILOT IN COMMAND

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

Findings
5. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On October 30, 2004, about 1206 eastern daylight time, a Cessna P206, N2588X, registered to PTP, Inc., and operated by Jacksonville Extreme Sports, crashed shortly after takeoff from Herlong Airport, Jacksonville, Florida. Visual meteorological conditions prevailed at the time and no flight plan was filed for the 14 CFR Part 91, local, parachute drop flight. The airplane was substantially damaged and the commercial-rated pilot and three passengers sustained serious injuries, one passenger sustained minor injuries, and one passenger was fatally injured. The flight was originating at the time of the accident.

Several witnesses who were located on the airport reported that shortly after takeoff from runway 11, the airplane was observed in a steep nose high attitude. Witnesses on the airport reported seeing the airplane pitch nose down, roll left, then disappear behind trees.

One passenger in the airplane who is a pilot reported that the airplane pitched up after becoming airborne. He moved forward, and noticed the pilot "frantically" moving the elevator trim wheel 4 or 5 times towards the nose down direction. The passenger reported the airplane then descended in an approximately 15-20 degrees left wing low attitude. The passenger and several witnesses on the airport reported hearing no discrepancies with the engine. The pilot-rated passenger also reported the engine was "humming fine, it sounded great."

The pilot reported in writing that due to his injuries, he does not remember, "...any of the events that took place before, during, or after the accident...." His normal procedure was for him and often times the jump master to preflight the airplane at the beginning of each day in accordance with the "operating handbook." The flight controls would be tested, and he would check for water in the fuel. He verbally reported using the Pilot's Operating Handbook (POH) to perform the preflight inspection of the airplane for the first few times when flying the airplane for jump flights, but stopped using the POH once he was familiar with the airplane.
He reported that based on the typical fueling procedure, he could fly 2 loads without refueling between flights. He would not give any jumpers any briefing before the flight; the jump master would brief them on the use of lap belts. With respect to 2 tandem jumps and a photographer on-board, the jump master would have been all the way aft in the airplane. He also verbally advised he would not do a weight and balance on every skydive flight. It was a standard procedure to have all occupants belted for takeoff, and they would remain belted until the airplane was in a stable climb. Most jumpers remained in that position until the airplane climbed to 10,000 feet. He estimated that at the time of the accident there were 8 gallons of fuel in the left fuel tank and 15 gallons of fuel in the right fuel tank. For takeoff he would typically extend the flaps to 20 degrees and set the elevator trim to the takeoff setting. He did not recall the seating positions of the passengers which he and the on-board jump master

devised, and does not recall if all people were belted in for takeoff on the accident flight. There was no problem with the airplane during his preflight inspection, or during the engine run-up before takeoff; otherwise, he would not have started the flight. He has a general rule not to fly an airplane if he finds anything inconsistent with how the aircraft should be. He reported that on every other flight the elevator trim indicator was operable.

PERSONNEL INFORMATION

The pilot is the holder of a commercial pilot certificate with airplane single engine land, airplane multi-engine land, and instrument airplane ratings. On November 24, 2003, he was issued a first class medical certificate with no restrictions or limitations.

The pilot reported having a total time of 1,603 hours, and 28 hours total time in the accident make and model airplane. He reported having accrued 133 hours in the last 90 days, of which 28 hours were in the accident make and model airplane. In the last 30 days he reported having accumulated 60 hours, of which 28 hours were in the accident make and model airplane. He verbally reported flying 25-30 jump flights in the accident airplane since being checked out on or about September 27, 2004.

AIRCRAFT INFORMATION

The airplane was manufactured in 1965 by Cessna Aircraft Company as model P206, and was designated serial number P206-0088. It was certificated in the normal category and was equipped with a Teledyne Continental IO-550-F (9) factory new engine rated at 300 horsepower when operated at 2,700 rpm, installed in accordance with Supplemental Type Certificate (STC) SA2830SO on November 7, 2001. The airplane was also equipped with a constant-speed 3-bladed Hartzell PHC-J3YF-1RF propeller also installed in accordance with STC SA2830SO on November 7, 2001.

The airplane was last inspected in accordance with an annual inspection which was signed off as being completed on August 11, 2004. The airplane had accumulated approximately 72 hours since the inspection, and the engine had accumulated 1,774.3 hours since manufacture at the time of the accident.

The primary pitch control system consisted of a single control yoke installed at the left seat, interconnected to a bellcrank near the control surface by a combination of a push/pull rod and steel cables guided by several pulleys along its length. The secondary pitch control system consisted of a manually operated trim wheel located in a pedestal about the center of the instrument panel and immediately below it, interconnected by steel cables also guided by several pulleys along its length to an jackscrew type actuator located inside the right horizontal stabilizer and forward of the right elevator. The elevator trim tab actuator is connected to the trim tab via a link. Secondary pitch flight control system setting is indicated by a pointer adjacent to the manual trim wheel. The aircraft did not have an electric elevator trim system.

METEOROLOGICAL INFORMATION

A surface observation weather report taken at Jacksonville International Airport (KJAX) Jacksonville, Florida, on the day of the accident at 1156, or approximately 12 minutes before the accident, indicates the wind was from 260 degrees at 3 knots, the visibility was 6 statute miles with haze, few clouds existed at 500 feet, the temperature and dew point were 26 and 21 degrees Celsius, respectively, and the altimeter setting was 30.11 inHg. The accident airport is located approximately 14 nautical miles and 210 degrees from KJAX.

AIRPORT INFORMATION

The Herlong Airport is equipped with runways designated 7/25, and 11/29, the later being the runway utilized by the pilot for departure. Runway 11/29 is an asphalt runway 3,500 feet in length by 100 feet wide. The airport is equipped with a common traffic advisory frequency of 123.0 mHz, which is not recorded.

WRECKAGE AND IMPACT INFORMATION

The airplane crashed on airport property; the wreckage came to rest at position 30 degrees 16.637 minutes North latitude and 081 degrees 47.983 minutes West longitude, or approximately .41 nautical mile and 104 degrees magnetic from the approach end of runway 11. The accident site was also located approximately 400 feet north of the north edge of runway 11.

Examination of the wreckage revealed the airplane came to rest upright on a magnetic heading of 095 degrees adjacent to a line of trees. The airplane was resting on the fuselage and right wingtip. The nose landing gear strut was located at the initial ground contact location, which was approximately 55 feet from the main wreckage resting location. The heading from the initial ground scar to the main wreckage was approximately 115 degrees magnetic. All components necessary to sustain flight were attached or located in close proximity to the main wreckage. There was no evidence of fire on any component of the airplane. Damage to the leading edge of the left wing associated with tree contacts was noted at the stall warning vane, and outboard of the lift strut attach point of the wing. The upper skin of the right wing exhibited compression wrinkles. The firewall and instrument panel were displaced to the left. The right main landing gear was collapsed.

Flight control continuity was confirmed for roll, pitch, yaw, and for pitch trim. The elevator trim tab actuator was measured and found extended approximately 1.2 inches, which equates to approximately 10 degrees tab down, or aircraft nose up.

A rubber vent line for the right fuel tank was cut with fuel leaking from the cut surface. Approximately 10.3 and 6.3 gallons of 100 low lead fuel were drained from the left and right fuel tanks, respectively. No contaminants were noted in either fuel tank.

Examination of the cockpit and cabin revealed the aircraft was only equipped with 1 seat (pilot seat), which was outside the airplane when first viewed by NTSB. The pilot's lap belt was not fastened. Examination of the pilot's seat revealed both inboard legs were fractured with no evidence of preexisting cracks. The floorboard beneath the pilot's seat and the forward portion of both seat tracks were displaced down approximately 3 inches. The outboard seat track of the pilot's seat had a "Saf-T-Stop" device secured to the track. The airplane was not equipped with shoulder harnesses. The pilot's left rudder pedal was broken. The control yoke for the co-pilot seat position was not installed; a tennis ball was in-place over the yoke attach point. The aircraft was equipped with 6 separate restraints for the passengers; none were failed or fastened. A bulkhead on the right side of the airplane located at fuselage station 90.0 and approximately 12 inches above the floor had a section of the bulkhead displaced forward with evidence of contact by a passenger. The fuel selector was positioned to the right tank and was in the detent. The elevator trim indicator was damaged. With battery power applied, the flap indicator was indicating 20 degrees of flaps extended which correlated with the flap actuator position, and the stall warning horn was heard to operate. The throttle, mixture, and propeller controls were full forward.

Examination of the engine was performed by the NTSB investigator-in-charge (NTSB-IIC), and the FAA inspector-in-charge. Crankshaft, camshaft, and valve train continuity was confirmed. Suction and compression was noted at all cylinders during rotation of the engine by hand. Eight quarts of oil were indicated on the oil dipstick. The magnetos were timed approximately 26 degrees before top dead center (BTDC) while specification is 22 degrees BTDC; spark was noted at all spark plugs during engine rotation. The top and bottom spark plugs exhibited normal wear when compared to the Champion "Aviation Check - A - Plug" chart. The drive shaft of the engine driven fuel pump was not fractured; the pump was able to be rotated by hand. Residual fuel consistent with 100 low lead was found in the flexible fuel line at the fuel control unit and also at the inlet of the auxiliary fuel pump. The fuel control screen was clean, and all fuel injector nozzles were clear of obstructions. The air induction system was free of obstructions, and the spring loaded alternate air door was closed; the alternate air door operationally checked good. Examination of the muffler revealed the baffle was intact. The oil filter was cut open; the filter element was clean.

Examination of the three-bladed propeller was performed by the NTSB-IIC which revealed all blades were free to rotate in the hub. One propeller blade was bent aft approximately 20 degrees, with the leading edge twisted towards low pitch; paint on the outboard 10 inches had been polished off. No chordwise scratching, and no gouges on the leading edge were noted. The second propeller blade was bent aft approximately 45 degrees beginning about 12-14 inches from the hub center. Polishing of paint was noted nearly full span, and no gouges were noted on the leading edge of the blade. Minor scratches were noted on the cambered side of the blade at the blade tip. The third propeller blade exhibited a large radius bend and was bent forward approximately 110 degrees. Approximately 2 inches inboard from the tip was bent aft. Nearly 2//3 span on the leading edge was polished.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination of the passenger was performed by the District 4 Medical Examiner's Office (Medical Examiner's Office). The cause of death was listed as blunt impact to head and neck.

Toxicological analysis of specimens of the passenger was also performed by the Medical Examiner's Office. The results of analysis was negative in blood for ethanol and carbon monoxide. An unquantified amount of caffeine was detected in the submitted urine specimen.

TESTS AND RESEARCH

The airplane was last fueled on the day of the accident; a total of 20.0 gallons of 100 low-lead fuel were added to the right fuel tank. The individual who fueled the airplane reported that after fueling it he observed the airplane depart on the first skydive flight of the day. The fueler reported that the accident airplane then landed some time later, and he then noted the accident airplane was on the takeoff roll on runway 11, for the second skydive flight of the day. Following the accident, a sample of fuel from the fuel truck that last fueled the airplane was submitted by the NTSB to a fuels testing laboratory for analysis. The result of the fuel analysis indicate the submitted specimen met "...ASTM D-910 specifications for Avgas grade." Additionally, there were no complaints from owner/operators of other airplanes fueled from the same truck.

A tape from one of the passengers who planned to video the skydive event was submitted for examination to the NTSB Video Recorder Division, located in Washington, D.C. NTSB examination of the tape revealed it captured video and audio portions of the accident flight. A "Video Factual Report" prepared by the Video Recorder Division indicates that the accident flight recording begins immediately after the jumpers board the airplane while the engine is running. The recording then skips to inside the airplane which is on the ground with a view out the right window. The right flap is observed retracted, and few scattered clouds are noted. Four people including the pilot, two students, and an instructor are captured inside the airplane. The camera then skips to a view looking perpendicular to the flight looking out the left window while the airplane is traveling down the runway. The factual report further indicates that "Loud engine noise can be heard and the left wing extended flap can be seen but the exact position cannot be determined." The airplane rotates and "...its shadow can be seen tracking left of centerline on the climb out." The airplane pitch is noted to increase from the point of rotation to approximately 2 seconds after rotation, when the recording abruptly skips to a view of foliage in front of a blue sky background. A loud warning horn can be heard with voices in the background.

The portable global positioning system (GPS) receiver was removed from the airplane and examined at the manufacturers facility. The examination of the receiver revealed 6 recorded trackpoints associated with the accident takeoff. The first recorded trackpoint occurred at 1205:08, in which the "leg speed" was 21 knots, and the "leg course" was 108 degrees true. The second trackpoint at 1205:14, indicates the leg speed was 45 knots, and the leg course

was 110 degrees true. The third trackpoint at 1205:21, indicates the leg speed was 62 knots, and the leg course was 108 degrees true. The fourth trackpoint at 1205:25, indicates the leg speed was 56 knots, and the leg course was 100 degrees true. The fifth trackpoint at 1205:29, indicates the leg speed was 39 knots, and the leg course was 085 degrees true. The sixth and final recorded trackpoint at 1205:34, indicates the leg speed was 46 knots, and the leg course was 073 degrees true.

The installed J.P. Instruments graphic engine monitor was removed from the airplane and examined at the manufacturers facility. The unit was programmed to record EGT and CHT for all cylinders, and also the battery reading every 6 seconds. A total of 28 data points associated with the accident flight were recorded. The average EGT and CHT readings for the first reading associated with the accident flight were approximately 1,147 degrees Fahrenheit, and approximately 354 degrees Fahrenheit, respectively. Each of the readings for all 6 cylinders were noted to decrease over the 2 minute 42 second period. The last recorded EGT readings averaged approximately 563 degrees Fahrenheit, and the last recorded CHT readings averaged 314 degrees Fahrenheit.

The pilot verbally reported that when returning to land after off-loading the skydivers, he would generally have full nose-up trim because the airplane was nose-heavy, and he reported in writing that on at least 2 previous occasions, he began the takeoff roll in the accident airplane with the elevator trim set in the full nose-up position. On both occasions as he added power, the nose of the airplane rose "...more than normal, and it was quite evident that the trim was not set for normal takeoff. In both cases, I simply decreased power, rolled the trim wheel forward approximately 3 times to set it for a normal takeoff, and then continued the takeoff without incident."

As previously reported in the "History of Flight" section of this report, a pilot-rated passenger in the airplane reported that after the airplane pitched up after takeoff, the pilot "frantically" moved the elevator trim wheel 4 or 5 times towards the nose down direction. As previously reported in the "Wreckage and Impact" section of this report, the as-found setting of the elevator trim tab was 10 degrees trailing edge tab down, or aircraft nose-up. No determination could be made as to how much the pilot moved the elevator trim towards the nose-down direction.

According to a representative of the airplane manufacturer, the elevator trim indicator has a takeoff band, with the neutral position of the elevator trim tab in the approximate center of the band. The trailing edge tab down takeoff limit is 4 degrees.

A review of the airplane "Owner's Manual" revealed the "Before Landing" checklist indicates, "Elevator and Rudder Trim - - Adjust for landing." The "Before Take-off" checklist indicates "Elevator and Rudder Trim - - Take-off settings."

Weight calculations were based on the latest empty weight of the airplane (1,890.5 pounds), the provided weight of the pilot and the actual weight of his parachute combined (240.5

pounds), the provided weight of the passenger seated at the co-pilot's seat position with tandem parachute combined (234.0 pounds), the provided weight of the passenger at the co-pilot's seat position (140.0 pounds), the provided weight of the passenger with parachute immediately aft of the pilot's seat combined (177.0 pounds), the provided weight of the passenger on the right side of the airplane immediately aft of the co-pilot's seat (145.0 pounds), the combined weight of the fatally injured passenger with parachute as provided by the medical examiner's office (263.0 pounds), the weight of a recovered harness (7.0 pounds), the weight of fuel drained from the left wing fuel tank (62.5 pounds), and the pilot's estimate of the amount of fuel in the right fuel tank at the time of the accident (90 pounds). Based on the above listed data, at the time of the accident the airplane was calculated to weigh 3,249.5 pounds, and the center of gravity (CG) was calculated to be 42.724 inches aft of datum. The Owner's Manual indicates the maximum gross weight is 3,300 pounds, and the CG range at that weight is 40.5 to 47.4 inches aft of datum.

ADDITIONAL INFORMATION

The wreckage minus the retained components was released to Mr. Greg Nardi, President of PTP, Inc., on November 1, 2004. The NTSB retained components were also released to Mr. Greg Nardi on March 1, 2006.

Pilot Information

Certificate:	Commercial	**Age:**	30,Male
Airplane Rating(s):	Single-engine land; Multi-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:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	November 1, 2003
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 1, 2004
Flight Time:	1603 hours (Total, all aircraft), 28 hours (Total, this make and model), 1535 hours (Pilot In Command, all aircraft), 133 hours (Last 90 days, all aircraft), 60 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N2588X
Model/Series:	P206	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	P206-0088
Landing Gear Type:	Tricycle	**Seats:**	1
Date/Type of Last Inspection:	August 1, 2004 Annual	**Certified Max Gross Wt.:**	3300 lbs
Time Since Last Inspection:	72.29 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	12413.89 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-550-F (9)
Registered Owner:	PTP, Inc.	**Rated Power:**	300 Horsepower
Operator:	Jacksonville Extreme Sports	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KJAX,30 ft msl	**Distance from Accident Site:**	14 Nautical Miles
Observation Time:	11:56 Local	**Direction from Accident Site:**	30°
Lowest Cloud Condition:	Few / 500 ft AGL	**Visibility**	6 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.11 inches Hg	**Temperature/Dew Point:**	26°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Jacksonville, FL (KHEG)	**Type of Flight Plan Filed:**	None
Destination:	(KHEG)	**Type of Clearance:**	None
Departure Time:	12:06 Local	**Type of Airspace:**	

Airport Information

Airport:	Herlong Airport KHEG	**Runway Surface Type:**	Asphalt
Airport Elevation:	87 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	11	**IFR Approach:**	Unknown
Runway Length/Width:	3500 ft / 100 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal, 3 Serious, 1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 4 Serious, 1 Minor	**Latitude, Longitude:**	30.277221,-81.79972

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Billy J Meadows; FAA Flight Standards District Office; Orlando, FL Steve Miller; Cessna Aircraft Company; Wichita, KS
Original Publish Date:	May 30, 2006
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=60460

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.