



National Transportation Safety Board Aviation Accident Final Report

Location:	Palo Alto, CA	Accident Number:	LAX05FA058
Date & Time:	01/02/2005, 1337 PST	Registration:	N4165P
Aircraft:	Piper PA-46-350P	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 Minor, 3 None
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The airplane landed long and overran the runway, colliding with a berm and marshy terrain about 300 yards beyond the runway end. The first leg of the flight originated at Mammoth Lakes, California, destined for Palo Alto. En route at 18,000 feet over the Sierra Nevada Mountains, the pilot observed erratic high oil temperature and low oil pressure readings and diverted to Modesto to have the engine checked. No mechanics were available at the airport and the pilot subsequently departed for Palo Alto, after adding oil to the engine for the 65-mile remaining trip, heading west. En route to Palo Alto, and in actual IFR conditions, the pilot experienced erratic operation of both GPS navigation systems (one failed after losing a lock on the satellites), which troubled the pilot since she had had a very bad prior experience with losing the navigation systems in actual IFR and icing conditions in a non-radar environment. Shortly after that, the oil pressure and oil temperature indications became erratic again, with the oil temperature flickering near the upper limit and the oil pressure flickering near the lower limit. The pilot said she pushed the reset buttons and cycled the circuit breakers and the audible alarms for the oil temperature and pressure sounded. In addition, the ice warning system activated, alerting the pilot to select the deice functions, and after turning them on, the pilot observed clear ice breaking off the wings. Then the fuel gages started to give erratic indications, cycling to near empty and back again. The pilot told the TRACON controller she needed to land as soon as possible and the controller suggested two nearby airports, one with an 11,000-foot-long runway; however, since the original destination was only 8 minutes further on, the pilot elected to continue to Palo Alto. As she approached the airport, the oil temperature continued to fluctuate and the associated warning horn sounded. She continued to reset (silence) the horn as she approached the airport. The pilot was given the winds at Palo Alto (120 degrees at 8 knots) and since she was concerned with losing the engine over a populated city area, she requested runway 31 in order to make a straight-in approach. The pilot was cleared to land on the 2,500-foot-long runway 31. The pilot said she realized she was high on the approach but did not think about a go-around because of the concern with the potential for an engine failure. The airplane landed about halfway down the runway and could not stop before overrunning the runway and colliding with a berm and marshy terrain about 300 yards beyond the runway end. The aircraft is equipped with an integrated engine parameter instrument and warning system (EMIS), which is a precision measurement and

display system containing both analog and digital displays of engine related parameters with alarms for parameter exceedances. In normal operation mode, the Enhanced Digital Indicator (EDI) posts a digital enhancement of the selected analog indicators. The automatic exceedance warning mode has the highest priority. When an exceedance is detected, the EDI will automatically select that indicator and display the readings on the LCD. The peak exceedance value of the indicator will flash in the display and be recorded in non volatile memory for future extraction. The EDI was powered up and placed into exceedance review mode. While in exceedance review mode, the EDI reported the following exceedances: 1) Oil Temperature (OT) recorded three events with a peak exceedance of 278 with an average exceedance of 278 for 11 seconds; 2) Oil Pressure (OP) recorded one event with a peak exceedance of 0 (zero) with an average exceedance of 0 for 81 seconds; 3) Manifold Pressure (MP) recorded nine events with a peak exceedance of 42.0 with an average exceedance of 42.0 for 2 seconds; 4) Turbine Inlet Temperature (T.I.T.) recorded one event of 43 seconds at an average exceedance of 1750. The Cylinder Head Temperature (CHT), Fuel Flow (FF), and Propeller rpm (rpm) indicators did not report any exceedances. A functional test of the EMIS system, to include all probes, analog gages, and associated wiring, was conducted, with no anomalies found. The electrical connection of the temperature probe was forcibly manipulated in an attempt to make the indicator fluctuate. All attempts to duplicate a fluctuating oil temperature indication failed. A detailed examination of the engine found no evidence of a malfunction with the lubricating system or evidence of lubrication related damage to the core engine.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's misjudged distance and speed on final approach, which led to a long landing and a runway overrun. Also causal was the pilot's inadequate in-flight decision to continue flight with indications of apparent serious system anomalies, failure to divert to a more suitable destination alternate, and failure to perform a go-around when an overshoot became obvious. Factors in the accident were the short runway at Palo Alto and the pressure placed on the pilot by the apparent indications of multiple system failures and the potential for a catastrophic engine failure. The cause of the erratic engine instrument indications was not resolved.

Findings

Occurrence #1: OVERRUN

Phase of Operation: LANDING

Findings

1. ENGINE INSTRUMENTS,ELECTRONIC FLT INFO SYSTEM - ERRATIC
2. (C) IN-FLIGHT PLANNING/DECISION - INADEQUATE - PILOT IN COMMAND
3. (F) PRESSURE INDUCED BY CONDITIONS/EVENTS - PILOT IN COMMAND
4. (C) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - CONTINUED - PILOT IN COMMAND
5. (F) NOT PERFORMED - PILOT IN COMMAND
6. (F) TERRAIN CONDITION - SHORT RUNWAY/LANDING AREA
7. WEATHER CONDITION - TAILWIND
8. (C) DISTANCE/SPEED - MISJUDGED - PILOT IN COMMAND
9. (C) PROPER TOUCHDOWN POINT - NOT ATTAINED - PILOT IN COMMAND
10. (C) GO-AROUND - NOT PERFORMED - PILOT IN COMMAND

Occurrence #2: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER

Phase of Operation: LANDING - ROLL

Findings

11. TERRAIN CONDITION - BERM

Factual Information

HISTORY OF FLIGHT

On January 2, 2005, at 1337 Pacific standard time, a Piper PA-46-350P, N4165P, overran the runway and collided with marshy terrain at Palo Alto, California. The pilot/owner operated the airplane under the provisions of 14 CFR Part 91. The private pilot received minor injuries and the three passengers were not injured. The airplane was substantially damaged. The personal flight originated at Modesto, California, about 1300, on an instrument flight plan. The wreckage location was about 37 degrees 27.66 minutes north latitude by 122 degrees 06.90 minutes west longitude.

The first leg of the flight originated at Mammoth Lakes, California, destined for Palo Alto. En route at 18,000 feet over the Sierra Nevada Mountains, the pilot observed erratic high oil temperature and low oil pressure readings and diverted to Modesto to have the engine checked. No mechanics were available at the airport and the pilot subsequently departed for Palo Alto, after adding oil to the engine for the 65-mile remaining trip, heading west.

En route to Palo Alto, and in actual IFR conditions, the pilot experienced erratic operation of both GPS navigation systems (one failed after losing the satellites), which troubled the pilot since she had had a very bad prior experience with losing the navigation systems in actual IFR and icing conditions in a non-radar environment. Shortly after that, the oil pressure and oil temperature indications became erratic again, with the oil temperature flickering near the upper limit and the oil pressure flickering near the lower limit. The pilot said she pushed the reset buttons and cycled the circuit breakers and the audible alarms for the oil temperature and pressure sounded. In addition, the ice warning system activated, alerting the pilot to select the deice functions, and after turning them on the pilot observed clear ice breaking off the wings. Then the fuel gages started to give erratic indications, cycling to near empty and back again.

The pilot told the TRACON controller she needed to land as soon as possible and the controller suggested two nearby airports, one with an 11,000-foot-long runway; however, since the original destination was only 8 minutes further on, the pilot elected to continue to Palo Alto. As she approached PAO the oil temperature continued to fluctuate and the oil temp instrument warning horn sounded. She continued to reset (Silence) the horn as she approached the airport. She reported something about oil pressure being high inbound to PAO but no warning horn or light related to oil pressure or any engine indications. The pilot was given the winds at Palo Alto (120 degrees at 8 knots) and since she was concerned with losing the engine, she requested runway 31 in order to make a straight-in approach. The pilot was cleared to land on the 2,500-foot-long runway 31. The pilot said she realized she was high on the approach but did not think about a go-around because of the concern with the potential for an engine failure. The airplane landed about halfway down the runway and could not stop before overrunning the runway and colliding with a berm and marshy terrain about 300 yards beyond the runway end.

PILOT INFORMATION

The private certificated pilot was rated for airplane single engine land and instrument airplanes. The pilot reported a total flight time of 990 hours with 500 hours as pilot-in-command, and 120 hours dual flight instruction in the accident make and model airplane. The pilot's most recent Biennial Flight Review occurred on October 4, 2004, in the accident airplane. The pilot's most recent second-class flight physical occurred on January 9, 2004.

AIRPLANE INFORMATION

The most recent annual inspection occurred on July 1, 2004, at 438.5 total hours. The total time at the accident was 484.3 total hours.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest beyond the end of the runway 31, in a marsh, separating a wing and other parts of the airplane. The fuselage was inverted. The airport side was Santa Clara County. The fuselage was in San Mateo County, with the engine section partially submerged in the tide-affected water.

TESTS AND RESEARCH INFORMATION

On January 12, 2005, the National Transportation Safety Board investigator examined the airplane and engine for the first time at Pleasant Grove, California. The engine is a six cylinder, air cooled, direct drive, horizontally opposed, turbocharged, fuel injected, internal combustion engine rated at 350 hp and 2,700 rpm. The engine remained attached to the airframe by the engine mount. The engine sustained no significant damage. Visual examination of the engine revealed no evidence of preimpact catastrophic mechanical malfunction or fire.

The full flow oil filter and suction screen were removed and examined. The oil filter was cut open for examination of the filtering media and was found to be clean of contaminants. The top spark plugs were removed, examined, and photographed. The crankshaft was rotated by hand, and was free and easy to rotate in both directions. Compression was positive for all six cylinders. Gear train continuity was established.

The oil cooler thermostatic bypass valve (vernatherm) was removed for examination. The valve assembly remained intact. The seat area was undamaged and exhibited no unusual wear patterns. Heat was applied to the valve assembly. It was observed to extend and retract in a normal fashion. The oil temperature indicator thermocouple was removed from the rear of the engine. The thermocouple was intact and undamaged. An external heat source was applied to the thermocouple at which time a temperature rise was observed on the cockpit mounted oil temperature indicator. The indicator was tested to 270 degrees Fahrenheit.

The oil cooler was examined. There were no obstructions noted affecting the airflow to the cooler cores. There was a cooler air directing baffle mispositioned, allowing for a significant loss of ram air pressure to the cooler.

TRANSICOIL ELECTRONIC MODULE INSTRUMENT SYSTEM (EMIS)

Description of the system:

The aircraft is equipped with an integrated engine instrument system. The Transicoil Electronic Module Instrument System (EMIS) is a precision measurement and display system containing both analog and digital displays of engine related parameters. The EMIS is comprised of two parts: -- Dual Analog Module Indicators, and -- Enhanced Digital Indicator (EDI) display.

The Dual Analog Module Indicator is a precision microprocessor based instrument for displaying engine parameters. Each module consists of two completely independent analog indicators. Each indicator displays its respective engine parameter reading on the analog dial, as well as transmits digital data to the EDI via the data bus. A rear connector is provided for system interface and analog sensor inputs. Alarm outputs are provided where applicable.

The Enhanced Digital Indicator (EDI) is a precision microprocessor based instrument that contains two Dichroic Liquid Crystal Displays (LCDs) with three lines each, and an annunciator in the lower left corner of each LCD. The LCDs are backlit for use in low ambient light conditions, and contain heaters for low temperature operation. The EDI is capable of displaying six engine parameters at one time. The EDI top line is dedicated to engine manifold pressure and rpm; the middle displays selected analog indicators; and the lower displays OAT and % PWR.

In normal operation mode, the EDI posts a digital enhancement of the selected analog indicators. The automatic exceedance warning mode has the highest priority. When an exceedance is detected, the EDI will automatically select that indicator and display the readings on the LCD. The peak exceedance value of the indicator will flash in the display.

When an analog indicator is in exceedance, its red or yellow LED will illuminate and remain on until the unit is no longer in exceedance. The external audible alarm will sound and the LCD display will flash until the operator acknowledges each exceedance by pressing the switch adjacent to the exceeding instrument. During the entirety of the exceedance (up to 10 minutes or 599.9 seconds), the EDI will record the peak value of the exceedance, the average value of the exceedance, and the time duration of the exceedance. This data is stored in nonvolatile memory for future recall. The operator must acknowledge each exceedance to mute the external audible alarm.

The EDI contains nonvolatile memory for future examination of recorded exceedances. The memory size is sufficient to record a total of 238 exceedance events. Each event contains the Peak, Average, and Time duration of exceedance. The exceedance history is presented in reverse chronological order for each indicator during review, with the most recent exceedance event listed first.

Exceedance Review:

The EDI was powered up and placed into exceedance review mode. While in exceedance review mode, the EDI reported the following exceedances:

Oil Temperature (OT) recorded three events with a peak exceedance of 278 with an average exceedance of 278 for 11 seconds.

Oil Pressure (OP) recorded one event with a peak exceedance of 0 (zero) with an average exceedance of 0 for 81 seconds.

Manifold Pressure (MP) recorded nine events with a peak exceedance of 42.0 with an average exceedance of 42.0 for 2 seconds.

Turbine Inlet Temperature (T.I.T.) recorded one event of 43 seconds at an average exceedance of 1750.

Vacuum System Indication (VAC) recorded one event with a peak exceedance of 0.0 (zero) with an average of 0.1 for 84 seconds.

The Cylinder Head Temperature (CHT), Fuel Flow (FF), and Propeller rpm (rpm) indicators did not report any exceedances.

In order to perform a function test of the oil temperature indicator, the temperature probe was removed from the engine. With electrical power to the EMIS system applied, the oil temperature probe was heated using a propane torch. The indicator was observed to rise up

the scale and briefly pass the high temperature red line. The indicator went into exceedance mode and a warning horn sounded. After acknowledging the exceedance, the horn was silenced. The indicator was heated and allowed to cool down several times. The indicator movement was observed to be steady both up and down the scale. The electrical connection of the temperature probe was forcibly manipulated in an attempt to make the indicator fluctuate. All attempts to duplicate a fluctuating oil temperature indication failed.

ADDITIONAL INFORMATION

The Federal Aviation Administration (FAA) inspector provided a written report about his personal interview of the pilot. He stated that "There is some confusion on which indications actually were out of tolerance." Early FAA air traffic reports indicated an oil temperature and pressure issue. He stated that the pilot did not indicate during the interview that there was any oil pressure issues at Modesto, only oil temp fluctuating. After establishing cruise at 6,000 feet mean sea level (msl) outbound from Modesto, the oil temp indications returned. The pilot considered Livermore airport as an alternate, but the weather was bad so she continued over the pass. She had a discussion with Northern California Approach (Nor Cal) about landing at San Jose, but decided that Palo Alto (PAO) was only an additional 8 minutes out and continued. As she approached PAO the oil temp continued to flux and the oil temp instrument warning horn sounded. She continued to reset (silence) the horn as she approached the airport. She reported something about oil pressure being high inbound to PAO but no warning horn or light related to oil pressure or any engine indications. Cylinder head temp was asked about and she indicated it was normal throughout the flight, as was all engine performance criteria. There was never any actual degradation of engine performance.

The pilot remembered turning base early and being higher than she should be for the approach, but was concerned about losing the engine and wanted to get it on the ground. As she touched down (more than halfway down the runway), she remembered skidding and the dike approaching fast. She remembers thinking she had to clear the dike, and lifting the nose. She applied power and the engine responded according to the passenger in the right seat, but the pilot only remembers pulling back on the controls. She never had a plan or thought of going around, only to get it on the ground.

The Safety Board did not take possession of the airplane nor the engine.

Pilot Information

Certificate:	Private	Age:	45, Female
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last FAA Medical Exam:	01/01/2004
Occupational Pilot:		Last Flight Review or Equivalent:	10/01/2004
Flight Time:	990 hours (Total, all aircraft), 600 hours (Total, this make and model), 940 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N4165P
Model/Series:	PA-46-350P	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	4636263
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	07/01/2004, Annual	Certified Max Gross Wt.:	4358 lbs
Time Since Last Inspection:	45 Hours	Engines:	1 Reciprocating
Airframe Total Time:	484 Hours at time of accident	Engine Manufacturer:	Textron Lycoming
ELT:	Installed, not activated	Engine Model/Series:	TIO-540-AE2A
Registered Owner:	Bjorg A. Sky	Rated Power:	350 hp
Operator:	Bjorg A. Sky	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	PAO, 5 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	1338 PST	Direction from Accident Site:	120°
Lowest Cloud Condition:	Scattered / 800 ft agl	Visibility	6 Miles
Lowest Ceiling:	Overcast / 4000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	120°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.85 inches Hg	Temperature/Dew Point:	9°C / 7°C
Precipitation and Obscuration:	Light - No Obscuration		
Departure Point:	Modesto, CA (MOD)	Type of Flight Plan Filed:	IFR
Destination:	Palo Alto, CA (PAO)	Type of Clearance:	IFR
Departure Time:	1300 PST	Type of Airspace:	

Airport Information

Airport:	Palo Alto (PAO)	Runway Surface Type:	Asphalt
Airport Elevation:		Runway Surface Condition:	Wet
Runway Used:	31	IFR Approach:	Global Positioning System; Visual
Runway Length/Width:	2443 ft / 70 ft	VFR Approach/Landing:	Full Stop

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	3 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor, 3 None	Latitude, Longitude:	37.461111, -122.115000

Administrative Information

Investigator In Charge (IIC):	George E Petterson	Report Date:	04/25/2006
Additional Participating Persons:	Sean Skaggs; Federal Aviation Administration; San Jose, CA Charles Little; The New Piper Aircraft Co.; Vero Beach, FL Mark Platt; Textron Lycoming; Williamsport, PA		
Publish Date:			
Investigation Docket:	NTSB accident and incident docket serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).