Aviation Investigation Final Report

Location:	S. BURLINGTON, Vermont	**Accident Number:**	NYC01LA012
Date & Time:	October 12, 2000, 09:31 Local	**Registration:**	CFAWF
Aircraft:	Piper PA-60-601P	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious, 4 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that after rotation, he obtained a positive rate of climb. At 110 knots, with the landing gear retracted and the wing flaps at 10 degrees, he noticed a right roll, a drop in climb performance, and a drop of manifold pressure on the right engine to at least 34 inches. The left engine maintained 42 inches. The pilot decided that, due to a "very minimum climb rate, rising terrain ahead, [and] airspeed not increasing," he would land the airplane in a small field about 1/4 mile and 50 degrees to the left. The pilot abruptly lowered the nose of the airplane and raised the flaps to gain airspeed, then landed with a nose-high attitude and the landing gear partially extended. Post-accident examination of the airplane revealed there was vertical compression to the belly area, the fuselage was spilt across the top at the aft end of the cabin, and both wings were damaged, with the left wing buckled downward just inboard of the engine. Examination also revealed that a clamp on the right engine intake manifold was loose. An estimated takeoff weight placed the airplane 74 pounds over the maximum allowed of 6,200 pounds. The type certificate holder estimated that with the airplane at 6,400 pounds, climbing at 110 kts, and with a partial power loss down to 26 inches on one engine, the rate of climb should have been 1,150 fpm with flaps and landing gear up, and 830 fpm with flaps 10 degrees and landing gear down. Higher terrain was to the east, and lower terrain was to the west. Terrain elevation for a straight-out departure was 25 feet above the runway at 0.5 nm, and 70 feet above the runway at 2.8 nm. The pilot reported his total flight experience as 15,000 hours, which included 13,000 hours in multi-engine airplanes, and 30 hours in make and model, all with the preceding 90 days.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper in-flight decision to perform a precautionary landing, and his failure to

maintain airspeed after he experienced a partial loss of power on one engine. A factor was the partial loss of power on one engine due to an induction air leak.

Findings

Occurrence #1: LOSS OF ENGINE POWER(PARTIAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. 1 ENGINE
2. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
3. (F) INDUCTION AIR DUCTING - LEAK
4. PRECAUTIONARY LANDING - PERFORMED - PILOT IN COMMAND

Occurrence #2: HARD LANDING
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
5. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND

Factual Information

On October 12, 2000, at 0931 Eastern Daylight Time, a Piper PA-60-601P, Canadian registration C-FAWF, was substantially damaged during a precautionary landing in South Burlington, Vermont, after it departed Burlington International Airport (BTV), South Burlington. The Canadian certificated airline transport pilot received serious injuries, and the four passengers were not injured. Visual meteorological conditions prevailed for the personal flight that was destined for Pearson International Airport (YYZ), Toronto, Canada. The flight was on an instrument flight rules (IFR) flight plan conducted under 14 CFR Part 91.

The pilot reported that he departed from Runway 19, and had set the wing flaps at 10 degrees.

In the NTSB Form 6120.1/2, dated October 23, 2000, the pilot stated:

"...Normal static (28-30 inches) brake release takeoff roll, liftoff at 102 kts, normal gear retraction (pos. climb) established at 500 feet per minute. Speed 110-111 kts. Instrument scan identified right hand power decrease to about 34 inches. Lt. hand [engine] at 42 inches. Rate of climb decrease to about 75-100 feet per minute. Slight rolling tendency of airplane to the right. Due to very minimum climb rate, rising terrain ahead, airspeed not increasing, decision to land in a small field approx. 1/4 mile ahead and about 50 degrees to the left was made. To ensure control of aircraft, nose of A/C was abruptly lowered, flaps reduced from 10 degrees to zero to gain immediate airspeed which was required to maneuver A/C over some trees, power lines, small ditch and into field beside a small building...."

In a telephone interview, the pilot reported that just prior to touchdown, the landing gear was extended. However, full extension was not achieved prior to touchdown. The airplane touched down in a tail low attitude.

According to the Federal Aviation Administration (FAA) transcript of communications with the Burlington control tower, an airport surveyor located adjacent to Runway 19 reported that he heard one of the engines backfiring as the airplane went by.

According to an FAA inspector at the accident scene, the airplane exhibited vertical compressive damage, the fuselage was split across the top at the aft end of the cabin, and both wings were damaged, with the left wing buckled downwards just inboard of the engine. All propeller blades were curled back, and loose in their hubs.

The inspector also found that the clamp on the flex duct between the right engine and turbo-compressor was "sufficiently loose to allow significant leakage." A cold cylinder compression check of the right engine revealed that the number 1 cylinder was 50/80, and all other cylinders were at least 70/80.

A representative of Textron-Lycoming reported that a loose duct between the turbo-charger and the fuel control unit, could allow the manifold pressure to decrease to ambient.

According to maintenance records, in February 2000, the airplane received a Machen Superstar upgrade, STC SA1658NM. The upgrade included airframe and engine modifications, and resulted in a boost of maximum manifold pressure from 29.5 inches to 41 inches. In addition, maximum gross weight increased from 6,000 pounds to 6,200 pounds.

New performance charts were not issued with the upgrade. However, according to the STC:

"General performance with the above engine and propeller combinations is equal to or better than that previously demonstrated for the Piper Aerostar Model 601P or 602P with the following exceptions: Single engine best rate of climb speed 117 KTS CAS."

The airplane had accumulated 50 hours since the modification.

According to the FAA inspector who conducted the on-site investigation, the airplane was estimated to have weighed 6,515 pounds at takeoff. He made the computation based upon an interview with the line person who had serviced the airplane, and reported that the fuel tanks were full. The line person also reported that he had loaded several heavy bags, and had estimated the weights of the pilot and passengers. The line person subsequently moved, and further attempts to contact him were unsuccessful.

In a telephone interview conducted by the Safety Board investigator on October 16, 2000, the pilot reported he had computed the takeoff weight at 6,275 pounds, and that the maximum allowable takeoff weight was 6,314 pounds.

On February 26, 2001, in a follow-up telephone interview, the pilot reported the takeoff weight of the airplane was 6,191 pounds. The pilot also reported that he had used actual weights and there was no baggage, only two student knapsacks. In addition, he reported that the fuel tanks were not filled to capacity.

An estimated takeoff weight was computed using the pilot and passenger weights supplied by the pilot, with an additional 20 pounds added for baggage. The takeoff weight was 6,211 pounds. When full fuel was used, the takeoff weight increased to 6,274 pounds.

In a written statement dated May 28, 2001, the pilot further amplified his actions and stated:

"...I would like to emphasize that the power loss took place during rotation, past the point at which a reject would even be considered. The aircraft never accelerated above 105 kts and was unable to climb at a rate that would enable me to out climb the terrain that was ahead. Turning was not an option as increased bank would further decrease airspeed and cause a negative rate of climb. With regards to your question of 'flying out of it', this would have been a

consideration if the airspeed had reached 117 kts as the technical performance data suggests. I needed to trade altitude to get airspeed and having reached only about 150 feet, this was also not an option. With regard to manifold pressure, the last I recall looking at the MP it was 34" and appeared to be decreasing. Further, discussion with...[my son, a pilot] had indicated to me that the power did in fact decrease below 34" and was fluctuating. Having then made the decision to land I was too busy to further analyze the exact power. The fact, from my perspective is that the power decreased sufficiently that the aircraft's performance was not adequate to continue and a landing was the only option, the actual lack of performance of the aircraft reflects the amount of power loss."

The type certificate holder for the airplane was contacted and requested to supply performance data at 6,400 pounds and 6,200 pounds with one engine at takeoff power, 41 inches of manifold pressure (340 horse power), and the other engine at 26 inches of manifold pressure (200 horse power), pressure altitude 334 feet, and outside air temperature 54 degrees Fahrenheit.

The rates of climb at 110 KIAS, with a weight of 6,400 pounds were estimated to be 1,150 fpm for flaps up and landing gear up, and 830 fpm for flaps 10 degrees and landing gear down. At 6,200 pounds, the rates of climb were estimated to have increased to 1,210 fpm, and 890 fpm respectively, for the same configurations.

The published airport elevation was 334 feet mean sea level (msl). A topographic map of the area south of Burlington airport revealed that on a line corresponding to a straight-out departure from Runway 19, terrain was about 25 feet above the runway at 0.5 nm, and about 70 feet above the runway at 2.8 nm. Higher terrain existed to the east and south, and a lake with an elevation of about 98 feet msl was to the west.

The pilot reported his total experience as 15,000 hours, which included 13,000 hours in multi-engine airplanes, and 30 hours in the Aerostar, all the preceding 90 days.

Pilot Information

Certificate:	Airline transport	**Age:**	47,Male
Airplane Rating(s):	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 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	May 10, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	15000 hours (Total, all aircraft), 30 hours (Total, this make and model), 14000 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	CFAWF
Model/Series:	PA-60-601P PA-60-601P	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	61P-7963287
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	September 26, 2000 Annual	**Certified Max Gross Wt.:**	6200 lbs
Time Since Last Inspection:	50 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	5929 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-540-S1A5MM
Registered Owner:	AIR CAPITAL ENTERPRISES INC.	**Rated Power:**	340 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BTV ,334 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	09:38 Local	**Direction from Accident Site:**	5°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	50°C / 43°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(BTV)	**Type of Flight Plan Filed:**	IFR
Destination:	(YYZ)	**Type of Clearance:**	IFR
Departure Time:	09:30 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	BURLINGTON INTL ARPT BTV	**Runway Surface Type:**	Asphalt
Airport Elevation:	334 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	19	**IFR Approach:**	None
Runway Length/Width:	3611 ft / 75 ft	**VFR Approach/Landing:**	Precautionary landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	4 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 4 None	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	Hancock, Robert
Additional Participating Persons:	PAUL HUBBARD; PORTLAND , ME
Original Publish Date:	September 6, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=50449