

AVIATION INVESTIGATION REPORT

A01A0022

LOSS OF CONTROL

PIPER PA-30 N8736Y

ST. JOHN'S, NEWFOUNDLAND

14 MARCH 2001

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

## Aviation Investigation Report

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### *Summary*

A US-registered Piper PA-30 Twin Comanche, N8736Y, serial number 30-1890, took off from Runway 16, St. John's International Airport, Newfoundland, at 0450 Newfoundland standard time. Only the pilot was on board this transatlantic ferry flight to Santa Maria, Azores, Portugal. Less than one minute after take-off, the aircraft appeared on air traffic control radar at 500 feet above sea level (asl), about 50 feet above ground level, tracking the runway centreline with a ground speed of 100 knots. By 350 feet above ground level, ground speed had increased to 120 knots, and the aircraft was accelerating.

At this point, the pilot acknowledged an instruction from the flight service station to contact Gander Area Control Centre. Radar data showed that the aircraft continued to climb steadily at about 350 feet per minute until about 900 feet asl. At 900 feet asl, the aircraft's speed began a gradual decrease from about 135 knots, and the aircraft began to climb at about 1200 feet per minute. On reaching 2200 feet asl and 70 knots, the aircraft descended vertically until impact. The aircraft crashed in a near-level attitude approximately 3 nautical miles from the departure end of Runway 16 in a residential area of St. John's. The aircraft was destroyed, and the pilot suffered fatal injuries.

*Ce rapport est également disponible en français.*

## *Other Factual Information*

The pilot, who had completed more than 30 transatlantic ferry flights, had been responsible for preparing the aircraft for the ferry trip and acquiring the necessary approval for aircraft modifications and for the ferry flight. Before departing from his base in Calgary, Alberta, a ferry fuel system was fitted in the cabin. The ferry fuel system consisted of two 45-gallon drums mounted transversely and strapped to a wooden platform.

An aircraft maintenance engineer (AME), whom the pilot had asked to visually inspect the installation, recognized that the aft ferry tank capacity was twice that permitted by centre-of-gravity (CG) limitations. The AME and the pilot discussed fuel loading limits, and the pilot understood that using the full capacity of the aft tank would place the aircraft outside of its aft CG limits. To stay within the aft CG limit, the aft tank could be filled to only half of its capacity.

The AME had assisted the pilot in completing the documentation required for approval of the ferry fuel system and the ferry flight by regulatory authorities; however, the documents were not submitted. No ferry flight permit was issued for the intended flight, nor was a maintenance release completed. When ferry flight permits are issued for light aircraft on transatlantic flights, a 10% increase in the maximum gross take-off weight is usually allowed; the CG limits remain the same.

Transport Canada (TC) Maintenance Staff Instruction 45, section 4, paragraph 4.4 states:

Gross Weight Increase: An aeroplane gross weight increase of a maximum of 10% is allowed without the need for substantiation, except in the case of aircraft where a Special Overweight Ferry Flight Authorization is specifically stated in the Type Certificate – e.g. the Cessna C-172.

The accident aircraft was registered in the US and therefore would require a special flight permit from the Federal Aviation Administration (FAA) to fly in a modified and overweight condition. According to Federal Aviation Regulation 21.197, FAA may issue a special flight permit, for many purposes, for an aircraft that may not currently meet applicable airworthiness requirements but is capable of safe flight. One purpose would be to authorize operation of an aircraft at a weight exceeding its maximum certificated take-off weight for flight beyond its normal range over water, or over land areas where adequate landing facilities or appropriate fuel is not available. Once a flight permit is issued, the aircraft would then be permitted to fly in US airspace. Before the aircraft enters Canadian airspace, the operator is required to forward details of the flight and the FAA-issued special flight permit to TC for review and validation. If the documentation is not submitted, apart from a general ramp inspection program for all aircraft, TC has no systematic means of detecting regulatory noncompliance in ferry flight operations.

There is no indication that TC or the FAA was aware of the planned flight, and there was no other known safety oversight of this flight by the regulator.

The aircraft departed Calgary for the journey on 07 March 2001. During the trip to St. John's, the pilot kept a detailed fuel log, which showed that he did not completely fill the aft ferry tank until the aircraft arrived in St. John's on March 13. In St. John's, the wing tanks and both ferry tanks were filled to capacity, placing the CG beyond the aft limit. The pilot had never flown the aircraft in this CG condition. After being refuelled, the aircraft was towed inside a hangar, where it remained overnight.

The pilot then purchased provisions from a local grocery store and checked into a hotel at about 2015. He arrived at the St. John's Flight Service Station (FSS) at about 0330 the next morning and was reported to be alert. He received a pre-flight briefing from the duty FSS specialist and proceeded to the hangar to complete the pre-flight check of the aircraft. The aircraft was then towed to the ramp.

After the aircraft was started, the pilot contacted the St. John's FSS at 0431 and requested an instrument flight rules clearance. He received the following weather information from the FSS: altimeter 30.05 inches of mercury; visibility 15 statute miles; ceiling 600 feet overcast; temperature  $-6^{\circ}\text{C}$ ; dewpoint  $-9^{\circ}\text{C}$ ; and wind calm. The pilot advised FSS of his intent to use Runway 16 for departure.<sup>1</sup> The pilot received his instrument flight rules clearance and, at 0450, advised the FSS that he was on the take-off roll.

The aircraft crashed on the southern shore of Quidi Vidi Lake, approximately 300 feet from residential housing. An eyewitness quickly found the aircraft, and emergency response authorities were advised. The pilot was fatally injured at impact. Post-mortem examination did not reveal any indication that incapacitation or physiological factors had affected pilot performance.

At impact, the aircraft broke into three sections. Damage was consistent with the aircraft being in a left spin, which was confirmed by eyewitness accounts. Both engine nacelles were torn downward from the wings, and both propellers were slightly bent. The emergency locator transmitter, located in the empennage behind the aft cabin bulkhead, was damaged by impact forces and did not transmit. When the aircraft wreckage was examined, there was no indication of ice accumulation. At least two plastic grocery bags containing provisions for the flight were found on the floor in front of the right pilot's seat. The carrying handles of the bags were slung over the right arm of the pilot's right control yoke. By the way the handles were slung over the yoke, it is concluded that they were very likely placed there by the pilot.

Although a number of control cables were severed at impact, flight control system continuity was confirmed. The nose "up" stabilator trim-tab cable was severed and had several frayed strands; however, analysis determined that trim cable separation occurred at impact. The stabilator trim tab was found in a neutral trim position. The flap selector switch was found in a "down" position; however, because of conflicting impact signatures on the control surfaces, a flap position at impact could not be determined. According to the pilot's operating handbook, use of flaps is discretionary on take-off. It is not known if the pilot had selected any flap for take-off.

Both propellers had impact damage consistent with a low-power setting. Blades were on the fine pitch stops, consistent with the propeller pitch lever settings. Throttle controls were in the idle position, and mixture controls in the full-rich position. Throttle positions were consistent with the positioning required for recovery from a spin. All engine control cables were connected and functional. Fuel samples were drawn from each tank

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<sup>1</sup> The track from St John's Airport to the first turning point (lat.  $45^{\circ}45'$  N, long.  $50^{\circ}$  W) was approximately  $140^{\circ}$  magnetic.

at the accident site; all samples were clear and free of contamination. After the aircraft was moved to a storage facility, further samples were drawn from both fuel injector inlet screens and respective fuel distribution manifolds. Fuel was present in supply lines between the engine firewall to the fuel injector servo. All samples were clean and showed no sign of contamination. The engines were transported to an engine overhaul facility where they were test run; they ran well and produced the required maximum-rated power.

A considerable amount of cargo, much of which was not necessary for the ferry flight, was on board. The cargo included tins of paint, engine parts, aircraft instruments, and unnecessary aviation publications. Passenger seats had been placed on top of the ferry tank system and were unrestrained. The cargo was removed from the aircraft and weighed. The aircraft was at least 425 pounds above its maximum allowable gross take-off weight of 3800 pounds, and the CG was approximately three inches beyond the aft limit. No record of a weight and balance calculation was found.

Position of the CG affects aircraft stability and manoeuvrability. An out-of-limits CG may cause an aircraft to become uncontrollable during configuration changes (such as lowering or raising the flaps or landing gear, increasing power, or decreasing speed). An aft CG would have reduced the forward control authority available to counter a sudden nose-up pitch and would have hampered the pilot's ability to recover from a nose-high attitude or a spin.

## *Analysis*

Radar data indicated that, even with the overloading and a CG about three inches beyond the aft limit, the aircraft had at least a moderate climb capability and was capable of controlled flight. There was no apparent mechanical cause for the sudden departure from controlled flight, and flight controls were operable before impact. Both engines were operating at impact and were capable of producing rated power. Positioning of the engine controls at the idle position suggests that the pilot was conscious when he lost control and that he was attempting to recover the aircraft.

There was no indication that the aircraft encountered icing during its brief exposure (about 40 seconds) to instrument meteorological conditions. It is unlikely that the pilot became disorientated because he lost control below the reported cloud base.

It could not be determined why control of the aircraft was lost. However, several scenarios could have led to the sudden climb: the handles of the grocery bags, which were slung over the right control yoke, might have impeded control yoke movement; unsecured cargo might have shifted, worsening the CG condition; or retraction of the flaps might have induced the loss of control. The aft CG likely contributed to the suddenness of the aircraft pitch-up and would have made regaining control of the aircraft difficult or impossible. The heavy weight of the aircraft would also have affected controllability.

By failing to obtain the required approvals from regulatory authorities and by operating the aircraft outside of its flight envelope, the pilot appears to have disregarded normal safe operating practices and aviation regulations, thereby putting himself and others at risk. Had TC inspected the aircraft before the transatlantic flight, deficiencies in the approval process and operation of the flight would likely have been detected and corrected. However, no documentation had been submitted to TC, and TC was unaware of the proposed flight.

The following TSB Engineering Laboratory Report was completed:

LP 20/2001—Stabilator Trim Cable

*Findings as to Causes and Contributing Factors*

1. Control of the aircraft was lost for undetermined reasons three minutes after take-off, during the climb.

*Findings as to Risk*

1. The aircraft was more than 11% above its maximum allowable gross take-off weight, and the centre of gravity was three inches beyond the aft limit, increasing the risk of control difficulties.
2. Cargo stowed on top of the ferry tanks was not secured.
3. The pilot showed a disregard for normal safe operating practices and aviation regulations.
4. Transport Canada was not aware of the proposed ferry flight and therefore could not intervene.

*Other Findings*

1. The “up” stabilator trim cable showed signs of fraying; however, it was determined the cable failed at impact.
2. The emergency locator transmitter was damaged on impact and did not transmit.
3. The ferry tank installation was not approved.
4. A maintenance release was not completed after ferry tank system installation.
5. Necessary documents for the ferry flight were not submitted to regulatory authorities.

## *Safety Action*

This accident was the first of two fatal air accidents in Atlantic Canada in 2001. The other fatal accident (TSB Report No. A01A0058) involved a Piper PA-31 that crashed shortly after take-off, killing the pilot and two passengers and seriously injuring a third passenger. Both occurrences involved overloading and incorrect stowage of cargo. On 13 July 2001, TSB released an occurrence bulletin to Transport Canada, giving details of the occurrences and identifying aircraft loading as a safety issue.

Since incorrect loading of aircraft can lead to catastrophic results, including loss of life, the Board is concerned that pilots continue to disregard safety by operating aircraft outside the maximum allowable weight and loading limitations. The Board will continue to monitor this safety issue.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 27 August 2002.*