



AIRCRAFT ACCIDENT REPORT

No. 92-006

Cessna 207A

ZK-FTL

**Cleddau River, near Milford Sound
Aerodrome**

1 March 1992

**Transport Accident Investigation Commission
Wellington - New Zealand**

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

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Aircraft Type, Serial Number and Registration:	Cessna 207A, 20700728 ZK-FTL
Number and Type of Engines:	One Teledyne Continental IO 520-F
Year of Manufacture:	1981
Date and Time:	1 March 1992, 1603 hours NZDT
Location:	Cleddau River, near Milford Sound Aerodrome Latitude: 44°41'S Longitude: 167°57'E
Type of Flight:	Private (Test Flight)
Persons on Board:	Crew: 1
Injuries:	Crew: 1 Nil
Nature of Damage:	Substantial
Pilot in Command's Licence:	Commercial Pilot Licence (Aeroplane)
Pilot in Command's Age:	34
Pilot in Command's Total Flying Experience:	1400 hours 800 on type
Information Sources:	Pilot Report and Engineering follow-up
Investigator in Charge:	Mr D G Graham

1. INTRODUCTION

1.1 ZK-FTL was used regularly by the operator for scenic passenger flights between Queenstown and Milford Sound.

1.2 The aircraft had performed satisfactorily during the earlier part of the day. In the afternoon, on a flight to Queenstown from Milford Sound with a full load of passengers, the aircraft's engine began to run less smoothly than normal and make an unusual "bubbling" sound. Routine checks did not identify the problem and the pilot decided to return to Milford Sound.

1.3 The pilot arranged for his passengers to be flown to Queenstown in another operator's aircraft and then contacted engineering personnel by telephone at the base where ZK-FTL was maintained, to discuss the situation. It was decided that the pilot should carry out a thorough run-up and if no abnormality was observed a test circuit should be flown at Milford Sound. If the pilot was satisfied with the engine's performance he would then ferry the empty aircraft to Queenstown.

1.4 The engine run-up disclosed no unusual indications and the pilot subsequently took off on runway 29 at Milford Sound Aerodrome for a test circuit. After take-off, at a height between 1600 feet and 1700 feet the engine again developed a roughness and the pilot decided to return and land.

1.5 Although not running smoothly the engine gave no indication of stopping until, in a late left downwind position for runway 29, it cut suddenly and completely. Each of the fuel tanks, installed in the aircraft's wings, contained about 60 litres of Avgas.

1.6 Conditions recorded at the time included: visibility 70 km, approximately 1 octa cumulus cloud at 3000 feet amsl, 4 octa's cirrus, and QNH 1003 hPa. The surface wind was 320/13 knots with a stronger westerly flow at higher levels, and light turbulence.

1.7 In the prevailing windy conditions with the bush covered terrain providing no option for a successful power-off landing short of the aerodrome, the pilot decided to land on a dry expanse of riverbed which lay within gliding distance.

1.8 During the final turn the engine fired for 2 to 3 seconds before cutting once more, at which stage the pilot pulled the mixture control to idle cut-off to prevent any further unexpected surge of power. The nose wheel assembly was torn out in the ensuing 50 metre groundroll on the boulder strewn surface and the propeller and lower forward airframe and engine structure sustained extensive damage.

1.9 Following the accident the aircraft was lifted out from the site by helicopter and transported to an approved maintenance and overhaul facility.

1.10 The operator reported that the engine of ZK-FTL had misfired or faltered on two or three previous occasions in the last three or four years. Some two weeks, and about 19 flying hours before the accident, the engine had cut briefly and then regained power during descent to Milford Sound while being flown by a different pilot. Subsequent engineering line checks disclosed no defects or abnormalities in the engine or fuel system and the aircraft was returned to service.

1.11 Certain components of ZK-FTL including the exhaust and induction systems, had been severely damaged during the forced landing sequence so their precise pre-impact condition could not be determined, but a detailed examination of the engine and airframe with specific attention to the fuel system revealed no obvious reasons for the sudden engine cut. Some wrinkling existed at the base of the flexible fuel tank installed in each wing. However, regular fuel drain checks were carried out by the operator and there was no evidence to suggest that an undetected accumulation of water in the fuel system had affected engine operation.

1.12 The engine, with its accessories undisturbed apart from necessary disconnection and reconnection, was installed in a test rig. The engine started and performed satisfactorily in accordance with the manufacturer's test schedule. It was noted, however, that the full throttle metered and unmetered fuel pressures were 1.5 psi and 2.0 psi respectively above the published maximum and the measured fuel flow was correspondingly greater than normal.

1.13 Before being disassembled the fuel control unit, Part No. 629703-2, was installed on a calibrated test rig. While measured performance was in accordance with the required limits, continued testing indicated that the mixture control valve face was leaking severely in all positions. Strip examination disclosed a build up of thread sealant on the face and some scoring. After removal of the thread sealant, lapping of the valve faces, and renewal of all "O" rings, the unit was reassembled. Subsequent testing was entirely satisfactory.

1.14 The electric fuel pump, Part No. 545212-1, was also tested and disassembled. Thread sealant was present in the blade housing cavities and the pump main seal was found to be distorted. On the test rig the fuel pump in its "as received" condition did not maintain the specified top end pressure/fuel flow, and the adjustment range was not consistent.

1.15 The manifold valve, Part No. 631351-15A32, performed within the required flow limits when tested. Some contamination existed in the plunger section. Tests of the fuel lines and nozzles disclosed no defects but considerable internal sludge was present in each nozzle.

1.16 During the accident flight and in the most recent previous incident the engine had unexpectedly "cut" at a relatively low power setting. Although conclusive evidence was not obtained, the post-accident rig-tests and strip examination of the fuel system components suggested the defective fuel control unit as the most likely source of the problems experienced.

1.17 Contamination and internal leakage within the fuel control unit was likely to result in variation in fuel flow through the unit to the throttle metering control. At a reduced power setting potential existed for an unexpected engine cut if internal leakage permitted an excessive quantity of fuel to bypass through the fuel return line diminishing the normal flow to the engine.

2. FINDINGS

2.1 The pilot in command was appropriately licensed to conduct the flight.

2.2 During a test circuit at a late stage downwind the engine suddenly "cut".

2.3 The aircraft's height, the prevailing wind conditions, and surrounding bush covered terrain obliged the pilot to land on a boulder strewn river bank.

2.4 The engine had previously run roughly and had "cut" briefly on an earlier occasion.

2.5 Line engineering inspection and ground runs did not reveal any defect or reproduce the reported fault.

2.6 Post-accident tests disclosed that the mixture control valve face of the fuel control unit was leaking and contamination existed within the unit. This was concluded to be the most probable source of the engine problems experienced.

3. SAFETY RECOMMENDATIONS

3.1 As a result of the investigation of this accident it was recommended that engineers be made aware of the accident circumstances to stress the desirability of identifying the cause of an apparent engine problem before authorising a test flight, and

3.2 Pilots in command be advised of the need to consider fully the consequences of a repetition of an engine fault before conducting a test flight following a reported engine malfunction.

11 February 1993

M F DUNPHY
Chief Commissioner