



No. 94-026

PIPER PA32-260

ZK-ENZ

HALF A NAUTICAL MILE EAST OF NORTH SHORE AERODROME

22 NOVEMBER 1994

ABSTRACT

At 1215 hours on 22 November 1994 ZK-ENZ, a Piper PA32, lost power on its landing approach to runway 27 at North Shore Aerodrome and landed short of the runway. The pilot and passenger were not injured. The safety issue discussed is the importance of sound fuel management by pilots.

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

AIRCRAFT ACCIDENT REPORT NO. 94-026

Aircraft Type, Serial Number and Registration:	Piper PA32-260, 32-1117, ZK-ENZ
Number and Type of Engines:	One Lycoming O-540-E4B5
Year of Manufacture:	1969
Date and Time:	22 November 1994, 1215 hours*
Location:	Half a nautical mile east of North Shore Aerodrome Latitude: 36° 39.6' S Longitude: 174° 40' E
Type of Flight:	Air Transport
Persons on Board:	Crew: 1 Passengers: 1
Injuries:	Crew: 1 Nil Passengers: 1 Nil
Nature of Damage:	Substantial
Pilot-in-Command's Licence:	Commercial Pilot Licence, (Aeroplane)
Pilot-in-Command's Age:	39
Pilot-in-Command's Total Flying Experience:	688 hours 33 hours on type
Information Sources:	Transport Accident Investigation Commission field investigation
Investigator in Charge:	Mr K A Mathews

*All times in this report are in NZDT (UTC + 13 hours)

1. NARRATIVE

1.1 At approximately 1140 hours on Tuesday 22 November 1994 ZK-ENZ, a PA32-260, departed Great Barrier Aerodrome for North Shore Aerodrome. On board were the pilot and one passenger. Previously the aircraft had been flown from North Shore to Okiwi, on Great Barrier Island, and then to Great Barrier Aerodrome.

1.2 ZK-ENZ's fuel system included four fuel tanks. Prior to departure from North Shore Aerodrome the aircraft's wing-tip fuel tanks had been refueled to capacity with an uplift of 58 litres of fuel bringing the total on board to 48 US gallons (180 litres), 17 US gallons (64 litres) in each tip tank and 7 US gallons (26 litres) in each main fuel tank. The pilot stated that as a standard operating procedure the aircraft had been flown to Great Barrier with the left tip tank selected, and prior to starting the engine for the return flight he had selected the right tip tank.

1.3 The pilot completed his pre take-off checks, departed Great Barrier Aerodrome and set heading for North Shore Aerodrome.

1.4 Approaching the aerodrome from the north-east the pilot positioned ZK-ENZ for a straight-in approach to runway 27, and completed his pre-landing checks by 2 nm from the runway.

1.5 At approximately 1.5 nm from the threshold and 800 feet indicated altitude (600 feet agl) in the approach configuration, ZK-ENZ's engine stopped without warning. The pilot stated that he checked the carburettor heat was on and the mixture was full rich. He visually checked that the fuel selector was selected to what he believed was the right tip tank and therefore did not attempt to select another tank, due to the altitude of the aircraft and the limited time available to carry out a forced landing. He pumped the throttle, but the engine did not respond.

1.6 The pilot was not able to extend the glide of the aircraft to reach the runway so he carried out a forced landing in a paddock half a nautical mile short of the runway.

1.7 After touching down ZK-ENZ went through a fence and came to rest in an upright position. The pilot and passenger were uninjured and vacated the aircraft without difficulty. Prior to exiting the aircraft the pilot turned all the switches off, selected the mixture control to idle cut-off, and the fuel selector to off.

1.8 The aircraft incurred substantial damage to its undercarriage and supporting structure, propeller, and right wing. The left tip fuel tank was dislodged during impact, and no fire occurred.

1.9 Examination of the aircraft's engine revealed that it had not been damaged during the landing, nor was there evidence of any mechanical or electrical malfunction that might have caused it to stop running. The fuel system revealed no evidence of any pre accident failure. An inspection of the fuel lines however showed there was no fuel in the fuel line between the selector valve and the carburettor, and the carburettor bowl was found to contain a lower than normal quantity of fuel. The fuel system selector valve functioned correctly when tested and its engine driven and electric fuel pumps produced normal fuel pressure. The system was not contaminated by water.

1.10 Following the above examination, fuel was introduced to the engine and the engine was started, without any repair or adjustment. The engine ran normally and responded to varying power demands appropriately with normal instrument indications. Further running and examination showed no evidence of any malfunction that could have contributed to a loss of engine power.

1.11 ZK-ENZ had been maintained correctly. Its last maintenance inspection was a 50 hour check completed on 17 November 1994. The pilot had carried out a pre-flight inspection of the aircraft, as well as the normal after start and airborne checks. No defects were evident and the pilot reported that ZK-ENZ had been performing normally up to the time its engine lost power.

1.12 The fuel system in ZK-ENZ included a left-wing tip tank and main tank, and a right-wing main tank and tip tank. A fuel tank selector control was located below the instrument panel on the sloping face of a control tunnel, and permitted individual selection of each fuel tank, plus an OFF selection.

1.13 The company's standard operating procedure when conducting flights to Great Barrier Island was to refuel the aircraft's tip tanks to capacity, 17 US gallons each, and carry 7 US gallons in each main fuel tank. This gave a total fuel endurance of some 3.2 hours based on an average fuel consumption of 15 US gallons per hour. The left tip tank was to be used on the flight to Great Barrier and the right tip tank for the return trip. The fuel in the main fuel tanks was not normally used, but was carried to give an additional fuel reserve and provide a "wet selection"¹ when selecting between the tip tanks.

1.14 The round trip flight usually took about 1.1 flying hours to complete, and consumed approximately 16 US gallons of fuel, 8 US gallons from each tip tank.

1.15 The first person to arrive at the scene of the accident was the operating company's manager. He carried out a visual inspection of ZK-ENZ's fuel tanks and found a quantity of fuel in the dislodged left tip tank, left main tank and right tip tank. No fuel was evident in the right main tank so he removed its fuel drain cock for further checking. He found no fuel in the tank, and it had not been punctured during the forced landing. The fuel selector was in the OFF position, as selected by the pilot after the event.

1.16 The pilot stated that he had selected the right tip tank prior to departure from Great Barrier Aerodrome, had confirmed this selection en-route, during his pre-landing checks and immediately after the engine lost power. After the power loss he did not attempt to select another fuel tank, but left the selector in its selected position.

1.17 The right main tank contained 7 US gallons prior to departure from Great Barrier Aerodrome. If the pilot had selected this tank by mistake, and not the right tip tank as he thought, there would have been sufficient fuel for approximately 28 minutes of flight. The flight from Great Barrier to North Shore typically took about 33 minutes.

1.18 The passenger on the flight sat in the front right seat next to the pilot, and during the flight observed the fuel gauges and positioning of the fuel selector lever. He noticed that each fuel gauge showed a quantity of fuel but the right main tank, he thought, showed a lower quantity than the other gauges. In looking at the fuel selector lever he noticed it was not selected fully to the right, but positioned about mid-way across the right half of its range. These observations were consistent with a selection of the right main fuel tank, not the right tip tank.

1.19 The available evidence shows that the engine lost power due to fuel starvation. Prior to taking off from Great Barrier Aerodrome the pilot had mistakenly selected the right main fuel tank, thinking he had selected the right tip tank. His subsequent in-flight checking and emergency procedure checking did not alert him to this.

¹ Used to avoid introducing air into the system, which may occur when momentarily selecting a dry tank.

1.20 The pilot was appropriately licensed and authorised to carry out the flight. His PA32 type conversion training was completed on 8 March 1994, and his most recent Civil Aviation regulation 76 check was completed on 15 November 1994. He was employed by the company on a part time basis, and usually flew for them at least once per week.

1.21 The weather at North Shore at the time of the accident included four octas of cloud cover with a base of around 1000 feet, and visibility of 8 to 10 kilometres. Passing showers had been observed in the area, and the wind was reported as 15 to 20 knots from the west.

2. FINDINGS

2.1 ZK-ENZ had a valid Certificate of Airworthiness and Maintenance Release.

2.2 ZK-ENZ had been maintained correctly.

2.3 The pilot was appropriately qualified and licensed to conduct the flight.

2.4 ZK-ENZ's engine lost power due to fuel starvation.

2.5 The aircraft had sufficient fuel on board to complete the flight.

2.6 The pilot mistakenly selected a fuel tank other than that intended and appropriate for the flight.

2.7 The pilot's fuel management procedures were inadequate, in that he did not recognise a developing low fuel state and was not alerted to the fact by his system of checking.

2.8 The pilot did not attempt to select another fuel tank after the engine lost power, as required by the emergency checklist, due to the height of the aircraft and the limited time available to carry out a forced landing.

19 April 1995

M F Dunphy
Chief Commissioner

ABBREVIATIONS COMMONLY USED IN TAIC REPORTS

AD	Airworthiness Directive
ADF	Automatic direction-finding equipment
agl	Above ground level
AI	Attitude indicator
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
amsl	Above mean sea level
AOD	Aft of datum
ASI	Airspeed indicator
ATA	Actual time of arrival
ATC	Air Traffic Control
ATD	Actual time of departure
ATPL (A or H)	Airline Transport Pilot Licence (Aeroplane or Helicopter)
AUW	ll-up weight
C	Celsius (normally preceded by °)
CAA	Civil Aviation Authority
CASO	Civil Aviation Safety Order
CFI	Chief Flying Instructor
C of G	Centre of Gravity
CPL (A or H)	Commercial Pilot Licence (Aeroplane or Helicopter)
DME	Distance measuring equipment
E	East
ELT	Emergency location transmitter
ERC	En route chart
ETA	Estimated time of arrival
ETD	Estimated time of departure
F	Fahrenheit (normally preceded by °)
FAA	Federal Aviation Administration (United States)
FL	Flight level
g	Acceleration due to gravity
GPS	Global Positioning System
HF	High frequency
hPa	Hectopascals
IAS	Indicated airspeed
IFR	Instrument Flight Rules
IGE	In ground effect
ILS	Instrument landing system
IMC	Instrument meteorological conditions
ins Hg	Inches of mercury
kgs	Kilograms
kHz	Kilohertz

KIAS	Knots indicated airspeed
kt	Knot(s)
LF	Low frequency
LLZ	Localiser
M	Mach number (e.g. M1.2)
M	Magnetic (normally preceded by °)
MAANZ	Microlight Aircraft Association of New Zealand
MAP	Manifold absolute pressure (measured in inches of mercury)
MAUW	Maximum all-up weight
METAR	Aviation routine weather report (in aeronautical meteorological code)
MF	Medium frequency
MHz/Mhz	Megahertz
mph	Miles per hour
N	North
NDB	Non-directional radio beacon
nm	Nautical mile
NOTAM	Notice to Airmen
NTSB	National Transportation Safety Board (United States)
NZAACA	New Zealand Amateur Aircraft Constructors Association
NZDT	New Zealand daylight time (UTC + 13 hours)
NZGA	New Zealand Gliding Association
NZHGPA	New Zealand Hang Gliding and Paragliding Association
NZMS	New Zealand Mapping Service map series number
NZST	New Zealand standard time (UTC + 12 hours)
octa	Eighth's of sky cloud cover, (e.g. 4 octas = 4/8 of cloud cover)
OGE	Out of ground effect
PAR	Precision approach radar
PIC	Pilot in command
PPL (A or H)	Private Pilot Licence (Aeroplane or Helicopter)
psi	Pounds per square inch
QFE	An altimeter subscale setting to obtain height above aerodrome
QNH	An altimeter subscale setting to obtain elevation above mean sea level
level	
RNZAC	Royal New Zealand Aero Club
RNZAF	Royal New Zealand Air Force
rpm	revolutions per minute
RTF	Radio telephone or radio telephony
S	South
SAR	Search and Rescue
SSR	Secondary surveillance radar
T	True (normally preceded by °)

TACAN	Tactical Air Navigation aid
TAF	Terminal aerodrome forecast
TAS	True airspeed
UHF	Ultra high frequency
UTC	Coordinated Universal Time
VASIS	Visual approach slope indicator system
VFG	Visual Flight Guide
VFR	Visual flight rules
VHF	Very high frequency
VMC	Visual meteorological conditions
VOR	VHF omnidirectional radio range
VORTAC	VOR and TACAN combined
VTC	Visual terminal chart
W	West