Proximity incident, Boeing 737-219 ZK-NAS and Cessna 152 ZK-EOJ, 5 nm north-east of Dunedin Airport, 25 August 1994

Micro-summary: **A near-miss occurred between a Boeing 737 and Cessna 152.**

Event Date: **1994-08-25 at 1115 NZST**

Investigative Body: **Transport Accident Investigation Commission (TAIC), New Zealand**

Investigative Body's Web Site: **http://www.taic.org.nz/**

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NO. 94-019

BOEING 737-219 ZK-NAS

AND

CESSNA 152 ZK-EOJ

5NM NORTH-EAST OF DUNEDIN AIRPORT

25 AUGUST 1994

ABSTRACT

At approximately 1115 hours on 25 August 1994 an airmiss occurred between a Boeing 737 airliner on approach to Dunedin Airport and a Cessna 152 operating from Taieri Aerodrome. It was recommended that the vertical and horizontal airspace boundaries to the southwest of Taieri Aerodrome be modified to improve separation between uncontrolled VFR traffic and controlled IFR traffic on approach to Dunedin Airport.

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

AIRCRAFT INCIDENT REPORT NO. 94-019

Aircraft Types, and Registrations:	Boeing 737-219, ZK-NAS and Cessna 152 ZK-EOJ	
Date and Time:	25 August 1994, 1115 hours*	
Location:	5NM north-east of Dunedin Airport	
Types of Flights:	Boeing:	Scheduled Air Transport
	Cessna:	Aerial Work (Flight Training)
Persons on Board:	Boeing:	117
	Cessna:	2
Injuries:	Boeing:	Nil
	Cessna:	Nil
Pilots in Command's Licences:	Boeing:	Airline Transport Pilot Licence (Aeroplane)
	Cessna:	Commercial Pilot Licence (Aeroplane)
Pilots in Command's Total Flying Experience:	Boeing:	10 000 hours
	Cessna:	440 hours
Information Sources:	Transport Accident Investigation Commission field investigation	
Investigator in Charge:	Mr J J Goddard	

* All times in this report are NZST (UTC + 12 hours)

1. NARRATIVE

1.1. At approximately 1115 hours on August 25 1994 ZK-NAS, operating as New Zealand 415, was on a scheduled airline flight from Wellington to Dunedin. The flight proceeded normally in clear weather and the crew had Dunedin Airport in sight on their descent at Moeraki, some 50 NM out, where they first made RTF contact with Dunedin Tower.

1.2. As the aircraft approached Swampy VOR the crew requested and were cleared for a visual approach to Runway 21. The First Officer, who was the handling pilot, continued to fly the ILS approach to Runway 21 as a visual procedure.

1.3. At approximately 1115 hours and shortly after passing Mosgiel NDB, the outer marker for the approach, and with the aircraft slightly above the glideslope, both the Captain and First Officer saw the Cessna, ZK-EOJ, ahead in the bottom left of their windscreen. Engine power was increased and the Boeing was levelled off to pass over the Cessna. Their altitude was reported as 1700 feet, and they estimated that they passed about 150 feet above ZK-EOJ which was flying across their path from left to right in a gentle right turn.

1.4. After passing the Cessna the approach was resumed and a landing was made without further event.

1.5. ZK-EOJ was on a dual training flight from Taieri Aerodrome, with an instructor and student aboard. The student was at an early stage of ab-initio training, on his fourth lesson. Their intention was to take off from Taieri Aerodrome, then contact Dunedin Tower by RTF to request a clearance through the Dunedin CTR/D to the Brighton Training Area on the coast to the south east.

1.6. After their take-off from grass vector 23 the instructor had selected his radio to the Dunedin Tower frequency and called Dunedin Tower while the aircraft was climbing out straight ahead to the south-west. Dunedin Tower responded but he did not receive the reply, so he checked the radio settings and his headset connections, then called again. As he again received no reply he instructed his student to turn the aircraft right to fly crosswind, then downwind back towards Taieri. The aircraft was levelled as it reached an altitude of 1400 feet.

1.7. As the Cessna turned crosswind the instructor saw the Boeing fly past above him. He reported that the Cessna was at about 1200 feet at that time, and that they were somewhat south-west of the Mosgiel NDB.

1.8. When the Cessna was downwind at Taieri Aerodrome the instructor succeeded in making RTF contact with Dunedin Tower and obtained a clearance through the CTR to Brighton, where the lesson was completed as planned. No further radio problems were encountered

1.9. The data from the Boeing Flight Data Recorder was examined to further establish the circumstances of the event. As the recorder was of the obsolescent scratch-foil type, with only basic flight parameters recorded, it was not possible to define the location of the event more accurately, but the data available generally supported the crew's account and indicated that a normal stabilised ILS approach was flown, apart from the brief levelling-off to overfly the Cessna.

1.10. The vertical separation between the two aircraft was not established, but was probably somewhere between the 150 feet estimated by the Boeing crew and the 500 feet implied by the reported altitudes of the two aircraft. They obviously passed sufficiently close to alarm the Boeing crew and cause them to take avoiding action.

1.11. The altimeter in ZK-EOJ was checked on the day after the incident and found to indicate correctly at Taieri Aerodrome for the prevailing Dunedin QNH.

1.12. Taieri Aerodrome is an uncontrolled aerodrome situated towards the north-east end of the Taieri valley (Figure 1). It is some 8 NM north-east of Dunedin Airport and within the Dunedin CTR/D, which extends from the surface to 2500 feet amsl. A VFR lane within the CTR, Victor 9, allows VFR traffic to operate without an ATC clearance up to 1500 feet amsl. As the Dunedin ILS 21 approach passes almost overhead Taieri, the south-west boundary of Victor 9 is located 2 NM from Taieri along Riccarton Road, which is also the location of Mosgiel NDB.

1.13. Uncontrolled VFR aircraft are thus permitted to fly at an altitude of 1500 feet up to this boundary, while the charted minimum crossing altitude at Mosgiel NDB for aircraft on the Dunedin ILS 21 approach is 1800 feet, producing a separation of 300 feet.

1.14. In this incident the Cessna strayed to the south-west beyond the Victor 9 boundary by possibly up to 1 NM. In that position the on-glidepath altitude for the Dunedin ILS 21 is 1580 feet, while normal variations in ILS approaches could be expected to cause some aircraft to be at about 1500 feet.

1.15. The instructor in ZK-EOJ was inexperienced in this role with 25 hours instructing time. The combined tasks of supervising his student, who was handling the aircraft, and trying to sort out a radio problem led him to overlook the position of his aircraft as it flew past the boundary of Victor 9. A more practical course of action for him might have been to take over the controls and reposition the aircraft first.

1.16. Numerous factors in practice can compromise this 300 foot separation. They include altimeter tolerances, turbulence, pilot accuracy in visual navigation, ILS glidepath tolerance and pilot accuracy in flying the ILS. As a result it is considered that the height and position of Victor 9 are not sufficiently error tolerant in relation to instrument approach procedures to Dunedin Airport Runway 21 to ensure a safe separation between IFR aircraft operating on a clearance in controlled airspace, and uncontrolled VFR aircraft.

1.17. Investigation of the flight paths of aircraft departing from Taieri Aerodrome grass vector 23 indicated that some aircraft with a shallow climb gradient, but in compliance with CASO 4, may have difficulty remaining within Victor 9 during their crosswind turn after climbing to 500 feet. Similarly a "practice engine failure after take-off" exercise might cause an aircraft to transgress the boundary.

1.18. It was concluded that a practical need exists for the south-west boundary of Victor 9 to be extended further from Taieri Aerodrome so that all departure flight paths may be readily contained, and so that the boundary of Victor 9 may thus be respected and complied with.

1.19. It was also evident that the existing Victor 9 ceiling of 1500 feet is necessary to allow safe standard circuit joining procedures at this uncontrolled aerodrome.

1.20. The conflicting requirements for the airspace require a modification to be devised to optimise the mutual separation and safety of all traffic. Such a compromise could be achieved by lowering the ceiling to 1000 feet in the sector south-west of Taieri Aerodrome but extending the boundary further from Taieri Aerodrome. The north-east boundary for this 1000 foot sector might be located sufficiently far from Taieri Aerodrome to allow space for overhead circuit joining procedures. This would increase the separation from the descent profile of traffic on approach to Dunedin Airport while facilitating safe compliance by Taieri Aerodrome traffic.

2. FINDINGS

2.1. An airmiss occurred which jeopardised the safety of the occupants of the airline aircraft and the light aircraft involved.

2.2. The avoiding action taken by the crew of the Boeing aircraft may have been instrumental in averting a collision.

2.3. The aircraft passed with a vertical separation of between 150 and 500 feet.

2.4. The occurrence was not related to any action or inaction on the part of the Dunedin Tower controller or the crew of the Boeing aircraft.

2.5. The instructor in the Cessna allowed his aircraft to fly beyond the boundary of Victor 9 into the Control Zone before he obtained an Air Traffic Control clearance.

2.6. The instructor was probably distracted by a problem with his aircraft's radio at the time.

2.7. The Cessna passed beyond the boundary of Victor 9 by possibly up to to 1 NM.

2.8. At 1 NM beyond the boundary of Victor 9 an aircraft on an instrument approach to Dunedin was likely to be at the same altitude as that permitted within Victor 9.

2.9. The vertical and horizontal boundaries of Victor 9 in the vicinity of the instrument approach path to Dunedin Runway 21 were so located that safe separation could not be assured between IFR aircraft operating on a clearance in controlled airspace and uncontrolled VFR aircraft in Victor 9.

2.10 The conflicting requirements for the airspace require a modification to be devised to optimise the mutual separation and safety of all traffic.

3. SAFETY RECOMMENDATIONS

3.1 A Safety Recommendation was made to the Director of Civil Aviation that:

> He modify the sector of Victor 9 to the south-west of Taieri Aerodrome in terms of its boundaries and altitude to improve separation between uncontrolled VFR traffic and controlled IFR traffic on approach to Dunedin Aerodrome, while facilitating safe operations within the Taieri circuit. (072/94)

3.2 The Director of Civil Aviation responded on 9 September 1994 that:

(072/94) “The implications of the modification to Victor 9 as proposed have been evaluated and it is our opinion that such action could cause problems for aircraft as they descend from 1500 ft to join the circuit at Taieri and that any benefit gained from improved separation from aircraft on IFR approaches to Dunedin, could be lost by continual infringements (even if only by small amounts), in the northern boundary of the proposed new 1000 ft sector.

It would be necessary for the Civil Aviation Authority to seek comment from the industry sectors affected and evaluate the response received, before making any final decision.”

7 December 1994

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	Aeronatical Information Publication
amsl	Above mean sea level
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	All-up weight
C	Celsius (normally preceded by °)
CAA	Civil Aviation Authority
CASO	Civil Aviation Safety Order
CFI	Chief Flying Instructor
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
IGE	In ground effect
IFR	Instrument Flight Rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
ins Hg	Inches of mercury
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	Megahertz
mph	Miles per hour
N	North
NDB	Non-directional radio beacon
NOTAM	Notice to Airmen
nm	Nautical mile
NZAACA	New Zealand Amateur Aircraft Constructors Association
NZGA	New Zealand Gliding Association
NZHGPA	New Zealand Hang Gliding and Paragliding Association
NZMS	New Zealand Mapping Service map series number
NZDT	New Zealand daylight time (UTC + 13 hours)
NZST	New Zealand standard time (UTC + 12 hours)
NTSB	National Transportation Safety Board (United States)
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
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

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