No. 95-013

Macchis MC 39 NZ6463, NZ6470, NZ6474 And NZ6477

And

Cessna 208 Caravan ZK-SFA

Picton Aerodrome

8 September 1995

Abstract

On Friday 8 September 1995, at approximately 1640 hours, as a Cessna 208 Caravan aircraft ZK-SFA was approaching to land at Picton Aerodrome the pilot saw the nose light of one of a loose formation of four RNZAF Macchi MC 39 aircraft approaching from the opposite direction at a similar height to that of his aircraft. He took evasive action and the nearest Macchi passed approximately 300 metres from the Caravan.

The causal factors included a lack of clear instruction in the NZAIP on VFR position reporting procedures in the vicinity of unattended aerodromes close to Control Zone boundaries and the standard of pre-flight planning including that for diversions from track due to weather.

The safety issue identified in this incident was the uncertainty as to the requirements for monitoring RTF frequencies after obtaining clearance through a control Zone and RNZAF formation leader's preparation for diversions from the planned track due to weather.

Transport Accident Investigation Commission

Aircraft Incident Report Number 95-013

Aircraft types and registrations:	Macchis MC 39 NZ6463, NZ6470, NZ6474 and NZ6477, and Cessna 208 Caravan ZK-SFA
Number and type of engines:	**Macchis**: 1 Rolls Royce Viper 680 **Cessna 208**: 1 Pratt and Whitney PT6A-114
Date and time:	8 September 1995, 1640 hours*
Location:	5 nm south-west of Picton Latitude: 41° 21′S Longitude: 173° 57′E
Type of flight:	Military Low Level Formation (training)/Civil Scheduled, (Passenger) Air Transport
Persons on board:	**Caravan**: Crew: 1 Passengers: 10 **Macchis**: Crews: (2x1 and 2x2).6 Passengers: Nil
Injuries:	Nil
Nature of damage:	Nil
Pilot-in-Command's Licence:	**Caravan**: Commercial Pilot Licence (Aeroplane) **Macchis**: Military
Ages:	**Caravan Pilot-in-Command:** 26 years **Macchi Formation Leader:** 29 years
Total flying experience:	**Caravan Pilot-in-Command:** 1350 hours. (220 on type) **Macchi Formation Leader:** 2000 hours (300 on type)
Information sources:	Transport Accident Investigation Commission field investigation
Investigator in Charge:	R Chippindale

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

1. Factual Information

1.1 At 1610 hours on Friday 8 September 1995 Cessna 208 Caravan, ZK-SFA, departed from Wellington for the Picton Aerodrome on scheduled passenger service SA61, with the pilot and 10 passengers on board.

1.2 The operator of the Caravan scheduled up to six flights on Fridays and Sundays and three to four on the other days of the week between Wellington and Picton.

1.3 At 1526 hours the same day RNZAF formation "Falcon Black" departed from Ohakea for a formation cross country flight via the mouth of the Mokihinui River (on the west coast of South Island), Four Rivers, Springs Junction, Blenheim, Maud Island (15 nm north of Woodbourne Aerodrome) and back to Ohakea. The flight from the mouth of the Mokihinui River to Maud Island was planned for 250 feet agl until five miles from the coast at which point a descent to 100 feet above the sea was authorised. The aircraft flew as two pairs at one mile trail.

1.4 As ZK-SFA passed over Picton township the pilot broadcast, on 119.1 MHz, that he was making a straight in approach to runway 18 at Picton Aerodrome. Picton Aerodrome is situated at Koromiko some five kilometers south-south-west of Picton.

1.5 At approximately 1640 hours ZK-SFA was at about 700 feet agl on a straight in approach to land on runway 18 at Picton Aerodrome when the pilot saw the nose light of one of a loose formation of four RNZAF Macchi MC 39 aircraft approaching from the opposite direction at a similar height to that of his aircraft. It appeared that the aircraft was going to pass him on the right hand side so he rolled his aircraft to the left but corrected the roll immediately when he saw a second Macchi to his left. As a result he passed between the first pair as he sighted the nose lights of a second pair of aircraft. To avoid these aircraft he raised the Caravan's flaps and climbed the aircraft with full power applied.

1.6 The reconstruction of the Macchis' flight paths from the camera recordings of their head up display units and the depiction of the Caravan's track by its pilot indicated a minimum horizontal separation of more than 300 m was involved.

1.7 The RNZAF pilots had carried out a pre-flight briefing and carried a colour photocopy of the topographical chart to use for the flight. Although the chart depicted the aerodrome at Koromiko with the standard symbol it also had printed on it in respect of the area of the incident "aeronautical information incomplete use Wellington VTC".

1.8 The aerodrome at Koromiko (Picton) was listed in the NZAIP with effect from 20 July 1995. A note on the chart stated:

> "3. Frequent scheduled (passenger) air transport operations. Pilots transiting or joining advise intentions on 119.1 MHz prior to entering the Koromiko Valley."

1.9 The terminal area forecast for Woodbourne which was provided to the formation pilots prior to departing from Ohakea read:

> "Terminal Area Forecast Woodbourne (0912 hours).
>
> Wind variable 3 knots
> Visibility 30 km
> Cloud 2 oktas cumulus base 2000 feet, 4 oktas stratocumulus base 3000 feet
> Becoming between 1000 and 1300 hours
> Wind 080°/10 knots with rain showers

Temporarily 1200 to 2359 hours
Visibility 6000m with showers of rain and small hail and/or snow pellets
Cloud 2 oktas cumulonimbus base 2000 feet
2000 foot wind 210°/20 knots
QNH minimum 1000 maximum 1009 hPa."

1.10 The routine aerodrome meteorological reports (Metars) for Woodbourne for 1600 and 1700 hours were:

	"1600 hours	1700 hours
Wind	070°/08 knots	050°/08 knots
Visibility	60 km	50 km
Cloud	4 oktas cumulus base 3000 feet	1 okta cumulus base 3000 feet 3 oktas cumulus base 3500 feet
Cloud cover	unchanged during previous hour	unchanged during previous hour
Temperature	8°C	8°C
Dew point	-1°C	-2°C
QNH	1001.6 hPa	1002.5 hPa
Remarks	nil	stratocumulus"

1.11 Each of the Macchi aircraft was equipped with one VHF and one UHF transceiver. The UHF was used for communication between aircraft in the formation and the VHF for communication with air traffic services and other aircraft.

1.12 The RNZAF formation leader understood that he was required to remain on the Woodbourne Tower frequency until the formation was clear of the Woodbourne Control Zone. This view was endorsed by senior Air Traffic Service staff but not by the Air Traffic Controller on duty in Woodbourne Tower.

1.13 The IFG and VFG advised:

"**POSITION REPORTS ARE REQUIRED**

Unattended and AFIS aerodromes

- Inbound or overflying - in class G (uncontrolled) airspace:
  10 NM from the aerodrome below 3000ft AGL."

1.14 The Aeronautical Information Publication (AIP) in Ops 8 advised:

"Pilots of VFR flights operating in uncontrolled airspace below 3000 ft agl and within 10NM of an unattended aerodrome (including controlled or AFIS aerodromes outside the hours of attendance of ATS) are required to maintain a continuous listening watch on the frequency listed in the COM box on the aerodrome chart, or on 119.1 MHz in there is no such chart, and broadcast their position, altitude and intentions for the benefit of other traffic as listed below:

In transit:

- between 5-10NM from the aerodrome:

Each aircraft transmission is to be preceded by the name of the aerodrome, followed by the word "TRAFFIC" "

1.15 Civil Aviation Regulation 91(1) requires:

> "91. Aerodrome traffic rules-(1) The pilot in command of an aircraft operating on or in the vicinity of an aerodrome, whether or not within an aerodrome traffic zone, shall-
>
> (b) Conform with the pattern of traffic formed by other aircraft or keep clear of the airspace in which the pattern is formed."

1.16 At 1634 hours the Falcon Black formation leader reported to Woodbourne Tower that the formation was "at the edge of the Zone". Woodbourne Tower responded, "Falcon Black understand you wish to overfly Woodbourne?". To the confirmation "Affirm." the Tower Controller responded, "Falcon Black cleared to enter the Zone to overfly Woodbourne and then to leave the Zone on track to Ohakea. QNH 1002. VFR traffic is an Aztec just airborne from Omaka zero one vacating to the east." The formation leader replied, "Roger five hundred feet agl." and at the appropriate time he advised Woodbourne Tower that the formation was leaving the Zone.

1.17 As the Macchi formation was about to depart the Control Zone it was apparent to the leader that they could not proceed direct to Maud Island, as planned, due to a shower of heavy rain. He elected to lead the formation, to the right of his planned track, up the Koromiko Valley in which the Picton Aerodrome is situated. He was aware of the existence of this aerodrome.

1.18 An alternative diversion up the Kaituna Valley via Pelorous Sound to Maud Island which would have kept the formation clear of the Picton Aerodrome was not available due to weather conditions.

1.19 The Macchis had a ground speed in the vicinity of 300 knots and the Control Zone boundary was less than two nautical miles or some 24 seconds flying time from Picton Aerodrome.

1.20 The NZAIP in RAC 5 Appendix 1 advises that in both controlled and uncontrolled airspace the maximum indicated airspeed below 10 000 feet amsl is 250 knots. However Regulation 5(2) states "Nothing in these regulations shall apply to the New Zealand Defence Force."

1.21 The formation remained on the Woodbourne RTF frequency until the leader reported clear of the Zone. The pilots then changed to the 119.1 MHz frequency. At that time the formation was already over the Picton Aerodrome. The pilots also had the Caravan aircraft in sight and had altered course to increase their separation from the Caravan. RTF contact was established with the pilot of the Caravan to reassure him there were no more aircraft following.

1.22 The RNZAF had a policy of avoiding such uncontrolled aerodromes by three nautical miles or a height of 2000 feet or transmitting their intentions as per AIP "Ops 8"[1].

1.23 The requirement to broadcast his intentions 10 nm prior to crossing an unattended aerodrome was known to the formation leader but he believed it impractical to make such a broadcast in conjunction with a perceived requirement to remain on the Woodbourne frequency until clear of the Control Zone.

1.24 The formation leader had not planned to fly over the aerodrome but in the environment of the poor weather and low level flight had no option but to alter course without an associated climb to maintain the required separation from any aerodrome traffic.

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[1] The Commission drew the RNZAF's attention to the discrepancy between the RNZAF's policy and the civil requirement as to the height below which an aircraft should make a position report, in the vicinity of an unattended aerodrome. As a result the Air Force undertook to amend their policy to align it with that in the civil requirement.

1.25 The RNZAF had nose lights installed on the Macchi specifically to assist in the visual acquisition of these aircraft.

2. Analysis

2.1 The cause of the incident was rooted in the attention to detail in the RNZAF briefing. While it was impractical for the formation leader to transmit the call to Picton traffic, it could have been handled by another formation leader. A contributory factor was the absence of information in the NZAIP in relation to the procedure to be followed by pilots of aircraft transiting a control zone on a track which took them into the vicinity of an uncontrolled aerodrome within 10 nm of the control zone boundary.

2.2 The promulgation of the existence of the aerodrome and the extent of its traffic should have ensured that it received more prominence in the pre-flight briefing conducted by the RNZAF for the formation pilots.

2.3 The see and be seen concept worked on this occasion but with high speed camouflaged aircraft at low level it is important that every precaution is taken to minimise the potential for a collision.

2.4 The use of nose lights provided an early warning in this case but this feature would have been enhanced by an RTF call advising the Caravan pilot of the approach of the Macchis and advice to the Macchis' pilots of the Caravan's approach to Picton in the Koromiko Valley.

2.5 The weather forecast for the area had been correlated with the planned track and the probability of a diversion from the low level tracks during the cross-country foreseen. The examination of the consequences during the RNZAF's pre-flight briefing, was "general and flexible" and as a result did not address the contingency of low level flight across Picton Aerodrome.

2.6 The RNZAF formation leader knew of the aerodrome's existence and was aware that the frequency on which the Caravan could be contacted was 119.1 MHz.

2.7 As he believed that he had to remain on the Woodbourne Tower frequency, and did so, the formation leader was deprived of the opportunity to broadcast his intentions to air traffic in the Koromiko Valley before the formation flew into the aerodrome's traffic pattern.

2.8 The RNZAF formation leader had no options which would have avoided the need for the formation to broadcast its presence.

2.9 While the RNZAF does not have to comply with the Civil Aviation Regulations its practise is to do so whenever practicable. In the case of a low level cross country there are advantages to be gained by flying at the aircraft's appropriate operational speed. As it was decided that the formation would fly at a speed in excess of the normal civil maximum for the altitude it behoved the pilots to ensure the potential for conflict with other traffic was kept to the practical minimum.

2.10 The note on the landing chart for Picton Aerodrome made special mention of scheduled (passenger) air transport operations at the aerodrome which should have provided a prompt to plan to avoid the area by the minimum required by both the RNZAF and the civil requirements. As the weather forecast indicated low cloud and reducing visibility could be expected in the area alternatives to the planned route in the vicinity of Picton Aerodrome should have been considered at the pre-flight briefing.

3. Findings

3.1 The RNZAF formation leader was forced to divert from his planned track by the weather conditions in the hills adjacent to the Koromiko Valley.

3.2 The formation leader knew of Picton Aerodrome's existence.

3.3 Once committed to low level flight on the leg which crossed Picton Aerodrome the formation leader could not have maintained his formation's separation from the aerodrome in accordance with the RNZAF's policy due to the weather conditions.

3.4 It would be desirable for the RNZAF pilots to develop contingency plans, during their pre-flight briefings, to avoid each unattended aerodrome in the vicinity of their intended low level route should a diversion from their planned track become necessary.

3.5 The formation leader could have broadcast his intentions before entering the Picton Aerodrome area but it appeared impracticable to him in the circumstances.

3.6 It would be prudent to investigate the practicality of providing an information service for pilots involved where unattended aerodromes are at, or less than, 10 nm from a control zone boundary.

3.7 The requirement or otherwise to remain on the Control Zone frequency once given a clearance to vacate the zone should be promulgated in the NZAIP.

3.8 The pilot of the Caravan aircraft was complying with the relevant principles of good airmanship.

3.9 The RNZAF briefing for the low level component of their formation cross-country exercise was comprehensive and accurate apart from the provision for avoiding unattended aerodromes.

3.10 The weather information provided for the RNZAF pre-flight briefing was informative and accurate.

3.11 The mutual spotting of the aircraft, which were approaching head on, was facilitated by the Caravan's landing lights and the Macchis' nose lights being switched on.

3.12 The incident highlighted a shortcoming in the existing information on RTF procedures relating to aircraft transiting near unattended aerodromes in respect of those aerodromes situated closer than 10 miles from a control zone.

4. Safety Recommendations

4.1 It was recommended to the Director of Civil Aviation that :

4.1.1 The Aeronautical Information Publication include specific instructions on the need or otherwise for pilots to remain on the appropriate Control Zone RTF frequency until their aircraft is clear of the Zone, (009/96); and

4.1.2 He investigate the practicality of pilots broadcasting their intentions, in relation to adjacent unattended aerodromes in the vicinity, prior to leaving a Control Zone and publish the appropriate procedure. (010/96)

4.2 It was recommended to the Chief of Air Staff that:

4.2.1 He emphasise to pilots on low level cross country exercises a need to consider, during pre-flight briefings, the action to be taken in relation to unattended aerodromes close to the planned track in the event of a diversion due to weather. (011/96)

17 April 1996

M F Dunphy
Chief Commissioner

Glossary of Aviation Abbreviations

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	All-up weight
°C	Degrees Celsius
CAA	Civil Aviation Authority
CASO	Civil Aviation Safety Order
CFI	Chief Flying Instructor
C of A	Certificate of Airworthiness
C of G (*or* CG)	Centre of gravity
CPL (A *or* H)	Commercial Pilot Licence (Aeroplane *or* Helicopter)
DME	Distance measuring equipment
E	East
ELT	Emergency location transmitter
ERC	Enroute chart
ETA	Estimated time of arrival
ETD	Estimated time of departure
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration (United States)
FL	Flight level
ft	Foot/feet
g	Acceleration due to gravity
GPS	Global Positioning System
h	Hour
HF	High frequency
hPa	Hectopascals
hrs	Hours
IAS	Indicated airspeed
IFR	Instrument Flight Rules
IGE	In ground effect
ILS	Instrument landing system
IMC	Instrument meteorological conditions
in	Inch(es)
ins Hg	Inches of mercury

kg	Kilogram(s)
kHz	Kilohertz
KIAS	Knots indicated airspeed
km	Kilometre(s)
kt	Knot(s)
LAME	Licenced Aircraft Maintenance Engineer
lb	Pounds
LF	Low frequency
LLZ	Localiser
Ltd	Limited
m	Metre(s)
M	Mach number (e.g. M1.2)
°M	Degrees Magnetic
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
mm	Millimetre(s)
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)
OGE	Out of ground effect
okta	Eighths of sky cloud cover (e.g. 4 oktas = 4/8 of cloud cover)
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	Second(s)
S	South
SAR	Search and Rescue
SSR	Secondary surveillance radar
°T	Degrees True
TACAN	Tactical Air Navigation aid
TAF	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