Air proximity incident, Boeing 767 and Piper PA 23-250 Aztec near Auckland Airport, 4 December 1998

Micro-summary: **A loss of separation occurred between a descending Boeing 767 and a climbing Piper Aztec.**

Event Date: **1998-12-04 at 2125 NZDT**

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

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

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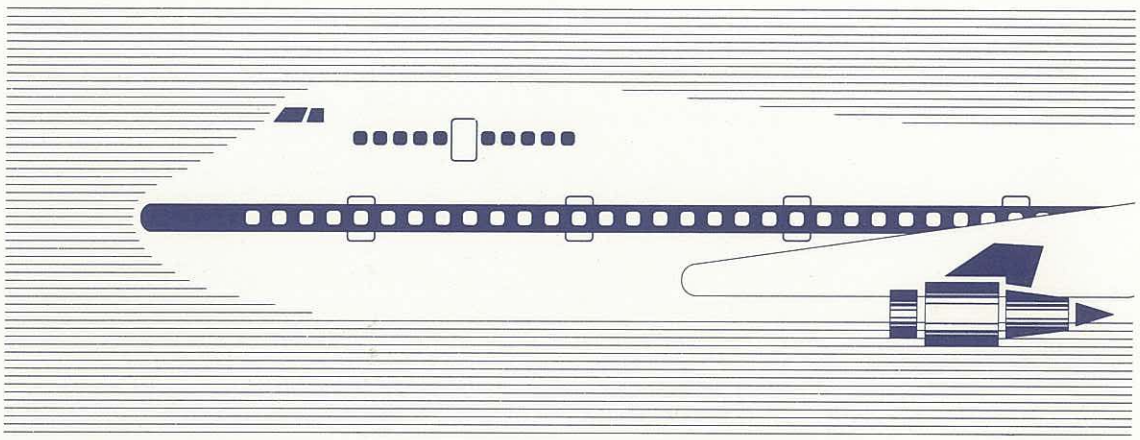

AVIATION OCCURRENCE REPORT

98-011 Air proximity incident, Boeing 767 and Piper PA 23-250 Aztec, near Auckland Airport — 4 December 1998

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

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Report 98-011

air proximity incident

Boeing 767 and Piper PA 23-250 Aztec

near Auckland Airport

4 December 1998

Abstract

At about 2125 hours on Friday 4 December 1998, a loss of separation occurred between an Air New Zealand Boeing 767 and a Sunair Piper Aztec near Auckland Airport. Both aircraft were under radar control at the time of the incident. The Boeing 767, on departure from Auckland, was intercepting the Auckland - Rarotonga track and climbing to flight level 250. The Piper Aztec was en route from Hamilton to Whangarei via Auckland, maintaining 7000 feet. The pilot of the Piper Aztec saw the Boeing 767 closing from the left and descended to ensure separation. The aircraft passed within approximately 0.7 nautical miles horizontally and 900 feet vertically.

The controller, on clearing the B767 to turn right on to track, did not notice a possible conflict with the overflying Piper Aztec. The newly installed Short Term Conflict Alert facility alerted the controller to initiate collision avoidance action as the required separation requirements had been infringed.

The safety issues identified were:

- the difficulty for controllers to maintain situational awareness of overflying aircraft,
- controllers management of flight progress strips,
- the span of responsibility for controllers following the consolidation of air traffic control sectors,
- the interaction of the ground based Short Term Conflict Alert system and the airborne Traffic Alert and Collision Avoidance System, and
- interruption of a transmission by the controller to SAV 17R.

Five safety recommendations relating to the safety issues were made to Airways Corporation of New Zealand.

Contents

List of abbreviations

ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATIS	automatic terminal information service
CA	conflict alert
DME	distance measuring equipment
ETA	estimated time of arrival
FL	flight level
MHz	megahertz
NDB	non directional beacon
nm	nautical miles
NZDT	New Zealand Daylight Time (UTC + 13 hours)
PRX	proximity alert
PVD	plan view display
QNH	an altimeter subscale setting to obtain height above mean sea level
RA	resolution advisory
SID	standard instrument departure
STCA	Short Term Conflict Alert
TA	traffic advisory
TCAS	Traffic Alert and Collision Avoidance System
TMA/C	Terminal Area class C
TMR	Approach or Terminal radar
VFR	very high frequency omnidirectional radio range

Transport Accident Investigation Commission

Aviation Incident Report 98-011

Aircraft types, flight numbers and registrations:	Boeing 767-219, ANZ 48, ZK-NBB Piper PA23-250 Aztec, SAV 17R, ZK-DIR
Date and time:	4 December 1998, 2125 hours[1]
Location:	Near Auckland Airport
Types of flights:	ANZ 48: Scheduled passenger transport SAV 17R: Non-scheduled passenger transport
Persons on board:	Crew: ANZ 48: 10 SAV 17R: 1 Passengers: ANZ 48: 155 SAV 17R: 2
Injuries:	Nil
Nature of damage:	Nil
Investigator-in-Charge:	I R M^{c}Clelland

[1] All times in this report are in NZDT (UTC + 13)

1. Factual Information

1.1 On Friday 4 December 1998 Sunair Piper Aztec ZK-DIR, operating as SAV 17R, was being flown on a non-scheduled passenger service from Hamilton to Whangarei. The flight planned route was via the Auckland VOR (very high frequency omnidirectional radio range) at an altitude of 7000 feet.

1.2 Auckland Control (Area radar), on 125.3 MHz, identified SAV 17R shortly after take off from Hamilton Aerodrome, at approximately 2055 hours. The Area controller then co-ordinated the departure of SAV 17R with a southbound flight to Taupo, callsign NSP. This latter aircraft was to vacate controlled airspace on descent to Taupo, with an estimated time of arrival (ETA) at Taupo of 2130 hours. Evening civil twilight for 4 December was at 2050 hours.

1.3 At 2104 hours as SAV 17R was passing approximately 15 nautical miles (nm) north of Hamilton, the pilot changed to the Approach radar (TMR)[2] controller on frequency 124.3 MHz and confirmed he was maintaining 7000 feet. The TMR controller acknowledged the call, "Sunair 17R thank you, 7000 feet, Northland QNH 1003." As there was no requirement to report overhead Auckland VOR, the next planned radio conversation with SAV 17R would be as the aircraft approached 'top of descent' for Whangarei, some 35 - 40 minutes later.

1.4 The TMR controller placed the computer-generated flight progress strip for SAV 17R in the strip rack with traffic inbound to Auckland. The intention was to manually transfer the strip to the outbound section of the rack as the aircraft passed overhead Auckland VOR. The rack contained no separate bay specifically for overflying aircraft. This planned action was in accordance with normal procedures.

1.5 Due to low traffic levels and workload, the Area radar position (126.0 MHz) was closed at 2115 hours and responsibilities passed to the TMR controller. The Bay Sector controller duties (125.3 &119.5 MHz) were included in the transfer. Along with the 4 active frequencies, the TMR controller was also monitoring 2 local approach frequencies, 120.5 and 120.1 MHz. Besides the TMR controller, the only other people in the radar room were the Oceanic controller and a technician.

1.6 When Area and TMR functions were amalgamated, the TMR controller was providing air traffic services for 4 aircraft, in addition to SAV 17R and NSP. These aircraft were a SAAB SF340 on approach to Auckland, a Boeing 737 (B737) and British Aerospace 146 (BAe146) inbound to Auckland from the south, and a B737 about to vacate the controller's airspace to the south. A fourth jet aircraft was approaching the Auckland Area boundary from the south.

1.7 Between 2113 and 2120 hours routine traffic co-ordination took place. The B737 to the south had changed to Christchurch Control and the SAAB, cleared for a visual approach, had changed to Auckland Tower. The inbound B737 and BAe146 had both been cleared to descend to 3000 feet. The fourth jet, identified crossing the Auckland boundary, was cleared to descend to 6000 feet and track direct to Auckland VOR.

1.8 At 2120 hours the TMR controller changed his radar range to 150 nm, identified NSP and confirmed that there was no conflicting traffic in the Taupo area. The controller then asked for the type of approach to be flown. The pilot of NSP stating that they would be flying "the NDB/DME ALPHA approach via the arc". The flight plan would be terminated on the ground through Christchurch Information.

1.9 The controller then changed to the 60 nm scale on the radar for a few seconds, before returning to remain on the 150 nm scale for the next 1½ minutes. No radio transmissions were made during this time.

[2] The term "TMR" refers to the terminal radar, which may be operated by an Approach or Terminal controller.

1.10 On the same evening, Air New Zealand Boeing 767 ZK-NBB, operating as ANZ 48, was being flown on a scheduled service from Auckland to Rarotonga. While taxiing for departure, ANZ 48 received its clearance to Rarotonga via the flight planned route at flight level (FL) 250[3].

1.11 The Auckland local area weather at the time was reported over the automatic terminal information service (ATIS) as: surface wind 240 degrees at 13 knots, scattered cloud at 2400 feet and a visibility of 30 kms. The runway in use was Runway 23.

1.12 The standard instrument departure (SID) passed to ANZ 48 was for it to climb to FL 140[4] and track to the Westpoint non-directional beacon (NDB). However, it was normal practice for aircraft to be identified by the controller shortly after take-off, well before reaching Westpoint NDB, and then to be cleared right or left on to track. To meet noise abatement requirements, the right turn would not be initiated until the aircraft had passed 3000 feet.

1.13 At 2122 hours, ANZ 48 called TMR, advising "passing 900 climbing FL 140". The controller identified the aircraft and instructed it "passing 3000 feet cancel SID turn right on track, climb FL 250". At this time SAV 17R was approximately 4½ nm to the south-east of Auckland VOR, maintaining 7000 feet.

1.14 The controller kept the radar range on the 150 nm scale during most of the conversation and changed the scale to 60 nm only when ANZ 48 read back the new clearance. He returned to the 150 nm scale on conclusion of the transmission from ANZ 48.

1.15 Shortly after ANZ 48 had read back the new clearance at 2123 hours, the pilot of NSP advised that he was anticipating a visual approach at Taupo and requested the lights for Runway 18 be turned on. The controller acknowledged the call and advised NSP "OK standby" as he needed to call back the technician who had gone to an adjacent room. The controller then contacted the technician by cordless telephone and advised him of the lighting requirements. The technician then immediately returned to his desk where the lighting controls for Taupo were located.

1.16 During the next 2 minutes the controller co-ordinated the lighting requirements at Taupo with the technician, approved the inbound B737's request to deviate from track due to weather and cleared the BAe146 "to descend to 2000 feet radar terrain". The pilot of the BAe146 read back the clearance and advised "anticipating visual approach". The controller acknowledged the reply.

1.17 As ANZ 48 passed 3000 feet, at around 2123:30 hours, it commenced a right turn on to a heading of approximately 040 degrees magnetic. At 2124:40 hours the controller changed the radar range to 60 nm for a few seconds before returning to the 150 nm scale. ANZ 48 was steady on its new heading by 2124:55 hours, at which time it was passing 6200 feet. The pilot of SAV 17R had noted the radio conversation between the controller and ANZ 48, and was able to occasionally sight the climbing B767 through gaps in the cloud.

[3] 25,000 feet
[4] 14,000 feet

1.18 At 2125:06 hours, with the radar range still set to 150 nm, the controller advised NSP that the lights were selected on at Taupo. The pilot of NSP acknowledged accordingly. At 2125:14 hours the controller's Short Term Conflict Alert (STCA) activated, indicating a conflict alert (CA) situation. The alert consisted of 2 audible beeps through the controller's keyboard, the radar label displays for the conflicting aircraft changing to a brighter intensity and the letters CA annotated on the labels. A conflict alert list was also displayed on the controller's plan view display (PVD) detailing conflicting aircraft callsigns, altitudes and distance information.

1.19 To correctly identify the conflict the controller changed the radar range to 60 nm, and at 2125:25 hours instructed ANZ 48 to "turn left heading 360". ANZ 48 acknowledged the heading change and advised, "we're just getting a TCAS (Traffic Alert and Collision Avoidance System) traffic alert here".

1.20 The traffic advisory (TA) on board ANZ 48, aural and instrument, indicated that the 'intruding aircraft' was in the 2 o'clock position. On looking out the cockpit window, the first officer, who was the non-flying pilot, detected "a set of landing lights in the 2 o'clock". At this stage the 2 aircraft were at about the same altitude and approximately 2 nm apart. ANZ 48 then began to turn onto its allocated heading.

1.21 At 2125:30 hours the controller's radar alert status changed to Proximity Alert (PRX), indicating an increase in the severity of the conflict. The change was indicated by a further 2 beeps on the controller's keyboard and the CA labels changing to PRX.

1.22 At about the time the PRX activated, the controller called SAV 17R, "Sunair 17R turn right heading 050". However, this transmission was cut off part-way through, with only "Sunair 17R" being heard on 124.3 MHz. The pilot of SAV 17R did not respond.

1.23 On hearing the transmission from ANZ 48 advising of a TCAS alert, and concerned that the 2 aircraft were to pass in close proximity, the pilot of SAV 17R initiated an immediate descent. He subsequently levelled at 6400 feet.

1.24 At 2125:42 hours, concerned about the closure rate and perceived slow turn away by both aircraft, the controller issued a second instruction to ANZ 48 to turn left. He also passed essential traffic information as "traffic north of Auckland overflying out on your one o'clock at 2 miles... seven thousand feet - you're above him now". ANZ 48 responded saying that they had had the traffic in sight, with the first officer observing the landing lights of SAV 17R passing behind and below.

1.25 After restoring separation and normal traffic flows, the controller located a replacement and was relieved from duty, as was normal practice after an incident.

1.26 Both aircraft completed their flights without further incident.

1.27 The incident occurred within Auckland Terminal Area class C (TMA/C) controlled airspace, in which aircraft are required to operate with an air traffic control (ATC) clearance, and where air traffic services are required to provide separation between aircraft "... for the purpose of preventing collisions".

1.28 The ATC radar was serviceable and was the primary means by which aircraft were being controlled. The minimum separation for 2 aircraft operating in TMA/C airspace under radar control was 3 nm horizontally or 1000 feet vertically. The 3 nm minimum required the radar to be operated on a maximum range scale of 60 nm; otherwise the lateral separation requirement increased to 5 nm.

1.29 At the time of the incident the minimum horizontal separation between the 2 aircraft was 0.7 nm. Vertical separation was 900 feet with SAV-17R descending through 6600 feet and ANZ 48 climbing through 7500 feet. At the time the 2 aircraft were level with each other, horizontal separation was 2 nm.

1.30 The controller concerned was validated on the Auckland TMR position in June 1998. For the previous 9 to 10 years he had held various controller positions at Auckland, which included Tower, Area and Oceanic qualifications. He had recently completed an annual medical examination and was in good health.

1.31 On 4 December, following a 2-day break, the controller began his duties at 1530 hours. The controller then spent 3 periods, each of approximately 1½ hour's duration, at the Terminal and Approach radar positions. Between each duty the controller was able to take a short break, during which he took some light refreshments. At 2046 hours the controller logged on at the Terminal position, which had been previously amalgamated with the Approach radar position. He took over the Area controller's duties at approximately 2115 hours. The incident occurred at 2125 hours.

1.32 At the time of the incident the controller was operating the radar with aircraft velocity vectors on and label overlap selected off, therefore requiring manual manipulation to avoid label interference. Local low level VFR traffic was erased from the screen on the 60 nm scale, but all traffic was displayed on the 150 nm scale. Traffic was considered by the controller and other staff to be light, generating a normal or average workload.

1.33 The recent introduction of STCA had been preceded by a training course for all controllers, which included a full day of lectures and practical exercises, followed by a short test. Despite a number of false CA and PRX alerts, the STCA was considered by controllers to be a valuable tool in helping to maintain traffic separation and ensure aircraft safety.

1.34 For TMA/C airspace, the STCA was calibrated to activate when it calculated that an aircraft would infringe a 2.5 nm horizontal or 800 foot vertical buffer around another aircraft. In a straight and level converging situation, this would give up to 95 seconds warning to the controller. In a climbing or turning situation, or both, the warning time would be reduced, to possibly less than 15 seconds. In this later context a PRX alert may be the first indication of a conflict. The PRX alert is activated when it is computed that the lateral separation will be less than 1.5 nm when the aircraft are within 1000 feet vertically.

1.35 During this incident, the STCA CA alert activated about 35 seconds before the aircraft tracks crossed, and about 10 seconds before infringing the 2.5 nm buffer zone. The alert status changed to PRX 20 seconds before the tracks crossed.

1.36 There was no requirement for aircraft operating within New Zealand airspace to have TCAS fitted. TCAS will provide information only when an 'intruding' aircraft is transponder or TCAS equipped. A TA warning, audio and instrument, is given when an intruding aircraft is 35 to 45 seconds from the aircraft's collision area. Should the intruding aircraft continue to within 20 to 30 seconds of the collision area, the warning level will increase to a 'resolution advisory' (RA). The RA will provide the crew with a climb or descend escape manoeuvre to avoid the intruder. When 2 aircraft are equipped with TCAS, the escape manoeuvres will be co-ordinated automatically.

1.37 ANZ 48 only was fitted with TCAS and the level of warning did not exceed a TA. At this level the crew were required by company procedures to "conduct a visual search" for the intruding aircraft, and if they saw anything, to "maintain visual acquisition to ensure safe separation". Evasive manoeuvres were not recommended unless they were considered essential for ensuring safety.

1.38 The planned move of the Auckland Air Traffic Control Centre (ATCC) to Christchurch by early 2000 has resulted in increased levels of concern, anxiety and stress for some controllers. However, the controller concerned believed that these additional pressures did not affect his ability to provide the required services at the time of the incident.

2. Analysis

2.1 The two aircraft involved in the incident were unlikely to have collided, even disregarding the evasive manoeuvres undertaken. However, the incident was significant, not only because it highlighted the interaction between STCA, TCAS, the controller and the air crew, but because the controller was unaware of the conflict until alerted by the STCA, which was supposed to have been the last ATC defence against a mid air collision, rather than the first alert for the controller.

2.2 The flight plan submitted for, and subsequently flown by, SAV 17R was not unusual. The majority of flights within the Auckland airspace either originate from or are planned to Auckland Airport. Other aircraft are usually flight planned to or from the nearby aerodromes of Whenuapai or Ardmore. This latter group of aircraft are, therefore, subject to active controlling when near Auckland.

2.3 A level overflight of Auckland, such as SAV 17R, is regarded by some controllers as "a trap". The flight progress strips for the overflying aircraft are placed in the inbound aircraft rack and transferred to the outbound rack as they pass overhead. The strips are placed in colour coded holders to assist the controller. The transfer of a strip requires manual intervention at the appropriate time, with controllers relying on a variety of cues to initiate the action. These cues include the controller's normal management and review of the progress strips, and monitoring aircraft as they approach overhead. However, the radar tracks of overflying aircraft can blend in with other inbound aircraft, with the potential to mask the actual destination of the overflying aircraft.

2.4 Ideally, flight progress strips for departing or outbound aircraft are sequenced chronologically in order of departure from Auckland. These strips may be received by the TMR controller up to 20 minutes before an aircraft is cleared for take-off. Further, the tower-initiated release system in operation at Auckland means that the TMR controller may not be aware of the order of departing aircraft, limiting the controller's ability to plan ahead can. Had the controller received more timely information on the take-off time of ANZ 48, he may have been able to conduct a more appropriate review of the departure profile and detect any possible conflict.

2.5 With no requirement to call overhead Auckland VOR, approximately 40 minutes would have elapsed before SAV 17R was required to talk to the TMR controller a second time. Other than the radar display, there was no additional prompt for the controller to update the progress of SAV 17R and thereby relocate the flight progress strip.

2.6 The controller's workload at the time of the incident was considered by him to be normal and within his capabilities. Although traffic levels were light, the controller was required to maintain a watch over a significant number of airspace sectors and radio frequencies. The Manual of Air Traffic Services and local procedures allowed for the reduction of staffing levels as traffic volumes decreased during the night. The absence of a planner to assist in traffic co-ordination and flow, removed any back-up the controller would have had in identifying a developing conflict. A planner, in conjunction with the controller, may have provided greater scrutiny of the departure of ANZ 48 and aided in the detection of SAV 17R as it passed overhead Auckland VOR.

2.7 The combination of using only one PVD for air traffic co-ordination and the combining of the Area, Terminal and Approach sectors meant that the controller was required to make frequent scale changes on the radar in an attempt to provide cover for the whole area. As a result the function of the flight progress strips', in complimenting the radar display, in helping to maintain traffic co-ordination and situational awareness was diminished.

2.8 Although an adjacent PVD was available, the controller continued to use the screen in front of him to provide traffic information on both the 60 and 150 nm scales. With "de-clutter" selected to off on the 150 nm scale, the radar target for SAV 17R would have been located among the radar returns generated by other local area traffic in the time immediately leading up to the incident.

2.9 Radar recordings indicated that the controller spent the majority of his time with the radar on the 150 nm scale. Between the first conversation with NSP at 2120 hours and the activation of the STCA at 2125:14 hours, the controller changed to the 60 nm scale 3 times, each for less than 11 seconds.[5] The range scale was on 150 nm when the controller confirmed with NSP that the lights at Taupo had been switched on, and when the STCA activated.

2.10 The SID given to ANZ 48 contained no unusual elements and was appropriate for the flight to be flown.

2.11 Approximately 1½ minutes elapsed between the time the controller talked to NSP and the time the pilot of ANZ 48 reporting passing 900 feet. There were no other radio transmissions during this time. There was ample time for the controller to locate SAV 17R as it passed between 9 and 5 nm to the south-east of Auckland VOR. Except for the first few seconds of this period, the range scale on the radar remained set on 150 nm.

[5] Scale changes for 10 seconds or less can only be recorded as an 11 second period.

2.12 Before the controller cleared ANZ 48 to turn right, all the traffic being controlled was to the south of Auckland. The controller's attention was likely to have been focused in this direction with little consideration given to any possible conflict developing to the north of Auckland. The controller had the radar range on 150 nm while he identified ANZ 48, and changed briefly to 60 nm only when the first officer read back the new clearance.

2.13 The normal procedure before cancelling a SID was for the controller to identify the aircraft concerned, generally by matching the radio call and radar label, then scan the radar screen in the intended direction of flight to detect any possible confliction and then issue the new clearance. The controller took approximately 5 seconds to perform this procedure for ANZ 48, but omitted to identify SAV 17R and project forward its intended flight path. Consequently he did not apply any separation criterion to the 2 incident aircraft.

2.14 After clearing ANZ 48 to turn right and climb on track, the controller's attention was again diverted to the south of Auckland in response to NSP's request for runway lights at Taupo. In changing the radar range to 150 nm, the label for SAV 17R could have been masked by the clutter of the traffic displayed on the screen. The STCA activated shortly afterwards.

2.15 It was common practice for technicians to move about the building, necessitating the use of the cordless telephone to establish contact. As the technician's desk and the controller's radar panel were only 5 m apart, it was likely that the controller turned away from his display to converse with the technician. This could be achieved easily without any interference or limitation.

2.16 Approximately 10 seconds elapsed between the STCA alert activating and the controller issuing a heading change to ANZ 48. A small proportion of this time would have been spent recognising the alert and changing the radar range to 60 nm to help distinguish the conflict. A greater proportion of time would have been spent identifying the situation and determining the best course of action. In this context, 10 seconds would be about the expected reaction time.

2.17 The STCA alert to the controller and the TCAS advisory to the crew of ANZ 48 were received almost simultaneously. In response to the TA, the first officer began to look for the intruder on his side of the aircraft. He was able to locate the intruding aircraft in the 2 o'clock position and about level with, but soon to pass below, ANZ 48. The controller's instruction to the crew of ANZ 48 to change heading was transmitted about this time. The first officer acknowledged the heading change and dialled in the new heading on the mode control panel and the aircraft commenced the left turn.

2.18 The initial instruction, by the controller, for ANZ 48 to turn left contained no urgency status. For example, words such as 'immediately' or 'now' were not included in the transmission.

2.19 The controller, concerned at the closure rate between the 2 aircraft, confirmed the heading change with ANZ 48 and inferred some greater urgency by including the term "essential traffic information...". This second instruction to ANZ 48 may have been influenced by a perceived low turn away by ANZ 48 and lack of heading change by SAV 17R.

2.20 The slow heading change by ANZ 48, as indicated by the radar plot, may be explained in part by the fidelity or accuracy of the radar. The PVD's multi-radar track update occurs every 5 seconds, and as a result the aircraft target will reflect a change at the same rate. The aircraft's velocity vector provides a flight path projection for the controller in the horizontal plane only. This projection is, however, based on the aircraft's previous heading and will lag during a turn. The tighter the turn, the greater the lag angle.

2.21 SAV 17R began to descend at about the same time the controller attempted to direct the pilot to turn right away from the flightpath of ANZ 48. The pilot did not respond to the abbreviated call, heard only as "Sunair 17R *click*", as he was probably preoccupied with executing the evasive manoeuvre. Further, having started the descent the pilot was satisfied that he would be clear of the wake turbulence generated by ANZ 48.

2.22 The reason for the broken transmission to SAV 17R was still being investigated by Airways Corporation. A recording of the transmissions on 124.3 MHz does not contain the segment "turn right heading 050". However, a second tape, recording all conversations made or received by the controller through his control panel, contains the full transmission made to SAV 17R. It is, therefore, considered to be more likely a technical fault that interrupted the transmission.

2.23 The decision by the pilot of SAV 17R to descend was understandable and appropriate. The combination of night and scattered cloud would have prevented the pilot from gaining a full and correct appreciation of the relative position of the 2 aircraft.

2.24 Though qualified on the TMA position for 5 months only, the controller was, nevertheless, experienced and familiar with the Auckland area. The traffic at the time of the incident was considered by the controller to be light. The controller's experience included a number of years as an oceanic and area controller. He might, therefore, have been biased to operating the radar on the 150 nm range scale whenever possible.

2.25 The level of impact of the planned relocation of the ATCC to Christchurch cannot be accurately determined. It would be normal to expect the staff of any organisation planning a major restructure to be affected to some degree. Nevertheless, the relocation does not appear to be a factor in this incident.

3. Findings

Findings and safety recommendations are listed in order of development and not in order of priority.

3.1 The TMR controller involved was properly qualified and fit for duty.

3.2 The 2 aircraft were under the control of the TMR controller at the time of the incident and operating in accordance with ATC clearances.

3.3 The TMR controller was operating without direct support, controlling the Auckland Area, Bay, Terminal and Approach sectors.

3.4 The TMR controller's selection of the 150 nm range scale on the radar, with de-clutter selected off, for the majority of the time leading up to the incident was not appropriate, as it reduced his level of awareness of the traffic near Auckland.

3.5 After the initial communication with SAV 17R, the controller did not continue to monitor the progress of the aircraft, either by use of the flight progress strip or by the radar display.

3.6 The absence of any radio conversation between the controller and SAV 17R contributed to the controller not updating the progress of SAV 17R until alerted by the STCA.

3.7 After cancelling the SID and clearing ANZ 48 to turn right, without first confirming the position of SAV 17R, the controller gave a clearance that resulted in a loss of separation between the aircraft.

3.8 The STCA performed as intended.

3.9 STCA and TCAS together provided appropriate and timely levels of collision avoidance information for the controller and crew of ANZ 48.

3.10 The controller's actions after becoming aware of the conflict between ANZ 48 and SAV 17R were appropriate.

3.11 The reason for the broken transmission from the TMR controller to SAV 17R had not been identified at the time this report was published.

4. Safety Actions

4.1 Airways Corporation advised that it has initiated a number of actions, including:

- The installation of a trial TV monitor above the TMA controller's console, relaying imags of the Tower controller's flight management board containing the order of aircraft about to take off.
- Implemented standard operating practices for night operations, based on lessons learnt from this incident.
- Engaged an Industrial consultant to review the manner in which controllers are taught scanning techniques.

5. Safety Recommendations

5.1 On 12 April 1999 it was recommended to the Chief Executive of the Airways Corporation that he:

5.1.1 Review training and local procedures to encourage controllers to issue reporting instructions for aircraft that may pose a conflict as they pass either overhead or through local terminal areas, (026/99); and

5.1.2 Issue instructions for controllers to utilise adjacent PVD to provide additional information and thereby avoid continual scale changes on their own screen, (027/99); and

5.1.3 Review orders and instructions to ensure the criteria under which controller staffing levels can be reduced, are adequately defined, (028/99); and

5.1.4 Review controller training and checking standards to ensure flight progress strips continue to compliment the functions of the radar display and provide an adequate means by which to control aircraft should there be a radar failure of some sort, (029/99); and

5.1.5 Investigate fully the cause for the interruption of the transmission from the controller to the pilot of SAV 17R on 124.3 Mhz (030/99).

5.2 On 2 June 1999 the Chief Executive of the Airways Corporation responded as follows:

5.2.1 **026/99**
Airways has completed publication of a Standard Operating Technique that states, inter alia, "Over-flying aircraft should be instructed to report over the VOR or at an appropriate point or time as a reminder."

5.2.2 **027/99**
Airways has completed publication of procedures that instruct controller to make use of the two available PVDs.

5.2.3 **028/99**
A review of position consolidation procedures is currently being conducted and is expected to be completed by 30 June 1999.

5.2.4 **029/99**
The recommended review is currently being conducted. A specialist external consultant is being employed to assist with this review. Expected completion date is 30 June 1999.

5.2.5 **030/99**
Airways has completed all known tests to determine the reason for the broken transmission. No technical fault was found although the possibility of a fault existing at the time cannot be eliminated. In spite of the conclusion reached by the investigator in paragraph 2.22 of the report the possibility of premature release of the transmit key by the controller also cannot be eliminated. There are circumstances whereby the full transmission could have appeared on the second tape even if the transmission key had been released. It is not possible to analyse those circumstances retrospectively.
Airways considers that it is not now possible to determine the reason for the broken transmission.

Approved for publication 26 May 1999

Hon. W P Jeffries
Chief Commissioner

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