



Australian Government
Australian Transport Safety Bureau

Loss of separation involving CASA C212-CC, VH-MQD, operating in the Richmond parachuting area and Boeing 737-7BX, VH-VBP

near Richmond Aerodrome, NSW | 5 November 2011



Investigation

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Addendum

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Safety summary

What happened

On 5 November 2011, a Construcciones Aeronáuticas S A C212-CC (C212) aircraft, registered VH-MQD, was conducting parachute operations, in controlled airspace, over the Western Grass Drop Zone at Royal Australian Air Force Base Richmond Aerodrome (Richmond), New South Wales (NSW). Air traffic control (ATC) had assigned the C212 flight crew clearance to conduct a parachute drop.

A Boeing Company 737-7BX (737) aircraft, registered VH-VBP, operating a scheduled passenger flight from Sydney, NSW to Cairns, Queensland, was cleared by ATC to track via Richmond, underneath the C212. A loss of separation occurred between the declared parachute operations area and the 737. At the time, the paratroopers had just exited the C212 and ATC issued the 737 flight crew, who were in the process of taking avoiding action, with a safety alert. The last paratrooper out of the aircraft reported that while in free fall and about 10 seconds after exiting the aircraft, they were at the same altitude as the 737, about 2,000 m away.

What the ATSB found

The ATSB identified that Airservices Australia (Airservices) had no standard, documented procedure to assure separation of aircraft departing Sydney via Richmond during parachute operations at Richmond, nor a documented means for controllers to display in the air traffic control computer system when a parachute drop clearance had been issued.

The ATSB also found that two of the controllers involved had not been provided with training in compromised separation recovery techniques. Furthermore, Airservices' process for recognition of prior learning, and the subsequent training provided to one of the controllers, had not effectively addressed the variances between that controller's skills and knowledge (after an absence working overseas) and the operational role requirements of a Sydney Terminal Control Unit air traffic controller.

What's been done as a result

Airservices advised that the Sydney Terminal Control Unit Local Instructions were amended to include a requirement for coordination between the Sydney Approach West controller and the adjacent Departures position when parachute operations were being conducted at Richmond.

Airservices also amended their procedures manual to include human-machine interface directives for the display of information for aircraft involved in parachute operations.

Safety message

This occurrence highlights three important safety lessons for air traffic controllers and flight crew:

- Documented procedures and phraseology are crucial when managing risks associated with unfamiliar operations
- Terminal area speed restrictions help maintain aircraft separation—air traffic controllers should always consider the potential safety implications before cancelling a speed restriction
- Flight crews need to be aware that the cancellation of a speed restriction may not always be available when requested, due to operational ATC requirements.

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The occurrence

Sequence of events

At 1443 Eastern Daylight-saving Time¹ on 5 November 2011, a loss of separation (LOS)² occurred during parachute operations overhead Royal Australian Air Force (RAAF) Base Richmond (Richmond), 50 km north-west of Sydney, New South Wales (NSW). The two aircraft involved were:

- a Construcciones Aeronáuticas S A C212-CC (C212) aircraft, registered VH-MQD (Figure 1), which was conducting parachute operations over the Western Grass Drop Zone at Richmond
- a Boeing Company 737-7BX (737) aircraft, registered VH-VBP, which was being operated on a scheduled passenger flight from Sydney to Cairns, Queensland.

Figure 1: Aircraft VH-MQD



Source: Craig Murray

Parachute operations

At 1403:59, the C212 flight crew contacted the Sydney air traffic control (ATC) Terminal Control Unit (TCU) Sydney Approach West (SAW) controller and reported being airborne off runway 10 at Richmond, on climb initially to 5,000 ft above mean sea level (the standard assignable altitude between Richmond Tower and SAW), for a parachute drop at 8,000 ft, over the Western Grass Drop Zone at Richmond, to be followed by a second drop from 12,000 ft. The SAW controller issued a clearance for the C212 to climb to 8,000 ft and instructed the flight crew to report when they were ready to dispatch the paratroopers.

The drop zone was contained within the Richmond Control Zone (CTR), which extended to 2,500 ft above Richmond and was managed by military ATC based in Richmond Tower. As a result, the civilian SAW controller was required to obtain approval for the drop. This ensured that separation from aircraft within the Richmond CTR was maintained and that no aircraft on the ground at Richmond started engines while the drop was in progress.

¹ Eastern Daylight-saving Time (EDT) was Coordinated Universal Time (UTC) + 11 hours.

² A loss of separation (LOS) is an occurrence in which two or more aircraft come into such close proximity that a threat to the safety of the aircraft exists, or may exist, in airspace where the aircraft is subject to an air traffic separation standard.

Richmond Tower had issued a Notice To Airmen (NOTAM)³ advising pilots that a start clearance was required when operating from Richmond, due to parachute operations. The intent of the NOTAM was to allow for the active control of departures, and provide assurance that the drop zone and paratroopers would remain separated from taxiing and departing aircraft.

At 1409:35, the C212 flight crew advised the SAW controller that they were 3 minutes out from the drop zone at 8,000 ft. The SAW controller coordinated a drop clearance with Richmond Tower and then issued the C212 with a clearance for the parachute drop, with an instruction for the flight crew to report when the last paratrooper had left the aircraft ('chutes away').

At 1413:22, the C212 flight crew reported to the SAW controller that the first parachute drop was complete and requested climb to 12,000 ft. The controller approved this request, with an instruction for the flight crew to report when ready for the second drop. That controller then advised Richmond Tower that the parachute drop from 8,000 ft was complete. The SAW controller later reported that when controlling the C212, they considered that from the clearance provided, the C212 flight crew were approved to manoeuvre at their discretion during the climb to 12,000 ft due to the nature of the operations.

At 1418:54, the C212 flight crew reported to the SAW controller that they were 3 minutes out from the drop zone at 12,000 ft and requested a drop clearance. The SAW controller advised that there would be a short delay for clearance and instructed them to maintain 12,000 ft, as there was military traffic inbound to Richmond. About 5 minutes later, the SAW controller instructed the C212 flight crew to reposition their aircraft behind the arriving military traffic. The flight crew advised the SAW controller that the arriving aircraft would have to be on the ground at Richmond with engines shut down before the Tower controllers would issue approval for the C212's parachute drop, and that it would probably be a period of 6 to 8 minutes.

At 1429:22, the SAW Controller requested Richmond Tower to advise when their arriving traffic had shut down and a drop clearance was available for the C212. The SAW controller then informed C212 flight crew of this arrangement.

At about 1430, a handover/takeover was conducted on the Sydney Departures South (SDS) console, in the TCU, for the combined SDS and Sydney Departures North (SDN) control positions. The incoming controller was a trainee undergoing on-the-job training under the direct supervision of an on-the-job training instructor (OJTI) and was approaching the end of the training period before their final checks. The OJTI reported that, during the handover process, the relinquishing controller did not inform them that there were parachute operations at Richmond. The C212 was not specifically mentioned, nor any relative separation arrangements between the combined SDS/SDN and SAW.

At 1434:43, Richmond Tower coordinated a drop clearance for the C212 with the SAW controller. In response, the SAW controller cleared the C212 flight crew to drop a 'stick'⁴ of five paratroopers, and requested that the flight crew report when they were commencing the run over the drop zone.

At 1437:11, the C212 flight crew reported being on the inbound run to the drop zone but that they would have to go around again, as they were unable to establish contact with the Drop Zone Safety Officer. The SAW controller instructed the C212 flight crew to manoeuvre at their discretion and report when ready to commence the inbound run again.

Loss of separation assurance

At that time, the 737 departed Sydney runway 34 Left (34L) on climb to 5,000 ft. The flight crew of the 737 had been issued with a Standard Instrument Departures (SID)⁵ clearance, which would

³ A Notice To Airmen advises personnel concerned with flight operations of information concerning the establishment, condition or change in any aeronautical facility, service, procedure, or hazard, the timely knowledge of which is essential to safe flight.

⁴ The number of paratroopers who jump from an aircraft during one run over a drop zone.

take the aircraft overhead Richmond. The 737 flight crew called the SDS trainee after transfer from Sydney Tower, requesting cancellation of the not above 250 kt indicated air speed restriction that applied to all arriving and departing aircraft below 10,000 ft within 30 NM (56 km) of Sydney. The trainee instructed the crew to maintain 5,000 ft and cancelled the speed restriction.

The SDS trainee reported that as they scanned their air situation display, they saw the C212 operating at 12,000 ft in the adjacent SAW airspace and identified the potential conflict with the 737. The trainee recalled attempting to ask the SAW controller for instructions via the hotline intercom system and through face-to-face contact but, as that controller appeared to have a very high workload with frequency congestion, no recorded coordination was achieved. The trainee reported that they decided that a safe means of ensuring vertical separation between the two aircraft would be to assign the 737 a climb to 10,000 ft. The standard assignable level for all jet aircraft departing from Sydney on a SID was flight level (FL)⁶ 280.

The OJTI reported that initially restricting the 737's climb to 10,000 ft was considered appropriate as both controllers were unaware at the time that the C212 had been issued a drop clearance by the SAW controller. The OJTI also reported that, as they themselves did not have a SAW endorsement, they did not have a full understanding of parachute operations at Richmond, or of the implications of these operations for their departures planning.

The decision to track the 737 via Richmond at an altitude beneath the C212 resulted in a loss of separation assurance (LOSA).⁷ At that time, the applicable separation minima between aircraft of 3 NM (5.6km) radar separation or 1,000 ft vertical separation was maintained. However, the 737's clearance meant that it would cross the defined parachute operations area (the area within a circle of 1 NM (1.85 km) radius of Richmond from ground level up to the C212's operating altitude). In this case, there was no assurance that the SAW controller would maintain the C212 at 12,000 ft, or that a drop clearance would be withheld by the SAW controller.

At 1439:15, the SDS trainee assigned the 737 a climb to 10,000 ft. At that time, the 737 was 21.5 NM (39.8 km) to the south-east of Richmond, passing through 3,400 ft with a groundspeed⁸ of 280 kt. The C212 was 1.7 NM (3.1 km) to the south-west of Richmond, maintaining 12,000 ft,⁹ with a groundspeed of 120 kt (Figure 2).

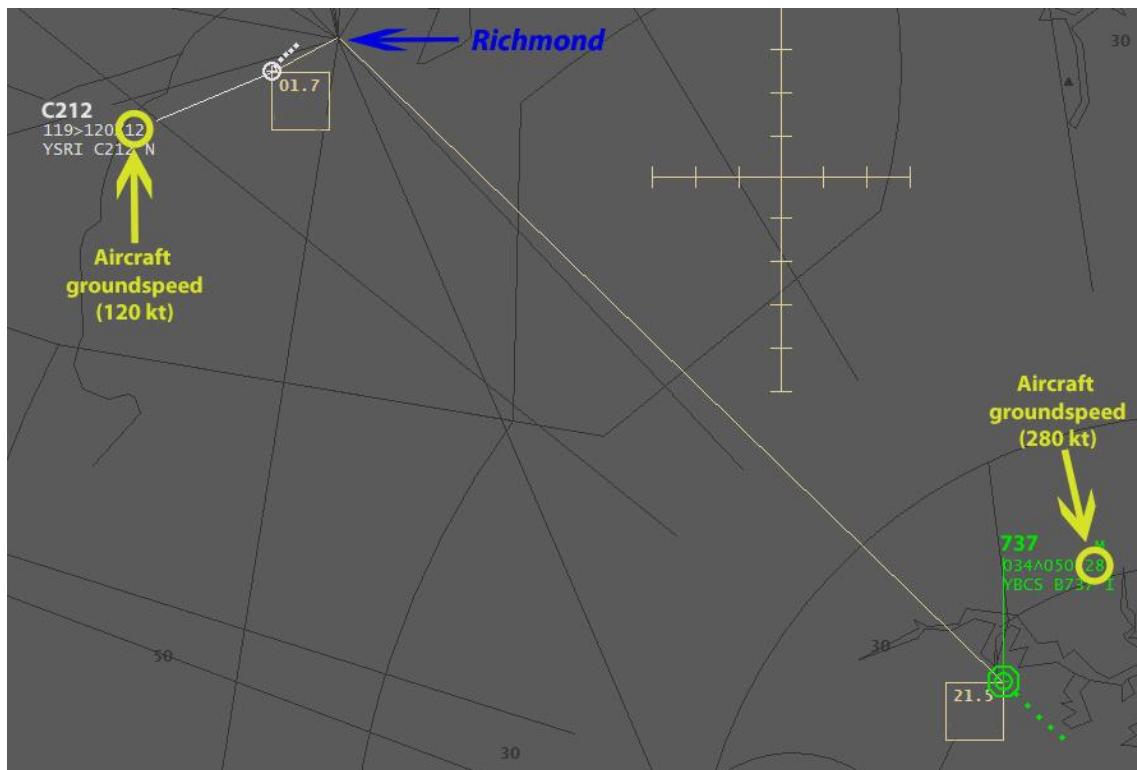
⁵ Standard Instrument Departures (SIDs) are designated Instrument Flight Rules departure routes linking the airport or a specified runway of the airport with a specified point, normally on a designated ATS route, at which the en route phase of a flight commences.

⁶ At altitudes above 10,000 ft in Australia, an aircraft's height above mean sea level is referred to as a flight level (FL). FL 280 equates to 28,000 ft.

⁷ Loss of separation assurance (LOSA) describes a situation where a separation standard existed but planned separation was not provided or separation was inappropriately or inadequately planned.

⁸ Aircraft's speed relative to the ground.

⁹ For ATC purposes, aircraft are determined by ATC to be maintaining a level when within +/- 200 ft of the assigned level.

Figure 2: Aircraft positions at 1439:15

Note: Each graduation on the scale marker is 1 NM (1.85 km). Aircraft groundspeeds are displayed in kt in units of ten.

Shortly after, the C212's PM advised the SAW controller that they had established contact with the safety officer and that they were 3 minutes from overhead the drop zone. The SAW controller reiterated the C212's drop clearance and requested that the flight crew report 'chutes away'. The SAW controller then advised Richmond Tower that the C212 was positioning for the drop run and was 2 minutes out (from overhead Richmond). Richmond Tower reiterated the drop clearance for the C212.

Transfer of the 737 to the Sydney Approach West control position

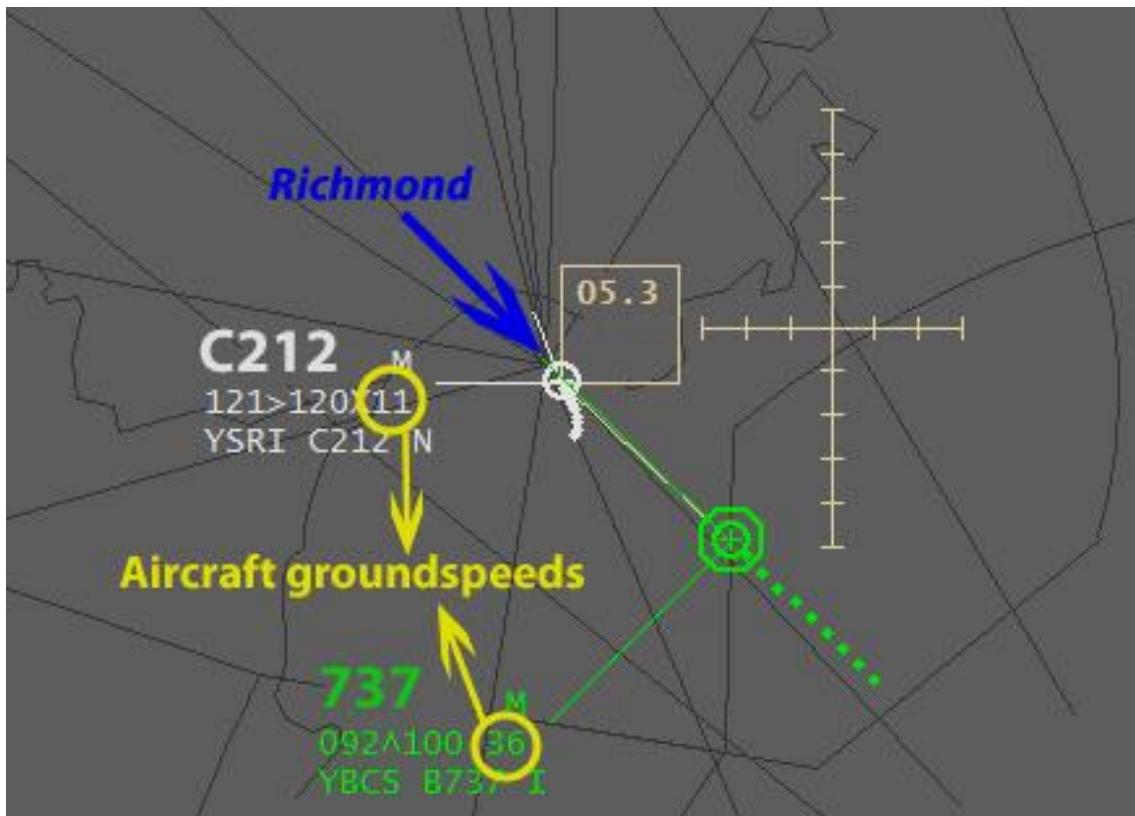
At 1440:45, when the 737 was 2.5 NM (about 5 km) from the Richmond Control Zone boundary and about 13.7 NM (about 25 km) from Richmond, the SDS trainee initiated a computerised handoff proposal to the SAW controller via the Australian Advanced Air Traffic Control System (TAAATS). The SDS trainee reported that, just prior to commencing the system handoff, they verbally advised the SAW controller that the 737 was assigned 10,000 feet. This advice was reportedly given via a raised voice in the direction of the SAW's console in the Sydney TCU Operations Room. The OJTI reported that they had prompted the trainee to initiate an early system handoff to assist the SAW controller's situational awareness of the separation action being taken by the SDS trainee.

The SAW controller accepted the system handoff of the 737 thirty-four seconds after the handoff proposal was initiated. During that period, the SAW controller was engaged in numerous transmissions to/from low-level aircraft operating outside controlled airspace and was assisting the Camden Tower controller and the TCU Shift Supervisor locate a missing aircraft.

The SAW controller stated that they first became aware of the 737 as it was being handed off to them, about 6–7 NM (about 11–13 km) to the south-east of Richmond, on climb to 10,000 ft. They recalled realising at about the same time that there were not enough track miles to climb the 737 over the C212 while maintaining separation.

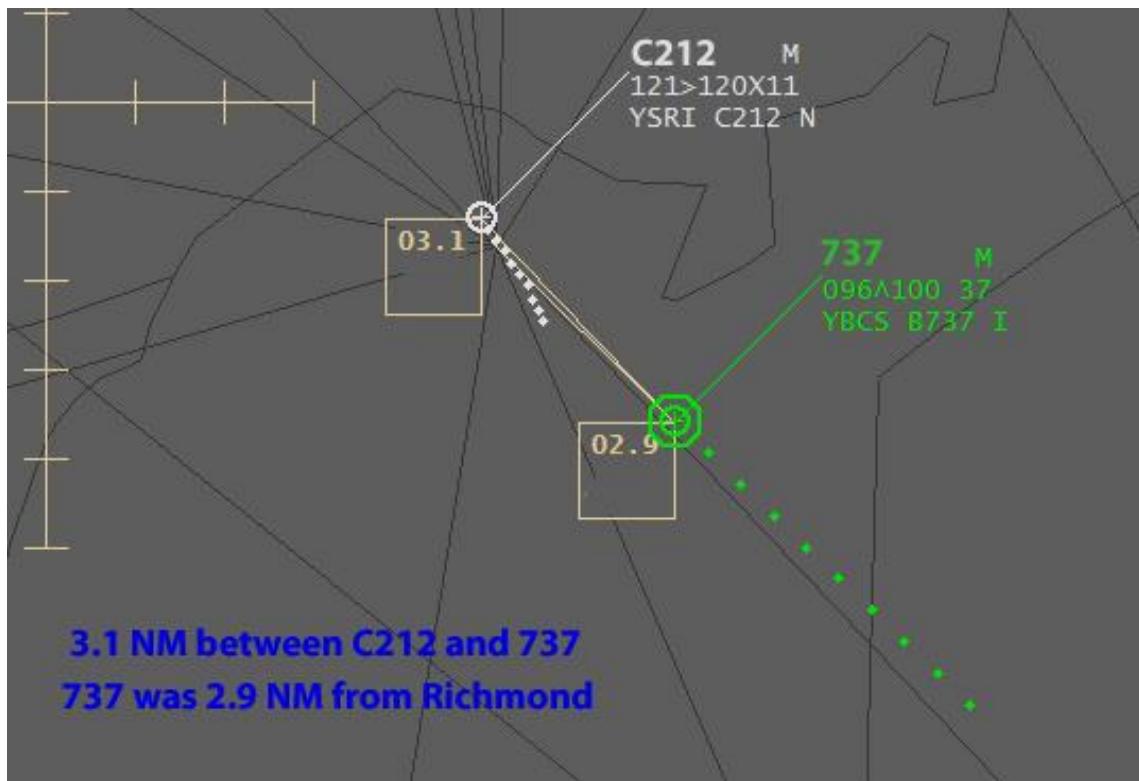
The SDS trainee instructed the 737 flight crew to contact the SAW controller at 1441:28, following that controller's system acceptance of the aircraft. The 737 flight crew first contacted the SAW controller at 1442:05, and was instructed by the SAW controller to stand by. At the time, the 737 was climbing through 9,200 ft, at a groundspeed of 360 kt, and 5.3 NM (9.8 km) from the C212. The C212 was maintaining 12,000 ft at a groundspeed of 110 kt and about 1 NM (1.85 km) south of Richmond tracking north-westerly (Figure 3).

Figure 3: Aircraft positions at 1442:05



Note: Each graduation on the scale marker is 1 NM (1.85 km). Aircraft groundspeeds are displayed in kt in units of ten.

The SAW controller then asked the C212 flight crew for the 'status of the chutes'. Seven seconds later, after no response from the C212 flight crew, the SAW controller called again, to which the flight crew asked for the controller to repeat their request. The SAW controller again asked for a report on the 'status of the chutes', to which the flight crew responded with another request for the controller to repeat their query. The controller then asked 'are the chutes in the air?' to which the flight crew reported that the paratroopers were exiting the aircraft. At that time (1442:35), the 737 was 2.9 NM (5.4 km) to the south-east of Richmond, passing 9,600 ft on climb, with a groundspeed of 370 kt. The C212 was maintaining 12,000 ft, with a groundspeed of 110 kt, just to the north-west of Richmond and 3.1 NM (5.7 km) from the 737 (Figure 4).

Figure 4: Aircraft positions at 1442:35

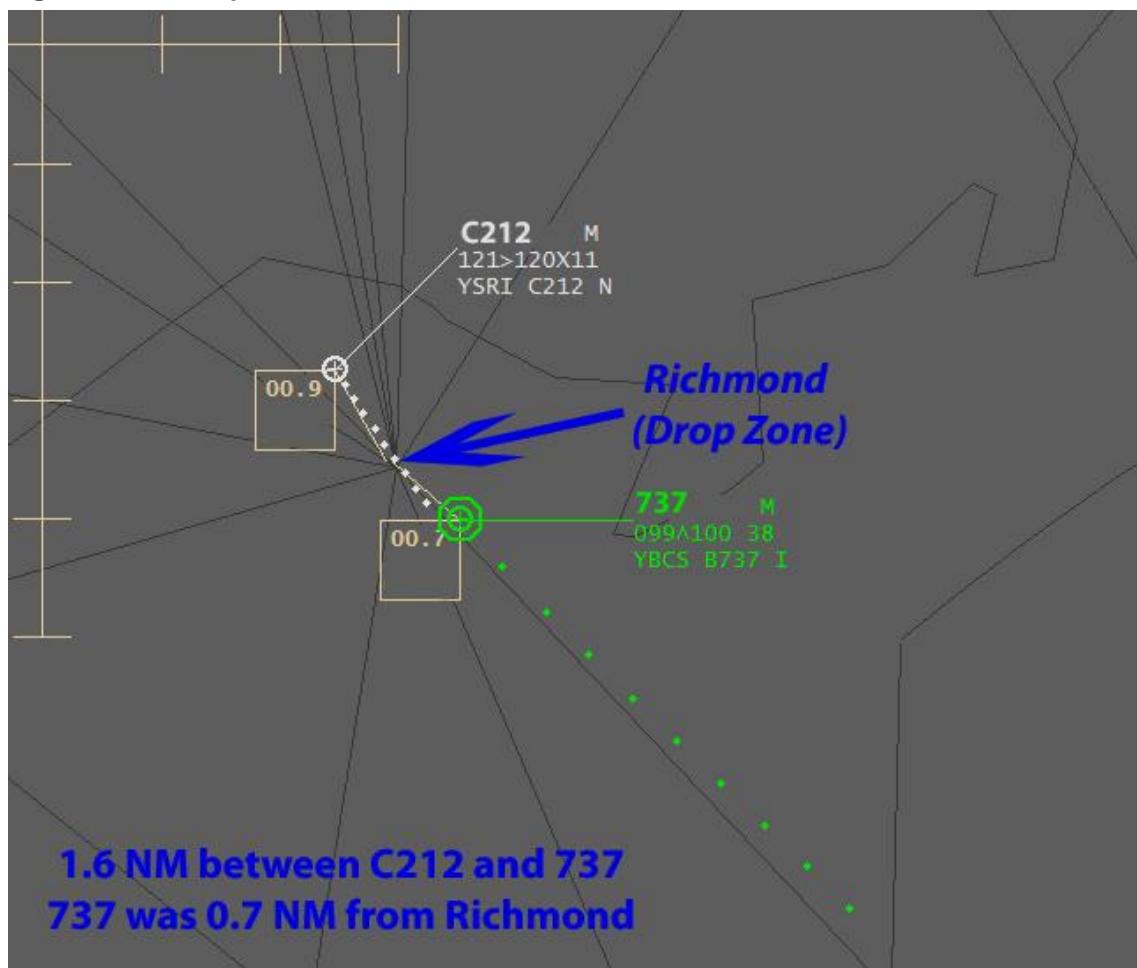
Note: Each graduation on the scale marker is 1 NM (1.85 km). Aircraft groundspeeds are displayed in kt in units of ten.

Loss of separation

At 1432.37, the SAW controller cancelled the C212 flight crew's clearance to conduct parachute operations and instructed the flight crew to maintain 12,000 ft. The controller also advised the C212 flight crew that there was a 737 transiting Richmond at 10,000 ft. The C212 flight crew again reported that the paratroopers were 'off the ramp'. The controller asked for the response to be repeated and the flight crew reiterated that the paratroopers had exited the aircraft.

Directly after, at 1442:59, the SAW controller issued a traffic alert to the 737 flight crew that advised the C212's call sign and that 'chutes [were] in the air'. At that time, the C212 was maintaining 12,000 ft, with a groundspeed of 110 kt, 0.9 NM (1.7 km) north-west of Richmond and 1.6 NM (3.0 km) ahead of the 737. The 737 was 0.7 NM (1.3 km) south-east of Richmond (the 'drop zone'), passing 9,900 ft in the climb, at a groundspeed of 380 kt (Figure 5).

There was a LOS between the 737 and the Richmond parachute operations area (and paratroopers). The requisite separation standard was for controllers to apply a separation buffer of 1 NM (1.85 km) around a declared parachute operations area, which itself was defined as an area within 1 NM (1.85 km) radius of the dropdown zone or target (see the section titled *Air traffic control information – ATC parachuting procedures*). In this instance, the target was within Richmond and for the period that the 737 operated within 2 NM (3.7 km) of Richmond, there was a loss of separation.

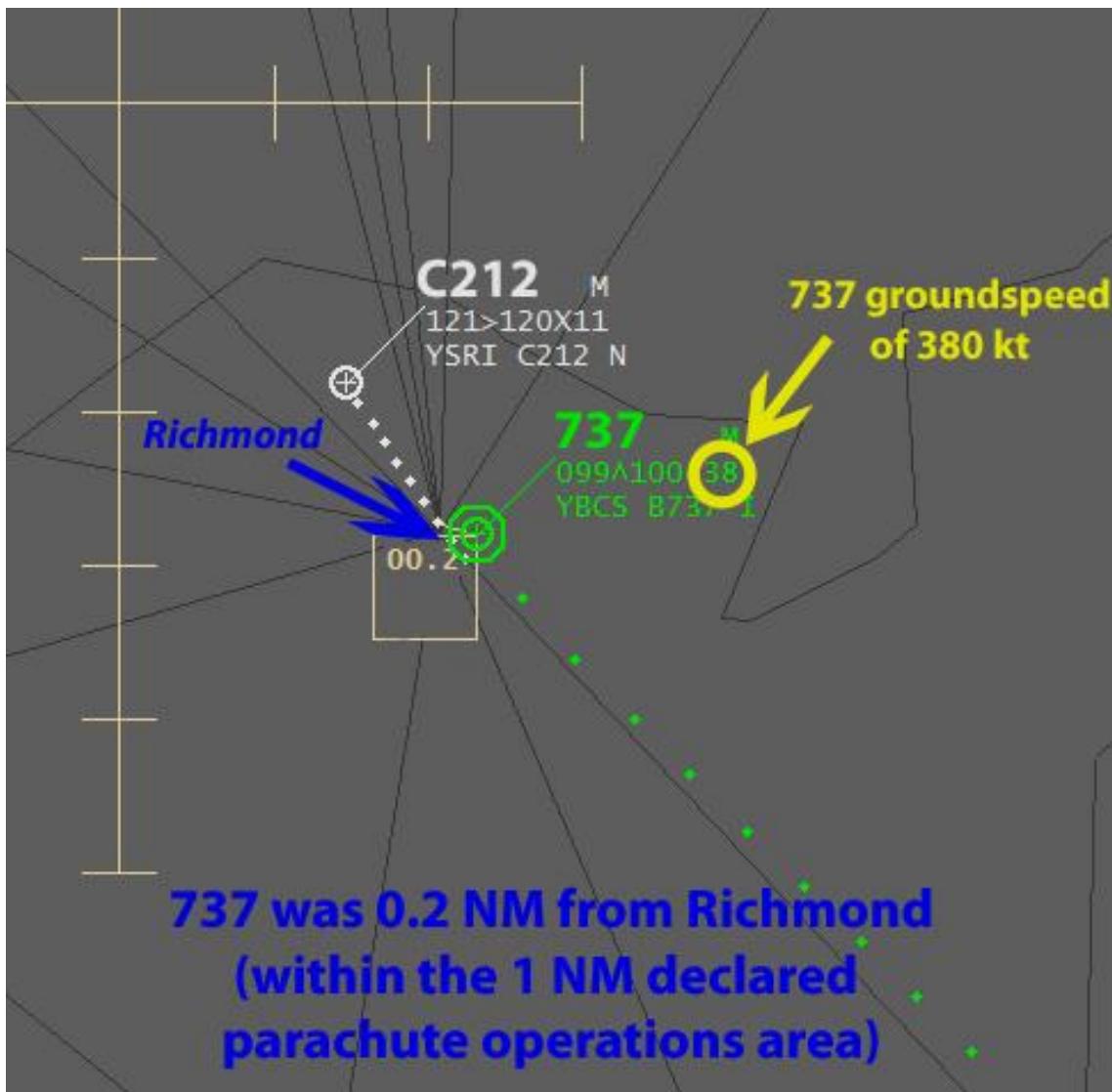
Figure 5: Aircraft positions at 1442:59

Note: Each graduation on the scale marker is 1 NM (1.85 km). Aircraft groundspeeds are displayed in kt in units of ten.

At 1443:06, the 737 flight crew advised the SAW controller that they had the C212 in sight and were turning right immediately. The controller then instructed the 737 flight crew to turn right onto a heading of 020° and maintain 10,000 ft, which was acknowledged. Soon after, the C212 flight crew advised that they had sighted the 737 and that it was well clear of the paratroopers.

Separation between the 737 and the declared drop zone reduced to 0.2 NM (0.4 km) before the right turn that was initiated by the 737 flight crew took effect (Figure 6). At that time, the groundspeed of the 737 was 380 kt.

Figure 6: Aircraft positions at 1443:02



Note: Each graduation on the scale marker is 1 NM (1.85 km). Aircraft groundspeeds are displayed in kt in units of ten.

Witness information

Flight crew of the 737

The 737 flight crew reported that as they were approaching Richmond, they became aware of confusion between ATC and a parachuting aircraft over the status of the parachutists. The 737 flight crew reported making visual contact with the parachute aircraft and initiating a right turn. This avoiding action was taken before receiving an ATC clearance, which was issued shortly after. They reported remaining 'just to the east' of the C212 and at no time sighted the parachutists.

Flight crew of the C212

The C212 was taxied for the flight, the seventh of the day, at 1400. The flight crew indicated that the flight was to dispatch one 'stick' of four paratroopers from 8,000 ft, followed by a 'stick' of five paratroopers from 12,000 ft; the last two parachutists, one of whom was the dispatcher, via a tandem jump. The parachute drop from 8,000 ft was reported completed without incident before the crew requested and were cleared by ATC for climb to 12,000 ft for the second drop.

Following clearance from the SAW controller for the drop from 12,000 ft, the flight crew made repeated attempts to establish contact and obtain drop clearance from the Drop Zone Safety

Officer but without success. As a result, the flight crew were unable to conduct the drop and commenced a go around to line up for another drop run, of which they advised Sydney ATC. The controller did not cancel the previously issued drop clearance. The flight crew reported eventually establishing communications with the safety officer and received the necessary drop zone clearance from that officer. The flight crew recorded those drop clearances on a mission load card and, in accordance with the operator's normal procedures in the case of a delay, reconfirmed the earlier drop clearance with ATC.

The flight crew reported that, as they had received the necessary drop clearances from ATC and the safety officer, they advised the dispatcher in the rear of the aircraft that they were 30 seconds from the target. This advice was via the activation of a green light in the rear of the aircraft. As normal, the dispatcher was off the headset intercom by that point, and communicating with the flight crew via hand signals.

The SAW controller's request just after 1442 for the flight crew to advise the 'status of the chutes' was about 15 seconds before the parachutists exited the aircraft. The flight crew reported hearing this query as a broken transmission. The flight crew asked the controller to repeat the query and after quickly discussing the next ATC transmission, the flight crew were unsure of the terminology being used and what it meant. This resulted in the flight crew asking the controller to repeat the transmission a third time. When it was finally established that the controller wanted to know if the paratroopers had exited the aircraft, it was too late to stop the drop, as the paratroopers had exited the aircraft.

The flight crew reported that the controller's traffic alert to the 737 flight crew was the C212 flight crew's first awareness of the 737 approaching from behind. The C212 flight crew reported looking out of the right cockpit window and seeing the 737 in a position about 2,000 m (about 1 NM) away and 1,000 ft below.

After landing at Richmond, the dispatcher, who had seen the 737 shortly after exiting the C212, advised the flight crew of the near miss. Following initial investigations by the operator and the Australian Defence Force (ADF) in response to the near miss, parachuting operations were recommenced later that day.

Paratroopers

All of the paratroopers were dispatched in accordance with the documented operator and ADF procedures and landed within the drop zone. One of the paratroopers reported observing the 737 pass an estimated 1,000 ft below and 2,000 m to the right rear of the C212. One of the tandem jump paratroopers, the last to exit the aircraft, reported that while in free fall about 10 seconds after exiting the aircraft, the 737 was at their altitude, about 2,000 m away.

Context

Personnel information

Sydney Approach West controller

At the time of the occurrence, the controller responsible for the Sydney Approach West (SAW), Departures West and Departures Sydney Radar Information positions had been an air traffic controller for about 11 years. Their Approach Radar Control rating and endorsements were initially issued in 2001, and re-issued in December 2008 and again in May 2011, following absences from Airservices Australia (Airservices). They had been employed on a permanent part-time basis for about 10 years before commencing as a full-time employee around 3 to 4 months before the occurrence.

At interview, the SAW controller demonstrated a thorough understanding of the separation requirements for parachute operations as stipulated in MATS. They reported that they would refuse clearance requests for aircraft wishing to track via Richmond and had not previously allowed any other aircraft in the vicinity of Richmond while the C212 was operating.

The SAW controller recalled being surprised that the SDS trainee and OJTI had left the 737 tracking via Richmond and assigned an altitude below the C212. They stated that a controller previously staffing the SDS/Sydney Departures North (SDN) position had been cancelling Standard Instrument Departures (SIDs) for jet aircraft departing off runway 34 Left (34L) at Sydney and tracking them north via Richmond and coordinating the tracking change and their proposed action with the SAW controller. This included radar vectoring those aircraft west towards Katoomba, NSW, before turning them back towards Richmond once the aircraft had climbed through 13,000 ft. This action established positive vertical separation with the C212 and the parachute area prior to the departing jets entering SAW's airspace. They stated that this process was employed on an as-required basis, as there were no published procedures for separation assurance with high-level parachute operations at Richmond.

A review of ATC radar and audio data indicated that between 1327 and 1419, controllers previously staffing the SDS/SDN position had left four aircraft tracking outbound from Sydney via Richmond on their flight planned routes and had applied vertical separation with the C212 aircraft without recorded verbal coordination with the SAW position. In the first three cases, the other aircraft was climbing above the C212. In the last case, about 20 minutes prior to the occurrence, the SAW controller accepted from an SDS controller a jet aircraft on the Sydney–Richmond track at 11,000 ft, when the C212 was at 12,000 ft. The jet aircraft had passed underneath the C212 with the required 1,000 ft vertical separation between the aircraft.

Sydney Departures South on-the-job training instructor

At the time of the occurrence, the OJTI for the SDS trainee had been a controller for about 18 years, with around 3 years' experience in the Sydney Terminal Control Unit (TCU). Their Approach Radar Control rating and Sydney Departures North, South and Radar Information endorsements were initially issued in 2008 and they held a current OJTI qualification. They did not have an endorsement for the SAW position.

Sydney Departures South trainee

The trainee SDS controller commenced their ATC career in 1977 and worked as a controller in Sydney until 1996, when they moved overseas to work as a controller. In 2009, they applied to return to work with Airservices. After completing pre-employment testing and being offered a position, the trainee commenced work in Sydney on 22 February 2011 (about 18 months prior to the occurrence).

The trainee undertook Short TCU Radar Approach training after recognition of prior learning/current competency was granted. This recognition was based on the trainee having previously held endorsements in the Sydney TCU, Sydney Enroute and Sydney Tower areas, and as a Tower/Approach controller overseas.

This occurrence took place less than 3 weeks before the trainee's planned final check on Departures North and South, and training continued during this intervening period. It was reported that during the trainee's final check, the trainee and the Check and Standardisation Supervisor came to the mutual decision that the trainee would not progress as a controller in the Sydney TCU.

ATC Shift Manager

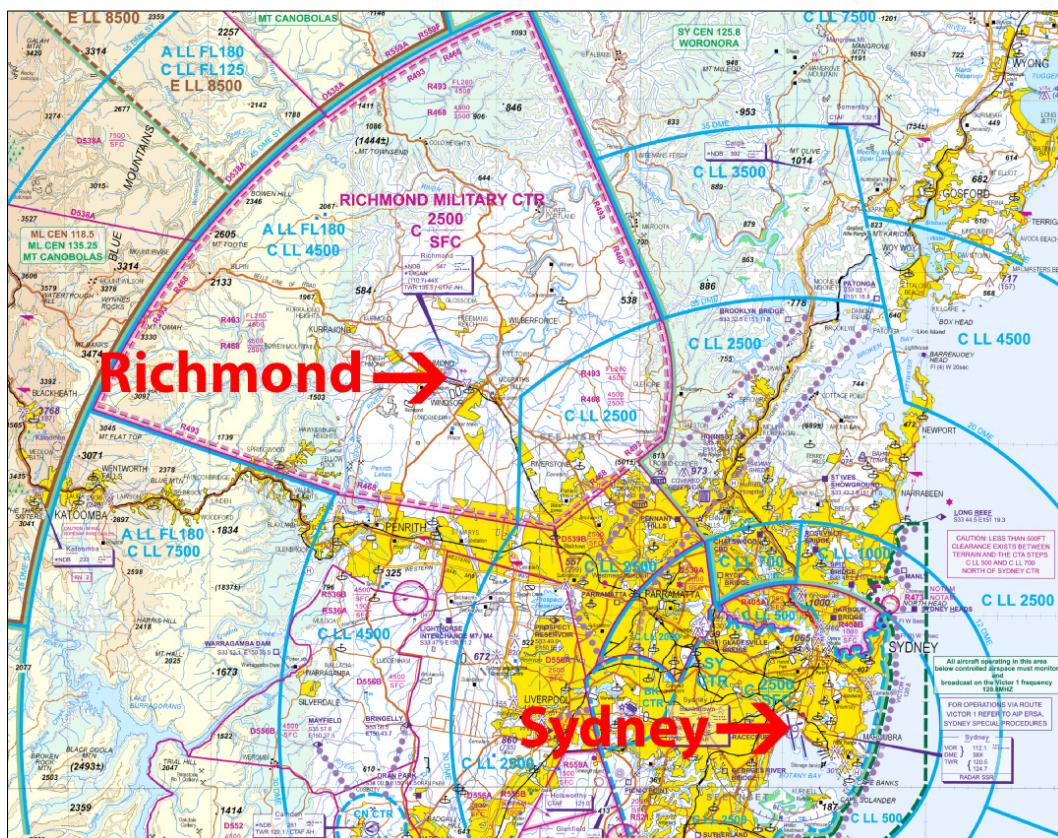
The air traffic control (ATC) Shift Manager at the time of the occurrence held a current Approach Radar Control Rating that was initially issued in 1998 and a current Sydney Traffic Manager TCU endorsement, which was initially issued in 2004. Prior to assuming Traffic Manager duties, the shift manager held Approach and Director endorsements.

Air traffic control information

Airspace and control position responsibilities

Richmond was a military aerodrome located 50 km north-west of Sydney with Australian Defence Force (ADF) controllers who were responsible for the provision of ATC Tower services within the Richmond Control Zone (CTR). This zone extended from the surface to 2,500 ft (Figure 7). Military operations had priority for the use of Richmond's airspace.

Figure 7: Airspace map



Source: Underlying map sourced from Airservices Australia

Civilian controllers in the Sydney TCU were responsible for the provision of ATC services in the airspace overhead the Richmond CTR. The SAW position was responsible for the provision of an

approach control service for Richmond Aerodrome, the Richmond CTR and restricted areas R469 and R494 from the surface to FL 280.

The Sydney Departures West (SDW) position was responsible for the provision of an approach control service for Bankstown Airport (22 km south-west of Sydney) and traffic within the western portion of the Sydney TCU airspace.

The Surveillance Information Service (SRI) position was responsible for the provision of services in the Class G airspace¹⁰ within 45 NM (about 83 km) of Sydney Airport.

At the time of the occurrence, the SAW, SDW and SRI positions were combined and administered by the SAW controller. The C212 and 737 were operating within the SAW controller's area of responsibility.

The SDS and SDN positions were combined at the time of the occurrence. This meant that the SDS/SDN controller was responsible for the 737 from the handover of that responsibility from the Sydney Tower controller until it was passed to the SAW controller.

Work demands

The Sydney TCU roster routinely had one less controller rostered on weekends compared to weekdays. Airservices reported that it considered the staffing levels were sufficient, as there routinely were 20 per cent fewer air traffic movements over a weekend. It was also reported that there was about a 50 per cent increase in radio transmissions on the SRI position during weekends, related to increased general aviation activity.

The SAW controller reported receiving a phone call from the developer or 'writer' of the Sydney TCU roster on the afternoon of 3 November 2011, in which they asked if the controller could commence their shift 1 hour earlier at 1300 on 5 November 2011. This was reported to have been in response to the fully endorsed controller on the 0600 to 1400 shift that day being the only Approach- and SDS-rated controller available for the period 1200 to 1400. The SAW controller agreed to commence their shift earlier and, on the day of the occurrence, was working a 1300 to 2100 shift. It was reported that when rostered on duty over a weekend period, SAW controllers usually worked periods of about 2.5 hours during the shift, with 15-minute rest breaks in between. Airservices reported that, as per the Enterprise Agreement current at that time, SAW controllers normally worked a period of up to 2 hours, followed by a 30-minute break.

It was reported as standard practice for the SDW and SAW control positions to be combined and worked by one controller from the designated SAW console. SRI was normally operated as a standalone position but, dependant on the level of traffic, it could be combined with SAW. On the day of the occurrence, SRI was combined with SAW and SDW at 1319. This was reported to have been to facilitate a controller rest break. However, other sources stated that following a discussion with the Shift Manager and other controllers, it was decided that the controller working the SRI position would open the SDS position de-combined. This decision was reported to have been taken before the SDS trainee and OJTI took over and, according to these subsequent reports, was intended to facilitate other controller training on the SDN position. In this circumstance, the SAW controller would work the combined SAW, SDW and SRI positions.

At 1326, the SAW controller accepted responsibility for the combined SAW, SDW and SRI positions following a handover of around 1 minute's duration. When later queried by other controllers if they wanted to de-combine the SRI position, the SAW controller reportedly advised that they were comfortable with the workload and did not want to split off SRI. There were sufficient suitably qualified controllers available to staff the SRI position at that time. Subsequently, other controllers stated that they considered the SAW controller's combined workload to have been extremely high at the time. Reportedly, the Check and Standardisation Supervisor for the Sydney TCU had advised the controllers that they were never to combine SRI with SAW and

¹⁰ Class G airspace was classified as uncontrolled airspace and operations were possible in that airspace without a clearance from ATC. However, an SRI was available to operators within Class G, controller workload permitting.

SDW. Airservices advised that the Check and Standardisation Supervisor had highlighted the considerations and risks associated with combining positions to controllers, but there was no documented evidence of that advice available to the ATSB.

The SAW controller reported that their workload had been moderate to high, with consistent tasks and actions required, but that they had not considered themselves hurried. The traffic on the SRI position had mostly consisted of five parachute aircraft conducting operations in Class G airspace consistently throughout that day. Depending on workload at the time, the controller was also providing a surveillance service to a visual flight rules survey aircraft and some unannounced general aviation operations, such as harbour scenic flights. Another controller was assisting the SAW controller with managing the response to the missing aircraft (see the previous discussion titled *Transfer of the 737 to the Sydney Approach West control position*).

The SAW controller later stated that they were quite surprised by the loss of separation between the 737 and C212 and became moderately stressed as a result. In response another controller, who was rated only on SDS and SDN, assumed responsibility for the SAW/SDW/SRI positions. Although another controller was available to, and assumed responsibility for the SRI position, the next available controller with the appropriate endorsements for the SAW and SDW positions was not rostered to commence shift for another 15 minutes, at 1500.

Supervision and monitoring

The Airservices National Air Traffic Services Administration Manual (NAAM) defined the general operational supervision responsibilities of a Shift Manager/Supervisor as being responsible for the overall provision of an air traffic service. This task required the:

...general supervision of operational staff to ensure a safe and efficient air traffic service and exercising Operational Command Authority.

At the time of the occurrence, the Shift Manager was in the ATC console room working at their desk, which was located about 8 m away from the SAW console. They moved over to the SAW console following the occurrence.

The SDS trainee was being trained and directly monitored by an OJTI in the operational environment. As the SDS trainee did not hold a current Australian ATC endorsement or ratings in that control position, the OJTI was also responsible for the provision of a safe and effective air traffic service.

ATC parachuting procedures

The Manual of Air Traffic Services (MATS) section 5-15-400 stated that it was an ATC responsibility to:

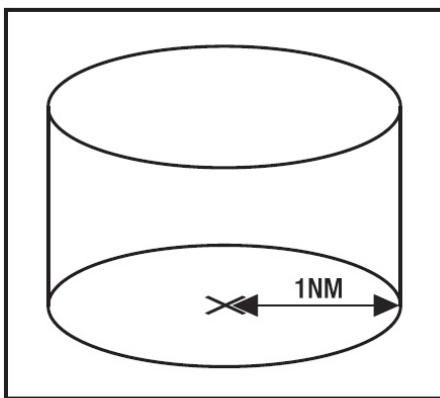
Base separation on the requirement for parachutists to be dropped within a 1 NM radius of the target.
and to:

Separate [other aircraft] from the declared drop area until receipt of advice that the drop is complete.

MATS contained a graphical illustration of the separation area to be applied to parachuting operations (Figure 8).

Figure 8: MATS separation requirement for parachute operations

The following illustrates 1 NM separation:



Source: Manual of Air Traffic Services

According to the Civil Aviation Safety Authority, the 1 NM (1.85 km) radius around a declared parachute operations area had to be supplemented by an additional 1 NM buffer, as specified in MATS 10-60-420 for operations without a specifically defined separation standard (see also Figure 9 in the *Safety analysis – Loss of separation* section of this report). However, Airservices reported that it did not consider the buffer was a requirement.

The Sydney ATC TCU Local Instructions stated that for the handoff of jet aircraft between SDS and SDW (the ATC sectors involved in the occurrence), jets departing from runway 34L at Sydney were to be cleared via a SID or cleared route. Alternatively, before the handoff was initiated, the controllers were to enter details in the operational data line of the aircraft's label in The Australian Advanced Air Traffic System (TAAATS), such as abbreviations for tracking direct to Katoomba or an assigned heading. In addition, the aircraft was to be assigned FL 280, or its cleared level if lower than FL 280.

An Airservices internal investigation determined that an informal, undocumented arrangement existed between the SDS and SAW positions. This included an agreement that the SDS controller was to hand off aircraft on the Sydney–Richmond track with positive separation from the C212, prior to handing jurisdiction for such aircraft to the SAW controller. The ATSB identified differing opinions amongst Sydney TCU controllers as to what constituted 'separation' between the 737 and Richmond parachute operations area. In the absence of a formal agreement or documented procedures, Airservices advised that the normal, accepted practice was that the SAW controller coordinated with the SDS controller regarding any airspace restrictions and/or requirements.

The Sydney TCU local instructions did not document any procedures to assure separation between jet aircraft departing on the Sydney–Richmond track and parachute operations at Richmond. Changes to the local procedures were promulgated on 18 May 2012 that stated:

SAW shall coordinate, when required, with SDS to ensure aircraft inbound to SAW airspace avoid the Parachute Drop Zone activity.

The Airservices internal investigation noted that neither the Sydney TCU Local Instructions, nor the informal arrangement between the SDS and SAW controllers, provided adequate separation assurance once a parachute drop clearance had been issued.

In this context, the operator of the C212 and the ADF paratrooper personnel and flight crews involved in parachute drop operations were trained to use the phraseology 'STOP DROP' in the event that any of doubt existed as to the safety of proceeding. This phraseology was documented in their respective operations manuals, to which Airservices personnel did not have access. No specific phraseology for the cancellation of a parachute drop clearance was promulgated in

MATS, the Airservices National ATS Procedures Manual or in the Australian Aeronautical Information Publication (AIP) at the time of the LOS. The AIP specified that the word 'CANCEL' was to be used to 'annul the previously transmitted clearance' for any type of clearance. Airservices advised that it considered this general phraseology was sufficient to address the requirement for parachuting operations.

TAAATS human-machine interface

The TAAATS human-machine interface (HMI) supports the accomplishment of tasks being undertaken within the air traffic computer system. In the case of parachuting operations, a display indication in the air traffic computer system that a parachute drop clearance has been issued is an integral situational awareness tool for controllers.

In this regard, TAAATS provided a number of methods for controllers to record information specific to an aircraft's operation. The SAW controller reported that they routinely used a 'C' prompt on the aircraft's call sign label in TAAATS to indicate if a parachute drop clearance had been issued. This also served as a reminder to conduct coordination with SDS as and when required. A 'C' prompt on an aircraft's label would only be displayed on the air situation display (ASD) at the local console and was not visible to other controllers or on other ASDs. In contrast, the entry of data into the operational data line of an aircraft's label in TAAATS provided a 'global' display that was also viewable on other controllers' ASDs.

At the time of the occurrence, there were no local or national air traffic control procedures prescribing how a controller was to interface with TAAATS to indicate when a parachute drop clearance had been issued. Contrary to the SAW controller's advice of routinely using the 'C' prompt, which would have provided no indication to the SDS trainee at their console, in this occurrence, the SAW controller did not use any TAAATS HMI to indicate that a drop clearance had been issued to the C212 flight crew, and there was no visible indication available to the SDS trainee and OJTI of the drop clearance.

The SAW controller reported having a personal procedure of displaying the Sydney Departures flight progress strip list on their ASD and highlighting the flight progress strips of departing aircraft that were cleared via Richmond. The controller could not recall highlighting the flight progress strip for the 737 that was involved in the occurrence.

Separation assurance

One of the primary aims of the ATC system is to ensure that controlled aircraft will always be kept apart by at least a defined standard of separation. That standard varies depending on a number of factors, including the type of airspace. Sometimes ATC planning or ATC or flight crew execution of those plans may temporarily not guarantee the required separation. When such a failure occurs, there is a loss of separation assurance (LOSA).

The MATS described tactical separation assurance as the preference for controllers to proactively plan to de-conflict aircraft, rather than to wait for or allow a conflict to develop before its resolution.

In order to assure separation, MATS required controllers to:

1. be proactive in applying separation to avoid rather than resolve conflicts;
2. plan traffic to guarantee rather than achieve separation;
3. execute the plan so as to guarantee separation; and
4. monitor the situation to ensure that plan and execution are effective.

If a LOSA is not rectified, there is a risk that aircraft will not maintain the required separation and a LOS may result.

Compromised separation

Separation is considered to be compromised when separation standards have been infringed, or where separation assurance is lacking to the extent that a LOS is imminent. Compromised

separation recovery training provides controllers with the knowledge and skills to manage an imminent conflict and/or recover a prescribed separation standard after a LOS.

At the time of the occurrence, MATS required controllers to issue safety alerts to pilots as a priority when they became aware that aircraft were considered to be in unsafe proximity to each other. An example of a generic traffic alert follows:

(Callsign) [sic] TRAFFIC ALERT (position of traffic if time permits) TURN LEFT/RIGHT (specific heading, if appropriate), and/or CLIMB/DESCEND (specific altitude if appropriate) IMMEDIATELY^[11].

ATSB investigation AO-2009-080^[12] examined a LOSA that occurred 222 km north-west of Tennant Creek, Northern Territory on 22 December 2009. The investigation identified that the controller had not received training in compromised separation recovery techniques. In response to that safety issue, Airservices implemented a compromised separation recovery training module for its ATC groups. In addition, a dedicated compromised separation recovery training module was introduced at the Airservices Australia Learning Academy, as part of initial ATC training, and compromised separation recovery training was to be provided to all en route controllers each financial year, commencing in the 2010/11 financial year.

Subsequently, ATSB investigation AO-2011-090^[13] examined a LOS that occurred in the holding pattern at BLAKA IFR reporting point, 93 km south-south-east of Brisbane, Queensland on 29 July 2011. That investigation found that, despite the prior Airservices commitment to provide compromised separation recovery training to all en route controllers each financial year, the controller in that case had not received training in compromised separation recovery techniques.

In this occurrence overhead Richmond, neither the SAW controller nor the SDS trainee had received training on compromised separation recovery techniques.

Recognition of prior learning

Prior to the SDS trainee's commencement of training, a Training Needs Analysis (TNA) was developed by Airservices. This analysis summarised the training requirements, outlined the particular controller's work history, carried out a gap analysis and developed a training strategy and the supporting assessment requirements. The TNA included a request for recognition of prior learning and current competency based on the candidate having previously been endorsed in Sydney TCU, Sydney en route and Sydney Tower, and that they had joined Hong Kong ATC as a Tower/Approach controller in 1996.

It was reported that at the time of the assessment, most experienced controllers joining Airservices from overseas were provided with a 7-week conversion course at the Airservices Learning Academy in Melbourne. The SDS trainee had no previous experience in using TAAATS or an automated/computerised ATS interface, and was provided with an abbreviated conversion course in Sydney, as part of their simulator training component.

The Airservices TNA documented that:

Recognition processes is a term that cover [sic] Recognition of Prior Learning (RPL), Recognition of Current Competency (RCC) and Skills Recognition. The term refers to assessment processes that enable recognition of competencies currently held, regardless of how, when or where the learning occurred.

Under the Australian Quality Training Framework 2007, competencies may be attained a number of ways. This includes through any combination of formal or informal training and education, work experience or general life experience. In order to grant recognition of prior learning/current competency the assessor must be confident that the candidate is currently competent against the required industry competency standards or competency outcomes specified in the training course.

^[11] In June 2012, Airservices initiated a change to the phraseology for traffic alerts and incorporated changes in the MATS and AIP.

^[12] http://www.atsb.gov.au/publications/investigation_reports/2009/aaир/ao-2009-080.aspx

^[13] http://www.atsb.gov.au/publications/investigation_reports/2011/aaир/ao-2011-090.aspx

The evidence may take a variety of forms and could include certification, references from past employers, testimonials from clients and work samples.

The TNA preamble stated that a candidate was required to complete written examinations for all theory components of the training course and that the examination requirements could be consolidated into single or multiple examinations. There was no evidence available to the ATSB that the SDS trainee had completed the required written examinations for all theory components.

The TNA preamble also stated that the candidate was to complete a performance assessment review at the 'Academy exit standard' for the relevant control simulation prior to progressing to the final field stage of training (also known as OJT). There was no documentation available to the ATSB to indicate that the SDS trainee was assessed as competent in the simulator environment and had been recommended to commence OJT.

Controller training

Sydney Approach West controller

The training provided to the SAW controller in 2011 to regain their rating and endorsements after an absence included simulator-based training conducted in Sydney. This incorporated parachute jump exercises, airspace route structure and airspace agreements, Standard Arrival Routes (STARs) and SIDs, and exposure to the workstation and TAAATS human-machine interface (HMI). The supporting parachute jumping exercise lesson plans did not contain information on the procedures for non-promulgated parachute operations, such as those conducted overhead Richmond.

The SAW controller was not provided with training in compromised separation recovery techniques. This was because Airservices had not identified it, at that time, as a necessary component of the training for re-issuing a controller's ratings and endorsements.

Sydney Departures South trainee

The Short TCU Radar Approach training provided to the SDS trainee on their re-employment after over 14 years absence contained SDS simulator exercises that incorporated the airspace route structure, airspace agreements, STARs, SIDs, and workstation and TAAATS HMI. That training was completed in the Airservices Learning Academy TAAATS simulator in Sydney.

Parachute jump exercises were part of the simulator training but those operations were dissimilar to the parachute operations conducted at Richmond in that the simulated drops were being conducted into uncontrolled airspace, where the pilots of the parachute aircraft were responsible for separation with other aircraft. The simulator exercises did not include any parachute operations over Richmond, or in the adjacent SAW airspace.

Compromised separation recovery training was not provided to the trainee.

The SDS trainee later reported that they found the transition back to Sydney ATC challenging. Hong Kong ATC used paper flight progress strips and no computer manipulation was required, unlike when interacting with TAAATS. The trainee also commented that the airspace was a 'lot simpler [in Hong Kong] than Sydney'. The traffic in Hong Kong consisted of jet aircraft, with no general aviation aircraft or parachute operations. At interview, the SDS trainee reported finding that the level of interaction required with the TAAATS HMI was a significant challenge.

About 7 weeks after commencing training in the simulator, the SDS trainee became unwell and was absent from work for a period of around 7 weeks. On their return on 6 July 2011, about 4 months prior to the occurrence, they recommenced their simulator training for a further 3 weeks, before commencing OJT in the operational environment on 28 July 2011. On 22 September 2011, the SDS trainee completed a progress check with a Sydney TCU check controller.

On the day of the occurrence (5 November 2011), the SDS trainee's training booklet documented that it had been a busy shift due to numerous visual flight rules aircraft. The OJTI noted that the trainee should listen out on the inter-console 'hotline' before talking. No reference was made to the

LOS and it was the first OJT period for which the OJTI marked the SDS trainee as being of a rating standard.

The SDS trainee's last documented OJT shift was 7 days after the incident on Saturday 12 November 2011, with a different OJTI. The OJTI for that shift did not indicate in the training booklet if the SDS trainee was of rating standard or performing as expected at that stage of their training.

Previous occurrences

Previous ATSB investigation AO-2009-080

In addition to identifying that the occurrence controller had not received training in comprised separation recovery techniques, ATSB investigation AO-2009-080 identified that recognition of the controller's prior learning resulted in that controller commencing final field training with a level of knowledge and skills below the required standard. Airservices had granted significant recognition for prior learning that reduced the controller's initial training period of 44 weeks to just over 11 weeks duration, though the controller had never operated in the relevant airspace previously.

Previous loss of separation incident involving the SDS trainee

On 21 August 2011, the SDS trainee and another OJTI were involved in a LOS between an Airbus A320 (A320) departing Sydney for the Gold Coast, Queensland on a scheduled passenger flight and a Boeing 737 aircraft arriving into Sydney on a scheduled passenger service from Vanuatu. In that instance, the trainee identified a pending conflict between the aircraft as their tracks would cross as the A320 turned onto its departure track. In response, and to assure separation, the trainee instructed the A320 flight crew to tighten the radius of their turn, following clearance direct to a position to the north. The trainee had previously cancelled the aircraft's departure speed restriction and the flight crew increased speed. The aircraft's resulting rate of turn was less than anticipated by the trainee. To achieve a tighter turn, the A320 flight crew selected the aircraft's 'Expedite Climb' function.

The trainee then tried to apply vertical separation by limiting the 737's descent to 8,000 ft and instructed the A320 flight crew to maintain 7,000 ft. Due to their increased climb rate the A320 flight crew was unable to comply with the tighter turn and the trainee then issued the 737 flight crew with a traffic alert and a turn instruction for avoiding action. Separation reduced to 1 NM (1.85 km) horizontally and 500 ft vertically, whereas the required separation standards were either 3 NM (5.56 km) or 1,000 ft. The Short Term Conflict Alert (STCA)¹⁴ activated in TAAATS.

The flight crew of the A320 later reported that they had received a traffic alert and collision avoidance system (TCAS) traffic advisory,¹⁵ followed by a resolution advisory.¹⁶ The crew complied with the resolution advisory and advised ATC of that action.

There was no daily progress report completed for the SDS trainee on the day of that occurrence. A daily progress report was completed for a training shift the following day, which was annotated in the trainee's booklet as OJT and conducted by the same Sydney Check Controller that would later conduct the trainee's progress check.

¹⁴ The STCA was a situational display alert in TAAATS that indicated a system-detected critical event requiring immediate controller intervention.

¹⁵ Traffic Collision Avoidance System Traffic Advisory (TA). When a TA is issued, pilots are instructed to initiate a visual search for the traffic causing the TA.

¹⁶ Traffic Collision Avoidance System Resolution Advisory (RA). When an RA is issued pilots are expected to respond immediately to the RA unless doing so would jeopardize the safe operation of the flight.

Operational information

C212 VH-MQD

The operator of the parachute aircraft had two C212 twin turboprop aircraft and was contracted by the ADF to supply aircraft and flight crew to the Australian Army Parachute Training School and the Red Berets based at Nowra, NSW. The operator was required to provide an aircraft to a unit at RAAF Base Richmond about twice a year. At the time of the occurrence, VH-MQD had been operating at Richmond for almost 2 weeks in support of parachute training.

Both of the pilots in VH-MQD were endorsed as captains. The operator's chief pilot, who was the pilot monitoring at the time of the occurrence, reported that 5 November 2011 was a fine and clear day. They had been conducting parachuting flights all day without incident. At interview, the chief pilot mentioned that when they were operating at 12,000 ft during an earlier 'dummy run'¹⁷ that day, an Airbus A320 aircraft had passed an estimated 1,000 ft directly beneath their aircraft. The flight crew and particularly the dispatcher had been surprised by the proximity of the A320.

The chief pilot reported that no other crew could recall having a jet aircraft cleared to transit beneath them at Richmond.

Flight planning for parachute operations

The C212 flight crew submitted flight plans for their parachute operations at Richmond via the National Aeronautical Information Processing System, which was a multi-function, computerised system that enabled the submission of flight plans to ATC, as well as the provision of briefing products and services to pilots and ATC. As the flight crew did not have exact timings for their flights each day, on the morning of operations they would submit 10 flight plans for operations at 12,000 ft, with departure times about 45 minutes apart.

Weather conditions

The wind at the exit altitude of 12,000 ft was reported as 320 °(M) at 10 kt. The parachute opening altitude for tandem jumps was 5,000 ft and 3,000 ft for a single parachutist. The wind at those altitudes was reported as 050 °(M) at 10 kt, which was the same as that on the ground at the drop zone.

There was no cloud reported in the area. The pilot monitoring in the C212 reported that the visibility was in excess of 20 km.

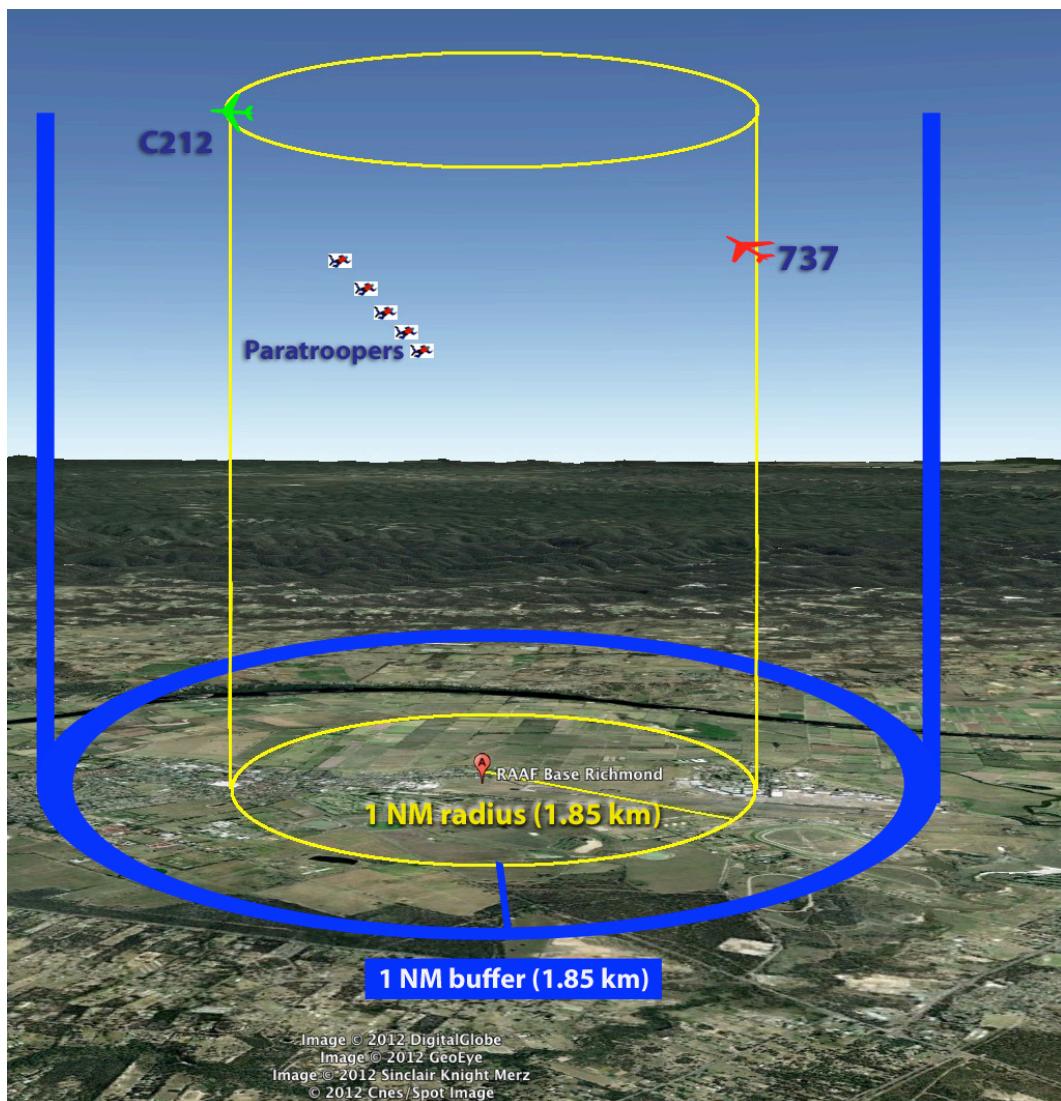
¹⁷ A flight where no paratroopers left the aircraft.

Safety analysis

Loss of separation

As defined in the Manual of Air Traffic Services (MATS), it was an air traffic control (ATC) responsibility to separate aircraft from the declared parachute drop area of 1 NM (1.85 km) radius from Richmond until receipt of advice that the drop was completed. That declared parachute drop area was from the altitude of the C212 to the ground. ATC were required to apply a 1 NM (1.85 km) buffer to that defined area (shown in blue in Figure 9). Should any aircraft have entered the 1 NM buffer, and then the column of reserved airspace below the C212 before a parachute drop had been completed, there was a loss of separation (LOS). This was the case when the 737 entered the 1 NM buffer zones, as ATC had not separated the aircraft from that area (Figure 9).

Figure 9: Illustration of the loss of separation



Source: Underlying image sourced from Google Earth

Note: Not to scale – for illustration purposes only

Separation plan

The Sydney Departures South (SDS) trainee and on-the-job training instructor (OJTI) did not hold endorsements on the Sydney Approach West (SAW) position and had not experienced Richmond parachute operations in the simulator environment. There were a number of indications that the SDS trainee did not fully understand the nature of parachute operations in controlled airspace or the underlying MATS requirements.

A fundamental component of ATC is the application of separation assurance. Although the LOS occurred in the SAW controller's airspace, the loss of separation assurance (LOSA) commenced when the 737 was under the jurisdiction of the SDS trainee and the OJTI. The SDS trainee and OJTI both considered that separation assurance was achieved by limiting the departing 737's climb to an altitude 2,000 ft below the C212. However, without prior coordination from or with the responsible controller, and no prescribed means to display that clearance if given, the assumption by the SDS trainee and OJTI that a drop clearance was yet to be issued was unreliable. In the event, their assumption was incorrect, and a more reliable means of assuring separation, and preventing the resulting LOS, would have been to assign the 737 a heading to the west, away from Richmond. This would have assured the 737's separation from the C212 and the parachute operations area. An additional benefit of this course of action was that it would have provided more time for coordination with the SAW controller.

Controller expectations

The Sydney Terminal Control Unit (TCU) controllers involved in the occurrence had differing expectations as to their coordination requirements and control responsibilities to assure separation with parachute operations at Richmond. The SAW controller expected the SDS trainee and OJTI to assure separation with the Richmond parachute operations area as undertaken by a previous SDS controller. This expectation was not consistent with what had been occurring in the period leading up to the occurrence.

The OJTI, who reported having a limited understanding of the Richmond parachute operations as a result of not having a SAW endorsement, expected that the SAW controller would advise them of the parachute operations. The SDS trainee believed that they were to leave aircraft departing Sydney and tracking via Richmond on the standard instrument departure (SID) and handover control jurisdiction to the SAW controller earlier than the normal transfer point, unless the SAW controller instructed otherwise.

The misalignment of these controllers' expectations contributed to the LOSA and ensuing LOS. The situation would most likely have been avoided had relevant procedures been in place to manage Sydney departures that tracked via Richmond during parachute operations at that location.

Controller workload

The unsuccessful attempt by the SDS trainee to coordinate the amended altitude assigned to the 737 as it tracked to Richmond was a consequence of the SAW controller's high workload at the time. This prevented timely communication between the controllers and resulted in the SAW controller being unaware of the conflict until their delayed acceptance of the system handover of responsibility for the 737. There was then limited time and distance available to the controller to implement compromised separation recovery techniques.

In this context, there was the potential for more effective monitoring of the SAW controller's workload on the day of the occurrence to have affected the outcome. Had the SAW controller been experiencing a lower workload at the time, they would have likely accepted the SDS trainee's coordination on initial contact. Earlier awareness of the developing situation would have allowed the SAW controller additional time to scan their flight progress strips and air situation display for pending traffic and potential conflicts, and take effective compromised separation recovery measures to assure separation.

Air traffic control management of parachute operations

Parachute operations at Richmond were not a regular activity. The ATSB found that neither the Sydney TCU Local Instructions nor the informal arrangement between the SDS and SAW positions provided adequate separation assurance once a parachute drop clearance was issued. In this context, the irregularity of parachute operations at Richmond increased the risk that LOSAs and LOSs would reoccur, suggesting the need to develop and formally document procedures for application to such operations. For example, this could include clarification of the MATS requirement for a declared parachute operations area to be treated as a column of reserved airspace that should not be entered by other aircraft until operations were completed.

Although the operator of the C212 and Australian Defence Force had standard phraseology for the cancellation of a parachute drop, there was no similar, parachute operations-specific terminology published in the documentation used and available to Airservices Australia (Airservices) controllers. Flight crews conducting parachute operations expect to hear 'STOP DROP' from the parachutists and/or ground personnel, yet ATC will use the word 'CANCEL', followed by the type of clearance being cancelled (in this case parachuting operations). The use of different terminology increases the potential for delay or misunderstanding between pilots and controllers. However, the term 'CANCEL' is used by ATC when referring to all types of ATC clearances, and as long as the type of clearance is clearly stated with the cancellation the risk of misunderstanding should be minimised. In this case, the delay and misunderstanding in communications occurred with the SAW controller attempting to clarify the status of the parachuting operations rather than the actual cancellation of the operations.

Cancellation of the speed restriction

The SDS trainee's cancellation of the 250 kt speed restriction enabled the flight crew of the 737 to increase their aircraft's speed below 10,000 ft. This resulted in the 737 approaching the SDS/SAW sector boundary faster than normal, in a situation where separation assurance was not established. The increasing speed of the 737 and resulting reduced effective rate of turn meant that, given the distance remaining, on handover the SAW controller was afforded less than 1 minute to react to and resolve this LOSA before the LOS. Similarly, the ability of the flight crew to implement the controller's instructions and clear the area of conflict was affected.

The cancellation of a departing aircraft's speed restriction was also a factor in an earlier LOS involving the SDS trainee, when a flight crew did not react as expected by the trainee and undermined the trainee's plan to separate the aircraft from another on a crossing track. The cancellation of speed restrictions is an acceptable control practice that can assist flight crews manage their flight profiles, and controllers with sequencing requirements. However, speed restrictions are imposed to assist with the maintenance of separation and variations to them should be thoughtfully applied by controllers.

Flight crew should be aware that the cancellation of a speed restriction will not always be available when requested, likely due to operational ATC requirements.

Compromised separation recovery

Neither the SAW controller nor the SDS trainee had received training in compromised separation recovery techniques. This meant that they probably did not have the necessary skills and knowledge to manage situations requiring controller intervention, including in the case of a LOSA or LOS. This absence of training would have combined with the effects of the cancelled speed restriction to make it highly unlikely that the SAW controller would be able to re-establish separation assurance prior to the LOS. The time taken to establish whether the paratroopers had exited the C212 due to communication difficulties further compounded the situation for the SAW controller.

The ATSB determined that the non-provision of compromised separation recovery training, to the SAW controller and SDS trainee in this occurrence, was isolated to those individuals and not indicative of an ongoing safety issue.

Staffing

The ATSB found that there was a period on the Sydney TCU roster on the day of the occurrence where there was only one controller available with the ratings and full endorsements for the SAW and SDW positions. That staffing did not allow for any contingency coverage of those positions, which were reportedly operated for about 15 minutes by a controller who was not endorsed in either position.

Airservices later advised that contingency staffing arrangements were implemented following the occurrence and that:

At the time of the incident there were enough appropriately rated staff to ensure that all positions on the DEP roster could be opened. This included an SDS endorsed controller (i.e. was trained on the airspace concerned but only for night time curfew operations) who operated the position for the 15 minutes stated.

Despite the Airservices advice of the availability of a replacement controller who was endorsed on the SDS position for night time curfew operations, reliance on this controller meant that the SDS position was filled during a time of day for which they were not endorsed. In addition, there was no evidence that the replacement controller held an SDW endorsement. This highlights the risk of not having another appropriately rated and endorsed controller available, in the event that a replacement controller is required due to incapacitation or other reason. This is particularly the case for the SAW and SDW control positions.

Training and performance management

Airservices' recognition of prior learning processes did not adequately consider the variances between the ATC operating systems, traffic complexities and airspace design in the trainee's previous overseas unit with those in Australia. In addition, the consideration of the trainee's skill and knowledge levels relative to the Sydney operational environment could have been considered more effectively.

The trainee had not used a computer-based ATC system before and, on return to the Sydney TCU after a 14-year absence, found the non-standard training program challenging. Their training had been interrupted due to a period of illness but there was no documented review of the training plan following the trainee's absence due sickness, or of the occurrences in which the trainee was involved in August and November 2011. Though an OJTI is directly responsible for the safe and effective provision of ATC services when conducting training, consideration must be given to the performance of the trainee, particularly when they are involved in an incident.

Ultimately the Airservices' checking system determined that the trainee should neither be endorsed, nor rated in the Sydney TCU. Whether the trainee might have successfully completed the training had the Airservices recognition of prior learning processes been more effective could not be established.

Findings

From the evidence available, the following findings are made with respect to the loss of separation involving, a Construcciones Aeronáuticas S A C212-CC (C212) aircraft, registered VH-MQD and operating in the Richmond parachuting area, and a Boeing Company 737-7BX (737) aircraft, registered VH-VBP, near Richmond Aerodrome, New South Wales, on 5 November 2011. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance.

A safety issue is an event or condition that increases safety risk and (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

Contributing factors

- The Sydney Departures South trainee and on-the-job training instructor maintained the 737 tracking via Richmond and established vertical separation underneath the C212 parachuting aircraft, unaware that a parachute drop clearance had been issued.
- The Sydney Approach West controller, who was responsible for three air traffic control positions at the time of the occurrence, was experiencing a period of high workload.
- **There was no documented procedure for assuring the separation of aircraft departing from Sydney from parachute operations at Richmond, increasing the likelihood that Sydney Terminal Control Unit controllers would have differing expectations as to their control and coordination requirements in respect of these operations. [Safety issue]**
- **Local and national air traffic control procedures did not prescribe the means for controllers to indicate in the air traffic control system that a parachute drop clearance had been issued. [Safety issue]**

Other factors that increased risk

- The Sydney Approach West controller and the Sydney Departures South trainee controller had not completed compromised separation recovery training.
- The cancellation of the 737's speed restriction reduced the time and distance available to the Sydney Approach West controller to direct, and the 737 flight crew to implement compromised separation recovery techniques.
- Airservices Australia's recognition of prior learning process and subsequent training did not effectively address the variances between the Sydney Departures South trainee's skills and knowledge and the role of a Sydney Terminal Control Unit air traffic controller in the operational environment at that time.

Other key findings

- The 737 flight crew proactively initiated avoidance action to limit their aircraft's proximity to the parachute aircraft and freefalling paratroopers.

Safety issues and actions

The safety issues identified during this investigation are listed in the Findings and Safety issues and actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

Procedures to establish separation assurance

Number:	AO-2012-142-SI-01
Issue owner:	Airservices Australia
Operation affected:	Aviation: Airspace management
Who it affects:	All Sydney Terminal Control Unit Sydney Approach West and Sydney Departures South controllers

Safety issue description:

There was no documented procedure for assuring the separation of aircraft departing from Sydney with parachute operations at Richmond, increasing the likelihood that Sydney Terminal Control Unit controllers would have differing expectations as to their control and coordination requirements in respect of these operations.

Response to safety issue and proactive safety action taken by: Airservices Australia

Changes to the Sydney Terminal Control Unit local procedures were promulgated by Airservices Australia (Airservices) 6 months after the occurrence on 18 May 2012 and stated:

SAW shall coordinate, when required, with SDS to ensure aircraft inbound to SAW airspace avoid the Parachute Drop Zone activity.

In addition, on 30 October 2013, Airservices advised that:

Airservices clarifies that the intent of the changes to Sydney Terminal Control Unit local procedures (promulgated on 18 May 2012) was to ensure that coordination takes place amongst controllers in order to maintain separation assurance for all parachute activities, not just those at Richmond. The specific separation assurance technique used will vary depending on the particular circumstances and disposition of involved aircraft.

To further strengthen the effectiveness of the Sydney Terminal Control Unit local procedures, Airservices will undertake a review to amend the wording of the procedures to better align with the clarified intent. The review is anticipated to be completed by 31 December 2013.

Airservices considers that the amended local procedures supported by the inclusion of drop clearances in the label indication to be viewed by controllers on the Australian Advanced Air Traffic System (TAAATS) Human Machine Interface (HMI) will adequately address the identified safety issue.

ATSB comment in response:

The ATSB is satisfied that the action proposed and already taken by Airservices will adequately address the safety issue. The ATSB will monitor the progress of the proposed safety action.

Current status of the safety issue:

Issue status: Details of the current status of this safety issue are available at www.atsb.gov.au

Drop clearance indication procedures

Number:	AO-2012-142-SI-02
Issue owner:	Airservices Australia
Operation affected:	Aviation: Airspace management
Who it affects:	All controllers using The Australian Advanced Air Traffic System

Safety issue description:

Local and national air traffic control procedures did not prescribe the means for controllers to indicate in the air traffic control system that a parachute drop clearance had been issued.

Response to safety issue and proactive safety action taken by: Airservices Australia

Following the occurrence, on 28 June 2012, Airservices made changes to its National ATS (Air Traffic Services) Procedures Manual to include The Australian Advanced Air Traffic System human-machine interface requirements in section 5-15 titled *Parachuting*.

Action number: AO-2012-142-NSA-062

Current status of the safety issue:

Issue status: Adequately addressed

Justification: The ATSB is satisfied that the action taken by Airservices Australia has adequately addressed the safety issue.

Other safety action

Although no organisational or systemic issues were identified in respect of the simulator-based training for the Sydney Approach West position, or the parachuting procedures used by Military Support Services Pty Ltd, who operated the C212, the following proactive safety actions were advised by Airservices Australia (Airservices) and that operator.

Airservices

In the period following the occurrence, the lesson plans for the Airservices simulator-based training for the Sydney Approach West position were amended to include procedures for non-promulgated parachute operations.

Military Support Services Pty Ltd

Military Support Services Pty Ltd has advised of proactive changes to their Operations Manual to document the procedures used in relation to 'drop clearances'. In addition, a number of other improvements to their procedures were advised, including the use of the aircraft's Load Card.

General details

Occurrence details

Date and time:	5 November 2011 – 1443 EDT
Occurrence category:	Incident
Primary occurrence type:	Loss of separation
Type of operation:	Air traffic control
Location:	Near Richmond Aerodrome, New South Wales

Aircraft details

Manufacturer and model:	Construcciones Aeronáuticas S A C-212-CC
Registration:	VH-MQD
Type of operation:	Airwork

Aircraft details

Manufacturer and model:	The Boeing Company 737-7BX
Registration:	VH-VBP
Type of operation:	Scheduled passenger service

Sources and submissions

Sources of information

The sources of information during the investigation included:

- Airservices Australia (Airservices)
- the Australian Defence Force (ADF)
- the Civil Aviation Safety Authority (CASA)
- the operator of VH-MQD
- the operator of VH-VBP
- the Manual of Air Traffic Services
- the Manual of Standards Part 172 *Air Traffic Services*
- the En Route Supplement Australia.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the air traffic controllers and flight crew who were involved in the occurrence, the aircraft operators, the ADF, Airservices and CASA.

Submissions were received from two of the controllers, the flight crew and operator of VH-MQD, the ADF, Airservices and CASA. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Investigation

ATSB Transport Safety Report

Aviation Occurrence Investigation

Loss of separation involving CASA C212-CC, VH-MQD, operating in the Richmond parachuting area, and Boeing 737-7BX, VH-VBP near Richmond Aerodrome, NSW, 5 November 2011

AO-2011-142
Final – 16 December 2013

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