



Australian Government
Australian Transport Safety Bureau

Loss of separation between Airbus A320, 9V-TAZ and Airbus A340, A6-EHH

near TANEM, 907 km NW of Karratha, Western Australia | 18 January 2012



Investigation

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Safety summary

What happened

On 18 January 2012 at 2125 Eastern Daylight-saving Time, there was a loss of separation (LOS) between an Airbus A320, registered 9V-TAZ, and an Airbus A340, registered A6-EHH, 907 km NW of Karratha, Western Australia. The aircraft were under the air traffic control of Airservices Australia. The A320 was southbound at FL 350 and the A340 was heading west and cleared to operate in a 'block' level, anywhere between FL 340 and FL 360. The aircraft were estimated to cross waypoint TANEM within 2 minutes of each other. The relevant separation standards were 1,000 ft vertical separation or 15 minutes lateral separation at the same position. Controller 1, who approved the block level clearance, did not detect the traffic conflict prior to handing over to controller 2. After a short break, controller 2 handed back to controller 1, and the conflict was detected by controller 2 during the handover. Compromised separation recovery techniques were applied to re-establish vertical separation.

What the ATSB found

The two controllers were experiencing a high workload due to a range of factors, including traffic levels, weather diversions and the airspace configuration, and controller 1 had limited opportunity to consolidate their training and skills before being rostered onto more complex sectors and situations. The ATSB found that Airservices' processes for monitoring and managing controller workloads did not ensure that newly-endorsed controllers had sufficient skills and techniques to manage the high workload situations to which they were exposed. In addition, Airservices had limited formal guidance regarding how to determine appropriate consolidation periods for en route controllers on one sector before they were transitioned to commence training on another sector. Further safety issues were also identified relating to the application of block level clearances, and the continuing absence of an automated air traffic conflict detection system available for conflicts involving aircraft that were not subject to radar or ADS-B surveillance services.

What's been done as a result

Airservices reported that changes had been made to the configuration, training and rostering arrangements for the airspace sectors involved in the occurrence. The commissioning of a radar in northern West Australia had reportedly alleviated controller workload in two of the airspace sectors, with enhanced surveillance of the majority of aircraft operating in that airspace expected with the mandate of automatic dependent surveillance-broadcast (ADS-B) effective in December 2013. A working group had also been established to determine a suitable workload model to monitor and forecast controller workload on a sector by sector basis. In addition, the first stage of a flight plan conflict function had also been deployed in Brisbane Upper Airspace, with further roll out planned in Melbourne Centre in 2014. The ATSB is not satisfied that Airservices has adequately addressed the identified safety issues regarding formal guidance for consolidation periods for newly-endorsed controllers and the limited formal guidance to controllers and pilots regarding the conditions in which it was safe and appropriate to use block levels. As a result the ATSB has made formal recommendations to Airservices.

Safety message

Ideally the best way of managing workload is to reduce the level of work demands and distractions. If the work demands cannot be reduced, then another option is to ensure the controllers have the experience, skills and techniques to effectively manage their task demands. Overall, high workload can have significant effects on a controller's performance, and it needs to be monitored and managed using a systemic approach, particularly for less experienced

controllers but also controllers who have recently received a new endorsement. The instances of other recent loss of separation occurrences involving high workloads and newly-endorsed controllers on other sector indicates that this problem was not restricted to the sectors involved in this occurrence.

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The occurrence

At about 2125 Eastern Daylight-saving Time¹ on 18 January 2012, a loss of separation (LOS)² occurred near the Instrument Flight Rules (IFR) navigation waypoint TANEM, located 490 NM (907 km), north-west of Karratha, Western Australia (WA). The two aircraft involved were:

- an Airbus A340 (A340) registered A6-EHH, operating on a scheduled passenger service between Sydney, New South Wales (NSW) to Abu Dhabi, United Arab Emirates, and
- an Airbus A320 (A320) registered 9V-TAZ, operating on a scheduled passenger service from Singapore, Republic of Singapore to Perth, WA.

The aircraft were under the air traffic control of Airservices Australia (Airservices).

The A320 was on a published air route that tracked overhead TANEM (Figure 1). The flight crew of the A340 had not planned nor was required to plan TANEM as a waypoint, but their planned track overflew TANEM. The A320 was operating at flight level (FL)³ 350 and the A340 was initially operating at FL 340. As there was no radar or Automatic Dependant Surveillance-Broadcast (ADS-B)⁴ coverage in the area, the aircraft were under procedural air traffic control (ATC), which relies on crew radio transmissions or aircraft equipment updating their position to ATC by Automatic Dependant Surveillance (ADS-C)⁵, either in real time or on a demand basis.

¹ Eastern Daylight-saving Time was Coordinated Universal Time (UTC) + 11 hours. This time zone is used in this report as it was the local time of the relevant controllers.

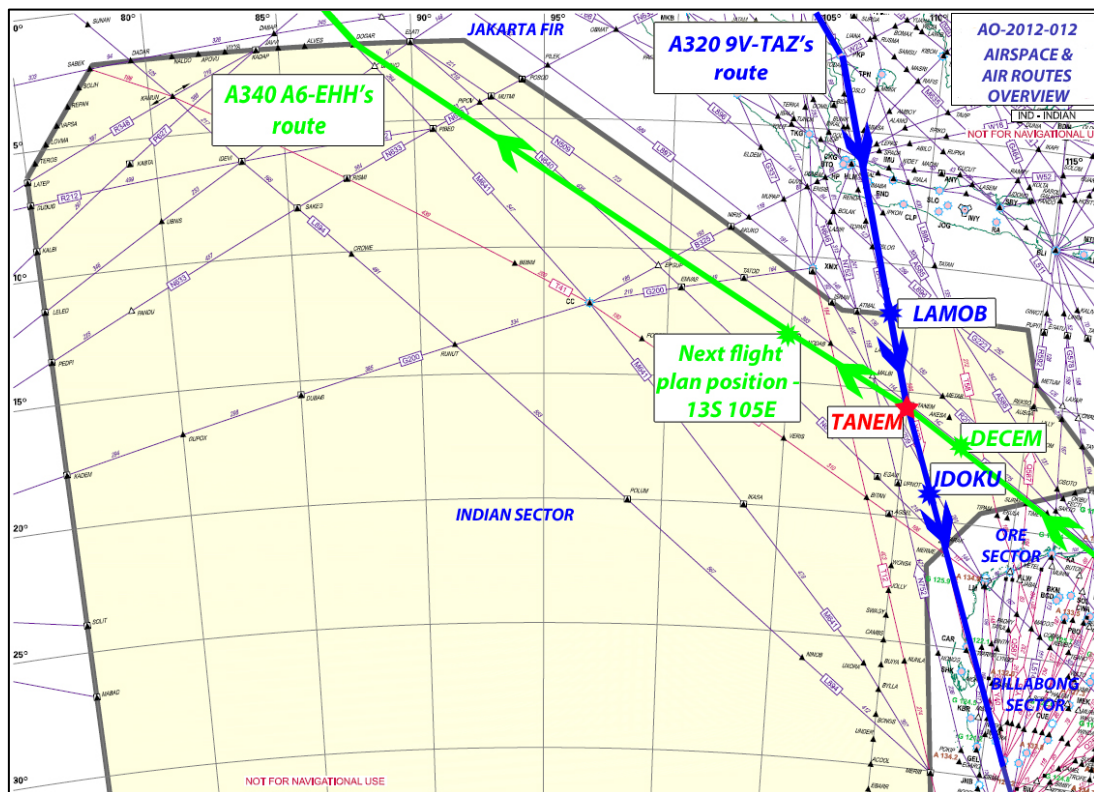
² An occurrence in which two or more aircraft come into such close proximity that a threat to the safety of the aircraft exists, or may exist, in airspace where the aircraft is subject to an air traffic separation standard.

³ 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 350 equates to 35,000 ft.

⁴ ADS-B is a system in which electronic equipment on-board an aircraft automatically broadcasts the precise location of the aircraft via a digital data link. The data can be used by other aircraft and air traffic control to show the aircraft's position and altitude on display screens without the need for radar. Dedicated ADS-B ground stations receive the broadcasts and relay the information to air traffic control for precise tracking of the aircraft.

⁵ ADS-C is a system in which electronic equipment on-board an aircraft broadcasts on demand the precise location of the aircraft via a digital link when passing a position or when specified parameters such as altitude change. The data can be used by ATC to show the aircraft's position and altitude on display screens similar to but without the need for radar.

Figure 1: Flight plan tracking - A340 and A320



Source: Aircservices (modified by the ATSB)

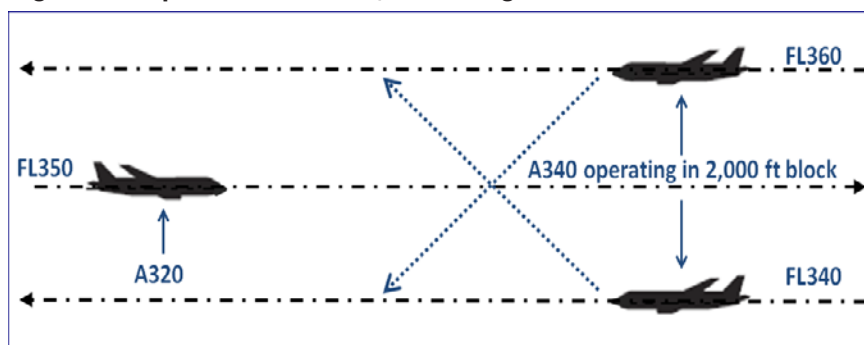
TANEM was located within the Australian air traffic services (ATS) provider's Indian (IND) airspace sector. At 2034, Jakarta (Indonesia) ATC provided the IND controller (controller 1) with coordination on the southbound A320, estimating that it would be overhead the waypoint LAMOB at 2109 at FL 350. LAMOB was the standard point of transfer between Jakarta ATC and the IND sector for all aircraft on this air route. Controller 1 updated the flight data record in The Australian Advanced Air Traffic System (TAAATS) with the received estimate.

At 2041, the A340 flight crew requested a clearance to operate in a 2,000 ft block from FL 340 to FL 360 (Figure 2). At 2047, controller 1 issued the block level clearance⁶ to the crew, apologising for the delay due to workload. Controller 1 also advised the flight crew that the primary method of communication would change from very high frequency (VHF) radio to data-link⁷, and instructed the crew to monitor the Brisbane high frequency (HF) channel.

⁶ A block level clearance allows an aircraft freedom to choose what level to operate at within the defined block. Block level clearances are cancelled if another aircraft requests clearance to operate at a level within the block.

⁷ Data-link communications utilises data messages between a controller and pilot. The A340 was data linked on Automatic Dependant Surveillance (ADS-C).

Figure 2: Representation of 2,000 ft height block issued from FL 340 to FL 360



Source: Manual of Air Traffic Services (modified by the ATSB)

At 2117 controller 1 asked the Brisbane HF operator to contact the A320 flight crew, as the crew had not provided an updated position report for LAMOB by the required time. It was later reported that the crew may have experienced difficulty in contacting the Brisbane HF operator.

At 2119, to facilitate a rest break for controller 1, a handover/takeover of the control position commenced. The handover contained operational and weather information, and information on traffic pending as well as aircraft operating in the airspace, including diversions. Controller 1 provided information to the incoming controller (controller 2) on the A320's overdue position report at LAMOB. They also advised controller 2 about the A340 and its position relevant to two other aircraft. However, the conflict between the A320 and A340 was not identified or discussed by either controller. The fact that the A340 was operating at a block level was not specifically mentioned by controller 1 or noticed by controller 2.

The handover/takeover was completed by 2122 when controller 2 assumed responsibility for the control position. At that time, the A320 was maintaining FL 350 and was south-east of LAMOB. The A340 was operating in the cleared height block of FL 340 to FL 360 and south-east of the waypoint DECEM.

At 2124, controller 2 contacted the Brisbane HF operator and determined that HF communications with the A320 still had not been established and an updated position report for LAMOB had not been received. As the expected time for communications to be established was 15 minutes overdue, the controller advised the Brisbane HF operator that the A320 was subject to an uncertainty phase⁸ (INCERFA) and requested that they continue their efforts to establish contact with the aircraft.

At about 2125 the loss of separation occurred. The relevant separation standards were 1,000 ft vertical separation⁹ or 15 minutes lateral separation at the same position and by this time the two aircraft had less than 1,000 ft vertical separation, were less than 15 minutes apart and the distance between them was closing.

At 2135, the Brisbane HF operator received a delayed position report from the A320 flight crew advising that the aircraft had passed LAMOB at 2112 and was estimating to be overhead TANEM at about 2140. TAAATS was updated and the system repositioned the visual representation of the A320's estimated location on the controller's air situation display (ASD). The INCERFA was cancelled. At this time the A340 was south-east of TANEM and likely to be overhead TANEM at 2142.

⁸ A search and rescue term used to describe a situation where uncertainty exists as to the safety of an aircraft and its occupants.

⁹ The vertical separation standard for two IFR aircraft between FL 290 and FL 410 could be reduced from 2,000 ft to 1,000 ft if both aircraft were approved for Reduced Vertical Separation Minimum (RVSM) operations. In this case both aircraft were appropriately equipped with transponders, specially certified altimeters and autopilot systems.

At about 2135 controller 1 returned from the rest break and a handover/takeover of the control position commenced. Controller 2 provided an update on air traffic in the airspace, which included advice that communication had just been established with the flight crew of the A320.

At about 2136, the A340 was maintaining FL 345 when the flight crew observed opposite direction traffic at FL 350 on the aircraft's traffic collision avoidance system (TCAS).¹⁰ Although no traffic advisory (TA)¹¹ or resolution advisory (RA)¹² was issued, the flight crew reported that they initiated an immediate descent to FL 340.¹³

At 2137, as the handover between the controllers progressed, controller 2 identified that the required vertical separation standard was not in place between the A340 and the A320, and that the proximity of the two aircraft would not permit the immediate establishment of an alternative separation standard. Controller 2 immediately initiated a data-link message to the flight crew of the A340 to request immediate descent to FL 340. The crew reported that they received this message at the time they were already commencing their descent.

The applicable 1,000 ft vertical separation standard was re-established at 2138 when the A340 was observed to maintain FL 340. This was about 2 minutes prior to the estimated time for the crossing point of TANEM (Figure 3).

Figure 3: Indicative representation of loss of separation



Source: Airservices (modified by the ATSB)

- ¹⁰ Traffic collision avoidance system (TCAS) is an aircraft collision avoidance system. It monitors the airspace around an aircraft for other aircraft equipped with a corresponding active transponder and gives warning of possible collision risks.
- ¹¹ Traffic Collision Avoidance System Traffic Advisory - when a TA is issued, pilots are instructed to initiate a visual search for the traffic causing the TA.
- ¹² Traffic Collision Avoidance System Resolution Advisory - when an RA is issued pilots are expected to respond immediately to the RA unless doing so would jeopardise the safe operation of the flight.
- ¹³ As the A340 was cleared to operate in the height block of FL 340 to FL 360, climb or decent contained within that height block is authorised without ATC approval.

Context

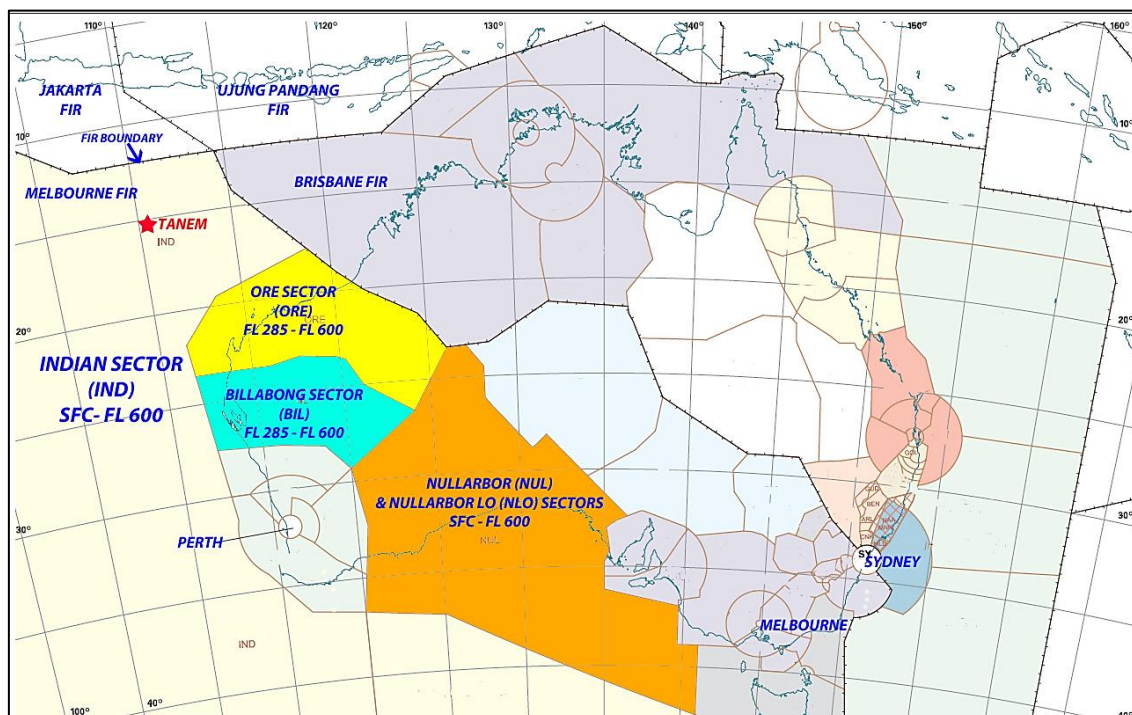
Airspace

The air traffic services (ATS) provider was Airservices Australia (Airservices). The IND sector was part of its West Procedural Group, which was located in the Melbourne Centre. The group also included the Ore (ORE) and Billabong (BIL) upper airspace sectors as well as lower airspace sectors. During the period associated with the occurrence, the IND sector was combined¹⁴ with the ORE sector.

IND covered a significant portion of the Indian Ocean from 150 NM (278 km) off the coast of WA, extending west to the Mauritius flight information region (FIR) located near the Maldives, and south of the equator near the Indonesian archipelago to the Antarctic Region. IND sector vertical limits extended from sea level to FL 600 (Figure 4).

ORE was predominantly a land-based sector overlying the Gibson Desert area west to the Hamersley Range. The airspace encompassed part of the Tropic of Capricorn, the townships of Paraburdoo and Exmouth and extended to about 150 NM off the coast of WA. ORE sector vertical limits extended from FL 285 to FL 600 (Figure 4).

Figure 4: West Procedural Airspace – Indian (IND), Billabong (BIL) and Ore (ORE) sectors



Source: Airservices Australia (modified by the ATSB)

The IND sector involved utilisation of oceanic separation standards, which were not based on ground navigation aids and required greater separation distances between aircraft, as well as a combination of communication methods that included HF, and CPDLC in association with ADS-C. The ORE and BIL sectors were able to utilise closer en route separation standards that used ground based navigation aids and/or could make greater use of surveillance coverage.

Controllers and line managers reported that traffic levels in ORE and BIL and related areas had been increasing in recent years. In addition, traffic complexity was often much higher during the

¹⁴ A volume or sector of airspace may be combined with one or more other sectors on a single air traffic control, depending on the workload.

summer thunderstorm season, with a significant number of weather-related diversions being common.

Personnel information

Controller 1

Qualifications and experience

Controller 1 undertook ATC en route training at Airservices' Learning Academy from January 2010 to March 2011. This initial training aimed to provide trainees with the required skills, knowledge and competence to progress to operational training. At the time that controller 1 attended the Academy, training focused on ATC fundamentals and did not necessarily provide specific training associated with oceanic airspace or controller airspace management techniques.

The controller was selected to progress to the West Procedural Group after initial training. However, none of that group's sectors were considered suitable for an ab initio¹⁵ controller at that time due to their complexity. Accordingly, the controller commenced training on the less complex sectors of Nullarbor (NUL) and Nullarbor Low (NLO) in the Bight Group (Figure 4). The training consisted of theory components associated with the ATC sectors and simulator sessions on those sectors, before progressing to the operational environment where an on-the-job training instructor (OJTI) oversaw and managed the controller's day-to-day training. The controller successfully completed the training and received their initial endorsement on the NUL/NLO sectors on 16 June 2011.

After 3.5 months consolidation on NUL/NLO, the controller moved to the West Procedural Group and commenced simulator training on the IND, ORE and BIL sectors on 1 October 2011. Controller 1 reported that the West Procedural Group simulator training concentrated on the BIL and ORE sectors. They understood that this was due to previous trainees who had had difficulties with the two land-based sectors but were generally able to quickly comprehend and apply the learning outcomes associated with the ocean-based IND sector. Controller 1 stated that this was the reverse for them and that they required an additional simulator session on IND in order to progress to on-the-job training.

It was reported that controller 1's operational training on IND/BIL/ORE was provided by multiple OJTIs, which made it more difficult to ensure consistency of instruction.¹⁶ The controller's intermediate check on 23 November noted that there were no critical issues of concern, and the final check on 15 December noted that the controller was performing at above the rating standard. The controller received their endorsement on IND/ORE/BIL sectors on 15 December 2011.

Throughout controller 1's IND/ORE/BIL training, they maintained their NUL/NLO endorsement, and controlled on those sectors on 18 occasions with a total of 49 hours. During the 5-week period between obtaining the IND/ORE/BIL endorsement and 17 January 2012, the controller operated on the IND/ORE/BIL sectors on 14 occasions with a total of 42.5 hours. They had also operated on the NUL/NLO sectors on 10 occasions with a total of 24 hours.

Recent history

In the period leading up to the occurrence the controller had 2 days rostered off duty (15–16 January 2012) and then worked from 1400–2200 local time on 17 January and 1500–2200 on 18 January. The incident occurred at 2125 local time on 18 January. Controller 1 reported that they had been plugged into the console for about 2 hours before their brief break that commenced

¹⁵ A person who has not previously held an air traffic control license.

¹⁶ The ATS provider was not able to locate and provide to the Australian Transport Safety Bureau (ATSB) the group training documentation that would have recorded the number of OJTIs involved with controller 1's training, the complexity and learning outcomes of each training session, and training progress reports.

at 2122. In the 2-week period prior to the occurrence, the controller had completed two additional duty shifts and no night shifts.

The controller reported that workloads were very high on 17 January and controllers on the group were working for up to 3 hours at a time with 15–20 minute rest breaks. On the day of the occurrence they were working 2-hour periods with 15–20 minute breaks. They reported that these were the highest workload shifts they had ever experienced, and they felt mentally fatigued at the end of each shift.

Controller 2

Controller 2 was a fully endorsed controller with over 16 years operational experience in the West Procedural Group, including 14 years as an OJTI. As a senior member of the West Procedural Group, they regularly advised the on-duty shift manager on the group's day-to-day operational airspace management requirements and controller resourcing needs, including rest break requirements.

The controller had recently returned from a month's leave and received re-familiarisation training on 27 December 2011. Their last rostered day off prior to the occurrence was on 14 January. They then worked from 0800–1800 on 15 January, 0600–1400 on 16 January, 1500–2200 on 17 January and 1500–2200 on 18 January. As with controller 1, controller 2 reported that the high workloads over 17 January and 18 January for 2 to 3 hour periods with short breaks resulted in them feeling mentally fatigued at the end of both shifts.

In the 2-week period prior to the occurrence, the controller had completed three additional duty shifts. During the period from 7 January to 12 January, the controller completed seven shifts in a row, which included four night shifts (with two of them being additional duties). The break between the first two shifts was 8 hours and there was 10 hours between the second and third shifts. The controller lived about 45 minutes away from the ATC centre. They did not recall experiencing any cumulative fatigue associated with the additional shifts.

Air traffic equipment

Each TAAATS workstation consisted of four separate operational displays. The upper left display was a combined weather and aviation/navigation data information access display. The bottom left display was a voice switching control position. The centre or main display was the controller's primary ASD, with a smaller auxiliary ASD located to the right of the main display (Figure 5).

Figure 5: The Australian Advanced Air Traffic System workstation



Source: Airservices

In order to manage the different types of surveillance and aircraft separation requirements within their area of responsibility, during the period leading up to the occurrence the controllers displayed ORE on the main ASD and IND on the auxiliary ASD. As the IND airspace area was about 3,000 NM (5,600 km) by 4,600 NM (8,500 km), the whole area was not displayed on the auxiliary ASD as the required screen range exceeded system parameters. This reduction in display coverage for the volume of airspace was authorised in the group's local instructions.

TAAATS had a Short Term Conflict Alert (STCA) function for detecting when two aircraft were approaching a compromised separation situation requiring immediate controller intervention. However, the STCA was only available in situations involving two conflicting aircraft under either radar or ADS-B surveillance. The STCA was not available for a situation involving procedurally-controlled aircraft such as the A320 and A340 involved in this occurrence.

Air traffic control activities

Traffic complexity

At the time that controller 1 approved the block level for the A340, they were interacting with about 32 aircraft. These included aircraft under the controller's jurisdiction, as well as other aircraft that were being coordinated into the IND and ORE sectors and had to be considered for separation assurance purposes.

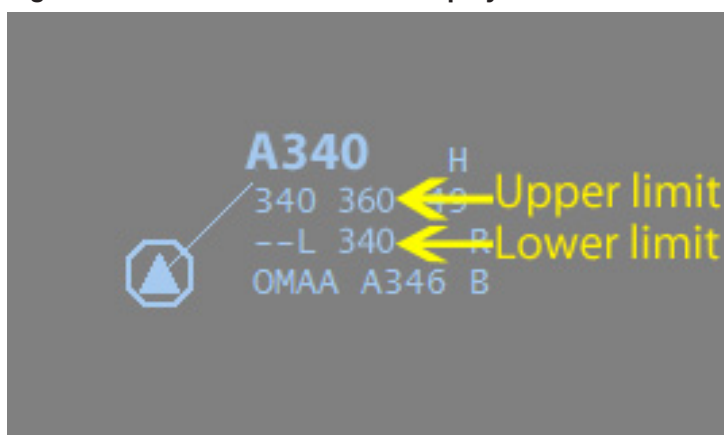
The amount of traffic was consistent with that time of the week, which was normally amongst the highest traffic level for the IND/ORE/BIL sectors. On this occasion the traffic complexity was higher than normal due to the presence of thunderstorms, resulting in many additional communication exchanges required to facilitate deviations around weather and climb or descend aircraft. As aircraft were no longer flying standard routes, controllers were also busy resolving atypical aircraft conflicts. The IND/ORE were also dealing with two INCERFAS during the period leading up to the occurrence, including the A320 involved in the loss of separation. The high workloads were consistent with what was often experienced during the northern wet season from December to February.

The controllers advised that the IND/ORE/BIL sectors were all controlled from the same console if the workload was low. When workload was increased, the sectors had to be decombined.

Controller 2 advised that the group's normal preference was to split the IND group off separately due to the screen size issue. In addition, when ORE and BIL were split there was a significant amount of coordination required between the two sectors. However, on 17 and 18 January almost all the traffic was over the land-based sectors and so combining IND with ORE meant that the traffic levels for IND/ORE and BIL were roughly the same. Controller 2 advised that splitting BIL off from IND/ORE had worked fairly well the previous day so the group's controllers had elected to do that again on 18 January. Airservices advised that at the time of the occurrence, all available staff were utilised and there were no spare consoles available to separate the ORE and IND sectors.

Although they had worked with all three sectors combined, controller 1 reported that they had not worked with the IND/ORE combination of sectors prior to 17 January. They found it difficult operating with that combination given the varied separation methods, coordination complexities and sector dimensions. They advised that, when busy, they would scan for potential conflicts based on flight levels. As the A340 was operating in a block, the upper clearance limit of FL 360 and lower clearance limit of FL 340 were displayed in the aircraft's label on the ASD (Figure 6). 'FL 350' was not displayed in that aircraft's label.

Figure 6: A340 block level label display



Source: Airservices Australia (modified by the ATSB)

Controller 2 reported that there were only four or five aircraft operating in the IND sector at the time of the occurrence, with most of the traffic and workload over the land-based sectors. Consequently their attention was focussed more on the land-based sectors as they thought that the aircraft in the IND sector had been sorted. They recalled seeing the A340 at FL 340 but did not notice that it was operating in a block.

Use of route probes

As coordination was often received from Jakarta ATC up to 1 hour prior to the transfer of control point, the West Procedural Group's local instructions authorised that controllers could use system tools to provide a visual cue that an aircraft was operating outside the display range. The reminder could include text on the controller's ASD or the use of a graphic route probe. The intent was that when an aircraft with a set reminder was close to the display range of the ASD, a controller would be visually prompted to check for any separation conflicts with other aircraft operating in the airspace.

Controller 1 stated that their normal process was to select an aircraft's route or a longer (30 minute) route probe¹⁷ as the trigger. However on this occasion they were busy at the time and they had not set the system reminder when they received coordination on the A320 from Jakarta ATC. They also advised that, when they approved the A340's block clearance, they had considered potential conflicts with other aircraft but they had not considered the A320 at that

¹⁷ Short route probe indicates the predicted position of aircraft at selected time intervals into the future.

stage. They were aware of the A320 when they did not receive an updated position report soon after the expected time of 2109, but they did not identify the conflict between the A320 and A340 at any stage.

Shift management and supervision

The Shift Manager role was an endorsed position that was responsible for the overall provision of ATC services. The documented requirements of the position were to provide general supervision of operational staff to ensure a safe and efficient air traffic service and to exercise Operational Command Authority.¹⁸ There was no operational requirement for a Shift Manager to maintain ATC endorsements unless a business need was identified.

Shift Managers provided supervision by minimising distractions, organising combined sectors to be de-combined if controllers were becoming overloaded and assisting with organising rest breaks for the controllers. They provided very little 'over the shoulder' supervision of controllers, and it was generally the case that the more experienced controllers on the group monitored the performance of the less experienced controllers, as an informal local practice.

On the corresponding shift on the day prior to the occurrence (17 January 2012), the group had six controllers rostered, which resulted in controllers working for up to 3 hours at a time on busy sectors with 15–20 minute rest breaks. On the day of the occurrence, there were six controllers rostered, but given the benefit of the experience gained from the day prior, controller 2 advised the Shift Manager that a further controller was required. The Shift Manager subsequently contacted the night shift controller who arrived 2 hours earlier than their rostered shift commencement time, at about 2000. This resulted in the group's controllers working on sectors for periods up to 2 hours at a time.

Related occurrences

29 July 2011, BLAKA, ATSB investigation AO-2011-090

On 29 July 2011, a loss of separation occurred between two B737 aircraft in the holding pattern at BLAKA, a reporting point south-west of Brisbane, Queensland.¹⁹ The aircraft were inbound to Brisbane on the same air route, with a requirement to hold at BLAKA for sequencing.

The air traffic controller did not identify that the sequence in which the two aircraft entered the holding pattern had changed, and twice assigned one aircraft descent through the flight level of the other aircraft. One of the flight crews identified the conflict and queried the controller, who then took action to recover the compromised separation situation.

The controller had only been endorsed on the Gold Coast (GOL) sector for about 2 weeks, after experience in the tower environment and another en-route sector. There were limitations with the controller's training on the GOL sector. Overall, the controller probably had not consolidated effective control techniques for the sector, particularly for high workload situations. The ATSB also found that, even though the quality of the controller's training had been affected by several factors, the controller's planned on-the-job training period had been reduced from 6 weeks to 4 weeks. More importantly, there was no requirement for a systematic risk assessment to be conducted and documented when the planned amount of training for a controller was reduced.

8 November 2011, Ceduna, ATSB investigation AO-2011-144

On 8 November 2011, a loss of separation occurred between a Boeing Company 737-8FE, registered VH-VUV and a Boeing Company 737-838, registered VH-VXM, near Ceduna, South Australia.²⁰ The aircraft were conducting scheduled passenger flights and operating on converging

¹⁸ The overall responsibility for the provision of an operational service.

¹⁹ http://www.atsb.gov.au/publications/investigation_reports/2011/aa/ao-2011-090.aspx

tracks at FL 390. The procedural longitudinal separation standard of 20 NM (37 km) was infringed. It is likely that there was between 6 NM (11 km) and 12 NM (22 km) longitudinal separation between the aircraft.

The ATSB's investigation identified that the two controllers involved were experiencing a high workload due to a range of factors, including the number of tasks and their limited experience. The air traffic services provider's processes for monitoring and managing controller workloads did not ensure that newly-endorsed controllers had sufficient skills and techniques to manage the high workload situations to which they were exposed. In addition, the air traffic control provider's fatigue risk management system (FRMS) did not effectively manage the fatigue risk associated with allocating additional duty periods. Although Airservices has also been in the process of developing and trialling a flight plan conflict function for procedurally-controlled aircraft for several years, the fact that it was still not operational was also identified as a safety issue.

²⁰ http://www.atsb.gov.au/publications/investigation_reports/2011/aair/ao-2011-144.aspx

Safety analysis

A potential traffic conflict between the A320 and A340 commenced at 2047 when controller 1 issued a clearance for the A340 to operate in a block from flight level (FL) 340 to 360, and the conflict developed into a loss of separation at 2125. The problem existed until 2137 without being noticed by either of the controllers responsible for the relevant sector during this period. The transfers of control jurisdiction between the two controllers were conducted in accordance with documented procedures and the handover/takeover process did not include notification of the traffic conflict as the controllers could not pass on information for an unidentified situation. During the second handover/takeover, Controller 2 identified the conflict shortly before the two aircraft had passed, but the A340 flight crew had already commenced descent in response to their observation of the A320 on the aircraft's traffic collision avoidance system (TCAS).

The potential for collision in this case was limited as the aircraft were on crossing tracks and the A340 was travelling at an altitude 500 ft lower than the A320. Nevertheless, the aircraft were not appropriately separated. Overall, the investigation identified several factors that can lead to such traffic conflicts not being detected and effectively managed.

Controller workload

Workload refers to the interaction between a specific individual and the demands associated with the tasks that they are performing. It varies as a function of the number and complexity of task demands and the capacity of the individual to meet those demands. For the same situation, different individuals will experience different levels of workload depending on their experience, skills and techniques, as well as factors such as fatigue.

High workload can result in an individual's performance on some tasks degrading, tasks being performed with simpler or less comprehensive strategies, or tasks being shed completely. In some cases tasks can be shed efficiently by not performing lower priority tasks or they can be shed inefficiently by abandoning tasks that should be performed (Wickens and Hollands 2000).

A range of factors can influence an individual's visual scanning performance. These include the salience of the items being searched for, the expectancy of finding relevant items, the value of identifying the items, and the amount of effort involved (Wickens and McCarley 2008). Workload and time pressure lead to a reduction in the number of information sources an individual will access, and the frequency or amount of time these sources are checked (Staal 2004).

The workload during the relevant period was very high due to a number of factors, including interaction with a large number of aircraft, significant weather diversions, airspace complexity and managing two sectors, Indian (IND) and Ore (ORE), on different displays. The IND sector also included oceanic airspace that required the use of different separation standards and procedures to the airspace positioned over land.

The workload for controller 1, who was controlling the IND/ORE sector for most of the traffic conflict period, was higher given their low level of experience. With the exception of the previous day, in the 5-week period following endorsement, controller 1 had not had the opportunity to control the configuration combination of the IND and ORE sectors. They also had limited exposure to significant weather diversions and an increase in the air traffic volume as transpired on the occurrence shift. They rated the workload that day, and the previous day, as the highest that they had ever encountered.

Although controller 1 did maintain an overall awareness of the traffic situation, the workload was such that the normal task of placing a system reminder on the coordinated A320's track, as a visual cue to check for separation at a later stage, was shed and then forgotten. Although the controller was still aware of the A320 aircraft, it appeared that their ability to conduct routine scanning for potential conflicts was also affected due to the workload. Controller 2's ability to

conduct a detailed scan of potential aircraft conflicts was also affected by workload during the short period that they were at the console.

Workload management

As high workload was ultimately the fundamental reason why the two controllers did not detect the traffic confliction involving the A320 and A340, the investigation examined the ways that workload was being monitored and managed.

On a tactical basis, workload was monitored by the controllers themselves and the Shift Manager. In this case, the controllers thought they were managing the situation. Workload effects can be subtle, and it is likely that the controllers may not have realised the extent to which their scanning processes were being adversely influenced. It would also be difficult for a Shift Manager to detect a developing problem unless the controller asked for assistance or the adverse effects were quite salient. Shift Managers oversee a significant number of consoles and may not have detailed operational knowledge of each sector under their supervision. In addition, the requirements of the role may not afford them time to monitor specific controllers for significant periods.

On a strategic basis, there had been no formal assessment of workload for the IND, ORE and Billabong (BIL) sectors in recent years. There had been traffic modelling studies which looked at the number of aircraft in the sector, but such modelling did not consider all of the factors that can influence workload. ATC Line Managers advised that it was well known that the traffic levels and complexity had been increasing on these and nearby sectors, and the increased workload had meant that the IND/ORE/BIL sectors were no longer being used as an initial endorsement for ab initio controllers. However, the extent to which relatively new controllers could not manage the combination of IND with other sectors during high workload periods was not fully appreciated at the time of the occurrence.

Ideally the best way of managing high workload is to reduce the level of work demands and distractions. On the day of the occurrence there appeared to be limited options available to reduce workload of the IND/ORE/BIL sectors other than de-combining the BIL sector from the IND/ORE sectors. There were no staff available to further de-combine the IND/ORE sectors. The workstation layout was not ideally suited to combining IND with other sectors during high workload periods, but was not able to be modified.

If the work demands cannot be reduced, then another option is to ensure the controllers have the experience, skills and techniques to effectively manage their task demands. In this case, controller 1 was relatively inexperienced and they were still consolidating their skills (see below). They were then exposed to a very high workload situation for which they had not been adequately prepared. A greater use of strategies such as reducing unnecessary tasks, like approving block level request from flight crews, may have assisted with reducing controller 1's workload and exposure to potential traffic conflict situations.

Overall, high workload can have significant effects on a controller's performance, and it needs to be monitored and managed using a systemic approach, particularly for inexperienced controllers who have recently received a new endorsement. The combination of this occurrence and other recent loss of separation occurrences involving high workloads indicates that Airservices did not have an effective, systemic approach to monitoring and managing workload for newly-endorsed controllers.

Consolidation periods for newly-endorsed controllers

Air traffic controlling is a highly skilled activity that often requires the controller to perform many tasks simultaneously, and they must develop the cognitive ability, through learned skills and knowledge, to perform familiar tasks with minimal attention. Specialist training is required to ensure that a controller has these essential skills and knowledge, and a controller requires substantial practice in a new sector to consolidate and embed the appropriate knowledge and

techniques. The ability to consolidate skills and knowledge in a new sector is also influenced by the other work tasks a controller is required to perform.

The Airservices National ATS Administration Manual (NAAM) stated:²¹

After each initial Endorsement, the person [a controller] must be given every opportunity to consolidate their skills on that position/function, to ensure that competencies only recently acquired are not eroded or degraded.

Minimum periods for consolidation are not prescribed. However, factors which must be considered by supervisors in determining respective periods of consolidation include:

- a. the abilities and experience of the person concerned
- b. the type and complexity of the position or function.

It was reported that it was normal practice to consolidate an initial endorsement for 6 to 12 months before undertaking further training, and it was reported that the previous controller endorsed on IND/ORE/BIL prior to controller 1 had 9 months of consolidation on NUL/NLO prior to commencing training. The West Procedural Group's line managers reported that 3 to 6 month consolidation periods were relatively common. They also noted that the NUL/NLO sectors were relatively simple and that providing more challenging work for a new controller was important. In this case controller 1 had progressed well on the IND/ORE/BIL sectors during training and a 3.5 month consolidation period seemed adequate. Until recently the IND/ORE/BIL had been used for ab initio controllers, so it was thought that controller 1 was now well above the skill level of an ab initio and at the appropriate skill level to transition.

One factor often considered when transitioning a controller to a new sector is the extent that it is similar to previous sectors. In this case, NUL/NLO were similar to ORE/BIL in many ways, although traffic patterns were different and the extent to which separation processes were required was increased. However, the IND sector was significantly different in many ways, and the line managers reported that they had not fully appreciated the difficulty that the sector would cause relatively inexperienced controllers with the increased traffic over recent years.

Another key factor to consider is the expected workload. The summer thunderstorm season significantly increases workload for sectors such as ORE and BIL, and controller 1 had not consolidated their skills to the level required to manage high workload periods with a new combination of sectors. The previous controller endorsed on IND/ORE/BIL transitioned to training outside of the summer period.

The available evidence also indicated that Controller 1 received training instruction from a number of on-the-job training instructors (OJTIs). This can introduce inconsistency in the training approach or mentoring of the controller, with exposure to a number of OJTI's opinions and styles. Although there may be some benefits in exposure to differing opinions and styles, it can also introduce difficulties in developing consistent and standardised performance and therefore require longer training and consolidation periods.

Controller 1 was concerned about commencing their training on West Procedural Group so soon after getting an initial endorsement, but did not express any views to management. However, other controllers had expressed concerns to senior management regarding the issue.

A final aspect to consider is the extent to which a controller is performing duties on another sector when learning a new sector. When learning new skills, it is important to not get task interference in order to maximise the speed and quality of skill acquisition. Although NUL/NLO were relatively simple and had similarities to ORE and BIL, the controller still had to learn traffic patterns as well as oceanic airspace processes on IND. Line managers reported that continuing to do work on a simple sector could help build confidence. However, in this case consolidating new skills and knowledge before the thunderstorm season would have been more important. Similar problems

²¹ National ATS Administration Manual, chapter 3.2, ATC LICENCES AND ATS CERTIFICATES, paragraph 3.2.18 to 3.2.20.

with consolidation and working on other sectors were also noted in a recent ATSB investigation (AO-2011-090).

Overall, the guidance provided to line managers regarding consolidation periods is broad in its consideration, limited in detail and reliant on subjective assessment. More detailed guidance based on past experience could list the full range of factors that need to be considered when determining consolidation periods, including similarity of previous sectors, expected workloads, the controller's views and the conduct of other work. There would appear to be a potential for situations where controllers are forced or allowed into situations where they are not able to effectively consolidate their skills. Such controllers may appear to be performing well during checks, but may not be performing at the level required to deal with high workload and novel situations.

With ATC groups often facing the challenge of maintaining a sufficient number of controllers with the right endorsements, it is important to ensure that there are adequate risk controls in place to ensure that controllers are not required to conduct tasks that are beyond their skill and experience levels. Accordingly, it is important to provide more detailed guidance to line managers regarding the factors that need to be systematically considered when determining consolidation requirements.

Fatigue

Both controllers reported that they were mentally fatigued at the end of the shift, as well as the previous day's shift, due to sustained periods of high workload. There was no evidence that either controller had experienced fatigue associated with their roster pattern in previous days, and they had plenty of opportunity for recuperative sleep associated with the previous days' shifts. In other words, the fatigue was the result of workload, and addressing the workload would help manage this type of fatigue.

However, the ATSB is concerned about the number and type of additional duty periods conducted by controller 2 in the 2 weeks prior to the occurrence. Their shift pattern included three additional duties within an already challenging roster, including night shifts and shifts with very short breaks between them. Such work patterns can significantly increase the risk of fatigue. Further discussion of this issue is provided in an ATSB investigation report into a related occurrence (AO-2011-144).

Block levels

The Australian Aeronautical Information Publication²² (AIP) stated that block level clearances would be issued on request. The AIP also stated that:

The pilot shall have complete freedom to change levels within the block, provided that the upper and lower limits are not exceeded. However, a clearance to operate within a Block Level shall be cancelled or amended if another aircraft requests the use of a level within the block.

The Manual of Air Traffic Services²³ stated that controllers were to cancel block level clearances if other aircraft requested a clearance to operate at levels within the block, but it did not define the proximity parameters of the other aircraft. There were no formal procedures or guidance to state other conditions under which block level clearances should not be provided, such as when experiencing high workloads. There were also no time restrictions specified for the use of block levels. Controllers advised that some international operators routinely requested the use of block levels, and that such requests were usually approved in oceanic airspace after considering their workload.

²² A package of documents that provides the operational information necessary for the safe and efficient conduct of national (civil) and international air navigation throughout Australia and its Territories.

²³ The Manual of Air Traffic Services (MATS) details the procedures governing the air traffic control management in Australia that is provided by the Royal Australian Air Force and Airservices Australia.

The A340 operator advised that it had no formal procedures regarding the use of block levels²⁴, but that during training its crews were recommended to use block levels for various reasons, including fuel economy, turbulence or weather avoidance. In one of its data-link communications to controller 2 very soon after returning to FL 340, the A340 flight crew asked when it could obtain approval for 'cruise climb'.

Cruise climb refers to a method of flying for the maximum range for aircraft with gas turbine engines, in which an aircraft gains height with a decrease in the aircraft gross weight due to the consumption of fuel. This method results in maximum range. The AIP stated that 'cruise climb' was not used in Australian administered airspace. Controllers advised that flight crews often appeared to be using block levels for cruise climb purposes rather than turbulence or weather avoidance.

The ATSB has previously expressed concern regarding the guidance provided to controllers regarding the use of non-conforming flight levels²⁵ (see ATSB investigation AO-2009-080). The ATS provider has significantly enhanced the procedures and guidance for such levels, and now the AIP requires that a pilot must only request a non-conforming level when it is determined by the pilot in command to be essential to the safety of the flight and its occupants. In addition, the pilot must report to ATC when the aircraft can return to the conforming level, and ATC is required to make this request if it is not volunteered by the pilot. MATS states that a controller must make an assessment of the safety impact to all traffic against any operational penalty to the aircraft prior to assigning the non-conforming level, and that this assessment must be updated regularly.

Block levels clearly have the potential to include, and permit the use of, non-conforming flight levels. They also have the potential to increase the complexity of a controller's task and reduce their situation awareness. Accordingly, it seems reasonable that further restrictions or guidance should be provided regarding the use of such levels in Australian-administered airspace.

Detection of the traffic conflict

In this occurrence, the traffic conflict was not detected by either of the controllers on duty in the period leading up to the loss of separation. In addition, the Short Term Conflict Alert (STCA) was not available as the aircraft were procedurally controlled. Airservices has been in the process of developing a conflict alert for procedurally controlled aircraft for several years.

The only detection system that was functioning effectively was the two aircraft's traffic collision avoidance systems, and in this instance, observation of the conflicting traffic by the flight crew of the A340 enabled that crew to take the prompt action to remain clear of the A320, albeit that the A340 crew received an instruction from ATC to descend to FL 340 via controller pilot data link communications at about the same time the flight crew made the TCAS observation. That said, it is not clear that ATC were aware that the A340 was below the level of the A320 at the time the instruction was sent, and risk could have been increased as a result of an instruction to descend, if the A340 had been higher than the A320.

Safety management principles recognise that individuals can make errors and might not detect and correct those errors without assistance. High reliability systems such as for air traffic control rely on having multiple risk controls in place to reduce the likelihood of individual errors, and to detect and recover from such errors.

The STCA has been in place within TAAATS for aircraft subject to radar and ADS-B surveillance for many years. As all aircraft in Australia operating above FL 290, excluding those categorised as

²⁴ A section of airspace with specified upper and lower limits on a specific track, in which a cleared aircraft is permitted to manoeuvre.

²⁵ The standard cruising levels for IFR aircraft traveling above FL 100 in Australia and related territories are odd numbers for aircraft heading 000 to 179° (such as FL350) and even numbers for aircraft heading 180 to 359° (such as FL340).

State aircraft²⁶ are required to have ADS-B equipment installed by December 2013, there will be a significant increase in the amount of traffic that will have an ATS-based automatic conflict detection system available.

However, there will still be areas where aircraft will be procedurally controlled outside of the range of radar and ADS-B surveillance, and for some aircraft operating below FL 290. The ATSB is also concerned that there have been increasing traffic levels and complexity in some sectors in recent years without a concomitant increase in controller resources, combined with a decrease in the experience levels of controllers. Although the ATS provider has also been in the process of developing and trialling a flight plan conflict function for procedurally-controlled aircraft for several years, the fact that it is still not operational is a safety issue.²⁷

²⁶ An aircraft or any part of the Defence Force (including any aircraft that is commanded by a member of that force in the course of his/her duties as such a member), other than any aircraft that by virtue of registration under the regulations is an Australian aircraft; and aircraft used in the military, Customs, or police services of a country other than Australia.

²⁷ Airservices previously advised the ATSB that a flight plan conflict function was scheduled to be operational in late 2006 (see ATSB investigation report 200404707).

Findings

From the evidence available, the following findings are made with respect to the loss of separation between an Airbus A340-642X (A340), registered A6-EHH, and an Airbus A320-232 (A320) registered 9V-TAZ that occurred near TANEM, 490 NM (907 km) north-west of Karratha, Western Australia (WA) on 18 January 2012. They 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 traffic conflict between the two aircraft existed for about 50 minutes but was not identified by either of the controllers on duty on the relevant sectors during this period.
- Both controllers were experiencing a high workload due to a range of factors, including traffic levels, weather diversions and the airspace configuration.
- **The air traffic services provider's processes for monitoring and managing controller workloads did not ensure that newly-endorsed controllers had sufficient skills and techniques to manage the high workload situations to which they were exposed. [Safety issue]**
- Controller 1 had limited opportunity to consolidate their training and skills before being rostered onto more complex sectors and situations.
- **The air traffic services provider had limited formal guidance regarding how to determine appropriate consolidation periods for en route controllers on one sector before they were transitioned to commence training on another sector. [Safety issue]**

Other factors that increased risk

- **The air traffic services provider had limited formal guidance to controllers and pilots regarding the conditions in which it was safe and appropriate to use block levels. [Safety issue]**
- **Although the air traffic services provider has been working on the issue for several years, there was still no automated air traffic conflict detection system available for conflicts involving aircraft that were not subject to radar or ADS-B surveillance services. [Safety issue]**

Other key findings

- The A340 flight crew identified the separation conflict with the A320 on their TCAS display and immediately initiated descent to establish the appropriate vertical separation.
- Controller 2 applied prompt compromised separation recovery actions after they had identified the loss of separation.

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.

Depending on the level of risk of the safety issue, the extent of corrective action taken by the relevant organisation, or the desirability of directing a broad safety message to the aviation industry, the ATSB may issue safety recommendations or safety advisory notices as part of the final report.

Controller workload monitoring and management

Number:	AO-2011-144-SI-01
Issue owner:	Airservices Australia
Type of operation:	Air Traffic Services
Who it affects:	All relatively inexperienced controllers

Safety issue description:

The air traffic controller provider's processes for monitoring and managing controller workloads did not ensure that newly-endorsed controllers had sufficient skills and techniques to manage the high workload situations to which they were exposed.

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

The ATSB was advised that:

Airservices does not support the finding indicating that our processes do not ensure that newly endorsed controllers had sufficient skills and techniques to manage the high workload situations. Airservices training and checking processes, which are also subject to ongoing regulatory oversight, ensure that controllers are appropriately trained and assessed to be competent to perform roles in their licensed environment with varying traffic volume, complexity and workload levels.

To further improve workload related risk management since the occurrence, two additional consoles have been installed in Aisle 3 of the Melbourne Area Control Centre to allow IND, BIL and ORE sectors to be separated. ATC [air traffic control] training for the IND sector has also been separated from ORE and BIL sectors.

Rostering arrangements have been amended to ensure additional controllers are rostered during peak periods. In conjunction with amendments to Western Australia airspace sectors, these arrangements allow IND sector to operate as standalone for the majority of the 24-hour period and ORE and BIL sectors to be split at peak times.

The commissioning of the radar at Paraburdoo has alleviated workload in the ORE and BIL sectors. In addition, CASA's ADS-B mandate effective in December 2013 will enable enhanced surveillance of the majority of aircraft operating in the ORE and BIL sectors.

Airservices has also established an ATC Workload and Complexity Reference Group to determine a suitable workload model to be used by ATC Shift Managers to monitor and forecast ATC workload on a sector by sector basis. This is aimed at further managing and mitigating workload-related risks.

Current status of the safety issue:

Issue status: Adequately addressed.

Justification: Although Airservices disagreed with the identified safety issue, the ATSB is satisfied that the actions taken by Airservices since the incident satisfactorily address the concerns which gave rise to identification of the safety issue.

Consolidation periods for newly-endorsed controllers

Number:	AO-2012-012-SI-01
Issue owner:	Airservices Australia
Operation type:	Air traffic control
Who it affects:	All operation types

Safety issue description:

The air traffic services provider had limited formal guidance regarding how to determine appropriate consolidation periods for en route controllers on one sector before they were transitioned to commence training on another sector.

Response to safety issue by Airservices Australia

Airservices Australia (Airservices) advised the ATSB that the National ATS Administration Manual provided formal documented guidance regarding consolidation after the initial endorsement and factors determining consolidation periods. Airservices provided no advice of safety action in relation to this safety issue.

ATSB comment/action in response:

The ATSB is not satisfied that Airservices has adequately addressed the identified safety issue. While the National ATS Administration Manual provides some guidance, as stated in the report, the minimum time periods for controller consolidation are not prescribed. As such, there is no formal time period required for consolidation and the subjective assessment is delegated to 'supervisors' in determining respective consolidation periods. It is not stated that any formal documentation of assessment is to be performed or that a training specialist or the controller themselves be involved in the process. As such, this safety issue has not yet been adequately addressed by Airservices Australia and the ATSB issues the following recommendation.

ATSB safety recommendation to Airservices Australia

Action number: AO-2012-012-SR-017

Action status: Released

The Australian Transport Safety Bureau recommends that Airservices Australia takes safety action to address the limited formal guidance regarding how to determine appropriate consolidation periods for en route controllers on one sector before they were transitioned to commence training on another sector.

Current status of the safety issue:

Issue status: Not adequately addressed

Justification: The ATSB is not satisfied that the current limited formal guidance provided is satisfactory.

Block level clearances

Number:	AO-2012-012-SI-02
Issue owner:	Airservices Australia

Operation type:	Air traffic control
Who it affects:	All operation types

Safety issue description:

The air traffic services provider had limited formal guidance to controllers and pilots regarding the conditions in which it was safe and appropriate to use block levels.

Response to safety issue by Airservices Australia

Airservices Australia (Airservices) reported that there were existing procedures relating to the use of block level clearances in certain areas. In addition, they advised that further standardisation and guidance would be considered, with the ATSB to be advised of any intended action.

ATSB comment/action in response:

The ATSB is not satisfied that Airservices has adequately addressed the identified safety issue. No evidence was provided to the ATSB of the existing procedures relative to certain areas and there remains limited formal guidance to controllers and pilots for the safe and appropriate conditions for the use of block levels. In addition, given Airservices has advised that further standardisation and guidance would be considered, the ATSB issues the following recommendation.

ATSB safety recommendation to Airservices Australia

Action number: AO-2012-012-SR-018

Action status: Released

The Australian Transport Safety Bureau recommends that Airservices Australia takes safety action to address the limited formal guidance to controllers and pilots regarding the conditions in which it was safe and appropriate to use block levels.

Current status of the safety issue:

Issue status: Not adequately addressed

Justification: Airservices have not provided the ATSB of evidence of existing procedures addressing block level clearances in certain areas. In addition, the ATSB is not satisfied that current limited formal guidance relating to block level clearances, contained in the Manual of Air Traffic Services and the Australian Aeronautical Information Publication, is adequate.

Procedural air traffic control conflict detection system

Number:	AO-2011-144-SI-03
Issue owner:	Airservices Australia
Type of operation:	Air Traffic Services
Who it affects:	All en route flights under procedural control

Safety issue description:

Although the air traffic services provider has been working on the issue for several years, there was still no automated air traffic conflict detection system available for conflicts involving aircraft that were not subject to radar or ADS-B surveillance services.

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

Airservices Australia (Airservices) advised that the first stage of a flight plan conflict function, called Flight Plan Safety Net Alert (FPSNA) had been deployed in Brisbane Upper Airspace, with further rollout planned in Melbourne for 2014. The FPSNA was an advisory safety net alerting tool for aircraft not subject to radar or Automatic Dependant Surveillance-Broadcast (ADS-B) surveillance services. Airservices advised that 'however controllers are still responsible for

performing the tasks in relation to conflict detection and resolution and assuring aircraft separation without FPSNA'. In addition, it was advised that:

Current procedural ATC operations are not considered limited or deficient. The rollout of the tool will support the controller in the conduct of their duties, but it is not required for the safety of air traffic operations.

Current status of the safety issue:

Issue status: Adequately addressed

Justification: The ATSB is satisfied that this safety action will, when fully implemented, satisfactorily address the safety issue.

Other safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Proactive safety action taken by Airservices Australia

In terms of the Fatigue Risk Management System (FRMS) procedures used by Airservices, the ATSB did not identify any organisational or systemic issues, as part of this investigation, which might adversely affect the future safety of aviation operations. However, the ATSB is concerned about the number and type of additional duty periods conducted by controller 2 in the 2 weeks prior to the occurrence and the assignment of additional duties is discussed further in an ATSB investigation report into a related occurrence (AO-2011-144). In relation to this report, Airservices advised that the 30 July 2012 update of the organisation's FRMS (referred to as FRMS 2) considered the previous controller shift cycle when fatigue risk assessments were conducted.

In addition, Airservices reported that the deployment of FRMS 2 had resulted in improved work scheduling capabilities through a new rostering tool to limit cumulative fatigue and further mitigate fatigue related risk. The fatigue assessment and control tool (FACT) decision support tool embedded within the rostering tool reportedly assisted managers and supervisors with effectively managing changes to work schedules through a number of means, including the identification of the most suitable individual for a roster variation, the assessment of situational factors that may affect potential fatigue related risk, identification of risk controls to mitigate potential fatigue related risk.

Further information on FRMS 2 was provided to the ATSB in Airservices' response to the ATSB's investigation report for AO-2011-144.

Proactive safety action taken by Tiger Airways Singapore (Tigerair)

While the ATSB did not make any findings or identify a safety issue associated with flight crew operations, Tigerair undertook proactive safety action in issuing a 'Safety Flash' to its flight crew to advise them of the occurrence and highlight a number of actions that could be taken in the event that crews experienced a loss of communications with ATC. In addition, flight crews were reminded to report all loss of communications events to provide the operator with the opportunity to determine acceptable mitigation procedures and ensure that 'normalization of non-normal events' did not occur. Tigerair advised the ATSB that often flight crews were not provided with an HF frequency before VHF communications were lost.

General details

Occurrence details

Date and time:	18 January 2012 – 1025 UTC	
Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft separation	
Location:	907 km NW Karratha, Western Australia	
	Latitude: 16° 46 05.40 S	Longitude: 112° 12 08.76 E

Aircraft 1 details

Manufacturer and model:	Airbus Industrie, A320-232
Registration:	9V-TAZ
Serial number:	4879
Type of operation:	Air Transport High Capacity

Aircraft 2 details

Manufacturer and model:	Airbus Industrie, A340-642X
Registration:	A6-EHH
Serial number:	870
Type of operation:	Air Transport High Capacity

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- Air traffic controllers
- Air Traffic Control Line Managers
- Operator of the A320
- Operator of the A340
- Airservices Australia
- Manual of Air Traffic Services
- Australian Aeronautical Information Publication.

References

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Wickens, CD & Hollands, JG 2000, *Engineering psychology and human performance*, 3rd edition, Prentice-Hall International, Upper Saddle River, NJ.

Wickens, CD & McCarley, JS 2008, *Applied attention theory*, CRC Press, Boca Raton, FL.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the 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 involved air traffic controllers and Air Traffic Control Line Managers, the aircraft operators, Airservices Australia (Airservices) and the Civil Aviation Safety Authority (CASA).

Submissions were received from one of the controllers, the operator of the A320, 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 factors related to the transport safety matter being investigated.

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.

Australian Transport Safety Bureau

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Investigation

ATSB Transport Safety Report

Aviation Occurrence Investigation

Loss of separation between Airbus A320, 9V-TAZ and
Airbus A340, A6-EHH, near TANDEM, 907 km NW of Karratha, WA
18 January 2012

AO-2012-012

Final – 18 October 2013