Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT

Aviation Occurrence Investigation – AO-2007-038

Final

Procedures-related event
Townsville Airport, Qld
27August 2007
VH-VYC
Boeing Company 737-838
VH-TIX
Cessna Aircraft Company C172

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Figure 1: Airservices Australia

Figure 2: Google Earth

Abstract

At about 1717 Eastern Standard Time on 27 August 2007, a student pilot and an instructor in a Cessna Aircraft Company C172 (172), registered VH-TIX, were operating in the circuit area as the crew of a Boeing Company B737-838 (737), registered VH- VYC, was conducting a runway 01 instrument landing system (ILS) approach at Townsville Airport, Qld.

The pilot of the 172 was cleared for takeoff and to make a right circuit on runway 07 from a position about 700 m along the runway. The 737 was about 1.2 NM from the runway 01 threshold and descending through 400 ft at that time.

The 737 landed on runway 01 and, as it crossed the extended centreline of runway 07, the pilot observed the 172 to pass in close proximity. Radar data and pilot estimates indicated that the 172 passed about 150 m behind the 737 at an altitude of about 100 ft. There was no separation assurance.

As a result of this incident, the local procedures at Townsville were amended to require the application of the Manual of Air Traffic Services (MATS) 4.8.9 *Take-off Behind Landing or Departing Aircraft on Intersecting Runways* separation standard between aircraft departing runway 07 and aircraft landing or departing runway 01/19 at Townsville.

In addition, the Royal Australian Air Force (RAAF) implemented an audit project to examine the compliance of Australian Defence Force (ADF) air traffic services, instructions and procedures with civil requirements.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal bureau within the Australian Government Department of Infrastructure, Transport, Regional Development and Local Government. ATSB investigations are independent of regulatory, operator or other external organisations.

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 enhance safety. To reduce safety-related risk, ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not the object of an investigation to determine blame or liability. However, 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 proactively initiate safety action rather than release formal recommendations. However, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation, a recommendation may be issued either during or at the end of an investigation.

The ATSB has decided that when safety recommendations are issued, they will focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on the method of corrective action. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations. It is a matter for the body to which an ATSB recommendation is directed (for example the relevant regulator in consultation with industry) to assess the costs and benefits of any particular means of addressing a safety issue.

About ATSB investigation reports: How investigation reports are organised and definitions of terms used in ATSB reports, such as safety factor, contributing safety factor and safety issue, are provided on the ATSB web site <www.atsb.gov.au>.

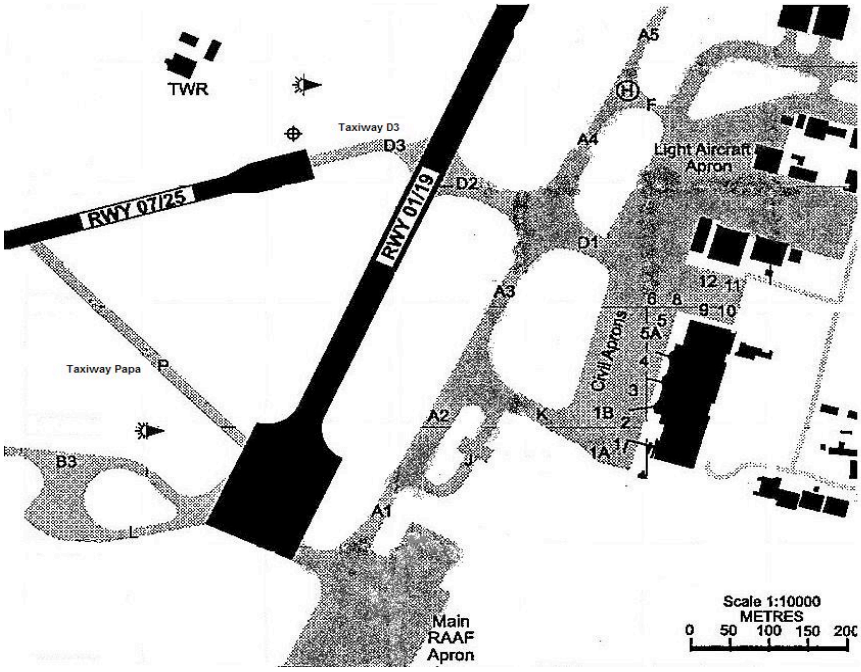
FACTUAL INFORMATION

History of the flight

At about 1717 Eastern Standard Time[1] on 27 August 2007, a student pilot and an instructor in a Cessna Aircraft Company C172 (172), registered VH-TIX, were operating in the circuit area at Townsville Airport, Qld. Concurrently, the flight crew of a Boeing Company B737-838 (737), registered VH-VYC, was conducting a runway 01 instrument landing system (ILS) approach. The aerodrome controller (ADC) stated that the separation of those aircraft was by visual observations from the tower, and that both were visually identified.

The pilot of the 172 reported on left base for runway 07 and requested a touch-and-go landing for additional circuits. The ADC recognised a potential flight path confliction with the 737 and cleared the pilot of the 172 to make a full-stop landing, rather than the touch-and-go landing as requested. The flight crew of the 737 was cleared to land on runway 01. Runways 01 and 07 converge but do not intersect (Figure 1).

Figure 1: Townsville/Townsville International Airport[2]



The pilot of the 172 completed the full-stop landing at 1719 and was instructed by the ADC to report when ready for takeoff. The 172 was on runway 07 and to the west of the intersection of the runway and taxiway Papa (P)[3] when the instructor

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

2 Reproduced with the permission of Airservices Australia.

3 About 600 m west of the crossing centreline of runway 01.

requested a backtrack to the runway threshold. A Cessna Aircraft Company C210 that was joining a left base with about 2.7 NM (5 km) to run to the runway 07 threshold, prevented the ADC from allowing the backtrack and the pilot of the 172 was advised to that effect. The instructor in the 172 then reported ready for takeoff.

At 1719:40, the pilot of the 172 was cleared for takeoff. The 737 was about 1.2 NM (2 km) from the runway 01 threshold and descending through 400 ft above mean sea level (AMSL) at that time.

The ADC reported that the separation assurance applied to the 172 departure was based upon the requirements of Royal Australian Air Force (RAAF) 44 Wing Detachment - Townsville, Standardisation Instruction (SI) (Operations) (44 WG DET-TVL SI (OPS)) 3-1 *Sequencing to multiple runways* (*Sequencing to multiple runways* instruction).[4] The ADC advised the understanding that the instruction allowed concurrent landings and departures, provided there was no collision risk. He believed that there had been sufficient spacing between the 172 and 737, and that there was no risk of collision.

The 737 landed on runway 01 at 1720:20 and, as it crossed the extended centreline of runway 07, the pilot observed the 172 to pass in close proximity.

Radar data and pilot estimates indicated that the 172 passed about 150 m behind the 737 at an altitude of about 100 ft above ground level (AGL). The height of the 737 tail in the landing configuration was 41 ft 2 ins (12.55 m)[5] AGL. There was no separation assurance.

Controller information

The ADC was rated and endorsed, and satisfied the stipulated recency requirements. The ADC commenced duty in that position about 5 minutes prior to the occurrence and reported that the workload experienced during that time was 'moderate'. The controller stated that there were no significant distractions and that all of the equipment and facilities were functioning correctly.

Before commencing duty in the tower, the ADC undertook a 2-hour training session on the Townsville approach radar service. Although rostered, a 30 to 40-minute rest period between that training and the commencement of the ADC's duty in the tower was not possible. The approach radar training officer advised that the rostered break time was taken up by an intensive de-brief of the approach radar training. As part of that brief, the unusual action was taken to access and review the relevant approach radar recordings. The ADC proceeded from that de-brief to the tower.

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4 44 Wing Detachment-Townsville, Standardisation Instruction (Operations) (effective 12 March 2007): local instructions that were developed by the Detachment Commander, RAAF 44 Wing Detachment Townsville to cater for operational situations not covered by the Manual of Air traffic Services (MATS) or by other military documentation. All new or revised unit instructions were vetted by the 44 Wing Standardisation cell prior to their implementation.

5 Frawley, G. *International Directory of Civil Aircraft 2003/2004* (5th updated edition). Fyshwick, ACT: Aerospace Publications Pty Ltd.

The approach radar training officer felt that the ADC may have still had the radar training de-brief in the forefront of his mind at the time of the incident, which had influenced the ADC's early performance in the tower.

Aerodrome information

Townsville Airport was a Joint User[6] airport owned by the Australian Defence Force (ADF). Part of the airport, primarily the civil apron and passenger terminal area, was leased to Townsville Airports Limited (TAPL). The airport had two runways (Figure 1):

- Runway 07[7] was 1,100 m in length, had a 30 m wide sealed surface and was oriented east-north-east with a heading of 066 degrees magnetic. The runway strip[8] was 90 m wide, with a 220 m stopway[9] at its eastern end.
- Runway 01 was 2,438 m in length, had a 45 m wide sealed surface and was oriented north-north-east with a heading 016 degrees magnetic. The runway strip was 300 m wide.

The eastern end of runway 07 was 165 m from the centreline of runway 01. Taxiway Delta three (D3) continued from the eastern end of runway 07 and crossed runway 01 about 700 m north of the runway 01 threshold. The runway strips overlapped.

The *Sequencing to multiple runways* instruction, dated 12 March 2007, noted that the runways did not cross and referred to the respective runway strips not intersecting. However, an examination of the length of the clearways, and the distance of the take-off surface inner edge relative to the runway end, showed that, in accordance with the civil requirements, that was not the case (Figure 2). The ADF advised that it considered that a portion of taxiway D3 was outside both runway strips. By contrast, under Civil Aviation Safety Regulation (CASR) Part 139, taxiway D3 was inside the runway strips, and transient operations on that taxiway would impinge on operations on both runways.

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6 An aerodrome used jointly on a continuing or regular basis by civil and military aircraft. The Commonwealth Airports Act 1996 lists Canberra, Darwin and Townsville as Joint User Airports.

7 Runways (RWY) are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees, with similar runway numbers being avoided (for example RWY 02 and RWY 20)

8 MATS - General (Version 2 – in force at the time of the occurrence and used throughout this report) described a runway strip as a defined area, including the runway and stopway (if provided), which was intended to reduce the risk of damage to an aircraft after running off a runway, and to protect other over-flying aircraft during takeoff or landing.

9 A defined rectangular area at the end of the take-off run in which an aircraft could be stopped in the case of an abandoned takeoff.

Figure 2: RWY07/25 and RWY 01/19 Townsville[10]

Organisational information

The Manual of Air Traffic Services (MATS) was a joint Airservices Australia (Airservices)/ADF document and was based on a combination of the requirements of the Manual of Standards (MOS) Part 172 Air Traffic Services and other Airservices and ADF documentation. The requirements and obligations detailed in the MATS reflected the provisions and regulations of the Air Navigation Act, the Air Services Act, and Defence Instructions. Additions to the instructions in MATS were possible by affected Business Units using MATS SUPPS and, at field level, by Local Instructions.

Separation standards

The MATS defined a separation standard as:

> A prescribed means to ensure separation between aircraft using longitudinal, lateral, vertical and visual standards.

and visual separation as:

> A means of spacing aircraft through the use of visual observation by a Tower Controller or by a pilot when assigned separation responsibility.

A number of factors were to be considered by a controller when applying visual separation, including; the affected aircraft's performance characteristics, the relative aircraft positions and their projected flight paths, and the closure rate of the aircraft. In the case of conflicting flight paths, options for controllers to assure visual separation included either:

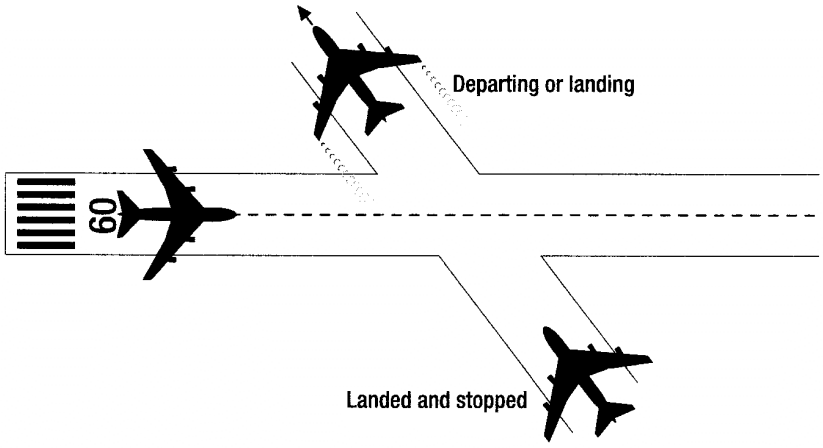
- sequencing and separating the aircraft, or
- transferring separation responsibility to the affected pilots.

10 Picture courtesy of Google Earth

The MATS encouraged controllers to primarily use azimuth[11] when providing visual separation. The judgement of relative distance or height between aircraft when applying visual separation was restricted to when there were wide margins between them and there was '...no possibility of the aircraft being in close proximity.' Controllers were cautioned of the possibility for error when visually determining the relative distance between aircraft that were in close proximity to each other; particularly when considering aircraft of different size.

In the case of intersecting runways, the separation standard for application to an aircraft operation conducted behind a landing or departing aircraft, required controllers to:[12]

> Apply the 'take-off behind landing or departing aircraft on intersecting runways' standard to fixed wing aircraft, provided that you do not permit a departing aircraft to commence take-off until:
>
> a. preceding departing aircraft on an intersecting runway has crossed the intersection; or
>
> b. an aircraft landing on the crossing runway has either crossed the intersection or stopped short.



However, there were a number of air traffic control units that were operated by Airservices (for example Brisbane and Cairns Airports) and by the ADF, that applied separation on runways that did not physically intersect, whereas their runway strips did intersect. An applicable separation standard was not provided in the MATS for those operations and each air traffic control unit published its own local unit instruction explaining how the necessary separation was to be achieved in each case.

Multiple runway operations at Townsville

At Townsville, the *Sequencing to multiple runways* instruction was developed by the Detachment Commander due to the lack of a documented MATS separation standard that was applicable to the airport's runway configuration. The instruction provided the following introductory message:

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11 Horizontal bearing or direction.

12 MATS for ATS 10-55-450.

> The simultaneous use of RWY 01/19 and 07/25 is problematic as these RWY do not cross and the RWY strips do not intersect, consequently they can be considered separate RWY. The overshoot path of RWY 07 crosses RWY 01 immediately beyond the departure end of the RWY, resulting in a need to consider the impact of an overshoot from RWY 07 when other aircraft are arriving or departing from RWY 01.

In addition, the instruction placed responsibility for the management of circuit aircraft on the tower controller as follows:

> It is the sole responsibility of the TWR controller to sequence circuit aircraft with arriving aircraft operating to multiple runways. TWR sequencing shall ensure that aircraft cleared to land at the same time have sufficient distance between them that in the event of one or both aircraft going around that the overshoot paths will be clear.

The instruction did not address a departing aircraft from runway 07 concurrent with a landing or overshooting aircraft on runway 01. However, a number of current and rated ADCs reported that the normal separation practice was to have the runway 01 landing aircraft 1,000 m or more north of the extended centreline of runway 07 when the departing aircraft from runway 07 crossed runway 01.

A number of controllers indicated that there had previously been a 44 WG instruction that required runways 01/19 and 07/25 to be treated as crossing runways for all operations. That previous instruction underwent a number of iterations, usually as a result of input from new Detachment or Operations Flight Commanders, which culminated in version 2 of the document. There was no auditable trail to the earlier crossing runway instruction.

Separation assurance

Separation assurance was described by the MATS[13] in terms of the tactical and strategic environments. Broadly relating to controller separation activities as compared with organisational responsibility, tactical and strategic separation assurance were described as follows:

> Tactical separation assurance places greater emphasis on traffic planning and conflict avoidance rather than conflict resolution and requires that controllers:
>
> a be proactive in applying separation standards to avoid rather than resolve conflicts
>
> b. plan traffic to guarantee rather than achieve separation
>
> c. execute the plan so as to guarantee separation; and
>
> d. monitor the situation to ensure that plan and execution are effective.

13 MATS for ATS 10-10-300

and:

> Strategic separation assurance is the designing of airspace, air routes, air traffic management plans and air traffic control practices, to reduce the likelihood that aircraft will come into conflict, particularly where traffic frequency congestion or system performance, amongst other considerations, may impair control actions.

Safety regulation of civil operations

The Civil Aviation Safety Authority (CASA) is responsible for the safety regulation of civil aviation operations in Australian territory and of Australian aircraft outside Australian territory. CASA monitors civil compliance with aviation safety standards by audit, surveillance and other procedures and practices. That was not the case in respect of military aviation services or facilities, even though military services and facilities were, in many instances, used by civil operators; including for domestic and international high-capacity and general aviation operations.

Similarly, Civil Aviation Regulation (CAR) Part 1 section 3(5), stated that the regulations did not apply to state aircraft, or in relation to military aerodromes. The effect was that a number of CASRs that might be considered relevant to this occurrence were not applicable to the provision of an air traffic service, or to a person providing that service, on behalf of the ADF. Those CASRs included:

- CASR 65 Air traffic services licensing
- CASR 143 Air traffic service training providers
- CASR 171 Tele-communication & navigation service providers
- CASR 172 Air traffic service providers
- CASR 139 Aerodromes.

Notwithstanding, TAPL advised that, as a condition of its Aerodrome Certificate[14], it was responsible for ensuring that the Joint User area[15] of the airport, as defined in the Townsville Airport Joint User Deed, was operated in accordance with the CASR 139 Aerodromes standards during operations by civil aircraft.

Despite the implications of CAR Part 1 section 3 (5), in October 2003, the Chief of Air Force (CAF) advised CASA that:

> Military air traffic controllers will continue to comply with CASA standards contained in the Manual of Standards (MOS) – Part 172 and amplified in MATS when controlling civilian aircraft.

and

> In regard to the provision of Telecommunications and Rescue and Fire Fighting services to civil aircraft in accordance with MOS 171 & 139H that work is being undertaken to resolve the outstanding issues.

14 A certificate that was issued by CASA and authorised the operation of the Townsville Airport.

15 Limited to the civil tarmac and apron areas.

That CAF advice affected a number of military airports, including: [16]

- those approved for use by aircraft engaged in all classes of civil operations, such as Darwin and Townsville
- those at which airline, aerial work, charter or other operations were authorised under prescribed conditions, including Williamtown, Nowra and Oakey.

The operating conditions affecting civil operations at military airports and aerodromes were promulgated in Civil Aviation Order (CAO) 20.17, and included that:

> Operations at Military aerodromes shall be conducted in accordance with the *Civil Aviation Regulations 1988* except that:
>
> (a) when any conditions, rules or instructions issued by the appropriate Military Authority differ from the provisions of the *Civil Aviation Regulations 1988*; or
>
> (b) when any additional conditions, rules or instructions have been issued by the appropriate Military Authority;
>
> operations shall be conducted in accordance with such conditions, rules or instructions issued by the Military Authority.

There was no specific documentation available that would enable a civilian pilot or operator to understand the extent that a military airport, its air traffic services or its navigation aids, complied with the civil regulations.

Pilot flight planning responsibility

The responsibilities of a pilot in command were listed in CAR 224 and included the operation and safety of the aircraft and crew members and/or persons carried during a flight. CAR 233 required pilots to take action to ensure that, prior to commencing a flight:

> (h) the latest aeronautical maps, charts and other aeronautical information and instructions, published in AIP [Aeronautical Information Publication] or by a person approved in writing that are applicable:
>
> (i) to the route to be flown; and
>
> (ii) to any alternate route that may be flown on that flight;
>
> are carried in the aircraft and are readily accessible to the flight crew.

The AIP included a number of documents and charts for access by pilots, including the En Route Supplement Australia (ERSA). Notes were made in the preamble to that document, including that information provided by airport operators for

16 CAO Part 20; section 20.17 Issue 3 dated 8 December 2004.

inclusion in ERSA shall be 'accurate, complete and current.' The preamble noted further that:

> ...the pilot or operator of an aircraft must ensure, independently and prior to use, that any aerodrome depicted in this publication [ERSA] is, in fact, safe and suitable for the particular use intended.

The ERSA comprised a number of sections. Of those, the Aerodrome and Facility Directory section alphabetically listed the details of each certified, registered[17], and military aerodrome, its navigation aids and air traffic and ground services, the available public facilities, and any special procedures for application at the aerodrome.

There were no special procedures in the Townsville Airport entry in the ERSA[18] to alert pilots and/or operators of the potential for convergent arrivals and departures to runways 01/19 and 07/25. That remained the case at the time of writing this report (ERSA effective 20 November 2008).

Safety and quality management

The CASRs that affected the operation of civil airports and their Air Traffic Services (ATS) required the establishment of a Safety Management System (SMS), with specific requirements detailed in the relevant MOS and in Advisory Circulars as required. The aim of an SMS was to reduce risk, and CASA conducted surveillance (audits) of Air Operator Certificate (AOC) holders and civil airport operators to ensure compliance.

The safety and quality management of ADF ATS was provided by the 44 Wing Standardisation Cell (44 WG STAND cell) to ensure:

- Compliance with the Officer Commanding 44 Wing's needs, expectations and requirements, with the applicable regulatory requirements and with Australian Air Publication (AAP) 8132.003 – Air Traffic Control Organisation and Administration.
- The verification of ATS outputs through the conduct of Operational Evaluations (OPEVAL). An OPEVAL was effectively an audit of the operational capability of 44 WG ATS and their compliance with a number of 'benchmark' regulatory documents. Those documents included the MATS and 44 WG instructions, but did not include the CARs or the CASRs. There was no requirement for an OPEVAL to consider the 'fitness for purpose' of a procedure, or to identify any associated safety hazards.
- The provision of high quality ATS by trained, qualified air traffic control officers who were applying procedures that complied with the MATS and 44 Wing instructions.

A review of the results of the Townsville OPEVAL reports for the 3 years prior to the incident appeared to confirm the purely audit nature of those evaluations. In particular, the 2005 report identified two instructions that were noncompliant with

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17 Registered aerodromes are aerodromes that voluntary comply with MOS139.

18 Effective 7 June 2007 and current at the time of the incident.

the MATS, whereas there was no accompanying analysis of the development of those non-compliances.

Additional information

Converging runway operations

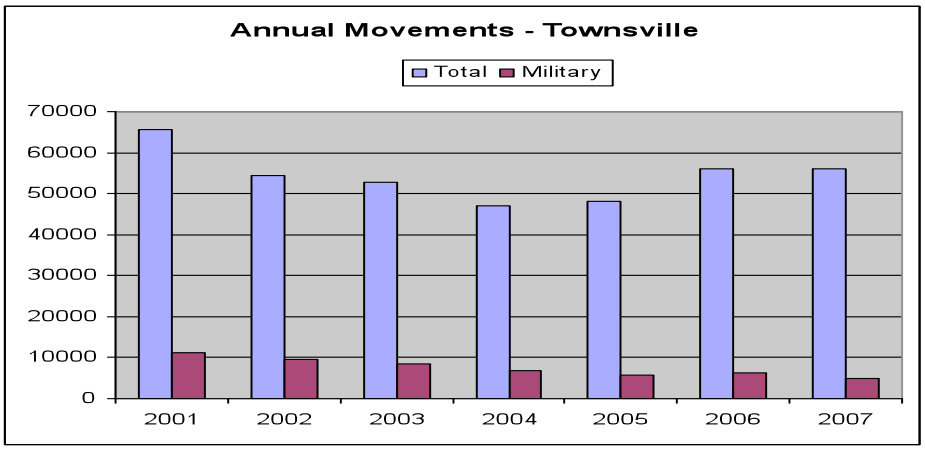
Converging runway operations (CROP) procedures were developed by Airservices to enhance the capacity of Brisbane International Airport (see Australian Transport Safety Bureau (ATSB) investigation report BO/200504338, available at www.atsb.gov.au). Converging runway operations procedures initially permitted simultaneous approaches, or arrivals and departures at Brisbane for certain runway configurations in visual conditions. Although the affected runways at Brisbane did not physically intersect each other, controllers were required to treat them as intersecting runways for the purposes of separation assurance.

Prior to the Townsville incident, the Brisbane CROP procedure was amended to restrict those operations to the conduct of simultaneous converging approaches at Brisbane (see ERSA effective 7 June 2007, which was current at the time of the incident). There was no provision for the conduct of simultaneous converging approaches and departures in that version of ERSA.

Civil/military aircraft movement statistics

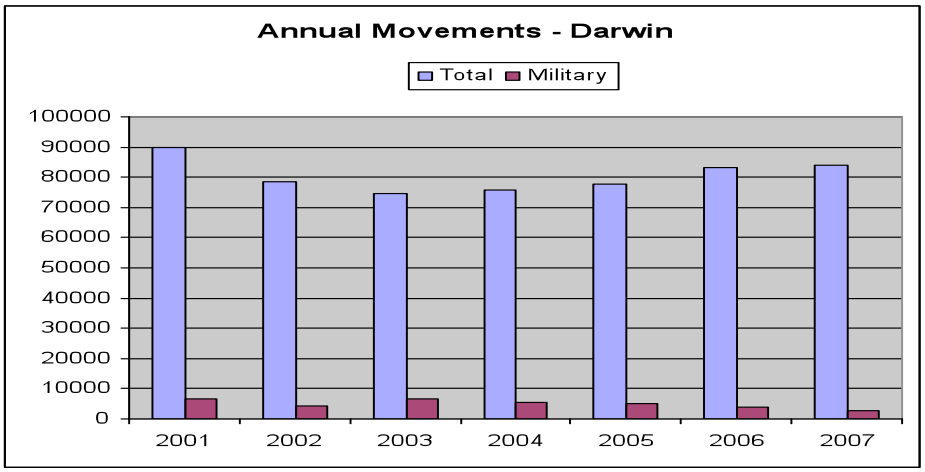
Data is collected by Airservices on the number of aircraft movements at Australian Airports. The annual numbers of aircraft movements for Townsville Airport over the period 2001 to 2007 are at Figure 3. Similar figures for Darwin Airport are at Figure 4.

Figure 3: Airport movement data Townsville



An examination of the aircraft movements at Townsville for 2007 showed that military aircraft accounted for just less than 9% of the total aircraft movements that year.

Figure 4: Airport movement data Darwin



An examination of the aircraft movements at Darwin for 2007 showed that military aircraft accounted for just less than 3.5% of the total aircraft movements that year.

ANALYSIS

Operational aspects

The application by the controller of visual separation to the takeoff by the 172 was predicated on the controller's understanding of its, and the 737's, performance characteristics, and their relative positions, projected flight paths and closure rates. However, the controller could not have known the effect of pilot technique, environmental and other aircraft-specific variables on the takeoff by the 172 from its displaced position on runway 07. Given the likely relative proximity of the converging aircraft to each other, any variation to the controller's anticipated 172 take-off performance increased the risk of a breakdown of separation (BOS). In that case, the provision of a take-off clearance to the pilot of the 172 did not provide for separation assurance as required by the Manual of Air Traffic Services (MATS).

The investigation considered the possibility for the intensity and unusual format of the approach radar training de-brief, and its proximity to the commencement of the controller's duty in the control tower, to have impacted on the controller's performance. Whereas it was unlikely to have directly affected the controller's judgement, any preoccupation by the controller with the nature and content of the de-brief would have impacted on the controller's separation planning.

In addition, the scope and discretionary nature of the Royal Australian Air Force (RAAF) 44 Wing (44 Wing) *Sequencing to multiple runways* instruction (*Sequencing to multiple runways* instruction) suggested its noncompliance with the strategic separation assurance requirements of the MATS, and increased the risk for that to occur. In this instance, the lack of a designated position for the landing 737 before clearing the 172 for takeoff, as would be the case had the runways been treated as intersecting, required the controller to judge the distance between the aircraft when they could be expected to come into relatively close proximity to each other. As a result, the estimation by the controller of the distance between the different-sized aircraft was unreliable. A more positive converging runway sequencing procedure would have greatly simplified the controller's traffic planning, and reduced the risk of a BOS involving the takeoff by the 172.

The investigation concluded that the lack of a definitive converging runway separation standard at Townsville Airport increased the risk of a BOS during those operations. The imposition of that standard by higher authority would have prevented the local amendment of the *Sequencing to multiple runways* instruction by successive managers. Such a standard could have application to all similar military runway configurations.

Safety and quality management

The audit nature of the 44 WG Operational Evaluations (OPEVALS) impacted on standardisation officers' ability to fully consider the fitness for purpose of the *Sequencing to multiple runways* instruction at Townsville Airport. In that case, it was perhaps understandable that successive OPEVALs did not identify the lack of a definitive separation standard as a safety issue, and provide options for its timely resolution. In addition, the unavailability of any records of the various changes to the sequencing instruction, suggested a somewhat informal document change

management process. Moreover, the reference in the sequencing instruction that runways 01/19 and 07/25 did not intersect, contrasted with the likely hazard identification had the requirements of Civil Aviation Safety Regulation (CASR) 139 Aerodromes been taken into account. The existing 44 Wing Standardisation Cell assessment practices would benefit from encouraging standardisation officers to consider the fitness for purpose of the wing procedures when carrying out their OPEVALS and, where necessary, to propose options for the resolution of any identified safety hazards.

Regulatory compliance

Civil aircraft movements represented the majority of the total aircraft movements at Townsville Airport in 2007, and potentially at a number of other Joint User military airports and aerodromes. Unless alerted otherwise, such as via the En Route Supplement Australia (ERSA), those operations could be expected by pilots and operators to be carried out in accordance with civil regulations.

Unlike the situation affecting the conduct of converging runway approaches at Brisbane International Airport, there was no documentation available for use by pilots and operators that described the potential for converging runway arrivals and departures at Townsville Airport. While Civil Aviation Order (CAO) 20.17 allowed military authorities to issue conditions, rules or instructions that differed from the provisions of the Civil Aviation Regulations (CAR), the lack of advice of the converging runway operations at Townsville meant that pilots were unknowingly unable to satisfy the operational requirements of the Aeronautical Information Publication (AIP) for operations at that airport.

In addition, when attempting to confirm the safety and suitability of their operations at Townsville, operators were similarly unknowingly affected by the lack of operational information. As a consequence, they were unable to determine Townsville's procedural compliance with the relevant civil regulations, and to consider operational risk strategies in response.

The fact that the Civil Aviation Safety Authority (CASA) did not oversight facilities used for civil aircraft at military airports, and a primarily military capability focus of the RAAF Operational Evaluations, suggested the potential for the extent of any difference with civil requirements at military airports to remain undetected. That could include in terms of those establishments':

- air traffic services (ATS) licensing and training
- provision of air traffic, telecommunication and navigation services
- aerodromes and their facilities.

Domestic and international operators would benefit from an audit of Joint User Australian Defence Force (ADF) facilities and their ATS, and advice of their comparison with civil requirements; particularly in relation to any differences that might affect operational risk.

FINDINGS

From the evidence available, the following findings are made with respect to the procedures related event that occurred at Townsville Airport, Qld on 27 August 2007 and involved VH-VYC, Boeing Company 737-800 and VH-TIX, Cessna Aircraft Company C172. They should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- The provision of take-off clearance to the pilot of the 172 did not provide separation assurance as required by the Manual of Air Traffic Services (MATS).
- There was no definitive separation standard for application to the converging runways at Townsville Airport. *(Safety issue)*

Other safety factors

- The Royal Australian Air Force (RAAF) 44 Wing (44 WG) *Sequencing to multiple runways* instruction did not comply with the strategic separation assurance requirements of the MATS.
- There was no standardised converging runway separation standard for application at relevant military airports and aerodromes.
- The 44 WG operational evaluation (OPEVAL) process did not ensure the consideration of the fitness for purpose of its procedures and the resolution of any identified safety hazards.
- There was no documentation available for civil pilots and operators to determine the degree of compliance of the Townsville Airport converging runway procedures with relevant civil regulations, and to consider operational risk strategies in response. *(Safety issue)*
- The nature and content of the approach radar training de-brief, and its proximity to the incident, probably impacted on the controller's separation planning.

SAFETY ACTIONS

The safety issues identified during this investigation are listed in the Findings and Safety 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 responsible organisations for the safety issues identified during this investigation were given 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.

Australian Defence Force

Converging runway separation standard

Safety issue

There was no definitive separation standard for application to the converging runways at Townsville Airport.

Action taken by the Australian Defence Force

In response to this incident, the Royal Australian Air Force (RAAF) commenced its own investigation. As a result of that investigation, RAAF Standardisation Instruction (SI) (Operations) (44 WG DET-TVL SI (OPS)) 3-1 *Sequencing to multiple runways* (*Sequencing to multiple runways* instruction) was amended. That amendment required controllers to apply the Manual of Air Traffic Services (MATS) 4.8.9 *Take-off Behind Landing or Departing Aircraft on Intersecting Runways* separation standard between aircraft departing runway 07 and aircraft landing or departing runway 01/19 at Townsville. Standard phraseology for use during dual runway operations was included in the revised sequencing instruction, which became effective on 29 August 2007.

ATSB comment

The amendment of the *Sequencing to multiple runways* instruction addressed the identified safety issue. Concern remains, however, with the ability for successive 44 WG Townsville Detachment or Operations Flight Commanders to amend that instruction in apparent isolation of any oversight by higher command.

Compliance of the Townsville converging runway procedures with civil regulations

Safety issue

There was no documentation available for civil pilots and operators to determine the degree of compliance of the Townsville Airport converging runway procedures with relevant civil regulations, and to consider operational risk strategies in response.

Action taken by the ADF

On 23 November 2007, RAAF 44 WG advised that they would implement an audit project in 2008 that would examine the compliance of ADF Air Traffic Services (ATS), instructions and procedures with civil requirements.

RAAF 44 WG subsequently advised that on 25 March 2008, an external consultant completed an audit of the generic framework underpinning 44 WG activities in respect to air traffic control licensing, training and operations. The consultant found that apart from some minor differences, 44 WG was compliant with the requirements of Civil Aviation Safety Regulations (CASRs) 172 *(ATS providers)*, 65 *(ATS licensing)* and 143 *(ATS training)*. Alignment with CASR 139 *(Aerodromes)* and 171*(Aeronautical telecommunications)* requirements was not considered within the audit scope.

ATSB comment

The ATSB acknowledges the commitment by the ADF to examine its instructions and procedures for their compliance with the civil regulations, including at Townsville Airport. Of equal importance is the need to publish relevant elements of the results of that audit, such as in the En Route Supplement Australia (ERSA), in order for civil pilots and operators to satisfy their operational responsibilities in accordance with the Aeronautical Information Publication (AIP) during operations to ADF/Joint User facilities.

At the time of finalising this report, no information was available to civil operators and pilots with regard to the the ADF's degree of alignment with the civilian ATS, aerodrome and telecommunication operational requirements.

APPENDIX A: SOURCES AND SUBMISSIONS

Sources of information

The sources of information during the investigation included:

- the involved air traffic controllers
- recorded radio transmissions
- Australian Defence Force Air Traffic System (ADATS) radar recordings
- the airport operator (civil)
- Australian Defence Force (ADF) documentation
- Civil Aviation Safety Authority (CASA)
- Airservices Australia (Airservices)
- the involved pilots
- civil aviation regulatory documentation
- International Civil Aviation Organization documentation.

References

The following references were accessed during the investigation:

- Manual of Air Traffic Services ((MATS)
- Frawley, G. *International Directory of Civil Aircraft 2003/2004* (5th updated edition). Fyshwick, ACT: Aerospace Publications Pty Ltd.

Submissions

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

A draft of this report was provided to CASA; Airservices; the ADF; the involved air traffic controllers, operator and pilot; and the airport operator (civil). A submission was received from CASA. That submission was reviewed and where considered appropriate, the text of the report was amended accordingly.