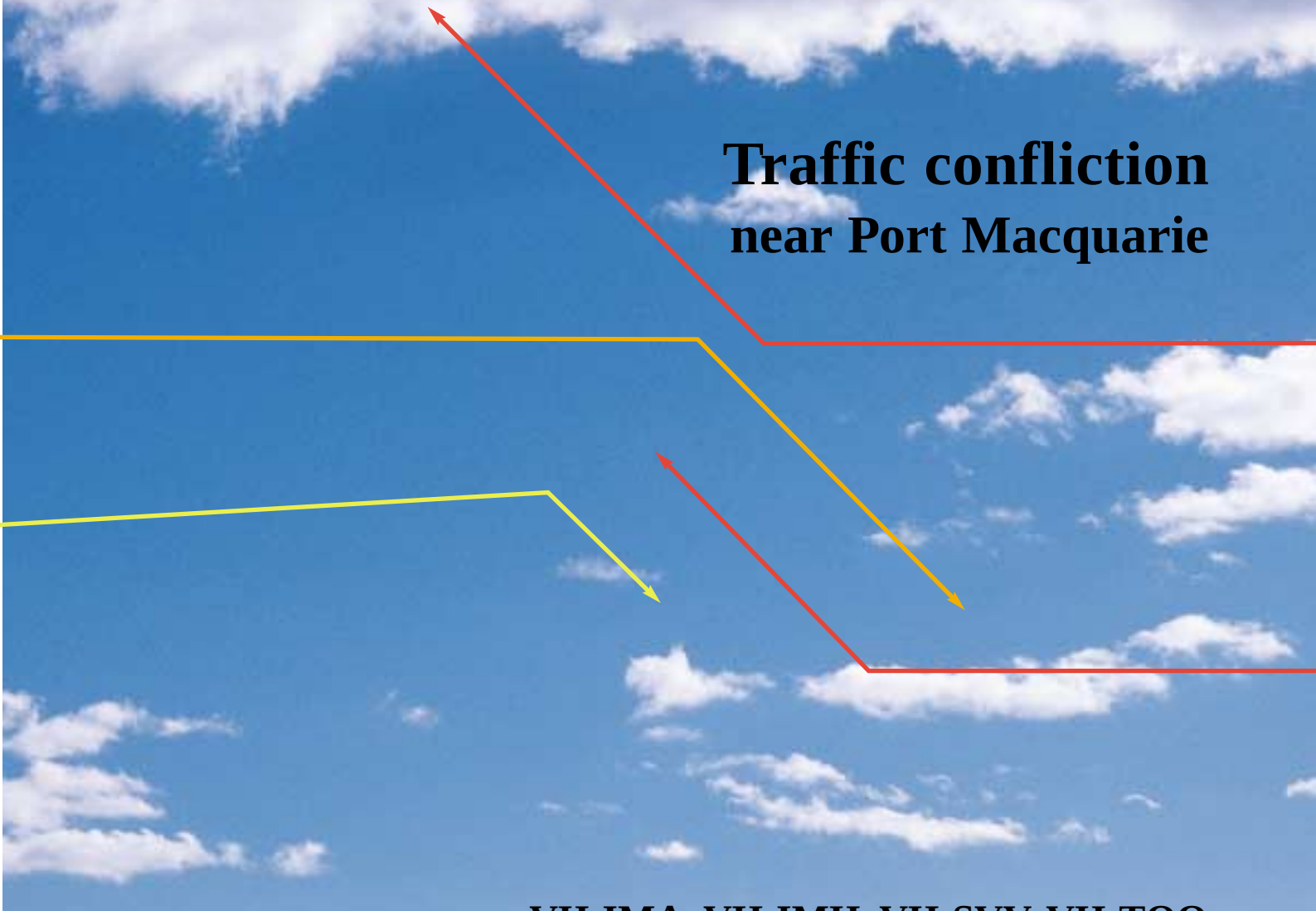
ATSB
Australian Transport Safety Bureau

AUSTRALIAN TRANSPORT SAFETY BUREAU

INVESTIGATION REPORT
199901959

Traffic confliction
near Port Macquarie



VH-IMA, VH-IMH, VH-SVV, VH-TQO
28 April 1999

COMMONWEALTH DEPARTMENT OF TRANSPORT AND REGIONAL SERVICES

Department of Transport and Regional Services

Australian Transport Safety Bureau

AIR SAFETY OCCURRENCE REPORT
199901959

Traffic Confliction
near Port Macquarie on 28 April 1999

Beech 1900	**VH-IMA**
Beech 1900	**VH-IMH**
Chieftain	**VH-SVV**
Dash 8	**VH-TQO**

When the ATSB makes recommendations as a result of its investigations or research, safety (in accordance with its charter) is its primary consideration. However, the Bureau fully recognises that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry.

Readers should note that the information in ATSB reports is provided to promote safety: in no case is it intended to imply blame or liability.

ISBN 0 642 274673 April 2001

This report was produced by the Australian Transport Safety Bureau (ATSB), PO Box 967, Civic Square ACT 2608.

CONTENTS

ABBREVIATIONS, TERMS, DEFINITIONS AND DIAGRAMS

Note: The definitions included in this report were current at the time of the occurrence.

ACAS	Airborne collision-avoidance system. An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.
Aircraft Conflict	An alert initiated by an air traffic controller when aware of Alert aircraft which are considered to be in unsafe proximity
BASI	The Bureau of Air Safety Investigation (now incorporated into the ATSB)
Category 4 Occurrence	Category 4 occurrences are those where the facts do not indicate a serious safety deficiency but investigation is required to substantiate the initial reported facts. The circumstances are sufficiently complex to require detailed information from the pilot, operator and/or other involved parties. This category may also include a selection of occurrences identified as involving characteristics which, from trend or safety analysis, require investigation.
Class 'E' airspace	Airspace of defined dimensions in which aircraft are subject to various requirements. These include: aircraft operating under the IFR receive a positive separation service from other IFR aircraft and traffic information on flights operating under the VFR as far as is practicable. IFR flights require an air traffic control clearance. Aircraft operating under the VFR do not require an air traffic control clearance and only receive a radar information service on request.
Class 'G' airspace	Airspace of defined dimensions in which IFR and VFR flight is permitted, but no separation service is provided. Pilots of IFR flights are required to submit a flight plan and air traffic services provide a flight information service, which includes a directed traffic information service on other IFR flights. Pilots of IFR aircraft are also provided with a 'flight following' service i.e. the progress of the flight is monitored by air traffic services and pilots are required to make regular position reports. All IFR aircraft are provided with a SAR alerting service, as are VFR aircraft on request. Pilots of VFR aircraft receive a flight information service if requested.
DTI	Directed traffic information. A service provided by an air traffic services unit to alert a pilot to other known aircraft which may be in proximity to the position or intended route of flight and to help a pilot avoid collision. Note: Normally only given to aircrew operating under the IFR.
EST	Eastern Standard Time using the 24 hour clock. Where a colon is used, the figures after the colon indicate the number of seconds after the minute.
Flight level	Height above mean sea level measured in hundreds of feet and standardised to internationally agreed parameters.
ft	Feet
IFR	Instrument flight rules.

MBZ	Mandatory broadcast zone. An airspace of defined dimensions, within which pilots must make specified broadcasts.
NM	Nautical mile
RA	Resolution advisory. Manoeuvring advice provided to a pilot by ACAS equipment to resolve conflicts with aircraft transponding SSR Mode C altitude. Note: Most airline standard operating procedures require a crew to carry out any manoeuvre so advised.
TA	Traffic advisory. Indications provided to a pilot by ACAS equipment showing the approximate relative positions of transponding aircraft which may become a threat.
TCAS	Traffic alert and collision-avoidance system. An airborne collision-avoidance system based on radar beacon signals which operate independently of ground based equipment. Note: There are different versions of TCAS available which provide different levels of advice.
Traffic Information	i) Information (by an air traffic services unit) to alert a pilot to other known or observed air traffic which may be in proximity to the position or intended route of flight and to help the pilot avoid collision. ii) Information (by certain TCAS versions) to give information to the pilot showing the approximate relative positions of transponding aircraft prior to activation of a traffic advisory.
m	Metres
MHz	Megahertz
VFR	Visual flight rules

Diagrams

The diagrams included in this report are to assist in the interpretation of the events and are not to scale. As each aircraft profile is approximately 2 miles long in the scale being used, the nose of the aircraft represents the position of the aircraft.

Note: The report contains numerous time references which are taken from three sources, air traffic control sector frequency, flight information service frequency and the Port Macquarie mandatory broadcast zone frequency. Whereas the time references for the sector and the flight information service were accurately aligned, the timings for the mandatory broadcast zone may differ by up to 30 seconds.

PREFACE

The Australian Transport Safety Bureau (ATSB) is responsible for investigating accidents, serious incidents, incidents, and safety deficiencies involving civil aircraft operations in Australia, as well as participating in overseas investigations of accidents and serious incidents involving Australian-registered aircraft. The ATSB also conducts investigations and studies of the aviation system to identify underlying factors and trends that have the potential to adversely affect safety. A primary concern is the safety of commercial air transport, with particular regard to fare-paying passenger operations.

ATSB investigations seek to determine the factors that led to an accident, incident or safety deficiency.

The results of those determinations form the basis for safety recommendations and advisory notices, statistical analyses, research, safety studies and ultimately accident prevention programs. To produce effective recommendations, the information collected during the investigation, and the conclusions reached, must be analysed in a way that reveals the relationship between the individuals involved, and the design and characteristics of the system within which those individuals functioned. As with equivalent overseas organisations, ATSB has no power to implement its recommendations.

The ATSB performs its functions in accordance with the provisions of the *Air Navigation Act 1920*, Part 2A. Section 19CA of the Act indicates that the object of an investigation is to determine the circumstances surrounding any accident, serious incident, incident, or safety deficiency to prevent the occurrence of other similar events.

The term 'safety deficiency' is defined in section 19AD of the Act as follows:

> A ***safety deficiency*** is constituted by any situation related to aviation that can reasonably be regarded as having the potential to affect adversely the safety of aviation.

It is not part of the object of an investigation to determine blame or liability. However, it does need to be recognised that an investigation report must contain factual material of sufficient weight to support the analysis and conclusions reached. That material will at times contain information reflecting on the performance of individuals and organisations, and how their actions may have contributed to the outcomes of the matter under investigation. 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.

Safety action statement

Safety action statements contain details of any ATSB safety outputs or other safety actions. ATSB safety outputs include Recommendations and Safety Advisory Notices. Safety outputs issued prior to the release of the final report are published in the final report together with any responses. The Statements will also contain any Final Recommendations and Safety Advisory Notices. Safety Actions taken by organisations other than ATSB, which were initiated as a result of the investigation (referred to as Local Actions), will also be published in the final report.

EXECUTIVE SUMMARY

The crews of all four aircraft had planned to use the same air route between Port Macquarie and Taree. VH-IMA and VH-TQO were arriving at Port Macquarie while VH-IMH and VH-SVV were departing. Due to minor deviations in track-keeping, all four aircraft were to the west of the nominal track.

Weather conditions were such that a layer of cloud existed upwards from approximately 7,000 ft.

Although the flight service officer provided a timely and up-to-date directed traffic information service to all crews, radio communications between the crews of IMA and IMH, and between IMH and SVV were insufficient to ensure self-separation between their aircraft.

The high number of radio transmissions on the various frequencies, when combined with the frequency management requirements of each crew, limited the opportunities for adequate radio contact.

The crews of IMA and IMH maintained altitudes in Class 'G' airspace without broadcasting their intentions on the flight service frequency. In addition, while both crews were maintaining a listening watch on the flight service frequency for 8 minutes prior to their aircraft passing, neither crew made radio contact with the other.

Analysis of the recorded radar data indicated that the aircraft passed within 1,000 m horizontally and 200 ft vertically while IMA was maintaining 8,000 ft.

None of the aircraft were fitted with an Airborne Collision Avoidance System (ACAS). An ACAS would, most probably, have improved the situational awareness of the crews to the extent that a more effective traffic management plan may have been undertaken.

The lack of adequate situational awareness of the crews of IMA and IMH resulted in two regular public transport aircraft coming into relatively close proximity without either crew carrying out a positive separation plan.

The investigation identified safety deficiencies in respect to timely conflict alerting and self-separation procedures and contains seven recommendations to the Civil Aviation Safety Authority addressing those deficiencies.

1 FACTUAL INFORMATION

1.1 History of the flights

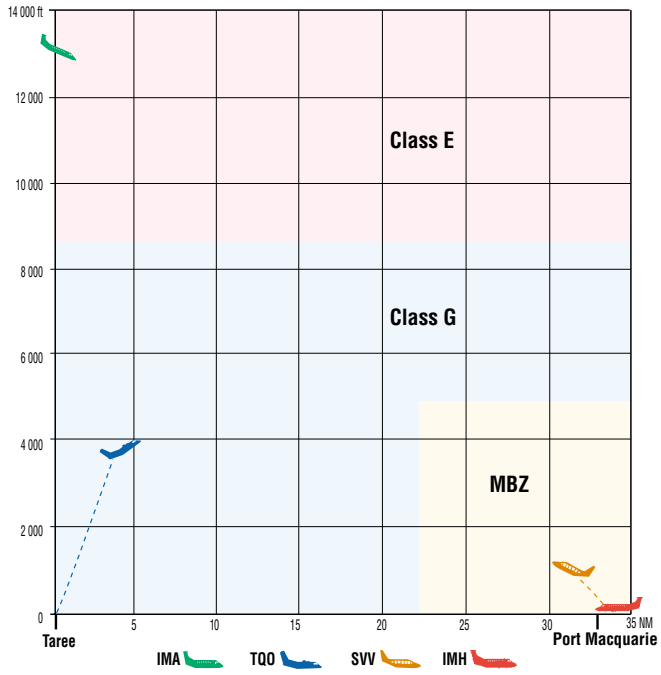
VH-IMA, a Beech 1900, had departed Sydney on a flight to Port Macquarie and was maintaining flight level 210. The crew estimated a time overhead Taree of 2002 Eastern Standard Time (EST) and an arrival time of 2008. The crew had been cleared to track from a position north-east of Sydney direct to Port Macquarie; a track that would pass east of Williamtown and Taree. As the aircraft was passing abeam Williamtown, its Global Positioning System failed and the crew elected to track via Taree to Port Macquarie with reference to the Non-Directional Beacons at each aerodrome. They commenced descent at 1954 and transferred to the flight service frequency (121.6 MHz) at 1956 with an 'all stations' broadcast, which included details of their arrival track and estimated time of arrival.

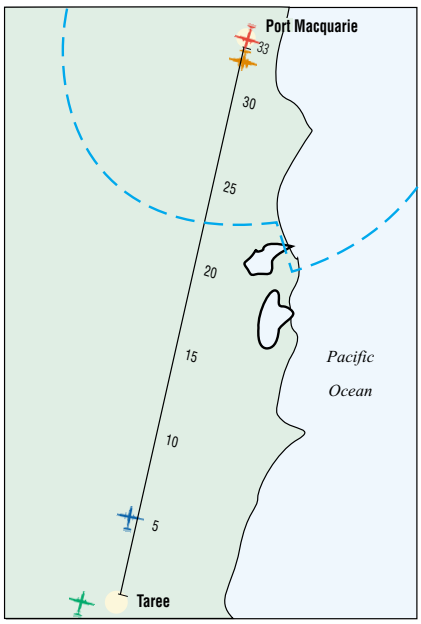
VH-TQO, a Dash 8, had departed Taree at 1957 on climb to 5,000 ft on a flight direct to Port Macquarie. The crew broadcast their departure details on the flight service frequency and estimated an arrival time of 2006.

VH-SVV, a Piper PA31 Chieftain, had departed Port Macquarie at 1959 and was initially climbing to 10,000 ft on a flight to Sydney. The pilot broadcast his departure details on the flight service frequency which included an estimated time overhead Taree of 2015.

VH-IMH, a Beech 1900, had departed Port Macquarie at 2002 on a flight to Williamtown. The crew broadcast on the flight service frequency that their proposed climb was to flight level 140 and had estimated a time overhead Taree of 2012.

Situation at 2000 EST





All four aircraft were operating under instrument flight rules (IFR) and the flight paths had been planned along the same nominal track–between Port Macquarie and Taree.

At 2005:30, IMA and IMH passed, in cloud, with approximately 200 ft vertical and 1,000 m horizontal separation.

None of the aircraft were fitted, nor were required to be fitted, with an airborne collision avoidance system (ACAS).

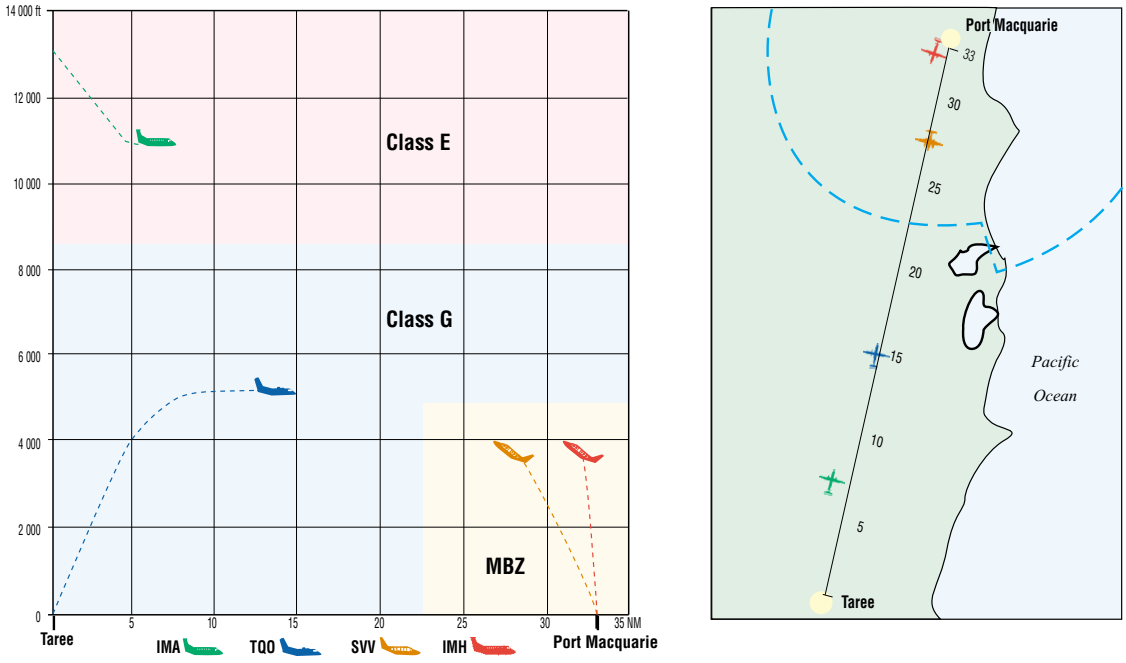
1.2 Sequence of events

At 1956, the sector controller cleared the crew of IMA to leave controlled airspace on descent. He included advice that flight service had traffic information for them.

Between 1956 and 2002, the flight service officer provided all crews with up to date traffic information on the other three aircraft.

At 2002, the crew of IMA broadcast on the Port Macquarie mandatory broadcast zone (MBZ) frequency (118.1 MHz) that they were descending to flight level 110. The crew of TQO responded to that call and then asked the crew of IMH if they were airborne. The reply (at approximately 2002:20) was affirmative and that they were climbing through 4,600 ft.

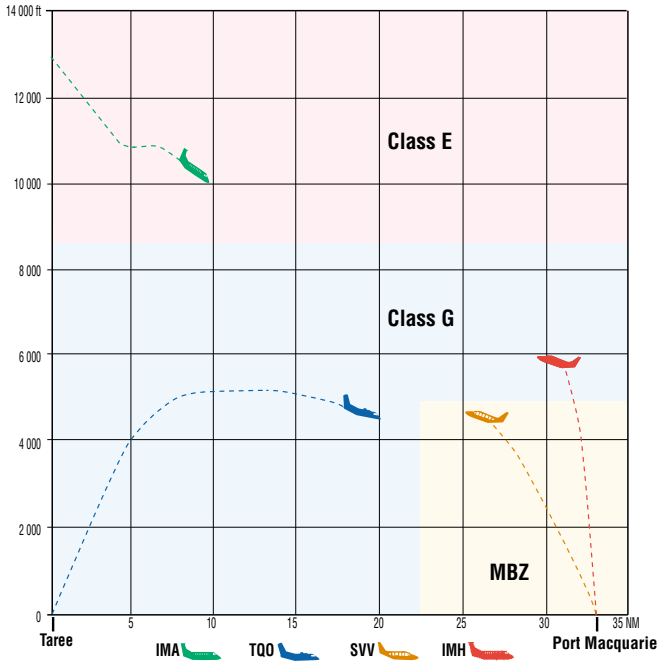
Situation at 2002 EST

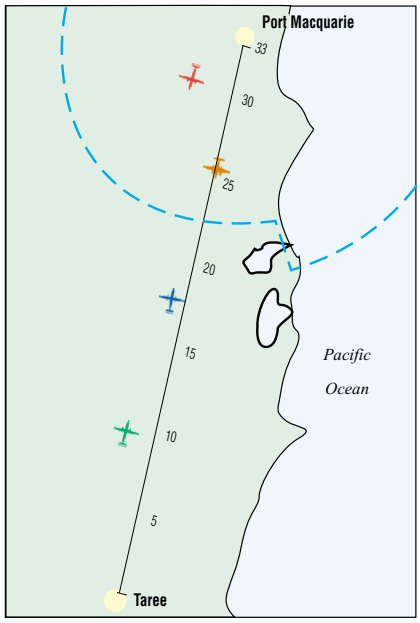


At 2003, the crew of IMA broadcast on the MBZ frequency that they were 23 NM south of Port Macquarie and descending to 9,000 ft. They then asked the pilot of SVV for his position, which he reported as 8 NM south and climbing through 4,800 ft. The crew of IMH reported that they heard this exchange but did not acknowledge the broadcast. However, they did elect to maintain 8,000 ft.

Also at 2003, the crews of IMH and SVV were instructed by the flight service officer to contact air traffic control approaching 8,500 ft; the base of controlled airspace in that area. At about the same time, the crew of TQO reported on the flight service frequency that they were transferring to the Port Macquarie MBZ frequency.

Situation at 2003 EST

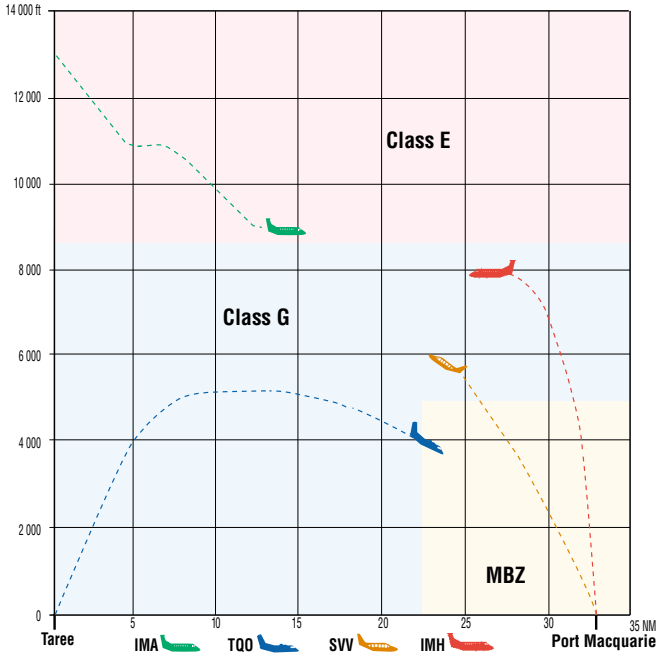


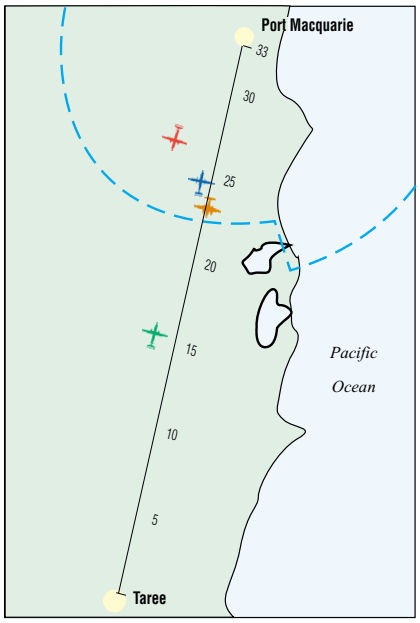


At 2003:34, the crew of IMH contacted the sector controller and requested an airways clearance. He reported that the aircraft was 5 NM south of Port Macquarie and passing 7,500 ft. The controller had not received any coordination on the aircraft from flight service and there was an exchange of information with the crew, which included the issue of a secondary surveillance radar transponder code, that lasted until 2005:05. At that time, the controller identified IMH on radar and issued a traffic conflict advice to the crew, which gave the radar-observed position of IMA as 3 NM at 12 o'clock and indicating an altitude of 8,000 ft on descent.

At 2003:57, the crew of IMH questioned the flight service officer regarding the non-availability of a transponder code from air traffic control. The code had not yet been issued to the flight service officer by the sector controller because the flight service officer had been unable to perform the coordination with the sector controller.

Situation at 2004 EST



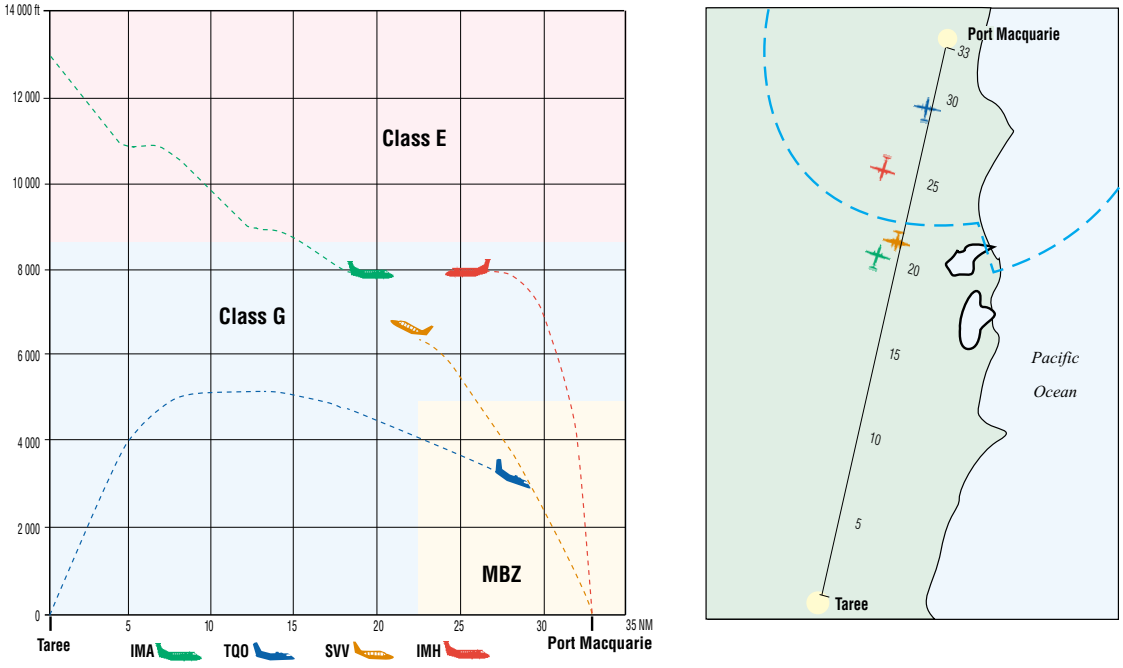


At 2004:05, the crew of IMH unsuccessfully attempted to contact the pilot of SVV on the flight service frequency to arrange mutual separation. Shortly after, on the MBZ frequency, the crew of IMA requested that the pilot of SVV maintain 7,000 ft to assist their arrival. He agreed.

At 2005:08, the crew of IMA broadcast on the flight service frequency an acknowledgment not related to any information being broadcast on that frequency, but which was in response to a transmission made on the MBZ frequency by the crew of TQO regarding turbulence in the MBZ. This transmission was also acknowledged by the crew of IMA on the MBZ frequency. There were no additional transmissions from either crew on the flight service frequency until after their aircraft had passed.

At 2005:10, the flight service officer contacted the sector controller and coordinated the departure of IMH. At about the same time, the crew of IMA broadcast on the MBZ frequency that they were 14 NM south and maintaining 8,000 ft.

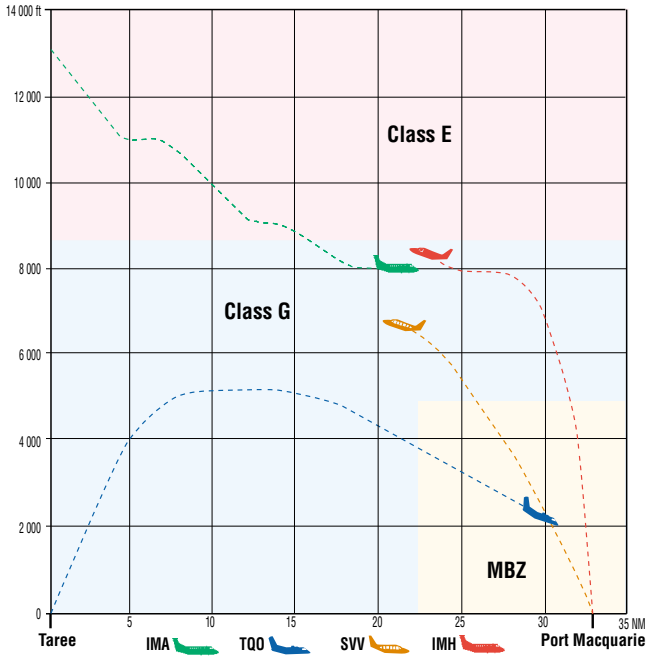
Situation at 2005 EST

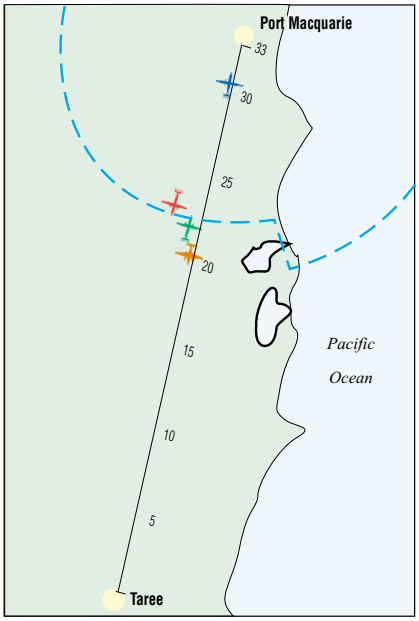


At 2005:19, the crew of IMH again requested an airways clearance from the sector controller. The clearance was issued at 2005:24 and included the question '... confirm you have IMA in sight'. The reply, at 2005:34, was 'negative, we're in cloud'.

Analysis of radar information revealed that IMA and IMH passed at 2005:30 while approximately 1,000 m horizontally apart. IMH had left 8,200 ft on climb and IMA was maintaining 8,000 ft.

Situation at 2005:30 EST



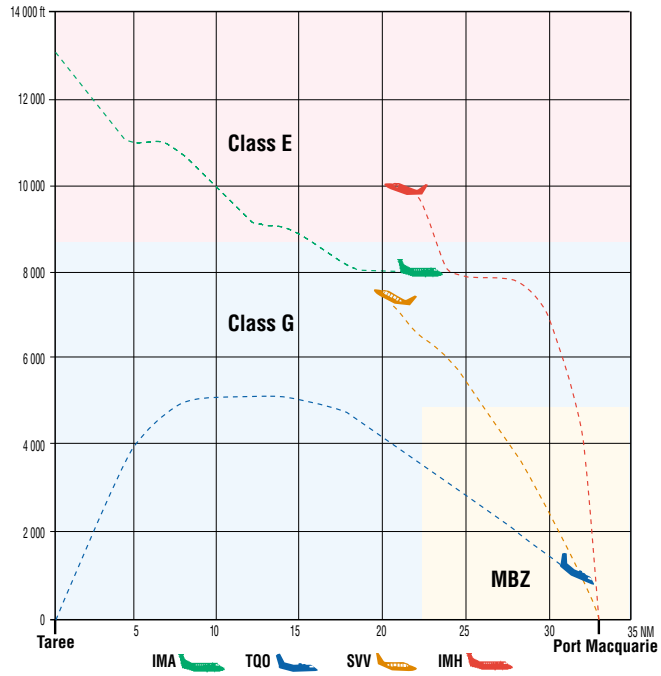


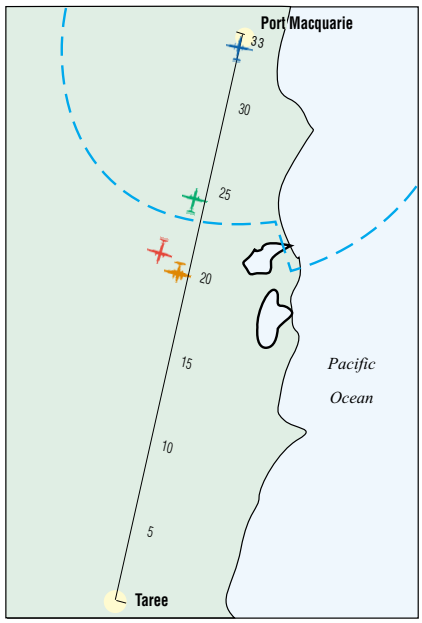
At 2005:48, the crew of IMA made contact with the crew of IMH. This was the first radio communication between the two crews and they established that IMH had left 9,300 ft on climb and IMA had left 8,000 ft on descent.

At 2005:54, the sector controller informed the crew of IMH that radar indicated that they had passed IMA.

Between 2005:15 and 2006, on the MBZ frequency, the pilot of SVV reported to the crew of IMA that he had visually passed their aircraft.

Situation at 2006 EST





1.3 Weather

The night was generally fine and clear, with a thin layer of cloud extending upwards from approximately 7,000 ft. The effect of this cloud band was such that visibility within the layer was restricted, but the pilot of SVV reported that he could see the lights of aircraft flying within the cloud.

1.4 Airspace

Air traffic control provided a separation service between IFR aircraft in Class 'E' airspace from 8,500 ft to flight level 125 (and above in Class 'C' airspace). IFR flights entering this airspace required an airways clearance. All crews complied with this requirement. In addition, where possible, IFR flights were provided with radar based traffic information on potentially conflicting traffic operating in Class 'G' airspace prior to being released to the flight service frequency. This service would have included information on any observed VFR aircraft.

Flight service provided a directed traffic information service to all IFR aircraft from ground level to 8,500 ft (Class 'G' airspace), except within the confines of the MBZ. All crews received this service.

Within the Port Macquarie MBZ, all crews were required to broadcast their position and intentions and to respond to other crews if they considered that a conflict may occur. The MBZ existed from ground level to 5,000 ft within a 10-NM radius to the west and 12-NM radius to the east. All the crews complied with this requirement.

1.5 Air traffic control

The sector controller was unaware of the departure of IMH until the crew contacted him requesting an airways clearance. He was busy with other work related tasks and had not been able to immediately answer the intercom line on those occasions when the flight service officer had initiated intercom coordination.

Because he had no prior knowledge of the aircraft, it took almost a minute and a half for him to establish the flight details, assign a transponder code and identify the aircraft. As soon as the controller observed the position and altitude of IMH, he provided the crew with a traffic alert on IMA.

Prior to the crew activating the assigned identification code, the controller had no specific radar information on any aircraft in that vicinity. There were other radar returns showing the general transponder codes of 1200 (VFR) and 2000 (IFR) and indicating lower levels, that were not in immediate conflict with IMA. One such return was emanating from IMH and one from SVV before the crews had been issued with specific codes.

1.6 Flight service

The flight service officer was very busy with numerous IFR aircraft requiring an information service. He was assisted by a supervisor, who acted as a traffic conflict 'spotter'. The supervisor did not have access to all the console facilities but performed some coordination tasks. With this limited capacity he did not have a full appreciation of the traffic picture and therefore, these tasks were necessarily restricted.

Although the flight service officer attempted to pass the taxiing information on IMH to the sector controller in a timely manner, he was unable to give his undivided attention to this task. He had assessed that the directed traffic information service should have precedence and, as he was busy with that air/ground radio function, he was unable to allocate sufficient time to allow

the sector controller time to answer the intercom line. Consequently, there was no taxiing advice to the sector controller on either SVV or IMH until after they had departed.

The crew of IMH had made their taxi broadcast at a time when the frequency was very busy and over-transmissions were occurring. Their initial call, at approximately 1957, had not been heard and it was 1958 before the taxi call was acknowledged. Although the flight service officer selected the intercom button several times over the next few minutes, due to workload on both flight service and air traffic control frequencies, it was 2005 when the coordination was completed. The Manual of Air Traffic Services stated that such coordination would be carried out 'by the quickest means'.

1.7 Radar analysis

Pilots of IFR aircraft were required to activate transponder code 2000 while outside controlled airspace unless a specific code had been issued by air traffic control. The crew of IMH believed that they had activated transponder code 2000 on departure. Recorded radar data displayed seven returns between 7,000 ft and 7,300 ft but did not detect any further returns on that code which were consistent with the track and altitude of IMH. Returns were recorded from the other aircraft on code 2000 at altitudes as low as 300 ft. The investigation was unable to determine why the code 2000 transponder returns from IMH were not recorded between 2003:30 and 2004:40.

The radar recording revealed that:

- TQO was at least 500 ft below SVV approximately 5 NM prior to their passing, and below IMH approximately 2 minutes prior to passing.
- SVV had maintained flight below 7,000 ft until passing IMA at 2005:18. The horizontal distance at that time was approximately 1,200 m with IMA maintaining 8,000 ft.
- The first radar return from IMH on its specific assigned code was at 2004:40, when it was maintaining 8,200 ft (8,000 ft after allowance was made for atmospheric pressure differences). At that time, SVV was passing 5,100 ft on climb.
- At the time IMH had left 8,000 ft on climb (approximately 2005:25), SVV was 2 NM ahead and passing 7,200 ft on climb.
- IMA had descended initially to flight level 110 and then to 9,000 ft. There was a short delay at 9,000 ft before descending to 8,000 ft. The aircraft maintained 8,000 ft until 2006:10, when unrestricted descent was commenced.
- The climb of IMH from 8,000 ft had commenced approximately 5 seconds before passing IMA.

1.8 Flight data recorder information

The recorded data revealed that IMA descended to flight level 110, which was maintained for approximately 45 seconds. Descent at approximately 1,500 ft/min followed to 9,000 ft when, for 15 seconds, a descent of approximately 300 ft/min was carried out. The aircraft then descended to 8,000 ft and maintained that altitude for 1 minute and 20 seconds before descending into the circuit area.

There were no flight data recorders fitted to IMH or SVV, nor were they required to be fitted.

The circumstances of the occurrence did not necessitate replay of the flight data recorder information from TQO.

1.9 Crew of TQO

The crew of TQO made contact with all three crews on either the flight service or MBZ frequencies. They had established their aircraft beneath the other three aircraft by 2003:30.

1.10 Pilot of SVV

The pilot of SVV responded to broadcasts from the other crews and provided altitude and position information when requested. His departure broadcast on the flight service frequency included nominating a departure track of 200 degrees and climb to 10,000 ft. He heard the crew of IMH report leaving 5,000 ft while he was only passing 4,500 ft and knew that their aircraft would out-climb his Chieftain. He was unaware that IMH would subsequently maintain 8,000 ft. Shortly after, he reported to the crew of TQO that he had left 5,000 ft and thereby established vertical separation with that aircraft.

When the crew of IMA requested that he maintain 7,000 ft to assist with their descent, he agreed and continued his climb above that altitude only after visually passing IMA. He then transferred radio frequency to air traffic control and made initial contact with sector control on climb to 10,000 ft.

There was no direct radio contact with the crew of IMH. The pilot was operating a single-pilot operation and, at the time the crew of IMH made their broadcast to him on the FIS frequency (2005:00), he had just completed talking to the crew of IMA on the MBZ frequency.

1.11 Crew of IMA

The crew had made a general broadcast on the flight service frequency prior to leaving Class 'E' airspace and received traffic information on the other three aircraft from the flight service officer. They decided to initially maintain flight level 110 while assessing the relative positions of the other traffic. Shortly after, they elected to descend to 9,000 ft and broadcast that intention on the MBZ frequency. They then contacted the pilot of SVV on the MBZ frequency and requested that he maintain 7,000 ft in order to facilitate their descent; he agreed. They then descended to 8,000 ft and, although the crew stated that they made a descent broadcast, no such transmission was recorded on either the MBZ or flight service frequency.

Approximately 30 seconds later, at about 2005, the crew broadcast on the MBZ frequency that they were maintaining 8,000 ft. Although they had received taxiing information on IMH, and had been listening on the FIS frequency when several transmissions between the crew of that aircraft and the flight service officer were made regarding their departure, the crew of IMA did not make radio contact with the other crew until after the aircraft had passed. The crew of IMA stated that they did not hear any of the broadcast from IMH during that period.

The crew was operating a normal frequency management plan whereby each pilot transmitted on one frequency but listened on both selected frequencies. Each pilot had the volume of the frequency on which they were transmitting set above the other frequency so that it would take precedence if simultaneous transmissions occurred on both frequencies. At the time that the crew of IMH were making their departure broadcasts, both pilots were listening on the FIS frequency but had the volume turned down because most transmissions involving SVV and TQO were taking place on the MBZ frequency.

1.12 Crew of IMH

The crew had received traffic information on the other three aircraft while taxiing at Port Macquarie. They heard the broadcast from the crew of IMA indicating descent to 9,000 ft and elected to maintain 8,000 ft as a result but did not broadcast that intention. When the aircraft

departed, the crew made their departure broadcast on the flight service frequency and reported a departure track of 201 degrees and initial climb to 8,000 ft. The flight service officer immediately questioned the altitude and a correction was made by the crew that they were climbing to flight level 140. However, they still intended to maintain 8,000 ft after making this broadcast.

As a result of a request from the crew of TQO, they reported leaving 5,000 ft and had, therefore, established vertical separation with that aircraft. The crew heard the pilot of SVV report that he had left 4,800 ft when they had already left 5,000 ft. They therefore assessed that they would continue to out-climb the Chieftain and maintain vertical separation above that aircraft. Shortly after, they transferred one radio from the MBZ frequency to the sector control frequency (130.1 MHz). However, after maintaining 8,000 ft while the Chieftain was still climbing, there was no further check with the pilot of SVV as to his current altitude. They had not heard the radio exchange between the crew of IMA and the pilot of SVV regarding their altitudes and, although an attempt had been made at 2005, did not contact the pilot of SVV at any time during the occurrence.

Although hearing broadcasts by the crew of IMA, the crew of IMH did not make radio contact with IMA until after the aircraft had passed.

The crew was very busy and it took a few seconds for the co-pilot to inform the pilot in command of the traffic information on IMA that had been passed by the sector controller. The reaction was to initiate a climb to avoid that aircraft. At approximately the same time, the sector controller issued an airways clearance and the climb was continued into controlled airspace.

1.13 Reporting requirements

The Australian Aeronautical Information Publication (AIP) required pilots of IFR aircraft to maintain a listening watch on the flight service frequency and respond to any other aircraft that may be considered in potential conflict. It also required pilots to report any change of level on the appropriate flight service frequency.

The investigation revealed that there was some doubt among pilots as to what constituted a change of level.

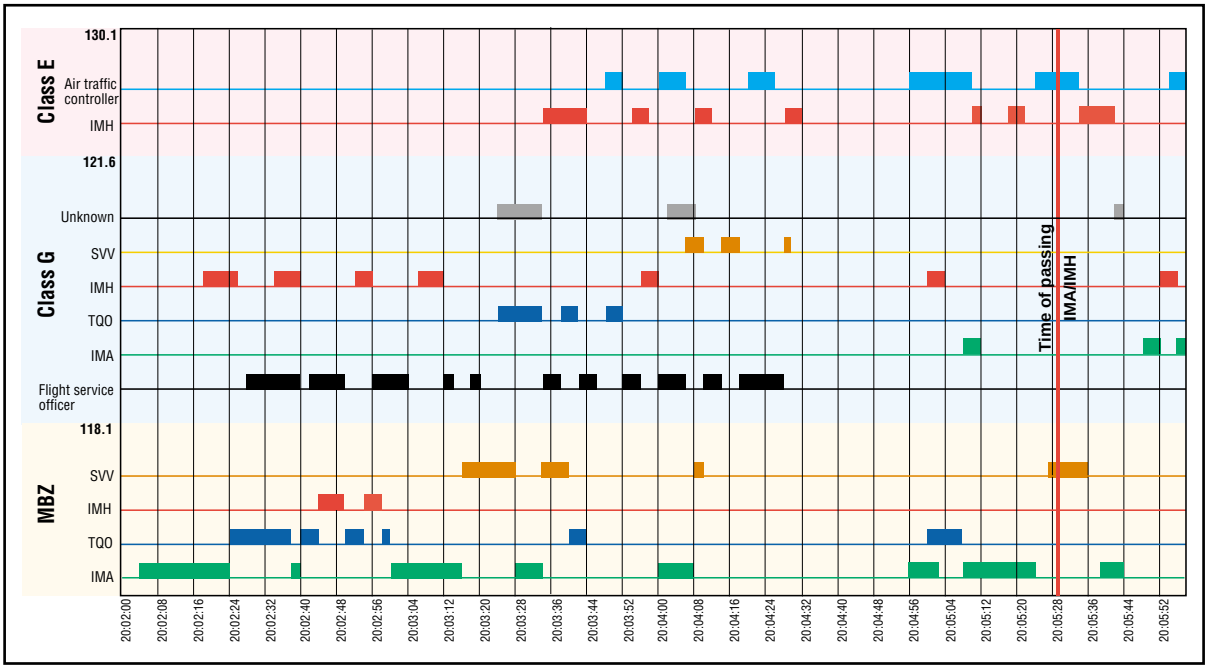
1.14 Radio frequency congestion

The recorded information from the flight service unit and Port Macquarie MBZ voice recorders indicated a period of high activity with numerous transmissions on both frequencies.

The MBZ recorded 20 transmissions between 2001 and 2003 (a 3 minute period) with two being over-transmitted by an unknown source.

The flight service frequency recorded 37 transmissions between 2000 and 2005 (a 6 minute period), with six being over-transmitted by other sources.

Frequency transmissions between 2002 and 2006



Note: The chart does not include some transmissions made on the air traffic control frequency that were not pertinent to the occurrence.

2 ANALYSIS

2.1 Air traffic services

Due to both officers experiencing a heavy workload, there was a delay in the coordination function. The result was a delay in the passing of taxiing information and a subsequent delay in the passing of a transponder code to the crew of IMH. Had this code been issued earlier, it would have enabled the sector controller to radar identify IMH earlier, so that when the crew contacted the controller (at 2003:34) he may have been able to pass traffic information shortly after. Instead the identification was not made for another minute and an aircraft conflict alert was not issued until 2004:57. However, within those limitations, both the sector controller and the flight service officer provided traffic information in an appropriate and timely manner which was sufficient for the crews of IMH and IMA to make adequate judgements for the mutual separation of their aircraft.

2.2 Frequency management

Although there were several over-transmissions and interrupted broadcasts on his frequency, the flight service officer resolved any confusion in a timely manner. However, the time taken to perform this task took away air time for other broadcasts.

In the 60 seconds prior to the time of passing of IMA and IMH, there were only two short transmissions on the flight service frequency and no congestion. During this time all crews were listening on the flight service frequency with the crew of IMA transmitting on the MBZ frequency and the crew of IMH on the sector control frequency.

Recordings and over-transmissions

Whereas the recording of the MBZ frequency was most useful in the investigation, its primary use was for establishing movements at the aerodrome. The design of the recording coverage was therefore restricted to the local area and some transmissions made on the frequency may not have been recorded. This would be especially true for any low-level operations not in the immediate aerodrome locality. It was, therefore, not possible to determine if some transmissions of this nature were made at the time of the occurrence. It is possible that, if such broadcasts were made, the crews of the aircraft may have had interference from those transmissions that were not recorded by the recording equipment.

The equipment used by Airservices Australia to record the flight service frequency was of a more efficient nature and would have been less likely to be affected in the same way. However, such instances of frequency use without being recorded were possible.

2.3 Altitude reporting

Although the AIP required pilots to report a change of level on the flight service frequency, the question of what is a change of level appeared to be in doubt among some pilots. If a crew reported leaving a flight level on unrestricted descent and then maintained a level (or altitude) without reporting that fact, did they have to report maintaining the level as a change of level or could they re-commence descent, some time later, as part of the original descent advice? The same argument could be applied to a crew maintaining a level while on climb to some higher level. However, if a level was reported as being maintained, advice of a change to that level was required.

In this occurrence the crews of IMA and IMH maintained intermediate levels to assist in traffic conflict resolution. Whereas no reports indicating that a level was being maintained were made on flight service frequency, there was one such advice on the MBZ frequency.

As the onus for separation was on mutual cooperation between pilots, adequate transmission of information was essential for flight safety.

2.4 Crew of IMA

The crew elected to make their initial descent to flight level 110 and, after obtaining traffic information from the flight service officer, decided to continue the descent to 9,000 ft. The decision was based on information (from the flight service officer) that SVV was climbing to 8,000 ft. The intent to maintain 9,000 ft was broadcast on the MBZ frequency but not on the flight service frequency. In their initial broadcast on the flight service frequency, the crew had included (by implication) an intention to conduct an unrestricted descent. That intention was never updated, despite a level-off at both 9,000 ft and 8,000 ft. The crew stated that they broadcast their intention to descend from 9,000 ft to 8,000 ft on the FIS frequency. However, no such broadcast was recorded on either FIS or MBZ frequencies. Consequently, the other crews were not able to assess the change in circumstance of IMA in their traffic avoidance considerations.

While maintaining 9,000 ft, the crew contacted the pilot of SVV to obtain his agreement to maintain 7,000 ft. That action provided them with the opportunity to descend to 8,000 ft in relation to that aircraft, but did not ensure separation from IMH.

Although the crew did not establish radio contact with the crew of IMH until after the aircraft had passed, there were opportunities for them to do so. At 2002, they made an initial broadcast on the MBZ frequency and, at 2003, updated their position on the same frequency. In between the two transmissions, the crew of IMH had conducted an exchange of information with the crew of TQO, which included the fact that IMH was passing through 5,000 ft on climb. As the crew of IMA had information on the impending departure of IMH, they had sufficient knowledge to initiate mutual separation procedures. Also, during the period from 1958 to 2005, the crew of IMH made several broadcasts on the flight service frequency indicating climb to both 8,000 ft and flight level 140. The crew of IMA had been listening on the flight service frequency since 1956:23 but were not cognisant of these transmissions. They had received an update on the position of IMH from the flight service officer at 1958:28 and, therefore, should have initiated radio contact with the crew of IMH to establish an adequate form of separation assurance in a similar manner to that achieved with the pilot of SVV.

At approximately 2002:30, immediately after they had made their initial report on the MBZ frequency, they were not cognisant of an exchange on that frequency between the crews of TQO and IMH in which the crew of IMH reported leaving 4,600 ft and 5,000 ft.

Because the crew had decided that SVV was their prime conflict, they elected to concentrate on performing self-separation procedures with that aircraft until the departure of IMH. Unfortunately, while performing this task, both pilots turned down the volume of the FIS frequency and missed the departure broadcast that they were waiting for.

2.5 Crew of IMH

The crew had initially tuned the radios to the MBZ and flight information service frequencies. They had heard the crew of IMA report on the MBZ frequency that they were descending to 9,000 ft and decided to maintain 8,000 ft for separation with that aircraft. They had initially reported this intention on the flight service frequency before indicating their intention to climb into controlled airspace. They decided not to speak with the crew of IMA at that time because they believed that they had set up a 1,000 ft vertical separation, based on the last

known altitude of IMA. However, as they had departed the MBZ, they changed one radio from the MBZ frequency to the sector control frequency, losing an opportunity to communicate with the crew of IMA.

The crew had established their aircraft above SVV and, due to their superior climb performance, expected to increase that separation. However, when they then elected to maintain 8,000 ft in relation to IMH, they enabled SVV to reduce the vertical separation to 800 ft. At that point IMH was 2 NM behind SVV and closing. That distance would have become closer had the crew of IMH not commenced climb when they did. The climb was 'by chance' in relation to this conflict. At the time, the crew of IMH had information that the pilot of SVV was climbing to 10,000 ft; they had not heard the conversation between the crew of IMA and the pilot of SVV that resulted in the pilot of SVV agreeing to maintain 7,000 ft. The pilot of SVV had last heard the crew of IMH report (on the flight service frequency) that they were above his aircraft and on climb to flight level 140. The lack of a broadcast announcing their intention to maintain 8,000 ft, removed a safety net by not giving the other crews up-to-date information on which to base their separation decisions.

After leaving the MBZ, the crew had tuned the radios to the flight service and sector control frequencies in accordance with standard operating procedures. The co-pilot was communicating with air traffic control to obtain an airways clearance to facilitate their climb into controlled airspace. While carrying out that radio exchange, he was given information that IMH was 3 NM ahead and at the same level (8,000 ft). This gave the crew approximately 25 seconds warning of the point of nearest conflict and was the first time they were aware that the 1,000 ft separation they thought they had, did not exist. Even then, there was a 20 second delay before they commenced climb.

2.6 Airborne collision avoidance systems

All four aircraft had their transponders operating on an appropriate code thus making the likelihood of a successful traffic indication on ACAS equipment probable. Despite the provision of an adequate directed traffic information service, two regular public transport aircraft came within 1,000 m laterally and 200 ft vertically while in cloud. Had the aircraft been equipped with an ACAS, there would have been a distinct probability that the situational awareness of the crews would have been significantly improved.

2.7 Separation assurance

The crews of both IMA and IMH displayed inadequate separation assurance techniques. Although both crews were aware of the other aircraft, neither made a concerted effort to establish radio contact and take positive action to self-separate their aircraft. They made operational decisions based on reports that were either overheard, or from a third party (flight service). They were not made from a direct communication with the other crew.

Although positive separation was achieved between IMA and both TQO and SVV, the crew of IMA did not then take similar action in regard to IMH. In fact, their decision to descend from 9,000 ft to 8,000 ft, without a radio information broadcast, not only placed their aircraft in direct conflict with IMH but, potentially, with other aircraft operating in, or near, the MBZ.

The crew of IMH had established positive separation with TQO and, initially, with SVV and IMA. However, they then made decisions based on information which, though correct at the time (and, in the case of IMA, later changed without their knowledge) was never confirmed with the other crews. Their decisions did not resolve the impending conflict with IMA and introduced a second conflict with SVV. A radio broadcast to the crews of those aircraft would have clarified the situation and would have been the basis for establishing a positive separation plan.

2.8 Summary

All crews were provided with sufficient information to have enabled positive action in respect to self separation. Vertical separation was established between TQO and all aircraft, and between SVV and IMA. However, separation between IMH and SVV and between IMH and IMA was not guaranteed after initial intentions were amended without adequate, informative radio broadcasts. Several transmissions took place on the MBZ frequency, which affected the flight of aircraft that had already departed the boundaries of the MBZ.

The airspace complexity in the vicinity of Port Macquarie did not make it easy for crews to perform their radio broadcast requirements. The crews of IMA and IMH needed to manage three frequencies (in addition to company requirements) in a short period while descending/climbing at comparatively high speeds.

The crew of IMA did not report any change of descent intention on the flight service frequency. The last recorded transmission on that frequency by the crew, prior to the point of nearest contact with IMH, was an acknowledgement when the flight service officer gave the taxi details for IMH. That broadcast was at 1958:28; some 7 minutes before the aircraft passed.

Despite the crews of IMA and IMH maintaining a listening watch on the correct flight service frequency for more than 8 minutes prior to their aircraft passing, they did not contact each other to establish self separation.

The lack of an ACAS in both aircraft further contributed to the diminution of the crews' situational awareness.

3 SIGNIFICANT FACTORS

1. The volume of radio transmissions on both the MBZ and FIS frequencies made adequate radio management difficult.
2. The crew of IMA did not make any level change broadcasts on the flight service frequency.
3. The crew of IMH did not make any level change broadcasts on the flight service frequency.
4. The crews of IMA and IMH did not contact each other until after the time of passing.
5. There was no airborne collision avoidance system fitted to any aircraft.
6. The crews of IMA and IMH did not apply appropriate separation assurance techniques.

4 SAFETY ACTION

4.1 Local safety action

As a result of the investigation, the operator of IMA and IMH refined its frequency management plan and reminded crews of their obligations in respect to radio broadcast information.

The operator of TQO has completed the fitting of ACAS to its Dash 8 fleet.

4.2 ATSB safety action

On 6 June 1995, the then Bureau of Air Safety Investigation issued an Interim Recommendation (IR19950117) to the then Civil Aviation Authority relating to the fitment of Airborne Collision Avoidance Systems in all aircraft engaged in Regular Public Transport and other fare-paying passenger operations. In reply, the Civil Aviation Safety Authority indicated that although it intended to mandate the carriage of TCAS II for turbine powered commercial aircraft with a seating capacity in excess of 30 seats, it did not consider that ACAS should be mandated in aircraft with less than 30 seats. However, it did indicate a willingness to harmonise with international requirements including those that currently applied in the United States.

On 9 September 1997, the Civil Aviation Safety Authority advised the Bureau that it intended raising a Notice of Proposed Rule Making (NPRM) to seek industry comment on the issue of ACAS for 10 – 30 passenger seat aircraft. However, communication on 23 May 2000 indicated that the Civil Aviation Safety Authority had recently taken this ACAS issue off its immediate regulatory review program.

Between January 1995 and November 2000, the Bureau has received 1,188 notifications of events where aircraft proximity was considered to be a hazard and has investigated over 350 occurrences where an ACAS did, or would have, significantly improved the situational awareness of flight crews.

Between 1st May 1999 and 30 November 2000, the Bureau has investigated (at the category 4 level) 41 occurrences involving aircraft operating in controlled airspace where an ACAS provided one or more crews with improved situational awareness during an infringement of separation standards. Additionally, 23 occurrences were investigated involving aircraft operating outside controlled airspace, where the proximity of aircraft was considered to be potentially prejudicial to safety. In each of those 64 occurrences, one or more aircraft was conducting a fare-paying passenger operation.

Although a directed traffic information service gives an approximation of the position of the conflicting traffic, the position information given by an ACAS can provide a more accurate and up to the minute traffic description. The resultant improvement in a crew's situational awareness would partially mitigate the inherent deficiencies of the see-and-avoid principle (see research report, Limitations of the See-and-Avoid Principle; BASI, 1991) allowing crews to make informed decisions and take appropriate action in a timely manner.

Therefore, the Australian Transport Safety Bureau simultaneously issues the following seven recommendations to the Civil Aviation Safety Authority.

Recommendation R20000181

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority mandate the fitment and use of an airborne collision-avoidance system in all aircraft with a passenger seating capacity of 10 – 30 seats engaged in regular public transport operations and, set a timetable for the introduction of such equipment.

Recommendation R20000182

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority consider the requirement for the fitment and use of a suitable airborne collision-avoidance system in aircraft engaged in the carriage of 10 or more passengers for hire or reward in other than regular public transport operations.

Recommendation R20000183

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority expand the requirements for the carriage and activation of transponders with the object of maximising the effectiveness of ACAS.

Recommendation R20000184

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority expand the current level of education among all levels of the industry to maximise transponder activation in all airspace.

Recommendation R20000198

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority ensure that any company authorised for fare-paying passenger operations has standard operating procedures that are adequate for self-separation assurance.

Recommendation R20000199

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review its educational program for all levels of pilot licences to improve pilot understanding of separation assurance techniques.

Recommendation R20000300

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority, in conjunction with Airservices Australia, review the existing air space model with a view to enhancing conflict recognition and resolution for fare-paying passenger operations to and/from non-controlled aerodromes.

5 ADDITIONAL INFORMATION IN SUPPORT OF THE ATSB's RECOMMENDATIONS

The following summaries are taken from investigations carried out since 1 May 1999. They are provided as an indication of the ACAS factors involved in selected occurrences and do not attempt to provide all the factors involved in those investigations. Full reports are available from the ATSB on request.

5.1 Occurrences where an ACAS contributed to situational awareness

BO/199902003 – near Cairns, Qld

Two Boeing 737 aircraft were departing with the minimum separation standard being applied. As the crews manoeuvred their aircraft, the separation reduced to 2 NM before corrective action was taken by the air traffic controller. Both crews received a TCAS resolution advisory and the crew of the following aircraft was able to maintain visual separation.

BO/199902321 – near Mount Isa, Qld

The crew of a Jetstream was descending from FL170 in 'G' airspace and had traffic information on a Kingair that was climbing to FL170. They used the TCAS display to assist their visual scan and sighted the aircraft. Due to a misunderstanding, the crew of the Kingair continued to climb when they did not have the Jetstream sighted. The TCAS in the Jetstream issued a resolution advisory and the crew took evasive action. The aircraft came within 500 m horizontally and 100 ft vertically.

BO/199902529 – near Mackay, Qld

While on descent to Proserpine in 'G' airspace, the crew of a BAe146 received a TCAS traffic advisory on a slower aircraft below and ahead of them. Although transmissions were made, they were unable to make radio contact with the aircraft. They used the TCAS information to take appropriate avoiding action.

BO/199902890 – near Melbourne, Vic.

A Boeing 737 and a Boeing 767 were being radar vectored by an air traffic controller while on descent into Melbourne. The controller was providing horizontal separation and therefore did not provide any vertical separation. However, the controller miscalculated the separation standard and both crews received TCAS alerts.

BO/199903617 – near Melbourne, Vic.

The crew of a Boeing 737, while at 3,000 ft on an approach to Melbourne, received a TCAS traffic advisory on an aircraft that had infringed controlled airspace at 2,300 ft. The air traffic controller had not noticed the intrusion. The crew used the TCAS information to sight the aircraft and maintained their own visual separation until they were clear.

BO/199903792 – near Cairns, Qld

The crew of an Airbus A320 had been assigned 2,000 ft on descent in 'C' airspace. As they were configuring the aircraft for a landing they received a TCAS resolution advisory to climb. They had descended below the assigned level and conflicted with a helicopter operating at 1,000 ft.

BO/199903689 – near Williamtown, NSW

The crew of a Boeing 767 was maintaining FL270 for separation with a formation of Westwind aircraft at FL280. The crew received a TCAS resolution advisory to descend. Although the air traffic controller had correctly assigned 1,000 ft separation, the Westwind aircraft had been maintaining FL277 due to an incorrect altimeter setting.

BO/199903790 – near Carnarvon, WA

Two Fokker F50 aircraft were tracking on air route B469 in opposite directions. The southbound aircraft was climbing to FL210 and the northbound aircraft was descending from FL200 to FL180. Due to an error by the flight service officer, directed traffic information had not been passed to either crew. The southbound aircraft had a TCAS and the crew received traffic information on a target in the 11 o'clock position at 7 NM and at about the same height. As the crews made radio contact to discuss their relative positions, the crew of the southbound aircraft saw the northbound aircraft pass approximately 400 ft below their aircraft. The crew of the northbound F50 did not see the other aircraft and did not have an ACAS fitted.

BO/199904048 – near Maryborough, Qld

Shortly after takeoff, the crew of a Shorts 360 received a TCAS alert on an unidentified aircraft approaching Maryborough from the opposite direction. As they were only climbing through 800 ft at the time of the alert, they turned off-track to avoid the other aircraft. A helicopter was then observed to pass their aircraft.

BO/199904196 – near Bundaberg, Qld

A Jetstream was inbound to Bundaberg in 'G' airspace and the crew had made all the required radio broadcasts. One pilot replied that he would commence a 'touch and go' and then depart. Communications with this pilot were then lost. When the Jetstream was passing 3,000 ft, the crew received a TCAS resolution advisory to climb. The aircraft reached 4,800 ft before the TCAS indicated that the confliction was cleared. The pilot of the other aircraft had climbed to 4,500 ft on his departure.

BO/199904360 – near Brisbane, Qld

The crew of a Boeing 737 was on a standard arrival (STAR) to Brisbane and had been cleared to descend to 4,000 ft. The air traffic controller was providing radar separation with a Cessna 404 but misjudged the distance between the aircraft. The crew of the B737 received a TCAS resolution advisory and commenced a climb. The aircraft passed with 1.6 NM horizontal and 400 ft vertical separation.

BO/199904403 – near Townsville, Qld

The pilot of a VFR Cessna 182 had been cleared to maintain 5,500 ft by air traffic control. A Shorts 360 was maintaining 6,500 ft for separation with the Cessna. The pilot of the Cessna encountered rising cloud and climbed to 6,300 ft without obtaining permission from air traffic control. The crew of the Shorts received a TCAS traffic advisory and diverted off track to avoid the Cessna.

BO/199904524 – near Bundaberg, Qld

A Piper Seneca and a Jetstream were arriving at Bundaberg in 'G' airspace. The crews were in radio contact with each other and agreed that the Jetstream would land first. The pilot of the Seneca reported that he had the Jetstream in sight and was following that aircraft. The crew of the Jetstream had not sighted the Seneca when they commenced final approach. When approximately 3 NM from touchdown, the crew of the Jetstream received a TCAS resolution advisory to climb,

which they did. During the manoeuvre, they saw the Seneca pass under their aircraft while making an approach to the same runway. The pilot of the Seneca stated that he did not think that the go-around by the Jetstream was warranted. He estimated that he was 100 ft below and 400 ft horizontally from the Jetstream.

BO/199904539 – near Kidston, Qld

A Beechcraft Duke and a Jetstream were both maintaining FL140 in 'G' airspace on IFR flight plans. The flight service officer made an error in calculating a frequency transfer time for the Jetstream, which resulted in the crews not being provided with a directed traffic information service. The crew of the Jetstream received a TCAS traffic advisory as the aircraft came into conflict. They initiated a climb to FL150 while communicating with flight service to clarify the traffic situation.

BO/199904547 – near Yass, NSW

The crew of a BAe146 were maintaining FL140 on departure from Canberra due to a Saab 340 descending to FL150. Both crews were in IMC. The crew of the Saab requested further descent due weather and the air traffic controller approved descent to FL130 during a momentary lapse of concentration. The crew of the BAe146 received a TCAS traffic advisory and was simultaneously issued with radar vector instructions for avoiding action. By the time traffic information had been passed by the controller, the aircraft had passed.

BO/199904600 – near Wynyard, Tas.

A Dash 8 and a Navajo were on descent into Wynyard in 'G' airspace. The crews had been given traffic information on each other based on pilot reports. The information indicated that the Navajo would arrive 5 minutes after the Dash 8. The crew of the Dash 8 received a TCAS traffic advisory on an aircraft 8 NM in front and below their aircraft. The crews then communicated with each other, on the MBZ frequency and established that the Navajo was 5 minutes earlier than the pilot expected.

BO/199906051 – near Tamworth, NSW

The crew of a Dash 8 were maintaining 2,500 ft after departure and were aware of a conflicting aircraft orbiting just ahead. Air traffic control issued a clearance for the Dash 8 to climb to 4,000 ft. As the crew commenced the climb, they received a TCAS resolution advisory to descend. As they commenced the descent, they saw the other aircraft pass approximately 700 ft above.

BO/200000451 – near Argyle, WA

The crew of a Boeing 737 was on descent in 'G' airspace and received a TCAS resolution advisory to reduce descent. The TCAS information was used to sight the other aircraft, which was 600 ft below and slightly to the left of the B737. The other aircraft was operating under the VFR and, as such, was not subject to a directed traffic information service. The pilot of the VFR aircraft did not acknowledge any transmissions from the crew of the B737.

BO/200000637 – near Port Macquarie, NSW

The crews of an arriving Dash 8 and a departing Beech 1900 Airliner had communicated their intentions to each other. Shortly after, the crew of the Dash 8 amended their arrival plan due to the presence of a third aircraft. Although they correctly transmitted details of the change, the crew of the Airliner did not hear or acknowledge the change. As the Dash 8 was maintaining 2,500 ft to allow the departure of the Airliner, they received a TCAS resolution advisory to climb. The Airliner was observed passing through their level approximately 400 ft ahead.

BO/200000727 – near Townsville, Qld

The crew of a Dash 8 had been cleared to climb to FL160 by air traffic control. They received a TCAS resolution advisory to descend: which they did. The conflicting traffic was a Brasilia that was overflying the aerodrome for a landing. Although the crew of the Dash 8 did not see the Brasilia, radar analysis indicated that it passed 600 ft above and 1 NM from the Dash 8.

BO/200002060 – near Gibraltar, NSW

Two Boeing 737 aircraft were maintaining FL370 on crossing tracks. The air traffic controller had not put a positive separation plan in place. As the aircraft came into conflict, both crews received a TCAS resolution advisory, one to climb and the other to descend.

BO/200002379 – near Alice Springs, NT

A Boeing 767 was maintaining FL280 on air route A576. An Airbus A320 had departed Alice Springs and was on climb to FL280 on the same air route but in the opposite direction. The controller had issued an incorrect flight level to the crew of the A320. As the aircraft came into conflict, the crew of the A320 reported that they were descending due to a TCAS resolution advisory. The crew of the B767 reported that they had a TCAS resolution advisory to climb.

BO/200002984 – near Bundaberg, Qld

A Dash 8 was maintaining FL160 enroute from Brisbane to Gladstone in Class 'C' airspace. A second Dash 8 was maintaining FL190 on the reciprocal route. The crew of the southbound aircraft requested descent to FL150, which was approved by air traffic control. The aircraft passed without the required separation standard. Both aircraft were fitted with a TCAS and both crews received traffic information advice. Each crew monitored the relative position of the other aircraft.

5.2 Occurrences where an ACAS was not fitted to any involved aircraft or where, when fitted, it did not activitate

BO/199902126 – near Rockhampton, Qld

Air traffic control were providing vertical separation between a Brasilia and a Super Kingair when an error by the controller resulted in one aircraft being cleared to climb through the level of the other. The aircraft were on reciprocal tracks and passed within 2.5 NM of each other while the vertical separation was 300 ft. The crews did not sight one another and were not aware of the conflict as the controller's error had not been detected at the time.

BO/199902445 – near Sydney, NSW

A Piper Chieftain had departed Bankstown and infringed the Sydney control zone. A Metroliner was on final approach to Sydney and came into conflict with the Chieftain. Although the controller issued appropriate instructions to the pilot of the Chieftain, the pilot had turned the aircraft before the instructions were issued.

BO/199902498 – near Melbourne, Vic.

The crew of a Gulfstream IV was instructed to maintain 5,000 ft on departure due to an inbound Dash 8 maintaining 6,000 ft. The crew incorrectly read back 6,000 ft but the controller did not detect the incorrect readback. The Gulfstream reached 5,500 ft before corrective action was taken by air traffic control after observing the altitude of the Gulfstream pass 5,400 ft. The aircraft passed with 2 NM horizontal separation.

BO/199902550 – near Shute Harbour, Qld

While operating within 5 NM of Shute Harbour and climbing through 2,300 ft, the pilot of a Cessna 182 saw a Boeing 737 pass within 100 m of his aircraft while on descent to Hamilton Island.

The crew of the B737 did not see the C182 and did not receive any information from the TCAS display. The pilot of the C182 had not activated that aircraft's transponder.

BO/199902615 – near Canberra, ACT

A Saab 340 was enroute to Canberra at FL120 and was closing on a Cessna 340 that was also at FL120. The air traffic controller did not realise that the closing speed was having the effect that it was and separation reduced to 2 NM before corrective action was initiated. The crew of the Saab reported sighting the Cessna after traffic information was given.

BO/199903208 – near Calga, NSW

A Jetstream and a Cessna 340 were on crossing tracks and both crews were then given track amendments by the air traffic controller. The result was that the aircraft were now on tracks that were not laterally separated and no vertical separation had been established. As the aircraft came into conflict, a second controller inquired as to the separation being applied. Corrective action was taken by the controlling sector but the aircraft came within 2 NM and 200 ft before diverging

BO/199903768 – near Latrobe Valley, Vic.

The crew of a Metroliner was making an approach to the airfield when a Chipmunk was seen to pass directly overhead with approximately 400 ft vertical separation. Although the crew of the Metroliner made all the appropriate radio broadcasts on the CTAF, no response was received from the other pilot. The Chipmunk was not radio equipped.

BO/199903965 – near Wilton, NSW

The crew of a Bandeirante was descending in 'G' airspace when they saw an opposite-direction aircraft at the same height. They took avoiding action by turning and the aircraft passed approximately 1,000 m apart. Despite both crews stating that they made the correct radio broadcasts, two-way communications were not established.

BO/199904103 – near Port Macquarie, NSW

The crew of a Beech Airliner was on descent in a MBZ when they saw a Cessna 152 pass within 200 ft. Despite having made all the required radio broadcasts, no response from the pilot of the C152 was heard.

BO/199904284 – near Griffith, NSW

The crew of a Saab 340 was departing from runway 06 at Griffith (CTAF) and had established radio contact with various aircraft. However, they had not heard a transmission from the pilot of a Cherokee that was on final approach for runway 36 and came within 400 ft of that aircraft in their initial climb-out.

BO/199904261 – near West Maitland, NSW

A Metroliner was leaving controlled airspace on descent into Armidale. The air traffic controller had not coordinated the details with flight service. As the controller was correcting this oversight, the aircraft came into conflict with a Dash 8. No directed traffic information was received by the crews.

BO/199904978 – near York Island, Qld

A Cessna 404 and a Commander were operating in 'G' airspace on IFR flight plans and the crews should have received mutual traffic information. Due to an incorrect assessment by the flight service officer, conflicting traffic advice was not provided. The aircraft passed within 100 ft without either crew sighting the other aircraft prior to the event.

BO/199904771 – near Dubbo, NSW

The crew of a Dash 8 were descending in 'G' airspace and had arranged separation with the pilot of a Cherokee based on navigation either side of 'the highway'. Due to the crews interpreting 'the highway' to mean different highways, separation was not as they expected. The aircraft came within 400 m horizontally and 200 ft vertically when the crews believed they were some miles apart.

BO/199904958 – near Swan Hill, Vic.

The crew of a Metroliner were making a straight-in approach to runway 26 at Swan Hill (CTAF) when they saw a Pawnee Brave pass across their flight path on final approach to runway 22. They initiated a go-around due to the close proximity. The pilot of the Pawnee had transmitted his intentions on the wrong frequency.

BO/199905136 – near Canty, Vic.

A Dash 8 and a Saab 340 were both holding in the same holding pattern at FL160 and FL150 respectively. The air traffic controller issued the crew of the Dash 8 with vectoring and descent instructions that resulted in the aircraft passing the Saab with 3 NM horizontal and 300 ft vertical separation.

BO/199905298 – near Port Lincoln, SA

The crew of a Bandeirante was maintaining 8,000 ft and was following a Piper Lance that was maintaining 7,500 ft under the VFR. As weather conditions were IMC, they elected to descend early to pass below the Lance. Due to the frequency management techniques used by the crews, they were not aware of each other's descent. Radio contact was not established until the Bandeirante was 21 NM from Port Lincoln and transmitting on the MBZ frequency. The pilot of the Lance reported at 20 NM and only 500 ft above.

BO/199905379 – near Cairns, Qld

A Dash 8 and a Beech Super Kingair were on reciprocal tracks and being controlled by separate air traffic controllers. Each controller thought the other was providing separation. Eventually the controllers realised the situation and issued turn instructions. The aircraft came within 4 NM before the turns took affect.

BO/199905578 – near Port Hedland, WA

The crew of a Twin Otter was maintaining an IFR flight level in 'G' airspace when they saw a Cessna 310 pass 20–50 ft from their right wing in the opposite direction. There was no time for any evasive manoeuvre. The other aircraft was operating under the VFR and, as such, was not subject to a directed traffic information service. The flight service officer had no details of the other aircraft.

BO/199906154 – north of Darwin, NT

A Brasilia was maintaining FL230 enroute to Darwin and a Falcon was following on the same route. Due to poor radio communications, the crew of the Falcon was unable to obtain an airways clearance and had to remain below controlled airspace. Weather conditions were generally IMC and both aircraft carried out diversions. As the Falcon crew had elected to maintain FL230 while proceeding outside controlled airspace, their aircraft was closing on the Brasilia. As the aircraft came within 3 NM, the crew sighted the Brasilia and passed with approximately 2 NM horizontal separation.