International Civil Aviation Organization

The Third Meeting of Automatic Dependent Surveillance – Broadcast (ADS-B) Study and Implementation Task Force (ADS-B TF/3)

Bangkok, 23-25 March 2005

Agenda Item 4: Review States' activities on trials and demonstration of ADS-B

DEVELOPMENT OF COCKPIT DISPLAY OF TRAFFIC INFORMATION (CDTI)

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SUMMARY

This information paper describes progress in the development of a Cockpit Display of Traffic Information (CDTI) for general aviation and small regional aircraft.

1 Introduction

1.1 Airservices Australia's Research and Development Team is involved in a number of projects aimed at encouraging the development of ADS-B avionics for regional aircraft and the general aviation (GA) community.

1.2 In addition to providing surveillance for air traffic control (ATC), ADS-B also supports airborne applications such as enhanced traffic situational awareness through the display of other aircraft to pilots and flight crew.

1.3 Cockpit Display of Traffic Information (CDTI) is a key element of the proposed Australian ADS-B Lower Airspace Program currently under consideration by the country's aviation industry.

1.4 Airservices has begun testing two cockpit display systems that are designed to provide pilots with accurate position and altitude information on proximate traffic.

1.5 The two systems, supplied by Eurotelematik of Ulm, Germany, use GPS and Automatic Dependent Surveillance Broadcast (ADS-B) technology to provide pilots with navigation, terrain and traffic information on a moving map display. The information can be shown on Eurotelematik's certified CDTI 2000 multifunction display or, as a lower cost alternative, on a pocket PC.

1.6 A 1090 MHz receiver produced by Filser Electronic, also of Germany, provides ADS-B data to both types of displays.

2 Cockpit Display of Traffic Information (CDTI) Concept

2.1 A functional diagram of a cockpit traffic display is shown in Figure 1. The display determines the "own-aircraft" position through the use of a directly connected GPS receiver. It may be possible to use an existing GPS receiver if one is installed in the aircraft. The Receiver (1090 MHz Rx) detects extended squitter ADS-B signals from other aircraft, and presents raw messages to the Display for further processing. The Display processor decodes the raw messages to determine the identity, position (latitude, longitude), altitude, and velocity of detected aircraft. It then presents symbols on the display depicting other aircraft in relation to the "own-aircraft".

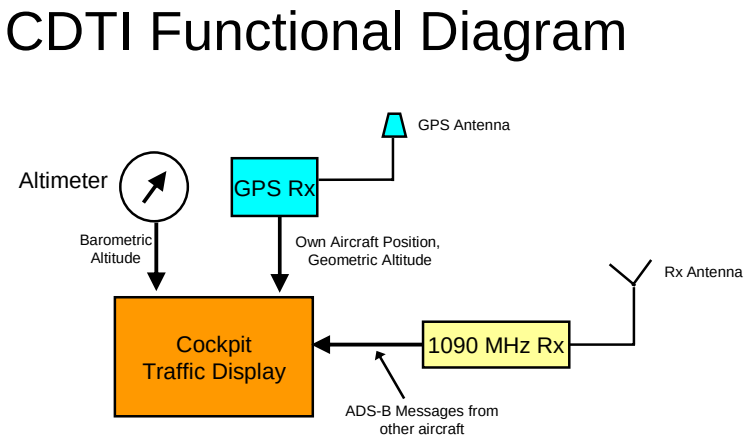

Figure 1 – Functional diagram of a traffic display system

2.2 Figure 2 is a picture of the EuroTelematik CDTI-2000 display, 1090 MHz Receiver, and the Receiver antenna. (The antenna is a standard aircraft transponder antenna.)

Figure 2 – Pictured left to right are the CDTI-2000, 1090 Rx, and Antenna

3 Testing

3.1 Initial tests were conducted in January during which the GPS and ADS-B receivers were positioned on a 7th floor balcony of Airservices Australia's Headquarters in Canberra. ADS-B equipped aircraft operating within 50 nautical miles of Canberra could then be monitored. Further tests have been

conducted at Brisbane Airport. The two cockpit display systems will be on exhibit at the Australian International Air Show at Avalon Airport in March, prior to being installed in aircraft for demonstrations and evaluation of "enhanced see and avoid" operating concepts.

3.2 Test results have been encouraging. A few problems were initially noted. These were referred to the manufacturer who has issued software updates to correct the faults.

3.3 Figure 3 is a picture of the CDTI-2000 showing VOZ721, a Virgin Blue 737-800, on approach to Canberra Airport. The aircraft symbol in the centre of the display is fixed and represents "own-aircraft". The blue circles with the bisecting lines represent airports.

3.4 The target label for other aircraft (arrowhead symbol) consists of three lines showing Flight Level; Aircraft Identification; and Ground Speed.

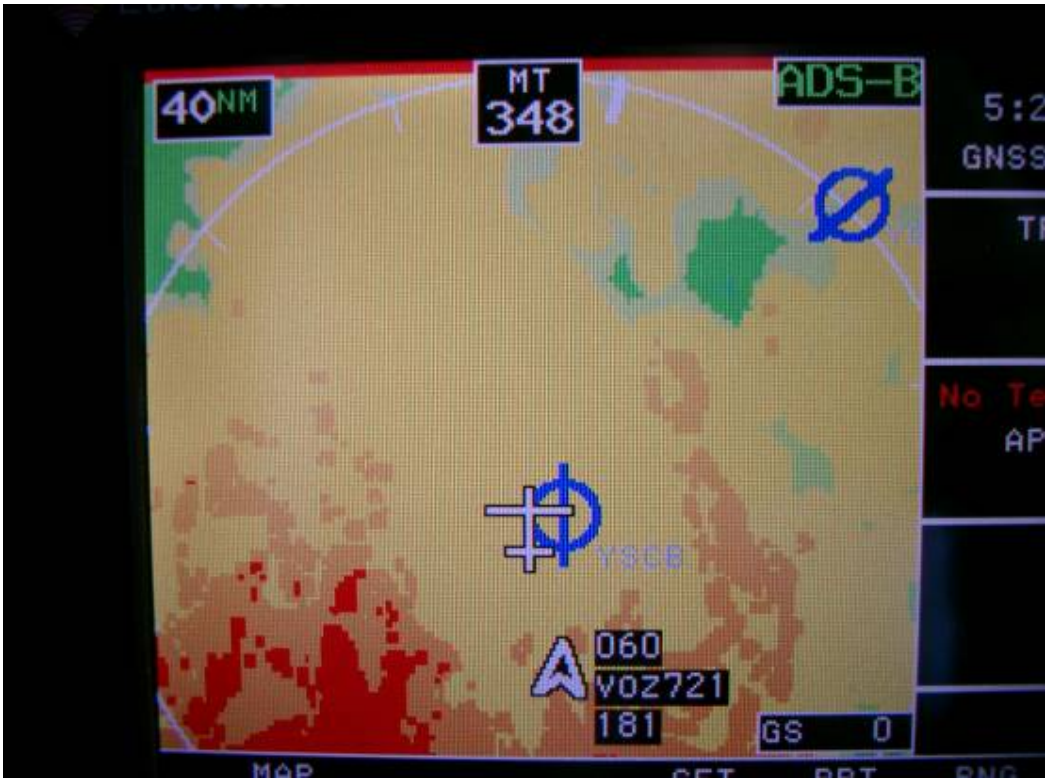

Figure 3 – VOZ721 on approach to Canberra Airport pictured on CDTI-2000

3.5 The display background is colour coded to provide an indication of the terrain height in relation to "own- aircraft". The Green areas are below the aircraft, the Yellow areas are in the same altitude band as the aircraft, and the Red areas are above the aircraft.

3.6 Figure 4 shows Qantas flight QF187 (an Airbus A330) en-route from Melbourne to Sydney on the Pocket PC display.

4 Industry Participation

4.1 Feedback is requested from the GA and regional airline community on the potential benefits that may be derived from the use of cockpit traffic displays.

4.2 Suggestions for trials and demonstrations of the technology are also sought. There is a need for the aviation community to participate in this exercise.

5 Conclusion

5.1 The meeting is invited to note the development of traffic displays described in this paper.

5.2 The meeting is further encouraged to participate in the development and demonstration of CDTI.

Figure 4 – Qantas flight 187 depicted on Pocket PC Display
