

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

Factual Report of Investigation - Traffic Alert and Collision Avoidance System

February 25, 2011

A. INCIDENT DCA10LA083

Location: New Orleans, Louisiana
Date: August 9, 2010
Time: 1134 Central Daylight Time (CDT)
Aircraft: Shuttle America flight 7630, an Embraer 170, N856RW

B. GROUP

No group was formed for this investigative activity.

C. SUMMARY

On August 9, 2010, about 1134 central daylight time, a Shuttle America Embraer 170, N856RW, flight 7630, was at a cruise altitude of 29,000 feet when they received a Traffic Alert and Collision Avoidance System (TCAS) resolution advisory (RA) to climb. Flight data indicates that within seconds, the flight crew disconnected the autopilot and climbed to 29,600 feet consistent with the TCAS alert. There were 2 pilots, 2 flight attendants and 70 passengers on board the Shuttle America flight. One passenger received a serious injury during the evasive maneuver. The commercial passenger flight was over the state of Mississippi when the TCAS RA occurred. The flight originated from the Chicago O'Hare International Airport (ORD), Chicago, Illinois, and was enroute to Louis Armstrong New Orleans International Airport (MSY), New Orleans, Louisiana. The flight was operating under the provisions of 14 *Code of Federal Regulations* Part 121 on an Instrument Flight Rules (IFR) flight plan.

Radar data indicates that a United States Air Force Northrop Corporation T-38 Talon, call sign FAST 13, was on a cross country instrument training flight at 28,000 feet, when they deviated to 28,600 feet for about 30 seconds. When the deviation occurred FAST 13 was converging on flight 7630, causing Shuttle America's TCAS RA. The military flight was operating under the provisions of 14 *Code of Federal Regulations* Part 91 on an IFR flight plan from Campbell Army Airfield (HOP), Fort Campbell/Hopkinsville, Kentucky, to Chennault International Airport (CWF), Lake Charles, Louisiana. There were two crewmembers aboard the military airplane. This airplane was not equipped with a TCAS.

The TCAS computer unit was removed from the airplane and sent to the manufacturer facility in Phoenix, Arizona for examination and download of the recorded

event data. The examination was conducted by manufacturer's personnel under local FAA witness.

The TCAS unit, an Aviation Communication and Surveillance Systems (ACSS) TCAS2000 computer, was documented as follows:

Part Number: 7517900-55007
Serial Number: 20008946

The contents of the memory of the TCAS2000 computer were successfully downloaded. ACSS personnel converted the data into engineering units. Examination of the information confirmed that the incident TCAS encounter was recorded.

Data history recorded on the TCAS computer indicated that a resolution advisory (RA) was calculated and annunciated to the flight crew. ACSS reported that a Traffic Advisory (TA) was not annunciated for the intruder airplane. According to ACSS, the TCAS2000 unit operated normally as expected. The flight crew responded to the RA annunciation by initiating a climb.

ACSS provided a report of their examination, the contents of which were summarized in this report.

D. DETAILS OF INVESTIGATION

During normal operation, the ACSS TCAS2000 unit tracks and records data that describes the history of intruder aircraft that result in TAs and/or RAs. The TCAS2000 stores event history data in Electrically Erasable Programmable Read-Only Memory (EEPROM) for later retrieval and analysis.

The event data that is recorded details the behavior of the responsible intruder(s) and "own" airplane throughout the event. The track data is periodically sampled and recorded to provide a record of the behavior of the intruder(s) prior to causing a TA and/or RA until the advisory is concluded.

The recorded data includes the following parameters:

- Event Identifier
- System Time
- Flight Segment Marker
- Intruder Altitude
- Intruder Altitude Rate
- Intruder Mode S Address
- Own Altitude
- Own Altitude Rate
- Own Aircraft Latitude
- Own Aircraft Longitude

- RA Command For This Intruder (RA Information and crossing)
- Resolution Advisory Complement For This Intruder
- Track Number
- Tracked Intruder Bearing
- Tracked Intruder Range
- Tracked Intruder Range Rate

1.0 Examination and Recovery of Information from the TCAS Computer

1.1 Visual Inspection of the TCAS Computer

The unit was removed from the shipping container and visually inspected. The identification of the unit was confirmed by the information plate. Visual examination of the unit was conducted, with no appreciable physical damage noted.

The face plate information was documented and confirmed as from the incident airplane.

1.2 Recovery of Information Stored in Non-Volatile Memory

The examination and recovery of the stored information were conducted according to procedures developed by the manufacturer and agreed to by the witness.

Since the unit was undamaged, the unit was connected to an ACSS bench, power applied to the unit, and the contents of the EEPROM successfully extracted from the device using computer software. The contents of the raw binary data were provided to the witness and NTSB.

Once the validity of the extracted memory data was confirmed, software utilities were used to convert the data into human-understandable information.

2.0 Examination and Plot of the Recorded Information

After the data was converted to human-understandable information, the data were tabulated and plotted. See Figure 1.

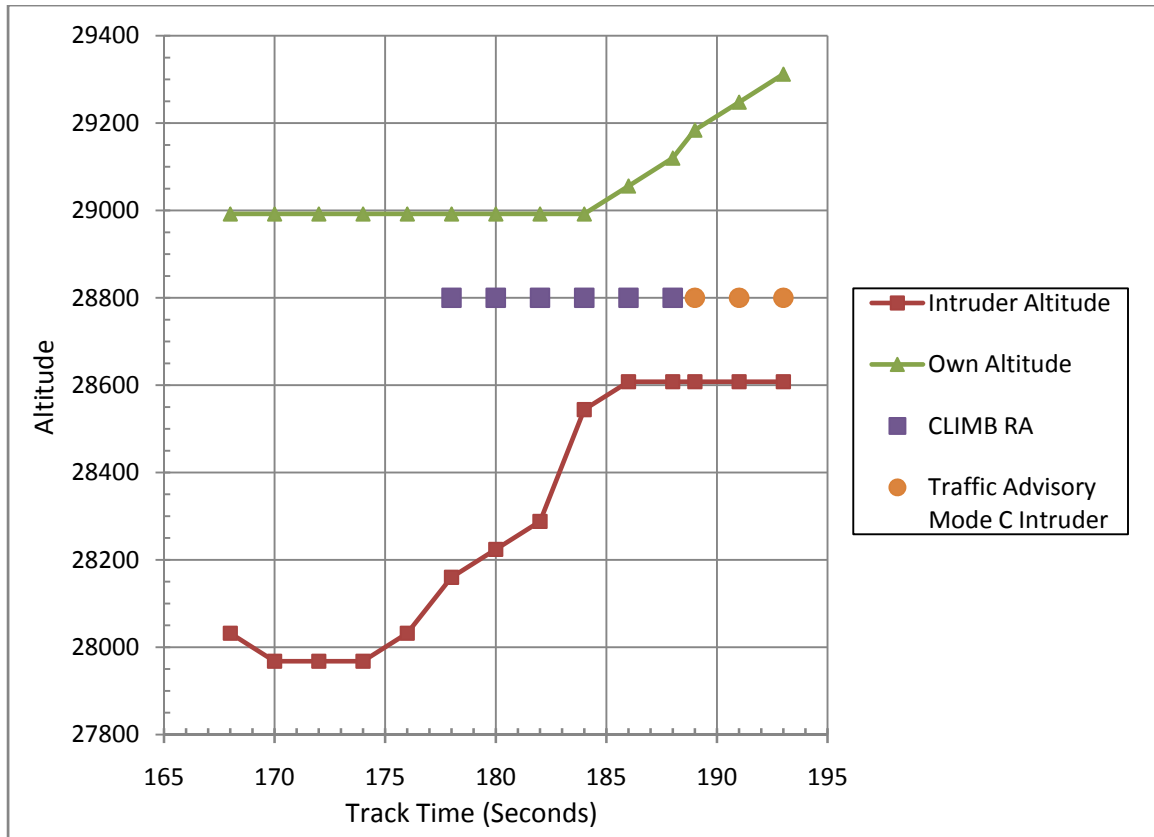


Figure 1 - Plot of Data Recorded by Shuttle America flight 7630's TCAS Computer.

The data indicate that Shuttle America flight 7630's TCAS computer announced a CLIMB RA shortly after the intruder airplane climbed through 28,000 feet altitude. No TA was calculated prior to the CLIMB RA. The CLIMB RA was announced for about 6 seconds until Shuttle America flight 7630 initiated a climb departing from 29,000 feet and the intruder arrested its climb at about 28,600 feet altitude. The CLIMB RA was weakened to a TA after the Shuttle America climb maneuver.

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