

Traffic Alert and Collision Avoidance System (TCAS) Certification Testing

April 1, 2008

Prepared by:
Ronald E Center
The Boeing Company
Enterprise Frequency Management Services
P.O. Box 3707
Seattle, WA 98124-2207
(206) 544-6583

As part of the FAA mandated aircraft certification program, special TCAS testing is required to demonstrate/certify TCAS operation on aircraft. The two primary FAA documents that guide the testing of TCAS systems are Advisory Circulars 20-131A and 20-151.

To paraphrase the two documents, Boeing must verify proper operation by observing at least 1 traffic advisory (TA) and at least 1 resolution advisory (RA). These advisories may be generated by "Encounters with an operating Mode C transponder installed at a fixed ground location, which reports an appropriate test altitude". The fixed ground station method is the safest means to trigger RAs and TAs in flight, where the aircraft under test is flying against a "hovering ghost target", instead of another in-flight aircraft.

The test procedure requires that an IFF transponder located on the ground be used to verify proper TCAS operation on the in-flight aircraft under test. The transponder set is located on the ground, and configured to simulate an aircraft at altitude, typically between 5,000 and 15,000 feet. The aircraft under test will fly in the vicinity of the test set in order to verify proper TCAS detection and alerting. Figure (1) depicts a functional diagram of the test.

This testing is conducted at two separate locations, which are Mansfield, WA and Glasgow, MT, and all testing will be pre-coordinated with local FAA authority. These two locations have been used for several years to conduct this type test, and no issues have ever been reported. Both locations were previously licensed under FCC call signs WC2XYH and WC2XYI respectively. The renewal application of these licenses was recently dismissed without prejudice, citing that re-coordination with the local FAA was required. The re-coordination was completed, and the coordination correspondence is attached as a separate attachment. The following coordination numbers were assigned:

NG T 080260.....M1090 (Mansfield, WA)
NG T 080262.....M1090 (Glasgow, MT)

Traffic Alert and Collision Avoidance System (TCAS) Certification Testing

Specific Test Data is as follows:

- Locations
 - a. Mansfield, WA; 47-48-35N, 119-38-10W
 - b. Glasgow, MT; 48-25-21N, 106-32-19W
- Purpose - Required as part of aircraft flight certification
- Frequency of Operation - 1090 MHz
- Emission - 11M9V7D
- Maximum ERP - 250 Watts, peak
- Ground Transponder Type - King KT-76A

TCAS Test Functional Diagram

In-Flight Aircraft Under Test



1090 MHz
11M0V7D
(simulating a second
aircraft at altitude)

KT-76A

Located on the ground

Figure 1