



# Memorandum

U.S Department  
of Transportation

**Federal Aviation  
Administration**

Subject: Action: Equivalent Level of Safety, AASI Jetcruzer 450,  
FAR 23.207(c), Stall Warning; ACE-94-6

Date: April 26, 1994

From: Manager, Los Angeles Aircraft Certification Office, ANM-100L

Reply to  
attn. of: S. Odle  
ANM-160L  
(310)988-5376

To: Manager, Small Airplane Directorate, ACE-100

This memorandum requests your office to review and provide concurrence to the proposed finding of equivalent level of safety to the stall warning system requirements of 14 CFR part 23.207(c).

## **BACKGROUND:**

The AASI Jetcruzer 450 is a fixed gear, no flap, canard configured aircraft with a single aft mounted PT6A-27 turbo-prop engine. The airplane has a stall warning system consisting of a Safeflight angle of attack vane and a separate micro switch installed on the control column. Throughout the course of the flight test program the system has been shown to produce a large amount of scatter in the stall warning flight test data. In order to get a system that is at least close to the requirements, the forward center of gravity limit has been moved aft 3.0 inches. However, the scatter is such that the normal method of data reduction (plot decel rate vs. stall warning speed) cannot be used. The applicant has proposed a simplified method of averaging the data for each test condition. This method would produce data that shows that the stall warning is between 5 and 10 knots for all cases except right turning stalls at maximum weight and forward center of gravity where it is 10.2 knots. However, the spread in the data used to obtain the averages for some of the test conditions is as follows:

Right turning	Fwd, Gross	8.7 to 11.3 knots
Left turning	Fwd, Regardless	6.3 to 11.8 knots
Right turning	Fwd, Regardless	6.1 to 10.8 knots
Right turning	Aft, Light	4.6 to 9.2 knots

**APPLICABLE REGULATIONS:**

The applicable Federal Aviation Regulation (FAR) paragraph states:

23.207 \*\*\*\*

(c) The stall warning must begin at a speed exceeding the stalling speed by a margin of not less than 5 knots, but not more than the greater of 10 knots or 15 percent of the stalling speed, and must continue until the stall occurs.

**APPLICANT POSITION:**

Applicant concurs with FAA position.

**FAA POSITION:**

Due to the Jetcruzer's benign stall characteristics and compliance to FAR part 23.221(a)(2) for Spin Resistance, the stall warning system provides an equivalent level of safety to that intended by FAR part 23.207(c). However, experience with the aircraft and the results from the flight tests have shown that the current stall warning system design is probably not readily reproducible from one aircraft to another. The system required an inordinate amount of tailoring through repetitive flight tests, adjustment of the yoke mounted micro switch, and finally restricting the C.G. envelope. The system as configured on the test aircraft appears to be highly influenced by pilot technique, air mass, pitch rate, and pitch acceleration. If this system is to be used every aircraft produced will have to be flight tested to ensure that it meets the pertinent regulations. This testing would require the installation of an airspeed boom on every aircraft.

**COMPENSATING FEATURES:**

The compensating features include:

- a) The airplane exhibits very benign stall characteristics at all weights and center of gravity locations.
- b) The aircraft has been shown to meet the Spin Resistant criteria of FAR 23.221(a)(2).
- c) The stall warning system as configured on the test aircraft does not produce nuisance alerts due to the high recommended rotation, climb and approach speeds ( $1.5V_S=95$  knots)

**RECOMMENDATION:**

Due to the compensating features (benign stall characteristics and spin resistance certification) the stall warning system installed on the Jetcruzer 450 provides an equivalent level of safety to that intended by FAR Part 23.207(c).

Concurred by:

*Acting*  
  
\_\_\_\_\_  
Manager, Los Angeles Aircraft Certification  
Office, ANM-100L

4/28/94  
Date

  
\_\_\_\_\_  
Manager, Standards Office, ACE-110

5/4/94  
Date

  
\_\_\_\_\_  
Manager, Small Airplane Directorate, Aircraft  
Certification Service, ACE-100

5/5/94  
Date