



Memorandum

U.S. Department
of Transportation

**Federal Aviation
Administration**

Subject: **ACTION:** Equivalent Level of Safety, AASI
Jetcruzer 450, FAR 23.1091(c)(2), Water Ingestion;
Finding No. ACE-94-3

Date: January 5, 1994

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

Reply to
attn. of: E. Smith (ANM-143L)
(310) 988-5260

To: Manager, Small Aircraft Directorate, ACE-100

This memorandum requests your office to review and provide concurrence to the proposed finding of equivalent level of safety to the air induction system water ingestion requirement of FAR 23.1091 (c) (2).

Background:

The AASI Jetcruzer 450 is a canard configured aircraft with a single aft mounted PT6A-27 turboprop engine in a pusher configuration. The two engine inlets are located on either side of the fuselage at approximately the 3 and 9 o'clock positions. In these locations, the inlets are exposed to potential water ingestion from the nose tire side plume water spray when taking off or landing on a runway with standing water.

AASI provided an analysis (report number ER-7501) that compared the aircraft configuration and speed to a NASA test that measured the flowrate and trajectory of aircraft tire-generated water spray from a general aviation aircraft of approximately the same size.

The comparative analysis was not accepted as demonstrating compliance to the regulation because of the differences between the NASA tested aircraft and the Jetcruzer 450. It could not be determined conclusively that no water would enter the engine inlets.

Applicable Regulations:

The applicable Federal Aviation Regulation (FAR) paragraph states:

"23.1091 ****

(c) ****

(2) The air inlet ducts must be located or protected so as to minimize the ingestion of foreign matter during takeoff, landing, or taxiing.

Advisory Circular (AC) 20-124, although not constituting a regulation, provides guidance on how to comply with the regulation. It states:

(4) ****

(c) ... An applicant seeking airworthiness approval may demonstrate the water ingestion demonstration of the engine and airspeed systems by conducting tests in a one-half inch deep water test bed. Upon a successful demonstration, the airplane is approved without an operating limit on runway water depth. If the applicant can demonstrate successfully only at some shallower water depth, then the lesser depth becomes a limitation on that airplanes operation.

Applicant's Position:

The applicant proposes to limit the aircraft operation by prohibiting takeoff and landing with standing water on the runway.

The proposed limitation will be implemented by the inclusion of this information in the Airplane Flight Manual (AFM) - in the Limitations Section, and on the instrument panel in the form of a placard which reads: "Takeoff or Landing is prohibited with standing water on the runway".

FAA's Position:

Adding a placard and limitation in the AFM prohibiting the aircraft from operating in standing water is sufficient to satisfy the intent of FAR 23.1091(c) (2).

Section (4) (c) of the AC allows (for demonstration of compliance) limitations to be established for the airplane for water depths less than one-half inch if the airplane cannot pass the one-half inch depth criteria. AASI's proposed limitations could be interpreted as meeting the criteria set forth in the AC except that the AC does not address the zero water depth condition.

If AASI chooses in the future to remove this limitation, water tests and/or additional analyses will be required to determine if the aircraft can operate in water at depths of up to one-half inch (in which case the limitation would be revised) or if the limitation can be removed completely.

Compensating Features:

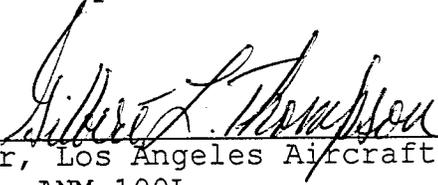
The compensating features include:

- a) Operating limitation placard in the cockpit; and
- b) The operational limitations listed in the AFM.

Recommendation:

We concur that the AASI proposed aircraft limitations are considered as providing an equivalent level of safety as envisioned in the regulations and thus meets the requirements of paragraph 23.1091 (c) (2) of the FAR.

Concurred by:



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

1/7/94
Date

Manager, Standards Office, ACE-110

1/19/94
Date



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

1/19/94
Date