



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Review and Concurrence, Equivalent Level of
Safety , ACE-02-12

Date: November 25, 2002

From: Manager, Denver Aircraft
Certification Office, ANM-100D

Reply to Kreg Voorhies
Attn. of: (303) 342-1092

To: Manager, Small Airplane Directorate, ACE-100

The Denver Aircraft Certification Office is currently processing an application for a Type Certificate for the Adam Aircraft Industries A500 airplane. The purpose of this memorandum is to request your office to review and provide concurrence to an equivalent level of safety finding for installation of a single power lever control (one per engine) in lieu of the traditional power (thrust) levers and mixture controls. The propeller (rpm control) levers will not be incorporated into the single power lever controls, §§ 23.777(d) and 23.781(b).

Background:

The Adam Model A500 CarbonAero is a pressurized, 6 - place, 6500 lb. MTOGW airplane with retractable landing gear and twin turbocharged engines in a centerline thrust configuration. The low wing, twin boom, high horizontal stabilizer configuration will be constructed of composite material.

The aircraft will be powered by two turbocharged Teledyne Continental TSIOF-550E (model suffix "E" may change) engines rated at 350 Hp (2700 rpm) at maximum continuous power. Each engine will incorporate a Full Authority Digital Electronic Control (FADEC) system to control the ignition and fuel injection functions throughout the operational envelope. Use of an electronic turbocharger waste gate control system and electronic propeller governor speed control will be incorporated at a later date. Certification of the FADEC engine will be conducted by the Atlanta Aircraft Certification Office concurrently with the Adam Model A500 type certification program. Similarly, certification of the aft propeller will be conducted by the Chicago Aircraft Certification Office concurrently with this program. The forward propeller is a FAA type certificated (TC No. P35EA), 3-bladed Hartzell model PHC-H3YF-2UF/FC7693DF propeller with a 78 inch diameter.

The FADEC system schedules the amount of fuel for the multi-port fuel injectors and compensates for changes in altitude by monitoring the intake manifold pressure, thereby eliminating the need for a mixture control in the cockpit. The FADEC controls the fuel injector by commanding a solenoid controlled injector valve ON or OFF. Injection duration for normal operations is calculated from a schedule and compensates mixture in accordance with a map. The map is the baseline mixture for the cylinder at any normal engine condition. The FADEC compensates this mixture in response to variations in intake manifold pressure, intake air temperature, fuel pressure, cylinder head temperature, exhaust gas temperature, system voltage, engine rpm, and throttle setting.

Applicable Regulations:

In accordance with § 23.777(d), the location order from left to right of the cockpit controls must be power (thrust) lever, propeller (rpm control), and mixture control. Furthermore, the powerplant control knobs must conform to the general shapes as defined in § 23.781(b).

Compensating Features:

The compensating features include:

the FADEC engine will automatically control the fuel mixture based on engine speed and crankshaft position; and

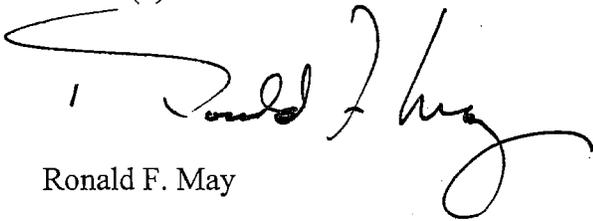
a single power lever control will reduce pilot workload due to the removal of the mixture control.

Applicant's Position:

Adam plans to provide a single power (thrust) lever (one per engine) installed in the center console between the two cockpit seats. The power (thrust) levers will be arranged in accordance with § 23.777(e)(2) which specifies that for front and rear mounted engines the front engine power control shall be mounted on the left and rear controls on the right. The controls will increase engine power when moved forward and decrease engine power when moved rearward. The power control lever knobs (handle) will be shaped as required by § 23.781(b). The motion and effect of the propeller (rpm control) levers will be in compliance with § 23.779(b)(1).

Recommendation:

We concur that the single power control lever (one per engine) provides an equivalent level of safety as envisioned in the regulations and therefore meet the requirements of §§ 23.777(d) and 23.781(b).



Ronald F. May

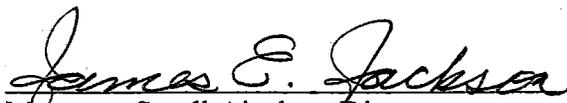
Concurred by:



Manager, Standards Staff, ACE-110

12/27/02

Date

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

12-30-02

Date