



Federal Aviation Administration

Memorandum

Date: SEP 19 2006

From: Manager, Small Airplane Directorate

To: Manager, Fort Worth Aircraft Certification Office, ASW-150

Prepared by: Rao Edupuganti, Aerospace Engineer, ASW-150

Subject: Equivalent Level of Safety to 14 CFR part 23, Appendix H, § H23.5,
Installation of an Automatic Power Reserve (APR) System, for the Eclipse
Aviation Corporation Model 500; Finding No. ACE-06-05

This memorandum documents concurrence for the subject finding of Equivalent Level of Safety (ELOS). We request your office to review and concur with the proposed ELOS finding to 14 CFR part 23, Appendix H, H23.5, Installation of an Automatic Power Reserve (APR) System. The proposed ELOS will allow for the utilization of APR power activation without taking credit for any improvement of takeoff distances, obstacle clearance and climb.

BACKGROUND:

Multi-engine aircraft lose a significant portion of their climb performance when operating with one-engine inoperative (OEI). As a result, the engine manufacturers have provided APR, an enhanced thrust rating, for OEI operations. The APR provides additional thrust in the event of an OEI condition. The activation of APR is automatic and 14 CFR part 23, Appendix H requires an additional manual means of activation and deactivation should the automatic system fail. The Eclipse Aviation Corporation Model 500 does not provide a manual means for APR activation.

APPLICABLE REGULATIONS:

The applicable regulation is 14 CFR part 23, § H23.5 which states:

Sec. H23.5

[Powerplant controls--general.]

[(a) In addition to the requirements of Sec. 23.1141, no single failure or malfunction (or probable combination thereof) of the APR, including associated systems, may cause the failure of any powerplant function necessary for safety.

(b) The APR must be designed to--

(1) Provide a means to verify to the flight crew before takeoff that the APR is in an operating condition to perform its intended function;

(2) Automatically advance power on the operating engines following an engine failure during takeoff to achieve the maximum attainable takeoff power without exceeding engine operating limits;

(3) Prevent deactivation of the APR by manual adjustment of the power levers following an engine failure;

(4) Provide a means for the flight crew to deactivate the automatic function. This means must be designed to prevent inadvertent deactivation; and

(5) Allow normal manual decrease or increase in power up to the maximum takeoff power approved for the airplane under the existing conditions through the use of power levers, as stated in Sec. 23.1141(c), except as provided under paragraph (c) of H23.5 of this appendix.

(c) For airplanes equipped with limiters that automatically prevent engine operating limits from being exceeded, other means may be used to increase the maximum level of power controlled by the power levers in the event of an APR failure. The means must be located on or forward of the power levers, must be easily identified and operated under all operating conditions by a single action of any pilot with the hand that is normally used to actuate the power levers, and must meet the requirements of Sec. 23.777(a), (b), and (c).] ignition control must have a means to prevent its inadvertent operation.

COMPENSATING FEATURES:

In the case of the Eclipse Aviation Corporation Model 500, the Airplane Flight Manual (AFM) does not take any credit for the APR rating. All rating tables are based on normal takeoff thrust available. Therefore, all takeoff distances, obstacle clearance and climb data is based on normal takeoff rating from the engine. Even if one engine were to fail, remaining performance is not based on APR rating from the remaining engine.

Eclipse Aviation Corporation has carried out all of the required analysis and testing to ensure the APR rating is safe, and the system, including failure modes, meets all levels of reliability and safety. APR availability in the event that one engine fails is a bonus to the pilot. The APR rating is basically an additional amount of thrust margin available to the pilot during takeoff with one engine inoperative.

RECOMMENDATION:

The Eclipse Aviation Corporation Model 500 Airplane Flight Manual (AFM) does not take any credit for the APR rating. There is no impact to the AFM published performance due to the

unavailability of APR either through automatic or manual means, thus the loss of APR availability does not result in a reduced level of safety. We concur that the Eclipse Aviation Corporation Model 500 provides an ELOS to that intended by CFR part 23, Appendix H, H23.5 and recommend the issuance of this ELOS.

Concurred by:

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