



U.S. Department
of Transportation

Federal Aviation
Administration

23.45 + 939
Policy File
Memorandum

Subject: **INFORMATION**: Policy Guidance for Extrapolation
of Propulsion Data for Showing Compliance with 14
CFR Part 23, § 23.45(d) Thrust Lapse Rate and
§ 23.939 Powerplant Operability Requirements

Date: DEC 01 1998

**COPY FOR YOUR
INFORMATION**

From: Manager, Regulations and Policy Branch
Small Airplane Directorate, ACE-111

Reply to
Attn. of: Randy Griffith

816-426-6941

To: Associate Manager, Systems and Propulsion
Wichita Aircraft Certification Office, ACE-116W

This memorandum is in response to yours dated March 19, 1998, requesting guidance for extrapolation procedures related to engine thrust lapse rate and operability compliance for airfields at higher elevations than those tested. This memorandum cancels and supersedes the guidance previously issued in our June 23, 1998, memorandum entitled "Policy Guidance for Engine Thrust Lapse Rate and Operability Compliance at High Elevation Airfields."

As you indicated, there are currently no extrapolation procedures for Part 23 aircraft for showing compliance with subject requirements. Traditionally, compliance has been shown by testing up to the field elevation in which the aircraft is to be approved. This is the most desirable method of showing compliance with subject requirements since testing at the altitude in which approval is to be granted does not require parameter variation analysis to account for higher airfield elevations. In the past, extrapolation for showing compliance with 14 CFR Part 25, § 25.101(c) and § 25.939, the transport category aircraft equivalents of § 23.45(d) and § 23.939, has been performed and the same considerations may be used for Part 23 aircraft.

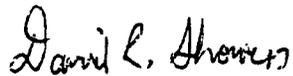
When considering extrapolation for compliance with § 23.45(d) and § 23.939, data must be presented that substantiates the proposed extrapolation procedures. This data should include supportive flight test and engine operations (i.e., electronic engine control, limits protection, and surge protection devices scheduling) data. Considerations for extrapolation depend upon an applicant's determination, understanding, and substantiation of the critical operating modes of the engine. This understanding includes a determination and quantification of the effects that engine installation and variations in ambient conditions have on these modes. We recommend that Advisory Circular 25.939-1, be utilized for turbine

engine guidance when determining/evaluating the engine's critical operating modes.

Advisory Circular 25-7A, Flight Test Guide for Certification of Transport Category Airplanes, paragraph 9.b provides considerations and procedures for extrapolation of engine performance data up to 3,000 feet above the highest altitude tested. These procedures may be applied for showing compliance with § 23.45(d).

As for § 23.939, an applicant may propose a means of compliance to the requirement that includes extrapolation for higher field elevations; however, these proposals should be evaluated on a case-by-case basis. As previously indicated, successful extrapolation of engine flight test data for compliance with § 23.939 depends on an applicant's understanding through both qualitative and quantitative test results of the engine installation's critical operating modes. If an applicant wishes to extrapolate to higher field elevations than those tested, the test proposal should be substantiated with appropriate supportive test and engineering data. If the proposal is appropriately substantiated, extrapolation of engine data for compliance with § 23.939 powerplant operability up to a maximum of 3,000 feet above the airfield elevation tested may be performed. Otherwise, installed engine testing up to the field elevation in which approval is requested should be performed when showing compliance with § 23.939.

If you have any questions or need additional information, please contact Randy Griffith at 816-426-6941. Thank you.



David R. Showers