Exemption No. 6431

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of **Cessna Aircraft Company** for an exemption from § 25.161(d) of the Federal Aviation Regulations	**Regulatory Docket No. 28463**

GRANT OF EXEMPTION

By letter L178-61-96-155 dated January 29, 1996, Rex D. Hamilton, Executive Engineer, Cessna Aircraft Company, One Cessna Boulevard, P.O. Box 7704, Wichita, Kansas 67277-7704, petitioned for an exemption from the engine-out lateral/directional trim requirements of §25.161(d) of the Federal Aviation Regulations (FAR).

Section of the FAR affected:

Section 25.161(d) requires that the airplane maintain longitudinal, directional, and lateral trim (and for lateral trim, the angle of bank may not exceed five degrees) at 1.4 V_{S1} during climbing flight with (1) the critical engine inoperative; (2) the remaining engines at maximum continuous power; and (3) the landing gear and flaps retracted.

V_{S1} is defined in Part 1 of the FAR as the minimum stalling speed or the minimum steady flight speed in a specific configuration.

The petitioner's supportive information is as follows:

Cessna Aircraft Company's application for a new type certificate for the Model 750 airplane was filed on October 15, 1991. Included in the certification basis of this airplane is § 25.161(d), as amended by Amendment 25-72.

Flight tests of the Cessna Model 750 have shown that the airplane exhibits a rolling moment that cannot be fully trimmed out during one-engine-inoperative flight, with asymmetric fuel loads, at lighter weights due to the low airspeeds that result from using a climb speed of 1.4 V_{S1}. There is no operational requirement for climb speeds as low as 1.4 V_{S1}, since the airplane's climb performance is based on a constant speed of 190 knots indicated airspeed (KIAS) for all weights in the enroute configuration.

Cessna Aircraft believes that the Model 750 has satisfactory trim capability at its operational speed at all gross weights.

Cessna Aircraft believes that an exemption:

1. Would be in the public interest because it would allow the scheduled delivery and operation of Cessna Model 750 airplanes in the contracted configuration, without the adverse financial effects that would otherwise be felt by both the manufacturer and the prospective operators by a redesign to increase the lateral trim capabilities or delayed certification; and

2. Would not result in any reduction in the level of safety from that existing in the world fleet of airplanes whose certification basis includes the lateral trim requirement for twin-engine airplanes.

Cessna Aircraft acknowledges that its petition was not submitted in accordance with the 120-day requirements of § 11.25(b)(1), but indicates that it submitted the request when it did because Cessna did not conduct the testing that revealed the airplane was not in compliance with the literal requirements of the rule until late in the certification program. The Cessna Aircraft Company consequently requests that the publication and comment requirements of § 11.27(c) be waived in order that delivery commitments not be adversely impacted, and because of its assertion that an acceptable level of safety appropriate to this twin-engine airplane will be provided.

The FAA finds, for good cause, that action on this petition should not be delayed by publication and comment procedures because a delay in acting on the petition would be disruptive to the flying public and create a major economic burden on the manufacturer and operators. Additionally, the FAA has determined that the requested exemption is identical to one recently granted for another two-engine airplane that could not show literal compliance with the requirements of § 25.161(d).

The FAA's analysis/summary is as follows:

The FAA has carefully considered the information provided by the petitioner and has determined that there is sufficient merit to warrant granting this petition for an exemption to § 25.161(d) for lateral trim.

Section 25.161(d) of the FAR requires that sufficient trim be available to maintain hands-off flight at $1.4V_{S1}$, with the critical engine inoperative and the remaining engines at maximum continuous power.

This requirement originally was contained in CAR 04, which was the airworthiness standard in effect in the early 1940's. The overriding consideration in the original rule was that the ability to provide adequate trim should be required "for any flight condition which it is reasonable to assume will be maintained steadily for any appreciable time." The "best rate of climb speed" was the speed originally referenced in the rule. The best rate of climb speed was chosen because that was the speed most likely to be flown in a steady-state climb. This best rate of climb speed was later interpreted to be $1.4V_{S1}$ as a convenience in testing, in accordance with advisory material available at that time.

The one-engine-inoperative enroute climb speed scheduled in the Cessna Model 750 Airplane Flight Manual (AFM) is a constant 190 KIAS for all gross weights, and it is possible to achieve hands-off lateral and directional trim at that speed. If one-engine-inoperative enroute climb speeds are determined as $1.4\ V_{S1}$, the resulting speeds will be a function of weight and only approach 190 KIAS at heavy weights, limiting literal compliance with § 25.161(d) to those same heavy weight conditions. Since the cleanup and acceleration to the enroute climb speed is a transient maneuver of limited duration, there would seem to be no good reason for the pilot to fully trim the airplane until the steady-state climb configuration and airspeed have been achieved. Since the Cessna Model 750 has an enroute climb speed schedule that allows for hands-off trim at all allowable gross weights, the FAA considers that the design of the Cessna Model 750 provides an acceptable level of safety.

The one-engine-inoperative enroute climb speed is provided in the FAA Airplane Flight Manual. Since this speed is chosen as a single value, close to the best rate of climb speed, to optimize climb performance over a weight range while at the same time simplifying operating procedures, it is considered more relevant in terms of the overriding trim authority concern than the $1.4V_{S1}$ contained in the current rule. The FAA has determined that it is not necessary to show compliance with the strict wording in § 25.161(d) with regard to lateral trim, and may consider

rulemaking in the future to correct § 25.161(d) to address this discrepancy between required and acceptable engine-inoperative trim speeds. (This would be consistent with the requirement of § 25.161(e) for airplanes with four or more engines that requires sufficient trim be available to maintain hands-off flight at the "scheduled" enroute climb speed, which the twin-engine Cessna Model 750 achieves.)

In conclusion, the FAA has determined that: (1) the existing requirements are unnecessarily restrictive for twin-engine airplanes; (2) the Cessna Model 750 meets the intent of the rule; and (3) the trim speed explicitly stated in the rule is not directly relevant given current procedures and interpretations.

In consideration of the foregoing, I find that a grant of exemption is in the public interest, and will not adversely affect safety. Therefore, pursuant to the authority contained in 49 USC 40113 and 44701, delegated to me by the Administrator (14 CFR 11.53), the petition of the Cessna Aircraft Company for exemption from the lateral trim requirements of § 25.161(d) is granted.

Issued in Renton, Washington, on April 26, 1996

/s/_____
Ronald T. Wojnar
Manager, Transport Airplane Directorate
Aircraft Certification Service, ANM-100