

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

In the matter of the petition of

LEARJET INC.

for an exemption from § 25.571(e)(1) of the
Federal Aviation Regulations

Regulatory Docket No. 27845

PARTIAL GRANT OF EXEMPTION

By letter L706-07-94-473 dated July 14, 1994, William W. Greer, Vice President, Engineering and Quality Assurance, Learjet Inc., P.O. Box 7707, Wichita, KS 67277-7707, petitioned for an exemption from the four-pound bird strike requirement of § 25.571(e)(1) from V_C at sea level to 8,000 feet in favor of V_C at sea level or $.85 V_C$ at 8,000 feet, whichever is greater.

Section of the FAR affected:

Section 25.571(e)(1) requires that the airplane be capable of successfully completing a flight during which likely structural damage occurs as a result of impact with a four pound bird at V_C at sea level to 8,000 feet.

Related Sections of the FAR

Section 25.631 requires that the empennage be capable of continued safe flight and landing after impact with an eight-pound bird at V_C at sea level.

Section 25.775 requires that the windshields directly in front of the pilots must withstand, without penetration, the impact of a four-pound bird at V_C at sea level.

The petitioner's supportive information is as follows:

"Pursuant to the procedures outlined in FAR 11.25, Learjet Inc. hereby submits a Petition for Exemption from the specific velocity requirements of FAR 25.571(e)(1) for the Learjet Model 45. The background of the regulation and the policy statements for the various amendments are well defined in [FAA memorandum dated 12/9/92] and are summarized as follows:

"1. [The] bird impact velocity of FAR 25.631 and 25.775 has consistently been expressed at ' V_C at sea level.'

"2. Amendment 45 to FAR 25 introduced bird impact as a discrete source damage tolerance criteria and specified 'likely operational speeds and altitudes up to 8,000 feet.'

"3. This 25.571(e)(1) requirement was subsequently changed (Amendment 72) to ' V_C at sea level to 8,000 feet.' (V_C in terms of equivalent airspeed.)

"4. [The FAA memorandum] notes that bird impact energy is proportional to the square of the true airspeed. Since the value of true airspeed is usually higher than equivalent or calibrated airspeed, the energy is higher.

"5. Quoting from [the FAA memorandum], 'The FAA did not intend to make the bird strike criteria more stringent at altitude.'

"The Learjet model 45 FAA certification basis includes Amendment 72 to FAR 25. V_{MO}/V_C is 330 KCAS up to $M_C = .81$. Three hundred and thirty KCAS is approximately 328 KEAS and 370 KTAS at an altitude of 8,000 feet.

"The Transport Standards Staff has agreed [in the FAA memorandum] to look favorably upon requests for exemptions from the ' V_C at 8,000 feet' requirement in FAR 25.571(e)(1), Amendment 25-72, provided that the airplane is capable of successfully completing a flight during which likely structural damage occurs as a result of impact with a four pound bird at whichever true airspeed is greater, V_C at sea level or $0.85 V_C$ at 8,000 feet. This, incidentally, coincides with the corresponding JAA regulatory requirement. In the case of the Learjet 45, since V_C at sea level is 330 KTAS, and at 8,000 feet is 370 KTAS, $0.85 V_C$ at 8,000 feet is approximately 315 KTAS.

"Learjet Inc. hereby expressly requests that an exemption from the ' V_C at sea level to 8,000 feet' be granted in favor of ' V_C at sea level or $0.85 V_C$ at 8,000 feet, whichever is greater', for FAR 25.571(e)(1)."

DESCRIPTION OF THE AIRPLANE TO BE COVERED

The Learjet Model 45 is a pressurized, transport category executive type airplane powered by two aft fuselage mounted Garrett TFE 731-20 engines. The Model 45 has a design cruise speed of 330 kts and .81 Mach and is designed to operate up to an altitude of 51,000 feet. The maximum design takeoff weight is 19,500 lbs. with a seating capacity of 8 to 10 passengers.

EXTENT OF THE REQUESTED REGULATORY RELIEF

Relief is sought to permit use of " V_C at sea level or .85 V_C at 8,000 feet, whichever is greater," in lieu of the current § 25.571(e)(1) requirement to test from " V_C at sea level to V_C at 8,000 feet". In the case of the Learjet Model 45, this means no relief at sea level but represents a 40 KTAS relief at 8,000 feet.

PUBLIC INTEREST

"The granting of this exemption will be in the public interest because it will allow the Learjet Model 45 to select V_C at sea level for certification to the four pound bird impact requirement. It was the intent of Amendment 25-72 to § 25.571(e)(1) to allow V_C at sea level to be used as the likely operating speed except in those cases where the applicant purposely reduced V_C at sea level to meet the bird strike requirements. The Learjet Model 45 has not deliberately reduced V_C at sea level to meet this requirement.

A summary of Learjet Inc.'s petition was published in the Federal Register on August 18, 1994 (59 FR 42639). No comments were received.

The FAA's analysis/summary is as follows:

The petitioner has requested relief from the four-pound bird strike requirement of § 25.571(e)(1), which requires that the airplane must be capable of successfully completing a flight during which likely structural damage occurs as a result of impact with a four pound bird at V_C (the design cruising speed) at sea level to 8,000 feet. The original bird strike provision was adopted by Amendment 25-45 and required the bird impact to be at likely operating speeds from sea level to 8,000 feet. The term "likely operating speed" was open to interpretation and causing confusion, so the FAA proposed a revision that would have required a specific structural design speed. The proposal was published on December 3, 1984 as Notice 84-21 (49 FR 47358). The FAA proposed a single speed of V_C at sea level, which was consistent with other bird strike requirements in §§ 25.631 and 25.775. One commenter to the proposal pointed out that an artificially low value of V_C at sea level could be established for the sole purpose of reducing the bird impact speed. This would lead to unconservative impact airspeeds

at lower altitudes where bird impacts are most likely. The FAA agreed and revised the final rule accordingly.

Most airplanes, except those with an artificially low V_C at sea level, have a near constant value of V_C KEAS from sea level to 8,000 feet. The same equivalent airspeed at 8,000 feet gives about a 13 percent increase in true airspeed above that at sea level. In Amendment 25-72, the FAA did not intend to make the rule more stringent at 8,000 feet than at sea level. The intent was to prevent an applicant from selecting an unrealistic value of V_C at sea level. The Learjet Model 45 has a realistic and near constant value of V_C from sea level to 8,000 feet and therefore meets the intent of Amendment 25-72.

In conclusion, the FAA has determined that the design cruising speed (V_C) schedule of the Learjet Model 45 meets the intent of the regulations with respect to the bird impact velocities defined in § 25.571(e)(1), as amended by Amendment 25-72.

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest and will not affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in §§ 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), Learjet is hereby granted an exemption from the bird impact speed requirement of § 25.571(e)(1) of the Federal Aviation Regulations, to the extent necessary to permit certification of the Learjet Model 45 using V_C at sea level, or $.85 V_C$ at 8,000 ft., whichever is greater.

This exemption will remain in effect unless superseded or rescinded.

Issued in Renton, Washington, on January 26, 1995.

/s/ John J. Hickey
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service, ANM-100