

UNITED STATES OF AMERICA  
DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
KANSAS CITY, MISSOURI 64106

Exemption No. 7306

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In the matter of the petition of

AYRES CORPORATION

for exemption from § 23.3 of Title 14  
of the Code of Federal Regulations (CFR)

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Regulatory Docket No. CE160

GRANT OF EXEMPTION

By letter dated January 21, 1999, the Ayres Corporation, P.O. Box 3090, Albany, Georgia, petitioned for exemption from the original intent of 14 CFR Part 23, § 23.3, "Airplane Categories" for the Model LM200. This exemption would allow Ayres Corporation to certificate the Model LM200 "Loadmaster," as a 19,000-pound maximum gross weight commuter category airplane with a novel and unique twin engine, single propeller propulsion system and limit seating to a maximum of 9 passengers.

**The petitioner requires relief from the following regulation:**

*Section 23.3 Airplane categories.*

*(d) The commuter category is limited to propeller-driven, multiengine airplanes that have a seating configuration, excluding pilot seats, of 19 or less, and a maximum certificated takeoff weight of 19,000 pounds or less. The commuter category operation is limited to any maneuver incident to normal flying, stalls (except whip stalls), and steep turns, in which the angle of bank is not more than 60 degrees.*

The Ayres Corporation has been working with the FAA for an extended period of time to determine an engineering method that would show that the nonredundant features of the LM200 propulsion system could meet the reliability achieved by fully redundant systems. An acceptable criteria could not be determined. For this reason, Ayres is petitioning for relief from the original intent of the commuter category which requires completely independent, redundant engine and propeller systems.

## **The petitioner supports their request with the following information:**

### **Equivalency to the existing level of safety**

The Model LM200 is a large but simple, low speed, fixed gear airplane using two engines to drive a single propeller. The Model LM200 will have to meet extensive special conditions for the engine/gearbox/propeller combination. Most of these special conditions are designed to set the reliability level of components very high. The Model LM200 design with centerline thrust has a safety advantage over the current fleet because it is not susceptible to asymmetric thrust related accidents. Since criteria to determine that a single propeller design can be equivalent to a fully redundant design is undetermined, as compensation for not having redundant features, all configuration for the LM200 will be limited to a maximum of nine passengers.

### **Public Interest**

Granting an exemption to Ayres for the Loadmaster is in the public interest because the continual growth in cargo transportation has generated a significant demand for cargo use aircraft. Also the growth of internet commerce will drive an increasing need for overnight cargo transportation. In addition to the jobs, public service, and revenues generated by cargo operations the Model LM200 program will generate an estimated 1400 manufacturing jobs and represents an investment in excess of 180 million U.S. dollars over the next few years.

### **Comments on published petition summary:**

On April 21, 2000 (65 FR 21498), the FAA published a summary of the petition in the FEDERAL REGISTER for public comment. The comment period closed on May 15, 2000, and the FAA received no comments.

### **The Federal Aviation Administration's (FAA) analysis is as follows:**

#### **Background**

The Ayres Corporation is seeking Part 23 commuter category certification of the Model LM200, as an all-new 19,000-pound maximum gross weight, fixed gear, non-pressurized, airplane with a single propulsion system consisting of two turboshaft engines, a gearbox and a single propeller.

The Model LM200 propulsion system includes two side-by-side Light Helicopter Turbine Engine Company (LHTEC) CTS800 turboshaft engines in association with a GKN Westland combining gearbox. Both engines, plus the combining gearbox, make up the model CTS800-4T powerplant, which will be type certificated to 14 CFR Part 33 as a "twin power section, turboshaft assembly." The powerplant will drive a single, Hamilton Sundstrand constant speed propeller, which is currently certified to Part 35. The powerplant, plus the propeller, make up the LM200 propulsion system. This single

propeller, two-engine combination is common in helicopters, but is unique to Part 23 commuter category.

The aircraft will be of conventional, semi-monocoque, aluminum construction with a high cantilever wing, fixed gear, centerline thrust, mechanical and electro-mechanical controls and will be unpressurized. Certification will include flight into known icing and single pilot, IFR operations.

### **Discussion**

The original intent of the commuter category was to require redundant features such that no single-point failure could cause a catastrophic failure. It follows then that the multi-engine requirement of the commuter category envisioned two completely independent, redundant powerplants and propellers. The Model LM200 has limited single-point failures that could be catastrophic, even recognizing the robust nature of the designs in these single-point failure areas.

The commuter category is intended for transport airplane operations and requires a higher level of safety than the normal category. The level of safety intended by the commuter category is discussed at length in the preambles of the notice and final rules of Part 23, Amendment 23-34, "Airworthiness Standards and Operating Rules: Commuter Category Airplanes." The preambles make the following points:

- Commuter category aircraft are required to meet International Civil Aviation Organization (ICAO) Annex 8, Part III. ICAO requires two power units and defines a power unit as "a system of one or more engines and ancillary parts which are together necessary to provide thrust, independently of the continued operation of any other power-unit(s), but not including short period thrust-producing devices."
- The level of safety established by the proposed airworthiness standards for the commuter category airplane are considered, to the maximum feasible extent, equivalent to those provided by the airworthiness standards for larger airplanes used in air transportation.

When developing the commuter regulations, the FAA did not envision a design such as the Model LM200. The language, as written in § 23.3(d), requires "multi-engine." The preamble to Amendment 23-34 further explains that "multi-engine" is intended to be that required by ICAO Annex 8, Part III. While the existing commuter category language is adequate, the preamble material is clear in that the original intent of commuter category, as explained in the preamble, was to ensure that no single point failure would prohibit continued safe flight and landing.

### **Conclusion**

The FAA has no criteria to determine that the non-redundant features of the Model LM200 propulsion system or their reliability can be shown through engineering design,

tests or analysis to be as reliable, or equivalent to a fully redundant system and, thus, be capable of continued safe flight to a landing with a known probable failure. The FAA, considering the following compensating features, has determined that granting an exemption to Ayres for the Model LM200 is in the public interest, because the continual growth in cargo transportation has generated a significant demand for cargo use aircraft. Also, the growth of internet commerce will drive an increasing need for overnight cargo transportation.

Compensating features will include special conditions that require additional robustness of the propulsion system showing that the non-redundant features are highly reliable and durable. The Model LM200 will provide a level of safety between that of a normal category airplane and that for a 19-passenger commuter airplane. By allowing the Model LM200 to be certificated in the commuter category rather than the normal category, the airplane will have the additional standards, such as single-engine climb performance, appropriate to a 19,000-pound airplane.

The FAA understands the safety benefit of centerline thrust and recognizes through accident data that this feature will greatly enhance safety in twin engine airplanes under 12,500 pounds operating under Part 91 flight rules. Upon examination of commuter category and Part 25 accident data, the centerline thrust also offers safety improvements in Part 135 operation, but less than that offered in Part 91.

The Model LM200 with certain failures will not be able to accomplish the commuter category intent of "continuing flight to a safe landing." However, by showing that the non-redundant features are highly reliable and durable, the Model LM200 can provide a higher level of safety than a normal category airplane, but not the level of safety required for a 19-passenger airplane. For this reason, the FAA will limit the number of passengers to 9, the maximum allowed under normal category.

In consideration of the foregoing, I find that a grant of exemption to the original intent of the commuter category rule is in the public interest and will not adversely affect safety provided Ayres demonstrates compliance with the accompanying special conditions.

Ayres is granted an exemption to allow certification of the Model LM200 "Loadmaster" for weights up to 19,000 pounds in the commuter category with the following limitations:

1. The airplane will be limited to a maximum of nine passengers.
2. The airplane must comply with the special conditions associated with the Ayres Model LM200 "Loadmaster."

Issued in Kansas City, Missouri on August 7, 2000.

  
Michael Gallagher  
Manager, Small Airplane Directorate  
Aircraft Certification Service