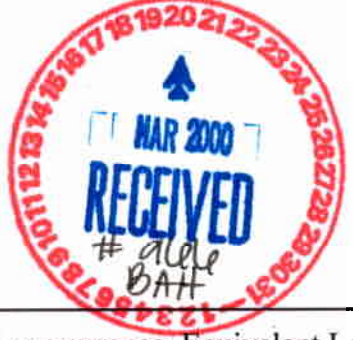
U.S. Department of Transportation
Federal Aviation Administration



Memorandum

Subject: ACTION: Review and concurrence, Equivalent Level of Safety for Ayres Model LM200 - Engine Type Certificate; ACE-00-04

Date: MAR 16 2000

From: Manager, Atlanta Aircraft Certification Office, ACE-115A

Reply to Attn. of: Cindy Lorenzen (770)703-6078

To: Manager, Small Airplane Directorate, ACE-100

Attn: Brian Hancock, ACE-112

BACKGROUND

In accordance with the provisions of 14 CFR Part 21.21(b)(1), Ayres Corporation has submitted a request for an equivalent level of safety to the requirements of §23.903(a)(1), "*Engine Type Certificate*" for the Loadmaster Model LM200 airplane project. Ayres Corporation is proposing to certify the Model LM200 as a Part 23 Commuter Category airplane using a novel and unique twin engine, single propeller propulsion system. The two engines, a combining gearbox and the engine assembly support structure comprise the "powerplant". The "powerplant" will be type certificated under Part 33, however, the individual engines will not have a separate type certificate. Ayres Corporation proposes the type certificate for the "powerplant" will provide an equivalent level of safety to the requirements of §23.903(a)(1).

The Model LM200 airplane will have a 19,000-lb. maximum takeoff weight with an approximate 7,500-lb. payload capacity and will utilize the Light Helicopter Turbine Engine Company (LHTEC) Model CTP800-4T "powerplant". The CTP800-4T "powerplant" utilizes two CTS800 derivative, non-regenerative, front-drive, free-turbine, turboshaft engines, capable of delivering 1350 shp each for a total power output takeoff rating of 2700 shp. The two engines drive the CGB through independent over-running clutches which drive a single propeller shaft and gearbox-mounted accessories. Independent lubrication systems are provided for each engine and the CGB. Each engine features self-contained electrical, fuel, ignition and lubrication systems as well as a redundant full-authority digital electronic control (FADEC). The CGB drives a single six blade, 12.9-foot diameter, propeller and CGB mounted accessories.

AFFECTED REGULATION

§23.903 Engines
(a) Engine type certificate
(1) Each engine must have a type certificate and must meet the applicable requirements of part 34 of this chapter.

In a conventional twin turbine engine airplane, this regulation would be interpreted as the individual engines must have a type certificate in accordance with Part 33 and the engines must meet the fuel venting and exhaust emission requirements of Part 34. Because the LHTEC CTP800-4T "powerplant" will be type certified as a unit, the propulsion system of the LM200 does not comply with the literal requirement of §23.903 (a)(1) for a separate type certificate for each engine.

DISCUSSION OF COMPENSATING FEATURES

The LHTEC CTP800-4T turboprop "powerplant" will receive an engine type certificate under 14 CFR Part 33 (Amdt. 33-19). The two engines will be certified as part of the CTP800-4T "powerplant". Therefore, each engine will be subjected to all required Part 33 testing and substantiation as part of the "powerplant" type certification. The Type Certification Data Sheet will include ratings and limitations for each engine.

The Model LM200 will also have to meet extensive special conditions for the engine, gearbox, and propeller combination. Most of these special conditions are designed to establish high levels of component reliability. For this reason, the CTP800-4T "powerplant" with its two engines and combining gearbox will be going through a much more rigorous certification program that is above and beyond a normal Part 33 engine certification.

An engine type certificate certifies that the type design with the operating limitations and conditions as specified in the regulations and the type certificate data sheet meets the airworthiness requirements of Part 33. This regulation ensures that the engines installed on a Part 23 aircraft are of an approved type design. Both engines of the CTP800-4T will be approved in type design under the umbrella of the powerplant type certificate. The CTP800-4T certification testing and resulting type certificate will provide the limitations and conditions for the entire powerplant as well as for each of its engines individually.

Compliance with Part 34 as specified in §23.903 (a)(1) is to be demonstrated by LHTEC based on the smoke emissions of each engine at a takeoff rating of 1350 shp. The requirements of Part 34 provide engine standards in concert with the Environmental Protection Agency for the benefit of public health. The intent here is that each engine installed on Part 23 aircraft must comply with these requirements. Since LHTEC has proposed to comply with Part 34 requirements for the CTP800-4T powerplant by testing on an individual engine basis, both engines will be shown to meet the applicable requirements just as if they were separately type certificated.

RECOMMENDATION

The intent of §23.903 (a)(1) is to ensure the engines installed on the airplane have a type certificate and meet the requirements of Part 34. The "powerplant" which is comprised of two engines will have a type certificate and the engines will meet Part 34, therefore, the intent of §23.903 (a)(1) has been met. The FAA recommends Ayres be granted an equivalent level of safety to §23.903 (a)(1) for the LM200.

CONCURRENCE

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