performance using an ATTCS. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**EFFECTIVE DATE:** February 3, 1995. **FOR FURTHER INFORMATION CONTACT:** Stephen Slotte, FAA, Standardization Branch, ANM–113, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98055–4056, telephone (206) 227–2797.

## SUPPLEMENTARY INFORMATION:

## Background

On September 13, 1989, Dassault Aviation, B.P. 24, 33701 Mérignac Cédex, France, applied for a new type certificate in the transport airplane category for the Model Falcon 2000 airplane. The Dassault Aviation Model Falcon 2000 is a medium-sized transcontinental business jet powered by two General Electric/Garrett CFE 738 turbofan engines mounted on pylons extending from the aft fuselage. Each engine will be capable of delivering 5,600 lbs. thrust. The airplane will be capable of operation with two flight crewmembers and eight passengers.

The Model Falcon 2000 will incorporate an unusual design feature, the Automatic Takeoff Thrust Control System (ATTCS), referred to by Dassault as Automatic Power Reserve or APR, to show compliance with the approach climb requirements of §25.121(d). Appendix I to part 25 limits the application of performance credit for ATTCS to takeoff only. Since the airworthiness regulations do not contain appropriate safety standards for approach climb performance using ATTCS, special conditions are required to ensure a level of safety equivalent to that established in the regulations.

## **Type Certification Basis**

Under the provisions of §21.17 of the FAR, Dassault Aviation must show that the Falcon 2000 meets the applicable provisions or part 25, effective February 1, 1965, as amended by Amendments 25–1 through 25–69. The certification basis may also include later amendments to part 25 that are not relevant to these special conditions. In addition, the certification basis for the Falcon 2000 includes part 34, effective September 10, 1990, plus any amendments in effect at the time of certification; and part 36, effective December 1, 1969, as amended by Amendments 36-1 through the amendment in effect at the time of

certification. These special conditions form an additional part of the type certification basis. In addition, the certification basis may include other special conditions that are not relevant to these special conditions.

If the Administrator finds that the applicable airworthiness regulations (i.e., part 25, as amended) do not contain adequate or appropriate safety standards for the Dassault Aviation Model Falcon 2000 because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16 to establish a level of safety equivalent to that established in the regulations.

Special conditions, as appropriate, are issued in accordance with § 11.49 of the FAR after public notice, as required by §§ 11.28 and 11.29, and become part of the type certification basis in accordance with § 21.17(a)(2).

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, the special conditions would also apply to the other model under the provisions of § 21.101(a)(1).

## Novel or Unusual Design Features

The Model Falcon 2000 will incorporate an unusual design feature, the ATTCS (referred to by Dassault as the Automatic Power Reserve or APR), to show compliance with the approach climb requirements of §25.121(d). The FALCON 2000 is a twin-turbofanpowered airplane equipped with Full Authority Digital Engine Controls (FADECs) that, in part, protect against exceeding engine limits. Further, the FALCON 2000 incorporates a nonmoving throttle system that functions by placing the throttle levers in detents for the takeoff and climb phases of flight, allowing the FADEC to schedule power setting based on flight phase. With the throttle levers placed in either of the two forward detents (takeoff/go-around and climb), if an engine failure (RPM (N1)) difference of greater than 10 percent between engines is sensed, power is automatically advanced on the remaining engine to the APR power level associated with the detent. The system is permanently armed and will function any time the throttle levers are in either of the two forward detents and an engine failure is sensed. Additionally, as in the case of an APR failure, or in an all-engines mode, the

crew can select APR by placing the throttle levers in either of the two forward detents and manually activating the system using an instrument panelmounted override switch.

APR power levels manifest themselves as an increase in the engine flat-rating temperature for the operating altitude, and, in general, result in higher thrust levels than those associated with the throttle detents alone. Dassault also makes reference in the APR logic description to thrust increase being armed for a throttle lever angle above 27 degrees (max cruise position), but does not make it clear in the system description if the APR system functions when the throttle is not in a detent. Further discussions with Dassault make it clear that when the throttle is between two detents, the FADEC makes a linear interpolation between the related tables of corrected N<sub>1</sub>; i.e., an almost linear thrust change. As function outside of a detent is possible, then a throttle angle of 28 degrees (arming angle + 1 degree) would produce almost no additional thrust when APR is activated, while 1 degree before the next detent (max cruise/max continuous) would produce almost the same thrust increase as when the throttle is in that detent. Logic for the max climb/max continuous detents is the same. From a practical point of view, throttle positions between the detents are not used.

The part 25 standards for ATTCS, contained in § 25.904 and Appendix I, specifically restrict performance credit for ATTCS to takeoff. Expanding the scope of the standards to include other phases of flight, including go-around, was considered at the time the standards were issued, but flightcrew workload issues precluded further consideration. As stated in the preamble to Amendment 25–62:

"In regard to ATTCS credit for approach climb and go-around maneuvers, current regulations preclude a higher thrust for the approach climb (§ 25.122(d)) than for the landing climb (§ 25.119). The workload required for the flightcrew to monitor and select from multiple in-flight thrust settings in the event of an engine failure during a critical point in the approach, landing, or goaround operations is excessive. Therefore, the FAA does not agree that the scope of the amendment should be changed to include the use of ATTCS for anything except the takeoff phase." (52 FR 43153, November 9, 1987)

The ATTCS incorporated on the FALCON 2000 allows the pilot to use the same power setting procedure during a go-around, regardless of whether or not an engine fails. In either case, the pilot obtains go-around power by moving the throttles into the forward (takeoff/go-around) throttle detent.