[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2014-1078; Special Conditions No. 25-616-SC]

Special Conditions: Dassault Aviation Model Falcon 5X Airplane; Use of Automatic Power Reserve (APR), an Automatic Takeoff Thrust Control System (ATTCS) for Go-Around Performance Credit

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Dassault Aviation (Dassault) Model Falcon 5X airplane. This airplane will have a novel or unusual design feature associated with go-around performance credit when using an automatic takeoff thrust-control system. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. 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.

DATES: This action is effective on Dassault Aviation on **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. We must receive your comments by **[INSERT DATE 45 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Send comments identified by docket number FAA-2014-1078 using any of the following methods:

- *Federal eRegulations Portal:* Go to http://www.regulations.gov/ and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to http://www.regulations.gov/, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477-19478), as well as at http://DocketsInfo.dot.gov/.

Docket: Background documents or comments received may be read at http://www.regulations.gov/ at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Chris Parker, FAA, Propulsion and Mechanical Systems Branch, ANM-112, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057-3356; telephone 425-227-1509; facsimile 425-227-1320.

SUPPLEMENTARY INFORMATION:

The substance of these special conditions has been subject to the public comment process in several prior instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon publication in the **Federal Register**.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On July 1, 2012, Dassault Aviation applied for a type certificate for their new Model Falcon 5X airplane. This airplane is a transport-category airplane to be operated in private/corporate transportation with a maximum of 19 passengers. The Model Falcon 5X airplane incorporates a low, swept wing and twin rear-fuselage-mounted Snecma Silvercrest turbofan engines. The fuselage is about 23 m long with a 26 m wingspan.

The current requirements of Title 14, Code of Federal Regulations (14 CFR) part 25 are

inadequate for addressing approach climb using ATTCS. Part 25 appendix I limits the application of performance credit for ATTCS to takeoff only.

Type Certification Basis

Under the provisions of 14 CFR 21.17, Dassault Aviation must show that the Model Falcon 5X airplane meets the applicable provisions of part 25, as amended by Amendments 25-1 through 25-136.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Model Falcon 5X airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

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, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model Falcon 5X airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Dassault Aviation Model Falcon 5X airplane will incorporate the following novel or unusual design feature.

An automatic takeoff thrust-control system (ATTCS), described as an automatic power reserve (APR) system, which is available at all times without any additional action or input from the pilot; and which the applicant proposes would not only function during the go-around, in addition to the takeoff phase of flight, but also allow the applicant to take performance credit for the system's function during that phase.

Discussion

Dassault Aviation proposes to include an APR system (a part 23 term; the part 25 term is ATTCS) in the Model Falcon 5X airplane. Dassault proposes to use the APR system during go-around, and is requesting approach climb performance credit for the use of the additional power APR up-trim provides.

The Model Falcon 5X powerplant control system comprises a full-authority digital electronic control (FADEC) for the Snemca Silvercrest engine. The engine FADEC system includes APR system functions. The proposed configuration, which is novel or unusual, provides for APR activation during takeoff and go-around flight operations, requiring no additional action from the pilot. The airplane performance data will be based on the availability of the up-trim power during takeoff and approach climb.

The part 25 standards applicable to the automatic advancement of reserve power, known as ATTCS and contained in § 25.904 and appendix I, specifically restrict performance credit for ATTCS to the takeoff phase of flight. At the time these standards were issued, the FAA considered including other phases of flight, including go-around. Concerns about flightcrew workload precluded including those additional phases of flight. As the preamble of Amendment 25-62 to part 25 states:

In regard to ATTCS credit for approach climb and go-around maneuvers, current regulations preclude a higher power for the approach climb (Section 25.121(d)) than for the landing climb (Section 25.119). The workload required for the flightcrew to monitor and select from multiple in-flight power settings in the event of an engine failure during a critical point in the approach, landing, or go-around 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.

The ATTCS incorporated on the Model Falcon 5X airplane allows the pilot to use the same power-setting procedure during a go-around regardless of whether or not an engine fails. Because the ATTCS is always active, it will function automatically following an engine failure, and will advance the remaining engine to the APR power level.

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.

Applicability

As discussed above, these special conditions are applicable to the Model Falcon 5X airplane. Should Dassault Aviation apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only a certain novel or unusual design feature on one model of airplane. It is not a rule of general applicability.

The substance of these special conditions has been subjected to the notice and comment period in several prior instances and has been derived without substantive change from those previously issued. It is unlikely that prior public comment would result in a significant change from the substance contained herein. Therefore, the FAA has determined that prior public notice and comment are unnecessary and impracticable, and good cause exists for adopting these special conditions upon publication in the **Federal Register**. The FAA is requesting comments to allow interested persons to submit views that may not have been submitted in response to the prior opportunities for comment described above.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Dassault Aviation Model Falcon 5X airplanes.

1. The Model Falcon 5X airplane must comply with the requirements of 14 CFR 25.904 and appendix I to 14 CFR part 25 and the following requirements pertaining to the go-around phase of flight:
2. Definitions
    a. **Takeoff/go-around (TOGA):** Throttle lever in takeoff or go-around position.

b. **Automatic takeoff thrust control system (ATTCS):** The ATTCS in Model Falcon 5X airplanes is defined as the entire automatic system available during takeoff and in go-around mode, including all devices, both mechanical and electrical, that sense engine failure, transmit signals, actuate fuel controls or power levers (or increase engine power by other means on operating engines to achieve scheduled thrust or power increase), and furnish cockpit information on system operation.

c. **Critical time interval:** The definition of the critical time interval in 14 CFR appendix I 25.2(b) must be expanded to include the following:

i. When conducting an approach for landing using ATTCS, the critical time interval is defined as follows:

1. The critical time interval begins at a point on a 2.5 degree approach glide path from which, assuming a simultaneous engine and ATTCS failure, the resulting approach climb flight path intersects a flight path originating at a later point on the same approach path corresponding that corresponds to the 14 CFR part 25 one-engine-inoperative approach climb gradient. The period of time from the point of simultaneous engine and ATTCS failure to the intersection of these flight paths must be no shorter than the time interval used in evaluating the critical time interval for takeoff beginning from the point of simultaneous engine and ATTCS failure and ending upon reaching a height of 400 feet.

2. The critical time interval ends at the point on a minimum performance, all-engines-operating go-around flight path from which, assuming a simultaneous engine and ATTCS failure, the resulting minimum approach climb flight path intersects a flight path corresponding to the 14 CFR part 25 minimum one-engine-inoperative approach climb gradient. The all-engines-operating go-around flight path and the 14 CFR part 25 one-engine-inoperative approach climb gradient flight path originate from a common point on a 2.5 degree approach path. The period of time from the point of simultaneous engine and ATTCS failure to the intersection of these flight paths must be no shorter than the time interval used in evaluating the critical time interval for the takeoff beginning from the point of simultaneous engine and ATTCS failure and ending upon reaching a height of 400 feet.

ii. The critical time interval must be determined at the altitude resulting in the longest critical time interval for which one-engine-inoperative approach climb performance data are presented in the airplane flight manual (AFM).

iii. The critical time interval is illustrated in the following figure:

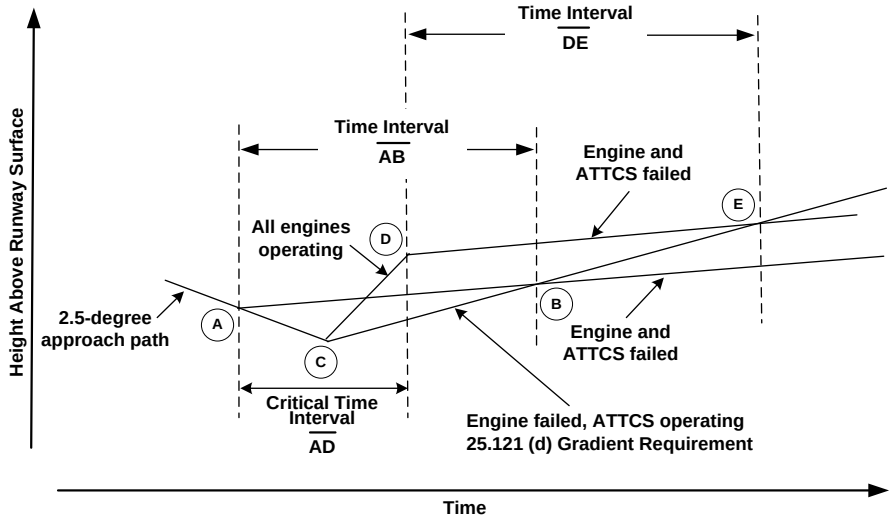

Figure 1. Go-around ATTCS

The all-engines-operating go-around flight path, and the 14 CFR part 25 one-engine-inoperative approach climb gradient flight path (engine failed, ATTCS operating path in Figure 1), originate from a common point, point C, on a 2.5-degree approach path. The period of time, "time interval DE," from the point of simultaneous engine and ATTCS failure, point D, to the intersection of these flight paths, point E, must be no shorter than the corresponding time in Figure 2, "I25.2(b) time interval FG."

d. The critical time interval must be determined at the altitude resulting in the longest critical time interval for which one-engine-inoperative approach climb performance data are presented in the AFM.

e. The "critical time interval AD" is illustrated in Figure 1.

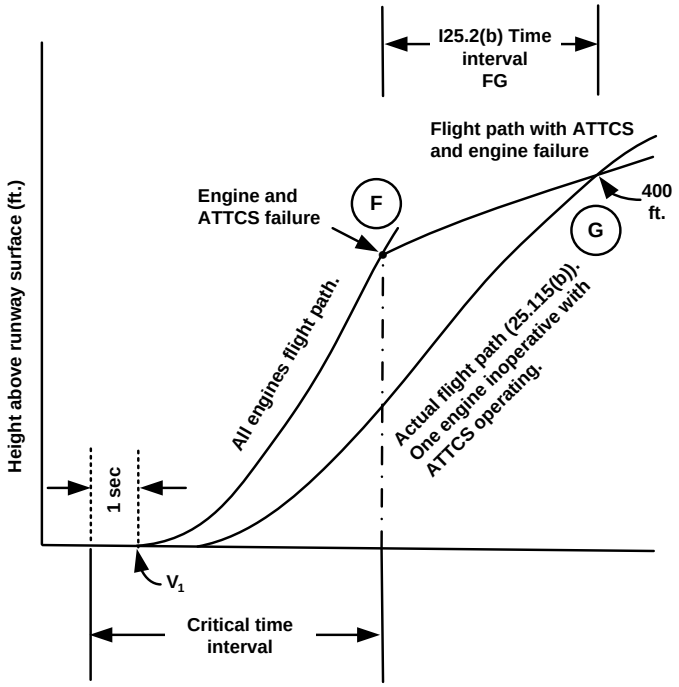

Figure 2. Appendix I25.2(b), "Critical Time Interval" Illustration (ATTCS takeoff)

3. Performance and system reliability requirements: The applicant must comply with the performance and ATTCS reliability requirements as follows:

    a. An ATTCS failure or a combination of failures in the ATTCS during the critical time interval (Figure 2):

        i. Must not prevent the insertion of the maximum approved go-around thrust or power, or must be shown to be a remote event.

        ii. Must not result in a significant loss or reduction in thrust or power, or must be shown to be an extremely improbable event.

    b. The concurrent existence of an ATTCS failure and an engine failure during the critical time interval must be shown to be extremely improbable.

c. All applicable performance requirements of 14 CFR part 25 must be met with an engine failure occurring at the most critical point during go-around with the ATTCS functioning.

d. The probability analysis must include consideration of ATTCS failure occurring after the time at which the flightcrew last verifies that the ATTCS is in a condition to operate until the beginning of the critical time interval.

e. The propulsive thrust obtained from the operating engine after failure of the critical engine during a go-around used to show compliance with the one-engine-inoperative climb requirements of § 25.121(d) may not be greater than the lesser of:

i. The actual propulsive thrust resulting from the initial setting of power or thrust controls with the ATTCS functioning; or

ii. 111% of the propulsive thrust resulting from the initial setting of power or thrust controls with the ATTCS failing to reset thrust or power and without any action by the flightcrew to reset thrust or power.

4. Thrust setting

a. The initial go-around thrust setting on each engine at the beginning of the go-around phase may not be less than any of the following:

i. That required to permit normal operation of all safety-related systems and equipment dependent upon engine thrust or power lever position; or

ii. That shown to be free of hazardous engine response characteristics and not to result in any unsafe aircraft operating or handling characteristics

when thrust or power is advanced from the initial go-around position to the maximum approved power setting.

b. For approval to use an ATTCS for go-arounds, the thrust setting procedure must be the same for go-arounds initiated with all engines operating as for go-arounds initiated with one engine inoperative.

5. Powerplant controls

a. In addition to the requirements of § 25.1141, no single failure or malfunction, or probable combination thereof, of the ATTCS, including associated systems, may cause the failure of any powerplant function necessary for safety.

b. The ATTCS must be designed to:

i. Apply thrust or power on the operating engine(s), following any one-engine failure during a go-around, to achieve the maximum approved go-around thrust without exceeding the engine operating limits;

ii. Permit manual decrease or increase in thrust or power up to the maximum go-around thrust approved for the airplane under the existing conditions through the use of the power lever. For airplanes equipped with limiters that automatically prevent the engine operating limits from being exceeded under existing ambient conditions, other means may be used to increase the thrust in the event of an ATTCS failure, provided that the means:

1. Is located on or forward of the power levers;

2. Is easily identified and operated under all operating conditions by a single action of either pilot with the hand that is normally used to actuate the power levers; and

3. Meets the requirements of § 25.777(a), (b), and (c).

iii. Provide a means to verify to the flightcrew before beginning an approach for landing that the ATTCS is in a condition to operate (unless it can be demonstrated that an ATTCS failure combined with an engine failure during an entire flight is extremely improbable); and

iv. Provide a means for the flightcrew to deactivate the automatic function. This means must be designed to prevent inadvertent deactivation.

6. Powerplant instruments: In addition to the requirements of § 25.1305:

a. A means must be provided to indicate when the ATTCS is in the armed or ready condition; and

b. If the inherent flight characteristics of the airplane do not provide adequate warning that an engine has failed, a warning system that is independent of the ATTCS must be provided to give the pilot a clear warning of any engine failure during a go-around.

Issued in Renton, Washington, on April 8, 2016.

Michael Kaszycki
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service
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