



**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2014-0419; Special Conditions No. 25-563-SC]**

**Special Conditions:** Gulfstream Aerospace Corporation, Model GVI; Electro-Hydraulically Actuated Seats Equipped with a Backup Power Supply.

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special condition; request for comments.

**SUMMARY:** These special conditions are issued for Gulfstream Aerospace Corporation Model GVI airplane. This airplane, as modified by Gulfstream Aerospace Corporation, will have novel or unusual design features associated with the installation of electro-hydraulically operated seats with a backup power supply (BPS) and hydraulic reservoir, pump, and actuators, as well as massage and heating functions. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for these design features. 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:** The effective date of these special conditions is [insert **Federal Register publication date**]. We must receive your comments by [insert **date 45 days after FR publication date**].

**ADDRESSES:** Send comments identified by docket number FAA-2014-0419 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, D.C., 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, D.C., 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 the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Dan Jacquet, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW, Renton, Washington 98057-3356; telephone 425-227-2676; facsimile 425-227-1320.

## **SUPPLEMENTARY INFORMATION:**

The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions is impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected aircraft. 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 June 14, 2014, Gulfstream Aerospace Corporation applied for an amendment to a Supplemental Type Certificate (STC) ST04252AT-D for the installation of electro-hydraulically operated seats with novel or unusual features in the Model GVI airplane. These features include a backup power supply used to return the backrest, seat pan, and leg rest to the taxi, takeoff, and landing (TT&L) position in the event of a power failure. In addition, each seat contains a hydraulic reservoir, pump, and actuators, as well as massage and heating functions. The Model GVI is a business jet airplane powered by two Rolls-Royce Deutschland Ltd. and Company KG turbofan engines and is certified for 19 passengers and a crew of 3.

## Type Certification Basis

Under the provisions of Title 14, Code of Federal Regulation (14 CFR) 21.101, Gulfstream Aerospace Corporation must show that the Model GVI, as changed, continues to meet the applicable provisions of the regulations incorporated by reference in Type Certificate No. T00015AT or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the “original type certification basis.” The regulations incorporated by reference in Type Certificate No. T00015AT are as follows:

- 14 CFR part 25, *Airworthiness Standards: Transport Category Airplanes*, effective February 1, 1965, including Amendments 25-1 through 25-120 and 25-122, 25-124, and 25-132. Amendment 25-118 was not published and therefore has no applicability.
- 14 CFR part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*, effective December 1, 1969, including Amendments 36-1 through 36-28.
- Compliance with Section 44715(e) of Title 49 U.S.C. (Noise Control Act of 1972).
- Optional Design Regulations:

(a) The Model GVI has been shown to comply with the requirements for ditching: §§ 25.801, 25.563, 25.807(e), and 25.1585(a). When the operating rules require emergency ditching equipment, compliance with §§ 25.1411 and 25.1415 must be shown. Gulfstream Report GVI-GER-1709, “Design Requirements Document for Ditching Equipment,” provides an acceptable means for showing compliance with §§ 25.1411 and 25.1415.

(b) The Model GVI is approved for flight into known icing conditions and has demonstrated compliance to § 25.1419.

- Exemptions pertinent to these special conditions: Exemption No. 9761, §§ 25.562(a) and 25.785(b), *Side Facing Divan*.

In addition, the certification basis includes certain special conditions, exemptions, and equivalent safety findings that are not relevant to these proposed special conditions.

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 Gulfstream Model GVI because of a novel or unusual design feature, special conditions are prescribed under the provisions of 14 CFR 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the applicant apply for a STC to modify any other model included on the same type certificate to incorporate the same novel or unusual design feature, the special conditions would also apply to the other model.

In addition to the applicable airworthiness regulations and special conditions, the Gulfstream Model GVI 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 14 CFR 21.101.

### **Novel or Unusual Design Features**

The Gulfstream Model GVI will incorporate the following novel or unusual design features: Hydraulically-actuated components on airplane seats including hydraulic reservoir, pump, and actuators, as well as massage and heating functions and backup power systems.

## Discussion

Hydraulically-actuated components and backup power systems on airplane seats are considered novel or unusual by the FAA. Therefore, we developed special conditions that contain the additional standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

The FAA has considered the installation of seats with these features to have four primary safety concerns:

1. Reliability of the backup power supply;
2. Safety hazards to the occupants from the hydraulically-actuated components of the seat;
3. Structural integrity of the hydraulic components; and
4. Flammability.

Emergency exits must be accessible to the passengers and the effectiveness of evacuation must be maintained. Typical airplane seats can be manually positioned to the lateral (track) and directional (swivel) TT&L position by mechanical means, so they can be positioned in the event of a loss of cabin power. For this electro-hydraulically operated seat design, in lieu of a manual means to re-position the hydraulically operated seat features (backrest, seat pan, and leg rest deployment) for TT&L, a BPS is used to temporarily power the hydraulic system. The BPS is only intended for use in the event of a loss of cabin power. If the seats are installed in the path of the emergency over wing exits, failure to return the seat to a TT&L position may have an adverse effect on evacuation. Substantiation of 14 CFR 25.809(b) and 25.813(c)(2)(ii) must be shown with the seats in their most adverse positions.

It must be shown that the hydraulically-actuated components of the seat pose no safety hazard to the occupants or airplane. This includes injuries caused by crushing of airplane occupants who are between the hydraulically-actuated components and any part of the passenger cabin when seat features (e.g., leg rest or backrest) are actuated. Additionally, the risk of loss of function of a control or proximity switch resulting in the pump motor being commanded to stay on, after the hydraulic actuator(s) have reached their maximum/minimum limit, must not cause the overloaded motor to overheat, as it could catch fire.

The FAA has also considered the emergency landing dynamic conditions for the installation of electro-hydraulically actuated seats. The applicant must show that the hydraulic system (actuators, reservoir, lines, etc.) remains intact and free from leakage under the conditions specified in § 25.562. Testing of each seat's hydraulic system per § 25.1435(c) may be conducted off of the airplane.

Flammability of hydraulic fluid used in the seat movement mechanism must be considered. If the fluid is flammable, it could contribute to a post-crash or in-flight fire. Any failure modes that would result in release of the flammable hydraulic fluid during a post-crash or in-flight fire causing such fluid to materially increase an existing fire must be examined. Examples of this could be flex lines burning through and releasing the flammable hydraulic fluid, or the fluid reservoir could be heated in a fire resulting in a boiling liquid expanding vapor explosion. The potential for spontaneous ignition of the fluid coming into contact with hot surfaces or other ignition sources should also be addressed. The applicant should examine any possible failure mode in which the flammable hydraulic fluid could be absorbed into materials, like the seat foam/fabric, carpeting, etc. The applicant must show that any fluid-soaked seat parts are still self-extinguishing. The applicant must also show that flammability of dry residue, which

may be present from a slow leak/fluid weepage, does not degrade the flammability characteristics of any materials it may come into contact with to a level below the requirements specified in § 25.853.

### **Applicability**

As discussed above, these special conditions are applicable to STC ST04252AT-D, which modifies the Gulfstream Model GVI airplane. Should Gulfstream Aerospace Corporation apply at a later date to amend this STC to incorporate the same novel or unusual design feature, the special conditions would apply to that amended STC as well.

### **Conclusion**

This action affects only certain novel or unusual design features on one airplane model. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of these features on the airplane.

Under standard practice, the effective date of final special conditions would be 30 days after the date of publication in the Federal Register; however, as the certification date for the modification to the Gulfstream Model GVI airplane is imminent, the FAA finds that good cause exists to make these special conditions effective upon publication in the Federal Register.

### **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 Gulfstream Aerospace Corporation airplanes modified by Gulfstream Aerospace Corporation.

### **Electro-Hydraulically Actuated Seats Equipped with a Backup Power Supply.**

1. The probability of failure of the backup power supply to return seat components to the required taxi, takeoff, and landing position must be shown to be no greater than  $10^{-5}$  per flight hour.
2. It must be shown that the hydraulically-actuated components of the seat pose no safety hazard to the occupants. Hazards to be considered per the latest revision of Advisory Circular 25.1309-1, at a minimum are:
  - a. Injuries caused by crushing of airplane occupants who are between the hydraulically actuated components and any part of the passenger cabin when the leg rest or backrest is actuated.
  - b. The risk of loss of function of a control or proximity switch resulting in the pump motor being commanded to stay on after the hydraulic actuator(s) have reached their maximum/minimum limit, creating potential for overheating or fire.
  - c. The potential for a significant contribution to a fire in the event fluid comes into contact with hot surfaces or other ignition sources, and the potential for release of toxic or flammable vapors/gasses.
3. It must be shown that the hydraulic system (actuators, reservoir, lines, etc.) remains intact and free from leakage under the conditions specified in § 25.562. Testing of each seat's hydraulic system per § 25.1435(c) may be conducted off of the airplane.

4. Section 25.863 requires consideration of any effects the fluid, including the fluid as a dry residue, could have on combustible or absorbing materials. The characteristics of the flammable fluid in these conditions must be tested to the requirements of § 25.853(a) and (c), or the materials must be shielded in a manner that prevents contact by the fluid. However, as an alternative to such testing or shielding, the applicant may provide, in accordance with § 25.863(c), a quick-acting means that alerts the crew that the fluid has leaked.

Issued in Renton, Washington, on August 26, 2014.

/s/

Michael Kaszycki  
Assistant Manager, Transport Airplane Directorate  
Aircraft Certification Service

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