DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 23

[Docket No. CE156, Special Condition 23–100–SC]

Special Conditions; Piper Cheyenne PA–31T2; Protection of Systems for High Intensity Radiated Fields (HIRF)

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued to Carpenter Avionics, Inc., 624–B Fitzhugh Blvd., Smyrna Airport, Smyrna, Tennessee 37167, for a Supplemental Type Certificate for the Piper Cheyenne PA–31T2 airplane. This airplane will have novel and unusual design features when compared to the state of technology envisaged in the applicable airworthiness standards. These novel and unusual design features include the installation of electronic flight instrument system (EFIS) displays for which the applicable regulations do not contain adequate or appropriate airworthiness standards for the protection of these systems from the effects of high intensity radiated fields (HIRF). These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to the airworthiness standards applicable to these airplanes.

DATES: The effective date of these special conditions is November 18, 1999. Comments must be received on or before December 30, 1999.

ADDRESSES: Comments may be mailed in duplicate to: Federal Aviation Administration, Regional Counsel, ACE–7, Attention: Rules Docket Clerk, Docket No. CE156, Room 506, 901 Locust, Kansas City, Missouri 64106. All comments must be marked: Docket No. CE156. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: Ervin Dvorak, Aerospace Engineer, Standards Office (ACE–110), Small Airplane Directorate, Aircraft Certification Service, Federal Aviation Administration, 901 Locust, Room 301, Kansas City, Missouri 64106; telephone (816) 329–4123, or Les Taylor, Aerospace Engineer, at the same address, telephone (816) 329–4134.

SUPPLEMENTARY INFORMATION: The FAA has determined that notice and opportunity for prior public comment hereon are impracticable because these procedures would significantly delay issuance of the approval design and thus delivery of the affected aircraft. In addition, 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 issuance.

Comments Invited

Interested persons are invited to submit such written data, views, or arguments as they may desire. Communications should identify the regulatory docket or notice number and be submitted in duplicate to the address specified above. All communications received on or before the closing date for comments will be considered by the Administrator. The special conditions may be changed in light of the comments received. All comments received will be available in the Rules Docket for examination by interested persons, both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerning this rulemaking will be filed in the docket. Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this notice must include a self-addressed, stamped postcard on which the following statement is made: ''Comments to Docket No. CE156.'' The postcard will be date stamped and returned to the commenter.

Background

On June 25, 1999, Carpenter Avionics Inc., 624–B Fitzhugh Blvd., Smyrna Airport, Smyrna, Tennessee 37167, made an application to the FAA for a new Supplemental Type Certificate for the Piper Cheyenne PA–31T2 airplane. The Cheyenne is currently approved under TC No. A8EA. The proposed modification incorporates a novel or unusual design feature, such as digital avionics consisting of an EFIS, that is vulnerable to HIRF external to the airplane.

Type Certification Basis

Under the provisions of 14 CFR part 21, § 21.101, Carpenter Avionics, Inc. must show that the Piper Cheyenne PA–31T2 aircraft meets the following provisions, or the applicable regulations in effect on the date of application for the change to the Cheyenne PA–31T2: CAR 3 effective May 15, 1956, through Amendment 3–8, effective December 18, 1962; FAR 23.205, 23.1545, 23.1563 and 23.1583, as amended by Amendment 23–3, effective November 11, 1965; and FAR 23.1557(c) as amended by Amendment 23–7, effective September 14, 1969; and the Eastern Region Engineering and Manufacturing Branch letter of December 6, 1965, addressing the showing of equivalent safety with regard to CAR 3.682, 3.771 and 3.772. Special Conditions No. 23–3–EA–1, Docket No. 9245, including Amendment No. 1 and AEA–210 letter of November 11, 1971, as amended by AEA–210 letter of February 1, 1978, referring to Amendment 23–14 and FAR 23.991 as amended by Amendment 23–7, effective September 14, 1969. Noise Certification—FAR 36 up to Amendment 10, as applicable. Fuel Venting Emissions—SFAR 27 up to Amendment 3, as applicable, and § 23.1301 of Amendment 23–20; §§ 23.1309, 23.1311, and 23.1321 of Amendment 23–49; and § 23.1322 of Amendment 23–43; exemptions, if any; and the special conditions adopted by this rulemaking action.

Discussion

If the Administrator finds that the applicable airworthiness standards do not contain adequate or appropriate safety standards because of novel or unusual design features of an airplane, special conditions are prescribed under the provisions of § 21.16.

Special conditions are normally issued in accordance with § 11.49, as required by §§ 11.28 and 11.29(b), and become a part of the type certification basis in accordance with § 21.101(b)(2).

Special conditions are initially applicable to the model for which they are issued. Should the applicant apply for a supplemental type certificate to modify any other model already 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 under the provisions of § 21.101(a)(1).

Novel or Unusual Design Features

Carpenter Avionics Inc. plans to incorporate certain novel and unusual design features into an airplane for which the airworthiness standards do not contain adequate or appropriate safety standards for protection from the effects of HIRF. These features include EFIS, which are susceptible to the HIRF environment, that were not envisaged by the existing regulations for this type of airplane.

Protection of Systems from High Intensity Radiated Fields (HIRF): Recent advances in technology have given rise to the application in aircraft designs of

advanced electrical and electronic systems that perform functions required for continued safe flight and landing. Due to the use of sensitive solid state advanced components in analog and digital electronics circuits, these advanced systems are readily responsive to the transient effects of induced electrical current and voltage caused by the HIRF. The HIRF can degrade electronic systems performance by damaging components or upsetting system functions.

Furthermore, the HIRF environment has undergone a transformation that was not foreseen when the current requirements were developed. Higher energy levels are radiated from transmitters that are used for radar, radio, and television. Also, the number of transmitters has increased significantly. There is also uncertainty concerning the effectiveness of airframe shielding for HIRF. Furthermore, coupling to cockpit-installed equipment through the cockpit window apertures is undefined.

The combined effect of the technological advances in airplane design and the changing environment has resulted in an increased level of vulnerability of electrical and electronic systems required for the continued safe flight and landing of the airplane. Effective measures against the effects of exposure to HIRF must be provided by the design and installation of these systems. The accepted maximum energy levels in which civilian airplane system installations must be capable of operating safely are based on surveys and analysis of existing radio frequency emitters. These special conditions require that the airplane be evaluated under these energy levels for the protection of the electronic system and its associated wiring harness. These external threat levels, which are lower than previous required values, are believed to represent the worst case to which an airplane would be exposed in the operating environment.

These special conditions require qualification of systems that perform critical functions, as installed in aircraft, to the defined HIRF environment in paragraph 1 or, as an option to a fixed value using laboratory tests, in paragraph 2, as follows:

(1) The applicant may demonstrate that the operation and operational capability of the installed electrical and electronic systems that perform critical functions are not adversely affected when the aircraft is exposed to the HIRF environment defined below:

Frequency	Field strength (volts per meter)	
	Peak	Average
10 kHz–100 kHz	50	50
100 kHz–500 kHz	50	50
500 kHz–2 MHz	50	50
2 MHz–30 MHz	100	100
30 MHz–70 MHz	50	50
70 MHz–100 MHz	50	50
100 MHz–200 MHz	100	100
200 MHz–400 MHz	100	100
400 MHz–700 MHz	700	50
700 MHz–1 GHz	700	100
1 GHz–2 GHz	2000	200
2 GHz–4 GHz	3000	200
4 GHz–6 GHz	3000	200
6 GHz–8 GHz	1000	200
8 GHz–12 GHz	3000	300
12 GHz–18 GHz	2000	200
18 GHz–40 GHz	600	200

The field strengths are expressed in terms of peak root-mean-square (rms) values.

or,

(2) The applicant may demonstrate by a system test and analysis that the electrical and electronic systems that perform critical functions can withstand a minimum threat of 100 volts per meter, peak electrical field strength, from 10 kHz to 18 GHz. When using this test to show compliance with the HIRF requirements, no credit is given for signal attenuation due to installation.

A preliminary hazard analysis must be performed by the applicant, for approval by the FAA, to identify either electrical or electronic systems that perform critical functions. The term ''critical'' means those functions whose failure would contribute to, or cause, a failure condition that would prevent the continued safe flight and landing of the airplane. The systems identified by the hazard analysis that perform critical functions are candidates for the application of HIRF requirements. A system may perform both critical and non-critical functions. Primary electronic flight display systems, and their associated components, perform critical functions such as attitude, altitude, and airspeed indication. The HIRF requirements apply only to critical functions.

Compliance with HIRF requirements may be demonstrated by tests, analysis, models, similarity with existing systems, or any combination of these. Service experience alone is not acceptable since normal flight operations may not include an exposure to the HIRF environment. Reliance on a system with similar design features for redundancy as a means of protection against the effects of external HIRF is generally insufficient since all elements of a redundant system are likely to be exposed to the fields concurrently.

Applicability

As discussed above, these special conditions are applicable to Piper Cheyenne PA–31T2 airplane. Should Carpenter Avionics Inc. apply at a later date for a supplemental type certificate to modify any other model on the same type certificate to incorporate the same novel or unusual design feature, the special conditions would apply to that model as well under the provisions of § 21.101(a)(1).

Conclusion

This action affects only certain novel or unusual design features on one model of airplane. 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.

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. For this reason, and because a delay would significantly affect the certification of the airplane, which is imminent, the FAA has determined that prior public notice and comment are unnecessary and impracticable, and good cause exists for adopting these special conditions upon issuance. 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 23

Aircraft, Aviation safety, Signs and symbols.

Citation

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113 and 44701; 14 CFR part 21, §§ 21.16 and 21.101; and 14 CFR part 11, §§ 11.28 and 11.49.

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 Piper Cheyenne PA–31T2 airplane modified by Carpenter Avionics Inc. to add an EFIS.

1. Protection of Electrical and Electronic Systems from High Intensity Radiated Fields (HIRF). Each system

that performs critical functions must be designed and installed to ensure that the operations, and operational capabilities of these systems to perform critical functions, are not adversely affected when the airplane is exposed to high intensity radiated electromagnetic fields external to the airplane.

2. For the purpose of these special conditions, the following definition applies: Critical Functions: Functions whose failure would contribute to, or cause, a failure condition that would prevent the continued safe flight and landing of the airplane.

Issued in Kansas City, Missouri, on November 18, 1999.

Marvin R. Nuss,

Acting Manager, Small Airplane Directorate.

[FR Doc. 99–31040 Filed 11–29–99; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 23

[Docket No. CE145; Special Conditions No. 23–096A–SC]

Special Conditions: Raytheon Model 390 Airplane

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Amended final special conditions; request for comments.

SUMMARY: This document amends special conditions issued to the Raytheon Aircraft Company for the Raytheon Model 390 airplane and requests comments on the revised portion of the amended special conditions. The Small Airplane Directorate issued final special conditions for this airplane on July 9, 1999, and published them on July 23, 1999 (64 FR 39899). The special conditions contained a requirement for operating limitations for weight and loading distribution already covered by an exemption issued to Raytheon Aircraft Company on December 12, 1996 (Exemption No. 6558, Docket No. 132CE). Accordingly, the portion of the special conditions that covers the operating limitations has been amended to remove the additional requirement. Only the revised sections are contained in this document.

Additionally, the special condition for turning flight and accelerated turning stalls has been amended to include a power-at-idle condition. This condition is included to make these special conditions consistent with previously approved special conditions for a similar airplane.

DATES: The effective date of these special conditions is November 15, 1999. Comments must be received on or before December 30, 1999.

ADDRESSES: Comments on these special conditions may be mailed in duplicate to: Federal Aviation Administration, Regional Counsel, ACE–7, Attention: Rules Docket CE145, 901 Locust, Room 506, Kansas City, Missouri 64106; or delivered in duplicate to the Regional Counsel at the above address. Comments must be marked: CE145. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: Lowell Foster, Aerospace Engineer, Standards Office (ACE–110), Small Airplane Directorate, Aircraft Certification Service, Federal Aviation Administration, Room 301, 901 Locust, Kansas City, Missouri 64106; telephone (816) 329–4125.

SUPPLEMENTARY INFORMATION: The FAA has determined that the substance of these special conditions has been subject to the public comment process and those comments were resolved. The FAA therefore finds that good cause exists for making these special conditions effective upon issuance.

Comments Invited

Interested persons are invited to submit such written data, views, or arguments as they may desire. Communications should identify the regulatory docket or notice number and be submitted in duplicate to the address specified above. All communications received on or before the closing date for comments will be considered by the Administrator. The special conditions may be changed in light of the comments received. All comments received will be available in the Rules Docket for examination by interested persons, both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerning this rulemaking will be filed in the docket. Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this notice must include a self-addressed, stamped postcard on which the following statement is made: ''Comments to CE145.'' The postcard will be date stamped and returned to the commenter.

Background

On August 1, 1995, Raytheon Aircraft Company (then Beech Aircraft Corporation), 9707 East Central, Wichita, Kansas 67201, applied for a type certificate for their new Raytheon Model 390 Airplane. The Raytheon Model 390 has a composite fuselage, a metal wing with 22.8 degrees of leading-edge sweepback, and a combination composite/metal empennage in a T-tail configuration with trimmable horizontal tail with 27.3 degrees of leading-edge sweepback. The airplane will accommodate six passengers and a crew of two. The Model 390 will have a V_{MO}/M_{MO} of 320 knots/m.83, and has two turbofan engines mounted on the aft fuselage above and behind the wing.

Raytheon plans to incorporate certain novel and unusual design features into the Model 390 airplane for which the airworthiness regulations do not contain adequate or appropriate safety standards. These features include turbofan engines, engine location, swept wings and stabilizer, and certain performance characteristics necessary for this type of airplane.

The final special conditions issued for this airplane on July 9, 1999, which were published on July 23, 1999 (64 FR 39899), contained a requirement covered by an exemption issued to Raytheon Aircraft Company on December 12, 1996 (Exemption No. 6558, Docket No. 132CE). The Small Airplane Directorate has amended SC23.1583 in the special conditions to remove the weight and loading distribution paragraph in the operating limitations portion of the special condition and to add idle thrust stalls to be consistent with past policy. The amended version of the operating limitations and the idle thrust stalls special conditions are published below.

Type Certification Basis

Under the provisions of 14 CFR part 21, § 21.17, Raytheon Aircraft Company must show that the Raytheon Model 390 meets the applicable provisions of 14 CFR part 23, effective February 1, 1965, as amended by Amendments 23–1 through 23–52, effective July 25, 1996; 14 CFR part 36, effective December 1, 1969, through the amendment effective on the date of type certification; 14 CFR part 34; exemptions, if any; and the special conditions adopted by this rulemaking action.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 23) do not contain adequate or appropriate safety standards for the Raytheon Model 390 because of a novel or unusual design feature,