

Rules and Regulations

Federal Register

Vol. 67, No. 243

Wednesday, December 18, 2002

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 23

[Docket No. CE192, Special Condition 23-132-SC]

Special Conditions; Cessna Model 441 Airplane; 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 S-TEC, One S-TEC Way Municipal Airport, Mineral Wells, TX 76007, for a Supplemental Type Certificate for Cessna Model 441 airplanes. 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 systems (EFIS) display Model "Meggitt Magic" 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). This special condition contains 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 December 6, 2002. Comments must be received on or before January 17, 2003.

ADDRESSES: Comments may be mailed in duplicate to: Federal Aviation Administration, Regional Counsel, ACE-7, Attention: Rules Docket Clerk, Docket No. CE192, Room 506, 901

Locust, Kansas City, Missouri 64106. All comments must be marked: Docket No. CE192. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT: Wes Ryan, 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.

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. CE192." The postcard will be date stamped and returned to the commenter.

Background

On June 6, 2002, S-TEC Corporation, One S-TEC Way, Mineral Wells Airport, Mineral Wells, Texas 76067, made an application to the FAA for a new Supplemental Type Certificate for the Cessna Model 441 (Conquest) airplanes. The Conquest is currently approved under Type Certificate No. A28CE. 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, S-TEC Corporation must show that the Cessna Model 441 airplanes meets the following provisions, or the applicable regulations in effect on the date of application for the modification to reference airplanes.

The Certification Basis that is incorporated by reference for the Cessna Model 441 airplane is listed under the Type Certificate Data Sheet No. A28CE with the exception of FAR Part 23.1301 as amended by Amendment 23-20; 23.1309, 23.1311, and 23.1321 as amended by Amendment 23-49; and the special conditions adopted by this rulemaking action. Noise requirements are not an issue because there is no change to the engine or aircraft fuselage.

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, as appropriate, as defined in § 11.19, are issued in accordance with § 11.38 after public notice 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.

Novel or Unusual Design Features

S-TEC Corporation 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 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 either by tests, analysis, models, similarity with existing systems, or by 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 the Cessna Model 441 airplanes. Should S-TEC Corporation 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.

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, §§ 11.38 and 11.19.

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 Cessna Model 441 airplanes modified by S-TEC Corporation 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 December 6, 2002.

Dorenda D. Baker,

Acting Manager, Small Airplane Directorate, Aircraft Certification Service.

[FR Doc. 02-31882 Filed 12-17-02; 8:45 am]

BILLING CODE 4910-13-P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. 2002-SW-48-AD; Amendment 39-12982; AD 2002-21-51]

RIN 2120-AA64

Airworthiness Directives; Eurocopter France Model AS355E, F, F1, F2, and N Helicopters

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule; request for comments.

SUMMARY: This document publishes in the **Federal Register** an amendment adopting Airworthiness Directive (AD) 2002-21-51, which was sent previously to all known U.S. owners and operators of Eurocopter France (ECF) helicopters by individual letters. This AD requires certain checks of the magnetic chip detector plug (chip detector) for any metal particles and the main gearbox (MGB) oil-sight glass for dark-colored oil. If any of these are present, the AD requires inspecting the lubrication pump (pump) and, if necessary, replacing the MGB and the pump with

an airworthy MGB and pump. Also, this AD requires that a different MGB or pump with any time-in-service (TIS) must meet the requirements of this AD before being installed. This AD was prompted by four reports of malfunctions of the MGB pump. The actions specified by this AD are intended to prevent failure of the MGB pump, seizure of the MGB, loss of drive to an engine and main rotor, and subsequent loss of control of the helicopter.

DATES: Effective January 2, 2003, to all persons except those persons to whom it was made immediately effective by Emergency AD 2002-21-51, issued on October 17, 2002, which contained the requirements of this amendment.

Comments for inclusion in the Rules Docket must be received on or before February 18, 2003.

ADDRESSES: Submit comments in triplicate to the Federal Aviation Administration (FAA), Office of the Regional Counsel, Southwest Region, Attention: Rules Docket No. 2002-SW-48-AD, 2601 Meacham Blvd., Room 663, Fort Worth, Texas 76137. You may also send comments electronically to the Rules Docket at the following address: 9-asw-adcomments@faa.gov.

FOR FURTHER INFORMATION CONTACT: Ed Cuevas, Aviation Safety Engineer, FAA, Rotorcraft Directorate, Regulations Group, Fort Worth, Texas 76193-0110, telephone (817) 222-5355, fax (817) 222-5961.

SUPPLEMENTARY INFORMATION: On October 17, 2002, the FAA issued Emergency AD 2002-21-51 for the specified ECF helicopters, which requires checking the chip detector for metal particles and the MGB oil-sight glass for dark oil and taking an oil sample if dark oil is observed. If you find metal particles on the chip detector or if an oil sample confirms that the oil is dark or dark purple, the AD requires further inspection of the pump and, if necessary, replacing the MGB and the pump with an airworthy MGB and pump. Also, the AD requires that a different MGB or pump with any TIS must meet the requirements of this AD before being installed. The AD was prompted by four reports of malfunction of the MGB pump. The bearings of the driven pinion inside the pump can deteriorate resulting in pump failure and loss of oil pressure in the MGB. This condition, if not corrected, could result in seizure of the MGB, loss of drive to an engine and main rotor, and subsequent loss of control of the helicopter.

The FAA has reviewed ECF Alert Telex No. 05.00.40, dated June 6, 2002

(Telex), which describes procedures for inspecting the MGB magnetic plug for sludge and the MGB for very dark oil and inspecting the pump. The Telex specifies overhauling the MGB if you find any of the following in the pump: Bearing crank pin play, bronze bushing out-of-round, offset of the driven gear pinion, certain wear, or metal chips. Pending the results of various investigations and to prevent loss of the drive train of the main transmission linkage for one or both engines, ECF specifies these procedures for all pumps.

The Direction Generale De L'Aviation Civile (DGAC), the airworthiness authority for France, notified the FAA that an unsafe condition may exist on these helicopter models. The DGAC advises of four reports of pump deterioration. The DGAC advises that, in time, the insufficiently lubricated power transmission assembly deteriorates resulting in loss of the drive train for one or both engines (deterioration of the combiner gearbox gears). The DGAC classified the Telex as mandatory and issued AD No. 2002-331-071(A) dated July 10, 2002, to ensure the continued airworthiness of these helicopters.

This unsafe condition is likely to exist or develop on other helicopters of the same type design. Therefore, this AD requires the following:

- Before the first flight of the day and at intervals not to exceed 10 hours TIS, check the chip detector for metal particles and the MGB oil-sight glass for dark oil.

- If you find metal particles on the chip detector, before further flight, inspect the pump.

- If you observe dark oil through the MGB oil sight glass, before further flight, take an oil sample to confirm that the oil is dark or dark purple.

- If the oil sample is dark or dark purple, before further flight, inspect the pump, part number 355A32-0700-00, -01, or -01M.

- If you find crank pin play, out-of-round bronze bushing, offset of the driven gear pinion, metal chips, or certain wear, replace the MGB and the pump with an airworthy MGB and pump before further flight.

- A different MGB or pump with any TIS must meet the requirements of this AD before installation.

An owner/operator (pilot) may perform the visual checks for metal particles on the magnetic chip detector plug and for dark oil in the MGB oil-sight glass and must enter compliance with those requirements into the helicopter maintenance records in accordance with 14 CFR 43.11 and 91.417(a)(2)(v). A pilot may perform