

DEPARTMENT OF TRANSPORTATION**Federal Aviation Administration****14 CFR Part 23**

[Docket No. CE183, Special Condition 23-117-SC]

Special Conditions; S-TEC Corporation Mirage PA-46-350P With Single Sided EFIS 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 Corporation, One S-TEC Way, Mineral Wells TX 76067 for a Supplemental Type Certificate for a single sided Electronic Flight Instrument System (EFIS) installed in the Mirage PA-46-350P 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) "Magic" display manufactured by Meggitt 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 this airplane.

DATES: The effective date of these special conditions is May 7, 2002. Comments must be received on or before June 24, 2002.

ADDRESSES: Comments may be mailed in duplicate to: Federal Aviation Administration, Regional Counsel, ACE-7, Attention: Rules Docket Clerk, Docket No. CE183, Room 506, 901 Locust, Kansas City, Missouri 64106. All comments must be marked: Docket No. CE183. 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.

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 action must include a self-addressed, stamped postcard on which the following statement is made: "Comments to Docket No. CE183." The postcard will be date stamped and returned to the commenter.

Background

On March 12, 2001, S-TEC Corporation, One S-TEC Way, Mineral Wells, TX 76067 made an application for a supplementary Type Certificate for a single sided EFIS installed in the Piper Mirage PA-46-350P airplane. The Piper Mirage PA-46-350P airplane is currently approved under TC No. A25SO. The 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, One S-TEC Way, Mineral Wells, TX 76067 must show that the single-sided EFIS installed in the Piper Mirage PA46-350P airplane meets the following provisions, or the applicable regulations

in effect on the date of application for the change to the Mirage PA-46-350P.

14 CFR part 23, effective February 1, 1965, as amended by Amendment 23-25, effective March 6, 1980; FAR 25.783(e) as amended by Amendment 25-54, effective October 14, 1980; 14 CFR part 25, § 25.831(c) and (d) as amended by Amendment 25-41, effective September 1, 1977, and 14 CFR part 36, Appendix F through Amendment 36-15, effective May 6, 1988, when equipped with a 2-bladed propeller or 14 CFR part 36, Appendix G through Amendment 36-16, effective December 18, 1988, when equipped with optional 3-blade propeller; Special Conditions No. 23-ACE-53, Docket No. 082CE; 14 CFR part 23, §§ 23.1309 and 23.1311 as amended by Amendment 49; and the special conditions adopted by this rule making 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, as appropriate, as defined in § 11.19, are issued in accordance with § 11.38 after public notice and become part of the type certification basis in accordance with § 21.101.

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 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

Frequency	Field strength (volts per meter)	
	Peak	Average
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, 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 Mirage PA–46–350P. Should S–TEC 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 21.16 and 21.17; and 14 CFR 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 Piper Mirage PA–46–350P airplane 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 May 7, 2002.

Dorenda D. Baker,

Acting Manager, Small Airplane Directorate, Aircraft Certification Service.

[FR Doc. 02-13133 Filed 5-23-02; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM221, Special Conditions No. 25-203-SC]

Special Conditions: Israel Aircraft Industries (IAI) Model 1124 Airplane; High-Intensity Radiated Fields (HIRF)

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued Israel Aircraft Industries (IAI) Model 1124 airplanes modified by Duncan Aviation, Inc. These modified airplanes will have novel and unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. The modification incorporates the installation of an air data display unit that displays critical flight parameters to the flightcrew. The applicable airworthiness standards do not contain adequate or appropriate safety standards for the protection of these systems from the effects of high-intensity radiated fields. The special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that provided by the existing airworthiness standards.

DATES: The effective date of these special conditions is May 16, 2002. Comments must be received on or before June 24, 2002.

ADDRESSES: Comments on these special conditions may be mailed in duplicate to: Federal Aviation Administration, Transport Airplane Directorate, Attn:

Rules Docket (ANM-113), Docket No. NM221, 1601 Lind Avenue SW., Renton, Washington, 98055-4056; or delivered in duplicate to the Transport Airplane Directorate at the above address. Comments must be marked: Docket No. NM221. 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: Meghan Gordon, FAA, Standardization Branch, ANM-113, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98055-4056; telephone (425) 227-2138; facsimile (425) 227-1149.

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 airplanes. 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

The FAA invites interested persons to participate in this rulemaking by submitting 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 ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning these special conditions. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this preamble between 7:30 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring expense or delay. We may change these special conditions in light of the comments we receive.

If you want the FAA to acknowledge receipt of your comments on this proposal, include with your comments a pre-addressed, stamped postcard on

which the docket number appears. We will stamp the date on the postcard and mail it back to you.

Background

On April 12, 2002, Duncan Aviation, Inc., 15745 South Airport Road, Battle Creek, MI, 49015, applied for a supplemental type certificate (STC) to modify the Israel Aircraft Industries (IAI) Model 1124 airplane listed on Type Certificate No. A2SW. The Model 1124 is a twin engine, small transport airplane. It is capable of carrying two flightcrew members and up to ten passengers. The modification incorporates the installation of an air data display system. The air data display system displays critical flight parameters to the flightcrew. These systems can be susceptible to disruption to command and/or response signals as a result of electrical and magnetic interference. This disruption of signals could result in loss of all critical flight displays and announcement functions or present misleading information to the pilot.

Type Certification Basis

Under the provisions of 14 CFR 21.101, Duncan Aviation must show that the Israel Aircraft Industries Model 1124 airplanes, as changed, continue to meet the applicable provisions of the regulations incorporated by reference in Type Certificate No. A2SW, 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 certification basis for the modified Israel Aircraft Industries Model 1124 airplane includes Civil Aviation Regulations (CAR) 4b, effective 31 December 1953, including amendments through 4b-11, 4b-12, paragraphs 4b.132(e), 4b.151(a), 4b.155, 4b.156, 4b.157, 4b.158, 4b.160, 4b.162, 4b.191, 4b.210(b)(5), 4b.603(k), 4b.711, and paragraphs pertaining to engine fire shielding 14 CFR part 25, dated February 1, 1965, including Amendments 25-1 through 25-20, as listed in the Type Certificate Data Sheet (TCDS) No. A2SW.

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 Israel Aircraft Industries Model 1124 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

In addition to the applicable airworthiness regulations and special conditions, the Model 1124 airplane