

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 based on 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 September 26, 2003, Garrett Aviation Services, 1200 North Airport Drive, Capital Airport Springfield, IL 62707, applied for a Supplemental Type Certificate (STC) to modify Israel Aircraft Industries (IAI) Model 1124 airplanes approved under Type Certificate No. A2SW. The IAI Model 1124 is a small transport category airplane. The IAI Model 1124 airplane is powered by two AiResearch Manufacturing Company TFE731-3-1G turbofans and has a maximum takeoff weight of 23,500 pounds. This airplane operates with a 2-pilot crew and can hold up to 10 passengers. The modification incorporates the installation of dual Innovative Solutions & Support Air Data Display Units (ADDU) and a single IS&S Air Data Sensor (ADS) interfaced with an existing Collins AP-105 Autopilot. The ADDU is a replacement for the existing analog flight instrumentation, while also providing additional functional capability and redundancy in the system. The ADS is a digital replacement for the existing analog Collins 590A-3() Air Data Controller which outputs vertical and lateral mode signals to the Collins flight guidance system. The digital avionics/electronics and electrical systems installed under this project in this airplane have the potential to be vulnerable to high-intensity radiated fields (HIRF) external to the airplane.

Type Certification Basis

Under the provisions of 14 CFR 21.101, Garrett Aviation Services must show that the IAI 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 IAI Model 1124

airplanes include 14 CFR Part 25, dated February 1, 1964, as amended by Amendments 25-1 through 25-20 except for special conditions and exceptions noted in Type Certificate Data Sheet (TDCS) A2SW.

If the Administrator finds that the applicable airworthiness regulations (*i.e.*, 14 CFR part 25, as amended) do not contain adequate or appropriate safety standards for the IAI Model 1124 airplanes because of novel or unusual design features, special conditions are prescribed under the provisions § 21.16.

In addition to the applicable airworthiness regulations and special conditions, the IAI Model 1124 airplanes must comply with the associated change requirements of § 21.93(b).

Special conditions, as defined in 14 CFR 11.19, are issued in accordance with § 11.38 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 Garrett Aviation Services apply at a later date for a supplemental type certificate to modify any other model included on the same type certificate to incorporate the same or similar novel or unusual design feature, these special conditions would also apply to the other model under the provisions of 14 CFR 21.101.

Novel or Unusual Design Features

The IAI Model 1124 airplanes modified by Garrett Aviation Services will incorporate dual Air Data Display Units and a single Air Data Sensor system that will perform critical functions. These systems have to potential to be vulnerable to high-intensity radiated fields (HIRF) external to the airplane. The current airworthiness standards (part 25) do not contain adequate or appropriate safety standards for the protection of this equipment from the adverse effect of HIRF. Accordingly, this system is considered to be a novel or unusual design feature.

Discussion

There is no specific regulation that addresses protection requirements for electrical and electronic systems from HIRF. Increased power levels from ground-based radio transmitters and the growing use of sensitive avionics/electronics and electrical systems to command and control airplanes have made it necessary to provide adequate protection.

To ensure that a level of safety is achieved that is equivalent to that intended by the regulations

incorporated by reference; special conditions are needed for IAI Model 1124 airplanes modified by Garrett Aviation Services. These special conditions require that new avionics/electronics and electrical systems that perform critical functions be designed and installed to preclude component damage and interruption of function due to both the direct and indirect effects of HIRF.

High-Intensity Radiated Fields (HIRF)

With the trend toward increased power levels from ground-based transmitters, plus the advent of space and satellite communications, coupled with electronic command and control of the airplane, the immunity of critical avionics/electronics and electrical systems to HIRF must be established.

It is not possible to precisely define the HIRF to which the airplane will be exposed in service. There is also uncertainty concerning the effectiveness of airframe shielding for HIRF. Furthermore, coupling of electromagnetic energy to cockpit-installed equipment through the cockpit window apertures is undefined. Based on surveys and analysis of existing HIRF emitters, an adequate level of protection exists when compliance with the HIRF protection special condition is shown with either paragraph 1, or 2 below:

1. A minimum threat of 100 volts rms (root-mean-square) per meter electric field strength from 10 KHz to 18 GHz.

a. The threat must be applied to the system elements and their associated wiring harnesses without the benefit of airframe shielding.

b. Demonstration of this level of protection is established through system tests and analysis.

2. A threat external to the airframe of the following field strengths for the frequency ranges indicated. Both peak and average field strength components from the Table are to be demonstrated.

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