comments submitted 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. Persons wishing the FAA to acknowledge receipt of their comments submitted in response to this request must submit with those comments a self-addressed, stamped postcard on which the following statement is made: "Comments to Docket No. NM-108." The postcard will be date stamped and returned to the commenter.

Background

On August 16, 1994, Duncan Aviation, Inc., of Lincoln, Nebraska, applied for a supplemental type certificate to modify the Gulfstream American Corporation (GAC) Model G-IV airplane. The GAC Model G-IV airplane is a business jet with two aftmounted turbofan engines. The airplane can carry two pilots and 19 passengers, depending on the exit and interior configuration, and is capable of operating to an altitude of 45,000 feet. The proposed modification incorporates the installation of a digital avionics system that will present critical functions on the Head-up Display System (HUD), which is potentially vulnerable to high-intensity radiated fields (HIRF) external to the airplane.

Supplemental Type Certification Basis

Under the provisions of § 21.101 of the Federal Aviation Regulations (FAR), Duncan Aviation, Inc., must show that the altered GAC Model G–IV airplane continues to meet the applicable provisions of the regulations incorporated by reference in Type Certificate No. A12EU, 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. A12EU include the following for the GAC Model G–IV airplanes: § 21.29 of 14 CFR part 21 and 14 CFR part 25, dated February 1, 1965, as amended by Amendments 25–1 through 25–26. In addition, under § 21.101(b)(1), the following sections of the FAR apply to the HUD installation: § 25.1322, as amended by Amendment 25–38; and §§ 25.1309, 25.1321(a)(b) (d), and (e), 25.1331, 25.1333, and 25.1335, as amended by Amendment 25–41. These special conditions will form an

additional part of the supplemental type certification basis.

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 GAC Model G–IV airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16 to establish a level of safety equivalent to that established in the regulations.

Special conditions, as appropriate, are issued in accordance with § 11.49 of the FAR after public notice, as required by §§ 11.28 and 11.29, and become 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 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).

Discussion

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

To ensure that a level of safety is achieved equivalent to that intended by the regulations incorporated by reference, special conditions are needed for the modified GAC Model G–IV airplanes that would require that the HUD be designed and installed to preclude component damage and interruption of function due to the 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 digital avionics systems, such as the HUD, to HIRF must be established.

It is not possible to precisely define the HIRF to which the airplanes will be exposed in service. There is also uncertainty concerning the effectiveness of airframe shielding for HIRF. Furthermore, coupling of electromagnetic energy to cockpitinstalled 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 paragraphs 1 or 2 below:

1. A minimum threat of 100 volts per meter peak 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:

Frequency	Peak (V/M)	Average (V/M)
10 KHz-100 KHz	50	50
100 KHz-500 KHz	60	60
500 KHz-2000 KHz	70	70
2 MHz-30 MHz	200	200
30 MHz-70 MHz	30	30
70 MHz-100 MHz	30	30
100 MHz-200 MHz	150	33
200 MHz-400 MHz	70	70
400 MHz-700 MHz	4,020	935
700 MHz-1000 MHz	1,700	170
1 GHz-2 GHz	5,000	990
2 GHz-4 GHz	6,680	840
4 GHz-6 GHz	6,850	310
6 GHz-8 GHz	3,600	670
8 GHz-12 GHz	3,500	1,270
12 GHz-18 GHz	3,500	360
18 GHz-40 GHz	2,100	750

As discussed above, these special conditions are applicable to the GAC Model G–IV airplane, modified by Duncan Aviation. Should Duncan Aviation apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. A12EU 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 unusual or novel design features on GAC Model G–IV airplanes modified by Duncan Aviation. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of this feature on this airplane.

The substance of these special conditions has been subjected to the notice and comment procedure in several prior instances and has been derived without substantive change from those previously issued. It is unlikely that prior public comment