



U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: **ACTION:** Equivalent Level of Safety (ELOS) for
Schempp-Hirth Duo Discus T to JAR 22.1093, Change 5;
Finding No. ACE-05-02

Date: April 11, 2005

From: Glider Project Officer, Project Support Branch, ACE-112

Reply to Gregory Davison
Attn. of: (816) 329-4130

To: Manager, Small Airplane Directorate, ACE-100

This memorandum requests your office review and concur with the proposed finding of equivalent level of safety to Joint Aviation Requirement (JAR) 22.1093, Induction System Icing Protection, requirements.

BACKGROUND:

The Schempp-Hirth "Duo Discus T" is a two-seat, powered (non self-launching) sailplane with an extending/retracting powerplant. Its two-stroke SOLO engine type "2350 D" is started by a windmilling effect of the multiblade folding propeller (OEHLER system). Throttle and choke mechanisms are not required as the engine is designed to operate at maximum continuous power.

To prevent ice accumulation in the induction system, JAR 22.1093 requires either a preheater for an engine that uses a venturi-type carburetor or a continuously heated air intake that provides a sufficient temperature rise. The Duo Discus T does not use a preheater and Schempp-Hirth assumes, through similar service history, that enough heat is produced by thermal radiation from the hot cylinders. Schempp-Hirth has submitted, to the German CAA, Luftfahrt-Bundesamt (LBA), a substantiation report which states their request and basis for an equivalent level of safety to JAR 22.1093.

APPLICABLE REGULATIONS:

The Schempp-Hirth "Duo Discus T" will not include a preheater for the engines as part of its type design.

JAR 22.1093, Change 5: Induction System Icing Protection

- (a) Except as permitted by (b), each engine having a conventional venturi carburetor must be provided with a preheater capable, in air free of visible moisture at a temperature of -1°C (30.20°F), of increasing the intake air temperature by 50°C (122°F) with the engine at 75 percent of maximum continuous power.
- (b) Where the intake air is continuously heated, and it is demonstrated that the temperature rise is adequate, a preheater need not be provided.

14 CFR, part 21, § 21.17

- (b) For special classes of aircraft, including the engines and propellers installed thereon (e.g., gliders, airships, and other nonconventional aircraft), for which airworthiness standards have not been issued under this subchapter, the applicable requirements will be the portions of those other airworthiness requirements contained in Parts 23, 25, 27, 29, 31, 33, and 35 found by the Administrator to be appropriate for the aircraft and applicable to a specific type design, or such airworthiness criteria as the Administrator may find provide an equivalent level of safety to those parts.

APPLICANT POSITION:

Schempp-Hirth's Position:

For the substantiation that the above assumption (as stated in the background) is justified, the field operation experience of over 500 self-sustaining powered sailplanes equipped with this powerplant design is considered. No single malfunction of the engine operation is known where icing was the reason. Our experience with every Duo Discus T during the production flight tests, and the operator's experience, are especially meaningful. These flights were performed not only under good soaring conditions but also under poor weather conditions without any malfunctions related to icing of the induction system.

LBA/FAA POSITION:

The LBA agrees with the manufacturer's position and has done so before in certifying the Duo Discus T for Germany with an equivalent level of safety on this subject. First, the engine runs constantly on maximum power, which reduces the risk of carburetor icing to a minimum. Second, the position of the air inlet of the carburetors in the vicinity of the crank case provides a reliable heat source to the system. This may be seen as a constant preheater, according to JAR 22.1093(b). However, due to the lower temperature level when compared to conventional preheaters, this system has not been officially named as a preheater.

COMPENSATING FEATURES:

The Duo Discus T is a powered sailplane not capable of self launching which, like a glider, must be either launched by winch or aerotow (with its powerplant retracted). The powerplant is not used during takeoff. The engine is a supplemental piece of equipment and is used to extend the glide or to overcome zero lift conditions. The powerplant is not used during

