



# Federal Aviation Administration

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## Memorandum

Date: February 3, 2006

From: Manager, Atlanta ACO, ACE-115A

To: Manager, Small Airplane Directorate, ACE-100

Prepared by: Donald O. Young, ASE, ACE-118A,

Subject: **ACTION:** Request for Review and Concurrence with an Equivalent Level of Safety (ELOS) to 14 CFR 23.1145 Ignition switches, for Piper PA-28-161 Cadet and Warrior II and III airplanes with Thielert Aircraft Engines, GmbH (TAE) Model TAE-125-01 Aircraft Diesel Engine (ADE). ACE-05-21

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This memorandum documents concurrence for the subject finding of an Equivalent Level of Safety (ELOS). We request your office to review and concur with the proposed ELOS finding to 14 CFR § 23.1145, Ignition switches. The proposed ELOS will allow the use of Full Authority Digital Engine Control (FADEC) electrical power switches in place of the function provided by ignition switches as described in § 23.1145.

**Background:** The airplanes that the Supplemental Type Certificate (STC) will apply to are the Piper PA-28-161 Cadet and Warrior II and Warrior III. These are conventional airplanes powered by Spark Ignition (SI) gasoline engines using magneto ignition systems that can be shut off with ignition switches. Aircraft Diesel Engines (ADE) operate on the Compression Ignition (CI) principle and do not use spark plugs, magnetos, or an ignition circuit to maintain ignition of the fuel air charge in the cylinders. Except for stopping fuel flow to the cylinders through the FADEC electrical power switch, compliance with 14 CFR § 23.1145, *Ignition Switches*, is not possible.

The intent of 14 CFR § 23.1145, Ignition Switches, is to provide the crew with a means to rapidly stop the engine in the event of an emergency. Piper Models PA-28-161 Cadet and Warrior II/III airplanes equipped with the TAE Model, TAE-125-01 ADE must provide the crew with an equivalent means to rapidly stop the engine. Removing electrical power to the FADEC has the same effect as shutting off the ignition switch on a gasoline engine. The applicant has requested an ELOS for the provisions of 14 CFR § 23.1145 Ignition switches, at Amendment 43 (latest amendment). This request for ELOS finding is the same request and finding applied to Cessna 172K, L, M, N, P, R and S airplanes with the same engine installation.

**Applicable Regulations:** The applicable regulation is 14 CFR §23.1145, which states:

§ 23.1145 *Ignition switches.*

- (a) Ignition switches must control and shut off each ignition circuit on each engine.
- (b) There must be means to quickly shut off all ignition on multiengine airplanes by the grouping of switches or by a master ignition control.
- (c) Each group of ignition switches, except ignition switches for turbine engines for which continuous ignition is not required, and each master ignition control must have a means to prevent its inadvertent operation.

**Compensating Features:**

The Piper Models PA-28-161 Cadet and Warrior II and III airplanes with a TAE Model, TAE-125-01 ADE are normally shut off by selecting the FADEC electrical power switch "OFF" position, which closes the fuel injector valve at each cylinder, thereby stopping the flow of fuel and stopping the engine. This feature meets the intent of § 23.1145 by providing a means of rapidly stopping the engine in an emergency. This provides an equivalent level of functionality and safety intended by the rule for conventional ignition systems used on gasoline engines.

**Recommendation:** We concur that the use of an electrical switch to shut off electrical power to the engine FADEC to accomplish the requirements of § 23.1145 provide an ELOS to that intended by § 23.1145 and recommend the issuance of this ELOS.

Concurred by:

Melvin Taylor  
Manager, Atlanta ACO, ACE-115A

2/13/06  
Date

John Colomby  
Manager, Standards Office, ACE-110

4/25/06  
Date

John Colomby  
ACIWA  
Manager, Small Airplane Directorate, ACE-100

4/26/06  
Date