



# Federal Aviation Administration

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## Memorandum

Date: June 9, 2006

From: Manager, Propulsion and Services Branch, ACE-118A

To: Manager, Small Airplane Directorate, ACE-100

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

Subject: **ACTION:** Request for Review and Concurrence with an Equivalent Level of Safety (ELOS) ACE-05-31, to 14 CFR part 23, 23.1145 Ignition switches, for Aero Propulsion, Inc. SMA Model SR305-230 Aircraft Diesel Engine (ADE) installed on Piper Model PA-28-236 Airplanes.

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This memorandum documents concurrence for the subject finding of 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 for the utilization of an air shut off valve in place of the function provided by ignition switches as described in § 23.1145.

**Background:** Aircraft diesel engines operate on the compression ignition 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 the fuel control fuel supply shut-off, compliance with the intent of 14 CFR § 23.1145, Ignition Switches, is not possible. However, a means of rapid engine shut down must be provided to the crew.

### **FAA POSITION:**

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 PA-28-236 airplanes equipped with the SMA Model SR305-230 ADE must provide the crew with a means to rapidly stop the engine in addition to the engine fuel control fuel shut-off. The applicant has requested an ELOS for the provisions of 14 CFR § 23.1145 Ignition switches, at Amendment 43 (latest amendment).

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

*Section 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 SMA Model SR305-230 ADE installed on Piper Model PA-28-236 Airplanes by Aero Propulsion, Inc. is normally shut off using the engine fuel control fuel shut off. In order to meet the intent of 14 CFR § 23.1145, an air shut off valve is provided to rapidly stop the engine in addition to the engine fuel control fuel shut-off. The air shut off valve is cable operated and located between the air filter and the turbocharger. In the event that the engine will not shut down using the engine fuel control fuel shut off, the aircraft flight manual supplement will advise the pilot to perform the following steps:

**INABILITY TO STOP THE ENGINE**

**Ensure the Power Control is in the “Fuel Cut Off” position  
Stop engine fuel supply by turning the Aircraft Fuel Selector to the “Off” position.**

**Activate the Air Shut Off Valve Control Lever until engine completely stops  
Switch off the master electrical supply.  
Investigate the fault and perform inspections according to the Engine Maintenance Manual before the next flight.**

This feature meets the intent of § 23.1145. This provides an equivalent level of functionality and safety as intended by the rule for conventional ignition systems as used on gasoline engines.

**Recommendation:** We concur that the use of an air shut off valve to accomplish the requirements of § 23.1145 provides an ELOS to that intended by § 23.1145 and recommend the issuance of this ELOS.

Concurred by:

Christina March  
Manager, Propulsion and Services Branch, ACE-118A

5-8-06  
Date

John Colomy  
Manager, Standards Office, ACE-110

6-2-06  
Date

James E. Jackson  
Manager, Small Airplane Directorate, ACE-100

6-9-06  
Date