



Federal Aviation Administration

Memorandum

Date: January 22, 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: Request for Review and Concurrence with an Equivalent Level of Safety (ELOS) ACE-04-01, to 14 CFR part 23, §23.777(d) Cockpit controls and § 23.779(b) Motion and effect of cockpit controls for Aero Propulsion, Inc. SMA Model SR305-230 Aircraft Diesel Engine (ADE) installed on Piper Model PA-28-236 Airplanes. ACE-05-30

This memorandum documents concurrence for the subject finding of ELOS. We request your office to review and concur with the proposed ELOS finding to 14 CFR part 23, § 23.777(d) Cockpit controls and § 23.779(b) Motion and effect of cockpit controls. The proposed ELOS will allow for the utilization of one thrust lever in place of conventional throttle (power), condition and mixture controls as the SMA Model SR305-230 Aircraft Diesel Engine (ADE) installed on Piper Model PA-28-236 airplane utilizes an electronic engine control to schedule the thrust command to the engine.

Background: The airplanes that the Supplemental Type Certificate (STC) will apply to are the Piper Model PA-28-236. These are conventional airplanes currently powered by gasoline engines and conventional controls. The SMA Model SR305-230 ADE installation will eliminate the current controls and install one control for power. The applicant has requested an ELOS for the provisions of 14 CFR part 23, § 23.777(d) Cockpit controls, and § 23.779(b) at Amendment 51.

Applicable Regulations: The applicable regulations are 14 CFR part 23, § 23.777(d) and § 23.779(b), which state:

Section 23.777 Cockpit controls

(d) The control location order from left to right must be power (thrust) lever, propeller (rpm control), and mixture control (condition lever and fuel cutoff for turbine-powered airplanes). Power (thrust) levers must be at least one inch higher or longer to make them more prominent than propeller (rpm control) or mixture controls. Carburetor heat or alternate air control must be to the left of the throttle or at least eight inches from the mixture control

when located other than on a pedestal. Carburetor heat or alternate air control, when located on a pedestal must be aft or below the power (thrust) lever. Supercharger controls must be located below or aft of the propeller controls. Airplanes with tandem seating or single-place airplanes may utilize control locations on the left side of the cabin compartment; however, location order from left to right must be power (thrust) lever, propeller (rpm control) and mixture control.

Section 23.779 Motion and effect of cockpit controls.

Cockpit controls must be designed so that they operate in accordance with the following movement and actuation:

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(b) Powerplant and auxiliary controls:

Motion and effect

(1) Powerplant controls:

Power (thrust) lever.....	Forward to increase forward Thrust and rearward to Increase rearward thrust.
Propellers.....	Forward to increase rpm.
Mixture.....	Forward or upward for rich.
Fuel.....	Forward for open. Carburetor, air heat or Alternate. Forward or upward for cold air.
Supercharger.....	Forward or upward for low blower.
Turbosuperchargers.....	Forward, upward, or clockwise to increase pressure.
Rotary controls.....	Clockwise from off to full on.

(2) Auxiliary controls:

Fuel tank selector.....	Right for right tanks, left for left tanks.
Landing gear.....	Down to extend.
Speed brakes.....	Aft to extend.

Compensating Features: The Electronic Engine Control (EEC) will automatically control the thrust from the engine. The diesel engine, by its nature, does not require a control for fuel mixture, so the mixture control is unnecessary. The constant speed propeller is governed by a propeller governor with a fixed setting; therefore there is no need for a propeller control. The use of the single power control, with the same shape and movement as the previous conventional gasoline throttle, and the deletion of the propeller and mixture control is consistent with other single power lever approvals and provides a consistent and equivalent level of safety to the previous control scheme utilized on the airplanes models affected.

Recommendation: We concur that Aero Propulsion, Inc.'s substitution of one power lever in place of the traditional levers of power, propeller control and mixture provides an equivalent

level of safety to the regulatory requirements of § 23.777(d) Cockpit controls, and § 23.779(b) Motion and effect of cockpit controls.

Concurred by:

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

5-8-06
Date

William J. Timberake
for Manager, Standards Office, ACE-110

5-26-06
Date

David R. Showers
for Manager, Small Airplane Directorate, ACE-100

6-22-06
Date

cc:

ACE-112 S. M. Nagarajan

ACE-112 RF