



# Federal Aviation Administration

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## Memorandum

Date: April 14, 2015

To: Manager, Project Support Branch, ACE-112

From: Manager, Small Airplane Directorate, ACE-100

Prepared by: J. Mike Kiesov, Project Support Branch, ACE-112

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Korea Aerospace Industries, Limited, Model Naraon KC-100

ELOS Memo#: ACE-15-07

Regulatory Ref: 14 CFR 23.777(d) and 23.781(b)

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This memorandum informs the certificate management aircraft certification office of an evaluation made by the Accountable Directorate on the establishment of equivalent level of safety findings for the Korea Aerospace Industries, Limited (KAI) Model Naraon KC-100 airplanes.

### **Background:**

KAI has installed a Teledyne Continental Motors Model TSIOF-550-K engine on their new KC-100 airplane. KAI is requesting an Equivalent Level of Safety (ELOS) finding to the requirements of 14 CFR 23.777(d) Cockpit controls and § 23.781(b) Cockpit control knob shape. The proposed ELOS will allow for the utilization of one single thrust lever instead of conventional throttle (power), propeller, and mixture controls, since the KC-100 airplane will incorporate the use of Full Authority Digital Engine Control (FADEC) to schedule the thrust command to the engine.

### **Applicable regulation:**

Section 23.777(d) Cockpit controls, states the following:

“When separate and distinct control levers are co-located (such as located together on the pedestal), the control location order from left to right must be power (thrust) lever, propeller (rpm control), and mixture control (condition lever and fuel cut-off for turbine-powered airplanes). Power (thrust) levers must be easily distinguishable from other controls, and provide for accurate, consistent operation. 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 23.781(b) Cockpit control knob shape, states the following:

“Powerplant control knobs must conform to the general shapes (but not necessarily the exact sizes or specific proportions) . . . .”

**Regulations requiring an ELOS finding:**

14 CFR 23.777(d) and 23.781(b), amendment 23-59

**Description of compensating design features or alternative Methods of Compliance (MoC) which allow the granting of the ELOS (including changes, limitations, or equipment needed for equivalency):**

The FADEC will automatically control the thrust from the engine. The FADEC control of the engine does not require a control for fuel mixture; therefore, a separate mixture control is unnecessary. The use of the single power control lever with the same shape and movement as the previous conventional throttle and the deletion of the propeller and mixture controls are consistent with other single power lever approvals. It provides a consistent standard and equivalent level of safety to the previous control scheme utilized on other airplane models.

**Explanation of how design features or alternative Methods of Compliance (MoC) provide an equivalent level of safety intended by the regulation:**

The use of the single power control lever with the same shape and movement as the previous conventional throttle and the deletion of the propeller and mixture controls provide a simple function for power management. A single power control lever system lowers the pilot workload regarding conventional systems; thus, providing an equivalent level of safety to the respective regulations.

**FAA approval and documentation of the ELOS finding:**

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper P-3. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Accountable Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number must be listed in the Type Certificate Data Sheet under the Certification Basis section Type Certificate (TC) and Amended Type Certificate (ATC) or in the Limitations and Conditions section of the Supplemental Type Certificate (STC). An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulations:

Section 23.777(d) Cockpit controls  
Section 23.781(b) Cockpit controls knob shape  
(documented in ELOS Memo ACE-15-07)

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Melvin Johnson, Acting Manager, Small Airplane Directorate,  
Aircraft Certification Service

April 14, 2015

Date

ELOS Originated by: Project Support Branch	Manager, Project Support Branch: Jacqueline Jambor	Routing Symbol: ACE-112
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