



Federal Aviation Administration

Memorandum

Date: November 25, 2008

To: Manager, Small Airplane Directorate, ACE-100

From: Manager, Project Support Branch, ACE-112,

Prepared by: Peter L. Rouse, Regulations and Policy, ACE-111

Subject: **INFORMATION:** Equivalent Level of Safety (ELOS) Finding for Embraer model EMB500 airplane to the provisions of 14 CFR part 23, § 23.1553: Fuel Quantity Indication.

ELOS Memo#: ACE-08-21

Regulatory Ref: 14 CFR, part 23, § 23.1553

This memorandum requests your office to review and provide concurrence with the proposed finding of equivalent level of safety to the fuel quantity indicator requirements of § 23.1553 of 14 CFR, part 23.

Background:

The Embraer model EMB-500 airplane is a normal category; low-winged monoplane with “T” tailed vertical and horizontal stabilizers, retractable tricycle type landing gear and twin turbofan engines mounted on the aircraft fuselage. Its design characteristics include a predominance of metallic construction. The maximum takeoff weight is 10,472 pounds, the VMO/MMO is 275 KIAS/M 0.70 and maximum altitude is 41,000 feet. The requirement for fuel quantity indicator is specified in 14 CFR, part 23, § 23.1553. A digital fuel quantity indication system cannot literally comply with this section. Embraer S.A. requests the Federal Aviation Administration (FAA) to give them credit for the system by accepting it as a safety device equivalent to 14 CFR, part 23, §23.1553, Fuel Quantity Indicator.

Applicable Regulation:

14 CFR, part 23, § 23.1553, at Amendment 55.

Regulation Requiring an ELOS Finding:

The applicable regulation is:

Section 23.1553 Fuel quantity indicator.

A red radial line must be marked on each indicator at the calibrated zero reading, as specified in Sec. 23.1337(b)(1).

Description of Compensating Features:

Instead of the round dial fuel indicator which is assumed by the regulation, Embraer has designed and installed a digital fuel quantity system. This primary system indication is show in Figure 1. This system presents the zero fuel indication with white letters on a red background:

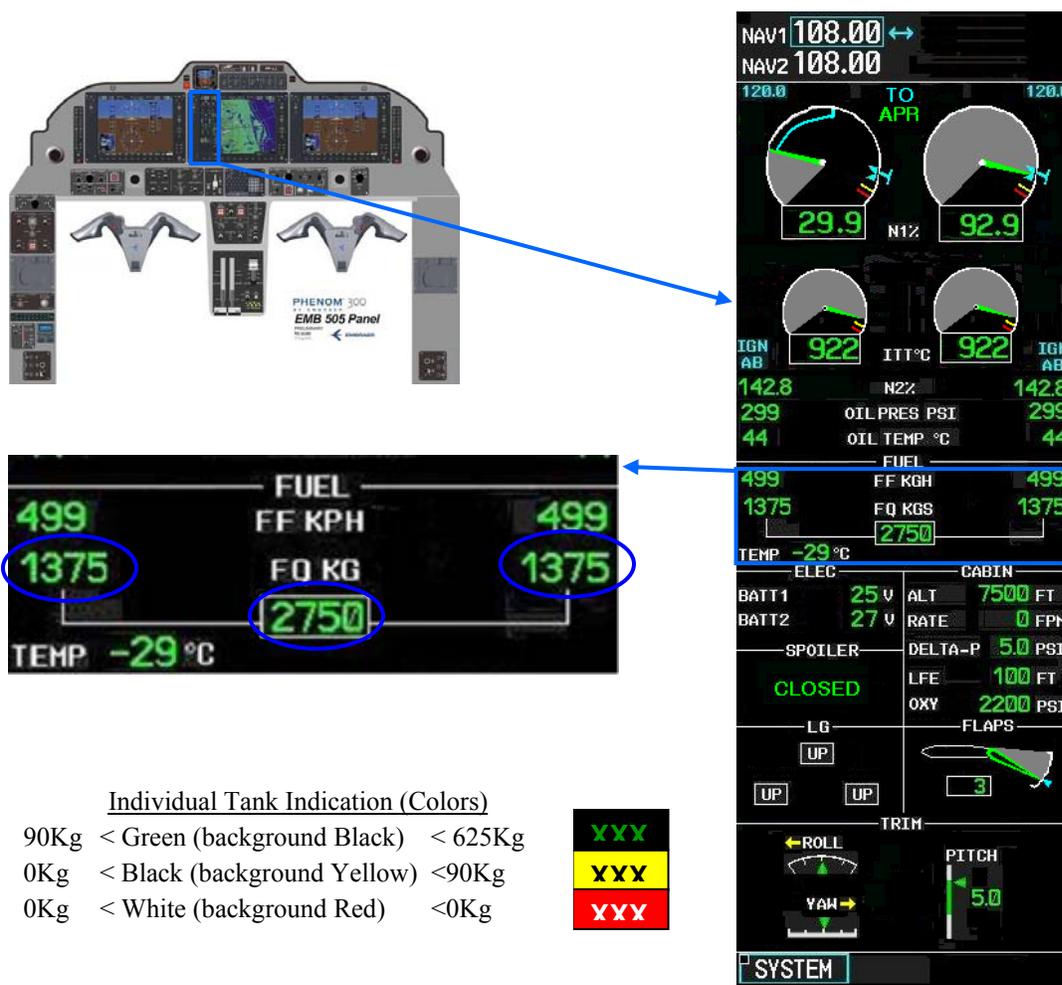
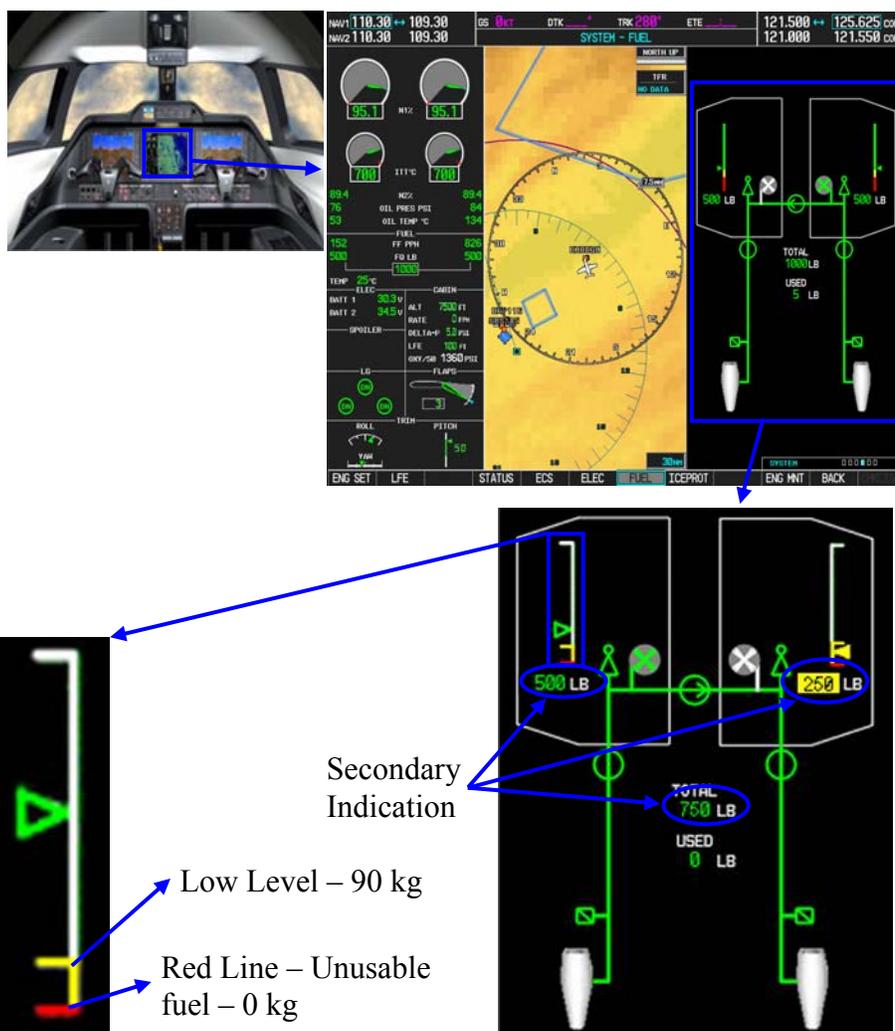


Figure 1 – EMB-500 Primary Indication on Engine Indicating and Color Code

In addition, the EMB-500 fuel system secondary and tertiary indications are presented to the crew, as shown in Figure 2. Both are located at the left side of the Multi Function Display, (MFD). They comprise right hand, left hand and total fuel quantities in digital (secondary) and analog (tertiary) indications. These quantities follow the same color code of the primary indication; the analog fuel indication (vertical line) indicates the zero level with a red line:



Analog Bar –Tertiary Indication

Synoptic – Secondary Indication

Figure 2 – EMB-500 Secondary and Tertiary Indications on Fuel System Synoptic Page

Explanation of Compensating Features:

The FAA evaluated the location and presentation of the fuel quantity system digital presentation as shown above, and considers the following compensating features:

- The primary fuel indication system utilizes a red color background with the numeral zero to indicate zero fuel, which is analogous to a red radial line on a conventional gage.
- The secondary and tertiary displays utilize digital indication of fuel that follow the same color scheme as the primary indication. In addition, in the tertiary indication synoptic (a vertical line) the zero fuel level is indicated with a red line, again analogous to the red radial line required by the regulation.

FAA Approval and Documentation of the ELOS Finding:

The Small Airplane Directorate concurs that the digital fuel quantity indication displays of the Embraer EMB-500 airplane provide an equivalent level of safety to the requirements of 14 CFR, part 23, § 23.1553.

Kim Smith
 Manager, Small Airplane Directorate
 Small Airplane Directorate
 Aircraft Certification Service

11-25-08
 Date

ELOS Originated by: Small Airplane Directorate	Project Support Office Manager: William J. Timberlake	Routing Symbol: ACE-112
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