



# Federal Aviation Administration

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## Memorandum

Date: July 19, 2013

To: Manager, Wichita Aircraft Certification Office, ACE-115W

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Christine Abraham, ACE-119W

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Electronic Standby Direction Indicator (Compass) on a Cessna Model 750, FAA Project # AT5435WI-T

ELOS Memo#: AT5435WI-T-SE-2

Regulatory Ref: 14 CFR 21.21(b)(1), 25.1301(a)(d), 25.1303(a)(3), 25.1309(a)(b)(d)(e), 25.1316, 25.1321, 25.1327, 25.1331, 25.1333, 25.1351(d), 25.1353(a)(c), 25.1459(e), and 25.1547

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This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Cessna Model 750.

### Background

The Cessna Model 750 will contain an electric Secondary Flight Display (SFD). The SFD provides and displays a third source for attitude, airspeed, altitude, and heading information utilizing a remotely mounted magnetic flux detector with gyroscopic stabilization provided by the inertial sensors in the SFD. All sensors used by the SFD are independent from the primary sensors used by the two primary display systems.

All functions associated with the standby direction indicating system will be independent of the main aircraft systems, including lighting, power, stabilization, and magnetic direction sensing. The SFD will be powered by the standby battery pack located in the nose of the aircraft and will remain powered for a determined minimum time duration after loss of all normal (generators) sources of electrical power. The standby battery pack is independent from the two aircraft main batteries.

The SFD provides a display format in an attitude display over the heading tape arrangement. By reducing the instrument scan, this allows the flight crew to have a smoother transition to the standby instruments in a condition that would warrant its use. The direction indicator would be in close proximity with attitude, airspeed, and altitude information in a presentation very similar to the primary flight displays.

**Applicable regulation(s)**

14 CFR 21.21(b)(1), 25.1301(a)(d), 25.1303(a)(3), 25.1309(a)(b)(d)(e), 25.1316, 25.1321, 25.1327, 25.1331, 25.1333, 25.1351(d), 25.1353(a)(c), 25.1459(e), and 25.1547

**Regulation(s) requiring an ELOS finding**

14 CFR 25.1303(a)(3) and 25.1547

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

The Cessna Model 750 contains an all electric full time standby instrument suite that consists of a SFD. The SFD provides and displays an independent third source for attitude, airspeed, altitude, and heading information. The heading function utilizes a remotely mounted magnetic flux detector with gyroscopic stabilization provided by the SFD.

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

The safety principle behind the rule, Title 14, Code of Federal Regulations (14 CFR) 25.1303(a)(3), which requires a magnetic, non-stabilized direction indicator is to ensure the availability of direction information which is essential to flight safety. Typical magnetic, non-stabilized (and non-powered) direction indicators are totally independent of the primary, gyro-stabilized direction indicators and not subject to the same failure modes.

All sensors used by the SFD standby suite are independent from the primary sensors used by the primary display systems. All functions associated with the standby direction indicating system will be independent of the main aircraft systems, including lighting, power, stabilization, and magnetic direction sensing. The standby direction indicating system is powered by the standby battery pack located in the nose of the aircraft. The standby battery pack is independent from the aircraft main battery. The standby heading function has been shown to meet the minimum accuracy requirements prescribed in 14 CFR 25.1327 ( $\pm 10$  degrees), for all flight conditions. Loss of heading function in the Cessna Model 750 is shown to be extremely improbable for the minimum time duration determined for "Operation Without Normal Electric Power."

In accordance with FAA policy regarding compliance with 14 CFR 25.1547, a calibration placard for this standby direction indicator is unnecessary because its performance and accuracy

of is equivalent to the primary direction indicators ( $\pm 2$  degrees), which is much better than the minimum requirements of 14 CFR 25.1327 ( $\pm 10$  degrees).

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

The FAA has approved the aforementioned ELOS finding in project issue paper SE-2. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the type certificate data sheet under the certification basis section. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation(s):

14 CFR 25.1303(a)(3) Flight and navigation instruments, and 14 CFR 25.1547 Magnetic direction indicator (documented in TAD ELOS Memo AT5435WI-T-SE-2)

Original signed by

*Paul Siegmund*

Transport Airplane Directorate,  
Aircraft Certification Service

7/19/13

Date

ELOS Originated by: Wichita ACO	ACO Manager: Margaret Kline	Routing Symbol: ACE-115W
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