FAA
Aviation Safety

SPECIAL AIRWORTHINESS INFORMATION BULLETIN

SUBJ: Attitude and Direction Data System; heading information errors due to maintenance practices

SAIB: CE-15-01
Date: 11/4/2014

This is information only. Recommendations aren't mandatory.

Introduction

This Special Airworthiness Information Bulletin is being issued to alert operators and maintenance personnel of an airworthiness concern, specifically possible induced heading errors in systems using magnetic sensitive sensors such as magnetometers to provide heading information.

At this time, the airworthiness concern is not an unsafe condition that would warrant airworthiness directive (AD) action under Title 14 of the Code of Federal Regulations (14 CFR) part 39.

Background

There continues to be a growing number of reports regarding heading errors and anomalies in heading reference systems due to standard maintenance practices and the use of standard tools while maintaining these systems.

These errors are occurring in both type certificated aircraft and aircraft not type certificated but operated under an experimental airworthiness certificate. The problem is due to the sensitive nature of the sensors used to provide heading data to the system. The sensitivity nature of the sensors may be substantially affected by ferrous materials, whether moving or stationary and close proximity, electro-magnetic effects, electric motors in close proximity, or improper installation procedures. Improper use of magnetic tools during maintenance or removal of wing inspection covers in the proximity of these heading sensor locations and replacing the panels using incorrect hardware can substantially affect proper operation of the sensor.

Recommendations

The FAA recommends that you follow all manufacturer installation/maintenance instructions, warnings, and troubleshooting procedures per their instructions for continued airworthiness or maintenance manuals. These usually require the magnetometer to be mounted away from other electrical or mechanical systems on the aircraft.

A simple test for possible interference in the proposed installation location is to use a magnetic compass and slowly move around the area of the sensor looking for any deflections of the compass needle. This test can reveal interference from moving landing gear, flap motors, air conditioning systems, etc. Excessive needle movement can be evidence of ferrous material or sources of magnetic interference.

Due to reports of flight control system components interfering with heading sensor operations, we also recommend that you operate control systems from stop to stop while observing a magnetic compass placed near the sensor. The compass needle should not deflect more than a couple of degrees. If it does, you may have to degauss (demagnetize) the flight control system components in the proximity of the sensor.

Additionally, the following information may assist an installer or maintainer in identifying potential interference on the heading sensor from existing systems:

- Avoid use of magnetic screwdrivers in the area of the sensors. Magnetic fields can permanently affect the sensor operation and accuracy and can leave residual magnetism on some materials.

- Ferromagnetic materials can become magnetized and cause magnetic interference. It is important to always use nonmagnetic hardware such as stainless steel or brass, in the vicinity of sensors. Always follow manufacturer's recommendation on hardware type and distance between sensors and ferrous materials. Never substitute ferrous hardware such as screws, washers, nutplates, etc. for non-ferrous hardware in the vicinity of the sensors.

- Always follow manufacturer's recommendations on minimum distance from magnetic sources such as electric motors, flight control cables, and permanent magnets in devices such as speakers.

- Check all wiring runs and ensure they are adequately spaced from the sensor locations. Be cautious of any new installed wiring in the general area and ensure that it has been routed properly to not affect the proper operation of the sensor.

- Aircraft structure can become magnetized by the accumulation of static energy on the structure due to inadequate or improper bonding of grounding straps and/or static wicks. Always ensure the integrity of the bonding systems using the manufacturer's recommendations. Newly painted aircraft may be a likely candidate for improper bonding systems.

- Degauss any magnetized structure near the sensor location(s). Always follow the manufacturer's instructions on use of degaussing equipment. Experience has shown that degaussing is not always 100 percent successful. Always check after completing the degaussing process for any remaining magnetism. In some rare cases, replacement of structure may be necessary.

For Further Information Contact

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