



U.S. Department
of Transportation
**Federal Aviation
Administration**

SAFO

Safety Alert for Operators

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Flight Standards Service
Washington, DC

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info

A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.

Subject: Heading Deviations in Bombardier Canadair Regional Jets (CRJ) caused by Surface Magnetic Anomalies

Purpose: This SAFO alerts operators of the potential for heading discrepancies caused by surface operations in areas of known or suspected magnetic field anomalies and encourages CRJ operators to develop and implement procedures for operating in such areas.

Background: As a result of several pilot deviations due to heading errors at various high traffic airports, the Federal Aviation Administration's (FAA) Flight Standards Division researched and developed the following safety recommendation to help prevent future heading deviations due to magnetic anomalies:

Safety Recommendation

AFS-400, Flight Technologies and Procedures Division and AFS-200, Air transportation Division, have reviewed the material concerning heading deviations after takeoff in CRJs. After review of procedures used by operators, and comparing them to Bombardier's procedures (published in the CRJ Flightcrew Operations Manual (FCOM)), the FAA believes an acceptable procedural solution is possible for Attitude and Heading Reference System (AHRS) equipped CRJs that do not have Inertial Reference System (IRS) or the AHC-4000 gyro-compassing AHRS installed.

Flight Standards Recommendations. This issue became apparent in the early 2000s and current trends indicate it will continue to be problematic if not addressed by means of updated operational procedures and enhancements in training programs. Flight Standards recommends operators flying AHRS equipped CRJ aircraft, without IRS, to comply with procedures in the aircraft's FCOM when departing from locations with known or suspected magnetic anomalies, and in addition:

1. **Awareness should be emphasized in initial and recurrent training.** Areas to be included in the training are:
 - a. Causes.
 - b. Recognition.
 - c. Procedural review.

- d. Consequences of heading deviations, particularly at busy airports and locations conducting parallel operations.
2. **In areas of known or suspected magnetic field anomalies, flightcrews should be required to takeoff in DG mode.** Recommended procedures for takeoff in known, and for determining suspected, areas of magnetic field anomalies are outlined in the Procedural Example section of this recommendation.
3. **Procedures.** Procedures for operating in areas with known or suspected magnetic field anomalies should be located onboard the aircraft and easily accessible to flightcrews, also:
 - a. Operators should develop and maintain a list of locations where known magnetic field anomalies have been identified. This list should be readily available to flightcrews. Some airports with known magnetic anomalies include: DFW, ORD, ATL and LGA.
 - b. Operators should develop a means for flightcrews to report locations with suspected magnetic field anomalies (not already listed).
4. For flights departing from locations with known magnetic anomalies, dispatchers should consider adding an alert to the flightcrew via dispatch release.
5. Once airborne, if the flightcrew notices a heading abnormality, they should alert Air Traffic Control.
 - a. A common thread that has been noted in aircraft experiencing adverse affects from magnetic disturbances is an unusual wind indication after takeoff. A typical indication would be a wind read out that is not consistent with the local forecast or reported weather.

Procedural Example. For Takeoff with Magnetic Field Anomalies:

- **Known Magnetic Field Anomalies**

When departing from a runway with known field anomalies use the following procedure:

1. Prior to entering the area of magnetic anomaly, and with the AHRS switches in MAG, verify the heading indicators agree and the EFIS COMP MON and HDG comparator flag are not displayed. This verifies proper system operation.
2. Just prior to taking position on the runway, select the AHRS switches to DG mode and use the SLEW switch to align the AHRS to the Standby Compass heading. Note the DG1(2) symbol that appears above each Heading Indicator. Use this as a reminder to return to MAG mode after takeoff.
3. With the aircraft lined up on the runway, check the Heading Indicators against the runway heading, and that the HDG flag and EFIS COMP MON are not displayed. Re-slew the AHRS as necessary.

4. After takeoff and initial climb, while in straight, level, at a steady speed, select both AHRS (one at a time) to MAG mode, and verify the HDG flag and EFIS COMP MON message are not displayed.

- **Suspected Magnetic Field Anomalies**

If the HDG flag and EFIS COMP MON messages appear when taxiing to a runway not listed as having a known magnetic field anomalies and magnetic anomalies are suspected, use the following procedure:

1. Taxi away from the area of suspected anomaly and then briefly select both AHRS to DG, and then back to MAG. This performs a rapid realignment of the AHRS heading system.
2. If the caution messages remain and the crew is confident the aircraft is away from magnetic field problems, then a system failure has occurred.
3. If the cautions go away and the heading on the PFD's agrees with the actual magnetic heading of the aircraft, it may be assumed the AHRS system is operational and that magnetic anomalies were the cause of the original problem. The procedure for departing from runways with known magnetic field anomalies may then be used.
4. Note the runway where the problem occurred and pass that information to the appropriate personnel by using established procedures so it can be evaluated and, if appropriate, added to the list of locations with known magnetic field anomalies.

Recommended Action: Directors of safety, directors of operations, chief pilots, fractional ownership program managers, training managers, and operators of aircraft should develop and implement procedures for operating in areas with known or suspected magnetic field anomalies.

Contact: Questions or comments regarding this SAFO should be directed to John Blair, AFS-410, Flight Technologies and Procedures Division, (202) 385-4586 or Deke Abbott, AFS-220, Air Transportation Division, (202) 267-8166.