FAA
Aviation Safety

SPECIAL AIRWORTHINESS INFORMATION BULLETIN

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SUBJ: Non-Aviation Transmitters **Date:** August 5, 2010

This is information only. Recommendations aren't mandatory.

Introduction

This Special Airworthiness Information Bulletin advises you of an airworthiness concern regarding potential electromagnetic interferences with required aviation radios caused by non-aviation transmitters installed in rotorcraft. At this time, this airworthiness concern is not an unsafe condition that would warrant airworthiness directive (AD) action under Title 14 of the Code of Federal Aviation Regulations (14 CFR) part 39.

Background

Various government agencies, emergency medical services (EMS), electronic news gathering (ENG), and other special service operators have a valid need for non-aviation, multi-band mission radios to be installed in rotorcraft. These non-aviation radios may be capable of transmitting directly on radio frequencies reserved for aviation. In all instances, these non-aviation radios are capable of generating harmonics while transmitting that creates interference with and adversely affects the operation of required communication, navigation, and surveillance equipment in the rotorcraft. This interference may cause the loss of a function or introduce misleading information to the flight crew. 14 CFR 29.1431 addresses interference to required radios on all Part 29, as well as Part 27 IFR rotorcraft. 14 CFR 27/29.1309 addresses required systems functioning under any foreseeable operating condition for VFR normal category rotorcraft. Hence the interference caused by non-aviation radios to required systems is a foreseeable operating condition and needs to be addressed in all installations. While these interference indications typically recover quickly after the stop of transmission, interference with required systems is non-compliance to the applicable rule(s). Many existing installations of non-aviation radios in rotorcraft are likely to have such an interference issue. The following adverse harmonic interference affects have been observed:

- Missed voice communications with air traffic control when the non-aviation radio is transmitting on a frequency with a harmonic that coincides with the ATC communication frequency (e.g., the non-aviation radio is transmitting on 60 MHz which prevents the reception of ATC communication at 120 MHz through the VHF communication transceiver).
- An unexpected deviation in roll during coupled ILS flight when the ILS localizer is tuned to a frequency that is close to a harmonic of the non-aviation radio transmission.
- VOR navigation mode temporarily reverts to dead reckoning during a non-aviation radio transmission when the non-aviation radio is transmitting on a frequency with a harmonic that coincides with the VOR frequency.
- The autopilot uncouples from the ILS during a non-aviation radio transmission when the non-aviation radio is transmitting on a frequency with a harmonic that coincides with the ILS frequency.
- GPS satellite signal reception degradation when the non-aviation radio is transmitting on frequency with a harmonic that coincides with the GPS frequency.
- An erroneous VOR and ILS flight director needle indication of up to two dots during non-aviation radio transmission.

Recommendations

To Aircraft Certification Offices (ACO) on Supplemental Type Certificates (STC) and Flight Standards on Field Approvals (FS may choose to request ACO engineering assistance on these field approvals) for new installations of non-aviation transmitters, we recommend the following:

- To minimize the risk of radio frequency (RF) interference, determining of the optimum separation between the non-aviation radio transmitting antenna and the ILS, VOR, VHF communication, GPS, etc. receiving antennas needs to consider the frequencies and wavelengths of the involved radios. Additional RF filtering (e.g., notch, low pass) in the RF cables or in the non-aviation transmitting radio may also be used to further attenuate the harmonic emissions.
- A comprehensive harmonic EMI test is recommended to validate that non-aviation radio transmit harmonics do not adversely affect the operation of the required communication, navigation, and surveillance equipment. This harmonic interference testing is in addition to the electromagnetic compatibility tests described in Appendix C of RTCA/DO-313, which demonstrate that the radio does not have other adverse affects.
-It is further recommended that an issue paper be initiated by the ACO engineer to document the steps taken to show compliance to the interference rules as part of the Supplemental Type Certificate data package.
-Address and submit for acceptance by the Aircraft Evaluation Group, the instructions for continued airworthiness (ICAs) so that maintenance of system integrity can be maintained.

Note: Installation of non-aviation radios capable of transmitting directly on aviation frequencies, which are not FCC Part 87 type accepted (typically military radios), should not be approved under civil aviation regulations. These radios are for public use only and their installation will need to be approved under other than civil aviation regulations.

To operators, crew and maintenance personnel with existing approved installations of non-aviation transmitters the following steps are strongly recommended.

- The crew needs to be attentive to and aware of interference issues while transmitting with non-aviation radios. Appropriate crew communication and procedural adjustments to mitigate operational issues is the first line of defense.
- When interference issues are identified, the crew should make a record of the frequencies and systems affected and make a concerted effort with flight operations, maintenance, and certification entities to incorporate the same RF interference elimination procedures used for new installations (as described above).
- Until the interference issues are resolved, incorporate procedures and limitations to preclude the transmission on non-aviation radios during critical phases of flight such as approach, departure and during IFR operations.

For Further Information Contact

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