Are Personal Electronics a Threat to Aircraft?

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he U.S. Federal Communications Commission began soliciting comments in December 2004 on proposed regulations that would permit the use of cell phones and other personal electronic devices (PEDs) on board commercial airline flights. Last summer, the House Committee on Transportation and Infrastructure noted that “the FCC hopes to issue a final ruling in 2006, stating that its ultimate objective is to allow consumers to use their own wireless devices during flight.”

There are numerous reports in the Aviation Safety Reporting System (ASRS) database of navigation errors which ceased after the crew asked for PEDs to be turned off. Although the VOR system was most often cited, the instrument landing system (ILS) was reported to have been affected 17 times, radar altimeters 10 times, autopilot systems eight times, ground-proximity warning systems seven times and an engine fuel controller once, in data through March 2001. Significantly, in a number of cases, the cockpit crew verified that the PED was the source of the error by having it turned back on and seeing the navigation error repeat, before requiring that the device be secured.

Corporate and general aviation pilots have reported that approach-certified GPS avionics can lose satellite lock in flight due to cellular telephones being on, even when not being used for a call. In one report, interference occurred at different geographic locations, took place with three different GPS receivers using separate antennas and was repeatable on multiple flights on different days. Interference went away when the phone was turned off. The FAA then asked NASA to perform laboratory tests of a popular cell phone model. NASA issued a technical memorandum (TM-2004-213001) measuring the presence of emissions in the GPS band that “show that the threat of interference from a particular mobile phone to aircraft GPS receivers is real.”

We conducted a survey of frequent travelers, which indicated that passengers are not aware of the reasons for the limitations on inflight PED use. Many doubt that safety is an issue. The survey further indicated that they were using prohibited electronic devices and permitted devices at prohibited times. General aviation is not immune to personal electronics use by passengers and crew. Several accident reports contain data showing that cell phones were being used in flight.

With support from the FAA, assistance from three major airlines, and approval from the FAA and Transportation Security Administration, we flew a spectrum analyzer on board 37 revenue flights along the Eastern Seaboard. Key findings are that onboard cellular activity is appreciable, signal activity was observed in the GPS band at levels that could result in interference, elevated broadband noise was observed on many occasions in the VOR/ILS band, and passenger use of electronics including wireless devices is occurring at prohibited times including during approach.

Personal electronics have caused avionics interference on airliners and general aviation aircraft. These devices are being used on revenue flights, including cell phones during approach. Passengers are not aware that their electronics are restricted for safety reasons. Finally, changes are afoot that would open the floodgates to much greater use of PEDs in flight. What can be done to break the accident chain?

• First, expand industry/government and inter-agency cooperation. FCC and FAA standards are not harmonized, and RTCA’s special committees on interference have convened too infrequently to be effective. Avionics susceptibility and allowed device emissions should be compatible.

• Second, augment the ASRS. Budget cuts at NASA have meant that only 20-25% of reports are entered into the database, and the random sampling that was used to allow statistically valid research has been eliminated. The focus of entered reports shifts as different topics, such as runway incursion, become a focus of management interest.

• Third, characterize the inflight radio frequency (RF) environment. Our spectrum analyzer study was limited. It should be expanded by an organization with significant resources. An operational system would allow the sort of data mining now routinely practiced by airlines using flight data recorder information.

• Fourth, develop and deploy simple real-time tools that can allow the crew to detect RF emissions.

• Fifth, clearly communicate to passengers on both airliners and general aviation aircraft that PEDs are restricted due to risks posed by their use, especially on flights that use GPS approaches. Turkish Airlines’ announcement is straightforward: “Mobile phones interfere with the flight instruments and have a negative effect on flight safety” and is accompanied by a drawing of a cell phone controlling the aircraft.

Our study has convinced us that use of personal electronics in flight should continue to be limited and that no one should be allowed to operate intentionally radiating devices during critical phases of flight. Both regulators and airlines should stop the headlong rush to allowing more RF interference before it results in an accident.