

Center for the Study of Wireless Electromagnetic Compatibility

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Avionics Research

There have been many reports questioning the potential interference that cellular phones could cause to aircraft avionics. To address this serious potential problem, a study was undertaken to provide valuable information on the spurious emission levels of wireless phones and the possible effect of those emissions on several of the more critical aircraft navigation equipment. It was designed to be an initial exploratory study to identify any significant problems that may exist. None of the phone technologies investigated exhibited a power level greater than a 38 dBm path loss level above the maximum sensitivity of the aircraft system antennae when tested one meter away from the antenna. Results indicated that, for the aircraft systems tested, the antenna of these systems would not have detected the emissions of the phones used in this study. For more information, contact Hank Grant, 405-325-2429; e-mail: emc@ou.edu.

Gas Station Research

A number of reports were circulated in the news media and on the Internet suggesting that cell phones could cause a fire or explosion if used at gas stations. In response to such potentially catastrophic events, a study was initiated. The cell phone/gas station issue is centered on claims that the cell phone battery could spark and ignite gas fumes, or that the electronic impulses or electromagnetic (RF) waves emitted by the phones might trigger fire and/or explosions of gas fumes. The Center performed a subjective assessment of the potential for a cell phone to cause an explosion, based on historical evidence and expert opinion. To add some perspective, comparison was made against the chances that an explosion could occur due to other sources. A matrix was developed that contains subjective ratings indicating the probability that a fire or explosion would occur under specified conditions. The matrix shows the fire/explosion probability from cell phones to be negligible. Thus, while it may be theoretically possible for a spark from a cell phone battery to ignite gas vapor under very precise conditions, realistically there is virtually no evidence to suggest that cell phones pose a hazard at gas stations. For more information, contact Hank Grant, Director, 405-325-2429; e-mail: emc@ou.edu.

Hearing Aid Research

The issue of the compatibility of hearing aids and wireless phones has been a “hot” issue for nearly a decade and continues to be a major issue. The Wireless EMC Center has been involved in this area throughout this time and has conducted several studies looking both at objective (performing laboratory measurements and developing laboratory protocols) and subjective (performing clinical studies by bringing in hearing aid wearers for evaluations) studies. The results of these studies were critical in the creation of a hearing aid compatibility standard that the Center

was commissioned to validate. The Center is currently working with the wireless phone and hearing aid industries to evaluate proposed changes to a compatibility standard. For more information, contact Hank Grant, 405-325-2429; e-mail: emc@ou.edu.

Implantable Cardioverter Defibrillator (ICD) Research

The Center developed a test protocol to evaluate whether there were any interactions between wireless phones and implantable cardioverter defibrillators (ICDs). The EMC Center found that interaction occurred between a small number of wireless phones and small number of ICDs. The phones were tested in close proximity to the ICD to represent the phone being carried in a chest pocket or being held adjacent to the chest. The Wireless EMC Center concluded that more effective electronic filtering and shielding of the ICD would be a viable solution to mitigate the interaction. The study confirmed the recommended “safe” distance that a wireless phone should be kept to prevent any potential interaction with an ICD implanted in a body. Following the study several of the worst offending devices were modified. Re-testing showed drastic improvements were made due to the modifications. For more information, contact Hank Grant, 405-325-2429; e-mail: emc@ou.edu.

Pacemaker Research

The Center for the Study of Wireless Electromagnetic Compatibility at the University of Oklahoma conducted two large-scale in-vitro investigations of interaction between wireless phones and cardiac pacemakers to address major concerns that wireless phones could interact with implanted pacemakers. All testing was conducted under the most extreme conditions, with the phones at their highest power and the pacemaker sensitivity set to the maximum value permitted. The testing showed that a variety of solution approaches are possible to eliminate the potential for interaction between the phone and the pacemaker. These solutions include various types of Electromagnetic Interference (EMI) filtering at the input stages of the detection circuitry. The studies confirmed the recommended “safe” distance that a wireless phone should be kept to prevent any potential interaction with an ICD implanted in a body. These studies helped the pacemaker companies to better understand how to design their devices to reduce the risk of interference from wireless devices. Newer models of pacemakers are virtually immune from wireless phones. The Center continues to test pacemakers with new wireless technologies as is needed. For more information, contact Hank Grant, 405-325-2429; e-mail: emc@ou.edu.

Electromagnetic Interference Management in the Hospitals

The Center has developed several items to provide important information to hospital personnel to assist in managing EMC issues in hospitals. The reports contain articles and information on research activities in the area of EMC in health care. The reports give an introduction to electromagnetic interference (EMI) and electromagnetic compatibility (EMC), discussing general terminology, types of interference, and the ambient electromagnetic environment. There is information for administrators, medical professionals, biomedical engineers, and general hospital personnel. By properly managing the electromagnetic environment in a medical center, administrators can better assure compatibility between wireless and medical devices. This translates into improved health care and gains in productivity, as advances in wireless technology are applied to medical applications. For more information, contact Hank Grant, 405-325-2429; e-mail: emc@ou.edu.