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Airlines Around the World Are Adding a New Line to Safety Briefings: 'Turn Off And Stow Your Electronic Devices.'

Laptop computers, portable radio/tape players and portable compact disc players may make a passenger's flight more productive or enjoyable — but they may also cause cockpit instruments to malfunction.

Editorial Staff Report

Reports linking abnormal behavior of avionics — such as navigation equipment incorrectly indicating the plane's location — to electronics carried on board by passengers have prompted worldwide concern by airlines and regulatory agencies.

An aircraft passenger using his cellular telephone during flight violates U.S. Federal Communications Commission (FCC) regulations, and may also be jeopardizing the safety of the flight. The telephone could interfere with the aircraft's communications and navigation systems, as could other passengers' portable computers or hand-held video games. [Telephones installed on an airplane transmit through a radio mounted in the radio bay and have their own, specific antenna. "As soon as you make it a permanent part of the airplane ... you have to demonstrate to the FAA's [U.S. Federal Aviation Administration] satisfaction that it will not interfere with other systems on the airplane," said Dennis Wright, vice president of opera-

tions for the National Business Aircraft Association (NBAA). Wright is the secretary of the Radio Technical Commission for Aeronautics' (RTCA) Special Committee 177 (SC-177), which is examining the issue of electromagnetic interference (EMI) for the FAA.¹] While evidence remains inconclusive, officials say there is enough to warrant further investigation.

The FAA has asked RTCA to look into the reports of EMI from portable electronic devices (PEDs). SC-177's final report is due in July 1994; an interim report is due in late October 1993.

This is RTCA's third examination of the PED question. RTCA Special Committee 156 (SC-156) spent five years studying the issue during the mid-1980s. Its report, published in 1988, concluded that the chances of EMI resulting from passengers' electronic toys and tape players were inconsequential. FAA rules regulating the use of electronics by passengers were put in place in the 1960s, after

RTCA took its first look at the issue. [U.S. Federal Aviation Regulation (FAR) 91.19 gave aircraft operators the responsibility to determine what types of electronic devices would affect their aircraft. Portable voice recorders, electric shavers, hearing aids and pacemakers were specifically listed as items that would not pose a problem.]

Since the 1988 report, there is evidence of additional occurrences, and PEDs have received more attention. In a recent newsletter, McDonnell Douglas Aircraft Co. described an increase in the number of incidents that appeared to be linked to PEDs (Figure 1), and said a reason for the increase might be that, "By 1990 ... the number of people boarding airplanes with electronic devices had grown significantly, and the low-voltage application of modern aircraft digital electronics were potentially more susceptible to EMI."²

The U.S. National Aeronautics and Space Administration's (NASA) Aviation Safety Reporting System (ASRS) published in February 1993 a compilation of about 40 reports that referred to *passenger* electronic devices (also called PEDs). The following report, filed by a flight crew in January 1989, is typical of the 40 reports:

"During cruise we were issued direct Louisville VOR [very high frequency (VHF) omnidirectional radio range]. Had problem with needle swings. Asked Center if Louisville

was OK. They said all OK. Asked flight attendant to check cabin for electronics. Found electronic chess player on. When turned off, CDI [course/deviation indicator] needles were stable and we proceeded direct to VOR."³

Nonetheless, the theory that PEDs affect avionics has not been proven scientifically, experts say.

In a July 26, 1993, memo, SC-177 Chairman John Sheehan, vice president of Phaneuf Associates, an aviation consulting firm, said, "As we begin to devise our test procedures, we find scant, incomplete and inconclusive evidence of interference to aircraft systems actually caused by a PED being operated on board an aircraft."⁴

"The problem with portable electronic devices is that even after the aircraft equipment returns to normal, we've never been able to repeat the instance," Sheehan said in a recent interview. Sheehan added that because no events have been repeated, coming up with a common denominator to predict when an event may occur has been difficult.⁵

SC-177 Secretary Dennis Wright said that the reports that have come in are not being treated as fact. "All reports are being treated as anecdotal in nature," he said. "Not once has [an instance] been reproduced."⁶

Larry Bessette, manager of the avionics branch, Flight Standards, FAA, said that he believes the threat from PEDs is genuine. He also said the threat is hard to prove. "It's one of those cases where we have hundreds of reports but have not been able to nail one down scientifically. I wish we could nail it down. But it's been so elusive, it's very difficult."⁷

The International Association of Transport Aircraft (IATA) recommended in early 1993 that its members restrict the use of PEDs during critical phases of flight. "IATA's Technical Committee decided to recommend to member airlines that passengers should not be allowed to use transportable electronic devices during the takeoff and landing phases of flight," an April 8 press release said.⁸ The release added that there was no conclusive evidence that PEDs caused interference, but further research would be conducted.

Terry Denny, manager of public relations for IATA, said: "We haven't been able to trace an accident to the use of one of these devices ... but we are convinced that this could happen."⁹

Bob Woodhouse, assistant director of flight operation services for IATA, said that verifying a cause-and-effect relationship is difficult in PED cases. He added that the innocent-until-proven-guilty attitude that once seemed to prevail has evolved into "You prove it is safe."¹⁰

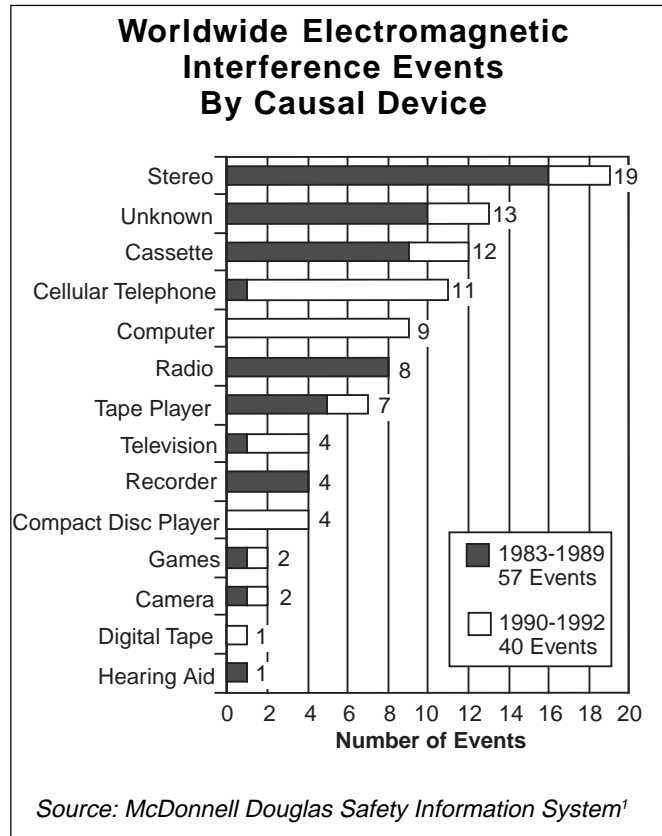


Figure 1

The FAA's Bessette says personal computers, electronic games, personal tape players/radios, and personal hand-held televisions seem to affect aircraft systems most. "It appears that any device that uses a clock ... tends to be the noisiest and radiates the most [EMI]." By a clock, he was referring to a computer chip which controls the device's electronic timing.

EMI is not the only reason airlines are asking passengers to stow their PEDs during takeoff and landing. As with any other carry-on item, passengers could be injured by an unstowed PED. Communicating during an emergency could also be a problem because earphones can prevent a passenger from hearing instructions.

"[There is] the potential for disaster as somebody wakes up to the fact that people are climbing over him to get out of the aircraft," said Denny.

Mary Ellen Miller, director of safety, health and deregulation for the Independent Federation of Flight Attendants (IFFA), said such a situation occurred during an incident at New York City's Kennedy Airport.

"During the [Trans World Airlines (TWA) flight] 843 accident, where the plane was on fire, one of the passengers had a [Sony] Walkman on, and he was unaware that an evacuation was going on. ... He was in the front of the plane where the fire wasn't," she said. Miller said the man did not hear the evacuation alarm, and she added that the passengers in the front of the plane seemed less aware of the danger than those who were in the back, where the fire was burning.¹¹

[TWA flight 843 aborted takeoff just after liftoff on July 30, 1992. A U.S. National Transportation Safety Board (NTSB) accident report said the aircraft landed hard, causing the wing to rupture; fuel escaped and ignited. Ten injuries, mostly minor, were reported. There were no fatalities, but the aircraft was destroyed.¹²]

An unusual aspect of the PED phenomenon is that corporate aircrews have reported few, if any, occurrences of PED interference. "[PED interference is] almost an airline-only problem," said Wright.

John Sheehan said corporate pilots may expect their passengers to be using electronic equipment, and expect anomalies to result. They may not file an incident report if an aberration does occur, he said. "Corporate pilots may assume it's the boss and ask him politely to turn it off," Sheehan said.

Still, the possibility of EMI causes concern for aircraft crews. In December 1988, the following report was filed with ASRS:

"Due to bad weather we went into holding at 13,000 feet [3,965 meters] at Beula intersection in IFR [instrument flight rules] conditions. While in holding, both autopilot and yaw dampers disengaged. In addition, we lost both flight guidance computers and air data computers.

"At the same time, the flight attendant called up and informed me that a passenger in Row I was using some sort of transceiver and was using it to either communicate or receive weather information on an HF [high frequency] marine band frequency. I told the first officer to make sure the man immediately put the radio away — that it was interfering with the aircraft.

"About a minute after I got the computers on line, the entire event recurred, including a call from the flight attendant about the man in Row I. This time I sent the first officer back to make sure the radio was put away. When he came back to the cockpit, he informed me that this man had a bag of various electronic devices.

"I also informed [the tower] of our problem and that I was uncertain of our exact position and the reliability of our radios due to the interference (or possible interference). We got all the computers back to normal operation, but because of bad weather, we diverted ... without incident. Unfortunately I never did get to see the man or the radios he was using. My first officer claims one of them was a high frequency marine band radio.

"Even though we broke no regulations, I think it presents a potentially dangerous situation, and that all medium transport [30,001-60,000 pounds (13,608-27,216 kilograms)] crews, or all crews, need to be aware [of EMI]. First, radio interference does affect the medium transport aircraft and these crews do need to be aware of this. I don't know if it was a combination of this man sitting in Row I near the VHF COM [very high frequency communication] antennas, and the ... computers under the floor, or just having enough wattage, or magnetism, to throw the computer slightly out of line or what.

"Second, people are told mistakenly by airlines, radio manufacturers and salesmen that their radios are approved for aircraft use by the FAA/FCC when in fact they are not.

"Third, maybe airlines need to re-emphasize that no radio transceiving devices are allowed for use on aircraft. Just imagine if the man had successfully penetrated a

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fly-by-wire [caused EMI that could have interfered with the aircraft's electronically operated flight controls]. I should also note that I flew this aircraft prior to and following this incident with no problems."³

Webster Heath, manager/technical liaison of industry and regulatory affairs at McDonnell Douglas, said the frequencies and magnitudes that cause problems have yet to be determined. "If I don't know what my problem is, I don't know how to fix it," he said.¹³

SC-177 plans to perform more extensive in-aircraft testing than SC-156 did. [SC-156 tested PEDs on board two aircraft, a Boeing 727 and a Convair 580.] The current strategy is to test several PEDs in an electronically "quiet" room, and to "map an electronic footprint of the personal electronic device," Sheehan said. Then, using a series of footprints, a worst-case scenario, which can be repeated precisely, will be devised and programmed. The computer-driven signal will be tested in several transport aircraft currently in use. Sheehan said another test will be run using the actual PEDs to provide a control group. Sheehan also said the committee needs more reports from flight crews of interference from PEDs.

Wright said that SC-177 is looking for "an envelope of permissible emissions," and added that some members of the committee hope to develop an RTCA "stamp of approval" at some point in the future.

In an advisory circular (AC) dated August 20, 1993, the FAA recommended that the use of portable electronic devices be prohibited during takeoff and landing.

"It must be recognized that the potential for personal injury to passengers is a paramount consideration, as well as the possibility of missing important safety announcements during these important phases of flight," the AC said. "This is in addition to lessening the possible interference that may arise during sterile cockpit operations [critical phases of flight during which a flight crew member may not engage in any activity that is not essential to the flight; these phases include all ground operations involving taxi, takeoff and landing and any other operations (except cruise) below 10,000 feet (3,050 meters)]."¹⁴

The IATA recommendation and the FAA recommendation are not law, and airlines must make their own decisions. IATA's Woodhouse does not believe that is the best course of action. "To dump the responsibility on the airlines is a bit thick," he said. Denny agrees and said that IATA would like to see governments making regula-

tions and policies on PEDs, not passing the responsibility to operators.¹⁵

Bessette says the FAA has given airlines the option of deciding what action to take because the FAA is not sure about future avionics developments and what equipment airlines will install on their planes. "This is one of the few rules where we put the onus back on the operators and they don't like it. They want us to come out with an edict saying 'shut them off,'" he said.

The Australian Civil Aviation Authority (CAA) has also left the decision up to the airlines. "We've raised their awareness of the issue and left it to the air carriers to decide what they'll do," said Kevin Moore, Australian Civil Aviation Representative to the FAA. He added that air carriers in Australia are forbidding the use of PEDs on the ground and during climb and descent. If the cockpit crew experiences a problem during the flight, and suspects PED interference, they should look for the culprit device.¹⁶

The U.K.'s Flight Safety Committee's *Focus on Commercial Aviation Safety* recently published an adaptation of a Transport Canada article in which readers received a lesson in handling PEDs. In the article, readers were told that if PED interference is suspected, crews should confirm that a PED is in use and have the passenger turn the device off. Then they should check the cockpit. If the cockpit instruments have returned to normal, Flight Safety Committee suggests the crew have the passenger turn the PED on and off again, to see if the abnormality can be repeated and to determine if that piece of equipment is actually the culprit. If it is, ask the passenger to keep it off.¹⁷

As with any rule that restricts a passenger's habits or keeps a passenger from doing what he or she wants to do, there is always the chance that a passenger will be uncooperative. In PED situations, however, the uncooperative passenger seems to be the exception and not the rule.

"From what I understand, most people are pretty good about not wanting to fall out of the sky for one reason or another," said Meg Leith, coordinator of air safety and health for the Association of Flight Attendants (AFA).¹⁸

But there is the occasional rebel among passengers. Moore said he began attending SC-177 meetings, in part, because of an uncooperative passenger. "[There was] an early instance where somebody wanted to use a cellular telephone. When told by the cabin crew it was interfering with VHF-NAV and VHF-COM [navigation and

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communication equipment], he sort of pooh-poohed it until he was prevailed upon by the cabin crew.”

Swissair restricts the use of PEDs during takeoff and landing,¹⁹ as does Northwest Airlines. Gloria Reagan, representative for inflight regulatory procedures for Northwest, said Northwest flight attendants announce that personal electronic devices must be stowed for takeoff and landing. Northwest suggests that its flight attendants tell reluctant passengers that the PED must be stowed and turned off for safety reasons.

“If [a passenger] becomes abusive or disruptive,” Reagan said, “then we advise them [the flight attendants] to contact the cockpit.”²⁰

AFA has not taken an official stand on PEDs. “We are monitoring the situation until something definitive comes up,” said Leith, “It’s an issue that we are going to be contending with. We’ll be involved in an enforcement mode.”

Leith added, “If people are insistent that they’re not going to do something that you want them to do that is a safety measure, it’s interference with a crew member.” In the United States, interfering with a crew member is a federal offense that can be prosecuted by the FAA and, if state lines are crossed, the Federal Bureau of Investigation.

Miller said: “If the plane hadn’t departed yet, you’d go back to the gate and put them [the offending passengers] off.” ♦

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