

COCKPIT DISTRACTIONS: PRECURSORS TO EMERGENCIES

Valerie E. Barnes
Battelle Human Affairs Research Centers
Seattle, Washington

Capt. William P. Monan
Battelle's Aviation Safety Reporting System Office
Mountain View, California

The Federal Aviation Administration promulgated the "Sterile Cockpit Rule" in mid-1981 in order to reduce incidents resulting from distractions occurring in the cockpit during critical phases of flight below 10,000 feet. The rule was, in part, a response to the large number of reports submitted to NASA's Aviation Safety Reporting System (ASRS) that indicated that non-safety-related activities, such as making PA announcements to passengers, had diverted flight crews' attention from their primary flight duties--with adverse results. In this paper, more recent ASRS reports are discussed. These reports indicate that distraction incidents below 10,000 feet have continued to occur since the rule was promulgated. The sources of distraction identified in the sample of ASRS reports are also discussed.

BACKGROUND

The problem of lapses in flight crews' attention to their primary duty of maintaining flight safety--and the adverse consequences of those lapses--are a recurring theme in descriptions of aviation incidents and accidents. Most recently, the Delta Air Lines Flight 1141 crash on takeoff from Dallas/Ft. Worth International Airport on August 31, 1988, which killed 12 passengers and two crewmembers, was attributed by the National Transportation Safety Board (NTSB), in part, to a lapse in the flight crew's attention to their duties. In its findings regarding the accident, the NTSB noted:

Extensive nonduty related conversations and the lengthy presence of the flight attendant in the cockpit reduced the flight crew's vigilance in ensuring that the aircraft was properly prepared for flight ("FAA Urged," 1990, p. 75).

In 1979, the National Aeronautics and Space Administration (NASA) published a study of the types and causes of cockpit distractions described in NASA's Aviation Safety Reporting System (ASRS) (Monan, 1979). One response to this study was the promulgation of the "Sterile Cockpit Rule" by the Federal Aviation Administration (FAA). The purpose of the Rule was to

reduce incidents that result from distractions occurring in the cockpit during critical phases of flight below 10,000 feet, such as those contributing to the Delta Flight 1141 accident. The Rule reads as follows:

No flight crew member may engage in, nor may any pilot in command permit, any activity during a critical phase of flight which could distract any flight crew member from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties.
[FAR 121.542(b) and FAR 135.100(b)]

Issued in mid-1981, the Sterile Cockpit Rule broadly prohibits distraction-inducing activities in both scheduled and non-scheduled passenger operations. Both sets of Federal Aviation Regulations (FARs) identify various non-essential flight deck functions and define critical phases of flight as "all ground operations including taxi, takeoff and landing, and all other flight operations conducted below 10,000 feet, except cruise flight."

Although the Delta Flight 1141 accident suggests that the Rule may not have been as effective as desired, the study reported in this paper was undertaken

to provide a broader assessment of the impact of the Sterile Cockpit Rule on flight crew behavior. An additional motive was to further explore the sources of flight crew distractions that were tentatively identified in earlier research efforts--in particular, those which may be viewed as anomalies in cockpit management as it is currently practiced. The reports contained in the ASRS database provide sufficiently rich descriptive detail to serve both purposes of the study.

METHOD

The ASRS Database and Study Sample

This assessment of the Rule's impact was conducted through a content analysis of a stratified random sample of incident reports contained in NASA's ASRS database. The reports comprising the ASRS database are submitted voluntarily, primarily by flight crews and air traffic controllers involved in commercial, general, and military aviation activities. The reports are mailed to ASRS headquarters in Mountain View, CA, where they are reviewed and coded by ASRS analysts before being entered into the database. Although the reports are submitted with information that allows the identification of the individual reporting so that ASRS analysts may contact the reporter to clarify information in the report, the reports are permanently "de-identified" before they are entered into the database. Thus, once entered into the database, reports cannot be linked to reporters (cf. Reynard, Billings, Cheaney, & Hardy, 1986, for a complete description of the ASRS program).

Although reporters' identities are kept confidential to encourage reporting, the number of incidents of a particular type reported to ASRS is unlikely to accurately represent the total number of such incidents that have occurred. For example, aviation personnel in some regions of the U.S. may be more familiar with the ASRS than personnel in other regions, and so the number of reports from one region may be significantly higher than reports from another as a result of familiarity with the system, rather than as a result of a truly larger number of incidents in a specific region of the country. Consequently, it is clear that the number of reports of a particular type of incident that are contained in the ASRS database represents a lower estimate of the

true number of incidents of a particular type that have occurred.

At the time this study was performed, the ASRS database contained 86,003 reports. The sample for this study was drawn from reports of incidents that occurred between January 1983 and December 1989. Approximately 20% of these reports were coded by ASRS analysts as involving flight crew distractions in some way. From this subset of reports, a sample of about 6% of the incidents was randomly selected for this project.

Report Review and Categorization

ASRS analysts performed the first reviews of the study sample and categorized the reports into three broad categories of distraction incidents. These categories were (1) distractions due to matters central to safe flight, (2) distractions due to matters peripheral to safe flight, and (3) distractions with social or personal matters.

Incidents that fell into the first category involved distractions associated with performing tasks that were critical to one aspect of flight safety to the exclusion of other critical concerns (e.g., altitude, airspeed, heading). Distraction-inducing activities in this category included troubleshooting malfunctions, watching for other air traffic, avoiding thunderstorms, and programming automatic flight systems.

Incidents in the second category involved distractions associated with performing non-critical flight duties, such as making company radio calls, performing company paperwork, or making announcements to the passengers. As in the previous category of incidents, these activities took precedence over other concerns central to safe flight.

The third category involved distraction incidents associated with social or personal matters that diverted the flight crews' attention from their primary flight duties. Examples of incidents in this category include distractions from irrelevant cockpit conversations and "sightseeing."

In addition to being categorized by the type of distraction incidents

described, the ASRS reports in the sample also were identified as occurring either (1) on the ground, (2) in the air below 10,000 feet, or (3) in the air at or above 10,000 feet. The year in which the incident occurred also was noted to identify any trends in the reporting of distraction incidents over the seven years of reports from which the sample was drawn. In addition, the consequences of the distraction incidents were recorded.

PRELIMINARY RESULTS AND DISCUSSION

At the time of this writing, only the broad categorization of the incidents had been completed. Based on this analysis, approximately 20% of the total sample is judged by ASRS analysts to involve distractions that directly contributed to the seriousness of the incident; of this 20%, approximately 65% involved activities central to safe flight, 35% to matters peripheral to safe flight, and 5% to social or personal matters. (Some reports fall into more than one category.) Approximately 63% of the remaining incidents were categorized as resulting from distractions associated with matters central to flight safety. Approximately 36% of the remaining incidents involved distractions associated with matters peripheral to safe flight, while only about 4% of the incidents were due to distractions from social or personal matters diverting flight crews' attention from their primary duties.

Although these results are very preliminary in nature, they suggest that the problem of flight crew distractions continues to be a source of flight safety concern, despite the Sterile Cockpit Rule. Further discussion of this important topic must be delayed until the analyses of the incidents are completed.

ACKNOWLEDGEMENTS

The authors express their appreciation to the following staff at the Aviation Safety Reporting System Office for their able assistance on this project: Robert Petersen, Coding Analyst; Rowena Morrison, Research Coordinator; and Loren Rosenthal, Director.

References

FAA Urged to Increase Oversight of Airline Flight Safety Programs. (1990, April 16). Aviation Week & Space Technology, pp. 73-77.

Monan, W. P. (1979). Distraction--A Human Factor in Air Carrier Hazard Events (NASA Technical Memorandum 78608). Moffett Field, CA: NASA.

Reynard, W. D., Billings, C. E., Cheaney, E. S., & Hardy, R. (1986, November). The Development of the NASA Aviation Reporting System (NASA Reference Publication 1114). Moffett Field, CA: NASA.