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DIRECTORS GENERAL OF CIVIL AVIATION CONFERENCE ON A GLOBAL STRATEGY FOR AVIATION SAFETY

Montréal, 20 to 22 March 2006

Agenda Item 1: The status of aviation safety today 1.3: Initiatives by States and industry

INITIATIVES BY STATES AND INDUSTRY

(Presented by the United States)

SUMMARY

Although the investigations of these fatal air transport accidents are ongoing, in each of the seven accidents, the factual data available to date has not revealed a technical failure of the aeroplane that would lead to a major accident. However, operational factors appear to be present in every event. There is ample evidence of non-compliance with established procedures and checklists, failure of the industry standard and accepted crew resource management concepts, and less than acceptable adherence to the strategies necessary to avoid controlled flight into terrain. Evidence in these accidents indicates some air transport crews display airmanship that is sub-standard for the commercial aviation industry. Further, aircrew and maintenance personnel performance puts into question their training and the airline management practices, and reflects directly on the diligence of the State of the Operator aeronautical authorities to conform to the standards expected within the international aviation community. These findings should be of continuing concern to the world aviation community, particularly from the viewpoint of a host State receiving international traffic or in considering the risk to airline passengers on a regional basis. ICAO and Contracting States must continue to strive toward the highest possible level of safety for the 21st century to ensure that the global aviation community is not compromised and the variation in safety among world regions is eliminated.

1. INTRODUCTION

1.1 On 27 and 28 July 2004, the National Transportation Safety Board convened a public hearing in Washington, D.C., to explore the feasibility, potential benefits and drawbacks of requiring crash-protected cockpit imaging systems on turbine-powered aircraft. Regulators, manufacturers, investigators, union representatives and pilots met to consider the issue from various points of view.

1.2 Subjects explored at the hearing included the following:

- a) the technical feasibility and costs associated with capturing, storing, and analyzing image data obtained from commercial aircraft cockpits and all turbine-powered aircraft;
- b) the legal and privacy concerns of flight crews, air carriers, regulatory agencies, and international organizations; and
- c) the regulatory difficulties surrounding implementation of image recorders.

2. DISCUSSION

2.1 The Safety Board investigates many aviation accidents without the benefit of any type of data recorder. From 1983 to 2003, the United States investigated 2 966 accidents involving turbine-powered aircraft (excluding experimental and restricted aircraft) that were not equipped with flight data recorders (FDRs). These accidents resulted in 754 fatalities. Data from cockpit image recorders might have aided investigators significantly had it been available. Video imagery is the only method available to investigators to document routine, nonverbal crew communications. Video imagery also provides a reliable method for evaluating pilot/crew interaction with cockpit equipment and controls, crew position and orientation, and such activities as the use of checklists. Video imaging is also appropriate to record certain types of cockpit instrument displays. Cockpit image recording devices would enhance methods currently available to investigators to reliably document human factors, including crew coordination, workload, distractions, incapacitation and fatigue.

2.2 The Safety Board first formally dealt with the issue of crash-protected image recorders in February 2000, following its investigation of the 1997 crash of a Cessna 208B Caravan near Montrose, Colorado that resulted in nine fatalities. The accident aircraft, operated under 14 *Code of Federal Regulations* (CFR) Part 135 for the United States Bureau of Reclamation, was neither equipped nor required to be equipped with a FDR or cockpit voice recorder (CVR). There were no recorded communications between the accident aircraft and air traffic control or other aircraft. The Safety Board has since investigated more than 100 additional accidents involving commercial aircraft not equipped with recorders, including the 25 October 2002 crash of a Raytheon (Beech) King Air near Eveleth, Minnesota, which killed Senator Paul Wellstone and seven other persons. Data limitations in all of these cases hindered investigators in reconstructing the events that led to the accident.

2.3 Larger category aircraft currently required to be equipped with a CVR and digital flight data recorder (DFDR) were also considered as a subject for the hearing agenda. This determination was based on the Board's investigations of a number of accidents, including the 1996 crash of ValuJet 592 into the Everglades near Miami, Florida; the 1997 crash of SilkAir flight 185 near Palembang, Indonesia; the 1998 crash of Swissair Flight 111 near Peggy's Cove, Nova Scotia; and the 1999 crash of EgyptAir

Flight 990 south of Nantucket Island, Massachusetts. These accidents claimed all five hundred and fifty persons aboard the four aircraft.

2.4 Over the last five years, the Safety Board has conducted several symposia where individuals from industry, unions, and government discussed the issues of cockpit image recorders. Most recently, these symposia included the June 2003 *SAE Vehicle Recorder Topical Technical Symposium*, which the Safety Board cosponsored with the Society of Automotive Engineers. At this meeting, industry representatives provided significant input regarding the merits of video and image recording devices as well as data privacy issues. Following this meeting, Safety Board staff determined that a public hearing would be helpful in gaining consensus within the aviation community regarding the feasibility, costs, and privacy issues associated with cockpit image recording devices and would also call attention to the need for cockpit image recorders to effectively investigate aircraft accidents. Participating at the July 2004 hearing were the FAA, the Air Transport Association (ATA), the Regional Airline Association (RAA), the Air Line Pilots Association (ALPA), the Allied Pilots Association, and the National Air Transportation Association.

2.5 At the July 2004 hearing, witnesses from recorder and camera system manufacturers testified that image-recording systems compliant with the Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems (ED-112) could be commercially available within a year after a technical standard order is issued. (ED-112 was issued by the European Organization for Civil Aviation Equipment, EUROCAE, in March 2003.) One witness estimated that a single-camera image recorder for smaller aircraft would cost between \$3 000 and \$5 000. Two other recorder manufacturers estimated that the equipment cost for a single-camera installation in large aircraft would be about \$10 000. These witnesses noted that installation costs would vary widely, and would be substantially less for installations in newly manufactured aircraft than as retrofits to existing aircraft. Witnesses, who had helped develop ED-112, as well as aeronautical authorities, testified that ED-112 provided a solid basis for the development of a technical standard order.

2.6 Witnesses from the United Kingdom's Air Accidents Investigation Branch, the United States Navy, and the Safety Board provided numerous illustrations of the investigative advantages of image recorders, and conversely, the difficulties and delays in accident investigations that did not have the benefit of such recordings to explain human and aircraft behaviour in accident situations. An ALPA witness contended, however, that such information was not as important to improved investigations as the information that would be available if the parameter requirements for digital flight data recorders (DFDRs) were expanded. The witness also presented concern that subjective judgments from a visual image could result in erroneous conclusions regarding crew member actions.

2.7 The hearing also focused on privacy protections currently established for CVRs and their extension to cockpit image recorders. Testimony indicated that, since the passage in 1990 of legislation protecting CVRs, no CVR recordings have been disclosed to the public in the United States. In addition, witnesses could cite only one international instance of the public disclosure of a CVR recording during that same period. Counsel representing both plaintiff and defendant positions in civil litigation stemming from aircraft accidents testified that the statutory protections and judicial procedures regarding the use of CVR recordings in evidence were effective both in supporting litigation and in preventing public release of the recordings in the United States. Testimony brought out the need in the international arena for ICAO Contracting States lacking similar protections to move forward with national legislation and rulemaking to extend those protections worldwide. Finally, hearing participants discussed the possibility of encrypting data that are recorded by the cockpit image recorders. Several witnesses testified that encryption is technically feasible, but the issues surrounding encryption, including who would have

control over encryption keys and how that information would be shared in the international arena, were not resolved.

2.8 After completion of the hearing, several of the parties submitted statements to the public docket. The RAA stated that they do not believe FAA rulemaking requiring the retrofit of cockpit image recorders (CIR) can be cost justified. The ATA recommended that stakeholders should continue to support voluntary safety programmes, continue efforts to strengthen international safety data protection laws through the ICAO Assembly, and consider creation of an Aviation Rulemaking Advisory Committee to address all issues related to image recorders. The ATA also recommended that the Safety Board should focus attention on those aircraft for which little or no data exist and cost-effective technologies that can provide objective accident data. Further, ALPA declared opposition to the installation of CIRs in civil transport aircraft citing concerns regarding the lack of objective data that could be provided by CIRs and the current protections against misuse and abuse of recorded safety information. ALPA recommended a holistic approach to CIR cost-benefit analysis, development of legislation and a mechanism for effective domestic and international protections for all recorded safety information, and the exploration of the use of conventional FDRs to address the segment of the commercial air transportation fleet not currently required to be equipped with either a CVR or FDR.

2.9 Information regarding the NTSB public hearing is available at www.nts.gov or through the NTSB Records Management Division, (CIO-40).

3. CONCLUSION

3.1 Reports of aviation accidents indicate numerous investigations have been hampered due to the unavailability and inaccuracy of factual data. Cockpit image recorders can provide data that will add an additional perspective to the process of accident and incident investigation and therefore contribute to overall aviation safety improvements. The Safety Board believes the presence of such recorders on turbine-powered aircraft can result in more timely investigations, reduce investigation costs, improve aeronautical training efficiency, and enhance global safety initiatives desired as part of the 21st century safety strategy. ICAO and Contracting States are encouraged to explore the feasibility and need for cockpit image recorders, the legal and privacy concerns associated with image recorders, and the regulatory challenges that must be overcome to ensure these important devices are implemented in the aviation industry.

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