



**National Transportation Safety Board**  
Washington, D.C. 20594

**Safety Recommendation**

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Date: **SEP 9 1999**

In reply refer to: A-99-55 and -56

Honorable Jane F. Garvey  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

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On February 6, 1999, at 0336 central standard time, Federal Express flight 1020 (FDX1020), a McDonnell-Douglas DC-10F, and Air Canada flight 754 (ACA754), an Airbus A320, were involved in a near midair collision approximately 40 miles north of Lincoln, Nebraska. While ACA754 was in cruise at flight level 350 (approximately 35,000 feet above sea level), the pilot received a Traffic Alert and Collision Avoidance System (TCAS)<sup>1</sup> traffic advisory (TA) about FDX1020 then a resolution advisory (RA), directing the flight crew to climb to avoid a potential collision. The two aircraft subsequently passed within one mile horizontally and 600 feet vertically. FDX1020 was not equipped with TCAS nor was it required. The flight crew of FDX1020 reported that it had not received any TAs from air traffic control (ATC) and had not been notified that proper separation had not been maintained. Neither aircraft was damaged, and no injuries were reported. Visual meteorological conditions (VMC) prevailed at the time of the incident. Both flights were operating under 14 Code of Federal Regulations (CFR) Part 121 on instrument flight plans.

On March 2, 1999, at 1140 eastern standard time, Federal Express flight 3207 (FDX3207), a DC-10F, and American International Airways flight 303 (CKS303), a Lockheed L-1011, were involved in a near midair collision approximately 30 miles west of Salina, Kansas. For reasons still being investigated by the National Transportation Safety Board, both flights lost

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<sup>1</sup> TCAS is anti-collision equipment that is required by 14 CFR 121.356, 125.224, and 129.18 to be carried aboard commercial passenger aircraft with 10 or more seats and operated in U.S. domestic airspace. Two versions of TCAS are in use: TCAS I (required on aircraft with 10 to 30 seats) detects nearby aircraft that are close enough to be of some concern but have not yet presented a collision threat and provides crews with traffic advisories (TA); TCAS II (required on aircraft with more than 30 seats) provides TAs and, if nearby aircraft present a collision threat, issues resolution advisories (RA), which instruct pilots to climb or descend to avoid potential collision with another aircraft. Aircraft equipped with TCAS II also require at least one Mode S transponder to provide the data communications needed to coordinate RAs with nearby aircraft.

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radio contact with ATC. Their paths converged, and the two aircraft passed at flight level 330 with approximately one-half mile horizontal separation and zero vertical separation. Neither aircraft was equipped with TCAS. Neither aircraft was damaged, and no injuries were reported. VMC prevailed at the time of the event. Both flights were operating under 14 CFR Part 121 on instrument flight plans.

The Safety Board is concerned that TCAS equipment was not installed on three of the four aircraft involved in these incidents nor was it required. A valuable feature of TCAS II is its ability to coordinate escape maneuvers with TCAS II equipment on an opposing aircraft. This feature makes it more likely that flight crews of conflicting aircraft will choose diverging paths. Conversely, when two potentially conflicting aircraft are not equipped with TCAS II, avoidance maneuvers chosen by the pilots may be uncoordinated and the aircraft's flight paths may, therefore, continue to converge. The same outcome could result even if one aircraft is equipped with TCAS II and the other is not equipped with TCAS at all.

Current FAA regulations do not require any aircraft used exclusively in cargo operations to be equipped with any version of TCAS.<sup>2</sup> The Safety Board notes that a draft implementation plan published by the European Civil Aviation Conference states that, by January 1, 2000, passenger and cargo aircraft weighing more than 15,000 kilograms (Kg) (33,000 lbs.) or configured with more than 30 seats must be equipped with TCAS II to fly within European airspace. Australia, India, Japan, and other Far Eastern countries are implementing similar requirements.

The Safety Board also notes that, since the FAA issued its original regulations requiring TCAS installation on passenger aircraft beginning in 1990, air cargo operations have expanded substantially. Hundreds of air cargo flights use the air traffic system every day, sharing airspace with passenger flights and other users.

The Safety Board notes that Federal Express and Polar Air Cargo have voluntarily started to install TCAS on their aircraft and have committed to equipping their entire fleets with TCAS II. Further, United Parcel Service has also announced that it will install TCAS II on all aircraft used in international service.

In February 26, 1997, testimony before the House Committee on Transportation and Infrastructure, Subcommittee on Aviation, National Transportation Safety Board Vice Chairman Robert T. Francis stated the following regarding the Safety Board's position on anti-collision equipment, "in all of its safety recommendations advocating TCAS implementation, the Board did not distinguish between passenger-carrying aircraft and cargo-only operations and sees no reason to do so." He further stated, "the Safety Board was pleased when the FAA committed to TCAS in 1981. We were also supportive of the phased installation program for TCAS II as finally established by regulation in April 1990. In retrospect, we would have preferred, however, that the regulation include cargo aircraft." This remains the Safety Board's position. Traffic

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<sup>2</sup> Title 14 CFR Part 121.356(b) established a TCAS requirement for a "passenger or combination cargo/passenger (combi) airplane that has a passenger seat configuration, excluding any pilot seat, of 10 to 30 seats," but not for a cargo-only airplane of any size.

density and the number of aircraft used in cargo-only operations have served to increase the Safety Board's concerns regarding the continued exemption of cargo aircraft from TCAS requirements.

The Safety Board notes that provisions requiring the FAA to mandate installation of collision avoidance systems on cargo-only aircraft weighing 33,000 pounds or more are included in Congressional bills HR 1000 and S.82, this year's FAA reauthorization legislation. On June 15, 1999, the House passed HR 1000, and as of July 1, 1999, S.82 has been voted out of committee and is awaiting floor action in the Senate. The FAA has publicly supported the requirement for collision avoidance equipment for cargo aircraft, although no rulemaking has yet been initiated pending congressional action. The Safety Board supports the FAA's commitment and the legislative efforts to achieve this important safety enhancement.

The Cargo Airline Association has stated that the aviation cargo industry is developing a potential alternative to TCAS known as Automatic Dependent Surveillance-Broadcast (ADS-B). This system will broadcast aircraft position, altitude, direction, and other information for use by other aircraft and ground facilities equipped to receive this information. ADS-B could enable other aircraft, vehicles, or ground stations to use such data for, among other purposes, collision avoidance, flight operations, ground operations, rescue operations, and reduced aircraft separation.

Although ADS-B may have future value as a collision avoidance system, that is not its primary function and no firm schedule or implementation plan has been established. Many technical and research issues remain to be resolved before ADS-B can provide an anti-collision capability comparable to that available from current TCAS equipment. In testimony before the House Committee on Transportation and Infrastructure, Subcommittee on Aviation, on February 26, 1997, Guy S. Gardner, then the FAA's Associate Administrator for Regulation and Certification, stated that, "ADS-B, standing alone, is not a collision avoidance system, and is not an alternative to TCAS." The Safety Board agrees and, therefore, believes that the FAA should amend 14 CFR 121.356, 125.224, and 129.18 to require that all aircraft of 15,000 Kg (33,000 pounds) or greater maximum takeoff weight or more than 30 passenger seats be equipped with TCAS II and an appropriate Mode S transponder.

Further, the Safety Board recognizes that the TCAS I equipment currently required for aircraft with 10 to 30 passenger seats may have safety benefits for small cargo aircraft as well. Therefore, the Safety Board believes that the FAA should study and publicly report on the feasibility and safety benefits of requiring TCAS equipment for all cargo aircraft operating under 14 CFR Parts 121, 125, and 129.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend 14 Code of Federal Regulations 121.356, 125.224, and 129.18 to require that all aircraft of 15,000 kilograms (33,000 pounds) or greater maximum takeoff weight or more than 30 passenger seats be equipped with Traffic Alert and Collision Avoidance System II and an appropriate Mode S transponder. (A-99-55)

Study and publicly report on the feasibility and safety benefits of requiring Traffic Alert and Collision Avoidance System equipment for all cargo aircraft operating under 14 Code of Federal Regulations Parts 121, 125, and 129. (A-99-56)

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

  
By: Jim Hall  
Chairman