

Log 2301



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: July 19, 1991

In reply refer to: A-91-32

Honorable James B. Busey  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

Aircraft familiarization information for aircraft rescue and fire fighting (ARFF) personnel exists in several forms and includes emergency access, aircraft systems, and fire fighting/rescue information for aircraft types. In addition to "crash crew" charts, aircraft manufacturers publish information in ground handling manuals on aircraft types and models. Also, the National Fire Protection Association (NFPA) publishes Manual 402M, "Aircraft Rescue and Fire Fighting Operations," 1989 Edition, which includes a number of charts for various aircraft. However, the adequacy and thoroughness of the information should be improved, and the availability and dissemination of such materials varies greatly.

Safety Board accident investigations have found that fire fighters were not familiar with several types of aircraft. For example:

NTSB Safety Study/SS-84/02, "Airport Certification and Operations," page 26 states:

The weakest area of training the Safety Board observed was in familiarization with new airplanes. None of the crash-fire-rescue units at the study airports had training diagrams of the DC-9-80, or the Boeing 757 or 767. The study found that airport crash-fire-rescue personnel indicated that familiarization was accomplished only when a new airplane began serving the airport and that training sessions were usually conducted by maintenance personnel of air carriers using the new equipment. Some crash-fire-rescue units stated that familiarization was difficult unless the new airplane remained at the airport overnight. Aircraft familiarization in crash-fire-rescue training is very important because it provides personnel with vital fire fighting and rescue information, such as the position and locking mechanism of normal and emergency exits, aircraft cabin configuration, seating arrangements, location and operation of the equipment and service access doors, and configuration of fuel and electrical power systems. Although this knowledge can be acquired by studying airplane emergency system diagrams, there is no substitute for periodic familiarization with the airplane.

NTSB Aircraft Accident Report/AAR/84/12, Pilgrim Airlines, Inc., Fokker F27-100, N148PM, John F. Kennedy International Airport, Jamaica, New York, January 13, 1984, page 23 states:

The judgement exercised by the CFR crew chief in requesting the captain to reenter the airplane to shut down the electrical power is a matter of concern. If it was believed that a risk existed because the electrical power was a potential ignition source for a fire, it was unwise to expose the captain to the potential hazard inside the airplane. A better choice would have been to have a fire fighter with a charged hand line and self-contained breathing apparatus (SCBA) accompany the captain into the airplane.

NTSB Aircraft Accident Report/AAR/88/09(PB88-910411), errata sheet, Continental Airlines, Inc., Flight 1713, McDonnell Douglas DC-9-14, N626TX, Stapleton International Airport, Denver, Colorado, November 15, 1987, page 41 states:

In the area of the aft tailcone exit, impact damage and debris delayed passenger evacuation 7 to 10 minutes. Contributing to the delay was the fact that outside rescuers were hampered by limited visibility around the hatch area. The only instruction printed on the outside of the hatch was the word "Pull" on a placard near the hatch release handle. The hatch was then upside down because the fuselage was inverted.

NTSB Aircraft Accident Report/AAR/88/11, Ryan Air Service, Inc., Flight 103, Beech Aircraft Corporation, 1900C, N401RA, Homer, Alaska, November 23, 1987, pages 30-31 states:

Information on recommended forcible entry locations would have resulted in quicker access into the cabin and to the passengers. As it was, passengers had to be removed one at a time through the main cabin door. The seven passengers arrived at the hospital in Homer between 48 to 78 minutes after the first rescue units arrived at the crash site. Survivors would have arrived at the hospital sooner had it been possible to remove more than one passenger at a time from the airplane.

Moreover, rescue personnel had to exercise extreme caution when they cut into the fuselage because they believed that fuel lines and electrical wires would be severed--fuel had been spilled and the electrical system was still energized during the extrication of survivors. Given the spilled fuel and several ignition sources in the cabin, the potential for a fire was great. Obviously, fire fighters and rescue personnel must know exactly where forcible entries can be made into aircraft without endangering themselves and trapped survivors.

Another problem faced by rescuers was their inability to locate the master switch to shut off the electrical power. When rescuers

arrived on scene, the pilot and first officer were still in their seats, and the instrument panel had been forced down onto them. During the 45 minutes it took for rescue personnel to locate and disconnect the battery, the first officer could not be removed from his seat because movement in the area resulted in electrical arcing in the instrument panel.

Examination of the cockpit revealed that the master switch was located on the lower left of the captain's instrument panel. It was a black-colored lever with white letters labeled MASTER SWITCH which were clearly visible under normal conditions. However, in the cockpit it was difficult to see the master switch lever. The importance of disconnecting electrical power in any accident is obvious--to negate the potential as an ignition source for a catastrophic fire and to allow for expeditious removal of injured crew and passengers.

Information in the form of Crash Crew Charts pertaining to forcible entry, normal exit points, location of fuel and electrical lines, and location of batteries for various commercial airplanes are contained in the National Fire Protection Association's document 402M--Aircraft Rescue and Fire Fighting Operational Procedures, 1984. However, the Crash Crew Charts apply to larger commercial aircraft similar to the Boeing 727, deHavilland Dash 7, and McDonnell Douglas DC-10. A search of available literature failed to discover any document that contains small airplane charts for use by crash, fire, and rescue personnel. The Safety Board believes that with the proliferation of commuter airplanes, there is a need for training aids for crash, fire and rescue agencies that provide support for smaller airplanes that operate under 14 CFR Part 135.

As a result of that investigation, the Safety Board made the following recommendation to the NFPA:

Expedite the publication and dissemination of information on airplane access points, fire hazard zones, interior fuselage arrangements, the master power switch, and battery locations for airplanes with 10 or more seats. (Class II, Priority Action)  
(A-88-159)

On January 31, 1989, the president of the NFPA responded to Safety Recommendation A-88-159 by forwarding it to the NFPA Technical Committee on Aircraft Rescue and Fire Fighting for consideration at its 1989 meeting. The NFPA has advised that the additional information requested has been developed and will be included in the 1992 edition of NFPA 402M. Safety Recommendation A-88-159 is currently classified as "Open--Acceptable Action."

Following the crash of Grand Canyon flight Canyon 5, a deHavilland DHC-6-300 Twin Otter that crashed at the Grand Canyon National Park Airport on September 27, 1989, the Safety Board sent Safety Recommendation A-90-6 to

the Arizona Department of Transportation recommending that an ARFF training officer be appointed at the airport. The Safety Recommendation letter states: "The airport maintenance workers did not disconnect the airplane's battery when they arrived at the scene because they had not received aircraft familiarization training required by 14 CFR 139.319 and, thus, did not know where the battery was located."

In all of the aforementioned investigations, if the ARFF personnel had been more familiar with the aircraft, they would have been better prepared for the rescue operations, and they would have been able to minimize the difficulties encountered. For example, during the Pilgrim Airlines emergency response, if the CFR crew chief had sent a fire fighter into the airplane who was familiar with the electrical shut off switch on the Fokker F-27-100 instrument panel, the captain would not have had to reenter the airplane. If the rescuers at Denver's Stapleton International Airport had been familiar with the operation of the DC-9 pressure bulkhead hatch, they could have opened the hatch in spite of the fact that it was dark, the hatch release lever was inadequately marked, and the airplane was inverted. In the case of Ryan Air Service flight 103, the rescuers encountered difficulties attempting forcible entry and locating and operating the MASTER SWITCH to shut off electrical power. Had the rescuers been familiar with that type of airplane, the extrication/rescue time would have been significantly reduced.

Also, during the investigation of the collision of USAir Flight 1493 and Skywest Flight 5569 at Los Angeles International Airport (LAX) on February 1, 1991, LAX ARFF personnel expressed serious concerns that they had experienced difficulties in obtaining adequate aircraft rescue and fire fighting information for various types of aircraft.

Although "crash crew" charts and more detailed written information for fire fighters on each aircraft type and series would not be a panacea for all situations, adequate, detailed information must be available to rescuers to improve occupant survivability. Ideally, ARFF personnel should receive regular and thorough training on each type, series and configuration of aircraft that regularly use their airports, including periodic "hands-on" familiarization tours of such aircraft. Unfortunately, familiarization tours are difficult to conduct, especially at small and medium-size airports used by 14 CFR part 121 and/or 135 carriers, because the aircraft are often scheduled only for "quick turn-arounds." Longer aircraft down times, including overnight stays, typically occur at larger hub airports. Also, at smaller airports, which have more constrained budgets for ARFF personnel, training and equipment, it is more difficult to receive adequate aircraft familiarization training. Because of such constraints, it is imperative that detailed aircraft rescue information be provided to all ARFF personnel at 14 CFR part 139 certificated airports.

Although positive action by the NFPA on Safety Board Safety Recommendation A-88-159 could significantly improve the adequacy and dissemination of aircraft familiarization information for commuter aircraft, it is unclear whether such "crash crew" charts would be disseminated in a timely manner to all airports that need them. Whether the amount of information shown on typical "crash crew" charts is of sufficient detail to

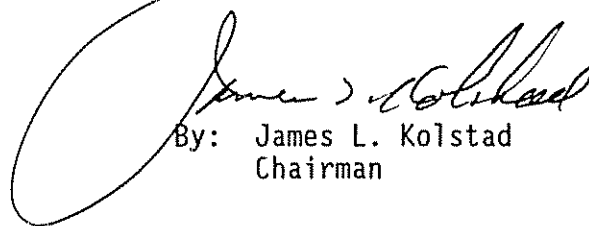
prepare ARFF personnel adequately for various types of emergencies is also undetermined. For example, the 40-page Canadair Challenger crash-fire-rescue manual, which is published and widely disseminated by Canadair Group, contains considerable information that could be of use to rescuers and is not routinely contained in typical "crash crew" charts. Such information includes diagrams of composite materials and interior configurations, detailed information on the operation of exit, cargo and service compartment doors, manufacturer's recommendations on the types of extinguishing agents to be used for different types and locations of fires, data on fuel tank capacities, and detailed descriptions/locations of internal and external electrical and fuel cut-off switches.

Safety Board accident investigations indicate that improvements in aircraft familiarity information provided to ARFF personnel are sorely needed. Therefore, the Safety Board believes that more detailed, aircraft-specific, rescue and fire fighting information is required, such as that contained in the Canadair Challenger crash-fire-rescue manual.

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

Establish and oversee a working group, consisting of at least the Airport Operators Council International, the American Association of Airport Executives, air carrier associations, the Aerospace Industries Association, and the National Fire Protection Association, to conduct an in-depth survey of 14 CFR part 139 certificated airports to determine the adequacy and timely dissemination of aircraft "crash crew" type publications used by aircraft rescue and fire fighting personnel, and after reviewing the survey information, take action as needed to improve the content of such publications and the methods for disseminating them. (Class II, Priority Action) (A-91-32)

Chairman KOLSTAD, Vice Chairman COUGHLIN, and Members LAUBER and HART concurred in this recommendation. Member HAMMERSCHMIDT did not participate.



By: James L. Kolstad  
Chairman