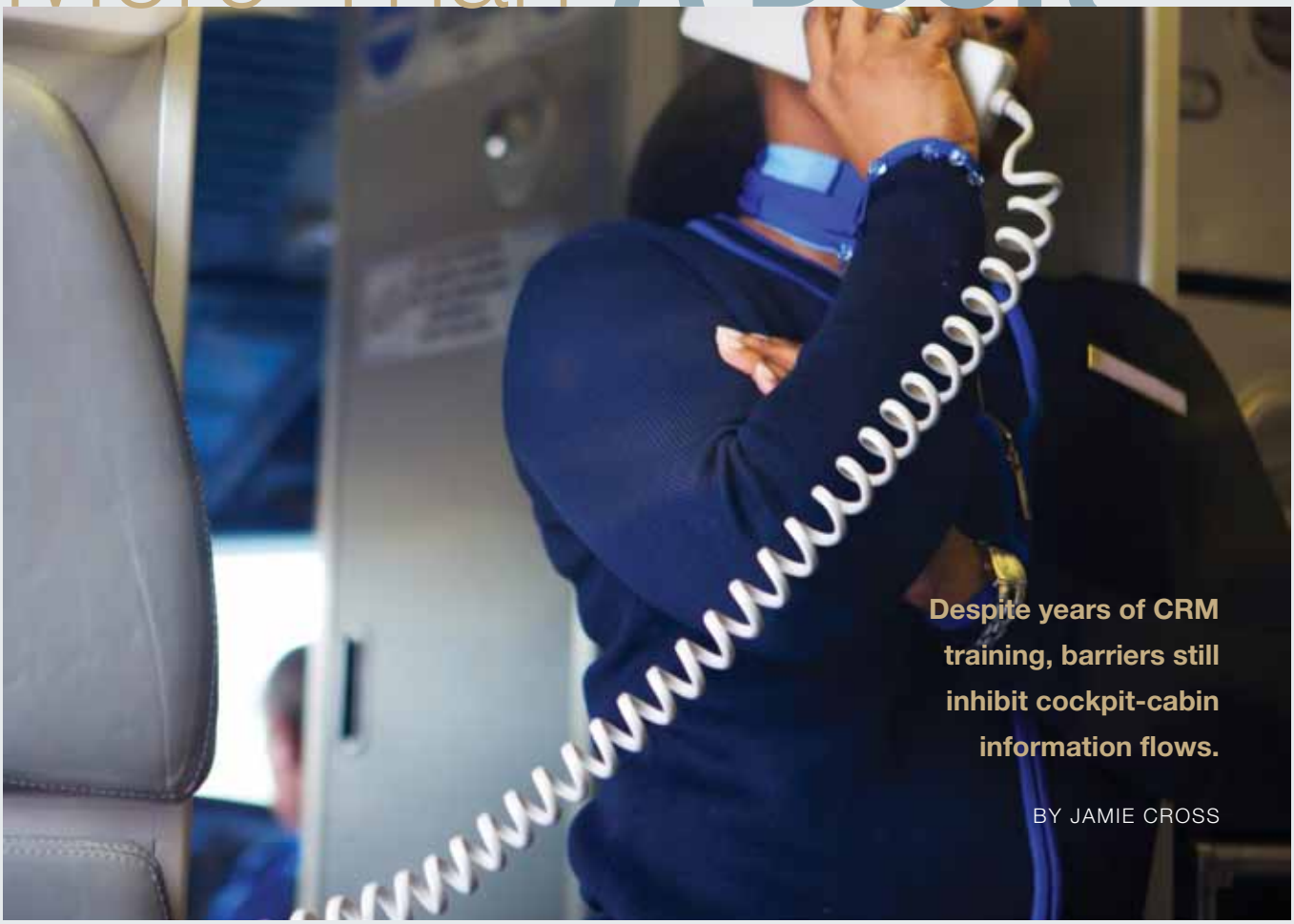
More Than A DOOR



Despite years of CRM training, barriers still inhibit cockpit-cabin information flows.

BY JAMIE CROSS

On Jan. 8, 1989, a British Midland Boeing 737-400 left London Heathrow Airport for Belfast, Northern Ireland, with eight crewmembers and 118 passengers. About 15 minutes into the flight, as the aircraft was climbing through 28,300 ft, a series of compressor stalls occurred in the left engine as a result of a fan blade detachment. Passengers and cabin crew heard an unusual noise, accompanied by moderate to severe vibration; some of those in the airplane were aware of smoke and a burning smell in the cabin, and many saw signs of distress from the left engine, which they described variously as fire, torching or sparks.[1]

On the flight deck, the pilots followed an emergency drill that led them to believe that the right engine had suffered damage. They reduced power and then shut down the healthy right engine without seeking observations from the cabin crew. The captain announced over the public address system that there was trouble with the right engine, that the engine was now shut down and that they were diverting to East Midlands Airport.

Although some passengers and cabin crew were puzzled by the announcement referring to the right engine, no attempt was made to inform the pilots that they had witnessed problems with the left engine. With little thrust available, the aircraft struck a field on final approach to the airport, with 48 fatalities.

Over the past 20 years, numerous dramatic accidents and incidents have highlighted the dangers of inadequate cockpit-cabin coordination and communication. The critical question raised at all the subsequent investigations was why this occurred, and what measures could be put in place to prevent it happening in the future.

The barriers to this communication can be traced to the earliest days of commercial aviation, when the captain was considered to be the ultimate authority. Little input from the other pilots was requested or considered, and there certainly was no input from the cabin crew.

However, this lack of synergy became increasingly recognized to have played a role in many accidents; initial attempts to improve the flow of information focused on the cockpit.

Meanwhile, in the cabin, airlines were introducing training that enabled cabin crew to work more effectively together. One accident highlighting this need occurred on Dec. 20, 1995, when a Tower Air Boeing 747, attempting to take off from New York John F. Kennedy International Airport during a snowstorm, departed the left side of the runway. A lack of coordination and communication in the cabin contributed to a flight attendant suffering serious injuries from an incorrectly stowed galley cart and to minor injuries to 24 passengers. Subsequent recommendations from the U.S. National Transportation Safety Board said the U.S. Federal Aviation Administration should work to improve communications among cabin crew and "encourage the use of this accident as a case study for crew resource management."[2]

Yet, despite this training, the separate entities still did not communicate effectively. It took years for the training to include the cabin crew, and then to evolve into what is now known as crew resource management (CRM), first achieved by America West Airlines' approach to CRM, titled "Aircrew Team Dynamics."[3]

However, despite this new CRM training, gaps remained. Some of these accidents and incidents are attributable to a misunderstanding, or misinterpretation, of the sterile cockpit rule, enacted in the United States in 1981 to help curb accidents in which the flight crew was diverted from the task at hand during critical phases of flight.

Shortly after takeoff on July 9, 1995, from O'Hare International Airport, Chicago, an ATR 72 operated by Simmons Airlines experienced the loss of the rear cabin entry door at an altitude of 600 feet.[4] A flight attendant could hear air coming through the door prior to the door's separation but did not call the cockpit because the aircraft was under sterile cockpit conditions. When asked later under what conditions she would call a sterile cockpit, she responded that she would call in case of fire or a problem passenger.

Studies undertaken in the mid-1990s further accentuated the importance of joint pilot and cabin crew training, and joint pilot and cabin crew preflight briefings.[5] Despite these advances, accidents and incidents continued. For example, aircraft on rare occasions land in the wrong place. Real-time moving maps in the cabin give cabin crew and passengers awareness of their position, yet nothing was said on Sept. 5, 1995, when a Northwest Airlines McDonnell Douglas DC-10 bound for Frankfurt, Germany, mistakenly landed in Brussels, Belgium, about 200 mi (322 km) away.[6] Passengers and cabin crewmembers were disturbed by the change in the flight plan but did not attempt to contact the pilots. Some cabin crewmembers even speculated that the aircraft had been hijacked, but contact still was not made with the pilots. When it became apparent the aircraft was landing at the wrong airport, they were reluctant to contact the pilots because of the sterile cockpit rule.

Another example of barriers to communication are flight deck doors, which create a physical barrier; following the Sept. 11 terrorist attacks, they were required to be locked prior to engine start-up. On Jan. 11, 2006, an Avro 146-RJ100 suffered a jet-pipe fire on engine startup at Edinburgh Airport, Scotland.[7] The fire knocked a generator off-line, severely restricting the interphone system. The cabin crew could not establish communication with the pilots, and were unable to open the locked cockpit door. The pilots were only made aware of the fire when it was reported to them by a ground handler. The cabin crew initiated an emergency evacuation of the passengers, of which the flight crew was unaware.

The author conducted a study to ascertain why communication breakdowns still play a role in accidents. A 26-item Web-based questionnaire was constructed for cabin crew. The questionnaire captured basic demographic information, work experience, seniority, aircraft

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types flown, exposure to training and experience of preflight briefings. There was also a series of questions that described scenarios to help us understand how cabin crewmembers would react in certain situations, gauging their reluctance to pass information to the pilots, their ability to prioritize information, their understanding of the impact of physical separation, their familiarity with technical and operational terminology, and their general awareness of the flight environment with regard to safety. Some of these questions were duplicated from previous research to allow a direct comparison of "now" and "then." Others were drawn from actual accident investigation reports. Mixed in with these historical scenarios were fabricated scenarios of less importance to present the participant with a choice. For example, do you tell the pilot there's a fire — a real scenario extracted from an accident report — or do you tell the pilot that there's no milk aboard?

The study discussed 19 accidents and incidents related to a breakdown of communication; the sample size was 263.

The study found that, as a result of the CRM training, cabin crews' working practices are safer today. This was based on improvements in all areas studied when measured against previous research, a positive behavioral trend in realistic scenario analysis compared with actual accidents, and a wide implementation of recommendations made by accident investigators in those actual accidents.

It also found a significant increase in the amount of joint CRM training with pilots (Table 1), although this still does not occur as often as might seem appropriate.

The study found that the majority of cabin crew could correctly distinguish between emergency and non-emergency events (Table 2). However, there continued to be confusion over the sterile cockpit rule, resulting in flight attendants saying they would contact the pilots with trivial and non-emergency information during critical phases of flight. Similarly, it was found that vital information would not be relayed to the pilots for fear of infringing upon the rule, even during non-critical phases of flight. With 96 percent of participants indicating that they have had some form of CRM training, a discussion of the sterile cockpit rule clearly is not being included, or it is being presented ambiguously, in this training.

The ability to understand technical aspects of a flight, and therefore to correctly relay relevant information to the pilots should an unusual situation occur, has an impact on the communication process. If the pilots do not expect reliable information from the cabin crew, they may be more skeptical about the information they do receive and more hesitant to utilize cabin crewmembers as a source of information. Similarly, a flight attendant who is not comfortable with their own technical knowledge may be less willing to pass information forward to the pilots. The study found that there is a significant improvement in the confidence of flight attendants to describe technical components or malfunctions of an aircraft.

While this study found that the frequency of preflight briefings has increased over previous research, they are not occurring prior to every flight, as might be desired. Crews may be unfamiliar with each other, and, in some unusual situations, may even come from different departments with different standard operating procedures and will be physically separated once on board, all of which makes communication difficult. One respondent to the questionnaire stated that a locked flight deck door "has undone 15 years of excellent CRM." Unless there is good rapport between pilots and cabin crew, established predominantly through preflight briefings, this physical separation can lead to feelings of alienation among cabin crewmembers and hesitation to contact the pilots.

Finally, the study addressed whether the accidents and incidents explored might have been prevented. With

Which statement best describes your experience of Crew Resource Management (CRM) training?

Answer Options	Response Percent	Response Count
I do not know what CRM training is	0.9%	2
I have never had CRM training	2.7%	6
I had CRM training once at the beginning of the job and it was also attended by pilots	6.4%	14
I had CRM training once at the beginning of the job and there were no pilots in present	11.9%	26
I have CRM training on a regular basis (at least annually) and it was also attended by pilots	65.3%	143
I have CRM training on a regular basis (at least annually) but it was rarely/never attended pilots	12.8%	28

Source: Jamie Cross

Table 1

You have completed your emergency demonstration and the aircraft is being pushed back from the stand. What is the earliest time you would contact the pilots given the following situations:

Answer Options	Immediately (5)	During Taxi (4)	During Climb (3)	In the Cruise (above 10,000 feet) (2)	Never (1)	Rating Average
To discuss the crew meals	2	0	4	146	29	1.90
In the event of what would appear to be smoke in the cabin	172	2	5	1	1	4.90
In the event of a disruptive passenger that does not immediately endanger safety	45	56	4	64	12	3.32
In the event of a disruptive passenger that is endangering safety	161	8	3	8	1	4.77
To discuss en-route weather	1	4	5	136	35	1.90
In the event of you hearing an unusual gentle humming noise coming from a door after take off, which progressively gets louder	68	5	67	40	1	3.55

Note: The answer options were rated as to how quickly the crewmember would contact the pilots, with 5 being the most rapid response and 1 being the least rapid response to arrive at the rating average listed.

Source: Jamie Cross

Table 2

reference to the British Midland accident, the evidence suggested a high probability that if the pilots of the ill-fated aircraft had received more information from the cabin crew, they might have had time to avert the accident.

In terms of future work, the breakdown of communication should continue to be monitored, since it is still, in part, a key element in many accidents and incidents. In addition, a study focusing on pilots would be beneficial.

Among many recommendations, the study included these:

All cabin crew should have initial CRM training, followed by refresher sessions, containing an element in which it is combined with pilot CRM training.

Included in any cabin crew CRM training should be a clear, concise and practical interpretation of the sterile cockpit rule.

In addition to CRM training, cabin crew would clearly benefit from a threat and error management program.

Every flight should be preceded with a briefing attended by all pilots and cabin crew, in a relaxed, informal atmosphere, inviting cabin crew participation and introductions.

Cabin crew should be made aware of, and encouraged to use, voluntary safety reporting systems.

All cabin crew should have technical and operational training.

Aircraft public address systems should be improved, or another system installed, such as the use of personal ear pieces, to ensure that the cabin crew can always hear pilot announcements.

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Notes

1. U.K. Air Accidents Investigation Branch (AAIB). (1990). *Report on the Accident to Boeing 737-400 G-OBME Near Kegworth, Leicestershire on 8 January 1989.* Aircraft Accident Report 4/90.
2. U.S. National Transportation Safety Board (NTSB) (1995). *Runway Departure During Attempted Takeoff, Tower Air Flight 41, Boeing 747-136, N605ff, JFK International Airport, New York, December 20, 1995.* NTSB/AAR–96/04.
3. Vandermark, M. J. (1991). "Should Flight Attendants Be Included in CRM Training? A Discussion of a Major Air Carrier's Approach to Total Crew Training." *International Journal of Aviation Psychology*, 1(1), pp. 87–94.
4. NTSB (1995 B). *Survival Factors Specialist Report, Simmons Airlines (dba American Eagle) Flight 4127, Chicago, Illinois; July, 9, 1995.* NTSB/CHI-IA-A215.
5. Chute, R. D.; Wiener, E. L. (1994). "Cockpit and Cabin Crews: Do Conflicting Mandates Put Them on a Collision Course?" *Cabin Crew Safety* Volume 29 (March–April 1994).
6. Phillips, D. (1995). "U.S. Jet Bound for Germany Mistakenly Lands in Belgium." *Washington Post*, October 1, 1995. pp. A1, A5.
7. AAIB (2006). *Avro 146-RJ100, G-CFAE. AAIB Bulletin* 1/2007 EW/C2006/01/01.