



Use of Standard Phraseology by Flight Crews and Air Traffic Controllers Clarifies Aircraft Emergencies

International Civil Aviation Organization procedures for declaring mayday or pan-pan eliminate ambiguity about an aircraft in distress or an aircraft in an urgency condition, respectively. Declaring an emergency generates maximum assistance from air traffic controllers worldwide, but delay in declaring an emergency may create confusion or narrow the pilot's options.

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FSF Editorial Staff

Ten years ago, during the U.S. National Transportation Safety Board's (NTSB) investigation of the Avianca Airlines Flight 052 accident, U.S. Federal Aviation Administration (FAA) air traffic controllers said that they expected flight crews to use the specific words "mayday" or "emergency" to declare an emergency.^{1,2}

The investigation considered — among other issues — whether international procedures and phraseology for pilot-controller emergency communications were adequate. One outcome was safety recommendations to distinguish situations in which an aircraft is in distress because of low fuel and situations in which a flight crew cannot accept any undue delays because of low fuel. Otherwise, there was consensus that the procedures and phraseology were adequate.

Declaring an emergency obligates controllers — under procedures of the International Civil Aviation Organization (ICAO), FAA and other civil aviation authorities — to give maximum assistance and priority handling to an aircraft in distress. The term "priority handling" (and similar terms such as "traffic priority") have not been defined officially by ICAO



or FAA, but "priority" in air traffic control (ATC) refers to aircraft order of service established by procedures for determining the order of importance. Priority handling may be provided to aircraft for various reasons other than an emergency (for example, a medical transport mission or search-and-rescue operations); nevertheless, specific procedures for declaring an emergency ensure the maximum level of priority handling.

David Canoles, manager, FAA air traffic evaluation and investigation staff, said, "In general, all traffic in the system is handled on a first-come, first-served basis. Priority handling does not mean urgency or distress, it simply means no undue delay.

"In an emergency, however, the controller can break all the rules to assist the pilot."³

Cay Boquist, chief of the ICAO Air Traffic Management Section, said that air traffic controllers commonly use priority in the dictionary sense, but pilots and controllers have come to understand priority handling to mean specifically a method of ATC operation in which controllers typically would provide

direct routing to an airport, would reroute other aircraft to the extent necessary to avoid delays and would not use holding for the aircraft receiving priority handling.⁴

Boquist said that the following excerpts from ICAO documents summarize key concepts of priority handling of aircraft and pilot-controller authority to take necessary action during an emergency:

- “An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given priority over other aircraft;”⁵
- “The approach sequence shall be established in a manner which will facilitate the arrival of the maximum number of aircraft with the least average delay. A special priority may be given to: a) an aircraft which anticipates being compelled to land because of factors affecting the safe operation of the aircraft (engine failure, shortage of fuel, etc.); b) hospital aircraft or other aircraft carrying any sick or seriously injured person requiring urgent medical attention; [and.]”⁶
- “The various circumstances surrounding each emergency situation preclude the establishment of exact detailed procedures to be followed. ... Air traffic control units shall maintain full and complete coordination, and personnel shall use their best judgment in handling emergency situations.”⁷

The action or inaction of pilots and controllers during an emergency may have immediate safety consequences, and may affect court judgments about legal responsibility if an accident occurs. (See “Analysis of U.S. Court Cases Shows Compatibility of Safety, Legal Responsibility” on page 3.)⁸

ICAO procedures for emergency communication do not “prevent the use, by an aircraft in distress, of any means at its disposal, to attract attention, make known its position and obtain help.”⁹

Specific ICAO terms — for declaring an emergency and for telling ATC about an aircraft in an urgency condition — were designed to be simple but unmistakable signals taught during the basic training of pilots and air traffic controllers worldwide.

To declare an emergency, the pilot precedes the message with the word “mayday,” preferably spoken three times, at the beginning of the first distress communication. (“Mayday” comes from the French “m’aidez,” which means “help me.”)

To declare an urgency condition, the pilot precedes the message with the term “pan-pan” (pronounced pahn-pahn), preferably spoken three times. (ICAO said that pilots also can precede each subsequent communication in distress radio communication or urgency radio communication with mayday or pan-pan, respectively.)¹⁰

Following ICAO procedures, the pilot of the aircraft in distress should transmit on the air-ground frequency in use at the time (that is, normally the station communicating with the aircraft or in whose area of responsibility the aircraft is operating). Emergency frequency 121.5 MHz or an alternative aeronautical mobile frequency can be used “if considered necessary or desirable,” but some aeronautical stations do not guard continuously the emergency frequency. In using any means available to attract attention and communicate about the aircraft’s conditions, the pilot also may activate the appropriate secondary surveillance radar transponder mode and code. The pilot should tell ATC, speaking slowly and distinctly, as many of the following items of information as possible (the exact procedures of a specific civil aviation authority or airline may vary):

- The identification of the station addressed;
- The identification of the aircraft;
- The nature of the distress condition;
- The intentions of the pilot-in-command (PIC); and,
- The present position, altitude and heading.¹¹

Flight crews should expect air traffic controllers to take the following actions:

- Acknowledge immediately the crew’s distress message;
- Take control of the communications or clearly transfer that responsibility to another controller (and notify the flight crew);
- Take immediate action to inform other ATC facilities (and the aircraft operator as soon as possible);
- Warn other ATC facilities to prevent the transfer of non-related communications to the frequency in use for distress communication;
- Possibly impose radio silence on that frequency for either all stations of the mobile service (that is, all aircraft and ground facilities) in the area or for any station that interferes with the distress traffic; and,
- Announce the termination of distress communication and of radio silence, if imposed.¹²

ICAO’s policy on languages to be spoken in international aviation is that the language of the ground station (typically the language of the country in which the station is located) determines the primary language to be used in air-ground communications. If English is not the language of the ground station, however, ATC services in English should be available on request. English, in effect, serves as a universal medium of radio communications.¹³

Analysis of U.S. Court Cases Shows Compatibility of Safety, Legal Responsibility

Two aviation principles — that the pilot-in-command (PIC) of an aircraft has authority for the safe conduct of flight and that pilots may exercise emergency authority to deviate from the normal regulations and clearances — are among many that come into play when U.S. courts determine legal responsibilities following an aircraft accident.

Declaration of an emergency by either a flight crewmember or an air traffic controller may become a pivotal element of judging whether an aviation professional exercised the degree of care expected by society — by following applicable regulations and standard operating procedures, for example.

Steven Riegel, a senior aviation counsel in the U.S. Department of Justice, in 1997 analyzed the legal responsibilities of pilots and air traffic controllers in the context of in-flight emergencies by reviewing the relevant laws and regulations, discussing 10 court cases that involved pilot-controller emergency communication and citing several dozen court decisions that have set legal precedents.¹

Based on his experience representing U.S. air traffic controllers in legal matters, Riegel said that typically controllers expect to handle aircraft emergencies as part of their normal services to pilots, focus on assisting pilots who declare an emergency and do not want to generate unnecessary paperwork.

Riegel said, "Air traffic controllers are trained to provide maximum assistance to pilots in an emergency situation, but the majority of controllers are not pilots, and no controller can be as familiar as the pilot with a particular pilot's situation, capabilities and needs in an emergency. Therefore, the more specificity in a pilot's request, the better the controllers can accommodate the requests."

Riegel made the following points among the findings in his analysis:

- Pilots and air traffic controllers have concurrent responsibilities for the safety of an aircraft flight and passengers;
- The pilot and the air traffic controller switch roles in some respects after the pilot declares an emergency. That is, the PIC then tells air traffic control (ATC) his or her intentions, deviates from normal rules and clearances as necessary, and obligates air traffic controllers to provide maximum assistance to enable the flight crew to conduct the flight via the course of action determined by the PIC;
- In the United States, Federal Aviation Regulations (FARs) have the force and effect of law, and the

recommended procedures adopted by the International Civil Aviation Organization may be significant in establishing in court the standard of care expected of aviation professionals;

- U.S. courts have held that the authority of the PIC includes presumptions that aircraft pilots will handle unusual and unexpected occurrences appropriately, will exercise discipline on the flight deck, will be cognizant at all times of any hazards that they can perceive (and declare an emergency when appropriate), and will reject any ATC vectors, instructions or clearances that would jeopardize safety;
- Litigation involving the actions of air traffic controllers may consider whether ATC met the standard of care of maximum assistance after declaration of an emergency, but controllers have not been expected to have known an aircraft's situation beyond what has been communicated by the flight crew or has been reasonably apparent (for example, by observing the aircraft using radar);
- Air traffic controllers must warn aircraft to avoid a hazard when they are aware of the hazard, but they are not necessarily negligent when they deviate from guidelines issued by FAA, do not warn pilots about something that the pilot should know in ordinary circumstances, or do not anticipate that an aircraft emergency will develop from the limited information that they have received;
- FAA personnel can assume that pilots will know and follow all FARs applicable to the flight operation, will exercise their best judgment and, to a reasonable degree, will provide information that is relevant to the pilot's decision making; and,
- U.S. courts have not accepted arguments that pilots should be exempt from enforcement action if they declared an emergency and this action was, in reality, not related to an in-flight emergency that required immediate attention.♦

— FSF Editorial Staff

Reference

1. Riegel, Steven. "In-flight Emergencies: Legal Responsibilities of Pilots and Air Traffic Controllers." Paper presented at the 31st annual Southern Methodist University Law Symposium, Dallas, Texas, U.S., February 1997.

Describing the need for a universally available language, ICAO said, "It is always possible that an emergency may require communication with a ground station not foreseen in the original planning [of crewmember assignments by language qualification], and that the handicapping or prevention of such emergency communications by the lack of a language common to the aircrew and the ground station could lead to an accident."¹⁴

Standardized phraseology and communication procedures help to compensate for distractions and ambiguity of context inherent in pilot-controller radio communication even when English is used. For example, in the 1977 fatal accident involving two Boeing 747 aircraft on a runway in Tenerife, Canary Islands, Spain, one pilot's use of the phrase "at takeoff" was misinterpreted by a tower controller to mean that his aircraft was ready for takeoff when the pilot actually was beginning the takeoff.¹⁵

Several civil aviation authorities, international aviation organizations, controllers and pilots said that they believe that ICAO procedures for pilot-controller emergency communication work well. They said that in current practice, the following commonalities, and a few differences, are significant:

- ICAO procedures and phraseology for declaring an emergency are well documented, but many flight crews use alternate phraseology in their first language if circumstances permit;
- Air traffic controllers in some countries are receiving more training to be alert to signs of an aircraft emergency or impending emergency, to question flight crews and to declare an emergency for the flight crew in some situations;
- Some said that ICAO phraseology for communicating an urgency condition apparently is not used, or not used appropriately, by many flight crews;
- Hesitancy or reluctance to declare an emergency was not considered to be a significant issue for airline pilots, especially in the United States and most of Europe;
- Flight crews do not gain anything significant by not declaring an emergency when circumstances indicate that they should do so; and,
- The universal, overriding objective of ATC is to provide assistance, not to enforce regulations, when an aircraft is in a distress situation or an urgency situation. Typically, declaring an emergency does not carry any penalty and does not prompt an automatic investigation of the emergency, because civil aviation authorities want to encourage pilots to request ATC assistance at the earliest possible time. Flight crews might be expected to

document what occurred for their airline and/or civil aviation authorities, however, and may not be exempt from regulatory enforcement action for other reasons.

Accident Focused Attention on Issues in Declaring an Emergency

The following statements concerning pilot-controller emergency communication were part of the discussion in NTSB's final report on the Avianca Flight 052 accident:¹⁶

- "If a pilot, or flight crew, has a limited English-language vocabulary, he has to rely heavily on the meaning of the words he does know. If those words have a vague meaning, such as the word 'priority,' or if a clear set of terms and words [is] not used by pilots and controllers, confusion can occur, as it did in this accident";
- "The word 'priority' was used in procedures manuals provided by The Boeing Co. to the airlines. A captain from Avianca Airlines testified that the use by the first officer of the word 'priority,' rather than 'emergency,' may have resulted from training at Boeing. The captain also testified that airline personnel, who provided flight and ground instruction to the first officer of AVA052, were trained by Boeing. He stated that these personnel received the impression from the training that the words priority and emergency conveyed the same meaning to air traffic control. ... Also, in its published procedures, Avianca Airlines uses the term 'priority' regarding the communication of low fuel status";
- "When [U.S.] ATC controllers were asked the phraseology that they would respond to immediately when a flight crew indicated a low-fuel emergency, they replied 'mayday,' 'pan-pan' and 'emergency.' The controllers stated that, although they would do their utmost to assist a flight that requested 'priority,' the word would not require a specific response and that if a pilot is in a low-fuel emergency and needs emergency handling, he should use the word 'emergency'";
- "The question also was raised during the investigation about whether pilots might use such words as 'priority,' when they really needed emergency assistance, because of concern about receiving a flight violation or having to write a report to the FAA after landing. ... However, [FAA] said that there would not be unwarranted actions against any pilot who had declared an emergency and that if a pilot has an emergency, he or she is encouraged to declare it"; [and,]
- "The evidence gathered by the [NTSB] during its investigation of the Avianca accident suggests that FAA ATC phraseology is not always understood by [non-U.S.] pilots."

U.S. Airline Pilots Believe Key Lessons Have Been Learned

Capt. Paul McCarthy, executive air safety chairman for the Air Line Pilots Association, International (ALPA), said that the Avianca Flight 052 accident was significant in revealing the types of problems that might occur in communications during an emergency.¹⁷

The NTSB report said that the accident flight crew did not adequately communicate its increasingly critical fuel situation to the controllers who handled the flight; that the first officer (who made all recorded transmissions to U.S. controllers) incorrectly assumed that his request for priority handling by ATC had been understood as a request for emergency handling; that the captain experienced difficulties in monitoring communications between the first officer and ATC; and that the first officer did not use the appropriate phraseology to communicate to ATC the aircraft's minimum fuel status. The Colombia Department of Civil Aeronautics, in comments on the NTSB report, said that "the control tower gave no special meaning to the statement made by the flight crew 'And we are running out of fuel, sir' made during their missed approach."

The Avianca Airlines Route Manual contained the following information about low-fuel state, said the NTSB report:

- "Advise ATC of your minimum fuel status when your fuel supply has reached a state where, upon reaching [the] destination, you cannot accept undue delay;
- "Be aware that this is not an emergency situation but merely an advisory that indicates an emergency situation is possible should any undue delay occur; [and,]
- "Be aware [that] a minimum fuel advisory does not imply a need for traffic priority."

The NTSB report said, "After the flight discontinued its approach to [John F. Kennedy International Airport (JFK), New York, New York, U.S.,] ... the captain advised the first officer, 'tell them we are in emergency.' However, the first officer acknowledged an ATC altitude and heading instruction to the JFK tower controller, adding ' ... we're running out of fuel.' He did not use the word 'emergency,' as instructed by the captain, and therefore did not communicate the urgency of the situation. Thus, the controller was not alerted to the severity of the problem."

McCarthy said that when an airline pilot declares an emergency, most often the situation involves one of three things: a problem with the aircraft, low fuel or the need to deviate around weather at a time when the controller cannot give this clearance because of other traffic. Airlines' standard operating procedures (SOPs) and emergency training cover most situations that could be anticipated and the corresponding

decision-making processes. (See "Reports Show Various Circumstances for Declaring an Emergency" on page 6.)

McCarthy cited one possible source of misconceptions about adverse consequences for an airline captain after declaring an emergency. If a mechanical anomaly were to occur — such as a malfunction of flaps — and emergency procedures were followed to land the aircraft safely, the decision to declare an emergency would not be questioned. After landing, even if the pilot could move flaps to the commanded position and then cycle the flaps normally, this fact would not indicate that the pilot's declaration of an emergency was unwarranted, he said. Nevertheless, if the captain failed to make the appropriate logbook entries to document an anomaly that the flight crew experienced, the result could be regulatory enforcement action or enforcement of policy by the company.

"If you declare an emergency for a malfunction and you do not log [the malfunction], you have breached your obligation as a pilot," said McCarthy.

Regional Airline Safety Manager Finds ATC Proactive in Emergencies

Capt. Deborah Lawrie, flight safety manager of KLM Cityhopper and chairwoman of the European Regions Airline Association's Air Safety Work Group, said that in general, unless pilots in Europe declare pan-pan or mayday, they will not be given priority handling or emergency assistance. Lawrie said that sometimes air traffic controllers recognize that an emergency situation exists, request clarification and begin appropriate procedures before the flight crew declares an emergency. Flight crews should not assume or expect that controllers will interpret the aircraft's situation correctly; therefore, flight crews should declare an emergency promptly, she said.¹⁸

"Certainly you need to register the aircraft's distress status or urgency status with ATC to receive the correct priority," Lawrie said. "If an aircraft crew has been conducting communications about a developing problem, then it is probable that ATC will treat the situation as an emergency even before an official declaration of an emergency has been made by the flight crew."

Lawrie said that controllers in most parts of Europe commonly ask flight crews "if operations are normal," when the crew is unable to comply with ATC instructions or requests clearance to return to the departure airport or to divert. In these situations, ATC may not know whether an emergency situation exists, she said.

"It is my experience that ATC inquires about emergency status rather than requesting that pilots declare an emergency or urgency status," said Lawrie. "In some cases, the pilot simply may have overlooked the formality of declaring mayday or pan-pan."

Reports Show Various Circumstances for Declaring an Emergency

[FSF editorial note: The following excerpts from incident reports and accident reports in the United States describe circumstances in which airline flight crews and air traffic controllers declared an emergency or an urgency condition. The reports have been edited for clarity.]

- “After an engine was shut down due to an engine low-pressure light, we declared an emergency and requested the emergency equipment to stand by for landing at [Viracopos Airport, Sao Paulo, Brazil]. [The] Curitiba [Center] controller had difficulty understanding our request due to the language barrier between us. In addition, he did not realize that we were declaring an emergency. He asked us if it was a red, yellow or green emergency. We did not know what this meant. This resulted in my decision to dump fuel without notifying air traffic control (ATC). I also failed to set the transponder to 7700. Not being able to communicate adequately with ATC greatly increased our workload. (Callback conversation with [the captain who filed the report] revealed the following information: [the captain] expresses concern primarily over the fact that the Curitiba Center controller did not understand the meaning of the word ‘emergency.’ This captain stated ‘emergency’ many times, and it was not until another aircraft interrupted the communications, about five minutes after the first emergency declaration, that [the captain’s] words were translated into Portuguese for the controller. It was then that the controller asked if this was a ‘red, green or yellow’ emergency. [The captain] replied, ‘red,’ as he believes that anyone would. ... He now believes that the problem was purely related to the controller’s failure to understand ‘emergency.’ ... In hindsight, the captain states that he should have communicated the fuel dumping to ATC and set 7700 in the transponder. He also might have tried ‘mayday’ and [‘pan-pan.’] [The captain] has questioned his own actions in this emergency, [and] he states that everything was so confusing as a result of the conversation that transpired.”¹
- “On May 7, 1998, about 1920 eastern daylight time, a Douglas DC-9-32, N948VV, registered to and operated by Airtran Airlines as Flight 426, [U.S. Federal Aviation Regulations (FARs)] Part 121 scheduled domestic passenger service from Atlanta, Georgia, to Chicago, Illinois, encountered turbulence and hail near Calhoun, Georgia, while climbing through 20,000 feet, after departure from Atlanta. Instrument meteorological conditions (IMC) prevailed at the time, and an instrument flight rules (IFR) flight plan was filed. The aircraft received substantial damage. One flight attendant received serious injuries, and one passenger received minor injuries. The airline-transport-rated captain, first officer, two flight attendants, one jump seat rider and 80 passengers were not injured. The flight originated from Atlanta, Georgia, the same day, about

1905. The flight crew stated that while at a position about 50 miles north of Atlanta, they asked for and received permission from the [U.S. Federal Aviation Administration (FAA)] air traffic controller to fly a heading of 330 degrees to go around weather. This would take them between two weather returns and also allow them to follow another aircraft ahead of them. They had not given the flight attendants permission to leave their seats, and the captain again called them and asked them to remain seated. While climbing through 20,000 feet, they encountered severe hail, which lasted about five seconds, and moderate turbulence which lasted about 30 seconds. The three front windshields shattered and the radome separated from the aircraft. The captain’s [airspeed indicator] and first officer’s airspeed indicator became inoperative, and it became very noisy in the cockpit. They declared an emergency with the FAA air traffic controller and asked for directions to the nearest airport. An approach to landing was made to Lovell Field, Chattanooga, Tennessee, with FAA air traffic controllers reporting the aircraft’s groundspeed about every 10 [seconds to] 15 seconds. A landing was made at 1940, and, after inspection of the aircraft by fire-department personnel, the aircraft was taxied to a gate.”²

- “Over the Atlantic [Ocean] at Flight Level (FL) 320, the first officer came into the cabin to tell me that I should come back into the cockpit. I was on my break. Arriving in the cockpit, the first officer and international-relief first officer briefed me on the loss of engine oil in [the] no. 2 engine. The quantity showed one quart, the engine temperature was slightly higher than the left engine, and the oil pressure was about 26 pounds per square inch (psi) [1.84 kilograms per square centimeter] with some dips to below 25 psi [1.76 kilograms per square centimeter] showing an intermittent amber exceedance. Following the procedures, we increased the left engine to maximum continuous power and brought [the] no. 2 [engine] to idle. A [satellite communication (SATCOM)] call was placed to dispatch and patched into maintenance. Maintenance advised against running [the] engine in [the] amber zone for long. At idle, [the] engine still went into amber. I made the decision to shut down [the] engine, clear the North Atlantic Tracks track, descend to FL 240 and [divert to Bermuda International Airport, St. George’s, Bermuda]. New York [FAA flight service station] was notified via a high-frequency [declaration of pan-pan] and an emergency was declared. We were about two hours [from landing at the airport,] so the passengers were not informed of the situation until one hour out and were given an excellent briefing by the purser. We briefed a full emergency landing and the evacuation procedure, but passengers were given all assurances that the landing would be normal. [The flight crew] restarted [the]

engine 20 miles [(37 kilometers) from the airport] and kept it in reserve ... only adding minimal power on short final. No red exceedances were noted. Landing was not overweight and was normal in all respects. [The flight crew] terminated [the] emergency with [the airport] tower.”³

- “Deviating around [thunderstorms] (approximately 40 [nautical] miles [74 kilometers]) south and roughly paralleling [the] wind, while in cloud with light-to-moderate turbulence, [the aircraft] encountered [an] extremely strong updraft that forced auto-disconnect of [the] autopilot and [an] approximately 2,000-foot altitude excursion prior to manually stabilizing [the] aircraft. No traffic conflict occurred and no injuries or damage [were] sustained, but [a] significant clearance deviation occurred. [The captain who filed the report] broadcast a [pan-pan] message on [the] center frequency and [ATC] immediately recleared [the aircraft for] ‘block FL 370–410.’ [The aircraft] returned to FL 370 within approximately two minutes after [the] event. Turbulence never [was] greater than ‘moderate’ even though [an] updraft of approximately 5,000 feet [1,524 meters] per minute [was] experienced. After situation assessment and contact with both ATC and company, [the] flight proceeded with normal operations to [the] destination.”⁴
- “On Aug. 9, 1998, about 1253 eastern daylight time, an Embraer EMB-120RT, N225AS, landed with smoke trailing from the right engine at the Atlanta Hartsfield International Airport, Atlanta, Georgia. The airplane was operated by Atlantic Southeast Airlines as Flight 735, under the provisions of [FARs] Part 121 and IFR. Visual meteorological conditions (VMC) prevailed, and an IFR flight plan was filed. The airline transport pilot, copilot, one flight attendant and 23 passengers were not injured, and the airplane was not damaged. The flight originated at the Meridian, Mississippi, airport, at 1212. According to the FAA, while the aircraft was on final approach, air traffic controllers observed smoke trailing from the right engine. They notified the pilot [and aircraft] rescue and fire fighting (ARFF) and declared an emergency. The airplane landed on Runway 27L without incident and evacuated passengers via the stairs. There was no fire.”⁵
- “On Feb. 16, 1999, at 1602 eastern standard time, an Airbus A320-231, N628AW, operated by America West Airlines as Flight 2811, received minor damage when it landed at Port Columbus International Airport, Columbus, Ohio. There were no injuries to the two certificated pilots, three flight attendants and 26 passengers. [VMC] prevailed for the scheduled passenger flight which had departed from Newark, New Jersey, about 1404. Flight 2811 was operated on an IFR flight plan under [FARs] Part 121. According to statements from the flight crew, Flight 2811 was uneventful until the landing gear was lowered prior to

landing at [the airport]. The flight crew received multiple faults and elected to enter a holding pattern at the outer marker. The flight crew contacted maintenance control for assistance and was unsuccessful in clearing the faults. The flight crew then decided to perform a landing at [the airport], with the knowledge that the thrust reversers and nosewheel steering would be inoperative. On short final, the flight crew asked the control tower for a visual check of the nose landing gear, and was informed that the nosewheel was cocked. A go-around was initiated, and then another flyby was made. The nosewheel was reported to be turned 90 degrees. The cabin crew was notified of an impending emergency landing and the cabin and passengers were prepared for the landing. The captain declared an emergency and initiated the approach. Touchdown was described as soft, and the airplane stopped on the 10,250-foot-long [3,124-meter-long] runway with about 2,500 feet [762 meters] of runway remaining. Damage was limited to the nose landing gear tires and rims. The captain noticed that smoke was drifting up on the right side of the airplane. ... All passengers were evacuated via the overwing exits.”⁶♦

References

1. U.S. National Aeronautics and Space Administration (NASA). Aviation Safety Reporting System (ASRS). Report no. 342790. July 1996. ASRS is a confidential incident-reporting system. ASRS acknowledges that its data have certain limitations. ASRS *Directline* (December 1998) said, “Reporters to ASRS may introduce biases that result from a greater tendency to report serious events than minor ones; from organizational and geographic influences; and from many other factors. All of these potential influences reduce the confidence that can be attached to statistical findings based on ASRS data. However, the proportions of consistently reported incidents to ASRS, such as altitude deviations, have been remarkably stable over many years. Therefore, users of ASRS may presume that incident reports drawn from a time interval of several or more years will reflect patterns that are broadly representative of the total universe of aviation-safety incidents of that type.”
2. U.S. National Transportation Safety Board (NTSB). *NTSB Aviation Accident/Incident Database Report*. Report no. DCA98MA045.
3. NASA ASRS Report no. 425407. January 1999.
4. NASA ASRS Report no. 180941. June 1991.
5. NTSB. *NTSB Aviation Accident/Incident Database Report*. Report no. ATL98SA109.
6. NTSB. *NTSB Aviation Accident/Incident Database Report*. Report no. NYC99IA062.

She said that one misconception among some pilots is the difference between declaring mayday and pan-pan.

“I have observed many cases where a mayday is given when pan-pan should be sufficient,” Lawrie said. “Many pilots do not realize that this distinction is ATC’s way of prioritizing two or more aircraft with an emergency at the same time.”

She said that from a flight crew’s perspective, the following factors are *most important* in deciding to declare an emergency:

- Is the aircraft in immediate danger?
- Does the aircraft require immediate assistance?
- Will the aircraft need priority handling during the approach or during any other phase of flight?
- Will the aircraft need special assistance on the ground?
- Does the crew need any assistance from other parties?

Lawrie said that the following factors are the *least important* in deciding whether to declare an emergency:

- Will declaring an emergency inconvenience other traffic?
- Will declaring an emergency involve extra expense?
- Will declaring an emergency cause extra paperwork or other problems afterward?
- Will declaring an emergency cause inconvenience or interrupt the aircraft’s planned schedule?

“Questions often arise as to whether a situation warrants distress or urgency communication,” said Lawrie. “Often times — or at least in our company documentation — it is stated clearly when and which specific conditions require such communications. For situations not covered in company documentation, the decision often depends upon the pilot’s own training or experience as to whether or not he adequately recognizes an emergency situation.”

Airlines’ Standard Operating Procedures Affect Pilot Decisions in Emergencies

Capt. Ashok Poduval, director of flight operations and safety services for the International Air Transport Association, said that the SOPs for handling aircraft emergencies are similar among airlines, but vary enough that describing universal practices is difficult. For example, different companies would have separate procedures on how and when flight crews should call for company assistance in an emergency, he said.¹⁹

Flight crews typically decide when to declare an emergency based on their assessment of all available information about the situation, applying memorized checklists for time-critical and safety-critical sequential actions, conducting challenge-and-response checklists for many specific types of emergencies and following expanded post-emergency drills, he said.

Poduval said, “These are all covered in company SOPs. What should be done [to obtain maximum ATC assistance is to follow] the ICAO procedures for emergency communication. As part of crew resource management, the flight crew also may be aided by dispatchers, such as in the selection of a diversion airport and in determining various sources of assistance.” A dispatcher may have very little involvement or considerable involvement in handling an emergency, depending on airline policy, SOPs and related training.

“Pilots appear to have moved away from the strict use of ICAO phraseology,” Poduval said. “For example, in the United States, although pilots and air traffic controllers speak English, it is often spoken very rapidly and there is considerable use of colloquialisms and American expressions that are often not understood by international operators within the airspace.”

Current Procedures Remain Satisfactory

Boquist said that, historically, some airline captains have not declared an emergency at the earliest possible time.²⁰ He said that this sometimes has occurred because of human factors — especially initial psychological resistance to admitting the seriousness of an unexpected turn of events — and sometimes because of cultural factors.

Boquist said that if a flight crew does not use the correct phraseology for communicating an emergency, this omission can result in miscommunication, which is undesirable in an emergency. For example, some pilots continue to make vague requests for “priority” from ATC when they are short of fuel, said Boquist.

“Controllers should recognize that an aircraft in that situation needs priority handling, but there is no provision in ICAO phraseology and procedures — other than declaring mayday — to ensure priority handling and maximum assistance from ATC,” he said. The term “minimum fuel” — in phraseology recommended by ICAO after the Avianca Flight 052 accident — means “a situation in which an aircraft’s fuel supply has reached a state where little or no delay can be accepted.” A note that accompanies this definition said, “This is not an emergency situation but merely indicates that an emergency situation is possible, should any undue delay occur.”²¹

Boquist said, “No changes were made to mayday and pan-pan phraseology or procedures after the accident because the [Avianca] accident flight crew did not use the language that was available.”

Global phraseology — including pilot-controller emergency communications — may be enhanced within a few years by several international initiatives, however, said Boquist.

“The ICAO Secretariat has submitted a new proposal to the Air Navigation Commission to have a new part of the ICAO *Procedures for Air Navigation Services (PANS)* assigned completely to emergencies and contingencies (such as short-term conflict alert, blocked frequencies and minimum safe altitude warnings),” he said. “This will be reviewed by the commission in March 2000, then sent to ICAO member states for comments. This is part of updating the provisions in *Rules of the Air and Air Traffic Services (PANS-RAC)*.”

ICAO also has been involved recently in several initiatives on worldwide pilot-controller communication. A coordinating group has presented to the ICAO Secretariat an amendment proposal to change phraseology in ICAO annexes and in the ICAO *PANS-RAC*, he said.

The Multi-agency Air Traffic Services Procedures Coordination Group recently compared FAA phraseology and ICAO phraseology, he said, and generated a working paper to be presented to the Air Navigation Commission session in May 2000.

“We have added some phraseology and adopted some FAA phraseology. Eurocontrol, NavCanada and FAA have worked on it and will present a revised phraseology for global application; some of it is emergency communications,” Boquist said.

One objective is to reduce air traffic controllers’ use of non-ICAO phraseology in normal operations throughout the world, he said.

“There should be no problem for a controller to understand a pilot who uses standard ICAO phraseology, and I cannot believe that a pilot would misunderstand ICAO phraseology,” said Boquist.

He said that, typically, the English phraseology used by pilots worldwide is not significantly different, but controllers may use some localized phraseology that is unfamiliar to pilots who are accustomed to standard ICAO terms. Nevertheless, this practice affects routine operations but is unlikely to cause problems in declaring mayday or pan-pan, Boquist said.

“We also have started technical work on a task called *Radiotelephony Speech for International Aviation*,” he said. “The intent is to develop and establish proficiency requirements, review everything in present provisions and look at minimum skill levels for the use of common English. It is something we have never done before.

In an emergency situation after declaring an emergency, people may not be able to use a standardized English phraseology for

all situations. We are looking for controllers and pilots in the future to have a common level of English knowledge for routine and emergency aviation communications.”

Boquist said that most of the world’s ATC facilities are sensitive to flight crews’ requests for assistance and that most countries have worked to improve controllers’ ability to recognize signs of aircraft emergencies and impending emergencies.

“What we are saying is that if [ATC] believes there to be a state of emergency, the emergency aircraft shall be given priority handling over other aircraft,” said Boquist.

An air traffic controller’s ability to recognize signs of an aircraft emergency and to request nonroutine information in English from flight crews may be impeded by limited English (or any nonnative language) proficiency of the controller or the flight crew. For example, in the American Airlines Flight 965 accident near Cali, Colombia, the official accident report of the Aeronautica Civil of the Republic of Colombia said, “When asked a specific question regarding his opinion about the effects the difference in native languages between the accident flight crew and approach control may have had, [the controller] stated that he would have asked the pilots of [Flight] 965 more detailed questions regarding the routing and the approach if the pilots had spoken Spanish. He stated that he believed that his comprehension of the pilot’s transmission was satisfactory, and that the pilot also understood him. ... The air traffic controller also stated that the request from the flight to fly direct to the TULUA VOR, when the flight was [38 nautical miles] north of Cali [and already had flown past the TULUA VOR], made no sense to him. He said that his fluency in nonaviation English was limited, and he could not ask them to elaborate on the request.”²²

Timely communication of an emergency by flight crews is paramount and must be unambiguous, said Boquist.

“The authority of the pilot-in-command is a universal rule of aviation,” he said. “There is no requirement for a controller to question a crew’s decision to declare an emergency. It is up to the civil aviation authority to decide the policy. The emergency declaration does not imply use of PIC authority to depart from rules of the air.”²³

U.S. Controllers Focus on Assistance, Not Enforcement, in Handling Emergencies

Maureen Woods, deputy director, Air Traffic Services, FAA, said that in the United States, regulations and ATC procedures have been designed to enable pilots and controllers to respond safely to an almost infinite variety of aircraft emergencies.²⁴ (See “U.S. Federal Aviation Administration Summarizes Mayday System” on page 12.)

“Declaring an emergency often is an indication of good judgment — it is knowing when to ask for help,” Woods said. “Once the emergency has been declared, we do not get into a question-and-answer [conversation about the pilot’s decision,] we treat the emergency as such and provide the needed service. Basically it is [when] the pilot informs us that he has some type of emergency need that we may ask follow-up questions. As a situation starts to [intensify] for the pilot in terms of distress, we start asking questions to get a sense of what the pilot needs. We may ask if it could have been handled better after the fact, but not during [the emergency].”

In an emergency in which the aircraft must land as quickly as possible, ATC will clear the airspace for direct-to-airport handling and landing at the nearest airport.

Woods said, “We give maximum attention to the emergency aircraft while maintaining system safety. We call people back from breaks or lunch. We would [position controllers to handle] traffic reroutes, with contingency plans [including] configuring the room for maximum [ATC] resources at our fingertips. We will provide ... runway configuration, weather — a lot of information will be shared with that pilot if not [flying to the flight-planned] airport of intended landing. We will reroute other aircraft out of the way.

“The amount of fuel is a factor. A commercial aircraft may want to dump fuel [for landing at a safe aircraft weight], and we would put the aircraft over areas where the crew could do that. Once the aircraft [arrives at the] airport, normally ATC gives the direction ‘cleared to land.’ [The aircraft in distress] then could land on any runway. We would ground-stop any aircraft on that airport [during the emergency] and alert [aircraft rescue and fire fighting services], depending on the emergency.” Controllers also might alert city emergency departments, the U.S. Coast Guard or other pilots who could assist, Woods said.

ATC records any declaration of an emergency in daily logs and reports the incident on an FAA form, then sends it to a Flight Standards District Office.

“ATC provides the service needed; we do not sit around and try to decide if it was or was not an emergency,” said Woods. “Certainly we review our actions and brief [controllers] within the facility so that others can gain from the experience — [but we do not look] at the merits of the emergency itself. ATC does not keep data on either the pilots or on the emergencies; it is up to Flight Standards to look at the nature of the event.”

FAA controllers receive annual refresher training on emergencies and periodic briefings in ATC facilities about accidents and resulting safety recommendations.

An individual air carrier’s procedures and guidance play a role in the declaration of an emergency by a flight crew, but the

most significant guiding factor is what level of assistance is needed and whether the need is immediate, said Nicholas Lacey, director, Flight Standards Service, FAA.

“It all gets back to the basic definitions in the *Aeronautical Information Manual* — if in distress, the aircraft needs emergency assistance now,” Lacey said. “Anywhere [they fly,] pilots should state clearly what their needs are. Communication is the most important aspect, [but flight crews cannot expect] the controller to anticipate the situation. Declaring an emergency is the best way [for pilots] to let ATC know what they need.”

FAA requires that the regulatory and procedural requirements be taught and emphasized during primary pilot instruction and tested on the written test, the practical test and later during carrier-specific training. Company manuals are the source of airline-specific procedures.

Nevertheless, Lacey said that FAA is aware that pilots also are influenced by the attitudes of their instructors or the operators for whom they work; consequently, if the instructor teaches or demonstrates a hesitancy to declare an emergency or to request assistance — or the operator stresses an “on-time, no diversion” policy — that attitude may be instilled in flight crews.

“The FAA has no goal of [taking enforcement action against pilots] or punishing pilots who declare emergencies,” said Lacey. “The goal is to help in any way to get that aircraft, including crew and passengers, on the ground safely. If the pilot feels he or she is in an emergency condition, but is afraid to declare an emergency, that pilot may be putting lives in danger. The most prevailing myth in pilots’ minds — that may cause them pause — is that they will need to provide a written report [to FAA after any emergency and that this will generate enforcement action]. All kinds of protections built into the system [should] preclude pilots from [being hesitant or reluctant] in declaring an emergency.”

Lacey said that after a pilot exercises his or her emergency authority and deviates from a rule or receives priority handling, a report will be required only upon request of the FAA administrator.

“In most cases, the flight crew will make a written report to the company, [and this report] will be available for FAA review,” he said.

Lacey provided the following summary of the FAA Flight Standards philosophy, policies and procedures related to a flight crew’s declaration of an emergency:

- “U.S. Federal Aviation Regulations (FARs) Part 91.123(d) requires a pilot who has been given priority by ATC in an emergency — even if he or she has not deviated from a regulation — to submit a ‘detailed report’

of the emergency within 48 hours to the ATC facility, *if requested by ATC* [emphasis added by FAA];

- “The pilot declaring an emergency can file a report with the [U.S. National Aeronautics and Space Administration (NASA)] Aviation Safety Reporting System (ASRS) and receive limited immunity from enforcement action if noncompliance was involved. Declaring an emergency is not automatically considered noncompliance, but many pilots file this ASRS report after declaring an emergency. We support that. Most pilot-employee groups recommend that after declaring an emergency, the pilot fill out an ASRS report ‘just in case’ of some violations;²⁵
- “The act of declaring an emergency does not necessarily initiate an enforcement investigation because [FARs] 91.3(b) allows the pilot to deviate from any rule to the extent needed to address the emergency. The pilot does not really gain anything by not declaring an emergency. In a lot of cases, the emergency would be declared and there would not be any subsequent investigation based on the type of communication that took place. ... However, if an accident or incident results and, as part of that investigation, the FAA determines that noncompliance occurred and led to the need for declaring an emergency, the airman could be subject to an enforcement investigation for noncompliance;
- “The intent of the written report requirement is to assure that pilots use their emergency authority only in emergency situations and do not attempt to cover up or elude investigation for noncompliance; for example, descending below minimums during an approach, then declaring an emergency to avoid responsibility for deviating from a clearance or regulation. There is an [enforcement] element to keeping the system — the whole process — honest ... we want to avoid abuse of the privilege of declaring an emergency. We [would not want a system in which] by declaring an emergency, the [circumstances] never would be looked at subsequently. A report of pilot incapacitation, for example, will trigger an investigation whether or not an emergency was declared. A series of [aircraft emergency] events also would attract an investigation;
- “FAA inspectors are expected to investigate all possible safety violations any time the inspector has reason to question compliance. An investigation does not automatically happen because of a declaration of an emergency. However, if, in the process of reviewing a report sent to the [FAA] administrator by the pilot or the pilot’s company, a violation becomes obvious, that inspector is mandated to take appropriate action;
- “At the time of the emergency, the situation will be treated as an emergency in accordance with the

responsibility of the PIC. If we find out otherwise, we would take [enforcement] action — but those [cases] would be extremely rare. If there was a deviation from ATC instructions, obviously we would look at that [and ask if the deviation] occurred before the emergency declaration. [FSF editorial note: In the United States, for example, FARs Part 91.123(c): “Each pilot-in-command who, in an emergency, or in response to a traffic-alert and collision avoidance system resolution advisory, deviates from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible.”];

- “After the fact, [responsibility for any] investigation would come back to Flight Service. What we are really trying to do is capture what happened — to track back to the root cause, such as a fire or lack of pressurization. We want an open investigative process in terms of what did occur. We are not necessarily looking to take action against the individual pilot because a regulation was overlooked; [and,]
- “If the declaration of an emergency or an urgency situation is part of an overall accident/incident or compliance investigation, there would be a reference in the accident/incident report or investigative report that becomes part of the airman’s record. However, the FAA does not track how many times a pilot declares an emergency and does not place such information in the airman’s permanent record as a specific entry. When Flight Standards does investigate, we [use the findings to] make recommendations to the company.”²⁶

Company Philosophies Influence Pilots During Emergencies In Eurocontrol Area

Gilles Le Galo, air traffic management expert in the Safety-Quality and Standardization Unit of Eurocontrol, said that the 38 countries in the European Civil Aviation Conference (ECAC) have different legislation, rules, habits and ways of doing things in some aspects of aviation. Nevertheless, ICAO procedures and phraseology for communicating an aircraft emergency transcend these differences. Le Galo said that company philosophies and expectations can vary significantly, and may affect pilot decision making.²⁷

Another factor that might affect a flight crew’s decision to declare an emergency is a punitive culture of either an airline or a civil aviation authority.

If a flight crew was hesitant or reluctant to declare an emergency, one likely cause would be human factors, he said.

“People may express themselves in a way that they believe will be interpreted as emergency communication,” he said.

U.S. Federal Aviation Administration Summarizes Mayday System

[FSF editorial note: The U.S. Federal Aviation Administration (FAA) — through Nicholas Lacey, director, Flight Standards Service, and Maureen Woods, deputy director, FAA Air Traffic Services — provided the following summary of FAA policies and procedures related to pilot-controller emergency communications during airline operations in U.S. airspace:]

- U.S. Federal Aviation Regulations (FARs) Part 91.3(a) said that the pilot-in-command (PIC) of an aircraft is “responsible for and the final authority as to the safe operation of that aircraft;”
- FARs Part 91.123(a), *Compliance with ATC [Air Traffic Control] Clearances and Instructions*, said that a PIC cannot deviate from a clearance except when an amended clearance is obtained, in response to an emergency or in response to a traffic-alert and collision avoidance system (TCAS) advisory;
- The FAA *Aeronautical Information Manual (AIM)* said that pilots in urgency situations should request assistance before the situation becomes a distress situation. *AIM 6-1-2(b)* said, “Pilots who become apprehensive for their safety for any reason should *request assistance immediately* [emphasis in original];”
- If the pilot uses appropriate phraseology — such as “mayday” — to communicate the nature of the emergency, or if the pilot clearly communicates a problem before a distress situation develops, the controller will have an unmistakable concept of the pilot’s situation and what needs to be done. This enhances safety by assuring that the flight crew receives the appropriate ATC assistance for the situation;
- When a pilot declares an emergency, the controller will try to determine the nature of the emergency and the pilot’s intentions. Priority handling by ATC will continue as long as required to resolve an emergency situation. ATC assistance may include, for example, communication with the pilot, coordination with other sectors and facilities, and communication with other pilots to assist the flight crew. Supervisory personnel also would be notified to handle coordination and resource management;
- The PIC does not need to declare an emergency to take action using emergency authority, but after an emergency has been declared, the pilot is considered by FAA to be operating under emergency authority.¹ The pilot has the final authority regarding the operation of the aircraft; if unable to comply with ATC clearances, the pilot has the authority to deviate from the clearance. By communicating the nature of the emergency and the pilot’s course of action, both the flight crew and the controller understand what can be accomplished and what cannot be accomplished. Air traffic controllers will accommodate whatever actions the pilot deems most appropriate whenever a pilot exercises emergency authority. This may result in the re-routing or delay of other aircraft;
- When a pilot reports a malfunction or other unusual situation, an air traffic controller may ask if the flight crew is declaring an emergency. Based on information received from the flight crew, air traffic controllers may consider that an emergency exists and handle the flight accordingly. Unless there is some indication that an emergency might occur, ATC normally would not take action prior to declaration of an emergency by the PIC. If there is some indication of an emergency, the controller will try to find out as much information as possible to assist the flight crew;
- FARs Part 121.557, *Emergencies: Domestic and Flag Operations*, said that the PIC may take any action considered necessary under the circumstances and in the interest of safety, and that airline dispatchers may declare an emergency if they are unable to communicate with the PIC. On the ground, the dispatcher and PIC share authority for the flight and both sign the dispatch release; during flight, the PIC is the final authority for the conduct and safety of the flight. If an emergency situation requires a decision by the PIC, the airline dispatcher must advise the PIC, ascertain the decision of the PIC and record the pilot’s decision. If the dispatcher cannot communicate with the PIC, the dispatcher must declare an emergency, take any action necessary, advise the appropriate ATC and dispatch facilities, and send a written report to the FAA administrator within 10 days. When a controller declares an emergency, dispatchers normally are not notified by ATC. (Requirements for supplemental operations under FARs Part 121.559 are similar, but the regulation said that airline management, not a dispatcher, has the responsibility in flight following to declare an emergency on behalf of the PIC.);
- When an emergency occurs, FAA ATC facilities compile and record the information in their daily record of facility operations, and prepare a miscellaneous incident report form that is forwarded to the appropriate FAA Flight Standards District Office. No data are collected by air traffic controllers concerning the incidence of pilots declaring an emergency or the number of emergencies that are reported;
- FAA analyzes events for trends after reviewing pilots’ written reports of deviations, after counseling pilots

or after investigations of accidents or incidents. This can result in changes to regulations, to the *AIM*, to training requirements and to other documents. FAA looks for general trends to improve safety, but does not study the history of declarations of an emergency by any specific pilot or compare pilots who, over their careers, may have declared an emergency several times; and,

- If a pilot questions the ATC handling received after declaring an emergency or after requesting assistance, the ATC facility may review the tapes of the exchange. As a result, FAA procedures or phraseology may be changed. Similarly, if a review

of the tapes by the FAA Flight Standards Service indicates some anomaly in training or other certification standards, those areas could be reviewed or changed.♦

— U.S. Federal Aviation Administration
and FSF Editorial Staff

Reference

1. The U.S. Federal Aviation Administration (FAA) cited U.S. Federal Aviation Regulations (FARs) Parts 91.3(a), 91.3(b), 91.123(a), 121.557(a) and 121.559(a).

“There could be conscious reluctance and unconscious reluctance. Anyone is sometimes reluctant to admit a difficult situation; there is a tendency to underestimate what is happening to you. This pushes people to not really declare what they have experienced. There also can be a problem of flight crews or controllers not really knowing the ICAO provisions ... they really do not know exactly when to declare what; it is more ignorance than reluctance.”

Apparent delay in declaring an emergency, however, also may indicate that the flight crew is conducting crew resource management procedures that involve a delay before the flight crew declares an emergency, Le Galo said.

Le Galo said that there is a possibility in some states that an air traffic controller might disregard a pilot’s request for priority handling if specific ICAO phraseology is not used to declare an emergency, he said.

“No special service would be provided in some parts of Europe unless very specific words are used to declare an emergency,” said Le Galo. “In other areas, the situation would be treated as an emergency by ATC just as if the pilot had declared the emergency.”

Typically, there is no systematic way to determine whether declaring an emergency was warranted by the circumstances.

“I have not really seen an example of second-guessing a pilot’s decision to declare an emergency,” he said. “If there is not a big problem for ATC, nothing will happen. If traffic was really disturbed and subsequent handling by controllers created a difficult situation to handle with a lot of traffic around — combined with suspicion that the flight crew overstated the situation — the occurrence would be subject to inquiry by the state. I have not heard recently of any case like that, but before Eurocontrol traffic flow management, general aviation pilots sometimes made inappropriate requests for ATC priority.”

Eurocontrol has no authority to request that a member country’s civil aviation authority investigate an aircraft emergency, however, Le Galo said.

“As far as I know, there would be no automatic review by air traffic management [ATM] providers if a pilot declared an emergency; what would occur really depends on the outcome of the flight,” he said. “If the aircraft lands safely, then, from the ATM side, nothing will happen. It will be left to the airline to decide what the pilot must do. Since Jan. 1, 2000, Eurocontrol has been requesting occurrence data only to monitor safety levels and to identify safety trends from an ATM perspective.”

The training of air traffic controllers for positions in Eurocontrol’s Maastricht Upper Area Control Center — which provides air traffic services in the upper airspace of Belgium, Luxembourg, the Netherlands and part of Germany — includes an *ab initio* course that “follows as closely as possible ICAO procedures for handling an aircraft in distress or urgency,” said Le Galo. “Before going to the center for live traffic training, controllers take a three-week course on handling of all kinds of emergencies using procedures derived from and closely aligned with the ICAO provisions.”

There have been a variety of situations that show different levels of preparedness among ATC facilities in various European states, he said.

“Some states of Europe have had aircraft emergencies where handling by ATC has not been what would have been expected,” said Le Galo. “This is an issue here that we are addressing. We would like to encourage other states to follow the example of five or six countries in controller training for emergencies. One of the big issues is how to assess whether someone handled an aircraft in distress appropriately. One of the aviation myths to kill in Europe is that you cannot train controllers effectively on aircraft emergencies ... because emergencies never will be the same thing twice and you cannot say what will happen.”

By studying incident reports from pilots, airlines and ATC, civil aviation authorities understand better the circumstances of occurrences in which flight crews declare an emergency. Current ICAO phraseology for pilot-controller emergency communication works well and enhances safety when used properly.

Notes and References

1. U.S. National Transportation Safety Board (NTSB). *Aircraft Accident Report NTSB/AAR-91/04. Avianca, The Airline of Colombia, Boeing 707-321B, HK 2016, Fuel Exhaustion, Cove Neck, New York, January 25, 1990.* Avianca Airlines Flight 052, a Boeing 707-321B, struck terrain in Cove Neck, Long Island, New York, U.S., during a scheduled international passenger flight from Bogota, Colombia, to John F. Kennedy International Airport, New York, with an intermediate stop at Jose Maria Cordova Airport near Medellin, Colombia. Seventy-three of 156 people on the flight were fatally injured, and the aircraft was destroyed. NTSB, in its final report on the accident, said that the probable causes were “the failure of the flight crew to adequately manage the airplane’s fuel load, and their failure to communicate an emergency fuel situation to air traffic control before fuel exhaustion occurred.” Contributing to the accident was “the flight crew’s failure to use an airline operational control dispatch system to assist them during the international flight into a high-density airport in poor weather.” Also contributing to the accident was “inadequate traffic flow management by the [U.S.] Federal Aviation Administration and the lack of standardized understandable terminology for pilots and controllers for minimum and emergency fuel states.” NTSB said “windshear, crew fatigue and stress were factors that led to the unsuccessful completion of the first approach and thus contributed to the accident.” NTSB said that among safety issues raised in the report was “pilot-to-controller communications regarding the terminology to convey fuel status and the need for special handling.”
2. The term “declaring an emergency” — while not part of the official phraseology of the International Civil Aviation Organization (ICAO) — is widely understood to mean that a pilot (or air traffic controller or aircraft operator) is formally notifying air traffic control that an aircraft is in distress. “Distress” in ICAO phraseology means “a condition of being threatened by serious and/or imminent danger and of requiring immediate assistance.” In addition to the word “mayday” in voice radio communication, the letter group “SOS” telegraphed in Morse code, rockets or shells throwing red lights (fired one at a time at short intervals) or a parachute flare showing a red light communicate distress in ICAO procedures. “Urgency” in ICAO phraseology means “a condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight, but which does not require immediate assistance.” (ICAO Annex 10, *Aeronautical Telecommunications*, Volume 2, 5.3.1.1) ICAO also said that an urgency signal will “mean that an aircraft wishes to give notice of difficulties which compel it to land without requiring immediate assistance.” (ICAO Annex 2, *Rules of the Air*, Appendix 1, 1.2.1) In addition to the term “pan-pan” in voice radio communication, repeated switching on and off of the landing lights or repeated switching on and off of navigation lights (in such manner as to be distinct from flashing navigation lights) communicates urgency in ICAO procedures.
3. Canoles, David. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., March 15, 2000. Flight Safety Foundation, Alexandria, Virginia.
4. Boquist, Cay. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., March 15, 2000. Flight Safety Foundation, Alexandria, Virginia.
5. ICAO. *Rules of the Air and Air Traffic Services (PANS-RAC Doc 4444)* 16.2.1.
6. ICAO PANS-RAC 12.1.1.
7. ICAO PANS-RAC 16.1.1.
8. In the United States, U.S. Federal Aviation Administration (FAA) Order 7110.65L *Air Traffic Control* 10-1-3 (the handbook for U.S. air traffic controllers) said, “Provide maximum assistance to an aircraft in distress. Enlist the services of available radar facilities, the military services and the Federal Communications Commission, as well as other emergency services and facilities, when the pilot requests or when you deem necessary.” *Air Traffic Control* 10-1-1 c. said, “If the words ‘mayday’ or ‘pan-pan’ are not used and you are in doubt that a situation constitutes an emergency or potential emergency, handle it as though it were an emergency.”
9. ICAO. *Annex 2, Rules of the Air*, Appendix 1 Signals, 1.1 Distress Signals.
10. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.2.1 and 5.3.3.1.
11. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.2.1.
12. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.2.2 through 5.3.2.5.3.
13. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, Attachment B, “Development of Radiotelephony Speech for International Aviation,” 1.2 and 1.4. The document said that ICAO believes that the current recommended practice on language has many limitations and that the process of developing a universal language for aviation must continue to enhance safety. ICAO said, “In attacking the problem with the sole objective of obtaining the highest efficiency in air-ground communication, the cooperation of all states may be expected and the burden now largely carried by non-English-speaking countries will be more equitably

shared; for the extent of the new language having to be acquired by non-English-speaking personnel will be reduced, while the English-speaking states will at the same time accept the obligation of training their personnel to keep within the agreed limits in the use of their own language.” (2.6)

14. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, Attachment B, 1.4.
15. Cushing, Steven. “Pilot-Air Traffic Control Communications: It’s Not (Only) What You Say, It’s How You Say It.” *Flight Safety Digest* Volume 14 (July 1995). Airclaims said that on March 27, 1977, a KLM Royal Dutch Airlines Boeing 747-200B during takeoff struck a taxiing Pan American Boeing 747 at Los Rodeos Airport, Tenerife, Canary Islands, Spain. All 14 crewmembers and 234 passengers on the KLM aircraft were killed. On the Pan American aircraft, nine crewmembers and 326 passengers were killed, seven crewmembers and 52 passengers were seriously injured; and two passengers received minor injuries or no injuries. Both aircraft were destroyed. Visibility at the time of the accident was poor with fog and light rain. The Subsecretaria de Aviacion Civil of Spain said that the cause of the accident was that the KLM captain conducted the takeoff without clearance, did not obey a “standby for takeoff” instruction from the control tower, and did not reject the takeoff when the Pan American flight crew said that their aircraft was still on the runway. Misunderstanding of orders, instructions, and low ceiling and fog were contributing factors.
16. NTSB. Aircraft Accident Report NTSB/AAR-91/04, 64–65.
17. McCarthy, Paul. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 17, 2000. Flight Safety Foundation, Alexandria, Virginia.
18. Lawrie, Deborah. Interview by Rosenkrans, Wayne, and personal communication. Alexandria, Virginia, U.S., Feb. 24, 2000. Flight Safety Foundation, Alexandria, Virginia.
19. Poduval, Ashok. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 24, 2000. Flight Safety Foundation, Alexandria, Virginia.
20. Boquist, Cay. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 17, 2000. Flight Safety Foundation, Alexandria, Virginia.
21. ICAO. *Rules of the Air and Air Traffic Services (PANS-RAC Doc 4444)* 1–8.
22. Aeronautica Civil of the Republic of Colombia. *Controlled Flight into Terrain, American Airlines Flight*

965, Boeing 757-223, N651AA, near Cali, Colombia, December 20, 1995. The official report of the Aeronautica Civil of the Republic of Colombia said that American Airlines Flight 965, a Boeing 757-223, was transitioning from cruise flight to a very high frequency omnidirectional range (VOR)/distance measuring equipment (DME) instrument approach to Runway 19 at the Alfonso Bonilla Aragon International Airport (SKCL), Cali, Colombia, when the aircraft collided with a mountain 53 kilometers (33 miles) northeast of the CALI VOR. Two flight crew members, six cabin crew members and 151 passengers were killed. Five passengers survived the Dec. 20, 1995 accident, but one of them later died as a result of injuries sustained in the accident. The aircraft was destroyed. The accident occurred at night in visual meteorological conditions. The report said that “the probable causes of this accident were: (1) the flight crew’s failure to adequately plan and execute the approach to Runway 19 at SKCL, and their inadequate use of automation; (2) failure of the flight crew to discontinue the approach into CALI, despite numerous cues alerting them of the inadvisability of continuing the approach; (3) the lack of situational awareness of the flight crew regarding vertical navigation, proximity to terrain and the relative location of critical radio aids; [and] (4) failure of the flight crew to revert to basic radio navigation at the time when the FMS [flight management system]-assisted navigation became confusing and demanded an excessive workload in a critical phase of the flight.” The report also said that “contributing to the cause of the accident were: (1) the flight crew’s ongoing efforts to expedite their approach and landing in order to avoid potential delays; (2) the flight crew’s execution of the GPWS [ground-proximity warning system] escape maneuver while the speedbrakes remained deployed; (3) FMS logic that dropped all intermediate fixes from the display(s) in the event of execution of a direct routing; [and] (4) FMS-generated navigational information that used a different naming convention from that published in navigational charts.”

23. ICAO *Annex 2, Rules of the Air*, said, “The pilot-in-command of an aircraft shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air, except that the pilot-in-command may depart from these rules in circumstances that render such departure absolutely necessary in the interests of safety.” (2.3.1) The same document said, “The pilot-in-command of an aircraft shall have the final authority as to the disposition of the aircraft while in command.” (2.4)
24. Woods, Maureen, and Lacey, Nicholas. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 22, 2000. Flight Safety Foundation, Alexandria, Virginia.

25. FARs Part 91.25, *Aviation Safety Reporting Program: Prohibition Against Use of Reports for Enforcement Purposes*, said, "The Administrator of the FAA will not use reports submitted to the [U.S.] National Aeronautics and Space Administration under the Aviation Safety Reporting Program (or information derived therefrom) in any enforcement action except information concerning accidents or criminal offenses which are wholly excluded from the Program." FAA Advisory Circular (AC) 00—46D, *Immunity Policy*, said, "When violation of the FAR comes to the attention of the FAA from a source other than a report filed with NASA under the ASRS, appropriate action will be taken." This AC also describes FAA's enforcement policy.

26. Lacey said, "No information in an airman's permanent record can be released to the public without the airman's permission. The airman has to sign a Privacy Act waiver for an employer to obtain his or her airman's record. As part of an investigation (accident, incident, non-compliance), an FAA inspector may review an airman's record via internal computer access (no public access) and may make a printed record of that airman's file, but the inspector cannot release that information to the public. It may be released to the NTSB, for example, in the event of an accident investigation."

27. Le Galo, Gilles. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 18, 2000. Flight Safety Foundation, Alexandria, Virginia.

Further Reading From FSF Publications

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