# CALLBACK

From NASA's Aviation Safety Reporting System

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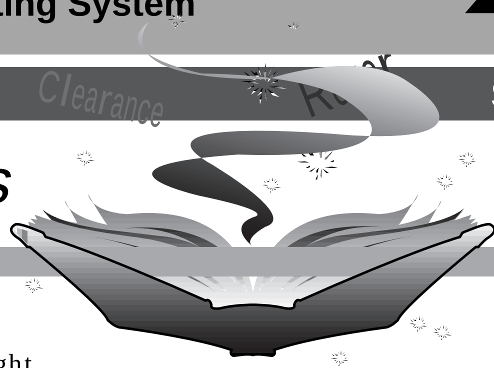
## Say The Magic Words




No, not the ones your parents taught you—"please" and "thank you." Rather, the ones your flight instructor taught you—"Cleared for..." These magic words apply to instructions for taxi, takeoff, landing, and entry into Class B airspace. Two reporters share their experiences of *not* verifying receipt of the magic words:

■ *About 7 miles West of [the Class B airport], I called [Approach Control], and stated our position and intentions. Controller responded with a squawk number and ident, which was complied with. Approximately one minute later [now inside the Class B boundary], the Controller came back with, "I guess a clearance means nothing, but you are cleared into the [Class B airspace]." I felt that once contact was made, the Controller knew our intentions and a squawk and ident were given, that a clearance was imminent.*

Imminent does not mean "Cleared." Contact with ATC and receipt of a squawk code constitutes permission to enter Class C airspace, but Class B airspace requires the magic words.

Even when the pilots are clear on the rules, distractions can set the stage for not receiving the magic words.

■ *Landed without receiving landing clearance from Tower. The weather and traffic were heavy... Just prior to marker...we had a lightning strike which caused a momentary loss of navigation instruments. I believe this event caused the First Officer not to switch over to the Tower, and I forgot to verify that we had received a landing clearance. I landed and rolled out normally, and realized we were on Approach Control frequency. When...distracted or startled, even experienced pilots can make fundamental mistakes.*

## Will the Last One Out Please Turn Out the Lights?

■ *Normal single engine taxi, [and] at the gate, ran normal engine shutdown checklist. When external power came on line, APU was shut down and normal transfer of power was observed on panel... Cockpit cleanup was accomplished and we departed to the next gate for [our next] flight... Approximately 10-15 minutes later, we were notified of the left engine running on [our previous] aircraft, and maintenance had shut down the engine.*

Chances are the flight crew substituted the APU shutdown for shutdown of the last engine. Apparently, their thoughts were already on their next flight instead of clear communication and proper coordination of cockpit duties.

## "Roger"

According to the Pilot/Controller Glossary of the Airman's Information Manual (AIM), "Roger" means, "I have received all of your last transmission." It should not be used by either pilots or controllers to answer a question that requires a "yes" or "no" response. In this incident reported to ASRS, the pilot of a small aircraft questioned a controller's use of "Roger":

■ *We were cleared by Tower to depart and climb northeastbound. [We noticed] an aircraft approximately 50 feet below us...paralleling our course, and climbing. I told the Tower we had traffic off our wing. The Tower acknowledged by saying, "Roger." The aircraft began turning northbound towards us, at which point we took evasive action to avoid [a mid-air collision]. The aircraft continued climbing and departed northbound. I questioned the Tower again about the traffic, and again the Tower only answered, "Roger."*

*Upon landing, I telephoned the Tower to try to clear up several questions about the Tower's responsibility. The Controller's response was that once we had the traffic in sight, it was our responsibility to maintain visual separation ...[and] that he was not in contact with the airplane in question. The way the Controller stated "Roger" [on our initial call] gave me the impression that the Tower was aware of the traffic and it was under his control.*

It appears that the pilot of the other aircraft was flying in Class D airspace without contacting the Tower.

The report doesn't say whether the Tower was radar-equipped. This does make a difference, since the conflict was estimated to have occurred two miles from the airport, at 2,300 feet MSL. If the Tower lacked radar, the controller's "Roger" may have been appropriate. However, an optional message from ATC–"I'm not in contact with the traffic"–would have been helpful to the pilot.

If the Tower did have radar, the controller might have announced, "You have traffic at [clock position]." However, the AIM notes that the issuance of a safety alert is contingent upon the Controller's capability to have an awareness of the situation. Controller workload, poor radar return of transponder signals, and lack of aircraft transponders, can all reduce the Controller's ability to have this awareness. In this incident, the Controller apparently had no knowledge of a second aircraft until the call-out from the reporter.

Finally, the AIM and the FARs both state that the job of safely flying the aircraft remains with the pilot. As the Controller observed, it was the pilot's responsibility to practice the see-and-avoid concept and to maintain separation.

| ASRS Recently Issued Alerts On... |
|---|
| NOTAM procedures for tethered balloon operations |
| Reported transmission gaps in an RCO below FL170 |
| Failure of a backup battery system at San Juan CERAP |
| Uncommanded yawing during a Fokker F-28 ferry flight |
| A BA-31 emergency attributed to a chafed hydraulic line |

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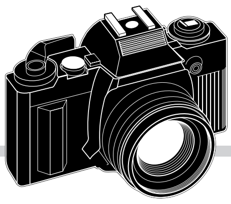
**The Office of the NASA Aviation Safety Reporting System, P.O. Box 189, Moffett Field, CA 94035-0189**

| July 1995 Report Intake | |
|---|---|
| Air Carrier Pilots | 2028 |
| General Aviation Pilots | 817 |
| Controllers | 100 |
| Cabin/Mechanics/Military/Other | 24 |
| **TOTAL** | **2969** |



# ASRS Research "Snapshots"

***Editor's note*: In April 1995, ASRS presented several research papers at The Ohio State University's Eighth International Aviation Psychology Symposium. Brief summaries of four papers are presented below.**

## ❶ Airport Ramp Safety and Crew Performance Issues

This study examined 182 Part 121 and Part 135 ramp operations incident reports from the Aviation Safety Reporting System (ASRS) database, to determine the areas of operations in which damage is most likely to occur, the types of damage that occur, and the role of flight and ground crew performance errors in ramp incidents.

It was found that ramp damage incidents occurred more often during aircraft arrivals than during departures. The damage incidents occurred most frequently at the gate stop area (within 20 feet of the nose wheel parking line); next most frequently at the gate entry/exit areas, where taxi lines lead into and out of the gate area; and least frequently on the ramp fringe areas. Damage most frequently occurred to ground equipment (in 64% of the incidents). In more than one third of the damage incidents, there was only one ground crew member available to attend the aircraft. Pilot reporters attributed error to ground crew personnel in more than half the incidents, but also faulted themselves almost as frequently. The authors offer suggestions relevant to both airline management and flight crews for preventing ramp incidents.

## ❷ Flight Crew Performance During Aircraft Malfunctions

Past research has shown that a large number of aircraft accidents attributed to human error began with an aircraft malfunction. Several of these accidents were caused by the flight crew's fixation on the malfunction, which resulted in their loss of overall situational awareness. The objectives of this study were to develop a better understanding of the factors that can affect performance when flight crews are faced with inflight malfunctions, and to offer recommendations designed to improve crew performance during these conditions.

The study examined 230 reports in NASA's Aviation Safety Reporting System (ASRS) database. Each report was placed into one of two categories, based on the severity of the malfunction. Report analysis was conducted to extract information regarding crew procedural issues, communications, workload management, situational awareness, and safety problems. A comparison of these factors across malfunction types was then performed. This comparison revealed significant differences in the ways that crews dealt with serious malfunctions compared to less serious malfunctions. These differences may be due to crew perception of the malfunction severity, as well as training. The authors offer recommendations for improving crew performance when faced with inflight aircraft malfunctions.

## ❸ The Use of ASRS Incident Reports in AQP (Advanced Qualification Program) Training

The FAA's Advanced Qualification Program (AQP) is a recent approach to flight crew training that can be customized to an air carrier's unique operational needs. The goal of AQP is to introduce real-world conditions into training situations that require trainees to apply a range of technical and flight management skills. AQP emphasizes the use of scenario-based training in Line Oriented Flight Training (LOFTS), ground school, Flight Training Devices (FTDs), and simulators, to ensure that trainees learn to *apply* the information they are expected to know.

However, scenario development requires creativity and high-fidelity attention to detail on the part of curriculum designers. The Aviation Safety Reporting System (ASRS) database is a repository of a wide variety of incident reports that can be used as a basis for AQP training scenarios. ASRS incident reports cover such areas as breakdown of CRM, maneuvers specific to a particular aircraft, and crew response to deviations and malfunctions. The ASRS database is now available on CD-ROM. This paper suggests search strategies likely to produce reports that can be used in LOFTs or other simulator situations.

## ❹ Measuring Safety with Flight Data

For more than two decades, airlines outside of the U.S. have routinely measured safety by screening flight data for deviations from prescribed procedures. In 1993, the FAA and NASA began a joint five-year program, known as the Automated Performance Measurement System (APMS), to develop a set of highly automated tools that will enable the large-scale analysis of flight data by U.S. airlines. The goal of the APMS program is to develop a prototype system that uses powerful data retrieval, analysis, and presentation tools to address industry's and government's questions relating to operational performance and safety. In addition to measuring specific safety parameters, the APMS research program will develop techniques for determining *why* an unsafe event occurs. APMS does not, however, involve the actual implementation of a nationwide flight data collection system.

This paper provides a brief overview of the APMS approach to developing a prototype flight data analysis system. This approach consists of a user-needs study, creation of a common graphical user interface, development of powerful data visualization features, and a library of statistical procedures that support cluster analysis and pattern recognition.

**Readers may obtain free copies of papers of interest by requesting specific titles from the following address: Aviation Safety Reporting System, c/o Administrative Staff, P. O. Box 189, NASA Ames Research Center, Moffett Field, CA, 94035-0189.**