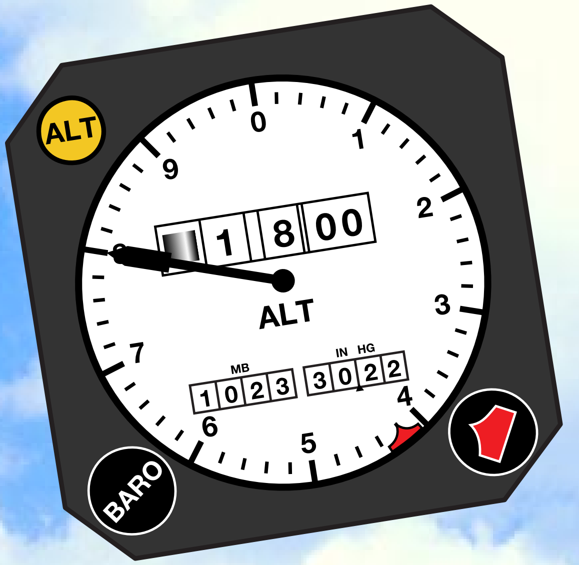
ASRS Directline

ISSUE No. 9 MARCH 1997

The Aviation Safety Reporting System is a cooperative program established by the Federal Aviation Administration's Office of the Assistant Administrator for System Safety, and administered by NASA



A Review of Altimeter-Setting Incidents Reported to ASRS
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And...

ASRS Operational Issues Bulletin 96-01
Confusion in Using Pre-Departure Clearances

ASRS is on the Internet — http://olias.arc.nasa.gov/asrs

An Introduction to Issue Number 9

Here is Issue Number Nine of *ASRS Directline*. In addition to *Directline's* normal complement of articles, we have included a new ASRS safety product—***ASRS Operational Issues Bulletins***. ASRS's Ops Bulletins will provide timely review of safety issues seen as important to ASRS Analysts.

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Here are the articles for Issue Number Nine:

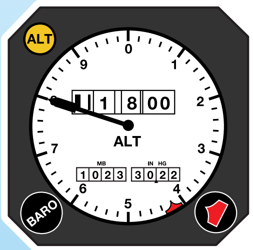
That's all for this issue of *ASRS Directline*.

Charles Drew—*ASRS Directline* Executive Editor.

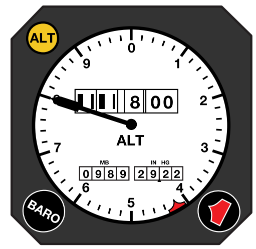
Internet News

ASRS's web pages have been upgraded. CALLBACK issues and ASRS Directline articles and issues are now available in "HTML" and Adobe Acrobat versions. A page for ASRS Operational Issues Bulletins has been added, and we now have mail links to key ASRS staff positions. We are planning to add a number of ASRS's research papers in the near future. Finally, the old URL (address) for the ASRS was made a little simpler (the old address will still work). Access the ASRS at:

http://olias.arc.nasa.gov/asrs



The Low-Down on Altimeter Settings



by
Marcia Patten
and
Ed Arri

"This was the last leg of a long 3-day trip…Inbound…we ran the 'preliminary checklist,' cross-checking altimeters at 30.22. This seemed a little odd to me at the time as the area had a low front moving through, but we were busy and I did not press the issue. Once on approach, everything was normal until just before the final approach fix when we broke out of the clouds and a ridge was looking very close. Also the GPWS went off as we passed over the ridge. I checked our altitude and we were right on profile. I had the Captain check the altimeter with Tower. Altimeter was actually 29.22, not 30.22, putting us approximately 1,000 feet too low on approach." (# 292718)

The incident cited above is one of many typical altimeter-missetting reports sent to the Aviation Safety Reporting System (ASRS). ASRS analysts note that these reports often come in bunches, as numerous flight crews experience the same problem on the same day in a particular area that is encountering unusual barometric pressures. Incorrect altimeter settings are a direct cause of altitude deviations, some of them severe enough to result in near mid-air collisions and controlled flight toward terrain. Fortunately, most of these deviations are detected following an alert from ATC, GPWS, or TCAS, and are corrected before the situations become truly perilous.

In this article, we present some of the common scenarios for altimeter missetting incidents. In particular, we focus on incidents associated with the very low altimeter settings that often occur during the winter months. We also consider the influence of human behavior in altimeter-missetting incidents, and offer suggestions for pilots to avoid falling prey to falling barometric pressure.

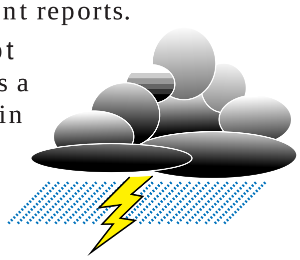
Where in the World…?

We searched the ASRS database for altimeter-missetting incidents that occurred during extremely low barometric pressures, and found reports from far and wide. We also enlisted the aid of the Canadian Aviation Safety Board, and obtained some of their reports of incidents and accidents attributed to misset altimeters.

The greatest number of reports referenced far-north or very cold locations—many incidents occurred in Alaska and in cities near the Great Lakes. Other locations known for severe weather and cold temperatures were also well-represented—New York, the high-altitude Rocky Mountains, and parts of Canada. Somewhat surprisingly, there were also reports from otherwise relatively temperate locations, such as San Francisco, California; Portland, Oregon; Kansas City, Kansas; and Richmond, Virginia. Although these areas generally have less severe weather, unusual frontal systems created some significant changes in barometric pressure and caught several reporters off-guard.

There were also a number of reports of incidents that occurred in foreign locales—Moscow, Keflavik, Copenhagen, Frankfurt, Brussels. Many of these locations are even farther north, that is, at higher latitudes, than the locations in the domestic incident reports.

Weather or Not



Weather plays a significant role in many incidents of misset altimeters. A semi-permanent low pressure area off the Aleutian Islands is the perfect set-up to bring frequent low barometric pressures to Alaska and Western Canada. Likewise, a winter-season low that forms between Greenland and Iceland provides very low altimeter settings across those areas and in Eastern Canada.

The fierce cold fronts that race through central Canada and the north-central and northeast sections of the United States often have steep frontal slopes, resulting in rapid lifting movement of air. This movement causes sudden drops in barometric pressure. After frontal passage, the barometric pressure rises again. During these rapid ups and downs, a number of pilots found themselves missetting their altimeters. A General Aviation pilot reports:

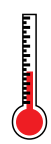
"I set the field elevation on the altimeter…and departed VFR, [then] contacted Center and received my clearance. In the climb I encountered icing conditions and…I must have misset the altimeter. A frontal passage was in progress and the barometer was changing rapidly. Center told me to stop squawking altitude, as my transponder and altimeter did not agree. Then I suddenly was surprised to realize I had set my altimeter wrong at 30.82 instead of 29.82." (#293162)

A helicopter accident resulting in four fatalities was attributed at least in part to an incorrectly set altimeter during a period of known low barometric pressure. The report from the Canadian Aviation Safety Board states:

"The helicopter was being used to transport personnel to work sites across a large frozen lake. An approaching low pressure area with snow and high winds…reduced visibility to near zero in some areas. The pilot most certainly encountered adverse conditions and altered course to circumvent the worst areas. The aircraft was later found…wreckage was widely scattered. The altimeter showed a setting on impact of 30.05; the correct setting would be about 29.22, causing the altimeter to read about 800-850 feet high. The altimeter had obviously been set two days previously [apparently during a time of high barometric pressure–Ed.]." (A80C0002)

Weather or Not you are flying near significant weather activity, ensure that you have the most up-to-date weather reports, including complete information on frontal movement.

Barometer Surprise



A number of reporters indicated that the low altimeter setting they encountered was unusual for the area or unexpected for the current weather conditions. In many of these cases, the crew subconsciously ignored the correct setting in favor of a setting that seemed more appropriate. Some examples:

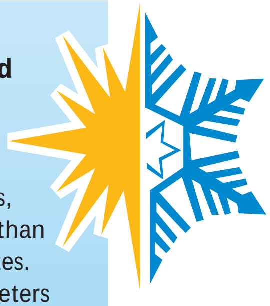
"The altimeter setting I wrote down was 28.85, but we had both set 29.85. I did not recognize the unusual nature of the setting, and reverted to more familiar settings during the checklist." (#97654)

"I read back the clearance, understanding the altimeter to be 30.37. Factors in this incident include my hearing ".37" and assuming it was the more normal 30.37 rather than the [actual] low reading of 29.37." (#287167)

High to Low
Hot to Cold

Flying into cold air has the same effect as flying into a low pressure area, that is, the aircraft is lower than the altimeter indicates. Unfortunately, altimeters cannot be corrected for temperature-related errors. However, pilots can adjust their minimum procedure altitudes to compensate for temperature errors. Canadian pilots consult a government-provided chart to determine how much altitude to add to the published procedure altitudes listed on approach charts, thereby ensuring obstacle clearance when temperatures are extremely low. The U.S. Defense Mapping Agency also publishes an altitude correction table, which is available to military pilots. Another helicopter accident report from the Canadian Aviation Safety Board points out the hazards of failing to correct for temperature. Fortunately, there were no fatalities in this incident:

"The helicopter was dispatched [to an offshore oil rig inside the Arctic Circle] at night, in IFR conditions… The crew descended on the inbound leg to 150 feet, with reference to the pilot's altimeter. The helicopter struck the sea ice and was destroyed by post-impact fire. The crew had not applied a temperature correction to the minimum descent altitude [approximately 40 feet to as much as 100 feet–Ed.], and this omission—combined with



"Altimeter was 29.32. First Officer set his altimeter to 29.32; I did not check mine. Weather was such that a 29.32 altimeter setting was not expected-winds were calm and a clearing trend was in the works." (#295359)

Crews can avoid a Barometer Surprise by listening carefully to ATIS and ATC broadcasts, especially before, during and after significant weather, when the altimeter setting may be an unusual number.

Et cetera

Our research produced one other oddity associated with a low altimeter setting:

"The temperature was 53 degrees with an altimeter setting of 29.34. I advised the Captain that we were over our allowable takeoff gross weight for that runway. The low altimeter setting required a further reduction of 270 pounds in allowable takeoff weight. The Captain said he was not aware of correction due to altimeter settings. The procedures for adjusting weights…had been in effect for only a few months. Before this, altimeter settings had only affected takeoff power, not takeoff weights. A test or some classroom work should be sufficient to correct the situation." (#145629)

This report serves as a reminder for all pilots to review flight and operations manuals frequently for changes or additions to out-of-the-ordinary procedures.

The Far Side

FAR 91.121 states that, when operating an aircraft below 18,000 feet MSL, pilots will maintain altitude by reference to an altimeter that is set to: 1) the current reported altimeter setting of a station along the route of flight and within 100 nautical miles of the aircraft; 2) the current reported altimeter setting of an appropriate available station; or, 3) in aircraft without a radio, the elevation of the departure airport or an appropriate setting available before departure.

This is not a problem on most flights. However, some routes or operations may take a pilot far from an altimeter reporting station, as was the case with this General Aviation pilot:

"Southeast bound [on airway] at 17,000 feet indicated altitude, Controller reported my altitude encoder indicated 16,000 feet on the readout. I had departed VFR and picked up my IFR clearance at about 4,000 feet… I had set the barometric pressure as provided by Center when clearance was provided. I was approaching a cold front which was lying north to south over Lake Michigan. I asked for an altimeter setting. The setting provided was 1 inch lower than the previous provided setting (about 100 nm earlier). I reset my altimeter… After the reset, my altimeter now indicated 16,000 feet… The problem was evidently a very steep pressure gradient behind the cold front." (#190851)

Large portions of the Canadian provinces and territories are remote, making aircraft an ideal form of transportation to and from these far-off areas. However, flying in such remote locations is not without some hazards. Two incident reports from Canada provide graphic examples of why an accurate altimeter setting can be critical:

"The pilot stated that he was lined up [on approach] for the runway and that the altimeter was reading 300 feet when the nose wheel struck the ice. The pilot applied full power…and flew back to [his departure airport over 100 nm south–Ed.], where the landing was uneventful. The pressure in the area was lower than the point of departure, sufficient to make the altimeter read 250-300 feet high if not properly reset." (A80W0001)

"On a night VFR flight, the pilot encountered deteriorating weather as he approached his destination. He received an IFR clearance…During a procedure turn, the aircraft started to strike the tree tops. The aircraft stalled and crashed into the trees. Because the airport had been closed for the night, no altimeter setting was available. The FSS operator gave the pilot the setting for XYZ (29.68) and for ABC (29.87) [approximately 90 nm south and 90 nm east, respectively–Ed.]. The aircraft altimeter was set at 29.94. Both pilots had been without proper rest for approximately 20 hours." (A80C0079)

To avoid being left on the Far Side, obtain altimeter settings from the nearest FSS or ATC facility. Then give yourself an <u>extra</u> margin for error when flying or landing in areas far from the altimeter-reporting station. Remember the old adage, "High to low, look out below." A one-inch error in the altimeter setting equals 1,000 feet of altitude.

The One-Eight-Zero Blues

ASRS receives many reports of altimeter-missetting incidents that occur when aircraft are transitioning through FL180 *(see **"Transitioning Through FL180"**, beginning page 9)*. A flight crew's failure to reset an altimeter at FL180 has probably caused an occasional adrenaline rush among controllers; the added factor of an extremely low barometric pressure increases the potential for large altitude errors. The following report excerpts illustrate:

"Altimeter [at departure field] 28.42. When…climbing through 18,000 feet, Captain called, '29.92 set' when in fact he set 28.92. I did the same. The back lighting in my altimeter was out, and maintenance had installed post lights [which left] a dark shadow…thus my meter was in the dark. I was careless in not double-checking with a flashlight." (#290765)

"Holding off and on. We neglected to reset altimeters from 29.92 to 29.20 passing through FL180. Extremely low pressure caused us to be at 12,200 feet when we thought we were at 13,000 feet. We didn't accomplish the checklist on descent, which would have prevented this." (#289818)

"Received low altitude warning, pulled up and discovered altimeter was misset. Altimeter was set at 29.84, and should have been set at 28.84. Crew distracted with a [mechanical problem] about the time of altimeter transition from flight levels to altitudes." (#290122)

The cure for the One-Eight-Zero Blues is strict adherence to checklists and procedures (sterile cockpit, readback of ATC clearances, etc.), and good CRM techniques for cross-checking with the other crewmember(s).

"Bar" Exam

Hectopascals, more commonly referred to as millibars, are used in many foreign countries instead of inches of mercury as the unit of measurement of barometric pressure. (More information on International Altimetry can be found in ASRS Directline #2, Fall, 1991). Reporters noted that distractions or inattention to details were precursors to many of the incidents that occurred where millibars are the status quo. Others pointed to a lack of clear communication, as the next reporter suggests:

"During descent, the altimeters were incorrectly set at 29.99 instead of 0999 hectopascals, resulting in Approach Control issuing an altitude alert. I believe the ATIS was copied by the relief pilot using 3 digits with a decimal point. Since [ATIS] normally issues both hectopascals and inches of mercury, I incorrectly assumed

the known 50-foot error in the pilot's altimeter—accounted for the mistaken belief the helicopter was higher." (A81W0134)

For those who have never used an altitude correction chart, here is an example of how the Canadian chart works. The Whitehorse airport, in the Yukon Territory along the Alaska-Canada highway, is approximately 2,300 feet MSL elevation. The approach plates indicate, *"Mountainous terrain all quadrants. Apply altitude corrections for cold temperatures."*

At the 10-mile marker, for example, the published crossing altitude is 6,600 feet MSL. On a -30°C day (-22°F) on the ground, pilots would add more than 700 feet to that altitude; that is, they would cross the fix at an indicated altitude of 7,300 feet MSL to offset the error caused by the cold temperature and to ensure obstacle clearance. At the final approach fix, the published altitude of 4,000 feet MSL would need to be increased approximately 300 feet; that is, pilots would cross the fix at 4,300 feet MSL indicated altitude. In other examples, at higher published altitudes and at colder surface temperatures, corrections can be more than 1,000 feet—a potentially critical difference between true altitude and indicated altitude, especially in IMC.

that the decimal denoted the inches-of-mercury scale and announced '29.99,' and set my altimeter. I recommend the following phraseology: 'Altimeter zero 999 millibars' for hectopascal scale; 'Altimeter 2999 inches' for inches-of-mercury scale." (#295007)

Even when you know you are working in millibars, just how few millibars can come as a surprise:

"Altimeter setting 971 mb [descending] out of 4,000 feet (transition altitude) …started to set altimeter. By the time I had set 971 mb, I was 500 feet below assigned altitude. Approach Control noticed what had happened and cleared us to 2,000 feet…and said, 'Altimeter setting is pretty low, huh!' Never having used millibars before, the significance of 971 mb wasn't apparent to me until I read the inches of mercury equivalent, 28.68." (#101698)

Pass your Bar Exam in foreign countries; be particularly vigilant where altimeter settings may be in units other than inches of mercury, and where altimeter transition levels, from pressure altitude (QNH) to the standard pressure setting of 29.92 (QNE), and vice-versa, may be variable.

Feeling Pressured?

Other reporters confessed to simple human error-mistakes in reading, hearing, or copying the broadcast altimeter setting; distractions and inattention; and failure to complete checklists.

"The 30.06 altimeter setting we used was actually the wind speed and direction and was written [on the ATIS information card as] 3006. In my mind, this was a reasonable altimeter setting. The ATIS setting was actually 29.54." (#292949)

"PNF understood ATIS recording to state altimeter setting to be 29.99 when actually the setting was 29.29." (#293372)

"First flight of the day after overnight maintenance…and there was adequate time to accomplish all required checks. Maintenance had set the Captain's altimeter to zero. Departure field elevation was almost exactly 1,000 feet MSL. This was a very subtle trap, but we had a lot of chances to catch it." (#300270)

Even with what appeared to be a clear reminder for the flight crew, this Second Officer reports that they all still missed the "heads-up:"

"The altimeter was 28.84. I remember enlarging the 8's with two circles on top of each other, thinking this would be sufficient in drawing attention to the low altimeter setting. The next crew after our flight…found the altimeter to be set at 29.84 instead of the actual 28.84 setting." (#195014)

Take the Pressure off by applying solid CRM skills. Keep all crew in the loop and confirm communications (verbal and written) with each other.

ATC's Role

A number of reporters expressed concern that ATC had "failed" to warn the flight crews about unusually low altimeter settings. However, misconceptions abound regarding ATC or FSS personnel's responsibility during low pressure situations. Two report excerpts illustrate:

"ATIS [reported altimeter] 28.84. No mention of low altimeter was made. [Climbing through] FL180, altimeters were set to 28.92 Captain and 29.92 First Officer. At FL320 Captain's altimeter, I called FL320 for 330. The First Officer called 330, noticing the wrong altimeter setting on my side. I immediately descended…while setting my altimeter to 29.92. I feel this mistake might have been avoided if the ATIS had mentioned the low altimeter setting." (#290458)

In recording the ATIS, some controllers may emphasize the altimeter setting by stating, for example, "a low 28.84." However, this procedure is not mandatory.

"Destination weather [reported altimeter] 28.83. Prior to initial descent, the Second Officer received and put the ATIS information on the landing bug card, except that the altimeter was written as 29.83… [On final], the Captain started a go-around at the same time the Tower reported they had a low altitude alert warning from us… I feel anytime [the altimeter setting] is below 29.00, the term 'low/low' should be used." (#290848)

Again, there is no requirement for controllers to notify pilots of unusually low barometric conditions, although many controllers elect to do so. The phrasing "low/low" is a technique used by some controllers and Flight Service Station specialists to emphasize a particularly low altimeter setting, but pilots shouldn't count on hearing it.

As little as a year ago, the FAA Air Traffic Procedures Division again looked into the suggestion that controllers state the word "low" before issuing an altimeter setting below 29.00 inches. Ultimately, the proposal was not adopted. In explaining the decision, the FAA stated in part: *"The low altimeter issue has been determined to be geographically specific. A Regional or facility directive would be most effective in this case. The [automated ATC systems] can be adapted…to alert the air traffic control personnel to emphasize an unusual situation."*

Summary

So, Wherever in the World you fly, avoid Feeling Pressured by a Barometer Surprise or the One-Eight-Zero Blues. Weather or Not you pass your Bar Exam, learn ATC's Role before you reach The Far Side.

Obtain frequent and appropriate weather reports throughout the flight. Listen carefully to the complete ATIS or ATC altimeter-setting broadcast, and confirm the information with other crewmembers.

Thanks, eh?

Many of the reports used in this article were provided by ASRS's sister agency in Canada, the Canadian Aviation Safety Reporting Program (CASRP). Our thanks to Les East of the CASRP for helping us find so many useful incident records.

The CASRP incident reports may be identified by their combined letters and numbers (A80C0079), while ASRS incident reports use only numbers (#290458).

Transitioning Through FL180

FL180 is the altitude at or above which, in North America, all aircraft altimeters should be set at 29.92, and below which they should be set to the current barometric pressure of the nearest reporting station. Extreme barometric pressure is only one of the causes reporters cited for the altimeter-missetting incidents that occurred during a climb or descent through this altitude. A frequently reported cause was distraction by other cockpit tasks. Other causes noted by ASRS analysts were failure to follow procedures and lack of Crew Resource Management (CRM) skills.

All three of the following report excerpts indicate a lack of CRM, and a resultant failure to maintain an adequate division of labor among the cockpit crew. In the first report, numerous distractions inside and outside the cockpit, combined with an apparently uncompleted checklist, led to a relatively minor altitude deviation:

✍*"Reported weather was thunderstorms and hail. We were on a heading and altitude…that kept us parallel to a line of thunderstorms. After level-off at FL290, [the Center Controller] called us 500 feet high. In all the confusion…we neglected to reset altimeters at FL180. The problem arose…during a high workload period of time, a period of moderate turbulence, lightning nearby, working with airborne radar to determine our safest flight path, and communicating constantly with the Controller."* (#107888)

The next reporter likewise experienced high workload and multiple distractions, including a minor mechanical malfunction.

✍*"Descending through approximately 23,000 feet and while navigating an area of precipitation and thunderstorms, both air conditioning packs failed. …as we worked on the pressurization problem…we were assigned 11,000 feet. As we leveled, ATC asked our altitude because he saw us at approximately 10,500 feet. Then we noticed that two of our altimeters were still set at 29.92 with the [actual] pressure at 29.42. Our workload was obviously heavy, but we should not have missed this basic procedure."* (#265215)

Again, appropriate division of cockpit tasks (one pilot to fly the aircraft, the other to handle the malfunction), and adherence to procedure (the checklist) probably would have caught this mistake before ATC did. At the very worst, left unnoticed, this incident had the makings of a repeat of other distraction-related accidents.

Another distraction, in the form of food, was the undoing of the next reporter:

✍*"Just before we began descent, the flight attendant brought up dinner for both of us at the same time. Started descent as we started eating. Because of distraction, we failed to reset altimeters at 18,000 feet. Descended to 17,000 feet with wrong altimeter setting. Received TA of traffic at 16,000 feet."* (#295619)

Many air carriers have established policies that forbid the Captain and First Officer eating meals at the same time.

Transitioning Elsewhere

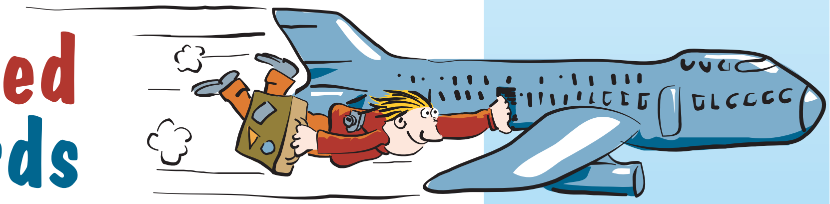
Beyond the North American continent, the pressure altitude/indicated altitude transition level is variable. In South America, Buenos Aires, Argentina is at the low end at 3,000 feet; the high end is 18,000 feet in La Paz, Bolivia. Most of Europe uses 4,000-6,000 feet; much of India also uses 4,000-5,000 feet. The transition level in Tel Aviv, Israel is 10,500 feet, but Jerusalem's transition altitude is changed by ATC as required. Cape Town, South Africa uses 7,500 feet, and further north, Cairo, Egypt uses 4,500 feet. To the East, in Riyadh, Saudi Arabia, the transition level is 13,000 feet. Australia uses 10,000 feet; Japan uses 14,000 feet; much of the rest of the Far East uses 11,000 feet. Above these transition levels, altitude is expressed as "Flight Level" (FL), and altimeters will be set to QNE—the standard pressure setting of 29.92 inches of mercury, or 1013.25 hectopascal.

In the following report from a flight crew on a European flight, the unfamiliar, non-standard transition altitude simply added to the distractions of the departure workload.

✍*"Climbing to FL60 (transition altitude 4,500 feet)…We were task saturated flying the Standard Instrument Departure, reconfiguring flaps and slats, resetting navigation receivers and course settings, resetting engine anti-ice, etc. The crew missed resetting the Kohlsman window to 29.92 at 4,500 feet MSL, and leveled off at FL60 indicated altitude with a Kohlsman setting of 28.88 inches. Departure informed us of our error."* (#206218)

It would have been easy for this three-person crew to unconsciously think, "We'll get all this other stuff taken care of, then change the altimeter at FL180." Again, it was ATC to the rescue, bringing the problem to the crew's attention before the error became critical.

Passenger-Related Safety Hazards



by Betty Hicks and Rowena Morrison

REPORTS in the media and popular films frequently leave the impression that the main safety threats to commercial air carrier operations involve bombs, terrorist hijackings, and hazardous cargo. However, reports received by Aviation Safety Reporting System (ASRS) belie some of these notions. Pilot and flight attendant reports to the ASRS indicate that passengers themselves are an unexpected source of many inflight safety problems, ranging from the merely annoying, to those that pose serious interference with crew duties and a potential risk to aircraft structural integrity.

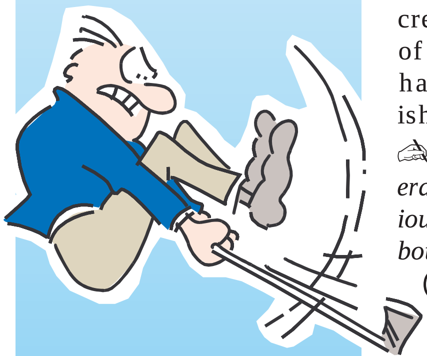
ASRS data is not the only indicator of a serious and growing problem with passenger inflight incidents. A recent issue of a major air carrier's employee publication noted an almost 200% increase between 1994 and 1995 in reports filed with the company by flight attendants describing interference from passengers.[1] The interference included assaulting, threatening, or intimidating crew members performing their inflight duties. During this same period, the number of physical assaults experienced by flight attendants at this carrier increased threefold.

Passenger-related incidents form only a tiny fraction of ASRS database holdings. A recent review of 73 database reports referencing inflight security problems revealed that passengers—drunken, obstreperous, or dangerously uninformed—constituted 23 percent of the reports submitted, equaling the number of incidents involving hazardous materials carried in the cargo hold. Passengers carrying guns, with and without the necessity to be armed, accounted for another 12 percent of these 73 reports. In general, the ASRS passenger-induced safety hazards fell into the following categories:

- Alcohol or drug-related violence;
- Uncooperative or unstable behavior;
- Carriage of hazardous materials and devices on board.

The following discussion presents some thought-provoking—and typical—examples drawn from ASRS data of adverse passenger effects on flight safety. It describes how these incidents were handled, and summarizes reporters' conclusions about how future occurrences might be prevented, or their impact lessened.

Footnote:
1. "American Will Not Tolerate Abuse of its Employees," American Airlines *Flagship News*, Vol. 52, No. 19, September 30, 1996, p. 1.



The Case of the Swinging Golfer

A golfer en route to an overseas tournament could be expected to swing—but at passengers and flight crew? As so frequently occurs in cases of obstreperous passengers, this golfer had been too well served, as the British phrase it:

"The passenger had been served several drinks prior to this, [and] was obnoxious, walking around the cabin with a wine bottle and annoying his seat partner…" (#250824)

It was later determined that the passenger had apparently taken a doctor-prescribed sleeping pill or relaxant along with the alcohol. At the initial disturbance, the Captain dispatched the relief pilot to check on the situation. The passenger temporarily calmed down, but the cease-fire was not long-lived. In response to the next disturbance, the Captain sent the Second Officer (a retired Captain), to speak to the golfer. While the Second Officer momentarily had his attention diverted, the golfer hit him in the chin with an uppercut. The pugilist *"was subdued and restrained with airline-issue handcuffs, from which he released himself (or broke) in about 30 minutes."* The relief pilot was recalled to oversee the behavior of the out-of-bounds golfer, *"…who was on good behavior for the remainder of the flight."* At the intermediate destination, the golfer was removed from the airplane and sent back to the origination point with two escorts. He was arrested there and permitted one phone call—which he used to call the airline to make reservations to his original overseas destination!

The unlucky Captain of this flight had two recommendations to ASRS and to his airline, based upon this passenger's antics: (1) have a designated "bouncer" assigned to flights, and in no case send the PIC back to cope with the problem; and (2) provide training in use of the airline's new-design handcuffs.

A Commotion at Cruise

The pilot reported to ASRS that this female passenger *"was OK for the first two hours of the flight…"* (#132061) But she became violent at cruise, grabbing a Flight Attendant by the hair and shaking her, and bruising and scratching other passengers. A doctor on board managed to calm the passenger. *"The person who boarded her put us all at risk!"* protested the reporting pilot, expressing what may be excessive optimism that a Passenger Service Representative could diagnose the future misbehavior of a passenger who appeared calm during boarding.

In similar ASRS reports, crew members suggested better screening of passengers: *"I suggest airport police be given the authority to test suspect passengers for intoxication to determine if they are fit for boarding." "We feel that passengers should be closely observed during the ticketing and boarding process, and not boarded if their behavior is questionable."*

“Oh, Were We Cleared to Two Five Zero?”

“While we began our pushback, a deranged passenger tried to force open the main cabin door.” The relationship between this incident and the late initiation of a descent would appear to fall in the non-sequitur category. Not according to this ASRS report:

“The Flight Service Manager and I were discussing some events concerning the passenger who earlier tried to force open the main cabin door. That event [had] resulted in a one-hour delay, police action, reports, etc. which we were discussing as the Flight Service Manager reviewed the comments in her report with me at the time I failed to begin my descent.

“A few minutes later, while we were still at FL290, the Controller asked, ‘Have you started your descent to flight level two five zero? You were cleared to two five zero several minutes ago. I now need a good descent rate through flight level two seven zero for traffic.’ As I leveled, I asked the Controller if our late descent had caused any problem. ‘Not now,’ was ATC’s curt reply.” (#151533)

Since the flight was still at cruise, well above the altitude at which sterile cockpit procedures would have been initiated, this may have seemed a reasonable time to review the pushback incident. However, assignment of cockpit duties to the co-pilot would have been appropriate before the Captain took himself “out of the loop” for the discussion with the Flight Service Manager.

The Pax with the Aft Attitude

The commuter passenger who figures in the next incident was not hauled off for incarceration, nor was he charged with physically interfering with a crew member in performance of his or her duties. But for sheer obstinance, he was a winner.

“The forward cargo door motor was inoperative, so substantial baggage was placed in the aft cargo compartment. For weight and balance purposes, this required the four rearmost rows of seats to be vacant throughout the flight. All passengers seated in those rows were moved forward prior to taxi. Fifteen minutes after takeoff, while the seat belt sign was still illuminated, our Flight Attendant (FA) called on the intercom and said that one passenger got up and moved to one of the blocked rows.” (#170401)

The Flight Attendant asked the man to move for weight and balance purposes. He refused. She explained again that his moving was necessary for weight and balance compliance. He responded that he was a pilot, and punctuating his statement with four-letter words, announced that he knew better than to accept the necessity to move. Moreover, he challenged, *“If the pilots want me to move, they can come back here and make me.”* The Flight Attendant then asked for help from the flight deck, but both pilots were too busy with flight duties to leave the cockpit. The Captain later reported to ASRS:

“The Flight Attendant assured us the man was now seated in the blocked rows where there was no one to disturb. I decided to continue to our destination, but wanted to ensure that nothing whatsoever would be done to agitate this individual... Since he indicated he was a pilot, he was aware of the laws and intentionally violated them. He certainly knew the significance of keeping an aircraft loaded within weight and balance parameters. He willfully jeopardized the lives of everyone aboard the aircraft.”

The Flight Attendant added, *“When I offered him refreshments he just sat there with his arms folded and would not look at me.”*

The crew probably took the best action—no action—during this incident. Any further prodding of the passenger by the crew might have resulted in an altercation and a more serious disruption of the flight. Since the aircraft was apparently still flyable with the passenger in the off-limits seat, continuing to the destination was the least provocative course of action.

"What's That Smell?"

Not all the inflight passenger problems reported to ASRS were the result of actions by intoxicated or belligerent individuals. There were several instances in which well-behaved but uninformed passengers introduced hazardous carry-on baggage into the cabin. One such incident, reported by a First Officer, involved the discovery by the cabin crew of a malodorous surprise in an overhead bin:

"…A passenger was carrying a compact chain saw (blade and chain removed) in a cardboard box in the overhead bin. The box would not fit upright, so the passenger had set it on its side. This apparently allowed fuel/oil mixture in the engine (tank was empty) to seep out into the box and finally the overhead bin as well. We removed the other articles from the bin (2 coats) and covered the box with a damp blanket to keep down the fumes. Other passengers now started to complain about the fumes, so I went back to investigate. By now a mixture of fuel and water was dripping out of the overhead bin onto a passenger seat… (#225383)

The cabin crew carried the offending box to a rear lavatory and covered it with a damp blanket to stifle the fumes, while air vents and the lavatory drain were opened to increase airflow. The crew then locked the lavatory and increased the airflow through the cabin to dissipate the odor. The passenger who owned the chain saw was described as *"very cooperative, maybe even embarrassed."* The final surprise was the passenger's account of how the chain saw had been brought on board: Prior to this passenger's initial borading, *"Security told him he could carry it on. Since then he had not had to clear security screening, so nothing more was said to him about it."*

In a similar incident, cabin crew investigating an unusual odor discovered a small leaking camp stove concealed in a knap sack enclosed in an overhead bin. Confusion reigned while the crew tried to sort out the appropriate procedure to follow. The airplane flight manual was ambiguous, so they contacted dispatch, which in turn contacted the Chief Pilot and Fleet Manager for clarification. The Chief Pilot and Fleet Manager disagreed on interpretation of the flight manual, so the hapless crew finally complied with the most conservative procedure—they diverted for landing to remove the leaking camp stove from the aircraft.

"An emergency was declared so as to have assistance readily available should it become needed. Upon arrival at the gate, the Station Manager removed the camp stove and knapsack from the aircraft. The passenger to whom the knapsack belonged was cooperative. He had proceeded through security screening with the nap sack without the stove being detected, despite the fact that the stove was constructed of metal and was stored in a metal box measuring approximately 4 inches by 6 inches by 6 inches. The passenger was unaware that carrying the fuel camp stove on board an aircraft was prohibited." (#342234)

Of Arms and a 'Leg'

Flight crews become upset when they are the last to know that they have authorized armed security on board. *"Before boarding,"* recalled one PIC, *"I was told that a [government] VIP was traveling. After the flight was completed, I discovered that the VIP was accompanied by two security personnel. It was then that we realized that we had two armed individuals on the flight, and we had no notification to the flight attendants or to the PIC."*

This violation of the airline's operations manual caused the Captain to invite the Operations Department to investigate. They found a trail of deteriorating communications.

"The proper forms were filled out. The agents were briefed to inform the Flight Attendants (FAs) that they were armed; they did not do so. The ramp supervisor knew that the VIP's escorts were armed, and he told our FA that we had 'two leg passengers in Row 4,' ('Leg' being the curious code word for 'armed individual.') Needless to say, no one told us that was the code, so the FA thought he meant, 'Two passengers with hurt legs.' The agents did not display their special boarding passes to the FA. Not only that, they did not sit in their assigned Row 4 seats." (#251326)

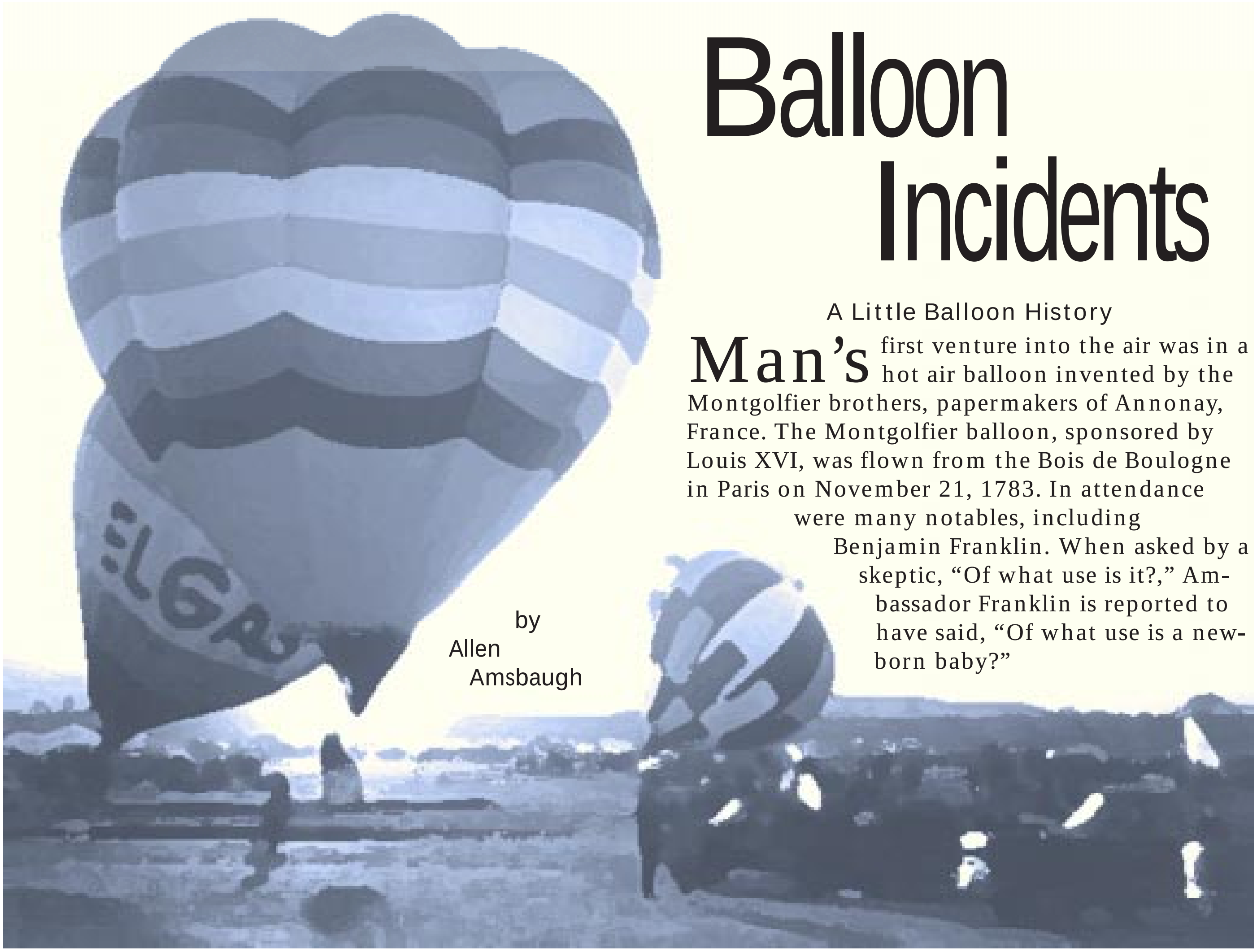
The Flight Attendant solicitously asked the two passengers in Row 4 if their legs were OK. They were.

It is a policy at some air carriers that when an armed passenger is admitted to the aircraft, the Passenger Service Representative comes to the cockpit to inform the flight crew of the location of the passenger and that person's need for carrying the weapon during the flight. When there is more than one armed passenger on board, the Captain also makes sure that the armed individuals are introduced to each other, so that neither will be surprised by the sight of another weapon-carrying passenger. The use of direct, clear communication—privately delivered to the appropriate parties—generally gets the information across.

Other Passenger Problems

The balance of reports regarding other passenger problems were mostly unique incidents. They included gate agents who permitted passenger boarding before flight attendants were on the airplane, an apparently alcohol-impaired passenger blocking an emergency exit, and a brazen passenger retrieving his own bags from a commuter baggage compartment.

Intoxicated passengers, disorderly behavior, undeclared hazardous materials in carry-on baggage—these and other problems identified in ASRS data pose potential threats to the safe operation of aircraft flights. To safely manage the outcome of these incidents, pilots need to use lots of diplomacy, apply Crew Resource Management skills, and operate strictly according to company procedures. One Captain summed it up nicely: *"In order to guarantee compliance with the numerous, complex aviation regulations, pilots need to be well informed, cautiously skeptical, and they need to document their actions."*



Balloon Incidents

by
Allen
Amsbaugh

A Little Balloon History

Man's first venture into the air was in a hot air balloon invented by the Montgolfier brothers, papermakers of Annonay, France. The Montgolfier balloon, sponsored by Louis XVI, was flown from the Bois de Boulogne in Paris on November 21, 1783. In attendance were many notables, including Benjamin Franklin. When asked by a skeptic, "Of what use is it?," Ambassador Franklin is reported to have said, "Of what use is a newborn baby?"

Professor Charles, inventor of the gas balloon, was working concurrently with the Montgolfier brothers, and in direct competition for the support of the king. His approach was a balloon filled with newly discovered hydrogen obtained from disassociation of the elements composing water. Professor Charles' creation, the Charliere balloon, flew from the Tuileries on December 1, 1783, and the *Space Race* was on!

Within a very few years, a third type of balloon was flown by Pilatre de Rozier, also in France. The Rozier balloon combined hot air and hydrogen; a hydrogen envelope inside a hot air envelope was heated so that less valving and ballasting were necessary to maintain altitude control. This soon proved to be dangerous, and the Roziere-type balloon was forgotten until helium became readily available.

All three types of balloons, or *aerostats*—the Mongolfiere, Charliere, and Roziere—are in use today. Propane burners have replaced wood, straw, and dung in the hot air, or Mongolfiere balloons. Helium, ammonia, city gas, and hydrogen are the lifting gasses used in gas, or Charliere balloons, while Roziere balloons now use a helium inner envelope, with a surrounding hot air envelope heated by propane.

The renaissance of hot air ballooning developed under the guidance of Ed Yost in Sioux Falls, SD, in the early 1960s under a U.S. Navy contract with General Mills. The Yost-General Mills product proved to be more valuable for recreation than for military use, and sport hot air ballooning was reborn. There has since been a steady growth of ballooning in the United States and around the world, and balloons can be seen flying every day. Many flights are in competitive events and rallies. Balloons are also used commercially to give sightseeing rides, and as flying billboards to advertise many products.

Balloon Reports to ASRS

More and more balloonists, or *aeronauts*, have become aware of and are using the Aviation Safety Reporting System (ASRS) to report safety concerns or perceived violations. A review was performed of 109 ballooning incidents reported to the ASRS from 1990 to 1994. There were no reports from gas balloon or airship flights, possibly a reflection of the low level of activity in these sectors. Also, there were no reports from any of the highly publicized long distance or altitude flights. This may reflect the extra caution, care, and planning that goes into these flights, as opposed to the casual weekend sport flight or the flights taken by commercial pilots.

Most of the reporters state that weather and winds were the cause of their incidents. These adverse wind and weather conditions are often found only in a very small area and thus may be termed *micro*-meteorological conditions. Weather briefers tasked with providing area and airport-specific aviation forecasts may be unable to provide micro-meteorological forecasts or reports about conditions of concern to the balloonist. Consequently, most observation is done by the balloonist on the spot after getting all available official reports. This often leads to surprises, incidents, accidents, and sometimes, to tragedy.

Sixty-five of the 109 reports (60 %) listed weather factors as the cause of the incident. (See Figure 1.)

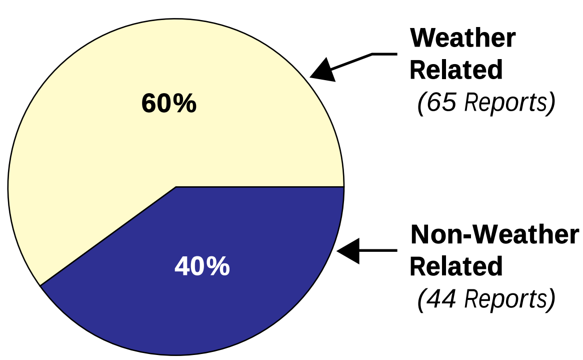


Figure 1—Total Incidents in Data Set

As may be seen in Figure 2 below, forty-three of the weather-involved reporters (66 %) listed unforecast increasing winds as their problem. Nine reports attributed their difficulties to thermals, or other downdrafts, forcing the balloon into the ground. An additional eight reports listed becoming becalmed as the source of their dilemma—not enough wind can be almost as hazardous as too much. One aeronaut became becalmed over trees at sunset, and pulled himself to a clearing by using the treetops. Finally, five reports were received from pilots who found themselves VFR in IMC due to fog or fast-forming clouds underneath.

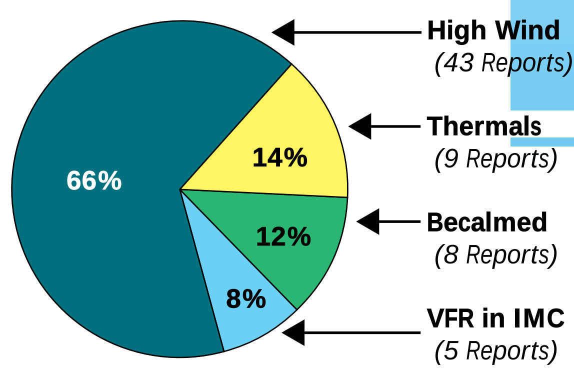


Figure 2—Types of Weather Involvement

What Happens in Balloon Incidents

In truth, probably all of the balloon incidents could be considered weather related, as low-level flights to find suitable landing sites, landing in residential areas, and hard landings are usually caused by winds that are not favorable to the balloonist. Even some of the ground incidents undoubtedly involved unreported weather factors.

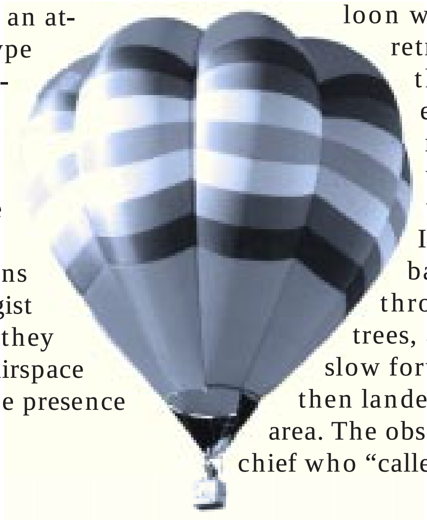
Airspace Problems

Eleven of the incidents reported involved airspace violations by aeronauts who found themselves inside the edge of Class "B," "C," or "D" airspace without proper radio contact due to a wind shift, faulty or no radio, or faulty navigation. Two aeronauts were intercepted by Air National Guard F-16s while in R-5503. The balloons were flying legally; it was the fighters who were in the airspace early and no NOTAM had been issued.

Airborne Conflict

Midair collisions between balloons accounted for nine of the incidents, with five reporting damage, and one reporting an injury. Most balloon midair collisions are of the "kiss" variety where there is very little relative velocity. Reports concerning damage and injury were of the variety where the lower balloon did not observe common-sense rules in a crowded situation. In one incident, the lower pilot climbed rapidly into a balloon above. The balloon below has the right-of-way because of the lack of visibility, but this does not allow the lower balloon to climb rapidly. In an attempt to preclude this type of mishap, most balloonmeets limit the climb and descent rates to 200 feet per minute.

Six of the reports were from air carrier pilots who encountered balloons in "their" airspace. The gist of their reports was that they were loath to share the airspace and were surprised by the presence of the balloons.



Conflict with Ground and Objects

Seventeen of the reported incidents concerned flights into power lines, the one incident which causes the most fatalities in ballooning. In one third of these incidents, the reporters stated that the power lines were obscured in trees. More than half reported minor damage, and three reported injuries.

There have been other reported injuries, including two broken ankles, to passengers who were not wearing proper footwear in a "ride" balloon. Another ASRS incident record describes one of the more serious types of incidents when working with balloons or airships—attempting to hold the aerostat down by hanging onto a line or the exterior of the basket. In this instance, a crewman lost his grip and fell, breaking an arm and an ankle. No one should ever let his or her feet leave the ground when handling a lighter-than-air vehicle.

They Don't Understand

One of the problems aeronauts find in almost every flight is the notion, "If you're having fun, or doing something unusual, it must be illegal!" This attitude seems to be pervasive among unknowledgeable observers. One reporter describes a balloon landing on a boat in a lake after becoming becalmed. The aeronaut and his balloon were successfully retrieved, only to find themselves on the evening news! Fortunately, the local FSDO was able to laugh with the aeronaut over this.

In another incident, a balloon was seen flying through the tops of some trees, an accepted practice to slow forward velocity, and then landed safely in a vacant area. The observer was the local fire chief who "called out the artillery."

The Sky is Falling

Four incidents related to livestock on the ground. One involved a typical "balloon dog" that got upset, then barked and upset its owner. In another report, the balloon spooked some cattle, and in another incident, the balloon flew low over an aviary that was not on the pilot's chart. The most serious incident was the alleged spooking of a horse. Its rider was thrown and suffered a broken arm.

Other Hazards

Balloon fatalities can also result from a propane leak, either in flight or on the ground. Three reporters listed a propane leak—two in the air and one on the ground. In one incident there was damage, and the other resulted in injury. In a fourth incident, an aeronaut reported fuel contamination of an unknown source.

Counting the Problems

Of the 109 incidents studied, 25 reported damage to their balloon or to another balloon; 13 reported injuries; and 25 reported official action taken, mostly by local law enforcement or fire departments.

Table 1 (at right) lists the numbers and percentages of incidents reported in the 109 reports reviewed for this article.

The Final Word

Reading these incident reports reminds one that ballooning can be a hazardous sport, but there are actually few injuries and little damage. Nonetheless, the following suggestions may help reduce the potential for incident:

- Obtain all available weather information;
- Carefully observe local conditions before committing to flight;
- If unfamiliar with the micro-meteorology of any area, seek local advice from experienced balloonists;
- Brief passengers and crew on all normal and abnormal preflight, inflight, and post-flight procedures.

Table 1—Balloon Incident Results

Incident	Citations	Percent
Low-Altitude Flight	22	20%
Power Line Contact	17	16%
Landing in Residential Area	17	16%
High Wind / Hard Landing	12	11%
Airspace Violations	11	10%
Miscellaneous	11	10%
Ground Incidents [1]	10	9%
Mid-Air Collisions	9	8%
Ground Personnel Perception [2]	8	7%
VFR in IMC	8	7%
Balloon in "Airplanes's" Airspace [3]	6	6%
Livestock Incidents	4	4%
Propane Leak / Fuel Contamination [4]	4	4%
Totals	139	128%

1. Balloon did not fly, or the flight had terminated.
2. Reporter claimed to have done nothing wrong, but was threatened by being reported to higher authority by a homeowner, police, etc.
3. Reported by airplane pilots.
4. One on the ground, two in the air, one contamination.

Multiple citations are possible in any given category, thus the combined totals of citations and percentages shown here are greater than 109 citations and 100 percent, respectively.

Additional Information:

For additional information, readers can reference the following books used in preparation of this article.

The Eagle Aloft—Two Centuries of the Balloon in America, Tom D. Crouch, Smithsonian Institution Press, Washington, DC, 1983

Astra Castra, Experiments and Adventures in the Atmosphere, Hatton Tuznor, Chapman and Hall, London, 1865

Picture Credits

The stylized photograph that appears in the title of this article (page 16), and the photo at left (page 18), are the author's balloon.

ASRS

OPERATIONAL ISSUES BULLETIN

ASRS Operational Issues Bulletin 96-01

Confusion in Using Pre-Departure Clearances

Background

In 1990, the FAA implemented the Pre-Departure Clearance (PDC) program at a number of U.S. airports. This system allows pilots to obtain IFR clearances through aircraft ACARS units prior to taxi-out, thus eliminating the need for verbal communication on Clearance Delivery frequencies. The program's objective of reducing congestion on Clearance Delivery frequencies has been met. However, a number of ASRS incident reports indicate that pilots and controllers frequently experience confusion in using the PDC system.

In order to further investigate the causes of PDC-related problems, a team of ASRS analysts reviewed a relevant selection of incoming ASRS incident reports, and conducted interviews with aviation professionals at Oakland Center, San Francisco Tower, several major air carriers, NASA, and FAA Headquarters in Washington, D.C. This operational bulletin will focus on the two most frequently cited areas of concern: (1) inconsistent PDC formats, and (2) lack of confirmation procedures for PDC receipt.

Inconsistent PDC Formats

Revised Routings. The PDC problem most frequently reported to ASRS is confusing depiction of clearance revisions or amendments. Most PDC revisions are depicted by dashes before and after the revision: – REV –. The original filed clearance is printed on a separate line immediately following the revised clearance. However, many flight crews apparently are not trained to observe the formatting differences between clearance revisions and filed clearances. As a result, flight crews often believe that revisions are erroneous (or separate clearances), and revert to their original filed clearances. A recent report from a flight crew illustrates:

> *"After checking in, the Center told us to proceed direct to 'ATL,' rest of route unchanged. A quick check of our route showed we were not going over ATL so we told Atlanta Center we were not filed that way. He asked how we were filed and then changed our clearance to 'ATL-VUZ-as previously cleared.' The confusion I [felt] resulted from the display on our ACARS screen:*
>
> *– HARAY SPA J14 ATL VUZ –*
> *CLT HARAY ODF VUZ J52 DFW*
> *J4 ABI J66 EWM J4 ./. SAN*
> *SQK 2021 ALT 310*
>
> *…I assumed the – HARAY SPA J14 ATL VUZ – part was a mistake, since it was not complete."* (# 313340)

Sample PDC Formats

An ASRS analyst team obtained samples of actual PDC formats used by air carriers. Excerpts from several of these clearances are depicted below. Following each clearance is an explanation of the formatting inconsistency identified by ASRS.

SAMPLE 1

##DPTR CLRNC##
FLT 1234-05 SEA - SFO
XAL1234 SEA
T/B73J/G P2150 RQ330
XPDR 3572 EDCT 2200
SEATTLE2 RV J70
ELMAA
MAINT 9000 EXPT REQ
ALT 15NM AFT T/O
CONTACT DPTR CTL ON
120.4
CLNC VOID 15 MIN
AFTER EDCT
SEA ELMAA5 CVO
J589./. SFO

Problem: This PDC cites two departures, SEATTLE2 and ELMAA5. The flight crew must sort out which departure to use.

Confusion in Using
Pre-Departure Clearances

The type of confusion experienced by this flight crew over their PDC routing is potentially hazardous, as noted by a controller reporter to ASRS:

> *"It has been my experience…that several times per shift aircraft which have received PDCs with amended routings, have not picked up the amendment…I have myself on numerous occasions had to have those aircraft make some very big turns to achieve separation."* (# 233622)

The sources consulted by ASRS suggested several potential solutions to this problem:

✔ Standardize PDC formats, so that pilots will know where to look for routing information and revisions.

✔ Show only one clearance line in a PDC, and insert any revisions into the clearance line. For example, instead of showing a route revision this way:

– SFO 6 SFO LIN J84 MVA J198 ILC –

SFO LIN OAL J80 ./. BWI

Show it this way:

– SFO 6 LIN J84 MVA J198 J80 ./. BWI

✔ Make the revision section more visible by tagging it ("REVISION") or highlighting with asterisks or other eye-catching notation (*****).

✔ Provide flight crews with training in how to recognize PDC revisions.

Assigned SIDs. Another source of confusion occurs when assigned Standard Instrument Departures (SID) information is placed outside the routing section of the PDC. An ASRS report explains:

> *"We were anticipating radar vectors to intercept J70 ELMAA, etc., which was the route listed on the PDC message against our flight plan. Seattle Departure questioned us if we were in the turn. We replied negative, we were runway heading expecting vectors. We referred again to the PDC with route J70 ELMAA, with no mention of any SID. Departure then questioned which SID we were assigned. Again referring [to] the PDC, we noticed that the ELMAA 5 departure was listed. However, it was printed on the top portion of the PDC message, not near the route lines which are always on the bottom portion of the message…The placement of the SID in the portion of the PDC reserved for remarks caused both pilots to believe no SID was assigned."* (# 229216)

This pilot and other ASRS reporters had a single recommendation for how to handle SID information in PDCs:

✔ Standardize the placement of SID information within the PDC.

Sample PDC Formats

SAMPLE 2

_HX PDC MESSAGE
PDC 25 XAL1234 2602 PHX
T/B72S/G P1616 455 200
–DRK6 DRK J92 BLD–
PHX DRK6 DRK J92./. SFO
EDCT 1818

Problem: There is no apparent difference between the revision

–DRK 6 J92 BLD–

and the filed clearance. This is potentially confusing to a flight crew.

SAMPLE 3

_EA PDC MESSAGE
PDC 10 XAL1234 3516 SEA
T/B72S/G P1455 872 330
–ELMAA5 CVO–
SEA J70 ELMAA J589./.
EDCT
ELMAA5.CVO DEPARTURE

Problem: The revision is between dashes:

–ELMAA5 CVO–.

ELMAA (the same routing) is repeated on the next line for no apparent reason.

Confusion in Using Pre-Departure Clearances

Lack of Confirmation Procedures For PDC Receipt

Another frequently reported problem is flight crews' forgetting to obtain PDC, and taking off without a clearance. This oversight occurs primarily at airports that do not have a confirmation procedure for PDC receipt by the flight crew. The first clue that the PDC has been forgotten usually is when the Departure controller gives the crew a transponder code and Departure frequency, as described by these ASRS reporters:

> *"Our company uses PDCs to retrieve ATC clearances on ACARS. I requested our clearance but it didn't come up. I left the aircraft for a couple of minutes and when I returned, I failed to request the clearance a second time. We completed all checklists and departed, still failing to realize we hadn't received the clearance. On climbout, we received the Departure frequency from the Tower. Departure gave us the correct squawk code. Since we had a copy of the company routing and were accustomed to using the Hornet SID, we were lucky we ended up doing what we were supposed to do. I was surprised that none of the controllers seemed aware that we didn't have the text of the clearance…On our [Before Start] checklist there is an item, 'Radio/ACARS.' That was our only opportunity to prevent this error, but neither of us looked up the Departure frequency or squawk code…Pilots need to cross-check themselves with some sort of reminder."* (# 250847 & 250495)

ASRS sources had several suggestions for combatting the "forgotten PDC" problem:

- ✔ ATC facilities at PDC airports should consider requiring flight crews to read back their transponder codes prior to taxi.
- ✔ Flight crews should consider adopting the personal verbal challenge, "Code/Mode," at engine start. In glass cockpit aircraft, this is a reminder to check the transponder code and the navigation control mode. In non-glass cockpit airport, "Code/Mode" is a reminder to check the transponder setting.

Sample PDC Formats

SAMPLE 4

A recent letter to ASRS from an air carrier pilot noted another type of PDC discrepancy. This pilot is involved with daily flights from Los Angeles and San Francisco to Vancouver (CYVR), British Columbia. The final flight segment is SEA DRCT PAE DRCT ACORD ACORD6 CYVR. The PDC duplicates the filed flight plan up to Seattle, but then truncates the rest of the clearance as shown:

PDC 173 FLT XAL1234/12
KSFO
T/DC9/A P2110 BQ350
XPRD 1720 EDCT 1310
–SF06 SFO RBL–
KSFO RBL J65
SEA*CYVR**

Problem: Because of the truncated PDC routing, the flight crew must call Clearance Delivery before takeoff to verify the actual route after SEA. The discrepancy between the filed and PDC routes creates confusion for the flight crew. The necessity to call Clearance Delivery also nullifies the advantage of using a PDC.

Confusion in Using
Pre-Departure Clearances

Summary of PDC Recommendations

✔ Standardize PDC formats, including placement of SID information, so that pilots will know where to look for routing information and revisions.

✔ Show only one clearance line in a PDC, and insert any revisions into the clearance line.

✔ Make PDC revisions more visible by labeling them ("REVISION") or highlighting with asterisks or other eye-catching notation (*****).

✔ Include PDC formats and interpretation in pilots' recurrent training.

✔ Standardize confirmation procedures for PDC receipt. At airports using PDCs, ATC facilities should consider requiring flight crews to read back their PDC transponder codes prior to taxi.

✔ Flight crews should consider adopting the personal verbal challenge, "Code/Mode," at engine start.

Users Note: The information presented in this bulletin is subject to some of the known limitations of ASRS data:

> (1) incidents cannot be independently verified; (2) reporters to ASRS may have a variety of reporting motivations and biases; (3) the voluntary and non-random nature of ASRS report submissions makes it impossible to accurately assess the full population of events for a given incident type. In spite of these limitations, ASRS report processing analysts have a unique vantage point in monitoring aviation system issues and problems from the incoming report flow of approximately 2,600 reports each month.

ASRS Contacts. Comments and questions related to this bulletin may be directed to Ed Arri and Jerry Martin of the ASRS staff at (415) 969-3969. You may obtain a copy of ASRS Operational Issues Bulletin 96-01 "Confusion in Using Pre-Departure Clearances" by writing ASRS at:

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