ASRS Directline

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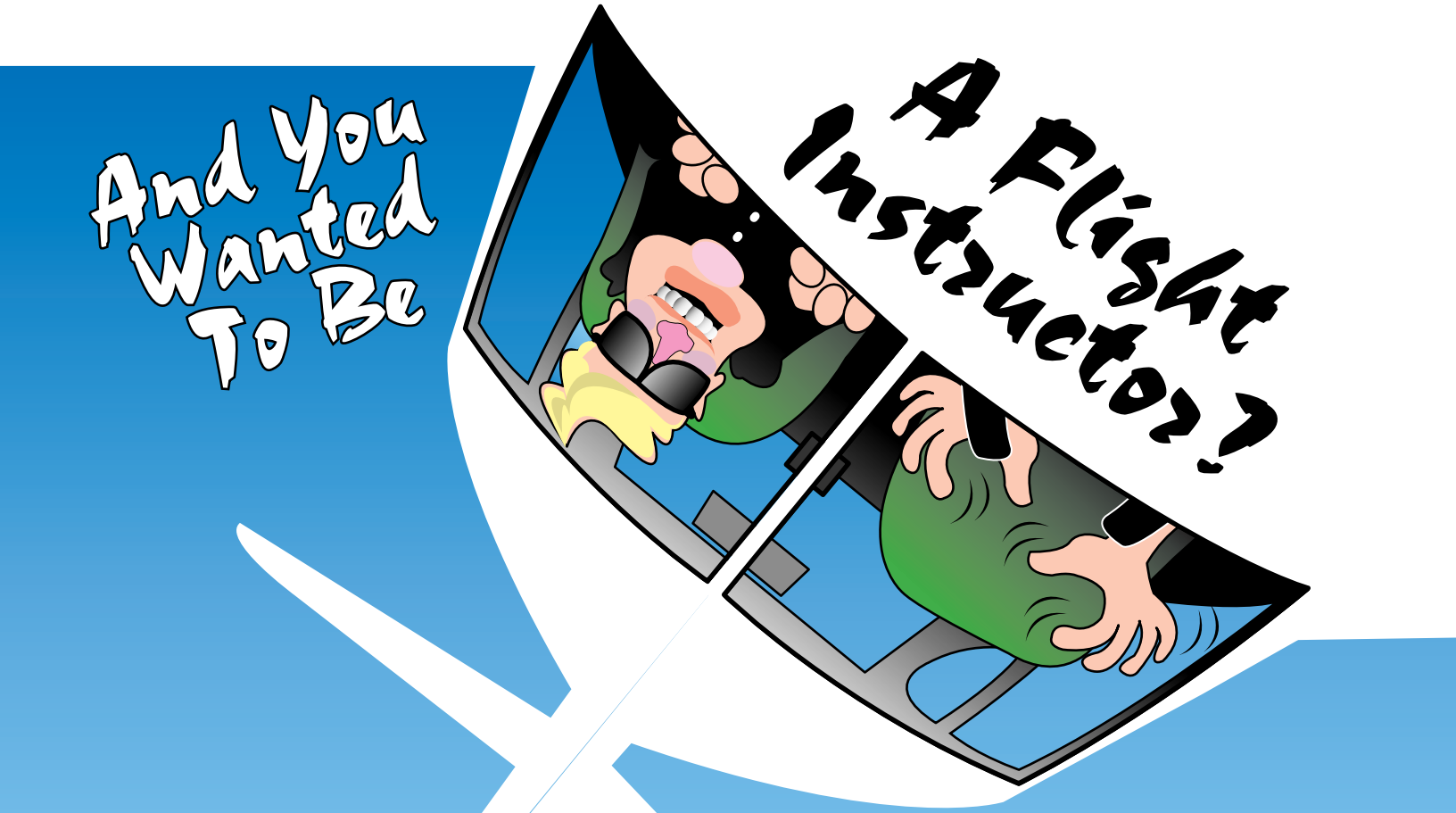

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An Introduction

Readers will notice that Directline has been redesigned. We are always working to make our publications more readable. We are grateful to David Faust of the NASA-Ames Graphics Group for doing a great job of refining Directline's layout and providing graphics elements. We hope you like the new format.

Here are the articles contained in the seventh issue of ASRS Directline:

The ASRS Database on CD-ROM

4 The ASRS database is now available for personal computers. See this notice to find out how you can get your copy.

How do you spell...?
How do you pronounce...?
by Allen Amsbaugh

5 Allen takes a look at the problems with waypoint identifiers—ASRS receives many reports about navigational identifiers that sound similar to other fixes, or whose pronunciation seems to defy rational spelling (or the other way around). This article also contains some good sidebar information on how navigational fixes get their names, and how ASRS deals with safety problems with the Alert Bulletin and For Your Information alerting messages.

And You Wanted to be a Flight Instructor?
by Marcia Patten & ASRS Analysts

8 This article is for instructors and would-be instructors—regardless of experience or whether the job is on a Cessna 150 or a Boeing 747. Marcia, with the assistance of ASRS's experienced cadre of pilot analysts, examines the pitfalls of the job, with some great advice on how to deal with the problems, too. CRM for general aviation instructors? See page 11 for more information.

More Than Meets the Eye
by Marcia Patten

15 A subject in a recent CALLBACK issue, we thought this one was important enough to provide an expanded review of the subject in Directline. Laser light shows are posing some problems for pilots; check out this article for the latest information.

Say What?
by Robert Matchette

18 Bob has done his usual excellent research job—this time examining non-standard phraseology issues. This article looks at typical phraseology issues on a flight-phase by flight-phase basis. (There's a good sidebar on one of the weirder results of miscommunication, too.) Circulate this article among your pilot staff.

That's all for the seventh issue of ASRS Directline. We hope you find theses articles useful and informative.

ASRS Directline
Issue Number 7
September, 1995

ASRS Directline is a publication of the Aviation Safety reporting System, and complements ASRS's long-standing, award-winning publication CALLBACK.

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If you have questions or comments, drop us a line—write to:

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The ASRS Database CD-ROM

The ASRS database is widely regarded as one of the world's premier sources of information on aviation safety and human performance. ASRS data is particularly useful for accident prevention, procedures training, LOFT scenario development, aviation education, AQP development, safety analysis, and human factors studies. Over the years, ASRS has received thousands of requests for database information; in 1994 alone, ASRS satisfied 632 requests for ASRS incident data.

The ASRS database is now available on CD-ROM. Data requesters can now have quick, effective access to ASRS data—search parameters can be tailored or modified as required in "real time."

The ASRS CD-ROM version of the ASRS database provides unprecedented ease of access to ASRS data utilizing the included easy data retrieval software. The disc contains over 50,000 full-form incident records, covering the most recent five years. The user can search on keywords specified by ASRS analysts, browse and print user-selected records, and export data for use in word processing, spreadsheet analysis, and database or other programs.

The ASRS CD-ROM is currently available for DOS only, and requires an IBM (or true compatible) 386 or higher PC, with at least 640 kb RAM, DOS 3.31 or above, and an ISO 9660 compatible CD-ROM drive.

The ASRS database CD-ROM is available from:

AeroKnowledge, Inc.
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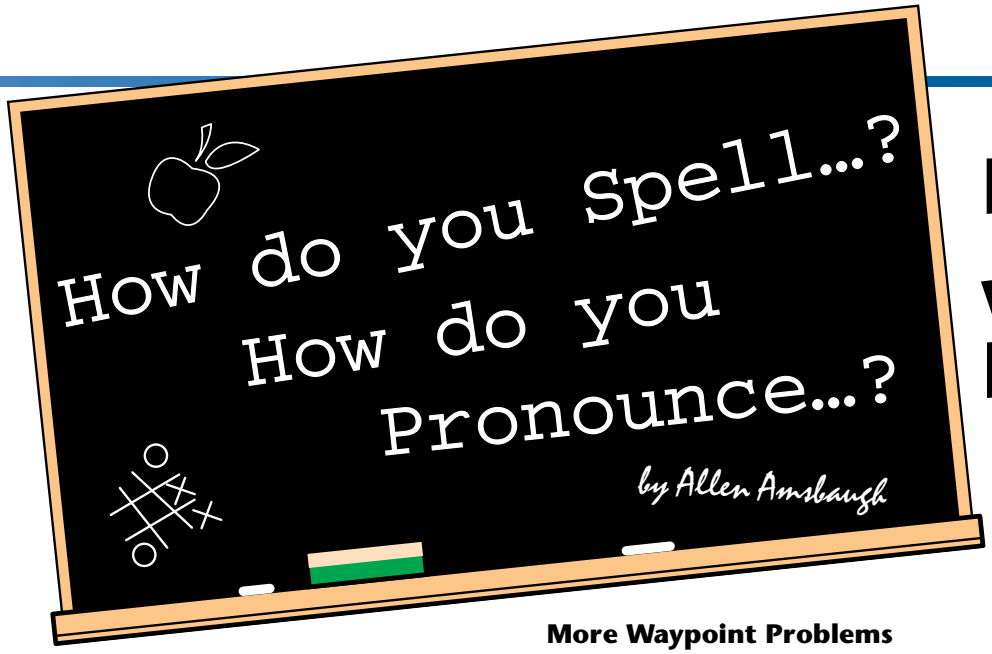


Problems with Waypoint Identifiers

Over the years, the ASRS has received many reports regarding navigational identifiers that sound similar to other fixes, or are not spelled in a logical fashion. Two caught my eye recently and were the impetus for this article. The first incident was reported by two crew members. One of these reporters stated:

✍ *"Enroute to PDX from DEN. Near BOI cleared direct DUFUR, direct PDX. Inadvertently spelled DUFER into the FMC. Note: DUFER is 14 DME, ILS 16R Seattle. Since the course seemed reasonable, I did not double-check for route deviation DUFER to PDX. A lesson learned! I am surprised that two intersections would be so close with similar names." (# 258559, 258669)*

SEA is about 50 miles farther from BOI than PDX, and about 17 degrees farther to the north. The ARTCC Controller rectified the situation by a gentle, *"Where are you going?"*

The ASRS has issued a For Your Information Notice *(see the sidebar about AB's and FYI'S on page 5)* to the appropriate agencies and FAA offices in an attempt to rectify this problem. It was recommended that the name be changed on one of the intersections. We all hope that one of the spellings will not be changed to DOOFR!

More Waypoint Problems

Another air carrier crew had a problem entering the Charlotte, NC, area:

✍ *"We mistook Barretts Mountain (BZM) to LINCO intersection. Instead we started BZM to LYNNO intersection. LINCO is 203 degree radial off BZM, and LYNNO is 115 degree radial off BZM, both about 25 miles. It is suggested that intersections which sound so similar not be used in such a close area to another." (# 108815, 108919)*

The ASRS issued an Alert Bulletin to the appropriate FAA offices with a recommendation that the name of one of the intersections be changed. This is exactly what has been done—LYNNO is now PLUMM on the MAJIC SEVEN arrival to Charlotte (MAJIC.MAJIC7). The system works!

International Events

The system also works in international airspace, as seen in the following report:

✍ *"On R22 between Alaska and Japan (the 'N' route). We requested Tokyo Radio to obtain clearance from FL330 to FL290 after NOGAL. HF communication was spotty, but I read back the clearance twice. Each time, Tokyo acknowledged by reading back the whole clearance. (I assumed he did this because of HF. Perhaps he was trying to clarify the fix.) Passing NOGAL, I called, 'Departing FL330 for FL290.' When we called 'reaching FL290,' Tokyo told us we should be at*

Where do they find these names?

About twenty years ago, the FAA decided to use only five letter names for airspace fixes so that all fixes would fit into a nice, clean computer format. Gone are romantic sounding names such as CEDAR RIDGE, now CEDES, variously pronounced "Seeds" or "See-Dees"), and ROSE FLAT, now FLAKK. By the way, CEDES is in California, SEEDS is in Texas. Two more examples:

- DOWNEY is now DOWNE. Downey, by the way, is also a Southern California town named by John G. Downey, governor of California from 1860 to 1862. Governor Downey subdivided the Santa Gertrudis Rancho and modestly named the town after himself.
- PAJARO is now PAJAR, and is named after the Pájaro river. The Pájaro river was named by Gaspar de Portolá's soldiers in 1769 when they found an enormous bird which Native Americans had stuffed with straw. The "j" in Pajaro is pronounced as an "h," with the first "a" accented. Pájaro is the Spanish word for "bird."

...continued page 4

The FAA's National Flight Data Center is in charge of naming airspace fixes. When a new fix is needed by an FAA region or facility, a request is made with a choice of names. The center will then check to see that the proposed name: a) is pronounceable, b) does not duplicate another spelling, c) is not profane in several of the major languages, and d) is unique to the entire world. Then the new fix is put into use.

Would you like a little bit of immortality? Captain Cortlandt L. Dickinson, retired American Airlines Captain, was at a meeting when the route system from the West Coast of the United States to Hawaii was being revised. He claims that he said, "Why don't you name one of the fixes after me?" They did, as CORTT.

Captain D.E. Ehmann, retired Vice President of Flight Operations with American Airlines, is also immortalized in a missed approach holding fix named EHMAN, at Buffalo, NY.

A study of the fixes, airport names, and VORs will provide names of celebrities and interesting geographical points to all who take the time to look. Compare your aeronautical chart with the atlas that you all carry and learn some of the local points of interest while you are looking out the window. ■

FL330 until NOGAR (a fix 493 miles down track). It's interesting to note that it took about three minutes before he could pronounce the two fixes differently, and then we realized there was a similar sounding fix on the same route. Japanese pronounce 'L' and 'R' [similarly], making the words [sound] the same when pronounced by Tokyo Radio. Tokyo immediately amended our clearance to FL290. An immediate review of related fix names for similar sounding names, as pronounced by local speaker's language, is essential. Not every nation or language can or does speak English the same way native English speakers do. Japanese phonetic differences should be taken into account, especially in Japanese airspace. At a minimum, NOGAL should be changed. (# 242971)

ASRS issued a For Your Information Notice to the FAA with the recommendation that NOGAL intersection be renamed to minimize confusion. The latest charts show that NOGAL has been renamed NYTIM. But, how does one pronounce NYTIM? Is it as "nighttime," or possibly "nit tim," or even "nee tim"? Even native English speakers will have to guess about this one.

The Perils of English Pronunciation

English is a wonderful tongue, and is the official language of the air. Every time that I flew abroad, I thanked my lucky stars that the Wright brothers were American! But the English language has several deficiencies—the biggest one being that there are no iron-clad rules for the pronunciation of vowels and combinations of vowels. Several consonants, in combination or singly, also can be pronounced more than one way.

The English language has come a long way from its Latin roots wherein pronunciation has very strong rules, but aviation makes tough demands on English. One member of the ASRS staff suggested using the Klingon language, which has no vowels; another suggested creating more vowels just for naming navigational fixes!

The United States airspace fixes also include many names of Native American, Spanish, and French origin. Very near the ASRS office is the compass locator for the ILS Runway 30L approach to the San José International Airport—JORGE, the Spanish name equivalent to the English "George." I have heard it pronounced "George," and more properly, "Hor-Hay," as it would be pronounced in Spanish. Many others come to mind, including DOWNE on the ILS Runway 25L at Los Angeles. Is it pronounced "Down," or "Downey" as is the city beneath it? You will hear this both ways too.

When expert help is proffered, it is a good idea to accept it—as the following example shows:

✍ *"Controller gave route change 'Direct PERRI intersection, J8 OTT, OTT 3 arrival KBWI.' He spelled out the intersection. The Captain began programming the FMS while we both reached for enroute charts. The Captain loaded 'Direct PERRY,' and the course indicated about 140° which was reasonable from the assigned 090° heading. The FMS would not accept J8, and we began to analyze why. TCAS II indicated traffic which was descending through our altitude and a potential conflict. The Captain initiated a left turn to avoid the traffic. Center issued a 'Left turn immediately!' and then assigned 100° [heading]. The conflict could have been averted by my verifying PERRI versus PERRY as the FMS entry. The Controller spelled out P-E-R-R-I, and I wrote it down correctly, but did not verify the Captain's input…" (# 264927)*

This error resulted in a traffic conflict because of the wrong heading. The Controller wanted the reporter to go to PERRI, a fix east of Charleston, WV, while the Captain entered PERRY, a fix southeast of Puerto Rico in the Caribbean! The FMS would not take J8 from PERRY because PERRY is not on J8, but PERRI is. Both man (the Controller) and machine (the FMS) tried to help this crew—to no avail.

5, 4, 3...

These problems are not restricted to five letter fixes. They also crop up in three letter VORs, as evidenced in this report:

"The original flight plan from SFO-DFW included Las Vegas, NM, as part of the filed route. A re-file was requested airborne, "Direct Beatty [BTY], Las Vegas, [LVS] Wichita Falls [SPS], on course." We were requesting BTY, LVS and SPS VORs. LAX Center cleared us "direct LIDAT, Beatty, Las Vegas, Wichita Falls." Just east of BTY VOR, LAX Center gave us a right turn to a 180 degree heading and said that we were getting close to a hot restricted area. LAX Center said that our clearance was over Las Vegas [LAS], NV…I realize that there are many navigation fixes around the world that have the same name…" (# 81977)

The reporter is right. There are many fixes with the same name, but no five-letter airspace fixes have the same name, only VORs and NDBs. For example, VORs with the same name but different letter designators include Springfield (SGF), MO, and Springfield (SPI), IL; Las Vegas (LAS), NV, and Las Vegas (LVS), NM; Bradford (BDF), IL, and Bradford (BFD), PA; and Danville (DNV), IL, and Danville (DAN), VA. All these examples are in United States airspace, and there are many more throughout the world.

Common Problems

As you might surmise, all of the above incidents happened in modern aircraft with Omega Navigation Systems or Inertial Navigation Systems. The same problems will be encountered by those pilots flying with Global Positioning Systems or LORAN. This is not to imply that the flight crew with the more modern navigation systems are more careless, it just means that they have new problems to solve. They must be more careful with their long distance leg requests to ensure that ARTCC understands that they want to go to Farmington, NM, (FMN) not Farmington, MO, (FAM) or Farmington, MN, (FGT). Flight crews must be very careful when they type a fix into their FMCs so that they go to CLEAT, MD, not CLETE, OH.

There are many examples similar to CLEAT/CLETE—such as AANTS/ANNTS, BRIJJ/BRIDG, etc. If you'd like to play a little game, go to FAA Publication 7350.6, "Location Identifiers," and turn to the Airspace fixes section. See how many pairs you can find in one minute. You'll find many are listed consecutively, such as DUMPE/DUMPI.

Entering the Fix

If there are any questions in your mind, whether you are a pilot or a controller, you must ask immediately to clarify the situation, of course. We also have a few suggestions to help you avoid Waypoint Identifier Woes:

- Pilots flying the aircraft with the new navigation systems should have their charts on hand at all times to ensure that spelling mistakes are not made.
- Charts and flight plans should be consulted often to ensure that direct routings seem reasonable, and that the map presentation has no strange "spikes" or turns.

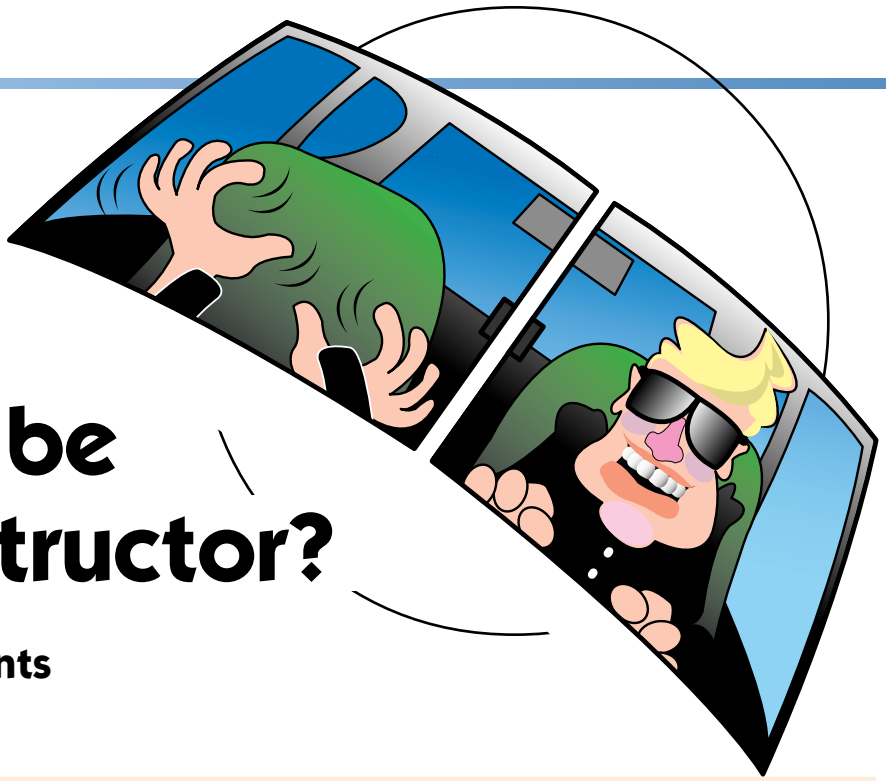
Common sense precautions and special care will prevent any of the navigation errors we've discussed.

AB's and FYI's

When ASRS receives a report describing a hazardous or safety-related situation—for example, a defective navigation aid, mis-charting, a confusing procedure, or any other circumstance which might compromise safe flight—it issues an alerting message in the form of an AB (Alert Bulletin) or FYI (For Your Information) notice.

Alerting messages have a single purpose: to relay safety information to individuals in a position of authority so that they can investigate the allegation and take needed corrective actions as appropriate.

ASRS has no direct operational authority of its own. It acts through, and with the cooperation of, others. ■



And You Wanted to be a Flight Instructor?

Flight Instruction Incidents

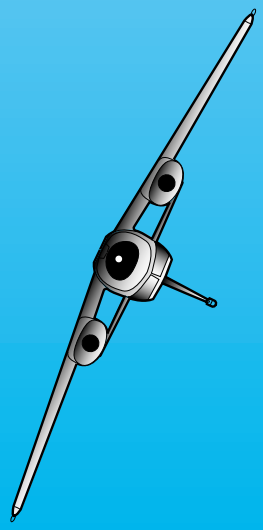
by

Marcia Patten

&

ASRS Analysts

"Following a period in which I had had a total of 4 days off work in the previous 2 months, I was programmed for a particularly busy 12-hour day. [After landing on] my third flight…as we cleared the runway, we were told to contact Ground Control, and the student acknowledged, however we did not change frequency. I immediately began taxiing and debriefing the landing…Maybe having been cleared to the ramp so often in the last few days I assumed we were cleared again…and ***I taxied [across the active] runway****. This was a clear case of tiredness or fatigue from overwork. Fear of being replaced or losing my status as a 'senior' instructor if I eased up in a world awash with instructors, and also needing the money from a poorly paid piecework job were the driving factors." (# 242730)* [Emphasis added-Ed.]



You Still Want to Instruct?

✍ *"While giving an ATP/Light Transport jet-type check-ride, the candidate made a very smooth landing followed by a rollout with four flat tires. Prior to this landing, we made an aborted takeoff at 120 knots on an 85° day. The apparent problem was that the tires overheated and blew the wheel fuses which deflated the tires." (# 179098)*

Are You Sure?

✍ *"[During takeoff], just as we reached rotation speed, [the student] raised the nose and for no explainable reason, he reached down and raised the gear at the same time. The left prop hit the runway…he yanked back on the yoke to try and climb. I took control…and my student reduced both throttles to idle in an attempt to abort! In discussing this with the pilot, after the fact, he was at a total loss as to why he did what he did." (# 252497)*

The Instructor's World

In every instructional situation, the instructor is faced with multiple performance and cockpit management tasks. Errors may occur during all levels of instruction, from an instructor's first flight with a student pilot in a Cessna 172, to a check airman doing upgrade training with a highly experienced pilot in a large air carrier aircraft.

Instructors may also be under personal and professional pressures. For a flight school instructor, there may be the pressure to build flight time, to make a profit for the flight school, or just to make a living. Air taxi or air carrier instructors may feel pressured to upgrade their own careers, help upgrade the trainee's career, or cut costs on additional training. Some air carrier, commuter, or air taxi pilots may also be expected to maintain their company instructor or check airman status with the local FAA office on their own time, all while still sustaining a full line schedule.

Juggling these personal and professional performance requirements may cause an instructor to react in ways that result in instructional accidents or incidents. Instructional incidents are not just a source of aggravation or embarrassment to the instructor or the company. They also have the potential for huge economic impact in cases of aircraft damage or personal injury. There is the additional potential for emotional impact—on instructors, in FAA investigatory follow-up, or loss of credibility or reputation; and on students, in fear, loss of confidence in their instructors, or more importantly, loss of confidence in themselves.

Why do some of these incidents happen? What human factors and human behaviors contribute to instructional incidents? How can instructors avoid the mistakes made by some of their unwary colleagues?

To answer these questions, we searched the Aviation Safety Reporting System (ASRS) database for a representative sample of incidents that occurred during instructional or checkride flights. This article reviews only records in which the action or task of instructing appeared to contribute directly to the incident, and the aircraft involved was generally "healthy", i.e., without mechanical problems. The data set includes 78 records from 1988-1993, including all sectors of civil aviation, i.e., general aviation (GA), air taxi and commuter, and air carrier.

A Student By Any Other Name

More than half of the "students" involved in the reported incidents were undergoing advanced training (e.g., instrument, complex aircraft, commercial, multi-engine, flight instructor, etc.). These included company pilots undergoing initial operating experience (IOE) and upgrade training in new aircraft. Only 10 percent of the reports referred specifically to instruction of student pilots. Instructors indicated that they were quite vigilant with their student pilots, but tended to relax with their advanced students due to higher expectations about the advanced students' abilities to perform various tasks or maneuvers. This was especially so in the case of air taxi or air carrier instructors doing upgrade training with company pilots.

Training Environment

Most incidents (89 percent) occurred in VMC weather where most GA flight training would be expected to take place. Only three incidents are known to have occurred at night—these were commuter training operations. Half of the incidents occurred in the typically high-density traffic area of Class D airspace, where the pilots were in contact with ATC. More than half of the incidents occurred during the approach and landing phase, which involves numerous and varied tasks, requiring maximum attention to detail inside the aircraft and maximum vigilance outside.

Distraction

Looking Out

Distraction due to some aspect of instructional activity was cited as a contributing factor in 80 percent of the incident reports, and appeared to be a major cause of near mid-air collisions (NMACs), the most commonly reported incident by a margin of more than 2-to-1. These incidents reflected an apparent breakdown in the practice of basic "see and avoid" principles. In the following case, conversation was the culprit in distracting the instructor from his usually-thorough scan:

✍ *"As my student and I were returning after a training flight…we reported downwind abeam and were cleared to land following the SMA downwind ahead. At this point I got heavily involved in talking my student through the steps to be followed during the approach, and after looking for the traffic and not seeing it, I wrongly assumed it was already on the ground…A couple of moments later I observed the other SMA take evasive action…Contributing factors to this incident…are: my lack of concentration on looking and positively identifying our traffic before landing (as I routinely do) due to the heavy 'question and answer' situation that my student involved me in. After this incident, I have made it a very clear point to all my students to minimize the pilot-to-pilot chat during operation in the traffic pattern." (# 124564)*

Looking In

Another often-cited source of distraction was the need to be focusing inside the aircraft instead of outside the aircraft:

✍ *"…I noticed the shadow of an airplane headed towards us. We had heard no traffic in the vicinity [of this uncontrolled airport]. Giving flight instruction to a student under the hood prevents and/or impedes proper scanning. Although I constantly remind myself to get my head out of the cockpit on these flights, there are lapses…I must be looking out so often for traffic that I am unable to evaluate a student's approach at all." (# 148597)*

Did You Hear Something?

Distraction was also cited as a contributing factor to gear-up and near gear-up landings. Gear-up landings occurred in 8 percent of the reported incidents. Although this is a small percentage of reports, it probably accounts for a very large cash outlay for repairs. Many reporters indicated that they were so involved in the instructional situation that they missed the gear check on their pre-landing checklist, and often didn't even hear a gear warning-horn.

✍ *"The second day of training for the trainee…with numerous approaches, both 2 engine and single engine. The last approach was a single engine, flapless approach…to simulate a flap problem. The approach was broken off and the circling maneuver was commenced. Airspeed dropped and this was brought to the attention of the trainee…so gear was retracted to clean up the aircraft. When the gear was retracted, the gear warning horn went off because of the simulated single engine condition of the power lever (retarded). The gear warning horn was canceled and the circling continued. As we were getting re-established, it seems that at some point [the trainee] called for final checks, but I don't know when because my attention was primarily on circling, checking for traffic, proper radio procedures, and problems inherent in the maneuver…I missed reselecting the gear down. When the L power lever was retarded for landing, the gear warning horn did not go off (was not heard at all) again to warn of an impending gear up landing." (# 145537)*

Fatigue

Fatigue was mentioned specifically in the three reports of night training incidents, and alluded to in many others. Tired pilots may be unable to divide their attention adequately among many cockpit tasks. They may ignore standard procedures, or, as in the following report, forget some basic operating limitations. This reporter apparently was well aware of his aircraft's gear warning-horn system, but the details slipped his mind in the wee hours:

✍ *"The student, a First Officer in upgrade training, was instructed to execute…a simulated single engine, no flap approach and landing. All items on the checklist were done except for the gear down call, which was delayed until landing assured. The student and I forgot to call for gear down and to verify it…The above events occurred in the early A.M. during training (mostly emergency situations). Both crew members had been awake since the morning the previous day…for 20 hours" (# 180849)*

Another pair of reports from an instructor and trainee regarding their near gear-up landing reiterate the hazards of late night or early morning training flights.

✍ *"A definite contributing factor…was fatigue. Due to the unavailability of aircraft, all flight training had to take place at night. I got home the night before at 4 A.M. and the night before that at 3 A.M." (# 182635)*

✍ *"The company is not using flight simulators any longer, I assume to save money. It was late at night because there are not any aircraft available during the day because all the aircraft are in revenue service." (# 181978)*

The company certainly did not save any money on the repairs or replacement of two bent props, not to mention the loss of revenue associated with aircraft down-time!

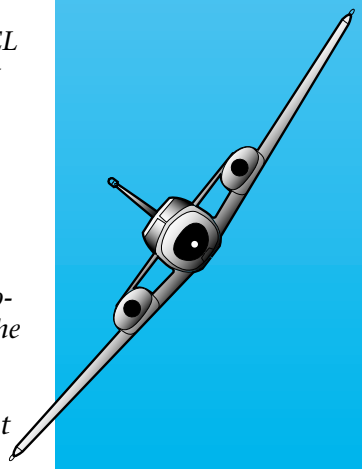
Expectation

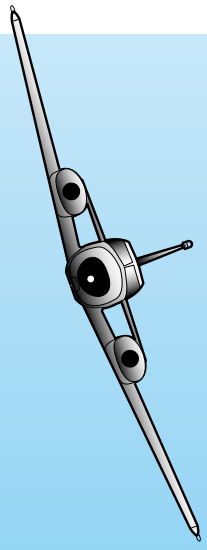
Inappropriate or unrealistic expectations, sometimes referred to as complacency, were cited in 50 percent of the reports. In retrospect, many instructors realized that they had been too relaxed about operations on a well-known airport or route. Non-adherence to clearances, including runway and taxiway transgressions, and unauthorized entry into controlled airspace, were often the result of an instructor's unfulfilled expectations. One instructor expected too much of the student's command of English:

✍ *"My [foreign] student…had been training here for 3 months, 30 hours. I assumed he was competent with taxi instructions. I was distracted in the cockpit. He taxied onto the active runway…! I then realized that this student understood very little of what was being said. I [took] the English language for granted. Never again." (# 256111)*

Even more common, and more distressing to many instructors, was the realization that they had placed too high an expectation on a student's performance. Sometimes this resulted in a costly incident due to loss of aircraft control.

✍ *"I was giving a Commercial SEL/MEL instrument rated pilot a…biennial flight review. The pilot had over 700 hours of total time. In flight he did everything above commercial pilot standards and had a good handle on the aircraft. I brought the throttle to idle to simulate engine failure. The pilot set up for a landing…As we neared the ground…I noticed the tailwind. We touched down…the grass was slick…the airplane swerved…the wingtip contacted the ground and the nose cowling came to rest against a small pine tree. The pilot was doing an excellent job and my guard was down compared to someone not so proficient…" (# 258389)*





Communication

Someone Else's Fault ?

As often happens, a few pilots blamed ATC for its "failure" to provide advisories. Fortunately, however, more than a third of the reporters recognized their own unwarranted reliance on ATC advisories as a contributing factor to the reported incident:

✍ *"I should have been more vigilant outside [the aircraft] instead of being totally absorbed with my student's approach. I probably was lulled into a false sense of security by hearing from FSS that there was no reported traffic in the area" (# 144724)*

And in another report:

✍ *"Too much reliance is placed on…ATC for collision avoidance and traffic advisories in a VFR environment. The [other] instructor said he never saw us and that ATC never called [us as] traffic ahead. Lack of understanding of ATC's responsibility by the [other instructor] contributed to the near miss." (# 158566)*

Is Anybody Listening…?

Sometimes pilots forget that controllers can have their hands full, too. The only report by ATC personnel was from this controller frantically trying prevent a midair collision:

✍ *"I issued expeditious turn and climb to [light aircraft] X. There was no reply. I then issued traffic alert [and descent] to [light aircraft] Y, who continued climbing…There was no reply from either aircraft. [Follow-up] phone conversations with both pilots revealed that [light aircraft] X was being flown with a student and instructor. The instructor apparently was 'busy' in the cockpit. [Light aircraft] Y apparently thought the climb clearance…was for him." (# 166851)*

The Team Approach

Who's In Charge Here?

Usually rank provides a fairly clear delineation of who does what in a multi-person cockpit. The addition of some Crew Resource Management (CRM) skills encourages cooperation and assertiveness among the crewmembers, and a safe flight results. However, there can be a gray area of responsibilities and of delegation of authority when, for example, a captain is in a "trainee" position being given a line check by the company check pilot who is acting as first officer (F/O) for the flight. The reversal of roles may lead to an incorrect assumption that the "other" pilot has control of the aircraft, has programmed a flight computer, or is making a crucial decision about the flight.

✍ *"Aircraft began to show significant oil loss. The Captain chose to continue to operate the aircraft as if there was not a problem. He made no contact with the company and made no plans for a precautionary landing. My role as F/O and check airman giving a regular line check created a conflict as I began to question the appropriateness of the Captain's judgment. In the future, when giving line checks, I will do it from the observer's seat. This will give the Captain the benefit of a complete crew without conflicting agendas. It will also provide me a single role to better evaluate the crew." (# 163040)*

And in another report:

✍ *"[On approach] the right hydraulic quantity and pressure went to 0. The landing was uneventful. With the emergency equipment standing by and maintenance working on the gear doors, we started the APU to supplement cabin cooling. Once the APU air was selected on, the cabin began filling with smoke and fumes. We immediately secured the APU and ventilated the cabin…My gut feeling was not to start the APU…however, this was a line check by a check airman in the jump seat and my intuition was influenced by his suggestion to start the APU to save fuel." (# 235103)*

Both reporters were uncomfortable with the actions or suggestions of another cockpit crewmember, but felt unable to act due to their assigned "roles."

Not all role reversal stories are problematic. A crew with 2 of its 3 engines running erratically and causing airframe vibrations pulled it all together and landed safely:

✍ *"From a human factors standpoint, 2 Captains were flying plus a very experienced S/O (retired Air Force). Both Captains…deferred to each other, assessed the situation with the S/O's input and all agreed how to resolve the problem. It was refreshing to see cockpit resource management work in an emergency situation." (# 247627)*

CRM is not just for air carrier crews. An instructor and student experiencing a landing gear malfunction put their heads together to land their aircraft with minimum damage and no injury:

✍ *"I solicited input from my student, who is also a CFI. We elected to review our checklist…in an effort to find any items which might aid our effort to land safely…and make decisions for landing…The student and I planned our landing sequence, and I instructed the student to secure all objects in the airplane. On downwind, the student latched the door 'ajar'…All engines, mixtures, fuel selectors, ignition, electrical system were turned off in accordance with checklists and to prevent a fire hazard. Calmness prevailed…Flight experience on the part of both student and instructor contributed to the decisions made during the emergency." (# 223725)*

I've Got The Airplane!

Several instructors indicated that they should have been on the controls sooner than they did, sometimes even at the start of a maneuver:

✍ *"My student and I had drifted over another aircraft that was on a simultaneous approach course…I allowed my student to deviate…instead of taking over the aircraft with a verbal 'my airplane!,' I let my student go too far." (# 146237)*

Know Thy Aircraft

Did I Do That?

An instructor's lack of thorough knowledge of the aircraft often resulted in incorrect or improper use of equipment. Mistakes included an improper use of gear lever, flap switch, and fire extinguisher. The following air taxi training incident points to the potential hazards of not being knowledgeable about all the details of the aircraft.

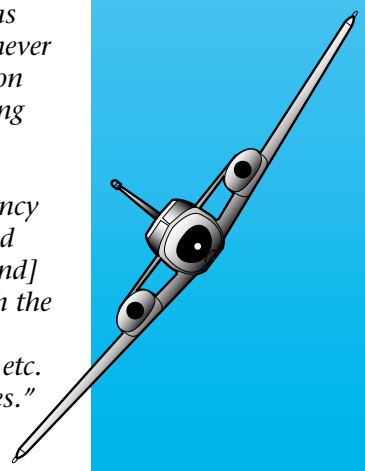
✍ *"While conducting a training flight, [I] induced a simulated power plant failure…I had failed to turn the auto-coarsen off, a standard procedure for simulating engine failure…Before I could turn off the auto-coarsen computer, the right prop went to full auto-coarsen. I was concerned about the possibility of an over-torque if I turned off the computer …so I elected to shut down the right engine and land single engine." (# 144307)*

Another reporter apparently knew all the right procedures, but lack of practice caused him to fail to perform when he needed to.

✍ *"[On start] we experienced an engine fire. I…grabbed the fire extinguisher and exited the plane. I couldn't make the extinguisher work, but the student was able to use it and put out the fire. It never occurred to me to read the directions on the fire extinguisher or to keep cranking the engine starter, even though this is what we have all been told to do. We have talked about this type of emergency but never practiced it. Everyone should read directions on the extinguisher [and] know how to operate it. Walk through the procedure with actual cranking of the engine, turning off fuel, call for help, etc. Do this like we practice engine failures." (# 213870)*

General Aviation Instructors and CRM

How do General Aviation flight instructors learn about CRM? A good starting point is the FAA Advisory Circular AC120-51A, "Crew Resource Management Training," available free by writing to the U.S. Department of Transportation, General Services Section, M-443.2, Washington, DC 20590. ■



Conclusions and Recommendations

Flight instruction problems exist in all levels of flying, from beginning instruction through air carrier recurrent training.

- Training situations involving advanced students may be more conducive to instructional incidents than ab-initio (beginning) flight training, due to the instructor having unwarranted expectations about an advanced trainee's capabilities and performance. Instructors involved in providing training to advanced students should remember to maintain vigilance.
- ASRS flight instruction incident reports and other published incident and accident data support the conclusion that approach and landing phases of flight are when a large portion of aircraft accidents occur. Instructors should minimize unnecessary conversation throughout the flight lesson, and maintain a sterile cockpit (i.e., eliminate nonessential dialog) during approach and landing.
- Some of the problems associated with distraction due to cockpit chat can be eliminated by the instructor conducting a thorough pre-procedure briefing with the trainee prior to the flight, then by adhering to the planned procedure as much as possible. This will help minimize conversation, especially during the critical phase of approach and landing. Another strategy some instructors employ is to have another trainee along to act as an observer during instrument training flights. The observer can maintain a nearly full-time scan outside the aircraft, and still listen and learn from the training experience. Although the instructor is not relieved of the responsibility for collision avoidance, the extra pair of eyes can allow the instructor to spend more time monitoring student performance.
- It is difficult for most people to properly determine their level of fatigue, let alone their level of impairment due to fatigue. Watch out for uncomfortably long duty days, or periods of duty with little or no intervening sleep—these are precursors to fatigue-related errors. Remember that in addition to appropriate duty-time restrictions and adequate rest, pilots (and everyone else) require adequate and proper nourishment to perform at required levels (and, no that doesn't mean coffee and a doughnut for breakfast, with selected items from the four major junk food groups for lunch and dinner, either).
- Sometimes, in their zeal, instructors try too hard to coach an overwhelmed or fatigued student just a little bit too far. Sometimes, it is safest and wisest course just to say, "I've got the airplane. Let's call it a day."
- Apply Crew Resource Management concepts and skills. General aviation instructors should include these decision-making and communication skills as part of basic student instruction, and reinforce them throughout advanced or upgrade training. (See the sidebar on General Aviation Instructors and CRM.) Air carrier and commuter instructors and check airmen should recognize that the decision-making and crew-coordination skills are even more important during training and check-rides, when role delegation is not routine, e.g., a line captain is acting as a first officer.
- Know your aircraft. Instructors should decline to provide instruction in an aircraft unless they are thoroughly trained and current in that make and model. A training session for the student should not be an initial or recurrent training session for the instructor.

More Than Meets the Eye

by Marcia Patten

PROBLEMS WITH LASER LIGHT SHOWS

Prior to reaching NANCI Intersection…we were bombarded with multi-colored laser beams coming from atop the Pan Am building. This continued until we were out of the area that the laser beams were being aimed. After turning final for runway 13, the laser beams again struck our aircraft and continued to do so until we were out of their line of sight. It appears that good sense operation of laser beams is out of hand. The damage to one's eyes, not to mention loss of night vision, can contribute to an accident." (# 89425)

Such was the surprise awaiting one Captain over New York City several years ago. Recently, though, encounters with lasers have become prevalent enough to attract media attention.

Lasers—standing for Light Amplification by Stimulated Emission of Radiation—are light beams powerful enough to cut through metal, or delicate enough to perform microscopic surgery. Apart from their scientific and medical uses, lasers are being used increasingly to produce spectacular, crowd-pleasing light shows at concerts, fairs, theme parks, and casinos.

Current Regulations

In general, commercial laser light demonstrations are regulated by the Food and Drug Administration (FDA) via its Center for Devices and Radiological Health. When a laser operator applies for a permit for an outdoor light show, the regional FAA Air Traffic Division conducts a study of the effects a light show may have upon nearby navigable airspace. The study considers many issues, including:

- ✔ Quantities of traffic affected;
- ✔ Traffic flow, especially arrival and departure corridors;
- ✔ Locations of aviation activity that may be affected, including low-level helicopter activity;
- ✔ Control jurisdiction, i.e., Tower or Center;
- ✔ Coordination with local officials, i.e., airport managers, FAA Air Traffic Managers, military representatives;
- ✔ Possible flight restrictions that should be imposed;
- ✔ Negotiations to resolve objectionable effects, such as limiting wattage, restricting direction and or elevation of projections, weather requirements, etc.

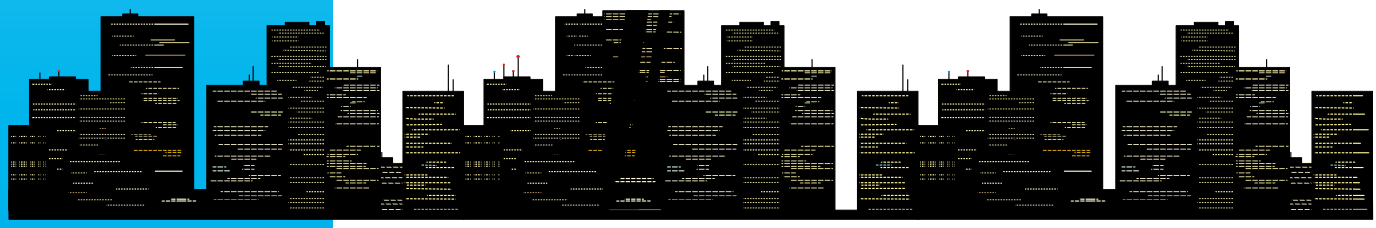
The FAA combines its study results with information supplied by the FDA to develop power restrictions for laser use in navigable airspace. The most explicit restrictions define a horizontal and a vertical "eye-safe distance" for each display, depending on the type and intensity of the lasers used. Exposure at any closer than this distance is deemed to be potentially injurious to pilots' or passengers' eyes.

Flash Blindness

However, there is a more widespread problem associated with laser shows, that of flash blindness. A sudden flash from a laser or any other bright light causes a spot or halo to remain at the center of the visual field for a few seconds or even a minute, rendering a person virtually blind to all other visual input. At night, a flash destroys the eye's adaptation to the dark environment; partial recovery of this adaptation is usually achieved in 3-5 minutes, but full adaptation typically requires 40-45 minutes or more. ASRS receives many reports of flash blindness being caused by various light sources, among them: lightning strikes, searchlights, aircraft static discharges or electrical short circuits, reflections from glass high-rise buildings, and even floodlights from golf course driving ranges. A First Officer flying near Miami at night reported just such an experience:

✍ *"At 10,000 feet, approximately 8 miles from downtown, a green laser was being used for a laser light show. The laser flashed directly into my eyes. I was blinded for about 2 seconds. I had trouble with near focus for about 15 seconds. My eyes 'hurt' for about 2 minutes. All normal post incident." (# 149671)*

Loss of "night vision" could be particularly dangerous for a single pilot, who has no one else in the cockpit to provide assistance while initial recovery of night vision begins.



An Eyeful from "The Strip"

Las Vegas, Nevada, seems to be a hotbed of laser activity. On any evening, three or four outdoor laser light shows might pierce the skies. These shows have become a major source of pilot complaints and a major recipient of careful scrutiny by the FAA Air Traffic Management office. One crew departing Las Vegas got more than the "eyeful" usually associated with The Strip:

✍ *"[On takeoff], at approximately 500 feet AGL, a laser beam of green light struck through the right side window of my cockpit striking my First Officer in the right eye and blinding both he and I for approximately 5-10 seconds due to the intensity of the light beam. I immediately notified the Tower Controller [who stated] that this had become a recurring problem with the laser show coming from the top of the [hotel] in Las Vegas. We were very fortunate, because this could have been a much more serious situation had the laser struck myself as well as [my First Officer] at a more direct angle, severely blinding both of us and endangering the lives of my passengers and crew." (# 285091)*

And another pilot, 90 miles south of Las Vegas, reported:

✍ *"I was flying at 31,000 feet. [The captain] saw a bright flash and said look at the laser show in Las Vegas. I looked at Las Vegas and we both got hit in the eyes with a green laser. After we turned our eyes back forward, we both noticed a green glow around the periphery of our vision. This was a momentary condition lasting no more than 10 minutes." (# 285090)*

Progress

A Society of Automotive Engineers (SAE) committee, composed of FAA personnel, aviation industry representatives and others, is addressing issues of flash-blindness and its impact on safety of flight, rather than just eye-safe distance, which already is properly controlled by FDA regulations. Among the potential solutions being studied include: further limitation of laser power (wattage), restriction of laser shows to non-flight times and non-flight airspace, additional training for laser operators, enforcement action against laser operators who violate airspace regulations, and standardization of FAA handling of laser show studies. Technical advances may provide aircraft systems that can interrupt a laser's beam before it strikes the aircraft.

Forewarned is Forearmed

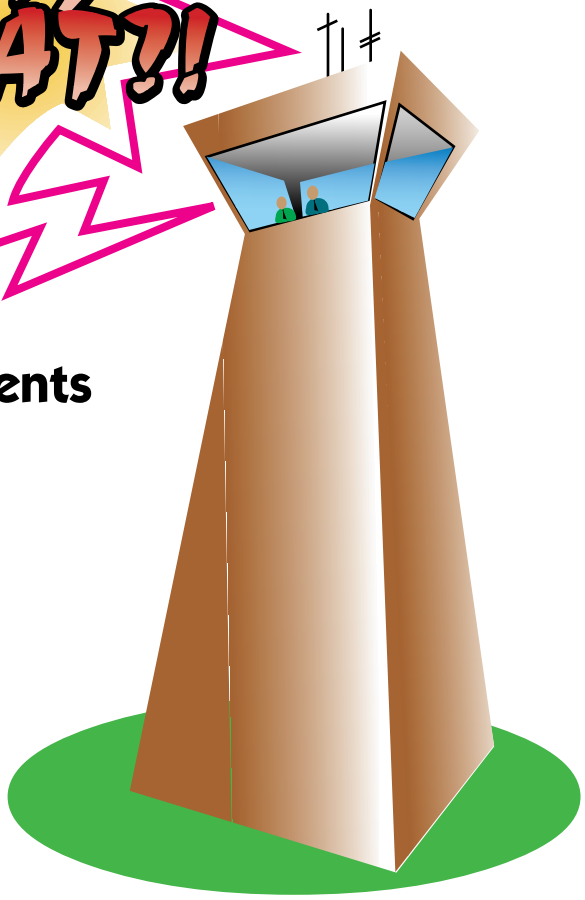
At present, a pilot's best defense against laser flashes is knowing where to avoid them. The locations, dates, durations, and eye-safe distances for approved displays are published in the Airport Facility Directory (AFD) for each region. Locations of light shows that have been approved after the publication of the AFD may be available only through Flight Service Stations (FSS). A glance through some of the most recent AFDs revealed quite a list of scheduled laser light show locations. Several regions noted only a few shows, but the South West region listed ten laser shows nightly. Some are temporary during the summer, or for the duration of a fair or other event; others are listed as permanent. Air carrier dispatch or base operations offices, as well as general aviation pilots, need to be in frequent contact with the local FSSs to receive the most up-to-date information on laser show activity.

Another simple defense against laser flashes is to avoid looking at them, if possible. Just as automobile drivers are advised to avoid looking directly at oncoming headlights, one airline's safety representative has recommended, "If you see the laser coming toward you, don't look right at it."

Pilots are also urged to submit reports of laser flash incidents to ASRS, and to the regional Air Traffic Management officer.

Non-Standard Phraseology Incidents

by Robert Matchette



Aviation has enjoyed numerous advances in aerodynamics, power plant efficiency and reliability, flightdeck automation, and navigation systems. However, ATC/aircraft communications have changed little over the years, and still exhibit the age-old limitations of natural and human-made interference that can distort messages, difficulties with language barriers, and the problems of pronunciation and phraseology. At the same time, the volume of ground-to-air (ATC/aircraft) communication has increased dramatically because of the remarkable increase in air traffic. Satellite links and discrete communication technology promise communications solutions for the future—until then, aviation is forced to deal with the communications status quo. One of the greatest problems inherent in voice communications today is the use of **non-standard phraseology**.

The ASRS database was searched for records which made reference to phraseology in their narratives, and 260 reports were reviewed. Many reported incidents resulted in little more than momentary confusion or annoyance for pilots and controllers. However, nearly half the reports involved near mid-air collisions, loss of standard ATC separation, runway transgressions, or other conflicts with potentially serious safety consequences.

Phraseology 101

Examples of non-standard phraseology occur during all flight phases. What follows are examples of common non-standard phraseology [✍] used in each phase of flight (which may or may not have had potentially serious consequences), and suggested alternate wording [℞] which may have prevented the incident.

Preflight

Watch out, you may get what you ask for!

✍ *"I called for clearance to St. Louis as follows: 'Clearance delivery, company ident, ATIS info, federal aid to St. Louis.' Federal aid was meant to mean FAA clearance in a joking fashion. The Controller misinterpreted this to mean that we were being hijacked and called the FBI and airport police…I used no 'standard' phraseology to indicate nor was it my intent to indicate we had a hijacking…I will use absolutely standard phraseology in the future…" (# 248982)*

℞ Conventional wisdom (and the AIM) dictate the use of a less provocative phrase: "ABC Clearance, company ident, I-F-R St. Louis." Although the AIM does not suggest advising Clearance Delivery that you have the current ATIS, individual locations may request that information, as well as the gate number when applicable.

Pushback/Taxi

You have to push prior to taxi…right?

After a pilot receives an IFR clearance, the next interaction with ATC is often a pushback request. What may be construed as authorization by some may not be by others.

✍ *"Called for pushback Gate ABC Miami. Ground Control said 'Advise ready for taxi, use caution, company pushing out of XYZ.' Maintenance pushed us back with a turn and we blocked the inner taxiway. At that time Ground Control said we had not been cleared for push. I felt that since he said advise ready for taxi, we had been cleared for push. Suggest if he did not want us to push he should have said so and not have mentioned taxi." (# 627717)*

℞ At many large airports, some gates may be controlled by ATC, while others, out of direct sight of controllers, may be under the control of the air carrier—aircraft movements in this case will be governed by the letter of agreement between the carrier and ATC. It is not clear, in this instance, who had jurisdiction for this gate area. If this gate was ATC-controlled, the controller should have said *"Hold"* or *"Pushback approved."* If the gate was the carrier's responsibility, the flight crew erred in entering the taxiway during pushback. In any event, the **message** here is clear—controllers need to provide clear instructions and messages, and pilots need to ask for clarification if there is any confusion or opportunity for misinterpretation.

Taxi Out

To get there, I have to cross…

✍ *"Ground cleared me to taxi to Runway 23. The taxi route was on the west side of the runway. While taxiing, Ground called and instructed me to conduct runup on the east side of Runway 23, so I taxied across active end of Runway 23. When across, Ground called and said, 'You just crossed end of active Runway 23 without a clearance to do so.' " (# 123722)*

℞ Although the reporter certainly did not a have a specific clearance to cross the runway, the Controller contributed to the incident. A less ambiguous clearance would have been, "Aircraft ident, plan to conduct runup on east side of Runway 23, hold short of Runway 23." After an aircraft gets to a runway (assuming that it was the one intended), the pilot's awareness is often heightened, and the probability of a misunderstanding should be reduced…right?

Come Out With Your Hands Up!

The Pilot-Controller Glossary defines squawk as "activate specific mode/code/function on the aircraft transponder." Therefore, "squawk your altitude" is a controller's instruction to activate the altitude function of a Mode 3/A transponder.

Squawking 7500 is the international code to indicate a hijacking. The AIM instructs pilots of hijacked aircraft to set 7500 into the aircraft transponder, which triggers a flashing "HIJK" in the aircraft's data block on the Controller's radar screen. The Controller will then ask the pilot to "verify squawking 7500." If the pilot verifies the code or makes no response at all, the Controller will not ask further questions, but will continue to flight-follow, respond to pilot requests, and notify appropriate authorities. These procedures are exactly the ones that occurred, as this reporter can testify:

...continued page 19

Into Position
No, your other right

"Cleared for takeoff Runway 17 at Colorado Springs. Took runway to use total length, required back-taxi approximately 300 feet. We were at maximum weight. Turning left on runway for short back-taxi, Tower said, 'Turn right on runway for departure.' (In my mind, what other direction would we turn [after turning left to back-taxi]?) Light aircraft turning final for Runway 12. As we back-taxied, Tower sent light aircraft around, and we began takeoff roll. Tower chastised us for not complying with his instructions to 'turn right on the runway.'...If Tower had wanted us to takeoff from the intersection, perhaps he should have cleared us for an intersection departure or depart from the intersection..." (# 197294)

℞ The reporter could have prevented any misunderstanding by informing the controller prior to reaching the runway that full length would be required for takeoff. In many situations, pilots and controllers giving each other as much advance information as possible will reduce the likelihood of miscommunication. In this case, the phraseology in question occurred at a busy time for the flight crew. Unfortunately, last-minute changes often occur at the highest workload phases of flight. In these situations, a sense of urgency can often cause pilots and controllers to neglect to clarify misconceptions as they might have done if there were no apparent time constraints. Schedule pressure plus a complex clearance can equal instructions in non-standard phraseology, as the next reporter discovered.

Takeoff/Initial Climb
When do we turn?

"While in position and holding on Runway 22L, we received the following clearance: 'Turn left heading 140, cleared for takeoff Runway 22L, will call your turn in the air.' I queried the Captain about the turn and he agreed that ATC would initiate our turn. As we passed 1,000 feet AGL, the Tower said, 'Further left heading 110 degrees, tighten your turn'...He [could] have said, 'Left heading 140, cleared for takeoff Runway 22L, will call further turn in the air.' " (#141940)

℞ A query directed to the Tower could have alleviated any misunderstanding, which in this case resulted in less than standard separation from another departing aircraft. The possibility for confusion abounds when specific numerical values are assigned as headings, airspeeds or altitudes. At times, the importance of standard phraseology can become critical, as the following report illustrates:

Climb
230 what?

"...we finally contacted Departure passing through approximately 6,500 feet climbing. The Controller's response was a hurried, 'Roger, maintain 2-3-0.' The Captain responded, 'Roger, 2-3-0.' At this point, flight level 230 was selected on the aircraft's MCP (Mode Control Panel)...It was at this point that the Controller said that we had been assigned 8,000 feet. The Captain replied that we had been assigned flight level 230. The Controller's response was, 'I said two-hundred thirty knots, sir.'...Those numbers can imply heading, altitude or airspeed." (# 127825)

℞ According to the AIM, when controllers issue a speed restriction, they are to use the word "speed" or "knots" in the clearance. However, once again, the flight crew could have asked for clarification before this altitude deviation took place.

Cruise

Cruise flight is often the time when flight crews can relax, since there is usually little cockpit activity compared to other phases of flight. This lack of activity can inspire flight crews to let down their guard and disregard things they might notice if they were more focused on specific tasks. Nonstandard phraseology contributed to this incident in which a Controller attempted to verify a flight's altitude after a hand-off.

Roger what?

✍ *"Cruise altitude was 7,000 feet assigned by New York Center. Hand-off was about 11 miles northwest of HAR VOR. The Captain checked in with MDT Approach and reported level at 7,000 feet. The Controller replied, 'Verify level at 8,000 feet.' The Captain replied, 'Roger'…The Controller presumed we were at 8,000 feet at check-in and tried to clarify our altitude, but was misled by our Captain's response to the inquiry ('Roger' was incomplete phraseology)." (# 229932)*

℞ AIM defines the term "Roger" as, "I have received all of your last transmission," and states that it "should not be used to answer a question requiring a yes or no answer." However, the term is constantly misused in communications, often resulting in misunderstanding, annoyance, or more serious consequences for both pilots and controllers.

Descent

Roger this…

✍ *"Center issued a clearance to descend to 5,000 feet MSL as the flight neared the entry point [of special use airspace]. This clearance was read back and the Controller was advised that the flight was, 'Canceling IFR at this time.' The Center responded with, 'Roger.' This response did not seem appropriate and the Controller was extremely busy…As we descended through 3,000 feet MSL, Center advised us that we were only cleared to 5,000 feet MSL and then asked us if we had canceled. We repeated that we had, and that we had heard his acknowledgment of our cancellation…'Roger' is probably the most misused term in flying today." (# 140258)*

Roger that…

✍ *"Planned descent for normal crossing restriction of 11,000 feet and 250 knots at FLATO. Issued 250 knots now, during descent. 250 knots now made the crossing restriction almost impossible. Busy frequency to get in a word that we wouldn't make the altitude. Finally got in a word, and ATC responded, 'Roger.' Did 'roger' mean it was OK or what?" (# 89792)*

℞ When pilots realize that an ATC clearance cannot be complied with, they are required to advise ATC as soon as possible. Timely notification is critical to prevent problems which could compromise separation from other traffic. Once pilots have advised ATC that a restriction cannot be made, they are often very anxious for a Controller's response either to relieve them of responsibility or to assign a new restriction. Roger is not the only response that offers little in the way of an answer, as the next report illustrates.

✍ *"Burbank assigned me a squawk code. Several minutes later the Controller asked me my altitude and I responded 7,500 feet. He told me to squawk my altitude. I replied, 'Squawking 7500', and the Controller confirmed my code…After landing, Ground directed me to a specific parking area, and I was immediately surrounded by three police cars with a number of officers pointing their weapons at me…They frisked me and handcuffed me. They really roughed me up…I would suggest that Controllers never use the terminology 'squawk your altitude.' " (# 147865)*

This poor pilot forgot to review his AIM, which would have informed him that:

✻ "Code 7500 will never be assigned by ATC without prior notification from the pilot that his aircraft is being subjected to unlawful interference [hijacking]. The pilot should refuse the assignment of Code 7500 in any other situation and inform the controller accordingly."

In fact, ATC will not assign any transponder codes beginning with 75, 76, or 77 for anything other than what they are meant for. Code 7512, or 7622, or 7752, for example, will not be assigned because the first two numbers trigger the computer—the last two digits make no difference. ■

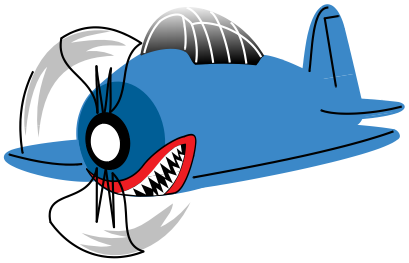
Approach and Landing

In an effort to keep each other well-informed, controllers and pilots might supply information that is out of the ordinary in order avoid potential problems or to help clear up any questions that might arise. Sometimes, these out-of-the-ordinary advisories can create more confusion or consternation than they were intended to alleviate. Consider this next report:

What are all those fire trucks doing?

✍ *"We arrived on final approach to Runway 22L at EWR airport with less than 7,000 pounds of fuel. The airplane ahead of us did not vacate the runway in time, so a go-around was accomplished… The Captain asked me to declare 'minimum fuel', which I did. New York radar then asked us how much fuel we had remaining. The Captain said, 'We need to be on the ground in 10 minutes.' I repeated that to New York…New York radar said, 'Understand you have 10 minutes fuel remaining.' I said, 'Negative.' Apparently, New York had declared an emergency and called out the fire trucks anyway." (# 246925)*

℞ After the Avianca Airlines accident on Long Island, NY, ATC sensitivity about fuel exhaustion was justifiably heightened. (See "Great Expectations" by Jeanne McElhatton, an excellent article in Issue # 3 of ASRS Directline about minimum fuel situations.) The flight crew might have alleviated this Controller's concerns by accurately conveying their situation. They could have said, for instance, *"…we would like to be on the ground in about 10 minutes—just so we don't get too far into our fuel reserves."*



Landing and Rollout

Once a successful approach and landing are accomplished, pilots tend to relax a little bit. The challenge, danger, and possibility of error are dramatically reduced, right?

✍ *"…was instructed to enter right downwind for 25R. Landed and during rollout was instructed, 'Left next taxiway,' but at this point was unable to positively identify the next opening as a taxiway. …Immediately after receiving this instruction, another aircraft (which was already holding in position on 25R) was cleared for takeoff 25R. Hearing this caused me to panic. I was afraid of crossing Runway 30 which I had been given landing instructions to hold short of. …Sometimes it's 'left this taxiway', sometimes it's 'left next taxiway', which if you are very close to a taxiway (as I was), might be construed as the taxiway after the one you have almost passed…" (# 103105)*

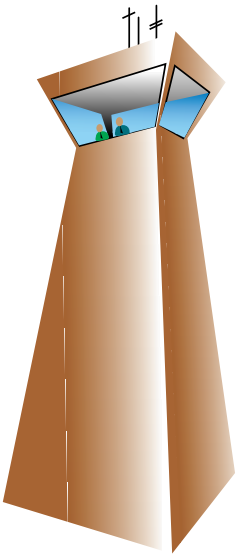
℞ When arrivals to an airport are tightly spaced and aircraft are in position for departure, communications can get especially hectic. Controllers often try to assist a pilot by giving what they think are simple, direct instructions. Although the intentions are good, identifying the specific taxiway designation in the instruction would help minimize misunderstanding. Pilots can assist the controller by advising ATC as soon as possible of any known restrictions on where they can turn off the runway.

Taxi In

If you're not sure, ask…

✍ *"…on rollout at Moline, IL, Controller instructions heard and read back as, 'Clear at taxiway E, stay with Tower to ramp.' Upon reaching and entering Runway 31, we noted another aircraft in takeoff position…Tower said, '[Air Carrier X], you were supposed to hold short.' I responded 'I thought we were cleared to the ramp with you.' He said, 'No, you were cleared to hold short on Runway 31.' I never recall hearing or reading back such a clearance…" (# 194811)*

℞ As in many cases, without reviewing the ATC tapes, no one will ever know whose account of this incident is correct. However, unless it is absolutely clear that a taxi clearance includes a crossing clearance, a confirmation of the clearance as well as a visual check of the runway must occur to prevent this kind of incident.



The Human Factor

So where is the problem?

Problems with communications technique are evident on both sides of the radio link. Although controllers are mandated to adhere to standard phraseology, there are certainly examples of controllers using non-standard phrases. Pilots are required by regulation to read back certain phases of a clearance, but are given, and often exercise, more latitude in phraseology than their controller counterparts. In the final analysis, human factors issues, such as loss of situational awareness, readback/hearback, anticipatory problems, response to schedule pressure, etc., affect controllers and pilots alike. Following are some typical examples of flawed communications technique with which most pilots can identify.

Too Casual

In the following report, the pilot's phraseology is too casual for the task at hand:

✍ *"The low altitude Controller issued the aircraft a clearance of: 'Cross WHIGG intersection at and maintain one-five thousand, and two-five-zero knots.' The pilot responded with: '[Air Carrier X], we'll do it.' At WHIGG the aircraft's Mode C altitude readout on the Controller's scope indicated 16,500 feet MSL, and the ground speed readout indicated that the aircraft was still well above the 250 knot restriction. When the Controller questioned the pilot,…the pilot responded with an unconcerned, '…yeah, I know…' " (# 105229)*

Sentence Construction

Even when the proper words are uttered over the frequency, the inflection or cadence used can significantly change the meaning.

"Center cleared us to 'Descend to 13,000 at MAJEK (pause) 250 knots at 14,000 feet'…Something didn't sound right, so my response on readback was, 'I understand, flight cleared to descend to 13,000, slow to 250 knots upon reaching 14,000 feet.' Center response was 'Roger.'…About that same time an aircraft behind us was cleared, 'Cross MAJEK at 14,000, 250 knots, then descend to 13,000 feet.' We were at approximately 13,700 feet, 250 knots when the copilot and I both decided that the Center wanted us at 14,000 feet until MAJEK…" (# 113536)

Fatigue and CRM

A high-workload phase of flight, frequency congestion, heavy traffic, and fatigue sometimes combine with less than optimum cockpit resource management to push pilots and controllers to their limits. When non-standard phraseology enters the picture, things can quickly fall apart as they did in this airborne conflict near Denver.

"The Controller was very busy, on the verge of overload…The Controller, with no warning or explanation called, '[Air Carrier X], the traffic you're following is turning final for Runway 26, a company [jet].' We looked at our 3 o'clock position and saw a [jet] inbound for the runway. My F/O, without asking me, called the traffic in sight [to ATC]…Just prior to our turn to final the Controller called with a frantic, 'You followed the wrong aircraft, turn right heading 270 degrees and climb to 5,000 feet'…I feel this was caused by improper phraseology and procedures, heavy traffic, crew fatigue, 12th leg in 27 hours, and a breakdown in cockpit communications." (# 248002)

Say it Again, Sam

It should be evident to anyone listening to an ATC frequency that non-standard phraseology is common. Whether it is a significant factor in aviation incidents is open to discussion. The reports reviewed here are but a fraction of those in the ASRS database. Regardless of the magnitude of the problem, there certainly are ways to help avoid these problems in the first place, or to minimize their effect on day-to-day operations.

- If a clearance or instruction seems the least bit out of the ordinary or ambiguous, flight crews should not hesitate to clarify the clearance or instruction until no doubt remains.
- Pilots and controllers should make a conscious effort to use standard phraseology in all ATC communications. In addition, inflection and the placement of pauses in a transmission may be significant.
- A recurrent training session is the perfect venue for pilots to review the AIM and other pertinent resources discussing standard phraseology.
- Before the first trip as a flight crew, the Captain should take the initiative to discuss phraseology issues as they pertain to inter-crew as well as ATC communications. This may help to prevent misunderstandings among the crew, and to heighten alertness for non-standard phraseology used by ATC. It is equally important for flight instructors to discuss these issues with their students, since frequent intra-cockpit communications take place during instructional sessions.