



FLYING

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SAFETY

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1999



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THE CHIEF OF SAFETY, USAF**

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Air Traffic Controller Now in Place at the Air Force Safety Center

MSGT KEVIN ELLIOTT
HQ AFSC/SEFO

Hello all, my name is MSgt Kevin Elliott, and I am the new ATC guy at the HQ Air Force Safety Center (AFSC). Since this position has been vacant for a long time, I thought it would be a good idea to provide a brief history. I'd also like to let you know what my duties and responsibilities are and pass along some information on our new initiatives for the Hazardous Air Traffic Report (HATR) Program.

Until 1993, a SNCO air traffic controller worked at the Air Force Inspection and Safety Center (AFISC) at Norton AFB as the HATR Program Manager. When the HQ AFSC moved to Kirtland AFB, the controller position was eliminated. However, the HATR Program did not go away, and due to manpower shortages, the program was turned over to a mishap investigations officer as an additional duty. With only one individual working on a part-time basis, it was difficult, at best, to keep the program and information current. Because HATR information is vital to flight safety, the HQ AF Flight Standards Agency (AAFFSA) stepped up in early 1994 and did their best to fill the void. AFFSA collected and maintained HATRs in a temporary database, analyzed the information for trends, and distributed the results through the AFFSA Airfield Operations Quarterly Report.

In 1997, following a series of meetings between AFFSA and AFSC representatives, a determination was made that something had to be done to ensure HATR data was tracked at the appropriate level and within the appropriate AF organization. Hence, HQ AFSC, in coordination with AFFSA and AFPC, reestablished the air traffic position.

I received my assignment notification in December 1997 and reported to the Safety Center in late March. My initial task was to gather all HATR information/databases from AFFSA/XAS and input it into the database maintained at AFSC. All HATR information from 1995 to the present is now loaded. My primary responsibilities are to ensure the HATR database is current, provide you with HATR information when requested, and be the focal point for AFI 91-202, Attachment 3, *Hazardous Air Traffic Reporting Program*.

Some of the duties and associated responsibilities include:

- OPR for AFI 91-202, Attachment 3, *Hazardous Air Traffic Report (HATR) Program*.
- Reviewing all HATRs to determine trends related to ATC procedures and airspace issues.
- Maintaining a comprehensive HATR database.
- Developing and distributing quarterly trend and

continued on page 31



The Human Factors Council— A Tool for the Human Part of ORM

Lt Col Jay C. Neubauer
HQ AFSC/SEFL

Introduction

Human Factors

- Account for 75-80% of recent aviation mishaps.
- Represent an ever increasing concern in aviation safety.

Prevention, therefore, must be geared toward picking up on the subtleties of human behavior and the effect it can have on human performance.

Human Factors Councils can provide another tool for the unit commander to systematically review each aircrew member in the unit for preventable human factor risk.

Origin of Human Factors Councils (HFC)

A few years ago, the Navy elected to institute a program to periodically review individual aircrew performance and factors that might detract from performance. The Navy developed the program after the unfortunate F-14 mishap in Nashville in which the pilot was noted to have personal factors indicating degraded performance. The following is a synopsis of portions of COMNAVAIRPACINST 5420.2B and COMNAVAIRLANTINST 5420.5C, which outline the program for the Navy.

Why Would I Want to Do This?

In retrospect, there are several recent mishaps which could have been prevented with more attention to individual risk. As the Air Force embraces Operational Risk Management (ORM), an increasing need for tools and techniques for discovering and evaluating risk arises. The HFC provides a formal, systematic, consistent way for helping commanders know their people. HFCs bring together information that may point out individuals with degraded performance who are at high risk for a mishap. Knowing who represents an increased risk provides insight as to where help is needed and where to put resources to reduce risk and decrease the chances of an incident or mishap.

**What Are
HFCs?**

General Concept

An HFC is a periodic (at least quarterly) gathering of the squadron or unit leadership, which meets at the discretion of the unit commander, to review

- Personal stresses
- Medical issues
- Training issues
- Discipline issues

The council evaluates each active flier using a series of questions in each area.

Purpose

The HFC reviews the personal and professional characteristics of each flier. Each member of the council brings information to the table, providing a thumbnail sketch of the individual. The HFC process brings forth the full range of training, currency, flight discipline, job performance, aeromedical and psychosocial issues that might interfere with safety of flight.

The HFC may be especially important during unit deployments where stresses are greater, resources are more critical, and normal support functions are less readily available.

Note: The HFC can just as easily work for any organization where human performance is critical to operations (maintenance, ATC, industrial shops).

**Who Makes
Up the HFC?**

The commander or unit leader picks the participants. The participants will change depending on the type of unit. A typical council might include

- The operations officer
- The training officer
- The safety officer
- The flight commander
- The flight surgeon

Keep in mind: The commander can include anyone who might have pertinent information on individual fliers.

**Potential
Outcomes**

The HFC is a commander's tool. Any action taken on the findings is left to the discretion of the commander. In cases where something significant may come up in the HFC, the commander can tailor a response depending on the potential for reduced performance. Options might be

- Further evaluation
- Individual counseling
- Developing training plans
- Scheduling selectively
- Increasing supervision
- Setting up formal counseling or support services
- Short-term DNIF

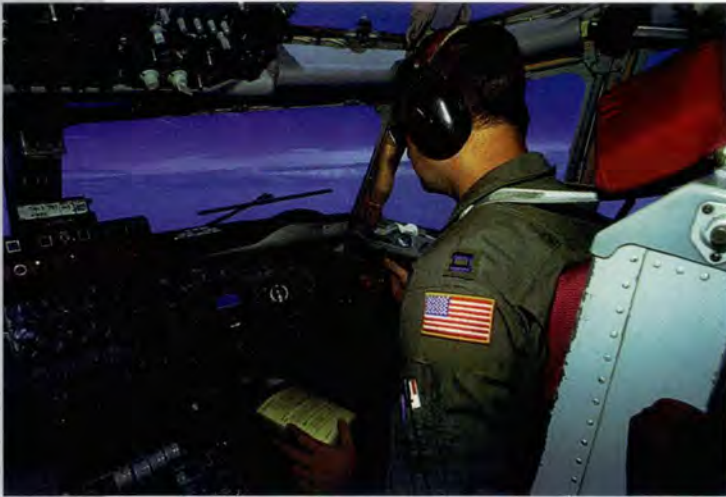
Critical: This is not meant to be a *punitive* forum.

**General
Guidelines**

During the HFC meeting the members should evaluate

- Operations Tempo
 - Is the squadron/individual flying too much?

continued on next page



- Is the aviator flying enough to maintain proficiency?
- Training
 - Is the aviator's professional advancement progressing normally?
 - Is the aviator about to lose currency/qualifications?
- General Skills
 - Flying skills
 - Systems/Procedures knowledge
 - Coordination/Communication skills
 - Professional discipline
 - Risk-taking behavior
 - Career development
- Medical/Psychosocial Issues
 - Are there any medical/physical/physiological issues that could decrease performance?
 - Are there any family/personal issues that might degrade performance?

General Aviator Risk Categories

According to the Navy, there are general categories into which "at risk" aviators may fall. The characteristics are usually very recognizable and should send up warning flags. By no means does each aviator need to be categorized. Most aviators will not fit into any category, and some may have characteristics of several. That is where the judgment of the commander, with input from key staff, plays into assessing the risk and determining what, if anything to do about it.

Risk Category	Key Characteristics
Below Average Newcomer or Transition Aviator	<ul style="list-style-type: none"> • Behind peers in skills progression • Fails exams or check rides • Poor procedures knowledge • Marginal flying or mission proficiency • Poor judgment • Lacks confidence in ability • Weak crew coordination
Overconfident Senior Aviator	<ul style="list-style-type: none"> • Not flying regularly • "Been-there-done-that" attitude • Relies on experience, not proficiency

- May use rank to “bend” the rules
- Fails to recognize own limits
- Intimidates flight or crew members
- Poor crew coordination

“Best” Pilot/Aviator/Aircrewman

- Typically overestimates ability
- May be highly regarded by command and peers
- Consistently pushes the envelope
- Completes the mission at any cost
- Lacks judgment, accurate perception of mission risks
- Violates the rules
- Considers rules only for “average” aviator
- May talk down to peers
- Prefers high-risk missions to maintain best aviator image
- Low regard for crew coordination, takes minimal input from others
- History of below average performance
- May be well liked and excel in ground/admin duties
- Slow qualification progress
- Easily distracted and task overloaded
- Frequent loss of situational awareness (SA)
- Behind peers and not catching up
- Lacks self-confidence
- Excess dependence on other crew

Consistent Poor Performer

Overstressed Aviator

- Presence of major personal stressors (financial, family, job, etc.)
- Noticeable change in mood or personality
- Frequent or out of proportion anger, resentment, hostility
- Distracted, preoccupied
- Uncharacteristic breakdown of flight discipline
- High rate of DNIF or removal from schedule
- Increased or excess alcohol use

The Paperwork The HFC meeting should be documented in a simple set of meeting minutes kept by the commander until no longer needed.

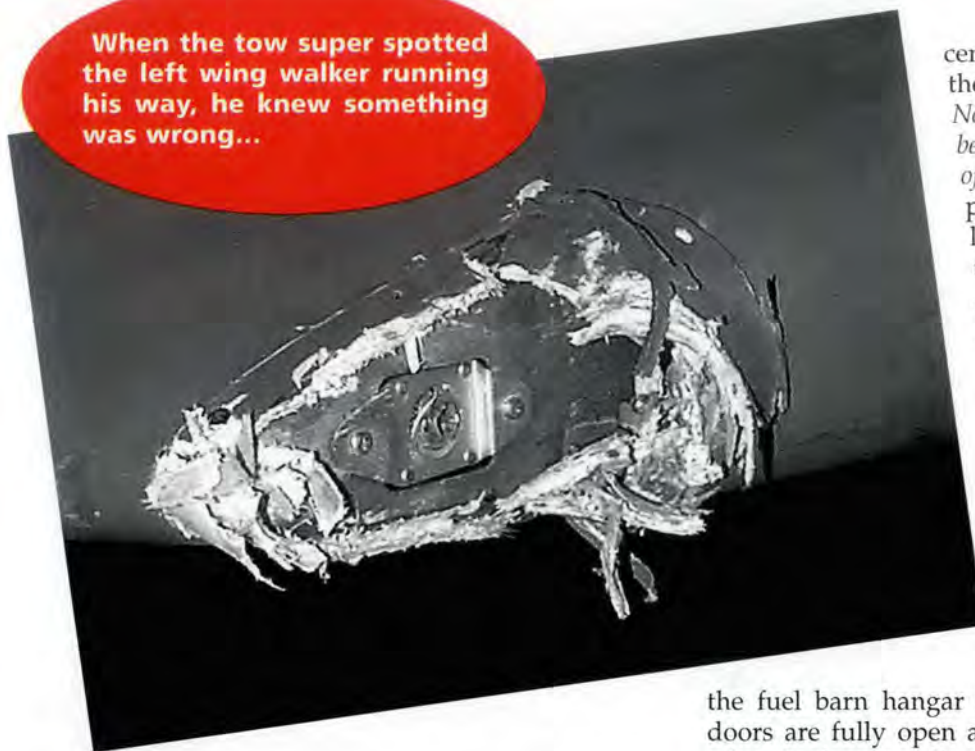
Conclusion

The HFC is a quick, clean way for the commander and senior staff to keep up with changes occurring within the ranks of the unit. The process provides a thumbnail sketch of each individual allowing the commander to assess risk and make fact-based decisions on mitigation of risk. Of course, the HFC is just one more tool for commanders that may help keep an aviator from becoming the next incident or mishap statistic. ✈

Tow Team Tribulations

(Or: How to Modify a B-52 Wing Tip Without Really Trying)

When the tow super spotted the left wing walker running his way, he knew something was wrong...



CMSGT MIKE BAKER
Maintenance/Technical Editor

Invariably, mishaps are preceded by a discrete series of events, or links, which form a chain. Remove one of these links and the mishap is averted. See if you can spot the links in this sequence of events, any one of which, if disabled, may have prevented nearly \$18,000 in aircraft damage and \$5,000 in damage to a hangar door.

The Scenario

It was graveyard shift, and the tow team was moving its third B-52 of the night. This aircraft was being moved from the main ramp to the fuel barn. The tow vehicle driver checked out the tow kit and, as he had done on the two previous tows, distributed the air horns, whistles, and wands to tow team members. Prior to their first tow of the shift, one of the wing walkers pointed out that her air horn was inop. This was acknowledged, and she was told to use the whistle instead. *Note: An equipment serviceability check prior to leaving CTK would have revealed that of the four air horns, three of them were kaput.*

In accordance with applicable B-52 tech data, prior to towing, the aircraft's crosswind crab indicator is to be

centered—which it was—indicating the MLG are pointed fore and aft. *Note: There's a tolerance of ± 2 degrees between indicated and actual positions of the MLG.* The tow through the parking ramp proceeded routinely, and with no obstacles in sight, the wing and tail walkers rode in a step van following the aircraft. Just before reaching the fuel cell hangar, one of the wing walkers riding in the van noticed the aircraft was "crabbing" slightly to the left. *Note: He didn't mention this to anyone else.* The tow vehicle driver carefully centered the B-52 in front of the hangar, and the spotters got out of the van and went to their assigned aircraft positions.

Yellow safety lines painted on the fuel barn hangar floor indicate when the hangar doors are fully open and help provide a reference for wing tip clearance. But due to binding, one of the hangar doors on the left side didn't fully open and was protruding approximately 1 foot inside the yellow safety line. *Note: After-the-fact investigation revealed the tow super failed to ensure the hangar was ready to receive the aircraft and also failed to adequately brief the team prior to this final tow.* All of the mishap links were now in place.

A Mishap in Slow Motion

With wing walkers in their assigned positions, the aircraft proceeded inside the hangar with the wing walker who knew about the crabbing MLG (but had said nothing to anyone else) situated at the left wing (the one that would pass next to the faulty door). He perceived clearance to be okay until the wing tip was within 15 feet of the hangar door. It then became apparent that because of the slight crab of the MLG, the wing tip and protruding hangar door would meet. He tried to sound his air horn in alarm, discovered it was inop, and yelled "Stop!" (didn't attempt the whistle or wand) to warn the tow super and tow vehicle operator. They didn't hear him, but the right wing walker did. She instinctively tried to activate her air horn and discovered it, too, was inop (didn't attempt the whistle or wand either). With the aircraft still moving inexorably forward, the left wing walker started running toward the tow super and tow driver to alert them of the danger. When the tow super spotted the left

wing walker running his way, he knew something was wrong and directed the tow driver to halt the tow—but too late to prevent the impact between wing and door. The wing tip sustained a 6- x 7-inch gash.

The Aftermath

In retrospect, it seems pretty easy to recognize the individual elements that led up to this mishap. But put yourself in their shoes, and you'll realize that assigning primary "blame" to any one individual is an exercise in futility. Complacency and a failure to communicate did a number on all of them.

Because each of the members of the tow team had worked together on the two previous tows and nothing had gone wrong, they dropped their guard. A cursory pre-tow briefing, repetition-induced boredom, finishing up another no-sweat tow job—any or all of these conditions could have instilled a false sense of security in each of them.

Remember that line spoken by the actor Strother Martin to the chain gang in the movie *Cool Hand Luke*? "What we have here, is...a failure to communicate..." That line aptly describes how, if the team had more effectively communicated with each other, it's likely this mishap wouldn't have happened. *What if* the tow driver who checked out the tow kit had checked the air horns and all the rest of the equipment before leaving CTK? *What if*

the tow super had required each team member to check his/her air horn after learning one was inop? *What if* everyone who needed an air horn took it upon himself to ensure it worked before towing? *What if* the aircraft crab had been reported to the tow super and tow driver? And on, and on.

Lessons Learned

Here's what we believe the tow team learned.

1. A series of small, seemingly insignificant discrepancies, by themselves, may be no cause for alarm. But if they're combined, then a mishap is bound to occur.
2. Don't let routine tasks lull you into letting down your guard. We most often hurt ourselves and damage equipment when doing the things that we've done so often that perhaps we believe we don't need to refer to tech data anymore.
3. When the hairs on the back of your neck stand up and you feel like something bad is about to happen, call a time out. Reassess the situation, and start over again if need be.
4. Stay on your toes no matter how simple (or boring) the job.
5. Communicate, communicate, communicate.
6. Bad things can happen to good people. It's a lot easier to tarnish a good reputation than it is to clean up one that's been tarnished. ✈



Something's got to give when an irresistible force (B-52 wing tip, opposite page) meets an immovable object (hangar door, right). In this case, both did.



**Never let an aircraft take you where
your brain didn't get to 5 minutes earlier.**





USAF Photo by SSgt Steve Thurow

JANUARY

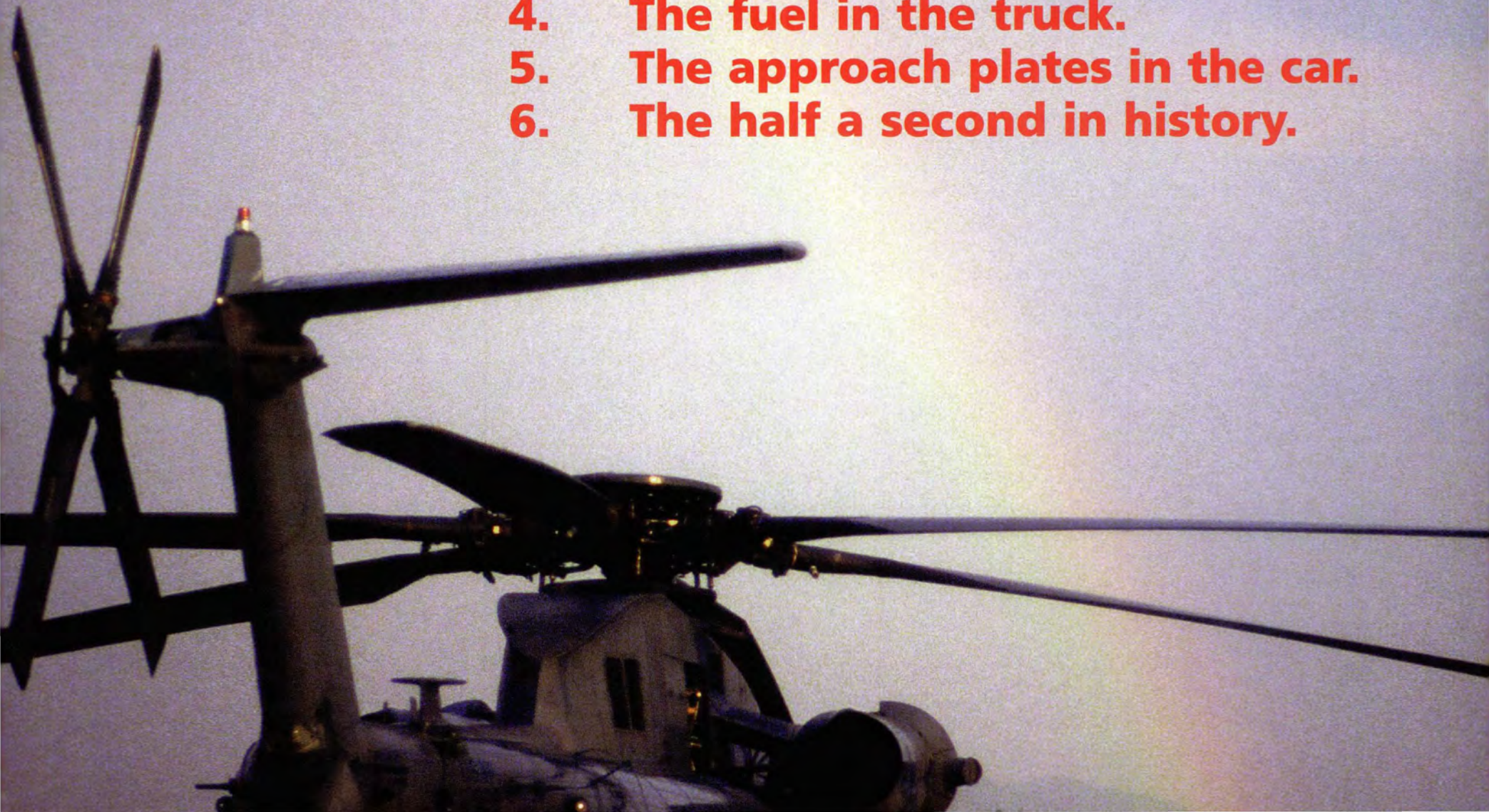
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Six useless things in aviation:

- 1. The altitude above you.**
- 2. The runway behind you.**
- 3. The airspeed you used to have.**
- 4. The fuel in the truck.**
- 5. The approach plates in the car.**
- 6. The half a second in history.**





USAF Photo by SSgt Steve Thurow

MARCH

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Know safety, no pain
No safety, know pain





USAF Photo by SSgt Andrew N. Dunaway, II

MAY

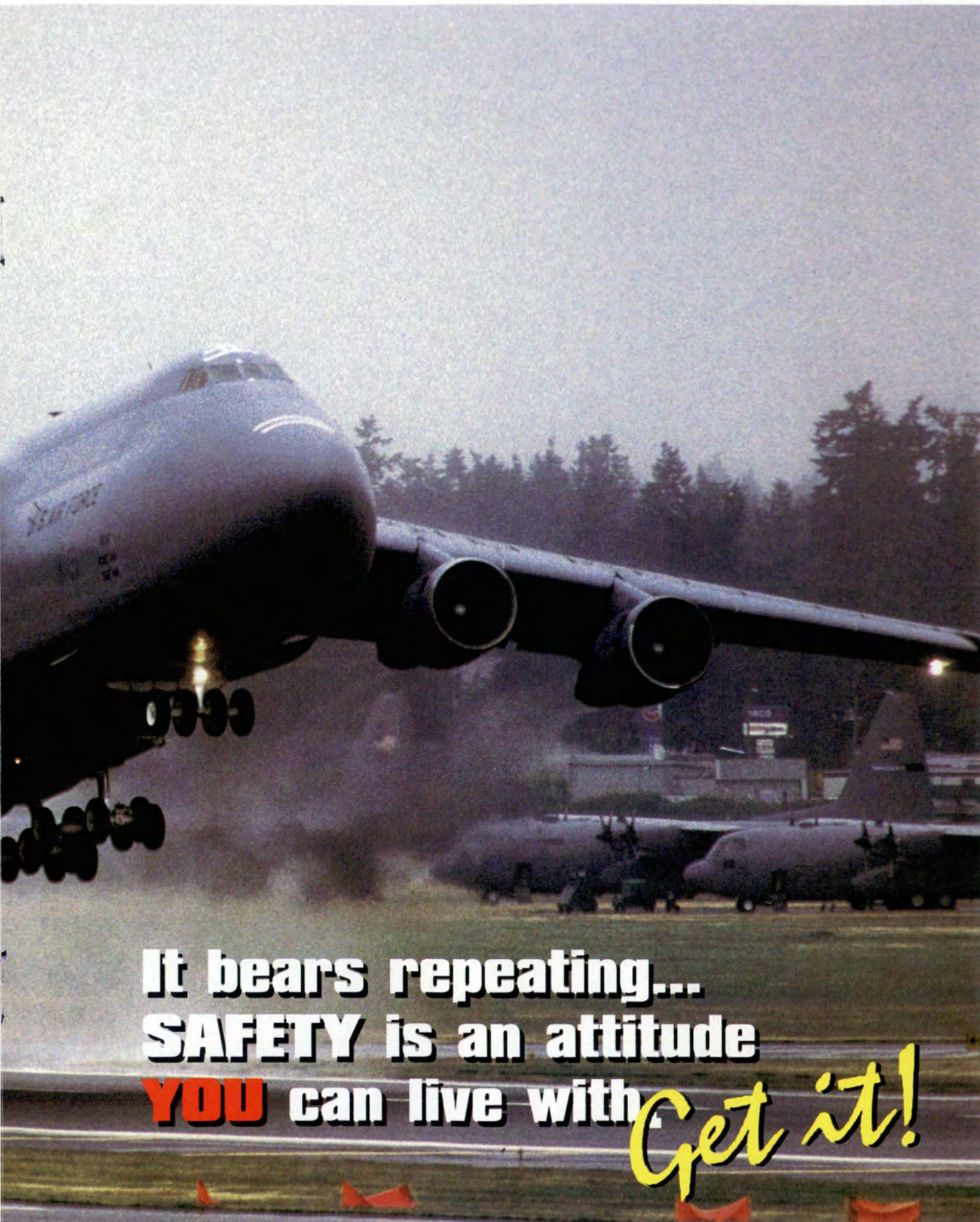
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Flying
SAFETY





USAF Photo by MSgt Perry J. Helmer



Safety, discipline, thinking in the cockpit, and using your head are still as important today as they were 20 years ago and will still be 20 years from now.



USAF Photo by SSgt Steve Thurow

JULY

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**A professional pilot
may lapse into an attitude of complacency—
but when he does, he
ceases to be a pro.**



USAF Photo by SSgt Andrew N. Dunaway, II

SEPTEMBER

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Application of hard-learned principles of flight safety, airmanship, and cautious aggression will enable safe completion of the mission.



USAF Photo by SSgt Steve Thurow

NOVEMBER

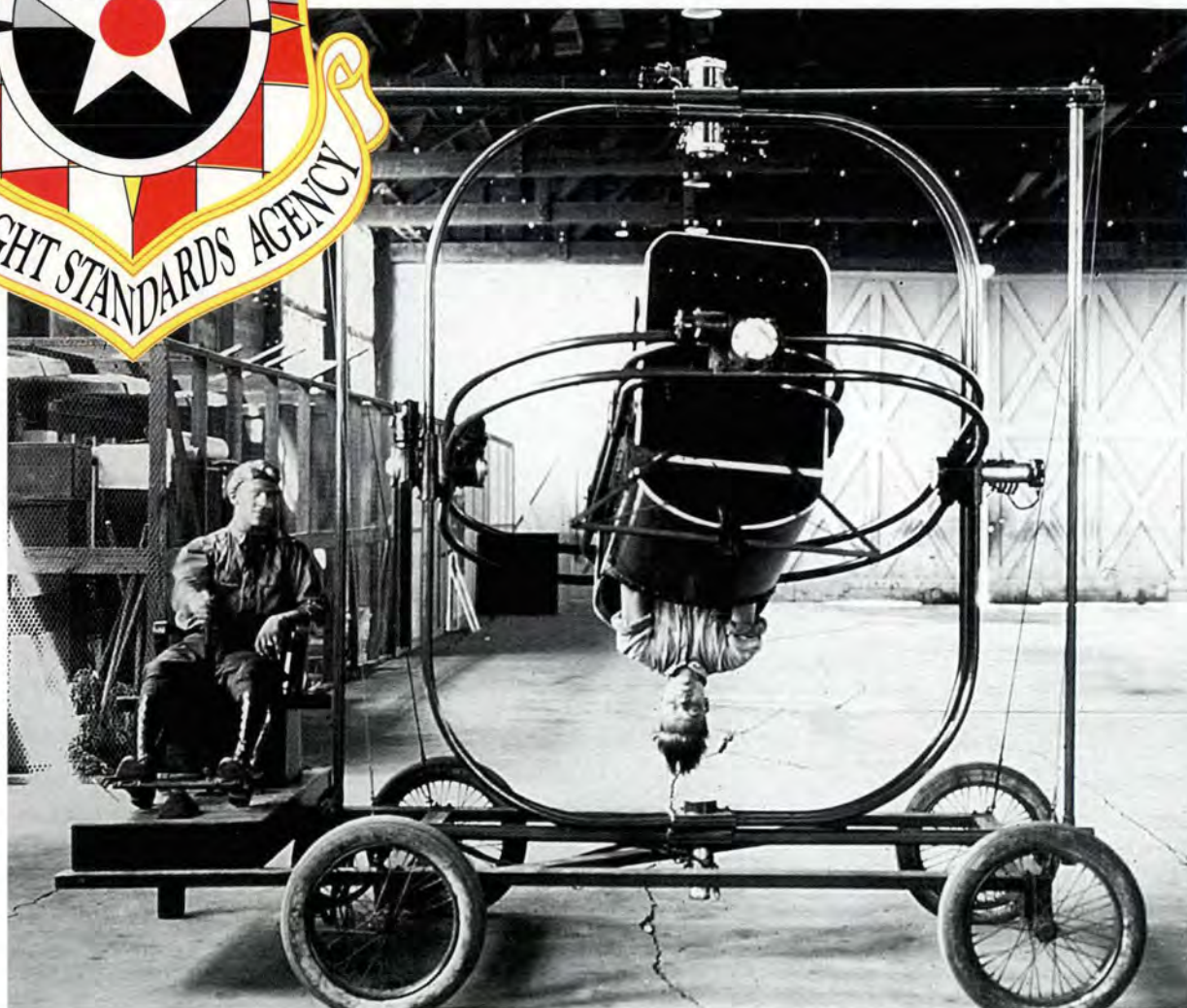
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INSTRU



Flying Safety Archives

MAJ KEVIN JONES
HQ AFFSA/XOFD

During my 4 years at the Flight Standards Agency, it seems like I've answered a million questions about flying. I know I have resolved at least a thousand bets and a bunch of check rides. It's been a great job, and I've learned a lot about flying. By the time you decide to call us, there is no such thing as an easy question. Believe me, coming up with the answers is not any easier. So, for this month's quiz, we are going to turn the tables and give you a taste of what it's like to be on the receiving end of the questions.

Just for a moment, I want you to pretend you are Maj

Scott Taylor, the OPR for AFI 11-202, Vol 3, *General Flight Rules* (formerly AFI 11-206 and before that AFR 60-16). Your e-mail account has melted down, your voice mail is full, and the phone is ringing off the hook. Warily, you pick up the phone and hear the following questions.

1. My unit has worked out a deal with the local FAA Flight Standards District Office (FSDO). They have granted a waiver to the FARs for aircraft flying training sorties from my base. Are we legal to fly using the guidance provided in the FSDO waiver?

Probably not. The FAA is not the USAF, and a waiver from the FARs does not imply an automatic waiver to AFI 11-202, Vol 3. There are instances where an FSDO may grant a waiver for an operation required by AFI 11-209 (*Air Force Participation in Aerial Events*). These are

MENT QUIZ

generally one-time, event-driven waivers and can be executed while still complying with USAF General Flight Rules. Day-to-day flying waivers, however, are coordinated through MAJCOM channels and obtained for the USAF through AFFSA. Once the FAA grants a waiver to the FARs (generally Part 91), an appropriate waiver to AFI 11-202, Vol 3, is also issued.

2. Paragraph 5.9.2.1 says that when I'm executing a closed pattern that I don't have to wait until 400 feet above the DER elevation. What if I'm doing a normal crosswind in the VFR pattern?

The 400-foot rule applies to IFR departures—not to VFR patterns. The 400-foot turn restriction is meant to keep aircraft departing under IFR inside TERPs' Zone 1 for obstacle protection. If you are flying a VFR pattern, you are expected to visually clear your flight path. We'll change the wording in the next revision of General Flight Rules.

3. I'm confused. Chapter 8 of General Flight Rules states USAF fixed-wing aircraft will fly under IFR to the maximum extent possible. Chapter 7 says VFR flight is allowed only "when required for mission accomplishment." Does this mean I must fly IFR unless VFR flight is the only way to complete the sortie or mission?

No. There are missions the USAF flies every day that can be completed only under VFR. If crews are to safely and effectively complete these missions, they must train to do so. When and how this training is accomplished varies by MAJCOM and MDS. Appropriate training may be (1) a VFR cross-country flight at varying VFR hemispheric altitudes between 3,500 and 17,500 MSL; (2) a low-level sortie on an established MTR; or (3) a short airlift mission leg where fuel consumption/conservation are not overriding constraints. VFR flight, like IFR flight, does require detailed planning and preparation—these preflight actions are critical to flying safety and ensure the training is as effective as possible.

4. Why do I have to get MAJCOM approval to fly practice instrument approaches under VFR?

The ability to fly practice instrument approaches under VFR has its advantages, but at the expense of other benefits. For example, allowing some USAF aircraft to do practice approaches under VFR may permit aircraft to practice approaches in busy terminal areas where they would otherwise be turned away. However, the safety margin is decreased because ATC may, in some

cases, provide VFR separation instead of IFR separation which "shrinks the bubble" around your aircraft. MAJCOM approval is required so that the appropriate risk management decision is made; i.e., is the gain worth the risk involved?

5. Paragraph 8.4.2.2 requires me to file an alternate when my destination does not have weather reporting capability. How do I know if the destination has weather reporting capability?

The answer is fairly simple. If you get a weather briefing and the forecaster is *unable* to give you a forecast for a particular airport (for whatever reason), then you may consider that destination one that "does not have weather reporting capability," and an alternate is required.

6. I'm not sure how to interpret paragraph 9.4.6.2 which states, "Crew rest is required to preflight, load, start, and taxi aircraft." Does this mean crew rest is required if you are going to accomplish all four of these actions, or is crew rest required if you are going to accomplish any of these actions?

In most cases, crew rest is required if you are going to accomplish any of these actions. A crewmember's responsibility to "break the chain" and prevent a mishap is established long before the engines are running and ground control issues taxi clearance. Here are some of the "real world" events behind this paragraph. Preflight: The fatigued scanner failed to notice the flight controls had been cross-wired during maintenance; the fatigued engineer failed to recognize that the flight control movement acknowledged by the scanner was opposite the yoke movement. Load: An improperly loaded DC-8 experienced a CG shift on takeoff resulting in a fatal crash. Start: The pilot who decided to remain on the flightline after a full duty day to help maintenance with the engine-run failed to notice a malfunction while starting the engine; the engine was destroyed. Taxi: You name your mishap—lots of wingtips have been scraped off on light poles.

Well, how did you do? If you answered all the questions just like we did, then a miracle has taken place! It's rare that everyone agrees with our position. In fact, even within our agency, we hardly ever have a unanimous decision. In the end, we try to balance operational needs and regulatory requirements with a dose of common sense. If you have questions about these issues or any others, please get in touch. Maj Taylor's e-mail address is taylorsc@andrews.af.mil. Fly Safe! ✈

Aircraft Runway Incursions— The Escalating Threat to YOU!



USAF Photo by MSgt Perry J. Heimer

CAPT TONY CORTES

6th Airlift Squadron
McGuire AFB, New Jersey

Whether you fly a J-3 around dirt fields or a Starlifter into Frankfurt, you are susceptible to creating a runway incursion or suffering because of one. This article looks at causes and prevention strategies of this increasing threat to ground operations.

You're flying a training sortie, sweating on final approach. One of your engines is simulated failed, and as you approach the runway, you wonder if your IP will let you land or have you perform an engine-out go-around. You can almost feel the grin on your IP as you hear, "Let's simulate that a bus full of nuns pulls out on the runway..."

You commence your go-around procedures and think, "Good grief! There's got to be a more original scenario than that!" The truth is, if you ever have to go around in real life, it'll probably be due to a runway incursion by an aircraft (unless you're landing at Vatican International in Rome).

Incursions Are Coming to a Runway Near You

Runway incursions are in the FAA spotlight this year. DOT statistics show an alarming increase in these violations—a 40 percent increase in the last 5 years (a 19 percent spike occurred in 1997).

There are two popular terms in the pilot-controller vernacular that require clarification—runway transgressions and runway incursions. A transgression is when a runway is used without authorization. An incursion is a transgression that creates a traffic conflict. Although many transgressions result in a simple ATC "wrist slap," incursions usually result in a "call this phone number" scenario and frequently result in violation action.

Most transgressions occur due to pilot deviations and usually result in embarrassment. Incursions result in go-arounds and aborted takeoffs. *In worst cases, incursions spawn high-speed ground collisions between two aircraft, such as the worst aviation disaster of all time—two Boeing 747s that collided in the Canary Islands 21 years ago.* More recently in 1996, a Beech 1900 smashed into a King Air 200 in Quincy, Illinois. The 1977 mishap occurred at a tower-controlled field while the Quincy mishap did not.

Let's examine pilot-induced runway transgressions and determine what human failures cause them. We will

then spell out 15 key prevention strategies that will vaccinate you against this spreading safety disease. Learn these and teach them. The life you save may be your own!

Transgressions Versus Incursions

A runway transgression is when a runway holding position line is crossed without clearance, or a runway is used without permission (unauthorized takeoffs and landings). Transgressions also occur on taxiways, but most of these result in extreme embarrassment rather than mishaps. Most transgressions are never reported to the FAA.

On the other hand, incursions are frequently documented at airfields with control towers because "big brother" is sitting in the tower cab, writing down the details of the incident to pass to the local Flight Standards District Office (FSDO). However, incursions are even more commonplace at airfields without control towers.

Incursions at Uncontrolled Airports

Those who frequent these airfields know that freedom from Air Traffic Control (ATC) comes at a price. Instead of ATC, the Aeronautical Information Manual (AIM) predicates pattern and ground procedures which are rooted in expecting certain behavior from other traffic. This is paramount to creating orderly traffic flow. Expect-

No. 2 Cause. The second leading cause was inadequate visual clearing. In addition to AIM recommendations, special consideration should be given to runways that slope upwards from both thresholds, cresting halfway down their runway. It's difficult to visually clear the opposite threshold and runup area prior to departure in this case. It would be bad to "crest the hill" on takeoff and see another aircraft doing the same in the opposite direction. With VHF transmissions limited to line-of-sight use, both pilots may use CTAF properly and get a nasty surprise "over the hill." Another caveat to throw out is a calm or light wind situation. This always makes my neck hairs stand at full attention when I approach an uncontrolled field. The prospect of two opposing traffic flows is highly increased.

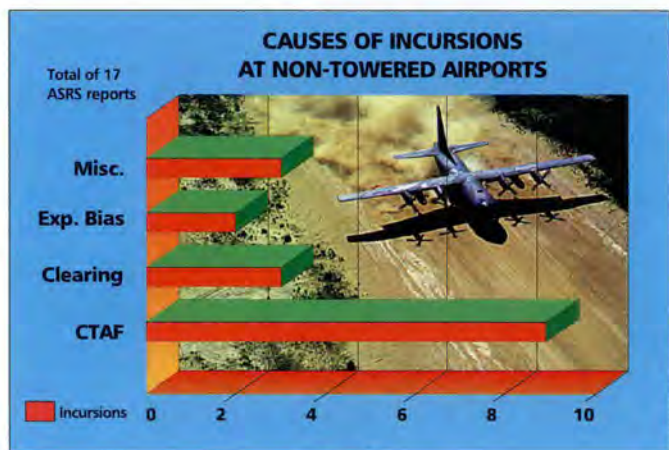
No. 3 Cause. Lastly, and also functioning as a catalyst for the two previous causes, is expectation bias. Expectation bias is a natural by-product of the human psyche. Our brains are enamored with patterns and closure. If the brain senses something similar to what it's accustomed to, it will try to associate it with previously recognized patterns and neatly file it away in the "been there, solved that" pocket of synapses.

For example, you're driving to a meeting and running late. You impatiently wait for the green light at an intersection. The cross traffic light turns yellow, you shift into gear and rev the engine. The cross traffic light turns red, and away you go. Halfway through the intersection you look for your green light (a nice warm fuzzy), and what do you see? A left-turn arrow instead. Oops! So I guess that's an "intersection incursion," huh? I'm sure you've seen that scenario before.

How does this apply to incursions at towerless fields? Here are some examples. Let's say you are No. 2 on final. No. 1 lands, slows to taxi speed, and is approaching a taxiway turnoff as you near the threshold. You begin your roundout in full awareness of the tight spacing, but the rollout traffic is abeam the turnoff taxiway. So, no sweat. It's going to work because you are the grand master of efficient pattern spacing. As you begin your flare, though, you notice that instead of turning off, the rollout traffic has passed the taxiway and is continuing down the runway. So you tuck your tail between your legs and feed in the power to initiate the go-around.

How about this other scenario? You just completed your runup and are taxiing onto the runway for departure when you hear someone call turning base. "No problem," you think. "Plenty of time." As you commence your takeoff run, you hear, "N45K on the go...thanks a lot there, departing traffic!" Above you, the shadow of a Cessna Citation streaks by. Oops! Your brain was *expecting* the closure rate of a typical light aircraft, not a bizjet.

Misuse of CTAF, inadequate visual clearance, and expectation bias also lead the causes for airborne near misses. Focusing on these areas will cover you in both ground and flight operations. Remember these causes often act together synergistically. When they do, the mishap chain is formed, and you're in for an ugly sur-

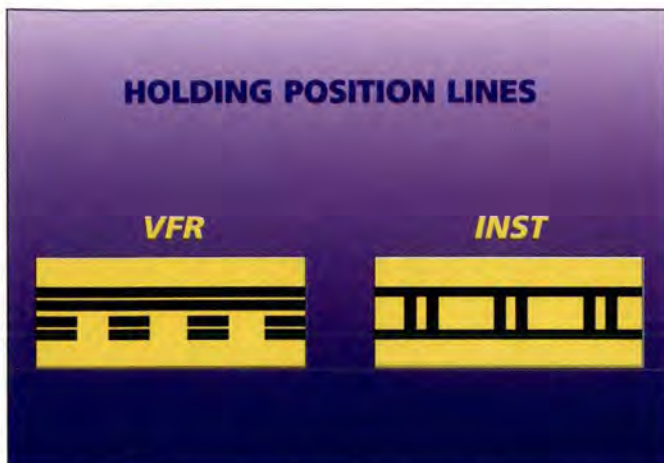


Graph 1

tations are confirmed, updated, or revised using the Common Traffic Advisory Frequency (CTAF). Transgressions will not occur at uncontrolled fields, since no one is there to authorize your runway use (remember how we defined transgressions). Graph 1 shows a breakdown of runway incursion causes at these fields during 1997, as reported by the NASA Aviation Safety Reporting System (ASRS).

No. 1 Cause. Misuse of CTAF. As gleaned from the ASRS reports, most misuse involved omitting position reports or not clearing on the radio, inadvertently having the volume turned down or having the radio off, and frequency congestion. *CTAF discipline is the key to preventing runway incursions at these airports.*

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Know your holding position lines (AIM Chapter 2).

prise. In the 1996 Quincy mishap, the field control tower was closed, and all three of the aforementioned causes created the deadly mishap.

Transgressions and Incursions at Tower-Controlled Airports

Tower-controlled airports can be complex animals. Time pressures, ATC cutbacks, and increased traffic flow sometimes lead to managed mayhem. Before we dive into what causes runway transgressions, let's define exactly what constitutes one.

If any part of your aircraft penetrates onto the runway side of a holding position line (popularly referred to as "hold short" lines) without ATC clearance to use that runway, a transgression has occurred, and most often carbon-based interface has caused it (that means *you*). The holding position lines can be VFR or instrument lines. (See the figure.) A takeoff without ATC clearance also constitutes a runway transgression since the runway is not yours yet. FAA Advisory Circular 150/5340-1G stipulates the design criteria for holding position lines. The VFR lines provide wingtip clearance from runway traffic. The instrument lines protect precision instrument navaid transmissions.

There are three recurring transgression traps at tower-controlled fields I want to cover before addressing general causes. These are violations waiting to happen. ASRS reports are full of accounts from pilots

who have fallen into these traps. Don't join them!

Trap No. 1. When you are cleared into "position and hold" ("line up and wait," in ICAO operations) and given an IFR clearance or an amended clearance, do not take off unless you also receive *takeoff* clearance! This was the trigger event that cascaded into the 1977 mishap in the Canary Islands. This is a classic case of expectation bias. Because of this mishap, FAA controllers must now affix "continue holding in position" to any clearances issued to aircraft holding in position. Something tells me not to expect such thoughtfulness in other countries.

Trap No. 2. In order to guarantee wingtip clearance, VFR holding position lines are placed sufficiently far from the runway edge on all approaching taxiways. Geometrically speaking, the smaller the angle of convergence between the taxiway and the runway, the further back along the taxiway these lines will be.

In an extreme example of, say, a 20-degree convergence angle, the holding position line may be back on the ramp. What the heck! Let's really take it to the extreme—maybe you're parked *on it*! I can imagine the radio traffic now! First the thickly accented foreign controller saying, "Spar 96, you taxi now Runway 24." Then the crew, "Okay, taxiing to Runway 24, Spar 96." As the jet starts rolling, you hear, "Spar 96, I violate you now!"

There are two points to make from this example. First, tons of ASRS reports quote the aircrew as saying, "Although we had crossed the hold short line, we were not on the runway." Not true! The runway is defined as the area starting at the VFR holding position line.

The second point to cull from our example is that we usually see VFR holding position lines shortly before entering the runway, but they may not always be there. If your taxiway doesn't intersect with your runway perpendicularly, the lines will be farther back than you are accustomed to seeing, and it won't register in your mind to start looking for them until you have passed them (ex-

pectation bias, yet again). Always taxi around scanning the pavement for holding position lines. You never know where they are for sure!

Trap No. 3. The last situation develops when two runways originate from a common threshold area (both runways form the letter "V"). After receiving takeoff clearance, you proceed to line up with what you think is the correct runway and blast off. Five seconds into your sup-

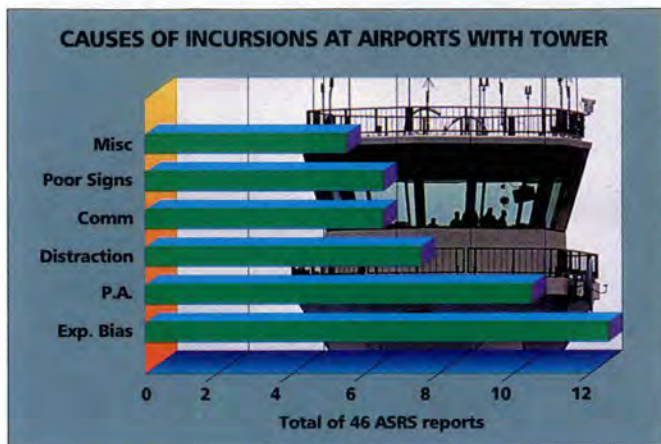


Stop the aircraft immediately if you don't see the holding line where you expect to see it.

Official USAF Photo by TSgt Lance Cheung

posed 6,000 feet of runway, you notice the end of the runway up ahead. Oops! What a time to realize there's also an assault strip on this airport, huh? When you line up with a runway, don't just check your heading instruments to ensure they are aligned with the runway heading. Also check the runway to make sure it's aligned with your heading instruments!

All right, then, those are three specific traps. So what are the general causes of runway transgressions and incursions at airfields with control towers? Everything you learned from our discussion so far applies here as well. In order of importance, there are five major areas. Guess what leads the list! (See graph 2.)



Graph 2

No. 1 Cause. Expectation bias! This accounted for 12 of the 46 ASRS reports on incursions for 1997. This is no surprise since it's a phenomenon associated with the mental synapses that are hopefully in use when we taxi around. Nonetheless, these were 12 incidents where it was specifically to blame, not just a contributing factor.

An example is when two aircraft, on separate taxiways, are awaiting takeoff clearance for the same runway. Each crew is "expecting" takeoff clearance. The controller clears one aircraft for takeoff, and both aircraft respond and start lining up. To make matters worse, both aircraft acknowledged the clearance simultaneously, thus blocking each other out. The tower controller frantically calls the aircraft, but Murphy takes over,



Nice landing...have you developed a plan for taxiing to parking?

and one of the aircraft has a stuck mike after reading back the clearance (let your imagination fill in the ensuing chaos).

One characteristic of many transgressions is that they occur during periods of crew confusion or distraction. This can be confusion over cryptic IFR clearances, equipment malfunctions, passengers, etc. *When you are confused, you are especially prone to expectation bias because your brain is channelized away from filtering information.* New chunks of information are funneled into old recognized patterns, unbeknownst to you.

No. 2 Cause. Loss of positional awareness (PA). Don't you love asking your crew where you are on the airfield and getting four different responses? Sometimes you just have to stop the aircraft and "fess up" to ground control that you are lost. *PA has two big foes: unfamiliarity with an airport and not using an airfield diagram. Remember navigation begins at block-out and ends at block-in (not gear-up to touchdown).*

Hitting another aircraft on the ground can be just as bad as smacking Mother Earth on departure. Make your ground navigation a natural extension of the airborne portion. That's not to say, of course, that you should program an INS waypoint for each taxiway intersection and "fly the flight director down the taxiway." You get my point.

Anything that reduces visibility also works against your PA—rain, darkness, snow, heat radiation, glare—all fight against your ability to retain PA as you scurry about. Seems pretty simple, huh? Sucker!

Put yourself in this situation. You are on rollout from landing and hear tower say, "Thunder 56, exit high-speed Tango, ground point eight, good day." As you make the turnoff during your slowdown, the pilot not flying goes heads-down to change frequencies, and you notice a yellow line streak by underneath the aircraft. As you call ground control, you are greeted with, "HOLD YOUR POSITION!"

You stop and look out the window behind you. It then hits you that you just passed the holding position line for the parallel runway. So much for the nice landing, boss.

No. 3 Cause. Distraction. This is exactly what you think. For example, inadvertently taxiing across the holding position line because both pilots are heads-down programming the FMS, FSAS, INS, UNS, or whatever. Just like when flying,

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USAF Photo by SSGT Lisa Zinzanyka-Carpenter

Exercise a sterile cockpit anytime the aircraft is moving during taxi.

one pilot must always be completely dedicated to taxiing the aircraft.

No. 4 Cause. Communication breakdown. This entails mixups between similar call signs, bad readbacks and hearbacks, nonstandard phraseology, etc. Much like expectation bias, communication is interwoven into everything we do and, thus, functions as a mistake multiplier under all circumstances. In this case, its rank as No. 4 comes from being fully causal of the incursion versus just a participant. Communication breakdown is commonly the trigger event for many error chains, and runway transgressions are no exceptions.

Stop the aircraft immediately if you don't see the holding line where you expect to see it. And use the airfield diagram carefully when taxiing.

The NTSB has placed runway incursions on their "Most Wanted Transportation Safety Improvement" list. You now know all the ingredients for an incursion recipe and how to prevent one from happening to you. Please review AIM Chapter 2, section 3, "Airport Marking Aids and Signs," use the 15-point prevention strategy for every flight, and you'll have no worries!

Taxi safe out there!

You can relax once you get airborne. ✈

No. 5 Cause. Faulty ground signs. Be they above-ground signs or painted symbology on the surface, these are essentially "navaids." Some are confusing at best. Many bases are in the process of establishing FAA standard signs to aid with surface navigation. Just like with normal navaids, you need to report them if you detect a problem (snow contamination, inoperative lighting, confusing location, etc.) Call your airfield manager.

Can you name which two prevention strategies provide the biggest doses of incursion vaccine?

If you remember only two things from this discussion, here they are:

Steps to Vaccinate Yourself Against Runway Transgressions (in no particular order)

1. PREFLIGHT PLANNING. Use the airfield diagram as a master document for surface movements. Before stepping to the aircraft, annotate areas you cannot taxi on due to weight-bearing restrictions, NOTAMs, insufficient width, or obstructions. I personally "X" out on my diagram anything I can't taxi over. This makes surface navigation much easier than a flight deck full of Summary of Airfield Restrictions (SAR), NOTAMs, and In-Flight Supplements being passed between crewmembers.

Remember that the NOTAMs in question, at this point, are the local NOTAMs (sometimes labeled as "Airfield Advisories" at Base Op-

erations). Only the NOTAMs for your departure location will usually be available. You can get arrival local NOTAMs by calling the FSS that services the airport in question or by listening to ATIS upon arrival. Those small remarks like "Taxiway N closed from 1400 to 1500Z on Mondays due to construction" can save you tons of confusion and embarrassment.

Take a moment while at Base Ops to examine possible routings to and from the runway. Consult the FAA NOTAM Booklet for preferred taxi routings and NOTAMs that are not published elsewhere. That way, when Detroit clears you to taxi to Runway 21L via "Orange 1," you

know to follow taxiways "K-H-H1-V-W," versus just muttering, "Uuuuh...Orange who?" When the taxi clearance is read to you, I recommend marking your taxi clearance directly on the airfield diagram by lightly tracing the route in pencil along the applicable taxiways. This is much better than copying the clearance in shorthand since you can notice routing problems as the clearance is being read (naturally, professional courtesy dictates erasing all marks once you level off at cruise; or you can xerox the diagram and use the copy to write your notes on).

2. BOTH PILOTS MUST ACTIVELY LISTEN TO THE TAXI CLEARANCE.

In crew aircraft, both pilots must participate in this process to ensure clearance reception. Furthermore, both pilots should confirm the taxi routing and holding position with each other after clearance read-back.

3. READ BACK ALL CLEARANCES that involve a runway crossing, runway use, or hold-short instructions. Afford the controller the opportunity to analyze what you think you heard. Controllers also use your readback to catch *their* mistakes. The ASRS files are packed with transgressions from pilots who replied "Roger" to taxi instructions and then went the wrong way.

4. EXERCISE A STERILE COCKPIT anytime the aircraft is moving during taxi.

5. ALWAYS VERIFY A DOUBTFUL CLEARANCE. If any crewmember has a doubt about a clearance, whether it was misheard, misinterpreted, or led to confusion, make it a CRM procedure on your flight deck to always query the controller for verification.

6. TAXI SLOWLY if unfamiliar with the airport, uncertain of exact location or under reduced visibility conditions.

7. CONFESS to ground control if confused, disoriented, or lost. Request "progressive taxi instructions," if necessary.

8. DO NOT RUN ANY CHECKLISTS while crossing taxiway intersections or runways.

9. STOP IMMEDIATELY and query ground control if you think you should be seeing a holding position line but do not (hint: it's probably behind you). Being too cautious shouldn't worry you. If the line is farther up ahead, who cares? If ground control needs you to scoot up, they'll tell you.

10. "SEE AND BE SEEN...HEAR AND BE HEARD." Maximize use of lighting, and make yourself conspicuous, clear on the radio, and raise the "that doesn't sound right" flag to the controller (even if it involves a third party aircraft).

11. USE THE AIRFIELD DIAGRAM when taxiing. It should be easily accessible for quick glances by the pilot taxiing and for constant referencing by the pilot not taxiing. Place the diagram as high as possible in the cockpit to minimize time spent heads down (e.g., window rail holders are better than yoke clips, but yoke clips are better than kneeboards). Eventually, virtual reality displays of the surface environment on HUDs will be the way to go (especially in Cat III weather conditions).

12. ALWAYS CHECK AIRCRAFT HEADING after lining up on the departure runway to ensure you are aiming down the proper runway.

13. VISUALLY CLEAR the entire runway and any intersecting runways and taxiways before each takeoff and landing (especially the opposite threshold area). If potential con-

flicts exist, keep the suspicious aircraft in your scan, and prepare to take evasive action. If conditions warrant, confirm with tower that the suspicious aircraft will be holding. A minor bit of controller irritation is preferable to a high-speed collision, especially since incursions are so fashionable these days.

14. ACTIVELY BATTLE COMPLACENCY during ground operations. Most crewmembers start to relax after slowing to taxi speed on landing or aren't "pumped up" yet before lining up for departure. Fight this very human tendency with CRM by making statements such as, "Folks, we're on the ground, but we have a maze of taxiways to go through before the ramp. Let's stay alert."

15. ADHERE TO AND ENFORCE STANDARD PHRASEOLOGY USE. Far too many accidents are traced back to nonstandard phraseology. You don't sound cool when you "loosen up the lingo"—you sound young and foolish. When a controller uses nonstandard terminology, query with "Confirm you mean...?" It may sound picky, but it's critical to safety. Know your ICAO phraseology. Remember that "position and hold" in some countries means, "Don't move an inch—there's traffic at the middle marker." What would you interpret it as? If it sounds different from what you expect, **query—query—query!** ■

NOTAMS continued from page three

analysis reports.

- Reviewing all HATR conclusions and recommendations for technical accuracy and appropriateness of corrective actions.
- Web master/editor for AFSC's new HATR summary page.
- Writing HATR articles for *Flying Safety* magazine.
- Providing and assisting in the mishap investigation process as an ATC technical expert.
- Flight Safety Officer (FSO) and Facility Management School (FMS) course instructor.
- Providing airfield operations technical expertise for the Midair Collision Avoidance (MACA) program.
- Attending MAJCOM Airfield Operations Flight (AOF) conferences.
- AFSC liaison officer to the International Air Transport Association (IATA) and the International Fed-

eration of Airline Pilots (IFALP) Association.

I am taking several steps to improve and revitalize the HATR program. So far, along with developing and maintaining a current database, I have written informational HATR articles for *Flying Safety* magazine (September and October 1998 issues) and created the AFSC HATR web site. The HATR and operations web site is located at <http://www-afsc.saia.af.mil/AFSC/RDBMS/Flight/fltops/home.html>. This site contains HATR summaries, guidance, and information links. The summary link will provide you with a sanitized snapshot of all HATRs. The guidance link contains AFI 91-202, Attachment 3. And the information link will show you proposed changes to the HATR program along with past HATR articles. If you have any questions or comments about the HATR program, please feel free to call me at DSN 263-2034 or e-mail elliottj@kafb.saia.af.mil. ✈



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