



# Surface Safety

James Williams photo

## You Can Make a Difference

**R**unway incursions are rare events, but every single one has the potential for catastrophic consequences. Some of aviation's worst disasters have been caused by runway incursions. The most notable was the collision of the two Boeing 747 aircraft on the island of Tenerife on March 27, 1977. There were 583 fatalities.

From fiscal year 2000 through fiscal year 2003 in the United States, runway incursions resulted in seven collisions at towered airports. From fiscal year 2002 through 2007, pilot deviations were the causes of 1,106 out of a total of 2,015 runway incursions, or 55 percent of the total. Pilot error is the major cause of runway incursions in the United States.

If we look at this issue in a positive way, we can see that pilots have a tremendous opportunity to reduce runway incursions. If we can prevent even one serious accident, the effort will have been worthwhile. So let's look at how you, as a pilot, can make a difference.

## Defining the Problem

Why are pilots causing 55 percent of all runway incursions? Why did the percentage climb even higher in 2008? What exactly is a runway incursion? The original FAA definition included a requirement for “loss of required separation,” defined as less than one mile. In order to standardize the definition, the International Civil Aviation Organization (ICAO) published a new definition that went into effect November 2004. The FAA transitioned to this new definition in 2007. It states that a runway incursion is:

*Any occurrence at an aerodrome [airport] involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of an aircraft.*

This change caused many of what were called surface incidents to be defined as runway incursions. The change in definition had the effect of increasing the number of incursions (see figure below).

Whatever the definition, the facts remain that accidents caused by close encounters on the airport surface have horrific consequences and pilot deviations have been the cause of more than 50 percent of them. Let’s examine a few runway incursions to see what pilots can do to prevent them.

## Short-term Memory Deficits

The number one cause of runway incursions: Pilots who enter the runway or cross the hold-short

line after acknowledging hold-short instructions. A pilot is instructed to taxi to runway 27 via taxiways C and D, hold-short of runway 33. The pilot acknowledges the hold-short instruction, but enters runway 33 and causes a landing aircraft to go around. What happened?

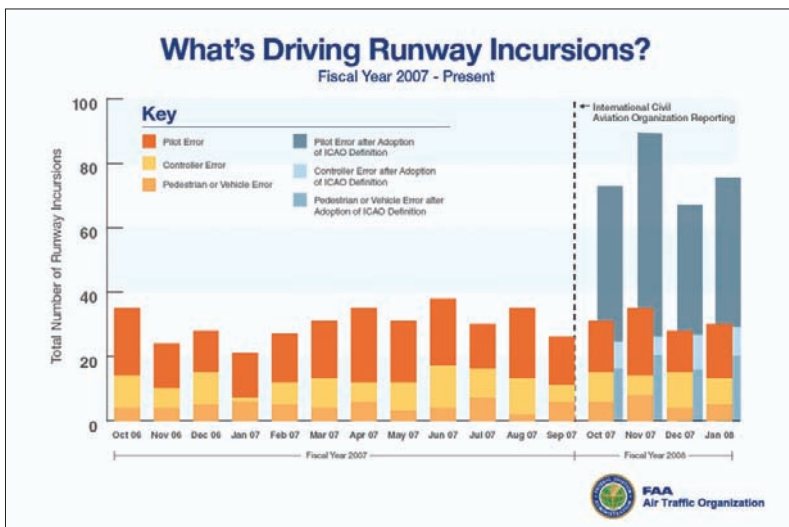
Humans are constantly picking up information from many sources. While we are processing one piece of information, other items are sent to short-term memory, which will only hold it for 10 to 20 seconds. Unless we actively rehearse it, the information will be forgotten. The end result is that the pilot in the example read back the clearance to hold short, but the information was replaced by something more pertinent to him/her at the time.

One mitigation for memory loss is to write down the taxi clearance before moving the aircraft. Another way to ensure that we stop before entering the runway is to develop the habit of hesitating when approaching any runway. Slow down and ask yourself, “Am I cleared to enter this runway?” If there is even the slightest doubt, stop and ask the controller for clarification.

## Distractions

A pilot was instructed to taxi to runway 9 via taxiways A and B. When the aircraft reached taxiway B, the pilot continued on taxiway A and ended up going out onto the active runway in front of a landing jet that had to go around. An investigation revealed that the pilot was inputting data to the GPS unit while taxiing. The pilot was distracted from the primary duty of taxiing the aircraft.

It is extremely important to pay strict attention to what is going on around us and to know exactly where you are relative to your planned taxi route. To eliminate distractions as a factor in causing a runway incursion, remember that taxiing an aircraft is a critical phase of flight. Consequently, you must avoid duties that take your attention away from this primary task. Taxiing an aircraft is not the time to hold a conversation, enter data into a navigation system, or run a checklist. Prioritize your tasks and maintain vigilance whenever you are moving on the airport surface. When performing a secondary task while trying to taxi the aircraft, you may not see the runway hold position sign or





the runway hold position marking and enter the runway safety area causing a runway incursion.

### **Disorientation**

Pilots sometimes cause runway incursions because they are unfamiliar with an airport, and/or with the signs and markings used on airports. Pilots have a responsibility to know and understand the signs and markings used at airports and to have and use a current airport taxi diagram. Many resources are available to help. Airport diagrams that show taxiways and runways are available on the FAA Runway Safety Web site ([www.faa.gov/runwaysafety](http://www.faa.gov/runwaysafety)), the Aircraft Owners and Pilots Association (AOPA) Web site, ([www.aopa.org](http://www.aopa.org)), and on the Jeppesen Approach Plates. The AOPA Runway Safety Training Program is also available on both Web sites.

Use the airport diagram when moving on the surface of an airport. If you are expecting a complex taxi clearance, write it down. It is much easier to taxi if you understand the route. If you still have questions, ask the controller for progressive taxi instructions. Controllers are ready and willing to help you.

Another example of disorientation comes from pilots who have landed on taxiways. Wide taxiways that parallel runways are particularly vulnerable to this problem because they fit the pilot's idea of what a runway should look like. Pilots under stress (and you *are* under stress if you are not sure of the runway to land on) and pilots suffering from fatigue are particularly vulnerable to this error. The pilot's focus is on the wrong thing. Pilots may believe strongly that they have made the correct decision and miss the cues that let them know the truth. Knowledge is a key in this situation. The pilot should be using the airport diagram and have knowledge of the markings used on the airport surface. Few pilots would land on a taxiway if they realized that all runway markings are white and all taxiway markings are yellow. Also, it pays to be aware that all runways have large white numbers

painted on the approach end to designate the runway direction.

### **Position and Hold**

Another area where pilots are more likely to cause a runway incursion involves the tower's instructions to "taxi into position and hold." The pilot acknowledges the instruction but forgets and takes off without a clearance thus causing a runway incursion that could have the potential for a collision. It may seem impossible, but it is easy to forget what clearance you were issued in the short time it takes to taxi onto the runway.

Remember, human memory only holds things for a very short time and you may have a lot on your mind. You are adding power, concentrating on moving the aircraft so that it is lined up on the centerline of the runway, thinking of the proper rotation speed, assessing the wind, as well as determining the heading to turn to after takeoff, the altitude to climb to before turning, the first navigation fix, and any pertinent emergency procedures. There is plenty to occupy the mind, thus it is very possible that you will not remember what the clearance was when you get into position for takeoff. To mitigate the undesirable consequences of this error, you must maintain focus on the clearance to taxi into position and hold. One way to do this is to tell yourself several times while you are moving into position that you are going to hold. Also, when able, it is a good practice to turn the landing light on when you receive the takeoff clearance. These actions will help hold the clearance in your mind.

### **Expectations and "Noise"**

Let's look at another possible runway-incursion scenario. Aircraft number one is in position on the runway awaiting takeoff clearance. Aircraft number two is holding in position on a crossing run-



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way. The tower issues a takeoff clearance to aircraft number two, but both aircraft begin their takeoff roll. This is obviously a very dangerous situation. It happened because the pilot of aircraft number one was anticipating a takeoff clearance and missed the aircraft call sign. The pilot only heard “cleared for takeoff.” This is called expectancy and is the “we hear what we want to hear and see what we want to see” syndrome. Whenever expectations are high, we are likely to make a false assumption and only hear that part of the conversation that interests us. This can happen at any time, but is more likely to happen if we are under stress (for example, we are in a hurry to go) or we are fatigued.

Another possibility is for part of a communication to be lost due to distortion or noise. Humans are very good at filling in missing information, so a pilot may assume that the takeoff clearance was for his/her aircraft. This happened at Tenerife. There was a squeal that blocked a key transmission and an opportunity was missed.

To mitigate these errors, you first must realize that they *can* happen to you. When you are in position on a runway ready to go, you must pay particular attention to radio communications so that you are absolutely positive that the clearance was for your aircraft. If there is the slightest doubt, ask the controller. Be aware, listen carefully.

### Knowing the Rules

The area of ground operations covered by Title 14 Code of Federal Regulations section 91.129(i) is confusing to many pilots. This section states:

*No person may, at any airport with an operating control tower, operate an aircraft on a runway or taxiway, or take off or land an aircraft, unless an appropriate clearance is received from ATC. A clearance to “taxi to” the takeoff runway assigned to the aircraft is not a clearance to cross that assigned take-*

*off runway, or to taxi on that runway at any point, but is a clearance to cross other runways that intersect the taxi route to that assigned takeoff runway. A clearance to “taxi to” any point other than assigned takeoff runway is clearance to cross all runways that intersect the taxi route to that point.*

Many pilots believe that if they receive a clearance to the takeoff runway or if they are told to follow an aircraft that has received a clearance to cross, they too are cleared to cross the runway. Not so! Your aircraft must be specifically cleared to cross an active runway in order to be in compliance with this provision. Remember, if you are ever in doubt, verify your clearance to cross with the controller.

### Knowing the Territory

The wrong-runway departure accident at Lexington, Kentucky, in August 2006 pointed out the importance of positively identifying the departure runway. Prior to departure, ensure that the aircraft is aligned with the correct runway. Confirm this with the magnetic heading data from the aircraft’s flight instruments—primarily the magnetic compass, since there is always a chance the heading indicator may be set incorrectly.

Surface operations require the same high level of pilot discipline as flight operations. We must always strive to maintain the highest level of airmanship. Whenever you are moving an aircraft on the surface of an airport, maintain awareness, be vigilant, think, avoid runway incursions, and remember: You *can* make a difference.

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