

**N.R. Notes on FAA Seminar, "Human Factors in Taxi Operations," presented by Kenny McDonald at 6B6 on June 10, 2009**

As most of us know, the FAA has been on an anti-runway-incursion crusade for the past several years. (*Basically, they'll hang you if you happen to do it!*). And just last week we had a fresh incident at Logan involving a US Airways plane and a contractor's truck!

It's easy enough to say (especially right now), "Just. . . . DON'T . . . .go anywhere on any airport that you shouldn't!" And indeed, you mustn't!

But there's a lot more to it (and to accident prevention in general) that we need to keep in mind. Just look at the recently-reported number [70+ (!)] airspace incursions in the DC area – how could any pilot in his right mind do that? And when it comes to runway incursions, who would want to venture out on an active runway, or wind up staring down the air-intakes of an opposite-direction monster on some taxiway?

-----

As many of you know, Kenny McDonald is a legendary instructor in these parts. Even though he is now largely retired, the FAA got *him* to do their recent presentation on runway incursions, and he did not disappoint! What follows is a (much condensed and slightly annotated) version of his talk, which was full of things that we need to hear and take to heart.

Some Background

Runway incursions (defined as any sort of mistake that puts an airplane or vehicle on a runway or taxiway where it shouldn't be) have slowly been trending down in the past few years, but the number of dangerous near-misses or actual wrecks has not been declining proportionately. It persists at the level of 5 – 8 serious incidents per year.

And now we're about to have some new stuff to get our heads around:

- + new hold-line markings (already in place at major airports);
- + crushable pavement areas that will stop you dead in your tracks if you venture out on them.
- + some new signage that needs to be interpreted correctly.
- + runway-crossing lights (yellow wig-wag blinkers now being installed in various places to try to get the attention of airline pilots generally perched up too high to really see the signage);
- + takeoff and hold release lights

---

Kenny is under no illusions that anyone is really paying proper attention to the signs and lights. He sourly observes that "Pilots just don't read signs!" To illustrate, he asked the

audience one of his favorite BFR questions, "What does the black lettering on a taxiway sign mean?" Hardly anybody knew, which didn't surprise him. (Answer: "Black is where you're at." A black "A" on a yellow ground means you're *on* taxiway "Alpha;" the reverse means you're approaching "Alpha.") He suspects that, on top of our existing shortcomings, there will no doubt be any number of spotty or clueless responses by some of us to the new things tumbling out of the pipe:

- + 91.129 is going away: we will soon *need a clearance to cross each and every runway.*
- + "Position and hold" is likewise going away: soon it will be "Line up and wait" -- thus bringing the US in line with the ICAO phraseology used by foreign buggers in the rest of the world.

But when it comes to runway incursions and all the other boneheaded things people do all the time (that we always tell ourselves of course we'd never do), he asks, "What is the *real* problem here?" Nobody in his right mind would go out on an active runway, or bust the Washington DC airspace, any more that he would cross an active missile range or step in front of a bus.

### The Real Problem

Actually, there are several problems. The biggest is that, as countless industrial accidents show, human beings are *very bad* at doing things the right way, the same way, every time, without fail. Some reasons:

- + Fatigue, sleep deprivation, boredom, coming down with something
- + Simple forgetting (includes brain-farts, "senior-moments", etc.)
- + Cockpit distractions (*Nobody* can multi-task! *Can't be done!*)
- + Preoccupation with personal or business problems. Marital conflicts.
- + Expectancy – the tendency to hear or see what you expect to hear or see, regardless of what has actually been presented to you.
- + Excessive task demand – overwhelming the ability to keep up, prioritize, remember things that still need to be checked, etc.
- + Comm screwups (setting wrong freq., wrong xmtr, stepping on the other guy, talking to the wrong place without either person realizing it)
- + Confirmation bias (tendency to say "Looks good! – not to worry!" -- comes from an intense desire to want the thing to work.
- + Pilot culture (a misguided premium on affecting a confident, professional, can-do manner, of dismissing doubts and second thoughts – a trap for the inexperienced, the unthinking, or the unwary.)
- + Lulling effects of long-continued repetition of an item has been found OK, or that has been done OK each of the thousands of times it has come up in the past – to where your unconscious mind *thinks* "Well, that's all taken care of – don't have to worry about that any more!"  
(Note: *We can't help it! We're wired to think that way!*)



[The point is illustrated by a photo of a beaver squashed flat by the butt of the tree he had just cut down.]

(N.R. comment: we are forever making the very same points about safety in the high voltage laboratory – another place where the penalties for inattention and screw-up can be high.)

Kenny's big point here is: Get too comfortable, and you're going to screw up!

### A Discussion of Errors

[See the Mental Processes diagram (next page). It shows the hierarchy of situations vs. degree of consciousness, training, responsibility.]

There are different kinds of errors: at the lowest level (skills), you can have a mere lapse or slip-up. Relatively easy to catch and correct. At the mid-level (rules) you might have a breach of the rules, i.e. a violation, and then you can have a legal argument about whether the breach occurred, or was justified or not, but the issues are still pretty clear-cut. At the highest level, though, things become more subtle. For lack of knowledge, you can have true ignorance, or make a genuine, full-fledged, flat-out mistake.

Similarly, there are

- + skill-based errors
- + decision errors
- + violations

-- all relatively simple to deal with

-- but then there are

- + perceptual errors
- + situational misperceptions
- + genuine lack of knowledge

-- that involve subtleties.

There may be latent or predisposing conditions:

- + poor procedures, poorly thought-out rules
- + bad design ("accidents waiting to happen")

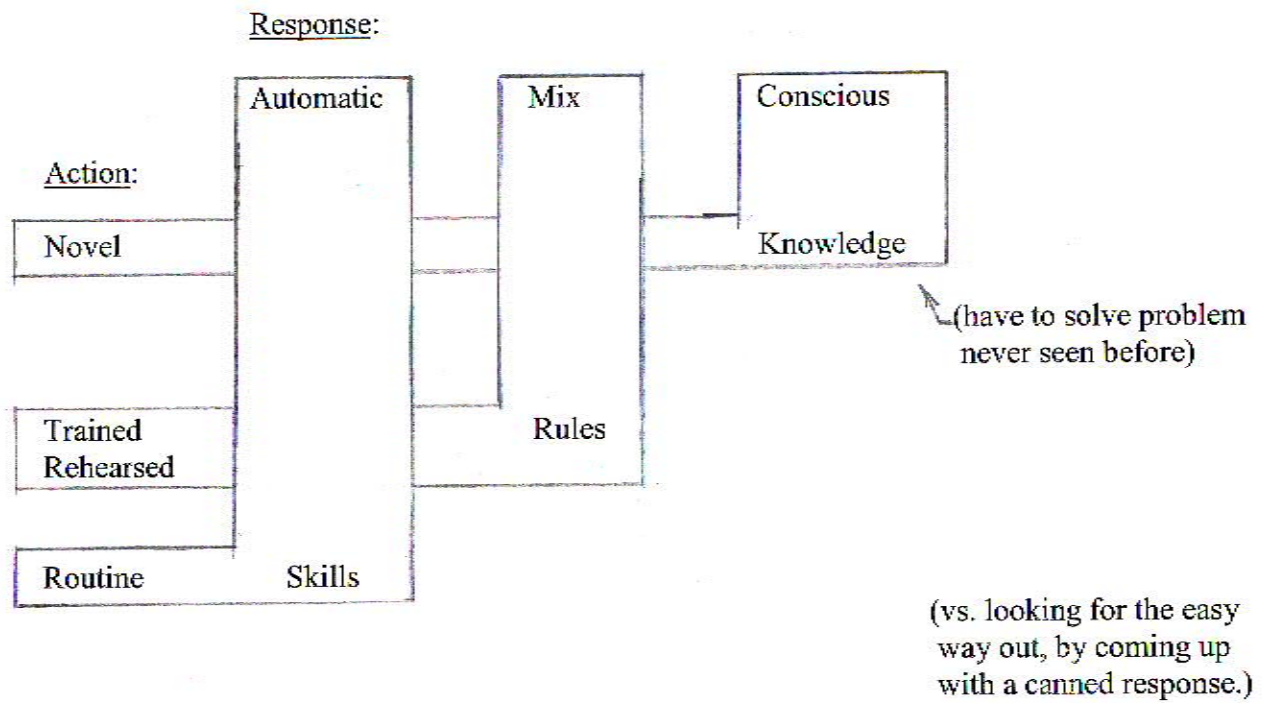
Or there might be

- + commercial pressures
- + poor organizational support, bad management
- + bad personnel selection, bad attitudes

-- and a variety of precipitating factors

- + unlikely coincidence, plain hard luck
- + bad engineering decisions taken a long time ago
- + bad decision by the pilot,
- + bad decision by line management
- + culture that allows toleration of unsafe (non-standard) acts

## MENTAL PROCESS DIAGRAM



Remember: we see only the tip of the iceberg: studies have shown there are typically 3 to 8 errors made per flight. The vast bulk of them go unreported.

For recent ones that have come to light, Kenny had examples consisting of slides, animated simulations, and actual voice-recordings – the evidence of almost-unbelievable screw-ups. In all cases, the questions become:

- + What were the mental processes that went astray?
- Why did the guy do what he did?
  - what did he see (hear); why did he think it was correct?
  - what was his state of situational awareness?
  - were there factors like fatigue or confirmation bias?
  - how much was due to boredom or the lull of routine?
  - how much due to expectancy, to “hear-back” error
  - was there a teamwork failure?

#### Kenny's Comments:

“Pilots don’t read signs!” also, “Pilots lie!” -- meaning that pilots are apt to mistake their position, to misspeak, to mis-identify even if they are where they are supposed to be, and to just assume things they shouldn’t. (They may also make self-serving, CYA statements after an event, but that’s something else.)

“You’ve got to *look, pay attention, all the time! Very difficult to do!*”

“*It’s best to assume other people ( including ATC), are out to get you!*”

“DON’T be fiddling with the GPS or doing check-list items while taxiing. DON’T indulge in idle cockpit conversation.”

[Riff on proper use of checklists – there’s a right and a wrong way]

“In a strange place, write down your taxi clearance. If you don’t understand something, ask for repeat, get confirmation.

If still in doubt, say “Unfamiliar,”ask for a “Progressive.”

“40% of incursions are due to violations = failure to follow SOP.

*Always* follow standard procedures; use standard phraseology,. If

the procedures are wrong, get them changed -- but meanwhile,

DON’T IMPROVISE. You and others may think you are

“fixing” a given situation, or that you have devised a clever work-

around, but you may have only made things worse, especially

where foreign nationals with only a shaky command of ESL might become involved.

(There’s the story of a ship’s captain in a foreign harbor who radioed, “Mayday! Mayday! We’re sinking!” Came the somewhat-annoyed, heavily-accented reply, “Yes, yes, but *you* are you sinking?”)

Then the discussion of radio technique grew to include various pet peeves, including the undisciplined behavior of locals in a number of places:



- + wrong altitude (or diving into the pattern)
- + lining up for the wrong runway
- + crazy-wide pattern followed by a cross-country final
- + entering pattern on the wrong side -- (check AIM for proper pattern procedures, inquire or check AF/D before visiting strange places).
- + improper departure (big discussion about this, since people seeking to avoid Onnecessary Mountain at Fitchburg often declare themselves to be making a "downwind departure" -- not a recognized procedure.)
- + making straight-outs, straight-ins -- not a good idea.
- + failure to look before turns, failure to be vigilant
- failure to observe right-of-way rules (or failure to yield them if that would have been the wiser course). Failure to be considerate.
- + failure to determine which is the active rwy
- + Failure to use correct CTAF freq.
- + Failure to use the radio to listen, to report position accurately, in time to be of use by others (esp. if there's mixed IFR and VFR traffic)
- + incorrect statement of position or intentions; confusion of north, south, east, west, of right and left, of distance (Remember, "Pilots lie!")
- + "Howdy!"-type conversations taking place over the radio
- + poor/confusing phraseology. If entering downwind, failure to say "left-" or "right downwind".
- + not delaying a right turn until well clear of the traffic pattern
- + confusion when two runways are both in use, or when ATC is in the midst of changing the active.

No substitute for paying attention at all times, maintaining situational awareness, doing things right, getting clarification if error is suspected. (N.R. can easily recall half a dozen occasions where a request for confirmation headed off

- being vectored toward a mountain and forgotten
- " " out to sea " "
- having a similar-call-sign aircraft copy my clearance and start a descent toward my altitude (both of us in IMC at KBDR)
- being told at intersection of 29 and 33 at ORH "Rwy 33, Cleared for takeoff," when "29" was really what Twr meant to say.
- and so on.

None of these became "deals" because they were caught in time, but whenever you have an airplane strapped to your bottom, you must remain unfailingly on the lookout for some error that could get you. It's necessary to be wary and forethoughtted -- at all times!

Nick Reinhardt  
June 23, 2009