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Educating Your Senses

Seat of the pants flying starts with the seat of your pants

If we were to ask you right now how we control an airplane, most would quickly answer that we maintain control with our brain, our eyes and our hands, in that order, which is not necessarily a wrong answer. It is, however, not the entire answer. There are other major components of airplane control that are often severely under-utilized.

The truth is that having complete command of the airplane means bringing all of our senses into play in an effort at total communication with both the airplane and the medium through which it is traveling. This means we use our vision, the tactile feeling of our hands on the controls, the sensations being created within our body by motion, our hearing, and lastly, the big kahuna: the interface where we touch the seat (if we were being crude, we'd say that interface is our butt). About the only sense that isn't used to actively control the airplane is smell, and even there, it takes only a tiny whiff of smoke for to tell us whether it's electrical or mechanical in nature and set our mind and hands into action accordingly.

The reason we refer to the posterior/upholstery interface as the "Big Kahuna" is because, in terms of importance, it ranks right behind the eyes and hands as being a source of terrifically useful aircraft control information (see the sidebar for the "also rans" in aircraft control: hearing, body sensations, etc.). Unfortunately, however, the butt may well be the most-ignored instrument in the airplane. This, even though it's always in "transmit" mode and gives us information in real time with zero instrument lag: what it feels is instantaneous transmitted and it exactly parallels what the airplane is doing at any given time.

So, if the butt is so important, why don't all training manuals have a section devoted to it? Why aren't there FAA advisory circulars titled, "Past and Present Ramifications of Yaw Indication Via Posterior Displacement Trend/Rate Interpretation?" The quick answer is, we don't know. A longer answer may be rooted in something best thought of as "old time aviating," because the pilot populace hasn't always been quite so quick to dismiss the butt-to-brain information highway.

At one time, saying, "He's flying by the seat of his pants," wasn't a clichéd insult. Its loose interpretation was that we're looking at a pilot who is controlling the airplane through a form of organic connection with the craft. It's interesting, and maybe just a little sad, to think that we've come to consider this natural way of aviating to be something bad. It probably says something about the way in which we now define the skill of flying as everything which is more standardized (a good thing) and more regimented (maybe a good thing) with an emphasis placed less on the art of flying and more on the technology (a bad thing to many). The net result is that many pilots spend entirely too much time with their heads in the cockpit reading instruments that tell them things that actually happened several seconds earlier: much of what we see on the instrument panel is historical because it happened in the windshield and to our butts first. Our bodies and our eyes already know well ahead of time what the instrument panel is about to tell us. This, of course, assumes we listen to our body, and, especially, our personal empennage.

As with so many things outside the purview of FAA certification, our butt's didn't come with a POH (Posterior Operations Handbook). Not even an owner's manual was supplied, which means that much of what we know about how it works in an aeronautical setting comes from empirical analysis and campfire tales: our aviation elders sit around in the warm sun and unknowingly pass along their own brand of intangible knowledge while engaging in the fine art of hangar-flying. And no, they don't say, "Now, listen sonny, this here is how your butt works. First, you…." The knowledge comes from inference, from the telling of the tales, as lore is passed

down through the generations. Unfortunately, there's no guarantee a new pilot is going to sit at the knee of a gray dog mentor. So, there's a high probability a pilot can go through his life never having heard the word "butt" applied to aircraft control. We're going to fix that right now.

First we want to make sure we all agree on one thing: keeping the ball in the middle is of prime importance at all times while in the air except when intentionally slipping the airplane. Just in case that isn't obvious to someone, let's run down the list of wonderful things that happen when we work at keeping the ball centered (and it's not just while turning).

On climb-out, P-factor always tries to drive the ball to the right indicating that the airplane is no longer climbing out straight but is slightly yawed. The amount and the overall effect of P-factor will vary from airplane to airplane but in 100% of the cases, letting the ball get off center ruins efficiency. Because the airplane is yawed, it is not perfectly streamlined so its drag goes up considerably. When this happens, horsepower is consumed overcoming the drag, which is another way of saying we're not climbing as fast as we should be and are wasting gas in the process.

In approach, when the power is off, the same P-factor will try to drive the ball to the left and, if this is allowed to to uncorrected, the effects will be the same as on climb-out but in reverse: because the yaw makes the airplane "dirty" it won't glide nearly as far. Also, when in gliding turns, with the ball to the inside of the turn and the nose to the outside, the airplane will take much longer to get through the turn so more time is spent in a dirty, wing-down situation and even more altitude is lost unnecessarily.

In all turns, if the adverse yaw isn't countered with rudder during the period of time that the ailerons are displaced during the roll-in and roll-out (everything is neutral while the turn is in progress) and the ball isn't centered, the drag will go up, the speed will suffer and the airplane won't be traveling nearly as precise a path as it

would be if the ball were centered. Precision in an airplane depends very much on an aerodynamically clean airplane and that, in turn, only happens with a centered ball.

So, how does the butt enter into this discussion? For one thing if you were to re-read the foregoing two paragraphs and substitute "butt" for "ball," the verbiage would have exactly the same meaning. You want to keep your butt centered for all the same reasons and the ball is doing nothing but telling you what your butt already knows. Assuming you're listening to it.

The butt talks to you because it acts as if it is sitting in a shallow "V" with equal pressure on both sides. However, as the airplane is yawed and your fanny moves sideways, the sensation you feel is as if it is being forced to move up one side of the "V." You feel more pressure on one side than you do on the other and the heavy pressure is on the same side as the ball. So, just as you step on the ball to center it, you also step on your butt (the heavy side) to center it. The sensations associated with yaw are felt ALL of the time in ALL aircraft, but in some aircraft they are difficult to detect. For that reason, a little butt-training is called for.

The next time you're saddled up in your trusty aero-steed with a safety pilot (you'll see why a safety pilot in a minute) let's try a few butt-awareness and training exercises. While doing this we're going to have three points of reference: the nose (better yet, a point on the nose, like a screw or hinge line), the ball and your butt. While flying straight ahead, let's establish a baseline for our posterior sensations and step on just a little rudder (small pressure, we're not killing ants here) with no aileron intentionally causing an uncoordinated yaw. When doing this, look at the nose, then the ball, all the while having one corner of your mind focused on exactly what it is that your tusche is feeling: there will be a slight sensation that you're moving sideways across the seat and the cheek that's downstream of the movement will be decidedly "heavier" than the other.

Now, let's induce the same feeling with just the ailerons: look at the nose, the ball and feel your butt while cranking in a significant amount of aileron with no rudder. As the aileron goes in, you'll see the ball slide out in the direction you're moving the aileron. At the same time, you'll feel your butt trying to move across the seat in the direction you're moving the ailerons. Left aileron, left butt movement, etc.

Repeat the above a few times, moving the controls in a deliberate, uncoordinated fashion and all the time keeping track of how the ball and your butt are reacting. What we're doing is using the ball to calibrate your butt so you know, what the ball is doing without looking.

Now, close your eyes and do the same thing (hence the safety pilot). With all other sensory inputs taken away, you can better concentrate on what your butt is actually feeling. Let your safety pilot fly the airplane from turn to turn, nose up and nose down, WITHOUT USING THE RUDDERS. You'll be given control of the rudders and you'll only know what to do based on what your butt is telling you. So, when you feel your butt slide to the left, you put in a little left rudder pressure. In that situation, most pilots fly more coordinated than they do with their eyes open.

The goal of all the foregoing is to develop an innate feeling of when the airplane is yawing by developing an inbred awareness of what our body is telling us at all times.

The benefits associated with actually flying by the seat of your pants is that eventually you won't have to look at the ball to know something isn't right. This is a critical addition to your flying skills because it will eliminate half of the cause of stall spin accidents: if , when it's stalled, the airplane isn't yawed, it won't spin and make the out-of-control situation even more out-of-control.

As part of this body-awareness training, you should also become generally more aware of the nose, which will eliminate the other half of the stall/spin scenario: the

loss of airspeed. The nose tells you when it is yawing because it's not tracking in the direction it should be tracking, as indicated by your butt (and the ball) being off center. However, the same awareness of the nose that throws up a red flag in yaw, should do the same when the attitude (up and down) of the nose begins to change in an undesirable direction. It's all part of being aware of what the airplane is telling your body before it every shows up on the instrument panel.

Our body is talking. All we have to do is listen.

SIDEBAR: The other senses in action.

Here's a little exercise that will show us how much information our ears are giving us that is generally ignored: get a safety pilot to fly along with you. Let him fly the airplane and set it up in landing configuration: power off, flaps down. Now, have him/her set it up in a glide at POH approach speed while you close your eyes. Listen to the noises around you for a few seconds while setting an audio datum for what the airplane sounds like at the correct speed. Without telling you what he is doing, the safety pilot should relax a little back pressure and let the airplane start to speed up. Listen carefully to the wind noise. Almost as soon as the nose goes down, you'll hear that wind noise change tone. You won't have to be told what is happening. You'll understand it intuitively. Now, he should bring the nose up just a little with your eyes still closed. See how it changes tone again? Do that several times until you really start to hear the sounds. Then open your eyes and do the same thing again watching the airspeed at the same time. Notice how the air noise changes well in advance of any effect on the airspeed.

The airplane is continually telling us when it's changing speed, if we know what to listen for.

The eyes closed thing will also work for emphasizing the way your body feels in certain situations. For instance, when in a glide, have your safety pilot let the nose

down and see how you can sense the momentary sensation of losing altitude. It's subtle, but it's there.