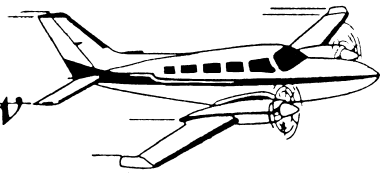
FEDERAL AVIATION ADMINISTRATION
AVIATION SAFETY PROGRAM

Arizona Airman
Aviation Safety Review



WP07FS23 **March, 2002**

"The Wheels Take Over Only When The Wings Quit Flying"

By: Mike Halloran
Safety Program Manager

Do you remember riding a tricycle when you were a kid? I do. I remember pedaling as fast as I could, then whipping around the corner of the sidewalk to shoot up the driveway. Plenty of fun, but early in the game I noticed that this thing had an unstable tendency to it causing me to fall off toward the outside of the turn, (motorcyclists call it "high-siding"). At the time I shrugged it off accepting it as just another anomaly thrown into the fun factor. But, later on I learned from it when I started to fly.

As a child of aviation, I found out that toy tricycles and airplanes shared the same characteristics as they drove on the ground. Both are great for going in a straight line, but are far less than sports cars in the turns. I also learned that planes, inherently, do only one thing well in this realm. Either they're good ground vehicles going straight or good flying machines, (This I'd proven to myself testing the envelope of my trainer). So when the term "flying it onto the runway" is mentioned in hangar talk, I quietly wince a little thinking that the wings haven't yet quit flying allowing for the wheels to take over. Also, if those wheels are not precisely aligned with the direction of flight – hang on, this ride could get exciting!

When a plane flies it carries with it two types of energy: Kinetic – airspeed, and Potential- altitude, for which both are interchangeable. Potential to kinetic, dive to get more airspeed. Kinetic to potential, pull back on the yoke to go up and lose airspeed, (I'm leaving out power because we're focusing on landing). In a perfect touchdown, scenario the balance of these two energies are at a minimum. There should be just enough kinetic energy to keep the plane flying (airspeed at Vmca), and no more potential energy (altitude). The wheels kiss the pavement and normal braking can occur.

So, what happens if potential and kinetic are out of harmony on landing? Well, if you run out of airspeed before you run out of altitude (flare too high), Bang! The bottom drops out and you "fall" those last few feet, testing the limits of aluminum and spring steel. If you run out of altitude before you run out of airspeed (flying it onto the ground), you're landing too fast. Aside from the instability that we talked about earlier, all that energy needs to dissipate somewhere, and usually does, causing extra wear and tear on brakes and other aircraft components. Incidentally, landing with too much energy is considered dangerous. Kinetic energy increases with the square of the velocity. So, at 50 kts that energy is 36% greater than at 42 kts, and 42% greater than at 38kts. So, to recap, what you are trying to do is dissipate all of the energy that the airplane is carrying (kinetic and potential) from flare, touchdown and rollout. "But, where does this process start?" you might ask. Well, I'm glad you did.

Almost all general aviation aircraft come from the factory with approach speeds listed in the manual. These vary a bit based on aircraft configuration and weight, but not by much (in the absence of a listed speed 1.3Vso is recommended). Here's something to think about concerning an approach speed. It's the speed at which, when the airplane enters the flare with no power, will cause a predictable touchdown with constant smooth increasing back pressure applied on the elevator.

Try this the next time you practice. Begin the flare when the aircraft starts to enter ground effect (a wingspans worth) at the minimum approach speed listed for your aircraft. When you are in level flight a few inches from the runway concentrate on *preventing* the plane from landing. Hold it off until the plane cannot fly any more. If you hear the stall warning horn sounding just before touchdown - good, that's what you want. Practice this and you'll soon get to know the exact distance between your aiming point (the spot at which the approach path intersects the ground with no flare) and the actual touchdown spot.

Now that we've discussed proper speed control on landings, I want cover that "tricycle" thing I was talking about in the opening paragraph. In this area of operation, almost all Practical Test Standards state "…and airplane's longitudinal axis aligned with the runway centerline," for good reason. If the aircraft's ground track is *not* parallel with the line that runs from the nose to the tail, the plane will want to high-side and throw the outside wing toward the ground (the greater the angle difference, the larger the effect). This even includes crosswind touchdowns. You can crab that plane as much as you want to maintain the runway centerline on a x-wind final, but, you'd better have the longitudinal axis parallel with the runway on touchdown.

Obviously, serious turbulence and rare weather phenomenon may require *slightly* higher touchdown speeds and different technique, but for the majority of the time, keeping a proper approach speed and longitudinal alignment when you practice will only enhance your landings. Now, if I can only remember where I left my tricycle….

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Aviation Safety Seminars

Know of a meeting that could be turned into a "Wings" qualifying program? Contact this office at least three months in advance so that the proper arrangements can be made and we'll advertise it here?

The Arizona area seminar and special event schedule for March is as follows: These are *WINGS* qualifying.

Tuesday, March 5th, 2002, 7:00pm

Subject: National and local airspace issues.
Where: Ballroom, Student Union Building, Williams Gateway Airport.
Presented by: University of North Dakota, Williams Gateway Tower.
Sponsored by: FAA Aviation Safety Program.
Contact: Everett Sharp: 480-988-9261 or sharp@aero.und.edu

What's Inside this Issue

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&
Aviation Safety Seminar Notices

March 7th. & 8th, 2002, 7:00am – 4:00pm

Subject: "Greater Southwest Maintenance Symposium."
Where: Building #1, (Gilbert Chandler Community College Bldg.)
Williams Gateway Airport, Mesa, AZ.
Presentations by various organizations relating to aircraft airworthiness and operational aspects flying.
Sponsored by: The Scottsdale FSDO.

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