Highlights and Margin Notes in
Wolfgang Langewieshe's

Stick and Rudder: An Explanation of the Art of Flying
Chapter 16 Notes

Perhaps my notes and observations will inspire you to buy your own copy and learn from this classic…or to take the copy you already own off the shelf and revisit its great lessons, just as I am doing again now.

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Continuing my notes on Wolfgang Langewiesche's essential classic, ***Stick and Rudder***:

Part V: Getting Down

Chapter 16: "The Landing"

Page No.	Highlighted Text (Langewiesche's words)	My margin notes
287	It is sometimes said that the landing maneuver is a stall, brought on a foot or so above the ground. This may be so, but it is not necessarily always so…. Stalling is not the essence of the maneuver; the essential part if the slowness… the slowest forward speed at which the ship…is aerodynamically capable of flying.	It is, but it isn't, but it is? Is L trying to describe a wheel landing?
288	The landing run of an airplane increases "as the square of the speed"	
290	A bounce…an involuntary take-off…the force that actually lifts the airplane away from the ground is not the ground impact, but the action of the air upon the wings as they suddenly assume a much higher angle of attack.	Hence, by definition a bounce is a result of excess speed, or else the increased angle of attack would stall the wing instead of increasing lift.
293	The pavement does not develop enough friction [to overcome AoA]…. The typical student bounce is caused mainly by the delayed reaction of the student, his jerking the stick all the way back after ground contact has been made. Moral: Don't.	Why airplanes are easier to land on grass: more friction.
294	If you bounce, concentrate your attention on the *attitude* of the airplane. Do with your stick whatever is necessary to put the airplane into a three-point attitude, do with the stick whatever is necessary to hold it there.	Or the landing attitude, in a nosewheel airplane.
296	Depth perception of the direct kind is reliable only through quite short distance; beyond 100 feet or so it fades out entirely. If you do perceive depth beyond those distances, you do so by different means—all indirect…. Even a one-eyed man…can easily learn how to judge a landing.	
298	One of the main differences between lightly and heavily wing-loaded airplanes. In an ordinary trainer, if you want to be flared out and floating level at, say, 2 feet, you may want to begin the flaring out at, say, 20 feet. If you were making the same type of approach and landing in a ship of four times the wing loading—say a transport—you would have to start the flare-out at 80 feet!	
	In a landing, the altitudes to be judged are very small, but the clues are the same. There is the horizon. Where does is cut across things?	Again, look toward the end of the runway
300	[A] "floating" landing; your task…is to neither gain or lose altitude.	Judging the flare
	Perspective shift: the thing to watch perspective for is in	"hold it off"

	this case not indications of how high or low you are, but *indications of whether you are rising or sinking.*	
302	The stall-down landing is essentially the same…but with this difference…. The "stall-down" landing requires that you blend the approach glide, the flare-out, and the slowing-up of the airplane all into one maneuver so that, when you arrive at ground level, you arrive in the three-point attitude, all slowed up and ready to squat.	Or landing attitude, in nosewheel airplanes. The "round-out."
304	The clue to watch is the intended landing spot and the scenery beyond it and to the sides of it.	
	What makes the stall-down landing more difficult than the floating kind is that you might run out of stick travel before you are all the way down; that is, that you might get a complete stall 10 or 15 feet in the air.	And a hard landing
	When you arrive at the ground, there should be just a last couple of inches of stick travel (and hence, a last bit of reserve lift).	
	The advantage of the stall-down landing is that it is more accurate; in a floating landing it is harder to predict just how far the float will carry you….	
	The more heavily loaded the airplane is [the more advantageous] the wheel landing, made at high speed.	NOT for crosswinds, but helpful for judging the flare in a heavy or high wing loaded airplane
307	The first thing a ship needs [for a wheel landing] is speed—excess speed beyond stalling speed…. It gives positive control…. It does not fly so nose-high….	
	The second thing a ship needs is a slight shove or forward pressure on the stick, applied at the exact moment when the ground impact effect wants to nose it up.	
308	In a "wheel" landing, the airplane is in fast forward motion—rolling on the ground at approximately take-off speed! And in that condition, you probably couldn't nose over even if you rammed the stick all the way forward!	As long as you don't use brakes!
	There is no reason then not to put a distinct forward pressure on the stick and force the ship onto a slightly nose-down attitude in which its wings can develop no lift or actually develop downward (negative) lift, and bouncing becomes physically impossible.	Because of zero or negative angle of attack
	Nor is there any reason not to get on the brakes quite heavily.	I suspect this was true with relatively weak brakes then, not so much now. I notice no mention of crosswinds in the wheel landing discussion at all. It's all about compensating for our ability to judge the flare at higher speeds and/or wing loadings.
309	Conventional landing gear is really all wrong…the landing gear is unstable. So-called "tricycle" landing gear is sometimes also called the "stable" landing gear.	
310	With the level landing gear, the ground contact slaps the airplane's nose down and slaps its tail up. This lowers the airplane's angle of attack. Its wings spill their lift; it becomes heavy and hugs the ground.	Yet we still bounce landings in trikes!
	The pilot need not know where the ground is but can simply keep flying until his landing gear takes over…"level landing" undercarriage…makes it possible to build airplanes that are unstallable and hence nonspinnable and very safe.	Well, maybe.
	On an airplane that need not be stalled for the landing, it becomes possible to restrict the backward travel of the stick so severely that the pilot simply cannot achieve stalling speed or stalling Angle of Attack.	Ercoupe, but that was a dead-end
311	And even that is not all! Once the airplane can be rendered unstallable (which can be done if it has a level-landing undercarriage) it no longer needs a rudder!	Well, maybe.

Secure your own copy of *Stick and Rudder* and make your own notes and observations. Beyond

simply reading its words, analyze, criticize, mark up and understand Langewiesche's teachings to, as Adler suggests, **make this book your own**.

I look forward to your comments on these notes and the larger work. Please send your thoughts to me at mastery.flight.training@cox.net. Thank you.

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