



Highlights and Margin Notes in
Wolfgang Langewieshe's

Stick and Rudder: An Explanation of the Art of Flying
Chapter 6 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 Langewieshe's essential classic, ***Stick and Rudder***.

Part II: SOME AIR SENSE

Chapter 6: "Wind Drift"

Page No.	Highlighted Text (Langewiesche's words)	My margin notes
87	Whatever wind there is...has its effect on your every single minute of flight.	
88	Wind has no effect on the throttle setting or on power required for flight.	Not <i>required</i> , but sometimes <i>desired</i> . You might want a higher power setting into the wind to improve ground speed; you might recue power with a tailwind to get the same ground speed with less fuel burn.
	There isn't any tendency for the ship to weathercock [in a crosswind], any attempt to "counteract drift" by holding ruder is unnecessary, illogical, futile and even dangerous!	Maintain coordinated flight within the air mass. The only time you need uncoordinated flight is when you are attempting to fight against the air mass in order to fly to a specific target on the ground.
88-89	Any ship, regardless of size, weight or power, is fully subject to the effects of even the slightest wind.	What works in larger airplanes doesn't always work in smaller ones, but what works in smaller airplanes always applies to larger ones.
89	To be a pilot, wind effects must seem right.... Chew on the problem until they do.	
	The whole thing hinges on three key ideas. The first key idea: Air is a soup.	
90	Wind is...simply the fact that the air fluid is in flow.	
	The second key idea: Motion is relative	
92	The third key idea: You're <i>in</i> the air	
	The airplane has motion <i>through</i> the air. It [also] has motion <i>with</i> the air, called <i>drift</i> .	
	Motion through the air...is what makes the air strike [the airplane's] wing and produce lift...stability and control and...registers on the airspeed indicator.	
94	This motion <i>through</i> the air is in no way affected by the fact that the air itself is in motion.	
	The airplane cannot "feel" any difference between down-wind flight and up-wind flight and cross-wind flight. It feels the same; the engine has to pull no harder; the air-speed indicator indicates the same; the lift is the same.	There is no "upwind turn" hazard.
	The wind does not have any effect on speed, lift, stability and control: an airplane, once in flight, cannot "feel" the wind.	
	Regardless of what maneuvers the airplane executes within the mass of air that surrounds it, it helplessly participates in the motion of that air mass; it "drifts" with	

	the wind.	
	Beware of thinking that the airplane drifts because the wind is blowing against it.... The wind can't blow against the airplane...; [the airplane] yields without any resistance; it moves <i>with</i> the air.	"Crosswind" is a misnomer. It is "drift" within the air mass.
96	The path that the airplane takes over the ground is always compounded of those two separate types of motion: its motion <i>through</i> the air and its motion <i>with</i> the air.	
	The eye, which cannot see the air but can judge only by reference to the ground, simply records the compound of the two—the resulting motion of the airplane relative to the ground.	
98	[in] straight cross-wind flight...by using left rudder [the pilot] will merely yaw the airplane over to the left.... Holding rudder in this attempt to "counteract the drift" he would turn the airplane completely off its intended heading."	
100	Because he notices that his rudder veers him off, the student is likely to hold right aileron against his left rudder, flying with his right wing low. Thus the two controls cancel each other, and the only result is that the airplane is forced to fly inefficiently, in a continual slight sideslip; and the eastward sliding of the airplane still continues.	And airspeed drops because of the sideslip flight.
102	"allowing for drift" is a speculation; you head the airplane around by guess, and then you wait a while, watch [the airplane's] track over the ground, and see whether it goes where you intend to go. If it does not you make a new correction....	
	This [correction] turn is a normal turn.... Beware of making these corrections by just kicking rudder.	Maintain coordination
	Flight <i>through</i> the air is then again perfectly straight; there is then no need for any rudder....to counteract drift.	
	Coming in down-wind...the ship is fast, gliding through the air....the ships speed [is] relative to the ground.	Groundspeed is visually apparent. Airspeed is apparent only through instrumentations.
104	[Visually a pilot thinks] "I guess I had better slow this thing up a little." He is quite wrong. What keeps [the airplane] from stalling is speed <i>through</i> the air.	
	Visual impressions tend to override all other perceptions.	The pilot must have complete understanding of ground speed vs. airspeed to overcome visual perception.
	A training maneuver sometimes called the <i>wind-drift eight</i> . Over some conspicuous object on the ground...go into a turn.... Hold this turn for 360 degrees...holding the bank carefully constant.	
105	...thus describe an exact circle <i>through</i> the air [but] the path described over the ground is not a circle but it looks more like a figure six.	
	If you can understand this maneuver you understand the whole problem of drift in turns.	
	You come back to the same spot of air that you flew through when you started the maneuver; perhaps you come back so accurately that you feel your own wing wash and slipstream still swirling there from your previous passage through that air spot. But that spot of air has itself meanwhile moved on a couple of hundred feet.	
	If the pilot did not watch the ground, he would not notice any wind effects and would not get mixed up.	Conversely, "turns around a point" requires the pilot to assess drift and control.
	If [the pilot] notices how this path [across the ground] is being pulled out of shape, and involuntarily he tries to keep it in shape, maybe by shallowing and steepening his bank, maybe by "holding rudder against the drift..." he will tend to skid as he turns from up-wind to down-wind and to slip while he turns from down-wind to up-wind.... He must learn simply to relax, let the drift effects take place....	And yet, in the pattern the pilot must learn to recognize and compensate for drift.

106	A pilot must judge things less by eye and more by his other senses	
	If there is a wind, you cannot fly a perfectly circular track over the ground by flying a perfectly circular path through the air.	
	If you want a circular ground path, you must distort your air path.	Ground reference maneuvers
107	Why are we required to do spins, chandelles and so on up-wind? Doing them up-wind keeps students from getting lost while concentrating on this maneuver.... If you do them up-wind, then the air itself will at the same time drift backward, and you with it; you will stay fairly well in one position relative to the ground....	
108	The pilot may be able to maintain his intended ground speed, despite the headwind, by opening the throttle more, retrimming the ship for lower angle of attack and flying faster. But that would not evade the wind effect.	
	While the fast ship drifts just as helplessly as the slow ship, the drift is proportionately less important to the fast ship; the drift <i>angle</i> is smaller. This is one reason why a fast ship is much easier to navigate.	
109	The air may be rough, but it still makes no difference whether you fly up-wind, cross-wind or down-wind.	
	Near the ground, wind velocity varies rapidly with altitude.	
	The time when the air shoves the airplane is right at the take-off. Right after you break ground, you can feel for a couple of seconds actually feel the sideways shoving of the air.... By the time the airplane has yielded to this force, and from then on it is true that an airplane cannot feel the wind.	Rudder to correct for propeller effects <i>plus or minus</i> that needed for wind correction for takeoff, but then only that rudder necessary to counter propeller effects in climb.

I'll add chapter highlights and notes until we reach the end of the book. If you're impatient—and I hope you are—you won't wait for my musings, but instead will secure your own copy of *Stick and Rudder* now. Beyond simply reading its words, you'll truly 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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