

ON ZERO-ZERO TAKEOFFS

BY

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According to a wise old saying, takeoffs are optional, but landings are mandatory. In the dawn of aviation, getting off the ground in the first place was no mean feat. Then, staying up there provided quite a challenge, followed by an inevitable return to earth that often took care of itself, sometimes with disastrous results.

In my years of flying and instructing, I don't think I've encountered a harder skill to master than landing. But taking off is fairly simple. In fact, my normal practice is to let my students make their own takeoffs, starting with about the third flying lesson.

Taking off is one of the simpler processes we pilots have to learn, especially if things are going well. If the winds are not too gusty or cross; if the runway is adequate, and if nothing unexpected happens to the engine, taking off is pretty much a matter of using the feet to keep the machine pointed down the runway until it gains some speed, then letting it do what it was designed to do.

Taking off when you can't see is probably not one of the world's safest practices, but it is not technically challenging to a pilot who knows a little bit about scanning. The rules say nothing about minimum ceilings or visibilities for takeoffs for flights operating under Part 91, so we all assume that zero-zero

takeoffs are legal, if you don't get too fussy about careless and reckless operation. I teach my instrument students to do them, even though it is not part of a standard curriculum, and it is not one of the maneuvers that are tested on the instrument airplane practical test. And, of course, it's not a maneuver a prudent pilot undertakes lightly.

There are three reasons why I teach ITOs. First, it seems to me that a competent instrument pilot ought to have a nodding acquaintance with any maneuver he's legally entitled to perform. Second, it's kind of a neat thing to know you can do, provided that it's simulated with a competent instructor-type supervisor standing by in the right seat in case you're about to take out some runway lights. And third, I have had two occasions when I started a takeoff run with plenty of visibility, then found myself abruptly on the ground, on instruments, and going fast enough so that I judged it was safer to get off the ground before I hit something, rather than trying to bring the bird to a halt when I couldn't see where I was going.

The first time it happened to me, I was going around 30 or 40 knots when a sudden rain shower engulfed the entire scene, instantly reducing visibility to zero. The second such surprise occurred when I got an Aztec going down the runway while my copilot fiddled with the heater, trying to get us some warm air in the cabin. He must have done something right, since a gush of warm air suddenly engulfed us, completely fogging up all the windows, putting us in zero-visibility conditions just a little before liftoff speed came up on our airspeed indicator.

So here's what you do. Let's assume that you're flying a little piston-powered airplane that doesn't have artificial vision

or other fancy infrared T.V. pictures of what's out in front. Let's also assume that you've found a way to get to the runway. If the visibility is so bad that that's going to be a problem, I don't think you ought to be doing this. And let me repeat: I don't think this is at all a smart thing to do anyway, in actual real life.

But let's assume that you can see about two runway stripes down the runway, giving you enough visibility to grope your way to the hold short line. Do a *careful* runup. You are about to do something that doesn't give you any outs, if anything goes wrong.

Taxi onto the runway and line up with the centerline. Let the airplane roll forward until the nosewheel is aligned, then put on the brakes and stop. (I *really* hope you're not thinking of doing this in a tailwheel airplane, unless you are some kind of mystic medium channeling Jimmy Doolittle's spirit.)

Now, bring the power up to runup RPM, or at least enough power to get your suction gauge up into the green. You are now giving the system enough vacuum to bring all the gyros up to operating speed. If the suction gauge is giving you anything abnormal at this time, like fluctuations or abnormally high or low readings, I'd advise you to rethink this project.

Okay, so everything is stable and normal. All systems are up and running – all gauges are in the green. Now set the heading indicator to something that's easy to read. My old boss told us to set it to the precise runway bearing, which I think was 356° . This was the bearing we were supposed to maintain during the takeoff.

The more I thought about doing that, the less I agreed with it. It seems to me that if you're going to depart on runway 36, you should set the thing to zero degrees. We all know that the number 36 is precise only to within \pm 5 degrees, but it seems to me that the zero on the heading indicator is a lot easier to hold than is 356° . Or just set zero on the thing, regardless of the runway bearing. The point is to average out this reading on the directional gyro until you're in the air and established in a solid climb. There'll be plenty of time to reset the gyro compass, provided that you survive the takeoff. And if you don't, what difference will it make?

So now all the chicken guts and tea leaves are favorable for normal operation, you've aligned the nosewheel with the direction in which you wish to take off, and you've got the gyros spinning nice and fast. Your life insurance is paid up. Now release the brakes and smoothly add the rest of the power. *Watch your heading indicator.* At this time, you're going to want to *average out* the reading on that instrument. That means that, if the airplane zigs two degrees left of your target heading for three seconds, you should make it zag two degrees right for another three seconds, or a little less, since you are accelerating.

It is to be hoped that your time on the ground won't be very long. A typical Cessna 172 probably takes something less than fifteen seconds to get the airspeed up to rotation speed. Now switch over to the attitude indicator and start cross-checking. Pull the nose up into about a 3-bar high attitude – high enough to give you a nice clean liftoff and initial climb, without risking a stall, right off the deck. If you don't know what this pitch attitude looks like on instruments, you probably shouldn't have started this instrument takeoff in the first place.

But it's way too late to give it up, at this point. You're pretty much committed to flying from the time you get the power up to 100%, since you're not going to be able to see enough to keep yourself on the runway during an abort.

By and by you'll feel the airplane lift off the runway and the rate-of-climb will give you a nice upward indication. This is not a good time to answer your cellphone. Get a good scan going and make sure that, no matter how much the seat of your pants is telling you that the nose is pitching up, you do exactly what the attitude indicator and rate-of-climb tell you to do. You might want to keep the wings absolutely level as well.

If you have gotten the right pitch attitude, you should soon be climbing strongly, somewhere around your V_y speed. Stay strictly on the gauges until you get up to about a thousand feet above the runway, trimming out any extraneous elevator pressure. Don't look down to find the trim wheel. Do it by feel. Better yet, do it with the little thumb thing that activates the electric trim. You do have electric trim, don't you? There is little room for error here. If somebody calls you on the radio, ignore it for the moment and make sure everything's totally under control.

Somewhere around five hundred feet would probably be a good time to engage the autopilot. Let it do the flying and monitor things closely to make certain that your HAL 9000 has things well in hand. Then you can start tending to the petty concerns of departure control.

I've heard people say they'd tune up the ILS for the departure airport in case something goes wrong and they need to get back down. Well, good luck with that. Landing in zero-zero

conditions is the subject of another essay, but I'd suggest that a better option is a thorough weather briefing, a knowledge of the big picture and a direction in which to fly, in case you need to find yourself a takeoff alternate that has some visibility.

For the record, I have adopted a personal minimum of 1000 foot cloud bases and 3 miles visibility when I go flying. You may be saying, "What's the point of having an instrument rating, if you're going to limit yourself to that kind of stuff?" The answer is that I do most of my flying in single-engine piston airplanes, the kinds of machines that are very reliable, but that have little redundancy built in. There are lots of reasons I might want to get down before I get where I'm going, including equipment malfunctions and passengers getting sick or needing a bathroom urgently. For this reason, I simply make it a policy to bring the briefing to a screeching halt if the weather man says we're going to have less than 1000/3 during departure, enroute, or arrival segments of the trip.

Knowledge of how to do a zero/zero takeoff is like packing your favorite pistol when you go to church. It's something some people judge a prudent thing to have, but you *really* hope you're not ever going to have to use it.