What the Examiner Sees: IFR Errors

by Larry Bothe, 12/26/2013

In earlier *Examiner Sees* columns I have confined myself to writing about the things I observe when conducting Private Pilot checkrides. I have maintained this rather narrow focus because there are way more Private checkrides performed than any other test. Discussing them makes the column appeal to the widest possible audience within the flight instructor community. However, in recent times I have been asked to consider the Instrument-Airplane checkride, write about it, and perhaps create a Power Point presentation for live audiences or webinars. I don't have enough material to create a series of IFR checkride articles, but I believe I can write one IFR checkride article that will be helpful. Here goes.

The IFR error I see most often is the failure to descend at the proper time. I have found in my own personal IFR flying that when performing an instrument approach the best plan is to descend to the lowest possible altitude at the earliest possible time. *Earliest* usually means "when established" and *lowest* is whatever altitude is published on the chart for that segment of the approach.

Failure to descend is caused by two different errors. The first one is simply missing the fact that a lower altitude is available. That altitude is usually the one published for the intermediate segment of the approach. It comes into play when being vectored to final, or when intercepting final at the completion of the procedure turn (course reversal). The applicant just intercepts final and maintains either the last assigned altitude or the procedure turn altitude, and maintains that altitude all the way to the final approach fix. That of course really screws them up because they can't get down to the MDA before they time out and/or reach the airport. In the real world that results in a missed approach and the opportunity to go do the approach again. When it happens during a checkride the applicant often becomes confused and keeps descending after time is up, resulting in a bust.

The way to avoid missing the availability of a lower altitude is to do the six T's every time you cross a fix or intercept a course. Let's see: Turn, Time, Twist, Throttle, Talk, Track. When you get to Throttle, that's the reminder to change either altitude and/or speed. You descend to the

lower altitude, and perhaps slow to approach speed upon leveling off. The key thing here is to do the six T's at intercepts as well as fixes.

The flip side of the descent error is when the applicant knows there is a lower altitude available but doesn't know when to initiate the descent. The problem centers on the word "established". The controller is giving you vectors and tells you to maintain X-thousand feet until *established* on the final approach course; or, upon intercepting final out of the procedure turn you can descend to the intermediate altitude when you get *established* inbound. But at what point are you "established"? When I learned instrument flight back in the mid-seventies I was taught that I could descend as soon as the needle came alive (off the peg at full-scale). However, navigation receivers will sometimes cause their CDI display needle to begin to quiver some distance from the desired course, and then maybe fall back to the full-scale deflection again for quite a while before becoming truly alive. In order to prevent the overly anxious IFR pilot from initiating a descent (unsafely) at the first misleading movement of the needle the guidance was later changed to the needle being at half scale (2.5 dots) from the center before the airplane is considered to be established on the course. Some applicants believe the needle has to be *centered* on the final approach course before they are officially "established" and can therefore descend. If, say because of a strong crosswind, they take a long time to get the needle centered they will be at or near the final approach fix at way too high an altitude. As instructors we must tell our students to do the 6 T's at every fix or intercept, and that they have intercepted (become established on) the new course when the CDI needle reaches half scale. That way the applicant can descend while making the final correction to get exactly on course (needle centered). Then they will cross the final approach fix at the correct altitude and be able to further descend to the MDA with time to spare, as it should be.

Beyond the major descent error there are several small errors that, while not terrible taken alone and promptly corrected, can become a real problem if they pile up and snowball. Single-pilot IFR, especially without an autopilot, is about the toughest job there is in aviation. Every effort must be made to minimize and spread our workload so it doesn't get the best of us. Many of the errors discussed below have to do with managing workload.

It is very important to set all the radios up to the best advantage before launching into the soup. Once you're airborne and calling Departure you won't have time to fool around with radios. In order to do a thorough job of radio set-up you have to consider each radio individually and ask yourself if it is tuned in the most advantageous way, both sides (NAV & COM). It doesn't matter whether you do communications or navigation first, but I do all of one before proceeding to the other. I'm less likely to make an error if I stay focused on one category at a time. Most radio packages these days will deal with 4 frequencies at once. Use as many as you can so that when it becomes necessary to change frequencies you can do it with one or two

button pushes; no tuning necessary. Here's an example for a departure from my home airport, Seymour, Indiana. I need to announce my departure on Unicom, so 122.8 goes in COM 1, Active. After takeoff I'll need to contact Departure, which in Seymour is Indy Center, so 124.77 goes in COM 1, Standby. If we're going to Shelbyville and Columbus (Indiana) to practice approaches I know I'll need Indy Approach next so 124.95 goes in COM 2, Active. Next will be Columbus Tower so I put 118.6 in COM 2, Standby. Unicom at Shelbyville is also 122.8, which I already have available.

The same thought process can be applied to navigation frequencies, but with a different twist (pun intended). If we're going to do the VOR approach into Shelbyville I can file direct Shelbyville VOR and put that frequency in #1 NAV, Active. The Columbus ILS frequency goes in NAV 1 Standby. Since I don't need any other NAV frequencies I can put the same ones in the #2 NAV as a backup to #1. If I thought it through correctly I can do the whole flight without actually having to tune a radio. That is a huge workload saver. If it's a long flight that will obviously require multiple frequency changes I do whatever tuning I can during the quiet cruising phase. I'm willing to gamble and put in frequencies I think will be correct. When the controller gives me the new frequency chances are I won't have to do any tuning; the frequency will already be there. I immediately begin to have strong doubts about applicants who don't tune radios, COM and NAV, before takeoff.

Besides not putting in all the reasonably possible frequencies there are two other radio errors to consider. The first is putting in the frequency but not adjusting the OBS. Frequency and OBS are kissing cousins; they don't go anywhere without each other. Anytime you tune a NAV frequency you should set the OBS to the desired course. Even if it's a localizer and the OBS setting doesn't matter set in the final approach course anyway, for reference. You say you don't know the exact course? Then put in the approximate one. Once you take off the adjustment to center the needle will be minimal. Every little bit of time saved helps.

The other error is failure to properly identify the VOR or localizer after tuning it. Some applicants become frustrated and confused if they can't ID a station while sitting on the ground. That of course only works if the facility is on the field or very close by. If an applicant doesn't understand line-of-sight and service volume I begin to have serious doubts about his readiness to be rated for IFR. In a related issue, you can't ID a localizer if you are way off to one side. You have to remember to do it when the needles start to come alive and the flag drops. Flag and needle movement is the reminder.

Be sure to teach your students to level off from climbs and descents in a quick and efficient way. When leveling from a climb the best procedure is to go about 50 feet past the desired altitude before you do anything. Then lower the nose to level flight on the AI, and hold it there. DON'T TOUCH THE POWER! Leave it at climb power (wide open in most trainers) while making

a gross nose-down trim movement to relieve most of the forward pressure on the yoke. When the airspeed reaches the expected cruise value reduce the power to the cruise setting. Finish by fine-tuning the trim. That whole sequence takes 10 to 15 seconds as opposed to the 2 or 3 minutes of fiddling with power and trim it takes if you initiate the level-off by first reducing power.

An efficient and work-free level-off from a descent can be made by figuring out your level-off lead altitude by taking 10% of your rate of descent and at that point simply return the power to wherever it was before you reduced it to do the descent. Don't apply any backpressure to raise the nose; it will come up all by itself and level off at the desired lower altitude. For example, let's say you're doing a non-precision approach and are descending to the MDA at 800 fpm. 10% of 800 is 80. At 80 feet above the desired altitude you promptly advance the throttle back to previous level-flight setting. The airplane will descent the last 80 feet as the nose comes up and you will be in level flight going the same speed as before the descent, assuming you didn't monkey with the trim. I didn't learn the easy way to do level-offs until I was in instrument training, but now I teach those procedures to all students from the very beginning.

Lately I have had applicants turn the wrong way on a parallel entry to a published hold. What's wrong? You're just going to turn the plane around and go back to the fix, so why does it matter which way you turn? It matters because of protected airspace. You should turn toward the holding side, where the "racetrack" is depicted. On the holding side a very large chunk of airspace is protected (safe to fly in at the published altitude), but on the non-holding side the protected corridor is relatively narrow. A strong wind or a heading error could put you in an unsafe position.

Voice communication errors sometimes crop up. The first one is dropping the plane to fly the mic. Just because the controller instructs you to report crossing a certain fix doesn't mean you have to report the instant you get there. Fly the plane first. For example, when flying the ILS for 23 into Columbus the tower will often instruct us to "report CLIFS (the FAF) inbound". But when you get to CLIFS that's about where you intercept the glideslope and start down. Pitch and power have to be adjusted, maybe approach flaps added and/or the gear lowered. There's a lot to do. Your defense is once again the 6 T's. Do them. Fly the plane. TALK is the 5th T. The previous 4 T's have to do with flying the plane. Do them first. The controller in the $600 leather chair sitting in an air-conditioned room will wait while you fly, bouncing around in the rain. He is trained to do so. He knows that when you report CLIFS inbound you are actually half a mile past the fix. That's expected and OK. But you can't get so caught up in flying and navigating that you get stuck on one of the earlier T's and never get all the way to #5 and make your call. The ability to do all these things, in the proper sequence and in a reasonable amount of time, is

what the examiner is looking for to determine that the applicant is ready for instrument flight without an instructor beside him.

When filing a flight plan, for real or simulated with the examiner, the only thing the applicant should be reading off are the things she wrote with her pen; NOT the block titles. The Flight Service person knows the block titles, and they are right there on the screen in front of him anyway. The information in the Route block should not include the departure or destination points. Route is what happens in between the departure and destination. It is not usually necessary to give airport or VOR identifiers phonetically; just the spoken given name will do nicely. If the airport is really obscure (doesn't have an IFR approach) then you will probably have to furnish the identifier.

When performing an instrument approach or holding in a strong wind I'm looking for the applicant to have situational awareness and set up some sort of appropriate wind correction angle as they intercept the desired course. If they simply roll out on the published heading and then wait to get blown away, thus requiring some major maneuvering to get back on course, I'm once again wondering if they are ready to hold an instrument rating. I recently did a checkride where the surface wind was only 10 or 12 knots, but the winds aloft at 3000 were 35 knots. For the hold we had a right quartering headwind. It ended up that the outbound time needed to be literally zero seconds, and a 45-degree inbound wind correction angle was required. Be prepared to do whatever it takes.

If I ask an applicant if their airplane has any anti-icing or deicing capability and I immediately get told "no" then I'm quite sure they aren't willing to think about the plane they are flying and probably won't react properly when they inadvertently get into an icing situation. Even the simplest IFR-capable airplanes have 3 anti-icing or deicing systems; carb heat (or alternate air), pitot heat, and windshield defrost. Systems knowledge is important for instrument flight.

Recovery from unusual attitude is no longer required to be partial panel but one partial-panel non-precision approach still must be flown. That involves turns to a heading using only the wet compass. There are two ways to do that; estimating lead-lag and timed turns. Since the estimate method is woefully inaccurate most pilots do timed turns. Good choice, much better results. But I find that a lot of applicants don't know that there is no lead-lag error on headings of East or West. For practical purposes you can turn to headings of 80 to 100 and 260 to 280 directly on the wet compass; no need for timing.

I'll close with a simple question: If you tune the frequency for a VOR or Localizer, how do you know if you have a good signal suitable for navigation? The answer is that you must be able to hear the Morse code ID, and the OFF flag must drop. I asked that in an oral several years ago and the applicant was unable to tell me the answer; she couldn't remember the flag drop part. I

let it go; we don't fail people for not knowing a single small thing. When we flew the plane to Columbus to do the ILS for her precision approach the glideslope flagged when she tuned the localizer frequency. The flag remained in sight throughout the approach, and the up/down needle never moved from the center. I was really wondering what she would do when she got to the outer marker where she should be intercepting the glideslope. The answer soon became obvious; nothing. She just flew along at the intermediate inbound altitude as if nothing was wrong. I had already decided she failed after the outer marker went off and then stopped and she didn't do or say anything, but I was intrigued as to just how far she would fly. I let it go for almost 4 minutes, at which time she was right over the airport. I suggested that she look out the side window to determine where she was. She saw the runways directly below, and then I told her she failed. She was furious; said I couldn't do that! Her reasoning was that the glideslope had worked the day before, and it wasn't her fault that it didn't work today. ….. We did her retest about a week later, after she learned more about inoperative equipment. Just because things usually work doesn't mean they always work.

Single-pilot IFR is perhaps the most challenging activity in all of aviation. It demands continual situational awareness, especially wind awareness, and workload management is crucial. The pilot cannot allow himself to become overwhelmed because of errors and inefficient practices. As a pilot examiner I am looking at the big picture of whether an applicant is prepared to function safely in the IFR environment. His or her proper completion of the required tasks on the checkride will tell me if the applicant is ready.

Larry Bothe is an FAA Designated Pilot Examiner, FAASTeam Representative and Gold Seal Instructor in the Indianapolis, IN FSDO area. He is also a Master Certified Flight Instructor and has over 7000 hours in more than 80 types of aircraft. Larry is part-owner of a 1961 7EC Champ and may be contacted at LBothe@comcast.net.