

Inside the Microsoft Flight Simulator 2004 Instrument Rating Checkride

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1 Introduction

"I'm sorry, you're gonna to have to take that checkride again. Check the flight analysis to see where you need improvement."

Words that can make a grown person cry.

There are probably one or two people in the world that passed the FS2004 Instrument Rating Checkride the first time and never heard those gut-wrenching words. The rest of us, though, are all too familiar with them. Maybe you saw it coming when your airspeed dropped below 90 kts or you wandered from your assigned altitude by more than 100 feet. Or, as happens all too often, you thought things were going well when all of a sudden she nails with that famous sentence. Maybe her reason made sense or maybe you have no idea what she was talking about. One way or another you have been initiated into a very, very large club.

But even though this checkride is probably the single most difficult flight in FS2004 it is possible to pass it--if you know what our charming examiner is expecting. The briefing for the flight is good as far as it goes but it only tells part of the story. For example, it says that you must cross the SEA VOR to enter the holding pattern. But what exactly does that mean? How do you know if you've crossed it the way the examiner expects? What did she mean when she said you didn't fly the procedure turn correctly? And what about her stop watch. She uses it extensively to keep you moving along at a set pace and the briefing only mentions some of the places where she uses it.

There are many ways to fail this checkride--many ways that aren't mentioned in the briefing. And that's what this examination is all about--to help you pass the Instrument Rating Checkride by telling you, in detail, what the examiner expects. This is not about flying on instruments in the real world or even in the simulated world. It is about the Instrument Rating Checkride in the July 29th, 2003 release of Flight Simulator 2004. It's not guaranteed to apply to future versions of the checkride. It's entirely possible that Microsoft will change the checkride through patches to FS2004 and even re-write it altogether for FS2006.

2 Preparing for the checkride

One of the best ways to begin your preparation for the checkride is by taking the Flying Lessons in FS2004. Start with the Flying Lessons Overview to see how the lessons work. Go through the Student Pilot course. When you've mastered that move on to the Private Pilot course and then the Instrument Pilot course.

And don't just take a lesson one time and automatically move on. Try to repeat each lesson until you have mastered the important skills from each one. At the same time, though, be balanced about them. There are times when Rod will sit very still and very quiet waiting for you to do something and it's not always clear what he is waiting for. In that respect the lessons are like miniature versions of the Instrument Rating Checkride. Rod asks you to do certain tasks but it's not always obvious what, precisely, he is expecting.

Between lessons go out and practice--have fun while you're at it but practice. On one flight pick a heading and hold it as close as you can for five minutes. When you've done that then do what you want for the rest of the flight. On another flight assign yourself an altitude and hold it to within 100 feet above or below. And then have fun. Do the same with airspeed.

When you get to the instrument lessons begin practicing the things you'll have to do in the checkride; a VOR approach, a hold pattern, an ILS approach and landing.

And when you get to steep turns in the Private Pilot course master them. Fly steep turns until you feel like that's the only way to turn. Then when you get to the turns in the checkride they will be kid stuff.

Pay attention to the ground school lessons as well. If you want to review them outside of Flight Simulator just go to the folder "Program Files\Microsoft Games\Flight Simulator 9\Fsweb\Lessons" and double click on Lessons_index_mainframe.htm. This is the list of lessons you see when you select Flying Lessons from the Flight Simulator main menu.

3 Practice flights

After you have the basic instrument skills down you can begin practicing the checkride itself.

Probably the most basic way to practice the checkride is to start with the default flight at Seattle-Tacoma International on runway 34R. Set the time to "day", take off and make a climbing right turn. Circle back and cross over the SEA VOR and track outbound on a heading of 170 degrees. Climb to 5000 feet and fly until you are DME 22.5 from the VOR. This is approximately the starting point of the checkride and is a little bit WSW of Shady Acres airstrip. Turn left to a 066 degrees and hit the ALT key. Select Flight and then Save flight. After that, you can select this flight to practice any time you wish.

By saving a daytime flight you will be able to see landmarks in the area and this will help keep you oriented. Once you're comfortable with the various phases of the flight, being able to see the landscape will become more of a hindrance than a help. In the checkride you will not be able to see the ground most of the time so you have to depend on your instruments and trust them to get you to the end of the checkride.

These are the weather conditions in the checkride. Add them to your flight.

- Cloud tops at 10,000 feet
- Cloud base at 1,000 feet
- Cloud cover is 6/8.
- 2 miles visibility
- No wind, precipitation, turbulence or icing.

If you are comfortable moving files around with Windows Explorer and with editing text files you can set up the exact conditions of the checkride in a practice flight. Flight Simulator creates a folder within your "My Documents" folder called "Flight Simulator Files" and stores, among other things, your saved flights there. Here's how to create an Instrument Rating Checkride practice flight:

- With Windows Explorer navigate to the folder "Program Files\Microsoft Games\Flight Simulator 9\Lessons\instr"
- Highlight the files "Rating Checkride.FLT" and "Rating Checkride.WX."
- Click on Edit->Copy. Be very careful here. Don't click on Edit->Cut accidentally. This will delete the two files and you really don't want to do that.

- Navigate to "My Documents\Flight Simulator Files" and click on Edit->Paste.

With notepad open up the "Rating Checkride.FLT" file. The front of it will look like this:

```
[Main]
Title=Rating Checkride
Description= Demonstrate your instrument environment skills to the examiner, and you
will receive a certificate of your accomplishment!
AppVersion=8.0.10829
FlightVersion=1
ABLScript = Rating Checkride
```

Change the line that starts with "Title=" to look like this:

```
Title=Rating Checkride Practice
```

and change the line that starts with "Description=" to look like this:

```
Description= Practice the instrument rating checkride
```

Finally, put a # sign in front of the line that starts with ABLScript:

```
#ABLScript = Rating Checkride
```

Then save the file. The first two changes you made gave the flight a title and a description that will show up on the "Select a Flight" menu. The third change removes the examiner from the airplane, so to speak.

Now when you start Flight Simulator and go to the "Select a Flight" menu one of the flights will be called "Rating Checkride Practice" and the description will be "Practice the instrument rating checkride." Select this flight and give it a few seconds to start up. This flight, like the checkride itself, starts with the autopilot on to establish the aircraft at 5000 feet on a heading of 066 degrees. To begin your practice session just turn off the autopilot and go.

If you want to practice without the weather so you can orient yourself through the ride then rename the "Rating Checkride.WX" file to some other name. You have just lifted the fog and made the weather clear. As soon as you're ready for it, though, you want to change the name of the WX file back to what it was so you can get accustomed to flying in near-zero visibility.

4 Before you start the checkride

On the big day, when you're ready to tackle the actual checkride, start your preparations even before you turn on the computer. Pick a time when you will have an hour with no distractions. You will need 45 minutes for the flight and 15 minutes to celebrate when you pass. So clear your schedule, relax, focus and get comfortable. Select the checkride and click on Fly Now!

5 The beginning

As the flight opens, you and the examiner are perched 5000 feet somewhere over Shady Acres

airstrip. The autopilot quickly settles the plane on a heading of 066 degrees at 100 kts and the examiner begins her opening remarks. You might hear these same remarks from a real examiner on a real checkride. This is a simulator, though, so she will tell you that it's okay to use the pause button to set the radios. She will also tell you that you must set the NAV1 radio to the SEA VOR frequency of 116.80.

At this point she will pause while you do so. You have 30 seconds to set the radio to the correct frequency. This is the first point at which you can fail so set the radio correctly but set it quickly.

As soon as she sees that the radio is set to the proper frequency she will continue. She will tell you that you have a clearance to FACTS and then for a VOR approach to runway 34R at KSEA. She will end by saying that you will not be allowed to use the autopilot and that she is disabling it. Now you have the plane and, if all goes well, she won't say anything else until you cross the SEA VOR in about 15 minutes.

The first thing you must do here is to set the NAV1 OBS to 338 degrees and you must do this within 30 seconds. You set it, of course, by using the mouse on the OBS knob to spin the dial around. One method of setting it to 338 is to set it to 340 as nearly as possible then click the mouse once to move the dial clockwise. The OBS arrow should now be pointing a little off center of the 340 degree mark. This will be 338 degrees.

The OBS tolerance for the VOR approach is 338 +/- 3. This means that any setting from 335 to 341 is acceptable. In fact, as soon as the examiner sees the OBS set within these tolerances she will set it herself to exactly 338 degrees.

At this point you have two minutes to get on the proper radial on a heading of 338 degrees plus or minus 10 degrees.

Next set the throttle to 2400 RPM and stabilize your airspeed at 100 kts.

Now you have to go find FACTS.

Quick Summary: Set NAV1 to 116.80 and OBS set to 338.

6 Finding FACTS

FACTS is one of three intersections that sit very close together about 17 nautical miles south of the airport. FACTS is part of the VOR approach to runway 34R--it's why we're here. The other two are NEEAL, used in the ILS approach to 34R, and LORIE, used in the ILS approach to 34L.

It will be helpful here if you have reviewed Chart 1 from the briefing. It shows FACTS being at DME 17.0 from the SEA VOR along the 158 degree radial.

How do you know when you get to FACTS? Your instruments will tell you. The Course Deviation Indicator will be centered and the DME will show 17.0 nm. From where you are at the start of the flight FACTS is ahead of you and to the left and getting there is going to be a two-step process. You're going to get on the proper VOR radial and then you're going to fly toward the VOR until you are at DME 17.0.

For this section of the checkride you have some freedom of movement. You must hold 5000 feet and 100 kts but you can fly almost any heading necessary to get to the FACTS intersection.

Tolerance on the altitude deserves some mention here. Although the briefing states that you

must hold your altitude to within +/- 100 feet it's actually +100 and -50 feet from the start of the flight to the end of the VOR approach. The reasoning is that you're dealing with published minimum altitudes and, therefore, shouldn't drop below them. If you were flying this approach in the real world ATC would tell you to "cross FACTS at or above 5000." They wouldn't be happy if they found you below 5000. So your altitude in this section of the checkride must be between 4950 and 5100 feet.

In finding the proper radial we said you have some freedom of movement here but there are limitations. Regardless of how you choose to get on the 338 degree heading with the CDI centered your heading must be within 328 and 348 degrees within two minutes after the examiner sees that the OBS heading is set correctly.

One way to get on the heading is to stay on your 066 degree heading until about 11:49:00 and begin a left turn. Synchronize your turn with the CDI so that you roll out on 338 degrees at the same time that it is centered.

If you used the pause button to set your instruments your two minutes won't expire until about 11:49:30 and, with the above turn, you will be within tolerances before that.

There is another timer running as well. You have 5 minutes to reach FACTS from the time you set the OBS to 338 degrees.

Quick Summary: Be at DME 17.0 on a heading of 338 with the CDI centered, at 5000 feet and 100 kts.

7 *the VOR approach*

Once you reach FACTS it's time to begin the VOR approach. You're going to pass MILLT and the NDB before you reach the VOR itself and you have altitude requirements that you have to adhere to. You also have to maintain your airspeed at 100 kts +/- 10 kts, you have to hold your 338 degree heading and you have to keep the CDI centered.

Don't begin your descent until your DME shows 17.0 and even then it wouldn't hurt to wait until 16.9. If you begin your descent before DME 17.0 you run the risk of being below 4950 feet at 17.0 and that will cause you to fail. So at 16.9 throttle back to near idle and begin descending to 3000 feet. MILLT is an intersection ahead of you at DME 11.0 and you want to be near 3000 feet when you get there.

From here until DME 11.0 you are descending from 5000 to 3000 feet. The examiner can't hold you to 5000 feet because you're descending to MILLT and she can't hold you to 3000 feet because you're not there yet. What this means is that the altitude tolerance checking is turned off and won't be turned on again until you reach DME 11.0. So if you're at DME 12.9, for example, and your altitude is at 2930 feet don't worry about it. Just make sure that you are back above 2950 feet by the time you get to DME 11.0.

You have 5 minutes to get from FACTS to MILLT. If you hold your airspeed and heading this won't be a problem.

At DME 11.0 you want your altitude to be a little above 3000 feet. You will pass this particular test if your altitude is between 2950 feet and 3100 feet. Remember that the minimum tolerance here is only 50 feet below the target altitude. You must not be below this altitude at MILLT.

You also have to hold your altitude at 3000 feet long enough for the examiner to verify that you are

at the correct altitude. Actually once you reach DME 11.0 the examiner watches your altitude for 3 seconds before turning off the altitude tolerances for the next leg.

From MILLT you have 6 minutes to get to the NDB and so from DME 10.9 to 4.4 altitude checking is again turned off.

At the NDB at DME 4.3 your altitude must be between 1550 and 1700 feet. Other than that it's a repeat of MILLT. Hold your altitude for three seconds before continuing your descent.

From DME 4.2 to the VOR you must descend to the decision altitude of 840 feet.

You have 5 minutes to get from the NDB to within 1.0 nm of the VOR. At that point the examiner will stop holding you to the OBS heading. You are so close now that the OBS will begin to switch from "To" to "From".

When the VOR flips your altitude must be between 790 and 940 feet and it must stay there long enough for the examiner to see it--three seconds.

This is the end of the VOR approach and she tells you to go around and execute the published missed approach.

Let's stop here and summarize the VOR approach. At FACTS you have to be at 4950 to 5100 ft. At MILLT you must be between 2950 and 3100 ft. At the NDB you must be between 1550 and 1700 feet. When you cross the VOR you must be between 790 and 940 feet. Your heading for the approach must stay between 328 and 348 degrees and the VOR must always be on a bearing between 335 and 341 degrees. This is a lot of room to move around but you must cross the VOR at 1.0 nm or less.

All this time the examiner has been taking notes on your performance. If you've strayed out of tolerance you will see a yellow message on the screen telling you to correct your speed, altitude or heading as the case may be. Those messages are a sure sign that you've failed. But she doesn't actually end the flight yet. That won't happen until you reach PARKK.

Quick Summary: Keep the CDI centered, airspeed 100 at kts, altitude at 5000 feet at FACTS, 3000 feet at MILLT, 1600 feet at the NDB and 840 feet at the VOR.

8 On to PARKK

As soon as she tells you to execute the missed approach she starts her stop watch. You have six minutes to find PARKK.

You must immediately do three things: go full throttle, begin your climb to 2100 feet and turn toward PARKK.

Throttling up and beginning the climb is pretty straight forward. Your airspeed is, of course, going to start falling off so the examiner stops holding you to 100 kts. She lets you select the airspeed for the climb even if it's below 90 kts. That's right--she won't fail you if your airspeed falls below 90 kts.

She is, though, watching your rate of climb. She wants your rate of climb to stay within -300 feet per minute and +1000 feet per minute. Yes, that's a 300 fpm descent! You can do almost anything in that range and still pass but if you exceed those limits it's another way to fail.

The challenge for this section of the checkride is flying the proper heading and passing within 0.8 nm of PARKK. If you don't come at least this close her six minute timer will keep going and when it expires she will fail you for not crossing PARKK as instructed.

However, you don't have anything that tells you how far from PARKK you are. You must fly the heading that takes you closest to PARKK, use your ADF needle and hope for the best. The examiner does you a small favor by setting your ADF to the PARKK frequency of 281 at the start of the flight.

For this leg of the checkride she wants you to fly outbound from the VOR on the 339 radial toward PARKK. The briefing and Chart 1 both tell you that you must fly a heading of 339 degrees and this is what she is grading you on. You are supposed to turn to 339 degrees as soon as she tells you to go around and doing this will take you to within 0.8 nm of PARKK.

But there's a problem here. If your heading drifts to the left by even one degree you will miss PARKK. Suppose you fly to PARKK on the 338 degree radial instead of the 339. Your heading will be within the range of 329 and 349 degrees that you're allowed and your course from the VOR will be within the range of 336 and 342 degrees that you're allowed. But your closest distance to PARKK will be greater than 0.8 nm and the crossing won't count. You will fail.

Flying, as instructed, on 339 degrees leads you to a distance from PARKK of about 0.75 nm. This just barely makes it. So you have no room at all to drift left for any length of time. If you find you have done so you should correct by following the ADF needle for a bit.

But there are problems with following the ADF. If you don't do it precisely you could drift too far right of 339 and she will fail you for that, too. So what's going on here? Everything about this checkride--the briefing, chart 1, the instructor--all say a heading of 339 degrees is supposed to take you squarely over PARKK. We should expect that the ADF would be straight up the whole way. We'll discuss the answer in more detail in another section later on.

For now, though, 340 degrees is probably the best heading to fly in this section. It's a compromise, though. It takes you closer to PARKK but it also takes you farther away from your assigned heading of 339 degrees. So be careful in here.

So hold your heading, hold your altitude at 2100 feet and head for PARKK. Your altitude tolerance is now +100 feet, as before, and -100 feet as the briefing says so your altitude will be acceptable if its between 2000 and 2200 feet.

Once you pass within 0.8 nm of PARKK hold your altitude for three seconds. This is the same drill you did on the approach. The examiner counts three seconds and then not only checks your altitude but reviews her notes on everything so far. This is the first comprehensive review she does of your performance. If you have blown anything so far, this is where she will fail you with those famous words we started with.

If you have passed, however, she tells you to turn left to a heading of 160 degrees and climb to 3000 feet. Now, even though she told you to turn to 160 degrees, she is really going to hold you to 159 degrees.

Try to make a standard rate turn. The examiner is looking for 20 degrees of bank to the left but she'll accept anything between 5 and 35 degrees. Try to control your bank angle so that you are at 250 degrees after thirty seconds and 160 degrees another 30 seconds after that. On top of that you have 2.5 minutes to reach altitude.

If it's any help in here, airspeed checking is still off. You can fly whatever airspeed works.

Finally, while you're in this turn it's a good idea to hit pause and set your OBS to about 150

degrees. The exact value isn't very important as long as it's a value that gives you a "To" reading. You need to do this to get around a small problem in the checkride program. We'll explain more about this in the next couple of sections.

Quick Summary: Climb to 2100 feet, fly heading 339 or 340 to PARKK. Airspeed checking is off.

9 Heading for the VOR

When your heading drops below 170 degrees she will tell you to head for the Seattle VOR and hold on the 140 degree radial. She is still holding you to 159 degrees but she wants you to fly direct to the VOR which may not be on a heading of 159. So what to do here?

The first thing you might consider is to hit pause. First off, there's nothing wrong with hitting pause just to take a break. This is a lot of work and a lot to keep track of so stopping for a bit to check your notes and catch up is perfectly okay.

Then spin the OBS until the needle centers. This will be somewhere around 154 degrees but any heading between 149 and 169 will keep you from failing. From a practical point of view, however, you need to cross the VOR as close as possible. So center the CDI and follow it to the VOR.

Don't forget, too, that you're supposed to be at 3000 feet +/- 100 feet and, because you could still be climbing, airspeed checking is still off.

Quick Summary: Turn left to 160 degrees, climb to 3000 feet, set OBS to a heading that gives a "To" indication, follow CDI to the VOR.

10 Entering the hold pattern

If the Instrument Rating Checkride is the most difficult flight in FS2004 then the hold pattern is the most difficult part of the flight. If you can get past this section with no dings then you will be almost home free.

Try to come as close as you can to the VOR. You must cross it at 0.9 nm or less and the OBS must flip from "To" to "From" for the crossing to count. If you cross at DME 1.0 or greater the timer set earlier doesn't get reset and when it reaches five minutes you fail. In other words if you cross the VOR at 1.0 or 1.1 nm, for example, and set your OBS to 320 degrees and start your teardrop entry you're going to fail. Your entry may be otherwise perfect but the crossing distance is what failed you.

After you cross the VOR wait for the OBS to flip from "To" to "From." As soon as it does hit pause and set your OBS to 320 degrees and note the time to the second.

Let's back up just a bit here. Remember right after PARKK when we said to change the OBS to any heading that gave you a "To" indication? The reason is that the program begins looking for a "From" setting as one of the signs that you have crossed the VOR and it begins looking as soon as the examiner tells you to hold on the 140 radial. If your OBS has a "From" reading at that point she is going to assume that you're way ahead of her and that you have crossed the VOR already. She is going to give you 5 minutes to finish your hold entry. The problem is that you're

nowhere near the VOR and it will take you most of 5 minutes just to get there. What will happen is that you'll get to the VOR and be flying a perfectly good hold entry and suddenly you'll fail because you didn't enter the hold pattern correctly. If you want some additional detail go to <http://www.rodmachado.com/Flight%20Sim/FS-IFR%20Ride.htm>.

Hit pause to restart the flight and begin turning to a heading of 110 degrees. This is the beginning of a standard teardrop entry. If you remember, the rule is to make your entry heading 30 degrees off of the radial you are to hold on. You want the 140 degree radial so we're going to enter with a 110 degree heading.

Fly the 110 degree heading for 60 seconds from the time you crossed the VOR. As a cross check you should be 1.7 nm from the VOR. Now begin an "aggressive" standard rate turn to the right to a heading of 320 degrees. Your bank angle must be a good solid 20 degrees or a bit more if you want to come reasonably close to the 140 radial. Try to roll out as close to 320 degrees as you can.

The examiner is looking for a bank angle between 5 and 35 degrees. If you roll out to less than 5 degrees of bank before you reach 310 degrees you will fail. 310 degrees is the lower limit of the heading tolerance here. You will also fail if you exceed 35 degrees of bank.

If you decide for some reason that you don't like a 20 degree bank and want to fly the turn at something closer to 10 or 15 degrees that's okay. It's still going to be acceptable. However, your turn will be wider and you will overshoot the 140 degree radial. To compensate you should make your initial turn at something closer to 105 or 100 degrees instead of 110 degrees. This is something you'll have to work out in practice sessions before the checkride.

When you cross the VOR after the teardrop entry you must cross it at a distance of 0.4 nm or less.

The basic idea is to cross the VOR, turn around somehow and cross the VOR again and do it within 5 minutes. The teardrop entry works but so does a parallel entry. However you choose to do it make sure you practice it first.

All of this is hard work and it's not over yet. So you will be glad to know that airspeed checking is still off! That's right--she's not watching your airspeed. It made sense for her to give you a break during the climb from the VOR to PARKK and back to the VOR. But surely she would start holding you to 100 kts +/- 10 when you started your hold entry. Wouldn't she? The answer is No, she wouldn't. As a matter of fact she's not going to look at your airspeed again until you touch down at Boeing Field later on! So if your airspeed drops below 90 kts here, don't worry about it.

Here's a record from one checkride hold entry:

12:08:10 Cross VOR at 0.4 nm and begin turn to 110 degrees.
12:08:22 Bank angle hits 22 degrees.
12:08:31 Overshoot heading to 100 degrees and roll back to 110.
12:09:10 1.7 nm from VOR on 110 degrees. Begin right turn to 320 degrees. During this turn the bank angle reaches 25 degrees.
12:10:06 Hit 320 degrees at 15 degrees bank and begin rollout
12:10:12 Turn stops on 331 degrees and we turn back toward 320 degrees.
12:10:29 Turn back stops at 315 degrees.

12:10:41 0.8 nm from VOR. Plane settles on 320 degrees.
12:10:55 0.5 nm from VOR. Almost end of hold entry.
12:11:01 0.4 nm from VOR.

The turn from 110 degrees to 331 took 62 seconds. This is an average of 3.5 degrees per second--close to a standard rate turn. The bank angle for a standard rate turn at 100 kts is generally accepted to be about 15 degrees. But the plane was at less than 15 degrees at the beginning of the turn and at the end of the turn during the rollout. This means that we had to bank at more than 15 degrees in the middle of the turn to make up for the difference. Hence the 25 degrees of bank.

Quick Summary: Cross VOR at 0.9 nm or less, fly any entry that works, use standard rate turns, cross VOR again on heading of 320 degrees at 0.4 nm or less. Maintain 3000 feet. Airspeed checking is still off.

11 *Hold pattern*

You've just crossed the Seattle VOR for the third time in this checkride. Just once more and you can leave it in your prop wash.

As soon as you cross the VOR begin a standard rate turn to the right. As you know, a standard rate turn means that you will turn through 180 degrees to a heading of 140 degrees in one minute. That's the goal but, as before, the examiner will accept any bank angle between 5 and 35 degrees. And what's more important here is consistency. Whatever rate of turn you make here try to do the same thing later when turning back to 320 degrees. You're flying a racetrack here and you want the turns to be the same.

For now try to roll out on a heading of 140 degrees. The examiner will be looking for anything between 130 and 150 degrees. However, she is also going to start one of her infamous timers as soon as your heading passes 120 degrees. You must fly the outbound leg for about a minute and this is where she starts counting from. Don't worry too much about watching the clock though. It's more important to watch your turn rate, heading and altitude.

Fly your outbound leg on 140 degrees for at least 55 seconds but no more than 90 seconds. Then begin your turn to the right to 320 degrees. This turn should be as much like the previous one as you can make it. Doing so will go a long way toward helping you roll out on 320 degrees. The examiner's tolerance here is any heading between 290 degrees and 350 degrees but she's going to hold you to within 3 degrees of the localizer. This means that when you roll out the VOR must be ahead of you on a course between 317 and 323 degrees and once you turn past 295 degrees in the turn you have 30 seconds to get there. You can zig zag back and forth any way you need to to get there--as long as your zigging and zagging is done on a heading between 290 and 350 degrees.

All right. You've rolled out on 320 degrees, you're on the radial and you're at 3000 feet. Hold this configuration. You must cross the VOR at 0.4 nm or less and your OBS must flip to "From" for the crossing to count.

When that happens she will review your performance again. Here is where she will fail you if you've missed something. If you pass she will tell you to move on to NOLLA. If she doesn't say anything at all it means you probably didn't come close enough to the VOR and she is still waiting

for you to cross it. About all you can do in this case is just wait. Within a minute--two at the most--she will tell you that you've failed.

Here's the rest of the record with some scenes from the previous episode. These entries are for one loop through the hold pattern.

- 12:10:55 0.5 nm from VOR. Begin right turn to 140 degrees.
- 12:11:01 0.4 nm from VOR. Notice that we started the turn a bit too early but we came close enough to the VOR for the crossing to count.
- 12:11:09 Reach 25 degrees of bank.
- 12:11:41 0.9 nm from VOR. Heading hits 141 degrees. Bank angle is 10 degrees.
- 12:11:45 Heading reaches 145 degrees and we begin to roll back to 140 degrees.
- 12:11:49 1.0 nm from VOR. We settle on 140 degrees for the outbound leg.
- 12:12:47 2.3 nm from VOR. Begin right turn to 320 degrees.
- 12:12:56 Reach 25 degrees of bank.
- 12:13:25 2.4 nm from VOR. CDI centers on the 140 degree radial. Heading is 303 degrees. Bank angle is about 21 degrees.
- 12:13:35 Heading 322 degrees. Bank angle under 5 degrees. CDI indicates we're about one degree left of the 140 degree radial.
- 12:13:40 1.8 nm from VOR. Heading settles on 320 degrees. We're still a little left of the radial. Fly inbound leg.
- 12:14:37 0.5 nm from VOR. Examiner says to proceed to NOLLA.
- 12:14:40 Cross the VOR at 0.4 nm.

At this point the hardest part of the hardest flight is over. All that's left is a procedure turn and a landing and you're done!

Quick Summary: Right turn to 140 degrees, fly for one minute, right turn to 320 degrees, cross VOR at 0.4 nm or less. Maintain 3000 feet. Airspeed checking is still off.

12 To NOLLA

As soon as you cross the Seattle VOR for the last time hit pause and set your NAV1 radio to 110.90. This is the ILS frequency for runway 13R at Boeing Field. Set your OBS to the runway heading of 130 degrees and your ADF to the NOLLA frequency of 362.

Resume the flight, begin descending to 2200 feet and head straight for NOLLA.

The heading to NOLLA is listed as 326 degrees but if you keep the ADF needle centered you'll find yourself on a heading closer to 325 degrees. This is within tolerances and takes you closer to NOLLA than 326 so use it as your heading instead. We discuss this along with the heading to

PARKK a little later on.

This section of the flight will take a few minutes so once you have the plane configured and stable your workload will get a bit lighter.

At NOLLA you will be at DME 8.1 from BFI, the Outer Marker light will flash and the ADF needle will flip. For the crossing to count you must be 0.4 nm or less from NOLLA. The only confirmation that you have crossed NOLLA correctly is that the examiner tells you that you are cleared to land on runway 13R. Other than that there is no direct means for you to check your distance from NOLLA so all you can do is follow the ADF needle as closely as possible.

There is, of course, the GPS map. With it, you can watch your track to NOLLA and estimate how close you are going to come to it. But using the GPS is going to add to your workload and may end up being more of a distraction and a help. If it takes your attention away from the airplane you could miss something and fail.

Once past NOLLA, it's time to start the procedure turn.

Quick Summary: Set NAV1 to 110.90, OBS to 130. Fly to NOLLA on 325 or 326 degrees, descend to 2200 feet. Airspeed checking is still off! Yes, fly any airspeed that works!

13 Procedure turn

Immediately past NOLLA turn to a heading of 310 degrees and hold it for a few seconds. Actually, your heading must stay between 300 and 320 degrees for 10 full seconds. As soon as that happens she will evaluate your performance again. Here is the third point where your past will catch up to you.

Don't wait for her to fail you. Assume you are going to pass and make your turn to 265 degrees. If you end up staying between 300 and 320 degrees for 2 minutes or if you get farther than 10.0 nm from BFI at this point you will fail.

Make your turn to 265 carefully. You want a standard rate turn and you want it to take less than 30 seconds. If you don't bank at least 10 degrees she won't recognize the turn and if you take longer than 30 seconds to reach 265 she will fail you. And here's another point. If you overshoot 265 degrees and turn back to it with a bank angle of more than 5 degrees she will fail you. To her it looks like you have rolled out on 265 and then immediately started your turn to 085 degrees. So she will fail you for starting that turn too early.

If you make a mistake on any of these points she will fail you for not making the procedure turn correctly.

After your turn stay on 265 degrees for at least 55 but no more than 90 seconds. Then make a standard rate turn to the right to heading 085 degrees. This turn is not as critical as the ones in the hold pattern. All that's necessary is to make your bank angle close to 20 degrees. The goal is a heading of 085. During this turn you will probably be farther from BFI than DME 10.0 but don't worry about it. She checked your distance back at NOLLA and stopped looking at it after that.

Once your heading is between 75 and 95 degrees you will see a message on the screen that says again that you're cleared to land.

Don't forget your altitude. It must be within 2100 and 2300 feet from NOLLA to the end of the 085 degree leg of the checkride. And even though airspeed tolerances are still off there shouldn't be

much need to fly below 90 kts or above 110 kts in this section. If you do, don't worry about it.

Quick Summary: At NOLLA turn to 310 degrees, then turn to 265, fly for 1 minute, turn right to 085 degrees. Hold 2200 feet. Airspeed checking is still off!

14 ILS approach

Toward the end of the 085 leg you will see the localizer needle begin to move. When you're within 3 degrees of the runway heading she will adjust her tolerance checking for the ILS approach. This means that you now have 30 seconds to get lined up on the localizer. To do this you must turn to a heading between 120 and 140 degrees. Now while that is a twenty degree spread and it's all legal only a heading of 130 degrees will get you to the runway.

She is also going to give you 90 seconds to find the glideslope. And, lastly, she turns off altitude checking. You are allowed to fly any altitude necessary. Of course this just allows you to follow the glideslope down to the runway.

And, as always, she starts another timer. You have 500 seconds to get below about 300 feet but if you're even close to following the glideslope this won't be a problem. This timer lets her fail you if you decide to abandon the approach and go do something else.

At 300 feet AGL she turns off both the localizer and glideslope tolerances. So at this point you are free to do pretty much whatever it takes to get to the runway. The only thing she's watching now is her stop watch. You guessed it--another timer. You have 60 seconds to touch down. Of course, you don't know what your altitude is above ground level so you're not going to know exactly when the 60 seconds starts. Don't worry though--just follow the glideslope.

If you've been maintaining 100 kts through here it's time to slow down to about 65 kts and lower your flaps if you want to use them. The exact speed is not critical here but if you touch down too fast you won't be able to stop in time. More about this in the next section.

Quick Summary: Follow the localizer and the glideslope. Slow down for the landing. Airspeed checking is still off!

15 Landing

It's important to touch down on the runway, stay on the runway throughout the landing roll and come to a stop on the runway. Be careful here. You have just flown a difficult checkride for 45 minutes and you don't want to fail just because one wheel rolls off the runway for a second.

And there is one last timer to make sure your speed is below 5 kts within 30 seconds after you touch down. If you touched down at too high a speed you won't be able to stop within 30 seconds so watch your speed on final and slow down.

She'll evaluate your performance one last time and, of course, you're going to hear "Good job. You passed the checkride."

That's it! The end! Finished! Done! Over! No more!

There's one last detail to take care of and it's the most important of all--spell your name correctly on the certificate.

Quick Summary: Stay on the runway, stop within 30 seconds. Spell your name correctly on the certificate. Who cares about airspeed anymore!

16 *But what if you didn't pass*

Okay. As we said earlier this checkride is the hardest flight in FS2004. So if you feel that for one reason or another you don't have the time to put into it right now then don't worry about it.

Passing this checkride or not passing it doesn't change anything you can do in Flight Simulator. You can still file IFR flight plans, do ILS approaches in IMC weather--all of that stuff. You can even go on to the other lessons and the other checkrides. You can fly 747s, 777s, SSTs, anything you want. No one asks you for a certificate when you sit down in the left seat.

Remember that the goal here is to have fun and if you find parts of it that are not fun then skip them.

One of the things that will help even if you did pass the checkride is to master the autopilot. First, it's there. It's there in FS2004 and there is a section in the Learning Center that will get you started using it. It's there in real airplanes and real pilots in the real world use it all the time.

17 *Your heading to PARKK*

Earlier here we recommended that you fly from SEA to PARKK on a heading of 340 degrees instead of the 339 degree heading called for by the checkride. Now it's time to tell you why.

Open the flight planner and select Portland, Oregon (KPDX) as your starting airport and Paine Field (KPAE) as your destination. Select a GPS route, go to the edit page and add FACTS, MILLT, DONDO, SEA VOR and PARKK to the flight plan. Now look at the Nav Log.

You'll see that the heading from FACTS to MILLT to DONDO and to the VOR is 339 degrees instead of 338 degrees. That by itself is not a huge problem. 339 is close enough to 338 to allow you to fly the checkride without noticing the difference. The heading to PARKK, though, is 341 instead of 339 degrees. This two degree difference is a bit more important, however. You are graded in the checkride on how well you hold your course to PARKK and on how close you come to PARKK.

But those two measures are not entirely compatible. If you fly, for example, 338 degrees to PARKK you will be within your heading tolerances but you will most likely fail because you won't come close enough to PARKK for the crossing to count. If you fly the 341 degree radial from the VOR you will cross directly over PARKK but if you stray to off course to the 343 radial accidentally you will fail. The course of 340 degrees we suggested above, you see, is a compromise between staying within course tolerances and making sure you cross PARKK at a minimum distance.

Now go back to the flight plan, delete PARKK and add NOLLA. The Nav Log will tell you that the proper heading from SEA to NOLLA should be 324 degrees instead of 326 degrees. In flying to NOLLA you're following a heading instead of the OBS needle. This means that you have a 10

degree tolerance on your heading. So any heading between 316 and 336 will be acceptable as long as you cross NOLLA at a distance of 0.4 nm or less. You should be able to fly 324 degrees and pass.

What this means is that there will probably be some changes in the Instrument Rating Checkride in FS2006. Jeppesen's SimCharts 3.0, for example, show the heading from FACTS to SEA as 341 degrees instead of 338 or 339 and the heading to PARKK as 343 degrees.

18 The messages and what they mean--exactly

When the examiner tells you that you failed she will also give you a reason why. In her notes she refers to these reasons as "ding" messages. Unless you make a career out of this checkride you may not see some of these messages but here are all of them with a summary of what each one means.

Message: You did not stay within 100 feet of your assigned altitude.

Meaning: You did not stay within +100 feet and -50 feet on the VOR approach or within +/- 100 feet of assigned altitudes.

Message: You did not stay within 10 knots of your assigned airspeed.

Meaning: Your airspeed dropped below 90 kts or went above 110 kts.

Message: You did not stay within 10 degrees of your assigned heading.

Meaning: You must stay with +/- 10 degrees of your assigned heading. For example, if your assigned heading is 339 degrees, you must stay within 329 and 349 degrees.

Message: You did not set your NAV1 radio to the correct frequency for the VOR approach.

Meaning: You didn't set NAV1 to 116.80 at the start of the flight.

Message: You did not maintain 5,000 feet to FACTS.

Meaning: Your altitude at FACTS was not in the range 4950 to 5100 feet.

Message: You did not cross FACTS as instructed.

Meaning: You must be at DME 17.0 of SEA VOR or less within 5 minutes of the start of the flight

Message: You did not set the NAV1 OBS to the correct inbound course.

Meaning: There are three ways to get this message. You didn't set the OBS heading to something between 335 and 341 degrees at the start of the checkride. You didn't set the OBS heading to 320 degrees when you crossed the VOR during your hold entry. You didn't set the OBS heading to 130 degrees for the ILS approach to Boeing Field.

Message: You did not intercept and hold the 338 course inbound.

Meaning: Your heading was not in the range 328 to 348 within 2 minutes after you set the OBS to 338 degrees or it went outside this range during the VOR approach.

Message: You crossed MILLT below 3,000 feet.

Meaning: Your altitude at MILLT was not in the range 2950 to 3100 feet.

Message: You did not cross MILLT as instructed.

Meaning: You didn't reach DME 11.0 within 5 minutes after passing FACTS

Message: You crossed the outer marker below 1,600 feet.

Meaning: Your altitude at the NDB was not in the range 1550 to 1700 feet.

Message: You did not cross the outer marker as instructed.

Meaning: You didn't reach DME 4.3 within 5 minutes after passing MILLT

Message: You descended below the MDA of 840 feet.

Message: You crossed the Seattle VOR below 840 feet.

Meaning: These two messages go together. If you crossed the Seattle VOR above 940 feet you get the second message. Yes, that's right. if you crossed "above" you get a "below" message. If you crossed below 790 feet you get both of these messages.

Message: You did not cross the SEA VOR as instructed.

Meaning: You didn't reach DME 1.0 within 5 minutes after passing the NDB

Message: You did not climb on the missed approach.

Meaning: At some point during your climb to PARKK you descended at a rate faster than 300 fpm or climbed at a rate faster than 1000 fpm.

Message: You did not level off at 2,100 feet.

Meaning: Your altitude when you crossed PARKK was not in the range 2000 to 2200 feet.

Message: You did not maintain the 339 course.

Meaning: You must fly to PARKK on a SEA VOR radial between 336 and 342 degrees.

Message: You did not cross PARKK as instructed.

Meaning: You didn't cross PARKK within 0.8 nm.

Message: You did not fly the 326 course toward NOLLA

Meaning: Your heading to NOLLA did not stay between 316 and 336 degrees.

Message: You did not set your NAV1 radio for the ILS approach.

Message: You tuned your NAV1 radio to the wrong frequency.

Meaning: These messages go together. You either didn't set NAV1 to 110.9 for the ILS approach or you didn't set the OBS to 130 degrees. If you make one of these mistakes you will get both of these messages.

Message: You did not cross NOLLA to begin the approach.

Meaning: You did not pass within 0.4 nm of NOLLA.

Message: You did not track the localizer outbound.

Meaning: You stayed on the 310 degree heading for more than 2 minutes or, while on that heading, exceeded DME 10.0.

Message: You did not turn to a heading of 265 on the procedure turn.

Meaning: You stayed on 310 degrees for more than two minutes or exceeded 10.0 nm from BFI while on that heading or you turned to 265 but your heading was outside the range of 255 to 275 degrees.

Message: You did not fly the procedure turn correctly.

Meaning: This message is a catch-all for anything that goes wrong on the turn from 310 to 265 degrees. See section 13 on the Procedure Turn.

Message: You did not turn to a heading of 085 to intercept the ILS.

Meaning: After flying a heading of 265 degrees you did not turn to a heading within 75 and 95 degrees within 5 minutes of rolling out on 265 degrees.

Message: You did not intercept and hold the localizer.

Meaning: You did not intercept the runway 13R localizer within 2 minutes of rolling out on 085 degrees.

Message: You did not intercept and hold the glide slope.

Meaning: You did not stay within two degrees of the glideslope during the ILS approach.

Message: You did not stay on the ILS to the decision height.

Meaning: You will get this message if you also got one of the two previous messages about the localizer and glideslope.

Message: You did not land on the runway.

Meaning: You did not land within 60 seconds of passing 300 feet AGL. You can get this, for example, if you fly low over the runway without landing.

Message: You didn't land on the runway and you didn't stop on the runway.

Message: You stopped on the runway, but you didn't land on the runway.

Message: You landed on the runway, but came to a stop off the runway.

Message: You landed and came to a stop on the runway, but drifted off.

Meaning: These are pretty straightforward. You must touch down with both wheels on the runway, stay on it completely and come to a full stop with both wheels still on the runway.