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Pass Your Instrument Pilot Checkride

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**Aviation / Flight Training** 

#### **Outer Marker Publishing**

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To my parents who helped me dream big.

To my beautiful bride who helped me achieve those dreams.

Jason



A Word Of Caution...

#### This book will help you Pass Your Instrument Checkride

I m about to take the most cut and dry, jargon filled, complex subject matters and make them fun, frustration free, and easy to remember.

Work Hard

Study Hard

Fly Your Best

And remember...

A Good Pilot Is Always Learning

Jason

Jason Schappert – MzeroA.com
About The Author and About This Book 31
Chapter 1: Making Sure You're Ready 33
<i>What are the Requirements for Applying for an Instrument Pilot Rating?</i>
<i>What Areas of Operations Should a Pilot Be Proficient in For an IFR rating?</i> 34
Chapter 2: IFR Flight Planning
<i>When is the Pilot Required to File a Flight Plan?</i> 36
Can You Cancel Your Flight Plan?
<i>Can You File a Flight Plan with both VFR and IFR Portions?</i> 36
When Filing a Flight Plan Would You Request Your Initial or Final Altitude?
<i>What is the Minimum Altitude for an IFR Flight Over Designated Mountainous Terrain?</i> 37
<i>What is the Minimum Altitude for an IFR Flight Over Non-Mountainous Terrain?37</i>
When is an Alternate Airport Required in a Flight Plan?
When Can An Airport Be Used As An Alternate? 38



Can An Airport without an Instrument Approach Procedure (IAP) be listed as an Alternate?39
What is A Preferred Route?
Where Can You Find Out About Preferred Routes?
Chapter 3: IFR Charts and Information 40
What is a Low Enroute Chart?40
How Long Do Low Enroute Charts Remain Valid For?40
Are The Courses On A Low Enroute Chart Based on True North or Magnetic North? 40
What is a NOTAM?40
<i>What information are commonly included in NOTAMs?</i>
As A Pilot How Can You Find Out About Any NOTAMS?41
What are three types of NOTAMs?42
Chapter 4: How Do Those Instruments Work?

Name the compass errors
When can a magnetic compass be considered accurate?
What is Indicated Altitude?44
What is a pressure altitude?44
What is True Altitude?45
What is Density Altitude? 45
What is Absolute Altitude? 45
What are some limitations of the heading indicator?
What is Slip and Skid?46
How Should You the Pilot prepare the Heading Indicator Prior the Commencing an IFR Flight46
How Should You the Pilot prepare the Heading Indicator Prior the Commencing an IFR Flight
How Should You the Pilot prepare the Heading Indicator Prior the Commencing an IFR Flight
How Should You the Pilot prepare the Heading Indicator Prior the Commencing an IFR Flight
How Should You the Pilot prepare the Heading Indicator Prior the Commencing an IFR Flight
How Should You the Pilot prepare the Heading Indicator Prior the Commencing an IFR Flight



What is Magnetic Bearing?49
What Formula Would You Use For Calculating Magnetic Bearing To and From Stations?
How Do You Calculate for Relative Bearing if Magnetic Bearing (TO) and Magnetic Heading are given?49
What is VOR Waypoint?50
Define a Changeover Point 50
Where do you receive information on available VOR receiver ground checkpoints as well as VOR receiver test facilities (VOT)? 
How Do You Check for VOR Error over FAA- designated airborne checkpoints?
How Do You Check the Accuracy of your VOR Using VOTs on the ground?51
What is the Maximum Allowable Error for VOR receivers on the ground and over airborne checkpoints, respectively?
Are There Alternatives to Certified Airborne Checkpoints?52

	How Often Must a VOR Operational Check be Performed?
	What does a full scale deflection of the VOR CDI Indicate?53
	What Happens when VORs are Undergoing Maintenance?53
	How Many Times is a DME Coded Identification Transmitted?53
	How Do You Know That You Have Just Passed Over a VOR Station?54
	How Much Range Does an H-class VORTAC Facility Have?54
	What Does a "Dot" of Aircraft Displacement Indicate (on the CDI)?54
	<i>What are the Two Formulas for Calculating Time and Distance to Station?</i>
	<i>When Can a Pilot Use a GPS System for IFR Navigation?55</i>
	When Can You Use VFR-certified GPS systems in IFR?56
	Describe an HSI?56
Ch	apter 5: Aviation Weather Related To IFR60
	What causes weather?60
	What are Isobars?



What are the three forces influencing winds? 61
What is an Air Mass?62
Name the 4 main types of fronts62
What Happens When You Fly Across a Front? 63
<i>What Other Bad Side Effects Can a Front Cause?63</i>
What is a Lapse Rate? 63
<i>How can a Pilot Make Use of an Ambient Lapse Rate?64</i>
Describe an Adiabatic Lapse Rate64
<i>What contributes to the growth rate of precipitation?65</i>
How do Clouds Form?65
What are the Four Different Types of Clouds? 
Name the Four Cloud Formations
Which Cloud Formation is Characteristic of Turbulence?66

What Do Fair Weather Cumulus Clouds Indicate?67
<i>What Are Standing Lenticular Altocumulus Clouds?</i>
<i>Which Cloud Families Are Likely to Contribute to Structural Icing?</i>
<i>Typically Under What Conditions Does Structural Icing Develop?69</i>
How Does Icing Affect Flight Characteristics? 69
What is Freezing Rain?70
What is a Freezing Level?70
Define Wind Shear70
What are Microbursts?71
<i>How Does a Microburst After an Aircraft s Performance?71</i>
How Long Does a Microburst Last?
How do thunderstorms form?74
What are the Three Levels of Development In a Thunderstorm?74
What are Embedded Thunderstorms?
If Unintentionally Caught in a Thunderstorm, What is the Proper Procedure?75



What is a Squall Line?76
Compare stable versus unstable air76
When should one expect fog?77
What is Dew Point?77
What are the Four Types of Fog?77
What is an EFAS?79
What is HIWAS?79
Define a METAR80
What is A Weather Depiction Chart?
What is a Station Circle83
<i>What Information Can be Found in a Station Circle?</i> 83
What is a Radar Summary Chart?84
What Symbols Are Used in the Radar Summary Chart?86
PIREPS 87
Where Can You Obtain PIREP?
What is the ASOS?

What is the AWOS?90	)
TAFS91	
Area Forecasts (FA)93	;
Winds and Temperatures Aloft	,
Example95	,
How Does a Winds and Temperatures Forecast Help You?95	;
How can you determine the most favorable altitude, possible icing areas and turbulence from a winds and temperatures forecast?96	;
What is a prognostic chart?	;
What is a convective SIGMET?	•
When Can a Convective SIGMET be Issued? 97	•
Describe a SIGMET (WS)?98	;
What is an AIRMET (WA)?	)
Chapter 6: The FAR/AIM 101	
<i>Which airspace and situational limitations require an IFR rating?101</i>	
When can instrument flying time be logged?	



How Should Flying Time Be Logged for Simulated Flight Conditions?101
What Flight Experience Is Required to Act As Pilot in Command of an Instrument Flight?
What Happens if the Pilot-in-Command Does not Meet the Experience Requirements? 102
What are the Responsibilities as well as
Authorities of the Pilot-in-Command?103
Under Part 91, are Portable Electronic
Devices Allowed for IFR flights ?103
What are the Pre-Flight Responsibilities of
the Pilot in Command? 103
What Instruments MUST Be Working For A
IFR Flight?
14/h of increasions are required for your
what inspections are required for your
What documents are required aboard the
aircraft105
Do aircraft registrations over expire?
What documents must you have on you
always while acting as PIC?

What is a Safety Pilot?107
<i>Under Part 91.123, what is the proper emergency procedure for cases that necessitate deviation from ATC clearance?</i> 
What are the Fuel Requirements for Flying in IFR Conditions?108
Chapter 7: Airspace Related To IFR Operations
Define Class A Airspace
Under Part 91, What are the Requirements for Flying IFR in Class B Airspace?
Define Class C Airspace?109
Define Class D Airspace?110
Is a Transponder Required to Operate in Class D Airspace?110
What Happens When a Control Tower within Class D Airspace Ceases Operations for the Day?110
Define Class E Airspace?110
What are the Altitudes Covered by Class G Airspace?111
Where Can You Find Information on Special Use Airspace?111



Define a Prohibited Area112
What is a Restricted Area?112
What is a Military Operations Area?
Can Civil Aircraft Fly Through a MOA? 112
Define Warning Areas?113
<i>Do You Need A Clearance to Fly Through Warning Areas?113</i>
What are Alert Areas? 113
Can Aircraft Pass Through Alert Areas? 113
What are Controlled Firing Areas?
Define national security areas. (TFR s)114
Can Flights Pass Through NSAs? (TFR s) 114
Chapter 8: IFR Departures115
Define a Departure Procedure115
What are the Two Types of DPs? 115
Are Pilots Required to Always Accept Issued DPs?

What Are The Takeoff Minimums For Aircraft Operating Under Part 91?
<i>What Does a Large T in a Black Triangle Found in the Bottom of the Departure Airport s Approach Chart Represent?118</i>
<i>Where Can Information on Nonstandard Minimums Be Found?118</i>
What are Climb Gradients?
What is the Standard Climb Gradient for Standard Instrument Departures?
What Climb Gradient Can a Pilot Use if None is Specified?119
<i>If Directed to Climb or Descend to a Certain Altitude, What Procedure Should a Pilot Undertake?119</i>
Chapter 9: Aeromedical Factors
What is hypoxia?121
What are the 4 types of hypoxia? 121
What are some symptoms of hypoxia? 122
Explain Hyperventilation123
<i>Name and explain the 8 types of spatial disorientation123</i>
Chapter 10: IFR Enroute128



What is a Minimum Reception Altitude? 128
What is the Minimum Obstruction Clearance Altitude?128
Define a Minimum Enroute Altitude128
Define a Minimum Crossing Altitude 128
What is a OROCA?129
What is the minimum altitude for IFR flight for both mountainous and non-mountainous terrain?
At which altitudes should oxygen be provided to the passengers?
At which altitudes should the minimum flight crew USE supplemental oxygen?
How Long Can Pilots Fly at Cabin Pressure Altitudes of 12,500 to 14,000 feet MSL without Oxygen?
<i>What must a pilot do to obtain VFR-on-top clearance?131</i>
Under a VFR-on-top clearance, what special privileges can a pilot enjoy?

Specifically, what are pilots with IFR flight plans required to do with a VFR-on-top flight clearance?131
Are VFR-on-top operations allowed in all airspace?131
<i>What Happens if the Transponder Fails During Flight?132</i>
What are the three fundamental skills required for attitude instrument flying?132
What is Required for Instrument Interpretation?132
What are the Three Elements of Airplane Control?
What are the Three Divisions of Flight Instruments?133
Name the Four Pitch Instruments133
Name the Four Bank Instruments:133
Name the Three Power Instruments
Define Primary and Secondary Instruments. 
What are the Primary Instruments that Show Straight and Level Flight?
What are the Primary Instruments to Check for Airspeed Changes in Straight and Level Flight?



What are the Primary Instruments Used for Establishing a Level Standard-Rate Turn? 135

What Primary Instruments are Used After Increasing Power to Maintain a Straight, Constant Rate Climb?......137

How is a Standard-Rate Turn Indicated?....138

What are the Indications of a Nose-Low
Unusual Attitude?138
How Do You Recover From A Nose-Low
Unusual Attitude?139
What are the Indications of a Nose-High
Unusual Attitude?139
How Do You Recover From a Nose-High
Unusual Altitude?139
What Hannens if the Pitot Tube s Ram Air and
Drain Hole Are Clogged?
What Hannana if Only the Dam Air Hala is
Clogged?
What Deep It Mean When You Are in Deday
Contact With the Tower?
What Does "Resume Own Navigation" Mean?
What Can You Do If You Believe An Assigned
Altitude of Heading is incorrect?141
When Holding At A Fix With An Uncharted
Pattern, What Information Should You Report
To The ATC to be Given Clearance?
Can You Deviate From Your Flight Clearance
Anytime? 142
What situations require a pilot to report at all
times to the ATC?143



What Does a Pilot Do After Reporting a Missed Approach?144	4
<i>What Information Should A Pilot Give ATC In Case of Loss of Radar Contact?144</i>	4
When Giving a Position Report, What Information Should You Include?	5
Chapter 11: Lost Comm Procedures	5
What is the Procedure When Two-Way Communications Are Lost in IFR Flight?146	5
Chapter 12: IFR Arrival 150	)
What Are The Four Segments Of An Instrument Approach Procedure?	2
Define the Initial Approach Segment 150	)
Define the Intermediate Approach Segment. 	2
Define the Final Approach Segment	)
Define the Missed Approach Segment 15	1
What are the Different Aircraft Approach Categories?15:	1

How Do You Determine Which Aircraft Approach Category is For Your Aircraft? 151
Can You Use Minimums From Another Category Besides the Category Your Aircraft is Listed In?
Define a Minimum Vectoring Altitude152
What is the Decision Height?152
Define an MDA152
What is the VDP?153
What is a Precision Approach?153
What is a Non-Precision Approach?153
Define RVR153
What if the RVR cannot be obtained? 153
What is the Normal RVR Minimum? 153
What are the Components of an ILS? 154
What is the Normal Decision Height When Using a Category I ILS?154
What Functions Does An Outer Marker Typically Do?154
What Functions does the Middle Marker Typically Do?154
What is the Inner Marker?155



What is the Function of the VHF Localizer?
<i>What is the Function of the UHF Glide Slope Transmitter?155</i>
What Minimum Radar Separation Do Parallel ILS Approaches Provide for Aircraft? 155
What Happens When More Than One Component is Rendered Unusable?155
What Happens When the Outer or Middle Markers are Rendered Inoperative?
What s the Procedure for Addressing Glide Slope Failure?156
What Do You Do When You ve Committed to the Glide Slope and the ILS Suddenly Fails?
What are Instrument Approach Fixes?156
When You Encounter a T in a point-down black triangle, What Does It Mean?
What Does an A in a Point-Up Black Triangle Mean?157
What Does It Mean When There is No Procedure Turn Barb on the Approach Chart s Planview?157

<i>If There Are Radar Vectors Provided, Could You Still Execute Course Reversals?</i>
How Much Minimum Safe Sector Clearance Do Minimum Safe Sector Altitudes Provide? 
When Do Published Landing Minimums Apply?
Can You Expect Terrain and Obstacle Clearance With Minimum IAP Altitudes? 158
<i>If You are Being Radar Vectored to an Instrument Approach and You Have a Previously Assigned Altitude, What Do You Do?</i>
Where Can You Find Restrictions to Circle to Land Procedures in an IAP Chart?
What Does A Lightning Bolt Symbol Indicate On The Approach Chart?158
Where Can You Find the Distance from the FAF to MAP for a Nonprecision Approach Using the IAP?158
How Can You Identify the Final Approach Fix for a Nonprecision Approach?159
When Can You Execute an Approach?158
How Is The Rate Of Descent On The Glide Slope Related To The Aircraft s Groundspeed?159



What Usually Happens if the Headwind Suddenly Changed to a Tailwind While Shooting An Approach?
What is the Procedure Required for a Successful Approach if the Headwind Suddenly Changed to a Tailwind?
What s the Maximum Correction Allowed for Completing the Approach?159
What Happens When You Do a Side Step Approach?159
When Should the Pilot Start to Perform a Side Step Approach?159
At What Time Can You Do a Timed Approach?160
Can You Perform a Timed Approach Without the Help of a Control Tower?160
Where Are Timed Approaches Usually Used? 
Can You Execute a Circle-to-Land Approach Anytime You Choose to?160
You Can Find Only Circling Minimums in Some Airports and no Straight-in Minimums. What does that Mean?

Can You Make Straight-in Landings Without
Straight-in Minimums? 161
When Do You Start Descending for the
Runway During a Circling Approach? 161
How Much Obstacle Clearance is
Guaranteed by a Circling Approach
Maneuver?162
What Size are the Circling Approach Areas
According to Aircraft Category?162
When Does a Pilot Execute a Missed
Approach?
· · PP· • • • • • • • • • • • • • • • •
What is the Procedure to Follow if You
Decide to Execute a Missed Approach before
the MAP? 163
If You Lose Visual Contact in a Circle to Land
Procedure in an Instrument Approach, What
Procedure Should You Follow Next?163
What Happens When There is More Than One
Missed Approach Procedure Available for the
Timed Approach?
What Happens When There is More Than One
Missed Approach Procedure Available for the
Timed Approach?164
What is a contact approach?163
When can a pilot request for a contact
approach?164



What is a Visual Approach? 164
Who Issues a Visual Approach Authorization?164
What are the Requirements for a Visual Approach Authorization?164
Are Radar Service Still Available for Contact Approaches?165
What is a Low Approach?165
Describe the characteristics of a localizer- type directional aid. (LDA)
What Minimums Are Usually Published With LDA Approaches?165
What is the Course Width of an LDA? 165
Can you Set Up a GPS Approach without a Receiver Autonomous Integrity Monitoring? (RAIM)
What is the Other Requirement for Using GPS for Navigation and Instrument Approach?166
What is a Holding Procedure? 166
Describe a Holding Pattern

<i>What are the Components of a Holding Pattern?</i>
<i>Define Standard and Nonstandard Holding Patterns167</i>
<i>What are the Three Methods for Entering a Holding Pattern?167</i>
Describe the Parallel Procedure
Describe the Teardrop procedure168
Describe the Direct Entry Procedure 168
Who Can Determine the Holding Pattern Entry Procedure?168
<i>How Can You Determine the Holding Pattern Entry Procedure for the FAA Knowledge Test?</i>
When Does the Outbound Leg Begin?169
What Are The Maximum Holding Pattern Airspeeds for all Aircraft169
<i>What Happens When a Holding Pattern is Used Instead of a Procedure Turn?</i>
What is STAR?169
Is a STAR compulsory?170
How Do You Decline a STAR?170
Can a Pilot Land Even if Actual Visibility is Lower than Published Minimums?



What Procedures is Called for Flight Plan?	r to Close the 170
Is There a Required Ceiling to	Land? 171
Conclusion	171

## **About The Author and About This Book**

PILOT LIFE

Let me tell you something, you're going to rock your instrument pilot checkride! I tell you this and believe it with all my heart! Anyone who has the drive and willingness to pick up and read this book is going to be such a success.

This book is 100% content. Everything you need to know and nothing that you don't. I'm cutting through all the fluff building safe and knowledgeable pilots.

Every question you see in this book **HAS BEEN ASKED ON AN ACTUAL CHECKRIDE**. Some more than others and you'll catch those as you read.

I've been at this thing for over 5,000 hours! Having seen the best and worst of checkrides I'm confident when I say if you study and master this book you'll get through the oral portion of you checkride like it was nothing.

I want you to remember one thing... A good pilot is always learning.



I've based my entire flight school around this model. Just because you've passed your checkride doesn't mean you can stop learning!

When I released my last book *Pass Your Private Pilot Checkride* the amazing thing I found was over half the people who purchased the book the day it came out were already private pilots!? Is that crazy or what?

It really speaks great measures about that person as a pilot. Even though they had the certificate they knew there was more to master.

Especially with instrument flying you can't afford to fall out of proficiency. Follow my model and remember a good pilot is always learning.

Enjoy,

Jason MS chappent

## Chapter 1: Making Sure You're Ready

# What are the Requirements for Applying for an Instrument Pilot Rating?

In order to qualify for an instrument rating, you must accomplish the following requirements:

- A private pilot certificate.
- A working knowledge of the English language.
- A current FAA medical certificate.
- Logged ground training in IFR aside from practical lessons.
- At least a 70% score in the FAA Knowledge Test.
- Flight experience of at least 50 hours of cross country flight time as pilot in command, 40 hours of actual or simulated training in the following areas of instrument flying:
  - a. Instrument training from a certified flight instructor with instrument rating (CFII) for at least 15 hours.
  - An additional 3 hours of training by a CFII within 60 days before the actual practical test.



- c. At least one cross-country flight of purely IFR with a flight plan encompassing at least 250 nautical miles. The flight should also involve three different instrument-aided approaches.
- If any, at least 20 hours of simulation experience under an approved training device.
- Complete a practical test with an FAA inspector or FAA-designated pilot examiner.

I want to add something here... It's important to know that you do need 50 hours of cross country time logged at the time of your checkride. However you can start the flight training process for your instrument upon completion of your private.

# What Areas of Operations Should a Pilot Be Proficient in For an IFR rating?

These areas are as follows:

- Preflight prep and procedures
- Aircraft control clearances and procedures
- Instrument flying

- Navigation systems
- Approaches
- Emergency operations
- Postflight procedures



## Chapter 2: IFR Flight Planning

#### When is the Pilot Required to File a Flight Plan?

The pilot-in-command is required to file a flight plan half an hour before estimated time of departure in order to receive clearance from Air Traffic Control. The flight plan is required to operate in controlled airspace under IFR. It's a good idea to get this in quite a bit ahead of time to allow your flight plan to be forwarded to the controlling agency.

#### Can You Cancel Your Flight Plan?

You may cancel your flight plan when it has shifted to VFR conditions outside of Class A airspace. Take note that you may have to prescribe to other established procedures upon cancellation of your IFR flight plan in areas such as Class B or Class C airspace as well as designated TRSA areas.

# Can You File a Flight Plan with both VFR and IFR Portions?

Yes. Under AIM 5-1-6, you can specify such a flight plan. This is called a composite flight plan.
### When Filing a Flight Plan Would You Request Your Initial or Final Altitude?

You would request the initial altitude you need for your IFR flight. If you need to go up or down to other altitudes, the request should be done in-flight through a direct request with air traffic control.

### What is the Minimum Altitude for an IFR Flight Over Designated Mountainous Terrain?

Unless other wise prescribed in FAR Parts 95 and 97, the minimum altitude for an IFR flight over designated mountainous terrains is 2,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles.

### What is the Minimum Altitude for an IFR Flight Over Non-Mountainous Terrain?

Again, unless other wise prescribed in FAR Parts 95 and 97, the minimum altitude for an IFR flight over non-mountainous terrain is 1,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles.



# When is an Alternate Airport Required in a Flight Plan?

### Popular Checkride Question ALERT!

An alternate airport is required if:

- The intended airport has no instrument approached procedure.
- There is a forecast of less than 2,000 feet ceiling and less than 3 statute miles of visibility for an hour before and after the ETA.

### When Can An Airport Be Used As An Alternate?

Popular Checkride Question ALERT!

Non Precision

The forecasted weather should have at least 800 feet of ceiling and 2 statute miles of visibility at your ETA in order to list an airport with a non-precision approach as an alternate.

Precision

On the other hand, if the forecast indicates at least 600 feet of ceiling together with 2 statute miles of visibility,

an airport with a precision approach can be indicated as an alternate.

#### Can An Airport without an Instrument Approach Procedure (IAP) be listed as an Alternate?

Yes, if forecast weather minimums will allow for a normal descent from the MEA, to approach, and landing under basic VFR.

#### What is A Preferred Route?

Preferred routes are found in your AFD (Airport Facilities Directory) and list preferred routing from one airport to another.. Preferred routes have been established as a means of improving traffic as well as the efficiency of the airports.

### Where Can You Find Out About Preferred Routes?

Information on preferred routes can be found in the Airport/Facility Directory. (AFD)



### **Chapter 3: IFR Charts and Information**

### What is a Low Enroute Chart?

Low Enroute charts are used by IFR pilots to find navigational information for altitudes below 18,000 feet MSL.

#### How Long Do Low Enroute Charts Remain Valid For?

They are current for only 56 days. New versions are published every 56 days.



Are The Courses On A Low Enroute Chart Based on True North or Magnetic North? Magnetic North

#### What is a NOTAM?

NOTAMS, or notice to airmen, are time-critical publications that did not make it in time to get printed on the chart or is temporary information that did not

warrant publication in any aeronautical chart or publication.

# What information are commonly included in NOTAMs?

The information published in NOTAMs varies, but it may include critical information such as runway closures, problems in radar service availability, updated navigational aids, etc...

# As A Pilot How Can You Find Out About Any NOTAMS?

NOTAMs are available immediately upon receipt by the National NOTAM System. They are published either in the *Notice to Airmen Publication* every 28 days as well as through telecommunications networks.

<u>Cutting through the fluff... You can call your local Flight</u> <u>Service Station</u>



### What are three types of NOTAMs?

The three types of NOTAMs are: NOTAM(D), NOTAM (L), and FDC NOTAM.

### NOTAM (D).

A NOTAM(D) contains critical information that may indicate possible closure of airports or other similar facilities.

### NOTAM (L)

A NOTAM (L) provides information on taxiway closures, obstructions near to or crossing runways, failures of airport beacons etc... Information on NOTAM (L) reports are not crucial to non-local aviation.

### FDC NOTAM

FDC NOTAMs contain notifications that are more related to regulations, like IAP amendments and similar aeronautical charts. FDC NOTAMSs are issued by the National Flight Data Center when the need arises.

### Chapter 4: How Do Those Instruments Work?

#### Name the compass errors

Popular Checkride Question ALERT!

Remember UNOS and ANDS

### **Turning Errors**

- U Undershoot
- N North
- O Overshoot
- S South

### **Dip Errors**

- A Accelerate
- N North
- D Decelerate
- S South

### When can a magnetic compass be considered accurate?

Since a magnetic compass is subjected to the interference of electrical and magnetic fields, the only time that you can consider a magnetic compass to be



100% accurate is when you are flying straight and level and are maintaining a constant airspeed.

# How can you ensure that your altimeter is true and correct?

The proper procedure when preflighting a pressure altimeter prior to an IFR flight is to tune it to the local altimeter setting. In order for the altimeter to be more accurate, the pilot has to make sure that the altimeter setting is within 75 feet of actual elevation. Any more that that, the pilot has the responsibility to declare the altimeter erroneous and cancel the flight for safety purposes.

#### What is Indicated Altitude?

Indicated altitude is the value read out by the altimeter, and should be read as such.

#### What is a pressure altitude?

Pressure altitude is the altitude read if the altimeter if is tuned to the setting of 29.92". Pressure altitude is generally used when flights take place at 18,000 ft and above.

#### What is True Altitude?

True altitude is the height flown by the aircraft relative to sea level.

### What is Density Altitude?

### Popular Checkride Question ALERT!

It is another altitude that is computed by the flight computer. By definition, it is pressure altitude corrected for non-standard temperature. Density altitude can also be equal to pressure altitude at standard temperature conditions.

The best way to summarize it... Where the airplane "feels" like it's at altitude wise.

#### What is Absolute Altitude?

Absolute altitude is true altitude minus the elevation of the terrain below the aircraft. Think of it as if you had a laser beam shooting straight down from the airplane. The distance would constantly be changing as you flew over hills and depressions.

### What are some limitations of the heading indicator?

Precession also sometimes referred to as "drift" is when the heading indicator "drifts" off proper heading due to low suction or abrupt maneuvering.



#### What is Slip and Skid?

Slipping is what happens when there is insufficient rate of turn to match the rate of banking the aircraft is going through. On the other hand, skidding is the the opposite of slipping. It happens when the pilot turns too much relative to the amount of bank done by the aircraft.

#### How Should You the Pilot prepare the Heading Indicator Prior the Commencing an IFR Flight

The pilot is required to set the heading indicator to the aircraft's magnetic heading 5 minutes after the engine had been started. Proper alignment should be checked after completing taxi turns in preparation for takeoff.

# How do you check for errors in the attitude indicator?

Your pre takeoff check should be done 5 minutes after engine start-up. What you should do is to check the horizon bar. If the attitude indicator is free of error, the horizon bar will be up and stable. While taxiing, make sure that the horizon bar does not tilt more than 5 degrees.

#### What errors occur in an attitude indicator?

The errors that occur in an attitude indicator are the precession errors, which happen when the gyro is precessed during turns. The error is caused by the effects of centrifugal force on the pendulous vanes. Attitude indicators sustain most precession errors when the pilot stabilizes from a 180 degree turn. Both pitch and bank precession errors will be present in such conditions.

Acceleration and deceleration errors due to precession can also occur for an attitude indicator.

### What does the Distance Measuring Equipment or DME do?

The DME informs the pilot of the slant range distance using nautical miles. Pilots should take note that the DME is prone to having errors especially when the pilot is flying directly over a VOR at high altitudes.



#### When Is DME Most Accurate?

In order to make sure that the reading you get from the DME, is correct you should be at least a mile from the facility for every 1,000 feet of altitude above it. This is because the DME's accuracy is 1 NM.

**Note From Jason:** Listen, I've got to be honest and transparent with you. The next few questions regarding ADF's and NDB's may or may not be relative to you. If your airplane doesn't have an ADF don't sweat it, they are slowly phasing out NDB's anyways! HOWEVER... These questions ARE still on the written test so you'll need to know a thing or to.

#### What is an Automatic Direction Finder?

The ADF is a navigational instrument that looks for direction by homing on the nondirectional beacon.

#### What is Relative Bearing?

RB stands for the relative bearing of the aircraft to the NDB station. Relative bearing to the station can be read from the head of the needle, while the relative bearing from the station is indicated by the tail of the needle. You can also read RB from the fixed card ADF.

#### What is Magnetic Bearing?

The magnetic bearing, on the other hand, is the actual heading to the station with reference to magnetic north. Magnetic bearings to the station can also be read directly from a movable card ADF, which indicates magnetic heading at the top. MB from the station is always indicated by the tail of the needle in a movable card ADF.

### What Formula Would You Use For Calculating Magnetic Bearing To and From Stations?

The Formula for MB(TO) = MH + RB. On the other hand, to get MB(FROM), you can either add or subtract 180 degrees. If the MB (TO) is greater than 180 degrees, subtract 180 degrees and vice versa.

#### How Do You Calculate for Relative Bearing if Magnetic Bearing (TO) and Magnetic Heading are given?

To get RB, you simply subtract the magnetic heading from the magnetic bearing to the station, and then adding or subtracting 360 degrees. The value arrived at should always be between 0 to 360 degrees.



#### What is VOR Waypoint?

A VOR waypoint is a predetermined position that is used for purposes of keeping track of the aircraft as well as giving the pilot a location reference. The waypoint is either reported in data relative to VOR or the universal latitude/longitude coordinates.

### Define a Changeover Point.

A changeover point is a position between two adjacent navigational facilities or even waypoints that would require the pilot to change navigational guidance.



# Where do you receive information on available VOR receiver ground checkpoints as well as VOR receiver test facilities (VOT)?

Pilots can obtain this information from the Airport/ Facility Directory

How Do You Check for VOR Error over FAAdesignated airborne checkpoints?

- Make sure that the CDI needle is centered prior to flying over the checkpoint.
- Once over the checkpoint, turn on the OBS and you will get an indication of error, if any.

# How Do You Check the Accuracy of your VOR Using VOTs on the ground?

This is the process of using VOT's to verify the accuracy of your VOR receiver while on the ground:

- First, obtain the correct frequency.
- Tune in to this frequency and turn on the omnibearing selector. This is to help you arrive at an omnibearing course of 0 or 180 degrees since the VOT also transmit 360 degree radials in all directions.
- Make sure that the CDI needle is centered.
- If you select an OBS course of zero degrees, you will receive an indication of FROM using the TO/FROM indicator. If you select 180 degrees, the indicator should say "TO."
- The OBS will then indicate VOR error. This should be referred to as plus or minus \_\_\_\_\_\_ degrees.



# What is the Maximum Allowable Error for VOR receivers on the ground and over airborne checkpoints, respectively?

The maximum allowable error for calibrating VOR receivers is plus or minus 4 degrees while on the ground, and plus or minus 6 degrees of the designated radial while over designed airborne checkpoints.

# Are There Alternatives to Certified Airborne Checkpoints?

Yes. Pilots can also make use of known ground reference points, but only if they are more than 20 nautical miles away from a VOR station along an established VOR airway.

# How Often Must a VOR Operational Check be Performed?

Under FAR 91, operational VOR checks must be performed once every 30 days, as this is a legal requirement to use the aircraft **for IFR**. Pilots should

also take note to record operation checks and their results in the aircraft log for reference.

# What does a full scale deflection of the VOR CDI Indicate?

The deflection indicates a 10-degree deviation from the course centerline. This can be caused by an OBS setting change of about 10 to 12 degrees.

# What Happens when VORs are Undergoing Maintenance?

The pilot does not receive a coded and/or voice identification from the VOR station. (The Morse Code)

# How Many Times is a DME Coded Identification Transmitted?

A DME coded identification is transmitted once after the fourth or third transmission of a VOR identification. (Typically Every 30 Seconds)



# How Do You Know That You Have Just Passed Over a VOR Station?

The TO/FROM will indicate a complete reversal. The CDI will also show a 1/2-scale deflection as you fly away from the station.

100 NM **How Much Range** 60,000 ft. 🔺 Does an H-class 130 NM **VORTAC Facility** 45,000 ft. 🍝 Have? 18,000 ft. The range of an H-Class VORTAC facility 14,500 ft. 🕳 varies with certain altitudes. From an 1,000 ft. altitude of 1,000 feet to 14,500 feet above

would be 40 nautical miles. However, from 14,500 to 18,000 feet AGL, the range will be 100 nautical miles.

# What Does a "Dot" of Aircraft Displacement Indicate (on the CDI)?

ground level, the range

### Popular Checkride Question ALERT!

A Dot equals to 1 nautical mile of displacement at 30 NM out and 2 nautical miles at 60 NM out. (This is very important to know for the purpose of situational awareness)

# What are the Two Formulas for Calculating Time and Distance to Station?

Using a flight computer, one can calculate time in minutes to station by multiplying the minutes between bearings by 60, and then dividing the product by degrees of bearing change. Distance to station on the other hand can be calculated by first multiplying TAS by the minutes between bearings and then dividing the result by degrees of bearing change.

# When Can a Pilot Use a GPS System for IFR Navigation?

Obviously the unit must first be approved and certified by the FAA. The pilot also has to make sure he has a current and updated database of waypoints and instrument approach procedures. In addition, a pilot needs to make sure that the aircraft has an alternative



navigation system that is approved by the FAA and is appropriate to the route being travelled.

# When Can You Use VFR-certified GPS systems in IFR?

NEVER!

VFR-certified GPS systems and hand-held GPS units can only be used in IFR flights not as primary means of navigation but simply as aids to situational awareness. A goo answer to this question would be "If they're not IFR approved I can't use them for any IFR related activities only for basic situational awareness.

### Describe an HSI?

The HSI bears some common features with the VOR/ ILS indicator like: Image on Next Page...

- Azimuth card
  - Displays the heading under the index on the instrument's top portion.

- Course indicating arrow, which is the same as the OBS indicator
- VOR TO/FROM indicator
- Glide slope deviation pointer
  - Informs the pilot if the course is above or below the glide slope.
- Glide slope warning flag
  - Warns the pilot of errors in the signals received by the glide slope receiver.
- Heading set knob
  - This knob aligns the heading indicator with the magnetic compass.
- Lubber line
  - Displays the heading the aircraft is flying.
- Course deviation bar
  - Displays information about the direction of turn towards the selected OBS station.
- Airplane symbol
  - Represents a bird eye's view of the airplane.
    The airplane symbol does not move, but instead it shows the aircraft's relative position to its course.



- Course setting knob
  - Just like the VOR indicator, the course setting knob is used to make adjustments to the OBS.



On an HSI What If The Needle is Set to the Front Course Heading?

In this case, you will have normal sensing on the HSI. It does not matter if you are flying a front course or approaching on a back course.



### Chapter 5: Aviation Weather Related To IFR

For those of you who are veterans of my Online Ground School or other books know that I really stress aviation weather and this book is no exception. It's a lot of material to digest. The thing to remember is we're not building meteorologists we're creating safer pilots through the knowledge of weather related to IFR flying.

#### What causes weather?

The most basic answer that you need to know is that all weather is the result of a difference in temperature. Weather is primarily caused by heat exchanges in the atmosphere and the surface. When pressure changes, it means that the surface is not heated equally with the atmosphere thus resulting in weather phenomenon.

#### What are Isobars?

Isobars appear on several aviation weather charts/ maps and show areas of like (same/similar) pressure.

### What are the three forces influencing winds?

The three forces that are said to influence winds in are:

### Pressure gradient force

The pressure gradient force is the reason behind the migration of winds to a low pressure area from a high pressure area. In weather maps, it is drawn perpendicular to the isobars.

### Coriolis force

The Coriolis force causes the deflection of winds to the right. The force exerts itself at right angles and is always equal to wind speed.

Its effect is isolated on the Northern hemisphere only, and is a result of the Earth's rotation. Pilots can feel the effect of the Coriolis force more in higher altitudes, specifically more than 2000 feet AGL. Areas affected by the Coriolis force will show winds flowing parallel to isobars in weather maps.

### Surface Friction

Surface friction is caused by obstructions to wind flow such as man made and naturally produced obstructions.



What is an Air Mass?

It is a body of air that is described as having uniform moisture and temperature properties.

### Name the 4 main types of fronts.

Cold Front (1) Leading edge of colder air that is replacing warmer air.

Warm Front (2)

Leading edge of warmer air that is replacing cooler air.

Stationary Front (3) A front that is not moving.

### Occluded Front (4)

When a cold front catches up to a warm front.

A front is an occurrence created by the transition between two air masses that are different in temperature, humidity and wind.



### What Happens When You Fly Across a Front?

The pilot will experience a change in winds when flying across a weather front. While it is not a threat most of the times, a low-level wind shear is bound to occur prior to the passage of a warm weather front over the airport. The same wind shear can also occur similarly but also after the cold front passes the airport.

### What Other Bad Side Effects Can a Front Cause?

Cold fronts can contribute to the formation of frontal waves and tornados when they are moving slowly or have become stationary in one area. Cold fronts can also cause squall lines that move ahead of it.

#### What is a Lapse Rate?

A lapse rate indicates the rate of fluctuation (whether it increases or decreases) of temperature relative to the increase in altitude. It can also be called as ambient lapse rate.



# How can a Pilot Make Use of an Ambient Lapse Rate?

An ambient lapse rate can be a tool to measure the stability of air. For example, if there is a lapse rate of more than 2 degrees Celsius for every 1,000 feet and the air is very humid, it can be a sign of impending thunderstorm activity.

### Describe an Adiabatic Lapse Rate.

The adiabatic lapse rate is the opposite of the ambient lapse rate. It is a measure of the decrease of temperature caused by increases in altitude. This is because air expands as it rises. Take note that the adiabatic lapse rate does not represent a loss of heat.

Average adiabatic lapse rate is about 2 degrees Celsius for every 1,000 feet gained. The actual rate would vary however according to how much moisture there is in the air. Take note, the more moisture there is in the air,

the less stable it is. This is because of its very slow adiabatic lapse rate.

# What contributes to the growth rate of precipitation?

Precipitation is caused by the upward movement of air as well as moisture. The higher the altitude, the cooler the air gets thus moisture condenses until it is saturated and brought down as precipitation.

#### How do Clouds Form?

Cloud formation is generally determined by the stability of the air. The stability of the air determines whether or not there is vertical development, thus resulting into different types of clouds.



### What are the Four Different Types of Clouds?

There are four families of clouds. These families are:

- High
- Middle
- Low
- Clouds With Extensive Vertical development. (Fancy name huh?)

### Name the Four Cloud Formations.

The four cloud formations are stratus, cumulus, nimbus and cirrus clouds.

# Which Cloud Formation is Characteristic of Turbulence?

Nimbus clouds are almost always in direct relation to turbulence. The two types of Nimbus clouds are:

Cumulonimbus clouds

These are characterized by heavy and swelling cloud formations because of extensive vertical development. These are also known to be indications of heavy turbulence especially thunderstorms.

Nimbostratus clouds

Are stratiform clouds that carry precipitation and, eventually, produce rain.

### What Do Fair Weather Cumulus Clouds Indicate?

Fair weather cumulus clouds are indications of turbulence at and below cloud level.

#### What Are Standing Lenticular Altocumulus Clouds?

Standing lenticular altocumulus clouds, otherwise abbreviated as ACSL, are clouds that gather together on top of



barriers to wind flow. For example, clouds found on mountain peaks and volcano craters are ACSL clouds.



They are shaped either like almonds or lens. Pilots should expect very strong turbulence in these clouds.

# Which Cloud Families Are Likely to Contribute to Structural Icing?

The low and vertically developing clouds contribute highly to structural icing. This is because these two families of clouds contain supercooled water, and is very likely to contribute to structural icing. The supercooled water freezes on contact with the aircraft.

The high and middle clouds, on the other hand, consist entirely of ice crystals and do not pose a high risk of structural icing since the crystals are already frozen.

# Typically Under What Conditions Does Structural Icing Develop?

lcing occurs in conditions where there are large supercooled water droplets as well as moisture and high humidity.

Icing can develop when an aircraft passes through freezing rain, because of the presence of large and supercooled water drops, and at altitudes equal or above the freezing level.

### How Does Icing Affect Flight Characteristics?

### Popular Checkride Question ALERT!

This is one of those no-brainers! But needs to be addressed....lcing greatly heightens the risk of stalling and reduces the maneuverability of an aircraft. Specifically, pilots will experience lift that is up to 30% less than what it was before the development of icing. Aircraft with significant icing conditions can also experience increased drag of up to 40%. Frost along with ice can significantly alter the performance of an aircraft and will even endanger it.



#### What is Freezing Rain?

Freezing rain is precipitation that instantly freezes into ice after impact, and is a leading cause for icing. On the other hand, freezing rain in certain altitudes can be avoided by climbing since it indicates above freezing levels in higher altitudes.

### What is a Freezing Level?

Freezing levels are altitudes where snow, frost and ice are likely to develop. You can calculate freezing levels by knowing the temperatures at a certain level together with the elevation.

#### Define Wind Shear.

Wind shear is defined as occurring when there are sudden changes in wind velocity. Wind shear occurs as both vertical and horizontal phenomenon and can develop at **any altitude**. All it needs is two adjacent air

flows that travel in opposite directions as well as different speeds.

#### What are Microbursts?

These are simply smallscale downdrafts. Despite being small, they are



quite intense. These concentrated downdrafts can prove deadly to aircraft of ALL sizes.

### Where Do Microbursts Come From?

Microbursts usually originate from any low or middle layer convective clouds.

# How Does a Microburst After an Aircraft's Performance?

The effects of a microburst on an aircraft's performance varies:

 If the aircraft penetrates against the microburst, it may encounter improved performance



because of increased tailwind from the expansion.

• If the aircraft is penetrating with the microburst outflow, it will experience increased headwinds and strong downdrafts from the microburst.

The aircraft below was at a level altitude for the last 1,000 feet and believed to be caught in an extreme downdraft (microburst) Now what would that same downdraft do to your trainer aircraft? I can't give enough emphasis avoid storms and poor weather days!
### A Note From Jason

A Microburst is NOTHING to mess around with these concentrated areas can be detemential to aircraft. If you don't believe me have a look below.



## How Long Does a Microburst Last?

A microburst has a maximum life of 15 minutes starting from impact with the ground until it has completely dissipated.



#### How do thunderstorms form?

Thunderstorms are formed when there is enough moisture in the air in the form of water vapor, coupled with an unstable lapse rate and ideal upward lift. Other factors that can contribute to its formation include surfacing heating, convergence zones, sloping terrain, and many others.

The three ingredients needed for a thunderstorm to form are: A difference in temperature, moisture, and an uplifting action.

## What are the Three Levels of Development In a Thunderstorm?

The three levels of a thunderstorm's development are as follows:

Cumulus

This is the first stage of development, and is characterized by updrafts.

Mature

The first sign of rainfall begins the mature stage. It is also characterized by the presence of both updrafts and downdrafts. Wind shear also

maintains a presence during the mature stage of a thunderstorm's development.

Dissipating

The dissipating stage is when the rain clouds begin to "rain" themselves out (Larger droplets for a short period of time)

## What are Embedded Thunderstorms?

Embedded thunderstorms are thunderstorms that can be found within layers of clouds. These thunderstorms are more hazardous because they cannot be spotted visually and could mean trouble for any plane caught inside the clouds they are embedded in.

## If Unintentionally Caught in a Thunderstorm, What is the Proper Procedure?

This my friends is a predicament. Two options and two schools of thought. Any book you read will tell you to continue forward and accelerate to your aircrafts maximum turbulence penetration speed (Va). However I disagree...

Continuing into a thunderstorm is not smart in the least bit. You as the pilot need to exercise good judgement and before the storm or turbulence gets too extreme



make a **<u>shallow</u>** 180 degree turn back to where you came from because flying into a thunderstorm in our tiny training aircraft or any aircraft for that matter will be detrimental.

## What is a Squall Line?

Squall lines are described as a non-frontal line composed of active steady-state thunderstorms.

## Compare stable versus unstable air.

Stable air - calm air

Unstable air - Turbulent

Characteristics of a stable air: include stratiform clouds, continuous precipitation, smooth air, and fair to poor visibility in haze and smoke.

Characteristics of Unstable air:

Cumulus clouds, showery precipitation, good visibility, strong surface winds.

### When should one expect fog?

Fog can be expected when there is a temperature-dew point spread of at most 3 degrees Celsius. (The closer together more likely the chance of fog) Example 15/16 as read in a METAR.

### What is Dew Point?

When the temperature results to the air having 100% humidity, that temperature is the dew point.

## What are the Four Types of Fog?

The four types of fog are:

Radiation fog

Radiation fog is a result of rapid drop in ground temperature, which causes surface air to cool faster than in higher altitudes. Because of this, radiation fog can be encountered only during clear skies where there is minimal wind activity as well as minimal spread between temperature and dew point on the ground.

• Advection fog



Advection fog is the result of the movement of moist air over cool surfaces, especially near coastal areas. The colder temperature of the surface causes moisture to condense and become fog.



Upslope fog

When warm moist air is carried by the wind up sloping terrain, upslope fog forms.

Precipitation-induced fog

This type of fog is created by warm precipitation falling over colder air. The precipitation saturates the colder atmosphere as it evaporates.

Aside from these, fog caused by industrial pollution can also be encountered as a result of the high amounts of condensation nuclei from the pollutants.

#### What is an EFAS?

EFAS is an acronym for the Enroute Flight Advisory Service. This is, as its name suggests, a service designed to help aircraft enroute to a certain destination have access to updated weather advisories. Also known as Flight Watch, EFAS can also be used for pilots to provide weather reports on observed conditions to their fellow aviators. **Favorite Checkride Question... Which Frequency? ... 122.0** 

#### What is HIWAS?

In contrast to the EFAS, the HIWAS is a specific service designed to warn pilots about incoming hazards in the weather. An acronym for the Hazardous In-Flight Weather Advisory Service, it continually broadcasts aviation weather reports across a VOR frequency.



## Define a METAR.

METAR is an Aviation Routine Weather Report. Better said it's a surface observation

## How Long are they valid for?

Hourly

## When are they issued? 55 minutes past the hour

#### Practice

METAR KJFK 242235Z 28024G36KT 7SM -RA BR BKN009 OVC020CB 26/24 A2998 RMK AO2 SLP993 T02640238 56012

**KJFK** -Station ID 242235Z -Prepared on the 24th at 2235 Zulu (UTC)

**28024G36KT** -Winds are from 280 at 24 Knots Gusting to 36 Knots

7SM - Visibility 7 Statute Miles

-RA BR - Light Rain (-RA) Mist (BR)

**BKN009 OVC020CB** - Ceiling 900ft broken, 2,000ft Overcast, Cumulonimbus

**26/24** -Temperature 26 degrees C, dew point 24 degrees C

A2998 - Altimeter 29.98

RMK -Remarks

AO2 -Station has automatic precipitation discriminator

**SLP993** -Sea level pressure 999.3 hectopascals (add either a "9" or "10" whichever ' makes the number closest to 1,000

**T02640238** -Exact Temperature 26.4, Exact Dewpoint 23.8

**56012** - Atmospheric Pressure lower since previous 3 hours ago ("5" means Atmospheric Pressure. If the next number is a 1,2,3 the Atmospheric Pressure has increased since the previous 3 hours. 4 means it has stayed the same, 5,6,7,8 Means its has decreased. In our case it has decreased "thus the 6" by .12 This tends to be the main trouble maker for most people.



### What is A Weather Depiction Chart?



The weather depiction chart is complementary material for a METAR. The METAR is the basis of the information that is outlined in the weather depiction chart, which the computer uses to then generate the chart.

## What is a Station Circle

This is a circle that is used to symbolize the reporting station in a weather depiction chart. If the station is an automated METAR issuer, the circle has a bracket to its right.



#### What Information Can be Found in a Station Circle?

The following data is denoted by the station circle:

- The intensity of the shading of the circle indicates the total sky cover.
- Cloud height is indicated in numbers below the station circle. The data is always in hundreds of feet and above ground level.



- Weather and visibility factors are indicated to the left or above the station circle. The latter is intended for readability only.
- Visibility less than 6 SM is indicated to the left of the weather and visibility factors.
- Ceiling and visibility, shown in three categories:
  - a. IFR

If ceilings are less than 1,000 feet, a hatched area and a smooth outline will be used. The same thing will be done for visibilities less than 3 SM.

- b. Marginal VFR
- c. VFR

#### What is a Radar Summary Chart?

These are preflight charts that provide information about precipitation as described by reports derived from radar. You can find data about squall lines, specific thunderstorm cells, and other dangerous forms of precipitation you may encounter enroute.

Specifically, you may find this information and more in a Radar Summary Chart:

- Echo pattern and coverage
- Weather associated with echoes
- Intensity (contours)
- Height of echo tops
- Movement of echoes

The information in the Radar Summary Chart is best used together with other weather charts.



## What Symbols Are Used in the Radar Summary Chart?



The Radar Summary Chart makes use of the following symbols:

• R – stands for rain

- RW means rain shower
- S stands for snow
- SW snow shower
- T thunderstorm
- NA Not available
- NE No echoes
- OM Out for maintenance
- Arrow and number the number indicates wind speed of weather cell in knots, while the arrow indicates direction.
- LM Little movement

## PIREPS

#### When are they issued?

Pireps are issued by you the pilot. So whenever a pilot in your area issues a Pirep you'll see it.

Required data found in all PIREP's are as follows:

UA or UUA used to identify the PIREP as routine

(UA) or urgent (UUA).

/OV location of the PIREP

/TM time the PIREP was received from the pilot



/FL flight level or altitude above sea level at the time the PIREP is filed /TP aircraft type

optional info to be reported and displayed:

/SK sky cover /TA temperature /WV wind velocity /TB turbulence /IC icing /RM remarks

## Practice

UA /OV YSP 090025 /TM 2120 /FL050 /TP BE99 / SK 020BKN040 110OVC /TA -14 /WV 030045 /TB MDT CAT 060-080 /IC LGT RIME 020-040 /RM LGT FZRA INC

Which reads as:

Aircraft observation was 25 NM east of the Marathon, Ontario VOR/DME at 2120 UTC. The aircraft was at 5,000 ft and is a Beech 19. The clouds were broken at 2,000 ft MSL with tops at 4,000 ft and an overcast layer

at 11,000 ft AMSL. The temperature is -14 Celsius and the winds are from the NE at 45 knots. There is moderate clear air turbulence between 6,000 ft and 8,000 ft. There is light rime icing between 2,000 ft and 4,000 ft. Note this would indicate that the icing is picked up in the cloud. The remarks section says that light freezing rain was encountered in the cloud.

## Where Can You Obtain PIREP?

A Pilot Report can be obtained either individually or part of a surface aviation weather report.

## What is the ASOS?

The ASOS – short for Automated Surface Observation System – is an up-to-date, timely broadcasting of weather observations. The ASOS, which is the United States' primary surface weather observation system, provides observations to the pilot by the minute. These information are also used to compile and generate Surface Aviation Observation or any other relevant report.



#### What is the AWOS?

The AWOS stands for the Automated Weather Observation System. You can only find this system in selected airports nationwide. The FAA handles the installation of this system and thus has exclusive discretion on which airport is to be installed with this, and which ones would not. Using ground-to-air communication systems as well as through a telephone answering machine, the AWOS system gives out automated reports on ceiling/sky conditions, visibility, temperature, dew point, wind direction/speed/gusts, altimeter settings and at times remarks on density altitude, variable visibility and variable wind direction.

## TAFS

How Long are they valid for? Usually 24 hours

#### When are they issued?

4 Times daily

Practice KCRG 282323Z 290024 08009KT P6SM FEW025 BKN250 FM0400 VRB03KT 6SM BR SCT120 SCT250 TEMPO 0912 4SM BR FM1400 36005KT P6SM SCT030 SCT120 FM1800 04010KT P6SM VCTS SCT040CB SCT250 PROB30 1821 2SM TSRA BKN025CB

282323 - The TAF was prepared on the 28th at 2323Z

**290024** - This TAF is valid from the 29th at 00Z till the 30th at 24Z

On the Forecast you will see one of the following

**FM**(time) The From group, the group most commonly seen, it shows a rapid or significant change occurring in less than 1 hour.

**BECMG**(time) The Becoming group shows a gradual change over time. The time period for this change is show in the digits to follow the group



ex: BECMG 0103 OVC12 (sometime between 01Z and 03Z the ceiling will gradual drop to Overcast at 1200ft

**TEMPO**(time) The temporary group is used to show fluctuations of wind, visibility, or sky conditions expected to last for LESS THAN 1 hour, and expected to occur during half of the given time period.

ex: TEMPO 1216 2SM BR (lasting only half the time period of between 1200Z and 1600Z the visibility will drop to 2SM because of mist.

**PROB30** or **PROB40** Both stand for probability, the 30 being and 30% chance the conditions could happen and the 40 being a 40% it could.

ex: PROB30 1821 2SM TSRA BKN025CB - There is a 30% chance that between 1800Z and 2100Z the visibility could drop to 2SM due to Rain and Thunderstorms, the ceiling could be as low as Broken at 2,500 with cumulus clouds.

#### **Describe Terminal Aerodome Forecasts or TAFs?**

The TAF outlines expected meteorological conditions at a certain period given a specific period of time. For example, if the TAF says it is forecasting conditions for

the next 24 hours, then the forecast is only applicable for that time.

### Area Forecasts (FA)

Area forecasts are 12 hour aviation forecasts plus a 6 hour categorical outlook prepared 3 times daily with each section amended as needed.

### What do they tell you?

They give general descriptions of potential hazards, airmass and frontal conditions, icing and freezing level, turbulence and low-level windshear and significant clouds and weather for an area the size of several states. Heights of cloud bases and tops, turbulence and icing are reported **ABOVE MEAN SEA LEVEL (MSL)**; unless indicated by Ceiling (CIG) or **ABOVE GROUND LEVEL (AGL)**. Each SIGMENT or AIRMET affecting an FA area will also serve to amend the Area Forecast.

#### How are they displayed?

Area Forecasts are broken up into 4 sections

- Communications and Product Header
- Precautionary Statements
- Synopsis
- VFR Clouds and Weather



The are also divided up into 6 geographic sections

## Practice

NC CSTL PLAIN...OVC010-020. VIS 3-5SM -RA BR. 22Z ISOL TSRA. CB TOP FL350. WND SE 20G30KT. 01Z CB TOP FL300. OTLK...IFR CIG RA

Which Reads As:

North Carolina Coastal Plain

Overcast 1,000 to 2,000 ft MSL

3-5 Statue Miles visibility in light rain and mist

At 2200 zulu Isolated thunderstorms and rain with cumulus cloud tops at 35,000 ft

Wind from the Southeast at 20 knots gusting to 30 knots

From 0100 zulu cumulus cloud tops at 30,000

Outlook IFR because of Ceilings and Rain

#### Winds and Temperatures Aloft

Winds and temperatures aloft forecasts are 6, 12, and 24 hour forecasts of wind direction to the nearest 10 degrees **based on true north** and speed in knots for selected flight levels. Forecast Temperatures Aloft (degrees Celsius) are included for all but the 3000 foot level.

### Example

FD WBC 121645 BASED ON 121200Z DATA VALID 130000 Z FOR USE 2100-0600Z. TEMPS NEG ABOVE 24000 FT.

3000 6000 9000 18000 4000 30000 34000 39000 BOS 3127 3425-07 3420-11 3421-16 3512-38 311649 292451 283451 JFK 3026 3327-08 3324-12 3120-27 2923-38 284248 285150 285749

Which Reads As:

At 6000 feet MSL over JFK wind from 330 degrees at 27 knots and a temperature of -8 degrees Celsius.

## How Does a Winds and Temperatures Forecast Help You?

The FD is useful for determining the following:



- Most favorable altitude for flying
- Areas of possible icing
- Temperature inversions
- Turbulence

### How can you determine the most favorable altitude, possible icing areas and turbulence from a winds and temperatures forecast?

The most favorable altitude can be determined by noting the winds as well as the direction that you are taking for your flight. As for icing, a pilot can determine which areas are possible if the forecasted temperature is -20 to positive 2 degrees Celsius. Turbulence is possible if there are abrupt changes in wind direction as the altitude changes.

## What is a prognostic chart?

The low level significant weather prognostic chart is different from other charts in that it is a forecast chart (not an observation chart). The "prog" chart is issued four times daily and provides a 12-hour and a 24-hour

weather forecast for a given region. It also, only covers from the surface up to the 400-millibar pressure level (24,000 feet in altitude). It is to be used only in planning flights below 24,000 feet. It is one of the more widely used because of its ease to read.

#### What is a convective SIGMET?

A Convective SIGMET is issued when there is a possibility of extreme turbulence as well as conditions that can result to severe icing or low-level wind shear. The convective SIGMET is designed for all categories of aircraft, and are broadcasted 55 minutes past the hour. Special bulletins may be issued anytime but would be updated at H+55.

#### When Can a Convective SIGMET be Issued?

A convective SIGMET may be issued by a forecaster when these conditions for thunderstorms are present in a specific area:

- Surface winds exceeding 50 knots.
- Tornadoes
- Surface hail greater than 1/4 of an inch in diameter.



Additionally, a convective SIGMET may be issued if there are:

- Embedded thunderstorms
- The presence of more than one thunderstorm after the other.
- Level 4 thunderstorms that are affecting an area of at least 3,000 square miles.

## Describe a SIGMET (WS)?

As compared to the convective SIGMET, the WS is issued for non-convective weather conditions. Like the convective SIGMET, it is also issued in the face of weather that is potentially dangerous to any type of aircraft.

A SIGMET (WS) is issued when any or all of these conditions are present: **NOTE: These are conditions NOT associated with convective activity otherwise it would be a convective SIGMET** 

- Severe icing, turbulence or clear air turbulence without an indication of thunderstorms
- Conditions that can lower surface or aerial visibility to only 3 miles. These conditions include duststorms, sandstorms and ashfall from volcanic eruptions

## What is an AIRMET (WA)?

AIRMETs are issued for conditions that are less severe as compared to the SIGMET reports. They are usually broadcasted to pilots that are enroute as well as those that are just preflighting their aircraft. A pilot can obtain updated AIRMET bulletins once every six hours.

AIRMET (WA) reports describe the following conditions:

- Icing and turbulence of moderate intensity.
- Surface winds at least 30 knots.
- Reduced visibility of less than 3 miles at 50% of the area being traversed or about to be traversed by the aircraft.
- Obscured mountainous terrain



There are 3 types of AIRMETS

AIRMET Tango - Turbulence/strong surface winds

AIRMET Sierra - IFR conditions and or mountain obscurations

AIRMET Zulu - Icing

## **Chapter 6: The FAR/AIM**

## Which airspace and situational limitations require an IFR rating?

The pilot needs an instrument rating in order to operate in Class A airspace. For commercial pilots, they are not allowed to fly at night with passengers if they don't hold an instrument rating nor can they ferry passengers in cross-country flights past a 50 nautical mile radius.

#### When can instrument flying time be logged?

Flying time can only be considered instrument flying time when the pilot refers solely to the instruments with little to no VFR involved. Actual and simulated flight conditions can be logged as instrument flying time.

## How Should Flying Time Be Logged for Simulated Flight Conditions?

Flying time should be logged with the following information: location, type of instrument approach, and safety pilot's name.



## What Flight Experience Is Required to Act As Pilot in Command of an Instrument Flight?

In order to act as pilot-in-command of an IFR flight, the pilot needs to have logged flight time in the previous 6 months containing:

- Six or more instrument approaches
- Holding procedures
- Intercepting and tracking courses solely by navigation systems.

## What Happens if the Pilot-in-Command Does not Meet the Experience Requirements?

The pilot would be required to submit to and pass a proficiency check to be conducted by an FAA inspector, an FAA pilot-examiner or a CFII.

## What are the Responsibilities as well as Authorities of the Pilot-in-Command?

The pilot-in-command bears the responsibility of ensuring the airworthiness and operation of the aircraft before each IFR flight commences.

## Under Part 91, are Portable Electronic Devices Allowed for IFR flights?

Portable electronic devices that interfere with the instruments are not allowed aboard an IFR flights. If there are any, these portable devices should be switched off.

## What are the Pre-Flight Responsibilities of the Pilot in Command?

#### Popular Checkride Question ALERT!

Before commencing each IFR flight, the pilot-incommand is responsible for obtaining information regarding:

• Weather reports and forecasts



- Fuel requirements
- Available alternative landing fields
- Existing traffic delays
- Lengths of runways available at intended airports
- Takeoff and landing distance information

## What Instruments MUST Be Working For A IFR Flight?

## Popular Checkride Question ALERT!

An aircraft needs to be equipped with the necessary VFR systems for day and night flying as well as the following instruments:

Remember the acronym GRABCARD

- Generator/alternator with adequate capacity
- Radios
- Altimeter

- Ball (The ball in your turn coordinator)
- Clock
- Attitude Indicator
- Directional gyro

### What inspections are required for your aircraft?

As a general rule almost every aircraft can fall under the acronym "AVIATES"

A - AD's (airworthiness directives)

V - VOR Check every 30 days (IFR Only)

I - Inspections: Annual and 100 hour (100 hour is only if flown for hire)

- A Altimeter every 24 calendar months
- T Transponder every 24 calendar months
- E ELT every 12 calendar months
- S Static System every 24 calendar months

## What documents are required aboard the aircraft.

To help us remember what documents are required aboard our aircraft at all times we've developed the acronym ARROW

- A Airworthiness Certificate
- **R** Registration Certificate
- R Radio License (International Flights Only)
- O Operations Manual
- W Weight and Balance Documents



Source: 14 CFR 91.203 & 91.9

### Do aircraft registrations ever expire?

No, they by nature don't have an expiration date. However they can be nullified (made void) the acronym to remember that is 30FTDUC "30 Foot Duck"

30 - Thirty Days After Death

F - Foreign Registry (change to another country for aircraft registration)

T - Transfer of Ownership (If you sell your airplane)

- D Destroyed (If the aircraft is destroyed)
- U United States citizenship revoked
- C Cancelled

Source: FAA-H-8083-25

## SPECIAL UPDATE: Aircraft Registrations Now Must Be Renewed Every 3 Years!

## <u>The Above Acronym Still Applies However You</u> <u>Must "Re-Apply" For Your Certificate Every 3 Years!</u>

## What documents must you have on you always while acting as PIC?

To act as PIC (Pilot in Command) aboard an aircraft you must have:

- Photo ID (Drivers License, Military, ID etc...)
- Pilot Certificate
- Medical

## What is a Safety Pilot?

A safety pilot is someone who holds at least a private pilot certificate and serves as your eyes outside the cockpit under simulated instrument conditions.

# Under Part 91.123, what is the proper emergency procedure for cases that necessitate deviation from ATC clearance?

The pilot is required to notify air traffic control at once. The pilot may be required to submit a detailed report within 48 hours once he has been given priority by the controller, even if the action broke no rule. The pilot should submit the report to the ATC facility manager.



## What are the Fuel Requirements for Flying in IFR Conditions?

## Popular Checkride Question ALERT!

An aircraft must have sufficient fuel to fly to <u>both</u> <u>intended and alternate airports</u>, as well as 45 minutes of flight at normal cruising speed.
### Chapter 7: Airspace Related To IFR Operations

#### **Define Class A Airspace**

Class A airspace encompasses altitudes from 18,000 MSL all the way to FL 600.

# Under Part 91, What are the Requirements for Flying IFR in Class B Airspace?

To operate in Class B airspace, the aircraft must have the following requirements:

- Facilities for two-way radio communications with ATC.
- Mode C transponder
- VOR receiver (Remember we're talking IFR now)

#### Define Class C Airspace?

Class C airspace starts from the surface to 4,000 feet above airport elevation and has a 10-nautical mile shelf area encompassing 1,200 feet to 4,000 feet above airport elevation. This airspace extends on a 5 nautical mile radius core surface area and surrounds airports that have operational control towers, radar approach control and a number of IFR operations.



#### Define Class D Airspace?

Class D airspace starts from the surface to 2,500 feet MSL above the airport elevation. Extending in a radius of 4nm

# Is a Transponder Required to Operate in Class D Airspace?

FAR 91 does not require a transponder to operate in Class D airspace. So there is no deviation required in the event of transponder failure in Class D airspace.

### What Happens When a Control Tower within Class D Airspace Ceases Operations for the Day?

The rules that may apply would either be Class E surface area rules, or both Class E rules up to 700 feet AGL and Class G rules for the surface.

#### Define Class E Airspace?

Class E airspace is controlled airspace that does not belong to any of the other airspace classes. It usually starts from the surface but can also begin from a

designated altitude and extend to the controlled area of the airspace.

Class E airspace can also have a floor of either 700 or 1200 feet AGL depending if it is designated with an IAPapproved airport or a Federal airway, respectively. This is shown by the faded magenta circle known as a "transition area"

#### What is Class G Airspace?

Class G Is uncontrolled airspace that does not belong to either of the first 4 classes of airspace.

### What are the Altitudes Covered by Class G Airspace?

Class G can stretch from the surface to the 14,500 feet MSL, but this ceiling is lower if Class E airspace has been designated at a lower altitude. (Remember those Transition Areas of Class E Airspace)

# Where Can You Find Information on Special Use Airspace?

Information on special use airspace can be found in the Low Enroute Chart, whose legends include special use airspace.



### Define a Prohibited Area.

It is the area in the airspace where no aircraft is allowed to fly.

(Look For P-50 In Example To The Right)



#### What is a Restricted Area?

A restricted area is a type of special use airspace that requires aircraft to get clearance or radar vectors from the controlling agency in order to navigate. This type of airspace usually has invisible hazards to the aircraft.

#### What is a Military Operations Area?

This is a part of the airspace that is intended to separate civil from military aviation activity.

#### Can Civil Aircraft Fly Through a MOA?

VFR flights can navigate through this area even without permission, but caution should be observed. For IFR

flights, pilots are **required** to contact ATC for clearance or for radar vectors around the area.

#### **Define Warning Areas?**

Warning areas are airspace that extends outward from the coast of the United States in a distance of at least 3 nautical miles. It may also extend to international waters.

### Do You Need A Clearance to Fly Through Warning Areas?

You don't need clearance to navigate through warning areas, but you are advised to file a flight plan since any activity in the warning areas may be dangerous to nonparticipating aircraft.

#### What are Alert Areas?

Alert areas are regions that contain high pilot activity, including but not limited to training.

#### Can Aircraft Pass Through Alert Areas?

Yes, but extreme caution should be exercised by VFR flights. IFR flights should request clearance or radar vectors in order to navigate through alert areas.



#### What are Controlled Firing Areas?

Like Alert areas, Controlled Firing Areas have high concentration of activity that can be dangerous to nonparticipating aircraft. However, since they are not charted, activity in CFAs are automatically ceased to give priority to nonparticipating aircraft when spotter aircraft or radar detects these aircraft approaching.

#### Define national security areas. (TFR's)

A National security area is airspace that encompasses the immediate vicinity of a national security establishment.

### Can Flights Pass Through NSAs? (TFR's)

Again, think TFR (Temporary Flight Restriction) Because security is necessary for the vicinity, pilots are requested to avoid flying over NSAs at all costs unless authorized by the controlling agency. If the situation is deemed fit, regulations may enforce a no-fly zone and suspend aviation activity over the NSAs.

### **Chapter 8: IFR Departures**

#### Define a Departure Procedure.

The Departure Procedure or a DP is a coded procedure that ATCs at certain airports. They are designed to simplify delivery of clearances. DPs can be found in text and graphics format at the Terminal Procedures Publication.

#### What are the Two Types of DPs?

The two types of DPs are the pilot navigation and vector DPs.

#### Are Pilots Required to Always Accept Issued DPs?

Pilots have the prerogative to refuse DPs especially if they have no access to any graphical or textual representation of the departure procedure.





### What Are The Takeoff Minimums For Aircraft Operating Under Part 91?

There are none! Scary huh? You can talk off in zero/ zero

Ok so let's compare that to the question below...

# What are the Takeoff Minimums Under FAR/CFR Parts 121 or 135?

The aforementioned CFR parts indicate the following visibility minimums for take-off:

- Single or twin engine aircraft 1 statute mile visibility.
- Aircraft with more than 2 engines 1/2-statute mile visibility.

Now You re not going to be asked something like the question above unless you re flying for an airliner or charter company but I just put it in there for comparison to our part 91 operations



#### What Does a Large T in a Black Triangle Found in the Bottom of the Departure Airport's Approach Chart Represent?

The T alerts pilots that nonstandard takeoff minimums and procedures exist in the departure airport.

Multiple nees and bosites begining 3464 moin PER/7.32 ten of centennie, up to 1.00 MOL/0177 mat V DEPARTURE ROUTE DESCRIPTION TAKE-OFF RUNWAY 33: Climbing right turn heading 345°, maintain 16000 or assigned altitude for radar vectors to assigned route/fix. Expect clearance to filed altitude 10 minutes after departure. LOST COMMUNICATIONS: If no transmissions are received for one minute after departure, turn left heading 270° to intercept and proceed via the I-PKN NW course (outbound) to LINDZ INT/DBL R-244/13 DME, thence via assigned fix/route.

# How Does a Pilot Determine Takeoff Minimums in an IFR Flight?

If no instrument approach procedure has been defined for the airport, the pilot should apply basic VFR minimums. Otherwise, he should refer to the prescribed instrument approach procedure for the airport. BE SMART! Don't ever push it. If you have to question it, it's most likely a no-go.

### Where Can Information on Nonstandard Minimums Be Found?

Listings for non-standard takeoff minimums can be found in the "IFR Takeoff Minimums and Procedures" of every Terminal Procedures Publication.

#### What are Climb Gradients?

Climb gradients are standards established in order for departing aircraft to clear out obstacles in different altitudes. They are used to determine climb rates to be used by pilots to avoid obstructions from above.

### What is the Standard Climb Gradient for Standard Instrument Departures?

The standard climb gradient is 200 feet per 1 nautical mile.

### What Climb Gradient Can a Pilot Use if None is Specified?

He should use the standard climb gradient if the airport has not specified a climb gradient upon departure.

#### If Directed to Climb or Descend to a Certain Altitude, What Procedure Should a Pilot Undertake?

Pilots should, after acknowledgment of directions, descend or ascend to 1,000 feet above or below the prescribed altitude using the optimum rate prescribed by the aircraft's operating characteristics. Afterwards, pilots should proceed to the assigned altitude at a climb



or descend rate of between 500 and 1,500 feet per minute.

### **Chapter 9: Aeromedical Factors**

#### What is hypoxia?

Hypoxia is most simply put is a lack of oxygen to the brain.

#### What are the 4 types of hypoxia?

1. Hypoxic hypoxia is the most common and is caused by decreased oxygen or the inability to diffuse the oxygen across the lungs. If this happens, the person has less than 100% saturation of the blood in the arteries. This can happen if you are at an altitude where the oxygen content of air is low (i.e., over 12,500 feet). Another problem would be if a person's lungs were damaged so oxygen transfer was impaired.

2. Hypemic hypoxia is caused by the reduction of the oxygen carrying capacity of the blood. Anemia (low hemoglobin) can cause this. The oxygen is available, but there isn't enough good blood to carry the oxygen. Carbon monoxide poisoning will cause this type of Hypoxia The blood holds on to the carbon monoxide from the exhaust leak in your engine and your capacity to carry oxygen decreases, you become hypoxic!

3. Stagnant hypoxia is caused by reduced cardiac output (the pump isn't working good enough) or by venous pooling during high G force stresses. We are all getting older and we have to remember that the function of the heart is essential for pumping the oxygenated blood.



4. Histotoxic hypoxia occurs when all systems are working but the cells can't "take" the oxygen from the blood. The oxygen is available. Alcohol or cyanide poisoning can cause this.

#### What are some symptoms of hypoxia?

Headache, Dizziness, Cyanosis, and Euphoria

These keep in mind are just a few

Everyone reacts differently, however you will repeat the same symptoms in the same order each time.

#### Explain Hyperventilation.

The most important thing to remember is the signs of hypoxia and hyperventilation are almost the same, this is why it's best to treat for the worst (hypoxia) to save someone's life if the situation is serious enough.

Hyperventilation can also be called "over-breathing" the person is breathing at too rapid of a rate and exhaling all of their carbon dioxide from the blood.

Usually the cause of panic, the best cure is to breath into a bag or simply calm yourself or your passenger down.

Keep in mind the symptoms to hyperventilation and hypoxia are EXACTLY the same.

### Name and explain the 8 types of spatial disorientation.

Spatial Disorientation is the state of confusion where the pilot loses orientation to the horizon.

First up is **The Leans**. The leans occur when a quick correction of a banked attitude happens to slowly. The sensory in your inner ear send your brain the sensation of banking in the opposite direction. However the disoriented pilot will just over bank in the wrong direction possibly rolling the aircraft.

**Coriolis Illusion -** The Coriolis Illusion Is caused by making a quick head movement during a constant rate turn that has ceased stimulating the inner ear. The most common occurrence of this is. A pilot making a timed



180 degree turn for one minute, dropping a pen, approach plate etc. Thus stirring up the fluid in the inner ear, when the pilot comes back up he will feel as though he is straight and level, although his



instruments show he is still turning. It is best to avoid abrupt head movements while under IFR.

#### Graveyard Spin -

The pilot recovering from a spin that had stopped the fluid in the inner ear can create the illusion that he or she has entered a spin in the other direction although they just reenter the original spin



**Graveyard Spiral -** While turning you notice you have lost altitude. Your sensory systems makes you feel as though you are in level flight so you pitch back.

Although you are actually in a turn, the abrupt pitching back tightens the turn and you loose more altitude and increase the loss of altitude, the process then repeats itself.



**Somatogravic Illusion -** This is caused usually during takeoff. The rapid acceleration pushes the pilot back in his or her seat, giving them the sensation of a nose up attitude to correct the pilot noses the plane over towards the earth. NOTE: A rapid deceleration has the opposite effect.



**Inversion Illusion -** A quick change from a climb to level flight makes the pilot feel as though he or she is tumbling backwards. The natural tendency is to nose the aircraft over, which actually intensifies the illusion.

Elevator Illusion - On a turbulent day and updraft



could cause extreme vertical acceleration the pilot then continues to nose over the aircraft, this illusion also has the opposite effect with downdrafts. Although intense this illusion presents the least of troubles, considering it usually happens at higher altitudes.



**False Horizon -** A false horizon can be caused by city lights, clouds, stars, darkness. It causes the pilot to believe that it is the horizon. The pilot then places the aircraft in this dangerous attitude.

Autokinesis - At night, when a light is stared at for a

long period of time it begins to "move" While flying at night pilots should not stare at stationary lights for long periods of time to avoid this sensation.



### **Chapter 10: IFR Enroute**

#### What is a Minimum Reception Altitude?

The minimum reception altitude or MRA represents the lowest altitude where a possible intersection can be plotted.

# What is the Minimum Obstruction Clearance Altitude?

The MOCA is an altitude that provides clear radio coverage for navigation. The MOCA can only assure coverage within 22 nautical miles of a VOR.

#### Define a Minimum Enroute Altitude.

The minimum enroute altitude represents the lowest altitude between radio fixes. The altitude serves as a base altitude between which navigational signal coverage is assured, as well as meeting obstacle clearance requirements.

#### Define a Minimum Crossing Altitude.

The minimum crossing altitude is defined as the lowest altitude that the aircraft must pass through as it

proceeds on its way to a higher minimum enroute altitude.

#### What is a OROCA?

No not the whale that would be an Orca...

The OROCA is the Off-Route Obstruction Clearance Altitude. Its main function is to provide a buffer for obstruction clearance. The buffer for non-mountainous terrains is 1,000 feet while a 2,000-foot buffer is assigned to designed mountainous terrains within the contiguous United States.

# What is the minimum altitude for IFR flight for both mountainous and non-mountainous terrain?

Unless otherwise prescribed the minimum altitudes for IFR operations for designated mountainous terrains is 2,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles. On the other hand, the minimum altitude for IFR operations for non-mountainous terrain is 1,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles.



# At which altitudes should oxygen be provided to the passengers?

Passengers should be provided with supplemental oxygen at cabin pressure altitudes above 15,000 MSL.

# At which altitudes should the minimum flight crew USE supplemental oxygen?

The required minimum flight crew is to use supplemental oxygen during the entire time the flight traverses cabin pressure altitudes of 14,000 feet MSL.

#### How Long Can Pilots Fly at Cabin Pressure Altitudes of 12,500 to 14,000 feet MSL without Oxygen?

Pilots can only fly at those cabin pressure altitudes without oxygen for only 30 minutes after which they will be required to use supplemental oxygen.

## What must a pilot do to obtain VFR-on-top clearance?

VFR-on-top clearance can be obtained by request from ATC.

### Under a VFR-on-top clearance, what special privileges can a pilot enjoy?

With a VFR-on-top clearance, the pilot can ascend through cloud layers where he can employ VFR flying on top of the clouds. The pilot-in-command is also allowed to apply both VFR and IFR flight rules with a VFR-on-top clearance. Neat huh?

Specifically, what are pilots with IFR flight plans required to do with a VFR-on-top flight clearance? Pilots in IFR flight plans but under a VFR-on-top flight clearance are required to:

- Maintain appropriate VFR flight altitudes.
- Adhere to the rules of VFR regarding visibility and distance from clouds.
- Comply with applicable IFR flight rules.

**Are VFR-on-top operations allowed in all airspace?** VFR-on-top operations are allowed in most airspace except for Class A airspaces.



# What Happens if the Transponder Fails During Flight?

Depending on circumstances, the flight may be allowed to continue to the destination. The pilot may request a deviation from the flight plan if he has non-Mode C transponder anytime. For an aircraft without an operating transponder, the pilot has to notify ATC of his request at least an hour before the deviation.

### What are the three fundamental skills required for attitude instrument flying?

The three fundamental skills of attitude instrument flying are: instrument cross check, instrument interpretation, and airplane control.

#### What is Required for Instrument Interpretation?

Instrument interpretation requires understanding the construction of each instrument, their operating principle and how they are related to the overall performance of the aircraft.

#### What are the Three Elements of Airplane Control?

The three elements of airplane control are pitch, bank and power control.

#### What are the Three Divisions of Flight Instruments?

The three categories of flight instruments are pitch instruments, bank instruments and power instruments.

#### Name the Four Pitch Instruments.

The four pitch instruments are the:

- 1. Attitude Indicator
- 2. Altimeter
- 3. Airspeed indicator
- 4. Vertical speed indicator

#### Name the Four Bank Instruments:

The four bank instruments are the:

- 1. Attitude Indicator
- 2. Heading indicator
- 3. Turn coordinator/turn-and-slip coordinator
- 4. Magnetic compass



Name the Three Power Instruments. The three power instruments are the:

- 1. Manifold pressure gauge (if applicable)
- 2. Tachometer
- 3. Airspeed indicator

### Define Primary and Secondary Instruments.

Primary instruments are those that show the most relevant information pertaining to certain flight conditions, while the secondary instruments are those that support the information given by the secondary instruments.

# What are the Primary Instruments that Show Straight and Level Flight?

The primary instruments to check for straight and level flight are the altimeter, heading indicator and airspeed indicator. If the heading indicator is inoperative, the pilot may then refer to the magnetic compass.

# What are the Primary Instruments to Check for Airspeed Changes in Straight and Level Flight?

These instruments are the altimeter, heading indicator and either the manifold pressure gauge and the tachometer.

# What are the Primary Instruments Used for Establishing a Level Standard-Rate Turn?

The primary instruments used for establishing a level standard-rate turn are the altimeter, attitude indicator and the airspeed indicator.

### What are the Primary Instruments to Check for Stable Standard-Rate Turns?

These instruments are the altimeter, turn coordinator and the airspeed indicator.

### What are the Primary Instruments for Detecting Airspeed Changes in Level Turn?



The instruments primarily used for detecting airspeed changes in level turns are the altimeter, attitude indicator and the airspeed indicator.

#### What are the Primary Instruments Used When Transitioning from Straight and Level Flight to Constant Airspeed Climb?

The primary instruments used for transitioning to constant airspeed climb from straight-and-level flight are the attitude indicator, heading indicator and either of the manifold pressure gauge or the tachometer.

# What are the Primary Instruments to Refer to When Maintaining Straight Constant Airspeed Climb?

The instruments primarily used for maintaining straight constant airspeed climb are the airspeed indicator, heading indicator and either the manifold pressure gauge or the tachometer.

#### What Primary Instruments are Used After Increasing Power to Maintain a Straight, Constant Rate Climb?

The primary instruments in this case are the attitude indicator, heading indicator and either the manifold pressure gauge or the tachometer.

# What Primary Instruments Are Referred to In Order to Maintain a Straight, Constant-Rate and Stabilized Climb?

The primary instruments for maintaining a straight, constant-rate and stabilized climb are the vertical airspeed indicator, the heading indicator and the airspeed indicator.

### Which of the Pitch Instruments are Used to Correct Altitude Deviations?

The attitude indicator is used to make pitch corrections in the event of altitude deviation. The altimeter and the vertical speed indicator are then used for monitoring the correction.



#### How is a Standard-Rate Turn Indicated?

The plane is in a standard-rate turn when the needle of the turn-and-slip indicator is pointing at the doghouse mark.



#### What is a Standard Rate of Turn?

The standard rate of turn is 3 degrees per second, or a full 360 degrees in two minutes. With this, you can establish a half standard rate of turn as 1.5 degree per second or a full 360 degrees in 4 minutes.

### What are the Indications of a Nose-Low Unusual Attitude?

The indications of a nose-low unusual attitude are: negative vertical speed indication, increasing airspeed, decreasing altitude, and airplane is below horizon on attitude indicator.

### How Do You Recover From A Nose-Low Unusual Attitude?

#### Popular Checkride Question ALERT!

Nose-low unusual altitudes can be recovered from with the following steps:

- Reducing power
- Leveling the wings using rudder and aileron movements
- Raising the nose until level attitude is achieved.

### What are the Indications of a Nose-High Unusual Attitude?

The indications of a nose-high unusual attitude are: positive vertical speed indication, increasing altitude, and airplane appearing to be above the horizon on attitude indicator.

### How Do You Recover From a Nose-High Unusual Altitude?

#### Popular Checkride Question ALERT!

Nose-high unusual attitudes can be recovered from by:

- Increasing power
- Lowering the nose



- Leveling the wings
- Returning to the prior altitude and heading

### What Happens if the Pitot Tube's Ram Air and Drain Hole Are Clogged?

Since it is powered by both the pitot tube and the static source, the airspeed indicator will double as an altimeter. Lower altitudes will result in the airspeed indicator indicating low airspeeds regardless of the actual airspeed.

#### What Happens if Only the Ram Air Hole is Clogged?

The airspeed indicator will show zero airspeed. This is because the ram air hole's pressure will be vented out the drain hole.

### What Does It Mean When You Are in Radar Contact With the Tower?

This means that the tower has identified your aircraft through its radar signature and it is following you in its radar screens.

#### What Does "Resume Own Navigation" Mean?

#### Popular Checkride Question ALERT!

When you are told to resume own navigation, it means you can navigate on your own means under continued surveillance by ATC. When you are given this directive, you are no longer required to submit position reports.

# If You Were To Radio "Minimum Fuel" to ATC What Does That Permit You To Do?

You are indicating that you may declare an emergency due to insufficient fuel if there are any deviations in transit. This is not declaring an emergency. This is informing ATC of your situation and letting them know that you need to continue ahead and can't afford any deviations or need to find the nearest airport with fuel.

# What Can You Do If You Believe An Assigned Altitude or Heading Is Incorrect?

As pilot-in-command, you are responsible for ascertaining that the aircraft is safe thus you can feel free to question any assigned altitude or heading if you believe is wrong or will endanger your aircraft and/or passengers.

#### When Holding At A Fix With An Uncharted Pattern, What Information Should You Report To ATC.



Popular Checkride Question ALERT!

In order to be cleared to hold at a fix using an uncharted holding pattern, you should provide the controller with the following information:

- Direction of holding pattern with respect to the fix, given in any of the eight cardinal directions.
- Holding fix
- Information specifying which radial, course, bearing, airway or route that the pilot intends to hold.
- Length of the holding pattern's leg in miles when using RNAV or DME, but can also be specified in minutes if pilot requests or the tower finds necessary.
- Direction of turns
- Information specifying how long the pilot will wait for further clearance.

# Can You Deviate From Your Flight Clearance Anytime?

No, you can only deviate from your flight clearance if there is an emergency. You have to report and receive priority from the controller.

## What situations require a pilot to report at all times to the controller?

A pilot is required to make a report to the controller, when:

- Your are leaving an altitude or flight level you're currently flying to a new one assigned by the controller.
- Your are changing altitudes while flying with a VFR-On-Top clearance.
- Your are experiencing inability to maintain a descent or climb rate of 500 feet per minute.
- Your are going "missed" (Missed Approach)
- Your aircraft's average true speed changes by 5% or at 10 knots more than the true speed he had filed in his flight plan.
- You've reached the holding point he has clearance for.
- Your are leaving an assigned holding fix or point.
- You've lost navigational aids in controlled airspace.



- There is information about the safety of the flight.
- You've encountered hazardous conditions that were not reported in the forecasts.

# What Does a Pilot Do After Reporting a Missed Approach?

A pilot is then required to request clearance from ATC if he is to proceed to alternate airport or to try another approach.

### What Information Should A Pilot Give ATC In Case of Loss of Radar Contact?

If the controller loses radar contact with the aircraft, the pilot is required to report the following information:

- Information that the pilot is leaving final approach fix and proceeding to the approach
- Information that he has passed compulsory reporting points.
# When Giving a Position Report, What Information Should You Include?

A position report is required to have the following information from the pilot:

- Identification
- Position
- Time
- Altitude or flight level
- Flight plan type, but this is not applicable if you're giving an IFR operation report directly to ARTCCs.
- ETA and Identification on next reporting point
- The name of the succeeding reporting point along the route of flight.
- Any remarks that are relevant to your position, including unforeseen weather conditions.



### Chapter 11: Lost Comm Procedures

What is the Procedure When Two-Way Communications Are Lost in IFR Flight?

Listen Close: IFR Lost Comm Procedures WILL Come Up On Your Checkride. Read This, Understand It, and Apply It.

Flying IFR can be strenuous when everything is working, let alone when something goes wrong. Studies show people can remember things better when they are broken down into acronyms, as pilots acronyms are something we've learned to be very fond of. Our acronym for IFR lost comm's is A-V-E-F M-E-A

Not to bad to remember Avenue F MEA. It's much better then some of the other one's I've seen. Lets take a closer look

There are two portions to our acronym the first part A-V-E-F (Avenue F) has to do with our route of flight. You are to fly your route based on your last:

Assigned (Your last assigned heading) Vectored (If nothing is assigned fly your last vector) Expected (If no vector fly what was expected in your

clearance) Filed (Finally fly what you filed)

For altitude we use the MEA portion of our acronym

Fly the HIGHEST of the following

Minimum en-route altitude Expected altitude Assigned altitude



Let's apply this to a situation Your clearance reads as follows:

"Cleared to the Ocala airport via V-441 to Gators then as filed. Climb and maintain 3,000 expect 6,000 10 minutes after departure." Shortly before takeoff the tower tells you "turn right heading 210 cleared for take off runway 14."

You take off and enter IFR conditions at 500 feet. After 4 minutes of flying you experience communications failure your altitude is 2,500 feet and heading is 210. The MEA along our route is 5,000 What might you do in this situation?



#### Let's break down our acronym

A – We were assigned heading 210 so we'll continue to fly that

V – In our limited communication with the controller we never received radar vectors

 $\mathsf{E}-\mathsf{Our}$  clearance instructed us to fly V-441 to Gators VOR then as filed

F – After we fly what was expected, we'll fly what we filed.

So we'll continue to fly 210 until we intercept V-441 and proceed to Gators VOR. Upon

reaching Gators we'll continue as filed which in our case is direct Ocala.

What about our altitude?

Remember we want to fly the highest of our M – Minimum en-route altitude (5,000 in our case) E – Expected (6,000 as given in our clearance) A – Assigned – We were not assigned another altitude by another controller

So after 10 minutes of flying "expect 6,000 10 minutes after departure" we will climb and maintain 6,000 feet with a heading of 210 until intercepting V-411 to Gators and then continue direct Ocala as filed.

If Ocala is IFR we will enter a hold over the Ocala VOR. This is why it is crucial to always file to a fix rather than an airport. It works out in our case because

Ocala has a VOR. But when flying to an airport with out a VOR file to a fix on the field this way you can hold until you reach your time of arrival you filed for.

We will hold over the Ocala VOR until we approach our ETA on our flight plan, from

there we can commence our approach as prescribed on our approach plate.



### Chapter 12: IFR Arrival

### What Are The Four Segments Of An Instrument Approach Procedure?

The four segments of an instrument approach procedure are the following: initial, intermediate, final and missed approach segments.

#### Define the Initial Approach Segment.

The initial approach segment is the point between the initial approach fix and the intermediate or final approach fix, whichever is applicable.

#### Define the Intermediate Approach Segment.

The intermediate approach segment is the point between the intermediate approach fix and the final approach fix. It can also be defined as the point between the end of a reversal, race track or dead reckoning track procedure and the final approach fix.

#### Define the Final Approach Segment.

The final approach segment is where the pilot aligns with the runway and descends for landing.

#### Define the Missed Approach Segment.

The missed approach segment is the segment encompassed between arrival at decision height and the missed approach point.

# What are the Different Aircraft Approach Categories?

The five different aircraft approach categories are A, B, C,D and E.

### How Do You Determine Which Aircraft Approach Category is For Your Aircraft?

Each aircraft category is equal to 1.3 times the stall speed of the aircraft in landing configuration at maximum certified gross landing weight.

Specifically, Category A encompasses speeds less than 91 knots, while Category B is limited to speeds of 91 knots until 120 knots. Category C has 121 knots to 140 knots, Category D has 141 to 165 knots and Category E has speeds of 166 knots and higher.

#### Can You Use Minimums From Another Category Besides the Category Your Aircraft is Listed In?

Yes. For example, if you have a Category B aircraft but you are maintaining a speed that exceeds those specified for Category B, you are allowed to use



minimums for the next category which is Category C. However, aircraft in Category C are not allowed to use Category B minimums even when flying at Category B airspeeds.

#### Define a Minimum Vectoring Altitude.

The Minimum Vectoring Altitude or the MVA is the lowest height in MSL in which a pilot flying instruments can receive vectors from a radar controller.

#### What is Decision Height?

The decision height is a flight level that necessitates a decision from the pilot during an ILS approach. The question you ask is... Should I go missed? Or can I safely land?

#### Define an MDA.

The minimum descent altitude is the lowest altitude where the pilot is authorized to when shooting a nonprecision approach.

#### What is a Precision Approach?

A precision approach is aided by an electronic glide slope, through the use of systems like the ILS.

#### What is a Non-Precision Approach?

A non-precision approach is the opposite of the precision approach. There is no electronic glide slope provided by any electronic system. Example VOR or Localizer only approach.

#### Define RVR.

RVR (Runway Visual Range) is a value that is indicative of the horizontal distance from the runway to the end of the approach that is visible to the pilot under VFR.

#### What if the RVR cannot be obtained?

If the RVR is inoperative, the pilot can still obtain visibility minimums for takeoff and landings by converting the RVR minimum to ground visibility.

#### What is the Normal RVR Minimums?

The normal RVR minimum is equal to 2400ft or a half statute mile of visibility.



#### What are the Components of an ILS?

The components of an ILS are the localizer, glide slope, outer and middle markers, and the approach lights.

# What is the Normal Decision Height When Using a Category I ILS?

A Category I ILS requires a height of 200 feet AGL. This height also corresponds to the height of the centerline of the glide slope. This is with respect to the middle marker.

## What Functions Does An Outer Marker Typically Do?

An outer marker typically transmits final approach fixes for non-precision approaches.

### What Functions does the Middle Marker Typically Do?

The middle marker usually indicates approximate decision height point.

#### What is the Inner Marker?

The inner marker is a component of the ILS that you can recognize by a flashing white marker beacon and a series of dots transmitted at a rate of 6 dots per second.

# What Minimum Radar Separation Do Parallel ILS Approaches Provide for Aircraft?

Parallel or dependent ILS approaches give aircraft a minimum of 1.5 miles of diagonal radar separation between each other.

# What Happens When More Than One Component is Rendered Unusable?

The minimums in every usable instrument is increased to the highest minimum of each of the components that are no longer usable.

## What Happens When the Outer or Middle Markers are Rendered Inoperative?

They may be substituted with a compass locator or a precision approach radar. If an aircraft has been installed with a DME on their ILS, they may use the DME instead of an OM.



# What's the Procedure for Addressing Glide Slope Failure?

A glide slope failure will necessitate substitution with a nonprecision localizer.

# What Do You Do When You've Committed to the Glide Slope and the ILS Suddenly Fails?

There are 3 options to this tricky yet common question:

- If you're visual follow the VASI down
- If just the glideslope fails shoot it as a localizer only non-precision approach
- IF the entire system fails... You're going missed!

#### What are Initial Approach Fixes?

Initial approach fixes indicate the start of the initial approach segment for your instrument approach. You can easily identify these fixes as they are marked "IAF" by the charts.

### When You Encounter a T in a point-down black triangle, What Does It Mean?

It indicates non-standard takeoff minimums as well as the presence of departure minimums. You should then procure alternative takeoff procedures.

#### What Does an A in a Point-Up Black Triangle Mean?

The A in a point-up black triangle means that there are nonstandard minimums and that the airport is eligible to be listed as an IFR alternative.

### What Does It Mean When There is No Procedure Turn Barb on the Approach Chart's Planview?

The absence of a procedure turn barb means that you are not authorized to execute a procedure turn for the approach. The absence is indicated by the symbol or term NoPT.

### If There Are Radar Vectors Provided, Could You Still Execute Course Reversals?

There is no authorization or requirement for course reversals when you are given radar vectors.



#### If You are Being Radar Vectored to an Instrument Approach and You Have a Previously Assigned Altitude, What Do You Do?

The last assigned altitude should be followed only until you have established your aircraft on a segment of a published route and heard the magic words "cleared for the approach"

## Where Can You Find Restrictions to Circle to Land Procedures in an IAP Chart?

You can find these restrictions below the chart's minimums section.

## What Does A Lightning Bolt Symbol Indicate On The Approach Chart?

The lightning bolt in the IAP chart indicates the final approach fix for a precision approach.

# Where Can You Find the Distance from the FAF to MAP (Missed Approach Point) for a Nonprecision Approach Using the IAP?

You can find this information below the airport diagram.

## How Can You Identify the Final Approach Fix for a Nonprecision Approach?

The final approach fix for a nonprecision approach is indicated by an X. Also known as a Multis-cross

#### What Usually Happens if the Headwind Suddenly Changed to a Tailwind While Shooting An Approach?

The pilot experiences a drop in airspeed, the aircraft assumes a nose-down attitude and vertical speed starts to climb. The airplane will also have the tendency to go below the proper glide slope.

### What Happens When You Do a Side Step Approach?

You are performing an instrument approach on one runway, then you side-step or fly across to a parallel runway, ultimately landing on it.

# When Should the Pilot Start to Perform a Side Step Approach?

The pilot is to begin the side step approach as soon as he has visual contact on the runway or the runway environment he intends to land at.



#### At What Time Can You Do a Timed Approach?

A pilot can only perform a timed approach when you have received clearance to depart the outer marker or final approach fix. At this point, pilot is required to modify his holding pattern so he can leave from the final approach fix at the time assigned to him.

## Can You Perform a Timed Approach Without the Help of a Control Tower?

No, you need to have a control tower operating in the airport in order to be able to perform a timed approach. That is because you need to contact the tower in order to receive clearance to maintain a timed approach.

#### Where Are Timed Approaches Usually Used?

These approaches are primarily utilized in nonradar environments only.

# Can You Execute a Circle-to-Land Approach Anytime You Choose to?

No, you have to obtain prior authorization from the controller, which would require you to have solid visual contact with the airport and runway.

#### What If You Can Find Only Circling Minimums in Some Airports and no Straight-in Minimums. What does that Mean?

This means that there is an excessive rate of descent from the MDA. It can also mean that the runway alignment is more than 30 degrees.

### Can You Make Straight-in Landings Without Straight-in Minimums?

Yes, you can still perform straight-in landings even if there are no straight-in minimums published. You just have to make sure that you have visual contact of the runway, that you have enough time and you have received the necessary clearance to land.

## When Do You Start Descending for the Runway During a Circling Approach?

To start descending into the runway, you should first satisfy the following conditions:

- You should be in a position where you can descend into the runway at a normal rate of descent and using conventional maneuvers.
- Visibility requirements for a standard instrument approach are met.
- You must have solid visual contact of at least one visual reference for the landing runway.



### How Much Obstacle Clearance is Guaranteed by a Circling Approach Maneuver?

You are guaranteed an obstacle clearance of 300 feet of obstacle clearance within your circling approach area.

# What Size are the Circling Approach Areas According to Aircraft Category?

The following are the radii in nautical miles of the circling approach areas for each category:

- Category A 1.3 mile
- Category B 1.5 mile
- Category C 1.7 mile
- Category D 2.3 miles
- Category E 4.5 miles

#### When Would a Pilot Execute a Missed Approach?

A pilot can execute a missed approach if any of these conditions are present:

- No visual contact of runway environment upon arrival at the missed approach point.
- No visual contact of runway environment upon at arrival at glide slope decision height.

- Pilot judges risks of accident in landing are high.
- Losing visual contact during a circle-to-land procedure.
- ATC instructs the pilot to execute a missed approach.

# What is the Procedure to Follow if You Decide to Execute a Missed Approach before the MAP?

If you need to execute a missed approach prior to passing the missed approach point, wait until you have reached the MAP (Missed Approach Point) before you start turning. You can take altitudes higher than the minimum descent altitude or the decision height.

#### If You Lose Visual Contact in a Circle to Land Procedure in an Instrument Approach, What Procedure Should You Follow Next?

The first thing you should do is go into a climbing turn towards the runway. This will help you intercept and assume the missed approach course.

#### What is a contact approach?

A contact approach is designed to be an alternative to the standard instrument approach procedure for landing. A contact approach is not assignable by ATC, who is only authorized to issue visual approaches.



#### When can a pilot request for a contact approach?

A pilot may be authorized for a contact approach if he has one statute mile of visibility or more before him. He must also be able to operate clear of clouds to the destination airport.

#### What is a Visual Approach?

A visual approach authorizes a pilot to conduct a purely visual approach to landing rather than instruments. It is also needed if you plan to follow other aircraft towards landing.

#### Who Issues a Visual Approach Authorization?

The Air Traffic Control authorizes a pilot for visual approach.

## What are the Requirements for a Visual Approach Authorization?

In order to be assigned a visual approach, you must have visual contact of the target airport.

#### What is a Low Approach?

A low approach is defined as maneuver where the pilot goes around the runway instead of landing or making a touch-and-go. It is done straight ahead, unless turns and climbs are authorized by the controller, so that safety and mid-air collisions can be avoided.

### Describe the characteristics of a localizer-type directional aid. (LDA)

The LDA does not have a glide slope. It also is not aligned with the runway.

### What Minimums Are Usually Published With LDA Approaches?

Straight-in minimums may be published if the course and centerline have alignment angles not exceeding 30 degrees.

### Can you Set Up a GPS Approach without a Receiver Autonomous Integrity Monitoring? (RAIM)

No. The absence of RAIM would require to use another navigation and approach system.



## What is the Other Requirement for Using GPS for Navigation and Instrument Approach?

The alternate destination airport must have an alternate instrument approach procedure outside GPS. This procedure must be available in the aircraft and operational in the airport at the ETA.

#### What is a Holding Procedure?

A holding procedure is a maneuver designed to occupy an aircraft while awaiting clearance to land or any further action. The maneuver is limited to specific airspace usually within the vicinity of a controlling agency or airport.

#### Describe a Holding Pattern.

A holding pattern is typically racetrack-shaped. They are determined using a fix provided by navigational aids like VOR and ADF. The fix is the end of the inbound leg of the pattern.

#### What are the Components of a Holding Pattern?

The components of a holding pattern are as follows:

- Fix
- Fix end
- Outbound leg
- Inbound leg
- Holding side
- Non-holding side
- Outbound end
- Holding course

# Define Standard and Nonstandard Holding Patterns.

Standard patterns are composed of right-handed turns while nonstandard patterns take left-handed turns.

# What are the Three Methods for Entering a Holding Pattern?

The three procedures prescribed for entering a holding pattern are:

- Parallel procedure
- Teardrop procedure



Direct entry procedure

#### Describe the Parallel Procedure.

A parallel procedure requires a pilot to fly a parallel holding course, and then turning left to return to the holding fix from where it commences the actual holding pattern.

#### Describe the Teardrop procedure.

The teardrop procedure starts with a 30-degree outbound track. The pilot then turns right to intercept holding course.

#### **Describe the Direct Entry Procedure.**

The simplest of the three, the direct entry procedure simply requires you to turn right and then assume the pattern.

## What Are The Maximum Holding Pattern Airspeeds for all Aircraft.

The maximum holding pattern airspeeds for all aircraft are the following:

- 200 knots for aircraft at the minimum holding altitude until 6,000 feet.
- 230 knots for aircraft situated at 6,001 feet until 14,000 feet.
- 265 knots for aircraft at 14,001 feet and higher.

## What Happens When a Holding Pattern is Used Instead of a Procedure Turn?

The pilot must still execute the holding maneuver within the time or leg length specified by the instrument approach chart. It is more common, however, to find the outbound leg specified in distance in the IAP chart in this instance.

#### What is STAR?

STAR is an abbreviation for Standard Terminal Arrival Route. A STAR is intended to inform and guide IFR flights on established routes for approach and landing.



#### Is a STAR compulsory?

A STAR is a helpful piece of information, but a pilot may choose to decline one if he thinks information provided is not sufficient to be helpful in his approach and landing procedures.

#### How Do You Decline a STAR?

To decline a STAR, simply place "NO STAR" in the remarks section when planning your flight.

## Can a Pilot Land Even if Actual Visibility is Lower than Published Minimums?

No, it is illegal and dangerous for a pilot to land with visibilities below the published minimums.

### What Procedure is Called for to Close the Flight Plan?

If operating at a controlled airport they will typically close it for you. However at an uncontrolled airport you need to contact your local FSS via phone or the approach controller from the ground if able to close it.

### Conclusion

I know you're going to be such a success on your checkride...

Commit this book to memory, study and shoot approaches at any possible nearby airports, and work hard on those emergency procedures.

You're going to do awesome

Be confident

And remember a good pilot is always learning

Jason

PS: Email me with any question or comment related to flight training and this book jason@m0a.com