



**AVIATION SEMINARS**  
— SINCE 1974 —



**2024  
INSTRUMENT/CFII  
STUDY GUIDE**

## **IMPORTANT INFORMATION FOR SEMINAR PREPARATION PLEASE READ THIS CAREFULLY!**

People attending our courses come to class with wide variations of both knowledge and experience – from those who are still waiting to take their first flight lesson, through those who have been ready for their flight tests for years (private or commercial), but haven't yet completed their FAA knowledge exam. However, our recommendations below are applicable for everyone.

The first thing you will discover is that our course manual is intentionally small. Many test preparation guides have 4 or 5 times as many pages, trying to cover much more information than necessary for the FAA Knowledge Exam. We believe that it is important to obtain all of the knowledge about flying that you can. We do not produce this book with the belief that it will contain all the information you need to know as a pilot, but instead wish to provide you with a study guide that is concise and specific to your FAA Exam. We have written the summaries to be as brief as possible while still providing the necessary background to explain the topic and questions. You'll find that we cover a lot more information and detail in the classroom!

Here's the most effective way to preview this material:

First, you will notice that we have bolded and italicized the correct answer to each of the FAA test questions in the book. We've learned that it is counterproductive to test yourself by reading a question and its selection of answers without first knowing the correct answer.

Second, read through each of the summaries. Directly following each summary, read each question followed by the associated correct answer. Don't bother to read the incorrect answers, and don't worry about slowing down to analyze and study at this time – we simply want you to become familiar with the type of information the FAA wants you to learn, and become exposed to the questions and correct answers. This will help you focus more productively in class, and will help prepare you for additional learning and study. IF YOU DO NOTHING ELSE, AT LEAST READ THROUGH THE BOOK THE DAY BEFORE THE TEST AS DESCRIBED ABOVE. Most people find that this can be done in about 2 hours.

Finally, make sure to take the Aviation Seminars Online Practice Exams after the class. Prior to taking the FAA exam, you should be scoring in the mid-80's on the practice exams.

***THANK YOU FOR CHOOSING AVIATION SEMINARS FOR YOUR TEST PREPARATION!***

## **INSTRUMENT PILOT/INSTRUMENT INSTRUCTOR COURSE SUMMARY**

Airman Knowledge Testing Supplement for Instrument Rating  
FAA-CT-8080-3F

Things You Should Know About the FAA Exam	Pages 01-02
IFR Preflight and Departure	03-22
IFR Enroute and Arrival	23-32
IFR Approach and Landing	33-45
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Aviation Seminars  
1934 N Marshall Ave, Suite 102  
El Cajon, CA 92020  
**800-257-9444**





## THINGS YOU SHOULD KNOW ABOUT YOUR FAA COMPUTER EXAM

### To achieve the best results on your exam:

As time allows, answer all the questions in the Course Summary BEFORE coming to class, so the instructor can clarify any with which you have trouble. Allow some time Saturday evening for a second review of those questions you missed.

Take some notes as you listen to the lecture, but also keep an eye on the visuals the instructor uses in the presentation.

Complete all your available on-line practice tests.

Take the exam within 3 days after the seminar.

### About computer testing:

AVIATION SEMINARS constantly monitors for new areas that the FAA is asking of its current pilot applicants in the knowledge tests.

FAA airman knowledge testing is done by computer only. Two private companies are authorized by the FAA to administer computer tests. A complete list of those companies and their testing sites is available through the FAA's website.

Each FAA-approved computer testing company sets its own fees and maintains a nation-wide, toll-free registration/information telephone number.

There are no minimum flight time requirements to take the Private Pilot knowledge exam. However the applicant must be at least 15 years old at the time they take the written test.

The Instrument Pilot exam has 60 questions, which are chosen from over 700 in the exam database. You are allowed 2.5 hours to complete the exam.

A minimum score of 70% is required to pass the exam.

### Bring with you to the test:

- Any failed test report, signed by a certified instructor.
- Government issued picture identification. Non-US citizens should bring passport or immigration green card.
- Evidence of completion of ground school with instructor sign-off. You will receive this at the end of our seminar.

- Flight computer and Plotter. The printed instructions and formulas on the slide rule computer are allowed during the exam.
- Electronic calculator, if desired. You will need to memorize how to use the functions required on the test. You are not allowed to bring the guide booklet into the testing station.

### How to take the test:

Computer tests are designed to be easy to understand and user-friendly, requiring no previous computer experience.

When you arrive at the test center, the test proctor will review your registration information and exam sign-off, and confirm the correct test. At the computer, you will step through sample screens and answer practice questions, with the proctor available to assist as needed.

Look through and identify the contents of the "Airman Testing Supplement" book your proctor gives you. When you are fully confident of how computer testing works, the allotted time for your test will begin.

Testing software allows you to review questions already answered (and change answers if needed), or to skip over a difficult question and return to answer it later.

Testing software keeps you advised of time remaining for your test. Use your full time to double-check your answers.

### How to answer each question:

Know when one answer is correct and the other two are incorrect. All questions have the same score value and are independent from each other.

Answer EVERY question. There is no penalty for guessing, but unanswered questions are graded as incorrect. If you have a baffling question, write the question and all three answers on your scratch paper, to think through them again.

### After the computer exam:

The best part - instant results! 70% is a passing grade. Your test report is printed out immediately and embossed as "official" by the test center.

Keep your Airman Computer Test Report. DO NOT LOSE IT! It is valid for 24 months. Drop us a line on how you did in our CONTACT US portal in our website!





## PREFLIGHT PLANNING AND DEPARTURE

### PREFLIGHT PLANNING

#### Certificates And Ratings Required

The pilot in command must be instrument rated:

- on an IFR flight plan under instrument weather conditions, including a "VFR on TOP" clearance.
- in weather conditions less than minimum prescribed for legal VFR flight.
- in Class A airspace.
- under a special VFR clearance at night.
- when, as a commercial pilot, carrying passengers for hire on cross country flights of more than 50 NM, or at night, regardless of distance.

#### Medical Certificates (Class)

To act as PIC with an Instrument Rating, you must possess at least a 3rd Class Medical Certificate or be on BasicMed. If any medical certificate (1st, 2nd, 3rd) is obtained before the age of 40, it is valid as a 3rd class for 60 months.

If any medical certificate (1st, 2nd, 3rd) is obtained after the age of 40, it is valid as a 3rd class for only 24 months. (FAR 61.23)

#### Medical Certificates (BasicMed)

BasicMed allows a pilot who has previously held a valid "class" medical certificate on or after July 15, 2006, to act as PIC with 3rd class privileges in both VFR and IFR operations with no other restrictions.\* (\*Not for hire)

#### Requirements for BasicMed

- Must hold a valid state driver's license.
- Must get a basic physical from a licensed physician, then again every 4 years (48 months)
- Must take the on-line Medical Education Course (MEC) then again every 2 years (24 months)

#### Limitations while flying IFR under BasicMed

- Flight in U.S and Bahamas only.
- Maximum altitude 18,000 feet MSL.
- Maximum speed 250 KIAS.
- Maximum occupants 6 (including pilot).
- Maximum aircraft weight 6,000 MTOW.

#### Recent Flight Experience

No person may act as a pilot in command under IFR if fly in weather conditions that are less than those required for VFR, unless within the preceding 6 calendar months, that person has performed and logged under actual or simulated instrument conditions:

1. At least 6 instrument approaches;
2. Holding procedures; and
3. Intercepting and tracking courses through the use of navigation systems.

These requirements must be met in the category for which the instrument rating is held. For example, an airplane rated instrument pilot must meet these requirements in an airplane or approved airplane ground aviation training device.

If your instrument recency of experience has lapsed, but for less than 6 calendar months, you may either obtain the IFR experience listed above, or pass an IFR competency check. If it has lapsed more than 6 calendar months, you must pass an Instrument Proficiency Check (IPC) before acting as pilot in command under IFR.

#### Logging Of Flight Time

You may log as instrument time only the flight time you are controlling the airplane solely by reference to flight instruments.

An instrument flight instructor (CFII) may log as instrument time all the time during which he acts as instructor in actual instrument weather conditions.

The safety pilot who occupies the other control seat during simulated instrument flight must be appropriately rated (have a category and class rating for the aircraft being flown)

The logbook entry for simulated instrument conditions must include the place and type of each instrument approach completed and the name of the safety pilot.



## Preflight Action For The Flight

The pilot in command is responsible for determining that an aircraft is safe for flight.

Before beginning any flight under an IFR clearance, you must check:

- weather reports and forecasts,
- runway length at airports of intended use,
- alternatives available if the flight cannot be completed as planned.

## Fuel Requirements

You must have:

- Fuel to first airport of intended landing, plus
- Fuel to alternate, if alternate required, plus
- 45 minutes reserve at normal cruise.

## Equipment Required For IFR Flight

To fly IFR, your aircraft must be equipped with navigational equipment appropriate to the ground facilities being used and appropriate communication equipment.

A gyroscopic direction indicator is required.

DME is required at or above 24,000 MSL when VOR navigational equipment is used.

In Class B or C airspace, or operating at or above 10,000 MSL and above 2,500 AGL your airplane must be equipped with a transponder having Mode C capability (altitude reporting).

If not transponder equipped, you must request deviation from the Class B transponder requirement at least 1 hr before proposed flight.

Transponder must be on Mode C at all times if the equipment has been calibrated, unless requested otherwise by ATC.

## Preflight Action For The Aircraft

To fly IFR, the pilot in command must verify the aircraft is in compliance to fly IFR:

- annual inspection within the last 12 calendar months,
- altimeter system check within the last 24 calendar months,
- transponder test within the last 24 calendar months and VOR test within the last 30 days.

## VOR equipment tolerances are:

- VOT: TO flag, 180 degrees +/- 4 degrees, FROM flag, 000 degrees +/- 4 degrees.
- VOR designated ground check: +/- 4 degrees of the designated radial with the TO-FROM flag indicating a FROM. Dual VOR system comparison: On the ground or airborne, 4 degrees between the indicated bearings to the station.
- VOR designated airborne check: +/- 6 degrees of the designated radial with the TO-FROM flag indicating a FROM.

VOR Ground, Airborne and VOT frequencies are listed in the Chart Supplement. \*

*\*The FAA Test Supplement 8080-3F shows the Chart Supplement still listed as the old Airport Facility Directory.*

A record of the VOR operational check must include the date, place, bearing error, and the person's signature and be kept in the aircraft.

## Oxygen Requirement

Above 12,500 and up to 14,000 MSL the crew must use oxygen after 30 minutes at that altitude.

Above 14,000 MSL the crew must use oxygen all the time.

Above 15,000 MSL provide passengers with oxygen, but they are not required to use it.

## IFR Flight Plan (ICAO Form)

New International Flight Plan Section is Pending for 2019-20. Only general flight plan questions asked.

Currently, pilots must use the ICAO flight plan form when the flight will enter international airspace controlled by FAA facilities.

## Refer to Figure 51

- Block 15 - Level: Enter initial cruising altitude.
- Block 16 - Aerodrome: Enter destination airport if no stopover is planned for more than 1 hour.
- TEE - Time Estimated Enroute: Is total usable fuel on board in hours and minutes.



## Alternate Airport Requirements

An alternate airport is required if the destination airport has a forecast ceiling of less than 2000 feet or forecast visibility of less than 3 miles within 1 hour before to 1 hour after the ETA at the destination.

Then:

The forecast weather at the alternate airport (at your ETA) must be no less than:

- with a precision approach, 600 foot ceiling and 2 miles visibility.
- with a non-precision approach, 800 foot ceiling and 2 miles visibility.
- with no instrument approach available, adequate ceiling and visibility to allow descent from the MEA, and an approach and landing under basic VFR.
- if nonstandard minimums are listed, adhere to those minimums. Standard minimums apply except for the specific situation listed.

T symbol on IAP indicates Take-off Mins not standard.

## Preferred IFR Routes

Preferred routes are published to minimize the route changes and to aid in the systematic flow of traffic.

Routes beginning or ending with a fix indicate that aircraft will be routed to the fix via a DP, radar vectors, or a STAR.

## Chart Supplement \* (Formerly Airport Facility Directory)

*\*The FAA Test Supplement 8080-3F shows the Chart Supplement still listed as the old Airport Facility Directory.*

The most current en route and destination flight information should be obtained from FSS. Look at the Chart Supplement to find availability of FSS, frequencies for communication, hours of operation of the control tower or ATIS, and which enroute low altitude chart is applicable for your route of flight, and restrictions to NAVAIDs.

## Flight Data Center NOTAMS

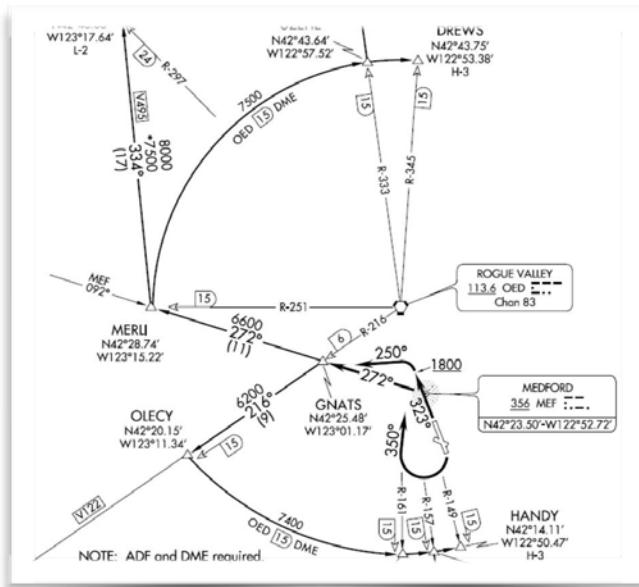
Flight Data Center Notams (FDC) advise of changes in flight data which affect IFR approach procedures, aeronautical charts, and flight restrictions prior to normal publications.

## Distant (D) NOTAMS

The latest status of airport conditions (e.g. runway closures, runway lighting, snow conditions) is found in the Chart Supplement, and Distant (D) NOTAMS.

## Hot Spots

Hot Spots are areas on the airport prone to runway incursions. Hot Spots can be found by airport on the Runway Safety section on the [FAA.gov](http://FAA.gov) website.



## THE IFR DEPARTURE

### Authority Of Pilot In Command

The pilot in command may deviate in an emergency, from any Part 91 FAR to the extent necessary to meet the emergency.

If you deviate from an ATC clearance in an emergency, you must notify ATC of the deviation as soon as possible.

ATC may request a detailed report of an emergency even though a rule has not been violated when priority has been given over another aircraft.



## ATIS (Automatic Terminal Information Service)

ATIS broadcasts at towered airports are updated upon receipt of any official weather, regardless of content change or reported values.

The absence of sky condition and visibility implies that the ceiling is more than 5000 feet and the visibility is 5 miles or more.

### The Clearance

To receive the clearance, call Ground Control if tower is operation or FSS on listed frequency if tower is closed.

Read back parts of ATC clearances containing altitude assignments or vectors, or any part requiring verification.

An abbreviated clearance (cleared as filed) indicates the route cleared is identical to that which you requested. It always includes the name of destination airport and a specified altitude, and DP name, number and transition, if appropriate.

When departing from an airport not served by a control tower, the issuance of a clearance may be given by telephone, and will contain a "void time." The pilot must advise ATC as soon as possible, but not later than 30 minutes, of his intentions, if not off by the void time.

Instrument Departure Procedures (DP) and Standard Terminal Arrival Routes (STAR's) are often assigned.

DP's are ATC coded departure routings established to simplify departure clearance delivery problems.

The basic DP terminates, and the transition begins, at the end of the bold black line.

You may be issued a clearance for a DP by ATC unless you have indicated (in the remarks section of your flight plan form) that you want "NO DP." If a DP is accepted, the pilot must possess at least the textual description.

### Departure Control

After takeoff, departure control should be contacted when advised by the control tower.

When given clearance to a new altitude, maintain an optimum climb or descent without intermediate level-offs until within 1,000 feet of assigned altitude, then between 500 and 1,500 FPM until reaching the assigned altitude.

When climbing to your assigned altitude on an airway, climb on the centerline of the airway except when maneuvering to avoid other aircraft, or making clearing turns while in VFR conditions, or when authorized by ATC

### ATC Traffic Information

You are responsible for avoiding other aircraft when weather conditions permit regardless of whether operating IFR or VFR.

"Traffic at 2 o'clock 5 miles southbound"

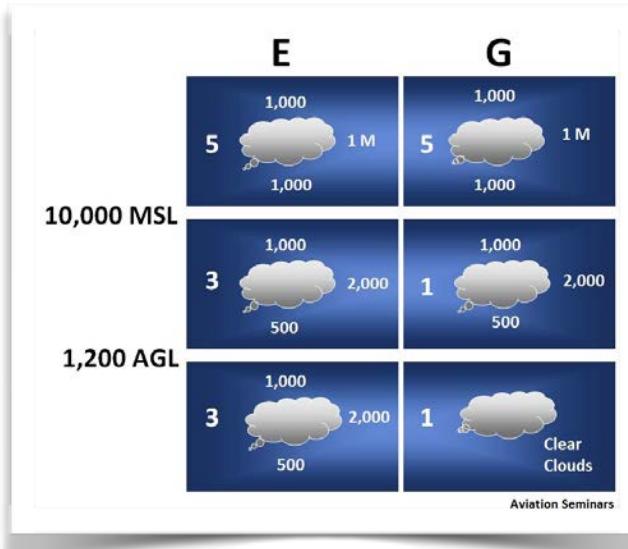
Indicates traffic 60 degrees to the right of your direction of travel and five miles away. If holding a 20-degree right crab, look 40 degrees to the right.

### VFR Operations On An IFR Flight Plan

A VFR-On-Top clearance may be requested if you are enroute and wish to maintain your IFR flight plan and clearance, but fly at a VFR altitude of your choice.

### When flying VFR-On-Top:

- Follow VFR and IFR rules.
- maintain a VFR altitude (if your magnetic course is 0 to 179, fly odd thousands plus 500 feet; magnetic course of 180 to 359, fly even thousands plus 500 feet airway direction is given in magnetic course) between the MEA and below Class A airspace.  
Highest allowable altitude is 16,500 westbound and 17,500 eastbound.
- Maintain VFR distances from clouds. Below 1,000 MSL 3 miles visibility, 500 below, 1000 above, 2000 horizontally from clouds.





## When flying VFR-On-Top (Continued)

- in uncontrolled airspace during daylight hours, you need 1 mile visibility.
- 10,000 MSL or above, 5 miles visibility, 1,000 below and above clouds, 1 mile horizontally.
- make the same compulsory reports that are required for an IFR flight at IFR altitudes.
- report changes in altitudes.
- follow the same procedure in the event of loss of communication.
- realize that no traffic separation is provided.

Pilot would request a clearance "to VFR-On-Top" to climb through a cloud layer and then continue VFR.

ATC will issue a VFR restriction to an IFR flight when the pilot requests it.

In VFR conditions, including VFR-On-Top, continue the flight under VFR and land as soon as practical (not as soon as possible).

In IFR conditions, continue on the route specified in your clearance. Fly at your assigned altitude, unless the MEA is higher, or unless given an expected further clearance to climb to a higher altitude.

If in a holding pattern, leave the holding pattern at the EFC (expected further clearance) time.

## Loss Of Communications

Squawk 7600 on your transponder.

## Malfunction Reports

You must report immediately to ATC:

- complete loss of VOR, TACAN (DME), or ADF capability;
- complete or partial loss of ILS capability; loss of DME if at or above FL 240 (notify ATC, then continue to your destination airport as cleared where repairs can be made).

## TEST QUESTIONS (Use Test Supplement 8080-3F)

NOTE: CORRECT ANSWER IN **BOLD ITALICS**

### 4XXX. FAA AVSEM IRA

Which statement is true regarding flying PIC as an instrument pilot under BasicMed?

- A) Must see a physician every 24 months and take the Medical Education Course (MEC) every 48 months.
- B) Must see a physician every 48 months and take the Medical Education Course (MEC) every 24 months.**
- C) Must have a Driver's license with an expired class medical certificate.

### 4XXX. FAA AVSEM IRA

What conditions allow a pilot who is exercising the privileges of BasicMed to act as a PIC under instrument flight rules (IFR)?

- A) Flight in IMC is not permitted under BasicMed.
- B) When the PIC is instrument rated and current.**
- C) When there is a safety pilot who shares the PIC responsibilities.

### 4XXX. FAA AVSEM IRA

What is the maximum altitude allowed for a pilot who is exercising the privileges of BasicMed to act as a PIC under instrument flight rules (IFR)?

- A) 10,000 feet MSL.
- B) 12,000 feet MSL.
- C) 18,000 feet MSL.**

### 4002. IRA

What limitation is imposed on a newly certificated commercial airplane pilot if that person does not hold an instrument pilot rating?

- A) The carrying of passengers or property for hire on cross-country flights at night is limited to a radius of 50 nautical miles (NM).
- B) The carrying of passengers for hire on cross-country flights is limited to 50 NM for night flights, but not limited for day flights.
- C) The carrying of passengers for hire on cross-country flights is limited to 50 NM and the carrying of passengers for hire at night is prohibited.**



4003.            IRA

Before beginning any flight under IFR, the pilot in command must become familiar with all available information concerning that flight. In addition, the pilot must

- A) be familiar with all instrument approaches at the destination airport.
- B) list an alternate airport on the flight plan and confirm adequate takeoff and landing performance at the destination airport.
- C)** be familiar with the runway lengths at airports of intended use, and the alternatives available if the flight cannot be completed.

4005.            IRA

During your preflight planning for an IFR flight in an airplane you determine that the first airport of intended landing has no instrument approach prescribed in 14 CFR part 97. The weather forecast for one hour before through one hour after your estimated time of arrival is 3000' scattered with 5 miles visibility. To meet fuel requirements for this flight you must be able to fly to the first airport of intended landing;

- A) and then fly for 45 minutes at normal cruising speed.
- B)** then to the alternate airport, and then for 45 minutes at normal cruising speed.
- C) then to the alternate airport, and then for 30 minutes at normal cruising speed.

4007.            IRA

If the aircraft's transponder fails during flight within Class B airspace,

- A) the pilot should immediately request clearance to depart the Class B airspace.
- B)** ATC may authorize deviation from the transponder requirement to allow aircraft to continue to the airport of ultimate destination.
- C) aircraft must immediately descend below 1,200 feet AGL and proceed to destination.

4008.            IRA

If a pilot enters the condition of flight in the pilot logbook as simulated instrument conditions, what qualifying information must also be entered?

- A)** Place and type of each instrument approach completed and name of safety pilot.
- B) Number and type of instrument approaches completed and route of flight.
- C) Name and pilot certificate number of safety pilot and type of approaches completed.

4009.            IRA

What portion of dual instruction time may a certificated instrument flight instructor log as instrument flight time?

- A) All time during which the instructor acts as instrument instructor, regardless of weather conditions.
- B)** All time during which the instructor acts as instrument instructor in actual instrument weather conditions.
- C) Only the time during which the instructor flies the aircraft by reference to instruments.

4010.            IRA

Which flight time may be logged as instrument time when on an instrument flight plan?

- A) All of the time the aircraft was not controlled by ground references.
- B)** Only the time you controlled the aircraft solely by reference to flight instruments.
- C) Only the time you were flying in IFR weather conditions.

4011.            IRA

What are the minimum qualifications for a person who occupies the other control seat as safety pilot during simulated instrument flight?

- A)** Private pilot certificate with appropriate category and class ratings for the aircraft.
- B) Private pilot with instrument rating.
- C) Private pilot with appropriate category class, and instrument ratings.

4012.

The minimum instrument time required, within the last 6 months, to be current for IFR is

- A)** six instrument approaches, holding procedures, and intercepting and tracking courses.
- B) six hours in the same category aircraft.
- C) six hours in the same category aircraft, and at least 3 of the 6 hours in actual IFR.

4013.            IRA

After your recent IFR experience lapses, how much time do you have before you must pass an instrument competency check to act as pilot in command under IFR?

- A)** 6 months.
- B) 90 days.
- C) 12 months.



4014.            IRA

An instrument rated pilot, who has not logged any instrument time in 1 year or more, cannot serve as pilot in command under IFR, unless the pilot A) completes the required 6 hours and six approaches, followed by an instrument competency check given by an FAA-designated examiner.

**B)** passes an instrument competency check in the category of aircraft involved, given by an approved FAA examiner, instrument instructor, or FAA inspector.  
C) passes an instrument competency check in the category of aircraft involved, followed by 6 hours and six instrument approaches, 3 of those hours in the category of aircraft involved.

4015.            IRA

A pilot's recent IFR experience expires on July 1 of this year. What is the latest date the pilot can meet the IFR experience requirement without having to take an instrument competency check?

- A) December 31, this year.  
B) June 30, next year.  
C) July 31, this year.

4017.            IRA

What minimum conditions are necessary for the instrument approaches required for IFR currency?

- A)** The approaches may be made in an aircraft, approved instrument ground trainer, or any combination of these.  
B) At least three approaches must be made in the same category of aircraft to be flown.  
C) At least three approaches must be made in the same category and class of aircraft to be flown.

4020.            IRA

How may a pilot satisfy the recent instrument experience requirement necessary to act as pilot in command in IMC in powered aircraft?

- A)** Log six instrument approaches, holding procedures, and intercepting and tracking courses using navigational systems.  
B) Log six instrument approaches and 3 hours under actual or simulated IFR conditions within the last 6 months; three of the approaches must be in the category of aircraft involved.  
C) Log 6 hours of instrument time under actual or simulated IFR conditions within the last 3 months, including at least six instrument approaches of any kind. Three of the 6 hours must be in flight in any category aircraft.

4021.            IRA

How long does a pilot remain current for IFR flight after successfully completing an instrument competency check if no further IFR flights are made?

- A) 90 days.  
**B)** 6 months.  
C) 12 months.

4023.            IRA

What recent instrument flight experience requirements must be met before you may act as pilot in command of an airplane under IFR?

- A)** A minimum of six instrument approaches in an airplane, or an approved simulator (airplane) or ground trainer, within the preceding 6 calendar months.  
B) A minimum of six instrument approaches in an aircraft at least three of which must be in the same category within the preceding 6 calendar months.  
C) A minimum of six instrument approaches at least three of which must be in an aircraft within the preceding 6 calendar months.

4024.            IRA

Under which condition are you required to have an instrument rating for flight in VMC?

- A) Flight through an MOA.  
B) Flight into an ADIZ.  
**C)** Flight into class A airspace.

4025.            IRA

The pilot in command of a civil aircraft must have an instrument rating only when operating

- A) under IFR in controlled airspace and in a positive control area or positive control route segment.  
**B)** under IFR, in weather conditions less than the minimum for VFR flight, and in Class A airspace.  
C) in weather conditions less than the minimum prescribed for VFR flight.



4026.           IRA

What additional instrument experience is required for you to meet the recent flight experience to act as pilot in command of an airplane under IFR? Your present instrument experience within the preceding 6 calendar months is:

A) 1.3 hours with holding, intercepting, and tracking courses in an approved airplane flight simulator.  
B) two instrument approaches in an airplane.

C) Four instrument approaches in an approved flight simulator that is representative of the airplane category.

B) Three hours of simulated or actual instrument flight time in a helicopter and two instrument approaches in an airplane or helicopter.

C) Three instrument approaches in a helicopter.

4027.           IRA

To meet the minimum required instrument experience to remain current for IFR operations, you must accomplish during the past 6 months at least six instrument approaches including

A) holding procedures intercepting and tracking courses through the use of navigation systems.  
B) and 6 hours of instrument time in any aircraft.  
C) three of which must be in the same category and class of aircraft to be flown, and 6 hours of instrument time in any aircraft.

4028.           IRA

A certificated commercial pilot who carries passengers for hire in an airplane at night is required to have at least

A) an associated type rating if the airplane is of the multiengine class.  
B) a First-Class Medical Certificate.  
C) an airplane instrument pilot rating.

4029.           IRA

You intend to carry passengers for hire on a night VFR flight in a single engine airplane within a 25 mile radius of the departure airport. You are required to possess at least which rating(s)?

A) A Commercial Pilot Certificate with a single engine land rating.  
B) A Commercial Pilot Certificate with a single engine and instrument (airplane) rating.  
C) A Private Pilot Certificate with a single engine land and instrument airplane rating.

4031.           IRA

Under which condition must the pilot in command of a civil aircraft have at least an instrument rating?

- A) When operating in class E airspace.  
**B)** For a flight in VFR conditions while on an IFR flight plan.  
C) For any flight above an altitude of 1,200 feet AGL, when the visibility is less than 3 miles.

4032.           IRA

What are the minimum fuel requirements in IFR conditions, if the first airport of intended landing is forecast to have a 1,500 foot ceiling and 3 miles visibility at flight-planned ETA? Fuel to fly to the first airport of intended landing,

- A) and fly thereafter for 45 minutes at normal cruising speed.  
**B)** fly to the alternate, and fly thereafter for 45 minutes at normal cruising speed.  
C) fly to the alternate, and fly thereafter for 30 minutes at normal cruising speed.

4033.           IRA

Before beginning any flight under IFR, the pilot in command must become familiar with all available information concerning that flight. In addition, the pilot must

- A) list an alternate airport on the flight plan and become familiar with the instrument approaches to that airport.  
B) list an alternate airport on the flight plan and confirm adequate takeoff and landing performance at the destination airport.  
**C)** be familiar with the runway lengths at airports of intended use, and the alternatives available if the flight cannot be completed.

4034.           IRA

Which limitation is imposed on the holder of a Commercial Pilot Certificate if that person does not hold an instrument rating?

- A) That person is limited to private pilot privileges at night.  
B) The carrying of passengers or property for hire on cross-country flights at night is limited to a radius of 50 NM.  
**C)** The carrying of passengers for hire on cross-country flights is limited to 50 NM and the carrying of passengers for hire at night is prohibited.



4035.           IRA

To carry passengers for hire in an airplane on cross-country flights of more than 50 NM from the departure airport, the pilot in command is required to hold at least

- A) a Category II pilot authorization.
- B) a First-Class Medical certificate.
- C) a Commercial Pilot Certificate with an instrument rating.

4036.           IRA

When must an operational check on the aircraft VOR equipment be accomplished when used to operate under IFR?

- A) Within the preceding 10 days or 10 hours of flight time.
- B) Within the preceding 30 days or 30 hours of flight time.
- C) Within the preceding 30 days.

4037.           IRA

In the 48 contiguous states, excluding the airspace at or below 2,500 feet AGL, an operable coded transponder equipped with Mode C capability is required in all controlled airspace at and above

- A) 12,500 feet MSL.
- B) 10,000 feet MSL.
- C) Flight level (FL) 180.

4038.           IRA

A coded transponder equipped with altitude reporting capability is required in all controlled airspace

- A) at and above 10,000 feet MSL, excluding at and below 2,500 feet AGL.
- B) at and above 2,500 feet above the surface.
- C) below 10,000 feet MSL, excluding at and below 2,500 feet AGL.

4039.           IRA

Who is responsible for determining that the altimeter system has been checked and found to meet 14 CFR part 91 requirements for a particular instrument flight?

- A) Owner.
- B) Operator.
- C) Pilot-in-command.

4042.           IRA

If an unpressurized aircraft is operated above 12,500 feet MSL, but not more than 14,000 feet MSL, for a period of 2 hours 20 minutes, how long during that time is the minimum flight crew required to use supplemental oxygen?

- A) 2 hours 20 minutes.
- B) 1 hour 20 minutes.
- C) 1 hour 50 minutes.

4044.           IRA

Which data must be recorded in the aircraft log or other appropriate log by a pilot making a VOR operational check for IFR operations?

- A) VOR name or identification, date of check, amount of bearing error, and signature.
- B) Place of operational check, amount of bearing error, date of check, and signature.
- C) Date of check, VOR name or identification, place of operational check, and amount of bearing error.

4045.           IRA

What is the maximum cabin pressure altitude at which a pilot can fly for longer than 30 minutes without using supplemental oxygen.

- A) 10,500 feet.
- B) 12,000 feet.
- C) 12,500 feet.

4046.           IRA

What record shall be made in the aircraft log or other permanent record by the pilot making the VOR operational check?

- A) The date, place, bearing error, and signature.
- B) The date, frequency of VOR or VOT, number of flight hours since last check, and signature.
- C) The date, place, satisfactory or unsatisfactory, and signature.

4047.           IRA

Your aircraft had the static pressure system and altimeter tested and inspected on January 5, of this year, and was found to comply with FAA standards. These systems must be reinspected and approved for use in controlled airspace under IFR by

- A) January 5, next year.
- B) January 5, 2 years hence.
- C) January 31, 2 years hence.

4048.           IRA

Which checks and inspections of flight instruments or instrument systems must be accomplished before an aircraft can be flown under IFR?

- A) VOR within 30 days, altimeter systems within 24 calendar months, and transponder within 24 calendar months.
- B) ELT test within 30 days, altimeter systems within 12 calendar months, and transponder within 24 calendar months.
- C) VOR within 24 calendar months, transponder within 24 calendar months, and altimeter system within 12 calendar months.

4049.           IRA

An aircraft altimeter system test and inspection must be accomplished within

- A) 12 calendar months.
- B) 18 calendar months.
- C) 24 calendar months.



4051.           IRA

An aircraft operated under 14 CFR part 91 IFR is required to have which of the following?

- A) Radar altimeter.
- B) Dual VOR system.
- C) Gyroscopic direction indicator**

4052.           IRA

What is the maximum IFR altitude you may fly in an unpressurized aircraft without providing passengers with supplemental oxygen?

- A) 12,500 feet.
- B) 14,000 feet.
- C) 15,000 feet.**

4053.           IRA

What is the oxygen requirement for an unpressurized aircraft at 15,000 feet?

- A) All occupants must use oxygen for the entire time at this altitude.
- B) Crew must start using oxygen at 12,000 feet and passengers at 15,000 feet.
- C) Crew must use oxygen for the entire time above 14,000 feet and passengers must be provided supplemental oxygen only above 15,000 feet.**

4054.           IRA

When making an airborne VOR check, what is the maximum allowable tolerance between the two indicators of a dual VOR system (units independent of each other except the antenna)?

- A) 4° between the two indicated bearings of a VOR.**
- B) Plus or minus 4° when set to identical radials of a VOR.
- C) 6° between the two indicated radials of a VOR.

4055.           IRA

What minimum navigation equipment is required for IFR flight?

- A) VOR/LOC receiver, transponder, and DME.
- B) VOR receiver and, if in ARTS III environment, a coded transponder equipped for altitude reporting.
- C) Navigation equipment appropriate to the ground facilities to be used.**

4059.           IRA

When may a pilot file a composite flight plan?

- A) When requested or advised by ATC.
- B) Any time a portion of the flight will be VFR.**
- C) Any time a landing is planned at an intermediate airport.

4060.           IRA

When filing a composite flight plan where the first portion of the flight is IFR, which fix(es) should be indicated on the flight plan form?

- A) All points of transition from one airway to another, fixes defining direct route segments, and the clearance limit fix.**
- B) Only the fix where you plan to terminate the IFR portion of the flight.
- C) Only those compulsory reporting points on the IFR route segment.

4061.           IRA

What is the recommended procedure for transitioning from VFR to IFR on a composite flight plan?

- A) Prior to transitioning to IFR, contact the nearest FSS, close the VFR portion, and request ATC clearance.**
- B) Upon reaching the proposed point for change to IFR, contact the nearest FSS and cancel your VFR flight plan, then contact ARTCC and request an IFR clearance.
- C) Prior to reaching the proposed point for change to IFR, contact ARTCC, request your IFR clearance, and instruct them to cancel the VFR flight plan.

4062.           IRA

When is an IFR flight plan required?

- A) When less than VFR conditions exist in either Class E or Class G airspace and in Class A airspace.
- B) In all Class E airspace when conditions are below VFR, in Class A airspace, and in defense zone airspace.
- C) In Class E airspace when IMC exists or in Class A airspace.**

4063.           IRA

Prior to which operation must an IFR flight plan be filed and an appropriate ATC clearance received?

- A) Flying by reference to instruments in controlled airspace.
- B) Entering controlled airspace when IMC exists.**
- C) Takeoff when IFR weather conditions exist.

4064.           IRA

To operate under IFR below 18,000 feet, a pilot must file an IFR flight plan and receive an appropriate ATC clearance prior to

- A) entering controlled airspace.**
- B) entering weather conditions below VFR minimums.
- C) takeoff.

4065.           IRA

To operate an aircraft under IFR, a flight plan must have been filed and an ATC clearance received prior to

- A) controlling the aircraft solely by use of instruments.
- B) entering weather conditions in any airspace.
- C) entering controlled airspace.**



4066.           IRA

When is an IFR clearance required during VFR weather conditions?

- A) When operating in the Class E airspace.
- B)** When operating in a Class A airspace.
- C) When operating in airspace above 14,500 feet.

4067.

Operation in which airspace requires filing an IFR flight plan?

- A) Any airspace when the visibility is less than 1 mile.
- B)** Class E airspace with IMC and positive control area.
- C) Positive control area, Continental Control Area, and all other airspace, if the visibility is less than 1 mile.

4068.           IRA

When departing from an airport located outside controlled airspace during IMC, you must file an IFR flight plan and receive a clearance before

- A) takeoff.
- B) entering IFR conditions.
- C)** entering Class E airspace.

4070.           IRA

Preferred IFR routes beginning with a fix, indicate that departing aircraft will normally be routed to the fix by

- A) the established airway(s) between the departure airport and the fix.
- B)** an instrument departure procedure (DP), or radar vectors.
- C) direct route only.

4079.           IRA

Which sources of aeronautical information, when used collectively, provide the latest status of airport conditions (e.g., runway closures, runway lighting, snow conditions)?

- A) Aeronautical Information Manual, aeronautical charts, and Distant (D) Notice to Airmen (NOTAM's).
- B) Chart Supplements, FDC NOTAM's.
- C)** Chart Supplements and Distant (D) NOTAM's.

4080.           IRA

What is the purpose of FDC NOTAMs?

- A) To provide the latest information on the status of navigation facilities to all FSS facilities for scheduled broadcasts.
- B) To issue notices for all airports and navigation facilities in the shortest possible time.
- C)** To advise of changes in flight data which affect instrument approach procedure (IAP), aeronautical charts, and flight restrictions prior to normal publication.

4081.           IRA

What minimum weather conditions must be forecast for your ETA at an alternate airport, that has only a VOR approach with standard alternate minimums, for the airport to be listed as an alternate on the IFR flight plan?

- A) 800 foot ceiling and 1 statute mile visibility.
- B)** 800 foot ceiling and 2 statute miles visibility.
- C) 1,000 foot ceiling and visibility to allow descent from minimum en route altitude (MEA), approach, and landing under basic VFR.

4082.           IRA

Is an alternate airport required for an IFR flight to ATL (Atlanta Hartsfield) if the proposed ETA is 1930Z?

TAF

KATL I2I720Z 121818 20012KT 5SM HZ  
BKN030 FM2000 3SM TRSA OVC025CB  
FM2200 33015G20KT P6SM BKN015 OVC040  
BECMG 0608 02008KT BKN040 BECMG 1012  
00000KT P6SM CLR=

A) Yes, because the ceiling could fall below 2,000 feet within 2 hours before to 2 hours after the ETA.

B) No, because the ceiling and visibility are forecast to remain at or above 1,000 feet and 3 miles, respectively.

**C)** No, because the ceiling and visibility are forecast to be at or above 2,000 feet and 3 miles within 1 hour before to 1 hour after the ETA.

4083.           IRA

What minimum conditions must exist at the destination airport to avoid listing an alternate airport on an IFR flight plan when a standard IAP is available?

- A) From 2 hours before to 2 hours after ETA, forecast ceiling 2,000, and visibility 2 and 1/2 miles.
- B) From 2 hours before to 2 hours after ETA, forecast ceiling 3,000, and visibility 3 miles.
- C)** From 1 hour before to 1 hour after ETA, forecast ceiling 2,000, and visibility 3 miles.

4085.           IRA

What standard minimums are required to list an airport as an alternate on an IFR flight plan if the airport has a VOR approach only?

- A)** Ceiling and visibility at ETA, 800 feet and 2 miles, respectively.
- B) Ceiling and visibility from 2 hours before until 2 hours after ETA, 800 feet and 2 miles, respectively.
- C) Ceiling and visibility at ETA, 600 feet and 2 miles, respectively.



4086.           IRA

What are the minimum weather conditions that must be forecast to list an airport as an alternate when the airport has no approved IAP?

- A) The ceiling and visibility at ETA, 2,000 feet and 3 miles, respectively.
- B) The ceiling and visibility from 2 hours before until 2 hours after ETA, 2,000 feet and 3 miles, respectively.
- C) The ceiling and visibility at ETA must allow descent from MEA, approach, and landing, under basic VFR.**

4087.           IRA

What minimum weather conditions must be forecast for your ETA at an airport that has a precision approach procedure, with standard alternate minimums, in order to list it as an alternate for the IFR flight?

- A) 600-foot ceiling and 2 SM visibility at your ETA.**
- B) 600-foot ceiling and 2 SM visibility from 2 hours before to 2 hours after your ETA.
- C) 800-foot ceiling and 2 SM visibility at your ETA.

4488. AVSEM   IRA

(Refer to figures 163 and 165) Which restriction to the use of the OED VORTAC would be applicable to the (GNATS6.KOLER) departure?

- A) R 333 beyond 30 NM below 9,000 feet.
- B) R 297 beyond 35 NM below 8,500 feet.**
- C) R 251 within 15 NM below 6,600 feet.

4488.           IRA

(Refer to Figure 155.) Which restriction would be applicable for the Grand Junction Six Departure BRICK transition (JNC6.BRICK)?

- A) Minimum climb rate of 300' per NM to 9,300 feet.
- B) Two VOR receivers required.
- C) DME required.**

4275.           IRA   PLT281, IR.I.C.K4

(Refer to figure 190.) What are the hours of operation (local standard time) of the control tower at Santa Barbara (SBA)?

- A) 0530am-10:00pm
- B) 0600-2300.**
- C) 0700 - 2200

4305.           IRA

(Refer to figure 184.) What are the hours of operation (local time) of the Class D service for the Yakima Air Terminal when daylight savings time is in effect?

- A) 0500-2100
- B) 0700-2300.
- C) 0600 - 2200**

4280.           IRA

(Refer to figure 34) At which altitude and location on V573 would you expect the navigational signal of the HOT VOR/DME to be unreliable?

- A) 3,000 feet at APINE intersection.**
- B) 2,800 feet at MARKI intersection.
- C) 6,000 feet at ELMMO intersection.

4361.           IRA

(Refer to figure 211) At which point does the basic instrument departure procedure terminate?

- A) When Helena Departure Control establishes radar contact.
- B) At STAKK intersection.**
- C) Over the BOZEMAN VOR.

4362.           IRA

(Refer to figure 76.) Which indication would be an acceptable accuracy check of both VOR receivers when the aircraft is located on the VOR receiver checkpoint at the Helena Regional Airport?

- A)
- B)
- C) C.**

4365.           IRA

(Refer to figure 214) Which en route low altitude navigation chart would cover the proposed routing departing Billings Logan (BIL)?

- A) H-1E.
- B) L-13D.**
- C) Billings Sectional Chart.

4372.           IRA

What is the maximum tolerance allowed for an operational VOR equipment check when using a VOT?

- A) Plus or minus 4°.**
- B) Plus or minus 6°.
- C) Plus or minus 8°.

4373.           IRA

When is a pilot on an IFR flight plan responsible for avoiding other aircraft?

- A) At all times when not in radar contact with ATC.
- B) When weather conditions permit, regardless of whether operating under IFR or VFR.**
- C) Only when advised by ATC.

4375.           IRA

The aircraft's transponder fails during flight within Class D airspace.

- A) The pilot should immediately request clearance to depart the Class D airspace.
- B) No deviation is required because a transponder is not required in Class D airspace.**
- C) Pilot must immediately request priority handling to proceed to destination.



4376.           IRA

When using a VOT to make a VOR receiver check, the CDI should be centered and the OBS should indicate that the aircraft is on the

- A) 090 radial.
- B) 180 radial.
- C) 360 radial.**

4377.           IRA

How should the pilot make a VOR receiver check when the aircraft is located on the designated checkpoint on the airport surface?

- A) Set the OBS on 180° plus or minus 4°; the CDI should center with a FROM indication.
- B) Set the OBS on the designated radial. The CDI must center within plus or minus 4° of that radial with a FROM indication.**
- C) With the aircraft headed directly toward the VOR and the OBS set to 000°, the CDI should center within plus or minus 4° of that radial with a TO indication.

4378.           IRA

When the CDI needle is centered during an airborne VOR check, the omni-bearing selector and the TO/ FROM indicator should read

- A) within 4° of the selected radial.
- B) within 6° of the selected radial.**
- C) 0° TO, only if you are due south of the VOR.

4379.           IRA

What does declaring 'minimum fuel' to ATC imply?

- A) Traffic priority is needed to the destination airport.
- B) Emergency handling is required to the nearest useable airport.
- C) Merely an advisory that indicates an emergency situation is possible should any undue delay occur.**

4380.           IRA

When ATC has not imposed any climb or descent restrictions and aircraft are within 1,000 feet of assigned altitude, pilots should attempt to both climb and descend at a rate of between

- A) 500 feet per minute and 1,000 feet per minute.
- B) 500 feet per minute and 1,500 feet per minute.**
- C) 1000 feet per minute and 2,000 feet per minute.

4381.           IRA

During an IFR flight in IMC, a distress condition is encountered, (fire, mechanical, or structural failure). The pilot should

- A) not hesitate to declare an emergency and obtain an amended clearance.**
- B) wait until the situation is immediately perilous before declaring an emergency.
- C) contact ATC and advise that an urgency condition exists and request priority consideration.

4382.           IRA

(Refer to figure 81) When checking a dual VOR system by use of a VOT, which illustration indicates the VOR's are satisfactory?

- A) 1**
- B) 2
- C) 4

4383.           IRA

While airborne, what is the maximum permissible variation between the two indicated bearings when checking one VOR system against the other?

- A) Plus or minus 4° when set to identical radials of a VOR
- B) 4° between the two indicated bearings to a VOR.**
- C) Plus or minus 6° when set to identical VOR radials.

4385.           IRA

(Refer to figure 82) Which is an acceptable range of accuracy when performing an operational check of dual VOR's using one system against the other?

- A) 1.
- B) 2.
- C) 4.**

4386.           IRA

Where can the VOT frequency for a particular airport be found?

- A) On the IAP Chart and in the Chart Supplement.
- B) Only in the Chart Supplement.**
- C) In the Chart Supplement and on the A/G Voice Communication Panel of the En Route Low Altitude Chart.

4387.           IRA

Which indications are acceptable tolerances when checking both VOR receivers by use of the VOT?

- A) 360° TO and 003° TO, respectively.
- B) 001° FROM and 005° FROM, respectively.
- C) 176° TO and 003° FROM, respectively.**

4388.           IRA

In which publication can the VOR receiver ground checkpoint(s) for a particular airport be found?

- A) Airman's Information Manual.
- B) En Route Low Altitude Chart.
- C) Chart Supplement.**

4389.           IRA

Which is the maximum tolerance for the VOR indication when the CDI is centered and the airplane is directly over the airborne checkpoint?

- A) Plus or minus 6° of the designated radial.**
- B) Plus or minus 7° of the designated radial.
- C) Plus or minus 8° of the designated radial.



4390.           IRA

When should your transponder be on Mode C while on an IFR flight?

- A) Only when ATC requests Mode C.
- B)** At all times if the equipment has been calibrated, unless requested otherwise by ATC.
- C) When passing 12,500 feet MSL.

4391.           IRA

When making an airborne VOR check, what is the maximum allowable tolerance between the two indicators of a dual VOR system (units independent of each other except the antenna)?

- A)** 4° between the two indicated radials of a VOR.
- B) Plus or minus 4° when set to identical radials of a VOR.
- C) 6° between the two indicated radials of a VOR.

4393.           IRA

What is the recommended climb procedure when a non-radar departure control instructs a pilot to climb to the assigned altitude?

- A) Maintain a continuous optimum climb until reaching assigned altitude and report passing each 1,000 foot level.
- B) Climb at a maximum angle of climb to within 1,000 feet of the assigned altitude, then 500 feet per minute the last 1,000 feet.
- C)** Maintain an optimum climb on the centerline of the airway without intermediate level offs until 1,000 feet below assigned altitude, then 500 to 1500 feet per minute.

4394.           IRA

When departing from an airport not served by a control tower, the issuance of a clearance containing a void time indicates that

- A) ATC will assume the pilot has not departed if no transmission is received before the void time.
- B)** the pilot must advise ATC as soon as possible, but no later than 30 minutes, of their intentions if not off by the void time.
- C) ATC will protect the airspace only to the void time.

4395.           IRA

What response is expected when ATC issues an IFR clearance to pilots of airborne aircraft?

- A) Read back the entire clearance as required by regulation.
- B)** Read back those parts containing altitude assignments or vectors and any part requiring verification.
- C) Read-back should be unsolicited and spontaneous to confirm that the pilot understands all instructions.

4396.           IRA

Which clearance items are always given in an abbreviated IFR departure clearance? (Assume radar environment.)

- A) Altitude, destination airport, and one or more fixes which identify the initial route of flight.
- B)** Destination airport, altitude, DP Name, Number and/or Transition if appropriate.
- C) Clearance limit, and DP Name, Number, and/or Transition, if appropriate.

4398.           IRA

On the run-up pad, you receive the following clearance from ground control:

CLEARED TO DALLAS-LOVE AIRPORT AS  
FILED - MAINTAIN SIX THOUSAND -SQUAWK  
ZERO SEVEN ZERO FOUR JUST  
BEFORE DEPARTURE - DEPARTURE  
CONTROL WILL BE ONE TWO FOUR POINT  
NINER.

An abbreviated clearance, such as this, will always contain the;

- A) departure control frequency.
- B) requested enroute altitude.
- C)** destination airport and route.

4402.           IRA

How should you preflight check the altimeter prior to an IFR flight?

- A) Set the altimeter to 29.92" Hg. With current temperature and the altimeter indication, determine the true altitude to compare with the field elevation.
- B) Set the altimeter first with 29.92" Hg and then the current altimeter setting. The change in altitude should correspond to the change in setting.
- C)** Set the altimeter to the current altimeter setting. The indication should be within 75 feet of the actual elevation for acceptable accuracy.

4403.           IRA

When are ATIS broadcasts updated?

- A) Every 30 minutes if weather conditions are below basic VFR; otherwise, hourly.
- B)** Upon receipt of any official weather, regardless of content change or reported values.
- C) Only when the ceiling and/or visibility changes by a reportable value.



4404.           IRA

Absence of the sky condition and visibility on an ATIS broadcast specifically implies that

**A) the ceiling is more than 5,000 feet and visibility is 5 miles or more.**

B) the sky condition is clear and visibility is unrestricted.

C) the ceiling is at least 3,000 feet and visibility is 5 miles or more.

4405.           IRA

The most current en route and destination flight information for planning an instrument flight should be obtained from

A) the ATIS broadcast

**B) AFSS Publications**

C) Notices to Airmen Publications

4406.           IRA

From what source can you obtain the latest FDC NOTAM's?

A) In Notices to Airmen.

**B) AFSS / FSS.**

C) Chart Supplements U.S.

4407.           IRA

When may ATC request a detailed report of an emergency even though a rule has not been violated?

**A) When priority has been given.**

B) Any time an emergency occurs.

C) When the emergency occurs in controlled airspace.

4414.           IRA

Which information is always given in an abbreviated clearance?

A) DP or transition name and attitude to maintain.

**B) Name of destination airport or specific fix and altitude.**

C) Altitude to maintain and code to squawk.

4417.           IRA

What action is recommended if a pilot does not wish to use an instrument departure procedure?

A) Advise clearance delivery or ground control before departure.

B) Advise departure control upon initial contact.

**C) Enter "No DP" in the remarks section of the IFR flight plan.**

4419.           IRA

Which procedure applies to instrument departure procedures?

A) Instrument departure clearances will not be issued unless requested by the pilot.

B) The pilot in command must accept an instrument departure procedure when issued by ATC.

**C) If an instrument departure procedure is accepted, the pilot must possess at least the textual description.**

4420.           IRA

During a takeoff into IFR conditions with low ceilings, when should the pilot contact departure control?

A) Before penetrating the clouds.

**B) When advised by the tower.**

C) Upon completing the first turn after takeoff or upon establishing cruise climb on a straight-out departure.

4421.           IRA

During a flight, the controller advises "traffic 2 o'clock 5 miles southbound." The pilot is holding 20° correction for a crosswind from the right. Where should the pilot look for the traffic?

**A) 40° to the right of the airplane's nose.**

B) 20° to the right of the airplane's nose.

C) Straight ahead.

4426.           IRA

In addition to a VOR receiver and two-way communications capability, which additional equipment is required for IFR operation in Class B airspace?

A) Another VOR and communications receiver and a coded transponder.

B) Standby communications receiver, DME, and coded transponder.

**C) An operable coded transponder having Mode C capability.**

4427.           IRA

No person may operate an aircraft in controlled airspace under IFR unless he/she files a flight plan

A) and receives a clearance by telephone prior to takeoff.

B) prior to takeoff and requests the clearance upon arrival on an airway.

**C) receives clearance prior the entering controlled airspace.**

4439.           IRA

Prior to operating an aircraft not equipped with a transponder in Class B airspace, a request for a deviation must be submitted to the

A) FAA Administrator at least 24 hours before the proposed operation.

B) nearest FAA General Aviation District Office 24 hours before the proposed operation.

**C) controlling ATC facility at least 1 hour before the proposed flight.**

4440.           IRA

Which of the following is required equipment for operating an airplane within Class B airspace?

**A) A 4096 code transponder with automatic pressure altitude reporting equipment.**

B) A VOR receiver with DME.

C) A 4096 code transponder.



4441.           IRA

Which procedure is recommended while climbing to an assigned altitude on the airway?

- A) Climb on the centerline of the airway except when maneuvering to avoid other air traffic in VFR conditions.
- B) Climb slightly on the right side of the airway when in VFR conditions.
- C) Climb far enough to the right side of the airway to avoid climbing or descending traffic coming from the opposite direction if in VFR conditions.

4442.           IRA

Which clearance procedures may be issued by ATC without prior pilot request?

- A) DP's, STAR's and contact approaches.
- B) Contact and visual approaches.
- C) DP's, STAR's, and visual approaches.

4447.           IRA

Where are VFR-on-Top operations prohibited?

- A) In Class A airspace.
- B) During off-airways direct flights.
- C) When flying through Class B airspace.

4448.           IRA

What action should you take if your DME fails at FL 240?

- A) Advise ATC of the failure and land at the nearest available airport where repairs can be made.
- B) Notify ATC that it will be necessary for you to go to a lower altitude, since your DME has failed.
- C) Notify ATC of the failure and continue to the next airport of intended landing where repairs can be made.

4449.           IRA

Which rules apply to the pilot in command when operating on a VFR-on-Top clearance?

- A) VFR only.
- B) VFR and IFR.
- C) VFR when "in the clear" and IFR when "in the clouds."

4450.           IRA

When can a VFR-on-Top clearance be assigned by ATC?

- A) Only upon request of the pilot when conditions are indicated to be suitable.
- B) Any time suitable conditions exist and ATC wishes to expedite traffic flow.
- C) When VFR conditions exist, but there is a layer of clouds below the MEA.

4451.           IRA

Which ATC clearance should instrument-rated pilots request in order to climb through a cloud layer or an area of reduced visibility and then continue the flight VFR?

- A) VFR on Top.
- B) Special VFR to VFR Over-the-Top.
- C) VFR Over-the-Top.

4452.           IRA

When on a VFR-on-Top clearance, the cruising altitude is based on;

- A) true course.
- B) magnetic course.
- C) magnetic heading.

4454.           IRA

What cruising altitude is appropriate for VFR on Top on a westbound flight below 18,000 feet?

- A) Even thousand-foot levels.
- B) Even thousand-foot levels plus 500 feet, but not below MEA.
- C) Odd thousand-foot levels plus 500 feet, but not below MEA.

4455.           IRA

What reports are required of a flight operating on an IFR clearance specifying VFR on Top in a non-radar environment?

- A) The same reports that are required for any IFR flight.
- B) All normal IFR reports except vacating altitudes.
- C) Only the reporting of any unforecast weather.

4457.           IRA

What minimums must be considered in selecting an altitude when operating with a VFR-on-Top clearance?

- A) At least 500 feet above the lowest MEA, or appropriate MOCA, and at least 1,000 feet above the existing meteorological condition.
- B) At least 1,000 feet above the lowest MEA, appropriate MOCA, or existing meteorological condition.
- C) Minimum IFR altitude, minimum distance from clouds, and visibility appropriate to altitude selected.

4459.           IRA

What is the procedure when the DME malfunctions at or above 24,000 feet MSL?

- A) Notify ATC immediately and request an altitude below 24,000 feet.
- B) Continue to your destination in VFR conditions and report the malfunction.
- C) After immediately notifying ATC, you may continue to the next airport of intended landing where repairs can be made.



4460.            IRA

What action should you take if your No. 1 VOR receiver malfunctions while operating in controlled airspace under IFR? Your aircraft is equipped with two VOR receivers. The No. 1 receiver has Omni/Localizer/Glide Slope capability, and the No. 2 has only Omni.

- A)** Report the malfunction immediately to ATC.
- B)** Continue the flight as cleared; no report is required.
- C)** Continue the approach and request a VOR or NDB approach.

4461.            IRA

While on an IFR flight, a pilot has an emergency which causes a deviation from an ATC clearance. What action must be taken?

- A)** Notify ATC of the deviation as soon as possible.
- B)** Squawk 7700 for the duration of the emergency.
- C)** Submit a detailed report to the chief of the ATC facility within 48 hours.

4462.            IRA

You enter a holding pattern at a fix, not the same as the approach fix, and receive an EFC time of 1530. At 1520 you experience a complete two-way communications failure. Which procedure should you follow to execute the approach to a landing?

- A)** Depart the holding fix to arrive at the approach fix as close as possible to the EFC time and complete the approach.
- B)** Depart the holding fix at the EFC time, and complete the approach.
- C)** Depart the holding fix at the EFC time or earlier if your flight planned ETA is before the EFC.

4463.            IRA

Which procedure should you follow if you experience two-way communications failure while holding at a holding fix with an EFC time? (The holding fix is not the same as the approach fix.)

- A)** Depart the holding fix to arrive at the approach fix as close as possible to the EFC time.
- B)** Depart the holding fix at the EFC time.
- C)** Proceed immediately to the approach fix and hold until EFC.

4464.            IRA

You are in IMC and have two-way radio communications failure. If you do not exercise emergency authority, what procedure are you expected to follow?

- A)** Set transponder to code 7600, continue flight on assigned route and fly at the last assigned altitude or the MEA, whichever is higher.
- B)** Set transponder to code 7700 for 1 minute, then to 7600, and fly to an area with VFR weather conditions.
- C)** Set transponder to 7700 and fly to an area where you can let down in VFR conditions.

4465.            IRA

Which procedure should you follow if, during an IFR flight in VFR conditions, you have two-way radio communications failure?

- A)** Continue the flight under VFR and land as soon as practicable.
- B)** Continue the flight at assigned altitude and route, start approach at your ETA, or, if late, start approach upon arrival.
- C)** Land at the nearest airport that has VFR conditions.

4466.            IRA

What altitude and route should be used if you are flying in IMC and have two-way radio communications failure?

- A)** Continue on the route specified in your clearance, fly at an altitude that is the highest of last assigned altitude, altitude ATC has informed you to expect, or the MEA.
- B)** Fly direct to an area that has been forecast to have VFR conditions, fly at an altitude that is at least 1,000 feet above the highest obstacles along the route.
- C)** Descend to MEA and, if clear of clouds, proceed to the nearest appropriate airport. If not clear of clouds, maintain the highest of the MEA's along the clearance route.

4470.            IRA

What does the symbol T within a black triangle in the minimums section of the IAP for a particular airport indicate?

- A)** Takeoff minimums are 1 mile for aircraft having two engines or less and ½ mile for those with more than two engines.
- B)** Instrument takeoffs are not authorized.
- C)** Takeoff minimums are not standard and/or departure procedures are published.

4471.            IRA

What responsibility does the pilot in command of an IFR flight assume upon entering VFR conditions?

- A)** Report VFR conditions to ARTCC so that an amended clearance may be issued.
- B)** Use VFR operating procedures.
- C)** To see and avoid other traffic.



4489.           IRA

(Refer to figures 216 and 216A) What route should you take if cleared for the RENO Nine Departure and your assigned route is to V6 from runway 25?

- A) Climb on heading 254 degrees to 5,000 feet MSL, then climbing right turn heading 340 degrees and expect radar vectors to V6.  
B) Climb on runway heading to 5,000 feet MSL, then climbing right turn heading 340 degrees to 9,700 feet MSL, then direct V6.  
C) Climb on runway heading to 5,000 feet MSL, then climbing right turn heading 340 degrees to 9,700 feet MSL, then direct V6.

4490.           IRA

(Refer to figures 216 and 216A) What procedure should be followed if communication is not established with departure control 1 minute after takeoff from runway 34L?

- A) Turn right direct FMG VORTAC, then via assigned route.  
**B)** Maintain 330 degrees heading up to 10,000 feet MSL, then right turn direct FMG VORTAC, then via assigned route.  
C) Turn right direct FMG VORTAC and hold until reaching 8,700 feet MSL, then via assigned route.

4491.           IRA

(Refer to figures 216 and 216A) What is the minimum rate climb per NM to 9,700 feet departing runway 25?

- A)** 500 feet.  
B) 450 feet.  
C) 400 feet.

4500.           IRA

(Refer to figure 87) While holding at the 10 DME fix east of LCH for an ILS approach to RWY 15 at Lake Charles Muni airport, ATC advises you to expect clearance for the approach at 1015. At 1000 you experience two-way radio communications failure. Which procedure should be followed?

- A) Squawk 7600 and listen on the LOM frequency for instructions from ATC. If no instructions are received, start your approach at 1015.  
B) Squawk 7700 for 1 minute, then 7600. After 1 minute, descend to the minimum final approach fix altitude. Start your approach at 1015.  
**C)** Squawk 7600; plan to begin your approach at 1015.

4503.           IRA

(Refer to figure 89.) What are the oxygen requirements for an IFR flight northeast-bound from Milford Municipal on V244 at the lowest appropriate altitude in an unpressurized aircraft?

- A) The required minimum crew must be provided and use supplemental oxygen for that part of the flight of more than 30 minutes.  
B) The required minimum crew must be provided and use supplemental oxygen for that part of the flight of more than 30 minutes, and the passengers must be provided supplemental oxygen.  
**C)** The required minimum crew must be provided and use supplemental oxygen, and all occupants must be provided supplemental oxygen for the entire flight above 15,000 feet.

4505.           IRA

In the event of two way radio communications failure while operating on an IFR clearance in VFR conditions the pilot should continue

- A) by the route assigned in the last ATC clearance received.  
**B)** the flight under VFR and land as soon as practical.  
C) the flight by the most direct route to the fix specified in the last clearance.

4510.           IRA

(Refer to figure 91.) What are the two limiting cruising altitudes useable on V343 for a VFR-on-Top flight from DBS VORTAC to RANEY intersection?

- A) 14,500 and 16,500 feet.  
B) 15,000 and 17,000 feet.  
**C)** 15,500 and 17,500 feet.

4518.           IRA

What is the minimum flight visibility and distance from clouds for flight at 10,500 feet with a VFR-on-Top clearance during daylight hours? (Class E airspace.)

- A) 3 SM, 1,000 feet above, 500 feet below, and 2,000 feet horizontal.  
**B)** 5 SM, 1,000 feet above, 1,000 feet below, and 1 mile horizontal.  
C) 5 SM, 1,000 feet above, 500 feet below, and 1 mile horizontal.

4519.           IRA

What is the required flight visibility and distance from clouds if you are operating in Class E airspace at 9,500 feet MSL with a VFR-on-Top clearance during daylight hours?

- A)** 3 SM, 1,000 feet above, 500 feet below, and 2,000 feet horizontal.  
B) 5 SM, 500 feet above, 1,000 feet below, and 2,000 feet horizontal.  
C) 3 SM, 500 feet above, 1,000 feet below, and 2,000 feet horizontal.



4543.           IRA

If, while in Class E airspace, a clearance is received to "maintain VFR conditions on top," the pilot should maintain a VFR cruising altitude based on the direction of the  
A) true course.  
B) magnetic heading.  
**C) magnetic course.**

4431.           IRA

When must a pilot fly at a cardinal altitude plus 500 feet on an IFR flight plan?  
A) When flying above 18,000 feet in VFR conditions.  
B) When flying in VFR conditions above clouds.  
**C) When assigned a VFR-on-Top clearance.**

4555.           IRA

To comply with ATC instructions for altitude changes of more than 1,000 feet, what rate of climb or descent should be used?  
A) As rapidly as practicable to 500 feet above/below the assigned altitude, and then at 500 feet per minute until the assigned altitude is reached.  
B) 1,000 feet per minute during climb and 500 feet per minute during descents until reaching the assigned altitude.  
**C) As rapidly as practicable to 1,000 feet above/below the assigned altitude, and then between 500 and 1,500 feet per minute until reaching the assigned altitude.**

4633.           IRA

Under which of the following circumstances will ATC issue a VFR restriction to an IFR flight?  
A) Whenever the pilot reports the loss of any navigational aid.  
B) When it is necessary to provide separation between IFR and special VFR traffic.  
**C) When the pilot requests it.**

4634.           IRA

What is expected of you as pilot on an IFR flight plan if you are descending or climbing in VFR conditions?  
A) If on an airway, climb or descend to the right of the centerline.  
B) Advise ATC you are in visual conditions and will remain a short distance to the right of the centerline while climbing.  
**C) Execute gentle banks, left and right, at a frequency which permits continuous visual scanning of the airspace about you.**

4638.           IRA

Which is true regarding the use of an instrument departure procedure chart?  
A) The use of an instrument departure procedure is mandatory.  
**B) To use an instrument departure procedure, the pilot must possess at least the textual description of the approved standard departure.**  
C) To use an instrument departure procedure, the pilot must possess both the textual and graphic form of the approved standard departure.

4640.           IRA

Which is true regarding STAR's?  
A) STAR's are used to separate IFR and VFR traffic.  
**B) STAR's are established to simplify clearance delivery procedures.**  
C) STAR's are used at certain airports to decrease traffic congestion.

4694.           IRA

(Refer to figure 131.) During a missed approach from the VOR/DME RWY 33L approach at BOS, what course should be flown to the missed approach holding waypoint.

- A) 342°.  
B) Runway Heading.  
**C) 030°.**

4751.           IRA

Under which condition does ATC issue a STAR?  
A) To all pilots wherever STAR's are available.  
B) Only if the pilot requests a STAR in the "Remarks" section of the flight plan.  
**C) When ATC deems it appropriate, unless the pilot requests "No STAR."**

4760.           IRA

What are the alternate minimums that must be forecast at the ETA for an airport that has a precision approach procedure?  
A) 400-foot ceiling and 2 miles visibility.  
**B) 600-foot ceiling and 2 miles visibility.**  
C) 800-foot ceiling and 2 miles visibility.

4761.           IRA

What point at the destination should be used to compute estimated time en route on an IFR flight plan?  
A) The final approach fix on the expected instrument approach.  
B) The initial approach fix on the expected instrument approach.  
**C) The point of first intended landing.**



4769.            IRA

An airport without an authorized IAP may be included on an IFR flight plan as an alternate, if the current weather forecast indicates that the ceiling and visibility at the ETA will;

- A) be at least 300 feet and 2 miles.
- B) be at least 1,000 feet and 1 mile.
- C)** allow for a descent from the MEA approach, and a landing under basic VFR.

4637.            IRA

When making an instrument approach at the selected alternate airport, what landing minimums apply?

- A) Standard alternate minimums (600-2 or 800-2).
- B) The IFR alternate minimums listed for that airport.
- C)** The landing minimums published for the type of procedure selected.



## ENROUTE AND ARRIVAL

### Airspace

**CLASS A:** Positive controlled airspace at and above 18,000 feet MSL to FL600. All aircraft must be on a IFR flight plan. The maximum altitude for operation on a Low Altitude Chart (Victor Airway) is 17,000 feet MSL. Jet Routes (J-Routes) are established on High Altitude charts. 18,000 feet is not used for VFR or IFR operations.

**CLASS B:** Generally goes up to 10,000 feet. Aircraft must be equipped with an operable coded transponder with Mode C (altitude encoding) in and within 30 NM of the primary Class B airport.

Transponder with Mode C is also required at and above 10,000 MSL ATC may authorize a deviation from the Class B transponder requirement if a request to ATC is made at least 1 hour before flight.

**CLASS C:** A pilot must maintain two-way communication with ATC while in and above class C. A Mode C transponder is required. ATC provides separation from all IFR and participating VFR aircraft within the outer area.

**CLASS D:** Class D airspace extends 4NM from the center and 2,500 feet AGL. The top is shown in MSL. When the control tower is not in operation, then airport becomes class E airspace.

**CLASS E:** Any controlled airspace that is not Class A, B, C, or D. Class E airspace that starts at the surface is shown by a segmented circle, as the control zone was shown

The floor of Class E airspace designated on an airway is 1200 feet AGL. When designated in conjunction with an airport with an approved instrument approach (IAP), airspace is designated as a transition area (700 Feet), unless there is a segmented circle, then Class E starts at the surface.

**CLASS G:** Any uncontrolled airspace, where ATC does not control air traffic. The maximum altitude for Class G airspace is 14,500 feet MSL.

### The IFR Route

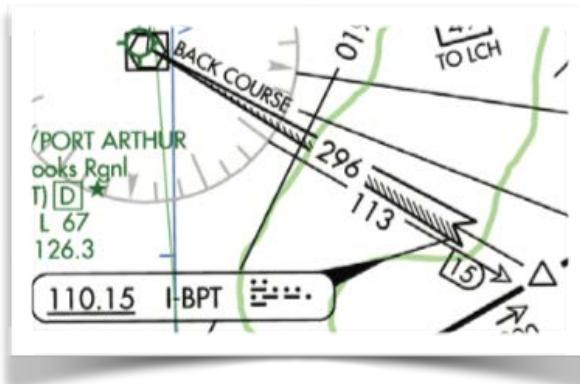
VHF/UHF aids are depicted in blue on the chart, and LF (NDB) aids are shown in brown. All courses listed are magnetic, and all distances are nautical. Airports that have instrument approaches are printed in blue or green for GPS.

VOR changeover point is the midpoint between radio aids, unless shown otherwise by a mileage breakdown "X" or a VOR changeover symbol.

An open arrow indicates a DME fix to identify an intersection and shows encircled mileage from the VOR.



An ILS localizer course arrow symbol with an ILS frequency is ONLY shown on a low enroute chart indicates it has an additional ATC function (forms an intersection).



### Altitude Minimums

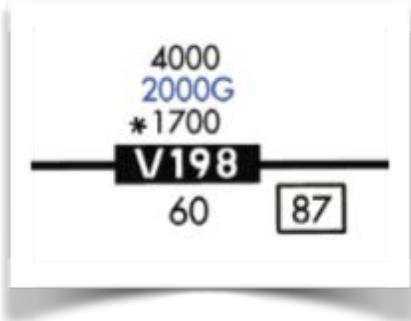
All minimum enroute altitudes provide for obstacle clearance of 1,000 feet above the highest obstacle within 5 miles, and 2,000 feet above the highest obstacle within 5 miles in mountainous areas.

**MEA (Minimum Enroute Altitude)** is a depicted altitude, which assures, acceptable navigational signal coverage and obstruction clearance requirements for that portion on an airway. The MEA along a jet route is 18,000 feet MSL.

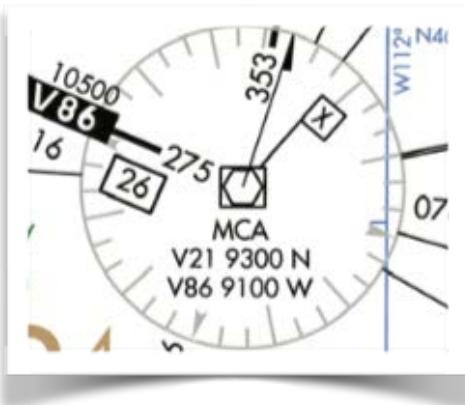


### **MOCA (Minimum Obstructions Clearance Altitude)**

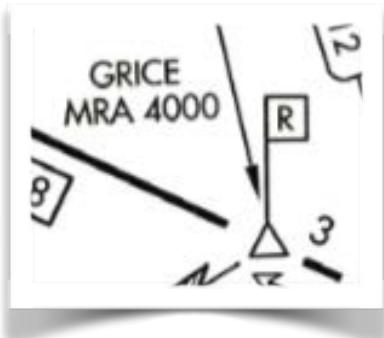
**Altitude**, when listed, is a lower altitude than the MEA and meets obstruction clearance requirements, but only assures acceptable radio signals for accurate navigation within 22 NM of the VOR. (4,000 MEA, 2,000G GPS MEA (Tango Route), \*1,700 MOCA.



**MCA (Minimum Crossing Altitude)** is a flag with an "X" showing the lowest altitude at certain fixes which an aircraft must cross when proceeding in the direction indicated due to approaching a higher minimum MEA (9,300 Northbound on V21 and 9,100 Westbound on V-86).



**MRA (Minimum Reception Altitude)** is a flag with an "R" showing the lowest altitude at an intersection that can be flown to receive signals from an off-airway VOR. Not needed if DME is used. (To identify GRICE, must be at or above 4,000)



**MAA (Maximum Authorized Altitude)** is a published altitude representing the maximum useable altitude on a federal airway, jet route or RNAV route. The maximum useable altitude on a Victor Airway is 17,000 MSL eastbound, and 16,000 MSL westbound. 18,000 feet is never used as an assigned altitude.

The lowest altitude an IFR flight may cross an intersection or a radio aid is:

- MEA for your direction of flight;
- MOCA, if published and within 22 NM of the VOR;
- MCA, if published and applicable for your direction of flight.

### **En Route Communications**

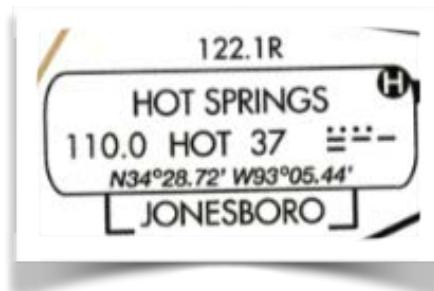
As you proceed IFR, ATC will keep you updated on current altimeter settings (below 18,000 feet) and assign frequency changes when required and being handed off between controllers. The nearest ATC facility or Air Route Traffic Control Center (ARTCC) frequencies nearest your flight is indicated with a blue "Postage Stamp" with the frequency.

Military Operation Areas (MOA) are established to separate certain military training activities from IFR traffic. ATC automatically clears your flight through an MOA when the clearance routes you on the airway.

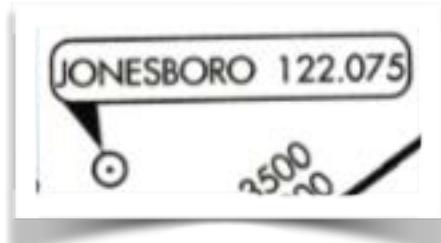
Flight Service Stations (FSS) located at an airport without a control tower can provide airport advisories.

FSS can always receive on 122.2, and other frequencies if listed on top of a navigation box. Also frequencies marked with R (122.1R) can only receive, and frequencies marked with a T (e.g. 122.3T) can only transmit.

En Route Flight Advisory Service (Flight Watch) is obtained on the standard frequency of 122.0 MHz. An inverse "T" inside a navigation box indicates TWEB availability, and an inverse "H" indicates HIWAS.



Remote communications outlet (RCO) provides communication capability with FSS.



"Radar contact" means your aircraft has been identified on the radar display and radar flight following will be provided until identification is lost or radar service is terminated.

"Radar service terminated" means you should resume normal position reporting. 'Resume own navigation' means you should maintain the airway by use of your navigation equipment.

A cruise clearance ("...cruise six thousand...") allows the pilot to fly at any altitude from the MEA up to and including the specified altitude. Climb and descent within the block is at the pilot's discretion.

### IFR Compulsory Reporting Points

You must report to ATC:

- when vacating any previously assigned altitude;
- VFR conditions on-top altitude change;
- each fix used to define an off-airway direct route;
- change in TAS of more than 10 knots or 5%, whichever is greater (maintain within 10 knots IAS of directed speed);
- when unable to maintain a 500 FPM climb or descent;
- time and altitude when reaching a holding fix;
- when leaving any assigned holding fix or point when not in radar contact.

### ARRIVAL

Blue and Green lettered airports mean they have published instrument approaches.

Standard Terminal Arrival Routes (STAR) are ATC coded arrival routings established to simplify arrival clearance delivery problems.

On a STAR, the arrival begins at the beginning of the bold black line.

You may be issued a clearance for a STAR by ATC unless you have indicated (in the remarks section of your flight plan form) that you want "NO STAR". If a STAR is accepted, the pilot must possess at least the textual description.

### Holding Patterns

Patterns at most fixes are depicted on charts. Right Turns are standard. Left are non-standard.

### Maximum Holding Speeds

Up to and including 6,000 ft.....200 knots.  
6,001 ft. up to & including 14,000 ft.....230 knots.  
14,001 and above.....265 knots.

There are 3 types of holds the FAA can test you on. They are DIRECT, PARALLEL or TEARDROP.

Your classroom instructor will cover each hold pattern and their respective entry procedures.

Timing for any hold on the outbound leg begins over or abeam the fix, whichever is later. If the abeam position cannot be determined, start timing on the completion of the turn to the outbound leg.

A DME holding fix is defined using a distance in lieu of time values.

### Visual Approach

ATC may issue a visual approach in lieu of a standard instrument approach procedure without request only when:

- you are in radar contact, and
- the weather is VFR, and/or
- you have the airport in sight, or the identified preceding aircraft in sight.

On a visual approach, radar service is terminated when ATC instructs the pilot to contact the tower.

### Contact Approach

ATC may authorize a contact approach in lieu of a standard instrument approach procedure only when:

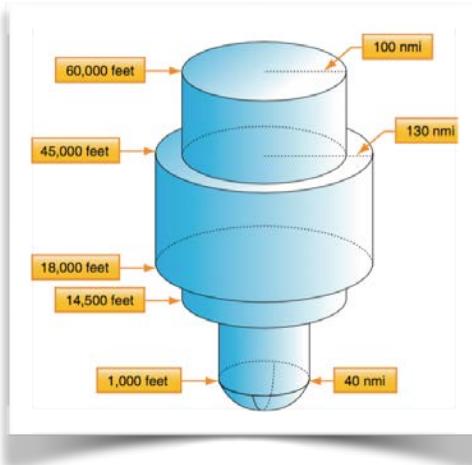
- the pilot specifically requests it, and
- there exists a published instrument approach procedure for that airport, and
- the reported visibility is at least 1 mile, and
- the pilot can reasonably be expected to remain clear of clouds

A 'no-gyro' approach is available if a pilot has an inoperative directional gyro. The controller will tell you when to start and stop each turn. All turns should be made at standard rate until the pilot is turned on final approach, then at half-standard rate.



### VOR Service Volumes (Figure 37)

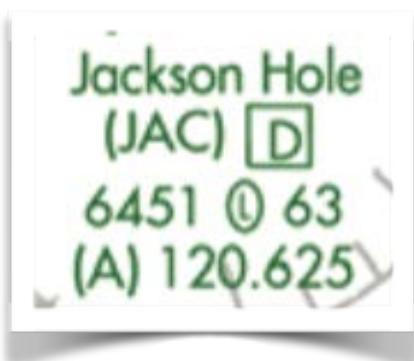
Three (3) types of VOR's. HIGH, LOW and TERMINAL. Know the maximum distance between VOR's that you can fly (dependent on altitude) and always be able to receive at least one of the VOR's.



### Airport Lighting

Use Legend 33 and 34 in the test supplement (available to you for the test) when asked questions pertaining to the IFR Enroute Low Altitude Chart.

Pilot controlled lighting at a Class D airport as indicated by an encircled "L" on the chart.



### TEST QUESTIONS (Use Test Supplement 8080-3F)

**NOTE: CORRECT ANSWER IN **BOLD ITALICS****

4006. **IRA**

Except when necessary for takeoff or landing or unless otherwise authorized by the Administrator, the minimum altitude for IFR flight is;

- A) 3,000 feet over all terrain.
- B) 3,000 feet over designated mountainous terrain; 2,000 feet over terrain elsewhere.
- C) 2,000 feet above the highest obstacle over designated mountainous terrain; 1,000 feet above the highest obstacle over terrain elsewhere.**

4071. **IRA**

For which speed variation should you notify ATC?

- A) When the groundspeed changes more than 5 knots.
- B) When the average true airspeed changes 5 percent or 10 knots, whichever is greater.**
- C) Any time the groundspeed changes 10 MPH.

4077. **IRA**

Which airspaces are depicted on the En Route Low Altitude Chart?

- A) Limits of controlled airspace, military training Routes and special use airspace.**
- B) Class A, special use airspace, Class D and Class E.
- C) Special use airspace, Class A, Class B, Class C, Class D, Class E and Class G.

4078. **IRA**

For IFR planning purposes, what are the compulsory reporting points when using VOR/DME or VORTAC fixes to define a direct route not on established airways?

- A) Fixes selected to define the route.**
- B) There are no compulsory reporting points unless advised by ATC.
- C) At the changeover points.

4261. **IRA**

(Refer to figure 24.) Proceeding southbound on V187, (vicinity of Cortez VOR) contact is lost with Denver Center. What frequency should be used to contact Denver Center?

- A) 118.575**
- B) 108.4.
- C) 122.3.



4262. AVSEM IRA

(Refer to figure 24.) For planning purposes, what would the highest MEA on V382 for a flight planned between Grand Junction, Walker Airport, and Durango, La Plata Co. Airport?

- A) 12,000 feet.
- B) 15,300 feet.**
- C) 16,000 feet.

4263. IRA

(Refer to figure 24.) At what point should a VOR changeover be made from JNC VOR to MANCA intersection southbound on V187?

- A) 36 NM south of JNC.
- B) 52 NM south of JNC.**
- C) 74 NM south of JNC.

4264. IRA

(Refer to figure 24.) What is the MOCA between JNC and HERRM intersection on V187?

- A) 15,000 feet MSL.
- B) 12,400 feet MSL.
- C) 12,100 feet MSL.**

4287. IRA

(Refer to figure 34.) For planning purposes, what is the highest useable altitude for an IFR flight on V573 from the HOT VORTAC to the TXK VORTAC?

- A) 16,000 feet MSL.**
- B) 14,500 feet MSL.
- C) 13,999 feet MSL.

4291. IRA

(Refer to figure 40.) For planning purposes, what is the highest useable altitude for an IFR flight on V16 between the BGS and ABI VORTACs?

- A) 17,000 feet MSL.**
- B) 18,000 feet MSL.
- C) 6,500 feet MSL.

4317.

(Refer to figure 53.) Where is the VOR COP on V27 between the GVO and MQO VORTACs?

- A) 20 DME from GVO VORTAC.**
- B) 20.DME from MQO VORTAC.
- C) 30 DME from SBA VORTAC.

4499.

(Refer to figure 87.) Where is the VOR changeover point on V70 between Lake Charles and Sabine Pass?

- A) Halfway point.**
- B) POPEY intersection.
- C) MARSA Back Course.

4318. IRA

(Refer to figure 53.) What service is indicated by the inverse "H" symbol in the radio aids to navigation box for PRB VORTAC?

- A) VOR with TACAN compatible DME.
- B) Availability of HIWAS.**
- C) En Route Flight Advisory Service available.

4339. IRA

(Refer to figures 65 and 67.) What is the Significance of the symbol at GRICE intersection?

- A) It signifies a localizer-only approach is available at Harry P. Williams Memorial.
- B) The localizer has an additional navigation function.**
- C) GRICE intersection also serves as the FAF for the ILS approach procedure to Harry P. Williams Memorial.

4348 IRA

(Refer to Figure 71.) Which VORTAC along the proposed route of flight could provide HIWAS information?

- A) HUGUENOT.
- B) CARMEL.
- C) KINGSTON.**

4366. IRA

(Refer to figure 78.) What is the maximum altitude that you may flight plan an IFR flight on V-86 EASTBOUND between BOZEMAN and BILLINGS VORTACs?

- A) 14,500 feet MSL.
- B) 17,000 feet MSL.**
- C) 18,000 feet MSL.

4370. IRA

(Refer to figure 78.) What is the minimum crossing altitude over the BOZEMAN VORTAC for a flight southeast bound on V86?

- A) 10,900 feet MSL.
- B) 10,200 feet MSL.**
- C) 10,500 feet MSL.

4392 IRA

What is the significance of an ATC clearance which reads "... CRUISE SIX THOUSAND"?

- A) The pilot must maintain 6,000 feet until reaching the IAF serving the destination airport, then execute the published approach procedure.
- B) Climbs may be made to, or descents made from, 6,000 feet at the pilot's discretion.**
- C) The pilot may utilize any altitude from the MEA/ MOCA to 6,000 feet, but each change in altitude must be reported to ATC.



4458. IRA

A "CRUISE FOUR THOUSAND FEET" clearance would mean that the pilot is authorized to;  
**A) vacate 4,000 feet without further ATC clearance.**  
B) climb to, but not descend from 4,000 feet, without further ATC clearance.  
C) use any altitude from minimum IFR to 4,000 feet, but must report leaving each altitude.

4409. IRA

What service is provided by departure control to an IFR flight when operating from within the outer area of Class C airspace?  
**A) Separation from all aircraft operating in Class C airspace.**  
B) Position and altitude of all traffic within 2 miles of the IFR pilot's line of flight and altitude.  
**C) Separation from all IFR aircraft and participating VFR aircraft.**

4416.

Which service is provided for IFR arrivals by a FSS located on an airport without a control tower?  
**A) Automatic closing of the IFR flight plan.**  
**B) Airport advisories.**  
**C) All functions of approach control.**

4078. IRA

What are the compulsory reporting points when using VOR/DME or VORTAC fixes to define a direct route not on established airways?  
**A) Fixes selected to define the route.**  
B) There are no compulsory reporting points unless advised by ATC.  
C) At the changeover points.

4400. IRA

For operations off established airways at 17,000 feet MSL in the contiguous U.S., High Altitude VORTAC facilities used to define a direct route of flight should be no farther apart than  
**A) 75 NM.**  
B) 100 NM.  
**C) 200 NM.**

4400. AVSEM IRA

For operations off established airways at 17,000 feet MSL using VOR navigation to define the route, the maximum distance between NAIADS should be;  
A) 40 NM.  
**B) 80 NM.**  
C) 90 NM.

4422. IRA

What is meant when departure control instructs you to "resume own navigation" after you have been vectored to a Victor airway?

- A) You should maintain the airway by use of your navigation equipment.**  
B) Radar service is terminated.  
C) You are still in radar contact, but must make position reports.

4423. IRA

What does the ATC term "Radar Contact" signify?

- A) Your aircraft has been identified and you will receive separation from all aircraft while in contact with this radar facility.  
**B) Your aircraft has been identified on the radar display and radar flight-following will be provided until radar identification is terminated.**  
C) You will be given traffic advisories until advised the service has been terminated or that radar contact has been lost.

4429. IRA

What is the definition of MEA?

- A) The lowest published altitude, which meets obstacle clearance requirement and assures acceptable navigational signal coverage.**  
B) The lowest published altitude, which meets obstacle requirements, assures acceptable navigational signal coverage, two-way radio communications, and provides adequate radar coverage.  
C) An altitude, which meets obstacle clearance requirements, assures acceptable navigation signal coverage, two-way radio communications, adequate radar coverage, and accurate DME

4432. IRA

The altitude that provides acceptable navigational signal coverage for the route, and meets obstacle clearance requirements, is the minimum;

- A) enroute altitude**  
B) reception altitude  
C) obstacle clearance altitude.

4432. AVSEM IRA

The MEA assures acceptable navigational signal coverage and;

- A) DME reception.  
B) radar coverage.  
**C) meets obstacle clearance requirements.**



4542.           IRA

MEA is an altitude which assures;  
A) obstacle clearance, accurate navigational signals from more than one VORTAC, and accurate DME mileage.  
B) a 1,000-foot obstacle clearance within 2 miles of an airway and assures accurate DME mileage.  
**C)** acceptable navigational signal coverage and meets obstruction clearance requirements.

4541.           IRA

In the case of operations over an area designated as a mountainous area where no other minimum altitude is prescribed, no person may operate an aircraft under IFR below an altitude of  
A) 500 feet above the highest obstacle.  
B) 1,000 feet above the highest obstacle.  
**C)** 2,000 feet above the highest obstacle.

4XXX. FAA AVSEM IRA

You are flying at an altitude of 7,000 feet MSL when you notice you are picking up ice. You request 9,000 feet because you know it is clear above. ATC replies unable. You then request 9,500 feet VFR-on-Top and ATC approves it. Your enroute IFR clearance is now  
A) canceled.  
B) VFR only as conditions permit.  
**C)** both VFR and IFR rules apply.

4433.           IRA

You have filed an IFR flight plan with a VFR on Top clearance in lieu of an assigned altitude. If you receive this clearance and fly a course of 180°, at what altitude should you fly? (Assume VFR conditions.)

- A) Any IFR altitude which will enable you to remain in VFR conditions.  
B) An odd thousand foot MSL altitude plus 500 feet.  
**C)** An even thousand foot MSL altitude plus 500 feet.

4434.           IRA

MOAs are established to  
A) prohibit all civil aircraft because of hazardous or secret activities.  
**B)** separate certain military activities from IFR traffic.  
C) restrict civil aircraft during periods of high density training activities.

4435.           IRA

Reception of signals from an off airway radio facility may be inadequate to identify the fix at the designated MEA. In this case, which altitude is designated for the fix?

- A)** MRA.  
B) MCA.  
C) MOCA.

4545.           IRA

ATC may assign the MOCA when certain special conditions exist, and when within;  
**A)** 22NM of a VOR.  
B) 25 NM of a VOR.  
C) 30 NM of a VOR.

4546.           IRA

Which aeronautical chart depicts Military Training Routes (MTR) above 1,500 feet?  
A) IFR Planning Chart.  
**B)** IFR Enroute Low Altitude Chart.  
C) IFR Enroute High Altitude Chart.

4436.           IRA

Which condition is guaranteed for all of the following altitude limits: MAA, MCA, MRA, MOCA and MEA? (Non-mountainous area.)  
A) Adequate navigation signals.  
B) Adequate communications.  
**C)** 1,000-foot obstacle clearance.

4437.           IRA

If no MCA is specified, what is the lowest altitude for crossing a radio fix, beyond which a higher minimum applies?

- A)** The MEA at which the fix is approached.  
B) The MRA at which the fix is approached.  
C) The MOCA for the route segment beyond the fix.

4544.           IRA

Reception of signals from a radio facility, located off the airway being flown, may be inadequate at the designated MEA to identify the fix. In this case, which altitude is designated for the fix?

- A) MOCA.  
**B)** MRA.  
C) MCA.

4438.           IRA

When an aircraft is not equipped with a transponder, what requirement must be met before ATC will authorize a flight within class B airspace?

- A)** A request for the proposed flight must be made to ATC at least 1 hour before the flight.  
B) The proposed flight must be conducted when operating under instrument flight rules.  
C) The proposed flight must be conducted in visual meteorological conditions (VMC).



4456.            IRA

Which report should be made to ATC without a specific request when not in radar contact?  
**A)** Entering instrument meteorological conditions  
**B)** When leaving final approach fix in bound on final approach.  
**C)** Correcting an E.T.A. any time a previous E.T.A. is in error in excess of 2 minutes.

4473.            IRA

Which airspace is defined as a transition area when designated in conjunction with an airport which has a prescribed IAP?  
**A)** The Class E airspace extending upward from 700 feet or more above the surface and terminating at the base of the overlying controlled airspace.  
**B)** That Class D airspace extending from the surface and terminating at the base of the continental control area.  
**C)** The Class C airspace extending from the surface to 700 or 1,200 feet AGL, where designated.

4476.            IRA

What are the vertical limits of a transition area that is designated in conjunction with an airport having a prescribed IAP?  
**A)** Surface to 700 feet AGL.  
**B)** 1,200 feet AGL to the base of the overlying controlled airspace.  
**C)** 700 feet AGL or more to the base of the overlying controlled airspace.

4474.            IRA

The vertical extent of the Class A airspace throughout the conterminous U.S. extends from;  
**A)** 18,000 feet to and including FL450.  
**B)** 18,000 feet to and including FL600.  
**C)** 12,500 feet to and including FL600.

4475.            IRA

Class G airspace is that airspace where;  
**A)** ATC does not control air traffic.  
**B)** ATC controls only IFR flights.  
**C)** the minimum visibility for VFR flight is 3 miles.

4485.            IRA

Unless otherwise specified on the chart, the minimum en route altitude along a jet route is;  
**A)** 18,000 feet MSL.  
**B)** 24,000 feet MSL.  
**C)** 10,000 feet MSL.

*Note\* The question is asking the limits of the Jet Route Chart, not what ATC would assign as a minimum assigned altitude.*

4605.            IRA

During the en route phase of an IFR flight, the pilot is advised "Radar service terminated." What action is appropriate?  
**A)** Set transponder to code 1200.  
**B)** Resume normal position reporting.  
**C)** Activate the IDENT feature of the transponder to re-establish radar contact.

4486.            IRA

An abbreviated departure clearance "...CLEARED AS FILED..." will always contain the name;  
**A)** and number of the STAR to be flown when filed in the flight plan.  
**B)** of the destination airport filed in the flight plan.  
**C)** of the first compulsory reporting point if not in a radar environment.

4609.            IRA

(Refer to figure 112.) You arrive at the 15 DME fix on a heading of 350°. Which holding pattern correctly complies with the ATC clearance below, and what is the recommended entry procedure?

"...HOLD WEST OF THE ONE FIVE DME FIX ON THE ZERO EIGHT SIX RADIAL OF THE ABC VORTAC, FIVE MILE LEGS, LEFT TURNS..."

What is the recommended procedure to enter the holding pattern?

- A)** 1; teardrop entry.  
**B)** 1; direct entry.  
**C)** 2; direct entry.

*Note\* Your classroom instructor will work holding pattern procedures out with you during the course.*

4610.            IRA

(Refer to figure 113.) You receive this ATC clearance:

"HOLD EAST OF THE ABC VORTAC ON THE ZERO NINER ZERO RADIAL, LEFT TURNS..."

What is the recommended procedure to enter the holding pattern?

- A)** Parallel only.  
**B)** Direct only.  
**C)** Teardrop only.

*Note\* Your classroom instructor will work holding pattern procedures out with you during the course.*



4612.           IRA

(Refer to figure 113.) You receive this ATC clearance:

"...CLEARED TO THE XYZ VORTAC. HOLD NORTH ON THE THREE SIX ZERO RADIAL, LEFT TURNS..."

What is the recommended procedure to enter the holding pattern?

- A) Parallel only.
- B) Direct only.
- C) Teardrop only**

*Note\* Your classroom instructor will work holding pattern procedures out with you during the course.*

4617.           IRA

To ensure proper airspace protection while in a holding pattern, what is the recommended maximum airspeed above 14,000 feet?

- A) 220 knots.
- B) 265 knots.**
- C) 200 knots.

4626.           IRA

To ensure proper airspace protection while holding at 5,000 feet in a civil airplane, what is the recommended maximum indicated airspeed a pilot should use?

- A) 230 knots.
- B) 200 knots.**
- C) 210 knots.

4620.           IRA

At what point should the timing begin for the first leg outbound in a nonstandard holding pattern?

- A) When over or abeam the holding fix, whichever occurs later.**
- B) When the wings are level at the completion of a 180 turn outbound
- C) Abeam the holding fix, or wings level, whichever occurs last.

4496.           IRA

(Refer to figure 87.) What is indicated by the localizer course symbol at Beaumont-Port Arthur Airport?

- A) A published LDA localizer course.
- B) A published SDF localizer course.
- C) A published ILS localizer course, which has an additional navigation function.**

4497.           IRA

(Refer to figure 87.) Which VHF frequencies, other than 121.5, can be used to receive De Ridder FSS in the Lake Charles area?

- A) 122.1, 126.4.
- B) 123.6, 122.65.
- C) 122.2, 122.3.**

4647. AVSEM   IRA

(Refer to figure 47.) Enroute eastbound on V468 from BTG VORTAC, the minimum altitude at TROTS intersection is;

- A) 7,100 feet.
- B) 10,000 feet.
- C) 11,500 feet.**

4501.           IRA

(Refer to figure 89.) When flying from Milford Municipal to Bryce Canyon via V235 and V293, what minimum altitude should you be at when crossing Cedar City VOR?

- A) 11,400 feet.
- B) 12,000 feet.**
- C) 13,000 feet.

4517.           IRA

(Refer to figure 91.) What is the minimum crossing altitude at SABAT intersection when eastbound from DBS VORTAC on V298?

- A) 8,300 feet.
- B) 11,100 feet.**
- C) 13,000 feet.

4506.           IRA

(Refer to figure 89.) What is the ARTCC discrete frequency at the COP on V208 southwest bound from HVE to PGA VOR/DME?

- A) 122.1.
- B) 122.4.
- C) 127.55.**

4509.           IRA

(Refer to figure 91.) What is the minimum crossing altitude at DBS VORTAC for a northbound IFR flight on V257?

- A) 7,500 feet.
- B) 8,600 feet.**
- C) 11,100 feet.

4512.           IRA

(Refer to figure 91.) What lighting is indicated on the chart for Jackson Hole Airport?

- A) Lights on prior request.
- B) No lighting available.
- C) Pilot controlled lighting.**

4515. AVSEM   IRA

(Refer to figure 91.) What is the function of the Boise and Great Falls RCO (SW of Yellowstone vicinity)?

- A) Long range communications outlet for Great Falls Center.
- B) Remote communications outlet for Great Falls and Boise FSS.**
- C) Satellite remote controlled by Salt Lake Center with limited service.



4286. IRA

(Refer to figures 167 and 168.) At which point does the BYP.BYP6 arrival begin?

- A) At the LIT VORTAC.
- B) At GLOVE intersection.
- C) At the BYP VORTAC.**

4292. AVSEM IRA

(Refer to figures 174 and 175) At which point does the JEN.JEN9 arrival begin?

- A) TEVON Waypoint
- B) INK VORTAC.
- C) JEN VORTAC.**

4529. IRA

Which altitude is the upper limit for Class A airspace?

- A) 14,500 feet MSL.
- B) 18,000 feet MSL.
- C) 60,000 feet MSL.**

4530. IRA

What is the maximum altitude that Class G airspace will exist? Does not include airspace less than 1,500 feet AGL.)

- A) 18,000 feet MSL.
- B) 14,500 feet MSL.**
- C) 14,000 feet MSL.

4531. IRA

What is generally the maximum altitude for Class B airspace?

- A) 4,000 feet MSL.
- B) 10,000 feet MSL.**
- C) 14,500 feet MSL.

4532. IRA

What are the normal lateral limits for Class D airspace?

- A) 8NM.
- B) 5NM.
- C) 4NM.**

4539. IRA

What minimum aircraft equipment is required for operation within Class C airspace?

- A) Two-way communications and Mode C transponder.**
- B) Two-way communications.
- C) Transponder and DME.



## THE APPROACH AND LANDING

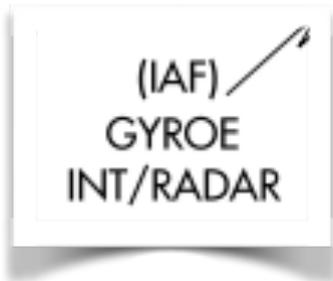
### IFR APPROACH PROCEDURES

#### Approach Plate Frequencies And Services

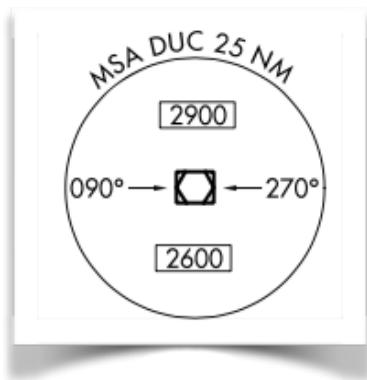
The top of an approach plate states the type of approach, the runway it serves, the frequencies of approach control, tower, ground control, ATIS and/or FSS frequencies.

#### The Initial Approach

Initial approach fixes are identified with the letters (IAF)



Minimum safe altitudes (MSAs) provide 1,000 feet obstacle clearance within 25 NM from the facility.

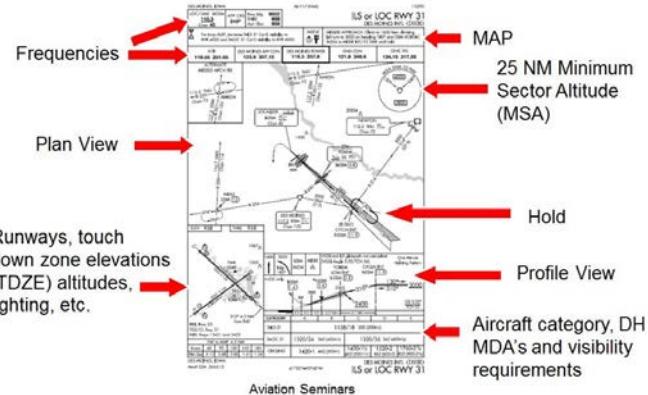


Know your route and minimum altitude when arriving from any direction.

When cleared for an approach, maintain the last assigned altitude until:

- a different altitude is assigned by ATC, or
- you are established on a segment of a published route or instrument approach procedure.

#### Instrument Approach Procedure Chart (IAP)



#### The Procedure Turn

Procedure turns allow you to reverse direction to establish the aircraft inbound. Maximum speed in a procedure turn is 200 knots.

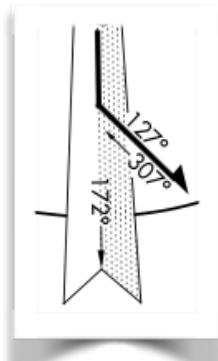
If you are vectored to the final approach fix, no procedure turn will be necessary.

When a holding pattern is shown in lieu of a procedure turn, use the standard entry to the depicted holding pattern as the means of becoming established on the inbound course.

When a turn barb is depicted and a course reversal is required, the turn must be executed in the direction shown on the chart.



Holding Pattern Entry



Turn Barb Entry



**NoPT** indicates a procedure turn is not authorized. This is used when the approach can be made directly from a specified intermediate fix to the final fix. Also, when there is no turn barb or hold depicted, a procedure turn is not authorized.

"Remain within 10 miles" is a reminder to stay within 10 NM of the appropriate fix while completing your procedure turn.

### The Intermediate Approach

The intermediate segment begins at the intermediate fix (IF) or point, and ends at the final approach fix (FAF). Positive course guidance is provided. The FAF is usually located at Outer Marker (OM)

All altitudes listed in the Planview are minimum altitudes. Profile diagram altitudes are:  
If you are shooting an ILS approach, you may intercept the glide slope prior to the final approach fix and start your descent so as to be over the final approach fix at the published "Glide Slope Altitude at Outer Marker".

### The Final Approach

The final approach segment begins when you cross the final approach fix (FAF). After passing the FAF, descend to the MDA or DH/DA. The DH / DA of 200 feet AGL is usually located at the Middle Marker (MM).

A precision approach is one that has an electronic or radar glide slope to provide altitude information, for example, the ILS approach. ILS minimums are normally 200 ft above runway threshold and 1/2 mile visibility.

The missed approach point (MAP) on a precision approach is the decision height (DH) on the glide slope. Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the runway threshold elevation. Both DA and DH are the same position. To meet ICAO terminology, DH (height above runway threshold) is being replaced by DA (mean sea level).

A non-precision approach is one without a glide slope. Examples of non-precision approaches include VOR, ADF, LOC, ASR, SDF and LDA approaches. On a non-precision approach, your missed approach point is the minimum descent altitude (MDA) at the runway threshold.

You may not descend below MDA or DH/DA unless:

- the aircraft is in a position to make a normal landing, and

- you can see the approach lights or runway environment.

- a step-down fix permits additional descent in a segment by identifying a point at which a controlling obstacle has been safely overflowed.

### The Landing Minimums

A straight-in approach is one in which the landing runway is aligned not more than 30 degrees from the approach course. Circling approaches are all others.

Aircraft approach categories are based on 1.3 times the stalling speed in landing configuration at maximum gross landing weight. If maintaining a speed 5 knots faster than specified for category B, use approach minimums for category C.

RVR (runway visual range) is the horizontal visibility or distance a pilot can see down the runway from the approach end.

RVR is given in hundreds of feet. If RVR is inoperative, minimums which are specified in the procedures should be converted and applied as ground visibility. (1,800 and 2,400 convert to 1/2 SM)

The minimum weather condition for landing upon completion of an IFR approach is required visibility and is measured in statute miles (SM).

If the published visibility for an ILS is 3/4 SM instead of the normal 1/2 SM, the pilot should be aware there may be penetration of the Obstacle Identification Surface (OIS) area and care should be taken in the visual segment below the DH/DA to avoid any obstacles.

### Inoperative Components

If certain components are inoperative, your MDA/DH/DA and required visibility will be affected, unless the component can be replaced by a listed substitute.

A compass locator or precision radar may be substituted for the ILS outer marker (OM) or middle marker (MM).

If the glide Slope is inoperative, you should revert to the localizer minimums.

If two or more components are inoperative, raise the minimum to the highest minimum required by any single component that is inoperative.



## The Missed Approach

You must execute a missed approach if the runway environment is not in sight, or anytime that visual reference is lost:

- for a precision approach, after arrival at the decision height on the glide slope, or
- for a non-precision approach, when passing the runway threshold, either measured by time, DME, crossing a NAVAID, or any other published means.

If a missed approach is executed prior to reaching the MAP, continue the approach to the MAP at or above the MDA or DH before executing a turning maneuver.

If circling and you lose visual references, make an initial climbing turn towards the landing runway, then continue the turn until in a safe position to intercept the missed approach course procedure.

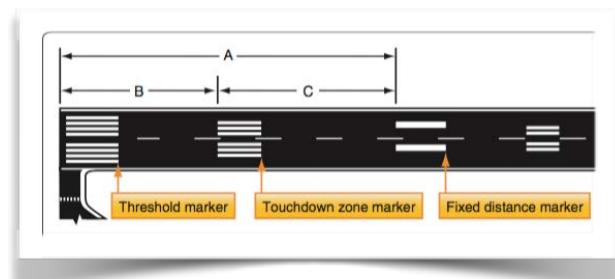
## The Airport Sketch

This shows runway length, types of approach lighting available, airport elevation and touchdown elevation

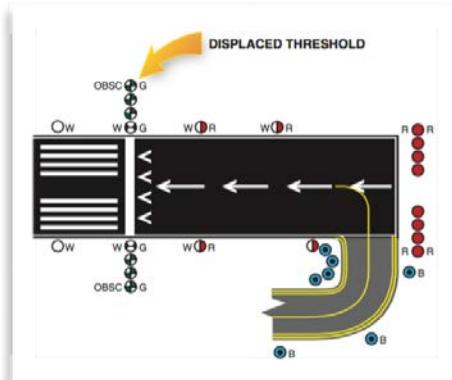
Daytime operation of an airport rotating beacon identifies ground visibility less than 3 miles and/or the ceiling is less than 1000 feet in Class D airspace.

## Runway Markings

REIL - runway and identifier lights are a pair of synchronized flashing lights, one on each side of the runway threshold, that provide rapid identification of the approach end of the runway during reduced visibility.



The touchdown zone marker is 500 ft. from the end of the runway. The fixed distance marker is 1000 ft. from the end of the runway.



## Refer to Figure 138

Arrows leading to the threshold mark indicate a displaced threshold, a non-landing area, usable for taxiing, landing rollout, and takeoff run.

## Refer to Figure 259

- A. Runway 4-22
- B. Runway 4 Approach Area
- C. ILS Area
- D. No Entry for aircraft
- E. Taxiway Bravo
- F. Runway 22
- G. Runway Safety Area / Obstacle Free Zone
- H. ILS Critical Hold
- I. Inbound Destination Sign to terminal
- J. Outbound Destination Sign to runway
- K. Destination Sign to Taxiway Bravo
- L. Runway Distance remaining
- M. Hotspot
- N. Taxiway Ending Marker

Know what each sign / marking is for the test.



## Closing The IFR Flight Plan

You may cancel your IFR flight plan anytime you can proceed in VFR conditions and are outside Class A airspace. Cancel your IFR flight plan by telling ATC to "Cancel IFR".

At an airport with a control tower, your IFR flight plan is automatically cancelled upon landing. If you have earlier cancelled your IFR flight plan, you must contact the control tower for clearance into Class D airspace at least five miles from the airport.

If an FSS is located on the airport, and it has no tower, or the control tower is closed, the FSS will provide Airport Advisory Service, usually on the tower frequency.

At an uncontrolled airport, cancel your IFR flight plan by contacting the local FSS on the radio using a remote communication site nearby, or by telephoning the nearest FSS or ATC facility.

## Wake Turbulence

Wake turbulence is created only when the wings are producing lift. It is increased behind a jet transport just after takeoff because of the high angle of attack and high gross weight.

Wake turbulence moves down below the flight path of the aircraft, and tends to move outward. A light crosswind of 3 to 7 knots will tend to keep the upwind vortex in the touchdown zone.

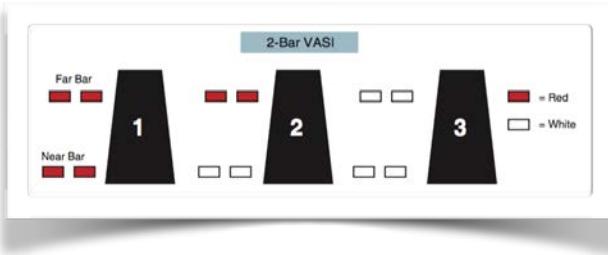
When flying behind larger aircraft, remain above the other aircraft's flight path. A light-quartering tailwind prolongs hazard on landing runway.

## Visual Approach Slope Indicator (VASI)

Normal glide path for VASI is 3.00 degrees. Regulations require you, if landing on a runway served by VASI, to use the VASI glide slope and stay at or above the glide slope until a lower altitude is necessary for landing.

VASI glide slope assures safe obstruction clearance in the approach area.

Precision Approach Path indicator (PAPI) consists of one row of four lights. Two white and two red lights indicate that you are on the glide path.



## Miscellaneous Information

When using a DME Arc to intercept a course, 10 to 20 degrees of relative bearing change should be used for each 1/2 mile of deviation.

ATC may authorize a sidestep maneuver ("cleared for the ILS runway 7L approach, sidestep to runway 7R"). Commence the sidestep maneuver as soon as possible after runway environment is in sight.

If during a VFR practice approach, ATC assigns you a heading that will cause you to enter the clouds, avoid the clouds and inform ATC that altitude/heading will not permit VFR.

While being vectored, if crossing the ILS final approach course becomes imminent and an approach clearance has not been issued, maintain the last assigned heading and query ATC.

Hydroplaning is most likely to occur during conditions of standing water, slush, high speed, and smooth runway texture.

An ILS runway equipped with MALS, that there may be penetration of the obstacle identification surfaces (OIS), and care should be taken in the visual segment to avoid any obstacles?



**TEST QUESTIONS** (Use Test Supplement 8080-3F)

NOTE: CORRECT ANSWER IN **BOLD ITALICS**

4058.           IRA

How is your flight plan closed when your destination airport has IFR conditions and there is no control tower or flight service station (FSS) on the field?

- A) The ARTCC controller will close your flight plan when you report the runway in sight.
- B) You may close your flight plan any time after starting the approach by contacting any FSS or ATC facility.
- C)** Upon landing, you must close your flight plan by radio or by telephone to any FSS or ATC facility.

4076.           IRA

When may a pilot cancel the IFR flight plan prior to completing the flight?

- A) Anytime.
- B)** Only in VFR conditions when not in Class A airspace.
- C) Only if an emergency occurs.

4274.           IRA

(Refer to figures 161 and 162) What is the TDZ elevation for RWY 16R on Eugene/Mahlon Sweet Field?

- A)** 363 feet MSL.
- B) 365 feet MSL.
- C) 396 feet MSL.

4276.           IRA

(Refer to figure 161 and Legend 27) Using a groundspeed of 90 knots on the ILS final approach course, what rate of descent should be used as a reference to maintain the ILS glide slope?

- A) 415 feet per minute.
- B)** 478 feet per minute.
- C) 555 feet per minute.

4282.           IRA

(Refer to figure 171) Under which condition should the missed approach procedure for the RNAV RWY 33 approach be initiated?

- A) Upon reaching the LNAV MDA of 1,240 ft. MSL.
- B) 10.1 NM from the FAF.
- C)** Runway 33 MAP locator.

4283.           IRA

(Refer to figure 171) What are the MDA and visibility criteria respectively for landing on runway 33?

- A) 596 feet; 1 NM.
- B)** 1,240 feet; 1 SM
- C) 600 feet; 1 SM.

4295.           IRA

(Refer to figures 174, 176 and 176A) Which frequency should you expect to use for Regional Approach Control, control tower, and ground control respectively at DFW?

- A) 119.87; 126.55; 121.65.
- B)** 119.87; 124.15; 121.85.
- C) 125.25; 124.55; 121.65.

4297.           IRA

(Refer to figure 177) What is the difference in elevation (in feet MSL) between the airport elevation and the threshold elevation?

- A)** 25 feet.
- B) 30 feet.
- C) 35 feet.

4307.           IRA

(Refer to figure 188) What are the MDA and visibility criteria for a straight-in LOC/DME RWY 21 approach at Portland International at 100 knots?

- A) 1,120 feet MSL, visibility 1 SM.
- B)** 700 feet MSL, visibility 1 SM,
- C) 700 feet MSL, visibility 1 NM.

4309.           IRA

(Refer to figure 188) You have been cleared to the CREAK intersection via the BTG 054 radial at 7,000 feet. Approaching CREAK, you are cleared for the LOC/DME RWY 21 approach to PDX. Descent to procedure turn altitude should not begin prior to;

- A) completion of the procedure turn, and established on the localizer.
- B) intercepting the glide slope.
- C)** CREAK outbound.

4320.           IRA

(Refer to figure 192) As a guide in making range corrections; how many degrees of relative bearing change should be used for each one-half mile deviation from the desired arc?

- A) 2° to 3°.
- B) 5° maximum.
- C)** 10° to 20°.

4321.           IRA

(Refer to figures 192) Under which condition should a missed approach procedure be initiated if the runway environment (Paso Robles Municipal Airport) is not in sight?

- A) After descending to 1,440 feet MSL.
- B) After descent to 1,440 feet or reaching the 1 NM DME, whichever occurs first.
- C)** When you reach the established missed approach point and determine the visibility is less than 1 mile.



4332.           IRA

(Refer to figure 196) What is the elevation of the TDZE for RWY 4?

- A)** 44 feet MSL.
- B) 46 feet MSL.
- C) 70 feet MSL.

4351.           IRA

(Refer to figure 210) What is the minimum altitude at which you should intercept the glide slope on the ILS RWY 6 approach procedure?

- A) 3,000 feet MSL.
- B)** 1,800 feet MSL.
- C) 1,690 feet MSL.

4352.           IRA

(Refer to figure 210) At which indication or occurrence should you initiate the published missed approach procedure for the ILS RWY 6 approach provided the runway environment is not in sight?

- A)** When reaching 373 feet MSL indicated altitude.
- B) When 3 minutes (at 90 knots groundspeed) have expired or reaching 373 feet MSL, whichever occurs first.

C) Upon reaching 373 feet AGL.

4353.           IRA

Which indications will a pilot receive when passing over an outer marker (OM) on a front course ILS approach?

- A) One dot per second.
- B) Four dots per second.
- C)** Single dashes and a blue light.

4353-1.          IRA

Which indications will a pilot receive when passing over an inner marker (IM) on a front course ILS approach?

- A) One dot per second.
- B)** Four dots per second.
- C) Alternating dashes and a blue light.

4353-2.          IRA

Which indications will a pilot receive when passing over a middle marker (MM) on a front course ILS approach?

- A) One dot per second.
- B) Four dots per second.
- C)** Alternating dots and dashes and an amber light.

4355.           IRA

(Refer to figure 210) What is the touchdown zone elevation for RWY 6?

- A)** 173 feet MSL.
- B) 200 feet AGL.
- C) 270 feet MSL.

4356.           IRA

(Refer to figure 210) After passing the OM, Bradley Approach Control advises you that the MM on the ILS RWY 6 approach is inoperative. Under these circumstances, what adjustments, if any, are required to be made to the DH and visibility?

- A) DH 423/24.
- B)** No adjustments are required.
- C) DH 373/24.

4357.           IRA

(Refer to figure 210) Which runway and landing environment lighting is available for approach and landing on RWY 6 at Bradley International?

- A) HIRL, REIL, and VASI.
- B) HIRL and VASI.
- C)** ALSF2 and HIRL

4350.           IRA

(Refer to figure 195) How many precision approach procedures are published for William P Hobby (HOU)?

- A) Two.
- B)** Three.
- C) Five.

4401.           IRA

What does the Runway Visual Range (RVR) value, depicted on certain straight-in IAP Charts, represent?

- A) The slant range distance the pilot can see down the runway while crossing the threshold on glide slope.
- B)** The horizontal distance a pilot should see down the runway from the approach end of the runway in a moving aircraft.
- C) The slant visual range a pilot should see down the final approach and during landing.

4408.           IRA

The operation of an airport rotating beacon during daylight hours may indicate that

- A) the in-flight visibility is less than 3 miles and the ceiling is less than 1,500 feet within Class E airspace.
- B)** the ground visibility is less than 3 miles and/or the ceiling is less than 1,000 feet in Class B, C, or D airspace.
- C) an IFR clearance is required to operate within the airport traffic area.

4469.           IRA

When are you required to establish communications with the tower, if you cancel your IFR flight plan 10 miles from the destination?

- A) Immediately after canceling the flight plan.
- B) When advised by ARTCC.
- C)** At least 5 miles from the center of the airport.



4540.            IRA

What obstacle clearance and navigation signal coverage is a pilot assured with the Minimum Sector Altitudes depicted on IAP charts?

A) 1,000 feet and acceptable navigation signal coverage within a 25 NM radius of the navigation facility.

**B)** 1,000 feet within a 25 NM radius of the navigation facility but not acceptable navigation signal coverage.

C) 500 feet and acceptable navigation signal coverage within a 10 NM radius of the navigation facility.

4630.            IRA

If a pilot elects to proceed to the selected alternate, the landing minimums used at that airport should be the;

**A)** minimums specified for the approach procedure selected.

B) alternate minimums shown on the approach chart.

C) minimums shown for that airport in a separate listing of "IFR Alternate Minimums."

4631.            IRA

If the pilot loses visual reference while circling to land from an instrument approach and ATC radar service is not available, the missed approach action should be to

A) execute a climbing turn to parallel the published final approach course and climb to the initial approach altitude.

B) climb to the published circling minimums then proceed direct to the final approach fix.

**C)** make a climbing turn toward the landing runway and continue the turn until established on the missed approach course.

4632.            IRA

When the approach procedure involves a procedure turn, the maximum speed should not be greater than;

A) 180 knots IAS.

**B)** 200 knots IAS.

C) 250 knots IAS.

4635.            IRA

(Refer to figure 217) During the ILS RWY 13 procedure at DSM, what altitude minimum applies if the glide slope becomes inoperative?

A) 1,420 feet.

**B)** 1,380 feet.

C) 1,121 feet.

4636.            IRA

What does the absence of the procedure turn barb on the planview on an approach chart indicate?

A) A procedure turn is not authorized.

B) Teardrop-type procedure turn is authorized.

C) Racetrack-type procedure turn is authorized.

4641.            IRA

While being radar vectored, an approach clearance is received. The last assigned altitude should be maintained until;

A) reaching the FAF.

B) advised to begin descent.

**C)** established on a segment of a published route or IAP.

4642. AVSEM    IRA

(Refer to figure 221) The final approach fix for the precision approach is located at;

A) SKOLL intersection.

**B)** Glide slope intercept (lightning bolt).

C) JETSA intersection locator outer marker.

4648. AVSEM    IRA

(Refer to figure 227) Refer to the APA ILS RWY 35R procedure. The FAF intercept altitude is;

A) 7,977 feet MSL.

**B)** 8,000 feet MSL.

C) 9,000 feet MSL.

4649. AVSEM    IRA

(Refer to figure 227) The symbol on the planview of the ILS RWY 35R procedure at APA represents a minimum safe sector altitude within 25 NM of;

A) LECET 5.4 miles

**B)** CASSE outer marker.

C) Denver/Centennial Airport.

4650.            IRA

(Refer to figure 223) During the ILS RWY 30R procedure at DSM, the minimum altitude for glide slope interception is;

A) 2,365 feet MSL.

**B)** 2,400 feet MSL.

C) 3,000 feet MSL.

4653.            IRA

(Refer to figure 230) What minimum navigation equipment is required to complete the VOR/DME-A procedure?

A) One VOR receiver.

**B)** One VOR receiver and DME.

C) Two VOR receivers and DME.



4654.            IRA

(Refer to figure 230) The symbol on the planview of the VOR/DME or GPS-A procedure at 7D3 represents a minimum safe sector altitude within 25 NM of:

- A) DEANI intersection.
- B)** White Cloud VOR/DME.
- C) Baldwin Municipal Airport.

4655.            IRA

(Refer to figure 234) What options are available concerning the teardrop course reversal for LOC RWY 18 approach to Lincoln?

- A)** If a course reversal is required, only the teardrop can be executed.
- B) The point where the turn is begun and the type and rate of turn are optional.
- C) A normal procedure turn may be made if a 10 DME limit is not exceeded.

4657.            IRA

(Refer to figure 234) You are cleared for RWY 18 at Lincoln and crossed the Lincoln VOR at 5,000 feet MSL, at what point in the teardrop could a descent to 3,200 feet commence?

- A) As soon as intercepting LOC inbound.
- B)** Immediately.
- C) Only at the point authorized by ATC.

4658.            IRA

(Refer to figure 234) If cleared for an S-LOC 18 approach at Lincoln from over HUSKR, it means the flight should;

- A) land straight in on runway 18.
- B) comply with straight-in landing minimums.
- C)** begin final approach without making a procedure turn.

4660. AVSEM    IRA

(Refer to figure 236) If cleared for a straight-in LOC RWY 32 approach from over OALDY, it means the flight should;

- A) land straight in on runway 32.
- B) comply with straight-in landing minimums.
- C)** begin final approach without making a procedure turn.

4667.            IRA

If an early missed approach is initiated before reaching the MAP, the following procedure should be used unless otherwise cleared by ATC.

- A)** Proceed to the missed approach point at or above the MDA or DH before executing a turning maneuver.
- B) Begin a climbing turn immediately and follow missed approach procedures.
- C) Maintain altitude and continue past MAP for 1 minute or 1 mile whichever occurs first.

4668.            IRA

When more than one circuit of the holding pattern is needed to lose altitude or become better established on course, the additional circuits can be made

- A) at pilot's discretion.
- B) only in an emergency.
- C)** only if pilot advises ATC and ATC approves.

4670.            IRA

When simultaneous approaches are in progress, how does each pilot receive radar advisories?

- A)** On tower frequency.
- B) On approach control frequency.
- C) One pilot on tower frequency and the other on approach control frequency.

4671.            IRA

During an instrument approach, under what conditions, if any, is the holding pattern course reversal not required?

- A)** When radar vectors are provided.
- B) When cleared for the approach.
- C) None, since it is always mandatory.

4672.            IRA

During an instrument precision approach, terrain and obstacle clearance depends on adherence to

- A)** minimum altitude shown on the IAP.
- B) Terrain contour information.
- C) natural and man-made reference point information.

4677.            IRA

(Refer to figure 240) At which points may you initiate a descent to the next lower minimum altitude when cleared for the VOR/DME RWY 36 approach, from the PUC R-009 IAF (DME operative)?

- A)** Start descent from 8,900 when established on the PUC R-009 at 12 DME.
- B) Start descent from 8,900 when established on the PUC R-009 at 8.3 DME.
- C) Descent from 6,240 can be made once reaching the PUC 12.0 DME.

4678.            IRA

(Refer to figure 240) What is the purpose of the 10,600 MSA on the Price/Carbon County Airport Approach Chart?

- A)** It provides safe clearance above the highest obstacle in the defined sector out to 25 NM.
- B) It provides an altitude above which navigational course guidance is assured.
- C) It is the minimum vector altitude for aircraft in that defined sector.



4692.            IRA

Which of the following statements is true regarding Parallel ILS approaches?

- A) Parallel ILS approach runway centerlines are separated by at least 4,300 feet and standard IFR separation is provided on the adjacent runway.
- B)** Parallel ILS approaches provide aircraft a minimum of 1 1/2 miles radar separation between successive aircraft on the adjacent localizer course.
- C) Landing minimums to the adjacent runway will be higher than the minimums to the primary runway, but will normally be lower than the published circling minimums.

4706.            IRA

A pilot is making an ILS approach and is, past the OM to a runway which has a VASI. What action should the pilot take if an electronic glide slope malfunction occurs and the pilot has the VASI in sight?

- A) The pilot should inform ATC of the malfunction and then descend immediately to the localizer DH and make a localizer approach.
- B)** The pilot may continue the approach and use the VASI glide slope in place of the electronic glide slope.
- C) The pilot must request an LOC approach, and may descend below the VASI at the pilot's discretion.

4707.            IRA

What wind condition prolongs the hazards of wake turbulence on a landing runway for the longest period of time?

- A) Direct headwind.
- B) Direct tailwind.
- C)** Light quartering tailwind.

4708.            IRA

Wake turbulence is near maximum behind a jet transport just after takeoff because

- A) the engines are at maximum thrust output at slow airspeed.
- B) the gear and flap configuration increases the turbulence to maximum.
- C)** of the high angle of attack and high gross weight

4709. AVSEM    IRA

(Refer to Figure 158.) With winds reported as from 330 degrees at 4 knots, you are given instructions to taxi to runway 4 for departure and to expect takeoff after an airliner departs from runway 29. What effect would you expect from that airliner's vortices?

- A) The winds will push the vortices SE of your takeoff path.
- B)** The upwind vortex would tend to remain over the runway.
- C) The downwind vortex will rapidly dissipate.

4710.            IRA

When landing behind a large jet aircraft, at which point on the runway should you plan to land?

- A) If any crosswind, land on the windward side of the runway and prior to the jet's touchdown point.
- B) At least 1,000 feet beyond the jet's touchdown point.
- C)** Beyond the jet's touchdown point.

4714.            IRA

Which procedure should be followed by a pilot who is circling to land in a Category B airplane, but is maintaining a speed 5 knots faster than the maximum specified for that category?

- A)** Use the approach minimums appropriate for Category C.
- B) Use Category B minimums.
- C) Use Category D minimums since they apply to all circling approaches.

4715.            IRA

How can an IAF be identified on a Standard Instrument Approach Procedure (SIAP) Chart?

- A)** All fixes that are labeled IAF.
- B) Any fix illustrated within the 10 mile ring other than the FAF or stepdown fix.
- C) The procedure turn and the fixes on the feeder facility ring.

4716.            IRA

RVR minimums for landing are prescribed in an IAP, but RVR is inoperative and cannot be reported for the intended runway at the time. Which of the following would be an operational consideration?

- A)** RVR minimums which are specified in the procedures should be converted and applied as ground visibility.
- B) RVR minimums may be disregarded, providing the runway has an operative HIRL system.
- C) RVR minimums may be disregarded, providing all other components of the ILS system are operative.

4717.            IRA

Aircraft approach categories are based on:

- A) certificated approach speed at maximum gross weight.
- B)** 1.3 times the stall speed in landing configuration at maximum gross landing weight.
- C) 1.3 times the stall speed at maximum gross weight.



4719.            IRA

When a pilot elects to proceed to the selected alternate airport, which minimums apply for landing at the alternate?

- A) 600-1 if the airport has an ILS.
- B) Ceiling 200 feet above the published minimum; visibility 2 miles.
- C)** The landing minimums for the approach to be used.

4726.            IRA

You are being vectored to the ILS approach course, but have not been cleared for the approach. It becomes evident that you will pass through the localizer course. What action should be taken?

- A) Turn outbound and make a procedure turn.
- B)** Continue on the assigned heading and query ATC.
- C) Start a turn to the inbound heading and inquire if you are cleared for the approach.

4728.            IRA

How is ATC radar used for instrument approaches when the facility is approved for approach control service?

- A) Precision approaches, weather surveillance, and as a substitute for any inoperative component of a navigation aid used for approaches.
- B) ASR approaches, weather surveillance, and course guidance by approach control.
- C)** Course guidance to the final approach course, ASR and PAR approaches, and the monitoring of nonradar approaches.

4731.            IRA

Which pilot action is appropriate if more than one component of an ILS is unusable?

- A)** Use the highest minimum required by any single component that is unusable.
- B) Request another approach appropriate to the equipment that is useable.
- C) Raise the minimums a total of that required by each component that is unusable.

4732.            IRA

If the ILS outer marker is inoperative, you may substitute?

- A)** A compass locator or precision radar.
- B) VOR radials that identify the location.
- C) Distance Measuring Equipment (DME).

4733.            IRA

What facilities, if any, may be substituted for an inoperative middle marker during an ILS approach without affecting the straight-in minimums?

- A) ASR.
- B)** Substitution not necessary, minimums do not change.
- C) Compass locator, PAR, and ASR.

4734.            IRA

When being radar vectored for an ILS approach, at what point may you start a descent from your last assigned altitude to a lower minimum altitude if cleared for the approach?

- A) When established on a segment of a published route or instrument approach procedure.
- B) You may descend immediately to published glide slope interception altitude.
- C) Only after you are established on the final approach unless informed otherwise by ATC.

4738.            IRA

Under which conditions is hydroplaning most likely to occur?

- A) When rudder is used for directional control instead of allowing the nosewheel to contact the surface early in the landing roll on a wet runway.
- B)** During conditions of standing water, slush, high speed, and smooth runway texture.
- C) During a landing on any wet runway when brake application is delayed until a wedge of water begins to build ahead of the tires.

4740.            IRA

When cleared to execute a published sidestep maneuver for a specific approach and landing on the parallel runway, at what point is the pilot expected to commence this maneuver?

- A) At the published minimum altitude for a circling approach.
- B)** As soon as possible after the runway or runway environment is in sight.
- C) At the localizer MDA minimum and when the runway is in sight.

4742.            IRA

Which of these facilities may be substituted for an MM during a complete ILS IAP?

- A) Surveillance and precision radar.
- B)** Compass locator and precision radar.
- C) A VOR/DME fix.



4744.            IRA

If all ILS components are operating and the required visual references are not established, the missed approach should be initiated upon

- A)** arrival at the DH on the glide slope.
- B) arrival at the middle marker.
- C) expiration of the time listed on the approach chart for missed approach.

4749.            IRA

When may a pilot make a straight-in landing, if using an IAP having only circling minimums?

- A) A straight-in landing may not be made, but the pilot may continue to the runway at MDA and then circle to land on the runway.
- B) The pilot may land straight-in if the runway is the active runway and he has been cleared to land.
- C)** A straight-in landing may be made if the pilot has the runway in sight in sufficient time to make a normal approach for landing, and has been cleared to land.

4753.            IRA

Approximately what height is the glide slope centerline at the MM of a typical ILS?

- A) 100 feet.
- B)** 200 feet.
- C) 300 feet.

4754.            IRA

If the RVR is not reported, what meteorological value should you substitute for 2,400 RVR?

- A) A ground visibility of  $\frac{1}{2}$  NM.
- B) A slant range visibility of 2,400 feet for the final approach segment of the published approach procedure.
- C)** A ground visibility of  $\frac{1}{2}$  SM.

4763. AVSEM    IRA

During an ILS to a runway equipped with MALSR, how would a pilot know if there was penetration of the Obstacle Identification Surface (OIS) area and what should the pilot know?

- A) There is a runway visual approach slope indicator (VASI) and all is clear.
- B)** The published visibility for the ILS is no lower than 3/4 SM and care should be taken to avoid any obstacles.
- C) The approach chart has a visual descent point (VDP) published and all is clear.

4764.            IRA

Immediately after passing the final approach fix inbound during an ILS approach in IFR conditions, the glide slope warning flag appears. The pilot is

- A) permitted to continue the approach and descend to the DH.
- B)** permitted to continue the approach and descend to the localizer MDA.
- C) required to immediately begin the prescribed missed approach procedure.

4770.            IRA

Which substitution is appropriate during an ILS approach?

- A) A VOR radial crossing the outer marker site may be substituted for the outer marker.
- B)** LOC minimums should be substituted for ILS minimums whenever the glide slope becomes inoperative.
- C) DME, when located at the localizer antenna site, should be substituted for either the outer or middle marker.

4771.            IRA

Assume this clearance is received:

"CLEARED FOR ILS RUNWAY 07 LEFT  
APPROACH, SIDE-STEP TO RUNWAY 07  
RIGHT."

When would the pilot be expected to commence the side-step maneuver?

- A)** As soon as possible after the runway environment is in sight.
- B) Any time after becoming aligned with the final approach course of Runway 07 left, and after passing the final approach fix.
- C) After reaching the circling minimums for Runway 07 right.

4774.            IRA

(Refer to figure 134.) Unless a higher angle is necessary for obstacle clearance, what is the normal glidepath angle for a 2-bar VASI?

- A)  $2.75^\circ$ .
- B)**  $3.00^\circ$ .
- C)  $3.25^\circ$ .



4775.            IRA

Which of the following indications would a pilot see while approaching to land on a runway served by a 2-bar VASI?

- A) If on the glidepath, the near bars will appear red, and the far bars will appear white.
- B)** If departing to the high side of the glidepath, the far bars will change from red to white.
- C) If on the glidepath, both near bars and far bars will appear white.

4776.            IRA

The middle and far bars of a 3-bar VASI will

- A) both appear white to the pilot when on the upper glidepath.
- B) constitute a 2-bar VASI for using the lower glidepath.
- C)** constitute a 2-bar VASI for using the upper glidepath.

4778.            IRA

When on the proper glidepath of a 2-bar VASI, the pilot will see the near bar as

- A)** white and the far bar as red.
- B) red and the far bar as white.
- C) white and the far bar as white.

4779.            IRA

If an approach is being made to a runway that has an operating 3-bar VASI and all the VASI lights appear red as the airplane reaches the MDA, the pilot should

- A) start a climb to reach the proper glidepath.
- B) continue at the same rate of descent if the runway is in sight.
- C)** level off momentarily to intercept the proper approach path.

4781.            IRA

Which approach and landing objective is assured when the pilot remains on the proper glidepath of the VASI?

- A) Continuation of course guidance after transition to VFR.
- B)** Safe obstruction clearance in the approach area.
- C) Course guidance from the visual descent point to touchdown.

4782.            IRA

(Refer to figure 135.) Unless a higher angle is required for obstacle clearance, what is the normal glidepath for a 3-bar VASI?

- A) 2.3°
- B) 2.75°
- C)** 3.0°

4783.            IRA

(Refer to figure 135.) Which illustration would a pilot observe when on the lower glidepath?

- A) 4
- B)** 5
- C) 6

4784.            IRA

(Refer to figure 135.) Which illustration would a pilot observe if the aircraft is above both glidepaths?

- A) 5
- B) 6
- C)** 7

4785.            IRA

(Refer to figure 135.) Which illustration would a pilot observe if the aircraft is below both glidepaths?

- A)** 4
- B) 5
- C) 6

4963.            IRA

(Refer to Figure 259.) While clearing an active runway, you are clear of the ILS critical area when you pass which sign?

- A) D.
- B) G.
- C)** H.

4791.            IRA

(Refer to figure 137.) What is the distance (A) from the beginning of the runway to the fixed distance marker?

- A) 500 feet.
- B)** 1,000 feet.
- C) 1,500 feet.

4792.            IRA

(Refer to figure 137.) What is the distance (B) from the beginning of the runway to the touchdown zone marker?

- A) 250 feet.
- B)** 500 feet.
- C) 750 feet.

4794.            IRA

Which runway marking indicates a displaced threshold on an instrument runway?

- A)** Arrows leading to the threshold mark.
- B) Centerline dashes starting at the threshold.
- C) Red chevron marks in the nonlanding portion of the runway.



4795.            IRA

Which type of runway lighting consists of a pair of synchronized flashing lights, one on each side of the runway threshold?

- A) RAIL.
- B) HIRL.
- C) REIL.**

4796.            IRA

The primary purpose of runway end identifier lights, installed at many airfields, is to provide

- A) rapid identification of the approach end of the runway during reduced visibility.**
- B) a warning of the final 3,000 feet of runway remaining as viewed from the takeoff or approach position.
- C) rapid identification of the primary runway during reduced visibility.

4797.            IRA

(Refer to figure 138.) What night operations, if any, are authorized between the approach end of the runway and the threshold lights?

- A) No aircraft operations are permitted short of the threshold lights.
- B) Only taxi operations are permitted in the area short of the threshold lights.
- C) Taxi and takeoff operations are permitted, providing the takeoff operations are toward the visible green threshold lights.**

4799-1.          IRA

While on a GPS approach, you receive a RAIM annunciation about the status of RAIM reliability. You

- A) execute an immediate missed approach** regardless of where you are on the approach path.\*
- B) execute an immediate missed approach only if you are past the FAWP.
- C) continue the approach since you have up to 5 minutes of GPS accuracy to complete the approach after you receive the annunciation.

*\* Although Aviation Seminars believes the wording in the correct answer (A) is flawed, answer B and C are much more incorrect because you wouldn't want to ever continue an approach after being alerted to a position reliability issue.*

4822.            IRA

During a "no-gyro" approach and prior to being handed off to the final approach controller, the pilot should make all turns

- A) one-half standard rate unless otherwise advised.
- B) any rate not exceeding a 30° bank.
- C) standard rate unless otherwise advised.**

4823.            IRA

After being handed off to the final approach controller during a "no-gyro" surveillance or precision approach, the pilot should make all turns

- A) one-half standard rate.**
- B) based upon the groundspeed of the aircraft.
- C) standard rate.



## IFR NAVIGATION

### General

All radio aids are oriented to Magnetic North.

The only way to identify a VOR / VORTAC is by reception of the Morse Code or voice identification. If you do not receive any identification, the station is unusable, even though you may be receiving a strong navigational signal.

If you receive a single coded identification once every 30 seconds, the VOR is inoperative, but the DME is operative.

### Very High Frequency Omnidirectional Range (VOR)

#### VOR Components:

Omnibearing selector (OBS) enables you to select the course you wish to fly. This selector should always agree with your course or heading you wish to fly or intercept a course. If reading a VOR indicator, imagine the aircraft on the same heading as the OBS.

TO-FROM flag tells you if flying the course selected will take you closer TO or farther FROM the VOR station. Station passage occurs with the first positive, complete reversal of the TO-FROM indicator.

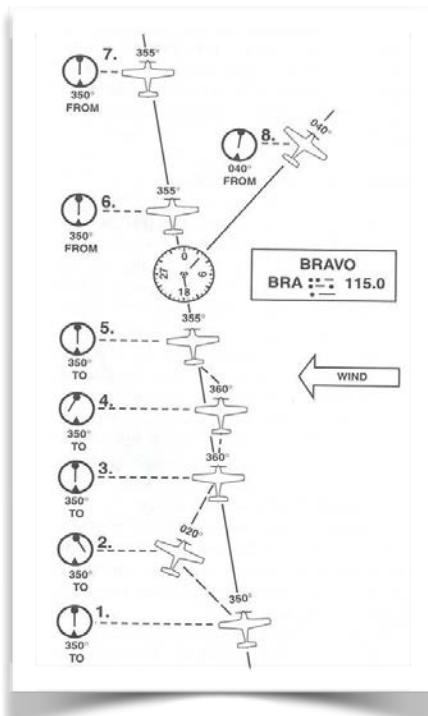
Left-Right needle tells you, if flying the course selected, to turn right or left to center the needle and put you on course.



To interpret airplane position from a VOR indication, imagine the airplane to be on the same heading as OBS, either going closer TO or farther FROM the VOR (as indicated by TO-FROM flag), and having to turn towards the needle to get on course.

On a back course approach imagine the airplane to be on the inbound front course heading.

Full needle deflection from the center indicates 10 to 12 degrees off course. Be able to compute the miles off course by knowing that one degree off course at 60 miles distance is one mile off course.



### RMI (Radio Magnetic Indicator)

The RMI points to the station. The FAA may still refer to an RMI, but only in a way that shows where a station is relative to aircraft position.



## Horizontal Situation Indicator (HSI)

An HSI, simply put, is a basic Directional Gyro (DG) with a basic VOR slapped on it's face.

The HSI below indicates:

Aircraft heading, at top of instrument, is 240°.  
OBS setting, shown by arrowhead, is 180° TO  
The aircraft is flying a 60° intercept angle to intercept the 360° radial that will take it to the station from the North.



TO-FROM indicator shows TO since arrow points to the OBS arrowhead.

Left-Right indicator shows getting closer to the selected course. (60 degree intercept angle)

Glide slope information, if tuned to ILS localizer frequency. (Not Showing a G/S Indicator)

## DME (Distance Measuring Equipment)

DME measures the line of sight distance (Slant Range) in nautical miles from the airplane to the ground VORTAC.

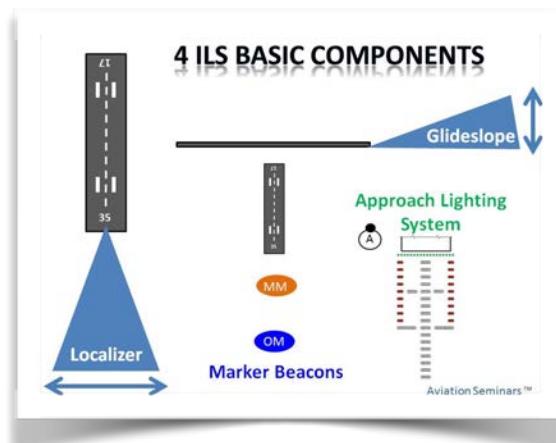
If you are over the VORTAC at 6,000 AGL, the DME would show 1.0 miles, because you are that far above the station.

The greatest errors occur at high altitudes close to the station.

As a rule of thumb, you should be one or more miles from the station for each 1,000 feet of altitude above the facility for the DME to be considered accurate.

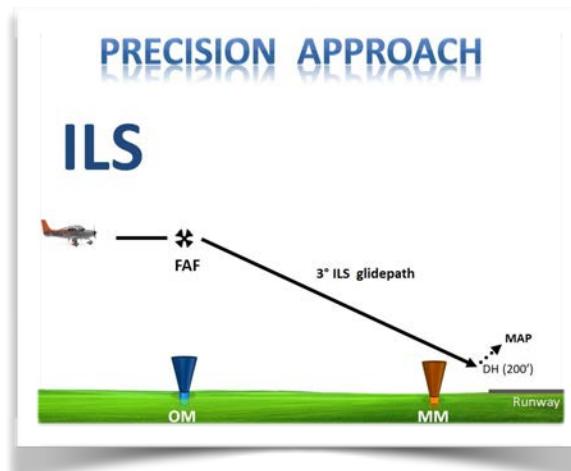
## Instrument Landing System (ILS)

An ILS is the most common precision approach. An ILS is an approach that has both Localizer (LOC) left and right guidance and Glide-slope (GS) vertical guidance.



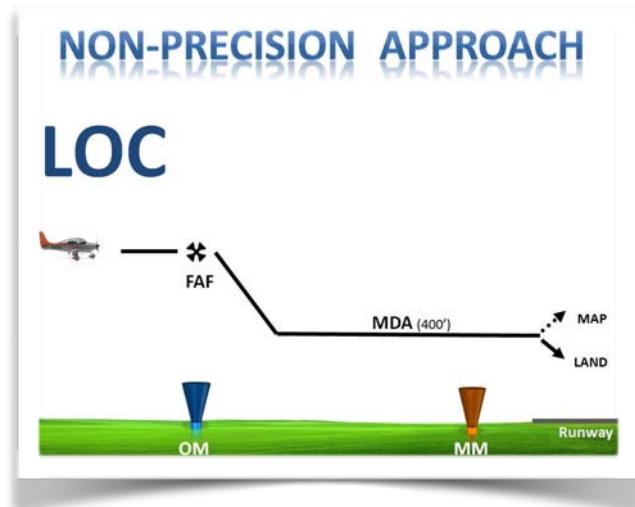
LOC course width is between 3 and 6 degrees. and the GS angle is 3 degrees. (Standard)  
ILS approaches normally have a 200 foot Decision Height (DH / DA) and 1/2 SM visibility requirement.

The DH is the altitude where the pilot would make an immediate decision to land if the runway environment is in sight OR execute the Missed Approach Procedure (MAP) if the runway is not in sight.





A LOC only (with no GS) is a non-precision approach procedure. LOC approaches normally have a standard 400 foot Minimum Descent Altitude (MDA) and a 1 SM or more visibility requirement.



The MDA is the minimum altitude an aircraft would be allowed to descend towards the runway while the pilot tries to acquire the runway environment to land.

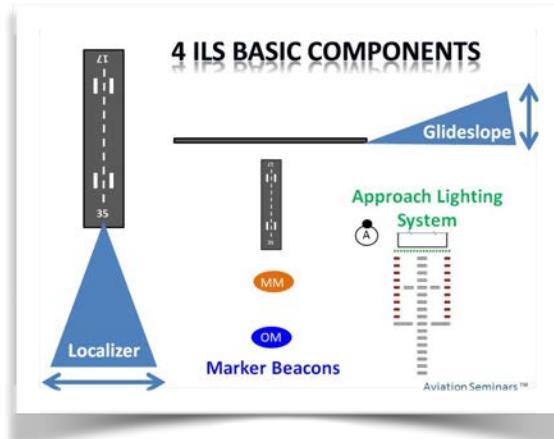
The pilot flying a non-precision approach would execute a missed approach when the aircraft arrives at a time or fixed point and the pilot doesn't have the runway environment in sight.

ILS and LOC procedures are designed to be Straight-In procedures (S-ILS or S-LOC)

Localizer Type Directional Aid (LDA) courses differ from a standard ILS approach facility in that the LOC is 5 degrees and may be offset to the runway and usually has a higher MDA. (Less Accurate)

Simplified Directional Facility (SDF) courses differ from both an ILS and LDA in that the LOC is either 6 or 12 degrees and may not be aligned with the runway and usually has even higher MDAs. (Least Accurate)

### The 4 Basic ILS Components:



**Localizer** - frequencies of 108.1 - 111.9 MHz, odd tenths only.

- Morse code ident is preceded by the letter I (I-MSY).
- 2 1/2 degrees off course fully deflects the needle.

**Glide-Slope** - uses UHF frequencies automatically paired with the localizer frequency.

- normally intercepts MM at 200 AGL
- Your rate of descent on the glide slope increases with your groundspeed.

### Marker Beacons

Outer Marker - about 5 miles from runway.

Middle Marker - within about a 1/2 mile from runway.

Inner Marker - within a few 100 feet from runway.

The code and light identifications of marker beacons are as follows:

- OM dash dash dash BLUE
- MM dot dash dot dash AMBER
- IM dot dot dot dot WHITE (4 dots per second)

### RNAV (Area Navigation)

Requires any approved RNAV receiver.

Waypoint is a predetermined geographical position used on an RNAV route or RNAV instrument approach.



## Global Positioning System (GPS)

There are 24 GPS satellites in the system available for civilian use.

Satellite based area navigation (RNAV) procedures are used to fly optimum routes with minimal controller intervention.

A pilot can determine if a Global Positioning System (GPS) installed in an aircraft is approved for IFR enroute and IFR approaches by looking in the Flight Manual Supplement.

When using GPS for navigation and instrument approaches, any required alternate airport must have an approved operational instrument approach procedure other than GPS.

## Receiver Autonomous Integrity Monitoring (RAIM)

RAIM verifies the accuracy of the GPS signal.

A RAIM prediction must be performed during preflight and be predicted to be available during the entire route of flight including the GPS approach.

If more than 5 minutes predicted loss, flight should be delayed or re-routed.

If RAIM is not available when setting up a GPS approach, the pilot should use a navigation system other than GPS for the approach.

If you receive a RAIM annunciation (reliability warning) during the approach, execute the missed approach.

## Limitations

Hand-held GPS systems are never allowed to be used as any required navigation equipment for IFR operations.

Hand-held GPS systems, and GPS systems certified for VFR operation, may be used during IFR operations as an aid to situational awareness ONLY.

During IFR en route operations using an approved TSO-C129 or TSO-C196 GPS system for navigation the aircraft must have an approved and operational alternate navigation system appropriate for the route.

During IFR en route and terminal operations using an approved GPS system for navigation, ground based navigational facilities must be operational along the entire route.

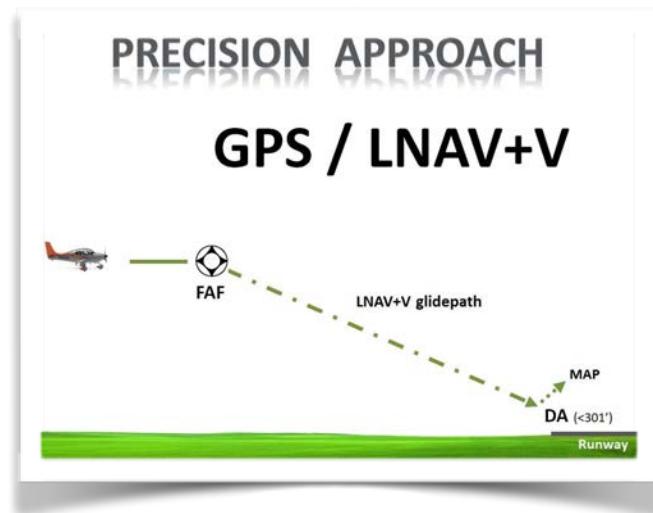
## Wide Area Augmentation System (WAAS)

WAAS-capable approaches can be certified for precision approaches using any IFR certified GPS.

LNAV+V provides advisory vertical guidance that may be used in lieu of the published step-down fixes on the IAP.

The LNAV+V vertical guidance is advisory and provides an aid to the pilot during the descent to the runway.

At Decision Altitude (DA) The pilot would make an immediate decision to land if the runway environment is in sight OR execute the Missed Approach Procedure (MAP) if the runway is not in sight.





**TEST QUESTIONS (Use Test Supplement 8080-3F)**

**NOTE: CORRECT ANSWER IN **BOLD ITALICS****

4069.      IRA

What is a waypoint when used for an IFR flight?

- A) A predetermined geographical position used for an RNAV route or an RNAV instrument approach.**
- B) A reporting point defined by the intersection of two VOR radials.
- C) A location on a Victor airway which can only be identified by VOR and DME signals.

4269.      IRA

(Refer to figure 163) During the arc portion of the instrument departure procedure (GNATS 6. MOURN) a left crosswind is encountered. Where should the bearing pointer of the RMI be referenced relative to the wingtip to compensate for wind drift and maintain the 15 DME arc?

- A) Behind the right wingtip reference point.**
- B) On the right wingtip reference point.
- C) Behind the left wing tip reference point.

4282.      IRA

(Refer to Figure 171.) Under which condition should the missed approach procedure for the RNAV (GPS) RWY 33 approach be initiated?

- A) Upon reaching the LNAV MDA of 1,240 ft. MSL.
- B) 10.1 NM from the FAF.
- C) RWY 33 MAP.**

4338.      IRA

(Refer to figures 65 and 66) What is your position relative to the GRICE intersection?

- A) Right of V552 and approaching GRICE intersection.**
- B) Right of V552 and past GRICE intersection.
- C) Left of V552 and approaching GRICE intersection.

4284.      IRA

How can a pilot determine if a Global Positioning System (GPS) installed in an aircraft is approved for IFR enroute and IFR approaches?

- A) Flight manual supplement.**
- B) GPS operator's manual.
- C) Aircraft owner's handbook.

4296.      IRA

(Refer to figure 177) Which navigational information and services would be available to the pilot when using the localizer frequency?

- A) Localizer and glide slope, DME, TACAN with no voice capability.
- B) Localizer information only, ATIS and DME are available.
- C) Localizer and glide slope, DME, and no voice capability.**

4306.      IRA

(Refer to figure 188) What determines the MAP on the LOC/DME RWY 21 approach at Portland International Airport?

- A) I-GPO 1.2 DME.**
- B) 5.8 NM from ROBOT FAF.
- C) 160 radial of BTG VORTAC.

4347.      IRA

(Refer to Figures 71 and 71A.) What is your position relative to the Fosi intersection Northbound on V213?

- A) West of V213 and approaching the Fosi intersection.**
- B) East of V213 and approaching the Fosi intersection.
- C) West of V213 and past the Fosi intersection.

4397.      IRA

Which distance is displayed by the DME indicator?

- A) Slant range distance in NM.**
- B) Slant range distance in SM.
- C) Line-of-sight direct distance from aircraft to VORTAC in SM.

4399.      IRA

Where does the DME indicator have the greatest error between ground distance to the VORTAC and displayed distance?

- A) High altitudes far from the VORTAC.
- B) High altitudes close to the VORTAC.**
- C) Low altitudes far from the VORTAC.

4410.      IRA

What indication should a pilot receive when a VOR station is undergoing maintenance and may be considered unreliable?

- A) No coded identification, but possible navigation indications.**
- B) Coded identification, but no navigation indications.
- C) A voice recording on the VOR frequency announcing that the VOR is out of service for maintenance.

4411.      IRA

A particular VOR station is undergoing routine maintenance. This is evidenced by

- A) removal of the navigational feature.
- B) broadcasting a maintenance alert signal on the voice channel.
- C) removal of the identification feature.**



4412.      IRA

What is the meaning of a single coded identification received only once approximately every 30 seconds from a VORTAC?

- A) The VOR and DME components are operative.
- B) VOR and DME components are both operative, but voice identification is out of service.
- C) The DME component is operative and the VOR component is inoperative.**

4413.      IRA

Which DME indication should you receive when you are directly over a VORTAC site at approximately 6,000 feet AGL?

- A) 0.
- B) 1.**
- C) 1.3.

4472.      IRA

As a rule of thumb, to minimize DME slant range error, how far from the facility should you be to consider the reading as accurate?

- A) Two miles or more for each 1,000 feet of altitude above the facility.
- B) One or more miles for each 1,000 feet of altitude above the facility.**
- C) No specific distance is specified since the reception is line-of-sight.

4507.      IRA

(Refer to Figures 89 and 90.) What is your relationship to the airway while en route from BCE VORTAC to HVE VORTAC on V8?

- A) Left of course on V8.**
- B) Left of course on V382.
- C) Right of course on V8.

4548.      IRA

What angular deviation from a VOR course centerline is represented by a full-scale deflection of the CDI?

- A) 4°.
- B) 5°
- C) 10°.**

4549.      IRA

When using VOR for navigation, which of the following should be considered as station passage?

- A) The first movement of the CDI as the airplane enters the zone of confusion.
- B) The moment the TO-FROM indicator becomes blank.
- C) The first positive, complete reversal of the TO-FROM indicator.**

4550.      IRA

Which of the following should be considered as station passage when using VOR?

- A) The first flickering of the TO-FROM indicator and CDI as the station is approached.
- B) The first full-scale deflection of the CDI.
- C) The first complete reversal of the TO-FROM indicator.**

4551.      IRA

When checking the sensitivity of a VOR receiver, the number of degrees in course change as the OBS is rotated to move the CDI from center to the last dot on either side should be between

- A) 5° and 6°.
- B) 8° and 10°.
- C) 10° and 12°.**

4552.      IRA

A VOR receiver with normal five-dot course sensitivity shows a three-dot deflection at 30 NM from the station. The aircraft would be displaced approximately how far from the course centerline?

- A) 2 NM.
- B) 3 NM.**
- C) 5 NM.

4553.      IRA

An aircraft which is located 30 miles from a VOR station and shows a  $\frac{1}{2}$  scale deflection on the CDI would be how far from the selected course centerline?

- A)  $1\frac{1}{2}$  miles.
- B)  $2\frac{1}{2}$  miles.**
- C)  $3\frac{1}{2}$  miles.

4554.      IRA

What angular deviation from a VOR course centerline is represented by a  $\frac{1}{2}$  scale deflection of the CDI?

- A) 2°.
- B) 4°.
- C) 5°.**

4556.      IRA

After passing a VORTAC, the CDI shows  $\frac{1}{2}$  scale deflection to the right. What is indicated if the deflection remains constant for a period of time?

- A) The airplane is getting closer to the radial.
- B) The OBS is erroneously set on the reciprocal heading.
- C) The airplane is flying away from the radial.**

4557.      IRA

(Refer to figure 95.) What is the lateral displacement of the aircraft in NM from the radial selected on the No. 1 NAV?

- A) 5.0 NM.**
- B) 7.5 NM.
- C) 10.0 NM.



4558.      IRA

(Refer to figure 95.) On which radial is the aircraft as indicated by the No. 1 NAV?

- A) R-175.
- B) R-165.
- C) R-345.**

4559.      IRA

(Refer to figure 95.) Which OBS selection on the No. 1 NAV would center the CDI and change the ambiguity indication to a TO?

- A) 175°.
- B) 165°.**
- C) 345°.

4560.      IRA

(Refer to figure 95.) What is the lateral displacement in degrees from the desired radial on the No. 2 NAV?

- A) 1°.
- B) 2°.
- C) 4°.**

4561.      IRA

(Refer to figure 95.) Which OBS selection on the No. 2 NAV would center the CDI?

- A) 174°.**
- B) 166°.
- C) 335°.

4562.      IRA

(Refer to figure 95.) Which OBS selection on the No. 2 NAV would center the CDI and change the ambiguity indication to a TO?

- A) 166°.
- B) 346°.
- C) 354°.**

4947.      IRA

Hand-held GPS systems, and GPS systems certified for VFR operation, may be used during IFR operations as A) the principal reference to determine en route waypoints.

**B) an aid to situational awareness.**

C) the primary source of navigation.

4948.      IRA

During IFR en route and terminal operations using an approved GPS system for navigation, ground based navigational facilities

A) are only required during the approach portion of the flight.

**B) must be operational along the entire route.**

C) must be operational only if RAIM predicts an outage.

4962.      IRA

During IFR operation using an approved TSO-C129 or TSO-C196 GPS system for navigation,

- A) no other navigation system is required.
- B) active monitoring of an alternate navigation system is always required.
- C) the aircraft must have an approved and operational alternate navigation system appropriate for the route.**

4563.\*      IRA

(Refer to figures 96 and 97.) To which aircraft position(s) does HSI presentation "A" correspond?

- A) 9 and 6.**
- B) 9 only.
- C) 6 only.

4564.\*      IRA

(Refer to figures 96 and 97.) To which aircraft position(s) does HSI presentation "B" correspond?

- A) 11.
- B) 5 and 13.**
- C) 7 and 11.

4565.\*      IRA

(Refer to figures 96 and 97.) To which aircraft position does HSI presentation "C" correspond?

- A) 9.
- B) 4.
- C) 12.**

4566.\*      IRA

(Refer to figures 96 and 97.) To which aircraft position does HSI presentation "D" correspond?

- A) 1.
- B) 10.
- C) 2.**

4567.\*      IRA

(Refer to figures 96. and 97.) To which aircraft position(s) does HSI presentation "E" correspond?

- A) 8 only.
- B) 3 only.
- C) 8 and 3.**

4572.      IRA

(Refer to figures 98 and 99.) To which aircraft position does HSI presentation "D" correspond?

- A) 4.
- B) 15.
- C) 17.**

4573.      IRA

(Refer to figures 98 and 99.) To which aircraft position does HSI presentation "E" correspond?

- A) 5.
- B) 6.**
- C) 15.



Note\* Aviation Seminars is aware of the wrong ILS arrow shading in Figure 96 in the FAA 8080-3F Supplement.

If you get a test question using Figure 96, treat the front course as being shaded on the right side as it should be instead of the incorrect left side depicted.

4574.      IRA

(Refer to figures 98 and 99.) To which aircraft position does HSI presentation "F" correspond?

- A) 10.
- B) 14.
- C) 16.**

4601.      IRA

(Refer to figure 106.) The course selector of each aircraft is set on 360°. Which aircraft would have a FROM indication on the ambiguity meter and the CDI pointing left of center?

- A) 1.
- B) 2.**
- C) 3.

4606.      IRA

(Refer to figure 109.) In which general direction from the VORTAC is the aircraft located?

- A) Northeast.**
- B) Southeast.
- C) Southwest.

4607.      IRA

(Refer to figure 110.) In which general direction from the VORTAC is the aircraft located?

- A) Southwest.
- B) Northwest.
- C) Northeast.**

4608.      IRA

(Refer to figure 111.) In which general direction from the VORTAC is the aircraft located?

- A) Northeast.
- B) Southeast.
- C) Northwest.**

4646.      IRA

(Refer to figure 47.) When en route on V448 from YKM VORTAC to BTG VORTAC, what minimum navigation equipment is required to identify ANGOO intersection?

- A) One VOR receiver.**
- B) One VOR receiver and DME.
- C) Two VOR receivers.

4663.      IRA

When a VOR/DME is collocated under frequency pairings and the VOR portion is inoperative, the DME identifier will repeat at an interval of;

- A) 20 second intervals at 1020 Hz.
- B) 30 second intervals at 1350 Hz.**
- C) 60 second intervals at 1350 Hz.

4664.      IRA

When installed with the ILS and specified in the approach procedures, DME may be used;

- A) in lieu of the OM.**
- B) in lieu of visibility requirements.
- C) to determine distance from TDZ.

4666.      IRA

Full scale deflection of a CDI occurs when the course deviation bar or needle;

- A) deflects from left side of the scale to right side of the scale.
- B) deflects from the center of the scale to either far side of the scale.**
- C) deflects from half scale left to half scale right.

4669.      IRA

How does a pilot determine if DME is available on an ILS/LOC?

- A) IAP indicate DME\TACAN channel in LOC frequency box.**
- B) LOC\DME are indicated on en route low altitude frequency box.
- C) LOC\DME frequencies available in the Airman's Information Manual.

4674.      IRA

(Refer to figure 240.) How should a pilot determine when the DME at Price/Carbon County Airport is inoperative?

- A) The airborne DME will always indicate "0" mileage.
- B) The airborne DME will "search," but will not "lock on."
- C) The airborne DME may appear normal, but there will be no code tone.**

4680.      IRA

(Refer to figure 242.) What indication should you get when it is time to turn inbound while in the procedure turn at FEHXE?

- A) 4 DME miles from FEHXE.**
- B) 10 DME miles from the MAP.
- C) 12 DME miles from LIT VORTAC.

4682.      IRA

(Refer to figure 242.) How should the missed approach point be identified when executing the RNAV RWY 36 approach at Adams Field?

- A) When the TO-FROM indicator changes.**
- B) Upon arrival at 760 feet on the glidepath.
- C) When time has expired for 5 NM past the FAF.



4684.        IRA

(Refer to figure 129) What minimum airborne equipment is required to be operative for RNAV RWY 36 approach at Adams Field?

- A) An approved RNAV receiver that provides both horizontal and vertical guidance.
- B) A transponder and an approved RNAV receiver that provides both horizontal and vertical guidance.
- C) Any approved RNAV receiver.**

4729.        IRA

Which range facility associated with the ILS is identified by the last two letters of the localizer identification group?

- A) Inner marker.
- B) Outer marker.
- C) Middle compass locator.**

4799.        IRA

If Receiver Autonomous integrity Monitoring (RAIM) is not available when setting up a GPS approach, the pilot should

- A) use another type of navigation system other than a GPS approach.**
- B) continue to the MAP and hold until the satellites are recaptured.
- C) continue the approach, expecting to recapture the satellites before reaching the FAF.

4799-2      IRA

As part of your GPS preflight planning, RAIM prediction should be verified. This means that

- A) RAIM availability is assured for your entire route of flight including the GPS approach at your destination.
- B) RAIM is predicted to be available for your entire route of flight including the GPS approach at your destination.**
- C) if RAIM is predicted to be available, you must still have ILS capability to use a GPS approach.

4801.        IRA

When using GPS for navigation and instrument approaches, any required alternate airport must have

- A) authorization to fly approaches under IFR using GPS avionics systems.
- B) a GPS approach that is anticipated to be operational and available at the ETA.
- C) an approved operational instrument approach procedure other than GPS.**

4824.\*      IRA

(Refer to figures 139 and 140) Which displacement from the localizer and glide slope at the 1.9 NM point is indicated?

- A) 710 feet to the left of the localizer centerline and 140 feet below the glide slope.
- B) 710 feet to the right of the localizer centerline and 140 feet above the glide slope.**
- C) 430 feet to the right of the localizer centerline and 28 feet above the glide slope.

4825.

(Refer to figures 139 and 141.) Which displacement from the localizer centerline and glide slope at the 1,300-foot point from the runway is indicated?

- A) 21 feet below the glide slope and approximately 320 feet to the right of the runway centerline.
- B) 28 feet above the glide slope and approximately 250 feet to the left of the runway centerline.
- C) 21 feet above the glide slope and approximately 320 feet to the left of the runway centerline.**

4826.        IRA

(Refer to figures 139 and 142.) Which displacement from the localizer and glide slope at the outer marker is indicated?

- A) 1,550 feet to the left of the localizer centerline and 210 feet below the glide slope.**
- B) 1,550 feet to the right of the localizer centerline and 210 feet above the glide slope.
- C) 775 feet to the left of the localizer centerline and 420 feet below the glide slope.

4684.        IRA

What are the primary benefits of satellite based area navigation (RNAV)?

- A) Provides optimal routing and altitudes.**
- B) Radio tuning and controller communication is minimized.
- C) Standard terminal arrival routes and departure procedures are not required.

4685.        IRA

(Refer to figure 244) How does an LDA facility, such as the one at Roanoke Regional, differ from a standard ILS approach facility?

- A) The LOC is wider.
- B) The LOC is offset from the runway.**
- C) The GS is unusable beyond the MM.

4703.        IRA

What is the difference between a Localizer-Type Directional Aid (LDA) and the ILS localizer?

- A) The LDA is not aligned with the runway.**
- B) The LDA uses a course width of 6° or 12°, while an ILS uses only 5°.
- C) The LDA signal is generated from a VOR-type facility and has no glide slope.

4704.        IRA

How wide is an SDF course?

- A) Either 3° or 6°
- B) Either 6° or 12°.**
- C) Varies from 5° to 10°.



4705.            IRA

What are the main differences between the SDF and the localizer of an ILS?

- A) The useable off-course indications are limited to 35° for the localizer and up to 90° for the SDF.
- B)** The SDF course may not be aligned with the runway and the course may be wider.
- C) The course width for the localizer will always be 5° while the SDF course will be between 6° and 12°

4949.            IRA

On a WAAS-capable GPS approach, what is the significance of "LNAV+V" being displayed?

- A) Advisory vertical guidance is provided to the pilot that must be used in lieu of published step-down fixes on the instrument approach.
- B)** Advisory vertical guidance is provided as an aid to the pilot during the descent to the runway.
- C) Approved vertical guidance to descend to the decision height is provided to the pilot.



## Flight Planning Computations

### Flight Planning Computation Tips

There are three types of computation problems on the IFR/CFII written.

- Determine the CAS (calibrated airspeed) required to maintain a certain TAS at a given OAT and altitude.
- Use the E6-B flight computer, remembering that CAS is read on the middle scale.
- Determine fuel consumption for a given flight.

### TEST QUESTIONS (Use Test Supplement 8080-3F)

NOTE: CORRECT ANSWER IN **BOLD ITALICS**

#### 4267. IRA

What CAS must be used to maintain the filed TAS of 155 knots at 8,000 feet if the outside air temperature is  $-0.5^{\circ}\text{C}$ ?

- A) 134 KCAS.  
**B) 139 KCAS.**  
C) 142 KCAS.

#### 4278. IRA

What CAS must be used to maintain the filed TAS of 180 knots at 8,000 feet if the outside air temperature is  $+8^{\circ}\text{C}$ ?

- A) 154 KCAS.  
**B) 157 KCAS.**  
C) 163 KCAS.

#### 4289. IRA

What CAS must be used to maintain the filed TAS of 156 knots at 11,000 feet if the outside air temperature is  $+05^{\circ}\text{C}$ ?

- A) 129 KCAS.**  
B) 133 KCAS.  
C) 139 KCAS.

#### 4301. IRA

What CAS must be used to maintain the filed TAS of 120 knots at 12,000 feet if the outside air temperature is  $+5^{\circ}\text{C}$ ?

- A) 147 KCAS.**  
B) 150 KCAS.  
C) 154 KCAS.

#### 4313. IRA

What CAS must be used to maintain the filed TAS of 158 knots at 8,000 feet if the outside air temperature is 0 degrees C?

- A) 136 KCAS.  
**B) 140 KCAS.**  
C) 147 KCAS.

#### 4345. IRA

What CAS should be used to maintain the filed TAS of 128 knots at 5,000 feet if the outside air temperature is  $+05^{\circ}\text{C}$ ?

- A) 119 KCAS.**  
B) 124 KCAS.  
C) 126 KCAS.

#### 4265. IRA

(Refer to Figure 24.) Your original route of flight was CEZ V391 JNC. However, due to thunderstorms en route, ATC revises your route to CEZ V391 DVC V68 MTJ V26 JNC. Calculate how much additional fuel you will consume given the following:

Winds = 230 at 40 knots

TAS = 130 knots

GPH = 17.0

- A) 13.2 gallons.

- B) 5.5 gallons.**

- C) 9.1 gallons.

#### Solution for 4265.

You will need to plot out both routes of flight. You then will need to determine your magnetic headings and distances for each flight.

Then using flight computer you can determine ground speed, leg time, and fuel burn for each leg.

#### Totals Route 1

Distance: 106 NM

Time En Route: 46:40

Fuel Burn: 13.3 GPH

#### Totals Route 2

Distance: 152

Time En Route: 01:10

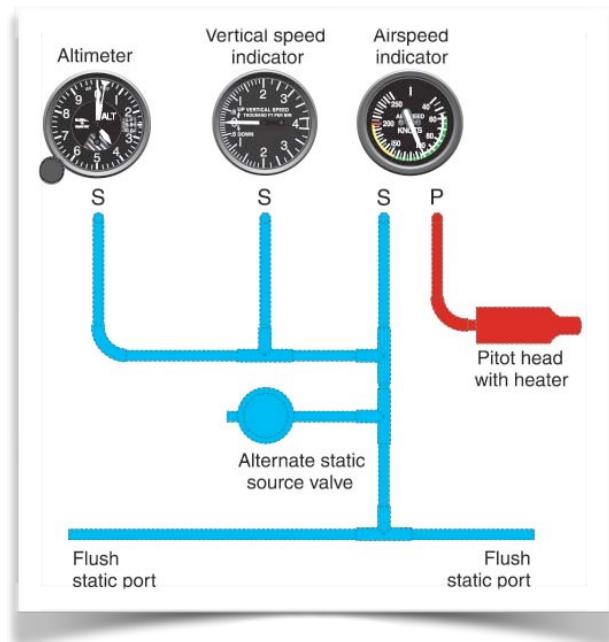
Fuel Burn: 19.8 GPH

(Choose the closest answer. Aviation Seminars came up with 6.5 gallons)



## Aircraft Instruments

### Pitot Static System



The pitot tube provides information to the airspeed indicator only. The static vent provides information to the airspeed indicator, altimeter and vertical speed indicator.

If the pitot tube and drain hole are blocked the airspeed indicator will react like an altimeter. In level flight, IAS remains the same as it was prior to the blockage with no variation in IAS. Once a climb is established, the indicated airspeed will increase. (Altimeter Effect)

If the static vent becomes blocked, the vertical speed indicator will remain at zero.

If you switch to an alternate static source within the aircraft (where the pressure is less) the lower static pressure will cause the IAS to read higher, the altimeter to read higher, and the vertical speed indicator (VSI) to show a momentary climb.

### Airspeed Indicator

Indicated Airspeed (IAS) is the direct reading you obtain from the airspeed indicator, uncorrected for atmospheric density or instrument error.

Calibrated Airspeed (CAS) is the indicated airspeed corrected for installation and instrument errors.



True Airspeed (TAS) is your actual speed, and is found on a flight computer by matching pressure altitude with temperature, then reading TAS on the outer scale opposite CAS on the middle scale.

Maneuvering Speed ( $V_a$ ) is the maximum turbulence speed and maximum speed for abrupt maneuvers. It is slower than cruising speed so the amount of excess load that can be imposed on the wing will be decreased. (Not shown on AS indicator)

### Altimeter



'Indicated Altitude' is the direct reading from the altimeter, and shows the height in relation to the pressure level set in the barometric window.



## Altimeter (Cont)

If the current altimeter setting is set, the altimeter should read the actual field elevation (true altitude) while on the ground at the departure area.

True altitude is your actual altitude above sea level.

Pressure Altitude is indicated any time 29.92 is set in the Kollsman window. Use 29.92 as a standard setting when above 18,000 MSL. Pressure altitude equals true altitude whenever standard conditions exist.

Density Altitude (DA) is pressure altitude corrected for non-standard temperature, and is used to determine aircraft performance. Pressure altitude and density altitude are equal at standard temperature.

The local altimeter setting should be used by all pilots in a particular area to provide for better vertical separation of aircraft.

If the local altimeter setting is not available before takeoff, set the altimeter to the airport elevation. In flight, ATC will periodically advise you of the proper altimeter setting.

If you fly from HIGH to LOW pressure or temperature and do not set the new altimeter setting, or into lower than standard temperatures, look out below. Your altimeter indicates higher than you actually are.

If you have the wrong altimeter setting in the Kollsman window, your altimeter will read incorrectly at the rate of 1 inch per 1,000 feet. As you increase the Kollsman window setting one inch, indicated altitude increases 1,000 feet.

## Magnetic Compass



Magnetic variation is the angle between true and magnetic north, and is found on the enroute low altitude

charts, and also listed in the Airport/Facility Directory (Chart Supplement)

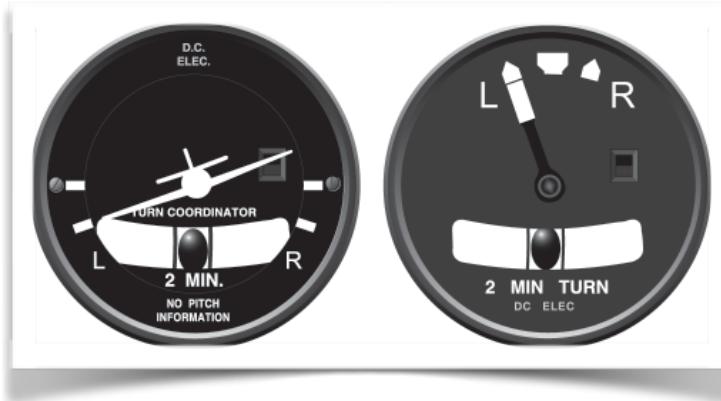
Deviation is the angle between magnetic north and compass north, caused by metals and electrical systems within the aircraft.

Errors (caused by magnetic dip) are:

**TURNING ERROR** - Turning on a southerly heading (091 degrees to 269 degrees) in either direction, the compass will lead your turn. Turning on any northerly heading (271 degrees to 089 degrees), the compass will turn in the opposite direction then lag your turn. There are no turning errors on headings of east and west.

**ACCELERATION ERROR** - On an easterly or westerly heading, if you accelerate, the compass turns north; if you decelerate, it turns south. There are no acceleration-deceleration errors on headings of north or south.

## Turn Coordinator and Turn & Slip Indicators



The standard rate of turn is 3 degrees per second. A 360 degree turn will take 2 minutes. A half-standard rate turn will take 4 minutes.

Turn and slip indicators show rate of turn and coordination.

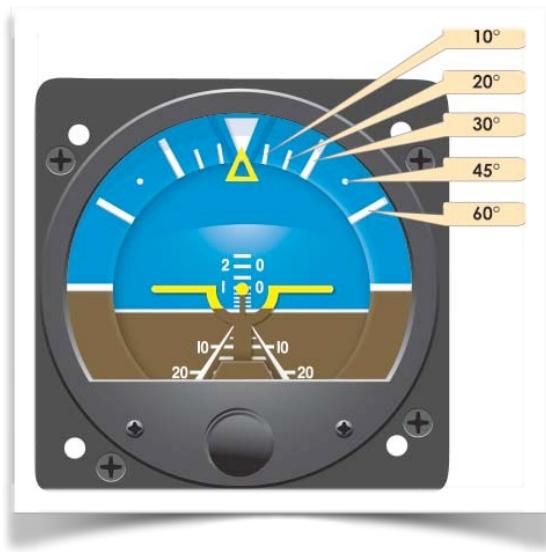
Turn coordinators show roll rate, rate of turn, coordination, and an indirect indication of bank.

The ball shows quality of turn, and skids to the outside of the turn, or slips to the inside of the turn. The position of the ball has no effect on the accuracy of the needle.

The horizontal component of lift (always equal to centrifugal force) causes the airplane to turn, and determines rate of turn. Radius of turn can be decreased, and rate of turn increased by decreasing airspeed and increasing bank.



## Attitude Indicator



Centrifugal force during turns, especially skidding turns, will cause errors of 5 degrees bank and slight nose-up pitch after 180 degrees of turn. After a 180 degree turn to the right, if the airplane is rolled out to straight-and-level by visual references, the miniature aircraft will show a slight climb and a turn to the left.

Acceleration will cause some attitude indicators to precess and incorrectly indicate a climb, and deceleration will indicate a descent.

## Preflight Engine And Instrument Indications

Prior to electrical power being turned on:

- Turn and Slip - make sure the needle is centered and the tube full of fluid.
- Magnetic Compass - check the approximate magnetic heading and the amount of fluid.

Listen for any unusual or irregular mechanical noises when electrical power first is turned on.

Pre-takeoff indications should be:

- VSI - if the needle is not zeroed (100FPM), use this as your zero indication.
- Altimeter - with correct altimeter setting, it should show within 75 feet of airport elevation.
- Magnetic Compass - card should swing freely.
- Turn and Slip - the ball moves freely opposite the turn, and the needle deflects in the direction of the turn.
- Heading indicator - set the indicator and check for proper alignment after taxi turns.
- Attitude Indicator - the horizon bar (not miniature aircraft) should be erect and stable within 5 minutes.

## Primary And Supporting instruments\*

Pitch instruments consist of attitude indicator, altimeter, airspeed indicator and VSI.

Bank instruments consist of attitude indicator, heading indicator, and turn coordinator. (Notice-magnetic compass not listed.)

Power instruments consist of manifold pressure or tachometer, and airspeed indicator.

A PRIMARY instrument is one that defines the quality of each maneuver, in terms of pitch, bank and power. The primary instruments for pitch, bank and power tell you if you are doing exactly what you mean to do.

SUPPORTING instruments confirm the information shown on the primary instruments, but it is the primary instruments that tell you if you are being successful.

Conditions that determine pitch attitude required to maintain level flight are airspeed, air density, wing design, and angle of attack.

## Wind Shear On The Glideslope

If a headwind shears to a calm or tailwind, aircraft pitch decreases, IAS decreases then increases, VSI increases, and you must first add thrust then reduce it. There is a tendency to go below the glideslope.

If a tailwind shears to a calm or headwind, pitch increases, IAS increases then decreases, VSI decreases, and you must decrease thrust then increase it. There is a tendency to go above the glideslope.



**TEST QUESTIONS (Use Test Supplement 8080-3F)**

**NOTE: CORRECT ANSWER IN **BOLD ITALICS****

4056.        IRA

You check the flight instruments while taxiing and find that the vertical speed indicator (VSI) indicates a descent of 100 feet per minute. In this case, you:

- A) must return to the parking area and have the instrument corrected by an authorized instrument repairman.
- B) may take off and use 100 feet descent as the zero indication.**
- C) may not take off until the instrument is corrected by either the pilot or a mechanic.

4089.        IRA

Under what condition is pressure altitude and density altitude the same value?

- A) At standard temperature.**
- B) When the altimeter setting is 29.92" Hg.
- C) When indicated, and pressure altitudes are the same value on the altimeter.

4090.        IRA

Under which condition will pressure altitude be equal to true altitude?

- A) When the atmospheric pressure is 29.92" Hg.
- B) When standard atmospheric conditions exist.**
- C) When indicated altitude is equal to the pressure altitude.

4091.        IRA

Which condition would cause the altimeter to indicate a lower altitude than actually flown (true altitude)?

- A) Air temperature lower than standard.
- B) Atmospheric pressure lower than standard.
- C) Air temperature warmer than standard.**

4093.        IRA

When an altimeter is changed from 30.11" Hg to 29.96" Hg, in which direction will the indicated altitude change and by what value?

- A) Altimeter will indicate 15 feet lower.
- B) Altimeter will indicate 150 feet lower.**
- C) Altimeter will indicate 150 feet higher.

4109.

Under what condition will true altitude be lower than indicated altitude with an altimeter setting of 29.92" Hg?

- A) In warmer than standard air temperature.
- B) In colder than standard air temperature.**
- C) When density altitude is higher than indicated altitude.

4110.        IRA

Which of the following defines the type of altitude used when maintaining FL 210?

- A) Indicated.
- B) Pressure.**
- C) Calibrated.

4111.        IRA

Altimeter setting is the value to which the scale of the pressure altimeter is set so the altimeter indicates

- A) true altitude at field elevation.**
- B) pressure altitude at field elevation.
- C) pressure altitude at sea level.

4444.        IRA

What is the procedure for setting the altimeter when assigned an IFR altitude of 18,000 feet or higher on a direct flight off airways?

- A) Set the altimeter to 29.92" Hg before takeoff.
- B) Set the altimeter to the current • altimeter setting until reaching the assigned altitude, then set to 29.92" Hg.
- C) Set the altimeter to the current reported setting for climbout and 29.92" Hg upon reaching 18,000 feet.**

4445.        IRA

En route at FL 290, the altimeter is set correctly, but not reset to the local altimeter setting of 30.57" Hg during descent. If the field elevation is 650 feet and the altimeter is functioning properly, what is the approximate indication upon landing?

- A) 715 feet.
- B) 1,300 feet.
- C) Sea level.**

4446.        IRA

While you are flying at FL 250, you hear ATC give an altimeter setting of 28.92" Hg in your area. At what pressure altitude are you flying?

- A) 24,000 feet.
- B) 25,000 feet.**
- C) 26,000 feet.

4477.        IRA

How can you obtain the pressure altitude on flights below 18,000 feet?

- A) Set your altimeter to 29.92" Hg.**
- B) Use your computer to change the indicated altitude to pressure altitude.
- C) Contact an FSS and ask for the pressure altitude.



4478.           IRA

How can you determine the pressure altitude at an airport without a tower or FSS?

- A)** Set the altimeter to 29.92" Hg and read the altitude indicated.
- B)** Set the altimeter to the current altimeter setting of a station within 100 miles and correct this indicated altitude with local temperature.
- C)** Use your computer and correct the field elevation for temperature.

4479.           IRA

Which altitude is indicated when the altimeter is set to 29.92" Hg?

- A)** Density.
- B)** Pressure.
- C)** Standard.

4480.           IRA

If you are departing from an airport where you cannot obtain an altimeter setting, you should set your altimeter;

- A)** on 29.92" Hg.
- B)** on the current airport barometric pressure, if known.

**C)** to the airport elevation.

4481.           IRA

En route at FL 290, your altimeter is set correctly, but you fail to reset it to the local altimeter setting of 30.26" Hg during descent. If the field elevation is 134 feet and your altimeter is functioning properly, what will it indicate after landing?

- A)** 100 feet MSL.
- B)** 474 feet MSL.
- C)** 206 feet below MSL.

4482.           IRA

How does a pilot normally obtain the current altimeter setting during an IFR flight in Class E airspace below 18,000 feet?

- A)** The pilot should contact ARTCC at least every 100 NM and request the altimeter setting.
- B)** FSS's along the route broadcast the weather information at 15 minutes past the hour.
- C)** ATC periodically advises the pilot of the proper altimeter setting.

4720.           IRA

When passing through an abrupt wind shear which involves a shift from a tailwind to a headwind, what power management would normally be required to maintain a constant indicated airspeed and ILS glide slope?

- A)** Higher than normal power initially, followed by a further increase as the wind shear is encountered, then a decrease.
- B)** Lower than normal power initially, followed by a further decrease as the wind shear is encountered, then an increase.
- C)** Higher than normal power initially, followed by a decrease as the shear is encountered, then an increase.

4721.           IRA

What effect will a change in wind direction have upon maintaining a 3° glide slope at a constant true airspeed?

- A)** When groundspeed decreases, rate of descent must increase.
- B)** When groundspeed increases, rate of descent must increase.
- C)** Rate of descent must be constant to remain on the glide slope.

4727.           IRA

While flying a 3° glide slope, a constant tailwind shears to a calm wind. Which conditions should the pilot expect?

- A)** Airspeed and pitch attitude decrease and there is a tendency to go below glide slope.
- B)** Airspeed and pitch attitude increase and there is a tendency to go below glide slope.
- C)** Airspeed and pitch attitude increase and there is a tendency to go above glide slope.

4739.           IRA

Thrust is managed to maintain IAS, and glide slope is being flown. What characteristics should be observed when a headwind shears to be a constant tailwind?

- A)** PITCH ATTITUDE: Increases; REQUIRED THRUST: Increased, then reduced; VERTICAL SPEED: Increases; IAS: Increases, then decreases to approach speed.
- B)** PITCH ATTITUDE: Decreases; REQUIRED THRUST: Increased, then reduced; VERTICAL SPEED: Increases; IAS: Decreases, then increases to approach speed.
- C)** PITCH ATTITUDE: Increases; REQUIRED THRUST: Reduced, then increased; VERTICAL SPEED: Decreases; IAS: Decreases, then increases to approach speed.



4755.      IRA

While flying a 3° glide slope, a headwind shears to a tailwind. Which conditions should the pilot expect on the glide slope?

- A)** Airspeed and pitch attitude decrease and there is a tendency to go below glide slope.
- B)** Airspeed and pitch attitude increase and there is a tendency to go above glide slope.
- C)** Airspeed and pitch attitude decrease and there is a tendency to remain on the glide slope.

4756.      IRA

The glide slope and localizer are centered, but the airspeed is too fast. Which should be adjusted initially?

- A)** Pitch and power.
- B)** Power only.
- C)** Pitch only.

4820.      IRA

As a rule of thumb, altitude corrections of less than 100 feet should be corrected by using a

- A)** full bar width on the attitude indicator.
- B)** half bar width on the attitude indicator.
- C)** two bar width on the attitude indicator.

4821.      IRA

If both the ram air input and drain hole of the pitot system are blocked, what airspeed indication can be expected?

- A)** No variation of indicated airspeed in level flight even if large power changes are made.
- B)** Decrease of indicated airspeed during a climb.
- C)** Constant indicated airspeed during a descent.

4830.      IRA

If both the ram air input and the drain hole of the pitot system are blocked, what reaction should you observe on the airspeed indicator when power is applied and a climb is initiated out of severe icing conditions?

- A)** The indicated airspeed would show a continuous deceleration while climbing.
- B)** The airspeed would drop to, and remain at, zero.
- C)** No change until an actual climb rate is established, then indicated airspeed will increase.

4831.      IRA

What indication should be observed on a turn coordinator during a left turn while taxiing?

- A)** The miniature aircraft will show a turn to the left and the ball remains centered.
- B)** The miniature aircraft will show a turn to the left and the ball moves to the right.
- C)** Both the miniature aircraft and the ball will remain centered.

4832.      IRA

The gyroscopic heading indicator is inoperative. What is the primary bank instrument in unaccelerated straight-and-level flight?

- A)** Magnetic compass.
- B)** Attitude indicator.
- C)** Miniature aircraft of turn coordinator.

4833.      IRA

When airspeed is decreased in a turn, what must be done to maintain level flight?

- A)** Decrease the angle of bank and/or increase the angle of attack.
- B)** Increase the angle of bank and/or decrease the angle of attack.
- C)** Increase the angle of attack.

4834.      IRA

On the taxi check, the magnetic compass should

- A)** swing opposite to the direction of turn when turning from north.
- B)** exhibit the same number of degrees of dip as the latitude.
- C)** swing freely and indicate known headings.

4835.      IRA

Which condition during taxi is an indication that an attitude indicator is unreliable?

- A)** The horizon bar tilts more than 5° while making taxi turns.
- B)** The horizon bar vibrates during warmup.
- C)** The horizon bar does not align itself with the miniature airplane after warmup.

4836.      IRA

What instruments are considered supporting bank instruments during a straight, stabilized climb at a constant rate?

- A)** Attitude indicator and turn coordinator.
- B)** Heading indicator and attitude indicator.
- C)** Heading indicator and turn coordinator.

4837.      IRA

What instruments are primary for pitch, bank, and power, respectively, when transitioning into a constant airspeed climb from straight-and-level flight?

- A)** Attitude indicator, heading indicator, and manifold pressure gauge or tachometer.
- B)** Attitude indicator for both pitch and bank; airspeed indicator for power.
- C)** Vertical speed, attitude indicator, and manifold pressure or tachometer.



4838.        IRA

What is the primary bank instrument once a standard rate turn is established?

- A) Attitude indicator.
- B) Turn coordinator.**
- C) Heading indicator.

4839.        IRA

What does the miniature aircraft of the turn coordinator directly display?

- A) Rate of roll and rate of turn.**
- B) Angle of bank and rate of turn.
- C) Angle of bank.

4842.        IRA

What pre-takeoff check should be made of the attitude indicator in preparation for an IFR flight?

- A) The horizon bar does not vibrate during warmup
- B) The miniature airplane should erect and become stable within 5 minutes.
- C) The horizon bar should erect and become stable within 5 minutes.**

4870.        IRA

What force causes an airplane to turn?

- A) Rudder pressure or force around the vertical axis.
- B) Vertical lift component.
- C) Horizontal lift component.**

4843.        IRA

The rate of turn at any airspeed is dependent upon

- A) the horizontal lift component.**
- B) the vertical lift component.
- C) centrifugal force.

4844.        IRA

During a skidding turn to the right, what is the relationship between the component of lift, centrifugal force, and load factor?

- A) Centrifugal force is less than horizontal lift and the load factor is increased.
- B) Centrifugal force is greater than horizontal lift and the load factor is increased.**
- C) Centrifugal force and horizontal lift are equal and the load factor is decreased.

4845.        IRA

As power is increased to enter a 500 feet per minute rate of climb in straight flight, which instruments are primary for pitch, bank, and power respectively?

- A) Attitude, indicator, heading indicator, and manifold pressure gauge or tachometer.**
- B) VSI, attitude indicator, and airspeed indicator.
- C) Airspeed indicator, attitude indicator, and manifold pressure gauge or tachometer.

4848.        IRA

What is the primary pitch instrument during a stabilized climbing left turn at cruise climb airspeed?

- A) Attitude indicator.
- B) VSI.
- C) Airspeed indicator.**

4850.        IRA

What is the primary pitch instrument when establishing a constant altitude standard rate turn?

- A) Altimeter.**
- B) VSI.
- C) Airspeed indicator.

4851.        IRA

What is the initial primary bank instrument when establishing a level standard rate turn?

- A) Turn coordinator.
- B) Heading indicator.
- C) Attitude indicator.**

4856.        IRA

What indication is presented by the miniature aircraft of the turn coordinator?

- A) Indirect indication of the bank attitude.**
- B) Direct indication of the bank attitude and the quality of the turn.
- C) Quality of the turn.

4857.        IRA

During normal operation of a vacuum-driven attitude indicator, what attitude indication should you see when rolling out from a 180° skidding turn to straight-and-level coordinated flight?

- A) A straight-and-level coordinated flight indication.
- B) A nose-high indication relative to level flight.
- C) The miniature aircraft shows a turn in the direction opposite the skid.**

4858.        IRA

What is the primary bank instrument while transitioning from straight-and-level flight to a standard rate turn to the left?

- A) Attitude indicator.**
- B) Heading indicator.
- C) Turn coordinator (miniature aircraft).

4860.        IRA

During normal coordinated turns, what error due to precession should you observe when rolling out to straight-and-level flight from a 180° steep turn to the right?

- A) A straight-and-level coordinated flight indication.
- B) The miniature aircraft would show a slight turn indication to the left.**
- C) The miniature aircraft would show a slight descent and wings-level attitude.



4863.      IRA

As power is reduced to change airspeed from high to low cruise in level flight, which instruments are primary for pitch, bank, and power, respectively?

- A) Attitude indicator, heading indicator, and manifold pressure gauge or tachometer.
- B) Altimeter, attitude indicator, and airspeed indicator.
- C) Altimeter, heading indicator, and manifold pressure gauge or tachometer.**

4864.      IRA

What information does a Mach meter present?

- A) The ratio of aircraft true airspeed to the speed of sound.**
- B) The ratio of aircraft indicated airspeed to the speed of sound.
- C) The ratio of aircraft equivalent airspeed, corrected for installation error, to the speed of sound.

4865.      IRA

Which instrument provides the most pertinent information (primary) for bank control in straight-and-level flight?

- A) Turn-and-slip indicator.
- B) Attitude indicator.
- C) Heading indicator.**

4866.      IRA

Which instruments are considered primary and supporting for bank, respectively, when establishing a level standard rate turn?

- A) Turn coordinator and attitude indicator.
- B) Attitude indicator and turn coordinator.**
- C) Turn coordinator and heading indicator.

4867.      IRA

While recovering from an unusual flight attitude without the aid of the attitude indicator, approximate level pitch attitude is reached when the

- A) airspeed and altimeter stop their movement and the VSI reverses its trend.**
- B) airspeed arrives at cruising speed, the altimeter reverses its trend, and the vertical speed stops its movement.
- C) altimeter and vertical speed reverse their trend and the airspeed stops its movement.

4868.      IRA

What is the relationship between centrifugal force and the horizontal lift component in a coordinated turn?

- A) Horizontal lift exceeds centrifugal force.
- B) Horizontal lift and centrifugal force are equal.**
- C) Centrifugal force exceeds horizontal lift.

4869.      IRA

Which instruments, in addition to the attitude indicator, are pitch instruments?

- A) Altimeter and airspeed only.
- B) Altimeter and VSI only.
- C) Altimeter, airspeed indicator, and vertical speed indicator.**

4871.      IRA

Which instrument provides the most pertinent information (primary) for pitch control in straight-and-level flight?

- A) Attitude indicator.
- B) Airspeed indicator.
- C) Altimeter.**

4872.      IRA

Which instruments are considered to be supporting instruments for pitch during change of airspeed in a level turn?

- A) Airspeed indicator and VSI.
- B) Altimeter and attitude indicator.
- C) Attitude indicator and VSI.**

4873.      IRA

If an airplane is in an unusual flight attitude and the attitude indicator has exceeded its limits, which instruments should be relied on to determine pitch attitude before starting recovery?

- A) Turn indicator and VSI.
- B) Airspeed and altimeter.**
- C) VSI and airspeed to detect approaching VSI or VMO.

4874.      IRA

Which instrument is considered primary for power as the airspeed reaches the desired value during change of airspeed in a level turn?

- A) Airspeed indicator.**
- B) Attitude indicator.
- C) Altimeter.

4876.      IRA

Which instruments should be used to make a pitch correction when you have deviated from your assigned altitude?

- A) Altimeter and VSI.
- B) Manifold pressure gauge and VSI.
- C) Attitude indicator, altimeter, and VSI.**



4877.            IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the left from an east heading in the Northern Hemisphere?

- A) The compass will initially indicate a turn to the right.
- B) The compass will remain on east for a short time, then gradually catch up to the magnetic heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4878.            IRA

When airspeed is increased in a turn, what must be done to maintain a constant altitude?

- A) Decrease the angle of bank.
- B) Increase the angle of bank and/or decrease the angle of attack.**
- C) Decrease the angle of attack.

4879.            IRA

What would be the indication on the VSI during entry into a 500 FPM actual descent from Level flight if the static ports were iced over?

- A) The indication would be in reverse of the actual rate of descent (500 FPM climb).
- B) The initial indication would be a climb, then descent at a rate in excess of 500 FPM.
- C) The VSI pointer would remain at zero regardless of the actual rate of descent.**

4880.            IRA

How should you preflight check the altimeter prior to an IFR flight?

- A) Set the altimeter to the current temperature. With current temperature and the altimeter indication, determine the calibrated altitude to compare with the field elevation.
- B) Set the altimeter first with 29.92" Hg and then the current altimeter setting. The change in altitude should correspond to the change in setting.
- C) Set the altimeter to the current altimeter setting. The indication should be within 75 feet of the actual elevation for acceptable accuracy.**

4881.            IRA

Which practical test should be made on the electric gyro instruments prior to starting an engine?

- A) Check that the electrical connections are secure on the back of the instruments.
- B) Check that the attitude of the miniature aircraft is wings level before turning on electrical power.
- C) Turn on the electrical power and listen for any unusual or irregular mechanical noise.**

4882.            IRA

Prior to starting an engine, you should check the turn-and-slip indicator to determine if the

- A) needle indication properly corresponds to the angle of the wings or rotors with the horizon.
- B) needle is approximately centered and the tube is full of fluid.**
- C) ball will move freely from one end of the tube to the other when the aircraft is rocked.

4883.            IRA

What indications should you observe on the turn-and-slip indicator during taxi?

- A) The ball moves freely opposite the turn, and the needle deflects in the direction of the turn.**
- B) The needle deflects in the direction of the turn, but the ball remains centered.
- C) The ball deflects opposite the turn, but the needle remains centered.

4884.            IRA

Which instrument indicates the quality of a turn?

- A) Attitude indicator.
- B) Heading indicator or magnetic compass.
- C) Ball of the turn coordinator.**

4885.            IRA

What pre-takeoff check should be made of a vacuum-driven heading indicator in preparation for an IFR flight?

- A) After 5 minutes, set the indicator to the magnetic heading of the aircraft and check for proper alignment after taxi turns.**
- B) After 5 minutes, check that the heading indicator card aligns itself with the magnetic heading of the aircraft.
- C) Determine that the heading indicator does not precess more than 2° in 5 minutes of ground operation.

4886.            IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the right from an easterly heading in the Northern Hemisphere?

- A) The compass will initially indicate a turn to the left.
- B) The compass will remain on east for a short time, then gradually catch up to the magnetic heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4887.            IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the right from a south heading in the Northern Hemisphere?

- A) The compass will indicate a turn to the right, but at a faster rate than is actually occurring.**
- B) The compass will initially indicate a turn to the left.
- C) The compass will remain on south for a short time, then gradually catch up to the magnetic heading of the aircraft.



4888.        IRA

On what headings will the magnetic compass read most accurately during a level  $360^{\circ}$  turn, with a bank of approximately  $15^{\circ}$ ?

- A)  $135^{\circ}$  through  $225^{\circ}$ .
- B)  $90^{\circ}$  and  $270^{\circ}$ .**
- C)  $180^{\circ}$  and  $0^{\circ}$ .

4889.        IRA

What causes the northerly turning error in a magnetic compass?

- A) Coriolis force at the mid-latitudes.
- B) Centrifugal force acting on the compass card.
- C) The magnetic dip characteristic.**

4890.        IRA

What should be the indication on the magnetic compass when you roll into a standard rate turn to the left from a south heading in the Northern Hemisphere?

- A) The compass will indicate a turn to the left, but at a faster rate than is actually occurring.**
- B) The compass will initially indicate a turn to the right.
- C) The compass will remain on south for a short time, then gradually catch up to the magnetic heading of the aircraft.

4891.        IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the right from a westerly heading in the Northern Hemisphere?

- A) The compass will initially show a turn in the opposite direction, then turn to a northerly indication but lagging behind the actual heading of the aircraft.
- B) The compass will remain on a westerly heading for a short time, then gradually catch up to the actual heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4892.        IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the right from a northerly heading in the Northern Hemisphere?

- A) The compass will indicate a turn to the right, but at a faster rate than is actually occurring.
- B) The compass will initially indicate a turn to the left.**
- C) The compass will remain on north for a short time, then gradually catch up to the magnetic heading of the aircraft.

4893.        IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the left from a west heading in the Northern Hemisphere?

- A) The compass will initially indicate a turn to the right.
- B) The compass will remain on west for a short time, then gradually catch up to the magnetic heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4895.        IRA

If a half-standard rate turn is maintained, how long would it take to turn  $360^{\circ}$ ?

- A) 1 minute.
- B) 2 minutes.
- C) 4 minutes**

4896.        IRA

If a standard rate turn is maintained, how long would it take to turn  $180^{\circ}$ ?

- A) 1 minute.**
- B) 2 minutes.
- C) 3 minutes.

4897.        IRA

If a half-standard rate turn is maintained, how much time would be required to turn clockwise from a heading of  $090^{\circ}$  to a heading of  $180^{\circ}$ ?

- A) 30 seconds.
- B) 1 minute.**
- C) 1 minute 30 seconds.

4898.        IRA

During a constant-bank level turn, what effect would an increase in airspeed have on the rate and radius of turn?

- A) Rate of turn would increase, and radius of turn would increase.
- B) Rate of turn would decrease, and radius of turn would decrease.
- C) Rate of turn would decrease, and radius of turn would increase.**

4899.        IRA

Conditions that determine pitch attitude required to maintain level flight are;

- A) flight path, wind velocity, and angle of attack.
- B) airspeed, air density, wing design and angle of attack.**
- C) relative wind, pressure altitude, and vertical lift component.

4900.        IRA

Errors in both pitch and bank indication on an attitude indicator are usually at a maximum as the aircraft rolls out of a;

- A)  $180^{\circ}$  turn.**
- B)  $270^{\circ}$  turn.
- C)  $360^{\circ}$  turn.



4902.        IRA

One characteristic that a properly functioning gyro depends upon for operation is the;  
A) ability to resist precession 90° to any applied force.  
**B)** resistance to deflection of the spinning wheel or disc.  
C) deflecting force developed from the angular velocity of the spinning wheel.

4904.        IRA

If a standard rate turn is maintained, how much time would be required to turn to the left from a heading of 090° to a heading of 300°?  
A) 30 seconds.  
B) 40 seconds.  
**C)** 50 seconds.

4905.        IRA

If a half-standard rate turn is maintained, how long would it take to turn 135°?  
A) 1 minute.  
B) 1 minute 20 seconds.  
**C)** 1 minute 30 seconds.

4906.        IRA

Approximately what percent of the indicated vertical speed should be used to determine the number of feet to lead the level-off from a climb to a specific altitude?  
**A)** 10 percent.  
B) 20 percent.  
C) 25 percent.

4908.        IRA

If, while in level flight, it becomes necessary to use an alternate source of static pressure vented inside the airplane, which of the following should the pilot expect?  
A) The altimeter to read lower than normal.  
B) The vertical speed to momentarily show a descent.  
**C)** The vertical speed to momentarily show a climb.

4909.        IRA

During flight, if the pitot tube becomes clogged with ice, which of the following instruments would be affected?  
**A)** The airspeed indicator only.  
B) The airspeed indicator and the altimeter.  
C) The airspeed indicator, altimeter, and Vertical Speed Indicator.

4910.        IRA

The local altimeter setting should be used by all pilots in a particular area, primarily to provide for  
A) the cancellation of altimeter error due to nonstandard temperatures aloft.  
**B)** better vertical separation of aircraft.  
C) more accurate terrain clearance in mountainous areas.

4911.        IRA

At an altitude of 6,500 feet MSL, the current altimeter setting is 30.42" Hg. The pressure altitude would be approximately  
A) 7,500 feet.  
**B)** 6,000 feet.  
C) 6,500 feet.

4912.        IRA

The pressure altitude at a given location is indicated on the altimeter after the altimeter is set to;  
A) the field elevation.  
**B)** 29.92" Hg.  
C) the current altimeter setting.

4913.        IRA

If the outside air temperature increases during a flight at constant power and at a constant indicated altitude, the true airspeed will  
A) decrease and true altitude will increase.  
B) increase and true altitude will decrease.  
**C)** increase and true altitude will increase.

4914.        IRA

Rate of turn can be increased and radius of turn decreased by  
A) decreasing airspeed and shallowing the bank.  
**B)** decreasing airspeed and increasing the bank.  
C) increasing airspeed and increasing the bank.

4915.        IRA

The primary reason the angle of attack must be increased, to maintain a constant altitude during a coordinated turn, is because the  
A) thrust is acting in a different direction, causing a reduction in airspeed and loss of lift.  
**B)** vertical component of lift has decreased as the result of the bank.  
C) use of ailerons has increased the drag.



4916.        IRA

If severe turbulence is encountered during your IFR flight, the airplane should be slowed to the design maneuvering speed because the;

- A) maneuverability of the airplane will be increased.
- B)** amount of excess load that can be imposed on the wing will be decreased.
- C) airplane will stall at a lower angle of attack, giving an increased margin of safety.

4917.        IRA

When a climb or descent through an inversion or wind-shear zone is being performed, the pilot should be alert for which of the following change in airplane performance?

- A) a fast rate of climb and a slow rate of descent.
- B)** a sudden change in airspeed.
- C) a sudden surge of thrust.

4918.        IRA

When an airplane is accelerated, some attitude indicators will precess and incorrectly indicate a

- A)** climb.
- B) descent.
- C) right turn.

4919.        IRA

When an airplane is decelerated, some attitude indicators will precess and incorrectly indicate a

- A) left turn.
- B) climb.
- C)** descent.

4920.        IRA

For maintaining level flight at constant thrust, which instrument would be the least appropriate for determining the need for a pitch change?

- A) Altimeter.
- B) VSI.
- C)** Attitude indicator.

4921.        IRA

The displacement of a turn coordinator during a coordinated turn will;

- A) indicate the angle of bank.
- B) remain constant for a given bank regardless of airspeed.
- C)** increase as angle of bank increases.

4922.        IRA

Altimeter setting is the value to which the scale of the pressure altimeter is set so the altimeter indicates

- A) pressure altitude at sea level.
- B)** true altitude at field elevation.
- C) pressure altitude at field elevation.

4924.        IRA

To enter a constant-airspeed descent from level-cruising flight, and maintain cruising airspeed, the pilot should;

- A) first adjust the pitch attitude to a descent using the attitude indicator as a reference, then adjust the power to maintain the cruising airspeed.
- B) first reduce power, then adjust the pitch using the attitude indicator as a reference to establish a specific rate on the VSI.
- C)** simultaneously reduce power and adjust the pitch using the attitude indicator as a reference to maintain the cruising airspeed.

4927.        IRA

During recoveries from unusual attitudes, level flight is attained the instant;

- A) the horizon bar on the attitude indicator is exactly overlapped with the miniature airplane.
- B) a zero rate of climb is indicated on the VSI.
- C)** the altimeter and airspeed needles stop prior to reversing their direction of movement.

4928.        IRA

While cruising at 160 knots, you wish to establish a climb at 130 knots. When entering the climb (full panel), it is proper to make the initial pitch change by increasing back elevator pressure until the;

- A) attitude indicator, airspeed, and vertical speed indicate a climb.
- B) vertical speed indication reaches the predetermined rate of climb.
- C)** attitude indicator shows the approximate pitch attitude appropriate for the 130-knot climb.

4930.        IRA

If while in level flight, it becomes necessary to use an alternate source of static pressure vented inside the airplane, which of the following variations in instrument indications should the pilot expect?

- A) The altimeter will read lower than normal, airspeed lower than normal, and the VSI will momentarily show a descent.
- B)** The altimeter will read higher than normal, airspeed greater than normal, and the VSI will momentarily show a climb.
- C) The altimeter will read lower than normal, airspeed greater than normal, and the VSI will momentarily show a climb and then a descent.

4931.        IRA

(Refer to figure 144.) What changes in control displacement should be made so that "2" would result in a coordinated standard rate turn?

- A)** Increase left rudder and increase rate of turn.
- B) Increase left rudder and decrease rate of turn.
- C) Decrease left rudder and decrease angle of bank.



4932.      IRA

(Refer to figure 144.) Which illustration indicates a coordinated turn?

- A)** 3.
- B) 1.
- C) 2.

4933.      IRA

(Refer to figure 144.) Which illustration indicates a skidding turn?

- A) 2.
- B)** 1.
- C) 3.

4934.      IRA

(Refer to figure 144.) What changes in control displacement should be made so that "1" would result in a coordinated standard rate turn?

- A) Increase right rudder and decrease rate of turn.
- B)** Increase right rudder and increase rate of turn.
- C) Decrease right rudder and increase angle of bank

4935.      IRA

(Refer to figure 144.) Which illustration indicates a slipping turn?

- A) 1.
- B) 3.
- C)** 2.

4937.      IRA

(Refer to figure 146.) Identify the system that has failed and determine a corrective action to return the airplane to straight-and-level flight.

- A)** Static/pitot system is blocked; lower the nose and level the wings to level-flight attitude by use of attitude indicator.
- B) Vacuum system has failed; reduce power, roll left to level wings, and pitch-up to reduce airspeed.
- C) Electrical system has failed; reduce power, roll left to level wings, and raise the nose to reduce airspeed.

4939.      IRA

(Refer to figure 148.) What is the flight attitude? One system which transmits information to the instruments has malfunctioned.

- A) Climbing turn to left.
- B)** Climbing turn to right.
- C) Level turn to left.

4940.      IRA

(Refer to figure 149.) What is the flight attitude? One system which transmits information to the instruments has malfunctioned.

- A) Level turn to the right.
- B) Level turn to the left.
- C)** Straight-and-level flight.

4941.      IRA

(Refer to figure 150.) What is the flight attitude? One instrument has malfunctioned.

- A)** Climbing turn to the right.
- B) Climbing turn to the left.
- C) Descending turn to the right.

4942.      IRA

(Refer to figure 151.) What is the flight attitude? One instrument has malfunctioned.

- A) Climbing turn to the right.
- B)** Level turn to the right.
- C) Level turn to the left.



## Attitude Instrument Flying

The three skills used in instrument flying are (given in the correct sequence): Cross-Check, Instrument Interpretation, and Aircraft Control.



- 1. Cross – Check**
- 2. Instrument Interpretation**
- 3. Aircraft Control**

*Always in that order!*



To level-off from a descent, lead the desired altitude by 10% of the vertical speed, or about 50 feet.

Altitude corrections of less than 100 feet, use only a half bar on the attitude indicator.

Addition of power should be made 100 to 150 feet above the desired altitude.

If you wish to establish a climb at a slower speed, increase back elevator pressure until the attitude indicator shows the approximate pitch attitude for the climb airspeed.

When tracking inbound on a localizer, drift corrections should be accurately established before reaching the outer marker and completion of the approach should be accomplished with heading corrections no greater than 2°.

The rate of descent on the glide slope is dependent upon the ground speed.

During a precision radar or ILS approach, the rate of descent required to remain on the glide slope will need to increase as ground speed increases.

## Unusual Attitude Recovery

For a NOSE LOW recovery, Reduce power, Level the wings, Pitch attitude to level flight. (Figure 145)



For a NOSE HIGH recovery, Add power, Lower nose, Level wings and return to original attitude and heading. (Figure 147)



Recovering from an unusual flight attitude without the aid of the attitude indicator, approximate level pitch attitude is reached when the airspeed and altimeter stop their movement and the VSI reverses its trend.



## Physiological Effects

Hypoxia is a lack of oxygen. Can experience tunnel vision and cyanosis (discoloration) Symptoms may be difficult to recognize before the pilot's reactions are affected.

Hyperventilation is a lack of carbon dioxide as a result of over-breathing and exhaling too fast. To remedy, consciously breathe at a slower rate or into a bag.

## Spatial Disorientation

Spatial disorientation is more likely if you use body signals to interpret flight attitude. If a pilot experiences these false sensations, they must be suppressed and complete reliance placed on the indications of the flight instruments.

An instrument pilot can best overcome spatial disorientation by properly reading and interpreting the flight instruments and act accordingly.

A pilot often interprets centrifugal force as a sensation of rising or falling.

Abrupt head movement during a prolonged constant rate turn in IMC or simulated instrument conditions can cause Coriolis Illusion.

An abrupt change from climb to straight-and-level flight can create the illusion of tumbling backwards.

A rapid acceleration during takeoff can create the illusion of being in a nose-up attitude. Navy pilots flying off aircraft carriers must combat this type of disorientation.

## Optical Illusions

A narrower-than-usual runway can create the illusion that the aircraft is at a higher altitude than it actually is flying.

A pilot who does not recognize this illusion will fly a lower approach, increasing the risk of hitting ground objects or landing short of the runway.

An up-sloping runway , up-sloping terrain or both can create the illusion that the aircraft is flying higher than it actually is.

A pilot who does not recognize this illusion will fly a lower approach. This is the same effect as a narrower-than-usual runway.

A sloping cloud formation, an obscured horizon, and a dark scene spread with ground lights and stars can create an illusion known as False Horizons.

Haze creates the illusion of being a greater distance than actual from other traffic, and from the runway, and causes pilots to fly a lower approach.

## Cockpit Lighting and Scanning for Traffic

Coloration shown on maps is HIGHLY affected by the use of direct red lighting. Anything red on the map will virtually be invisible to the pilot trying to read it.

The use of regular white light, such as a flashlight, will impair night vision.

To scan for traffic to the right and left in straight and level flight, systematically focus on different segments of the sky for short intervals.

## Hazards to Safe Flight

Pilots on IFR flights seeking ATC in-flight weather avoidance assistance should keep in mind that ATC radar limitations and frequency congestion may limit the controllers capability to provide this service.

The radarscope of ATC provides no assurance of avoiding instrument weather conditions.

If a pilot should unintentionally penetrate an embedded thunderstorm, set power for recommended turbulence penetration airspeed and attempt to maintain a level flight attitude best you can without over stressing the airframe.

Light turbulence is defined as turbulence that momentarily causes slight, erratic changes in attitude and/or altitude.

## Risk Management

An aircraft which is equipped with an Electronic Flight Display (EFD) can offer new capabilities and simplify the basic flying task. But there is risk to this newer capability, such as complacency.

Automation in aircraft has proven to present new hazards in its limitations.

When a pilot believes advanced avionics enable operations closer to personal or environmental limits, risk is increased.





NTSB Part 830 contains regulations pertaining to notification and reporting of aircraft accidents, incidents and overdue aircraft, preservation of aircraft wreckage after a crash and other areas.

If you cannot avoid penetrating a thunderstorm, set power for recommended turbulence penetration airspeed and attempt to maintain a level flight attitude.

Turbulence that momentarily causes slight, erratic changes in altitude and/or attitude is defined as light turbulence.

### TEST QUESTIONS (Use Test Supplement 8080-3F)

*NOTE: CORRECT ANSWER IN BOLD ITALICS*

#### 4802.           IRA

Without visual aid, a pilot often interprets centrifugal force as a sensation of;  
**A) rising or falling.**  
B) turning.  
C) motion reversal.

#### 4803.           IRA

Due to visual illusion, when landing on a narrower-than-usual runway, the aircraft will appear to be;  
**A) higher than actual, leading to a lower-than-normal approach.**  
B) lower than actual, leading to a higher-than-normal approach.  
C) higher than actual, leading to a higher-than-normal approach.

#### 4804.           IRA

What visual illusion creates the same effect as a narrower-than-usual runway?  
**A) An up sloping runway.**  
B) A wider-than-usual runway.  
C) A down sloping runway.

#### 4805.           IRA

Abrupt head movement during a prolonged constant rate turn in IMC or simulated instrument conditions can cause;  
**A) coriolis illusion.**  
B) false horizon.  
C) elevator illusion.

#### 4806.           IRA

A sloping cloud formation, an obscured horizon, and a dark scene spread with ground lights and stars can create an illusion known as;  
A) elevator illusions.  
B) auto kinesis.  
**C) false horizons.**

#### 4807.           IRA

An abrupt change from climb to straight-and-level flight can create the illusion of  
**A) tumbling backwards.**  
B) a nose-up attitude.  
C) a descent with the wings level.

#### 4808.           IRA

A rapid acceleration during takeoff can create the illusion of  
**A) spinning in the opposite direction.**  
**B) being in a nose-up attitude.**  
C) diving into the ground.

#### 4809.           IRA

Why is hypoxia particularly dangerous during flights with one pilot?

- A) Night vision may be so impaired that the pilot cannot see other aircraft.  
**B) Symptoms of hypoxia may be difficult to recognize before the pilot's reactions are affected.**  
C) The pilot may not be able to control the aircraft even if using oxygen.

#### 4810.           IRA

The sensations which lead to spatial disorientation during instrument flight conditions;

- A) are frequently encountered by beginning instrument pilots, but never by pilots with moderate instrument experience.  
B) occur, in most instances, during the initial period of transition from visual to instrument flight.  
**C) must be suppressed and complete reliance placed on the indications of the flight instruments.**

#### 4811.           IRA

How can an instrument pilot best overcome spatial disorientation?

- A) Rely on kinesthetic sense.  
B) Use a very rapid cross-check.  
**C) Read and interpret the flight instruments, and act accordingly.**

#### 4812.           IRA

Which statement is correct regarding the use of cockpit lighting for night flight?

- A) Reducing the lighting intensity to a minimum level will eliminate blind spots.  
**B) The use of regular white light, such as a flashlight, will impair night adaptation.**  
C) Coloration shown on maps is least affected by the use of direct red lighting.

#### 4813.           IRA

How can an instrument pilot best overcome spatial disorientation?

- A) Use a very rapid cross-check.  
**B) Properly interpret the flight instruments and act accordingly.**  
C) Avoid banking in excess of 30°.



4814.        IRA

A pilot is more subject to spatial disorientation if  
A) kinesthetic senses are ignored.  
B) eyes are moved often in the process of cross-checking the flight instruments.  
**C) body signals are used to interpret flight attitude.**

4815.        IRA

Which procedure is recommended to prevent or overcome spatial disorientation?  
A) Reduce head and eye movements to the extent possible.  
B) Rely on the kinesthetic sense.  
**C) Rely on the indications of the flight instruments.**

4816.        IRA

What action should be taken if hyperventilation is suspected?  
A) Breathe at a slower rate by taking very deep breaths.  
**B) Consciously breathe at a slower rate than normal.**  
C) Consciously force yourself to take deep breaths and breathe at a faster rate than normal.

4818.        IRA

Which technique should a pilot use to scan for traffic to the right and left during straight-and-level flight?  
**A) Systematically focus on different segments of the sky for short intervals.**  
B) Concentrate on relative movement detected in the peripheral vision area.  
C) Continuous sweeping of the windshield from right to left.

4819.        IRA

What effect does haze have on the ability to see traffic or terrain features during flight?  
A) Haze causes the eyes to focus at infinity, making terrain features harder to see.  
B) The eyes tend to overwork in haze and do not detect relative movement easily.  
**C) Haze creates the illusion of being a greater distance than actual from the runway, and causes pilots to fly a lower approach.**

4840.        IRA

What is the correct sequence in which to use the three skills used in instrument flying?  
A) Aircraft control, cross-check, and instrument interpretation.  
B) Instrument interpretation , cross-check , and aircraft control.  
**C) Cross-check, instrument interpretation, and aircraft control.**

4855.        IRA

What are the three fundamental skills involved in attitude instrument flying?  
A) Instrument interpretation, trim application, and aircraft control.  
**B) Cross-check, instrument interpretation, and aircraft control.**  
C) Cross check, emphasis, and aircraft control.

4859.        IRA

What is the third fundamental skill in attitude instrument flying?  
A) Instrument cross-check.  
B) Power control.  
**C) Aircraft control.**

4862.        IRA

What is the first fundamental skill in attitude instrument flying?  
A) Aircraft control.  
**B) Instrument cross-check.**  
C) Instrument interpretation.

4925.        IRA

To level off at an airspeed higher than the descent speed, the addition of power should be made, assuming a 500 FPM rate of descent, at approximately;  
A) 50 to 100 feet above the desired altitude.  
**B) 100 to 150 feet above the desired altitude.**  
C) 150 to 200 feet above the desired altitude.

4926.        IRA

To level off from a descent maintaining the descending airspeed, the pilot should lead the desired altitude by approximately;  
A) 20 feet.  
**B) 50 feet.**  
C) 60 feet.

4146.        IRA

Which procedure is recommended if a pilot should unintentionally penetrate embedded thunderstorm activity?  
A) Reverse aircraft heading or proceed toward an area of known VFR conditions.  
B) Reduce airspeed to maneuvering speed and maintain a constant altitude.  
**C) Set power for recommended turbulence penetration airspeed and attempt to maintain a level flight attitude.**

4160.        IRA

If you fly into severe turbulence, which flight condition should you attempt to maintain?  
A) Constant airspeed (VA).  
**B) Level flight attitude.**  
C) Constant altitude and constant airspeed.



4210.        IRA

A pilot reporting turbulence that momentarily causes slight, erratic changes in altitude and/or attitude should report it as;

- A)** light turbulence.
- B) moderate turbulence.
- C) light chop.

4468.        IRA

Pilots on FR flights seeking ATC in flight weather avoidance assistance should keep in mind that;

- A)** ATC radar limitations and, frequency congestion may limit the controllers capability to provide this service.
- B) circumnavigating severe weather can only be accommodated in the en route areas away from terminals because of congestion.
- C) ATC Narrow Band Radar does not provide the controller with weather intensity capability.

4092.        IRA

Which is true regarding the use of airborne weather-avoidance radar for the recognition of certain weather conditions?

- A)** The radarscope provides no assurance of avoiding instrument weather conditions.
- B) The avoidance of hail is assured when flying between and just clear of the most intense echoes.
- C) The clear area between intense echoes indicates that visual sighting of storms can be maintained when flying between the echoes.

4745.        IRA

The rate of descent required to stay on the ILS glide slope

- A) must be increased if the groundspeed is decreased.
- B) will remain constant if the indicated airspeed remains constant.
- C)** must be decreased if the groundspeed is decreased.

4748.        IRA

To remain on the ILS glidepath, the rate of descent must be

- A) decreased if the airspeed is increased.
- B) decreased if the groundspeed is increased.
- C)** increased if the groundspeed is increased.

4752.        IRA

The rate of descent on the glide slope is dependent upon

- A) true airspeed.
- B) calibrated airspeed.
- C)** groundspeed.

4772.        IRA

During a precision radar or ILS approach, the rate of descent required to remain on the glide slope will

- A) remain the same regardless of groundspeed.
- B)** increase as the groundspeed increases.
- C) decrease as the groundspeed increases.

4773.        IRA

When tracking inbound on the localizer, which of the following is the proper procedure regarding drift corrections?

- A)** Drift corrections should be accurately established before reaching the outer marker and completion of the approach should be accomplished with heading corrections no greater than 2°.
- B) Drift corrections should be made in 5° increments after passing the outer marker.
- C) Drift corrections should be made in 10° increments after passing the outer marker.

4875.        IRA

Which is the correct sequence for recovery from a spiraling, nose-low, increasing airspeed, unusual flight attitude?

- A) Increase pitch attitude, reduce power, and level wings.
- B)** Reduce power, correct the bank attitude, and raise the nose to a level attitude.
- C) Reduce power, raise the nose to level attitude, and correct the bank attitude..

4936.        IRA

(Refer to figure 145.) What is the correct sequence for recovery from the unusual attitude indicated?

- A) Reduce power, increase back elevator pressure, and level the wings.
- B)** Reduce power, level the wings, bring pitch attitude to level flight.
- C) Level the wings, raise the nose of the aircraft to level flight attitude, and obtain desired airspeed.

4938.        IRA

(Refer to figure 147.) Which is the correct sequence for recovery from the unusual attitude indicated?

- A) Level wings, add power, lower nose, descend to original attitude, and heading.
- B)** Add power, lower nose, level wings, return to original attitude and heading.
- C) Stop turn by raising right wing and add power at the same time, lower the nose, and return to original attitude and heading.

4976.        IRA

When a pilot believes advanced avionics enable operations closer to personal or environmental limits;

- A) greater utilization of the aircraft is achieved.
- B)** risk is increased.
- C) risk is decreased.



4977.            IRA

Automation in aircraft has proven;  
A) to present new hazards in its limitations.  
B) that automation is basically perfect.  
C) effective in mitigating accidents.

4977-1          IRA

An aircraft which is equipped with an Electronic Flight Display (EFD) can;  
**A)** offer new capabilities and simplify the basic flying task.  
B) compensate for an airman's lack of skill or knowledge.  
C) improve flight awareness by allowing the pilot to simply watch for alerts.

4978.            IRA

The lighter workloads associated with glass (digital) flight instrumentation;  
A) are instrumental in decreasing flightcrew fatigue.  
B) have proven to increase safety in operations.  
**C)** may lead to complacency by the flightcrew.

4978-1.          IRA

The advancement of avionics in light general aviation airplanes has enhanced situational awareness for properly trained pilots. However, there is concern that this technology could lead to;

- A)** complacency.  
B) fatigue.  
C) resignation.

4088.            IRA

Which publication covers the procedures required for aircraft accident and incident reporting responsibilities for pilots?

- A) FAR Part 61.  
B) FAR Part 91.  
**C)** NTSB Part 830.



## WEATHER THEORY

### Temperature, Pressure and Precipitation

The primary cause of all changes in the earth's weather is variation of solar energy received by the earth's regions.

The average (Standard) sea level temperature is 15 degrees Celsius, decreasing 2 degrees Celsius per 1000 feet. This decrease is called the Standard Temperature Lapse Rate. Unsaturated air flowing upslope will cool at 3 degrees per 1000 feet.

The average (Standard) sea level pressure is 29.92 inches Hg., or 1013.2 millibars. Pressure decreases 1 inch per 1000 feet.

The tropopause is the boundary between the troposphere and the stratosphere. The average height is 37,000 feet. The tropopause contains an abrupt change in temperature lapse rate. In the stratosphere, there are relatively small changes in temperature with an increase in altitude.

The jet stream is a trough of high speed winds (50 knots or greater) Jetstream winds are weaker and farther north in the summer.

The amount of moisture air can hold largely depends on the temperature. Warm air can hold more moisture than cold air. Upward currents enhance the growth rate of precipitation

Precipitation, clouds, and poor visibility can occur when the air is cooled to its dew point (the temperature at which the air is saturated)

Steady Precipitation refers to continuous rain most often from widespread stratus type clouds.

Showery Precipitation refers to rain showers found most often under isolated cumuliform type clouds.

### Pressure Systems

An air mass is a body of air that covers an extensive area and has fairly uniform properties of temperature and moisture.

Pressure gradient toward a low pressure area, and coriolis force that deflects winds to the right, counteract to cause winds to flow parallel to the isobars.

Above 2,000 AGL, wind flow is parallel to the isobars, and when the isobars are closer together, the pressure gradient is steeper and the winds are stronger.

Surface friction causes surface winds to flow across the isobars at an angle, rather than parallel to the isobars.

### Fronts

The passage of any front always produces a wind and/or temperature change. Frontal waves are areas of low pressure that develop with slow moving cold fronts or stationary fronts.

### Stability

The stability of air is determined by the ambient (actual) temperature lapse rate. It is a measurement of the vertical movement of the atmosphere.

The lower the temperature lapse rate ( $< 2^\circ$ ) the more STABLE the air.

Stable air forced upward will remain stable and produce layer-like stratus clouds with steady precipitation and little vertical development.

## STABLE

- Widespread Low Level Stratus Clouds
- Continuous Rain or Mist
- Drizzle, Fog or Snow
- Poor Visibility, Smooth Flying
- Warm Front

Think SEATTLE WASHINGTON and the coastal Northwest

The higher the temperature lapse rate ( $> 2^\circ$  degrees) the more UNSTABLE the atmosphere.

Unstable air forced upward by convective activity (heating) or (orographic) produce cumuliform clouds with considerable vertical development and associated severe turbulence.



## Cloud Groups (Family)

**UNSTABLE**

- Cumulus Clouds with Considerable Vertical Development (CB's)
- Intense Rain Showers under the Storm Clouds
- Turbulence, Bumpy Air in and around
- Cold Front

Think DESERT SOUTHWEST

**THE 4 GROUPS OF CLOUDS**

**HIGH**

**MIDDLE**

**LOW**

**CONSIDERABLE VERTICAL DEVELOPMENT**

Aviation Seminars™

### Temperature Inversions

A temperature inversion exists where there is an increase in temperature as altitude is increased.

When this happens, cold air stays near the surface (does not rise) making the air super stable.

Expect smooth air and poor visibility due to fog, haze, or low clouds.

The most frequent type of ground based inversion is that produced by ground radiation on clear, cool nights when the wind is light.

### Lenticular Clouds

(ACSL) Altocumulus standing lenticular clouds are almond or lens-shaped clouds that show little or no movement, but contain very strong winds and turbulence.

### Wind Shear

Wind shear is a change in wind direction and/ or speed in a horizontal or vertical direction.

It may be encountered during periods of strong temperature inversions and near thunderstorms.

With a warm front, the most critical period is before the front passes the airport.

During a climb or descent through an inversion, be alert for a sudden change in airspeed.

The 4 groups (or family) of clouds are High, Middle, Low and those with Considerable Vertical Development.

Expect turbulence below cumulus clouds.

High clouds are small ice crystals and least likely to contribute to structural icing on an aircraft.

### Cumulonimbus Clouds (CB's)

The three ingredients needed to form a thunderstorm are UNSTABLE air, high moisture content, and a lifting action.

Thunderstorms ALWAYS produce lightning.  
Nimbus means rain cloud.

The three stages of a thunderstorm:

**Stage One** - CUMULUS (building) - Updrafts extend from the surface to above the cloud tops.

**Stage Two** - MATURE - Rain begins to fall from the cloud base..

**Stage Three** - DISSIPATING - Severe downdrafts.

### Squall Line Thunderstorms

They most often develop ahead of a cold front, and produce the most severe conditions including heavy hail and destructive winds.

Squalls are sudden increases in windspeed of at least 16 knots, rising to 22 knots or more, lasting for at least 1 minute.

Embedded thunderstorms are obscured by massive cloud layers and cannot be seen.



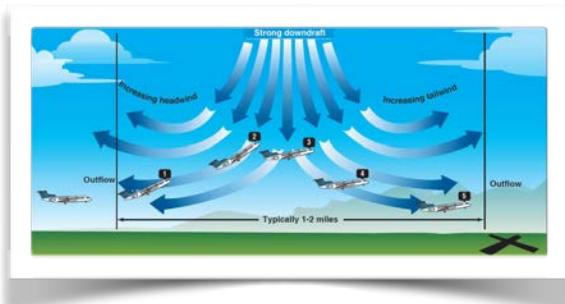
## Microbursts

Strong downdrafts from a thunderstorm may reach 6,000 FPM, and seldom last more than 15 minutes.

At position 1, expect a performance increase without a change in pitch or power.

At positions 3 and 4, expect the most severe downdraft.

At position 4, expect decreasing performance with a tailwind and downdraft.



An aircraft that encounters a 45 knot headwind within a microburst may expect a total of 90 knot wind-shear across the microburst

## Fog

The most frequent type is Radiation Fog. It occurs with clear sky, little or no wind, small temperature/dew point spread, and over a land surface.

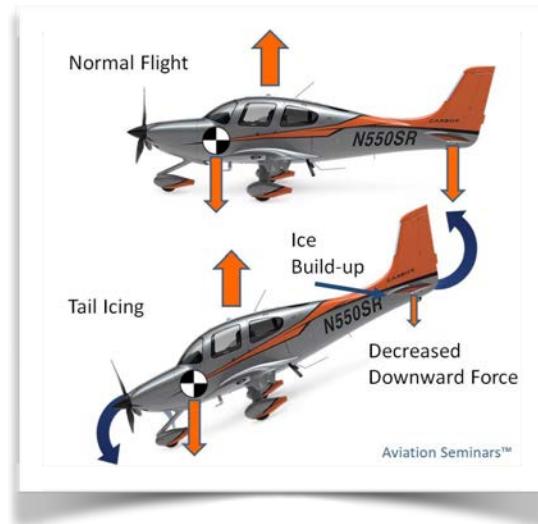
Advection Fog requires wind. It occurs in coastal areas as the result of an addition of moisture, when warm air flows from a body of water over a colder surface.

Fog is usually prevalent in industrial areas because of an abundance of condensation nuclei from combustion products.

## Structural icing

Structural icing has the most hazardous aspects because of loss of control due to aerodynamic degradation from a build up of ice on wings and control surfaces.

Tailplane icing is detected by a sudden change in elevator force or un-commanded nose-down pitch condition.



The tailplane is often the first place ice forms.  
Once detected RETRACT FLAPS, ADD POWER.

A ROLLING condition indicates main wing stall.  
Set power and angle of attack (AOA) for a controlled descent.

## Freezing Precipitation

Freezing rain occurs where rain is falling into freezing temperatures. Temperatures are above freezing at some higher altitude.

Freezing rain causes the highest rate of ice accumulation.

Ice pellets are freezing rain that has frozen, and indicates freezing rain at a higher altitude.  
Wet snow is an indication that the temperature is above freezing at your altitude.

Frost is formed if the surface temperature of the airplane is below dew point and the dew point is below freezing.

Frost causes early airflow separation, resulting in a loss of lift.

Ice on the upper surface of a wing can reduce lift by as much as 30 percent and increase drag by 40 percent.



**TEST QUESTIONS (Use Test Supplement  
8080-3F)**

NOTE: CORRECT ANSWER IN **BOLD ITALICS**

4094.      IRA

A common type of ground or surface based temperature inversion is that which is produced by;

- A) warm air being lifted rapidly aloft in the vicinity of mountainous terrain.
- B) the movement of colder air over warm air, or the movement of warm air under cold air.
- C) ground radiation on clear, cool nights when the wind is light.**

4095.      IRA

How much colder than standard temperature is the actual temperature at 9,000 feet, as indicated in the following excerpt from the Winds and Temperature Aloft Forecast?

FT	6000	9000
	0737 - 04	1043 - 10

- A) 3° C.
- B) 10° C.
- C) 7° C.**

4096.      IRA

The primary cause of all changes in the Earth's weather is;

- A) variation of solar energy received by the Earth's regions.**
- B) changes in air pressure over the Earth's surface.
- C) movement of the air masses.

4097.      IRA

A characteristic of the stratosphere is

- A) an overall decrease of temperature with an increase in altitude.
- B) a relatively even base altitude of approximately 35,000 feet.
- C) relatively small changes in temperature with an increase in altitude.**

4098.      IRA

Steady precipitation, in contrast to showers, preceding a front is an indication of;

- A) stratiform clouds with moderate turbulence.
- B) cumuliform clouds with little or no turbulence.
- C) stratiform clouds with little or no turbulence.**

4099.      IRA

The presence of ice pellets at the surface is evidence that

- A) there are thunderstorms in the area.
- B) a cold front has passed.
- C) there is freezing rain at a higher altitude.**

4100.      IRA

Which conditions result in the formation of frost?

- A) The temperature of the collecting surface is at or below freezing and small droplets of moisture are falling.
- B) When dew forms and the temperature is below freezing.
- C) Temperature of the collecting surface is below the dewpoint of surrounding air and the dew point is colder than freezing.**

4101.      IRA

To which meteorological condition does the term "dew point" refer?

- A) The temperature to which air must be cooled to become saturated.**
- B) The temperature at which condensation and evaporation are equal.
- C) The temperature at which dew will always form.

4102.      IRA

What temperature condition is indicated if wet snow is encountered at your flight altitude?

- A) The temperature is above freezing at your altitude.**
- B) The temperature is below freezing at your altitude.
- C) You are flying from a warm air mass into a cold air mass.

4103.      IRA

The amount of water vapor which air can hold largely depends on;

- A) relative humidity.
- B) air temperature.**
- C) stability of air.

4104.      IRA

Clouds, fog, or dew will always form when

- A) water vapor condenses.**
- B) water vapor is present.
- C) the temperature and dew point are equal.

4105.      IRA

What causes surface winds to flow across the isobars at an angle rather than parallel to the isobars?

- A) Coriolis force.
- B) Surface friction.**
- C) The greater density of the air at the surface.



4106.            IRA

Winds at 5,000 feet AGL on a particular flight are southwesterly while most of the surface winds are southerly. This difference in direction is primarily due to;

- A) a stronger pressure gradient at higher altitudes.
- B) friction between the wind and the surface.**
- C) stronger Coriolis force at the surface.

4107.            IRA

What relationship exists between the winds at 2,000 feet above the surface and the surface winds?

- A) The winds at 2,000 feet and the surface winds flow in the same direction, but the surface winds are weaker due to friction.
- B) The winds at 2,000 feet tend to parallel the isobars while the surface winds cross the isobars at an angle toward lower pressure and are weaker.**
- C) The surface winds tend to veer to the right of the winds at 2,000 feet and are usually weaker.

4108.            IRA

Which force, in the Northern Hemisphere, acts at a right angle to the wind and deflects it to the right until parallel to the isobars?

- A) Centrifugal.
- B) Pressure gradient.
- C) Coriolis.**

4112.            IRA

The most frequent type of ground or surface based temperature inversion is that produced by;

- A) radiation on a clear, relatively still night.**
- B) warm air being lifted rapidly aloft in the vicinity of mountainous terrain.
- C) the movement of colder air under warm air, or the movement of warm air over cold air.

4113.            IRA

If the air temperature is +8 °C at an elevation of 1,350 feet and a standard (average) temperature lapse rate exists, what will be the approximate freezing level?

- A) 3,350 feet MSL.
- B) 5,350 feet MSL.**
- C) 9,350 feet MSL.

4114.            IRA

What feature is associated with a temperature inversion?

- A) A stable layer of air.**
- B) An unstable layer of air.
- C) Air mass thunderstorms.

4115.            IRA

What type of clouds will be formed if very stable moist air is forced upslope?

- A) First stratified clouds and then vertical clouds.
- B) Vertical clouds with increasing height.
- C) Stratified clouds with little vertical development.**

4117.            IRA

Which is a characteristic of stable air?

- A) Fair weather cumulus clouds.
- B) Stratiform clouds.**
- C) Unlimited visibility.

4116.            IRA

The general characteristics of unstable air are;

- A) good visibility, showery precipitation, and cumuliform-type clouds.**
- B) good visibility, steady precipitation, and stratiform type clouds.
- C) poor visibility, intermittent precipitation, and cumuliform-type clouds.

4118.            IRA

What type clouds can be expected when an unstable air mass is forced to ascend a mountain slope?

- A) Layered clouds with little vertical development.
- B) Stratified clouds with considerable associated turbulence.
- C) Clouds with extensive vertical development.**

4119.            IRA

What are the characteristics of stable air?

- A) Good visibility, steady precipitation, and stratus type clouds.
- B) Poor visibility, intermittent precipitation, and cumulus type clouds.
- C) Poor visibility, steady precipitation, and stratus type clouds.**

4120.            IRA

What are some characteristics of unstable air?

- A) Nimbostratus clouds and good surface visibility.
- B) Turbulence and poor surface visibility.
- C) Turbulence and good surface visibility.**

4121.            IRA

Stability can be determined from which measurement of the atmosphere?

- A) Low-level winds.
- B) Ambient lapse rate.**
- C) Atmospheric pressure.



4122.        IRA

What determines the structure or type of clouds which form as a result of air being forced to ascend?

- A) The method by which the air is lifted.
- B) The stability of the air before lifting occurs.**
- C) The amount of condensation nuclei present after lifting occurs.

4123.        IRA

Which of the following combinations of weather producing variables would likely result in cumuliform type clouds, good visibility, rain showers, and possible clear type icing in clouds?

- A) Unstable, moist air, and no lifting mechanism.
- B) Stable, dry air, and orographic lifting.
- C) Unstable, moist air, and orographic lifting.**

4124.        IRA

Unsaturated air flowing upslope will cool at the rate of approximately (dry adiabatic lapse rate)

- A) 3°C per 1,000 feet.**
- B) 2°C per 1,000 feet.
- C) 2.5°C per 1,000 feet.

4125.        IRA

A temperature inversion will normally form only;

- A) in stable air.**
- B) in unstable air.
- C) when a stratiform layer merges with a cumuliform mass.

4126.        IRA

Which weather phenomenon signals the beginning of the mature stage of a thunderstorm?

- A) The start of rain at the surface.**
- B) Growth rate of cloud is maximum.
- C) Strong turbulence in the cloud.

4127.        IRA

Frontal waves normally form on;

- A) slow moving cold fronts or stationary fronts.**
- B) slow moving warm fronts and strong occluded fronts.
- C) rapidly moving cold fronts or warm fronts.

4128.        IRA

Which are characteristics of an unstable cold air mass moving over a warm surface?

- A) Cumuliform clouds, turbulence, and poor visibility.
- B) Cumuliform clouds, turbulence, and good visibility.**
- C) Stratiform clouds, smooth air, and poor visibility.

4129.        IRA

Which clouds have the greatest turbulence?

- A) Towering cumulus.
- B) Cumulonimbus.**
- C) Altocumulus castellanus.

4130.        IRA

Standing lenticular clouds, in mountainous areas, indicate

- A) an inversion.
- B) unstable air.
- C) turbulence.**

4131.        IRA

The suffix 'nimbus', used in naming clouds, means a;

- A) cloud with extensive vertical development.
- B) rain cloud.**
- C) dark massive, towering cloud.

4132.        IRA

The presence of standing lenticular altocumulus clouds is a good indication of

- A) a jetstream.
- B) very strong turbulence.**
- C) heavy icing conditions.

4134.        IRA

What are the four families of clouds?

- A) Stratus, cumulus, nimbus, and cirrus.
- B) Clouds formed by updrafts, fronts, cooling layers of air, and precipitation into warm air.
- C) High, middle, low, and those with extensive vertical development.**

4133.        IRA

Which family of clouds is least likely to contribute to structural icing on an aircraft?

- A) Low clouds.
- B) High clouds.**
- C) Clouds with extensive vertical development.

4135.        IRA

Where can wind shear associated with a thunderstorm be found? Choose the most complete answer.

- A) In front of the thunderstorm cell (anvil side) and on the right side of the cell.
- B) In front of the thunderstorm cell and directly under the cell.
- C) On all sides of the thunderstorm cell and directly under the cell.**



4136.      IRA

Which weather phenomenon is always associated with the passage of a frontal system?

- A)** A wind change.
- B) An abrupt decrease in pressure.
- C) Clouds, either ahead or behind the front.

4137.      IRA

Where do squall lines most often develop?

- A) In an occluded front.
- B) In a cold air mass.
- C)** Ahead of a cold front.

4138.      IRA

Where does wind shear occur?

- A) Exclusively in thunderstorms.
- B) Wherever there is an abrupt decrease in pressure and/or temperature.
- C)** With either a wind shift or a windspeed gradient at any level in the atmosphere

4140.      IRA

Which is a characteristic of low-level wind shear as it relates to frontal activity?

- A)** With a warm front, the most critical period is before the front passes the airport.
- B) With a cold front, the most critical period is just before the front passes the airport.
- C) Turbulence will always exist in wind-shear conditions.

4141.      IRA

What is indicated by the term "embedded thunderstorms"?

- A) Severe thunderstorms are embedded within a squall line.
- B) Thunderstorms are predicted to develop in a stable air mass.
- C)** Thunderstorms are obscured by massive cloud layers and cannot be seen.

4142.      IRA

If squalls are reported at your destination, what wind conditions should you anticipate?

- A)** Sudden increases in windspeed of at least 16 knots to a peak of 22 knots or more, lasting for at least 1 minute.
- B) Peak gusts of at least 35 knots for a sustained period of 1 minute or longer.
- C) Rapid variation in wind direction of at least 20° and changes in speed of at least 10 knots between peaks and lulls.

4143.      IRA

During the life cycle of a thunderstorm, which stage is characterized predominately by; downdrafts?

- A) Cumulus.
- B)** Dissipating.
- C) Mature.

4144.      IRA

Which weather phenomenon is always associated with a thunderstorm?

- A)** Lightning.
- B) Heavy rain showers.
- C) Supercooled raindrops.

4145.      IRA

Which thunderstorms generally produce the most severe conditions, such as heavy hail and destructive winds?

- A) Warm front.
- B)** Squall line.
- C) Air mass.

4147.      IRA

What is an indication that downdrafts have developed and the thunderstorm cell has entered the mature stage?

- A) The anvil top has completed its development.
- B)** Precipitation begins to fall from the cloud base.
- C) A gust front forms.

4148.      IRA

What are the requirements for the formation of a thunderstorm?

- A) A cumulus cloud with sufficient moisture.
- B) A cumulus cloud with sufficient moisture and an inverted lapse rate.
- C)** Sufficient moisture, an unstable lapse rate, and a lifting action.

4149.      IRA

Fair weather cumulus clouds often indicate;

- A)** turbulence at and below the cloud level.
- B) poor visibility.
- C) smooth flying conditions.

4150.      IRA

What is an important characteristic of wind shear?

- A) It is an atmospheric condition that is associated exclusively with zones of convergence.
- B) The Coriolis phenomenon in both high- and low-level air masses is the principal generating force.
- C)** It is an atmospheric condition that may be associated with a low-level temperature inversion, a jet stream, or a frontal zone.



4151.        IRA

Why is frost considered hazardous to flight operation?  
A) Frost changes the basic aerodynamic shape of the airfoil.  
B) Frost decreases control effectiveness.  
**C)** Frost causes early airflow separation resulting in a loss of lift.

4152.        IRA

In which meteorological environment is aircraft structural icing most likely to have the highest rate of accumulation?  
A) Cumulonimbus clouds.  
B) High humidity and freezing temperature.  
**C)** Freezing rain.

4153.        IRA

What is an operational consideration if you fly into rain which freezes on impact?  
A) You have flown into an area of thunderstorms.  
**B)** Temperatures are above freezing at some higher altitude.  
C) You have flown through a cold front.

4154.        IRA

The average height of the troposphere in the middle latitudes is;  
A) 20,000 feet.  
B) 25,000 feet.  
**C)** 37,000 feet.

4155.        IRA

A jetstream is defined as wind of;  
A) 30 knots or greater.  
B) 40 knots or greater.  
**C)** 50 knots or greater.

4156.        IRA

Under which condition does advection fog usually form?  
**A)** Moist air moving over colder ground or water.  
B) Warm, moist air settling over a cool surface under no-wind conditions.  
C) A land breeze blowing a cold air mass over a warm water current.

4157.        IRA

A high cloud is composed mostly of;  
A) ozone.  
B) condensation nuclei.  
**C)** ice crystals.

4158.        IRA

An air mass is a body of air that;  
A) has similar cloud formations associated with it.  
B) creates a wind shift as it moves across the Earth's surface.  
**C)** covers an extensive area and has fairly uniform properties of temperature and moisture.

4159.        IRA

What enhances the growth rate of precipitation?  
A) Advection action.  
**B)** Upward currents.  
C) Cyclonic movement.

4161.        IRA

Which precipitation type normally indicates freezing rain at higher altitudes?  
A) Snow.  
B) Hail.  
**C)** Ice pellets.

4162.        IRA

Which weather condition can be expected when moist air flows from a relatively warm surface to a colder surface?  
A) Increased visibility.  
B) Convective turbulence due to surface heating.  
**C)** Fog.

4163.        IRA

Fog is usually prevalent in industrial areas because of;  
A) atmospheric stabilization around cities.  
**B)** an abundance of condensation nuclei from combustion products.  
C) increased temperatures due to industrial heating.

4164.        IRA

In which situation is advection fog most likely to form?  
**A)** An air mass moving inland from the coast in winter.  
B) A light breeze blowing colder air out to sea.  
C) Warm, moist air settling over a warmer surface under no-wind conditions.

4165.        IRA

In what localities is advection fog most likely to occur?  
**A)** Coastal areas.  
B) Mountain slopes.  
C) Level inland areas.



4166.        IRA

What types of fog depend upon a wind in order to exist? .

- A) Steam fog and downslope fog.
- B) Precipitation induced fog and ground fog.
- C) Advection fog and upslope fog.**

4167.        IRA

What situation is most conducive to the formation of radiation fog?

- A) Warm, moist air over low, flatland areas on clear, calm nights.**
- B) Moist, tropical air moving over cold, offshore water.
- C) The movement of cold air over much warmer water.

4168.        IRA

The strength and location of the jetstream is normally

- A) stronger and farther north in the winter.
- B) weaker and farther north in the summer.**
- C) stronger and farther north in the summer.

4171.        IRA

Test data indicate that ice, snow, or frost having a thickness and roughness similar to medium or coarse sandpaper on the leading edge and upper surface of a wing can;

- A) reduce lift by as much as 50 percent and increase drag by as much as 50 percent.
- B) increase drag and reduce lift by as much as 25 percent.
- C) reduce lift by as much as 30 percent and increase drag by 40 percent.**

4200.        IRA

Which weather conditions should be expected beneath a low-level temperature inversion layer when the relative humidity is high?

- A) Smooth air and poor visibility due to fog, haze, or low clouds.**
- B) Light wind shear and poor visibility due to haze and light rain.
- C) Turbulent air and poor visibility due to fog, low stratus-type clouds, and showery precipitation.

4227.        IRA

Which feature is associated with the tropopause?

- A) Absence of wind and turbulent conditions.
- B) Absolute upper limit of cloud formation.
- C) Abrupt change in temperature lapse rate.**

4238.        IRA

Hazardous wind shear is commonly encountered near the ground

- A) during periods when the wind velocity is stronger than 35 knots.
- B) during periods when the wind velocity is stronger than 35 knots and near mountain valleys.
- C) during periods of strong temperature inversion and near thunderstorms.**

4251.        IRA

What is the expected duration of an individual microburst?

- A) Two minutes with maximum winds lasting approximately 1 minute.
- B) One microburst may continue for as long as 2 to 4 hours.
- C) Seldom longer than 15 minutes from the time the burst strikes the ground until dissipation.**

4252.        IRA

Maximum downdrafts in a microburst encounter may be as strong as

- A) 8,000 feet per minute.
- B) 7,000 feet per minute.
- C) 6,000 feet per minute.**

4253.        IRA

An aircraft that encounters a headwind of 45 knots, within a microburst, may expect a total shear across the microburst of

- A) 40 knots.
- B) 80 knots.
- C) 90 knots**

4254.        IRA

(Refer to figure 13.) If involved in a microburst encounter, in which aircraft positions will the most severe downdraft occur?

- A) 4 and 5.
- B) 2 and 3.
- C) 3 and 4.**

4255.        IRA

(Refer to figure 13.) When penetrating a microburst, which aircraft will experience an increase in performance without a change in pitch or power?

- A) 3.
- B) 2.
- C) 1.**



4256.            IRA

(Refer to figure 13.) The aircraft in position 3 will experience which effect in a microburst encounter?

- A) Decreasing headwind.
- B) Increasing tailwind.
- C) Strong downdraft.**

4257.            IRA

(Refer to figure 13.) What effect will a microburst encounter have upon the aircraft in position 4?

- A) Strong tailwind.**
- B) Strong updraft.
- C) Significant performance increase.

4258.            IRA

(Refer to figure 13.) How will the aircraft in position 4 be affected by a microburst encounter?

- A) Performance increasing with a tailwind and updraft.
- B) Performance decreasing with a tailwind and downdraft.**
- C) Performance decreasing with a headwind and down draft.

4959. AVSEM IRA

The most pronounced characteristic of tailplane icing is:

- A) a slow and deliberate loss of altitude.
- B) the failure of flaps to operate.
- C) a sudden change of elevator force causing an un-commanded nose down pitch condition.**

4960. AVSEM IRA

If tailplane icing causes a tailplane stall, the pilot should;

- A) retract the flaps and increase power**
- B) decrease airspeed to VFE
- C) reduce power, lower the flaps and decrease airspeed

4960-1. AVSEM        IRA

What should a pilot do if icing is detected while experiencing a change in elevator pressure with a rolling condition?

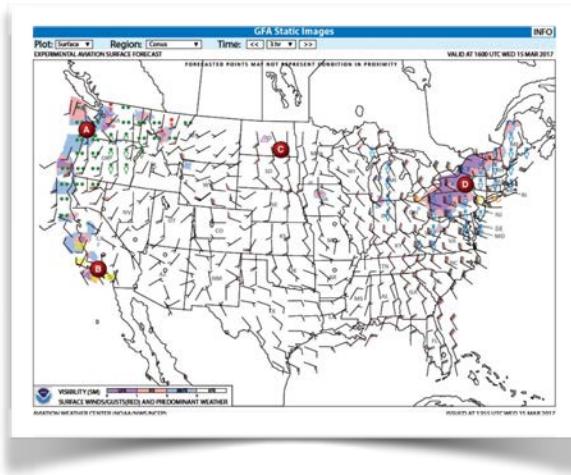
- A) Lower the flaps and decrease airspeed.
- B) Set power, lower the nose for a controlled descent.**
- C) Retract the flaps and increase power.



## WEATHER REPORTS and SERVICES

### Graphical Forecasts for Aviation (GFA)

To best determine general forecast weather conditions within a flight information region. Example: Continental U.S. (CONUS)



To interpret a GFA chart, look at the region, then the Valid Time on the chart in the upper right hand corner to assure it is the correct time, then the area they are referring to.

Answer the question they are asking. For example in Figure 260, Area "A" it is showing Washington State as +3 hours and predominately 3-5 statute miles visibility in MVFR (Marginal VFR) with Moderate Rain.

In Figure 261, Area "C" it is showing Freezing Rain in Southern North Dakota.

In Figure 262, Area "A" they are showing the Winds in Eastern Washington State at 10 Knots sustained with Gusts 20-30. Each full barb on a Wind Arrow depicts 10 knots. Red barbs indicate Gusts.

In Figure 263, Area "C" the color in Southern Texas depicts Overcast (OVC) conditions.

In Figure 269, Area "B" the color along with the text depicts the Bases of the Overcast 6,000 and the Top of the Overcast to be 7,000 feet MSL.

### Common GFA Symbology

The GFA format uses colors and various symbology to depict various weather conditions. You will need to memorize some of these for the test.

••	-RA	Light rain
•••	RA	Moderate rain
••••	+RA	Heavy rain
▽	-SHRA	Light rain showers
▽▽	SHRA +SHRA	Moderate to heavy rain showers
▽*	-SHRASN	Light rain and snow showers
○U	-FZRA	Light freezing rain
≡	FG	Fog

For example, in Figure 266, Washington and Oregon States have predominately Light Rain Showers and Rain as depicted by the Rain Dots symbology.

Instrument pilots are encouraged to download and print the many various symbology icons that are used within a GFA.

These charts are available on-line through NOAA or Googling them. Aviation Seminars utilizes the most common and those that are used by the FAA for testing purposes. There are many more a true IFR pilot would want to know.

### Surface Analysis Chart (Report)

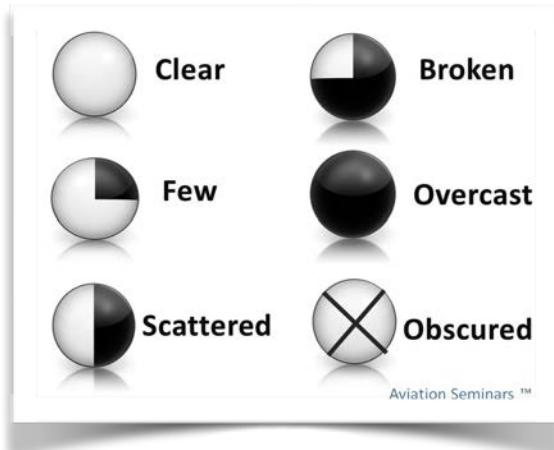
The Surface Analysis chart provides a graphic display of actual frontal positions, pressure patterns, temperature, dew point, wind, weather, and obstructions to vision at the valid time of the chart.

NOTE\* The Surface Analysis chart is not shown in the IFR Test Supplement 8080-3F. Only need to know what this chart represents for the test.



### Weather Depiction Chart (Report)

The Weather Depiction chart provides a graphic display of VFR / IFR, actual frontal positions, precipitation intensity, sites with automated observation stations, cloud height and/or ceilings.



O] = Automated Observation Station.

### Ceilings

Defined as the lowest layer of clouds reported as BROKEN (BKN), OVERCAST (OVC) or OBSCURED (VV)

Few or Scattered do not constitute a ceiling.

### Low Level Significant Weather Prognostic (Forecast)

The Low Level Significant Weather Prognostic Chart forecasts conditions up to 24,000 ft. MSL.

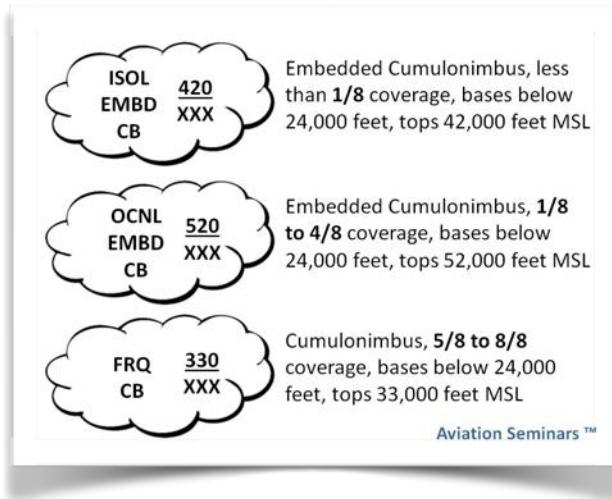
It forecasts VFR, MVFR and IFR weather including areas of precipitation that are expected to exist at the time on the chart.

Using this chart is simple. Often you just match up the 12 or 24 hour chart with the colors and line designs within a specific area to match what the question is asking about. The forecast exists for a specific time in the future. (12 or 24 hours)

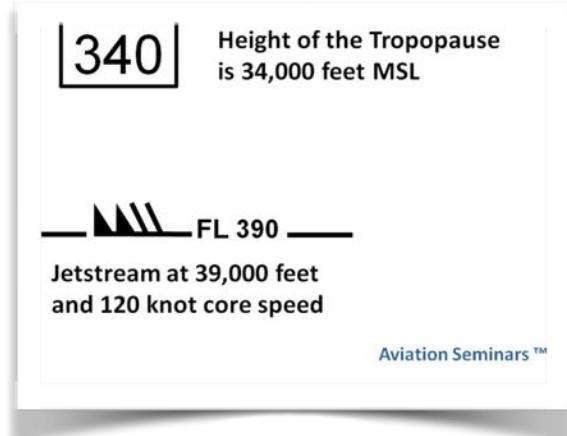
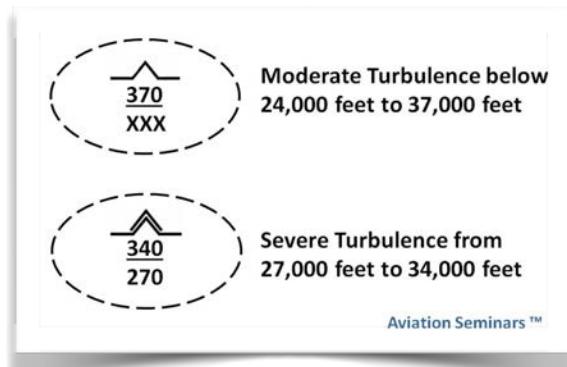
Example on Figure 18.

### High Level Significant Weather Prognostic (Forecast)

The High Level Significant Weather Prognostic Chart forecasts conditions from 24,000 feet MSL to 63,000 feet MSL. (Example on Figure 7.)



Shows Tropopause Height, CB Cloud coverage, Turbulence and Jet stream height and velocity.





## METARS and SPECI Reports (METAR / SPECI)

A Meteorological Terminal Aerodrome Report (METAR) is an observation report of weather conditions existing at the airport at the time the report was issued. (Usually once per hour)

Special METAR (SPECI) are unscheduled and issued as soon as possible when conditions change significantly between the scheduled reporting times.

KBNA	1250Z	33018KT	290V360	1/2	SM
R31/2700	FT +	SN	BLSNFG	VV008	
00/M03	A2991	RMK	RAE42SNB42		
SPECI					
KOKC	2228Z	28024G36KT	3/4SM		
BKN008	OVC020	28/23	A3000		

KBNA (Nashville) 1250Z (Time Issued) 33018KT = Wind from 330 degrees at 18 knots variable from 290 to 360 degrees. 1/2 statute mile visibility. R31/2700 = Runway 31 reporting 2,700 feet visibility down the runway due to heavy blowing snow and fog. VV008 = vertical visibility into obscured sky measured 800 feet. 00/M03 = temperature 0c / dew point -3c. RMK = Rain ended at 1242Z and Snow began at 1242Z.

## Terminal Aerodrome Forecast (TAF)

A TAF is similar to a METAR except it is a forecast. It is a concise statement of expected meteorological conditions for a specified time period.

A TAF covers an area within 5 statute miles of the center of an airport runway complex.

A TAF is also the primary source to obtain information regarding destination weather at the planned ETA.

KCVG	230151Z	231212	12012KT	4SM	-RA
BR	OVC008	WS	005/27050KT	TEMPO	1719
1/2SM	-RA	FG	FM1930	09012KT	1SM -DZ
BR	VV003	BECMG	2021	5SM	HZ +

WS 005 / 27050KT means wind-shear at 500 feet AGL from 270° at 50 KT.

Winds reported as 'VRB' means winds are variable at less than 6 knots.

Winds reported as '00000KT' means winds are less than 3 knots.

'P6SM' means prevailing visibility is or is expected to be greater than 6 statute miles.

## Winds and Temperatures Aloft Forecast (FB)

Predict wind direction, knots and temperature in Celsius. Only available above 1,500 feet above the surface.

FT	VALID 1600Z FOR USE 0900-1500Z. TEMPS NEG ABV 24000									
	3000	6000	9000	12000	18000	24000	30000	34000	39000	
EHI	2807	2715-07	2726-10	2842-13	2867-21	2891-30	751041	771150	780855	
ALB	0210	9900-07	2714-09	2728-12	2656-19	2777-28	781842	760150	269658	
PSB	1509+04	2119+01	2233-04	2262-14	2368-26	781639	780850	780456		
STL	2308	2613+02	2422-03	2431-08	2446-19	2461-30	760142	782650	780559	

Figure 2. No temperature given within 3,000 feet AGL or within 2,500 feet of the station. 9900 = calm winds.

Winds greater than 100 knots or more is indicated by adding '50' to the first digit in the wind direction.

STL at 30,000 feet shows 760142 = Wind is from 260 degrees at 101 knots and an aloft temperature of -42c.



### Convective Outlook (AC)

Defines the prospects of general thunderstorm outlook areas.

Defined as areas of slight, moderate, or high risk of severe thunderstorms during the following 24 hours.

Note\* Actual AC not shown in the 8080-3F Test Supplement. Just know what an AC forecasts.

### Severe Weather Watch Bulletins (WW)

A severe weather watch bulletin (WW) defines areas of possible severe thunderstorms or tornado activity.

They are unscheduled and are issued as required.

### AIRMET's (WA)

AIRMET's are issued as a warning for weather particularly hazardous to small aircraft.

Issued on a scheduled basis every 6 hours. Maximum forecast period is also 6 hours.

### SIGMET's (WS)

SIGMET's are issued as a warning of weather conditions potentially hazardous to all aircraft.

Examples of a SIGMET include widespread sand or dust storms affecting at least 3,000 square miles or an area deemed to have a significant effect on the safety of all aircraft operations.

### Pilot Reports

PIREP's are reports from pilots to ATC or FSS of conditions they encounter while enroute.

MRB UA/OV MRB/TM 1430 FL060/TP C182/  
SK BKN BL/WX RA/TB MDT.

MRB (East West Virginia Regional) at 1430Z at 6,000 feet from a Cessna 182, sky was broken between layers; moderate rain and moderate turbulence.

### TEST QUESTIONS (Use Test Supplement 8080-3F)

*NOTE: CORRECT ANSWER IN **BOLD ITALICS***

4170.           IRA

The body of a Terminal Aerodrome Forecast (TAF) covers a geographical proximity within a;

**A) 5 statute mile radius of the center of an airport runway complex.**  
B) 5 nautical mile radius of the center of an airport.  
C) 5 to 10 mile radius of the center of an airport runway complex.

4170-1.           IRA

Which weather product is a concise statement of the expected weather for an airport's runway complex?

- A) Area Forecast (FA)  
B) Weather Depiction Charts  
**C) Terminal Aerodrome Forecast (TAF)**

4172.           IRA

What wind direction and speed is represented by the entry 9900 +00 for 9,000 feet, on an Winds and Temperatures Aloft Forecast (FD)?

- A) Light and variable; less than 5 knots.**  
B) Vortex winds exceeding 200 knots.  
C) Light and variable; less than 10 knots.

4175.           IRA

What does a Convective Outlook (AC) describe for a following 24 hour period?

- A) Areas of slight, moderate, or high risk of severe thunderstorms.**  
B) A severe weather watch bulletin.  
C) When forecast conditions are expected to continue beyond the valid period.

4176.           IRA

Which primary source should be used to obtain forecast weather information at your destination for the planned ETA?

- A) Area Forecast.  
B) Radar Summary and Weather Depiction Charts.  
**C) Terminal Aerodrome Forecast (TAF).**

4177.           IRA

A "VRB" wind entry in a Terminal Aerodrome Forecast (TAF) will be indicated when the wind is;

- A) 3 knots or less.  
**B) 6 knots or less.**  
C) 9 knots or less.

4178.           IRA

When the visibility is greater than 6 SM on a TAF it is expressed as;

- A) 6PSM.  
**B) P6SM.**  
C) 6SMP.



4179. IRA

To best determine general forecast weather conditions covering a flight information region, the pilot should refer to;

- A) Graphical Forecasts for Aviation (GFA).**
- B) Satellite Maps
- C) Weather Depiction Charts

4180. IRA

What is the forecast wind at 1800Z in the following TAF?

KMEM 091 740Z 1818 00000KT 1 /2SM RAFG  
OVC005

- A) Calm.**
- B) Unknown.
- C) Not recorded.

4181. IRA

SIGMET's are issued as a warning of weather conditions potentially hazardous;

- A) particularly to light aircraft.
- B) to all aircraft.**
- C) only to light aircraft operations.

4182. IRA

What significant sky condition is reported in this METAR observation?

METAR KBNA 1 250Z 3301 8KT 290V360 1 /2SM  
R31/2700FT +SN BLSNFG W008 00/M03 A2991  
RMK RAE42SNB42

- A) Runway 31 ceiling is 2700 feet.
- B) Sky is obscured with vertical visibility of 800 feet.**
- C) Measured ceiling is 300 feet overcast.

4183. IRA

Which meteorological condition is issued in the form of a SIGMET (WS)?

- A) Widespread sand or dust storms affecting at least 3,000 square miles or an area deemed to have a significant effect on the safety of aircraft operations.**
- B) Moderate icing.
- C) Sustained winds of 30 knots or greater at the surface.

4184. IRA

A pilot planning to depart at 1100Z on an IFR flight is particularly concerned about the hazard of icing. What sources reflect the most accurate information on icing conditions (current and forecast) at the time of departure?

- A) Low-Level Significant Weather Prognostic Chart, and the Area Forecast.
- B) The Area Forecast, and the Freezing Level Chart.
- C) Pilot weather reports (PIREP's), AIRMET's, and SIGMET's.**

4186. IRA

When are severe weather watch bulletins (WW) issued?

- A) Every 12 hours as required.
- B) Every 24 hours as required.
- C) Unscheduled and issued as required.**

4187. IRA

What is the maximum forecast period for AIRMET's?

- A) Two hours.
- B) Four hours.
- C) Six hours.**

4188. IRA

When is the temperature at one of the forecast altitudes omitted at a specific location or station in the Winds and Temperatures Aloft Forecast (FB)?

- A) When the temperature is standard for that altitude.
- B) For the 3,000 foot altitude (level) or when the level is within 2,500 feet of station elevation.**
- C) Only when the winds are omitted for that altitude (level).

4189. IRA

When is the wind group at one of the forecast altitudes omitted at a specific location or station in the Winds and Temperatures Aloft Forecast (FD)?

When the wind

- A) is less than 5 knots.
- B) is less than 10 knots.
- C) at the altitude is within 1,500 feet of the station elevation.**

4190. IRA

Decode the excerpt from the Winds and Temperature Aloft Forecast (FD) for OKC at 39,000 feet.

FT 39000 OKC 830558

- A) Wind 130° at 50 knots, temperature -58 °C.
- B) Wind 330° at 105 knots, temperature -58 °C.**
- C) Wind 330° at 205 knots, temperature -58 °C.



4191.      IRA

Which values are used for winds aloft forecasts?

- A) Magnetic direction and knots.
- B) Magnetic direction and MPH.
- C) True direction and knots.**

4192.      IRA

(Refer to figure 2.) What approximate wind direction, speed, and temperature (relative to ISA) should a pilot expect when planning for a flight over PSB at FL270?

- A) 260° magnetic at 93 knots; ISA + 7 °C.
- B) 280° true at 113 knots; ISA +3 °C.
- C) 255° true at 93 knots; ISA +6 °C.**

4193.      IRA

(Refer to figure 2.) What approximate wind direction, speed, and temperature (relative to ISA) should a pilot expect when planning for a flight over ALB at FL270?

- A) 270° magnetic at 97 knots; ISA -4 CC.
- B) 260° true at 110 knots; ISA +5 °C
- C) 275° true at 97 knots; ISA +4 °C**

4194.      IRA

(Refer to figure 2.) What approximate wind direction, speed, and temperature (relative to ISA) should a pilot expect when planning a flight over EMI at FL 270?

- A) 265° true; 100 knots; ISA +3 °C**
- B) 270° true; 110 knots; ISA +5 °C
- C) 260° magnetic; 100 knots; ISA -5 °C

4196.      IRA

The station originating the following weather report has a field elevation of 1,300 feet MSL. From the bottom of the overcast cloud layer, what is its thickness? (tops of OVC are reported at 3,800 feet)

SPECI KOKC 2228Z 28024G36KT 3/4SM  
BKN008 OVC020 28/23 A3000

- A) 500 feet.**
- B) 1,700 feet.
- C) 2,500 feet.

4198.      IRA

Which response most closely interprets the following PIREP?

UA/OV OKC 063064/TM 1522 /FLO8OJTP C172/  
TA-04/WV 245040/TB LGT/RM IN CLR.

- A) 64 nautical miles on the 63 degree radial from Oklahoma City VOR at 1522 UTC, flight level 8,000 ft. Type of aircraft is a Cessna 172.**
- B) Reported by a Cessna 172, turbulence and light rime icing in climb to 8,000 ft.
- C) 63 nautical miles on the 64 degree radial from Oklahoma City, thunderstorm and light rain at 1522 UTC.

4199.      IRA

A station is forecasting wind and temperature aloft at FL 390 to be 300° at 200 knots; temperature -54 C. How would this data be encoded in the FD?

- A) 300054.
- B) 809954.**
- C) 309954.

4201.      IRA

(Refer to Figure 5.) On a low-level significant weather prognostic chart, this symbol represents;

- A) Freezing rain.
- B) Mixed precipitation.**
- C) Snow showers.

4202.      IRA

A ceiling is defined as the height of the;

- A) highest layer of clouds or obscuring phenomena aloft that covers over 6/10 of the sky.
- B) lowest layer of clouds that contributed to the overall overcast.

- C) lowest layer of clouds or obscuring phenomena aloft that is reported as broken or overcast.**

4203.      IRA

The reporting station originating this Aviation Routine Weather Report has a field elevation of 620 feet. If the reported sky cover is one continuous layer, what is its thickness? (tops of OVC are reported at 6500 feet)

METAR KMDW 121856Z AUTO 32005KT  
1 1/2SM +RABR OVC007 17/16 A2980

- A) 5,180 feet.**
- B) 5,800 feet.
- C) 5,880 feet.



4204.            IRA

What is the wind shear forecast in the TAF?

KCVG 23105IZ 231212 12012KT 4SM -RA BR  
OVCOO8 WS005/27050KT TEMPO 1719  
1/2SM -RA FG FM1930 09012KT 1SM -DZ BR  
VV003 BECMG 2021 5SM HZ

- A) 5 feet AGL from 270° at 50 KT.
- B) 50 feet AGL from 270° at 50 KT.
- C) 500 feet AGL from 270° at 50 KT.**

4205.            IRA

What is meant by the entry in the remarks section of METAR surface report for KBNA?

METAR KBNA 211250Z 3301 8KT 290V260  
1/2SM R31/2700FT +SN BLSNFG VV008 00/M03  
A2991 RMK RAE42SNB42

- A) The wind is variable from 290° to 360.
- B) Heavy blowing snow and fog on runway 31.
- C) Rain ended 42 past the hour, snow began 42 past the hour.**

4206.            IRA

(Refer to figure 4.) What is the meaning of a bracket ( ] ) plotted to the right of the station circle on a weather depiction chart?

- A) The station represents the en route conditions within a 50 mile radius.
- B) The station is an automated observation location.**
- C) The station gives local overview of flying conditions for a six hour period.

4207.            IRA

(Refer to Figure 18.) The right panel of the significant weather prognostic chart provides a forecast of selected aviation weather hazards up to FL240 until what time?

- A) March 18th at 0600.
- B) March 17th at 1800.
- C) March 18th at 1800.**

4208.            IRA

(Refer to Figure 19.) The next issuance of the 12-hour significant weather prognostic chart will become valid at;

- A) 0000Z**
- B) 1200Z
- C) 1800Z

4209.            IRA

The Surface Analysis Chart depicts;

- A) actual pressure systems, frontal locations, cloud tops, and precipitation at the time shown on the chart.
- B) frontal locations and expected movement, pressure centers, cloud coverage, and obstructions to vision at the time of chart transmission.
- C) actual frontal positions, pressure patterns, temperature, dew point, wind, weather, and obstructions to vision at the valid time of the chart.**

4211.            IRA

The Low-Level Significant Weather Prognostic Chart depicts weather conditions;

- A) that are forecast to exist at a valid time shown on the chart.**
- B) as they existed at the time the chart was prepared.
- C) that existed at the time shown on the chart which is about 3 hours before the chart is received.

4212.            IRA

Which meteorological conditions are depicted by a prognostic chart?

- A) Conditions existing at the time of the observation.
- B) Interpretation of weather conditions for geographical areas between reporting stations.
- C) Conditions forecast to exist at a specific time shown on the chart.**

4213.            IRA

(Refer to figure 5.) What is the meaning of the symbol depicted as used on the U.S. Low-Level Significant Weather Prog Chart?

- A) Showery precipitation (e.g. rain showers) embedded in an area of continuous rain covering half or more of the area.**
- B) Continuous precipitation (e.g. rain) covering half or more of the area.
- C) Showery precipitation (e.g. thunderstorms/rain showers) covering half or more of the area.

4214.            IRA

A prognostic chart depicts the conditions;

- A) existing at the surface during the past 6 hours.
- B) which presently exist from the 1000 millibar through the 700 millibar level.
- C) forecast to exist at a specific time in the future.**



4215.        IRA

- What information is provided by a Convective Outlook (AC)?
- A) It describes areas of probable severe icing and severe or extreme turbulence during the next 24 hours.
  - B)** It provides prospects of both general and severe thunderstorm activity during the following 24 hours.
  - C) It indicates areas of probable convective turbulence and the extent of instability in the upper atmosphere (above 500 MB).

4220.        IRA

Interpret this PIREP.

MRB UA/OV MRB/TM 1430 FL060/TP C182/  
SK BKN BL/WX RA/TB MDT.

- A) Ceiling 6,000 feet intermittently below moderate thundershowers; turbulence increasing westward.
- B) FL 60,000, Intermittently below clouds; moderate rain, turbulence increasing with the wind.
- C)** At 6,000 feet; between layers; moderate turbulence; moderate rain.

4221.        IRA

(Refer to figure 7.) What weather conditions are depicted around area 7?

- A)** Occasional cumulonimbus, 1/8 to 4/8 sky coverage, bases below 25,000 ft MSL tops 53,000.
- B) Moderate or severe turbulence up to FL530.
- C) Occasional cumulonimbus, 5/8 to 8/8 sky coverage, tropopause height 53,000 ft. MSL.

4222.        IRA

(Refer to figure 7). What weather conditions are depicted around area 9?

- A) Existing isolated cumulonimbus clouds, bases below 25,000 ft. MSL, tops 33,000 ft. MSL.
- B)** Forecast isolated cumulonimbus clouds, tops 33,000 ft. MSL, with less than 1/8 coverage.
- C) Forecast isolated cumulonimbus clouds, tops 33,000 ft. MSL, with 1/8 to 4/8 coverage.

4223.        IRA

(Refer to figure 7.) What weather conditions are depicted within area 3?

- A) Moderate CAT turbulence at FL370.
- B)** Severe turbulence from FL300 up to FL370.
- C) Reported moderate turbulence from FL300 up to FL370.

4224.        IRA

(Refer to figure 7.) What weather conditions are depicted within area 1?

- A)** Moderate turbulence from below FL250 up to FL360.
- B) Moderate to severe turbulence at FL310
- C) Severe CAT up to FL360.

4225.        IRA

(Refer to figure 7.) What information is indicated to the right of 8??

- A) The height of the tropopause in meters above sea level.
- B) The maximum height of CAT.
- C)** The height of the tropopause in hundreds of feet above MSL

4226.        IRA

Which weather forecast describes prospects for an area coverage of both severe and general thunderstorms during the following 24 hours?

- A) Terminal Aerodrome Forecast.
- B)** Convective outlook.
- C) Radar Summary Chart.

4228.        IRA

From which primary source should you obtain information regarding the weather expected to exist at your destination at your estimated time of arrival?

- A) Weather Depiction Chart.
- B) Surface Analysis Chart.
- C)** Terminal Aerodrome Forecast.

4229.        IRA

(Refer to figure 7.) What weather conditions are depicted within area 6?

- A)** Occasional embedded cumulonimbus clouds, bases below 25,000 ft. MSL, tops 45,000 ft. MSL.
- B) Embedded cumulonimbus clouds, less than 1/8 coverage.
- C) Embedded thunderstorm activity from the surface up to FL450.

4241.        IRA

The Hazardous in-flight Weather Advisory Service (HIWAS) is a continuous broadcast over selected VORs of;

- A)** SIGMETs, CONVECTIVE SIGMETs, AIRMETs, Severe Weather Forecasts Alerts (AWW), and Center Weather Advisories.
- B) SIGMETs, CONVECTIVE SIGMETs, AIRMETs, Wind Shear Advisories, and Severe Weather Forecast Alerts (AWW).
- C) Wind Shear Advisories, Radar Weather Reports, SIGMETs, CONVECTIVE SIGMETs, AIRMETs, and Center Weather Advisories (CWA)



4243.            IRA

(Refer to figure 20.) What is the maximum wind velocity forecast in the jet stream shown on the high level significant weather prognostic chart over the southern United States?

- A) 50 knots.
- B) 140 knots.
- C) 90 knots.**

4244.            IRA

(Refer to figure 20.) What is the height of the tropopause over the northwest United States?

- A) 45,000 feet MSL.**
- B) 45,000 meters.
- C) 450,000 feet MSL.

4245.            IRA

(Refer to figure 7.) The area indicated by the arrow in area 3 indicates;

- A) light turbulence below 34,000 feet.
- B) isolated embedded cumulonimbus clouds with bases below FL180 and tops at FL340.
- C) severe turbulence at and below 37,000 feet.**

4467.            IRA

AIRMET'S are issued on a scheduled basis every;

- A) 15 minutes after the hour only.
- B) 15 minutes until the AIRMET is canceled.
- C) six hours.**



## ADDITIONAL INSTRUMENT PILOT QUESTIONS

4611.            IRA

(Refer to figure 113.) You receive this ATC clearance:

“...CLEARED TO THE ABC VORTAC. HOLD SOUTH ON THE ONE EIGHT ZERO RADIAL...”

What is the recommended procedure to enter the holding pattern?

- A) Teardrop only.
- B) Direct only.**
- C) Parallel only.

4613.            IRA

(Refer to figure 113.) You receive this ATC clearance:

“...CLEARED TO THE ABC VORTAC. HOLD WEST ON THE TWO SEVEN ZERO RADIAL...”

What is the recommended procedure to enter the holding pattern?

- A) Parallel only.
- B) Direct only.**
- C) Teardrop only.

4614.            IRA

(Refer to figure 114.) A pilot receives this ATC clearance:

“...CLEARED TO THE ABC VORTAC. HOLD WEST ON THE TWO SEVEN ZERO RADIAL...”

What is the recommended procedure to enter the holding pattern?

- A) Parallel or teardrop.
- B) Parallel only.
- C) Direct only.**

4960.            IRA

On initial climb-out after takeoff and with the autopilot engaged, you encounter icing conditions. In this situation you can expect;

- A) ice to accumulate on the underside of the wings due to the higher AOA.**
- B) the autopilot to hold the vertical speed, if the anti-icing boots are working.
- C) the increased airflow under the wings to prevent the accumulation of ice.