



AYERS AVIATION
WORLD'S FINEST FLIGHT TRAINING
www.ayersaviation.com

Instrument Rating Study Guide for FAA -ACS Book and Oral Exam

Task A – Pilot Qualifications (page 4)

Pilot Currency

- Current Flight Review
- 3 take offs and landings within 90 days to carry passengers (Night Full stop)
- Medical or Basic Med must be current

Documentation

- Pilots License
- Medical Certificate or Basic Med
- Government Photo ID

Recency of experience

- 6 Approaches within previous 6 months
- Holding
- Intercepting and tracking
- What if I don't maintain currency within 6 months?
- 6-month grace period
- Instrument Proficiency Check with CFII or DPE Pilot Examiner

Recordkeeping

Minimum required to log in logbook to show you have met the currency requirements

Privileges as an Instrument Pilot

- Can fly in IFR Conditions
- Class A Airspace
- Special VFR at Night

Limitations as an Instrument Pilot

- If medical is expired
- Currency is not met for IFR **or** normal Pilot Currency
- Can NOT fly into known icing with an aircraft that is not rated

Proficiency vs currency

- Proficiency – Very good at something
- Current – Legal to fly, but might suck at it.

Personal Minimums

- Winds, Ceiling, Visibility, Icing, Storms, Fog

Fitness for flight

- IMSAFE – ILLNESS, MEDICATION, STRESS, ALCOHOL, FATIGUE, ENVIRONMENT

Flying unfamiliar Aircraft, Avionics, Flight Displays

- IPAD
- Avionics
- Autopilot

Task B. Weather –

What do you do to gather weather information? What Sources do you use? And can you gather enough information to make a competent decision to go or not to go thru with the flight.

Acceptable weather Sources –

- 7 day forecast
- 6 o'clock news weather report
- www.aviationweather.gov – FAA Approved
- Flight Briefer (1800-WX-BRIEF) – FAA Approved
- Foreflight – FAA Approved
- Apps – MyRadar, Aeroweather, etc
- Weather Discussion on Foreflight – FAA Approved

What are weather minimums for IFR Departures?

What are weather minimums for Approaches? Ceiling vs Visibility

What are weather minimums for an Alternate Airport?

Freezing Level - The level of the atmosphere where freezing temperatures are at. (most of the time air is freezing above that level, but sometimes there is a temperature inversion and freezing temperatures are below that and warmer air above that.

Types of Icing –

Where would you encounter these? And which is the worst? Can you fly into known icing conditions with your aircraft? What tells you that you can or can't?

- Rime
- Mixed

- Clear
- Frost

If you start picking up icing, immediately notify ATC and start trying to get out of it, turn around, Divert, etc. Never wait until it starts building up, then start to decide to divert. It might be too late at that point.

Airmets – General Warning Areas

- Icing (Light to Moderate)
- Turbulence (Light to Moderate)
- IFR (Low clouds and/or visibility)
- Mountain Obscuration (IFR Conditions in Mountainous terrain areas)
-

Sigmets- Warning Areas for Severe Weather

- Icing (Severe)
- Turbulence (Severe)
- Duststorms
- Volcanic Ash
- Hurricanes
-

Convective Sigmets (Thunderstorms)

- How far to stay away from thunderstorms?
- Hazards of Thunderstorms – Turbulence, Lightening, Hail, Rain, Wind Shear, Tornados
- Microburst

Convective Outlook – Outlook that Thunderstorms are forecasted in a general area (Yellow shade on Foreflight)

Weather Systems-

- High Pressure
- Low Pressure
- Cold Fronts
- Warm Fronts
- Stationary Fronts
- Dry Line

Prognostic Charts – Charts of weather fronts, High/Low pressures and movements of each

Winds Aloft

- Forecasts
- Wind direction/Velocity
- Temperature
- Calm winds - 9900

Personal weather Minimums – What is yours?

- Ceiling

- Visibility
- Winds
- Storms
- Rain
- Crosswinds
- Icing

Limitations of onboard weather conditions?

Radio- Flight Service, AWOS, ATIS, Center/Approach Frequencies – Out of Range, Too busy to help, ADS-B/ IPAD (Signal, Overheating, Dead battery)

Limitations of Weather Reports and Forecasts?

Weather is only predicted accurately 65% of the time.

TAF Forecasts - 24 Hour forecast, updated every 6 hours, Forecast for a 5NM radius around an airport.

METAR – A lot of the time ceiling and visibility readings are not accurate.

MOS Forecast – Foreflight – Computer Calculated forecast

Diversion

What types of weather conditions would make a diversion necessary?

Where would you divert to due to bad weather? Instrument/Equipment Failure?

Task C. Cross Country Flight Planning (Page 6)

Plan an IFR Cross country to include route, Altitude, Airspace, Fuel Requirements, Alternates, Weather, SIDS/STARS, NOTAMS. Be able to walk the examiner why you planned that route and everything you took into consideration.

Be able to explain

Climb Rate / Descent Rate (Feet per NM) – How do you calculate it?

Standard climb rate is 200 Ft per NM

Take Off Minimums – (Trouble T symbol)

How do you know if your Airport has nonstandard take off minimums and instructions?

Where do you find this information?

Standard Departure Procedure – at 35 ft above the departure end of the runway, you must maintain a 200 ft per NM climb rate to 400FT AGL then can turn in any direction but must maintain a 200ft per NM climb rate to avoid obstacles.

Non-Standard Departure Procedure – There is a hazard around an airport that requires you to fly something different than the Standard Departure procedure. Example – On departure Fly heading 190, Climb and maintain 2400ft MSL then turn on course. Or Fly heading 190, climb rate of 340ft per NM to 2400 then turn and climb on course.

Chart Symbolology

Enroute Charts

- MEA
- MOCA
- MRA
- MCA
- Compulsory reporting points
- Military Training Routes
- Restricted Areas
- Military Operations Areas (MOAs) – Can you fly thru an MOA while flying IFR?
- Victor Airways
- Distances of Airway legs
- Minimum Safe Altitudes (Off Airways) How much clearance in mountainous vs non-mountainous areas
- GPS Airways
- Change Over Points
- Airports – Green, Brown, Blue – What is the difference between them?

Approach Plate –

- Visual approach point – “V” on the profile section of the chart... What does that mean?
- The Lightning Bolt on the profile section of the chart – What does that mean?
- “X” on the profile section of the approach plate – what does that mean?
- Where does the missed approach point start on the approach? How can you tell?
- What is DH and MDA? What is the difference?
- You are at Minimums on the approach... when can you descend below that? If so, how much lower can you descend?
- Remain within 10 NM.... What does that mean?
- What is an Outer marker? Can you identify the symbol on the approach plate?
- What is an NDB? Can you identify the symbol on the approach plate?
- MSA – Minimum Safe Altitude.... What does that mean on the approach plate?
- What are the Approach Category’s A,B,C,D mean? What are the speeds for each? And do you determine what approach category you are?
- On a Circling Approach to land, when can you descend below Circling Minimums?
- What does the (Trouble T) and (Trouble A) Symbols in the briefing strip at the top of the approach plate mean when they are there? Where do you go to find that information at?
- What Type of Approach Lighting does the airport have that your about to shoot the approach at?
- How do you Identify a VOR or ILS to see if it is operational?
- On the Top Right of the Plan View of the approach plate it says (ADF Required or Radar Required
- If you follow a VASI Lighting system in to the runway, are you guaranteed to be clean of terrain/obstructions?
- What are the 4 ways you do not have to fly a procedure turn? (ATC **Clears you Straight -In**, Approach plate states **No-PT**, ATC issues **vectors to final** approach course, Timed Approach
- What Approaches are Considered Precision Approaches? Which are considered Non-Precision?

Holding Patterns

Entries –

- Direct
- Parallel
- Tear Drop

Holding Times

- Below 14,000 Ft – 1 minute Legs
- Above 14,000 Ft – 1 ½ minute Legs
- DME Holding Legs (KGLE GPS 36 approach)

Fuel Requirements –

- How much extra fuel is required if flying to your destination?
- How much extra fuel is required if flying to your alternate airport?

What are the different ways you can activate and close an IFR Flight plan at

- Uncontrolled Airports – Can depart only in VFR conditions and activate your IFR Flight plan while airborne.
- A pilot can request and receive an IFR departure clearance and activate it while on the ground with a **void time**.
- Controlled Airports – Control Tower will issue IFR Clearance (CRAFT) and will activate it (Release you for Departure) They will also automatically cancel your IFR Flight plan every time you land at a towered airport

Alternate Airports –

What is the purpose of an Alternate Airport?

When are you required to File an alternate Airport?

1-2-3 Rule

From 1 hour before to 1 hour after plane arrival time at the destination airport, the weather is below 2000ft ceiling and/or below 3 miles visibility.

If the weather is below that then you must file an alternate Airport.

Alternate Requirements

Intended arrival time at the alternate airport, the forecasted weather must be -
600 ft Ceiling and 2 miles visibility for higher for a precision approach
800 ft ceiling and 2 miles visibility or higher for a non-precision approach
VFR conditions if there is no approach for the airport.

What if you are on a flight and unable to land at your destination and have to divert to your alternate and the weather is below your Alternate Minimums (600-2 or 800-2) but are at or above the approach plate minimums. Can you shoot the approach at your alternate airport or do you have to divert to an additional airport?

Emergency Procedures –

Lost Communication – After you receive your IFR clearance you depart and enter IFR condition and realize you lost communications. What do you do?

Equipment Failure – You lost an Alternator, Vacuum system, Engine is running rough in IFR conditions... what do you do?

Transponder Codes –

- Emergency 7700
- Lost Communications 7600
- Hijack 7500
- VFR 1200.

Oxygen Requirements

12,500 Ft MSL – 13,999 – Crew members must go on oxygen after 30 minutes

14,000 Ft MSL -14,999 Ft Crew members must go on oxygen immediately

15,000 Ft MSL and Above – Crew members must go on oxygen and passengers must be supplied oxygen.

Task A. Aircraft Systems Related to IFR Operations (page 7)

Applicable anti-icing and deicing systems on your aircraft.

- Airframe – Deicing Boots, Alcohol – leading edge
- Propeller – Alcohol, Electric Boots
- Intake – Carburetor Heat vs Fuel Injection, Alternate Air Intake,
- Fuel – Additives
- Pitot/Static System – Pitot Heat how does it work?

Task B Aircraft Flight Instruments and Navigation Equipment (Page 8)

Operation of the aircraft flight Instruments

What are they? How do they work? If a particular system fails, how do you know? And what instruments will you lose?

- Pitot Static Instruments – Airspeed Indicator, Altimeter, Vertical Speed Indicator
- Pitot Tube & Static Port
- Gyroscopic System – Attitude Indicator, Directional Gyro
- Vacuum Pump, Suction Gauge, OFF Flag on Attitude Indicator

Electrical System

- How many volts is it?
- What charges the electrical system? Alternator vs generator
- Where is the battery located at in the plane?
- How do you know if the charging system has failed? Light? Ammeter?

Magnetic Compass

- What are the Errors associated with it?
- Acceleration & Deceleration
- Turns
- Oscillation
- Magnetic Variation
- Magnetic Deviation

- ANDS - Accelerate North, Decelerate South
- UNOS - Undershoot North, Overshoot South
- Timed Turns to Heading (2-minute turns/ Standard Rate Turns)

Operation of the aircrafts navigation Systems

- VOR
- DME
- ILS
- Marker beacon

GPS – What is GPS? How does it operate? How many satellites do you need?

What are the differences of each one of these?

- RNAV
- GPS
- WAAS
- LNAV
- LPV
- LNAV/VNAV

What is RAIM?

- How does it work?
- How can you check if RAIM is available for your route of flight and intended destination?

How much distance on a CDI full scale deflection do you get on GPS mode

- Enroute Mode – 5 miles non WAAS GPS or 2nm – WAAS GPS
- Terminal Mode – 1 mile
- Approach Mode - .3 mile

What if your CDI Indicator fails? Is there a backup deflection indicator?

Difference between Approved and non-approved navigation devices for IFR operation.

- How do you know if it is approved?

Electronic Flight Bags

- What are they? IPAD's with Foreflight or like navigational apps. What are the limitations?
- Battery could Die
- Overheating issues
- Reception Issues
-

Navigation Data Bases-

- Can you operate with expired Navigation Databases?
- How can you tell your Navigation Data Base is current?
- What is the Difference between Navigation Data base and Terrain Database?

Instrument Flight Deck Check (Page 9)

Instrument Flight Deck Check (Ground)

- Airspeed should read zero
- Attitude Indicator should be erected by 5 minutes of startup and should have pitch or bank changes while taxiing
- Directional Gyro should turn and hold within a few degrees when taxiing
- Altimeter should be 75 feet or less of airport elevation when tuned to the current barometric pressure setting for the field of departure.
- Turn and Bank Indicator should show a roll in the direction of the turn on the ground. (Ball will be whatever, no specific check for it)
- Vertical Speed Indicator should read Zero... if not, use where it is for your level flight indication.

IFR Airworthiness – Aircraft

Minimum Instruments for VFR – **TOMATO FLAMES**

- Tachometer
- Oil Pressure
- Magnetic Compass
- Altimeter
- Temperature Gauge for Liquid Cooled Engine
- Oil Temperature Gauge
- Fuel Gauge
- Landing Gear position Indicator
- Airspeed Indicator
- Manifold Indicator
- ELT
- Seatbelts

Minimum Instruments for IFR – **GRABCARD**

- Generator or Alternator
- (Gyroscopic) Rate of Turn Indicator

- (Sensitive) Altimeter
- Ball (slip/Skid Indicator)
- Clock
- Attitude Indicator
- Radio
- Directional Gyro

Aircraft Inspections

- Annual Inspection
- 100 Hour Inspection (if for hire)
- Transponder Check – 24 Calendar Months
- Pitot Static Check – 24 Calendar Months
- VOR Check – within 30 days

VOR Checks: Must be documented in the Aircraft Logbooks- Date, Location, VOR, and amount of error on each CDI indicator

- Where do you find a list of VOR Check locations? Chart Supplement
- VOT – Avionics Shop
- VOR Ground Check - +/- 4 degrees
- VOR Airborne Check - 6 degrees
- Dual system Check airborne check - 4 degrees difference

Inoperative Equipment –

If an instrument fails that is require or not required. That instrument has to be labeled **INOPERATIVE**
It is up to you as Pilot in Command to determine if a failed instrument must ground the aircraft and the flight, or if you can continue to fly if the instrument is not required to be working for a VFR or IFR flight.

Navigation Databases:

Some navigational GPS units will allow you to fly IFR enroute with an expired navigation database. Our Garmin 430W will not allow you. It states in the Garmin 430 STC that in order to fly IFR all GPS Navigation databases must be current

