CFI Bootcamp
Flight Instructor Training

INSTRUMENT FLIGHT

INSTRUCTOR LESSON PLANS

First Edition

IFR Lesson Plans

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Flight Instructor Training
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Flight Instructor Instrument Lesson Plans

First Edition
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Mike Shiflett's Aviation credentials and experience are as follows:

FAA Certificates
Airline Transport Pilot Certificate – Airplane Muli-Engine Land. CE-525 Type rating
Commercial Pilot Privileges: Airplane Single Engine Land and Sea
Flight Instructor Certificate – Airplane Single and Multi-Engine Land, Instrument Airplane
Former FAA Designated Pilot Examiner – Recreational – ATP including Initial CFI, CFII, MEI

UK Certificates
Commercial Pilot – Airplane Single Engine Land
Former UK Flight Examiner for Private Pilot and IMC ratings

Mike has amassed over 16,000 hours of which most was in general aviation aircraft. He also adminis-tered around 3,000 practical tests (Checkrides) for the FAA.

Mike has authored numerous courses used by top flight schools and Universities in his previous company. At CFI Bootcamp he authored all the course content including 42 hours of video, 10 books used by students at CFI Bootcamp and has been featured in many aviation media organizations. He has also presented at EAA Airventure – Oshkosh, WI, Sun-n-Fun and Aviation conferences as a speaker. He also produced a Podcast "Flight Training the way I see it", and has a weekly webinar called "The Power Hour". The CFI Bootcamp website has links to the webinar and previous Podcasts.

He continues to innovate in the aviation industry and is particularly focused on creating courses and training materials to produce better flight instructors.

Mike currently lives in both San Jose, CA and more often in Miami Beach, FL. He flies from the Opa Locka airport just north of Miami International.

Introduction

These lesson plans cover every area of operation for both the Flight Instructor Instrument Airplane PTS and the knowledge areas for the Instrument Airplane ACS.

The lesson plans can be used in two ways:

1. Read and do exactly what is described (This method works if it's been a while, or you are newly minted CFII).
2. Use it as a checklist. Read the elements of the lesson plan in order.

The lesson plans include many references such as specific FAR's, Chapters of the AIM and so on. They are built into the lesson plan, so you don't have to look them up.

Remember that a lesson plan is to be sure you cover all of the content and budget enough time to complete the lesson. Lesson plans are not for the student, until the lesson is over. Giving a lesson plan to the student or projecting it will not deliver a better lesson. The student will begin reading the lesson plan while you are talking and not hear what you are saying. Once you deliver the lesson you can give the student a copy or go over any additional items.

Practice teaching these lessons aloud. You'll be able to hear, and fix, any problems with the flow or the content of the lesson.

I hope that you find these lesson plans useful for your checkride and when teaching students. I have been working on these for a long time and I'm sure they will work for you and save you an enormous amount of time.

Mike Shiflett – Miami Beach, FL - November 20, 2021

AEROMEDICAL FACTORS

Objective

To become familiar with Aeromedical factors.

Motivation

It's almost a sure thing that you will have a passenger who exhibits a medical symptom from being in the air. Knowing how to identify what they are having trouble with and then taking the corrective action is why you need to understand Aeromedical factors.

Presentation: 45 Minutes

What it is	Causes	Symptoms	Corrective actions
Hypoxia	Lack of oxygen	Headache, Dizziness, Numbness in extremities, Cyanosis	Lower altitude or supplemental oxygen
Hyperventilation	Not enough CO2, Nervousness, Anxiety, Fright	Clammy sweaty skin, rapid breathing	Breath More Slowly
Middle ear and sinus problems	Inflammation, Disease, Cold / Flu	Pain due to pressure difference	Valsalva method, Clear ears, descend more slowly
Spatial Disorien-tation	Loss of horizon or visual reference	Loss of control, Confusion of airplane attitude	Use the flight instruments
Motion Sickness	Motion not matching visual cues	Clammy skin, Pale color, hot, Nausea	Look out to the horizon, climb to avoid turbulence, Open ventilation, Sick sack
Carbon monoxide poisoning	Hypoxia caused by CO.	Same as hypoxia except red extremities in the later stages	Turn off heater, land, ventilate cabin
Stress and fatigue	Chronic or Acute	Delayed reaction, not thinking well, Fatigued, Loss of Muscle control	Acute - Rest and eliminate stress Chronic – Under care of physician
Dehydration	Loss of water or electrolytes	Loss of balance or muscle control, Confu-sion, Disorientation	Restore electrolytes and hydrate

Alcohol	Produces hypoxia like symptoms and dehydration	8 hrs. before last drink, 0.04% BAC, Not under the influence	Wait
Drugs	Prescription vs. Non prescription	Varies	Use AOPA guide to drugs
Scuba – Nitrogen	Nitrogen excess	Produces the bends	24 hours waiting for a controlled ascent, 12 for non-con-trolled ascent

Completion Standards

This lesson is complete when the student demonstrates a basic understanding of aeromedical factors during oral quizzing and completion of homework exercises.

References

Airplane Flying Handbook (FAA-H-8083-3a)
FAR / AIM (FAA-H-8083-25B)
NTSB reports
Personal stories
FAA-S-ACS-6B

REGULATIONS AND PUBLICATIONS RELATED TO IFR OPERATIONS

OBJECTIVE

For the pilot to have a working knowledge of the regulations and publications available so the pilot can compeletly with any regulatory requirement.

MOTIVATION

Understanding the regulations and publications keeps the pilot in compliance with any regulatory requirement.

PRESENTATION: 60 MINUTES

1. Review of general content of FAR Part 61, 71, 91 and 97:
   a. Part 61 – Certification requirements (61.65) and saying current (61.57).
   b. Part 71 – Designation of A, B, C, D, and E airspace. Review 71.1 – 71.71 and 71.901.
   c. Part 91 – General operating and flight rules. Review IFR regulations (91.167 – 91.187), 91.205.
   d. Part 97 – Standard instrument procedures. Review (97.1 – 97.5).
2. FAR 91.175 - Emphasize when a pilot can descend below DA/MDA using the approach lighting system only – Can descend 100 feet above touchdown zone elevation with any approach lighting system. May descend further if using an ALSF-1 or 2 because they have either red terminating lights or red side bar lights.
3. Use AC 61-65 to see a CFII can do the following:
   a. Endorse for the instrument knowledge test
   b. Endorse for an instrument rating practical test
   c. Endorse for completion of an Instrument proficiency check (IPC)
   d. Endorse to authorize an IGI to teach IFR ground.
   e. Endorse for an initial CFII rating if the CFII meets the requirements (61.195(h)).

   f. Endorse for an additional rating (CFII) on a flight instructor certificate.

4. A CFII may also provide the 10 hours of instrument training required for a Commercial Pilot Certificate (61.129(a)(3)(i).

Instrument Flying Handbook – FAA-H-8083-15:

1. Show the general content of the handbook by chapter.
2. Updated as needed – No set schedule

Aeronautical Information Manual (AIM):

1. Assign reading of Chapters 4 and 5 of the AIM. Instruct the student to read over the sections that are new to them, or they have not used in a while. It typically takes an hour for each chapter.
2. Review all other parts of the AIM, Chapters 1-3 and 6-9 to show what's in each chapter.
3. Show the student Appendix 3 in the AIM – Abbreviations/Acronyms for use when needed.
4. Updated every 4 weeks

Practical Test Standards (PTS) and Airman Certification Standards (ACS):

1. Instruct the student that the PTS is valid for Flight Instructor Instrument Airplane and there are special emphasis areas and other important information that appear before the required Areas of Operation. Review all areas of operation prior to the practical test.
2. For use with an Instrument Rating or IPC show the student the required tasks and review it prior to the practical test. The appendix contains important information such as the use of autopilot, loss of primary flight instruments, performing a non-radar vectored approach etc. There are also tables in the appendix that show what will be tested for a pilot who holds an instrument rating in another category and wants to add an instrument rating to airplane single ending land. For conducting an IPC there is a table showing the required tasks.
3. The PTS is not currently being updated. The ACS is updated as needed with not set schedule.

Chart Supplements (Airport Facility Directory in the CFII PTS):

1. Issued every 56 days.
2. Contains chart NOTAMS, airport information, Navigational Aid information and Hot Spots.
3. Explain how to use the Chart Supplements by using the legend and decoding at least one airport information page and chart NOTAM.

Standard Instrument Departures/Terminal Arrivals:

1. Explain what a SID, Obstacle departure procedure (ODP), and diverse vector area are. ODP and diverse vector areas are shown in the terminal approach procedures pack under Takeoff minimums, (Obstacle) departure procedures, and diverse vector area (Radar Vectors) or under the airport information button in ForeFlight and then departure. Note that on FAA charts SIDS

are not to scale and can't be geo referenced. Jeppesen charts are to scale and can be geo referenced. Note that weather Takeoff minimums don't apply but the required climb gradients apply. If no climb gradient is specified, the default is 200ft/nm. Also, no turns can be made below 400 AGL. (AIM 5-2-9).

2. Updated every 28 days.

En Route Charts:

1. Review the legend with the student. Any symbol on any chart can be found in the Aeronautical chart users guide at faa.gov.
2. Review the following key points on the En Route Chart:
    a. Issued every 28 days
    b. No terrain is shown
    c. MEAs – Minimum enroute altitude – Shown on airways as an MSL altitude above the line indicating the airway. It provides navigation coverage over the entire airway and terrain clearance of 2000 feet in mountainous areas and 1000 feet in non-mountainous areas.
    d. MOCAs – Minimum obstruction clearance altitude -are shown below the MEA as a MSL altitude with an asterisk (*) before the number. The MOCA provides 2000 feet of terrain clearance in mountainous areas and 1000 feet in non-mountainous areas, but navigation is only within 22 miles of the VOR defining the airway.
    e. A map of the designated non-mountainous and mountainous areas is in the AIM 5-6-16.
    f. MCA – Minimum crossing altitude – Flag with an X in the flag. You must cross the fix at or above this altitude.
    g. MRA – Minimum reception altitude – The minimum altitude you need to be at to identify this fix. A flag it at the fix or navaid with the letter R on the flag.
    h. Airways – Navigation aid types and frequencies to use. Radials/course depiction, Fixes with no MEA change, fixes with an MEA change (T-marking), Airway distances: Total, to a fix, from fix to fix.
    i. OROCA – Off route obstruction clearance altitude – Used when not on an airway. Denoted in brown numbers in the middle of each quadrant of longitude and latitude lines. Provides 2000 feet of terrain clearance in mountainous areas and 1000 feet in non-mountainous areas.
    j. Airports: Green have instrument approach procedure(s), Blue have instrument approach procedure(s) and have military function. Examples are: Beale Airforce base – Not available to civil aircraft. Fresno Yosemite airport – Mixed use – one side is Air force the other is civilian. Brown do not have any instrument approaches.

Standard Instrument Approach Procedure Charts

1. Used to connect to the enroute chart and provide an instrument procedure that allows an airplane to land at an airport.
2. Published every 28 days.
3. Paper versions have Non-Standard Alternate Minimums in the front of the pack. There are also,

sections for Takeoff Minimums, (Obstacle) Departure Procedures and Diverse Vector Areas (Radar Vectors). The rest of the book contains the instrument approach procedures that are available to the airports that have them in the geographical area.

4. Show the student the city name, type of the approach and other FAA designators around the perimeter of the chart. Also shown are the effective and expiration date of the chart.

   NOTE: Jeppesen doesn't show an expiration date. They require a subscription and therefore say that if your subscription is current you have current charts.

5. Show the briefing strip and how its organized to be in the typical order you need.
6. Show the plan view. Explain that the plan view is North up and there can be shading to show terrain. Show what items are on the briefing strip that are also on the plan view.
7. Show the profile view. Show symbology about altitudes, what an asterisk (*) (or hashtag (#) means. Show the missed approach dashed line.
8. Show the iconic missed approach.
9. Show the minimums section and explain how to determine the category for the airplane to be flown (FAR 97.3). Show the inoperative components of an approach lighting system table in the front of the book and how to apply corrections to the printed minimums.
10. Show the airport diagram and show an example of ground speed to time to determine the missed approach point on some non-precision approaches.

RISK MANAGEMENT

As this is a technical subject area for Flight Instructor Instrument Airplane and there is currently not an ACS available, there are no risk management tasks.

COMPLETION STANDARDS

To determine the applicant exhibits instructional knowledge of the elements related to regulations and publications (related to instrument flight instruction) their purpose, general content, availability, and method of revision

LOGBOOK ENTRIES RELATED TO INSTRUMENT INSTRUCTION

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Certification: Pilots and Flight and Ground Instructors
Date: 8/27/18
Initiated by: AFS-800
AC No: 61-65H
Change:

OBJECTIVE

To understand the logbook entries, regulatory requirements and endorsements for recommendation for an Instrument Rating, IPC, Initial CFII rating, additional flight instructor rating, ground instructor authorization, and the required flight instructor records.

MOTIVATION

As a CFII you will are permitted to do all of the above training and recommendations.

PRESENTATION: 30 MINUTES

NOTE: As a CFII you will are permitted to do all of the above training and recommendations.

1. AC 61-65: Certification: Pilots and Flight and Ground Instructors.
2. Logging training time in a logbook or training record (61.51).
3. Logging simulated and actual instrument conditions of flight (61.51).
4. Logging PIC time for a pilot who is rated in the same category and class while receiving dual instruction – Can log PIC even in the clouds if they are sole manipulator of the flight controls (61.51).
5. Preparation of endorsements and recommendation for an Instrument Rating:
    a. FAR 61.65 details the requirements
    b. AC 61-65 provides the sample endorsements to be given:
        i. Knowledge test
        ii. Flight proficiency
        iii. Training within 2-calendar months of the practical test
        iv. Prepared for the practical test
        v. Resolved the deficient areas found on the knowledge test
6. Endorsement for successful completion of an instrument proficiency check (IPC).

a. FAR 61.57(c) and (d) address recency of experience and IPC requirements.
b. Instrument rating airplane ACS in the appendix shows the required tasks.
c. AC 61-65 provides the sample endorsement to give.

7. Preparation of endorsements and recommendation for a Intial Flight Instructor – CFII
    a. Limitations – You must meet the requirements of 61.195(h).
    b. AC 61-65 provides the sample endorsements to be given:

i. Fundamentals of instructing
ii. Knowledge tests (FOI and FII)
iii. Flight proficiency
iv. Spin endorsement
v. Training withing 2-calendar months of the practical test
vi. Prepared for the practical test
vii. Resolved the deficient areas found on the knowledge tests.

8. Preparation of endorsements and recommendations for the addition of an instrument rating on an existing flight instructor certificate.
   a. Not subject to the limitations of 61.195(h) – Not an initial certificate.
   b. AC 61-65 provides the sample endorsements to be given:
      i. Knowledge test
      ii. Flight proficiency
      iii. Training within 2-calendar months of the practical test
      iv. Prepared for the practical test
      v. Resolved the deficient areas found on the knowledge test
9. Endorsement for Recent Experience Requirements of an Instrument Ground Instructor.
   a. FAR 61.217 addresses what must be done – A new IGI needs this endorsement.
   b. AC 61.65 provides the sample endorsement to give:
      i. Ground Instructor that does not meet the recent experience requirements.
10. Flight Instructor Records:
   a. 61.189 – The only records that need to be kept for a CFII are:
      i. Any person endorsed for a knowledge or practical test and the result of the tests.
      ii. Must be kept in a logbook or training record for at least 3 years.
      iii. Ground instruction and flight instruction must be logged in the students logbook or training record any time you give it.

RISK MANAGEMENT

1. There are no risk management tasks as this is a PTS requirement for Flight Instructor Instrument Airplane.

COMPLETION STANDARDS

1. To determine that applicant exhibits instruction knowledge of logbook entries related to instrument instruction by describing:
   a. Logbook entries or training records for instrument flight/instrument flight instruction or ground instruction given.
   b. Preparation of a recommendation for an instrument rating practical test, including the appropriate logbook entry.
   c. Required endorsement of a pilot logbook for satisfactory completion of an instrument proficiency check.
   d. Required flight instructor records.

PILOT QUALIFICATIONS

OBJECTIVE

To determine how a pilot can meet the certification and recency of experience requirements to act as pilot in command (PIC) of an airplane under instrument flight rules.

MOTIVATION

Every IFR pilot needs to know when they can accept and file an IFR flight plan and act as PIC under IFR.

PRESENTATION: 20 MINUTES

1. The addition of an instrument rating allows a pilot to fly in other than VFR weather subject to any limitations on airplane performance and visibility requirements for instrument approach procedures or departure procedures.
2. A pilot must be at least 17 years old and hold at least a Private Pilot Certificate.
3. A pilot needs a 3rd class medical or higher, or Basic Med.
4. Aeronautical experience requirements are found in FAR 61.65(c). Certification requirements for an Instrument Rating for Airplane Single Engine Land:
    a. 50-hours of cross-country time as pilot in command (Not required for 141 programs)
    b. 40 hours of actual or simulated instrument time of which 15 hours must have been received from a CFII and that time includes:
        i. Three hours of instrument flight training within 2 calendar months of the practical test
        ii. Instrument training on cross-country procedures including one cross country flight with a CFII performed under instrument flight rules, when a flight plan has been filed with an ATC facility and that involves:
            1. A flight of 250 nautical miles along airways or by directed routing from an ATC facility
            2. An instrument approach at each airport
            3. Three different kinds of approaches with the use of navigation systems
5. A full motion simulator or aviation training device may be used for up to 20 hours of the 40 re-

quired provided a CFII provides that training. FAR 61.65(h) and (i).

6. Aeronautical knowledge required is found in FAR 61.65(b). A knowledge test and an endorsement to take it is required. The passing score is at least 70%.
7. Flight proficiency required is found in FAR 61.65(c).
8. A pilot must be endorsed and must pass a practical test.

Recency of experience to act as PIC of an airplane under IFR – FAR 61.57(c):

1. Must within the last 6 months have done the following:
   a. 6 approaches
   b. Holding procedures and tasks
   c. Intercepting and tracking courses using navigational electronic systems
2. If this has not been done the pilot has another 6 months to meet the recency of experience requirements by using an appropriately rated safety pilot or with a CFII
3. If it has been over one year since the pilot was current an Instrument Proficiency Check (IPC) from a CFII, DPE or FAA Inspector is required (FAR 61.57(d). The required tasks are in the appendix of the Instrument Rating Airplane ACS.
4. A flight training device may be used to remain or regain currency within the one-year period. This does not have be done with a CFII.
5. Pilots are required to log any time that proves that they meet an aeronautical experience requirement or have received an IPC.

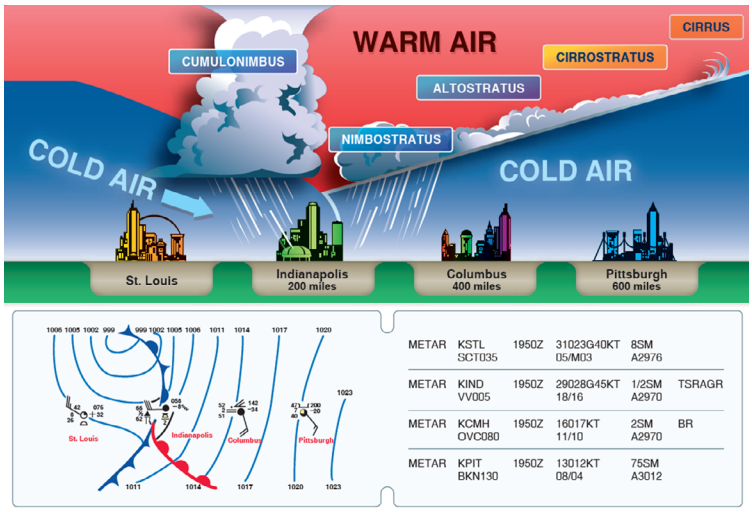
RISK MANAGEMENT

1. Failure to distinguish proficiency versus currency.
2. Failure to set personal minimums.
3. Failure to ensure fitness for flight and physiological factors that might affect the pilot's ability to fly under instrument conditions.
4. Flying unfamiliar airplanes or operating with unfamiliar flight display systems and avionics

COMPLETION STANDARDS

1. Apply requirements to act as PIC under Instrument Flight Rules (IFR) in a scenario given by the evaluator.

WEATHER INFORMATION



OBJECTIVE

To understand aviation weather products to use in cross-country flight planning, the decision to go/no-go and what fuel requirements and alternates are required.

MOTIVATION

Every IFR flight will require a pilot to gather information and make a go/no-go decision.

PRESENTATION: 45 MINUTES

1. Acceptable sources of weather data for flight planning purposes (91.103):
    a. National Weather Service
    b. Flight Service – 800wxbrief and 800wxbrief.com
    c. ForeFlight
    d. aviationweather.gov – can register and then it's a legal briefing
2. Current and forecast weather for flights conducted under IFR for:
    a. Departure – No visibility requirements operating under Part 91
    b. En route – Freezing level, Pireps, Airmets/Sigmets, Turbulence, Radar, Convective Sigmets, Center Weather Advisory (CWA).
    c. Alternate – Meet requirements of 91.167 and 91.169
    d. Destination – Meet requirements of 91.167
3. Expected climate and hazardous conditions such as:
    a. Atmospheric composition and stability
    b. Wind
    c. Temperature

d. Moisture/Precipitation
e. Weather system formation including air masses and fronts
f. Clouds
g. Turbulence
h. Thunderstorms and mircobursts
i. Icing and freezing level information
j. Fog/Mist
k. Frost
l. Obstructions to visibility (e.g., smoke, haze, volcanic ash, etc.)

NOTE: Use appropriate charts in a IFR flight planning scenario where the items in line 3 above can be discussed.

4. Flight desk displays of digital weather and aeronautical information.
   a. ADS-B on panel mounted avionic systems
   b. ADS-B on EFB devices

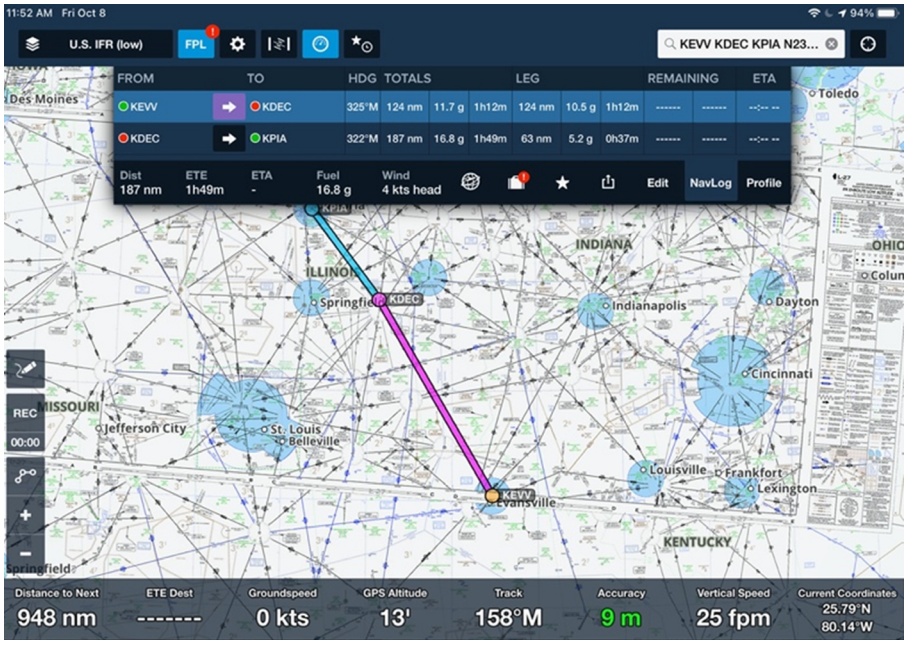
RISK MANAGEMENT

1. Factors involved in making a go/no-go decision and continue/divert decisions to include:
   2. Circumstances that would make diversion prudent
   3. Personal weather minimums

COMPLETION STANDARDS

1. Use available aviation weather sources to obtain an adequate weather briefing.
2. Analyze the implications of at least three of the conditions listed as part of line 3 above using actual weather or weather conditions in a scenario provided by the evaluator.
3. Correlate weather information to make a competent go/no-go decision.
4. Determine whether an alternate airport is required, and, if required, whether the selected alternate airport meets the regulatory requirements.

CROSS-COUNTRY FLIGHT PLANNING



OBJECTIVE

To plan a flight under IFR to another airport considering the weather, route, fuel requirements, altitude and alternate requirements.

MOTIVATION

Planning a flight under IFR ensures the highest degree of safety and that the pilot and airplane meet any regulatory requirements.

PRESENTATION: 60 MINUTES

1. Selection of destination airport considering:
    a. Location
    b. Altitude, terrain and other obstacles
    c. Runway lengths
    d. Temperature – Current and Forecast
    e. Instrument approaches and types available
2. Weather from the departure to destination airport including:
    a. Convective activity
    b. Freezing level
    c. Ceiling/tops
    d. Visibility – at the departure and destination airports

e. Wind – Surface and aloft
f. Current observations – METAR, AWOS, ASOS
g. Forecasts – TAF, Graphical Forecast for Aviation (GFA)
h. Other charts and products as necessary
i. Application of personal minimums – Go/no-go decision
j. Application of Risk Management - PAVE
k. Requirements for an alternate airport

3. Type of planning – Manual or Electronic
   a. Manual:
      i. Use enroute chart and IFR plotter (Not the same scale as a sectional chart).
      ii. Courses shown on en route charts are magnetic; therefore, must be converted to true or the winds aloft need to be converted to magnetic to calculate the wind correction angle.
      iii. Calculate all courses and distances based upon expected route and approach.
      iv. Determine the top of descent (TOD) using the appropriate chart. If there is no chart, then use: (Cruising altitude – Airport altitude)/500 = Minutes required to descend. Minutes * (Descent speed/60) = Distance to descend. Plot this point on the chart and when appropriate add to the navigation log. Use cruise fuel GPH if no descent chart/table is available.
      v. Calculate the top of climb (TOC) using an appropriate chart and complete the navigation log. (Typically, there are no wind or groundspeed corrections made to the climb or descent as the airplane is only doing that for a short period of time relative to the trip time. Adding several minutes of fuel to the flight plan is a good practice to compensate for this)
      vi. Calculate the wind correction angle(s) for the route and apply them to the plotted course. (If magnetic was used for plotted and wind the variation is already included in the calculation).
      vii. Calculate the ground speed and determine the time on each leg.
      viii. Calculate the fuel required on each leg based upon the appropriate chart and power setting for the TAS desired. Add at least 45 minutes of additional fuel.
      ix. Because the approach or routing to the approach is typically not known a reasonable estimate of additional time/fuel can be added to the navigation log. This is dependent on the airplane.
      x. Determine the time enroute and convert to UTC time when estimated ETA.
      xi. Plan using a navigation log from the destination airport to the alternate in the same way if one is required. Add extra fuel as the 45 minutes of required fuel will already be included from the flight to the destination.
   b. Electronic:
      i. Ensure the profile for the airplane to be used is correct in the EFB
      ii. Perform a weather briefing to the destination and any alternates
      iii. Use the flight plan feature of the EFB and input the routing and altitudes
      iv. If using ForeFlight, use the route advisor located in the flight planner to determine the route most likely that will be assigned by ATC if available.
      v. View the completed flight plan and add the necessary fuel reserves.

4. Elements of an IFR flight plan:
    a. ICAO flight plan is required (The form is at the back of this lesson plan).
    b. A determination of navigation equipment is required. (Instructions are at the back of this lesson plan).
    c. If filing a non-electronic flight plan, file by calling flight service or 800wxbrief.com.
    d. If filing an electronic flight plan use the file feature in the EFB to file the flight plan.
5. Procedures for activating/closing an IFR flight plan in controlled/uncontrolled airspace:
    a. Controlled airspace procedure:
        i. Departing in controlled airspace with a control tower – Receive clearance from the control tower.
        ii. Departing in controlled airspace without a control tower (Class E to the surface) – Receive a clearance from flight service via radio or telephone.
        iii. After arrival in controlled airspace with a control tower – The flight plan will be closed automatically.
        iv. After arrival in controlled airspace without a control tower – Close the flight plan via radio, phone or 800wxbrief.com as soon as possible.
    b. Uncontrolled airspace procedure:
        i. Departing in uncontrolled airspace – Receive a clearance from flight service via radio or phone. It will include a clearance void time. The airplane must be airborne by this time of the clearance is void.
        ii. After arrival in uncontrolled airspace – Close the flight plan as soon as possible by radio or phone.

RISK MANAGEMENT

1. Demonstrate the ability to identify, assess and mitigate risks encompassing:
    a. Pilot.
    b. Aircraft.
    c. Environment (e.g., weather, airports, airspace terrain, obstacles).
    d. External pressures.
    e. Limitations of air traffic control (ATC) services.
    f. Limitations of electronic planning applications and programs.
    g. Improper fuel planning.

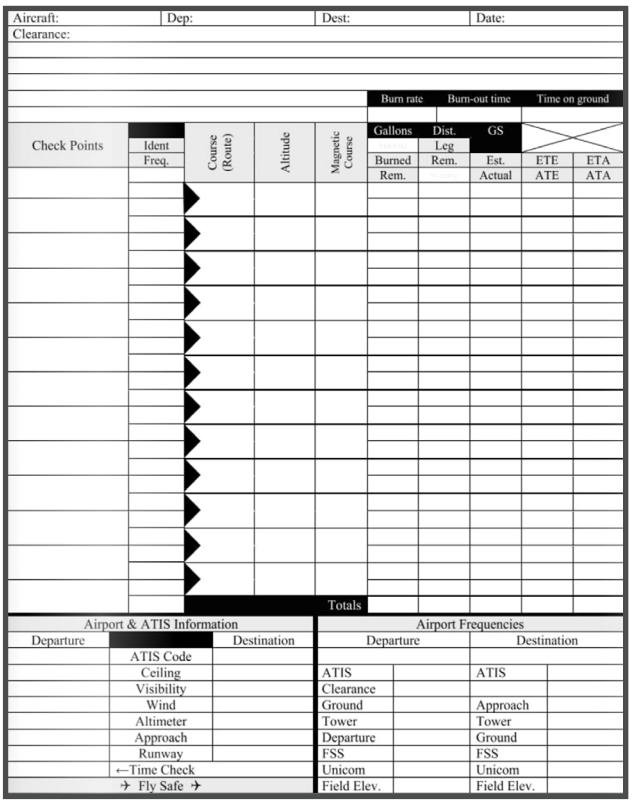
COMPLETION STANDARDS

1. Prepare, present and explain a cross-country flight plan assigned by the evaluator including a risk analysis based on real time weather which includes calculating time en route and fuel considering factors such as power settings, operating altitude, wind, fuel reserve requirements, and weight and balance requirements.
2. Recalculate fuel reserves based on a scenario provided by the evaluator.

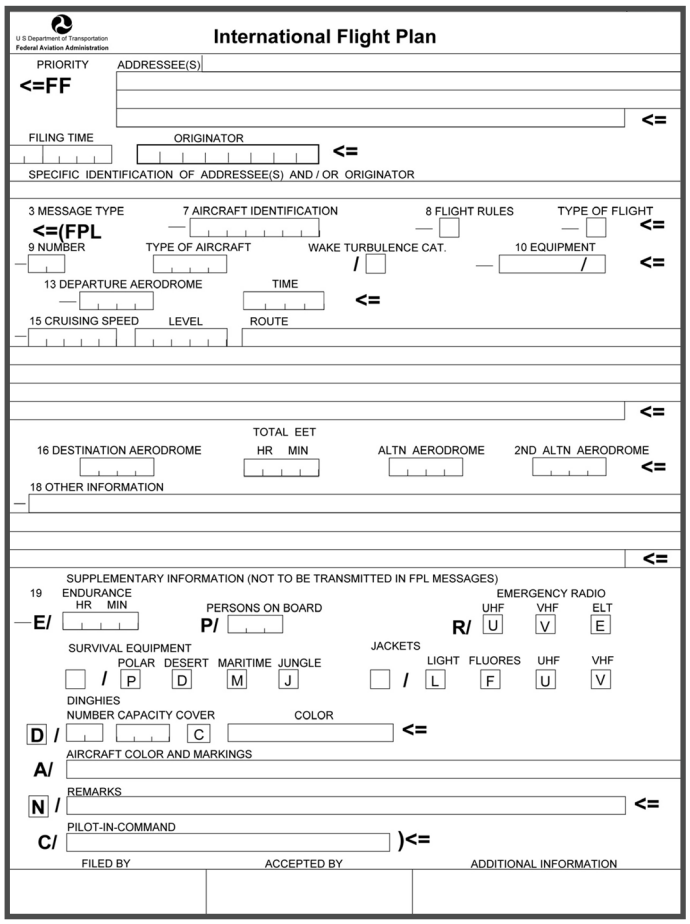
3. Create a navigation plan and simulate filing an IFR flight plan.
4. Interpret departure, arrival, en route, and approach procedures with reference to appropriate and current charts.
5. Recognize simulated wing contamination due to airframe icing and demonstrate knowledge of the adverse effects of airframe icing during pre-takeoff, takeoff, cruise and landing phases of flight as well as the corrective actions.
6. Apply pertinent information from appropriate and current aeronautical charts, Charts Supplement, NOTAMs, runway/taxiway closures; other flight publications.

RELATED IMAGES

Example IFR Navigation Log



ICAO Flight Plan



STS/ Special Handling Reasons

ALTRV	altitude reservation	HUM	Humanitarian
ATFMX	exempt from ATFM	FFR	Fire fighting
FLTCK	Flight Check	HEAD	Head of State
HAZMAT	Hazardous Materials	SAR	Search and Rescue
MEDEVAC	Life-critical medical flight	HOSP	Medical Flight
MARSA	Military assumes responsibility for separation of aircraft		
NONRVSM	Non-RVSM requesting operations in RVSM airspace		
STATE	Military, customs, or police		

PBN/ capabilities (8 max)

A1 RNAV 10 (RNP10)

RNAV 5
B1 All (at least B1-B5)
B2 GNSS
B3 DME/DME
B4 VOR/DME
B5 INS or IRS
B6 LORANC

RNAV 2
C1 All
C2 GNSS
C3 DME/DME
C4 DME/DME/IRU

RNAV 1
D1 All
D2 GNSS
D3 DME/DME
D4 DME/DME/IRU

L1 RNP 4

There is no PBN/ code for RNP2; file as NAV/RNP2

RNP 1
O1 All
O2 GNSS
O3 DME/DME
O4 DME/DME/IRU

Approach
S1 RNP APCH
S2 RNP APCH w/BARO VNAV

AR Approach
T1 RNP AR APCH With RF
T2 RNP AR APCH Without RF

See "Filing for Advanced Services" on back panel for detailed guidance by route type.

PER/ Performance Cat.

Categories based on Vref if specified, or 1.3Vso, each at maximum certificated landing weight per CFR 97.3

A less than 91 knots IAS
B at least 91 and less than121 knots IAS
C at least 121 and less than 141 knots IAS
D at least 141 and less than 166 knots IAS
E greater than 166 and less than 211 knots IAS
H Helicopters

Filing for advanced services

Oceanic 50 NM lateral separation (AC 90-105A)
R in Fld 10a
A1 or L1 in Fld 18 PBN/

Oceanic 50 NM longitudinal separation (AC 90-105A)
R and (J5, J6, or J7) in Fld 10a D1 in Fld 10b
A1 or L1 in Fld 18 PBN/

Oceanic 30 NM Longitudinal or Lateral separation (AC 90-105A)
R and (J5, J6, or J7) in Fld 10a D1 in Fld 10b
L1 in Fld 18 PBN/
Note: The ADS-C contract requirements differ for longitudinal and lateral. See AC 90-105 for details.

Performance Based Oceanic Separation:
R, P2, and (J5, J6, or J7) in Fld 10a D1 in Fld 10b
RSP180 in Fld 18 SUR/
In addition to the above, also include:
For 23 NM lateral: L1 in Fld 18 PBN/
For 5 minutes longitudinal: A1 or L1 in Fld 18 PBN/; or RNP2 in Fld 18 NAV/
For 30 NM longitudinal: L1 in Fld 18 PBN/, or RNP2 in Fld 18 NAV/
For 50 NM longitudinal: A1 or L1 in Fld 18 PBN/

RNAV Route Assignment
Q Route: C1, C2, or C4 in Fld 18 PBN/ ; R in Fld 10a
T Route: C1, C2, or C4 in Fld 18 PBN/ ; R and G in Fld 10a
RNAV DP or STAR: D1, D2, D4 in Fld 18 PBN/ ; R in Fld 10a
Include a NAV/ entry to exclude an arrival or departure:
Can fly the RNAV departure only: NAV/RNVD1E2A0
Can fly the RNAV arrival only: NAV/RNVD0E2A1

Datacomm DCL (basic options):
Include Z in Fld 10a and Include in Fld 18 DAT/:
PDC- for ACARS PDC
FANS- for FANS DCL Only
FANSP- for FANS 1/A+ DCL

```
Examples:
DAT/1FANS
DAT/1FANS2PDC
```

Note: DCL does not require a "J" code
In item 10a. Codes J1-J7 indicate en route/oceanic CPDLC (not DCL).
See AC 90-117 Appendix D for full details and all options.

Datacomm En Route Services:
Include appropriate codes in Fld 10a and Fld 18 DAT/
According to AC 90-117 Appendix D.

FAA ICAO FPL Quick Guide (2019)

(FPL-ACID-Flt Rules Flight Type
-AC Type/Wake Cat-Equip.&Capability
-Departure EOBT
-Speed Altitude [sp] Route
-Destination ETE [sp] Alternate(s)
-Other Information)

```
Example:
(FPL-TTT123-IS
-C550/L-SDE1E2GHIJ3J5RWZ/SB1D1
-KPWM1225
-N0440F310 SSOXS5 SSOXS DCT BUZRD
 DCT SEY DCT HTO J174 ORF J121
 CHS EESNT LUNNI1
-KJAX0214 KMCO
-PBN/A1B1C1D1L1 DAT/1FANS2PDC
 SUR/260B RSP180 DOF/180217
 NAV/RNP2 REG/N123A SEL/BPAM
 CODE/A05ED7
```

For more information

FAA ICAO Flight Planning:
http://www.faa.gov/ato?k=fpl

Field 10a (Nav/Com/Appr)

File capabilities in the order shown

N No capabilities
Include no other entries if filed
S Standard
A GBAS Landing Sys.
B LPV (APV w/SBAS)
C LORAN C
D DME

E1-E3 ACARS
E1 FMC WPR
E2 D-FIS
E3 PDC

F ADF
G GNSS
H HF RTF
I INS

J1 CPDLC ATN
J1 VDL Mode 2

J2-J7 CPDLC FANS 1/A
J2 HFDL
J3 VDL Mode A
J4 VDL Mode 2
J5 Satellite Inmarsat
J6 Satellite MTSAT
J7 Satellite Iridium

K MLS
L ILS

ATC Satvoice
M1 Inmarsat
M2 MTSAT
M3 Iridium

When filing ATC Satvoice capability, Include the Aircraft Address in CODE/

O VOR

P1-P9 RCP → See AC 90-117 and AC 20-140C; Requires Ops Approval Auth.
P1 RCP400
P2 RCP240
P3 RCP400 (Satvoice)

R PBN → Must include type of PBN in Field 18 PBN/
T TACAN
U UHF RTF
V VHF RTF
W RVSM → Do not file W unless authorized for RVSM operation
X MNPS
Y 8.33 kHz VHF
Z Other Cap. → Requires NAV/, COM/, or DAT/ in Field 18

Notes:
1. Standard equipment is VOR, VHF, and ILS
2. J1-J7 signify authorization for En Route/Oceanic CPDLC
3. Always file the aircraft registration in Field 18 REG/ when planning a CPDLC login.

Field 10b (Surv)

File Transponder, ADS-B and ADS-C capabilities as applicable, in the order shown. File 'N' only if none of these capabilities are present.

N No capability- include no other entries if filed

Transponder (file no more than one letter)
A Mode A
C Mode A and C

S Mode S, ACID and Altitude
P Mode S, Altitude, no ACID
I Mode S, ACID, no Altitude
X Mode S, no ACID, no Altitude

E Mode S, ACID, Altitude, extended squitter
H Mode S, ACID, Altitude, Enhanced Surveillance
L Mode S, ACID, Altitude, Enhanced Surveillance, extended squitter

ADS-B
B1 1090 MHz out capability, or
B2 1090 MHz out and in capability

U1 UAT out capability, or
U2 UAT out and in capability

V1 VDL Mode 4 in capability, or
V2 VDL Mode 4 out and in capability

Notes:
1. Include Aircraft Address in Field 18 CODE/
2. When compliant with 14 CFR 91.227 and AC 20-165, also include in Field 18 SUR/:
260B *(for 1090 MHz)*
282B *(for UAT)*

ADS-C
D1 ADS-C FANS-1/A, and/or
G1 ADS-C ATN

Note: Always file the aircraft registration in Field 18 REG/ when planning an ADS-C login.

Field 18 (Other Info)

Note:
Do not use an oblique stroke except as part of an indicator. Do not use special characters in Field 18 text.

(File in this order)

STS/	Special Handling (see list)
PBN/	Performance Based Navigation (see list on back)
NAV/	Other Navigation Capability (see advanced services)
COM/	Other Comm. Capability
DAT/	Other Data Application (See AC 90-117)
SUR/	Other Surv. Capability (e.g. 260B RSP180)
DEP/	Non-standard Departure (e.g. MD24)
DEST/	Non-standard Destination (e.g. EMI090021)
DOF/	Date of Flight (YYMMDD, e.g. 121123)
REG/	Registration (e.g. N123A)
EET/	Estimated Elapsed Times (e.g. KZNY0124)
SEL/	SELCAL (e.g. BPAM)
TYP/	Non-standard AC Type
CODE/	Aircraft/Mode S address in hex (e.g. A519D9)
DLE/	Delay (at a fix) (e.g. EXXON0120)
OPR/	Operator
ORGN/	Flight Plan Originator (e.g. KHOUARCW)
PER/	Performance Category (e.g. A)
ALTN/	Non-standard Alternate(s) (e.g. 61NC)
RALT/	Enroute Alternate(s) (e.g. EINN CYYR KDTW)
TALT/	Take-off Alternate(s) (e.g. KTEB)
RIF/	Route to revised Destination
RMK/	Remarks- include any information instructed to include in Remarks (e.g. for NAS Field 11)

AIRPLANE SYSTEMS RELATED TO IFR OPERATIONS

OBJECTIVE

To understand the anti-icing and de-icing capability of an airplane.

MOTIVATION

If an airplane is approved for flight into known icing it expands the utility and reliability for getting to a destination.

PRESENTATION: 15 MINUTES

1. Deicing equipment found on some general aviation airplanes:
    a. De-icing boots – Inflatable – Used on the leading edge of the wing and horizontal stabilizer.
    b. Heated propeller – Electric element at the hub of each blade controlled by cycling in the cockpit. (Typically, automatic control once on)
    c. Heated windscreen – Electric heating element in a portion of the windscreen to allow the pilot to see.
    d. Heated pitot tube – Electric element in the pitot tube.
    e. Heated static system port – Electric element in the static port.
    f. Heated angle of attack vane – Electric element in the angle of attack vane.
    g. Heated fuel system (JET A aircraft) – Usually done with bleed air from a turbine.
    h. Heated air intake – Mostly on turboprop and Jet aircraft.
    i. Alternate air – Lets air from within the cowling serve as induction air on fuel injected aircraft. May be manual or automatic.
    j. Carburetor Heat – On carbureted engines – Uses hot air from the exhaust to heat an area near the venturi in the intake manifold (Venturi is the coldest place there).

   k. Defroster – Hot air directed on the windscreen.

2. Flight into known icing – The airplane can't have a limitation on flying into known icing – Section 2 of the POH (Limitations).
3. Most general aviation airplanes that are not turbine powered have limited ability to operate in icing conditions due to the relatively low service ceiling and climb rate.
4. It is up to the pilot as to how to operate in icing conditions based upon the airplane.
5. A pilot's experience helps choose the safest conditions and alternatives.
6. Even large transport aircraft like the 777 have limited time they can operate in moderate icing. It is the high altitude and rate of climb capability that makes it possible due to a shorter time of encounter.
7. Flying in icing should be minimized to the maximum extent possible.
8. Icing types are more likely at the following temperature ranges:
   a. -2 to -10C Clear Ice
   b. -10 to -15C Mixed Ice
   c. -15 to -20C Rime Ice
9. At temperatures below -20C there are enough contaminates to not let water stay liquid so altitudes with a temperature below that will already be frozen. (Doesn't stick).

RISK MANAGEMENT

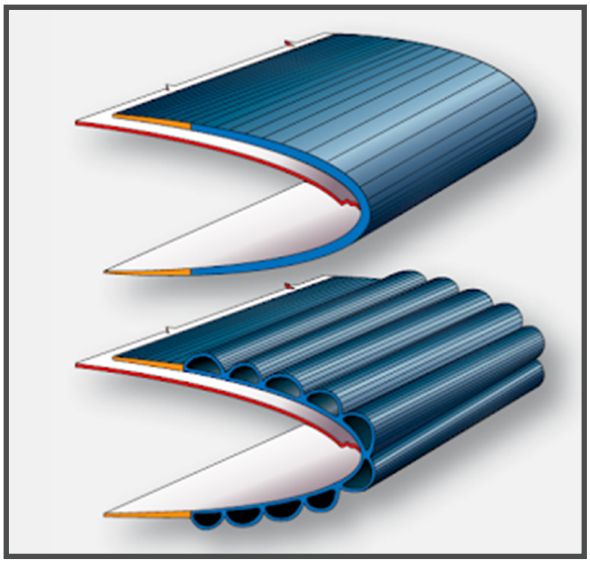
1. Pilots with little or no experience in icing conditions.
2. Limitations on anti-icing and de-icing systems.

COMPLETION STANDARDS

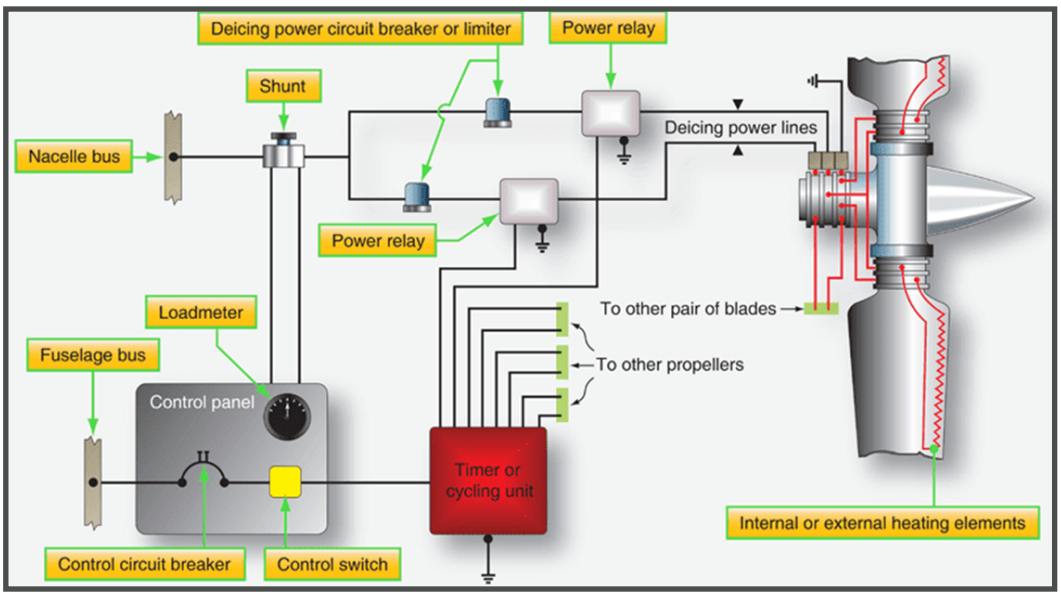
1. Demonstrate familiarity with anti-icing or de-icing procedures or information published by the manufacturer that is specific to the airplane used on the practical test.v

RELATED IMAGES

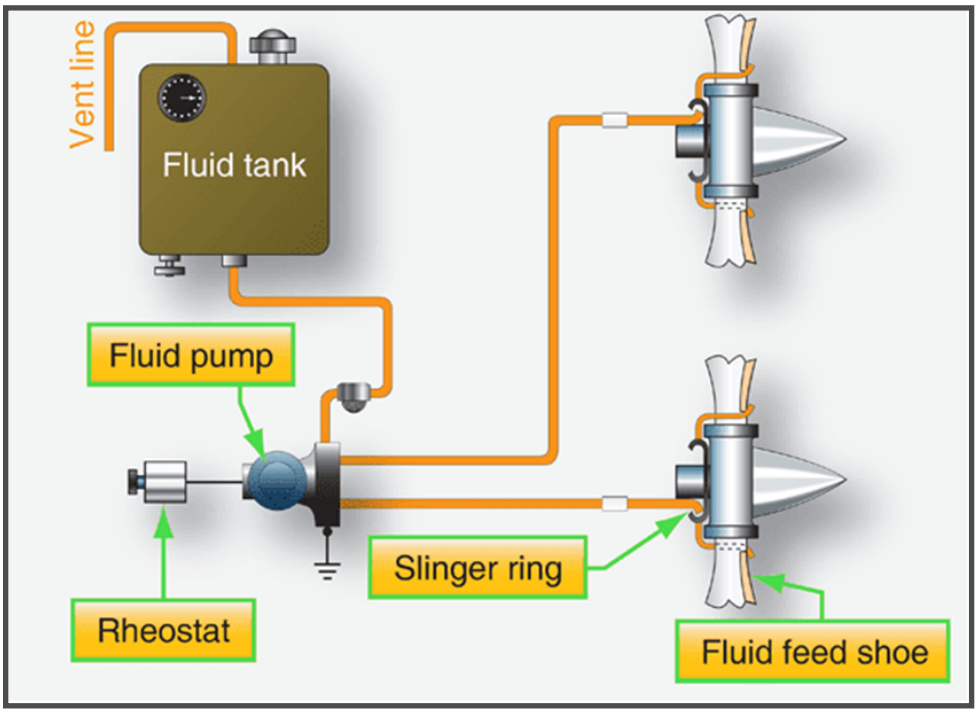
Deicing boot – uninflated and inflated



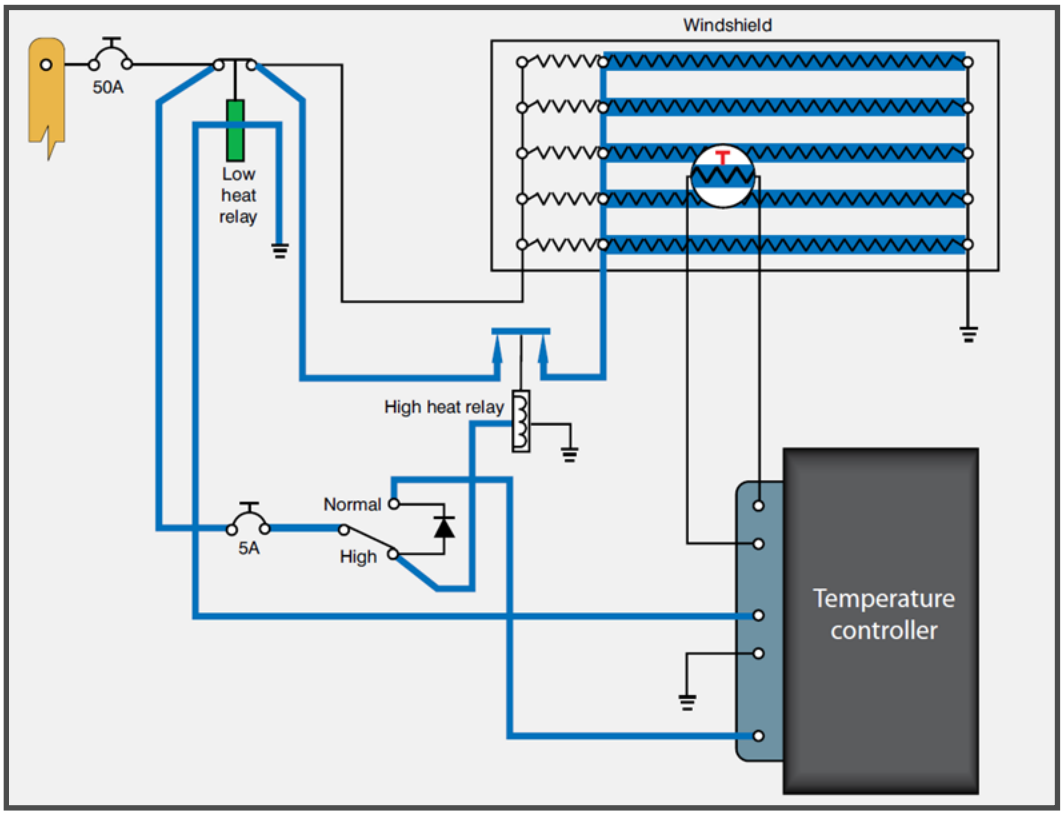
Electrically heated propeller



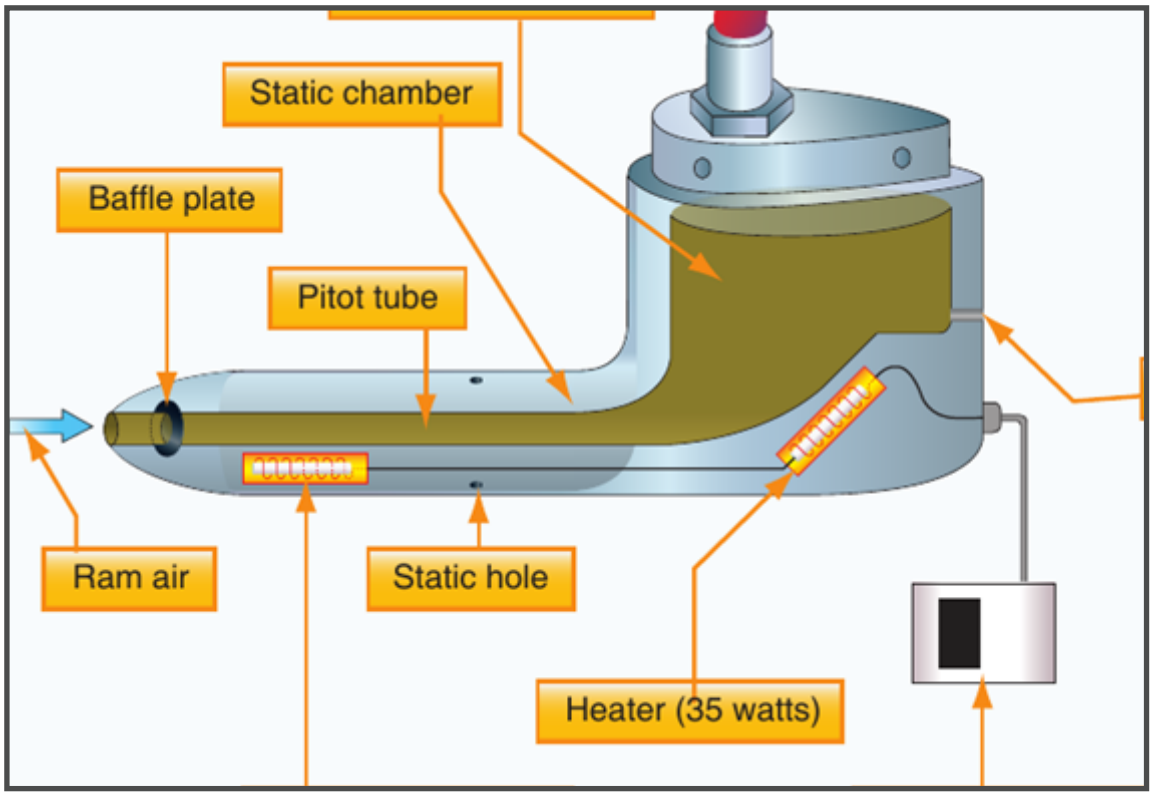
Fluid type propeller deicing system



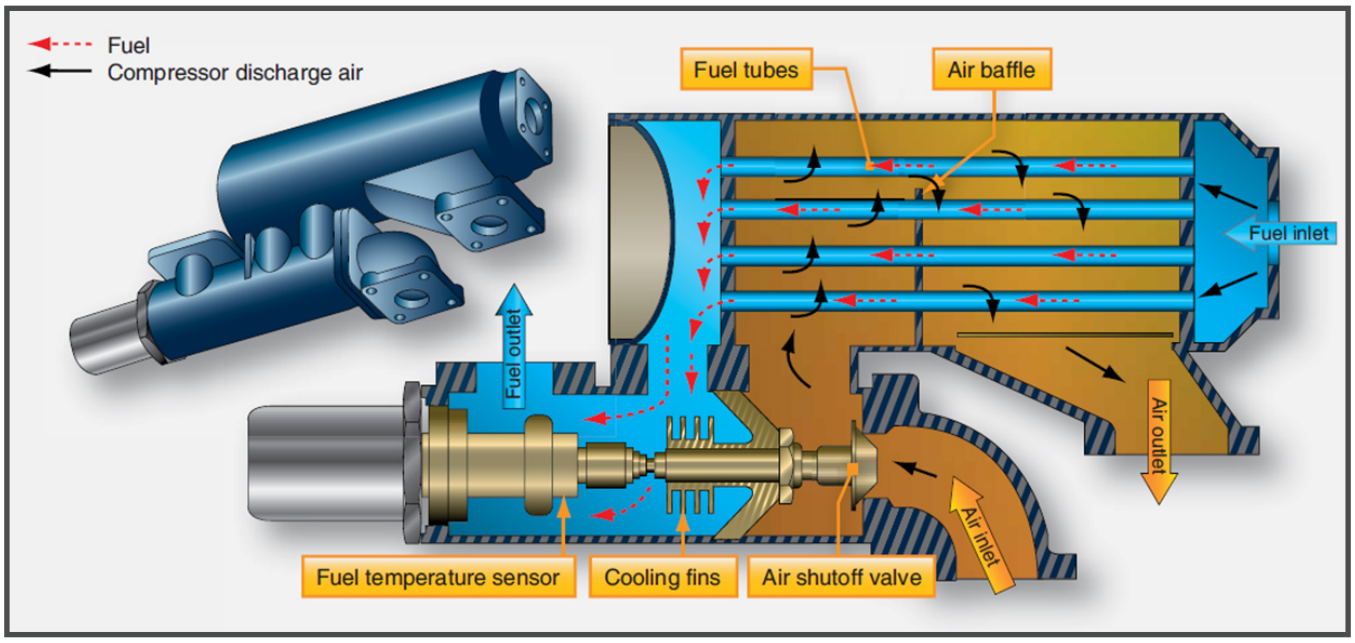
Heated windscreen – Heating elements are in clear plastic



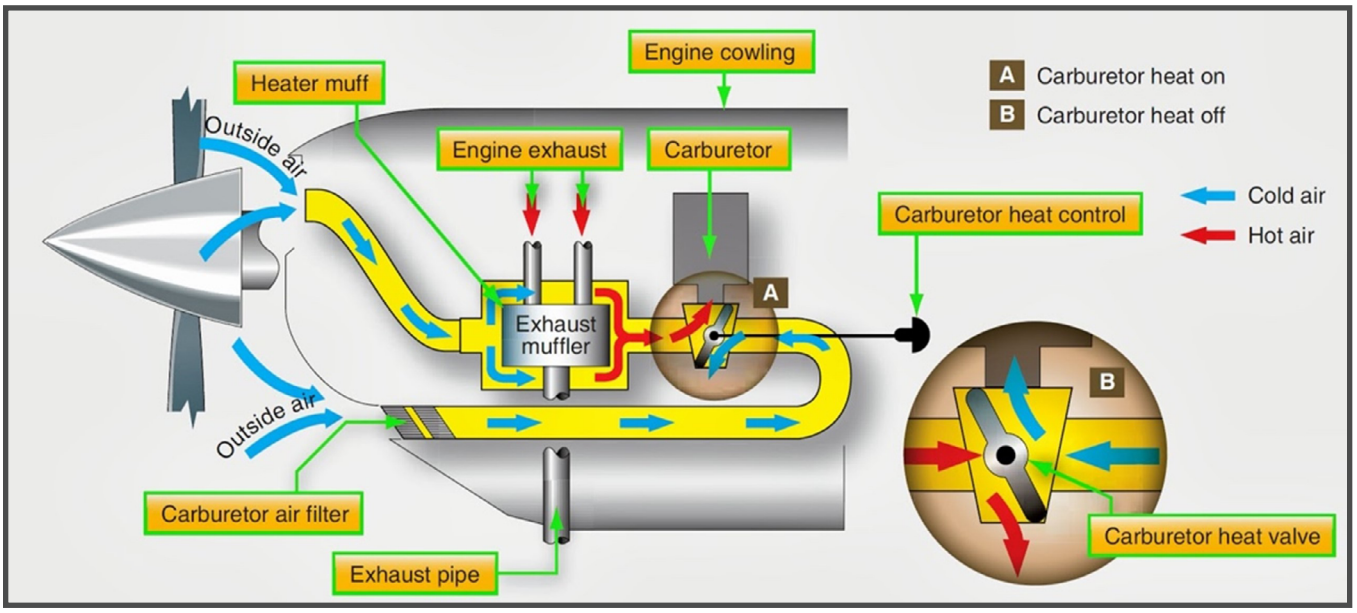
Pitot heater



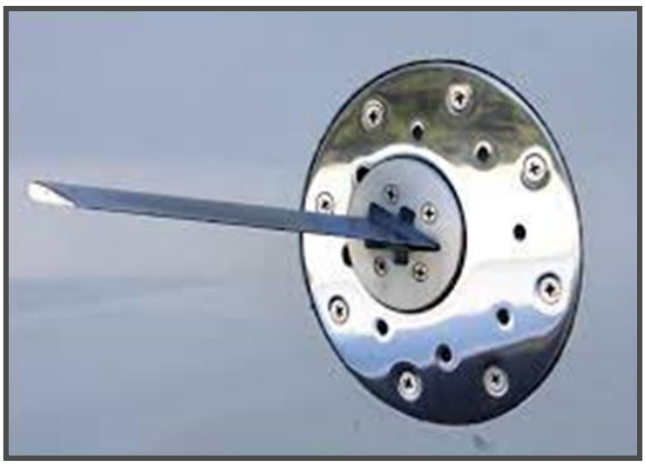
Fuel heater for aircraft using JET A



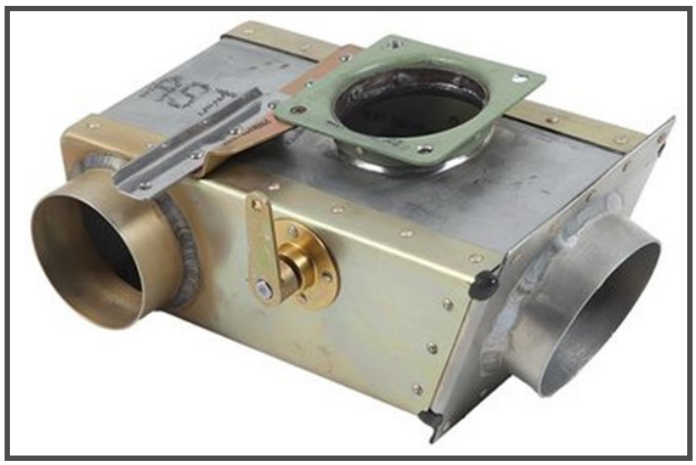
Carburetor Heat Diagram



Heated angle of attack vane



Cessna Carburetor Heat Box



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