

## V.A. Preflight Inspection

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**References:** [Airplane Flying Handbook](#) (FAA-H-8083-3), POH/AFM

Objectives	The student should develop knowledge of the elements related to a comprehensive preflight inspection. The student will understand what to look for during each part of the inspection and have the ability to perform the preflight inspection as required by the checklist and the ACS/PTS.
Key Elements	<ol style="list-style-type: none"><li>1. Aircraft Specific Checklist</li><li>2. Airworthy and Safe</li><li>3. Fuel Grade and Contamination</li><li>4. *Oil Level (4-6 Quarts)</li></ol>
Elements	<ol style="list-style-type: none"><li>1. <a href="#">Reasons for the Preflight Inspection</a></li><li>2. <a href="#">Checklist</a></li><li>3. <a href="#">The Preflight Overview</a></li><li>4. <a href="#">What to Inspect</a></li><li>5. <a href="#">Detecting Problems</a></li><li>6. <a href="#">Ice and Frost</a></li><li>7. <a href="#">Loading and Securing</a></li><li>8. <a href="#">Determining the Airplane is Safe</a></li></ol>
Schedule	<ol style="list-style-type: none"><li>1. Discuss Objectives</li><li>2. Review material</li><li>3. Development</li><li>4. Conclusion</li></ol>
Equipment	<ol style="list-style-type: none"><li>1. White board and markers</li><li>2. References</li></ol>
IP's Actions	<ol style="list-style-type: none"><li>1. Discuss lesson objectives</li><li>2. Present Lecture</li><li>3. Ask and Answer Questions</li><li>4. Assign homework</li></ol>
SP's Actions	<ol style="list-style-type: none"><li>1. Participate in discussion</li><li>2. Take notes</li><li>3. Ask and respond to questions</li></ol>
Completion Standards	The student can perform a comprehensive preflight inspection, understanding what to look for at each part of the inspection. The student will be able to determine whether or not the airplane is airworthy and in a condition for safe flight.

## Instructor Notes:

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### Introduction:

#### Attention

Interesting fact or attention-grabbing story

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We don't want to find a problem with the airplane while we're in the air. For that reason, we perform a thorough preflight on the ground, allowing us to find and fix any problems before getting airborne, where issues are considerably more difficult to deal with.

#### Overview

Review Objectives and Elements/Key ideas

#### What

The preflight inspection is a thorough check of the airplane to ensure airworthiness and safety prior to flight.

#### Why

The accomplishment of safe flight begins with a careful preflight inspection. The preflight inspection determines the airplane is legally airworthy, and that it is in a condition for safe flight.

### How:

#### 1. Reasons for the Preflight Inspection

- A. To ensure that the airplane meets regulatory airworthiness standards and is in a safe mechanical condition prior to flight
  - i. Airworthy: The aircraft and its components meet the airplane's type design or is in a properly altered configuration and is in a condition safe for operation

#### 2. Checklist

- A. The POH must be the reference for conducting the visual preflight inspection
  - i. Preflight checklist is located in Chapter 4 of the POH
  - ii. Each manufacturer has a specified sequence to follow for their specific aircraft
  - iii. Using a different checklist will result in missing equipment and confusion
- B. Always have the checklist to be used as a reference to ensure everything is checked
- C. **Common Error** - Failure to use, or the improper use, of a checklist
  - i. Always use the manufacturer's checklist to prevent missing or skipping important steps
- D. **Common Error** - Hazards which may result from allowing distractions to interrupt a visual inspection
  - i. Distractions can result in the pilot accidentally skipping steps/missing parts of the inspection
  - ii. If distracted, the safest option is to start over. Otherwise, find a step you are sure has been completed and continue from there

#### 3. The Preflight Overview

- A. The preflight will logically move around the airplane in order to ensure it is in a condition for safe flight
- B. It should begin while approaching the airplane on the ramp
  - i. Make a note of the appearance, looking for obvious problems
    - a. Gear out of alignment, structural distortion, skin damage, dripping fuel/oil leaks, etc.
- C. Upon reaching the airplane, all tie downs, control locks, and chocks should be removed

#### 4. What to Inspect

- A. Inside the Cockpit
  - i. Airworthiness - Required Documents (AROW)
  - ii. Logbooks – To ensure the required tests and inspections have been completed (logbooks are not usually kept in the airplane)
    - a. Annual
    - b. 100 hour
    - c. Static/Transponder/Altimeter (every 24 months)
    - d. ELT (every 12 months)
    - e. Airworthiness Directives are complied with
  - iii. Required equipment for the flight (Ex: Mode C transponder in Class B/C Airspace, Instruments)
  - iv. Inspect the items inside the airplane (Instruments, Switches, Lights, Mixture, etc., as listed on the checklist)
- B. Outside the Airplane
  - i. Inspect the items outside the airplane (Structure, Controls, Engine, Prop, Gear, Struts, everything)
  - ii. Defects are detected by following the checklist and looking for something wrong in each item
  - iii. **Common Error** - Inability to recognize discrepancies to determine airworthiness
    - a. Be familiar with the POH procedures, and know what you are looking at and looking for

## 5. Detecting Problems

- A. Visible Structural Damage
  - i. Check for dents, cracks, bending, separating, etc.
    - a. \*Diamond aircraft cannot be flown if a dent is found due to the composite structure
  - ii. Check for leaks/stains as they are signs of potential problems
  - iii. Look for missing rivets, bolts, etc.
  - iv. Inspect the propeller for damage including nicks and cracking
- B. Flight Controls
  - i. Ensure the flight controls move freely/correctly and are attached securely/properly
  - ii. Check the flap movement and connections
- C. Fuel Quantity and Contamination
  - i. \*Quantity - Confirm the fuel quantity indicated on the gauge by a visual inspection (DA20: Fuel stick)
    - a. Airplane attitude, gauge malfunctions, etc. can result in incorrect readings
  - ii. Contamination
    - a. Type, Grade of Fuel – Critical to safe flight
      - Looking for 100LL (AVGAS) – Blue with a familiar gasoline scent
      - Jet-A is clear, has a kerosene scent, and has disastrous effects when in reciprocating engines
        - a A reciprocating engine operating on jet fuel may start, run, and power the plane for enough time to become airborne only to fail catastrophically in flight
        - b The engine will be destroyed from detonation
          - 1. Detonation - The uncontrolled explosive combustion of the fuel/air mixture in the cylinder's combustion chamber
        - c Refueling trucks are marked with JET-A placards
      - Supervise fueling to ensure the right type, and grade of fuel, and that the fuel caps are in place

- Never substitute a lower grade of fuel for a required higher grade (detonation will result)
    - a 80 is Red; 100LL is Blue; 100 is Green; Jet Fuel is Clear
  - b. Water and Other Sediment – Usually from condensation in partially filled tanks or bad seals
    - a Water is heavier than fuel and therefore accumulates in the low points
    - b Prevented by minimizing the opportunity for condensation – fill the tanks after each flight, or at least after the last flight of the day
  - Sediment can arise from dust/dirt entering the tanks
  - c. Checking the Grade and Removing the Water and Other Contamination
    - Drain the fuel from the gascolator/tank sumps checking for color, smell, water, and contamination
      - a Water is usually in bubble, or bead-like droplets, different in color, in the bottom of the sample
      - b If water/contaminants are found, drain until they have been removed
  - D. Oil Quantity and Contamination
    - i. \*Check the oil level on the oil dip stick to ensure it is at an acceptable amount (4-6 quarts)
      - a. The plane will use a small amount each flight, if a large amount is used there may be a problem
      - b. If the engine is cold, oil levels on the dipstick show higher than if the engine is warm and recently shutdown after a flight
    - ii. Contamination can be detected by discoloration
      - a. Oil darkens as operating hours increase, however rapidly darkened oil may point to cylinder problems
  - E. **Common Error** - Failure to ensure servicing with the proper fuel and oil
    - i. Monitor the fueling process, when possible
    - ii. Always drain a sample of fuel to ensure the proper grade
    - iii. When adding oil, verify it is the type called for in the POH
  - F. Leaks (Fuel, Oil, Hydraulic)
    - i. Check to see there are no leaks under the airplane, inside the cowling, or on the wheel struts
      - a. The fuel vent may appear to be a leak, but its purpose is to allow air into the tank or vent excess fuel depending on pressure differences
- 6. Ice and Frost**
- A. Small amounts of ice/frost can disrupt the airflow over the wing, increase stall speed, and reduce lift
  - B. Do not fly unless the ice/frost is removed in accordance with the requirements in the POH
- 7. Loading and Securing (Baggage, Equipment, Cargo)**
- A. Ensure everything is properly loaded and secured prior to flight
    - i. Verify the weight and balance calculations agree with the actual position loaded (Ex: if the baggage was planned to be in the nose compartment but was loaded in the aft cargo)
  - B. Secure everything properly to prevent movement during flight
    - i. This not only could damage the airplane, but could change the CG, or affect the pilot
  - C. **Common Error** - Failure to ensure proper loading and securing of baggage, cargo, and equipment
- 8. Determining the Airplane is Safe**
- A. During the preflight inspection, note any issues with the airplane to make an educated go/no go decision

- i. If there are any questions as to whether the airplane is safe, ask for help
  - a. Find a Chief Instructor, CFI, Maintenance/AMP, etc.
  - b. Don't take a plane that is probably safe
- B. Follow the recommendations in the POH, as well as those learned from experience to make a determination as to whether the airplane is safe for flight
  - i. Do not let emotion, outside pressure, or any other undue influence sway you from doing what is safe
- C. Remember, in [FAR 91.103](#): The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft

**Common Errors:**

- Failure to use or the improper use of a checklist
- Hazards which may result from allowing distractions to interrupt a visual inspection
- Inability to recognize discrepancies to determine airworthiness
- Failure to ensure servicing with the proper fuel and oil
- Failure to ensure proper loading and securing of baggage, cargo, and equipment

**Conclusion:**

Brief review of the main points

A safe flight begins with a thorough preflight as prescribed in the airplane's POH. This preflight inspection ensures the airplane is both airworthy and safe for flight.

**PTS Requirements:**

To determine that the applicant:

1. Exhibits instructional knowledge of the elements of a preflight inspection, as applicable to the airplane used for the practical test, by describing:
  - a. Reasons for the preflight inspection, items that should be inspected, and how defects are detected.
  - b. Importance of using the appropriate checklist.
  - c. How to determine fuel and oil quantity and contamination.
  - d. Detection of fuel, oil, and hydraulic leaks.
  - e. Inspection of the oxygen system, including supply and proper operation (if applicable).
  - f. Inspection of the flight controls and water rudder (if applicable).
  - g. Detection of visible structural damage.
  - h. Removal of tie-downs, control locks, and wheel chocks.
  - i. Removal of ice and frost.
  - j. Importance of the proper loading and securing of baggage, cargo, and equipment.
  - k. Use of sound judgment in determining whether the airplane is in an airworthy condition for safe flight.
2. Exhibits instructional knowledge of common errors related to a preflight inspection by describing:
  - a. Failure to use or the improper use of checklist.
  - b. Hazards which may result from allowing distractions to interrupt a visual inspection.
  - c. Inability to recognize discrepancies to determine airworthiness.
  - d. Failure to assure servicing with the proper fuel and oil.
  - e. Failure to ensure proper loading and securing of baggage, cargo, and equipment.
3. Demonstrates and simultaneously explains a preflight inspection from an instructional standpoint.