

V.G. Before Takeoff Check

References: FAA-H-8083-3; FAA 8083-23; POH/AFM

Objectives	The student should develop knowledge of the elements related to the before takeoff check. The student should perform the check as required in the manufacturer's POH and as required in the PTS.
Key Elements	<ol style="list-style-type: none">1. Read and Do2. Departure Brief3. Incursions and Hazards
Elements	<ol style="list-style-type: none">1. Required Temperatures and Pressures2. Positioning the Aircraft3. Division of Attention4. Checklist5. Go/No Go Decision6. Departure Brief7. Assuring the Takeoff Area is Free of Hazards8. Avoiding Incursions
Schedule	<ol style="list-style-type: none">1. Discuss Objectives2. Review material3. Development4. Conclusion
Equipment	<ol style="list-style-type: none">1. White board and markers2. References
IP's Actions	<ol style="list-style-type: none">1. Discuss lesson objectives2. Present Lecture3. Ask and Answer Questions4. Assign homework
SP's Actions	<ol style="list-style-type: none">1. Participate in discussion2. Take notes3. Ask and respond to questions
Completion Standards	The student understands the elements involved in a proper, thorough, and safe before takeoff check. The student can make a competent decision as to whether the airplane is safe to fly and is vigilant in maintaining hazard and incursion avoidance.

Instructors Notes:

Introduction:

Attention

Interesting fact or attention grabbing story

Which situation would you rather be in? Discovering there is a problem with the airplane after takeoff and having to make an emergency landing or discovering there is a problem with the airplane before taxiing onto the runway?

Overview

Review Objectives and Elements/Key ideas

What

The before takeoff check is the systematic procedure for making a check of the engine, controls, systems, instruments, and avionics prior to flight.

Why

This final check ensures the airplane is ready for safe flight before taking off.

How:

1. Required Temperatures and Pressures

- A. The before takeoff check is usually performed after taxiing to a position near the takeoff runway (usually a designated run-up area)
 - i. Allows time to warm up to minimum operating temperatures ensuring lubrication and internal engine clearances
 - a. The oil temperature must reach a minimum value (DA20 - 75°)
- B. Scan all the engine instruments periodically to ensure they are suitable for the run-up and takeoff

2. Positioning the Aircraft

- A. Position the aircraft on a firm surface that is free of debris (Debris can damage the propeller and tail)
- B. Position the aircraft into the wind to prevent overheating and to obtain more accurate indications
 - i. Sometimes this is not possible due to the run-up area configuration or other aircraft, adjust as necessary
- C. After positioning, allow the aircraft to move forward slightly to straighten the nosewheel
 - i. Considerable stress is placed on the nosewheel during the run-up
- D. **CE** - Improper positioning of the airplane
 - i. Do not blast anything behind you into other aircraft, buildings, etc.; position the aircraft into the wind on a firm surface free of debris

3. Division of Attention

- A. Attention must be divided inside and outside the aircraft
 - i. If the brake slips, or if the toe brakes are not adequate the airplane could move forward unnoticed
 - ii. Excessive time with your head down (checklists, etc.) can result in unmonitored movement
 - a. This can be hazardous to yourself and others

4. Checklist

- A. The before takeoff checklist provided by the manufacturer should be used to ensure a proper check
- B. Follow the checklists, item by item (Read and Do)
- C. Be critical of the airplane's performance, and determine whether it meets the guidelines in the POH
 - i. Do not accept any unacceptable levels of performance
- D. **CE** - An improper check of flight controls

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- i. Visually check the controls for proper position/movement
- ii. Move the controls freely in the full range of positions (a square is a good movement pattern)
- E. **CE** - Failure to properly use the appropriate checklist
 - i. A manufacturer's checklists ensures every item is completed and checked in a logical order
 - ii. Don't go on memory, always backup your actions with a checklist
 - a. You will make a mistake sooner or later without a checklist

5. Go/No Go Decision

- A. The PIC is responsible for determining whether the airplane is in a condition for safe flight
 - i. Remember that everything on the checklist is being checked for a reason
- B. Stop at any discrepancy and note its effects
 - i. Are we still legal? Can the problem be recovered? Is this safe?
- C. If there are any doubts, return to the ramp for further investigation
- D. **CE** - Improper acceptance of marginal engine performance
 - i. Be safe, marginal performance may lead to a hazardous condition
 - ii. Do not feel like you have to complete a flight at a certain time

6. Departure Brief

- A. Before takeoff, review the performance speeds, expected takeoff distance and emergency procedures
 - i. V_R (44 knots), V_X (58 knots), V_Y (65 knots) - Announce the speeds
 - ii. "Takeoff on runway 27, we have 5,500' of runway, performance shows we need 1,300' today"
 - a. Ensure performance works with the runway and conditions have not changed to prevent that
 - iii. Emergency - Lose engine on the roll, close the throttle and maintain control with the rudder/brakes
 - a. Lose engine after rotation, with runway available, land on the remaining runway
 - b. Lose engine above 600' AGL (DA20) attempt to turn back to the runway, otherwise land straight ahead
- B. **CE** - Hazards of failure to review takeoff and emergency procedures
 - i. This helps prepare for any emergency that may occur and puts everyone on the same page
 - ii. Also, in the case of an emergency you have a plan
 - a. Don't try to come up with a plan at 100' AGL when the engine quits

7. Assuring the Takeoff Area is Free of Hazards

- A. Visually check the area to ensure it is clear of aircraft, vehicles, persons, livestock, wildlife, etc.
- B. At an uncontrolled airport, announce intentions on CTAF and make a 360° turn in the pattern direction
 - i. Radio communication is not required at uncontrolled airports, be vigilant for aircraft in the pattern

8. Avoiding Incursions

- A. Before moving, clear to the Left, Right and Center
- B. Just like in taxiing, know where other aircraft are in relation to you
 - i. Traffic separation is a function of ATC at controlled airports but it is not their responsibility
 - a. The pilot always has the responsibility to see and avoid
- C. Monitor the appropriate frequency (CTAF/Ground)
- D. Repeat all clearances and do not cross hold short lines without a clearance to do so
- E. If any doubt exists, wait for the traffic to clear
- F. Clear final approach before taxiing into the takeoff position
- G. Be safe and don't put yourself in a dangerous position
- H. **CE** - Failure to avoid incursions and to ensure no conflict with traffic prior to taxiing into takeoff position
 - i. It is the PIC's responsibility to avoid traffic and incursions
 - a. Do not taxi without clearance and watch for hazards - Know what is happening around you
 - b. Maintain situational awareness
 - Have a 3D picture of other aircraft in the area and on the ground, know how they may influence your decisions

- c. Be conservative in your decisions

Common Errors:

- Failure to properly use the appropriate checklist
- Improper positioning of the airplane
- Improper acceptance of marginal engine performance
- An improper check of flight controls
- Hazards of failure to review takeoff and emergency procedures
- Failure to avoid runway incursions and to ensure no conflict with traffic prior to taxiing into takeoff position

Conclusion:

Brief review of the main points

The before takeoff check is essential to ensure there are no problems before taking off. It is extremely important to use the correct checklist and make a safe decision regarding whether or not to make the flight. During this check, runway incursion and hazard avoidance is also extremely important and should not be ignored.

PTS Requirements:

To determine that the applicant:

1. Exhibits instructional knowledge of the elements of the before takeoff check by describing:
 - a. Positioning the airplane with consideration for other aircraft, surface conditions, and wind.
 - b. Division of attention inside and outside the cockpit.
 - c. Importance of following the checklist and responding to each checklist item.
 - d. Reasons for ensuring suitable engine temperatures and pressures for run-up and takeoff.
 - e. Method used to determine that the airplane is in a safe operating condition.
 - f. Importance of reviewing takeoff performance airspeeds, expected takeoff distances, and emergency procedures.
 - g. Method used for ensuring that the takeoff area or path is free of hazards.
 - h. Method of avoiding runway incursions and ensures no conflict with traffic prior to taxiing into takeoff position.
2. Exhibits instructional knowledge of common errors related to the before takeoff check by describing:
 - a. Failure to properly use the appropriate checklist.
 - b. Improper positioning of the airplane.
 - c. Improper acceptance of marginal engine performance.
 - d. An improper check of flight controls.
 - e. Hazards of failure to review takeoff and emergency procedures.
 - f. Failure to avoid runway incursions and to ensure no conflict with traffic prior to taxiing into takeoff position.
3. Demonstrates and simultaneously explains a before takeoff check from an instructional standpoint.
4. Analyzes and corrects simulated common errors related to a before takeoff check.