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Certified Flight Instructor Binder

Titusville, USA

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II. TECHNICAL SUBJECTS

A. AEROMEDICAL FACTORS

Hypoxia

Hypoxia is a state in which there is an insufficient amount of oxygen in the body. There are four types:

Hypoxic	Lack of oxygen partial pressure in the air	*high altitudes*
Stagnant	Inadequate circulation	*high G forces, blood clot*
Anemic	Oxygen carrying capacity of the blood is low	*CO poisoning, blood donation*
Histotoxic	Body tissue can't extract oxygen from blood	*Alcohol, drugs*

Indications	Hazards	Preventions
Fatigue	Decreased night vision	Use lowest practical altitude
Drowsiness	Decreased judgement	Minimize duration of hight altitude operations
Nausea	Decreased coordination	Use supplemental oxygen
Headache	Death	Stop smoking
Tingling		Stay in shape
Numbness		
Dizziness		
Cyanosis		

FAR/AIM §91.211

Cabin pressure altitude (ft)	Flight crew	Passengers
12,500 – 14,000	Must be provided with and use supplemental oxygen for that part of the flight that is more than 30 min	N/A
14,000 – 15,000	Must be provided with and use supplemental oxygen for the entire flight above those altitudes	N/A
15,000 – above	Must be provided with and use supplemental oxygen	Must be provided with oxygen

Treatment

Breathe pure oxygen through a mask

Descend to altitudes below 10,000 ft.

Note

Alcohol and smoking significantly increases your susceptibility to Hypoxia (by at least 2000 ft.)
Supplemental oxygen is encouraged when flying above 5,000 ft. at night

Hyperventilation

Hyperventilation is a state in which an excessive rate and depth of respiration lead to abnormal loss of CO_2 from the blood.

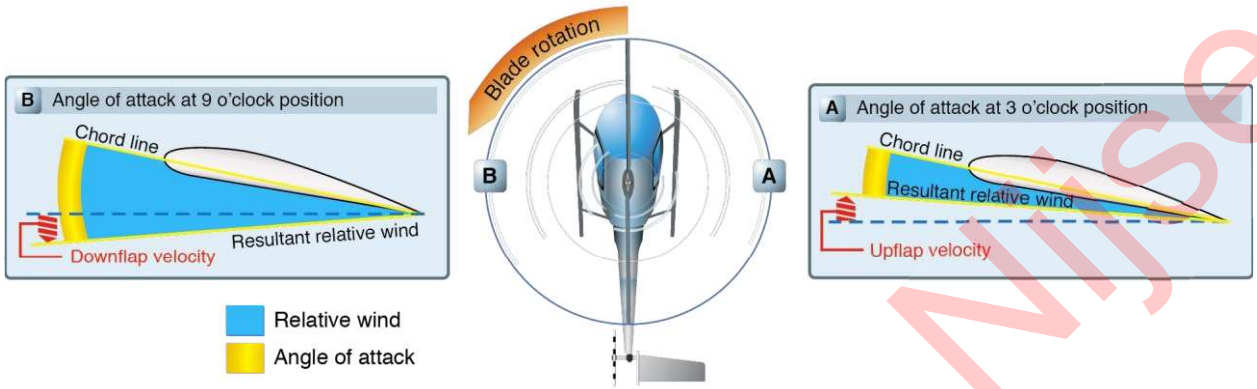
Indications	Causes	Hazardss
Fatigue	Under conditions of stress and anxiety an increase in breathing occurs	Numbness
Drowsiness	This increase leads to a significant decrease in the CO_2 content of the body	Dizziness
Nausea	Among the factors that can initiate this cycle are emotions, pressure breathing and hypoxia	Visiual impairment
Headache		Unconsciousness
Tingling		
Numbness		
Dizziness		
Visual impairment		

Retreating side

- Blade flaps down
- Blade flaps up
- Angle of attack increased
- Lift is increased

Advancing side

- Blade flaps up
- Induced flow is increased
- Angle of attack is decreased
- Lift is decreased



Retreating blade stall

The retreating blade reaches a maximum Angle of Attack and airflow separation due to excessive flapping, which is caused by the dissymmetry of lift. To compensate for the dissymmetry of lift, the retreating blade flaps down which then increases the Angle of Attack. More forward airspeed creates more dissymmetry of lift, flapping increases and the Angle of Attack gets greater. The result is a retreating blade stall

Stalling

- Airflow separation
- Turbulent pattern
- Loss of effective lift area

Symptoms

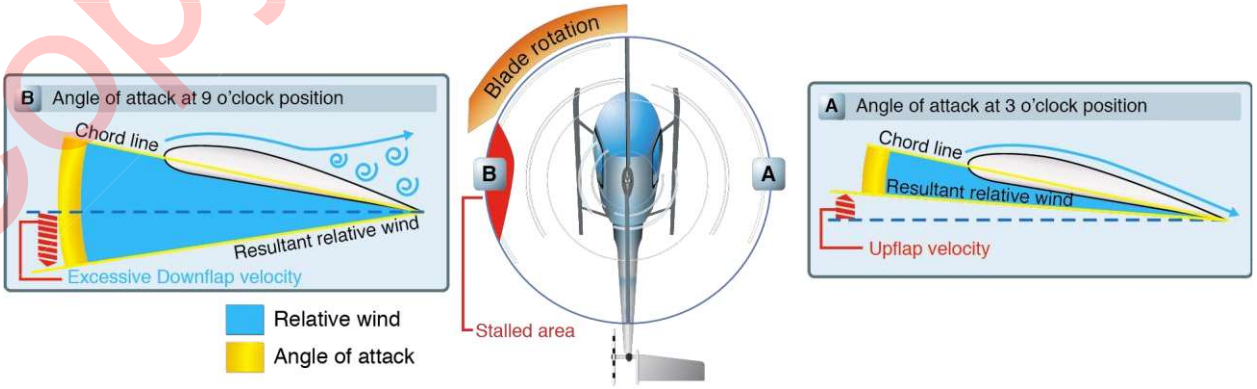
- Low frequency vibrations
- Blow back
- Roll to the retreating blade (left for 300CBi)

Factors

- High gross weight
- High forward speed (Vne)
- Steep turns
- Turbulence
- High density altitude
- Low rotor RPM

Recovery

- Lower collective (instant reduction of Angle of Attack)
- Reduce forward speed (only after lowering collective)
- RPM top of the green



Basic VFR weather minimums and airspace entry requirements

Airspace Class	Entry Requirement	Pilot Certificate or Rating	Two-Way Communication	Altitude Decoding Transponder	VFR Min Visibility Below 10,000 MSL	VFR Min Visibility 10,000 MSL and Above	VFR Cloud Clearance Below 10.000 MSL	VFR Cloud Clearance 10,000 MSL and Above
A	ATC Clearance	Instrument	Yes	Yes	N/A	N/A	N/A	N/A
B	ATC Clearance	Private Certificate or student with endorsement[1]	Yes	Yes within 30nm of the class B primary airport[2]	3 miles	3 miles	Clear of Clouds	Clear of Clouds
C	VFR: Radio Contact IFR: Clearance	Student Certificate	Yes	Yes within C space and above lateral limits of C space[2]	3 miles	3 miles	500 below 1,000 above 2,000 horz	500 below 1,000 above 2,000 horz
D	VFR: Radio Contact IFR: Clearance	Student Certificate	Yes	No unless required by other airspace	3 miles	3 miles	500 below 1,000 above 2,000 horz	500 below 1,000 above 2,000 horz
E	VFR: None IFR: Clearance	Student Certificate	IFR only	No unless required by other airspace	3 miles	5 miles	500 below 1,000 above 2,000 horz	1,000 below 1,000 above 1 mile horz
G	None	Student Certificate	No	No unless required by other airspace	Day: 1 mile Night: 3 miles	5 miles[3]	500 below[3] 1,000 above 2,000 horz	1,000 below[3] 1,000 above 1 mile horz

[1] Student endorsement not permitted at some Class B airports.
[2] An altitude decodeing transponder is required above 10,000 MSL.
[3] When flying 1,200 AGL or below; Day: 1 mile visibility, clear of clouds; Night: 3 miles visibility, 500 below, 1,000 above, 2,000 horizontal. See and Avoid for helicopters 91.155 (B)(1).

Special VFR for helicopters (§91.157(b))

- Request to ATC and get permission
- Be clear of clouds at all times
- Stay below 10,000 ft. in airspace

Basic FAA VFR definition

VFR	> 3000 ft. ceiling	5+ SM visibility
MVFR	1000 - 3000 ft. ceiling	3 - 5 SM visibility
IFR	500 – 1000 ft. ceiling	1 - 3 SM visibility
MIFR	< 500 ft. ceiling	< 1 SM visibility

Waivers under subpart J (§91.905)

The FAA may issue a certificate waiver authorizing operation of aircraft in deviation from §91.155(a) if the FAA finds that proposed operation can be safely conducted under the terms of the waiver. It needs to be applied for with the FAA.

Examples:

- Airshows
- Exploration
- Air Patrol
- Research (Hurricane)
- Gliders to soar above 18,000 feet MSL

Special use airspace

Special Use Airspace or special area of operation (SAO) is the designated airspace in which certain activities must be confined or where limitations may be imposed on aircraft operations that are not part of those activities. Special Use Airspace consists of the following

Prohibited area

Entry for aircraft is prohibited. Such areas are established for national security or other reasons. They are published in the Federal Register.

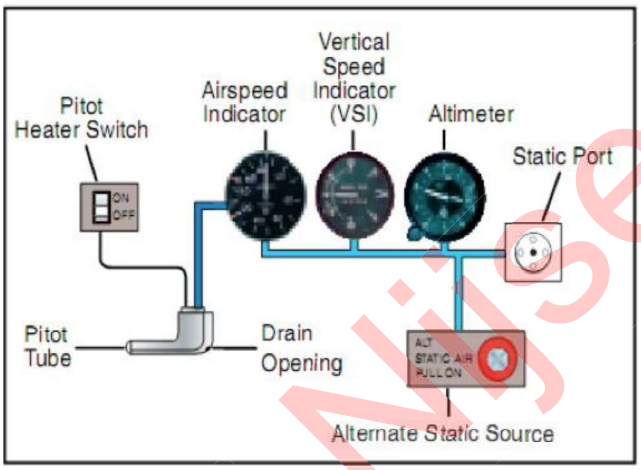
See example on the right for Washington D.C., the White House edge is charted:

Pitot-static system and associated instruments

General

The pitot-static system feeds three instruments providing vital information to the pilot

- Airspeed indicator
- Altimeter
- Vertical speed indicator



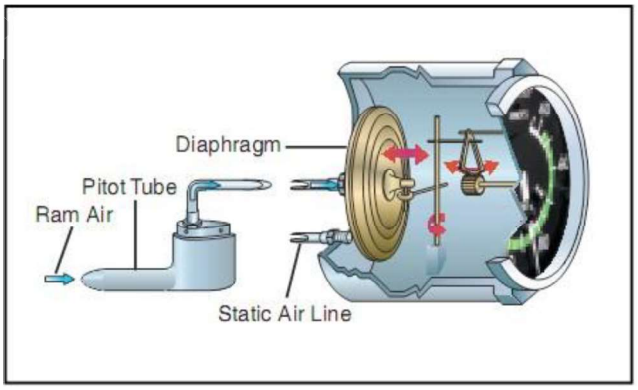
The instruments work on the principle of differential air pressure. The static pressure is fed to all three instruments. The airspeed indicator is the only instrument that also used the total pressure from the pilot tube

Not all aircraft have a pitot-tube heater or alternate static source

Airspeed indicator

The airspeed indicator (ASI) works on the principle of comparing Total Pressure from the pitot-tube with ambient air pressure from the static port, measuring Dynamic Pressure. The total pressure is fed into a diaphragm inside the casing of the instrument which is vented to the static port. The diaphragm will expand or contract, depending on the total pressure being greater or equal to the static pressure. A mechanical linkage transfers the movement of the diaphragm to the display in front of the instrument.

The airspeed is shown as indicated airspeed (IAS). By using the diagram provided by the manufacturer in the POH you can correct the values for instrument and position error, giving you Calibrated Airspeed (CAS). You can then further convert it to True Airspeed (TAS) by correcting it for density and temperature error



Preflight checklists include checking the pitot-tube, drainhole (if applicable) and static port for water or other obstructions. It is also important to confirm that the instrument is reading '0' when the helicopter is stationary on the ground. If otherwise, there is a problem with the pitot-static system. This results in the aircraft being grounded, as the ASI is one of the instruments needed for flight according to §91.205

B. SINGLE PILOT RESOURCE MANAGEMENT

Resource management is very important, as most of the time you will be the only person in the cockpit. This means you have your hands on the controls most of the time, preventing you from operating switches, folding a map, etc. Make sure you are prepared for the flight before you go, by putting in the required frequencies, setting the preferred volume setting, folding your map for quick use, etc.

Cockpit

- Arrange your materials and equipment
- Ensure that no lose articles are in the cockpit
- Ensure proper arrangement of tools so that access is permitted during the flight
- Ensure proper adjustment of flight controls and seats

Pilot

- Arrange your knee-board in a manner that allows easy access to get the required information during the flight
- Make sure that you are not distracted from flying the aircraft when looking at information on your kneeboard
- Organize yourself so that you will always be able to fly the aircraft before navigating and communicating. Remember Aviate, Navigate and then Communicate. It should always be in this order, never anything else
- Know frequencies and prepare yourself mentally for the next part of the flight and thing to do
- Be ahead of the aircraft at all times
- Know how to use all of your resources, especially in an emergency. This begins with the preflight, use weather sources, FSS information, enroute assistance, your mechanics, ATC, weather briefers, etc. It is available for a reason!

Passengers

- Ensure that your passengers are briefed properly on all procedures and what to do in case of an emergency before the flight commences. It is not only for their, but also your safety
- Make sure they understand how to:
  - Approach the helicopter
  - Use the fire extinguisher
  - Enter and exit the helicopter, especially with slopes / rotors still turning
  - Fasten and unfasten the seat belts
  - Secure their belongings during the flight, especially when the doors have been removed
  - When they can speak and when they have to be silent

Aeronautical decision making (ADM)

Aeronautical decision making is a systematic approach to the mental process used by pilots to consistently determine the best course of actions in response to a given situation. Risk management, situational awareness and single pilot resource management are all principles of ADM

C. AIRPORT AND HELIPORT MARKIGNS AND LIGHTING

Definition

Airport and heliport markings are established in uniformity in order to provide specific information to the pilot during taxi, takeoff and landing. Lighting at airports is provided to allow for visual identification and reference at night or in adverse meteorological conditions

Refer to the following documents for more information; "AC 150/5340-1 - Standards for Airport Markings", " AC 150/5340-18 Standards for Airport Sign Systems" and "AC 150 series for specifics on airport lights, signs, and designs"

Airport markings

Airport markings provide direction and assist pilots with ground operations. The markings can be classified as pavement markings, runway markings, taxiway markings, holding position markings, other markings (vehicle roads, etc.) and signs