

HELICOPTER KEY FACTS

and Study Advice

Vol 3

By Mike Burton

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P r e f a c e

The helicopter is a complex machine and today's examinations require an in-depth knowledge of the machine. This book contains Key Facts that must be known and understood if examination success is your goal.

Good Luck with your studies.

Mike Burton
Aviation Instructor
Author and Consultant

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BASIC PRINCIPLES OF FLIGHT-HELICOPTERS

THE AEROFOIL AND ASSOCIATED AIRFLOW

1. In flight, the centre of pressure on an aerofoil, such as a main or tail rotor blade, is located at the thickest point of the section where air velocity is greatest. The centre of pressure is the point through which lift is said to act.
2. If the angle of attack of the aerofoil is increased, the centre of pressure moves forward towards the leading edge.
3. As the free stream airflow is deflected by an aerofoil passing through it, the air deflected over its upper surface is accelerated to a greater velocity than the air passing under the aerofoil.
4. The pressure of the air above the aerofoil is less than that below the aerofoil. The result is, the generation of the force that is termed lift.
5. Two thirds of the lift generated by an aerofoil is produced by its upper surface.
6. As a blade passes through the air, the air immediately in front of the blades leading edge is brought to rest. This small pocket of air is termed the Stagnation Point.
7. The stagnation point is static pressure plus dynamic pressure.
8. The point where the airflow breaks away from the aerofoil, usually at or near the trailing edge, is called the Separation Point.
9. As the airflow passes over the aerofoil it tends to accelerate from in front of the leading edge up to the centre of pressure.
10. After the centre of pressure it then progressively reduces velocity.
11. As the airflow reduces velocity after the centre of pressure the boundary layer, the thin layer of air in contact with the surface, becomes thicker.
12. This thicker element of the boundary layer is more turbulent.
13. The airflow in front of the C of P is smooth, or laminar.
14. The airflow aft of the C of P is thicker and is a turbulent boundary layer.
15. At approximately the same point as the C of P is the Transition Point, where the transition from laminar flow to turbulent flow occurs.