

TORQUE

The propeller usually rotates clockwise, as seen from the pilot seat. The reaction to the spinning propeller causes the aircraft to rotate counterclockwise.

ASYMMETRIC THRUST

At high angles of attack and high power setting at take-off, the descending blade of the propeller has a greater angle of attack than the ascending blade. This produces more lift from the right side of the propeller with a consequent yawing to the left.

SLIPSTREAM

The air pushed backward by the revolving propeller has a corkscrew motion. This causes an increase in pressure on the left side of the tail unit and a decrease on the right side. Therefore the aircraft yaws to the left. This can be countered by use of rudder or offsetting the fin.

PRECESSION

The spinning propeller of an airplane acts like a gyroscope. A rotating gyro tends to stay in the same plane of rotation and resists any change in that plane. If an airplane goes quickly from nose up to nose down on take-off it will yaw to the left.

CLIMBING

The ability to climb is dependent on ability of aircraft to produce thrust. Lift always acts perpendicular to relative airflow. Therefore the vertical component of lift must increase to balance the vertical component of thrust.

Best Rate Of Climb:

- This is the rate of climb that will gain the most altitude in the least time. The best rate of climb is normally used on take-off.

Best Angle Of Climb:

- This is the angle that will gain the most altitude in a given distance. It is valuable in climbing out over obstacles.

Normal Climb:

- This is a rate of climb that should be used in any prolonged cruise climb.

GLIDING

In gliding there is NO power from the engine and the airplane is under influence of gravity. Of the four forces, thrust is now absent and a state of equilibrium must be maintained by lift, drag, and weight only.

Best Glide Speed For Range:

- The speed at which an aircraft will glide the furthest distance for altitude lost.

Best Glide Speed For Endurance:

- The speed at which an aircraft will glide the greatest amount of time for altitude lost.

TURNS

The force of Lift acts 90° to the wing span. In a turn this force of lift is inclined away from the vertical. Therefore the vertical forces are no longer in balance or equilibrium. The airplane will descend unless the angle of attack is increased to produce more lift.

In a turn the lift force has 2 components:

- Vertical opposes weight (lift), and
- Horizontal makes the airplane turn. This horizontal force is known as Centripetal Force (toward the turn).

Steeper the angle of bank:

- i. The greater rate of turn,
- ii. The less the radius of turn,
- iii. The higher the stalling speed, and
- iv. The greater the loading.

High airspeed in a turn:

- i. Slower rate of turn, and
- ii. larger radius of turn.