

VIII.AB. Straight and Level Flight and Level Turns

About: Straight and level flight is flight in which heading and altitude are maintained. A level turn is a basic flight maneuver used to change or return to a desired heading, while maintaining altitude.

TSW: Learn to consciously fix the relationship of a reference point on the horizon, cross check with instruments and subconsciously correct for small deviations.

How: Learn proper use of controls for maneuvering the airplane, attaining the proper attitude in relation to the horizon by using outside and inside references.

Procedure:

1. Level off:
 - a. Ease nose over, 3 fingers, power back to cruise, forward trim, pick out a point on the horizon
2. 360 degree turn (to the right)
 - a. Power set, hold altitude, 25-30 degree bank with right aileron and right rudder pressure.
 - b. Look outside, peak inside
 - i. Select a spot on the horizon to maintain alt & bank angle
 - c. Nose will pitch down, maintain back pressure.
 - i. Demonstrate if turn is made without adding back pressure -> what happens
 - d. Left aileron, left rudder to come out of the turn.

Discussion Points:

3. Effect and use of elevator, ailerons, rudder and trim.
 - a. Demonstrate the effect of the controls; 'pitch', 'roll' and 'yaw'.
4. The Integrated Flight Instruction Method.
 - a. Outside visual references and by the use of flight instruments.
5. Straight-and-level flight:
 - a. The pitch attitude for level flight is established and maintained by selecting some portion of the airplane's nose as a reference and keeping that point in a fixed position relative to the horizon, then the altimeter and VSI should be cross-checked to verify.
 - b. The attitude indicator works as an artificial horizon, should be used to set the pitch attitude when flying by ref to instruments.
 - c. The wingtips should be at the same distance above or below the horizon, and adjustments with ailerons should be made.
 - d. Any changes in power or configuration also require a change in pitch attitude and trim in order to maintain altitude.

6. Level turns:

- a. Before starting the turn, clear the area by lifting the wings.
- b. To start the turn, simultaneously apply aileron and rudder pressures to the direction of the desired turn.
- c. To maintain altitude, increase elevator back pressure to compensate for the loss of vertical component of lift, set the pitch attitude by reference to the horizon and cross-check against the altimeter.
- d. Maintain coordination by "stepping on the ball".
- e. The roll-out should be started at a heading approximately one-half of the bank angle before the desired heading.
- f. During the roll-out, gradually release the back pressure to maintain altitude.

7. Trim technique.

- a. The airplane should be trimmed so that it will fly straight-and-level without constant assistance, "hands-off flight".
- b. Trim by first applying control pressure to attain the desired attitude, then adjust the trim to relieve the control pressures, the airplane should maintain that attitude when flying hands-off.

8. Methods that can be used to overcome tenseness and over controlling.

- a. Do not hold the yoke too firmly, since it prevents sensing the control pressures.
- b. When moving the yoke, try to sense the control pressures and respond to them by making small movements instead of just simply moving the yoke without feel.
- c. Make smooth control movements, not too fast and "jerky".

Common errors:

9. Failure to cross-check and correctly interpret outside and instrument references.
10. Application of control movements rather than pressures.
11. Uncoordinated use of flight controls.
12. Faulty trim technique.
13. Faulty altitude and bank control (level turns only).

Evaluations/ Standards:

14. Alt: +/-100ft, A/S +/- 10kts, Bank angle +/-5°, Head: +/-10°
15. Student will know the basic aerodynamics related to the four fundamentals of flight, and make smooth, timely and correct control applications while executing straight-and-level flight and level turns, and maintain positive control and coordination of the aircraft at all times.