Theory Brief 2: Straight and Level

Aim:

"To be able to fly the Aircraft Straight and level within given tolerances"

Tolerances: straight = +/- 5° Level: +/- 100'

Objectives:

1. To be aware of the attitude changes whilst maintaining a constant altitude and heading at differing speeds of 70/80/90kts

Straight and Level:

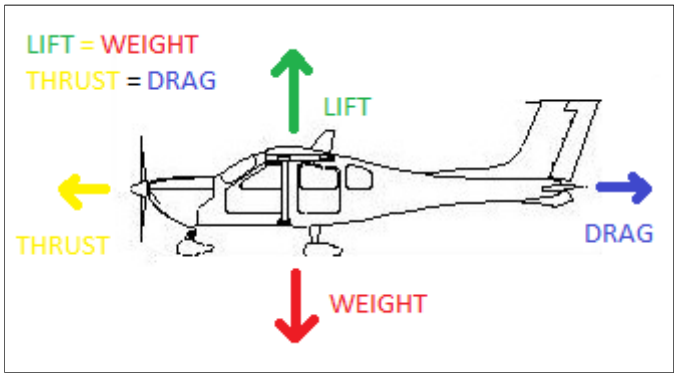
Definition: where the aircraft maintains a constant direction, altitude and speed. We call this "Cruise"

Cruise for a jabiru J160 is: 90 to 95kts @ 2850RPM

(dependent on the aircrafts weight)

Forces acting on the Aircraft:

- There are four forces which act on the aircraft during straight and level flight.
- The aircraft is designed to fly in straight and level flight when properly trimmed and the aircraft is in equilibrium.
- In straight and level flight, Lift = Weight and Thrust = Drag. Lift is created by an aerofoil, passing through air at a positive angle of attack. Increasing either speed or angle of attack increases lift but also increases drag.



Airspeeds

- Increasing IAS has the effect of creating more lift. Increased slipstream will improve control responsiveness.
- Decreasing IAS reduces lift. Decreased slipstream will reduce control responsiveness
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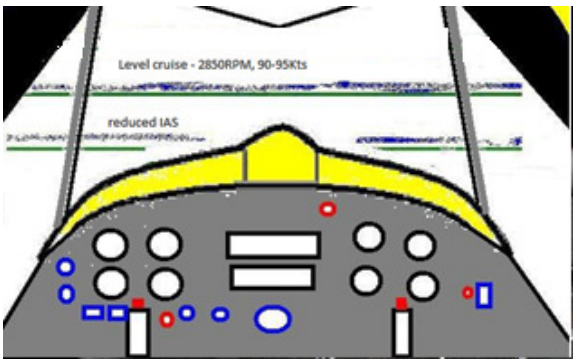
Attitudes for Airspeeds

Attitude: is the relative position to where the horizon 'cuts' the windscreen.



- Decreasing IAS:
  - Reduces the production of lift.
  - To maintain constant altitude we need to compensate for **Decreasing IAS** by **Increasing** the Angle of Attack.
  - Less airflow over the control surface will reduce the control effectiveness in all axis.
  - The Horizon will be slightly lower relative to the cruise horizon position.

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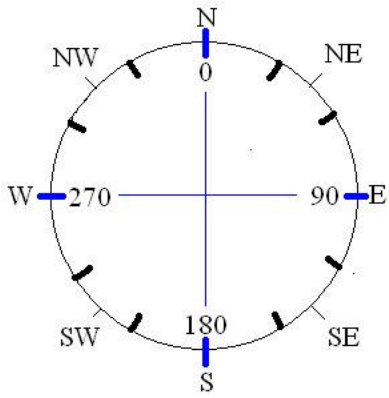
E.O.C Revision

- Increasing thrust has the effect of raising the nose and yawing the aircraft to the left
    - To counter the Yaw effect of more power, apply RIGHT RUDDER sufficient to balance the ball.

- Decreasing thrust has the effect lowering the nose and yawing the aircraft slightly to the right.
    - To counter the Yaw effect of less power, REDUCE RIGHT RUDDER INPUT sufficient to balance the ball.

Flying a Heading:

- Small inputs are required to maintain a heading.
- Large input will make oscillations around straight and will increase difficulty.
- Compass basics



Each major compass marking is in 30 degree increments
Turning Left- numbers decrease
Turning Right- numbers increase
Numbers reset @ N or 0°/360°

Eyes in the cockpit:

As we are VISUAL pilots, as much as possible, our eyes must stay OUTSIDE the cockpit (ie not looking at the instruments). Our rule is we should NOT be looking at the instruments for more than 6 seconds per minute. (10%)

To reduce the amount of time looking at instrumentation, yet ensuring we maintain a sufficient check on each instrument, we prioritise the instruments by using different scans which are in order of most importance based on the workload inside the cockpit

1. Reference point, IAS, ALT, RP

2. Reference point, IAS, Turn and Slip, ALT, RP

3. RP, IAS, Turn and Slip, ALT, Compass, RP

4. RP, IAS, Turn and Slip, ALT, RPM, Compass, RP

5. RP, IAS, Turn and Slip, ALT, RPM, Engine gauges, Compass, RP

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Airmanship:

Performance instruments

Indicated Airspeed

Altimeter

Vertical Speed Indicator

Turn and Slip Indicator

Compass

Clock code

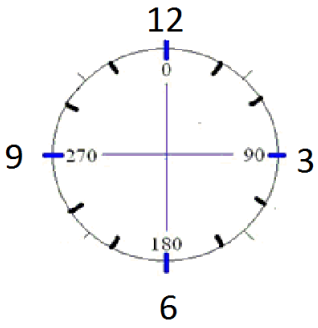
The clock code is a method for pilots and passengers to identify the position of other aircraft/birds in the air.

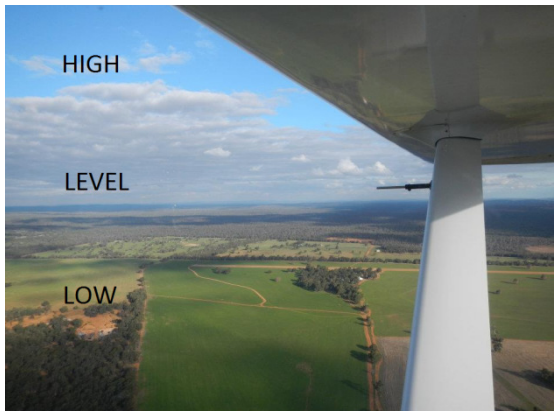
12 o'clock represents the aircrafts forward orientation

For example:

Aircraft is spotted 90 degrees to the right lower than the aircraft's level you would say:

"Aircraft spotted 3 o'clock Low"





Air Excercise:

1. To learn the straight and level attitude.
2. To recover to straight and level cruise flight.
3. To fly straight and level at reduced speed.