



VICTORIA FLYING CLUB

## Contact Information

- Stephan Heinemann
- SMS: +1 (250) 891-5446
- Email: [stephan.heinemann@hotmail.com](mailto:stephan.heinemann@hotmail.com)
- Bookings, Questions



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# Straight-and-Level Flight

- Review Attitudes and Movements
- Definition and Motivation
- **Straight Flight**
- **Level Flight**
- **Magnetic Compass**
- Summary and Questions
- Pre-Flight Briefing



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# Attitudes and Movements Review



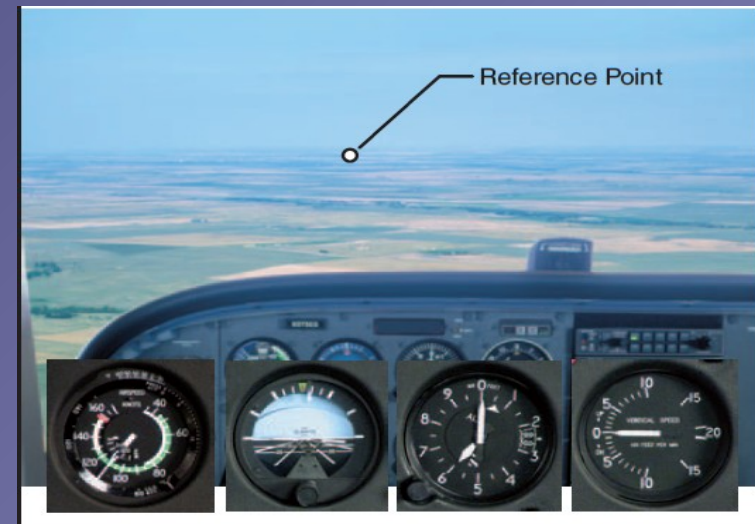
- What attitudes are displayed and how can they be established, maintained and recovered?





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# Straight-and-Level Flight





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# Straight Flight



- Maintain *constant* **heading** (horizon and reference point)
- Control **roll** and **yaw** to keep **wings level** in **coordinated flight**
- Check **attitude indicator** (bank attitude), **heading indicator** and **turn coordinator**
- Straight flight is *not* necessarily level flight (**variable altitude**)





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# Level Flight



- Maintain *constant* **altitude** (attitude and power)
- Control **pitch** and **power** to maintain **altitude** in **coordinated flight**
- Check **attitude indicator** (pitch attitude), **tachometer** (power setting), **altitude indicator** and **vertical speed indicator**
- Level flight is *not* necessarily straight flight (**variable heading**)



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# Level Flight – Attitude and Power



- *Attitude plus power equals performance*
- **Less power** requires **more nose-up** (less nose-down) attitude (and vice versa) to *maintain altitude* at **lower constant airspeed**
- **More power** requires **less nose-up** (more nose-down) attitude (and vice versa) to *maintain altitude* at **higher constant airspeed**
- **Trim** is used to compensate control forces at different settings



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# Power Changes

- **Decrease Power / Reducing Airspeed:**
  - **Throttle back** *smoothly* to estimated setting
  - Anticipate and **prevent yaw**
  - **Pitch back** to raise nose
  - Readjust power setting
  - **Trim** to eliminate control forces
- **Increase Power / Increasing Airspeed:**
  - **Advance throttle** *smoothly* to estimated setting
  - Anticipate and **prevent yaw**
  - **Pitch forward** to lower nose
  - Readjust power setting
  - **Trim** to eliminate control forces







# Straight-and-Level Flight

- Maintain **heading** and **altitude** in *close* tolerances
- *Restrained* use of all three flight controls
- Control **roll** and **yaw** to maintain **heading**: straight
- Control **pitch** and **power** to maintain **altitude**: level
- Maintain **coordinated flight**
- Level flight at different power settings (airspeeds) is required for **separation** with other traffic
- Pitch and power affect the aerodynamic and economic **performance** of the aircraft (range and endurance)



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# Magnetic Compass

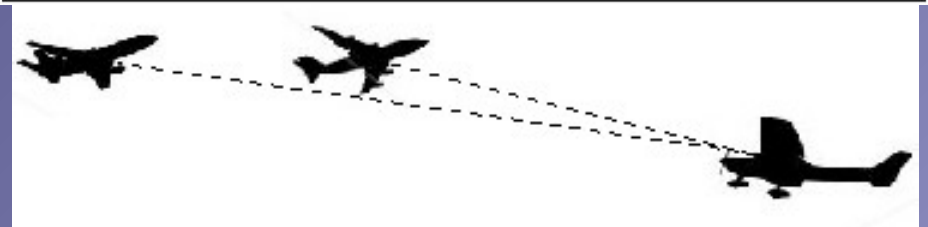
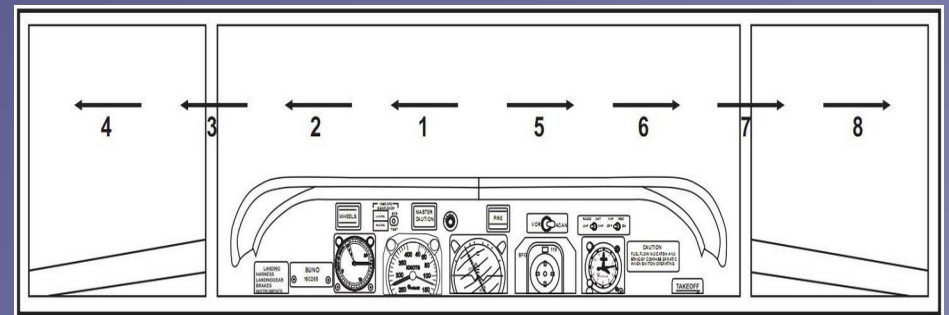
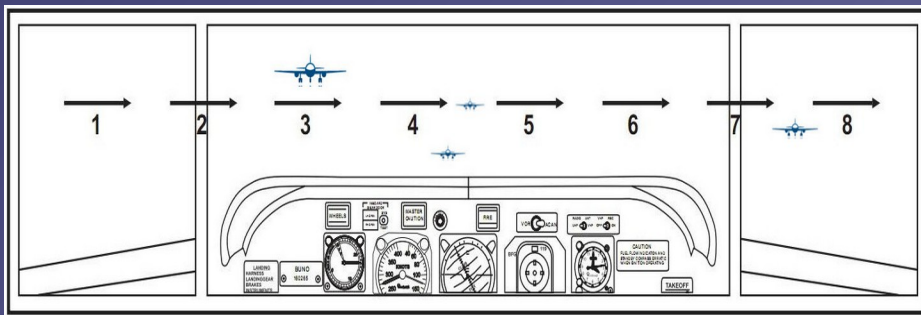
- **Acceleration Error**
  - Accelerate **N**orth **D**ecelerate **S**outh (**ANDS**)
- **Turning Error**
  - Undershoot **N**orth **O**vershoot **S**outh (**UNOS**)
- Reliable *only* in straight non-accelerated flight
- Readings in straight-and-level, straight-climbing or straight-descending provided *constant* airspeed
- Average readings in turbulent air
- Adjust heading indicator every **15 min** (OPS check)





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# Lookout



- **Conflicts:**
  - Head-On, Converging, Climbing, Descending
- **Blind Spots:**
  - Below the Aircraft (above and behind depending on the cockpit)
- **Scanning:**
  - Side to Side, Middle to Side





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## Summary / Quiz

- What parameter is to be kept constant in straight flight?
- What references and instruments are available to maintain straight flight?
- How is straight flight maintained using the flight controls?
- What parameter is to be kept constant in level flight?
- What references and instruments are available to maintain level flight?
- How is level flight maintained using the flight controls?
- How do power changes affect straight-and-level flight?
- What are the errors of the magnetic compass?



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# Pre-Flight Briefing

- Exercise
- Training Area
- Departure and Arrival Procedures
- Weather Briefing / NOTAMs
- Aircraft and Documents
- Time and Fuel Requirements
- Safety Considerations and Responsibilities



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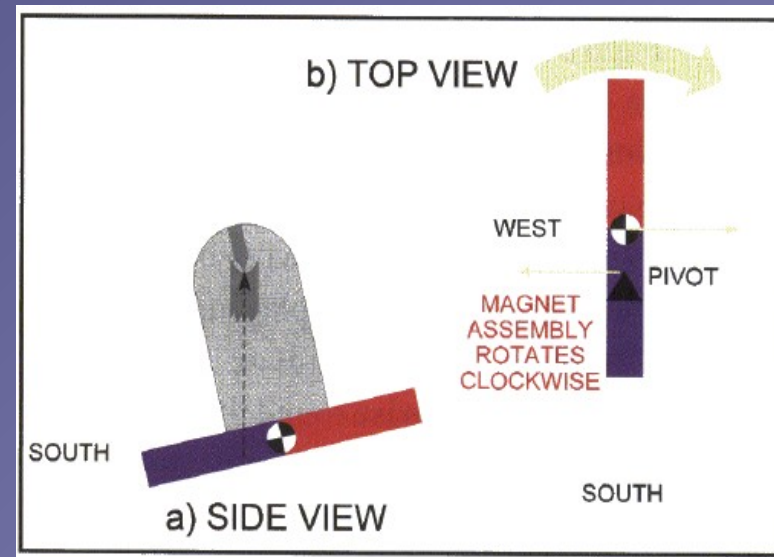
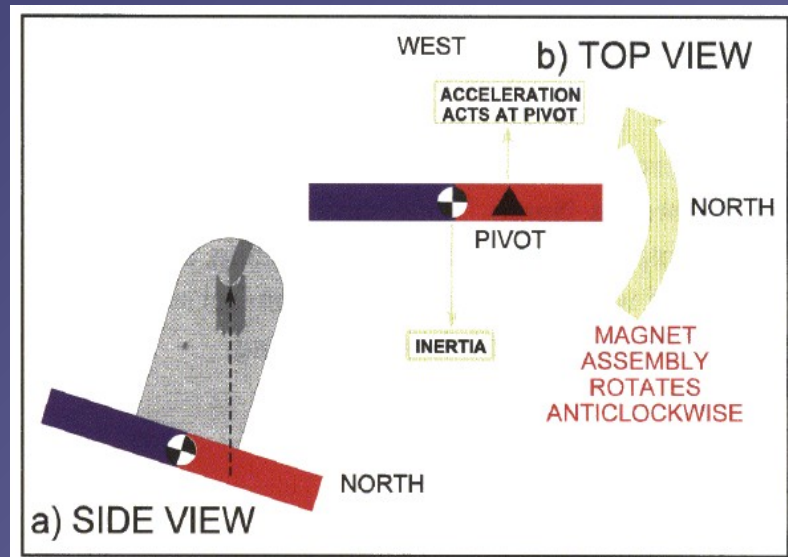
# Additional Materials

- Additional Materials for Straight and Level Flight
- Flight Instructor Guide – Exercise 6, Lesson Plans 2, 3, 4





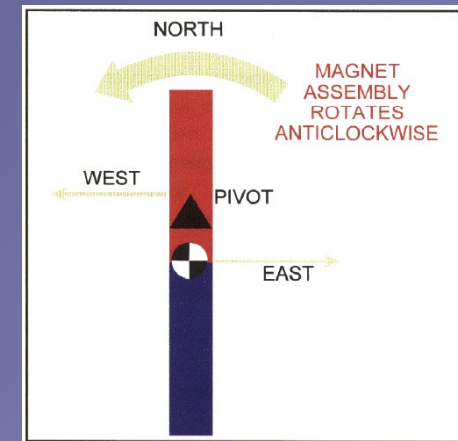
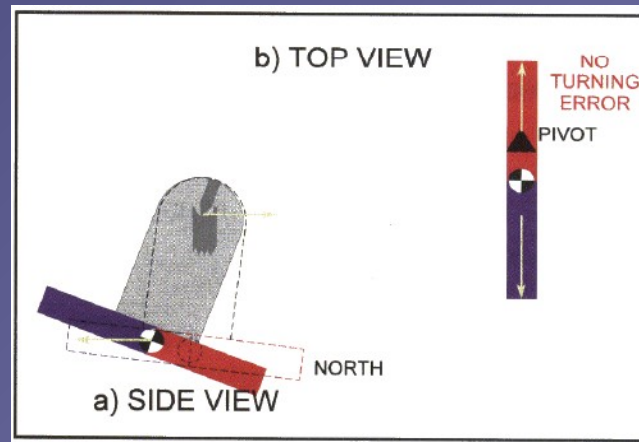
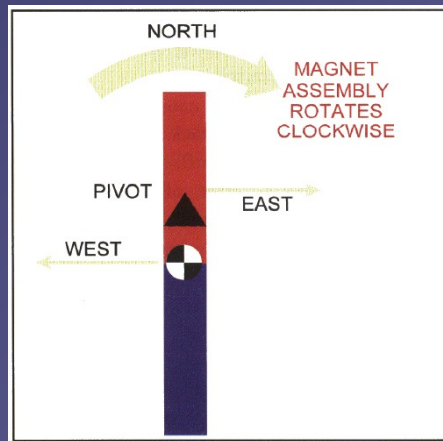
# Magnetic Dip



- Magnetic dip is the reason for **dip errors** (acceleration / deceleration, turning)
- Magnetic dip shifts the **pivot** point away from the magnet's **center of gravity**



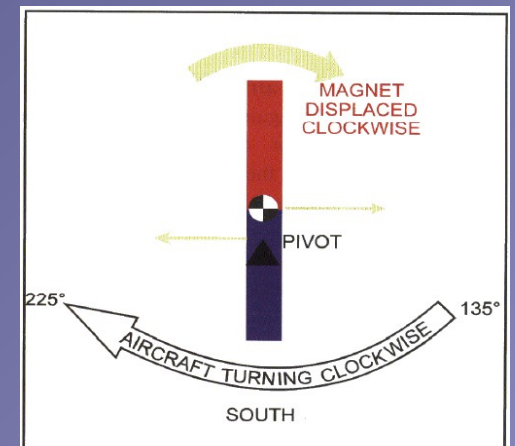
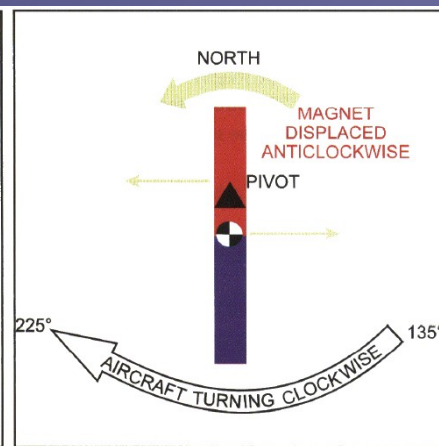
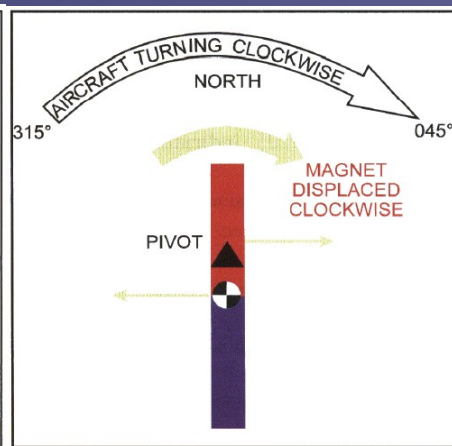
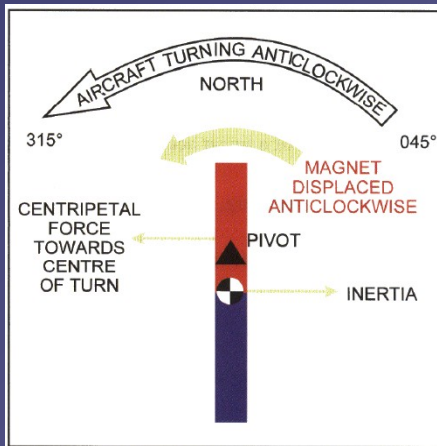
# Acceleration/Deceleration Errors



- Accelerate North Decelerate South (**ANDS**)
- Opposite behavior on the southern hemisphere
- *More* pronounced on easterly / westerly headings
- *Less* pronounced on northerly / southerly headings



# Turning Errors



- **Undershoot North Overshoot South (UNOS)**
- Opposite behavior on the southern hemisphere
- *More pronounced on northerly / southerly turns*
- *Less pronounced on easterly / westerly turns*