

SESSION 42: INSTRUMENT FLIGHT — ABNORMAL INSTRUMENT INDICATIONS AND FAILURE RECOGNITION

1. The primary method for detecting an instrument failure in flight is to:
 - A. Cross-check the instruments against each other and against the known aircraft state
 - B. Rely on a single primary instrument
 - C. Wait for a warning light only
 - D. Disregard any instrument that disagrees

2. An instrument failure is suspected when one instrument indicates something that:
 - A. Matches all the other instruments
 - B. Confirms the expected aircraft state
 - C. Is inconsistent with the other instruments and the expected aircraft state
 - D. Agrees with the attitude indicator

3. A vacuum failure causes the attitude indicator to:
 - A. Read accurately throughout
 - B. Fail instantly and obviously
 - C. Slowly drift and provide increasingly erroneous attitude information
 - D. Display the heading

4. During a suspected vacuum failure, the pilot confirms it by cross-checking the attitude/heading indicators against the:

- A. Magnetic compass only
- B. Airspeed indicator only
- C. Altimeter only
- D. Turn coordinator, magnetic compass, and pitot-static instruments

5. A blocked pitot tube (ram inlet and drain) causes the airspeed indicator to:

- A. Drop immediately to zero
- B. Behave like an altimeter — increasing in a climb, decreasing in a descent
- C. Read accurately
- D. Reverse its scale

6. A blocked static port causes the altimeter to:

- A. Read increasingly high in a climb
- B. Drop to zero
- C. Read accurately
- D. Freeze at the altitude of the blockage

7. A pilot in level flight notices the attitude indicator showing a gradual bank while the turn coordinator, heading indicator, and altimeter all indicate wings-level, constant heading and altitude. The failed instrument is:

- A. The attitude indicator (likely vacuum-driven failure)
- B. The turn coordinator
- C. The altimeter
- D. The heading indicator

8. A pilot sees the airspeed reading unusually high during a climb at constant pitch and power, while the altimeter and VSI confirm a normal climb. The most likely problem is:

- A. A static port blockage
- B. A blocked pitot tube (ram inlet plugged, drain open or trapped pressure)
- C. A vacuum failure
- D. A heading indicator failure

9. A pilot observes the altimeter frozen and the VSI reading zero during a known descent, with the airspeed reading erroneously high. The failure is:

- A. A pitot blockage
- B. A vacuum failure
- C. A static system blockage
- D. An electrical failure

10. The most reliable confirmation that the attitude indicator has failed is when it disagrees with:

- A. The combined picture of the turn coordinator, altimeter, airspeed, and VSI
- B. Only the magnetic compass
- C. Only the heading indicator
- D. The navigation display

11. A pilot suspects the heading indicator is failing because it disagrees with the magnetic compass in straight-and-level, unaccelerated flight. The likely cause is:

- A. A static blockage
- B. Precession from a vacuum/gyro problem
- C. A pitot blockage

D. An altimeter failure

12. A "red X" through a field on a glass PFD is an abnormal indication meaning:

- A. The data is highlighted
- B. The autopilot is engaged
- C. The aircraft is on the glideslope
- D. That data source has failed and the information is invalid

13. When a glass PFD loses attitude information (AHRS failure), the pilot should:

- A. Transition to the standby attitude indicator and supporting instruments
- B. Continue trusting the failed PFD
- C. Disregard all instruments
- D. Restart the engine

14. A scan that includes the vacuum gauge (or annunciator) helps detect a vacuum failure because:

- A. It shows the airspeed
- B. It indicates the heading
- C. A low or zero reading reveals the failure before the gyros mislead the pilot
- D. It displays the altitude

15. A pilot who notices the airspeed and altimeter both behaving abnormally together, while the gyro instruments appear normal, should suspect:

- A. A vacuum failure
- B. A heading indicator failure
- C. A pitot-static system problem

D. An attitude indicator failure

16. The danger of an undetected gradually-failing attitude indicator in IMC is that the pilot may:

- A. Notice it immediately and recover
- B. Lose only the heading information
- C. Have the airspeed read erroneously
- D. Follow the false attitude into an actual unusual attitude

17. A reliable cross-check to detect a failing attitude indicator is to compare its bank indication against the:

- A. Magnetic compass alone
- B. Turn coordinator and heading trend
- C. Airspeed indicator
- D. Vertical speed indicator

18. When two instruments that share a power source both fail, the pilot should suspect:

- A. Two independent random failures
- B. A common power source failure (e.g., vacuum or electrical bus)
- C. A pitot blockage
- D. A navigation database error

19. A pilot detecting a partial-panel situation should immediately:

- A. Continue controlling the aircraft using the remaining reliable instruments
- B. Disregard all instruments and look outside in IMC
- C. Shut down the affected systems' breakers without analysis

D. Descend at maximum rate

20. A pitot heat failure in icing conditions can cause an abnormal indication by:

A. Freezing the altimeter

B. Causing the heading indicator to precess

C. Tumbling the attitude indicator

D. Allowing ice to block the pitot tube, producing erroneous airspeed

21. A pilot who recognizes the attitude indicator and heading indicator failing together, with the turn coordinator and pitot-static instruments still good, should conclude:

A. The pitot system has failed

B. The electrical bus has failed

C. The vacuum system has failed (driving both gyros)

D. The airspeed indicator has failed

22. A useful principle when one instrument disagrees with several others is to:

A. Trust the single disagreeing instrument

B. Disregard all instruments

C. Average all the readings

D. Trust the majority of consistent instruments and treat the outlier as suspect, pending confirmation

23. Recognizing the failure quickly matters most because:

A. Early recognition allows the pilot to transition to reliable instruments before losing control

B. It is required to file a report

C. It changes the destination

D. It resets the failed instrument

24. A pilot flying glass with a standby (steam) attitude indicator that disagrees with the PFD attitude must:

A. Always trust the PFD

B. Determine which is failed by cross-checking other instruments and select the reliable source

C. Always trust the standby

D. Disregard both

25. The fundamental skill in recognizing abnormal indications is to:

A. Memorize each instrument's appearance

B. Rely solely on warning systems

C. Maintain a disciplined cross-check that detects when an instrument disagrees with the others and the known aircraft state, then identify and disregard the failed instrument

D. Trust the most expensive instrument

ANSWER KEY & EXPLANATIONS – SESSION 42

1. A. Cross-check — Instrument failure is detected primarily by cross-checking the instruments against each other and the known aircraft state.

2. C. Inconsistent indication — A failure is suspected when one instrument indicates something inconsistent with the others and the expected aircraft state.

3. C. Slow drift — A vacuum failure causes the attitude indicator to slowly drift and provide increasingly erroneous attitude information.

4. D. TC/compass/pitot-static — A vacuum failure is confirmed by cross-checking the attitude/heading indicators against the turn coordinator, magnetic compass, and pitot-static instruments.
5. B. Acts like altimeter — A blocked pitot tube (ram inlet and drain) makes the airspeed behave like an altimeter.
6. D. Freezes — A blocked static port freezes the altimeter at the blockage altitude.
7. A. Attitude indicator failed — A gradual bank on the attitude indicator contradicted by the TC/HI/altimeter indicates the attitude indicator failed (likely vacuum-driven).
8. B. Pitot blockage — High airspeed in a climb at constant pitch/power with a normal altimeter/VSI indicates a blocked pitot tube.
9. C. Static blockage — A frozen altimeter, zero VSI, and erroneously high airspeed in a descent indicate a static system blockage.
10. A. Combined picture — The attitude indicator failure is most reliably confirmed when it disagrees with the combined picture of the TC, altimeter, airspeed, and VSI.
11. B. Gyro precession — A heading indicator disagreeing with the compass in straight-and-level flight indicates precession from a vacuum/gyro problem.
12. D. Source failed/invalid — A red X on a glass PFD means that data source has failed and the information is invalid.
13. A. Standby instruments — An AHRS failure requires transitioning to the standby attitude indicator and supporting instruments.
14. C. Reveals before gyros mislead — Scanning the vacuum gauge detects a vacuum failure before the gyros mislead the pilot.

15. C. Pitot-static problem — Airspeed and altimeter both abnormal while gyros are normal indicates a pitot-static problem.

16. D. Follow false attitude — An undetected failing attitude indicator can lead the pilot to follow the false attitude into an actual unusual attitude.

17. B. TC + heading trend — A failing attitude indicator's bank is cross-checked against the turn coordinator and heading trend.

18. B. Common power failure — Two instruments sharing a power source failing together suggests a common power source failure (vacuum or electrical bus).

19. A. Use reliable instruments — On detecting a partial panel, the pilot immediately continues controlling the aircraft using the remaining reliable instruments.

20. D. Ice blocks pitot — A pitot heat failure in icing can let ice block the pitot tube, producing erroneous airspeed.

21. C. Vacuum failure — Attitude and heading indicators failing together (with TC and pitot-static good) indicates the vacuum system (driving both gyros) failed.

22. D. Trust the majority — When one instrument disagrees with several, trust the majority of consistent instruments and treat the outlier as suspect, pending confirmation.

23. A. Recover before losing control — Quick recognition lets the pilot transition to reliable instruments before losing control.

24. B. Diagnose and select — A PFD/standby attitude disagreement requires determining which failed by cross-checking other instruments and selecting the reliable source.

25. C. Disciplined cross-check — Recognizing abnormal indications means maintaining a disciplined cross-check that detects disagreement and then identifying and disregarding the failed instrument.