ACS AREA IV — FLIGHT BY REFERENCE TO INSTRUMENTS

Sessions 39–46

Area IV is the foundational flying skill on which everything else in the instrument rating rests. Every clearance you copy, every approach you brief, every hold you enter is meaningless if you cannot keep the aircraft upright and on profile when the horizon disappears. This area covers the core competency of instrument flight: maintaining precise control of the aircraft — attitude, altitude, heading, airspeed — using nothing but the instruments, when the body's own sense of orientation has become an active liability.

These eight sessions build from technique to failure management. Sessions 39 through 41 cover the fundamentals: the instrument cross-check and the control-and-performance method, attitude instrument flying, and interpreting the instruments in normal maneuvers. Sessions 42 through 45 turn to the abnormal and the dangerous: recognizing abnormal indications, the physiology of spatial disorientation and its illusions, recovering from unusual attitudes, and flying partial panel when primary instruments are lost. Session 46 closes the area with a mixed scenario that combines IMC flying with a systems failure, the way real instrument emergencies actually arrive.

This is the area where knowledge alone is least sufficient. The oral can confirm that you understand the scan, the illusions, and the recovery techniques — but understanding them and executing them under the disorienting pressure of actual IMC are different things. Spatial disorientation leading to loss of control remains the leading cause of fatal accidents in instrument conditions, which is why the DPE probes this material carefully and why the practical demonstration is unforgiving. Work these sessions aloud, and treat the spatial-disorientation and unusual-attitude material as the life-safety content it is, returning to Chapter 9 wherever an answer does not come with certainty.

SESSION 39: INSTRUMENT FLIGHT — THE INSTRUMENT SCAN AND CONTROL/PERFORMANCE METHOD

1. The instrument cross-check (scan) is best described as:

A. The continuous, logical observation of the instruments to maintain control and detect changes

B. Fixating on the attitude indicator alone

C. Reading each instrument once per minute

D. Checking only the airspeed and altimeter

2. In the control/performance method, the "control instruments" are those that:

A. Show the result of a control input

B. Display the aircraft's navigation position

C. Indicate the aircraft's distance to a fix

D. Directly display the attitude and power being set (attitude indicator and power instruments)

3. In the control/performance method, the "performance instruments" are those that:

A. Set the aircraft's attitude directly

B. Reflect the aircraft's actual performance (airspeed, altimeter, VSI, heading, turn rate)

C. Control the engine power

D. Provide navigation guidance only

4. The control/performance method works by:

A. Reading only the performance instruments

B. Ignoring the attitude indicator

C. Setting an attitude and power (control), then cross-checking the performance instruments and adjusting

D. Setting power last after all performance is confirmed

5. "Fixation" as a scan error means the pilot:

A. Concentrates on a single instrument while neglecting the others

B. Scans too rapidly to interpret any instrument

C. Reverses the control inputs

D. Omits the attitude indicator entirely

6. "Omission" as a scan error means the pilot:

A. Fixates on the attitude indicator

B. Leaves one or more instruments out of the scan

C. Scans in the wrong order only

D. Sets the wrong power

7. "Emphasis" as a scan error means the pilot:

A. Scans all instruments equally at all times

B. Ignores the attitude indicator

C. Reverses the scan direction

D. Places excessive attention on one instrument for a given flight condition

8. In the "primary/supporting" concept, the primary instrument for a given parameter is the one that:

A. Is easiest to read

B. Provides the most direct and accurate indication of that parameter for the flight condition

C. Is located in the center of the panel

D. Requires the least interpretation

9. In straight-and-level flight, the primary instrument for altitude is the:

A. Attitude indicator

B. Vertical speed indicator

C. Altimeter

D. Airspeed indicator

10. In straight-and-level flight, the primary instrument for heading is the:

A. Attitude indicator

B. Turn coordinator

C. Magnetic compass

D. Heading indicator

11. In straight-and-level flight, the primary instrument for bank is the:

A. Turn coordinator

B. Heading indicator (it shows heading constant, indicating wings level on a constant heading)

C. Attitude indicator

D. Altimeter

12. The attitude indicator is considered a control instrument because it:

A. Directly displays the pitch and bank attitude the pilot sets

B. Shows the aircraft's altitude

C. Indicates the heading

D. Displays the navigation course

13. During a constant-airspeed climb established at a set power, the primary instrument for pitch once the climb is established is the:

A. Airspeed indicator

B. Attitude indicator

C. Altimeter

D. Vertical speed indicator

14. The fundamental principle "attitude + power = performance" means that:

A. Performance is set directly without reference to attitude

B. A known attitude and power setting produce a predictable, repeatable performance

C. Power alone determines all performance

D. Attitude is irrelevant to performance

15. A smooth, effective scan technique requires the pilot to:

A. Stare at the attitude indicator continuously

B. Scan only when a deviation is noticed

C. Read each instrument in a fixed clockwise pattern regardless of condition

D. Return frequently to the attitude indicator while sampling the relevant performance instruments

16. When transitioning from one flight condition to another (e.g., level to climb), the pilot first:

A. Sets the new attitude and power on the control instruments, then verifies on the performance instruments

B. Waits for the performance instruments to change before adjusting attitude

C. Adjusts only the performance instruments

D. Ignores the attitude indicator during the transition

17. A pilot who chases the altimeter and VSI with large pitch inputs is likely committing which error?

A. Omission of the heading indicator

B. Fixation on the attitude indicator

C. Reversing the controls

D. Over-controlling by reacting to performance instruments instead of setting a stable attitude

18. The "trim" of the aircraft supports the scan because proper trim:

A. Eliminates the need for any scan

B. Replaces the attitude indicator

C. Sets the navigation course

D. Reduces control pressures, freeing the pilot's attention for the cross-check

19. In a level standard-rate turn, the primary instrument for bank (turn rate) is the:

A. Attitude indicator

B. Heading indicator

C. Turn coordinator

D. Altimeter

20. During the entry to a maneuver (before performance stabilizes), the attitude indicator serves as the primary reference because:

A. It is the only instrument that works

B. The performance instruments lag and the attitude indicator gives immediate feedback

C. It shows the aircraft's altitude directly

D. The performance instruments are more accurate during entry

21. A complete, effective cross-check integrates the control and performance instruments by:

A. Reading the performance instruments only after landing

B. Setting attitude and power, then sampling performance instruments and making small corrections back to attitude

C. Ignoring power entirely

D. Fixating on whichever instrument shows the largest deviation

22. "Trim technique" in instrument flight is important because untrimmed control pressures:

A. Improve the scan

B. Have no effect on workload

C. Increase workload and divert attention from the scan

D. Replace the need for the attitude indicator

23. A pilot who notices an altitude deviation in level flight should:

A. Make a large pitch change to recover quickly

B. Disregard it until the next scan cycle

C. Make a small, smooth pitch correction toward the target attitude and verify on the altimeter

D. Add full power

24. The control/performance method is especially valuable in glass cockpits because:

A. Glass cockpits have no attitude indicator

B. It eliminates the need for power instruments

C. The performance instruments are not displayed

D. The same control-then-verify discipline applies, with attitude and power set on the PFD and verified by the performance displays

25. The fundamental goal of the instrument scan and control/performance method is to:

A. Maintain precise aircraft control by reference to instruments alone, detecting and correcting deviations smoothly

B. Eliminate the need for trim

C. Replace navigation equipment

D. Fixate on a single primary instrument

ANSWER KEY & EXPLANATIONS – SESSION 39

1. A. Continuous logical observation — The cross-check is the continuous, logical observation of the instruments to maintain control and detect changes.

2. D. Attitude + power instruments — Control instruments directly display the attitude and power being set (attitude indicator and power instruments).

3. B. Reflect actual performance — Performance instruments reflect the aircraft's actual performance (airspeed, altimeter, VSI, heading, turn rate).

4. C. Set attitude/power, then verify — The method sets an attitude and power (control), then cross-checks the performance instruments and adjusts.

5. A. Single-instrument fixation — Fixation is concentrating on a single instrument while neglecting the others.

6. B. Leaving instruments out — Omission is leaving one or more instruments out of the scan.

7. D. Excessive attention on one — Emphasis is placing excessive attention on one instrument for a given flight condition.

8. B. Most direct/accurate indication — The primary instrument provides the most direct and accurate indication of that parameter for the flight condition.

9. C. Altimeter — In straight-and-level flight, the primary instrument for altitude is the altimeter.

10. D. Heading indicator — In straight-and-level flight, the primary instrument for heading is the heading indicator.

11. B. Heading indicator — In straight-and-level flight, the primary instrument for bank is the heading indicator (constant heading indicates wings level).

12. A. Displays set attitude — The attitude indicator is a control instrument because it directly displays the pitch and bank attitude the pilot sets.

13. A. Airspeed indicator — In an established constant-airspeed climb, the primary instrument for pitch is the airspeed indicator.

14. B. Predictable performance — "Attitude + power = performance" means a known attitude and power setting produce predictable, repeatable performance.

15. D. Return to AI, sample performance — An effective scan returns frequently to the attitude indicator while sampling the relevant performance instruments.

16. A. Set control, verify performance — Transitioning conditions, the pilot first sets the new attitude and power on the control instruments, then verifies on the performance instruments.

17. D. Over-controlling — Chasing the altimeter and VSI with large inputs is over-controlling by reacting to performance instruments instead of setting a stable attitude.

18. D. Reduces pressures/frees attention — Proper trim reduces control pressures, freeing the pilot's attention for the cross-check.

19. C. Turn coordinator — In a level standard-rate turn, the primary instrument for bank (turn rate) is the turn coordinator.

20. B. Performance lags — During maneuver entry, the attitude indicator is primary because performance instruments lag and the attitude indicator gives immediate feedback.

21. B. Set then sample/correct — A complete cross-check sets attitude and power, then samples performance instruments and makes small corrections back to attitude.

22. C. Increases workload — Untrimmed control pressures increase workload and divert attention from the scan.

23. C. Small smooth correction — An altitude deviation in level flight calls for a small, smooth pitch correction toward the target attitude, verified on the altimeter.

24. D. Same discipline on PFD — The control/performance method applies in glass cockpits, with attitude and power set on the PFD and verified by the performance displays.

25. A. Precise control by instruments — The goal of the scan and control/performance method is to maintain precise aircraft control by reference to instruments alone, detecting and correcting deviations smoothly.