SESSION 51: NAVIGATION — RNAV AND FMS: ROUTE LOADING AND WAYPOINT MANAGEMENT

---

1. RNAV (area navigation) allows an aircraft to navigate:

A. On any desired flight path within the coverage of referenced navaids or self-contained systems (e.g., GPS)

B. Only along VOR radials

C. Only on published Victor airways

D. Only using ground-based DME

2. "RNP" (Required Navigation Performance) is RNAV with the added requirement of:

A. A second VOR receiver

B. A paired DME frequency

C. A magnetic compass cross-check

D. Onboard performance monitoring and alerting of the navigation accuracy

3. An RNP value (e.g., RNP 1) specifies the navigation accuracy the aircraft must maintain, expressed as:

A. A bank angle

B. An altitude tolerance

C. A speed limit

D. A lateral containment in nautical miles for a given percentage of flight time

4. An FMS (Flight Management System) integrates navigation by:

A. Replacing the need for any pilot input

B. Functioning only as a backup attitude indicator

C. Combining navigation sources and managing the flight plan, often coupling to the autopilot

D. Providing only fuel quantity

5. The active leg of an RNAV/FMS flight plan is the segment the aircraft is:

A. Has already passed

B. Will fly last

C. Filed but not loaded

D. Currently navigating to/along, between the "from" and "to" waypoints

6. A "direct-to" (Direct) function commands the navigator to:

A. Hold at the current position

B. Reverse course

C. Fly the full filed route

D. Create a direct course from the present position to a selected waypoint and make it the active leg

7. After executing a direct-to a downstream waypoint, the waypoints between the present position and that waypoint are:

A. Flown in reverse

B. Retained as the active legs

C. Removed/bypassed from the active route sequence

D. Converted to holds

8. Programming a flight plan into the FMS requires the pilot to:

A. Disable the autopilot

B. Enter the route waypoints/procedures and verify the loaded route against the clearance

C. Set the transponder code first

D. Tune the VOR

9. A critical discipline when using the FMS is to:

A. Trust the magenta line without checking

B. Verify the active leg and the moving map agree with the clearance and the chart

C. Disregard the annunciations

D. Fly only in en route mode

10. The "OBS" mode on an RNAV navigator allows the pilot to:

A. Select and fly a specific course to/from the active waypoint, suspending automatic sequencing

B. Increase CDI sensitivity

C. Update the database

D. Pair the DME

11. When ATC clears a reroute, the pilot using an FMS should:

A. Continue the old route until the destination

B. Disregard the change if GPS-equipped

C. Fly the old route and request clarification airborne

D. Reprogram the flight plan and verify the new routing matches the clearance

12. A "fly-by" waypoint in an RNAV flight plan is one where the navigator:

A. Overflies the waypoint exactly before turning

B. Begins the turn before the waypoint to smoothly join the next leg

C. Enters a hold

D. Reverses course

13. A "fly-over" waypoint is one where the aircraft must:

A. Turn before the waypoint

B. Begin a descent

C. Cross/overfly the waypoint before commencing the turn to the next leg

D. Hold at the waypoint

14. Activating a leg ("activate leg" or "activate approach") tells the navigator to:

A. Make the selected/next segment the active leg being navigated

B. Delete the flight plan

C. Reverse the route

D. Increase the sensitivity to approach

15. A pilot must monitor the FMS during automated navigation because:

A. The FMS never makes errors

B. Automation can do exactly what it is told even if that is not what the pilot intended (programming or mode errors)

C. The FMS replaces the cross-check

D. The autopilot guarantees the route

16. "Automation surprise" or mode confusion in FMS operation is mitigated by:

A. Leaving the FMS in one mode the whole flight

B. Never using the autopilot

C. Disabling the moving map

D. Understanding and verifying the active leg, modes, and annunciations

17. A pilot who enters the wrong waypoint identifier into the FMS may:

A. Have it automatically corrected

B. Lose only the fuel display

C. Navigate to an unintended location, which the verification step is designed to catch

D. Trigger a RAIM alert only

18. When the FMS sequences to the next leg automatically, the pilot should confirm:

A. The new active leg and course match the intended route

B. Only the airspeed

C. Only the altitude

D. The transponder code

19. The moving map display supports RNAV/FMS situational awareness by:

A. Replacing the certified navigator's guidance

B. Eliminating the need to verify the route

C. Showing the aircraft's position relative to the programmed route and waypoints

D. Providing the glideslope

20. Before an RNAV approach, the pilot loads and verifies the procedure, then at the appropriate point:

A. Disables the FMS

B. Switches to VOR

C. Activates the approach so the navigator transitions and sequences correctly

D. Reverses the route

21. A "hold" programmed at an FMS waypoint will cause the navigator to:

A. Fly the published or defined holding pattern and suspend onward sequencing until the pilot exits

B. Reverse the route

C. Delete the waypoint

D. Increase sensitivity

22. The pilot's fundamental responsibility with an FMS is to remain:

A. Passive once the route is loaded

B. The manager of the system — programming, verifying, and monitoring it

C. Reliant on the moving map alone

D. Focused only on the autopilot

23. RNAV/RNP procedures expand access by:

A. Eliminating the need for any navigation database

B. Allowing efficient, precise routes and approaches not dependent on ground-based navaid geometry

C. Removing the requirement to monitor the system

D. Replacing the attitude indicator

24. A discrepancy between the FMS magenta line and the cleared route should prompt the pilot to:

A. Stop, identify the error, and correct the flight plan before continuing

B. Follow the magenta line regardless

C. Disregard the clearance

D. Squawk 7600

25. The fundamental principle of RNAV and FMS operation is that the pilot must:

A. Trust the automation without verification

B. Use only direct-to navigation

C. Program, verify, and continuously monitor the flight plan and active leg so the aircraft flies the intended, cleared path

D. Disable automatic sequencing at all times

ANSWER KEY & EXPLANATIONS — SESSION 51

1. A. Any desired path — RNAV allows navigation on any desired flight path within the coverage of referenced navaids or self-contained systems (e.g., GPS).

2. D. Monitoring/alerting — RNP is RNAV with onboard performance monitoring and alerting of the navigation accuracy.

3. D. Lateral containment — An RNP value specifies navigation accuracy as a lateral containment in nautical miles for a given percentage of flight time.

4. C. Integrate/couple — An FMS combines navigation sources and manages the flight plan, often coupling to the autopilot.

5. D. Currently navigating — The active leg is the segment the aircraft is currently navigating, between the "from" and "to" waypoints.

6. D. Direct course active — A direct-to creates a direct course from the present position to a selected waypoint and makes it the active leg.

7. C. Bypassed — After a direct-to a downstream waypoint, the intervening waypoints are removed/bypassed from the active route sequence.

8. B. Enter/verify route — Programming the FMS requires entering the route waypoints/procedures and verifying the loaded route against the clearance.

9. B. Verify agreement — A critical discipline is verifying the active leg and moving map agree with the clearance and the chart.

10. A. OBS course/suspend — OBS mode lets the pilot select and fly a specific course to/from the active waypoint, suspending automatic sequencing.

11. D. Reprogram/verify — On a reroute, the FMS pilot reprograms the flight plan and verifies the new routing matches the clearance.

12. B. Turn before — A fly-by waypoint is one where the navigator begins the turn before the waypoint to smoothly join the next leg.

13. C. Overfly then turn — A fly-over waypoint requires crossing/overflying the waypoint before commencing the turn to the next leg.

14. A. Make segment active — Activating a leg makes the selected/next segment the active leg being navigated.

15. B. Does what it's told — The FMS must be monitored because automation does exactly what it is told even if that is not what the pilot intended.

16. D. Verify legs/modes — Automation surprise is mitigated by understanding and verifying the active leg, modes, and annunciations.

17. C. Unintended location — A wrong waypoint entry may navigate to an unintended location, which the verification step is designed to catch.

18. A. Confirm new leg — On automatic sequencing, the pilot confirms the new active leg and course match the intended route.

19. C. Position vs. route — The moving map shows the aircraft's position relative to the programmed route and waypoints.

20. C. Activate approach — Before an RNAV approach, the pilot activates the approach so the navigator transitions and sequences correctly.

21. A. Fly hold/suspend — A programmed hold causes the navigator to fly the holding pattern and suspend onward sequencing until the pilot exits.

22. B. Manager of the system — The pilot's fundamental responsibility is to remain the manager of the system — programming, verifying, and monitoring it.

23. B. Efficient routes/approaches — RNAV/RNP expands access by allowing efficient, precise routes and approaches not dependent on ground-based navaid geometry.

24. A. Identify/correct — A magenta-line/clearance discrepancy should prompt the pilot to stop, identify the error, and correct the flight plan before continuing.

25. C. Program/verify/monitor — The fundamental principle is to program, verify, and continuously monitor the flight plan and active leg so the aircraft flies the intended, cleared path.