

SESSION 50: NAVIGATION — WAAS, LPV, AND DATABASE CURRENCY REQUIREMENTS

1. WAAS improves basic GPS by providing:

- A. A second magnetic heading reference
- B. Ground-based localizer signals
- C. Correction and integrity signals that increase accuracy and enable vertical guidance approaches
- D. Marker beacon indications

2. WAAS corrections are transmitted to the aircraft via:

- A. Geostationary satellites broadcasting the correction messages
- B. The VOR network
- C. The DME system
- D. Ground-based marker beacons

3. A key capability WAAS adds over a non-WAAS GPS is:

- A. Pairing with DME
- B. Approaches with vertical guidance (e.g., LPV) flown to a decision altitude
- C. Replacing the attitude indicator
- D. Eliminating the database

4. "LPV" stands for:

- A. Localizer Performance with Vertical guidance
- B. Lateral Position Verification
- C. Low Precision VOR
- D. Lateral Path Vector

5. Despite its name, LPV is:

- A. A localizer-based approach
- B. A non-precision approach with no vertical guidance
- C. An RNAV (GPS) approach with WAAS-provided vertical guidance flown to a DA, approach-procedure-with-vertical-guidance
- D. A precision ILS

6. On an RNAV (GPS) approach chart, the typical lines of minima, from lowest (most capable) to highest, are generally:

- A. LNAV, LP, LNAV/VNAV, LPV
- B. Circling, LNAV, LPV, LP
- C. LPV, LNAV/VNAV, LP/LNAV, circling
- D. LP, LPV, circling, LNAV

7. "LNAV" minimums represent:

- A. A precision approach
- B. An LPV approach
- C. A vertically-guided approach
- D. Lateral navigation only — a non-precision approach flown to an MDA

8. "LNAV/VNAV" minimums provide:

- A. Lateral guidance only
- B. Lateral and vertical guidance (via baro-VNAV or WAAS) flown to a DA, with higher minimums than LPV
- C. A circling-only procedure
- D. A localizer back course

9. "LP" (Localizer Performance) minimums provide:

- A. Vertical guidance to a DA
- B. A precision approach
- C. An ILS glideslope
- D. Lateral-only guidance with WAAS angular sensitivity, no vertical guidance (flown to an MDA)

10. LPV approaches with the lowest minimums can have a DA as low as approximately:

- A. 1,000 feet AGL
- B. 500 feet AGL
- C. 800 feet AGL
- D. 200 feet HAT, comparable to a Category I ILS at some runways

11. A WAAS-capable navigator selects the line of minima a pilot can use based on:

- A. The integrity/service level available and the procedure annunciated (e.g., LPV vs. LNAV)
- B. The aircraft's empty weight
- C. The transponder code
- D. The departure frequency

12. If WAAS vertical guidance is unavailable for an LPV at the time of the approach, the navigator may:

- A. Provide an ILS glideslope
- B. Increase the LPV minimums
- C. Pair with DME
- D. Annunciate a downgrade to LNAV (lateral-only) minimums

13. A WAAS receiver does not require a separate RAIM prediction in the same way a non-WAAS unit does because WAAS:

- A. Has no integrity monitoring
- B. Provides its own integrity information through the augmentation system
- C. Uses the DME for integrity
- D. Relies on the magnetic compass

14. The "channel number" or procedure selection that a WAAS navigator uses to load a specific LPV approach is associated with:

- A. The transponder code
- B. The coded approach in the current navigation database
- C. The VOR frequency
- D. The DME pairing

15. A current navigation database is especially critical for WAAS/LPV approaches because:

- A. The receiver will not power on without it
- B. WAAS requires a daily database update
- C. The autopilot depends on the database date
- D. The vertical and lateral path, including the glidepath angle and waypoints, comes from the database

16. Flying an LPV approach, the pilot tracks vertical guidance similar to:

- A. A VOR radial
- B. A DME arc
- C. An ILS glideslope, descending to the DA
- D. A circling approach

17. Reaching the DA on an LPV without the required visual references, the pilot must:

- A. Descend to the LNAV MDA
- B. Level off and continue
- C. Circle to land
- D. Execute the missed approach

18. The advantage of LPV over LNAV minimums at the same airport is generally:

- A. Lower minimums and vertical guidance, improving access in lower weather
- B. A wider final approach course
- C. No need for a current database
- D. Elimination of the missed approach

19. A pilot must confirm the aircraft's GPS/WAAS equipment is approved for the intended approach type by checking:

- A. The aircraft's approvals/AFM supplement for the navigator's authorized approach capabilities
- B. The weight and balance
- C. The transponder inspection date
- D. The ATIS

20. When a WAAS navigator annunciates "LNAV+V," the "+V" indicates:

- A. A precision approach
- B. An LPV approach
- C. Advisory vertical guidance on an LNAV (non-precision) approach — the minimums remain the LNAV MDA
- D. A vertical guidance to a DA

21. The "advisory glidepath" (+V) is flown by the pilot but the controlling minimum remains:

- A. The LPV DA
- B. The published LNAV MDA (advisory vertical guidance does not lower the minimums)
- C. The circling minimum
- D. The LNAV/VNAV DA

22. Database currency for IFR GPS/WAAS use is typically managed on a cycle of:

- A. 28 days (the AIRAC cycle)
- B. 7 days
- C. 90 days
- D. 12 months

23. If the navigation database is out of date, the pilot:

- A. May fly any approach as published
- B. May use only LPV approaches
- C. Need not verify any data
- D. Must verify the procedure data against current sources and may be restricted from certain procedures

24. The fundamental benefit of WAAS to instrument approaches is that it:

- A. Eliminates the need for any approach chart
- B. Replaces all ground-based nav aids immediately
- C. Enables precise lateral and vertical guidance (LPV) to low minimums without ground-based approach aids
- D. Removes the database requirement

25. The fundamental principle for using WAAS/LPV approaches is that the pilot must:

- A. Disregard the annunciated service level
- B. Confirm WAAS/LPV capability and current database, fly the annunciated line of minima, and respond correctly if the service downgrades
- C. Always use LNAV minimums
- D. Fly the advisory glidepath to the LPV DA

ANSWER KEY & EXPLANATIONS – SESSION 50

1. C. Correction/integrity + vertical — WAAS provides correction and integrity signals that increase accuracy and enable vertical guidance approaches.
2. A. Geostationary satellites — WAAS corrections are transmitted via geostationary satellites broadcasting the correction messages.
3. B. Vertical guidance approaches — WAAS adds approaches with vertical guidance (e.g., LPV) flown to a decision altitude.
4. A. Localizer Performance with Vertical guidance — LPV stands for Localizer Performance with Vertical guidance.
5. C. RNAV with WAAS vertical to DA — LPV is an RNAV (GPS) approach with WAAS-provided vertical guidance flown to a DA (an approach procedure with vertical guidance).

6. C. LPV/LNAV-VNAV/LP-LNAV/circling — From lowest/most capable to highest, the lines of minima generally run LPV, LNAV/VNAV, LP/LNAV, circling.
7. D. Lateral only/MDA — LNAV minimums represent lateral navigation only — a non-precision approach flown to an MDA.
8. B. Lateral + vertical to DA — LNAV/VNAV provides lateral and vertical guidance flown to a DA, with higher minimums than LPV.
9. D. Lateral-only WAAS/MDA — LP provides lateral-only guidance with WAAS angular sensitivity, no vertical guidance, flown to an MDA.
10. D. ~200 ft HAT — The lowest LPV minimums can have a DA as low as about 200 feet HAT, comparable to a Category I ILS at some runways.
11. A. Service level/annunciation — The usable line of minima depends on the integrity/service level available and the procedure annunciated (LPV vs. LNAV).
12. D. Downgrade to LNAV — If WAAS vertical guidance is unavailable for an LPV, the navigator may annunciate a downgrade to LNAV (lateral-only) minimums.
13. B. WAAS own integrity — A WAAS receiver provides its own integrity information through the augmentation system, so it doesn't need separate RAIM prediction the same way.
14. B. Coded approach in database — The LPV approach is loaded from the coded approach in the current navigation database.
15. D. Path from database — A current database is critical because the vertical and lateral path, including glidepath angle and waypoints, comes from the database.
16. C. Like an ILS glideslope — LPV vertical guidance is tracked similar to an ILS glideslope, descending to the DA.

17. D. Missed approach — Reaching the LPV DA without the required visual references requires executing the missed approach.

18. A. Lower minimums/vertical — LPV's advantage over LNAV is lower minimums and vertical guidance, improving access in lower weather.

19. A. AFM/approvals — Equipment approval for an approach type is confirmed by checking the aircraft's approvals/AFM supplement for the navigator's authorized capabilities.

20. C. Advisory +V on LNAV — "LNAV+V" indicates advisory vertical guidance on an LNAV (non-precision) approach; the minimums remain the LNAV MDA.

21. B. LNAV MDA controls — With an advisory glidepath (+V), the controlling minimum remains the published LNAV MDA.

22. A. 28-day AIRAC — Database currency for IFR GPS/WAAS use is typically on a 28-day (AIRAC) cycle.

23. D. Verify/restricted — With an out-of-date database, the pilot must verify the procedure data against current sources and may be restricted from certain procedures.

24. C. Precise guidance, no ground aids — WAAS's fundamental benefit is enabling precise lateral and vertical guidance (LPV) to low minimums without ground-based approach aids.

25. B. Confirm/fly/respond — The fundamental principle is to confirm WAAS/LPV capability and current database, fly the annunciated line of minima, and respond correctly if the service downgrades.