WAASssss UUUUPPP with GPS and RNAV: Demystifying Modern Navigation from Enroute to Minimums

What's Up?! Know. Learn. Fly.

HANDOUT

Resources:

- Air Traffic Services Brief -- Wide Area Augmentation System (WAAS)
  - https://www.aopa.org/advocacy/advocacy-briefs/air-traffic-services-brief-wide-area-augmentation-system-waas
- PBN bingo: Making sense of new acronyms
  - https://www.aopa.org/news-and-media/all-news/2023/june/pilot/instrument-tip-pbn-bingo
- Get inside your navigator's head: Turn to the flight plan page for smooth approaches
  - https://www.aopa.org/news-and-media/all-news/2026/january/flight-training/instrument-tip-get-inside-your-navigators-head
- Tango and TEC routes: More tools in your IFR toolbox
  - https://www.aopa.org/news-and-media/all-news/2026/april/pilot/instrument-tip-tango-and-tec-routes
- Let's be precise: A new era of approach designations
  - https://www.aopa.org/news-and-media/all-news/2025/april/pilot/instrument-tip-lets-be-precise
- GPS: substitute or alternate? An important distinction, especially during an approach
  - https://www.aopa.org/news-and-media/all-news/2025/october/pilot/instrument-tip-gps-substitute-or-alternate
- Descend with caution: A guide to vertical guidance
  - https://www.aopa.org/news-and-media/all-news/2026/august/pilot/instrument-tip-descend-with-caution
- Staying centered with GPSS: Setting the mode for smooth lateral navigation
  - https://www.aopa.org/news-and-media/all-news/2025/august/pilot/instrument-tip-staying-centered-with-gpss
- The course ahead: Select the right club to stay in the fairway
  - https://www.aopa.org/news-and-media/all-news/2026/may/flight-training/instrument-tip-the-course-ahead
- Back to basics navigation: Do you know what to do if the magenta line turns yellow?

    - https://www.aopa.org/news-and-media/all-news/2025/june/flight-training/proficiency-back-to-basics-navigation
- Will +V Guidance Clear Stepdown Restrictions? (Bold Method)
    - https://www.boldmethod.com/shorts/shorts.ifr.0231/
- FAA Satellite Navigation webpage
    - https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss

VFR GPS Proficiency Skills Checklist (based on AIM 1-1-17 a and b)

- A proficient VFR GPS pilot should be able to successfully perform the following tasks:
    - Programming airports, navaids, intersections, and user-defined waypoints;
    - Creating, editing, storing, and activating flight plans;
    - Using the Direct-To function appropriately;
    - Using OBS mode to navigate a selected course to or from a waypoint;
    - Distinguishing between OBS mode and Leg mode operations;
    - Identifying the active waypoint and active leg of a flight plan;
    - Interpreting GPS navigation information, including DTK, BRG, TK, and XTK;
    - Modifying a route in flight while maintaining aircraft control and situational awareness;
    - Verifying waypoint identifiers prior to activation;
    - Recognizing and avoiding waypoint-entry errors and duplicate identifiers;
    - Using GPS information in conjunction with pilotage and dead reckoning;
    - Cross-checking GPS position with visual landmarks, charts, and other navigation sources;
    - Maintaining navigation proficiency using VORs and other available navigation systems;
    - Understanding the capabilities and limitations of the installed GPS equipment;
    - Understanding the operational differences between handheld, portable, panel-mounted, and IFR-certified GPS equipment;
    - Verifying database currency and understanding the risks of using outdated navigation data;
    - Verifying waypoints against current aeronautical charts and publications when necessary;
    - Recognizing the importance of GPS antenna placement and satellite visibility;

    - Recognizing indications of degraded GPS performance or signal loss;
    - Understanding the limitations of GPS receivers that do not provide RAIM alerting;
    - Questioning GPS position information that conflicts with other navigation sources;
    - Maintaining visual scanning for traffic, terrain, obstacles, and airspace while using GPS navigation;
    - Minimizing head-down time through proficiency with GPS controls and menus;
    - Identifying VFR waypoints on aeronautical charts;
    - Locating and entering VFR waypoint identifiers into a GPS receiver;
    - Understanding the proper use and limitations of VFR waypoints;
    - Using VFR waypoints to enhance situational awareness around airspace, reporting points, and geographic checkpoints;
    - Incorporating VFR waypoints into VFR flight plans when appropriate;
    - Recognizing that VFR waypoints may not be used for IFR flight plan routing;
    - Loading VFR waypoints and routes prior to departure whenever practical;
    - Avoiding extensive route programming while airborne;
    - Anticipating increased traffic concentrations near commonly used VFR waypoints;
    - Monitoring appropriate frequencies when operating near congested VFR routes and reporting points;
    - Using mountain-pass waypoints as planning and situational-awareness tools rather than obstacle-clearance guidance;
    - Evaluating terrain, weather, winds, and aircraft performance independently of GPS guidance;
    - Maintaining safe navigation following a partial or complete GPS failure.
- Summary Question
    - Can you confidently perform all of these tasks in your GPS navigator while maintaining aircraft control, looking outside for traffic, and navigating safely without relying solely on the magenta line?
    - If not, those areas represent excellent opportunities for additional training, simulator practice, and proficiency flying with an instructor.

IFR GPS Proficiency Skills Checklist (based on AIM 1-1-17 (k)(1-12)

- A proficient IFR GPS pilot should be able to successfully perform the following tasks:
    - Using the Receiver Autonomous Integrity Monitoring (RAIM) prediction function;
    - Interpreting the consequences of a RAIM failure before and after the Final Approach Waypoint (FAWP);
    - Programming the destination airport;
    - Inserting a Departure Procedure (DP) into the flight plan;
    - Configuring terminal CDI sensitivity and understanding when terminal sensitivity is available;
    - Loading, activating, and modifying instrument approaches;
    - Programming and flying instrument approaches, including procedure turns and course reversals;
    - Programming and flying approaches that contain DME arcs or RF-style transitions;
    - Changing to a different approach after an approach has already been loaded or selected;
    - Programming and flying approaches with radar vectors to the intermediate segment;
    - Using Direct-To and OBS mode techniques to accommodate radar vectors;
    - Understanding GPS mode transitions during approach operations;
    - Verifying CDI sensitivity changes during enroute, terminal, and approach operations;
    - Programming and flying “direct” missed approaches;
    - Programming and flying “routed” missed approaches;
    - Knowing when and how to activate a missed approach sequence;
    - Managing missed approaches that require a straight-ahead climb before turning;
    - Entering, flying, and exiting holding patterns;
    - Entering and flying holds-in-lieu of procedure turns (HILPTs);
    - Programming and flying holding patterns containing multiple defining waypoints;
    - Programming and flying a route from a holding pattern;
    - Understanding distance-based and time-based holding pattern guidance;
    - Recognizing limitations when using GPS distance versus DME distance in holding procedures;
    - Programming a radial and distance from a VOR;

    - Creating and using user waypoints based on VOR radial and distance information;
    - Creating user-defined waypoints for departure, arrival, and approach procedures;
    - Activating individual legs within a flight plan;
    - Modifying flight plans while maintaining situational awareness and obstacle clearance;
    - Verifying waypoint selection and avoiding waypoint-entry errors;
    - Distinguishing between GPS and VLOC navigation modes;
    - Distinguishing between OBS mode and Leg mode operations;
    - Understanding waypoint sequencing and when automatic sequencing should or should not occur;
    - Interpreting fly-by and fly-over waypoint behavior;
    - Programming and flying RNAV (GPS) approaches with LNAV, LNAV/VNAV, LP, and LPV minimums;
    - Understanding the operational differences between GPS Overlay, RNAV (GPS), and RNP AR procedures;
    - Understanding GPS equipment limitations, database requirements, and operational approvals applicable to the installed equipment.
- Summary Question for Viewers
    - Can you confidently perform all of these tasks in your installed GPS navigator without referring to the manual while managing the aircraft in IFR conditions?
    - If not, those areas represent excellent opportunities for simulator practice, recurrent training, or dual instruction with a CFII.