USING GPS IN AIRCRAFT for Visual Navigation

A syllabus for training

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The Syllabus

A. CLASSROOM TRAINING

1. General Operations
   a. How does it work?
   b. Altitude, positions in 3D
   c. Accuracy
   d. Error factors
   e. Developments

   Critical points
   - System vulnerability
   - Minimum coverage
   - Dilution of precision, fallibility
   - Fallibility of GPS

2. Familiarisation with an actual GPS
   a. Powering the GPS
      i. Batteries
      ii. Rechargeables
      iii. External power
   b. Switching on the GPS
      i. Power on
      ii. Start up sequence
      iii. Autolocating & acquiring position
      iv. Selecting an initialisation method
   c. Operating Principles
      i. Main pages
      ii. Satellite status and positions pages
      iii. HSI/CDI/MAP pages
      iv. Active route page
   d. Configuration Checks
      i. Checking the database validity
      ii. Setting the timezone
      iii. Setting measurement units
      iv. Position format and map datum
      v. Setting battery type
      vi. Contrast and brightness
      vii. Bleeper settings
      viii. Display mode
   e. Exploring the information in database
      i. Preset information
      ii. Creating User Defined waypoints

   Critical points
   - Avoid & deal with battery failure
   - Rate & suddenness of discharge
   - Indications, deviation, free controls
   - Method
   - Database currency
   - Signal strength indications
   - Signal strength
   - Key ability to find way around GPS
   - Satellite status
   - Key familiarity
   - Key familiarity
   - Importance of validity
   - Correct zone
   - Units in operation
   - Units in operation
   - Possible misinterpretation of power
   - Key familiarity
   - Key familiarity
   - Maintain constant mode
   - Where to find which information
   - Creation & error checking

3. Using the unit's Simulator
   a. Starting the simulator
   b. Setting the simulator position
   c. Using GOTO (Direct To)
   d. Simulator speed
   e. Airspace warnings/Alarms
   f. Selecting waypoint by another method
   g. Map/Navigation settings
   h. Switching the simulator off

   Critical points
   - Availability, operation & indication
   - Setting position
   - Setting a destination
   - Setting speed
   - Relative urgency & importance
   - Other than ICAO codes
   - Configuration, track definitions, zone displays, items not in database
   - Selection, indication
B. IN THE AIRCRAFT

4. GPS In the Aircraft
   a. Positioning the GPS
      i. Yoke Mount
      ii. Dash Mount
   b. installing the antenna
   c. installing external power
   d. Check the installation
      i. Full and free check
      ii. Contrast and brightness
   e. Start up procedures
      i. Check database validity
      ii. Check power supply
      iii. Check satellite status
      iv. Check indicated position
   Controls balanced & unencumbered
   View, deviation, glare, turbulence
   Signal strength vs obstructions
   Deviation, cable routing
   Importance
   Importance of correct settings
   Routine for starting during checks
   Importance of check
   Importance of check
   Importance of check

5. Flight Planning and Flying a Route (Ground exercise)
   a. Check NOTAMS and weather
   b. Choosing waypoints
   c. Plan flight
   d. Enter route into the GPS
   e. Saving the route in the GPS
   f. Activating the route
   g. Configuring active route information
   h. Configuring map/navigation page(s)
   Importance of standard procedures
   Importance of factors affecting choice
   Importance of standard parameters
   Comparison error check
   Most can support multiple routes
   Importance
   Configurability, reasons for confusion
   Zone displays, Key data fields inc
   track definitions

6. First Flight (flown with instructor /safety pilot)
   a. Prepare the Flight
   b. Switch on
   c. Functional Checks
   d. Fly Headings not the GPS line
   e. Appreciation of navigation displays
   f. Include GPS in regular checks
   g. GPS at the waypoint
   Fly selected headings
   Check for coverage & power
   Compare with track and speed

7. Subsequent Flights
   a. In-flight cross checks
   b. Track corrections using GPS
      i. Bracketing track and actual "winds aloft"
      ii. Parallelling track
      iii. Regaining track
   c. Simple diversions using GPS
   d. More complex diversions
   e. Inverting the route
   f. Appreciation of navigation displays
   How to adjust
   Method
   Either quickly or at next waypoint
   How to use GO-TO (or equivalent)
   Around hazards – database risks
   Including specific legs
ABOUT THIS SYLLABUS

The Royal Institute of Navigation since its inception has aimed to improve the standards of navigation on land, sea and in the air. To that end, they have published material to assist recreational pilots (the aerial navigators of today), including a booklet on Visual Navigation Techniques and another on GPS use.

Over recent years, satellite navigation system receivers and their associated computers have become available at low cost to the general public, and recreational aviators have seized on the opportunities they have offered. However, it has become clear that, despite manufacturers providing instruction manuals and CDs, there is a need for pilots to have access to detailed training before they can feel confident to use the system as an effective back up to the visual techniques which should remain their primary means of navigation for reasons explained in the “GPS Use” leaflet.

The Institute’s General Aviation Navigation Group has therefore produced this syllabus of training to cover the competencies which they consider pilots need in order to use their GPS equipment successfully. Those providing the training should refer to the Instructors Guide, which expands on the basic syllabus to assist in preparing individual lessons, but it is emphasised that details of individual systems can only be found by reference to the manufacturer’s instructions. The individual equipment manual must of necessity be the source of the basic information being taught.

There is no requirement for anyone to be formally associated with the RIN in order to use this or any other of its training material. However, if training providers or their students feel that their own aims are aligned with those of the Institute, various categories of membership are available as detailed on the RIN web site www.rin.org.uk

The Royal Institute of Navigation (RIN) is a learned society formed in 1947. It has three main aims: to unite all those with a professional or personal interest in any aspect of navigation in one unique body; to further the development of navigation in every sphere; and to increase public awareness of both the art and science of navigation, how it has shaped the past, how it impacts our world today, and how it will affect the future.