



USING GPS IN AIRCRAFT for Visual Navigation

A syllabus for training



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The Syllabus

A. CLASSROOM TRAINING

Critical points

1. General Operations

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

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

Avoid & deal with battery failure
Rate & suddenness of discharge
Indications, deviation, free controls

b. Switching on the GPS

- i. Power on
- ii. Start up sequence
- iii. Autolocating & acquiring position
- iv. Selecting an initialisation method

Method
Database currency
Signal strength indications
Signal strength

c. Operating Principles

- i. Main pages
- ii. Satellite status and positions pages
- iii. HSI/CDI/MAP pages
- iv.. Active route page

Key ability to find way around GPS
Satellite status
Key familiarity
Key familiarity

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

Importance of validity
Correct zone
Units in operation
Units in operation
Possible misinterpretation of power
Key familiarity
Key familiarity
Maintain constant mode

e. Exploring the information in database

- i. Preset information
- ii. Creating User Defined waypoints

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

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

Critical points

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. Paralleling 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.