



USING GPS IN AIRCRAFT for Visual Navigation

A syllabus for training



Student's guide



The Syllabus

A. CLASSROOM TRAINING	Critical points
1. <u>General Operations</u>	
a. How does it work?	System vulnerability
b. Altitude, positions in 3D	Minimum coverage
c. Accuracy	Dilution of precision, fallibility
d. Error factors	Fallibility of GPS
e. Future development	
2. <u>Familiarisation with an actual GPS</u>	
a. Powering the GPS	
i. Batteries	Avoid & deal with battery failure
ii. Rechargeables	Rate & suddenness of discharge
iii. External power	Indications, deviation, free controls
b. Switching on the GPS	
i. Power on	Method
ii. Start up sequence	Database currency
iii. Autolocating & acquiring position	Signal strength indications
iv. Selecting an initialisation method	Signal strength
c. Operating Principles	
i. Main pages	Key ability to find way around GPS
ii. Satellite status and positions pages	Satellite status
iii. HSI/CDI/MAP pages	Key familiarity
iv.. Active route page	Key familiarity
d. Configuration Checks	
i. Checking the database validity	Importance of validity
ii Setting the timezone	Correct timezone
iii. Setting measurement units	Units in operation
iv. Position format and map datum	Units in operation
v. Setting battery type	Possible misinterpretation of power
vi. Contrast and brightness	Key familiarity
vii. Bleeper settings	Key familiarity
viii. Display mode	Maintain constant mode
e. Exploring the information in database	
i. Preset information	Where to find which information
ii. Creating User Defined waypoints	Creation & error checking
3. <u>Using the unit's Simulator</u>	
a. Starting the simulator	Availability, operation & indication
b. Setting the simulator position	Setting position
c. Using GOTO (Direct To)	Setting a destination
d. Simulator speed	Setting speed
e. Airspace warnings/Alarms	Relative urgency & importance
f. Selecting waypoint by another method	Other than ICAO codes
g. Map/Navigation settings	Configuration, track definitions, zone displays, items not in database
h. Switching the simulator off	Selection, indication

B. IN THE AIRCRAFT	Critical points	
4. <u>GPS In the Aircraft</u>		
a. Positioning the GPS		
i. Yoke Mount	Controls balanced & unencumbered	
ii. Dash Mount	View, deviation, glare, turbulence	
b. installing the antenna	Signal strength vs obstructions	
c. installing external power	Deviation, cable routing	
d. Check the installation		
i. Full and free check	Importance of full & free check	
ii. Contrast and brightness	Importance of correct settings	
e. Start up procedures		
i. Check database validity	Routine for starting during checks	
ii. Check power supply	Importance of check	
iii. Check satellite status	Importance of check	
iv. Check indicated position	Importance of check	
5. <u>Flight Planning and Flying a Route (Ground exercise)</u>		
a. Check NOTAMS and weather	Importance of standard procedures	
b. Choosing waypoints	Importance of factors affecting choice	
c. Plan flight	Importance of standard parameters	
d. Enter route into the GPS	Comparison error check	
e. Saving the route in the GPS	Most can support multiple routes	
f. Activating the route	Importance	
g. Configuring active route information	Configurability, reasons for confusion	
h. Configuring map/navigation page(s)	Zone displays, Key data fields inc track definitions	
6. <u>First Flight (flown with instructor /safety pilot)</u>		
a. Prepare the Flight		
b. Switch on		
c. Functional Checks		
d. Fly Headings not the GPS line	Fly selected headings	
e. Appreciation of navigation displays		
f. Include GPS in regular checks	Check for coverage & power	
g. GPS at the waypoint	Compare with track and speed	
7. <u>Subsequent Flights</u>		
a. In-flight cross checks		
b. Track corrections using GPS		
i. Bracketing track and actual "winds aloft"	How to adjust	
ii. Parallelling track	Method	
iii. Regaining track	Either quickly or at next waypoint	
c. Simple diversions using GPS	How to use GO-TO (or equivalent)	
d. More complex diversions	Around hazards – database risks	
e. Inverting the route	Including specific legs	
f. Appreciation of navigation displays		

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.

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, many users are limited in their understanding of their equipment. 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 produced this syllabus of training to cover the competencies which they consider pilots should have in order to use their GPS equipment successfully in VFR flight, and this has been accepted by the Airspace & Safety Initiative Communication & Education Programme (ACEP) as the recognised syllabus for GA GPS visual navigation training. It is supported by the major UK GA organisations.

Those providing the training should refer to the Instructors Guide, which is available from the RIN and expands on this Student's Basic Syllabus to assist in preparing individual lessons. Details of individual systems can only be found in the manufacturers' instructions, which 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 an affinity with the aims of the Institute, various categories of individual and group membership are available as detailed on the RIN web site www.rin.org.uk.

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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.