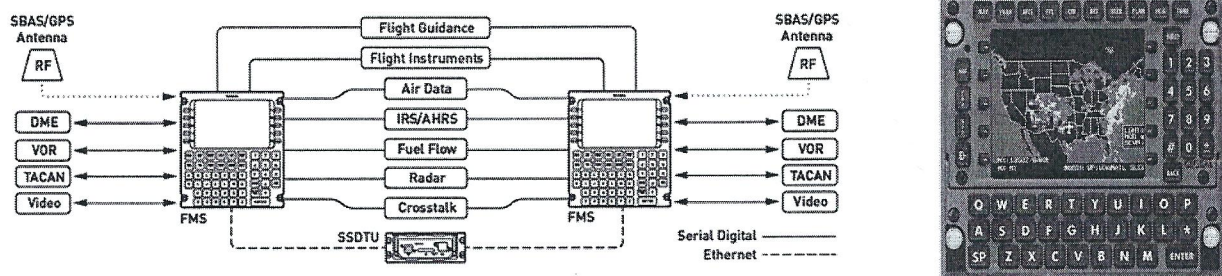# FMS – Route distance

Lab work nº1

1 Objectives

- To understand the main functions of the Flight Management System (FMS)

- To design and to implement a simple FMS function

2 Introduction

The Flight Management System (FMS) is a complex avionic system that plays an import role in the process of optimizing the aircraft use. It is composed by two units, a control display unit and a computer unit. The control display unit is used to input and to visualize data. The computer unit runs performance databases with complex optimization algorithms to optimize the fuel consumption, the flight trajectory and the timing to reach waypoints, that is, 4 dimensional trajectories.

(Note: Diagrams obtained from Internet for educational purposes.)

One of the simplest tasks of FMS is to compute the route distance defined by a set of waypoints.

3 The problem

The objective of this lab work is to address the computation of a route distance, where the flight path between two consecutive waypoints is computed using the absolute length (great-circle distance).

The following simplifications are assumed:
1. The surface of the Earth is assumed to be spherical.
2. The waypoints are described in terms of latitude, longitude, and altitude.
3. The altitude along the route (flight path) is not constant, but the altitude between two consecutive waypoints, A and B (leg) is constant and is defined by the altitude of the first waypoint A.

This functionality must be implemented using the C programming language (Linux). The program starts by reading a file (route) with a sequence of waypoints and must compute/show the route total distance.

In order to address the this problem the following steps must be considered:
1. A research on the subject must be performed, what scientific principles must be used?
2. List of requirements. Is the description of the problem adequate to develop a solution?
3. Define a technical solution, software design. What is the accuracy of the solution?
4. Testing procedures.

4 Evaluation

The following points will be considered in the evaluation of this lab work:
1. Description of the scientific principle used.
2. Software design, clean code.
3. Program output.
4. Tests used to evaluate the solution.

Delivery date: Defined in the first theoretical class.