(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 413 449 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90308119.8**

(51) Int. Cl.5: **G08G 5/00**

(22) Date of filing: **25.07.90**

(30) Priority: **18.08.89 GB 8918896**

(43) Date of publication of application:
20.02.91 Bulletin 91/08

(84) Designated Contracting States:
DE FR IT NL

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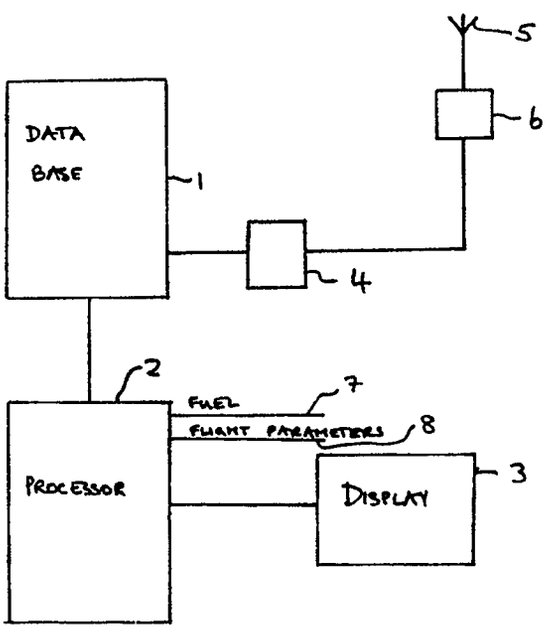
(54) Navigation aid for aircraft pilot.

(57) An navigation aid for the pilot of an aircraft comprises a data base 1 which contains information about location of airfields, a processor 2 for estimating the permissible aircraft range based on the fuel remaining and aircraft flight parameters, and a display 3 to indicate airfields that are within range. The aid is intended to assist the pilot in the event of an unforeseen problem.



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NAVIGATION AID FOR AIRCRAFT PILOT

This invention relates to navigation aids for pilots of aircraft, and is particularly concerned with a navigation aid which can be used in the case of events which render the pilot or the aircraft unable to complete a mission as planned.

The invention provides a navigation aid for a pilot of an aircraft, which comprises a data base containing information about the location of airfields, means for estimating the permissible aircraft range from information on the fuel remaining and the aircraft flight parameters, and a display to indicate airfields that are within range.

Such a navigation aid will reduce the tasks of the pilot in the event of a problem e.g. an engine failure or collision with birds.

A navigation aid for the pilot of an aircraft, constructed in accordance with the invention, will now be described by way of example with reference to the accompanying drawing, which is a block diagram of the circuit of the navigation aid.

The navigation aid is mounted on-board an aircraft and consists of a data base 1 containing information about the location of airfields, a processor 2 which is capable of using the information in the data base, and a display 3 on which the various information can be shown.

The data base contains information about airfields for the region over which it would be possible for the aircraft to travel. Apart from their position, the data base contains details of the runways at each location viz., their length, direction and pavement classification number (PCN) which specifies the bearing strength of the runway for continuous operation. Details of the instrument landing system data and the arresting gear available are also stored.

To facilitate navigation to an airfield, corresponding way points are stored together with radio frequencies applicable to aircraft approach.

The weather situation at most airfields is transmitted every fifteen minutes along with airfield status. Airfield status is dependent on local visibility and results of enemy attacks. A keyboard 4 enables a pilot to update the weather information in the database by that received by antenna 5 and radio 6.

Air corridors together with threats are also stored.

Sensors (not shown) connected to lines 7, 8 continuously feed the flight parameters and the fuel remaining to the data processor.

Processor 2 is able to automatically plan a route to a friendly air base using data concerning aircraft status, airfield capabilities and parameters, threats status and relevant mission aspects.

The basic operation is to estimate the range obtainable by the aircraft at its current speed and altitude. This range limit will only encompass a certain number of airfields, which are then examined further.

The next main filtering stage considers the runway parameters of the remaining airfields. If the specific aircraft classification number (ACN) is greater than the PCN, than authorisation will be needed from the airfield authorities prior to landing. This may not be possible, and so the ACN is taken as the maximum allowable PCN at which a landing is permissible.

The preliminary selection process will result in a list of airfields (name, bearing and distance) in range of the aircraft with usable runways, weighted partially against those with adverse weather conditions in the area, together with instrument landing system data and arresting gear available.

A route planning algorithm will be used to determine the optimum route from the aircraft to each of the remaining airfields by known way points if necessary. Optimum routes will avoid known hostile positions and will use air corridors where ever possible. The shortest path will be preferred incorporating the above conditions. The way points are already stored in the aircraft. If the aircraft is not capable of flying within the conditions of the air corridors, than a route avoiding the known corridors will be chosen. The information will be displayed on display 3, which may be visual or symbolic and/or audio.

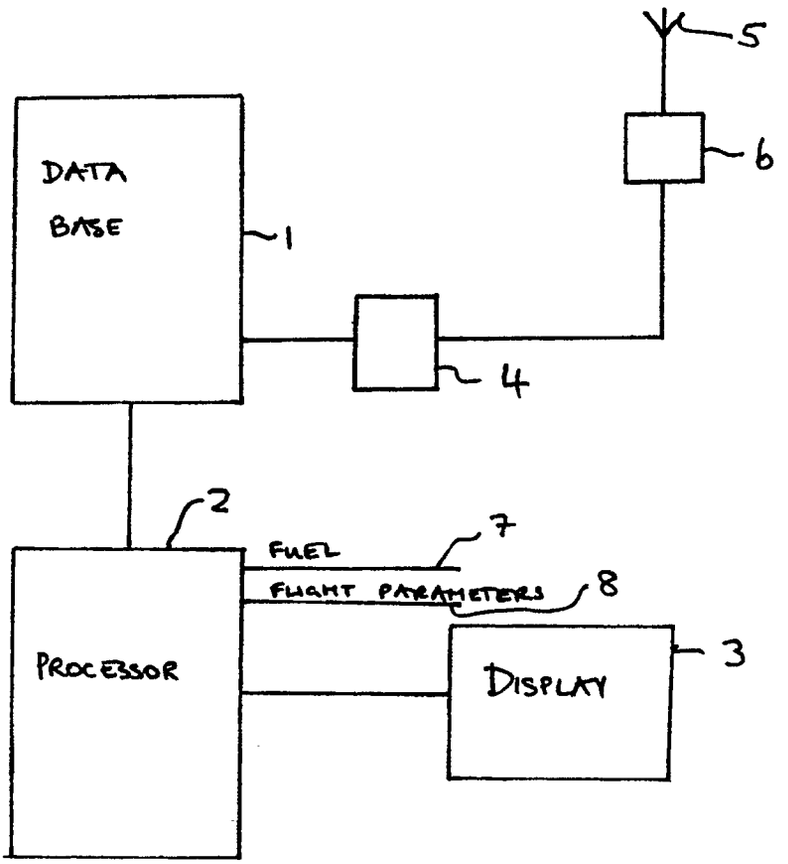
Via the keyboard 4, the pilot may request information concerning an emergency situation in which it is urgently necessary to land at the nearest airfield with a long enough runway and having no weather problems. Or a less urgent level of aid may be requested which requires the correct fuel, repair facilities, armament stores etc. The weighting of each category will be able to be varied according to specific needs.

Once a suggested airfield has been accepted by the pilot, navigation to way point data will be displayed along with radio frequencies applicable to the sector or aircraft being approached.

The navigation aid will improve the chances of an aircraft returning to a base which will suit its needs. Among the advantages are reduced work load for the pilot in a time of increased stress, vital information provided without having to refer to charts, tables or other intensive heads down activity, better use of available corridors and safe flight levels, and automatic range in time of flights from fuel status calculations.

Claims

1. Navigation aid for pilot of aircraft comprising a data base containing information about the location of airfields, means for estimating the permissible aircraft range from information on the fuel remaining and aircraft flight parameters, and a display to indicate airfields that are within range.
2. An aircraft including a navigation aid as claimed in claim 1.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6
DATA
BASE
1
4
2
7
FUEL
FLIGHT PARAMETERS
8
PROCESSOR
DISPLAY
3