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(54) **Title:** METHOD, SCHEME AND SYSTEM FOR DISPLAYING FLIGHT RELATED INFORMATION

(57) **Abstract:** A method for presenting an advised action for recovering an aircraft from an unusual flight attitude, the method including the procedures of: retrieving real-time flight parameters; retrieving aircraft aerodynamic characteristics; determining if the aircraft is at the unusual flight attitude; determining an attitude recovery scheme; and presenting the attitude recovery scheme.

METHOD, SCHEME AND SYSTEM FOR DISPLAYING FLIGHT RELATED INFORMATION

Michael ABRAHAMI

FIELD OF THE DISCLOSED TECHNIQUE

The disclosed technique relates to flight related information display in general, and to methods, schemes and systems for presenting an advised action for recovery from an unusual flight attitude, aircraft flight performance limits, and aircraft estimated predicted situations in particular.

BACKGROUND OF THE DISCLOSED TECHNIQUE

Flight recommendations display systems which present to a pilot of an aircraft, flight recommendations and flight boundaries are known in the art. such a display system presents, for example, to the pilot an allowed pitch scale range and a recommendation in the form of an arrow, pointing in the direction of the allowed pitch scale range (i.e., in case the aircraft is not within the allowed pitch scale range). The display system further presents to the pilot the minimum approach altitude and a flight path marker for assisting the pilot in a landing maneuver.

US Patent No. 6,150,960 issued to Voulgaris, and entitled "Integrated Flight Control Indicator" is directed to an integrated flight control indicator for indicating to a pilot, a preferred landing approach,

according to an instrument landing system. The indicator includes a flight path marker, a heading and glide slope indicator, a left index marker, a right index marker, and a minimum approach altitude indicator. The flight path marker includes a left vertical line and a right vertical line, extending there-from.

The pilot maneuvers the aircraft, such that the flight path marker is maintained within the heading and glide slope indicator, and such that the left index marker and the right index marker are generally aligned with the left vertical line and the right vertical line extending from the flight path marker. Thus, the aircraft is descending at the correct rate. The minimum approach altitude indicator shows the pilot the altitude of the aircraft relative to the minimum permissible descent altitude below which the pilot either lands visually or initiates a missed approach procedure.

SUMMARY OF THE PRESENT DISCLOSED TECHNIQUE

It is an object of the disclosed technique to provide a novel method and system for displaying flight related information to the pilot of an aircraft. In accordance with the disclosed technique, there is thus provided a method for presenting an advised action for recovering an aircraft from an unusual flight attitude. The method includes the procedures of retrieving real-time flight parameters, retrieving aircraft aerodynamic characteristics, determining if the aircraft is at the unusual

flight attitude, determining an attitude recovery scheme, and presenting the attitude recovery scheme.

In accordance with another aspect of the disclosed technique there is thus provided a system for presenting an advised action for recovering an aircraft from an unusual flight attitude. The system includes a processor and a display. The processor retrieves aircraft aerodynamic characteristics and aircraft flight parameters. The processor determines if the aircraft is at the unusual flight attitude. The processor determines an attitude recovery scheme. The display displays the attitude recovery scheme.

In accordance with a further aspect of the disclosed technique there is thus provided a method for presenting a virtual airstrip and an aircraft calculated stopping point. The method includes the procedures of retrieving flight parameters, retrieving aircraft aerodynamic characteristics, retrieving airport related information, producing a virtual airstrip representation, dynamically producing an aircraft calculated stopping point, presenting the virtual airstrip representation, and dynamically presenting the aircraft calculated stopping point.

In accordance with another aspect of the disclosed technique there is thus provided a system for presenting a virtual airstrip and an aircraft calculated stopping point. The system includes a processor and a display. The processor retrieves aircraft aerodynamic characteristics, aircraft flight parameters and airport related information. The processor

produces a virtual airstrip representation. The processor dynamically produces an aircraft calculated stopping point. The display displays the virtual airstrip representation and dynamically displays the aircraft calculated stopping point.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosed technique will be understood and appreciated more fully from the following detailed description taken in conjunction with the drawings in which:

Figure 1 is a schematic illustration of a display for presenting a flight related advised action for recovering from an unusual flight attitude, and an aircraft flight performance limit to a pilot of an aircraft, operative in accordance with an embodiment of the disclosed technique;

Figure 2A is a schematic illustration of a display for presenting a virtual airstrip, estimated immediate aircraft speed and aircraft flight performance limit to a pilot of an aircraft, operative in accordance with another embodiment of the disclosed technique;

Figures 2B is a schematic illustration of the display of Figure 2A further including a calculated aircraft stopping point symbol located within the boundaries of the virtual strip;

Figures 2C is a schematic illustration of the display of Figure 2A further including a calculated aircraft stopping point symbol located beyond the boundaries of the virtual strip;

Figure 3 is a schematic illustration of a system for presenting flight related information, including but not limited to a flight related advised action for recovering from an unusual flight attitude, an aircraft flight performance limit, an aircraft estimated immediate speed, and an

aircraft calculated stopping point, constructed and operative in accordance with a further embodiment of the disclosed technique;

Figure 4 is a schematic illustration of a method for presenting an advised action for recovering an aircraft from an unusual flight attitude, operative in accordance with another embodiment of the disclosed technique; and

Figure 5 is a schematic illustration of a method for presenting a virtual airstrip and an aircraft calculated stopping point, operative in accordance with a further embodiment of the disclosed technique.

DETAILED DESCRIPTION OF THE EMBODIMENTS

The disclosed technique overcomes the disadvantages of the prior art by providing novel methods, schemes and systems which present flight related information, including but not limited to a flight related advised action for recovering from an unusual flight attitude, aircraft flight performance limits (e.g., a pitch or roll angle, beyond which an unusual flight attitude might occur), and aircraft estimated predicted situations (e.g., a predicted speed of the aircraft ten seconds from the current time, an aircraft calculated stopping point on an airstrip).

The term Angle of Attack (AOA) herein below, refers to an angle between the direction of the chord line of an aircraft wing airfoil and the direction of the airflow wind. The term "unusual flight attitude" herein below, refers to the attitude of an aircraft, deviating from the normal flight attitude, as predefined by an operator (i.e., an organization operating the aircraft such as an aviation company, a national air-force and the like) of the aircraft. The unusual flight attitude is determined by considering the aircraft aerodynamic characteristics, the mission of the aircraft (i.e., flying passengers, flying cargo, aerobatic maneuvers, and the like), and the like. Reference is now made to Figure 1, which is a schematic illustration of a display for presenting a flight related advised action for recovering from an unusual flight attitude, and an aircraft flight performance limit to a pilot of an aircraft, generally referenced 100, operative in accordance with an embodiment of the disclosed technique. In the example set forth in Figure

1, the aircraft (not shown) is in an unusual flight attitude situation, in which the pilot (not shown) has to make the correct action in order to recover the aircraft from the unusual flight attitude situation.

Display 100 includes a display frame 102, an artificial horizon symbol 104, a speed display bar 106, a current speed symbol 108, an altitude display bar 110, a current altitude symbol 112, an aircraft reference symbol 114, a reference horizon angle display 116, an AOA limit symbol 118, and an advised action symbol 120. Display frame 102 is a circle containing the symbols presented to the pilot of the aircraft. Display frame 102 is located in the top centre of display 100.

Artificial horizon symbol 104 represents the position of the horizon with respect to the position of the wings (not shown) of the aircraft (i.e., the roll angle of the aircraft is substantially zero when artificial horizon 104 is aligned with aircraft reference symbol 114). Artificial horizon symbol 104 is in shape of a truncated isosceles baseless triangle, including a vertical line 126 extending vertically downwards from the middle of a truncated portion 128. Artificial horizon symbol 104 is aligned with aircraft reference symbol 114 when truncated portion 128 is at the top of display frame 102, and is horizontal.

Speed display bar 106 is located on the left side of display 100 (i.e., left of display frame 102). Speed display bar 106 represents a range of aircraft speeds, containing the current aircraft speed. Current speed symbol 108 represents the current aircraft speed, which in the example set

forth in Figure 1 is 153 knots. Current speed symbol 108 is moving up and down along speed display bar 106, according to the current speed of the aircraft.

Altitude display bar 110 is located on the right side of display 100 (i.e., right of display frame 102). Altitude display bar 110 represents a range of aircraft altitudes, containing the current aircraft altitude. Current altitude symbol 112 represents the current aircraft altitude, which in the example set forth in Figure 1 is twenty five thousand, three hundred and fifty feet. Current altitude symbol is moving up and down along altitude display bar 110, according to the current altitude of the aircraft. Reference horizon angle display 116 represents the pitch angle between the aircraft and the horizon, which in the example set forth in Figure 1 is minus seventy degrees.

AOA limit symbol 118 represents the limit AOA. The Angular difference between aircraft reference symbol 114 and AOA limit symbol 118 represents the maneuvering area in which the pilot may maneuver safely without exceeding AOA limits, beyond which an unusual flight attitude might occur. AOA limit symbol 118 consists of two corner shaped symbols, one on each side of aircraft reference symbol 114, indicating the highest point to which aircraft reference symbol 114 may be raised to. In order to draw the attention of the pilot, when the wings of the aircraft are getting closer to the limit AOA, AOA limit symbol 118 changes its color to red.

Advised action symbol 120 represents a maneuver the pilot should perform in order to recover the aircraft effectively from the unusual flight attitude. Advised action symbol 120 is presented in a visual way directed at catching the attention of the pilot (e.g., flashing, bold, brightly colored, colored in red, changing colors, changing sizes, accompanied by oral instructions, or a combination thereof). Advised action symbol 120 is in form of a semi circular arrow pointing in the direction (e.g., to the left) to which the pilot should maneuver the aircraft. In the example set forth in Figure 1, the advised action as represented by advised action symbol 120 is to roll the aircraft to the left. When the pilot would roll the aircraft according to advised action symbol 120, the situation of the aircraft would change, and advised action symbol 120 would also change.

In case the aircraft recovers from the unusual flight attitude, advised action symbol 120 is removed from display 100. In case the aircraft would not recover from the unusual flight attitude, advised action symbol would change into a new symbol representing a new advised action, appropriate for the new aircraft situation (e.g., an arrow pointing upwards, advising the pilot to pull the nose of the aircraft upwards).

It is noted that all the symbols within display 100 change their color according to the situation of the aircraft, such that the closer the aircraft gets to an unusual flight attitude or to an other unsafe situation (e.g., the altitude of the aircraft is too low), the color of the corresponding symbol changes to a brighter, more warning related color. For example,

when the wings of the aircraft are getting within ten degrees of the AOA limit, AOA limit symbol 118 changes its color from green to yellow. When the wings of the aircraft are getting within five degrees of the AOA limit, AOA limit symbol 118 changes its color from yellow to red.

Additionally, the corresponding symbol can start flashing for further drawing the attention of the pilot. It is further noted that, the flight related information of display 100 can be displayed to the pilot of the aircraft on the PFD, and take priority over other displays. The flight related information of display 100 can be presented to other people as well as the pilot of the aircraft, such as other pilots flying in the vicinity of the aircraft, a control tower of an airport, and the like.

Reference is now made to Figures 2A, 2B and 2C. Figure 2A is a schematic illustration of a display for presenting a virtual airstrip, estimated immediate aircraft speed and aircraft flight performance limit to a pilot of an aircraft, generally referenced 200, operative in accordance with another embodiment of the disclosed technique. Figures 2B and 2C are schematic illustrations of the display of Figure 2A further including a calculated aircraft stopping point symbol. In the example set forth in Figures 2A, 2B, and 2C an aircraft (not shown) is approaching an airstrip (not shown) for landing.

With reference to Figure 2A, display 200 includes a speed display bar 202, a current speed symbol 204, an altitude display bar 206, a current altitude symbol 208, a aircraft reference symbol 210, a virtual

airstrip symbol 212, a virtual airstrip end symbol 214, an auto-brake deceleration symbol 216, an estimated immediate speed arrow 218, and an airport elevation symbol 220.

Speed display bar 202, current speed symbol 204, altitude display bar 206, current altitude symbol 208, and aircraft reference symbol 210 are substantially similar to speed display bar 104, current speed symbol 106, altitude display bar 110, current altitude symbol 112, and aircraft reference symbol 114 of Figure 1, respectively. Virtual airstrip symbol 212 is a virtual representation of the airstrip, the aircraft is approaching to. The numerals on either side of virtual airstrip symbol 212 represent the distance to the end of the airstrip. Virtual airstrip end symbol 214 is a virtual representation of the end of the airstrip, the aircraft is approaching to.

Auto-brake deceleration symbol 216 is located to the left of speed display bar 204. Auto-brake deceleration symbol 216 is in form of a rectangle, the length of the rectangle represents the selected auto-break value and therefore the predicted aircraft deceleration within a short time period, such as 5 seconds. Estimated immediate speed arrow 218 is pointing to the estimated immediate aircraft speed (i.e., the speed the aircraft will reach within ten seconds, or any other predetermined time period). It is noted, that the length of estimated immediate speed arrow 218 should be equal to or exceed the length of auto-brake deceleration symbol 216. When the length of auto-brake deceleration symbol 216

exceeds that of estimated immediate speed arrow 218, then it is an indication that there is a problem with the brakes, the runway is slippery, and the like. Airport elevation symbol 220 is a striped rectangle located to the right of altitude display bar 206. The top of airport elevation symbol 220 represents the actual airport elevation. The rationale of this symbol is to minimize confusion of barometric height versus height above ground.

With reference to Figures 2B and 2C, display 200 further includes an aircraft calculated stopping point symbol 222. Aircraft calculated stopping point symbol 222 represents the calculated stopping point of the aircraft on the airstrip, based on the aircraft current position, current speed and selected auto-brake deceleration rate. According to one aspect of the disclosed technique, aircraft calculated stopping point symbol 222 only appears after the aircraft has touched down (i.e., only after the wheels of the aircraft have made contact with the airstrip and brakes are applied either automatically or manually by the pilot such that the aircraft decelerates in a controlled fashion).

In the example set forth in Figure 2B, aircraft calculated stopping point symbol 222 is within the boundaries of virtual airstrip symbol 212 and virtual airstrip end symbol 214 (i.e., the aircraft actual calculated stopping point is estimated to be within the boundaries of the airstrip). In the example set forth in Figure 2C, aircraft calculated stopping point symbol 222 is located outside the boundaries of virtual airstrip symbol 212 and virtual airstrip end symbol 214 (i.e., aircraft calculated stopping point

symbol 222 is located beyond the virtual airstrip end symbol 214 on display 200).

It is noted that, all the symbols presented on Figures 1, 2A, 2B, and 2C can be replaced by other symbols of different shape, size, location on display, and color. All the symbols can change their color, shape, and size, or start flashing, according to the situation the aircraft is in. The purpose of the symbols is to draw the attention of the pilot to a possible unsafe situation, and to advise the pilot on the recommended action in case the aircraft is already within the unsafe situation, such as selecting a higher auto-brake setting, and the like. It is further noted that the flight related information presented by the symbols of Figures 1, 2A, 2B, and 2C can also be presented as an audio output (e.g., an audible instruction to roll the aircraft to the left).

Reference is now made to Figure 3, which is a schematic illustration of a system, generally referenced 300, for presenting flight related information, including but not limited to a flight related advised action for recovering from an unusual flight attitude, an aircraft flight performance limit, an aircraft estimated immediate speed, and an aircraft calculated stopping point, constructed and operative in accordance with a further embodiment of the disclosed technique.

System 300 includes a display 302, a processor 304, a database 306, a GPS receiver 308, and an Inertial Navigation System (INS) 310. Processor 304 is coupled with display 302, database 306, GPS receiver

308, and with INS 310. Display 302 is substantially similar to display 100 and display 200 of Figures 1 and 2A, respectively. Database 306 is mounted on the aircraft. Alternatively, database 306 is a remote database, which is coupled with processor 304 via a communication interface. Processor 304 retrieves aircraft aerodynamic characteristics (e.g., limit AOA), topography information (e.g., the altitude of the ground below the flight path), airport related information (e.g., the position, orientation, and dimensions of an airport), and flight path related information (e.g., commercial flights routes and schedules) from database 306.

Processor 304 retrieves real-time flight parameters (i.e., current flight parameters of the aircraft such as flight attitude, and speed) from at least one aircraft sensor (e.g., a barometric altitude meter, a GPS receiver, an Internal Navigation System - INS). In the example set forth in Figure 3, processor 304 retrieves flight parameters from GPS receiver 308, and from INS 310. Processor 304 produces flight related information for presentation, according to the information retrieved from database 306 from GPS receiver 308, and from INS 310. Processor 304 displays, via display 302, flight related information including but not limited to flight related advised action for recovering from an unusual flight attitude, an aircraft flight performance limit, an aircraft estimated immediate speed, and an aircraft calculated stopping point. The calculated stopping point symbol is displayed only after the aircraft has touched down.

Reference is now made to Figure 4, which is a schematic illustration of a method for presenting an advised action for recovering an aircraft from an unusual flight attitude, operative in accordance with another embodiment of the disclosed technique. In procedure 400 flight parameters are retrieved. With reference to Figure 3, processor 304 retrieves flight parameters from GPS receiver 308 and from INS 310.

In procedure 402 aircraft aerodynamic characteristics are retrieved. With reference to Figure 3, processor 304 retrieves aircraft aerodynamic characteristics from database 306. In procedure 404, an unusual flight attitude of the wings of the aircraft, is determined. This unusual flight attitude is determined according to the flight parameters and the aerodynamic characteristics. With reference to Figure 3, processor 304 determines if the wings of the aircraft are at an unusual flight attitude, according to the flight parameters retrieved from GPS receiver 308 and from INS 310, and according to the aerodynamic characteristics retrieved from database 306.

In procedure 406 an attitude recovery scheme (i.e., a plurality of actions to be performed by a pilot in a predetermined order, in order to recover the aircraft from the unusual flight attitude) is determined. With reference to Figure 3, processor 304 determines an attitude recovery scheme. In procedure 408, the attitude recovery scheme is presented to the pilot of the aircraft. With reference to Figure 3, Processor 304

displays, via display 302, the attitude recovery scheme to the pilot of the aircraft.

Reference is now made to Figure 5, which is a schematic illustration of a method for presenting a virtual airstrip and an aircraft calculated stopping point, operative in accordance with a further embodiment of the disclosed technique. In procedure 500, flight parameters are retrieved. With reference to Figure 3, processor 304 retrieves flight parameters from GPS receiver 308, and from INS 310.

In procedure 502, aircraft aerodynamic characteristics are retrieved. With reference to Figure 3, processor 304 retrieves aircraft aerodynamic characteristics from database 306. In procedure 504, airport related information is retrieved. With reference to Figure 3, processor 304 retrieves airport related information from database 306.

In procedure 506, a virtual airstrip representation is produced. With reference to Figure 3, processor 304 produces a virtual airstrip representation, according to the flight parameters and the airport related information. In procedure 508, after the aircraft has touched down, an aircraft calculated stopping point is dynamically produced. With reference to Figure 3, processor 304 produces a representation of an aircraft calculated stopping point, according to the flight parameters, the aircraft aerodynamic characteristics, and according to the airport related information. Processor 304 updates the aircraft calculated stopping point

constantly, in this manner the aircraft calculated stopping point is dynamically produced.

In procedure 510, the virtual airstrip representation is presented. With reference to Figure 3, processor 304 displays, via display 302, the virtual airstrip representation. In procedure 512, the aircraft calculated stopping point is dynamically presented. With reference to Figure 3, processor 304 displays, via display 302, the aircraft calculated stopping point. Processor 304 updates the representation of the aircraft calculated stopping point according to the dynamically produced aircraft calculated stopping point.

It will be appreciated by persons skilled in the art that the disclosed technique is not limited to what has been particularly shown and described hereinabove. Rather the scope of the disclosed technique is defined only by the claims, which follow.

CLAIMS

1. A method for presenting an advised action for recovering an aircraft from an unusual flight attitude, the method comprises the following procedures:

   retrieving real-time flight parameters;

   retrieving aircraft aerodynamic characteristics;

   determining if said aircraft is at said unusual flight attitude;

   determining an attitude recovery scheme; and

   presenting said attitude recovery scheme.

2. The method of claim 1, wherein said procedure of determining if said aircraft is at said unusual flight attitude includes the sub-procedure of determining if the wings of said aircraft are at said unusual flight attitude situation.

3. The method of claim 1, wherein said procedure of determining if said aircraft is at said unusual flight attitude, is performed by determining the Angle Of Attack (AOA) of said aircraft according to said flight parameters, and determining if said AOA is within the AOA limit of said aircraft, according to said aerodynamic characteristics.

4. The method of claim 1, further comprising the procedure of presenting an Angle Of Attack (AOA) limit, beyond which an unusual flight attitude occurs, after said procedure of determining if said aircraft is at said unusual flight attitude.

5. The method of claim 4, further comprising a procedure of alerting a pilot of said aircraft when said aircraft approaches said AOA limit.

6. The method of claim 1, wherein said procedure of presenting said attitude recovery scheme includes the sub-procedure of presenting an advised action for instructing a pilot of said aircraft to perform a recovery flight maneuver in order to recover said aircraft from said unusual flight attitude.

7. A system for presenting an advised action for recovering an aircraft from an unusual flight attitude, the system comprises:

a processor, wherein said processor retrieves aircraft aerodynamic characteristics and aircraft flight parameters, said processor determines if said aircraft is at said unusual flight attitude, and determines an attitude recovery scheme; and

a display for displaying said attitude recovery scheme.

8. The system of claim 7, wherein said processor determines a limit AOA, beyond which an unusual flight attitude occurs, according to said flight parameters and according to said aerodynamic characteristics, and wherein said processor displays via said display a limit AOA symbol for presenting to a pilot of said aircraft said limit AOA.

9. The system of claim 8, wherein said processor alerts said pilot when said aircraft approaches said AOA limit by at least one of the list consisting of:

said processor displays said AOA limit symbol such that said symbol changes its color;

said processor displays said AOA limit symbol such that said symbol changes its size;

said processor displays said AOA limit symbol such that said symbol starts flashing; and

said processor alerts said pilot with an audio output.

10. The system of claim 7, wherein said processor displays an advised action symbol for presenting an advised action a pilot of said aircraft should perform in order to recover said aircraft form said unusual flight attitude.

11. The system of claim 10, wherein said processor displays said advised action symbol such that it draws the attention of said pilot by at least one of the list consisting of:

said processor displays said advised action symbol in bright colors;

said processor displays said advised action symbol as flashing;

said processor displays said advised action symbol as changing colors;

said processor displays said advised action symbol as changing sizes; and

said processor accompanies said advised action symbol with an audio output.

12. The system of claim 7, wherein said processor retrieves said aircraft flight parameters from at least one aircraft sensor.

13. The system of claim 12, wherein said aircraft sensor is selected from the list consisting of:

a barometric altitude meter;

a GPS receiver; and

an INS.

14. The system of claim 7, further comprising a database coupled with said processor for storing said aerodynamic characteristics, and wherein said processor retrieves said aerodynamic characteristics from said database.

15. A method for presenting a virtual airstrip and an aircraft calculated stopping point, the method comprises the following procedures:

retrieving flight parameters;

retrieving aircraft aerodynamic characteristics;

retrieving airport related information;

producing a virtual airstrip representation;

dynamically producing an aircraft calculated stopping point;

presenting said virtual airstrip representation; and

dynamically presenting said aircraft calculated stopping point.

16. The method of claim 15, further comprising the procedure of presenting the speed said aircraft is about to lose in a short predetermined period of time, wherein the said aircraft decelerates in a controlled fashion.

17. The method of claim 15, further comprising the procedure of presenting the elevation of an airstrip.

18. The method of claim 15, wherein said procedure of dynamically producing an aircraft calculated stopping point, is performed by determining the current aircraft position according to said flight parameters, determining the current aircraft speed according to said flight parameters, and according to an auto-break deceleration rate.

19. The method of claim 15, wherein said procedure of dynamically producing an aircraft calculated stopping point is performed only after the wheels of said aircraft have touched down on an airstrip and said aircraft decelerates in a controlled fashion.

20. A system for presenting a virtual airstrip and an aircraft calculated stopping point, the system comprises:

a processor, wherein said processor retrieves aircraft aerodynamic characteristics, aircraft flight parameters and airport related information, said processor produces a virtual airstrip representation and dynamically produces an aircraft calculated stopping point; and

a display for displaying said virtual airstrip representation and dynamically displaying said aircraft calculated stopping point.

21. The system of claim 20, wherein said processor displays via said display an auto-break deceleration symbol for presenting the speed,

said aircraft is about to lose in a short predetermined period of time, and wherein said aircraft decelerates in a controlled fashion.

22. The system of claim 20, wherein said processor displays an airstrip elevation symbol for presenting an elevation of an airstrip.

23. The system of claim 20, wherein said processor dynamically produces said aircraft calculated stopping point by determining current aircraft speed according to said flight parameters, determining current aircraft position according to said flight parameters and according to an auto-break deceleration rate.

24. The system of claim 20, wherein said processor dynamically produces said aircraft calculated stopping point only after said aircraft has touched down on an airstrip and said aircraft decelerates in a controlled fashion.

25. The system of claim 20, wherein said processor retrieves said aircraft flight parameters from at least one aircraft sensor.

26. The system of claim 25, wherein said aircraft sensor is selected from the list consisting of:

a barometric altitude meter;

a GPS receiver; and

an INS.

27. The system of claim 20, further comprising a database coupled with said processor for storing said aerodynamic characteristics and said airport related information, and wherein said processor retrieves said aerodynamic characteristics and said airport related information from said database.

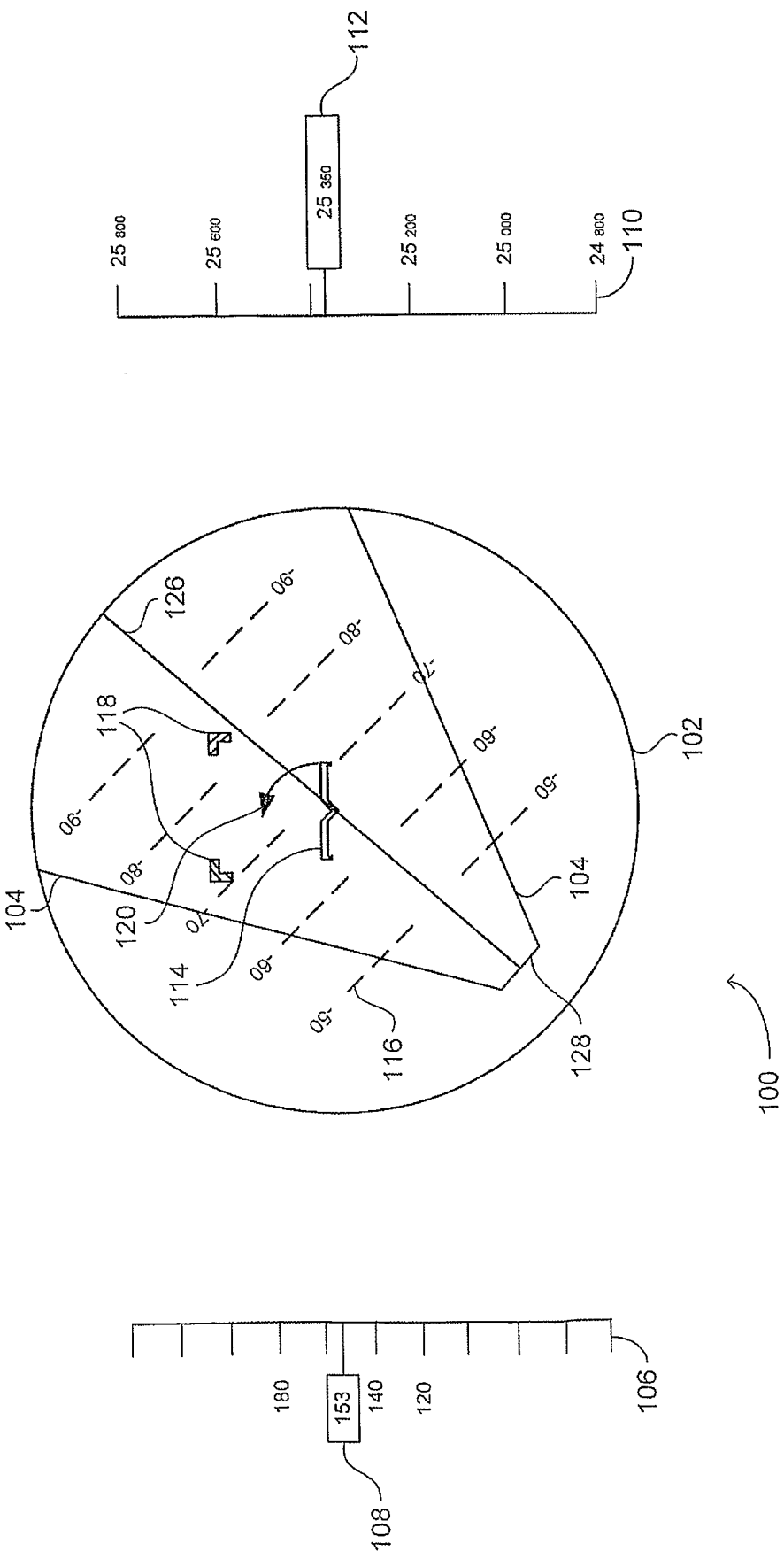
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FIG. 1

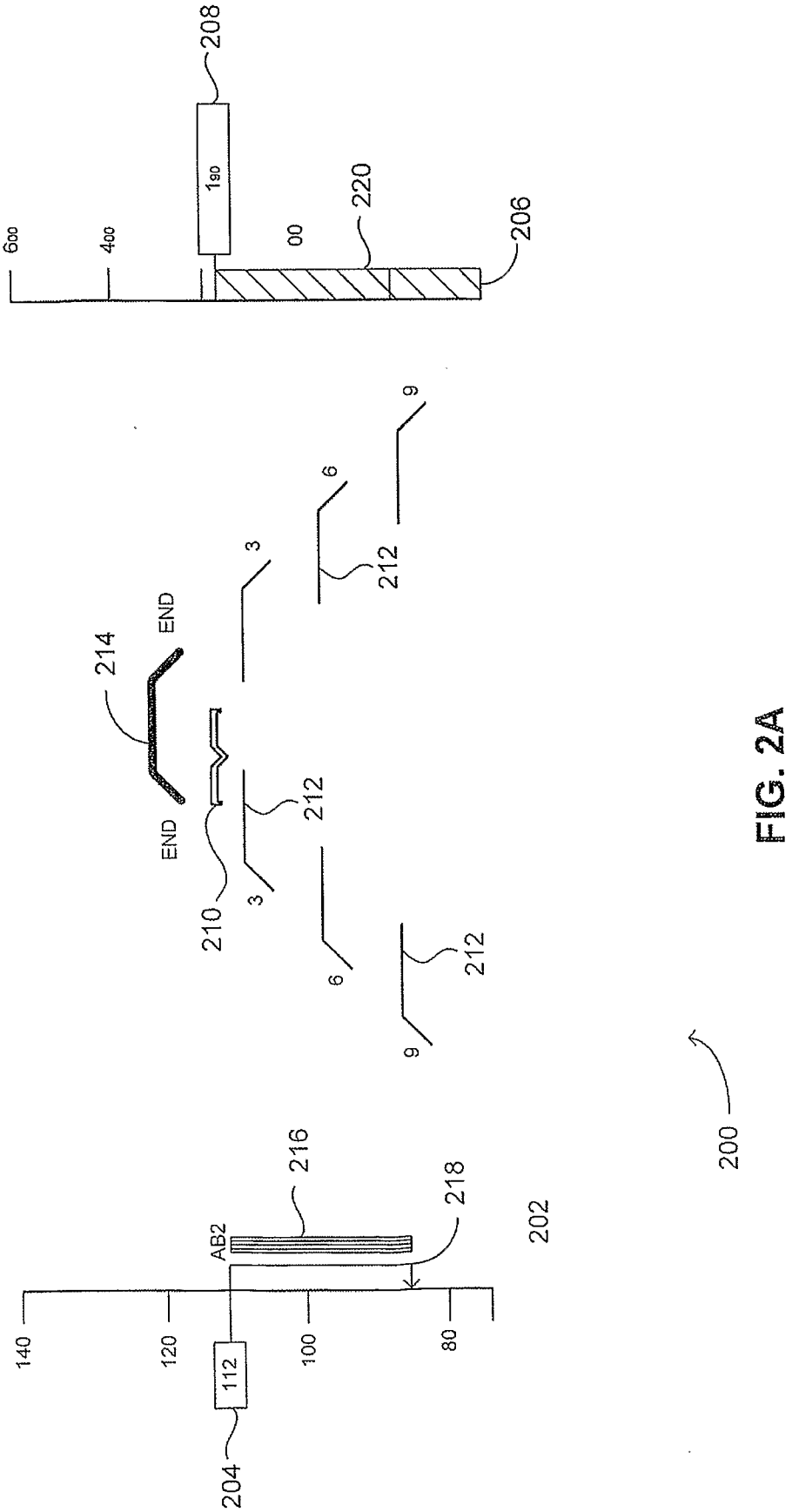
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FIG. 2A

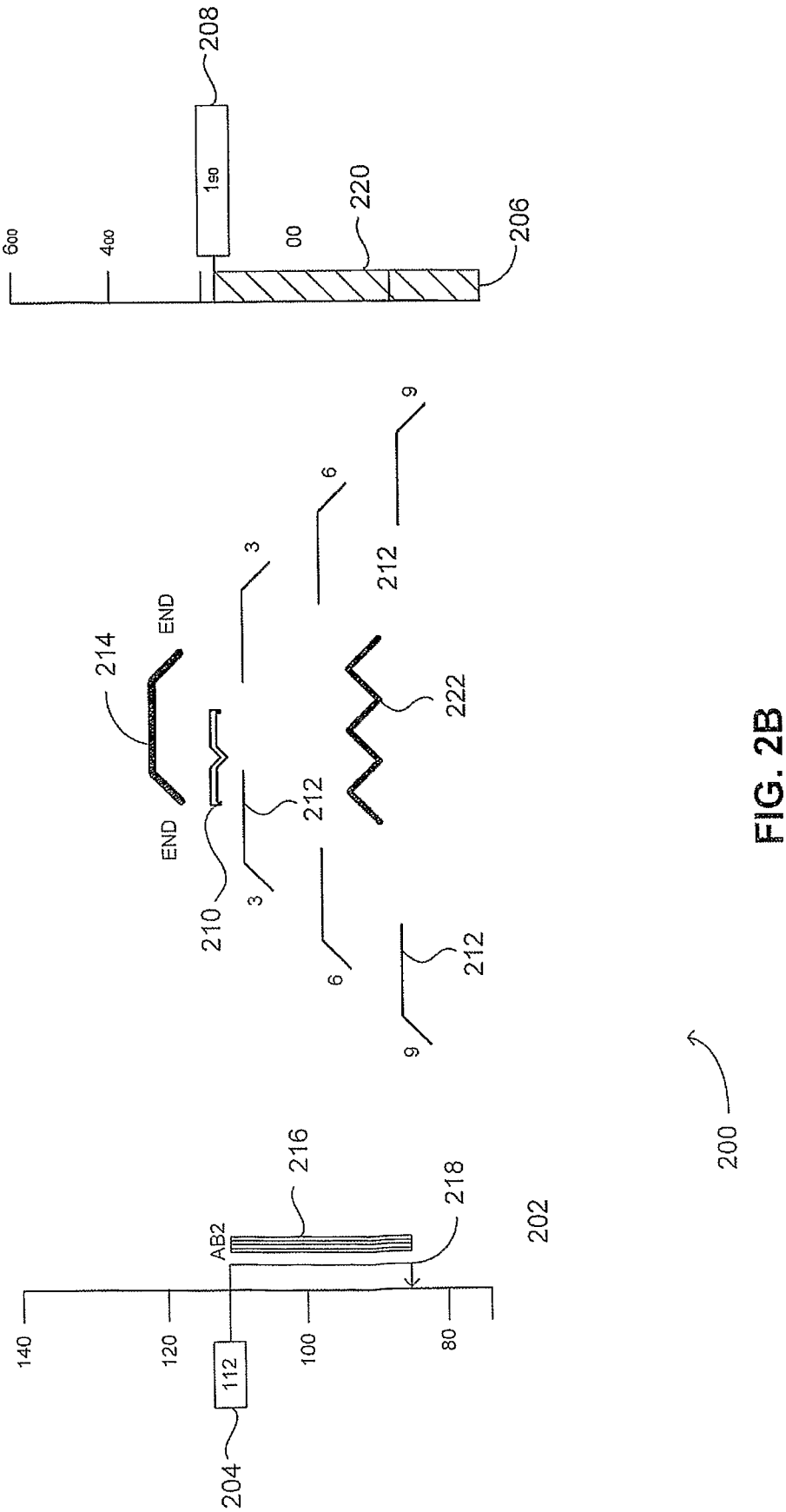
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FIG. 2B

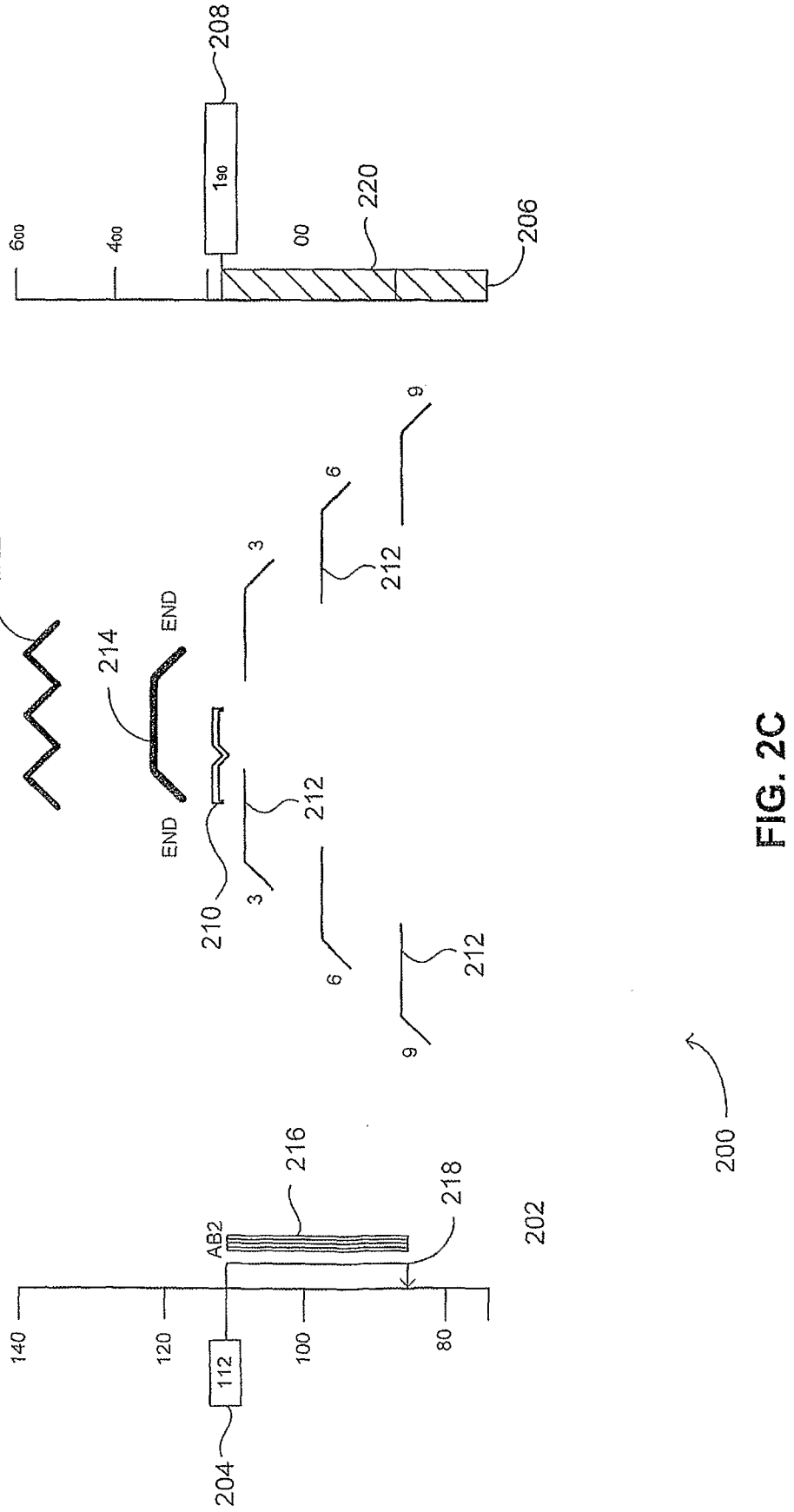
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FIG. 2C

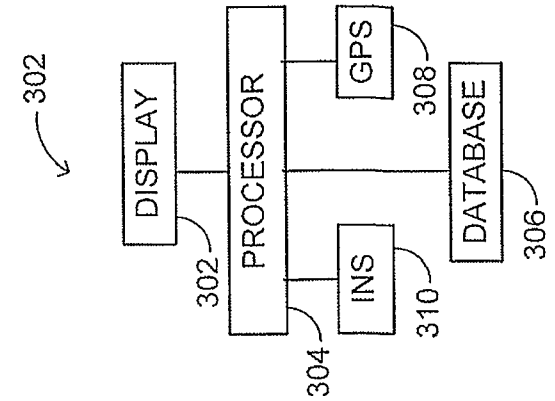
302
DISPLAY
302
PROCESSOR
304
GPS
308
INS
310
DATABASE
306

FIG. 3

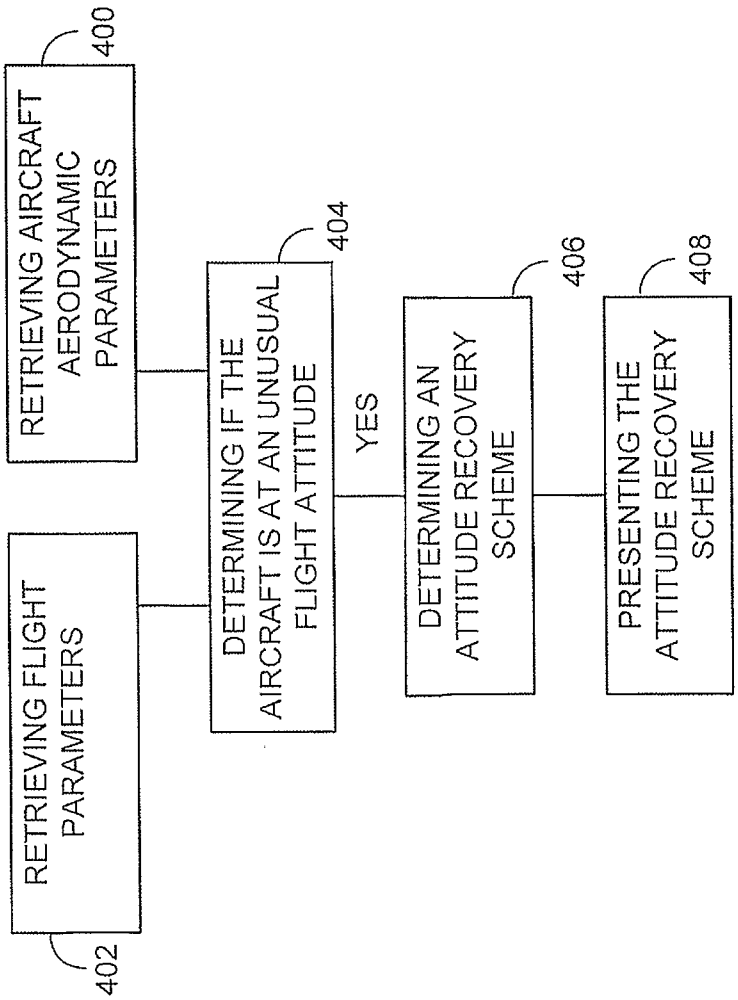
RETRIEVING AIRCRAFT AERODYNAMIC PARAMETERS
400
RETRIEVING FLIGHT PARAMETERS
402
DETERMINING IF THE AIRCRAFT IS AT AN UNUSUAL FLIGHT ATTITUDE
404
YES
DETERMINING AN ATTITUDE RECOVERY SCHEME
406
PRESENTING THE ATTITUDE RECOVERY SCHEME
408

FIG. 4

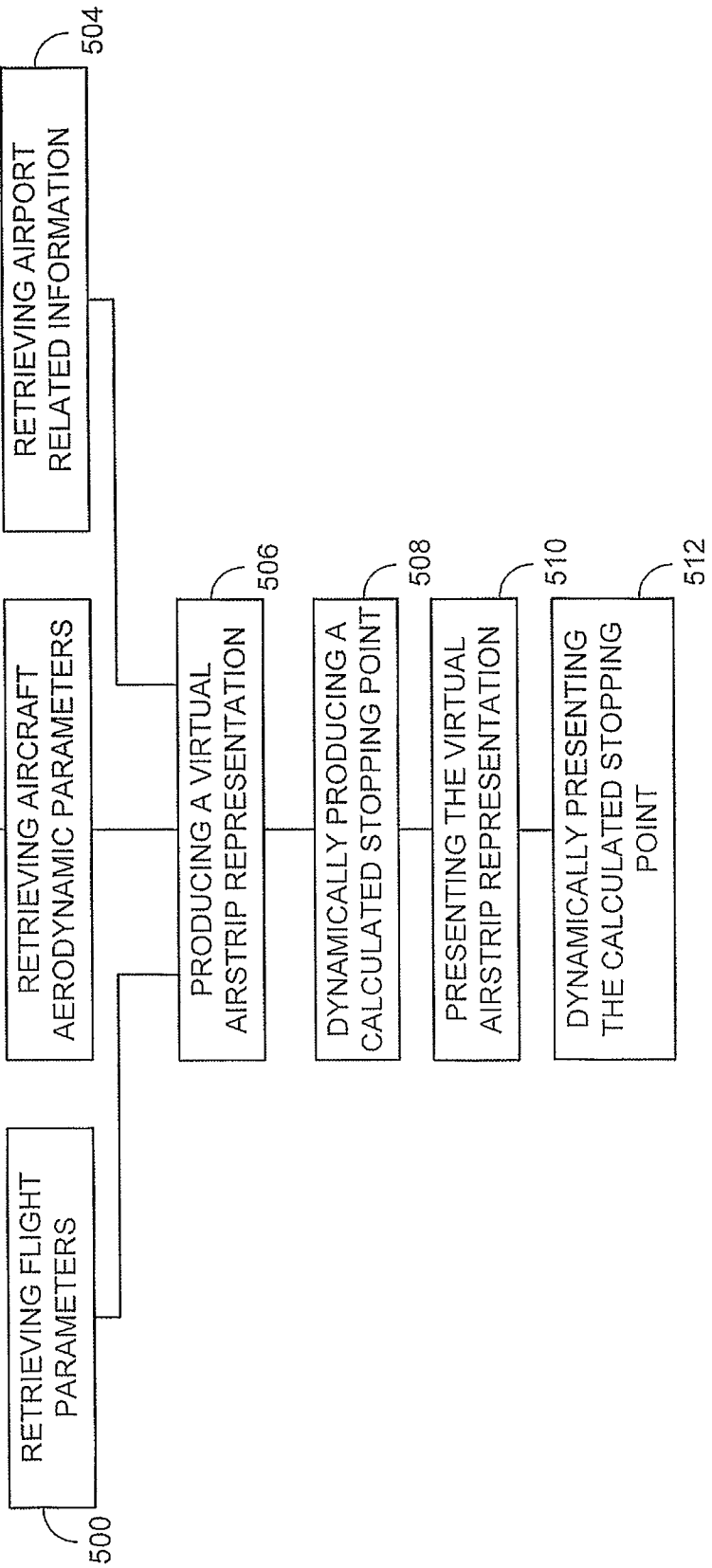
RETRIEVING FLIGHT PARAMETERS
500
RETRIEVING AIRCRAFT AERODYNAMIC PARAMETERS
502
RETRIEVING AIRPORT RELATED INFORMATION
504
PRODUCING A VIRTUAL AIRSTRIP REPRESENTATION
506
DYNAMICALLY PRODUCING A CALCULATED STOPPING POINT
508
PRESENTING THE VIRTUAL AIRSTRIP REPRESENTATION
510
DYNAMICALLY PRESENTING THE CALCULATED STOPPING POINT
512

FIG. 5