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Anmeldenummer / Filing No / N° de la demande : 80 201 150.2

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Bezeichnung der Erfindung:
Title of invention:
Titre de l'invention : Apparatus for aircraft pitch and thrust axes control

Klassifikation / Classification / Classement : G05D 1/06

ENTSCHEIDUNG / DECISION

vom / of / du 28 November 1989

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : The Boeing Company

Einsprechender / Opponent / Opposant :
OPP. I Aerospatiale Société Nationale Industrielle
OPP. II MBB Transport und Verkehrsflugzeuge
OPP. III Bodenseewerk Gerätetechnik GmbH

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step - no"

Leitsatz / Headnote / Sommaire

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Case Number : T 210/88 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 28 November 1989

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XL1,5
Decision under appeal : **Decision of the Opposition Division of the European Patent Office dated 14 March 1988 revoking European patent No. 30 066 pursuant to Article 102(1) EPC.**

Composition of the Board :

Chairman : P.K.J. van den Berg
Members : W.J.L. Wheeler
M. Lewenton

Summary of Facts and Submissions

I. The grant of European patent No. 30 066 on the Appellant's European patent application No. 80 201 150.2, which was filed on 3 December 1980 claiming priority of 3 December 1979 from a previous application in the United States of America (US 99686), was published on 19 September 1984. As granted, the patent had 4 claims.

II. On 18 June 1985 Opponent I filed an admissible opposition, requesting revocation of the patent on the grounds that its subject-matter was not patentable within the terms of Articles 52, 54 and 56 EPC. The notice of opposition contained several alternative arguments, each based on different prior art documents. According to one of those arguments, appearing under the heading "VII - QUATRIEMES REMARQUES", the subject-matter of Claim 1 of the patent in suit was not new, since it did not differ from the system developed by Lockheed and ARMA for the L-1011 TriStar. In support of that argument, Opponent I cited the following prior art documents:

V: Aviation Week and Space Technology, 7 November 1977, page 131;

W: Extract from ARMA FLIGHT MANAGEMENT COMPUTER SYSTEMS Document TJN-ED-47, Rev. A, 26 September 1978: "Summary of Performance Management Modes";

X: Aviation Week and Space Technology, 18 June 1979, pages 46 to 48 and page 53: "L-1011 Cockpit Automation Cuts Crew";

Y: Interavia 9/1978, pages 863 to 866: "Le nouveau long-courrier L-1011-500 TriStar";

Z: Aircraft Engineering, November 1979, pages 2 to 5: "TriStar Development".

III. Opponents II and III filed admissible oppositions on 15 June 1985.

IV. By a decision dated 14 March 1988, the Opposition Division revoked the patent. The reason given was that the subject-matter of Claim 1 was not new, being known from, and used in, the ARMA system as disclosed in the documents W, X and Z, cited by Opponent I. The other arguments submitted by Opponent I and the entire submissions made by Opponents II and III were not decided upon by the Opposition Division.

V. On 11 May 1988 the Appellant filed a notice of appeal against that decision, and paid the appeal fee. A written statement setting out the grounds of appeal was filed on 13 July 1988.

VI. With a letter dated 2 November 1988, Opponent I filed a further document relating to the L-1011 flight management system, namely:

A1: International Air Transportation Conference, New Orleans, 30 April to 3 May 1979, Proceedings, Vol. 1, pages 383 to 398: "L-1011 Flight Management System Design Considerations".

VII. In response to a communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Appellant filed with a letter dated 24 October 1989 (received on 26 October 1989) an amended Claim 1 and a new page of description to replace the first paragraph in column 1 of the description of the patent as published. The amended Claim 1 is worded as follows:

"1. An aircraft flight path control system comprising a pitch axis control system (64), an engine thrust control system (84), and means for providing a signal representative of a desired selected reference speed (22), comprising means (12) for providing logic command signals in response to desired climb, descend or maintain altitude maneuvers of said aircraft; characterized by manual selectable flight level change mode means (FLCH) (20) enabling switching means (60, 62, 66) responsive to said logic command signals for automatically selecting said pitch axis control system (64) to control the aircraft to said selected reference speed (22) when said aircraft is commanded to climb or descend, and for automatically selecting said engine thrust control system (84) to control the aircraft to said selected reference speed (22) when said aircraft is commanded to maintain a predetermined altitude."

VIII. Oral proceedings were held on 28 November 1989.

IX. The Appellant accepted that documents V, W, X, Y, Z and A1 all related to one and the same prior art system developed by Lockheed and ARMA for the Lockheed L-1011 TriStar, and went on to argue that that prior art system was a computer flight management system (FMS) for flight path profiles, which, when interfaced with a navigation system, made it possible to fly automatically to a destination. However, in practice, it was often necessary to depart from the preprogrammed flight profile, for example in response to an instruction from air traffic control (ATC) to interrupt climb and hold a given altitude. With the ARMA system, the crew must then decouple the FMS and fly manually. They must manually select IAS HOLD and ALT HOLD at the precise moments when the required airspeed (IAS) and altitude were reached.

These would then be maintained by the flight controller (AFCS).

The Appellant's representative distributed two sheets showing an example scenario of an interrupted climb to altitude and a table showing a comparison of crew actions required to follow the example scenario with the ARMA system and with the present invention. The table showed that the present invention reduced the workload placed on the crew: they only had to select the flight level change (FLCH) mode, enter the desired climb speed and target altitude (which did not have to be done at any precise moment) and push the FLCH button (20). The aircraft would then climb automatically to the target altitude and automatically level out. This was achieved by the switching means (60, 62, 66) as specified in the characterising part of Claim 1 of the patent in suit, which produced automatic changes between pitch and thrust control, as required. The FLCH mode was different from, and provided in addition to, the vertical navigation (VNAV) mode, as could be seen in Fig. 2 of the patent in suit. The FLCH mode was a new mode of flying, not provided for in the ARMA system. In the ARMA system, once the FMS had been decoupled there was no relationship between the AFCS pitch servo control and the AFCS throttle control, as could be seen in Figure 3 of document A1.

X. Opponent I argued in effect that if there was an invention in the patent in suit, it lay in the details of the FLCH mode means, not in the mere fact that such means were provided. The amendment made to Claim 1 had placed the means (12) for providing logic command signals in response to desired climb, descend or maintain altitude manoeuvres of the aircraft in the first part of the claim. The switching means (60, 62, 66) should also be in the first

part of the claim, because the ARMA system had means responsive to said logic command signals for automatically selecting the pitch axis control system or the engine thrust control system as specified in Claim 1 of the patent in suit. The only difference between the subject-matter of Claim 1 and the ARMA system would then lie in the provision of manually selectable flight level change mode means. However there was always a manual override in any autopilot. The ARMA system had manual override in the form of the VNAV button shown in the figure on page 48 of document X. Claim 1 merely specified the result to be achieved, without specifying the means by which it was to be achieved.

XI. Opponents II and III agreed with Opponent I. Opponent III pointed out that the phrase "manual selectable flight level change mode means" was just a sequence of words with no clear meaning. It was not apt to define an invention and did not support the Appellant's explanation as to what the invention was.

XII. The Appellant requests that the decision of the Opposition Division be set aside and that the patent be maintained as amended on 26 October 1989 (main request), alternatively, that the case be remitted to the Opposition Division (auxiliary request).

XIII. The Respondents (Opponents I, II and III) request dismissal of the appeal (main request), alternatively, that the case be remitted to the Opposition Division (auxiliary request).

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. Document W, whose availability to the public has not been disputed by the Appellant, contains a summary of performance management modes of the ARMA 500-series flight management system.

2.1 It appears from document W that in the climb mode and during step climb, interim descent to new flight level and descent to target point in destination terminal area (descent to E*D), the ARMA system controls the speed of the aircraft through the pitch control system, while in the cruise mode and during interim altitude hold, the ARMA system controls the speed of the aircraft through the throttle control system (i.e. through the engine thrust control system). The Board understands that this is in accordance with conventional flying practice, as is acknowledged in the first two paragraphs in column 2 of the published specification of the patent in suit.

2.2 It also appears from document W that the ARMA system controls the speed automatically to a desired reference speed, which, depending on the mode, may be in accordance with a selected climb speed schedule or a selected cruise speed.

2.3 It further appears from document W that at the end of step climb, interim descent to new flight level, or descent to E*D, a new cruise altitude is automatically captured and the system automatically returns to the

cruise mode, implying an automatic change from the pitch control system to the engine thrust control system to control the speed, and that when VNAV is pressed to resume climb at the end of interim altitude hold, or when top-of-descent is passed at the start of descent to E*D, the ARMA system automatically selects the pitch control system to control the speed.

2.4 In the section dealing with the INTERIM ALTITUDE HOLD mode, document W states that this mode "provides automatically coupled level flight when not at cruise flight level inserted on CDU (e.g. if climb is interrupted by ATC ...)", "FMS controls throttle to continue level flight at last climb schedule speed. If desired, speed can be changed from CDU" and "to resume climb, press "VNAV" on AFCS controller."

2.5 In the section dealing with the STEP CLIMB mode, document W states "when desired to commence step climb, engage VNAV on AFCS controller."

3. In the opinion of the Board, the disclosure in document W, taken alone, makes it obvious to a person skilled in the art to provide an aircraft flight path control system with the following features:

(a) a pitch axis control system, an engine thrust control system, and means for providing a signal representative of a desired selected reference speed (c.f. 2.1, 2.2 and 2.4 above);

(b) means for providing some sort of signals (which may be called "logic command signals") in response to desired climb, descend, or maintain altitude manoeuvres of the aircraft (c.f. 2.3 above); and

(c) some manually selectable override means (for responding to instructions from ATC) enabling switching means responsive to said logic command signals for automatically selecting said pitch axis control system to control the aircraft to said selected reference speed when said aircraft is commanded to climb or descend, and for automatically selecting said engine thrust control system to control the aircraft to said selected reference speed when said aircraft is commanded to maintain a predetermined altitude (c.f. 2.4, 2.5 and 2.1 above).

4. In the opinion of the Board, the phrase "manual flight level change mode means" in the Appellant's amended Claim 1 simply conveys a rather general idea that there is provided some sort of manually selectable override means for initiating an automatic flight level change. It does not say, or imply, that the flight level change mode must be selectable by means of any particular equipment operating in any particular way. The fact that the particular embodiment described in the patent in suit has a push button (20, Figs. 2 and 3A) labelled "FLCH", in addition to VNAV, does not imply that the scope of the claim is limited to such an arrangement or that it excludes the possibility that the flight level change could be carried out by means of, or with the help of, VNAV, as in the ARMA system. Apart from this, in the opinion of the Board, it would be obvious to provide a separate selection means for the flight level change mode, if this is convenient for the crew.

5. It therefore appears to the Board that document W, taken alone, would make it obvious to provide an aircraft flight path control system according to Claim 1 of the patent in suit. It is not necessary to consider the other documents cited.

6. According to Article 113(2) EPC, the Board shall decide upon the opposed patent only in the text submitted to it, or agreed, by the proprietor of the patent. Since ground (a) in Article 100 EPC prejudices maintenance of the patent in suit in the amended form specified in the Appellant's request, the appeal must be dismissed.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Fabiani P.K.J. van den Berg