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Anmeldenummer / Filing No / N° de la demande : 86 109 378.9

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Bezeichnung der Erfindung: Control valve system for a four speed ratio auto-
Title of invention: matic transmission including a dual range regulator
Titre de l'invention : valve for controlling independently two upshift
ratio changes.

Klassifikation / Classification / Classement : F16H 5/48

ENTSCHEIDUNG / DECISION

vom / of / du 10 January 1990

Anmelder / Applicant / Demandeur : Ford-Werke AG

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPU / EPC / CBE Article 54(3)

Schlagwort / Keyword / Mot clé : "Earlier European patent application, objection
of lack of novelty based on a prior art
drawing"-

Leitsatz / Headnote / Sommaire

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Patentamt

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Office

Boards of Appeal

Office européen
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Chambres de recours



Case Number : T 356/89 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 10 January 1990

Appellant : Ford-Werke Aktiengesellschaft
Ottoplatz 2
Postfach 21 03 69
D-5000 Köln 21 (DE)

Ford Motor Company Ltd.
Eagle Way
Brentwood
Essex CM13 3BW (GB)

Ford France Société Anonyme
344 Avenue Napoléon Bonaparte
B.P. 307
F-92506 Rueil Malmaison Cedex (FR)

Representative : Ritzkowsky, Harald, Dipl.-Ing.
Ford-Werke Aktiengesellschaft
Patentabteilung Z/DRP
Ottoplatz 2
D-5000 Köln 21 (DE)

Decision under appeal : Decision of Examining Division
2.3.07.117 of the European Patent
Office dated 22 December 1988
refusing European patent application
No. 86 109 378.9 pursuant to
Article 97(1) EPC.

Composition of the Board :

Chairman : F. Gumbel
Members : F.J. Pröls
W. Moser

Summary of Facts and Submissions

- I. European patent application No. 86 109 378.9, filed on 9 July 1986 and published on 4 February 1987, was refused by a Decision of the Examining Division dated 22 December 1988.
- II. The Decision was based on original Claim 1, wherein the words "characterised by" had been cancelled at the Applicant's request received on 8 July 1988, and on original Claims 2 to 5.
- III. The reason given for the refusal was that in view of EP-A-195 295 representing a prior art according to Art. 54(3) EPC the subject-matter of Claims 1 to 5 was not novel. The Examining Division argued that the hydraulic circuitry in the combined Figure 4A-D of the aforementioned prior art document had to be compared with the identical Figures 4A-D of the application and that the skilled person would have recognised in EP-A-195 295 two accumulators cushioning the pressure rise in the intermediate clutch CL₂ and the overdrive brake B₁ and an accumulator regulating valve the control pressure of which being applied to both accumulators whereby the pressure of a third clutch CL₃ acts on a pilot area of this valve through conduit 298.
- IV. On 16 February 1989 a Notice of Appeal was filed and the appeal fee was paid in due time. The Statement of Grounds of Appeal was submitted on 27 April 1989.

The Appellant, having filed an amended claim set (Claims 1 to 3), argued that, except for the hints given in the description of EP-A-195 295 as concerns the accumulator regulator valve assembly and the accumulator capacity

modulator valve assembly, the prior art document described neither the line connections to the accumulator regulator valve nor the arrangement of two control areas in form of valve land differential areas and their supply with selected pressure at different times and, therefore, a skilled person would have read these hints without taking particular notice of the accumulator functions. Only the Examiner, once having read the present application which, by its extended additional description pages in connection with particular, enlarged drawing Figures 5A and 5B referring to details of these accumulator functions, has concentrated his attention on this area of the accumulator arrangements and only in a retrospective view he could understand the intended function of this area in the prior art document in the absence of any detailed information.

- V. The valid independent Claims 1 and 2 received on 27 April 1989 read as follows (after correction of some clerical errors):

"1. In a control system for a four speed automatic transmission for motor vehicles having a driving shaft (10), a driven shaft (36), multiple ratio gearing (42, 44 and 46) establishing multiple torque delivery paths between said driving (36) and driven shafts (38) and fluid pressure operated clutches and brakes (CL₁, CL₂ and CL₃ resp. B₁, B₂ and B₃) adapted to control the relative motion of the elements of said gearing (42, 44 and 46);

a fluid pressure pump (39), and clutch and brake servos for activating and deactivating said clutches and brakes to effect speed ratio changes, conduit structure (Fig.4A-4D) connecting said pressure pump (39) via a main regulator valve (114) with said servos, multiple ratio shift valve structure including a 1-2 shift valve (118) and a 3-4 shift valve (122) in said conduit structure for

controlling distribution of line pressure to servos (CL₂ resp. B₁) to effect ratio changes, between a first ratio and a second ratio resp. between a third ratio and a fourth ratio;

a 1-2 accumulator (642) comprising an accumulator cylinder (644) and an accumulator piston (646) cooperating with said cylinder to define a 1-2 accumulator chamber, said 1-2 accumulator chamber communicating with the servo (CL₂-Servo) for effecting second speed ratio;

a 3-4 accumulator (664) comprising an accumulator cylinder (666) and an accumulator piston (668) cooperating with said cylinder to define a 3-4 accumulator chamber, said 3-4 accumulator chamber communicating with the servo (B₁-Servo) for effecting fourth speed ratio;

an accumulator regulator valve (126) for regulating line pressure to produce a modulated accumulator control pressure, a common accumulator control pressure passage (638) connecting the output side of said accumulator regulator valve (126) with each accumulator (642 resp. 664),

characterized in,

said accumulator regulator valve (126) includes a valve element (616) with a pressure area (620) thereon that is subjected to line pressure and a land area (622) smaller than land (620) and a land area (624) smaller than land (622), a valve spring (628) acting on said valve element (616) with a force that opposes the pressure force on said land area (620) a movable valve plunger (630) engaged by said spring (628), one side of said valve plunger (630) being in communication with the control area (622/624) on said accumulator regulator valve (126) whereby said plunger (630) is shifted to a first position to compress said valve spring (628) when said control area (622/624)

is pressurized, said plunger (630) assuming a second position corresponding to an increased valve spring position corresponding to an increased valve spring length when said control area (622/624) is not pressurized and

said shift valve structure being adapted to distribute line pressure to said control area (620/622) during a 1-2 upshift interval regulated to an optimum control pressure for said 1-2 accumulator (642) to effect a smooth ratio change and

said shift valve structure being adapted to distribute line pressure across passage (298) to control area (622/624) during a 3-4 upshift interval regulated to an optimum accumulator control pressure for said 3-4 accumulator (664) to effect a smooth ratio change.

2. In a control system for a four speed automatic transmission for motor vehicles according to the precharacterizing part of claim 1, characterized in, said accumulator regulator valve (126) includes a pressure regulator valve element (616) with a pressure area (620) thereon that is subjected to line pressure and a land area (622) smaller than land (620) and a land area (624) smaller than land (622), a valve spring (628) acting on said valve element (616) with a force that opposes the pressure force on said land area (620), a movable valve plunger (630) engaged by said spring (628), one side of said valve plunger (630) being in communication with the control area (622/624) on said accumulator regulator valve (126) whereby said plunger (630) is shifted to a first position to compress said valve spring (628) when said control area (622/624) is pressurized, said plunger (630) assuming a second position corresponding to an increased valve spring position corresponding to an increased valve

spring length when said control area (622/624) is not pressurized and

said shift valve structure being adapted to distribute line pressure across passage (672) to said control area (620/622) prior to a 1-2 upshift interval regulating an optimum control pressure for said 1-2 accumulator (642) to effect a smooth ratio change and

said shift valve structure being adapted to exhaust line pressure across passage (672/274) to control area (622/624) prior to a 3-4 upshift interval regulating an optimum accumulator control pressure for said 3-4 accumulator (664) to effect a smooth ratio change."

VI. The Appellant requested that the appeal be rectified by the Examining Division according to Art. 109(1) EPC and the examination be continued on the basis of the amended Claims 1 to 3 received on 27 April 1989.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is therefore admissible.
2. The examination of formal admissibility of the claims under Article 123(2) EPC by the Board results in the following observations:
 - 2.1 Independent Claim 1 finds its basis in original Claims 1 to 4 in conjunction with page 34, lines 15/16 of the original description and Figure 5A.

Independent Claim 2 combines the features of original Claims 1 to 4 and the features set out on page 38, lines 23 to 27 of the original description in connection with Figure 5B. Dependent Claim 3 corresponds to original Claim 5.

Thus, the amended claims meet the requirement of Art. 123(2) EPC.

3. Concerning the ground of refusal, it is noted that EP-A-195 295 was published on 24 September 1986, i.e. after the filing date of the present application (9 July 1986) but its priority date of 18 March 1985 is earlier than that of the present application (19 July 1985). Both priority dates have been found to be validly claimed. Furthermore, EP-A-195 295 designates the same Contracting States (DE, FR, GB) as the present application. The "whole contents" of this earlier document within the meaning of Art. 54(3) EPC must therefore be considered as forming part of the state of the art as far as novelty is concerned.

3.1 As admitted by the Appellant, the Figures 1-3 and 4A-D of EP-A-195 295, which show the general arrangement of the automatic transmission and the layout of the hydraulic shift valve circuit including the shift brakes and clutches, are in all details, including the reference numerals, identical to the corresponding Figures 1-3 and 4A-4D of the present application. The description of these Figures from page 4, line 10 to page 32, line 27 of EP-A-195 295 literally corresponds to the original description from page 5, line 8 to page 34, line 9 of the present application.

3.2 Present independent Claims 1 and 2 concern the particular layout of the accumulator regulator valve 126 regulating the pressure build-up in the 1-2 accumulator (642,

Figure 5A,B) and the 3-4 accumulator (664, Figure 5A,B), which are arranged to establish a cushioned ratio change during a 1-2 upshift interval and a 3-4 upshift interval, so that according to the problem to be solved by the application (as set out on page 3, paragraph 2 of the description) the rates in the build-up of the accumulator pressures active during a 1-2 upshift interval and a 3-4 upshift interval are different from each other.

3.3 The accumulator regulator valve 126, the accumulators, all passages communicating with them and the 1-2 and 3-4 upshifting servo actuators, i.e. the intermediate clutch CL₂ and the overdrive servo brake B₁, are already shown in Figure 4B of EP-A-195 295. The description of this document furthermore generally mentions the accumulator regulator valve on page 8, line 31 to page 9, line 4 as follows:

"High pressure is supplied by passage 102 also to an accumulator regulator valve assembly 126. Valve assembly 126 provides a cushioned engagement of the overdrive brake B₁ on a 3-4 upshift. It provides a relatively steep linear relationship of pressure in the overdrive brake with respect to time and a corresponding relationship for the rate of pressure build up in the intermediate clutch CL₂. Valve assembly 126 controls also the engagement of the intermediate clutch CL₂ on a 1-2 upshift."

The 1-2 accumulator and the 3-4 accumulator, clearly visible in Figure 4B of EP-A-195 295 and connected to the accumulator regulator valve 126 by a passage which is not provided with a reference numeral, are not mentioned in the description. Only page 14, lines 19 to 21 and 25 to 29 of the description gives a hint to the 1-2 accumulator capacity modulator valve assembly 246 which according to

Figure 4B of EP-A-195 295 is included in a passage connecting the 1-2 accumulator with the feed passage 240, 244, 248 for the intermediate clutch CL₂ being applied during a 1-2 shift:

"At that time line pressure passage 166 communicates with intermediate clutch feed passage 240."

"The pressure in passage 240 is distributed also to intermediate clutch feed passage 244, which communicates with feed passage 248 for the 1-2 accumulator capacity modulator valve assembly 246 seen in Figure 4B."

The description of EP-A-195 295, however, gives no further indication as concerns the details of line connections to the accumulator regulator valve 126 and the arrangement of two control areas on its valve member in the form of valve land differential areas (620/622 and 622/624 in Figure 5A,B of the application) having different size and their pressure supply and control during the 1-2 and 3-4 upshift interval.

- 3.4 As concerns the requirements for a sufficient disclosure of technical features merely by a drawing, the Board, in conformity with other Decisions of the Boards of Appeal (T 204/83, OJ EPO 1985, 310, point 4; and T 169/83, OJ EPO, 1985, 193, point 3.5), has investigated whether the teaching of independent Claims 1 and 2 is clearly, unmistakably and fully derivable from the drawings (i.e. the Figures 1-3 and 4A-D) of EP-A-195 295 in combination with the aforementioned hints on pages 8, 9 and 14 in its description to such an extent that it is immediately apparent to a person skilled in the art reading this document.

3.5 As a result, the Board is of the opinion that in the present case at least the structural feature concerning the size of the differential control areas which are contained in both independent claims now on file, but had not been present in the claims forming the base for the decision under appeal, cannot be readily derived from the drawing of the accumulator regulator valve 126 in Figure 4B of EP-A-195 295 due to the fact that the scale of this Figure is so small that not all land area differences as claimed can be recognised. Indeed, when regarding the two right hand lands of the valve spool of the accumulator regulator valve 126 (the lands corresponding to those defined by the reference numerals 622 and 624 in Figure 5A,B and in Claims 1 and 2 of the application), a viewer would assume that these two lands are of the same diameter and so their land areas appear to be of the same size contrary to the teaching of Claim 1 (page 2, lines 7 and 8) and Claim 2 (page 3, lines 4 and 5) defining

"...and a land area (624) smaller than land (622)..."

This feature cannot be derived from the description of EP-A-195 295 either, which neither mentions the problem to be solved in the present application nor gives any details how the pressure build-up in the overdrive brake B1 and in the intermediate clutch CL2 (during a 3-4 and 1-2 shift as generally set out on page 8, line 31 to page 9, line 4 of EP-A-195 295) is controlled to arrive at the desired objective.

3.6 The fact that this teaching could possibly be found if, in view of the disclosure of EP-A-195 295, the general engineering knowledge of the person skilled in the art is mobilised, is considered irrelevant, since this would

concern a question of inventive step which is not to be considered in respect of a prior art document according to Art. 54(3) EPC (cf. Art. 56 EPC, second sentence).

The accumulator regulator valve 126 in Figure 4B of EP-A-195 295 is associated with several fluid passages leading to the land areas. These passages are partly represented in dotted lines. It cannot be immediately derived from this circuit system that (as first clarified by the drawings in figures 5A, B of the present application and their description) these fluid passages are supposed to define two solutions (as described in Claims 1 and 2 now on file), whereby only the uninterrupted passage lines are active for the first solution while the dotted passage lines are operative for the second solution. The whole disclosure of EP-A-195 295 does not give any hint as to for what purpose the dotted passages communicating with the accumulator regulator valve 126 shall be used.

- 3.7 Therefore, the Board is of the opinion that the teaching of the independent Claims 1 and 2 now on file is novel in comparison with EP-A-195 295.

4. The Examining Division has refused the application in suit for reasons of lack of novelty of the previous single independent Claim 1 in respect of EP-A-195 295, without expressing a final opinion in view of the further documents cited in the Search Report and in the original description and with respect to the other requirements of the EPC, for which they obviously had no reason to do so in the light of their findings.

The Board is, however, somewhat surprised that the Examining Division, having had the opportunity to examine the claims now on file, did not decide to rectify their Decision according to Art. 109(1) EPC as expressly requested by the Appellant.

Anyway, examination of the case in respect of all requirements of the Convention should now be continued on the basis of Claims 1 to 3 now on file, which certainly need some clarification and the delimitation of which should be re-considered.

In this regard the documents GB-A-2 072 772 and GB-A-2 061 422 as cited in Search Report of the Appellant's co-pending EP-patent application 86 109 379.7 (=T 377/89 - 3.2.1) should also be considered.

For these reasons and in order not to deprive the Appellant of his right to have any findings revised by a second instance, the Board considers it appropriate to remit the case to the Examining Division under Article 111(1) EPC for further prosecution.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division for further examination on the basis of Claims 1 to 3 filed on 27 April 1989, by taking into account the statements under point 4 above.

The Registrar:

The Chairman:

S. Fabiani

F. Gumbel

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20.2.90 [initials]
21.2.90 / G. Meyer