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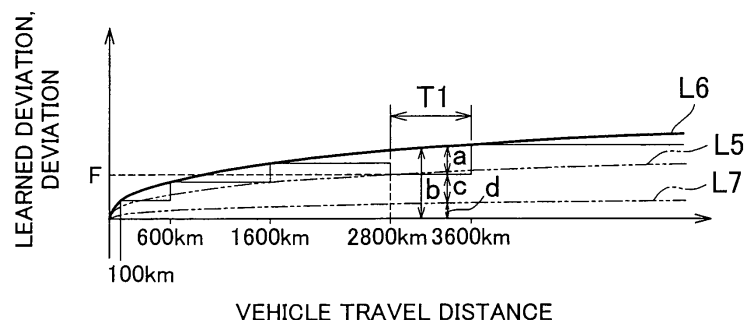
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(54) **Fuel injection amount control device and method**

(57) In an ECU that corrects an injection amount of an injector (5) based on a learned value acquired by learning a secular change in the injection amount of the injector, a temporary learned value (F) of the injection amount of the injector is calculated based on a degradation trend map (L5) indicating the secular change in the injection amount of the injector estimated per vehicle

travel distance, and a vehicle travel distance input from a terminal device (22). During the time period (T1) after the input of the vehicle travel distance until an acquisition of a new learned value is completed, the injection amount of the injector is corrected based on the temporary learned value of the injection amount of the injector.

**FIG. 8**





## EUROPEAN SEARCH REPORT

 Application Number  
 EP 09 25 1255

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP H06 146988 A (TOYOTA MOTOR CORP) 27 May 1994 (1994-05-27)	1,3,6	INV. F02D41/14 F02D41/24 F02D41/00 F02D43/02
Y	* paragraphs [0003] - [0004], [0008] -	2,4	
A	[0009], [0027] - [0032], [0038]; figures 1, 4, 5 *	5,7	
E	EP 2 112 358 A2 (TOYOTA MOTOR CO LTD [JP]) 28 October 2009 (2009-10-28) * paragraphs [0008], [0010], [0012], [0014], [0018] - [0021], [0056] - [0057], [0069], [0076], [0079], [0086] - [0090]; figures 2, 8, 9, 11 * & JP 2009 264165 A (TOYOTA MOTOR CORP) 12 November 2009 (2009-11-12) * the whole document *	5,7	
Y	EP 1 172 542 A2 (TOYOTA MOTOR CO LTD [JP]) 16 January 2002 (2002-01-16) * paragraphs [0003], [0012], [0014], [0018], [0020] - [0022], [0024], [0066], [0070] - [0071], [0080], [0082], [0089]; figure 4 * * paragraph [0109] *	2,4	
A	EP 1 340 900 A2 (DENSO CORP [JP]) 3 September 2003 (2003-09-03) * paragraphs [0023], [0099], [0103]; figure 24 *	4	
A	US 2005/092300 A1 (ASANO MASAHIRO [JP] ET AL) 5 May 2005 (2005-05-05) * paragraphs [0003], [0012] *	1-7	TECHNICAL FIELDS SEARCHED (IPC)
A	DE 10 2007 000323 A1 (DENSO CORP [JP]) 20 December 2007 (2007-12-20) * paragraphs [0005], [0026], [0049] *	1-7	F02D
		-/--	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 February 2017	Examiner Eitner, Christian
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

 1  
 EPO FORM 1503 03.82 (P04C01)

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## EUROPEAN SEARCH REPORT

Application Number  
EP 09 25 1255

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 10 2006 032245 A1 (SIEMENS AG [DE]) 17 January 2008 (2008-01-17) * paragraphs [0006], [0011]; figures 1-5 * -----	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>16 February 2017</b>	Examiner <b>Eitner, Christian</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 25 1255

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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16-02-2017

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP H06146988 A	27-05-1994	NONE	
EP 2112358 A2	28-10-2009	EP 2112358 A2 JP 4840397 B2 JP 2009264165 A	28-10-2009 21-12-2011 12-11-2009
EP 1172542 A2	16-01-2002	EP 1172542 A2 JP 4543588 B2 JP 2002089333 A	16-01-2002 15-09-2010 27-03-2002
EP 1340900 A2	03-09-2003	CN 1442607 A CN 1966960 A EP 1340900 A2 JP 4089244 B2 JP 2003254139 A KR 20030071641 A US 2003164166 A1	17-09-2003 23-05-2007 03-09-2003 28-05-2008 10-09-2003 06-09-2003 04-09-2003
US 2005092300 A1	05-05-2005	DE 102004053347 A1 FR 2861806 A1 JP 4218496 B2 JP 2005139951 A US 2005092300 A1	04-08-2005 06-05-2005 04-02-2009 02-06-2005 05-05-2005
DE 102007000323 A1	20-12-2007	DE 102007000323 A1 JP 2007332816 A	20-12-2007 27-12-2007
DE 102006032245 A1	17-01-2008	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82