(11) **EP 1 215 386 A3**

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3: **21.01.2004 Bulletin 2004/04**

(51) Int CI.⁷: **F02D 41/22**, F02D 41/14, F02D 41/34, F02D 41/38

(43) Date of publication A2: 19.06.2002 Bulletin 2002/25

(21) Application number: 01129734.8

(22) Date of filing: 13.12.2001

(84) Designated Contracting States:

AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR

Designated Extension States:

AL LT LV MK RO SI

(30) Priority: 15.12.2000 JP 2000381626

(71) Applicant: TOYOTA JIDOSHA KABUSHIKI KAISHA Aichi-ken 471-8571 (JP) (72) Inventor: Morikawa, Atsushi, Toyota Jidosha Kabushiki Kaisha Toyota-shi, Aichi-ken 471-8571 (JP)

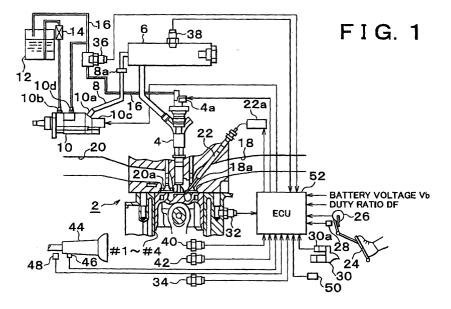
(74) Representative:

Leson, Thomas Johannes Alois, Dipl.-Ing. Tiedtke-Bühling-Kinne & Partner GbR, TBK-Patent, Bavariaring 4 80336 München (DE)

(54) Apparatus and method for diagnosing fuel supply system of internal combustion engine

(57) Apparatus and method for diagnosing a fuel supply system of an internal combustion engine wherein a compensation amount (qcy) for each cylinder is determined on the basis of a deviation (DNE) of an actual operating state of the engine with respect to a desired operating state thereof, and the fuel supply system is feedback-controlled by compensating a commanded value (QFIN) of a quantity of injection of a fuel by the fuel supply system into the internal combustion engine, according to the compensation amount. The apparatus

and method include respectively include a diagnosing device (52) and a diagnostic step for effecting a diagnostic compulsory adjustment (in steps S590 and S600) of an operating condition of the fuel supply system for each cylinder when the absolute value of the compensation amount (qcy) exceeds a predetermined threshold (A) (when affirmative decision is obtained in step S550), and for diagnosing the fuel supply system on the basis of a speed variation of the engine cause by the adjustment.





EUROPEAN SEARCH REPORT

Application Number EP 01 12 9734

Cata	Citation of document with ind	lication, where appropriate.	Relevant	CLASSIFICATION OF THE	
Category	of relevant passage		to claim	APPLICATION (Int.CI.7)	
E	EP 1 205 657 A (FIAT 15 May 2002 (2002-05 * abstract; figure 1 * column 3, line 9 -	5-15)	1-15	F02D41/22 F02D41/34 F02D41/14 F02D41/38	
Y		1-10-22)	1-15		
Y	DE 195 40 826 A (DAI 7 May 1997 (1997-05- * abstract; figure 1 * column 2, line 3 - * column 2, line 20 * column 4, line 9 -	07) * line 8 * - line 37 *	1-7,		
Y	PATENT ABSTRACTS OF vol. 2000, no. 08, 6 October 2000 (2000 & JP 2000 145520 A (CORP), 26 May 2000 (* abstract *	-10-06) MITSUBISHI MOTORS	8,9,13,	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F02D	
P, Y	EP 1 132 604 A (SIEM 12 September 2001 (2 * abstract; figure 1 * column 1, line 38 * column 2, line 46	001-09-12)	1-15		
Y	EP 0 754 845 A (DAIM 22 January 1997 (199 * abstract * * column 2, line 9 - * column 3, line 6 -	7-01-22) line 33 *	1-7, 10-12,15		
	The present search report has be	en drawn up for all claims	<u>}</u>	·	
	Place of search	Date of completion of the search		Examiner	
	MUNICH	2 December 2003	Wet	temann, M	
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		E : earlier patent do after the filing dat D : document cited i L : document cited fo	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		
A : technological background O : non-written disclosure P : intermediate document			& : member of the same patent family, corresponding		

2



EUROPEAN SEARCH REPORT

Application Number EP 01 12 9734

	Citation of document with in	dication, where appropriate,	Relevant	CLASSIFICATION OF THE
ategory	of relevant passa		to claim	APPLICATION (Int.Cl.7)
4	EP 0 828 069 A (BOS 11 March 1998 (1998 * abstract *	CH GMBH ROBERT)	1-15	
				TECHNICAL FIELDS SEARCHED (Int.CI.7)
			ļ -	
	The present search report has b	een drawn up for all claims	_	
	Place of search	Date of completion of the searc		Examiner
	MUNICH	2 December 200	3 Wet	temann, M
X : parti Y : parti docu	ATEGORY OF CITED DOCUMENTS cularly relevant if taken alone cularly relevant if oombined with anothment of the same category nological background	T : theory or pri E : earlier pater after the filing er D : document of L : document of	nciple underlying the in t document, but publis g date ted in the application ted for other reasons	vention

EPO FORM 1503 03.82 (P04C01)

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

EP 01 12 9734

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 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-12-2003

JP 2002206451 A 26-07-20 US 2002112528 A1 22-08-20 US 5058547 A 22-10-1991 DE 4106418 A1 29-08-19 DE 19540826 A 07-05-1997 DE 19540826 A1 07-05-19 JP 2000145520 A 26-05-2000 NONE EP 1132604 A 12-09-2001 DE 10010847 C1 20-09-20 EP 1132604 A2 12-09-20 EP 0754845 A 22-01-1997 DE 19526644 C1 04-07-19 DE 59604736 D1 27-04-20 EP 0754845 A1 22-01-19 US 5872312 A 16-02-19 EP 0828069 A 11-03-1998 DE 19632339 A1 12-02-19 CN 1173585 A ,B 18-02-19	Patent document cited in search report		Publication date		Patent family member(s)		Publication date	
DE 19540826 A 07-05-1997 DE 19540826 A1 07-05-19 JP 2000145520 A 26-05-2000 NONE EP 1132604 A 12-09-2001 DE 10010847 C1 20-09-20 EP 1132604 A2 12-09-20 EP 0754845 A 22-01-1997 DE 19526644 C1 04-07-19 DE 59604736 D1 27-04-20 EP 0754845 A1 22-01-19 US 5872312 A 16-02-19 EP 0828069 A 11-03-1998 DE 19632339 A1 12-02-19 CN 1173585 A ,B 18-02-19	EP 1	1205657	A	15-05-2002	JP	2002206451	Α	15-05-2002 26-07-2002 22-08-2002
JP 2000145520 A 26-05-2000 NONE EP 1132604 A 12-09-2001 DE 10010847 C1 20-09-20 EP 1132604 A2 12-09-20 EP 0754845 A 22-01-1997 DE 19526644 C1 04-07-19 DE 59604736 D1 27-04-20 EP 0754845 A1 22-01-19 US 5872312 A 16-02-19 EP 0828069 A 11-03-1998 DE 19632339 A1 12-02-19 CN 1173585 A ,B 18-02-19	US 5	5058547	Α	22-10-1991	DE	4106418	A1	29-08-1991
EP 1132604 A 12-09-2001 DE 10010847 C1 20-09-20 EP 0754845 A 22-01-1997 DE 19526644 C1 04-07-19 DE 59604736 D1 27-04-20 EP 0754845 A1 22-01-19 US 5872312 A 16-02-19 EP 0828069 A 11-03-1998 DE 19632339 A1 12-02-19 CN 1173585 A ,B 18-02-19	DE 1	19540826	Α	07-05-1997	DE	19540826	A1	07-05-1997
EP 1132604 A2 12-09-20 EP 0754845 A 22-01-1997 DE 19526644 C1 04-07-19	JP 2	2000145520	Α	26-05-2000	NONE			
DE 59604736 D1 27-04-20 EP 0754845 A1 22-01-19 US 5872312 A 16-02-19 EP 0828069 A 11-03-1998 DE 19632339 A1 12-02-19 CN 1173585 A ,B 18-02-19	EP 1	1132604	Α	12-09-2001				20-09-2001 12-09-2001
CN 1173585 A ,B 18-02-19	EP 6	9754845	А	22-01-1997	DE EP	59604736 0754845	D1 A1	04-07-1996 27-04-2000 22-01-1997 16-02-1999
	EP 0	0828069	Α	11-03-1998	CN EP	1173585 0828069	A ,B A2	12-02-1998 18-02-1998 11-03-1998 24-03-1998

FORM P0459

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