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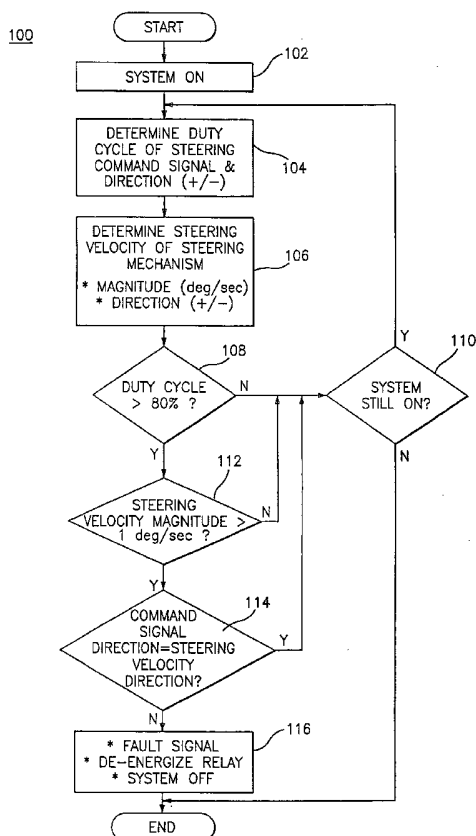
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[Continued on next page]

(54) Title: METHOD FOR DETECTING MOTOR CONTROL LOSS IN A POWER STEERING SYSTEM



(57) Abstract: A method (100) for detecting a loss of motor control in an electric power steering system is disclosed. In an exemplary embodiment, the method (100) includes determining a duty cycle of a steering command signal (104) generated by a controller. The steering command signal (104) commands a steering mechanism to be turned in either a first or a second direction, the second direction being opposite to the first direction. A steering velocity (106) of the steering mechanism is determined, the steering velocity (106) being characterized by a steering velocity magnitude and a steering velocity direction whenever the steering velocity is greater than zero. The steering velocity direction corresponds to either the first or the second direction. The duty cycle is then compared to a first selected value (108), and the steering velocity magnitude is compared to a second selected value (112). If the duty cycle exceeds the first selected value (108), the steering velocity magnitude exceeds the second selected value (112), and the steering velocity direction is opposite to the direction commanded by the steering command signal (114), then a fault signal is generated (116).



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/24353

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : B62D 5/04, 5/06, 7/15; G06F 17/00

US CL : 701/34, 41, 43, 69, 89; 180/242, 404, 410, 411, 412, 413, 445; 340/438

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 701/34, 41, 43, 69, 89; 180/242, 404, 410, 411, 412, 413, 445; 340/438

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
STN search: power steering, rear steering, motor, failure, duty cycle, angular speed

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,983,628 A (KANAZAWA et al) 28 January 1992 (28.01.1992), see entire document.	1-21
A	US 5,257,191 A (TAKEHARA et al) 26 October 1993 (26.10.1993), see the abstract.	1-21
A	US 5,554,969 A (EGUCHI) 10 September 1996 (10.09.1996), see the abstract, figures 1, 3 and the related text.	1-21



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/24353

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.