

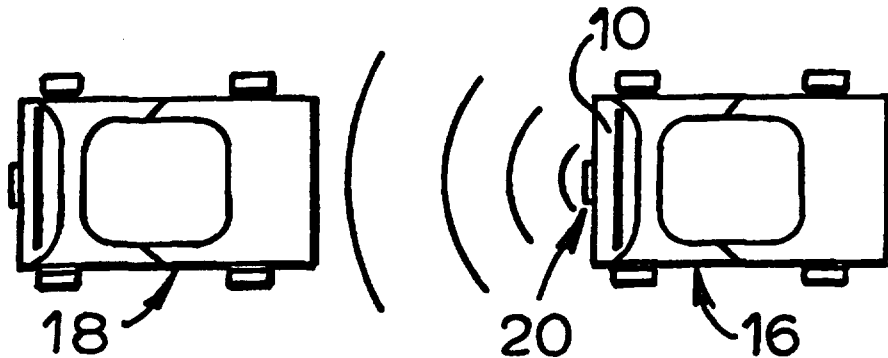


<p>(51) International Patent Classification ⁶ : G01S 13/93</p>	<p>A3</p>	<p>(11) International Publication Number: WO 96/02853 (43) International Publication Date: 1 February 1996 (01.02.96)</p>
<p>(21) International Application Number: PCT/GB95/01670 (22) International Filing Date: 14 July 1995 (14.07.95) (30) Priority Data: 9414393.0 15 July 1994 (15.07.94) GB (71) Applicant (for all designated States except US): DESIGN TECHNOLOGY AND INNOVATION LTD. [GB/GB]; The Barn, Ripe Lane, Ripe, Lewes, Sussex BN8 6AP (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): TONKIN, Mark [GB/GB]; The Barn, Ripe Lane, Ripe, Lewes, Sussex BN8 6AP (GB). (74) Agent: HEPWORTH LAWRENCE BRYER & BIZLEY; Merlin House, Falconry Court, Baker's Lane, Epping, Essex CM16 5DQ (GB).</p>		<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 14 March 1996 (14.03.96)</p>

(54) Title: SAFETY SYSTEM FOR VEHICLES

(57) Abstract

The system comprising a controller fitted to a subject vehicle (16) and sensor means (20) operable to sense a distance of separation and relative velocity of a trailing vehicle (18). Also input to the controller is a velocity signal derived from a velocity sensing means (97) determining the ground speed of the subject vehicle using a doppler radar system. The controller calculates a safety envelope and activates a visible warning device attached to the rear of the subject vehicle if the trailing vehicle penetrates the safety envelope. An enhanced safety envelope determined by adverse road conditions is also established, any incursion into the enhanced envelope resulting generally in the visible warning being at a less prominent level. If however the closing speed of the trailing vehicle exceeds a predetermined threshold, penetration of the enhanced envelope results immediately in the full warning being displayed with full prominence to the driver of the trailing vehicle. The system has application to improving the safety of road vehicles.



The system comprising a controller fitted to a subject vehicle (16) and sensor means (20) operable to sense a distance of separation and relative velocity of a trailing vehicle (18). Also input to the controller is a velocity signal derived from a velocity sensing means (97) determining the ground speed of the subject vehicle using a doppler radar system. The controller calculates a safety envelope and activates a visible warning device attached to the rear of the subject vehicle if the trailing vehicle penetrates the safety envelope. An enhanced safety envelope determined by adverse road conditions is also established, any incursion into the enhanced envelope resulting generally in the visible warning being at a less prominent level. If however the closing speed of the trailing vehicle exceeds a predetermined threshold, penetration of the enhanced envelope results immediately in the full warning being displayed with full prominence to the driver of the trailing vehicle. The system has application to improving the safety of road vehicles.

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INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/GB 95/01670

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G01S13/93

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)
IPC 6 G01S B60Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	CH,A,661 250 (COPLAX AG) 15 July 1987 see the whole document ---	1,2,12 3-11, 13-15
X Y	WO,A,93 15931 (INTERNATIONAL AUTOMOTIVE DESIGN) 19 August 1993 cited in the application see the whole document ---	16,17 11
Y	EP,A,0 549 909 (MITSUBISHI DENKI KABUSHIKI KAISHA) 7 July 1993 see page 3 - page 4 ---	3-8,10
Y	GB,A,2 268 350 (ROKE MANOR RESEARCH LIMITED) 5 January 1994 see abstract ---	9,13
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- *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.
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Date of the actual completion of the international search

27 September 1995

Date of mailing of the international search report

24. 01. 95

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 95/01670

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,5 119 901 (BUIE) 9 June 1992 see abstract	14,15
A	----- WO,A,91 17068 (DONNACHIE) 14 November 1991 see abstract; figures 1-3 -----	16,17

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

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

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims 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. Claims 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. claims 1-18: Safety system for vehicles using radar
2. claims 19,20: Safety system for vehicles using ABS
3. claims 21-28: Safety system for vehicles using an impact energy absorbing device

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.:

1-18

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/GB 95/01670

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CH-A-661250	15-07-87	NONE	
WO-A-9315931	19-08-93	AU-B- 3505893	03-09-93
		EP-A- 0680418	08-11-95
EP-A-0549909	07-07-93	JP-A- 5155291	22-06-93
		US-A- 5432509	11-07-95
GB-A-2268350	05-01-94	NONE	
US-A-5119901	09-06-92	NONE	
WO-A-9117068	14-11-91	AU-B- 7763691	27-11-91
		GB-A, B 2245351	02-01-92