

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
26 June 2003 (26.06.2003)

PCT

(10) International Publication Number
WO 03/052449 A3

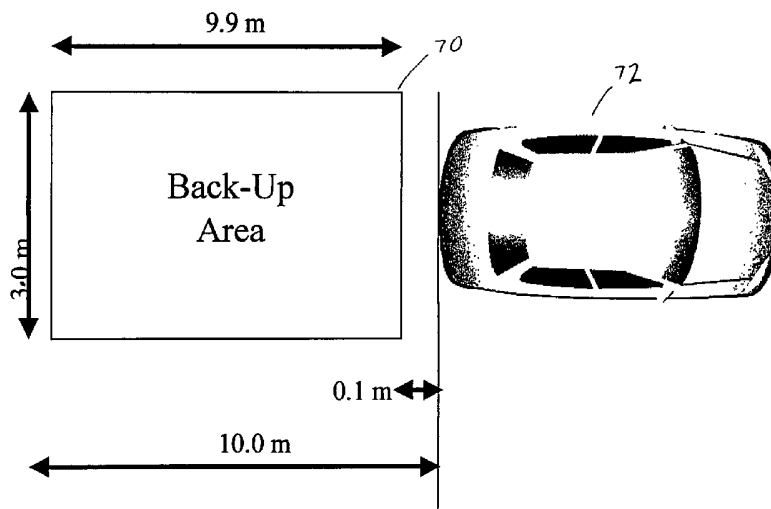
- (51) International Patent Classification⁷: G01S 13/87, 13/93, H01Q 1/32
- (21) International Application Number: PCT/US02/40094
- (22) International Filing Date: 16 December 2002 (16.12.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/340,543 14 December 2001 (14.12.2001) US
- (71) Applicant: RAYTHEON COMPANY [US/US]; 141 Spring Street, Lexington, MA 02421 (US).
- (72) Inventors: VIANA, Luis, M.; 10 Partridge Lane, Wakefield, MA 10880 (US). DELCHECCOLO, Michael, J.; 4 Chesapeake Drive, Westford, MA 01886 (US). RUSSELL, Mark, E.; 5 Buckboard Drive, Westford, MA 01886-2700 (US). WOODINGTON, Walter, Gordon; 222 Concord Road, Lincoln, MA 01773-5115 (US).
- (74) Agents: GAIMAN, Barry et al.; Daly, Crowley & Moford, LLP, 275 Turnpike Street, Suite 101, Canton, MA 02021 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

[Continued on next page]

(54) Title: BACK-UP AID INDICATOR

Coverage Zone



(57) Abstract: A back-up aid indication system includes a sensor for providing detection coverage in a predetermined coverage zone behind a vehicle. The sensor includes a transmit antenna adapted for transmitting an RF signal having a quasi-collimated antenna pattern in a near field. The system further includes a waveform generator which selectively provides one of a frequency modulated continuous wave FMCW Chirp signal and a pulse waveform signal as the transmitted RF signal.



WO 03/052449 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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.

(88) Date of publication of the international search report:
27 November 2003

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/40094

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01S13/87 G01S13/93 H01Q1/32

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 7 G01S H01Q H01P

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)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 517 197 A (ALGEO JERRY A ET AL) 14 May 1996 (1996-05-14) abstract column 1, line 6 - line 10 column 2, line 65 -column 3, line 1 column 6, line 3 - line 13 ---	1-19, 24-28
Y	EP 0 575 814 A (FIAT RICERCHE ;SMA SEGNALAMENTO MARITTIMO ED (IT)) 29 December 1993 (1993-12-29) abstract column 3, line 30 -column 5, line 28 ---	1-19, 24-28
A		20,29
A	US 5 682 136 A (DEL SIGNORE MAURO) 28 October 1997 (1997-10-28) column 2, line 57 -column 3, line 36 ---	1,2,25
A		20,29
	-/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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.

"&" document member of the same patent family

Date of the actual completion of the international search

17 September 2003

Date of mailing of the international search report

09.10.2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Zaccà, F

INTERNATIONAL SEARCH REPORT

 tional Application No
 PCT/US 02/40094

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 211 833 B1 (HAUPT GÜNTER) 3 April 2001 (2001-04-03)	1, 24, 25
A	abstract column 1, line 5 - line 64 ---	20, 29
A	RIVENQ-MENHAJ A ET AL: "COMBINING TWO RADAR TECHNIQUES TO IMPLEMENT A COLLISION AVOIDANCE SYSTEM" MEASUREMENT SCIENCE AND TECHNOLOGY, IOP PUBLISHING, BRISTOL, GB, vol. 9, no. 8, August 1998 (1998-08), pages 1343-1346, XP000848608 ISSN: 0957-0233 abstract ---	1, 25
A	US 5 166 690 A (CARLSON THOMAS F ET AL) 24 November 1992 (1992-11-24) abstract; figure 3 column 5, line 1 - line 31 ---	14-19
A	RICHARD C. JOHNSON: "Antenna Engineering Handbook" 1993, MCGRAW-HILL, INC., USA XP002246568 238420 page 3-17, paragraph 3.5 -page 3-18 ---	14-18
A	HARRIS F J: "ON THE USE OF WINDOWS FOR HARMONIC ANALYSIS WITH THE DISCRETE FOURIER TRANSFORM" PROCEEDINGS OF THE IEEE, IEEE. NEW YORK, US, vol. 66, no. 1, 1978, pages 51-84, XP000568030 ISSN: 0018-9219 Page 55, Table 1 page 82, right-hand column, line 32 - line 35 ---	17
A	WO 01 15275 A (AEROSAT CORP) 1 March 2001 (2001-03-01) figures 5, 9, 10 page 14, line 24 -page 16, line 18 ---	21-23, 29-32
A	GB 2 248 974 A (QUASAR MICROWAVE TECH) 22 April 1992 (1992-04-22) abstract ---	21
A	ZELUBOWSKI S A: "LOW COST ANTENNA ALTERNATIVES FOR AUTOMOTIVE RADARS" MICROWAVE JOURNAL, HORIZON HOUSE. DEDHAM, US, vol. 37, no. 7, 1 July 1994 (1994-07-01), pages 54, 56-57, 59-61, XP000468714 ISSN: 0192-6225 page 63 -----	20, 29

INTERNATIONAL SEARCH REPORT

national application No.
PCT/US 02/40094

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:

see additional sheet

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-19,24-28

1.1. Claims: 1-14,16,19,24-28
Back-up aid indicator

1.2. Claims: 15,17,18
Antenna

2. Claims: 20-23,29-32

External vehicle antenna

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Original Application No

PCT/US 02/40094

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5517197	A	14-05-1996	NONE	
EP 0575814	A	29-12-1993	IT 1257225 B EP 0575814 A1	10-01-1996 29-12-1993
US 5682136	A	28-10-1997	IT 1256863 B BR 9305915 A DE 69319896 D1 DE 69319896 T2 EP 0626072 A1 JP 7504494 T RU 2139572 C1 AT 168786 T CA 2129673 A1 WO 9316397 A1 ES 2121992 T3	27-12-1995 19-08-1997 27-08-1998 29-04-1999 30-11-1994 18-05-1995 10-10-1999 15-08-1998 19-08-1993 19-08-1993 16-12-1998
US 6211833	B1	03-04-2001	DE 19859999 C1 DE 59904834 D1 EP 1014106 A1	31-08-2000 08-05-2003 28-06-2000
US 5166690	A	24-11-1992	NONE	
WO 0115275	A	01-03-2001	AU 1230400 A CN 1367945 T EP 1212810 A1 WO 0115275 A1	19-03-2001 04-09-2002 12-06-2002 01-03-2001
GB 2248974	A	22-04-1992	NONE	