PCT

(30) Priority Data:

08/908,485

WORLD INTELLECTUAL PROPERTY ORGANIZATION International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶:

G01S 5/00, 5/08

A3

(11) International Publication Number: WO 99/13352

(43) International Publication Date: 18 March 1999 (18.03.99)

US

(21) International Application Number: PCT/US98/16530

(22) International Filing Date: 7 August 1998 (07.08.98)

7 August 1997 (07.08.97)

(71) Applicant: HONEYWELL INC. [US/US]; Honeywell Plaza –

MN12-8251, P.O. Box 524, Minneapolis, MN 55440-0524 (US).

(72) Inventor: HARTMAN, Randolph, G.; 4605 Vinewood, Plymouth, MN 55442 (US).

(74) Agent: UNGEMACH, Charles, J.; Honeywell Inc., Honeywell Plaza – MN12-8251, P.O. Box 524, Minneapolis, MN 55440-0524 (US).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

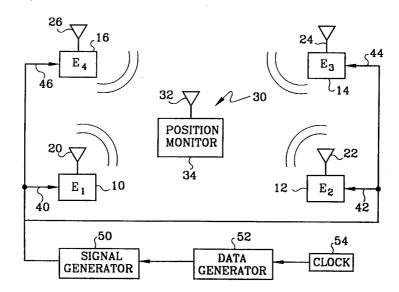
With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(88) Date of publication of the international search report:

6 May 1999 (06.05.99)

(54) Title: RANGE POSITIONING SYSTEM



(57) Abstract

A system for determining the three dimensional position of an object by use of at least four RF transmitters whose positions are accurately known with each transmitter sensing a common time based signal containing its position information to a remote receiver on or proximate the object, the receiver using the information in the data signals to determine the position of the object.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav	TM	Turkmenistan
\mathbf{BF}	Burkina Faso	GR	Greece		Republic of Macedonia	TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	$\mathbf{z}\mathbf{w}$	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
\mathbf{CZ}	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 98/16530

A CLASS	VEICATION OF OUR LEGT ALL TIME			
IPC 6	G01S5/00 G01S5/08			
According	to International Patent Classification (IPC) or to both national class	sification and IPC		
1	SEARCHED	and it o		
Minimum d IPC 6	ocumentation searched (classification system followed by classific 601S	cation symbols)		
Documenta	ition searched other than minimum documentation to the extent the	at such documents are included in the fields s	searched	
Electronic o	lata base consulted during the international search (name of data	base and, where practical, search terms user	d)	
C. DOCUM	ENTS CONSIDERED TO BE RELEVANT			
Category °	Citation of document, with indication, where appropriate, of the	relevant passages	Relevant to claim No.	
X	US 5 056 106 A (WANG JAMES J E 8 October 1991 see column 4, line 30 - column		1-8	
X	WO 95 00821 A (OMNIPLEX INC) 5 January 1995 see page 9, line 4 - page 12, l	ine 24	1-8	
X	US 5 530 440 A (DANZER PAUL M & 25 June 1996 see column 2, line 60 - column 4		1-8	
X,P	US 5 686 924 A (TRIMBLE CHARLES 11 November 1997 see column 2, line 45 - column 2 claim 5		1,7	
		-/		
X Furth	er documents are listed in the continuation of box C.	X Patent family members are listed in	n annex.	
° Special cate	egories of cited documents :	"T" later degreement published after the inter-		
conside E" earlier de	nt defining the general state of the art which is not ared to be of particular relevance coument but published on or after the international	 "T" later document published after the inter or priority date and not in conflict with to cited to understand the principle or the invention "X" document of particular relevance; the classified in the cited of the	the application but ory underlying the	
which is	it which may throw doubts on priority claim(s) or cited to establish the publication date of another	cannot be considered novel or cannot linvolve an inventive step when the doc "Y" document of particular relevance; the cla	be considered to sument is taken alone	
"O" documer other m		cannot be considered to involve an invidence of the considered to involve an invidence of the combined with one or more ments, such combination being obvious	entive step when the	
"P" documer later tha	it published prior to the international filing date but in the priority date claimed	in the art. "&" document member of the same patent fa	i	
Date of the ad	ctual completion of the international search	Date of mailing of the international sear	ch report	
4	March 1999	16/03/1999		
Name and ma	ailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk	Authorized officer		
	Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Kahn, K-D		

INTERNATIONAL SEARCH REPORT

Internacional Application No
PCT/US 98/16530

C.(Continu	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	PC1/US 98/10530		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
,				
X	WO 83 04451 A (STORNO AS) 22 December 1983 see page 4, line 25 - page 6, line 7	7		
X	EP 0 502 312 A (BOSCH GMBH ROBERT) 9 September 1992	7		
	see page 2, line 10 - page 3, line 50			

INTERNATIONAL SEARCH REPORT

information on patent family members

Inter: nal Application No PCT/US 98/16530

Patent document cited in search report		Publication date	Patent family member(s)		Publication date	
US 5056106	Α	08-10-1991	GB JP	2247131 A,B 7059894 A	19-02-1992 07-03-1995	
WO 9500821	Α	05-01-1995	AU US	7173694 A 5815538 A	17-01-1995 29-09-1998	
US 5530440	Α	25-06-1996	NONE			
US 5686924	Α	11-11-1997	US	5708440 A	13-01-1998	
WO 8304451	A	22-12-1983	DK DE DE EP GB SE SE	255382 A 3390030 C 3390030 T 0110945 A 2132398 A,B 456287 B 8400632 A	02-02-1984 07-02-1991 28-06-1984 20-06-1984 04-07-1984 19-09-1988 07-02-1984	
EP 0502312	Α	09-09-1992	DE	4107116 A	10-09-1992	