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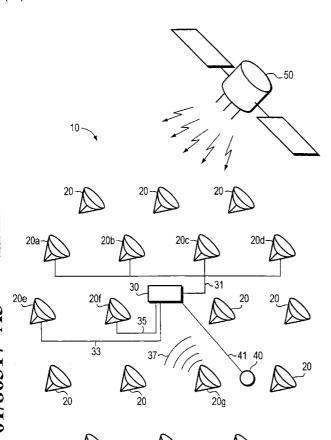
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PRECISE POSITIONING SYSTEM FOR MOBILE GPS USERS



(57) Abstract: Multiple geographically fixed reference stations, with precisely known locations, that each receive GPS signals send information to a central processing facility that generates a three dimension topographical gradient map or model of the differences between the known locations and the locations as calculated from the received GPS signals. GPS signals received by mobile users are communicated to the central processing facility whereupon the central processing facility, using the model, generates precise corrected locations of the mobile users which is sent back to the mobile users. The mobile users can use and display the locally generated position from the locally received GPS signals or the corrected position from the central processing facility.

### INTERNATIONAL SEARCH REPORT

Intranational Application No FUT/CA 01/00636

# A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G01S5/14

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

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, WPI Data, PAJ, INSPEC

C. DOCUMENTS	CONSIDERED	TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Υ	US 5 899 957 A (LOOMIS PETER VAN WYCK) 4 May 1999 (1999-05-04)	1,4,5,8, 10,13, 14,16
Α	abstract	2,3,9, 11,12,18
	column 7, line 30 -column 8, line 41 column 10, line 17 -column 11, line 9 column 14, line 56 -column 17, line 48	
Y	DE 44 24 412 A (ESG ELEKTRONIKSYSTEM UND LOGIS) 18 January 1996 (1996-01-18)	1,4,5,8, 10,13, 14,16
Α	abstract	2,7,11,
	column 2, line 10 - line 43 column 3, line 14 - line 30 column 6, line 18 - line 59	
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ı	χ	Further documents are listed in the	continuation of box C.

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Patent family members are listed in annex.

<ul> <li>Special categories of cited documents</li> </ul>	0	Special	categories	of	cited	documents	
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- 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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Date of mailing of the international search report

\*&\* document member of the same patent family

30 November 2001 11/12/2001

## Name and mailing address of the ISA

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Roost, J

## INTERNATIONAL SEARCH REPORT

Ir\* rnational Application No

	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	Relevant to claim No.
Category °	Citation of document, with indication, where appropriate, of the relevant passages	nelevalit to claim no.
4	US 5 872 539 A (MULLEN ROBERT) 16 February 1999 (1999-02-16) abstract	1,10
A	US 5 043 736 A (DARNELL RALPH D ET AL) 27 August 1991 (1991-08-27) cited in the application abstract	1,10
A	US 5 323 322 A (MUELLER K TYSEN ET AL) 21 June 1994 (1994-06-21) cited in the application abstract	1,10
		,

1

## INTERNATIONAL SEARCH REPORT

Information on patent family members

Irtarnational Application No

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5899957	Α	04-05-1999	US WO	5477458 A 9518978 A1	19-12-1995 13-07-1995
DE 4424412	Α	18-01-1996	• DE	4424412 A1	18-01-1996
US 5872539	Α	16-02-1999	NONE		
US 5043736	A	27-08-1991	AU CA JP AU EP	645114 B2 2049818 A1 6186318 A 8267791 A 0528090 A1	06-01-1994 27-02-1993 08-07-1994 25-02-1993 24-02-1993
US 5323322	Α	21-06-1994	NONE		