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DeLorme et al.

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(54) **INTEGRATED ROUTING/MAPPING INFORMATION**

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(57) **ABSTRACT**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

An Integrated Routing/Mapping Information System (IRMIS) links desktop personal computer cartographic applications to one or more handheld organizer, personal digital assistant (PDA) or "palmtop" devices. Such devices may be optionally equipped with, or connected to, portable Global Positioning System (GPS) or equivalent position sensing device. Desktop application facilitates user selection of areas, starts, stops, destinations, maps and/or point and/or route information. It optionally includes supplemental online information, preferably for transfer to the PDA or equivalent device. Users' options include route information, area, and route maps. Maps and related route information are configured with differential detail and levels of magnitude. Used in the field, in conjunction with GPS receiver, the PDA device is configured to display directions, text and map formats, the user's current position, heading, speed, elevation, and so forth. Audible signals identifying the next turn along the user's planned route are also provided. The user can pan across maps and zoom between two or more map scales, levels of detail, or magnitudes. The IRMIS also provides for "automatic zooming," e.g., to show greater detail or closer detail as the user approaches a destination, or to larger scale and lower resolution to show the user's overall planned route between points of interest. The IRMIS also enables the user to mark or record specific locations and/or log actual travel routes, using GPS position information. These annotated location marks and/or "breadcrumb" or GPS log data can be saved, uploaded, displayed, or otherwise processed on the user's desktop geographic information or cartographic system. The IRMIS application and data may be distributed online and/or in tangible media in limited and advanced manipulation formats.

(21) Appl. No.: **09/144,836**

(22) Filed: **Aug. 31, 1998**

Related U.S. Application Data

(63) Continuation-in-part of application No. 08/661,600, filed on Jun. 11, 1996, now Pat. No. 5,802,492, which is a continuation-in-part of application No. 08/381,214, filed on Jan. 31, 1995, now Pat. No. 5,559,707, which is a continuation-in-part of application No. 08/265,327, filed on Jun. 24, 1994, now abandoned.

(51) **Int. Cl.**⁷ **G01C 21/30**

(52) **U.S. Cl.** **701/201; 701/209; 701/211; 340/995; 342/357.09**

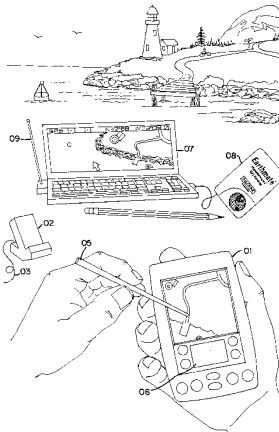
(58) **Field of Search** 701/201, 200, 701/202, 208, 209, 211, 210, 212, 213; 340/988, 990, 995; 342/357.06, 357.07, 357.09, 357.13, 357.1

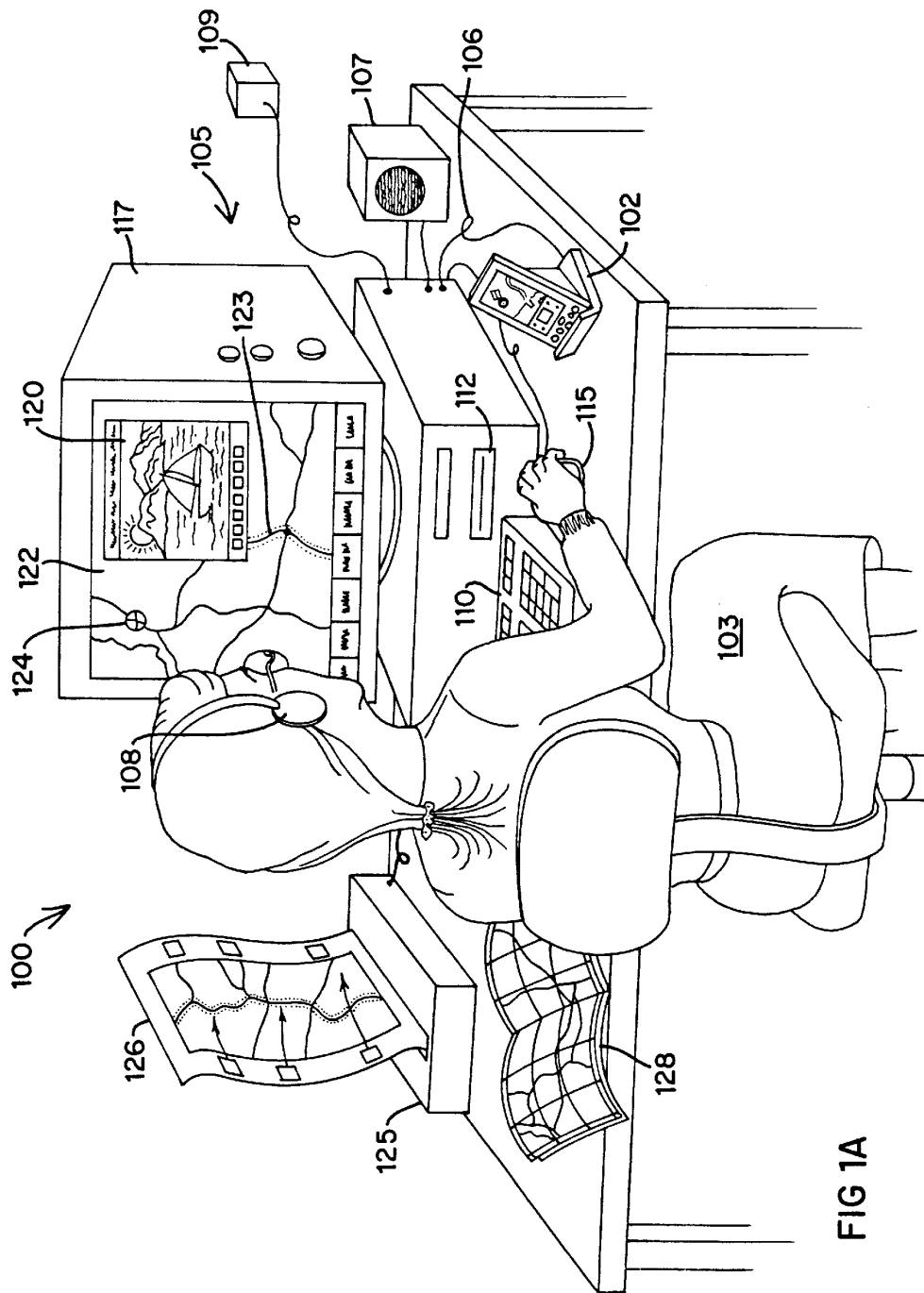
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28 Claims, 51 Drawing Sheets





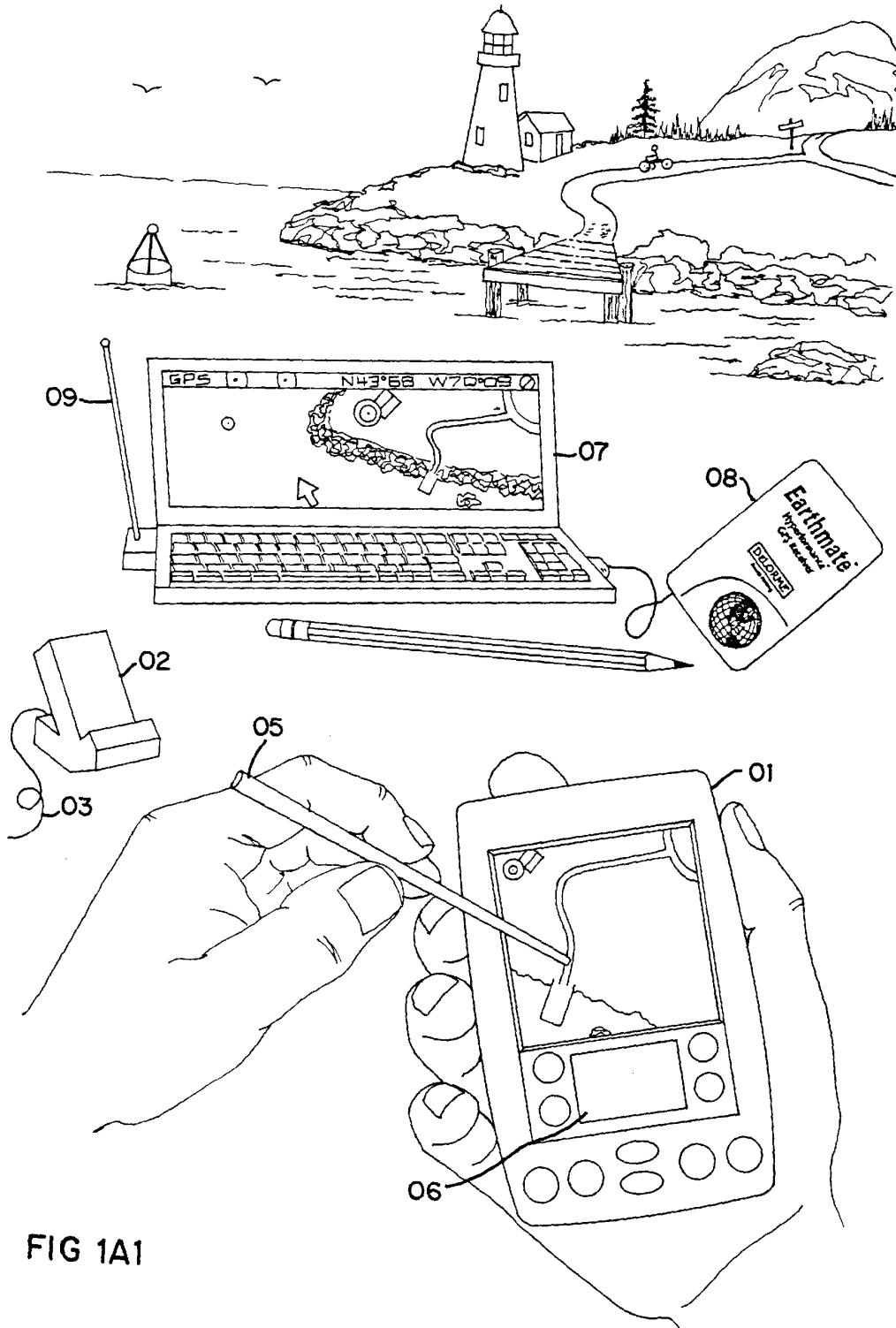
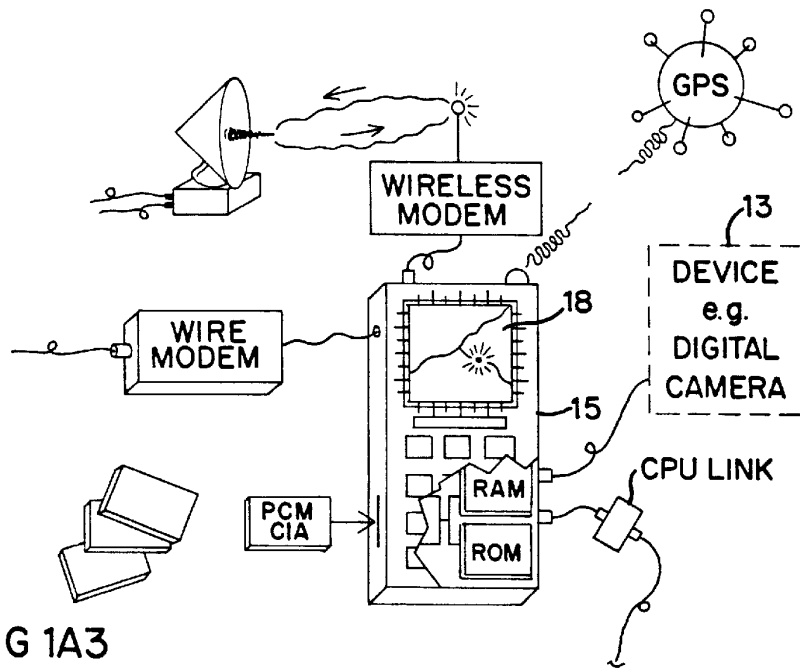
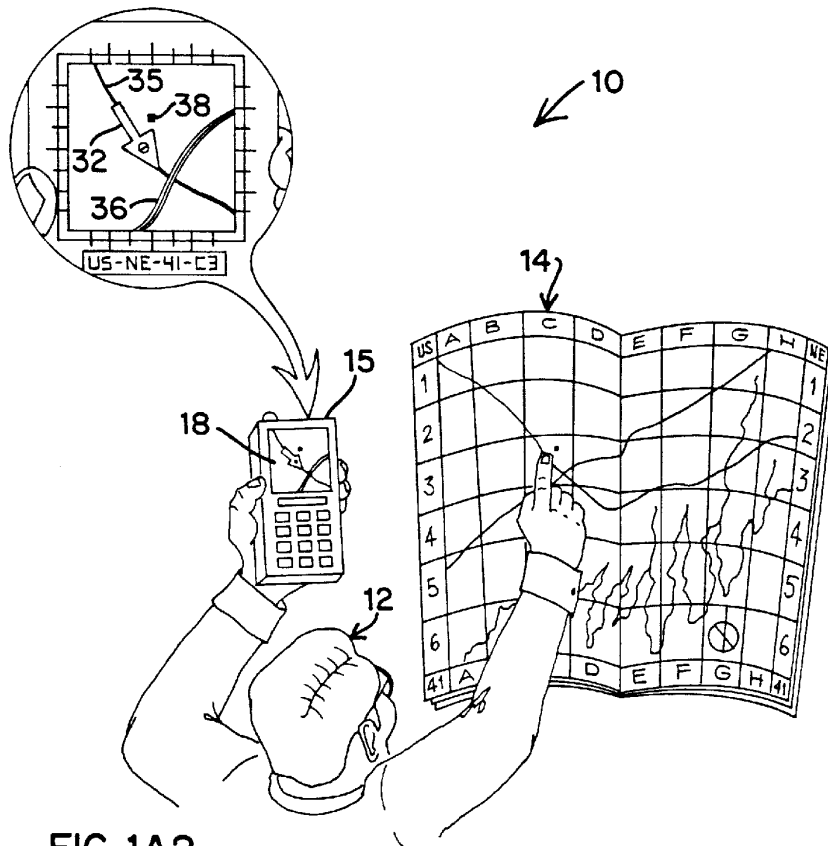


FIG 1A1



DIRECTIONS		⊘
<ul style="list-style-type: none"> ● EXIT I-95 EXIT 11 US1 (BLUE MEM.) 0:00, 0.0 MI, NE ● I-95 EXIT 17 MI 11 (US1 (BLUE MEM.)) 0:02, 2.5 MI, SW JUNIPER DR. 0:02, 2.8 MI, N 		
TIME TO NEXT 0:19	DIST. TO NEXT 0.3 MI	

a

NAVIGATE		⊘
GO SW ON US1 (BLUE MEM.)		
TIME TO NEXT 0:19	DIST. TO NEXT 0:3 MI	
TIME TO FINISH 5:43	DIST. TO FINISH 2.8 MI	

b

POSITION		⊘
LAT N43°48.600 LONG W070°09.599		
SPEED 18 MPH	ELEV. 211 FT.	
HEADING N(000)	TIME 1:12	
<input type="button" value="MARK"/> <input type="button" value="STOP"/>		

c

MODE	TOOLS	⊘
POSITION	SELECT MAP	
MAP	SELECT DIRECTIONS	
NAVIGATE	-----	
DIRECTIONS	MARKS	
INITIALIZE	PREFERENCES	

	HELP	
	ABOUT	

d

MARK LIST	⊘
DELORME MAP STORE	

<input type="button" value="DELETE"/> <input type="button" value="NEXT"/> <input type="button" value="OK"/>	
TEXT DELORME MAP STORE LAT 43.80800 LONG 70.16400 DEV DIGITAL CAMERA	

e

INITIALIZE		⊘
DEVICE	DELORME GPS TRIPMATE	
	DELORME EARTHMATE	
STATE	<input type="button" value="LOST"/> <input type="button" value="MAP"/> AL ↓	<input type="checkbox"/> DST
GMT OFFSET	-5	
LAT	48.81	
LONG	-70.16	
	<input type="button" value="OK"/>	

f

FIG 1A4

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