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# United States Patent [19]

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Ohmura et al.

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[54] NAVIGATION SYSTEM

5,899,956 5/1999 Chan ..... 701/213

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[22] Filed: **Sep. 19, 1997**

### [57] ABSTRACT

### [30] Foreign Application Priority Data

Sep. 30, 1996 [JP] Japan ..... 8-259140

[51] Int. Cl.<sup>7</sup> ..... **G01S 3/02**; H04B 7/29;  
G01C 21/00

[52] U.S. Cl. .... **701/213**; 701/211; 701/207;  
701/201; 701/202; 701/205; 701/206; 342/457;  
455/456

[58] Field of Search ..... 701/213, 211,  
701/207, 201, 202, 205, 206; 342/457,  
456

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A combination of a main navigation apparatus **2** which is fixed to the vehicle and a sub-navigation apparatus **3** which is detachable from the vehicle. When the sub-navigation apparatus **3** is attached, map information and current position information is displayed on a main display **25** under control of a sub-control unit **1**, and state of the vehicle is displayed on a sub-display **33**. When detaching the sub-navigation apparatus **3** from the vehicle, area map information necessary for waking outside of the vehicle is transmitted from an on-vehicle database **22** to a RAM **32**. When the sub-navigation apparatus is detached from the vehicle, if the operation switch **36** is turned on, either the sub-display **33** or a speaker **34** is operated by an sub-navigation unit in a saving power control mode in which either the sub-display **33** or the speaker **34** is operated only for a predetermined period of time since the operation switch **36** is turned on. When information stored in the RAM **32** is not insufficient, additional information is transmitted from the on-vehicle database **22** via a telephone terminal **37**.

**18 Claims, 5 Drawing Sheets**

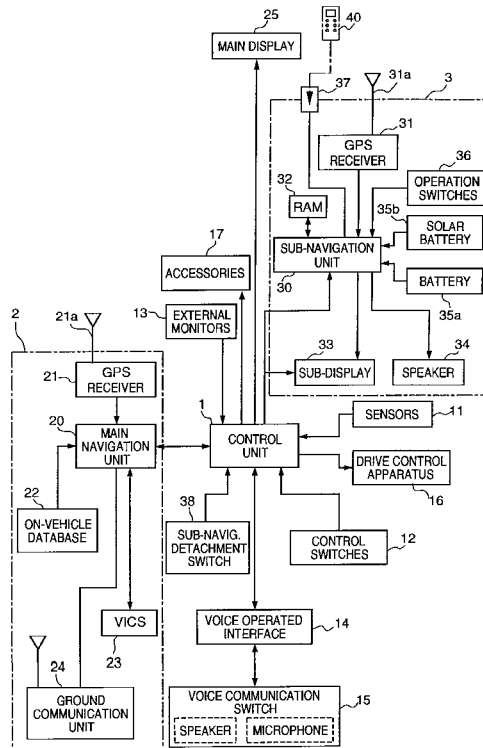


FIG. 1

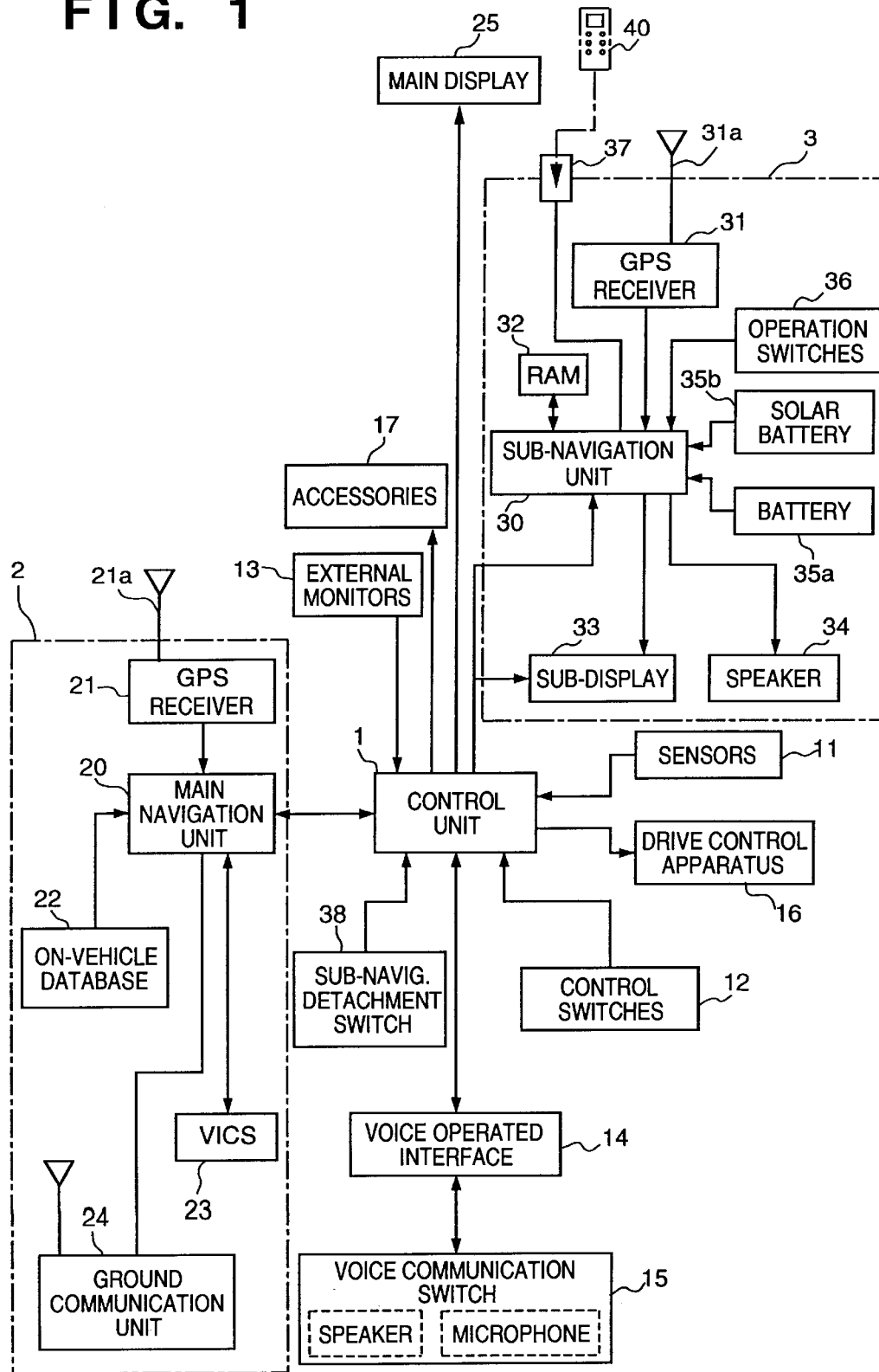
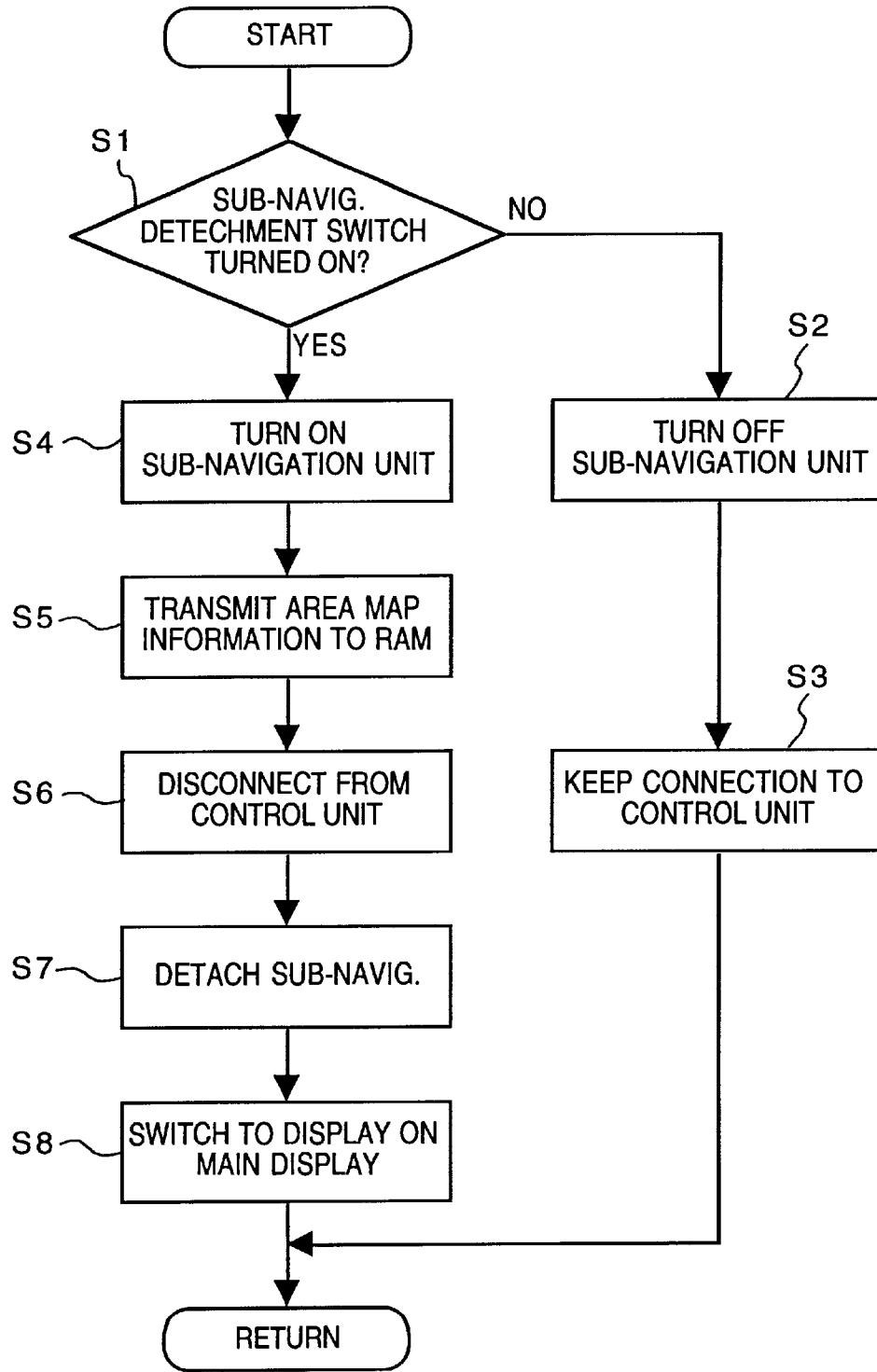
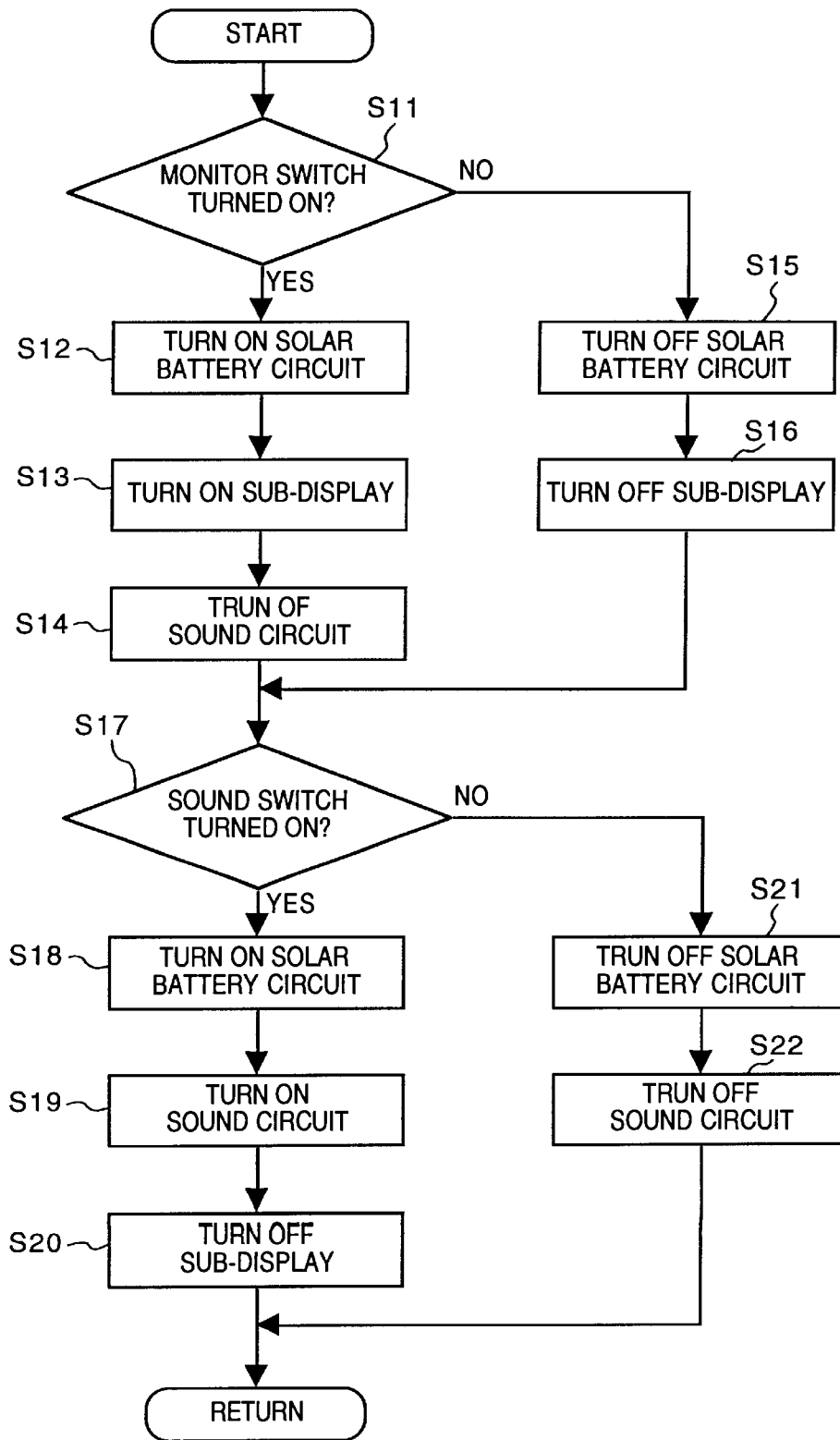


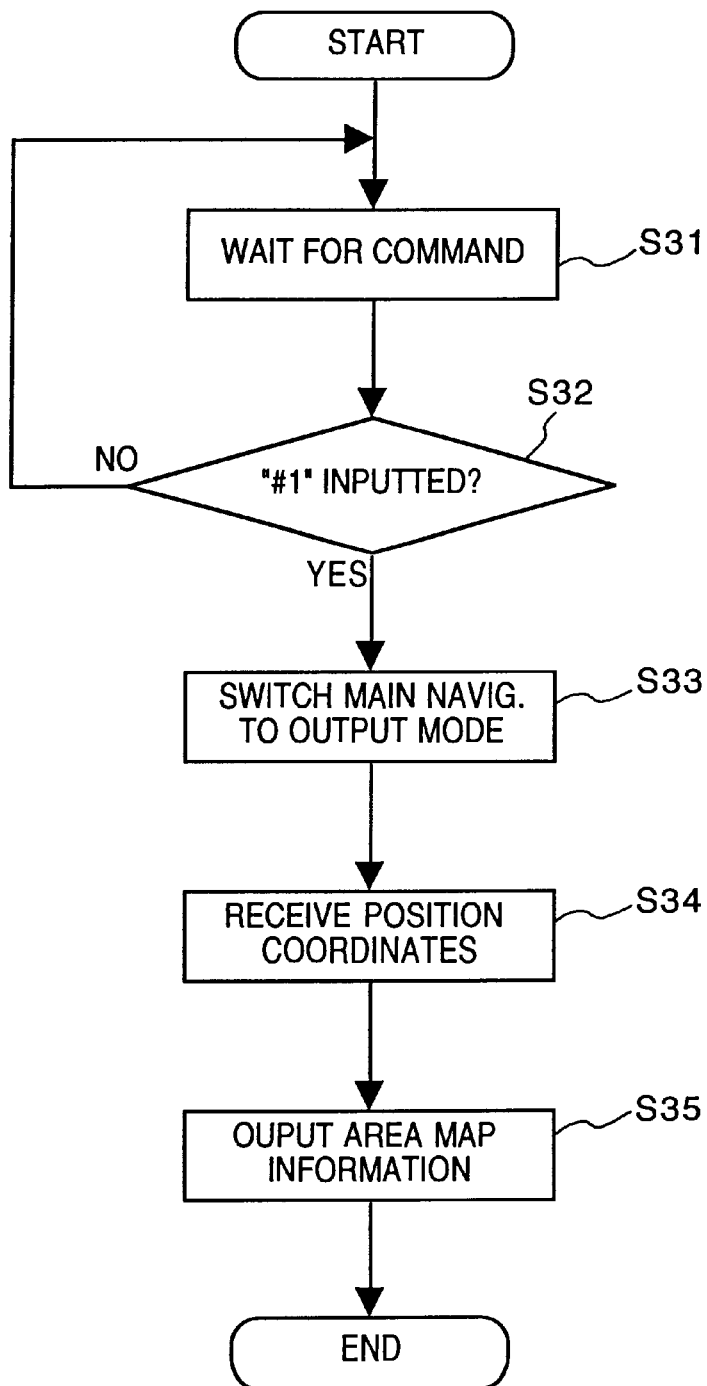
FIG. 2



# FIG. 3



# FIG. 4



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