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Croyle et al.

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(54) **VEHICLE NAVIGATION SYSTEM AND METHOD USING MULTIPLE AXES ACCELEROMETER**

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(58) **Field of Search** 701/220, 207, 701/1; 364/454; 235/150.27

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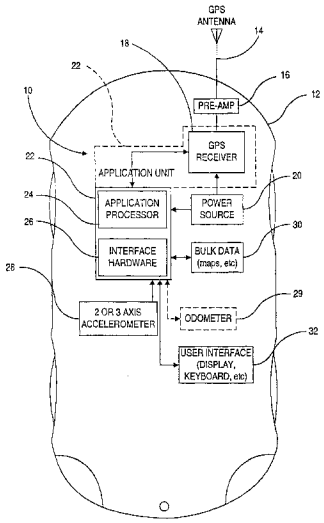
(57) **ABSTRACT**

The improved vehicle navigation system uses a multiple, orthogonal axes accelerometer, such as two or three accelerometers which are mounted orthogonal to one another. The two axes whose acceleration are to be measured are the longitudinal (nose to rear bumper) axis and lateral (left to right side) axis. The tangential or longitudinal axis acceleration is integrated once to obtain longitudinal speed and is integrated again to produce a vehicle displacement. The lateral accelerometer measures the centripetal force that the vehicle is encountering which is used to compute a centripetal or lateral acceleration. The lateral acceleration is used to obtain a heading change derived from the lateral acceleration information and the longitudinal speed. Using the heading change and the longitudinal acceleration, the improved vehicle navigation system propagates a previous position to a current position. This is accomplished without the need for connection to the vehicle speed sensor and the heading sensor. If a third axis acceleration measurement sensor is used the improved vehicle navigation system can operate completely independent of vehicle sensors, further increasing flexibility in mounting. The third accelerometer provides pitch to assist in calibrating the other accelerometers or other sensors and in altering the longitudinal and/or lateral acceleration information by, for example, detecting a banked turn.

20 Claims, 10 Drawing Sheets



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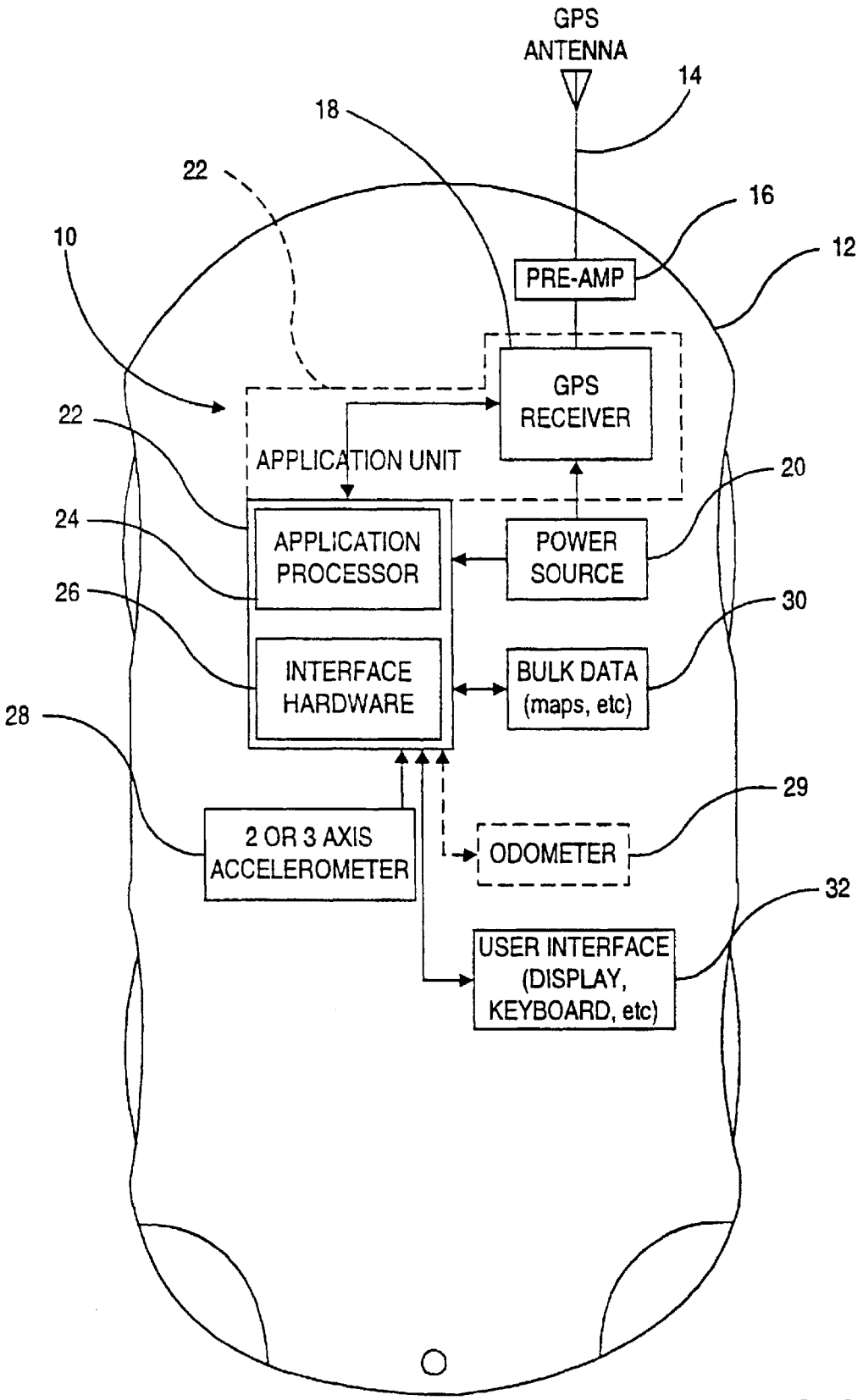

FIG. 1

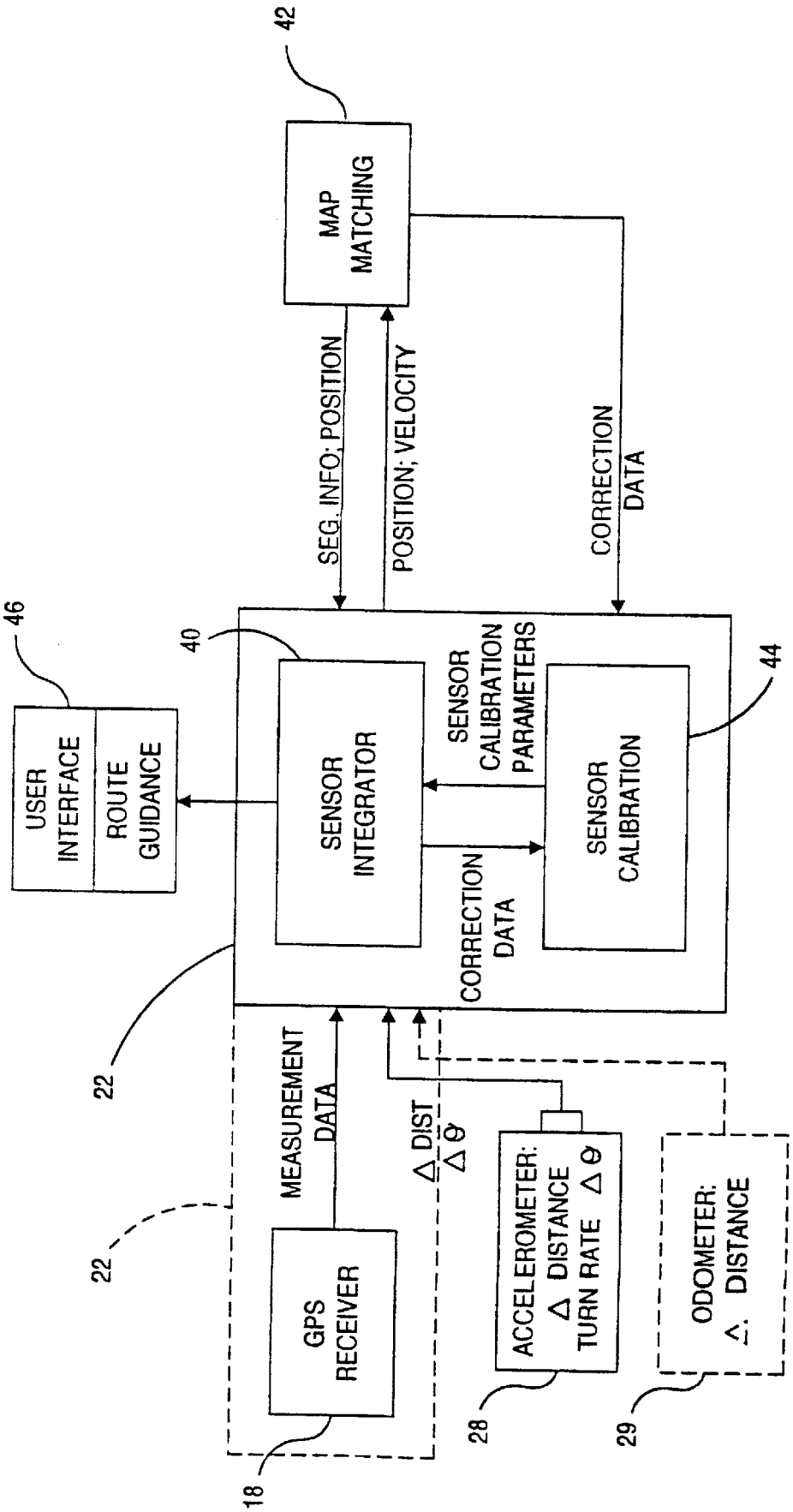

FIG. 2

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