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(54) [Title of the Invention] Position information communication terminal and GPS positioning system

(57) [Abstract]

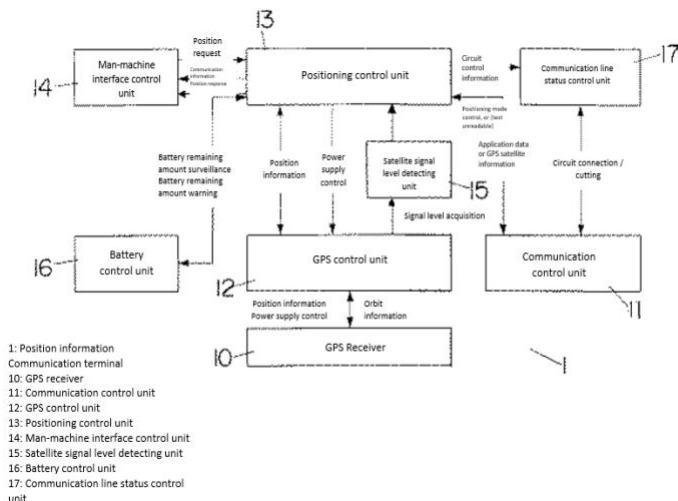
[Problem] To provide a position information communication terminal and GPS positioning system with which it is possible to flexibly switch between the normal sensitivity positioning mode in which the GPS receiver operates only when necessary and the high sensitivity positioning mode in which it always operates.

[Solution Means]

Through control of the power supply of the GPS receiver 10 by GPS control unit 12, each positioning operation is controlled of the normal sensitivity positioning mode in which the GPS receiver 10 is operated only when necessary and the high sensitivity positioning mode in which the GPS receiver 10 is always operated, the latest orbit information of GPS satellites is obtained, the positioning control unit 13 switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver 10, and the orbit information obtained via the network using the communication control unit 11 is supplied to the GPS control unit 12.

[Drawings]

FIG. 1



(2)

[Claims]

[Claim 1]

A position information communication terminal, provided with a GPS receiver that receives GPS satellite signals from GPS satellites and performs positioning operations; a communication control unit having a mobile communication means; a GPS control unit having an orbit information acquisition means for acquiring the latest orbit information of the GPS satellite in response to a request from a GPS receiver, a position information acquisition means for acquiring position information from the GPS receiver, and a positioning operation control means for controlling each positioning operation in a normal sensitivity positioning mode in which the GPS receiver is operated only when necessary and a high sensitivity positioning mode in which the GPS receiver is always operated by controlling the power of the GPS receiver; and a positioning control unit having a positioning mode switching means for switching between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver, and an orbit information supply means for supplying the orbit information acquisition means with orbit information obtained via a network using the communication control unit.

[Claim 2]

The position information communication terminal according to claim 1, provided with a man-machine interface control unit that outputs information corresponding to the operation of the terminal user, wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the request of the terminal user acquired via the man-machine interface control unit.

[Claim 3]

The position information communication terminal according to claim 1, wherein the communication control unit receives positioning control information transmitted from the outside, and the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the positioning control information.

[Claim 4]

The position information communication terminal according to claim 1, provided with a satellite signal level detecting unit for detecting the level of the GPS signal received by the GPS receiver, wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the signal level information acquired from the satellite signal level detecting unit.

[Claim 5]

The position information communication terminal according to claim 1, provided with a battery that supplies operating power, and a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value, wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the remaining battery amount warning information.

[Claim 6]

The position information communication terminal according to claim 1, provided with a battery that supplies operating power, a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value, and a man-machine interface control unit for notifying the terminal user of the remaining battery amount warning; wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the remaining battery amount warning.

[Claim 7]

The GPS positioning system according to claim 1, consisting of a position management server that searches the position of the terminal, provided with a position information communication terminal, a communication control unit having mobile communication means that connects to the terminal via a mobile communication network, a positioning mode control unit that transmits and receives positioning control information to and from the terminal via the communication control unit, and a GPS satellite information management unit that collects and manages GPS satellite information and sends the latest GPS satellite orbit information to the terminal via the mobile communication network;

wherein the positioning control unit of the terminal switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the positioning control information from the position management server.

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## [Claim 8]

The GPS positioning system according to claim 7, wherein the positioning mode control unit sets positioning mode information that specifies the positioning operation of the GPS receiver of the terminal to the normal sensitivity positioning mode or the high sensitivity positioning mode, as positioning control information, based on an instruction from a position searcher, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

## [Claim 9]

The GPS positioning system according to claim 7, wherein the terminal is provided with a satellite signal level detecting unit that detects a level of the GPS signal received by the GPS receiver, the positioning control unit sets the signal level information to positioning control information, the communication control unit of the terminal transmits positioning control information in which the signal level information is set to the position management server via a mobile communication network, the positioning mode control unit of the position management server, based on the signal level information, sets positioning mode information for specifying the positioning operation of the GPS receiver of the terminal as the normal sensitivity positioning mode or the high sensitivity positioning mode to the positioning control information, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

## [Claim 10]

The GPS positioning system according to claim 7, wherein the terminal is provided with a battery that supplies operating power, and a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value; wherein the positioning control unit sets the remaining battery amount warning information to positioning control information, the communication control unit of the terminal transmits the positioning control information in which the remaining battery amount warning information is set to the position management server via the mobile communication network, the positioning mode control unit of the position management server, based on the remaining battery amount warning information, sets the positioning mode information for specifying the positioning operation of the GPS receiver of the terminal as the normal sensitivity positioning mode or the high sensitivity positioning mode to the positioning control information, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

## [Claim 11]

The GPS positioning system according to claim 7, wherein the terminal is provided with a battery that supplies operating power, and a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value; wherein the positioning mode control unit of the position management server, based on the remaining battery amount warning information, notifies the position searcher of the battery remaining warning, sets the positioning mode information specifying the positioning operation of the GPS receiver of the terminal in the normal sensitivity positioning mode or the high sensitivity positioning mode to the positioning control information, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

## [Claim 12]

The GPS positioning system according to any one of claims 7 to 11, provided with a communication line status control unit in the position information communication terminal or the position management server that switches the communication line connecting the position information communication terminal with the position management server via the mobile communication network between a mode that is always connected and a mode that is connected for each position search based on a request from a position searcher.

## [Detailed Description of the Invention]

## [0001]

## [Technical Field of the Invention]

The present invention relates to a position information communication terminal capable of position measurement using a GPS receiver, and a GPS positioning system.

## [0002]

## [Prior Art]

In Japanese Unexamined Patent Publication No. 10-31061 a technology is disclosed that shortens the time from power-on to the first position detection by inputting the latest navigation message of the GPS satellite from the outside to the

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GPS receiver. However, it is difficult to track and capture the GPS satellite signal with a level lower than the signal level that can be captured using this technique.

[0003]

Therefore, there is a highly sensitive positioning operation that always operates the GPS receiver as a GPS receiving technique capable of detecting the position even in an environment where the satellite signal level is lower after once capturing the GPS satellite. However, it is necessary to keep the GPS receiver itself running, and when applied to devices with limited battery capacity such as portable terminals, it is necessary to flexibly control the operation mode of the GPS receiver from the outside and selectively use the highly sensitive positioning operation and the normal positioning operation.

[0004]

[Problems to be Solved by the Invention]

The present invention has been developed in light of the above reasons; the purpose thereof is to provide a position information communication terminal and a GPS positioning system wherein it is possible to flexibly switch between the normal sensitivity positioning mode in which the GPS receiver operates only when necessary and the high sensitivity positioning mode in which it operates constantly.

[0005]

[Means for Solving the Problems]

The invention according to claim 1 is provided with a GPS receiver that receives GPS satellite signals from GPS satellites and performs positioning operations;

a communication control unit having a mobile communication means;

a GPS control unit having an orbit information acquisition means for acquiring the latest orbit information of the GPS satellite in response to a request from a GPS receiver, a position information acquisition means for acquiring position information from the GPS receiver, and a positioning operation control means for controlling each positioning operation in a normal sensitivity positioning mode in which the GPS receiver is operated only when necessary and a high sensitivity positioning mode in which the GPS receiver is always operated by controlling the power of the GPS receiver; and

a positioning control unit having a positioning mode switching means for switching between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver, and an orbit information supply means for supplying the orbit information acquisition means with orbit information obtained via a network using the communication control unit.

[0006]

The invention of claim 2 according to claim 1, provided with a man-machine interface control unit that outputs information corresponding to the operation of the terminal user, wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the request of the terminal user acquired via the man-machine interface control unit.

[0007]

The invention of claim 3 according to claim 1, wherein the communication control unit receives positioning control information transmitted from the outside, and the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the positioning control information.

[0008]

The invention of claim 4 according to claim 1, provided with a satellite signal level detecting unit for detecting the level of the GPS signal received by the GPS receiver, wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the signal level information acquired from the satellite signal level detecting unit.

[0009]

The invention of claim 5 according to claim 1, provided with a battery that supplies operating power, and a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value, wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the remaining battery amount warning information.

[0010]

The invention of claim 6 according to claim 1, provided with a battery that supplies operating power, a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value, and a man-machine interface control unit for notifying the

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terminal user of the remaining battery amount warning; wherein the positioning control unit switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the remaining battery amount warning.

[0011]

The invention of claim 7 according to claim 1, consisting of a position management server that searches the position of the terminal, provided with a position information communication terminal, a communication control unit having mobile communication means connected to the terminal via a mobile communication network, a positioning mode control unit that transmits and receives positioning control information to and from the terminal via the communication control unit, and a GPS satellite information management unit that collects and manages GPS satellite information and sends the latest GPS satellite orbit information to the terminal via the mobile communication network;

wherein the positioning control unit of the terminal switches between the normal sensitivity positioning mode and the high sensitivity positioning mode of the GPS receiver based on the positioning control information from the position management server.

[0012]

The invention of claim 8 according to claim 7, wherein the positioning mode control unit sets positioning mode information that specifies the positioning operation of the GPS receiver of the terminal to the normal sensitivity positioning mode or the high sensitivity positioning mode, as positioning control information, based on an instruction from a position searcher, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

[0013]

The invention of claim 9 according to claim 7, wherein the terminal is provided with a satellite signal level detecting unit that detects a level of the GPS signal received by the GPS receiver, the positioning control unit sets the signal level information to positioning control information, the communication control unit of the terminal transmits positioning control information in which the signal level information is set to the position management server via a mobile communication network, the positioning mode control unit of the position management server, based on the signal level information, sets positioning mode information for specifying the positioning operation of the GPS receiver of the terminal as the normal sensitivity positioning mode or the high sensitivity positioning mode to the positioning control information, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

[0014]

The invention of claim 10 according to claim 7, wherein the terminal is provided with a battery that supplies operating power, and a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value; wherein the positioning control unit sets the remaining battery amount warning information to positioning control information, the communication control unit of the terminal transmits the positioning control information in which the remaining battery amount warning information is set to the position management server via the mobile communication network, the positioning mode control unit of the position management server, based on the remaining battery amount warning information, sets the positioning mode information for specifying the positioning operation of the GPS receiver of the terminal as the normal sensitivity positioning mode or the high sensitivity positioning mode to the positioning control information, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

[0015]

The invention of claim 11 according to claim 7, wherein the terminal is provided with a battery that supplies operating power, and a battery control unit that notifies the positioning control unit of a remaining battery amount warning when the remaining amount value of the battery is lower than a preset threshold value; wherein the positioning mode control unit of the position management server, based on the remaining battery amount warning information, notifies the position searcher of the battery remaining warning, sets the positioning mode information specifying the positioning operation of the GPS receiver of the terminal in the normal sensitivity positioning mode or the high sensitivity positioning mode to the positioning control information, and the communication control unit of the position management server transmits positioning control information in which the positioning mode information is set to the terminal via a mobile communication network.

[0016]

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