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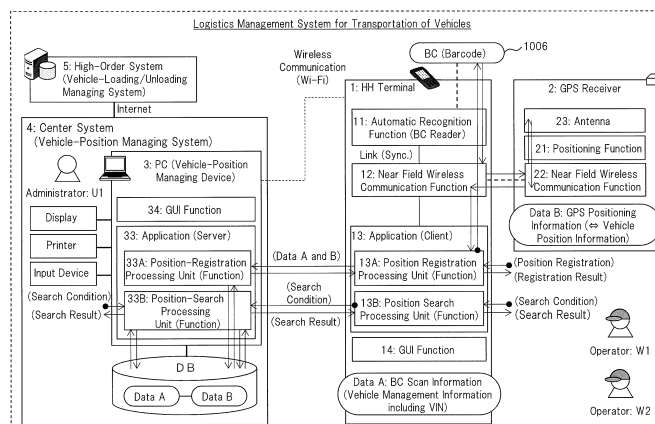
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(54) **VEHICLE LOGISTICS MANAGEMENT SYSTEM**

(57) It is possible to provide techniques for vehicle distributing tasks (vehicle distribution management), capable of improving the efficiency of operations such as registration and search of the places of storage of vehicles in a terminal, realizing a low-price system with sufficient management accuracy, and shortening the lead time. This system has: a PC 3 which is used by an administrator, a HH terminal 1 which is carried by an operator, and a GPS receiver 2. The HH terminal 1 has: a function of reading first data including the ID of the vehicle from a medium of the vehicle; a function of obtaining positioning information (second data) from the GPS receiver

er by the near field communication with the GPS receiver 2. When the HH terminal 1 is operated by the operator for position registration of the vehicle, the HH terminal 1 obtains the first and second data, transmits them to the PC 3, and causes the information corresponding to the ID and the position of the vehicle to be registered in the DB. The PC 3 manages, on the basis of a location (section), a region of land serving as a target in which the vehicle is stored in a distributing task of the vehicle, and manages the position at which the vehicle is stored in connection with the positioning information and an ID of the location.

FIG. 2



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Description**TECHNICAL FIELD**

[0001] The present invention relates to information processing techniques of a logistics management system and the like, and more particularly to a logistics operation management for vehicles (automotive vehicles), position management for vehicles and the like.

BACKGROUND ART

[0002] Conventionally, in a logistics operation for vehicles and an information processing system for management, loading of vehicles in a terminal at the time of loading, searching and unloading of vehicles from the terminal at the time of unloading, and their information managements are carried out.

[0003] In recent years, a global navigation satellite system (GNSS), specifically, global positioning systems using U.S. global positioning satellites are used for many purposes such as measurement, vehicle navigation, personal handheld terminals, and the like, therefore, it is possible to easily carry out position measurement (positioning) at low cost.

[0004] One example of techniques for logistics management is disclosed in Japanese Patent Laid-Open Publication No. 2001-348110 (Patent Document 1). In this Patent Document 1 ("Logistics Management Method using Handheld Terminal and System")(see Abstract), GPS receiver function and barcode input function are added to a handheld terminal, and on the basis of instruction from a center system or conditions preset in the handheld terminal, it is transmitted with GPS information or/and barcode information (specifically both of them) from the handheld terminal to the center system.

PRIOR ART DOCUMENTS**PATENT DOCUMENTS**

[0005] Patent Document 1: Japanese Patent Application Laid-Open Publication No. 2001-348110

DISCLOSURE OF THE INVENTION**PROBLEMS TO BE SOLVED BY THE INVENTION**

[0006] Conventionally, in a site of a vehicle distributing task (vehicle distribution management), IT systematization has not really progressed due to unique characteristics and various factors, and there is room for improvement. Part of tasks (for example, basic part such as loading/unloading schedule management) has been systematized, but in the management of storage positions of vehicles in a terminal and in the tasks thereof, there are unique problems and room for improvement particularly.

[0007] Characteristics and problems of conventional

general vehicle distributing tasks are as follows.

[0008] Each vehicle as cargo is large and complex in shape, and needed to be individually handled. Each vehicle is not protected, packaged, container-housed, and the like, and it is stored (kept) in outdoor land (terminal). It is necessary to carefully handle it (for example, so as not to scratch it), and high cargo-handling quality is required. In movement of each vehicle in a terminal, cargo-handling equipment (such as for example crane and transporter) cannot be used, and each vehicle is moved by driving by an operator (driver).

[0009] The vehicles cannot be, for example, stacked, but are planarly stored (parallel). Therefore, large land (terminal) is required. Space utilization efficiency in the land having a predetermined area is not good. When the number of the vehicles is increased, congestion occurs, and the places for new storage lack. When the storage places lack, there is a situation that vehicles are tentatively stored in the places where no vehicles are normally stored, and the congestion becomes worse. Depending on the site, vehicles during manufacturing (in-process) are temporarily stored in a terminal in some cases. Although it depends on the scale of the site, many vehicles and increase/decrease in the number thereof have to be supported.

[0010] In a large land (terminal), labor is taken in the storage and search operations of vehicles depending on its size. In large land, the places for storing the vehicles are easily mistaken. Furthermore, in large land, it is difficult to find a target vehicle. If the place of storage is mistaken, the vehicle cannot be easily found. If the position of storage is registered in a system, the vehicle can be looked up and found later. However, it takes labor of registration (for example, taking notes), and the registration is easily forgotten.

[0011] Slip, accompanying material or the like is smaller than a vehicle body, and its model differs depending on the manufacturer of the vehicle. Furthermore, many vehicles are similar in color and size. Because of this, the operator cannot distinguish whether or not it is a particular vehicle unless the operator goes to the vicinity of the vehicle. It is necessary to carry out an operation of checking/noting the ID of the vehicle, storage position and the like in the vicinity of the vehicle. Also, mix-up of vehicles caused by human errors easily occurs.

[0012] The place and manner (storage rules) of storage of vehicles are various depending on the site. For example, area separation in a terminal, the size of storage areas, storage directions, and the like. are various. A system which matches the characteristics thereof has to be built.

[0013] Depending on, for example, change in the needs of the owner of cargo or movement of the market, the time (lead time) required from unloading determination (instruction) until unloading completion tends to be shortened. The operations such as look-up of a vehicle have to be completed in a short period of time, and it has become difficult to taking a measure for that.

[0014] For example, at the time of loading, at the time of movement (shifting), or at the time of unloading of a vehicle in a terminal, it is necessary to understand the position of storage of the vehicle, for example, by registration or search. However, since those operations are mainly carried out manually, this is laborious for the operator, and there are many mistakes.

[0015] Furthermore, characteristics, problems, circumstances and the like in the sites of the conventional vehicle distributing tasks will be explained hereinafter.

[0016] In an automobile manufacturing factory, in a case of large production, 1000 vehicles or more (completed vehicles) are produced per one day. After completion of manufacturing process, these completed vehicles are, for example, temporarily stored in a terminal adjacent to the factory (loading to the terminal). Here, although the term "terminal" is differently called depending on the site, in this specification, the terminal refers to "space" such as outdoor land in which vehicles can be stored. Additionally, the terminal can be construed as, for example, a general distribution warehouse; however, the terminal does not have a roof since it is outdoor in this, and an environment that utilizes radio waves of GPS is assumed. In a case of a large terminal, it is as large as 1 square kilometer or more, and for example, several tens of thousands of vehicles can be stored in this terminal.

[0017] In response to, for example, determination (instruction) of unloading, the vehicles (completed vehicles) stored in the terminal are moved and loaded onto, for example, a ship or a trailer (unloading from the terminal). Many vehicles for domestic use are mounted on trailers and transported by land to sales companies. In a case of the vehicles for oversea export or domestic remote locations, the vehicles are moved to a dock to meet the arrival timing of a ship, then loaded onto the ship, and transported to a terminal of a transportation destination. Examples of transport ships include automobile carrier ships (PCC: Pure Car Carrier). In a case of a large PCC, about 6000 vehicles can be loaded at one time.

[0018] Furthermore, there are various cases, for example, a case in which vehicles are manufactured after determination of delivery destinations (transportation destinations, sales destinations, and the like), and a case in which a certain large number of vehicles are manufactured before determination of delivery destinations. In the sites of vehicle distributing tasks, it is necessary to store the vehicles in the terminal while supporting such various cases.

[0019] In each site, there is a wide range of variations in place and rules on storage of vehicles in a terminal. For example, in advance, vehicles are stored collectively in a predetermined area in the unit of, for example, a vehicle type or a delivery destination (areas are defined in the terminal). When a vehicle is stored, space is reserved in order to facilitate the operation, and when a vehicle is moved, an arrangement for shortened moving distances of vehicles in that neighborhood (front, rear,

left, and right) is employed. Furthermore, as an example of the storage rule, a predetermined plurality of vehicles are stored in each area having a predetermined size (area bounded by, for example, a parking reference line).

5 In an example for loading onto a ship, a plurality of vehicles is stored in a predetermined area in a front-space-filled parallel parking in one direction. In an example in which they are loaded onto trailers, a plurality of vehicles are stored in a predetermined area in opposing arrangement.

10 **[0020]** An operation (task) of registering the place (position) of each vehicle at the time of loading is, for example, described below. In advance, vehicle management information including basic information such as vehicle ID required for management is registered in a system, printed on a medium (slip, accompanying material, and the like), and pasted on the inside of, for example, a front window of the vehicle. For example, the vehicle which has been transported from a factory is moved by an operator (driver) and stored in a vacant space in a terminal. In this process, there are two cases, that is, a case in which a rough storage area is specified, and a case in which it is not specified. Furthermore, the information of the place (position) in which the vehicle is stored by the operator is not registered in a system, or after a note is taken at that place, it is registered in the system.

20 **[0021]** An operation (task) of look-up of a vehicle, supporting a case in which vehicles are transported by a ship at the time of unloading is, for example, described below. A list (operation instruction form) for the vehicles to be loaded onto the ship (vehicles to be looked up) is passed from an administrator to an operator. On the basis of the information described in the list (for example, vehicle IDs, storage places, and the like), the operator finds the target vehicles which are stored in the terminal, one by one. For example, this process is carried out by going to the vicinity of the vehicle and visually checking the information of a medium (for example, a slip or an accompanying material) pasted on the vehicle. Then, when the operator finds the target vehicle, the operator leaves a predetermined mark on the vehicle. Then, immediately before the arrival timing of the ship (timing of unloading), the operator (driver) moves the target vehicle to a predetermined place (for example, an area or a dock) on the basis of the above described mark.

45 **[0022]** The vehicles stored in the terminal are sometimes arbitrarily moved (shifted) in accordance with needs. For example, preparation is carried out in advance in expectation of, for example, an unloading schedule (unloading schedule date, delivery destination, and the like) according to, for example, pre-information (prior information) from the owner of cargo. More specifically, the places (positions) of storage of vehicles are changed so that the vehicles are efficiently arranged in the terminal. When unloading (loading to a ship) is determined, an operation such as loading onto the ship from the prepared place of storage can be carried out. In conventional examples, there has been pre-information, and

lead time has allowance; therefore, it has been possible to sufficiently take measures even by manual operations. **[0023]** However, recently, it has been becoming difficult to take measures in a conventional terminal operation system (vehicle distribution management) due to, for example, change in a distribution management system, needs and the like of the owner of cargo and the circumstances of a global market. The owner of cargo desires to short the lead time (for example, the time from unloading determination (instruction) until unloading completion). Due to increase in changed factors, accuracy of pre-information from the owner of cargo has been lowered. There is a tendency that the time which can be taken for the operations of moving (shifting) and unloading (look-up and the like) in the above described terminal is reduced. For example, a conventional example has two days of a preparation period according to pre-information and five days of allowance as lead time (from unloading determination until unloading completion). However, in a recent case, there is no pre-information, the date of unloading determination is late, and there is only one day of lead time. The operation such as look-up of vehicles has to be completed in a short period of time.

[0024] In some cases, suddenly, production is significantly increased due to, for example, large movement of a market or the influence of natural disasters. In this case, vehicle storage space in the terminal lacks. In the conventional state with allowance, it has been possible to orderly and collectively store the vehicles in each area. However, when the space lacks, it becomes more difficult to carry out operations (measures) in the terminal. For example, it is inevitable to sequentially store vehicles in a vacant place of one-vehicle unit or to tentatively store vehicles in space such as a road in which no vehicle is normally stored.

[0025] Under the above described circumstances, in some cases, it becomes too busy to, for example, take a note of the vehicle store position every time, and as a result, the positions of vehicles cannot be understood in the system. Look-up of a vehicle in a certain small range is easy; however, if vehicles are sporadically stored in large land, it is extremely laborious to find the vehicles from among many vehicles having similar shapes and colors. As long as the vehicles are found within a time limit (for example, departure time of a ship), it will be fine. However, if they are not found (and left behind), it is extremely large loss.

[0026] Additionally, examples of conventional techniques such as Patent Document 1 expects drivers who carry out distributing tasks, and the GPS information expects management of the positions of the drivers at the time of cargo handling. Therefore, when applied to a vehicle distributing task which is a target of the invention of the present application, there is room for improvement.

[0027] In view of the foregoing problem, it is a main object of the present invention to provide techniques for vehicle distributing tasks (vehicle distribution manage-

ment), capable of improving the efficiency (for example, simplify, shorten the time of) operations such as registration and look-up (search) of the places (positions) of storage of vehicles in a terminal at the time of, for example, loading/unloading, capable of realizing a low-price system with sufficient management accuracy (for example, GPS positioning accuracy) supporting the characteristics of sites, and capable of shortening lead time, particularly by improving an IT system for vehicle position management (introduction of individual management and location management).

MEANS FOR SOLVING THE PROBLEMS

[0028] In order to attain the above described object, a typical aspect of this invention is an information processing system (logistics management system and the like for transportation of vehicles) for vehicle distributing tasks (vehicle distribution management), and the system has a configuration described hereinafter. The system has a vehicle-position managing function, has a function of individual management of each vehicle and location management, and has a function of supporting operations such as registration and look-up (search) of the stored place (position) of the vehicle in the terminal (land) at the time of, for example, loading/unloading.

[0029] The logistics management system of this aspect comprises: a computer which is used by an administrator, a terminal which is carried by an operator, and a GPS receiver; wherein the computer has a server program which constitutes a vehicle-position managing function, the server program has: a first processing unit (position registration processing unit) which manages data information including an ID and a position of the vehicle by registering the data information in a DB; and a second processing unit (position search processing unit) which searches the data information including the ID and the position of the vehicle from the DB, the GPS receiver has a positioning function which carries out positioning by a GPS, the computer and the terminal carry out wireless communication with each other, the terminal and the GPS receiver carry out near field communication with each other.

[0030] The terminal has: a function of reading first data including the ID of the vehicle from a medium of the vehicle; a function of obtaining second data which is positioning information from the GPS receiver by the near field communication with the GPS receiver; and a client program which constitutes the vehicle-position managing function, the client program has: a third processing unit (position registration processing unit) which, when operated by the operator, obtains the first and second data, transmits the first and second data to the computer, and causes the information corresponding to the ID and the position of the vehicle to be registered in the DB, in order to register a storage position of the vehicle; and a fourth processing unit (position search processing unit) which, when operated by the operator, searches the information

including the ID and the position of the vehicle from the DB of the computer, in order to search the storage position of the vehicle.

[0031] The computer manages, on the basis of a location (section), a region of land serving as a target in which the vehicle is stored in a distributing task of the vehicle, and at the time of the position registration, manages the position at which the vehicle is stored in connection with the positioning information and an ID of the location.

[0032] In this system, at the time of the position registration, the terminal carries out: a process of evaluating an accuracy of the positioning information which is the second data obtained from the GPS receiver; a process of comparing an evaluation value of the accuracy with a threshold value, and determining whether to employ or reject the positioning information for the position registration; and if rejected, a process of discarding the second data, and obtaining the second data which is the positioning information again from the GPS receiver.

[0033] In this system, at the time of the position registration, the terminal carries out: a process of displaying a position of a current positioning result, on a map of the land, on a screen of the terminal on the basis of the first and second data obtained from the GPS receiver, a process of displaying a previous position-registration-finished positioning result around the position of the current positioning result, on the map of the land, on the screen of the terminal on the basis of the data obtained from the computer, and a process of manually moving and correcting the position of the positioning result of the present time in the screen by an operation by an operator and determine the position for the position registration.

EFFECTS OF THE INVENTION

[0034] According to a typical mode of the present invention, for vehicle distributing tasks (vehicle distribution management), it is possible to improve the efficiency (for example, simplify, shorten the time of) operations such as registration and look-up (search) of the places (positions) of storage of vehicles in a terminal at the time of, for example, loading/unloading, realize a low-price system with sufficient management accuracy (for example, GPS positioning accuracy) supporting the characteristics of sites, and shorten lead time, particularly by improving an IT system for vehicle position management (introduction of individual management and location management).

BRIEF DESCRIPTION OF THE DRAWINGS

[0035]

FIG. 1 is a diagram showing an operator side configuration of a logistics management system according to one embodiment of the present invention;
FIG. 2 is a diagram showing the whole configuration including an administrator side configuration of the

logistics management system according to one embodiment of the present invention;

FIG. 3 is an explanatory diagram showing height comparison between an operator and a vehicle in this embodiment;

FIG. 4 is a diagram showing a configuration example of data information in a database of the system in this embodiment;

FIG. 5 is a diagram showing a configuration example of a map (terminal) as an application example;

FIG. 6 is a diagram showing a configuration example of allocation of locations;

FIG. 7 is a diagram showing an example of association between parking areas and locations (sections);

FIG. 8 is a diagram showing an example of parking areas and storage roles;

FIG. 9 is a diagram showing an example of storage and operation on a map (terminal);

FIG. 10 is a chart showing a (first) operation flow at the time of loading using this embodiment;

FIG. 11 is a chart showing a (second) operation flow at the time of loading using this embodiment;

FIG. 12 is a chart showing an operation flow at the time of unloading using this embodiment;

FIG. 13 is a chart showing a processing flow of a position registration in the system of this embodiment;

FIG. 14 is a chart showing a processing flow of a position search in the system of this embodiment;

FIG. 15 is a diagram showing a first output example at the time of position search in the system of this embodiment;

FIG. 16 is a diagram showing a second output example at the time of position search in the system of this embodiment;

FIG. 17 is a diagram showing an output example at the time of position registration and correction in the system of this embodiment;

FIG. 18 is a chart showing a processing flow of a filtering function in the system of this embodiment; and

FIG. 19 is a chart showing a processing flow of a correction function in the system of this embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

[0036] Hereinafter, an embodiment of the present invention will be explained in detail with reference to the drawings. Additionally, parts the same in function as each other are basically denoted by the same reference symbols, and repetitive explanation thereof will be omitted.

[Outline and the like]

[0037] As a measure for characteristics, problems, and current status (change) of the above described vehicle distributing task (vehicle distribution management), the

present invention and embodiment provide a system configuration which will be described below. In this system (FIGS. 1, 2, and the like), individual management, location management, and the like of vehicles are introduced by using automatic recognition techniques (for example, barcodes or RFIDs), GPS techniques, and the like to improve the system about vehicle position management, thereby enhancing the efficiency of operations (for example, simplifying and shortening) such as registration and look-up (search) of storage places (positions) for each vehicle in a terminal at the time of loading/unloading. And particularly, as functions for managing storage places (positions) and detailed individual information for each vehicle in the terminal at the time of loading/unloading, a function of registering storage positions for vehicles to a system (DB) on the basis of GPS positioning (position registering function), and a function of searching information on registered storage positions (position searching function) are provided in this system. Therefore, man-hours, labor, mistakes and the like in an operation such as look-up are reduced to improve or support the task.

[0038] Particularly, in location management, by managing storage positions for vehicles in the terminal in a somewhat flexible manner, space utilization efficiency and facilitate are improved, thereby simplifying the look-up (search) and reducing the look-up (search) time. Furthermore, particularly administrators and operators in a center system can easily and sufficiently accurately register information on the storage position for each vehicle to the system (DB) from anywhere in the terminal, and easily search it later. Furthermore, particularly, registration, search and the like of each position can be easily carried out by terminals carried by the operators (easy-to-understand user interface is provided). By predetermined systematization (GUI and the like), it is possible to prevent the position registration for each vehicle from being forgotten or mistaken by the operators, and to prevent the vehicles from failing to be found at the time of look-up.

[0039] Furthermore, particularly, the system which is capable of adapting and flexibly supporting characteristics (such as storage rules) of each site is provided (it is possible to set suitable management granularity). Particularly, GPS positioning accuracy (its management granularity) is required to be requisite minimum depending on the characteristics of each site, and it is possible to build and operate a low-price system by using a low-price GPS (GPS receiver). Furthermore, depending on the positioning accuracy of the low-price GPS receiver, mechanisms (re-positioning function, correction function, and the like) for compensating positioning accuracy using low-price GPS are provided. Therefore, accuracy of position registration and search can be enhanced (sufficient management granularity can be realized), and the time taken for operations can be shortened. If the accuracy (granularity) is desired to be further improved, a system using GPS (GPS receiver) having high positioning accuracy can be also built.

[System Configuration (1)]

[0040] FIG. 1 shows a configuration of a system (logistics management system for transportation of vehicles) of this embodiment including a vehicle and an operator. As elements in FIG. 1, the system has: an operator W1; a handheld terminal (HH terminal) 1; a GPS receiver 2; a vehicle 10; a GPS satellite 1003; a cap (GPS-housing cap) 1004; a medium 1005 (for example, a slip or an accompanying material); a barcode (BC) 1006; a parking area (parking reference line) 1007; operation instruction information, an operation instruction form 1008, or the like. A reference character "A1" represents automatic recognition (BC scanning) between the HH terminal 1 and the BC 1006 of the medium 1005. A reference character "A2" represents near field wireless communication (for example, Bluetooth (registered trade name)) between the HH terminal 1 and the GPS receiver 2.

[0041] The vehicle 10 represents a vehicle (completed vehicle) stored in a terminal (in this case, in the parking area 1007 for one vehicle). The parking area 1007 is an area in a terminal, and shows an area (a reference line formed on the ground) partitioned for parking one vehicle.

[0042] The HH terminal 1 is a terminal device which is carried and operated by the operator W1, and has a function of supporting operations including registration and look-up (search) of the position of the stored vehicle. The HH terminal 1 may be a dedicated device for distributing tasks, or a general-purpose device such as mobile phone (smartphone) and tablet may be used as the HH terminal 1. The HH terminal 1 is provided with a display (screen display function), operation buttons, and the like. The HH terminal 1 has a function of scanning and reading the BC 1006 like A1 (automatic recognition function) and a function of performing near field wireless communication with the GPS receiver 2 like A2 (wireless communication function).

[0043] The GPS receiver 2 is housed in (or attached to) the cap (GPS-housing cap) 1004 of the operator W1. The GPS receiver 2 is a small unit, and provided with a function of receiving radio waves from the GPS satellite 1003 to carry out positioning (GPS positioning function) and a function of wireless communication with the HH terminal. The GPS receiver 2 has a predetermined GPS positioning accuracy, and an existing low-price unit can be utilized as this receiver. If the system needs the higher GPS positioning accuracy, an expensive unit may be correspondingly utilized. The cap 1004 has the GPS receiver 2 housed therein. Instead of the cap 1004, a headset device provided with a microphone, a speaker, and the like may be utilized. The headset device may be equipped with the functions of the GPS receiver 2.

[0044] The BC 1006 is, for example, printed on the medium 1005. The medium 1005 including the BC 1006 is pasted on, for example, the inside of a windowpane of the vehicle 10. Alternatively, the BC 1006 is printed on the accompanying material installed in the vehicle 10. The BC 1006 is encoded information for vehicle man-

agement including VIN (vehicle management number (vehicle ID)). The medium 1005 and the BC 1006 are issued for logistics management of vehicles. Information such as the VIN of the BC 1006 is managed in a system (DB). It is assumed that the medium 1005 including the BC 1006, which is the encoded vehicle management information such as VIN, is previously attached to the completed vehicle (10) in another step.

[0045] The operation instruction information or the operation instruction form 1008 shows operation instruction information displayed/stored by the HH terminal 1, or an operation instruction form (for example, operation sheet) output by printing on paper, and either one of them may be utilized. For example, instructions of an operation(s) to be carried out by the operator W1 (for example, information on a vehicle to be registered or a vehicle to be looked up) are described on the operation instruction information or the operation instruction form 1008. The operation instruction information or the operation instruction form 1008 is issued for vehicle distributing tasks.

[0046] Additionally, the operator W1 is shown in FIG. 1. However, a person such as administrator U1 of a center system (FIG. 2) can also carry out operations by utilizing the HH terminal and the like.

[System Configuration (2)]

[0047] FIG. 2 shows a configuration of the system including the administrator side as the system (logistics management system for transportation of vehicles) of this embodiment. The whole system (logistics management system for transportation of vehicles) has: a vehicle-loading/unloading managing system which is a high-order system 5; the center system 4 (vehicle-position managing system) which is a system for each site (for example, a terminal or an office); and the above HH terminal 1 and the GPS receiver 2 which are connected to the center system. Operators (W1 and W2) carry and operate the HH terminal 1 and the GPS receiver 2.

[0048] The high-order system 5 (vehicle-loading/unloading managing system) has software, DB, and the like which carry out processes of managing/supporting vehicle distributing tasks (management of loading/unloading and management of operations), and the system may be an existing system or a unique system. The high-order system 5 may be on a network (cloud), or may be in each site as a system integrated with the center system 4.

[0049] The center system 4 (vehicle-position managing system) has at least a vehicle-position managing function, and this system has a PC 3 (vehicle-position managing device). In this example, the center system 4 is composed of the PC 3 in an office and the like next to a terminal on the site, and this system is operated and used by the administrator U1.

[0050] The PC 3 has a vehicle-position managing function, and has an application 33 (server program) and a GUI function 34 using software program processes operated on a CPU, ROM, RAM, OS and the like (not

shown). The application 33 (server program) includes a vehicle-position registering function (position-registration processing unit 33A) and a vehicle-position searching function (position-search processing unit 33B). The application 33 is linked (communicates) with an application 13 in the HH terminal 1. The PC 3 is connected to or incorporates a DB and is connected to or incorporates an output device(s) such as a printer and/or a display and an input device(s) such as a mouse and/or a keyboard. The GUI function 34 carries out a process of displaying GUI information on a display screen.

[0051] The HH terminal 1 has a vehicle-position managing function, and has an automatic recognition function 11 (BC reader), a near field wireless communication function 12, an application 13 (client program), and a GUI function 14, each of which is constituted by software programs which are executed on CPU, ROM, RAM, OS, and the like (not shown). The application 13 (client program) includes a vehicle-position registering function (position-registration processing unit 13A) and a vehicle-position searching function (position-search processing unit 13B). The application 13 is linked (communicates) with the application 33 in the PC 3. The HH terminal 1 is provided with: an output device such as a display; and an input device such as key buttons. The HH terminal 1 may be provided with a touch panel as a display screen, or a main body thereof may be provided with dedicated buttons.

[0052] In this embodiment, the automatic recognition function 11 is a BC reader function which scans the BC 1006 of the medium 1005, and reads vehicle management information (data A) including the VIN (vehicle ID). As another example, in place of this function, an OCR (optical character reading) function or a RFID (wireless IC tag) reader function may be used. In this embodiment, the near field wireless communication function 12 uses a Bluetooth (registered trademark), but may use another method. Furthermore, this is a wired communication function if the HH terminal 1 and the GPS receiver 2 are connected to each other with wires. The GUI function 34 carries out a process of displaying GUI information on the display screen.

[0053] The HH terminal 1 can be connected to, and can communicate with the GPS receiver 2 (near field wireless communication function 22) by using the near field wireless communication function 12, and can obtain positioning information (data B) from the GPS receiver 2 when needed.

[0054] The GPS receiver 2 has a positioning function 21, the near field wireless communication function 22, and an antenna 23. The positioning function 21 carries out GPS positioning by receiving radio waves of the GPS satellite 1003 via the antenna 23, and outputs the GPS positioning information (data B).

[Performance of Main Functions]

[0055] Operations of the main functions (position reg-

istration, position search) are briefly described below. In an operation of registering a storage position of a vehicle, the operator W1 utilizes the application 13 (the position-registration processing unit 13A) of the HH terminal 1 to press a predetermined button and scan the BC 1006 of the medium 1005 of the vehicle 10, thereby obtaining the vehicle management information (data A) including the vehicle ID. This triggers the HH terminal 1 to obtain the positioning information (data B) of the place/time of that point from the GPS receiver 2 connected by the communication carried out by the near field wireless communication function 12 at the same time (in a linked manner). Through the above described series of working, the vehicle management information (data A) including the VIN and the GPS positioning information (data B) about the target vehicle 10 is obtained/saved in association with each other in a memory in the HH terminal 1. Then, the HH terminal 1 transfers the data A and B to the PC 3 of the center system 4. The application 33 (position-registration processing unit 33A) of the PC 3 registers (stores) the data A and B (the information including the ID and the position of the vehicle) in the DB and returns results. The operator W1 moves to the vehicle 10 which is a next target, and repeats similar operations (handling).

[0056] At the time of an operation in which the storage position of a vehicle is to be searched, the operator W1 utilizes the application 13 (the position-search processing unit 13B) of the HH terminal to input search conditions and carry out a search on the basis of the search conditions. The search conditions (request) are transmitted from the HH terminal 1 to the PC 3 of the center system 4. The application 33 (position-search processing unit 33B) of the PC 3 carries out search in the DB according to the search conditions and returns results. The HH terminal 1 displays the search result on the screen. Similarly, the administrator U1 utilizes the application 33 (position-search processing unit 33B) of the application 33 of the PC 3 to input search conditions and carry out a search on the basis of the search conditions. The application 33 (position-search processing unit 33B) of the PC 3 carries out search in the DB according to the search conditions and displays a search result on the screen.

[Height Comparison and GPS Positioning Accuracy]

[0057] FIG. 3 schematically shows height comparison of the vehicle 10, the operator W1, the GPS receiver 2, and the like. In this embodiment, regarding the height h_2 of the vehicle 10 and the GPS receiver 2 located at the level h_3 of the head (cap 1004) of the operator W1, the GPS receiver 2 is elevated above the height h_2 of the vehicle 10. By virtue of this, unnecessary reflection of the radio waves of the GPS by the vehicle 10 is avoided/reduced, and accuracy of the GPS positioning is enhanced.

[0058] The vehicle 10 is mostly a metal chunk, and if many vehicles are densely stored, the radio waves from the GPS satellite 1003 are reflected by the vehicles forming a multipath, thereby negatively affecting (lowers) the

GPS positioning accuracy. In order to reduce the influence of the reflection (multipath) as much as possible, it is preferable to install the antenna of the GPS at a position which is as high as possible. More specifically, it is preferable to attach the GPS receiver 2 so that the radio waves from the GPS satellite 1003 is received without being shielded and that the reflected waves (multipath) from the object (vehicle 10) are not received as much as possible.

[0059] Therefore, in this embodiment, the terminal is not provided with GPS function, the HH terminal and the GPS receiver 2 are mutually separated and linked, and the GPS receiver 2 is attached to the cap 1004 of the operator W1. The cap 1004 is a dedicated cap in which a bag housing the GPS receiver 2 is provided at the top (head top part) thereof. When the operator W1 is carrying out a predetermined operation by using the HH terminal 1, the GPS receiver 2 is at a level higher than the vehicle 10. By virtue of this, positioning can be carried out with the influence of the reflection from the vehicle 10 being reduced. Thus, sufficiently accurate positioning can be easily carried out even if the GPS receiver 2 is low in price.

[0060] As another example, the GPS receiver 2 may be attached to a part of a back collar or shoulder of the clothing worn by the operator W1 instead of the cap 1004. As a result, similar effects can be obtained. In this operation, the operator W1 who operates the completed vehicle (10) should not wear an object which has a potential to scratch the vehicle, as much as possible. Therefore, although the GPS receiver 2 is desired to be high as possible, it is not possible to, for example, carry a stick-like object on the back of the operator W1, and attach the GPS receiver 2 at the tip thereof.

[0061] The GPS positioning result has errors caused by various factors (for example, received radio wave intensity from the GPS satellite, GPS satellite position, the state of the ionized layer of the earth, and the like at the time of positioning). In a high-performance GPS (GPS receiver) for surveying, errors are small (for example: about several millimeters to several centimeters); however, it is extremely expensive, and this device is large and heavy in many cases. Furthermore, it takes a long time to carry out positioning of one point (for example: several minutes to several tens of minutes). Because of this, it is not suitable for the vehicle distributing task. On the other hand, in a GPS (GPS receiver) for consumer equipment such as car navigation, it is low in price, small, and light. However, its GPS positioning accuracy is affected by errors caused by the above described various factors, and reduced. The positioning error thereof is, for example, several meters to several tens meters.

[0062] In this embodiment, the system is designed in a balanced manner by using the low-price device which is used as the GPS receiver 2, and providing a mechanism compensating errors while taking its relatively low GPS positioning accuracy into consideration. In a task using this system, in order to register the storage position of a vehicle, for example, the position of each of the ve-

hicles closely-spaced and stored in a terminal is measured by the GPS. One vehicle is within the range of a size of, for example, about 2.5 m \square 5 m. In positioning of the stored vehicle using the present GPS receiver 2, when the positioning error thereof is about several m or less, the mistake that could occur in system registration is only mix-up between an adjacent vehicle and the target vehicle. Therefore, in a case in which the target vehicle is looked up (searched) later on the basis of the result of the positioning and registration, if the corresponding vehicle is not present at the specified place (position), the vehicle can be easily found only by checking the vehicles adjacent thereto (around). As described later, the present system has, for example, a function of correcting the position at the time of vehicle position registration. Therefore, a low-price receiver having a measurement error of about several m to several tens of m can be utilized as the GPS receiver 2 as described above.

[DB (data information)]

[0063] FIG. 4 shows a configuration example of the data information managed in the DB of the center system 4 in the system of FIG. 2. As an example, vehicle management information (D1), terminal management information (D2), operation management information (D3), and the like are managed in tables.

[0064] As management information items, the vehicle management information (D1) has: a vehicle ID (= VIN: Vehicle identification Number), model, vehicle type, vehicle body color, delivery destination (for example, transportation destination), loading date, unloading date, storage position (vehicle position information) (for example, yard, area, location (section), GPS positioning information), status, and the like. The vehicle ID is information which uniquely identifies the vehicle 10. The storage position is information which identifies the place (position) in which the vehicle 10 is stored in the terminal and consists of, for example, a yard ID, an area ID, a location (section) ID, and GPS positioning information (latitude/longitude, coordinate point). The status is the information such as vehicle accompanying information, domestic use or exporting (oversea) use, or an operation type.

[0065] The terminal management information (D2) includes map information (map) and location management information. The map information (map) includes management information (ID (number), position information, and the like) of each unit such as terminal, yard, area, or parking area described later (FIG. 5). The map information may be obtained by utilizing, for example, an existing map service (data). The location management information includes management information of a location (section). In the location management information, an ID, a position (the coordinate of a representative point), a size, and the like are managed in the unit of the location (section) described later (FIG. 6).

[0066] As management information items, the opera-

tion management information (D3) has: an operator (ID, name, and the like), operation instructions (for example, movement origin position, destination position), an operation state (for example, loading, movement (shift), unloading, and the like), an operator position, and the like. The positioning information (the positioning information at the time of vehicle position registration and periodic positioning information) by the GPS receiver 2 can be utilized as the operator position. For example, an operator who started an operation, a HH terminal which was used in that operation, and start time of that operation can be understood by pasting a barcode or the like representing an operator ID or the like on a nameplate (ID card or the like) of each operator (for example, W1) and reading the ID with the HH terminal 1 of the operator at the time of start of the operation. Also, separately from obtaining of the vehicle position information (positioning information) by a position registration operation, the HH terminal 1 of the operator may be configured to automatically/periodically (for example, every one minute) obtain the position of the operator (HH terminal 1) by positioning using the GPS receiver 2 and transmit/register the position to the system (DB). By virtue of this, the motion line of the operator can be understood, and this can be utilized for optimization of the task.

[0067] In this embodiment, the positioning information (data B) obtained by the GPS receiver 2 is transmitted in a NMEA format which includes accompanying information such as for example latitude/ longitude information, the number (M) of the GPS satellites used in the positioning at that time, and HDOP (N). The present system (DB) stores various set values (for example, threshold values m1 and m2 of the number (M) of the GPS satellites and a threshold value n of HDOP (N) described later).

[Linkage with High-Order System]

[0068] In FIG. 4, an example of linkage between the high-order system 5 and the center system 4 is as below. The high-order system 5 (vehicle-loading/unloading managing system) is designed to manage loading/unloading information for vehicles, and issue an operation instruction list of loading/unloading (with no location management) to the center system 4. The center system 4 (vehicle-position managing system) is designed to receive the loading/unloading operation instruction list (with no location management) from the high-order system 5. For example, the PC 3 is designed to convert it to information in a format supporting the location management of this embodiment. Additionally, the conversion may be carried out in the high-order system 5. Then, on the basis of the loading/unloading operation instruction list (with location management), the center system 4 (PC 3) is designed to issue an operation instruction from the administrator U1 to, for example, the operator W1.

[Terminal]

[0069] FIG. 5 shows a configuration example of the map (terminal). This terminal T0 (automobile (completed vehicle) terminal) is an outdoor land serving as a storage space for vehicles 10 (particularly, completed vehicles is kept until shipment after manufacturing) for vehicle distributing operation. Here, in another distributing operation, in place of the term "terminal", it is referred to as "warehouse", "distribution center" and the like. Cargo (load) is vehicles 10. Hereinafter, loading (arrival) and unloading (shipment) from the terminal T0 will be described. The vehicle (completed vehicle) 10 transported (moved) from a loading origin such as factory or another terminal is loaded (arrival, receiving) into the terminal T0 and stored (parked, kept). The vehicle 10 stored in the terminal T0 is carried out (picked and the like) for transportation to a delivery destination (transportation destination) and unloaded (shipped). For example, the vehicle is moved from the terminal T0 to a dock or the like for loading onto a ship. As transportation means, ship, trailer and the like is used. The vehicles are moved by drivers in the terminal T0. A first yard Y1 is a receiving/storing yard mainly used in loading. A second yard Y2 is a hoisting yard mainly used for unloading. Additionally, not only completed vehicles, but also in-process vehicles and the like may be stored.

[0070] The terminal T0 can be separated into particular areas. For example, examples of the areas include: areas for respective loading origins, areas for respective vehicle types, areas for respective delivery destinations, and areas for respective unloading dates.

[0071] As one of operations for loading, information on vehicle storage position and the like is registered in the system (DB). As one of operations for unloading, information on the vehicle storage position is searched from registered information of the system (DB) to look-up (find) the target vehicle to move the vehicle. Also in a case where the storage position is changed (shifted) in the terminal T0, the position is appropriately searched/registered. However, when the vehicle is stored in a particular area for unloading, position registration (position management) can be omitted. The configuration is not limited to that of the present example, and a plurality of terminals, yards, areas, and the like can be hierarchically provided.

[Location and Granularity]

[0072] FIG. 6 shows one configuration example of allocation of locations (grid). In this system (the center system 3 (PC 3) and the HH terminal 1), location management (or free location management) of the vehicles 10 in the terminal T0 (map) is carried out. Therefore, in this figure, the configuration example of the locations allocated to the map (terminal T0) is shown. This is a configuration of grids (matrix-like sections). One ID (location ID) is imparted to one location corresponding to a square

section. For example, one location is represented by "A-1". In this system, the storage position of the vehicle 10 is managed by the unit (ID) of the location (section) together with the GPS positioning information. Thus, the granularity of the vehicle position management corresponds to the granularity of the location management.

[0073] A suitable location configuration (granularity) is designed depending on the GPS positioning accuracy, terminal configuration, vehicle size, storage rules of each site, and the like. It is designed also in consideration of average storage space for vehicle (by taking into ease of operation into consideration), the size of each parking area (parking reference lines) formed on the road surface, and the like.

[0074] As a configuration of one location (section), in a first example, the size of each square location is 5 m \square 5 m. For the sake of ease, the ratio of one location to the number of vehicles is 1:1. In other words, one vehicle 10 is stored in one location. The average storage space for each vehicle is 5 m \square 5 m (larger in size than vehicle and enough for storage of vehicle). In a second example, the size of one location is 5 m \square 5 m, and the ratio of one location to the number of vehicles is 1:2 (two vehicles 10 are stored in one location). The average storage space for each vehicle is 2.5 m \square 5 m, which is the same in size as the vehicle. In a third example, the size of one location is 10 m \square 10 m, the ratio of one location to the number of vehicles is 1:8, and eight vehicles 10 are stored in one location.

[0075] In this embodiment, the GPS positioning accuracy (positioning error) by the GPS receiver 2 is, for example, several m to 10-odd meters (here, in order to facilitate understanding, particularly assumed to be 10 m in order to facilitate understanding). It is assumed that the average size of one vehicle is 2.5 \square 5 m. On the other hand, the granularity of location management is equivalent (several m to 10-odd m (particularly 10 m)) to the GPS positioning accuracy (positioning error) (above described third example). The granularity of location management suitably employs the unit of some grouped vehicles instead of the unit of each vehicle (above described first example) since the GPS positioning accuracy is, for example, several meters or more (particularly 10 m). Therefore, for example, the above described third example is employed. In this case, the granularity of the vehicle position management (location management) is 10 m corresponding to the size of the section.

[0076] The configuration is not limited to the above described configuration examples, and other location configurations (design) can be also employed. In a case in which the granularity of the vehicle position management (location management) is larger than that of the GPS positioning accuracy, errors in position registration are reduced. In an opposite case, space utilization efficiency can be improved. It can be designed with a necessary balance in consideration of prioritized effects. Furthermore, the present system may be configured to be provided with a function capable of variably setting (adjust-

ing) the granularity (location configuration) of the above described location management. In that case, the balance can be adjusted depending on the characteristics of sites.

[0077] As a result of introduction of this location management, the vehicle storage positions in the terminal T0 basically become free (arbitrary in vacant locations), operation time can be shortened, space utilization efficiency is improved, and increase/decrease in the number of stored vehicles can be easily adapted.

[0078] In this embodiment, the location management is carried out by using the simple grid structure, but may be carried out on the basis of the structure of the location (section) corresponding to the shape of the map (terminal). For example, locations are set to match parking areas which are discontinuously present on the road surface. In that case, the calculations for associating become complex, but the positions of registration of the vehicles become easily distinguishable.

[Parking Area - Location]

[0079] FIG. 7 shows an example of association between the parking areas (1007) and locations (sections) in the map (terminal T0). In case (a), one parking area (one vehicle) is managed in connection with one location (section) as a first example corresponding to FIG. 6. As a second example, two parking areas (two vehicles) are managed in connection with one location (section). In case (b), a plurality (for example, 8) parking areas (vehicles) are managed in connection with one location (section). The stored vehicles in one location (section) are managed (registered) by the same location ID.

[0080] When the first example is employed, each vehicle can be found as a pinpoint at the time of position search. Instead, each location (section) is relatively small, and the required GPS positioning accuracy is needed. On the other hand, when the third example is employed, since each location (section) is relatively large, and the required GPS positioning accuracy can be relatively suppressed low (low-price GPS receiver 2 can be utilized). In the third example, if a vehicle in one location (section) is to be looked up (position search), the target vehicle cannot be found as a pinpoint; however, when the operator goes to the section of the location ID, the vehicle is certainly present in the at most eight vehicles therein, and the target vehicle can be therefore easily found since there are about eight vehicles.

[Storage Rules]

[0081] FIG. 8 shows examples of parking areas and storage rules in the map (terminal T0). These are conventionally existing examples, but can be also supported by the present system.

[0082] In an example (a), there is a plurality of parking areas (parking reference lines) (802) sectioned by a road (801), and parking area numbers (803) and the like for

identification are applied on the road surface. In some cases, vehicles are temporarily stored also on the road (801).

[0083] In an example (b), vehicles are loaded on a ship, and in this case, vehicles are closely-spaced and stored in parallel parking in a single direction in parking areas (811).

[0084] In an example (c), vehicles are loaded on a trailer, and three vehicles and three vehicles are stored so as to face each other.

[0085] Other than that, for example, vehicles may be stored in an orderly manner under certain rules in each parking area. For example, vehicles may be stored so that their right tires are disposed on a line of a parking area. For example, in an area (for example (b)) in which a plurality of vehicles are parked, vehicles may be closely-spaced and parked in a parallel parking manner as much as possible.

20 [Storage/Operation Example]

[0086] FIG. 9 shows an example of storage, operation, and the like in the terminal T0. The vehicles (completed vehicles) 10 are loaded from, for example, an exit of an adjacent factory. For example, there are two vehicles having VIN= 1 and 2. The vehicle having VIN=1 is stored in a first area A1 (vacant arbitrary position) in the first yard Y1. The operator W1 carries out position registration, and a location ID corresponding to the storage position is, for example, A-1. Similarly, the vehicle having VIN=2 is stored in a second area A2 (vacant arbitrary position) in the first yard Y1. The operator W1 carries out position registration, and a location ID corresponding to the storage position is, for example, B-1. The areas A1 and A2 of the yard Y1 are, for example, areas for respective vehicle types.

[0087] In the yards Y1 and Y2, depending on operation policies, the vehicles may be stored at free positions, or may be stored in an orderly manner roughly in each area.

[0088] In the terminal T0, on the basis of unloading schedule information and the like, the storage positions of the vehicles can be arbitrarily moved (shifted) if there is allowance. In this example, in response to the fact that spare time is short (the time from determination until loading to a ship is shortened) on the basis of requests from owners of the goods, the vehicles are only moved from the first yard Y1 to the second yard Y2 at the timing of unloading determination. The second yard Y2 has, for example, areas B1 and B2 respectively for delivery destinations. The efficiency of the operations is improved when the vehicles are stored in the areas respectively which are for the delivery destinations.

[0089] For example, at the timing when unloading (loading to ship) is determined, the target stored vehicles in the first yard Y1 are moved (shifted, picked, hoisted) to the area, which are for respective delivery destinations, in the second yard Y2. The administrator U1 or the operator W1 searches the positions of the vehicles (VIN=1,

2) which are targets of unloading (movement). As a result of the search, the operator W1 finds the target vehicles and moves (drives, parks) the vehicles to the areas in the second yard Y2. For example, both of the vehicles having VIN=1, 2 are for the same delivery destination A. Therefore, the vehicles having VIN=1, 2 are moved to the area B1 corresponding to the delivery destination A. Then, in accordance with needs, the storage positions after the movement are similarly registered. If position management becomes unnecessary at this point, the position registration can be omitted. For example, if they are stored in the area for each delivery destination because of unloading determination, position registration is unnecessary since the positions thereof are clear (look-up is easy).

[0090] Furthermore, depending on the site, the operations in the terminal T0 are sometimes shared by a plurality of operators. For example, there are two operators including the first operator W1 who carries out position registration, and the second operator W2 who is in charge of moving vehicles by driving. As a basic example of the task, the administrator U1 of the center system 4 carries out overall operation management, and instructs the operators W1 to carry out operations.

[Operation Flow]

[0091] An example of an operation flow using the system of this embodiment will be explained with reference to FIGS. 10 to 12.

[Operation Flow for Loading (1)]

[0092] FIG. 10 shows an operation flow for loading. In this case, a vehicle 10 carried from a loading origin such as a factory is stored in the yard Y1 in the terminal T0.

(A) First, a reference character "A" shows a case in which, for example at the exit of the factory or the entrance of the terminal T0, the administrator U1 of the center system 4 passes devices (the HH terminal 1 and the GPS receiver 2) to each operator W1 (driver) for loading operations (position registration). On the other hand, a reference character "B" shows a case in which the above described devices (1 and 2) are not passed to him/her (next FIG. 11). The case "A" is as follows.

(A1) A reference character "A1" shows a case in which, for example, an area of a rough storage place in the yard Y1 is indicated as a loading operation instruction 1008 from the administrator U1 to the operator W1. A reference character "A2" shows a case in which, for example, the above described area of the rough storage location is not indicated (freely selected in this case).

(S1) In the case A1, in step S1, the operator W1 wears the devices 1 and 2, checks the operation instruction form/information 1008, and stores (moves

and parks by driving) a specified vehicle in a vacant part in the specified rough storage place (area) in the yard Y1.

(S2) In the case A2, in step S2, the operator W1 wears the devices 1 and 2, checks the operation instruction form/information 1008, selects a vacant place in the yard Y1, and stores (moves and parks by driving) a specified vehicle in the place.

(S3) The operator W1 carries out a position registration operation of by using the devices 1 and 2 at the place of the above described stored vehicle. Specifically, for example, an operation of pressing the predetermined button of the HH terminal 1 and scanning the BC 1006 is carried out. As a result, the HH terminal 1 obtains the vehicle management information (data A) including the ID of the above described vehicle and the GPS positioning information (data B).

(S4) Subsequently, the above described data A and B are transferred from the HH terminal 1 to the center system 4 (PC 3) by wireless connection and registered in the DB. Alternatively, the devices 1 and 2 of the operator W1 are collected later, for example, at the entrance of the terminal T0, and the data A and B in the HH terminal 1 is directly transferred to the PC 3 by wired connection and registered in the DB by the administrator U1. If there is a plurality of vehicles serving as targets, the operator W1 moves to a next target vehicle and repeats an operation (handling) similar to the above described operation.

[Operation Flow for Loading (2)]

[0093] FIG. 11 shows a flow of the case B in the above described operation flow for loading. In the case B, the vehicle is firstly stored by the first operator W1 who does not have the devices 1 and 2, position registration is then carried out by the second operator W2 by using the devices 1 and 2. Reference characters "B1" and "B2" represent the presence/absence of the instruction on the rough storage place as well as the above case.

(S1) In the case B1, in step S1, the operator W1 checks the operation instruction form/information 1008 and stores the specified vehicle in a vacant part in the specified storage place (area) in the yard Y1.

(S2) In the case B2, in step S2, the operator W1 checks the operation instruction form/information 1008, selects a vacant part in the yard Y1, and stores the specified vehicle in the selected part.

(S3) In step S3, at the place of the stored vehicle, the operator W1 marks this stored vehicle with a predetermined mark showing a state in which position registration (positioning) is not finished (and in which position registration should be carried out later). For example, an object such as a card is sandwiched by a wiper, a wiper is raised, or a sun visor in the vehicle is pulled down.

(S4) Then, at the appropriate time, the operator W2 brings the received devices 1 and 2 with him/her, moves/checks around in the terminal T0 (in the yard Y1), and finds the stored vehicle by relying on the mark (showing a state in which the position registration is not finished) formed in S3. The operator W2 carries out an position registration operation the same as the above by using the devices 1 and 2 for the found stored vehicle, and obtains the vehicle ID (data A) and GPS positioning information (data B). Then, the data A and B is transferred from the HH terminal 1 to the center system 4 (PC 3), and registered in the DB.

[Operation Flow for Unloading (1)]

[0094] FIG. 12 shows an operation flow for unloading. In this case, before unloading (loading onto a ship) a target vehicle, the vehicle is once moved (shifted) from the first yard Y1 (area of a storage place at the time of loading) into the second yard Y2 (area for, for example, each delivery destination) and stored. When there is not enough time, direct unloading from the yard Y1 can be also carried out.

(S1) In step S1, the administrator U1 of the center system 4 receives information (unloading instruction information) such as unloading determination (unloading date) about the stored vehicle in the terminal T0 from the high-order system 5. When there is enough time before the unloading day (shipping and departure time), the vehicle is moved (shifted) in advance.

(S2) In step S2, before the unloading day (shipping and departure time), the administrator U1 outputs (issues) an operation sheet for an unloading operation together with the information S1 and stored vehicle information (vehicle ID, storage position, and the like) stored in the system (DB). This operation sheet includes the information of a storage place of a movement origin of the target vehicle (in the yard Y1) and a storage place of a delivery destination (in the yard Y2).

[0095] In step S2, the administrator U1 can search the information such as the storage position of the target vehicle by carrying out a process using the position searching function 33B of the application 33 of the PC 3. The detailed storage position of the vehicle can be found out by inputting a vehicle ID and the like as search conditions and executing a search. The information obtained in the search may be added to the operation sheet.

(C1) Next, a reference character "C1" shows a case in which the vehicle is moved (shifted) to and stored in advance in the area which is for each delivery destination of the vehicle in the second yard Y2, and vehicle position management is subsequently car-

ried out in the yard Y2 (a case in which position registration is carried out at the time of storage in the yard Y2). Furthermore, a reference character "C2" shows a case in which vehicle position management is not carried out for the stored vehicle in the second yard Y2.

(S3) In the case C1, in step S3, the administrator U1 passes the devices 1 and 2 and the operation sheet of S2 to the operator W1. As well as the case of loading, the operation sheet may be paper or information transferred to and displayed by the HH terminal 1.

(S4) In step S4, the operator W1 checks the contents of the operation sheet and finds the vehicle at the specified storage location (movement origin) in the yard Y1. In this process, the operator W1 can look-up the vehicle while searching the detailed storage position of the target vehicle and checking it on the screen not only by the information of the operation sheet but also by a process using the position searching function 13B of the application 13 of the HH terminal 1.

(S5) In step S5, in accordance with the instruction of the operation sheet, the operator W1 drives and moves the target vehicle and stores the vehicle in the specified storage place (for example, area for each delivery destination) in the yard Y2.

(S6) In step S6, the operator W1 carries out a position registration operation about the stored vehicle by using the devices 1 and 2, obtains "the ID or the like (data A) of the storage vehicle" and "GPS positioning information (data B)", transfers the data to the center system 4 (PC 3), and registers that to the DB.

(S7) In step S7, for reliably management of an unloading event about the stored vehicle, immediately before unloading (shipping) on the unloading day, the operator W1 obtains the vehicle ID and the like from the BC 1006 of the vehicle by using the devices 1 and 2 and records a unloading completion event of the vehicle with respect to the DB of the center system 4. Then, in the system, since position management of the vehicle is not needed as a result of unloading completion, a process of deleting the position management information is carried out.

[Operation Flow for Unloading (2)]

[0096] In the above case, the flow of C2 is as follows. In C2, since position management is not needed after storage in the yard Y2, position registration using the devices (1 and 2) is not carried out. As an example corresponding to C2, areas are clearly separated, for example, for delivery destinations or for shipment date in the yard Y2. Although position registration is not carried out, the HH terminal 1 may be used, for example, for position search or display of operation instructions.

(S3) The administrator U1 passes the operation

sheet of above step S2 to the operator W1.

(S4) The operator W1 checks the contents of the operation sheet, and finds the vehicle at the specified storage place (movement origin) in the yard Y1. In this process, as well as the above case, the position searching function may be utilized by using the HH terminal 1.

(S5) In accordance with the instruction of the operation sheet, the operator W1 drives and moves the target vehicle, and stores the vehicle in the specified area in the yard Y2.

(S6) The operator W1 does not carry out an operation of position registration about the stored vehicle. Furthermore, when an unloading event about the stored vehicle is to be reliably managed, a process similar to that of above step S7 is carried out.

[Position Registering Process]

[0097] A basic processing flow of the position registering function in the system of this embodiment will be explained with reference to FIGS. 2 and 13. The explanation will be given for the case in which the HH terminal 1 (application 13) is operated by the operator W1. However, the PC 3 (application 33) may be operated by the administrator U1, and it can be similarly carried out.

(S101) At the time of position registration, at the place of the target vehicle 10, the operator W1 uses the position registering function (13A) of the application 13 of the HH terminal 1. The operator W1 presses a predetermined button (for position registration) of the HH terminal 1, and scans the BC 1006 of the medium 1005. The position-registration processing unit 13A reads the vehicle management information (data A) including the vehicle ID from the BC 1006 by the automatic recognition function (BC reader) 11.

(S102) Then, above described S101 triggers the automatic recognition function 11 of the HH terminal 1 to link with the near field wireless communication unit 12 to link with the near field wireless communication unit 22 of the GPS receiver 2 by near field wireless communication. The GPS receiver 2 obtains the GPS positioning data information (data B) (NMEA format) of the place and time at that point by the positioning function 21 and the antenna 23. The data B corresponds to position information of the vehicle 10. Then, the data B is transferred from the GPS receiver 2 to the HH terminal 1 by near field wireless communication.

[0098] Additionally, after S102, a process of a later-described filtering (re-positioning) function (FIG. 18) and/or a process of the correction function (FIG. 19) may be inserted.

[0099] Regarding the map information displayed on the screen by the GUI function 14 of the HH terminal 1

at the time of the position registering process, directions may be set, or the direction in which the operator is going may be selected and set to match that on the screen.

5 (S 103) The application 13 (position-registration processing unit 13A) of the HH terminal 1 obtains the above described data A and B and once saves the data in the memory so that the data A and B are associated with each other.

10 (S104) Then, the above described data A and B are transferred from the application 13 of the HH terminal 1 to the application 33 of the PC 3 of the center system 4. In this process, as a first method, the application 13 (position-registration processing unit 13A) of the HH terminal 1 transfers the data A and B to the application 33 of the PC 3 of the center system 4 by wireless communication (for example, Wi-Fi). This timing can be continuous (prompt) from the button operation (1 trigger operation) of S101. Alternatively, it may be transferred after the intermediation of a predetermined button operation.

20 Furthermore, as a second method, after the operation at the place of the stored vehicle, the HH terminal 1 may be brought (and collected) to the place of the center system 4 (PC 3). The HH terminal 1 is connected to the PC 3 by a wire(s) (for example, cradle), and the data A and B are transferred to it.

25 (S105) The application 33 of the PC 3 carries out a process to register (save) the data A and B from the HH terminal 1 in the DB in a predetermined format, and returns a registration result to the HH terminal 1 as a response.

30 **[0100]** Furthermore, as the information of the position registration to the DB, latitude/longitude information (coordinate point on a map) or the like according to the GPS positioning information (data B) may be registered without being changed, information in the unit of a location or the like calculated from the latitude/longitude information may be registered, or both of them may be registered in association with each other.

[Position Searching Process]

35 **[0101]** A basic processing flow of the position searching function in the system of this embodiment will be explained with reference to FIGS. 2 and 14. The explanation is given for the case in which the HH terminal 1 (application 13) is operated by the operator W1. However, even when the PC 3 (application 33) is operated by the administrator U1, it can be similarly carried out.

40 (S201) at the time of position search, the operator W1 uses the position searching function (13B) of the application 13 of the HH terminal 1. The operator W1 executes position search by inputting search conditions (for example, VIN) on the screen and pressing a predetermined button.

(S202) The application 13 of the HH terminal 1 causes the position-search processing unit 13B to transmit a search request including the search conditions of S201 to the application 33 of the PC 3 of the center system 4 by wireless communication. In accordance with needs, the GPS positioning information at that point (more specifically, the information indicating the position of the operator W1) may be obtained and transmitted together.

(S203) The application 33 of the center system 4 (PC 3) causes the position-search processing unit 33B to search the DB by the search conditions of S202 from the HH terminal 1, retrieves storage position information or the like of the target vehicle, organizes the data of the search result, and makes a response to the HH terminal 1. In accordance with needs, data of the map and the like may be transmitted together.

(S204) The application 13 of the HH terminal 1 displays the search result received from the center system 4 on the screen. More specifically, information such as the storage position of the target vehicle (corresponding yard, area, location, parking area, and the like) is displayed on the map. The position of the operator W1 may be also included in the display. By virtue of that, the operator W1 can easily find out the relative positions of the target vehicle and him/her, and operation efficiency is improved.

[Output Example 1 (at the time of Position Search)]

[0102] FIG. 15 shows an output example 1 at the time of position search. In this case, information at the time of position search is displayed together with operation instructions on the display screen of the PC 3 by the administrator U1. Information similar to this may be displayed on the screen of the HH terminal 1, or may be printed on paper (operation sheet) by a printer. Similar output can be carried out also at the time of position registration.

[0103] For example, the administrator U1 creates and displays an operation sheet on the basis of a list of the above described loading/ unloading operation instructions by the PC 3. As items, an example of FIG. 15 has VIN (vehicle ID), storage place (position), attribute, state, delivery destination, and the like. The storage place (position) has ID of yard, area, location and the like indicating the storage place of vehicle. The attribute is, for example, delivery destination. The state is, for example, operation type (operation state) (for example, loading/shifting/unloading). The "delivery destination" represents the place (yards area and the like) of vehicle in the operation instruction.

[0104] For example, the row of 1501 shows that: the current storage place of a vehicle having a certain VIN is "yard Y1, area A2, location E-5"; the delivery destination is "A"; the operation type is "unloading operation"; and the destination is "yard Y2, area B1" (corresponding

to the example of FIG. 9).

[0105] For example, at the time of position search, the administrator U1 selects, for example, a target VIN in the screen (example: 1501) and presses a search button (or executes a search command). As a result, the above described process of the position search is executed, and the search result is displayed on the screen. Alternatively, a search condition such as VIN may be input in a search condition field, and the search button may be pressed.

[Output Example 2 (For Position Search)]

[0106] FIG. 16 shows an output example 2 at the time of position search. This is an example in which the information of the storage position of the search result on the map is displayed on the display screen of the PC 3 at the time of position search. Information similar to this may be displayed on the screen of the HH terminal 1 or may be printed on paper (operation sheet) by a printer. Similar output can be carried out also at the time of position registration.

[0107] As shown in 1600, the above described location (grid) (FIG. 6) is overlapped and displayed on a map. In the map, when it has data (image) of yard, area, parking area, and the like, they are displayed in combination. 1601 is an example of a vehicle storage position (location) of a search result. It shows in which location the target vehicle is stored (registered). For example, the frame, coordinate point, or the like of the location is displayed in an intensified manner by, for example, red. 1602 shows a case in which relevant information (for example, VIN, storage position, and destination) is displayed by, for example, a pop-up.

[0108] The administrator U1 may transfer the information of the search result to the HH terminal 1 of the operator W1, or may print the information on paper (1008) and pass it to the operator W1. The operator W1 may look-up the target vehicle while seeing the information (operation instruction information 1008) of the search result by the screen of the application 13 of the HH terminal 1, or may look it up while seeing the paper (1008). By virtue of this, the vehicle can be easily found in a short period of time.

[0109] As described above, this system has a function of guiding by displaying various information on the screen (GUI). Even if such a function is not provided, minimally, only a function of outputting the values of the area and location corresponding to the position of the target vehicle may be provided. As long as the operator W1 understands the outline of the configuration of the areas and locations in the terminal T0 by a paper map or the like, it can be looked up sufficiently in a short period of time.

[0110] Although another calculation processes are needed, a route from the current position of the operator (according to GPS) to the position of the target vehicle may be displayed on the screen. Also, a route from the current storage position to the storage position of the

destination may be displayed on the screen.

[Output Example 3 (For position registration at the time of correction)]

[0111] FIG. 17 shows screen examples of a case in which a GPS positioning result is displayed on the screen so that the operator W1 can carry out correction at the time of position registration by the position registering function (including the later-described filtering function and correction function) by using the HH terminal 1. The example (a) shows the screen before the correction, and the example (b) shows the screen after the correction. At the time of operating position registration of the stored vehicle by the above described operator W1 using the HH terminal 1, if the button is pressed to scan the BC 1006, the screen of the shows the information of a positioning result (correction) as shown in FIG. 17.

(1) In the present screen (a), a point (a1) indicating a position according to the GPS positioning result (data B) of the present time is displayed (for example, displayed in an intensified manner by red) on a map (1701). As the map (1701), in accordance with needs, information such as yards, areas, parking areas, and grids (locations) is displayed in an overlapped manner. In the present example, as shown in 1702, parking areas (parking reference lines) of an area A1 are displayed, but may be added/omitted in accordance with setting. In the map, around the positioning point (a1) of the present time, points (a2) representing the positions of previously positioning-finished (position registration finished) stored vehicles are displayed (for example, display by blue). The information of these points (a2) is obtained from the center system 4 (DB). In the present example, the positions of a2 are displayed in the form of coordinate points according to the previous GPS positioning results (latitude/longitude information); however, the display is not limited thereto, and they may be orderly displayed in the form of units such as locations (sections) or parking areas associated with the positions (points) thereof.

(2) The operator W1 sees the present screen (a) and the actual state (view) in that neighborhood and determines whether the positioning point (a1) of the present time is appropriate as a registration position or not. In the present example, the positioning point (a1) of the present time is away from a2 (corresponding to, for example, rows of other stored vehicles in that neighborhood) and the parking areas (1702) (displacement is large). Therefore, it can be determined that it is inappropriate as a registration position (GPS positioning error is large).

(3) If the operator W1 determines it is appropriate in the above description, the positioning point (a1) of the present time can be registered without change, for example, by pressing a determination button. The

application 13 of the HH terminal 1 saves registered data and transfers the data to the center system 4 (PC 3) side to register it in the above described manner. If the operator W1 determines that it is inappropriate in the above description, the registration position can be, for example, corrected. First, a case of manual correction is described below.

[0112] In the case of manual correction, as shown in the screen of (b), the operator W1 manually moves the positioning point (a1) of the present time in the screen to a position estimated to be actually correct according to the information in the screen and the actual state. The positioning point a3 is the nearest from the point (position) of a1 and is the position estimated to be actually correct according to the previous positioning results (a2) in that neighborhood and the state, and the frame of a4 is a parking area corresponding to a3. The operator W1 manually moves the point of a1 to the position of a3 (a4) as shown by an arrow of a5. This movement may be, for example, top/bottom/left/right operations of a key button or the like or may be a touching operation (dragging) on a touch-panel screen depending on the specifications of the HH terminal 1. Then, the operator W1 can carry out position registration by pressing the determination button at the position (a3, a4) after the movement (correction).

[0113] Also, the correction is not limited to the above described manual correction, but an automatic correction function may be provided. The present application 13 compares the point (a1) of the positioning result of the present time and the points (a2) of the previous positioning results in that neighborhood with each other, calculates the position estimated to be actually correct like a3 (a4), and displays that as an option of position registration. The operator W1 sees the option like a3 (a4); and, if the operator determines it is appropriate, position registration can be carried out by selecting it or by the determination button. Alternatively, an automatic correction button may be prepared so that, when the operator W1 presses the automatic correction button, automatic correction to the option position is carried out in the above described manner.

[0114] Also, when the operator W1 determines that it is inappropriate in the above, for example, positioning (obtainment of the data B) may be carried out again by pressing a re-positioning button so that the result thereof is displayed.

[Filtering Function (Re-Positioning Function)]

[0115] Furthermore, the application 13 of the HH terminal 1 (the corresponding application 33 of the PC 3) has the filtering function (re-positioning function). The flow of FIG. 18 is added to the flow of FIG. 13. This function also corresponds to the re-positioning function of the screen of FIG. 17. This filtering function is a function that evaluates/determines the positioning result (data B) obtained with relatively-low GPS positioning accuracy, car-

ries out filtering (discarding, rejection) if inappropriate in order to take a measure against a positioning error, and carries out re-positioning. By virtue of this, a low-price receiver can be easily employed as the GPS receiver 2. **[0116]** FIG. 18 shows a processing flow of the filtering function (re-positioning function). It has predetermined characteristic determination step (S303) and the like.

(S301) At the time of position registration, regarding the positioning information (data B) (NMEA format) transferred and obtained from the GPS receiver 2 in the above described manner (for example, FIG. 13, S102), the HH terminal 1 (application 13) carries out the following process before the information is transferred to the center system 4.

(S302) The HH terminal 1 evaluates the accuracy (reliability) of the positioning information by a predetermined method, and then calculates the value of the accuracy.

(S303) The HH terminal 1 compares the above described accuracy value with a predetermined threshold value.

(S304) When the above described accuracy is equal to or larger than the threshold value, the HH terminal 1 employs (saves) the positioning result. For example, the fact that it is employed (OK) is displayed on the screen.

(S305) When the above described accuracy is smaller than the threshold value, the HH terminal 1 rejects this positioning result. In this case, this positioning result (data B) is discarded, and an error (message) representing rejection is displayed on the screen so as to urge the user (operator W1) to carry out re-positioning. As a result, the operator W1 executes an operation for position registration again in a manner similar to that described above. Alternatively, the HH terminal 1 may forcibly execute re-positioning without the intermediation of check/operation of the user. As a result, a result that satisfies the determination (S303) is obtained and used for position registration. When an appropriate result cannot be obtained even when it is tried several times, for example, error termination is carried out.

[0117] Specific examples about the above described evaluation/ determination are described below. "The number of GPS satellites" (M) and "HDOP" (N) in the NMEA format of the GPS positioning information (data B) are used. The "number of GPS satellites" is the number of the GPS satellites utilized at the time of positioning, and has a high correlation with positioning accuracy. The "HDOP" is one of positioning accuracy indexes, and is DOP (Dilution of Precision) in the horizontal direction, wherein, the more densely satellites are distributed up in the sky, the more smaller the HDOP value becomes.

[0118] In the evaluation of S302, the number of GPS satellites (M) and the HDOP (N) are used as evaluation values. Another evaluation value may be calculated from

the values (M, N) (for example, the evaluation value = $a \square M + b \square N$). In the determination of S303, the above described evaluation values (M, N) are compared with threshold values. The threshold values of the number of the GPS satellites (M) are "m1" and "m2" ($m1 > m2$), and the threshold value of HDOP (N) is "n". The threshold values can be variably set in this system.

[0119] For example, as a first determination method, when the number of the GPS satellites (M) is equal to or larger than "m1", and (AND) HDOP (N) is smaller than "n", the result is employed (OK) like S304. When the conditions are not satisfied, the result is rejected (NG). For example, $m1=6$, $n=2$.

[0120] For example, as a second determination method, the number of the GPS satellites (M) is equal to or less than "m2", the result is rejected (NG) like S305. When the condition is satisfied, the result is employed (OK). For example, $m2=5$. Also, $m2 < m1$. In the second determination method, when the positioning accuracy is not too low or not is determined.

[0121] Furthermore, both of the above described first and second determination methods may be used in combination. Only the number of the GPS satellites (M) may be used to carry out determination, or only HDOP (N) may be used to carry out determination. Other element values in the format of the GPS positioning information may be used in combination.

[0122] Furthermore, the above described evaluation values of the accuracy (the number of the GPS satellites (N), HDOP (N)) or information thereof expressed in a different way (for example, a message showing the magnitude of the accuracy) may be displayed in the screen of the HH terminal 1. For example, the information may be always displayed. At the time of an operation of position registration, the operator W1 sees the evaluation values (M, N) displayed on the screen, determines whether or not the positioning accuracy (positioning error) is appropriate according to the magnitude, and determines to employ or reject the result. If employed, for example, the determination button is pressed. If rejected, for example, the re-positioning button is pressed to do it again.

[0123] Furthermore, in the case where re-positioning (obtainment of the data B) is executed on the basis of a result of the above described determination as well as S305, since this system basically has a mechanism in which obtainment of the data A and B is linked by one trigger operation as described above (see FIG. 2), both of them (data A and B) may be obtained again, or only one of them, the needed data B is may be obtained again. When only the data B is obtained, the data may be obtained by linkage from the application 13 to the near field wireless communication function 12 and the GPS receiver 2 (22 and 21).

[Correction Function]

[0124] Furthermore, in this system, the application 13 of the HH terminal 1 (the corresponding application 33

of the PC 3) has a correction function. The flow of FIG. 19 is added to the flows of FIGS. 13 and 18. Additionally, this function corresponds to the function of manual correction or automatic correction of the screen of FIG. 17. **[0125]** FIG. 19 shows a flow chart of the correction function. This flow has a predetermined characteristic correction step (S405) and like.

(S401) At the time of position registration, regarding the positioning information (data B) (NMEA format) transferred and obtained from the GPS receiver 2 as described above (for example, FIG. 13, S102), the HH terminal 1 (application 13) carries out the following process before the information is transferred to the center system 4 or when the positioning accuracy is low in the determination of FIG. 18.

(S402) The HH terminal 1 displays the position (point) of the positioning result (data B) of the present time on the map in a correction screen (see FIG. 17, a1). In this process, in accordance with needs, data such as the map is obtained from the DB of the center system 4 (PC 3) and used in display. Furthermore, in this process, for example, the index values (M, N) of accuracy may be displayed in combination.

(S403) Furthermore, together with the positioning point of S402, the HH terminal 1 obtains position-registration-finished data from the DB of the center system 4 (PC 3) and displays the information of the previous positioning points in that neighborhood on the map in the correction screen (see FIG. 17, a2). Furthermore, in this process, positions a3 and a4 serving as options may be automatically calculated and displayed in the above described manner.

(S404) As described above, the operator W1 sees the correction screen, and determines whether or not the latest positioning point of the present time is appropriate as the storage position of the target vehicle while using, for example, the previous positioning points and its neighborhood as a reference.

(S405) When it is inappropriate, the position is, for example, moved/corrected manually (button or touching operation) in the above described manner. The application 13 obtains the corrected data B.

(S406) When it is appropriate (or after correction), it is employed (determined). The application 13 obtains the determined data B.

[0126] Additionally, on whether or not to transit to the above described correction screen (for example, correction function), the decision is made on the basis of the setting of this system. For example, the transition may be certainly made once automatically before the data A and B is transmitted to the center system 4, or the transition may be made under predetermined conditions or by a predetermined user operation. In the former case, when the operator W1 does not want to carry out correction, the operator can proceed to a next operation without doing anything except for checking (for example, the de-

termination button). In the latter case, for example, as the predetermined condition, the transition is made only when the positioning error is large according to the evaluation value such as the above described number of the GPS satellites (M).

[0127] Additionally, even if the position displaced from the actual one is erroneously registered by the position registering function (correction function) on the basis of a GPS positioning error or one's judgment error, since the position is only displaced to somewhere around the actual position as described above, the correction of this error can be carried out with ease. For example, at the time of position search (look-up), the target vehicle is not present in the position (location) of the search result, but is found in a displaced position (location). In this case, since an error in the position registration is found out, the correction of this error is carried out by carrying out position registration again for this vehicle.

[Effects and the like]

[0128] As explained above, the following effects are attained according to this embodiment. In this system, by virtue of improvement of the system by introducing, for example, individual management and location management about the vehicle position management, the efficiency of the operations such as registration and look-up (search) of the places (positions) of the vehicles in the terminal at the time of loading/unloading can be improved (for example, simplified, the time taken therefor can be shortened). Furthermore, the system can be realized at low cost with sufficient management accuracy (for example, GPS positioning accuracy) supporting the characteristics of sites. Furthermore, reduction in the lead time from unloading determination to unloading completion can be realized. Particularly, by virtue of the free location management, the stored positions of the vehicles in the terminal are liberalized to some extent so that space utilization efficiency can be improved, look-up (search) can be facilitated, and the time taken therefor can be shortened.

[0129] This embodiment has a configuration in which the HH terminal 1 and the GPS receiver 2 are separated from and linked with each other, and the positioning accuracy can be improved by placing the low-price GPS receiver 2 at a position higher than the vehicle 10 to reduce the influence of reflection.

[0130] In connection with the position registration by the operator W1, a series of processes including obtaining and registration of the vehicle ID and positioning information can be carried out by one operation (for example, one button), wherein the operation of scanning the BC 1006 serves as a trigger. Therefore, the operation is easy and also effective for preventing registration from being forgotten. Furthermore, in connection with position search, positions are graphically displayed on the screen, and it is easy to carry out look-up.

[0131] By utilizing the low-price/small/light-weight

GPS receiver 2, a low-cost system can be built. Furthermore, the mechanisms (for example, filtering function, correction function) which compensate for the relatively-low GPS positioning accuracy of the low-price GPS receiver are provided. By virtue of this, the accuracy of position registration and search is improved (sufficient management granularity is realized), and the time taken for operations can be shortened. If the accuracy (granularity) is desired to be further improved, a system using a GPS receiver having high positioning accuracy can be also built.

[0132] In the filtering function and the correction function, when the positioning information obtained by the GPS receiver 2 is to be used in position registration, inappropriate results caused by positioning errors can be eliminated/corrected by utilizing determination by a person (operator W1), and more appropriate positioning information can be utilized as a result of re-positioning/correction. The accuracy of position registration can be enhanced by effectively utilizing determination by a person about, for example, the actual state in that neighborhood. The information of the positioning accuracy (evaluation value) such as the number of the GPS satellites (M) is displayed in the screen; therefore, the operator W1 can roughly understand the positioning accuracy at the time of position registration. Corresponding to this, if the positioning accuracy is the predetermined threshold value, it is rejected, and re-positioning can be automatically executed. Therefore, the accuracy of position registration can be improved as much as possible.

[0133] In the site (terminal T0) of the vehicle distributing task, the tasks (operation) of storing vehicles are often carried out under extremely orderly rules (storage rules) compared with, for example, general parking space. The storage rules include several ways as described above (FIG. 8). At the point when positioning of a vehicle stored in accordance with the above described rules (storage rules) is carried out, the position of the positioning result is plotted on the screen of the HH terminal 1 of the operator together with the positions of the previous positioning results in that neighborhood. Therefore, while using the information in the screen as a guide, the operator can visually determine whether the position of the positioning result to be registered this time is how much displaced from or matching the actual storage position (for example, parking area).

[Modification example]

[0134] Modification examples of this embodiment will be described below. In this system, the HH terminal 1 of the operator W1 may be provided with a photographing function (for example, a device such as camera may be utilized) as another function. As a result, if a vehicle has a damaged part such as a dent, in the operation flow, that part is photographed by the photographing function, and the photograph data (damage information) is obtained/saved. For example, at the time of the above de-

scribed position registration, together with the vehicle ID (data A) and the positioning information (data B), the photograph data (damage information) is transferred to, for example, the center system 4, and saved in association therewith in the DB. For example, the above described position registration (transfer of the data A, B) can be carried out by one trigger operation; wherein, an option of transfer of the photograph data is additionally provided for that so that the option can be selected and executed. As a result, the photograph data can be utilized, for example, in a maintenance operation of the vehicle thereafter.

[0135] As the automatic recognition function 11, the BC 1006 is configured to be read; however, the object is not limited thereto, and, for example, a RFID (IC tag) can be utilized (for example, a corresponding RFID reader/writer function is used). In the case in which the RFID is used instead of the BC 1006, the above described operation of position registration should be carried out near the RFID, and the vehicle ID and the like can be more easily read. The RFID is pasted, for example, on the front of the vehicle or a left/right window in the form of a label. For example, the RFID is latched and hung from an attachment column of a rear-view mirror in the vehicle. As a result, the RFID can be reused, and the information of the RFID in the vehicle can be read from outside of the vehicle.

[0136] Although the present invention accomplished by the present inventor is explained in detail on the basis of the above embodiment, the present invention is not limited to the above embodiment, and it goes without saying that various modifications can be made without departing from the gist thereof. For example, the invention can be applied not only to position management of vehicles, but also to position management of goods in a similar terminal (outdoor land).

INDUSTRIAL APPLICABILITY

[0137] The present invention can be utilized in a task of distributing mainly vehicles. Also, the present invention can be utilized in a case in which many large steel materials are temporarily stored in a huge plot of land in order to carry out assembling operations.

DESCRIPTION OF REFERENCES

[0138]

50	1	Handheld (HH) terminal
	2	GPS Receiver
	3	PC (Vehicle-Position Managing Device)
	4	Center System (Vehicle-Position Managing System)
55	5	High-Order System (vehicle-Loading/Unloading Managing System)
	10	Vehicle 10

11	Automatic Recognition Function	
12, 22	Near Field Wireless Communication Function	
13, 33	Application	
13A, 33A	Position-Registration Processing Unit	5
13B, 33B	Position-Search Processing Unit	
21	Positioning Function	
23	Antenna	
14, 34	GUI Function	
1003	GPS Satellite	10
1004	Cap	
1005	Medium	
1006	Barcode (BC)	
1007	Parking Area	
1008	operation instruction information and/or operation instruction form	15

Claims

1. A logistics management system for carrying out information processing of managing a distributing task of a vehicle, the system comprising: a computer which is used by an administrator, a terminal which is carried by an operator, and a GPS receiver; wherein
the computer has a server program which constitutes a vehicle-position managing function,
the server program has: a first processing unit which manages data information including an ID and a position of the vehicle by registering the data information in a DB; and a second processing unit which searches the data information including the ID and the position of the vehicle from the DB,
the GPS receiver has a positioning function which carries out positioning by a GPS,
the computer and the terminal carry out wireless communication with each other,
the terminal and the GPS receiver carry out near field communication with each other,
the terminal has: a function of reading first data including the ID of the vehicle from a medium of the vehicle; a function of obtaining second data which is positioning information from the GPS receiver by the near field communication with the GPS receiver; and a client program which constitutes the vehicle-position managing function,
the client program has: a third processing unit which, when operated by the operator, obtains the first and second data, transmits the first and second data to the computer, and causes the information corresponding to the ID and the position of the vehicle to be registered in the DB, in order to register a storage position of the vehicle; and a fourth processing unit which, when operated by the operator, searches the information including the ID and the position of the vehicle from the DB of the computer, in order to search the storage position of the vehicle, and
the computer manages, on the basis of a sectioned location, a region of land serving as a target in which the vehicle is stored in a distributing task of the vehicle, and at the time of the position registration, manages the position at which the vehicle is stored in connection with the positioning information and an ID of the location.
2. The logistics management system according to claim 1, wherein,
at the time of the position registration, the terminal carries out:
a process of evaluating an accuracy of the positioning information which is the second data obtained from the GPS receiver;
a process of comparing an evaluation value of the accuracy with a threshold value, and determining whether to employ or reject the positioning information for the position registration; and
if rejected, a process of discarding the second data, and obtaining the second data which is the positioning information again from the GPS receiver.
3. The logistics management system according to claim 1, wherein,
at the time of the position registration, the terminal carries out:
a process of displaying a position of a current positioning result, on a map of the land, on a screen of the terminal on the basis of the first and second data obtained from the GPS receiver,
a process of displaying a previous position-registration- finished positioning result around the position of the current positioning result, on the map of the land, on the screen of the terminal on the basis of the data obtained from the computer, and
a process of manually moving and correcting the position of the positioning result of the present time in the screen by an operation by an operator and determine the position for the position registration.
4. The logistics management system according to claim 2, wherein
the number of a GPS satellite(s) used in the positioning is used as the evaluation value of the accuracy of the positioning information, and,
if the number of the GPS satellite(s) is equal to or less than the threshold value, the positioning information is rejected.
5. The logistics management system according to claim 2, wherein

- a HDOP value is used as the evaluation value of the accuracy of the positioning information, and, when the HDOP value is equal to or higher than the threshold value, the positioning information is rejected.
6. The logistics management system according to claim 2, wherein,
At the time of the position registration, the terminal carries out a process of displaying at least one of the number of a GPS satellite(s) utilized in positioning and a HDOP value as the evaluation value of the accuracy of the positioning information by the screen of the terminal, and
a process of obtaining the second data which is the positioning information again from the GPS receiver by an operation by the operator.
7. The logistics management system according to claim 3, wherein,
At the time of the position registration, the terminal carries out a process of automatically displaying, on the map of the land by the screen of the terminal, a position of a correction option estimated from a relation between the position of the positioning result of the present time and the position of the previous positioning-registration-finished positioning result therearound, and
a process of correcting the position of the positioning result of the present time in the screen to the position of the correction option and determine the position for the position registration by an operation by the operator.
8. The logistics management system according to claim 1, wherein,
when the stored position of the vehicle is registered by using the client program, the terminal carries out, by one trigger operation of the operator,
a process of reading the first data including the ID of the vehicle from the medium of the vehicle;
in synchronization with the process, a process of obtaining the second data which is the positioning information from the GPS receiver by the short-distance communication with the GPS receiver; and
a process of transmitting the first and second data to the computer and causing the information corresponding to the ID and the position of the vehicle to be registered in the DB.
9. The logistics management system according to claim 1, wherein
the GPS receiver is attached to a cap of the operator, the positioning accuracy of the GPS receiver and the granularity of the location management are approximately the same as each other, and
the size of one location unit area in the location management corresponds to a storage region of a pre-
- determined plurality of vehicles.
10. The logistics management system according to claim 1, wherein
when the stored position of the vehicle is searched by using the server program of the computer by an operation of the administrator,
a process of searching the information including the ID and the position of the vehicle from the DB of the computer, and
a process of displaying, by a screen of the computer, the information including the position of the search result in at least one of formats of the positioning information and the location on the map of the land are carried out.
11. The logistics management system according to claim 1, wherein
when the stored position of the vehicle is searched by using the client program of the terminal by an operation of the operator,
a process of searching the information including the ID and the position of the vehicle from the DB of the computer, and
a process of displaying, by the screen of the terminal, the information including the position of the search result in at least one of formats of the positioning information and the location on the map of the land are carried out.

FIG. 1

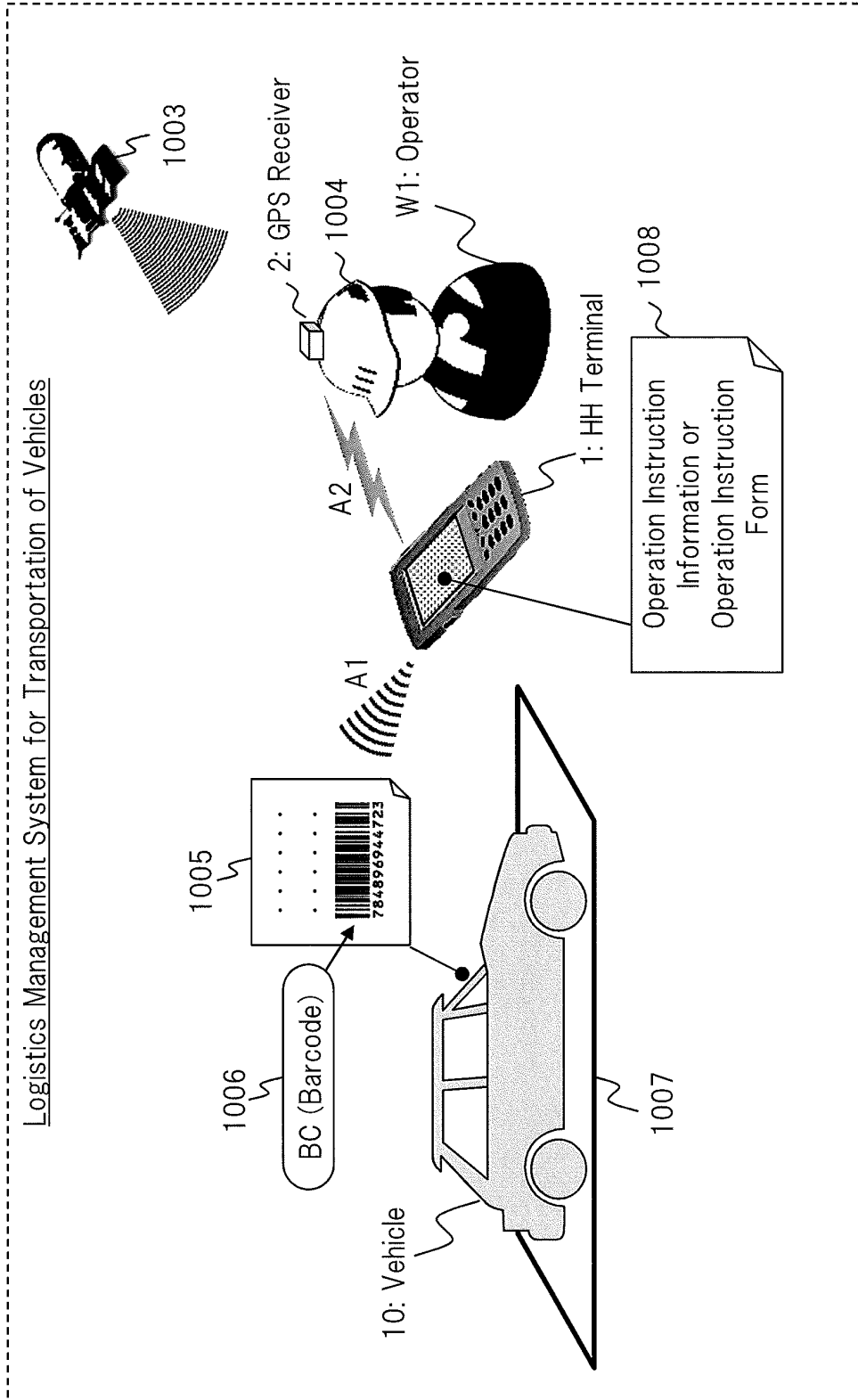


FIG. 2

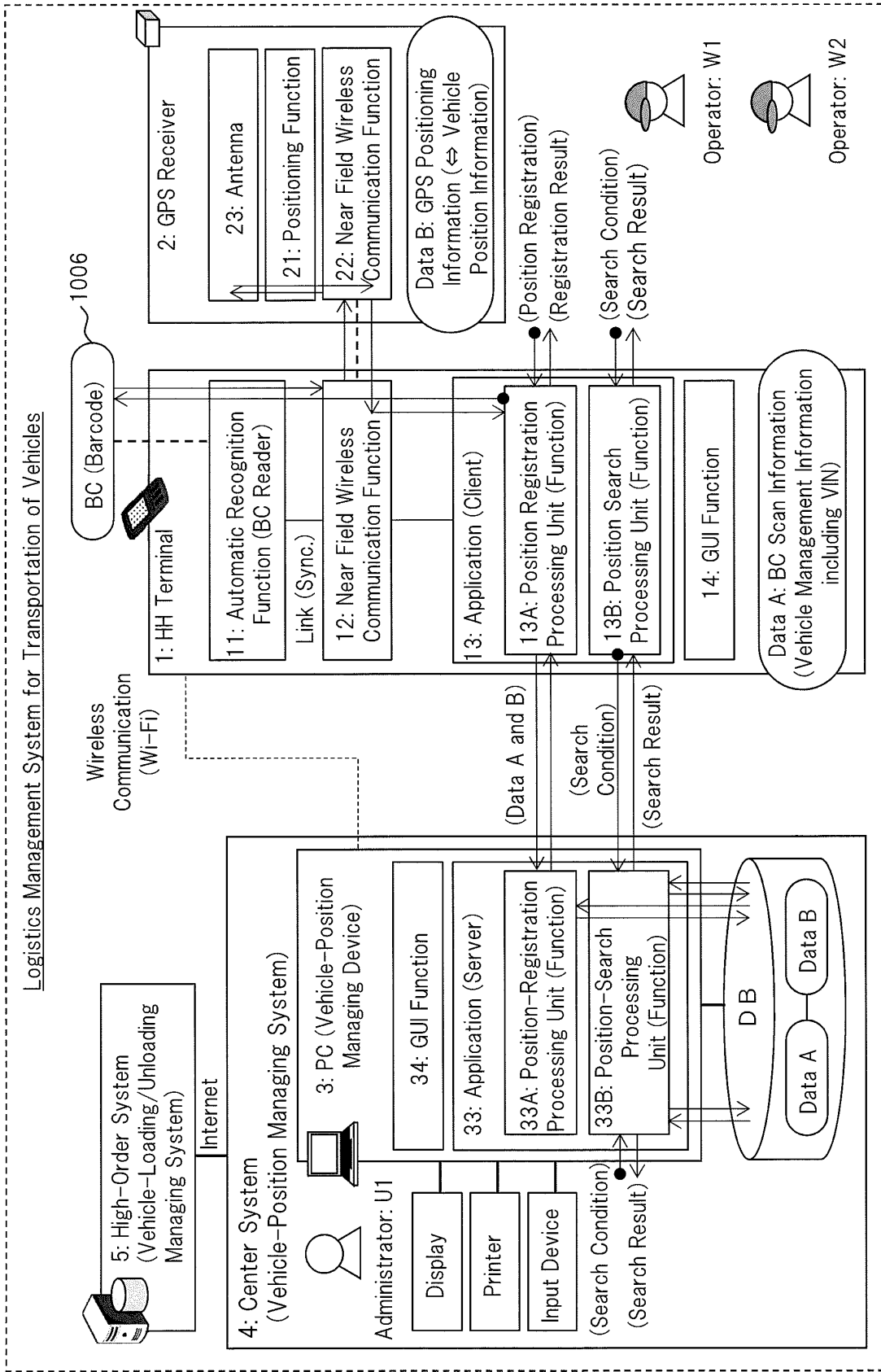


FIG. 3

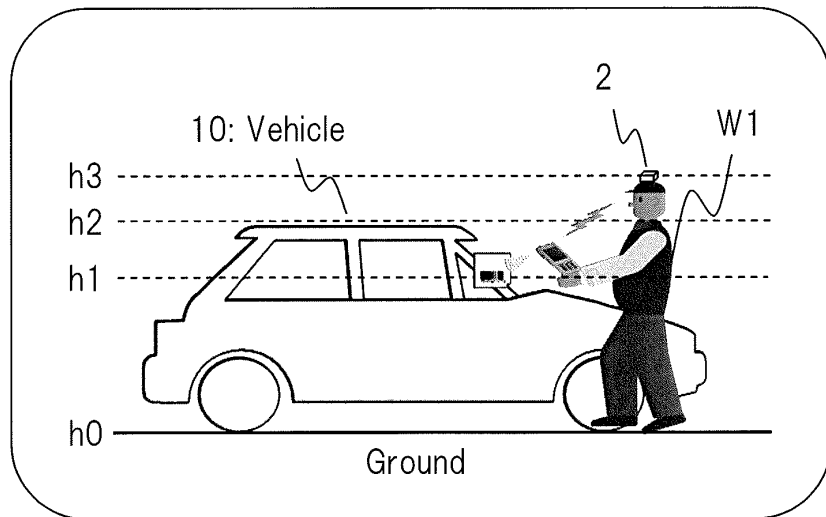


FIG. 4

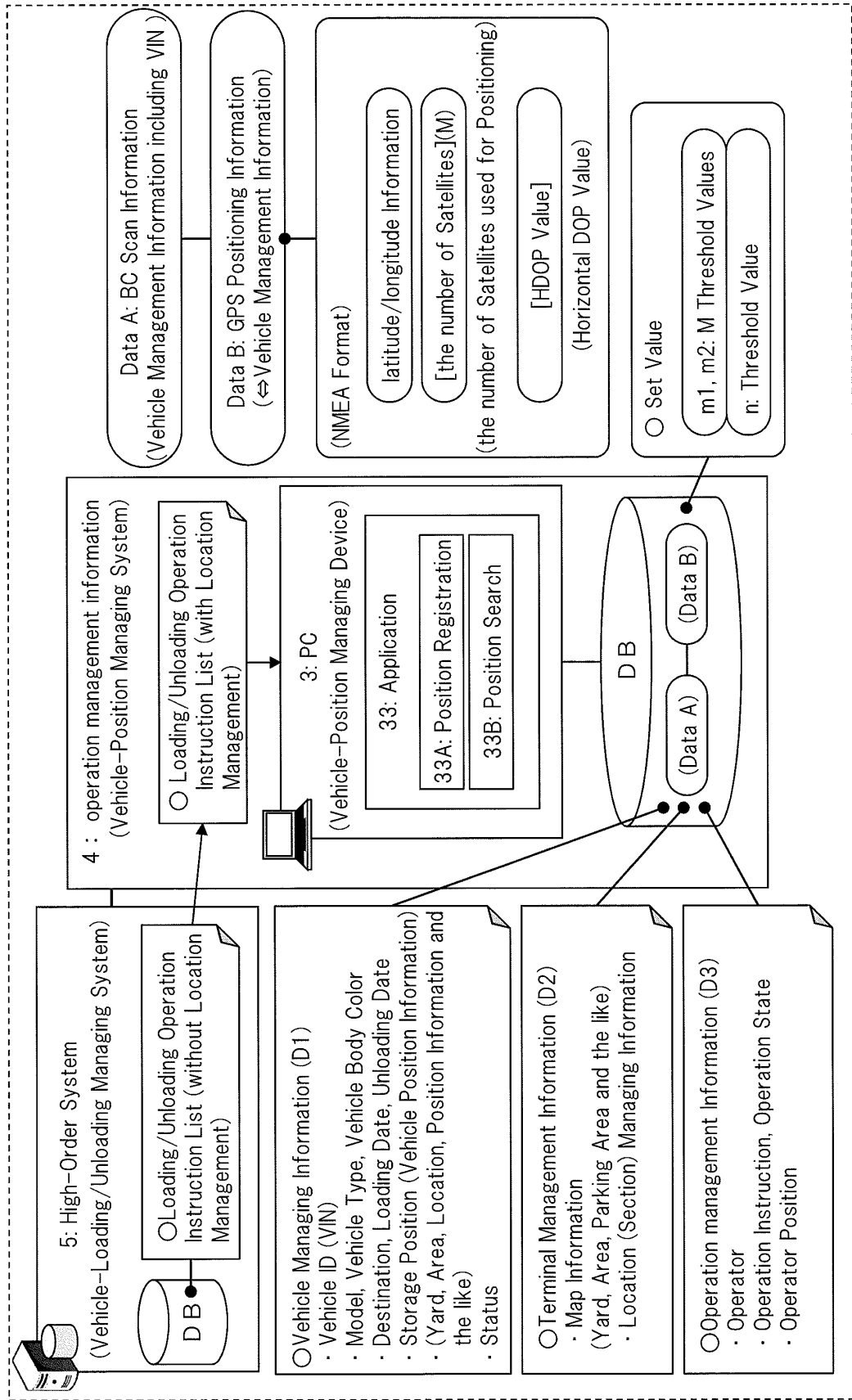


FIG. 5

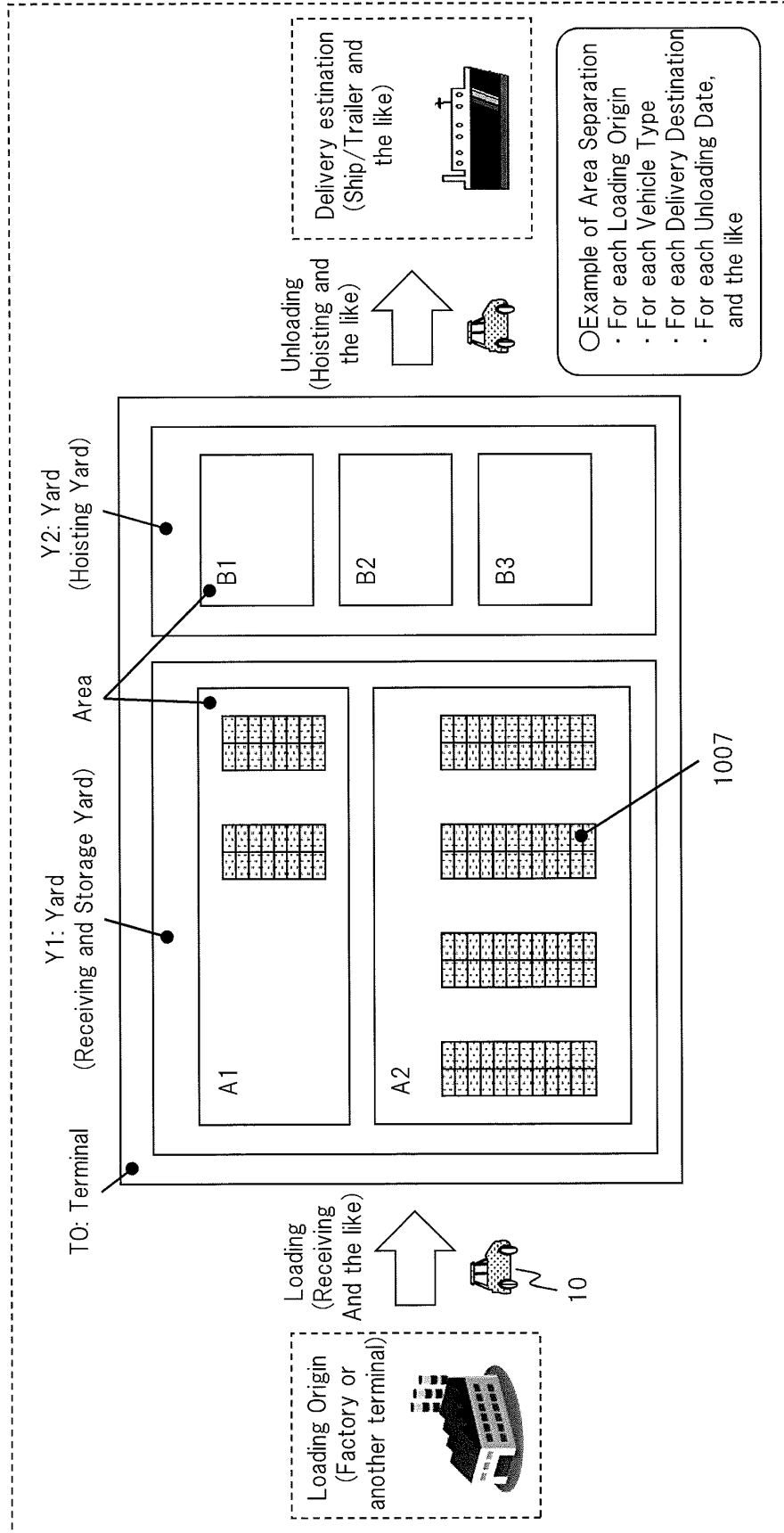


FIG. 6

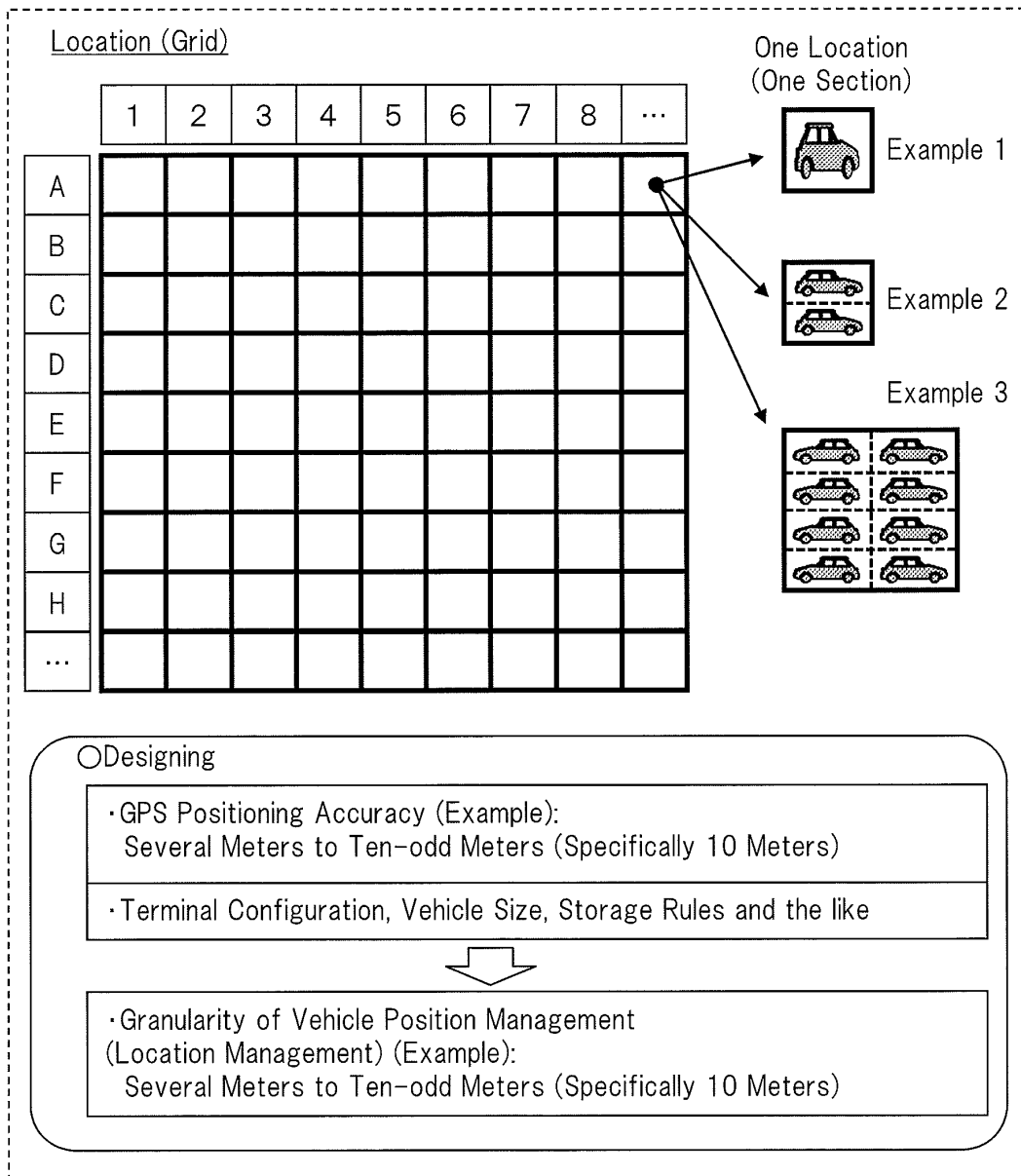


FIG. 7

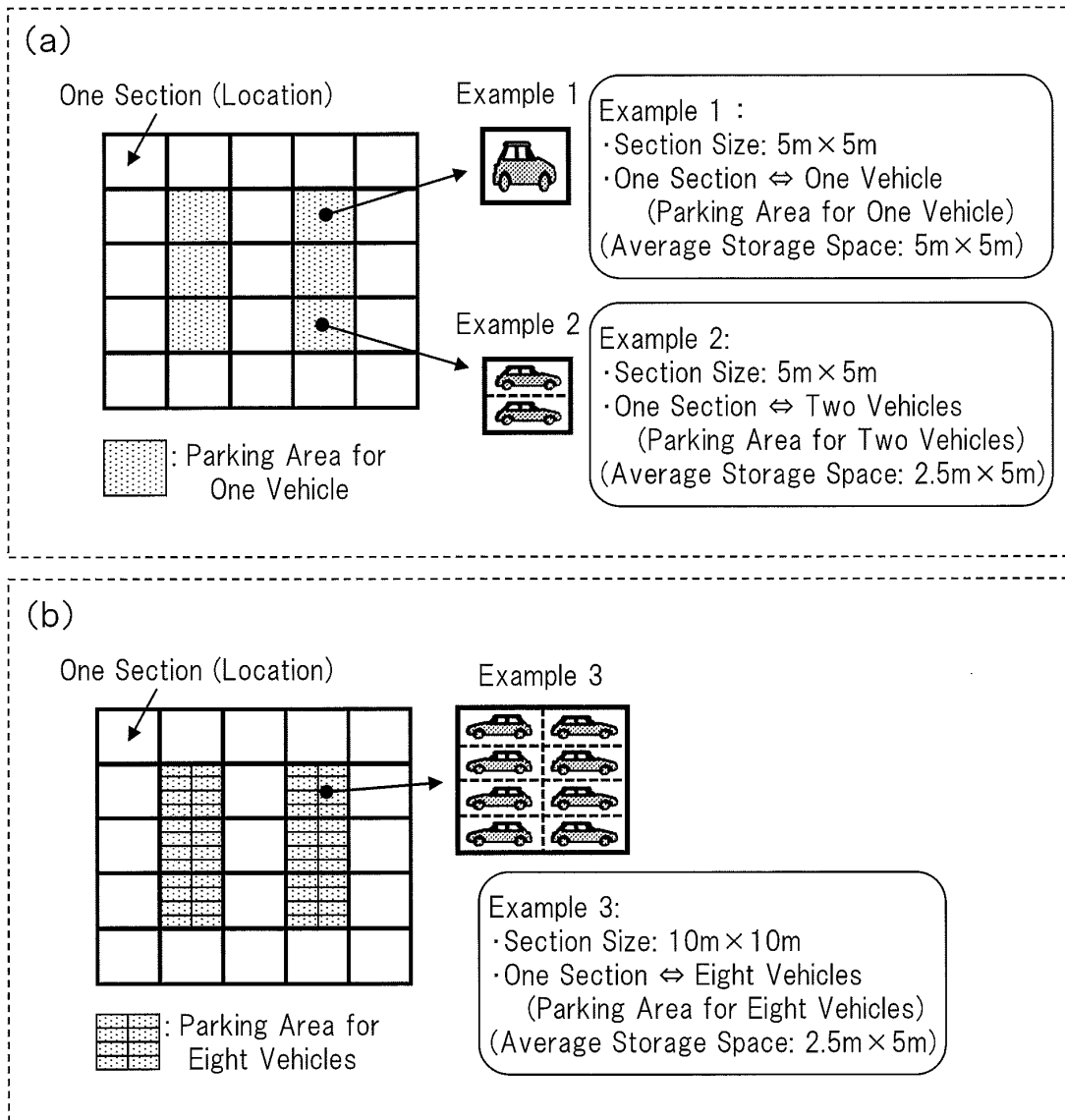


FIG. 8

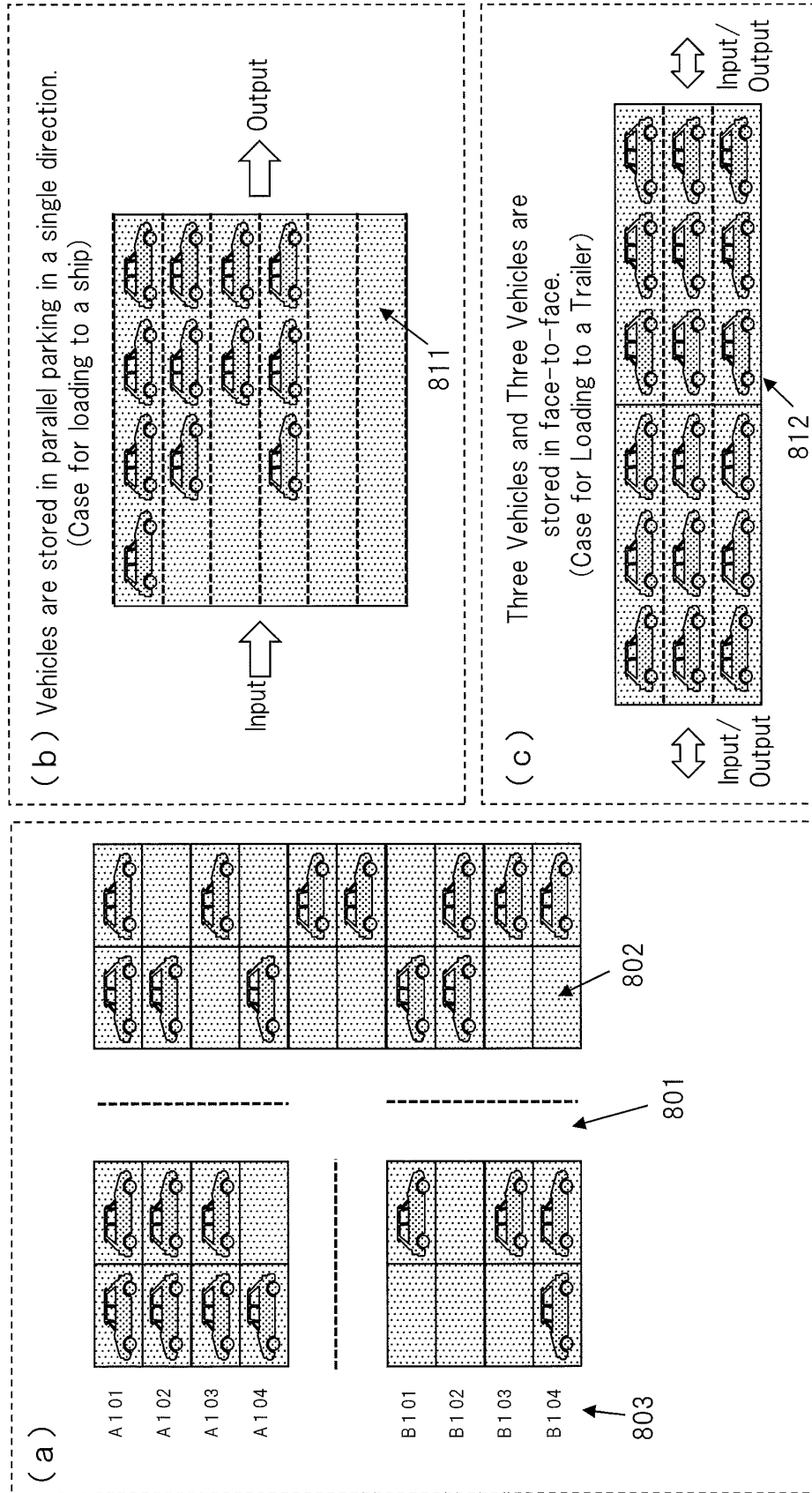


FIG. 9

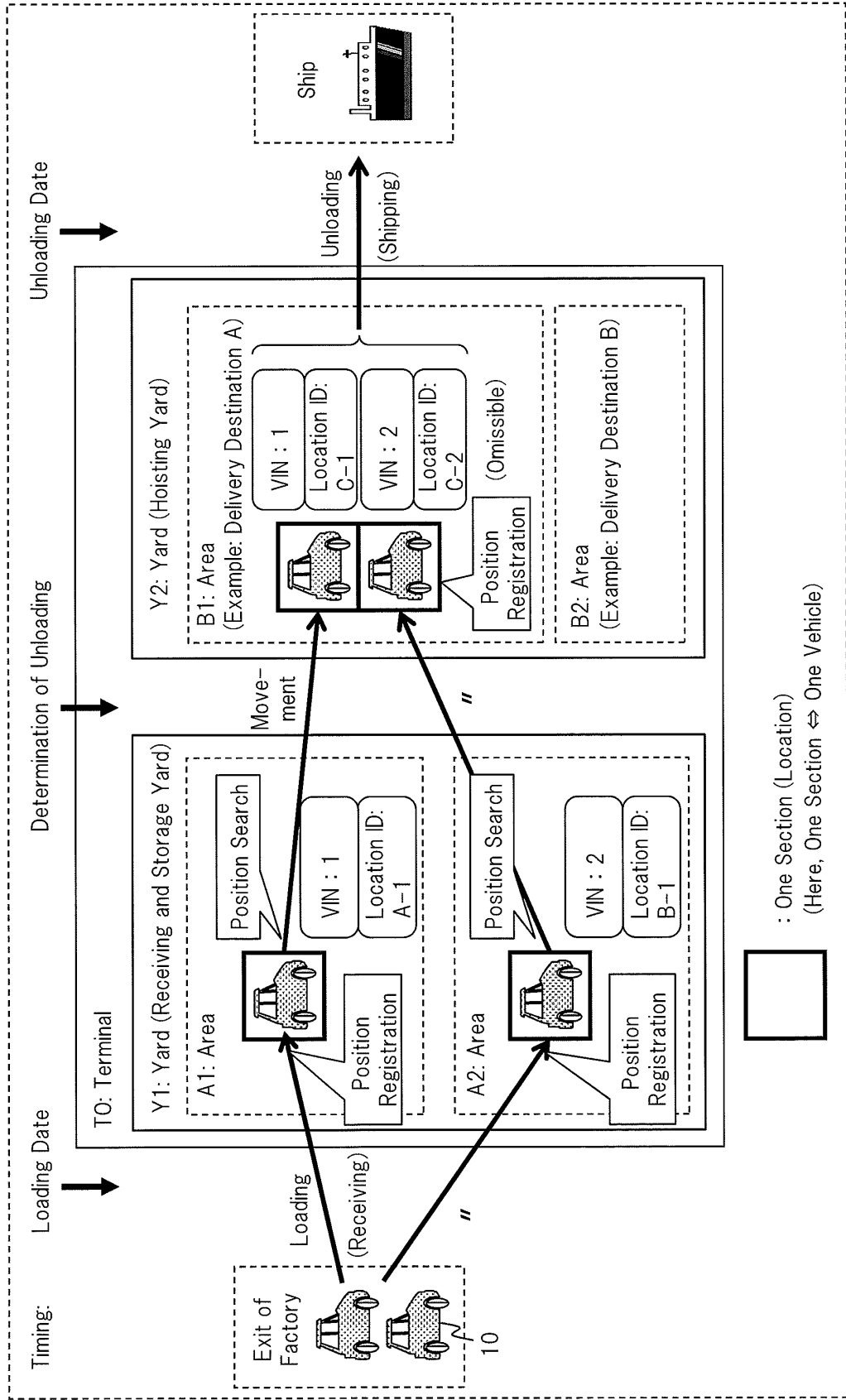


FIG. 10

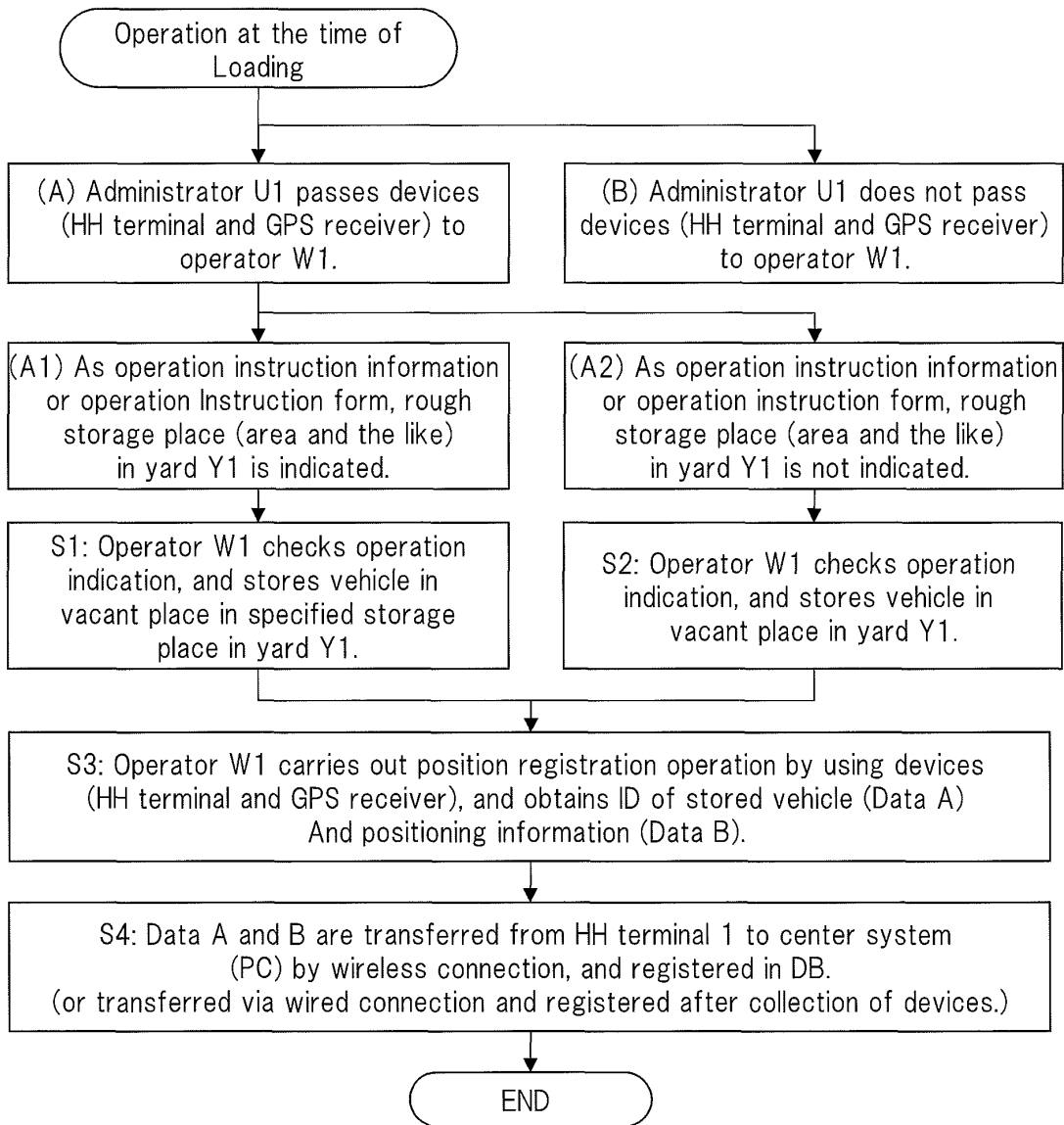


FIG. 11

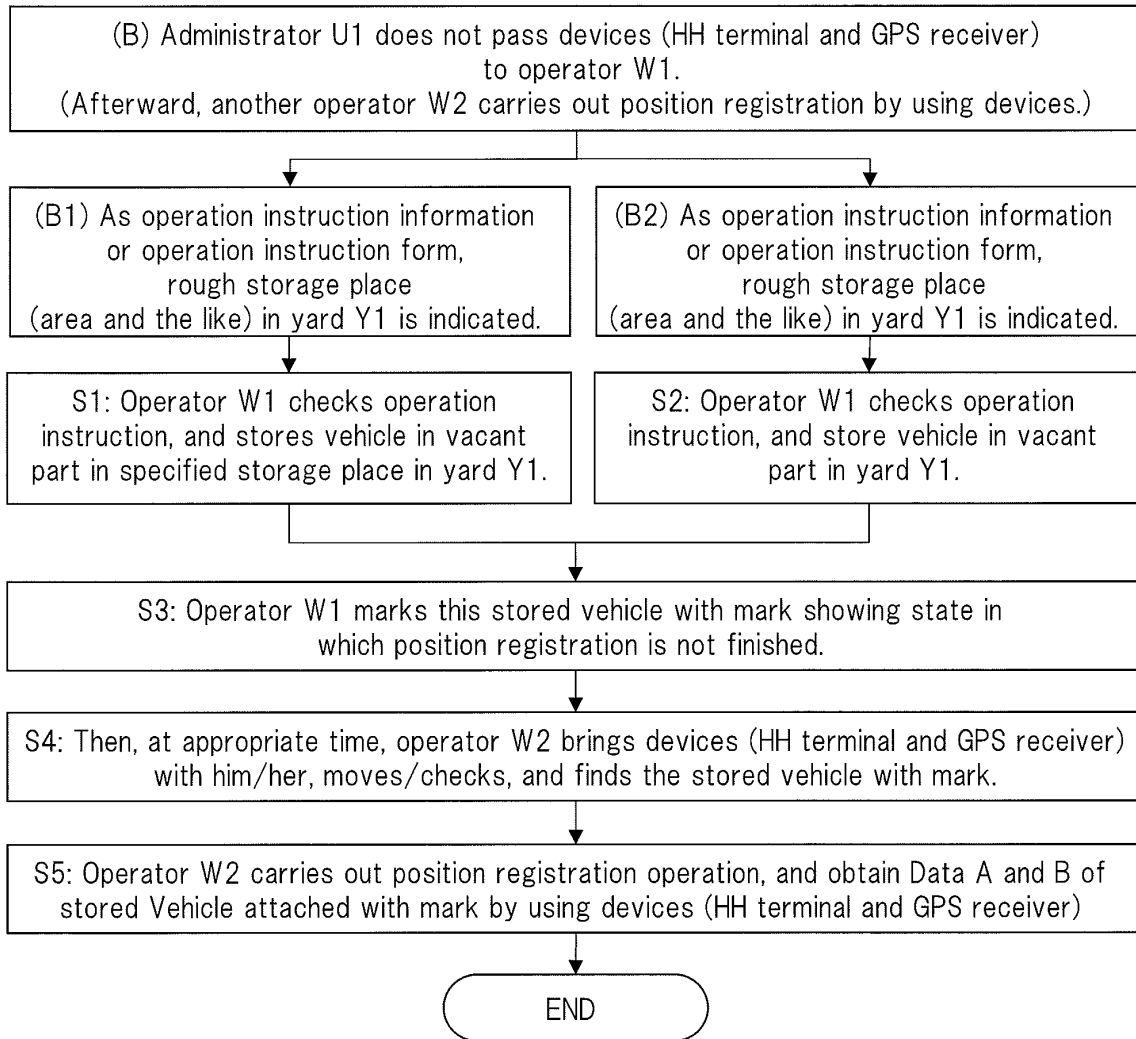


FIG. 12

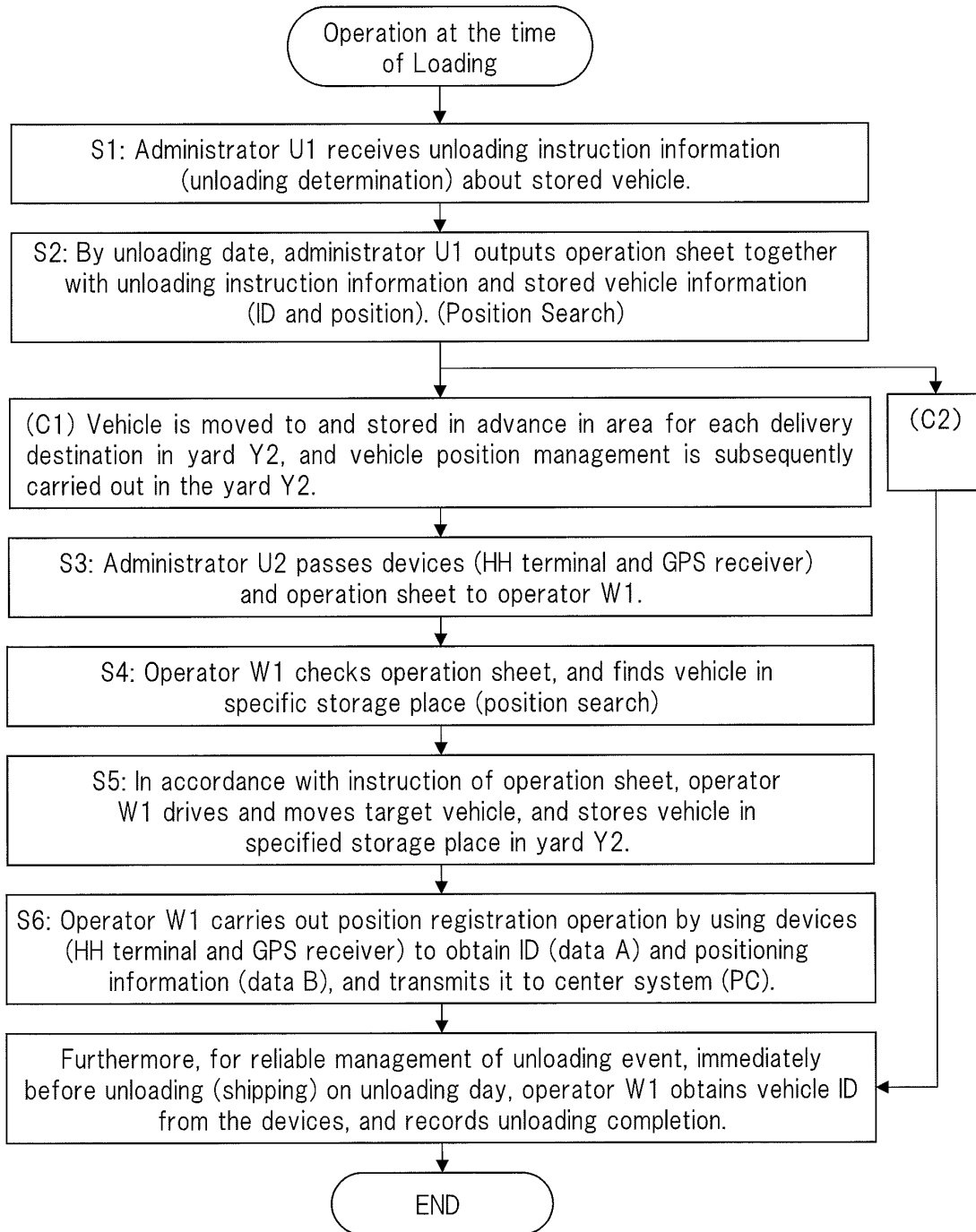


FIG. 13

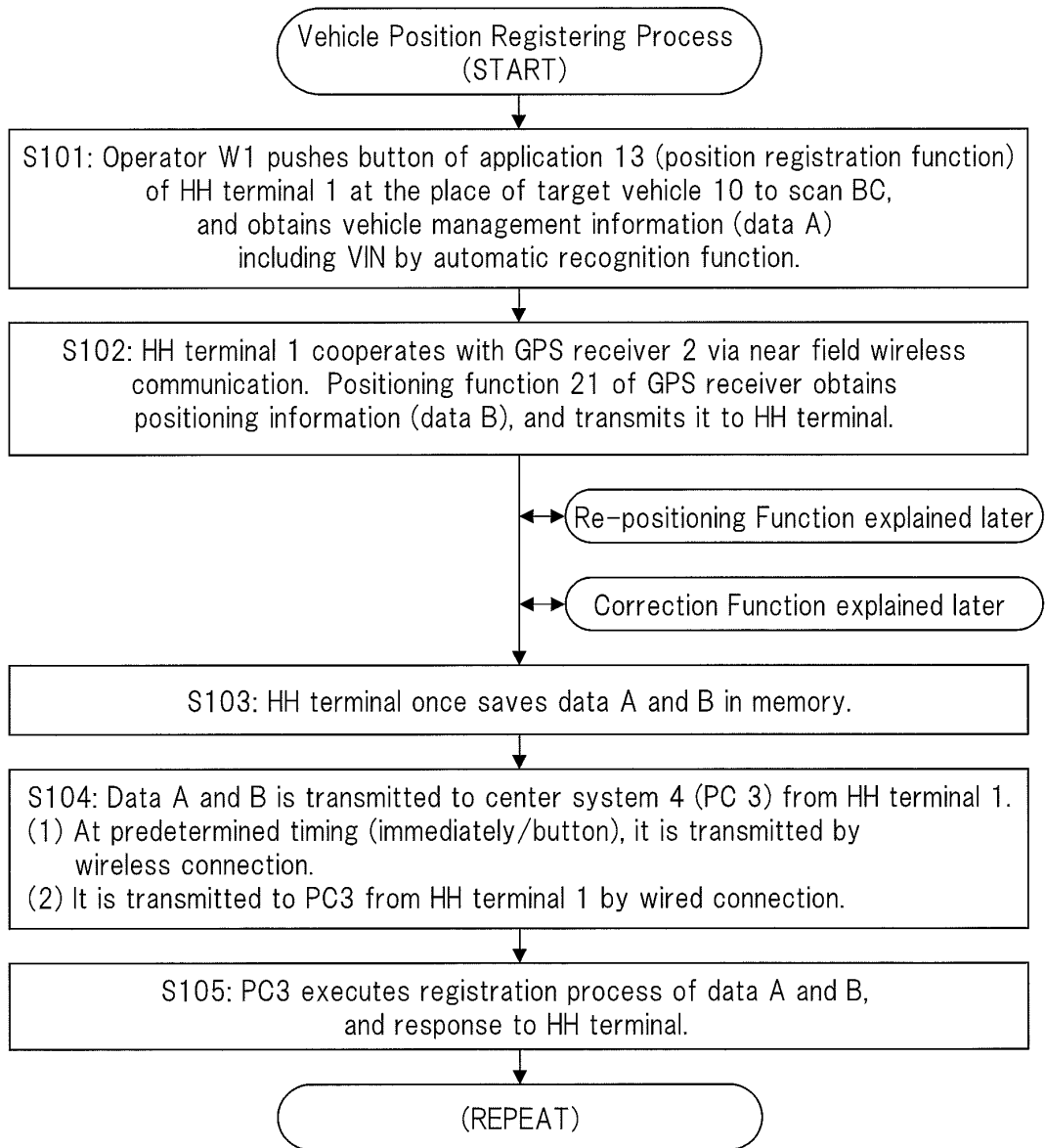


FIG. 14

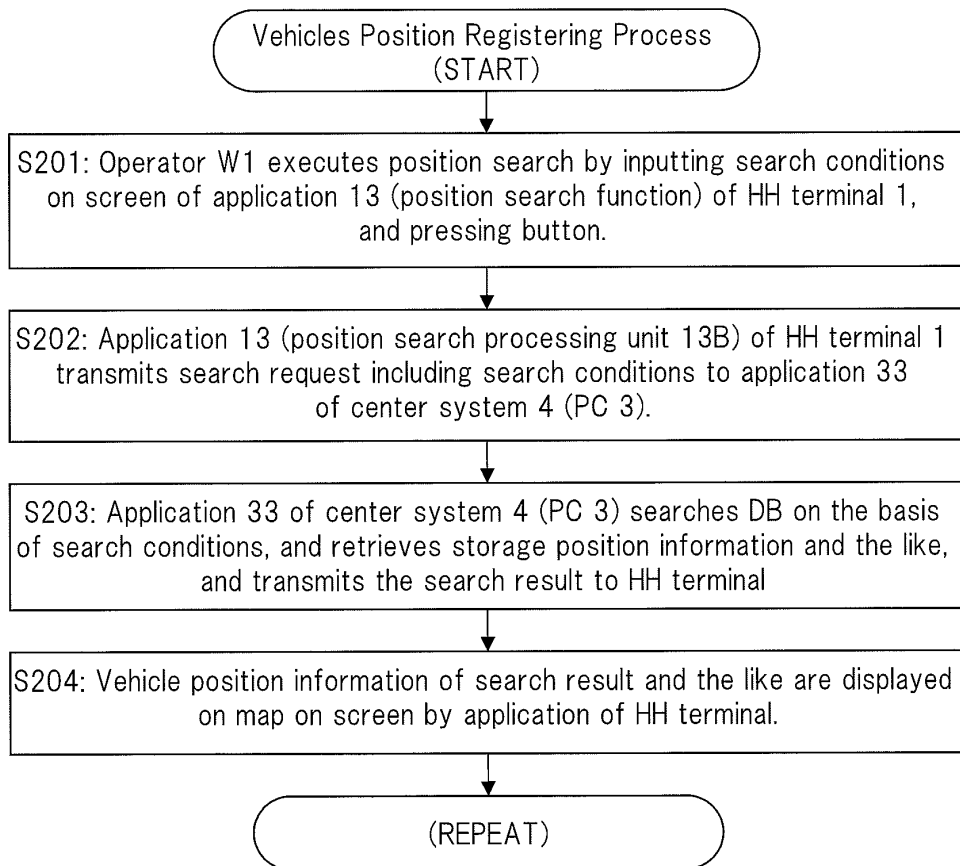


FIG. 15

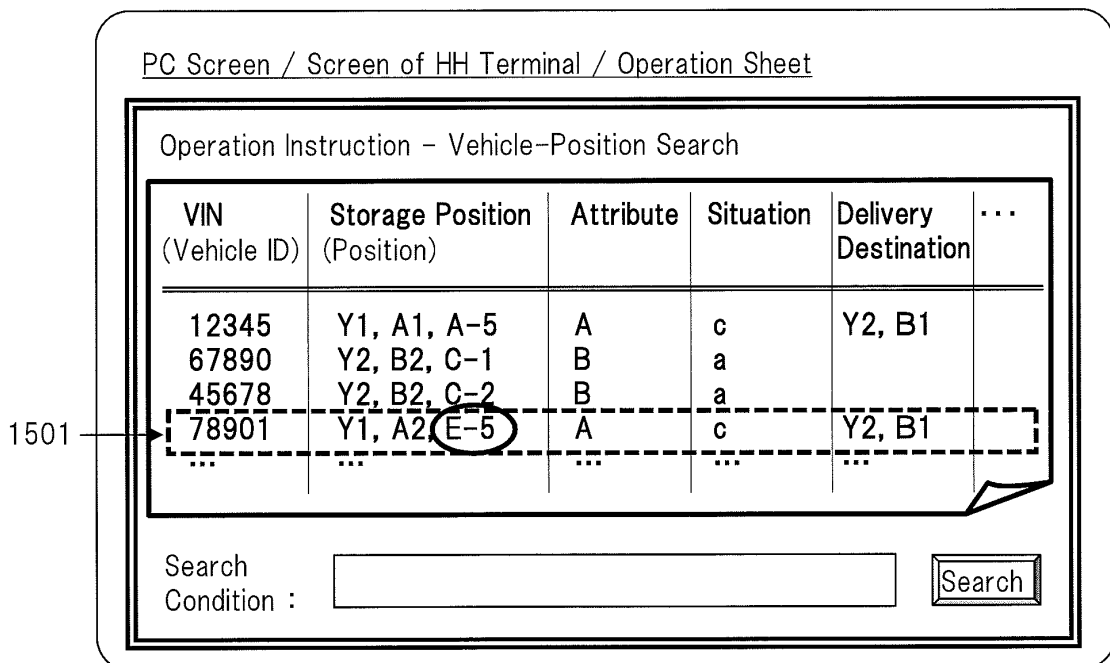


FIG. 16

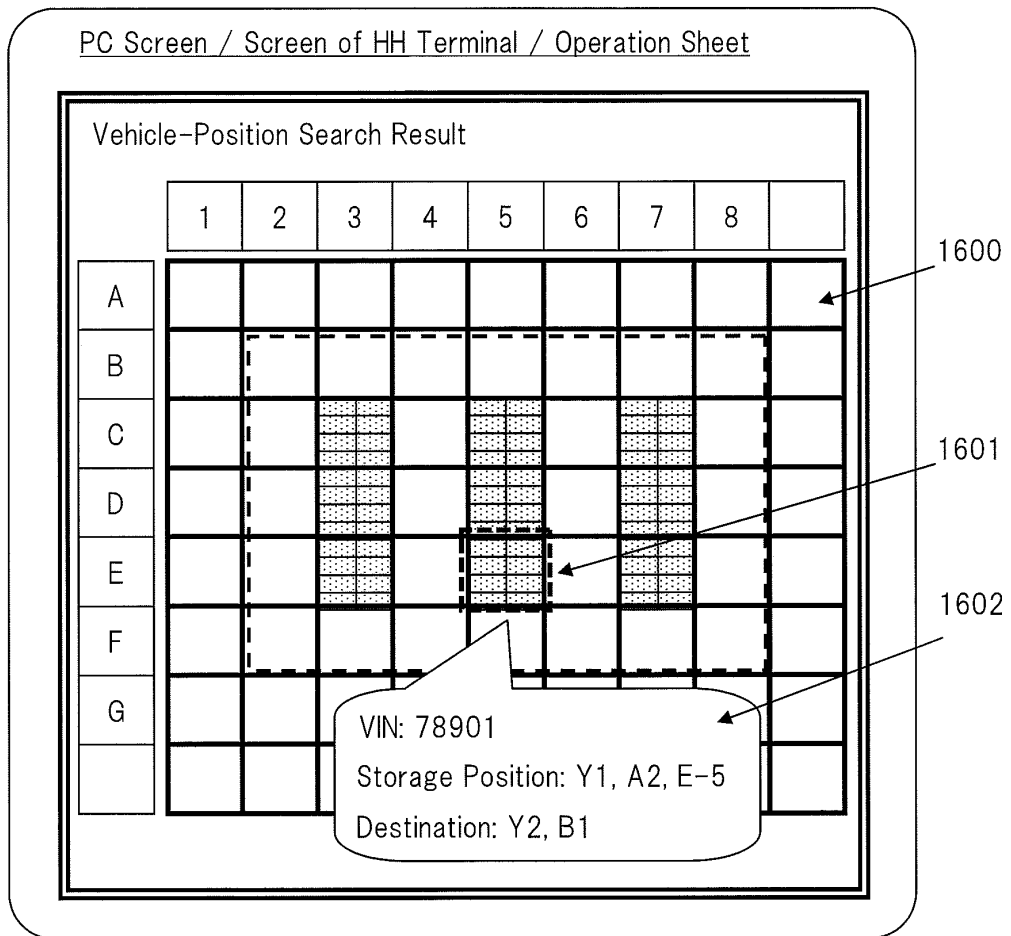


FIG. 17

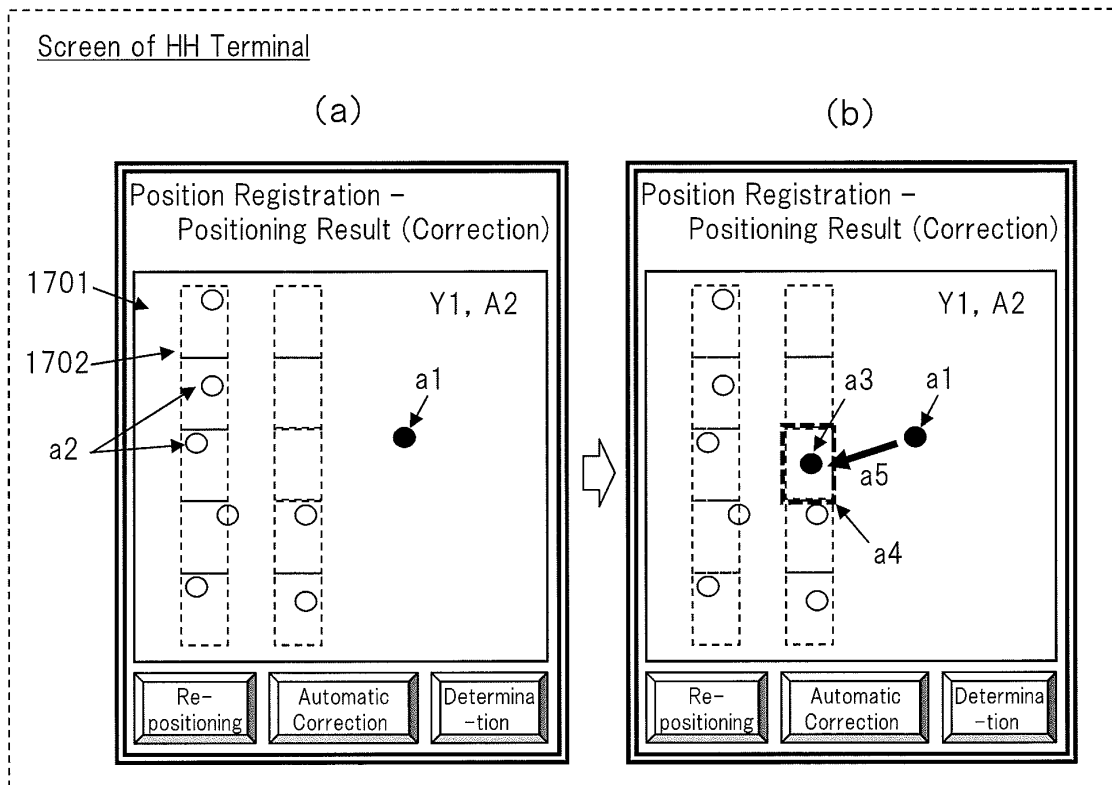


FIG. 18

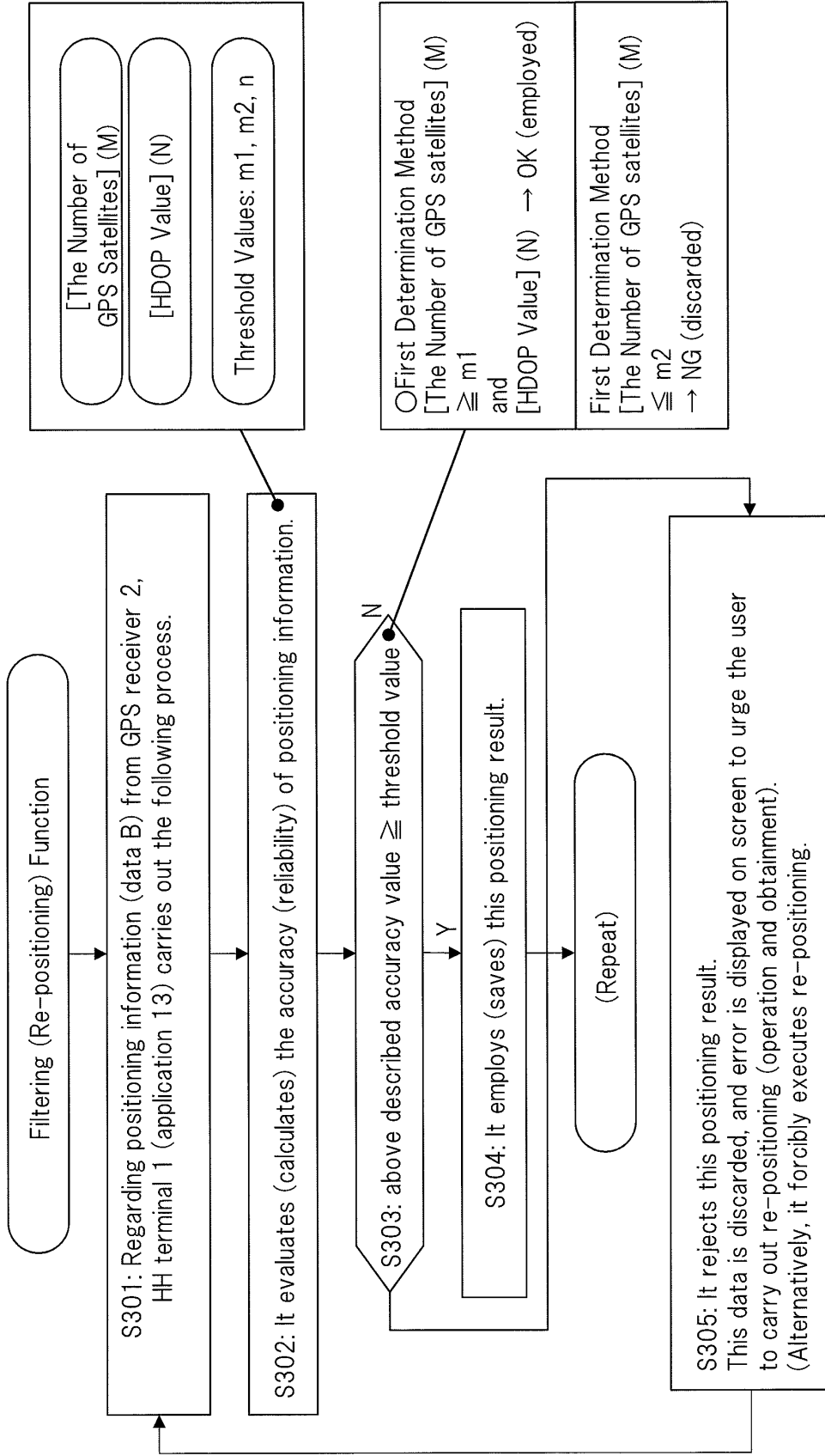
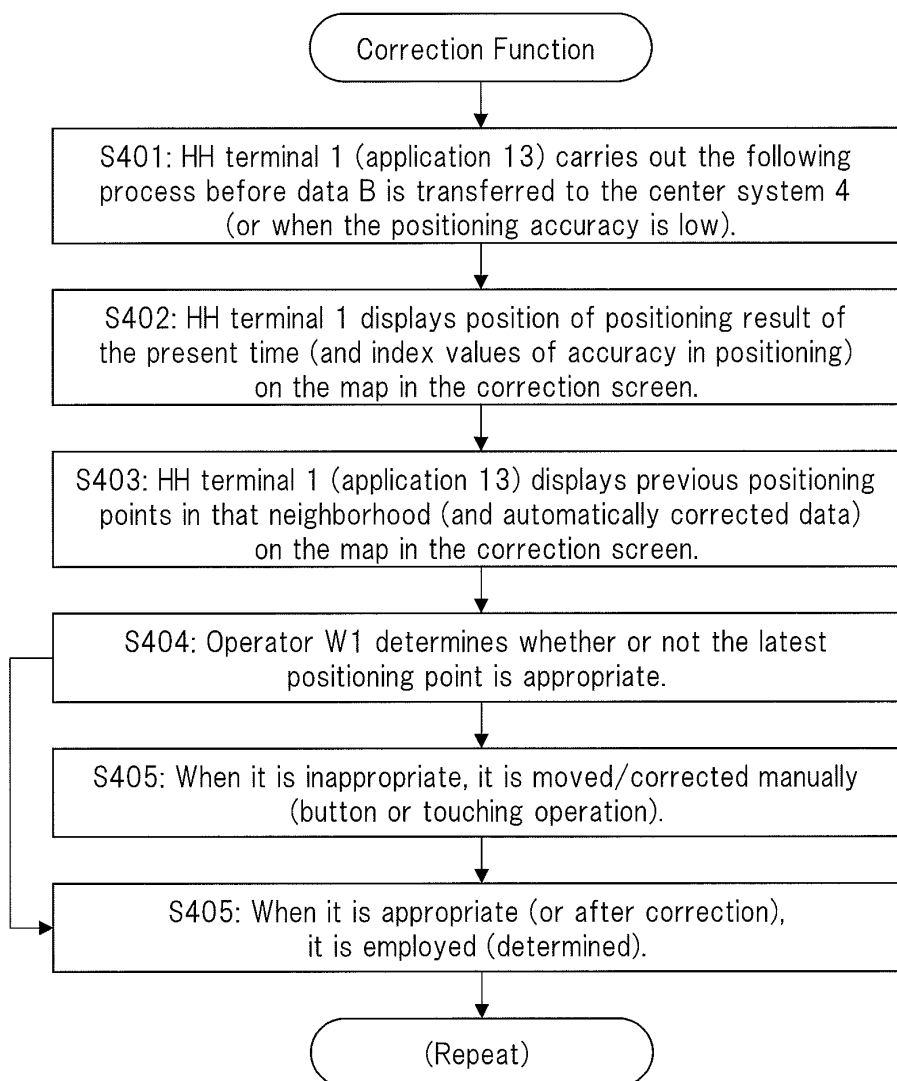


FIG. 19



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/057669

5	A. CLASSIFICATION OF SUBJECT MATTER B65G1/137(2006.01)i, B65G61/00(2006.01)i, B65G63/00(2006.01)i, G06Q50/28(2012.01)i, G08G1/13(2006.01)i	
	According to International Patent Classification (IPC) or to both national classification and IPC	
10	B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) B65G1/137, B65G61/00, B65G63/00, G06Q50/28, G08G1/13	
15	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013 Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013	
20	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)	
	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
	Category*	Citation of document, with indication, where appropriate, of the relevant passages
25	A	JP 2004-355415 A (Toyota Motor Corp.), 16 December 2004 (16.12.2004), paragraphs [0009] to [0055]; fig. 1 to 7 (Family: none)
30	A	JP 3904967 B2 (Mitsubishi Electric Information Systems Corp.), 11 April 2007 (11.04.2007), paragraphs [0022] to [0028]; fig. 1, 2 (Family: none)
35	A	JP 2001-175983 A (Nihon Denki Idotsushin Kabushiki Kaisha), 29 June 2001 (29.06.2001), paragraphs [0013] to [0022]; fig. 1, 2 (Family: none)
40	<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.	
45	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
50	Date of the actual completion of the international search 12 June, 2013 (12.06.13)	Date of mailing of the international search report 25 June, 2013 (25.06.13)
55	Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/057669

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2008-143658 A (Mitsubishi Electric Corp.), 26 June 2008 (26.06.2008), paragraphs [0007] to [0023]; fig. 1 to 7 (Family: none)	1-11
A	JP 2009-12975 A (Toshiba Plant Systems & Services Corp.), 22 January 2009 (22.01.2009), paragraphs [0053], [0108] to [0116]; fig. 15, 29 (Family: none)	1-11
A	JP 2008-87953 A (Techno Front Kabushiki Kaisha, Azu System Kabushiki Kaisha), 17 April 2008 (17.04.2008), paragraphs [0080] to [0092]; fig. 1 (Family: none)	1-11
A	JP 2010-260700 A (Nissho Denki Kabushiki Kaisha), 18 November 2010 (18.11.2010), paragraphs [0022] to [0025]; fig. 1 (Family: none)	1-11

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Patent documents cited in the description

- JP 2001348110 A [0004] [0005]