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DESCRIPTION

EMERGENCY REPORTING METHOD, EMERGENCY REPORTING SYSTEM, EMERGENCY REPORTING APPARATUS, AND CENTER FOR COPING WITH EMERGENCIES

Technical Field

The present invention relates to an emergency reporting method of reporting occurrence of an emergency event from a vehicle to a center, and an apparatus that performs the method.

Background Art

As disclosed in Japanese Patent Application Laid-Open (*kokai*) No. 2002-279567, there has conventionally been known an emergency reporting apparatus which, upon occurrence of an accident, reports the present position of a vehicle and personal information to a center. The conventional emergency reporting apparatus comprises accident detection means for detecting occurrence of an accident, and vehicle position detection means for detecting the position of the vehicle; and a portable phone is connected to the emergency reporting apparatus. A personal ID code for identifying a person is previously stored in the portable phone. When the accident detection means detects occurrence of an accident, the emergency reporting apparatus transmits to the center vehicle position information representing the position of the vehicle detected by the vehicle position detection means, as well as the personal ID code.

The above-described conventional emergency reporting apparatus is

configured so as to automatically transmit the vehicle position information and the personal ID code when the accident detection means detects occurrence of an accident. Incidentally, for example, in a case where an occupant of a vehicle has suddenly become ill, the occupant may explain the state of emergency directly to an operator at the center by use of, for example, a portable phone. In such a case of sudden illness, the occupant making the call encounters difficulty in calmly coping with the situation, and in some cases, the occupant cannot accurately convey the present position of the vehicle to the operator. Therefore, the operator at the center may fail to properly request dispatch of an ambulance, because of a failure to obtain the accurate position of the vehicle. Moreover, even when the present position of the vehicle is automatically determined and the vehicle position information is available at the center, in some cases, the operator fails to establish the correspondence between the calling occupant and the determined position of the vehicle.

Disclosure of the Invention

In view of the foregoing problem, an object of the present invention is to provide an emergency reporting method which enables an operator at a center to easily ascertain, in a related manner, an emergency report provided from a vehicle occupant by a phone call, and the present position of the vehicle.

Another object of the present invention is to provide a system, an apparatus, and a center which are used in relation to performance of the emergency reporting method.

The present invention is directed to improvement of an emergency

reporting method in which a terminal apparatus mounted on a vehicle and a center are communicable with each other, and the terminal apparatus reports to the center an emergency event occurred in the vehicle, as well as improvement of a system, an apparatus, and a center which are used in relation to performance of the emergency reporting method.

The present invention has the following features. The terminal apparatus detects a predetermined operation of an occupant in the vehicle, establishes a voice communication line between the terminal apparatus and the center to thereby enable a phone call between the occupant of the vehicle and an operator at the center via the established voice communication line, and transmits to the center present position information representing a present position of the vehicle. The center receives the transmitted present position information, accepts the received present position information, issues acceptance information for the accepted present position information, displays the issued acceptance information and the received present position information in a mutually related manner, and transmits the issued acceptance information to the terminal apparatus. The terminal apparatus receives the transmitted acceptance information, and displays the received acceptance information. In this case, the order of the establishment of a phone call with the operator at the center and the transmission of the present position information may be changed in such a manner that the terminal apparatus detects a predetermined operation of an occupant in the vehicle, transmits to the center present position information representing a present position of the vehicle, and establishes a voice communication line between the terminal apparatus and the center to thereby enable a phone call between the occupant of the vehicle and an

operator at the center via the established voice communication line.

By virtue of the above features, upon detection of the occupant's predetermined operation, the terminal apparatus can establish a voice communication line between the terminal apparatus and the center to thereby enable a phone call between the occupant of the vehicle and the operator at the center via the established voice communication line. Therefore, when an anomalous state occurs in the vehicle or an occupant suddenly becomes ill, the occupant can easily report such an emergency event to the center, and can explain the emergency event to the operator at the center over the phone.

Moreover, upon detection of the occupant's predetermined operation, the terminal apparatus can transmit to the center the present position information representing the present position of the vehicle. Meanwhile, when the center receives the present position information from the terminal apparatus, the center can issue acceptance information, and display the issued acceptance information and the present position information in a mutually related manner. Further, the center can transmit the issued acceptance information to the terminal apparatus. The terminal apparatus can display the received acceptance information.

Therefore, the occupant can report to the operator at the center the displayed acceptance information over the phone. On the basis of the acceptance information reported from the occupant, the operator at the center can quite easily grasp the correspondence between the occupant with whom the operator is presently talking and the present position of the vehicle in which the occupant is present, by viewing the acceptance information and the present position information which are displayed at the

center in a mutually related manner. Therefore, the operator at the center can quickly and appropriately cope with the emergency event.

Brief Description of the Drawings

FIG. 1 is a schematic block diagram showing the entirety of an emergency reporting system according an embodiment of the present invention;

FIG. 2 is a schematic block diagram showing the configuration of an onboard information terminal apparatus shown in FIG. 1;

FIG. 3 is a schematic block diagram showing the configuration of a center shown in FIG. 1;

FIG. 4 is a flowchart showing emergency reporting programs executed at the onboard information terminal apparatus and the center shown in FIG. 1;

FIG. 5 is an explanatory diagram showing a state in which acceptance information and the present position of a vehicle are displayed, in a mutually related manner, on a display unit of the center shown in FIG. 1; and

FIG. 6 is an explanatory diagram showing a state in which acceptance information is displayed on a display unit of the onboard information terminal apparatus shown in FIG. 1.

Best Mode for Carrying Out the Invention

An embodiment of the present invention will now be described with reference to the drawings. FIG. 1 is a schematic block diagram schematically showing an emergency reporting system according the

present embodiment, which is adapted to report to a center an emergency event having occurred in a vehicle. The emergency reporting system includes an onboard information terminal apparatus 10, which is mounted on a vehicle, and a center 20, which can radio-communicate with the onboard information terminal apparatus 10. A relay station 40, which can radio-communicate with the onboard information terminal apparatus 10, a firehouse 50 and a police station 60 are connected to the center 20 via a network 30 (e.g., a phone network).

As shown in FIG. 2, the onboard information terminal apparatus 10 includes a microcomputer 11; and connected to the microcomputer 11 are a GPS (Global Positioning System) receiver 12, a gyroscope 13, and a vehicle speed sensor 14. The microcomputer 11 contains, as main components, a CPU, ROM, RAM, and a timer. The microcomputer 11 comprehensively controls operation of the onboard information terminal apparatus 10 by executing various programs, including a program that is shown in FIG. 4 on the side of the onboard information terminal apparatus. Thus, the microcomputer 11 executes various types of processing, such as processing for establishing a voice communication line, processing for transmitting data representing the present position of the vehicle, and processing for displaying acceptance information, which will be described later.

The GPS receiver 12, the gyroscope 13, and the vehicle speed sensor 14 are used for detecting the position of the vehicle. The GPS receiver 12 receives, from satellites, radio waves for detection of the present position of the vehicle, and detects and outputs the present position of the vehicle in the form of coordinate data. The gyroscope 13 detects turning speed of the vehicle, and outputs a detection value representing the turning

speed, which is used for detection of the traveling direction of the vehicle. The vehicle speed sensor 14 detects traveling speed of the vehicle, and outputs a detection value representing the traveling speed. The detection data and values output from the GPS receiver 12, the gyroscope 13, and the vehicle speed sensor 14 are supplied to the microcomputer 11 at predetermined short intervals, whereby the microcomputer 11 can detect the present position of the vehicle.

Moreover, a communication unit 15, an external memory unit 16, and a display unit 17 are connected to the microcomputer 11. The communication unit 15 enables radio communications with the center 20 and the relay 40. An antenna 15a for radio communication is connected to the communication unit 15. The external memory unit 16 is formed by a writable nonvolatile memory such as a hard disk drive or nonvolatile RAM, and stores the above-described programs to be executed by the microcomputer 11, phone numbers including that of the center 20, and other data. The display unit 17 is formed by an unillustrated liquid crystal display or the like, and is adapted to display acceptance information transmitted from the center 20, which will be described later.

Furthermore, a hands-free phone 18 and an emergency reporting switch 19 are also connected to the microcomputer 11. The hands-free phone 18 is a phone which allows a driver to make a phone call to the outside, without any dialing operation. Specifically, in response to the driver's voice, or the driver's operation of a switch provided, for example, on a steering wheel, or the emergency reporting switch 19, the hands-free phone 18 automatically dials a predetermined phone number, which is previously stored in the external memory unit 16. This configuration

enables the driver to make a phone call to the outside, without actually dialing. Notably, the phone call by use of the hands-free phone 18 is realized through establishment of a voice communication line, which is established via the microcomputer 11 and by means of the radio communication between the communication unit 15 and the relay unit 40.

The emergency reporting switch 19 is depressed or operated by the driver or a passenger when an anomalous state occurs in the vehicle, or an occupant (the driver or a passenger) has suddenly become ill. When the emergency reporting switch 19 is depressed or operated by the driver or the passenger, the emergency reporting switch 19 supplies the microcomputer 11 with an emergency signal indicating that an emergency event has occurred.

As shown in FIG. 3, the center 20 includes a control unit 21, a storage unit 22, a communication unit 23, a display unit 24, and an external communication interface 25 (hereinafter referred to as the "external communication I/F 25"), which are connected with one another for mutual communications. The control unit 21 contains, as main components, a CPU, ROM, RAM, and a timer. The control unit 21 comprehensively controls operations of the storage unit 22, the communication unit 23, and the display unit 24 by executing various programs, including a program that is shown in FIG. 4 on the side of the center. Thus, the control unit 21 executes various types of processing, such as processing for issuing and transmitting acceptance information, on the basis of coping-request information received from the onboard information terminal apparatus 10, as will be described later.

The storage unit 22 includes recording mediums such as a hard disk,

CD-ROM, and DVD-ROM, and drive mechanisms for the recording mediums. The storage unit 22 stores various programs, including the above-described programs to be executed by the control unit 21, and various data. Further, a road database 22a is formed on the hard disk of the storage unit 22 in order to retrievably store detailed roadmaps of regions throughout the country. Notably, the road database 22a is updated at a predetermined frequency, so that the road database 22a stores the latest, detailed road data.

The communication unit 23 enables radio communications with the onboard information terminal apparatus 10. An antenna 23a for radio communication is connected to the communication unit 23. Communications (transmission and reception) between the onboard information terminal apparatus 10 and the center 20 are performed by means of radio, via the antennae 15a and 23a. The communications are performed in an ordinary manner, and have no particular features. Therefore, when the term "reception" or "transmission" is simply used in the following description, this means that reception or transmission is performed, while a proper communication method is employed.

The display unit 24 is formed by an unillustrated liquid crystal display or the like, and is adapted to display the present position of vehicles and acceptance information in a related manner, as will be described later. The external communication I/F 25 is connected to the network 30, and is adapted to establish voice communication lines with the relay station 40, the firehouse 50, and the police station 60. Therefore, a phone 26, which an operator at the center 20 uses, is connected to the external communication I/F 25. By use of the phone 26, the operator at the center 20 can make a

call with the driver or a passenger via the hands-free phone 18, or can transmit necessary information to the firehouse 50 or the police station 60.

Next, operation of the emergency reporting system having the above-described configuration will be described in detail. When an unillustrated ignition switch of the vehicle is turned on, the microcomputer 11 of the onboard information terminal apparatus 10 starts execution of the emergency reporting program shown in FIG. 4. The emergency reporting program is started from step S10. In step S11, the microcomputer 11 determines whether the emergency reporting switch 19 has been depressed (operated) by an occupant of the vehicle.

Specifically, the microcomputer 11 determines whether the emergency reporting switch 19 has been depressed (operated) by the occupant, on the basis of whether an emergency signal is supplied from the emergency reporting switch 19. When the emergency reporting switch 19 has not been depressed (operated) by the occupant; i.e., when the emergency signal is not supplied from the emergency reporting switch 19, the microcomputer 11 performs a "No" determination. The microcomputer 11 performs a "No" determination and repeatedly performs step S11 until the emergency reporting switch 19 is depressed (operated) by the occupant and the microcomputer 11 receives the emergency signal.

Meanwhile, when the emergency reporting switch 19 has been depressed (operated) by the occupant; i.e., when the microcomputer 11 has received the emergency signal, the microcomputer 11 performs a "Yes" determination, and proceeds to step S12. In step S12, the microcomputer 11 establishes a voice communication line between the hands-free phone 18 and the phone 26 at the center 20. Specifically, the microcomputer 11

instructs the hands-free phone 18 to dial the phone number of the phone 26 at the center 20. In accordance with the instruction, the hands-free phone 18 obtains the phone number of the phone 26 previously stored in the external memory unit 16, and dials the obtained phone number.

When the hands-free phone 18 dials the phone number of the phone 26, a signal output in response to the dialing is radio-transmitted to the relay station 40 via the microcomputer 11 and the communication unit 15. The relay station 40 performs predetermined connecting processing so as to transmit the received signal to the phone 26 at the center 20 via the network 30.

As a result, the phone 26 rings. When the operator at the center 20 picks up the receiver of the phone 26, a voice communication line is established between the hands-free phone 18 and the phone 26. Since the voice communication line established between the hands-free phone 18 and the phone 26 enables the occupant of the vehicle and the operator at the center 20 to talk to each other, the occupant can report to the operator the details of the emergency event that has occurred.

After completion of the voice-communication-line establishing processing in step S12, the microcomputer 11 proceeds to step S13 so as to detect the present position of the vehicle. Specifically, the microcomputer 11 obtains the detection data and values output from the GPS receiver 12, the gyroscope 13, and the vehicle speed sensor 14, and detects the present position of the vehicle. Subsequently, the microcomputer 11 temporarily stores the detected present position of the vehicle in unillustrated RAM as present position information consisting of coordinate data, and then proceeds to step S14. Notably, in the case where a navigation system is

mounted on the vehicle, and the present position of the vehicle is detected continuously; the microcomputer 11 obtains from the navigation system present position information representing the present position, and temporarily stores the information in the RAM.

In step S14, the microcomputer 11 transmits the present position information to the center 20. Specifically, the microcomputer 11 supplies the communication unit 15 with the present position information that has been temporarily stored in the RAM in step S13. Subsequently, the microcomputer 11 instructs the communication unit 15 to transmit the supplied present position information to the center 20. In accordance with the instruction, the communication unit 15 transmits the supplied present position information to the center 20.

At the center 20, the control unit 21 receives, in step C10, the present position information transmitted from the onboard information terminal apparatus 10 by means of the transmission processing in the above-described step S14. The control unit 21 temporarily stores the received present position information in unillustrated RAM, and proceeds to step C11.

In step C11, the control unit 21 issues acceptance information for the present position information received in the above-described step C10. Specifically, every time the control unit 21 receives present position information from the onboard information terminal apparatus 10, the control unit 21 assigns a number to the present position information, wherein the number increments in accordance with the order of reception. The control unit 21 issues the assigned number as acceptance information. After issuance of the acceptance information, the control unit 21 stores the

present position information and the acceptance information, in a mutually related manner, at a predetermined storage position of the storage unit 22, and then proceeds to step C12.

In step C12, the control unit 21 displays an acceptance number represented by the acceptance information stored in the storage unit 22 in the above-described step C11, and the present position of the vehicle represented by the present position information, in such a manner that the acceptance number and the present position are displayed in a mutually related manner. This display operation will be described with reference to FIG. 5. First, the control unit 21 retrieves the acceptance information and the present position information, which are stored in the predetermined storage position of the storage unit 22 in a mutually related manner. Subsequently, the control unit 21 supplies the retrieved acceptance information and present position information to the display unit 24, and instructs the display unit 24 to display these pieces of information.

The display unit 24 receives the acceptance information and the present position information supplied from the control unit 21. Further, the display unit 24 searches the road database 22a of the storage unit 22, and retrieves a road map around the present position of the vehicle represented by the received present position information. Subsequently, in accordance with the instruction from the control unit 21, the display unit 24 displays, on the liquid crystal display, the obtained road map, the acceptance number represented by the acceptance information, and the present position of the vehicle represented by the present position information, in such a manner that the acceptance number and the present position are displayed on the road map in a mutually related manner, as shown in FIG. 5. At this time,

the display unit 24 also displays the position (e.g., address) of the obtained road map on the liquid crystal display.

After completion of the display processing in the above-described step C12, the control unit 21 transmits to the onboard information terminal apparatus 10 the acceptance information issued in the above-described step C11. Specifically, the control unit 21 retrieves the acceptance information stored in the predetermined storage position of the storage unit 22. Subsequently, the control unit 21 supplies the retrieved acceptance information to the communication unit 23, and instructs the communication unit 23 to transmit the acceptance information to the onboard information terminal apparatus 10. The communication unit 23 receives the supplied acceptance information and transmits the received acceptance information to the onboard information terminal apparatus 10 in accordance with the instruction.

At the onboard information terminal apparatus 10, the microcomputer 11 receives, in step S15, the acceptance information transmitted from the center 20 by means of the transmission processing in the above-described step C13, and then proceeds to step S16. In step S16, as shown in FIG. 6, the microcomputer 11 displays, on the liquid crystal display of the display unit 17, the acceptance number represented by the acceptance information received in the above-described step S15.

A telephone conversation between the occupant of the vehicle and the operator at the center 20 in the state in which the acceptance number is displayed on the liquid crystal display of the display unit 17 will be briefly described with reference to FIGS. 5 and 6. By use of the hands-free phone 18, the occupant reports to the operator at the center 20 the acceptance

number displayed on the liquid crystal display of the display unit 17; i.e., "1234" shown in FIG. 6. While utilizing the display unit 24 that displays data as shown in FIG. 5, the operator at the center 20 ascertains the present position of the vehicle which is related to the acceptance number "1234" reported from the occupant.

Through this ascertainment, the operator at the center 20 can confirm the present position of the vehicle which rides the occupant with whom the operator is presently talking by use of the phone 26. In accordance with the details of the emergency event reported from the occupant, the operator copes with the emergency event by, for example, requesting the firehouse 50 to dispatch an ambulance and/or requesting the police station 60 to dispatch a police patrol car.

After completion of the display processing in the above-described step S16, the microcomputer 11 proceeds to step S17 so as to break the voice communication line between the hands-free phone 18 and the phone 26. After completion of breakage of the voice communication line, the microcomputer 11 ends the program in step S18.

As can be understood from the above description, in the emergency reporting system according to the present embodiment, the onboard information terminal apparatus 10 can operate in such a manner that when the emergency reporting switch 19 is depressed (operated), the hands-free phone 18 automatically dials the number of the phone 26 at the center 20 to thereby establish a voice communication line. Further, the onboard information terminal apparatus 10 can transmit present position information representing the present position of the vehicle when the emergency reporting switch 19 is depressed (operated).

Meanwhile, the center 20 can issue acceptance information in response to reception of the present position information from the onboard information terminal apparatus 10. Further, the center 20 can display the issued acceptance information and the present position information, in a mutually related manner, on the display unit 24. Moreover, the center 20 can transmit the issued acceptance information to the onboard information terminal apparatus 10. The onboard information terminal apparatus 10 can display the received acceptance information on the display unit 17.

Therefore, when an anomalous state occurs in the vehicle or an occupant suddenly becomes ill, the occupant can easily report such an emergency event to the center 20, and can explain the emergency event to the operator at the center 20 over the phone. Moreover, by use of the hands-free phone 18, the occupant can report to the operator the acceptance information displayed on the display unit 17. By viewing the display screen of the display unit 24, the operator can quite easily establish the correspondence between the occupant with whom the operator is presently talking and the present position of the vehicle in which the occupant rides. Therefore, the operator can quickly and appropriately cope with the emergency event.

Although the embodiment of the present invention has been described above, the present invention is not limited to the above-described embodiment, and may be modified in various manners, without departing from the scope of the invention.

In the above-described embodiment, when the emergency reporting switch 19 is depressed (operated) by an occupant of the vehicle, a voice communication line is established between the hands-free phone 18 and the

phone 26, and then present position information is transmitted to the center 20. However, the embodiment may be modified in such a manner that when the emergency reporting switch 19 is depressed (operated) by an occupant of the vehicle, present position information is transmitted to the center 20, and then a voice communication line is established between the hands-free phone 18 and the phone 26.

In this case, as well as in the case of the above-described embodiment, the operator at the center 20 can quite easily establish the correspondence between the vehicle occupant with whom the operator is presently talking and the present position of the vehicle in which the occupant rides. Therefore, the operator can quickly and appropriately cope with the emergency event.

CLAIMES

1. An emergency reporting method for reporting an emergency event occurred in a vehicle from a terminal apparatus mounted on the vehicle to a center communicable with the terminal apparatus, wherein the terminal apparatus detects a predetermined operation of an occupant in the vehicle, establishes a voice communication line between the terminal apparatus and the center to thereby enable a phone call between the occupant of the vehicle and an operator at the center via the established voice communication line, and transmits to the center present position information representing a present position of the vehicle;

the center receives the transmitted present position information, accepts the received present position information, issues acceptance information for the accepted present position information, displays the issued acceptance information and the received present position information in a mutually related manner, and transmits the issued acceptance information to the terminal apparatus; and

the terminal apparatus receives the transmitted acceptance information, and displays the received acceptance information.

2. An emergency reporting method for reporting an emergency event occurred in a vehicle from a terminal apparatus mounted on the vehicle to a center communicable with the terminal apparatus, wherein the terminal apparatus detects a predetermined operation of an occupant in the vehicle, transmits to the center present position information representing a present position of the vehicle, and establishes a voice

communication line between the terminal apparatus and the center to thereby enable a phone call between the occupant of the vehicle and an operator at the center via the established voice communication line;

the center receives the transmitted present position information, accepts the received present position information, issues acceptance information for the accepted present position information, displays the issued acceptance information and the received present position information in a mutually related manner, and transmits the issued acceptance information to the terminal apparatus; and

the terminal apparatus receives the transmitted acceptance information, and displays the received acceptance information.

3. An emergency reporting system which comprises a terminal apparatus mounted on a vehicle, and a center communicable with the terminal apparatus, and in which terminal apparatus reports to the center an emergency event occurred in the vehicle,

wherein the terminal apparatus comprises:

predetermined-operation detection means for detecting a predetermined operation of an occupant in the vehicle;

present position detection means for detecting a present position of the vehicle;

terminal voice-communication-line establishing means for establishing a voice communication line between the terminal apparatus and the center;

terminal phone means for enabling the occupant to make a phone call to an operator at the center by use of the voice communication line

established by the terminal voice-communication-line establishing means;

present-position-information transmitting means for transmitting present position information to the center, the present position information representing the present position of the vehicle detected by the present position detection means;

acceptance-information receiving means for receiving acceptance information issued by the center; and

display means for displaying the acceptance information received by the acceptance-information receiving means,

wherein the center comprises:

present-position-information receiving means for receiving the present position information transmitted from the terminal apparatus;

center voice-communication-line establishing means for establishing a voice communication line between the center and the terminal apparatus;

center phone means for enabling the operator to make a phone call to the occupant of the vehicle by use of the voice communication line established by the center voice-communication-line establishing means;

acceptance-information issuing means for accepting the present position information received by the present-position-information receiving means, and for issuing acceptance information for the accepted present position information;

display means for displaying the acceptance information issued by the acceptance-information issuing means and the present position information received by the present-position-information receiving means in a mutually related manner; and

acceptance-information transmitting means for transmitting to the

terminal apparatus the acceptance information issued by the acceptance-information issuing means.

4. An emergency reporting apparatus mounted on a vehicle and adapted to report to an outside an emergency event occurred in the vehicle, comprising:

predetermined-operation detection means for detecting a predetermined operation of an occupant in the vehicle;

present position detection means for detecting a present position of the vehicle;

voice-communication-line establishing means for establishing a voice communication line between the apparatus and the outside;

phone means for enabling the occupant to make a phone call to the outside by use of the voice communication line established by the voice-communication-line establishing means;

present-position-information transmitting means for transmitting present position information to the outside, the present position information representing the present position of the vehicle detected by the present position detection means;

acceptance-information receiving means for receiving acceptance information from the outside, the acceptance information representing acceptance of the present position information transmitted by the present-position-information transmitting means; and

display means for displaying the acceptance information received by the acceptance-information receiving means.

5. A center which receives from an outside a report regarding an emergency event occurred outside, and copes with the emergency event, comprising:

present-position-information receiving means for receiving present position information from the outside;

voice-communication-line establishing means for establishing a voice communication line between the center and the outside;

phone means for making a phone call to the outside by use of the voice communication line established by the voice-communication-line establishing means;

acceptance-information issuing means for accepting the present position information received by the present-position-information receiving means, and for issuing acceptance information for the accepted present position information;

display means for displaying the acceptance information issued by the acceptance-information issuing means and the present position information received by the present-position-information receiving means in a mutually related manner; and

acceptance-information transmitting means for transmitting to the outside the acceptance information issued by the acceptance-information issuing means.