UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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CUB ELECPARTS INC.

Petitioner

v.

ORANGE ELECTRONIC CO., LTD.

Patent Owner

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Patent No. 8,031,064 C3

IPR2024-00744

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PETITIONER'S MOTION FOR LEAVE TO SUBSTITUTE EXHIBITS

LIST OF EXHIBITS FOR WHICH SUBSTITUION IS REQUESTED

Old Exhibit Number	**Old Exhibit Content**	**New Exhibit Number**	**New Exhibit Content**
1005	JP 2006/15832 and Machine Translation (Matsui)	1010	JP 2006/15832 and Certified Translation (Matsui)
1009	Taiwan Patent Office Invalidation Proceeding (translated)	1011	Taiwan Patent Office Invalidation Proceeding (translated) with Translation Certification

Petitioner respectfully requests substitution of original Exhibit 1005 for new Exhibit 1010 and substitution of original Exhibit 1009 for new Exhibit 1011.

A table is presented below matching each paragraph of the machine translation of Exhibit 1005 with the new certified translation of Exhibit 1010 showing that they are nearly identical. Paragraphs [0034]-[0035], the only quoted portions of this Exhibit, are highlighted. The two translations differ only with respect to grammatical changes due to the large difference between Japanese grammar (in which the verb is positioned at the end of the sentence) and English grammar.

In the alternative, as the current translator has indicated that the original translation is technically accurate, Petitioner can provide a certification for the originally-filed machine translation regarding its accuracy if this is more acceptable to the Board and in order to minimize any potential prejudice to the Patent Owner.

Regarding the Taiwan invalidation proceedings, Exhibit 1009, these proceedings were translated by a Taiwanese patent professional. However, a certificate of translation was not provided with the April, 2024 filing. Exhibit 1011 is identical to Exhibit 1009 with only the addition of the translator's certificate of translation.

Both of the above issues were raised in Patent Owner's Preliminary Response; therefore, the Petitioner is requesting the substitution in order to provide a more

complete record. Petitioner apologizes for failing to include this information with the original Exhibits.

Date: 30 August 2024

Respectfully submitted,

/*Margaret Burke*/

Margaret Burke
Reg. No. 34,474
Counsel for Petitioner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that, on the date below, a copy of this Petitioner's Motion with copies of the proposed Exhibit 1010 and a copy of the translator's certificate for proposed Exhibit 1011 were served on the Patent Owner at the following e-mail addresses:

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Dated: 30 August 2024

Respectfully submitted,
/ Margaret Burke /
Margaret Burke
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COMPARISON BETWEEN EXHIBIT 1005 AND PROPOSED EXHIBIT 1010

EXHIBIT 1005 Matsui Machine Translation (4/3/24)	**EXIBIT 1010 (Proposed) Matsui Ng Translation (8/30/24)**
[0001] The present invention relates to a so-called tire pressure monitoring system, and more specifically relates to a technique for setting an ID on a transmitter used in a tire pressure monitoring system.	【0001】The present invention relates to a so-called tire pressure monitoring system, and more specifically, to a technology for setting an ID in a transmitter used in a tire pressure monitoring system.
[Background Technology] [0002] Today, in vehicles such as passenger cars, trucks, buses, etc. having wheels with tires assembled on rims (wheels), tire pressure, temperature, etc. are constantly monitored, and from the monitoring results, whether there is an abnormality in the tire is determined, and when necessary, an abnormality such as tire pressure is notified to the driver.	【Background Art】 【0002】Today, in vehicles such as passenger cars, trucks, buses, etc., which have wheels with tires mounted on rims (wheels), there are known tire pressure monitoring systems that constantly monitor the tire's status, such as air pressure and temperature, and determine whether there is an abnormality in the tire based on the monitoring results, notifying the driver of any abnormality in tire pressure or other issues when necessary, thereby improving vehicle safety.
For example, in the tire cavity area surrounded by the inner peripheral surface of the tire and the bottom surface of the bottom of the rim and filled with air, a pressure sensor that measures air pressure and a transmitter that wirelessly transmits air pressure data measured by this pressure sensor are provided as integral. Such a sensor transmitter (hereinafter simply referred to as a transmitter) is attached to each wheel or tire, so that it can be distinguished, and an ID code is assigned. Each transmitter sends its own ID code together when transmitting information such as air pressure collected by the sensor. On the other hand, an antenna of a receiver that receives information from the transmitter is provided in the vicinity of the tire house on the body side of the car body, and air pressure data is received by this antenna.	【0003】For example, in the tire cavity region, which is enclosed by the inner circumferential surface of the tire and the bottom surface of the rim, where air is filled, a pressure sensor for measuring the air pressure and a transmitter for wirelessly transmitting the air pressure data measured by this pressure sensor are provided as an integrated unit. Since such a sensor-cum-transmitter (hereinafter simply referred to as "transmitter") is installed for each wheel or tire, an ID code is assigned to distinguish them. Each transmitter, when transmitting information such as air pressure collected by the sensor, transmits its own ID code along with it. On the other hand, an antenna for the receiver that receives the information from the transmitter is provided near the tire house on the vehicle body side, and this antenna receives the air pressure data.

[0004] The receiver compares the received ID code with the ID registered in the receiver (for example, Patent Document 1) to determine at which position the transmitted ID code is from the tire attached.	【0004】 In the receiver, the received ID code is compared with the ID registered in the receiver (for example, Patent Document 1) to determine which tire the transmitted ID code belongs to, and then it is judged whether the air pressure of the identified tire is abnormal or not, and if abnormal, a notification that the air pressure is abnormal is given to the driver.
[0005] As an art for setting and registering a transmitter ID, for example, there is Patent Document 2. In Patent Document 2, the setting device wirelessly transmits the ID to be set by the transmitter to set it to the transmitter and causes the transmitter to set it, and the mounting position information of the wheel separately set and input is wirelessly transmitted to the receiver.	【0005】 As a technology for setting and registering the transmitter ID, Patent Document 2 is known. In Patent Document 2, the setting device transmits the ID to be set to the transmitter wirelessly, setting the ID in the transmitter, and then transmits this ID along with separately set input wheel mounting position information to the receiver wirelessly, allowing the receiver to correlate the ID with the mounting position and register this correlation.
[Patent Document 1] JP 07-507513 [Patent Document 2] Japanese Patent Application No. 2003-109565	【Patent Document 1】 Japanese Patent Publication No. Hei 07-507513 【Patent Document 2】 Japanese Patent Application No. 2003-109565
[Disclosure of Invention] [Problem to be solved by the invention] [0006] As described above, in the conventional tire pressure monitoring system, the transmitter transmits an individually set transmitter ID and registers it with the receiver. However, in the case of this method, there are the following problems. Each transmitter must have a unique transmitter ID, and the work and management of giving an ID to each transmitter at the time of manufacturing is costly. For this purpose, a setting device having the function of setting a transmitter ID on the transmitter and registering the set ID with the receiver is required. It takes a lot of time and effort to enter the transmitter ID for each transmitter when registering from the setting device. - If	【Disclosure of the Invention】 【Problem to be Solved by the Invention】 【0006】 In the conventional tire pressure monitoring system as described above, the general method is to have each transmitter transmit its individually set transmitter ID and register it with the receiver to register the transmitter ID. However, this method has the following problems: • Each transmitter must have a unique transmitter ID, which incurs costs for assigning and managing the ID for each transmitter during manufacturing. For this, a configuration device with the function to set the transmitter ID on the transmitter and register the set ID in the receiver is required.

another transmitter ID is registered with the same transmitter ID as the transmitter ID set and registered with one setting unit, there is a risk of inducing malfunction between systems. If a third party rewrote the transmitter ID, the administrator had no way of knowing this.	• It is very laborious to input the transmitter ID for each transmitter when registering from the configuration device. • If the same transmitter ID registered by one configuration device is registered by another configuration device, there is a risk of inducing malfunction between systems. • If a third party rewrites the transmitter ID, the administrator had no means of knowing this.
[0007] Considering the above points, it is convenient to have a system in which the setting device can automatically generate a transmitter ID as needed, set it to the transmitter and register it with the receiver, and the set transmitter ID does not overlap with the transmitter ID set by a different setting device. An object of the present invention is to provide such a transmitter ID management method and setting device	【0007】Considering the above points, it would be convenient to have a system where the configuration device automatically generates the transmitter ID as needed, sets it on the transmitter, and registers it in the receiver, ensuring that the set transmitter ID does not overlap with transmitter IDs set by different configuration devices. The present invention aims to provide such a transmitter ID management method and configuration device.
[Measures to solve the problem] In order to achieve the above objects, the present invention provides, in one aspect, a method for setting a transmitter identifier on a transmitter of a tire pressure monitoring system. The transmitter identifier setting method of the present invention includes writing a setting device identifier unique to each shipped identifier setter to a non-rewritable memory, and writing a predetermined initial value for a predetermined number of variable codes into a non-volatile rewritable memory. A generation step for generating a new transmitter identifier by combining a value advanced by one unit of the variable code of the finally set setting device identifier and the setting device identifier, and the step of transmitting the new transmitter identifier are included.	【Means for Solving the Problem】 【0008】To achieve the above objectives, the present invention provides, on one aspect, a method for setting a transmitter identifier in a transmitter of a tire pressure monitoring system. The method for setting the transmitter identifier of the present invention includes the steps of writing a unique configuration device identifier into a non-rewritable memory of the shipped identifier configuration device, writing a predetermined initial value for a variable code of a predetermined number of digits into a rewritable non-volatile memory, generating a new transmitter identifier by combining a value obtained by advancing the variable code by one unit from the last set configuration device identifier with the configuration device identifier in response to a setting instruction by a predetermined operation, and transmitting the new transmitter identifier.

[0009] The generation step preferably generates a new transmitter identifier by concatenating a value obtained by advancing the variable sign one unit after the setting device identifier. The present invention provides a setting device for setting a transmitter identifier to a transmitter of a tire pressure monitoring system in another aspect. The setting device of the present invention includes an irrevritable storage means for storing a unique setting device identifier, and a non-volatile rewritable storage means for storing a variable code of a predetermined number of digits constituting a part of the last set or next set setting device identifier. After generating a new transmitter identifier by combining the setting device identifier and the variable code with a value advanced by one unit, the value advanced by one unit is written as the variable code to the rewritable storage means, and the variable code constitutes a part of the setting device identifier to be set next. A generating unit for writing a value advanced by one unit of the variable code as the variable code to the rewritable storage means, and a means for transmitting the new transmitter identifier.	【0009】It is preferable that the generating step generates the new transmitter identifier by concatenating the value obtained by advancing the variable code by one unit after the configuration device identifier. The present invention also provides, on another aspect, a configuration device for setting a transmitter identifier in a transmitter of a tire pressure monitoring system. The configuration device of the present invention includes a non-rewritable storage means for storing a unique configuration device identifier, a rewritable non-volatile storage means for storing a variable code of a predetermined number of digits that constitutes part of the last set or the next to be set configuration device identifier, a generation means that, in response to a setting instruction by a predetermined operation, when the variable code constitutes part of the last set configuration device identifier, combines the configuration device identifier with the value obtained by advancing the variable code by one unit to generate a new transmitter identifier, writes the advanced value as the variable code into the rewritable storage means, and when the variable code constitutes part of the next to be set configuration device identifier, combines the configuration device identifier with the variable code to generate a new transmitter identifier, and then advances the variable code by one unit, writing it as the variable code into the rewritable storage means, and a means for transmitting the new transmitter identifier.
[0010] The generation means preferably generates a new transmitter identifier by concatenating a value in which the variable code is advanced by one unit or the variable code as it is after the setting device identifier. Means for allowing input of the tire position and means for associating and transmitting the new transmitter identifier after transmitting the new transmitter	【0010】The generation means preferably generates the new transmitter identifier by concatenating the variable code as it is or after advancing by one unit after the configuration device identifier. The configuration device may further include means to input the tire position and means to relate and transmit the new transmitter

identifier may be further comprised of transmitting in association with the tire position.	identifier and the tire position after transmitting the new transmitter identifier.
[0011] A means for inputting the number of transmitters to be set, an means for receiving the number of setting instructions, and a means for transmitting the transmitter identifier set according to the number of setting instructions after the operation according to the setting instructions for the number of transmitters is completed. In one embodiment, the means for transmitting so that the correspondence with the tire position can be understood, includes means for transmitting the transmitter identifiers set according to the number of setting instructions in the order in which they are set.	【0011】The configuration device may further include means to input the number of transmitters to be set, means to receive setting instructions corresponding to the number, and means to transmit the transmitter identifiers set according to the number after the setting operations corresponding to the number are completed, so that the correspondence with each tire position is clear. 【0012】In one embodiment, the means for transmitting the correspondence with the tire position consists of means for sequentially transmitting the transmitter identifiers set according to the number in the order they were set.
[Effect of the invention] [0013] According to the present invention, whether the transmitter identifier is registered individually or collectively, the user does not need to manage the transmitter identifier at all, and the identifier can be automatically assigned.	【Effect of the Invention】 【0013】According to the present invention, whether registering transmitter identifiers individually or collectively, the user does not need to manage the transmitter identifiers at all, as they can be automatically assigned.
[0014] According to the present invention, each setting device has a unique setting device ID, and since the transmitter identifier is used to generate a transmitter identifier, it is easy to find when the transmitter ID is illegally rewritten. Further, since the transmitter identifier is assigned in order, the registration date can be specified approximately from the transmitter identifier.	[0014] According to the present invention, each configuration device has a unique configuration device ID, and since the transmitter identifier is generated using the configuration device identifier, it is easier to detect if a transmitter ID has been fraudulently rewritten. Furthermore, since the transmitter identifiers are assigned sequentially, the approximate registration date can be identified from the transmitter identifier.
[The best form for implementing the invention] [0015] Hereinafter, the present invention will be described in detail with reference to	Best Mode for Carrying Out the Invention [0015]Below, the embodiments of the present invention will be described in detail with

embodiments of the present invention and accompanying drawings. In addition, when the same element is shown in a plurality of drawings, the same reference numerals are attached. FIG. 1 shows a tire pressure monitoring system 1 for a large vehicle 90 such as a truck or bus. As shown in FIG. 1, the vehicle 90 has a plurality of wheels 92, each wheel 92 is an assembly of a tire and a rim (wheel), and each wheel is mounted in a predetermined mounting position. T1 ~ T6 specifies a position in which the tire 92 is mounted, and may be a mere sequence number or a combination of letters and numbers. The transmitter 4 is installed and fixed on the bottom of a rim constituting a wall surface of the tire cavity area of each wheel 92, and transmits measured air pressure data or the like wirelessly. In addition to a transmission function that mainly transmits air pressure data and temperature data, the transmitter also has a reception function for receiving a predetermined signal. Since the transmitter 4 is attached to each tire 92, it can be identified by tire position information T1 ~ T6 in the same way as a tire.	reference to the accompanying drawings. Identical reference numerals are used for the same elements across multiple drawings. Figure 1 shows a tire pressure monitoring system 1 for large vehicles such as trucks and buses 90. As shown in Figure 1, the vehicle 90 has multiple wheels 92, each wheel 92 being an assembly of a tire and a rim (wheel), and each wheel is mounted in a predetermined mounting position. T1 to T6 are used to specify the positions where tires 92 are mounted; they can be simple sequence numbers or combinations of letters and numbers. [0016] A transmitter 4 is installed and fixed on the bottom surface of the rim that forms one wall of the tire cavity of each wheel 92 and transmits the measured air pressure data and other information wirelessly. The transmitter has not only a primary function of transmitting air pressure data and temperature data but also a receiving function for receiving predetermined signals. Since the transmitter 4 is attached to each tire 92, it can be identified in the same way as the tire position information T1 to T6.
[0017] A receiver communication unit 5 is provided in the vicinity of each mounting position where the wheel 92 of the vehicle 90 is attached, and receives information transmitted wirelessly from the transmitter 4. Further, the receiver communication unit 5 has an antenna and an amplifier, and is connected to the receiver main unit 6 with a cable or the like. Then, each receiver communication unit 5 communicates with the transmitter 4 attached to a nearby tire. The receiver body unit 6 is connected to a display 7 that notifies the driver of air pressure data. FIG. 2 is a diagram showing a configuration of the transmitter 4 of FIG.1 In	[0017] Near each mounting position for the wheels 92 of the vehicle 90, a receiver communication unit 5 is provided to receive information transmitted wirelessly from the transmitter 4. The receiver communication unit 5 includes an antenna and an amplifier and is connected to the receiver main unit 6 via a cable or the like. Each receiver communication unit 5 communicates with the transmitter 4 mounted on a nearby tire. [0018]The receiver main unit 6 is connected to a display unit 7 that notifies the driver of the air pressure data.

FIG. 2, the transmitter 4 includes a communication control unit 24, a pressure sensor 9, and a temperature sensor 10.	Figure 2 shows the configuration of the transmitter 4 of Figure 1. In Figure 2, the transmitter 4 comprises a communication control unit 24, a pressure sensor 9, and a temperature sensor 10.
[0019] The pressure sensor 9 measures tire pressure using a semiconductor pressure sensor that measures gauge pressure, differential pressure, or absolute pressure, or the like. The temperature sensor 10 is a semiconductor temperature sensor, a resistive element type temperature sensor, or the like, and measures the temperature in the cavity region of the tire. The communication control unit 24 includes an AD conversion circuit 11 connected to the pressure sensor 9 and the temperature sensor 10, a timer circuit 12, a microprocessor 13, a memory 14, an RF (radio frequency) transmission circuit 15, an LF (low frequency) receiving circuit 16, a transmission antenna 17, a receiving antenna 18, and a battery 19 as a power source for each circuit. When the tire pressure is in a predetermined allowable range set in advance, the timer circuit 12 performs measurement intervals and transmission intervals for repeatedly transmitting tire pressure and temperature measurement results from the transmission antenna 17 to the receiver communication unit at regular intervals, for example, every 10 minutes.	[0019] The pressure sensor 9 measures the tire’s air pressure using a semiconductor pressure sensor or a capacitive pressure sensor to measure gauge pressure, differential pressure, or absolute pressure. The temperature sensor 10, which can be a semiconductor temperature sensor or a resistive temperature sensor, measures the temperature within the tire cavity. The communication control unit 24 consists of an AD conversion circuit 11 connected to the pressure sensor 9 and the temperature sensor 10, a timer circuit 12, a microprocessor 13, a memory 14, an RF (radio frequency) transmission circuit 15, an LF (low frequency) reception circuit 16, a transmission antenna 17, a reception antenna 18, and a battery 19 as the power source for the circuits. The timer circuit 12 manages the measurement interval and transmission interval, repeating the transmission of the tire’s air pressure and temperature measurement results at a constant interval, such as every 10 minutes, when the tire's air pressure is within a predetermined permissible range.
[0020] Since a large drive power is required when the AD conversion circuit 11, the microprocessor 13, and the RF transmission circuit 15 are constantly driven, when the tire pressure is normal by the timer circuit 12, it is driven at regular time intervals, and the rest of the transmitter 4 (simply referred to as 4 except for referring to a specific transmitter) is processed and transmitted in a sleep mode that is suspended. Thereby, the consumption of the battery 19 is reduced, and the transmitter 4 can monitor the tire pressure over a long period of time.	[0020] Since constant driving of the AD conversion circuit 11, the microprocessor 13, and the RF transmission circuit 15 requires a significant amount of power, the timer circuit 12 ensures that when the tire's air pressure is normal, it operates at regular intervals and otherwise puts the transmitter 4 (referred to as 4 unless specifically referring to a particular transmitter) into a sleep mode, halting processing and transmission. This reduces battery 19 consumption and allows the transmitter 4 to monitor the tire’s air pressure over a long period.

[0021] The microprocessor 13 uses the AD-converted air pressure data and temperature data and the identification information (TID) and data signal (data such as word length) of the transmitter 4 called from the memory 14 to generate a transmission signal to be transmitted to the receiver communication unit 5 disposed in the vicinity.	[0021] The microprocessor 13 generates a transmission signal to be sent to the nearby receiver communication unit 5 using the AD-converted air pressure data and temperature data and the transmitter 4's identification information (TID) and data signals (such as word length). It also stores a new TID in the memory 14 and controls the operation of each circuit.
[0022] Further, a new TID is stored in the memory 14 to control the operation of each circuit. The memory 14 can store measured air pressure data, temperature data, and the like, in addition to storing the TID of the transmitter 4. The RF transmission circuit 15 modulates, amplifies and transmits a carrier wave according to an oscillator circuit (not shown) that generates a carrier wave at a predetermined frequency, for example, 315 MHz, and a transmission signal generated by the microprocessor 13. The modulation method of the carrier wave can be any suitable method.	[0022] The memory 14 not only stores the TID of the transmitter 4 but can also store the measured air pressure data and temperature data. The RF transmission circuit 15 generates a carrier wave of a predetermined frequency, such as 315 MHz, using an oscillator (not shown), and modulates and amplifies the carrier wave according to the transmission signal generated by the microprocessor 13. Any suitable modulation method for the carrier wave is acceptable.
[0023] According to the present invention, the LF receiving circuit 16 receives a signal transmitted from the setting device described later, and when the strength, frequency, duration, and the like of the received signal meet predetermined conditions, it has a function of supplying a signal indicating that it is a TID transmission instruction to the microprocessor 13.	[0023] According to the present invention, the LF reception circuit 16 has the function of receiving signals transmitted from the setting device described later, and if the received signal meets certain conditions regarding signal strength, frequency, and duration, it provides a signal indicating that it is a TID transmission instruction to the microprocessor 13.
[0024] In order to enable the transmitter TID to be changed, the received signal includes the TID input set in the setting device, and after extracting the TID contained in the signal received by the microprocessor 13, this TID may be stored in the memory 14 as a new TID of the transmitter.	[0024]To allow for changes in the transmitter TID, the received signal may include the TID set in the setting device. After extracting the TID contained in the received signal by the microprocessor 13, this TID can be stored in the memory 14 as the new TID of the transmitter.
[0025] The antenna 17 is configured to emit radio waves of 315 MHz, for example, toward the receiver communication unit 5a and the	[0025] The antenna 17 is configured to radiate, for example, 315 MHz radio waves toward the receiver communication unit 5a

setting device. The antenna 18 is configured to receive, for example, 125 kHz radio waves from the setting device. Since there is an extremely large difference in the operating frequency that is the operating condition of the radio waves in the antennas 17 and 18, the antenna 17 and the antenna 18 have a separate configuration so that the antenna can efficiently transmit and receive. For the battery 19, a known battery such as CR-613 (coin-type lithium manganese dioxide battery) is used, for example. Next, FIG. 3 is a configuration diagram showing a receiver body unit 6 and a receiver communication unit 5 connected thereto. Each receiver communication unit 5 includes an antenna 20 and an amplifier circuit (AMP) 21. The antenna 20 is configured to receive radio waves transmitted from the transmitter 4.	and the setting device. The antenna 18 is configured to receive, for example, 125 kHz radio waves from the setting device. Since there is a significant difference in operating frequencies between the antennas 17 and 18, to ensure efficient transmission and reception, antennas 17 and 18 are separately configured. The battery 19 may be a known battery such as a CR-613 (coin-type lithium manganese dioxide battery). [0026] Next, Figure 3 shows a configuration diagram of the receiver main unit 6 and the connected receiver communication unit 5. Each receiver communication unit 5 includes an antenna 20 and an amplification circuit (AMP) 21. The antenna 20 is configured to receive radio waves transmitted from the transmitter 4.
[0027] The receiver main body unit 6 includes a demodulation circuit 22 that demodulates signals from high-frequency signals supplied from each receiver communication unit 5, a timer circuit 23, a microprocessor 24, a memory 25, and a signal processing circuit 26. The battery of the truck vehicle 2 is used as the power source. Alternatively, a battery or the like built into the receiver body unit 6 may be used.	[0027] The receiver main unit 6 comprises a demodulation circuit 22 that demodulates signals from the high-frequency signals supplied by each receiver communication unit 5, a timer circuit 23, a microprocessor 24, a memory 25, and a signal processing circuit 26. The power source is the battery of the truck vehicle 2. Alternatively, a built-in battery within the receiver main unit 6 may be used.
[0028] The microprocessor 24 acquires the transmitter TID, air pressure data, temperature data, and the like from the signals supplied from each demodulation circuit 22, and associates it with the wheel mounting position information. The memory 25 stores the measured atmospheric pressure, temperature, and the like in addition to the set TID. The interface (IF) 26 converts the data received from the microprocessor 24 into a format compatible with the display 7.	[0028] The microprocessor 24 retrieves the transmitter TID, air pressure data, and temperature data from the signals supplied by each demodulation circuit 22 and refers to the stored transmitter TID in the memory 25 to determine which mounting position the retrieved TID corresponds to. The memory 25 stores the set TIDs as well as the measured air pressure and temperature data. The interface (IF) 26 converts data received from the microprocessor 24 into a format suitable for the display unit 7.

[0029] The receiver communication unit 5 described above can change the number of antennas depending on the vehicle model, and may receive, for example, reception from all transmitters with one antenna. FIG. 7 is a block diagram illustrating an outline of the configuration of the setting device 8 according to one embodiment of the present invention. In FIG. 7, the setting device 8 includes various switches 830 that enable data input and operation by the user, a controller 820 that controls the entire setting device, a display 810 that displays various information, an LF transmission circuit 850 for communicating with the transmitter 4 and an RF receiving circuit 846, and an RF transmission circuit 842 for communicating with the receiver 6. All are electrically connected to controller 820. Antennas 844 and 848 are connected to the RF transmitter 842 and the RF receiver 846, respectively. An antenna 852 is connected to the LF transmission circuit 850. Controller 822, as well known, is a microprocessor-based device and includes a memory 822.	[0029] The receiver communication unit 5 described above can have its number of antennas changed depending on the vehicle type. For example, a single antenna may receive signals from all transmitters. Figure 7 is a block diagram showing the outline of the configuration of a setting device 8 according to one embodiment of the present invention. In Figure 7, the setting device 8 includes various switches 830 for user data input and operation, a controller 820 for controlling the entire setting device, a display unit 810 for displaying various information, an LF transmission circuit 850 and RF reception circuit 846 for communication with the transmitter 4, and an RF transmission circuit 842 for communication with the receiver 6, all electrically connected to the controller 820. The RF transmission circuit 842 and RF reception circuit 846 each have antennas 844 and 848 connected, respectively. The LF transmission circuit 850 has an antenna 852 connected. The controller 822 is a known microprocessor-based device with a memory 822.
[0030] The operation of the tire pressure monitoring system 1 of the present invention having the hardware configuration as described above will be described. FIG. 4 is a diagram for explaining the difference in the method of setting the transmitter ID in the present invention of the prior art. Conventionally, as shown in FIG. 4A, a unique number is assigned to each transmitter 4 of the same manufacturer as a transmitter identifier, so that IDs must be set and managed without duplication for many transmitters 4. On the other hand, according to the principle of the present invention, as shown in FIG. 4B, a unique setting device identifier SIDi (i is the number of the setting device manufactured by the manufacturer) may be assigned to each setting device 8 that has a much smaller	[0030] The operation of the tire pressure monitoring system 1 of the present invention with the above-described hardware configuration will be explained. Figure 4 is a diagram for explaining the difference in the method for setting the transmitter ID in the prior art. In the prior art, as shown in Figure 4A, each transmitter 4 is assigned a unique number as a transmitter identifier from the same manufacturer, so IDs must be set and managed without duplication across many transmitters 4. [0031] According to the principle of the present invention, as shown in FIG. 4B, it is sufficient to assign a unique setting device identifier (SID_i) (where "i" is the number of the setting device manufactured by the maker) to each setting device 8, which is produced in

number of shipments than the transmitter 4. The setting device identifier SIDi may be a combination of numbers or arbitrary characters (eg, alphabets, ASCII (American Standard Code for Information Interchange) characters, etc.). This SIDi shall be written to the ROM 824 constituting the memory 822 of the setting device 8. Further, the non-volatile memory 826 constituting the memory 822 has a storage area for storing a variable number VN that can be set by the setting device 8. At the time of shipment of the setting device 8, for example, a number in which all digits are zero is written as the initial value of the variable number VN. Of course, this variable number VN does not necessarily have to be a number, but consists of an appropriate number of digits, and each digit may be a number or arbitrary. In this sense, it can be said to be a variable code.	far fewer numbers than the transmitters 4. The setting device identifier SID_i can be a combination of numbers or any characters (e.g., alphabet letters, ASCII (American Standard Code for Information Interchange) characters, etc.). This SID_i is assumed to be written into the ROM 824 that constitutes the memory 822 of the setting device 8. Additionally, in the non-volatile memory 826 that constitutes the memory 822, a region is secured to store a variable number VN that can be set by the setting device 8. At the time of shipment of the setting device 8, for example, a number with all digits set to zero is written as the initial value of the variable number VN. Of course, this variable number VN does not necessarily have to be a number; it can consist of an appropriate number of digits, and each digit can be a number or any character. In this sense, it may also be called a variable code.
[0032] Thus, a user who has obtained a setting device 8 in which the setting device identifier SIDi unique to the setting device 8 and the initial value of the variable number VN are set in advance can automatically set the transmitter ID using the setting device 8 to the transmitter 4 attached to the wheel of the vehicle owned or managed. When issuing a new transmitter identifier TID, the setting device 8 generates a new transmitter identifier TID by simply concatenating the setting device identifier SIDi written in the ROM 824 (hereinafter referred to as one setting device 8 and simply referred to as SID) and the variable number VN written in the nonvolatile memory 826 plus 1. Writes the value of VN+1 as VN to non-volatile memory 826. Therefore, the VN stored in the non-volatile memory 826 indicates the final number of the TID set so far. Therefore, VN is referred to as the final variable number. In this way, according to the setting device 8 of the present invention, the TID of the transmitter 4 can be automatically assigned, so that the	[0032] In this way, a user who has obtained a setting device 8 with a unique setting device identifier SID_i and an initial value of the variable number VN pre-set can automatically set a transmitter ID in the transmitter 4 attached to the wheels of the vehicle they own or manage using this setting device 8. When the setting device 8 issues a new transmitter identifier TID, it simply concatenates the setting device identifier SID_i (hereafter referred to simply as SID) written in ROM 824 and the number VN+1 obtained by adding 1 to the variable number VN written in the non-volatile memory 826 to generate a new transmitter identifier TID. Then, the value VN+1 is written back as VN to the non-volatile memory 826. Therefore, the VN stored in the non-volatile memory 826 indicates the final number of the TID that has been set so far. Therefore, VN is referred to as the final variable number. In this way, according to the setting device 8 of the present invention, the TID of the transmitter 4 can be automatically assigned, eliminating the

management of the transmitter identifier is not bothered. For example, if the SID is 111 and the VN is 001, the new TID can be automatically 111002 as a new TID by concatenating 002 (= 001 + 1) after 111.	need to manage transmitter identifiers. For example, if the SID is 111 and the VN is 001, a new TID can be automatically obtained as 111002 by concatenating 002 (= 001 + 1) after 111.
[0033] [Embodiment] FIG. 5 is a flowchart showing a process in which the setting device 8 sets and registers a transmitter identifier according to one embodiment of the present invention. When the setting device 8 is turned on to use the setting device 8, in step 70, a batch registration that sets the TID for all of the transmitters 4 of one vehicle or an individual registration that sets the TID for a specific transmitter 4 is selected using an appropriate switch 830. When individual registration is selected, in step 72, the tire position to which the transmitter 4 to be registered is attached is entered.	[0033] [Embodiment] FIG. 5 is a flowchart showing the process in which the setting device 8 sets and registers the transmitter identifier according to an embodiment of the present invention. When the power of the setting device 8 is turned on to use it, in step 70, a switch 830 is appropriately used to select whether to perform batch registration, which sets TIDs for all transmitters 4 of one vehicle, or individual registration, which sets TIDs for specific transmitters 4. If individual registration is selected, in step 72, the tire position where the transmitter 4 to be registered is attached is entered.
[0034] Next, in step 90, TID settings for the specific transmitter 4 are performed. Specifically, in step 73, the setting device 8 is brought close to the tire 92 to which the transmitter 4 is mounted for which the TID is to be set, and the TID setting is instructed by a predetermined operation such as, for example, pressing the setting button included in the switches 830. In step 74, the setting device identifier SID and the last variable number VN are read from the memory 822. Then, in the determination step 76, it is determined whether or not the number (VN + 1) added to the read final variable number plus 1 is a predetermined range (a range allowed by the setting device 8). If it is not within the range, a registration process failure message is displayed in step 88 and the setting process is terminated. In the determination step 76, if VN + 1 is within a predetermined range, in step 78, a new TID is generated from the SID and VN + 1, and it is stored in relation to the tire position input in step 72.	[0034] Next, in step 90, TID setting is performed for the specific transmitter 4. Specifically, in step 73, the setting device 8 is brought close to the tire 92 on which the transmitter 4 to be set with the TID is mounted, and a predetermined operation such as pressing a setting button included in the switches 830 is performed to instruct the TID setting. In step 74, the setting device identifier SID and the final variable number VN are read from the memory 822. Then, in decision step 76, it is determined whether the number (VN+1) obtained by adding 1 to the read final variable number is within a predetermined range (a range allowed for the setting device 8). If it is not within the range, a registration processing failure message is displayed in step 88, and the setting process is terminated. If VN+1 is within the predetermined range in decision step 76, in step 78, a new TID is generated from SID and VN+1, and it is stored in association with the tire position entered in step 72.

Next, in step 80, the generated transmitter identifier TID is transmitted and set to the transmitter 4. Then, in the determination step 82, it is determined whether or not a response has been returned from the transmitter 4. If it does not return, a registration process failure message is displayed in step 88 and the setting process is terminated. In step 82, if a response is returned, in step 83, VN + 1 is written to the nonvolatile memory 826 as VN. This completes step 90 of setting TID settings for the specific transmitter 4.	Next, in step 80, the generated transmitter identifier TID is transmitted and set in the transmitter 4. Then, in decision step 82, it is determined whether a response has been returned from the transmitter 4. If no response is returned, a registration processing failure message is displayed in step 88, and the setting process is terminated. If a response is returned in step 82, in step 83, VN+1 is written as VN into the non-volatile memory 826. This completes step 90 for setting the TID for the specific transmitter 4.
[0035] Next, in the determination step 84, it is determined whether or not an instruction to complete registration has been issued by the user. If the registration is not completed, return to step 72 and set another transmitter 4 identifier. In step 84, when registration is completed, in step 86, the TID previously set by the process of steps 72 to 84 is transmitted to the receiver 6 in relation to the tire position. The receiver 6 registers the received TID in relation to the tire position accordingly. On the other hand, if batch registration is selected in the judgment step 70, the user is prompted to enter the number T of tires or transmitters 4 to be registered in step 92. In step 94, wait for the user to enter the number T, and when it is entered, substitute the number T entered into the variable t in step 96. Then, in step 90 described above, TID settings are performed on the target transmitter 4. At this time, the user shall set the tire position in the order of predetermined tire positions (for example, T1 ~ T6). By doing this, since the TID is assigned in the order of a predetermined tire position, the setting device 8 can automatically associate the set TID with the tire position. After step 90, in step 98, t is decremented, and in step 100, it is determined whether t has become zero. If t is not zero, the process returns to step 90. When t is zero, it means that all	[0035] Next, in decision step 84, it is determined whether a registration completion instruction has been issued by the user. If the registration is not complete, the process returns to step 72, where the identifier of another transmitter 4 is set. If the registration is complete in step 84, in step 86, the TIDs set from steps 72 to 84 are transmitted to the receiver 6 in association with the tire positions. The receiver 6 registers the received TIDs in association with the tire positions. [0036] On the other hand, if batch registration is selected in decision step 70, in step 92, the user is prompted to enter the number of tires or transmitters 4 to be registered. In step 94, the process waits for the user to enter the number T, and once entered, the number T is assigned to the variable t in step 96. Then, in step 90 mentioned above, the TID is set for the target transmitter 4. At this time, the user is to perform the setting in the order of the predetermined tire positions (e.g., T1 to T6). By doing so, the TID is assigned in the order of the predetermined tire positions, allowing the setting device 8 to automatically associate the set TID with the tire position. After step 90, in step 98, t is decremented, and in step 100, it is determined whether t has reached zero. If t is not zero, the process returns to step 90. If t is zero, all planned transmitters 4 have been set, so in step 86, the TIDs set

scheduled transmitters 4 have been set, so in step 86, the TID set by the processing of steps 90, 98, and 100 is related to the tire position and transmitted to the receiver 6.	through the processes of steps 90, 98, and 100 are transmitted to the receiver 6 in association with the tire positions.
[0037] In this example, in the case of batch registration, the setting device 8 associates the TID with the tire position, but after step 100, the set TID is transmitted to the receiver 6 in the order of setting.	[0037] In this example, in the case of batch registration, the setting device 8 associates the TID with the tire position, but after step 100, the receiver 6 may perform the association of the set TID with the tire position by transmitting the set TID to the receiver 6 in the order of setting.
[0038] Thus, according to one embodiment of the present invention, there is no need for the user to manage the transmitter identifier at all in either individual registration or batch registration. Further, one embodiment is valid whether the TID of the transmitter 4 for which the TID is already set or whether the TID is newly set to the transmitter 4 for which the TID is not set.	[0038] Thus, according to one embodiment of the present invention, there is no need for the user to manage the transmitter identifiers, whether in individual registration or batch registration. Additionally, the embodiment is effective whether changing the TID of a transmitter 4 where a TID is already set or setting a new TID for a transmitter 4 where a TID is not set.
[0039] According to the present invention, each setting device has a unique setting device ID (SID) and generates a transmitter identifier using the setting device identifier, so that the identifier of the transmitter 4 set by the particular setting device is preceded by the SID of the setting device. Therefore, if the transmitter ID is tampered with, it is easy to detect.	[0039] According to the present invention, each setting device has a unique setting device ID (SID), and the transmitter identifier is generated using this setting device identifier. Therefore, since the SID of the setting device that set the transmitter 4 is attached to the front of the transmitter identifier, it is possible to identify the setting device by checking the transmitter identifier. Consequently, if the transmitter ID is illegally rewritten, it can be easily detected.
[0040] Further, since the transmitter identifier is assigned in order, the registration date can be specified approximately from the transmitter identifier. The above are only examples for the purpose of explaining the present invention. Therefore, it will be easy for those skilled in the art to make various changes, modifications or additions to the above examples in accordance with the technical idea or principle of the present invention.	[0040] Moreover, since the transmitter identifier is assigned in sequence, it is possible to determine the approximate registration date from the transmitter identifier. The above examples are merely provided to explain the present invention. Therefore, it is easy for those skilled in the art to make various changes, modifications, or additions to the above-described embodiments based on the technical idea or principle of the present invention.

For example, in the above embodiment, VN is assumed to be the last set variable number or code, but it may also be a transmitter identifier to be newly set. In this case, the VN read from the memory 822 may be attached to the setting device identifier SID as it is. Then, after setting, VN+1 can be written to the memory 822 as VN.	[0041] For example, in the above-described embodiment, VN was described as the last set variable number or code, but it may also be used as the transmitter identifier to be newly set. In this case, VN read from memory 822 may be attached directly to the setting device identifier SID. After setting, VN+1 may be written as VN into memory 822.
[0042] In the above example, TID was generated by adding VN after SID, but the order of SID and VN can be reversed. Furthermore, the SID may be separated by a middle digit and a VN may be inserted in between. The reverse may be done. In short, SID and VN can be combined appropriately to generate a TID.	[0042] Additionally, in the above example, the TID was generated by attaching VN after SID, but the order of SID and VN may be reversed. Furthermore, SID may be separated by digits, and VN may be inserted in between. The reverse operation may also be performed. In short, TID can be generated by appropriately combining SID and VN.
[0043] In the above embodiment, VN has been described as a number consisting of numbers, but as described above, VN may be a code of a predetermined number of digits, and may be a specific ordinal character set (eg, alphabet, etc.). That is, it can be used as long as it is a character set in which a certain order is determined. For such digits using an ordinal character set, the above-described "add 1" operation may advance the character by one character.	[0043] In the above embodiment, VN was explained as a number consisting of digits, but as mentioned earlier, VN may be a code with a predetermined number of digits, and part or all of the digits may be a specific sequential character set (e.g., alphabet). In other words, any character set with a defined sequence can be used. For the digits that use such a sequential character set, the "add 1" operation mentioned above can be achieved by advancing the character by one.
[Brief description of the drawing] [0044] FIG. 1 is a schematic diagram showing an overall configuration of a tire pressure monitoring device according to one embodiment of the present invention. FIG. 2 is a schematic configuration diagram of the transmitter 4 in FIG. FIG. 3 is a schematic configuration diagram of the receiver communication unit 5 and the receiver body 6 in FIG. FIG. 4A is a diagram showing a conventional transmitter ID setting method.	[Brief Description of Drawings] [0044] [FIG. 1] A schematic diagram showing the overall configuration of a tire pressure monitoring system according to one embodiment of the present invention. [FIG. 2] A schematic block diagram of the receiver in the tire pressure monitoring system shown in FIG. 1. [FIG. 3] A schematic block diagram of the transmitter in the tire pressure monitoring system shown in FIG. 1.

FIG. 4B is a diagram which shows a method for setting a transmitter ID according to the present invention. FIG. 5 is a flowchart showing a process in which the setting device 8 sets and registers a transmitter identifier according to one embodiment of the present invention. FIG. 6 is a diagram illustrating how a new transmitter identifier is generated by the present invention. FIG. 7 is a schematic block diagram showing the configuration of the setting device according to one embodiment of the present invention.	[FIG. 4A] This is a diagram illustrating the conventional method for setting transmitter IDs. [FIG. 4B] A schematic illustration of a transmitter ID configuration according to the present invention. [FIG. 5] A flowchart showing the process of setting a transmitter identifier using the setting device. [Fig.6] This is a diagram illustrating the process of generating a new transmitter identifier according to the present invention.; [Fig.7] This is a simplified block diagram showing the configuration of a setting device according to one embodiment of the present invention.
[Explanation of the code] [0045] 1 Tire pressure monitoring system 4 Transmitter 5 Receiver communication unit 6 Receiver body 7 Display unit 8 Setting device 9 Pressure sensor 10 Temperature sensor 11 A/D conversion circuit (AD) 12, 23 Timer circuit 13, 24 Microprocessor (MP) 14 Memory 15 RF Transmitter 16 LF Receiver Circuit 17,18,20 Antenna 19 Battery 21 Amplifier (AMP) 22 Demodulation circuit 24 Communication control unit 25 Memory 26 Interface circuit (IF) 30 Start-up push button 32 Switch Control Circuit 34 Batteries 36 Switch Circuit 38 Trigger Signal Transmitter 90 Vehicles 92 Wheels	[Description of Symbols] [0045] Explanation of Symbols [0045] 1 Tire pressure monitoring system 4 Transmitter 5 Receiver communication unit 6 Receiver body 7 Display unit 8 Setting device 9 Pressure sensor 10 Temperature sensor 11 A/D conversion circuit (AD) 12, 23 Timer circuit 13, 24 Microprocessor (MP) 14 Memory 15 RF Transmitter 16 LF Receiver Circuit 17,18,20 Antenna 19 Battery 21 Amplifier (AMP) 22 Demodulation circuit 24 Communication control unit 25 Memory 26 Interface circuit (IF) 30 Start-up push button 32 Switch Control Circuit 34 Batteries 36 Switch Circuit 38 Trigger Signal Transmitter 90 Vehicles 92 Wheels