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(71) Applicant: **Keihin Corporation**
**Tokyo (JP)**

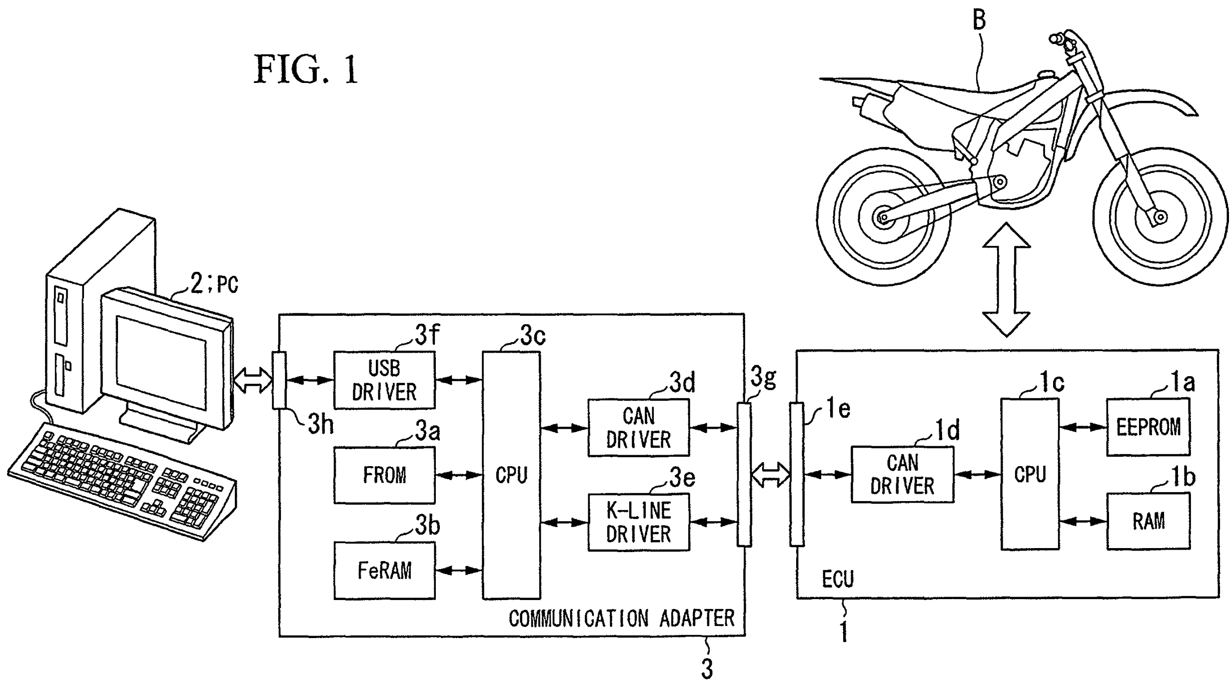
(72) Inventor: **Kanno, Satoru**
**Shioya-gun**
**Tochigi-ken (JP)**

(74) Representative: **Eisenführ, Speiser & Partner**
**Postfach 31 02 60**
**80102 München (DE)**

## (54) Engine setting system and engine setting method

(57) An engine setting system includes: an engine control device (1) that performs engine control based on a basic control map; and a terminal device (2) that is connected to and capable of communicating with the engine control device (1), and defines the control map that is used for correcting the basic control map, the terminal device (2) including: an input section (2a); a display section (2b) that displays a correction screen in which control targeted values are two-dimensionally arranged, the control targeted values constituting a correction control map to be corrected; and a map redefinition section (2d) that collectively corrects the control targeted values included in a correction object region (11) that is specified by input operation of the input section (2a), by use of a method that is specified by input operation of the input section (2a), and redefines the correction control map by use of the control targeted values that have been corrected, on the correction screen.

FIG. 1



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## Description

BACKGROUND OF THE INVENTION

Field of the invention

**[0001]** The present invention relates to an engine setting system and an engine setting method used for setting an engine of a saddle-riding-type vehicle.

Description of Related Art

**[0002]** In recent years, an electronic control unit (hereinafter, referred to as an "ECU") is generally employed in a variety of saddle-riding-type vehicles. In the ECU, a control map for driving an engine in a preferred condition is stored. Here, the control map indicates a data group representing a correspondence relationship between quantity of state representing an engine drive condition (engine speed, load to the engine, and the like), and a target level for controlling the engine (target level relative to controlled variables such as fuel injection amount, engine ignition timing, and the like).

**[0003]** Namely, the ECU obtains a control target level in accordance with a current drive condition of the engine from the control map, controls a fuel injection amount or engine ignition timing based on the obtained control target level, and thereby drives the engine in a preferred condition.

**[0004]** However, there is a case where it is required that the control target level that has been preliminarily set in the above-described control map is modified in accordance with a condition in which a vehicle runs. In a race, when setting of various control target levels (hereinafter, referred to as a "setting") is modified, for example, in accordance with road surface conditions of the course (an amount of gradient of the road surface, dry / wet condition, a number of corners, size of corner, or the like), weather, or the like, it is possible to drive the engine in a further-preferred condition.

**[0005]** For example, in Japanese Unexamined Patent Application, First Publication No. 2008-19843, an engine setting system is disclosed in which a preferred engine setting in accordance with a racecourse is easily performed by using a terminal device that is connected to and capable of communicating with a server device via Internet. Specifically, a recommended control map that is suitable for each racecourse is downloaded from the server device, the recommended control map is transferred from the terminal device to an ECU, a control map that is preliminarily stored in the ECU is rewritten to the recommended control map, and a preferred engine setting in accordance with the racecourse is thereby performed. However, the recommended control map that is obtained via download is not always suitable for each user.

**[0006]** That is, for example, a novice racer is different from a professional racer in terms of how they drive a vehicle (operation, handling). In addition, users' driving techniques are different from each other in terms of how they approach a race. For example, one user's technique may be to drive the vehicle so as to accelerate from a corner of the racecourse, while another user's technique may be to drive to a corner of the racecourse without breaking or breaking very little. Therefore, it is difficult to obtain a control map suitable for each user.

**[0007]** Therefore, an engine setting system is conceivable, in which the user can appropriately set a correction control map that is used to correct the basic control map so as to perform the engine setting that the user desires, for the basic control map that has been obtained by the download or the like, or for the basic control map that has been preliminarily set in the ECU.

**[0008]** Generally, in order to correct and modify the above-described correction control map, the user must correct and modify a control targeted value constituting the correction control map one by one. In addition, since it is impossible to collectively correct and modify control targeted values of a region, it is necessary to perform the operation of correction and modification for a large amount of labor and time. Furthermore, it is not always true that the control targeted values that are set by the user are the allowable values used in the vehicle, and there is a concern that the engine will be damaged if an excessive value or a value that is under a lower limit is set in the engine.

SUMMARY OF THE INVENTION

**[0009]** The present invention was conceived in view of the above-described circumstances and it is an object thereof to provide an engine setting system and an engine setting method where it is possible to ease a burden of the setting operation by the user at the time of engine setting.

**[0010]** In order to achieve the above-described object, an engine setting system of a first aspect of the present invention includes an engine setting system including: an engine control device that performs engine control based on a basic control map; and a terminal device that is connected to and capable of communicating with the engine control device, and defines the control map that is used for correcting the basic control map. The terminal device includes: an input section; a display section that displays a correction screen in which control targeted values are two-dimensionally arranged, the control targeted values constituting a correction control map to be corrected; and a map redefinition section that collectively corrects the control targeted values included in a correction object region that is specified by input operation of the input section, by use of a method that is specified by input operation of the input section, and redefines the correction control map by use of the control targeted values that have been corrected on the correction screen.

**[0011]** It is preferable that, in the engine setting system of the first aspect of the present invention, the map redefinition section set the control targeted values included in the correction object region, to values that are specified by the input operation of the input section.

**[0012]** It is preferable that, in the engine setting system of the first aspect of the present invention, the map redefinition section add a value specified by the input operation of the input section to the control targeted values included in the correction object region or subtract a value specified by the input operation of the input section from the control targeted values included in the correction object region.

**[0013]** It is preferable that, in the engine setting system of the first aspect of the present invention, the map redefinition section multiply the control targeted values included in the correction object region by a value specified by the input operation of the input section.

**[0014]** It is preferable that, in the engine setting system of the first aspect of the present invention, the map redefinition section determine whether or not the corrected control targeted values are in an allowable range, and the map redefinition section set the control targeted values to an upper limit or a lower limit of the allowable range, when the corrected control targeted values are not in the allowable range.

**[0015]** It is preferable that, in the engine setting system of the first aspect of the present invention, the map redefinition section determines whether or not the corrected control targeted values are in an allowable range, and the map redefinition section displays a warning screen on the display section and inhibits the control targeted values from being corrected, when the corrected control targeted values are not in the allowable range.

**[0016]** It is preferable that, in the engine setting system of the first aspect of the present invention, the map redefinition section determine whether or not the corrected control targeted values are in an allowable range, and the map redefinition section cause the display section to display a warning screen that prompts a user to re-correct the control targeted values, when the corrected control targeted values are not in the allowable range.

**[0017]** It is preferable that the engine setting system of the first aspect of the present invention further include a relay device that relays data communication between the engine control device and the terminal device.

It is preferable that, in the engine setting system of the first aspect of the present invention, the relay device be a communication adapter mountable to the engine control device.

**[0018]** In order to achieve the above-described object, an engine setting method of a second aspect of the present invention includes: preparing an engine control device that performs engine control based on a basic control map and a terminal device that is connected to and capable of communicating with the engine control device and defines the control map that is used for correcting the basic control map; displaying a correction screen in which control targeted values that are two-dimensionally arranged, the control targeted values constituting a correction control map to be corrected; collectively correcting the control targeted values included in a correction object region that is specified by a user, by use of a method that is specified by the user, on the correction screen; and redefining the correction control map by use of the control targeted values that has been corrected.

**[0019]** According to the present invention, it is possible to collectively correct and modify the control targeted values included in the desired correction object region of the correction control map. Therefore, comparing a case where the control targeted value is corrected and modified one by one in a conventional manner, it is possible to considerably ease a burden of the setting operation by the user. Furthermore, since the present invention includes the function for determining whether or not the corrected control targeted values are in an allowable range, it is possible to prevent damage to the engine in a case of applying the corrected correction control map.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0020]**

FIG. 1 is a schematic view showing a structure of an engine setting system relating to an embodiment of the present invention.

FIG. 2 is a block diagram showing a personal computer of the embodiment.

FIGS. 3A to 3C are views showing an example of a screen displayed on a personal computer of the embodiment when a correction control map is displayed.

FIG. 4 is a flowchart representing an operation of a control device of the embodiment after correcting the control targeted value.

FIG. 5 is a flowchart representing a certification process of a saddle-riding-type vehicle B of the embodiment.

## DETAILED DESCRIPTION OF THE INVENTION

**[0021]** Hereinafter, an embodiment of the present invention will be described with reference to the drawings.

**[0022]** FIG. 1 is a schematic view showing a structure of an engine setting system relating to an embodiment of the present invention.

**[0023]** As shown in FIG. 1, the engine setting system relating to the embodiment of the present invention is constituted of an ECU (engine control device) 1 that performs an engine control of a saddle-riding-type vehicle B based on a basic control map; a personal computer 2 that defines a correction control map that is used for correcting the basic control map (terminal device : hereinafter, referred to PC 2); and a communication adapter 3 that is mountable to ECU 1 and serves as a relay device relaying data communication between the ECU 1 and the PC 2.

**[0024]** The foregoing engine setting system is a system for performing a preferred engine setting, for example, in accordance with a racecourse, that is, for setting the basic control map stored in the ECU 1.

**[0025]** In FIG. 1, for convenience, the ECU 1 and the saddle-riding-type vehicle B are indicated so as to be separated from each other, but the ECU 1 is installed inside the saddle-riding-type vehicle B as a practical matter. In addition, the ECU 1 and the communication adapter 3 are also indicated so as to be separated from each other, but communication adapter 3 is attached to the ECU 1 and connected to PC 2 with a USB cable interposed therebetween as a practical matter.

**[0026]** Namely, the ECU 1 is connected to and capable of communicating with the PC 2 with the communication adapter 3 interposed therebetween.

**[0027]** As shown in FIG. 1, the ECU 1 includes an EEPROM 1a, a RAM (Random Access Memory) 1b, a CPU (Central Processing Unit) 1c, a CAN (Controller Area Network) driver 1d, and a communication connector 1e.

**[0028]** The EEPROM 1a is a rewritable nonvolatile storage medium that permanently stores the basic control map used during normal driving of the saddle-riding-type vehicle B, the other data that is necessary for the engine control, a program to be executed in the CPU 1c, or the like. The RAM 1b is a rewritable volatile storage medium used for temporal data storage.

**[0029]** The CPU 1c performs the engine control of the saddle-riding-type vehicle B based on the basic control map stored in the EEPROM 1a during normal driving. Specifically, as the engine control of the vehicle B, a fuel injection amount, an engine ignition timing, an air intake quantity, an air-fuel ratio, or the like are controlled.

**[0030]** In addition, at the time of engine setting, the CPU 1c has a function for writing the basic control map of the EEPROM 1a based on the correction control map that is defined by the PC 2 and is transmitted from the PC 2 via the communication adapter 3.

**[0031]** Furthermore, at the time of engine setting, the CPU 1c stores engine condition data (e.g., torque, engine speed, throttle valve opening angle, temperature of cooling water, intake pressure, intake temperature, or the like) representing the drive condition of the engine of the saddle-riding-type vehicle B in the RAM 1b. When the CPU 1c receives a transferring request from the PC 2, the CPU 1c transmits the above-described engine condition data stored in the RAM 1b to the PC 2 via the communication adapter 3. The engine condition data can be obtained from output of various sensors disposed in the saddle-riding-type vehicle B.

**[0032]** Namely, the output from the various sensors is input to the ECU 1, converted into digital data by use of an A/D converter (not shown), thereafter transmitted to the CPU 1c.

**[0033]** The CAN driver 1d converts data (e.g., above-described engine condition data) transmitted from the CPU 1c into a data format based on a CAN communication protocol, and transmits the converted data to the communication adapter 3. The CAN driver 1d converts data (data format based on a CAN communication protocol) received from the communication adapter 3 into data that can be processed by the CPU 1c, and outputs the converted data to the CPU 1c. The communication connector 1e is a connector used for attachment to the communication adapter 3, and is electrically and mechanically connected to a communication connector 3g of the communication adapter 3 when the communication connector 1e is attached to the communication adapter 3.

**[0034]** The PC 2 is a personal computer that defines a correction control map based on input information, and is constituted of an input device 2a, a display device 2b, a storage device 2c, and a control device 2d as shown in FIG. 2.

**[0035]** The input device 2a (input section) is, for example, a keyboard, a mouse, or the like, and outputs input information that is input by operation of user to the control device 2d. The display device 2b (display section) is, for example, a liquid crystal display, and displays a predetermined image by controlling the control device 2d.

**[0036]** Specifically, with reference to FIG. 3A, the display device 2b displays a correction screen in which control targeted values that are two-dimensionally arranged (a matrix of control targeted values), the control targeted values constituting a correction control map to be corrected.

**[0037]** The storage device 2c is, for example, a hard disk, and stores a program, an application software, or the like to be executed by the control device 2d, or the correction control map that has been previously defined in previous cases.

**[0038]** The control device 2d (map redefinition section) is, for example a CPU, and executes, a program or an application software stored in the storage device 2c, and thereby controls whole operation of PC 12. The control device 2d is connected to the communication adapter 3 with a USB cable interposed therebetween, and can perform a data communication between the control device 2d and the communication adapter 3 based on a USB protocol.

**[0039]** The control device 2d has a function for defining the control map based on input information transmitted from the input device 2a and for transmitting the correction control map to the ECU 1 via the communication adapter 3. As described below, on the correction screen displayed on the display device 2b, the control device 12d has a function for collectively correcting the control targeted values included in a correction object region that is specified by input operation of the input device 2a, by use of a method that is specified by the input operation of the input device 2a, and for redefining the correction control map by use of the control targeted values that has been corrected.

**[0040]** Returning to FIG. 1, explanation is continued.

**[0041]** The communication adapter 3 includes a FROM (flash ROM) 3a, a FeRAM (Ferroelectric RAM) 3b, a CPU 3c, a CAN driver 3d, a K-Line driver 3e, a USB driver 3f, a communication connector 3g, and a USB connector 3h. FROM 3a is a rewritable nonvolatile storage medium that permanently stores a program to be executed in the CPU 3c or other data that is necessary to control the communication adapter 3. The FeRAM 3b is a nonvolatile storage medium used for temporal data storage.

**[0042]** The CPU 3c controls whole operation of communication adapter 3 (namely, data relay operation), and stores data (correction control map or the like) received from the PC 2 via the USB driver 3f in the FeRAM 3b. The CPU 3c transmits the data to the ECU 1 via the CAN driver 3d. In addition, the CPU 3c stores the data (engine condition data or the like) received from the ECU 1 via the CAN driver 3d in the FeRAM 3b. The CPU 3c transmits the data to the PC 2 via the USB driver 3f.

**[0043]** The CAN driver 3d converts the data transmitted from the CPU 3c into a data format based on a CAN communication protocol, and transmits the converted data to the ECU 1. The CAN driver 3d converts the data (data format based on the CAN communication protocol) received from the ECU 1 into data that can be processed by the CPU 3c, and outputs the converted data to the CPU 3c. The K-Line driver 3e converts the data transmitted from the CPU 3c into a data format based on a K-Line communication protocol, and transmits the converted data to the ECU 1. The K-Line driver 3e converts the data (data format based on the K-Line communication protocol) received from the ECU 1 into data that can be processed by the CPU 3c, and outputs the converted data to the CPU 3c. The CAN driver 3d and the K-Line driver 3e are drivers that are selectively used in accordance with a communication protocol of the ECU 1. In the embodiment, since the communication protocol of the ECU 1 is CAN, the CAN driver 3d is thereby used.

**[0044]** The USB driver 3f converts the data transmitted from the CPU 3c into a data format based on a USB communication protocol, and transmits the converted data to the PC 2. The USB driver 3f converts the data (data format based on a USB communication protocol) received from the PC 2 into data that can be processed by the CPU 3c, and outputs the converted data to the CPU 3c. The communication connector 3g is a connector used for attaching the communication adapter 3 to the ECU 1, and is electrically and mechanically connected to the communication connector 1e of the ECU 1 when the communication connector 3g is attached to the communication adapter 3. The USB connector 3h is a connector used for connecting the communication adapter 3 to the PC 2 with a USB cable interposed therebetween.

**[0045]** Subsequently, operation of the engine setting system relating to the embodiment of the present invention constituted as described above, specifically, correction operation of correction control map in the terminal device 2 will be described. FIG. 3A shows a correction screen displayed on the display device 2b at the time of engine setting when the correction control map is displayed. As shown in FIG. 3A, a map sheet 10 in which a matrix of control targeted values is disposed is displayed on the correction screen. The control targeted values constitute the correction control map.

**[0046]** In FIG. 3A, the correction control map that is used for controlling engine ignition timing (crank angle: the axis of ordinate, y-axis) relative to the engine speed (the axis of abscissas, x-axis) is illustrated by an example.

**[0047]** When the user operates the input device 2a, the correction object region 11 that is used for collectively selecting the control targeted values that is to be corrected can be specified as indicated in FIG. 3A. The foregoing correction object region 11 can be specified by operating the mouse so as to drag the mouse cursor on the map sheet 10 or by operating arrow keys while pressing a shift key of the keyboard. A cell that is selected by correction object region 11 is displayed by reversed display relative to non-selected cell.

**[0048]** Subsequently, when the mouse cursor is positioned at the map sheet 10 and the user selects "Area Setting" on a menu screen that is displayed by clicking a right button of the mouse, a region setting dialogue 20 is displayed on the correction screen shown in FIG. 3B. Also, by selecting "Area Setting" on the map menu, the region setting dialogue 20 can be displayed.

**[0049]** A setting method selection box 21, a value input box 22, an OK tab key 23, and a cancel tab key 24 are displayed on the region setting dialogue 20.

**[0050]** The setting method selection box 21 is used to select a method for collectively correcting the control targeted values included in the correction object region 11 (hereinafter, refers to setting method).

**[0051]** The value input box 22 is used to input a numerical value in accordance with the setting method.

**[0052]** The OK tab key 23 is used to execute a collective correction for collectively correcting the control targeted values due to the selected setting method and the input numerical value.

**[0053]** The cancel tab key 24 is used to cancel the correction process.

**[0054]** The user selects one of the three "Value (setting value)", "Addition and subtraction", and "Multiplication" in the setting method selection box 21, as the setting method for setting the control targeted values. FIG. 3C shows a list of correction processes that are executed by the control device 2d when each of the setting methods is selected. As shown in FIG 3C, when the "Value(setting value)" is selected, the control device 2d sets all of the control targeted value included in the correction object region 11 to the value that is input to the value input box 22.

**[0055]** In addition, when the "Addition and subtraction" is selected, the control device 2d adds the value input to the value input box 22 to each of the control targeted values included in the correction object region 11, or subtracts the value input to the value input box 22 from each of the control targeted values included in the correction object region 11. In this case, when the value input to the value input box 22 is a negative value, the above-described subtraction is performed.

**[0056]** In addition, when the "Multiplication" is selected, the control device 2d multiplies each of the control targeted values included in the correction object region 11 by the value input to the value input box 22.

**[0057]** As described above, when the setting method for setting the control targeted values is selected in the setting method selection box 21, the numerical value is input to value input box 22, and the OK tab key 23 is entered, the control device 2d collectively corrects the control targeted values in accordance with the selected setting method and the input numerical value.

**[0058]** Here, the control device 2d determines whether or not the corrected control targeted values are in an allowable range for the saddle-riding-type vehicle B to which the control targeted values are applied. In the case of the determination being negative, that is, the control targeted values are not in the allowable range for the saddle-riding-type vehicle B, the control device 2d sets the control targeted values that have been corrected to the upper limit or the lower limit of the allowable range.

**[0059]** FIG. 4 shows a flowchart representing an operation of the control device 2d of the embodiment after correcting the control targeted values.

**[0060]** As shown in FIG. 4, the control device 2d collectively corrects the control targeted values as described above (step S1). When the correction of the control targeted values is completed, the control device 2d compares each of control targeted values and the upper limit of the allowable range, and determines whether or not the control targeted value is greater than the upper limit (step S2). In step S2, in the case of "Yes", control device 2d sets the control targeted value that has been determined as being greater than the upper limit to the upper limit (substituting the upper limit), thereafter, moves to step S4 (step S3).

**[0061]** In contrast, in the above-described step S2, in the case of "No", the control device 2d compares each of control targeted values and the lower limit of the allowable range, and determines whether or not the control targeted value is less than the upper limit (step S4). In step S4, in the case of "Yes", control device 2d sets the control targeted value that has been determined as being less than the lower limit to the lower limit (substituting the lower limit), thereafter, moves to step S6 (step S5). In contrast, in step S4, in the case of "No", the control device 2d decides the current value as the control targeted value, and redefines the correction control map by the decided control targeted values (step S6).

**[0062]** The control device 2d transmits the correction control map that has been redefined as described above via the communication adapter 3 to the ECU 1. At this time, by performing a certification process for the saddle-riding-type vehicle B, the control device 2d prevents an improper operation which is caused by transmitting the correction control map to an unapplied saddle-riding-type vehicle.

**[0063]** FIG. 5 shows a flowchart representing a certification process of a saddle-riding-type vehicle B of the embodiment.

**[0064]** As shown in FIG. 5, before transmitting the correction control map, the control device 2d obtains the vehicle ID from the ECU 1 (step S10). The control device 2d determines whether or not the obtained vehicle ID coincides with the vehicle ID information stored (registered) in the storage device 2c (step S11). In step S11, the control device 2d stops the transmission of the correction control map in the case of "No", or the control device 2d executes the transmission of the correction control map in the case of "Yes" (step S 12).

**[0065]** As described above, according to the engine setting system relating to the embodiment, it is possible to collectively correct and modify the control targeted values included in the desired correction object region of the correction control map. Therefore, comparing a case where the control targeted value is corrected and modified one by one in a conventional manner, it is possible to considerably ease a burden of the setting operation by the user. Furthermore, since the engine setting system includes the function for determining whether or not the corrected control targeted values are in an allowable range, it is possible to prevent damage to the engine in the case of applying the corrected correction control map.

**[0066]** In addition, since the engine setting system of the embodiment includes the function of the above-described vehicle certification, it is possible to prevent an improper operation which is caused by transmitting the correction control map to an unapplied saddle-riding-type vehicle.

**[0067]** In the above-described embodiment, the case where the engine setting system determines whether or not the control targeted value that has been corrected is in the allowable range, and the engine setting system sets the control targeted value to the upper limit or the lower limit of the allowable range in the case of the determination being negative, is illustrated by an example. The engine setting system may have a function for displaying a warning screen on the display device 2b and for inhibiting the control targeted values from being corrected in addition to the above-described case. In addition, the engine setting system determines whether or not the control targeted values that have been corrected are in the allowable range, and the engine setting system may have a function for displaying a warning screen in order to prompt the user to re-correct the control targeted values in the case of the determination being in the negative, and for waiting until the user performs a new correction operation.

**[0068]** In the above-described embodiment, as a relay device relaying a data communication between the ECU 1 and the PC 2, the structure in which the communication adapter 3 directly attached to the ECU 1 (mountable communication adapter) is used is described. However, it is not necessary to use the mountable communication adapter 3, a relay device that is capable of connecting the ECU 1 using a communication cable or the like may be used. In addition, a structure in which the ECU 1 is directly connected with the PC 2 may be used without providing a relay device. In addition, a structure in which a communication adapter 3 having a radio communication function is used may be employed, and a data communication may be performed between the communication adapter 3 and the PC 2 by the radio communication.

## Claims

1. An engine setting system comprising:

   an engine control device (1) that performs engine control based on a basic control map; and a terminal device (2) that is connected to and capable of communicating with the engine control device (1), and defines the control map that is used for correcting the basic control map, the terminal device (2) comprising:

   an input section (2a);
   a display section (2b) that displays a correction screen in which control targeted values are two-dimensionally arranged, the control targeted values constituting a correction control map to be corrected; and
   a map redefinition section (2d) that collectively corrects the control targeted values included in a correction object region (11) that is specified by input operation of the input section (2a), by use of a method that is specified by input operation of the input section (2a), and redefines the correction control map by use of the control targeted values that have been corrected, on the correction screen.

2. The engine setting system according to claim 1, wherein
   the map redefinition section (2d) sets the control targeted values included in the correction object region (11), to values that are specified by the input operation of the input section (2a).

3. The engine setting system according to claim 1, wherein
   the map redefinition section (2d) adds a value specified by the input operation of the input section (2a) to the control targeted values included in the correction object region (11) or subtracts a value specified by the input operation of the input section (2a) from the control targeted values included in the correction object region (11).

4. The engine setting system according to claim 1, wherein
   the map redefinition section (2d) multiplies the control targeted values included in the correction object region (11) by a value specified by the input operation of the input section (2a).

5. The engine setting system according to any one of claims 1 to 4, wherein
   the map redefinition section (2d) determines whether or not the corrected control targeted values are in an allowable range, and the map redefinition section (2d) sets the control targeted values to an upper limit or a lower limit of the allowable range, when the corrected control targeted values are not in the allowable range.

6. The engine setting system according to claim 5, wherein
   the map redefinition section (2d) determines whether or not the corrected control targeted values are in an allowable range, and the map redefinition section (2d) displays a warning screen on the display section (2b) and inhibits the control targeted values from being corrected, when the corrected control targeted values are not in the allowable range.

7. The engine setting system according to any one of claims 1 to 4, wherein
   the map redefinition section (2d) determines whether or not the corrected control targeted values are in an allowable range, and the map redefinition section (2d) causes the display section (2b) to display a warning screen that prompts a user to re-correct the control targeted values, when the corrected control targeted values are not in the allowable range.

8. The engine setting system according to any one of claims 1 to 7, further comprising:

   a relay device (3) that relays data communication between the engine control device (1) and the terminal device (2).

9. The engine setting system according to claim 8, wherein
   the relay device (3) is a communication adapter mountable to the engine control device (1).

10. An engine setting method comprising:

   preparing an engine control device (1) that performs engine control based on a basic control map and a terminal device (2) that is connected to and capable of communicating with the engine control device (1) and defines the control map that is used for correcting the basic control map;
   displaying a correction screen in which control targeted values that are two-dimensionally arranged, the control targeted values constituting

a correction control map to be corrected;
collectively correcting the control targeted values included in a correction object region (11) that is specified by a user, by use of a method that is specified by the user, on the correction screen; and
redefining the correction control map by use of the control targeted values that has been corrected.

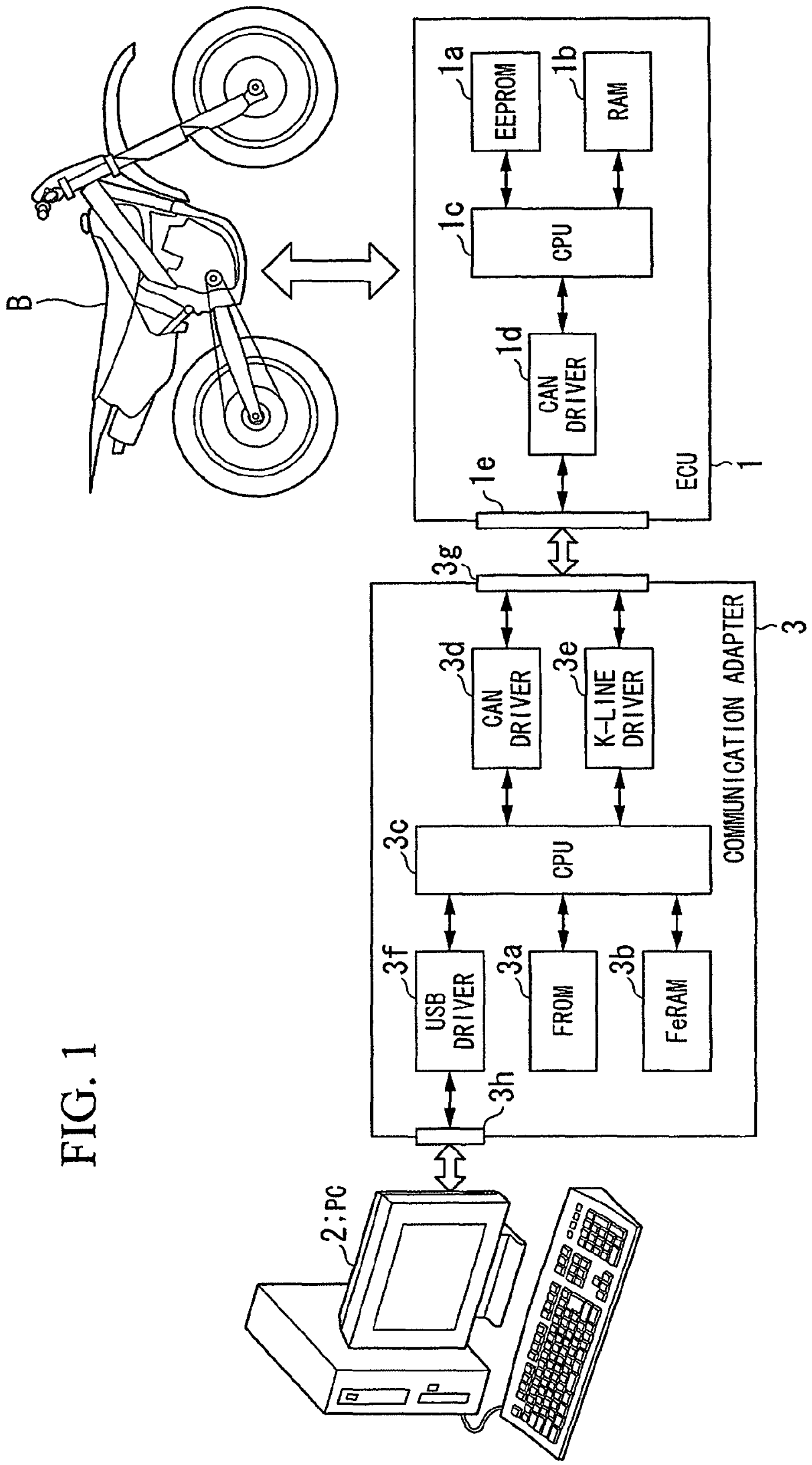
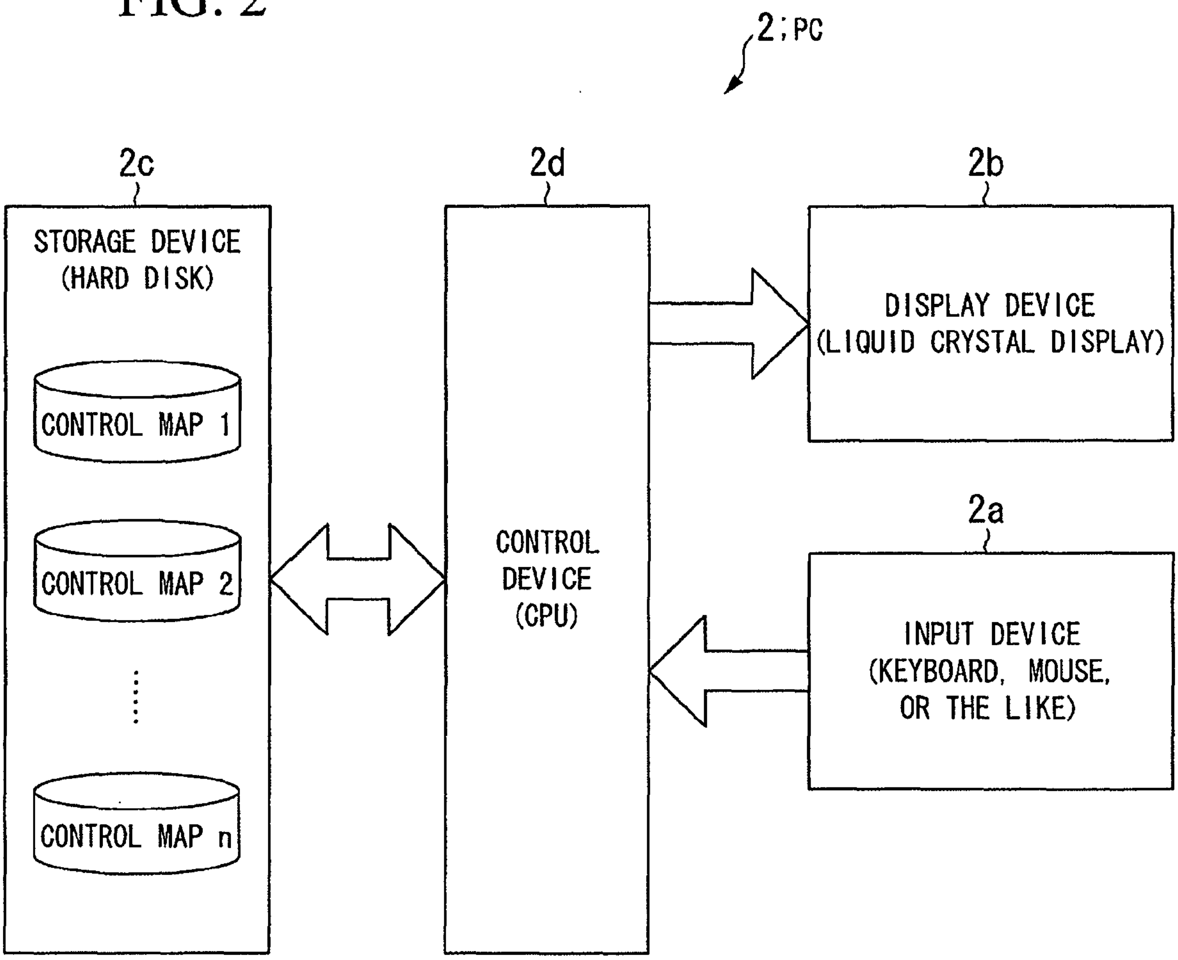

B
EEPROM
1a
RAM
1b
CPU
1c
CAN DRIVER
1d
1e
ECU
1
3g
CAN DRIVER
3d
K-LINE DRIVER
3e
COMMUNICATION ADAPTER
3
CPU
3c
USB DRIVER
3f
FROM
3a
FeRAM
3b
3h
2;PC

FIG. 1

FIG. 2


2;PC
2c
STORAGE DEVICE
(HARD DISK)
CONTROL MAP 1
CONTROL MAP 2
CONTROL MAP n
2d
CONTROL
DEVICE
(CPU)
2b
DISPLAY DEVICE
(LIQUID CRYSTAL DISPLAY)
2a
INPUT DEVICE
(KEYBOARD, MOUSE,
OR THE LIKE)

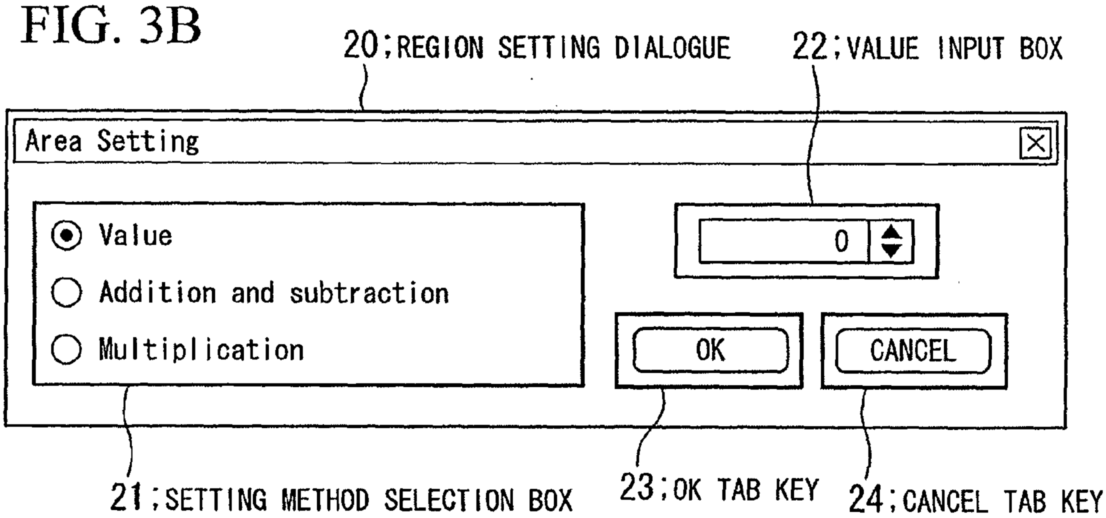
## FIG. 3A

10; MAP SHEET

| ADJUSTED VALUE (%) | 1000 (rpm) | 2000 (rpm) | 3000 (rpm) | 4000 (rpm) | 5000 (rpm) | 6000 (rpm) |
|---|---|---|---|---|---|---|
| 10. 0 (deg) | 0 | 0 | 0 | 0 | 0 | 0 |
| 20. 0 (deg) | 0 | 0 | 0 | 0 | 0 | 0 |
| 30. 0 (deg) | 0 | 0 | 0 | 0 | 0 | 0 |
| 40. 0 (deg) | 0 | 0 | 0 | 0 | 0 | 0 |
| 50. 0 (deg) | 0 | 0 | 0 | 0 | 0 | 0 |
| 60. 0 (deg) | 0 | 0 | 0 | 0 | 0 | 0 |

11; CORRECTION OBJECT REGION

## FIG. 3B




## FIG. 3C

| SETTING METHOD | FUNCTION |
|---|---|
| SETTING VALUE | SETTING THE VALUE INPUT TO THE VALUE INPUT BOX TO EACH OF THE CONTROL TARGETED VALUES INCLUDED IN THE CORRECTION OBJECT REGION |
| ADDITION AND SUBTRACTION | ADDING THE VALUE INPUT TO THE VALUE INPUT BOX TO EACH OF THE CONTROL TARGETED VALUES INCLUDED IN THE CORRECTION OBJECT REGION, OR SUBTRACTING THE VALUE INPUT TO THE VALUE INPUT BOX FROM EACH OF THE CONTROL TARGETED VALUES INCLUDED IN THE CORRECTION OBJECT REGION "NEW VALUE = CURRENT VALUE + INPUT VALUE", OR "NEW VALUE = CURRENT VALUE - INPUT VALUE" |
| MULTIPLICATION | MULTIPLYING EACH OF THE CONTROL TARGETED VALUE OF THE CORRECTION OBJECT REGION BY THE VALUE INPUT TO THE VALUE INPUT BOX "NEW VALUE = CURRENT VALUE × INPUT VALUE" |

FIG. 4

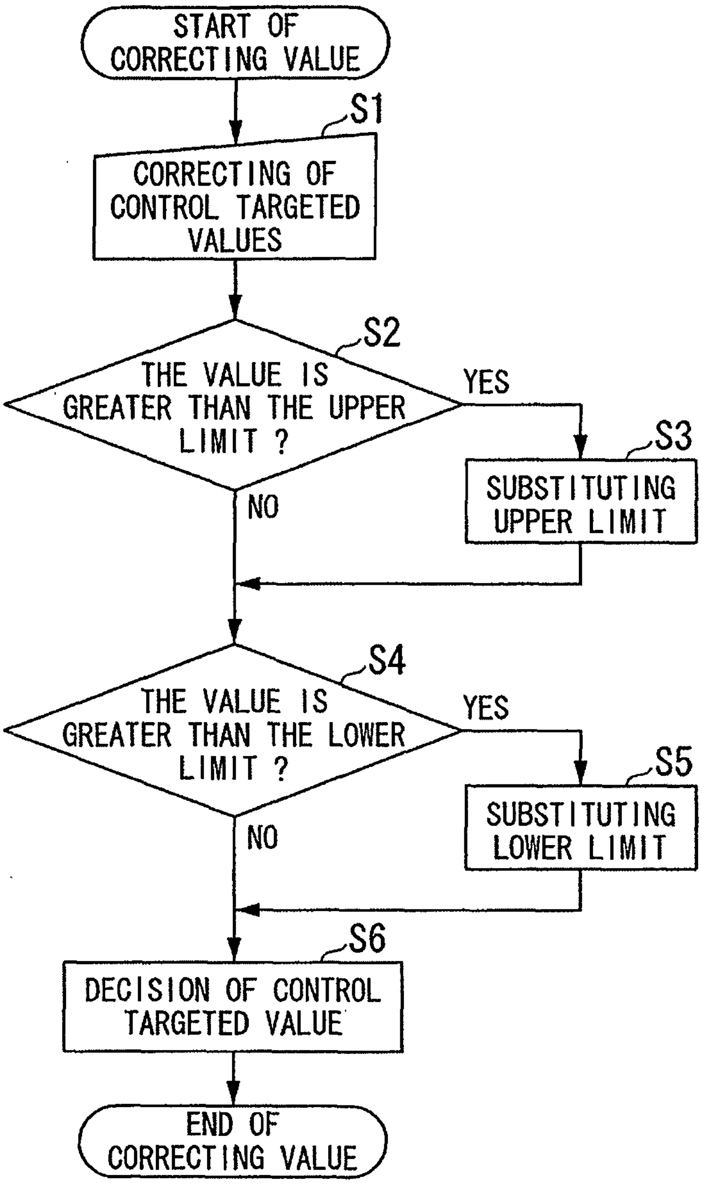
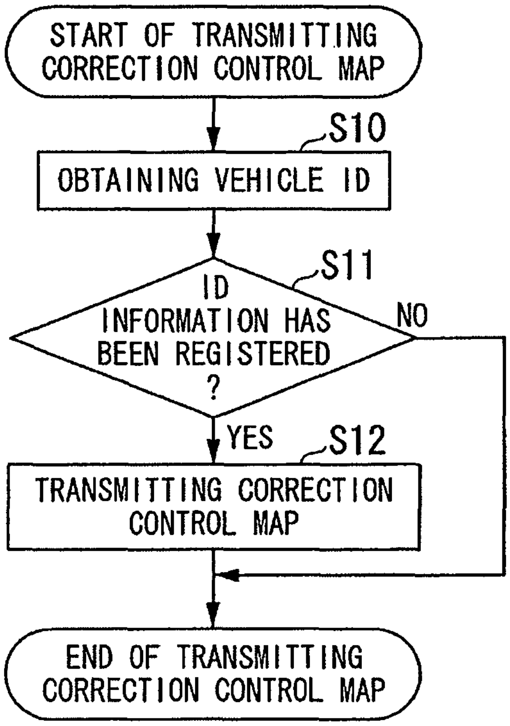

START OF CORRECTING VALUE
S1
CORRECTING OF CONTROL TARGETED VALUES
S2
THE VALUE IS GREATER THAN THE UPPER LIMIT ?
YES
NO
S3
SUBSTITUTING UPPER LIMIT
S4
THE VALUE IS GREATER THAN THE LOWER LIMIT ?
YES
NO
S5
SUBSTITUTING LOWER LIMIT
S6
DECISION OF CONTROL TARGETED VALUE
END OF CORRECTING VALUE

FIG. 5


START OF TRANSMITTING CORRECTION CONTROL MAP
S10
OBTAINING VEHICLE ID
S11
ID INFORMATION HAS BEEN REGISTERED ?
NO
YES
S12
TRANSMITTING CORRECTION CONTROL MAP
END OF TRANSMITTING CORRECTION CONTROL MAP

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- JP 2008019843 A **[0005]**