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(54) PORTABLE ELECTRONIC DEVICE AND LOYALTY POINT SYSTEM

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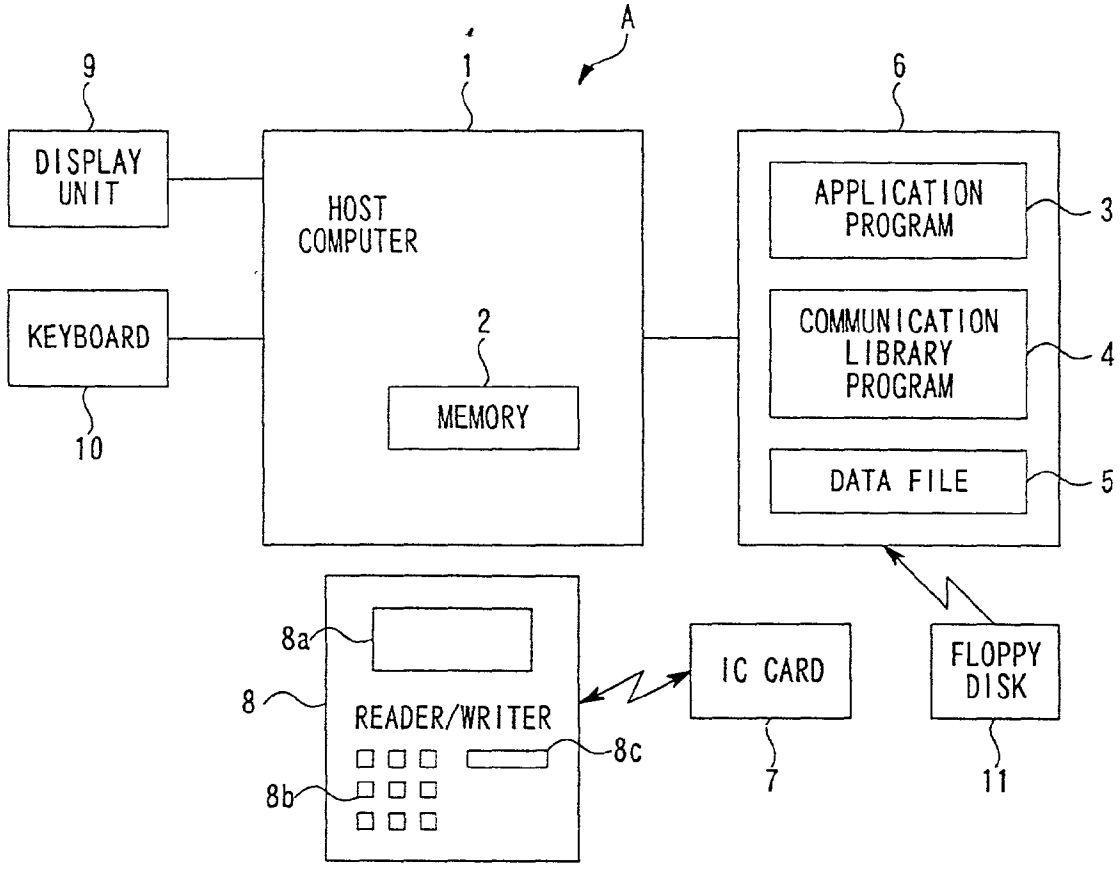
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(57) **ABSTRACT**

A portable electronic device, which executes a prescribed process based on a selling amount of money that is input from a terminal device, has a memory for storing information concerned with a loyalty point calculation process corresponding to a selling amount of money, calculates a loyalty point using information stored in the memory based on a selling amount of money which is input from the terminal device and updates a loyalty point stored in the memory to a calculated loyalty point.



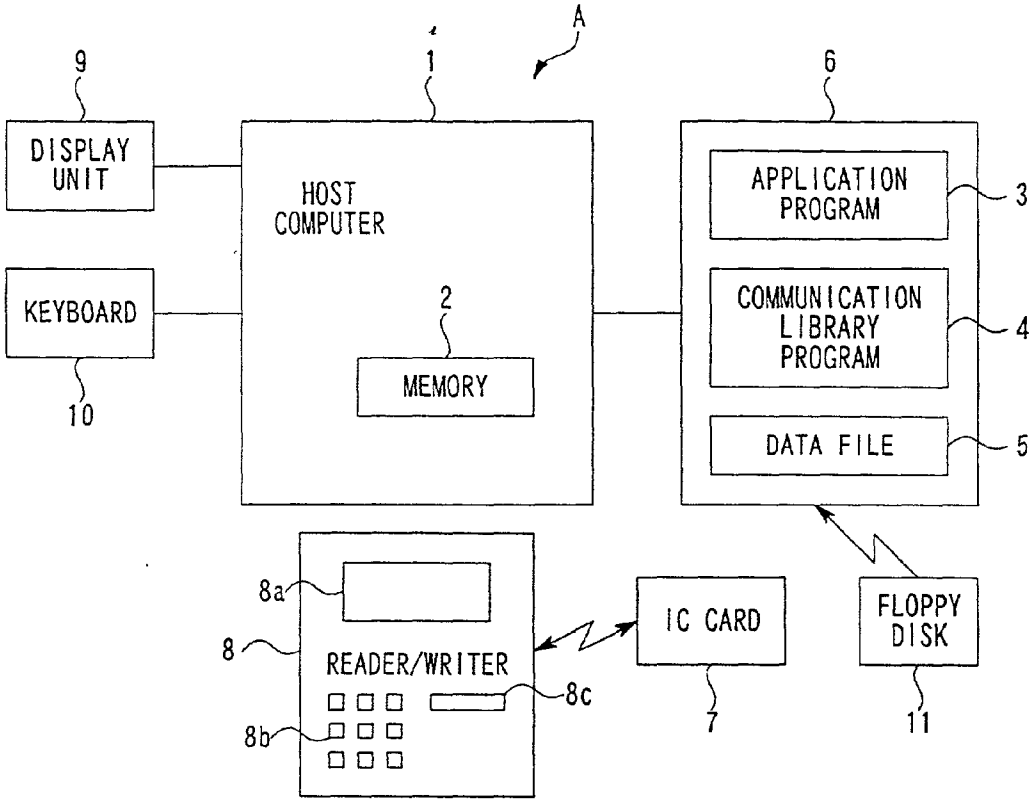


FIG. 1

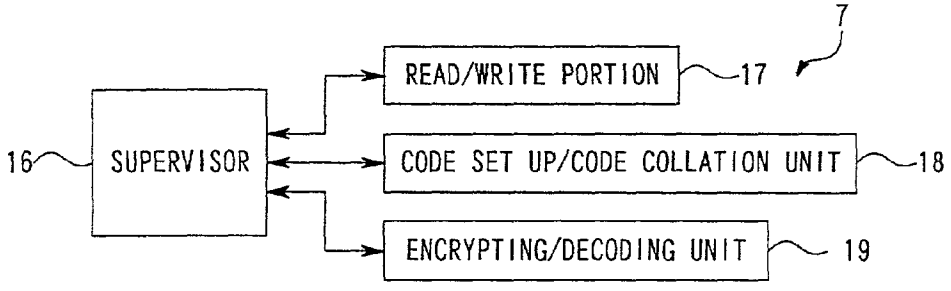


FIG. 2

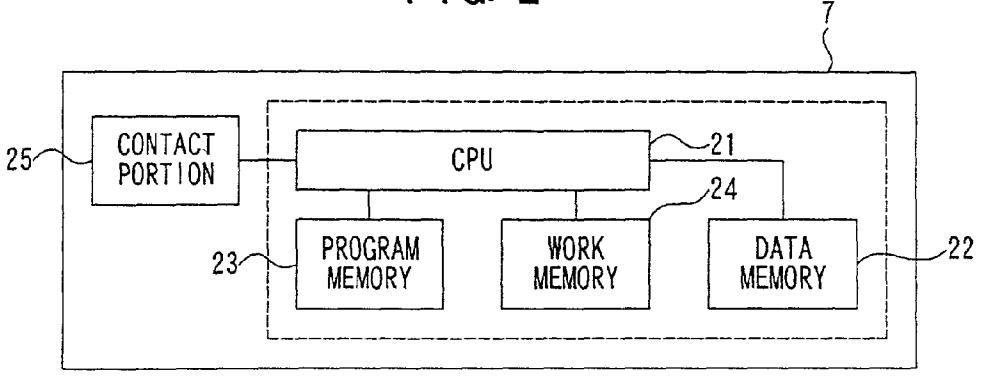


FIG. 3

22a	NAME	HANAKO TOSHIBA
22b	DATE OF BIRTH	1970-3-3
22c	MANAGEMENT NUMBER	98765
22d	PHONE NUMBER	03-1234-5678
22e	NUMBER OF TIMES OF COMING TO STORE	3
22f	PURCHASE AMOUNT OF MONEY	12345
22g	NUMBERS OF LOYALTY POINT	500
22h	ADDING DATE OF LOYALTY POINT	2000-1-1
22i	TERM OF VALIDITY	2000-3-31

T1

FIG. 4

T2

	ITEM	QUALIFICATION	RATIO OF SERVICE	
30	NUMBERS OF BASIC LOYALTY POINT	EVERY 100 YEN	5 LOYALTY POINT	30b
31	NUMBER OF VISITING STORE	ABOVE 5	2 MULTIPLE	31b
		ABOVE 10	3 MULTIPLE	
		ABOVE 20	5 MULTIPLE	
32	DATE OF BIRTH	AGREED WITH DATE	3 MULTIPLE	32b
33	PURCHASE AMOUNT OF MONEY	ABOVE 50,000 YEN	2 MULTIPLE	33b
		ABOVE 80,000 YEN	3 MULTIPLE	
		ABOVE 100,000 YEN	5 MULTIPLE	
34	PHONE NUMBER	LOWER 2 DIGITS AGREES WITH 01	3 MULTIPLE	34b
	. . .	. . .	. . .	

31a 30a 32a 33a 34a

FIG. 5

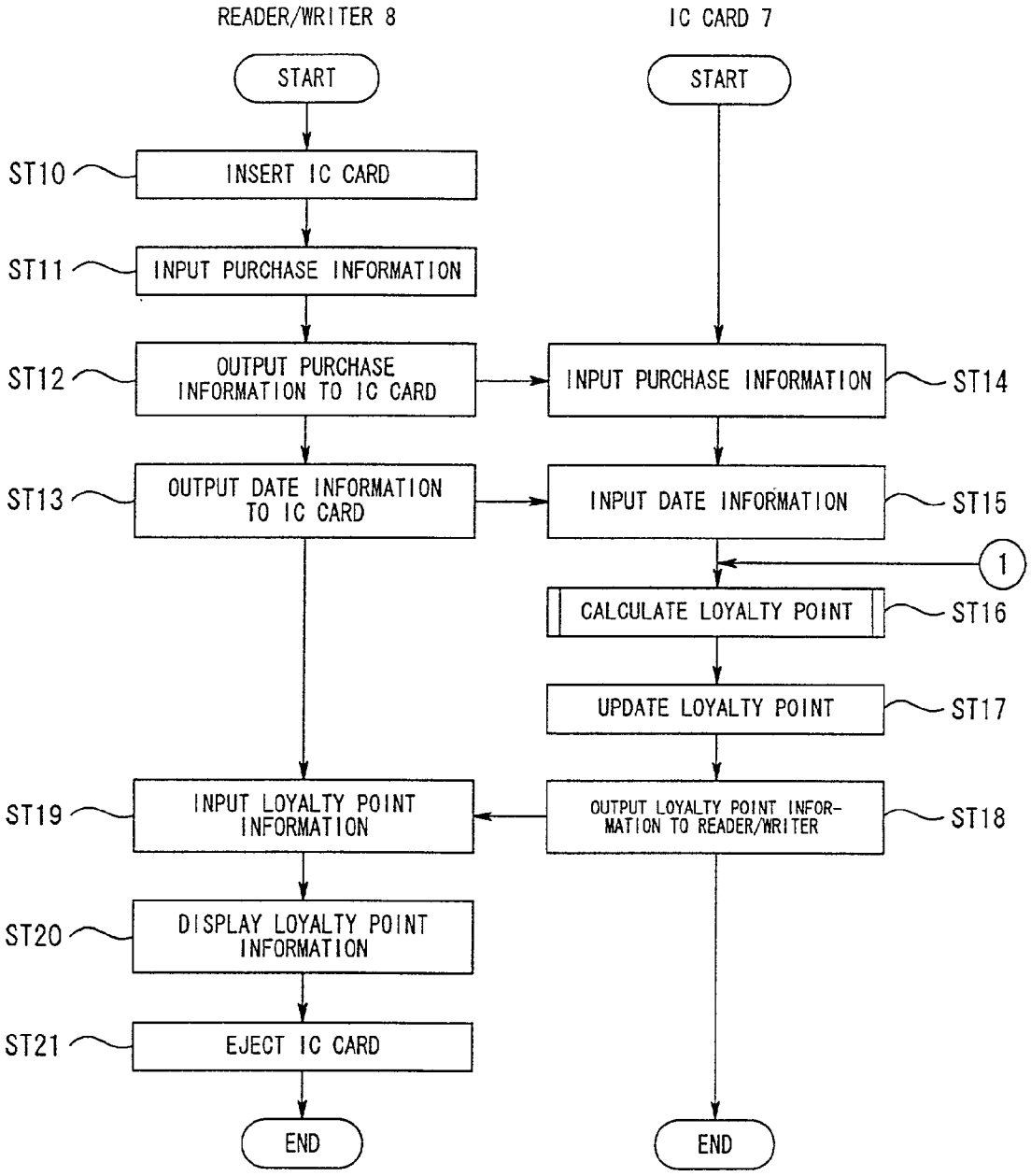

READER/WRITER 8
IC CARD 7
START
START
ST10
INSERT IC CARD
ST11
INPUT PURCHASE INFORMATION
ST12
OUTPUT PURCHASE INFORMATION TO IC CARD
INPUT PURCHASE INFORMATION
ST14
ST13
OUTPUT DATE INFORMATION TO IC CARD
INPUT DATE INFORMATION
ST15
1
CALCULATE LOYALTY POINT
ST16
UPDATE LOYALTY POINT
ST17
ST19
INPUT LOYALTY POINT INFORMATION
OUTPUT LOYALTY POINT INFORMATION TO READER/WRITER
ST18
ST20
DISPLAY LOYALTY POINT INFORMATION
ST21
EJECT IC CARD
END
END

FIG. 6

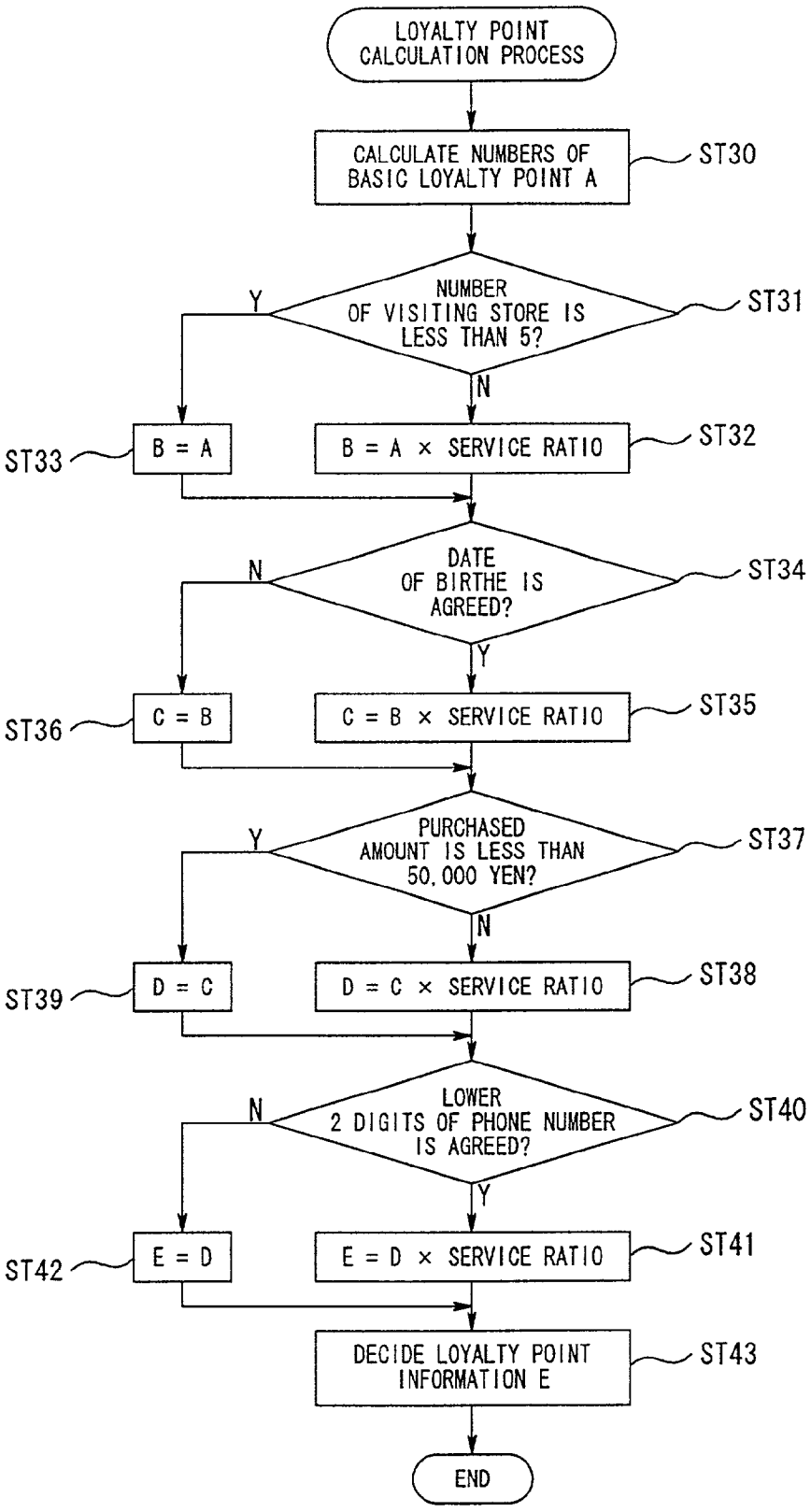

LOYALTY POINT CALCULATION PROCESS
CALCULATE NUMBERS OF BASIC LOYALTY POINT A
ST30
NUMBER OF VISITING STORE IS LESS THAN 5?
ST31
Y
N
B = A
ST33
B = A × SERVICE RATIO
ST32
DATE OF BIRTHE IS AGREED?
ST34
N
Y
C = B
ST36
C = B × SERVICE RATIO
ST35
PURCHASED AMOUNT IS LESS THAN 50,000 YEN?
ST37
Y
N
D = C
ST39
D = C × SERVICE RATIO
ST38
LOWER 2 DIGITS OF PHONE NUMBER IS AGREED?
ST40
N
Y
E = D
ST42
E = D × SERVICE RATIO
ST41
DECIDE LOYALTY POINT INFORMATION E
ST43
END

FIG. 7

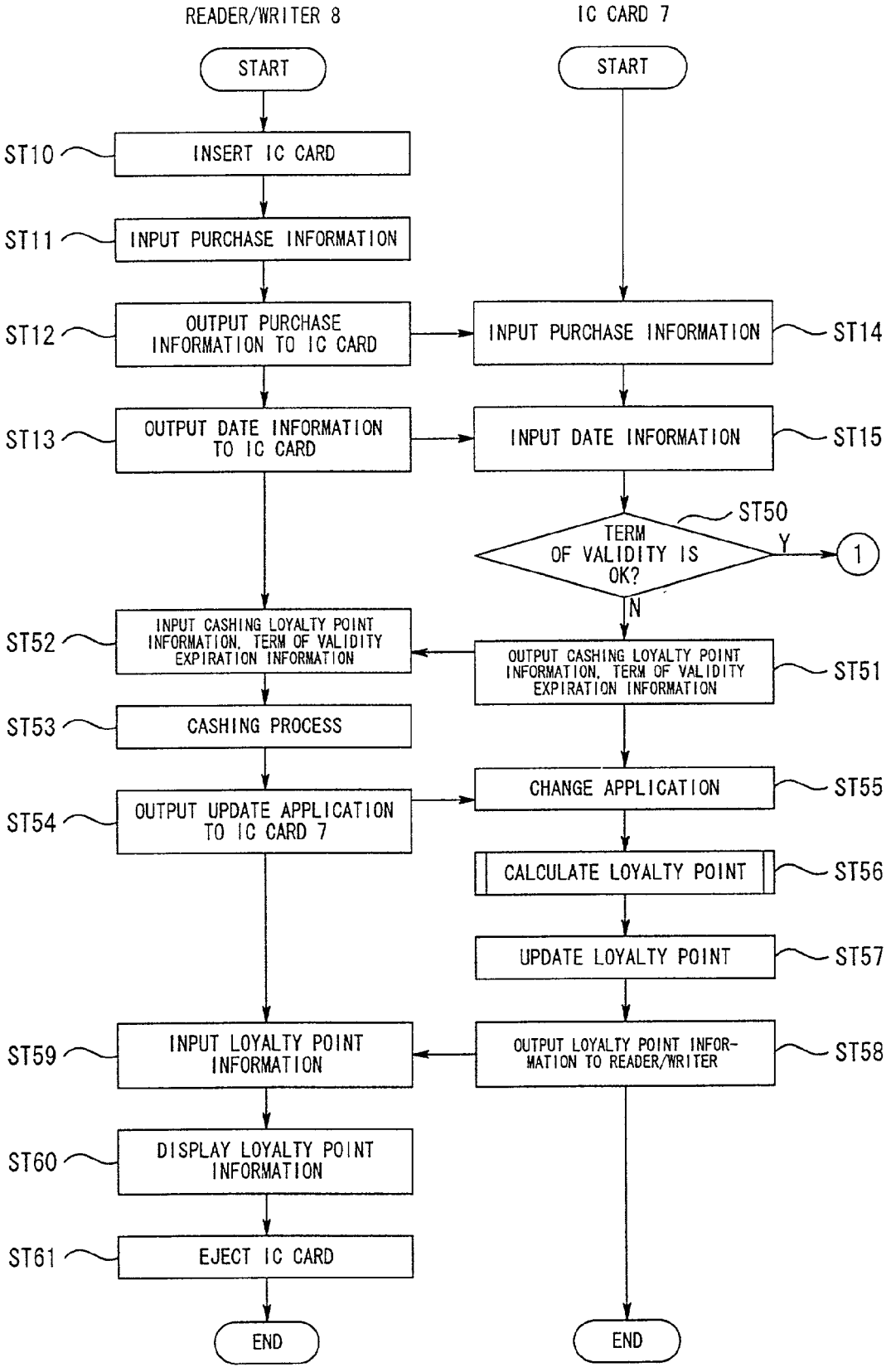

READER/WRITER 8
IC CARD 7
START
START
ST10
INSERT IC CARD
ST11
INPUT PURCHASE INFORMATION
ST12
OUTPUT PURCHASE INFORMATION TO IC CARD
INPUT PURCHASE INFORMATION
ST14
ST13
OUTPUT DATE INFORMATION TO IC CARD
INPUT DATE INFORMATION
ST15
ST50
TERM OF VALIDITY IS OK?
Y
1
N
ST52
INPUT CASHING LOYALTY POINT INFORMATION, TERM OF VALIDITY EXPIRATION INFORMATION
OUTPUT CASHING LOYALTY POINT INFORMATION, TERM OF VALIDITY EXPIRATION INFORMATION
ST51
ST53
CASHING PROCESS
CHANGE APPLICATION
ST55
ST54
OUTPUT UPDATE APPLICATION TO IC CARD 7
CALCULATE LOYALTY POINT
ST56
UPDATE LOYALTY POINT
ST57
ST59
INPUT LOYALTY POINT INFORMATION
OUTPUT LOYALTY POINT INFORMATION TO READER/WRITER
ST58
ST60
DISPLAY LOYALTY POINT INFORMATION
ST61
EJECT IC CARD
END
END

FIG. 8

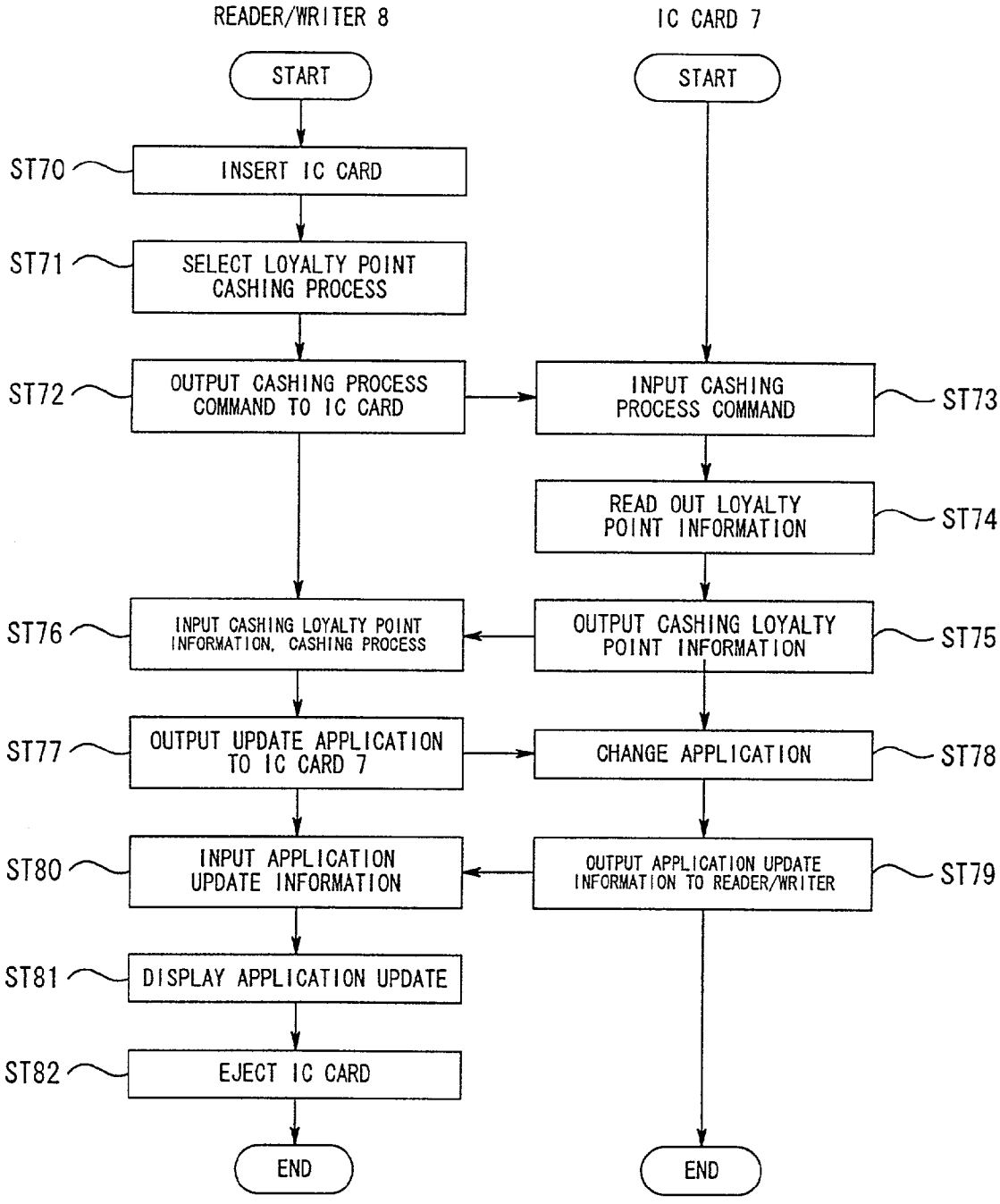

READER/WRITER 8
IC CARD 7
START
START
ST70
INSERT IC CARD
ST71
SELECT LOYALTY POINT CASHING PROCESS
ST72
OUTPUT CASHING PROCESS COMMAND TO IC CARD
INPUT CASHING PROCESS COMMAND
ST73
READ OUT LOYALTY POINT INFORMATION
ST74
ST76
INPUT CASHING LOYALTY POINT INFORMATION, CASHING PROCESS
OUTPUT CASHING LOYALTY POINT INFORMATION
ST75
ST77
OUTPUT UPDATE APPLICATION TO IC CARD 7
CHANGE APPLICATION
ST78
ST80
INPUT APPLICATION UPDATE INFORMATION
OUTPUT APPLICATION UPDATE INFORMATION TO READER/WRITER
ST79
ST81
DISPLAY APPLICATION UPDATE
ST82
EJECT IC CARD
END
END

FIG. 9

PORTABLE ELECTRONIC DEVICE AND LOYALTY POINT SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a portable electronic device that is held by customer and to store individual information and more particularly to a portable electronic device that is capable of providing a service to add loyalty point according to a degree of utilization of a store by customer and a loyalty point system in the retail business.

[0003] 2. Description of the Related Art

[0004] A special benefit system called as a loyalty point system has been introduced into retail stores including supermarkets in recent years. This system converts a total amount of money of purchased merchandises into loyalty points every time when a customer purchased merchandises and the loyalty points are accumulated. When the accumulated loyalty points reach a prescribed value, a little gift or a coupon is presented/merchandises purchased next time are discounted aiming at the fixation of customers.

[0005] This system generally uses card type media including magnetic cards and the like. In other words, a customer who is a member of this system and carrying a membership card issued from a store shows the membership card to a store clerk when purchases merchandises and pays a price. The shop clerk registers the sales data of the merchandise purchased by that customer in such a merchandise sales data processor as an electronic cash register, a POS terminal, etc. At the same time, the card data of the membership card is read by a card reader/writer provided to the merchandise sales data processor. An accumulated loyalty point up to the last time is recorded on this membership card.

[0006] After reading accumulated loyalty point data of a membership card by the card reader/writer, the merchandise sales data processor obtains the total amount of money for merchandise purchased by a customer by processing the registered merchandise sales data and converts the total amount of money into a loyalty point. Then, the loyalty point calculated this time is added to the accumulated loyalty point data read from the membership card and this added value is written into the membership card as an accumulated loyalty point up to the present time by the card reader/writer. This loyalty point system has been programmed as described above.

[0007] In Japanese Laid-Open Patent Publication No. Hei 9-212743 and Japanese Laid-Open Patent Publication No. Hei 6-76124, the application of this system to provide the special service, wherein loyalty points are calculated by changing the point conversion ratio according to the amount of money and by setting the loyalty point conversion at a higher level than the ordinary level, was disclosed.

[0008] In the existing system described above, point information is read out of a card that recorded loyalty points and after calculating loyalty point by a card processor that is generally called as a reader/writer, the calculated loyalty point information is recorded on a card. However, there was a possibility of illegally calculating loyalty points by maliciously rewriting a program stored in a card processor by a store clerk. Further, for calculating loyalty points it is necessary to output individual information recorded on a card to an external device (a card processor), there is generated a problem from, the viewpoint of security.

SUMMARY OF THE INVENTION

[0009] It is an object of the present invention to provide a portable electronic device and a loyalty point system capable of calculating loyalty points corresponding to individual information while keeping the security.

[0010] According to the present invention, there is provided a portable electronic device for executing a prescribed process according to information related to the selling amount of money that is input from a terminal device, which comprises: a means to store information on a calculation process of loyalty points corresponding to a selling amount of money and a calculated loyalty point; a means to calculate loyalty point using information stored in the storage means according to information on an amount of money of sales that is input from the terminal device; and a means to update the loyalty point stored in the storage means to a loyalty point calculated by the calculation means.

[0011] Further, according to the present invention, there is provided a loyalty point system, which comprises a portable electric device including: a storage means to store a prescribed application program for calculating loyalty point corresponding to an amount of money for sales and loyalty point; a means to calculate loyalty point according to the application program stored in the storage means based on the dealt amount of money that is input from the terminal device; a means to update the loyalty point stored in the storage means to the loyalty point calculated by the calculating means; and an output means to output the loyalty point calculated by the calculating means to the terminal device, and the terminal device including a display means to display the loyalty point that is output from the portable electronic device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] **FIG. 1** is a schematic block diagram showing a loyalty point system using an IC card as a portable electronic device of the present invention;

[0013] **FIG. 2** is a block diagram showing the basic function of the IC card that is used for the loyalty point system;

[0014] **FIG. 3** is a block diagram showing the control of an IC card **7** that is used for the loyalty point, system;

[0015] **FIG. 4** is a table showing individual information stored in a data memory of an IC card;

[0016] **FIG. 5** is a table showing loyalty point service information relative to a loyalty point service application stored in a data memory of an IC card;

[0017] **FIG. 6** shows flowcharts relative to a reader/writer and an IC card for explaining a loyalty point adding process that is executed when a customer who has an IC card purchases a merchandise, etc. by a loyalty point system.

[0018] **FIG. 7** is a flowchart for explaining a loyalty point calculating process of the IC card **7** in Step ST**16** shown in **FIG. 1**;

[0019] **FIG. 8** are flowcharts for explaining the installation of a loyalty point service application to an IC card of which term of validity is over in the loyalty point system using an IC card; and

[0020] **FIG. 9** is a flowchart for explaining the installation of a loyalty point service application to an IC card and an associated cashing process in the loyalty point system using an IC card.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] Preferred embodiments of the present invention will be described below referring to the attached drawings. **FIG. 1** is a diagram for explaining a loyalty point system A using an IC card as a portable electronic device involved of the present invention. As shown in **FIG. 1**, the loyalty point system A has a host computer **1** as a higher device having a memory **2**, an auxiliary storage **6** connected to this host computer **1**, a reader/writer **8** as a terminal unit, a display unit **9** and a keyboard **10**.

[0022] The auxiliary storage **6** houses an application program **3**, a communication library program **4** and a data file **5**. It is also possible to install programs, etc. in the auxiliary storage **6** from a storage medium, for example, a floppy disk **11**. The reader/writer **8** reads and writes (transmission/reception) a message to the IC CARD **7** in contact or non-contact with it. The display unit **9** is to inform, the operating procedures and the operating state. The keyboard **10** is used to input amount of purchase and other data by operator.

[0023] The reader/writer **8** as a terminal unit has a display **8***a* as a display means, a keyboard **8***b* as an input means, and an IC card slot **8***c* (as this embodiment is explained using a contact type IC card). The display **8***a* displays the process contents in the reader/writer **8**, information relative to information forwarded from the IC card **7**, etc. The keyboard **8***b* is for inputting various kinds of information and, for example, to select the process contents in the reader/writer **8**, input a code and amount of money information.

[0024] **FIG. 2** is a diagram showing the functional blocks of the IC card **7**. As shown in **FIG. 2**, the IC card **7** is composed of portions for executing fundamental functions such as a read/write portion **17**, a code set up/code collation unit **18** and an encrypting/decoding unit **19**, and a supervisor **16** to manage these fundamental functions.

[0025] The read/write portion **17** is a functional portion to read, write or erase data from/to a data memory, etc. The code set up/code collation unit **18** stores a code number that is set by a user, protects it from being read and after setting the code number, collates it with a code number that is input from an external device and approves the subsequent process. The encrypting/decoding unit **19** has a function to execute the encryption to prevent leakage and forgery of communication data and the decoding the encrypted data when data is exchanged between the reader/writer **8** and the IC card **7** via a communication line. The supervisor **16** has a function to read a functional code input from the reader/writer **8** or a functional code added to data, and have the IC card **7** to execute the operation according to the contents of the code.

[0026] **FIG. 3** is a diagram showing a control block of the IC card **7**. As shown in **FIG. 3**, the IC card **7** is composed of a CPU **21**, a data memory **22**, a program memory **23** and a work memory **24** , which are storage memories, and a contact portion **25** to get the electrical contact with the reader/writer **8**, to execute such functions as shown in **FIG. 2**. Out of these devices, the CPU **21**, the data memory **22**, the program memory **23** and the work memory **24** are formed into a single IC chip (or a plurality of IC chips) and embedded in the main body of IC card.

[0027] The program memory **23** is composed of, for example, a mask ROM and stores a control program of the CPU **21** equipped with a subroutine to realize such the fundamental functions as described above and further, has a function to download an application program.

[0028] The data memory **22** is used for storing applications including a loyalty point service application and data and is composed of, for example, a non-volatile memory that can be erased such as EEPROM. The work memory **24** is a memory that is used in working and is composed of, for example, such a volatile memory as RAM, etc.

[0029] **FIG. 4** is a diagram showing a table T1 relative to individual information that is stored in the data memory **22** of the IC card **7**. As shown in **FIG. 4**, such individual information as, for example, name "HANAKO TOSHIBA"**22***a*, date of birth "1970-3-3"**22***b*, management number "98765"**22***c*, phone number "03-1234-5678"**22***d*, number of times of coming to store "3 times"**22***e*, purchase amount of money "12345 Yen"**22***f*, number of loyalty points "500 points"**22***g*, adding date of loyalty point "2000-1-1" 22*h*, and term of validity "2000-3-**31" 22I are stored in the data memory 22.**

[0030] Of these individual information, information relative to name **22***a*, date of birth **22***b* and management number **22***c* is a fixed information. Information relative to phone number **22***d*, number of times of coming to the store **22***e*, purchase amount of money **22***f*, number of loyalty point **22***g*, adding data of loyalty point **22***h* and term of validity **22**I are variable information. In particular, of these variable information, number of times of coming to the store **22***e*, purchase amount of money **22***f*, number of loyalty points **22***g* and adding date of loyalty point **22***h* are information to be updated whenever a customer who has the IC card **7** purchases merchandises.

[0031] **FIG. 5** is a diagram showing a table T2 of the loyalty point service information related to the loyalty point service application stored in the data memory **22** of the IC card **7**. As shown in **FIG. 5**, "Item", "Qualification", "Ratio of Service" for the service to be added especially in connection with the individual information are to be stored/set on the table T2 of the loyalty point service.

[0032] As the "Item" to be added to the service especially in connection with the individual information, for example, "Number of Basic Loyalty points"**30**, "Number of Visiting Store"**31**, "Date of Birth"**32**, "Purchase Amount of Money"**33** and "Phone Number"**34** are stored/set. Corresponding to "Number of Basic Loyalty Points"**30**, "Every 100 Yen"**30***a* and "5 Loyalty point"**30***b* are stored as "Qualification" and "Service Ratio", respectively. So, it is so set that 5 loyalty points are added to the number of basic loyalty points for the purchase of every 100 yen.

[0033] Further, corresponding to "Number of Visting Store", plural figures are set for "Qualification" and "Service

Ratio" so that a different "Service Ratio" is set for each qualification step. That is, as "Qualification", "Above 5", "Above 10" and "Above 20"**31***a* are set by stages. As "Service Ratio", "2 multiple", "3 multiple" and "5 mulitple"**31***b* are set by stages. As a result, when the number of visiting store is above 5, the calculated number of loyalty points is doubled and when above 10, the number of loyalty points is trebled and when above 20, it is increased by 5 multiple.

[**0034**] Further, corresponding to the date of birth **32**, "Agreed with Date"**32***a* is stored as "Qualification" and "3 multile" is stored as "Service Ratio". As a result, it is so set that when "Date of Birth" agreed with the date information, the number of calculated loyalty points is further trebled.

[**0035**] Further, corresponding to "Purchase Amount of Money"**33**, plural figures are set for "Qualification" and "Service Ratio" so that "Service Ratio" becomes different according to the qualification step. That is, "Above 50,000 yen", "Above 80,000 yen" and "Above 100,000 yen"**33***a* are set by stages as "Qualification". "2 multiple", "3 multiple" and "5 multiple"**33***b* are stored by stages as "Service Ratio". As a result, it is so set that when the purchase amount of money is above 50,000 yen, the calculated number of loyalty points is further doubled, when above 80,000 yen, it is trebled and when above 100,000 yen, it is further increased by 5 multiple.

[**0036**] Further, corresponding to "Phone Number", "Lower 2 digits agrees with 01"**34***a* is stored as "Qualification" and "3 multiple"**34***b* is stored as "Service Ratio". It is so set that as a result, when the lower 2 digits of a phone number agreed with "01",the calculated number of loyalty points is further trebled.

[**0037**] **FIG. 6** is a flowchart for explaining the loyalty point adding process executed by the reader/writer **8** and the IC card **7** when a customer who has the IC card **7** purchased merchandises according to the loyalty point system using the IC card **7** set as described above. As shown in **FIG. 6**, first when the IC card is inserted into the IC card slot **8***c* of the reader/writer **8** (ST**10**), various purchase information, for example, purchase amount of money and the like are input by a store clerk from the keyboard (ST**11**). When the purchase information is input in the step ST**11**, the reader/writer **8** outputs the purchase information and also, the date information to the IC card **7** (ST**12**) and is put in the standby state (ST**13**).

[**0038**] When the purchase information and date information are input from the reader/writer **8** to the IC card **7** via the contact portion **25** (ST**14** and ST**15**), the CPU **21** executes the loyalty point calculation process described later (ST**16**). When the loyalty points are calculated in Step ST**16**, the CPU **21** updates the individual information **22***e*-**22***h* stored in the data memory **22**. That is, the CPU **21** stores a new figure of "Number of visiting store"**22***e* with "+1" added in the table T**1** of the data memory **22**. Further, CPU **21** stores a new purchase amount of money added with the purchase amount of money of this time in the table T**1**. Further, the CPU **21** stores a new number of loyalty point added a number of loyalty point calculated this time to "Number of loyalty points"**22***g* in the Table T**1** and stores the data information of this time for "Adding date of loyalty point"**22***h* in the Table T**1** (ST**17**). In addition, the CPU **21** outputs the loyalty point information calculated in Step ST**16** to the reader/writer **8** (ST**18**).

[**0039**] When loyalty point information that is output from the IC card **7** is input (ST**19**), the reader/writer **8** displays that information on the display **8***a* for visual check by a customer who has an IC card (ST**20**), ejects the IC card for returning to that customer (ST**21**) and terminates the loyalty point adding process.

[**0040**] **FIG. 7** is a flowchart for explaining the loyalty point calculation process of the IC card in Step ST**16** shown in **FIG. 6**. As shown in **FIG. 7**, the CPU **21** of the IC card **7** first calculates a new purchase amount of money by adding the purchase amount of money information of this time included in the purchase information input in Step ST**14** to "Purchase Amount of Money"**22***f* on the table T**1** of the data memory **22**. Then, based on "Qualification" of "Number of Basic Loyalty Points" 30; that is, "Every 100 Yen" and "Service Ratio"; that is, "5 point" on the Table T**2** of the data memory **22**, the CPU **21** calculates the number of basic loyalty point A corresponding to a new money information (ST**30**).

[**0041**] Next, the CPU **21** compares a new number of visiting store, which is "+1" added to the number of times read from "Number of Visiting Store"**22***e* on the table T**1** of the data memory **22**, with the number of times that is set for "Qualification" (Above 5 times, 10 times and 20 times) **31***a* of "Number of Visiting Store" (ST**31**) on the table T**2** of the data memory **22**. As a result of the comparison in Step ST**31**, when the new number of visiting store is in excess of 5, 10 or 20, special loyalty points corresponding to the number of visiting store are added. That is, numbers of loyalty point B that is the number of basic loyalty points calculated in Step ST**30** multiplied by "Service Ratio" (2, 3 or 5 multiple) **31***b* corresponding to the Table T**2** is calculated (ST**32**). As a result of the comparison in Step ST**31**, when a new number of times of visiting store is less than 5, a special loyalty point according to the number of visiting store is not added (that is, B=A) (ST**33**).

[**0042**] Next, the CPU **21** compares the date read from "Date of Birth"**22***b* of the Table T**1** with the date information input in Step ST**15** (ST**34**). As a result of the comparison in Step ST**34**, when the date of birth agreed with the data of this time, the special loyalty point in connection with the date of birth is added. That is, the number of loyalty points C is calculated by multiplying the number of loyalty points B calculated in Step ST**32** or ST**33** by "Service Ratio" (3 multiple) corresponding to "Date of Birth"**32** on the table T**2** (ST**35**). As a result of the comparison in Step ST**34**, when the date of birth does not agree with the date of this time, a special loyalty point in connection with the date of birth is not added (that is, C=B) (ST**36**).

[**0043**] Then, the CPU **21** compares the selling amount of this time that is included in purchase information input in Step ST**14** with the amount of money set for the qualification (above 50,000 yen, 80,000 yen and 10,000 yen) **33***a* of "Purchase Amount of Money"**33** on the table T**2** (ST**37**). As a result of the comparison in Step ST**37**, when the purchase amount of money of this time is in excess of 50,000 yen or 80,000 yen or 100,000 yen, a special loyalty point in connection with the purchase amount of money is added. That is, the number of loyalty points D is calculated (ST**38**) by multiplying the number of loyalty points C that is calculated in Step ST**35** or ST**36** by "Service Ratio" (2, 3 or 5 multiple) **33***b* corresponding to "Purchase Amount of

Money"**33** on the tale T**2**. As a result of the comparison in Step ST**37**, when the purchase amount of money of this time is below 50,000 yen, a special loyalty point in connection with the purchase amount of money is not added (that is, D=C) (ST**39**).

[**0044**] Then, the CPU **21** compares the lower two digit values of a phone number read from "Phone Number"**22***d* on the table T**1** with a value "01" set for "Qualification" (the lower two digits are 01) of "Phone Number"**34** on the table T**2** (ST**40**). As a result of the comparison in Step ST**40**, when the lower two digits are "01", a special loyalty point in connection with the phone number is added. That is, the number of loyalty points E is calculated (ST**41**) by multiplying the number of loyalty points D calculated in Step ST**38** or ST**39** by "Service Ratio" (3 multiple) **34***b* corresponding to "Phone Number" on the table T**2**. As a result of the comparison in Step ST**40**, when the lower 2 digits are not "01", a special loyalty point in connection with the phone number is not added (that is, E=D) (ST**42**). Thus, the number of loyalty points E calculated in Step ST**41** or ST**42** is decided as the number of loyalty points at this time and the loyalty point calculation process is terminated (ST**43**).

[**0045**] **FIG. 8** is a flowchart for explaining the installation of a loyalty point service application in the IC card **7** that expired the data of validity in the loyalty point system A using the IC card **7** set as described above. That is, in this embodiment, when the term of validity of the IC card **7** expired, after the cashing process of loyalty points, the application in the IC card is changed to another higher loyalty point service application. Further, those portions for the same process as shown in **FIG. 6** are assigned with the same step numbers.

[**0046**] As shown in **FIG. 8**, when the IC card is first inserted into the IC card slot **8***c* of the reader/writer **8** (ST**10**), various kinds of purchase information including purchase amount of money information are input by a store clerk through the keyboard **8***b* (ST**11**). When the purchase information is input in ST**11**, the reader/writer **8** outputs the purchase information to the IC card **7** (ST**12**) and also, outputs the date information and is placed in the standby state (ST**13**).

[**0047**] When purchase information and date information are input to the IC card **7** from the reader/writer via the contact portion **25** (ST**14** and ST**15**), the CPU **21** reads "Term of Validity"**22***i* out of the table T**1** of the data memory **22** and compares it with date information input in Step ST**15** (ST**50**). As a result of the comparison in Step ST**50**, when the date is judged to be within the term of validity, the work proceeds to the loyalty point calculation process in Step **16**. Further, when the date is judged to be within the term of validity, the process contents after Step ST**16** are the same as the processes after Step ST**16** shown in **FIG. 6**. Further, when it is judged the term of validity expired as a result of the comparison in Step ST**50**, the CPU **21** reads "Number of Loyalty Points"**22***g* out of the table T**1** and outputs information on the expiration of the term of validity to the reader/writer **9** together with this "Number of Loyalty Points" as cashing information of loyalty point (ST**51**).

[**0048**] When information on cashing loyalty point and information on the term of validity expiration output from the IC card **7** are input to the reader/writer **8**, the reader/writer **8** executes a prescribed cashing process for information on the cashing loyalty point and returns the service for the cashing loyalty point to a customer holding the IC card **7** (ST**53**). Further, the reader/writer **8** outputs a loyalty point service application for changing with the improved services including loyalty point ratio, etc. based on the input information on the expiration of term of validity (ST**54**).

[**0049**] When the loyalty point service application for changing is input to the IC card **7** from the reader/writer **8**, the CPU **21** updates the loyalty point service application in the data memory **22** (ST**55**). When the updating of the application in Step ST**55** is completed, the CPU **21** proceeds to Step ST**56** and executes the loyalty point calculation process for the purchase of this time (ST**56**). When the loyalty point is calculated in Step ST**56**, the CPU **21** updates the individual information **22***e*-**22***h* stored in the data memory **22**. That is, the CPU **21** stores a new number of times with "+1" added to "Number of Visiting Store"**22***e* in the table T**1** of the data memory **22**, stores a new purchase amount of money with the purchase amount of money of this time added to "Purchase Amount of Money"**22***f* in the Table T**1**, stores a new number of loyalty points with the number of loyalty points calculated this time added to "Number of Loyalty Points"**22***g* in the table T**1**, and stores the date information of this time for "Adding Date of Loyalty Point"**22***h* of the table T**1** (ST**57**). In addition, the CPU **21** outputs information on the loyalty point calculated in Step ST**56** to the reader/writer **8** (ST**58**).

[**0050**] When information of loyalty point that is output from the IC card **7** is input to the reader/writer **8** (ST**59**), the loyalty point is displayed on the display **8***a* for the visual check by a customer who has the IC card (ST**60**), the IC card is ejected for returning to the customer (ST**61**), the application change process and the loyalty point adding process are terminated.

[**0051**] **FIG. 9** is a flowchart for explaining the installation of a loyalty point service application to the IC card **7** in connection with the cashing process of loyalty points in the loyalty point system A using the IC card **7** set as described above. In this embodiment, when the cashing process of loyalty point recorded in the IC card **7** is executed, the loyalty point service application in the IC card **7** is changed to another higher loyalty point service application for further increase the service.

[**0052**] As shown in **FIG. 9**, when the IC card is first inserted into the IC card slot **8***c* of the reader/writer **8** (ST**70**), a store clerk selects "Loyalty Point Cashing Process" through the keyboard **8***b* (ST**71**). When the loyalty point cashing process is selected in Step ST**71**, the reader/writer **8** first outputs a cashing process command to the IC card **7** and becomes the standby state (ST**72**).

[**0053**] When the cashing process command is input to the IC card **7** from the reader/writer **8** via the contact portion **25** (ST**73**), the CPU **21** reads loyalty point information out of "Number of Loyalty Points"**22***g* on the table T**1** of the data memory **22** (ST**74**) and outputs it to the reader/writer **8** as loyalty point cashing information (ST**75**).

[**0054**] When loyalty point cashing information output from the IC card is input, the reader/writer **8** executes a prescribed cashing process for cashing loyalty point information according to the preset loyalty point service application, and returns a service according to the cashing loyalty

point to a customer who has the IC card (ST**76**). Further, the reader/writer **8** outputs the loyalty point service changing application to the IC card (ST**77**).

[**0055**] When the loyalty point service changing application is input to the IC card **8** from the reader/writer **8**, the CPU **21** updates the loyalty point service application in the data memory **22** (ST**78**). When the application updating in Step ST**78** is completed, the CPU **21** outputs the information that the application was updated to the reader/writer **8** (ST**79**).

[**0056**] When information associated with the updating of the application is input from the IC card **7** (ST**80**), the reader/writer **8** displays the completion of the application updating on the display **8***a* for a store clerk (ST**81**), ejects the IC card for returning to a customer who has the IC card (ST**82**), and terminates the application change process.

[**0057**] As described above, this invention is able to calculate a loyalty point in an IC card based on a loyalty point service application which is pre-stored in the IC card memory by inputting purchase information comprising at least purchase amount of money into the IC card. As a result, it has an effect to prevent the forgery of illegal loyalty points.

[**0058**] Further, because loyalty service loyalty points are calculated/updated on an IC card, it becomes possible to calculate loyalty points without installing a loyalty point service application to the reader/writer and executing the data processing by the reader/writer. Accordingly, a burden of the data process on the reader/writer can be largely reduced, and it becomes possible to use a cheap reader/writer and contribute to the spread use of the loyalty service point system.

[**0059**] Further, as described above, this invention calculates loyalty service points in connection with individual information without obtaining it from an IC card, that is, adds loyalty service points especially in connection with individual information. Therefore, it has an effect that loyalty service points can be added in connection with individual information while retaining its security without leaking individual information to the outside.

[**0060**] Further, as described above, this invention is capable of updating the loyalty point service application that is stored in an IC card. Accordingly, it becomes possible to easily change size of loyalty points calculated in an IC card and service objects to which loyalty points are added. Particularly in this embodiment, when the loyalty point cashing process is executed, the loyalty point service application can be changed to another loyalty point service application which is for providing a further improved service including loyalty point ratio or after executing the loyalty point cashing process for an IC card of which term of validity is expired, it can be changed to the loyalty point service application. Accordingly, the service to an IC card holding customer is increased and the spread use/firmly fixing of the loyalty point system.

[**0061**] As explained above, according to the present invention, it is possible to calculate loyalty point information and service loyalty points can be calculated corresponding to individual information while holding security.

What is claimed is:

1. A portable electronic device to execute prescribed process according to information on dealt amount of money input from a terminal device comprising:

storage means for storing loyalty points and information in connection with a loyalty point calculation process corresponding to a dealt amount of money;

means for calculating a loyalty point using the information stored in the storage means according to the information on the deal amount of money input from the terminal unit; and

means for updating the loyalty point stored in the storage means to a loyalty point calculated by the calculation means.

2. A portable electronic device according to claim 1, wherein the information on the calculation process of the loyalty point stored in the storage means is an application program for calculating a loyalty point.

3. A portable electronic device according to claim 1, wherein the storage means stores individual information of a person who is holding the portable electronic device, a qualification to add a special loyalty point based on the individual information and a size of a loyalty point added corresponding to the qualification.

4. A portable electronic device according to claim 3, wherein the calculation means includes:

means for judging whether the individual information stored in the storage means satisfies the qualification; and

means for calculating a loyalty point including a loyalty point that is especially added corresponding to the qualification when it is judged by the judging means that the qualification is satisfied.

5. A portable electronic device according to claim 1, wherein the storage means stores a qualification to add a special loyalty point in connection with date information and a size of a loyalty point to add corresponding to the qualification.

6. A portable electronic device according to claim 5, wherein the calculation means includes:

judging means for judging whether the date information input from the terminal device satisfies the qualification stored in the storage means; and

means for calculating a loyalty point including a loyalty point that is especially added corresponding to the qualification when it is judged by the judging means that the qualification is satisfied.

7. A portable electronic device according to claim 1, wherein the storage means stores individual information of customers who have a portable electronic device, qualification for adding a special loyalty point associated with individual information and date information, and size of loyalty point to be added especially corresponding to the qualification.

8. A portable electronic device according to claim 7, wherein the calculation means includes:

means for judging whether the qualification stored in the storage means is satisfied based on date information input from the terminal device and individual information stored in the storage means; and

means for calculating a loyalty point including a loyalty point that is specially added corresponding to the qualification when it is judged that the qualification is satisfied.

9. A portable electronic device according to claim 1, further comprising:

output means for outputting a loyalty point calculated by the calculating means to the terminal device.

10. A portable electronic device according to claim 1, further comprising:

output means for outputting the loyalty point calculated by the calculating means to the terminal device after updating the loyalty point stored in the storage means by the updating means.

11. A portable electronic device according to claim 1, further comprising:

means for executing the exchanging process of the loyalty point stored in the storage means based on the information stored in the storage means when an instruction for the exchanging process to exchange a loyalty point to another valuable thing from the terminal device; and

means for outputting the result of exchange by the execution means to the terminal device.

12. A portable electronic device according to claim 2, further comprising:

means for executing the loyalty point exchange process for the loyalty point stored in the storage means according to an application program stored in the storage means when an instruction is input from the terminal device for the exchange process to exchange the loyalty point to another valuable thing; and

means for executing the rewrite of an application program stored in the storage means according to an instruction from the terminal device when the exchange process by the execution means is completed.

13. A portable electronic device according to claim 1, wherein the storage means stores the information of the term of validity relative to the portable electronic device.

14. A portable electronic device according to claim 13, further comprising:

judging means for judging whether the term of validity of the portable electronic device has expired by comparing the date information input from the terminal device with the term of validity information stored in the storage means;

means for executing the loyalty point calculation process by the calculation means when the judging means judges that the term of validity is not yet expired and to execute the exchange process to exchange the loyalty point stored in the storage means to another valuable thing based on the information stored in the storage means when the judging means judges that the term of validity is expired; and

means for outputting the loyalty point calculated by the calculation means to the terminal device when the term of validity is judged to have not yet been expired by the judging means and to output the information showing that the term of validity has been expired together with the result of exchange by the execution means to the terminal device.

15. A portable electronic device according to claim 2, wherein the storage mean stores the information on the term of validity of the portable electronic device.

16. A portable electronic device according to claim 15, further comprising:

judging means for judging whether the term of validity of the portable electronic device was expired by comparing the date information input from the terminal device with the term of validity information stored in the storage means;

means for executing the loyalty point calculation process by the calculation means when the judging mean judges that the term of validity has not yet been expired and execute the exchange process to exchange the loyalty point stored in the storage means to another valuable thing according to the application program stored in the storage means when the judging means judges that the term of validity was already expired;

means for outputting the loyalty point calculated by the calculation means to the terminal device when the judging means judges that the term of validity has not yet been expired and to output the information showing that the term of validity was already expired to the terminal device together with the result of exchange by the execution means;

means for executing the rewrite of the application program stored in the storage means according to the instruction from the terminal device after outputting the information showing the expiration of the term of validity by the output means when the judging means judges that the term of validity was already expired; and

control means for controlling the calculation means to execute the loyalty point calculation process according to the rewritten application program stored in the storage means after completing the rewriting process by the rewriting means.

17. A loyalty point system comprising a terminal device having an input means for inputting prescribed information and a portable electronic device to execute prescribed processes for the information input from the terminal device; wherein,

the portable electronic device includes:

storage means for storing a prescribed application program for calculating loyalty points corresponding to a dealt amount of money and loyalty points;

means for calculating a loyalty point based on the information on dealt amount of money input from the terminal device according to the application program stored in the storage means;

means for updating the loyalty point stored in the storage means to the loyalty point calculated by the calculation means; and

output means for outputting the loyalty point calculated by the calculating means to the terminal device;

the terminal device includes:

display means for displaying a loyalty point output from the portable electronic device.

18. A loyalty point system according to claim 17, wherein the terminal device further includes:

a application storage means for storing another application program separately from the application program stored in the portable electronic device; and

output means for outputing a rewriting instruction of the application program and another application program stored in the application storage means to the portable electronic device according to the instruction from the input means.

19. A loyalty point system according to claim 17, wherein the portable electronic device further includes:

means for executing the process to rewrite the application stored in the storage means to the application program output from the terminal device according to the rewriting instruction of the application program output from the terminal device.

20. A loyalty point system according to claim 17, wherein the terminal device further includes:

means for instructing the exchange process to exchange the loyalty point stored in the portable electronic device to another valuable thing;

the portable electronic device further includes:

means for executing the exchange process of the loyalty point stored in the storage means based on the application program stored in the storage means when the exchange process to exchange the loyalty point to another valuable thin is instructed from the terminal device; and

output means for outputting the result of exchange by the execution means to the terminal device.

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