

SYSTEM FOR AND METHOD OF ELEVATOR INFORMATION DISPLAY

This invention relates to an elevator information display system and method for displaying elevator information. A particular example relates to a system for displaying information in the information displays provided within the elevator cage and at the places where the elevator stops at each floor and a method for displaying information.

In recent years, there has been an increase in elevator information systems, wherein elevator information displays such as to display "free" messages are fitted in the elevator cages and at the elevator boarding points on the various floors; the messages to be displayed are input from the building monitoring room and are displayed on these information displays. Fig. 5 shows the layout of a conventional elevator information display system of this type.

In more detail, in the case where character information (messages) are displayed on a cage information display device 1 and boarding point information display devices 2, character information data is input from an information input device 4 provided in a monitoring room 3 for building equipment such as elevators and air conditioning equipment. This character information data is

then transmitted to an information control terminal 7 of a machinery room 6 through a transmission line 5 constructed for example of optical fiber. This information control terminal 7 then transmits the received character information data through another transmission line 8 to cage information display device 1 and boarding point information display device 2, so that the character information data that has been input can be displayed as a display character pattern on the various information display devices 1 and 2.

The detailed construction of this conventional example will now be described. As shown in Fig. 6, information control terminal 7 is equipped with a terminal CPU 7a that generates text data based on the information from information input device 4, a dual port RAM 7b that stores the text data generated by this terminal CPU 7a, and a transmission CPU 7c that transmits the text data stored by this dual port RAM (DP-RAM) 7b to transmission line 8. Each of cage information display device 1 and boarding point information display devices 2 is equipped with: a transmission CPU 10a that performs reception processing on the data sent from transmission line 8, a dual port RAM (DP-RAM) 10b that stores the incoming text data, a JIS level 2 Kanji ROM 10c storing 16 x 16 dot data of a plurality of Kanjis, an interface CPU 10d that reads from Kanji ROM 10c 16 x 16 dot data of Kanjis corresponding to text data stored in dual port RAM 10b and generates the

display character pattern data of character information messages, a video RAM 10e that stores the display character pattern data of the messages generated by this interface CPU 10d, and a CRT control (CRTC) 10g whereby the display character pattern data of this video RAM (VRAM) 10e is displayed on a display unit 10f. For display unit 10f, a 16 x 16 dot x 10 character LED display, or a 640 dot x 400 dot EL display or plasma display etc. can be used.

In Fig. 6, the construction of cage information display device 1 is shown and that of boarding point information display device 2 is omitted, because the latter is the same as the former.

Thus, in such a conventional elevator information display system, character information messages to be displayed were transmitted by elevator information control terminal 7 to the various information display devices 1 and 2 through transmission line 8 as text data. In each information display devices 1, 2, the text data was temporarily stored in dual port RAM 10b and the respective corresponding display character pattern data was read from Kanji ROM 10c by interface CPU 10d, this was stored as video information in VRAM 10e, and was displayed on display unit 10f.

However, in such a conventional elevator information display system, Kanji ROMs are provided in the information display devices arranged in each elevator cage and at each boarding point, and text data is transmitted from the

information control terminal. Consequently, in the case of elevators in regions where the Japanese language is not used, the Kanji ROMs of the respective information displays must be replaced by character ROMs incorporating the characters that are used in such regions. As the number of elevators increases, the number of floor boarding points increases, then the number of information display devices increases. This means that a large number of character ROMs have to be changed. This task, and the task of remodelling the interface board which loads the circuit elements of information display devices 1, 2 except for CRT control 10g and display unit 10f, requires considerable time and labour, resulting in cost problems.

Accordingly, one object of this invention is to provide a system and method of elevation information display which can be modified more simply with less time and labour when it is necessary to change the type of character.

This can be achieved by providing an elevator information display system in accordance with one aspect of the invention, said system including an information input terminal and a plurality of interface stations one in an elevator cage and at one or more floor boarding points. A network couples the information input terminal and said interface stations. The system further includes a plurality of information displays for displaying the character message, respectively. The information input terminal, which receives the character message and converts it to

character message data, includes a character read only memory (ROM) for storing a plurality of character data, and transmits the transmission information including the character message data and a plurality of the character data. Each of the interface stations includes an electrically rewritable memory and it receives the transmission information and stores the character data in the electrically rewritable memory. The interface station converts the character message data to the display character pattern data by referring to the character data stored in the electrically rewritable memory and displays the display pattern data in the information display as the character message.

In accordance with a second aspect of the invention, there is provided a method for displaying the character message in the information display in an elevator information display system in accordance with the first aspect. The method includes the steps of downloading the character data stored in the character read only memory in the information input terminal to the electrically rewritable memory in the interface station and inputting the character message to the information input terminal. The method further includes the steps of converting the character message to the character message data in the information input terminal, transmitting the character message data from the information input terminal to the interface station through

the network, converting the character message data to the display character pattern data by referring to the character data stored in the electrically rewritable memory, and displaying the display character pattern data in the information display, thereby to display the character message in the information display.

With the elevator information display system of this invention, character ROM data stored in the character ROM is downloaded from the information input terminal to the electrically re-writable memory provided in the interface stations respectively installed in each cage and at each boarding point, through the network.

Thus, when character information (a message) that is to be displayed is input to the information input terminal, this message data is likewise sent through the network to the corresponding interface station. The conversion means then converts the received message data into display character pattern data by referring to the character ROM data, and this pattern data is displayed by the display control circuit on the information display. The required character information message is thereby presented to the user.

Thus, a requirement to alter the type of characters used can be met simply by replacing the character ROM installed at the information input terminal with a ROM for the character type required, without needing to carry out work on the information displays installed at any of a

possibly large number of locations.

One embodiment of the invention, given by way of example, will now be described with reference to the accompanying drawings, wherein:

Fig. 1 is a system layout diagram showing an elevator information display system according to an embodiment of this invention;

Fig. 2 is a functional block diagram showing the detailed internal construction of the information control terminal and interface stations of the above embodiment;

Fig. 3 is a diagram given in explanation of the respective transmission formats of Kanji ROM data and message data in the above embodiment;

Fig. 4 is a memory map of an interface station in the above embodiment;

Fig. 5 is a system layout diagram showing a conventional elevator information display system;

Fig. 6 is a functional block diagram showing the detailed internal construction of the information control terminal and information display of a conventional system shown in Fig. 5;

Fig. 7 is a diagram showing a flow chart of the operation of information input device 15;

Fig. 8 is a diagram showing a flow chart of writing

character data from information control terminal 13 to interface stations 17, 18a, 18b, ...; and

Fig. 9 is a diagram showing a flow chart of transmitting and displaying message information.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, the embodiments of this invention will be described below.

Fig. 1 is a functional block diagram of an embodiment of this invention. In the elevator cages and the various floor boarding points, information displays 11, 12a, 12b, ... constituted by flat displays or three-colour LED displays etc. are installed. These are organically coupled by means of an information network 14 to an information control terminal 13 installed in a machinery room. Information control terminal 13 in the machinery room is connected by a separate transmission line 16 with an information input device 15 which is installed in the machinery room or a monitoring room of for example elevator equipment and crime prevention and air conditioning equipment etc.

Network 14 is constructed by connecting transmission paths having, for example, electrical characteristics RS 485. It has a parent station constituted by information control terminal 13, and substations constituted by interface stations 17, 18a, 18b, ... that are capable of

serial input/output with information displays 11, 12a, 12b, ... respectively, situated in the cage and at each floor boarding point. Information control terminal 13 and interface stations 17, 18a, 18b, ... are each equipped with a network CPU (NPU) 19 constituting information network 14. Information control terminal 13 is also equipped with a terminal CPU 20.

Furthermore, each of interface stations 17, 18a, 18b, ... are equipped with an interface CPU 21 that has an interface with each information display 11, 12a, 12b, ..., the construction being such that data can be mutually exchanged due to the interposition of a common memory such as a dual port RAM, to be described.

Information displays 11, 12a, 12b are connected with interface stations 17, 18a, 18b by means of a video interface making use of a CRT control unit.

Information network 14 will now be described in more detail. Interface stations 17, 18a, 18b between the information control terminal 13 and the respective information displays 11, 12a, 12b are equipped with the internal structure shown in Fig. 2. The network CPU (NPU) 19 provided in these interface stations is a CPU that controls network 14. It is capable of inputting information from network 14 having electrical characteristics specified by the IEEE (RS 485) and outputting to network 14. Usually, this NPU 19 is constituted by a one-chip processor including ROM storing

the execution program and RAM for internal processing.

Each of interface stations 17, 18a, 18b, ... is also equipped with dual port RAM (DP-RAM) 22 which is coupled with NPU 19 by a local bus line of NPU 19. Interface CPU 21 is each equipped with an EPROM 21A storing a basic program and a RAM 21B for internal processing. Each of interface stations 17, 18a, 18b, ... are also equipped with: a flash memory 23 constituting electrically re-writable memory that stores the execution program, a video RAM (VRAM) 24 constituting the interface with information displays 11, 12a, 12b, ..., and a CRT control unit (CRTC) 25 that controls information displays 11, 12a, 12b, .... These various circuits are coupled by the local bus line of interface CPU 21.

Information input device 15 is equipped with a Kanji ROM (not shown). The character data read out of this Kanji ROM is transmitted to information control terminal 13 through transmission line 16.

Information control terminal 13 is further equipped with a dual port RAM 22 and a Kanji ROM 26. Terminal CPU 20 stores character data input that is input through transmission line 16 from information input device 15 in dual port RAM 22. The character data is then temporarily stored in dual port RAM 22, and NPU 19 transmits it to interface stations 17, 18a, 18b, ... of the various information displays 11, 12a, 12b, ... through information network 14.

The detailed description of the construction of the elements shown in Fig. 2 is omitted, because the construction thereof is the same as that of the corresponding elements of the conventional system shown in Figs. 5 and 6 except for flash memory 23. The construction of network 14 and transmission line 16 is also the same as that of the corresponding ones. The flash memory is well known to those skilled in the art and is also described in detail later. Accordingly, those skilled in the art can easily construct this embodiment based on the above description.

Next, the operation of the elevator information display system constructed as above will be described.

First of all, the procedure will be described whereby the data of Kanji ROM in information input device 15 is transmitted by terminal CPU 20 of information control terminal 13 to the respective interface stations 17, 18a, 18b, ... through network 14 and stored. The object code of the Kanji ROM is sent from information input device 15 to information control terminal 13 through transmission line 16 in a prescribed format as shown in Fig. 3a. In this data format, it is necessary to set in the header 28 the remote station address (DA), the home station address (SA), the program start address (CSAD) and the data length (number of bytes: L). The Kanji ROM data is written into the information section 29.

Terminal CPU 20 of information control terminal 13

therefore writes header 28 and information section 29 (with the Kanji ROM data written in) into the dual port RAM 22 of information control terminal 13.

As a result, network CPU (NPU) 19 of information control terminal 13 sends the information that was written in DP-RAM 22 on a transmission line of information network 14. On this transmission line of information network 14, all the interface stations 17, 18a, 18b, ... are in equivalent relationship. NPU 19 of each interface stations 17, 18a, 18b, ... ascertains whether or not the remote station address DA is its own address. If in fact the address corresponds, it writes the information into its own DP-RAM 22. The interface CPU 21 of this station then writes the incoming transmitted Kanji ROM data into the electrically re-writable memory constituted by flash memory 23, in the amount of data byte length L from the designated program starting address CSAD.

With respect to the operation described above, the flow chart of the operation of information input device 15 is shown in Fig. 7, and the flow chart of writing character data from information control terminal 13 to interface stations 17, 18a, 18b, ... is shown in Fig. 8.

If we assume that the Kanji ROM data stores 16 dot x 16 dot character patterns of about the number (5000) of characters specified by JIS number 2 standard, for a display with only one level of shading (black/white),

the data amount = 16 bit x 16 bit x 5000 characters  
 = 1 280 000 bits = 1.28 Mbit

Thus, it is sufficient to provide about two 1-Mbit flash memories.23. For a medium-rate data transmission capability, in which the transmission rate of network 14 is of the order 2 Mbps, data transmission can be completed in about 1 second, so there are no problems in regard to transmission time.

In the above description, Kanji ROM data stored in Kanji ROM in information input device 15 is transmitted to all interface stations 17, 18a, 18b, .... Kanji ROM data stored in Kanji ROM 26 in information control terminal 13 can also be transmitted to all interface stations 17, 18a, 18b, ... instead. In this case terminal CPU 20 in information control terminal 13 reads out character data from Kanji ROM 26. The character data is then stored in flash memory 23 of the interface stations 17, 18a, 18b, ... through information network 14 in the same manner as described above.

The procedure in transmitting message information will now be described. When message text data is input from information input device 15, a message is transmitted in text format to terminal CPU 20 of information control terminal 13 from information input device 15 by the default transmission procedure stored in terminal CPU 20 of information control terminal 13 and information input device 15.

CPU 20 of information control terminal 13 then writes the received message into DP-RAM 22. Regarding the format of this transmission data, as shown in Fig. 3b, the remote station address (DA), home station address (SA), message storage starting address (MSAD) and data length (L) are allocated to header 30. The information message is written in information section 31.

NPU 19 of information control terminal 13 then sends the information, with the above format, on to the transmission line of information network 14. In contrast, the respective NPUs 19 of interface stations 17, 18a, 18b, ... ascertain whether the remote station address DA is their own address. If it is their own address, they write the information message into their own DP-RAM 22. Thereupon, interface CPU 21 of the interface station in question writes the incoming transmitted message data into flash memory 23, constituting the electrically re-writable memory, in the amount of a number of data bytes L, from the designated start address CSAD. Interface CPU 21 then writes this message as display character pattern data in video RAM (VRAM) 24, by referring to the Kanji data that was stored in flash memory 23 as described above.

CRT control unit (CRTC) 25 extracts the display character pattern data stored in VRAM 24 and displays it on information displays 11, 12a, 12b, ..., so as to present the desired message to the passenger.

Fig. 4 shows the memory allocation of the above Kanji

ROM data, message data, and application program etc. in each of interface stations 17, 18a, 18b, .... Since the initializing processing, downloading processing and interrupt vector processing of the execution program can be embodied in fixed form, these are allocated to read-only memory (ROM) 32 constituted by EPROM 21A. Display screen data and their processing, and the application program etc. are subject to frequent alternation depending on the type of information display and client's specification. In the embodiment described above, these are therefore allocated to electrically re-writable memory 33 constituted by flash memory 23. The Kanji ROM data and text data are then also allocated to this electrically re-writable memory 33.

The flow chart of transmitting and displaying message information as described above is shown in Fig. 9.

In the embodiment described above, interface CPU 21 of the interface station in question writes the incoming transmitted message data into flash memory 23, and then writes this message as display character pattern data in video RAM (VRAM) 24 by referring to the Kanji data stored in flash memory 23. But this invention is not limited to this embodiment. The incoming transmitted message data is temporarily stored in dual port RAM 22 and interface CPU 21 of the interface station in question writes this message as display character pattern data in video RAM (VRAM) 24 by referring to the Kanji data stored in flash memory 23, without storing this message in flash memory 23.

It should be noted that there is no particular restriction on the electrically re-writable memory, and, instead of flash memory, it could be constructed of EEPROM or non-volatile RAM fitted with a battery backup etc.

As described above, according to this invention even if the site where the elevator is installed is abroad, so that the display language is not Japanese but some other language such as for example Chinese or Korean, a character ROM of the necessary type for display of the language in question can be installed in place of Kanji ROM of information input device or information control terminal. If this is then downloaded, character display of various different languages can be coped with in a flexible way without needing to change the specification at the interface stations.



## Claims:

1. An elevator information display system,  
comprising:

information input terminal means for inputting  
character message and for outputting transmission  
information;

a plurality of interface station means one provided in  
an elevator cage and at one or more floor boarding points;

network means for coupling said information input  
terminal means and said interface station  
means;

each of said interface station means being connected  
to receive said transmission information through said  
network means and for outputting display character pattern  
data; and

a plurality of information display means, each being  
connected to one of said interface station means for  
receiving said display character pattern data and for  
displaying said character message, respectively;

said information input terminal means including,  
message input means for inputting said character  
message and for converting it to character message data,

character read only memory means for storing  
a plurality of character data,

first transmission processing means connected to said  
message input means and said character read only memory  
means for transmitting to said network means said



transmission information including said character message data and a plurality of said character data; and

each of said interface station means including,

second transmission processing means connected to said network means for inputting said transmission information,

electrically rewritable memory means,

processing and conversion means connected to said second transmission processing means for inputting said transmission information including said character message data and a plurality of said character data for storing said character data in said electrically rewritable memory means and for converting said character message data to said display character pattern data by referring to said character data stored in said electrically rewritable memory means, and

display control means connected to receive said display character pattern data for controlling said information display means to display said display character pattern data, thereby to display said character message in said information display means.

2. An elevator information display system according to Claim 1, wherein:

said processing and conversion means is arranged to store said character message data in said electrically rewritable memory means.



3. An elevator information display system according to Claim 1 or 2, wherein: said information input terminal means includes,

an information input device having said message input means and said character read only memory means,

an information control terminal having said first transmission processing means, and

a network for coupling said information input device and said information control terminal.

4. An elevator information display system according to Claim 1 or 2, wherein: said information input terminal means includes,

an information input device having said message input means,

an information control terminal having said character read only memory means and said transmission processing means, and

a network for coupling said information input device and said information control terminal.

5. An elevator information display system according to any preceding Claim, wherein:

said first transmission processing means in said information input terminal means includes a network CPU;  
and

said second transmission processing means in said



interface station means includes a network CPU.

6. An elevator information display system according to any preceding claim, wherein:

said processing and conversion means includes video RAM means for storing said display character pattern data; and

said display control means is connected to said video RAM means to receive said display character pattern data.

7. An elevator information display system according to Claim 6, wherein;

said display control means includes CRT control unit.

8. The elevator information display system according to Claim 1, wherein:

said electrical rewritable memory means includes a flash memory.

9. A method for displaying said character message in said information display means in said elevator information display system according to Claim 1, comprising the steps of:

downloading a plurality of said character data stored in said character read only memory means in said information input terminal means to said electrically rewritable memory means in said interface station means;

inputting said character message to said information input terminal means;

converting said character message to said character message data in said information input terminal means;



transmitting said character message data from said information input terminal means to said interface station means through said network means;

converting said character message data to said display character pattern data by referring to said character data stored in said electrically rewritable memory means; and

displaying said display character pattern data in said information display means, thereby to display said character message in said information display means.

10. A method according to Claim 9, wherein: after the step of displaying, next character message is inputted in said information input terminal means and displayed in said information display means by repeating the step of inputting through the step of displaying of Claim 9.

11. An elevator information display system, substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.