

(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 200128114 B2
(10) Patent No. 778237

(54) Title
Method for operating an elevator

(51) ⁶ International Patent Classification(s)
B66B 001/34 B66B 001/28

(21) Application No: 200128114 (22) Application Date: 2001.03.19

(30) Priority Data

(31) Number	(32) Date	(33) Country
00810234	2000.03.20	EP

(43) Publication Date : 2001.09.27

(43) Publication Journal Date : 2001.09.27

(44) Accepted Journal Date : 2004.11.25

(71) Applicant(s)
Inventio AG

(72) Inventor(s)
Kilian Schuster

(74) Agent/Attorney
WATERMARK PATENT and TRADEMARK ATTORNEYS, Locked Bag 5, HAWTHORN
VIC 3122

(56) Related Art
EP 0540984
EP 0731050
EP 6269911

Abstract

In this elevator control an elevator user creates on a user terminal (3) his individual program (2), which is adapted to his needs, for operating the elevator. To write the program (2) the user terminal (3) has a keypad and a screen. Depending on identification, the user can access the entire command set or only certain commands. The user program (2) is transmitted to a terminal (4) by means of wireless communication. From the terminal (4) the user program (2) proceeds to a program control (1) with a task manager (5) which adds to the user programs (2) of all terminals (4) data required for execution and stores them in a memory (6). The task manager (5) initiates the execution of the executable user programs by an interpreter (7) which interprets the executable programs (2) step by step. In the case of elevator-specific instructions such as, for example, travel commands or door opening commands, the interpreter (7) calls up an interface (8) which initiates the further execution by an elevator control (9).



(Fig. 1)

AUSTRALIA
Patents Act 1990

**ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT**



Application Number:

Lodged:



Invention Title: METHOD FOR OPERATING AN ELEVATOR



The following statement is a full description of this invention, including the best method of performing it known to :- us

Description**Method for Operating an Elevator**

5 The invention relates to a method for operating an elevator, with which a user of the elevator communicates to the elevator via a human-machine interface an order which the elevator executes.

10 To operate an elevator it is usual to have arranged on each landing, or in the elevator car, an operating panel which serves as a human-machine interface. Provided on the operating panel is a call button for each destination floor. On a panel with ten-digit keypad, commands for
15 multi-digit floors are entered by combinations of keys. For the elevator control, the target floor selected by the user is a parameter in a permanently programmed sequence of the elevator control for execution of the travel order. The elevator control executes the travel order according
20 to an internal program in which, for example, the car load is read, coincident trips are taken into account, the doors are closed after a certain time, the acceleration, traveling speed and deceleration are determined, and the door is held open for a certain time at the destination
25 floor. For the program, the starting floor and destination floor serve simply as parameters.

A disadvantage of the known device is that the program is defined at the time when the elevator is developed, after
30 which it can no longer be changed, at least by the user.

It is here that the invention sets out to provide a remedy. Accordingly, in a first embodiment the invention provides a method for operating an elevator system in response to an operating order that is executable by a control of the elevator system including the steps of:

- 5 a) creating a user-specific operating order as a user program in response to commands entered by a user into a terminal of a human-machine interface;
- b) transmitting the user program to a terminal connected to a program control for an elevator system in response to an input to the user terminal by the user; and
- 10 c) executing the user program in the program control to operate the elevator system in accordance with the user-specific operating order.

In a second embodiment, the invention provides a method for operating an elevator system in response to a user generated operating order that is executable by a control of the elevator system including the steps of:

- 15 a) creating a user-specific operating order as a user program in response to user selected commands;
- b) transmitting the user program to an elevator program control for an elevator system when the user is ready to use the elevator system; and
- 20 c) executing the user program with the program control to operate the elevator system in accordance with the user-specific operating order for a single use of the elevator system user.

The advantages achieved by the invention are mainly to be seen in that for the user of the elevator an individual interface can be made in which the orders to be executed by the elevator can be programmed on an external operating terminal with keypad and screen. The user can use the elevator according to his needs. He can, for example, specify different door opening times, which are longer or shorter than the standard. In this way, certain users or groups of users, such as cleaning or maintenance personnel, can be provided with different command sets. A further advantage is that there is great freedom for the user in defining the functioning of the elevator without intervention in the basic functions of the elevator, such as door functions, being necessary. A further advantage is



2a

that certain functioning modes such as, for example, car cleaning, or evacuation, can be standardized independent of the elevator installation.

The invention is described in greater detail below by reference to programs and drawings illustrating exemplary embodiments.

5

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

They show:

Fig. 1 A block diagram of a program control for execution and control of a user program; and

5

Fig. 2 An operating interface of a user terminal.

Fig. 1 shows a block diagram of a program control 1 for execution and control of a user program 2. An elevator user creates on a user terminal 3 his individual user program 2, which is adapted to his needs, for operating the elevator. The program 2 can be written at a time independent of execution of the order, and at a place independent of the elevator installation. To write and execute the program 2, the user terminal 3 has a keypad, a screen, means of storage, means of calculation, at least one interface, and a transmitter/receiver like that of, for example, a mobile telephone. In the user terminal 3 the entire command set, for example, can be stored.

20 Depending on the access authorization defined for the user in, for example, the user terminal 3, the user can access the entire command set, or only certain commands. The user terminal 3 can, for example, also contain an exchangeable chip card on which at least a user program 2 is stored.

25 The user program 2 is transmitted, for example by wireless communication, in encrypted or unencrypted form, to a terminal 4 of which, for example, one is arranged on each floor of an elevator installation. User programs 2 can also be stored in terminal 4 and need only be activated by the respective user. From terminal 4 the user program 2 proceeds to the program control 1 with its task manager 5

which adds to the user programs 2 of all terminals 4 data necessary for execution and stores them in a memory 6. The task manager 5 initiates the execution of executable user programs by means of an interpreter 7 which interprets the executable programs 2 step by step. In the case of elevator-specific instructions such as, for example, travel commands or door-opening commands, the interpreter 7 calls up an interface 8 which initiates the further execution by an elevator control 9. After complete execution of a user program 2, the executable user program is deleted and, if necessary, the user is informed of the conclusion of the user program 2.

In essence, the user program 2 can contain data about the user, the place and time of issue of the order, travel commands, reservations of space in the elevator car, and door opening and closing commands. The user program 2 can also contain trip-specific parameters as, for example, travel speed, acceleration and deceleration values, load, special trip, or information concerning information and display elements, etc. The respective command set available in each case forms the operating interface for the user.

Exemplary embodiments of user programs for operating an elevator are shown below.

For a trip from floor A to floor B the user program 2 can consist of the following sequence [1]:

30

```

01 share_priority 50
02 goto A
03 open 2s
5 04 reserve 1m2
05 goto B
06 open 2s
07 release 1m2

```

10 In step 01 the order to be executed is weighted with a priority which indicates that individual actions of other orders with priorities less than or equal to 50 will be interrupted or shared respectively. This rule serves mainly to coordinate special requirements, as explained

15 further below. For normal trips as described above, it should be endeavored to have orders which are uniform in respect of sequence. In step 02 the elevator car is ordered to floor A. With step 03 the command is issued to open the landing and car doors for 2 seconds. In step 04

20 space is reserved in the car for one person. With step 05 the command to travel to floor B is issued. With step 06 the command is again issued to open the landing and car doors for 2 seconds. With step 07 the command sequence is concluded by the reserved space in the elevator car being

25 released.

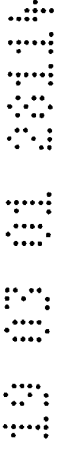
For up-peak distribution trips the user program 2 can consist of the following sequence [2] with iteration. The command set can, for example, be made available only

30 during certain times of day.

```

01 share_priority 100
02 goto 0
03 open 5s
04 reserve 5m2
5 05 for i = 1 to 10 do
      goto i
      open 2s
      end
06 goto 0
10 07 open 5s
08 release 5m2

```


 In step 01 the order to be executed is weighted with a priority which indicates that individual actions of other orders with priority less than or equal to 100 will be interrupted or shared respectively. In step 02 the elevator car is ordered to the main stop 0. With step 03 the command is issued to open the landing and car doors for 5 seconds. In step 04 space is reserved in the car for five persons. In step 05 an iteration is shown by means of which a travel command for floors 1 to 10 is issued, stating that the elevator car must stop at floors 1 to 10 and on each floor open the landing door and car door for 2 seconds. After this, with step 06 the elevator car is ordered to the main stop 0, and with step 07 the command is issued to open the landing door and car door for 5 seconds. With step 08 the command sequence is concluded by the reserved space in the elevator car being released.

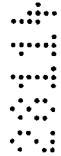
30 For car cleaning the user program 2 can consist of the following sequence [3]. The user program 2 can, for

example, be written by the building maintenance services and stored on a chip card, or directly in the user terminal 3 of the cleaning personnel, or in the terminal 4. When required, the car cleaning personnel then need only to activate the user program 2.

```

01 require_priority 30
02 close
03 goto 1
10 04 open 5s
05 wait pressed DTO
06 open 5s
07 wait 20s

```



15 In step 01 the order to be executed is weighted with a priority which indicates that other orders will be postponed until the car cleaning has been carried out. With step 02 the command is issued to close the landing door and car door. With step 03 the elevator car is ordered to floor 1, from which the car cleaning work is carried out. With step 04 the command is issued to open the landing door and car door for 5 seconds so that the car cleaning personnel can enter the elevator car. With step 05 the user program 2 is interrupted until, for example, on the screen of the user terminal 3, or on the car operating panel, a pushbutton DTO is actuated. With step 06 the command is then issued to open the landing and car doors for 5 seconds so that the car cleaning personnel can leave the elevator car. The command in step 07 is optional and provided in case cleaning work outside the elevator car is necessary. As an alternative, the landing

door and car door can be kept open until the pushbutton
 DTO is actuated.

For evacuation trips in emergency situations the user
 5 program 2 can consist of the following sequence [4]:

```

01 require_priority 250
02 close
03 goto 0
10 04 open
  
```

15 In step 01 the order to be executed is weighted with a
 priority which indicates that other orders will be
 interrupted and their execution postponed. With step 02
 the command is issued to close the landing door and car
 door. With step 03 the elevator car is ordered to the
 evacuation floor, and with step 04 the landing door and
 car door are opened.

20 For service and maintenance it is possible, for example,
 to make available an extended command set, or a command
 set based on another programming language. With these
 command sets user programs can be written by means of
 which, for example, the elevator cars can be ordered to
 25 certain positions in the hoistway, for example to adjust
 hoistway switches or to carry out maintenance work in the
 hoistway from the roof of the car. To check the drive, or
 slip, it is possible, for example, to use the program to
 specify certain speed curves for the trip.

30

On an elevator group with elevators having different rated loads, the program can be used to communicate to the control the load to be transported. The control then selects the elevator corresponding to the desired load.

5

On an elevator group with elevators of different speeds it is possible, for example, for VIP trips to use the program to request the elevator with the highest speed.

10 To avoid misuse it is possible to demand from the user a password, for example, or for VIP trips to take account of additional personal characteristics of the user.



15 The available command set for writing a user program can be adapted depending on the user and trip or transport.



For maintenance personnel an extended command set is available. VIP persons have more commands available than normal users. Occupants of the upper floors of a multi-story building can be provided with commands to influence



20 the travel speed. For hospital personnel a command set is available for passenger elevators or bed elevators. The command set can also be time-independent. For example, occupants of the higher-level floors can be provided in the morning with commands for nonstop travel down, and in the evening with commands for nonstop travel up. Since all travel and user data of an order are contained in the user program, the user program can also be used to keep account of the costs of usage. The respective user receives, for example, each month an invoice for the services provided.



25

30

Fig. 2 shows an example of an operating interface of a user terminal 3. In the right-hand half of the terminal screen the available command set is shown, which is made up from text elements depending on the user. Each text element representing a command can, for example, be copied to the left-hand half of the screen by means of arrow markers and, if necessary, have added to it parameters such as, for example, the door opening time, floor, priority, space reservation in the car, etc. As an alternative, for example, the text element for the door opening time and/or the text element for space reservation can be provided with a preset parameter. The present floor and/or the destination floor can also be provided with parameters. The user can change the preset parameters according to his choice. After composition of the program, which is easy for any user, the finished user program 2 is sent to the terminal 4.



If it is intended that the user program 2 which has been created shall be reused, it can be saved in the user terminal 3 or on a chip card, and called up automatically or with short commands. The way in which the individual text elements function is explained in more detail in the sequences [1], [2], [3], and [4] described above.

25

If users are not authorized or able to write individual user programs 2, the desired user program can be written on a remote user terminal and saved on a chip card. The chip card with the finished user program 2 can then be inserted into a user terminal 2 of the user without

30

programming authorization, which serves as interface between the chip card and terminal 4.

4
3
2
1

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method for operating an elevator system in response to an operating order that is executable by a control of the elevator system including the steps of:
 - a) creating a user-specific operating order as a user program in response to commands entered by a user into a terminal of a human-machine interface;
 - b) transmitting the user program to a terminal connected to a program control for an elevator system in response to an input to the user terminal by the user; and
 - 10 c) executing the user program in the program control to operate the elevator system in accordance with the user-specific operating order.

2. The method according to claim 1 including limiting the types of commands available to the user based upon an access authorization of the user.

3. The method according to claim 1 including limiting the types of commands available to the user based upon at least one of a load to be transported, a traffic volume, and a time of day.

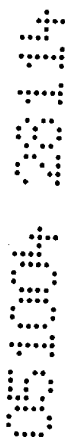
4. The method according to claim 1 including storing the user program in a memory associated with one of the user terminal and a chip card.

5. The method according to claim 1 including generating an account of travel costs from the user program.
- 20

6. The method according to claim 1 wherein the creating step is performed at a location remote from the elevator system.

7. The method according to claim 1 wherein the creating step is performed at a time that is prior to but independent of the transmitting and executing steps.

- 25 8. The method according to claim 1 wherein the user program includes data about at least one of the user, a location, a time of issuing the operating order,



travel commands, reservations of space in an elevator car, door opening and closing commands, and trip-specific parameters.

9. The method according to claim 1 including providing the commands as combinable text elements.

5 10. A method for operating an elevator system in response to a user generated operating order that is executable by a control of the elevator system including the steps of:

a) creating a user-specific operating order as a user program in response to user selected commands;

10 b) transmitting the user program to an elevator program control for an elevator system when the user is ready to use the elevator system; and

c) executing the user program with the program control to operate the elevator system in accordance with the user-specific operating order for a single use of the elevator system user.

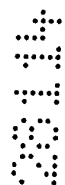
15 11. The method according to claim 10 including prior to performing the executing step adding data to the user program necessary for execution.

12. The method according to claim 10 including subsequent to performing the executing step deleting the user program from the program control.

20 13. The method according to claim 10 including informing the user of conclusion of the user program after complete execution.

14. The method according to claim 10 including making available to the user selected ones of a plurality of commands based upon an access authorization of the user.

25 15. A method for operating an elevator system in response to a user created operating order that is executable by a control of the elevator of the elevator system including the steps of:



- a) creating a user-specific operating order as a user program in response to a plurality of user commands entered into a terminal;
- b) storing the user program;
- c) selectively transmitting the user program to an elevator program control for an elevator-system;
- d) executing the user program with the program control to temporarily operate the elevator system in accordance with the user-specific operating order; and
- e) deleting the user program from the program control upon completion of said step d.

16. The method according to claim 15 wherein said steps a. and b. are performed utilizing a user terminal and said step c. is performed by wireless transmission.

15

DATED this 30th day of September 2004

INVENTIO AG

WATERMARK PATENT & TRADE MARK ATTORNEYS
290 BURWOOD ROAD
HAWTHORN VICTORIA 3122
AUSTRALIA

CJS/JSF

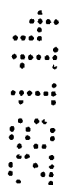


Fig. 1

