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Conveying Installation and Method of Placing a Conveying Installation in Operation

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Abstract

The invention relates to a method for placing a conveying installation in operation, the conveying installation comprising several components (21-27), wherein at least one conveying means, an installation control (20) and a drive are included, a control program suitable for different installation controls (20) contains different control functions (12-18), wherein the control program (11) is executed in the installation control (20) for operation of the conveying installation, and the method comprising the steps: activation of the conveying installation (S30); recognition of identification numbers (29) of components (21-27) of the conveying installation (S31); checking whether the recognised identification numbers (29) belong to permitted component combinations (S32); recognition of the installation control type (11); activation of the different control functions (12-18) in the control program (11) in dependence on the recognised installation control type; release of the conveying installation (S37).

Fig. 3

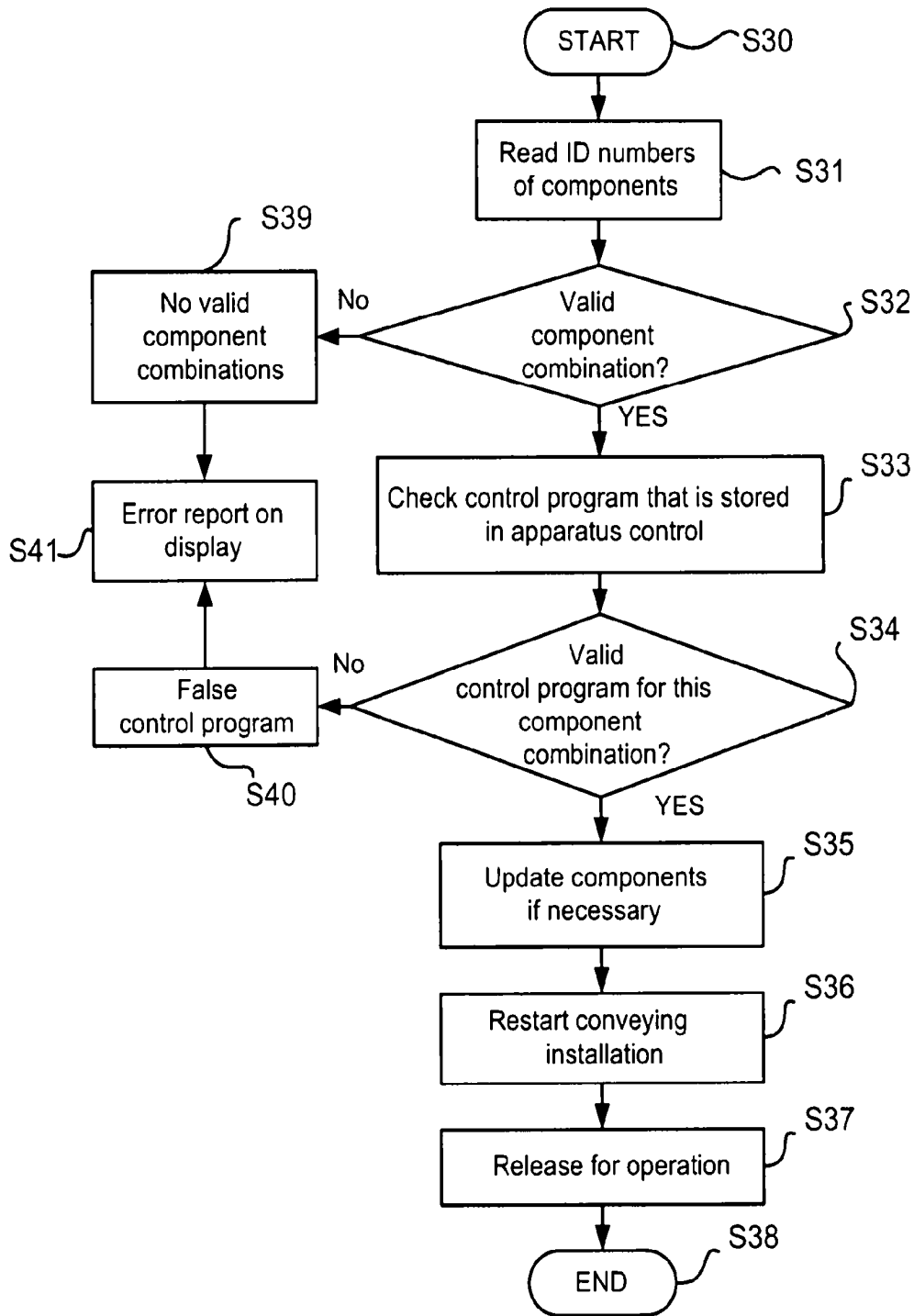


Fig. 3

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Section 29
Regulation 3.2(2)

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COMPLETE SPECIFICATION STANDARD PATENT

Application Number:

Lodged:

Invention Title: **Conveying Installation and Method of Placing a Conveying Installation in Operation**

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

**Conveying installation and method of placing a conveying installation
in operation**

5 **FIELD OF THE INVENTION**

The invention relates to a conveying installation and a method for placing a conveying installation in operation.

10 **BACKGROUND OF THE INVENTION**

Conveying installations consist of a plurality of different components. Numbering amongst these is, in particular, a conveying means, for example a lift cage or an escalator. Moreover, a drive for the conveying means and an installation control are provided. Communications and safety components are optionally arranged.
15 are provided. Communications and safety components are optionally arranged. For control of the conveying installation a control program is executed in the installation control. The installation control has different functions.

Hitherto, in the case of placing a conveying installation in operation the control program inclusive of the required drivers and functions was activated by way of
20 parameter settings. These parameter settings are stored in the installation control. Alternatively, these parameter settings are created at the time of configuration at the manufacturer and loaded into the control. It is also possible to input the parameters manually at the installation control in order to thus activate
25 and set the control program for the installation control.

In order to keep the development cost for control programs low it is usual to use one control program for one kind of conveying installation. Thus, for example, a common control program is employed for different lift installation controls. A
30 further common control program is employed for different escalator controls. Lift installations have to have many different functions. In that case it is not necessary to realise all possible functions in the individual cases of use. However, the control program is also designed for the purpose of being able to control an elevator installation in which all possible functions are realised. As an example of

a simple realisation of a conveying installation there may be cited a goods lift moved between only two storeys. The control outlay in this case is low. In the case of a passenger lift in a high-rise building the control outlay is substantially higher. A passenger lift of that kind has, for example, lift call control. In addition, safety circuits are required. Air-conditioning of the lift cages can optionally be present.

It was thus past practice to use a common control program for a conveying installation regardless of which functions were or were not realised in the conveying installation. Setting of the functions in the control program needed for the individual conveying installation was, as explained above, fixed on the basis of parameters which were either programmed at a manufacturer or had to be manually input when the conveying installation was placed in operation.

Due to the multiplicity of different installation control types with different functions in a conveying installation is, however, always important to recognise the correct installation control type and activate the correct functions for the respective conveying installation. Installation control types of that kind have different complexity depending on the respective outlay. For example, an installation control for the above-mentioned goods lift does not have to be in a position of controlling an air-conditioning plant. An installation control for the above-mentioned passenger elevator is, thereagainst, substantially more complex in its functional scope.

The different installation control types can be operated only with the matching control program, wherein the large number of possible functions can lead to erroneous configurations, since there are dependencies between the individual functions in the control program and components of a conveying installation. The presence of numerous functions in the control program and numerous parameters does, however, also require many regulations. These represent sources of error. Thus, a conveying installation in which only a few or no parameters have to be set is a more reliable conveying installation.

An object of the invention is to attempt to address one or more limitations of the existing art relating to conveying installations and their operation. More particularly, it is an object of the present invention to indicate a method and a device making it possible, in the case of a specific component combination of a conveying installation, to determine the installation control type and, depending on the installation control type, to activate the correct control functions corresponding with these component combinations. Control functions suitable for non-installed component combinations remain deactivated.

SUMMARY OF THE INVENTION

The invention is based on the recognition that with self-recognition of the components of a conveying installation the error source of manual input is excluded. Thus, a device according to the invention is safer and less susceptible to error. Moreover, an additional risk of a hardware conflict in the case of components not matching one another in the installed component combination is reduced, whereby the safety risk is diminished. Safety risks are not acceptable in, in particular, the realm of conveying installations, to which lift installations and escalators belong.

The method guarantees that only the control functions of the control program intended for a specific component combination are executed in the lift control.

Control programs are subject to constant development. Individual functions of conveying installations are developed, whereby it is necessary to adapt the control functions in the control program to the new components and in a given case to also change the drivers for drive control of the new components. In this connection it is enormously important that in the case of an update of a driver in

the installation control this driver is loaded into the installation control of the conveying installation and executed by this only when this driver was also intended for the installation control and tested.

- 5 According to the invention it is proposed that the components of the conveying installation have identification numbers which are determined automatically on activation of the conveying installation. By virtue of the determined identification number it is established whether the recognised identification numbers belong to a permitted component combination. Only if the recognised identification numbers
- 10 belong to a permitted component combination is there a decision therefrom as to which installation control type is present. If identification numbers are recognised which belong to no permitted component combination, placing of the conveying installation into operation is interrupted. The permitted component combinations are combinations of components for which there is present an installation control
- 15 type in a position to control these components. Tables can be created to list and illustrate the permitted component combinations for each installation control type.

After it has been determined which installation control type is present the recognised installation control type is set in the control program. The different

20 control functions in the control program are activated in dependence on the recognised installation control type. Only thereafter does release of the conveying installation take place.

In a special embodiment of the invention it is provided that only the drivers for the

25 control functions which were previously also activated as control functions are loaded into the

installation control. This ensures that only the correct drivers are loaded into the installation control.

In a further advantageous embodiment of the method according to the invention it is checked after setting of the installation control type whether the recognised component combination corresponds with the activated control functions. The information with regard to which installation control types the control program with the activated control functions is released is contained in the control program. The conveying installation is released only when the component combinations and the control functions are permissible, i.e. when the component combinations are in a position of executing these control functions. Tables can be created to list and illustrate the permitted control functions for each installation type.

In a further advantageous method of the invention the conveying installation is reactivated after release of the conveying installation. Loading of the updated drivers is ensured by this restarting of the conveying installation.

In an advantageous embodiment of the invention the conveying installation is a lift installation. In an alternative embodiment of the invention the conveying installation is an escalator.

The invention is also fulfilled by a conveying installation with several components, wherein at least one conveying means, a lift control and a drive are arranged and the installation control has a predetermined functional scope, wherein for operating the conveying installation a control program suitable for different installation controls and containing different control functions can be executed in the installation control, wherein the components of the conveying installation have identification numbers and in the case of activation of the conveying installation there is recognition of the identification numbers of the activated components and present in the control program is a list for checking whether the recognised program numbers belong to a permitted component combination and an installation control type can be set in the control program in dependence on the recognised identification numbers and the control functions contained in the control program are activatable in dependence on the installation control type, wherein a check is provided as to whether the recognised component combination corresponds with the activated control functions and the conveying installation can be released if the combination and the activated control function correspond.

DESCRIPTION OF THE DRAWINGS

The invention is explained in more detail in the following by way of examples of embodiment illustrated schematically in the drawings, in which:

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FIG. 1 shows a schematic layout of a control program with different control functions, according to the present invention;

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FIG. 2 shows a schematic illustration of the components of a lift control according to the present invention;

FIG. 3 shows a flow chart for placing a conveying installation in operation; and

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FIG. 4 shows a table of the relevant component combinations for recognition of each installation control type.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Figure 1 shows the modular layout of a control program 11 in which different control functions 12 to 18 are implemented. Each control function 12 to 18 is responsible for a specific function of the conveying installation. The control function 12 is responsible for the drive control of user interfaces in the conveying installation. The control function 13 serves for monitoring and the input and output
 25 control of parameters and operating magnitudes at external and internal components. The control function 14 takes over the function I/O Plug & Play, for example the air-conditioning of one or more lift cages. The control function 15 controls a chipcard reader. The control function 16 takes over a subgroup control for parts of a lift installation. The control function serves for supply of data picked
 30 up by means of, for example, sensors, of a lift shaft. The control function 18 controls the spacing control between cages and shaft. Another important function is, for example, control of the safety circuit.

Different installation control types are illustrated in the individual modules or control functions 12-18. It can be seen that different settings for the control functions 12-18 are required in the control program 11 for the different installation control types TXR5, TX-GC, MX-GC, MX-GC2, TX GC2_EUAP, TX GC2_NA and GX-GC. Thus, it can be recognised that in, for example, the control function 14, which is responsible for air-conditioning of the conveying installation, no air-conditioning is provided for a control TXR5. In the case of another installation control type, for example MX-GC 2, an air-conditioning is provided for

each lift cage. In a further installation control type GX-GC a group air-conditioning of several lift cages is provided. Similarly, in the case of the control function 15 for the chipcard reader it is recognisable that different chipcard reading apparatus are used for different installation control types. It is thus recognisable in the case of, for example, the control TX-GC that no chipcard reader is required. Settings for the chipcard reader are required for, in particular, the installation control MX-GX. It is readily apparent that due to the multiplicity of different installation control types great care must be taken in the activation of the individual control functions 12-18 or also the control modules in order to avoid safety risks.

Figure 2 shows, in a schematic illustration, the different components of an installation control 20. The modules 21-23 are communications modules of the lift control. The lift control 20 contains a microprocessor 24 having an I²C functionality 28. Identification numbers 28 at the individual components 21-27, which are stored in EEPROM memory modules of the individual components 21 to 27, are read out at the individual components 21-27 by way of this I²C bus. The identification numbers 29 are characterised by address position A0 to A2. A sufficient number of different identification numbers can be provided by the provision of 3 bits. Figure 2 shows the layout of a TX-GC installation control.

One component 25 serves for the safety feed 25. A further component 26 serves for the safety control 26. In addition, a brake control 27 is provided.

A flow chart illustrated in Figure 3 shows the sequence of a method according to the invention. In step S30 the method for placing a conveying installation in operation is started. After the installation was activated, the components of the installation are recognised in step S31 in that the stored identification numbers 29 of the installed components 21-27 are read by the microprocessor 24 by way of the I²C bus. In step 32 it is checked whether the recognised component combination represents a valid component combination.

The permitted or valid component combinations are combinations of components for which there is present an installation control type in a position of controlling these components. A table listing, for each installation control type, the permitted component combinations is stored in the control software. The control software can thus recognise whether the detected component combination is valid and permitted. Such a table is similar to the

table illustrated in Fig. 4, which, however, only lists the relevant component combinations for recognition of each installation control type. When the control software detects the component combinations listed in Fig. 4, the control software can assign the combination to a specific installation control type. A specific installation control type can, however, also control many other permitted and valid component combinations, which have not been listed in Fig. 4.

If no valid component combination is illustrated, a communication to the service engineer is issued by way of a display device in step S39, S41. If a valid component combination is present, it is checked in step S33 which control program is stored in the installation control, in a further step S34 it is checked whether this software or the control program for the individually recognised component combination is released. If it is the incorrect control program, a communication is issued by way of a display device in steps S40, S41. If the control program for this component combination is released, the components of the lift installation are updated in step S35 insofar as this is required. Thereafter, the conveying installation is restarted in step S36 so as to enable correct starting of all control functions, drivers and components. In step 37 the conveying installation is ready for use. The program for placing in operation is concluded by step S38.

Thus, a conveying installation and a method for placing a conveying installation in operation are provided in which it is ensured that only the control program which is also released for the installation control type is executed on the lift control. Moreover, a common control program for different installation control types can thus be used, wherein then different development versions of the control program are tested and released only for specific installation control types. Thus, for a plurality of different installation control types there exists only a single control program which can be developed centrally, whereby the error search in the control program can be simplified and new control functions can be developed for all installation control types. Through use of version or generation numbers for the control program and the control functions it can be established simply and automatically when placing in operation whether the generation of a control program can be used for an installation control type, since the control program contains information on which installation control types it may be able to be executed.

Activation of control functions in the control program for non-installed components is thus excluded. Moreover, availability of untested or undesired control functions in an

impermissible installation control type is prevented, which would otherwise create a safety risk. The method according to the invention ensures that the check which installation control type is incorporated in the conveying installation is determined exclusively on the basis of the installed components. No interaction by a service engineer is required.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of starting a conveying installation having several components including at least one conveying means, an installation control and a drive, wherein a control program suitable for different controls contains different control
5 functions, wherein the control program for operating the conveying installation is executed in the installation control, the method including the steps of:

activating of the conveying installation;

determining automatically by the control program identification numbers of components of the conveying installation, each component having a different
10 identification number;

checking by the control number whether the identification numbers belong to a permitted component combination;

determining of the installation control type;

activating the different control functions in the control program in
15 dependence on the determined installation control type; and

releasing the conveying installation for operation.

2. The method according to claim 1, further including loading at least one driver for the control functions into the installation control in dependence on the activated control functions.

20 3. The method according to claim 1 or 2, further including, after determination of the installation control type, checking which control program is stored in the installation control and whether the storage control program is valid for the determined component combination, wherein the conveying installation is released when component combinations and control functions are permissible.

4. The method according to any one of claims 1 to 3, further including reactivating the conveying installation after an updating of components or control functions.

5. The method according to any one of claims 1 to 4, wherein the conveying installation is a lift installation.

6. The method according to any one of claims 1 to 4, wherein the conveying installation is an escalator.

7. A conveying installation having at least one conveying means, and an installation control and a drive, the installation control having a predetermined functional scope,

wherein for operating the conveying installation a control program suitable for different installation controls and containing different control functions is executable in the installation control,

wherein the components of the conveying installation have identification numbers, each component having a different identification number, and the identification numbers of the activated components are determined by the installation control when the conveying installation is activated, the control program checking whether the determined identification numbers belong to a permitted component combination, and an installation control type being settable in dependence on the determined identification numbers in the control program, and the control functions contained in the control program are activatable in dependence on the installation control type,

wherein checking is performed by the installation control as to whether the determined component combination corresponds with the activated control functions, and the conveying installation being released when the component combination and the activated control functions correspond.

8. A method of starting a conveying installation substantially in accordance with any one of the embodiments described herein with reference to the accompanying drawings.
9. A conveying installation substantially in accordance with any one of the
5 embodiments described herein with reference to the accompanying drawings.

INVENTIO AG

WATERMARK PATENT & TRADE MARK ATTORNEYS

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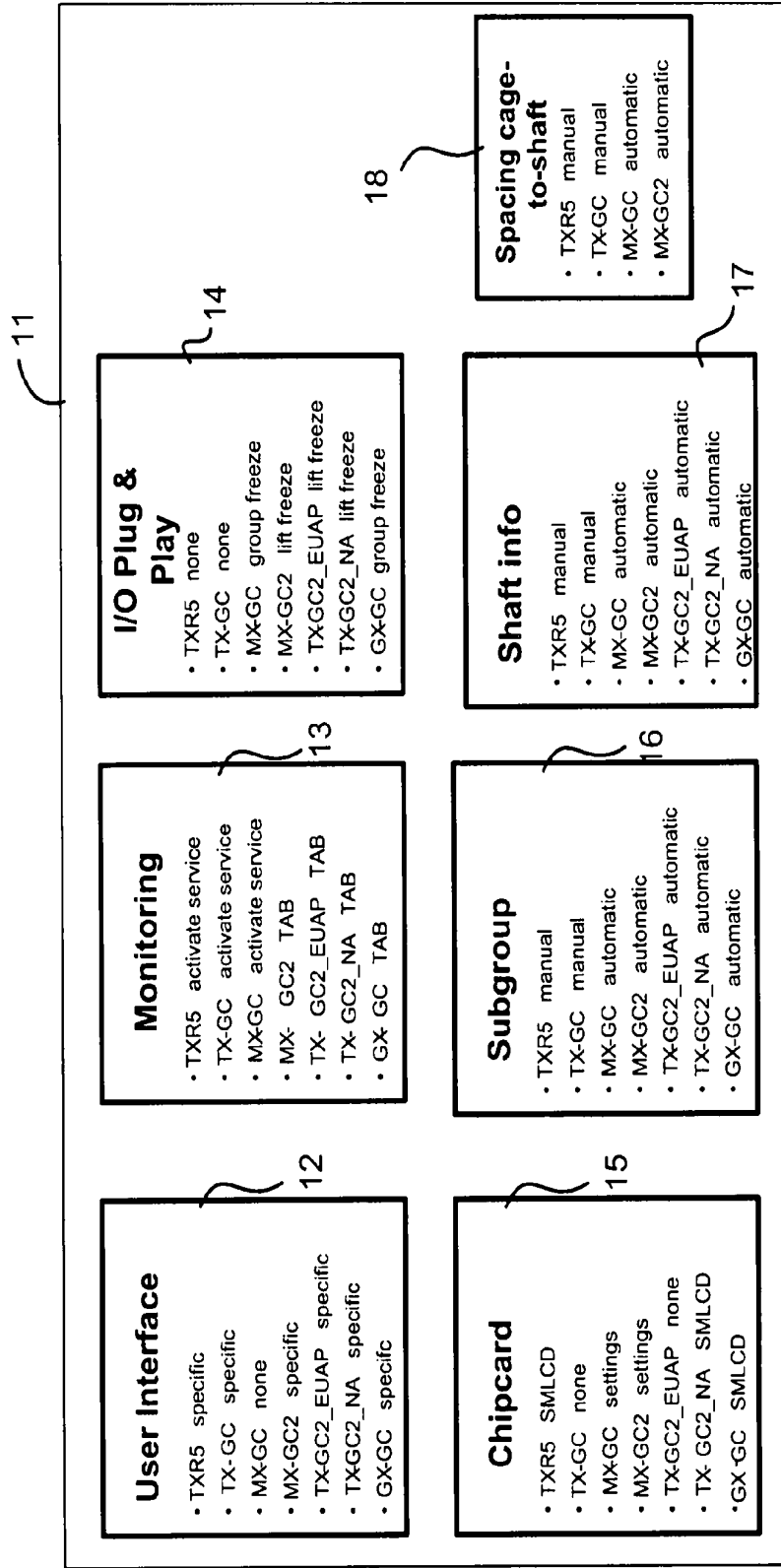


Fig. 1

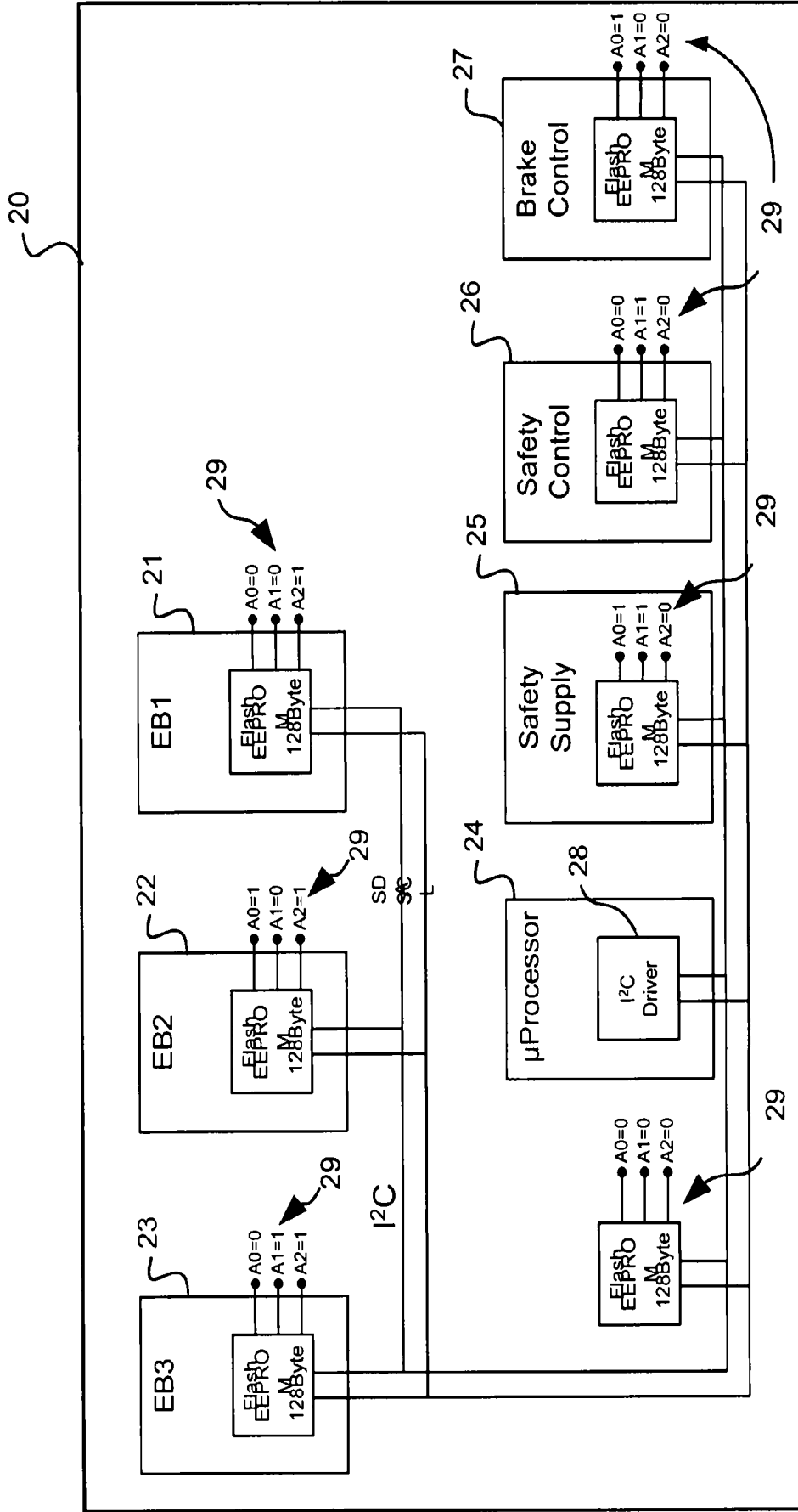


Fig. 2

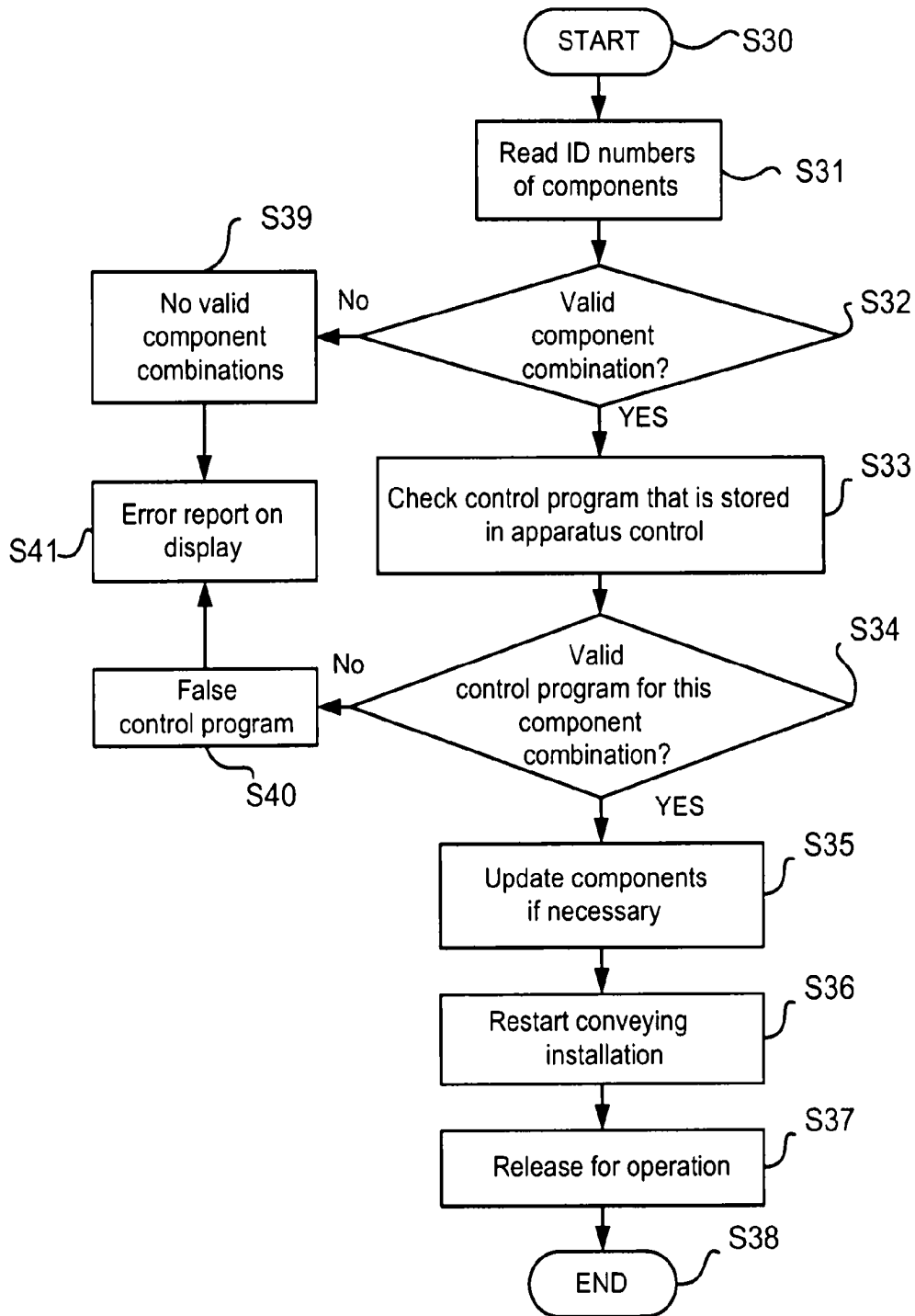


Fig. 3

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Control type	Components for recognition of control type
MX-GC	Motherboard1
MX-GC2	Motherboard2
TX-GC	Motherboard3 and BrakeControl1 and SafetyControl1
TXR5_pre2000_2Line	Motherboard3 and Brake/SafetyControl1
TXR5_2000_2Line	Motherboard3 and Brake/SafetyControl2
TXR5_2000_4Line	Motherboard4 and Brake/SafetyControl2
HX_Pre2000_EECO	Motherboard5
HX_2000_EECO	Motherboard6
HX_Pre2000_DA	Motherboard7
HX_2000_DA	Motherboard8
TX-GC2_NA	Motherboard4 and BrakeControl2 and SafetyControl2 and SafetySupply1
TX-GC2_EUAP	Motherboard4 and BrakeControl2 and SafetyControl3 and SafetySupply1

Fig. 4