

SWITCHING SYSTEM

TECHNICAL FIELD

5 The present invention relates to a switching system for turning on/off a plurality of loads, and more particularly, to a switching system which can control a corresponding load by means of manipulating a manual switch and a remote control switch, and optionally turn on/off any load among a plurality of loads via a
10 telephone line even though a user is at distant places beyond the remote control of loads.

BACKGROUND ART

15 Generally, there has been used a manual switch for manual manipulation or a remote control switch with a remote controller for connecting and disconnecting a power source being supplied to lamp appliances indoors. However, a conventional switching system has a drawback that users always operate manual switches in their original
20 places.

To solve the above problem, technique which can optionally perform a switching operation with regard to a power source of loads set up in a plurality of chambers blocked off from each other and warn against a state of emergency, is disclosed in Korean patent
25 application entitled "Switching system" filed on February 16, 1995 by the same applicant. The present disclosure is based on the technique that the plurality of loads can be turned on/off easily using a manual switch and a remote control switch without directly manipulating a corresponding switch. However, in the case where a user is at distant places
30 beyond the remote control of loads with a remote controller, the turning on/off state of loads can not be confirmed and

turning-ON/OFF of the corresponding load is out of control.

Taking account into this point, the above-mentioned reference can control the turning-ON/OFF of loads by manipulating buttons on user's telephone set only when a receiving unit is connected to a remote
5 controller, and a password assigned to the receiving unit is identical with a received number. However, there is a drawback that switching control can not be performed with regard to a corresponding load, under condition of the receiving unit not being connected to the remote controller during user's absence.

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DISCLOSURE OF INVENTION

Therefore, to solve the above problem, it is an object of the present invention to provide a switching system which can control a
15 corresponding load by means of manipulating a manual switch and a remote control switch, confirm a turning on/off state of a plurality of loads as voice via a telephone line at distant places beyond the remote control of loads, and optionally turn on/off any load via automatic answer by manipulating buttons on user's telephone set.

20 To accomplish the above object of the present invention, there is provided a switching system for switching a power source being supplied to a plurality of loads, the switching system comprising:

at least two or more units, each including a switching portion composed of switches for applying a control signal to control the
25 plurality of loads, a control signal generator individually electrically connected to each switch, for operating according to the control signal applied from any switch, and a display unit for displaying a control state of the loads;

unit transmission/receiving means for transmitting and receiving
30 the control signal of the individual unit;

means for supplying and cutting off the power source to a

desired load according to the output signal of the control signal generator in the unit; and

a telephone line connector for receiving an input command applied via a telephone line, outputting a predetermined load control response
5 signal, in response to the input command by an allowed subscriber, so that the control signal generator of the unit can turn on/off a corresponding load, and converting information regarding the turning-ON/OFF state or turning-ON/OFF control operation of the corresponding load into a voice signal to then transmit the converted
10 signal to the subscriber.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a circuit diagram of a switching system in accordance
15 with one embodiment of the present invention;

Figs. 2A to 2C are circuit diagrams showing a main switching set and/or a sub-switching set of Fig. 1 in accordance with the present invention; and

Fig. 3 is a circuit diagram of a switching system in accordance
20 with the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The embodiment of the present invention will be described
25 below with reference to the accompanying drawings.

The present invention performs an operation controlling a corresponding load by means of a manual switch and a remote control switch as disclosed in Korean patent application entitled "Switching system" filed by the same applicant, and also controls switching of the
30 corresponding load via a telephone line at distant places beyond the remote control of loads. The switching system according to the

present invention is composed of a plurality of units each unit being constructed as a main switching set or a sub-switching set. The main switching set can perform all functions such as turning-ON/OFF of loads connected to the system, monitoring of turning on/off conditions, etc., and the sub-switching set having a structure that part
5 of functions of the main switching set is omitted and simplified, can perform only essential functions such as turning-ON/OFF of loads connected directly to the sub-switching set or turning-ON/OFF under the control of the main switching set. However, combination between
10 a unit composed of the main switching set and a unit comprised of the sub-switching set allows a plurality of loads to be utilized effectively at a low cost. Therefore, a manufacturing cost can be reduced, and the sub-switching set can be used as a subsidiary switch or a spare switch for emergency.

15 A manually switching operation is performed by directly manipulating a switch for controlling the corresponding load. Either a remote control method using a remote controller or a paging control method of connecting the receiving unit to a remote controller to perform a switching control, communicates with the main switching
20 set or the sub-switching set of each unit to then carry out a control operation. In a method for controlling loads of the main switching set or the sub-switching set of each unit via a telephone line, a telephone line connector communicates with each unit, and then a switching control operation is performed.

25 Specially, one embodiment including a microcomputer and peripheral devices in which a basic Spec of the present invention is programmed, allocates different respective addresses to each of loads and performs a control operation based on the addresses.

30 Prior to describing the operation of the present invention, the switching control of loads by a manual manipulation and a remote control is described on the basis of the disclosure of the

above-mentioned reference "Switching system", and then the turning-ON/OFF of each load via a telephone line is mainly described.

Fig. 1 is a circuit diagram of a switching system in accordance with the present invention. As shown, the switching system
5 comprises switching unit 200 coupled to a plurality of loads L1, L2, L3 ...LS which are connected to a power source of an alternating current, for turning on and/or off a corresponding load, a remote controller 107 for performing a remote control operation with regard to a load connected to the switching means 200, and a receiving unit 106 to
10 which the remote controller 107 is connected, for controlling the loads L1, L2, L3 ...LS of each unit.

Also, the present invention further comprises a telephone line connector 300 which is connected to and contacts with units each being composed of a main switching set and/or a sub-switching set,
15 for outputting a control signal to switch a corresponding load according to a control command of each load applied via an exchange 400, and transmitting to a user side a voice signal corresponding to the turning-ON/OFF or the control operation with regard to loads of each unit

20 First, the operation of controlling the turning-ON/OFF of each load according to a manual and remote control switch is described as an example. Fig. 2A is a detailed circuit diagram showing a main switching set and/or a sub-switching set of Fig. 1 in accordance with one embodiment of the present invention.

25 A control signal generator 90 receives a switching manipulation signal from a switching portion 97 composed of a plurality of switches 1~20 and S1~S5 and a remote control signal of a remote receiver 91, and applies an output signal to a load controller 96. The load controller 96 drives a transistor and coil-type relay to control
30 turning-ON/OFF of the load.

Here, the control signal generator 90 employs the microcomputer

mentioned above. The control signal generator 90 is referred to as a microcomputer 90 hereinafter. Also, a light emitting diode (LED) driving controller 94 and 94' and a light emitting diode (LED) display unit 95 receives the same signal, and the LED display 95 indicates the turning-ON/OFF state of loads in red or green color. The transmission/receiving unit 93 which transmits and receives signals between respective units and, for transmitting and receiving a signal with a telephone line connector 300 described hereinafter.

The switches S1~S5 of the switching portion 97 is designed to be easily used in a switching set installed in an individual chamber. A load selector 92 is designed to be constructed as EEPROM for setting an address so that a specific load can be regulated by button manipulation of each switch. A load control limit unit 99 limits an on/off operation with respect to any specific load. A confirmatory unit 98 performs an ALL OFF function and confirming a state display of a LED.

Fig. 2B shows a sub-switching set capable of being used as a subsidiary switch or a spare switch, the device of which has the same construction and function as that of Fig. 2A, in comparison with the device of FIG. 2A, with the exception that EEPROM for setting an address is replaced with a DIP switch, and a LED display unit 95' and a switching portion 97' are applied only for a directly connected load, and the confirmatory unit 98 for performing an ALL OFF function and confirming a state display of the LED is omitted.

Fig. 2C is a circuit diagram showing a remote controller 107 in which connectors for connecting an external receiver with a remote controller are incorporated, the device of which is for manipulating turning-ON/OFF of each load in the switching system using a telephone line. When a proper number, password and allocation number of the switching system are dialed, a signal applied to the receiver is supplied to the remote controller 107 via an external

receiving terminal 103, and an operation of a microcomputer 105 which is incorporated in the remote controller 107 makes turning-ON/OFF of a desired load performed.

Described is in detail with reference to Fig. 3 the operation of the telephone line connector which is connected to a main switching set or a sub-switching set of each unit constructed for the switching unit 200 and controls loads of a corresponding unit according to an input command from a specific user, that is a subscriber

Fig. 3 is a detailed circuit diagram of the telephone line connector of Fig. 1. As shown, the telephone line connector 300 comprises a central processing unit (CPU, 320) for controlling turning-ON/OFF state of loads associated with the main switching set or the sub-switching set of the switching unit 200 in a voice form according to an input command applied via a telephone line, a switching set controller 330 for mediating signal transmission and receiving between the CPU 320 and the switching means 200 and controlling a signal of an ON/OFF state and a switching operation with regard to a predetermined load, a transmission/receiving unit 350 for transmitting and receiving a signal with regard to the corresponding unit of the switching unit 200 under the control of the switching set controller 330, a voice message outputter 310 for previously storing a predetermined voice message and outputting a voice signal of a corresponding voice message under the control of the CPU 320, a voice signal processor 380 for performing signal-processing to transmit the voice signal from the voice message outputter 310 via the telephone line, and a dial signal detector 390 connected to the telephone line, for detecting a dial signal.

Also, the telephone line connector 300 of the present invention comprises a switching set connector 360 connected between the switching set controller 330 and the CPU 320 for controlling the switching set controller 330 according to the control signal of the CPU

320, an a power unit 370 connected to an analog-to-digital converter 100, for receiving a power source of a direct current and supplying it to respective element units. The switching set controller 330 switches an open/closed element such as a relay (not shown) coupled to the power unit 370 in order to control the operation of the telephone line connector 300 and controls the supply of the power source of direct current being supplied to each element unit. The switching set controller 330 reads out an address allocated for the operation of the open/closed element and switches the open/closed element to be turned on or off.

Describing specifically a structure with regard to each element unit, the voice signal processor 380 comprises a filter 384 for receiving a voice signal from the voice message outputter 310 and filtering a voice grade of the voice signal, an amplifier 385 for amplifying the voice signal filtered by the filter 384 into a proper level, a circuit switch 383 for switching a circuit between the amplifier 385 and a circuit connector 382 in order to output the amplified voice signal to a subscriber or output a tone signal applied via the telephone line to the CPU 320, a circuit connector 382 for connecting and disconnecting the telephone line according to a selection control signal output from the CPU 320, and a rectifier 381 for rectifying the voice signal output from the circuit connector 382 and transmitting the rectified signal to the telephone line.

The voice message outputter 310 comprises a short phoneme processor 311 for outputting phonemic information regarding a short phoneme among voices of voice messages under the control of the CPU 320, a long phoneme processor 315 for outputting phonemic information regarding a long phoneme among voices of voice messages under the control of the CPU 320, a voice signal controller 313 for outputting voice data corresponding to the phonemic information from the short phoneme processor 311 and the long phoneme processor 315,

a voice oscillator 312 for outputting an address corresponding to a predetermined oscillating frequency to output a voice to the voice signal controller 313, and a voice signal mixer 314 for mixing the voice data to a voice signal of an analog form. The voice signal
5 controller 313 presets an address corresponding to predetermined phonemic information of the short phoneme processor 311 and the long phoneme processor 315 and makes a predetermined voice message according to an address with respect to the phonemic information be outputted. The voice message outputter 310, the filter 384 and the
10 amplifier 385 can be integrated into one signal chip.

A memory 340 which receives an address corresponding to information regarding an on/off state of a predetermined load from the switching set controller 330 and stores the address, and outputs information of the corresponding address in response to request of the
15 switching set controller 330, which can be constructed as EEPROM for setting an address. That is, the switching set controller 330 reads out an address with regard to a corresponding load from the memory 340, and discerns the corresponding load communicating with the main switching set or the sub-switching set, or the CPU 320 of each unit.

20 A control operation with regard to a predetermined load via the telephone line from the external is described as an example. In the embodiment, an on/off state of a third load L3 in a first main switching set 210A is confirmed in voice form via the telephone line under the condition far away from an indoor load (lamp), and the
25 turning-ON/OFF of the corresponding load is controlled via button manipulation of the telephone set by users or subscribers.

The subscriber is connected to the telephone line connector 300 coupled to the exchange 400. When the subscriber inputs a preset telephone number, each element is electrically connected. The tone
30 signal processor 386 detects a tone signal input from the telephone set and outputs the detected signal to the CPU 320. The CPU 320 counts

times a telephone bell rings, and outputs a predetermined control signal to the voice message outputter 310 so as to advise voice guidance prepared to confirm the subscriber when the counted times reaches a predetermined times, for example, ten times. The voice message outputter 310 receives a short phoneme and a long phoneme among voices with regard to the corresponding voice message from the short phoneme processor 311 and the long phoneme processor 315, respectively, and outputs a voice signal such as "please input a password" via the voice signal mixer 314. The voice signal output from the voice message outputter 310 is transmitted to the subscriber via the voice signal processor 380. At this time, the CPU 320 controls the circuit connector 382 and makes the voice signal filtered and amplified by the filter 384 and the amplifier 385 circuit-connected.

When the subscriber inputs an assigned password, the dial signal detector 390 outputs a detection signal with regard to the input password to the CPU 320. The CPU 320 judges whether the applied detection signal is a preset password, and outputs a predetermined control signal to the voice message outputter 310 in order to output a corresponding voice guidance message according to the judgment result. The voice signal output to the voice message outputter 310 is transmitted to the subscriber via the voice signal processor 380. In condition that the subscriber inputs the preset password, the CPU 320 controls the voice message outputter 310 to transmit a voice message for confirming the turning-ON/OFF of a predetermined load or that for turning-ON/OFF the predetermined load to the subscriber via the voice signal processor 380.

When the subscriber presses a button, for example number 3, to confirm the on/off state of a third load L3 in the main switching set 210A, the CPU 320 which receives a detection signal of the button number 3 from the dial signal detector 390, is interfaced with the switching set controller 330 to receive information concerning the

on/off state of the third load L3, and controls the voice message outputter 310 and the voice signal processor 380 to then output a voice message with regard to the on/off state of the third load L3. At this time, the switching set controller 330 transmits a signal for
5 detecting the on/off state of the third load L3 to the transmission/receiving unit 350, and a transmitter/receiver of each unit connected to the transmission/receiving unit 350 judges whether the input signal is a preset signal. The main switching set 210A reads out the on/off state of the third load L3 and transmits the read signal
10 to the transmission/receiving unit 350. Accordingly, the CPU 320 receives information regarding the on/off state of the third load L3 and outputs it in a voice message form.

In the case that the third load L3 of the first main switching set 210A is turned on or off according to the informed voice message in
15 condition that the subscriber inputs an assigned password, the CPU 320 outputs the control signal for turning-ON or turning-OFF of the third load L3, and the switching set controller 330 applies a driving signal for turning-ON or turning-OFF of the third load L3 to the first main switching set 210A via the transmission/receiving unit 350, and
20 the first main switching set 210A turns on or off the third load L3, and then reads out the turning-ON/OFF of the third load L3 to output the read result to the transmission/receiving unit 350. Next, the CPU 320 controls the switching set controller 330 to output the turning-ON/OFF of the third load L3 to be voice-outputted and
25 transmitted to the subscriber.

The operation that the main switching set or the sub-switching set of each unit detects the on-off state of a corresponding load or performs the turning-ON/OFF by manual manipulation or remote control with a remote controller, is functionally equal, except for only
30 the fact that a manipulation command is applied via the telephone line connector 300.

The above embodiment describes the operation of confirming the turning-ON/OFF of a load and turning on/off the load by communicating with the first main switching set 210A, but it can be fully understood by those of ordinary skill in the art that the operation
5 can be identically applied to a load connected to any main switching set or sub-switching set.

Also, the switching system of the present invention can be properly modified and applied to a preventive system without limiting to this embodiment, and thus can be fully embodied within an
10 application range based on technology of the present invention.

The present invention described above can confirm a turning-on/off state of a corresponding load and perform a switching operation, listening a voice message being informed via a telephone line, as well as control any load installed in isolated places from each
15 other by manipulating a manual switch and a remote control switch, thereby conveniently controlling the load according to a desired switching method regardless of places or situations. Particularly, the switching system is useful to control any loads via the telephone line during absence or in far isolated places. In the case that the system
20 is associated with a burglar alarm system for crime prevention, it provides great effect that can adaptively cope with emergency.

INDUSTRIAL APPLICABILITY

25 As described above, a switching system in accordance with the present invention can effectively use and manage all loads connected thereto, and thus provide wide-spread utilization in an industrial field as well as good power-saving efficiency in use of various electric and electronic appliances for house and working places.

CLAIMS

1. A switching system for switching a power source being supplied to a plurality of loads, the system switching comprising:

5 at least two or more units, each including a switching portion (97) composed of switches for applying a control signal to control the plurality of loads, a control signal generator (90) individually electrically connected to each switch, for operating according to the control signal applied from any switch, and a display unit (95) for
10 displaying a control state of the loads;

unit transmission/receiving means (93) for transmitting and receiving the control signal of said individual unit;

means for supplying and cutting off the power source to a desired load according to the output signal of said control signal
15 generator (90) in said unit; and

a telephone line connector (300) for receiving an input command applied via a telephone line, outputting a predetermined load control response signal, in response to the input command by an allowed subscriber, so that the control signal generator (90) of said unit can
20 turn on/off a corresponding load, and converting information regarding the turning-ON/OFF state or turning-ON/OFF control operation of the corresponding load into a voice signal to then transmit the converted signal to the subscriber.

25 2. The switching system as claimed in claim 1, wherein said telephone line connector (300) comprises a central processing unit (CPU, 320) interfaced with a switching set controller (330), for controlling an output operation of a voice message according to an input command applied via a telephone line;

30 a switching set controller (330) interfaced with said CPU (320), for outputting a control signal to turn on/off a predetermined load;



a transmission/receiving unit (350) for transmitting the output signal of said switching set controller (330) to the corresponding unit, receiving a response signal from said unit transmission/receiving means (93), and supplying the received response signal to a switching
5 set (200);

a voice message outputter (310) for previously storing a predetermined voice message and outputting a voice signal of a corresponding voice message under the control of said CPU (320);

a voice signal processor (380) for performing signal-processing
10 to transmit the voice signal of said voice message outputter (310) via the telephone line, to detect a tone signal from the subscriber; and

a dial signal detector (390) connected to the telephone line, for detecting a dial signal.

15 3. The switching system as claimed in claim 2, wherein said voice signal processor (380) comprises a filter (384) for receiving the voice signal from said voice message outputter (310) and filtering a voice grade of the voice signal;

an amplifier (385) for amplifying the voice signal filtered by said
20 filter (384) into a proper level;

a circuit switch (383) for switching a circuit between said amplifier (385) and a circuit connector (382) in order to output the amplified voice signal to the subscriber or output a tone signal applied via the telephone line to said CPU (320);

25 a circuit connector (382) for connecting and disconnecting the telephone line according to a selection control signal output from said CPU (320); and

a rectifier (381) for rectifying the voice signal output from said circuit connector (382) and transmitting the rectified signal to the
30 telephone line.



4. The switching system as claimed in claim 2, wherein said voice message outputter (310) comprises a short phoneme processor (311) for outputting phonemic information regarding a short phoneme among voices of voice messages under the control of said CPU (320);

5 a long phoneme processor (315) for outputting phonemic information regarding a long phoneme among voices of voice messages under the control of said CPU (320);

a voice signal controller (313) for outputting voice data corresponding to the phonemic information from said short phoneme processor (311) and said long phoneme processor (315);

10 a voice oscillator (312) for outputting an address corresponding to a predetermined oscillating frequency to output a voice to said voice signal controller (313); and

15 a voice signal mixer (314) for mixing the voice address to a voice signal of an analog form.

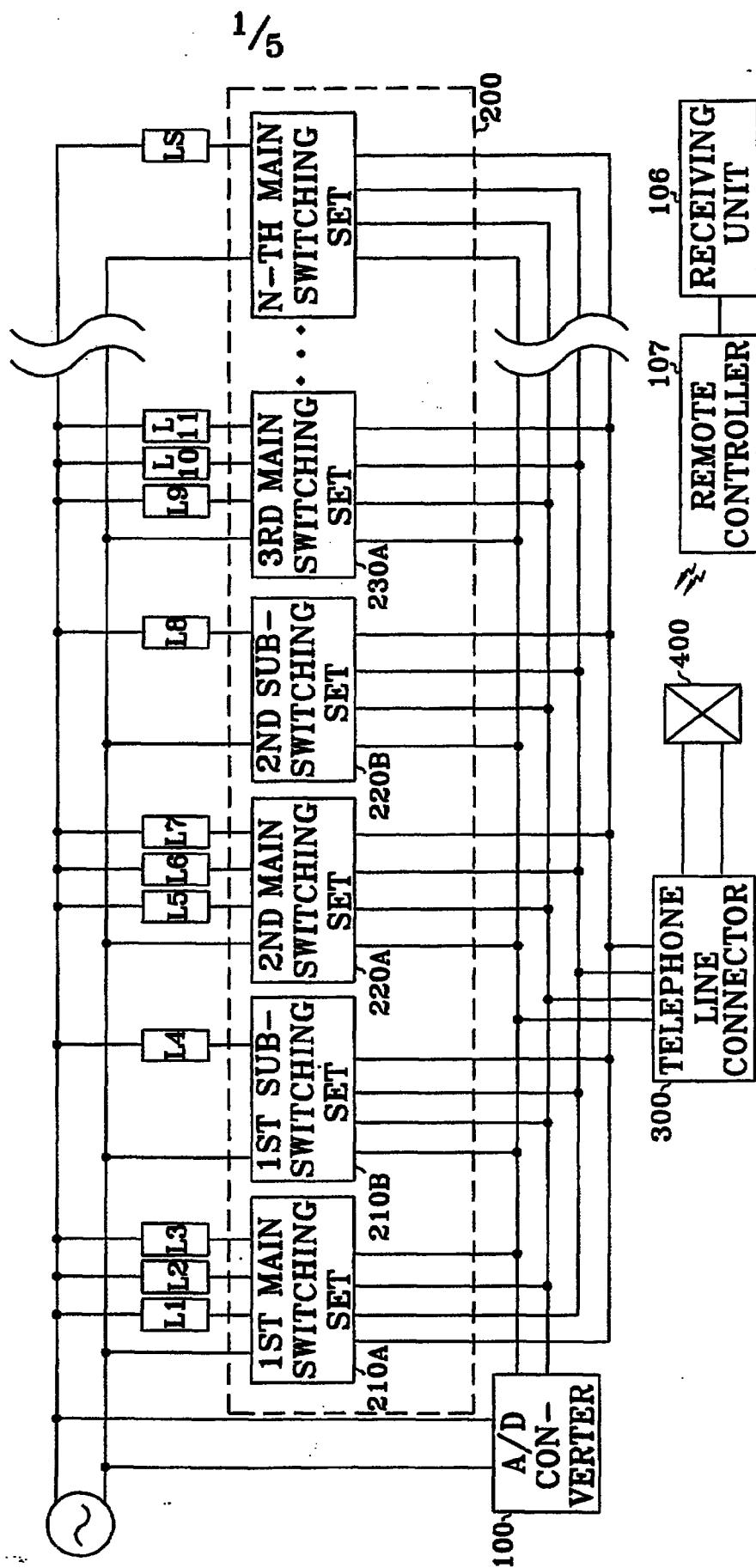
5. The switching system as claimed in claim 2, wherein said switching set controller (313) further comprises a memory (340) for storing an address allocated for the operation of an open/closed element to switch the supply of a power source of said telephone line connector (300).

6. The switching system as claimed in claim 2, wherein said voice message outputter (310) outputs a predetermined voice message according to an address for preset phonemic information.

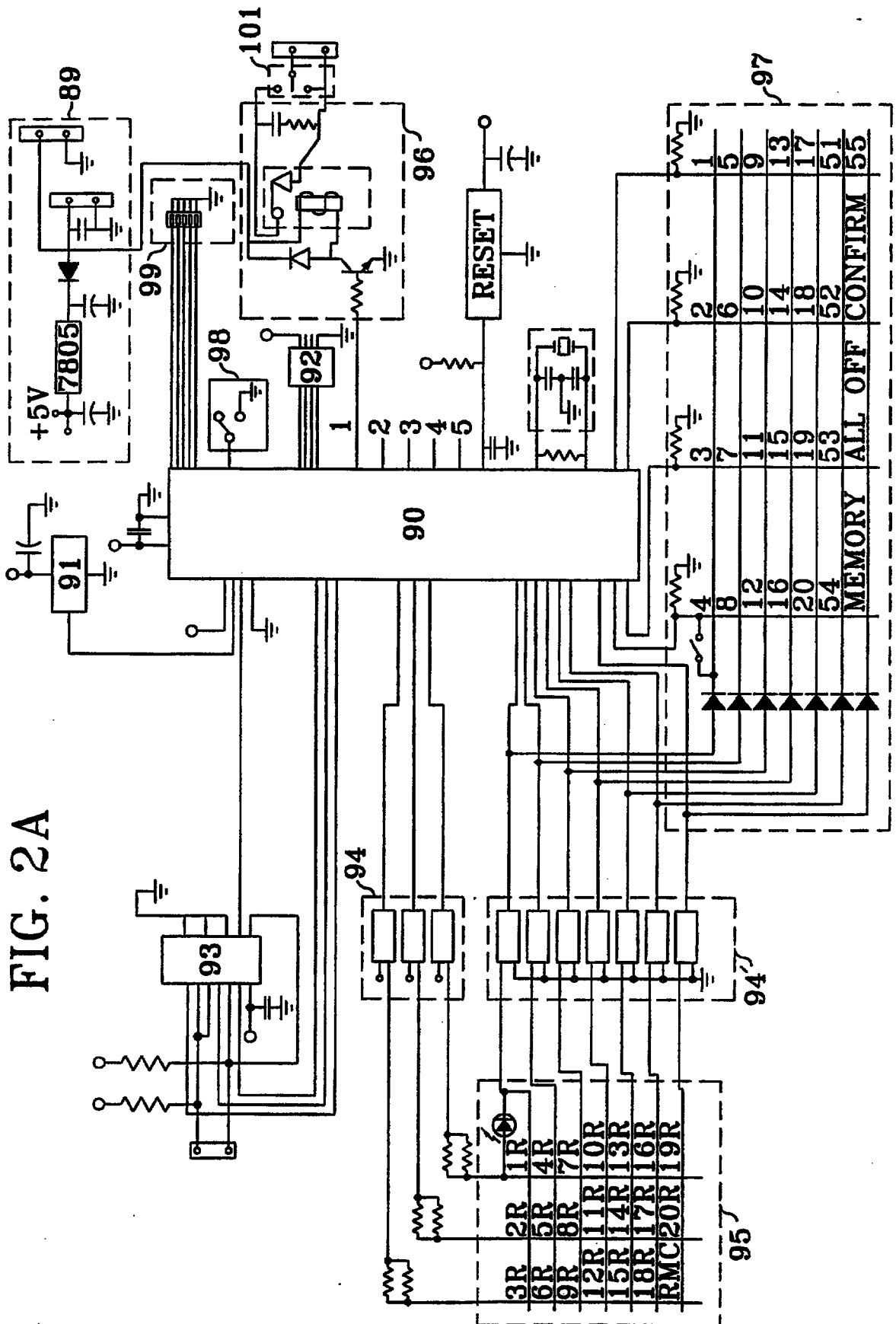
7. The switching system as claimed in claim 2, wherein said switching set controller (330) is interfaced with the main switching set of each unit and said CPU (320) according to the preset address to discern a corresponding load.



FIG. 1

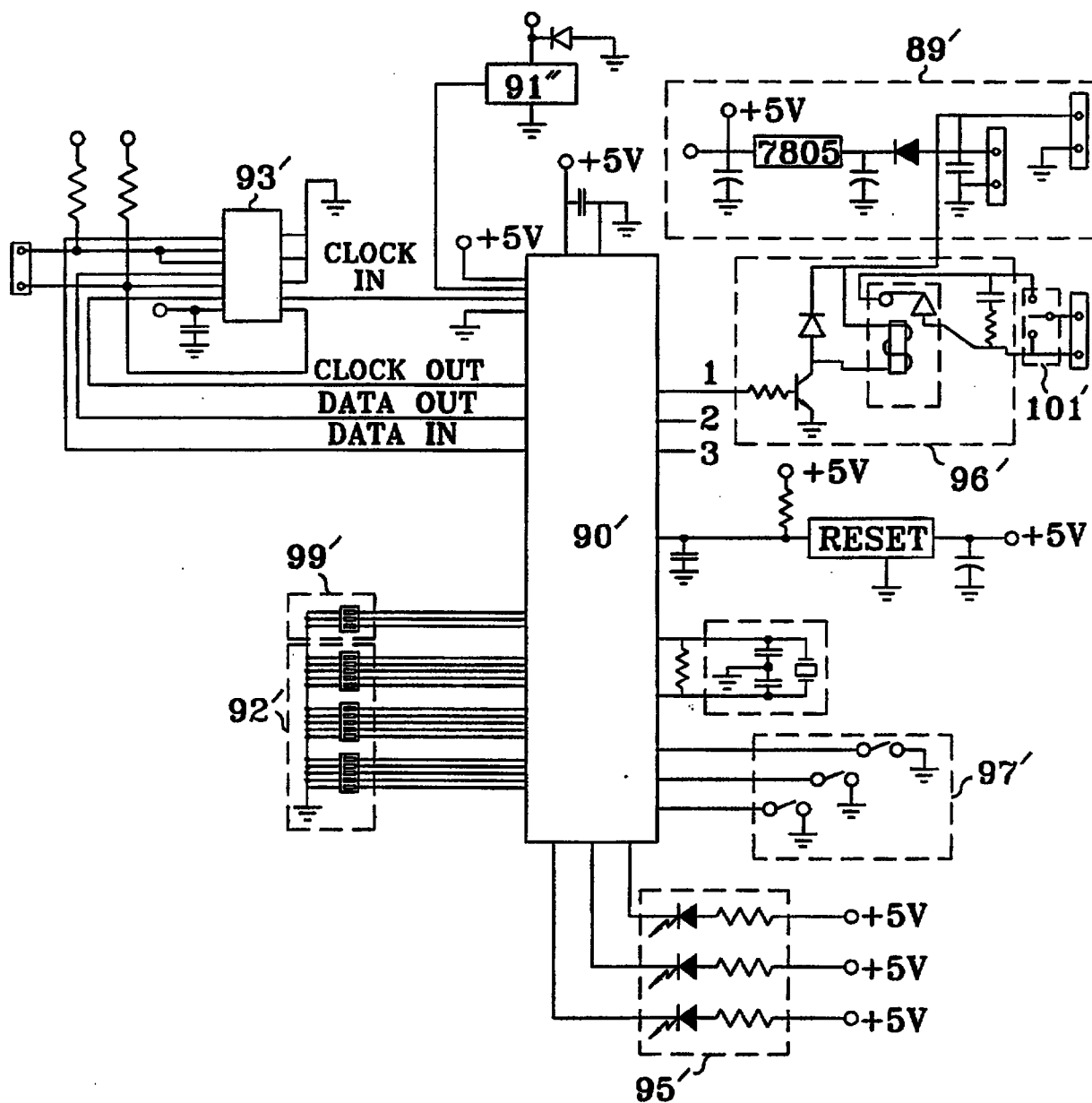


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FIG. 2B



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FIG. 2C

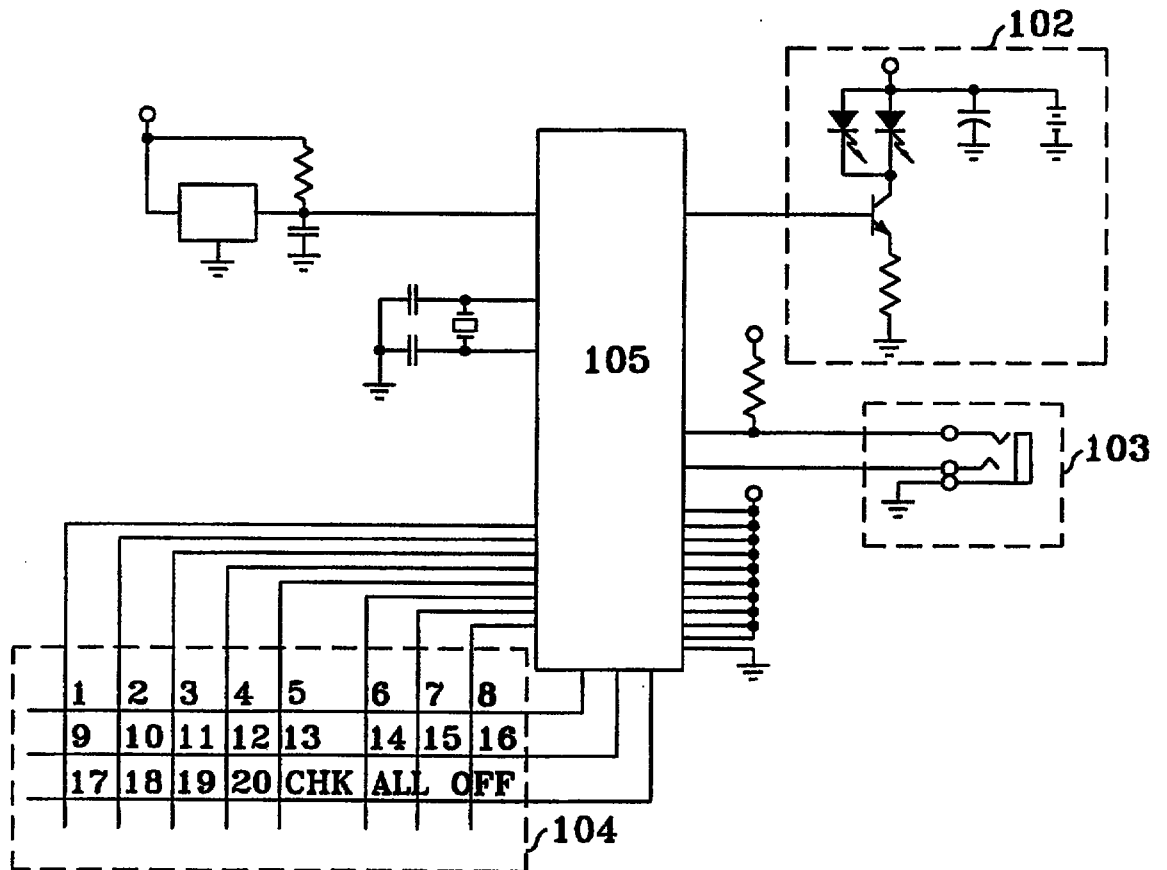
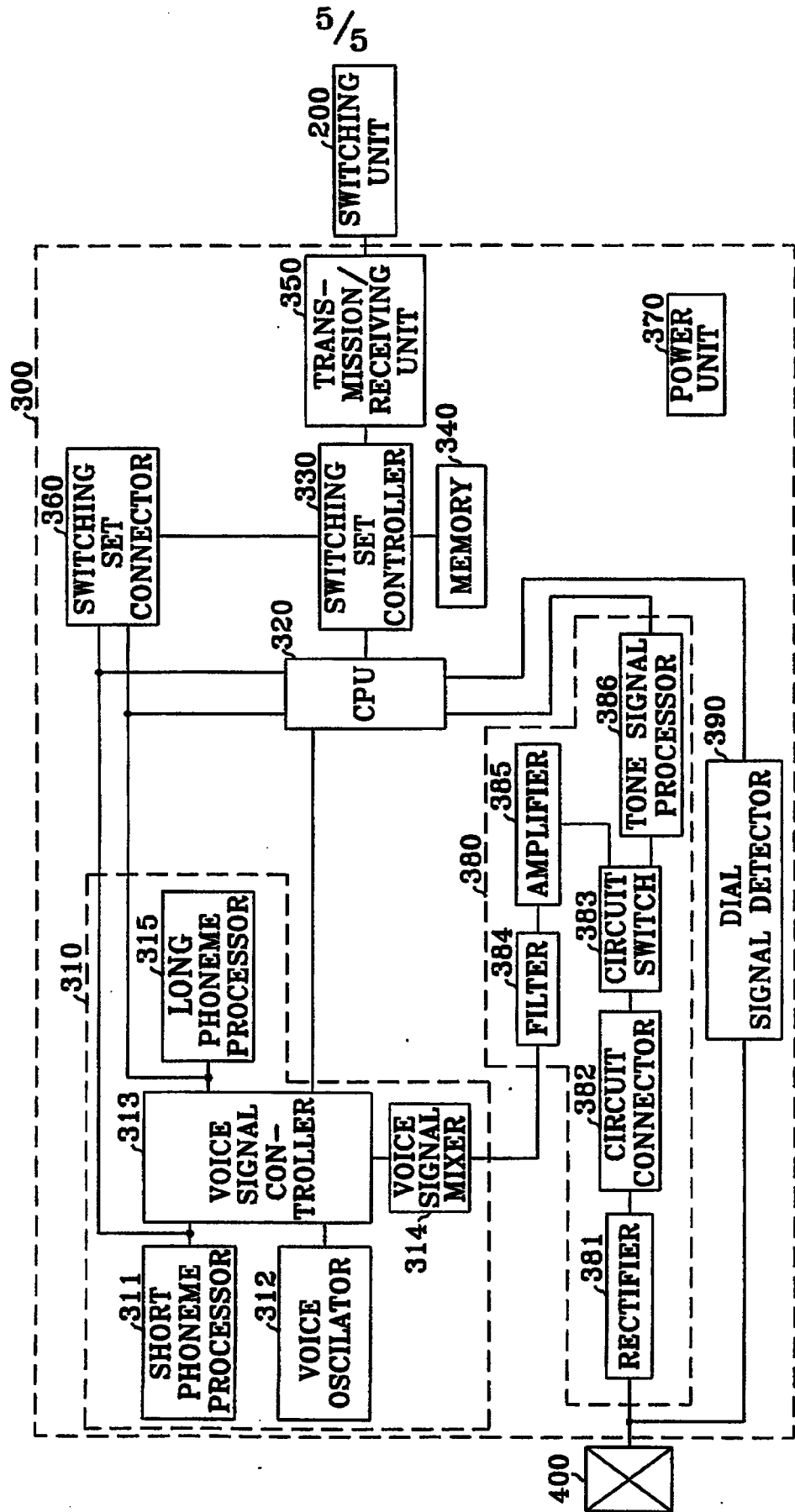


FIG. 3





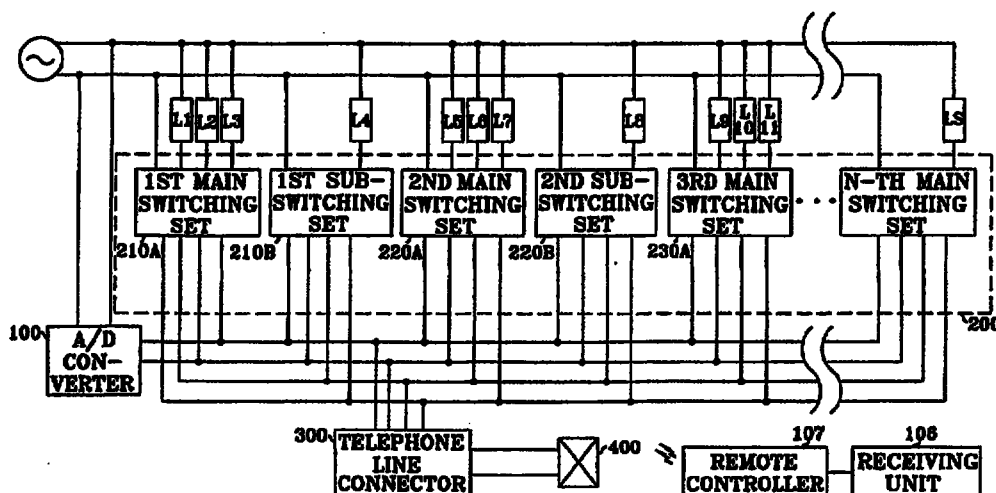
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(54) Title: SWITCHING SYSTEM



(57) Abstract

The present invention relates to a switching system which can control a corresponding load by means of manipulating a manual switch and a remote control switch (107), and optionally turn on/off any load among a plurality of loads via a telephone line even though a user is at any distant places beyond the remote control of loads. The switching system of the present invention recognizes an allowed subscriber by inputting a predetermined password, and confirms a turning-on/off state of loads connected to a switching set unit via a voice to then control turning-ON/OFF of the corresponding load via button manipulation of a telephone set. Accordingly, the switching system can perform manual switching control or remote switching control using a remote controller (107), and also carry out switching control with regard to any load via the telephone line even under a poor condition of remote control, thereby conveniently confirming and manipulating a state of loads regardless of places.