ELEVATOR CAR ANNOUNCING SYSTEM


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ABSTRACT OF THE DISCLOSURE

An elevator car announcing system including an array of message storage modules each including an endless storage media initiated by an elevator command to extract the stored message. The module controls its own output and resets the initiating circuit by virtue of a superposed 40 cycle tone on the message. A unique ladder network of relays insures that remaining circuits are disabled during the functioning of each elevator command.

This invention relates to an elevator message announcing system, and in particular, to one of extreme flexibility and instantaneous response.

Conventional message announcing systems, such as one might hear on the floor of a department store, while satisfactory for their intended purpose, are generally not adaptable to employment with elevator banks. This arises chiefly because of the continuous duty cycle imposed by elevators, the maintenance problems peculiar to elevator systems, the difficulty in exercising elevator control over the message store, and the arbitrary message sequence and instantaneous response demanded by elevators.

Accordingly, it is the object of this invention to provide a message announcing system, adaptable to individual or banks of elevators, which reduces the various portions subjected to a continuous duty cycle to a minimum, and is simple to both test and maintain.

It is another object of this invention to provide a flexible message store in which the access time to any message is minimized.

It is a further object of this invention to provide a message announcing apparatus which has a plurality of messages stored in a manner in which each may be easily and independently replaced, and which ensures against undesired message repeats and partial plays.

It is a further object of this invention to predetermine the system upon a plurality of standard storage modules of minimum simplicity and minimum cost.

It is a further object of this invention to permit each module to control the duration of its own cycle without modifying or increasing the complexity or cost of the basic module.

It is still a further object of this invention to adapt to emergency conditions; indicating the presence of such conditions to appropriate personnel and allowing communication therewith.

It is a feature of this invention to provide each elevator car with a pair of speakers, one directed into the hall and the other into the car, and a switching arrangement coupled thereto for directing the appropriate message to persons waiting on the landing or those in the car.

Briefly, the invention is predicated upon the concept of an array of message storage modules (receptors) each including an endless storage media, and each independently initiated by an elevator command to extract the stored message. Subsequent to message initiation, the module itself is utilized to further control its own output and to reset the initiating circuit upon completion of the message.

The above mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will best be understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a schematic elevation of the basic message module utilized in the invention;

FIG. 2 is a block schematic of the module audio and power circuits according to the invention; and

FIGS. 3a, 3b and 3c illustrate the module switching control circuits (broken into sections for clarity).

In the drawings and in the following description, insofar as possible, the following relay nomenclature is adhered to:

Initial capital—relay coil (for example IX₅).

Initial small—relay associated contact (for example IX₅X).

Numeral following first letter—the module with which the relay or contacts are associated (for example XX₅).

Letter subscript—the particular relay associated with that message module (for example XIX₅).

Thus Iₓₑ₆ is the second relay coil associated with the second message module and Iₓₑ₆ is a contact associated with that relay. General function relays will, similar to the above, have coils designated by initial capitals and their contacts by initial small letters.

Since the invention relates to an apparatus automatically supervised by conventional elevator control circuits (these latter circuits forming no part of this invention except as ancillary thereto), the discussion of such circuits thus, for the sake of brevity, been omitted from the specification. In its stead, the phrase "elevator command" will be employed. It is to be understood that this term embraces those functions normally relegated to elevator control and supervisory circuits as well as incidental and non-automatic functions. For example, the verbal message "Sixth Floor" may be supervised by the elevator selector relay associated with the sixth floor. The automatic safety switch, door opening relays, deceleration controls, control relays, overload relays, etc. may similarly control associated messages, as may the manual floor buttons, manual emergency switch, etc.

FIG. 1 illustrates schematically the message storage module or repeater unit utilized in the invention. Each module drives a tap loop, containing a pre-recorded message; the loop being led around friction drive wheel 1 and the roller guides 2 and 3 for transporting the tap adjacent the reading head. Since the messages may vary in length from tape to tape, and it is desired to have the message cover substantially the whole loop (save for a minor control portion, to be described), the guide rollers and head are preferably adjustably spaced (not shown) from the drive wheel in any conventional manner. Alternatively, the tape may be embodied in a cartridge insertable in the module. In the latter case the slack will be taken up on the driven cartridge spindle, and the tape fed in an inside loop arrangement.

The wheel 1 is driven by a synchronous motor M via suitable transmission means (not shown). The output from the magnetic head is fed via a preamplifier to output terminals 14 and 12, while the motor and preamp are energized at terminals 7 through 10 in a manner to be described. Push button PB permits the system to be tested locally at each module. These buttons are connected in parallel with the elevator command controls (FIG. 3c) and activate each module in a manner identical to that which would occur upon the associated elevator command.

Each module is preferably constructed as a plug-in unit allowing replacement maintenance rather than in the field trouble shooting. The module tapes are prepared as follows: A length of tape sufficient for several mes-
sages is prerecorded with a low frequency (e.g., 40 cycle) tone. Each message is then recorded serially over the tone, and the tape is spliced into several loops, each slightly longer than the included message. That small portion of the tape upon which no message exists and which is therefore indicative of the end of the message, is scraped to remove the magnetic material and provide a window free of the superposed 40 cycle control signal. While the purpose of this window will be described hereinafter, it will suffice at this juncture to point out that the window to window distance of any loop may be defined as a cycle.

The upper portion of FIG. 2 illustrates the repeater and audio circuits. Each repeater has its motor and audio portions independently controlled and accordingly each is shown twice in this figure; the numerals adjacent to the module corresponding to the audio and motor terminals shown in FIG. 1.

Repeater motor power is made available at winding T1 of transformer T, the several repeaters being coupled in parallel via respectively relay contacts l9A-l2A (the associated relays being shown in Fig. 3b). Connected in parallel with the repeaters is the breaking circuit consisting of a capacitor C, a resistor R1, a diode D, and the normally closed contact "run" of the "RUN" relay (FIG. 3a). Upon an elevator command, in a manner to be described, the "RUN" relay is energized and capacitor C charges via the diode D. When the "RUN" relay releases D.C. braking voltage is available to the energized repeater, insuring that the motor does not carry the tape past the window into a second cycle.

Power for the repeater audio circuits, connected in parallel via associated control contacts 11C-l2C, is afforded by a common D.C. power supply 20, the voltage to which is derived from winding T2 of transformer T. The audio outputs from these repeaters are led in common to the amplifier 21 and discriminator 22 through additional contacts l9C-12C of the relays 11C-12C. Amplifier 21, which contains a high pass filter for rejecting the superposed 40 cycle tone, drives the monitor and car speakers with the selected message. Discriminator 22 detects the 40 cycle tone and in response thereto energizes relay DX; releasing this relay when the window has appeared at the energized repeater. Both the discriminator and amplifier are preferably plug-in units, each containing an independent power supply. Accordingly, each is shown connected to an A.C. source.

If the elevator is following a microphone superposed tone has been described in cooperation with a discriminator circuit for detecting this tone, it will be appreciated by those skilled in the art that many alternative arrangements are available for indicating the end of a message. The one described is preferred, however, because of the continuous control which is exercised during the readout of the message.

FIGS. 3c-3e illustrate the module switching and control circuits, shown coupled to a common relay power source. So that the invention may be better appreciated, a typical operative example will be described. Assuming the elevator is approaching the first floor, contacts 1FL (FIG. 3c) will close. This elevator command may, for example, be initiated by a selector brush wiping the first floor segment. As a consequence, relay 11A is energized, thereby energizing relays 11B (controlling the motor energization) and 11C (controlling the audio circuits). Both of these relays are associated with the first repeater, will be energized via 1BD, 1AC, and dv. The latter of these contacts, that is, dv, is closed by virtue of the dependency of the DV relay upon dt and the closed state of the latter via the normally closed contact "disc" of relay "Disc" (FIG. 3a). By virtue of its motor energization, the repeater No. 1 will start its message ("First Floor") and the superposed 40 cycle tone will cause discriminator 22 (FIG. 2) to energize DX.

The energization of relay DX energizes relay "Disc" and hence relays 11B and 11C are self held via contact 11C. Simultaneously, relay DT has been released by the normally closed contact of relay "Disc" (FIG. 3a) and the circuit l1A, dv drops out. Thus the motor and audio circuits are now under the control of the discriminator-dependent relay "Disc" (assuming contact l1B opens). At this juncture, the control by the discriminator is not exclusive, and one problem remains. This arises because the elevator commands are not constant in duration and may last beyond the length of the message. This might occur, for example, where the elevator sits at one landing for several seconds. If the elevator command exceeds the duration of the length of the message, the "Disc" relay would release when the window caused the discriminator to drop out relay DX and the message would be replayed; the circuits reenergizing as described above in response to relay 11A.

To preclude the foregoing, exclusive control is afforded the discriminator by the action of relay 11B. This relay is energized subsequent to 11A and 11C due to the dependency of the "Disc" relay on the "Disc" relay (FIG. 3a). Energization of 11B opens the normally closed contact 11B of circuit dv, ceasing the energizing of relays 11D and 11B thereby allowing the discriminator contact "disc" to control these delays. Relay 11D is self-held by the parallel path l1D, l1A. Thus, if the elevator command-dependent relay 11A remains on after a message is completed, 11B will remain energized and contact "disc" in circuit with relays 11B and 11C will exclusively control these relays and hence the associated module.

Since it is sometimes desirable to intentionally replay messages (such as safety instructions) a provision is included to effect this result, and is shown at the bottom of FIG. 3e. Contacts of relays 11A and 11B, are included in a dual timer circuit comprising timing relays 11X and 11T. Assume, for example, that the safety switch has been latched in a closed position. Ordinarily, as has been explained, replay is precluded. However, when either 11A or 11B is energized, timer 11X will be energized until the "Disc" relay's normally closed contact "disc" opens in response to the superposed tone. Consequently, whereas the circuits would reset after one play through of the module, now contact 11X (FIG. 3b) holds relay 11B and 11C for a second play through until the "Disc" relay can respond to the tone (a similar arrangement is provided for 11A and 11B, not shown).

To prevent in endless cycling of the message, relay 11T is added. This relay is time to a predetermined maximum number of replays and, since it has a normally closed contact in series with timer 11X, it precludes the latter's operation when this time has been exceeded. Each of the module circuits in FIG. 3b is arranged in a "ladder" circuit with each rung containing the relays associated with one module (for example 11A, 11B, and 11C). The ladder sides contain two contacts respectively dependent upon the above and below rung (for example 11B and 12A). By applying the relay energization voltage across a diagonal of the ladder (X, Y) a positive interlock is effected and only one set of module associated relays may be energized at a given time.

When a message has been completed, the window appears at the tape head and relay DX is released followed by relays "Disc" and "Disc" (FIG. 3a). The capacitor CD and resistor RD discharge across the relay "Disc" ensuring its slow release and thus relay 11D follows relay 11B so that the latter cannot be self held.

Capacitor 11B, which has been charged during the energization of 11B, now discharges via 11B across relay 11B, causing this relay to remain held for a sufficient amount of time for the motor braking circuit (described in connection with FIG. 3) to become effective. This is rendered possible by relay "RUN" which releases with 11B providing the D.C. path (FIG. 2) C, "run" (normally closed) 11B. Diode D1 ensures that the capacitor C1 does not dis-
charge across $I_{oc}$ and cause it to delay its release (FIG. 3b). Should a tape loop break, a repeater motor fail, or if for any reason an individual repeater should fail and the 40 cycle tone were not received by the discriminator, the system would lock-in on the module then energized. To prevent this lock-up, a failure timer and indicator lamp are included in FIG. 3a (at the top). This resets the system automatically and provides a manually reset indicator light.

The operation of this circuit is as follows. Timing relay R is normally energized via contact "run." If the "RUN" relay circuit, through but the "Dirc" relay fails to respond to the 40 cycle tone within the predetermined time of the R relay slow release (provided by the capacitor CT and resistor RT) then relay TA is energized via contact t. Thus, all power to the remaining circuits is cut off (via normally closed contact ta), relay T/I is energized and self held and the failure light (which may be remote) is lit. The removal of power from the relay circuits resets the sys tem for the next message; the failure light being manually reset (via PBF) when the serviceman remedies the malfunction.

Examples of other elevator command circuits are also shown in FIG. 3e, each controlling an associated module. Since some of these messages will be Figs. 3a-e to people on the landings rather than those in the elevator (for example "going up"), it is proposed to provide each elevator with two speakers, one directed into the hall (roof speaker) and one into the car (panel speaker). Where the message is to be directed into the hall, the associated command relay (for example 17a and 18a) controls a speaker switching relay ID (FIG. 2a). This relay via the two ID contacts (FIG. 2) substitutes the roof speaker for the normally employed panel speaker in the amplifier circuit.

Emergency intercom facilities are easily added to the invention as may be seen from Figs. 2 and 3a. Upon the operation of the automatic safety or manual safety switch, relay SSM is energized in conjunction with the associated message module. This relay alerts supervisory personnel, who, via ancillary intercom equipment, may monitor, the car as follows: At the end of the emergency message switch OP may be manually operated, energizing relay E (FIG. 3a). Consequently, an intercom circuit is automatically connected to the car via the contact e.

The equipment may be locally tested by virtue of push buttons PB1–PB2 disposed respectively in each module and coupled in parallel with the associated elevator command module. Coupled to said transducers by manual switch MON2 because each button, in effect, replaces the associated command circuits the test comprehensively includes the total system. Switch MON2 allows the audio to be switched to a local speaker SP.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made by way of example and not as a limitation to the scope of my invention as set forth in the objects thereof and in the accompanying claims.

1 claim:

1. An elevator control circuit commanded message announcing system comprising: a plurality of message storage modules each including an endless recording media for storing a verbal message to be extracted by an associated elevator command, transducer means for deriving an audio output from said media, and means for transporting said media past said transducer means; a plurality of switch means, each respectively responsive to a predetermined elevator command; means respectively responsive to each of said switch means for cycling the associated module; means coupled to said modules and responsive to a predetermined signal therefrom; a speaker mounted on the elevator car; means for coupling the output of the activated module to said speaker; said cycling means comprising means responsive to said switch means for initiating the cycling of a module, and means controlled by said responsive means for preventing the control for further cycling said module and for deactivating said module after one complete cycle thereof.

2. The message announcing system claimed in claim 1 in which said signal responsive means is coupled to the module transducer and comprises a discriminator for detecting a superposed signal on said endless media.

3. The message announcing system claimed in claim 2 in which the superposed signal on said endless media is an audio signal substantially removed from the voice range and substantially coextensive with the verbal message for releasing said signal responsive means after the completion of the message.

4. The message announcing system claimed in claim 3 in which said endless media consists of a magnetic tape loop; said signal being absent in a loop position by the removal of magnetic material therefrom.

5. The message announcing system claimed in claim 1 in which each of said cycling means comprises a switching control circuit, the respective switching control circuits being connected in parallel in a ladder network; means connected across a diagonal of said ladder network for the energization thereof; and a pair of switches connected in series in respective legs of said ladder between adjacent switching control circuits and respectively responsive to each of the adjacent circuits for disabling the energizing means to all circuits save that associated with the elevator command.

6. The message announcing system claimed in claim 1 further comprising a second car mounted speaker and means coupled to predetermined said switch means for cycling the activated module output to said second speaker.

7. The message announcing system claimed in claim 1 further comprising a plurality of manual switch means each respectively controlled in parallel with the associated elevator command control and disposed at the respective modules for commanding a message therefrom.

8. An elevator control circuit commanded message announcing system comprising: a plurality of message storage modules each including an endless recording media for storing a verbal message to be extracted by an associated elevator command, transducer means for deriving an audio output from said media, and means for transporting said media past said transducer means; means responsive to a predetermined elevator command for initiating the cycling of the associated module; and means responsive to the self controlling means for cycling said module of the message recorded thereon and resetting said cycle initiating means at the end of the message; said endless media including a message length control signal superposed thereon, and said self-controlling means comprising a discriminator responsive to said signal.

9. The message announcing system claimed in claim 8 further comprising means responsive to a malfunction of said self controlling means for resetting said system for the next command.

10. The message announcing system claimed in claim 8 further comprising means for preventing the resetting of the cycle initiating means of predetermined control modules for a predetermined time, thereby causing repetition of the associate message a predetermined maximum number of times.

References Cited

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