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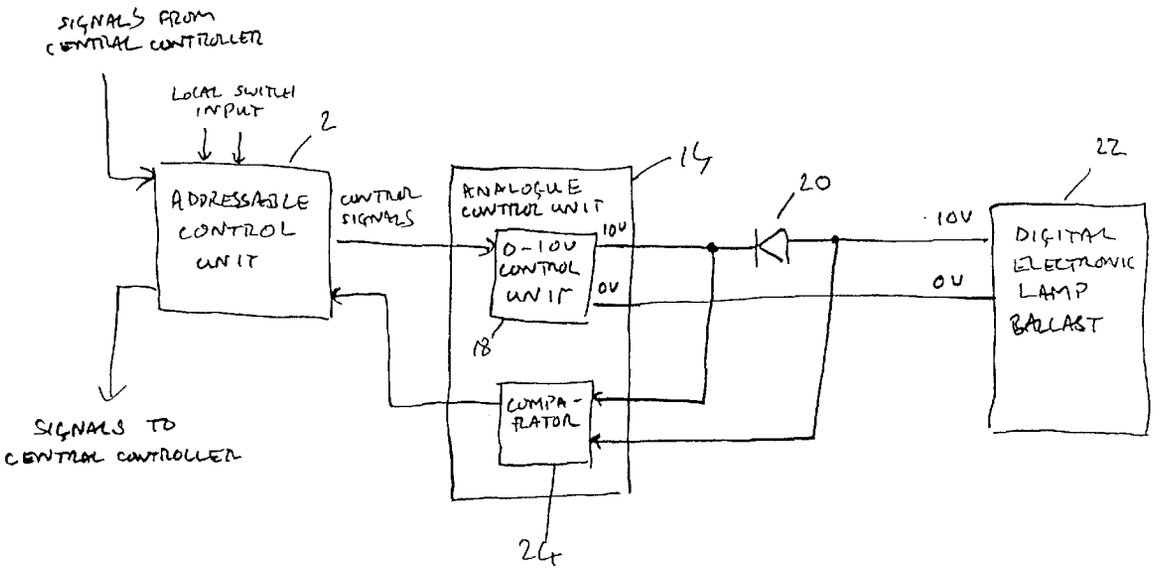
(54) Blown light detector

(57) A failed light detector for use in a dimmer circuit which has a control input producing a positive output when the lamp is in operation and falls to zero when the lamp fails comprises means (18) for providing a controlled voltage for a remotely addressable controlled module (22) in the range required to dim the lamp. A comparator (24) monitors the output voltage of the control input to the dimmer circuit to detect whether the lamp has failed and a lamp failure signal is provided by this in dependents on the measured voltage.



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Description

This invention relates to a failed light detector and in particular to a failed light detector of the type which can be used in a remotely controlled lighting system of the type proposed in our British patent application No. GB-A-2278473 and with a dimmable digital electronic ballast for lamp control such as the Trilux DD58.1-23031 electronic ballast.

Our British patent application No. GB-A-2278473 describes a remotely controlled lighting system in which a plurality of remotely controlled modules are connected in series. The modules are digital and are responsive to status enquiry signals and to control signals sent along the chain of modules to report on their status to a central controller and to switch on or off or to dim the associated lamps in response to the control signals.

One problem with such systems is that there is no straightforward way in which a lamp failure can be detected without modifying the control modules by the addition of relatively expensive current measurement devices responsive to lamp current.

It is desirable in many situations to use dimmable lights in such a control system. These, and conventional remotely controlled lights are usually operated by some form of digital electronic ballast such as are manufactured by Trilux Lighting Limited. For example, the Trilux DD58.1-23031 is a dimmable digital electronic lamp ballast. Many digital electronic ballasts such as these provide a positive voltage level on their control input. The lamp is them dimmed by pulling the positive voltage line to a lower voltage. Alternatively the lamp may be dimmed by the application of a pulse waveform for example the Manchester code depending on the type of dimmer unit used. However, when the light that that digital electronic ballast is controlling fails the 10 volt output drops to zero. We have appreciated that this can be used to detect remotely whether or not a lamp has failed.

The invention is defined in more detail in the appended claims to which reference should now be made.

A preferred embodiment of the invention will now be described in detail by way of example with reference to the single figure.

The figure shows an addressable control module 2 of the type which would be used in a remotely controlled lighting system such as described in our British patent application No. GB-A-2278473. This receives input control signals from a central controller and sends these signals back to the central controller with the response to any status enquiry. This addressable control module is capable of responding to status enquiries and of switching and dimming a lamp.

The input circuitry associated with this addressable control module is not the subject of the present invention and is not discussed in detail here.

The addressable control is coupled to an analogue control unit 14 to control dimming of the light. The addressable control module sends signals 16 which are used to dim the light. The analogue control unit 16 is also used to check periodically whether or not the lamp has failed.

Included in the analogue control unit 14 are a 0 to 10V control unit 18 which has 0 and 10 volt outputs. The 10 volt output is coupled via a reverse biased diode 20 to the positive voltage (in this case 10 volt) output of the dimmer control on a digital electronic lamp ballast 22. The 0 volt output of the control unit 18 is coupled to the 0 volt output of the lamp ballast. The lamp is dimmed by reducing the voltage level of the 10 volt output on the control unit 18.

Also included in the analogue control unit 14 is a comparator. The two inputs to this are coupled across the reverse biased diode 20. In normal usage the difference in the comparator inputs will be the diode voltage drop which may be, for example, 0.7V. This is taken as effectively zero difference and the comparator does not generate any output in response to this. In this situation the dimmer unit output is pulled to a voltage level less than 10V by the analogue control unit to dim the light.

The comparator is used, whilst the lamp is in operation, to determine whether or not there has been a failure of the lamp. In order to do this the 10 volt output of the control unit 18 must be at a positive voltage and the lamp must be switched on. The comparator determines the difference in voltage across the diode. If the lamp is working the voltage measured will be the standard 0.7V drop across the diode. However, if the lamp has failed the voltage level between the diode 20 and the lamp ballast 22 will have dropped to zero. The comparator will therefore detect a voltage of opposite polarity to this 0.7V diode drop and equivalent to the output level of the analogue control unit. This is detected by the addressable control module and a lamp failure signal is output back to the central controller.

The comparator can be operated continuously or at intervals to determine whether or not the lamp has failed. In the event that a failure is detected and transmitted to the central controller, an engineer can be sent to replace the lamp in question.

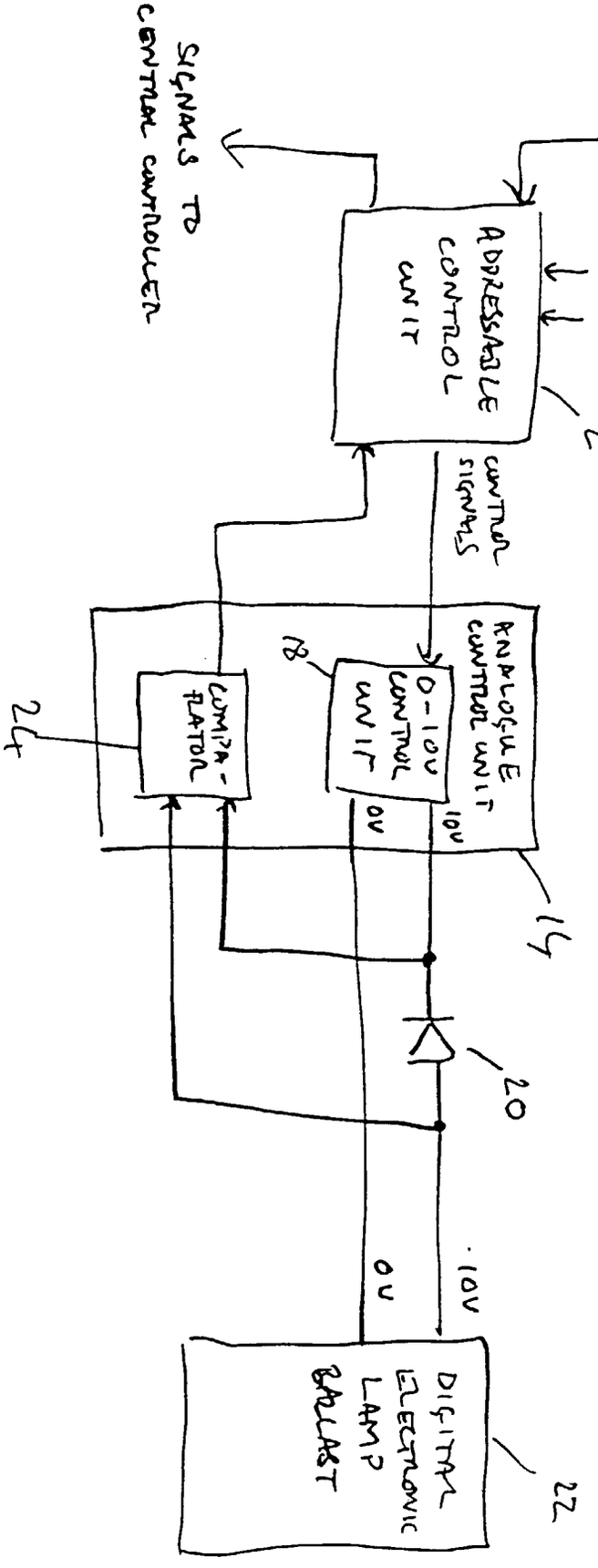
Claims

1. Apparatus for use in a remotely controlled lighting system for detecting when a lamp controlled by a dimmer circuit (22) has failed, the dimmer circuit having a control input which produces a positive output when the lamp is on and which falls to zero when the lamp fails, comprising means (18) for use with a remotely addressable control module for providing a control voltage in the range required to dim the lamp, means (24) for measuring the output voltage of the control input to the dimmer circuit to detect whether the lamp has failed and means for providing a lamp failure signal at an output from the addressable control module in response to the

measured voltage.

2. Apparatus according to claim 1 in which a diode (20) is coupled between the means for providing a control voltage and the control input of the dimmer circuit (22) and the measuring means (24) is coupled across the diode to detect whether the lamp has failed.

3. Apparatus according to claim 1 in which the measuring means (24) is coupled to a reference voltage and to the control input of the lamp ballast and is isolated from the control voltage by a diode which is reverse biased with respect to the control voltage.


SIGNALS FROM CENTRAL CONTROLLER
LOCAL SWITCH INPUT
ADDRESSABLE CONTROL UNIT
2
CONTROL SIGNALS
SIGNALS TO CENTRAL CONTROLLER
ANALOGUE CONTROL UNIT
14
18
0-10V CONTROL UNIT
0V
10V
COMPARATOR
24
20
0V
10V
DIGITAL ELECTRONIC LAMP BALLAST
22