

## VEHICLE CONDITION MONITORING SYSTEM RELATED APPLICATIONS

This is a continuation-in-part application of applica- 5  
tion Ser. No. 446,529, filed Feb. 27, 1974 now abandoned.

### BACKGROUND OF THE INVENTION

The present invention relates to an electrical system 10  
for monitoring the status of a number of load devices or conditions associated with the vehicle; the vehicle preferably being a truck. More particularly, this invention pertains to a vehicle condition monitoring system including means for detecting such conditions as a lamp 15  
outage and/or a "jackknife" condition. The monitoring system of this invention is most advantageous in that the detection circuitry makes use of the existing vehicle wiring.

Due to the ever increasing demand for the transpor- 20  
tation of goods and materials, there is an ever expanding requirement for a larger number of vehicles as well as vehicles of increased size. This is evident by the greater use of trailer trucks and the tandem operation of these trucks. These trucks are not provided with sufficient safety devices for the protection of the truck- 25  
driver and others. There are not sufficient monitoring devices. Accordingly, one object of the present invention is to provide a vehicle condition monitoring system including a display panel accessible to the driver for 30  
registering a number of different fault conditions that may occur in the vehicle such as the outage of a lamp or the overheating of a brakedrum.

Another object of the present invention is to provide a monitoring system for use preferably in a trailer truck 35  
and that includes means including display means for detecting a jackknife condition of the vehicle.

Regarding the aspect of the present invention pertaining to the monitoring of the condition of certain lamps or lights in the vehicle, it is noted that the prior art shows different systems for indicating the condition 40  
of lamps in a vehicle.

The problem with the prior art systems is that they all require a separate sensing system such as a magnetic sensing system and thus the systems become quite complex 45  
especially if there are a number of lamps to monitor.

Accordingly, another object of the present invention is to provide a vehicle condition monitoring system especially for monitoring the outage of lamps wherein 50  
the continuity of the lamp is checked by impressing and sensing an alternating signal on the existing vehicle wiring.

A further object of the present invention is to provide a system in accordance with the preceding object and that is relatively inexpensive to construct, easy to install 55  
in existing vehicles and that is relatively inexpensive.

It has also been found that many times a fault condition occurs and is only temporarily corrected by the driver. For example, there may be a small leak in the vehicle radiator that activates an indicator light. The driver then fills the radiator but the problem, which is not reported, remains. 60

Accordingly, another object of the present invention is to provide a condition monitoring system including memory means that registers a fault condition and maintains the fault reading even if the fault is temporarily corrected. 65

Still another object of this invention is to provide a system as in the preceding object and where a diagnostic unit is thereafter employed to read the condition of the memory means.

### SUMMARY OF THE INVENTION

To accomplish the foregoing and other objects of this invention there is provided in a motor vehicle having a driving compartment, a number of load devices and means for providing energy to the load devices for operation thereof, a system for monitoring the operable condition of each load device. Most of these load devices are lamps of the vehicle and the system of the present invention is for monitoring the continuity of 15  
these lamps whether these lamps are being operated through the existing wiring of the vehicle or not. The system of this invention generally comprises a display console disposed in the driving compartment and including a plurality of indicator lights one being associated with each load device, a harmonic generator for establishing an alternating signal, separate lines for coupling the alternating signal to each load device by way of each line with each line preferably including its own filter circuit for passing only predetermined frequencies and a sensing element which may simply be a resistor connected in series between the filter circuit and the existing line which couples to the associated load device. With respect to the tail lights, for example, the sensing line would not be connected at the tail lights but could be connected in the driving compartment area from where the tail lights are controlled. 20

The system further comprises in one embodiment a sensing circuit associated with the sensing resistor for determining continuity to the load device. In the disclosed embodiment the presence of a voltage drop across the resistor is sensed to indicate the proper operation of the lamp and the absence of a voltage drop generates a signal which is coupled to the display panel for operating the indicator light of the display panel that is associated with the inoperative load device or lamp. 25

In an alternate arrangement for detecting the lamp outage instead of filtering the output from the square-wave generator, this output is coupled to a counter and a decoder circuit for providing time sequence signals for pulsing the existing wires in a sequential manner to detect lamp outage. This alternate arrangement may also employ a resistor sensing circuit in association with an indicator lamp. 30

In another embodiment of the present invention the system is adapted to store an indication of a particular fault that has occurred. For example, one fault that may be sensed is an overheating of the vehicle engine which is usually occasioned by the leakage of coolant from the radiator or hoses. Thus, the system may comprise a sensor for monitoring this condition which sensor would have an actuated state when the fault occurs and an unactuated state in the absence of the fault. The system also includes an indicator which would tell the operator of the vehicle when the fault has occurred. The memory storage means is responsive to the state of the sensor for setting the memory means to a fault indicating state when the sensor has been actuated. In the example given the sensor would be a heat sensor for determining when the temperature of the coolant has exceeded a predetermined value in which case the sensor is actuated. Preferably, the memory means is in the form of a bi-stable flip-flop device which is of the 35