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Description

This invention relates to a motor vehicle fault indication system including a transducer for detecting a fault and a display device associated therewith.

As the number of fault detecting transducers increases it becomes desirable to associate two transducers with a single display device. In one particular example, it has been found desirable to associate a transducer for detecting the level of fluid in an engine coolant reservoir and a transducer for detecting the level of fluid in a screen washer reservoir with a single display device.

In DE-OS-2 428 990 there is described an arrangement in which a warning device is responsive to a temperature sensor when the vehicle ignition switch is closed and in which the warning device is responsive to the state of the headlamp switch when the ignition switch is open and the driver's door is open. Although this arrangement is satisfactory for using a single warning device with a temperature sensor and to indicate when the headlamps have been left on when the driver is leaving the vehicle, this document does not teach how to use a single display device with transducers in the engine coolant reservoir and the screen washer reservoir.

In United States Patent 3 302 171 there is shown a system for indicating engine coolant overheating. In this system a single display device is associated with a first transducer for monitoring coolant temperature under normal pressurised conditions and a second transducer for monitoring coolant temperature in the event of pressure loss. If overheating occurs, the display device merely indicates this and it cannot easily be ascertained which transducer has detected the overheating. In the particular case of a system for indicating overheating it is not important for the driver to appreciate which transducer has detected the fault, but in the case of transducers for detecting fluid levels in the engine coolant reservoir and the screen washer reservoir this is not so.

In United States Patent 3 333 259 there is shown a system which includes a transducer for detecting loss of oil pressure, a transducer for detecting the level of oil in a reservoir, and a single indicating lamp associated with both transducers. The indicating lamp is normally controlled by the transducer for detecting loss of oil pressure but, upon depressing a push button, the indicating lamp becomes responsive to both transducers. Although this system does provide a way of associating two transducers with a single indicating lamp, it suffers from the disadvantage of requiring a push button.

According to this invention there is provided a motor vehicle fault indication system comprising an electric circuit including first transducer means for detecting a first fault, second transducer means for detecting a second fault, a common display device associated with both the first transducer means and the second transducer means, a driver controlled device which is associated with a vehicle system in which said second fault may occur and which is not provided solely to interrogate said transducer means, and switch means for selectively rendering the display device responsive to only one of said first and second transducer means, the driver controlled device being so arranged in said electric circuit that the display device is normally responsive to said first transducer means but, upon operation of the driver controlled device, the display device is temporarily rendered responsive to the second transducer means, characterized in that the display device comprises a face marked with a legend and means for illuminating the face and in that the first transducer means comprises transducer means for detecting the level of fluid in an engine coolant reservoir, the second transducer means comprises transducer means for detecting the level of fluid in the screen washer reservoir, and the driver controlled device includes a control switch device for evergising a motor for operating a pump positioned to deliver fluid from the screen washer reservoir, operation fo said switch device causing the motor to be energised simultaneously with the temporary rendering of said display device responsive to the second transducer means.

As the display device is responsive to the second transducer means upon operation of the driver controlled device associated with the screen washer reservoir, the driver can readily appreciate which transducer has detected a fault.

The present invention will now be described in more detail by way of example with reference to the accompanying drawings in which :

Figure 1 is a circuit diagram of a motor vehicle fault indication system embodying the present invention , and

Figure 2 is a truth table of the operation of the system of Figure 1.

Referring now to Figure 1 there is shown a motor vehicle fault indication system which is installed in a motor vehicle. The motor vehicle includes a conventional internal combustion engine having a spark ignition system, and a water cooling system and associated coolant reservoir. The engine is lubricated by an oil lubrication system which is associated with an oil reservoir. The vehicle also includes a screen washer reservoir for providing a jet of water for washing the windscreen of the vehicle. As will now be described the system is capable of indicating a low level in the coolant reservoir or the screen washer reservoir and is also capable of indicating faults in the oil lubricating system.

The system comprises a battery 10 having its negative terminal connected to earth and its positive terminal connected to an input terminal of an ignition switch I having four operating positing positions Ia, Ib, Ic, and Id. The position Ia is an « of » position. In the position Ib, the input

terminal is connected to a supply line 12 and in the position Ic the input terminal is connected to the supply line 12 and to a supply line 14. The supply line 14 is also connected to the ignition system, and so the position Ic is the normal driving position of the switch. In the position Id, the input terminal is connected to the supply line 14 and also to a relay, not shown, for operating a starter motor. Thus, the position Id is the position for starting the vehicle.

The supply line 12 is connected through two series connected resistors R1, R2 to the supply line 14 and the supply line 14 is connected through a resistor R3 to earth. The junction of the resistor R1 and R2 is connected to the base of a p—n—p transistor T_1, the emitter of which is connected to the supply line 12 and the collector of which is connected through a relay coil B_1 of a relay B to earth. The supply line 14 is also connected through a push-button switch S and the windings of a motor 16 to earth. The motor 16 drives a pump positioned in the screen washer reservoir. The junction of the switch S and motor 16 is connected to the anode of a diode D_1, the cathode of which is connected to the junction of the collector of transistor T_1 and relay coil B_1.

The supply line 12 is connected through a lamp 18 forming part of a display device to an input terminal of a relay switch B_2 of the relay B. The display device comprises a face marked with a legend depicting a tap to indicate low water level and a means for illuminating the face in the form of the lamp 18. The relay switch B_2 has two output terminals which are connected respectively through two fault detecting transducers in the form of float switches WL and CL to earth. The input terminal is normally connected to the output terminal associated with the float switch Cl but, on energization of the relay coil B, is connected instead to the output terminal associated with the float switch WL. The float switch CL is positioned in the engine coolant reservoir and the float switch WL is positioned in the screen washer reservoir. Each flota switch closes when the liquid in its respective reservoir falls below a predetermined level.

The line 14 is also connected through two series connected resistors R_4 and R_5 to earth.

The junction of the resistors R_4 and R_5 is connected through a resistor R_6 to the junction of the lamp 18 and the input terminal of the switch B_2 and also to the base of an npn transistor T_2. The collector of the transistor T_2 is connected via a resistor R_{13} to the line 12 and the emitter is connected to earth. The collector of transistor T_2 is also connected to the anode of a diode D_2, the cathode of which is connected to the collector of an npn transistor T_3. The collector of transistor T_3 is also connected to the line 14 through a resistor R_7 and the emitter of transistor T_3 is connected to earth.

The line 14 is also connected through a lamp 20 and an oil pressure switch PL to earth. The lamp 20 forms part of a display device, generally similar to the display device associated with the lamp 18 except that its face is marked with a legend depicting an oil can to indicate low oil pressure. The line 14 is also connected through a resistor R_8 and a float switch QL to earth. The float switch QL is positioned in the oil reservoir and closes when the oil falls below a predetermined level. The junction of the resistor R_8 and the float switch QL is connected to the base of the transistor T_3 through a resistor R_9 and the float switch QL is connected to the base of the transistor T_3 through a resistor R_9 and the junction of the lamp 20 and the oil pressure switch PL is connected to the base of the transistor T_3 through a resistor R_{10}. The base of transistor T_3 is connected to earth through a resistor R_{11}.

The collector of transistor T_3 is connected to earth through a resistor R_{12} and also connected to the base of a transistor T_4, the collector of which is connected through a buzzer 22 to the supply line 12 and the emitter of which is connected to earth.

The operation of the fault indication system will now be described with reference to the truth table shown in Figure 2.

If the ignition switch I is in the position Ia, no fault will be indicated.

If the ignition switch I is moved to the position Ib, the line 12 is energized, the transistor T_1, is rendered conductive, the relay coil B is energized as indicated by « 1 » in Figure 2, and the float switch WL is connected in series with the lamp 18. If the float switch WL is open, it will prevent illumination of the lamp 18 but current will be supplied to the base of transistor T_2 thereby rendering this transistor conductive. If the float switch WL is closed, the lamp 18 will be illuminated, thereby providing a visual indication that the water in the screen washer reservoir is below the predetermined level, and the current will be removed from the base of the transistor T_2, thereby rendering it non-conductive, rendering transistor T_4 conductive and energizing the buzzer 22 to provide an audio indication that the water is below the predetermined level. The current supplied to the line 14 through resistors R_1 and R_2 will be insufficient to illuminate the lamp 20.

With the switch I in the position I_B, the line 14 is at a voltage too low to provide base current to transistors T_2, T_3 and T_4. Hence the buzzer 22 is energized only if the switch W_L is closed enabling base current to flow to transistor T_4 through diode D_2.

Thus, when the ignition switch I is in the position Ib, the condition of the lamp 18 and the buzzer 22 will depend upon the condition of the float switch WL, as indicated by « WL » in Figure 2, and so the level of water in the screen washer reservoir may be checked by moving the ignition switch into this position.

If the switch I is moved into the position Ic, which is the normal driving position, both lines 12 and 14 will be energized thereby rendering the transistor T_1 non-conductive. With the switch in this position, the float switch CL will normally be

connected in series with the lamp 18 with the result that the lamp 18 will be illuminated if the float switch CL is closed, thereby indicating that the water in the coolant reservoir is below the predetermined level. However, if the switch S is depressed to energize the motor 16, relay coil B will be energized and the float switch WL will be connected in series with the lamp 18, which will now only be illuminated if the float switch WL is closed. Thus, with the switch I in the position Ib, the condition of the lamp 18 will depend on the condition of the float switch CL if the switch S is not depressed or upon the condition of the float switch WL is the switch S is depressed. This is indicated in Figure 2 by « $CL.\bar{S} + WL.S$ ».

With the switch I in the position Ic, the lamp 20 will be illuminated if the pressure switch PL is closed, thereby providing a visual indication of low oil pressure. This is indicated in Figure 2 by « PL ».

Also with the switch I in the position Ic, the transistor T_2 will be rendered conductive as line 14 is energized and so the condition of the float switch WL and CL will not affect operation of the buzzer 22. If either or both of the switches QL, PL are open, the base of transistor T_3 will receive base current through either or both of the resistors R_8, R_9, thereby rendering the transistor T_3 conductive, the transistor T_4 non-conductive and preventing energization of the buzzer 22. However, if both switches QL, PL are closed, the transistor T_3 will be rendered non-conductive, and the transistor T_4 will be rendered conductive thereby energizing the buzzer 22 to provide an audio indication of low oil pressure combined with low oil level in the oil reservoir. This is indicated in Figure 2 by « PL.QL ».

If the ignition switch is moved to the position Id, which is the position for starting the engine, the line 12 will no longer be energized and so the lamp 18 and the buzzer 22 will be inoperative, as is indicated in Figure 2 by « O ». However, the condition of lamp 20 will still depend on the condition of the float switch PL.

Thus, the lamp 18 is used to indicate both a low level in the screen washer reservoir and in the engine coolant reservoir, the lamp 18 being normally controlled by the float switch CL, but being controlled by the float switch WL in certain predetermined circumstances, namely when the ignition switch I is in the position Ib, or when the washer switch S is depressed. As the lamp 18 is used for both these purposes it is only necessary to design a single legend.

The fault indication system described above could be extended to include other display devices which are used to indicate two or more faults. For example, this system could include a display device for indicating both a low level in a cluth fluid reservoir and a low level in a brake fluid reservoir, the display device being controlled by a float switch in the brake fluid reservoir when the switch I is in the position Ic and by a float switch in the clutch fluid reservoir when the ignition switch is in the position Ib.

It will be appreciated that the circuit shown in Figure 1 makes use of normally open switches WL, CL, QL, PL, which are standard, readily available float-operated and pressure switches. If desired, however, normally closed switches could be specially made for the circuit, but this would involve somme circuit modifications.

A further modification which may be thought desirable is an arrangement for preventing continuous operation of the warning devices with the ignition switch in its « auxiliary-only » position. This would involve incorporating a timer to turn off the warning devices after a predetermined time if the ignition contacts of the ignition switch were not closed.

Claims

1. A motor vehicle fault indication system comprising an electric circuit including first transducer means (CL) for detecting a first fault, second transducer means (WL) for detecting a second fault, a common display device (18) associated with both the first transducer means (CL) and the second transducer means (WL), a driver controlled device (S, 16) which is associated with a vehicle system in which said second fault may occur and which is not provided solely to interrogate said transducer means (WL), and switch means (B) for selectively rendering the display device (18) responsive to only one of said first and second transducer means (WL, CL), the driver controlled device (S, 16) being so arranged in said electric circuit that the display device is normally responsive to said first transducer means (CL) but, upon operation of the driver controlled device (S, 16), the display device (18) is temporarily rendered responsive to the second transducer means (WL), characterized in that the display device (18) comprises a face marked with a legend and means for illuminating the face and in that the first transducer means (CL) comprises transducer means for detecting the level of fluid in an engine coolant reservoir, the second transducer means (WL) comprises transducer means for detecting the level of fluid in the screen washer reservoir, and the driver controlled device (S, 16) includes a control switch device (S) for evergising a motor (16) for operating a pump positioned to deliver fluid from the screen washer reservoir, operation of said switch device (S) causing the motor (16) to be energised simultaneously with the temporary rendering of said display device responsive to the second transducer means.

2. A system as claimed in claim 1, in which the illuminating means comprises a single lamp.

Patentansprüche

1. Kraftfahrzeug-Fehleranzeigeeinrichtung, umfassend eine elektrische Schaltung mit einem ersten Signalgeber (CL) zur Erfassung eines er-

sten Fehlers, einem zweiten Signalgeber (WL) zur Erfassung eines zweiten Fehlers, einer beiden Signalgebern (CL und WL) zugeordneten gemeinsamen Anzeigeeinheit (18), einer fahrergesteuerten Vorrichtung (S, 16), die einem Fahrzeugsystem, in dem der zweite Fehler auftreten kann, zugeordnet und nicht ausschließlich zum Abfragen des Signalgebers (WL) vorgesehen ist, und einem Schalter (B), um die Anzeigeeinheit (18) selektiv auf nur einen der beiden Signalgeber (WL, CL) ansprechen zu lassen, wobei die fahrergesteuerte Vorrichtung (S, 16) so in der elektrischen Schaltung angeordnet ist, daß die Anzeigeeinheit normalerweise auf den ersten Signalgeber (CL) anspricht, aber bei Betätigung der fahrergesteuerten Vorrichtung (S, 16) vorübergehend auf den zweiten Signalgeber (WL) anspricht, dadurch gekennzeichnet, daß die Anzeigeeinheit (18) eine beschriftete Fläche und Mittel zum Beleuchten der Fläche aufweist und daß der erste Signalgeber (CL) ein Meßwertgeber zur Erfassung des Flüssigkeitsstands in einem Motorkühlmittelbehälter und der zweite Signalgeber (WL) ein Meßwertgeber zur Erfassung des Flüssigkeitsstands in der Scheibenwaschanlage ist und die fahrergesteuerte Vorrichtung (S, 16) einen Bedienungsschalter (S) zur Aktivierung eines Motors (16) zum Betätigen einer so angeordneten Pumpe, daß Flüssigkeit aus der Scheibenwaschanlage gefördert wird, aufweist, wobei die Betätigung des Bedienungsschalters (S) gleichzeitig den Motor (16) aktiviert und die Anzeigeeinheit vorübergehend auf den zweiten Signalgeber ansprechen läßt.

2. Einrichtung nach Anspruch 1, wobei die Beleuchtungsmittel aus einer einzigen Lampe bestehen.

Revendications

1. Système d'indication de défaillance de véhicule à moteur comportant un circuit électrique contenant un premier moyen transducteur (CL) servant à détecter une première défaillance, un deuxième moyen transducteur (WL) servant à détecter une deuxième défaillance, un dispositif commun de visualisation (18) associé à la fois au premier moyen transducteur (CL) et au deuxième moyen transducteur (WL), un dispositif (S, 16) commandé par le conducteur, qui est associé à un système de véhicule dans lequel peut se produire la deuxième défaillance et qui n'est pas prévu uniquement pour interroger ledit moyen transducteur (WL), ainsi qu'un moyen de commutation (B) pour, sélectivement, rendre le dispositif de visualisation (18) sensible à l'un seulement des premier et deuxième moyens transducteurs (WL, CL), le dispositif (S, 16) commandé par le conducteur étant connecté dans le circuit électrique de manière que le dispositif de visualisation (18) soit normalement sensible au premier moyen transducteur, mais soit temporairement rendu sensible au deuxième moyen transducteur (WL) à l'actionnement du dispositif (S, 16) commandé par le conducteur, caractérisé en ce que le dispositif de visualisation (18) comprend une face portant une légende et un moyen permettant d'illuminer la face, et en ce que le premier moyen transducteur (CL) est formé par un moyen transducteur pour détecter le niveau de fluide dans un réservoir de fluide de refroidissement pour le moteur, le deuxième moyen transducteur (WL) est formé par un moyen transducteur pour détecter le niveau de fluide dans le réservoir de lave-glace, et le dispositif (S, 16) commandé par le conducteur comporte un dispositif interrupteur de commande (S) pour alimenter un moteur (16) servant à l'entraînement d'une pompe installée pour délivrer du fluide du réservoir de lave-glace, l'actionnement de ce dispositif interrupteur de commande (S) provoquant l'alimentation du moteur et rendant en même temps le dispositif de visualisation sensible, temporairement, au deuxième moyen transducteur.

2. Système selon la revendication 1, dans lequel le moyen d'illumination est formé par une seule lampe.

FIG.1.

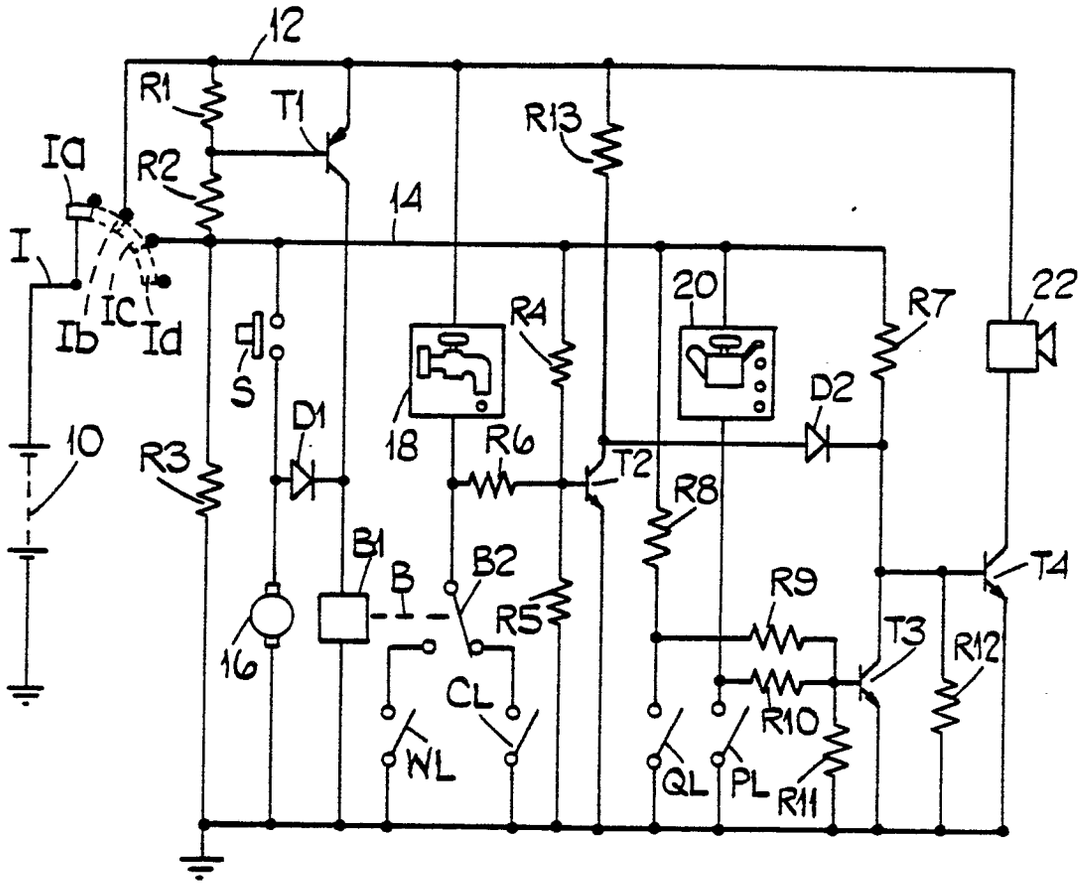

FIG.2.

I	B			
Ib	I	WL	O	WL
Ic	S	CL$\bar{S}$+WLS	PL	PL.QL
Id	S	O	PL	O