AUTO THEFT PREVENTION DEVICE

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ABSTRACT

A security system for motor vehicle ignition or starting circuits wherein a lock switch unit is connected between essential circuit elements such as the primary coil and the distributor. The system has a special provision for the defeating attempts to bypass the lock switch by cutting the conductors to and from the switch and shorting the circuit between the essential circuit elements. This is accomplished by means of a cable extending between the lock switch unit and an essential circuit element and comprising a plurality (e.g., 20 or more) of discrete identical insulated conductors. A first group of these conductors is connected between the switch unit and one essential circuit element, a second group between the switch unit and another essential circuit element and a third group is grounded at one end. If the cable is cut through by a thief, he would be unable to distinguish the conductors of the three groups and would thus be frustrated in an attempt to bypass or short circuit the lock switch.
AUTO THEFT PREVENTION DEVICE

BACKGROUND OF THE INVENTION

This invention relates to anti-theft systems for motor vehicles and especially to systems for disabling a motor vehicle by securing an essential electrical circuit, such as the primary ignition circuit or starter circuit, against unauthorized activation. More particularly, the invention relates to an improvement in lock switch type anti-theft devices that disable the primary ignition circuit or starter circuit. Such lock switch type anti-theft devices are disclosed in U.S. Pat. Nos. 3,675,035; 3,697,945 and 3,745,271.

The anti-theft devices of these patents are intended to prevent "jumping" of the ignition circuit or, in other words, bypassing the key-operated lock switch, by connecting a separate "jump"er" across the input and output terminals of the ignition switch. The device includes a combination lock switch unit connected between the distributor and primary coil using two conductors, at least one of which is located in an armored conduit.

While this type of device discourages most auto thieves, occasionally a more sophisticated thief with special tools and using considerable force will break the connection between the armored conduit and the lock switch housing. Then the two conductors from the distributor and primary coil respectively may be connected, the key lock ignition switch jumped, and the car started and stolen.

While many techniques have been developed to defeat attempts to bypass or short circuit a lock switch, their effectiveness only endures until a new technique can be developed by professional thieves. Most professional car thieves prefer to work inside a car to be stolen rather than in the engine compartment with the hood raised. This is probably due to the reduced probability of suspicion or detection. In any event, it is most important that any portion of an anti-theft device located inside the passenger compartment of a vehicle be especially protected against tampering by thieves. The theft prevention device of the present invention substantially increases the security of a lock switch unit of the type described, particularly as to those parts within the vehicle, and affords other features and advantages heretofore not obtainable.

SUMMARY OF THE INVENTION

It is among the objects of the invention to defeat attempts to steal automobiles containing a lock switch mechanism in the motor vehicle ignition circuit or starter circuit.

Another object is to protect a security system in the ignition circuit or starter circuit of an automobile against unauthorized tampering by prospective thieves.

Still another object is to provide a security system for the primary ignition circuit or starter circuit of an automotive vehicle, that makes it difficult, if not impossible, for a thief to jump the particular circuit by connecting a separate jumper wire between essential circuit elements.

These and other objects are accomplished by means of an improved automobile security system of the type that includes a lock switch assembly electrically connected between essential circuit elements such as the primary coil and distributor of the engine ignition circuit. The improvement embodying the invention comprises a cable consisting of a plurality of discrete identical insulated conductors including a first group connected between the lock switch and the primary coil, for example, a second group connected between the lock switch and the distributor, for example, and a third group connected to ground. If the cable is cut by a prospective thief, the conductors of the groups are indistinguishable from one another and thus inhibit the proper interconnection of the severed conductors to afford sufficient current carrying capacity to enable circuit elements to function and provide a ground if the conductors are improperly connected.

While the lock switch assembly of the invention may be used in association with different electrical circuits for the vehicle engine, such as the starter circuit, it will be illustrated and described only in connection with the engine ignition circuit.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram of a motor vehicle electrical circuit including a combination type electrical lock switch and an improved cable construction embodying the invention;

FIG. 2 is a perspective view of the automobile security unit illustrated schematically in FIG. 1 and showing the cable construction embodying the invention;

FIG. 3 is a vertical section on an enlarged scale with parts broken away and including a fragmentary sectional view of a portion of the vehicle distributor;

FIG. 4 is a sectional view on an enlarged scale taken on the line 4—4 of FIG. 2;

FIG. 5 is a perspective cross-sectional view of the cable of FIGS. 1 and 2;

FIG. 6 is a perspective view on an enlarged scale of one of the discrete individual insulated conductors of the cable of FIG. 5; and

FIG. 7 is a schematic diagram illustrating the 24 individual discrete conductors of the cable of FIG. 5 after they have been broken such as by cutting through the cable, and illustrating the futility of attempting to interconnect the individual discrete conductors to bypass the lock switch.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings, FIG. 1 shows certain electrical circuits for a motor vehicle including an ignition circuit having a combination type lock switch 10 of the type described in U.S. Pat. No. 3,697,945, interposed between the coil 11 and the distributor 12. The various circuits are activated by a key-operated ignition lock switch 13 connected in series between the battery 14 and the various other circuits.

The switch 13 has three movable contacts 13a, 13b and 13c, one of which, 13c energizes a starter circuit including a starter solenoid 15 and the starter 16. Another movable contact 13b energizes certain accessory circuits such as, for example, a radio, heater blower, etc. Another movable contact 13a energizes the ignition circuit including the coil 11 and the distributor 12. The circuit extends through the primary coil 17 and from the negative terminal of the primary coil 17 to the combination lock switch 10. The secondary coil 18 has a central terminal 19 with a high tension lead 21 connecting the terminal 19 to the rotor 22 of the distributor 12.
The combination lock switch unit 10 has a casing 30 that contains three rotary switch units 31, 32 and 33. Each unit has a switch shaft 34 with a knurled front end that receives a dial knob 36 secured to the front end 35 by a set screw 37. The front end 35 of each shaft 34 extends through a control panel 38 on the front end of the casing 30 and each dial knob 36 has indica thereon that may be used with related indicia marked on the control panel 38. Each of the shafts 34 is journaled in a bushing integral with the casing 30 and extends through a printed circuit board 45 located within the casing 30. The circuit board has imprinted thereon (FIG. 4) an ignition-circuit closing conductor pattern 49.

Each switch shaft 34 carries a rotary contact carrier 50 with a contact arm 51, and each contact carrier 50 is electrically connected to the ignition-circuit closing conductor pattern 49. The contact carrier 50 has a raised dimple 53 (FIG. 4) that engages a stationary contact disc 54 imprinted on the circuit board 45, the disc 54 being electrically connected to the circuit closing conductor pattern 49.

Accordingly, whenever the contact arm 51 of one of the rotary switch units 31, 32 or 33 is in the correct predetermined position and in contact with the respective portion of the circuit closing conductor pattern 49, the ignition circuit between the coil 11 and the distributor 12 will be completed. It will be noted that each of the rotary switch units 31, 32 and 33 has only one position in which its respective rotary contact carrier 50 is electrically connected to the respective portion of the circuit closing conductor pattern 49.

As indicated above in the "Background Of The Invention", an automobile security system of the type to which the present invention relates requires that certain conductors extend from the lock switch unit 10, through the vehicle fire wall to the engine compartment; it is especially important that all portions of conductors located within the passenger compartment be secured against tampering so as to defeat any attempt by a thief located within the passenger compartment to bypass the switch system. In the present instance, these conductors are confined in an armored conduit 55 that extends from a tubular connector elbow 56 securely anchored to the housing for the distributor 12, to a fitting 57 securely anchored to the casing 30 of the lock switch unit 10. The respective end of the armored conduit 55 is welded or otherwise securely fastened to the connector 57 which has a threaded end extending through the wall of the casing 30 and anchored thereto by a nut 58.

Thus, the armored conduit 55 inhibits any attempt to obtain access to the conductors associated with the lock switch unit 10 except access which might be obtained with special equipment such as a hack saw or the like. The unique construction of the conductors embodied in the present invention, however, further impedes attempts to defeat the lock switch 10 even though a thief may cut through the armored conduit 55.

In accordance with the invention, a cable assembly is located within the armored conduit 55, the cable comprising a plastic insulating sheath 59 with a plurality (in this instance 24) of discrete insulated conductors located therein. In the present instance the conductors comprise No. 26 size copper wire insulated with a resin coating. The resin may be an epoxy compound, for example, as in the case of magnet wire or wire used in the winding of magnet coils. The conductors include (FIGS. 1 and 7) a first group of seven wires 60 connected between the conductor pattern 49 on the printed circuit 45 to a junction located within the casing 30; a second group of seven wires 61 electrically connected between one of the stationary contacts 52 and the distributor 12; and a third group of ten ground wires 62 which are bundled and dead-ended within the casing 30 of the lock switch unit 10 and connected to ground at the connector 56 on the distributor 12. The first and second groups preferably are of an equal number. The wires 60 and 61 are wrapped around the interior of the casing 30 (FIGS. 1 and 4) in order to assure that they cannot be easily pulled out of the lock switch unit 10. The wrapped portions of the wires are embedded or potted in a suitable potting compound such as Emerson & Cummings Epic resin, which is an epoxy resin. Phenolic resins, polyester resins or other electrical potting compounds may be used instead of the aforesaid epoxy resin as will be apparent to those skilled in the art. In this way, a thief has to break open and cut apart the lock switch unit in order to determine the true nature of the electrical circuitry.

In the present instance, seven No. 26 electrical wires are just sufficient to accommodate the current load between the primary coil 17 and the distributor 12. Any less than seven of the wires 60 or 61 would be less than adequate to carry the load and probably less than five thereof would be insufficient to sustain engine ignition. It will be noted that the wires 60, 61 and 62 are indistinguishable from one another in size and appearance. The wires 60 are connected at their terminal junction within the connector 56 to a lead 63 that extends from the junction to the primary coil 17. Thus, the lock switch unit 10 is electrically interposed between the primary coil 17 and the distributor 12 even through a portion of the circuit from the primary coil 17 to the lock switch unit 10 comprises conductors within the same cable as the conductors 61 extending from the lock switch unit 10 to the distributor 12.

In accordance with the invention, if a thief should cut through the armored conduit 55 and obtain access to the cable containing the wires 60, 61 and 62 and thereafter cut through the cable to expose the cut ends of the wires 60, 61 and 62, he would be faced with the problem of matching each of the seven wires 60 with one of the seven wires 61. The matching of any of the wires 60 or 61 with any of the grounded wires 62 would merely serve to ground the ignition circuit and prevent the sustaining of ignition.

Where the automobile security system of the invention is interconnected in the engine starter circuit rather than in the engine ignition circuit as illustrated in the drawings, one group of conductors (e.g., 60 or 61) is connected to a terminal on the starter solenoid and another group (e.g., 60 or 61) is connected to an existing lead to the appropriate terminal in the ignition and starter switch unit inside the vehicle. Since the starter circuit is normally adapted to carry a load as high as 35 amps, the individual conductors 60, 61 and 62 of the cable assembly and preferably No. 26 size copper wire insulated as before with a resin coating. In this instance, the lock switch unit 10 disables the starter circuit rather than the ignition circuit.

FIG. 7 best illustrates one example of the result of an attempt by a thief to short circuit the lock switch unit.
3,892,976

10 from within the vehicle. As described above with respect to FIG. 7, it will be seen that one of the wire 61 has been grounded, two have been connected to one another and only two have been connected to the wires 60. The two connections would not provide sufficient current carrying capacity to handle the load between the primary coil 17 and distributor 12 necessary to sustain ignition. Furthermore, one of the wires 60 has been connected to ground and this would further aid in defeating attempts to sustain engine ignition.

Thus, the unique conductor arrangement embodied in the security system of the invention substantially reduces the chances that a thief could steal the vehicle in which the lock switch unit 10 and associated equipment are installed.

While the invention has been shown and described with reference to a specific embodiment thereof, this is for the purpose of illustration rather than limitation and other variations and modifications will be apparent to those skilled in the art upon a reading of the specification and claims. Accordingly, the patent is not to be limited in scope and effect to the specific embodiment shown and described herein nor in any way that is inconsistent with the extent to which the progress in the art has been advanced by the invention.

We claim:

1. In a security system for a motor vehicle electrical circuit including a lock switch assembly electrically connected between two essential circuit elements of said circuit, the improvement which comprises a cable consisting of a plurality of discrete identical insulated conductors including a first group connected between one of said essential circuit elements and said lock switch, a second group connected between the other of said essential circuit elements and said lock switch, and a third group connected to ground whereby if said cable is cut the conductors of said groups are indistinguishable from one another.

2. Apparatus as defined in claim 1 wherein said first and second groups comprises an equal number of conductors, wherein less than said number of conductors would have insufficient combined current carrying capacity to provide adequate current between said essential circuit elements to operate said engine, and wherein any attempt to complete a circuit with even one wire from the third group will ground the system.

3. Apparatus as defined in claim 2 wherein said first and second groups each comprises seven conductors and wherein said third group comprises at least seven conductors.

4. Apparatus as defined in claim 1 wherein said lock switch assembly is encased within a sealed housing defining an enclosed chamber, wherein said first and second groups of conductors are wrapped around the walls of said enclosed chamber at least one convolution, wherein said third group is bundled inside said housing making it impossible to put it out, and all of said conductors are embedded in an electrical potting compound so that any attempt to cut the housing will also cut such wires and make engine operation impossible.

5. Apparatus as defined in claim 1 wherein said essential circuit elements comprise the primary coil and distributor of the engine ignition circuit.

6. Apparatus as defined in claim 1 wherein said essential circuit elements comprise the engine starter and the actuating switch therefor.

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