

2237602

-1-

"A SECURITY SYSTEM"

This invention relates to a security system.

Vehicle thefts are a matter of great concern to their owners, the police forces and to the insurance companies who have to meet the cost of such thefts.

There are currently available various devices which are designed to act as a deterrent to a potential thief.

In existing arrangements it is possible for vehicles to be easily "push-started", 'jump-started' or 'hot-wired' and thus to defeat a system which may have been installed to inhibit ignition from taking place and the engine from being started.

US3714628 discloses a security system which, when applied to a vehicle, or other instrumentality, is intended to prevent unauthorized use of the vehicle or other device on which it is installed, and to prevent tampering with any component attached to the vehicle or device. For this purpose, the conventional cylinder and tumbler locks are omitted and replaced with a multiple contact plug and socket. The plug is associated with a special key unit, coded and matched with a special lock unit associated with the socket, itself associated with a door and/or with an ignition unit. With the special key unit, the owner may lock and unlock the doors and/or boot, start and drive the vehicle, and turn off the ignition, in much the same way as he would use the conventional key. Further, if another key unit or plug, or "jump wiring" is used in an attempt to unlock the doors of the car or to start the engine, an alarm will be initiated to announce that the vehicle or other instrumentality has been tampered with. The system is so constructed as to turn off all the major components, including the ignition, petroleum supply, and electrical current to the various components. The system also includes setting an alarm against motion and unauthorized entry. A serious drawback

-2-

of the system is that a thief can probe the terminals in its socket with a multimeter to determine which leads are performing which functions in the electrical system of the vehicle, and then connect across the relevant terminals.

5 GB2136620 discloses a security system to prevent unauthorised use of a motor vehicle or other device, the system comprising a crystal oscillator circuit with a crystal which is removable for keeping by an authorised user, the crystal defining the frequency of oscillation of the oscillator circuit, a filter circuit tuned to the frequency of the oscillator circuit, and some means disabling the device against
10 operation except upon receipt of a signal from the oscillator circuit via the tuned filter circuit when the crystal is inserted in the oscillator circuit.

The disabling means includes a relay having three changeover switches,
15 of which one is employed for internal latching, the second is employed to maintain a bonnet lock solenoid energized in the absence of the crystal and the third is employed to cut the power to the ignition coil and instead applies it to the horn for alarm purposes, until the key is inserted, whereupon the power is transferred to the ignition
20 coil. The system interrupts the power supply to only one device essential to the starting of the engine, namely the ignition coil at its positive side, so that the engine can be relatively easily jump-started by running a jump lead from the battery positive terminal to the ignition coil positive terminal. Although the horn would be
25 sounded upon such jump-starting, a thief would simply sever the power supply to the horn. Therefore the only happening which would alert, for example, a policeman to the fact that the vehicle was being stolen would be the horn sounding and this could be for only a very short time.

30 US4278963 discloses a system similar to that of GB2136620 except that the secure control means consists of an additional mechanical key and a combination thumbwheel switch arrangement and that, instead of interrupting the power supply to the ignition coil it interrupts the supply to the starter solenoid.

-3-

The interruption of the supply to only the starter solenoid has the serious disadvantage that the vehicle can be push-started.

US4546266 describes a security system in which an electrical circuit, the starting circuit for a motor vehicle for example, is selectively enabled by a control circuit which includes a magnetic field responsive switching device. Proper positioning of a magnet which provides a field of the appropriate polarity and strength relative to the switching device results in the energization of a relay which has contacts connected in series with the circuit being controlled. In the motor vehicle application, operation of the ignition switch within a predetermined time subsequent to removal of the magnet will latch the relay in the energized state. The system is relatively insecure in that a thief either arrives provided with another suitable magnet or traces the wiring to the magnetically operated switching device and bypasses the device, and in that it interrupts the power supply to the starter relay, so that the vehicle can be push-started. Another security weakness is the utilization of a "service" plug, thus increasing the opportunities open to a potential thief.

According to the present invention, there is provided a vehicle security system, comprising an electrical device for operating an engine, an electronic device for controlling said electrical device, an engine starter, for example an ignition key, sensing means for sensing states of said engine, electrical conductor means serving for supply of said electronic device and for interconnection of said electrical device, said electronic device and said sensing means, said conductor means including signal-conductor means which conducts signals which are employed in controlling said electrical device and which have a communication-interrupting location, and secure control means usable at said location to enable communication at said location, said secure control means being the only secure control means required to be used to enable said starter to start said engine.

This arrangement puts an obstacle in the way of a thief attempting to start the engine.

The secure control means can take various forms but is advantageously an electrical or electronic key.

5 The security system may also comprise electrical control circuitry, a plurality of electrical devices, including the electronic device for controlling the engine, connectible to said control circuitry for operation thereby, electrical conductors, at least one being included in said control circuitry and extending to said interruption location where said conductors terminate and others extending from said interruption location to said electrical devices, said secure control means being usable at said location to connect said at least one to said others individually, one or more further electrical conductors having no operating function being arranged among at least some of the first-mentioned conductors in the manner of a wiring loom.

10 The provision of these further electrical conductors makes it more difficult for a person attempting to breach the security to ascertain by trial-and-error the individual functions of the various conductors in the system.

15 At least one of said first-mentioned conductors may have a discontinuity therein, and tapped-in conductors be connected to respective opposite sides of the discontinuity and extend in and along the wiring loom.

20 The provision of these tapped-in electrical conductors again makes it more difficult for a person attempting to breach the security to ascertain the individual functions of the various conductors in the system.

25 The security system may further include relay means comprising driving means and a plurality of individual switching means openable and closable by energization and de-energization of said driving means, any one of said electrical devices being operatively connectible to any one of all of the individual switching means operable by said driving means.

30 The arrangement whereby any one of the devices is operatively connectible to any one of all of the switching means increases the number of security permutations available compared with an arrangement

whereby at least one of the switching means is dedicated to a particular device.

5 The security system may further include secondary electrical circuitry and accessories, e.g. a vehicle horn, electrically connected to said secondary electrical circuitry for operation thereby, said secondary electrical circuitry including a supply line separate from a supply line of said electrical control circuitry, and said electrical control devices include relay means interposed between said interruption location and said secondary electrical
10 circuitry and operative upon use of said secure control means to close said secondary electrical circuitry. The plurality of accessories are advantageously selected from windscreen wiper motors, exterior lamps and a horn.

15 With this arrangement, even if a thief manages to start the engine and drive away the vehicle, he is unlikely to be able also to render operable the windscreen wiper motors and/or exterior lamps (such as the headlamps, sidelamps, trafficators, and/or brake lamps), so that a policeman may well notice the failure of these accessories to operate.

20 The said electrical devices may include an ignition coil for the engine of the vehicle and having a positive side and a negative side, in which circumstances a first conductor may extend from said negative side to said interruption location, to earth, and a second conductor extend from said interruption location to earth, said secure control means being usable at said interruption location to disconnect
25 said second conductor electrically from said first conductor.

The provision of the short-circuit from the negative side to earth has the advantage that a thief applying a jump lead from the power supply means to the input of the coil simply shorts the power supply to earth and may even burn out the jump lead.

30 Owing to the present invention, it is possible to provide an anti-theft device for a vehicle, the electrical circuits of which device cannot be by-passed from within the driving compartment of the

vehicle. Moreover, it would be extremely difficult for a potential thief to start the engine from within the engine compartment, without effectively re-wiring, for which activity there would normally not be sufficient time. The device therefore provides a very effective deterrent against vehicle theft.

The device may comprise a series of linked electro-magnetic relays or solid state on/off switching devices, with contacts whose arrangement may be varied, contained within a suitable housing and arranged such that, in the absence of electrical power, they are either in normally 'open' or normally 'closed' conditions. The housing may be integral with the dashboard or control panel of the vehicle or attached at any convenient point within the driving compartment or behind the dashboard or control panel.

The relays can only be activated or caused to change their mode from 'open' to 'closed' and vice versa when the electrical link circuit among them is completed by the insertion of a coded electrical key,

-7-

particularly a coded electronic key.

5 The sequence of the electrical circuits in the anti-theft device may be varied from anti-theft device to anti-theft device to provide variations in type. The key may be flat and with one end formed in the plane of the key so as to provide various coded configurations to give further security in that a particular key configuration will only fit into a matching housing.

10 The key may also have an aperture or series of apertures which can be positioned in any part of its plan area to provide a further, vertical coded configuration which will allow a light beam to pass through it or them from, for example, a light emitting diode to a light dependent resistor to further complete the electrical circuit. The key can be male in form and designed to be inserted into a female housing which has matching configurations in both its plane and a plane
15 perpendicular thereto. When the housing is provided with electrical power via the insertion of the key, then the circuit is completed through the light emitting diode, the light dependent resistor and the additional contacts in the plane of the key provided that they match exactly. The electrical circuit thus completed by the key then
20 transmits power to the electro-magnetic relays or solid state on/off switching devices contained within the housing and causes them to open or close to perform their prescribed function of supplying continuous electrical power to the various components of the engine to cause ignition to take place and the engine to function and continue to do
25 so.

30 In a conventional situation, the power needed to start the engine of a vehicle is provided by the vehicle ignition key being inserted into the ignition lock of the vehicle and turned to the 'on' or 'contact' position for it to start. In this present situation, the normal ignition system is interrupted by the electro-magnetic relays or solid state on/off switching devices contained within the anti-theft housing and, until such time that the anti-theft key is inserted, the circuit will not be completed and the engine will not start.

Therefore, in the absence of the anti-theft key, a potential thief will not be able to start a vehicle fitted with the housing unless he is able to duplicate the configurations of the anti-theft key or has the time required to re-arrange the wiring of the vehicle to cause it to start, which could only be achieved with extreme difficulty.

The electrical power needed to complete the circuit and activate the light emitting diode and the light dependent receiver can be provided automatically from the battery of the vehicle and when the key is inserted the circuit is completed. The power thus provided could, for example, cause a solenoid or similar electrically powered locking mechanism to be activated and provide a means of being able to open or close the door of a vehicle and secure it in such manner that it would not be possible to open it without the key, other than by force. Substantial additional security can thereby be provided.

All of the electrical connections to the vehicle components in question, such as the ignition coil, the distributor and the fuel valve, in the case of a petrol internal combustion engine, may be contained within a ribbon of wires, sealed at the terminal ends within the housing, and the sequence of wires as they connect to the various components may be varied from anti-theft device to anti-theft device and the connections to and from the various components of the engine may be made by soldering them within the ribbon so as to make them virtually undetectable and taped up to simulate the original loom.

In another embodiment of this invention, the electrical connection carrying the ignition switch current to the positive side of the ignition coil passes through both the housing and the key of the anti-theft device.

Consequently, unless the key is connected to the housing when the ignition current is switched on, electrical power will not be transmitted to the positive terminal of the ignition coil and the engine will not start.

In addition to the line which carries the ignition switch current to

the ignition coil positive terminal, the housing and the key are arranged to carry the following main connections to other vital components which have to be electrically powered for the engine to start and to continue to run:-

- 5 1. From the coil negative terminal to the distributor.
2. From the distributor to an electronic ignition module or engine management system.
3. From the battery positive line to an alarm system or systems which may be incorporated.
- 10 4. From the ignition line to the fuel pump where the engine is fitted with an electrically powered pump. In cases where the engine is fitted with a mechanical pump a fuel cut-off valve which is operated by an electrically powered solenoid may be connected additionally into the fuel line.
- 15 5. To an earthing point for the complete system or to any other electrical components or parts which may need to be isolated to provide additional security.

20 Again, unless the key is connected to the housing when the ignition current is switched on, the vital components which would normally cause ignition to take place and the engine to run will have been isolated.

25 Therefore, by arranging the wiring of an engine in such manner as to make provision for the anti-theft housing and key, an extremely effective deterrent against theft of a vehicle in which the engine is installed will have been provided because, in the absence of the anti-theft key, a potential thief will not be able to start the engine even if he is in possession of a duplicate set of ignition keys.

30 The system is designed to have its housing installed in the driving compartment of the vehicle or other convenient location of the vehicle and either fitted as an 'add-on' or incorporated as part of the

-10-

original wiring loom when the vehicle is built.

Consequently, installation of the housing within the driving compartment means that it will be impossible to 'hot wire' from within the driving compartment in the normal way by joining the ignition wires because these will have been interrupted by the housing along with other essential circuits.

Equally, any vehicle so fitted could only be 'hot-wired' from under the bonnet with extreme difficulty and by effectively re-wiring the engine, for which activity, within the context of vehicle theft, there would not be sufficient time, for the following reasons:-

(i) the wires or connections coming from or going to the housing are randomly arranged within the loom of the vehicle so that they cannot be easily identified. Further, and because the wires or connections are so arranged, it will not be possible for a potential thief to be able to readily identify the connection sequence to allow him to 'hot-wire' the vehicle by, for instance, connecting the battery positive to the ignition coil positive, because the connection between these two will have already been interrupted at the housing and also because, even if he were able to find these two and make a connection, it would still be necessary for him to locate the other wires leading to the vital components for him to be able to complete the sequence and start the vehicle in the absence of the anti-theft key.

(ii) the housing is provided with a number of wires which may exceed that number required to connect to the vital components. These excess wires may be used as earth wires for the system whilst the others may remain un-used or for linking to additional security devices which may be specified. The sequence of wires which are used to connect to the various components cited may, together with the un-used or earth wires, be varied such as to provide a very large number of permutations within the system so as to make the sequence of connection to the components on any given vehicle virtually undetectable.

(iii) additional anti-theft security is provided by the fact that only two wires emanating from the housing could be identified using test equipment - these two wires being the battery positive wire and the ignition current wire. All of the other wires emanating from the housing are at zero potential. These wires are the earth wires and those going to, for example, the ignition coil negative terminal, the distributor, and the electronic management system.

Therefore, if by mistake the potential thief were to connect the ignition wire to any wire at zero potential other than to the right one then the ignition line fuse provided in the vehicle will fuse and cause it to be totally immobilised.

Likewise, if the potential thief were to connect the battery positive connection to any wire at zero potential, the fuse provided in the battery line of the system will fuse. This will mean that there will be no live current derived from either the ignition or battery source present at the face of the housing and the whole system will be inert and the vehicle totally immobilised until such time as the fuse is replaced.

(iv) in some versions the anti-theft key is provided with a means of linking the sequence of wires or connections which extend from or to the housing and the means of linking can be varied to match the selected sequence within the housing.

The wires extending from the housing to the vital components can be connected to the components with the variations being incorporated within the housing, instead of within the ribbon.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 is a diagram of part of an electrical system of a petrol, spark-ignition, internal combustion engine of a motor vehicle and ~~including a main portion of an anti-theft device, the system part~~

-12-

~~being shown in its condition prior to receiving electrical power from an ignition switch,~~

Figure 2 is a fragmentary, diagrammatic top plan view of the motor vehicle with that anti-theft device,

Figure 3 shows a section taken on the line III-III in Figure 2,

Figure 4 is a diagram similar to Figure 1, but of a modified version of the anti-theft device suited to a Diesel-engined motor vehicle,

Figure 5 shows diagrammatically a detail of the anti-theft device, and

Figure 6 shows diagrammatically a modification of the anti-theft device.

With reference to Figure 1, an electronic key portion 317 of the anti-theft device is electrically connectible to a hybrid chip 375 which acts as key identifying and accepting circuitry comprising a digital comparator followed by an amplifier. The key portion 317 is insertable into a socket 352 from which flying leads 353 in a wiring ribbon extend into a main portion 316 of the anti-theft device. In the latter portion is a coil 354 and four contact sets 355 to 358 of a four-pole changeover relay, the coil 354 being connected to the output of the hybrid chip 375 for energization in the event that the correct key portion 317 is inserted and the engine starter, which is an ignition key, switched on. The contact sets 355, 356 and 357 are normally open and the contact set 358 is normally closed. A wire 359 from the positive terminal of the battery is directly connected to the chip 375 for energization of a sound warning device 360 in the event that the key portion 317 is left in the socket 352 when the ignition is switched off. This is intended to remind the driver to take his key portion 317 with him. Also connected to the chip 375 is an ignition switch wire 304 and an earth wire 361. The positive terminal of the battery is also connected through a wire 362 containing a mercury tilt switch and an alarm siren to the normally closed contact set 358 and thence to the wire 361. Two wires 365 and 366 are connected to the normally open contact set 357 and are

-13-

connected across a cut wire between the distributor and an electronic ignition module. Two earthed dud wires 363 and 364 are interposed between the wires 361 and 366. The normally open contact set 356 is connected to wires 367 and 368 connected to the distributor points and the contact breaker terminal of the ignition coil, an earthed dud wire 369 being associated with them. The normally open set 355 connects the wire 304 to four wires 371 to 374, among which is arranged a dud earthed wire 370. The wire 371 is connected to the switch terminal of the ignition coil; the wire 372 to the power line to the electrical fuel pump (if provided) or (if not) to the solenoid-operated fuel cut-off valve; and the wires 373 and 374 to ignition-controlled accessories, such as wiper motors.

In operation of the device shown in Figure 1, upon switching on the ignition, current is supplied to a solid state electronic system consisting of the key 317, conductors in which contain resistors of selected values; the key identification and verification, key command acceptance and amplifying chip 375 which transmits current in a latched phase to the coil 354 of the 4-pole relay. All of the wires 304 and 361-373 are buried in a taped wiring loom, to make it even more difficult for a thief to start the engine.

The resistors in the key 317 may be four in number and may be identical to, or different from, each other in value. For insertion of the key to result in energization of the relay coil 354 upon switching-on of the ignition, the four resistors in the key must match four resistors provided in the chip 375. Since resistors can vary in value between zero ohms and several million ohms, hundreds of thousands of combinations are available.

To increase security further, the sequence of entry of the flying leads 353 into the main portion 316 in a resin-pot housing can be varied from device-to-device, as can the sequence of entry of the wires 304 and 361-373 into that housing.

Referring to Figures 2 and 3, the motor vehicle 376 has a bonnet 377 liftable to give access to an engine compartment containing a spark-

ignition, petrol, internal combustion engine 378. Within the passenger compartment are seen a steering wheel 379, an electronic key portion 317 and its associated socket 352, a sound warning device 360 and a light emitting diode (LED) device 380 which is connected in the wire 362 and which indicates that the anti-theft device is effective. The device 380 is provided because otherwise there is nothing to enable a user to distinguish between the effective condition of the anti-theft device and a condition where there is no power supply available, for example because of a faulty connection to the battery 328 in the engine compartment. The engine compartment may also contain the main portion 316 connected by flying leads 353 to the socket 352. The device 360 is connected by leads 381 to the main portion 316. A wire 383 extends from the positive terminal of the battery 328 to an ignition switch 384 closable by insertion and turning of an ignition key 385. A wire 386 leads from the switch 384 towards the positive terminal of an ignition coil 309 in the engine compartment. However, the wire 386 is interrupted at 387 and the wires 304 and 371 are tapped into the wire 386 at respective opposite sides of the interruption 387. Tapped into the wire 386 at a location between the switch 384 and the interruption 387 is a wire 388 leading towards an electronic ignition module 382 in the engine compartment. However, this wire is interrupted at 389 and the wires 365 and 366 are tapped into the wire 388 at respective opposite sides of this interruption 389. A wire 390 leads from the module 382 towards the negative terminal of the coil 309, but is interrupted at 391 and the two wires 367 and 368 are tapped into the wire 390 at respective opposite sides of the interruption 391. A fuel flow inhibiting valve 315 is connected between earth and the wire 372. A mercury tilt switch 331 and a siren 332 and the device 380 are connected between earth and the wire 362. A plurality of relay coils, such as 392 and 393 are connected between earth and the wire 373 and serve to operate respective relay switches, such as 394 and 395, interposed in the supply lines, such as 396 and 397, of accessories unrelated to the anti-theft purpose, such as the headlamps 398. Extra "dud" wires 399 to earth are provided.

The wires are made into a loom or looms wherever reasonably possible.

For example, Figure 3 shows a cross-section through such a loom at a location where there are twenty-one wires, each wire consisting of its conductor encased in a plastics or rubber sheath for electrical insulation purposes, the bundle of wires being encased in an outer sheath 400 which may consist of insulating tape wrapped around the bundle. The presence of the "dud" earthed wires such as 363, 364, 369 and 399 in the loom, combined with the hidden interruptions such as 387, 389 and 391 in the loom make it extremely difficult for a thief to work out which wires have any operating function and what those individual functions are.

Referring to Figure 4, the items 404, 416, 417, 452 to 464, 469, 473 and 499 correspond to the respective items 304, 316, 317, 352 to 364, 369, 373 and 399 in Figure 1. However, in the present version, the wire 471 is utilised to operate a solenoid valve controlling the supply of Diesel fuel to the engine, and the wire 467 is used to power heaters and injector units.

Referring to Figure 5, in addition to the ignition coil 309, the distributor 325 and the electronic ignition module 382, there are shown an electronic sensor 500 connected by conductors 501, 502 and 503 to the module 382 for transmitting to the module 382 information signals as to states of the engine 378, and a suppressive capacitor 504. The Figure illustrates diagrammatically at A, B and C, respectively, that the input of the module 382, the input of the coil 309, and/or at least one of the conductors 501 to 503 are formed with one or more interruptions, i.e. discontinuities, at which are tapped-in pairs of conductors connected to one or more relay contact sets at the main portion 316.

In the modification shown in Figure 6, the sensor 500 is a crank angle sensor and the earth and negative conductors 502 and 503 are short-circuited by way of a relay contact set 505 at the main portion 316 until the key 317 is inserted.

The electromechanical relays illustrated in the various Figures can of course be replaced by electronic relays.

-16-

It will be appreciated that there is only a single electrical key 317 or 417 required to be used to enable the ignition key to start the engine. However, instead of the driver being required to carry at least two keys, namely the electrical key 317 or 417, and the mechanical door and/or ignition key(s), it may be feasible for the electrical key and the mechanical key to be combined into one key capable of "unlocking" both mechanically and electrically.

We have found that the anti-theft device described with reference to the drawings appears to have the following advantages:-

1. It cannot be hot-wired from inside the driver's compartment nor started from inside the engine compartment
2. Even if a thief has a duplicate set of mechanical ignition keys, the car cannot be stolen.
3. The device is not affected by outside influences such as radio waves on all bands, sonic waves, white noise etc.,
4. The device cannot arm or disarm itself without the owner's instruction. Many known anti-theft devices have this problem because they are based on radio, sonic waves or infra red.
5. The device, when installed in any car or lorry, does not interfere with operation by an authorized user of any onboard computer systems, electronic engine management systems or others of the vehicle's electronics.
6. If the device is damaged, destroyed or removed, the car cannot be started.
7. If the loom is cut the car cannot be started.
8. The only thing that will readily enable starting of the car is the anti-theft key.

9. It is virtually impossible for a thief to copy, duplicate or make a master of the key as the thief would never know the circuit configuration of the system.
10. On test, the device was not affected by:-
 - a) Electrical surges or impulses.
 - b) Humidity.
 - c) Dust.
 - d) Water.
 - e) Salt.
 - f) Vibration.
 - g) Shock.
 - h) Bombardment by radio or sonic waves.
 - i) Extreme heat or cold.
11. The device does not require an independent power supply to retain its electronic security coding. Accordingly, there is no chance of the individual code being lost or erased, and as the code is electronic and not written, not even the owner has it, whereby total security is observed.
12. The device cannot be successfully tampered with, examined or x-rayed and even if the thief knew the principles of the circuit, it would not matter. If he tried to use his knowledge of the circuit, he would not know which of the hundreds of thousands of electronic wiring combinations he was up against and there is no way from the device that he would be able to tell. Accordingly, the device virtually cannot be by-passed or beaten.
13. The device is cheaper to produce than the more complex of the anti-theft devices on the market.

The present device is also applicable, additionally to preventing engine-starting, to other security purposes, for example to holding a vehicle or other door closed and to holding a wireless or a cassette player in its mounting aperture in a vehicle.

The subject matter of the specification of our co-pending British Patent Application 9124677.7 has been divided out of the present Application.

CLAIMS

1. A vehicle security system, comprising an electrical device (309,325) for operating an engine (378), an electronic device (382) for controlling said electrical device (309,325), an engine starter (385), for example an ignition key (385), sensing means (500) for sensing states of said engine (378), electrical conductor means (388,390, 501-503) serving for supply of said electronic device (382) and for interconnection of said electrical device (309, 325), said electronic device (382) and said sensing means (500), said conductor means (388,390, 501-503) including signal-conductor means (390,501-503) which conduct signals which are employed in controlling said electrical device (309) and which have a communication-interrupting location (316; 416; C; 505), and secure control means (317, 352, 353, 375; 417, 452, 453, 475) usable at said location (316; etc.) to enable communication at said location (316; etc.), said secure control means (317, 352, 353, 375; etc.) being the only secure control means required to be used to enable said starter (385) to start said engine (378).
2. A system according to claim 1, wherein said location (C, 505) is between said sensing means (500) and said electronic device (382).
3. A system according to claim 1 or 2, wherein said signal-conductor means (501-503) is short-circuited until the aforesaid use of said secure control means (317, 352, 353, 375; etc.).
4. A system according to claim 1 or 2, wherein said signal-conductor means (390, 501-503) is in an electrically broken condition until the aforesaid use of said secure control means (317, 352, 353, 375; etc.).
5. A system according to any preceding claim and further comprising electrical control circuitry (316; 416) including said secure control means (317, 352, 353, 375; etc.), a plurality of electrical devices (309, 315, 382) including said electrical device (309) and said electronic device (382) connectible to said control circuitry (316; 416) for operation thereby, electrical conductors (304, 365, 366, 371, 372; 404, 471), at least one

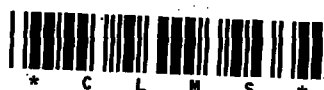
(304, 366; 404) being included in said control circuitry (316; 416) and extending to said location (316; 416) where said conductors (304, 365, 366, 371, 372; etc.) terminate and others (365, 371, 372; 471) extending from said location (316; 416) to said electrical devices (309, 315, 382), said secure control means (317, 352, 353, 375; etc.) being usable at said location (316; 416) to connect said at least one (304, 366; 404) to said others (365, 371, 372; 471) individually, one or more further electrical conductors (363, 369; 463, 469) having no operating function being arranged among at least some of the first-mentioned conductors (304, 365, 366, 371, 372; etc.) in the manner of a wiring loom.

6. A system according to claim 5, wherein said further conductor(s) (363, 369; etc.) extend(s) in and along said loom from said location (316; 416).

7. A system according to claim 5, wherein at least one conductor (388; 390) of said electrical conductor means and said electrical conductors (304, 365, 366, 371, 372, 388, 390; etc.) has a discontinuity (389, 391) therein, and wherein tapped-in conductors (365-368) are connected to respective opposite sides of the discontinuity (389, 391) and extend in and along said loom.

8. A system according to claim 7, wherein said tapped-in conductors (365-368) extend from the or each discontinuity (389, 391) to said location (316; 416).

9. A system according to any one of claims 4 to 7, and further comprising relay means (354-358; 454-458) comprising driving means (354; 454) and a plurality of individual switching means (355-358; 455-458) openable and closable by energization and de-energization of said driving means (354; 454), any one of said electrical devices (309, 315, 382) being operatively connectible to any one of said individual switching means (355-358; 455-458).



10. A system according to any one of claims 5 to 9 and further comprising secondary electrical circuitry (396, 397) and accessories (398) electrically connected to said secondary electrical circuitry (396, 397) for operation thereby, said
5 secondary electrical circuitry (396, 397) including a supply line (396, 397) separate from a supply line (304; 359) of said electrical control circuitry (316), and said electrical devices (309, 315, 382, 392-395) including relay means (392-395) interposed between said location (316) and said secondary
10 electrical circuitry (396, 397) and operative upon use of said secure control means (317, 352, 353, 375) to close said secondary electrical circuitry (396, 397).

11. A system according to claim 10, wherein said accessories are selected from windscreen wiper motors, exterior lamps (398) and a
15 horn.

12. A vehicle security system, substantially as hereinbefore described with reference to Figure 2, 5 or 6 of the accompanying drawings.

