Electronic theft discouraging safeguarding device for electronic apparatus.

The safeguarding device comprises first circuit means (1) for installation at a preset location within an automobile vehicle, and second circuit means (2) effective to be mounted on the inside of a radio set to be protected and operatively interconnectable with the first circuit means (1) to only enable operation of the radio set after a predetermined coded coupling relationship has been established between the first and second circuit means.
ELECTRONIC THEFT DISCOURAGING SAFEGUARDING DEVICE
FOR ELECTRONIC APPARATUS

This invention relates to a theft discouraging safeguarding device for application on electronic apparatus of any kind for the purpose of discouraging unauthorized tempering of such apparatus.

More particularly, under the aspect of one non-limitative embodiment thereof, the invention relates to a safeguarding device associable with radio sets installed on automobile vehicles, useful to only permit their utilization on predetermined automobile vehicles.

As is known, the reluctance to the installation of a radio set on a vehicle is nowadays due to a very high number of theft attempts, that number being so high as to cause most of the Insurance Companies to even decline any coverage, however small, on that implement, in spite of the high rates exacted and of the radio set being sometimes protected by antitheft arrangements.

In fact, antitheft devices for car-mounted radio sets are of a mechanical type and in general relatively ineffective, while their cost is a prohibitive one, sometimes exceeding that of the radio set itself.

An antitheft device of the mentioned type has been studied, which is based on the principle of removably associating to the radio set an operative circuit block indispensable for the operation of the radio itself, which block is removed by the user with the car in a parked condition. This device, however,
has the drawback that, after the mentioned operative block has been removed from the radio and relocated therein many times, it may be irreparably damaged because of falls, shocks and the like, thereby preventing the overall radio set from operating. Moreover such a block is a rather cumbersome component to be held in the pocket.

Another antitheft device has been studied for car radio sets based on a microprocessor to be built in as a main code controller in the radio and which is in turn controlled by a radiation emitting stick at disposal of the user for enabling and respectively disabling the radio from operating, at will. Such an antitheft device, however, proved to be very expensive and moreover makes very complex the circuitry of the radio.

Accordingly, the task of the present invention is to provide a safeguarding device for application on electric and electronic apparatus of any kind, in particular car radios, to only enable their utilization in preset conditions, and only in a selected installation environment, in particular only on one selected automobile vehicle.

Within that task it is a main object of the invention to provide a safeguarding device of the type mentioned above, which is simple construction-wise, highly effective, and may be applied on almost all types of currently sold car radio set types.

A further object of the invention is to provide a safeguarding device as above, which is of relatively
low cost, requires virtually no maintenance, and can be manufactured from commercially readily available components and/or materials.

According to one aspect of the invention, the above task and objects as well as yet other objects, such as will be apparent hereinafter, are achieved by a safeguarding device for electric and electronic apparatus in general and in particular for car radio sets, provided for only allowing such apparatus to be used upon the occurrence of predetermined installation conditions, characterized in that it comprises first circuit means for installation at a preset location, in particular within an automobile vehicle, and second circuit means adapted to cooperate functionally with said first circuit means and for installation on the inside of said apparatus and/or car radio set, said second circuit means being adapted for functional interconnection with said first circuit means upon installation of said apparatus or car radio set at the operative location thereof to only enable operation of said apparatus or car radio set after a predetermined coded coupling relationship has been established between said first and second circuit means.

Further features and advantages of this safeguarding device for electric and electronic apparatus of any kind will be more clearly apparent from the following detailed description of one embodiment thereof, with reference to the accompanying illustrative drawings, where:

Figure 1 is a general block diagram of the safe-
guarding device according to the invention; and

Figure 2 shows a preferred circuit diagram of the inventive device.

Making now reference to the cited drawing figures, and in particular to Figure 1, there is shown one embodiment of the safeguarding device according to this invention.

In particular, throughout the description which follows, reference will be made to the use and installation of the inventive device within a car radio set mounted on an automobile vehicle, in order to make the radio set unusable without major alterations, which could only be made by a skilled person, after the radio set has been removed from the car.

It should be considered, however, that such an application is merely exemplary and not limitative of the invention scope.

More specifically, and with reference to Figure 1, this device, of an electronic character, is functionally comprised of three blocks, namely: a first unit 1 which contains specific coding means for that unit indicated in the diagram at Rx and comprising, for example, a mere resistor; a second block or unit 2 which contains the decoder means capable of reading out only that preset code as set in the unit 1; and a third block or unit 3 comprising essentially, in accordance with this invention, a circuit which inhibits or in all cases disallows the normal operation of the radio set.

In particular, the unit 1 may be installed in any desired portion of the automobile vehicle, e.g. in
the engine compartment thereof, the units 2 and 3 being intended for installation inside the radio set, or preferably, in the circuit of the radio set.

Making now reference to the circuit diagram of Figure 2 as well, it will be apparent to the skilled person how the code applied in the circuitry shown is formed by a dual resistive divider, more specifically a bridge comprising \( R_x, R_y \) on the one side, and \( R_z, R_j \) on the other side.

In particular, if the value of \( R_x \), included with said unit 1 accommodated in the engine compartment, is different from the value of the reference resistor \( R_j \), then at the terminal 8 of the codifying unit 2, advantageously consisting of the commercially available integrated circuit TCA 965 no preset voltage value will appear which, for this type of integrated circuit and as the skilled one will recognize, is to be equal to that appearing at the center node of the fixed divider \( R_z-R \) connected to the terminals or pins No. 6 and 7 of the integrated circuit. More specifically, the integrated circuit TCA 965, which, as aforesaid, is readily available commercially, controls the voltage applied at the terminals 6 and 7 to keep it within set limits; thus, if the value is maintained within the design range, then a peak positive voltage appears at the terminal 3 of the integrated circuit, whereas, if the voltage applied to the terminal 8 is outside of the design range, then the operation of the electric apparatus or car radio set is prevented.

Again with reference to Figure 1, when a positive
bias is applied through the switch INT 1, this will flow through the protection diode D1, and following filtration through C1, the positive signal is brought to activate the cited integrated circuit at the terminal No. 11 such that, if the cited resistive bridge associated with the integrated circuit is the preset one, a positive signal appears at the terminal No. 3, which signal, after filtering by C6 and through R6, turns on TR1 to energize the relay 1 and LED 1. The relay 1, when de-energized, will short the positive terminal and negative terminal together so as to inhibit the use of the radio set with an outside power source.

Of course, the relay, in the energized state thereof, will pass a positive voltage to transistors, in turn feeding specific portions of the radio set.

It may be appreciated from the foregoing that the invention achieves its objects. In fact, with the provision of a simple encoding means in the form of a mere resistor, susceptible of millions different values, it can be easily concealed at a selected location in the car, and by providing the radio set with a simple decoding circuitry, the radio set itself, when removed from the automobile vehicle, is rendered virtually unusable, thus discouraging burglary acts. The inventive device is simple circuit-wise, readily adaptable on any existing types of car radio sets, and may be produced commercially for a very low cost.

While the invention has been described with constant reference to a presently preferred
embodiment thereof, and in relation to a preferred application thereof in the field of car radio set safeguarding, it is susceptible of many modifications and variations without departing from the same inventive concept, its field of application being expandable to include safeguarding of a variety of electric and electronic apparatus. For example the inventive device may be easily adapted for the protection of the storage battery of the car, by inserting the mentioned integrated circuit and the driving circuitry therefor in the battery itself in the making shop, or for the protection of other electronic devices of the car, such as the modern computers in the form of processor blocks controlling the fuel delivery rate according to the driving conditions.
CLAIMS

1. A safeguarding device for electric and electronic apparatus in general and in particular for car radio sets, provided for only allowing such apparatus to be used upon the occurrence of pre-determined installation conditions, characterized in that it comprises first circuit means (1) for installation at a preset location, in particular within an automobile vehicle, and second circuit means (2) adapted to cooperate functionally with said first circuit means and for installation on the inside of said apparatus and/or car radio set, said second circuit means (2) being adapted for functional interconnection with said first circuit means (1) upon installation of said apparatus or car radio set at the operative location thereof to only enable operation of said apparatus or car radio set after a predetermined coded coupling relationship has been established between said first (1) and second (2) circuit means.

2. A safeguarding device according to Claim 1, characterized in that said first circuit means (1) for installation within said enclosure and/or automobile vehicle comprises at least one resistor (Rx).

3. A safeguarding device according to Claim 1, characterized in that said second circuit means (2) for installation inside said apparatus and/or car radio set comprises a decoder electronic circuit TCA 965.

4. A safeguarding device according to Claim 3, characterized in that said decoder electronic circuit
comprises the integrated circuit TCA 965 or its equivalent for the essential component thereof.

5. A safeguarding device according to Claim 1, characterized in that said second circuit means (2) comprises at least one solid state controlled element (TRI) adapted to control the shorting of the power input terminals of said car radio set in the condition of non-use thereof.

6. A safeguarding device according to Claim 5, characterized in that said controlled element includes at least one transistor (TRI) effective to drive a respective shorting relay (RELAY 1).

7. An electric and/or electronic apparatus, in particular a car radio set, including a safeguarding device according to any of the preceding claims.
Fig. 2

Fig. 1
## DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>EP-A-0 010 870 (GLYNWED GROUP SERVICES LTD.) * Figure 2, elements 26, 28; abstract; page 1, line 5 - page 2, line 12 *</td>
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<td>A</td>
<td>US-A-4 148 372 (T. SCHROEDER) * Figure 1, element 16; figure 4, element 108; column 3, lines 33-41 *</td>
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<td>A</td>
<td>ELO, 1977, no. 2, &quot;TCA 965 Fensterdiskriminator&quot;, pages 41-42 * Figure 4 *</td>
<td>1,2,3,6</td>
<td>B 60 R 11/02 B 60 R 25/00 B 60 R 25/04 B 60 R 25/10 E 05 B 49/00 G 08 B 13/00 G 08 B 13/14 G 08 B 13/22 H 04 B 1/06 H 05 K 11/02</td>
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The present search report has been drawn up for all claims

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<td>10-01-1984</td>
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**Examiner:** ARENDT M

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