

Translation:

The invention relates to an electronic device intended to permit the use of a memory card with a system for which the card is intended, this system, comprising a principal installation situated at a specific place, and at least one secondary installation situated at a distance from the principal installation and connected to the latter, the said secondary installation comprising dialogue means to permit the exploitation of the system.

The expression "memory card" as utilised in the description and the claims must be understood in a very general sense; it covers especially magnetic cards, for example bank or credit cards, microcircuit cards, etc.

It is known that memory cards are intended to be used in a great number of applications, especially :

the control of access to a computer;

the payment for a service; for example telephonic communications payment card; at the outset the card comprises a specific credit; the operations are automatically debited progressively as they are executed, until the credit of the card is exhausted.

remote payment, that is payment, for a purchase by long-distance debit of an account, especially a bank account;

portable files; that is to say information is stored on the card, which information can be read and if desired deleted and replaced by other information.

In all the applications evoked above, the user is situated at the site of a secondary installation, and with the aid of his memory card he can exploit the system starting from the said secondary installation. In the case of access control this secondary installation will be constituted for example by a console with screen and keyboard.

The placing in position of systems which can function with memory cards constitutes a particularly heavy investment in material. It is especially appropriate that the secondary installation should be equipped with means permitting the exploitation of the memory card, these means being generally constituted by a card reader reaching the secondary installation and connected by bundles of electric conductors to the said installation.

The document EP-A-0,138,386 describes such a system comprising an electronic reading/writing device intended to permit the use of a memory card with the system for which it is intended. This system comprises a principal installation situated at a specific location, and at least one secondary installation situated at a distance from the principal installation and connected to the latter, the said secondary installation comprising dialogue means to permit the exploitation of the system, the device comprising means for treatment of electric information to render it usable for

the memory card, these treatment means being conversely adapted to render exploitable information coming from the memory card, means for electric coupling between the memory card and electric interface circuits permitting the adaptation of the tensions and impedances, and of the emission means, governed by the treatment means for the purpose of communication with the principal installation.

However in the system as known from the document EP-A-0,138,386 the electronic device is physically connected with the secondary installation, which is harmful to its utilisation flexibility.

Likewise it is known from the document DE-A-2,909,899 to render an electronic device physically independent of a secondary installation, and to equip it with reception means permitting of reading signals at the level of the secondary installation and adapted to transform these signals into electric information items, and with a direct current voltage source for the necessary electric supply.

However the transformation of the existing systems in order to permit them to operate with memory cards would necessitate considerable expense, if it were desired to make use of the present-day solutions for exploitation of memory cards.

The invention has the aim of supplying an electronic device physically independent of the secondary installation, which is of relatively low cost, simple and practical in use and permits, with a minimum of expense, of operating a system with memory cards, whereas this system was not necessarily initially intended to operate with such memory cards.

These aims are achieved by means of an electronic device as defined in Claim 1, which device, thanks to the possibility of reading optical signals appearing on the screen, permits of using an existing installation not originally intended to function with memory cards. Thus one avoids additional expense for the transformation of the installation to permit it to function with memory cards. The only costs to be borne concern the acquisition of electronic devices according to the invention.

When each secondary installation comprises a screen and a keyboard, the emission means of the device comprise display means, especially of liquid crystal type, and the transmission of the information from the card, appearing on the display means, to the system is effected by the user, who enters the said information on the keyboard.

By way of variant the emission means can comprise means for connection to the secondary installation, such that the information coming from the card is transmitted directly to the system, without necessitating the intervention of the user, nor the presence of display means.

The optical reading means can advantageously be constituted by photo-transistors associated with an

operational amplifier CMOS mounted as amplifier or as comparator.

Advantageously the gain of the amplifier, or the threshold of the comparator, is variable and means are provided for adjusting this threshold as a function of the luminosity of the screen (or of a display device of the secondary installation) during a phase of initialisation of the transmission, this regulation being able to be effected analogically, or piloted by a micro-processor.

The optical signals intended to appear on the screen or display device of the secondary installation, in order to be interpreted by a device in accordance with the invention are advantageously constituted by slabs, especially of square form, or simply characters, disposed in accordance with a pre-determined configuration, for example aligned rows, corresponding to the spacing of the optical reading means (especially photo-transistors) of the device according to the invention.

The square arrangement permits of overcoming the problems caused by the different screen sizes.

The reading of the optical signals can be effected by presentation of the photo-transistors in front of the screen, or through the intermediary of optical fibres of which one extremity is placed in front of the slabs and the other extremity is situated in front of the photo-transistors.

The treatment means can comprise an integrated micro-processor or micro-computer.

The means for the electric coupling of the device according to the invention with the card comprise a slot for the introduction of the card into the device, and guides permitting a sufficiently precise positioning of this card, electric contacts, especially gilded ones, being further provided.

The constituent elements of the device according to the invention are advantageously disposed within a casing substantially of rectangular parallelepiped form comprising, in its thickness, following a plane substantially parallel to a major face of the casing the slot for introduction for the memory card this casing being physically independent of the secondary installation.

Such a casing is advantageously inscribed within a rectangular parallelepiped the dimensions of which would be 5 cm. x 8 cm x 1 cm.

The invention consists, apart from the arrangements set forth above, in a certain number of other features which will be set forth more explicitly below, with reference to a particular form of embodiment described with reference to the accompanying drawings, but which is in no way limitative.

Figure 1 of these drawings is a simplified diagram of a system according to the prior art, functioning with a memory card.

Figure 2 is a diagram of an electronic device according to the invention, and of an associated system.

Figure 3 illustrates diagrammatically the putting into use of the device according to Figure 2.

Figure 4 is a synoptic diagram of the device according to the invention.

Finally Figure 5 is a diagram of the optical reading means combined with an amplifier of gain variable as a function of the luminosity of the screen.

Referring to Figure 1, which illustrates the prior art diagrammatically, one can see a system Sa comprising a principal installation 1, situated at a specific site, and at least one secondary installation 2a situated at a distance from the principal installation and connected to the latter by a multi-conductor cable 3. To facilitate explanation it will hereinafter be considered that the principal installation 1 is constituted by a computer while the secondary installation 2a is constituted by a console or terminal comprising dialogue means for permitting the exploitation of the system. These dialogue means D comprise a display device formed by a screen 4, and a keyboard 5. Although a single secondary installation 2a is represented in Figure 1, in practice several secondary installations 2a are connected to one and the same principal installation 1.

According to the prior art, when such a system Sa is intended to be utilised by the intervention of a memory card M, the secondary installation 2a is equipped with means 6 permitting the exploitation of the memory card. These means 6 are constituted by equipment such as a card reader 7 reaching the secondary installation 2a, that is to say physically connected to this installation, or forming an integral part of the said installation; furthermore this card reader 7 is connected to the said installation 2a by bundles of electric conductors.

The integration of such a card reader 7 in a secondary installation 2a is costly, even if this integration is foreseen at the time of conception of the installation 2a. The placing in position of a card reader such as 7 is still more costly if it is to be done on an installation 2 already in position, for which such an installation was not originally intended.

The electronic device 8 according to the invention, visible especially from Figures 2 and 3, provides a solution to this problem.

The electronic device 8 is physically independent of the secondary installation 2. In practice the constituent elements of the device 8 are disposed within a casing 9 the form of which can for example be a substantially rectangular parallelepiped. The dimensions of this casing 9 are

relatively small. By way of indication, but not of limitation, the casing can be inscribed in a rectangular parallelipiped the dimensions of which are 5 cm. x 8 cm. x 1 cm. No physical connection permanently subjects the device 8 to the installation 2. The casing 9 comprises, preferably on an edge face, a slot 10, the mean plane of which is parallel to the major faces of the casing 9, for the introduction of the memory card M and its use.

The electronic device, as represented diagrammatically in Figure 4, comprises reception means E permitting of reading signals at the level of the secondary installation 2 and adapted to transform these signals into electrical information. In the particular case envisaged, where the secondary installation 2 comprises a screen 4, the reception means E comprise optical reading means 11 permitting of reading optical signals 12 (Figure 2) appearing on the screen 4. These optical signals 12 are advantageously constituted by slabs especially of square form, appearing at pre-determined locations of the screen 4. The presence or absence of a luminous slab at a specific point of the screen 4 permits of causing correspondence of two states either to "1" or to "0", or vice versa, for an information transmission.

The optical reading means 11 are advantageously constituted by photo-transistors 13 (Figures 2, 4 and 5) associated with an operational amplifier 14 CMOS mounted as amplifier (or as comparator).

As may be seen from Figure 2, the photo-transistors 13 are preferably aligned.

The disparity of the screens 4 (especially as regards the size, the colour, the luminosity, the remanence, the type of characters and the number of lines and columns) has the result that the signal received on a photo-transistor 13 can vary approximately in a ratio of one to two hundred.

This disparity is such that the signal received from a photo-transistor 13 corresponding to a slab 12 extinguished on a luminous screen 4, can be greater than the signal supplied by the photo-transistor 13, in response to a slab 12 lit on a screen 4 of low luminosity. Such a disparity derives especially from the phenomenon of diffraction and of remanence.

In order that the electronic device 8 may function correctly with various types of secondary installations 2, that is to say so that the device 8 can read, without error, the information appearing in the form of slabs 12 on the screen 4, whatever is the type of terminal 2, an adaptation of the performances of the reception function (gain of the amplification or threshold of the comparator) at the level of the signal received on the photo-transistor 13 is provided.

The gain of the amplifier 14 (or the threshold of the comparator) is variable and adjusts itself as a function of

the luminosity of the screen 4 during a phase of initialisation of the transmission.

The general form of the curve representing the gain of the amplifier (or the inverse of the threshold of the comparator) as a function of the level is a hyperbole.

This function can be approximated by a staircase function (discrete values).

The adjustment of the gain or of the threshold can be effected during a phase of initialisation or on reference pulses in an analogous manner with the aid of a sampler-blocker, or piloted by a micro-processor.

Figure 5 is a diagram corresponding to piloting by a micro-processor.

The emitter of the photo-transistor 13 is connected, through the intermediary of a resistor R_t , to earth. This emitter is further connected by a capacitor C to the non-inverting input of the operational amplifier 14. This same input is connected to earth through a resistor R_c . The output of the amplifier 14 is connected to the inverting input by a resistor R . This output of the amplifier 14 is further connected to an input of a micro-processor 15, several outputs of which are connected respectively in parallel by resistors R_1 , R_2 , R_3 to the inverting input of the amplifier 14. One terminal of the micro-processor is connected to earth, while another terminal receives the feed voltage V_{cc} .

The gain of the reception function, at the level of the amplifier 14, is given by the ratio R/R_i , i being able to vary from one to three in the example under consideration. The resistance R_i which intervenes in the gain is that which is commuted to earth by the micro-processor. In the phase of initialisation the photo-transistor 13 is exposed to a luminous slab 12 the intensity of which corresponds to the logic "1". In other words, in response to the electric signal supplied by the photo-transistor 13, the amplifier 14 must give, at its output, an electric signal corresponding to the logic "1". for example a signal of 4 volts. The micro-processor 15 first of all commutes to earth the resistance R_i having the strongest value, for example the resistance R_1 . The micro-processor 15 next tests the output of the amplifier 14. If the output of the amplifier 14 is seen as a logic "1" by the micro-processor 15, the gain is sufficient and the resistance R_1 remains commuted to earth.

In the contrary case, that is if the output of the amplifier 14 is seen by the micro-processor as a logic "0", the micro-processor commutes to earth the following resistor R_2 of lower value, in such manner as to increase the gain.

The procedure is reiterated until the micro-processor sees a logic "1" at the output of the amplifier 14.

The values of the resistors R_i give the paces of approximation of the gain.

The solution as set forth above permits of obtaining a stairway adjustment..

A solution starting from a numerical/analog converter would permit of obtaining a continuous adjustment of the gain or of the threshold.

The reception means E could include, in place of optical reading means, means sensitive to acoustic signals, or to an electro-magnetic radiation, apart from the visible spectrum. Such reception means E, which are physically independent of the installation 2, like the device 8 of which they form part, do not necessitate any cable connection to receive information deriving from the system.

The electronic device 8 comprises, as represented in Figure 4, means T for the treatment of the electrical information supplied by the reception means E, in order to render it usable by the memory card M. These treatment means T are conversely adapted to render exploitable the information emitted by the memory card M, and especially intended to be displayed (management of the procedure permitting the utilisation of the desired function on the memory card).

These treatment means T can be designed around a micro-processor such as 15, already cited with reference to Figure 5, or of an integrated micro-computer.

A source of direct-current voltage is provided for the electrical supply of the various elements and circuits which require such feed.

Electric coupling means B are likewise provided to establish a connection between the memory card M and interface electric circuits permitting the adaptation of the voltages and impedances. These electrical coupling means comprise especially the slot 10 permitting the insertion of the card into the device, and electrical contacts 17, represented diagrammatically in Figure 4, for establishing the necessary connections. These contacts 17 are for example eight in number. Guide means 18 (Figure 2), for example formed by the edges of the slot 10, are provided to permit a sufficiently precise positioning of the card M in the device 8.

This device 8 comprises finally emission means F governed by the treatment means T, for the purpose of communication with the principal installation 1, through the intermediary of the secondary installation 2.

These emission means F can comprise display means 19, composed especially of a liquid crystal display unit comprising a sufficient number of characters, for example a number equal to or greater than 5.

These emission means F can likewise comprise means for series transmission of the information, which means are for example constituted by a pick-up 21 connected to the outputs

of the micro-processor 15. The information would then be transmitted directly, through the intermediary of this pick-up 21 to a series connection of the type RS232C or the type MODEM.

In an analogous manner, the information intended for the inputs of the micro-processor 15, instead of transiting through the intermediary of a pick-up 22 connected to the inputs of the micro-processor 15, which pick-up 22 could be connected directly to another pick-up supplying the information to be considered.

A device 8 equipped with pick-ups such as 21 and 22 as represented in Figure 4 can serve for the coding of in-line data necessitating continuous use of the device and the memory card M.

One possible variant of the device is the addition of a keyboard 23 (see Figure 2) to the casing 9, connected to the micro-processor 15 and permitting the user to enter information useful for the exploitation of the card. A pick-up 24 (Figure 4) connected to the micro-processor, is provided on the housing 9, for the operation of the keyboard 23.

This being so, the use of a memory card M, with the aid of an electronic device 8 according to the invention with a system S for which this card M is intended, takes place in the following manner.

The card M is introduced into the slot 10 of the device 8, in the appropriate direction.

The casing of this device 8 is then taken in hand by the user, as represented in Figure 3, and the photo-transistors 13, constituting the optical reading means, are disposed against the luminous slabs 12 which appear on the screen 4 of the terminal. It is to be noted that these slabs 12, appearing on the occasion of the phase of initialisation, are obtained from a suitable logic system utilised in the computer 1.

The slabs 12 can be luminous or substantially extinguished in correspondence respectively with the states 1 or 0, in accordance with determined laws.

The information read by the photo-transistors 12 is treated by the device 8, equipped with the memory card M.

The signals resulting from the treatment appear on the display unit 20. In the example under consideration, the resulting signal is constituted by the number : 1515, as visible in Figure 3.

By way of variant, the device 8 could be equipped with fibre optic cords, in number equal to the photo-transistors 12; one optic fibre cord end would be kept against an associated photo-transistor. For the reading of the information appearing in the form of slabs 12 on the screen 4, the other extremity of the optic fibre cords would be

applied against the screen 4 at the level of the corresponding slab 12.

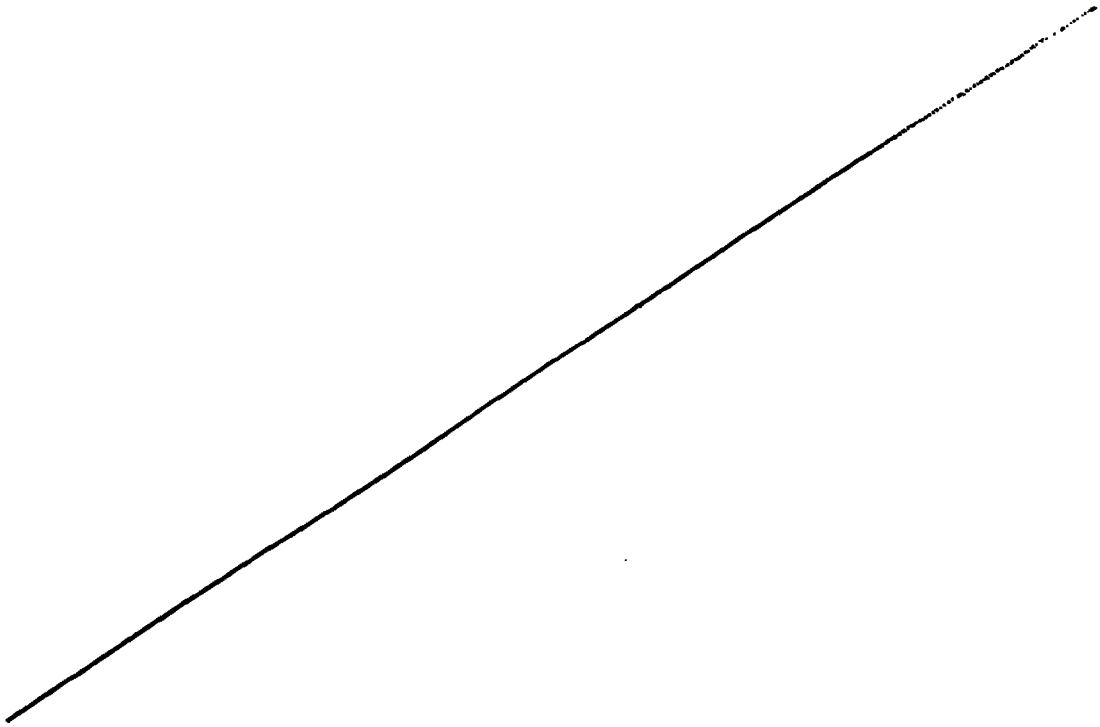
The user then enters, on the keyboard 5 of the terminal 2, the succession of numbers and/or letters which appear on the display means 2e of the device 8.

The access to the system S will be ensured to the user when he has completely authenticated with the aid of the information appearing on the display means 20m and entered by the keyboard 5. This information can be constituted by several series of numbers or letters appearing successively on the display means 20 following upon a dialogue between the computer 1 and the memory card M.

These information items correspond to the logic key for entry to the system S, transmitted in coded form to this system. The result is that the information which will be entered by the keyboard 5 for access to the system S, by the bearer of the memory card M will not always be the same from one access operation to the other. The coding and transmission take place by virtue of an exchange of bi-directional information items between the card M and the system S. This information is dependent upon the manner of exploitation of the memory card.

In the case where the pick-ups 21 and 22 are utilised, being connected to appropriate pick-ups on the terminal 2, the user is freed of entering on the keyboard 5 the information items appearing on the display means 20.

The electronic device according to the invention is of relatively low cost and simple in use. It permits the use of a memory card with a system S which does not comprise means specially provided for the reading of such a card. Such a device 8 thus permits, in consideration of low cost, the transformation of existing systems to permit them to function with a memory card, whereas they were not originally intended for such an operation.



CLAIMS

1.) Electronic device intended to permit the use of a memory card (M) with a system (S) for which the card is intended, this system comprising a principal installation (1) situated at a specific place, and at least one secondary installation (2) situated at a distance from the primary installation and connected with the latter, the said secondary installation (2) comprising dialogue means (4, 5) to permit the exploitation of the system, the device comprising means (T) for treatment of electric information items to render them usable by the memory card (M), these treatment means conversely being adapted to render exploitable information coming from the memory card (M), electric means (B) for coupling between the memory card (M) and interface electric circuits permitting the adaptation of the tensions and impedances and emission means (F), governed by the treatment means (T) for the purpose of a communication with the principal installation (1), the secondary installation (2) comprising a screen (4), and characterised in that the said device (8) is physically independent of the secondary installation (2) and comprises reception means (E) comprising optical reading means (11) permitting of reading optical signals (12) appearing on the screen (4) of the secondary installation (2) and adapted to transform these signals into electric information, also a direct current voltage source (16) for the necessary electrical supply.

2.) Device according to Claim 1, characterised in that the optical reading means comprise photo-transistors (13) associated with an operational amplifier CMOS (104) connected as amplifier or as comparator.

3.) Device according to Claim 2, characterised in that the gain of the amplifier (14), or the threshold of the comparator is variable and in that means (15, R, R1) are provided to adjust this threshold as a function of the luminosity of the screen (4) during a phase of initialisation of the transmission.

4.) Device according to Claim 3, characterised in that the means for adjusting the threshold comprise a micro-processor (15) and several resistors (R1, R2, R3) connected in parallel between the micro-processor and the inverting input of the amplifier (14), this inverting input being connected to the output by another resistor (R), the micro-processor (15) being adapted to switch the resistors (R1, R2, R3) to earth successively from the strongest to the weakest, until the gain obtained at the output from the amplifier (14) is sufficient.

5.) Device according to any one of the preceding Claims, intended to be used with a system each secondary installation of which comprises a keyboard (5), characterised in that the emission means F comprise marker means (20), especially liquid crystal means, and in that the transmission towards the system (S) of information items coming from the card (M) and appearing on the marker means



(20) is effected by the user, who again enters the said information items, on the keyboard (5).

6.) Device according to any one of the preceding Claims, characterised in that the emission means (F) comprise a means (21) for connection to the secondary installation (2) in such a way that the information items can be transmitted directly without needing the user.

7.) Device according to Claim 1, characterised in that the optical signals are constituted by luminous blocks (12) appearing on the screen (4) of the secondary installation and disposed in accordance with a pre-determined configuration.

8.) Device according to any one of the preceding Claims, characterised in that the treatment means (T) include an integrated micro-processor or micro-calculator.

9.) Device according to any one of the preceding Claims, characterised in that the electrical coupling means comprise a slot (10), for the introduction of the card (M) and guides (18) permitting a sufficiently precise positioning of this card (M), electric contacts further being provided.

10.) Device according to any one of the preceding Claims, characterised in that the constituent elements are disposed at the interior of a casing (9) comprising a slot (10) for introduction for the memory card, this casing being physically independent of the secondary installation (2).

