

CONNECTOR OR CONNECTION IN THE FORM OF A SMART CARD

The present invention relates to a connector adapted to be connected to an electronic housing of a computer.

The state of the art can be defined by FR-A-
5 2.735.251 which provides cards of the PCMCIA type, that can be plugged into a standardized PCMCIA slot of a microcomputer. To use such a card in connection with a smart card with flush contacts, although the microcomputer has no smart card reader with flush contacts, the plug-in card is modified such that it
10 can receive a smart card. The plug-in card comprises an insertion slot for the smart card. This slot is formed between an upper and a lower plate, substantially the same length as the upper plate and spaced by a distance substantially equal to the thickness of a card with flush contacts;
15 one of the plates is rigid and the other is constituted at least in part by a flexible or semi-rigid tongue on the insertion side of the smart card. Insertion is easy and the retention in place of the smart card is ensured.

This document describes the possibility of modifying
20 a microcomputer such that it can receive a PCMCIA card, which itself receives a smart card. In this embodiment, the smart

card is completely inserted into the PCMCIA card, it is therefore necessary to provide ejection means, because access to the smart card is not easy.

Moreover, if the card with the PCMCIA format has no recess, it will be impossible to use a smart card, which leads to very insufficient functionality of said PCMCIA card.

EP-A-0 696 010 has for its object a portable interface with one or several electronic smart cards, the interface being adapted to be plugged into a card reader, comprised by a module, adapted to be disposed in the card reader and comprising at one end means to be plugged into electrical connection with the card reader, a tip secured to the other end of the module comprising a slot into which to introduce the smart card, a recess adapted to receive at least partially the smart card and passing through at least a portion of said tip, said recess comprising guiding and positioning means for the smart card, and electrical connection means with the areas of electrical contact of the smart card.

Another drawback resides in the fact that the card reader sticks out quite a distance from the side of the computer, without there being the possibility of withdrawing this portion from the central unit. This is troublesome and during handling can damage the electronic hardware.

Moreover, it is not possible to use this type of connector with a smart card reader.



This is provided by the application FR97/11742 of the application, filed September 22, 1997. More precisely, it relates to a connector adapted to be plugged into an electronic housing, such that a PCMCIA module of a computer, characterized in that the connector comprises at least one recess, each recess permitting the insertion of a smart card.

In a particular embodiment, the connector comprises a recess, for the insertion of an intermediate element which itself comprises a recess, for the insertion of a smart card, and a device for interfacing between a smart card and said housing, via the intermediate element, which utilizes the free bus, dedicated to the interface inlet/outlet and connected to an interface of the smart card integrated with said connector.

The present invention proposes to solve a chronic deficiency in the field of computer peripherals. It permits, on the one hand, the connection of a connector to a single smart card reader carried by the computer, and, on the other hand, of associating with a connector a large number of smart card readers, in situ on the connector.

To this end, the invention relates to a connector adapted to be connected to an electronic housing of a computer, for example with a PCMCIA or a PCCARD format, characterized by the fact that the electronic housing is constituted by a smart card reader comprising a recess permitting the insertion in said housing of a smart card, and that the connector comprises a connection in the form of a smart card, permitting its insertion in the recess of said housing, and at



least two recesses each permitting the insertion of another smart card.

The invention will be disclosed according to the following embodiments.

5 The dimensions of each recess of the connector permit only a partial insertion of each smart card, such that a portion of said smart card, external to said connector, remains accessible.

10 The recesses are located in parallel planes, each plane being parallel to the plane formed by the electronic housing.

 The recesses are located in parallel planes, each plane being in an oblique position relative to the plane formed by the electronic housing.

15 The recesses are located in oblique planes relative to each other, one of the planes being parallel to the plane formed by the electronic housing, the other plane or planes being in an oblique position relative to the plane formed by said electronic housing.

20 The insertions of the cards in the recesses take place perpendicularly.

 The insertions of the cards in the recesses take place in identical directions.

25 The insertions of the cards in the recesses take place in opposite directions.

 The connector comprises a rotatable keyboard that is adaptable to the position of the person who uses the keyboard.

At least one of the recesses comprises a blocking means for the position of the smart card inserted in its recess.

5 The portion of the smart card external to the connector comprises a keyboard.

The recesses are connected together solely by an axle of articulation which permits varying the obliquity between said recesses.

10 The connector has, for each smart card, an interface component communicating on the one hand with the smart card and, on the other hand, with the card reader to provide the serial fashion chain of the smart cards.

15 The interfacing component has inlet/outlet components connected to the smart card by a connection, said components integrating:

- one or several inlet/outlet registers,
- a physical interface

ensuring the communication with the smart card.

20 The interfacing component comprises communication means in connection with the card reader to adapt the data from the inlet-outlet components in a serial fashion.

25 The accompanying drawings are given by way of indicative examples and not by way of limitation. They show different preferred embodiments according to the invention. They permit easy understanding of the invention.

Figure 1 is an assembly view of a microprocessor provided with a PCMCIA reader before its coaction with a

connector with two smart cards according to a first embodiment of the invention.

Figure 2 shows an assembly view of a microcomputer provided with a PCMCIA reader after its cooperation with a connector having two smart cards according to the invention.

Figure 3 is a longitudinal cross-sectional view of a connector showing figures 1 and 2 in the absence of the two smart cards.

Figure 4 is a view identical to Figure 3 just before the introduction of the two smart cards.

Figure 5 is a side view of a final embodiment of a connector when the two recesses for reception of the smart cards, empty in the present case, are parallel to each other.

Figure 6 shows a view identical to Figure 5, in which one of the recesses has undergone a rotation such that the two recesses form an angle.

Figure 7 shows a second embodiment of the present invention according to a first modification of construction.

Figure 8 shows a second modification of the second embodiment.

Figure 9 is a view identical to Figure 7, the connector carrying a keyboard.

Figure 10 is a view identical to Figure 8, of a connector carrying a keyboard.

Figures 11 and 12 are diagrams illustrating the communication between the smart cards and the electric housing of a computer.

According to Figures 1 to 10, several modifications of construction of the invention are shown.

According to this embodiment, the connector is always designated 1 no matter what its form.

5 This connector 1 coacts, as is shown in Figures 1 and 2, with an electronic housing 2 which is constituted, in all of the figures, by a PCMCIA module.

 This PCMCIA module 2 is incorporated in a microcomputer 3. It is not necessary, as is shown in the figures, 10 that there be elements which are external to the central unit of the microcomputer 3.

Nevertheless, for understanding of the connection, an element external to the central unit has been in an enlarged manner.

15 This connection is effected by insertion in the direction of the arrow F of the connector 1 into the microcomputer 3. A connection takes place in a recess 4 of the connector 1. This recess 4 normally permits the partial insertion of a smart card. Because of this, the connector 1 20 comprises a connection 5 in the form of a smart card.

 According to Figures 3 and 4, the connector 1 is better shown in longitudinal cross-section.

It will be noted that there are two recesses 6 and 7 which permit the insertion of two smart cards 8 and 9.

25 According to this modification of construction, the two recesses 6 and 7 are in oblique position relative to each other, which is to say that there exists an angle α shown in

Figure 3, this angle α existing between the plane passing through the first recess 6 and the plane passing through the second recess 7.

5 The first plane is in fact in the same plane as the electronic housing 2. This second plane is itself positioned in an oblique manner. Moreover, there are several wire connections 10 within the connector 1.

10 This is not at all the case of the embodiment of the connector 1 according to Figures 7 to 10, because in this case, the planes of the two recesses 6 and 7 are in a position parallel to each other.

15 According to Figure 7, the two cards 8 and 9 are inserted perpendicularly to each other, one of the cards 8 being inserted along the same axis as the insertion in the direction of arrow F1 of the connector 1 of the microcomputer 3. Of course, the other card 9 is perpendicular.

20 According to Figure 8, the two cards 8 and 9 are inserted in opposite directions. The two cards 8 and 9 are then perpendicular in their insertion to the insertion direction according to the arrow F1, seen above.

The embodiments of Figures 7 and 8 are shown in Figures 9 and 10. Nevertheless, an important difference exists. In the connector 1, there is a keyboard 13.

25 According to an embodiment not shown in the drawings, it is possible to move the keyboard 13 with the movement of rotation.

Thus, one of the principal interests of this type of connector 1 with a rotatable keyboard 13, is the use of said connector 1 with a portable computer or not, for example by a doctor.

5 Thus, it will be possible in future years, for the doctor, to insert his personal card so as to actuate the computer for the task to be accomplished.

10 Then, as a function of the patient who will be consulting him and who will himself have a health card, it will be possible to insert the patient's card in one of the recesses that remains free. The keyboard 13 is moved in rotation, according to the side on which the connector 1 is implanted in the electronic housing 2. Thus, the doctor or the patient could type in his confidential code whilst having
15 the numerals facing him.

 According to Figures 5 and 6, the two recesses 6 and 7, adapted to receive smart cards 8 and 9, have another configuration, they constitute two physically independent elements separated one 6 from the other 7 by a pivotal axis
20 11. By pivoting of the recess 7 in the direction of arrow F2, it is possible to vary infinitely the position of the two recesses 6 and 7, there is thus an infinity of values for α in this embodiment.

25 Thus, so that the connector 1 will be functional, it is necessary that the connection in the form of a smart card 5 have all the functionalities of a smart card.

Because of this, said connection 5 comprises areas of electrical contact 12, identical to those carried by the smart card, as for example those shown at 8 and 9 in the drawings.

5 The connector 1 in this case permits the reading of several smart cards 8, 9 by using only a single card reader corresponding to the electronic housing 2.

To achieve communication between several cards 8, 9 and a single reader, the invention could use specific means,
10 hereafter denominated interfacing components 22.

By permitting a series connection between the smart cards 8, 9 and the electronic housing 2, the interfacing components 22 permit chaining the cards.

There could therefore be utilized a standard card
15 reader whilst communicating with several smart cards.

Figures 11 and 12 show the use of the interfacing component 22 integrated into the connector 1 according to the invention.

In Figure 11, the different icons designated 22 each
20 correspond each to an interfacing component 22 connected to a smart card. There are as many components 22 as cards 8, 9 and recesses 6, 7.

Between the interfacing components 22 and the electronic housing 2, a chain of data is effected in series
25 fashion as shown by the communication arrows in Figure 11.

In the electronic housing 2, current components of a PCMCIA type reader could be used, and particularly:

- an IPCIC component 23,
- a microprocessor 24,
- a memory 25.

5 The IPCIC component 23 can contain an autolearning system (system of automatic measurement of the time unit of the "ETU" peripherals) permitting recognizing the communication protocols used by the smart cards and above all the communication protocol put into place by the interfacing components 22.

10 Finally, Figure 11 shows the communication between the electronic housing 2 and the computer 3 established in the usual way such as a PCMCIA connection with 68 pins.

 Figure 12 shows more precisely the characteristics of an interfacing component 22.

15 The component 22 is first of all in connection with the smart card 8, 9 by a connection 14 suitable for the card format.

20 The component 22 has inlet/outlet members 15 connected to the connection 14. There could also be used a system of registers 16 such as FIFO registers (First In First Out) and a physical interface device of the UART type (Universal asynchronous receiver transmitter).

25 The component 22 has the function of integrating the communication means 18 permitting a transformation in series communication of the data from the inlet/output components 15.

 The communication means 18 consist in using subsystems with a communication protocol 20, 21 of the series type.

There could particularly be used communication means 18 I2C and SPI (serial peripheral interface) known to those in the art.

5 At the output of the communication means 22, an adaptation has been made so as to permit series connection with the electronic housing 2. This connection is shown by the icon 19 in Figure 12.

10 To ensure the management of the internal operation of the interfacing component 22, a parallel connection may be emplaced, particularly for the modification of the parameters and the passage to test mode.

REFERENCES

1. Connector
2. Electronic housing
3. Computer
- 5 4. Recess of the housing 2
5. Connection in the form of a smart card
6. First recess of the connector 1
7. Second recess of the connector 1
8. Smart card
- 10 9. Other smart card
10. Wire connection in the connector 1
11. Axis of articulation
12. Regions of electric contact
13. Keyboard
- 15 14. Smart card connection
15. Inlet/outlet components toward the smart card
16. Inlet/outlet register
17. Parallel connection
18. Communication means
- 20 19. Series connection toward the smart card
20. Communication protocol
21. Communication protocol
22. Interface component
23. IPCIC component
- 25 24. Microprocessor
25. Memory

- F1. Insertion of the connector 1 into the recess 4
- F2. Rotation of one of the two recesses 9 relative
to the axis 11



CLAIMS

1. Connector (1) adapted to be connected to an electronic housing (2) of a computer (3), for example of a PCMCIA or PCCARD format, characterized by the fact

that the electronic housing (2) is constituted by a smart card reader comprising a recess (4) permitting the insertion in said housing of a smart card, and

that the connector (1) comprises a connection in the form of a smart card (5), permitting its insertion in the recess (4) of said housing (2), and at least two recesses (6 and 7) permitting the insertion into each of another smart card (8 or 9).

2. Connector according to claim 1, characterized by the fact

that the dimensions of each recess (6 or 7) of the connector (1) permit only partial insertion of each smart card (8 or 9), such that a portion of said smart card (8 or 9), external to said connector (1), remains accessible.

3. Connector according to any one of claims 1 or 2, characterized by the fact

that the recesses (6 and 7) are located in parallel planes, each plane being parallel to the plane formed by the electronic housing (2).

4. Connector according to any one of claims 1 or 2, characterized by the fact





that the recesses are located in parallel planes,
each plane being in an oblique position relative to the plane
formed by the electronic housing.

5. Connector according to any one of claims 1 or 2,
characterized by the fact

that the recesses (6 and 7) are located in oblique
planes relative to each other, one of the planes being
parallel to the plane formed by the electronic housing (2),
the other plane or planes being in an oblique position
relative to the plane formed by said electronic housing (2).

6. Connector according to any one of claims 3 or 4,
characterized by the fact

that the insertions of the cards (8 and 9) in the
recesses (6 and 7) takes place perpendicularly.

7. Connector according to any one of claims 3 or 4,
characterized by the fact

that the insertions of the cards (8 and 9) in the
recesses (6 and 7) takes place in identical directions.

8. Connector according to any one of claims 3 or 4,
characterized by the fact

that the insertions of the cards (8 and 9) in the
recesses (6 and 7) takes place in opposite directions.

9. Connector according to any one of claims 1 to 8,
characterized by the fact





that the connector comprises a rotatable keyboard to adapt it to the position of the person who uses the keyboard
5 (13).

10. Connector according to any one of claims 1 to 9, characterized by the fact

that at least one of the recesses comprises means for blocking in position the smart card (8 or 9) inserted into
5 its recess (6 or 7).

11. Connector according to any one of claims 1 to 10, characterized by the fact

that the portion of the smart card, external to the connector, comprises a keyboard.

12. Connector according to any one of claims 1 to 11, characterized by the fact

that the recesses (8 and 9) are connected together solely by an axle of articulation (11) which permits varying
5 the obliquity between said recesses.

13. Connector (1) according to any one of claims 1 to 12, characterized by the fact

that it has, for each smart card (8, 9), an interfacing component (22) communicating on the one hand with the
5 smart card (8, 9) and on the other hand with the card reader, to provide the chain in series fashion of the smart cards (8, 9).



14. Connector (1) according to claim 13, characterized by the fact

that the interfacing component (22) has inlet/outlet components (15) connected to the smart card (8, 9) by a connection (14), said components (15) integrating:

- one or several inputs/output register (16),
- a physical interface

ensuring communication with the smart card (8, 9).

15. Connector (1) according to claim 14, characterized by the fact

that the interfacing component (22) comprises communication means (18) in connection with the card reader to adapt the data from input-output components (15) in series fashion.

