Claims

1. An input device comprising:

a circuit board;

a switch connector fixedly mounted to the circuit board, the switch connector having a plurality of electrical terminals;

a switch assembly magnetically coupled to the switch connector in a removable manner, the switch assembly comprising

a switch adapter to interface with the switch connector, the switch adapter having

a plurality of contact elements in engagement with the plurality of electrical terminals of the switch connector, and

an arrangement of electrical elements connected to the plurality of contact elements of the switch adapter, and

a switch fitted to the switch adapter with a plurality of leads of the switch engaged to the arrangement of electrical elements so as to electrically connect the plurality of leads of the switch to the plurality of contact elements of the switch adapter,

wherein the switch assembly is magnetically coupled to the switch connector with the switch adapter between the switch connector and the switch; and

a magnetic catch arrangement to magnetically couple the switch assembly to the switch connector, the magnetic catch arrangement comprises a first catch unit coupled to the circuit board and a second catch unit coupled to the switch adapter, wherein the first catch unit and the second catch unit comprises a pair of coacting magnet elements or a coacting pair of a magnetic metal element and a magnet element such that the first catch unit and the second catch unit coact with each other to magnetically couple the switch assembly and the switch connector,

wherein the first catch unit comprises one or more catch elements and the second catch unit comprises one or more corresponding catch elements.

~~2. The input device as claimed in claim 1, wherein each of the plurality of electrical terminals of the switch connector comprises a pogo pin or a spring-loaded pin.~~

~~3~~2. The input device as claimed in claim 1, wherein the switch comprises a mechanical switch, an optical switch, a magnetic switch, a hall effect switch, a membrane switch, a pressure sensitive switch, or a piezo switch.

~~4~~3. The input device as claimed in claim ~~3~~2, wherein the plurality of electrical terminals of the switch connector is arranged in a manner such that the switch assembly is interchangeable between a first switch assembly having the mechanical switch and a second switch assembly having the optical switch.

~~5~~4. The input device as claimed in claim ~~3~~2, wherein, when the switch is a mechanical switch, the arrangement of electrical elements of the switch adapter comprises spaced apart conductive stripes extending within the switch adapter in a perpendicular direction from the switch connector to the mechanical switch.

~~6~~5. The input device as claimed in claim ~~5~~4, wherein each of the plurality of contact elements of the switch adapter is a first end portion of each of the conductive stripes directed towards the switch connector,

wherein each of the conductive strips is bent at a second end portion thereof so as to engage with a corresponding lead of the plurality of leads of the mechanical switch, and/or

wherein the switch adapter comprises an insulation shim plate with a plurality of holes, the insulation shim plate being on a side of the switch adapter opposite the plurality of contact elements of the switch adapter, wherein the mechanical switch is fitted to the switch adapter in a manners so as to be abutting the insulation shim plate and with the plurality of leads of the mechanical switch respectively inserted through the plurality of holes of the insulation shim plate to respectively engage with the conductive stripes.

~~7. The input device as claimed in claim 6, wherein each of the conductive strips is bent at a second end portion thereof so as to engage with a corresponding lead of the plurality of leads of the mechanical switch.~~

~~8. The input device as claimed in claim 5, wherein the switch adapter comprises an insulation shim plate with a plurality of holes, the insulation shim plate being on a side of the switch adapter opposite the plurality of contact elements of the switch adapter, wherein the mechanical switch is fitted to the switch adapter in a manners so as to be abutting the insulation shim plate and with the plurality of leads of the mechanical switch respectively inserted through the plurality of holes of the insulation shim plate to respectively engage with the conductive stripes.~~

~~9. The input device as claimed in claim 3, wherein, when the switch is an optical switch, the arrangement of electrical elements of the switch adapter comprises an intervening circuitry disposed in the switch adapter.~~

~~10~~6. The input device as claimed in claim ~~9~~2 or 3, wherein, when the switch is an optical switch, the arrangement of electrical elements of the switch adapter comprises an intervening circuitry disposed in the switch adapter,

wherein the intervening circuitry comprises the plurality of contact elements of the switch adapter and one or more connection points to connect to the optical switch.

~~11~~7. The input device as claimed in claim ~~10~~6, wherein the intervening circuitry comprises a printed circuit board assembly having a first printed circuit board and a second printed circuit board in a dual layer arrangement and interconnected to each other, wherein the first printed circuit board has the plurality of contact elements and the second printed circuit board has the one or more connection points, wherein the first printed circuit board and the second printed circuit board are arranged in a manner such that the plurality of contact elements and the one or more connection points are directed away from each other,

wherein the switch adapter comprises one or more plastic pins to hold apart the first printed circuit board and the second printed circuit board,

wherein the switch assembly is magnetically coupled to the switch connector with the plurality of contact elements of the first printed circuit board of the switch adapter in contact with the plurality of electrical terminals of the switch connector, and the optical switch abutting the second printed circuit board of the switch adapter.

~~12. The input device as claimed in claim 11, wherein the switch adapter comprises one or more plastic pins to hold apart the first printed circuit board and the second printed circuit board.~~

~~13. The input device as claimed in claim 11 or 12, wherein the switch assembly is magnetically coupled to the switch connector with the plurality of contact elements of the first printed circuit board of the switch adapter in contact with the plurality of electrical terminals of the switch connector, and the optical switch abutting the second printed circuit board of the switch adapter.~~

~~14. The input device as claimed in claim 1, wherein the first catch unit comprises one or more catch elements and the second catch unit comprises one or more corresponding catch elements.~~

~~15~~8. The input device as claimed in claim ~~14~~1, wherein the first catch unit comprises one elongated catch element coupled to the circuit board and the second catch unit comprise one corresponding elongated catch element coupled to the switch adapter, wherein the elongated catch element of the first catch unit of the circuit board is aligned to the corresponding elongated catch element of the second catch unit of the switch adapter in a manner so as to align the plurality of contact elements of the switch adapter to the plurality of electrical terminals of the switch connector when the elongated catch element of the circuit board and the corresponding elongated catch element of the switch adapter coact to magnetically couples the switch adapter and the switch connector, or

wherein the first catch unit comprises two or more catch elements coupled to the circuit board and the second catch unit comprises two or more corresponding catch elements coupled to the switch adapter, wherein the two or more catch elements of the first catch unit of the circuit board are lined with respect to the plurality of electrical terminals of the switch connector and the two or more corresponding catch elements of the second catch unit of the switch adapter are aligned to the plurality of contact elements of the switch adapter in a manner so as to align the plurality of contact elements of the switch adapter to the plurality of electrical terminals of the switch connector when the two or more catch elements of the first catch unit of the circuit board and the two or more

corresponding catch elements of the second catch unit of the switch adapter coact to magnetically couples the switch adapter and the switch connector.

~~16. The input device as claimed in claim 14, wherein the first catch unit comprises two or more catch elements coupled to the circuit board and the second catch unit comprises two or more corresponding catch elements coupled to the switch adapter, wherein the two or more catch elements of the first catch unit of the circuit board are lined with respect to the plurality of electrical terminals of the switch connector and the two or more corresponding catch elements of the second catch unit of the switch adapter are aligned to the plurality of contact elements of the switch adapter in a manner so as to align the plurality of contact elements of the switch adapter to the plurality of electrical terminals of the switch connector when the two or more catch elements of the first catch unit of the circuit board and the two or more corresponding catch elements of the second catch unit of the switch adapter coact to magnetically couples the switch adapter and the switch connector.~~

~~17. The input device as claimed in claim 1, wherein the switch adapter of the switch assembly comprises alignment structures for aligning the switch adapter of the switch assembly to the switch connector during assembling.~~

~~18. The input device as claimed in claim 17, wherein the alignment structures comprises two or more alignment pins for aligning with corresponding recesses or enclosure wall structures for surrounding the switch connector.~~

~~19~~9. The input device as claimed in any one of claims 1 to 8,

wherein the circuit board has a planar surface,

wherein the plurality of electrical terminals of the switch connector is directed perpendicularly away from the planar surface of the circuit board,

wherein the switch assembly is magnetically coupled to the switch connector in a manner so as to be removably stacked onto the switch connector in a direction perpendicular to the planar surface of the circuit board,

wherein the switch adapter of the switch assembly is between the switch connector and the switch of the switch assembly along the direction perpendicular to the planar surface of the circuit board.

~~20~~10. A switch assembly for magnetically coupling to a switch connector fixedly mounted to a circuit board of an input device, the switch assembly comprising

a switch adapter to interface with the switch connector of the circuit board, the switch adapter having

a plurality of contact elements on a first side of the switch adapter for engaging with a plurality of electrical terminals of the switch connector of the circuit board, and

an arrangement of electrical elements connected to the plurality of contact elements of the switch adapter;

a switch fitted to the switch adapter with a plurality of leads of the switch engaged to the arrangement of electrical elements so as to electrically connect the plurality of leads of the switch to the plurality of contact elements of the switch adapter, wherein the switch is fitted to the switch adapter on a second side of the switch adapter opposite the first side of the switch adapter having the plurality of contact elements; and

a catch unit coupled to the switch adapter, the catch unit comprising a magnet element or a magnetic metal element to coact with a corresponding catch unit of the circuit board so as to magnetically couple the switch assembly to the switch connector via the switch adapter, wherein the catch unit comprises one or more catch elements coupled to the switch adapter so as to coact with one or more corresponding catch elements of the circuit board for magnetically coupling the switch adapter to the switch connector of the circuit board.

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~~21~~11. The switch assembly as claimed in claim ~~20~~10, wherein the switch comprises an optical switch, a mechanical switch, a magnetic switch, a hall effect switch, a membrane switch, a pressure sensitive switch, or a piezo switch.

~~22~~12. The switch assembly as claimed in claim ~~21~~11, wherein, when the switch is a mechanical switch, the arrangement of electrical elements of the switch adapter comprises

spaced apart conductive stripes extending within the switch adapter from the first side of the switch adapter towards the second side of the switch adapter.

~~23~~13. The switch assembly as claimed in claim ~~22~~12, wherein each of the plurality of contact elements of the switch adapter is a first end portion of each of the conductive stripe at the first side of the switch adapter,

wherein each of the conductive strips is bent at a second end portion thereof so as to engage with a corresponding lead of the plurality of leads of the mechanical switch, and/or

wherein the switch adapter comprises an insulation shim plate with a plurality of holes, the insulation shim plate being on the second side of the switch adapter, wherein the mechanical switch is fitted to the switch adapter in a manners so as to be abutting the insulation shim plate and with the plurality of leads of the mechanical switch respectively inserted through the plurality of holes of the insulation shim plate to respectively engage with the conductive stripes.

~~24. The switch assembly as claimed in claim 23, wherein each of the conductive strips is bent at a second end portion thereof so as to engage with a corresponding lead of the plurality of leads of the mechanical switch.~~

~~25. The switch assembly as claimed in claim 22, wherein the switch adapter comprises an insulation shim plate with a plurality of holes, the insulation shim plate being on the second side of the switch adapter, wherein the mechanical switch is fitted to the switch adapter in a manners so as to be abutting the insulation shim plate and with the plurality of leads of the mechanical switch respectively inserted through the plurality of holes of the insulation shim plate to respectively engage with the conductive stripes.~~

~~26. The switch assembly as claimed in claim 21, wherein, when the switch is an optical switch, the arrangement of electrical elements of the switch adapter comprises an intervening circuitry disposed in the switch adapter.~~

~~27~~14. The switch assembly as claimed in claim ~~26~~11, wherein, when the switch is an optical switch, the arrangement of electrical elements of the switch adapter comprises an

intervening circuitry disposed in the switch adapter, wherein the intervening circuitry comprises the plurality of contact elements of the switch adapter and one or more connection points to connect to the optical switch.

~~28~~15. The switch assembly as claimed in claim ~~27~~14, wherein the intervening circuitry comprises a printed circuit board assembly having a first printed circuit board and a second printed circuit board in a dual layer arrangement and interconnected to each other, wherein the first printed circuit board has the plurality of contact elements and the second circuit board has the one or more connection points, wherein the first printed circuit board is at the first side of the switch adapter and the second printed circuit board is at the second side of the switch adapter,

wherein the switch adapter comprises plastic pins to hold apart the first printed circuit board and the second printed circuit board,

wherein the optical switch is fitted to the switch adapter with the optical switch abutting the second printed circuit board of the switch adapter.

~~29. The switch assembly as claimed in claim 28, wherein the switch adapter comprises plastic pins to hold apart the first printed circuit board and the second printed circuit board.~~

~~30. The switch assembly as claimed in claim 29, wherein the optical switch is fitted to the switch adapter with the optical switch abutting the second printed circuit board of the switch adapter.~~

~~31~~16. The switch assembly as claimed in claim ~~20~~10, wherein the catch unit comprises one elongated catch element coupled to the switch adapter, the one elongated catch element being aligned to the plurality of contact elements of the switch adapter in a manner so as to coact with a corresponding elongated catch element of the circuit board for magnetically coupling the switch adapter to the switch connector of the circuit board such that the plurality of contact elements of the switch adapter engages with the plurality of electrical terminals of the switch connector, or

wherein the catch unit comprises two or more catch elements coupled to the switch adapter, the two or more catch elements being aligned to the plurality of contact

elements of the switch adapter in a manner so as to coact with two or more corresponding catch elements of the circuit board for magnetically coupling the switch adapter to the switch connector of the circuit board such that the plurality of contact elements of the switch adapter engages with the plurality of electrical terminals of the switch connector.

~~32. The switch assembly as claimed in claim 20, wherein the catch unit comprises two or more catch elements coupled to the switch adapter, the two or more catch elements being aligned to the plurality of contact elements of the switch adapter in a manner so as to coact with two or more corresponding catch elements of the circuit board for magnetically coupling the switch adapter to the switch connector of the circuit board such that the plurality of contact elements of the switch adapter engages with the plurality of electrical terminals of the switch connector.~~

~~33. The switch assembly as claimed in claim 20, wherein the switch adapter of the switch assembly comprises alignment structures at the first side of the switch adapter for aligning the switch adapter of the switch assembly to the switch connector of the circuit board during assembling.~~

~~34. The switch assembly as claimed in claim 33, wherein the alignment structures comprises two or more alignment pins for aligning with corresponding recess in the switch connector or enclosure wall structures for surrounding the switch connector.~~

~~35~~17. A computer mouse comprising:

a circuit board;

a switch connector fixedly mounted to the circuit board, the switch connector having a plurality of electrical terminals;

a mouse switch assembly magnetically coupled to the switch connector in a removable manner, the mouse switch assembly having a plurality of contact elements in engagement with the plurality of electrical terminals of the switch connector; and

a magnetic catch arrangement to magnetically couple the mouse switch assembly to the switch connector, the magnetic catch arrangement comprises a first catch unit coupled to the circuit board and a second catch unit coupled to the mouse switch assembly, wherein the first catch unit and the second catch unit comprises a pair of

coacting magnet elements or a coacting pair of a magnetic metal element and a magnet element such that the first catch unit and the second catch unit coact with each other to magnetically couple the mouse switch assembly and the switch connector,

wherein the first catch unit comprises one or more catch elements and the second catch unit comprises one or more corresponding catch elements.

~~36. The computer mouse as claimed in claim 35, wherein each of the plurality of electrical terminals of the switch connector comprises a pogo pin or a spring-loaded pin.~~

~~37~~18. The computer mouse as claimed in claim ~~35~~17, wherein the mouse switch assembly comprises an optical switch, a mechanical switch, a magnetic switch, a hall effect switch, a membrane switch, a pressure sensitive switch, or a piezo switch.

~~38~~19. The computer mouse as claimed in claim ~~37~~18, wherein the plurality of electrical terminals of the switch connector is arranged in a manner such that the mouse switch assembly is interchangeable between a first mouse switch assembly having the optical switch and a second mouse switch assembly having the mechanical switch.

~~39. The computer mouse as claimed in claim 35, wherein the first catch unit comprises one or more catch elements and the second catch unit comprises one or more corresponding catch elements.~~

~~40~~20. The computer mouse as claimed in claim ~~39~~17, wherein the first catch unit comprises one elongated catch element coupled to the circuit board and the second catch unit comprise one corresponding elongated catch element coupled to the mouse switch assembly, wherein the elongated catch element of the circuit board is aligned to the corresponding elongated catch element of the mouse switch assembly in a manner so as to align the plurality of contact elements of the mouse switch assembly to the plurality of electrical terminals of the switch connector when the elongated catch element of the circuit board and the corresponding elongated catch element of the mouse switch assembly coact to magnetically couples the switch assembly and the switch connector, or

wherein the first catch unit comprises two or more catch elements coupled to the circuit board and the second catch unit comprises two or more corresponding catch

elements coupled to the mouse switch assembly, wherein the two or more catch elements of the circuit board are lined with respect to the plurality of electrical terminals of the switch connector and the two or more corresponding catch elements of the mouse switch assembly are lined with respect to the plurality of contact elements of the mouse switch assembly in a manner so as to align the plurality of contact elements of the switch assembly to the plurality of electrical terminals of the switch connector when the two or more catch elements of the circuit board and the two or more corresponding catch elements of the switch assembly coact to magnetically couples the switch assembly and the switch connector.

~~41. The computer mouse as claimed in claim 39, wherein the first catch unit comprises two or more catch elements coupled to the circuit board and the second catch unit comprises two or more corresponding catch elements coupled to the mouse switch assembly, wherein the two or more catch elements of the circuit board are lined with respect to the plurality of electrical terminals of the switch connector and the two or more corresponding catch elements of the mouse switch assembly are lined with respect to the plurality of contact elements of the mouse switch assembly in a manner so as to align the plurality of contact elements of the switch assembly to the plurality of electrical terminals of the switch connector when the two or more catch elements of the circuit board and the two or more corresponding catch elements of the switch assembly coact to magnetically couples the switch assembly and the switch connector.~~

~~42. The computer mouse as claimed in claim 35, wherein the mouse switch assembly comprises alignment structures for aligning the mouse switch assembly to the switch connector during assembling.~~

~~43. The computer mouse as claimed in claim 42, wherein the alignment structures comprises two or more alignment pins for aligning with corresponding recesses in the switch connector or enclosure wall structures for surrounding the switch connector.~~