

PICK-UP DEVICE FOR A CONNECTOR

FIELD OF INVENTION

5 The present invention relates broadly to a pick-up device for a connector.

BACKGROUND

10 Receptacle connectors such as S-ATA (serial ATA) receptacles and SAS (serial attached SCSI) receptacles are often soldered onto printed circuit board (PCBs). In such PCB assembly processes, pick-up devices or caps are typically utilised to allow the pick and place process for the receptacles to be positioned on the PCBs.

15 In the design of suitable pick-up devices, issues such as versatility of the pick-up device for use with different receptacles, and whether or not the pick-up device can engage the receptacle in different places may be considered.

It is with the knowledge of the above mentioned issues that the present invention has been made and is now reduced into practice.

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SUMMARY

25 In accordance with a first aspect of the present invention there is provided a pick-up device for a connector, the device comprising a main body; a pair of side walls extending from the main body and arranged to resiliently engage respective walls of the connector; a first raised portion extending from the main body in substantially the same direction as the side walls and arranged to be received in a first slot portion formed on the connector; wherein the first raised portion comprises an abutment surface for abutment with a surface portion of the first slot portion
30 extending transversely to at least one of the side walls.

One of the side walls may abut a surface of a protrusion portion formed on the wall of the connector which the one side wall resiliently engages, the surface of the protrusion portion extending transversely to at least one of the side walls.

The device may further comprise a second raised portion extending from the main body between the side walls and arranged to be received in a second slot portion formed on the connector.

5 The device may further comprise means for preventing engagement between the device and the connector in an erroneous orientation.

The means for preventing engagement in an erroneous orientation may comprise an off-centre disposition of the second raised portion between the side walls.

10 The surface portion of the first slot portion may extend substantially perpendicularly to the at least one of the side walls.

Lateral movement of the device with respect to the engaged connector may be restrained by a mating of the first raised portion and the first slot portion.

The surface of the protrusion portion may extend substantially perpendicularly to at least one of the side walls.

15 Lateral movement of the device with respect to the engaged connector may be restrained by a cooperation of the abutment of said one side wall of the device with the surface of the protrusion portion, and abutment of the first raised portion of the device with the surface portion of the first slot portion.

20 The first raised portion may be laterally displaced with respect to the pair of side walls of the device.

The device may be arranged for use with a SAS receptacle connector and a S-ATA receptacle connector.

25 BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

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Figure 1 is a schematic perspective view of a SAS receptacle and a pick-up cap according to an embodiment of the present invention.

35 Figure 2 is a schematic perspective view of a S-ATA receptacle and a pick-up cap according to an embodiment of the present invention.

Figure 3 is a schematic cross-sectional view of a SAS receptacle and a pick-up cap according to an embodiment of the present invention.

- 5 Figure 4 is a schematic perspective view, partly in section, of a S-ATA receptacle and a pick-up cap according to an embodiment of the present invention.

DETAILED DESCRIPTION

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Figure 1 illustrates a perspective view of a SAS (serially attached SCSI) receptacle 10 according to an example embodiment. The receptacle 10 which is molded to accommodate electrical terminals 12, 14. The receptacle 10 has three sets of terminal arrays, arranged on different planes of the receptacle 10. A first array 18 consists of
15 twenty-two terminals 12 of 1.27 mm pitch and is located towards one end of the receptacle 10, along one edge thereof, each terminal 12 being positioned in their respective chambers 20. The terminals 12 of the first array 18 usually connect power lines.

- 20 A second array 22 consists of eight terminals 14 of 0.8 mm pitch. The second array 22 is located towards the center of the receptacle 10 and on the edge thereof which is opposite to the edge having the first array 18. Each terminal 14 is positioned in respective chambers 24. The terminals 14 of the second array 22 usually connect signal lines. A third array 26 consists of seven terminals 28 of 1.27 mm pitch and is located on
25 the other end of the receptacle 10 and on the same edge thereof as that of the first array 18, each terminal 28 being positioned in their respective chambers 30. The terminals 28 of the third array 26 usually connect signal lines.

- The first and the third arrays 18, 26 are located on the same edge of the receptacle 10
30 and are flush with the outer surface of the receptacle 10, whilst housing portion 32, housing the second array 22, protrudes out of a wall 34 of the receptacle 10.

- Each of the ends of the receptacle 10 is terminated with a vertically positioned pillar 36 and a horizontally positioned base 38. On one edge of each of the bases 38, a metallic
35 hold-down pin 40 is formed in a vertical direction to enable the receptacle 10 to be

inserted on to a PCB. The tail portions e.g. 42, 44, 46 of the electrical terminals 12, 14, 28 protrude the receptacle 10. Tail portion e.g. 42 are of the through mount type. Tail portions e.g. 44, 46 are of the surface mount type. It will be appreciated that other tail portion configurations are possible in other embodiments.

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A pick-up device in the form of cap 48 according to an example embodiment is also shown in Figure 1. Cap 48 comprises a main body 50, and a wall portion 52 extending from the main body 50. A wall corresponding to, and being a mirror image of, wall 52 is provided on the opposite side of the main body 50 (compare also Figs. 3 and 4).

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The cap 48 further comprises a protrusion in the form of block 54, extending from the main body 50 in the same direction as the walls e.g. 52.

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When the cap 48 is positioned for pick-up of the receptacle 10, the wall 52, and the corresponding wall on the opposite side (not shown) resiliently engage the walls e.g. 34 of the receptacle 10. At the same time, the block 54 is received in a slot portion 56 of the receptacle 10. As will be appreciated by a person skilled in the art, in the engaged position, lateral movement between the receptacle 10 and the cap 48 is restraint by the combined action of the abutment of wall 52 with the protruding housing portion 32 of the SAS receptacle 10 on the one hand, and abutment of the block 54 with the ridge surface 58 of the slot portion 56 on the other hand.

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Figure 2 is a perspective view of a S-ATA receptacle 100. The receptacle 100 is somewhat similar to the SAS receptacle 10 described above with reference to Figure 1. In the following, the description will focus on structural differences of the receptacle 100, in the context of its co-operation with the pick-up cap 48 in the example embodiment.

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The receptacle 100 comprises a wall 102 extending between the side walls 104 and 106 of the receptacle 100, and extending through the entire height of the receptacle 100. In an engaged position, the block 54 of the pick-up cap 48 is received in a slot portion 108 of the receptacle 100, while the wall 52, and the corresponding wall on the opposite side of the pick-up cap 48, (not shown) resiliently engage the side wall e.g. 104 of the receptacle 100.

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It will be appreciated by the person skilled in the art that lateral movement between the receptacle 100 and the pick-up cap 48 in the engaged position is restraint as a result of the fit in at least the lateral dimensions between the block 54 and the slot portion 104. This results in simultaneous abutment of the block 54 with at least the ridge surface 110 and the side surface 112 of the slot portion 104.

Figure 3 shows a cross-sectional view of the mated assembly of the pick-up cap 48 and the SAS receptacle 10. The figure more clearly illustrates the resilient engagement of the side walls 52 and 53 of the pick-up cap 48 with the walls 34, 35 of the receptacle 10 respectively. The walls 52, 53 in the example embodiment are shaped to include inwardly facing prong portions e.g. 60, for facilitating the resilient engagement.

In the example embodiment, the main body 50 has a flat top surface for vacuum assisted a pick and place manipulating by an auto machine (not shown).

The pick-up cap 48 further comprises a central protruding wall 62 between the walls 52, 53 and extending in the same direction from the main body 50. The wall 62 is positioned off-centre with respect to the side walls 52, 53, leaving, in the example embodiment, a smaller distance between wall 62 and side wall 52 on the one hand, compared with the distance between wall 62 and side wall 53 on the other hand. It will be appreciated by the person skilled in the art that accordingly, in the example embodiment incorrect insertion of the pick-up cap 48 for engagement with the receptacle 10 is prevented, by selecting the distance between wall 62 and side wall 52 to be smaller than the width of one of the side walls 35, of the receptacle 10.

Furthermore, it will be appreciated that the wall 62 in the example embodiment additionally prevents incorrect insertion of block 54 into the "wrong" slot 105 symmetrical about wall 102, instead of the "correct" slot 104 (see Figure 2). The abutment of wall 62 with wall 102 will prevent the incorrect insertion, as will be appreciated by the person skilled in the art.

Similarly, and as further illustrated with reference to Figure 4, the wall 62 serves the same function when the pick-up cap 48 is used in conjunction with the S-ATA receptacle 100.

The example embodiment described can achieve the following advantages:

- A single pick-up cap design can be used for both SAS and S-ATA existing receptacles.
- 5 - The pick-up cap of the example embodiment provides pre-position functionality when placing the cap near the centre position of the receptacles. More particularly, the cap can be inserted into the receptacles in substantially only one position and in only one orientation, with lateral movement between the receptacle and the cap restraint when the cap is engaged with the receptacle. As such, the operation of an auto machine to
10 which the cap is mounted during the pick and place process can preferably be controlled without having to take into account possible positioning variations between the cap and the receptacle on the one hand, and consequently between the receptacle and a PCB to which the receptacle is to be soldered on the other hand.

15 It will be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the present invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

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CLAIMS

1. A pick-up device for a connector, the device comprising:
a main body;
a pair of side walls extending from the main body and arranged to resiliently
5 engage respective walls of the connector;
a first raised portion extending from the main body in substantially the same
direction as the side walls and arranged to be received in a first slot portion formed
on the connector;
wherein the first raised portion comprises an abutment surface for abutment
10 with a surface portion of the first slot portion extending transversely to at least one of
the side walls.
2. The device as claimed in claim 1, wherein one of the side walls abuts
a surface of a protrusion portion formed on the wall of the connector which the one
side wall resiliently engages, the surface of the protrusion portion extending
15 transversely to at least one of the side walls.
3. The device as claimed in claims 1 or 2, further comprising a second
raised portion extending from the main body between the side walls and arranged to
be received in a second slot portion formed on the connector.
4. The device as claimed in any one of claims 1 to 3, further comprising
20 means for preventing engagement between the device and the connector in an
erroneous orientation.
5. The device as claimed in claims 3 and 4, wherein the means for
preventing engagement in an erroneous orientation comprises an off-centre
disposition of the second raised portion between the side walls.
- 25 6. The device as claimed in any one of claims 1 to 5, wherein the first
slot portion extends substantially perpendicularly to the at least one of the side
walls.
7. The device as claimed in any one of claims 1 to 6, wherein lateral
movement of the device with respect to the engaged connector is restrained by a
30 mating of the first raised portion and the first slot portion.
8. The device as claimed in claim 2, wherein the surface of the
protrusion portion extends substantially perpendicularly to the at least one one of
the side walls.
9. The device as claimed in claims 2 or 8, wherein lateral movement of
35 the device with respect to the engaged connector is restrained by a cooperation of

the abutment of said one side wall of the device with the surface of the protrusion portion, and abutment of the first raised portion of the device with the surface portion of the first slot portion.

10. The device as claimed in any one of claims 1 to 9, wherein the first
5 raised portion is laterally displaced with respect to the pair of side walls of the device.

11. The device as claimed in any one of claims 1 to 10, wherein the device is arranged for use with a SAS receptacle connector and a S-ATA receptacle connector.