

Description

This invention relates to the connection of ribbon cable connectors.

The securing of card-edge type ribbon cable connectors to a plane or panel has generally been ignored by the manufacturers of connectors of this type. The manufacturers either fail to provide any means of retaining their cable connectors or provide simple mounting feet at either end of the connector. These mounting feet may have clearance holes or be threaded for receiving screw type fasteners.

Another method of securing connectors of this type is to provide additional hardware which could be constructed as a hood. The hood may provide both a means of mounting the completed cable assembly and a means to provide strain relief for electrical contacts of the connector.

The present invention seeks to provide an efficient (and preferably also economical) means for securing a ribbon cable connector to a panel, for example a back panel or plane.

Patent Specification FR-A-2 365 273 discloses a housing having inwardly directed snap tags in side walls thereof which allow a circuit board pressed into the housing to flex the snap tags outwardly and be retained in the housing by the free ends of the snap tags engaging the outer face of the circuit board. Patent Specification US-A-3 432 802 discloses a housing with outwardly directed flexible spring tabs on opposite side walls thereof whereby the housing can be inserted into an aperture in a panel with inward bending of the spring tabs, the housing being retained in the aperture in the panel by the edges of the panel engaging in grooves in the spring tabs.

According to a first aspect of the invention there is provided a connector clip for a ribbon cable connector, the connector clip comprising:

- a side wall;
- a pair of end walls connected to opposite ends of the side wall;
- a front lip connected to the side wall and to the end walls and extending between the end walls, the side wall, end walls and front lip forming a receptacle having an open front and an open side opposite to the side wall,
- a directional snap tab extending from each end wall, into the receptacle, near a side of each end wall opposite to the side wall, whereby a cable connector can be inserted, without the aid of any tools, into the receptacle behind the front lip with the snap tabs engaged against the connector for retaining the connector in the receptacle; and
- a resilient spring tab connected to an outer surface of each end wall near the front lip, each spring tab extending at an angle outwardly from its

respective end wall in a direction away from the front lip, and each spring tab carrying a panel slot on an outer surface thereof, the spring tabs being resiliently movable towards each other whereby edges of a panel opening can be received in the panel slots to hold the clip to a panel having the panel opening.

According to a second aspect of the invention there is provided a one-piece injection moulded connector clip for securing a ribbon cable edge-type connector to a panel. The connector clip provides a generally rectangular receptacle for the cable connector. The cable connector is insertable into the receptacle and held by projection of the clip. The clip has external resilient spring tabs and a generally rectangular cross-section so that it is insertable into a rectangular slot of a back panel or plane. Projections on the spring tabs hold the clip in the slot. The clip can be attached and detached from the panel and the cable connector can be inserted and removed from the clip, by hand, without the need for any tools.

Preferably, a side wall of the clip is provided with a raised rib which is insertable into a notch of the rectangular slot to provide polarisation indication. In this way, the clip can be inserted into the slot only in one way so that the cable connector is properly oriented in the slot. Preferably, the clip has a mechanical stop to off load the spring tabs to avoid over-stressing of the tabs.

A preferred embodiment of the invention described hereinbelow provides a clip which can carry a ribbon cable connector and which can be inserted into an opening in a panel without the use of any tools. The preferred clip is simple in design, rugged in construction and economical to manufacture.

The invention will now be further described, by way of illustrative and non-limiting example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view showing the connector clip in accordance with a preferred embodiment of the invention;

Figure 2 is a front elevational view of the clip taken in the direction of an arrow 2 in Figure 1;

Figure 3 is a side elevational view of the clip taken in the direction of an arrow 3 in Figure 1;

Figure 4 is a rear elevational view of the clip taken in the direction of an arrow 4 in Figure 1;

Figure 5 is a sectional view of the clip taken along a line 5-5 in Figure 3;

Figure 6 is a view similar to Figure 3, but with a ribbon cable connector attached to the clip; and

Figure 7 is a view similar to Figure 5, but with a ribbon cable connector attached.

The drawings show a one-piece connector clip 10 which has a side wall 12 and opposite end walls 11 connected to the side wall 12 and defining with

the side wall a receptacle for receiving a ribbon cable edge-type connector shown at 100 in Figures 6 and 7.

As shown in Figure 1, the receptacle, which is bounded at the top and bottom by the end walls 11 and at one side by the side wall 12, is open at its opposite side. Its rear is covered by a back strap 34. The inner surface of the side wall 12 carries front and rear lips 14 and 16, respectively, and a plurality of transversely extending ribs 20. The outside surface of the side wall 12 carries a polarising and load relief rib 32 which is also visible in Figures 2 and 4.

Access openings 44 are provided in the side wall 12 near the end walls 11 and an access opening 42 is provided between the rear lip 16 and the back strap 34.

The inner surfaces of the end walls 11 carry directional snap tabs 18 and locating steps 36.

A resilient spring mounting tab 22 is connected to the outer surface of each end wall 11 near the front lip 14. Both tabs 22 extend at a diverging angle from the front of the clip to define inclined surfaces or ramps 24. A lead ramp 26 having an inclined front edge and a perpendicular rear edge is positioned on each tab 22 intermediate its length. This is followed by a panel slot 27 which, at its rear, is bounded by a stop rib 28. An upturn 30 is provided at the rear end of each tab 22.

Referring now once more to Figures 6 and 7, the ribbon cable connector 100 has a rectangular solid head to which a ribbon cable 102 is connected. The head of the connector 100 includes a front edge 104 and rear connecting projections 106.

To attach the connector 100 to the clip 10, the rectangular head of the connector 100 is inserted through the open side of the clip 10 in a direction towards the side wall 12. The front edge 104 of the connector head is seated behind the front lip 14 and against the side wall rib 20. The ends of the connector 100 are held laterally by the locating steps 36.

The clip 10 is made as one piece and from a resilient material such as polycarbonate (e.g. Lexan 940-701, a trade mark). The one piece clip 10 can be injection moulded. Its inherent resiliency permits the connector head to be pressed past the directional snap tabs 18 which then snap against the back edge of the connector head as shown in Figures 6 and 7. In this way, the connector head is held firmly within the clip receptacle. The connecting projections 106 bear backwardly against the back strap 34 so that the connector is held firmly in all directions within the clip 10. While the connector 100 can be removed by hand simply by spreading the end walls 11, removal may be facilitated by using simple tools, such as a screwdriver or the

like, which are insertable through the access openings 42 and 44 to dislodge the connector head.

Once the connector is engaged in the clip 10, the clip 10 can then be inserted into an oversize rectangular slot in a back panel (not shown). Upper and lower edges of the slot bear against the inclined surfaces (ramps) 24 to compress the tabs 22 towards the end walls 11. The edges of the slot are then pressed past the lead ramps 26 to engage finally in the panel slots 27. The forward progress of the clip 10 is stopped by the stop ribs 28. The resiliency of the material of the clip 10 holds the tabs 22 outwardly against the upper and lower edges of the slot.

A notch may be provided in the slot to closely receive the rib 32. The rib 32 thus acts to ensure that the clip 10 is inserted in the right orientation to present its connector 100 in the right polarity. The rib 32 also supports the vertical weight of the clip to remove loading from the resilient tabs 22.

To remove the clip 10, the tabs 22 are squeezed towards each other and the clip is simply withdrawn from the panel slot. The pulling action is facilitated by the upturns 30, which provide grip areas for removal of the clip from its mounted position.

Claims

1. A connector clip for a ribbon cable connector (100), the connector clip (10) comprising:
 - a side wall (12);
 - a pair of end walls (11) connected to opposite ends of the side wall (12);
 - a front lip (14) connected to the side wall (12) and to the end walls (11) and extending between the end walls (11), the side wall, end walls and front lip forming a receptacle having an open front and an open side opposite to the side wall (12),
 - a directional snap tab (18) extending from each end wall (11), into the receptacle, near a side of each end wall (11) opposite to the side wall (12), whereby a cable connector can be inserted, without the aid of any tools, into the receptacle behind the front lip (14) with the snap tabs (18) engaged against the connector for retaining the connector in the receptacle; and
 - a resilient spring tab (22) connected to an outer surface of each end wall (11) near the front lip (14), each spring tab (22) extending at an angle outwardly from its respective end wall (11) in a direction away from the front lip (14), and each spring tab (22) carrying a panel slot (27) on an outer surface thereof, the spring tabs (22) being resiliently movable towards each other whereby edges of a panel opening

the side wall a receptacle for receiving a ribbon cable edge-type connector shown at 100 in Figures 6 and 7.

As shown in Figure 1, the receptacle, which is bounded at the top and bottom by the end walls 11 and at one side by the side wall 12, is open at its opposite side. Its rear is covered by a back strap 34. The inner surface of the side wall 12 carries front and rear lips 14 and 16, respectively, and a plurality of transversely extending ribs 20. The outside surface of the side wall 12 carries a polarising and load relief rib 32 which is also visible in Figures 2 and 4.

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Referring now once more to Figures 6 and 7, the ribbon cable connector 100 has a rectangular solid head to which a ribbon cable 102 is connected. The head of the connector 100 includes a front edge 104 and rear connecting projections 106.

To attach the connector 100 to the clip 10, the rectangular head of the connector 100 is inserted through the open side of the clip 10 in a direction towards the side wall 12. The front edge 104 of the connector head is seated behind the front lip 14 and against the side wall rib 20. The ends of the connector 100 are held laterally by the locating steps 36.

The clip 10 is made as one piece and from a resilient material such as polycarbonate (e.g. Lexan 940-701, a trade mark). The one piece clip 10 can be injection moulded. Its inherent resiliency permits the connector head to be pressed past the directional snap tabs 18 which then snap against the back edge of the connector head as shown in Figures 6 and 7. In this way, the connector head is held firmly within the clip receptacle. The connecting projections 106 bear backwardly against the back strap 34 so that the connector is held firmly in all directions within the clip 10. While the connector 100 can be removed by hand simply by spreading the end walls 11, removal may be facilitated by using simple tools, such as a screwdriver or the

like, which are insertable through the access openings 42 and 44 to dislodge the connector head.

Once the connector is engaged in the clip 10, the clip 10 can then be inserted into an oversize rectangular slot in a back panel (not shown). Upper and lower edges of the slot bear against the inclined surfaces (ramps) 24 to compress the tabs 22 towards the end walls 11. The edges of the slot are then pressed past the lead ramps 26 to engage finally in the panel slots 27. The forward progress of the clip 10 is stopped by the stop ribs 28. The resiliency of the material of the clip 10 holds the tabs 22 outwardly against the upper and lower edges of the slot.

A notch may be provided in the slot to closely receive the rib 32. The rib 32 thus acts to ensure that the clip 10 is inserted in the right orientation to present its connector 100 in the right polarity. The rib 32 also supports the vertical weight of the clip to remove loading from the resilient tabs 22.

To remove the clip 10, the tabs 22 are squeezed towards each other and the clip is simply withdrawn from the panel slot. The pulling action is facilitated by the upturns 30, which provide grip areas for removal of the clip from its mounted position.

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 - a side wall (12);
 - a pair of end walls (11) connected to opposite ends of the side wall (12);
 - a front lip (14) connected to the side wall (12) and to the end walls (11) and extending between the end walls (11), the side wall, end walls and front lip forming a receptacle having an open front and an open side opposite to the side wall (12),
 - a directional snap tab (18) extending from each end wall (11), into the receptacle, near a side of each end wall (11) opposite to the side wall (12), whereby a cable connector can be inserted, without the aid of any tools, into the receptacle behind the front lip (14) with the snap tabs (18) engaged against the connector for retaining the connector in the receptacle; and
 - a resilient spring tab (22) connected to an outer surface of each end wall (11) near the front lip (14), each spring tab (22) extending at an angle outwardly from its respective end wall (11) in a direction away from the front lip (14), and each spring tab (22) carrying a panel slot (27) on an outer surface thereof, the spring tabs (22) being resiliently movable towards each other whereby edges of a panel opening



can be received in the panel slots (27) to hold the clip (10) to a panel having the panel opening.

A clip according to claim 1, including a locating step (36) defined on an inner surface of each end wall (11), the locating steps (36) being spaced from each other by a distance equal to a width of a connector to be engaged in the receptacle for positioning the connector.

3. A clip according to claim 1 or claim 2, including a plurality of side wall ribs (20) defined on an inner surface of the side wall (12) and extending into the receptacle for supporting a connector held against the side wall ribs by the directional snap tabs (18).

4. A clip according to claim 1, claim 2 or claim 3, including a back strap (34) connected to and extending between the end walls (11) at rear sides of the end walls opposite to the front lip (11), the back strap defining an access opening (42) with the side wall (12).

5. A clip according to any one of the preceding claims, including a rear lip (16) connected to the side wall (12) and extending into the receptacle.

6. A clip according to claim 4, including a rear lip (16) connected to the side wall (12) and extending into the receptacle, the rear lip (16) bounding the access opening (42).

7. A clip according to claim 4 or claim 6, wherein the side wall (12) includes additional access openings (44) adjacent each of the end walls (11).

8. A clip according to any one of the preceding claims, including a lead ramp (26) defined on the outer surface of each spring tab (22) and a stop rib (28) defined on the outer surface of each spring tab (22), the panel slot (27) for each spring tab (22) being defined between the stop rib (28) and the lead ramp (26) for each spring tab.

9. A clip according to any one of the preceding claims, including an upturned portion (30) positioned at an end of each spring tab (22) spaced away from the front lip (14) and turned outwardly away from the respective end wall (11).

10. A clip according to any one of the preceding claims, including a load relief rib (32) defined

on an outer surface of the side wall (12).

11. A clip according to any one of the preceding claims, wherein the side wall (12), end walls (11), front lip (14), directional snap tabs (18) and spring tabs (22) are made of a single piece of resilient material.

12. A clip according to claim 11, wherein the resilient material is a plastics material.

13. A clip according to claim 11 or claim 12, wherein the entire clip is constituted by the single piece of resilient material.

Patentansprüche

1. Verbindungsklemme für eine Flachkabelverbindung (100), wobei die Verbindungsklemme (10) aufweist:

eine Seitenwand (12),

ein Paar von Endwänden (11) bzw. Stirnwänden, die an gegenüberliegenden Enden mit der Seitenwand (12) verbunden sind,

eine vordere Lippe (14), welche mit der Seitenwand (12) und den Endwänden (11) verbunden ist und welche sich zwischen den Endwänden (11) erstreckt, wobei die Seitenwand, die Endwände und die vordere Lippe eine Aufnahme mit einer offenen Vorderseite und einer offenen Seite gegenüber der Seitenwand (12) bilden,

eine richtungsabhängige Schnapplasche (18) bzw. -Stecker, die sich von jeder Endwand (11) in die Aufnahme erstreckt und zwar in der Nähe jeder Endwand (11) gegenüber von der Seitenwand (12), wodurch ein Kabelverbinder bzw. -Stecker ohne Zuhilfenahme irgendwelcher Werkzeuge in die Aufnahme hinter die Vorderlippe (14) eingesetzt werden kann, wobei die Schnapplaschen (18) mit dem Verbinder in Eingriff stehen, um diesen in der Aufnahme zu halten, und

eine nachgiebige Federlasche (22), die mit einer äußeren Oberfläche jeder Endwand (11) in der Nähe der Vorderlippe (14) verbunden ist, wobei jede Federlasche (22) sich unter einem Winkel nach außen von ihrer jeweiligen Endwand (11) in einer Richtung weg von der vorderen Lippe (14) erstreckt, und wobei jede Federlasche (22) eine Plattennut bzw. -schlitz (27) auf ihrer äußeren Oberfläche trägt und die Federlaschen (22) federnd in Richtung aufeinander zu bewegbar sind, wodurch die Kanten einer Plattenöffnung in den Plattenschlitzten bzw. -nuten (27) aufgenommen werden können, um die Klemme (10) an einer Platte festzuhalten, welche die Plattenöffnung aufweist.



2. Klemme nach Anspruch 1, einschließlich einer Platzierungsstufe (36), die an einer inneren Oberfläche jeder Endwand (11) definiert ist, wobei die Ausricht- bzw. Platzierungsstufen (36) voneinander um einen Abstand entfernt sind, der einer Breite eines Verbinders entspricht, welcher in die Aufnahme eingreifen soll, um den Verbinder auszurichten bzw. anzuordnen.
3. Klemme nach Anspruch 1 oder 2, einschließlich einer Mehrzahl von Seitenwandrippen (20), welche an einer inneren Oberfläche der Seitenwand (12) definiert sind und sich in die Aufnahme erstrecken, um einen Verbinder bzw. Stecker abzustützen, der durch die richtungsabhängigen Schnappstecker (18) bzw. -Laschen gegen die Seitenwandrippen gehalten wird.
4. Klemme nach Anspruch 1, 2 oder 3, einschließlich eines rückwärtigen Streifens (34), der mit den Endwänden (11) an den hinteren Seiten der Endwände gegenüber von der Vorderlippe (11) verbunden sind und sich zwischen diesen erstreckt, wobei der rückwärtige Streifen eine Zugangsöffnung (42) zu der Seitenwand (12) definiert.
5. Klemme nach einem der vorstehenden Ansprüche, einschließlich einer rückwärtigen Lippe (16), die mit der Seitenwand (12) verbunden ist und sich in die Aufnahme hinein erstreckt.
6. Klemme nach Anspruch 4, einschließlich einer rückwärtigen Lippe (16), die mit der Seitenwand (12) verbunden ist und sich in die Aufnahme erstreckt, wobei die rückwärtige Lippe (16) die Zugangsöffnung einengt bzw. begrenzt.
7. Klemme nach Anspruch 4 oder 6, wobei die Seitenwand (12) zusätzliche Zugangsöffnungen (44) aufweist, die neben jeder der Stirnwände (11) liegen.
8. Klemme nach einem oder vorstehenden Ansprüche, einschließlich einer Führungsrampe (26), welche auf der äußeren Oberfläche jeder Federlasche (22) definiert ist, und einer Halterippe (28), welche auf der äußeren Oberfläche jeder Federlasche (22) definiert ist, wobei der Plattenschlitz (27) für jede Federlasche (22) zwischen der Halterippe (28) und der Führungsrampe (26) für jede Federlasche definiert ist.
9. Klemme nach einem der vorstehenden Ansprüche, einschließlich eines nach oben gewendeten Abschnittes (30), welcher im Abstand von

der vorderen Lippe (14) an einem Ende jeder Federlasche (22) angeordnet ist und welcher nach außen von der jeweiligen Endwand (11) wegwendet ist.

10. Klemme nach einem der vorstehenden Ansprüche, einschließlich einer Entlastungsrippe (32), die an einer äußeren Oberfläche der Seitenwand (12) definiert ist.
11. Klemme nach einem der vorstehenden Ansprüche, wobei die Seitenwand (12), die Endwände (11), die vordere Lippe (14), die richtungsabhängigen Schnappstecker (18) bzw. -Laschen und die Federstecker (22) aus einem einzigen Stück federnd nachgiebigen Materials hergestellt sind.
12. Klemme nach Anspruch 11, wobei das nachgiebige Material ein Kunststoffmaterial ist.
13. Klemme nach Anspruch 11 oder 12, wobei die gesamte Klemme aus einem einzelnen Stück federnd nachgiebigen Materials aufgebaut ist.

Revendications

1. Attache de connecteur pour un connecteur de câble ruban (100), l'attache de connecteur (10) comprenant :
 une paroi latérale (12) ;
 une paire de parois d'extrémité (11) reliées aux extrémités opposées de la paroi latérale (12) ;
 une lèvre avant (14) connectée à la paroi latérale (12) et aux parois d'extrémité (11) et s'étendant entre les parois d'extrémité (11), la paroi latérale, les parois d'extrémité et la lèvre avant formant un réceptacle comportant une partie avant ouverte et un côté ouvert faisant face à la paroi latérale (12) ;
 une lame encliquetable (18) directionnelle s'étendant à partir de chaque paroi d'extrémité (11), dans le réceptacle, au voisinage d'un côté de chaque paroi d'extrémité (11), opposé à la paroi latérale (12), ce par quoi un connecteur de câble peut être introduit, sans l'aide d'aucun outil, dans le réceptacle, derrière la lèvre avant (14), les lames encliquetables (18) étant amenées en contact contre le connecteur pour maintenir le connecteur dans le réceptacle ; et
 une lame ressort (22) élastique reliée à une surface extérieure de chaque paroi d'extrémité (11) au voisinage de la lèvre avant (14), chaque lame ressort s'étendant selon un certain angle vers l'extérieur à partir de sa paroi d'extrémité (11) respective dans un sens



s'éloignant de la lèvre avant (14), et chaque lame ressort (22) portant une fente de panneau (27) sur sa surface extérieure, les lames ressorts (22) étant mobiles de manière élastique en direction l'une de l'autre ce par quoi les bords d'une ouverture de panneau peuvent être reçus dans les fentes de panneau (27) pour maintenir l'attache (10) sur un panneau comprenant ladite ouverture de panneau.

2. Attache selon la revendication 1, comprenant une partie étagée de positionnement (36) définie sur une surface intérieure de chaque paroi d'extrémité (11), les parties étagées de positionnement (36) étant espacées l'une de l'autre d'une distance égale à la largeur d'un connecteur devant être engagé dans le réceptacle pour positionner le connecteur.

3. Attache selon la revendication 1 ou la revendication 2, comprenant une pluralité de nervures de paroi latérale (20) définies sur une surface intérieure de la paroi latérale (12) et s'étendant à l'intérieur du réceptacle pour supporter un connecteur maintenu contre les nervures de paroi latérale par les lames encliquetables directionnelles (18).

4. Attache selon la revendication 1, la revendication 2 ou la revendication 3, comprenant un étrier arrière (34) connecté à et s'étendant entre les parois d'extrémité (11) au droit des côtés arrière des parois d'extrémité opposées à la lèvre avant (11), l'étrier arrière définissant une ouverture d'accès (42) avec la paroi latérale (12).

5. Attache selon l'une quelconque des revendications précédentes, comprenant une lèvre arrière (16) connectée à la paroi latérale (12) et s'étendant dans le réceptacle.

6. Attache selon la revendication 4, comprenant une lèvre arrière (16) connectée à la paroi latérale (12) et s'étendant dans le réceptacle, la lèvre arrière (16) limitant l'ouverture d'accès (42).

7. Attache selon la revendication 4 ou la revendication 6, dans laquelle la paroi latérale (12) comprend des ouvertures d'accès supplémentaires (44) adjacentes à chacune des parois d'extrémité (11).

8. Attache selon l'une quelconque des revendications précédentes, comprenant une rampe (26) définie sur une surface extérieure de chaque lame élastique (22) et une nervure d'arrêt (28)

définie sur la surface extérieure de chaque lame ressort (22), la fente de panneau (27) pour chaque lame ressort (22) étant définie entre la nervure d'arrêt (28) et la rampe de tête (26), pour chaque lame ressort.

9. Attache selon l'une quelconque des revendications précédentes, comprenant une partie formant retour (30) positionnée à l'extrémité de chaque lame ressort (22) éloignée de la lèvre avant (14) et retournée vers l'extérieur par rapport à la paroi d'extrémité respective.

10. Attache selon l'une quelconque des revendications précédentes, comprenant une nervure de suppression d'effort (32) définie sur une surface extérieure de la paroi latérale (12).

11. Attache selon l'une quelconque des revendications précédentes, dans laquelle la paroi latérale (12), les parois d'extrémité (11), la lèvre avant (14), les lames encliquetables directionnelles (18) et les lames ressorts (22) sont faites d'une seule pièce en un matériau élastique.

12. Attache selon la revendication 11, dans laquelle le matériau élastique est une matière plastique.

13. Attache selon la revendication 11 ou la revendication 12, dans laquelle la totalité de l'attache est constituée d'une seule pièce d'un matériau élastique.

