

Description

This invention relates to connector housings and more particularly to housings mountable on printed circuit boards to interconnect electro-optic devices and fiber optic connectors.

It is known to mount a housing on a printed circuit board and in a profiled bore of which is disposed a ferrule member. A metal clip member secures the ferrule member within the profiled bore by being itself secured onto the housing and also operates as a heat sink for an electro-optic member within the ferrule member. A fiber optic connector including a ferrule member terminated onto a fiber optic transmission member is securably connected to the housing within the profiled bore to interconnect the electro-optic member and the fiber optic transmission member. The housing, ferrule member, metal clip, and electro-optic member are all secured together as a device mountable onto a printed circuit board with no latching members for latchably securing a ferrule member of a fiber optic connector within the housing.

EP-A-0 016 526 discloses a connector housing for interconnecting optical ferrule connectors in a profiled bore extending through the housing including at an end of the bore means for releasably securing a ferrule within the bore at that end and means for mounting the housing to a board.

It is an object of the present invention to provide an improved connector housing.

According to the present invention a connector housing for interconnecting optical ferrule connectors in a profiled bore extending through the housing including at one end of the bore means for releasably securing a ferrule within the bore at that end and means for mounting the housing to a board is characterised in that the means for releasably securing and the means for mounting together comprise a pair of latching members stamped and formed from sheet metal and having mounting sections secured in recesses of the housing at opposite sides of the profiled bore, the latching members also extending beyond the said one end of the bore as opposed spring members having bent back portions extending back towards said one end with free ends of said bent back portions adjacent said one end being bent inwardly towards said spring members and positioned adjacent said one end for releasable engagement with an optical ferrule connector that has been positioned into said one end of the bore, said mounting sections each having at least one mounting leg extending outwardly from a bottom surface of the housing for engagement in a respective hole in a printed circuit board to mount the housing thereon.

US-A-4 152 041 discloses a hybrid filter header having a pair of spring members extending from a base secured to the header on opposite sides of pin terminals extending from the header and arranged to common the terminals to a ground plane when the header is in a disconnected condition. A mating member is arranged

to spread the opposed spring members on mating engagement, the spring members latching behind a shoulder of an insulating projection extending from the mating member between and forwardly of the contacts thereof.

The invention will now be described by way of example with reference to the accompanying partly diagrammatic drawings, in which:—

Figure 1 is a perspective, exploded view of a housing and its parts for interconnecting ferrule members to form a fiber optic connection.

Figure 2 is a perspective view showing the housing and parts assembled and mounted on a printed circuit board with fiber optic connectors latchably secured therein.

Figure 3 is a part top plan view of the housing with a part of the housing broken away showing the latching members in engagement with the ferrule member of the fiber optic connector.

Figure 4 is a view taken along line 4—4 of Figure 2.

Figures 1 through 4 illustrate the invention which comprises a housing member 10, spring latching members 12, and retaining clip 14. Housing member 10 is preferably molded from a suitable plastic material and has a profiled bore 16 extending therethrough in the form of frustoconical sections at each end thereof with a cylindrical section interconnecting the frustoconical sections. The entrance to one end of profiled bore 16 has a substantially annular recess 18 which has a flat keying surface therein, whereas the other end of profiled bore 16 has a substantially annular recess 20 also with a flat keying surface therein. Stop surfaces 22, 24 are located respectively at the intersections of annular recess 18 with the frustoconical section and annular 20 and the intersection of the frustoconical section of profile bore 16.

Slots 26 extend through housing member 10 and have smaller dimensioned sections 28 with stop surfaces 30 separating the larger and smaller sections of slots 26. Openings 32 are located in the sidewalls of housing member 10 and are in communication with the larger sections of slots 26 and they terminate at the position of stop surfaces 30. Openings 32 extend along the walls of projections 34 that extend outwardly from the sides of housing member 10. Recesses 36, 38 extend inwardly from the sides of housing member 10 and are parallel to one another. Projections 40, 42 extend outwardly from the bottom surface of housing member 10 with annular projections 44 extending outwardly from projections 42 and concentric therewith.

Latching members 12 are stamped and formed from a suitable metal having desirable spring characteristics and each latching member 12 includes a mounting section 46 from which extends a spring member 48 which includes a curved-back section 48A extending toward mounting section 46 and terminating in an inwardly-directed end 50. Projections 52 extend outwardly from the top of mounting sections 46. Mounting legs 54 extend outwardly from mount-

ing sections 46 and contain arcuate projections 56 adjacent the outer ends thereof.

Latching members 12 are securely mounted in slots 26 of housing member 10 with mounting sections 46 positioned in the larger sections of slot 26 and bottoming against stop surfaces 30 with mounting legs 54 extending through the smaller sections 28 of slots 26 and extending outwardly beyond the bottom surface of housing member 10. Spring members 48 extend outwardly through openings 32 of housing member 10 and extend along the sides thereof with the curved-back sections 48A extending toward annular recess 18 and terminating adjacent thereto with inwardly-directed ends 50 being positioned adjacent annular recess 18. Projections 52 bite into housing member 10 thereby securing latching members 12 therewithin.

After spring latching members 12 have been secured within slots 26 of housing member 10, housing member 10 can now be mounted onto printed circuit board 58 with arcuate projections 56 mounting legs 54 frictionally disposed in holes 60 in printed circuit board 58 while annular projections 44, are positioned within holes 62 therein. Arcuate projections 56 frictionally engage the walls of holes 60 thereby securing housing member 10 in position on printed circuit board 58 and mounting legs 54 extend slightly below a metal section 78 secured to board 58 to which mounting legs 54 are soldered thereby permanently securing housing member 10 on printed circuit board 58. Projections 40, 42 position housing member 10 away from printed circuit board 58 for cleaning purposes.

Housing member 10 is mounted on printed circuit board 58 adjacent electro-optic device 64 of the type disclosed in U.S. Patent No. 4,186,996, the disclosure of which is completely incorporated herein by reference. Electro-optic device 64 can be either a light-transmitting device or a light-receiving device which is encapsulated within a ferrule member formed from a suitable plastic having resilient characteristics that enables the front end having a frustoconical section 66 and cylindrical section 68 to be resiliently mated within the corresponding frustoconical and cylindrical sections of profiled bore 16 with annular section 70 being disposed within recess 20. A flat surface 72 on annular section 70 mates with a corresponding flat surface within annular recess 20 to key the positioning of electro-optic device 64 within the profiled bore 16 of housing member 10. Electrical leads 74 of electro-optic device 64 are electrically connected to conductive paths 76 on printed circuit board 58. When electrical leads 74 are flow-soldered to conductive paths 76, mounting legs 54 are also soldered to metal section 78 secured to printed circuit board 58 thereby securing housing member 10 on printed circuit board 58. The heat from the flow-soldering operation may deform projections 44 in such a way as to expand the end of projections 44 thereby riveting projections 44 to printed circuit board 58 thereby providing an additional securing arrangement.

Retaining clip 14 is stamped and formed from a suitable metal having spring characteristics and includes a body section 80 having a U-shaped opening 82 therein which clears electrical lead 74 when body section 80 is disposed against electro-optic device 64. A stop member 84 is at right angles to body section 80 and engages housing member 10 to position retaining clip 14 thereon. Spring arms 86 extend outwardly from body section 80 and inwardly-directed ends 88 which are slidably disposed in recesses 38 when retaining clip 14 is moved into a retaining position on housing member 10 to retain electro-optic device 64 within housing member 10 and to apply an axial force thereto to properly resiliently seat frustoconical section 66 and cylindrical section 68 within the corresponding sections of profiled bore 16 as a result of body section 80 engaging the rear surface of electro-optic device 64.

If desired, housing member 10 can be inserted within a rectangular opening of a mounting panel with projections 34 engaging one surface of the panel and a U-shaped clip (not shown) has its legs positioned within recesses 36 to retain housing member 10 in position within the opening of the panel.

Fiber optic connector 90 includes a plastic ferrule member 92 into which a fiber optic transmission member is positioned with transmission core member 94 having its end coincident with the end of cylindrical section 96. Frustoconical section 98 extends between cylindrical section 96 and annular section 100 which has a flat surface 102. Metal crimping ferrule 104 is crimped onto ferrule 92 and onto outer jacket 106 of the fiber optic transmission member thereby effectively terminating the fiber optic transmission member. The plastic material of which ferrule member 92 is made is suitably resilient so that frustoconical section 98 and cylindrical section 96 mateably and resiliently engage corresponding frustoconical section and cylindrical section of profiled bore 16 of housing member 10 when they are inserted thereinto thereby effecting an operable interconnection between fiber optic connector 90 and electro-optic device 64. Fiber optic connector 90 is latchably secured within the profile bore of housing member 10 by means of spring members 48 with inwardly-directed ends 50 engaging onto the rear surface of annular section 100 as illustrated in Figure 3 with annular section 100 fitting within annular recess 18 and flat surface 102 keyingly engaging the flat surface within recess 18. Spring members 48 are cammed outwardly when fiber optic connector 90 is being inserted into housing member 10 so that fiber optic connector 90 can be inserted into housing member 10 with low force and is removed from housing member 10 with substantially higher forces. Plastic ferrule member 92 is of the type disclosed in U.S. Patent No. 3,999,837, the disclosure of which is completely incorporated herein by reference.

Instead of electro-optic device 64 being positioned in recess 20 of housing member 10, a metal can type of electro-optic device identified as TO-

18/46 can be bonded within recess 20. A TO-18 electro-optic device having a plastic cap is press fitted into recess 20. Retaining clip 14 serves the dual function of retaining the electro-optic device in position in housing member 10 and also defines a heat sink to carry heat away therefrom.

If desired, another fiber optic connector similar to that of fiber optic connector 90 can be positioned within recess 20 of housing member 10 and retained therein by retaining clip 14 to provide an optical coupling device for optically coupling the terminated ends of fiber optic transmission members.

Claims

1. A connector housing (10) for interconnecting optical ferrule connectors (64, 90) in a profiled bore (16) extending through the housing (10) including at one end of the bore (16) means (12) for releasably securing a ferrule (90) within the bore (16) at that end and means (12) for mounting the housing (10) to a board (58) characterised in that the means for releasably securing and the means for mounting together comprise a pair of latching members (12) stamped and formed from sheet metal and having mounting sections (46) secured in recesses (26) of the housing (10) at opposite sides of the profiled bore (16), the latching members also extending beyond the said one end of the bore (16) as opposed spring members (48) having bent back portions (48a) extending back towards said one end with free ends (50) of said bent back portions (48a) adjacent said one end being bent inwardly towards said spring members (48) and positioned adjacent said one end for releasable engagement with an optical ferrule connector (90) that has been positioned into said one end of the bore (16), said mounting sections (46) each having at least one mounting leg (54) extending outwardly from a bottom surface of the housing (10) for engagement in a respective hole in a printed circuit board (58) to mount the housing (10) thereon.

2. A housing as set forth in claim 1 further characterised by a retaining clip (14) which has a body member (80) and spring members (86) extending outwardly from said body member (80) and having bent-back inwardly-directed end members (88) slidably engageable within further recesses (36) in said housing adjacent the other end of said profiled bore (16).

3. A housing as set forth in claim 2 characterised in that said body member (80) includes a stop member (84) for engagement with said housing to limit movement of said inwardly-directed end members (88) along said recesses (36) and said body member (80) having a U-shaped opening (82).

4. A housing as set forth in claim 1 characterised in that said bottom surface of said housing includes projections (40) to space said housing from said printed circuit board (58).

5. A housing (10) as claimed in any preceding claim characterised in that each latching member

(12) includes a pair of mounting legs (54) spaced along a line parallel to the profiled bore (16) and engageable in respective holes in a printed circuit board (58).

6. A housing as claimed in any preceding claim characterised in that the recesses (26) at said one end have openings (32) opening to adjacent sides of the housing (10), the latching member (12) extending through respective openings (32) and the spring members (48) extending from the openings along the sides of the housing (10).

Patentansprüche

1. Verbindergehäuse (10) zur Verbindung von optischen Endringverbindern (64, 90) in einer profilierten Bohrung (16), die sich durch das Gehäuse (10) hindurcherstreckt, wobei an einem Ende der Bohrung (16) Einrichtungen (12) zur lösbaren Festlegung eines Endrings (90) innerhalb der Bohrung (16) an diesem Ende vorgesehen sind, sowie Einrichtungen (12) zur Montage des Gehäuses (10) an einer Platte (58), dadurch gekennzeichnet, daß die Einrichtungen zur lösbaren Befestigung und die Einrichtungen zur Montage zusammen ein Paar von Verriegelungselementen (12) umfassen, die aus Metallblech gestanz und geformt sind und Montageabschnitte (46) besitzen, welche in Ausnehmungen (26) des Gehäuses (10) an entgegengesetzten Seiten der profilierten Bohrung (16) befestigt sind, daß die Verriegelungselemente sich auch über das eine Ende der Bohrung (16) als entgegengesetzte Federelemente (48) hinaus erstrecken, welche zurückgebogene Abschnitte (48a) haben, die sich zurück zu dem einen Ende erstrecken, daß freie Enden (50) der zurückgebogenen Abschnitte (48a) angrenzend an das eine Ende einwärts zu den Federelementen (48) gebogen und benachbart zu dem einen Ende zum lösbaren Eingriff mit einem optischen Endringverbinder (90) positioniert sind, welcher in das eine Ende der Bohrung (16) eingesetzt worden ist, daß die Montageabschnitte (46) jeweils wenigstens einen Montageschenkel (54) besitzen, der sich auswärts von einer Bodenfläche des Gehäuses (10) zum Eingriff in ein entsprechendes Loch in einer gedruckten Schaltungsplatte (58) erstreckt, um das Gehäuse (10) darauf zu montieren.

2. Gehäuse nach Anspruch 1, ferner gekennzeichnet durch einen Halteclip (14), welcher ein Körperelement (80) und Federelemente (86) hat, die sich auswärts von dem Körperelement (80) erstrecken und einwärts gerichtet zurückgebogene Endelemente (88) besitzen, die gleitend innerhalb von weiteren Ausnehmungen (36) in dem Gehäuse in der Nähe des anderen Endes der profilierten Bohrung (16) eingreifen können.

3. Gehäuse nach Anspruch 2, dadurch gekennzeichnet, daß das Körperelement (80) ein Anschlagelement (84) zum Eingriff mit dem Gehäuse umfaßt, um die Bewegung der einwärts gerichteten Endelemente (88) entlang der Ausnehmungen (36) zu begrenzen, und daß das Körperelement (80) eine U-förmige Öffnung (82) besitzt.

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If desired, another fiber optic connector similar to that of fiber optic connector 90 can be positioned within recess 20 of housing member 10 and retained therein by retaining clip 14 to provide an optical coupling device for optically coupling the terminated ends of fiber optic transmission members.

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2. A housing as set forth in claim 1 further characterised by a retaining clip (14) which has a body member (80) and spring members (86) extending outwardly from said body member (80) and having bent-back inwardly-directed end members (88) slidably engageable within further recesses (36) in said housing adjacent the other end of said profiled bore (16).

3. A housing as set forth in claim 2 characterised in that said body member (80) includes a stop member (84) for engagement with said housing to limit movement of said inwardly-directed end members (88) along said recesses (36) and said body member (80) having a U-shaped opening (82).

4. A housing as set forth in claim 1 characterised in that said bottom surface of said housing includes projections (40) to space said housing from said printed circuit board (58).

5. A housing (10) as claimed in any preceding claim characterised in that each latching member

(12) includes a pair of mounting legs (54) spaced along a line parallel to the profiled bore (16) and engageable in respective holes in a printed circuit board (58).

6. A housing as claimed in any preceding claim characterised in that the recesses (26) at said one end have openings (32) opening to adjacent sides of the housing (10), the latching member (12) extending through respective openings (32) and the spring members (48) extending from the openings along the sides of the housing (10).

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2. Gehäuse nach Anspruch 1, ferner gekennzeichnet durch einen Halteclip (14), welcher ein Körperelement (80) und Federelemente (86) hat, die sich auswärts von dem Körperelement (80) erstrecken und einwärts gerichtet zurückgebogene Endelemente (88) besitzen, die gleitend innerhalb von weiteren Ausnehmungen (36) in dem Gehäuse in der Nähe des anderen Endes der profilierten Bohrung (16) eingreifen können.

3. Gehäuse nach Anspruch 2, dadurch gekennzeichnet, daß das Körperelement (80) ein Anschlagelement (84) zum Eingriff mit dem Gehäuse umfaßt, um die Bewegung der einwärts gerichteten Endelemente (88) entlang der Ausnehmungen (36) zu begrenzen, und daß das Körperelement (80) eine U-förmige Öffnung (82) besitzt.



4. Gehäuse nach Anspruch 1, dadurch gekennzeichnet, daß die Bodenfläche des Gehäuses Vorsprünge (40) umfaßt, um das Gehäuse im Abstand von der gedruckten Schaltungsplatte (58) zu positionieren.

5. Gehäuse (10) nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß jedes Verriegelungselement (12) ein Paar von Montageschenkeln (54) umfaßt, die im Abstand entlang einer zu der profilierten Bohrung (16) parallelen Linie angeordnet sind und in jeweilige Löcher in einer gedruckten Schaltungsplatte (58) eingreifen können.

6. Gehäuse nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Ausnehmungen (26) an dem einen Ende Öffnungen (32) besitzen, welche sich zu benachbarten Seiten des Gehäuses (10) öffnen, daß die Verriegelungselemente (12) sich durch jeweilige Öffnungen (32) erstrecken, und daß sich die Federelemente (48) von den Öffnungen entlang der Seiten des Gehäuses (10) erstrecken.

Revendications

1. Boîtier de connecteur (10) pour interconnecter des connecteurs à viroles optiques (64, 90) dans une lumière profilée (16) s'étendant à travers le boîtier (10), comprenant, à une première extrémité de la lumière (16), des moyens (12) destinés à fixer de façon amovible une virole (90) à l'intérieur de la lumière (16) à cette extrémité et des moyens (12) pour le montage du boîtier (10) sur une plaquette (58), caractérisé en ce que les moyens de fixation amovible et les moyens de montage comprennent ensemble deux éléments de verrouillage (12) coupés et formés dans un métal en feuille et comportant des parties de montage (46) fixées dans des évidements (26) du boîtier (10) sur des côtés opposés de la lumière profilée (16), les éléments de verrouillage s'étendant également au-delà de ladite première extrémité de la lumière (16) sous forme d'éléments à ressorts opposés (48) ayant des parties (48A) recourbées en arrière qui reviennent vers ladite première extrémité, des extrémités libres (50) desdites parties (48A) recourbées en arrière, adjacentes à ladite première extrémité, étant courbées vers l'intérieur en direction desdits éléments à ressorts (48) et placées à proximité immédiate de

ladite première extrémité pour s'enclencher de façon amovible avec un connecteur à virole optique (90) qui a été mis en place dans ladite première extrémité de la lumière (16), lesdites parties de montage (46) ayant chacune au moins une branche de montage (54) qui s'étend vers l'extérieur d'une surface inférieure du boîtier (10) pour s'enclencher dans un trou respectif d'une plaquette (58) à circuit imprimé pour le montage du boîtier (10) sur celle-ci.

2. Boîtier selon la revendication 1, caractérisé en outre par une pince (14) de retenue qui comporte un élément de corps (80) et des éléments à ressorts (86) s'étendant vers l'extérieur dudit élément de corps (80) et ayant des éléments extrêmes (88) dirigés vers l'intérieur, recourbés en arrière, pouvant s'enclencher par glissement dans d'autres évidements (36) dudit boîtier, adjacents à l'autre extrémité de ladite lumière profilée (16).

3. Boîtier selon la revendication 2, caractérisé en ce que ledit élément de corps (80) comprend un élément de butée (84) destiné à porter contre ledit boîtier pour limiter le mouvement desdits éléments extrêmes (88) tournés vers l'intérieur le long desdits évidements (36), ledit élément de corps (80) ayant une ouverture (82) de forme en U.

4. Boîtier selon la revendication 1, caractérisé en ce que ladite surface inférieure dudit boîtier comporte des saillies (40) destinées à espacer ledit boîtier de ladite plaquette (58) à circuit imprimé.

5. Boîtier (10) selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque élément de verrouillage (12) comprend une paire de branches de montage (54) espacées le long d'une ligne parallèle à la lumière profilée (16) et pouvant s'enclencher dans des trous respectifs d'une plaquette (58) à circuit imprimé.

6. Boîtier selon l'une quelconque des revendications précédentes, caractérisé en ce que les évidements (26), à ladite première extrémité, présentent des ouvertures (32) s'ouvrant vers des côtés adjacents du boîtier (10), l'élément de verrouillage (12) s'étendant à travers des ouvertures respectives (32) et les éléments à ressorts (48) s'étendant à partir des ouvertures le long des côtés du boîtier (10).



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