

Description

The invention relates to an electrical connector, more particularly, to an electrical connector for use in the data communications industry.

There is a requirement to protect the equipment from which an open data link-line extends to prevent spurious and potentially damaging electrical signals being conveyed along the link-line to the equipment, as a result of misconnection or electrical strays.

Accordingly, it has been proposed to shunt preselected terminals of an interface connector. A disadvantage of some prior proposals is that the shunting mechanism must be manually removed prior to mating of the connector to establish the data link.

In addition, it is important that the resulting construction is simple and reliable in operation and adapted for manufacture by mass production techniques.

In one prior proposal described in U.S. Patent 4,224,486, an electrical connector comprises an insulating housing having a front, mating face and a rear, wire connecting face, a plurality of terminals mounted in the housing with wire connecting portions at the wire connecting face and contact portions at the mating face, and electrical shunting means mounted in the housing aligned with contact portions.

Although the shunt means is disengaged by the action of mating the connector without manual intervention, a cam member must be provided on the housing of the mating connector to effect such disengagement. This requires additional space and contributes to an increase in the complexity, cost and size of the connector assembly.

According to the invention, the contact portions are resiliently deformable from positions engaging the shunting means in an unmated condition of the connector to positions spaced from the shunting means in a mated condition of the connector by mating engagement with contact portions of a complementary connector, the connector being adapted for mating with a complementary hermaphroditic connector. Further, the housing has a terminal supporting platform extending between the faces and each contact portion is formed as a resilient contact tongue extending from proximate the mating face to a free end remote from the mating face; each contact tongue is matable against the contact tongue of the complementary connector to urge the contact tongues in each connector toward respective platforms. The shunting means is fixed in the housing aligned with the free ends of preselected contact tongues and comprises two one-piece shunt bars located in tandem relation, each having a bridge portion extending transversely of all the contact tongues and a pair of spaced contact lugs extending from the bridge portion toward respective preselected contact tongues. Each shunt bar engages a pair of preselected

contact tongues when the connector is in an unmated condition and is spaced from the respective preselected contact tongues when the connector is in a mated condition.

By bridging all of the contact tongues, the shunt bars advantageously permit shunting of spaced preselected terminals with intermediate terminals being bridged. Suitably the lugs are assymmetrically arranged along the bridge portion whereby substantially identical shunt bars may be used in opposite sense, i.e. oriented 180° in relation to each other.

Coding means may be provided on the shunt bars to ensure that receipt of the shunt bars in the housing in only one predetermined orientation or combination of orientations is possible.

Preferably, the contact tongues are reversely bent with rearwardly extending free ends aligned with the respective contact lugs.

As the tongues pivot about the axis of their fold line during mating engagement, the displacement of the ends away from the contact lugs of the shunt bar is advantageously greater than the displacement of their contact portions.

US-A-4 274 691 discloses a socket connector for printed circuit board mounting and having a plurality of resilient contact tongues extending rearwardly from a mating face to free ends aligned with shunt means fixed in the housing and engaging adjacent tongues when unmated, and, when mated with a plug connector, disengaging from the shunt means.

An example of a connector, according to the invention, will now be described with reference to the accompanying drawings in which:

Figure 1 is a perspective view of the connector with orthogonal cable lead out;

Figure 2 is a perspective view of the connector with axial cable lead out;

Figure 3 is an exploded perspective view of the connector;

Figure 4 is a cross-sectional view taken along line 4-4 of Figure 1 of a pair of similar connectors aligned for mating;

Figure 5 is a cross-sectional view of the connector pair of Figure 4 after mating;

Figure 6 is an exploded perspective view showing a terminal housing of the connector in greater detail;

Figure 7 is a cross-sectional view of the terminal housing taken along line 7-7 of Figure 3; and,

Figure 8 is a perspective view of a bush for use with the connector.

Each connector is of identical hemaphroditic construction and as shown particularly in Figure 3, comprise a bipartite cover 10 having upper and lower cover parts 11 and 12, respectively, of insulating plastics material, upper and lower cable clamping ground shields 13 and 14 respectively, a housing 15 for terminals 16 and a wire stuffer 17. A rear cap 18 is provided for attachment to the cover where axial cable lead out is not required.

As shown particularly in Figures 3 and 6, the

(11)

upper and lower cover parts 11 and 12 are each moulded in one piece of plastics material and comprise box-like constructions open at a front having respectively, base walls 21 and 22, pairs of opposite side walls 23 and 24 and rear walls 25 and 26. The covers 11, 12 are integrally formed with latching arms 27 and 28, respectively joined to the exterior of the side walls intermediate front and rear ends by web hinges 29 and 30 (as shown particularly in Figure 5). Panel mounting ribs 31 and 32 defining rearwardly facing shoulders 33 and 34 and having canted, forwardly facing surfaces extending transversely across the arms adjacent front, mating ends which are formed with complementary latches comprising a T-slot 36 in one arm 27 for receiving a T-bar 37 in the other arm 28 having, respectively, canted lead-in surfaces 39 and 40. The side walls of the upper cover part 11 are rebated towards a front end to provide a terminal housing receiving recess 41. A transverse shield-locating rib 42 extends across the cover interior in parallel relation to a locating rib 43 stepped back from the front end.

The side walls 24 of the lower cover part 12 are also rebated towards a front end to provide a terminal housing receiving recess 44 and a pair of terminal housing locating studs 45 upstand from the base wall 22 adjacent the front end. Frangible portions 46 are provided in the side walls of both upper and lower cover parts to permit optional cable lead out directions. Cable receiving recesses 49 and 51 are provided in both rear walls to permit axial cable lead out. Cap 18 has a locating boss 53 with a peripheral groove 54 receiving the lips of the recesses 49 and 51 when axial lead out is not desired.

The upper shield 13 is stamped and formed from a single piece of sheet metal and comprises a base panel 61 from opposite sides of which depend flanges 62 having latching apertures 63 on each side of a cable receiving recess 64. A braid contacting tab 65 depends from a rear of the panel and a forwardly extending portion 66 is stepped and extends to a bifurcated contact portion having contact tabs with enlarged, upturned contact surfaces 67 at their front ends.

The lower shield 14 is also stamped and formed from one piece of sheet metal stock and comprises flanges 69, 70 that upstand from the opposite sides and the rear of a base panel 71, cable receiving apertures 73 and 74 being provided in such flange and being defined by intumed cable gripping lips 75 on respective opposite sides of each aperture. Braid connecting tabs 76 are pushed out of the base panel adjacent each aperture. Latching detents 77 are provided on the flanges for receipt in the latching apertures 63 wherein the upper shield is applied to the lower shield. A forwardly extending portion of the base panel is provided with a pair of stud receiving apertures 78 and the front of the base panel is bifurcated and stepped to provide contact surfaces 79 for establishing electrical connection with the contact surfaces 67 of the shield of a mating connector half, as shown in

Figure 5.

Referring to Figures 6 and 7, terminal housing 15 is moulded in one piece of plastics material and comprises a foot 80 supporting a terminal support platform 82 extending between forward, mating and rear, wire connecting faces of the housing. A series of parallel channels 83 extend forwardly across the terminal support platform 82 from the wire connecting face defining between them undercut terminal supporting ribs 84. Parallel locking grooves 87 extend rearwardly in alignment with the ribs from the front of the platform. Side walls 88 and 89 upstand from respective opposite side edges of the terminal supporting platform and are bridged at a front end by a hood 91. The side walls have canted leading edges 92 extending from locations adjacent the platform 82 to locations adjacent the front end of the hood. Pairs of aligned downwardly extending slots 93 and 95, 94 and 96 are formed in the side walls adjacent the hood, slots 94 and 95 being less extensive in depth than aligned slots 93 and 96. Slots 97 and 98 are also formed across the ribs 84 in alignment with the respective pairs of slots 94, 96 and 93, 95 in the side walls.

Adjacent the rear of the housing 15, longitudinally extending portions of the side walls are formed with vertical locating ribs 99, 101 and laterally extending side wall portions 90, 90' define forwardly facing mounting shoulders 105, 105' for abutment with the edges of a panel aperture. Vertically extending guide channels 102 and 103 are located in each side wall intermediate the ribs 90, 101 and the front of the terminal platform 82.

Each terminal 16 is stamped and formed from a single piece of sheet metal stock and comprises an upstanding slotted wire-receiving barrel portion 106 similar to that described in our US Patent No. 3 860 318 connected by a neck to a body portion 107 from a front end of which extends a reversely bent contact tongue 108 formed with a step 109 at a free end. A locking lance 110 is pushed out from the body portion 107 and locking ears 111 upstand from respective opposite edges of the body portion. The terminals are assembled with the housing 15 by insertion from the rear until their locking lances resile into the locking slots 87 when side edges of the body portion 107 will be located in the undercut areas under adjacent rear surfaces of the adjacent barrier walls 86, preventing further movement of the terminals in any direction. The contact tongues 108 will then be exposed at the mating face.

Identical shunting bars 113, 113' are stamped from single pieces of sheet metal with spaced apertures 114, 114' and 115, 115' defining between them contact lugs 116, 116' and 117, 117' extending from a bridge portion. Tabs 118, 118' extend from an end of each shunting bar. The shunting bars 113, 113' are located in respective aligned slots 93, 95, 97 and 94, 96, 98, mutually orientated at 180° so that tabs 118, 118' are

received in the shorter slots 95, 94 respectively. It should be noted that, as shown in Figure 7, the apertures 114, 115 of one shunting bar 113 are aligned with the contact lugs 116', 117' of the other bar 113' because of the asymmetric location of the apertures with the result that the contact lugs 116, 117 engage stepped ends 109 and shunt the first and third terminals and contact lugs 116', 117' engage stepped ends of the second or fourth terminals.

The stuffer 17 is moulded in one piece of stiffly flexible plastics material with a series of internal partition walls 123 defining wire receiving passageways extending between outer and inner wire gripping lip pairs 121 and 124 to a cylindrical barrel receiving portion having a cylindrical wire engaging projection 125 Fig. 5 similar to that described in our US Patent No. 4 186 984. Vertical guiding ribs 126 extend on respective opposite ends.

In assembling the connector, the terminals 16 are inserted into the housing 15 as described above and the shunting bars 113, 113' are then inserted into the slots to shunt desired alternate terminals.

A hinged bush 127 is applied to a stripped shielded cable 128 in which shielding braid 129 has been reversely bent to extend rearwardly across a waisted supporting ferrule to clamp the braid and the individual insulated cable wires located in the stuffer passageways shown in Figure 3. The stuffer is then urged downwardly guided by the cooperation of the ribs 126 and the grooves 102, 103 simultaneously into the wire receiving slots of the barrel portions of the terminals.

The lower ground shield 14 may be heat staked or otherwise secured in the cover part 12 with the studs 45 registering within apertures 78. The terminal housing 15 terminating the wires is then assembled with the lower ground shield, the exposed braid portion being urged between the resilient lips 75 supported by the ferrule to establish electrical contact with the cable shield and ground. A tab 76 also engages the braid. The upper ground shield 13 is then applied to the housing 15 with the contact surfaces 67 inserted under the hood 91 on opposite sides of an axial rib and to the lower ground shield 14 so that the latching detents 77 are received in apertures 63 when the tab 55 will also engage the cable (with axial lead out) or the lips of a cable receiving recess 64.

The upper cover 11 is then applied to the terminal housing 15 and to the lower cover 12 (with the rear cap 18 omitted where axial lead out is desired) the locating ribs 99, 101 on the terminal housing cooperating with grooved lugs 47 formed in the upper cover.

On inserting the connector in a panel aperture, the shoulders 33 of the mounting ribs 31 snap behind the edges of the panel aperture on the other side of the panel preventing withdrawal while the shoulders 105, 105' abut the edges on the rear side preventing over insertion. An

identical connector rotated through 180° is mated with the mounted connector by the Tbar 37 being received in the T-slot 36 providing a remarkably stable structure. On mating, the contact tongues 108 of the two connectors interengage depressing the stepped ends 109 out of engagement with the contact lugs 116, 116', 117, 117' of the shunting bars 113, 113' and the contact surfaces 79 and 67 of respective ground shields 13 engage so that the ground shields substantially completely surround the exposed wires and the contacts irrespective of cable lead out direction providing braid-to-braid shielding.

The connector assembly is relatively inexpensive to manufacture in relation to its versatility and reliability of operation providing both reliable electrical characteristics and mechanical mating and mounting characteristics.

Claims:

1. An electrical connector comprising an insulating housing (15) having a front, mating face and a rear, wire connection face, a plurality of terminals (16) mounted in the housing (15) with wire connecting portions (106) at the wire connecting face and contact portions (108) at the mating face, electrical shunting means (113, 113') mounted in the housing (15) aligned with the contact portions, characterized in that, the contact portions (108) are resiliently deformable from positions engaging the shunting means 113, 113' in an unmated condition of the connector to positions spaced from the shunting means (113, 113') in a mated condition of the connector by mating engagement with contact portions of a complementary connector, the connector being adapted for mating with a complementary hermaphroditic connector, the housing (15) having a terminal supporting platform (82) extending between said faces, each contact portion comprising a resilient contact tongue (108) extending from proximate the mating face to a free end remote from the mating face, each contact tongue (108) being matable against the contact tongue (108) of the complementary connector to urge the contact tongues (108) in each connector toward respective platforms (82), the shunting means (113, 113') being fixed in the housing (15) aligned with the free ends of preselected contact tongues (108) and comprising two one-piece shunt bars (113, 113') located in tandem relation, each having a bridge portion extending transversely of all the contact tongues (108) and a pair of spaced contact lugs (116, 117 or 116', 117') extending from the bridge portion toward respective preselected contact tongues (108), each shunt bar (113, 113') engaging a pair of preselected contact tongues (108) when the connector is in an unmated condition and being spaced from the respective preselected contact tongues (108) when the connector is in a mated condition.

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2. The electrical connector of claim 1 characterized in that the contact lugs (116, 117, or 116', 117') of each shunt bar (113) extend toward alternate contact tongues (102).

3. The electrical connector according to claim 1 characterized in that the contact lugs (116, 117, or 116', 117') on each shunt bar (113, 113') are asymmetrically located along the bridge portion.

4. An electrical connector as in claim 1 characterized in that the shunt bars (113, 113') are substantially identical, each shunt bar (113, 113') being oriented 180° from the other.

5. An electrical connector according to claim 3 characterized in that the bridge portions have coding lugs (118, 118') at their ends and the housing (15) is formed with spaced coding slots (93, 94, 95, 96) on respective opposite sidewalls (88, 89) for receiving the respective lugs (118, 118').

6. An electrical connector as in claim 1 characterized in that all of said contact tongues (102) are engaged by said shunt bars (113, 113') when said connector is in an unmated condition.

Patentansprüche

1. Elektrischer Verbinder, mit einem Isoliergehäuse (15), das eine vorne liegende Verbindungsseite sowie eine hinten liegenden Drahtanschlußseite aufweist, mit einer Mehrzahl von in dem Gehäuse (15) angebrachten Anschlüssen (16), wobei sich Drahtanschlußbereiche (106) an der Drahtanschlußseite und Kontaktbereiche (108) an der Verbindungsseite befinden, und mit einer elektrischen Überbrückungseinrichtung (113, 113'), die in dem Gehäuse (15) angebracht und mit den Kontaktbereichen ausgerichtet ist, dadurch gekennzeichnet, daß die Kontaktbereiche (108) von Positionen, in denen sie in einem nicht-verbundenen Zustand des Verbinders an der Überbrückungseinrichtung (113, 113') angreifen, durch das beim Verbinden entstehende Angreifen an Kontaktbereichen eines komplementären Verbinders in federnd nachgiebiger Weise in Positionen biegsam sind, in denen die Kontaktbereiche (108) in dem verbundenen Zustand des Verbinders von der Überbrückungseinrichtung (113, 113') beabstandet sind,

daß der Verbinder für eine Verbindung mit einem komplementären Zwitterverbinder ausgelegt ist, daß das Gehäuse (15) eine sich zwischen den genannten Seiten erstreckende Anschlußtrageplattform (82) aufweist, daß jeder Kontaktbereich eine federnd nachgiebige Kontaktzunge (108) aufweist, die sich von einer Stelle in der Nähe der Verbindungsseite zu einem von der Verbindungsseite abgelegenen, freien Ende erstreckt,

daß jede Kontaktzunge (108) in bezug auf die Kontaktzunge (108) des komplementären Verbinders derart verbindbar ist, daß die

Kontaktzungen (108) in jedem Verbinder in Richtung auf die jeweiligen Plattformen (82) gedrückt werden,

daß die Überbrückungseinrichtung (113, 113') in dem Gehäuse (15) befestigt und mit den freien Enden ausgewählter Kontaktzungen (108) ausgerichtet ist und zwei einstückige Überbrückungsschienen (113, 113') umfaßt, die tandemartig hintereinander angeordnet sind und von denen jede einen sich in Querrichtung über alle Kontaktzungen (108) erstreckenden Verbindungsbereich sowie ein Paar voneinander beabstandeter Kontaktflaschen (116, 117 oder 116', 117') aufweist, die sich von dem Verbindungsbereich in Richtung auf entsprechende ausgewählte Kontaktzungen (108) erstrecken, und

daß jede Überbrückungsschiene (113, 113') bei in nichtverbundenem Zustand befindlichem Verbinder an einem Paar ausgewählter Kontaktzungen (108) angreift und bei in verbundenem Zustand befindlichem Verbinder von den jeweiligen ausgewählten Kontaktzungen (108) beabstandet ist.

2. Elektrischer Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß sich die Kontaktflaschen (116, 117 oder 116', 117') jeder Überbrückungsschiene (113) in Richtung auf jeweils übernächste Kontaktzungen (102) erstrecken.

3. Elektrischer Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß die Kontaktflaschen (116, 117 oder 116', 117') an jeder Überbrückungsschiene (113, 113') entlang des Verbindungsbereichs asymmetrisch angeordnet sind.

4. Elektrischer Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß die Überbrückungsschienen (113, 113') im wesentlichen miteinander identisch sind und jede Überbrückungsschiene (113, 113') gegenüber der jeweils anderen eine Orientierung von 180° aufweist.

5. Elektrischer Verbinder nach Anspruch 3, dadurch gekennzeichnet, daß die Verbindungsbereiche an ihren Enden Kodierlaschen (118, 118') aufweisen, und daß das Gehäuse (15) an jeweils gegenüberliegenden Seitenwänden (88, 89) mit voneinander beabstandeten Kodierschlitz (93, 94, 95, 96) zur Aufnahme der entsprechenden Laschen (118, 118') ausgebildet ist.

6. Elektrischer Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß die Überbrückungsschienen (113, 113') an allen Kontaktzungen (102) angreifen, wenn sich der Verbinder in dem nicht-verbundenen Zustand befindet.

Revendications

1. Connecteur électrique comprenant un bâti isolant (15) présentant une face avant



d'accouplement et une face arrière de connexion de fils, plusieurs bornes (16) montées dans le bâti (15) de manière que des parties (106) de connexion de fils soient situées à la face de connexion de fils et que des parties (108) de contact soient situées à la face d'accouplement, des moyens (113, 113') de shuntage électrique montés dans le bâti (15) en alignement avec les parties de contact, caractérisé en ce que les parties de contact (108) peuvent être déformées élastiquement à partir de positions engageant les moyens de shuntage (113, 113') dans un état désaccouplé du connecteur jusqu'à des positions espacées des moyens de shuntage (113, 113') dans un état accouplé du connecteur, par un enclenchement d'accouplement avec des parties de contact d'un connecteur complémentaire, le connecteur étant conçu pour être accouplé avec un connecteur hermaphrodite complémentaire, le bâti (15) comportant un plateau (82) de support de bornes s'étendant entre lesdites faces, chaque partie de contact comprenant une languette élastique (108) de contact s'étendant d'un point proche de la face d'accouplement jusqu'à une extrémité libre éloignée de la face d'accouplement, chaque languette (108) de contact pouvant être accouplée contre la languette (108) de contact du connecteur complémentaire afin que les languettes de contact (108) de chaque connecteur tendent à se déplacer vers des plateaux respectifs (82), les moyens de shuntage (113, 113') étant fixés dans le bâti (15), en alignement avec les extrémités libres de languettes de contact (108) préalablement choisies, et comprenant deux barrettes de shuntage d'une seule pièce (113, 113') disposées en tandem, comportant chacune une partie en pont qui s'étend transversalement à toutes les languettes de contact (108) et deux pattes espacées (116, 117 ou 116', 117') de contact s'étendant de la partie en pont vers des languettes de contact respectives (108) préalablement choisies, chaque barrette de shuntage (113, 113') portant contre deux languettes de contact (108) préalablement choisies lorsque le connecteur est dans un état désaccouplé, et étant espacée des languettes de contact respectives (108) préalablement choisies lorsque le connecteur est dans un état accouplé.

2. Connecteur électrique selon la revendication 1, caractérisé en ce que les pattes de contact (116, 117 ou 116', 117') de chaque barrette de shuntage (113) s'étendent vers des languettes de contact alternées (102).

3. Connecteur électrique selon la revendication 1, caractérisé en ce que les pattes de contact (116, 117 ou 116', 117') de chaque barrette de shuntage (113, 113') sont disposées de façon asymétrique le long de la partie en pont.

4. Connecteur électrique selon la revendication 1, caractérisé en ce que les barrettes de shuntage (113, 113') sont sensiblement identiques, chaque barrette de shuntage (113, 113') étant orientée à 180° par rapport à l'autre.

5. Connecteur électrique selon la revendication

3, caractérisé en ce que les parties en pont comportent des pattes de codage (118, 118') à leurs extrémités et le bâti (15) présente des entailles espacées (93, 94, 95, 96) de codage situées sur des parois latérales opposées respectives (88, 89) afin de recevoir les pattes respectives (118, 118').

6. Connecteur électrique selon la revendication 1, caractérisé en ce que toutes les languettes de contact (102) sont engagées par lesdites barrettes de shuntage (113, 113') lorsque ledit connecteur est dans un état désaccouplé.

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