

Description

There is an increasing requirement for effective electrical shielding of electrical connectors not only for sophisticated military applications but to prevent interference in commercial computing and communications equipment.

It is important that such shields can be manufactured economically by mass production techniques and can rapidly be assembled on site when required for example during the installation or operation of the equipment without a requirement for specialised assembly tooling. It follows that the shields should have few separate parts for ease of storage and assembly.

There is disclosed in DE—B2—2,613,907 a kit providing electromagnetic shielding for an electrical connector having mating first and second members said kit comprising first and second conductive enclosures each adapted to receive a respective connector member, the second enclosure being further adapted to receive the first enclosure when the connector members are intermated, and the first enclosure having a rear portion for engaging the shielding layer of a shielded cable, said first enclosure being formed by an intermating metallic inner first shell and outer second shell, said shells together defining a cavity adapted to receive a connector member therein.

The said shells and the second enclosure of this known kit are secured in assembled relationship by means of screws, so that the assembly operation is unduly time-consuming.

A kit as defined in the third paragraph of this specification, is, according to the invention, characterised in that each shell has a tail portion adapted to be received within a braided shielding layer of a shielded cable, said inner first shell having a plurality of cantilever beams extending from a substantial portion of the periphery thereof and each having an outwardly directed dimple spaced from the free end of said beam, said outer second shell having a flange depending from a like portion of the periphery thereof and being adapted to receive said beams therein in interference fit, said flange also having an array of apertures spaced each to receive a respective dimple to secure said shells together, clamp means adapted to embrace said cable to bring said braided layer into good mechanical and electrical contact with said tail portion, said second enclosure being formed by a metallic shroud adapted to substantially enclose said second member and to engage electromagnetic shielding associated therewith and the metallic shells of said first enclosure; and in that a series of cantilever beams extend from a connector-receiving mouth of the second enclosure and are reversely bent so that their free ends lie within the second enclosure and are formed with locking protuberances for engagement with one

or more locking apertures formed in a mating end of the first enclosure to retain the first and second enclosures in mating relation.

Other examples of known shield kits or assemblies are disclosed in US—A—3,907,396, US—A—3,864,011, US—A—3,871,735 and US—A—3,056,942.

Examples of the invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is an exploded perspective view of a kit for providing a shield according to the invention associated with a known electrical connector;

Figure 2 is a perspective view of the shield assembled from the kit on the connector member;

Figure 3 is a similar view to Figure 2 with the connector members mated;

Figure 4 is a partly cross-sectional view taken along line 4—4 of Figure 3;

Figure 5 is a plan view partly in cross-section taken along line 5—5 of Figure 3;

Figure 6 is a scrap cross-sectional view taken along line 6—6 of Figure 3;

Figure 7 is a perspective view of an alternative shield and clamp assembled with a connector member; and,

Figure 8 is a fragmentary perspective view of the shield assembly of Figure 7 with another clamp.

As shown particularly in Figures 1 to 6, the kit for providing an electromagnetic shield includes first and second metal enclosures 11 and 12, respectively, adapted to receive, respectively, known intermating connector members 13 and 14, respectively.

The first enclosure 11 is bipartite comprising a pair of half-shells 16 and 17 each stamped and formed as a single piece. The half-shells comprise base walls 18 and 19, respectively, from opposite longitudinal edges of which upstand side walls 21 and 22, respectively, converging towards a rear to form hemi-cylindrical tails 23 and 24, respectively. The side walls 22 of one half-shell 17 are formed with a plurality of cantilever beams 26 upstanding from the base 19 and provided with locking protuberances 27 adjacent their free ends. The base 19 is of less width than the base 18 of the other half-shell so that the half-shells can be assembled in a snap fit about the connector member 14 with the protuberances received in apertures 28 provided adjacent the root ends of side walls 21. A series of locking apertures 29 are also provided adjacent the front end of the base of half-shell 16. Connector locating tangs 30 and 31 are provided in the base 18 of one half-shell at, and spaced from, the front end, respectively. A connector locating flange and tangs 32 and 33 are provided in the base 19 of the other half-shell at, and spaced from, the front end, respectively.

The second enclosure 12 is stamped and formed as a single piece into an inverted

channel shape comprising a base 34 from opposite longitudinal edges of which upstand side walls 35. Mounting flanges 36 are bent outwardly from the free edges of the side walls and a series of cantilever beams 38 extend from the base and side walls at a connector-receiving mouth 40 which beams are reversely bent so that their free ends lie within the second enclosure 12. Locking protuberances 39 are provided adjacent the free ends of the cantilever beams which extend from the base 34. A connector locating flange 41 is provided on the rear of the base 34.

Contacts in the connector member 13 terminate signal wires 43 of a shielded cable 44 provided with a braided shielding layer 45 and the kit is preferably provided with a clamp formed as a split metal cylinder 46. A spreading tool 47 maintains the clamp in expanded condition. The connector member 14 is a pin header having pins 49 bent in flag fashion and soldered in apertures connected to conductive tracks of a circuit board 52 having a metal shielding layer 53.

The second enclosure 12 is assembled with the connector member 14 by clamping the flanges 36 against the shielding layer 53 on the printed circuit board. Prior to assembling the first enclosure 11 with the connector member 13 and the cable 44, the split metal cylinder 46 is preloaded onto the cable 44. The half-shells 16 and 17 are then moved together about the connector member 13 with the locating tines 30, 31, 32 and 33 engaging the connector member and the braid 45 moved over the tails 23 and 24. During movement together of the half-shells, the cantilever beams 26 are flexed in sliding engagement with the side walls 21 of the half-shell 18 and the locking protuberances 27 are received in the apertures 28 as a snap fit. The split metal cylinder 46 is then aligned over the braid covering the tails and the spreading tool 47 removed from the seam to permit the cylinder 46 to contract clamping the braid securely against the tails. The first enclosure 11 receiving the connector member 13 is then mated with the second enclosure with resilient deformation of the beams 38 and receipt of the locking protuberances 39 in the apertures 29 as a snap fit.

The mated connector members are effectively shielded by the enclosures without a requirement for gaskets at the interfaces of the enclosures. The hemi-cylindrical tails 23 and 24 completely surround the signal wires to provide effective shielding. Assembly of the enclosures on the connector members can be readily carried out on site without a need for expensive and complex tooling. Disassembly of the enclosure member is also relatively easy.

The mating surfaces of the stamped and formed enclosures can receive surface treatment ensuring good contact obviating a need for a gasket.

The shield can provide effective protection

from interference arising for example from ground loops as a result of equipment operating from different power outlets and electrostatic discharges, the latter being of major concern in computer operations.

The shield may have various configurations as for example an alternative first enclosure 56 shown in Figure 7 and alternative clamping members may include known spring clip 57 or a crimp ring 58, shown in Figure 8.

Claims

1. A kit providing electromagnetic shielding for an electrical connector having mating first and second members (13, 14) said kit comprising first and second conductive enclosures (11, 12) each adapted to receive a respective connector member (13, 14), the second enclosure (12) being further adapted to receive the first enclosure (11) when the connector members (13, 14) are intermated, and the first enclosure 11 having a rear portion (23, 24) for engaging the shielding layer of a shielded cable (44), said first enclosure being formed by an intermating metallic inner first shell (17) and outer second shell (16), said shells (16, 17) together defining a cavity adapted to receive a connector member (13) therein; characterised in that each shell has a tail portion (23, 24) adapted to be received within a braided shielding layer (45) of a shielded cable (44), said inner first shell having a plurality of cantilever beams (26) extending from a substantial portion of the periphery thereof and each having an outwardly directed dimple (27) spaced from the free end of said beam (26), said outer second shell (18) having a flange (21) depending from a like portion of the periphery thereof and being adapted to receive said beams (26) therein in interference fit, said flange (21) also having an array of apertures (28) spaced each to receive a respective dimple (27) to secure said shells together, clamp means (46) adapted to embrace said cable to bring said braided layer (45) into good mechanical and electrical contact with said tail portion (23, 24), said second enclosure (12) being formed by a metallic shroud adapted to substantially enclose said second member (14) and to engage electromagnetic shielding associated therewith and the metallic shells (16, 17) of said first enclosure; and in that a series of cantilever beams (38) extend from a connector-receiving mouth (40) of the second enclosure (12) and are reversely bent so that their free ends lie within the second enclosure (12) and are formed with locking protuberances (39) for engagement with one or more locking apertures (29) formed in a mating end of the first enclosure (11) to retain the first and second enclosures (16, 17) in mating relation.

2. A kit according to Claim 1, characterised in that each tail portion (23 or 24) is hemi-cylindrical.

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2. A kit according to Claim 1, characterised in that each tail portion (23 or 24) is hemi-cylindrical.



3. A kit according to Claim 1 or 2, characterised in that connector locating fins (30, 31, 32, and 33) are formed on said shells (16 and 17).

4. A kit according to Claim 1, 2 or 3, characterised in that the clamp means comprises a split cylinder (46) of smaller diameter than the shielding layer (45).

Patentansprüche

1. Bausatz zur Schaffung einer elektromagnetischen Abschirmung für einen elektrischen Verbinder mit einem ersten und einem zweiten Element (13, 14), die miteinander verbindbar sind, wobei der Bausatz eine erste und eine zweite leitfähige Verkleidung (11, 12) aufweist, deren jede zur Aufnahme eines entsprechenden Verbinderelements (13, 14) ausgelegt ist, und wobei die zweite Verkleidung (12) bei miteinander verbundenen Verbinder-elementen (13, 14) außerdem die erste Verkleidung (11) aufnehmen kann, und wobei die erste Verkleidung (11) einen hinteren Bereich (23, 24) zum Angreifen an der Abschirmungslage eines abgeschirmten Kabels (44) aufweist und die erste Verkleidung durch ein inneres, erstes Gehäuse-teil (17) aus Metall und durch ein äußeres, zweites Gehäuse-teil (18) aus Metall gebildet ist, die miteinander verbindbar sind und zusammen einen Hohlraum bilden, in dem ein Verbinder-element (13) aufnehmbar ist, dadurch gekennzeichnet, daß jedes Gehäuse-teil einen Endbereich (23, 24) aufweist, der innerhalb einer geflochtenen Abschirmungslage (45) eines abgeschirmten Kabels (44) aufnehmbar ist, wobei das innere, erste Gehäuse-teil eine Mehrzahl freitragender Arme (26) aufweist, die sich von einem beträchtlichen Bereich der Peripherie desselben wegerstrecken und jeweils eine nach außen gerichtete Ausdrückung (27) aufweisen, die von dem freien Ende des Arms (26) beabstandet ist, wobei das äußere, zweite Gehäuse-teil (18) einen Flansch (21) aufweist, der sich von einem ähnlichen Bereich der Peripherie desselben nach unten erstreckt und in dem die Arme (26) im Festsitz aufnehmbar sind, und wobei der Flansch (21) außerdem eine Anordnung von Öffnungen (28) aufweist, die jeweils voneinander beabstandet sind, so daß sie zum Aneinanderbefestigen der Gehäuse-teile eine entsprechende Ausdrückung (27) aufnehmen können, wobei eine Klemmeinrichtung (46) das Kabel umgreifen kann, um die geflochtene Lage (45) in guten mechanischen und elektrischen Kontakt mit dem Endbereich (23, 24) zu bringen, und wobei die zweite Verkleidung (12) durch eine Abdeckung aus Metall gebildet ist, die das zweite Element (14) im wesentlichen vollständig umschließen kann und die an der diesem Element (14) zugeordneten elektromagnetischen Abschirmung sowie an den Metall-Gehäuseteilen (16, 17) der ersten Verkleidung angreifen kann; und daß sich eine Reihe freitragender Arme (38) von einer Ver-

binderaufnahmeöffnung (40) der zweiten Verkleidung (12) wegerstreckt und diese Arme so nach hinten umgebogen sind, daß ihre freien Enden innerhalb der zweiten Verkleidung (12) liegen, und diese Arme (38) mit Verriegelungsvorsprüngen (39) zum Eingreifen in eine oder mehrere Verriegelungsöffnungen (29) ausgebildet sind, die in einem Anschlußende der ersten Verkleidung (11) ausgebildet sind, um die erste und die zweite Verkleidung (16, 17) in miteinander verbundenem Zustand zu halten.

2. Bausatz nach Anspruch 1, dadurch gekennzeichnet, daß jeder Endbereich (23 oder 24) halbzylindrisch ist.

3. Bausatz nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß Verbinderfestlegezinken (30, 31, 32 und 33) an den Gehäuseteilen (16 und 17) ausgebildet sind.

4. Bausatz nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß die Klemmeinrichtung einen geschlitzten Zylinder (46) umfaßt, dessen Durchmesser geringer ist als der der Abschirmungslage (45).

Revendications

1. Kit pour réaliser un blindage électromagnétique pour un connecteur électrique comportant des premier et second éléments (13, 14), ledit kit comprenant des premier et second boîtiers conducteurs (11, 12) conçus chacun pour recevoir un élément respectif (13, 14) de connecteur, le second boîtier (12) étant en outre conçu pour recevoir le premier boîtier (11) lorsque les éléments de connecteur (13, 14) sont accouplés l'un à l'autre, et le premier boîtier (11) comportant une partie arrière (23, 24) destinée à porter contre la couche de blindage d'un câble blindé (44), ledit premier boîtier étant formé de première (17) et seconde (16) coques intérieure et extérieure, métalliques, s'accouplant l'une à l'autre, lesdites coques (16, 17) définissant ensemble une cavité conçue pour recevoir un élément (13) de connecteur; caractérisé en ce que chaque coque comporte une partie de queue (23, 24) conçue pour être reçue dans une couche tressée (45) de blindage d'un câble blindé (44), ladite première coque intérieure comportant plusieurs lames (26) en porte-à-faux qui partent d'une partie substantielle de sa périphérie et qui comportent chacune un bossage (27) dirigé vers l'extérieur et espacé de l'extrémité libre de ladite lame (26), ladite seconde coque extérieure (18) comportant une aile (21) descendant d'une partie analogue de sa périphérie et étant conçue pour recevoir lesdites lames (26) avec un ajustement serré, ladite aile (21) présentant également une rangée d'ouvertures (28) espacées et destinées chacune à recevoir un bossage respectif (27) pour fixer lesdites coques l'une à l'autre, des moyens à collier (46) étant conçus pour entourer ledit câble afin d'amener ladite couche tressée (45) en bon contact mécanique et électrique avec ladite



partie de queue (23, 24), ledit second boîtier (112) étant formé d'un capot métallique conçu pour renfermer sensiblement ledit second élément (14) et pour porter contre un blindage électromagnétique qui lui est associé et contre les coques métalliques (16, 17) dudit premier boîtier; et en ce qu'une série de lames (38) en porte-à-faux partent d'une embouchure (40) de réception de connecteur du second boîtier (12) et sont recourbées en arrière afin que leurs extrémités libres s'étendent à l'intérieur du second boîtier (12) et comportent des saillies (39) de verrouillage destinées à s'enclencher avec une ou plusieurs ouvertures (29) de verrouillage formées dans une extrémité

d'accouplement du premier boîtier (11) pour retenir les premier et second boîtiers (16, 17) en position d'accouplement.

2. Kit selon la revendication 1, caractérisé en ce que chaque partie de queue (23 ou 24) est semicylindrique.

3. Kit selon la revendication 1 ou 2, caractérisé en ce que des dents (30, 31, 32 et 33) de positionnement du connecteur sont formées sur lesdites coques (16 et 17).

4. Kit selon la revendication 1, 2 ou 3, caractérisé en ce que les moyens à collier comprennent un cylindre fendu (46) de diamètre inférieur à celui de la couche de blindage (45).

