

CABLE INTERCONNECTION

Background of the Invention

This invention relates to shielded cable connectors and cable assemblies as well as to a method for assembling such a connector, according to the preamble portions of patent claims 1 and 7.

A shielded cable connector as described in the preamble portion of claim 1 is known from US 4,838,808 A1.

Cable connectors have been developed that employ shielding to maintain signal integrity during passage of high speed electrical signals. Such developments characteristically include strain relief mechanisms for providing strong attachment to the cable so that individual conductors remain secured to the terminals within the connector.

In addition, latching systems have been proposed for securing cable connectors to mating connectors, especially connectors that are mounted on the circuit boards or equipment with which the cable is to be associated. One such shielded cable connector with an associated latching arrangement is shown in International Application Serial No. PCT/US97/10063, the disclosure of which is hereby incorporated by reference. That application is owned by the assignee of this present



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application. While the shielded connectors and latching systems disclosed in the above noted application provide improved shielding and latching characteristics, there is a desire to improve these connectors and make them more space efficient.

US 4,838,808 A1 describes a shielded connector comprising a terminal block for receiving at least one terminal for intermating with a mating terminal; a shield member for substantially surrounding side portions of the terminal block and a separate strain relief member mountable on the shield member.

The strain relief is a plastic part mounted over a metallic ferrule part of the shield member so that two separate pieces are necessary.

Summary of the Invention

In order to improve the attachment of a shielded connector onto a cable, an improved means and method for providing strain relief was developed. A strain relief member is placed on the cable prior to attachment of other parts of the connector to the cable. A terminal block is secured on the conductors of the cable, the shielding sheath of the cable is associated with a ferrule of the strain relief member, and the shielding member is placed around the terminal block and in mounting relationship with the strain relief member. Parts of the shield member may be associated with the strain relief member. Thereafter a clamp is applied to clamp the shielding sheath and preferably an outer insulating cover of the cable on the strain relief ferrule.

A latch member is provided on a connector with which the cable connector is to be mated. The latch may engage portions of the strain relief member or other portions of the cable connector. Structure is provided for removably mounting latching members on a connector housing using simple tools or latch parts for demounting the latch.

Brief Description of the Drawings

Fig. 1 is an exploded isometric view of a shielded cable connector according to the invention;

Fig. 1a is an isometric view of the cable connector shown in Fig. 1, in assembled condition;

Fig. 2 is a side cross section of a preferred form of a strain relief member;

Fig. 3 is a fragmentary cross sectional view of a preferred form of attachment of a cable to the strain relief member shown in Fig. 2;

Fig. 4 illustrates a method of assembling the cable connector shown in Fig. 1.

Detailed Description of the Preferred Embodiments

Fig. 1 shows generally the principal components of a cable connector 10 in accordance with the invention. The connector 10 includes mating shields 11 and 11' that intermate with each other and are held together by tabs 11a and 11a', that interfit and lock with locking portions 11b and 11b'. In addition, the shields 11 and 11' can include openings 11c and 11c' that are adapted to receive the latching protrusions 17d disposed on opposed outer surfaces of the terminal block 17. Each of the shields 11 and 11' includes a cable engaging portion 12 and a pair of opposed openings 13 disposed along an upper edge.

Each connector 10 includes a strain relief member 15 that comprises a plate or wall member 18 having a central opening

surrounded by a ferrule 14. The plate 18 includes a plurality of mounting lugs 16 that are adapted to be received in the openings 13 of the shields.

The connector 10 also includes a terminal mounting block 17 that preferably is formed by a plurality of like modules 17a, 17b and 17c that are snapped or otherwise held together to form the block 17. The modules 17a, b, c are formed of a suitable dielectric material and each receives a plurality of contact terminals, for example, receptacle terminals, to which individual conductors of a cable are associated.

Referring to Fig. 1a, when the shields 11, 11' are secured about the terminal block 17, the strain relief member 15 is held in place by the shields, by reason of the interfit of tabs 11a, 11a' with locking portions 11b, 11b' and lugs 16 extending through the openings 13. In addition, the cable engaging members 12, preferably in the form of semi-circular members, encircle the ferrule 14. As shown in Fig. 1a, the terminal block 17 forms a plurality of openings 17e, for receiving terminals, such as pins, from a mating header.

Fig. 2 illustrates in greater detail a preferred form of strain relief member 15. The member 15 includes a plate or wall member 18 having an opening for receiving a cable. Disposed about the generally centrally positioned opening is a ferrule 14 that includes a first section 14a and a reduced diameter section 14b. The plate 18 includes lugs 16 at each corner. The lugs 16 are preferably canted upwardly.

Fig. 3 shows a cable 20 mounted on the strain relief member 15. For drawing simplicity, the group of mutually insulated conductors or wires within the cable is not shown. As shown, the outer insulative layer 22 of the cable has been stripped back to reveal the conductive shielding sheath 24, usually in the form of a wire braid. The strain relief member

has been applied to the cable in a manner such that the ferrule 14 receives the braided sheath in an encircling relationship to sections 14a and 14b. In addition, a portion of the insulative cover 22 is received over the reduced diameter section 14b. Cable engaging portions 12 of the shields are disposed over the ferrule 14 and serve as a stop against insulative cover 22. A clamping member in the form of a crimp ring 26 is disposed over the assembly of the ferrule, the cable and the shield parts 12. When the crimp ring 26 is compressed, the clamping force exerted by the ring clamps the shielding sheath 24, the shield parts 12, and the outer insulative cover 22 against the ferrule 14, which acts as an anvil. As can be seen in Fig. 3, the reduced diameter portion 14b is provided to allow for the presence of the portion of the insulative cover 22 that is captured beneath the crimp ring 26.

Fig. 4 illustrates in sequential steps the process for attaching a connector onto a cable 20. In a first step, the cable is prepared by stripping a portion of the outer insulative cover or sheath 22 to reveal the braided sheath 24. Thereafter, the crimp ring 26 is slid over the stripped portion of the cable. Thereafter, the braid is cut back to an appropriate length and the strain relief member 15 is slid onto the cable, with the ferrule 14 disposed beneath the braid and preferably a portion of the outer cover 20.

Then each of the individual modules 17a, 17b and 17c is associated with the appropriate conductors of the cable. After the conductors are fixed to the terminals, the modules 17a, 17b and 17c are snapped or otherwise secured together to form a terminal block. When the modules are secured together, the two halves of the shields 11 and 11' are snapped in place over the terminal block 17. In a final step, the crimp

ring 26 is slid over the ferrule 14 of the strain relief member 15 and is then subjected to a crimping operation. The crimp ring 26 exerts an inward force to clamp the conductive sheath of the cable, the outer insulative layer of the cover and the cable engaging portions of each shield part against the ferrule 14, thereby securing the connector onto the cable.

Claims

1. A shielded cable connector (10) comprising:
a terminal block (17) for receiving at least one terminal for intermating with a mating terminal;
a shield member (11, 11') for substantially surrounding side portions of the terminal block;
a separate strain relief member (15) mountable on the shield member (11, 11'),
characterized in that
the strain relief member (15) is electrically shielding and comprises an end wall (18) having an opening therein and a ferrule (14) aligned with the opening;
and
a clamp for clamping a portion of the braid (24) and a portion of the insulative sheath (22) of a cable (20) onto the ferrule (14),
wherein the shield member (11, 11') has at least one opening therein and the strain relief member (15) includes a portion for electrically shielding said opening.
2. A connector as in claim 1, wherein the clamping member is a crimp ring (26).
3. A connector as in claim 1, wherein the terminal block (17) comprises a body formed of an assembly of substantially similar modules (17a, 17b, 17c) with means for holding the modules together.

4. A connector as in claim 1, wherein the shield member (11, 11') comprises mateable parts with means for securing the mateable parts together and wherein the strain relief member (15) includes mounting means (16) engageable by the shield members (11, 11') for retaining the strain relief member (15) on the shield member (11, 11') upon mating engagement of the mateable parts (11a, 11a'; 11b, 11b') and particularly wherein the mateable parts of the shield member (15) include cable engaging portions disposed over the ferrule and the clamp is adapted to receive the cable engaging portions and clamp said portions against the ferrule.
5. A cable connector as in claim 2, wherein the crimp ring (26) is shrinkable; and particularly wherein the crimp ring (26) is heat shrinkable.
6. A cable assembly comprising:
a cable (20) having a plurality of mutual insulated conductors and an electrically conducting sheath (24) surrounding the conductors;
and
a shielded cable connector (10) according to one of the claims 1 to 5.
7. A method for assembling a shielded cable connector (10) according to one of the preceding claims on a cable having a plurality of mutually insulated conductors and an electrically conductive sheath (11, 11') surrounding the conductors comprising the steps of:
placing a clamp member over a portion of the sheath (11, 11');
positioning a strain relief member (15) having a ferrule (14) over the conductors and in a position to receive the sheath on an outer surface of the ferrule (14);
mounting a body on the cable to receive the conductors and electrically associate the conductors to terminals carried by the body;

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applying an electrical shield member (11, 11') on the body to substantially surround the body and engage with the strain relief member (15), and

placing the clamp over the ferrule (14) and activating the clamp to clamp the sheath on the ferrule (14).

8. A method as in claim 7, and further comprising the step of placing cable engaging portions of the shield member (15) over the sheath, whereby the clamp clamps the sheath and the cable engaging portions of the shield member (15) on the ferrule (14).
9. A method as in claim 6 or 7, wherein the cable (20) includes an outer sheath and wherein the step of positioning the strain relief member (15) includes placing a portion of the ferrule (14) in underlying relationship with the outer sheath.