

Description

The invention relates to an electrical connector assembly that provides tap connections and is constructed of component parts that are encircled by a compression applying collar that holds the component parts in the assembly.

U.S. Patent 3,201,743 discloses a known electrical connector that provides tap connections. The known connector includes a pin conductor having three branch portions. An insulative support encircles concentrically each of the branch portions. A conductive shell encircles concentrically the insulative support. The component parts of the known connector are fabricated for ease of assembly. For example, the insulative support has bipartite segments that abut each other. The branch portions of the pin conductor are readily inserted between the bipartite segments. The conductive shell has a channel portion open along one side to facilitate receipt of the insulative support. The channel is then formed by bending to a final sleeve form that encircles concentrically the insulative support. Bending must be performed with care to eliminate gaps in the shell that would cause undesired intrusion of electromotive interference or undesired escape of radio frequency electrical signals being transmitted along the pin conductor. Since the shell is constructed for bending, the shell provides only limited resistance to undesired bending or deformation.

The invention permits fabrication of tap connections in an electrical connector assembly with component parts that do not require bending to final shapes in the assembly. This advantageously permits a conductive shell of thick and rugged construction that resists undesired bending or deformation.

The invention further permits fabrication of tap connections in an electrical connector assembly with component parts that are encircled by a compression applying collar that holds the component parts in the assembly and urges the component parts into abutment with one another without undesired gaps therebetween.

The present invention provides an electrical connector assembly according to claim 1.

Embodiments of the invention will now be described by way of example with reference to the drawings; in which

FIGURE 1 is an enlarged, perspective view with parts shown exploded to illustrate the details of an electrical connector assembly;

FIGURE 2 is an enlarged, perspective view of an assembly of the parts shown in FIGURE 1, together with respective complementary mating connectors of cable assemblies;

FIGURE 3 is an enlarged, section view of the

assembly shown in Figure 2;

FIGURE 4 is an enlarged, perspective view of some of the parts shown in Figures 1 through 3, illustrated in exploded configuration;

FIGURE 5 is an enlarged, perspective view of another electrical connector assembly with complementary mating electrical connectors of cable assemblies shown in exploded configuration;

FIGURE 6 is an enlarged, section view of said another electrical connector assembly shown in Figure 5;

FIGURE 7 is an enlarged, perspective view of some of the parts shown in Figure 4 through 6, illustrated in exploded configuration;

FIGURE 8 is an enlarged, fragmentary section through the axes of corresponding parts shown in Figures 1 through 6;

FIGURE 9 is a schematic view illustrating an interference fit between certain of the parts shown in Figures 1 through 6; and

FIGURE 10 is an enlarged, perspective view of an insulative body with sections in exploded configuration.

With more particular reference to the drawings, the invention will be described by way of example. Figures 1 through 4 illustrate one form of an electrical connector. Figures 5 through 7 illustrate another electrical connector. In describing the connectors, similar parts will have the same reference numerals. As shown in Figure 1 through 4, and similarly as shown in Figures 5 through 7, each electrical connector assembly 1 provides electrical tap connections with either bayonet coupler prongs 2, 2 or with threads 2, 2, for coupling with respective, known electrical coaxial connectors, shown by way of example at 3, 3. Further details of the known coaxial connectors 3, 3 are disclosed in U.S. Patent 3,384,703.

The connector assembly 1 is fabricated from component parts that are constructed for ease of assembly. The component parts will now be disclosed in detail.

The connector assembly 1 includes a conductive electrical conductor 4 having elongated tap portions 5, 5, 5 and electrical contacts 6, 6, 6 on the ends of the tap portions 5, 5, 5. The electrical contacts 6, 6, 6 are in the form of either a pin or an electrical receptacle 6, 6 having a hollow end 7, 6 provided with axial slits 8, 8, that allow resilient radial expansion of the hollow end 7, 7 for disconnect coupling to a corresponding known electrical connector 3, 3, for example, of the type disclosed in U.S. Patent No. 3,384,703.

The connector assembly 1 includes an insulative support 9 for the conductor having elongated insulative portions 10, 10, 10 encircling respective tap portions 5, 5, 5 of the conductor 4. The insulative support 9 is constructed for ease of as-

sembly with the conductor 4. For example, the insulative support 9 is divided into separate sections 11, 11 that are constructed to interfit against the conductor 4 and abut against one another along corresponding seams 12, 12, 12 that extend through respective insulative portions 10, 10, 10. Figures 1 through 4 show a bipartite insulative support 9 in duplicate sections 11, 11 having respective shallow channels 13, 13 that interfit against the conductor 4. The duplicate sections 11, 11 abut one another along a seam 12 that extends through each of the insulative portions 10, 10, 10.

Figure 10 shows a bipartite insulative support 9 in sections 11, 11. A first section 11 is T-shaped and has an axial bore 13 intersecting a shallow channel 13 extending perpendicular to the bore 13. The bore 13 interfits with the conductor 4 with one of the tap portions 5 inserted along the bore 13. The channel 13 interfits against the remaining tap portions 5,5 of the conductor 4. A second section 11 is semicylindrical and has a shallow channel 13 that interfits against corresponding tap portions 5,5 of the conductor 4. The sections 11, 11 abut one another along a seam that extends through the insulative portions 10, 10, 10.

Further the connector assembly 1 includes a hollow conductive shell 14 that snugly encircles each of the insulative portions 10, 10, 10 of the insulative support 9. The shell 14 is constructed for ease of assembly with the insulative support 9. The shell 14 has a composite sleeve portion 15 constructed of composite segments 16, 16 that abut one another to form the composite sleeve portion 15. The shell 14 has individual sleeve portions 17, 17 attached to corresponding composite segments 16, 16 of the shell 14. During assembly of the shell 14, the insulative portions 10, 10 of the insulative support 9 are inserted along the corresponding interiors of the individual sleeve portions 17, 17, and the composite segments 16, 16 are located in abutment with one another to form the composite sleeve portion 15 assembled snugly over a corresponding insulative portion 10. The edge of each seam 12, 12, 12 through the corresponding insulative portion 10, 10, 10 is purposely covered and bridged across by a seamless section of a corresponding sleeve portion 16, 17, 17 of the shell 14. Thereby the seam 12, 12, 12 is substantially covered by the shell 14 to prevent undesired intrusion of electromotive interference or escape of electrical signals being transmitted along the conductor.

The connector assembly 1 further includes means 18 in the form of a collar 18 that encircles the composite segments 16, 16. The collar 18 is illustrated as being circular. The collar 18 may have a shape other than as illustrated. A function of the means 18, for example, the collar 18, is to hold

the composite segments 16, 16 and urge them into abutment with one another along abutting edges 19, 19 without gaps therebetween.

Another function of the means 18 is to urge corresponding sleeve portions 17, 17 into abutment with one another along their abutting edges 19, 19 without gaps therebetween. For example, the individual sleeve portions 17, 17 are attached to corresponding composite segments 16, 16 of the shell. When the composite segments 16, 16 are urged into abutment with one another, corresponding ones of the individual sleeve portions 17, 17, that are attached to the segments 16, 16, also are urged by the collar 18 into abutment with one another. These corresponding ones of the individual sleeve portions 17, 17, are provided with abutting edges 19, 19 that are urged by the collar 18 into abutment with one another without gaps therebetween. The absence of gaps in the shell 14 prevents undesired intrusion of electromotive interference or escape of electrical signals being transmitted along the electrical conductor. Further to insure the absence of gaps, and as shown in Figure 8, the abutting edges 19, 19 nest together by way of a channel 20, 20, provided along a corresponding abutting edge 19, 19, and a projecting rib 21, 21, provided along a corresponding abutting edge 19, 19 and received in a corresponding channel 20, 20.

As shown in Figures 1, 3, 4, 7 and 9, raised ribs 22, 22 are on the exterior of each corresponding composite segment 16, 16, and extend axially along the corresponding composite sleeve portion 15 adjacent to the individual sleeve portions 17, 17 that are attached to corresponding composite segments 16, 16. The interior 23 of the collar 18 is passed axially along the composite sleeve portion 15 until engaged and stopped against one of the individual sleeve portions 17, 17. The collar 18 forms an interference fit with the raised ribs 22, 22. The ribs 22, 22 are compressed against the interior 23 of the collar 18. Compression is sufficiently intensive that the ribs 22, 22 are distorted by being frictionally abraded by the collar 18 and are rigidly compressed against the interior of the collar 18. Thereby the collar 18 is secured in place, and compression that is applied by the collar 18 is transferred to the edges 19, 19 on the abutting composite segments and the edges 19, 19 on the corresponding individual sleeve portions 17, 17 that abut one another.

As shown in Figures 1 and 6, the composite sleeve portion 15 projects within an opening 23 in a wall 24 of a panel 25 in the form of a box 25. The opening 23 is sized to interfit with a section of reduced width of the composite sleeve portion 15, thereby to prevent rotation of the connector 1. The section of reduced width is provided by a flat 27

along the exterior of the composite sleeve portion 15.

The collar 18 engages the panel 25 and provides a pedestal 18 having a height equal to the length of the collar 18 along its axis. The length of the collar 18 is sufficient to provide access clearance between the panel 25 and the individual sleeve portion 17, 17 of the shell. Further the length of the collar 18 is sufficient to distribute the compression along the composite sleeve portion 15. The shell 14 is sufficiently thick and rugged to withstand the intensive compression.

A metal clip 27 is assembled on the end of the composite sleeve portion 15 to prevent its removal from the panel opening 23. The free end of the composite sleeve portion 15 is provided with a roughened surface 28 against which the clip 27 is frictionally secured and electrically connected. The clip 27 is in compression against the panels 25. This would establish an electrical connection between the connector 1 and the panel 25 which can be fabricated from conductive material. As shown, the panel 25 is constructed of insulative material. The clip 27 has integral conductors 29, 29 in the form of pins 29, 29 that project in the same direction as the pin 6 of the conductor 4. The pins 6, 29, 29 project outwardly from the wall 24 of the panel 25 and serve as electrical terminals 6, 29, 29 for establishing electrical connections to electrical equipment, not shown.

Figures 5, 6 and 7 show a pedestal 30, 30 attached to a corresponding individual sleeve portion 17, 17 and constructed with a threaded opening 31, 31 to receive a threaded fastener 32, 32 extending through the wall 24 of the panel 25. The pedestal 30, 30 assists in anchoring the connector 1 to the panel 25. The pedestal 30, 30 also may have a socket 33, 33 for mounting a projecting conductor pin 34, 34 that projects in the same direction as the pin 6 of the connector 4, and serves as an electrical terminal 34, 34 for establishing an electrical connection with an item of electrical equipment, not shown. The pins 34, 34 are used alternatively in place of the clip 27 and the pins 29, 29.

Claims

1. An electrical connector assembly comprising,
 - an electrical conductor (4) having elongated tap portions (5, 5, 5) and electrical contacts (6, 6, 6) on respective tap portions,
 - an insulative support (9) for the conductor (4) having insulative portions (10, 10, 10) encircling respective tap portions (5, 5, 5) of the conductor (4),
 - a hollow conductive shell (14) having individual sleeve portions (17, 17) and a com-

posite sleeve portion (15), the individual sleeve portions (17, 17) abutting one another and encircling respective insulative portions (10, 10) of the insulative support (9), the individual sleeve portions (17, 17) being provided with abutting edges (19, 19), and the composite sleeve portion (15) encircling a corresponding insulative portion (10) of the insulative support (9) and being constructed of composite segments (16, 16) attached to corresponding individual sleeve portions (17, 17) and abutting one another to form the composite sleeve portion (15), and

means (18) holding the composite segments (16, 16) for urging the composite segments (16, 16) into abutment with one another without gaps therebetween, and for urging the abutting edges (19, 19) of the individual sleeve portions (17, 17) into abutment with one another without gaps therebetween.

2. An electrical connector assembly as recited in claim 1, wherein raised ribs (22, 22) on the exterior of the composite segments (16, 16) are distorted by the means (18) and are compressed against the interior of the means (18).
3. An electrical connector assembly as recited in claim 1, wherein the means (18) is a collar (18) encircling the composite segments (16, 16) of the composite sleeve portion (15).
4. An electrical connector assembly as recited in claim 1, wherein corresponding insulative portions (10, 10, 10) are each constructed with a seam (12, 12, 12) and with insulative sections (11, 11) that abut one another along the seams (12, 12, 12) without gaps therebetween, and an edge of each seam (12, 12, 12) is covered by a seamless section of a sleeve portion (17, 17) of the conductive shell (14).
5. An electrical connector assembly as recited in claim 1, wherein the composite sleeve portion (15) is surrounded by a conductive clip (27) frictionally secured to the composite sleeve portion (15), and conductive pins (29, 29) are integral with the clip (27) and project in the same direction as the composite sleeve portion (15).
6. An electrical connector as recited in claim 1, wherein the abutting edges (19, 19) include channels (20, 20) and projecting ribs (21, 21) received in corresponding channels (20, 20).

Revendications



along the exterior of the composite sleeve portion 15.

The collar 18 engages the panel 25 and provides a pedestal 18 having a height equal to the length of the collar 18 along its axis. The length of the collar 18 is sufficient to provide access clearance between the panel 25 and the individual sleeve portion 17, 17 of the shell. Further the length of the collar 18 is sufficient to distribute the compression along the composite sleeve portion 15. The shell 14 is sufficiently thick and rugged to withstand the intensive compression.

A metal clip 27 is assembled on the end of the composite sleeve portion 15 to prevent its removal from the panel opening 23. The free end of the composite sleeve portion 15 is provided with a roughened surface 28 against which the clip 27 is frictionally secured and electrically connected. The clip 27 is in compression against the panels 25. This would establish an electrical connection between the connector 1 and the panel 25 which can be fabricated from conductive material. As shown, the panel 25 is constructed of insulative material. The clip 27 has integral conductors 29, 29 in the form of pins 29, 29 that project in the same direction as the pin 6 of the conductor 4. The pins 6, 29, 29 project outwardly from the wall 24 of the panel 25 and serve as electrical terminals 6, 29, 29 for establishing electrical connections to electrical equipment, not shown.

Figures 5, 6 and 7 show a pedestal 30, 30 attached to a corresponding individual sleeve portion 17, 17 and constructed with a threaded opening 31, 31 to receive a threaded fastener 32, 32 extending through the wall 24 of the panel 25. The pedestal 30, 30 assists in anchoring the connector 1 to the panel 25. The pedestal 30, 30 also may have a socket 33, 33 for mounting a projecting conductor pin 34, 34 that projects in the same direction as the pin 6 of the connector 4, and serves as an electrical terminal 34, 34 for establishing an electrical connection with an item of electrical equipment, not shown. The pins 34, 34 are used alternatively in place of the clip 27 and the pins 29, 29.

Claims

1. An electrical connector assembly comprising,
 - an electrical conductor (4) having elongated tap portions (5, 5, 5) and electrical contacts (6, 6, 6) on respective tap portions,
 - an insulative support (9) for the conductor (4) having insulative portions (10, 10, 10) encircling respective tap portions (5, 5, 5) of the conductor (4),
 - a hollow conductive shell (14) having individual sleeve portions (17, 17) and a com-

posite sleeve portion (15), the individual sleeve portions (17, 17) abutting one another and encircling respective insulative portions (10, 10) of the insulative support (9), the individual sleeve portions (17, 17) being provided with abutting edges (19, 19), and the composite sleeve portion (15) encircling a corresponding insulative portion (10) of the insulative support (9) and being constructed of composite segments (16, 16) attached to corresponding individual sleeve portions (17, 17) and abutting one another to form the composite sleeve portion (15), and

means (18) holding the composite segments (16, 16) for urging the composite segments (16, 16) into abutment with one another without gaps therebetween, and for urging the abutting edges (19, 19) of the individual sleeve portions (17, 17) into abutment with one another without gaps therebetween.

2. An electrical connector assembly as recited in claim 1, wherein raised ribs (22, 22) on the exterior of the composite segments (16, 16) are distorted by the means (18) and are compressed against the interior of the means (18).
3. An electrical connector assembly as recited in claim 1, wherein the means (18) is a collar (18) encircling the composite segments (16, 16) of the composite sleeve portion (15).
4. An electrical connector assembly as recited in claim 1, wherein corresponding insulative portions (10, 10, 10) are each constructed with a seam (12, 12, 12) and with insulative sections (11, 11) that abut one another along the seams (12, 12, 12) without gaps therebetween, and an edge of each seam (12, 12, 12) is covered by a seamless section of a sleeve portion (17, 17) of the conductive shell (14).
5. An electrical connector assembly as recited in claim 1, wherein the composite sleeve portion (15) is surrounded by a conductive clip (27) frictionally secured to the composite sleeve portion (15), and conductive pins (29, 29) are integral with the clip (27) and project in the same direction as the composite sleeve portion (15).
6. An electrical connector as recited in claim 1, wherein the abutting edges (19, 19) include channels (20, 20) and projecting ribs (21, 21) received in corresponding channels (20, 20).

Revendications



1. Assemblage de connecteur électrique comportant
 - un conducteur électrique (4) ayant des parties allongées (5, 5, 5) de dérivation et des contacts électriques (6, 6, 6) sur des parties de dérivation respectives,
 - un support isolant (9) pour le conducteur (4) ayant des parties isolantes (10, 10, 10) entourant des parties de dérivation respectives (5, 5, 5) du conducteur (4),
 - une coque conductrice creuse (14) ayant des parties de manchon individuelles (17, 17) et une partie de manchon composite (15), les parties de manchon individuelles (17, 17) butant l'une contre l'autre et entourant des parties isolantes respectives (10, 10) du support isolant (9), les parties de manchon individuelles (17, 17) étant pourvues de bords (19, 19) en butée, et la partie de manchon composite (15) entourant une partie isolante correspondante (10) du support isolant (9) et étant formée de segments composites (16, 16) reliés à des parties de manchon individuelles correspondantes (17, 17) et en butée l'un avec l'autre pour former la partie de manchon composite (15), et
 - un moyen (18) maintenant les segments composites (16, 16) pour solliciter les segments composites (16, 16) en butée l'un avec l'autre sans espaces entre eux, et pour solliciter les bords en butée (19, 19) des parties de manchon individuelles (17, 17) en butée l'un avec l'autre sans espaces entre eux.
2. Assemblage de connecteur électrique selon la revendication 1, dans lequel les nervures en saillie (22, 22) situées sur l'extérieur des segments composites (16, 16) sont déformées par le moyen (18) et sont comprimées contre l'intérieur du moyen (18).
3. Assemblage de connecteur électrique selon la revendication 1, dans lequel le moyen (18) est une bague (18) entourant les segments composites (16, 16) de la partie de manchon composite (15).
4. Assemblage de connecteur électrique selon la revendication 1, dans lequel les parties isolantes correspondantes (10, 10, 10) sont réalisées chacune avec un joint (12, 12, 12) et avec des sections isolantes (11, 11) qui sont en butée l'une contre l'autre le long des joints (12, 12, 12) sans espaces entre elles, et un bord de chaque joint (12, 12, 12) est recouvert d'une section sans joints d'une partie de manchon (17, 17) de la coque conductrice (14).
5. Assemblage de connecteur électrique selon la revendication 1, dans lequel la partie de manchon composite (15) est entourée d'une attache conductrice (27) fixée par friction à la partie de manchon composite (15), et des broches conductrices (29, 29) sont réalisées d'une seule pièce avec l'attache (27) et font saillie dans la même direction que la partie de manchon composite (15).
6. Connecteur électrique selon la revendication 1, dans lequel les bords en butée (19, 19) comprennent des gouttières (20, 20) et des nervures saillantes (21, 21) reçues dans des gouttières correspondantes (20, 20).

Patentansprüche

1. Elektrische Verbinderanordnung, gekennzeichnet durch folgende Merkmale:

- Ein elektrischer Leiter (4) weist längliche Zapfenglieder (5, 5, 5) und elektrische Kontakte (6, 6, 6) an den jeweiligen Zapfengliedern auf;
- Eine isolierende Halterung (9) für den Leiter (4) weist isolierende Glieder (10, 10, 10) auf, die die jeweiligen Zapfenglieder (5, 5, 5) des Leiters (4) umgeben;
- Ein hohles, leitendes Gehäuse (14) weist einzelne Buchsenglieder (17, 17) und ein Zusammenbaubuchsenglied (15) auf, wobei die einzelnen Buchsenglieder (17, 17) aneinander stoßen und die jeweiligen isolierenden Glieder (10, 10) der isolierenden Halterung (9) umgeben, wobei die einzelnen Buchsenglieder (17, 17) mit Stoßkanten (19, 19) versehen sind, und wobei das Zusammenbaubuchsenglied (15) ein entsprechendes isolierendes Glied (10) der isolierenden Halterung (9) umgibt und aus Zusammenbauteilen (16, 16) hergestellt ist, die an entsprechenden einzelnen Buchsengliedern (17, 17) angebracht sind und die aneinander stoßen, um das Zusammenbaubuchsenglied (15) zu bilden;
- Eine Einrichtung (18) zum Halten der Zusammenbauteile (16, 16), die die Zusammenbauteile (16, 16) in eine aneinander stoßende Berührung miteinander ohne Lücken dazwischen zwängt und die die Stoßkanten (19, 19) der einzelnen Buchsenglieder (17, 17) in aneinander stoßende Berührung miteinander ohne Lücken dazwischen zwängt.

2. Elektrische Verbinderanordnung nach An-



spruch 1, dadurch gekennzeichnet, daß erhöhte Rippen (22, 22) auf der Außenseite der Zusammenbauteile (16, 16) durch die Einrichtung (18) verformt sind und gegen die Innenseite der Einrichtung (18) zusammengedrückt sind.

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3. Elektrische Verbinderanordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Einrichtung (18) ein Kragen (18) ist, der die Zusammenbauteile (16, 16) des Zusammenbaubuchseinglieds (15) umgibt.

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4. Elektrische Verbinderanordnung nach Anspruch 1, dadurch gekennzeichnet, daß zusammengehörige isolierende Glieder (10, 10, 10) jeweils mit einer Nahtfläche (12, 12, 12) und mit isolierenden Abschnitten (11, 11) ausgebildet sind, die entlang der Nahtflächen (12, 12, 12) ohne Lücken dazwischen aneinander stoßen, und daß eine Kante jeder Nahtfläche (12, 12, 12) von einem nahtlosen Abschnitt eines Buchseinglieds (17, 17) des leitenden Gehäuses (14) abgedeckt ist.

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5. Elektrische Verbinderanordnung nach Anspruch 1, dadurch gekennzeichnet, daß das Zusammenbaubuchseinglied (15) von einer leitenden Klammer (27) umgeben ist, die unter Reibung an dem Zusammenbaubuchseinglied (15) befestigt ist, und daß leitende Stifte (29, 29) einstückig mit der Klammer (27) ausgebildet sind und sich in die gleiche Richtung wie das Zusammenbaubuchseinglied (15) erstrecken.

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6. Elektrische Verbinderanordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Stoßkanten (19, 19) Kanäle (20, 20) und vorspringende Rippen (21, 21) aufweisen, die in den entsprechenden Kanälen (20, 20) aufgenommen sind.

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