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**ELECTRICAL CONNECTOR FOR S TERMINAL
FOR USE WITH VIDEO EQUIPMENT**



5 The present invention relates to an electrical connector for 'S'-terminal on a video equipment which is constructed in such a way that a brightness signal and a color signal is separately derived as reproduced outputs in order to realize a higher quality image.

DESCRIPTION OF THE PRIOR ART:

10 Recently, in order to realize a higher quality image on a display both of the conventional VHS and BETA systems have been substituted by SUPER VHS (abbreviated as 'S-VHS') and ED BETA systems, respectively. As is well known, these new systems have excellent characteristics in which they are capable of preventing the reduction of an FM brightness signal overlapped on a color signal and of slightly widening a band-width of the color signal. 15 More specifically, they are capable of separately deriving the brightness signal 'Y' and the color signal 'C' as the reproduced signals.

20 Thus the video equipment of this kind has a 'Y/C' separate input/output terminal, commonly referred to as an 'S'-terminal, through which the video equipment is connected to a television set and a video camera. For this purpose, an electrical connector for an 'S'-terminal has been developed and widely utilized. More 25 specifically, the prior art connector of this kind is constructed and connected to cables in the manner as described below.

30 The prior art arrangement of the electrical connector will briefly be described below with reference of Figs. 6, 7 and 8. A cable 41 comprises a coaxial line 44 consisting of a core wire 42 and an

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outer sheath wire 43, as well as another coaxial line 47 consisting of a core wire 45 and an outer sheath wire 46. Each of said core wires 42 and 45 of the two coaxial lines 44 and 47 are crimped to each of core terminals 48 and 49 respectively. The core terminals 48 and 49 are passed through a holder 50 made of electrical insulation material which is then held in a metal pipe 51. The outer sheath wires 43 and 46 are currently connected in the manner as stated below.

10 The sheath wire 43 of the coaxial line 44 is covered with a heat shrinkage tube 52 as shown in Fig. 7. Then heat is applied to the heat shrinkage tube 52 which is shrunk thereby to make a bundle of the sheath wire 43. In Fig. 8, a bifurcated portion 53 of the coaxial line is also covered with a heat shrinkage tube 54 and heat is applied to shrink the heat shrinkage tube 54, thereby protecting the bifurcated portion 53. The equivalent process applies to the sheath wire 46 of the other coaxial line 47. These sheath wires 43 and 46 are crimped to external wiring terminals 55 and 56 which are then passed through the holder 50 and held therein. Although not shown in Fig. 6, all of these components are entirely molded with some resin of the electrical insulation material in the usual manner.

25 The prior art arrangement as stated above has a number of deficiencies. Firstly, it takes a longer time to connect the sheath wires 43 and 46 of the coaxial lines 44 and 47 to the external wiring terminals 55 and 56, respectively, thereby limiting the improvement of the productivity of the electrical connector. Secondly, due to the use of additional components such as the heat shrinkage tubes and the like, extra amount of materials is required. Thirdly, 35 the metal pipe 51 is not efficiently utilized because



it provides simply a mechanical positioning capability.

In view of the above, it is an object of the present invention to provide an electrical connector for an 'S'-terminal in which the connection of respective outer sheath wires of two coaxial lines with respective sheath wire terminals can simply and efficiently be achieved.

It is another object of the present invention to provide an electrical connector for an 'S'-terminal in which a metal pipe can effectively be utilized not only as a mechanical member but also as an electrical member, thereby saving the amount of additional materials used.

In order to achieve the above objects, the present invention provides a shielded electrical connector for electrically connecting a cable to an electronic apparatus, said cable composed of a pair of coaxial lines each made of a core wire and an outer sheath wire, wherein said electrical connector is provided with a pair of core wire terminals having two sections, a first section mating with corresponding contact terminals of a receptacle and a second section to which said core wires of said coaxial lines are respectively connected, and also with a pair of sheath wire terminals having two sections, a first section mating with corresponding contact terminals of a receptacle and a second section to which said sheath wires of said coaxial lines are electrically connected, characterized by:

an electrically conductive pipe which is installed on the outside of a holder, which holder is composed of an electrical insulator for positioning and securing therein said pair of core wire terminals and said pair of sheath wire terminals, wherein said sheath

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wires of said pair of coaxial lines are jointly connected and crimped to the rear end of said conductive pipe by a crimping member, and wherein said sheath wires of said pair of coaxial lines are respectively connected
5 to said pair of sheath wire terminals by way of said conductive pipe with the disengageable electrical connection of said pair of sheath wire terminals to said conductive pipe.

According to the arrangement as stated above,
10 electrical connection of said cable 1 and said electrical connector is effected as follows. The core wires 2 and 5 of the coaxial lines 4 and 7 are connected to the core wire terminals 8 and 9 in the conventional manner. The sheath wires 3 and 6 of the coaxial lines
15 4 and 7 are made into a bundle which is connected to the rear end 14 of the conductive pipe 11. In one embodiment, the bundle of the sheath wires are crimped to said rear end by a crimp terminal 15 mounted thereon. In such step of connection, there is no need for the heat shrinkage
20 tube and the like as in the prior art arrangement. At this time, the sheath wire terminals 16 and 17 passing through and retained in the holder 10 have been electrically connected to the front portion of the conductive pipe 11. More specifically, a resilient
25 member 19 leading to a coupler member 18 for the sheath wire terminals 16 and 17 is in resilient contact with the inner peripheral surface of the conductive pipe 11. Thus, the sheath wires 3 and 6 of the coaxial lines 4 and 7 are electrically connected to the sheath wire
30 terminals 16 and 17 via the conductive pipe 11. According to this arrangement, there is no need for the crimping means to be used for connection of sheath wire terminals 16 and 17 to the sheath wires 3 and 6. In addition to positioning the holder 10, the conductive pipe 11 also serves as the electrical connection member.



BRIEF DESCRIPTION OF THE DRAWINGS:

The present invention will now be described with reference to a preferred embodiment of an electrical connector for an 'S'-terminal shown in the accompanying drawings.

Figs. 1 through 5 show a preferred embodiment of an electrical connector for an 'S'-terminal constructed according to the present invention.¹ Fig. 1 is a perspective view representing a number of components of the electrical connector according to the present invention before they are assembled to each other. Fig. 2 is a perspective view of a holder before a sheath wire terminal is assembled thereto. Fig. 3 shows the components of the electrical connector in the form of longitudinal cross-sectional view taken along the center line thereof, except for a crimping member. Fig. 4 is a cross-sectional view of the crimping piece taken along a line 4-4 in Fig. 3. Fig. 5 is a cross-sectional view of a cable to be connected to the electrical connector for an 'S'-terminal taken along a line 5-5 in Fig. 3.

Figs. 6 through 8 show an arrangement of a prior art electrical connector for an 'S'-terminal. Fig. 6 is a perspective view representing a number of components of the prior art electrical connector before they are assembled to each other. Fig. 7 shows a coaxial line whose sheath wires are covered with a heat shrinkage tube which is then shrunk by an application of heat, thereby making a bundle of the sheath wires. Fig. 8 is a perspective view of the coaxial line whose bifurcated portion is covered with a heat shrinkage tube.



DESCRIPTION OF THE PREFERRED EMBODIMENT:

The present invention will now be described with reference to Figs. 1 and 5.

5 A cable 1 used with a SUPER VHS or ED BETA video equipment will briefly be described by way of example. The cable 1 has two coaxial lines 4 and 7 arranged in parallel and covered with an insulation 21. The coaxial lines 4 and 7 have core wires 2 and 5 and outer sheath wires 3 and 6 respectively. The cable 1
10 is adapted for use with an electrical connector for 'S'-terminal.

The electrical connector comprises core wire terminals 8 and 9. The core wire terminals 8 and 9 have respective crimping portions 22 and 23 at the
15 rear ends thereof. The core wire terminals 8 and 9 are passed through setting holes 12 and 13 on a holder 10 made of electrically insulated material with forward end contact portions 24 and 25 forwardly extended. The sheath wire terminals 16 and 17 are
20 coupled together at the rear end thereof by means of a coupler member 18. The coupler member 18 has a resilient member 19 integrally mounted on the lower portion thereof. The sheath wire terminals 16 and 17, shown as an integral member, are passed through said
25 holder 10 with forward end contact portions 26 and 27 forwardly extended. The holder 10 is covered with and held by an electrically conductive pipe 11. The resilient member 19 on the sheath wire terminals 16 and 17 resiliently contacts an inner peripheral
30 surface 20 of the conductive pipe 11. In addition, the conductive pipe 11 has a 'U'-shaped crimping member 15 mounted on the rear end 14 thereof.

According to the arrangement as described above, the electrical connection of the cable 1 and the
35 electrical connector is effected as follows.



At first the core wires 2 and 5 of the coaxial lines 4 and 7 are respectively crimped and connected to the core wire terminals 8 and 9 by the crimping portions 22 and 23 thereof. Then the core wire terminals 8 and 9 are passed through the holder 10 and held therein. The outer sheath wires 3 and 6 of the respective coaxial lines 4 and 7 are made into a bundle which is then crimped to the conductive pipe 11 by the crimping member 15 thereof. Thereafter when the holder 10 is covered by the conductive pipe 11, the resilient piece 19 of the sheath wire terminals 16 and 17 resiliently contacts the inner peripheral surface 20 of the conductive pipe 11 so that the sheath wires 3 and 6 are connected to the sheath wire terminals 16 and 17 via the conductive pipe 11.

In this way the cable 1 can be connected to the electrical connector for an 'S'-terminal without any operation for processing the heat shrinkage tube and the like by only making the sheath wires 3 and 6 of the coaxial lines 4 and 7 into a bundle which is then crimped to the rear end of the conductive pipe 11 as described above. Thus, the present invention provides the electrical connector for an 'S'-terminal which is capable of simply and efficiently connecting the cable 1 therewith.

Although in the prior art arrangement, the pipe 11 was used only for the purpose of mechanically positioning the holder 10, the present invention provides the more efficient usage of the pipe 11 as it is made of electrically conductive material which enables the highly efficient connection of the cable 1.

More specifically, only one crimping operation is required for crimping the sheath wires 3 and 6 to the rear end of the conductive pipe 11 and any other



operation such as those for making a bundle by use of the heat shrinkage tube are no longer necessary. This is because the sheath wire terminals 16 and 17 are electrically connected to the conductive pipe 11 via the resilient member 19 so that there is no need for crimping the sheath wires 3 and 6 to the sheath wire terminals 16 and 17, respectively.

It is to be noted that although an outermost resin mold has not been shown and described in the embodiment as stated above, it should actually be provided in the usual manner. In addition, although the sheath wires 3 and 6 have been crimped to the rear end 14 of the conductive pipe 11 by the crimping member 15 thereof, the connection means other than crimping may also be used. Furthermore, although in the embodiment as stated above, the sheath wire terminals 16 and 17 have been coupled together by use of the coupler member 18 and the resilient member 19 common to both terminals 16 and 17 has been used for connection with the inner surface 20 of the conductive pipe 11, the sheath wire terminals 16 and 17 may respectively be provided with each resilient member.

It is apparent from the foregoing that according to the first aspect of the present invention, the cable can be easily, simply and efficiently connected to the electrical connector for an 'S'-terminal. More specifically the conductive pipe can serve not only as a mechanical positioning means but also as an electrical member so that the number of steps for connection such as crimping and the like can be reduced. Also, there is no further need for using other additional materials such as a heat shrinkage tube and the like, thereby eliminating the additional operations for processing the same. Furthermore, because of no possibility for occurrence of short-

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circuiting and the like, a higher quality for the electrical connector can be achieved.

5 According to the second aspect of the present invention, higher reliability and ease in connecting the sheath wires of the coaxial lines to the conductive pipe can be achieved because of the connection method in which the sheath wires are jointly coupled to each other and crimped to the rear end of the conductive pipe.

10 In addition, according to the third aspect of the present invention, a compact electrical contact means for sheath wire terminals relative to the conductive pipe can be achieved because of the connection of two sheath wire terminals and the use of a common
15 resilient member for connecting them to the conductive pipe.

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CLAIMS:

1. A shielded electrical connector for electrically connecting a cable to an electronic apparatus, said cable composed of a pair of coaxial lines each made of a core wire and an outer sheath wire, wherein said electrical connector is provided with a pair of core wire terminals having two sections, a first section mating with corresponding contact terminals of a receptacle and a second section to which said core wires of said coaxial lines are respectively connected, and also with a pair of sheath wire terminals having two sections, a first section mating with corresponding contact terminals of a receptacle and a second section to which said sheath wires of said coaxial lines are electrically connected, characterized by:

an electrically conductive pipe which is installed on the outside of a holder, which holder is composed of an electrical insulator for positioning and securing therein said pair of core wire terminals and said pair of sheath wire terminals, wherein said sheath wires of said pair of coaxial lines are jointly connected and crimped to the rear end of said conductive pipe by a crimping member, and wherein said sheath wires of said pair of coaxial lines are respectively connected to said pair of sheath wire terminals by way of said conductive pipe with the disengageable electrical connection of said pair of sheath wire terminals to said conductive pipe.

2. An electrical connector as set forth in claim 1 wherein said pair of sheath wire terminals have resilient members extending in a direction opposite said first mating section, resiliently

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contacting the inner surface of said conductive pipe so that an electrical connection of said conductive pipe and said pair of sheath wire terminals are effected.

5 3. An electrical connector as set forth in claim 2 wherein said crimping member is mounted on said pipe.

 4. An electrical connector as set forth in claim 2 wherein said crimping member is formed
10 integrally with said pipe.

 5. An electrical connector as set forth in claim 4 with said electrically conductive pipe having a continuous inner diameter.

 6. An electrical connector as set forth in claim 5 wherein inwardly directed projections are
15 formed in said electrically conductive pipe.

 7. An electrical connector as set forth in claim 6 wherein said holder has recesses on its outer surface into which said inwardly directed projections
20 on said pipe extend.

 8. A method of applying an electrical connector to a cable having a pair of coaxial lines each line made of a core wire and a sheath wire, to terminate the cable with a shielded connector, comprising the
25 steps of:

 inserting into a front portion of an electrically conductive pipe, an electrically insulated holder having axially extending terminal receiving passageways therethrough and said holder having

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inserted therein, shield wire terminals which resiliently contact the inner surface of said pipe so that an electrical connection of said pipe and said pair of sheath wire terminals are effected;

5 forming an inwardly extending projection on said pipe to secure said holder therein;

 inserting through a rear section of said pipe and into said holding passageways electrical terminals terminated to respective core wires of said cable and
10 securing said terminals therein; and

 crimping said pair of sheath wires to an end of said pipe.

9. A method as claimed in claim 8 further comprising the step of aligning recesses in the outer
15 surface of said holder in line with inwardly directed projections formed in said pipe prior to said step of inserting said holder into said pipe.

10. A method as claimed in claim 9 wherein said step of inserting said holder into said pipe includes
20 the step of stopping insertion after said holder contacts one of said inwardly directed projections.

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