ADAPTER FOR COAXIAL CABLE CONNECTOR

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ABSTRACT

An adapter consists of a hollow cylinder of conductive or non-conductive material adapted to fit as a sleeve within the hollow shaft portion of an F-56 male, coaxial connector. The cylinder has a shaped end which assists an RG59/U type coaxial cable to slip over the hollow shaft of the F-56 type connector with the dielectric and inner conductor fitting on the inside of the hollow cylinder and the outer conductor and outer insulation of the cable fitting over the outside of the F-type connector's hollow shaft.

1 Claim, 3 Drawing Figures
ADAPTER FOR COAXIAL CABLE CONNECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to coaxial cable connectors and more particularly to an adapter which will enable a coaxial cable connector to be used with two types of coaxial transmission lines.

2. Description of the Prior Art

At the present time, RG59/U type coaxial cable and a larger diameter foam dielectric coaxial cable is used to contact a home television antenna to a television receiver. This larger diameter foam cable is sometimes referred to as an RG6/U foam dielectric cable. In F-59 and F-56 type male connectors commonly used in television antenna accessory equipment, the center conductor of the cable serves as the center pin of the male connector. The center conductor and the inner adjacent dielectric fit into a hollow shaft of these connectors and the outer conductor and outer insulation are clamped to the outside of this shaft.

Associated with the RG59/U type coaxial cable is the F-59 connector and associated with the RG6/U larger diameter foam type of coaxial transmission line is the F-56 connector. The hollow shaft of the F-56/U male connector has an inner surface diameter of approximately 0.155 inches to accommodate the smaller diameter dielectric of the RG59/U type coaxial cable. The hollow shaft of the F-56 connector, similarly designed, has an inner surface diameter of approximately 0.195 inches to accommodate the larger diameter foam dielectric of the RG6/U type cable.

A disadvantage of the RG59/U cable is that it's attenuation per unit length is significantly greater than is the case for the RG6/U foam type cable. The RG59/U cable is sometimes preferred over the RG6/U because of its structural properties. The RG6/U cable usually has foil as the outer conductor and the RG59/U is braided wire.

If attempts are made to use an F-56 connector with the RG59/U coaxial cable, the outside diameter of the F-56 shaft is too large to allow it to slip easily between the inner dielectric and the outer conductor of the smaller RG59/U cable. Also due to the excess size of the inner diameter of the shaft of the F-56 connector, the smaller diameter of the inner dielectric of the RG59/U coaxial cable does not remain centered and the inner conductor is free to move sideways causing misalignment with the mating connector. Off center alignment of the inner connector and excess air space surrounding the cable inner dielectric causes impedance mismatch problems.

If an attempt is made to use the F-59 connector with RG6/U foam coaxial cable, the larger diameter inner dielectric of the foam cable does not fit into the aperture of the smaller F-59 connector shaft. Thus, if it is not certain which type of cable the user has or prefers, the supplier of television and FM (frequency modulated) radio reception equipment, particularly that of TV antenna accessory equipment, such as couplers, amplifiers, baluns, etc. has to supply both an F-56 and an F-59 coaxial cable connector.

SUMMARY OF INVENTION

Briefly, in accordance with the present invention, an adapter is provided for a coupling apparatus which has a shaft member with an internal bore sufficient to hold the inner conductor and the inner dielectric of a first type of coaxial cable, the adapter serving to adapt the coupling apparatus for a second type of coaxial cable having a substantially smaller combined diameter inner conductor and inner insulator. The adapter includes a hollow cylindrical member having a uniform sleeve portion and a tapering raised end portion. The outer diameter of the sleeve portion is dimensioned to fit snugly within the internal bore of the coupling apparatus, and the thickness of the sleeve portion is made to substantially fill the gap between the bore and the outer surface of the inner insulator of the second type of cable when inserted in the bore of the shaft member of the coupling apparatus. The tapered raised end portion is adapted to spread the outer conductor of the second type of cable away from the inner dielectric.

DESCRIPTION OF THE DRAWING

The detailed description follows in conjunction with the following drawing wherein:

FIG. 1 is an assembly view of an F-56 coaxial cable connector, an adapter and RG59/U coaxial cable.

FIG. 2 is a cross-section of an RG6/U foam coaxial cable.

FIG. 3 is a cross-section of an RG59/U coaxial cable.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown in part A an F-56 male connector 10, in part B an adapter 12, and in part C a section of RG59/U coaxial cable 14. Turning to part A of FIG. 1, the F-56 male connector 10 includes a nut member 16, a cylinder member 20, and a hollow-shaft member 30. The nut member 16 has threads on the inner surface 18. The cylinder member 20 extends into the nut member 16. The shaft member 30 is pressed into the cylinder member 20 to complete the connector assembly. The cylinder member 20 has an expanded section 26 located rearward of the nut member 16. The shaft member 30 has an expanded section 31 which is located inside the nut member 16. The cylinder expanded section 26 and the shaft expanded section 31 serve to captivate the nut member 16 with the nut member 16 being free to rotate about the axis of cylinder member 20 and shaft member 30. The cylinder member 20 has a hollow section 24 to accommodate the outer conductor and outer cover of the RG6/U coaxial cable.

Referring to FIG. 2, there is illustrated a cross-section of the RG6/U foam type coaxial cable. This RG6/U cable includes a center conductor 35, an outer conductor 37, a dielectric insulator 39 therebetween and an outer dielectric cover 41. The inner conductor 35 may, for example, be copper. The outer conductor 37 is usually of metal foil. The dielectric 39 may be foam and the outer cover 41 polyvinyl. The RG6/U cable is sold commercially, for example, by Belden Corporation of Chicago, Ill. and is known as No. 8228 foam cable. A portion of the dielectric 39 is stripped away exposing the center conductor 35 which extends into the nut member 16 to act as a pin for the F-56 coaxial cable connector. The shaft member 30 has an elongated uniform bore 33 to accommodate snugly the inner conductor 35 and dielectric 39 of the RG6/U foam cable. Shaft member 30 has a tapered section 34 at one end to assist separation between the inner foam dielectric 39 and the outer conductor 37 of the RG6/U
foam coaxial cable. The outer conductor of the RG6/U cable is usually aluminum foil and goes around and over the shaft member 30 of the connector 10 with the outer conductor 37 and the outer dielectric cover 41 being located in the hollow section 24.

A clamping ring section 28 is held to the cylinder member 20 by a relatively thin walled holding ring 29. A special crimping tool or pliers is used to crimp the clamping ring section 28 inward to hold the outer conductor 37 of the coaxial RG6/U cable tightly against the shaft member 30 for positive electrical and mechanical connection.

Referring to part C of FIG. 1 and to FIG. 3, the RG59/U coaxial cable 14 has an inner conductor 45, an inner dielectric 47, outer conductor 49 and outer insulator 51. The combined diameter of the center conductor 45 and the inner dielectric 47 is approximately 0.155 inches. The outer conductor 49 is usually braided wire.

Referring to part B of FIG. 1, the hollow cylindrical member 12 includes a uniform sleeve portion 53 and a tapered portion 54. The adapter 12 has a uniform diameter bore 55 that extends the entire length of the adapter. The bore diameter is on the order of 0.155 inches to allow the inner dielectric 47 and the center conductor 45 of the RG59/U cable to fit snugly therein. The thickness of sleeve portion 53 is made somewhat less than 0.040 inches in order to allow the sleeve portion 53 to fit snugly between the bore 33 of shaft member 30 and the outer surface of the inner dielectric 47 of cable 14. The tapered end section 54 first abruptly increases to a value at point 57 such that the diameter of the outer surface of the adapter 12 is approximately equal to or matches the diameter of end 56 of hollow shaft member 30. The outer surface diameter of tapered section 54 decreases at a constant rate to end 59. The change in diameter of section 54 is such as to provide a ramp for the spreading of the outer conductor 49 of cable 14 from the inner dielectric 47 and so that the portion 54 acts as a continuing ramp with section 34 of the connector for the spreading of the outer conductor 49 from the inner dielectric 47.

In the connection of the RG59/U cable 14 to the connector 10, the sleeve portion 53 of adapter 12 is slid into the bore 33 of cylindrical member 20 with the end 45 57 of the tapered portion 54 resting against the end 56 of cylindrical member 30. The RG59/U cable has its center conductor 45 and inner dielectric 47 peeled away as shown in part C of FIG. 1. The inner dielectric 47 and the center conductor 45 of cable 14 are inserted inside the bore 55 of adapter 12 with the center conductor 45 extending as a pin inside nut member 16. The outer conductor 49 and outer insulator 51 are first forced over the tapered portion 54 of adapter 12, over section 34 and then over the bearing surface section 25 of cylindrical member 30 with the outer conductor 49 and insulator 51 under clamping ring section 28. The clamping ring section 28 is then crimped by pliers or a special crimping tool, to hold the outer conductor 49 and outer insulator 51 between the ring section 28 and the bearing surface section 25.

What is claimed is:

1. In a coupling apparatus for coaxial transmission lines of the type having a center conductor, an inner insulation, an outer conductor and an outer insulation in that order, wherein said apparatus comprises a hollow shaft member having an internal bore of a diameter just sufficient to hold snugly therein the center conductor and the inner insulation of a first type of coaxial line, said shaft member having for a sufficient distance a substantially cylindrical bearing surface against which the outer conductor and the outer insulation of said first type of coaxial line may be clamped, said shaft member having adjacent said bearing surface a tapered section at one end to assist separation between the inner insulator and the outer conductor of the first type of coaxial line and the spreading of the outer conductor of said first type of coaxial line over said bearing surface, the improvement therewith for adapting said apparatus for a second type of coaxial line having a combined center conductor and inner insulator diameter substantially smaller than the combined inner insulator and center conductor diameter of said first type of coaxial line and of said bore, said improvement comprising a hollow cylindrical member having a uniform sleeve portion and a raised tapered end portion, said outer diameter of said sleeve portion being such as to snugly fit within said bore of said first hollow shaft member and the thickness of said sleeve portion being such as to substantially fill the gap between said bore of said first hollow shaft member and the outer surface of said inner insulator of said second type of coaxial line when said second type of coaxial line is inserted in the bore of said shaft member, said raised tapered end portion located at an end of said cylindrical member having an outside diameter that increases from the extreme end to form a taper adapted to assist separation between inner insulation and outer conductor of the second type of coaxial line, said raised tapered end portion having an outside diameter at the junction with the uniform sleeve portion determined so that when said sleeve portion of said cylindrical member is fitted within said bore the raised tapered end portion matches said tapered section of said shaft member for providing a continuous ramp to assist in spreading the outer conductor and outer insulator of said second type of coaxial line from the inner insulator thereof over said tapered portion of said cylindrical member, over said tapered section and over and around said bearing surface.