ABSTRACT OF THE DISCLOSURE

A right angle contact including an insulated contact wire, a conductive housing with terminals at right angles to each other therefor, the cavity in the housing being filled with finely divided metallic particles.

This invention relates to angular electrical connectors and more particularly to right angle connectors.

An important object of the present invention is to provide an angular connector with improved electrical characteristics and wherein a constant characteristic impedance is maintained at all transverse cross sections. A further object is to provide an improved right angle connector which achieves the optimum electrical properties and which eliminates, insofar as possible, impedance discontinuities on an incremental basis. In other words, each incremental section of the transmission line is proportioned to introduce no reflection.

The usual practice in forming angular or elbow connectors has been to use a two piece contact and insulator design and form the right angle by soldering the two straight contacts together. The cavity surrounding the joint is then filled with insulating material, or the cavity may be left unfilled with air acting as the dielectric. This device gives poor electrical performance due primarily to the non-constant relationship of the distance between the outer diameter of the inner conductor and the inner diameter of the outer conductor.

The principal object of the present invention is to provide a right angle connector whose electrical properties approximate those of similar straight connectors through the same frequency excursions. These advantages are achieved by the use of a single contact and enclosing insulator bent at a 90° angle, and by employing novel means to insure a constant inner to outer conductor distance ratio at all points around the 90° bend.

This is achieved by filling the cavity around the bend with small conductive metallic particles. These metallic particles can be exceedingly fine and in order to insure the cavity being completely filled at all times and avoid any shifting of the mass which might produce a void, some adhesive or other binder may be incorporated with the particles to produce in effect a solid mass which precisely fits the cavity. This arrangement has produced significantly better results in enhancing the VSWR performance of the connector than by the use of a metallic insert, contoured to form around the circumference of the bent insulator.

The figure of the drawing is a central longitudinal section taken through a right angle connector embodying the present invention.

The right angle connector of the present invention employs a single contact 10 of substantially the same diameter as the central conductor 11 of a coaxial cable 12, the contact being enclosed in an Insulating sleeve 14. One end of the contact may have a reduced or rounded terminal section 18 which is received in force fit relation in a female contact having a solid central section 19, a slotted bore 20 to receive the contact, and a bore 22 at its other end to receive the central conductor 11. The wall of bore 22 may have an opening to receive a drop of solder shown at 24. The other end section of the contact is rounded and is of reduced diameter at 26 to be received in a female contact (not shown) for connection with another coaxial cable.

A tubular body 27 receives one end of the insulated right angular contact and, at one end, it has a bore 28 receiving one end of the insulated angular contact in snug fit relation. The inner end of bore 28 is tapered outwardly at 29 to facilitate entry of the insulated contact. Continuing outwardly, the bore has a slightly enlarged section 30 followed by a further enlarged section 31 and terminates in thread section 35. The female contact 19 is enclosed in an insulating sleeve 37 of lesser diameter than bore 30. One end of sleeve 37 abuts against insulation 14 and the other abuts against insulation 16 of the coaxial cable.

At the inner end of bore 31, there is a bushing 32 followed by a clamp gasket 33 for sealing this end against moisture, and next a collar 34 having slotted, tapered ends 36 which are engaged by a tapered section 38 of a bore in an externally threaded clamp nut 40 received on threaded terminal 35 of the body section. A wrench receiving part 42 facilitates screwing the nut into place, compressing the tapered ends 36 between tapered bore 38 and metal cable sheath 44, thus assuring a firm contact between the cable sheath and the body member.

The opposite end of this body member has a reduced threaded section 46 which receives a sleeve 48 internally threaded at 50 to receive section 46. Sleeve 48 is also internally threaded at its other end 52 to receive a closure plug 54 closing the cavity, between the sleeve 48 and the Insulation 14, which contains tightly packed metallic particles 55. The lower portion of sleeve 48, when viewed as in the drawing, has a threaded hole 56 to receive a reduced threaded terminal 58 of a tubular body 60 whose axis is at right angles to the major axis of body member 27 and has an upper flange 61. A coupling nut 63 having a wrench receiving surface 62 is carried on body 60 and is connected thereto by a split locking ring 64 positioned in aligned annular slots 65 and 67 in body 60 and nut 62.

Body 60 has a bore 69 of such size as to receive the Insulation 14 of the contact in snug fit relation and a sealing gasket 66 is positioned in a recess 70 at the outer end of body 60, thus providing a seal between body 60 and coupling nut 63, which latter is threaded at 71.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

The embodiments of the invention in which the exclusive property or privilege is claimed are defined as follows:

1. An angular connector comprising a single contact with end sections and provided with an angular bend and insulation between its end sections, a main tubular body having a bore to receive one end of the Insulation and having a terminal portion to receive another conductor, an inner extension of said main body, axially aligned therewith, and enclosing the bend portion of said contact and its Insulation, closure means at the outer end of said extension, and finely divided electrically conductive particles filling the cavity formed between the Insulation and the body sections, said extension having a side wall.
opening and a tubular extension secured in the opening at an angle to the main tubular body and through which the opposite end of the insulation and contact passes.

2. The structure described in claim 1 wherein the particles are metallic.

3. The structure described in claim 1 wherein said angular bend is a right angle.

4. The structure described in claim 1 wherein means are provided at at least one end for connecting the contact with a coaxial cable.

5. The structure described in claim 1 wherein the tubular extension has a bore to receive a second end of the insulated contact in snug fit relation, and a coupling nut is carried by said tubular extension, the nut and tubular extension having complementary annular grooves and a split spring washer extends into both grooves for securing the parts together.

6. A right angle connector comprising a single contact with tapered end sections for insertion in female contacts and provided with a right angular bend and insulation between its end sections, a main tubular body having a bore to receive one end of the insulation and having an enlarged outer terminal portion to receive an end of a coaxial cable, a female contact for connecting one conductor of said cable with the contact, an inner extension of said main body axially aligned therewith and enclosing the bend portion of said contact and its insulation, a closure means at the outer end of said extension, and finely divided metallic particles filling the cavity formed between the insulation, the body extension and the inner end of the body, said extension having a side wall opening and a tubular body secured in the opening at right angles to the main tubular body and through which the opposite end of the insulation and contact passes, and a coupling nut at the free end of said body extension.

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