

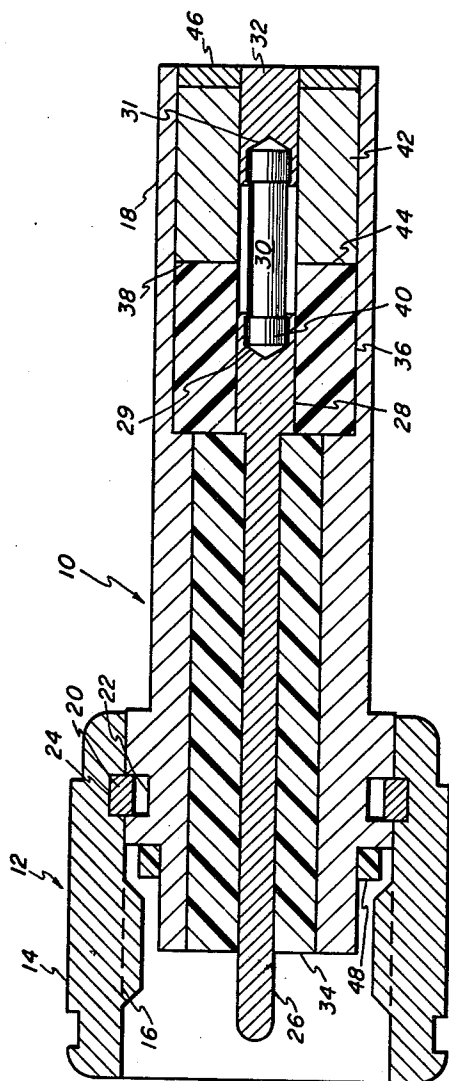
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TRANSMISSION LINE TERMINATION

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TRANSMISSION LINE TERMINATION

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This invention relates to an improved termination for a coaxial transmission line.

The characteristic impedance of a coaxial transmission line is purely resistive. Accordingly, if the line is terminated in a resistance of proper value there should be no reflections. However, it is difficult to obtain a purely resistive termination because the terminating resistors which are used contain inductive reactances due to their geometry and finite size.

In accordance with this invention, a conductive slug is disposed between inner and outer conductors in electrical contact therewith. A terminating resistor inserted in the inner conductor has one end in electrical contact with the slug through the inner conductor. The capacitive reactance provided between the slug and the other end of the resistor as a result of predetermined spacing between them compensates for the inductive reactance introduced by the resistor and a very pure resistive termination is obtained.

Accordingly, it is an object of this invention to provide an improved termination for a coaxial transmission line wherein capacitive reactance is provided to compensate for inductive reactance introduced by a terminating resistor.

It is another object of this invention to provide an improved termination of the above character which operates effectively over a broad frequency range.

It is a further object of this invention to provide an improved termination of the above character which is reliable in its operation and is extremely simple to manufacture on a mass production basis.

Other objects and advantages will become apparent from the following detailed description and from the appended drawing and claims.

In the drawing, the single figure is a cross sectional view of an embodiment of this invention.

The terminating device of the present invention generally indicated at 10 in the drawing is connected to a conventional coaxial connector generally indicated at 12. The connector 12 includes a tubular member 14 made of a conductive material such as brass with threads 16 on the inner surface thereof. The terminating device 10 includes a tubular member 18 made of a conductive material such as brass which is inserted into the member 14. An annular snap ring 20 positioned in annular grooves 22 and 24 of members 18 and 14 respectively, secures the member 18 within the member 14.

Disposed axially within the member 18 is a center conductor 26 made of a material such as brass. One end of the conductor 26 has a section 28 of larger diameter provided with a hole 29 to receive one end of a commercially available resistor 30 which is soldered to the section 28. In one termination device that was constructed, a 50 ohm resistor manufactured by the Film Resistor Corporation was used. This resistor having a diameter of .040 inch was received within a center conductor having a diameter of .050 inch. The other end of the resistor 30 is received within a hole 31 of conductive retainer 32 made of a material such as brass and is soldered thereto. In effect, the retainer 32 is an extension of the center conductor section 28 and may have substantially the same diameter.

A tubular insulator 34 made of a material such as Teflon is inserted between the conductor 26 and the member 18. An annular insulator 36 made of a material such as Teflon

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is inserted adjacent to the insulator 34 between the section 28 of the conductor 26 and the member 18. The insulator 36 is made a particular length so that the end face 38 thereof is at a desired distance from the end 40 of the resistor 30.

An annular conductive slug 42 made of a conductive material such as brass is inserted adjacent to the insulator 36 in electrical contact with the retainer 32. Since the slug 42 is adjacent to the insulator 36, its inner face 44 is also at the desired distance from the end 40 of the resistor 30. The slug 42 is fixed within the member 18 by solder 46.

The resistor 30 is selected to have a value of resistance substantially equal to the characteristic impedance of the coaxial transmission line it is desired to terminate. The coaxial line connector (not shown) is screwed into the threaded portion 16 so that the center conductor of the coaxial line makes electrical contact with the center conductor 26. A gasket 48 made of a suitable insulating material is provided on the member 18 so as to seat the coaxial line connector.

In accordance with the present invention, the undesirable inductive reactance introduced by the terminating resistor 30 is compensated for by the capacitive reactance provided between the end face 44 of the slug 42 and the end 40 of the resistor 30. As previously indicated, the face 44 is positioned at a particular distance from the end 40 to provide the desired amount of capacitive reactance to compensate for the inductive capacitance.

An important advantage of the termination device of the present invention is that it is relatively simple to manufacture on a mass production basis. For coaxial lines having a particular characteristic impedance, once it is determined what distance should be maintained between the end face 44 of the slug 42 and the end 40 of the resistor 30 to provide the necessary compensation, then this determines the length of the insulator 36 that must be used to provide the proper spacing. With an insulator 36 of proper length, it becomes a simple matter during assembly of the termination device to insert the insulator and then to insert the slug 42 adjacent thereto to achieve the necessary compensation.

Another important advantage of the termination device described herein is that it operates effectively over a very broad frequency range. For example, in a 50 ohm termination device that was built, the voltage standing wave ratio did not exceed 1.1 over a coaxial frequency range of D.C. to 12.6 gigacycles.

Although this invention has been disclosed and illustrated with reference to particular applications, the principles involved are susceptible of numerous other applications which will be apparent to persons skilled in the art. The invention is, therefore, to be limited only as indicated by the scope of the appended claims.

Having thus described my invention, I claim:

1. A device for terminating the end of a coaxial line comprising

a conductive outer member of tubular configuration,
a conductive inner member disposed axially within the outer member,

a resistance axially disposed within the outer member and having its first terminal in electrical contact with the inner member,

an insulating annular member disposed between the inner and outer members and extending to a position between the first and second terminals of the resistance,

and a conductive annular slug disposed within the outer member in contiguous relationship with the annular member to provide capacitive reactance between the slug and the first terminal of the resistance, said slug also providing electrical communication between the

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second terminal of the resistance and the outer member.

2. A device for terminating the end of a coaxial line comprising,
 a conductive outer member of tubular shape,
 first and second conductive inner members of cylindrical shape disposed axially within the outer member,
 a cylindrically shaped resistance disposed axially within the outer member between the first and second inner members and having its first and second terminals in electrical contact with the first and second inner members respectively,
 an insulating annular member disposed between the outer member and first inner member and extending to a position between the first and second terminals of the resistance,
 and a conductive annular slug disposed between the outer member and the second inner member and extending into contact with the annular member to provide a desired capacitive reactance between the slug and the first terminal of the resistance, said slug also providing an electrical short between the second inner member and the outer member.

3. A device for terminating the end of a coaxial line comprising
 a conductive outer member of tubular shape,

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a conductive inner member disposed axially within the outer member,
 a resistance disposed axially within the outer member and having its first terminal in electrical contact with the inner member,
 a conductive annular member disposed within the outer member in electrical contact therewith and having its inside surface positioned relative to the first terminal to provide a desired amount of capacitive reactance between said surface and said terminal for compensation of the inductive reactance introduced by the resistance,
 and means for electrically connecting the annular member to the second terminal of the resistance.

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