

[54] COAXIAL CONNECTOR WITH INTEGRAL
SWITCHED TERMINATING RESISTOR

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[58] Field of Search 338/220, 233, 243,
338/64; 333/22 R; 200/51.1

[56] **References Cited**

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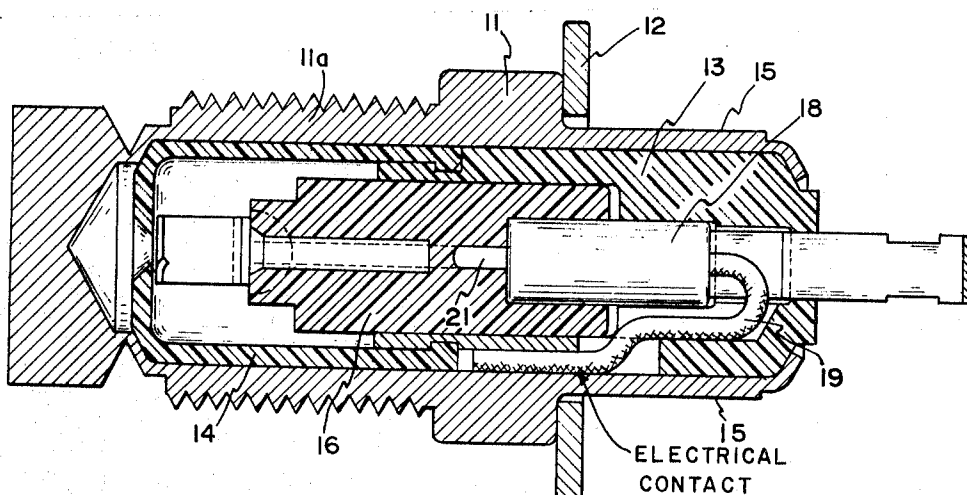
Primary Examiner—E. A. Goldberg

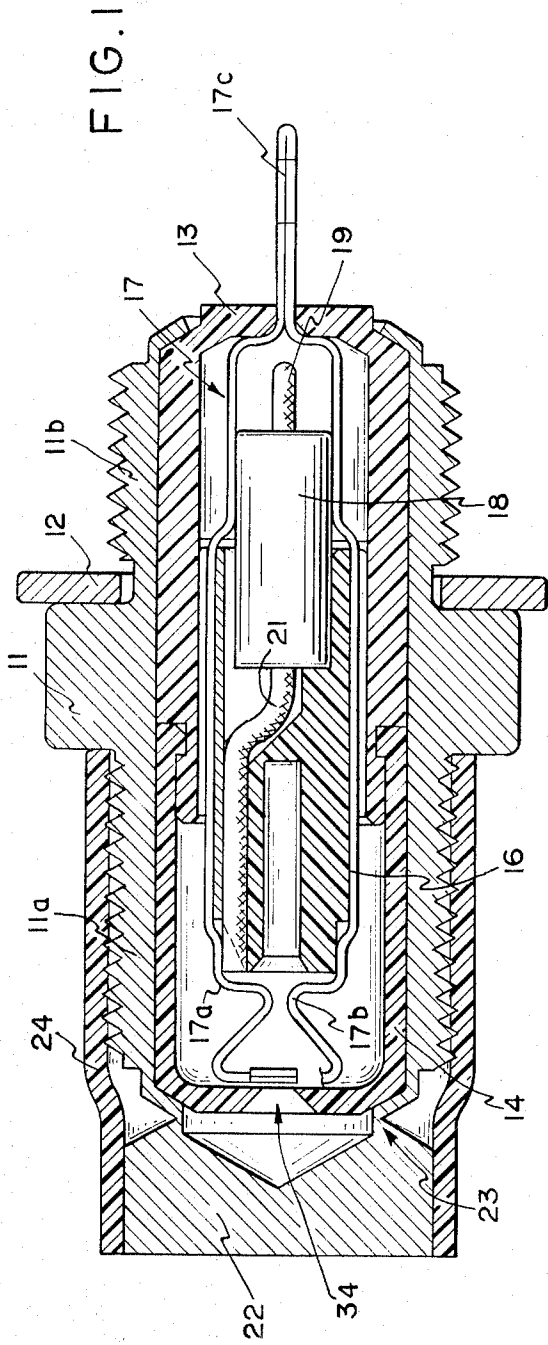
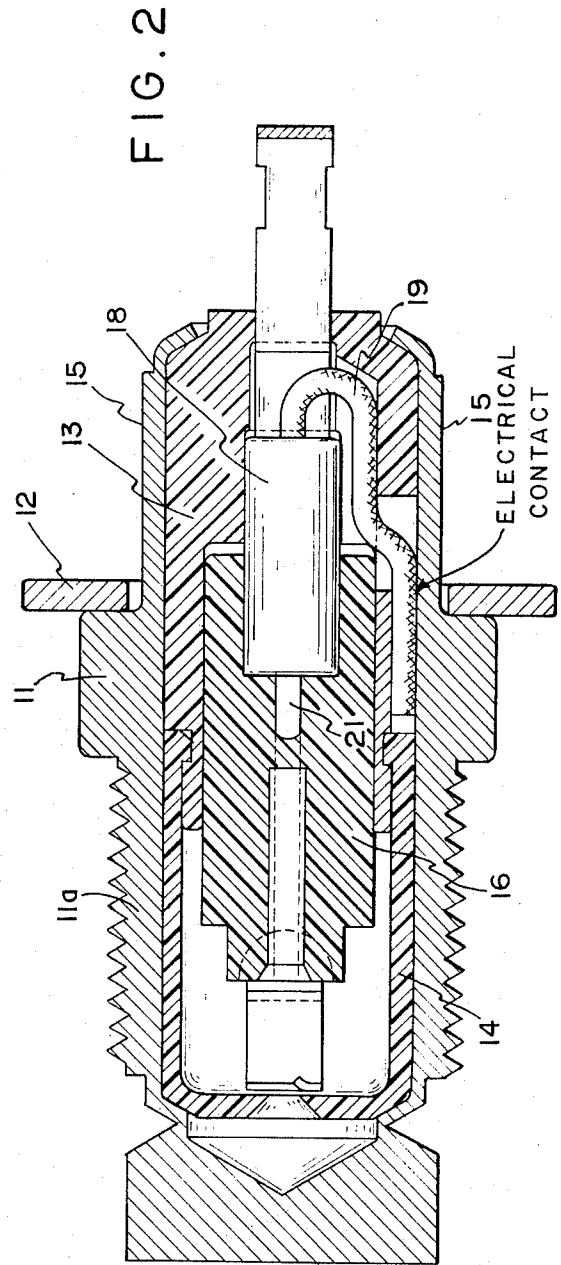
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[57] **ABSTRACT**

A coaxial connector which is especially suitable for use in CATV systems in which the connector contains an integral terminating resistor. The connector includes a hollow body surrounding an insulator assembly within which is disposed a spring contact assembly. The spring contact assembly includes two spring contact fingers normally biased to a first position, but which are adapted to be displaced to a second position upon the insertion of a coaxial cable center conductor therebetween. The terminating resistor has one of its leads connected to the connector body. The other lead of the terminating resistor makes direct electrical and mechanical contact to one of the spring contact fingers when the fingers are in the first position but the terminating resistor is mechanically and electrically disconnected therefrom when the spring contact fingers are displaced to the second position.

6 Claims, 3 Drawing Figures





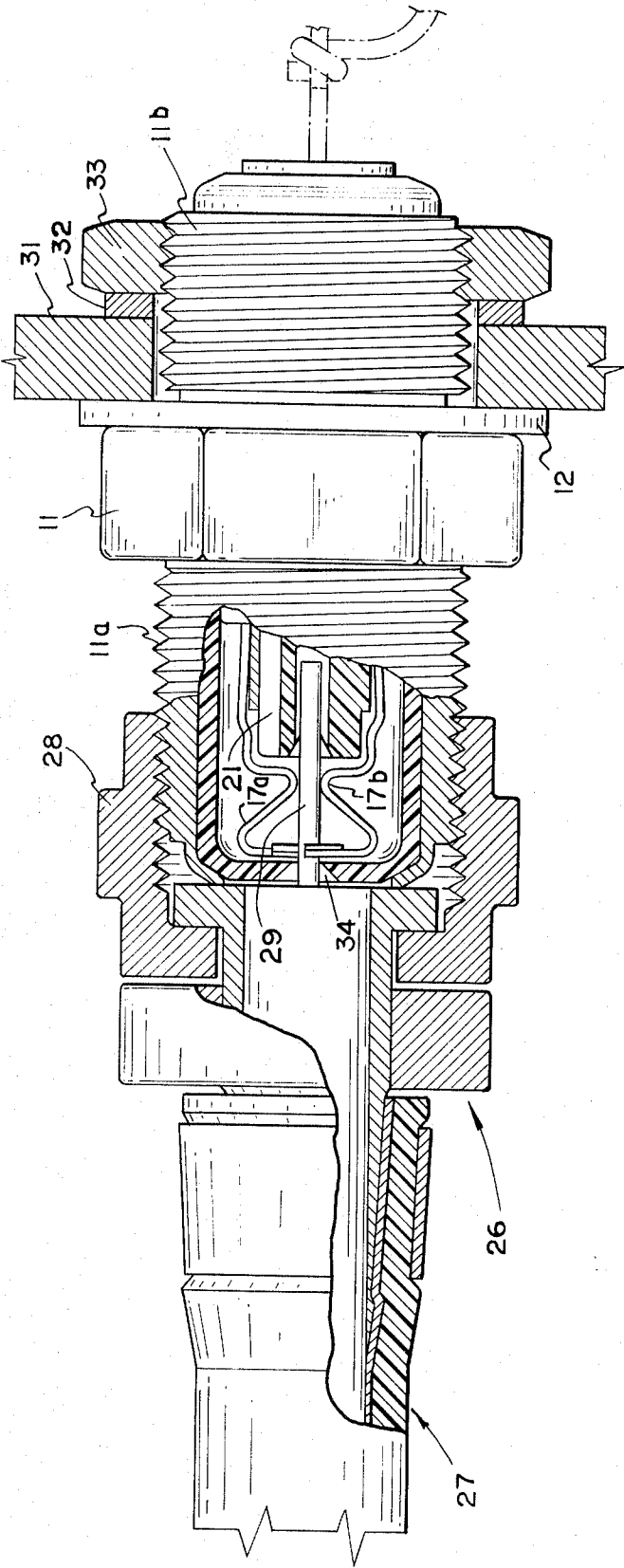


FIG. 3

COAXIAL CONNECTOR WITH INTEGRAL SWITCHED TERMINATING RESISTOR

BACKGROUND OF THE INVENTION

In the construction and operation of a modern community antenna television system (CATV) it becomes necessary to terminate unused subscriber coaxial connection provisions in the characteristic impedance for the CATV system. Typically, the characteristic impedance for a CATV system is 75 ohms. A modern CATV system is laid out and constructed with provisions for a coaxial cable connection to each potential subscriber that is passed by the cable system. Such layout and construction process is known in the industry as a dedicated plant.

Upon completion of the system construction task it then becomes necessary to electronically balance the CATV system. It is at this time that the subscriber coaxial connection provisions must be terminated in the system's characteristic impedance. The subscriber coaxial connection provisions are usually located in apparatus known in the industry as a directional tap. The coaxial connection provision consists of a threaded coaxial connector, generally known in the CATV system as G-61 chassis connector, which is incorporated into the directional tap housing. Directional taps are manufactured with from two to eight such connectors; with four connectors being the most commonly used configuration. There are various physical differences in the outward appearance of the G-61 type fittings; however, the portion of the fitting that is exposed for connection with the subscriber's coaxial drop cable has been standardized by the CATV industry. It is at the above described connector that the 75 ohm terminating resistor is applied. In current industry practice the terminating resistor is axially located in a threaded housing in which the resistor leads become the center conductor and the housing the outer conductor. A terminating resistor assembly of the type is known in the industry as a TR-59 terminator. Threads on the TR-59 terminator housing mate with the threads on the G 61 chassis connector.

Subscriber coaxial cable connections are made upon completion of the electrical balancing of the system, at which time the terminating resistor is removed from and the subscribers' coaxial drop cable is then attached to the subscribers' coaxial connection. As additional subscribers are connected to the system, more terminating resistors are removed with the subscribers' coaxial drop cables replacing them. The unused subscriber coaxial cable connection provisions at the directional tap must remain terminated. Considering that the average CATV system being constructed connects less than 25 percent of its potential customers, it becomes apparent that approximately 75 percent of the directional taps subscriber coaxial connection provisions must remain terminated. The cost associated with the termination requirements of a typical CATV system represents a considerable investment in facilities and labor to the owner of a CATV system.

Typical steps in the manufacture and installation of a CATV directional tap which contains subscribers' coaxial connection provisions include the following. First, in manufacturing the directional taps, usually after final assembly, a terminating device is attached to each subscriber coaxial connection for the purpose of testing the performance of the directional tap assembly. The terminating device in this instance consists of a suitable

holder containing a terminating resistor. After testing, the terminating device is removed. Subsequently, when the directional taps are installed in the CATV system it is again necessary to install terminating devices as described above.

It can be seen therefore that in the manufacture of directional taps for CATV systems and during the construction and balancing of the CATV system in which the directional taps are installed, considerable labor is required in respect to the installation, removal and general uses of terminating devices.

In copending application Ser. No. 280,969 filed Aug. 16, 1972, there is disclosed and claimed a coaxial connector for use in conjunction with devices such as CATV directional taps in which the coaxial connector incorporates an integral terminating resistor which is easily removed when desired by a breakoff feature incorporated in the coaxial connector body. The prior art also contains examples of coaxial connectors which have switchable load means incorporated therein. Such prior art includes U.S. Pat. No. 3,459,906 to O'Keefe et al and U.S. Pat. No. 3,525,056 to Qurashi. These patents disclose coaxial connectors which have a terminating resistor incorporated therein. The arrangements are relatively complex, however, and require the use of separate actuating means for connecting or disconnecting the resistor upon the connection or disconnection of a signal transmission line to the coaxial connector and further require the incorporation of a plug device attached to the center conductor of the (coaxial cable) signal transmission line.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a coaxial connector of simple, inexpensive construction having an integral switched terminating resistor.

It is another object of this invention to provide such an integral switched terminating resistor construction in a coaxial connector which requires no intermediate actuating members for connecting or disconnecting the terminating resistor.

It is another object of this invention to provide such a coaxial connector in which there is no need for a center conductor adapting pin.

It is another object of this invention to provide a coaxial cable connector which is completely shielded prior to the time a subscriber drop line is attached thereto so as to prevent radiation of electrical signals therefrom.

It is another object of this invention to provide such a coaxial connector in which the connector will remain waterproof until a subscriber drop line has been connected thereto.

Briefly, in accordance with one embodiment of the invention, a coaxial connector includes a hollow elongated body within which is disposed an insulator and a spring contact assembly. A terminating resistor having a pair of leads is also disposed in the hollow body. The spring contact assembly includes a pair of contact fingers which are normally spring biased to a first position but being adapted to receive a coaxial cable center conductor which deflects the contact spring finger to a second position. One of the resistor leads is disposed in permanent mechanical and electrical contact with the body. The other of the resistor leads is physically and electrically directly connected to one of the spring

contact fingers when the spring contact fingers are in the first position, but is physically and electrically disconnected therefrom when the spring contact fingers are in the second position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view partially sectioned of a coaxial connector in accordance with this invention incorporating an automatically switched terminating resistor.

FIG. 2 is similar to FIG. 1 except that it is a view partially in section of the coaxial connector of FIG. 1 rotated 90°.

FIG. 3 is a side view partially in cross-section of the connector of FIGS. 1 and 2 but illustrating a connection to the mating coaxial connector with the coaxial cable center conductor being inserted between the spring contact fingers.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 and 2, there are shown sectional views of the coaxial connector of this invention with FIGS. 1 and 2 representing sectional views rotated with respect to each other by 90°. The coaxial connector comprises a body 11 formed of aluminum or similar conducting material which is generally elongated and which has threaded portion 11a and 11b. A captive washer 12 is disposed on the threaded portion 11b. The threaded portion 11b as shown in FIG. 2 has flats 15 formed thereon for facilitating mounting the coaxial connector in a directional tap, as will be more fully discussed hereinafter. Inside the hollow elongated body 11 is a three-piece insulator assembly comprising a retainer insulator 13, a cap insulator 14 and a center insulator 16. The retainer insulator 13 and the center insulator 16 position a spring contact assembly 17 which includes spaced contact spring fingers 17a and 17b. The spring contact assembly 17 also has an extended end 17c to which a conductor may be secured such as by soldering. A terminating resistor 18 is disposed within the hollow elongated body 11 and is held in position by the retainer insulator 13 and the center insulator 16. The terminating resistor 18 has leads 19 and 21. The resistor lead 19 is oriented as shown in FIGS. 1 and 2 and is directly electrically and mechanically connected to the body 11. Electrical continuity of lead 19 to the body 11 is assured by its compression between the wall of body 11 and retainer insulator 13. The other lead 21 of terminating resistor 18 is routed through the center insulator 16 as shown in FIG. 1. As further shown in FIG. 1, the contact spring fingers 17a and 17b are normally spring biased such that the contact spring finger 17a is forced against the resistor lead 21 to make direct electrical and mechanical contact thereto.

The coaxial connector shown in FIGS. 1 and 2 includes a sealing member 22 which can be formed at the same time the body 11 is being formed and which is connected thereto by an interface portion of material 23. This forms a weathertight construction preventing the ingress of water or other environmental hazards into the coaxial cable center conductor receiving opening generally indicated by reference numeral 34 in the connector. The sealing member 22 together with the interface portion 23 also function as radiation shielding. That is, since the sealing member 22 together with the interface portion 23 are formed of the same material as the body 11, i.e., aluminum, a conductor, then

any electrical signals present in the coaxial connector are contained within the connector by this shielding rather than being transmitted into the surrounding environment. Utilizing this construction the problem of radiation from unused coaxial connectors in a directional tap is obviated.

As shown in FIGS. 1 and 2 the interface portion 23 is formed of a material having a thickness substantially less than that of the body 11 or the sealing member 22. Suitable means for protecting the threaded portion 11a of the coaxial connector may also be provided in the form of plastic thread protector sleeve 24 shown in FIG. 1. When it is desired to make an electrical connection to the coaxial connector the sealing member 22 and thread protector 24 are removed. This can be simply accomplished by subjecting the sealing member 22 to a lateral deflection force which serves to rupture or fracture the interface portion 23, thus separating the sealing member 22 from the body 11. After the sealing member 22 has been removed then a standard F 59 connector may be connected to the coaxial connector. FIG. 3 illustrates the coaxial connector of this invention with the sealing member removed and with an F 59 connector connected thereto. Thus in FIG. 3 an F 59 type connector generally indicated by reference numeral 26 has for example a coaxial cable 27 attached thereto and includes a threaded coupling 28 which threadedly engages and makes electrical contact with the threaded body portion 11a and also includes the coaxial cable center conductor 29. As shown in FIG. 3 the center conductor 29 extends through the connector pin receiving opening 34 and engages and spreads apart the spring contact fingers 17a and 17b, thus making electrical contact therewith. As the spring contact fingers 17a and 17b are spread apart the spring contact finger 17a which had been electrically and mechanically directly contacting the terminating resistor lead 21 is displaced therefrom so that the electrical connection between the terminating resistor lead 21 and the spring contact 17a is broken.

FIG. 3 illustrates the coaxial connector of this invention mounted to a wall 31 of a directional tap, for example. The coaxial connector is secured to the wall 31 by means such as a washer 32 and nut 33 screwed onto the threaded portion 11b of the connector. The flats 15 formed on body portion 11b and referred to in connection with FIG. 2 facilitate mounting the connector to the wall 31 in that the wall 31 is provided with an opening having corresponding flat sides so that the connector does not have a tendency to turn while nut 33 is being screwed on.

What has been described is an improved coaxial connector for use in CATV systems, for example, and which contains an integral terminating resistor for terminating a transmission line in its characteristic impedance when no connection is made to the coaxial connector. Thus for example when no customer's line is connected to the coaxial connector such as shown in FIGS. 1 and 2, then the terminating resistor 18 has its lead 19 directly mechanically and electrically connected to the body 11 forming the outer coaxial conductor for the coaxial connector, and its other resistor lead 21 directly mechanically and electrically connected to the spring contact assembly 17 forming the inner coaxial conductor of the coaxial connector. Thus a signal that is transmitted to the spring contact assembly at 17c and the body 11 is automatically terminated

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in its characteristic impedance. On the other hand, when connection is made to the coaxial connector of the invention such as shown in FIG. 3, the center conductor of the coaxial cable being inserted into the connector spreads apart the spring contact fingers 17a and 17b. The spreading apart of the contact fingers 17a and 17b moves them to a second position wherein the contact finger 17a is electrically and mechanically disconnected from the resistor lead 21, thus dropping the terminating resistor out of the circuit.

The coaxial connector of this invention thus achieves a coaxial connector containing an integrally switched terminating resistor which is automatically switched into or out of the circuit depending on whether connection is made to the connector. No separate or intermediate actuating members are required for switching the terminating resistor into or out of the circuit, with this switching being accomplished solely through the spring contact fingers already normally contained in a coaxial connector. Further, no plug adapter is required for connecting a coaxial cable to the connector, with the center conductor of the coaxial cable being inserted into the connector. This achieves simplicity of operation and thus keeps costs down, while at the same time ensuring reliability. Although the invention has been described with reference to a specific embodiment, it will be obvious to those skilled in the art that various modifications may be made to this specific embodiment disclosed herein without departing from the true spirit and scope of the invention.

I claim

1. A coaxial connector for use in a signal distribution system of the type having a transmission line extending from a directional tap housing with the tap housing mounting a plurality of coaxial connectors each of which is capable of being coupled to a transmission line, the coaxial connector comprising a hollow elongated body, a spring contact assembly, an insulator assembly surrounding said spring contact assembly, said insulator assembly and spring contact assembly being disposed within said hollow body, said spring contact assembly having a pair of contact fingers normally spring biased to a first position but being adapted to receive a coaxial cable center conductor which deflects the contact fingers to a second position, a terminating resistor disposed in said hollow body, said terminating resistor having a pair of leads, one of said resistor leads being disposed in permanent mechanical and electrical

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contact with said body, the other of said resistor leads being physically and electrically directly connected to one of said spring contact fingers when they are in the first position, but being physically and electrically disconnected therefrom when the spring contact fingers are in the second position.

2. A coaxial connector in accordance with claim 1 in which said body has a coaxial cable center conductor receiving opening in one of its ends, and including a sealing member adjacent the one of said body ends with an interface integrally joining said sealing member to said body.

3. A coaxial connector in accordance with claim 2 in which said interface is formed of material substantially thinner than said body and said sealing member whereby said interface is adapted to fracture when said sealing member is subjected to a lateral force.

4. A coaxial connector in accordance with claim 3 wherein said interface has a groove formed therein for facilitating fracture thereof to separate said sealing member from said body, and wherein at least a portion of said body is threaded for threadedly receiving a connector of the type which uses the exposed center conductor of the coaxial cable for contacting said spring contact fingers.

5. A coaxial connector in accordance with claim 4 including a thread protector disposed on said threaded body portion.

6. A coaxial connector for use in a signal distribution system of the type having a transmission line extending from a directional tap housing with the tap housing mounting a plurality of coaxial connectors each of which is capable of being coupled to a transmission line, the coaxial connector comprising a hollow elongated body formed of an electrically conducting material and functioning as an outer coaxial conductor, an inner contact assembly contained within said body and functioning as an inner coaxial conductor, an insulator separating said inner contact assembly from said body, a sealing member formed of an electrically conducting material, an interface formed of electrically conducting material and integrally connecting said body with said sealing member to form a radiation shield which prevents leakage of electrical signals from the coaxial connector, and a terminating resistor disposed within the radiation shield and electrically connected between said body and said inner contact assembly.

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