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54 **Delay compensated jack.**

57 A delay compensated jack is disclosed having a jack body with first, second and third ports. A first signal pathway is provided for electrically connecting a first cable and a second cable where said first and second cables are connected to said first and second ports, respectively. A second signal pathway is provided for electrically connecting a first cable and a third cable when said first and third cables are

connected to said first and third ports, respectively. Said first signal pathway includes a circuit member selected to induce a pre-determined signal compensation into a signal passing through the first pathway. A switch mechanism is provided for opening the first pathway when the third cable is connected to the third port.

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DELAY COMPENSATED JACK

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to a jack assembly. More particularly, this invention pertains to a jack assembly for use in video transmissions where the jack assembly includes delay compensated elements.

2. Description of the Prior Art

A more detailed description of the prior art with reference to drawings is set forth in that portion of this application entitled "DESCRIPTION OF THE PREFERRED EMBODIMENT". However, for the purposes of facilitating explanation, a brief description of the prior art and the environment in which the present invention is anticipated for use will now be presented.

The present invention is anticipated for use in the transmission of color video signals. In color video transmission, the timing relationship of various color signals determines the ability, to select at will, any of those circuits, using a video routing switcher to make that selection. If the timing relationship between those circuits is not correct, the hues of the various video signals will not be correct relative to each other, requiring recalibration of the signal as it is selected. This recalibration is both impractical and inconvenient.

In order to insure that any of these signals can be selected by the routing switcher without having to recalibrate, when a television studio is initially set up for broadcasting, the various pieces of video transmission equipment being used must be adjusted in order to maintain a proper timing relationship between all of the equipment and the routing switcher to which they are all connected. One of the most important factors effecting this timing relationship is the length of coaxial video cable between each piece of equipment and the routing switcher. Any change in the length of coaxial video cable in a given circuit will effect the timing relationship of that circuit relative to the other circuits in that system.

While broadcasting is in progress, it frequently becomes desirable to re-route the television signal between various elements of the broadcasting equipment. For example, when initially set up, the

broadcasting equipment may direct (by use of a routing switches) a signal from a television camera to a certain piece of video recording equipment. If, during broadcasting, problems develop with the recording equipment, it is desirable to re-route the signal to a different piece of recording equipment.

To facilitate re-routing of video signals, video jack fields are connected between the various pieces of equipment. However, if any re-routing of the signal path occurs during the broadcast, the timing relationships of the equipment must be preserved.

The re-routing of television signals between equipment during broadcasting represents a potential for the signal to become out of time resulting in hue distortion. This possibility is attributable to the use of patch cords in combination with the video jack fields. A patch cord is simply a length of cable having plugs on both ends. To re-route a signal, one plug of the patch cord is inserted in a jack having the incoming signal and the second plug is inserted in a jack connected to the secondary equipment to which the signal is to be re-routed. Accordingly, during re-routing, a given length of cable (i.e. the length of the patch cord) is effectively spliced into the pre-calibrated broadcasting equipment system. If not accounted for, this additional length of cable could result in loss of calibration and hue distortion.

Commercially available video jack field assemblies currently compensate for the possible loss of calibration due to patch cords by incorporating into the jack field assembly itself a length of cable equal to the patch cord length. An example of such a product is marketed by ADC Telecommunications, Inc., Minneapolis, Minnesota, U.S.A. (assignee of the present invention) under the mark Video Pro Patch MkII™. An example of such a product is shown on pages 24 and 25 of an April 1988 brochure of ADC Telecommunications entitled Professional Audio and Video Products.

In the Video Pro Patch MkII™, a jack circuit or jack assembly consists of two jacks. The first jack receives the signal and the second jack directs a signal to a desired piece of video transmission equipment. The two jacks are connected by a length of cable (referred to as a compensation loop) equal to the length of a patch cord to be used with the jack field. For example, the Video Pro Patch MkII™, currently includes a three foot compensation loop which would require that the jack field be used with a three foot patch cord. If a four foot patch cord were desired, the compensation loop would need to be four feet in length. As noted in the aforementioned ADC publication, the failure

to account for the three foot length of patch cord could result in a six degree phase shift.

While prior art phase or delay compensated jack fields such as a Video Pro Patch MkII™, are functionally acceptable, they present certain disadvantages. For example, the need to have two jacks per jack assembly connected by three feet of coaxial cable results in a jack field which is bulky and expensive. Accordingly, notwithstanding the functional acceptability of such prior art delay compensated jack fields, a continued need for an improved video jack field persists.

SUMMARY OF THE INVENTION

According to a preferred embodiment of the present invention a compensated jack is provided which includes first second and third ports for connection to first, second and third, respectively, coaxial cables. A first signal pathway is provided within the jack for electrically connecting a first and second cable when connected to the first and second ports, respectively. A second signal pathway is provided within the jack for electrically connecting the first cable to a third cable when the cables are connected to the first and third ports, respectively. The first signal pathway includes circuit elements selected to induce a predetermined signal compensation into a signal passing through the first pathway. A switch mechanism is provided for opening the first pathway when the third cable is connected to the third port.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig 1 is a view of a prior art jack assembly;

Fig. 2 is the view of the prior art of Fig. 1 with the addition of a patch cord;

Fig 3. shows a prior art compensated jack assembly;

Fig. 4 is a schematic representation of the circuitry of the jack assembly of Fig. 3;

Fig. 5 is a top plan view of a jack of the present invention;

Fig. 6 is a schematic view of the circuitry of the jack of Fig. 5;

Fig. 7 is a cross-sectional view of the jack of Fig. 5;

Fig. 8 is a view of an alternative embodiment of the jack of Fig. 7;

Fig. 9 is a view of the jack of Fig. 7 with a patch cord plug inserted into a port of the jack;

Fig. 10 is a view of the jack of Fig. 5 with an inserted patch cord plug;

Fig. 11 is a schematic view of the circuitry of the jack of Fig. 10 showing the electrical circuit impact of having a plug inserted within the jack;

Fig. 12 is a plan view of a spring contact for use in the jack of the present invention; and

Fig. 13 is a view of the jack of Fig. 7 with the rear body portion removed and with certain interior elements removed.

DESCRIPTION OF THE PREFERRED EMBODIMENT

1. Detailed Description Of Prior Art To Facilitate Understanding Of The Present Invention.

Referring now to the several drawing figures in which similar elements are numbered identically throughout, a description of the preferred embodiment will now be provided. In order to better acquaint the reader with the structure of the preferred embodiment, a detailed description of the prior art will first be provided with reference to Figures 1 through 4.

In Fig. 1 a jack assembly 1 (alternatively known as a jack circuit) of a prior art jack field (such as the aforementioned ADC Video Pro Patch MkII™ is shown. The jack assembly 1 includes two jacks 20,20'. Each of jacks 20,20' are identical and are disposed with jack 20 being physically placed above jack 20'. Jacks 20,20' are physically connected to a front panel 6 of a housing 8. The housing includes a back panel 10 which is spaced from front panel 6.

Jacks such as jacks 20,20' are such as those manufactured by ADC Telecommunications under the product designation SJ1000. An example of such a jack is shown with greater particularity in U.S. Patent No. 4,749,968 issued June 7, 1988 (which shows an improved version of the prior art SJ1000.

Jacks 20,20' include front ports 50 and 50' which are exposed through front wall 6. Both of jacks 20,20' include a pair of rear coaxial cable connectors 54, 55 and 54', 55'. Disposed within housing 8 is a compensation loop 24 of coaxial cable extending between coaxial cable connectors 55 and 55'.

A pair of jack couplings 26, 26' are mounted on back wall 10 with jack coupling 26 connected via coaxial cable 30 to cable connector 54. Similarly, jack coupling 26' is connected via coaxial cable 30' to cable connector 54'.

Ports 50, 50' are ports to receive a coaxial plug as is known in the art. Jack couplings 26, 26' are BNC-type connectors to receive a coaxial cable bayonet plug connection as is known in the art.

With reference to U.S. Patent No. 4,749,968 (the drawings and text of which are incorporated herein and by reference), a brief description of the internal structure of a jack such as jacks 20, 20' will now be given. The reference numerals referred to in the following three paragraphs are to those in the drawings and specification of U.S. Patent No. 4,749,968.

Best reference is made to Fig. 2 of the aforesaid patent where the jack is shown in cross-section. (In the jack of Fig. 2 of the aforesaid patent, the rear body of the jack is not provided with cable connectors such as 54, 55 but with BNC connectors being directly connected to the jack body. However, one of ordinary skill in the art will appreciate that such a modification is known.)

As shown in Fig. 2 of the aforesaid patent, disposed within the jack 20 are two conductors 150 and 158. Conductor 150 extends from the forward port (numeral 50 in the aforesaid patent) to the rear BNC connector 54. Conductor 158 extends from the second BNC connector and is essentially parallel to conductor 150. Disposed between conductors 150 and 158 is a V-shaped spring conductor 164.

A switch assembly 156 is provided which includes cam surfaces which are engaged by a plug inserted within port 50. The engagement of the cam surface by the plug inserted within port 50 urges the spring conductor 164 out of electrical contact with conductor 150. Fig. 11 of the aforesaid patent shows the relation of the various mechanical elements of the jack in response to a plug 52 being inserted within the port 50.

With no plug inserted within port 50 of the jack of U.S. Patent No. 4,749,968, an electrical signal passes from a cable attached to BNC connector 54 through conductor 150, crossing to conductor 158 (through spring conductor 164) and out of a coaxial cable connected to the other rearward BNC connector. Upon insertion of a plug into port 50, electrical connection between spring conductor 164 and conductor 150 is broken. Accordingly, the signal now passes from a coaxial cable connected to BNC connector 54, through conductor 150 and to the coaxial cable connected via the plug in port 50. Due to the action of the switch mechanism 156, no signal is passed through conductor 158. Fig. 8 of the aforesaid U.S. Patent No. 4,749,968 shows an alternative embodiment of the product where there are two forward ports 50. As a result, the switch 156 can be actuated by assertion of a plug into either of the forward ports 50.

With the background description of U.S. Patent No. 4,749,968 complete, reference to numerals through out the remainder of this application are to numerals in the attached drawings and not to those in the aforesaid patent.

2. Operation Of The Prior Art Device.

Referring now to Fig. 1 of the drawings, a dotted line A is provided showing the signal path through the jack assembly 1. With this structure, jack coupling 26 is an IN port and jack coupling 26' is a OUT port. A signal from a piece of transmitting equipment (such as a television camera) is connected via a coaxial cable to jack coupling 26. OUT port 26' is connected via a coaxial cable to subsequent broadcasting equipment (such as a video recorder). The signal from the television camera passes through the jack assembly indicated in the path A.

In the event it is desirable to re-route the signal from the television camera to a different piece of equipment (such as a different video recorder in the event of the failure of the primary video recorder), a patch cord 36 is employed. Reference is now directed to Fig. 2 where such a patch cord 36 is used with the jack assembly 1 of Fig. 1.

In Fig. 2, the patch cord 36 is shown as including a coaxial cable 38 extending between plugs 41 and 42. Plug 41 is inserted within port 50. Plug 42 is routed to a different jack assembly port (similar to port 50 or 50') of a different jack assembly (now shown).

The insertion of plug 41 into port 50 causes the jack's switch mechanism (as described more fully in U.S. patent 4,749,968) to be activated such that the signal from jack coupling 26 is now routed to and through patch cord 36 as indicated by the dotted line B. Due to the switching action of the jack, no signal passes through the compensation loop 24 or through jack coupling 26'.

The addition of the patch cord 36 to a video broadcasting system would, if no further action was taken, result in a phase shift in the video signal which could be manifested in visible hue distortion. To prevent this, the length of compensation loop 24 is selected to equal the length of patch cord 36. As a result, the electrical characteristics (such as phase shift) of the compensation loop 24 and patch cord 36 are matched.

Since compensation loop 24 is factory installed, the user of the jack assembly 1 or a jack filed incorporating the same is restricted to a patch cord 36 having a length equal to the length of compensation loop 24. Commonly, such patch cord and compensation loops have lengths of about three feet however, they could be four feet or any other length.

In addition to patching into port 50 to receive the signal from jack coupling 26, a user of the jack assembly could patch into port 50'. This would input a new signal through jack coupling 26' and break the signal coming from jack 20 through jack

20'.

The electrical operation of the jack assembly 1 of the prior art is best understood with reference to Figs. 3 and 4 where the jack assembly 1 of the prior art (Fig. 3) is shown juxtaposed to a schematic representation of electrical circuitry of the jack assembly (shown in Fig. 4). As shown in Fig. 4, a first conductor 150 extends from port 50 to cable connector 54. A second conductor 150 extends from port 50' to cable connector 54'. A conductor 158 extends from connector 55 to a switch member 156. Conductor 158 is connected by a spring conductor 164 to conductor 150.

In the second jack 20', the internal elements are identical and are numbered simply with the addition of an apostrophe. The total jack system is connected to a ground as indicated by the phantom lines 165. Switch mechanism 156 is connected via resistor 166 to ground 165. The compensation loop 24 is shown connecting cable connections 55 and 55'.

3. Detailed Description Of The Present Invention.

Having described the prior art in detail, a description of the present invention will now be given. Reference is now directed to Fig. 5 and 7 where a jack 40 of the present invention is shown. The jack 40 includes a housing body 42 having a forward section 43 and a rear section 44. The forward section 43 includes ports 46 and 48 and a mounting flange 51 for mounting the jack 40 to a forward wall (not shown) of a jack field housing.

The rear portion 44 of housing 40 includes jack couplings 52 and 53. Coupling 52 is coaxially aligned with port 46. Similarly, coupling 53 is coaxially aligned with port 48. Ports 46 and 48 are standard ports for receiving a coaxial plug. Couplings 52 and 53 are BNC-type connectors for receiving standard coaxial cable bayonet type connectors.

A first conductor 150 extends axially through the body coaxial with port 46 and coupling 52. Similarly, a second conductor 158 extends through the body 42 coaxially aligned with port 48 and coupling 53. Conductors 150 and 158 are those such as described in the aforementioned U.S. Patent 4,794,968.

Disposed within housing 42 between parallel conductors 150 and 158 is a switch mechanism 156 and a delay circuit 62. Delay circuit 62 and switch mechanism 156 are best shown in Fig. 13 where the rear portion 44 of the housing body has been removed and where conductors 150 and 158 have been removed.

Delay circuit 62 includes first and second spring conductors 64 and 66. Spring conductors

64, 66 are mirror images of one another and include spring contact portions 64a, 66a and conductor strips 64b, 66b integrally connected to spring contacts 64a, 66a, respectively. For ease of illustration, conductor 66 is shown separately in Fig. 12. (Spring conductors 64, 66 should be contrasted with the spring contact 164 of U.S. Patent 4,749,968 which is of unitary construction extending directly between the parallel conductors to form a direct electrical connection.)

As shown in Fig. 7 and 12, spring conductors 64, 66 are disposed such that spring contact portions 64a, 66a are resiliently urged against conductors 150, 158 respectively. Conductor strips 64b, 66b extend from the contact portions 64a, 66a rearwardly into the second portion 44 of the housing body 42. The conductor strips 64b, 66b terminate at upwardly projecting tabs 64c, 66c.

Disposed within second housing portion 44 is a solid state circuit element known as a delay line 68 which includes a first lead 68a and a second lead 68b. Lead 68a is electrically connected to tab 64c. Similarly, lead 68b is electrically connected to tab 66c. Delay line 68 includes a third lead (not shown) which is a ground lead which may be grounded in any suitable manner (such as direct connection to the jack body 42). The combination of the spring conductors 64, 66 and circuit element 68 form the delay circuit 62.

Switch mechanism 156 may be such as that described in the aforesaid U.S. Patent No. 4,749,968. As shown in Fig. 13, switch mechanism 156 includes a generally V-shaped conductor 70 having a free end of a first arm 72 opposing spring contact portion 64a and a free end of a second arm 74 opposing contact portion 66a. Dielectric posts 200, 201 contain arms 72, 74, respectively, to prevent them spreading too far apart.

First arm 72 is provided with a pad 76 of dielectric material to act as a cam surface as will be described. Similarly, second arm 74 is provided with a pad 78 of dielectric material to act as a cam surface. Pads 76, 78 are disposed to be physically engaged by a coaxial plug inserted within ports 46, 48, respectively. Switch mechanism 156 functions similar to that of U.S. Patent No. 4,749,968. Namely, the insertion of a plug 61 into port 46 causes the plug 61 to engage pad 76 to urge the free end of contact 72 into electrical and mechanical contact with contact portion 64a. This urges contact portion 64a out of electrical contact with conductor 150. The free end of arm 72 acts as a push point to push contact portion 64a. This arrangement is shown in the view of Fig. 9.

Fig. 6 is a schematic representation of the jack 40 of the present invention when no plug is received within either of ports 46 and 48. Fig. 11 shows the schematic representation of the structure

of the present invention when a plug 61 is received within port 46.

As shown in Fig. 6, with no plugs received within either of ports 46, 48, spring contact 64 is in electrical contact with conductor 150 at a contact point C. Similarly, spring contact 66 is in electrical contact with conductor 158 at a contact point D. A first signal pathway extends between connector 52 and 53. The signal passes from connector 52, through conductor 150, to contact point C, to spring conductor 64, through circuit element 68, through spring conductor 66, to contact point D, and through conductor 158 to connector 53.

With no plug received within either of ports 46, 48, neither of contact arms 72, 74 of switch mechanism 156 is in electrical contact with either of spring conductors 64, 66. However, upon insertion of a plug into either port (such as port 46), the plug engages the cam surface of pad 76 urging contact arm 72 against its bias into contact with spring conductor 64. The continued urging of a plug against pad 76 causes spring conductor 64 to move against its bias to break contact point C. So broken, the electrical signal extends in a second pathway directly from connector 52 through conductor 150 to port 46. The schematic of this circuit is shown in Fig. 11.

As shown in both of Figs. 6 and 11, the body of the jack is shown schematically as the phantom line 80 connected to ground 82. The switch mechanism 156 is connected to ground across a resistor 84. A preferred resistance is 75 ohm. However, those skilled in the art will recognize that other resistance levels can be selected.

In the embodiment described thus far, the jack is provided with two ports 46 and 48 on its forward end. Fig. 8 shows an alternative embodiment where only one port 46 is shown. In this embodiment, conductor 158 is shortened as indicated by conductor 158' in Fig. 8. Also, in the embodiment of Fig. 8, connectors 52 and 53 are replaced by coaxial cables 52' and 53' which are directly connected to conductors 150, 158' respectively. In all other respects, the jack of Fig. 8 is identical to that of the jack of Fig. 7.

As previously indicated, the delay circuit 62 includes the combination of spring conductors 64, 66 and a circuit element 68. The circuit element is what is known as a delay line such as product designation "ST Series" of the ESC Electronics, Corp. of Palisades Park, New Jersey shown in their brochure "Delay lines and Transformers".

Circuit element 68 is selected to impart a delay into a signal passing through the circuit element. The amount of the delay is selected for the circuit element 68 to simulate a length of coaxial cable equal to a predetermined length of a patch cord to be used with the jack. For example, for anticipated

use with a three foot patch cord, circuit element 68 is preferably selected to impart a delay equal to the length of time it takes a signal to travel the length of a three foot patch cord. This is of about 5.5 nanoseconds. For a four foot patch cord, it is presently anticipated that a delay of about 7.3 nanoseconds would be preferred and that circuit element 68 should be so selected. It will be appreciated that circuit elements such as element 68 are commercially available items such as the Series ST miniature signal delay line of the ESC Electronics Corp. and form no part of this invention per se.

With the structure of the present invention as described above, the jack 40 can be used in place of a prior art jack assembly for cross-connecting video equipment. The jack can operate in three modes. In the first mode of operation, the jack is unpatched as indicated in Fig. 5. When unpatched, no signals are re-routed and the signal path is indicated by phantom line E of Fig. 5. A television signal enters rear port 52 and passes through the first signal pathway (port 52, to contact C through circuit element 68 to contact D and to port 54).

In the second mode of operation (a single patch mode of operation), a plug is inserted into either of port 46 and 48. Using a plug inserted into port 46 as the example, the delay circuit 62 is grounded through the switch mechanism 156 and resistor 84. The signal passes directly from connector 52 through conductor 150 to the jack plug 61 inserted into port 46. This path is shown as line F in Fig. 10.

In addition to the above, the jack can also be used in a dual patch mode of operation where plugs are inserted into both ports 46 and 48. In this embodiment, the signal from plug 52 travels directly to port 46. Similarly, an input signal into port 48 travels directly to port 53.

With the structure and operation of the present invention being described as above, the advantages of the present invention over the prior art are now apparent. A prior art jack assembly required two jack bodies connected by an intermediate inter-connecting loop which was commonly three feet in length. This structure has been modified so that the complete jack assembly can now consist of a single jack having no intermediate loops. These benefits can be visually seen by a simple inspection of Figs. 3 and 5. The overall length (i.e. the dimension from forward ports 50, 50' to rear ports 26, 26') has been greatly reduced. Likewise, the intermediate compensation loop (commonly three feet in length) has been eliminated. Further, the need for two jack bodies has been replaced with a single jack body. The advantages of the design of the present invention is reduced labor and material cost and a great reduction in the package size for each circuit. Since numerous jack

assemblies are included in each jack field, the overall costs and physical size requirements for an entire jack field are greatly reduced.

From the foregoing detailed description of the present invention, it has been shown how the objects of the invention have been attained in the preferred manner. However, modifications and equivalents of the disclosed concepts such as those which readily occur to those skilled in the art are intended to be included in the scope of this invention. Thus, the scope of the invention is intended to be limited only by the scope of the claims as are, or may here after be, appended hereto.

Claims

1. A compensated jack comprising:
 a first connection means for connection to a first coaxial cable;
 a second connection means for connection to a second coaxial cable;
 a third connection means for connection to a third coaxial cable;
 a first signal pathway for electrically connecting a first cable to a second cable when said first and second cables are connected to said first and second connection means, respectively;
 a second signal pathway for electrically connecting a first cable and a third cable when said first and third cables are connected to said first and third connection means, respectively;
 said first signal pathway including circuit means selected to induce a pre-determined signal compensation into a signal passing through said first pathway, said third cable includes a predetermined electrical characteristic, said circuit means including a non-cable element selected for said first pathway to electrically simulate said characteristic; and
 switch means for opening said first pathway when said third cable is connected to said third connection means.

2. A jack according to claim 1 wherein said third cable is of known length and wherein said circuit means is selected to impart a delay of duration selected in response to said known length.

3. A jack according to claim 2 wherein said circuit means is selected to impart a delay equal to the length of time required for a signal to travel said known length of said third cable.

4. A jack according to claim 3 wherein said third cable is approximately three feet in length and said circuit means is selected to impart a delay of about 5.5 nanoseconds.

5. A jack according to claim 3 wherein said third cable is approximately four feet in length and

said circuit means is selected to impart a delay of about 7.3 nanoseconds.

6. A jack according to claim 1 wherein in said first pathway includes a normally closed circuit contact which is movable to an open position to interrupt a signal traveling through said first pathway, said switch means including means responsive to a cable being connected to said third connection means to urge said circuit contact to said open position.

7. A jack according to claim 6 wherein said switch means includes a push member having a cam surface and a push point, said cam surface disposed to be engaged upon connection of a cable to said third connection means, said push point disposed to urge said circuit contact to said open position upon engagement of said cam surface.

8. A jack according to claim 7 wherein said jack includes a jack body containing a first conductor extending from said first connection means to said third connection means and a second conductor extending from said second connection means with said first conductor being spaced from said second conductor, said first conductor disposed to make electrical contact with a cable connected to each of said first and third connection means; said second conductor disposed to make electrical contact with a cable connected to said second connection means;
 a delay circuit disposed between said first and second conductors where said delay circuit includes a first spring contact being resiliently biased with engagement with said first conductor; and
 a delay circuit element disposed in said delay circuit.

9. A jack according to claim 7 wherein said push point is electrically conductive and said push point is connected to an electrical ground across a resistance.

10. A jack according to claim 8 wherein said jack body includes a fourth connection means for connection to a fourth coaxial cable;
 said second conductor extending from said second connection means to said fourth connection means and disposed to make electrical connection with a cable connected to said fourth connection means;
 said delay circuit including a second spring contact resiliently biased into engagement with said second conductor, said delay circuit element electrically connecting said first and second spring contacts.

11. A jack according to claim 1 further comprising a fourth connection means for connection to a fourth coaxial cable;

a third signal pathway for electrically connecting said second cable and said fourth cable when said second and fourth cables are connected to said second and fourth connection means;

said switch means including means for opening said first pathway when said fourth cable is connected to said fourth connection means.

12. A jack according to claim 1 wherein said first pathway includes a portion electrically connected to said second cable when said first pathway is opened, said switch means including means for connecting said portion across a resistance to an electrical ground when said third cable is connected to said third connection means.

13. A jack according to claim 10 wherein said switch means includes means for opening said first pathway when said fourth cable is connected to said fourth connection means.

14. A jack according to claim 13 wherein said first pathway includes a portion connected to a cable when said first pathway is open, said switch means including means for connecting said portion across a resistance to an electrical ground when said pathway is opened.

15. A compensated jack comprising:
a jack body having first, second and third conductor connector means for receiving first, second and third electrical signal conductors, respectively;
a first signal pathway for electrically connecting a first conductor and a second conductor when said conductors are connected to said first and second connector means, respectively;
a second signal pathway for electrically connecting a first conductor and a third conductor when said conductors are connected to said first and third connection means, respectively; and
said first signal pathway including circuit means selected to modify a signal passing through said first pathway by simulating an electrical characteristic of said third conductor, said third cable is of predetermined length and said circuit means includes a non-cable circuit element selected to induce a delay into said signal of a duration selected in response to a length of said cable.

16. A compensated jack according to claim 15 further comprising switch means for opening said first pathway when said third cable is connected to said third connection means.

17. A compensated jack comprising:
a jack body including first, second and third connection means for receiving first, second and third cables, respectively;
a first conductor disposed within said body to electrically connect a first and third cable when connected to said first and third connection means, respectively;
a second conductor disposed within said body to electrically connect with a second cable when connected to said second connection means;
a delay circuit disposed within said jack and electrically connecting said first and second conductor, said delay circuit including a non-cable circuit ele-

ment selected to induce a delay into a signal passing between said first and second conductor, said delay selected to have a predetermined duration in response to a predetermined length of said third cable.

18. A compensated jack according to claim 17 wherein said circuit element is an electrical delay line.

19. A compensated jack according to claim 18 including switch means for interrupting signal flow through said delay circuit when a third cable is connected to said third connection means.

20. A compensated jack according to claim 19 wherein said delay circuit includes a first spring contact disposed within said body and having a contact end resiliently biased into engagement with said first conductor;
said delay element disposed connecting said first spring contact to said second conductor with a signal passing through said element;
said switch element including means for engaging said spring contact away from said first conductor upon connection of a third cable to said third connection.

FIG. 1
PRIOR ART

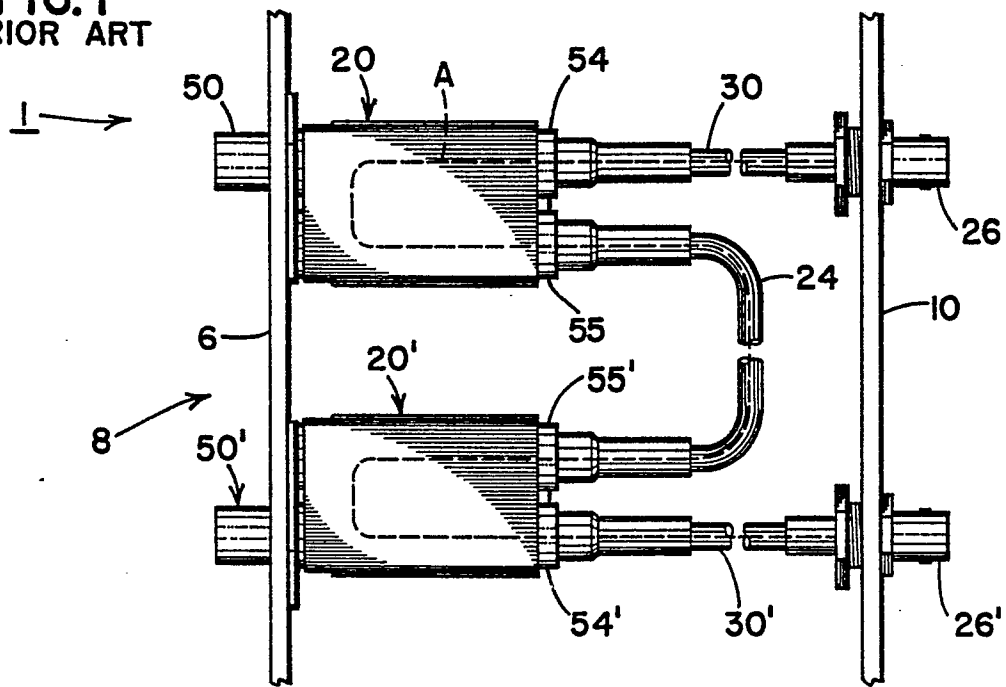


FIG. 2
PRIOR ART

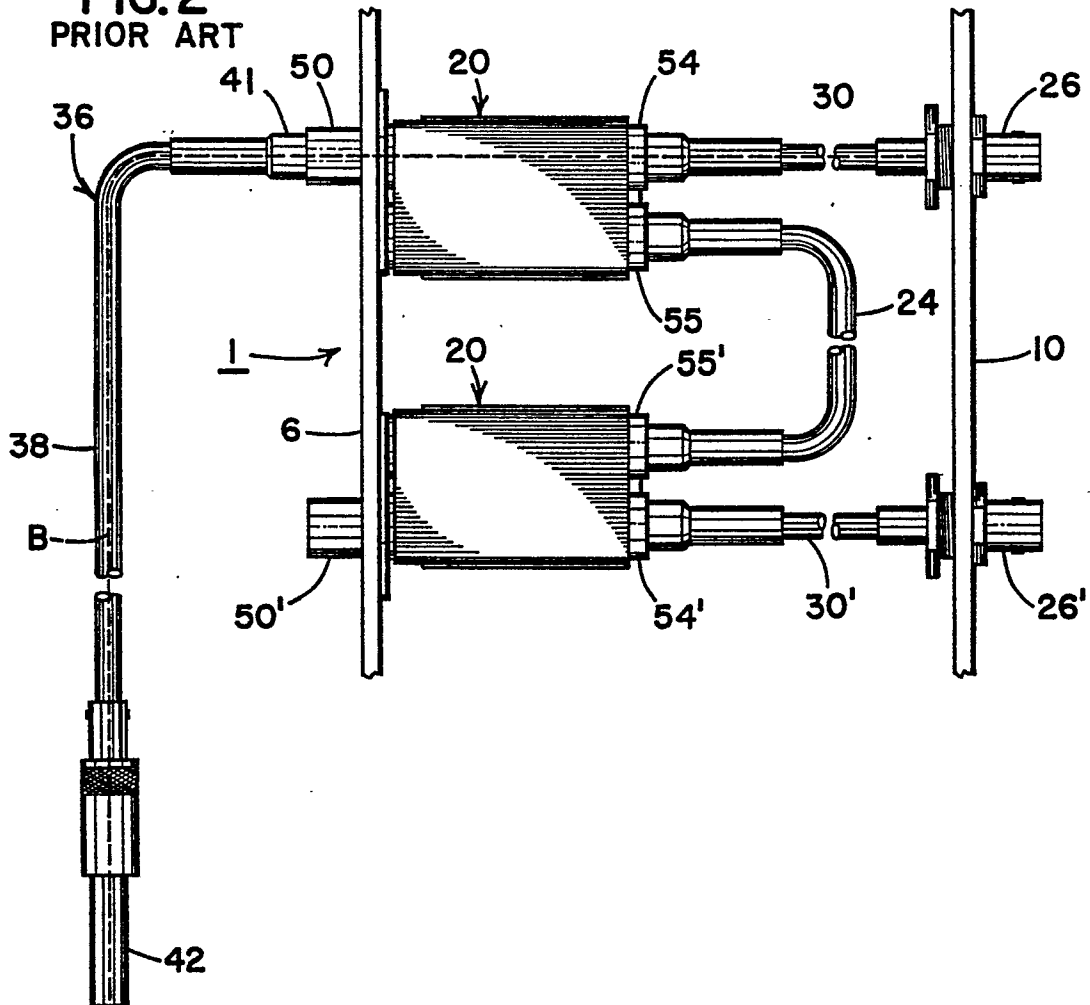


FIG. 3
PRIOR ART

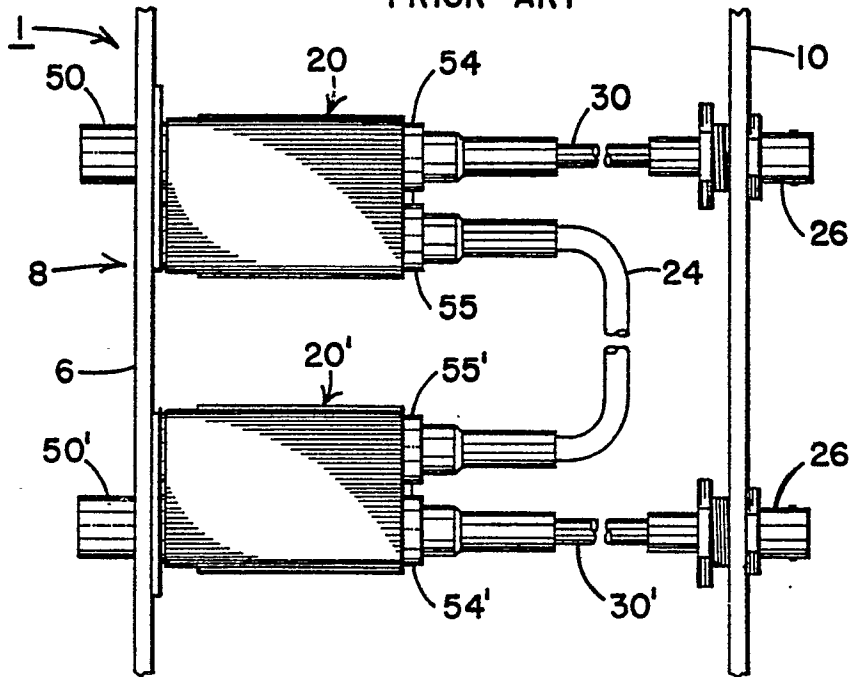


FIG. 4
PRIOR ART

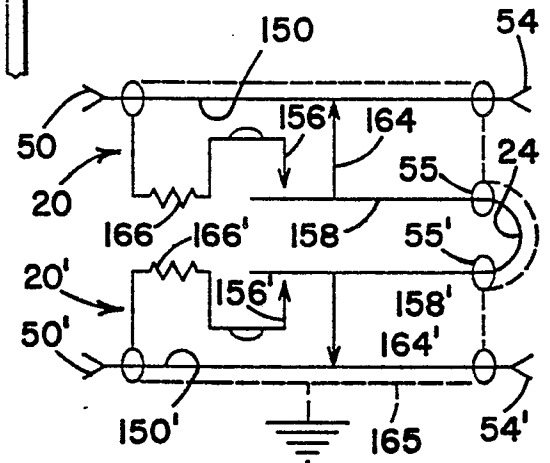


FIG. 5

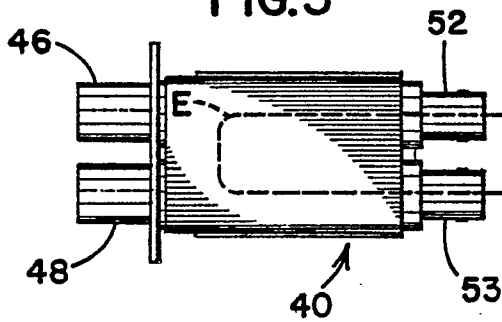


FIG. 6

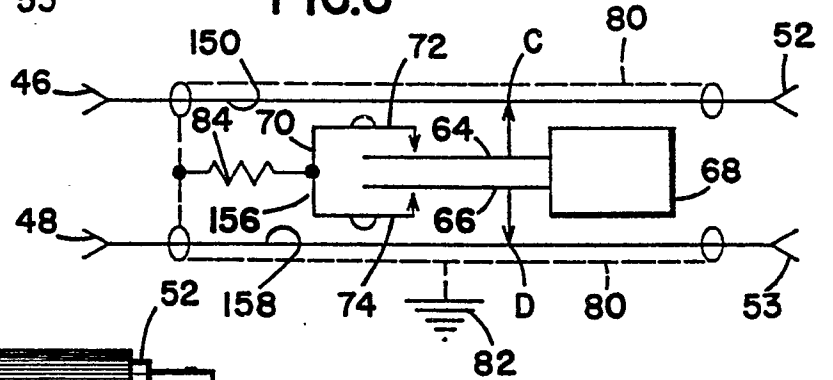


FIG. 10

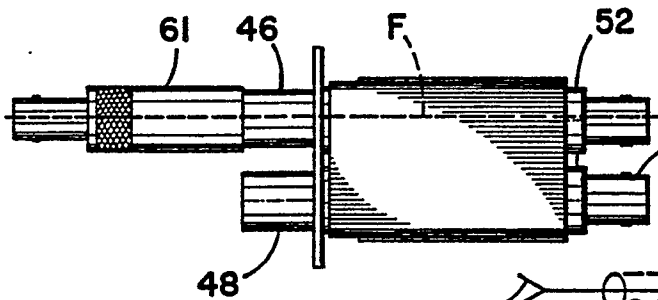


FIG. 11

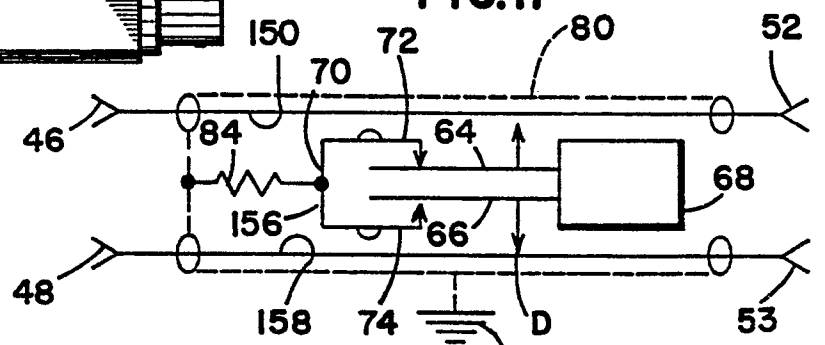


FIG.7

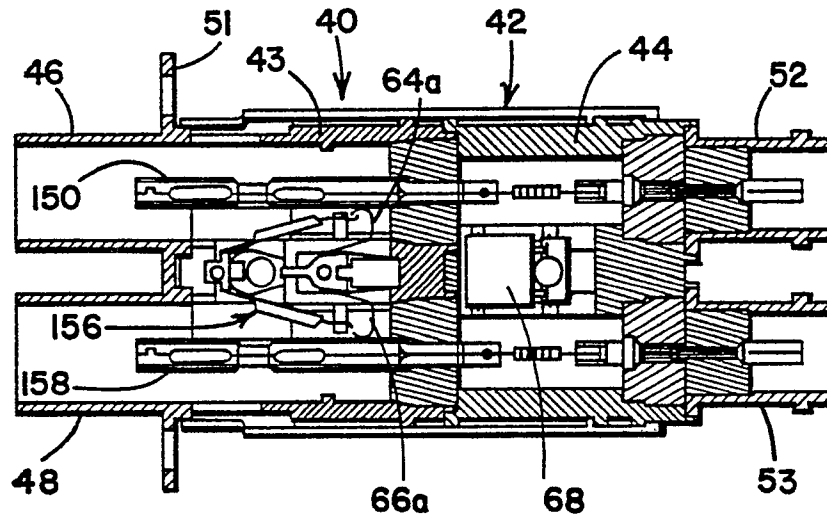


FIG.8

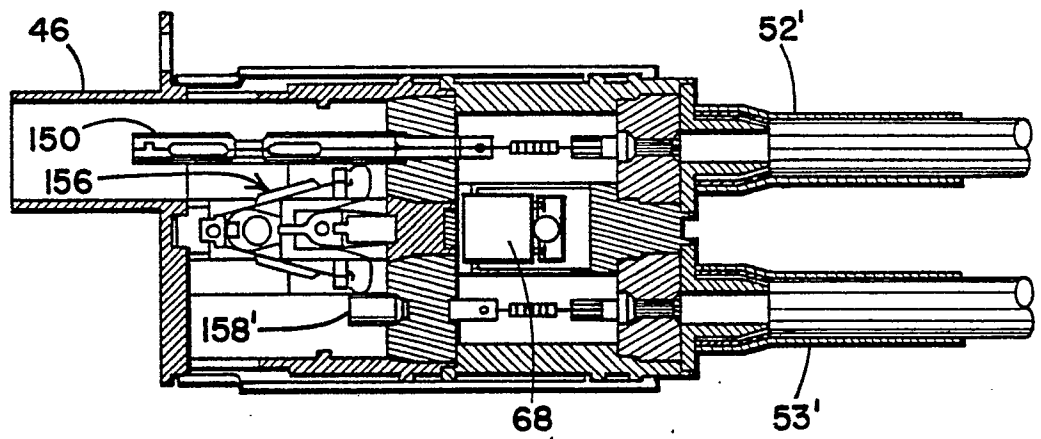


FIG.9

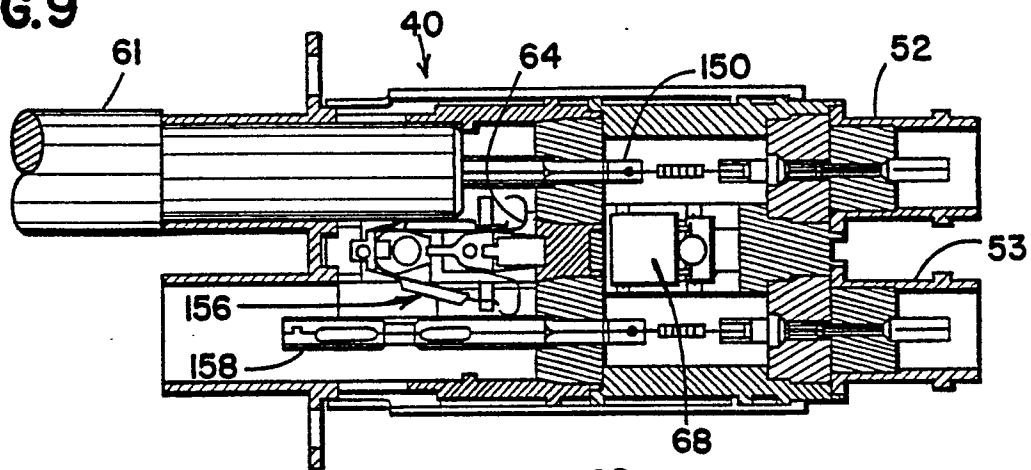


FIG.12

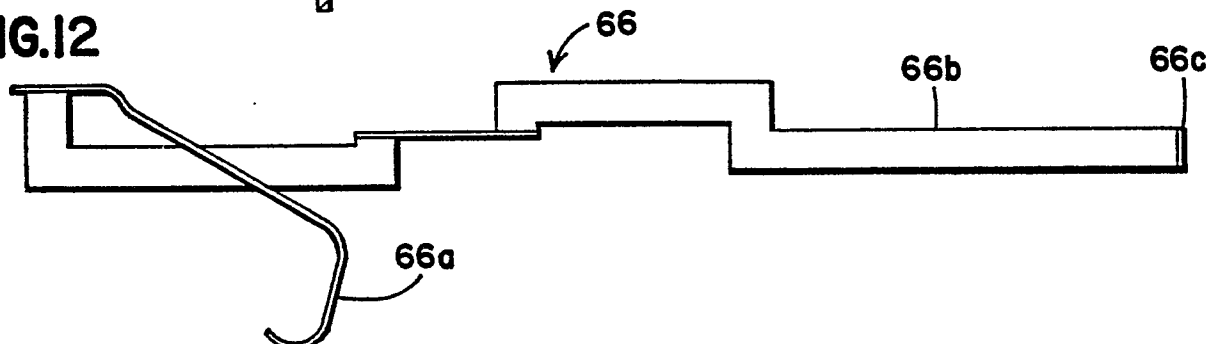


FIG. 13

