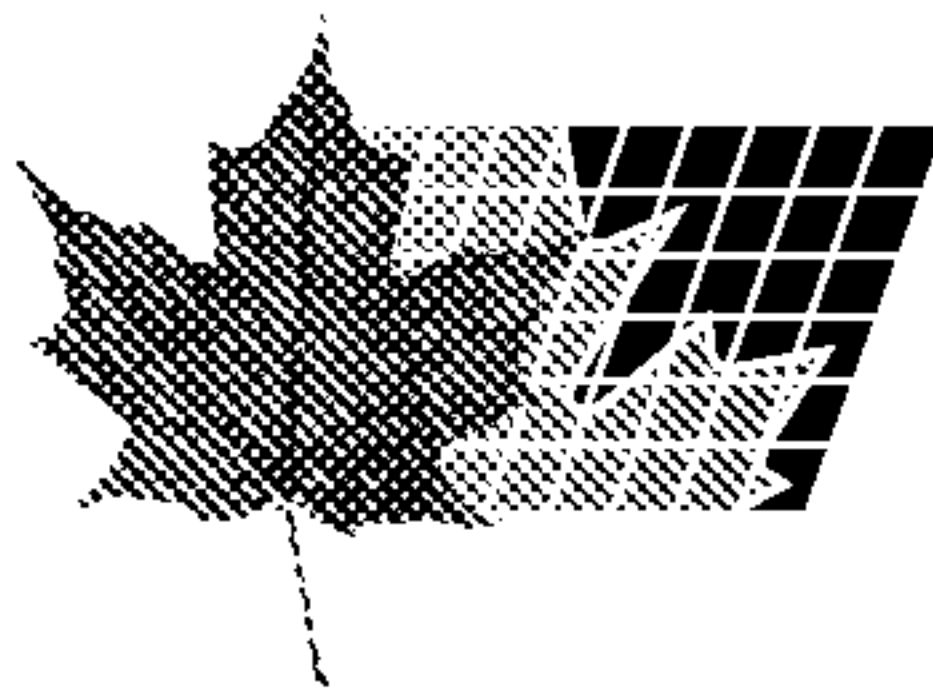




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(72) Gazzara, Paul, US

(72) Rodrigues, Julio, US

(72) Marowsky, Richard, US

(72) Wojtan, George, US

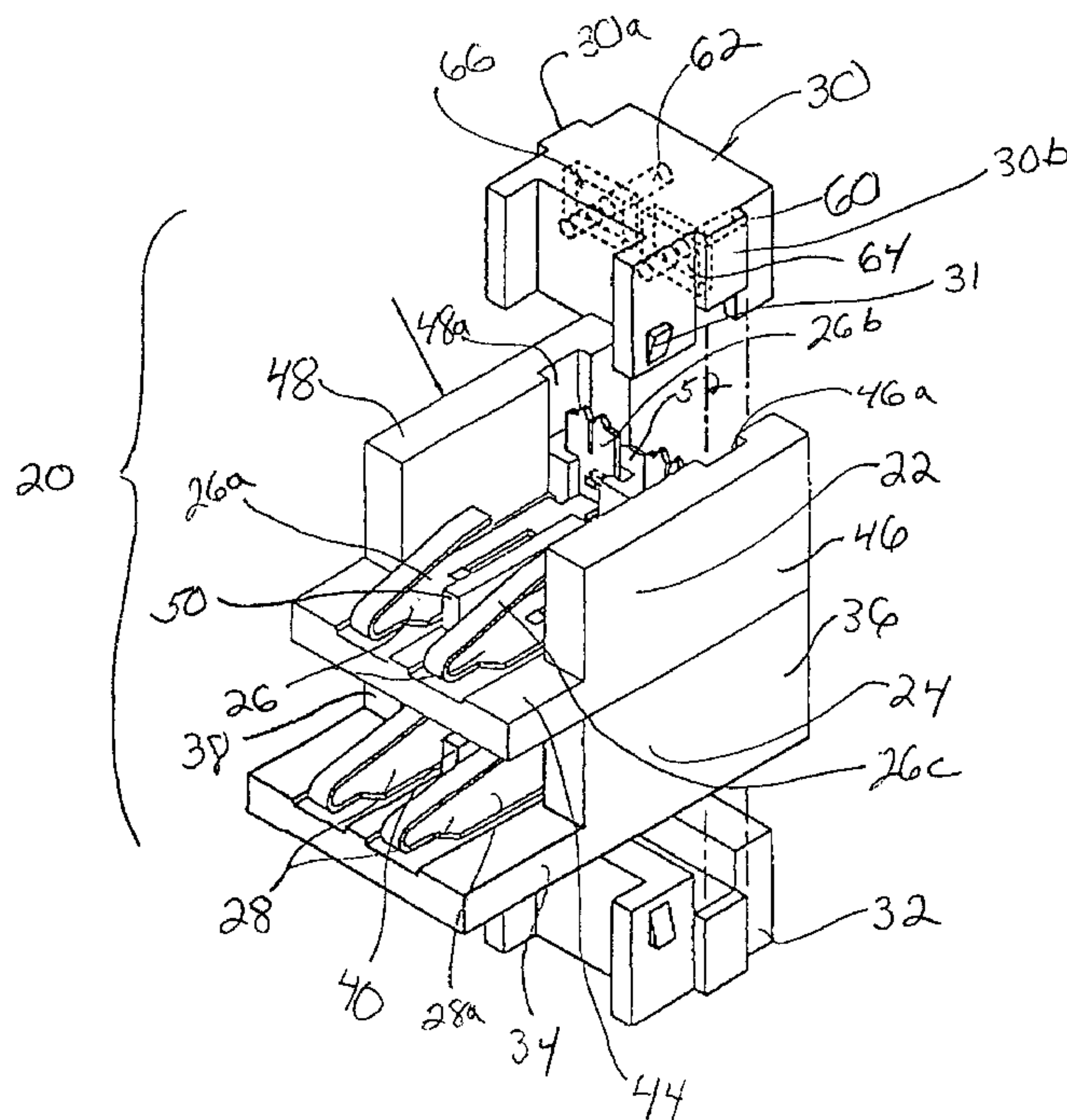
(73) THOMAS & BETTS CORPORATION, US

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(54) **COMPOSANTS DE CONNECTEUR ELECTRIQUE ALIGNES
VERTICALEMENT**

(54) **VERTICALLY ALIGNED ELECTRICAL CONNECTOR
COMPONENTS**



(57) An electrical connector component assembly terminates discrete conductors of a multiconductor data cable. The component assembly includes an insulative component housing having a mating end for engagement with a mating electrical connection device and a cable receiving end for terminating the multiconductor cable. A plurality of electrical contacts are supported by the component housing. Each of the contacts has a conductor terminating end and a mating connection end. The contacts are supported in the component housing in a pair of horizontally extending, vertically spaced rows with each contact of one row being aligned with a respective contact of the other row. The contacts of one row are directly electrically shunted to the aligned contacts of the other row.

1 ABSTRACT OF THE DISCLOSURE:

5 An electrical connector component assembly terminates discrete conductors of a multiconductor data cable. The component assembly includes an insulative component housing having a mating end for engagement with a mating electrical connection device and a cable receiving end for terminating the multiconductor cable. A plurality of electrical contacts are supported by the component housing. Each of the contacts has a conductor terminating end and a mating connection end. The contacts are supported in the component housing in a pair of horizontally extending, vertically spaced rows with each contact of one row being aligned with a respective contact of the other row. The contacts of one row are directly electrically shunted to the aligned contacts of the other row.

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VERTICALLY ALIGNED ELECTRICAL CONNECTOR COMPONENTSFIELD OF INVENTION:

The present invention relates to an improvement in electrical connector components. More particularly, the present invention relates to an electrical connector for terminating a multiconductor cable having vertically aligned connector components.

BACKGROUND OF THE INVENTION:

In transmitting data signals, electrical connectors are commonly used to terminate signal carrying multiconductor electrical cables which interconnect the various components of the data system. Many data systems require the components to be supported in an electrically closed loop. A closed-loop system provides for continuity of signal in a multicomponent system when certain of the components are not interconnected.

In order to achieve such a closed loop when the components are frequently connected and disconnected, the connectors connecting such components use automatic shunting mechanisms so that a closed-loop connection is maintained even when the connector is in a non-connected condition. The use of such shunting connectors in a closed-loop data system is shown in numerous patents including: Re. 32,760, 4,449,778, 4,501,459, 4,508,415, 4,582,376, 4,602,833, 4,619,494, 4,641,906, 4,653,825, 4,671,599, 4,682,836, 4,711,507, 4,711,511, 4,731,032, 4,744,769, 4,859,201, 4,883,433, 4,884,981, 4,891,022, 5,030,114, 5,030,121, 5,035,647, 5,052,940, 5,074,803, 5,088,934, 5,104,337, 5,112,243, 5,122,076 and 5,169,346.

While the connectors shown in the above-identified patents provide adequately for the connection of components in a data system, the increasing use of smaller components in such systems requires the use of smaller connectors. However, despite the reduction in size, these connectors still must provide closed loop connections.

1 It is, therefore, desirable to provide a data connector of reduced size, which provides adequate shunting to maintain closed-loop connections.

SUMMARY OF THE INVENTION:

5 It is an object of the present invention to provide an improved electrical data connector.

 It is a further object of the present invention to provide data connector components of reduced size which provide for adequate shunting.

10 It is a still further object of the present invention to provide a data connector having vertically aligned components.

 In the efficient attainment of these and other objects, the present invention provides an electrical
15 connector component assembly for terminating discrete conductors of a multiconductor cable. The component assembly includes an insulative component housing having a mating end for engagement with a mating electrical connection device and an opposed cable receiving end. A
20 plurality of electrical contacts are supported by the component housing. Each of the contacts includes a conductor terminating end and a mating connection end. The contacts are supported within the component housing such that they are aligned in a pair of horizontally extending
25 vertically spaced rows. Each contact of one row is disposed vertically above the contacts of the other row. Shunting means is provided for operatively electrically shunting the contacts of one row to the aligned contacts of the other row.

30 As more particularly described by way of the preferred embodiment herein, the component assembly of the present invention includes first and second insulative component housings respectively supporting first and second plural electrical contacts. The first insulative housing is
35 supported above the second insulative housing so that the

1 first and second contacts are vertically aligned. Each of
the first and second contacts includes a conductor
connecting portion at one end and a mating connection
portion at the other end. Each mating connection portion
5 includes an elongate contact base portion and a reversely
bent cantilevered spring portion extending over the contact
base portion. The cantilevered spring portion is deflectable
from a first position spaced from the contact base portion
to a second position adjacent the contact base portion upon
10 electrical engagement of a mating connecting device. The
first contacts further include depending shunt portions
extending from the contact base portions for electrical
engagement with the cantilevered spring portions of the
second contacts when the cantilevered spring portions are in
15 the first position.

BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 shows a shielded multiconductor electrical cable used in combination with the present invention.

20 Figure 2 is a perspective showing of the electrical connector component assembly of the present invention.

Figures 3 and 4 are rear-plan and side-elevational showings, respectively, of the electrical connector component assembly of Figure 2.
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Figures 5 and 6 are top and side fragmented showings, respectively, of an electrical contact used in the electrical connector component assembly shown in Figure 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

30 Referring to Figure 1, an electrical cable 10 of the type used in accordance with the present invention is shown. Electrical cable 10 is a multiconductor data transmission cable including a plurality of insulated conductors 12 enclosed in an outer insulative jacket 14. A
35 metallic shield 16 is interposed between the conductors 12

1 and the jacket 14. Shield 16, as is well-known in the art,
is used to provide electrical shielding for cable 10. In
the present illustrative embodiment, a braided shield 16 is
shown. However, shields of other construction, such as
5 metallic foil, may also be employed. Cable 10 is shown
prepared for termination with end portions of conductors 12
extending outwardly of jacket 14. A portion of shield 16 is
also shown extending from jacket 14.

Referring to Figures 2-4, the electrical connector
10 component assembly 20 of the present invention may be
described. Assembly 20 includes first and second
electrically insulative housings 22 and 24 arranged in a
vertically stacked relationship. Each housing 22 and 24
supports a pair of electrical contacts 26 and 28
15 respectively. Assembly 20 further includes a pair of
conductor support blocks 30 and 32 which are engageable with
housings 22 and 24, respectively, to support conductors 12
of electrical cable 10 in electrical engagement with
contacts 26 and 28, as will be further described
20 hereinbelow.

Electrical connector component assembly 20 may be
housed within an electrically shielded housing (not shown)
to permit electrical interconnection with a further
connection device. Connector component assembly 20 and its
25 associated shielded housing may be constructed to be of the
hermaphroditic variety so that it will permit
interconnection to an identically formed member. Connectors
of such construction are shown in several of the above-
identified U. S. patents, most notably, U. S. Patent No.
30 4,682,836.

Housing 24, which is the lower of the two housings
shown in the drawings, includes a bottom wall 34 and two
transversely spaced upstanding sidewalls 36 and 38. An
upstanding dividing wall 40 suitably electrically isolates
35 contacts 28. As shown in Figure 3, a transverse wall 42 of
height less than the sidewalls extends across a rear portion
of bottom wall 34.

1 Electrical contacts 28 are supported by housing
24. Contacts 28 are formed of a suitably conductive stamped
and formed metallic material such as beryllium copper.
Contacts 28 include a generally elongate base portion 28a,
5 an insulation displacement contact (IDC) portion 28b and a
reversely bent cantilevered spring portion 28c, which
extends back over base portion 28a. IDC portion 28b is of
conventional flat-blade configuration, having two spaced
relatively sharp tines 28d and 28e, defining therebetween a
10 conductor receiving slot 28f. IDC portion 28b is shown
extending in a direction opposite that of reversely bent
cantilevered spring portion 28c so that it may be accessible
adjacent bottom wall 34. A contact transition portion 28g
provides for the inversion of IDC portion 28b. Contacts 28
15 are fixedly secured in housing 24 with contact base portion
28a positioned along bottom wall 34. Appropriate housing
structure (not shown) inclusive of transverse wall 42 may be
employed to support IDC portion 28b in housing 24.

 Cantilevered spring portion 28c is deflectable to
20 move toward and away from base portion 28a upon
interconnection of a further connecting device in a manner
well-known in the art. Upon interconnection, cantilevered
spring portion 28c will deflect downwardly toward base
portion 28a, returning to its original position shown in
25 Figure 4 upon disconnection.

 Housing 22, shown as the upper housing in the
drawings, is of substantially similar construction to that
of housing 24. Housing 22 includes a bottom wall 44 and two
transversely spaced upstanding sidewalls 46 and 48. An
30 upstanding dividing wall 50 electrically isolates contacts
26. A transverse wall 52 of height less than the sidewalls
extends upwardly from a rear portion of bottom wall 44.

 Contacts 26 are of construction similar to that of
contacts 28 described above. Contacts 26 include an
35 elongate base portion 26a, an insulation displacing contact
(IDC) portion 26b and a reversely bent cantilevered spring
portion 26c. IDC portion 26b is also of generally flat

1 blade configuration, having sharp tines 26d and 26e defining
therebetween a conductor receiving slot 26f. IDC portion
26b extends upwardly from base 26a in the direction of
cantilevered spring portion 26c, which is of opposite
5 construction to that of contact 28. Thus, the IDC portions
26b, 28b of contacts 26 and 28 are accessible from opposite
directions.

As shown in Figures 5 and 6, each contact 26
further includes a depending shunt portion 26g. Shunt
10 portion 26g is struck from a central extent of the planar
base portion 26a and is bent downwardly out of the plane of
base portion 26a to extend at an angle of approximately 90°
with respect thereto.

Referring again to Figures 2-4, contacts 26 are
15 fixedly secured in housing 22 with each contact 26 being
supported on bottom wall 44. Transverse wall 52 is
appropriately constructed to support IDC portions 26b of
contacts 26. Further, bottom wall 44 includes a pair of
openings (not shown) which permit shunt portions 26g of
20 contacts 26 to extend therethrough.

As shown particularly in Figure 4, shunt portion
26g of each contact 26 extends downwardly toward contact 28,
which is vertically aligned therewith, such that a distal
extent 26h electrically engages cantilevered spring portion
25 28c. In this condition, contact 26 is electrically shunted
to contact 28.

As above described, cantilevered spring portion
28c of contact 28 is deflectable toward and away from base
portion 28a. Upon interconnection of another connecting
30 device, cantilevered spring portion 28c of contact 28 will
deflect downwardly from the position shown in Figure 4 so
that cantilevered spring portion 28c is out of engagement
with depending shunt portion 26g of contact 26. Upon
disconnection, cantilevered spring portion 28c will return
35 to its original position, as shown in Figure 4, reconnecting
with depending shunt portion 26g of contact 26.

1 To facilitate the termination of cable 10 to
connector component assembly 20, conductor support blocks 30
and 32 are employed. Support blocks 30 and 32 are of
substantially similar construction. Referring to support
5 block 30 as an example, block 30 is formed of suitably
insulative molded plastic and includes a pair of spaced
conductor receiving bores 60 and 62, which accommodate two
conductors 12 of cable 10. A pair of IDC receiving slots 64
and 66 are positioned adjacent conductor receiving bores 60
10 and 62 and are in communication therewith. In order to
terminate cable 10, two of the conductors 12 are inserted
into bores 60 and 62 of block 30. The block 30 is then
inserted into housing 22 such that IDC portions 26b are
accommodated in IDC receiving slots 64 and 66. Appropriate
15 mating structure on sidewalls 46 and 48 and on conductor
support block 30 facilitates insertion of support block 30
into housing 22. As shown in Figure 2, sidewalls 46 and 48
include vertical slots 46a and 48a which accommodate
extending tongues 30a and 30b of block 30. However, other
20 mating structure may also be employed. Also, a latch or
detent such as shown as 31 on block 30 may be employed to
provide for a snap fit of block 30 in housing 22. Support
block 30, including conductors 12 supported therein, may be
manually inserted or inserted under application of an
25 appropriate tool such that conductors 12 are electrically
terminated with IDC portions 26b in a manner well-known in
the connector art. Conductor support block 30 may be formed
of a clear molded plastic so that the proper termination of
conductors 12 to IDC portions 26b may be observed.

30 Conductor support block 32, being substantially
similar to that of conductor support block 30, operates in
the same manner to terminate the other two conductors 12 of
cable 10 to contacts 28 supported in housing 24. In fact,
it is contemplated that conductor support block 32 may be
35 identical to conductor support block 30 so that a single
construction may be used in both instances.

1 As above-mentioned, connector component assembly
20 is supported within a shielded housing for
interconnection purposes. The shield of that housing would
be appropriately electrically connected to shield 16 of
5 cable 10 which extends from jacket 14. Therefore, in order
to maintain shielded isolation as between contacts 26 and
28, the present invention contemplates interposing a
metallic shield between housing 22 and housing 24. This
metallic shield would be electrically continuous with the
10 shield of the outer housing, which is in turn connected to
the shield 16 of cable 10.

 Various changes to the foregoing described and
shown structures would now be evident to those skilled in
the art. Accordingly, the particularly disclosed scope of
15 the invention is set forth in the following claims.

WE CLAIM:

1 1. An electrical connector component assembly
for terminating discrete conductors of a multiconductor
cable comprising: ✓

5 an insulative component housing having a mating
end for engagement with a mating electrical connection
device and a cable receiving end;

 a plurality of electrical contacts supported by
said component housing, said contacts having conductor
terminating ends and mating connection ends;

10 said contacts being supported in said component
housing in a pair of horizontally extending, vertically
spaced rows with each contact of one row being aligned with
a respective contact of the other row; and

 shunting means for operatively electrically
15 shunting said contacts of said one row to said aligned
16 contacts of said other row.

1 2. An electrical connector component assembly of
claim 1 wherein said shunting means includes each of said
contacts of said one row having a depending shunt portion
extending therefrom for engagement with said mating
5 connector end of said aligned contact of said other row.

1 3. An electrical connector component assembly of
claim 2 wherein said mating connection end of each said
contact includes a deflectable portion and wherein said
shunt portions of said contacts of said first row are
5 engageable with said deflectable portions of said contacts
6 of said second row.

1 4. An electrical connector component assembly of
claim 3 wherein said conductor terminating ends of said
contacts include insulation displacing contact portions for
insulation displacing connection with said conductors of
5 said cable.

1 5. An electrical connector component assembly of
claim 4 wherein each said contact includes a contact base
3 portion extending between said deflectable portion and said

insulation displacing contact portion, said shunt portions of said contacts of said one row extending from said contact base portions.

6. An electrical connector component assembly for terminating conductors of a multiconductor cable comprising;

a first insulative component housing including a bottom wall supporting first plural electrical contacts; and

a second insulative component housing including a bottom wall supporting second plural electrical contacts;

said first housing being supported above said second housing so that said first and second plural contacts are vertically aligned;

each of said first and second contacts being elongate and including a conductor connection portion at one end thereof and mating connection portion at the other end thereof for electrical engagement with a mating electrical connector, each said mating connection portion including an elongate contact base portion and a reversely bent cantilevered spring portion extending over said contact base portion, said cantilevered spring portion being deflectable from a first position spaced from said contact base portion to a second position adjacent said contact base portion upon said electrical engagement of said mating electrical connector, said cantilevered spring portion being returnable to said first position upon disengagement of said mating electrical connector;

each said first plural electrical contact including a depending shunt portion extending from said contact base portion through said bottom wall of said first component housing for electrical engagement with said cantilevered spring portion of said second electrical contact positioned therebelow when said cantilevered spring portion is in said first position.

7. An electrical connector component assembly of claim 6 wherein each said contact base includes a flat planar member and wherein said shunt portion of said first

contact includes an extent of said planar member bent out of
the plane of said planar member in the direction of said
second contacts.

8. An electrical connector component assembly of
claim 7 wherein said conductor connection portions of said
first and second contacts include insulation displacing
contact elements for insulation displacing connection with
said conductors of said multiconductor cable.

9. An electrical connector component assembly of
claim 8 wherein said insulation displacing contact elements
of said first contacts and said insulation displacing
contact elements of said second contacts extend in opposite
directions.

10. An electrical connector component assembly of
claim 9 further including first and second conductor holding
blocks for supporting of said conductors of said
multiconductor cable adjacent said insulation displacing
contact elements.

11. An electrical connector component assembly of
claim 10 wherein said first and second conductor holding
blocks are supported by said first and second component
 housings respectively.

