ABSTRACT: A connector device containing a support block and one or more terminal members is disclosed in which the support block includes a socket opening and at least one terminal pocket and each terminal member is located in a terminal pocket and has two serially disposed contacts extending into the socket opening.
CONNECTION DEVICE HAVING SERIALLY DISPOSED PRETENSIONED CONTACTS

BACKGROUND OF THE INVENTION

This invention relates to connector devices having terminals for making electrical connection with plug-in devices such as printed circuit boards and, in particular, pertains to those devices in which the terminals are pretensioned.

When electrical connections are made between terminals in a connector and an inserted structure such as a printed circuit board, the terminal member has to be force to insure good electrical continuity between the appropriate contacting parts. Conventionally, the typical terminal connector uses a spring contact to generate contact force. Contact force, in turn, is proportional to the amount the spring contact is deflected. It follows, therefore, that in order to obtain reasonably high levels of contact force, the spring contact must either have a large deflection or it must be pretensioned. On the whole, the latter arrangement is generally the most desirable, because it requires the least amount of space and thereby results in smaller devices.

While small size is a worthwhile, if not essential, result, it is also desirable that connector devices be inexpensive and electrically efficient.

Accordingly, one object of the invention is to simplify the construction of connector devices while insuring that good electrical contact will be made between the components being connected.

SUMMARY OF THE INVENTION

In accordance with one embodiment of this invention, the connector device comprises a terminal member and a support block wherein the terminal member includes a contact end pretensioned to exert a force against an inserted component, and the support block includes an aperture to accommodate an inserted plug-in type device and at least one terminal pocket for accommodating the terminal member and for pretensioning the contact end thereof.

According to one feature of this invention, the terminal member is a unitary structure comprising two end sections, a base section, a contact section, and two raised contacts wherein the raised contacts are mounted on the contact section in line with each other, and the end sections cooperate with the base section to impart a pretensioning bias to the contact section when the terminal member is inserted in a terminal pocket.

According to another feature of this invention, the two raised contacts are mounted on line with each other on different portions of the contact section, each portion of the contact section is separated from the other by a space, and each end section is attached to the base section at one end and attached to one portion of the contact section at the other end.

According to another feature of this invention, the portions of the contact section containing the raised contacts join each other at one end and an end section at the other end. According to another feature of this invention, the portions of the contact section containing the raised contacts join each other at one end and an end section at the other end.

According to another feature of this invention, each terminal pocket comprises an inner wall and two parallel flanges separated by a slot wherein the slot accommodates the raised contacts of a terminal member and the inner wall and parallel flanges cooperate with the contact section to establish a pretensioning bias in the end sections.

The foregoing objects and features of this invention, as well as others not specifically set forth, will be better understood by reference to the drawings and the following detailed description.

DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a terminal member; FIG. 2 is a perspective view of a terminal member of alternate construction; FIG. 3 is a partial view of an end elevation of a terminal member and a support block combined to form a connector device; and FIG. 4 is a sectional view in elevation along the line 4—4 of the connector device shown in FIG. 3.

DETAILED DESCRIPTION

Referring to FIG. 3, a connector device 10 is shown which comprises a support block 20 and a terminal member 30. As illustrated in FIG. 4, the connector device is inserted to the bottom of the socket for a plug-in component such as a printed circuit board 40. Specifically, the printed circuit board 40 includes electrical conductor paths 41 which engage the terminal member 30 when printed circuit board 40 is inserted in the connector device 10.

The support block 20 is advantageously made of a rigid insulating plastic and is conveniently rectangular in shape. As illustrated in FIGS. 3 and 4, the center contains a hollowed out portion conveniently molded into the support block 20 and comprising a central socket opening 23 and a number of terminal pockets 24. The socket opening 23 is designed to accommodate an inserted printed circuit board and accordingly is conveniently rectangular in shape. Each terminal pocket 24 accommodates a portion of a terminal member 30.

The embodiment illustrated in FIG. 3 is a double-sided connector. Thus, the terminal pockets 24 are disposed on opposite sides of the socket opening 23. In a single-sided connector, on the other hand, the terminal pockets 24 will be disposed on only one side of the socket opening 23. Each terminal pocket 24 contains a slot 25, two flanges 26, a hole 27, an inner wall 28 and a groove 29. The slot 25 is located between the two flanges 26 and extends to the bottom of the socket opening 23. The hole 27 is located adjacent to the inner wall 28 and extends to the outside of the support block 20. The groove 29 extends only part way into the socket opening 23. Moreover, the depth of groove 29 extends into the socket opening 23 advantageously differs in adjacent terminal pockets 24 for reasons explained elsewhere. Finally, each hole 27 is designed to accommodate one portion of a terminal member 30, while the inner wall 28 functions as a support or base for another portion.

As best seen in FIGS. 1 and 2, each terminal member 30 comprises a contact end 31 and a terminal end 32. Two versions of the terminal member 30 are shown in FIGS. 1 and 2, respectively, and, in the version shown in FIG. 1, the contact end 31 includes a portion of a terminal blade 34 and a unitary contact structure made of a resilient material such as phosphorous bronze or beryllium copper. The unitary contact structure comprises a base section 35, two end sections 36, a contact section 37 divided into two portions, and two raised contacts 38. The base section 35 is rigidly attached, as by welding, to the terminal blade 34, the two portions of the contact section 37 each contain one of the raised contacts 38, and the end sections 36 join the base section 35 and the contact section 37 so that a bias will be imparted to the contact section 37 when the contact section 37 is constrained between the inner wall 28 and the flanges 26 in the support block 20.

As shown in FIG. 1, the terminal end 32 of the terminal member 30 is formed as a part of the terminal blade 34. Advantageously, it is rectangular in cross section to facilitate connection by the use of wire wrapping apparatus. Moreover, it includes a locating tab 39 which can be projected outwardly from the surface thereof.

Each terminal member 30 is assembled in the support block 20 by pushing the terminal end 32 through the hole 27, deflecting the end sections 36 and inserting the terminal member 30 until the locating tab 39 engages the support block 20. The end sections 36 are deflected to allow the contact section 37 to be squeezed into a terminal pocket 24 where it is held under tension or "pretensioned" by the flanges 26 and...
the inner wall 28. As can be seen from FIGS. 3 and 4, when
the terminal member 30 is in place, the contacts 38 are serially
disposed in the slot 25 and project into the socket opening 23.
After the terminal member 30 has been inserted in the support
block 20, it can be held in place by dimpling the terminal end
32 at an appropriate point (not shown).

Either version of the terminal member 30 performs satisfac-
torily. The one shown in FIG. 2, however, may permit manu-
facturing efficiencies. Specifically, the contact end 31 and the
terminal end 32 are both part of a single unitary structure. As
shown in FIG. 2, however, one end 36 does not fixedly attach
to the terminal blade 34. As a result, the end sections 36 can
separate when the contact section 37 is depressed during in-
sertion into a terminal pocket 24. Furthermore, the locating
tab 39 is designed to slide in the groove 29 so as to limit the
distance the terminal member 30 can be inserted. Since, as
described earlier, the grooves 29 in adjacent terminal pockets
24 are staggered, the terminal members 30 will be staggered
with respect to each other when inserted.

When a printed circuit board 40, as shown in FIG. 4, is in-
serted into the socket opening 23, the electrical path 41 en-
gage the contacts 38 and further deflect the end sections 36.
Since the force needed to deflect the end sections 36 must
overcome the existing pretensioned force, a small deflection
of the end sections 36 on the printed circuit board 40
produces a substantial contact force on the electrical paths 41
thereby contributing to a good electrical connection.

In addition, the particular arrangement of the contacts 38
also facilitates the electrical connection.
That is, as the printed circuit board 40 is inserted, the first
contact bears on the surface of its associated circuit path 41
and rubs or burnishes the surface material to form a cleaned
path for the second contact. As a result, a better metal-to-
metal contact is made and the resulting connection exhibits
less contact resistance.

Finally, the manner in which the support block 20 and the
terminal members 30 are designed allows ready adjustment of
the force necessary to insert the printed circuit board 40. For
example, where terminal members such as those illustrated in
FIG. 2 are being used, the staggered depths of the grooves 29
will cause the terminal members 30 to be staggered with
respect to each other when they are inserted in the support
block 20. Since the terminal members are staggered, they will
engage the printed circuit board 40 sequentially as it is in-
serted. Consequently, not all of the terminal members need be
deflected at once, thus reducing the required insertion force.
The same result is also easily achieved with the version of

the terminal members 30 shown in FIG. 1. For example, the
locating tab 39 can be modified and relocated to fit the
grooves 29. Similarly, the support plug 20 can be modified to
include an appropriate boss or stop (not shown) adapted to
engage the illustrated locating tab 29. In either case, the ter-
minal members will be staggered, thereby avoiding the neces-
sity for deflecting all at once when inserting the printed circuit
board 40.

In summary, an electrical connector has been disclosed in
which a support block and one or more terminal members
cooperate to achieve a device of small size which is capable of
simple, inexpensive fabrication and which performs its in-
tended function in an efficient manner.
It is to be understood that the above-described arrange-
ments are merely illustrative of the application of the princi-
pies of this invention. Numerous other arrangements may be
devised by those skilled in the art without departing from the
spirit and scope of the invention.
What is claimed is:
1. In a connector assembly for accommodating a plug-in
component, the combination comprising:
a support block having a central opening for accommodating
said plug-in component and at least one terminal
pocket, said terminal pocket including an inner wall, a
pair of flanges and a slot located between said flanges and
extending to said central opening and
a terminal member mounted in at least one terminal pocket,
said terminal member having a terminal blade, a base sec-
tion bearing against said inner wall, a contact section
bearing against said flanges and including a single unitary
portion, two end sections joining said base section and
said contact section and biased to urge said base and con-
tact sections against said inner wall and flanges, respec-
tively, one end section being rigidly joined to said base
section and the other of said end sections movably con-
tacting said base section, and a pair of contacts disposed
on said single unitary portion of said contact section and
located in said slot serially with respect to each other.
2. The combination in accordance with claim 1 wherein said
terminal blade, base section, contact section and end section
comprise a single unitary structure.
3. The combination in accordance with claim 1 wherein said
contacts are separated by a depressed portion of said contact
section.
4. The combination in accordance with claim 1 wherein each
terminal member includes a locking tab and said support
block includes a groove for accommodating said locking tab.