(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 984 516 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.03.2000 Bulletin 2000/10

(51) Int. Cl.[7]: **H01R 12/16**

(21) Application number: **99202563.5**

(22) Date of filing: **04.08.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **04.09.1998 GB 9819227**

(71) Applicant:
Delphi Technologies, Inc.
Troy, MI 48007 (US)

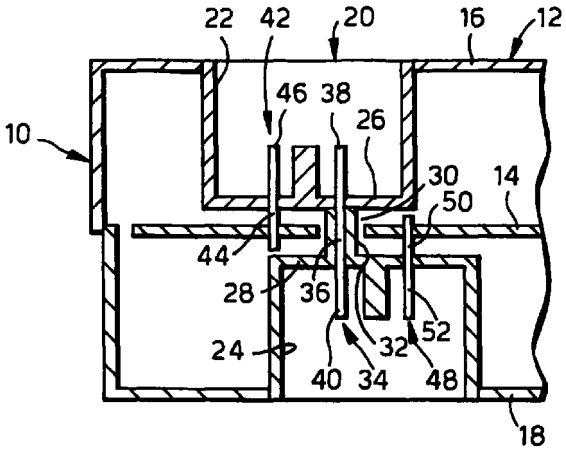
(72) Inventors:
- **Volpone, Mathew V.**
  58256 Ennepetal (DE)
- **Hold, Klaus**
  42289 Wuppertal (DE)
- **Kerr, Geoffrey**
  Ormskirk, Lancashire L39 3NU (GB)

(74) Representative:
Denton, Michael John
Delphi Automotive Systems
Centre Technique Paris
117 avenue des Nations
B.P. 60059
95972 Roissy Charles de Gaulle Cedex (FR)

(54) Electrical connector for a PCB

(57) An electrical connector (10) for mounting on a PCB (14) comprising a first housing (22) having a base wall (26) mountable on one side of the PCB; a second housing (24) having a base wall (28) mountable on the other side of the PCB, the base wall of the first housing and/or the second housing having an extension (32) which can be positioned in an aperture (30) in the PCB and engage the other housing; a first row (34) of electrical terminals (36) passing though, and secured in, the base walls and the or each extension to provide electric contacts (38) in the first housing and electric contacts (40) in the second housing; a second row (42) of electrical terminals (44) passing through, and secured in, the base wall of the first housing to provide electric contacts (46) in the first housing connectable with the printed circuit board; and a third row (48) of electrical terminals (50) passing through, and secured in, the base wall of the second housing to provide electric contacts (52) in the second housing connectable with the printed circuit board; wherein the second row is positioned on one side of the first row and the third row is positioned on the opposite side of the first row to the second row. Provides electrical connections to the PCB as well as through connections which bypass the PCB.

Fig.2.



EP 0 984 516 A2

Description

Technical Field

[0001] The present invention relates to an electrical connector for mounting on a printed circuit board (PCB).

Background of the Invention

[0002] Within the electrical systems in a motor vehicle it is becoming common practise to provide an electrical control unit handling both electrical power and electrical control signals. Such control units include at least one PCB which requires connection to an input wiring harness providing power and control signals into the control unit, and to an output wiring harness providing power and control signals out of the control unit. In some circumstances, where specific conductors of the input harness are connected to specific conductors of the output harness, the PCB just provides a through connection between the specific conductors of the harnesses. Such an arrangement increases the size and the cost of the PCB.

Summary of the Invention

[0003] It is an object of the present invention to overcome the above mentioned problem.

[0004] An electrical connector in accordance with the present invention, for mounting on a printed circuit board, comprises a first housing having a base wall mountable on one side of the printed circuit board; a second housing having a base wall mountable on the other side of the printed circuit board, the base wall of the first housing and/or the second housing having an extension which can be positioned in an aperture in the printed circuit board and engage the other housing; a first row of electrical terminals passing through, and secured in, the base walls and the or each extension to provide electric contacts in the first housing and electric contacts in the second housing; a second row of electrical terminals passing through, and secured in, the base wall of the first housing to provide electric contacts in the first housing connectable with the printed circuit board; and a third row of electrical terminals passing through, and secured in, the base wall of the second housing to provide electric contacts in the second housing connectable with the printed circuit board; wherein the second row is positioned on one side of the first row and the third row is positioned on the opposite side of the first row to the second row.

[0005] The present invention provides an electrical connector which has connections to a PCB and connections which bypass the PCB, allowing a reduction in size and cost of the PCB, and a reduction in wiring complexity.

Brief Description of the Drawings

[0006] The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a top view of an electrical control unit having an electrical connector in accordance with the present invention;
Figure 2 is a cross-sectional view on the line II-II of Figure 1; and
Figure 3 is a cross-sectional view on the line III-III of Figure 1.

Description of the Preferred Embodiment

[0007] An electrical control unit 10 suitable for installation in a motor vehicle is shown in Figures 1 to 3. The control unit 10 handles both electrical power and electrical control signals and includes a casing 12 with a printed circuit board (PCB) 14 mounted inside the casing. An electrical connector 20 in accordance with the present invention is mounted on the PCB 14 and opens through the casing 12 on both sides of the PCB.

[0008] The electrical connector 20 comprises a first housing 22 mounted on one side of the PCB 14, and a second housing 24 mounted on the other side of the PCB. The first housing 22 opens through the upper wall 16 of the casing 12 and the second housing 24 opens through the lower wall 18 of the casing. The second housing 24 has a base wall 28 with an extension 32 which extends through an aperture 30 in the PCB 14 and engages the base wall 26 of the first housing 22.

[0009] A first row 34 of electrical terminals 36 is mounted in the base walls 26,28 of each housing 22,24. Each terminal 36 of the first row 34 extends through the base walls 26,28 and through the extension 32 (and hence through the aperture 30 in the PCB 14) to provide an electric contact 38 in the first housing 22 and an electric contact 40 in the second housing 24.

[0010] A second row 42 of electrical terminals 44 is mounted in the base wall 26 of the first housing 22. Each terminal 44 of the second row 42 extends through the base wall 26 to provide an electric contact 46 in the first housing 22 and to make an electrical connection with an electrical conductor (not shown) on the PCB 14 in any suitable manner, such as by soldering.

[0011] A third row 48 of electrical terminals 50 is mounted in the base wall 28 of the second housing 24. Each terminal 50 of the third row 48 extends through the base wall 28 to provide an electric contact 52 in the second housing 24 and to make an electrical connection with an electrical conductor (not shown) on the PCB 14 in any suitable manner, such as by soldering.

[0012] In the present invention, the second row 42 of terminals 44 is offset from the first row 34 of terminals 36 on one side of the first row, and the third row 48 of terminals 50 is offset from the first row on the opposite

side of the first row to the second row.

[0013] The electric contacts 38,46 in the first housing 22 are electrically connectable with corresponding electric contacts in a housing (not shown) of an electrical connector (not shown) which can mate with the first housing. The electric contacts 40,48 in the second housing 24 are electrically connectable with corresponding electric contacts in a housing (not shown) of an electrical connector (not shown) which can mate with the second housing.

[0014] Where the control unit 10 is used in a motor vehicle, a first wiring harness can be mated with the first housing 22 and a second wiring harness can be mated with the second housing 24. The terminals 44 provide electrical connections between the first wiring harness and the PCB 14. The terminals 50 provide electrical connections between the second wiring harness and the PCB 14. The terminals 36 provide electrical connections between the first and second wiring harnesses without connecting with the PCB 14. Compared to previously known arrangements, this allows a reduction in size and cost of the PCB 14, and reduces wiring complexity.

[0015] The terminals 36 of the first row 34 are preferably assembled in the connector 20 by pushing the terminals into suitable apertures 54 in the base wall 28 and extension 32 of the second housing 24 from the rear of the second housing, and then installing the first housing 22 by passing the terminals though suitable apertures 56 in the base wall 26 of the first housing. The terminals 36 of the first row 34 preferably have shoulders 58 to prevent over-insertion of the terminals in the apertures 54 in the second housing 24, and to prevent removal of the terminals after the first housing 22 is in position. The terminals 36 of the first row 34 preferably have teeth 60 which bite into the base wall 28 and extension 32 of the second housing 24 to retain the terminals in the second housing. With this arrangement, the extension 32 of the second housing 24 is positioned in the aperture 30 of the PCB 14 before the first housing 22 is installed. The first and second housings 22,24 may be mounted on the PCB 14 in any suitable manner, such as by a snap fit or using screws.

[0016] The above described arrangement may be modified by providing an extension on both the base wall of the first housing and the base wall of the second housing, with the extensions abutting in the aperture in the PCB or on one side of the PCB.

Claims

1. An electrical connector for mounting on a printed circuit board comprising a first housing having a base wall mountable on one side of the printed circuit board; a second housing having a base wall mountable on the other side of the printed circuit board, the base wall of the first housing and/or the second housing having an extension which can be positioned in an aperture in the printed circuit board and engage the other housing; a first row of electrical terminals passing through, and secured in, the base walls and the or each extension to provide electric contacts in the first housing and electric contacts in the second housing; a second row of electrical terminals passing through, and secured in, the base wall of the first housing to provide electric contacts in the first housing connectable with the printed circuit board; and a third row of electrical terminals passing through, and secured in, the base wall of the second housing to provide electric contacts in the second housing connectable with the printed circuit board; wherein the second row is positioned on one side of the first row and the third row is positioned on the opposite side of the first row to the second row.

2. An electrical connector as claimed in Claim 1, wherein only the base wall of the second housing has an extension.

3. An electrical connector as claimed in Claim 1 or Claim 2, wherein the electrical terminals of the first row have teeth which bite into the base wall of the second housing to secure the terminals in the second housing.

4. An electrical connector as claimed in any one of Claims 1 to 3, wherein the electrical terminals of the first row have shoulders for substantially preventing removal of the terminals from the first or the second housing after assembly of the electrical connector.

Fig.1.

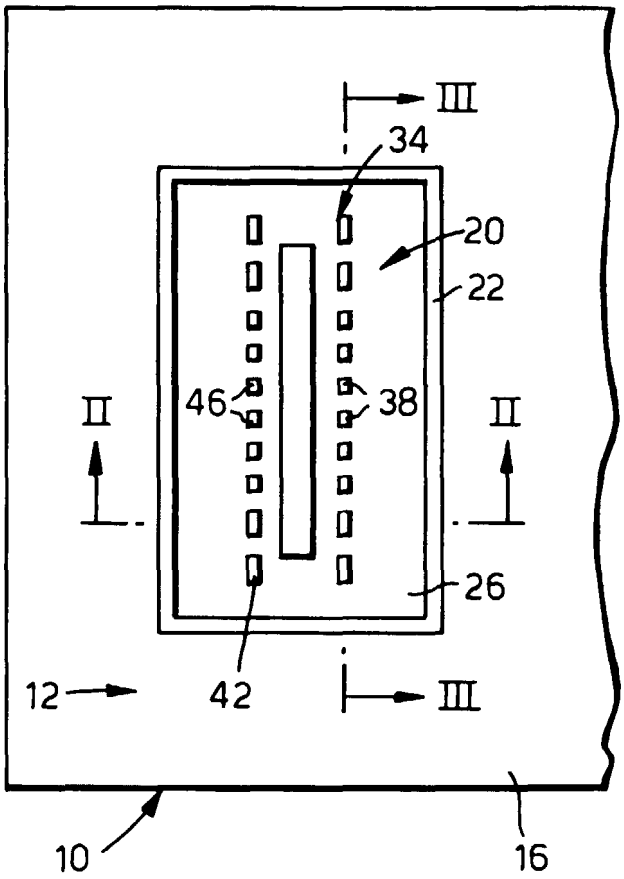

III
34
20
22
II
46
38
II
26
12
42
III
10
16

Fig.2.

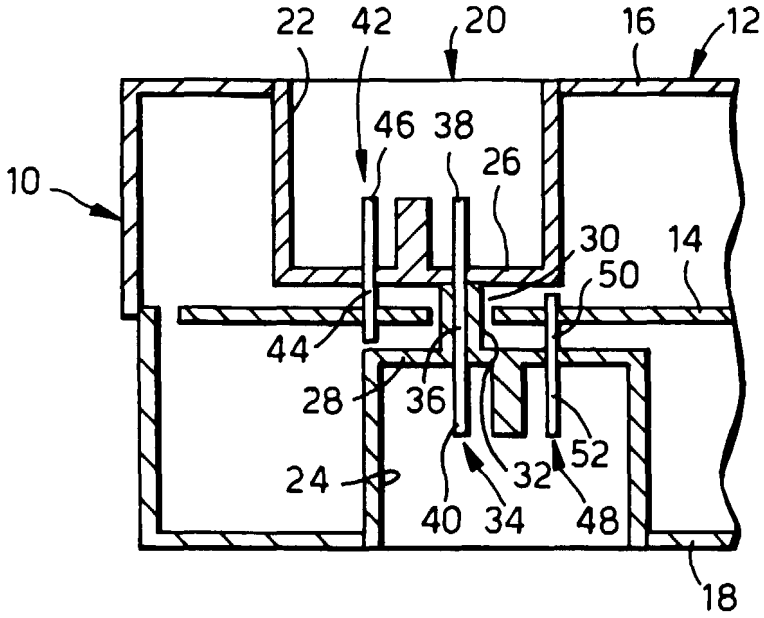

22
42
20
16
12
46
38
26
10
30
14
50
44
28
36
52
24
32
40
34
48
18

Fig.3.