

ELECTRICAL CONNECTOR

This invention relates to an electrical connector, and more particularly to an electrical connector that includes a ground terminal and that can be used to establish an electrical connection to thereby activate electronic devices at different times.

Referring to Figs. 1 and 2, in make-first-break-last ground connections disclosed in US Patent No. 5,582,519, an electrical connector assembly includes a blade connector and a receptacle connector. The blade connector includes two power terminals 91 and a ground terminal 92. Each of the power terminals 91 and the ground terminal 92 has a contact blade 911, 921 projecting from a mating face (not shown) of the electrical blade connector. The contact blades 911, 921 of the power terminals 91 and the ground terminal 92 have the same length and width. The contact blade 921 of the ground terminal 92 has an outer end formed with a tab 922. The receptacle connector includes three receptacle contacts 95, 96 each having an opening 97. The receptacle contacts 95, 96 are in electrical contact with the power terminals 91 and the ground terminal 92, respectively. Due to the presence of the tab 922, the ground terminal 92 is first to mate and last to break, thereby resulting in an appropriate contact with the corresponding receptacle contact 96.

Since the contact blades 911 of the power terminals 91 have the same length, as described above, when the blade

connector is mated with the receptacle connector, electronic devices used in a system and connected electrically to the electrical connector assembly are activated simultaneously. Such simultaneous activation of the electronic devices may result in overload of the system.

Therefore, the object of this invention is to provide an electrical connector that includes a plurality of power terminals, which can be used to establish an electrical connection to thereby activate electronic devices in a system at different times.

According to this invention, an electrical connector comprises:

a dielectric housing including a mating face adapted to be in electrical contact with an external electrical connector, and at least three terminal passages; and

a terminal unit including a first power terminal, a second power terminal, and at least one ground terminal that are disposed respectively within the terminal passages, each of the first power terminal, the second power terminal, and the ground terminal including a projection, a terminal body, and a solder portion, the projections of the first power terminal, the second power terminal, and the ground terminal projecting from the mating face in the same direction;

wherein the projections of the first power terminal, the second power terminal, and the ground terminal have

different shapes and lengths, and the projection of the ground terminal is longer than those of the first and second power terminals.

5 As such, if the electrical connector of this invention and the external electrical connector are used with a plurality of electronic devices in a system, when they are mated with each other, the electronic devices will be activated at different times. Thus, overload of the system can be prevented.

10 These and other features and advantages of this invention will become apparent in the following detailed description of a preferred embodiment of this invention, with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of a pair of
15 mating power contacts disclosed in US Patent No. 5,582,519;

Fig. 2 is an exploded perspective view of a pair of mating ground contacts disclosed in US Patent No. 5,582,519;

Fig. 3 is an assembled perspective view of the preferred embodiment, illustrating a mating face;

20 Fig. 4 is an exploded perspective view of the preferred embodiment;

Fig. 5 is an exploded perspective view of the preferred embodiment and an external electrical connector;

25 Fig. 6 is a partly exploded perspective view of the preferred embodiment and the external electrical connector, illustrating how terminals of the preferred embodiment are mated respectively with terminals of the external

electrical connector;

Fig. 7 is a schematic top view of the preferred embodiment and the external electrical connector;

Fig. 8 is a sectional view taken along Line VIII-VIII in Fig. 7; and

Fig. 9 is a sectional view taken along Line IX-IX in Fig. 7.

Referring to Figs. 3 and 4, the preferred embodiment of an electrical connector 100 according to this invention is connected to a first circuit board 7. The electrical connector 100 includes a dielectric housing 1, and a terminal unit including a first power terminal 2, a second power terminal 3, and a ground terminal unit consisting of two ground terminals 4. The dielectric housing 1 includes a mating face 11 in electrical contact with an external electrical connector 200, and four terminal passages 12. The four terminal passages 12 are arranged in a matrix of two rows and two columns. The first and second terminals 2, 3 are arranged in one of the two rows, and the ground terminals 4 are arranged in the other of the two rows. The first power terminal 2, the second power terminal 3, and the ground terminals 4 are disposed respectively within the terminal passages 12. Each of the first power terminal 2, the second power terminal 3, and the ground terminals 4 includes a projection 21, 31, 41, a terminal body 22, 32, 42, and a solder portion 23, 33, 43. The projection 21 of the first power terminal 2 has

a stepped end formed with a shoulder 211 at each lateral side thereof. The projection 31 of the second power terminal 3 has a non-stepped end. Each of the projections 41 of the ground terminals 4 has a stepped end formed with two shoulders 411 at each lateral side thereof. The projections 21, 31, 41 of the first power terminal 2, the second power terminal 3, and the ground terminals 4 project from the mating face 11 in the same direction, and have first, second, and third lengths 212, 312, 412, respectively. The first length 212 of the first power terminal 2 is longer than the second length 312 of the second power terminal 3, and is shorter than the third length 412 of the ground terminals 4. The first and second power terminals 2, 3 are connected respectively and electrically to two electronic devices in a system (not shown).

With further reference to Fig. 5, the external electrical connector 200 is connected electrically to a second circuit board 8, and includes a dielectric housing 5 and four external terminals 6. The dielectric housing 5 includes a mating face 51 in electrical contact with the electrical connector 100, and four terminal passages 52 arranged in a matrix of two rows and two columns. The external terminals 6 are similar in shape, and are spaced apart from the mating face 51 by the same distance.

With further reference to Figs. 6 to 9, when the electrical connector 100 of this invention is mated with the external electrical connector 200, since the first,

second, and third lengths 212, 312, 412 are different, the first power terminal 2 comes into contact with the corresponding external terminal 6 before the second power terminal 3 and after each of the ground terminals 4. As
5 a consequence, the electronic devices are activated at different times.

The terminal passages 12 are arranged in a 2x2 matrix in this embodiment, as described above, but should not be limited thereto. In other words, the number of the rows
10 and/or the columns of the matrix may be increased.

The shapes of the ends of the projections 21, 31, 41 may be changed as long as they can be easily identified. For example, the ends of the projections 21, 31, 41 are wavy, and have outlines of one wave, two waves, and three
15 waves, respectively. Alternatively, the ends of the projections 21, 31, 41 are serrated, and have outlines of one saw tooth, two saw teeth, and three saw teeth, respectively. Due to such apparently different shapes of the projections 21, 31, 41, misplacement of the first power
20 terminal 2, the second power terminal 3, and the ground terminals 4 can be easily found.

CLAIMS:

1. An electrical connector comprising:

a dielectric housing including a mating face adapted to be in electrical contact with an external electrical connector, and at least three terminal passages; and

a terminal unit including a first power terminal, a second power terminal, and at least one ground terminal that are disposed respectively within the terminal passages, each of the first power terminal, the second power terminal, and the ground terminal including a projection, a terminal body, and a solder portion, the projections of the first power terminal, the second power terminal, and the ground terminal projecting from the mating face in the same direction;

wherein the projections of the first power terminal, the second power terminal, and the ground terminal have different shapes and lengths, and the projection of the ground terminal is longer than those of the first and second power terminals.

2. The electrical connector as claimed in Claim 1, wherein the terminal passages are arranged in rows.

3. The electrical connector as claimed in Claim 2, wherein the first and second power terminals are arranged in the same row.

4. The electrical connector as claimed in Claim 3, wherein the dielectric housing includes four terminal passages arranged in two rows each having two of the terminal

passages.

5. The electrical connector as claimed in Claim 4, wherein the first and second power terminals are arranged in one of the rows, and the terminal unit includes two ground terminals arranged in the other of the rows.

6. An electrical connector comprising:

an dielectric housing including a mating face in electrical contact with an external electrical connector, and a plurality rows of terminal passages; and

a terminal unit including a first power terminal, a second power terminal, and at least one ground terminal that are disposed respectively within said terminal passages, each of the first power terminal, the second power terminal, and the ground terminal including a projection, a terminal body, and a solder portion, the projections of the first power terminal, the second power terminal, and the ground terminal projecting from the mating face in the same direction;

wherein the projection of the first power terminal has a stepped end formed with a shoulder at each lateral side thereof, the projection of the second power terminal having a non-stepped end, the projection of the ground terminal having a stepped end formed with two shoulders at each lateral side thereof, the projection of the first power terminal being longer than that of the second power terminal and shorter than that of the ground terminal.

7. The electrical connector as claimed in Claim 6, wherein the first and second power terminals are arranged in the same row.
- 5 8. The electrical connector as claimed in Claim 7, wherein the dielectric housing includes four terminal passages arranged in two rows each having two of the terminal passages.
- 10 9. The electrical connector as claimed in Claim 8, wherein the first and second power terminals are arranged in one of the rows, and the terminal unit includes two ground terminals arranged in the other of the rows.