

underside of the printed circuit boards and electrically connect the male and female terminals to the printed circuit boards one after another in lots in a process commonly referred to as a wave-soldering operation. Before the terminals of the female connector housings are soldered to the printed circuit boards, flux is applied to selected portions of the printed circuit boards to provide a solder resistant protective barrier for circuitry defined on the upper connector engaging surface of the circuit boards. The flux is liable to creep up into the female terminal contact areas through the inlets provided in the female connector housings for inserting the male terminal pins.

In an attempt to keep female terminals clean of flux, an electrical connector whose female connector housing has a membrane barrier at the inlet of each female terminal compartment has been proposed. The membrane barrier may be a thin closure having a cut at the center thereof. This thin closure is useful in preventing flux from creeping up to female terminals, but it has the following defects:

The closure must allow a male terminal pin to enter an associated female terminal when the male and female connector housings are mated with each other. During mating, the male terminal pin thrusts through the cut of the thin closure to break and open the cut wide. (1) This, however, requires an appreciable force to thrust and break the thin closure, and therefore, male terminals cannot be smoothly inserted in associated female terminals. (2) The thin membrane barriers are made as an integral part of the female housings, and therefore, the material of the female housing must be selected, considering what material is easy to be

thereby forming a fluid or foam seal.

An object of the present invention is to provide an improved electrical connector for printed circuit boards which connector permits the smooth insertion of its male terminals into its female terminals.

The present invention provides a female connector which is to be printed circuit board compatible to mate with male pin terminals associated with another circuit member, said female connector comprising a dielectric housing having a board engaging surface and a plurality of terminal cavities, each cavity having an inlet opening in said board engaging surface and a plurality of terminals mounted in said cavities, each terminal having a spring contact portion adapted to engage a contact portion of a male pin terminal inserted through said inlet opening and into the cavity; and barrier means at said inlet opening for preventing invasion of flux into said cavities during a flux treatment operation subsequent to a wave soldering operation where the barrier means comprises a unitary integral member hingeably connected at one side to said inlet opening and having a free end side on said hinged side, said free end side confronting an opposed wall in said inlet opening such that said flap closes said inlet opening, said flap being resiliently deflectable into said cavity upon insertion of a male terminal.

Contrary to the idea of breaking a thin closure by a male pin, the central feature of the present invention resides in: using a closure flap integrally connected to the inlet of a female terminal compartment in the form of cantilever to close the compartment, thereby preventing flux from creeping up to the female terminal in the

compartment by the associated female terminal spring, thereby making electrical connection therebetween.

In contradistinction to breaking the membrane barriers upon insertion of the male terminal pins into the inlets of the female terminals, in accordance with the present invention, the male terminal pins are inserted into corresponding female terminals by opening the closure-flap hinged to the inlets of the female terminal compartments, thus producing no broken pieces of barrier material and assuring good electrical contact between the male and female terminals when mated with each other.

One way of carrying out the present invention will now be described in detail by way of example with reference to drawings which show one specific embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 to 7 show a female connector housing. Specifically, Fig. 1 is a plane view of the female connector housing, only one compartment being shown as having a female terminal inserted therein, and the other compartments as having no female terminals inserted therein for clear illustration of their closures;

FIG. 2 is a bottom view of the female connector housing;

FIG. 3 is a sectional view taken along the line Y-Y in FIG. 1;

FIG. 4 is a front view of the female housing;

FIG. 5 is a right side view of the female housing;

FIG. 6 is a sectional view of the female housing taken along the line Z-Z in FIG. 1; and

A female terminal spring 8 is mounted in a terminal-mount partition 6. As is best shown in FIG. 3, the bent resilient portion 9 of the female terminal spring 8 is put in the compartment space 7 to exert a resilient force against the inside surface of the rear wall 2 in the direction as indicated by the arrow 11. The extending portion 10 of the female terminal spring 8 appears partly out of the bottom wall 1 of the female connector housing 1. Each compartment 7 has an opening 13 made in the bottom wall 1 in the vicinity of the inside surface 12 of the rear wall 2. Also, the compartment has a closure flap 14 integrally connected to the bottom side wall 3 of the compartment by a cantilever.

Specifically, each terminal inlet 15 is a square opening large enough to permit the insertion of a male terminal pin, which is square in cross-section. As best shown in FIGS. 2 and 3, the terminal inlet 15 is defined by four inclined surfaces 16, 17, 18 and 19. One side 19 of the closure flap 14 is connected to the edge of the front surface 16 of the rear wall 2, the other three sides 20, 21 and 22 of the closure flap 14 are close to, but free from the bottom surface 12 of the rear wall 2. Specifically, the side 20 of the flap 14 which confronts the inside surface 12 of the rear wall 2, is cut away from the front surface 16, and the opposite sides 21 and 22 extend from the opposite ends of the front surface 16 cut away from the left and right surfaces 17 and 18.

As shown in FIG. 3 the closure flap 14 is inclined at approximately 30 degrees with respect to the bottom wall 1. The closure flap 14 holds this position by a resilient force 23. When a male terminal pin 24 is inserted in the terminal inlet 15, the pin 24 normally substantially closes the opening 13 of the compartment.

printed circuit board "N". Referring to FIGS. 8 and 9, it is described how the male terminal pins 24 of the male connector housing 23 are mated with the female terminal springs 9 of the female connector housing 1. First, the male terminal pins 24 are inserted in the inlets 13 of compartments 7 of the female connector housing 1, as shown in broken lines in FIG. 8. Then, the male terminal pins 24 are pushed in the compartments 7. Their closure flaps 14 are yieldingly bent, as shown in solid line in FIG. 8, thereby allowing the male terminal pins 24 to mate with the female terminal groups 9, as shown in FIG. 9.

Each closure flap 14 is integrally connected to the inlet edge of each compartment in the form of cantilever. Specifically, the closure flap 14 is fixed at one side 19 thereof, and is free at the other sides 20, 21 and 22. Therefore, the closure flap 14 will allow a male terminal pin 24 to enter the compartment without substantial resistance. When the male terminal pin 24 is inserted in the compartment 7, it is pushed against the surface 12 of the rear wall of the compartment 7 by the female terminal spring 8. Thus, the two printed circuit boards "M" and "N" are mechanically and electrically connected with each other.

In this particular embodiment, the closure flap 14 is inclined, thereby making it easy to open the closure flap, and at the same time assisting the male terminal pin 24 in moving on the inside surface 12 of the rear wall 2 of the compartment when the male terminal pin is being inserted in the compartment.

As may be understood from the above, the electrical connector described in detail with reference to the drawings prevents flux from creeping up into the female terminal compartments when

contact areas of a female terminal, thereby ensuring good electrical contact between male and female terminals.

Claims

1. A female connector (1) which is to be circuit board-mounted to mate with male terminals associated with another circuit board, said female connector including a plastic housing (2) having a board engaging surface and a plurality of terminal receiving cavities (7), each cavity having an inlet opening in said board engaging surface and a plurality of female terminals (8) mounted in said cavity, each female terminal having a spring contact portion (9) in said cavity adapted to engage a contact portion of a male pin terminal inserted through said inlet opening and in said cavity; and barrier means in each said cavity for preventing invasion of flux in said cavities during a flux treatment preparation, said barrier means comprising a unitary integral flap member (14) hingeably connected at one end to the inlet opening (13) and having a free end on the side opposite said hinged side, said free end confronting an opposed wall in said cavity, said flap closing said inlet opening such that said flap closes said cavity upon insertion of a male terminal, said flap being resiliently deflected into said cavity upon insertion of a male terminal.
2. A female connector as in claim 1, wherein each terminal receiving cavity includes a rear facing sidewall abutment surface extending from said inlet opening into said cavity.

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Each closure flap 14 is integrally connected to the inlet edge of each compartment in the form of cantilever. Specifically, the closure flap 14 is fixed at one side 19 thereof, and is free at the other sides 20, 21 and 22. Therefore, the closure flap 14 will allow a male terminal pin 24 to enter the compartment without substantial resistance. When the male terminal pin 24 is inserted in the compartment 7, it is pushed against the surface 12 of the rear wall of the compartment 7 by the female terminal spring 8. Thus, the two printed circuit boards "M" and "N" are mechanically and electrically connected with each other.

In this particular embodiment, the closure flap 14 is inclined, thereby making it easy to open the closure flap, and at the same time assisting the male terminal pin 24 in moving on the inside surface 12 of the rear wall 2 of the compartment when the male terminal pin is being inserted in the compartment.

As may be understood from the above, the electrical connector described in detail with reference to the drawings prevents flux from creeping up into the female terminal compartments when

ensuring good electrical contact between female terminals.

Claims

1. A female connector (1) which is to be connected to a circuit board-mounted to mate with terminals associated with another circuit board, said female connector including a housing (2) having a board engaging surface and a plurality of terminal receiving cavities (7), each cavity having an inlet opening (13) in said board engaging surface and a plurality of female terminals (8) mounted in said cavity, each female terminal having a spring portion (9) in said cavity adapted to engage a contact portion of a male pin terminal inserted through said inlet opening and a barrier means in each cavity for preventing invasion of flux into said cavities during a flux treatment preparation, a wave soldering operation wherein said barrier means comprises a unitary integral member (14) hingeably connected at one end to the inlet opening (13) and having a free end on a side opposite said hinged side, said free end confronting an opposed wall in said cavity upon opening such that said flap closes the inlet opening, said flap being resiliently biased into said cavity upon insertion of a male terminal.
2. A female connector as in claim 1, wherein each terminal receiving cavity includes a rear facing sidewall abutment surface adapted to prevent flux from said inlet opening into said cavity.



bereich (9) im Hohlraum aufweist, der mit einem Kontaktbereich eines durch die Einlaßöffnung in den Hohlraum eingesetzten Anschlußsteckerstiftes (24) in Eingriff bringbar ist, und mit einer Sperreinrichtung in jeder Einlaßöffnung zum Verhindern eines Eindringens von Flußmittel in die Hohlräume während einer Wellenlötvorgang, wobei die Sperreinrichtung ein einheitliches einstückiges Klappenteil (14) umfaßt, das an einer Seite schwenkbar mit der Einlaßöffnung (13) verbunden ist und eine freie Endseite gegenüber der schwenkbaren Seite aufweist, die freie Endseite einer Gegenwand in der Einlaßöffnung gegenüberliegt, derart, daß die Klappe die Einlaßöffnung schließt, und die Klappe beim Einsetzen eines Anschlußsteckers federnd in den Hohlraum hinein ausgelenkt wird.

2. Buchsensteckverbinder nach Anspruch 1, bei dem jeder Anschlußaufnahmehohlraum eine nach innen weisende Seitenwandinlagefläche besitzt, die sich von der Einlaßöffnung in den Hohlraum hineinerstreckt, jeder Anschlußbuchsen-Federkontaktbereich gegen die Seitenwandinlagefläche vorgespannt ist, um unter federnder Auslenkung einen eingesetzten Anschlußsteckerstift zwischen dem Federkontaktbereich und der Anlagefläche aufzunehmen, und das freie Ende des Klappenteils der Anlagefläche in der Einlaßöffnung gegenüberliegt.

vague, caractérisé en ce que la cavité est constituée par un volet intégral u relié d'une manière articulée à u l'ouverture d'entrée (13) et ayant u trême libre situé à l'opposé du côté ce côté extrême libre étant situé d'une paroi opposée dans l'ouverture de telle façon que ce volet ferme d'entrée, ce volet pouvant être fléchi ment vers et dans la cavité lors de l'insertion d'une broche mâle.

2. Connecteur femelle suivant la revendication 1, caractérisé en ce que chaque cavité d'insertion d'une borne comporte une surface de butée d'une paroi latérale tournée vers l'ouverture d'entrée, et s'étendant, à partir de l'ouverture d'entrée, vers et dans la cavité, chaque cavité comportant un contact élastique d'une borne femelle appliquée contre cette surface de butée latérale afin de pouvoir recevoir, en l'absence d'une broche, une broche d'une manière élastique, une broche introduite entre la partie de contact et la surface de butée et l'extrémité libre de la broche est située en regard de cette surface de butée dans l'ouverture d'entrée.

