

Description

Field of the Invention:

The present invention relates to an improvement in means for mounting terminals in associated terminal slots in the housing of an electric connector.

Background of the Invention:

As is well known, a conventional electric connector comprises a housing having a plurality of terminal slots made therein and a corresponding plurality of terminals mounted in the terminal slots. It is desired that terminals are immovably mounted in the associated slots, thereby preventing the tilting of terminals or vertical displacement of the terminals in the housing slots while the electric connector is used. To mount the terminal, an end of the terminal base is inserted from the front end into the rear end of the housing. The inserted terminal end has at least one laterally extending projection or barb which skives into a slot in the rear end of the housing. The trailing end of the terminal is inserted into a slot in the front housing end.

This connector structure, however, has some defects. When the terminals of a printed circuit board or the conductors of the printed circuit board are repeatedly mated with or inserted in the trailing terminal portion, the terminals tilt or are lifted out of the slip fit slot resulting in misalignment with conductors on the printed circuit board or off-center contact with terminals on the printed circuit board. A deteriorated or incomplete electrical and mechanical connection results.

Summary of the Invention:

In view of the above one object of the present invention is to provide an electric connector terminal mount guaranteed free of such off-center and vertical displacement in associated terminal slots of the housing, thus assuring good electrical and mechanical connection of the connector terminals to conductive traces on associated printed boards or terminals extending therefrom.

To attain this object, an electric connector is provided to connect selected traces or terminals on a printed circuit board with selected conductors on a flat flexible cable a housing having a front side and a rear side and having a plurality of terminal slots made therein passing between the front and rear sides and a corresponding plurality of terminals slip fit in the terminal slots from the front side of the housing. Each terminal has a base with an engagement piece stamped therein to be caught by a corresponding engagement slot perpendicular to the terminal slot. The engagement piece is a metal strip cut away from the base of each terminal, having a first and second sur-

face, in the form of flattened "V"-shaped cantilever arm. The engagement piece consists of a first section bent outward from a first surface of the terminal base extending a set distance from said first surface and a consecutive second section integrally connected to and extending from the end of said first section through said base beyond the second surface of the terminal base ending in a free end. The free end extends the same set distance from the second surface of the base as the first section extends from the first surface of the base. The engagement slot extends in a direction equally from both sides of the terminal slot, thereby enabling each terminal to fixedly lie along the center line of the terminal slot with the first-to-second section transition of the engagement piece and the free end of said second section fit in the engagement slot.

A further improvement to the novel connector includes the terminal base having first and second portions extending in opposite directions. The first base portion having said engagement piece stamped therein and the second base portion having a protrusion on its edge which is forced into the top portion of said terminal slot thereby preventing the removal of the terminal out of the terminal slot. Another improvement to the novel connector includes a terminal having first and second contact arms extending from a center portion of the base in opposite directions generally parallel to the base. The first contact arm has a contact point on its free end extending toward the first base portion for contacting a selected terminal or circuit path on a printed circuit board and said second contact arm having a contact point on its free end extending toward the second base portion for contacting a selected conductor of a flat flexible cable.

With these arrangements, each terminal is held at two points in the horizontal plane contacting the sides of the engagement slot, thereby preventing off-center horizontal displacement of the terminals in the slip fit terminal slots of the housing of the electric connector. Thus, each terminal is assured to be held in an associated terminal slot within the center line of the terminal slot. The terminal is also held at two opposite points in the vertical plane contacting the top of the engagement slot, thereby preventing the terminal from raising above a predetermined vertical displacement while being held in the slip fit terminal slot.

Brief Description of the Drawings:

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with its objects and the advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings in which like reference numerals identify like elements in the figures and in which:

FIGURE 1 is a plan view of the electric connector;
 FIGURE 2 is a front view of the electric connector;
 FIGURE 3 is a rear view of the electric connector;
 FIGURE 4 is a right side view of the electric connector;
 FIGURE 5 is a longitudinal section of the electric connector taken along the line 5-5 of Fig. 2;
 FIGURE 6 is a longitudinal section of the electric connector taken along the line 6-6 of Fig. 5; and
 FIGURE 7 is a cross section of the electric connector taken along the line 7-7 of Fig. 5.

Detailed Description of the Preferred Embodiment:

As shown in the drawings, an electric connector according to a preferred embodiment of the present invention comprises a housing 1 having a plurality of terminal slots 4 made therein and a corresponding plurality of terminals 7 mounted in the terminal slots 4. Specifically, each terminal slot 4 extends from the front side 2 to rear side 3 of the housing 1. All terminal slots are arranged at a predetermined regular interval or pitch laterally in the direction "N", and an intervening wall 5 is arranged between adjacent terminal slots 4. As is best seen from Fig. 5, each terminal 7 has a projection 9a on its base 15 to be caught by a groove 8, which is made on the bottom of an associated terminal slot, thereby permitting the terminal 7 to be fixed at a predetermined position in the terminal slot 4 when the terminal 7 is inserted therein.

Also, as seen from Fig. 5, each terminal 7 is stamped as an integral metal piece comprising a first resilient contact arm 7a extending in one direction, a second resilient contact arm 7b extending in the other direction, and an elongated base consisting of portions 7c and 7d extending parallel to the first and second contact arms 7a and 7b. The first contact arm 7a is integrally connected to the base at its curved root 14 and has a contact point 13 on its free end for contacting a selected terminal or circuit trace on a printed circuit board 10. Likewise, the second contact arm 7b is integrally connected to the base at its curved root 14', and the second contact arm 7b has a contact point 13' on its free end for contacting a selected conductor of a flat, flexible cable 11. The terminal base portion 7d is mounted in the slip fit terminal slot 7 with a force fit created between the housing base 15 and housing middle wall 15a as a result of projection 9b extending outward from the terminal edge. This extending projection 9b skives into the edge of the terminal slot preventing the terminal base portion 7d from being withdrawn from the terminal slot 7.

Terminal 7 has an engagement piece 16 integrally formed from base portion 7c generally parallel with the first contact arms 7a. The engagement piece 16 functions to fix the terminal 7 in an associated terminal slot 4 as described later. The terminal 7 is stamped

out and formed from a metal sheet whose thickness dimension "T" is somewhat smaller than the width of the terminal slot 4 creating a slip fit relation between the terminal 7 and the terminal slot 4.

The engagement piece 16 is a metal strip stamped from the base portion 7c of the terminal in the form of flattened "V"-shaped cantilever arm. The metal strip consists of a first section 17 bent outward on one side of the terminal base 7c and a second section 18 integrally connected to and extending inward from the end of the first section 17 toward the other side of the terminal base 7c and ending at the free end of second section 18. An engagement slot 19 is made on each of the opposite walls 5 of each terminal slot 4, thereby enabling the terminal 7 with the first-to-second section transition 17 of the metal strip 16 and the free end 18 of the second section to fit in engagement slot 19 of the terminal slot 4.

As described so far, the terminal housing 1 has terminal 7 mounted in its terminal slots 4, positively holding each terminal 7 by allowing its engagement piece 16 to be caught by its first and free end portions 17 and 18 in the engagement slot 19 on both sides of the terminal slot 4. The terminal pins of a printed circuit board 10 or electrical traces on the circuit board 10 are inserted in the terminal slots 4 of the front side 2 of the housing 1. The conductors of a flat, flexible cable 11 are inserted in the terminal slots 4 of the rear side 3 of the housing 1. The contact arms 7a grip resiliently the pin terminals or the circuit traces on the printed circuit board 10, thereby making a necessary electrical connection between the printed circuit board 10. Each terminal is held in an associated terminal slot with the bent and free end portions 17 and 18 of its engagement piece 16 caught in the engagement slot 19 on opposite sides of the terminal slot, thereby preventing the terminal 7 from being moved toward either side relative to the center line of the terminal slot 4 or being displaced in a vertical direction Y.

As described earlier, the engagement piece 16 is cut away and bent from the base of the terminal in the form of a flattened "V"-shape cantilever arm. This configuration is simple, and can be easily formed compared with two or more pieces stamped out and formed in either side of the terminal.

It will be understood that the invention may be embodied in other specific forms without departing from the central characteristics as claimed. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

Claims

1. An electrical connector designed to connect se-



lected traces or terminals on a printed circuit board with selected conductors on a flat flexible cable comprising:

a housing (1) having a front side (2) and a rear side (3) and having a plurality of terminal slots (4) made therein passing between the front and rear sides and a corresponding plurality of terminals (7) slip fit in said terminal slots (4) from the front side (2) of the housing, each terminal (7) having a base with an engagement piece (16) stamped therein to be caught by a corresponding engagement slot (19) perpendicular to the terminal slot (4) characterized in that:

said engagement piece (16) is a metal strip cut away from the base of each terminal having a first and second surface in the form of flattened "V"-shaped cantilever arm, said engagement piece consisting of a first section (17) bent outward from a first surface of the terminal base extending a set distance from said first surface and a consecutive second section (18) integrally connected to and extending from the end of said first section (17) through said base beyond the second surface of the terminal base ending in a free end, said free end extending the same set distance from the second surface of the base as the first section (17) extends from the first surface of the base; and

said engagement slot (19) extending in a direction equally from both sides of the terminal slot (4), thereby enabling each terminal (4) to fixedly lie along the center line of the terminal slot with the first-to-second section transition of the engagement piece (16) and the free end of said second section (18) fit in the engagement slot.

2. An electrical connector as set forth in claim 1 wherein said base has first and second portions (7c, 7d) extending in opposite directions, the first base portion (7c) having said engagement piece (16) stamped therein and the second base portion (7d) having a protrusion on its edge which is forced into the top portion of said terminal slot (4) thereby preventing the removal of the terminal out of said terminal slot (4).

3. An electrical connector as set forth in claim 2 wherein said terminal (4) has first and second contact arms (7a, 7b) extending from a center portion of the base in opposite directions generally parallel to said base said first contact arm (7a) having a contact point (13) on its free end extending toward the first base portion (7c) for contacting a selected terminal or circuit path on a printed circuit board (10) and said second contact arm (7b) having a contact point (13') on its free end extending toward the second base portion (7d) for contacting a selected conductor of a flat

flexible cable (11).

Patentansprüche

1. Elektrischer Verbinder zur Verbindung gewählter Leiterbahnen oder Anschlüsse einer Druckschaltungsplatte mit gewählten Adern eines flexiblen Flachbandkabels mit einem Gehäuse (1), das eine Vorderseite (2) und eine Rückseite (3) sowie eine Vielzahl von Kontaktschlitz (4) zwischen der Vorder- und Rückseite und eine entsprechende Vielzahl von Kontakten (7) aufweist, die gleitend von der Vorderseite (2) des Gehäuses in die Kontaktschlitz (4) eingepaßt sind, wobei jeder Kontakt (7) eine Basis mit einem eingestanzten Anlageteil (16) besitzt, das durch einen entsprechenden, rechtwinklig zum Kontaktschlitz (4) verlaufenden Anlageschlitz (19) gefangen wird, dadurch gekennzeichnet, daß das Anlagestück (16) ein von der Basis jedes Kontakts abgeschnittener Metallstreifen mit einer ersten und einer zweiten Fläche und in Form eines flachen V-förmigen, freitragenden Arms ist und einen ersten Abschnitt (17) umfaßt, der von einer ersten Fläche der Kontaktbasis nach außen gebogen ist und sich um einen vorgegebenen Abstand von der ersten Fläche erstreckt, sowie einen zweiten, anschließenden Abschnitt (18) der einstückig mit dem Ende des ersten Abschnitts (17) verbunden ist und sich über die Basis der zweiten Fläche der Kontaktbasis hinaus erstreckt und ein freies Ende besitzt, wobei sich das freie Ende um den gleichen vorgegebenen Abstand von der zweiten Fläche der Basis aus wie der erste Abschnitt (17) von der ersten Fläche der Basis aus erstreckt, und daß der Anlageschlitz (19) sich in einer Richtung in gleichem Abstand von beiden Seiten des Kontaktschlitzes (4) erstreckt, wodurch jeder Kontakt (7) entlang der Mittellinie des Kontaktschlitzes festgelegt ist, wobei der Übergang zwischen dem ersten und dem zweiten Abschnitt des Anlagestücks (16) und das freie Ende des zweiten Abschnitts (18) in den Anlageschlitz passen.

2. Elektrischer Verbinder nach Anspruch 1, bei dem die Basis erste und zweite, sich in entgegengesetzte Richtung erstreckende Teile (7c, 7d) besitzt, das erste Basisteil (7c) das eingestanzte Anlagestück (16) besitzt und das zweite Basisteil (7d) einen Vorsprung an seiner Kante aufweist, der in den oberen Teil des Kontaktschlitzes (4) gepreßt wird, wodurch die Entfernung des Kontakts aus dem Kontaktschlitz (4) verhindert wird.

3. Elektrischer Verbinder nach Anspruch 2, bei dem



der Anschluß (7) erste und zweite Kontaktarme (7a, 7b) aufweist, die sich von einem mittleren Teil der Basis in entgegengesetzte Richtungen im wesentlichen parallel zur Basis erstrecken, wobei der erste Kontaktarm (7a) einen Kontaktpunkt (13) an seinem freien, sich in Richtung zum ersten Basisteil (7c) erstreckenden Ende besitzt, um einen Kontakt zu einem gewählten Anschluß oder einer gewählten Leiterbahn auf einer Druckschaltungsplatte (10) herzustellen, und der zweite Kontaktarm (7b) einen Kontaktpunkt (13') an seinem freien, sich in Richtung zum zweiten Basisteil (7d) erstreckenden Ende aufweist, um einen Kontakt zu einer gewählten Ader eines flexiblen Flachbandkabels (11) herzustellen.

Revendications

1. Connecteur électrique conçu pour connecter des rubans ou des bornes sélectionnés sur une carte à circuit imprimé à des conducteurs sélectionnés sur un câble ruban souple, comprenant :

un boîtier (1) ayant un côté avant (2) et un côté arrière (3) et comportant une pluralité de fentes pour borne (4) qui le traversent entre les côtés avant et arrière, et une pluralité correspondante de bornes (7) montées coulissantes dans lesdites fentes pour borne (4) à partir du côté avant (2) du boîtier, chaque borne (7) ayant une base avec une pièce de blocage (16) qui y est formée à la presse pour s'enclencher avec une fente de blocage correspondante (19) perpendiculaire à la fente de borne (4), caractérisé en ce que :

ladite pièce de blocage (16) est une bande de métal découpée à partir de la base de chaque borne, ayant une première et une seconde surfaces en forme de bras en porte-à-faux en forme de "V" aplati, ladite pièce de blocage étant constituée d'une première section (17) repliée vers l'extérieur à partir d'une première surface de la base de borne s'étendant à une distance déterminée par rapport à ladite première surface et une seconde section consécutive (18) reliée d'un seul tenant à l'extrémité de ladite première section (17) et s'étendant à partir de celle-ci dans ladite base au-delà de la seconde surface de la base de borne se terminant par une extrémité libre, ladite extrémité libre s'étendant de la même distance déterminée, par rapport à la seconde surface de la base, dont la première section (17) s'étend par rapport à la première surface de la base ; et

en ce que ladite fente de blocage (19) s'étend dans une direction de manière égale par rapport aux deux côtés de la fente de borne (4), en permettant ainsi à chaque borne (7) de se trouver immobilisée le long de l'axe de la fente de borne, la transition de la première à la seconde

section de la pièce de blocage (16) et l'extrémité libre de ladite seconde section (18) étant introduites dans la fente de blocage.

2. Connecteur électrique selon la revendication 1, dans lequel ladite base possède des première et seconde parties (7c, 7d) s'étendant en sens contraires, ladite pièce de blocage (16) étant formée à la presse dans la première partie de base (7c) et la seconde partie de base (7d) portant, sur son bord, une saillie qui est forcée dans la partie supérieure de ladite fente de borne (4) en empêchant ainsi la borne de sortir de ladite fente de borne (4).
3. Connecteur électrique selon la revendication 2, dans lequel ladite borne (4) possède des premier et second bras de contact (7a, 7b) s'étendant en sens contraires à partir d'une partie centrale de la base, globalement parallèlement à ladite base, ledit premier bras de contact (7a) possédant un point de contact (13) sur son extrémité libre s'étendant vers la première partie de base (7c) pour contacter une borne ou un trajet de circuit sélectionné sur une carte à circuit imprimé (10) et ledit second bras de contact (7b) possédant un point de contact (13') sur son extrémité libre s'étendant vers la seconde partie de base (7d) pour contacter un conducteur sélectionné d'un câble ruban souple (11).