ABSTRACT: An electrical contact for use in a card-edge connector includes a wiping finger that establishes a curved surface tangent to the plane of a printed circuit board inserted into the connector. The wiping finger is connected to an upward support leg by a pivot arm; the support leg and the pivot arm lie parallel to, but spaced from each other, and are interconnected by a U-shaped arcuate bend. A plurality of such contacts, when mounted in different connector housings, can be connected by a bus bar, which may be integral with said contacts.
CARD-EDGE CONNECTORS WITH CONTACTS INTERCONNECTED BY BUS BAR

This is a continuation of application Ser. No. 535,197, filed Mar. 17, 1966, now abandoned.

This invention relates to a contact for a printed circuit board, and more particularly, to a contact which may be affixed in an insulating casing to form a connector to make direct contact with printed circuit boards.

Connectors of this nature have been heretofore and are known in the art as card edge connectors. One feature common to many of the contacts used in these connectors is that they contain two separate pivot points in their structure in order to obtain maximum flexing during use. Maximum flexing is desirable in order to permit a single connector to accommodate various thicknesses of printed circuit boards. Also, this pivotal structure enables the contacts to firmly grip the printed circuit boards even when the assembly is subjected to vibrations or wear. Additionally, the pressure exerted by the contacts on the contact terminals of the printed circuit boards remains fairly constant even though the thickness of the inserted boards may vary from others previously inserted.

A contact which has been successfully employed in card-edge connectors is shown in U.S. Pat. No. 3,231,848. The contact shown in this patent includes a wiping finger which is connected to a pivot arm by a bend in the contact member. The pivot arm is in turn connected to, but spaced from, a supporting leg in order to obtain a second pivot point at the juncture of the pivot arm and supporting leg. The spacing of the pivot arm and supporting leg in the patented contact is achieved by cutting and physically removing the metal between the pivot arm and supporting leg. This is accomplished by a conventional stamping process.

In the contact of the present invention, the connection between the wiping finger and pivot arm is through an arcuate bend in the contact material. Likewise, the connection between the pivot arm and the supporting leg is through an arcuate bend in the contact material. These two bends provide a greater flexing movement than was possible with the prior bent and stamped configuration, as shown in U.S. Pat. No. 3,231,848.

In another aspect of the invention, the contacts in a respective plurality of card-edge connectors are integrally connected by a unitary bus strip. These contacts are adapted to receive the edges of said printed circuit boards and make physical and mechanical connections with at least one conductive member of each printed circuit board. Having the contacts connected to a continuous bus enables the user of the connectors to furnish a specific voltage in a ground to all of the contacts along the bus simultaneously, and therefore to transmit this voltage to all of the printed circuit boards within the connectors.

In yet another aspect of this invention the contacts contain square tails which are adapted for automatic wire wrapping in order to secure leads from an outside circuit to the contacts and hence those printed circuit boards held within the connectors. The contacts are configured in such a manner as to permit the varying of the positions of the square tails in order to accommodate the needs of the user of the connector. Thus the tails can project from the connector on any spacing ranging from 0.100 inch centers up to any other center spacing required by the user.

It is accordingly an object of this invention to provide a novel contact for printed circuit boards.

It is another object of this invention to provide a contact for printed circuit boards having a square tail adapted for automatic wire wrapping.

It is a further object of this invention to provide a contact for printed circuit boards which possesses greater flexibility than similar contacts of the prior art.

It is a further object of this invention to provide a novel connector adapted to receive printed circuit boards.

It is a further object of this invention to provide novel connectors adapted to receive a plurality of spaced parallel printed circuit boards.

It is a further object of this invention to provide a series of contacts for printed circuit boards wherein the positions of the tails of said contacts may be varied to suit the user's needs.

It is a further object of this invention to provide a novel series of contacts for printed circuit boards which are physically and electrically connected through a unitary bus.

These and other objects of this invention are accomplished by providing a contact for printed circuit boards, said contact being formed from a strip of resilient metal, said contact comprising a head section and a tail section, said head section including a supporting leg lying in a first plane, a pivot arm integrally connected to said supporting leg and lying in a plane which is parallel to said first plane, said pivot arm being connected to said supporting leg through an arcuate bend, a wiping finger integrally connected to said pivot arm, said wiping finger lying in a plane which is substantially perpendicular to the planes of said supporting leg and said pivot arm, said wiping finger being connected to said pivot arm by an arcuate bend, said wiping finger adapted to flex about said pivot arm at the arcuate bend joining said wiping finger and said pivot arm and said pivot arm adapted to flex about said supporting leg at the arcuate bend joining said pivot arm and said supporting leg.

Other objects and many of the attendant advantages of this invention will become readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a series of parallel connectors embodying the contacts of this invention, with printed circuit boards being shown schematically as secured within the connectors.

FIG. 2 is an enlarged sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2.

FIG. 4 is an enlarged sectional view taken along the line 4—4 of FIG. 1.

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 4.

FIG. 6 is a rear elevational view of the contact shown in FIG. 4.

FIG. 7 is a front elevational view of the contact shown in FIG. 4, and

FIG. 8 is a sectional view taken along the line 8—8 of FIG. 7.

Referring now in greater detail to the various details of the drawings wherein similar reference characters refer to similar parts, a connector embodying the present invention is generally shown at 10 in FIG. 2. Device 10 basically comprises a supporting plate 12, a plurality of end insulating bushings 14, a plurality of central insulating bushings 16, contacts 18 (FIGS. 2 and 3) mounted within end bushings 14 and contacts 20 (FIGS. 4, 6, 7 and 8) mounted in bushings 16.

Contacts 18 and 20 both embody the present invention, and are identical in structure, with the exception that contacts 18 project from a continuous bus or strip 22 whereas contacts 20 do not. Referring to FIGS. 4 to 8 it is seen that the contacts 18 and 20 each comprise a wiping finger 24, a pivot arm 26 and a supporting leg 28. Wiping finger 24 is bifurcated and includes a first leg 30 and a second leg 32. As seen in FIGS. 6 and 7, leg 30 is slightly wider than leg 32. The purpose of the difference in leg widths is to insure that the two legs of each wiping finger will resonate at different frequencies when the contacts engage printed circuit boards. Since the legs merge into unitary strip portion 34 of the wiping finger, physical and electrical contact of the wiping finger with a printed circuit line will always be assured regardless of any frequency that may be present at any given time. Thus, the total width of wiping finger 24 is approximately the same as any printed circuit lead which will be in contact with the wiping finger during use. As seen in FIG. 4, wiping finger 24 is convex. The purpose of this configuration is to facilitate the insertion of a printed circuit board into a connector and into contact with the wiping
fing. This aspect of the wiping fingers is well known in the art, as exemplified by the aforementioned U.S. Pat. No. 3,231,848. All of the elements of contacts 18 and 20 are stamped and formed from a unitary strip. As seen in FIGS. 4 and 8, wiping finger 24 is integrally connected to pivot arm 26 through strip 36 (FIG. 4) and arcuate bend 39 (FIG. 6). As seen in FIG. 6, pivot arm 26 and supporting leg 28 have their widest surfaces lying in planes which are parallel to each other. Pivot arm 26 is unitary with leg 28 and is joined to the leg by arcuate at bend 39 which is V-shaped. As seen in FIG. 4, arm 26 has a leading edge 40 thereof which tapers outwardly from supporting leg 28. This adds to the resiliency and flexibility of the contact. A relief hole 42 is cut at the base of arm 26, and arm 26 is provided with an enlarged rear section 44 to provide greater strength in the area of the relief hole. A similar relief hole 46 is formed in wiping finger 24.

Strip 48 is unitary with leg 28. As seen in FIG. 4, strip 48 is approximately three times the width of leg 28. Strip 48 is in unitary with mounting leg 50. As also seen in FIG. 4, mounting leg 50 is approximately one-half the width of strip 48. Mounting leg 50 in turn includes a tapering lower end 52 which merges into two legs 54 and 56. Legs 54 has a square cross section, as is apparent in FIG. 5, and is adapted for automatic wire wrapping for external connection.

The contact 20 is a unitary item and is formed by a stamping and bending process from a single strip of metal. Substantially any resilient metal having good electrical conductivity can be used for the contact in this invention. One such metal is a phosphor bronze plated with nickel and then gold. Another resilient metal which may be used is a beryllium-copper alloy.

In FIG. 1, a connector formed for contacts 18 and 20 is shown. This connector includes end bushings 14 and central bushings 16 mounted on a metallic plate 12. Plate 12 includes a plurality of equally spaced holes 56 which extend therethrough. As seen in FIGS. 1 to 3, end bushings include end walls 58 and lateral walls 60. End guides 62 are formed at the top of bushings 14. End guides 62 include a downwardly extending slot 64 and have the top edge of the slot chamfered, as shown at 65. The purpose of the end guides is to aid in the insertion of printed circuit boards, shown at 66 in FIG. 1, into the connector of this invention. Thus, slots 64 are slightly wider than the thickness of the printed circuit board and the chamfered guides aid in the insertion of the board.

End bushings 14 also include a horizontal base 68. Base 68 includes a bore 70 for the reception of strip 34 of wiping fingers 24. A longitudinal slot 72 passes through the lateral walls 60 of bushing 14 and includes a portion below and in communication with bore 70. Slot 72 in turn contains strip of bus 22 (FIG. 3) which passes through the lateral walls of the bushing.

Bushing 14 also includes inwardly projecting partitioning walls 74. As seen in FIG. 3, partitioning walls 74 have their ends laterally spaced to form channel 76 passing longitudinally through the bushing. Projecting below the base 68 of the bushings are bosses 78. Bosses 78 include hollow bores which are in communication with slots 72. The lower end of each boss 78 includes a tapered surface 80 which terminates in shoulder 82.

In use, bushings 14 are inserted in the outermost longitudinal holes 56 of plate 12. This insertion is accomplished by forcing bosses 78, which have the same spacing as holes 56, into the associated holes. The tapered surface 80 aids in this insertion. Since the insulating bushings are molded from a resilient thermoplastic resin, such as nylon, polypropylene or a polycarbonate resin, they can easily be forced through the holes. Once the bosses have been inserted, the bushings will be maintained in place by the abutment of shoulders 82 against the lower surface of plate 12 and the abutment of base 68 against the upper surface of plate 12. As seen in FIG. 1, each bushing 14 has an effective width equal to two aligned holes 56. A series of bushings 14 usually are used.

After the end bushings have been inserted, contacts 18 will be inserted. As pointed out above, contacts 18 are identical in structure to contacts 20, with the exception that strip 48 in contact 20 is replaced by a continuous bus 22 which integrally connects a series of contacts 18. The series of contacts 18 is inserted by placing bus 22 in the aligned slots 72 in bushings 14. Thereafter, the tails 54 of the contacts are pushed through the hollow bores of bosses 78. The mounting legs 50 of the contacts are forced into the hollow bores of bosses 78. Tapering section 52 aids in the insertion. Insertion is continued until bus 22 rests on the bottom horizontal surface of slot 72. Since the bushings 14 are molded from a resilient thermoplastic material, a forced fit of the contact mounting legs into the bushings can be accomplished. Thereafter a frictional force on the contact mounting legs will maintain the contacts within the bushings and consequently securely mount them onto plate 12. At the same time, bushings 14 electrically insulate the contacts from the metal mounting plate.

Intermediate the end bushings, central bushings 16 are mounted on plate 12. Central bushings 16 are similar in structure to end bushings 14. However, it is unnecessary to have a source of applied voltage across the central bushings since any voltage source is supplied through buses 22 in the contacts mounted in end bushings 14. Thus, central bushings 16 include end walls 84 and lateral walls 86. As seen in FIGS. 4 and 5, central bushings 16 additionally include a base 88. Bosses 90 project from the base 88 and through openings 56 in plate 12. Bosses 90 terminate in tapering ends 92 which include a locking shoulder 94. As seen in FIG. 4, bosses 90 can either be used in a central bore 96. The solid bosses will only be used when there is to be no contact mounted on each side of an inserted printed circuit board. Thus, as seen in FIG. 4, a wiping finger 24 will only engage one side of a printed circuit board. If printed circuitry appears on both sides of a board then a pair of opposed contacts 20 will be inserted in bushing 16 and therefore both bosses 90 will include a hollow bore.

Bushings 16 therefore additionally include recesses 98 formed in base 88 for the reception of strips 48 of contacts 20. Where a contact will be inserted, recesses 98 are in communication with bores 96 of bosses 90. Contacts 20 are each individual and are unconnected to any other contact. Thus, the contacts 20 will be inserted into bushing 16 by forcing mounting legs 50 into bores 96, thereby obtaining a frictional fit in the same manner as was done with contacts 18. The lower surface of recess 98 adjacent bores 96 serves as a stop for the insulation of the contact, as seen in FIG. 4.

The upper portion of each bushing 16 includes inwardly projecting partitioning walls 100 which form channels 102. The top edges of walls 100 are chamfered as shown at 104 in FIG. 4, as are the top edges of partitioning walls 74. The chamfering is used to aid in the insertion of the printed circuit boards.

As seen in FIGS. 1 and 5, central bushings 16 are arranged to receive two aligned individual contacts 20. Where necessary, each bushing 16 can additionally receive two aligned contacts which will be opposed to the aforementioned aligned contacts. This spacing of a maximum of four contacts per bushing is shown as being exemplary. The total number of contacts used in any bushing can be changed without departing from the scope of this invention. As seen in FIG. 5, each boss 90 includes a pair of flattened lateral walls 106. The purpose of the flattened walls is to aid in the compression of the boss 90 when passing it through holes 56 in plate 12. Similar flattened surfaces are provided for bosses 78.

In FIG. 1, only a small section of a plate 12 has been shown. In actual usage, the plate can be divided into any number of holes and a number of groups of connectors such as that shown in FIG. 1 can be used. By way of example, a strip 22 has been provided which will accommodate 88 contacts 18. Thus, a total of 44 insulating bushings 14 can be aligned along plate 12. Having a plate which is sufficiently large will permit the accommodation of a number of groups, with each having 44 insulating bushings extending in a lateral direction.
In the longitudinal direction, any number of bushings 16 may be added to accommodate any given width of printed circuit board 66. Thus, the greater the width of the printed circuit board, the greater the number of intermediate or central bushings 16 that will be used. Once the circuitry on the printed circuit boards is known and the external contacts for the printed circuit boards are determined, each row of bushings 14 and 16 can be set. If printed circuitry appears on both sides of board 66, then opposed contacts 18 and 20 will be inserted for their respective bushings. Where circuitry appears on only one side of a board, or if at any particular point it is necessary to terminate circuitry on only one side of the board, the individual unopposed contacts 18 and 20 will be used. In FIG. 3, alternate contacts 18 have been removed from strip 22. This is because in the embodiment shown there will be electrical connection made with only one side of an inserted printed circuit board.

As is apparent from FIG. 1, the printed circuit boards 66 are inserted in the laterally extending direction of plate 12. Thus, the boards will be received within end guides 62 and channels 76 and 102 formed in bushings 14 and 16, respectively. All of the edges entering the channels have been chamfered in order to aid in the insertion.

The entering boards will receive their lateral and vertical support from the bottom and sidewalls of the channels and end guides. The electrical and mechanical connection between the printed circuit boards and the connector is formed by the physical contact of wiping fingers 24 against the circuitry printed on the printed circuit boards. Since the boards have a thickness which is almost the dimension of the width of channels 74 and 102, and since fingers 24 are shown in FIGS. 3 and 4, the resilient wiping fingers will be forced outwardly from the channels by the printed circuit boards. Thus a resilient grip is placed against the boards by the wiping fingers. This resilient grip will always be present despite any varying thicknesses of the boards, in view of the great flexibility of the wiping fingers.

A first pivot location for the wiping fingers is obtained at arcuate bend 38 (FIG. 8). A second flexing or pivot point is obtained at arcuate bend 39 (FIG. 6). Greater flexibility is also obtained in view of the angular relation between pivot arm 26 and supporting leg 28 (FIG. 4). Thus, arm 26 can be pushed rearwardly or rotated slightly about section 44 when a board is inserted.

The number of busses used and the number of intermediate bushings 16 and their associated contacts used are varied in accordance with design requirements. The greater the number of individual circuits and interconnected circuits in any group of connectors, such as the group shown in FIG. 1, the greater the number of busses 22 which will be used. In the embodiment shown in FIG. 1, a total of five busses can be used for supplying an applied voltage through all of the inserted printed circuit boards. Wherever a given printed circuit board will not be included in an overall circuit, the contacts within the bushings containing the bus can be deleted. Thus, in FIG. 2 one of the contacts 18 has been severed since there should be no electrical connection with the printed circuit board inserted in the first connector along the particular bus 22.

Where a double-wiping action is required, as for instance a printed circuit board having circuitry on both sides, a pair of opposed wiping fingers 24 will be present in each bushing within a given connector. As pointed out above, in the embodiment shown in FIG. 3, alternate contacts have been severed since they will not be needed in a given circuit.

Another feature of the contacts of this invention is that the user can determine his own spacing for external connection according to his design requirements. Thus, tails 24 can project from bus 22 or strips 48 at any location along the strips or busses. Therefore, the tails can be on centers of approximately 0.100 inch up to any other centers required. Once the centers have been determined, the stamping operation for the strip of contact metal can then be set as to position the tail centers of the contacts according to the predetermined con-figuration. By way of example, in the embodiment shown, the tails are on 0.250 inch centers.

In the embodiment shown, the connectors comprise rows of insulating bushings mounted on a metal plate. However, the specific insulator of the card-edge connector can be varied without departing from the scope of this invention. Thus, the use of small individual aligned bushings is desired when greater flexibility of contact orientation is necessary. However, in many instances, when a single design is to be repeated, a unitary bushing can replace a row of separate bushings. In another embodiment of a connector utilizing the contacts of this invention, a single-insulating connector body can be used without a metal-mounting plate. An example of a connector body of this type is shown in FIGS. 2 and 3 of aforementioned U.S. Pat. No. 3,231,648. Thus, contacts 18 or 20 can be molded into a plastic insulating casing to form a card-edge connector and the external connections will be with the contact tails projecting from the bottom of the casing. The casing can be of any resilient plastic such as nylon, polypropylene or a polycarbonate resin.

It is thus seen that through the use of the contacts of this invention there is a great deal of flexibility in the design of connectors embodying the contacts. Almost any configuration of contacts and connector insulators can be used which would embody the teachings of this invention. Individual contacts can be inserted wherever needed through the use of bushings 16. Likewise, all of the contacts can be readily severed from bus 22. Each of the contacts possesses a great deal of resiliency in view of the two arcuate pivot points present in the contacts. Furthermore, angling pivot arm 26 away from supporting leg 28 and into the path of the inserted printed circuit board adds to the resiliency and gripping strength of the contact.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

I claim:

1. An electrical connecting assembly comprising:
a. a plurality of insulating housings, each having a base, a pair of lateral walls extending upwardly from said base in spaced relation to define a longitudinal channel for receiving the edge of a printed circuit board, a contact receiving bore in said base which communicates with said channel, and a bus bar-receiving slot extending through at least one of said pair of walls in a direction perpendicular to the direction of said channel, said housings being mounted side by side in parallel relationship such that said slots are in adjoining walls and are in line with each other,
b. an assembly of contacts and a bus bar mounted in said housings, said bus bar comprising a flat, elongated member mounted in said slots such that said bus bar lies in a plane extending upwardly from said base and normal to and intersecting said lateral walls, said contacts each comprising an elongated member, integral with and extending from an upper edge of said bus bar and having a wiping finger having a conductive mating surface which projects into said channel and which lies in a plane perpendicular to said bus bar, for electrically and mechanically engaging a conductive pad on a printed circuit board when the latter is inserted into said channel, said contacts having elongated tail portions, integral with and extending from the lower edge of said bus bar and through the respective contact receiving bore in said base.

2. The assembly of claim 1 wherein said contacts each comprise a support leg extending from and coplanar with said bus bar, a pivot arm parallel to and spaced from said support arm and interconnected to said support arm by a U-shaped bend, and a wiping finger containing said mating surface connected to said pivot arm by a substantially 90° bend such that said mating surface of said wiping finger lies in a plane substantially perpendicular to said pivot arm, said support leg, and said bus bar.
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3. The assembly of claim 2 wherein said wiping finger is bifurcated by a bifurcating slot extending from the end thereof.

4. A connector assembly for printed circuit boards, comprising:
   a. a plurality of elongated, insulating casings, each having a channel in one edge thereof for receiving the edge of a printed circuit board having contact pads on opposite surfaces of an edge thereof,
   b. said casings being mounted side-by-side such that the channels of said casings are in parallel relationship,
   c. each casing having a slot therethrough which is transverse to and which communicates with said channel,
   d. a bus-contact assembly comprising a flat, elongated, bus bar mounted upright in said casing and having a plurality of integral flat elongated members extending from an edge thereof, each member having been bent to form a contact having a convex mating surface which lies tangent to a plane orthogonal to said flat bus bar,
   e. said assembly being mounted in said casings such that said bus bar lies in the slots of a plurality of said casings and said mating surfaces of said contacts extend into said channels of said respective casings,
   f. a plurality of elongated contact tail portions extending from an opposite edge of said bus bar and through respective apertures in the bottom surfaces of said casings.

5. The assembly of claim 4 wherein said flat elongated members of clause (d) each comprise a support leg extending from and coplanar with said bus bar, a pivot arm parallel to and spaced from said support arm and interconnected to said support arm by a U-shaped bend, and a wiping finger containing said mating surface connected to said pivot arm by substantially the same means as that mating surface of said wiping finger lies in a plane substantially perpendicular to said pivot arm, said support leg, and said bus bar.

6. The assembly of claim 5 wherein said wiping finger is bifurcated by a bifurcating slot extending from the end thereof.

7. The assembly of claim 6 wherein said plurality of elongated contact tail members which extend from an opposite edge of said bus bar are located opposite said respective contacts.

8. A connector assembly for the direct reception of a plurality of printed circuit boards having printed circuitry thereon, said assembly comprising a plurality of aligned insulating housings mounted on a supporting plate, each housing having a plurality of contacts therein, each contact adapted to contact a printed circuit board, each contact being formed from a strip of resilient metal and comprising a head section and a tail section, said head section including a supporting leg having its widest surface lying in a first plane, a pivot arm overlying and integrally connected to said supporting leg and having its widest surface lying in a plane spaced from but parallel to said first plane, said pivot arm being connected to said supporting leg through an arcuate bend, a wiping finger integrally connected to said pivot arm, said wiping finger lying in a plane which is substantially perpendicular to the planes of said supporting leg and said pivot arm, said wiping finger being connected to said pivot arm by an arcuate bend and being adapted to flex about said pivot arm at the arcuate bend joining said wiping finger and said pivot arm, said pivot arm adapted to flex about said supporting leg at the arcuate bend joining said pivot arm and said supporting leg, each of said housings having a laterally extending slot passing therethrough, a unitary bus passing through said slots and through said aligned housings, with a plurality of contacts projecting from said bus into respective ones of said housings.

9. A plurality of integral electrical contacts, each for use in a card-edge connector, each comprising a wiping finger having a curved surface that will be tangent to the plane of a printed circuit board when said board is inserted into said connector and said contact is mounted in said connector, said wiping finger being connected to an upstanding support leg by a pivot arm, said support leg and said pivot arm having their widest surfaces parallel to but spaced from and overlying other and being interconnected by a U-shaped arcuate bend, said support leg and said pivot arm being disposed in different planes which are both perpendicular to the plane of said printed circuit board, said contact having, connected to said support leg, a body section which is flat and lies in a plane which is perpendicular to the plane of said printed circuit board, the body section of one of said contacts being integral with the body section of another of said contacts, thereby to form a unitary body section, whereby a bus-contact is formed wherein a plurality of nose portions and tail portions are integrally connected together by said common, unitary body section.

10. An electrical connector assembly comprising a plurality of card-edge connectors, each comprising an insulating casing, said connectors being arranged side by side so that printed circuit boards inserted into said connectors will be parallel to and overlie each other, a plurality of electrical contacts mounted in said connectors, each of said contacts comprising a wiping finger having a curved surface that will be tangent to the plane of a printed circuit board when said board is inserted into a respective connector, said wiping finger being connected to an upstanding support leg by a pivot arm, said support leg and said pivot arm having their widest surfaces parallel to but spaced from and overlying other and being interconnected by a U-shaped arcuate bend, said support leg and said pivot arm being disposed in different planes which are both perpendicular to the plane of said printed circuit board, said contact having, connected to said support leg, a body section which is flat and lies in a plane which is perpendicular to the plane of said printed circuit board, the body section of one of said contacts being integral with the body section of another of said contacts, thereby to form a unitary body section, whereby a bus-contact is formed having a plurality of nose portions and tail portions which are integrally connected together by said common, unitary body section, the nose portions of said bus-contact being mounted in different ones of said card-edge connectors to establish a common electrical connection between each contact nose in the same locations in each of said connectors, said connectors being provided with aligned slots for reception of said unitary body section.