United States Patent

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Continuation of application Ser. No. 735,714, June 10, 1968, now abandoned.

[54] INTEGRATED CIRCUIT MODULE ELECTRICAL CONNECTOR

10 Claims, 4 Drawing Figs.

[52] U.S. Cl. ..... 339/14 R, 339/210 M, 339/221 M
[51] Int. Cl. H01r 3/06
[50] Field of Search 339/14, 18, 19, 206, 207, 209, 210, 221, 222

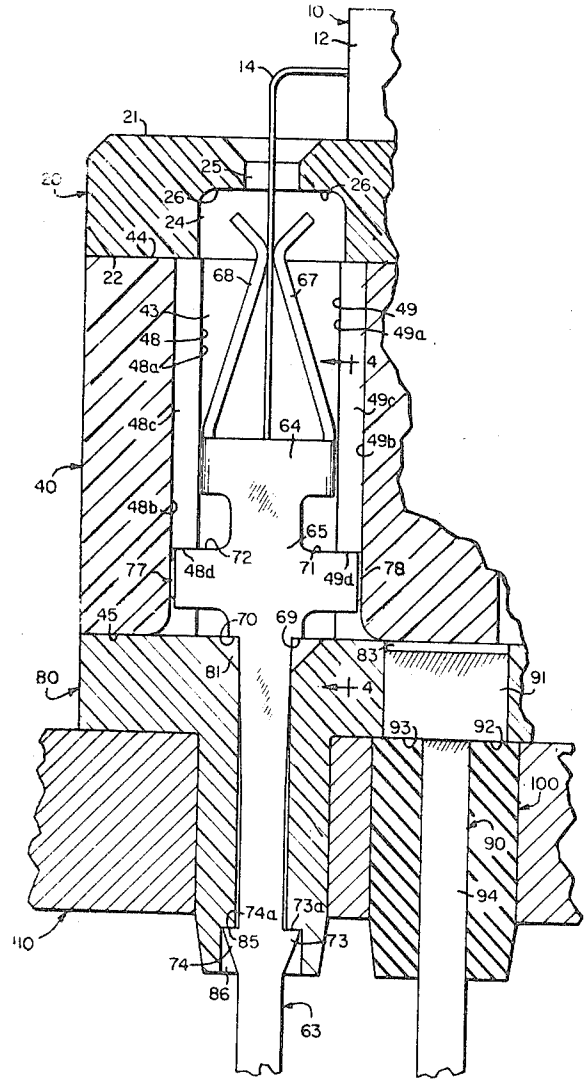
[56] References Cited

UNITED STATES PATENTS

2,995,617	8/1961	Maximoff et al.	339/221 M
3,166,372	1/1965	Just	339/186 M
3,345,599	10/1967	Henschen et al.	339/18 C

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ABSTRACT: An electrical connector comprises an insulating housing having a plurality of contact openings extending therethrough. A contact is positioned within each of said openings, and a separate lid is removably mounted on the upper surface of said insulating housing. The lid is provided with a plurality of lead openings, each lead opening being in direct alignment with, and in communication with a corresponding contact opening in the insulating housing. An adapter for insulating the contacts of the electrical connector from a metal plate is comprised of a flat insulating member having an upper and a lower surface. A plurality of hubs are integrally molded with said lower surface and extend downwardly therefrom. A plurality of tail-receiving openings are provided in the adapter, each such opening extending through the upper surface of the flat insulating member and a respective hub to receive the tail portion of a contact therein. The flat insulating member also comprises a plurality of terminal openings adjacent the tail-receiving openings, each terminal opening being adapted to accommodate a portion of a terminal pin mounted in, and grounded to the metal plate.



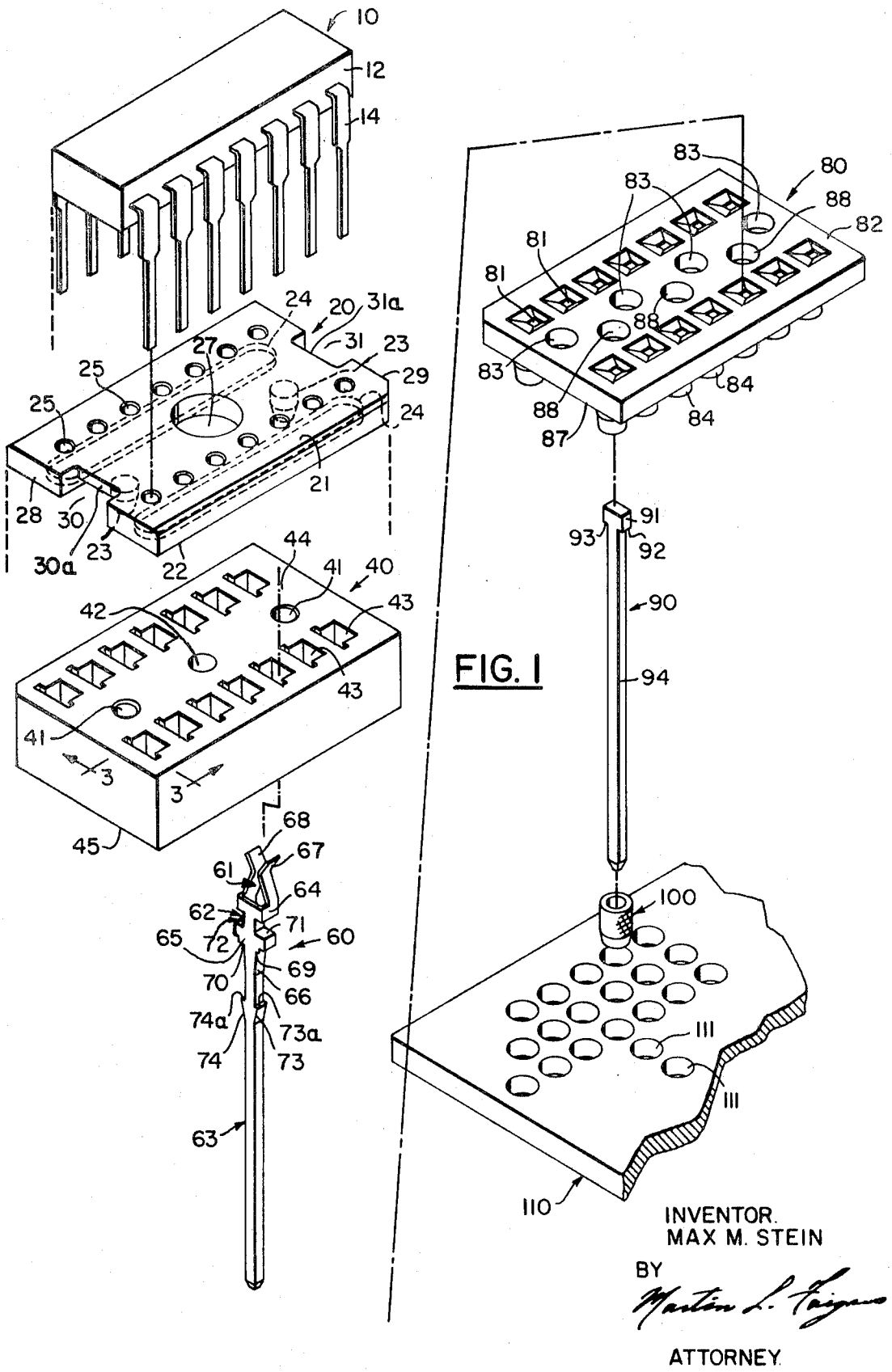


FIG. 1

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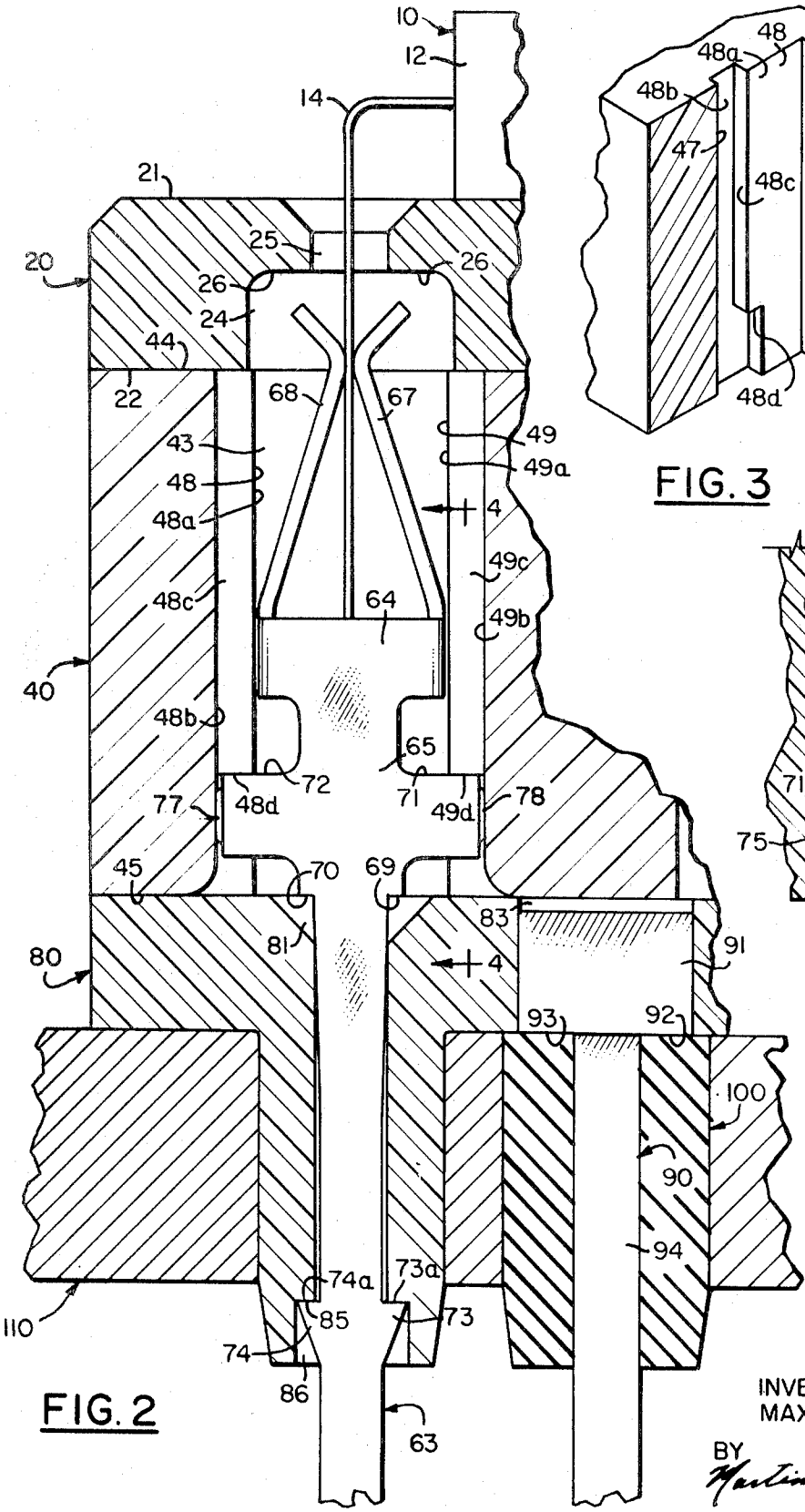


FIG. 2

FIG. 3

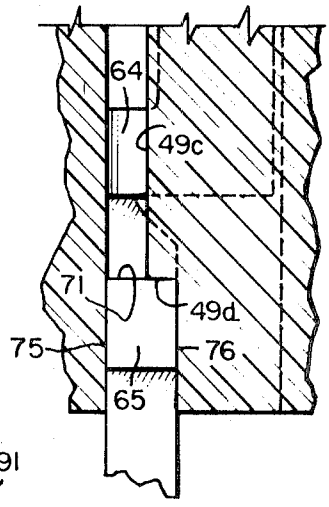


FIG. 4

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INTEGRATED CIRCUIT MODULE ELECTRICAL CONNECTOR

This application is a continuation of my copending application, Ser. No. 735,714, filed June 10, 1968, and now abandoned.

This invention relates to an electrical connector for removably connecting a dual-in-line package to a mounting structure such as a circuit board, molded block insulator, or metal plate, and represents an improvement over the electrical connector disclosed and claimed in my prior copending application Ser. No. 731,903, titled INTEGRATED CIRCUIT MODULE ELECTRICAL CONNECTOR AND CONTACT THEREFOR, filed May 24, 1968, and now abandoned.

A dual-in-line package is one in which an integrated circuit wafer is encapsulated in an insulating body that is generally parallelepiped in shape with dimensions of approximately ⅛×¼×¾ inch. Each dual-in-line package has a plurality of leads projecting from opposite longitudinal sides of the insulating body. The portions of these leads adjacent the insulating body of the package are generally rectangular with dimensions of approximately 0.060×0.012 inch; and a short distance from the body the leads are reduced in size to about 0.02×0.012 inch. The dual-in-line package permits the tiny, difficult to handle, integrated circuit wafer contained therein to be handled and contacted easily and economically, either manually or automatically.

The electrical connector disclosed in my above-referred-to copending application is comprised of an insulating member having a plurality of lead openings in the upper surface thereof for receiving the leads of the dual-in-line package. A contact opening is in direct alignment with, and in communication with each lead opening and extends through the lower surface of said insulating member. The electrical contacts are assembled and disassembled from the insulating member through the lower surface thereof. Thus, when it becomes necessary to replace a malfunctioning contact in said insulating member, the electrical interconnections among all the contacts must be removed, the electrical connector disassembled from the mounting structure, the defective contact removed from the insulating housing through the lower surface thereof, a new contact substituted for said malfunctioning contact, the electrical connector reassembled to the mounting structure, and the contacts again electrically interconnected by suitable terminating means, such as wire-wrapped terminations.

The electrical connector of this invention greatly simplifies the replacement of contacts therein by permitting removal of each contact through the upper surface of the insulating housing. The electrical connector of this invention is provided with a separate lid member containing the lead openings therein, said lid member being removably mounted on the upper surface of the insulating housing. Initial assembly of the contacts with the insulating housing of this invention is the same as disclosed in my above-referred-to copending application. Each contact is inserted into a respective contact opening of the insulating housing through the lower surface thereof until upwardly facing shoulders on each contact engage with downwardly facing shoulders which define a portion of each respective contact opening. However, when it becomes necessary to replace a malfunctioning contact in the electrical connector of this invention, the electrical interconnections to only the malfunctioning contact are removed, the lid containing the lead openings is removed, and the malfunctioning contact is disassembled from the insulating housing by removing it through the upper surface thereof. Removal of the contact in this manner broaches the downwardly facing shoulders which are associated with the contact opening from which such malfunctioning contact is removed. A new contact is then inserted into the contact opening through the upper surface of the insulating housing, and the lid is replaced.

A further object of this invention is to provide an adapter for use in insulating the contacts of the electrical connector of this invention from a metal plate. Metal plates are utilized as mounting structures for electrical components in electronic equipment and ground connections often must be made to such plates. The metal plate is provided with a plurality of openings for receiving the tail portions of contacts therethrough. These tail portions are electrically interconnected in the required pattern by suitable terminating means, such as wire-wrapped terminations. Those contacts which are not to be grounded to the plate must be electrically insulated therefrom.

The adapter of this invention comprises a flat insulating member having an upper and a lower surface, and a plurality of hubs molded integrally with said lower surface. Contact tail-receiving openings for receiving the tail portion of each contact extend through the upper surface of the flat insulating member and through each of the hubs. The hubs are arranged on centers which correspond to the spacing of the contacts in the insulating housing, and to the spacing of the openings in the metal plate. The flat insulating member is further comprised of a plurality of terminal receiving openings between the rows of contact tail-receiving openings.

The adaptor is utilized by inserting the tail portion of each contact through a respective contact tail-receiving opening in the adaptor. Each contact tail-receiving opening is provided with an enlarged lower portion adjacent the lower surface of each hub to provide a downwardly facing shoulder which engages upwardly facing shoulders on barbs which are provided on the tail portion of each contact. This arrangement assures firm retention of the adaptor to the electrical connector. If no ground connections to the metal plate are to be made, the electrical connector is assembled to the adaptor and the resultant assembly is inserted into the metal plate with the hubs on the adapter extending through the openings in said plate to insulate the contacts therefrom. When it is necessary to make a ground connection between a particular contact and the metal plate, an electrically conductive terminal having a tail portion is fitted with a ground bushing, and the assembly of the terminal and ground bushing is frictionally retained in an opening in the metal plate in close proximity to the opening in the metal plate which is to receive the tail of the contact to be grounded. The terminal has an upper head portion which projects upwardly from the upper surface of the metal plate. The electrical connector with the adaptor affixed thereto is assembled with the metal plate, the upper head portion of the terminal being received within a corresponding terminal-receiving opening in the adaptor to permit the adaptor to rest firmly on the upper surface of the metal plate. The ground connection can then be effected by providing a suitable termination, such as a wire-wrapped termination, between the tail portion of the contact to be grounded, and the grounded terminal.

The more important features of this invention have been outlined rather broadly in order that the detail description thereof which follows may be better understood and in order that the contribution to the art will be better appreciated. There are, of course, additional features of the invention that will be described hereinafter which will also form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based will readily be utilized as a basis for designing other structures for carrying out the several purposes of this invention.

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

FIG. 1 is an exploded isometric view showing the various parts of the invention separated for purposes of clarity;

FIG. 2 is similar to FIG. 1 but shows the parts in assembled condition;

FIG. 3 is an isometric section of the contact opening taken through line 3—3 of FIG. 1;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 2.

The electrical connector of this invention is utilized to provide the desired electrical connections to a dual-in-line package **10** (FIG. **1**) which has its circuitry encapsulated in insulating body **12** and electrically connected to leads **14** projecting from said insulating body. The electrical connector of this invention is comprised of a lid **20**, an insulating housing **40**, and a plurality of contacts **60** (FIGS. **1** and **2**). A novel adaptor **80** is utilized with the electrical connector of this invention to insulate the contacts of such electrical connector from a metal plate **110** (FIG. **2**).

The lid **20** is made from a suitable thermoplastic material, such as nylon, and has an upper surface **21** and a lower surface **22** (FIG. **1**). Projections **23** are integrally molded with the lower surface **22**, and project downwardly therefrom. These projections are adapted to seat in openings **41** in insulating housing **40**. The lid **20** is further provided with an enlarged central opening **27** which is in vertical alignment with a through opening **42** in insulating housing **40** when said lid is positioned on said insulating housing. Opening **27** in lid **20** and opening **42** in insulating housing **40** will accommodate a rivet to firmly attach the electrical connector to a mounting structure.

The lid **20** is further provided with two parallel rows of lead openings **25** in the upper surface **21** thereof. Each row of openings **25** is in communication with an oblong recess **24** in the lower surface **22** of the lid. The junction between each lead opening **25** and its corresponding oblong recess **24** defines a downwardly facing shoulder **26** (FIG. **2**) which provides a positive stop to prohibit removal of the contact through the upper surface **44** of insulating housing **40**.

Each lead opening **25** properly aligns a lead positioned therein with the nose portion **61** of a contact positioned in a contact opening **43**, aligned with said lead opening.

Lid **20** also has transverse side surfaces **28**, **29** which have oblong recesses **30**, **31** respectively, therein. Recess **30** has a rear wall **30***a* which extends vertically from the upper surface **21** of said lid and terminates short of the lower surface **22**. A corresponding rear wall **31***a* is associated with recess **31**. Termination of each rear wall **30***a*, **31***a* short of lower surface **22** provides an undercut region to receive a suitable tool for removing the lid **20** from the insulating housing.

As described above, insulating housing **40** is provided with openings **41** in upper surface **44** thereof for receiving projections **23** of the lid **20**. The insulating housing **40** is constructed from a suitable thermosetting material such as diallyl phthalate and has a plurality of contact openings **43** therein for receiving a plurality of contacts **60**. The details of construction of each contact opening **43**, best shown in FIG. **3**, comprises a front wall **46**, a rear wall **47** (only a portion of which is shown in FIG. **3**) and a pair of sidewalls **48**, **49**. Sidewall **48** is comprised of a first portion **48***a* and a second portion **48***b*, said first and second portions being joined by a stepped surface **48***c* which adjoins a downwardly facing shoulder **48***d*. The sidewall **49** is comprised of a first portion **49***a* and a second portion **49***b* joined by a stepped surface **49***c* which adjoins a downwardly facing shoulder **49***d*. Each contact opening **43** extends from upper surface **44** to lower surface **45** of the insulating housing **40**.

The contact **60** which is inserted into each contact opening **43** is made from a suitable conductive material such as beryllium copper or phosphor bronze, and has substantially the same configuration as the contact which is described in my copending application referred to above. The disclosure of the contact in such copending application is incorporated herein by reference. The only difference between the contact disclosed in such copending application and the contact disclosed herein is that the contact of this invention is provided with a pair of barbs **73**, **74** on the tail portion **63** of the contact. These barbs have upwardly facing shoulders **73***a* and **74***a*, the function of which will be described hereinafter. It is understood that the contact disclosed in my copending application could be utilized in the connector of this invention, but the preferred form of contact is provided with barbs **73** and **74**.

The contact of this invention is comprised of a nose portion **61**, a body portion **62**, and a tail portion **63** (FIG. **1**). The body portion **62** is comprised of an upper transition section **64**, a middle transition section **65**, and a lower transition section **66**. The upper transition section **64** is substantially U-shaped in transverse cross section and comprises two parallel legs from which extend opposed arms **67** and **68**, said arms constituting the nose portion **61** of the contact. The opposed arms **67**, **68** are resiliently deflectable toward and away from each other for gripping a lead when the latter is inserted therebetween. The middle transition section **65** is integral with upper transition section **64** and has portions which project laterally beyond the outer surface of each arm **67**, **68** to define upwardly facing shoulders **71**, **72**. The middle transition section is also comprised of a forward surface **76** and a rear surface **75** (FIG. **4**).

The lower transition section **66** of contact **60** tapers from the middle transition section **65** toward the tail portion **63**, and defines downwardly facing shoulders **69**, **70** at the junction between said lower transition section and said middle transition section. The tail portion **63**, as specifically disclosed herein, is adapted to receive a solderless termination such as a wire-wrapped termination, but other types of terminations can be provided.

The upper transition section **64** of the contact laterally offsets the opposed arms **67**, **68** from the plane of middle transition section **65** so that the free end of a downwardly extending lead which is gripped between the arms **67**, **68** can overlie and not interfere with said middle transition section **65** of said contact. Therefore, the upwardly extending arms **67**, **68** do not have to be of a sufficient length to accommodate the free end of a lead therebetween. This arrangement permits a reduction in the length of the contact which would not be possible if the upper transition section were not laterally offset from the middle transition section. Thus, an electrical connector utilizing the contact disclosed herein can be made more compact than would be the case if the contact had a nose section which was not laterally offset from the middle transition section. Reference should be had to my copending application for further details of construction of the contact **60**.

An adaptor **80**, made from a suitable thermoplastic material such as nylon, is utilized with the electrical connector of this invention when it is desired to insulate the contacts of said electrical connector from a metal plate **110** (FIGS. **1** and **2**). The adaptor **80** is comprised of a flat insulating member having an upper surface **82** and a lower surface **87**. A plurality of hubs are integrally molded with the lower surface **87** and are disposed in two parallel rows. A plurality of openings **81** are provided which extend from upper surface **82** of the flat insulating member through each hub **84**. Each opening **81** has an enlarged lower portion **86** (FIG. **2**) which defines a downwardly facing shoulder **85**. A plurality of terminal openings extending through upper surface **82** and lower surface **87** are positioned in each of two longitudinal rows along the flat insulating member. Terminal openings **83** are arranged in the first longitudinal row, and the terminal openings **88** are arranged in the second longitudinal row, said first longitudinal row being parallel to said second longitudinal row and transversely offset therefrom. The transverse distance between said rows is equal to the transverse spacing between openings **111** in metal plate **110**. Each opening **83** in the first longitudinal row is longitudinally offset from an adjacent terminal opening **88** in the second terminal row, and the longitudinal spacing between a terminal opening **83** and its closest adjacent terminal opening **88** is the same as the longitudinal spacing between corresponding openings **111** in metal plate **110**. The hubs **84** are spaced on centers which correspond to the spacing between openings **111** in metal plate **110**, and the spacing between the tail portions **63** of contacts **60**. The use of adapter **80** will be described infra.

The electrical connector of this invention is assembled by positioning the lid **20** on upper surface **44** of insulating housing **40** with projections **23** on the lower surface **22** of said lid **20** projecting into openings **41** in the insulating housing **40**.

The contacts 60 are then inserted into each contact opening 43 in the bottom of the insulating housing 40 until upwardly facing shoulders 71, 72 of the middle transition section 65 of each contact 60 engage with downwardly facing shoulders 48*d* and 49*d* of each respective opening 43. As can be seen in FIG. 4, the upwardly facing shoulder 71 is not completely engaged along its width by downwardly facing shoulder 49*d*. This same relationship exists between upwardly facing shoulder 72 on contact 60 and downwardly facing shoulder 48*d*. Also, the upwardly facing shoulders 71, 72 are not completely engaged in a transverse direction. The importance of the limited engagement between upper shoulder 71, 72 on the contact, and downwardly facing shoulders 48*d*, 49*d* of the insulator, will be discussed infra. End faces of middle transition section 64 are provided with upset portion 77, 78 for providing an interference fit with the second portion 48*b* of sidewall 48 and the second portion 49*b* of sidewall 49, respectively, of contact opening 43.

When it is desired to insulate each contact from its mounting board, e.g., when the connector is mounted on the conductive metal plate 110, adaptor 80 is inserted over the tail portions 63 of the contacts, with each contact's tail portion 63 extending through a respective contact opening 81 in said adapter. In assembled condition, the upwardly facing shoulders 73*a*, 74*a* on barbs 73, 74, respectively, seat against downwardly facing shoulder 85 to firmly retain the adapter 80 in assembled condition with the electrical connector. A portion of each opening 81 adjacent upper surface 82 of adapter 80 is chamfered to provide a lead-in portion for a respective tail portion 63 of each contact 60. The combination of the electrical connector and the adapter can be assembled with metal plate 110 by forcing hubs 84 through openings 111 in said metal plate to provide frictional retention between said hubs 84, and said openings 111.

When the specific circuit requires that certain contacts 60 be grounded to said metal plate, a terminal 90 and a bushing 100 are utilized. Prior to connecting the electrical connector and adapter to the metal plate 110, terminal 90, preferably made of phosphor bronze, is assembled with ground bushing 100, preferably made of aluminum, by inserting the square tail portion 94 of terminal 90 through the central circular opening in ground bushing 100 until the upper surface of the ground bushing comes in contact with, and seats against downwardly facing shoulders 92 and 93 formed at the junction between tail portion 94 and enlarged head portion 91 of terminal 90. The ground bushing is then crimped to firmly affix said bushing to the terminal 90, and the complete assembly is forced into an opening 111 in metal plate 110. The outer periphery of bushing 100 can be knurled to provide additional frictional retention between the surfaces defining opening 111 and the ground bushing 100. The particular opening 111 in which each assembly of terminal 90 and bushing 100 is inserted will depend upon which electrical contacts are to be grounded to the metal plate 110, since it is preferable to locate the terminal 90 as close as possible to the contact to be grounded to facilitate electrical interconnection by a wire-wrapped termination, or some other suitable termination. The terminal 90 is positioned in an opening 111 such that the enlarged head portion 91 of said terminal will be in direct alignment with and be received within a corresponding terminal opening 83, 88 in adaptor 80 upon the assembling of the electrical connector and adaptor 80 to the metal plate 110 (FIG. 2).

To replace a malfunctioning contact 60 in the electrical connector of this invention, all electrical connections to the tail portion of said malfunctioning contact are removed, the lid 20 is removed for insulating housing 40, and the malfunctioning contact 60 is removed through the upper surface 44 of said housing 40.

Removal of the contact in this manner broaches the downwardly facing shoulders 48*d*, 49*d* which define a portion of contact openings 43. The limited engagement between upwardly facing shoulders 71, 72 on contact 60, and downwardly facing shoulders 48*d*, 49*d*, prevents destruction of the insulating housing upon removal of the contact.

A replacement contact, preferably one having a middle transition section with a greater transverse dimension (measured from upset portion 77 to upset portion 78) than the original contact, is inserted into the contact opening through the upper surface 44 of insulating housing 30, and the lid is then repositioned on insulating housing 40 by inserting projections 23 of said lid into openings 41 in insulating housing 40. When the replacement contact has a middle transition section with a wider transverse dimension, a greater interference fit between the upset portions on the middle transition section of the contact, and the second portions 48*b* and 49*b* of sidewalls 48 and 49 respectively, is provided than by utilizing the original type contact as a replacement. This greater interference fit insures that the "push-out" resistance of the contact (force required to push the contact upwardly out of the insulating housing) will still meet operational requirements after the downwardly facing shoulders have been broached. The replacement contact will be inserted downwardly through opening 43 until downwardly facing shoulders 69 and 70 on contact 60 engage the chamfered walls defining the upper portion of contact opening 81.

If desired, the contact can be repositioned by pushing the contact upwardly until upwardly facing shoulders 73*a*, 74*a* on barb 73, 74 respectively, engage downwardly facing shoulder 85 defining a portion of opening 81. In this position, the downwardly facing shoulders 69 and 70 which are defined at the junction between middle transition 65 and lower transition section 66 will be even with lower surface 45 of insulating housing 40. The frictional fit between upset portions 77, 78 and the sidewalls 48, 49 will retain the contact firmly in either of the above positions. The shoulder retention between upwardly facing shoulders 73*a*, 74*a* on barbs 73, 74, and downwardly facing shoulder 85 defining a portion of opening 81, aids in insuring that the "push-out" resistance of the contact will meet operational requirements and in some instances, the presence of the barbs will eliminate the necessity for having a replacement contact with a middle transition section of wider transverse dimension than the original contact. After the replacement contact is positioned within insulating housing 40, the lid 20 is repositioned on upper surface 44 of said insulating housing, and the electrical connections to said replacement contact are reestablished.

It is within the scope of this invention to utilize a contact having a tail portion which is not provided with barbs. In this instance, the adapter 80 would be firmly attached to the electrical connector by virtue of an interference fit between the tail portion 63 of each contact, and a respective contact opening 81 in adapter 80.

It is also within the scope of this invention to utilize a contact which does not have upset portions associated with the middle transverse section. The necessary interference fit could also be provided by an interference engagement between flat surfaces on the middle transition section of each contact, and the sidewalls of each respective contact opening 43.

I claim:

1. A connector for mounting, on a pierced plate, an electrical component comprising an insulator body having a plurality of leads extending therefrom in a common direction, said connector comprising:

a. a unitary insulator housing having an upper surface, an opposed lower surface, and a plurality of contact openings extending therethrough from said upper surface to said lower surface,

b. a plurality of separate, conductive, elongated contacts positioned in said openings of said housing, each of said contacts having a nose section adjacent said upper surface of said housing, a tail section adjacent said lower surface of said housing, and a body section, said body section containing (1) means for frictionally retaining said contact in said housing and (2) a first pair of shoulders, wider than said tail section and facing said tail section, for precluding downward withdrawal of said contact when said housing is mounted with its bottom surface adjacent

a member having an opening, narrower than said shoulders, through which said tail section extends, said nose section of each contact having opposed yieldable arms for gripping a lead of said insulator body when said lead is inserted into one of said contact openings in said upper surface of said housing,

c. A flat lid mounted adjacent said upper surface of said housing, said lid containing a plurality of lead openings extending therethrough and positioned in alignment with said contact openings of said housing, said lead openings of said lid being smaller than said contact openings of said housing and the front of said nose section of said contact, thereby to preclude withdrawal of said contact from said housing when said lid is mounted on said housing, and to permit removal and replacement of a single contact after removal of said lid, even though said housing is mounted on said plate and the tail portions of the other contacts in said housing are wired in a circuit.

2. The connector of claim 1 wherein part of said nose section of each contact protrudes from said upper surface of said insulator housing, thereby to facilitate grasping of said nose section for withdrawal of said contact, and said lead openings of said lid have widened portions to accommodate the protruding portions of said nose sections.

3. The connector of claim 1 wherein said lid has a plurality of projections on the surface thereof adjacent said upper surface of said housing and said upper surface of said housing has a plurality of openings for receiving and frictionally engaging said projections of said lid to retain said lid on said housing.

4. The connector of claim 1 wherein the body section of each of said contacts also includes a second pair of shoulders facing the nose section of said contact and wherein each contact opening of said housing has a pair of shoulders facing said bottom surface of said housing for engaging said second pair of shoulders of said contact for preventing movement of said contact toward said upper surface of said housing, said second pair of shoulders of said contact only engaging part of said shoulders of said housing thereby to permit broaching of said housing shoulders upon removal of said contact through said upper surface of said housing

5. The connector of claim 4 wherein each of said contact openings in said insulator housing has a pair of grooves extending along respective opposed walls thereof from said upper surface to said lower surface, each of said grooves having a widened portion adjacent said bottom surface, the transition between said widened portion and the rest of each groove forming one of said pair of shoulders which face said bottom surface of said housing.

6. The connector of claim 1 further including an adapter comprising a flat insulating member having an upper surface and a lower surface, said lower surface having a plurality of hubs extending therefrom, each of said hubs being in alignment with a respective one of said contact openings in said housing and having an axial hole which extends through said adapter to said upper surface thereof, the upper surface of said adapter being positioned adjacent the lower surface of said housing such that the tail sections of said contacts extend through said axial holes in said adapter and engage said axial holes frictionally so as to retain said adapter to said housing, whereby said connector can be mounted on a pierced metal plate with said contacts insulated from said metal plate.

7. The connector of claim 6 further including a metal plate having a plurality of holes therein, said hubs on said adapter extending through said holes in said metal plate and frictionally engaging said holes so as to retain said adapter to said plate.

8. The connector of claim 7 wherein said adapter has a plurality of openings therein to accommodate the heads of ground terminals mounted on said metal plate.

9. The connector of claim 6 wherein the tail section of each of said contacts has a pair of opposed barbs thereon and each of said axial holes in said adapter has, adjacent the bottom surface of each of said hubs, a widened portion forming downwardly facing shoulders onto which the barbs of each contact can lock.

10. The connector of claim 1 wherein said opposed yieldable arms of said nose section of said contact extend from said body section in a direction normal to the direction of elongation of said contact, such that, in each contact, said nose section is offset from said body section.

* * * * *