METHOD AND APPARATUS FOR CONNECTOR ORIENTATION

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This invention relates in general to electrical connectors. It deals more particularly with apparatus and a method for polarizing or indexing blocks of terminal connectors with respect to mating connectors in a terminal board.

In missile control panels or electronic computers, for example, it has become the practice, due to recent development in the field, for huge terminal boards or banks of smaller boards to be provided for the base for thousands and thousands of terminal connectors in corresponding circuits. Groups or blocks of terminal connectors form these connections. Ordinarily female type terminals are set in groups in the board and separate unitary blocks of male terminals must mate with specific groups of the former to establish correct and proper circuit connections. Herein lies a problem and danger. Twenty to a hundred or more terminals might be congegated in one group or block, a hundred or more groups or blocks in one board. Yet, the correct connection of each block to a proper group in the board must be made quickly and errorlessly time after time as circuits are completed and broken in a missile firing submarine, for example. Herefore, correctly mating corresponding groups and blocks of connectors has been a time consuming and tedious task.

An object of this invention is to provide a connector assembly which insures proper connection of a block of terminal connectors with a block of mating terminal connectors.

Another object is to provide a connector assembly which prevents connection of a block of terminal connectors with the wrong block of mating terminal connectors in a bank of blocks of mating terminal connectors.

Yet another object is to provide a connector assembly including apparatus for mechanically protecting the terminal connectors from damage when the terminal blocks are disconnected.

Another object is to provide a connector assembly including apparatus for protecting the terminal connectors from electrical contact or short circuit when the terminal blocks are disconnected.

Another object is to provide a connector assembly which electrically shields the terminal connections from surrounding connections and equipment in a complicated electrical system.

Yet another object is to provide a connector assembly construction which facilitates the use of a maximum number of indexing variations.

A further object is to provide a connector assembly facilitating on-the-job programming of any indexing variation desired.

Still another object is to provide a method for insuring proper connection of a block of terminal connectors with a block of mating terminal connectors.

A further object is to provide a method for insuring correct placement and proper connection of a block of terminal connectors in a bank of blocks of mating terminal connectors.

The above and other objects are realized in accordance with the present invention by providing a method and apparatus, including several embodiments, for quickly and accurately positioning and properly connecting blocks of terminal connectors in pre-selected position in a bank of blocks of mating terminal connectors set in a terminal board. While specifically arranged male and female connectors are hereinafter referred to, it will be understood that many other types or arrangements of mating connectors may be used in accordance with the teachings of the invention.

Briefly, the invention contemplates characteristically indexing each set or block of male connectors with the corresponding female terminal connectors in the terminal board. One embodiment of the invention envisages the use of separate and individual indices surrounding each block of female terminal connectors and set in the terminal board. This construction facilitates seeing and removing individual indices and readily adapts itself to on-the-job programming.

Another embodiment of the invention contemplates the use of unitary indexing apparatus including separate indices forming a part of the unitary apparatus and protecting therefrom. In this embodiment, the indexing structure is associated as an element with each block of female terminal connectors. Such a construction also readily adapts itself to on-the-job programming.

Still another embodiment of the invention utilizes indexing structure forming a part of each block of female terminal connectors.

Each block of male terminal connectors is provided with indexing structure which is complementary to the indexing structure associated with a block of female terminal connectors it is intended to be seated in. This prevents inadvertent connection of unmatched blocks of male and female terminal connectors. The indexing structure associated with each block of male terminal connectors, regardless of the indexing structure utilized with complementary blocks of female terminal connectors, is substantially uniform. It provides electrical and mechanical protection for the male terminal blades when corresponding blocks of male and female terminal connectors are unconnected and additionally provides electrical shielding for the electrical connection itself.

The invention, both as to its organization and method of operation, taken with the other objects and advantages thereof, will be best understood by reference to the following description taken in connection with the accompanying drawings, wherein the several embodiments are illustrated.

FIGURE 1 is a perspective view of a portion of a terminal board showing blocks of male and female terminal connectors and associated indexing structure forming one embodiment of the invention, certain details of the board's construction having been omitted for purposes of clarity.

FIGURE 2 is a plan view of a portion of the terminal board illustrated in FIGURE 1 showing blocks of male and female terminal connectors and associated indexing structure;

FIGURE 3 is a view taken along line 3—3 of FIGURE 2 showing mating blocks of male and female terminal connectors and associated indexing structure;

FIGURE 4 is an exploded end view of the blocks of unmated terminal connectors and associated indexing structure illustrated in FIGURE 3;

FIGURE 5 is a sectional view through a portion of a terminal board showing a printed circuit board and associated indexing structure;

FIGURE 6 is a view taken along line 6—6 of FIGURE 5;

FIGURE 7 is a perspective view of a portion of a terminal board showing a block of female terminal connectors and associated indexing structure forming the basis for another embodiment of the invention;

FIGURE 8 is a view taken along line 8—8 of FIGURE 7;
FIGURE 9 is a perspective view of a portion of a terminal board showing a block of female terminal connectors and associated indexing structure forming the basis for yet another embodiment of the invention, and FIGURE 10 is a view taken along line 10—10 of FIGURE 9.

Referring to the drawings, a first embodiment of this invention is illustrated in FIGURES 1–6. Referring to FIGURE 1 particularly, a terminal board is shown generally at 10. The board illustrated is formed of aluminum sheet stock and has a plurality of holes 11 extending through it at generally regularly spaced intervals. Although an aluminum board is described, its use is merely a matter of choice and a wide variety of materials might be advantageously utilized.

Only a few of the holes 11 are shown in FIGURE 1, the remainder having been omitted in the interest of clarity. The board would normally be apertured across its entire surface or in the alternative large banks of holes might be separated by unapertured sections of the board. Blocks 12 of female terminal connectors 13 are mounted in groups of adjoining holes in predetermined relationship on the board. In practice, each block 12 of terminal connectors 13 is adapted to receive a specific block 14 of male terminal connectors.

For example, each set of mating terminal blocks 12 and 14 might be a terminal connection between elements of an electrical circuit or combination of circuits. It will be easily seen that inadvertent connection of a block of male terminal connectors forming a composite terminal for one circuit or combination of circuits with the wrong block of female terminal connectors might wreak havoc with complicated electrical equipment. In line with this, misalignment and consequently offset connection of what actually are mating blocks of terminal connectors is also highly undesirable and would be hazardous to the function of a circuit or combination of circuits. This invention insures the mating of correct blocks of terminal connectors and in conjunction with this prevents misconnection between blocks forming a normally mated pair of male and female terminal connectors.

Returning to the embodiment of this invention illustrated in FIGURES 1–6, and specifically to FIGURES 2 and 4, each female terminal connector 13 in a block includes a sleeve or bushing 20 seated in a hole 11 in the terminal board 10. A female terminal pin 21 extends through each bushing 20 and has a wire wrap shank 23 at one end thereof. As disclosed in U.S. Patent No. 2,995,617, entitled “Self-Locking Terminal,” issued August 8, 1961, in which I am the co-inventor, a self-locking or expansion fit is formed between the bushings 20 and the holes 11 through the cooperation of the locking shanks (not shown) forming part of the terminal pins 21 within each bushing 20. A male blade receiving fork forms the other end of each terminal pin 21 within the bushings 20. It will also be seen that the bushings 20 are generally square or rectangular in cross-section, establishing an orientating fit between the bushings themselves. The specific construction of the terminal connectors including the self-locking fit between the terminal board 10 and the connectors 13 forms no part of this invention, however, and a detailed description thereof is not thought to be necessary.

As shown in FIGURES 1 and 2, a total of three index bushings 25 are seated in the rows R of holes immediately bracketing each block 12 of female terminal connectors 13 in the terminal board 10. The index bushings 25 are solid, no bore being provided in them since they are not adapted to receive terminal pins 21 in the manner of the terminal connector bushings 20. Referring now to FIGURES 3 and 4, it will be seen that index bushings 25 are larger than the adjoining terminal connector bushings 20. Consequently, they extend a predetermined distance above the tops of the bushings 20. This extends the index bushings into a position of prominence and insures their being visible. This extending male terminal connector block 14 before any electrical connection is made. In addition, the index bushings 25 are sufficiently large in diameter to seat solidly in a force fit in the corresponding holes 11 in the terminal board 10.

The positioning or programming of each group of three index bushings 25 around each block of female terminal connectors is distinct. Accordingly, an arrangement of index bushings 25 characteristic to each different block of female terminal connectors in the terminal board is established. Since a total of ten holes is available, as seen in FIGURE 2, in each row R of indexes bracketing a block 12 of female terminal connectors 13, it will be obvious that a large number of variations in the relative positioning of each group of three index bushings 25 is available. It is not intended, however, that the use of ten holes be restrictive. More or less would be available, depending on the size of the block 12 of female terminal connectors.

Two bushings are shown on one side of each block 12 and one on the other side. This combination has been found most suitable for large terminal boards in which a great number of blocks 12 of terminal connectors 13 are mounted for connection to corresponding blocks of male terminal connectors to complete various circuits. It will readily be seen that the use of three index bushings in the manner described above eliminates the possibility of connecting a block of male terminal connectors in inverted relation to the wrong block of female terminal connectors, as might be the case if only two bushings were used, for example. However, under certain conditions it is contemplated that more or less than the three index bushings described might be satisfactory. In addition, though the indexing structure illustrated herein includes index bushings 25, it is conceivable that various types of pins might be utilized with identical results. For example metal dowels might be used.

Although the indexing structure associated with the blocks 14 of male terminal connectors 15 remains the same, regardless of which indexing structure associated with the female terminal connectors is used, the actual construction of different blocks of male terminals might vary depending upon the use contemplated. One construction of primary importance is the male terminal block seen in FIGURE 3. Such a block might include an inverted U-shaped plate 30. Downward extending skirts 31 and 32 form the legs of the plate while a base 34 connects the legs. The base 34 of each U-shaped plate 30 has a generally rectangular cut-out 35 therein. A terminal plate 36 is seated between the legs 31 and 32 of the U-shaped plate 30 and secured to the base 34 at the opposite ends of the plate by conventional methods, such as screws 37 and nuts 33. A plurality of holes (not shown), similar to the holes formed in the terminal board 10, in which the male terminal connectors 15 are seated, are formed in the terminal plate 36.

The male terminal connectors 15 in a wire wrap terminal block might include bushings 41 seated in corresponding holes (not shown) in the terminal plate 36. This is best illustrated in FIGURE 4 where four rows of bushings 41 having generally rectangular heads are seated in intimate relationship. Terminal pins 42 extend through the bushings 41 and might establish a self-locking fit between the bushings and corresponding holes (not shown) in the plate 36 in the manner disclosed in the aforementioned patent. The details of the fit between the terminal pins 42, the bushings 41 and the terminal plate 36 form no part of this invention and a complete description is not thought to be necessary. Each terminal pin 42 includes a wire wrap shank 43 normally extending upwardly from the plate 36 and male blades 44 which protrude downwardly from the bushings.
within the confines of the skirts 31 and 32 of the U-shaped plate 30. As is best illustrated in FIGURE 4, also, the skirts 31 and 32 extend below the ends of the male blades 44. Consequently, regardless of how the block 14 of male terminal connectors 15 is handled, the male blades 44 cannot come into contact with any substantially flat surface. This is important in that the positioning and spacing of the blades 44 is a matter of some criticality and any allowable deviation suffered by the blades can easily throw them out of alignment and consequently prevent their seating in the proper female terminal connectors 13 in a corresponding block 12 thereof. In line with this, the downwardly extending skirts 31 and 32 prevent short circuiting of the blades 44 due to inadvertent contact of the blades with conducting surfaces when mating blocks of male and female terminal connectors are disconnected. The skirts are additionally important in that they provide electrical shielding for the connections established by the various mating pairs of male and female terminal connector blocks 14 and 12, respectively. Consequently, electrical interference between adjoining circuits is substantially reduced.

FIGURE 3 best illustrates the notches 50 cut in the skirts 31 and 32 of the U-shaped plates 30 and forming complementary indexing structure or indicia receiving means. The notches 50 might be cut in the skirts 31 and 32 during manufacturing with a punch and die, for example. On the other hand, a portable hand cutting tool might as easily be utilized. The notches 50 are cut in such positions in the skirts 31 and 32 that they align with and are adapted to receive the characteristically placed index bushings 25 surrounding the block 12 of female terminal connectors upon which the block of male terminal connectors in question is intended to be seated. FIGURE 2 illustrates different positioning or programming of the index bushings 25 around various blocks 12 of female terminal connectors 13 and it will be readily understood that the notches 50 in the skirts 31 and 32 would be cut to align with these index bushings.

The apparatus comprising the indexing or polarization assemblies and forming the basis for this embodiment of the invention is of such nature that index bushings 25 can be characteristically placed or replaced in a terminal board while the board is in installed relationship in a computer control panel, for example. In keeping with this, the skirts 31 and 32 are readily cut and programmed with a portable hand tool for complementary seating over appropriately placed index bushings 25 surrounding female terminal connectors 13. This in effect provides on-the-job programming capabilities and facilitates the change or modification of connections in various circuits with speed and dispatch.

Although the male terminal connector block 14 has been described above as a block of wire wrap connectors 15, a male terminal connector block embodying the features of this invention might take other forms. For example, this invention might be embodied in a printed circuit assembly, as illustrated in FIGURES 5 and 6. In such case, the terminal block might include a wire circuit board 60 carrying a conventional printed circuit (not shown). The printed circuit board 60 is preferably mounted on a shell 61 which in turn carries a terminal board 62 secured to its base in any well known manner. A male terminal connector arrangement, seen generally at 64, is appropriately mounted in the terminal board 62. In general, the arrangement 64 is connected to the printed circuit boards 60 and adapted to be connected to the female terminal 13 of the female connector block 12.

More specifically, the male terminal connector arrangement 64 includes two or more rows of terminal connectors 70. Each terminal connector 70 comprises a bushing 71 seated in an appropriately formed aperture in the terminal board 62, an upwardly extending angulated shank 72 connected by soldering, for example, to the aforementioned appropriate circuits in the printed circuit board 60, and a depending male blade 65. A self-locking fit might be established between the terminal connectors 70 and the terminal board 62 in the manner disclosed in the aforementioned patent. In any event, the specific details of construction of the printed circuit assembly is not to be considered to be implied as forming an immediately circuit assembly form not a part of this invention. Consequently they have been described in broad terms only.

Brackets the male blades 65 so as to partially enclose them in an inverted U-shaped member 75, seen best in FIGURE 6. The U-shaped member 75 might be secured to the terminal board 62 by appropriately placed bolt and lock nuts of small dimension (not shown). This type of mounting is merely exemplary of various methods which might be utilized for securing the member 75 to the terminal board 62, however.

The U-shaped member 75 might be formed of aluminum, for example, although it might on the other hand be formed of other metals or even non-metallic materials. It includes depending skirts 76 which are adapted to extend below the lowest portion of the male blades 65, in the manner described hereinbefore in detail in relation to the wire wrap male terminal connector block 14. As with the aforesaid wire wrap terminal connector blocks 14, electrical and mechanical protection of the male blades 65 is afforded by the depending skirts.

The depending skirts 76 of the inverted U-shaped member 75 are notched as at 80, best seen in FIGURE 5. These notches 80 provide complementary indexing structure or indicia receiving means for the index bushings 25 seated in the terminal board 10 in bracketing relationship with a female terminal connector block 12 seated in the terminal board 10. As has previously been pointed out in detail, these bushings 25 are seated in holes in the terminal board 10 forming the two rows R immediately adjacent the terminal block 12. Preferably there are two such bushings 25 on one side of each block 12 of female terminals 12 and one bushing 25 on the opposite side.

This arrangement provides innumerable indexing combinations as has also been clearly pointed out in the foregoing discussion of the indexing structure embodying the features of this invention. In seated relationship, as seen in FIGURE 6, the depending skirts 76 electrically shield each block of terminal connectors and, as has previously been made clear, this guards against electrical disturbances from neighboring male connector blocks in the terminal board.

A second embodiment of the invention is illustrated in FIGURES 7 and 8, where a terminal board is indicated generally at 110. In this embodiment, the indexing structure associated with the female terminal connector blocks forms an integral part of certain of the connectors themselves. The complementary indexing structure associated with each male terminal connector block might be identical to that described in relation to the first embodiment of this invention, however. In effect, the latter structure is uniformly adaptable to incorporation in indexing assemblies forming the basis for all embodiments of the invention.

Referring specifically to FIGURE 7, a plurality of generally regularly spaced holes 111 extend through the terminal board 110. Again, only a few of the holes are shown, the remainder having been omitted in the interest of clarity. In predetermined relationship on the board, blocks 112 of female terminal connectors 113 are mounted in groups of adjoining holes 111. Each female terminal connector 113 includes a bushing 120 provided in the terminal board 110. A female terminal pin 121 extends through each bushing 120 and has a wire wrap shank 122 at one end thereof. As disclosed in the aforementioned patent, a self-locking or expansion fit is formed between the bushings 120 and the holes 111 through the cooperation of the locking shanks (not shown) forming a part of each terminal pin 121 within each bushing 120.
A male blade receiving fork forms the other end of each terminal pin 121 within each bushing 120. The specific construction of the female terminal connectors 113, including the self-locking fit, forms no part of this invention, however, and a detailed description thereof is not thought to be necessary.

As seen in both FIGURE 7 and FIGURE 8, certain of the bushings 120, which might be identified generally as 120a, have integrally molded index ears 125 extending from their sides. These bushings 120a are identical in all other respects to bushings 120 and are machine set in a terminal board along with the bushings 120 to provide indexing structure complementary with the notched skirts of a mating block 14 of male terminal connectors 15. This embodiment has the advantage of utilizing a minimum amount of terminal board space, since the molded index ears 125 need extend only a short distance outwardly from the block 112 of bushings 120 and 120a.

A third embodiment of the invention is illustrated in FIGURES 9 and 10, where a terminal board is indicated generally at 210. In this embodiment, the indexing structure associated with each female terminal connector block is unitary in form. As in each of the aforesaid embodiments, however, the indexing structure associated with each female terminal block remains unchanged. As has been previously pointed out, in effect the same male terminal connector block construction is adaptable for use with this or any embodiment of the invention.

Referring specifically to FIGURE 9, a plurality of generally regularly spaced holes 211 extend through the terminal board 210. As in the foregoing description of the first two embodiments of this invention, only a few of the holes are shown, the remainder having been omitted in the interest of clarity. In predetermined relationship on the board, blocks 212 of female terminal connectors 213 are mounted in groups of adjoining holes 211. Each female terminal connector 213 includes a bushing 220 seated in a hole 211 in the terminal board 210. A female terminal pin 231 extends through each bushing 220 and has a wire wrap shank 232 at one end thereof. A male blade receiving fork and locking shank might be formed on the other end of female terminal pin 231 within the bushing 220, in the manner elicited in the description of the foregoing embodiments of this invention. In such case, a locking fit might be formed between the bushings 220 and the holes 211 by the action of the locking shanks (not shown) of the terminal pins 221.

As seen in both FIGURE 9 and FIGURE 10, an indexing plate 225 is seated on top of each block 212 of female terminal connectors 213. Each plate 225 has a plurality of indexing tabs 225a extending outwardly therefrom in preselected locations. As seen in FIGURE 10, the plate 225 might be held securely to the top of each block 212 of female terminal connectors 213 by bayonets 236 extending into interstices 237 formed between the adjoining corners of bushings 229. Slots 228 in the surface of the plates 225 align the jaws of male blade receiving forks (not shown) within the bushings 220 to insure correct alignment of male blades with the jaws.

The indexing plates 225 provide indexing structure complementary with the notched skirts of mating blocks 14 of male terminal connectors 15. In this respect, of course, the indexing structure is identical to that of the aforesaid embodiments of this invention. The tabs 225a of the indexing plate 225 can readily be cut by hand tool to facilitate on-the-job programming. In addition, the slots 228 in each indexing plate 225 limit access to the corresponding female terminals to male terminal blades which are correctly aligned with the forks (not shown) within each bushing 230. This embodiment also has the advantage of requiring a minimum amount of terminal board space, since the indexing tabs 225a need extend only a short distance outwardly from the blocks 212 of bushings 220.

In each embodiment of this invention described above, electrical and mechanical protection of the male terminal blades is afforded by the depending skirts in which notches, for example, are cut. In addition, as has been pointed out, electrical shielding of each connection in the terminal board is provided by the depending skirts.

The polarization or indexing assemblies embodying this invention provide an efficient means of insuring correct location and proper connection of a block of male terminal connectors in a bank of blocks of female terminal connectors. Innumerable combinations of the complementary indexing structures are readily available to anyone setting up connections in a large terminal board. It has been shown that the number of combinations in positioning of the indexing structure around the blocks of male and female terminal connectors is virtually countless. There is no need of having preformed index receiving means or notches in the depending skirts of the connector blocks since they can readily be notched on-the-job to coincide with the characteristic positioning of index bushings 25, ears 125, or tabs 225a. The adaptability of the system is such that its desirability is obvious.

In conjunction with providing a portion of the actual indexing structure, the skirts 31 and 32 or 75, for example, protect male blades of the male terminal connectors from shorting their associated circuits or becoming fouled out of alignment by blows which might befall them during everyday handling. The shielding provided by the skirts isolates each connection electrically from those about it and consequently tends to eliminate electrical interference between the various circuits having connections in a large terminal board.

Although three embodiments of the invention have been described herein, it is understood that others might fall within its purview and that various modifications and improvements might be made therein. It is intended to cover in the appended claims all such embodiments, modifications and improvements as fall within the true spirit and scope of the invention.

What is desired to be claimed and secured by Letters Patent of the United States is:

1. In a polarization assembly for terminal blocks on a terminal board, the combination of a terminal board having a plurality of spaced holes extending therethrough, bushings seated in a group of said holes, female terminal pins mounted in said bushings, a terminal block for mounting on said terminal board, said terminal block including a plurality of male terminal connectors for connecting with corresponding female terminal pins in said group, said block further including a skirt shielding said male terminal connectors, a plurality of extra bushings seated in preselected holes adjacent said group of holes, said skirt being characteristically notched to coincide with the placement of said extra bushings and forming complementary index means for mating with said extra bushings to insure proper placement and connection of said block on said board.

2. In a polarization assembly for terminal blocks on a terminal board, the combination of a terminal board having a plurality of spaced holes extending therethrough, bushings seated in a group of said holes, female terminal pins mounted in said bushings, a terminal block for mounting on said terminal board, said terminal block including a plurality of male terminal connectors for connecting with corresponding female terminal pins in said group, said block further including a skirt shielding said male terminal connectors, a plurality of said bushings having ears forming a part thereof and extending outwardly from said group of bushings, said skirt being characteristically notched to coincide with the placement of said ears and forming complementary index means on said block for mating with said ears to insure proper placement and connection of said block on said board.

3. In a polarization assembly for terminal blocks on a terminal board, the combination of a terminal board hav-
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In a polarization assembly for terminal blocks on a terminal board, the combination of a terminal board having a plurality of spaced holes extending therethrough, bushings seated in a group of said holes, terminal pins mounted in said bushings, a terminal block for mounting on said terminal board, said terminal block including a plurality of terminal connectors for connecting with corresponding terminal pins in said group, said block further including a skirt shielding said terminal connectors, a plurality of members seated in predetermined holes adjacent said group of holes, said skirt being characteristically notched to coincide with the placement of said members and forming complementary index means for mating with said members to assure proper placement and connection of said block on said board.

8. In a polarization assembly for terminal blocks on a terminal board, the combination of a terminal board having a plurality of spaced holes extending therethrough, bushings seated in a group of said holes, terminal pins mounted in said bushings, a terminal block for mounting on said terminal board, said terminal block including a plurality of terminal connectors for connecting with corresponding terminal pins in said group, said block further including a skirt shielding said terminal connectors, a plurality of members seated in predetermined holes adjacent said group of holes, said skirt being characteristically notched to coincide with the placement of said members and forming complementary index means for mating with said members to assure proper placement and connection of said block on said board.

9. In a polarization assembly for terminal blocks on a terminal board, the combination of a terminal board having a plurality of spaced holes extending therethrough, bushings seated in a group of said holes, terminal pins mounted in said bushings, a terminal block for mounting on said terminal board, said terminal block including a plurality of terminal connectors for connecting with corresponding terminal pins in said group, said block further including a skirt depending on opposite sides of said terminal connectors, a plurality of members seated in preselected holes adjacent said group of holes, said skirt being characteristically notched to coincide with the placement of said members and forming complementary index means for mating with said members to assure proper placement and connection of said block on said board.

10. In a polarization assembly for terminal blocks on a terminal board, the combination of a terminal board having a plurality of spaced holes extending therethrough, terminal connectors including bushings mounted in a group of said holes, a terminal block for mounting on said terminal board, said block including a plurality of terminal connectors for connecting with corresponding terminal pins in said group, said block further including a skirt depending on opposite sides of said terminal connectors, a plurality of members seated in preselected holes adjacent said group of holes, means on said block being characteristically notched to coincide with the placement of said members and forming complementary index means for mating with said members to assure proper placement and connection of said block on said board.

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