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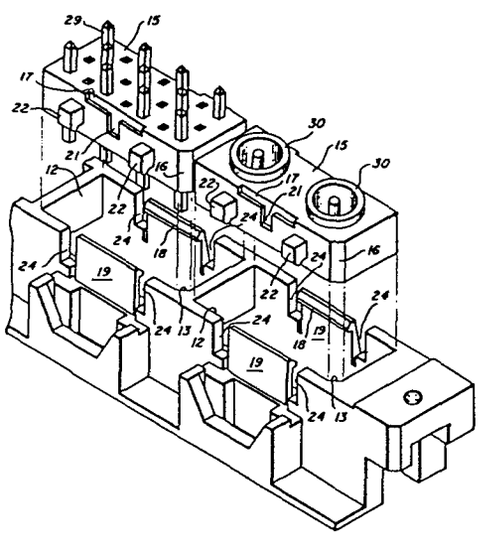
(54) Modular electrical connector.

(57) A modular connector which provides input and output connections between various contacts configurations comprises an elongated frame (11) having a plurality of identically sized rectangular cavities (12) formed therein, each of which receives a connector module (15). The modules are interchangeable in the cavities, and electrical contacts are mounted in each of the modules. All of the contacts mounted on a single module are the same, but the contacts mounted in some of the modules differ from the contacts mounted in others. Module selection is made at the time of connector installation and depends on the particular mix of contacts which is required.



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MODULAR ELECTRICAL CONNECTOR

Electrical connectors are manufactured in almost every size and form imaginable. Such connectors are used to couple power, signal, high-voltage, or high-current, between two wires, a wire and a printed circuit board, a printed circuit board and coaxial cable, or two printed circuit boards. Due to the increasing complexity of interconnect systems, various combinations of connectors are often required on a single rack of electronic equipment. The connectors used in such applications are dedicated to a specific purpose such as connecting two printed circuit boards together or connecting two power leads together or two signal cables or the like. While connectors exist for performing such functions, certain applications do not always require connectors which have 100 or more individual contacts all of the same contact type. Connectors may be designed to have a mix of signal carrying contacts, high power contacts, high voltage contacts, coaxial contacts, and fiber optic contacts, but it is often impossible to determine the exact ratio of contact styles which will be needed in a connector. Additionally, the low cost of a connector is only achieved when it is manufactured in high-production runs involving millions of identical units. Connectors having unusual or varied combinations of contact styles have limited application and necessarily preclude such high production runs. There is, therefore, a need in the art for a connector which can be customized at the time of installation to present an array of contact types which will be suitable for a particular application, and which will be intermatable with standard connector types.

According to the invention, a modular connector comprises a frame having a fixed size and a fixed number of cavities into which modules may be coupled. The modules are all of the same size but have mounted thereon different types of electrical contacts, and a selection is made according to the requirements of the individual system on which the connector will be used.

It is therefore an object of the invention to provide a modular connector having provision for receiving a plurality of differing contact modules.

It is another object of the invention to provide a modular connector having provision for receiving contact modules, each of which supports contacts which are different from the contacts in the other modules.

It is another object of the invention to provide a modular connector utilizing premolded modules which may be produced in high production runs in order to achieve low unit cost.

These and other objects of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawing figures in which like reference numerals designate like corresponding parts throughout the figures.

Figure 1 is a bottom view of a modular connector according to the invention.

Figure 2 is a partial view exploded and in perspective of a modular connector according to the invention.

Figure 3 is a sectional view taken along line 3-3 of Figure 1.

Figure 4 is a partial perspective view of the top of the connector of Figure 1.

Referring now to drawing Figures 1 and 2, there is shown a modular connector generally designated by the reference numeral 10. The connector comprises an elongated rectangular frame 11 having a plurality of identical rectangular cavities 12 formed therein. Each of the rectangular cavities 12 includes one beveled corner 13 which acts as a polarity key as more fully described below.

Each of the cavities 12 is dimensioned to receive a module 15. The module 15 comprises a body formed of insulating material such as plastic in which one or more electrical contacts may be mounted. The module 15 has a rectangular shape except for one corner 16 which is beveled to be compatible with the beveled corner 13 of each of the cavities 12 and to provide a visible indication of the polarity of the module. Additional polarity keying is provided by the integral plastic legs which project from the body of the module 15. The legs 22 on one side of each of the modules are separated by a distance which is greater than the distance separating the legs 23 on the other side of the modules. The mounting slots 24 are spaced apart to receive the legs 22 and 23, and the legs 22 and 23 are dimensioned so that conventional hoods (not shown) can be used with the connector.

Each module includes a recess 17 which may be formed on either side thereof and which receives a locking rib 18 when the module 15 is positioned in the cavity 12. The locking rib 18 is formed on the end of a cantilever portion 19 which forces the rib into the recess 17 to lock the module in place. An access slot

21 is formed adjacent the recess 17 to allow insertion of a tool to pry the locking rib out of the recess 17 against the bias of the cantilever portion 19 allowing removal of the module 15 when desired.

As shown, different types of electrical contacts may be mounted on each of the modules 15. The types of contacts which are normally used are solder pins 27, high-power plugs 28, wire-wrap pins 29, and coaxial connectors 30. It will be understood by those skilled in the art that other forms of electrical or fiber optic contacts may be used in the modules as may be required for a particular installation. The various modules may be produced in quantity before knowing the requirements of specific connector installations. At the time of installation, the modules 15 are interchangable in the cavities 12 and may be moved to different locations or eliminated entirely. Each of the modules 15 are dimensioned so as to be intermatable with existing forms of standard connectors.

Turning now to Figure 3, it will be seen that the locking rib 18 is formed on the end of a cantilever portion 19 which forces the rib into the recess 17 when the module is pressed into place. A top corner of the rib 18 includes a chamfer 20 to facilitate the insertion of the module into the cavity 12, and the entry of the tines 32 of a removal tool.

Turning now to Figure 4, it will be seen that the underside of the frame 11 includes an elongated recess 33 into which a mating connector half may be plugged. The recess 33 includes a standard polarizing feature comprising a stepped width end wall 34 which allows a mating connector half to be inserted into the recess 33 in only one orientation. The connector frame includes a mounting ear 36 by which the connector may

be fastened to a printed circuit board or a wiring frame.

Having thus described the invention, various alterations thereof will appear to those skilled in the art, which alterations are intended to be within the scope of the appended claims.

C L A I M S

1. A connector for providing input and output connections between various types of contacts wherein the connector comprises an elongted frame and mounting ears on the frame for mounting the connector to a base, characterized in that the elongated frame (11) has a plurality of identically sized cavities (12) formed therein, and the various types of electrical contacts are mounted in identically sized modules (15) which are received by the cavities, and the modules (15) are interchangable in the cavities (12).

2. The connector of claim 1 further characterized in that each cavity includes a polarity key (13) and each module includes a compatable keying means (16) for mating with the polarity key (13) of the cavity.

3. The connector of claim 2 further characterized in that each cavity includes a locking rib (18) for securing the module in the cavity and each module has a recess (17) for receiving the locking rib (18).

4. The connector of claim 3 further characterized in that each module includes an access slot (21) formed adjacent the recess (17) whereby the tines (32) of a tool may be inserted into the access slot (21) to pry the locking rib (18) out of the recess to release the module (15) from the cavity (12).

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LITTON PRECISION PRODUCTS
WI-132

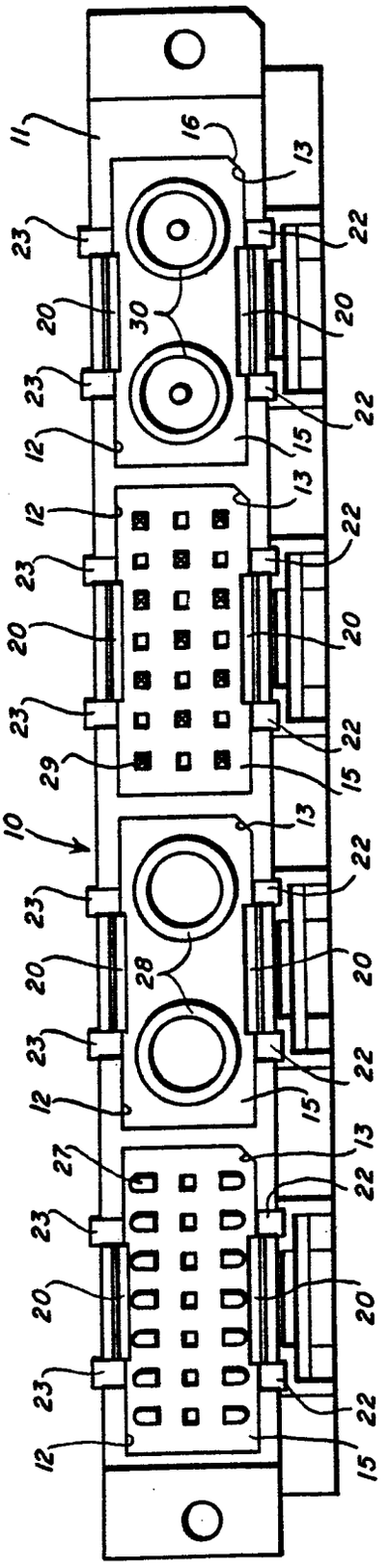

Fig_1

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LITTON PRECISION PRODUCTS
WT-132

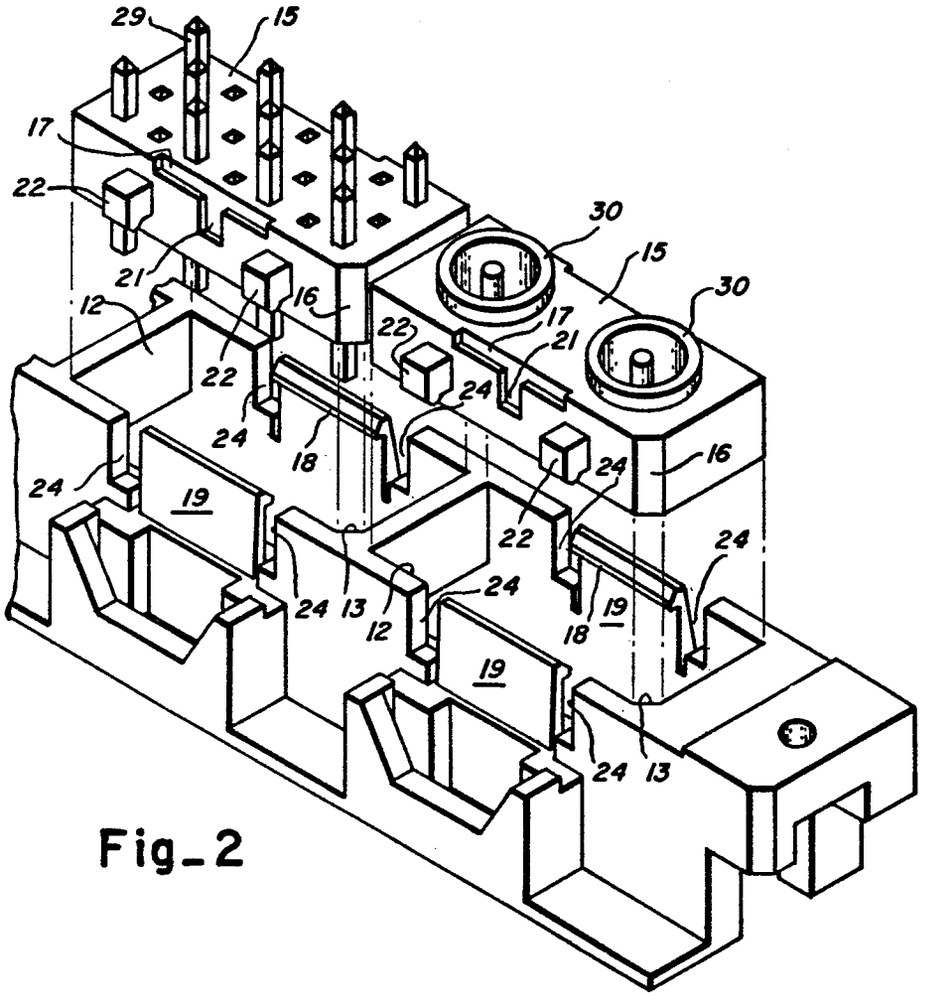

Fig_2

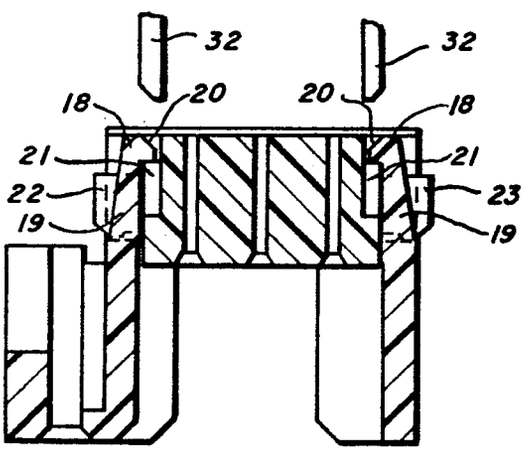

Fig_3

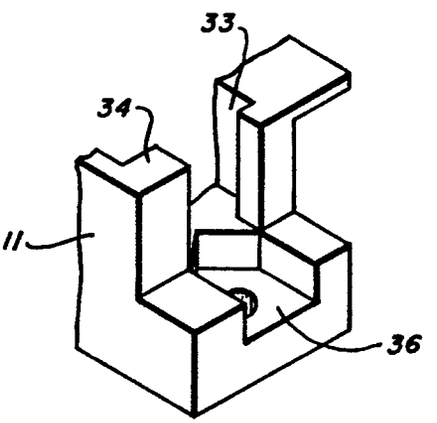

Fig_4

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EUROPEAN SEARCH REPORT

0152743
Application number

EP 85 10 0178

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US-A-4 090 764 (MALSBY et al.) * Figures 1,2,4,9-13; column 1, lines 29-55; column 5, line 22 - column 7, line 17 *	1-4	H 01 R 13/514
X	DE-A-2 806 437 (EDER) * Figures 5-10; page 4, line 4 - page 5, line 8; page 9, line 1 - page 10, line 11 *	1,3	
A	US-A-4 158 473 (SHEARER) * Figures 1-4; column 2, line 35 - column 3, line 66 *	1,3	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

H 01 R 13/514
H 01 R 13/516
H 01 R 13/645

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	23-04-1985	HAHN G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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