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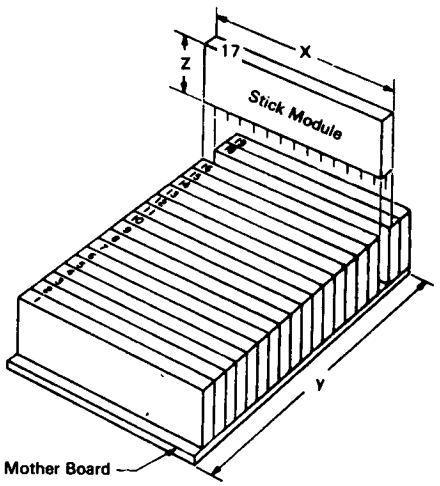
Flat Pack Interconnection Structure Simplifies Modular Electronic Assemblies



A modular system usually consists of a group of modules, each having an internal interconnection pattern and a mother board (or a back panel) which interconnects all of the modules. Both the mother board and the modules have their respective interconnecting networks employing at least two of the three axes of dimension, (the x, y, and z axes). As an example: Cordwood modules require all three axes (3-D) for interconnection. The multilayer board which interconnects the cordwood modules is also a three dimensional interconnection pattern. Each of these levels, the module and its carrier, require all three dimensions for interconnection. The need for using any of the three axes on more than one level was questioned. It was reasoned, that if the three axes could be distributed between the module and its carrier, without duplication, then a single axis mother board could result. If this were achieved, then the mother board would not require more than one level or layer for interconnections, since being single axis, it would have no crossovers. This, of course, would make a multilayer mother board interconnect unnecessary.

The "stick" module was evolved as a method of achieving a single axis mother board. The figure shows the distribution of the "x", "y", and "z" wiring planes as applied to the stick concept. The stick module has one of its dimensions, the length dimension, equal to the width dimension of the mother board. Because of this geometric relationship, the stick can act as the carrier of all "x" axis wires for itself and for the mother board. The stick also carries all of the "z" wires of the assembly, since it alone projects into that dimension. Since any individual stick does no

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interconnecting in the "y" plane, all of the "y" wires and only the "y" wires remain in the mother board.

As a general rule, it is better to have a high level of interconnection complexity in a low level of assembly. By having the "x" and "z" wiring planes located exclusively in the stick module, which is the lower level of assembly, the above objective has been accomplished.

Since only the "y" plane wiring is located on the mother board, the interconnect geometry will consist of a series of parallel conductors, segmented as needed, and extending the full length of the mother board (in the "y" direction). These conductors can be insulated wire, printed circuit, nickel ribbon, or a special ribbon ladder.

Note:

Inquiries concerning this innovation may be directed to:

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Patent status:

No patent action is contemplated by NASA.

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(JPL-819)