

Laminated bus strips ease pc-board layout

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Laminated pc-board bus bars can increase the effective ground-plane area of any two-sided printed-circuit-board layout and reduce layout time for the circuit. Two basic types of these bus bars are vertical bus strips (one, two, or three layers) that mount between rows of integrated circuits, and under-the-DIP strips (two or three layers) that mount underneath every IC in a row. Both of these types (shown in the figures) are sold commercially in standard lengths.

In the layout of a two-sided circuit board, one side is normally dedicated to the ground plane, and the other side is used for logic interconnections and voltage distribution. The use of a ground plane with any high-speed system is desirable for several reasons. Because the ground plane provides a low-inductance path for supply currents, it helps minimize noise on the power supply lines. Also, since this configuration of the pc board minimizes the signal-line impedance, coupling that re-

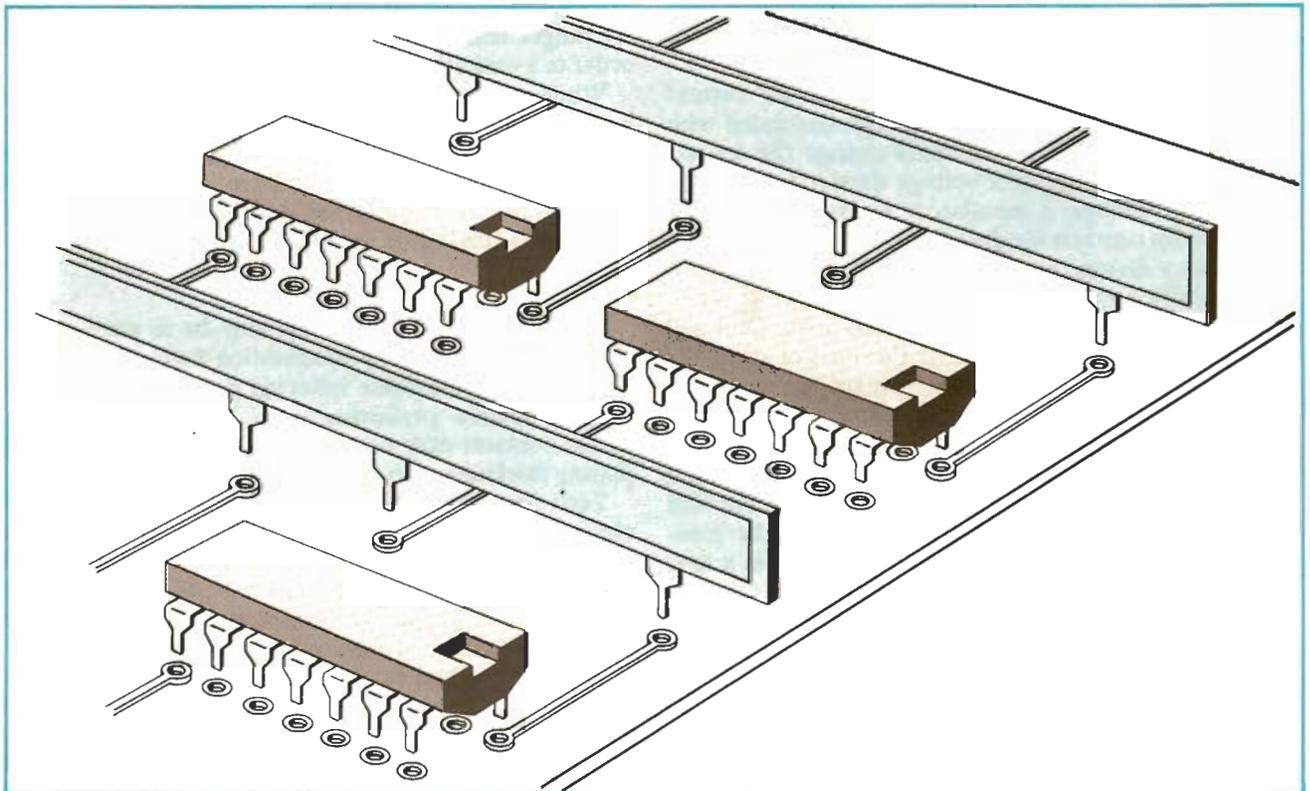
sults in cross talk is decreased. Moreover, a ground plane allows signal lines to have a constant characteristic impedance so that termination techniques can be used to eliminate ringing.

With today's complex integrated circuits, however, it is difficult to accommodate both signals and voltage lines within the confines of a single layer; therefore, the ground plane is sometimes broken up, and short signal lines, crossovers, and voltage bus are put on the ground-plane side of the board. As much as 40% of the ground-plane side of the board can be used for signal lines, but isolation of large areas of the ground plane must be avoided to prevent "current crowding" and inductive problems.

To further conserve space on the board, power can be distributed by the laminated bus bars. By this technique a large area of board is freed for line layout, and routing of lines becomes less complex.

Of course, a ground plane is easily maintained by using multilayer pc boards, although this approach is inevitably more costly and slower to implement than a system that utilizes a two-sided board. But the use of bus bars offers several other advantages over the multilayer approach:

- Vertical bus strips act as board stiffeners, often eliminating the need for separate mechanical stiffeners.
- Under-the-DIP bus strips offer a large thermal mass



1. Off-boarding the bus. Laminated insulated bus bars save space and simplify layout on printed-circuit boards. Vertical bus strips shown here mount between rows of integrated circuits and have extra advantage of serving as board stiffeners.