

TECH TALK

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Backplane Wiring Know How

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Question: How are *power bugs*, *lugs*, *taps*, *screw studs*, and *power nuts* related? Answer: All are backplane jargon for power terminals. Most engineers don't need to know these terms because they purchase enclosures that have the backplane and power supply integrated at the factory. There is little concern about how they are wired. However, if you need to replace a backplane or power supply, or if you install a backplane and wire the power supply into a custom enclosure, these terms suddenly become important.

Fortunately, backplane manufacturers (those building custom, PCI, VMEbus, CompactPCI, VXS, or AdvancedTCA) install conventional power connectors. Some architectures adopted power specifications, making integration easier. PCI, of course, uses ATX; AdvancedTCA specifies the [PICMG 3.0 Power Connector](#); and CompactPCI chose [PICMG 2.11 for plug-in supplies](#) and ATX, which follows the [ATX12V Power Supply Design Guide](#). Since most systems are not wired following a particular specification, it is challenging to understand the number of ways to connect power to a backplane.

CompactPCI and VMEbus specifications define regulated DC input supply voltages, power pins, power distribution, and provide backplane design recommendations. Nothing is said about which power connectors should be used for supply voltages. It is a bit clearer for plug-in power supplies. These use 38-pin or 47-pin Positronic power connectors, 47-pin being most common.

Power terminals such as **fastons**, **power bugs** (also called taps), **screw studs** (also called lugs), and **power nuts** are common in CompactPCI and VMEbus. These securely fasten ring terminals at the end of each supply voltage wire. One or more terminals are installed for each voltage (+12V, -12V, 3.3V, and 5V) and ground.

Backplanes are designed with a power insertion area where power connectors are installed. The area normally is located above, below, or beside the slot connectors. Power connectors are installed on the solder side of the backplane for external power sources and on the front side for plug-in supplies. For dense backplanes, the power insertion area may increase the size of the backplane an additional slot width, or one rack unit in height. To provide flexibility, backplane manufacturers often provide several power connector types (ATX connector plus bugs and fastons, for example) to accommodate multiple wiring configurations. Increased choices make wiring the power supply to the backplane easier for the engineer. The manufacturer also can reduce the number of backplane configurations it has to manage.

Power connectors associated with three standard architectures are listed below. The choice of connector is determined by cost, current capacity, size, and preference of the backplane manufacturer.

- [AdvancedTCA](#). PICMG 3.0 Zone 1 power connector
- [CompactPCI](#). ATX power connector, 47-pin Positronic connector, faston, power bugs, screw studs, power nuts, custom
- [VMEbus](#). 47-pin Positronic connector, faston, power bugs, screw studs, power nuts, bus bars, MIL-55302 type 96-pin connector for conduction cooled systems, custom

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