

Hot Swapping of Boards



The HotSwap and HotPlug PCI specifications plus the MakinaBOX carrier make it possible for the developers to conceive hot-swappable systems using standard boards such as PICMG, PCI, PCI-X, PCI Express, etc.

Extracting or inserting a computer board while it is still running is a feature which is more and more in demand as it prevents service interruptions and the closing of computer applications. Unfortunately, proposed standards for Hot Swap implementation touch only on the programming and electronics facets, leaving the mechanical implementation without any real solution.

Issue

The format for several standards require two connection axes at a 90° angle. The 2 perpendicular motions required to extract a board necessitate the opening of the chassis. The complete shut-down of the system, the interruption of service and the closing of all running applications then become unavoidable.



Solution

MakinaBOX is a mechanism which allows a first movement to connect or disconnect a board to the backplane and a second movement to insert or extract it. It is no longer necessary to open the casing and hot swapping is now possible.



The HotPlug specification requires in-operation signals and LEDs, specifications which are not always easy to respect.



The MakinaBOX carrier respects the recommendations of the HotPlug PCI specification regarding in-operation signals and LEDs.



MakinaBOX

Ease of Maintenance



The MakinaBOX carrier brings to standard boards the ease of maintenance normally found only in high-end boards.

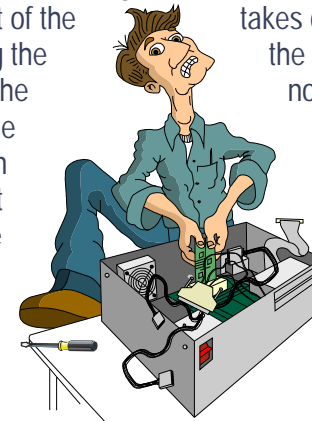
Issue

Extracting a standard board from a system requires time, effort and the interventions of specialists. Taking such an action involves many steps: total shut-down of the system, taking the computer out of the rackmount, opening the computer, disconnecting the circuits, and finally the extraction of the board in question. Only an expert is able to complete the task.



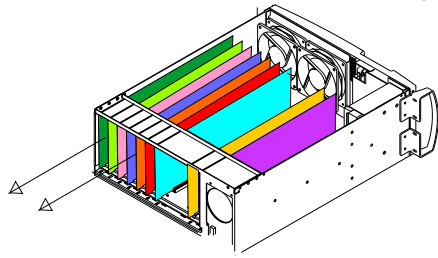
Solution

With the MakinaBOX mechanism, the steps required for the extraction of a board are limited to two: disconnecting the board then extracting it from the chassis. It takes only a few seconds and the services of a specialist are not necessarily required.



MakinaBOX

Cooling System Efficiency



Ensuring the cooling of boards by controlling airflow and turbulences is a solution well sought out. Unfortunately the configuration of system components is often dictated by considerations other than airflow and board cooling.

The parallel and uniform configuration of carriers in a MakinaBOX chassis forces a longitudinal airflow along the boards. This efficiently complements the cooling system by minimizing turbulences caused by empty spaces left in conventional chassis and by circulating the maximum air possible along the boards which generate heat.

Issue

The circuits proposed by the industry consume more and more electrical power, creating an important and undesirable heat input for systems.



Solution

With MakinaBOX, the airflow dictated by the cooling system cannot deviate from its path. The air travels along the circuits to ensure the required cooling. The MakinaBOX carrier can also serve as a radiator for components of the board affixed to it.

Often found in conventional chassis is a jumble of cables and components, creating important turbulences impeding cooling efficiency. Multiple configurations of computers create, within chassis, haphazard empty spaces into which pulsed air is often trapped, impeding the effectiveness of the ventilation system.



The MakinaBOX carriers are installed next to each other in a system. Although they can accept boards of different sizes, the carriers themselves are the same size. This uniform parallel configuration of the boards ensures the desired air circulation. Whatever the electronic configuration of computers, turbulences are reduced to a minimum, ensuring cooling system efficiency at all times.



Physical Protection



Eliminating circuit breakages and the risk of electrostatic discharges (ESD) due to handling constitutes an advantage that users of electronic boards would truly appreciate.

MakinaBOX physically protects system components, minimizing the risks of breakages and damages caused by electrostatic discharges.

Issue

Electronic board components are without protection and directly accessible. Any handling of the board puts it at risk of being damaged either physically or from electrostatic discharges (ESD).



Solution

The MakinaBOX carrier with its protective cover eliminates the direct handling of the board. The problem is controlled from the onset.



Protection against EMI /RFI Emissions



The MakinaBOX mechanism surrounds each system board individually, therefore blocking its EMI /RFI emissions at the source.

Being able to hot swap a card without the system emitting more radiation and ensuring that the system meets EMI/RFI standards even while a board is being removed, this a feature sought by many.

Issue	Solution
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System developers are faced with considerable challenges when it comes to international regulation regarding EMI/RFI emissions: regulation is becoming more stringent, circuits are emitting increasingly stronger radiations and interference between cards is ever increasing.



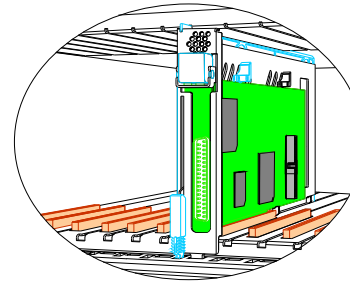
➔ The MakinaBOX carrier surrounds each electronic board giving it an individual metal protection. Even the backplane is protected with such an envelope. This configuration blocks emissions at the source and by doing so greatly helps in meeting standards.

Over the span of a system's life, boards are often removed, leaving a space of variable size in the system's envelope. Although the system initially met the EMI/RFI standards, it no longer does due to the missing components.

➔ The carrier shields each board individually. When a board is removed, the individual shielding of the other boards remains intact and the integrity of the entire system is preserved.



System Robustness



MakinaBOX makes up for the weaknesses of the electronic boards. The carriers make it easy to connect the boards to the backplane and to keep a system's electronic boards connected even when the system is subjected to rough transportation.

Ensure that an electronic board is kept connected to the backplane even through rough moving, minimizing the risks of board breakage when it is connected to the backplane and controlling the distortion of the backplane, here are features that save both time and money.

Issue	Solution
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Systems are often configured in the plant. During transportation, often turbulent, boards sometimes get disconnected from the backplane. With the results that the system when installed does not work, the client is dissatisfied and a team of technicians is rushed to the site. Systems installed on mobile units are subjected to repetitive vibrations, which risk disconnecting an electronic board. The system then ceases to function partly or totally.

➔ The MakinaBOX carrier, to which the board is fastened, is locked directly to the main part of the chassis. Disconnecting the board is practically impossible without the intervention of the user.

Inserting a board which is misaligned with its connector risks breaking the board under pressure. This risk is always great when inserting a board manually.

➔ During its insertion in the chassis the MakinaBOX carrier allows the alignment of the board's connector with that of the backplane within the required tolerance.

Backplanes are subject to the inconveniences of distortion when submitted to excessive stress during board connexion.

➔ The MakinaBOX carrier spreads over the board the force required to connect it to the backplane, thus controlling backplane distortion as well as the risks of the board itself being damaged.



Financial Economies



MakinaBOX brings to standard electronic boards the mechanical qualities required for ease of maintenance and service continuity that the market demands. Systems that rely on the MakinaBOX mechanism with the use of standard boards offer the best performance/cost ratio.

Market demands for ease of maintenance and service continuity force developers and manufacturers to use high-end buses (VME, compact PCI, etc.) or to use a custom design. These choices mean added development time and significant costs. Pressure increases as awareness of cost grows.

Issue	Solution
Standard boards are economical and meet the technical requirements of systems. However, the two connecting axes of these boards make it almost impossible to extract a board without opening the chassis. This creates difficulties regarding the maintenance and service continuity of systems.	The MakinaBOX mechanism brings to electronic boards the mechanical qualities required to meet the needs of ease of maintenance and service continuity. MakinaBOX allows the insertion and extraction of a board without having to open the chassis.
Developers are submitted to a lot of pressure to reduce development time.	By using standard boards developers minimize the development time of systems. When they integrate the MakinaBOX mechanism, they can also integrate the demanded ease of maintenance and continuity of service features.
The supply costs increase when developers chose to use custom design boards.	The use of standard boards available in quantity on the market is a choice that purchasing components of a system at the best cost. The integration of MakinaBOX carriers to systems transforms these into products that are perceived as higher end products. The manufacturer offers better products at excellent prices.
Users demand systems with a great ease of maintenance and service continuity while they seek affordable products.	It's by purchasing systems, based on standard architecture which also integrates the MakinaBOX mechanism, that the user finds the solution to his need for quality products at an affordable price.



Standard Board Utilization

MakinaBOX allows for the use of standard boards without compromising on ease of maintenance or service continuity. The

MakinaBOX carrier accepts standard boards without modification, even though they vary in sizes.



The utilization of standard boards reduces the development time of systems as well as production costs for manufacturers. However, using standard boards without compromising on ease of maintenance or service continuity represents a real puzzle for system developers.

Issue	Solution
Users expect ease of maintenance and service continuity, which are both difficult to obtain with standard circuits.	MakinaBOX allows the double movement required for the simple manipulation of standard boards, which brings to systems the ease of maintenance and the service continuity sought by users.
System developers are faced with the difficult choice of using standard boards which are strong technically but weak in the areas of ease of maintenance and service continuity or of using high-end boards strong in ease of maintenance and service continuity but require a longer development period and additional costs.	Systems, made up of standard boards and coupled to MakinaBOX carriers, answer the requirements of ease of maintenance and service continuity for users. It is then possible to take advantage of the HotSwap standard notwithstanding the physical constraints of these standard boards.



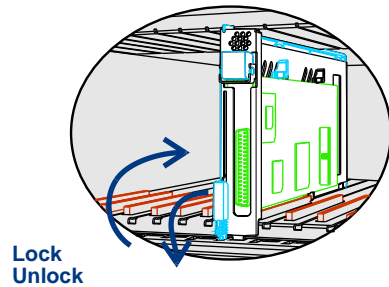
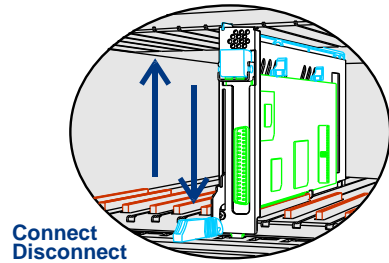
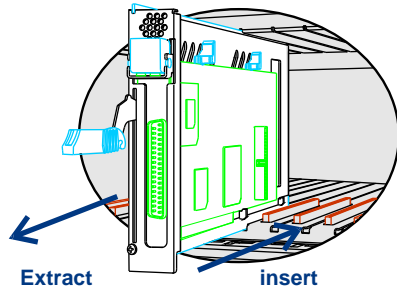
MakinaBOX

MakinaBOX™ is a patented mechanism which permits the insertion/extraction of an electronic board without having to open the rackmount.

With the carrier, the electronic board slides naturally on the guides in the rackmount.

This horizontal movement continues until a perfect alignment of the board's connectors with the backplane's connectors.

A lever permits connection of the board and locking the rackmount.



MakinaBOX, a TRIONIQ technology

www.makinabox.com

About TRIONIQ INC

Founded in 1984, TRIONIQ Inc. is a privately held company headquartered in Québec, Canada. Its flagship product MakinaBOX is a patented card carrier mechanism.

TRIONIQ's vision is to offer to the industry at large the MakinaBOX mechanism which is a natural answer to the often contradictory needs of micro-electronics, PC packaging and service continuity for computers. For more on TRIONIQ Inc. and MakinaBOX, visit www.makinabox.com



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