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(54) GUIDANCE BLOCK

(76) Inventors: **Lambert Simonovich**, Stittsville (CA); **Joseph J. Lommen**, Nepean (CA); **Sebastien Nadeau**, Gatineau (CA); **David A. McQuinn**, Ottawa (CA)

Correspondence Address:
ALAN M WEISBERG
CHRISTOPHER & WEISBERG
200 EAST LAS OLAS BOULEVARD
SUITE 2040
FORT LAUDERDALE, FL 33301 (US)

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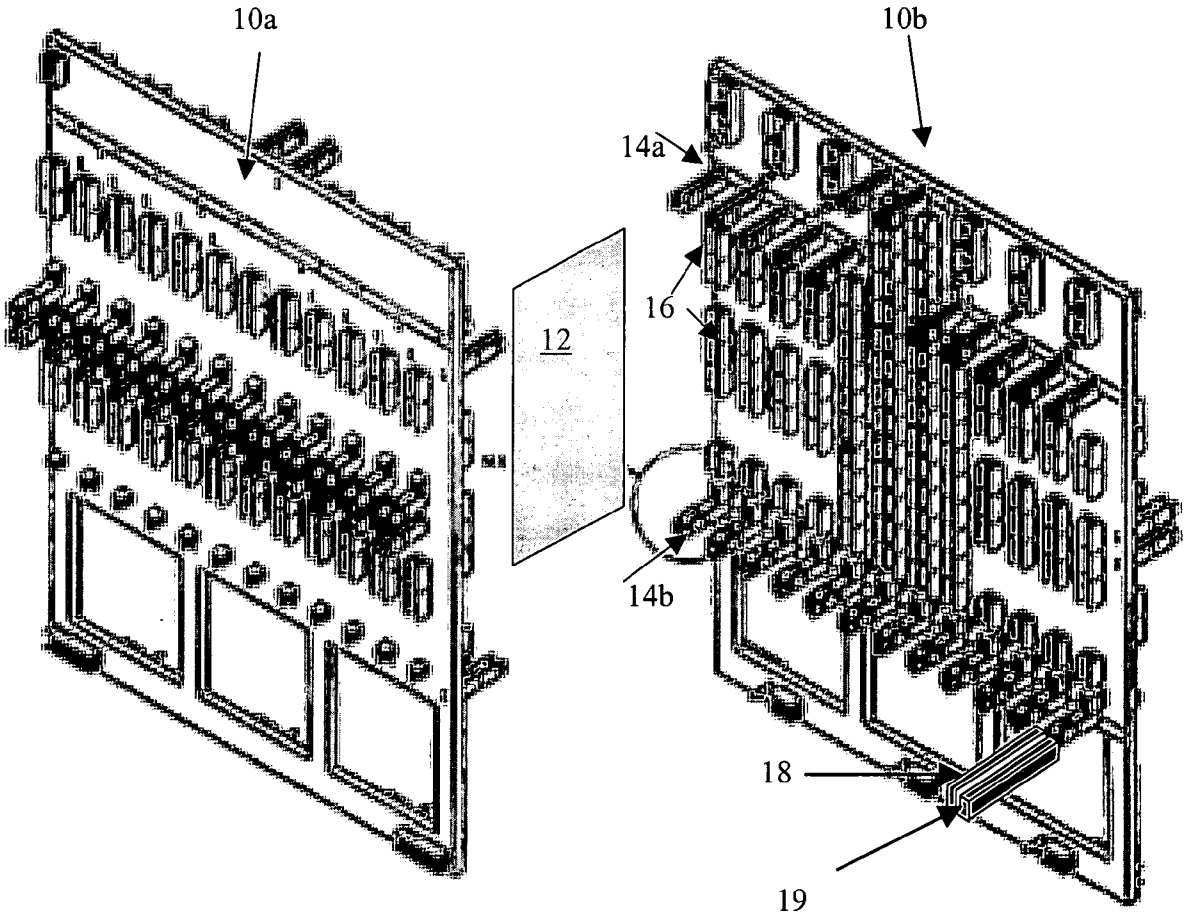
(57) **ABSTRACT**

A guidance block includes a base, a pair of opposing card guide sides supported on a common surface of the base, the sides defining a gap between the pair of opposing sides, and a spring coupled to one of the card guide sides, partially within the gap provided between the pair of opposing sides, with the card guide sides and spring member configured to align a circuit board disposed in the gap with a connector.



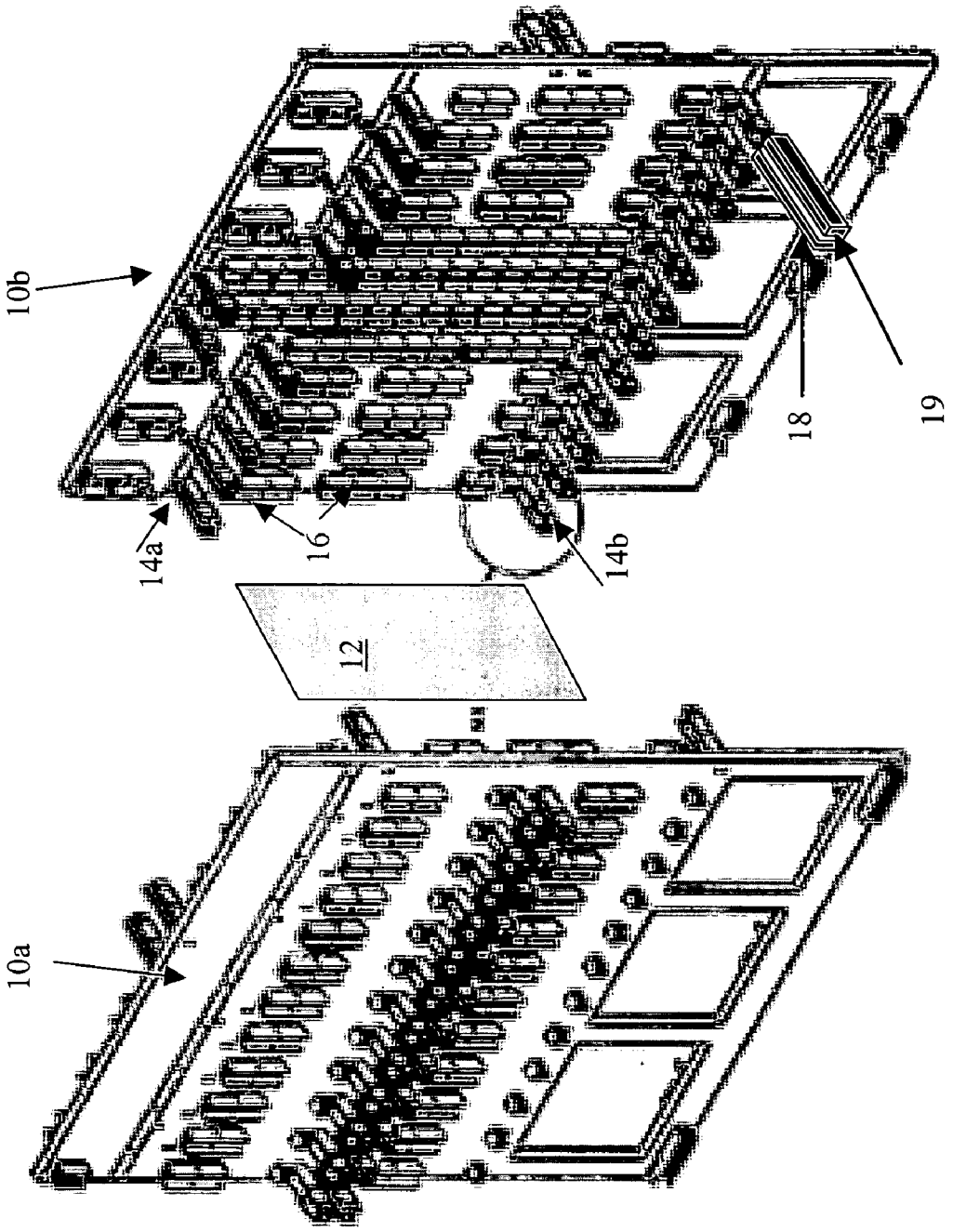


FIG. 1

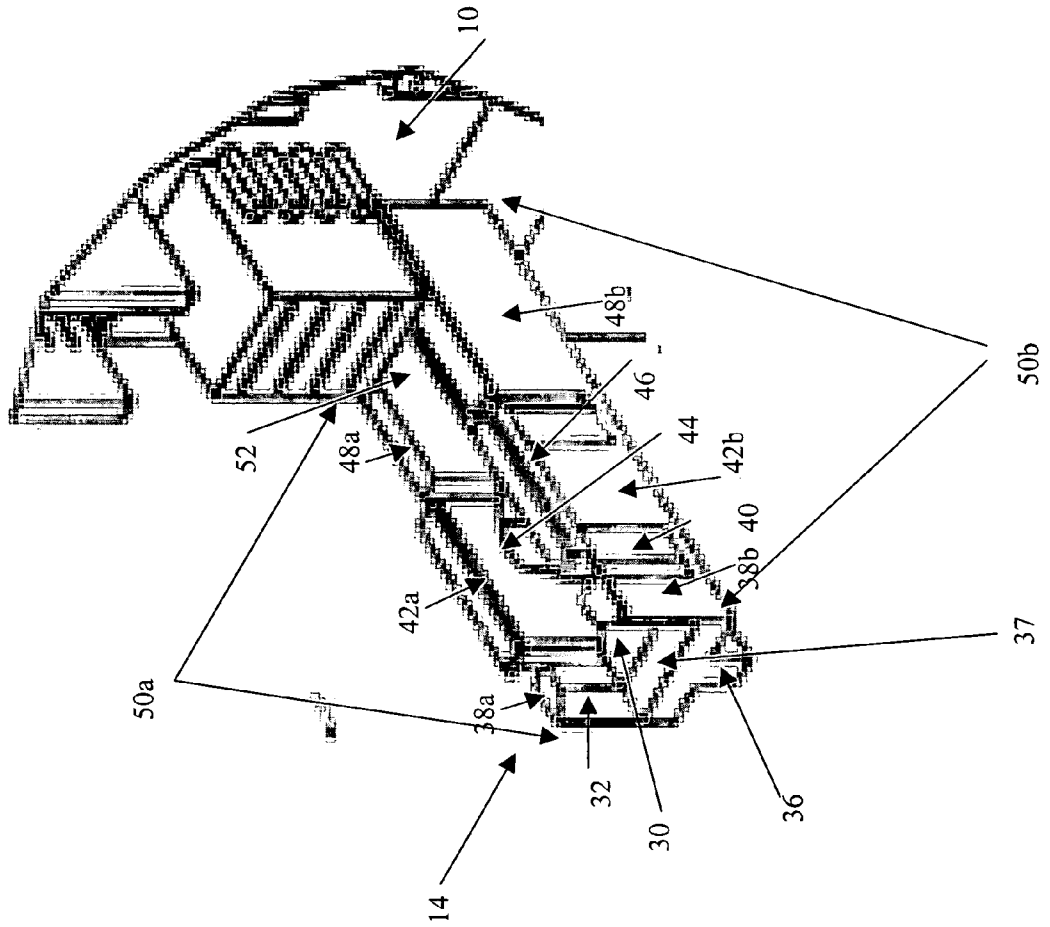
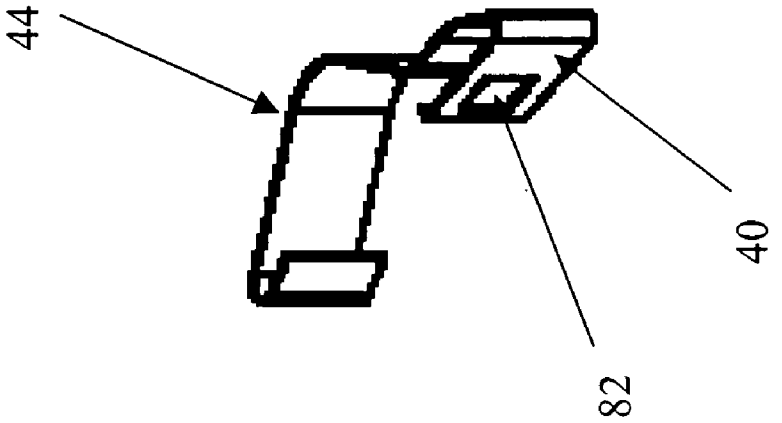


FIG. 2



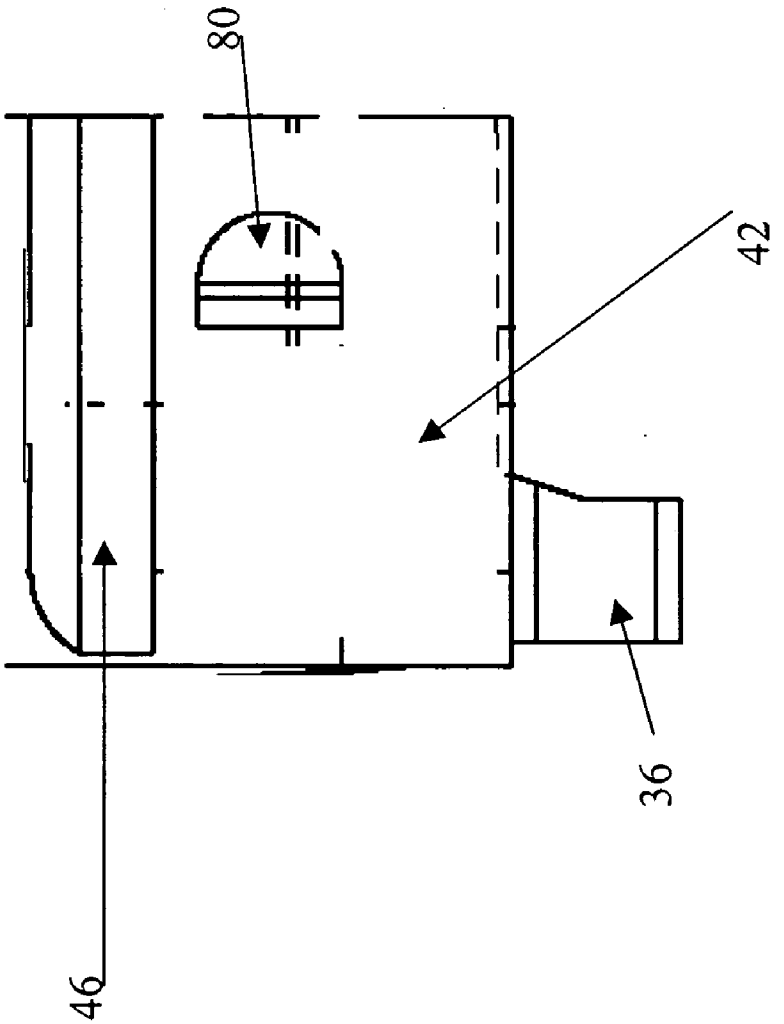


FIG. 3

GUIDANCE BLOCK

BACKGROUND

[0001] A backplane or midplane (hereafter called backplane) is an electronic circuit board, which may include circuits, and includes sockets into which other circuit boards or cards can be plugged. For instance, in a computer the backplane (sometimes referred to as a motherboard) is a circuit board that includes sockets for cards. The cards (also referred to as expansion cards, boards, adapters and so forth) include circuits that provide a functional capability to the computer. The card is typically made of a rigid material and is plugged into one of the computer's expansion slots e.g., connectors in the backplane. Cards have a variety of sizes designed to match corresponding socket dimensions. To provide alignment of the card to the slot, the backplane can include a guide pin and the card can include a receptacle. Inserting the guide pin into the receptacle aligns the card with the slot.

SUMMARY OF THE INVENTION

[0002] In one aspect the invention features a guidance block that includes a base and a pair of opposing card guide sides supported on a common surface of the base. The opposing card sides define a gap between the pair of opposing sides. A spring member is coupled to one of the card guide sides, partially within the gap provided between the pair of opposing sides, with the card guide sides and spring clip configured to align a circuit board disposed in the gap between with a connector.

[0003] Embodiments may include one or more of the following. The base can be connected to a backplane or a midplane. The base can include an extension region. The extension region can be configured to fit into an alignment slot in the backplane. The card guide side can include a spring region configured to attach the spring. The spring region can include an overhang member. The card guide sides can be configured such that the spring can be coupled to either of the sides. The card guide sides can include a macro alignment region. The macro alignment region can include an angled end. The guidance block can include screws that attach the base to the backplane. The spring can provide alignment of a primary side of the circuit board.

[0004] The sides can be configured to accept multiple thicknesses of circuit packs. The spring clip can include an electrically conductive material that provides an electrostatic discharge (ESD) path to ground. The base can include an angled outer region.

[0005] In another aspect, the invention features a device that includes a backplane and a guidance block. The guidance block includes a base, a pair of opposing card guide sides supported on a common surface of the base. The opposing card guide sides define a gap between the pair of opposing sides. A spring member is coupled to one of the card guide sides, partially within the gap provided between the pair of opposing sides. The card guide sides and spring clip are configured to align a circuit board disposed in the gap with a connector.

[0006] Embodiments may include one or more of the following. The base can include an extension region configured to fit into an alignment slot in the backplane. The card guide side can include a spring region configured to attach the spring. The spring region can include an overhang member. The card guide sides can be configured such that the spring can be coupled to either of the sides. The card guide sides can include a macro alignment region having an angled end. The spring can provide alignment of a primary side of the circuit board. The sides can accept multiple thicknesses of circuit boards. The spring clip can be composed of an electrically conductive material. The base can include an angled outer region

[0007] In one aspect, the guidance block includes a spring to bias a card to the primary side of the guidance block. This allows a user to insert a board into the device without regard for the thickness of the board. The spring aligns the connectors on the board with the connectors in the slot.

[0008] In another aspect, guidance blocks are provided in pairs. Providing the guidance blocks in pairs adds the advantage of both horizontal and vertical alignment of the card to the socket.

[0009] The current invention obviates the need for the traditional guide pin and receptacle to provide macro alignment of a card to a slot. The current invention does not require additional printed circuit board (PCB) real estate for a guide pin receptacle and maximizes the height of the PCB's. This allows greater I/O density per card since the space traditionally needed for a guide receptacle can be used for additional connectors.

DESCRIPTION OF DRAWINGS

[0010] **FIG. 1** is a diagram depicting a backplane with a guidance block.

[0011] **FIG. 2** is a diagram a guidance block.

[0012] **FIG. 3** is a diagram of the spring attachment region of the guidance block and a spring.

DESCRIPTION

[0013] Referring to **FIG. 1**, a backplane **10** includes multiple slots **16**. A user aligns and plugs a card **12** into one of the slots **16**. Each slot **16** fits a particular card thickness. Typical card thicknesses range from 0.05 inches to 0.20 inches. The shelf may include shelf card guides **18**. The shelf card guides **18** have slots **19** configured to accept the card, and are usually part of the shelf mechanical assembly. Alternately, guidance blocks **14** attached to the backplane **10** provide macro alignment of the card **12** to the slot **16** and can be easier to use than the shelf card guides **18** included in the backplane **10**. Each guidance block **14** includes a slot configured to accept the edge of a card **12**. For example, guidance block **14***a* guides a first edge (depicted as the upper edge in **FIG. 1**) of a card **12** while guidance block **14***b* guides a second parallel edge (depicted as :the lower edge in **FIG. 1**) of the card **12**. Using the guidance blocks in pairs, provides both horizontal and vertical alignment of the card to the sockets. The guidance blocks **14** can be removably attached to the backplane, for example by attaching the guidance blocks **14** to the backplane **10** using screws. Alternately, bonding, soldering, and so forth can permanently or semi-permanently attach the guidance blocks **14**.

[0014] Referring to **FIG. 2** guidance block **14** includes a base **30** and opposing perpendicular sides **50***a* and **50***b*

forming a guide slot **52**. Each side **50***a* and **50***b* includes three regions, a macro alignment region **38**, a spring region **42**, and an end region **48**. The macro alignment region **38** includes a slanted outer region **32** used to guide the card horizontally into the guide slot **52**. A slanted region **37** at the front edge of base **30** provides the ramping feature to vertically align the card **12** into slot **52**. A spring clip **44** attaches to the spring region **42** of one of the sides **50***a*, **50***b*. Alternately, other types of spring members could be used instead of spring clip **44**.

[**0015**] While the spring clip **44** provides the advantage of ease of manufacture and assembly, other types of spring members can be used. For example, a spring member could be composed of a coil spring with a flat plate attached for the sliding surface or a wire formed leaf spring, the spring could also be made of plastic and have an optional coating of a electrically conductive material.

[**0016**] The spring clip **44** can be attached to either spring region **42***a* or **42***b* dependent on whether the guidance block **14** will be used as a top guidance block or bottom guidance block. In order to bias the card to the opposite side, the spring clip **44** is attached to the opposite spring region (i.e. attaching the spring to region **42***a* of side **50***a* biases the card towards side **50***b*). In this example (**FIG. 2**), the spring clip **44** is shown attached to spring region **42***b*. A curved, unshaped lip **40** portion of the spring clip **44** attaches the spring clip **44** to spring region **42***b* of the guidance block **14**. Lip **40** extends around a side of spring region **42** (**FIG. 3**). The lip **40** includes an attachment hole **82** that snaps into a raised tab **80** on the spring region **42**. The locking of the raised tab **80** into the attachment hole **82** secures the spring clip **44** to the spring region **42**. Lip **40** extends around the side of spring region **42***b*. An overhang member **46** on the spring region **42** helps to hold the spring clip **44** in place. The overhang member **46** prevents the spring clip **44** from sliding vertically and detaching from the spring region **42**.

[**0017**] Spring clip **44** provides horizontal alignment for the circuit pack and biases the card **12** toward side **50***a* (**FIG. 2**). This biasing aligns a connector on the primary side of a card **12** to a connector in the backplane **10**. Since the spring clip **44** can be depressed in varying amounts and slot **52** is wider than the board, guidance block **14** can accept cards **12** of varying thickness. Since guidance block **14** can accept cards **12** of varying thicknesses, a guidance block **14** can be used with a backplane without concern for the card thickness the backplane is configured to accept. The spring clip **44** can be made of an electrically conductive material, for example beryllium copper stainless steel, spring steel, copper, or aluminum. In another example the spring clip can be made of plastic provided the plastic acts as a spring, moves the card, and returns to its original position after deflection. When the spring clip **44** is composed of metal, and the guidance block **14** is composed of metal and the block is grounded, the metal provides an electrostatic discharge (ESD) path from the board to ground. If the spring was formed out of plastic it could be electro-plated to-provide the electrical path for grounding.

[**0018**] An extension **36** from base **30** fits the shelf card guides **18**. A backplane is often configured to fit a particular card thickness. Thus, shelf card guide **18** may be included on the shelf to provide alignment of the card to the slot of the shelf. Since shelf card guide **18** is the approximate thickness of the board, it may be difficult for a user to align the board to the shelf card guide **18**. A user slides the extension **36** on the guidance block **14** into the shelf card guide **18**, thus the user can align the board using guidance block **14** instead of the shelf card guide **18** provided on the shelf. The spring clip **44** on guidance block **14** aligns the board, allowing the user to insert the card into a wider slot (slot **52**) yet still align the card to the connectors.

[**0019**] In one example, the base **30** and sides **50** are molded from plastic producing a unitary piece having the features discussed above. Base **30** and sides **50** could instead be composed of multiple parts bonded together to form the structure. In another example, the base **30** and sides **50** could be composed of metal (providing ESD protection) or another firm, electrically conductive material.

[**0020**] The exact shape and attachment of spring clip **44** can vary. In the example shown in **FIG. 2** and **FIG. 3**, the spring clip **44** is attached by extension region **40** of the spring using tab **80** and hole **82**. The spring clip **44** could alternately be adhesively bonded to region **42**.

[**0021**] While in the example described above, each guidance block **14** is individually attached to backplane **10**, multiple guidance blocks **14** can be grouped to form a larger unit. For example, a backplane might include eight card slots. Thus, a grouping of sixteen guidance blocks (one top and one bottom per slot) **14** provides alignment for each card slot in the backplane.

[**0022**] In the above example, the guidance block **14** includes a single spring to bias the card. The guidance block **14** could alternately include two springs. In this example, each side would have opposing springs. By including two springs, the card is aligned not to one side, but to the middle of the guidance block **14**.

[**0023**] A single part could be provided out of plastic that formed the ramp block and the spring as a single unit this could then be plated to provide the ground as well.

[**0024**] A number of embodiments of the invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other embodiments are within the scope of the following claims.

What is claimed is:

1. A guidance block comprising:

a base;

a pair of opposing card guide sides supported on a common surface of the base, the sides defining a gap between the pair of opposing sides; and

a spring member coupled to one of the card guide sides, partially within the gap provided between the pair of opposing sides, with the card guide sides and spring member configured to align a circuit board disposed in the gap with connector.

2. The guidance block of claim 1 wherein the base is connected to a backplane.

3. The guidance block of claim 1 wherein the base is connected to a midplane.

4. The guidance block of claim 1 wherein the base includes an extension.

5. The guidance block of claim 4 wherein the extension is configured to fit into a shelf card guide.

6. The guidance block of claim 1 wherein the card guide side includes a spring region configured to attach the spring member.

7. The guidance block of claim 6 wherein the spring region includes an overhang member.

8. The guidance block of claim 1 wherein the card guide sides are configured such that the spring member can be coupled to either of the card guide sides.

9. The guidance block of claim 1 wherein the card guide sides include a macro alignment region.

10. The guidance block of claim 1 wherein the spring member provides alignment of a primary side of the circuit board.

11. The guidance block of claim 1 wherein the card guide sides can accept multiple thicknesses of circuit boards.

12. The guidance block of claim 1 wherein the spring member includes an electrically conductive material.

13. The guidance block of claim 12 wherein the electrically conductive material of the spring clip provides an electrostatic discharge (ESD) path.

14. The guidance block of claim 1 wherein the base includes an angled outer region.

15. A device including:

a backplane; and

a guidance block, the guidance block including

a base;

a pair of opposing card guide sides supported on a common surface of the base, the sides defining a gap between the pair of opposing sides; and

a spring member coupled to one of the card guide sides, partially within the gap provided between the pair of opposing sides, with the card guide sides and spring clip configured to align a circuit board disposed in the gap with connector.

16. The device of claim 15 wherein the card guide side includes a spring region configured to attach the spring member.

17. The device of claim 16 wherein the spring region includes an overhang member.

18. The device of claim 15 wherein the card guide sides are configured such that the spring member can be coupled to either of the card guide sides.

19. The device of claim 15 wherein the card guide sides include a macro alignment region having an angled end.

20. The device of claim 15 wherein the spring member provides alignment of a primary side of the circuit board.

21. The device of claim 15 wherein the card guide sides can accept multiple thicknesses of circuit boards.

22. The device of claim 15 wherein the spring clip includes an electrically conductive material.

23. The device of claim 15 wherein the base includes an angled outer region

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