RACK-MOUNTED BRACKET ASSEMBLY

Inventors: David C. Moore, Ashby, MA (US); Jeffrey M. Lewis, Southboro, MA (US); Michael P. Rolla, Maynard, MA (US)

Correspondence Address:
HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400 (US)

Appl. No.: 11/157,739
Filed: Jun. 21, 2005

Publication Classification

Publication Classification

Int. Cl.
A47F 7/00 (2006.01)

U.S. Cl. 211/26

ABSTRACT

A rack-mounted bracket assembly comprises a main member having a first end, a second end, and a shelf therebetween. A set of long tabs is disposed on the first end of the main member. A set of short tabs is disposed on the second end of the main member. A retention latch is connected to the main member and limits the movement of the bracket within a rack.
RACK-MOUNTED BRACKET ASSEMBLY

BACKGROUND

[0001] For large-scale computing applications that require numerous servers, an industry standard EIA (Electronics Industries Alliance), or other type, rack is often used to contain servers in a stacked arrangement that uses the available space more efficiently. Such electronics racks are relatively simple structures that closely resemble open-frame bookcases. Computer server/component racks are typically constructed with perforated, hinged front-doors, rigid sides and a removable rear panel. Industry standard 19" EIA electronics racks are designed typically to house a column of electronics packages that are 17¾" in width with varying depths. The height of an electronics package can vary but is normally an integer multiple of an EIA unit called simply the “U.” An EIA U is 1.75 inches. Electronic equipment generally has a height in multiples of “Us” e.g., 1 U (1.75"), 2 U (3.50"), 3 U (5.25"), etc.

[0002] Typically, electronic components may be secured within the rack using a pair of horizontal brackets that are secured to the rack structure at vertical rails near the corners. As the height of components decreases the number of components within a particular rack increases. Therefore, the number of brackets needed for that rack also increases. Because the number of brackets increases, the hardware costs increase and the time needed to install the brackets also increases. The preferred embodiments of the present invention described below overcome these and other deficiencies of the prior art while focusing on these needs.

BRIEF SUMMARY

[0003] The problems noted above are solved in large part by a rack-mounted bracket assembly comprises a main member having a first end, a second end, and a shelf therebetween. A set of long tabs is disposed on the first end of the main member. A set of short tabs is disposed on the second end of the main member. A retention latch is connected to the main member and limits the movement of the bracket within a rack.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] For a detailed description of exemplary embodiments of the invention, reference will now be made to the accompanying drawings in which:

[0005] FIG. 1 shows a rack assembly constructed in accordance with embodiments of the invention;
[0006] FIG. 2 shows the front rail of the rack assembly of FIG. 1;
[0007] FIG. 3 shows a first step in installing a bracket assembly into a rack assembly in accordance with embodiments of the invention;
[0008] FIG. 4 shows a second step in installing a bracket assembly into a rack assembly in accordance with embodiments of the invention;
[0009] FIG. 5 shows a third step in installing a bracket assembly into a rack assembly in accordance with embodiments of the invention;
[0010] FIG. 6 shows a chassis installed in a bracket assembly in accordance with embodiments of the invention;
[0011] FIG. 7 shows a reinforced bracket assembly in accordance with embodiments of the invention; and
[0012] FIG. 8 shows a multi-bracket rack assembly in accordance with embodiments of the invention.

NOTATION AND NOMENCLATURE

[0013] Certain terms are used throughout the following description and claims to refer to particular system components. As one skilled in the art will appreciate, computer companies may refer to a component by different names. This document does not intend to distinguish between components that differ in name but not function. In the following discussion and in the claims, the terms “including” and “comprising” are used in an open-ended fashion, and thus should be interpreted to mean “including, but not limited to . . . .” Also, the term “couples” is intended to mean either an indirect or direct connection. Thus, if a first device couples to a second device, that connection may be through a direct connection, or through an indirect connection via other devices and connections.

DETAILED DESCRIPTION

[0014] The following discussion is directed to various embodiments of the invention. Although one or more of these embodiments may be preferred, the embodiments disclosed should not be interpreted, or otherwise used, as limiting the scope of the disclosure, including the claims. In addition, one skilled in the art will understand that the following description has broad application, and the discussion of any embodiment is meant only to be exemplary of that embodiment, and not intended to intimate that the scope of the disclosure, including the claims, is limited to that embodiment.

[0015] The figures presented herein illustrate a right-hand rack assembly. It is understood that a complimentary left-hand rack assembly would possess the same features as the right-hand assembly. Similarly, front and rear as used herein are merely descriptive terms and are not intended to be limiting recitations of the absolute position of any component.

[0016] Referring now to FIG. 1 a rack assembly 100 comprises bracket assembly 10 supported by front rail 12 and rear rail 14. Bracket assembly 10 comprises main member 16 and retention latch 18. Main member 16 has rear end 20 with a set of long tabs 22 and a front end 24 with a set of short tabs 26 and threaded receptacle 28. Between front end 24 and rear end 20, main member 16 has a substantially U-shaped cross-section including lower shelf 30 and upper shelf 32. Retainer 34 extends upward from lower shelf 30 towards rear end 20. Retention latch 18 comprises shoulder 36, spring body 38, and release tab 40. Front rail 12 comprises holes, or slots, 42 and flange 44. Rear rail 14 comprises holes, or slots, 46.

[0017] Main member 16 may be formed from a single piece of material, such as sheet metal. Retention latch 18 may also be formed from a single piece of material, such as a spring steel, and affixed to main member 16 by rivets 56, or some other attachment mechanism.
[0018] Long tabs 22 engage slots 46 on rear rail 14 to support bracket assembly 10 at its rear end 20. Short tabs 26 engage slots 42 on front rail 12 to support bracket assembly 10 at its front end 24. As can be seen in FIG. 2, shoulder 36 of retention latch 18 engages flange 44 of front rail 12 and prevents rearward movement, and thus disengagement of short tabs 26 from slots 42. Therefore, referring back to FIG. 1, bracket assembly 10 is securely connected to front rail 12 and rear rail 14.

[0019] Referring now to FIGS. 3-5, the installation of bracket assembly 10 onto rails 12 and 14 is shown. In a first step as shown in FIG. 3, bracket assembly 10 is disposed at an angle to the side of the rack assembly so that long tabs 22 can be inserted into slots 46 on rear rail 14. Once long tabs 22 are engaged with slots 46, bracket assembly 10 is rotated so that short tabs 26 are aligned with slots 42 on front rail 12 as shown in FIG. 4. In the aligned position of FIG. 4, retention latch 18 is deflected inward by flange 44. Bracket assembly 10 can then be moved forward so that short tabs 26 engage slots 42 and spring body 38 urges retention latch 18 into engagement with flange 44. Once in the locked position of FIG. 5, rearward movement of bracket assembly 10 is prevented by the engagement of retention latch 18 and flange 44. Forward movement of bracket assembly 10 is restricted by front end 24 so that long tabs 22 can not disengage from slots 46. Bracket assembly 10 can be removed by deflecting retention latch 18 inward, such as by using release tab 40, and reversing the installation steps described above.

[0020] Referring now to FIG. 6, an computer assembly 200 is shown disposed in rack assembly 100. Computer assembly 200 comprises chassis 48, front bezel 50, mounting ear 52, and fastener 54. Computer assembly 200 is shown as a 1 U-high server but could be any rack-mounted computer or accessory. Chassis 48 rests on and is supported by lower shelf 30. Retainer 34 engages the rear of chassis 48 to secure the rear of assembly 200 to rack assembly 100. Fastener 54 engages threaded receptacle 28, as shown in FIG. 1, to secure the front of assembly 200 to rack assembly 100.

[0021] In certain embodiments, the weight of a computer assembly, or other factors, may require reinforcement of the bracket assembly described above. Referring now to FIG. 7, in one embodiment, bracket assembly 10 is reinforced by stiffener 56 that is fitted to main member 16. Stiffener 56 may be constructed from sheet metal formed to a U-shaped cross-section that fits between lower shelf 30 and upper shelf 32. Stiffener 56 may have a plurality of apertures 58 that reduce its weight, provide for airflow/cooling, and/or provide access to main member 16 or retention latch 18 (see FIG. 1). Stiffener 56 may simply closely fit within main member 16 or may be attached to the main member by rivets, screws, or some other attachment mechanism.

[0022] Referring now to FIG. 8, a plurality of main members may be interconnected to form multi-bracket assembly 110 that can be supported by the front rail and rear rail as described above. Multi-bracket assembly 110 comprises a plurality of main members 16 connected to a backing plate 60. Backing plate 60 may be constructed from sheet metal and serves to interconnect the plurality of main members so that they can be installed as a unit. One or more retention latches 18 are affixed to selected main members 16 and engage front rail 12. Each lower shelf 30 can support an individual computer system. Thus, multi-bracket assembly 110 provides support for multiple computer systems with a minimum number and complexity of components.

[0023] The above discussion is meant to be illustrative of the principles and various embodiments of the present invention. Numerous variations and modifications will become apparent to those skilled in the art once the above disclosure is fully appreciated. For example, the bracket assembly can be constructed in any desired dimensions so as to support an intended computer system and is not limited to the 1 U embodiment described herein. It is intended that the following claims be interpreted to embrace all such variations and modifications.

What is claimed is:

1. A rack-mounted bracket assembly comprising:
   a main member having a first end, a second end, and a shelf therebetween;
   a set of long tabs disposed on the first end of said main member;
   a set of short tabs disposed on the second end of said main member; and
   a retention latch disposed on said main member, wherein said retention latch limits the movement of the bracket within a rack.

2. The rack-mounted bracket assembly of claim 1 further comprising:
   a threaded receptacle disposed on the second end of said main member; and
   a retainer extending from the shelf of said main member.

3. The rack-mounted bracket assembly of claim 1 further comprising:
   a first rail comprising a plurality of holes that engage said long tabs; and
   a second rail comprising a plurality of holes that engage said short tabs.

4. The rack-mounted bracket assembly of claim 3 wherein said second rail further comprises a flange that interfaces with said retention latch so as to prevent disengagement of said short tabs from said second rail.

5. The rack-mounted bracket assembly of claim 4 wherein said retention latch comprises:
   a shoulder that engages the flange of said second rail;
   a spring member that urges said shoulder into engagement with the flange; and
   a release tab that is movable to disengage said shoulder from the flange.

6. The rack-mounted bracket assembly of claim 5 wherein said retention latch is formed from a single piece of material.

7. The rack-mounted bracket assembly of claim 1 further comprising a stiffener member disposed on said main member.

8. A rack assembly comprising:
   a front rail having a plurality of holes therethrough;
   a rear rail having a plurality of holes therethrough;
   a flange disposed on said front rail
a bracket assembly disposed between said front rail and said rear rail, said bracket assembly comprising a lower shelf;
a plurality of rear tabs disposed on a rear end of said bracket assembly and engaged with the holes on said rear rail;
a plurality of front tabs disposed on a front end of said bracket assembly and engaged with the holes on said front rail; and
a retention latch disposed on said bracket assembly and engaged with said flange so as to restrict relative movement between said bracket assembly and said front rail.
9. The rack assembly of claim 8 further comprising:
a rear retainer that extends upward from the lower shelf; and
a threaded receptacle disposed on the front end of said bracket assembly.
10. The rack assembly of claim 9 further comprising a computer system that comprises:
a chassis supported by the lower shelf of said bracket assembly and engaged with said rear retainer; and
a front bezel coupled to the rack assembly by a fastener that is engaged with said threaded receptacle.
11. The rack assembly of claim 8 wherein said retention latch comprises:
a shoulder that engages the flange of said front rail;
a spring member that urges said shoulder into engagement with the flange; and
a release tab that is moveable to disengage said shoulder from the flange.
12. The rack assembly of claim 8 wherein said retention latch is formed from a single piece of material.
13. The rack assembly of claim 8 wherein said rear tabs are longer than said front tabs.
14. The rack assembly of claim 8 wherein said bracket assembly further comprises a stiffener member.
15. The rack assembly of claim 8 wherein said bracket assembly comprises a plurality of lower shelves interconnected by a backing plate.
16. The rack assembly of claim 8 wherein each of the plurality of lower shelves support an individual computer system.
17. A rack assembly method comprising:
inserting a bracket assembly into a rack such that a set of long tabs engages slots disposed on a rear rail;
rotating the bracket assembly so as to align a set of short tabs with slots disposed on a front rail;
moving the bracket assembly forward such that the short tabs engage with the slots on the front rail; and
engaging a flange on the front rail with a retention latch so as to prevent disengagement of the short tabs from the slots on the front rail.
18. The rack assembly method of claim 17, further comprising:
supporting a computer chassis on a shelf of the bracket assembly;
sliding the computer chassis relative to the bracket assembly until the chassis engages a rear retainer that extends upward from the shelf; and
securing the computer chassis to the rack by engaging a fastener disposed on the chassis with a threaded receptacle disposed on the rack assembly.
19. The rack assembly method of claim 17, further comprising:
operating the retention latch so as to disengage the flange;
moving the bracket assembly rearward such that the short tabs disengage the slots on the front rail; and
moving the bracket assembly so as to disengage the long tabs from the slots on the rear rail.
20. The rack assembly method of claim 17 wherein the bracket assembly comprises a plurality of lower shelves operable to support a plurality of computer systems.
21. A bracket assembly comprising:
means for supporting a computer system between a first rail and a second rail of a rack;
means for engaging holes in the first rail;
means for engaging holes in the second rail; and
means for limiting the movement of the bracket assembly within the rack.
22. The bracket assembly of claim 21 wherein said means for limiting the movement of the bracket prevents said means for engaging holes in the second rail from disengaging.
23. The bracket assembly of claim 21 further comprising a means for stiffening said means for supporting.

* * * * *