IBM

Technical Update

IBM @server BladeCenter power module upgrade guidelines

This *Technical Update* contains information that will help you determine whether you need to upgrade the power modules in your IBM® @server™ BladeCenter™ unit when installing IBM @server BladeCenter blade servers or options.

Attention: Nonredundant power is not supported in BladeCenter products. Power modules must always be present in power bays 1 and 2. When any blade server or option is in blade bay 7 through 14, power modules must be present in power bays 1 and 2, and power modules must be present in power bays 3 and 4.

If a power module fails or an ac power failure occurs, BladeCenter units configured for redundant power operation, as described in this document, will operate in a nonredundant mode, and the blower modules will run at full speed. You must replace the failing power module or restore ac power as soon as possible to regain redundant power operation and to reset the blower modules to their normal operating speed.

As of the date of this printing, three BladeCenter power-module options are supported:
- IBM BladeCenter 1200W Power Supply Module (part number 48P7052)
- IBM BladeCenter 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197)
- IBM BladeCenter 1800W Power Supply Module (part number 13N0570)

Go to http://www.ibm.com/pc/compat/ for information about these options.

Updates to this document are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates:
1. Go to http://www.ibm.com/pc/support/.
2. In the **Learn** section, click **Online publications**.
3. On the "Online publications" page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select your BladeCenter device.
5. Click **Continue**.

Keep this *Technical Update* with your BladeCenter and blade server documentation for future reference.

BladeCenter power overview

Your BladeCenter unit is separated into two power domains. Power domain A supports all the BladeCenter modules and bays 1 through 6; power domain A uses power modules 1 and 2.

Power domain B supports bays 7 through 14 and uses power modules 3 and 4. To support devices in power domain B, a power-supply option (consisting of two power modules) must be installed.

BladeCenter unit front view   **BladeCenter unit rear view**
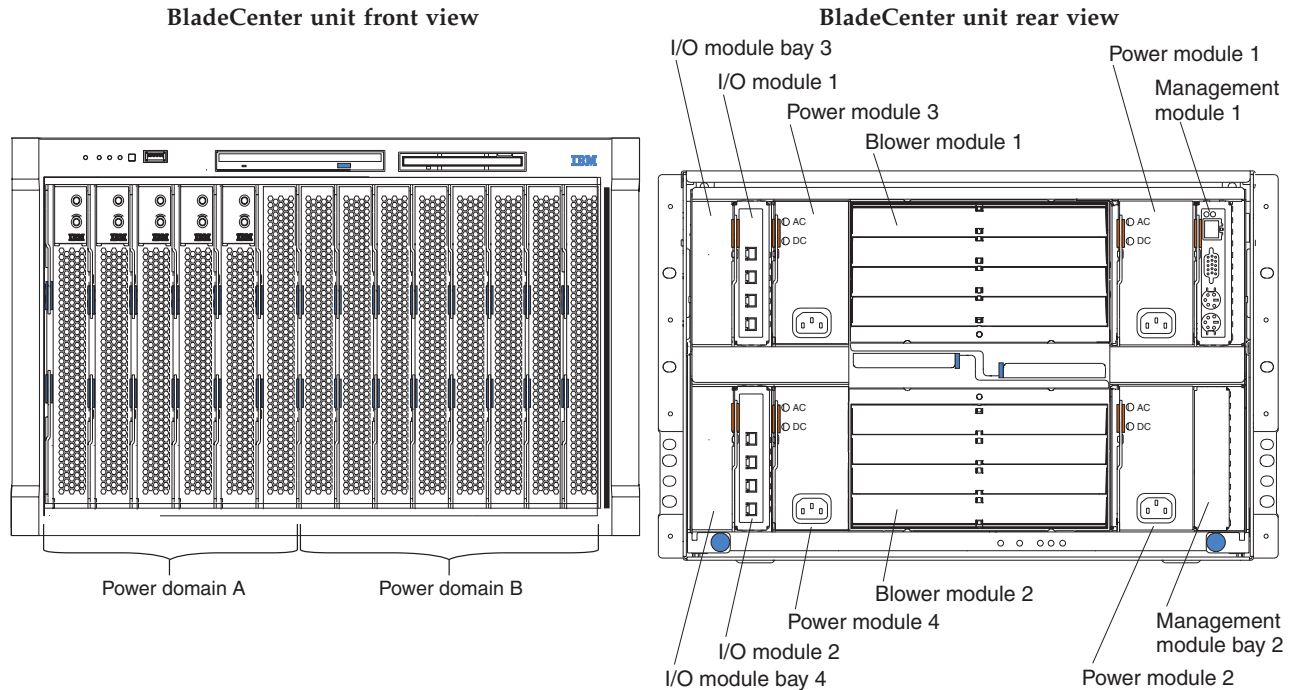
Important:

1. The power modules must be installed in pairs in a domain and must match each other in capacity (wattage, amperage, and so on).
2. A power domain operating above the capacity of a single power module results in a nonredundant power condition.
3. In a pair of power modules, a power module that is not connected to 200-240 volt ac power source results in a nonredundant power condition.
4. To provide true redundant power, BladeCenter power modules 1 and 3 must be connected to a different 200-240 volt ac power source than power modules 2 and 4.

The following tables list the power requirement for each IBM @server BladeCenter blade server or option that is available as of the date of this printing. These power requirements assume that each blade server is fully configured and are based on typical workloads. Use the values in these tables and complete the upgrade calculation (see "Upgrade calculation" on page 4) to determine which power modules are needed to deliver full power redundancy for your configuration.

Table 1. HS20 blade server power values

@server **BladeCenter HS20 blade server**	**IBM power units for the corresponding number of installed microprocessors**	
	1 microprocessor	**2 microprocessors**
2.0 GHz/400 MHz (8678-21X)	0.9	1.1
2.4 GHz/400 MHz (8678-41X)	0.9	1.2
2.6 GHz/400 MHz (8678-51X)	1.0	1.2
2.8 GHz/400 MHz (8678-61X)	1.0	1.3
2.8 GHz/533 MHz (8832-21X, 8832-L1X)	1.0	1.5
3.06 GHz/533 MHz (8832-31X, 8832-M1X)	1.2	1.6
3.2 GHz/533 MHz (8832-G1X, 8832-J1X)	1.2	1.65

Table 2. JS20 blade server power values

@server **BladeCenter JS20 blade server**	**IBM power units for two installed microprocessors**
1.6 GHz/800 MHz (8842-21X)	1.5

Table 3. BladeCenter expansion unit power values

@server **BladeCenter Expansion unit**	**IBM power units**
SCSI Storage Expansion Unit Option	0.4

Table 4. HS40 blade server power values

@server **BladeCenter HS40 blade server (occupies 2 bays)**	**IBM power units and the corresponding number of installed microprocessors (power unit value for each bay)**			
	1 microprocessor	**2 microprocessors**	**3 microprocessors**	**4 microprocessors**
2.2 GHz/400 MHz (8839-51X)	0.70	0.95	1.15	1.40
2.7 GHz/400 MHz (8839-61X)	0.75	1.0	1.25	1.55
2.8 GHz/400 MHz (8839-41X)	0.75	1.0	1.30	1.55
3.0 GHz/400 MHz (8839-71X)	0.80	1.1	1.35	1.67

Important:

The HS40 blade server occupies two adjacent bays. When you complete the "Power worksheets" on page 6, enter the power unit value from Table 4 twice, once for each bay that the blade server occupies. If you install an HS40 blade server in bays 6 and 7, the blade server will use power from both power domain A and power domain B. In the power worksheets, enter the power unit value twice, once for bay 6 of power domain A and once for bay 7 of power domain B.

Upgrade calculation

Complete the following steps to determine the power-module capacity that is needed to maintain full redundancy in each power domain.

If you have two 1800 W power modules installed in power domain A and two 1800 W power modules installed in power domain B, you do not need to complete this upgrade calculation. Your system meets the requirements to maintain full power redundancy in both domains.

Attention: If you are replacing the existing power modules with 1800 W power modules, you must upgrade the management-module firmware. If two management modules are installed in the BladeCenter unit, both management modules must be upgraded to the same level of firmware. Go to the IBM Support Web site at http://www.ibm.com/pc/support/ and obtain the latest firmware.

1. In the power worksheets on page 6, list the blade servers or other devices that are installed in the bays.
2. In the tables on page 3, look up the number of IBM power units associated with each device and enter it in the applicable power worksheet (see "Example calculation" on page 7).
3. Add all of the IBM power unit values for each domain and enter the totals.
4. To maintain full power redundancy in power domain A, make sure that the power modules in bays 1 and 2 are connected to different 200-240 volt ac power sources and meet the following requirements:
   - If the sum of the IBM power unit values is less than 7.4, domain A has power modules that are 1200 W or greater.
   - If the sum is greater than or equal to 7.4 and less than 9.0, domain A has power modules that are 1400 W or greater.
   - If the sum is greater than or equal to 9.0, domain A has power modules that are 1800 W.

   Note: If the label on the power module shows 7.5A, the power module is a 1200 W module; if the label on the power module shows 9A, the power module is a 1400 W module; if the label on the power module shows 12A, the power module is an 1800 W module.

   Important: If the sum of the power unit values in power domain A is greater than the capacity of the installed power modules, power domain A has nonredundant power. Complete the following steps:
   a. Determine whether rearranging the installed devices between power domain A and power domain B in the BladeCenter unit will sufficiently reduce the power requirements for the power domain (use the power worksheets on page 6).
   b. If rearranging the installed devices does not sufficiently reduce the power requirements, the power modules must be upgraded to maintain redundancy. Install the 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197) on the power modules to attain 1400 W, or install the 1800W Power Supply Module option (part number 13N0570) to attain 1800 W. Go to http://www.ibm.com/pc/compat/ for information about ordering these options.

5. To maintain full power redundancy in power domain B, make sure that the power modules in bays 3 and 4 are connected to different 200-240 volt ac power sources and meet the following requirements:
   - If the sum of the IBM power unit values is less than 9.9, domain B has power modules that are 1200 W or greater.
   - If the sum is greater than or equal to 9.9 and less than 11.5, domain B has power modules that are 1400 W or greater.
   - If the sum is greater than or equal to 11.5, domain B has power modules that are 1800 W.

   Note: If the label on the power module shows 7.5A, the power module is a 1200 W module; if the label on the power module shows 9A, the power module is a 1400 W module; if the label on the power module shows 12A, the power module is a 1800 W module.

   Important: If the sum of the power unit values in power domain B is greater than the capacity of the installed power modules, power domain B has nonredundant power. Complete the following steps:

a. Determine whether rearranging the installed devices between power domain A and power domain B in the BladeCenter unit will sufficiently reduce the power requirements for the power domain (use the power worksheets on page 6).

b. If rearranging the installed devices does not sufficiently reduce the power requirements, the power modules must be upgraded to maintain redundancy. Install the 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197) on the power modules to attain 1400 W, or install the 1800W Power Supply Module option (part number 13N0570) to attain 1800 W. Go to http://www.ibm.com/pc/compat/ for information about ordering these options.

Statement 13:

DANGER

> **Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.**

Power distribution unit assessment

If your calculations indicate that you need to upgrade your power modules, you will also need to reassess your power distribution unit (PDU) configuration. Use the IBM *BladeCenter Planning and Installation Guide* to determine the number and types of PDUs that you need. Complete the following steps to obtain the *BladeCenter Planning and Installation Guide*:

1. Go to http://www.ibm.com/pc/support/.
2. Click the BladeCenter link under **Servers**, and then select the brand **Servers** and the family **BladeCenter**.
3. Click **Continue**.
4. From the **View by document type** menu, click **Online publications**.

Power worksheets

Power domain A worksheet (for power modules 1 and 2)

Blade bay	Description of installed device	IBM power units
1		
2		
3		
4		
5		
6		
	Total	

Power domain B worksheet (for power modules 3 and 4)

Blade bay	Description of installed device	IBM power units
7		
8		
9		
10		
11		
12		
13		
14		
	Total	

Example calculation

Power domain A worksheet (for power modules 1 and 2)

Blade bay	Description of installed device	IBM power units
1	3.06 GHz/533 MHz HS20 blade server with 2 microprocessors	1.6
2	SCSI Storage Expansion Unit	0.4
3	3.06 GHz/533 MHz HS20 blade server with 2 microprocessors	1.6
4	SCSI Storage Expansion Unit	0.4
5	3.06 GHz/533 MHz HS20 blade server with 2 microprocessors	1.6
6	3.06 GHz/533 MHz HS20 blade server with 2 microprocessors	1.6
	Total	7.2

Result:
- 7.2 IBM power units < 7.4 IBM power units
- Two 1200 W power modules will provide full power redundancy for power domain A

Power domain B worksheet (for power modules 3 and 4)

Blade bay	Description of installed device	IBM power units
7	3.2 GHz/533 MHz HS20 blade server with 2 microprocessors	1.65
8	3.2 GHz/533 MHz HS20 blade server with 2 microprocessors	1.65
9	3.2 GHz/533 MHz HS20 blade server with 2 microprocessors	1.65
10	3.2 GHz/533 MHz HS20 blade server with 2 microprocessors	1.65
11	3.2 GHz/533 MHz HS20 blade server with 2 microprocessors	1.65
12	2.8 GHz/400 MHz HS40 blade server with 4 microprocessors – first bay (HS40 occupies 2 bays)	1.55
13	2.8 GHz/400 MHz HS40 blade server with 4 microprocessors – second bay (HS40 occupies 2 bays)	1.55
14	3.2 GHz/533 MHz HS20 blade server with 2 microprocessors	1.65
	Total	13.0

Result:
- 13.0 IBM power units > 11.5 IBM power units
- Two 1800 W power modules will provide full power redundancy for power domain B

Attention: To maintain proper system cooling, each unoccupied blade bay must contain a filler blade. To maintain proper module cooling, each unoccupied IO or management module bay must contain a filler.

(1P) P/N: 90P3148