Installation and Maintenance Guide

1U 18.5-inch Standard Console

Installation and Maintenance Guide

Note: Before using this information and the product it supports, read the general information in Appendix C, "Notices," on page 69, the *Safety Information* and *Environmental Notices and User Guide* documents on the *Documentation* CD, and the *Warranty Information* document that comes with the console unit.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

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Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཚོན་རྫས་འདི་བདེ་སྐྱོར་ས་ཕུས་གོང་། སྔར་ཏུ་ཉེད་གནང་། བྱ་འདུ་ཤེན་ཡོད་པའི་ཉེན་སྲེད་བསྐ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ .

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen
canjbinj soengq cungj vahgangj ancien siusik.

Important:

Each caution and danger statement in this documentation is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled `Statement 1`, translations for that caution statement are in the *Safety Information* document under `Statement 1`.

Be sure to read all caution and danger statements in this documentation before you perform the procedures. Read any additional safety information that comes with your system or optional device before you install the device.

L002

DANGER

Rack-mounted devices are not to be used as shelves or work spaces. (L002)

L004

DANGER

> **Hazardous voltage present. Voltages present constitute a shock hazard, which can cause severe injury or death. (L004)**

L012

CAUTION:
Pinch hazard. (L012)

DANGER

> **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)**

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the IBM or Lenovo provided power cord. Do not use the IBM or Lenovo provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To disconnect:

  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices.

  To connect:

  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.

- Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.

(D005)

CAUTION:
This product is equipped with a 3-wire (two conductors and ground) power cable and plug. Use this power cable with a properly grounded electrical outlet to avoid electrical shock. (C018)

DANGER

Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

(R001 part 1 of 2)

CAUTION:

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**

- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**

- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**

- **(For sliding drawers): Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**

- **(For fixed drawers): This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Chapter 1. Introduction

The 1U 18.5-inch Standard Console, Type 1723-8BX, is a flat-panel display and keyboard tray in one unit. The console unit occupies 1U[1] of space in a rack. You can install an optional console switch behind the standard console in the rack to attach more than one server to the flat-panel display and keyboard.

The console unit might have features that are not described in the documentation that comes with the console unit, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the console unit documentation. To check for updates, go to http://www.ibm.com/supportportal/.

For service or assistance, see Appendix B, "Getting help and technical assistance," on page 65.

Console features

The standard console has the following features:

- Mounts on slide-rails in the rack to enable easy movement and storage of the monitor
- Toolless rack installation in the 1U space for rack configurations
- 18.5-inch, 16:9 ratio LCD panel with a VGA connection to the server or KVM switch
- Support for widescreen and previous (through scaling) resolutions
- Compatible with worldwide power and regulatory requirements
- Cable-management arm comes preinstalled on the rear of the console
- Can be shipped installed in a rack (two shipping screws are required to secure the console unit to the rack)

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1. Racks are measured in vertical increments of 44 mm (1.75 inches) each. Each increment is called a "U." A 1U-high device is 44 mm (1.75 inches) tall.

Inventory checklist

Note: The illustrations in this documentation might differ slightly from your hardware.

The console kit contains the following items:

- One console unit with built-in flat-panel display and cable-management arm (A 1 meter power cord is routed along the cable-management arm and is secured with cable straps.)
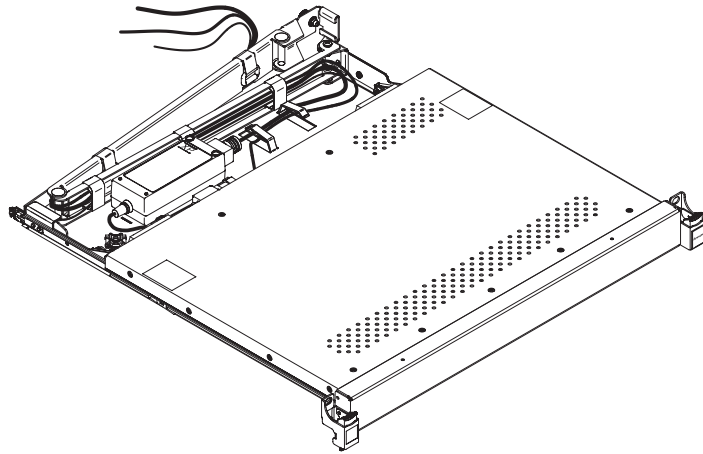
Important: The ac adapter that is connected to the flat-panel display is not intended for use with other products. Do not disassemble the flat-panel display or remove the ac adapter.

- Two outer rails
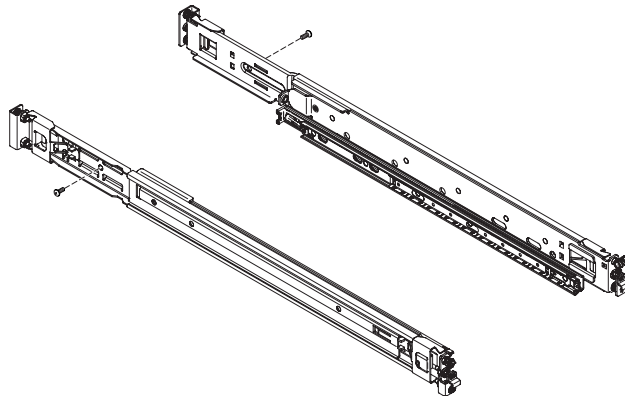
- Two console-switch mounting brackets, one with a channel (for routing the power, video, and keyboard-and-mouse cables) and six screws
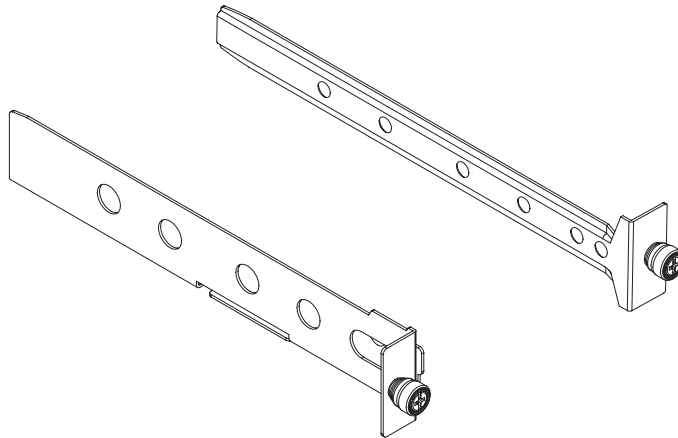
- One 2.8 m (9 ft) IEC connector power cord

- Bag with M5 clip nuts, M5 stability screws, and M5 shipping screws

You need the following tools to replace customer replaceable units:
- One #1 Phillips screwdriver (to install or remove the inner slide-rails)
- One #2 Phillips screwdriver (to unscrew the shipping screws from the rack if you move the rack to another location; to replace the cable-management arm)

See the documentation that comes with your rack or console switch for more information about those products.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Console unit specifications

The following sections provide the console unit specifications.

Rail-to-rail depth measurements

The console unit fits in a rack with the front to rear rail dimensions as shown in the following table. The console unit dimensions are measured outside-to-outside and are for racks with unthreaded and threaded holes.

Table 1. Console unit rack post distances

Rack configuration	Rack post distances
No console switch	613 - 909 mm (24.1 - 35.8 in.]
Provision for a console switch	706 - 909 mm (27.9 - 35.8 in.]

Dimensions and weight

The following table describes the console unit dimensions and weight.

Table 2. Console unit dimensions and weight

Height	44 mm (1.75 in.) (display in stored position)
Width	434 mm (17 in.) (main chassis only, slide-rails not included, faceplate not included)
Depth	434 mm (17 in.) (chassis behind EIA mounting flange, bezel in front of EIA flange not included, cable-management arm not included)
Bezel depth	35 mm (1.4 in.) (including latches and logo)
Bezel width	482 mm (19 in.)(includes latches)
Maximum forward extension	650 mm (25.6 in.)
Weight	10.4 kg (23 lb)

Chapter 2. Installing the console unit in the rack

The console unit occupies 1U of mounting space in a rack. To install the console unit in the rack, complete the steps in the following sections. Removing the rack doors and side panels, and removing the rack devices that are above and below where you want to install the console unit, might make installation easier.

See the documentation that comes with your rack for additional information.

Guidelines for rack mounting the console unit:

- Elevated operating ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment might be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- Reduced air flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- Mechanical loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- Circuit overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment—personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**

- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

CAUTION:
- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers): Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers): This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Installing the keyboard in the console unit

To install the keyboard in the console unit, complete the following steps:

1. Place the console unit on a table or other flat surface and make sure that the right side of the unit extends approximately 76 mm (3 in.) over the edge of the surface. This will help you route the keyboard-and-mouse cable more easily later in the procedure.

2. Carefully lift the front of the flat-panel display to the full upright position.
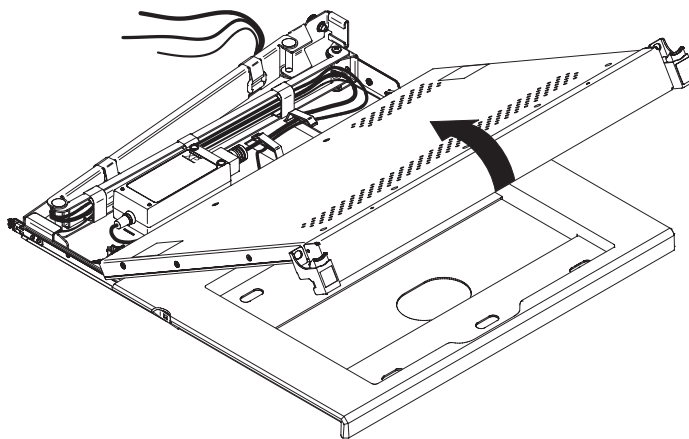
   Attention: Do not extend the keyboard feet. The flat-panel display screen might be damaged if the feet are extended when the display is closed.

3. Hold the keyboard near the keyboard tray and carefully route the keyboard-and-mouse cable down through the keyboard tray cutout and up

through the cutout that is behind the flat-panel display. (See the following illustration.) Carefully pull the cable through the cutouts.
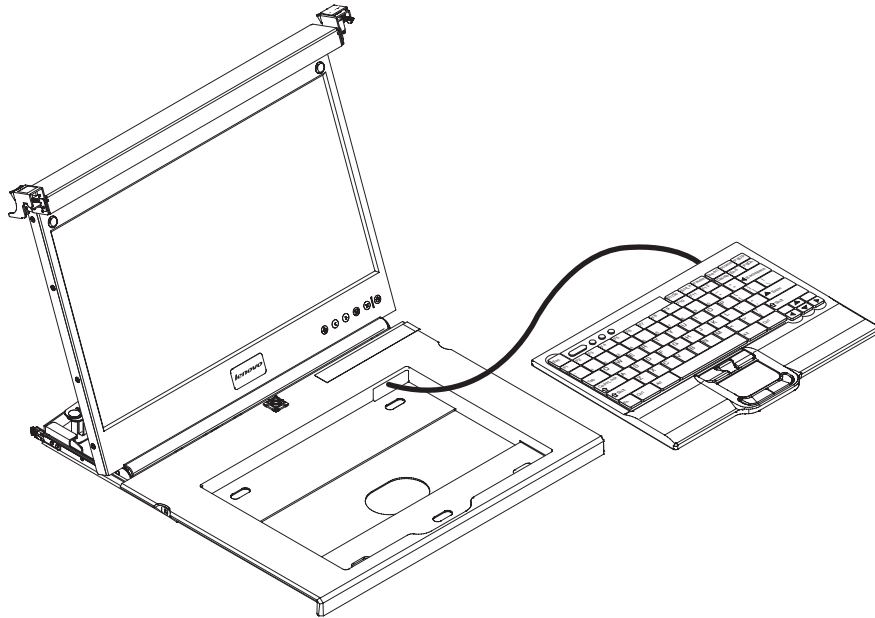
4. Peel the backing of the double-sided foam tape that is preinstalled on the front of the console tray.
5. Place the keyboard in the tray and exert a small amount of pressure on the keyboard to secure it to the double-sided tape.
6. Close the flat-panel display.

   Attention:

   • When you route the keyboard-and-mouse cable, make sure that the cable does not hang below the underside of the keyboard where it might be damaged if it interferes with the devices in the rack space below the console unit.

   • Make sure that you route all cables through the cable-routing features on the console frame behind the display and along the cable-management arm.

7. Route the cable along the cable-management arm, securing the cables with the hook-and-loop fastener strips.

Installing the console unit in the rack

Review the documentation that comes with your rack for safety and cabling information. When you install your system in a rack, observe the following guidelines:

- Make sure that the room air temperature is below 35°C (95°F).
- Do not block any air vents; usually 15 cm (6 in.) of air space provides proper airflow.
- Plan the device installation starting from the bottom of the rack.
- Install the heaviest device in the bottom of the rack.
- Do not extend more than one device out of the rack at the same time.
- Connect all power cords to properly wired and grounded electrical outlets.
- Do not overload the power outlet when you install multiple devices in the rack.
- You can install the outer slide-rails in a square-hole rack, round-hole rack, or threaded-hole rack and no tools are required.

To install the console unit in the rack, complete the following steps:

1. Place the console unit on a stable, flat surface.

   Attention: The video cable is connected to the flat-panel display. As you install the console unit in the rack, be careful that you do not pinch or cut the video cable.

2. Select a 1U location in the rack for the console unit.
3. Remove the shipping screw from each outer slide-rail.
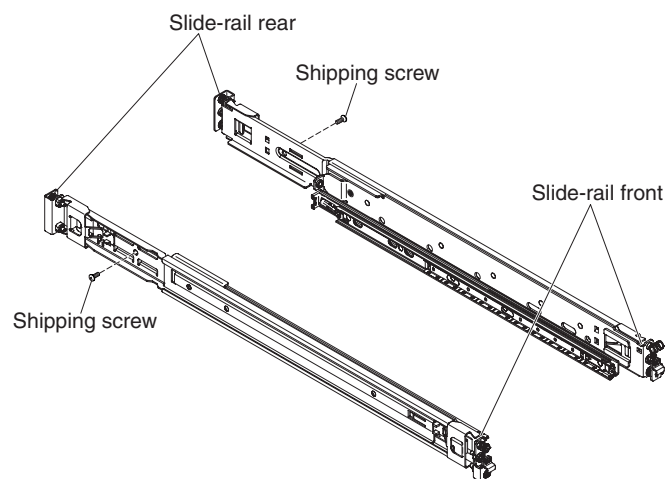
4. (For non-threaded hole racks) Install a clip nut in the front of the rack in the top hole of the U-space position that you select. The clip nuts are in the bag of screws that come with the console unit.
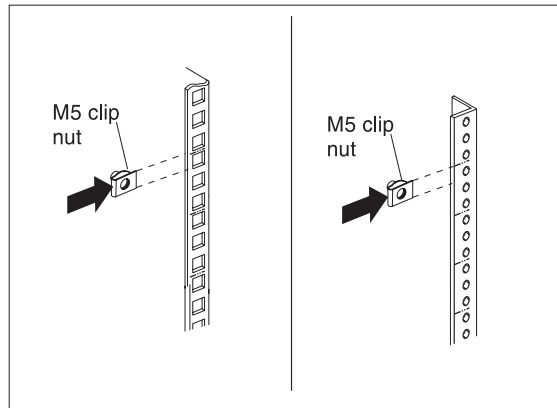
5. To attach the outer slide-rail to the rack, complete the following steps.

   Note: Install the rear slide-rail bracket on the rear of the rack first; then, install the front slide-rail bracket on the front of the rack.

   a. Holding the slide-rail horizontally, align the rear slide-rail bracket so that the bracket is on the outside of the rack mounting flanges.

   b. Press the rear slide-rail bracket toward the rack flange and then pull it towards the front of the rack until the locking bracket clicks into place behind the rack flange.
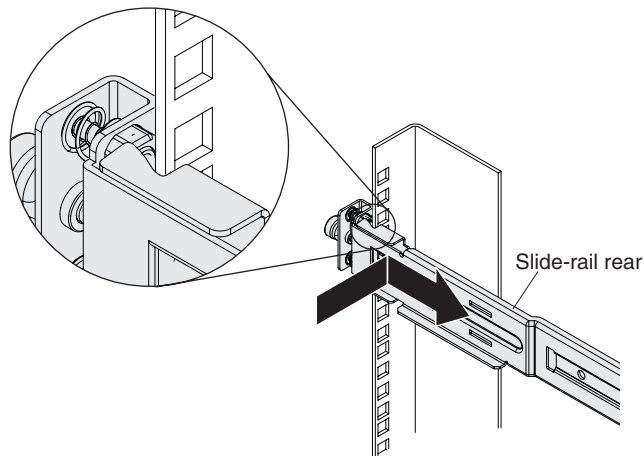
c. Extend the slide-rail and press the front slide-rail bracket toward the rack flange and then push it toward the rear of the rack until the locking bracket clicks into place behind the rack flange.

Slide-rail front
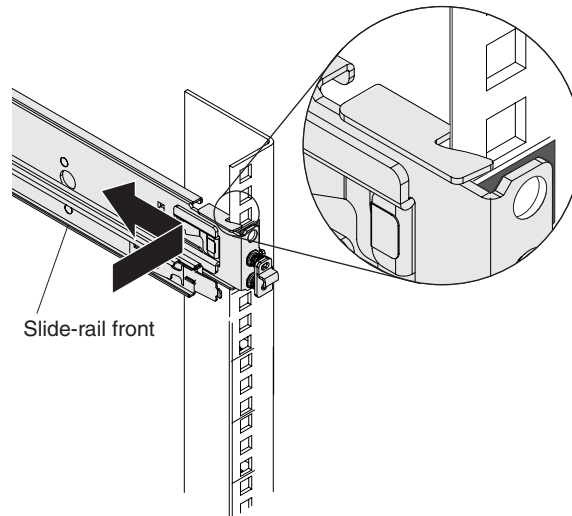
d. Repeat steps 5a on page 12 to 5c to attach the other outer slide-rail.

Note: Make sure that the two pins in the slide-rail brackets are pressed completely into the rack holes and that the bracket is flush with the rack flange. You might have to move the slide-rail up and down several times, and press on the end of the bracket to release the pins so that they are correctly in the holes in the rack flange.
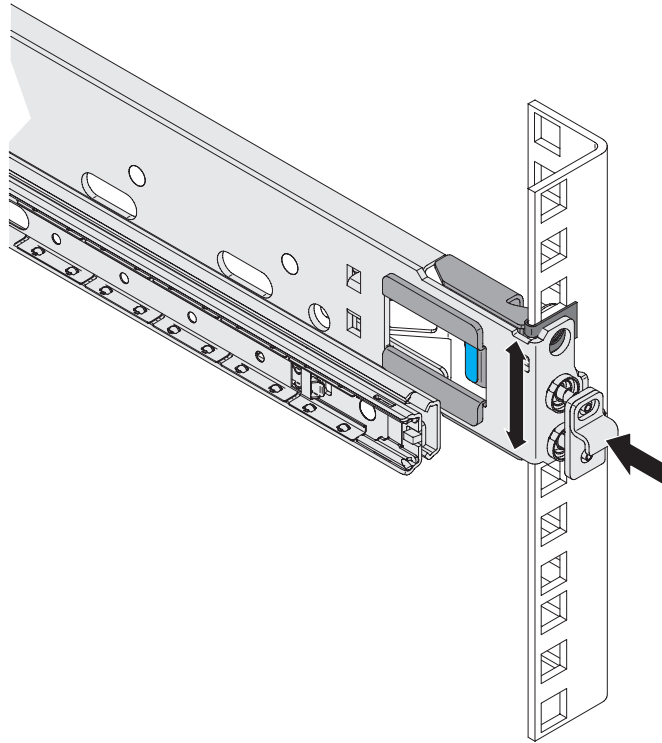
6. Extend the inner part of the outer slide-rails and slide them forward to the front of the outer rails. Carefully insert the console inner rail into the extended slide rail body as shown in the illustration.
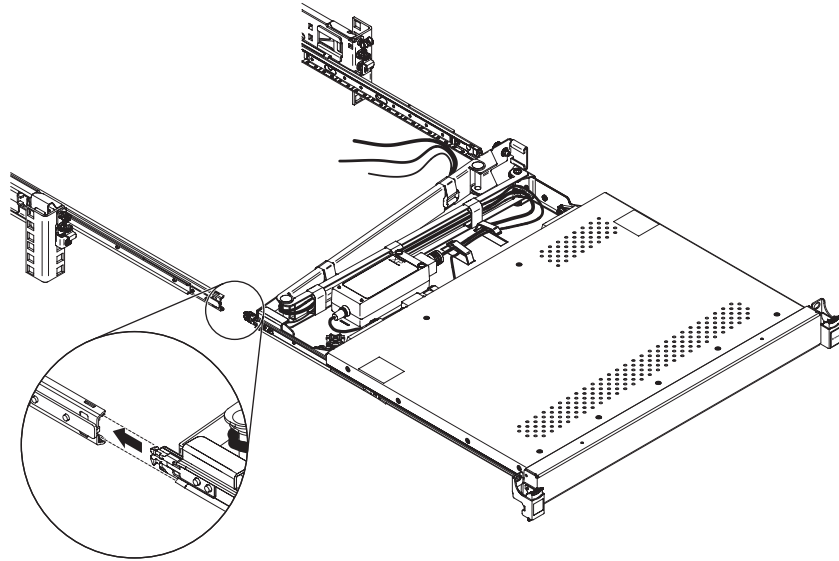
7. Press in both release latches **1** ; then, grasp both sides of the console unit and push it completely into the rack **2** . There will be resistance initially as the inner and outer rails are aligned. Pull the console unit out halfway, and then push it back in to seat the console unit in the rails. Do this a few times until the console unit moves smoothly in the rails.

   Note: The release latches are self-releasing detents (mechanisms), once the rails are seated properly. The release latches can be used for placement of the unit; but, are not required unless removing the unit from the rack.

Release latch

Release latch
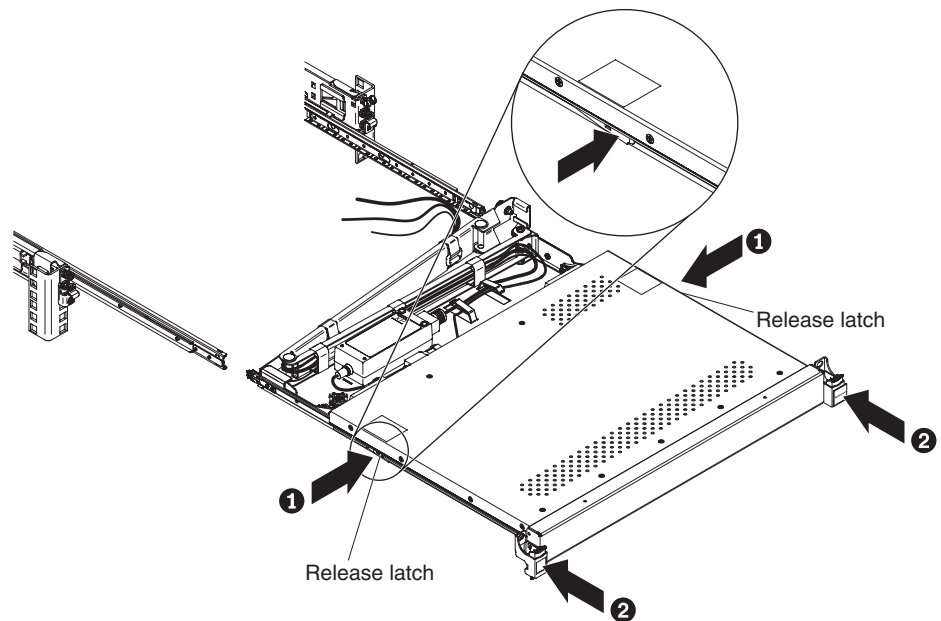
8. On the right rail, align the C-channel on the end of the cable-management arm with the bracket on the console unit. Slide the C-channel onto the bracket until the cable-management arm thumbscrew aligns with the hole in the bracket. Tighten the thumbscrew.

Thumbscrew

Cable-management arm
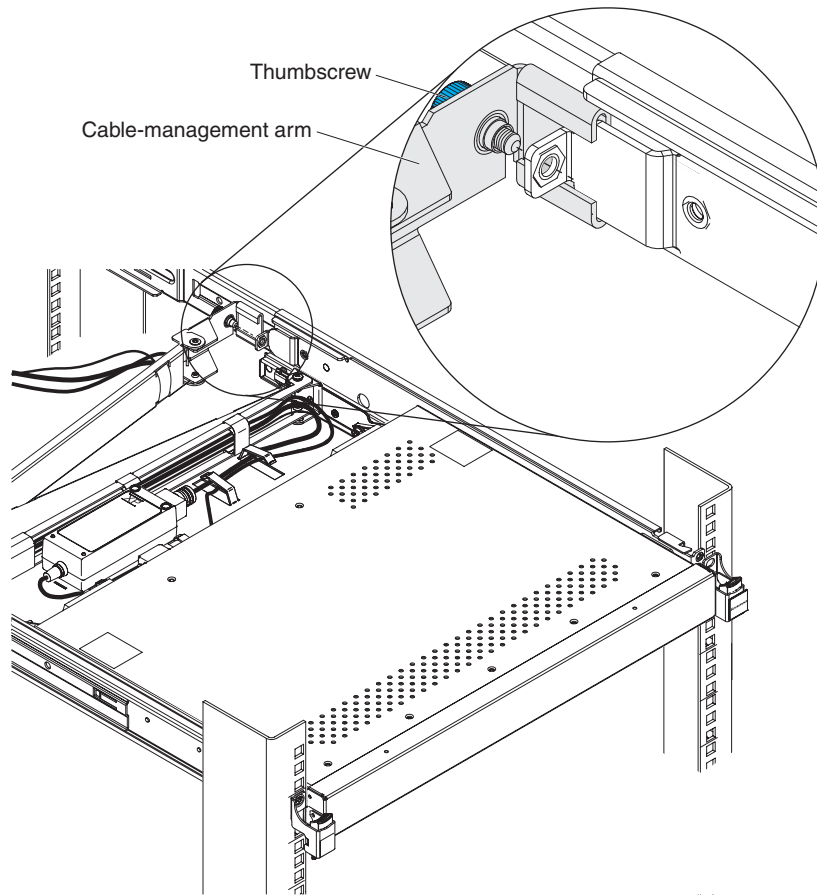
9. Connect all cables to either a server or a console switch in the rack. Connect the power cord to the short jumper cord on the cable-management arm, and then connect the power cord to a properly grounded electrical outlet or power distribution unit (PDU).

   For information about installing a console switch behind the console unit in the rack, see "Installing an optional console switch" on page 20.

10. Fully extend the console unit from the front of the rack, and then neatly route the cables within the rack and secure them with cable straps along the way.

    Important: If you have excess video cable, do not coil it as shown in the following illustration.
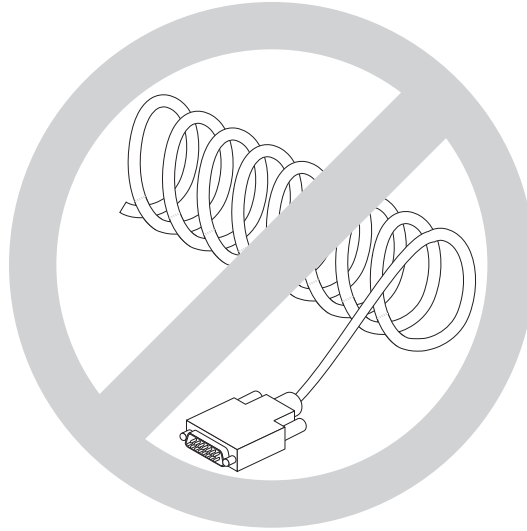
To minimize the electrical interference if you have excess video cable, arrange the cable in figure-eight loops, as shown in the following illustration. Secure the cable in the middle with a cable tie or strap.

Cable tie
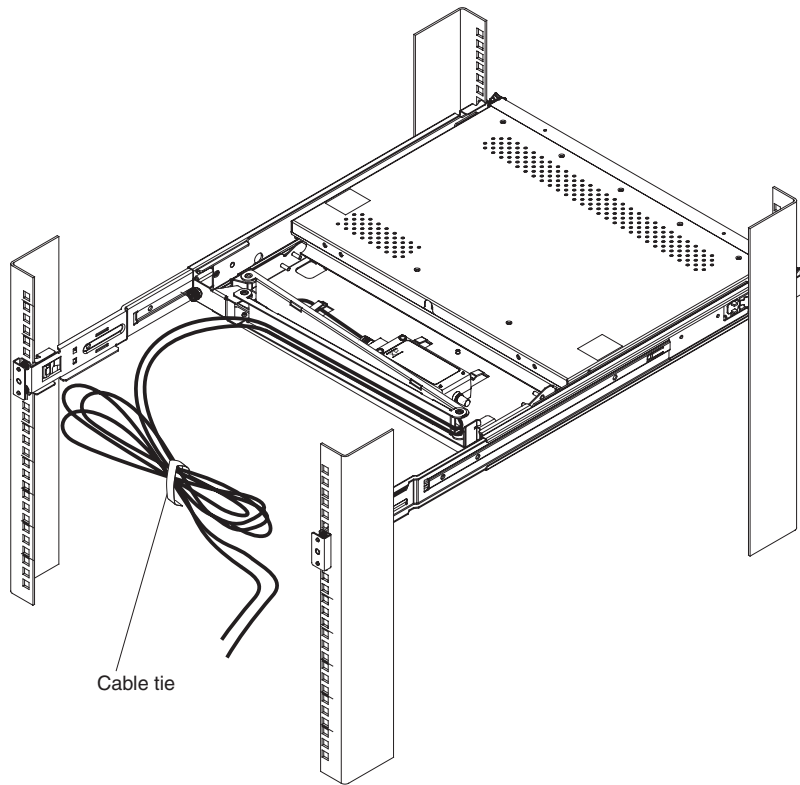
(Optional for all racks) To secure the slide-rails to the rack after installation, install a flat-head stabilizer screw in the top hole on the front of each slide-rail.

Stabilizer screw

Stabilizer screw
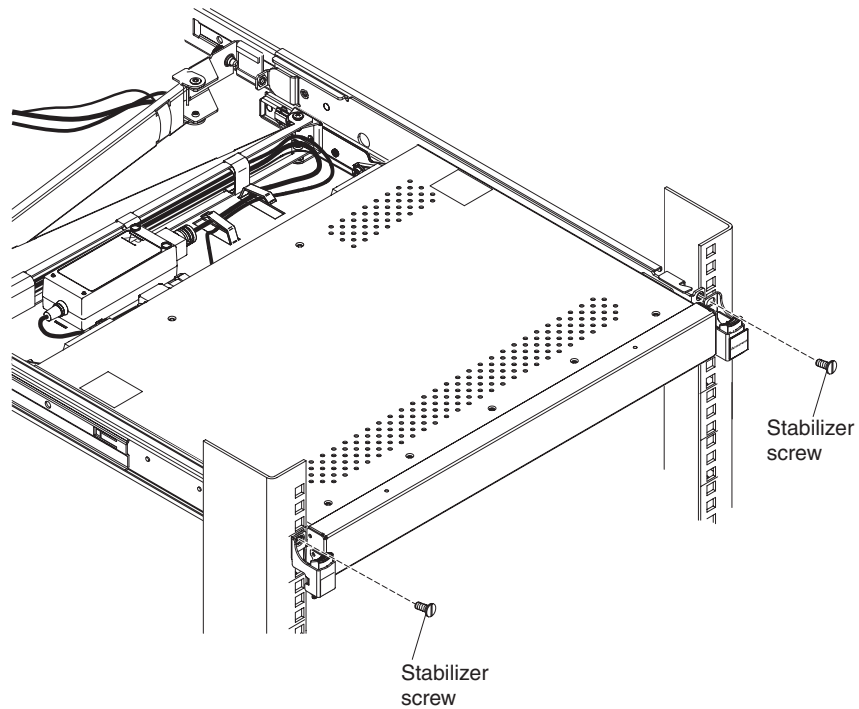
Before you move a rack with a console unit to another location, secure the front of the console unit to the rack with two M5 shipping screws that come in the bag of screws (see the following illustration).

Shipping screw

Shipping screw
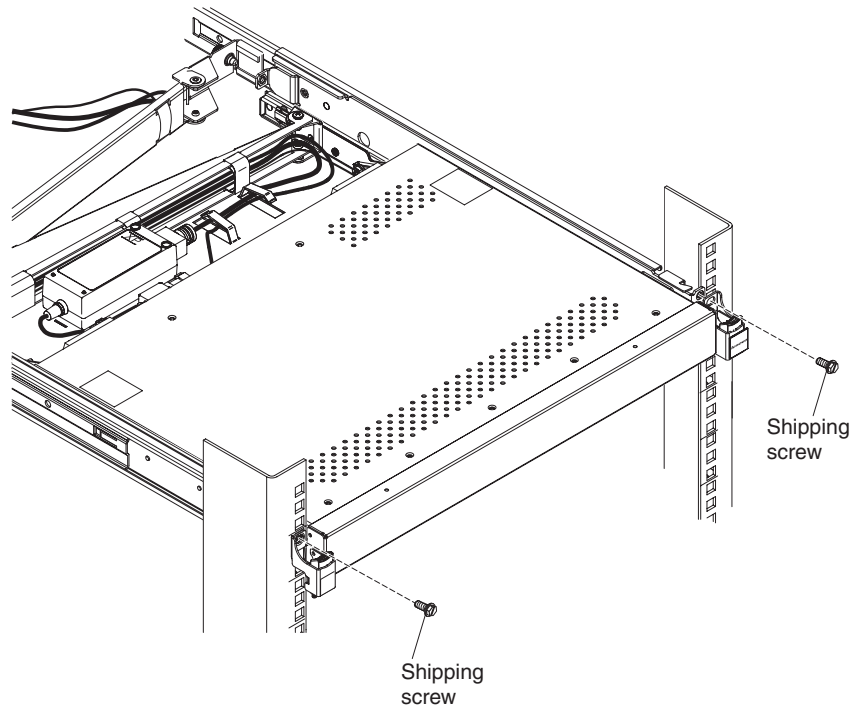
See Chapter 3, "TFT-LCD display" for information about operating the display. See the keyboard documentation for information about operating the keyboard.

Installing an optional console switch

You can use a console switch to attach more than one server to a single display and keyboard. The optional console switch is available separately.

Depending on the depth of the console switch and the depth of the rack, you might be able to mount a console switch behind the console unit in the same 1U space. To mount the console switch behind the console unit, use the custom mounting brackets that come with the console unit.

Use the brackets and instructions that come with the console switch for other installation options.

Important: The console switch extends beyond the rear rack-cabinet mounting flanges when you install the switch behind the console unit.

Notes:
1. In this procedure, *left* and *right* refer to orientations as you are facing the rear of the rack.
2. The console switch mounting brackets come in the miscellaneous hardware kit.
3. The mounting brackets have several pre-drilled holes and can support most console switch designs.

To install a console switch behind the console unit, complete the following steps.
1. Attach the mounting bracket (with the channel) to the left side of the console switch, using two 8-32 screws, and then attach the other mounting bracket to the right side of the console switch. Make sure that you correctly align the holes in the bracket with the console switch bracket holes.

   Note: The mounting bracket that you attach to the left side of the console switch has a channel through which you can route the power, video, and keyboard-and-mouse cables. Make sure that you attach the bracket to the console switch so that the channel on the mounting bracket faces upward.

Console switch

Mounting bracket

Mounting bracket with channel
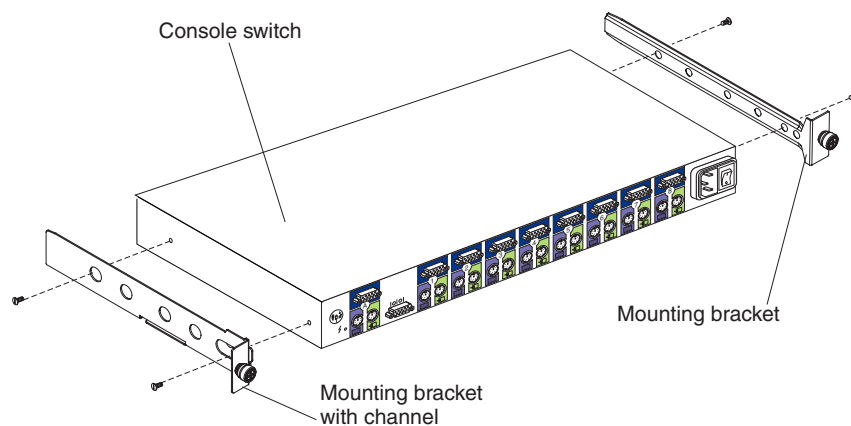
2. Install the console switch behind the console unit, making sure that the front switch brackets are in front of the rack flanges. Tighten the two thumbscrews to secure the switch to the rack.

Console switch screw

Console switch screw
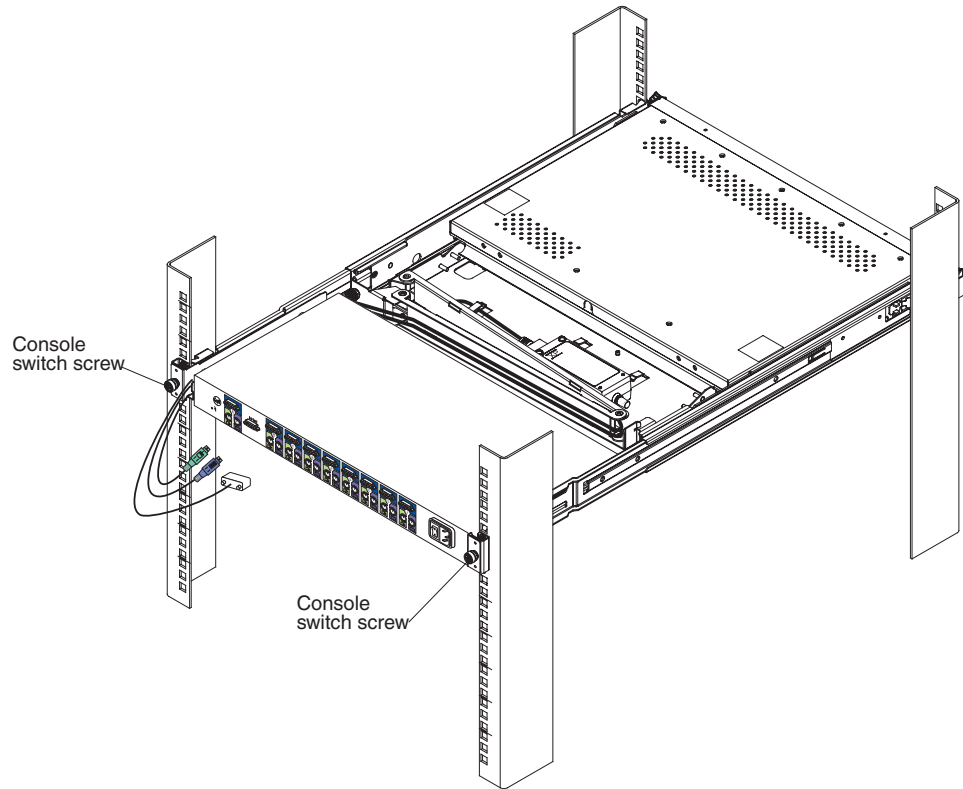
3. Route the power, video, and keyboard-and-mouse cables through the channel in the mounting bracket on the left side of the console switch, and then connect the video, keyboard, and mouse connectors to the console switch.

4. See the documentation that comes with the console switch for information about connecting the flat-panel display, thin keyboard, and servers to the console switch.

Chapter 3. TFT-LCD display

This chapter contains basic information about using the TFT-LCD display. For most applications, the factory default settings on the display do not require adjustment.

Using the on-screen display menu

Use the on-screen display (OSD) menu to adjust the characteristics of the image that is being displayed.

Using the control buttons

The control buttons on the lower right of the LCD display are shown in the following illustration. The following list describes each control button starting with the control button farthest to the left side.
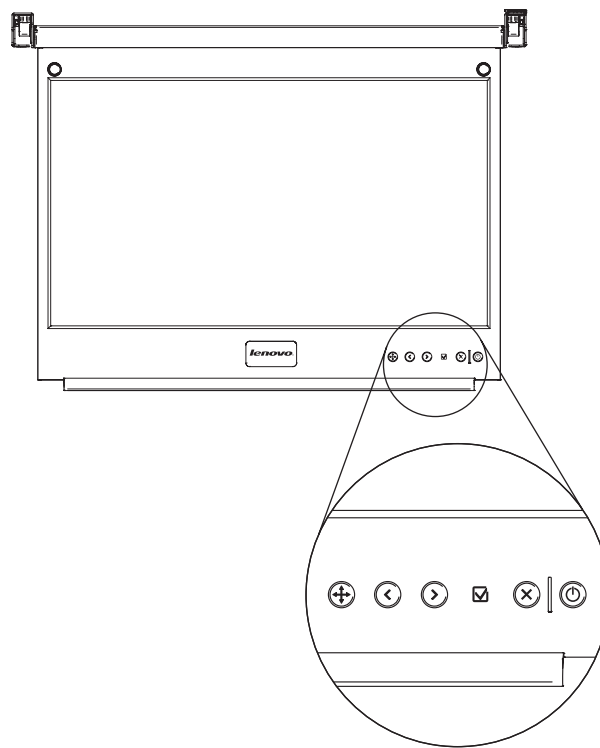
- **Auto Adjust: (☼):** Press this button to enable the monitor auto adjustment feature.
- **Left arrow and right arrow buttons (◄ ►):**
  - Press the right arrow button to select the function that is to be adjusted.
  - Press the left arrow or right arrow button to decrease or increase the value of the selected adjustment or to select the correct setting.
- **Select/Menu button:** Press this button to access, select, or confirm a menu option.
- **Exit button:** Press this button to exit the menu or return 1 level in the menu.
- **Power button:** Press this button to turn on and turn off the display power. This indicator shows the status of the display operation:
  - Green: Normal operation
  - Flashing green: Standby power

– Black: Power is off

Using the display menu

To activate the display menu, press the **Select/Menu** button. The Main menu is displayed.
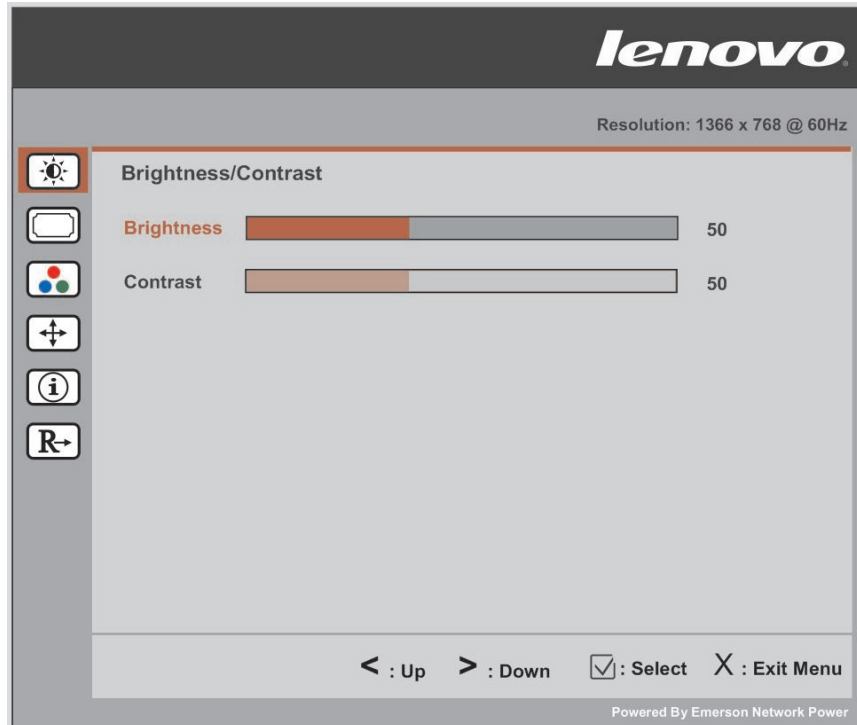
The menu choices are described in the following list:

- **Brightness/Contrast**
  - **Brightness** - Brightness Slider Default 50, incremental adjustment by 0 from 1 - 100
  - **Contrast** - Contrast Slider Default 50, incremental adjustment by 0 from 1 - 100
- **Display Settings**
  - **Wide Mode**
    - **1:1** - Uses exact pixel count from video controller
    - **Aspect** - Uses pixel ratio but scales to largest available picture
    - **Fill** - Default. Scales incoming image to utilize full screen
  - **Hoizontal Position** - Screen picture adjustment - Default at 50 Center of the Screen, incremental adjustment by 1 pixel from 0 - 100
  - **Vertical Position** - Screen picture adjustment - Default at 50 Center of the Screen, incremental adjustment by 1 pixel from 0 - 100
  - **Sharpness** - Visual reference to light and dark - Default 50, incremental adjustment by 10 from 0 - 100
  - **Pixel Clock** - Analog input control - Default Panel Dependent
  - **Phase** - Analog input control - Default Panel Dependent
  - **Display Info** - Display Resolution and Refresh Rate
  - **Reset Display settings** - Reset Display Settings to Factory Default - confirmation required

- **Color Settings**
  - **Standard**
  - **Warm**
  - **Cool**
  - **Custom Color** - If selected, the following RGB default values are displayed:
    - **Red** - Default 50, incremental adjustment by 1 from 0 - 100
    - **Blue** - Default 50, incremental adjustment by 1 from 0 - 100
    - **Green** - Default 50, incremental adjustment by 1 from 0 - 100
  - **Reset Color Settings** - Resets color to factory default - confirmation required
- **Auto Adjust** - Auto adjustment - confirmation required
- **Other Settings**
  - **Language**
    - **English** - Converts OSD UI into local language chosen by user (default language)
    - **Spanish** - Converts OSD UI into local language chosen by user
    - **French** - Converts OSD UI into local language chosen by user
    - **German** - Converts OSD UI into local language chosen by user
    - **Japanese** - Converts OSD UI into local language chosen by user
    - **Korean** - Converts OSD UI into local language chosen by user
    - **Simpl Chinese** - Converts OSD UI into local language chosen by user
  - **Menu Timer** Sliding scale by 5 sec increments From 5 to 100- Default 20
  - **DDC/CI** On/Off - Default On
  - **LCD Conditioning** On/Off - Default off
  - **Reset** Reset Other settings to Factory Default - confirmation required
- **Factory Reset** - Reset all settings to default

Maintaining the TFT-LCD display

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Before you perform any maintenance on the display, turn off the power. Observe the following guidelines when you clean the display:

- Gently wipe the device covers and the screen with a soft cloth.
- Remove finger marks and grease with a damp cloth and mild detergent; do not use solvents or abrasives.
- Never use flammable cleaning material to clean a display or any other electronic device.

Technical specifications

The technical specifications for the console unit are described in the following list.

LCD panel

Size	18.5- inch diagonal
Display area (horizontal x vertical)	409.8 x 230.4 mm
Type	TFT active matrix
Pixel pitch (horizontal x vertical)	300 x 300 per triad

Characteristics

Brightness	250 cd /m2 (Typ.)
Contrast ratio	1000:1 (Typ.)
Display color	16.7 M colors
Viewing Angle	Horizontal - 170°
	Vertical - 160°
Aspect Ratio	16:9 (Native)
Scaling	1:1, Aspect and Fill

Display resolution

Optimum mode	1366 x 768 at 60 Hz
Maximum mode	1600 x 1200 at 60 Hz

Note: For the supported display resolutions, see Appendix A, "Supported resolution timing charts," on page 55.

Connector	VGA
Power supply	ac 100 - 240 V, 47 - 63 Hz
	dc 12 V/ 3.3 A max

Power consumption

Standard usage	17 watts
Maximum	22 watts
Power supply maximum	40 watts
Power saving	Less than 1 watt

Environmental conditions

Operating temperature	0°C to 50°C
Operating humidity	10% to 80%
Operating altitude	Maximum 3000 meters
Storage temperature	-20°C to +60°C
Storage humidity	5% to 95%
Storage altitude	Maximum 3000 meters

Chapter 4. Hardware maintenance information

This chapter contains information about customer-replaceable units (CRUs) for the console unit and instructions for replacement parts.

Replaceable components

Tier 1 CRU: Replacement of Tier 1 CRUs is your responsibility. If Lenovo® installs a Tier 1 CRU at your request without a service contract, you will be charged for the installation.

Tier 2 CRU: You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your product.

For more information about the terms of the warranty and getting service and assistance, see the *Warranty Information* document that comes with the optional device.

CRU part numbers are subject to change without notice. This section contains a listing of the CRU part numbers that are available as of the date of this document was written.
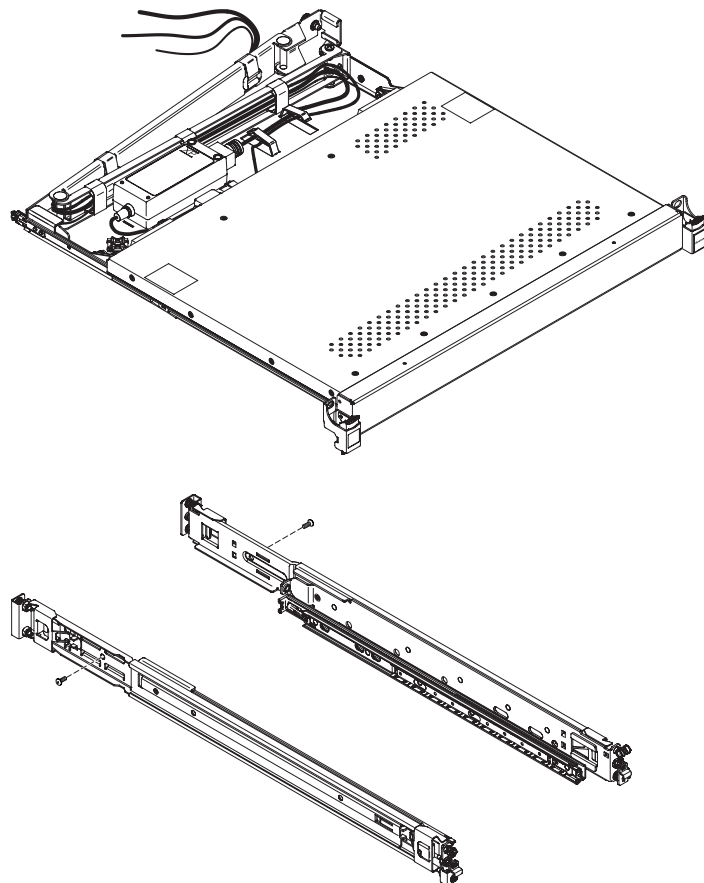
Table 3. Customer-replaceable units for the 1U 18.5-inch Standard Console

Description	CRU part number (Tier 1)
1U 18.5-inch Standard Console, without keyboard	00MM755
Standard slide-rail kit (inner and outer rails)	00MM753
Cable-management arm	00MM823
Miscellaneous parts kit (includes shipping screws, console switch mounting brackets and mounting screws)	00MM824
Power cord that connects the power supply to a power distribution unit (PDU)	39M5377

You need the following tools to replace customer replaceable units:

- One #1 Phillips screwdriver (to install or remove the inner slide-rails)
- One #2 Phillips screwdriver (to replace the cable-management arm)

Power cords

付属の電源コードセットはこの装置専用です。他の機器には使用しないでください。

For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

Power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

Power cords for a specific country or region are usually available only in that country or region.

Power cord part number	Used in these countries and regions
39M5206	China
39M5102	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea

Power cord part number	Used in these countries and regions
39M5123	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
39M5130	Denmark
39M5144	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
39M5151	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
39M5158	Liechtenstein, Switzerland
39M5165	Chile, Italy, Libyan Arab Jamahiriya
39M5172	Israel
39M5095	220 - 240 V Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
39M5081	110 - 120 V Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela
39M5219	Korea (Democratic People's Republic of), Korea (Republic of)
39M5199	Japan

Power cord part number	Used in these countries and regions
39M5068	Argentina, Paraguay, Uruguay
39M5226	India
39M5233	Brazil

Replacing the keyboard

Before you replace the keyboard, remove any devices that are directly above the console unit so that you have access to disconnect the cables. See the documentation that comes with the device for removal instructions.

You can also remove the console unit from the rack for easier cable access. See the instructions in "Removing the console unit from the rack" on page 44; then, return to step 5 in this procedure.

To replace a keyboard in the console unit, complete the following steps:

1. Close the flat-panel display.
2. Disconnect the keyboard-and-mouse cable from the server or console switch.
3. Carefully unfasten the hook-and-loop fastener strips from the cable-management arm and remove the keyboard-and-mouse cable.

    L012

    CAUTION:
    Pinch hazard. (L012)
4. Fully extend the console unit out of the rack.
5. Lift the front of the flat-panel display and raise the display to the full upright position.
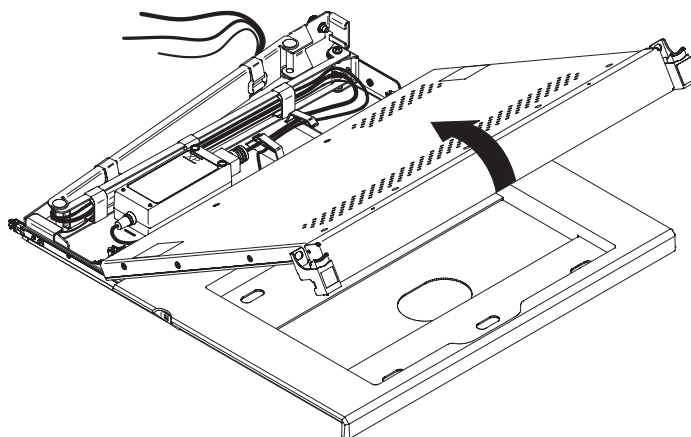
6. Remove the old keyboard from the console unit.
7. Unpack the replacement keyboard.

    Attention: Do not extend the keyboard feet. The flat-panel display screen might be damaged if the feet are extended when the display is closed.

8. Hold the new keyboard near the keyboard tray and carefully route the keyboard-and-mouse cable down through the keyboard tray cutout and up through the cutout that is behind the flat-panel display. (See the following illustration.) Carefully pull the cable through the cutouts.
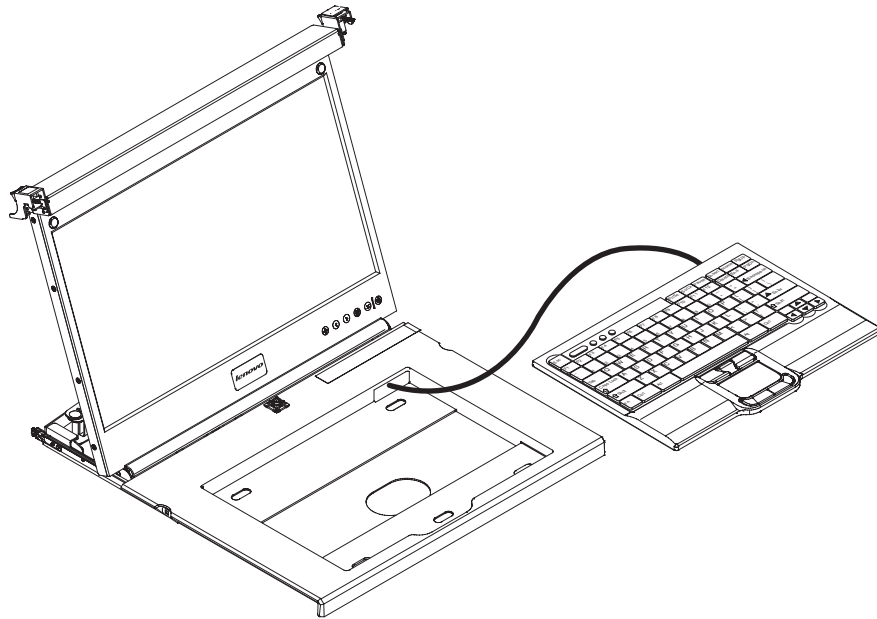
9. Place the keyboard in the tray and exert a small amount of pressure on the keyboard to secure it to the double-sided tape on the front of the console tray.

10. Close the flat-panel display.

11. If you removed the console unit from the rack, go to "Installing the console unit in the rack" on page 51 to complete the procedure.

    Attention: When you route the keyboard-and-mouse cable, make sure that the cable does not hang below the underside of the keyboard where it might be damaged if it interferes with the devices in the rack space below the console unit.

12. Route the keyboard-and-mouse cable along the cable-management arm, securing the cable with the hook-and-loop fastener strips.

13. Reconnect the keyboard-and-mouse cable.

Replacing the cable-management arm

Before you replace the cable-management arm, remove any devices that are directly above and below the console unit so that you can disconnect the cables and detach the cable-management arm. See the documentation that comes with the device for removal instructions.

You can also remove the console unit from the rack for easier access. See the instructions in "Removing the console unit from the rack" on page 44; then, return to step 5 in this procedure.

To replace the cable-management arm, complete the following steps:

1. If a console switch is installed behind the console unit, remove the console switch from the rack.
2. Turn off the display and disconnect the power cord from the short jumper cord on the cable-management arm from the electrical outlet or power distribution unit (PDU). Disconnect from the server or console switch any cables that are connected to the console unit (keyboard-and-mouse, video, and power cables).
3. Close the flat-panel display.
4. Temporarily remove all cables from the cable-management arm.
5. Remove the screw that attaches the front cable-management arm bracket to the console unit and then, remove the cable-management arm.
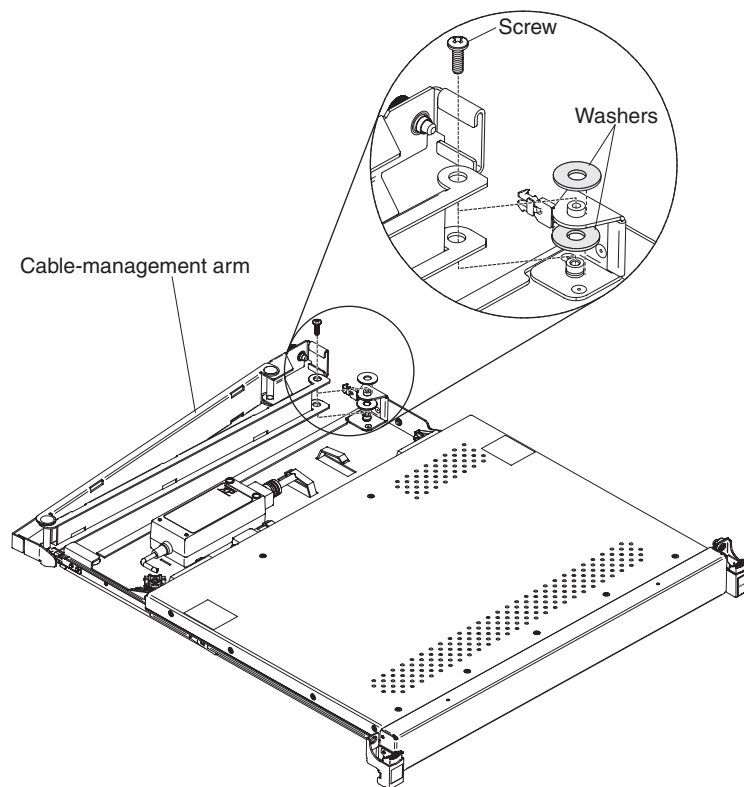
6. Unpack the replacement cable-management arm.
7. Remove the two washers on the cable-management arm bracket and replace them with the new washers that come with the replacement cable-management arm.
8. Align the screw holes in the new cable-management arm with the bracket and secure it with the screw that you removed in step 5.

9. If you removed the console unit from the rack, go to "Installing the console unit in the rack" on page 51 to complete the procedure.

10. Route the cables that you removed in step 2 on page 35 along the new cable-management arm and secure them along the way with the hook-and-loop fastener strips.

11. Align the C-channel on the end of the cable-management arm with the bracket on the console unit. Slide the C-channel onto the bracket until the cable-management arm thumbscrew aligns with the hole in the bracket. Tighten the thumbscrew.

Thumbscrew

Cable-management arm

12. If you removed a console switch from behind the console unit, reinstall it now.

13. Reconnect to the server or console switch all cables that you removed in step 2 on page 35.

14. Connect power to the display.

Replacing the slide-rail assemblies

Note: To make sure that the slide-rail assemblies fit correctly, replace both the outer and inner slide-rails at the same time.
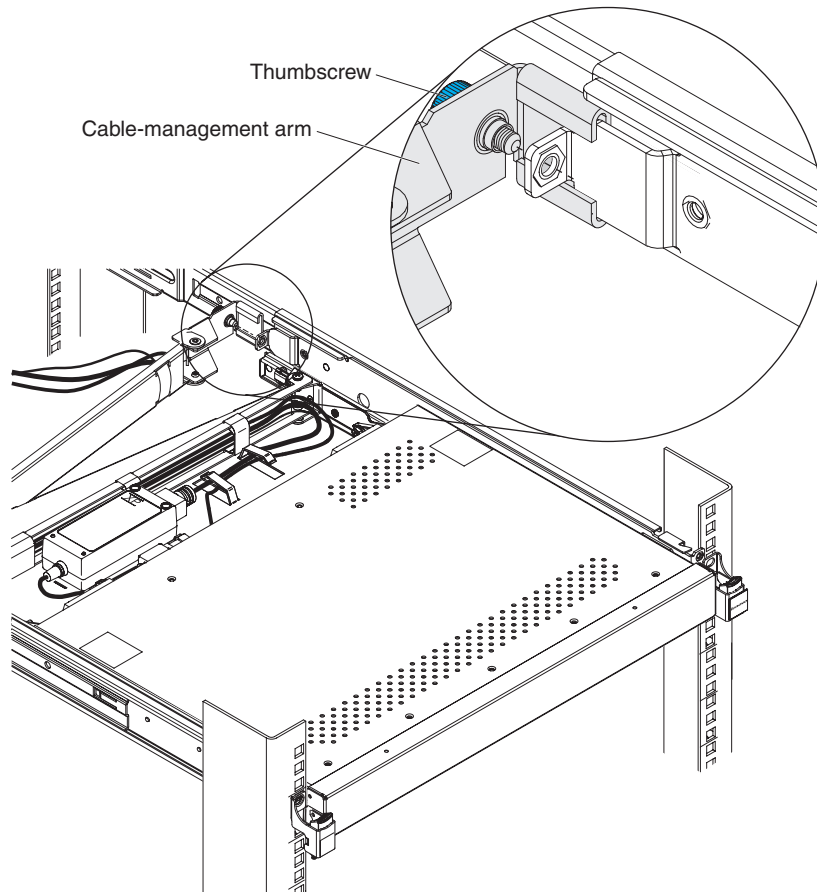
To replace the outer and inner slide-rails for the console unit, complete the following steps:

1. If a console switch is installed behind the console unit, remove the console switch from the rack.

2. Turn off the display and disconnect the power cord from the short jumper cord on the cable-management arm from the electrical outlet or power distribution unit (PDU). Disconnect from the server or console switch any cables that are connected to the console unit (keyboard-and-mouse, video, and power cables).

3. Close the flat-panel display.

4. If you installed the optional flat-head stabilizer screws in the top hole on the front of each slide-rail, remove them and set them aside.
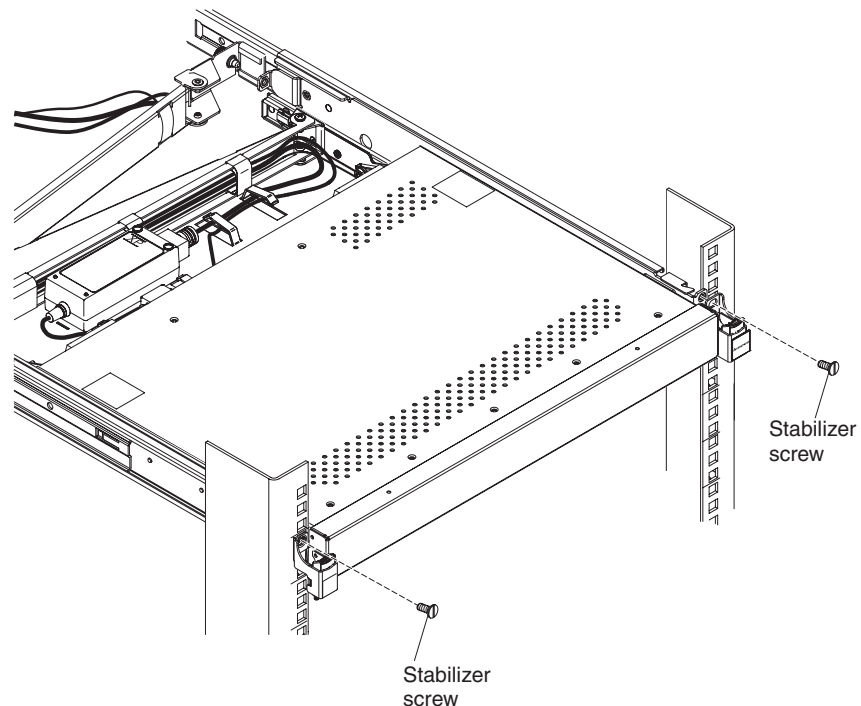
Stabilizer screw

Stabilizer screw

5. Remove the console unit from the rack:

   a. Remove the thumbscrew that attaches the cable-management arm to the outer slide-rail bracket. Slide the C-channel on the cable-management arm completely away from the bracket on the console unit.

L012

CAUTION:
Pinch hazard. (L012)

b. Fully extend the console unit out of the rack.
c. Press in both release latches **1** .

Release latch

1

2

1

Release latch

2
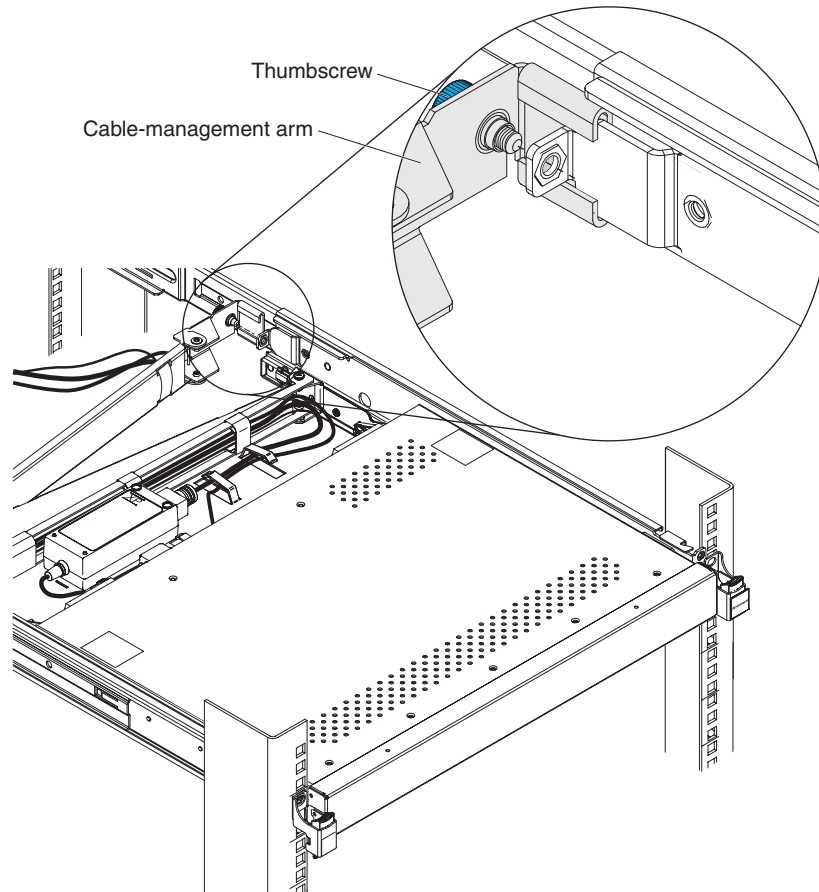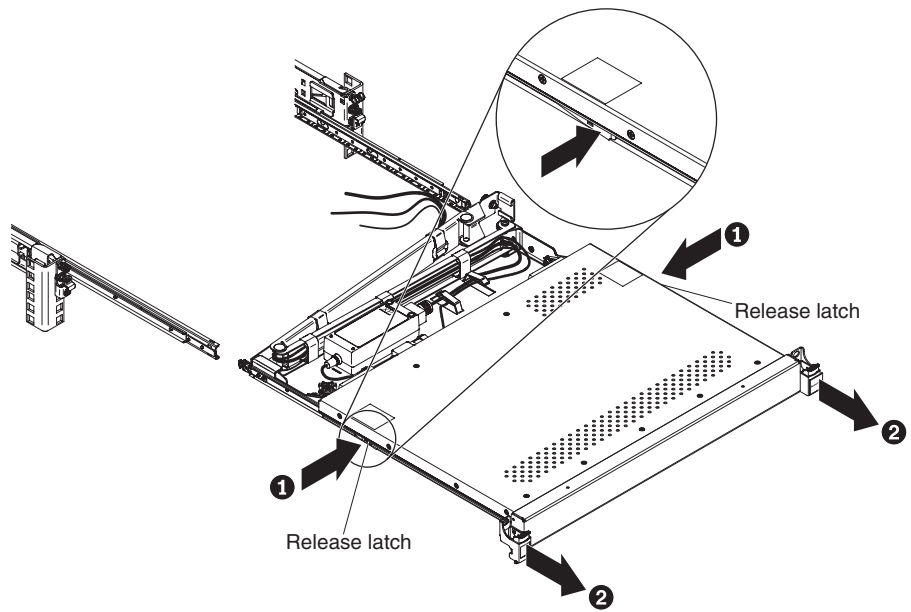
d. Grasp both sides of the console unit and pull it completely out of the rack **2** .
e. Place the console unit on a table or other flat surface.

6. To close the extended rails, press up on the release latch **1** and push the extended rail toward the rack so that it is fully closed **2** .
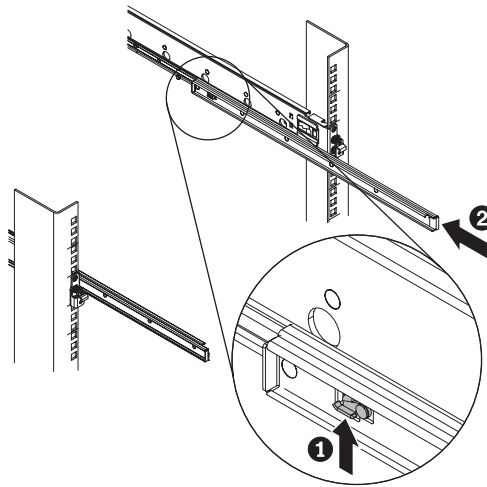
7. Remove the rear bracket of the outer slide-rail from the rack by pulling the blue tab out **1** while you move the end of the slide-rail away from the rack flange and toward the center of the rack **2** .
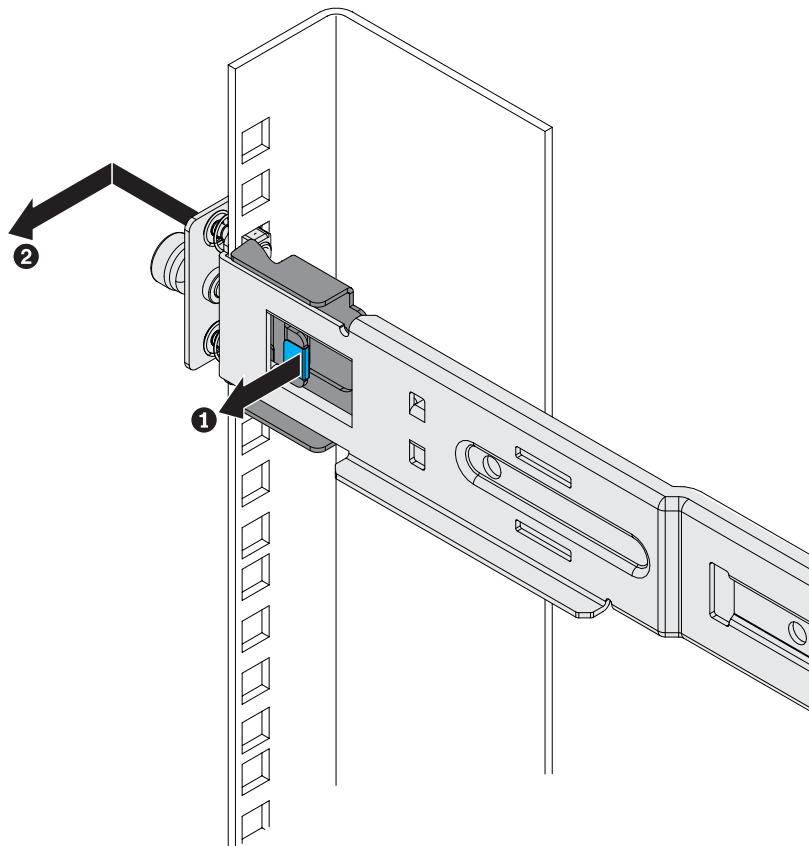
8. Remove the front bracket of the outer slide-rail from the rack by pulling the blue tab out **1** while you pull the end of the slide-rail away from the rack flange and toward the center of the rack **2** .
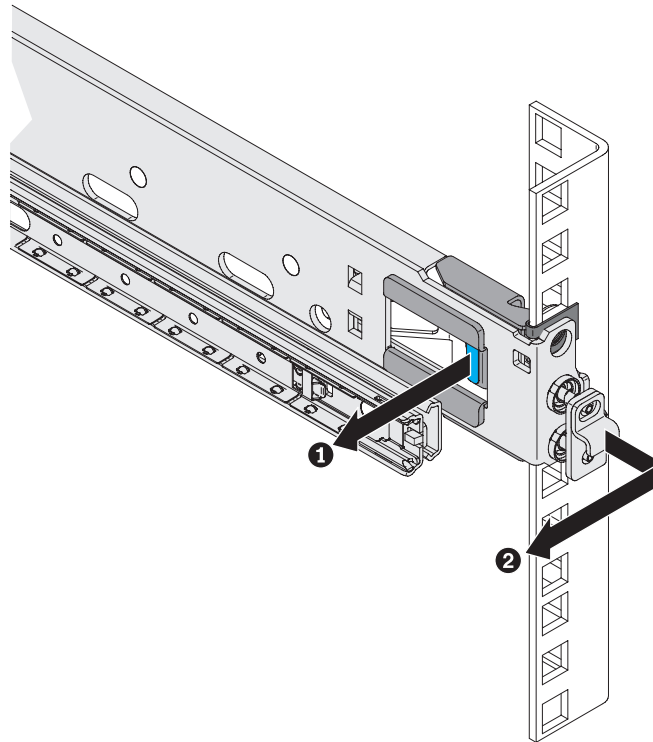
Repeat step 7 on page 40 and step 8 for the other outer slide-rail.

9. Remove the shipping screw from each new outer slide-rail.

10. To attach the outer slide-rail to the rack, complete the following steps.

   Note: Install the rear slide-rail bracket to the rear of the rack first; then, install the front slide-rail bracket to the front of the rack.

   a. Holding the slide-rail horizontally, align the rear slide-rail bracket so that the bracket is on the outside of the rack mounting flanges.

   b. Press the rear slide-rail bracket toward the rack flange and then pull it towards the front of the rack until the locking bracket clicks into place behind the rack flange.

c. Extend the slide-rail and press the front slide-rail bracket toward the rack flange and then push it towards the rear of the rack until the locking bracket clicks into place behind the rack flange.

d. Repeat steps 10a on page 41 to 10c to attach the other outer slide-rail.

11. Use a #1 Phillips screwdriver to remove the four screws that attach each inner slide-rail to the console unit. Then, attach the corresponding new inner slide-rails to the unit, using the same hardware. Make sure that you orient the inner slide rails correctly (see the following illustration).
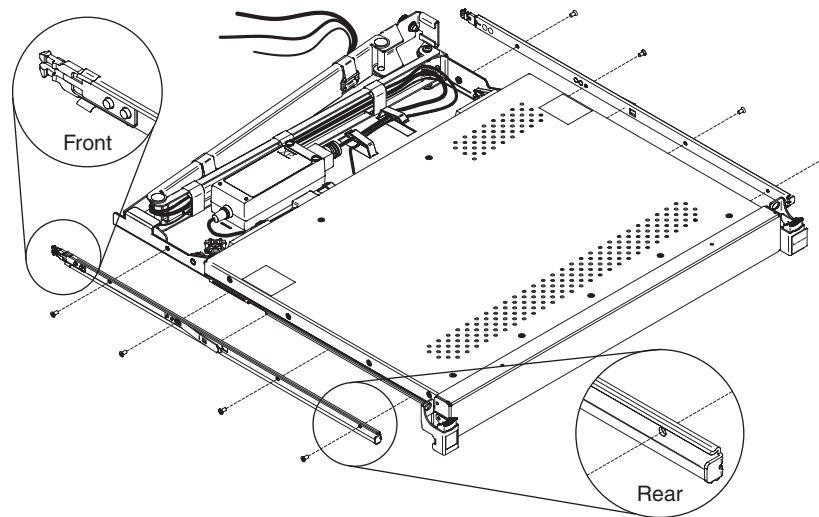
12. Go to "Installing the console unit in the rack" on page 51 for instructions for reinstalling the console unit in the rack, and then install any other devices that you removed from the rack.

Replacing the console unit

The procedures that are provided in this section to replace the console unit in the rack consist of the following tasks:

1. Removing the existing console unit from the rack
2. Moving the keyboard from the existing console unit to the replacement console unit
3. Removing and replacing the outer slide-rails

   Note: The replacement console unit comes with inner slide-rails attached. To make sure that the slide-rail assemblies fit correctly, replace the existing outer slide-rails with the new rails that come with the replacement console unit.

4. Installing the replacement console unit in the rack

Removing the rack doors and side panels might make removal of the existing console unit and installation of the replacement easier. See the documentation that comes with the rack for additional information.

Removing the console unit from the rack

To remove the console unit from the rack, complete the following steps:

1. If a console switch is installed behind the console unit, remove the console switch from the rack.
2. Turn off the display and disconnect the power cord from the short jumper cord on the cable-management arm from the electrical outlet or power distribution unit (PDU). Disconnect from the server or console switch any cables that are connected to the console unit (keyboard-and-mouse, video, and power cables).
3. Close the flat-panel display.

4. Remove the console unit from the rack:

   a. Remove the thumbscrew that attaches the cable-management arm to the outer slide-rail bracket. Slide the C-channel on the cable-management arm completely away from the bracket on the console unit.


L012

CAUTION:
Pinch hazard. (L012)
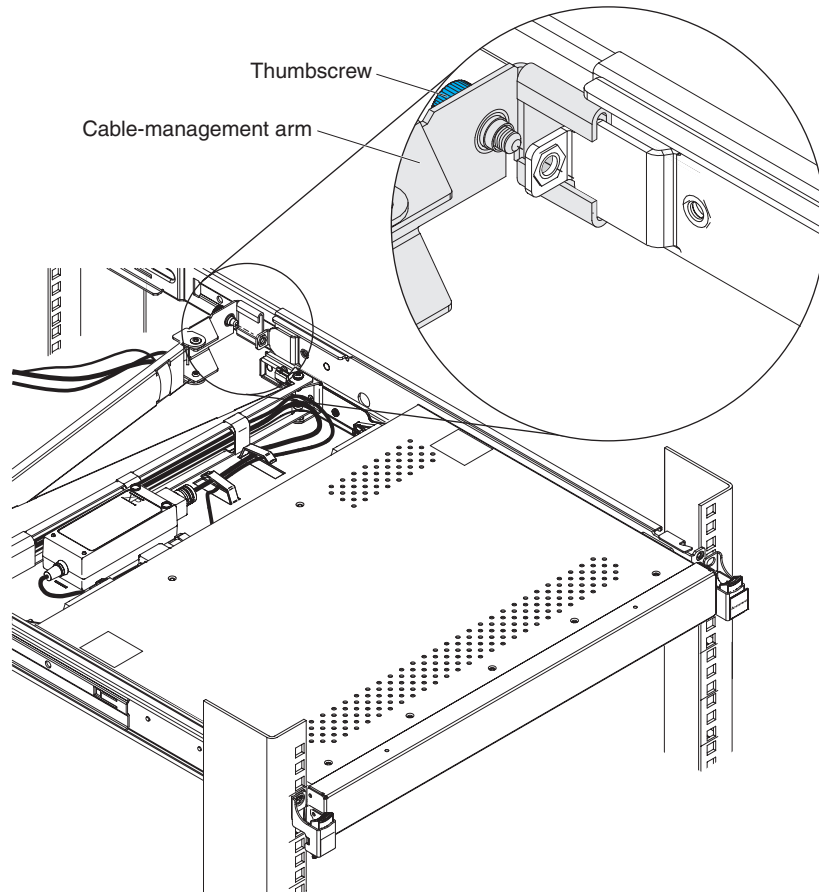
   b. Fully extend the console unit out of the rack.

c. Press in both release latches **1** .

Release latch

Release latch
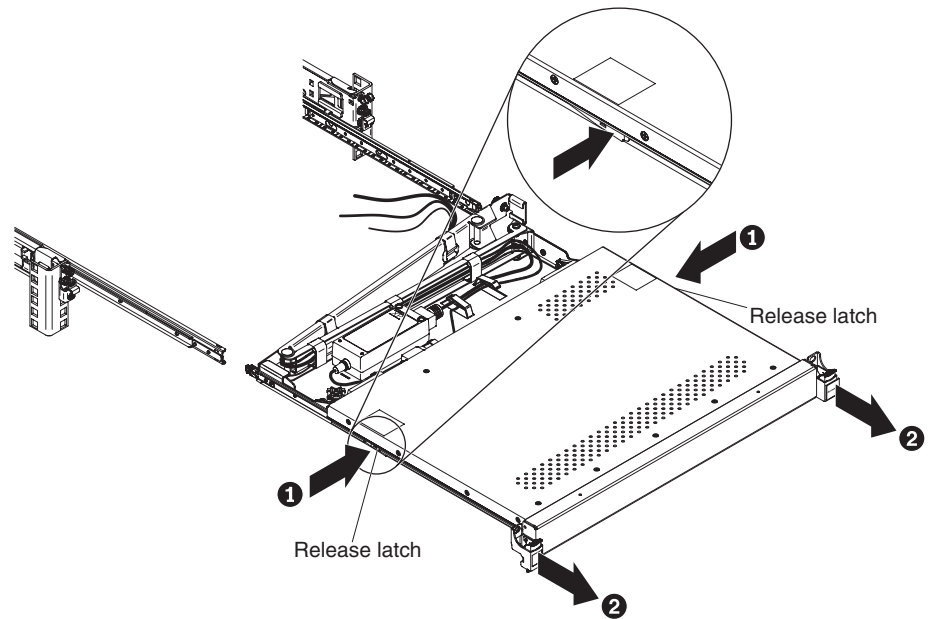
d. Grasp both sides of the console unit and pull it completely out of the rack **2** .

e. Place the console unit on a table or other flat surface.

Moving the keyboard

To move the keyboard from the existing console unit to the replacement console unit, complete the following steps:

1. Carefully lift the flat-panel display to the full upright position.

2. Remove the keyboard-and-mouse cable from the keyboard tray, and then remove the keyboard from the console unit and set it aside.

3. Place the replacement console unit on a table or other flat surface and make sure that the right side of the unit extends approximately 76 mm (3 in.) over the edge of the surface. This will help you route the keyboard-and-mouse cable more easily.

4. Hold the keyboard near the keyboard tray and carefully route the keyboard-and-mouse cable down through the keyboard tray cutout and up through the cutout that is behind the flat-panel display. (See the following illustration.) Carefully pull the cable through the cutouts.
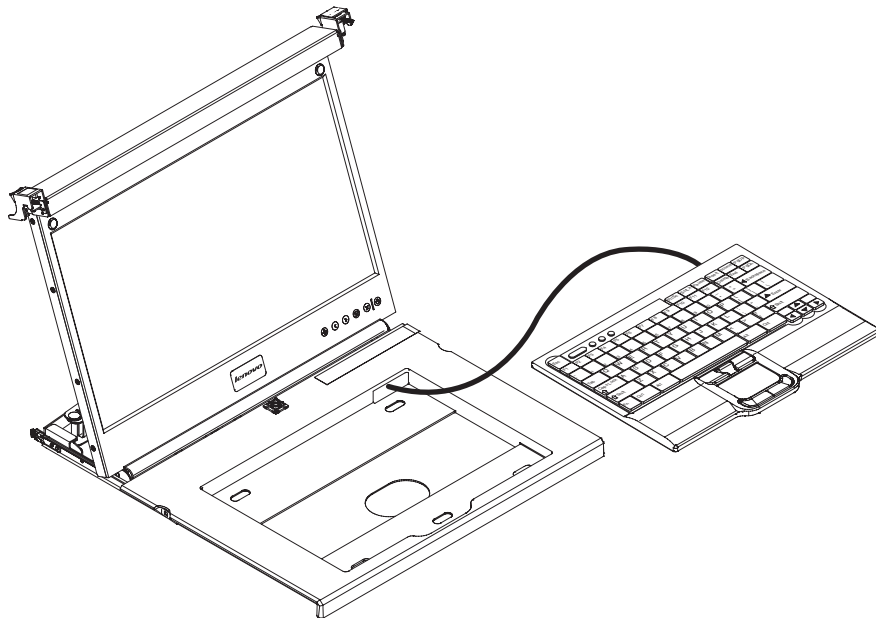
5. Place the keyboard in the tray and exert a small amount of pressure on the keyboard to secure it to the double-sided tape on the front of the console tray.

6. Close the flat-panel display.

   Attention:

   • When you route the keyboard-and-mouse cable, make sure that the cable does not hang below the underside of the keyboard where it might be damaged if it interferes with the devices in the rack space below the console unit.

   • Make sure that you route all cables through the cable-routing features on the console frame behind the display and along the cable-management arm.

7. Close the flat-panel display.

Removing and replacing the outer slide-rails

To remove and replace the outer slide-rails, complete the following steps:

1. Remove the rear bracket of the outer slide-rail from the rack by pulling the blue tab out **1** while you move the end of the slide-rail away from the rack flange and toward the center of the rack **2** .
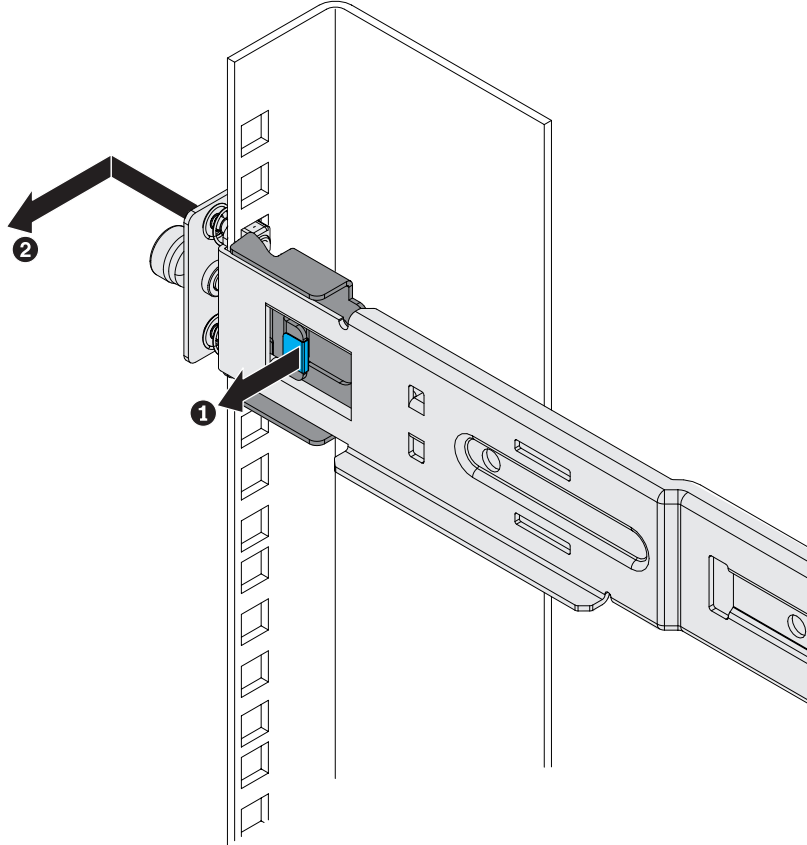
2. Remove the front bracket of the outer slide-rail from the rack by pulling the blue tab out **1** while you pull the end of the slide-rail away from the rack flange and toward the center of the rack **2**.
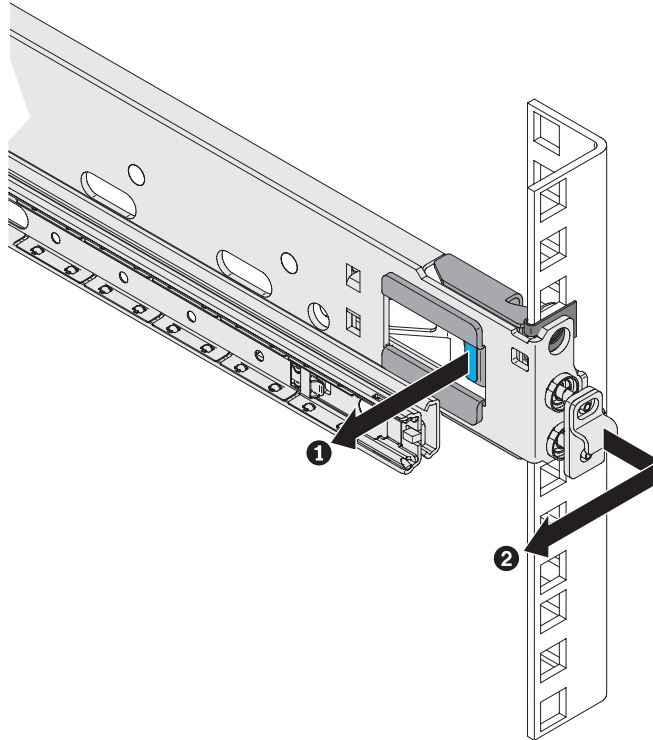
Repeat step 1 on page 48 and step 2 for the other outer slide-rail.

3. Remove the shipping screw from each new outer slide-rail.

Slide-rail rear

Shipping screw

Slide-rail front

Shipping screw

4. To attach the outer slide-rail to the rack, complete the following steps.

   Note: Install the rear slide-rail bracket to the rear of the rack first; then, install the front slide-rail bracket to the front of the rack.

   a. Holding the slide-rail horizontally, align the rear slide-rail bracket so that the bracket is on the outside of the rack mounting flanges.

   b. Press the rear slide-rail bracket toward the rack flange and then pull it towards the front of the rack until the locking bracket clicks into place behind the rack flange.

   c. Extend the slide-rail and press the front slide-rail bracket toward the rack flange and then push it towards the rear of the rack until the locking bracket clicks into place behind the rack flange.

   d. Repeat steps 4a to 4c to attach the other outer slide-rail.

Installing the console unit in the rack

To install the console unit in the rack, complete the following steps:

1. Extend the inner part of the outer slide-rails and slide them forward to the front of the outer rails. Carefully slide the rollers on the console unit into the notch in the slide-rails as shown in the illustration.
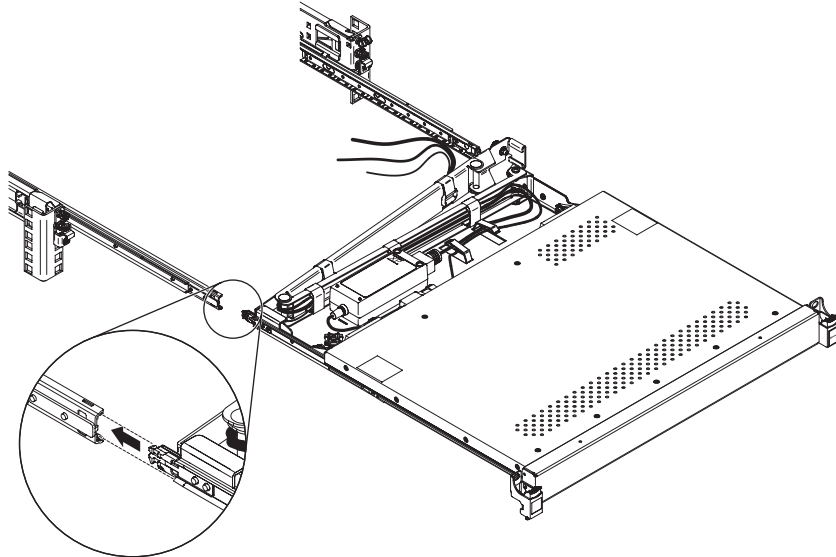
2. Press in both release latches **1**; then, grasp both sides of the console unit and push it completely into the rack **2** . There will be resistance initially as the inner and outer rails are aligned. Pull the console unit out halfway, and then push it back in to seat the console unit in the rails. Do this a few times until the console unit moves smoothly in the rails.

Release latch

Release latch

3. Align the C-channel on the end of the cable-management arm with the bracket on the console unit. Slide the C-channel onto the bracket until the cable-management arm thumbscrew aligns with the hole in the bracket. Tighten the thumbscrew.
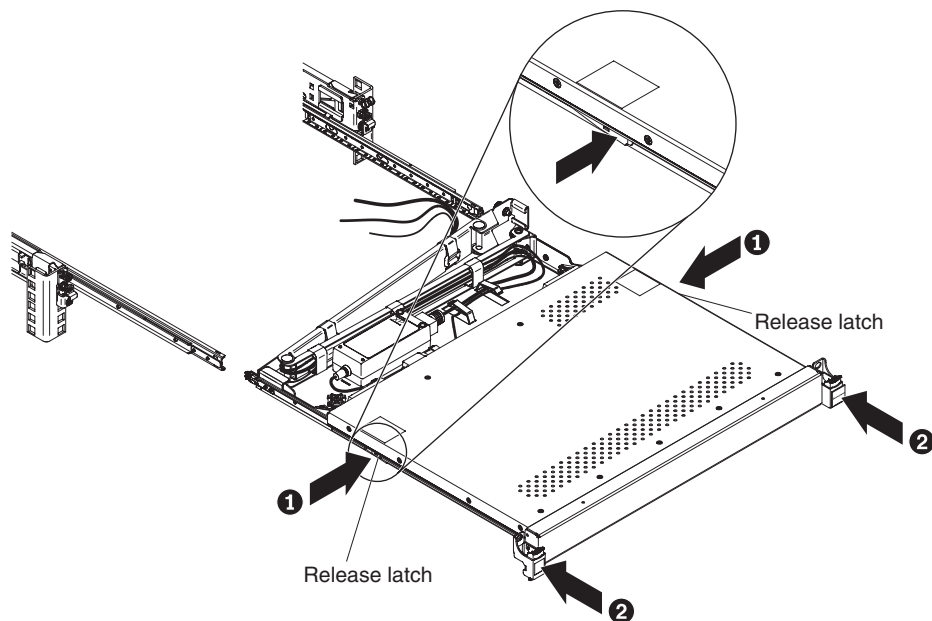
Thumbscrew

Cable-management arm
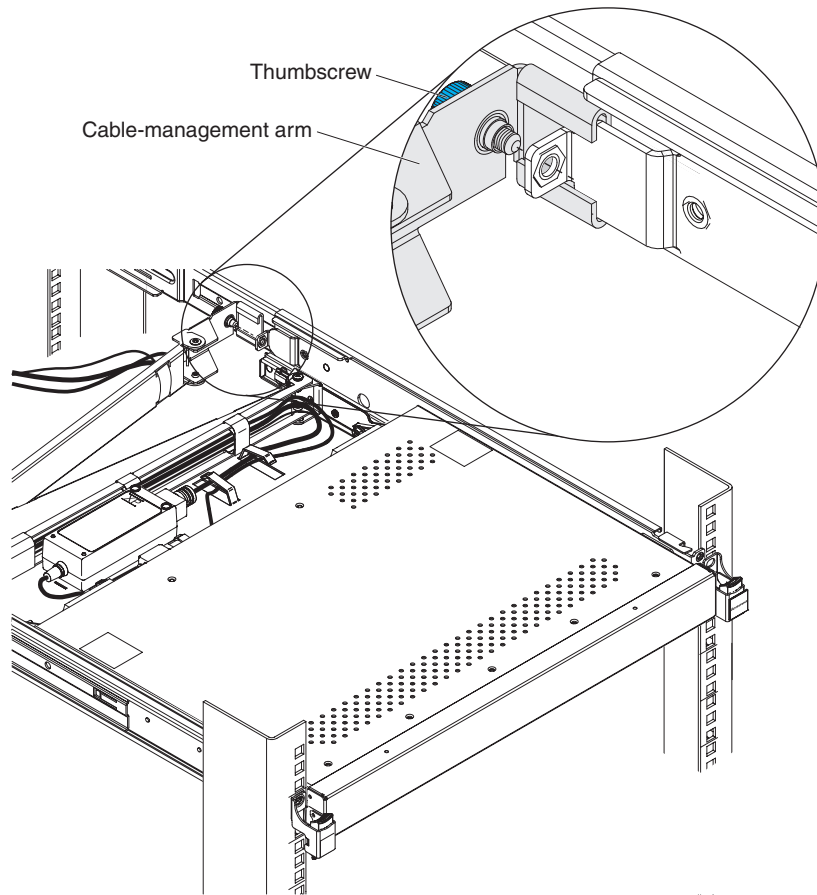
4. Reinstall the stabilizer screws if you removed them.

Stabilizer
screw

Stabilizer
screw
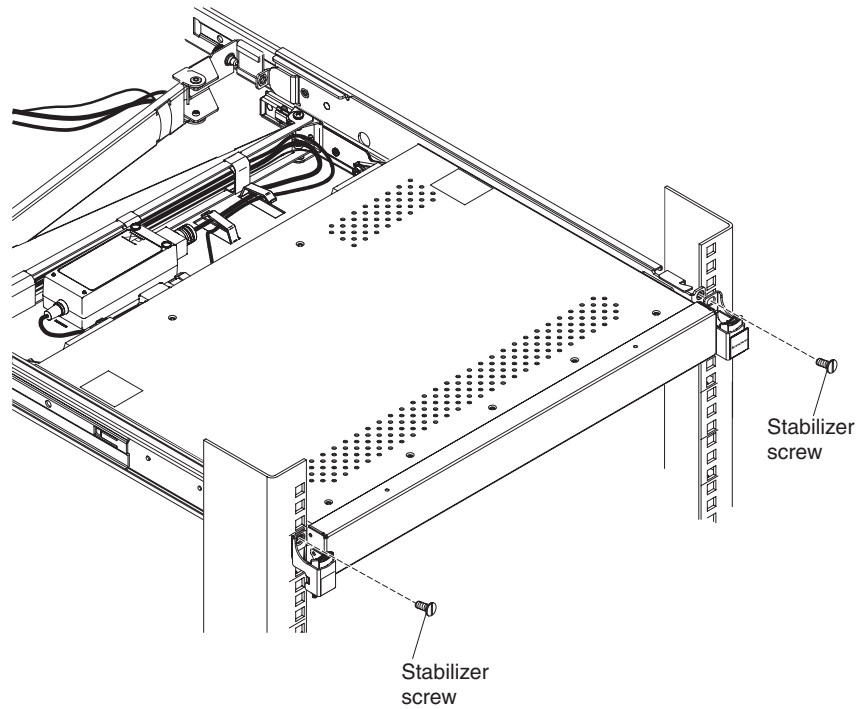
5. If you removed a console switch from behind the console unit, reinstall it now.

6. Reconnect to the server or console switch all cables that you removed.

7. Connect power to the display.

8. Fully extend the console unit from the front of the rack, and then neatly route the cables within the rack and secure them with cable straps along the way.

    Important: If you have excess video cable, do not coil it as shown in the following illustration.
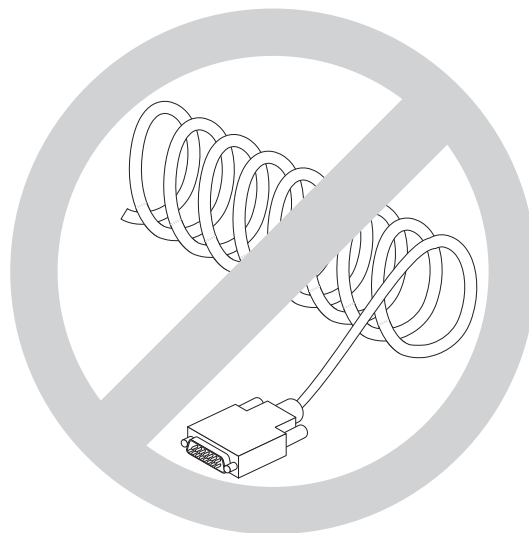
To minimize the electrical interference if you have excess video cable, arrange the cable in figure-eight loops, as shown in the following illustration. Secure the cable in the middle with a cable tie or strap.

Cable tie
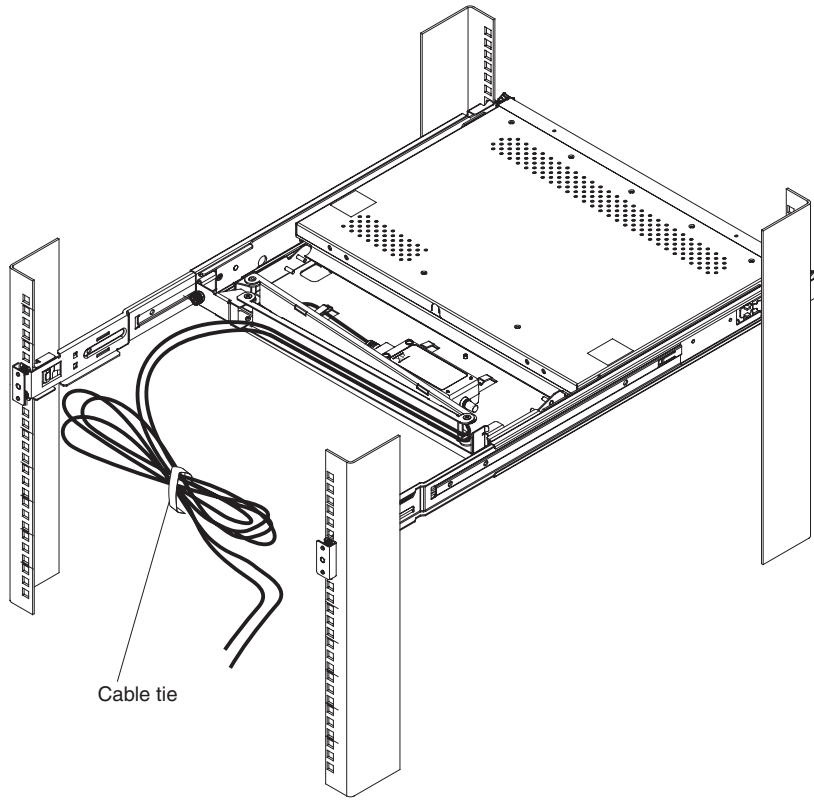
Appendix A. Supported resolution timing charts

The following tables are the supported resolution timing charts. Although additional resolutions might work, these are the supported signals.

Table 4. 640 x 480 timing chart

Type	Standard			
Timing name	640 x 480 @ 60 Hz		640 x 480 @ 75 Hz	
Horizontal frequency and polarity	31.469 kHz	Negative	37.5 kHz	Negative
Vertical frequency and polarity	59.94 Hz	Negative	75 Hz	Negative
Pixel clock	25.175 MHz		31.5 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	31.778 μs	800 pixels	26.667 μs	840 pixels
Display	25.422 μs	640 pixels	20.317 μs	640 pixels
Blanking	6.356 μs	160 pixels	6.349 μs	200 pixels
Sync	3.813 μs	96 pixels	2.032 μs	64 pixels
Back porch	1.907 μs	48 pixels	3.810 μs	120 pixels
Front porch	0.636 μs	16 pixels	0.508 μs	16 pixels
Vertical				
Total	16.683 ms	525 lines	13.333 ms	500 lines
Display	15.253 ms	480 lines	12.800 ms	480 lines
Blanking	1.430 ms	45 lines	0.533 ms	20 lines
Sync	0.064 ms	2 lines	0.080 ms	3 lines
Back porch	1.049 ms	33 lines	0.427 ms	16 lines
Front porch	0.318 ms	10 lines	0.027 ms	1 line

Table 5. 800 x 600 timing chart

Type	Standard			
Timing name	800 x 600 @ 60 Hz		800 x 600 @ 75 Hz	
Horizontal frequency and polarity	37.879 kHz	Positive	46.875 kHz	Positive
Vertical frequency and polarity	60.317 Hz	Positive	75 Hz	Positive
Pixel clock	40 MHz		49.5 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	26.400 μs	1056 pixels	21.333 μs	1056 pixels
Display	20.000 μs	800 pixels	16.162 μs	800 pixels
Blanking	6.400 μs	256 pixels	5.172 μs	256 pixels
Sync	3.200 μs	128 pixels	1.616 μs	80 pixels
Back porch	2.200 μs	88 pixels	3.232 μs	160 pixels
Front porch	1.000 μs	40 pixels	0.323 μs	16 pixels
Vertical				
Total	16.579 ms	628 lines	13.333 ms	625 lines
Display	15.840 ms	600 lines	12.800 ms	600 lines
Blanking	0.739 ms	28 lines	0.533 ms	25 lines
Sync	0.106 ms	4 lines	0.064 ms	3 lines
Back porch	0.607 ms	23 lines	0.448 ms	21 lines
Front porch	0.026 ms	1 line	0.021 ms	1 line

Table 6. 1024 x 768 timing chart

Type	Standard			
Timing name	1024 x 768 @ 60 Hz		1024 x 768 @ 75 Hz	
Horizontal frequency and polarity	48.363 kHz	Negative	60.023 kHz	Positive
Vertical frequency and polarity	60.004 Hz	Negative	75.029 Hz	Positive
Pixel clock	65 MHz		78.75 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	20.677 μs	1344 pixels	16.660 μs	1312 pixels
Display	15.754 μs	1024 pixels	13.003 μs	1024 pixels
Blanking	4.923 μs	320 pixels	3.657 μs	288 pixels
Sync	2.092 μs	136 pixels	1.219 μs	96 pixels
Back porch	2.462 μs	160 pixels	2.235 μs	176 pixels
Front porch	0.369 μs	24 pixels	0.203 μs	16 pixels
Vertical				
Total	16.666 ms	806 lines	13.328 ms	800 lines
Display	15.880 ms	768 lines	12.795 ms	768 lines
Blanking	0.786 ms	38 lines	0.533 ms	32 lines
Sync	0.124 ms	6 lines	0.050 ms	3 lines
Back porch	0.600 ms	29 lines	0.466 ms	28 lines
Front porch	0.062 ms	3 lines	0.017 ms	1 line

Table 7. 1152 x 864 timing chart

Type	Nonstandard		Standard	
Timing name	1152 x 864 @ 60 Hz		1152 x 864 @ 75 Hz	
Horizontal frequency and polarity	54.348 kHz	Positive	67.5 kHz	Positive
Vertical frequency and polarity	60.053 Hz	Positive	75 Hz	Positive
Pixel clock	80 MHz		108 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	18.400 µs	1472 pixels	14.815 µs	1600 pixels
Display	14.400 µs	1152 pixels	10.667 µs	1152 pixels
Blanking	4.000 µs	320 pixels	4.148 µs	448 pixels
Sync	1.200 µs	96 pixels	1.185 µs	128 pixels
Back porch	2.400 µs	192 pixels	2.370 µs	256 pixels
Front porch	0.400 µs	32 pixels	0.593 µs	64 pixels
Vertical				
Total	16.652 ms	905 lines	13.333 ms	900 lines
Display	15.898 ms	864 lines	12.800 ms	864 lines
Blanking	0.754 ms	41 lines	0.533 ms	36 lines
Sync	0.055 ms	3 lines	0.044 ms	3 lines
Back porch	0.681 ms	37 lines	0.474 ms	32 lines
Front porch	0.018 ms	1 line	0.015 ms	1 line

Table 8. 1366 x 768 timing chart

Type	Nonstandard			
Timing name	1366 x 768 @ 60 Hz		1366 x 768 @ 75 Hz	
Horizontal frequency and polarity	47.712 kHz	Positive	60.15 kHz	Positive
Vertical frequency and polarity	60.015 Hz	Positive	75 Hz	Positive
Pixel clock	85.5 MHz		110.195 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	20.959 μs	1792 pixels	16.625 μs	1832 pixels
Display	15.976 μs	1366 pixels	12.396 μs	1366 pixels
Blanking	4.983 μs	426 pixels	4.231 μs	466 pixels
Sync	1.310 μs	112 pixels	1.307 μs	144 pixels
Back porch	2.929 μs	250 pixels	2.120 μs	234 pixels
Front porch	0.749 μs	64 pixels	0.799 μs	88 pixels
Vertical				
Total	16.662 ms	795 lines	13.333 ms	802 lines
Display	16.097 ms	768 lines	12.768 ms	768 lines
Blanking	0.566 ms	27 lines	0.565 ms	34 lines
Sync	0.126 ms	6 lines	0.049 ms	3 lines
Back porch	0.377 ms	18 lines	0.498 ms	30 lines
Front porch	0.063 ms	3 lines	0.015 ms	1 line

Table 9. 1280 x 800 timing chart

Type	Standard			
Timing name	1280 x 800 @ 60 Hz		1280 x 800 @ 75 Hz	
Horizontal frequency and polarity	49.702 kHz	Negative	62.795 kHz	Negative
Vertical frequency and polarity	59.81 Hz	Positive	74.934 Hz	Positive
Pixel clock	83.5 MHz		106.5 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	20.120 µs	1680 pixels	15.925 µs	1696 pixels
Display	15.329 µs	1280 pixels	12.019 µs	1280 pixels
Blanking	4.790 µs	400 pixels	3.906 µs	416 pixels
Sync	1.533 µs	128 pixels	1.202 µs	128 pixels
Back porch	2.395 µs	200 pixels	1.935 µs	206 pixels
Front porch	0.862 µs	72 pixels	0.751 µs	80 pixels
Vertical				
Total	16.720 ms	831 lines	13.345 ms	838 lines
Display	16.096 ms	800 lines	12.740 ms	800 lines
Blanking	0.624 ms	31 lines	0.605 ms	38 lines
Sync	0.121 ms	6 lines	0.096 ms	6 lines
Back porch	0.443 ms	22 lines	0.462 ms	29 lines
Front porch	0.060 ms	3 lines	0.048 ms	3 lines

Table 10. 1280 x 1024 timing chart

Type	Standard			
Timing name	1280 x 1024 @ 60 Hz		1280 x 1024 @ 75 Hz	
Horizontal frequency and polarity	63.981 kHz	Positive	79.976 kHz	Positive
Vertical frequency and polarity	60.02 Hz	Positive	75.025 Hz	Positive
Pixel clock	108 MHz		135 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	15.630 µs	1688 pixels	12.504 µs	1688 pixels
Display	11.852 µs	1280 pixels	9.481 µs	1280 pixels
Blanking	3.778 µs	408 pixels	3.022 µs	408 pixels
Sync	1.037 µs	112 pixels	1.067 µs	144 pixels
Back porch	2.296 µs	248 pixels	1.837 µs	248 pixels
Front porch	0.444 µs	48 pixels	0.119 µs	16 pixels
Vertical				
Total	16.661 ms	1066 lines	13.329 ms	1066 lines
Display	16.005 ms	1024 lines	12.804 ms	1024 lines
Blanking	0.656 ms	42 lines	0.525 ms	42 lines
Sync	0.047 ms	3 lines	0.038 ms	3 lines
Back porch	0.594 ms	38 lines	0.475 ms	38 lines
Front porch	0.016 ms	1 line	0.013 ms	1 line

Table 11. 1440 x 900 timing chart

Type	Standard			
Timing name	1440 x 900 @ 60 Hz		1440 x 900 @ 75 Hz	
Horizontal frequency and polarity	55.935 kHz	Negative	70.635 kHz	Negative
Vertical frequency and polarity	59.887 Hz	Positive	74.984 Hz	Positive
Pixel clock	106.5 MHz		136.75 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	17.878 μs	1904 pixels	14.157 μs	1936 pixels
Display	13.521 μs	1440 pixels	10.530 μs	1440 pixels
Blanking	4.357 μs	464 pixels	3.627 μs	496 pixels
Sync	1.427 μs	152 pixels	1.112 μs	152 pixels
Back porch	2.178 μs	232 pixels	1.814 μs	248 pixels
Front porch	0.751 μs	80 pixels	0.702 μs	96 pixels
Vertical				
Total	16.698 ms	934 lines	13.336 ms	942 lines
Display	16.090 ms	900 lines	12.741 ms	900 lines
Blanking	0.608 ms	34 lines	0.595 ms	42 lines
Sync	0.107 ms	6 lines	0.085 ms	6 lines
Back porch	0.447 ms	25 lines	0.467 ms	33 lines
Front porch	0.054 ms	3 lines	0.042 ms	3 lines

Table 12. 1600 x 1200 timing chart

Type	Standard			
Timing name	1600 x 1200 @ 60 Hz		1680 x 1050 @ 60 Hz	
Horizontal frequency and polarity	75 kHz	Positive	65.29 kHz	Negative
Vertical frequency and polarity	60 Hz	Positive	59.954 Hz	Positive
Pixel clock	162 MHz		146.25 MHz	
Scan type	Noninterlaced		Noninterlaced	
Horizontal				
Period	13.333 µs	2160 pixels	15.316 µs	2240 pixels
Display	9.877 µs	1600 pixels	11.487 µs	1680 pixels
Blanking	3.457 µs	560 pixels	3.829 µs	560 pixels
Sync	1.185 µs	192 pixels	1.203 µs	176 pixels
Back porch	1.877 µs	304 pixels	1.915 µs	280 pixels
Front porch	0.395 µs	64 pixels	0.711 µs	104 pixels
Vertical				
Total	16.667 ms	1250 lines	16.679 ms	1089 lines
Display	16.000 ms	1200 lines	16.082 ms	1050 lines
Blanking	0.667 ms	50 lines	0.597 ms	39 lines
Sync	0.040 ms	3 lines	0.092 ms	6 lines
Back porch	0.613 ms	46 lines	0.459 ms	30 lines
Front porch	0.013 ms	1 line	0.046 ms	3 lines

Appendix B. Getting help and technical assistance

Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

Use this information to obtain additional information about Lenovo and Lenovo products, and determine what to do if you experience a problem with your Lenovo system or optional device.

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for the System x, Flex System, and NeXtScale System products.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself.

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call.

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to make sure that the hardware and software is supported by your product.
- Go to http://www.ibm.com/supportportal/ to check for information to help you solve the problem.
- Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  – Hardware and Software Maintenance agreement contract numbers, if applicable
  – Machine type number (Lenovo 4-digit machine identifier)
  – Model number
  – Serial number
  – Current system UEFI and firmware levels
  – Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/entry/portal/Open_service_request to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent

information available to the service technicians. The IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the product documentation. That documentation can include printed documents, online documents, readme files, and help files.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/supportportal/.

Getting help and information from the World Wide Web

Up-to-date information about Lenovo products and support is available on the World Wide Web.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/. The most current version of the product documentation is available in the following product-specific Information Centers:

Flex System products:
> http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp

System x products:
> http://www.ibm.com/systems/x

NeXtScale System products:
> http://pic.dhe.ibm.com/infocenter/nxtscale/documentation/index.jsp

How to send DSA data

You can use the Enhanced Customer Data Repository to send diagnostic data to IBM.

Before you send diagnostic data to IBM, read the terms of use at http://www.ecurep.ibm.com/app/upload_hw.

You can use any of the following methods to send diagnostic data:

* **Standard upload:** http://www.ibm.com/de/support/ecurep/send_http.html
* **Standard upload with the system serial number:** http://www.ecurep.ibm.com/app/upload_hw

- **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
- **Secure upload with the system serial number:** https://www.ecurep.ibm.com/app/upload_hw

Creating a personalized support web page

You can create a personalized support web page by identifying Lenovo products that are of interest to you.

To create a personalized support web page, go to http://www.ibm.com/support/mynotifications/. From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your Lenovo products.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/ or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

IBM is Lenovo's preferred service provider for the System x, Flex System and NeXtScale System products.

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In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

Taiwan product service

Use this information to contact IBM Taiwan product service.

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台北市松仁路 7 號 3 樓
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  3F, No 7, Song Ren Rd.
  Taipei, Taiwan

Telephone: 0800-016-888

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 13. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days
[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.	
[2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.	
[3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.	

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the installation of option cards from other manufacturers.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Lenovo, Einsteinova 21, 851 01 Bratislava, Slovakia

Germany Class A statement

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmittein Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher "Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4: **Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen

Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4).
Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der
entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in
den Handbüchern angegeben, zu installieren und zu betreiben.

Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用する
と電波妨害を引き起こすことがあります。この場合には使用者が適切な対策
を講ずるよう要求されることがあります。　　　　　　　　　　VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for
Interference (VCCI). If this equipment is used in a domestic environment, radio
interference may occur, in which case the user may be required to take corrective
actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン準用品

Japanese Electronics and Information Technology Industries Association (JEITA)
Confirmed Harmonics Guideline with Modifications (products greater than 20 A per
phase)

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers
and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国 "A类" 警告声明

声 明
此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，
可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A compliance statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

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