

Installation



NC200 and NC400 Network Computer

Dual Monitor Option Board

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Only qualified personnel should perform service procedures.

Injury precautions

Use proper power cord	To avoid fire hazard, use only the power cord specified for this product.
Ground the product	This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground.
Do not operate in wet/damp conditions	To avoid electric shock, do not operate this product in wet or damp conditions.
Do not operate in an explosive atmosphere	To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.
Avoid exposed circuitry	To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.

Product damage precautions

Use proper power source	Do not operate this product from a power source that applies more than the voltage specified.
Provide proper ventilation	To prevent product overheating, provide proper ventilation.
Do not operate with suspected failures	If you suspect there is damage to this product, have it inspected by qualified service personnel.



General Safety Summary

Safety terms and symbols

Terms in This Manual

These terms may appear in this manual:



WARNING: *Warning statements identify conditions or practices that can result in personal injury or loss of life.*



CAUTION: *Caution statements identify conditions or practices that can result in damage to the equipment or other property.*

Terms on the Product

These terms may appear on the product:

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

WARNING indicates a personal injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product

The following symbols may appear on the product:



DANGER high voltage



Protective ground (earth) terminal



ATTENTION – refer to manual

Dual Monitor Option Board Installation

Introduction

Use these instructions to install the dual monitor option board in your NCD NC400 network computer. After you check the contents of the kit and read the electrostatic precautions, begin the installation procedure.

Kit contents

This field installation kit includes the following:

- one dual monitor option board;
- two 6-32 phillips screws;
- one anti-static wrist strap;
- one anti-static conductive pad; and
- these installation instructions.

Tools required

Installation of the dual monitor option board kit requires these tools:

- #2 phillips screwdriver;
- 3/16" nutdriver; and
- small diagonal cutters.



Dual Monitor Option Board Installation

Electrostatic precautions

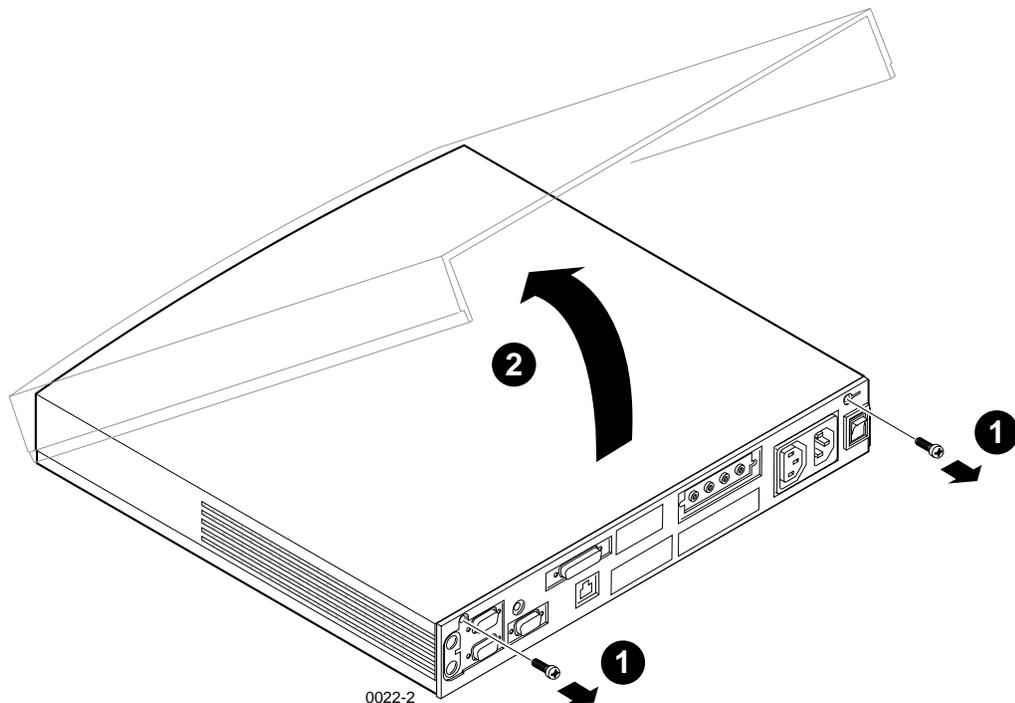
This product contains components that are highly sensitive to electrostatic discharge. To protect these components from damage and to maintain product reliability, take the following precautions when handling the circuit boards:

- Leave the board in its static-shielded bag until you are ready to install it.
- Handle all circuit boards in a static-protected area capable of controlling static charge on conductive materials, people, and non-conductive materials. Static-protected areas include non-static table tops and non-static floor mats.
- Use the anti-static wrist strap and conductive pad provided in the kit when working with any circuit board.
- Handle the circuit boards only by the edges. Avoid touching the printed wires on the back of any circuit board as much as possible.

Installing the dual monitor option board

1. Set the standby/on or power switch to standby or 0.
2. Disconnect the AC power by unplugging the AC line cord from the rear panel.
3. Disconnect as many other cables as necessary to easily reach the rear of the logic module.
4. Remove the logic module cover as shown in *Figure 1* below.

Figure 1. Removing the NC400 logic module cover



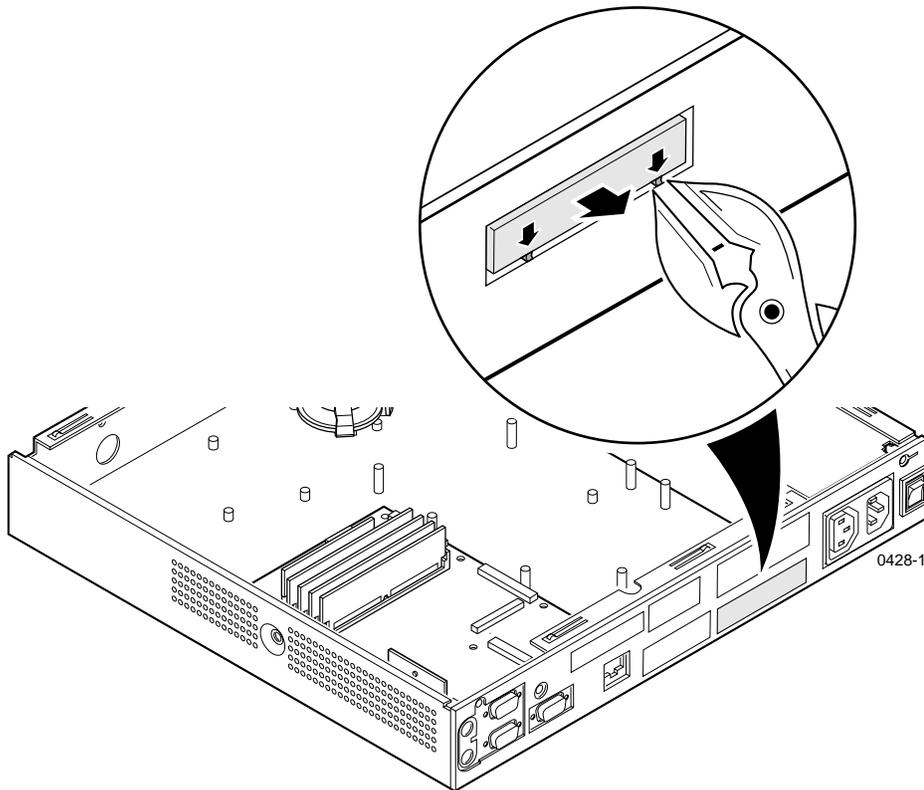
5. Remove the plastic blank that covers the cabinet opening for the dual monitor option board as shown in *Figure 2*. Use a pair of thin diagonal cutters to cut the bridges that support the blank cover.



Dual Monitor Option Board Installation

NOTE: A few early production models of the NC400 have a foam overlay on the rear panel instead of the molded plastic overlay. To uncover the cabinet opening, peel out the foam plug.

Figure 2. Removing the blank cover from the rear panel overlay

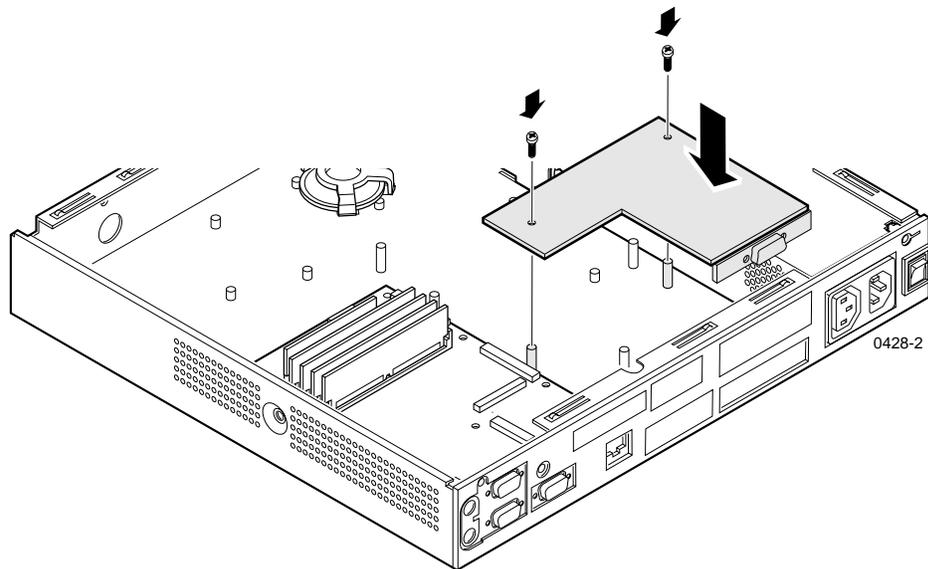


6. Put on the anti-static wrist strap. (Follow the instructions on the wrist strap package).
7. The dual monitor option board attaches to the white connector on the middle of the inner side of the main logic board, located directly beneath the ribbon cables for the audio/digital video board (if you have an audio board installed). Installing the dual monitor option board will be easier if you remove the audio board and set it aside. To do this, remove the two jacknuts that attach the audio board to the rear of the cabinet, and lay the board and ribbon cables back out of the way.

Installing the dual monitor option board

8. Remove the dual monitor option board from the protective package.
9. Lower the dual monitor option board into the chassis as shown in *Figure 3*, keeping it *parallel* to the floor of the chassis.
10. Feed the VGA connector and bracket into the chassis's rear panel opening.
11. Align the board's mounting holes with the spacers on the bottom of the chassis.
12. Plug the board into the white connector on the main logic board.
13. Tighten the two screws that attach the board to the bottom of the chassis.

Figure 3. Installing the dual monitor board



14. Replace the audio board (if you removed it).
15. Re-install the logic module cover.
16. Connect the VGA cable from your second monitor to the second video output connector on the dual monitor option board you just installed. (The dual monitor option board comes with the two jacknuts preinstalled.) Connect the monitor to a power source.



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17. Connect all cables to the rear panel that were disconnected at the beginning of the procedure. Connect the power supply to the logic module before plugging it into the AC power outlet.
18. Verify the installation using the procedure that follows.

Verification

To verify that your network computer is operating correctly after installing the dual monitor option board:

1. Set the standby/on or on/off switch to on (1) and watch for the *Boot Monitor* screen to appear.
2. Press any keyboard key before the network computer completes the boot process. This stops the boot process and transfers control to the *Boot Monitor*. The following message appears on the primary display (Screen 0.0):

```
Boot process interrupted by key press...
Type HELP for a list of commands
BOOT> _
```

3. Determine whether your network computer's software supports dual monitor functionality. The NC400 dual monitor network computer requires NCBridge 3.1.102 (or later) and *Boot Monitor* 7.7 (or later). Verify the NCBridge version and level in *Setup*'s **Main Menu** and the Boot ROM version in the **Boot Configuration Menu**. If you do not have the latest software, download the latest patch (3.1.102, with the dual monitor code) from our FTP server at:

```
ftp.ncd.com/pub/NCBridge/Patches/V3.1
```

If you do not have access to a browser, or if you wish to manually download the files, do the following from an FTP command line:

```
ftp ftp.ncd.com
Name (ftp.ncd.com:username): anonymous
Password: <your_email_address>
ftp> cd pub/NCBridge/Patches/V3.1
```

Use the “dir” and “mget” commands to list and obtain all the *README* files. Open and read the *README.lst* file to obtain information on downloading and installation. This file will direct you to other *README* files.

4. If you are satisfied that your network computer's operating system and *Boot Monitor* code support the dual monitor option, there are two ways to determine whether you have properly installed the dual monitor option board.

One way is to enter the **REport** command at the `BOOT>` prompt to generate a report screen similar to the one in *Figure 4* on page 9.

```
BOOT> re
```



Dual Monitor Option Board Installation

If you have properly installed your dual monitor option board, you will notice a few differences in this new report:

- The `vid mem` line will show two values, one for the standard video memory on the main logic board, and a second for the video memory on the newly installed dual monitor option board. (The parenthetical values are the VRAM identification numbers.)
- “DM” (for dual monitor) is listed in the `options` line.

If you do not see these additional values in your network computer’s report screen, inspect your physical installation. Otherwise, continue.

Another method is to start the Extended Self-Test and execute the Display Test. To do this, use the **BPath** command to point to the appropriate *selftest.xxx* file (usually in the same directory as your OS file) and enter the **Boot** command.

```
BOOT> bp /<bootpath>/selftest.500  
BOOT> b
```

In the Extended Self-Test Main Menu, select the Monitor Pattern Menu, then select one or more of the monitor test patterns. If you see the test patterns on both screens, then you have successfully installed the dual monitor option board. Otherwise, inspect your physical installation.

Figure 4. Boot Monitor REport screen

```

Ethernet 08:00:11:00:00:00

IADDR=      0.0.0.0          DNODE= 0.0
IHOST=      0.0.0.0          BMETHOD= NOT SET
IMASK=      0.0.0.0          BDELAY=  DISABLED
IGATE=      0.0.0.0          BAFROM=  NVRAM
BPATH=

-----

Boot process interrupted by key press...
Type HELP for a list of commands
BOOT>re

model:      NC400 (WinCE compatible)
std mem:    8192K
opt mem:    32768K
vid mem:    4096K (55aa1f02), 4096K (55aa2102)
flash mem:  0K (not installed)
mon type:   25 (1280x1024 72Hz 19" Color)
key type:   North American 101/102 with PAUSE key
nation:     a (North American)
lan:        Am79C971 Ethernet - Chip ID 52623003 with ICS1890 PHY
            autonegotiated half-duplex, 10Mbps

cpu id:     b22
cpu clock:  99MHz
rdram spd:  613MBs
asic rev:   2
options:    parallel, LAN, V2, PE, DM
serial:     2
auth key:   2w98<5G/rKp:Zvv26
opt mask:   00072fef
autoboot:   enabled
overtemp:   0

BOOT> _

```

- After you have confirmed that your network computer's *Boot Monitor* code supports the dual monitor option and that you have installed the dual monitor option board properly, enter the **Boot** command to boot your network computer.

```
BOOT> b
```

After a successful boot, both of your network computer's monitors will display the gray root-weave pattern. At this point, you may log in as you normally would. (If you choose to customize your dual monitor network computer, be sure to check out *Using a dual monitor network computer* on page 10.)



Using a dual monitor network computer

After proper installation of the dual monitor option board, you may want to configure your network computer to take full advantage of the second monitor. This section also gives a few tips on operating a dual monitor network computer.

Configuring your network computer for a second display

With the dual monitor option board installed, the boot ROM automatically determines that this is a dual monitor device and alters the diagnostics and certain *Setup* configuration menus accordingly.

The X Window System defines your X server's primary display as Screen 0.0; additional displays that may be attached to the same X server are defined as Screen 0.1, Screen 0.2, etc.. At startup, output is displayed on Screen 0.0 by default. All control displays (such as the *Boot Monitor*, the Extended Self-Test menus, *Setup*, *Console*, and *Launcher*, etc.) will appear on Screen 0.0. Furthermore, some of the *Boot Monitor*'s Extended Self-Test output will display *only* on Screen 0.0 (Mouse Test, LAN Test, etc.); others--the Monitor Pattern Test, for example--will display on both screens. Window manager pop-up menus will appear on the screen containing the pointer, and selections made from pop-up menus will produce windows on the invoking screen. If you use your mouse in the root window of Screen 0.1 to launch a new client, for instance, the new window will appear in Screen 0.1.

By default, the dual monitor network computer is set to a logical¹ horizontal configuration. In the horizontal model, the screens are logically side by side, with Screen 0.0 (the default monitor) on the left and Screen 0.1 (the secondary monitor) on the right. To change this, you will have to launch the *Setup* client.

In *Setup*, go to **Configuration Summaries | X Environment**. "Dual Display" is a field that will automatically appear when the network computer is properly configured for a second monitor. There are three buttons next to this new field: **Horizontal**, **Vertical**, and **Mono-Head**.

In the horizontal model (default), when you move your mouse from left to right on your mousepad, the pointer will move from the left of your primary monitor until it reaches the right edge. When it goes beyond the last pixel on your primary monitor, the pointer will reappear on the left edge of your second monitor. Clicking the **Vertical** button will switch immediately to the vertical model, in which the screens are logically one on top

1. These are "logically" horizontal or vertical--but not definitively so--because you can physically set your monitors up anywhere you choose. Internally, however, the network computer software assumes that the monitors will be set up as described and will interpret incoming mouse data accordingly.

of the other, with Screen 0.0 on the bottom and Screen 0.1 on top. In the vertical model, when you move your mouse from the bottom of your mousepad to the top, the pointer will move from the lower part of the primary monitor to the top of the display. When it crosses the last pixel on the top edge, it will reappear on the lower edge of the secondary monitor.

If you click the **Mono-Head** button, your network computer will cease to allow you to move the pointer to the secondary display. The reason for this selection is to allow you to use your network computer in a normal fashion if the secondary monitor proves faulty or if you disconnect it. If you operate a single display device configured for either of the dual display options, you may lose track of the pointer (in the missing “screen”).

NOTE: *In the mono-head model, the primary device (Screen 0.0) is the one which will function with your network computer. In the case of a defective monitor, you will have to connect the VGA connector of a good monitor to the Screen 0.0 video output connector on the back of the logic base (not the dual monitor option board connector).*

Dual monitor limitations

There are a few limitations to what you can do with a dual monitor network computer:

- A window can appear in either Screen 0.0 or in Screen 0.1, but *not* in both.
- You *cannot* drag a window from one screen to the other.
- Screen capture applications, such as XV, will *not* capture images on the opposite screen. An iteration of XV invoked on Screen 0.0 will be able to capture windows on Screen 0.0 but not on Screen 0.1 (and vice-versa).
- In some--but not all--multiple-workspace window manager environments (CDE, for example), the secondary display *might not* yield multiple workspaces. The primary display will still produce the four to six virtual desktops that a single monitor network computer would; but the secondary monitor will remain with one workspace.
- If you have the hardware-MPEG digital video option (DV) installed on your NC400, you can view digital video *only* on your primary display (Screen 0.0); digital video will *not* run on the secondary display.
- You can configure your NC400 (dual monitor and single monitor versions) for 8-bit pseudo color or 16-bit true color (if you also have option V2, an extra 2MB of RDRAM). However, the ICA client (for Windows application access) and the digital video client will *not* work in 16-bit color configurations.



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Dual monitor tips

Depending on which window manager you use, you may have to alter your *.Xdefaults* or *.Xresources* file to allow a second screen. OLWM starts with multi-screen functionality by default, so it will recognize that you have a second screen at startup; MWM, on the other hand, starts with multiscreen *off* by default. One way to enable dual monitor capability for MWM is to add the `-multiscreen` argument to your MWM command in your *.Xsession* or *.Xinitrc* file. The next time you reboot, MWM will recognize the second monitor. Another way is to add a multiscreen command to your *.Xdefaults* or *.Xresources* file as follows:

```
*mwm*multiScreen:      True
```

Again, MWM will check for the second monitor. After you add this line to your file, enter the following command:

```
xrdb -merge .Xdefaults
```

This will merge the new multiscreen setting with those settings that are already loaded in the X resource database. The last thing you will have to do is restart MWM.

NOTE: *Adjusting your *.Xresources* or *.Xsession* files to accommodate dual monitor functionality will not prevent you from operating single monitor network computers.*

To test whether your network computer is operating in multiscreen mode, try a couple of simple `xsetroot` commands for each display:

```
xsetroot -solid blue -display <IP-address>:0.0
xsetroot -solid gold -display <IP-address>:0.1
```

This should make the root window of your primary display blue and the root window of your secondary display gold. For a more interesting look, try some of the default X11 bitmaps and cursors, using different foreground and background colors for each display. (See *Example 1* below.)

Example 1. A few lines from a sample *.Xinitrc* file

```
xsetroot -bitmap /usr/include/X11/bitmaps/wingdogs
        -fg darkgreen -bg green4 -display 128.181.57.166:0.0
xsetroot -bitmap /usr/include/X11/bitmaps/mensetmanus
        -fg blue -bg blue4 -display 128.181.57.166:0.1
xsetroot -cursor_name shuttle
        -fg red -bg white -display 128.181.57.166:0.0
xsetroot -cursor_name pirate
        -fg red -bg white -display 128.181.57.166:0.1
```

After you have ascertained that you have multiscreen functionality with your window manager, you might want to further customize your environment to produce different default results for each of your two screens. To do this, you will again have to edit your *.Xresources* or *.Xdefaults* file, adding “if” statements, as shown in *Example 2* below.

Example 2. Dual monitor *.Xdefaults* example

```
! conditional screen resources

! screen 0 resources
#if SCREEN_NUM == 0
*foreground:      gold
*background:      blue
#endif

! screen 1 resources
#if SCREEN_NUM == 1
*foreground:      blue
*background:      gold
#endif
```

An “if” statement in your *.Xdefaults* or *.Xresources* file will allow you to customize your two screens. A window invoked in Screen 0.0 may have background, foreground, and menu bar colors that are different from those in a window invoked in Screen 0.1.

The same applies to “focus” statements and other window manager settings. For example, you can assign *explicit* focus to one screen and *pointer* focus to the other. You can also set different client-specific resources for each screen, forcing *xterm*, *xclock*, or other X clients to appear and behave differently, depending on which screen they are executing on. Follow the same procedure given above for foreground and background settings, substituting your client-specific statements.

Remember that whatever changes you make to your *.Xdefaults* or *.Xresources* file will not take place automatically. After you save these changes to your file, download the updated file using the `xrdb -merge` command as explained above. Then restart your window manager or your entire session.



Dual Monitor Option Board Installation

A note on colormaps and color flashing

A colormap is a table of red, green, and blue values for each pixel that a display device consults when determining what intensity of each of these primaries to reproduce on the display. Colormaps are limited by the number of bits available for each of these RGB values.

Many display devices are configured for 8-bit pseudo color, which means they are limited to 256 colors at any given moment. If this number is exceeded, the user may experience a “color flash” when switching from one client to another because these individual clients may have mapped colors differently. The question is, will using separate colors for each screen cause an NC400 with the dual monitor option to run out of available colors sooner?

Not necessarily. The dual monitor option board comes with its own video memory (4MB of RDRAM) to go along with the standard 2MB of video memory on the main logic board. So each screen has its own 256-cell colormap, yielding a total capability of 512 simultaneous colors in 8-bit pseudo color mode. Moreover, you can isolate certain color-hungry applications--such as Netscape Navigator and the NCD ICA client--to opposite screens, thus further avoiding color flashes.

And if that isn't enough colors, the NC400 with option DM (dual monitor) and option V2 (2MB of additional video memory) supports 16-bit true color mode, which allows separate colormaps of 65,536 colors for each screen. (See *Dual monitor limitations* on page 11 for restrictions when using 16-bit true color on your NC400.)