

# Dell™ OptiPlex™ 980 Service Manual—Small Form Factor

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## Notes, Cautions, and Warnings



**NOTE:** A NOTE indicates important information that helps you make better use of your computer.



**CAUTION:** A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.



**WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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# Working on Your Computer

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## Before Working Inside Your Computer


Use the following safety guidelines to help protect your computer from potential damage and to help to ensure your personal safety. Unless otherwise noted, each procedure included in this document assumes that the following conditions exist:


- You have read the safety information that shipped with your computer.
- A component can be replaced or—purchased separately—installed by performing the removal procedure in reverse order.

 **WARNING:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

 **CAUTION:** To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface, such as a connector on the back of the computer.

 **CAUTION:** Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

 **CAUTION:** When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.


 **NOTE:** The color of your computer and certain components may appear differently than shown in this document.

To avoid damaging your computer, perform the following steps before you begin working inside the computer.

1. Ensure that your work surface is flat and clean to prevent the cover from being scratched.
2. Turn off your computer (see [Turning Off Your Computer](#)).

 **CAUTION:** To disconnect a network cable, first unplug the cable from your computer and then unplug the cable from the network device.

3. Disconnect all network cables from the computer.
4. Disconnect your computer and all attached devices from their electrical outlets.
5. Press and hold the power button while the computer is unplugged to ground the system board.
6. Remove the [cover](#).

 **CAUTION:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity, which could harm internal components.

## Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Phillips screwdriver
- Small plastic scribe
- Flash BIOS update program media

## Turning Off Your Computer


 **CAUTION:** To avoid losing data, save and close all open files and exit all open programs before you turn off your computer.

1. Shut down the operating system:

- **In Windows® 7:**

Click **Start** , then click **Shut Down**.

- **In Windows Vista®:**

Click **Start** , then click the arrow in the lower-right corner of the **Start** menu as shown below, and then click **Shut Down**.



- **In Windows® XP:**

Click **Start® Turn Off Computer® Turn Off**.

The computer turns off after the operating system shutdown process is complete.


2. Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 6 seconds to turn them off.

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## After Working Inside Your Computer

After you complete any replacement procedure, ensure you connect any external devices, cards, and cables before turning on your computer.

1. Replace the [cover](#).


 **CAUTION:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.


2. Connect any telephone or network cables to your computer.
  3. Connect your computer and all attached devices to their electrical outlets.
  4. Turn on your computer.
  5. Verify that the computer works correctly by running the [Dell Diagnostics](#).
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# Technical Specifications

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 **NOTE:** Offerings may vary by region. For more information regarding the configuration of your computer, click **Start® Help and Support** and select the option to view information about your computer.

 **NOTE:** Unless otherwise stated, the specifications are identical for mini-tower, desktop, and small form factor computers.

Processor	
Type	
Quad-Core	Intel® Core™ i7 series Intel Core i5 series
Dual-Core	Intel Core i5 series Intel Core i3 series Intel Pentium®
Level 2 (L2) cache	
Intel Core i7 series Intel Core i5 series	8 MB
Intel Core i5 series Intel Core i3 series	4 MB
Intel Pentium	3 MB

Memory	
Type	DDR3 SDRAM (non-ECC memory only)
Speed	1066 MHz or 1333 MHz
Connectors	four
Capacity	1 GB, 2 GB, or 4 GB
Minimum memory	1 GB
Maximum memory	16 GB

Video	
Integrated	Intel graphics media accelerator HD  <b>NOTE:</b> Not supported by computers shipped with Intel i7 and Intel i5 quad-core processors.
Discrete	PCI Express x16 slot supports a PCI Express card

Memory - Integrated	Up to 1759 MB shared video memory (total system memory greater than 512 MB)
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<b>Audio</b>	
Integrated	Intel high definition audio

<b>Network</b>	
Integrated	Integrated Intel 82578DM Gigabit Ethernet capable of 10/100/1000 Mb/s communication

<b>System Information</b>	
Chipset	Intel Q57 Express chipset
DMA channels	eight
Interrupt levels	24
BIOS chips (NVRAM)	64 Mb and 16 Mb

<b>Expansion Bus</b>	
Bus type	PCI 2.3 PCI Express 2.0 SATA 1.0A and 2.0 eSATA USB 2.0
Bus speed	
PCI	133 MB/s
PCI Express	x1-slot (wireless only) bidirectional speed - 500 MB/s x16-slot (wired as x4) bidirectional speed - 2 GB/s x16-slot bidirectional speed - 8 GB/s
SATA	1.5 GB/s and 3.0 GB/s
eSATA	3.0 GB/s
USB	480 MB/s

<b>Cards</b>	
PCI	
Mini-tower	up to two full-height cards
Desktop	without riser card — up to two low-profile cards with riser card — up to two full-height cards
Small form factor	one low-profile card
PCI Express x16 (wired as x4)	
Mini-tower	one full-height card
Desktop	one low-profile card
Small form factor	none
PCI Express x16	

Mini-tower	one full-height card
Desktop	without riser card— one low-profile card with riser card— one full-height card
Small form factor	one low-profile card
PCI Express x1	
Mini-tower	one wireless card
Desktop	one wireless card
Small form factor	one wireless card

<b>Drives</b>	
Externally accessible - 5.25-inch drive bay(s)	
Mini-tower	two bays
Desktop	one bay
Small form factor	one slimline bay
Externally accessible - 3.5-inch drive bay (s)	
Mini-tower	one bay
Desktop	one bay
Small form factor	one bay
Internally accessible - 3.5 inch drive bay(s) for hard drives	
Mini-tower	two bays
Desktop	one bay
Small form factor	one bay
<b>NOTE:</b> Your computer can support up to two 2.5 inch hard drives with brackets.	

<b>External Connectors</b>	
Audio	
Back panel	two connectors for line-in/ microphone and line-out
Front panel	two front-panel connectors for headphones and microphone
eSATA	one 7-pin connector
Network	one RJ45 connector
Parallel	one 25-pin connector (bidirectional)
Serial	one 9-pin connector; 16550C-compatible
USB - Front panel	
Mini-tower	four connectors
Desktop	two connectors
Small form factor	two connectors
USB - Back panel	
Mini-tower	six connectors
Desktop	six connectors
Small form factor	six connectors

Video	one 15-hole VGA connector one 20-pin DisplayPort connector
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<b>System Board Connectors</b>	
PCI 2.3 data width (maximum) — 32 bits	
Mini-tower	two 120-pin connectors
Desktop	two 120-pin connectors
Small form factor	one 120-pin connector
PCI Express x16 (wired as x4) data width (maximum) — four PCI Express lanes	
Mini-tower	one 164-pin connector
Desktop	one 164-pin connector
Small form factor	not applicable
PCI Express x16 data width (maximum) — 16 PCI Express lanes	
Mini-tower	one 164-pin connector
Desktop	one 164-pin connector
Small form factor	one 164-pin connector
Serial ATA	
Mini-tower	four 7-pin connectors
Desktop	three 7-pin connectors
Small form factor	three 7-pin connectors
Memory	four 240-pin connectors
Internal USB	one 10-pin connector (supports two USB ports)
Processor fan	one 5-pin connector
Front I/O	one 26-pin connector
Front panel control	one 14-pin connector
Processor	one 1156-pin connector
Power 12V	one 4-pin connector
Power	one 24-pin connector
Internal serial card	one 14-pin connector
Internal speaker	one 5-pin connector
PCI Express x1 (wireless card)	one 36-pin connector
Thermal sensor	one 2-pin connector
Intruder connector	one 3-pin connector

<b>Controls and Lights</b>	
Front of the computer	
Power button	push button
Power light	blinking blue — indicates that the computer is in sleep state. solid blue — indicates that the computer is in power-on state. blinking amber — indicates a problem with the system board. solid amber (when the computer does not

	start) — indicates a problem with the system board or power supply.
Drive activity light	blinking blue — indicates that the computer is reading data from or writing data to the hard drive.
Network connectivity light	blue — indicates that a good connection exists between the network and the computer. off (no light) — indicates that the computer is not detecting a physical connection to the network.
Diagnostic lights	four amber lights on the front panel. For more information, see Diagnostics.
Back of the computer	
Link integrity light on integrated network adapter	green — a good 10 Mbps connection exists between the network and the computer. orange — a good 100 Mbps connection exists between the network and the computer. yellow — a good 1000 Mbps connection exists between the network and the computer. off (no light) — the computer is not detecting a physical connection to the network.
Network activity light on integrated network adapter	yellow light — a blinking yellow light indicates that network activity is present.
Power supply light	green light — the power supply is turned on and is functional. The power cable must be connected to the power connector (at the back of the computer) and the electrical outlet.  <b>NOTE:</b> You can test the health of the power system by pressing the test button. When the system's power supply voltage is within specification, the self-test LED lights up. If the LED does not light up, the power supply may be defective. AC power must be connected during this test.

<b>Power</b>		
Wattage		
Mini-tower	255 W (EPA)	305 W (non-EPA)
Desktop	255 W (EPA)	255 W (non-EPA)
Small form factor	235 W (EPA)	235 W (non-EPA)
Maximum heat dissipation		
Mini-tower	1000 BTU/hr (EPA)	1603 BTU/hr (non-EPA)
Desktop	1000 BTU/hr (EPA)	1341 BTU/hr (non-EPA)



Small form factor	921 BTU/hr (EPA)	1235 BTU/hr (non-EPA)
Voltage	100–240 VAC	
Coin-cell battery	3 V CR2032 lithium coin cell	
<b>NOTE:</b> Heat dissipation is calculated by using the power supply wattage rating.		

<b>Physical</b>		
Height		
Mini-tower	40.80 cm (16.06 inches)	
Desktop	39.70 cm (15.62 inches)	
Small form factor	29.0 cm (11.41 inches)	
Width		
Mini-tower	18.70 cm (7.36 inches)	
Desktop	10.90 cm (4.29 inches)	
Small form factor	8.50 cm (3.34 inches)	
Depth		
Mini-tower	43.10 cm (16.96 inches)	
Desktop	34.80 cm (13.70 inches)	
Small form factor	32.40 cm (12.75 inches)	
Weight		
Mini-tower	11.40 kg (25.13 lb)	
Desktop	8.30 kg (18.29 lb)	
Small form factor	5.90 kg (13.00 lb)	

<b>Environmental</b>		
Temperature		
Operating	10 °C to 35 °C (50 °F to 95 °F)	
Storage	–40 °C to 65 °C (–40 °F to 149 °F)	
Relative humidity (noncondensing)	20% to 80%	
Maximum vibration		
Operating	5 Hz to 350 Hz at 0.0002 G <sup>2</sup> /Hz	
Storage	5 Hz to 500 Hz at 0.001 to 0.01 G <sup>2</sup> /Hz	
Maximum shock		
Operating	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 20 in/sec [51 cm/sec])	
Storage	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 50 in/sec [127 cm/sec])	
Altitude		
Operating	–15.2 m to 3048 m (–50 ft to 10,000 ft)	
Storage	–15.2 m to 10,668 m (–50 ft to 35,000)	

	ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

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# Removing and Replacing Parts

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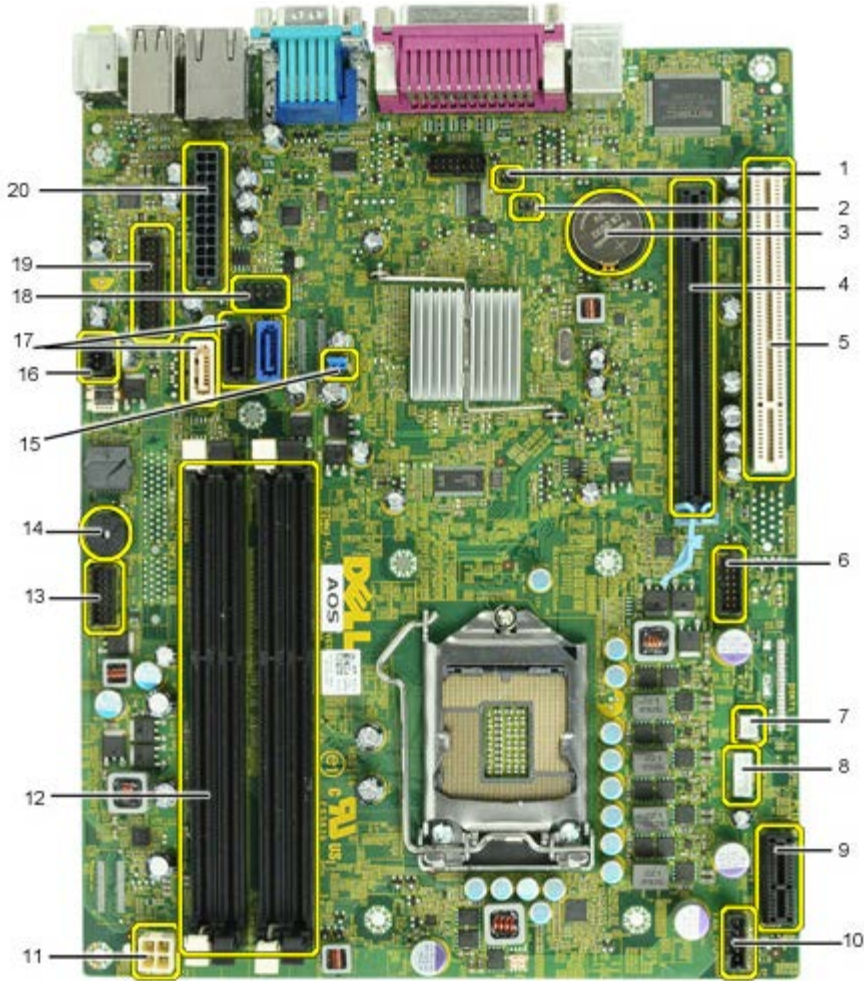
- [Cover](#)
- [Front Panel](#)
- [Optical Drive](#)
- [Hard Drive](#)
- [Wireless Module](#)
- [Fan](#)
- [Heat Sink and Processor](#)
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# System Board Layout

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1	service mode jumper (Service_Mode)	2	RTC reset jumper (RTCST)
3	battery socket (BATTERY)	4	PCI Express x16 card connector(SLOT1)
5	PCI card connector (SLOT2)	6	internal serial card connector (Serial2)
7	thermal sensor connector (THRM3)	8	speaker connector (INT_SPKR)
9	PCI Express x1 wireless card connector (PCIE_WLS1)	10	fan connector (FAN_CPU)
11	power connector (12V POWER)	12	memory module connectors (DIMM_1-4)
13	front panel connector (FRONTPANEL)	14	internal buzzer (BEEP)
15	password jumper (PSWD)	16	intruder connector (INTRUDER)
17	SATA drive connectors (SATA0-2)	18	internal USB connector (INT_USB)
19	front I/O connector (FIO)	20	power connector (MICRO_PWR)

# System Setup

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## Boot Menu

Press <F12> or <Ctrl><Alt><F8> when the Dell™ logo appears to initiate a one-time boot menu with a list of the valid boot devices for the system.

The options listed are:

- Onboard SATA Hard Drive
- Onboard or USB CD-ROM Drive
- System Setup
- Diagnostics

This menu is useful when you are attempting to boot to a particular device or to bring up the diagnostics for the system. Using the boot menu does not make any changes to the boot order stored in the BIOS.

## Navigation Keystrokes

Use the following keystrokes to navigate the System Setup screens.

Navigation Keystrokes	
Action	Keystroke
Expand and collapse field	<Enter>, left- or right-arrow key, or +/-
Expand or collapse all fields	< >
Exit BIOS	<Esc>—Remain in Setup, Save/Exit, Discard/Exit
Change a setting	Left or right-arrow key
Select field to change	<Enter>
Cancel modification	<Esc>
Reset defaults	<Alt><F> or <b>Load Defaults</b> menu option

## Entering System Setup

Your computer offers the following BIOS and System Setup options:

- Bring up a one-time boot menu by pressing <F12>
- Access System Setup by pressing <F2>


### <F12> Menu

Press <F12> when the Dell™ logo appears to initiate a one-time boot menu with a list of the valid boot devices for the computer. **Diagnostics** and **Enter Setup** options are also included in this menu. The devices listed on the boot menu depend on the bootable devices installed in the computer. This menu is useful when you are attempting to boot to a particular device or to bring up the diagnostics for the computer. Making changes in the boot menu does not make any changes to the boot order stored in the BIOS.

### <F2>

Press <F2> to enter System Setup and make changes to user-definable settings. If you have trouble entering System Setup using this key, press <F2> when the keyboard lights first flash.

## System Setup Menu Options

 **NOTE:** System Setup options may vary depending on your computer and may not appear in the exact same order.

General	
System Board	Displays the following information: <ul style="list-style-type: none"><li>System information: Displays <b>BIOS Version</b>, <b>Service Tag</b>, <b>Express Service Code</b>, <b>Asset Tag</b>, <b>Manufacture Date</b>, and the <b>Ownership Date</b>.</li><li>Memory information: Displays <b>Installed Memory</b>, <b>Memory Speed</b>, <b>Number of Active Channels</b>, <b>Memory Technology</b>, <b>DIMM_1 Size</b>, <b>DIMM_2 Size</b>.</li><li>Processor information: Displays the <b>Processor Type</b>, <b>Processor Speed</b>, <b>Processor Bus Speed</b>, <b>Processor L2 cache</b>, <b>Processor ID</b>,</li></ul>

	<p><b>Microcode Version, Multi Core Capable and HT Capable 64-bit Technology.</b></p> <ul style="list-style-type: none"> <li>• PCI information: Displays available slots on the system board.</li> </ul>
Date/Time	Displays the system date and time. Changes to the system date and time take effect immediately.
Boot Sequence	<p>Specifies the order in which the computer attempts to find an operating system from the devices specified in this list.</p> <ul style="list-style-type: none"> <li>• <b>Onboard or USB Floppy</b></li> <li>• <b>Onboard SATA Hard Drive</b></li> <li>• <b>Onboard or USB CD-Rom Drive</b></li> </ul>

Drives	
Diskette drive	<p>This field determines how the BIOS configures floppy drives, operating systems with USB support will recognize USB Floppy drives regardless of this setting:</p> <ul style="list-style-type: none"> <li>• <b>Disable - All Floppy drive are disable</b></li> <li>• <b>Enable - All floppy drive are enable.</b></li> </ul> <p>The "USB Controller" Setup option will affect floppy operation.</p>
SATA Operation	<p>configures the operating mode of the integrated hard drive controller.</p> <ul style="list-style-type: none"> <li>• <b>RAID Autodetect / AHCI</b> = RAID if signed drives, otherwise AHCI</li> <li>• <b>RAID Autodetect / ATA</b>= RAID if signed drives, otherwise ATA</li> <li>• <b>RAID On / ATA</b>= SATA is configured for RAID on every boot</li> <li>• <b>Legacy</b> = The hard drive controller is configured for legacy mode</li> </ul> <p><b>Legacy</b> mode provides for compatibility with some older operating systems that do not support native resources assigned to the drive controller.</p> <p><b>RAID Mode is incompatible with ImageServer. Please disable RAID mode if enabling Image Server.</b></p>
S.M.A.R.T. Reporting	<p>This field controls whether hard drive errors for integrated drives are reported during system startup. This technology is part of the SMART(Self Monitoring Analysis and Reporting Technology) specification.</p> <p>This option is disabled by default.</p>
Drives	Enables or disables the SATA or ATA drives connected to the system board.

System Configuration	
Integrated NIC	<p>Enables or disables the integrated network card. You can set the integrated NIC to:</p> <ul style="list-style-type: none"> <li>• <b>Disable</b></li> <li>• <b>Enable (default)</b></li> <li>• <b>Enable with PXE</b></li> <li>• <b>Enable with ImageSever</b></li> </ul> <p>ImageServe is incompatible with RAID mode. Please disable RAID if enabling ImageServer.</p> <p>PXE is needed only if intending to boot to an operating system located on a server, not if you are booting on an OS located on a hard drive in this system.</p>
USB Controller	<p>Enables or disables the integrated USB controller. You can set the USB controller to:</p> <ul style="list-style-type: none"> <li>• <b>Enable (default)</b></li> <li>• <b>Disable</b></li> <li>• <b>No boot</b></li> </ul> <p>operating systems with USB support will recognize USB Storage</p>
Parallel Port	<p>Identifies and defines the parallel port settings. You can set the parallel port to:</p> <ul style="list-style-type: none"> <li>• <b>Disable</b></li> <li>• <b>AT</b></li> <li>• <b>PS/2 (default)</b></li> <li>• <b>EPP</b></li> <li>• <b>ECP No DMA</b></li> <li>• <b>ECP DMA 1</b></li> <li>• <b>ECP DMA 3</b></li> </ul>
Parallel Port Address	Sets the base I/O address of the integrated parallel port.
Serial Port #1	<p>Identifies and defines the serial port settings. You can set the serial port to:</p> <ul style="list-style-type: none"> <li>• <b>Disable</b></li> <li>• <b>Auto (default)</b></li> <li>• <b>COM1</b></li> <li>• <b>COM3</b></li> </ul> <p>The operating System may allocate resources even though the setting is disabled.</p>
Miscellaneous Devices	<p>Enables or disables the following onboard devices:</p> <ul style="list-style-type: none"> <li>• <b>Front USB</b></li> <li>• <b>PCI slots</b></li> <li>• <b>Audio</b></li> <li>• <b>OptiPlex ON Reader</b></li> <li>• <b>Rear Quad USB</b></li> <li>• <b>WiFi NIC Slot</b></li> </ul>

Video	
Primary Video	<p>This field determines which video controller will become the primary video controller when 2 controllers are available in the system. This selection matters only if there are 2 video controller present.</p> <ul style="list-style-type: none"> <li>• <b>Auto</b>(default) - Use the add-in video controller.</li> <li>• <b>Onboard/Card</b> - Use the integrated video controller unless a Graphic care is installed. A PCI Express Graphic(PEG) card will override and disable the integrated video controller.</li> </ul>

Performance	
Multi Core Support	This field specifies whether the processor will have one or all cores enable. The performance of some application will improve with the additional cores.
Hyper-Threading Technology	This option enables or disables the Hyper-Threading Technology. When disabled, only one thread per enabled core is enabled This option is enabled by default.
Intel® Turbo Boost Technology	This option enables or disables the Intel® Turbo Boost Technology. When disabled, Intel® Turbo Boost Technology allows processor(s) to run at frequencies higher than the advertised frequency This option is enabled by default.
Intel® SpeedStep™	This Option enables or disables the Intel® SpeedStep™ mode of the processor. When disabled, the system is placed into the highest performance state and the Intel® SpeedStep™ applet or native operating system driver are prevented from adjusting the processor's performance. When enable, the Intel® SpeedStep™, enabled CPU is allowed to operate in multiple performance states. This option is disabled by default.
C States Control	This option enables or disables additional processor sleep states. The operating system may optionally use these for additional power saving when idle. This option is disabled by default.
Limit CPUID Value	This field limits the maximum value the processor Standard CPUID Function will support. Some operating systems will not complete installation when the maximum CPUID Function supported is greater than 3. This option is disabled by default.

Virtualization Support	
Virtualization	<p>This Option specifies whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel® Virtualization Technology.</p> <p><b>Enable Intel® Virtualization Technology</b> - This option is disabled by default.</p>
VT for Direct I/O	<p>Enables or disables the Virtual Machine Monitor (VMM) from utilizing the additional hardware capabilities provided by Intel® Virtualization technology for direct I/O.</p> <p><b>Enable Intel® Virtualization Technology for Direct I/O</b> - This option is disabled by default.</p>
Trusted Execution	<p>Field specifies whether a Measured Virtual Machine(MVMM) can utilize the additional hardware capabilities provided by Intel® Trusted Execution Technology. The TPM Virtualization Technology and Virtualization Technology for Direct I/O must be enable to use this feature.</p> <p><b>Enable Intel® Trusted Execution Technology</b> - This option is disabled by default.</p>

Security	
Administrative Password	<p>Provides restricted access to the computer's system setup program in the same way that access to the system can be restricted with the <b>System Password option</b>.</p> <p>This option is not set by default.</p>
System Password	<p>Displays the current status of the system's password security feature and allows a new system password to be assigned and verified.</p> <p>This option is not set by default.</p>
Password Changes	<p>Enables or disables the user from changing the system password without the administrative password.</p> <p>This option is enabled by default.</p>
Admin Setup Lockout	<p>Enables or disables the user from entering Setup when an Admin password is set.</p> <p>This option is disabled by default.</p>
Password Configuration	<p>These fields control the minimum and maximum number of characters allowed for Admin and System passwords. Changes to these fields are not active until they are committed via the apply button or saving changes before exiting setup.</p> <ul style="list-style-type: none"> <li>• <b>Admin Password Min</b></li> <li>• <b>Admin Password Max</b></li> <li>• <b>System Password Min</b></li> <li>• <b>System Password Max</b></li> </ul>
Strong Password	<p>This field enforces strong passwords. If enabled, all passwords must contain at least one uppercase character, one lowercase character, and be at least 8 characters long. Enabling this feature automatically changes the default minimum password length to 8 characters.</p> <p><b>Enforce strong password</b> - This option is disabled by default.</p>
TPM Security	<p>Enables or disables the trusted platform module (TPM) security.</p> <p>You can set the TPM security to:</p>

	<ul style="list-style-type: none"> <li>• <b>Deactivate</b> (default)</li> <li>• <b>Activate</b></li> <li>• <b>Clear</b></li> </ul> <p>When TPM Security is set to <b>Clear</b>, the system setup program clears the owner information stored in the TPM. Use this setting to restore the TPM to its default state if you lose or forget the owner authentication data.</p>
CPU XD Support	<p>Enables or disables the execute disable mode of the processor.</p> <p>This option is enabled by default.</p>
Computrace(R)	<p>Enables or disables the optional Computrace® service designed for asset management.</p> <p>You can set this option to:</p> <ul style="list-style-type: none"> <li>• <b>Deactivate</b> (default)</li> <li>• <b>Disable</b></li> <li>• <b>Activate</b></li> </ul>
Chassis Intrusion	<p>This field controls the chassis intrusion feature.</p> <p>You can set this option to:</p> <ul style="list-style-type: none"> <li>• <b>Clear Intrusion Warning</b> (Enabled by default if detected the chassis intrusion)</li> <li>• <b>Disable</b></li> <li>• <b>Enabled</b></li> <li>• <b>On-Silent</b> (Enabled by default if detected the chassis intrusion)</li> </ul>
SATA-0 Password	<p>Displays the current status of the password set for the hard drive connected to the SATA-0 connector on the system board.</p> <p>You can also set a new password. This option is not set by default.</p> <p>The system setup program displays a password for each of the hard drives connected to your system board.</p>
SATA-1 Password	<p>Displays the current status of the password set for the hard drive connected to the SATA-1 connector on the system board.</p> <p>You can also set a new password. This option is not set by default.</p> <p>The system setup program displays a password for each of the hard drives connected to your system board.</p>

#### Power Management

AC Recovery	<p>Determines how the system responds when AC power is re-applied after a power loss. You can set the AC Recovery to:</p> <ul style="list-style-type: none"> <li>• <b>Power Off</b> (default)</li> <li>• <b>Power On</b></li> <li>• <b>Last State</b></li> </ul>
Auto On Time	<p>Sets time to automatically turn on the computer.</p> <p>Time is kept in the standard 12-hour format (hours:minutes:seconds).</p> <p>Change the startup time by typing the values in the time and AM/PM fields.</p> <p>NOTE: This feature does not work if you turn off your computer using the switch on a power strip or surge protector or if <b>Auto Power On is set to disabled</b>.</p>
Low Power Mode	<p>Enables or disables low power mode.</p> <p>This option is disabled by default.</p> <p>When low power mode is enabled, the integrated network card is disabled when the system is shutdown or in Hibernate mode. Only Add-in NIC cards will be able to remotely wake the system.</p>
Remote Wakeup	<p>Allows the system to power up when a network interface controller receives a wake up signal. You can set Remote Wakeup to:</p> <ul style="list-style-type: none"> <li>• <b>Disable</b> (default)</li> <li>• <b>Enable</b></li> <li>• <b>Enable with Boot NIC</b></li> </ul>
Suspend Mode	<p>Sets the power management suspend mode to:</p> <ul style="list-style-type: none"> <li>• <b>S1</b></li> <li>• <b>S3</b> (default)</li> </ul>
Fan Control Override	<p>Controls the speed of the system fan. This option is disabled by default.</p> <p>NOTE: When enabled, the fan runs at full speed.</p>

#### Maintenance

Service Tag	Displays the Service Tag of your computer.
Asset Tag	<p>Allows you to create a system asset tag if an asset tag is not already set.</p> <p>This option is not set by default.</p>
SERR Messages	<p>Controls the SERR Message mechanism.</p> <p>This option is enabled by default.</p>



Some graphics cards require the SERR Message mechanism be disabled.

### Image Server

Lookup Method	Specifies how the ImageServer looks up the server address. <ul style="list-style-type: none"><li>• <b>Static IP</b></li><li>• <b>DNS</b></li></ul> NOTE: You must set the Integrated NIC to Enable with ImageServer to set the Lookup Method.
ImageServer IP	Specifies the primary static IP address of the ImageServer with which the client software communicates. The default IP address is <b>255.255.255.255</b> NOTE: You must set the "Integrated NIC" control in the "System Configuration" group to "Enabled with ImageServer" and when "Lookup Method" is set to "Static IP".
ImageServer Port	Specifies the primary IP port of the image server with which the client software communicates. The default IP port is <b>06910</b> NOTE: You must set the "Integrated NIC" control in the "System Configuration" group to "Enabled with ImageServer".
Client DHCP	Specifies how the client obtains the IP address. <ul style="list-style-type: none"><li>• <b>Static IP</b></li><li>• <b>DHCP</b> (default)</li></ul> NOTE: You must set the "Integrated NIC" control in the "System Configuration" group to "Enabled with ImageServer".
Client IP	Specifies the static IP address of the client. The default IP address is <b>255.255.255.255</b> NOTE: To set <b>Client IP you must set Client DHCP to Static IP</b>
Client SubnetMask	Specifies the subnet mask for the client. The default setting is <b>255.255.255.255</b> NOTE: To set <b>Client SubnetMask you must set Client DHCP to Static IP</b>
Client Gateway	Specifies the gateway IP address for the client. The default setting is <b>255.255.255.255</b> NOTE: To set <b>Client SubnetMask you must set Client DHCP to Static IP</b>
License Status	Displays the current license status.

### Post Behavior

Fast Boot	When enabled (default), your computer starts more quickly because it skips certain configurations and tests.
NumLock LED	Enables or disables the NumLock feature when your computer starts. When enabled (default), this option activates the numeric and mathematical features shown at the top of each key. When disabled, this option activates the cursor-control functions labeled on the bottom of each key
POST Hotkeys	Allows you to specify the function keys to display on the screen when the computer starts. <ul style="list-style-type: none"><li>• <b>Enable F2 = Setup</b> (enabled by default)</li><li>• <b>Enable F12 = Boot menu</b> (enabled by default)</li></ul>
Keyboard Errors	Enables or disables keyboard error reporting when the computer starts. This option is enabled by default.
MEBx Hotkey	sign-on displays a message stating the keystroke sequence required to enter the Manageability Engine BIOS Extensions(MEBx) Setup program. This option is enabled by default.

### System Logs

BIOS Events	Displays the system event log and allows you to: <ul style="list-style-type: none"><li>• <b>Clear Log</b></li><li>• <b>Mark all Entries</b></li></ul>
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# Diagnostics



## Dell™ OptiPlex™ 980 Service Manual—Small Form Factor

- [Dell Diagnostics](#)
  - [Power Button Light Codes](#)
  - [Beep Codes](#)
  - [Diagnostic Lights](#)
- 

## Dell Diagnostics

### When to Use the Dell Diagnostics

It is recommended that you print these procedures before you begin.


-  **NOTE:** The Dell Diagnostics software works only on Dell computers.
-  **NOTE:** The *Drivers and Utilities* media is optional and may not ship with your computer.

Enter system setup (see [Entering System Setup](#)), review your computer's configuration information, and ensure that the device you want to test displays in System Setup and is active.

Start the Dell Diagnostics from either your hard drive or from the *Drivers and Utilities* media.

### Starting the Dell Diagnostics From Your Hard Drive

1. Turn on (or restart) your computer.
2. When the DELL logo appears, press <F12> immediately.

-  **NOTE:** If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from your *Drivers and Utilities* media.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.


3. When the boot device list appears, highlight **Boot to Utility Partition** and press <Enter>.
4. When the Dell Diagnostics **Main Menu** appears, select the test that you want to run.

### Starting the Dell Diagnostics From the Drivers and Utilities Disc

1. Insert the *Drivers and Utilities* disc.
2. Shut down and restart the computer.

When the DELL logo appears, press <F12> immediately.

If you wait too long and the Windows logo appears, continue to wait until you see the Windows desktop. Then shut down your computer and try again.

-  **NOTE:** The next steps change the boot sequence for one time only. On the next startup, the computer boots according to the devices specified in the system setup program.

3. When the boot device list appears, highlight **Onboard or USB CD-ROM Drive** and press <Enter>.

4. Select the **Boot from CD-ROM** option from the menu that appears and press <Enter>.
5. Type 1 to start the menu and press <Enter> to proceed.
6. Select **Run the 32 Bit Dell Diagnostics** from the numbered list. If multiple versions are listed, select the version appropriate for your computer.
7. When the Dell Diagnostics **Main Menu** appears, select the test you want to run.

## Dell Diagnostics Main Menu

1. After the Dell Diagnostics loads and the **Main Menu** screen appears, click the button for the option you want.

Option	Function
Express Test	Performs a quick test of devices. This test typically takes 10 to 20 minutes and requires no interaction on your part. Run <b>Express Test</b> first to increase the possibility of tracing the problem quickly.
Extended Test	Performs a thorough check of devices. This test typically takes 1 hour or more and requires you to answer questions periodically.
Custom Test	Tests a specific device. You can customize the tests you want to run.
Symptom Tree	Lists the most common symptoms encountered and allows you to select a test based on the symptom of the problem you are having.

2. If a problem is encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description and follow the instructions on the screen.
3. If you run a test from the **Custom Test** or **Symptom Tree** option, click the applicable tab described in the following table for more information.






Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and may indicate requirements for running the test.
Configuration	Displays your hardware configuration for the selected device.  The Dell Diagnostics obtains configuration information for all devices from system setup, memory, and various internal tests, and it displays the information in the device list in the left pane of the screen. The device list may not display the names of all the components installed on your computer or all devices attached to your computer.
Parameters	Allows you to customize the test by changing the test settings.

4. When the tests are completed, if you are running the Dell Diagnostics from the *Drivers and Utilities* disc, remove the disc.
5. Close the test screen to return to the **Main Menu** screen. To exit the Dell Diagnostics and restart the computer, close the **Main Menu** screen.

## Power Button Light Codes

The diagnostic lights give much more information about the system state, but legacy power light states are also supported in your computer. The power light states are shown in following table.

Power Light State	Description
Off	

	Power is off, light is blank.
<b>Blinking Amber</b> 	Initial state of light at power up. Indicates system has power, but the POWER_GOOD signal is not yet active. If the <b>Hard Drive light is off</b> , it is probable that the power supply needs to be replaced. If the <b>Hard Drive light on</b> , it is probable that an onboard regulator or VRM has failed. Look at the diagnostic lights for further information.
<b>Solid Amber</b> 	Second state of the light at power up. Indicates the POWER_GOOD signal is active and it is probable that the power supply is fine. Look at the diagnostic lights for further information.
<b>Blinking Green</b> 	System is in a low power state, either S1 or S3. Look at the diagnostic lights to determine which state the system is in.
<b>Solid Green</b> 	System is in S0 state, the normal power state of a functioning machine. The BIOS will turn the light to this state to indicate it has started fetching op-codes.

## Beep Codes

If the monitor cannot display error messages during the POST, the computer may emit a series of beeps that identifies the problem or that can help you identify a faulty component or assembly. The following table lists the beep codes that may be generated during the POST. Most beep codes indicate a fatal error that prevents the computer from completing the boot routine until the indicated condition is corrected.

Code	Cause
1-1-2	Microprocessor register failure
1-1-3	NVRAM
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval timer
1-2-2	DMA initialization failure
1-2-3	DMA page register read/write failure
1-3-1 through 2-4-4	DIMMs not being properly identified or used
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure
3-1-4	Slave interrupt mask register failure
3-2-2	Interrupt vector loading failure
3-2-4	Keyboard Controller Test failure
3-3-1	NVRAM power loss
3-3-2	NVRAM configuration
3-3-4	Video Memory Test failure
3-4-1	Screen initialization failure
3-4-2	Screen retrace failure
3-4-3	Search for video ROM failure













4-2-1	No time tick
4-2-2	Shutdown failure
4-2-3	Gate A20 failure
4-2-4	Unexpected interrupt in protected mode
4-3-1	Memory failure above address 0FFFFh
4-3-3	Timer-chip counter 2 failure
4-3-4	Time-of-day clock stopped
4-4-1	Serial or parallel port test failure
4-4-2	Failure to decompress code to shadowed memory
4-4-3	Math coprocessor test failure
4-4-4	Cache test failure
1-1-2	Microprocessor register failure
1-1-3	NVRAM read/write failure
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval timer failure
1-2-2	DMA initialization failure
1-2-3	DMA page register read/write failure
1-3	Video Memory Test failure
1-3-1 through 2-4-4	Memory not being properly identified or used
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure
3-1-4	Slave interrupt mask register failure
3-2-2	Interrupt vector loading failure
3-2-4	Keyboard Controller Test failure
3-3-1	NVRAM power loss
3-3-2	Invalid NVRAM configuration
3-3-4	Video Memory Test failure
3-4-1	Screen initialization failure
3-4-2	Screen retrace failure
3-4-3	Search for video ROM failure
4-2-1	No timer tick
4-2-2	Shutdown failure
4-2-3	Gate A20 failure
4-2-4	Unexpected interrupt in protected mode
4-3-1	Memory failure above address 0FFFFh
4-3-3	Timer-chip counter 2 failure
4-3-4	Time-of-day clock stopped
4-4-1	Serial or parallel port test failure
4-4-2	Failure to decompress code to shadowed memory

























4-4-3	Math-coprocessor test failure
4-4-4	Cache test failure







## Diagnostic Lights

To help troubleshoot a problem, your computer has four lights labeled 1, 2, 3, and 4 on the bank panel. When the computer starts normally, the lights flash before turning off. If the computer malfunctions, the sequence of the lights help to identify the problem.

 **NOTE:** After the computer completes POST, all four lights turn off before booting to the operating system.

Light Pattern		Problem Description	Suggested Resolution
<b>Diagnostic LEDs</b>	<b>Power Button LED</b>		
		The computer is either turned off or not receiving power.	<ul style="list-style-type: none"> <li>Reseat the power cable in the power connector on the back of the computer and the electrical outlet.</li> <li>Bypass power strips, power extension cables, and other power protection devices to verify that the computer turns on properly.</li> <li>Ensure that any power strips being used are plugged into an electrical outlet and are turned on.</li> <li>Ensure that the electrical outlet is working by testing it with another device, such as a lamp.</li> <li>Ensure that the main power cable and front panel cable are securely connected to the system board.</li> </ul>
		A possible system board failure has occurred.	<ul style="list-style-type: none"> <li>Unplug the computer. Allow one minute for the power to drain. Plug the computer into a working electrical outlet and press the power button.</li> </ul>
		A possible system board, power supply, or peripheral failure has occurred.	<ul style="list-style-type: none"> <li>Power off computer, leaving the computer plugged in. Press and hold the power supply test button on the rear of the power supply unit. If the LED next to the switch illuminates, the problem may be with your system board.</li> <li>If the LED next to the switch does not illuminate, disconnect all internal and external peripherals, and press and hold the power supply test button. If it illuminates, there could be a problem with a peripheral.</li> <li>If the LED still does not illuminate, remove the PSU connections from the system board, then press and hold the power supply button. If it illuminates, there could be a problem with the system board.</li> <li>If the LED still does not illuminate, the problem is probably with the power supply.</li> </ul>
		Memory modules are detected, but a memory power failure has occurred.	<ul style="list-style-type: none"> <li>If two or more memory modules are installed, remove the modules, then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. If only one memory module is installed, try moving it to a different DIMM connector and restart the computer.</li> <li>If available, install verified working memory of the same type into your computer.</li> </ul>
		A possible CPU or system board failure has occurred.	<ul style="list-style-type: none"> <li>Replace the CPU with a known good CPU. If the computer still fails to boot, inspect the CPU socket for damage.</li> </ul>
		BIOS may be corrupt or missing.	<ul style="list-style-type: none"> <li>The computer hardware is operating normally but the BIOS may be corrupt or missing.</li> </ul>
		A possible system board	<ul style="list-style-type: none"> <li>Remove all peripheral cards from the PCI and PCI-E slots and restart the computer. If the computer boots, add the peripheral cards back one by</li> </ul>

		failure has occurred.	one until you find the bad one.
		Power connector not installed properly.	<ul style="list-style-type: none"> <li>• Reseat the 2x2 power connector from the power supply unit.</li> </ul>
		Possible peripheral card or system board failure has occurred.	<ul style="list-style-type: none"> <li>• Remove all peripheral cards from the PCI and PCI-E slots and restart the computer. If the computer boots, add the peripheral cards back one by one until you find the bad one.</li> </ul>
		A possible system board failure has occurred.	<ul style="list-style-type: none"> <li>• Disconnect all internal and external peripherals, and restart the computer. If the computer boots, add the peripheral cards back one by one until you find the bad one.</li> <li>• If the problem persists, the system board is probably bad.</li> </ul>
		A possible coin cell battery failure has occurred.	<ul style="list-style-type: none"> <li>• Remove the coin cell battery for one minute, reinstall the battery, and restart.</li> </ul>
		The computer is in a normal <i>on</i> condition. The diagnostic lights are not lit after the computer successfully boots to the operating system.	<ul style="list-style-type: none"> <li>• Ensure that the display is connected and powered on.</li> </ul>
		A possible processor failure has occurred.	<ul style="list-style-type: none"> <li>• Reseat the processor.</li> </ul>
		Memory modules are detected, but a memory failure has occurred.	<ul style="list-style-type: none"> <li>• If two or more memory modules are installed, remove the modules (see your service manual), then reinstall one module (see your service manual and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error.</li> <li>• If available, install working memory of the same type into your computer.</li> </ul>
		A possible graphics card failure has occurred.	<ul style="list-style-type: none"> <li>• Reseat any installed graphics cards.</li> <li>• If available, install a working graphics card into your computer.</li> </ul>
		A possible floppy drive or hard drive failure has occurred.	<ul style="list-style-type: none"> <li>• Reseat all power and data cables.</li> </ul>
		A possible USB failure has occurred.	<ul style="list-style-type: none"> <li>• Reinstall all USB devices and check all cable connections.</li> </ul>
		No memory modules are detected.	<ul style="list-style-type: none"> <li>• If two or more memory modules are installed, remove the modules (see your service manual), then reinstall one module (see your service manual) and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error.</li> <li>• If available, install working memory of the same type into your computer.</li> </ul>
		Memory modules are detected, but a memory	<ul style="list-style-type: none"> <li>• Ensure that no special requirements for memory module/connector placement exist.</li> </ul>

		<p>configuration or compatibility error has occurred.</p>	<ul style="list-style-type: none"> <li>• Ensure that the memory you are using is supported by your computer.</li> </ul>
		<p>A possible expansion card failure has occurred.</p>	<ul style="list-style-type: none"> <li>• Determine if a conflict exists by removing an expansion card (not a graphics card) and restarting the computer.</li> <li>• If the problem persists, reinstall the card you removed, then remove a different card and restart the computer.</li> <li>• Repeat this process for each expansion card installed. If the computer starts normally, troubleshoot the last card removed from the computer for resource conflicts.</li> </ul>
		<p>Another failure has occurred.</p>	<ul style="list-style-type: none"> <li>• Ensure that all hard drive and optical drive cables are properly connected to the system board.</li> <li>• If there is an error message on the screen identifying a problem with a device (such as the floppy drive or hard drive), check the device to make sure it is functioning properly.</li> <li>• If the operating system is attempting to boot from a device (such as the floppy drive or optical drive), check system setup to ensure the boot sequence is correct for the devices installed on your computer.</li> </ul>


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# Cover

## Dell™ OptiPlex™ 980 Service Manual—Small Form Factor



 **WARNING:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

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## Removing the Cover

 **NOTE:** You may need to install Adobe Flash Player from [Adobe.com](http://Adobe.com) to view the following illustrations.

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Pull back the cover release latch.

3. Tilt the computer cover outwards from the top, and then remove it from the computer.

## Replacing the Cover

To replace the cover, perform the above steps in reverse order.


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# Front Panel

Dell™ OptiPlex™ 980 Service Manual—Small Form Factor



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## Removing the Front Panel

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Gently pry the front panel retention clips away from the system.

3. Remove the front panel from the chassis.

## Replacing the Front Panel

To replace the front panel, perform the above steps in reverse order.

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# Optical Drive

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## Removing the Optical Drive

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Disconnect the data and power cables from the back of the optical drive.

3. Pull up the drive-release latch and then slide the optical drive towards the back of the system.

4. Lift up to remove the optical drive from the computer.



5. Remove the screws.

6. Remove the screw.

7. Remove the bracket from the optical drive.

## Replacing the Optical Drive

To replace the optical drive, perform the above steps in reverse order.

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# Hard Drive

Dell™ OptiPlex™ 980 Service Manual—Small Form Factor



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## Removing the Hard Drive

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Press in on the blue release tabs on each side of the hard drive and slide the hard drive out of the computer.

3. Disconnect and release the data and power cables.

4. Remove the hard drive cage from the computer.

5. Press in on the blue securing tabs on each side of the drive, and then remove the hard drive.

6. Remove the screws that secure the first hard drive to the bay.

7. Remove the first hard drive from the bay.

8. Remove the screws that secure the second hard drive (if available) to the bay.

9. Remove the second hard drive from the bay.

## Replacing the Hard Drive

To replace the hard drive, perform the above steps in reverse order.

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# Wireless Module

Dell™ OptiPlex™ 980 Service Manual—Small Form Factor



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## Removing the Wireless Module

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [hard drive](#).
3. Lift the wireless antenna port release tab, and then push the wireless antennae port towards the power supply.

4. Release the wireless antenna.

5. Release the securing tab to remove the wireless module from the system board.

6. Remove the metal cover from the wireless card assembly.

7. Disconnect the antenna cables.

8. Release the Wireless Local Area Network (WLAN) card from the securing tab.

9. Remove the WLAN card from the socket.

10. Release and remove the antennae cables.

11. Remove the WLAN board from the bracket.

## Replacing the Wireless Module

To replace the wireless module, perform the above steps in reverse order.

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# Fan

## Dell™ OptiPlex™ 980 Service Manual—Small Form Factor



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## Removing the Fan

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [optical drive](#).
3. Remove the [hard drive](#).
4. Remove the [wireless module](#).
5. Disconnect the fan from its connector on the system board.

6. Remove the screws from the processor fan shroud.

7. Remove the processor fan from the heat sink.



## Replacing the Fan

To replace the fan, perform the above steps in reverse order.

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# Heat Sink and Processor

Dell™ OptiPlex™ 980 Service Manual—Small Form Factor



## Removing the Heat Sink and Processor

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- 
1. Follow the procedures in [Before Working Inside Your Computer](#).
  2. Remove the [optical drive](#).
  3. Remove the [hard drive cage](#).
  4. Remove the [wireless module](#).
  5. Disconnect the fan cable from the connector on the system board.


6. Loosen the screws that secure the heat sink to the system board.

7. Rotate the heat sink towards the back of the computer and remove the heat sink.

8. Press the processor cover release lever down and out to release the cover.

9. Lift the processor cover.

10. Remove the processor from the system board.

 **CAUTION:** When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

## Replacing the Heat Sink and Processor

To replace the heat sink and processor, perform the above steps in reverse order.

---

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# Memory

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---

## Removing the Memory Module(s)

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [optical drive](#).
3. Remove the [hard drive cage](#).
4. Push down on the memory retention clips to release the memory module.

5. Lift the memory module out of its connector on the system board and remove it from the computer.

## **Replacing the Memory Module(s)**

To replace the memory module, perform the above steps in reverse order.

---

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# Internal Speaker

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## Removing the Internal Speaker

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [hard drive cage](#).
3. Remove the processor [fan](#).
4. Disconnect and release the internal speaker cable.



5. Press the speaker securing tab and slide to remove the speaker.

## Replacing the Internal Speaker

To replace the internal speaker, perform the above steps in reverse order.

---

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# Front Thermal Sensor

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## Removing the Front Thermal Sensor

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [hard-drive bay](#).
3. Remove the [internal speaker](#).
4. Remove the processor [fan](#).
5. Disconnect the front thermal sensor cable from the system board.

6. Release the hook to remove the front thermal sensor.

## **Replacing the Front Thermal Sensor**

To replace the front thermal sensor, perform the above steps in reverse order.

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# Power Supply

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## Removing the Power Supply

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [optical drive](#).
3. Remove the [hard-drive bay](#).
4. Remove the [heat sink](#).
5. Remove the data cable from the cable hook.

6. Disconnect the main power connector from the system board.

7. Disconnect the power connector from the system board.

8. Remove the screws that secure the power supply to the back of the chassis.

9. Slide the power supply towards the drive bay.

10. Lift the power supply up and away from the computer.

## Replacing the Power Supply

To replace the power supply, perform the above steps in reverse order.

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# Expansion Cards

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## Removing Expansion Cards

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [hard-drive bay](#).
3. Lift up the expansion card riser handle.



4. Lift the securing lever and pull up the expansion card riser.

## Replacing Expansion Cards

To replace expansion cards, perform the above steps in reverse order.

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# I/O Panel

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## Removing the I/O Panel

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [front panel](#).
3. Remove the [hard-drive bay](#).
4. Remove the [optical drive](#).
5. Remove the [memory](#).
6. Disconnect the I/O panel cable from the system board.

7. Release the I/O panel cable.

8. Lift the securing tab and push the I/O panel towards the right of the computer.

9. Remove the I/O panel from the front.

## Replacing the I/O Panel

To replace the I/O panel, perform the above steps in reverse order.

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# Control Panel

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## Removing the Control Panel

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [front panel](#).
3. Remove the [hard-drive bay](#).
4. Remove the [optical drive](#).
5. Disconnect the control panel cable from the system board.

6. Remove the screw.

7. Remove the control panel from the chassis.

## Replacing the Control Panel

To replace the control panel, perform the above steps in reverse order.

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# Intrusion Switch

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## Removing the Intrusion Switch

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [hard-drive bay](#).
3. Disconnect the intrusion switch cable from the system board.



4. Slide and remove the intrusion switch.

## Replacing the Intrusion Switch

To replace the intrusion switch, perform the steps above in reverse order.

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# Coin-Cell Battery

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## Removing the Coin-Cell Battery

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [hard-drive bay](#).
3. Pull the retention clip away from the coin-cell battery.

3. Lift up the coin-cell battery from its socket and remove the battery from the computer.

## Replacing the Coin-Cell Battery

To replace the coin-cell battery, perform the above steps in reverse order.

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# System Board

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## Removing the System Board

1. Follow the procedures in [Before Working Inside Your Computer](#).
2. Remove the [optical drive](#).
3. Remove the [hard-drive bay](#).
4. Remove the [heat sink and processor](#).
5. Remove the [wireless module](#).
6. Remove the [memory](#).
7. Remove the [expansion card](#).
8. Disconnect all the cables from the system board.

9. Remove the screws from the system board.

10. Lift up and remove the system board from the chassis.

## Replacing the System Board

To replace the system board, perform the above steps in reverse order.

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