
Resetting the Logic Board

System Management Controller (SMC) Reset

The System Management Controller (SMC) is a chip on the logic board that controls all power functions for the computer. If the computer is experiencing any power issue, resetting the SMC may resolve it. The SMC controls several functions, including:

- Telling the computer when to turn on, turn off, sleep, wake, idle, and so forth
- Handling system resets from various commands
- Controlling the fans

It is also recommended that the SMC be reset on any new logic board after it is installed as part of a repair.

Note that resetting the SMC does not reset the PRAM. Resetting the SMC will not resolve issues in which the computer is unresponsive—in these situations, restarting the computer will generally suffice. If the computer isn't responding, perform these steps one at a time, in the following order, until the issue has been resolved:

1. Force Quit (Option-Command-Escape)
2. Restart (Control-Command-Power)
3. Force Shut Down (press the power button for 10 seconds)

Resetting the SMC can resolve some computer issues such as not starting up, not displaying video, sleep issues, fan noise issues, and so forth. If the computer still exhibits these types of issues after you've restarted the computer, try resetting the SMC. There are two ways to reset the SMC on Mac Pro.

You can use the SMC reset switch:

1. From the Apple menu, choose Shut Down (or if the computer is not responding, hold the power button until it turns off).
2. Press the SMC_RST switch, which is located to the right and slightly below the row of diagnostic LEDs. (See the LED diagram in the following "Diagnostic LEDs" section.) To press the switch, use the nylon probe tool (Apple part number 922-5065).
3. Press the power button to start up the computer.

Or, you can reset the SMC by removing AC power:

1. From the Apple menu, choose Shut Down (or if the computer is not responding, hold the power button until it turns off).
2. Unplug the AC power cord.
3. Wait at least 15 seconds.
4. Plug the power cord back in, making sure the power button is not being pressed at the time.
5. Press the power button to start up the computer.

Real Time Clock (RTC) Reset

The Real Time Clock (RTC) is a chip on the logic board that controls the date and time functions of the computer. If the computer is experiencing an issue booting, resetting the RTC may resolve it. Follow these steps to reset the RTC:

1. From the Apple menu, choose Shut Down (or if the computer is not responding, hold the power button until it turns off).
2. Unplug the AC power cord.
3. Remove the battery for at least 20 seconds. You may need to remove a PCI Express card to have access to the battery.

System Reset

Mac Pro has a system reset switch on the logic board that may be used to restart the system while it is powered up. This switch can be used to determine if a computer that won't consistently boot from a cold start has power supply issues. Follow these steps to reset the system:

1. With the computer powered up, press the SYS_RST switch located in the upper right-hand corner of the logic board. To press the switch, use the nylon probe tool (Apple part number 922-5065).
2. If the computer boots after you press the SYS_RST switch, try shutting the computer off and restarting by pressing the front power button. If the computer restarts when you press the SYS_RST switch but not from a cold start, the power supply may need to be replaced.

Power-On Self Test: RAM and Processor Verification

A power-on self test in the computer's ROM automatically runs whenever the computer is started up after being fully shut down (the test does not run if the computer is only restarted). If the test detects a problem, the status LED located above the power button on the front of the computer will flash in the following ways*:

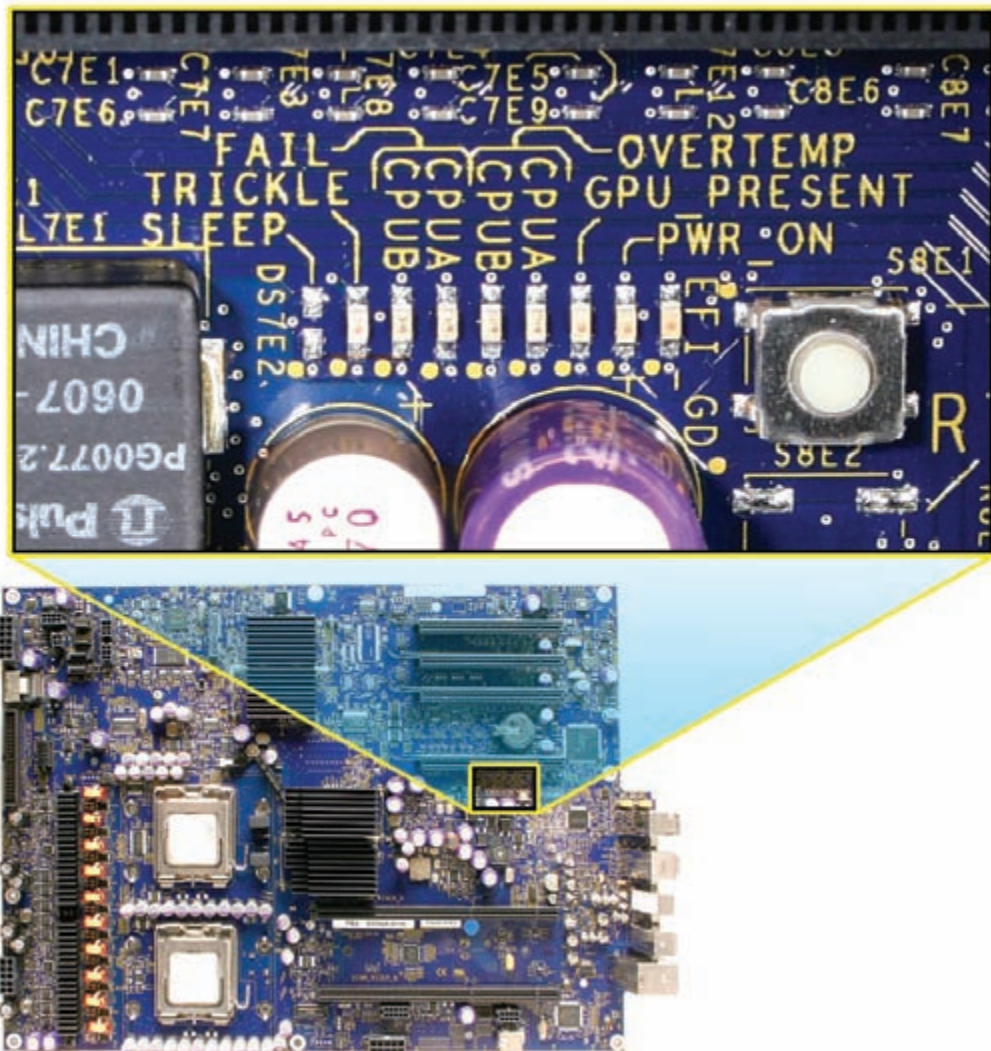
- 1 Flash: No RAM is installed or detected. Or, the quick memory test failed. An LED will light up on the DIMM riser card next to the affected DIMM.
- 3 Flashes: A RAM bank failed extended memory testing. An LED will light up on the memory riser card next to the affected DIMM.

Troubleshooting: Try reseating the memory DIMMs. Check memory installation instructions for proper installation order. Swap affected DIMM with known good DIMM.

***Note:** The status LED lights up when the power button is depressed at startup. Do not count this light as one of the diagnostic flashes.

Diagnostic LEDs

The Mac Pro logic board includes a set of LEDs to help service providers troubleshoot the computer. The LEDs are located toward the rear of the logic board, under the memory cage, next to PCI card slot 1. You can view these LEDs by removing the computer's side access panel and looking through the memory cage to the logic board below. LEDs 2, 3, 4, and 5 are normally off and will automatically illuminate if an error occurs. To read LEDs 1, 6, 7, and 8, you must press the DIAG_LED button, which is adjacent to the LEDs. To press the DIAG_LED button, use the nylon probe tool (Apple part number 922-5065).



Use the following table to interpret the LEDs.

Location	Name	Color	Nominal	Press DIAG_LED button to display	Indicates
Led 1	Trickle Pwr	Yellow	On	Yes	Power supply is providing trickle power
Led 2	CPU B Error	Red	Off	No	CPU B halts on an IERR (instruction error)
Led 3	CPU A Error	Red	Off	No	CPU A halts on an IERR (instruction error)
Led 4	CPU B OT	Red	Off	No	CPU B is over temperature
Led 5	CPU A OT	Red	Off	No	CPU A is over temperature
Led 6	GPU Present	Green	On	Yes	EFI has configured the graphics card
Led 7	Power On	Green	On	Yes	All power rails are functioning
Led 8	EFI Done	Green	On	Yes	EFI is done loading

Note: There is a position on the logic board next to LED 1 for a SLEEP LED that does not have any LED installed. This is normal; the LED was used only in development. To determine if a Mac Pro computer is in sleep mode, watch the power LED on the front of the computer. It will slowly change brightness levels if the computer is sleeping.

LED 1 Trickle Power

Normally on when DIAG_LED button is pressed.

If LED 1 is not on, the symptom would be that the computer won't power on.

Troubleshooting:

- Check AC cord is connected to a working AC wall outlet.
- Reseat AC Plug.
- Check connections of power supply cables to the logic board.
- Check power supply cable connections at power supply.
- Replace power supply.

LED 2 CPU B (Lower Processor) Error

LED 3 CPU A (Upper Processor) Error

Normally off. These LEDs come on if an error occurs or if the BootROM is corrupted. They do not depend on the DIAG_LED button being pressed.

Related symptoms include no video or the computer is hung up. If the BootROM is corrupted, the optical drive tray should eject, prompting for the insertion of a recovery disc to restore the BootROM.

Troubleshooting:

- With the computer booted, up press the SYS_RST switch. If this clears the CPU Error LED, check for incompatible device driver software that may have been installed for added hardware.
- If the Error LED is still on, power down the computer and try pressing the SMC_RST switch. Restart the computer.
- Reset the power supply by unplugging the AC cord for 10 seconds.
- Unplug AC cord and remove any added DIMMs and PCI Express cards. If this causes the LED to go off, repopulate the DIMMs and/or PCI Express cards to find the combination that caused the LED to come on. Overheated memory could be a possible cause for this CPU error LED to come on. Check fan operation.
- Unplug the AC cord and remove the battery for 10 seconds. You may need to remove a PCI Express card to get to the battery. Reinstall the battery and restart the computer.
- Try swapping CPU A and CPU B locations. If the CPU Error LED follows the CPU, replace that CPU.
- Try replacing the logic board.

LED 4 CPU B (Lower Processor) Overtemp

LED 5 CPU A (Upper Processor) Overtemp

Normally off. These LEDs come on if an error occurs. They do not depend on the DIAG_LED button being pressed.

These two LEDs can operate in two different modes; they will either flash or stay on. If either LED is flashing, it may indicate an initial processor over-temperature condition. If either LED is solidly on, it may indicate a chronic processor over-temperature condition. Initial processor over-temperature can cause symptoms such as sluggish computer performance. Chronic processor over-temperature can cause the computer to hang completely.

Troubleshooting:

- Verify proper heat sink installation.
- Verify all thermal sensors are properly connected.
- Verify all fans are operating properly, especially the front intake fan.

LED 6 GPU Present

Normally on when DIAG_LED button is pressed.

If this LED is on, it indicates there is a graphics card installed and recognized by the computer. It does not indicate that the graphics card is fully functional. Some graphics cards require additional power to function, which is available from connectors on the logic board. For these cards, if the auxiliary booster power cable is not connected between the logic board and the graphics card, an error message reminding about this additional power connection will be displayed as Mac OS X starts up.

Troubleshooting:

- Check that the graphics card is seated correctly in its PCI slot.
- Check that the card's auxiliary booster power cable is connected properly (if the card requires one).
- Try the graphics card in a different PCI slot.
- Try a different graphics card.
- Replace the logic board.
- If an error message about graphic card booster power connection is displayed, check that the appropriate booster power cable is firmly connected between the logic board and the graphics card.

LED 7 Power On

Normally on when DIAG_LED button is pressed.

If this LED is on, it indicates the power supply is functioning.

Troubleshooting:

- Check that the power cables to the logic board are properly attached.
- Check the cable connections at the power supply.
- Check for any signs of an obvious electrical short, e.g. metal screws or PCI card slot cover loose inside computer touching the logic board.

LED 8 EFI Good

Normally on when DIAG_LED button is pressed. Takes approximately 5 seconds after power up.

If this LED is on, it indicates that the computer has completed the on board Extensible Firmware Interface (EFI) operations and the operating system is now in control.

Troubleshooting:

- Check that LED 7 Power On LED is on.
- Check that LEDs 2, 3, 4, and 5 are off.
- Try removing any added hardware.
- Try removing any added DIMMs.

Memory Riser Card Diagnostic LEDs

Both of the memory riser cards include diagnostic LEDs for each DIMM. Each of the LEDs will light if it detects an issue with the corresponding installed DIMM. These LEDs will also flash briefly when the computer is started up or shut down and when it goes in and out of sleep mode. This is normal behavior.

Troubleshooting:

- Shutdown and restart the computer.
- Try reseating the DIMMs.
- Check memory installation instructions for proper installation order.
- Swap affected DIMM with known good DIMM.
- Try moving DIMM to another slot (within the same bank of two) to see if the failure LED follows the DIMM. If so, replace DIMM with known good DIMM.

Video Card Diagnostic LEDs

The Radeon X1900 XT video card also has diagnostic LEDs. These LEDs will also flash briefly when the computer is started up or shut down and when it goes in and out of sleep mode. This is normal behavior.

T_Fault LED

Normally off, this LED lights up if the graphics chip gets too hot.

Troubleshooting:

- Check that the front fan is working.
- Try re-seating the card in the PCI Slot.
- Make sure the card's auxiliary booster power cable is connected (if there is one).
- Re-boot the computer.
- Try a different video card.
- Replace the video card.

Ext_Power LED

Normally off, this LED lights up if the auxiliary power isn't being supplied.

Troubleshooting:

- Make sure the card's auxiliary booster power cable is connected (if there is one).
- Check connections from the power supply to the logic board.
- Try a different auxiliary power cable.
- Try a different video card.
- Replace the video card.

Power Supply Verification

To power on, the computer's logic board requires "trickle" power. If the system fails to power on, first reset the SMC as described in this chapter. If the computer still doesn't power on, follow the procedure outlined below to determine whether the issue is related to the power supply.

Verify trickle power

Diagnostic LED 1 indicates the presence of trickle power required by the logic board to begin the startup process.

LED 1 should be yellow when the DIAG_ LED button is pressed, indicating that trickle voltage is present.

Verify Power Supply Is Providing Power

Diagnostic LED 7 indicates that the main power is OK and within regulation.

Plug in AC power cord, and press the power-on button on the front panel.

LED 7 should be green when the DIAG_ LED button is pressed, indicating that the main power is OK and within regulation.



Symptom Charts

How to Use the Symptom Charts

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to the product. Because cures are listed on the charts in the order of most likely solution, try the cures in the order presented. Verify whether or not the product continues to exhibit the symptom. If the symptom persists, try the next cure.

Note: If a cure instructs you to replace a module, reinstall the original module before you proceed to the next cure.

Important: The only way to shut off power completely to the computer and display is to disconnect their power plugs from the power source. Make sure the power cords to the computer and display are within easy reach.

Startup Failures

When testing a computer for the following symptoms, remove the side access panel so you can better observe or listen for fan movement.

Note: Be sure to check the “Memory” and “Power-On Self Test” topics in the General Information section of this chapter. Incorrect installation of DIMMs or incompatible memory will not allow the system to start up correctly. For information on how to correctly install DIMMs, see the “Memory (DIMMs)” topic in the Take Apart chapter.

Power-on LED does not illuminate when power button is pressed, fans do not spin, and there is no boot tone or video

1. Verify power outlet is good.
2. Check that diagnostic LED 1 is on when the power cord is connected.
3. Replace power cord.
4. Check that diagnostic LED 1 is on when the power cord is connected.
5. Reset the logic board. Refer to “Resetting the Logic Board” in this chapter.
6. Verify power supply cables are fully connected.
7. Verify that processors are properly seated. Check diagnostic LED 2 and/or LED 3.
8. Verify that processors’ mounting clamps are properly tightened.
9. Test whether the front panel board or power button is at fault. Remove the installed front

panel board and test with a known-good front panel board.

10. Replace front panel board.
11. Replace power button.
12. Replace power supply.
13. Replace logic board.

Power-on LED illuminates when pressed in, but goes out when button is released, there is no boot tone or video, but you can hear a small click

1. Check diagnostic LED 1 for trickle voltage from the power supply. Refer to “Power Supply Verification” in this chapter. If verification fails, replace power supply.
2. Verify that the processors are properly seated. Check diagnostic LED 2 and/or LED 3.
3. Verify that the processor mounting clamps are properly tightened.
4. Replace the power supply.

Power-on LED illuminates when power button is pressed but fans do not spin (or spin only momentarily) and there is no boot tone or video

1. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.) For video cards that require power cables, check that they are connected.
2. Reset logic board. Refer to “Resetting the Logic Board” in this chapter.
3. Verify power supply cables are fully connected.
4. Check diagnostic LED 2 and/or LED 3 for processor connection.
5. Reseat processors and check for bent pins.
6. Check diagnostic LED 1 for trickle voltage from the power supply. Refer to “Power Supply Verification” in this chapter. If verification fails, replace power supply.
7. Replace logic board.
8. Replace processor.

Power-on LED illuminates when power button is pressed and fans spin continuously but there is no boot tone or video

1. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.) For video cards that require power cables, check that they are connected.
2. Verify speaker cable is fully seated.
3. Reset logic board. Refer to “Resetting the Logic Board” in this chapter.
4. Check diagnostic LED 2 and/or LED 3 for processor connection

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5. If only one of the CPU Error LEDs (LED 2 or 3) comes on, try swapping the processors. If the Error LED follows the processor to the other processor location, replace that processor.
 6. Replace logic board

Power-on LED illuminates when power button is pressed, fans spin, and boot tone chimes, but there is no video

1. Verify display is properly connected and powered on.
2. Check video card connector and display cable for any bent pins.
3. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.) For video cards that require power cables, check that they are connected.
4. Reset PRAM (restart computer while holding down Command-Option-P-R keys until second boot tone chimes)
5. Reset logic board. Refer to “Resetting the Logic Board” in this chapter.
6. Replace video card
7. Replace logic board

Power-on LED does not illuminate when power button is pressed, but fans spin, boot tone chimes, and there is video

1. Reseat front panel board
2. Replace front panel board
3. Replace logic board
4. Replace power supply

Power-on LED illuminates, fans spin up, no boot tone, and the system shuts down within a few minutes

1. Open the side access panel and observe all diagnostic LEDs. Refer to “Diagnostic LEDs” in this chapter for more information on how to locate and interpret these LEDs. Troubleshoot further if any LEDs indicate any failure.
2. Reseat the processors and check for bent pins
3. Replace the processors
4. Replace the logic board
5. Replace the power supply

Fans

Individual fan failure

1. Verify fan is properly connected.
2. Verify all other fans are working properly. If all fans seem to have failed, the problem is most likely not the fans. Reset the logic board to see if this resolves this problem.
3. Replace fan
4. Replace logic board

Fans run at high speed (computer may shut down or may just hang and not shut down as a result)

1. Check for proper ventilation around the exterior of the computer.
2. Remove the computer's side access panel and observe the diagnostic LEDs, specifically LED 4 and LED 5 (the CPU A and B Overtemp LEDs). Refer to "Diagnostic LEDs" in this chapter for more information on how to locate and interpret these LEDs. If either LED is flashing, it may indicate an initial processor over-temperature condition. If either LED is solidly on, it may indicate a chronic processor over temperature condition.
3. Verify proper processor heat sink installation (see the take apart section for more information on heat sink installation).
4. Verify all thermal sensors and their cables are properly connected, especially the ambient temperature sensor board.
5. Verify all fans are operating properly and are unobstructed, especially the front intake fan.
6. Verify that the proper type of memory is installed. (See "Memory" in the Take Apart chapter for more information.)
7. Replace power supply.

Computer performance seems sluggish or slow, or computer is completely hung

1. Start up the computer from a known-good volume, such as its Installation disc, or an external hard drive, to isolate the issue to software or hardware. If the computer seems to perform adequately when booted in this way, troubleshoot as a software issue. If the computer continues to perform sluggishly when booted this way, continue following the steps below.
2. Run Apple Service Diagnostic to verify hardware is functional. Address any diagnostic failures as necessary.
3. Check for proper ventilation around the exterior of the computer.
4. Remove the computer's side access panel and observe the diagnostic LEDs, specifically LED 4 and LED 5 (the CPU A and B Overtemp LEDs). Refer to "Diagnostic LEDs" in this chapter for more information on how to locate and interpret these LEDs. If either of these LEDs is flashing, this may indicate an initial processor over temperature condition. If either of these

LEDs is solidly on, this may indicate a chronic processor over temperature condition. Initial processor over-temperature can cause symptoms such as sluggish computer performance. A chronic processor over-temperature condition can cause the computer to hang completely.

5. Verify proper processor heat sink installation (refer to the Take Apart chapter for more information on heat sink installation).
6. Verify all thermal sensors and their cables are properly connected, especially the ambient temperature sensor board.
7. Verify all fans are operating properly and are unobstructed, especially the front intake fan.

Other Failures

Optical drive

1. Try different optical media.
2. If two drives are installed, check the Master/Slave or Cable Select jumpers on both optical drives (this will depend on drive vendor). Both drives should be set to 'Cable Select' mode for proper operation.
3. If two drives are installed, test one optical drive at a time by disconnecting one of the drives to see if the other one works.
4. Replace optical drive cable
5. Replace optical drive
6. Replace logic board

Front Panel FireWire port

1. Reseat front panel board
2. Replace front panel board
3. Replace logic board

Rear FireWire port

Replace logic board

Front Panel USB 2.0 port

1. Reseat front panel board
2. Replace front panel board
3. Replace logic board

Rear Panel USB 2.0 port

Replace logic board

Internal speaker

1. Check speaker cable connection
2. Replace speaker
3. Replace logic board

AirPort Extreme Card

1. Start up the computer from a known-good volume (such as an external hard drive) with AirPort driver software installed, to isolate the issue to software or hardware. If the computer seems to perform adequately when booted in this way, troubleshoot as a software issue. If the computer continues to exhibit the issue, follow the steps below.
2. Reseat antenna cables connected to card
3. Replace card
4. Replace logic board

Bluetooth Card

1. Start up the computer from a known-good volume (such as an external hard drive) with Bluetooth driver software installed, to isolate the issue to software or hardware. If the computer seems to perform adequately when booted in this way, troubleshoot as a software issue. If the computer continues to exhibit the issue, follow the steps below.
2. Reseat antenna cable connected to card.
3. Replace card.
4. Replace logic board.

Audio IO (front headphones)

1. Start up the computer from a known-good volume (such as its Installation disc or an external hard drive), to isolate the issue to software or hardware. If the computer seems to perform adequately when booted in this way, troubleshoot as a software issue. If the computer continues to exhibit the issue, follow the steps below.
2. Reseat front panel board
3. Replace front panel board
4. Replace logic board

Audio IO (rear audio line in; rear audio line out)

1. Start up the computer from a known-good volume (such as its Installation disc or an external hard drive), to isolate the issue to software or hardware. If the computer seems to perform

adequately when booted in this way, troubleshoot as a software issue. If the computer continues to exhibit the issue, follow the steps below.

2. Check Sound settings in System Preferences
3. Replace logic board