

No Power

Unlikely causes:

Bottom case, Display assembly, eDP flex cable, Fan, Keyboard flex cable, Audio board, Speaker set (L&R), Trackpad, Vent/antenna module

Quick Check

Symptoms	Quick Check
• Computer does not turn on • No image on display and no Caps Lock light when key is pressed • The computer does not start up when the display is opened Note: Inform the user that computer failures due to accidental damage are not covered. If applicable, discuss out-of-warranty repair options. Refer to OP14: Determining and quoting accidental damage for Mac portables.	Important: Before performing any troubleshooting that requires disassembling the computer, ensure that you have installed the battery cover and disconnected the battery. 1. After logic board replacement, if the computer does not turn on, this could mean that the replacement logic board has not yet been configured for use. For complete instructions to configure a replacement logic board, refer to TP1657: System Configuration for Macs with the Apple T2 Security Chip. Always complete all applicable procedures and diagnostic suites after part replacement, to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. 2. Verify that you are using a functional power outlet. 3. Verify that the user's power adapter and charging cable are the correct models for the user's computer. Refer to HT201700: Find the right power adapter and cable for your Mac notebook. Different power adapters and USB-C charging cables may appear similar but may not provide sufficient power to turn on or charge the computer. 4. Check for damage or debris in the USB-C connectors on the computer and the power adapter. 5. Inspect the power adapter, connectors, AC wall adapter, and charging cable for damage such as bent plug pins, frayed or exposed wiring, or burn marks. 6. Test with a known-good electrical outlet, power source, power adapter, and charging cable that is the correct type for the user's computer. 7. Connect the power adapter to each USB-C connector on the computer and retest each time to isolate a possible faulty USB-C port on the user's computer. 8. Disconnect all peripherals. 9. Determine whether the computer has power by confirming that any of the following function correctly: • Trackpad clicks when pressed • Power connection feedback occurs • Caps Lock key light turns on when pressed • Display activity functions • Keyboard backlight turns on with ambient light change or when the sensor is covered up • An external display functions 10. Follow suggested steps in HT204267: If your Mac doesn't turn on or start up. 11. Check if the computer is in recovery mode. This may happen if a software installation is interrupted. Connect the computer to a host Mac. On the host Mac go to Apple > About this Mac > System Report > USB. If the computer is connected and in recovery mode you should see a message such as "Apple Mobile Device (Recovery)". If the computer is in recovery mode, then the computer's T2 firmware will need to be restored using Apple Configurator. Follow steps in Apple Configurator 2 User Guide to restore the T2 firmware on the user's computer before performing further troubleshooting. Restart the computer and verify that it completely starts up to macOS. Refer to HT208862:

	About the Apple T2 Security Chip for more information. 12. Reset the SMC using the procedure listed for this computer in HT201295: How to reset the System Management Controller (SMC) on your Mac. Do not hold in the power button when turning on the computer. You could inadvertently put the computer into DFU mode if you do. 13. Refer to the following articles to learn more information about power-related features and functions specific to this computer that may be misinterpreted as service issues: • HT207097: Charge your MacBook Pro with Thunderbolt 3 • HT201150: How to turn your Mac on or off • HT204652: If your USB-C power adapter isn't charging your Mac notebook • HT204700: Battery may not charge or drains while using AC power
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Deep Dive

	Check	Result	Action	Code	Commodity
1.	Connect the user's computer to the user's power adapter and charging cable that is connected to a known-good electrical outlet.	Yes	Go to step 2.	`\${nodeText.yesSymptomCode}`	
	The computer should turn on automatically if it is off when the power adapter is connected. Check for any signs of power, such as Caps Lock LED illumination, or keyboard backlight. Does computer show any signs of power activity?	No	Go to step 4.	`\${nodeText.noSymptomCode}`	
2.	Check for a video signal on the built-in display.	Yes	Issue cannot be duplicated.	`\${nodeText.yesSymptomCode}`	
	Is a video image clearly visible on the built-in display?	No	Go to step 3.	`\${nodeText.noSymptomCode}`	
3.	Use a flashlight at a steep angle to the display to check for video output without the backlight.	Yes	Go to the "Backlight Issues or No Backlight" troubleshooting flow.	`\${nodeText.yesSymptomCode}`	
	Is any video visible with the flashlight?	No	Go to the "Power But No Video" troubleshooting flow.	`\${nodeText.noSymptomCode}`	

	Check	Result	Action	Code	Commodity
4.	Inspect the user's power adapter and AC wall adapter for damage.	Yes	Go to the "Mechanical, Physical, or Cosmetic Damage" troubleshooting flow.	\${nodeText.yesSymptomCode}	
	Check the USB-C ports on the user's power adapter and computer for contamination, debris, or damaged pins.				
	Inspect the user's USB-C charging cable and connectors for damage.	No	Go to step 5.	\${nodeText.noSymptomCode}	
	Refer to TP1520: Visual/Mechanical Inspection (VMI) Guide for Mac Portables USB-C Cables when inspecting the user's cable.				
5.	Does the user's power adapter, USB-C charge cable, or duckhead appear damaged?	Yes	Go to step 6.	\${nodeText.yesSymptomCode}	
	Inspect all USB-C ports and top case openings on the user's computer for any signs of deformation, damage, or debris that may be blocking the connection. Use compressed air to clear any obstructions or debris.				
	Important: Do not use any metal objects to clear debris or obstructions, as this can short the connector and cause damage.	No	Go to step 7.	\${nodeText.noSymptomCode}	
	Is any USB-C port damaged?				

	Check	Result	Action	Code	Commodity
6.	Inspect the opening on the top case for the USB-C port. Determine whether the opening is misshapen or deformed, preventing proper insertion of the USB plugs.	Yes	Replace the top case assembly. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	K16	KEYBOARD
	Is the opening for the USB-C port damaged or deformed?	No	Replace the I/O board. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	M24	OTHER BOARD
7.	Substitute the user's AC wall adapter (duckhead) or power cord for a known-good AC wall adapter or power cord.	Yes	Replace the power cord or AC wall adapter (duckhead). Verify that the issue is resolved.	X03	EXTERNAL CABLE
	Attempt normal startup again.	No	Go to step 8.	<code> \${nodeText.noSymptomCode} </code>	
8.	Substitute a known-good, compatible power adapter.	Yes	Replace the power adapter. Verify that the issue is resolved.	P23	ADAPTER
	Attempt normal startup again.	No	Go to step 9.	<code> \${nodeText.noSymptomCode} </code>	
	Does the computer turn on with a known-good power adapter?				

	Check	Result	Action	Code	Commodity
9.	Substitute a known-good, USB-C charging cable that is the correct type for the user's computer.	Yes	Replace the USB-C charging cable. Verify that the issue is resolved.	X03	EXTERNAL CABLE
	Attempt normal startup again. Does the computer turn on with a known-good charging cable?	No	Go to step 10.	`\${nodeText.noSymptomCode}`	
10.	Unplug the charging cable from the computer. Follow service guide procedures to remove the bottom case and disconnect the battery from the logic board. Connect the charging cable to the computer. Attempt normal startup again. Does the computer turn on when the battery is disconnected?	Yes	Go to step 11.	`\${nodeText.yesSymptomCode}`	
		No	Replace the logic board and Touch ID board. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	M01	MLB

	Check	Result	Action	Code	Commodity
11.	Substitute a known-good top case assembly.	Yes	Replace the top case assembly.	K20	KEYBOARD
	Attempt normal startup again.		Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair.		
	Does the computer turn on and attempt startup?	No	Verify that the issue is resolved.	M01	MLB
			Reinstall the user's top case assembly.		
12.	Run AST 2 Full System diagnostic suites (EFI & OS), if available, to ensure no other issues remain.	No	Replace the logic board and Touch ID board.	X99	
	Is the issue resolved?		Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair.		
		Yes	The issue is resolved.	{nodeText.yesSymptomCode}	
		No	ESCALATION REQUIRED.		
			Contact CSS for additional support or a multipart repair.		

Power Adapter Issues

Unlikely causes:

Bottom case, Display assembly, eDP flex cable, Fan, Keyboard flex cable, Touch ID board, Audio board, Logic board, Speaker set (L&R), Trackpad, Vent/antenna module

Quick Check

Symptoms	Quick Check
- No power connection feedback - Battery not charging - The computer does not start up from shutdown when the power adapter is attached Note: Inform the user that computer failures due to accidental damage are not covered. If applicable, discuss out-of-warranty repair options. Refer to OP14: Determining and quoting accidental damage for Mac portables.	Important: Before performing any troubleshooting that requires disassembling the computer, ensure that you have installed the battery cover and disconnected the battery. - Verify that you are using a functional power outlet. - Verify that the user's power adapter and charging cable are the correct models for the user's computer. Refer to HT201700: Find the right power adapter and cable for your Mac notebook. Different power adapters and USB-C charging cables may appear similar but may not provide sufficient power to turn on or charge the computer. - Reset the SMC using the procedure listed for this computer in HT201295: How to reset the System Management Controller (SMC) on your Mac. Do not hold in the power button when turning on the computer. You could inadvertently put the computer into DFU mode if you do. - Check for debris or broken pins on both plugs of the USB-C charging cable. Clean any debris from the plugs accordingly. - Connect the user's power adapter to a known-good computer and run AST 2 Power Adapter Diagnostic suite to confirm that the power adapter is functioning. Warning: If a power cord or AC wall adapter is damaged, do not connect it to power. - If the battery is drained on the user's computer, connect it to a known-good power adapter with a known-good charging cable and charge the computer for up to 10 minutes to verify that the computer's battery can charge. If the user's computer does not charge with a known-good power adapter, return to the list of symptoms and select "Battery Not Recognized or Does Not Charge" from the troubleshooting menu. - Refer to the following articles to learn more information about power-related features and functions specific to this computer that may be misinterpreted as service issues: HT207097: Charge your MacBook Pro with Thunderbolt 3 HT201150: How to turn your Mac on or off HT204652: If your USB-C power adapter isn't charging your Mac notebook HT204700: Battery may not charge or drains while using AC power

Deep Dive

	Check	Result	Action	Code	Commodity
1.	Inspect the user's power adapter and AC wall adapter for damage.	Yes	Go to the "Mechanical, Physical, or Cosmetic Damage" troubleshooting flow.	\${nodeText.yesSymptomCode}	
	Check the USB-C ports on the user's power adapter and computer for contamination, debris, or damaged pins.				
	Inspect the user's USB-C charging cable and connectors for damage.	No	Go to step 2.	\${nodeText.noSymptomCode}	
	Refer to TP1520: Visual/Mechanical Inspection (VMI) Guide for Mac Portables USB-C Cables when inspecting the user's cable.				
2.	Does the user's power adapter, USB-C charge cable, or AC wall adapter appear damaged?	Yes	Go to step 3.	\${nodeText.yesSymptomCode}	
	Inspect all USB-C ports and top case openings on the user's computer for any signs of deformation, damage, or debris that may be blocking the connection. Use compressed air to clear any obstructions or debris.				
	Important: Do not use any metal objects to clear debris or obstructions, as this can short the connector and cause damage.	No	Go to step 4.	\${nodeText.noSymptomCode}	
	Is any USB-C port damaged?				

	Check	Result	Action	Code	Commodity
3.	Inspect the opening on the top case for the USB-C port. Determine whether the opening is misshapen or deformed, preventing proper insertion of the USB plugs.	Yes	Replace the top case assembly. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	K16	KEYBOARD
	Is the opening for the USB-C port damaged or deformed?	No	Replace the I/O board. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	M24	OTHER BOARD
4.	Connect the user's computer to a known-good power adapter and charging cable that is connected to a known-good electrical outlet.	Yes	Go to step 5.	`\${nodeText.yesSymptomCode}`	
	The computer should turn on automatically if it is off when the power adapter is connected. Verify that the computer turns on and charges. Does the computer turn on and charge?	No	Go to the "No Power" troubleshooting flow.	`\${nodeText.noSymptomCode}`	

	Check	Result	Action	Code	Commodity
5.	Check System Information > Power > AC Charger Information to verify that the computer recognizes the known-good power adapter.	Yes	Go to step 6.	\${nodeText.yesSymptomCode}	
	Then substitute the user's power adapter and recheck System Information > Power > AC Charger Information to verify that the computer recognizes the user's power adapter.	No	Replace the power adapter. Verify that the issue is resolved.	P23	ADAPTER
	Does the computer recognize the user's power adapter?				
6.	Substitute the user's charging cable with the known-good power adapter.	Yes	Go to step 7.	\${nodeText.yesSymptomCode}	
	Verify that the computer turns on and charges.	No	Replace the USB-C charging cable. Verify that the issue is resolved.	X03	EXTERNAL CABLE
	Does the computer recognize the user's USB-C charging cable?				
7.	Run AST 2 Power Adapter diagnostic suite on the user's computer with the user's power adapter and charging cable connected to confirm that the user's power adapter and charging cable are both functioning.	Yes	Issue cannot be duplicated.	\${nodeText.yesSymptomCode}	
		No	Go to step 8.	\${nodeText.noSymptomCode}	
	Does the computer pass all tests?				
8.	Substitute the user's AC wall adapter (duckhead) or power cord for a known-good AC wall adapter or power cord.	Yes	Replace the power cord or AC wall adapter (duckhead). Verify that the issue is resolved.	X03	EXTERNAL CABLE
	Retest with AST 2 Power Adapter diagnostics.	No	Go to step 9.	\${nodeText.noSymptomCode}	
	Does the computer pass all tests?				
9.	Substitute a known-good, compatible power adapter.	Yes	Replace the power adapter. Verify that the issue is resolved.	P23	ADAPTER
	Retest with AST 2 Power Adapter diagnostics.	No	Replace the USB-C charging cable. Verify that the issue is resolved.	X03	EXTERNAL CABLE
	Does the computer pass all tests?				

	Check	Result	Action	Code	Commodity
10.	Verify that the computer can now charge. Run AST 2 Full System diagnostic suites (EFI & OS), if available, to ensure no other issues remain. Is the issue resolved?	Yes	The issue is resolved.	\${nodeText.yesSymptomCode}	
		No	ESCALATION REQUIRED. Contact CSS for additional support or a multipart repair.	X99	

Will Not Start Up

Unlikely causes:

Bottom case, Display assembly, AC wall adapter (duckhead), eDP flex cable, Fan, Keyboard flex cable, Touch ID board, I/O board, Audio board, Power adapter, Power cord, Speaker set (L&R), Top case assembly, Trackpad, USB-C charging cable, Vent/antenna module

Quick Check

Symptoms	Quick Check
• Blank black screen with backlight • Some video activity, Apple logo, progress bar • Prohibitory sign or folder with flashing question mark • Error beep tones • Caps Lock key light toggles on and off when Caps Lock key pressed • The computer does not start up when the display is opened Note: Inform the user that computer failures due to accidental damage are not covered. If applicable, discuss out-of-warranty repair options. Refer to OP14: Determining and quoting accidental damage for Mac portables.	Important: Before performing any troubleshooting that requires disassembling the computer, ensure that you have installed the battery cover and disconnected the battery. 1. In the event that there is an iBridge/macOS version mismatch in the user's computer, iBridge firmware will update automatically while the computer is connected to the Internet. During this process, the computer's display can remain completely black for at least 30 seconds. If the computer is turned off or disconnected from the Internet during this process under the assumption that something went wrong, the black screen will occur again until the iBridge update has completed. To resolve this issue, plug in the computer, attempt to turn it on, then wait at least one minute to provide an opportunity for any updates to complete if needed. Once completed, the computer should display video once again. 2. After logic board replacement, if the computer turns on but displays only a black screen and does not start up, this could mean that the replacement logic board has not yet been configured for use. For complete instructions to configure a replacement logic board, refer to TP1657: System Configuration. Always complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. 3. Use macOS Recovery to troubleshoot potential software issues. Press and hold Command-R during startup to restart from the recovery partition. See HT201314: About macOS Recovery. 4. Refer to HT201260: How to find the macOS version number on your Mac to make sure system build is correct for this computer model. Check for and apply the latest software and firmware updates. Remember that third-party software can contribute to this issue. It may be necessary to check for and apply third-party updates that may not appear in the App Store. 5. Verify that startup process passes initial memory checks and POST (Power-On Self-Test) with some video activity. If computer generates beeping sounds, there may be an issue with memory. See HT201702: About Mac Power On Self Test (POST) RAM error codes. 6. Try to determine what the computer was doing during startup. Refer to HT204156: About the screens you see when your Mac starts up. 7. Follow suggested steps in HT206182: Helping customers with a Mac that doesn't start up. 8. Follow suggested steps in HT204463: If the fans in your Mac run at full speed when you turn it on. 9. Hold down the Shift key during startup to put the computer into safe mode. Refer to HT201262: Use safe mode to isolate issues with your Mac. 10. Reset the SMC using the procedure listed for this computer in HT201295: How to reset the System Management Controller (SMC) on your Mac. Do not hold in the power button when turning on the computer. You

	could inadvertently put the computer into DFU mode if you do. - Reset the NVRAM using the procedure for this computer in HT204063: Reset NVRAM or PRAM on your Mac. - Start up from Mac Resource Inspector diagnostic suite (MRI), check for the presence of an installed macOS, then refer to HT201260: How to find the macOS version number on your Mac to check that the system build is correct for this computer model. - If the battery is drained on the user's computer, connect it to a known-good power adapter with a known-good charging cable and charge the computer for up to 10 minutes to verify that the computer's battery can charge. If the user's computer does not charge with a known-good power adapter, return to the list of symptoms and select the "Battery Not Recognized or Does Not Charge" troubleshooting flow. - Refer to the following articles to learn more information about power-related features and functions specific to this computer that may be misinterpreted as service issues: HT207097: Charge your MacBook Pro with Thunderbolt 3 HT201150: How to turn your Mac on or off HT204652: If your USB-C power adapter isn't charging your Mac notebook HT204700: Battery may not charge or drains while using AC power
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Deep Dive

	Check	Result	Action	Code	Commodity
1.	Connect the user's computer to the user's power adapter and charging cable that is connected to a known-good electrical outlet.	Yes	Go to step 2.	\$(nodeText.yesSymptomCode)	
	The computer should turn on automatically if it is off when the power adapter is connected. Check for any signs of power by confirming that any of the following function correctly: - Trackpad clicks when pressed - Power connection feedback occurs - Caps Lock key light turns on when Caps Lock key pressed - Display activity functions - Keyboard backlight turns on with ambient light change or when the sensor is covered up - An external display functions Does computer show any sign of power activity?	No	Go to the "No Power" troubleshooting flow.	\$(nodeText.noSymptomCode)	

	Check	Result	Action	Code	Commodity
2.	Disconnect any external peripherals.	Yes	Go to step 4.	\$(nodeText.yesSymptomCode}	
	Reset the NVRAM using the procedure for this computer in HT204063: Reset NVRAM or PRAM on your Mac. Check for any signs that the computer is starting up. Can you confirm that the computer is starting up?	No	Go to step 3.	\$(nodeText.noSymptomCode}	
3.	Follow Service Guide procedures to remove the bottom case and disconnect the battery from the logic board. Disconnect the Embedded DisplayPort (eDP) flex cable from the logic board. Connect an external display via a USB-C video adapter. Start up the computer and retest. Does the computer start up with the built-in display disconnected?	Yes	Go to “Power But No Video” troubleshooting flow.	\$(nodeText.yesSymptomCode}	
		No	Replace the logic board and Touch ID board. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	M02	MLB
4.	Press and hold the Option or Alt key to start up the computer. Observe the startup process to verify that the computer boots to Startup Manager. The startup will show, at a minimum, a black screen with a mouse cursor. Does the computer boot to Startup Manager?	Yes	Go to step 5.	\$(nodeText.yesSymptomCode}	
		No	Go to “Power But No Video” troubleshooting flow.	\$(nodeText.noSymptomCode}	
5.	Start up the computer and determine whether a kernel panic is occurring. Refer to HT200553: If your Mac spontaneously restarts or displays a message that it restarted or shut down because of a problem. Does the computer display a kernel panic during startup?	Yes	Go to the “Kernel Panic or System Instability” troubleshooting flow.	\$(nodeText.yesSymptomCode}	
		No	Go to step 6.	\$(nodeText.noSymptomCode}	

	Check	Result	Action	Code	Commodity
6.	Use one of the following two methods to start up the computer to a known-good macOS.	Yes	Go to step 9.	\${nodeText.yesSymptomCode}	
	Start up the computer to macOS Recovery. See HT201314: About macOS Recovery. Follow steps in HT208198: About Startup Security Utility to enable starting up from an external storage device on the user's computer. Then start up the computer to a known-good external macOS startup volume. During startup, allow up to four minutes for a defective flash storage to time out, after which the computer will start up from a known-good external device. Does the computer start up from a known-good volume?	No	Go to step 7.	\${nodeText.noSymptomCode}	
7.	Follow Service Guide procedures to remove the bottom case and disconnect the battery from the logic board. Inspect all internal cables and connectors for damage. Are any internal cables or connectors damaged?	Yes	ESCALATION REQUIRED. Contact CSS for additional support or a multipart repair.	X99	
		No	Go to step 8.	\${nodeText.noSymptomCode}	

	Check	Result	Action	Code	Commodity
8.	Reseat the internal connections and reassemble the computer. Attempt a normal startup. Does the computer start up?	Yes	The issue was resolved by reseating the internal connections. Verify resolution.	`\${nodeText.yesSymptomCode}`	
		No	Replace the logic board and Touch ID board. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	M02	MLB
9.	Run AST 2 MRI and Storage Diagnostic suites to verify the functionality of the built-in flash storage. Check only for hardware errors reported by diagnostics. Do not check for software or file system errors. Are any hardware issues detected in the flash storage?	Yes	Replace the logic board and Touch ID board. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	M43	MLB
		No	Go to step 10.	`\${nodeText.noSymptomCode}`	

	Check	Result	Action	Code	Commodity
10.	Use the results from AST 2 diagnostics to determine the macOS build version that is installed on the computer.	Yes	Go to step 11.	\$(nodeText.yesSymptomCode}	
	Refer to HT201260: How to find the macOS version number on your Mac to check that the system build is correct for this computer model. Is the correct version of macOS installed on the user's drive?	No	Reinstall macOS on the user's computer. Check for and apply the latest software and firmware updates. Verify that the issue is resolved.	\$(nodeText.noSymptomCode}	
11.	Use one of the following two methods to start up the computer to a known-good macOS.	Yes	The issue is resolved. Verify resolution.	\$(nodeText.yesSymptomCode}	
	Start up the computer to macOS Recovery. See HT201314: About macOS Recovery. Follow steps in HT208198: About Startup Security Utility to enable starting up from an external storage device on the user's computer. Then start up the computer to a known-good external macOS startup volume. Use Disk Utility to repair the user's internal flash storage volume. Attempt to start up the user's computer from its internal flash storage. Does the computer start up successfully from its internal flash storage?	No	Go to step 12.	\$(nodeText.noSymptomCode}	

	Check	Result	Action	Code	Commodity
12.	Follow all steps in HT204743: Partition a problematic drive two times before recommending service or replacement. This will force a rewrite of the partition table. Reinstall macOS on the user's computer. Refer to HT201260: How to find the macOS version number on your Mac to check that the system build is correct for this computer model. Check for and apply the latest software and firmware updates. Verify that the issue is resolved. Does the computer start up successfully from its internal flash storage?	Yes	The issue is resolved. Verify resolution.	\$(nodeText.yesSymptomCode)	
		No	Replace the logic board and Touch ID board. Refer to the Service Guide to complete all applicable procedures and diagnostic suites after part replacement to ensure that the new part operates properly with the rest of the system. Failure to do so may result in an inoperative system and an incomplete repair. Verify that the issue is resolved.	M44	MLB
13.	Verify that the computer can now complete the startup process over multiple trials. Run AST 2 Full System diagnostic suites (EFI & OS), if available, to ensure no other issues remain. Is the issue resolved?	Yes	The issue is resolved.	\$(nodeText.yesSymptomCode)	
		No	ESCALATION REQUIRED. Contact CSS for additional support or a multipart repair.	X99	

About Apple service certifications

Topic

To learn more about accessing [ATLAS](#) and service exams, review these articles:

- [How to get a Tech ID](#)
- [ATLAS frequently asked questions](#)
- [How to access Apple service exams at Pearson VUE](#)
- Certifications Explained Video - ([SV370](#)) for AASPs, ([SV371](#)) for Apple Store employees.

Service partners with a current service contract with Apple are eligible to receive, free of charge, private access codes for their employees. Contact Channel Service Support via Global Service Exchange (GSX) to obtain private access codes.

Note: Apple Store employees must read [Understanding Exam and Certification requirements](#) (RS228), in addition to this procedure.

Exams and courses that you need to service iOS products

Training for Apple Certified iOS Technician (ACiT) 2019 is available to technicians who work at Apple-authorized service facilities. Technicians need a Global Service Exchange (GSX) account to see the courses in [ATLAS](#).

To register for any ACiT exam, use [Pearson VUE](#).

ACiT 2019 Certification

With ACiT 2019 certification, you can service iOS devices such as iPhone and iPad, released before March 15, 2019, after passing the following exams:

- Apple Service Fundamentals Exam (SVC-18A or SVC-19A)
- ACiT 2019 iOS Service Certification Exam (iOS-19A)

Please note that the following devices have additional requirements:

- iPad Air (3rd generation), iPad mini (5th generation):
 - Also complete the Troubleshooting iPad course ([PQ-054](#)) in ATLAS

ACiT 2018 certification

Important: If you are not already ACiT 2018 certified, complete the ACiT 2019 exam instead.

With ACiT 2018 certification, you can service iOS devices such as iPhone and iPad released before April 2018 after passing the following exams:

- Apple Service Fundamentals Exam (SVC-18A) or (SVC-17A)
- ACiT 2018 iOS Service Certification Exam (iOS-18A)

Please note that the following devices have additional requirements:

- iPad Air (3rd generation), iPad mini (5th generation), iPad Pro 12.9-inch (3rd generation), iPad Pro 11.0-inch
 - Also complete the Troubleshooting iPad course ([PQ-054](#)) in ATLAS.
- iPhone XR:
 - Also complete the iPhone XR Product Qualification ([PQ-046](#)) and iPhone Display Adhesive Product Qualification ([PQ-053](#)) courses in ATLAS.
- iPhone XS and iPhone XS Max:
 - Also complete the iPhone XS and iPhone XS Max Product Qualification ([PQ-045](#)) and iPhone Display Adhesive Product Qualification ([PQ-053](#)) courses in ATLAS.

ACiT 2017 certification

Important: If you are not already ACiT 2017 certified, complete the ACiT 2019 exam instead.

With ACiT 2017 certification, you can service iPhone, iPad, Apple Watch and Apple TV devices released before April 2017 after passing the following exams:

- Apple Service Fundamentals Exam (SVC-17A)
- ACiT 2017 iOS Service Certification Exam (iOS-17A)

Please note that the following devices have additional product qualification requirements:

- iPad Air (3rd generation), iPad mini (5th generation), iPad Pro 12.9-inch (3rd generation), iPad Pro 12.9-inch (2nd Generation), iPad Pro 12.9-inch, iPad Pro 11.0-inch, iPad Pro 10.5-inch, iPad Pro 9.7-inch, iPad (6th Generation), iPad (5th Generation) and iPad mini 4
 - Also complete the Troubleshooting iPad course ([PQ-054](#)) in ATLAS.
- iPhone XR
 - Also complete the iPhone XR Product Qualification ([PQ-046](#)) and iPhone Display Adhesive Product Qualification ([PQ-053](#)) courses in ATLAS
- iPhone XS and iPhone XS Max
 - Also complete the iPhone XS and iPhone XS Max Product Qualifications ([PQ-045](#)) and iPhone Display Adhesive Product Qualification ([PQ-053](#)) courses in ATLAS
- iPhone X
 - Also complete the iPhone X Product Qualification course ([PQ-040](#)) in ATLAS
- iPhone 8 and iPhone 8 Plus
 - Also complete the iPhone 8 and 8 Plus Product Qualification course ([PQ-036](#)) in ATLAS.

ACiT 2016 certification

Important: If you are not already ACiT 2016 certified, complete the ACiT 2019 exam instead.

With ACiT 2016 certification, you can service iPhone, iPad, Apple Watch and Apple TV devices released before April 2016 after passing these exams:

- Apple Service Fundamentals Exam (SVC-16A)
- ACiT 2016 iOS Service Certification Exam (iOS-16A)

Please note that the following devices have additional product qualification requirements:

- iPad Air (3rd generation), iPad mini (5th generation), iPad Pro 12.9-inch (3rd generation), iPad Pro 12.9-inch (2nd generation), iPad Pro 12.9-inch, iPad Pro 11.0-inch, iPad Pro 10.5-inch, iPad Pro 9.7-inch, iPad (6th generation), iPad (5th generation), and iPad mini 4
 - Also complete the Troubleshooting iPad course ([PQ-054](#)) in ATLAS.
- iPhone XR:
 - Also complete the iPhone XR Product Qualification ([PQ-046](#)) and iPhone Display Adhesive Product Qualification ([PQ-053](#)) courses in ATLAS
- iPhone XS and iPhone XS Max
 - Also complete the iPhone XS and iPhone XS Max Product Qualification ([PQ-045](#)) and iPhone Display Adhesive Product Qualification ([PQ-053](#)) courses in ATLAS
- iPhone X
 - Also complete the iPhone X Product Qualifications course ([PQ-040](#)) in ATLAS
- iPhone 8 and 8 Plus
 - Also complete the iPhone 8 and 8 Plus Product Qualification course ([PQ-036](#)) in ATLAS
- iPhone 7 and 7 Plus
 - Also complete the iPhone 7 and iPhone 7 Plus Product Qualification course ([9L0-PQ20](#)) in ATLAS.

Exams and courses that you need to service Mac products

Training for Apple Certified Mac Technician (ACMT) 2019 is available to technicians who work at Apple-authorized service facilities. Technicians need a Global Service Exchange (GSX) account to view the courses in [ATLAS](#). To register for any ACMT exam, use [Pearson VUE](#).

ACMT 2019 certification

With ACMT certification, you can service Mac computers released before March 15, 2019 after passing these exams:

- Apple Service Fundamentals Exam (SVC-18A or SVC-19A)
- ACMT 2019 Mac Service Certification Exam (MAC-19A)

Please note that the following devices have additional product qualification requirements:

- MacBook Air (Retina, 13-inch, 2019)
 - Also complete the MacBook Air (Retina, 13-inch, 2019) Product Qualification course ([PQ-062](#)) and Apple T2 Security Chip courses series in ATLAS.
- MacBook Pro (15-inch, 2019)
 - Also complete the MacBook Pro (15-inch, 2019) Product Qualification course ([PQ-044](#)) and Apple T2 Security Chip course series in ATLAS.
- MacBook Pro (13-inch, 2019, Four Thunderbolt 3 ports)
 - Also complete the MacBook Pro (13-inch, 2019, Four Thunderbolt 3 Ports) Product

- Qualification course ([PQ-043](#)) and Apple T2 Security Chip course series in ATLAS.
- MacBook Pro (13-inch, 2019, Two Thunderbolt 3 Ports)
 - Also complete the MacBook Pro (13-inch, 2019, Two Thunderbolt 3 Ports) ([PQ-063](#)) and Apple T2 Security Chip courses series in ATLAS.
- iMac (2019)
 - Also complete the iMac 2019 Models Product Qualification course ([PQ-056](#)) in ATLAS.

ACMT 2018 certification

Important: If you're not already ACMT 2018 certified, complete the ACMT 2019 exams instead.

With ACMT 2018 certification, you can service Mac computers released before April 2018 after passing these exams:

- Apple Service Fundamentals Exam (SVC-18A) or (SVC-17A)
- ACMT 2018 Mac Service Certification Exam (MAC-18A)

These computers have additional product qualification requirements:

- MacBook Air (Retina, 13-inch, 2018 and 2019)
 - Also complete the MacBook Air (Retina, 13-inch, 2019) Product Qualification course ([PQ-062](#)) and Apple T2 Security Chip courses series in ATLAS.
- MacBook Pro (15-inch, 2018 and 2019)
 - Also complete the MacBook Pro (15-inch, 2019) Product Qualification course ([PQ-044](#)) and Apple T2 Security Chip course series in ATLAS.
- MacBook Pro (13-inch, 2018 and 2019, Four Thunderbolt 3 ports)
 - Also complete the MacBook Pro (13-inch, 2019, Four Thunderbolt 3 Ports) Product Qualification course ([PQ-043](#)) and Apple T2 Security Chip course series in ATLAS
- MacBook Pro (13-inch, 2019, Two Thunderbolt 3 Ports)
 - Also complete the MacBook Pro (13-inch, 2019, Two Thunderbolt 3 Ports) ([PQ-063](#)) and Apple T2 Security Chip courses series in ATLAS.
- iMac (2019)
 - Also complete the iMac (2019) Models Product Qualification course ([PQ-056](#)) in ATLAS.
- Mac mini (2018):
 - Also complete the Mac mini (2018) Product qualification course ([PQ-050](#)) and Apple T2 Security Chip course series in ATLAS.

ACMT 2017 certification

Important: If you're not already ACMT 2017 certified, complete the ACMT 2019 exams instead.

With ACMT 2017 certification, you can service most Mac computers released before April 2017 after passing these exams:

- Apple Service Fundamentals Exam (SVC-17A)
- ACMT 2017 Mac Service Certification Exam (MAC-17A)

These computers have additional product qualification requirements:

- MacBook (Retina, 12-inch, 2017):
 - Also complete the MacBook (Retina, 12-inch, 2017) ([9L0-PQ32](#)), Trackpad Calibration Check ([9L0-PQ15](#)) and Interpreting Liquid Contact Indicators (LCIs) ([9L0-PQ30](#)) courses in ATLAS
- MacBook Air (Retina, 13-inch, 2018 and 2019)
 - Also complete the MacBook Air (Retina, 13-inch, 2019) Product Qualification course ([PQ-062](#)) and Apple T2 Security Chip courses series in ATLAS.
- MacBook Air (11-inch, Mid 2013, Early 2014, and Early 2015) and MacBook Air (13-inch, Mid 2013, Early 2014, and 2017):
 - Also complete the MacBook Air course ([9L0-PQ31](#)) in ATLAS.
- MacBook Pro (15-inch, 2018 and 2019)
 - Also complete the MacBook Pro (15-inch, 2019) Product Qualification course ([PQ-044](#)) and Apple T2 Security Chip course series in ATLAS.
- MacBook Pro (15-inch, 2016 and 2017):
 - Also complete the MacBook Pro with Four Thunderbolt 3 Ports ([9L0-PQ24](#)) and the Trackpad Calibration Check ([9L0-PQ15](#)) courses in ATLAS
- MacBook Pro (13-inch, 2018 and 2019, Four Thunderbolt 3 ports):
 - Also complete the MacBook Pro (13-inch, 2019, Four Thunderbolt 3 Ports) Product Qualification course ([PQ-043](#)) and Apple T2 Security Chip course series in ATLAS.
- MacBook Pro (13-inch, 2019, Two Thunderbolt 3 Ports):
 - Also complete the MacBook Pro (13-inch, 2019, Two Thunderbolt 3 Ports) Product Qualification course ([PQ-063](#)) and Apple T2 Security Chip course series in ATLAS.