Microsoft Surface

Surface Studio 2+ Service Guide

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This document and the information it contains are subject to change without notice. You can find the latest information on Surface device servicing and repair at https://aka.ms/surfaceservicing. Always consult the most up-to-date information available before performing device servicing or repair.

Document Part Number: M1237919

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Device Identity Information

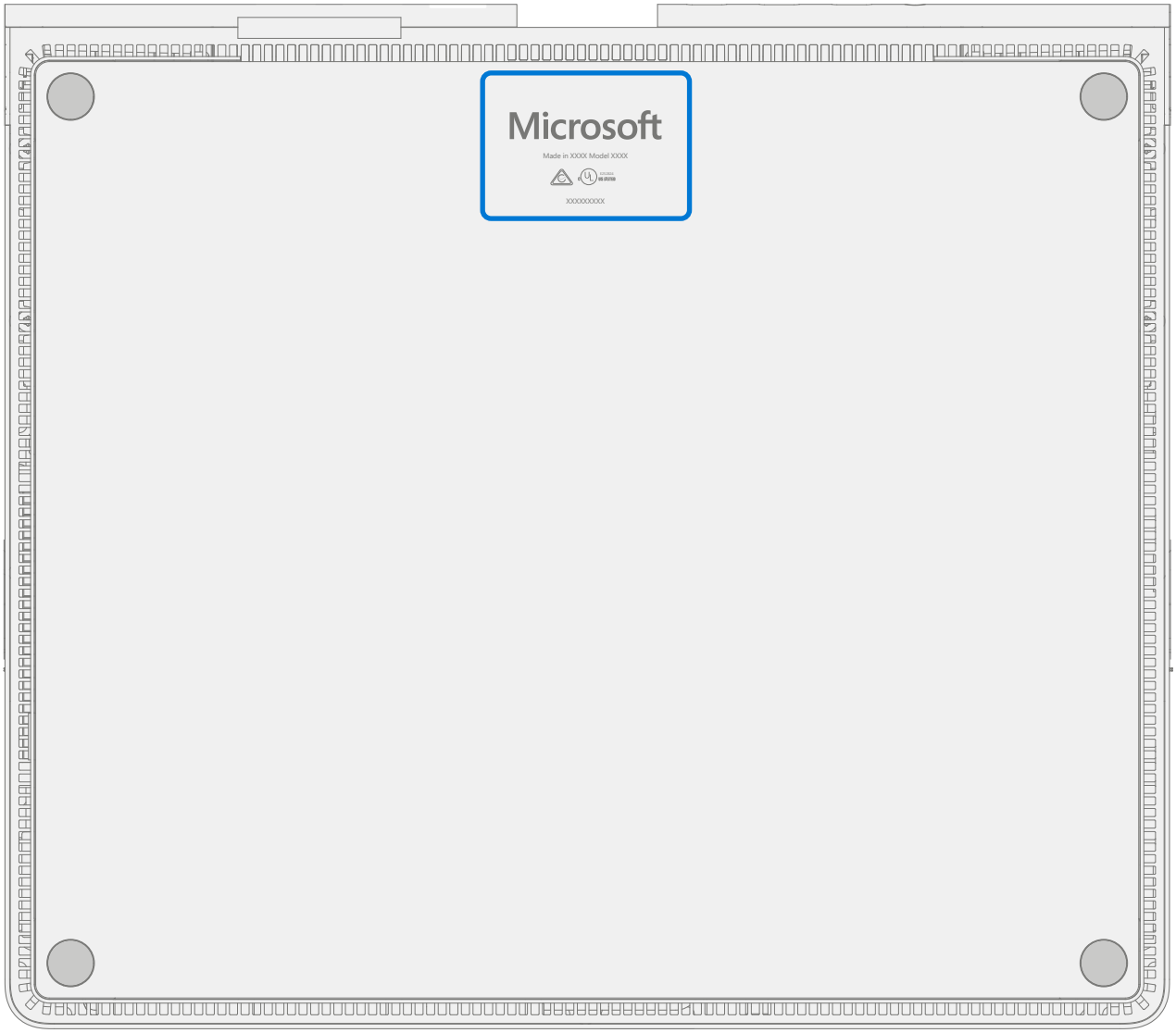
Surface Studio 2+

2028 – Surface Studio 2+

Surface Support - Studio: Link

Surface Studio 2 + Technical Specifications: Link

The serial number for Surface Studio 2+ is on the underside of the device on the cosmetic plate.



Glossary of Terms

The following terms are used throughout this guide.

- **ASP** – Authorized Service Provider. Companies that have received clearance to repair or maintain a product that is still under warranty by Microsoft.
- **B-Cover** – Metallic plate located under the C-Cover. Purpose is to secure the cooling fans.
- **BMR** – Bare Metal Recovery, refers to the process of installing a clean image.
- **C-Cover** – Plate/cover located at the bottom of the unit.
- **CPU** – Central Processing Unit
- **CRU or Commercial Spares** – Customer Replaceable Units. Service parts that can be removed and replaced by the customer.
- **Display or TDM** – The Touch Display Module, the complete screen with all layers
- **ESD** – Electro-Static Discharge
- **Feet or foot** – Non-Skid Foot Pads
- **FPC** – Flexible Printed Circuit Connections
- **FRU** – Field Replaceable Units are sub-system components such as the PCBA, rSSD, and TDM. FRUs are available only to ASPs. Some replaceable units will only be available as FRUs and therefore are only supported at an ASP.
- **FW** – Firmware
- **GPU** – Graphics Processing Unit
- **H-Cover** – Cover for the hinge assembly.
- **IPA** – Isopropyl Alcohol, should be used to clean adhesive from the device as detailed within process steps. Use 70% IPA in all cases.
- **Motherboard or PCBA** – Primary circuit board assembly
- **OS** – Operating System
- **PSA** – Pressure Sensitive Adhesive
- **PSU** – Power Supply Unit
- **rSSD** – Removable Solid-State Drive
- **SDT** – Surface Diagnostic Toolkit
- **SoC** – System-on-a-Chip, a microchip with several electronic circuits and parts in a single integrated circuit.
- **T-Cover** – Chassis/Case for PCBA, THM, PSU, and other components.
- **Thermal Module or THM** – Thermal Module is an assembly which manages thermal regulation for the system.
- **TIM** – Thermal interface material used between the THM and PCBA

General Information, Precautions, Warnings

⚠ This symbol identifies important safety and health information in this guide.

This symbol identifies important information in this guide.

! This symbol identifies important cautions in this guide.

Service Tools

Microsoft Provided Software Tools / References

- Surface Power Cord
- How To: Update Surface device firmware and OS
- How To: Surface Tools Video
- Download: Surface drivers and firmware
- Download: Surface Diagnostic Toolkit (SDT)
- Download: Surface Data Eraser
- Download: Surface Imaging Tools

Standard Service Tools

- Anti-static wrist strap (1 MOhm resistance)
- ESD-safe benchtop
- Gloves
- Safety Glasses
- Spudger tool
- Plastic Opening Pick (example iFixit Opening Picks)
- Plastic Opening tool (example iFixit Plastic Opening tool)
- Plastic Card tool (example iFixit Plastic Card tool)
- 8IP (Torx-plus) driver
- 6IP (Torx-plus) driver
- 3IP (Torx-plus) driver
- H5 (Hex) socket driver
- Non-metallic ruler
- Isopropyl Alcohol Dispenser bottle (use 70% IPA)
- Cleaning swabs
- ESD-safe tweezers
- Lint free cleaning cloths
- USB Drive (Loaded with SDT)
- Digital Multimeter

The tools identified on this list can be purchased from many different commercial sources, including but not limited to Amazon.com; iFixit; Chemdex, and other vendors. ASP's please refer to the ASP Guidebook for Microsoft tools.

General Safety Precautions

⚠ Always observe the following general safety precautions:

- Opening and/or repairing any device can present electric shock, device damage, fire, and/or personal injury risks and other hazards. Exercise caution when undertaking these activities as described in this guide. Microsoft recommends a familiarity with repair and troubleshooting of consumer electronics equivalent to an CompTIA A+ Certification for the best chance of success in the execution of a device repair.
- Always select and use the appropriate AC power supply for a device. We recommend you use genuine Microsoft power supply units and AC power cords. A genuine Microsoft power supply unit is provided with every device.
- Use only AC power provided by a standard (mains) wall outlet. Do not use non-standard power sources, such as generators or inverters, even if the voltage and frequency appear acceptable.
- Improper use, transport, and/or disposal of lithium-ion batteries may result in fire or explosion. Only open the enclosure on a device as outlined in this guide. Do not heat, puncture, mutilate, or dispose of devices or their batteries in fire. Do not leave or charge devices in direct sunlight or exposed to other extreme sources of heat for an extended period. Doing so may cause damage or melt the batteries.
- Depending on the device type, the available suite of FRUs/CRUs may include replacement lithium-ion batteries. Improper transport, recycling, reuse, or disposal of lithium-ion batteries may result in fire or explosion. Always manage lithium-ion batteries as required by local law or regulation. There are several ways to find battery recycling services and advice in your community. Visit Microsoft End-of-life management and recycling for more information about battery recycling and to find available resources near you.
- Do not dispose of your old device and/or its batteries in a household garbage can or recycling bin.
- While working on devices, avoid the use of clothing accessories such as bracelets or watches that can cause electrical shorts

For additional product safety information, including information about

- Hearing conservation
- Heat related concerns
- Choking hazard/small parts
- Interference with medical devices
- Broken glass
- Photosensitive seizures
- Musculoskeletal disorders

See aka.ms/surface-safety or the Surface app. To open the Surface app, select the Start button, enter Surface into the search box, then select the Surface app.

⚠ Repair-Specific Precautions and Warnings

- For Autopilot managed Surface Products refer to the following guidelines posted here.
- Prior to opening device, ensure device has powered off and disconnected from power for at least 30 seconds.
- We recommend wearing protective eyewear as a safety precaution when disassembling/re-assembling a device.
- Before opening device, always check that an anti-static wrist strap is worn, and work area is properly grounded to ensure electrostatic discharge (ESD) safe environment.
- During all activities involving the display, check to ensure that no loose articles are within the internals of the device when reassembling the unit.
- Check to make sure that general guidelines and ESD compliance steps are followed prior to starting activities. Refer to Prior to Device Disassembly section on (page 13) for details.
- If battery damage (e.g., leaking, expansion, folds, evidence of impacts, or other indications) is discovered during the back cover removal process or if the battery is impacted or damaged during the removal process, activities should cease. Refer to Microsoft Operational guidelines or contact Microsoft directly for information about proper device disposition.
- As you remove each subassembly from the device, place the subassembly (and all accompanying screws) away from the work area to prevent damage to the device and to the subassembly.
- During all activities (excluding feet-only replacement) check to ensure that no loose articles are on the back cover or within the internals of the device when reassembling the unit.
- Device Serial Number Notation – The Surface device serial number for this model is located on the bottom of the cosmetic plate.

⚠ Safety Policies/Procedures

Microsoft's field product safety program team is referred to as the Rapid Response Team (RRT). All device issues that may be safety related should be managed per the following instructions.

Cease repair on any Microsoft Surface device that visually exhibits any of the following, and contact Microsoft Surface Support to report and receive further guidance:

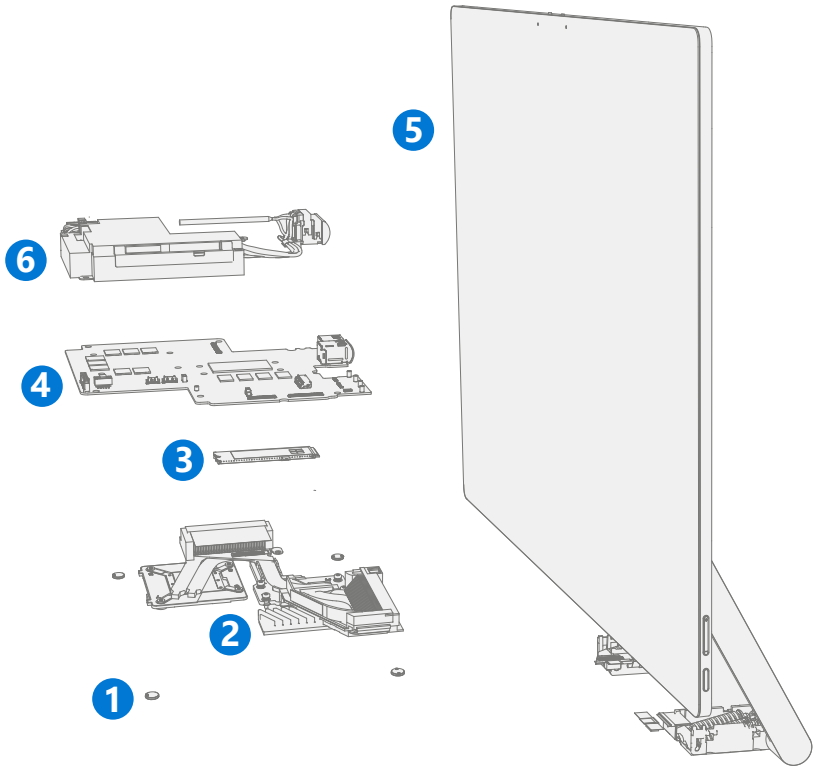
- Any burned or melted components, traces, or plastic parts on the **outside** of the device, including parts or components that otherwise exhibit heat damage, like charring seen in charging or other ports.
- Any burned or melted components, traces, or plastic parts on the **inside** of the device, including parts or components that otherwise exhibit heat damage.
- Any melting or heat damage observed for accessories such as power supplies, keyboards, mice, cables, charging connectors, etc. included with the Microsoft device.
- Any devices that exhibit a case that has separated apart or opened for reasons other than customer abuse (e.g., impact damage from dropping, evidence of tampering, separation caused by an expanded battery).
- Any other finding that may constitute a potential safety hazard to the user, such as sharp edges on plastics.

ASPs should refer to the Guidebook for the Microsoft RRT email address and instructions. All others shall go to Microsoft Surface Support Services to report any above condition(s) observed.

Microsoft will ask for the following information:

- The model and serial number of the affected Microsoft Surface device and/or accessory(ies).
- A description of the damage found.
- Clear photographs depicting the symptoms observed.
- ASPs: The Service Request (SR) Number or alternative service tracking work order that the device was received under

Illustrated Service Parts List



IMPORTANT: Device service part availability is segmented into two groups. FRUs are parts available for repair activity through an Authorized Service Provider under specific contract with Microsoft. CRUs/ Spares are parts available for repair activity by a skilled technician.

Item	Component	ASP / FRU Part No.	CRU Part No.
(1)	**Feet**		
	Black feet	VDI-00001	VDB-00001
(2)	**Thermal Module**		
	Thermal Module	VF8-00001	VF1-00001
(3)	**Removable Solid-State Drive**		
	rSSD 1 TB	VEI-00001	VEB-00001
(4)	**Motherboard**		
	Motherboard	VFI-00001	VFB-00001
	Motherboard (POTW)	VFI-00002	VFB-00002
	Motherboard (NATZ)	VFI-00003	VFB-00003
(5)	**Display**		
	Platinum	VE8-00001	VE1-00001
(6)	**PSU**		
	Power Supply	VNI-00001	VNB-00001

Service Diagnostics/Troubleshooting Overview

- For general Surface support, visit www.support.microsoft.com
- To troubleshoot device feature/function problems or learn more about Surface Pro visit www.aka.ms/SurfaceProHelp
- If you'd like to learn more about Windows, visit aka.ms/WindowsHelp
- To learn more about the accessibility features of the Surface Pro, go to the online user guide at aka.ms/Windows-Accessibility

Software Tools:

- How To: Update Surface device firmware and OS
- How To: Surface Tools Video
- Download: Surface drivers and firmware
- Download: Surface Diagnostic Toolkit (SDT)
- Download: Surface Data Eraser
- Download: Surface Imaging Tools

Hardware Troubleshooting Approach

> **IMPORTANT:** Be sure that devices meet all pre-repair qualifications related to safety and policy prior to repair. See ASP Guidebook for details.

The following approach should be taken when troubleshooting Surface devices:

1. Update device to latest OS/FW versions using the SDT tool – Refer to Software Tools section above for details on SDT.

   > **IMPORTANT:** Device updates are required as a prerequisite to all hardware repairs.

2. Verify any suspected hardware failures by setting the device in a known OS/FW version state and running SDT to verify fault:
   a. Replace the device's internal rSSD with a BMR imaged rSSD containing latest OS and FW updates (not supplied – must be created as a fault verification jig/tool) – Refer to Software Tools section above for details on imaging.
   b. Run SDT and verify if condition persists or if resolved with use of BMR imaged drive – Refer to Software Tools section above for details on SDT.
      i. If problem is resolved, then re-image original rSSD or replace original rSSD and image.
      ii. If problem persists, then replace suspected hardware FRU related to the problem by following the detailed replacement procedures covered within this service guide.
3. SDT must be run following all hardware repairs where a FRU was replaced to further verify that problem was resolved by the repair action taken.

Component Removal and Replacement Procedures

⚠ Prior to Device Disassembly

- Prior to opening device, ensure device has powered off and disconnected from power for at least 30 seconds.
- Always ensure that the work surface is covered with an ESD-safe, soft, non-marring material.
- Work surfaces should be cleaned regularly to ensure debris/abrasive particles are not present.
- Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device.
- FRUs/CRUs removed from a device under repair during the repair process should be stored in ESD-safe bags and packaged for return in the same packaging and order that the new replacement part came in.

⚠ Battery Warning

This product contains coin cell/button cell batteries. If swallowed, a coin cell/button cell battery can cause severe internal burns and perforation of soft tissue in just two hours, causing serious personal injury or death.

Always keep new and used batteries away from infants and children. If the battery compartment on your device does not close securely, stop using it and keep it away from infants and children. Seek immediate medical attention if you think an infant or child may have swallowed or placed a coin cell/button cell battery inside any part of his or her body. Coin cell/button cell batteries must be removed immediately by qualified medical personnel to minimize the risk of serious personal injury or death.

⚠ Internal Power Supply Warning

Always select and use a genuine AC power supply and AC power cord for your Microsoft device. Failure to take the following steps during device repair or component replacement can result in serious personal injury or death from electric shock or in damage to your device.

Non-Skid Feet Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

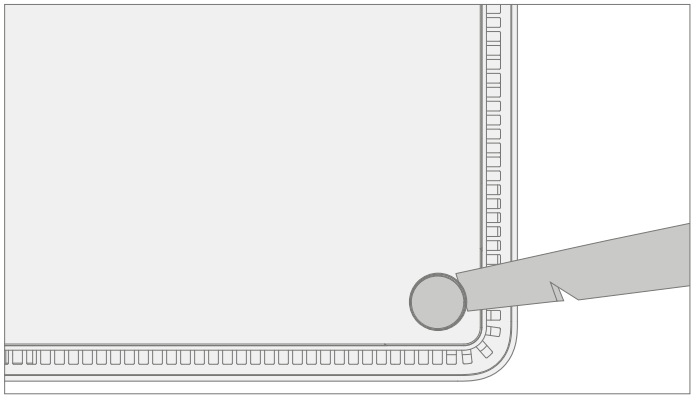
- **Tools:**
  - Plastic tweezers / spudger
  - Isopropyl Alcohol Dispenser Bottle (use only 70% IPA)
  - Cleaning swabs
  - Soft ESD-safe mat
  - Microfiber cloth
- **Components:**
  - Feet (Refer to Illustrated Service Parts List)

Prerequisite Steps

- **Power off device** – Ensure device is powered off and has been disconnected from a power supply for at least 30 seconds.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening the device. Refer to Prior to Device Disassembly section on (page 13) for details.
- **Position device** – Place device onto a clean surface free of debris with the screen face down on an ESD mat and the base of the unit facing the technician.

Procedure – Removal (Non-Skid Feet)

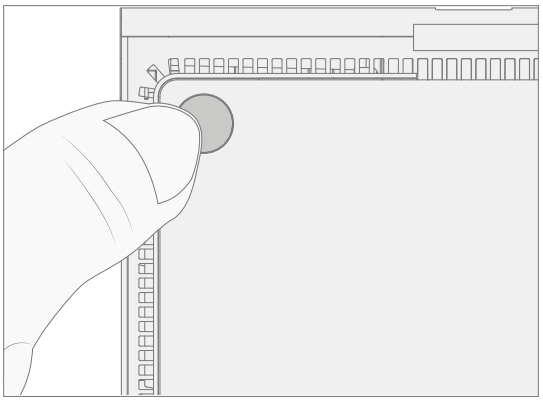
1. **Feet removal** – Use plastic tool / spudger to lift one edge of each foot. Ensure all adhesive tape remnants and glue residue are removed. Clean the cosmetic plate foot divots with 70% Isopropyl Alcohol.



Procedure – Installation (Non-Skid Feet)

IMPORTANT: Once removed, the feet must be replaced with new ones.

1. **Position device** – Place device onto a clean surface free of debris with the screen face down on an ESD mat and the base of the unit facing the technician.
2. **Prepare new foot and press into place** – To install each foot, remove protective sheet to expose adhesive on foot. Press foot into cosmetic plate divot for at least 15 seconds. Repeat for each foot.



3. **Inspect for anomalies** – Inspect each foot to ensure there is no cosmetic damage or gaps between the foot and the cosmetic plate foot divots.

Thermal Module Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

- **Tools:**
  - Plastic tweezers / spudger
  - Isopropyl Alcohol Dispenser Bottle (use only 70% IPA)
  - Cleaning swabs
  - Metric plastic thickness gauges
  - Soft ESD-safe mat
  - Microfiber cloth
  - 8IP (Torx-plus) driver
  - 10IP (Torx-plus) driver
  - H5 hex socket
- **Components:**
  - Thermal Module (Refer to Illustrated Service Parts List)
  - Fan Cover Screw 1 (131B-022D0QS) Qty. 4 (Panhead)
  - Fan Cover Screw 2 (131A-01LT0QS) Qty. 4 (Flathead)
  - Cosmetic Plate Screw 1 (131B-022A0QS) Qty. 2 (Short)
  - Cosmetic Plate Screw 2 (131B-022D0QS) Qty. 2 (Long, towards front of unit)
  - Thermal Module Standoff (13P1-4SU2U21) Qty. 1

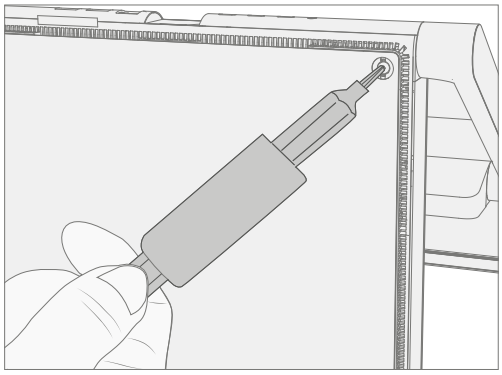
Prerequisite Steps

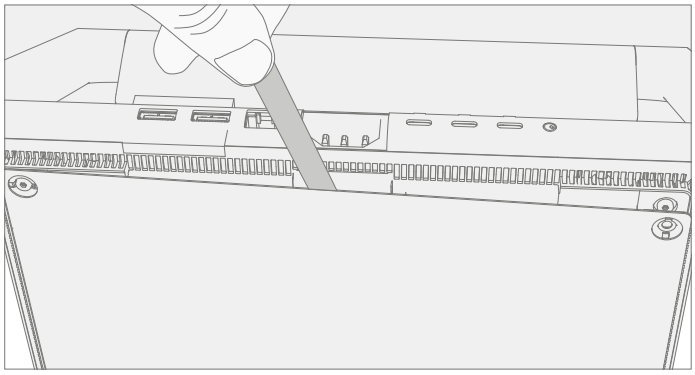
- **Power off device** – Ensure device is powered off and has been disconnected from a power supply for at least 30 seconds.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening the device. Refer to Prior to Device Disassembly section on (page 13) for details.
- **Position device** – Place device onto a clean surface free of debris with the screen face down on an ESD mat and the base of the unit facing the technician.
- **Remove Feet** – Refer to Procedure – Removal (Non-Skid Feet) on (page 14) for details.

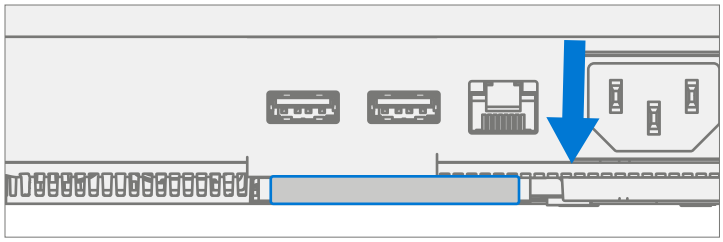
Procedure – Removal (Thermal Module)

1. **Remove cosmetic plate** – Remove the 4 screws at each corner of the cosmetic plate using an 8IP (Torx-plus) driver. Using a plastic spudger, gently work around the edge of the cosmetic plate to loosen it. Then gently pull the cosmetic plate away from the unit, being careful to peel off the foam tape that connects the cosmetic plate to the fan cover underneath using the flat end of a plastic spudger.

> ! **CAUTION:** The foam tape is located near the Microsoft logo on the cosmetic plate. Be careful when removing the foam tape from the cosmetic plate, it is delicate and easily torn.



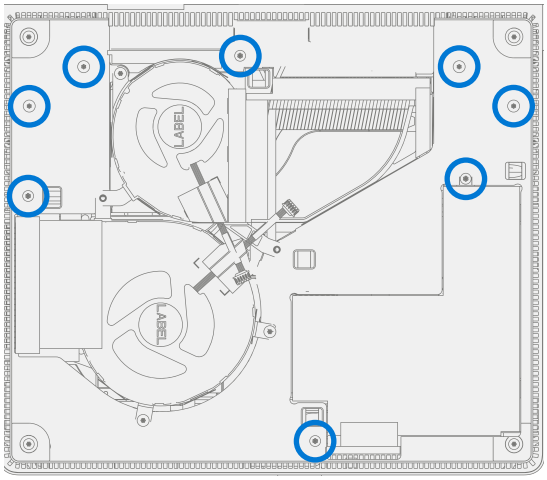




2. **Cleaning** – Remove any adhesive tape remnants from the cosmetic plate using IPA and a cotton swab.

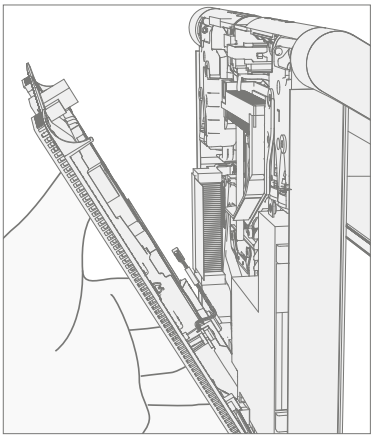
3. **Remove fan cover**
   a. Remove the 8 marked screws from fan plate using an 8IP (Torx-plus) driver.

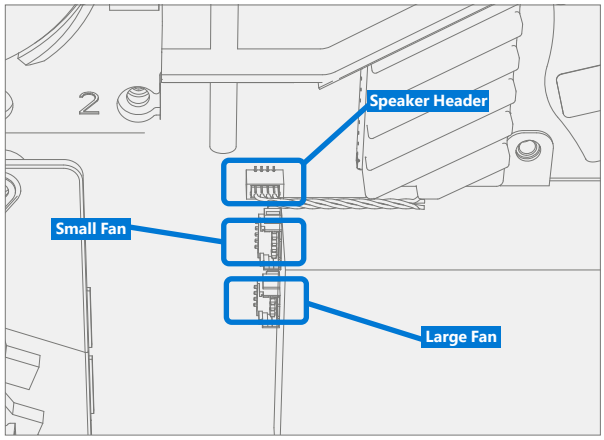
> **IMPORTANT:** Only remove the marked screws. Removal of screws securing fans to fan-cover is not required.



b. While holding the fan cover at a 45-degree angle, disconnect the two fan cables and one speaker cable from the headers on motherboard.

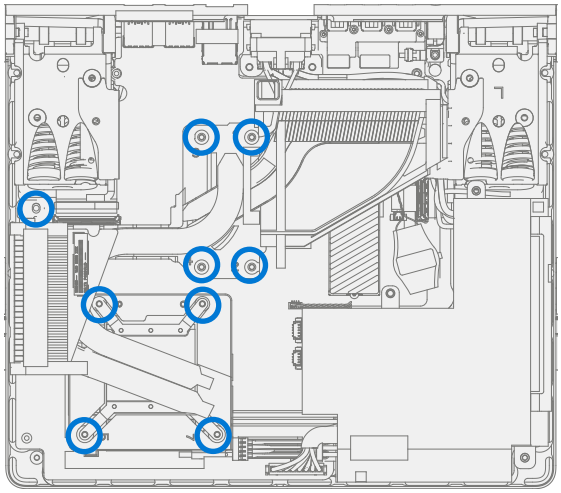
! **CAUTION:** Cables are extremely fragile, be extra cautious to not damage connector cables.





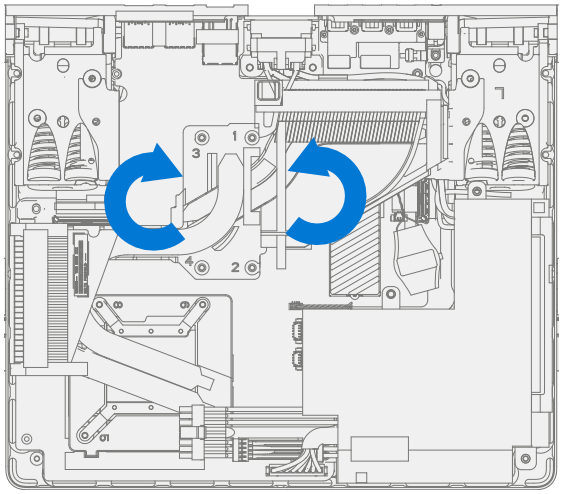
4. **Remove thermal module**

a. Using a H5 (Hex) socket, remove the standoff from the right side of the chassis. Using a 10IP (Torx-plus) driver, unscrew the first four captive screws (numbered 1 through 4). While holding the THM with one hand, use an 8IP (Torx-plus) driver to unscrew the final four captive screws (numbered 5 through 8).



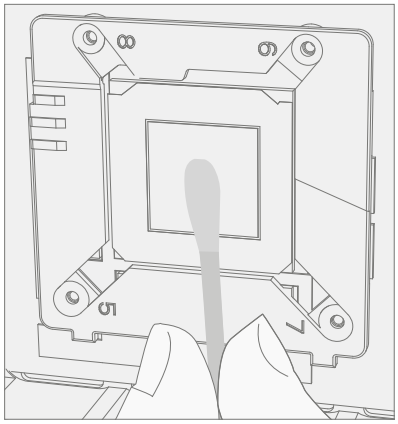
b. Gently rotate the thermal module left and right a few times to break the bond with the thermal material on the CPU, GPU, and rSSD. Once the bond is broken, lift the thermal module out of the device.

! **CAUTION:** Do not pull thermal module off without breaking the bond with the thermal interface materials. Doing so may cause damage to the rSSD and/or CPU and GPU.

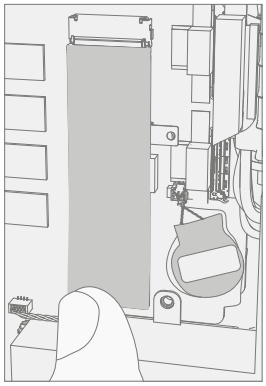


5. **Remove thermal material** – Using a cotton swab and Isopropyl alcohol clean the thermal interface material from the CPU and GPU. Wipe down with a lint-free cloth.

! **CAUTION:** Do scrub or apply too much pressure on the CPU or GPU dies. Excess pressure may cause damage to the chips.

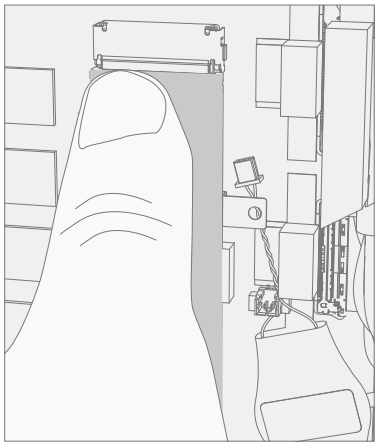


6. **Remove thermal pad** – Using your fingers remove the thermal pad on the rSSD.

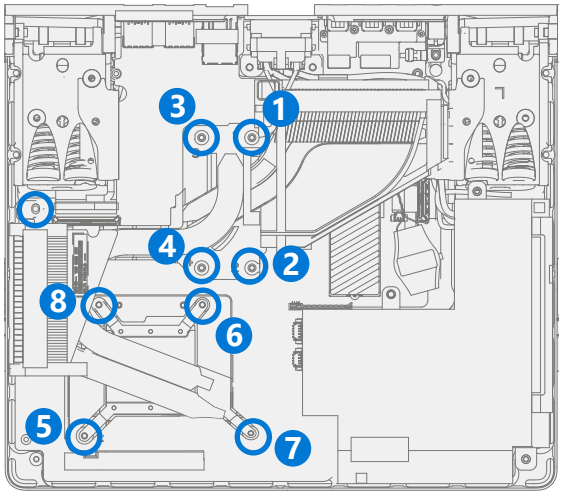


Procedure – Installation (Thermal Module)

1. **Apply new thermal material** – Apply new thermal pad to the rSSD.



2. **Install new thermal module** – Position new thermal module over CPU and GPU, while holding with one hand use a 10IP (Torx-plus) driver to tighten the first four captive screws (numbered 1 through 4). Turn each screw until snug, then turn another 45-degrees (1/4 turn). Use an 8IP (Torx-plus) driver to tighten the final four captive screws (numbered 5 through 8) using the same process as above. Use a H5 (Hex) socket to install the right standoff using the process above.

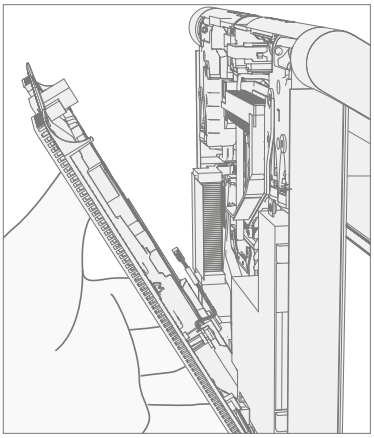


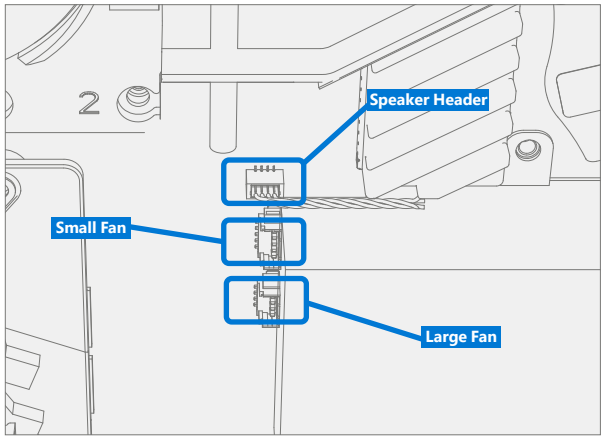
3. **Final Inspection** – Prior to continuing with the re-assembly, inspect the device internals to ensure no screws, foams, tape, or other foreign material has been misplaced inside the unit.

4. **Install fan cover**

a. While holding the fan cover at a 45-degree angle, connect the two fan cables and one speaker cable to the headers on the motherboard.

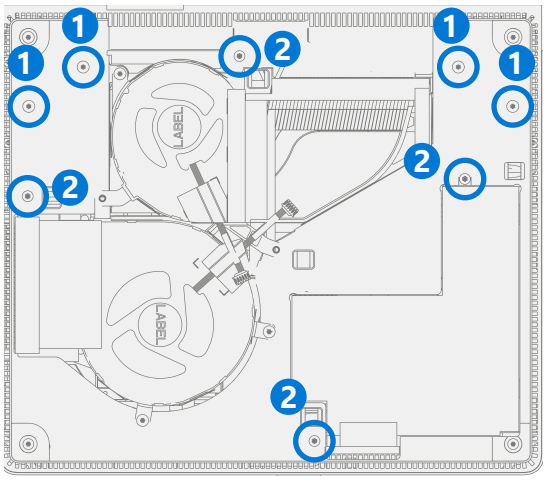
! **CAUTION:** Cables are extremely fragile, be extra cautious to not damage connector cables. Tuck them into the fan cover approximately as shown below.





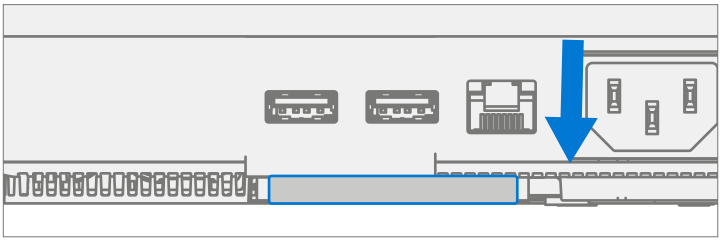
b. Using an 8IP (Torx-plus) driver install the 4 panhead fan cover screws (1), tightening each screw until snug and then turn another 45 degrees (1/8 turn). Repeat this process for the 4 flathead fan cover screws (2).

IMPORTANT: Ensure that connector wires do not touch the fans by ensuring that the fans spin freely.

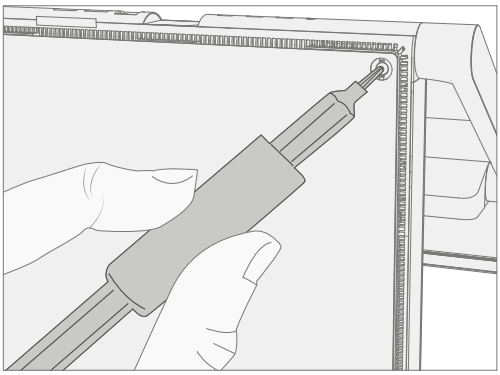


5. **Install cosmetic plate**
   a. Align the tabs on cosmetic plate with the openings on the fan cover. Install the foam tape from the fan cover onto the back of the cosmetic plate and fit the two parts together.

> ! **CAUTION:** The foam tape should be located near the Microsoft logo on the cosmetic plate. Be careful when installing foam tape on the cosmetic plate, it is delicate.



   b. Using a 8IP (Torx-plus) driver install the 4 screws at the corners of the C-Cover, tightening each screw until snug and then turn another 45 degrees (1/8 turn).



6. **Power on device** – Carefully place device top side up. Connect device to power supply and power on.
7. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.
8. **Install Feet** – Refer to Procedure – Installation (Feet) on (page 15) for details.

Power Supply Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

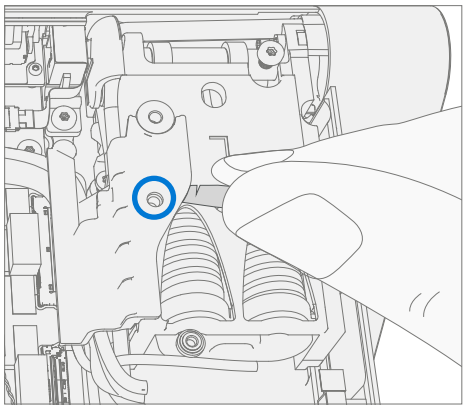
- **Tools**
  - Plastic tweezers / spudger
  - Isopropyl Alcohol Dispenser Bottle (use only 70% IPA)
  - Cleaning swabs
  - Metric plastic thickness gauges
  - Soft ESD-safe mat
  - Microfiber cloth
  - 8IP (Torx-plus) driver
  - H5 (Hex) socket driver
  - Digital Multimeter
- **Components**
  - Power Supply Unit (Refer to Illustrated Service Parts List)
  - PSU Standoff (13P1-4SU2U21) Qty. 1
  - PSU Screw (131B-022D0QS) Qty. 1
  - Power Plug Screw (131B-022D0QS) Qty. 1
  - Power Plug Standoff (13E5-3TN0C01) Qty. 1
  - Hinge Cover Screws (131B-022D0QS) Qty. 1

Prerequisite Steps

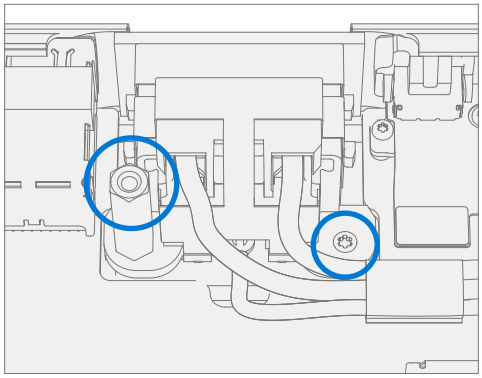
- **Power off device** – Ensure device is powered off and has been disconnected from a power supply for at least 30 seconds.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening the device. Refer to Prior to Device Disassembly section on (page 13) for details.
- **Position device** – Place device onto a clean surface free of debris with the screen face down on an ESD mat and the base of the unit facing the technician.
- **Remove Feet** – Refer to Procedure – Removal (Non-Skid Feet) on (page 14) for details.
- **Remove Thermal Module** – Refer to Procedure – Removal (Thermal Module) on (page 17) for details.

Procedure – Removal (Power Supply)

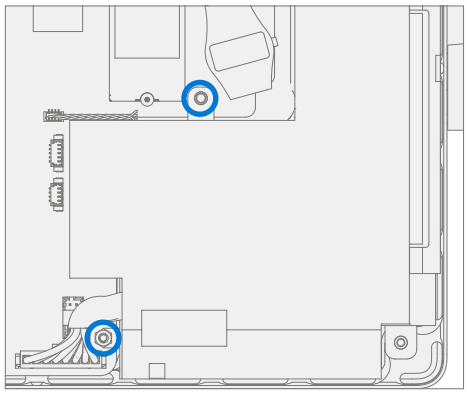
1. **Remove right hinge cover** – Using an 8IP (Torx-plus) driver, remove the screw securing the plastic hinge cover from the right hinge. Using a plastic spudger, lift the hinge cover from the hinge. Finally, use isopropyl alcohol to clean any residue.



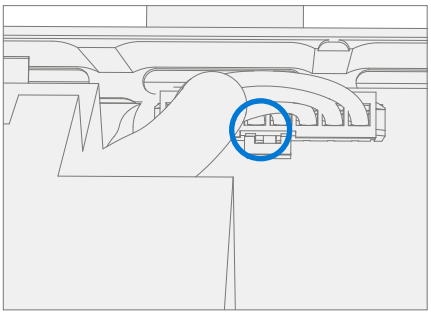
2. **Remove power plug** – Using an 8IP (Torx-plus) driver remove the right screw, using a H5 (Hex) socket remove the left standoff.

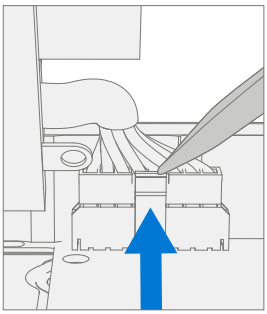


3. **Remove power supply**
   a. Using an 8IP (Torx-plus) driver remove the top screw securing the power supply to the chassis. Using a H5 (Hex) socket remove the bottom left standoff.



b. Lift the power supply out of the chassis, rotating towards the back of the unit. Gently pull out the small connector underneath the larger one. Depress the clip on the large connector to fully disconnect the power supply from the chassis.

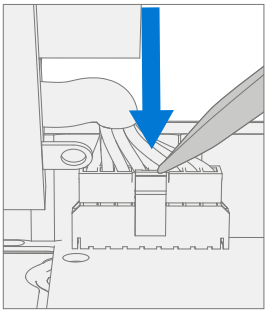


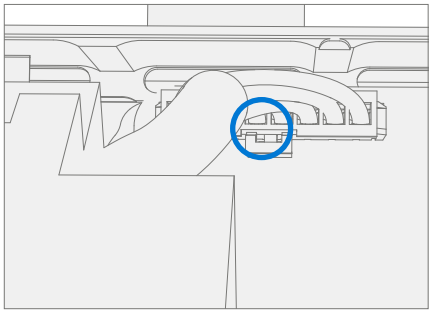


Procedure – Installation (Power Supply)

1. **Inspect power supply cables** – Before installation, check cables on power supply for any abrasion or damage. Any damage to power supply cables will require the power supply to be replaced.
2. **Install new power supply**
   a. Connect large connector to the motherboard by pressing in until there is a small click. While holding the power supply, carefully insert the small connector into its plug.

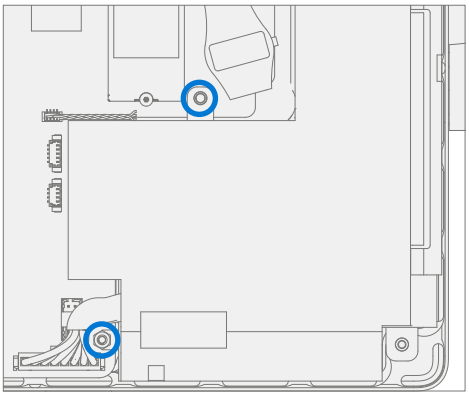
IMPORTANT: Both connectors are keyed and may only be inserted in one direction. Be careful to align connectors properly before pressing them into the motherboard to avoid damage to the motherboard.



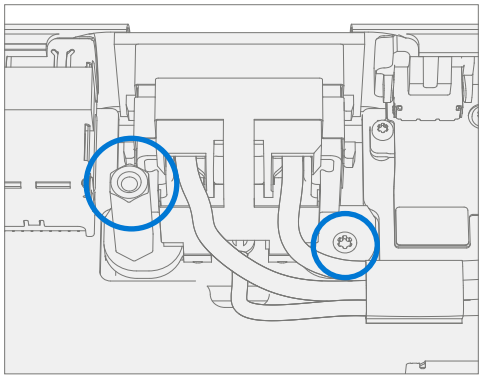


   b. Using an 8IP (Torx-plus) driver install the top screw, tightening the screw until snug and then turn another 1/8 turn (45 degrees). Repeat this process for the bottom left standoff using a H5 (Hex) socket.

CAUTION: Ensure the wires are pulled away from screw hole when installing screws. Damage to the casing of the wires requires PSU replacement.

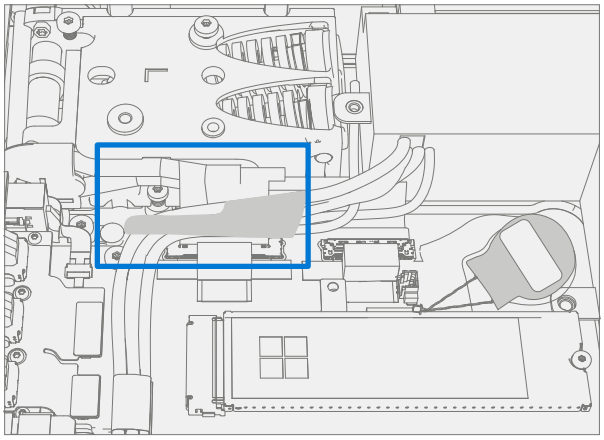


3. **Install power plug** – Using an 8IP (Torx-plus) driver install the right screw, tightening until snug and then turn another 45 degrees (1/8 turn). Repeat this process for the left standoff using a H5 (Hex) socket.



4. **Install right hinge cover** – Align PSU wires as shown in image below. Then using an 8IP (Torx-plus) driver, secure using the hinge cover screw, tightening until snug and then turn another 45 degrees (1/8 turn).

   ⚠ **WARNING: Take care not to pinch the wires between the motherboard and hinge cover.** This could damage the wires and the motherboard and cause an electrical fault.



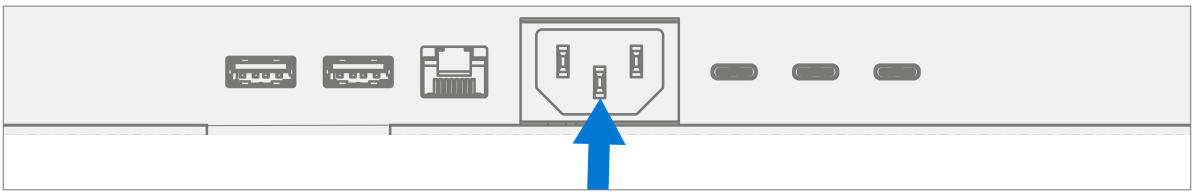
5. **Install thermal module** – Refer to Procedure – Installation (Thermal Module) on (page 20) for details.

6. **Perform continuity test** – A continuity test must be performed after the device is re-assembled and before it is returned to the user. The continuity test shall be performed from each of the three pins on the AC inlet to an exposed metal part of the chassis (ground). For chassis ground, insert a good USB cable into a USB port and use the metal shell of the connector on the opposite end of the cable as the contact point for the chassis (ground).

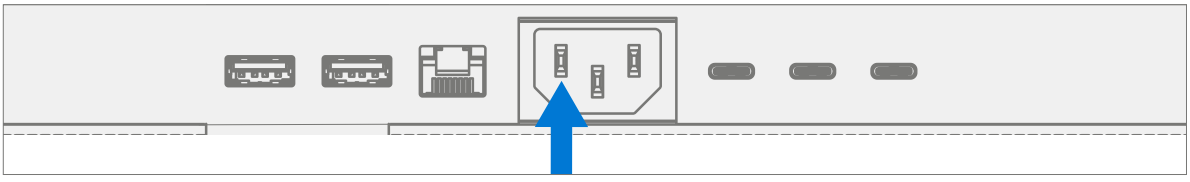
   IMPORTANT: After the repair process, any device which incorporates an internal power supply that connects to AC mains, may present a shock hazard to the user. This may be caused by conditions such as improper cable routing, pinched wires, foreign objects, solder bridges, debris, etc.

   IMPORTANT: If the device fails any portion of this test, remove the PSU and inspect the cables. If the cables are damaged or if the PSU continues to fail, replace the PSU.

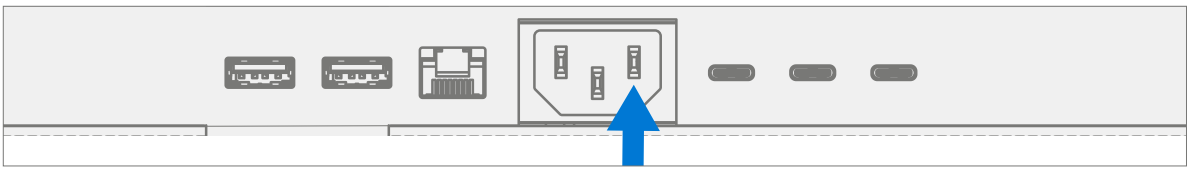
   a. Measure the resistance between the ground (center) pin to chassis (ground). A resistance of less than 0.5 ohms shall be measured.



   b. Measure the resistance between the neutral (right) pin to chassis (ground). A resistance of more than 50k ohms shall be measured.



c. Measure the resistance between the live (left) pin to chassis (ground). A resistance of more than 50k ohms shall be measured.



7. **Power on device** – Carefully place device top side up. Connect device to power supply and power on.
8. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.
9. **Install feet** – Refer to Procedure – Installation (Feet) on (page 15) for details.

rSSD Replacement Process

Preliminary Replacement Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

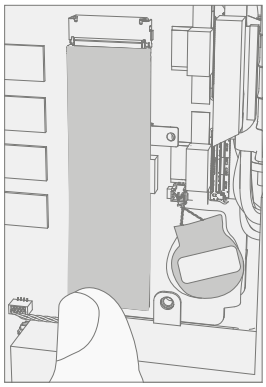
- **Tools**
  - Plastic tweezers / spudger
  - Anti-static wrist strap (1 MOhm resistance)
  - Isopropyl Alcohol Dispenser Bottle (use only 70% IPA)
  - Cleaning swabs
  - Metric plastic thickness gauges
  - Non-Metallic ruler (Amazon Example)
  - 3IP (Torx-plus) driver
  - USB Thumb drive with SDT
  - Surface Power Supply
  - Soft ESD-safe mat
  - Microfiber cloth
- **Components**
  - rSSD (Refer to Illustrated Service Parts List) if replacing
  - rSSD Screw (13N4-10N1S11, Alt. 13N4-10N1S12) Qty. 1

Prerequisite Steps

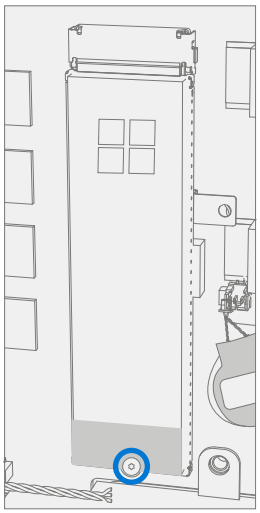
- **Power off device** – Ensure device is powered off and has been disconnected from a power supply for at least 30 seconds.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening the device. Refer to Prior to Device Disassembly section on (page 13) for details.
- **Position device** – Place device onto a clean surface free of debris with the screen face down on an ESD mat and the base of the unit facing the technician.
- **Remove Feet** – Refer to Procedure – Removal (Non-Skid Feet) on (page 14) for details.
- **Remove Thermal Module** – Refer to Removal (Thermal Module) on (page 17) for details.

Procedure – Removal (rSSD)

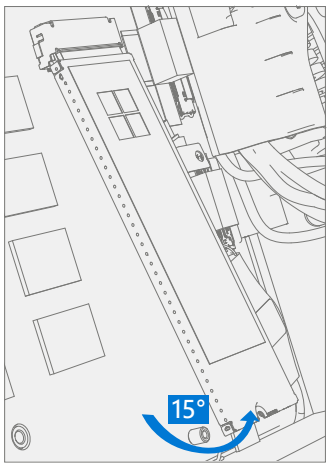
1. **Remove thermal pad** – Using your fingers remove the thermal pad on the rSSD.



2. **Remove rSSD screw** – Using a 3IP (Torx-plus) driver remove the screw securing the rSSD.

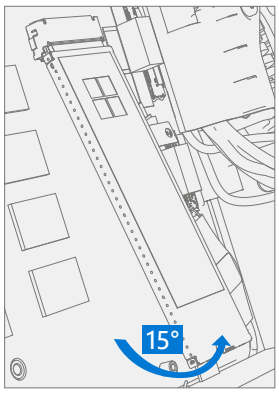


3. **Remove rSSD** – Lift the rSSD to 15 degrees and pull the rSSD out of the connector.

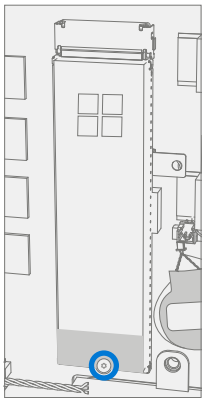


Procedure – Installation (rSSD)

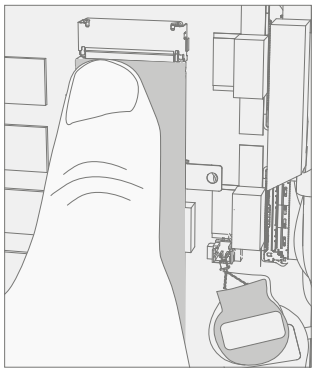
1. **Insert rSSD** – Insert the connector end of the rSSD into the receptacle on the motherboard at 15-degree angle from horizontal.



2. **Install rSSD screw** – Using a 3IP (Torx-plus) driver install the rSSD screw. Turn until just snug and seated, and then turn another 45 degrees (1/8 turn) or until fully fastened.



3. **Install thermal pad** – Install new thermal interface material on top of rSSD.



4. **Install thermal module** – Refer to Procedure – Installation (Thermal Module) on (page 20) for details.
5. **Power on device** – Carefully place device on its base. Connect device to power supply, and power on.
6. **Imaging** – Image the new rSSD by using a BMR Imaging USB drive specific to the device model.

> **IMPORTANT:** Refer to Surface imaging process - Surface Imaging Tools

7. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.
8. **Install feet** – Refer to Procedure – Installation (Feet) on (page 15) for details.

Motherboard Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

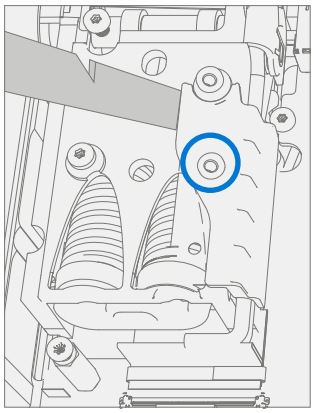
- **Tools**
  - Plastic tweezers / spudger
  - Anti-static wrist strap (1 MOhm resistance)
  - Isopropyl Alcohol Dispenser Bottle (use only 70% IPA)
  - Cleaning swabs
  - Metric plastic thickness gauges
  - 3IP (Torx-plus) driver
  - 8IP (Torx-plus) driver
  - H5 (Hex) socket
  - USB Thumb drive with SDT
  - Surface Power Supply
  - Soft ESD-safe mat
  - Microfiber cloth
- **Components**
  - Motherboard (Refer to Illustrated Service Parts List)
  - Hinge Cover Screws (131B-022D0QS) Qty. 2
  - Motherboard Screws (131B-02150QS) Qty. 3

Prerequisite Steps

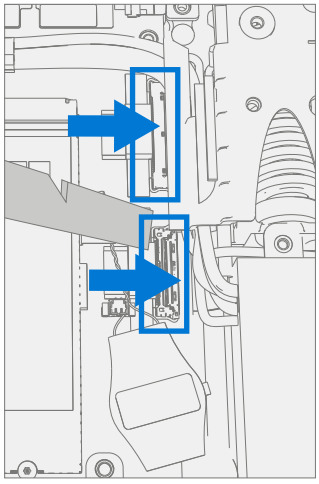
- **Power off device** – Ensure device is powered off and has been disconnected from a power supply for at least 30 seconds.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening the device. Refer to Prior to Device Disassembly section on (page 13) for details.
- **Position device** – Place device onto a clean surface free of debris with the screen face down on an ESD mat and the base of the unit facing the technician.
- **Remove Feet** – Refer to Procedure – Removal (Non-Skid Feet) on (page 14) for details.
- **Remove Power Supply** – Refer to Procedure – Removal (Power Supply) on (page 24) for details.
- **Remove Thermal Module** – Refer to Procedure – Removal (Thermal Module) on (page 17) for details.
- **Remove rSSD** – Refer to Procedure – Removal (rSSD) on (page 29) for details.

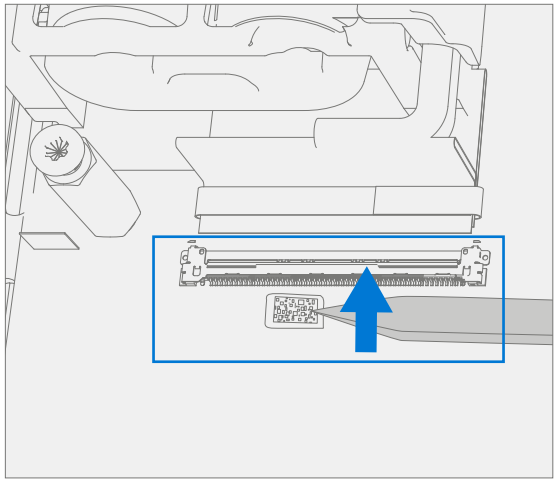
Procedure – Removal (Motherboard)

1. **Remove hinge cover** – Using an 8IP (Torx-plus) driver, remove the two screws securing the plastic left hinge cover to the left hinge. Using a plastic spudger, lift the hinge cover from the hinge. Finally, use isopropyl alcohol to clean any residue.

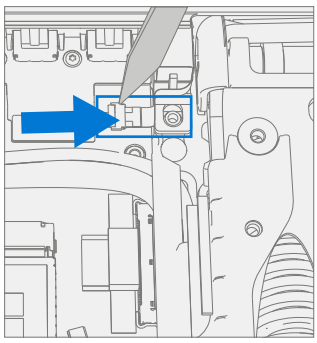


2. **Disconnect display cables** – Using a plastic spudger lift the locking bar from the three ribbon cables connected to the motherboard, slide them back, and lift them out.

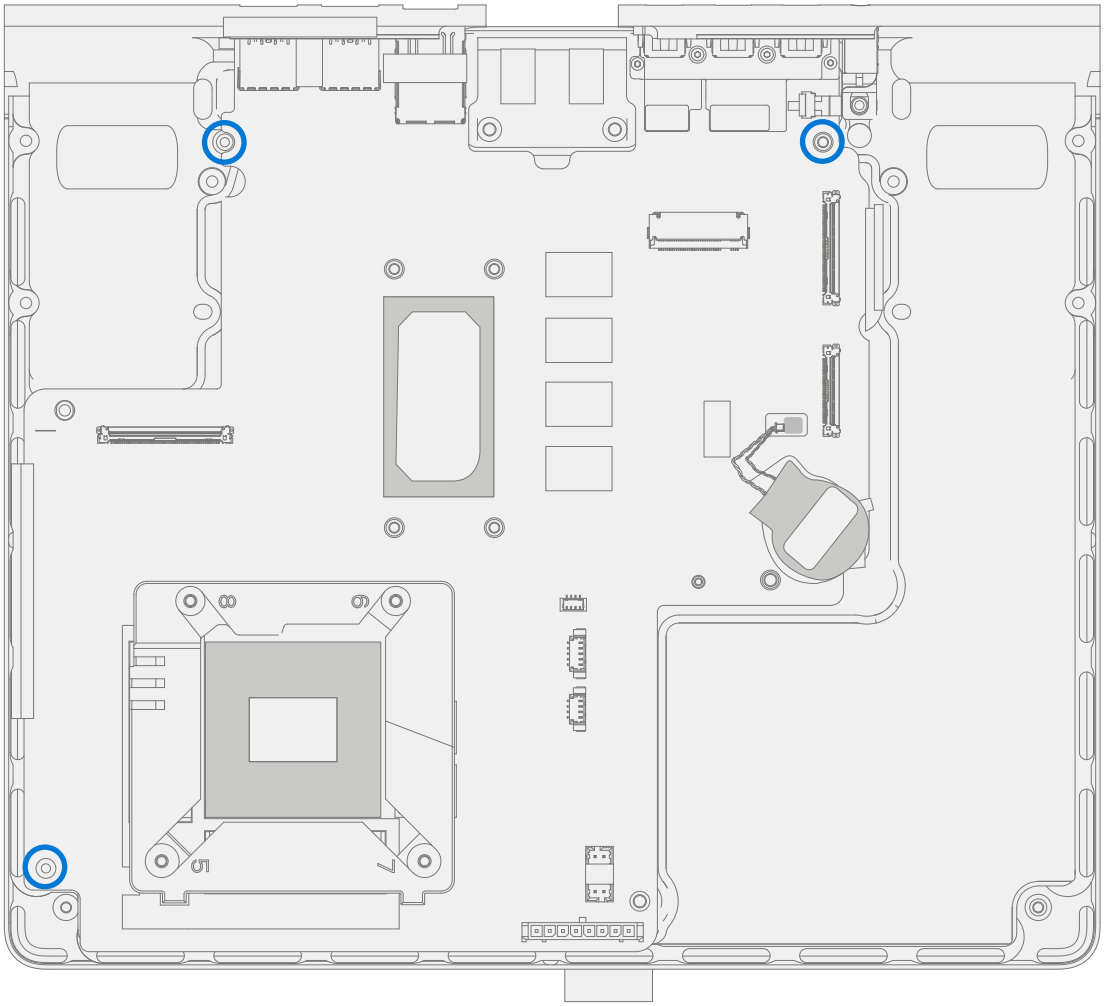




3. **Disconnect audio port** – Using a pair of plastic tweezers, lift the white locking tab on the connector, then remove the ribbon cable for the audio port.



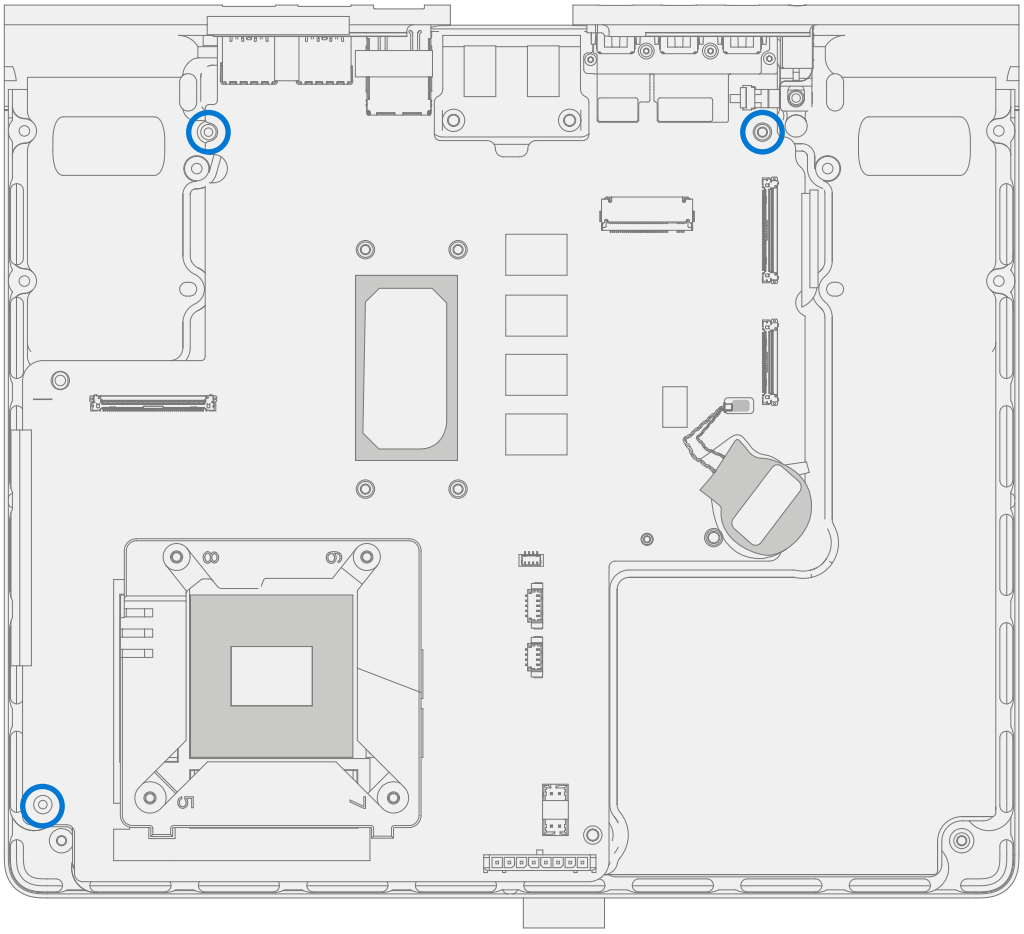
4. **Remove motherboard screws** – While holding the motherboard in place with one hand, use an 8IP (Torx-plus) driver, remove the 3 screws securing the motherboard to the chassis.



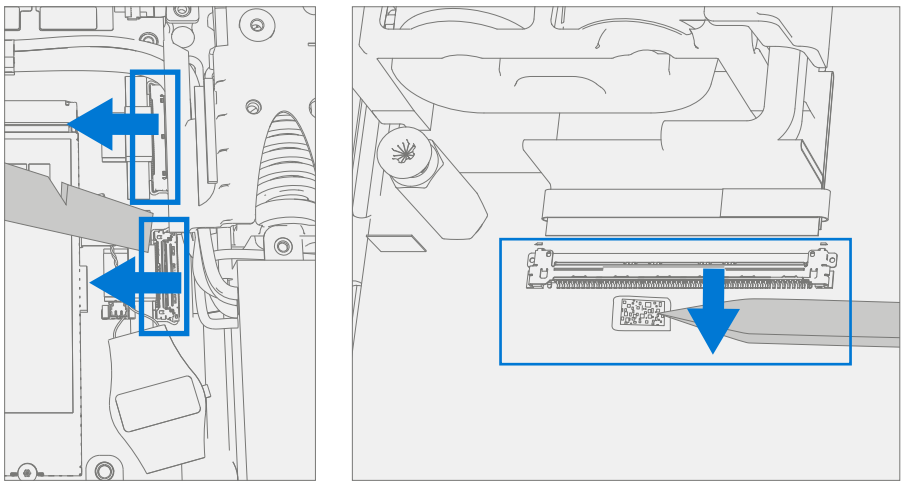
5. **Remove the motherboard** – Using two hands remove the motherboard from the chassis.

Procedure – Installation (Motherboard)

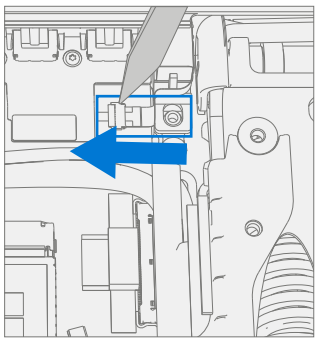
1. **Install new motherboard** – Place the new motherboard in the chassis using two hands. Align the motherboard with the screw holes in the chassis.
2. **Install motherboard screws** – While securing the motherboard with one hand, use an 8IP (Torx-plus) driver to install the 3 motherboard screws, tightening until finger tight. Then turn another 45 degrees (1/8 turn) or until fully fastened.



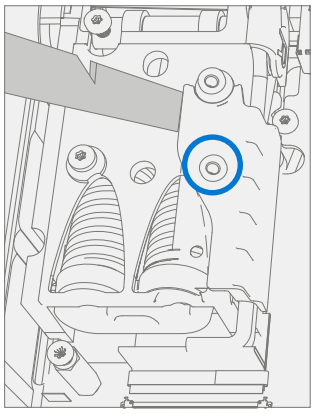
3. **Connect display connectors** – Position the cable over the connector and slide it into place. Push the locking tab down to secure the connector in place. Repeat process for the remaining two ribbon cables.



4. **Connect audio port** – Using a pair of plastic tweezers position and slide the ribbon cable into the audio port. Then press down the locking tab.



5. **Install hinge covers and screws** – Using an 8IP (Torx-plus) driver install the 2 hinge screws securing the plastic hinge cover to the left hinge. Tighten until just snug and seated, then turn another 45 degrees (1/8 turn) or until fully fastened.



6. **Install rSSD** – Refer to Procedure – Installation (rSSD) on (page 30) for details.
7. **Install thermal module** – Refer to Procedure – Installation (Thermal Module) on (page 20) for details.
8. **Install power supply** – Refer to Procedure – Installation (Power Supply) on (page 26) for details.
9. **Power on device** – Carefully place device top side up. Connect device to power supply, and power on.
10. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.
11. **Install Feet** – Refer to Feet installation on (page 15) for details.

Display Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

- **Tools**
  - Plastic tweezers / spudger
  - Plastic card tool (example iFixit Plastic Card)
  - Anti-static wrist strap (1 MOhm resistance)
  - Isopropyl Alcohol Dispenser Bottle (use only 70% IPA)
  - Cleaning swabs
  - Metric plastic thickness gauges
  - 6IP (Torx-plus) driver
  - 9IP (Torx-plus)
  - USB Thumb drive with SDT
  - Surface Power Supply
  - Soft ESD-safe mat
  - Microfiber cloth
- **Components**
  - Display Module (Refer to Illustrated Service Parts List)
  - WiFi Antenna Screws (131B-01WU0QS) Qty. 12
  - End Cap Screws (131A-01K20QS) Qty. 2
  - Display Hinge Screws (131A-01LU0QS) Qty. 9

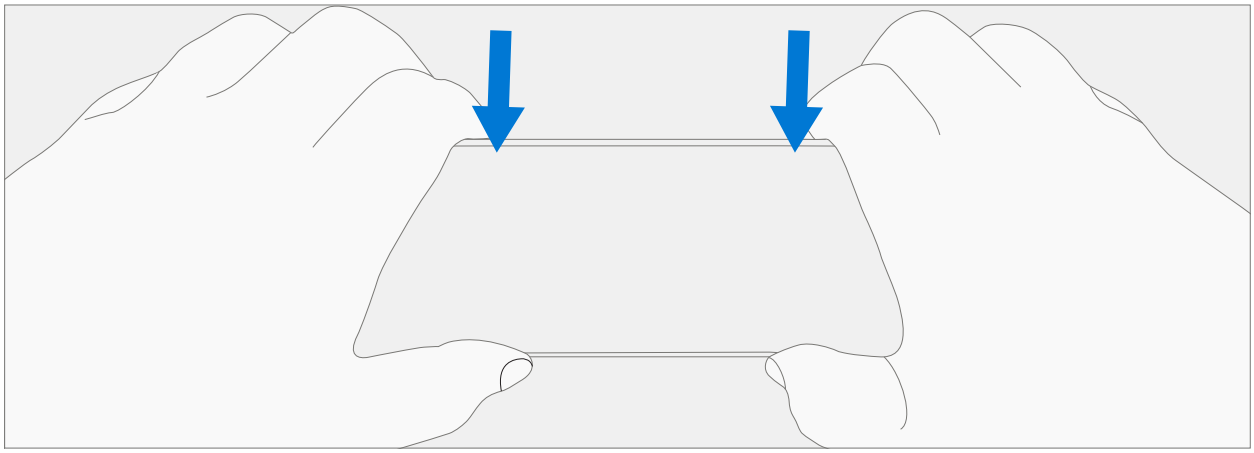
Prerequisite Steps

- **Power off device** – Ensure device is powered off and has been disconnected from a power supply for at least 30 seconds.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening the device. Refer to Prior to Device Disassembly section on (page 13) for details.
- **Position device** – Place device onto a clean surface free of debris with the screen face down on an ESD mat and the base of the unit facing the technician.

Procedure – Removal (Display)

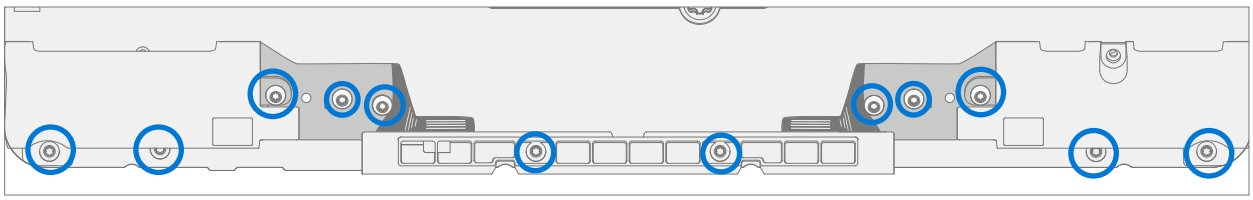
1. **Remove hinge cover** – Squeeze the top of the hinge cover with thumbs pressed firmly along the back for leverage. There should be an audible click as the plastic retaining tabs release from the back of the display. Rotate the hinge cover 15 degrees, then press bottom of the cover to release the bottom clips. Lift display hinge cover up and out.

   ! **CAUTION:** The plastic tabs on the hinge cover are fragile. If any tabs break, the hinge cover must be replaced. Example of a damaged hinge below.

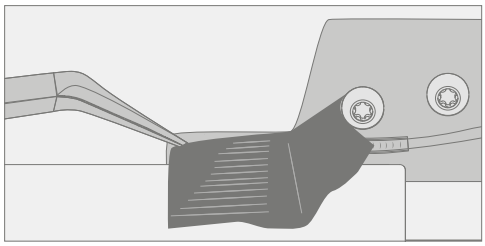


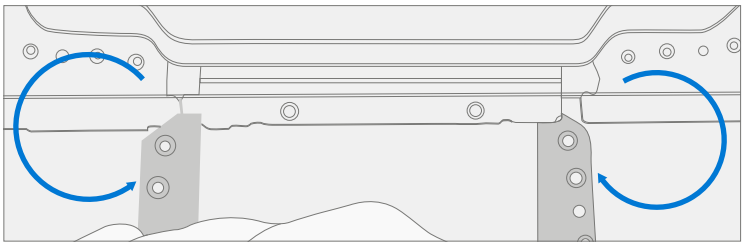
2. **Remove screws** – Using a 6IP (Torx-plus) driver remove the 12 screws marked below. Retain the two end caps on the left and right, and the plastic stiffening bar in the middle.

   IMPORTANT: The copper tape on the antenna boards is very fragile. Take extra caution to not tear it during screw removal.

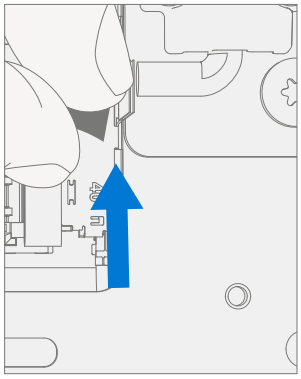


3. **Remove hinge plate** – Carefully peel up the copper tape from the two antennas on the left and right of the hinge. Position the antennas so the plate can be lifted away without disturbing the antenna wires. Lift hinge plate away from device.

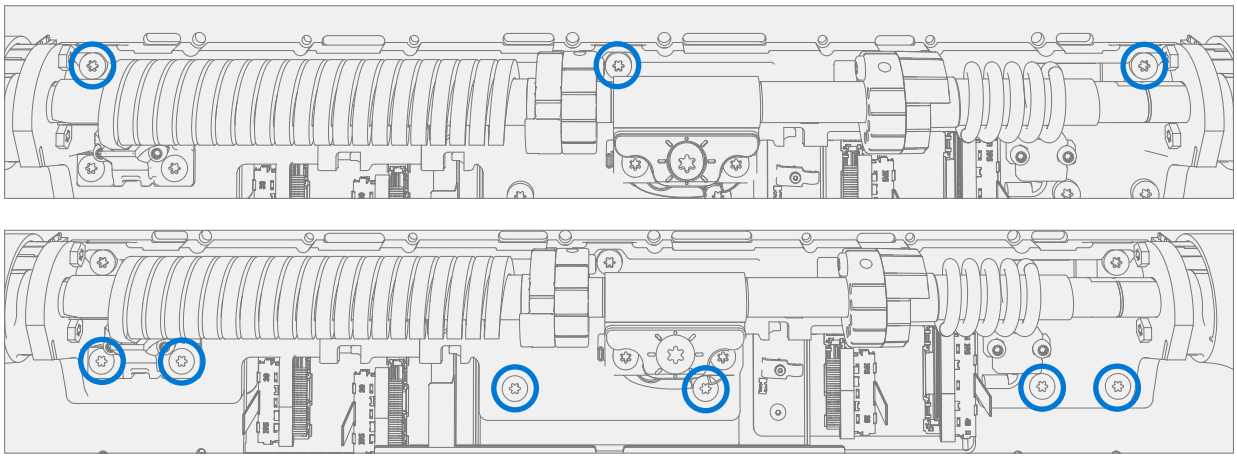




4. **Remove display connectors** – Pull the tab on each of the 4 connectors to disconnect them from the display.



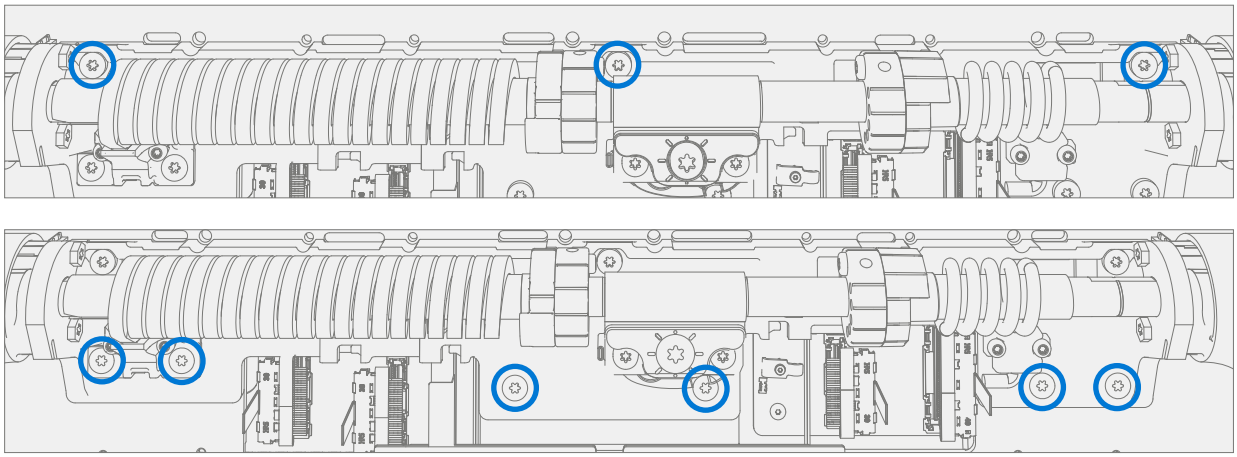
5. **Remove hinge screws** – While supporting the bottom of the unit with one hand, use a 9IP (Torx-plus) driver to remove the nine highlighted screws and separate the display from the rest of the unit.



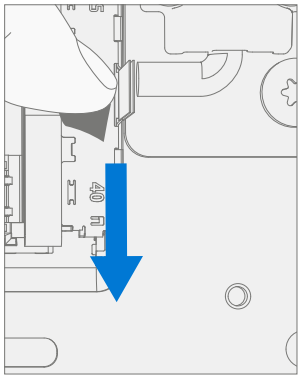
Procedure – Installation (Display)

1. **Position hinge over new display** – Align the screw holes on the new Display with the holes on the hinge.

2. **Install new hinge screws** – While supporting the bottom of the unit with one hand, use a 9IP (Torx-plus) driver to install the 9 display hinge screws as marked below. Tighten each screw until snug, then turn each screw another 1/8 turn (45 degrees) or until fully fastened.

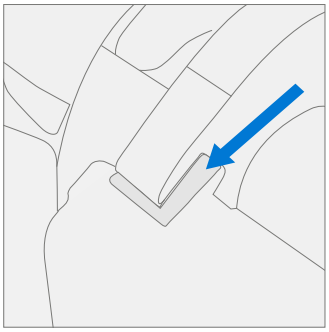


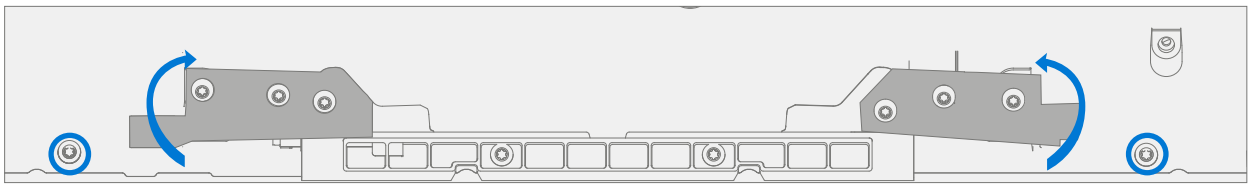
3. **Install display connectors** – Slide one of the connectors into the proper receptacle on the display. Make sure the connector is fully seated. Repeat for the remaining three FPC connectors.



4. **Install hinge plate** – Carefully move the antennas so they do not interfere with the hinge plate and position the hinge plate in place. Position WiFi antennas over holes. Using a 6IP (Torx-plus) Driver install 2 WiFi antenna screws as indicated below. Tighten each screw until snug, then turn each screw another 1/8 turn (45 degrees) or until fully fastened.

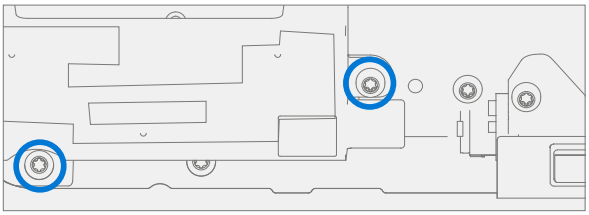
IMPORTANT: There is a notch on the hinge to accommodate the tabs of the hinge plate.

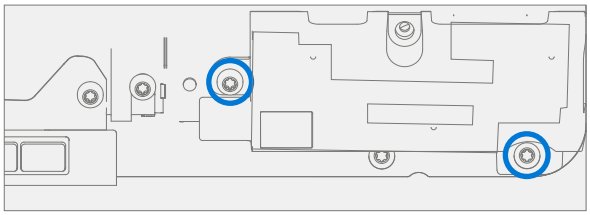




5. **Secure WiFi antennas**

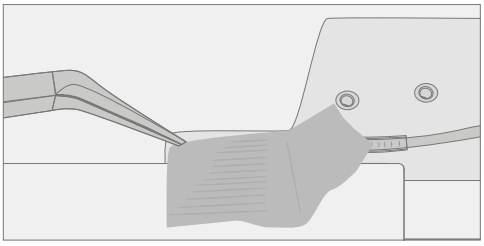
a. Position the two end caps on the left and right over the WiFi antennas. Using a 6IP (Torx-plus) Driver install 2 WiFi antenna screws as indicated below. Tighten each screw until snug, then turn each screw another 1/8 turn (45 degrees) or until fully fastened.



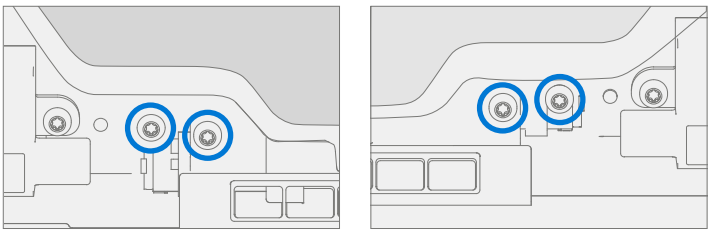


b. Install copper tape over each WiFi antenna, making sure to cover the antenna and the hinge plate.

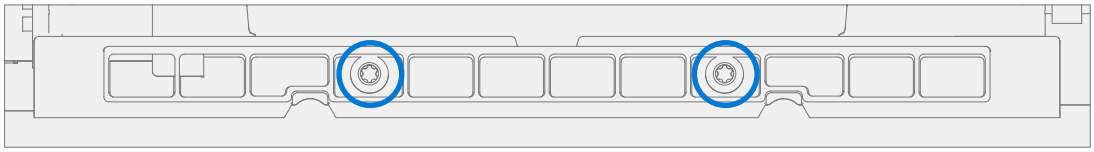
CAUTION: The copper tape on the antenna boards is very fragile. Take extra caution to not tear it during screw installation.



c. Using a 6IP (Torx-plus) Driver install the 4 remaining WiFi antenna screws as indicated below. Tighten each screw until snug, then turn each screw another 1/8 turn (45 degrees) or until fully fastened.

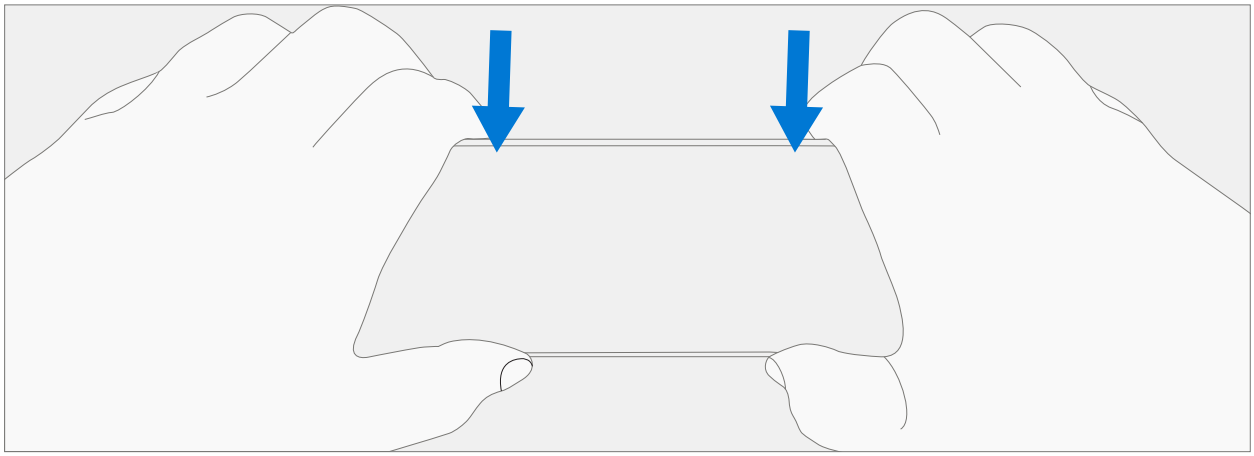


6. **Install cover guide bar screws** – Position the cover guide bar retained from step 2 of Procedure – Removal (Display) over the center holes of the hinge plate. Using a 6IP (Torx-plus) Driver install the 2 WiFi screws marked below. Tighten each screw until snug, then turn each screw another 1/8 turn (45 degrees) or until fully fastened.



7. **Install Hinge Cover** – Slot in the bottom of the hinge cover first, then align the plastic tabs with the appropriate holes along the top of the hinge. Squeeze the top of the hinge cover with thumbs pressed firmly along the back for leverage and slot top into the place. There should be an audible click as the plastic retaining tabs slot into place in the display.

! **CAUTION:** The plastic tabs on the hinge cover are fragile. If any tabs break, the hinge cover must be replaced. Example of a damaged hinge below.



8. **Power on device** – Carefully place device top side up. Connect device to power supply, and power on.
9. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.

Environmental Compliance Requirements

All waste electrical and electronic equipment (WEEE), waste electronic components, waste batteries, and electronic waste residuals must be managed according to applicable laws and regulations. And H09117, "Conformance Standards for Environmentally Sound Management of Waste Electrical and Electronic Equipment (WEEE)," which is available at this link: https://www.microsoft.com/en-us/download/details.aspx?id=11691 In case of questions, please contact AskECT@microsoft.com