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Microsoft Surface

Surface Laptop 3 / Laptop 4 Service Guide

SG

M1179886

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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.

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Device Identity Information

Surface Laptop Models

1867 – Surface Laptop 3 – 13.5″ (Fabric type keyboard)
1868 – Surface Laptop 3 – 13.5″ (Metal type keyboard)
1872 – Surface Laptop 3 – 15″ (Metal type keyboard)
1873 – Surface Laptop 3 – 15″ (Metal type keyboard)
1950 – Surface Laptop 4 – 13.5″ (Fabric type keyboard)
1951 – Surface Laptop 4 – 13.5″ (Metal type keyboard)
1953 – Surface Laptop 4 – 15″ (Metal type keyboard)
1958 – Surface Laptop 4 – 13.5″ (Fabric type keyboard)
1959 – Surface Laptop 4 – 13.5″ (Metal type keyboard)
1979 – Surface Laptop 4 – 15″ (Metal type keyboard)

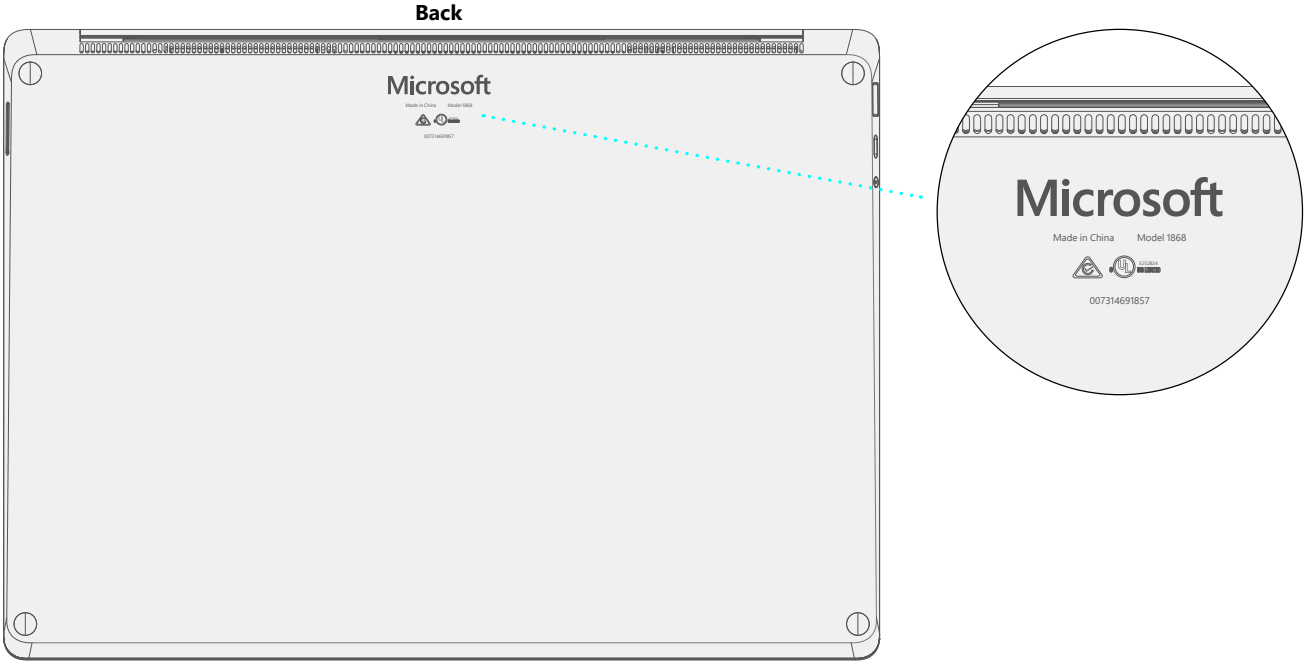
Surface Support – Laptop: Link

Surface Laptop 3 Technical Specifications: Link

Surface Laptop 4 Technical Specifications: Link

The model and serial number for Surface Laptops are on the bottom center closest to the display hinge point.

Back



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Glossary of Terms

The following terms are used throughout this manual

- **ASP** – a Microsoft Authorized Service Provider who performs repair services on behalf of Microsoft under an ASP Agreement
- **Commercial Spares/CRU** – Customer Replaceable Units available to commercial customers for repair by a skilled-technician
- **feet** or **foot** – Non-Skid Foot Pads
- **C-cover** – Keyboard Trackpad Assembly
- **rSSD** – Removable Solid-State Drive
- **AB-cover** – Display Assembly or AB-Cover Display Assembly
- **BMR** – Bare Metal Recovery refers to the clean imaging process.
- **chassis** or **D-chassis** or **D-bucket** – Device bottom case
- **SDT** – Surface Diagnostic Toolkit
- **ESD** – Electro-Static Discharge
- **FPC** – Flexible Printed Circuits connections
- **FRU** – Field Replaceable Units are sub-system components such as the C-cover, AB-cover, and rSSD. FRU are available only to ASPs. Some replaceable units will only be available as FRUs and therefore are only supported at an ASP.
- **IPA** – Isopropyl alcohol which should be used to clean adhesive from device as detailed within process steps. Use 70% IPA in all cases.

General Information, Precautions, Warnings

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

This symbol identifies important information in this manual.

! This symbol identifies important cautions in this manual.

Service Tools and Jigs

Microsoft Recommended Service Jigs

- ESD-safe battery cover

Microsoft Provided Software Tools / References:

- Software Tool – AB-cover Touch Calibration tool
- 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
- Surface Laptop Power Supply
- USB hub (3 ports required)
- USB keyboard (standard PC keyboard)
- USB mouse (standard PC mouse)
- Standard PC monitor with HDMI or DVI input
- Mini-DP port to HDMI/DVI dongle
- Spudger tool
- Clamps (2), 50.8mm (2 in) spring
- Torx plus drivers 3IP,5IP,6IP
- Isopropyl alcohol dispenser bottle (use 70% IP A)
- Cleaning swabs
- ESD-safe tweezers
- Guitar pick opening tool
- Heavy duty suction cups (2) – 57.15mm (2.25 in)
- Plastic feeler gauge – 0.40mm
- Plastic feeler gauge – 0.50mm
- Plastic feeler gauge – 0.050mm

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.

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 manual. Only skilled IT technicians to whom Microsoft has provided this manual should attempt CRU repair activities. Only Microsoft-authorized service providers should undertake FRU repair activities.
- 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 of device batteries may result in fire or explosion. Only open the enclosure on a device as outlined in this manual. 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 of time. Doing so may cause damage or melt the batteries.

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

- Prior to opening device, ensure device is powered off and disconnected from a power supply.
- 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

> ⚠ **WARNING:** It is recommended that an ESD-safe battery cover of appropriate size be placed across the device to protect the battery from any physical contact or accidental damage whenever C-cover is removed. Ensure corners of cover are always aligned with the corners of the device while battery is exposed. If battery cover is misaligned during activities in any way, re-align before continuing activities.

- 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 18 for details.
- If battery damage (e.g., leaking, expansion, folds or other) is discovered during the C-cover removal process or if the battery is impacted or damaged during the removal process, activities should cease. Refer to ASP Guidebook or contact Microsoft directly for 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 C-cover (Keyboard Assembly) or within the internals of the device when reassembling the unit.

> **IMPORTANT:** Remove rSSD (removable Solid-State Drive) whenever C-cover is removed from device. rSSD removal disconnects the battery from all device logical components for safety purposes. Refer to Procedure-Removal (rSSD) section for details.
>
> **IMPORTANT:** Whenever the rSSD has been removed, powering on the device requires that the rSSD and C-cover FRUs are installed. Refer to Procedure - Installation (rSSD) section for details.

Repair- Cross-reference Documents

- M1153910 In Device Battery Inspection process. Devices exhibiting battery issues as outlined in the Battery Inspection Process require whole unit replacement.

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.

As a quick guide, any Microsoft Surface device that visually exhibits any of the following symptoms shall be immediately removed from the repair process and delivered to your Variance Manager or IT Support Professional for notification to Microsoft:

- Any burned or melted components, traces or plastic parts on the **outside** of the device, or which otherwise exhibits heat damage, including charring seen in charging and other ports.
- Any burned or melted components, traces or plastic parts on the **inside** of the device, or which otherwise exhibits heat damage.
- Any accessories exhibiting melting or heat damage that are included with the Microsoft device, such as power supplies, keyboards, mice, cables, charging connectors, etc.
- 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 a malfunctioning battery).
- Any other finding that may constitute a safety hazard to the user, such as sharp edges on plastics.

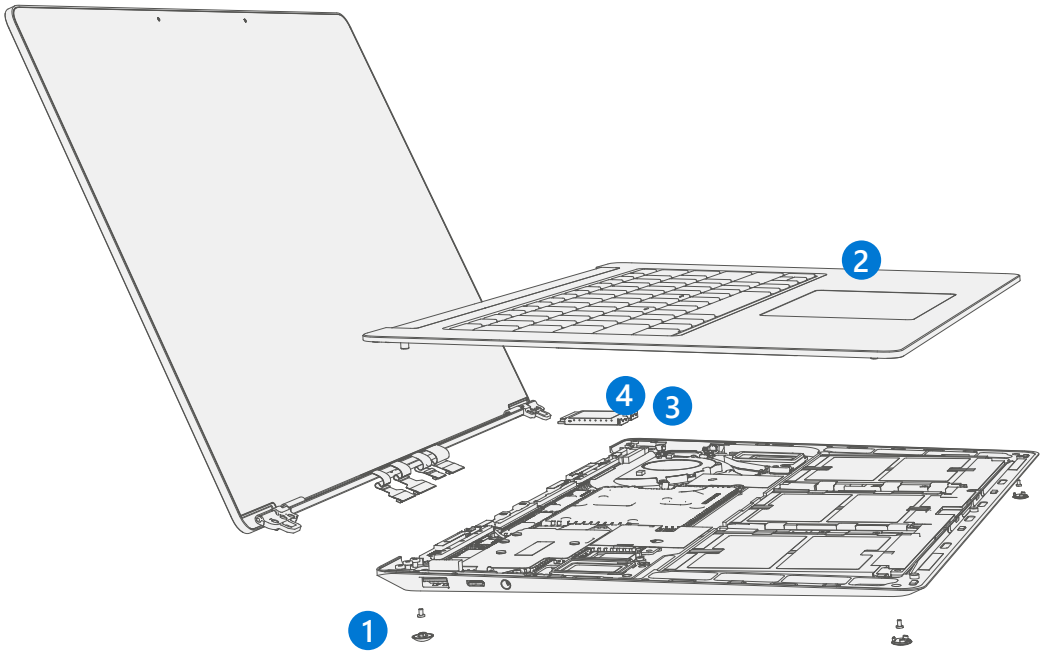
The Variance Manager or IT Support Professional must send an email to Microsoft RRT with pictures showing the damage within 24 hours of device receipt. Refer to the ASP Guidebook for the Microsoft RRT email address. Non-ASP's are to contact Microsoft Surface Support Services.

Your email should include:

- The model and serial number of the affected Microsoft Surface device and/or accessory(ies).
- The Service Request (SR) Number or alternative service tracking work order that the device was received under (Note as N/A if no SR exists).
- A brief description of the damage found.
- Clear photographs depicting the symptoms observed.

The Variance Manager or IT Support Specialist must await instructions from Microsoft Product Safety RRT for the affected unit before continuing with activities or returning the device to the end user.

Illustrated Service Parts List



IMPORTANT: Note 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.

				Models									
Item	**Component**	**ASP / FRU Part No.**	**CRU Part No.**	**1867**	**1868**	**1872**	**1873**	**1950**	**1951**	**1953**	**1958**	**1959**	**1979**
(1)	**Non-Skid Feet**												
	Feet Black	RPW-00001	CIG-00001 (Bulk)		X	X	X		X	X		X	X
	Feet Cobalt Blue	RPW-00002	CIG-00005 (Bulk)	X									
	Feet Platinum	RPW-00003	CIG-00002 (Bulk)	X		X	X	X		X	X		X
	Feet Sandstone	RPW-00004	CIG-00004 (Bulk)		X				X			X	
	Feet Ice Blue	RPW-00005	CIG-00003 (Bulk)					X			X		

Item	Component	ASP / FRU Part No.	CRU Part No.	Models 1867	1868	1872	1873	1950	1951	1953	1958	1959	1979
(2)	**C-cover Keyboard Assembly (Metal or Fabric)**												
	C-cover screws		CIH-00001 (Bulk)	X	X	X	X	X	X	X	X	X	X
	C Cvr 13.5" AMER/ASIA Black	RPQ-00001			X				X			X	
	C Cvr 13.5" Japan Black	RPQ-00003			X				X			X	
	C Cvr 13.5" French Canadian Black	RPQ-00002			X				X			X	
	C Cvr 13.5" Korea Black	RPQ-00004			X				X			X	
	C Cvr 13.5" Thailand Black	RPQ-00005			X				X			X	
	C Cvr 13.5" Taiwan Black	RPQ-00006			X				X			X	
	C Cvr 13.5" BH/KW/OM/QA/SA/AE Black	RPQ-00007			X				X			X	
	C Cvr 13.5" UK/Ireland Only Black	RPQ-00008			X				X			X	
	C Cvr 13.5" Netherlands Poland Black	RPQ-00009			X				X			X	
	C Cvr 13.5" Austria Germany Black	RPQ-00010			X				X			X	
	C Cvr 13.5" France Black	RPQ-00011			X				X			X	
	C Cvr 13.5" Switz/Lux Black	RPQ-00012			X				X			X	
	C Cvr 13.5" Blgm Black	RPQ-00013			X				X			X	
	C Cvr 13.5" Italy Black	RPQ-00014			X				X			X	
	C Cvr 13.5" Portugal Black	RPQ-00015			X				X			X	
	C Cvr 13.5" Spain Black	RPQ-00016			X				X			X	
	C Cvr 13.5" DK/FI/NO/SE Black	RPQ-00017			X				X			X	
	C Cvr 13.5" AMER/ASIA Cobalt Blue Fabric	RPQ-00018		X									
	C Cvr 13.5" French Canadian Cobalt Blue Fabric	RPQ-00019		X									
	C Cvr 13.5" Japan Cobalt Blue Fabric	RPQ-00020		X									
	C Cvr 13.5" Taiwan Cobalt Blue Fabric	RPQ-00023		X									

Item	Component	ASP / FRU Part No.	CRU Part No.	Models 1867	1868	1872	1873	1950	1951	1953	1958	1959	1979
(2)	**C-cover Keyboard Assembly (Metal or Fabric)**												
	C Cvr 13.5" UK/Ireland Only Cobalt Blue Fabric	RPQ-00025		X									
	C Cvr 13.5" Austria Germany Cobalt Blue Fabric	RPQ-00027		X									
	C Cvr 13.5" France Cobalt Blue Fabric	RPQ-00028		X									
	C Cvr 13.5" Switz/Lux Cobalt Blue Fabric	RPQ-00029		X									
	C Cvr 13.5" AMER/ASIA Platinum Fabric	RPQ-00035		X				X			X		
	C Cvr 13.5" French Canadian Platinum Fabric	RPQ-00036		X				X			X		
	C Cvr 13.5" Japan Platinum Fabric	RPQ-00037		X				X			X		
	C Cvr 13.5" Korea Platinum Fabric	RPQ-00038		X				X			X		
	C Cvr 13.5" Thailand Platinum Fabric	RPQ-00039		X				X			X		
	C Cvr 13.5" Taiwan Platinum Fabric	RPQ-00040		X				X			X		
	C Cvr 13.5" BH/KW/OM/QA/SA/AE Platinum Fabric	RPQ-00041		X				X			X		
	C Cvr 13.5" UK/Ireland Only Platinum Fabric	RPQ-00042		X				X			X		
	C Cvr 13.5" Netherlands Poland Platinum Fabric	RPQ-00043		X				X			X		
	C Cvr 13.5" Austria Germany Platinum Fabric	RPQ-00044		X				X			X		
	C Cvr 13.5" France Platinum Fabric	RPQ-00045		X				X			X		
	C Cvr 13.5" Switz/Lux Platinum Fabric	RPQ-00046		X				X			X		
	C Cvr 13.5″ Blgm Platinum Fabric	RPQ-00047		X				X			X		
	C Cvr 13.5" Italy Platinum Fabric	RPQ-00048		X				X			X		
	C Cvr 13.5" Portugal Platinum Fabric	RPQ-00049		X				X			X		
	C Cvr 13.5" Spain Platinum Fabric	RPQ-00050		X				X			X		

Item	Component	ASP / FRU Part No.	CRU Part No.	Models 1867	1868	1872	1873	1950	1951	1953	1958	1959	1979
(2)	**C-cover Keyboard Assembly (Metal or Fabric)**												
	C Cvr 13.5" DK/FI/NO/SE Platinum Fabric	RPQ-00051		X				X			X		
	C Cvr 13.5" AMER/ASIA Sandstone	RPQ-00052			X				X			X	
	C Cvr 13.5" French Canadian Sandstone	RPQ-00053			X				X			X	
	C Cvr 13.5" Japan Sandstone	RPQ-00054			X				X			X	
	C Cvr 13.5" Taiwan Sandstone	RPQ-00057			X				X			X	
	C Cvr 13.5" UK/Ireland Only Sandstone	RPQ-00059			X				X			X	
	C Cvr 13.5" Austria Germany Sandstone	RPQ-00061			X				X			X	
	C Cvr 13.5" France Sandstone	RPQ-00062			X				X			X	
	C Cvr 13.5" Switz/Lux Sandstone	RPQ-00063			X				X			X	
	C Cvr 15" AMER/ASIA Black	RPR-00001				X	X			X			X
	C Cvr 15" French Canadian Black	RPR-00002				X	X			X			X
	C Cvr 15" Japan Black	RPR-00003				X	X			X			X
	C Cvr 15" Korea Black	RPR-00004				X	X			X			X
	C Cvr 15" Thailand Black	RPR-00005				X	X			X			X
	C Cvr 15" Taiwan Black	RPR-00006				X	X			X			X
	C Cvr 15" BH/KW/OM/QA/SA/AE Black	RPR-00007				X	X			X			X
	C Cvr 15" UK/Ireland Only Black	RPR-00008				X	X			X			X
	C Cvr 15" Netherlands Poland Black	RPR-00009				X	X			X			X
	C Cvr 15" Austria Germany Black	RPR-00010				X	X			X			X
	C Cvr 15" France Black	RPR-00011				X	X			X			X
	C Cvr 15" Switz/Lux Black	RPR-00012				X	X			X			X

Item	Component	ASP / FRU Part No.	CRU Part No.	Models 1867	1868	1872	1873	1950	1951	1953	1958	1959	1979
(2)	**C-cover Keyboard Assembly (Metal or Fabric)**												
	C Cvr 15" Blgm Black	RPR-00013				X	X			X			X
	C Cvr 15" Italy Black	RPR-00014				X	X			X			X
	C Cvr 15" Portugal Black	RPR-00015				X	X			X			X
	C Cvr 15" Spain Black	RPR-00016				X	X			X			X
	C Cvr 15" DK/FI/NO/SE Black	RPR-00017				X	X			X			X
	C Cvr 15" AMER/ASIA Platinum	RPR-00018				X	X			X			X
	C Cvr 15" French Canadian Platinum	RPR-00019				X	X			X			X
	C Cvr 15" Japan Platinum	RPR-00020				X	X			X			X
	C Cvr 15" Korea Platinum	RPR-00021				X	X			X			X
	C Cvr 15" Thailand Platinum	RPR-00022				X	X			X			X
	C Cvr 15" Taiwan Platinum	RPR-00023				X	X			X			X
	C Cvr 15" BH/KW/OM/QA/SA/AE Platinum	RPR-00024				X	X			X			X
	C Cvr 15" UK/Ireland Only Platinum	RPR-00025				X	X			X			X
	C Cvr 15" Netherlands Poland Platinum	RPR-00026				X	X			X			X
	C Cvr 15" Austria Germany Platinum	RPR-00027				X	X			X			X
	C Cvr 15" France Platinum	RPR-00028				X	X			X			X
	C Cvr 15" Switz/Lux Platinum	RPR-00029				X	X			X			X
	C Cvr 15" Blgm Platinum	RPR-00030				X	X			X			X
	C Cvr 15" Italy Platinum	RPR-00031				X	X			X			X
	C Cvr 15" Portugal Platinum	RPR-00032				X	X			X			X
	C Cvr 15" Spain Platinum	RPR-00033				X	X			X			X
	C Cvr 15" DK/FI/NO/SE Platinum	RPR-00034				X	X			X			X
	C Cvr 13.5" Japan Ice Blue Fabric	RPQ-00071						X			X		

				Models									
Item	**Component**	**ASP / FRU Part No.**	**CRU Part No.**	**1867**	**1868**	**1872**	**1873**	**1950**	**1951**	**1953**	**1958**	**1959**	**1979**
(2)	**C-cover Keyboard Assembly (Metal or Fabric)**												
	C Cvr 13.5" UK/Ireland Only Ice Blue Fabric	RPQ-00072						X			X		
	C Cvr 13.5" Switz/Lux Ice Blue Fabric	RPQ-00075						X			X		
	C Cvr 13.5" Austria Germany Ice Blue Fabric	RPQ-00073						X			X		
	C Cvr 13.5" France Ice Blue Fabric	RPQ-00074						X			X		
	C Cvr 13.5” French Canadian Ice Blue Fabric	RPQ-00070						X			X		
	C Cvr 13.5” AMER/ASIA Ice Blue Fabric	RPQ-00080						X			X		
	C Cvr 13.5” Taiwan Ice Blue Fabric	RPQ-00076						X			X		
(3)	**Removable Solid-State Drive (NOTE: rSSD size must be same as original)**												
	rSSD Screw		CII-00001 (Bulk)	X	X	X	X	X	X	X	X	X	X
	rSSD 128GB	RPX-00002		X	X	X							
	rSSD 1TB	RPY-00001		X	X	X							
	rSSD 256GB	RPZ-00002		X	X	X							
	rSSD 512GB	RQG-00001		X	X	X							
	rSSD 128GB	RPX-00003					X						
	rSSD 1TB	RPY-00002					X						
	rSSD 256GB	RPZ-00003					X						
	rSSD 512GB	RQG-00003					X						
	rSSD 256GB	RPZ-00010	8LV-00003							X	X	X	
	rSSD 512GB	RQG-00007	8LX-00003							X	X	X	
	rSSD 128GB	RPX-00008	8LT-00002							X	X	X	
	rSSD 256GB	RPZ-00009	8LV-00002					X	X				X

Item	Component	ASP / FRU Part No.	CRU Part No.	Models 1867	1868	1872	1873	1950	1951	1953	1958	1959	1979
(3)	**Removable Solid-State Drive (NOTE: rSSD size must be same as original)**												
	rSSD 512GB	RQG-00006	8LX-00002					X	X				X
	rSSD 1TB	RPY-00004	8LU-00002					X	X				X
(4)	**AB-cover Display Assembly**												
	A/B Cvr13.5" Black	RPN-00001			X				X			X	
	A/B Cvr13.5" Cobalt Blue	RPN-00002		X									
	A/B Cvr13.5" Platinum	RPN-00003		X				X			X		
	A/B Cvr13.5" Sandstone	RPN-00004			X				X			X	
	A/B Cvr 15" Black	RPP-00001				X	X			X			X
	A/B Cvr 15" Platinum	RPP-00002				X	X			X			X
	A/B Cvr13.5" Ice Blue	RPN-00005						X			X		

Component Localization Codes

Code	Country	Code	Country
BH	Bahrain	FI	Finland
KW	Kuwait	NO	Norway
OM	Oman	SE	Sweden
QA	Qatar	Switz	Switzerland
SA	Saudi Arabia	Lux	Luxembourg
AE	United Arab Emirates	Blgm	Belgium
UK	United Kingdom	AMER	Canada, United States of America
DK	Denmark	ASIA	Australia, China, Hong Kong, Malaysia, New Zealand, Singapore

Service Diagnostics/Troubleshooting Overview

- For general Surface support, visit www.support.microsoft.com
- To troubleshoot device feature/function problems or learn more about Surface Laptops visit aka.ms/SurfaceLaptopHelp
- If you'd like to learn more about Windows, visit aka.ms/WindowsHelp
- To learn more about the accessibility features of the Surface Laptop, 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: Ensure that the devices meet all related safety and policy prior to repair. Follow the Safety Policies/Procedures described on page 10 above when applicable in lieu of continuing repair. ASP's: refer to additional processing instructions in the ASP Guidebook.

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 manual.
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:

- Before opening the device, always ensure device is powered off and disconnected from a power supply.
- 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.

WARNING: It is recommended that an ESD-safe battery cover be placed across the device to protect the battery from any physical contact or accidental damage whenever C-cover is removed. Ensure corners of cover are always aligned with the corners of the device while battery is exposed. If battery cover is misaligned during activities in any way, re-align before continuing activities.

CAUTION: Check C-cover and device enclosure for any loose articles that may be present inadvertently on the C-cover or within the device enclosure.

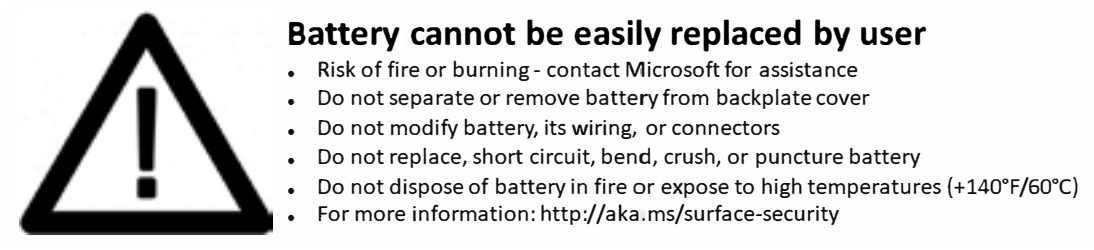
IMPORTANT: Remove rSSD (removable Solid-State Drive) whenever C-cover is removed from device. rSSD removal disconnects the battery from all device logical components for safety purposes. Refer to Procedure-Removal (rSSD) section for details.

IMPORTANT: Whenever the rSSD has been removed, powering on the device requires that the rSSD and C-cover FRUs are installed. Refer to Procedure - Installation (rSSD) section for details.

- FRUs 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.

Current Battery Warning

WARNING: Please note that the battery bears the following warning label. Please heed the information provided on the label.



Non-Skid Foot Pad 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
  - Clamps (2), 2" Irwin spring or 4.5" Fastpro
  - Plastic feeler gauge – 0.050mm
- **Components:**
  - Feet (Refer to Illustrated Service Parts List)

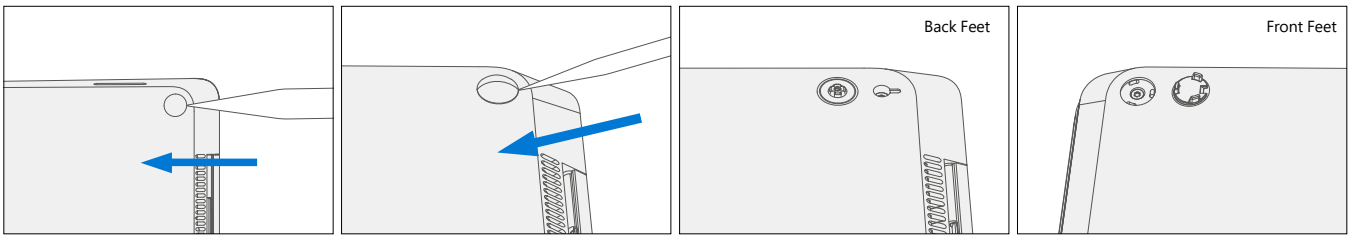
Prerequisite Steps:

- **Power off device** - Ensure device is powered off and disconnected from a power supply.
- **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 (page 18) for details.
- **Position device** - To prevent scratches, flip device over onto a clean surface free of debris with the device bottom facing up for access to the feet for removal.

IMPORTANT: There are two types of feet (front and back) – refer to illustration for details.

Procedure – Removal (Non-Skid Foot Pad)

1. **Front foot removal** – To remove front feet, insert the pointed end of a plastic Spudger tool (pictured) from the long side of the device under the foot. There is a designed gap in the foot located at the center of the outside edge of the foot. Point the plastic tool directly in the middle of the foot starting from the front edge and push in towards the middle of the device. Removal works best if the spudger is at a relatively low angle relative to the tabletop. Use plastic tweezers / spudger to lift one edge of each foot. Grasp the loose end and pull the foot from the D-bucket.
2. **Rear foot removal** – To remove back feet, perform the same steps as for the front feet but from the back side of the device and along the long edge. Removal works best if the spudger is at a relatively low angle relative to the tabletop.



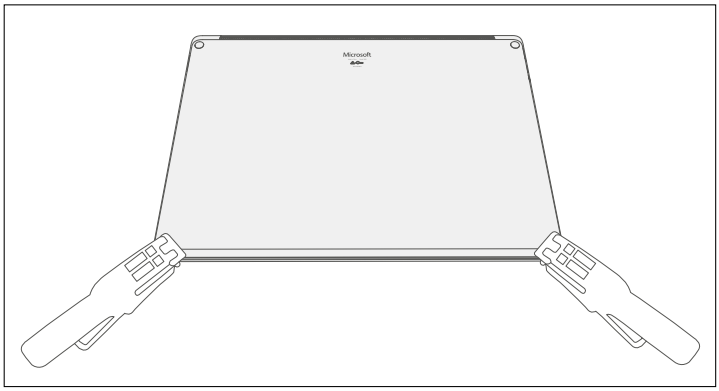
3. **Adhesive removal** – Remove any adhesive liners in the foot pockets. Use IPA and cotton wipes to clean off any adhesive residue within the foot pocket. Inspect the foot area carefully for any adhesive liner that may have remained. The liner is clear and may be hard to see at first glance. Inspect closely.

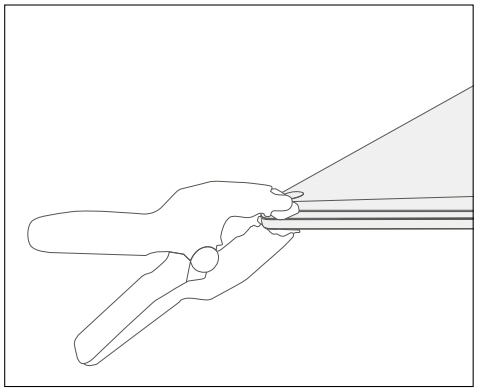
> **IMPORTANT:** Ensure the IPA is completely dried off device and that no adhesive residue is left before applying new feet to avoid the risk of insufficient adhesion of the new feet.

Procedure – Installation (Non-Skid Feet)

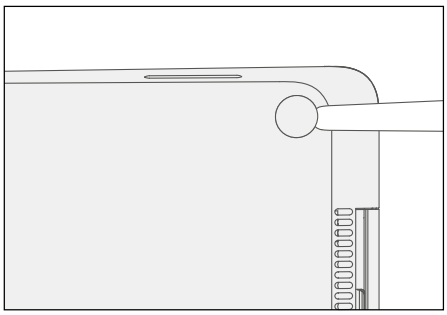
> **IMPORTANT:** Any further repairs that are required on the device should be carried out prior to feet installation. Do not reuse feet previously removed from a device.

1. **Prepare new front feet and press into place** – To reassemble front foot, remove protective sheet to expose adhesive on foot. Align the 3 posts with their respective pockets on the bottom side of the unit and hand press the foot in until the foot sits flat. Complete previous steps for the other front foot.
2. **Clamp replaced feet** – Align and center the press head of the clamp onto the front feet. Clamp **both** front feet for 4 minutes.



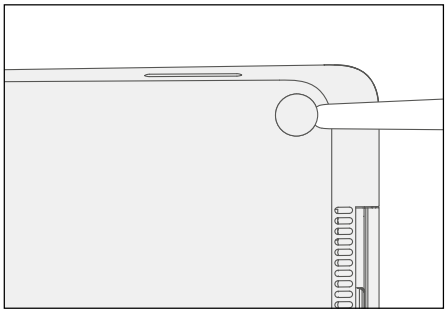


3. **Inspect for anomalies** – Inspect feet to ensure no cosmetic damage or gaps between the feet and the D-bucket exist.
   a. If gap exists, use a feeler gauge to verify gap is smaller than 0.05 mm. If gap is larger, replace foot.



4. **Prepare new back feet and press into place** – To reassemble the back feet, remove protective sheet to expose adhesive on foot. Insert the foot into the pocket on the bottom side of the unit and hand press the foot in until the foot sits flat.

5. **Clamp replaced feet** – Align and center the press head of the clamp onto the rear feet. Clamp **both** rear feet for 4 minutes.
6. **Inspect for anomalies** – Inspect feet to ensure no cosmetic damage or gaps between the feet and the D-bucket exist.
   a. If gap exists, use a feeler gauge to verify gap is smaller than 0.05 mm. If gap is larger, replace foot.



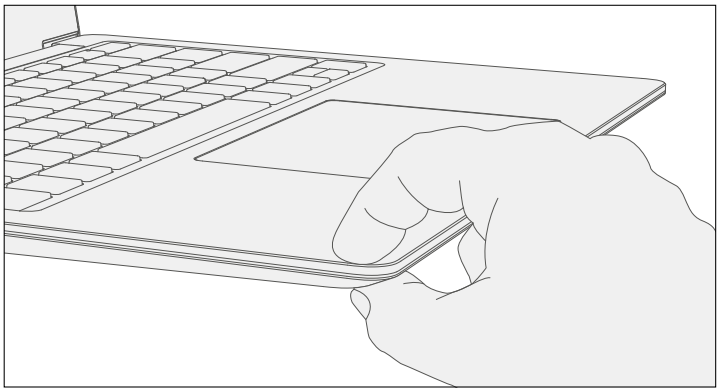
7. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.

IMPORTANT: Before transporting the device, we recommend letting it sit feet-down on a tabletop for at least 12 hours. If this isn't possible, it's recommended to avoid placing the device in a backpack, purse, other types of carriers, until at least 12 hours after installing new feet.

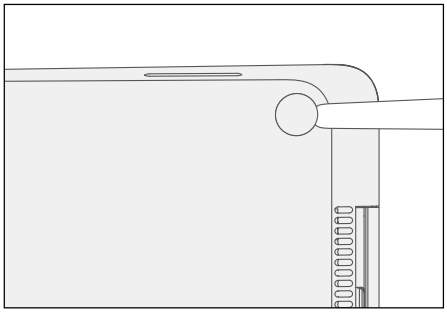
Alternate Procedure – Installation (Non-Skid Feet)

IMPORTANT: Any further repairs that are required on the device should be carried out prior to feet installation. Do not reuse feet previously removed from a device.

1. **Prepare new front feet and press into place** – To reassemble front foot, remove protective sheet to expose adhesive on foot. Align the 3 posts with their respective pockets on the bottom side of the unit and hand press the foot in until the foot sits flat. Complete previous steps for the other front foot.
2. **Pinch replaced feet** – Placing the keyboard and foot between your thumb and index finger as shown, pinch the foot tightly with your thumb and hold for 20 seconds.

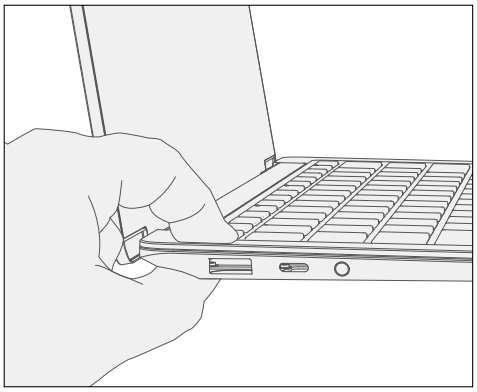


3. **Inspect for anomalies** – Inspect feet after pinching to ensure no cosmetic damage or gaps between the foot and the chassis exist.
   a. If gap exists, use a feeler gauge to verify gap is smaller than 0.05 mm. If gap is larger, replace foot.

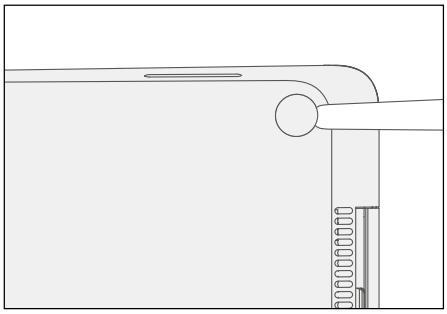


4. **Prepare new back feet and press into place** – To reassemble the back feet, remove protective sheet to expose adhesive on foot. Insert the foot into the pocket on the bottom side of the unit and hand press the foot in until the foot sits flat.

5. **Pinch replaced feet** – Placing the keyboard and foot between your thumb and index finger as shown, pinch the foot tightly with your thumb and hold for 20 seconds.



6. **Inspect for anomalies** – Inspect feet to ensure no cosmetic damage or gaps between the feet and the D-bucket exist.
   a. If gap exists, use a feeler gauge to verify gap is smaller than 0.05 mm. If gap is larger, replace foot.



7. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.

IMPORTANT: Before transporting the device, we recommend letting it sit feet-down on a tabletop for at least 12 hours. If this isn't possible, it's recommended to avoid placing the device in a backpack, purse, other types of carriers, until at least 12 hours after installing new feet.

C-cover Keyboard Assembly Replacement Processes (Metal, Fabric)

IMPORTANT: Devices are built with either a fabric type or metal type C-cover keyboard assembly. The C-cover removal process differs between the metal type and the fabric type C-covers. Be sure to follow the proper procedure based on the device model and associated C-cover type.

Replacement Process (C-cover Keyboard Metal type)

Preliminary Requirements

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

Required Tools and Components

- **Tools:**
  - Software Tool – SDT
  - Isopropyl Alcohol Dispenser (use only 70% IPA)
  - 5IP (Torx plus) driver
  - Anti-static wrist strap (1M Ohm resistance)
  - Recommended: ESD-safe battery cover (13.5" or 15")
- **Components:**
  - C-cover (If replacing refer to Illustrated Service Parts List)
    (New 5IP screw quantity= 4 supplied with component)

Prerequisite Steps:

- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove feet** – Follow steps for Procedure-Removal (Non-Skid Feet) section (page 19).

IMPORTANT: Be sure that all foot adhesive remains have been removed from the bottom device case foot sockets prior to C-cover screw removal to avoid the risk of stripping out the C-cover screw(s).

Procedure – Removal (C-cover Keyboard Metal Type)

1. **Remove C-cover screws** – Using a 5IP (Torx plus) driver, uninstall 1 screw from each foot socket (4).

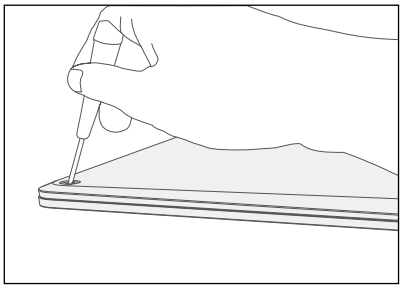
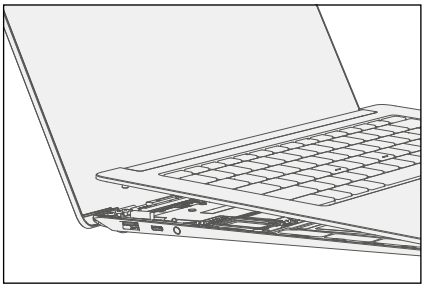
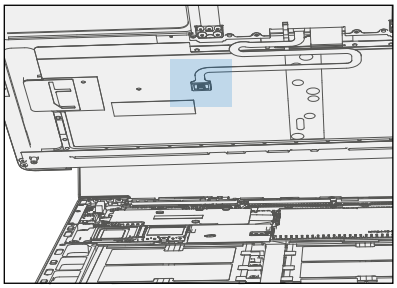
   ! **CAUTION:** Take care to prevent from depressing the keyboard power button during this step. If power button is accidentally depressed and device turns on, shut down device as normal through OS Start menu.

   ! **CAUTION:** Prior to unscrewing, ensure the driver is seated correctly in the screw recess by lightly turning the driver clockwise until it can be felt engaging fully with the screw. Also be sure the driver remains perpendicular to the device surface as much as possible during removal. Otherwise, there is a risk of stripping the screw heads.

   ! **CAUTION:** Ensure all (4) screws are removed from the enclosure before starting C-cover removal, otherwise there is a high risk of irreversibly damaging the C-cover.

   ! **CAUTION:** Remove C-Cover exactly as described in this step to avoid damaging the Flexible Printed Circuit (FPC) connected between the C-Cover and the Main Board.

   ! **CAUTION:** Remove C-cover and hold in a hover position as described below to avoid damaging the display glass. Never rest the rear edge of the C-cover on the device at the display hinge point or allow the C-cover to impact or touch the display during this step.

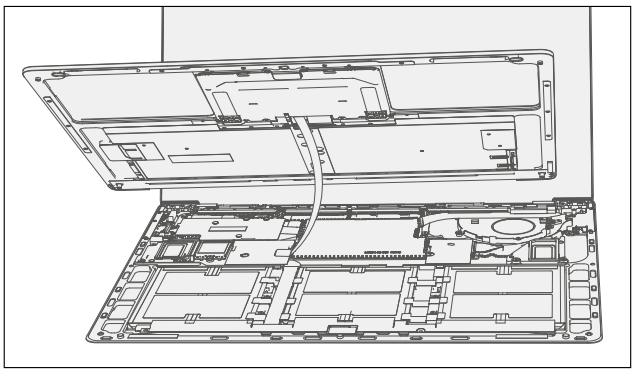




   IMPORTANT: In addition to the (4) C-cover screws, the C-cover is further secured to the device body with magnets. Further separation of the C-cover should be carried out per the following steps.

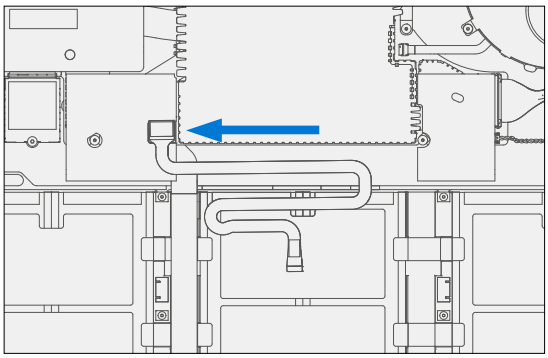
2. **Separate C-cover from device** – Turn device over into standard use position and open the AB-cover display exposing the C-cover keyboard. Grab the C-cover edge closest to display and slowly remove the C-cover at an angle as shown in drawing.

   ! **CAUTION:** Do not pull the C-cover apart beyond **45 degrees** otherwise damage to C-cover FPC could occur.

3. **Position C-cover for FPC removal** – After lifting the C-cover completely from the magnets on the device, angle and hover the C-cover so that the antenna side is facing down towards the device and C-cover FPC is accessible.

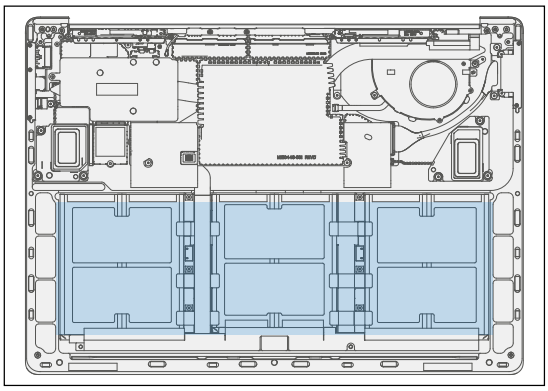


4. **Disconnect FPCs** – While hovering the C-cover, disconnect the FPC from the main board with your other hand. The FPC is easily disconnected by pulling up on the metal head vertically with a fingernail or Spudger tool edge.



! **CAUTION:** When removed from the device, place the C-cover in a safe place with **key and trackpad side down and FPC facing up** to avoid bending/creasing the FPC. Be sure the key and trackpad side of the C-cover is protected from cosmetic damage during storage.

⚠ **WARNING:** It is recommended a Microsoft provided ESD-safe battery cover appropriate for size (either 13.5″ or 15″ device) is placed across the device to protect the battery from any accidental damage during repair. Ensure corners of cover are aligned with the corners of the device at all times during repair. If battery cover is misaligned during the repair operation in any way, re-align before continuing repair activities.



IMPORTANT: Remove rSSD (removable Solid-State Drive) whenever C-cover is removed from device. rSSD removal disconnects the battery from all device logical components for safety purposes. Refer to Procedure-Removal (rSSD) section (page 36) for details.

Procedure – Installation (C-cover Keyboard Metal type)

1. **Pre-installation Device Inspection**

   ⚠ **WARNING:** Verify the battery's condition refer to the M1153910 In Device Battery Inspection process. Devices exhibiting battery issues as outlined in the Battery Inspection Process require whole unit replacement.

   ⚠ **WARNING:** Verify the condition of LDI (Liquid Damage Indicator) inside the audio jack. Use a bright light to illuminate the interior of the audio jack port. Any color other than white indicates liquids have entered the device. Devices exhibiting LDI require whole unit replacement.

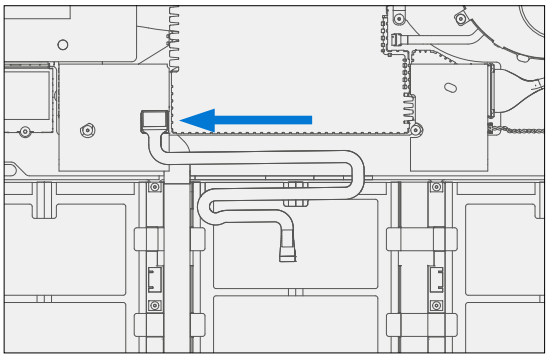
2. **Check for unexpected items within device** – Check C-cover (both sides) and device enclosure for any loose articles that may be present inadvertently on the C-cover or within the device enclosure areas.
   a. Check and remove any foreign objects that the magnets may have attracted or that may have been accidentally introduced into the device during replacement.
   b. Carefully inspect the area around battery specifically for any foreign objects before removing battery cover.

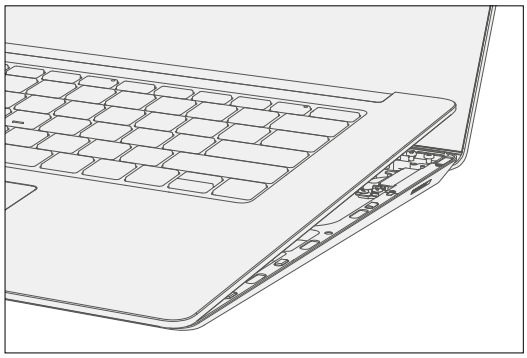
3. **Install rSSD** – Refer to Procedure-Removal (rSSD) section (page 36) for details.

4. **Remove tape from new C cover FPC** – Tape secures the C-cover FPC during shipping. Remove this tape before continuing with assembly.

5. **Connect C-cover FPC** – Remove battery cover. Hover the C-cover over the device while assembling the C-cover FPC to the main board by pressing connection using your finger.

   ! **CAUTION:** Be sure that FPC bends fall in place properly as pre-bent and no folds or creases are created during re-assembly of C-cover.





6. **Align the C-cover** – Properly align the cover to the unit using the front edge alignment posts. Carefully place the C-cover back onto the unit and shift until the C-cover snaps into place.

   ! **CAUTION:** Ensure that the C-cover is correctly aligned and seated before closing the device. There is the risk of breaking the display if the device lid is closed before C-cover is aligned.

7. **Install C-cover Screws** – Close the AB-cover. Turn the unit over and use a 5IP screwdriver to install **4 new screws** to secure the C-cover. Screws should be installed until just snug and seated, and then turned another 45 degrees (1/8 turn) or until fully fastened.
8. **Run SDT** – Run SDT to ensure all device features and functions operate as expected. Refer to (page 17) for details on SDT.
9. **Install Feet** – If SDT tests pass and no further repairs are to be performed on the device, follow steps for Procedure – Installation (Non-Skid Feet) on page 17.

Replacement Process (C-cover Keyboard Fabric type)

Preliminary Requirements

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

Required Tools and Components

- **Tools:**
  - Software Tool – SDT
  - Isopropyl Alcohol Dispense (use only 70% IPA)
  - 5IP (Torx plus) driver
  - Heavy duty suction cups
  - Anti-static wrist strap (1M Ohm resistance)
  - Recommended: ESD-safe battery cover (13.5″ or 15″)
- **Components:**
  - C-cover (If replacing refer to Illustrated Service Parts List)
    (New 5IP screw quantity=4 supplied with component)

Prerequisite Steps:

- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove feet** – Follow steps for Procedure-Removal (Non-Skid Feet) section (page 19).

IMPORTANT: Be sure that all foot adhesive remains have been removed from the bottom device case foot sockets prior to C-cover screw removal to avoid the risk of stripping out the C-cover screw(s).

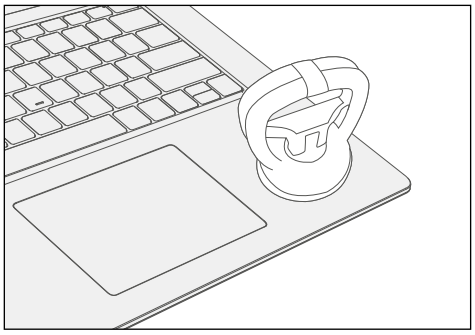
Procedure – Removal (C-cover Keyboard Fabric Type Keyboard)

1. **Remove C-cover screws** – Using a 5IP (Torx plus) driver, uninstall 1 screw from each foot socket (4).

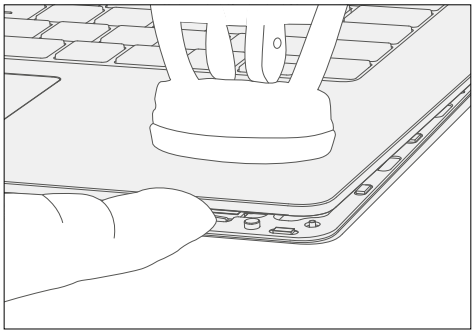
   ! **CAUTION:** Take care to prevent from depressing the keyboard power button during this step. If power button is accidentally depressed and device turns on, shut down device as normal through OS Start menu.
   ! **CAUTION:** Prior to unscrewing, ensure the driver is seated correctly in the screw recess by lightly turning the driver clockwise until it can be felt engaging fully with the screw. Also be sure the driver remains perpendicular to the device surface as much as possible during removal. Otherwise, there is a risk of stripping the screw heads.
   ! **CAUTION:** Ensure all (4) screws are removed from the enclosure before starting C-cover removal, otherwise there is a high risk of irreversibly damaging the C-cover.
   ! **CAUTION:** Fabric C-covers utilize magnets and a hook latching onto the chassis whereas metal C-covers do not. See illustrations for details.
   ! **CAUTION:** Remove C-Cover exactly as described in this step to avoid damaging the Flexible Printed Circuit (FPC) connected between the C-Cover and the Main Board.
   ! **CAUTION:** Remove C-cover and hold in a hover position as described below to avoid damaging the display glass. Never rest the rear edge of the C-cover on the device at the display hinge point or allow the C-cover to impact or touch the display during this step.

2. **Apply suction cups** – Turn device over into standard use position and open the AB-cover display exposing the C-cover keyboard. Place suction cup in the bottom palm rest area as shown, as close to the edge as possible.

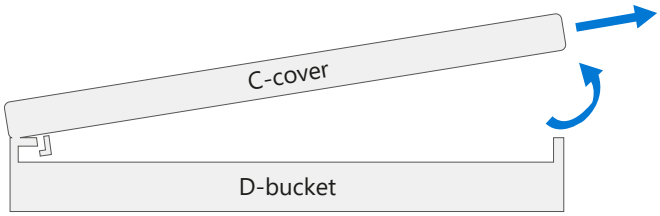
   ! **CAUTION:** Do not pull the C-cover apart beyond **45 degrees** otherwise damage to C-cover FPC could occur.
   ! **CAUTION:** Do not place suction cup on Trackpad to avoid potential damage to the Trackpad.
   ! **CAUTION:** Do not wet the suction cup in any way as liquid could stain the keyboard fabric. Place thumb holding down the corner hinge side of the cover closest to the user as shown. Keep pressure on the hinge area to prevent back edge of cover from lifting while pulling up on the suction cup. Be careful to prevent back edge from lifting. If suction cup releases before C-cover is separated from device bottom case then re-attach suction cup and try again.



3. **Separate C-cover from device** – Once C-cover separation from the device bottom case is achieved, place a finger between the C-cover and device region. Pull upwards **slightly** to separate the C-cover from the magnets.

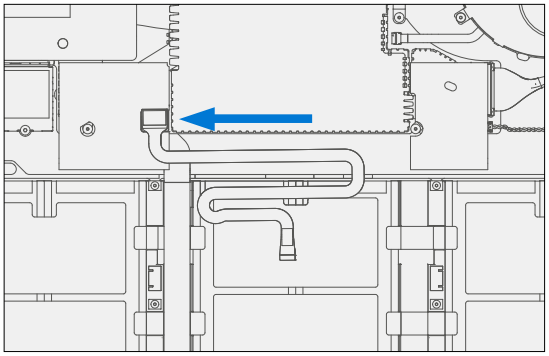


4. **Angle C-cover** – Angle the C-cover at approximately 45 degrees from horizonal—be sure to angle the C-cover **no more than 45 degrees** or else risk damaging the C-cover hook or FPC. If hook is damaged, it needs to be removed carefully to avoid damaging the FPCs, and then a new C-cover needs to be installed.
5. **C-cover hook clearance** – Once angled, keep the angle of the C-cover while pulling the C-cover directly towards yourself. Be sure to avoid pressing on the power button during this procedure.



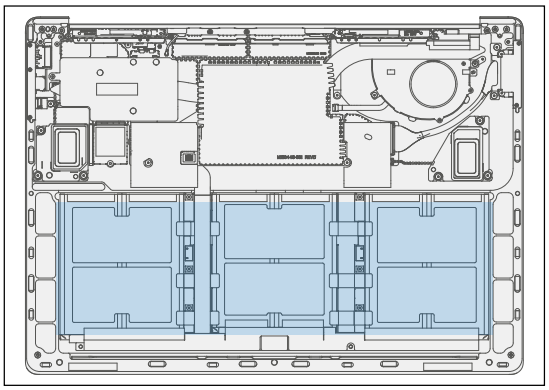
Side View

6. **Disconnect FPCs** – While hovering the C-cover, disconnect the FPC from the main board with your other hand. The FPC is easily disconnected by pulling up on the metal head vertically with a fingernail or Spudger tool edge.



! **CAUTION:** When removed from the device, place the C-cover in a safe place with **key and trackpad side down and FPC facing up** to avoid bending/creasing the FPC. Be sure the key and trackpad side of the C-cover is protected from cosmetic damage during storage.

⚠ **WARNING:** It is recommended an ESD-safe battery cover appropriate for size (either 13.5″ or 15″device) across the device to protect the battery from any accidental damage during repair. Ensure corners of cover are aligned with the corners of the device at all times during repair. If battery cover is misaligned during the repair operation in any way, re-align before continuing repair activities.



IMPORTANT: Remove rSSD (removable Solid-State Drive) whenever C-cover is removed from device. rSSD removal disconnects the battery from all device logical components for safety purposes. Refer to Procedure-Removal (rSSD) section (page 36) for details.

Procedure – Installation (C-cover Keyboard Fabric type)

1. **Pre-installation Device Inspection**

   ⚠ **WARNING:** Verify the battery's condition; refer to the M1153910 In Device Battery Inspection process. Devices exhibiting battery issues as outlined in the Battery Inspection Process require whole unit replacement.

   ⚠ **WARNING:** Verify the condition of LDI (Liquid Damage Indicator) inside the audio jack. Use a bright light to illuminate the interior of the audio jack port. Any color other than white indicates liquids have entered the device. Devices exhibiting LDI require whole unit replacement.

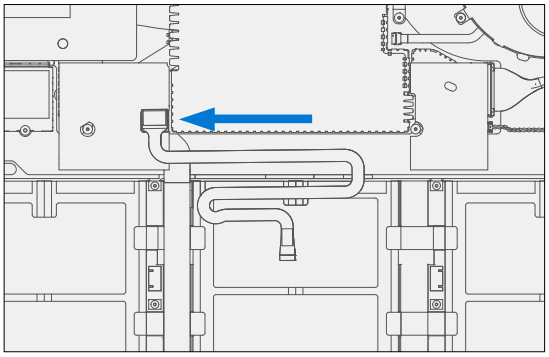
2. **Check for unexpected items within device** – Check C-cover (both sides) and device enclosure for any loose articles that may be present inadvertently on the C-cover or within the device enclosure areas.
   a. Check and remove any foreign objects that the magnets may have attracted or that may have been accidentally introduced into the device during replacement.
   b. Carefully inspect the area around battery specifically for any foreign objects before removing battery cover.

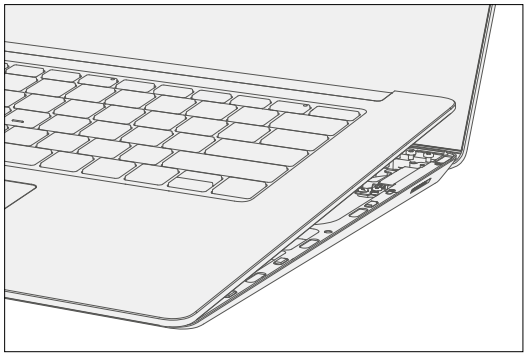
3. **Install rSSD** – Refer to Procedure-Removal (rSSD) section (page 36) for details.

4. **Remove tape from new C-cover FPC** – Tape secures the C-cover FPC during shipping. Remove this tape before continuing with assembly.

5. **Connect C-cover FPC** – Remove battery cover. Hover the C-cover over the device while assembling the C-cover FPC to the main board by pressing connection using your finger.

   ! **CAUTION:** Be sure that FPC bends fall in place properly as pre-bent and no folds or creases are created during re-assembly of C-cover.





6. **Align the C-cover** – Properly align the cover to the unit using the front edge alignment posts. Carefully place the C-cover back onto the unit and shift until the C-cover snaps into place. The top C-cover area under the display will protrude slightly after C-cover is placed. Press firmly on the top area until you hear a click and the C-cover flattens out.

   ! **CAUTION:** Ensure that the C-cover is correctly aligned and seated before closing the device. There is the risk of breaking the display if the device lid is closed before C-cover is aligned.

7. **Install C-cover Screws** – Close the AB-cover. Turn the unit over and use a 5IP screwdriver to install **4 new screws** to secure the C-cover. Screws should be installed until just snug and seated, and then turned another 45 degrees (1/8 turn) or until fully fastened.
8. **Run SDT** – Run SDT to ensure all device features and functions operate as expected. Refer to (page 17) for details on SDT.
9. **Install Feet** – If SDT tests pass and no further repairs are to be performed on the device, follow steps for Procedure – Installation (Non-Skid Feet) on page 20.

rSSD Replacement Process

Preliminary Requirements

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

Required Tools and Components

- **Tools:**
  - Software Tool – SDT
  - Isopropyl Alcohol Dispenser (use only 70% IPA)
  - 5IP (Torx plus) driver
  - Anti-static wrist strap (1M Ohm resistance)
  - Recommended: ESD-safe battery cover (13.5" or 15")
- **Components:**
  - rSSD (If replacing refer to Illustrated Service Parts List)
    (New 5IP screw supplied with component)

Prerequisite Steps:

- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove feet** – Follow steps for Procedure-Removal (Non-Skid Feet) on (page 19).
- **Remove C-cover** – Follow steps for C-cover Keyboard Assembly Replacement Processes (Metal, Fabric) on (page 24).

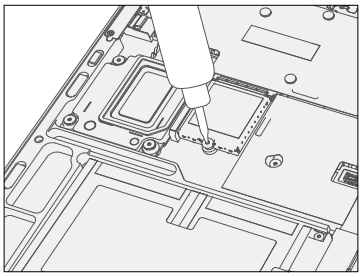
Procedure – Removal (rSSD)

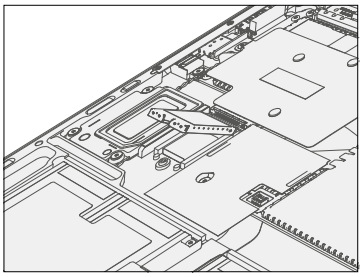
1. **Remove rSSD Screw** – Use a 5IP (Torx-Plus) driver to remove the screw securing the rSSD.

   ⚠ **WARNING:** Be very careful to position your screwdriver directly over the rSSD screw and to avoid slipping towards the battery during removal. If the battery is contacted, impacted, or damaged in any way during the rSSD removal process, activities should immediately cease, and designated return process should be followed.

2. **Remove rSSD** – The rSSD should lift upwards to ~15 degree tilt after screw is removed. Carefully grab sides of rSSD case and pull out of main board socket at same ~15 degree angle.

   IMPORTANT: Confirm condition of thermal pillow that resides beneath the rSSD once rSSD has been removed. Thermal pillow should maintain good contact with an installed rSSD and should not have physical evidence of deterioration such as collapsing, excessive cracking etc. The outside mylar layer of the foam should be intact and no foam should be visible when viewed from above.





Procedure – Installation (rSSD)

IMPORTANT: Only a Microsoft rSSD with part number as specified in the parts list, per device model, and of like capacity should be replaced in the device.

1. **Insert rSSD** – Insert the connector end of the rSSD into the SSD connector on Mainboard at ~15 degree angle.
2. **Install new rSSD screw** – Use a 5IP screwdriver to install a new rSSD screw until the screw is just snug and seated, and then turned another 45 degrees (1/8 turn) or until screw is fully fastened.

   WARNING: Be very careful to position your screwdriver directly over the rSSD screw and to avoid slipping towards the battery during removal. If the battery is contacted, impacted, or damaged in any way during the rSSD removal process, activities should immediately cease, and designated return process should be followed.

3. **Install C-cover** – Follow steps for C-cover Keyboard Assembly Replacement Processes (Metal, Fabric) on (page 24).
4. **Imaging new rSSD** – Power on device. Apply a new image to the rSSD using a BMR Imaging key specific to the device model. Refer to Surface imaging process - Surface Imaging Tools Link
5. **Run SDT** – Run SDT to ensure all device features and functions operate as expected. Refer to (page 17) for details on SDT. If SDT tests pass and no further repairs are to be performed on the device continue with the final assembly steps.
6. **Install Feet** – Follow steps for Procedure – Installation (Non-Skid Feet) on (page 20).

AB-cover Display Assembly Replacement Process

WARNING: The AB-cover is extremely sensitive to ESD and should be managed accordingly. Be sure all ESD safety precautions are taken when handling the AB-cover assembly. AB-cover assembly should always be stored in an ESD bag once new part is removed from package carton. Defective part should be managed in the same manner to enable recovery if applicable.

IMPORTANT: The C-cover keyboard assembly type (fabric or metal) on the device being repaired will drive slight differences in processes in this section. Be sure to follow proper sections and associated procedures based on C-cover keyboard assembly type for the device under repair.

IMPORTANT: The device must first be set in **AB-cover Replacement Mode** before broken/defective AB-cover is removed from device under repair. Software tools are provided for this purpose. Device must be functional to the point that software tools can be run on device from within the Windows OS. Details provided within process steps in this section.

IMPORTANT: If AB-cover on device under repair is non-functional, there is no display or it is unreadable, connect an external PC monitor to the device's Mini-DP port.

Preliminary Requirements

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

Required Tools and Components

- **Tools**
  - Software Tool – device calibration mode
  - Software Tool – SDT
  - Software Tool – AB-cover touch calibration tool
  - USB hub
  - USB keyboard (standard PC USB keyboard needed for interaction while running software tools)
  - USB mouse (standard PC USB mouse)
  - Standard PC monitor with HDMI or DVI input
  - Mini-DP port to HDMI/DVI dongle
  - 6IP (Torx plus) driver
  - ESD-safe tweezers
  - Feeler gauge – 0.40mm
  - Guitar pick opening tool
  - Anti-static wrist strap (1M Ohm resistance)
  - Recommended: ESD-safe battery cover (13.5" or 15")
- **Components:**
  - AB-cover (Refer to Illustrated Service Parts List)
    New 6IP screw quantity=6 (supplied with AB-cover replacement part)
    New set of AB-cover FPC RF baffles (supplied with AB-cover replacement part)
    New set of AB-cover FPC RF shields (supplied with AB-cover replacement part)
    One set of new mylar tapes for metal C-cover only (supplied with AB-cover replacement part)
    One set of new closure steels for metal C-cover only (supplied with AB-cover replacement part)

Prerequisite Steps:

- **AB-cover Replacement Mode** – Pulls calibration data from the old AB-Cover.

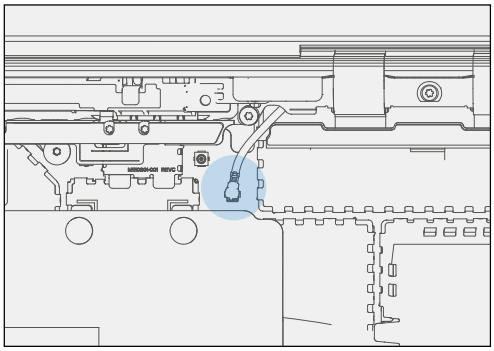
1. Connect software tools USB drive with software tools to USB connector on device under repair.
2. Connect power supply to device to enable power on.
3. Power on device – Depress the power button on the C-cover to power on the device.
4. Run software tool – At the device OS, use Windows Explorer, navigate to USB drive and run: **STEP1_DisplayModuleReplacement.cmd** – accept the power down prompt once tool is run.

> **IMPORTANT:** This step must be carried out on the device successfully before the broken/faulty AB-cover display assembly is replaced. Retry previous step if error message received.

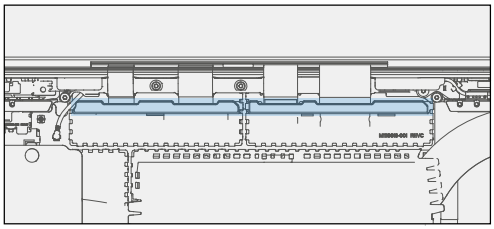
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove feet** – Follow steps for Procedure-Removal (Non-Skid Feet) on (page 19).
- **Remove C-cover** – Follow steps for C-cover Keyboard Assembly Replacement Processes (Metal, Fabric) on (page 24).
- **Remove rSSD** – Follow steps for Procedure-Removal (rSSD) section (page 36).

Removal Process (AB-cover Display Assembly)

1. **Disconnect Antenna Cable** – Using angled tweezers, disassemble left antenna cable located to the left of the left AB-cover FPC RF shield. This will prevent the antenna cable from being damaged during shield removal.

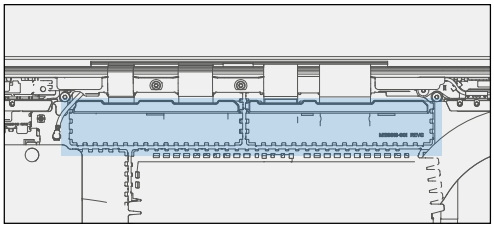


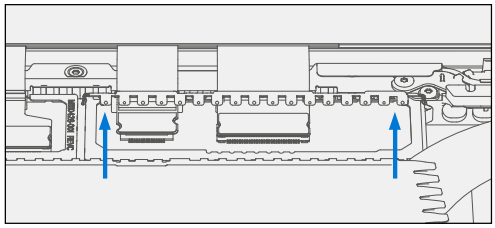
2. **Remove FPC RF Baffles** – Using tweezers, remove the left and right baffles that sit on top of the RF shield cans by prying upwards starting from one end of the baffle.



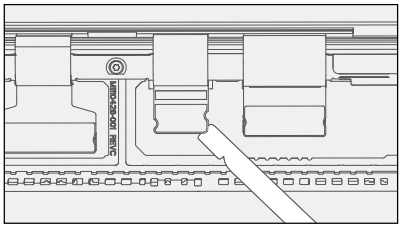
3. **Remove FPC RF Shield Cans** – Using tweezers, remove the two shield lids shown in the illustration below by first peeling on the bottom right corners of the shield. To prevent damage to the FPCs during shield removal, for both shields, peel up the shield along its front edge and bend the shield at 45 degrees. Carefully pull vertically and twist left and right as you pull towards you to remove the shield.

> ! **CAUTION:** This twisting procedure is necessary to prevent damage to the FPCs by the sharp edges of the shields. Be sure not to apply leverage on surrounding components, RF shields and/or thermal management components.

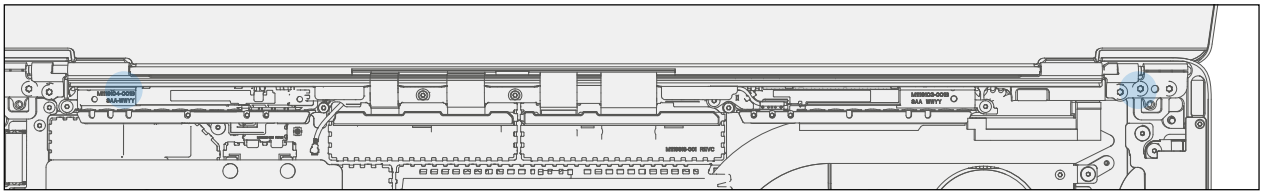




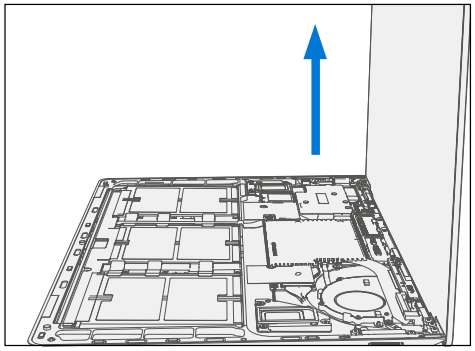
4. **Disconnect FPCs** – Once shields are removed and the 4 FPCs are exposed, use a Spudger tool to disconnect the 4 FPCs shown by prying upwards on the corners first and then along the front edge. Be sure not to bend the FPC head excessively otherwise the head will be damaged (refer to illustration for details). Grab each FPC connector and gently pull the ribbon towards the front of the device to untuck ribbon from underneath the chassis ledge.



5. **Remove Two Inner Hinge Screws** – Using a 6IP screwdriver, remove the inner 2 screws on the left and right hinges (refer to illustration for details).



6. **Set AB-cover Display Angle to 90 deg for Safe Removal** – Place the display module at an angle of about 90 degrees. Then remove the remaining external screw at the left and right hinges while holding the display with your free hand.



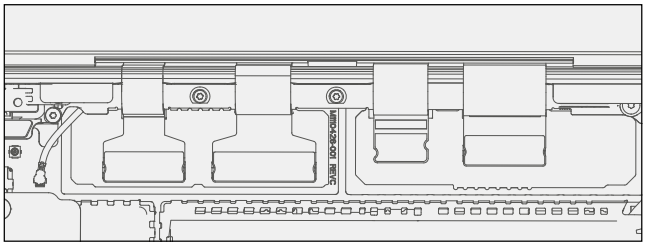
7. **Remove AB-cover from Device** – Lift the display module straight up vertically until detached from the unit.

Installation Procedures – (AB-cover Display Assembly)

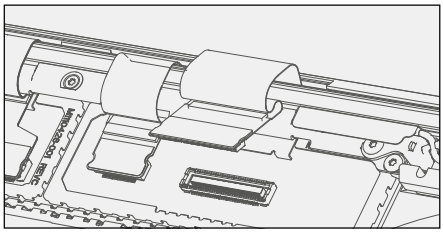
IMPORTANT: The installation process for the AB-cover varies between C-cover types (Metal vs. Fabric). Each C-cover type creates different AB-cover opening experiences. The opening experience is a differentiating characteristic of the Surface Laptop design. Be sure to move to the proper C-cover reassembly section based on C-cover type.

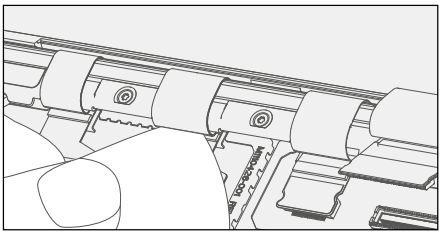
Procedure installation – (Metal C-cover Device)

1. **Initial AB-cover Install** – Clean out any residual thread locker surrounding the hinge screw holes or just inside the screw hole before installing replacement AB-cover assembly. Set the new AB-cover in place in the device chassis hinge wells and hold in place while installing 2 new outer screws on each hinge (4 total at this time). Screws should be installed until just snug and seated, and then turned another 90 degrees (1/4 turn) or until fully fastened.
2. **Release Hinge Clamp Force** – Turn all 4 screws 90 degrees (1/4 turn) counterclockwise to release the clamp force from those screws. This will allow for alignment of AB-cover to chassis at a later step.
3. **Connect AB-cover FPCs** – Connect all 4 display module FPCs into their respective connectors.



4. **Tuck FPCs** – Using a guitar pick opening tool, carefully tuck the loose portion of the FPCs under the enclosure lip as shown below. Ensure that the FPC is taut and that there is no remaining slack protruding out from under the lip. Any protrusions could prevent or negatively impact the re-installation of the C-cover.





5. **Touch Calibration Steps** – The new AB-cover must have touch calibration performed:
   a. **Install rSSD** to enable device operation (device won't power on without rSSD installed). Follow steps for Procedure – Installation (rSSD) section (page 37).
   b. **Temporarily connect the C-cover** FPC back on to device main board connector and set the C-cover in place on the device chassis. No screws are required at this time as the C-cover will be used temporarily to control the device; see details in Procedure – Installation (C-cover Keyboard Metal type) section (page 27).
   c. **Connect software tools USB drive** with software tools to USB connector on device under repair.
   d. **Connect power supply** to device to enable power on.

e. **Power on device** – Depress the power button on the C-cover to power on the device.

f. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive and run: **STEP2_DisplayModuleReplacement.cmd**. Follow prompts, device will restart. Verify touch by running finger across screen to check that touch is working.

g. **Power off device** – Use device OS to power down device.

h. **Remove C-cover.**

i. **Remove rSSD.**

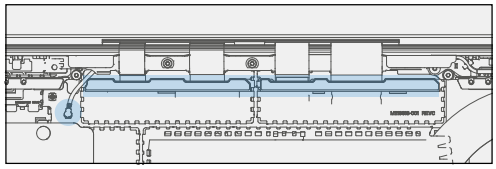
IMPORTANT: Calibration Failure – If calibration tool returns an error message that indicates calibration failure, see AB-cover Touch Calibration Retry section on page 57 for details on how to proceed. This must be carried out at this time and prior to complete re-assembly of device.

6. **FPC RF Shield Installation** – Install 2 new shield lids above the 4 AB-cover FPC connectors by orienting them along the outline of the shield fences.

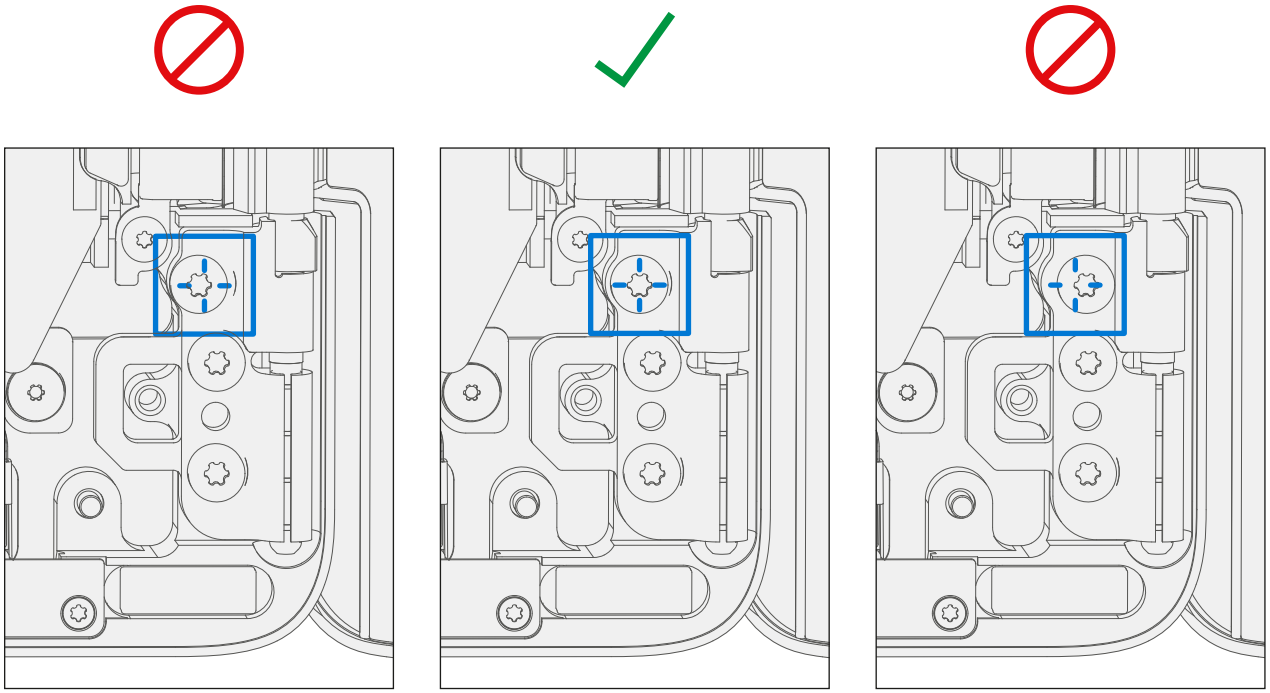
IMPORTANT: Be sure to install the correct shield type onto the corresponding shield fence. The left-hand shield has 2 rectangular embosses in the shape of connector heads and the right-hand shield has 3 rectangular embosses.
Prior to shield installation, visually inspect each shield to ensure that shield fingers are not bent such that they impeded the installation process.
Push the shields vertically downwards onto the fences and snap into place. Ensure the shields are evenly pressed along the entire perimeter of each fence and that the front shield prongs are pressed firmly against the shield fence.

7. **Connect WiFi Antenna** – Reconnect the left WiFi antenna cable (see illustration below).

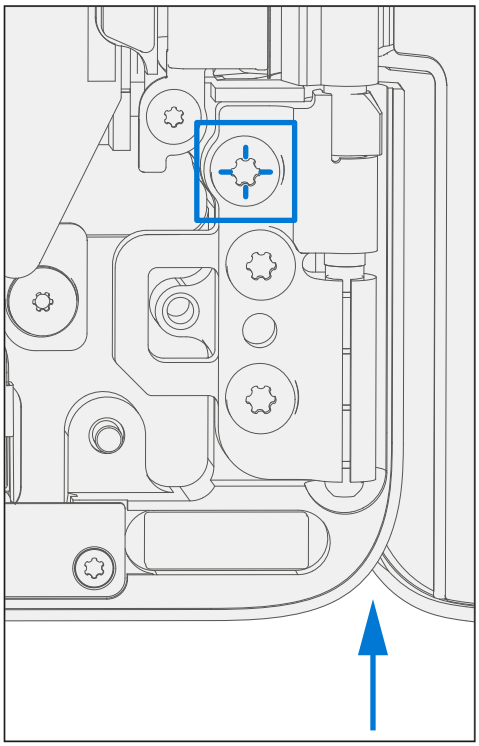
8. **RF Baffle Installation** – Install 2 new RF baffles on top of the shield by peeling off the adhesive protector sheet and snapping them into place near the back of the shields. Firmly press your finger along the top of the RF Baffle wall to adhere adhesive to shield.



9. **AB-cover Hinge Alignment** – It is necessary to properly align the front edge of the AB-cover to the lower device case to ensure step gap between front edges are proper.
   a. **Hinge Alignment** – Set Display Module to 90 degrees. Shift innermost screw on each side so that the screws are concentric with the circular feature on the hinge.



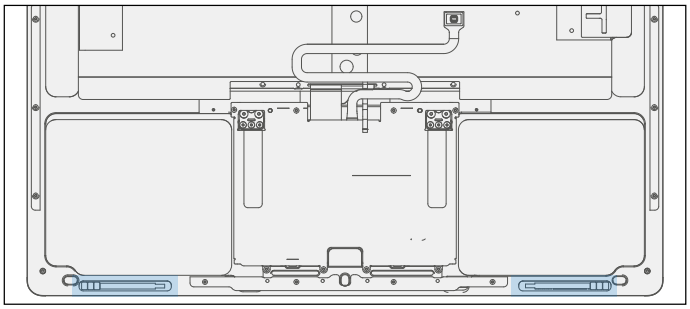
   b. **Verify Hinge Alignment** – With the screws concentrically aligned verify hinge alignment inserting a plastic 0.40mm feeler gauge in between the display and chassis (shown by blue arrow). Feeler gauge should be able to slide through smoothly. If gauge does not fit, re-alignment may be necessary.



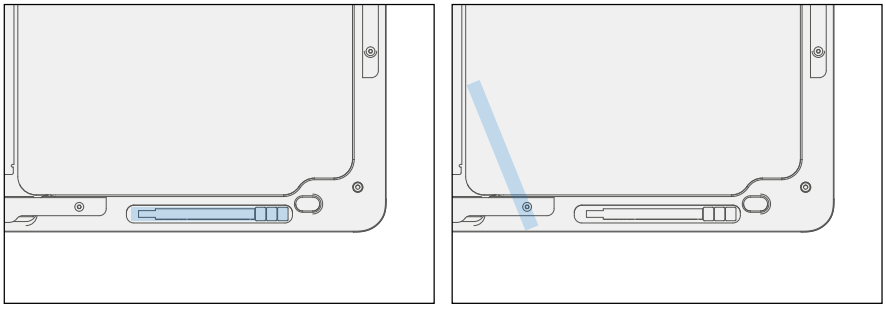
   c. **Secure hinge** – Turn all 6 hinge screws another 90 degrees (1/4 turn) or until fully fastened.

10. **Opening Strength Adjustment (Metal C-cover)** – As part of the AB-cover removal process, we will need to remove the current C-cover steels which are located at the bottom front edge pockets and install new provided steels.

    a. **C-cover Steels Mylar Removal** – Take C-cover and remove mylars covering the closure steels using tweezers.



    b. **C-cover Steels Removal** – Using tweezers again, remove the closure steels located in the two regions at the front edge of the C-cover.



    c. **Clean Closure Steel Area** – Clean off the closure steel area thoroughly with a cotton swab and IPA. Be sure there is no debris or residue left over.

    d. **Install New Closure Steels** – Install new closure steels about 2mm from the outside edge of the C-cover as shown in the image below using tweezers.

    e. **Left Closure Steel Placement** – Place **single closure steel** into left enclosure pocket about 2mm from the outside left edge of C-cover.

    f. **Secure Left Closure Steel** – Using the back of the tweezers, press continuously and firmly along the surface of the steel for 80 seconds.

    g. **Tape Left Closure Steel** – Place mylar tape over the steel. Black tape should fully cover steel and overlap onto the C-cover.

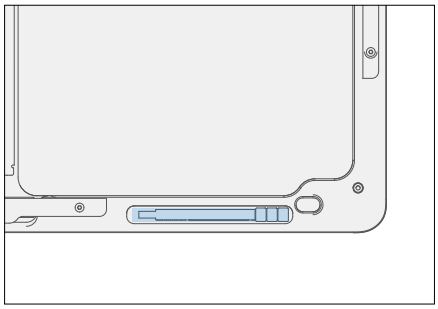
    h. **Smooth Left Closure Steel Tape** – Use Spudger tool to smooth out and flatten the tape to secure the steel.

    i. **Right Closure Steel Placement** – Place **single closure steel** into right enclosure pocket about 2mm from the outside right edge of C-cover.

j. **Secure Right Closure Steel** – Using the back of the tweezers, press continuously and firmly along the surface of the steel for 80 sec.

k. **Tape Right Closure Steel** – Place black tape over the steel. Black tape should fully cover steel and overlap onto the C-cover.

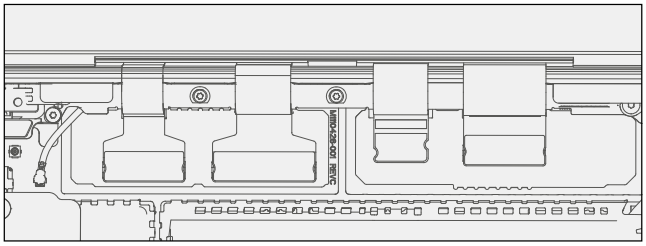
l. **Smooth Right Closure Steel Tape** – Use Spudger to smooth out and flatten the tape to secure the steel. Ensure that all metal keyboard covers have the mylar tape on top of the steel before final assembly of the keyboard.



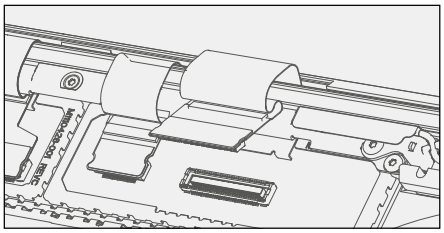
11. **Fit C-cover** – Follow steps 2-4 of the C-cover reassembly instructions. Do not install any Feet screws.
12. **Check AB-cover alignment** – Close the device and confirm flushness of feeler gauge to display module cover across the entire front edge.
    a. If flush, move to next step in this section.
    b. If not flush, follow steps for removing AB-hinge screws and steps for 9a thru 9c again until flush. Then follow steps for C-cover reassembly.
13. **rSSD Install** – Follow steps for Procedure – Installation (rSSD) section (page 37).
14. **C-cover Install** – Follow steps for Procedure – Installation (C-cover Keyboard metal type) section (page 27).
15. **Run SDT** – Power on device. Validate full device functionality by running SDT tool.
    a. If an SDT failure occurs, assess failure to determine if caused by any improper or missed step in the repair process and correct.
    b. Any failure that is not correctable should result in device exchange.
16. **Install Feet** – If SDT tests pass and no further actions are to be performed on the device, follow steps for Procedure – Installation (Non-Skid Feet) section (page 20).

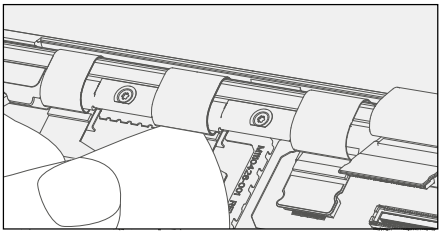
Procedure installation – (Fabric C-cover Device)

1. **Initial AB-cover Install** – Clean out any residual thread locker surrounding the hinge screw holes or just inside the screw hole before installing replacement AB-cover assembly. Set the new AB-cover in place in the device chassis hinge wells and hold in place while installing 2 new outer screws on each hinge (4 total at this time). Screws should be installed until just snug and seated, and then turned another 90 degrees (1/4 turn) or until fully fastened.
2. **Release Hinge Clamp Force** – Turn all 4 screws 90 degrees (1/4 turn) counterclockwise to release the clamp force from those screws. This will allow for alignment of AB-cover to chassis at a later step.
3. **Connect AB-cover FPCs** – Connect all 4 display module FPCs into their respective connectors.



4. **Tuck FPCs** – Using an guitar pick opening tool, carefully tuck the loose portion of the FPCs under the enclosure lip as shown below. Ensure that the FPC is taut and that there is no remaining slack protruding out from under the lip. Any protrusions could prevent or negatively impact the re-installation of the C-cover.





5. **Touch Calibration Steps** – The new AB-cover must have touch calibration performed:
   a. **Install rSSD** to enable device operation (device won't power on without rSSD installed). Follow steps for Procedure – Installation (rSSD) section (page 37).
   b. **Temporarily connect the C-cover** FPC back on to device main board connector and set the C-cover in place on the device chassis. No screws are required at this time as the C-cover will be used temporarily to control the device; see details in Procedure – Installation (C-cover Keyboard Fabric type) section (page 33).
   c. **Connect software tools USB drive** with software tools to USB connector on device under repair.
   d. **Connect power supply** to device to enable power on.
   e. **Power on device** – Depress the power button on the C-cover to power on the device.
   f. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive and run: **STEP2_DisplayModuleReplacement.cmd**. Follow prompts, device will restart. Verify touch by running finger across screen to check that touch is working.

IMPORTANT: Calibration Failure – If calibration tool returns an error message that indicates calibration failure, see AB-cover Touch Calibration Retry section on page 57 for details on how to proceed. This must be carried out at this time and prior to complete re-assembly of device.

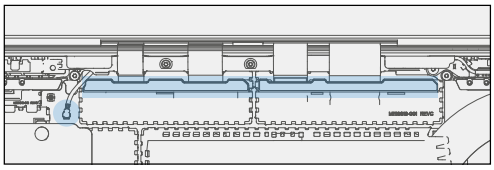
g. **Power off device** – Use device OS to power down device.
h. **Remove C-cover**.
i. **Remove rSSD**.

6. **FPC RF Shield Installation** – Install 2 new shield lids above the 4 AB-cover FPC connectors by orienting them along the outline of the shield fences.

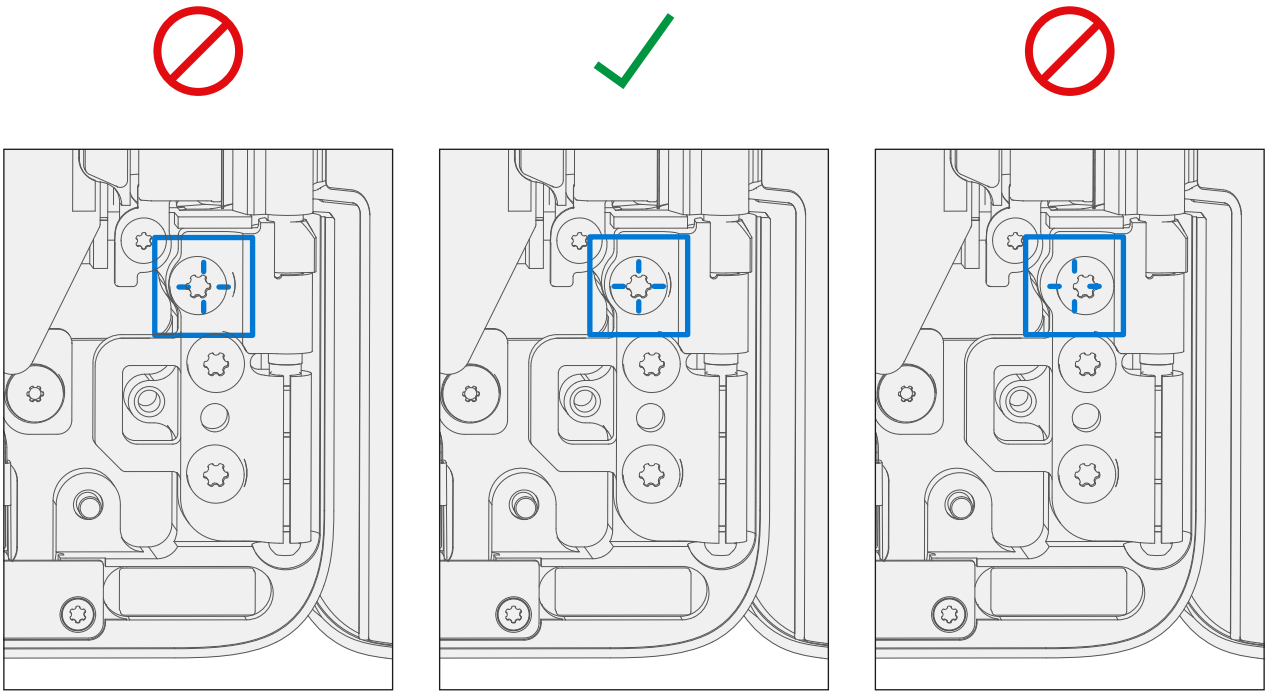
> **IMPORTANT:** Be sure to install the correct shield type onto the corresponding shield fence. The left-hand shield has 2 rectangular embosses in the shape of connector heads and the right-hand shield has 3 rectangular embosses.
> Prior to shield installation, visually inspect each shield to ensure that shield fingers are not bent such that they impede the installation process.
> Push the shields vertically downwards onto the fences and snap into place. Ensure the shields are evenly pressed along the entire perimeter of each fence and that the front shield prongs are pressed firmly against the shield fence.

7. **Connect WiFi Antenna** – Reconnect the left WiFi antenna cable (see illustration below).

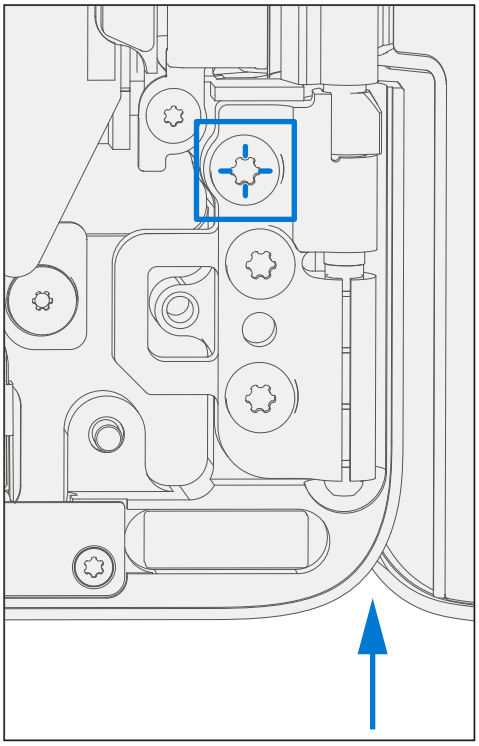
8. **RF Baffle Installation** – Install 2 new RF baffles on top of the shield by peeling off the adhesive protector sheet and snapping them into place near the back of the shields. Firmly press your finger along the top of the RF Baffle wall to adhere adhesive to shield.



9. **AB-cover Hinge Alignment** – It is necessary to properly align the front edge of the AB-cover to the lower device case to ensure step gap between front edges are proper.
   a. **Hinge Alignment** – Set Display Module to 90 degrees. Shift innermost screw on each side so that the screws are concentric with the circular feature on the hinge.



   b. **Verify Hinge Alignment** – With the screws concentrically aligned verify hinge alignment inserting a plastic 0.40mm feeler gauge in between the display and chassis (shown by blue arrow). Feeler gauge should be able to slide through smoothly. If gauge does not fit, re-alignment may be necessary.



   c. **Secure hinge** – Turn all 6 hinge screws another 90 degrees (1/4 turn) or until fully fastened.

10. **Fit C-cover** – Follow steps 2-4 of the C-cover reassembly instructions. Do not install any Feet screws.
11. **Check AB-cover alignment** – Close the device and confirm flushness of feeler gauge to display module cover across the rear corners of each hinge.
    a. If flush, move to next step in this section.
    b. If not flush, follow steps for removing AB-hinge screws and steps for 9a thru 9c again until flush. Then follow steps for C-cover reassembly.
12. **rSSD Install** – Follow steps for Procedure – Installation (rSSD) section (page 37).
13. **C-cover Install** – Follow steps for Procedure – Installation (C-cover Keyboard metal type) section (page 27).
14. **Run SDT** – Power on device. Validate full device functionality by running SDT tool.
    a. If an SDT failure occurs, assess failure to determine if caused by any improper or missed step in the repair process and correct.
    b. Any failure that is not correctable should result in device exchange.
15. **Install Feet** – If SDT tests pass and no further actions are to be performed on the device, follow steps for Procedure – Installation (Non-Skid Feet) section (page 20).

AB-Cover Touch Calibration Software Tools Overview

IMPORTANT: A calibration routine is provided to carry out the required touch calibration sequence on an AB-cover Display Assembly when replaced. Touch Calibration software tool details are provided within this section. The calibration tool runs from a USB drive connected to the device under repair and runs within the Windows OS. Follow steps within the AB-cover Display Assembly Replacement Process section (page 38) noting when to run tools and which file to choose based on the step in the process.

Preliminary Requirements

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

Required Tools and Components

- **Tools:**
  - AB-cover Touch Calibration Software Tool

Prerequisite Steps:

- **AB-cover replacement** – Refer to AB-cover Display Assembly Replacement Process section (page 38).

USB Drive Setup – Directory Structure and Files

Copy tools to the root directory of USB drive for easy access during the calibration process.
The following files are required and should reside in the same directory on the USB key:

- Folder: Project
- File: STEP1_DisplayModuleReplacement.cmd
- File: STEP2_DisplayModuleReplacement.cmd

Tool Runtime Details

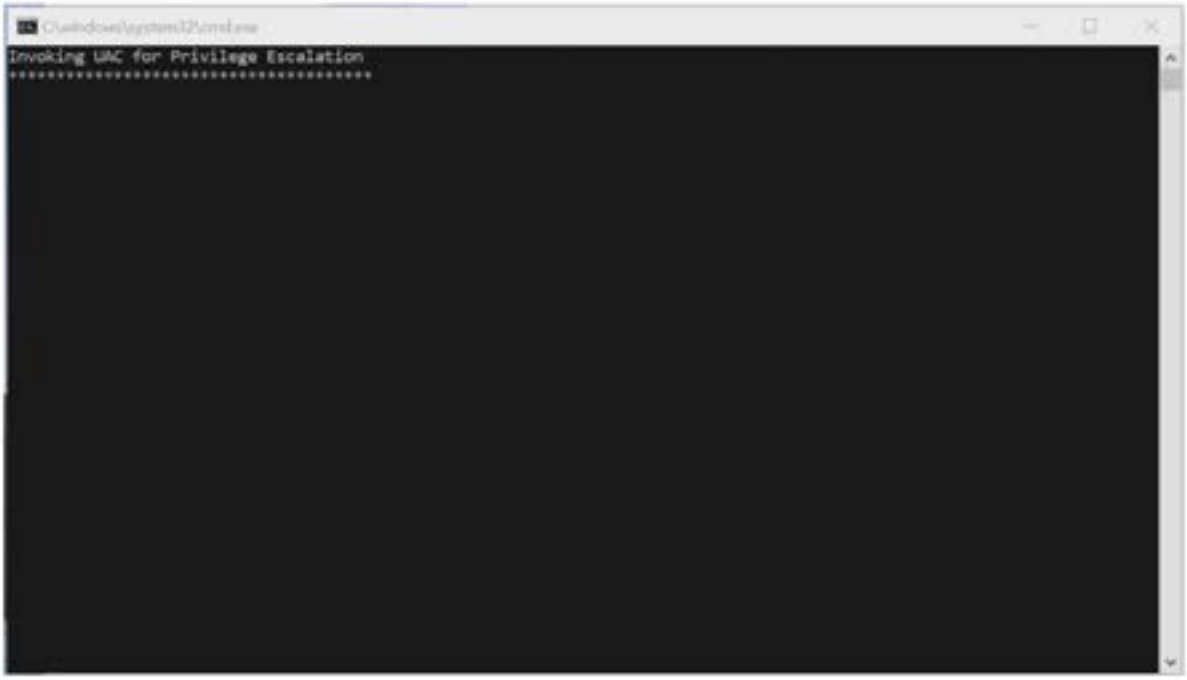
- The calibration tool runs within the Windows OS and therefore the device under repair must be functional to the point that the tools will run on device OS.
- For devices with secured Windows login accounts, login credentials are required to gain access to OS features that enable program execution.
- Once device is running and Windows login is completed, leverage Windows Explorer to navigate to the USB drive containing the calibration tools.
- Run the calibration tools in accordance with associated process steps within the AB-cover Display Assembly Replacement Process section (page 38).
- The tools perform the following two functions:
  - Set device under repair into AB-cover replacement mode.
  - Perform touch calibration on replaced (new) AB-cover.

Expected Screenshots

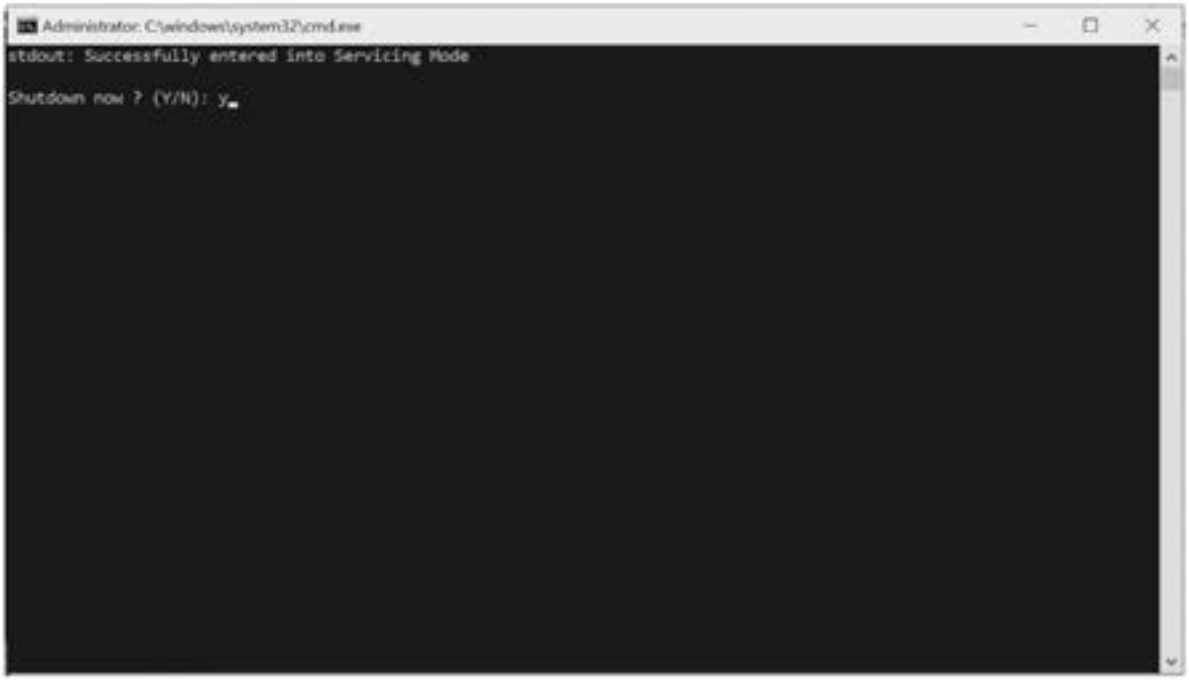
The following screenshots will be presented during tool operation:

When **STEP1_DisplayModuleReplacement.cmd** is invoked:

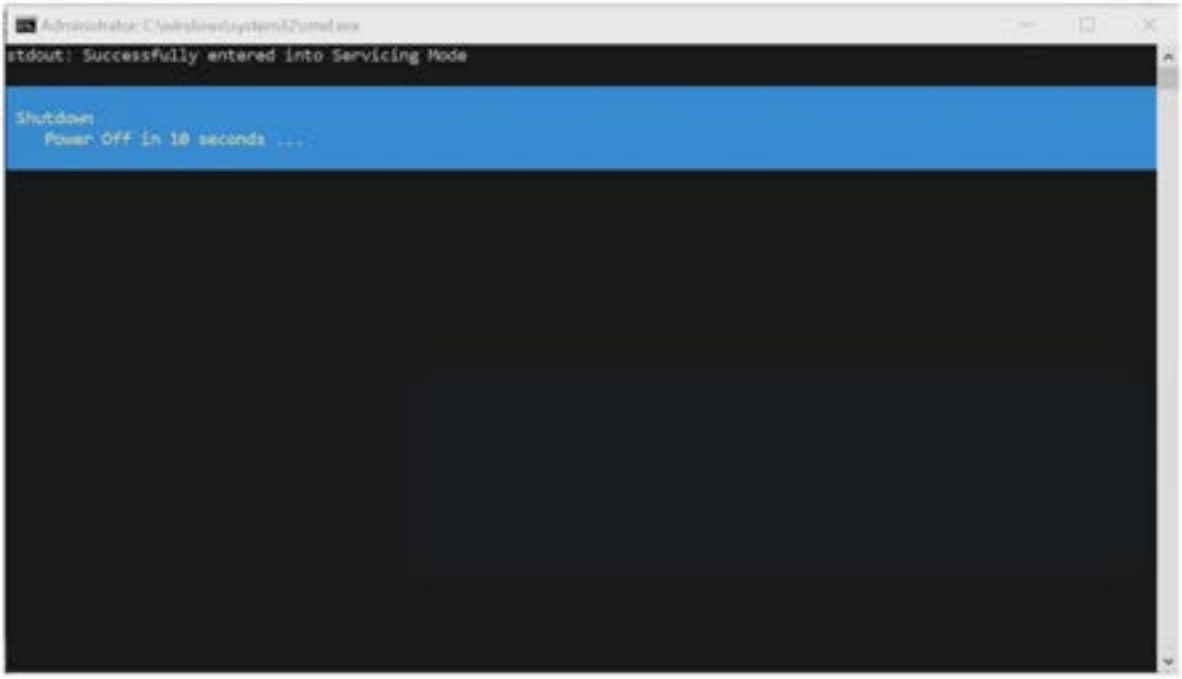
STEP_1 Screen 1: Initial screen indicates Step 1 initiation.



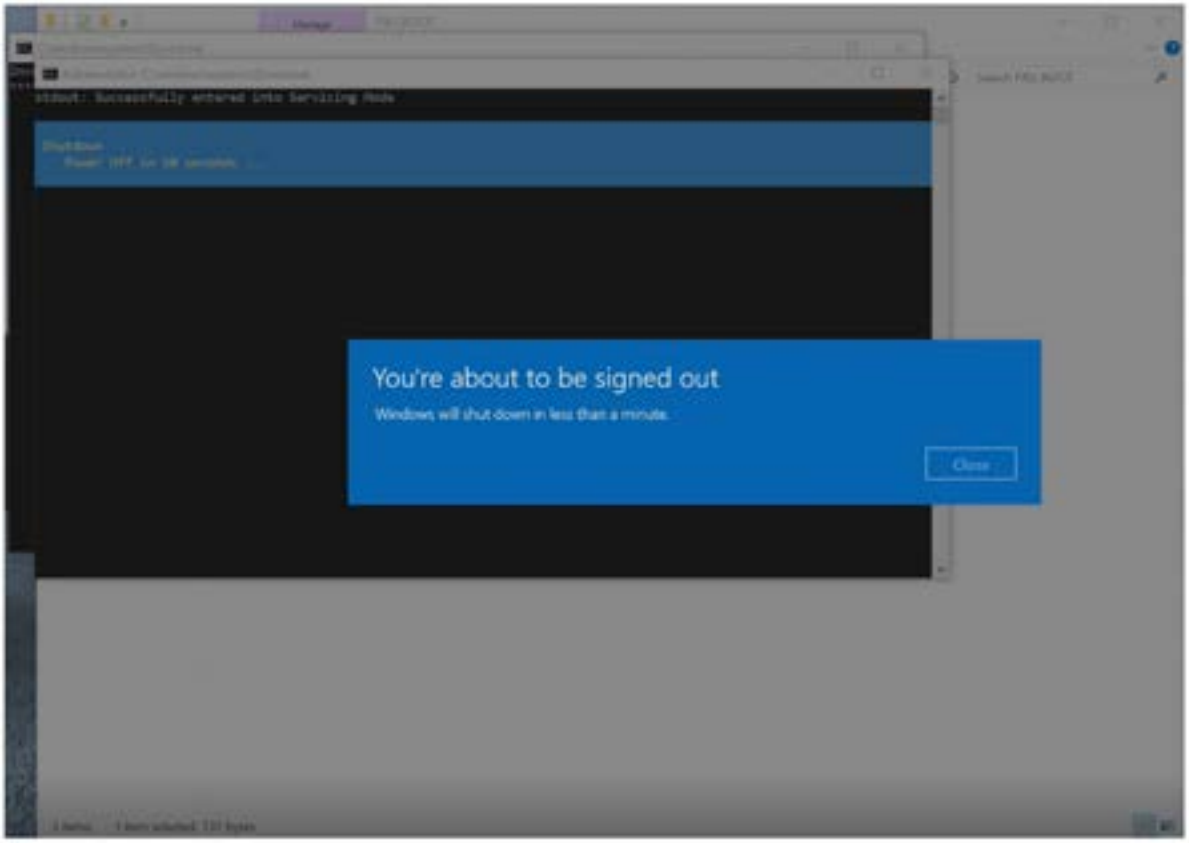
STEP_1 Screen 2: Indicates device has been set into AB-cover replacement mode (Servicing Mode). Operator prompted to authorize device shutdown by entering y or Y and pressing ENTER.



STEP_1 Screen 3: Tool confirms device shutdown authorization.

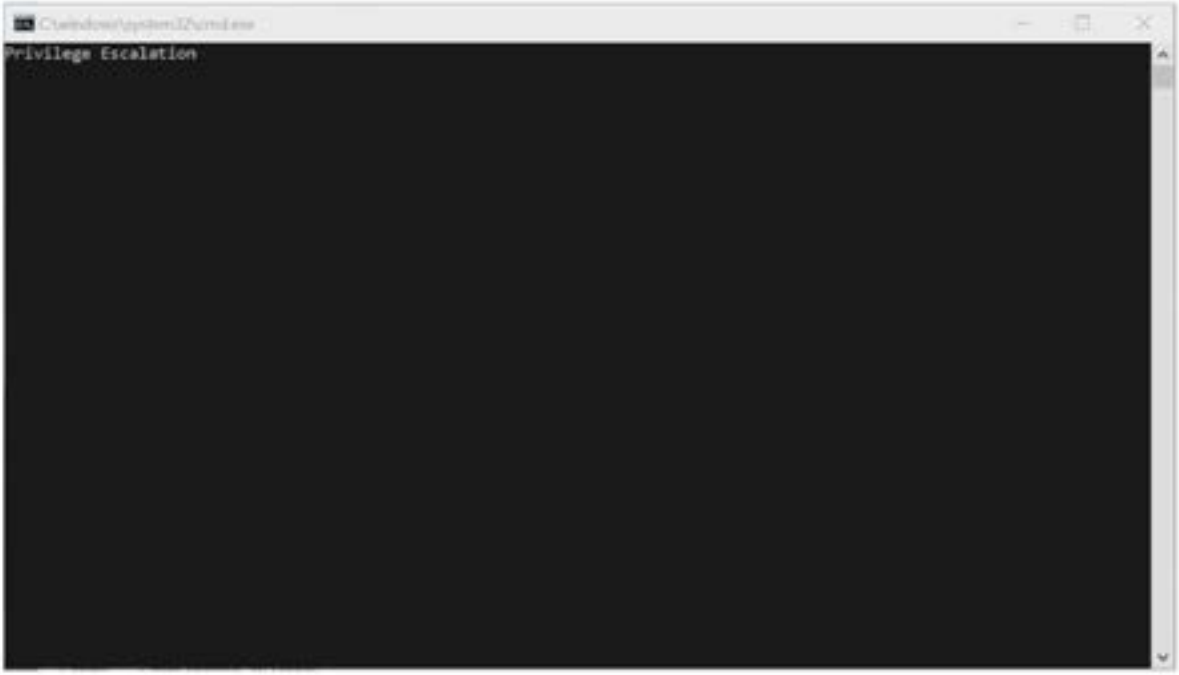


STEP_1 Screen 4: Windows OS alert noting device shutdown – Select **Close** and device shuts down to enable next process steps within AB-cover Display Assembly Replacement Process.

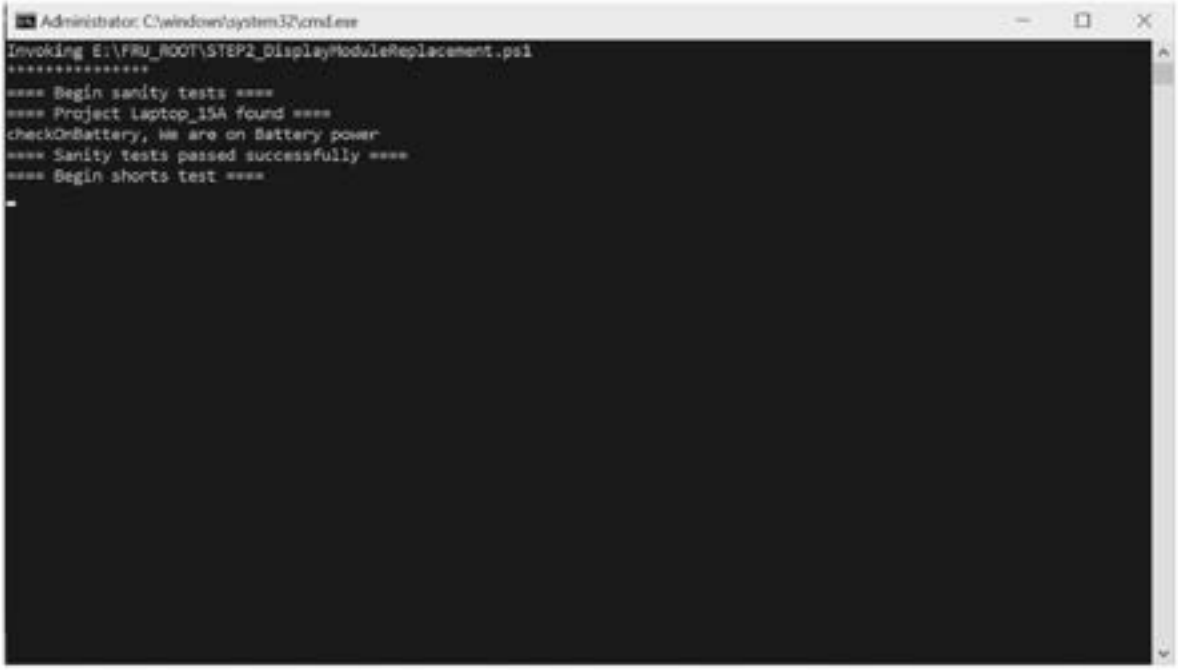


When **STEP2_DisplayModuleReplacement.cmd** is invoked:

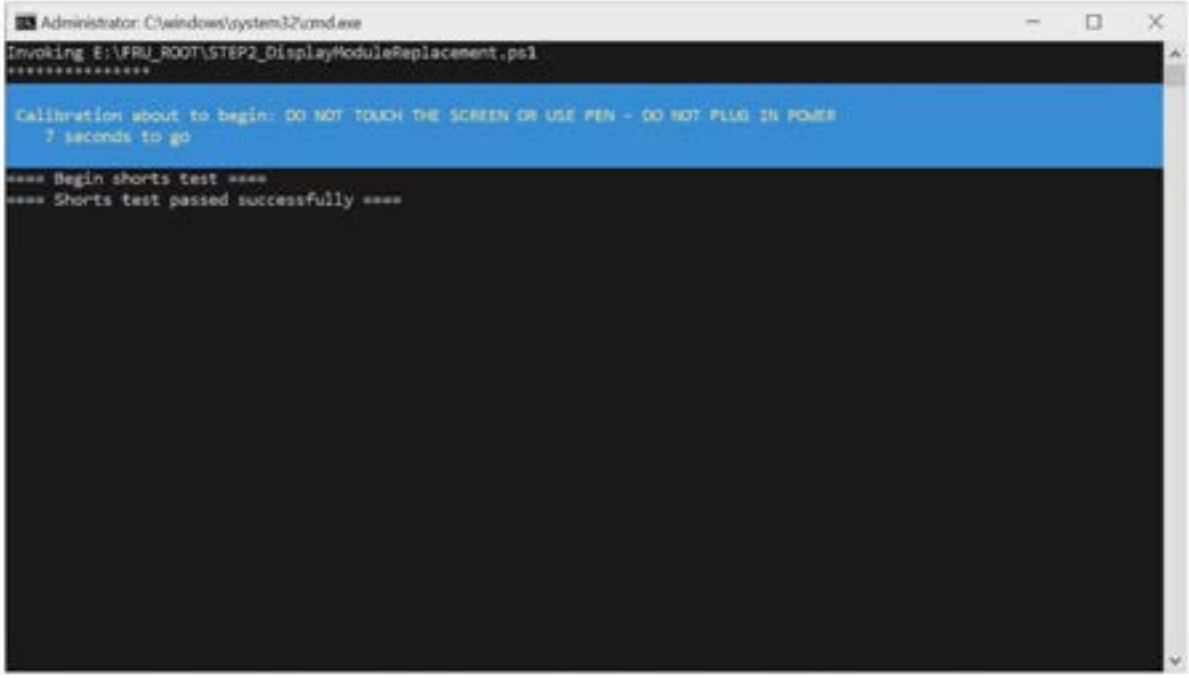
STEP_2 Screen 1: Initial screen indicates tool running.



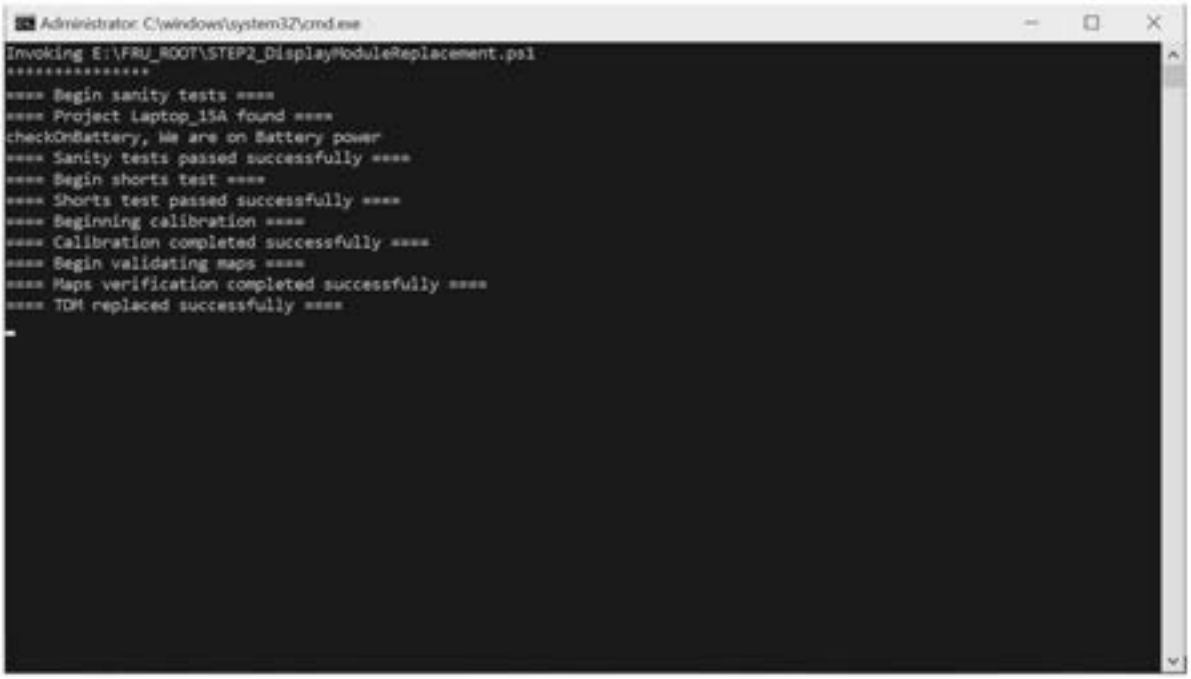
STEP_2 Screen 2: Calibration preliminary device testing initiated.



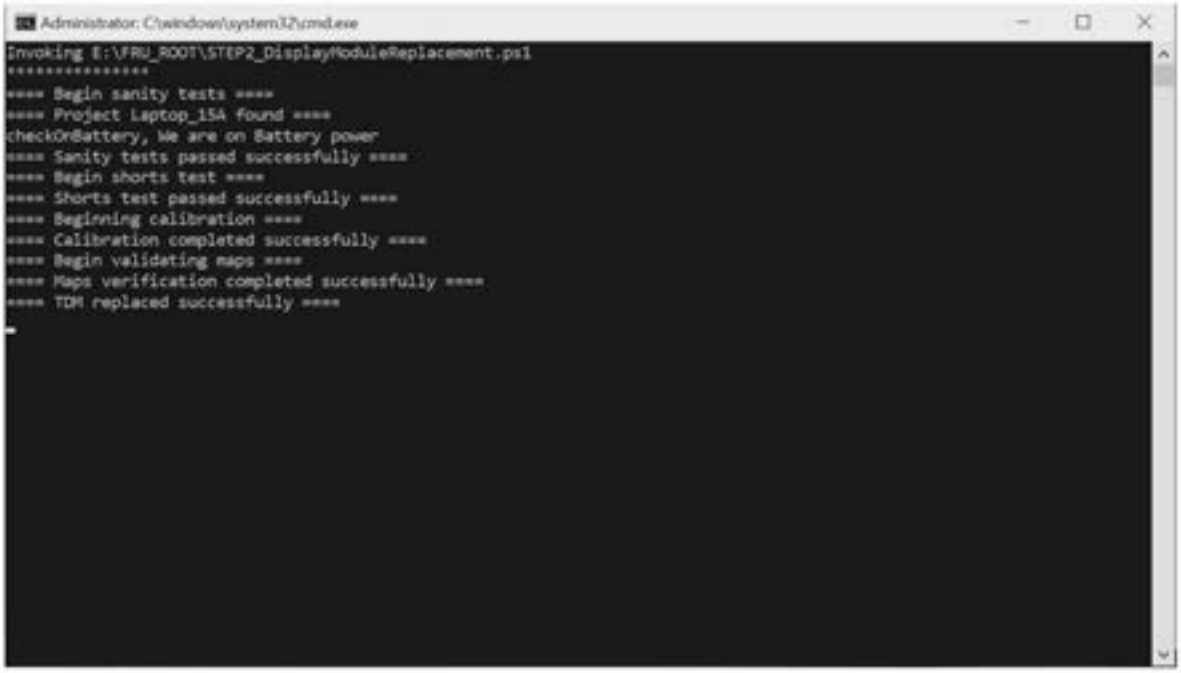
STEP_2 Screen 3: Tool prompts operator that calibration is about to commence with reminders that screen should not be touched and power should not be applied to the device during calibration.



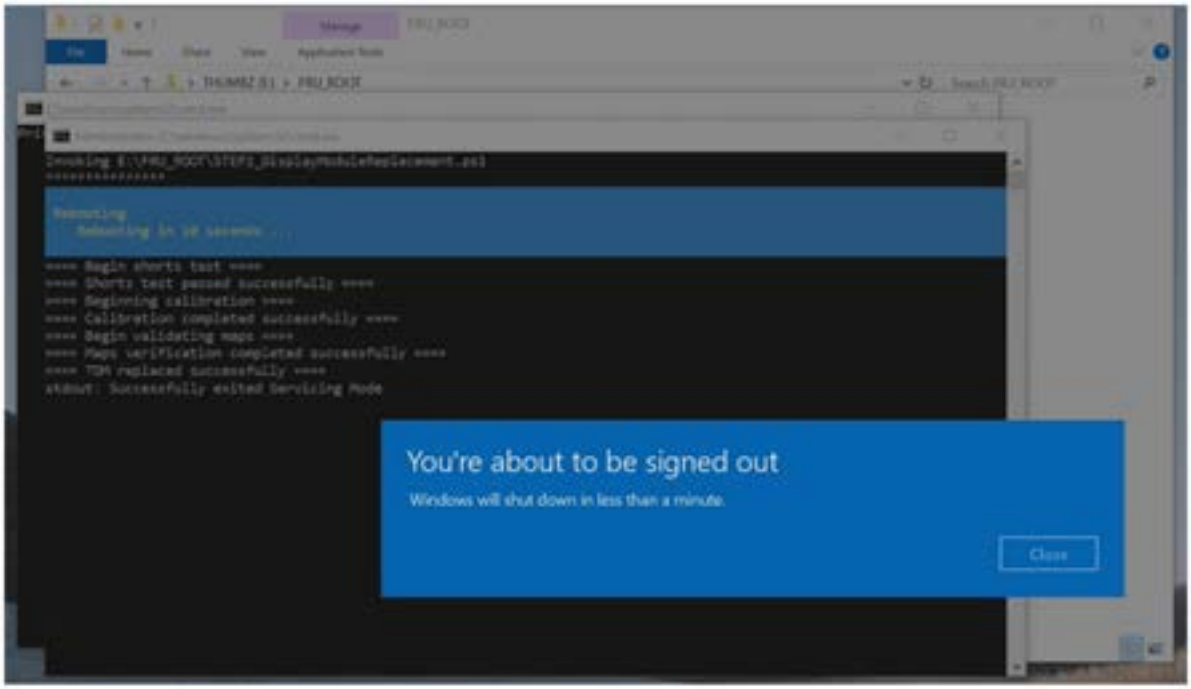
STEP_2 Screen 4: Tool reports that calibration routine is in progress.



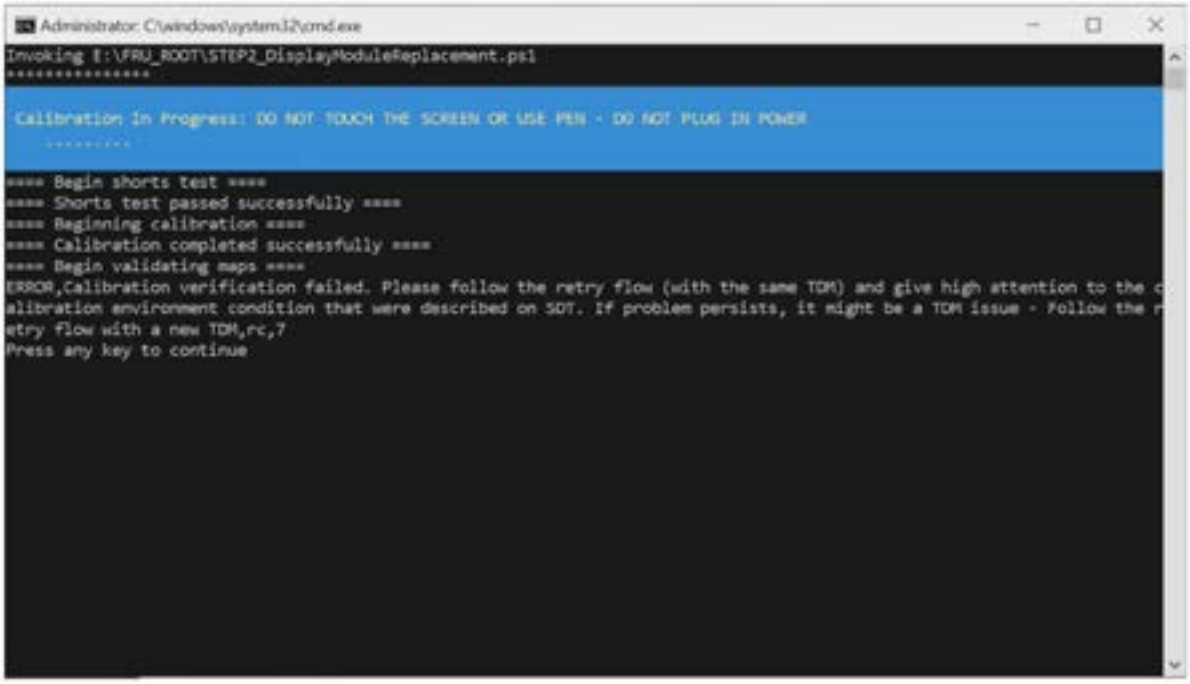
STEP_2 Screen 5: Tool reports results of calibration process.



STEP_2 Screen 6: Tool initiates OS restart and OS alerts operator that device will restart – Select **Close**.



STEP_2 Error Screen Example: In the case that calibration fails, follow screen prompts provided by tool. If retry attempt fails, refer to AB-cover Touch Calibration Retry section (page 57) for next steps.



AB-Cover Touch Calibration Retry (if required)

IMPORTANT: If touch calibration fails it is necessary to take the following steps to retry the calibration process.

Touch Calibration Steps (Retry):

1. **Preparation** – Confirm that the following steps have been completed:
   a. **Install rSSD** to enable device operation. Follow steps for Procedure – Installation (rSSD) on section (page 37).
   b. **Temporarily connect the C-cover** FPC back on to device main board connector and set the C-cover in place on the device chassis. No screws are required at this time as the C-cover will be used temporarily to control the device; see details in Procedure – Installation (C-cover Keyboard Fabric type) section (page 33) or Procedure – Installation (C-cover Keyboard Metal type) section (page 27).
   c. **Connect software tools USB drive** with software tools to USB connector on device under repair.
   d. **Connect power supply** to device to enable power on.
   e. **Power on device** – Depress the power button on the C-cover to power on the device.
   f. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive and run: **STEP1_DisplayModuleReplacement.cmd**. Accept the power down prompt once tool is run.
2. **Take the following steps:**
   a. **Device Powered Off** – Ensure device is powered off and disconnected from a power supply.
   b. **Remove C-cover** which was temporarily installed to allow device control. Be sure to follow proper actions when removing and storing the C-cover; see Procedure – Removal (C-cover Keyboard Fabric type) section (page 33) or Procedure – Removal (C-cover Keyboard Metal type) section (page 27).
   c. **Battery Cover in place** – Ensure a Microsoft provided ESD-safe battery cover appropriate for size (either 13.5″ or 15″ device) is placed across the device to protect the battery from any accidental damage during repair.
   d. **rSSD Removed** – Follow steps for Procedure – Removal (rSSD) section (page 36). Removing the rSSD will ensure that all power is removed from the device.
3. **Remove AB-cover** – Remove new AB-cover installed to device and install previously broken AB-cover back into device. The device under repair must see a different AB-cover in order to accept new touch calibration data each time. Follow steps for Procedure – Removal (AB-cover Display Assembly) section (page 39).

   IMPORTANT: This step must be carried out to re-enable touch calibration.

4. **Preparation** – Confirm that the following steps have been completed:
   a. **Install rSSD** to enable device operation (device won't power on without rSSD installed).
   b. **Temporarily connect the C-cover** FPC back on to device main board connector and set the C-cover in place on the device chassis. No screws are required at this time as the C-cover will be used temporarily to control the device; see details in Procedure – Installation (C-cover Keyboard Fabric type) on (page 33). or Procedure – Installation (C-cover Keyboard Metal type) section (page 27).
   c. **Connect software tools USB drive** with software tools to USB connector on device under repair.
   d. **Connect power supply** to device to enable power on.
   e. **Power on device** – Depress the power button on the C-cover to power on the device.
   f. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive and run: **STEP2_DisplayModuleReplacement.cmd**. Follow prompts, device will restart. Verify touch by running finger across screen to check that touch is working.
5. **Navigate to USB key with software tools** – Using Windows Explorer, navigate to USB drive and run the SDT tool.
6. **Run SDT** – Within SDT tool, choose Select Tests, Touch Display Repair and initiate by clicking on **Run Selected button** – follow instructions provided by tool.

IMPORTANT: If calibration tool continues to return an error message that indicates calibration failure, device should be processed as an exchange and sent back to Microsoft for repair.

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-pk/download/details.aspx?id=11691 In case of questions, please contact AskECT@microsoft.com

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