

 **jacobgkau** serw13: Add version of HDMI port ✓

446b3ab · last month 

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README.md

Serval WS (serw13)

- [External Overview](#)
- [Internal Overview](#)
- [Parts & Repairs](#)



The System76 Serval WS is a laptop with the following specifications:

- CPU
 - Supports Intel 13th & 14th Generation (Raptor Lake) CPUs
 - [Core i9-14900HX](#)
 - [Core i9-13900HX](#)
- Chipset
 - [Intel HM770](#)
- BIOS
 - GigaDevice GD25B256EYIGR
 - WSON-8 form factor
 - Programmed with [System76 Open Firmware](#)
- EC
 - ITE IT5570E
 - Programmed with [System76 EC](#)
- Graphics
 - GPU options:
 - NVIDIA GeForce RTX 4070
 - NVIDIA GeForce RTX 4060

- eDP display:
 - 17.3" 3840x2160@144Hz
 - LCD panel: AUO B173ZAN03.0 (or equivalent)
 - 17.3" 2560x1440@240Hz LCD
 - LCD panel: BOE NE173QHM-NZ1 (or equivalent)
 - 15.6" 1920x1080@165Hz LCD
 - LCD panel: BOE NV156FHM-NY8 (or equivalent)
- External video outputs:
 - 1x HDMI 2.1a
 - 1x Mini DisplayPort 1.4
 - 1x DisplayPort 1.4 over USB-C
- Memory
 - Up to 96GB (2x48GB) dual-channel DDR5 SO-DIMMs @ 5600 MHz
- Networking
 - 2.5-Gigabit Ethernet
 - M.2 PCIe/CNVi WiFi/Bluetooth options:
 - Intel Wi-Fi 7 BE200
 - Bluetooth 5.4
 - Intel Wi-Fi 6E AX210/AX211
 - Bluetooth 5.3
- Power
 - 280W (20V, 14A) DC-in port
 - DC-in port accepts rectangular (not barrel) connector
 - Included AC adapter: Chicony A18-280P1A
 - AC power cord type: IEC C13
 - 80Wh 6-cell Lithium-Ion battery
 - 15" model number: PD50BAT-6-80
 - 17" model number: PD70BAT-6-80
- Sound
 - Internal speakers & microphone
 - Combined headphone & microphone 3.5mm jack
 - Combined microphone & S/PDIF 3.5mm jack
 - HDMI, Mini DisplayPort, USB-C DisplayPort audio
- Storage
 - 2x PCIe NVMe Gen 4
 - MicroSD card reader

- USB
 - 1x USB Type-C with Thunderbolt 4
 - Supports DisplayPort over USB-C.
 - Supports USB-PD (charging) up to 100W when the system is powered off or suspended.
 - 1x USB 3.2 Gen 2 Type-C
 - Partially supports DisplayPort over USB-C.
 - Display output is unreliable with some display brands; usage of the Thunderbolt port is recommended instead.
 - 2x USB 3.2 Gen 1 Type-A
- Dimensions
 - 15": 2.49cm x 35.8cm x 24.0cm, 2.4kg
 - 17": 2.49cm x 39.6cm x 26.2cm, 2.8kg

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9963530 · last year



68 lines (50 loc) · 3.04 KB

Preview

Code

Blame

Raw

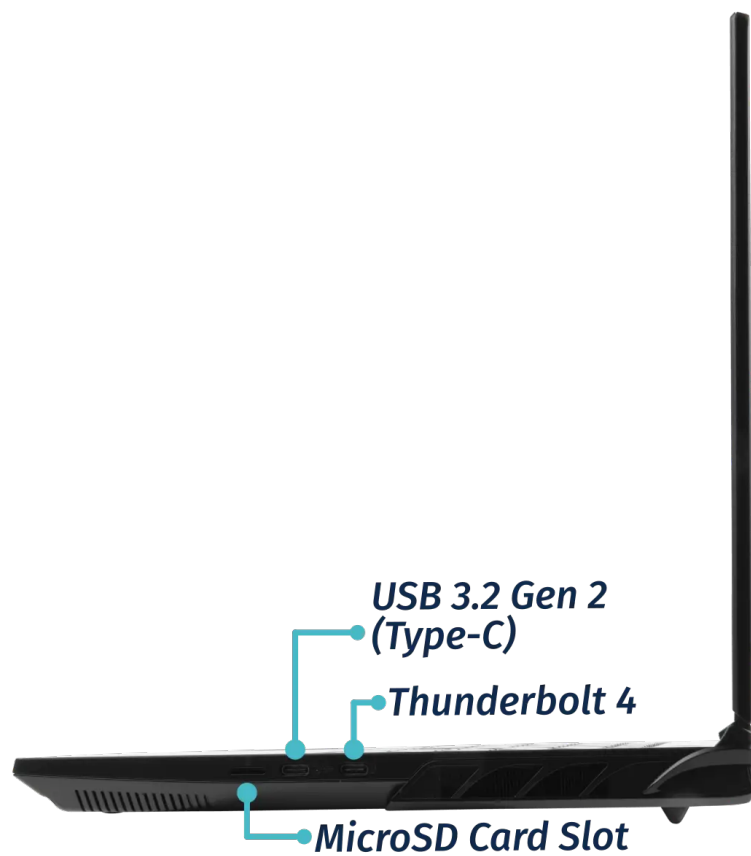


Serval WS (External Overview)

Left side overview:



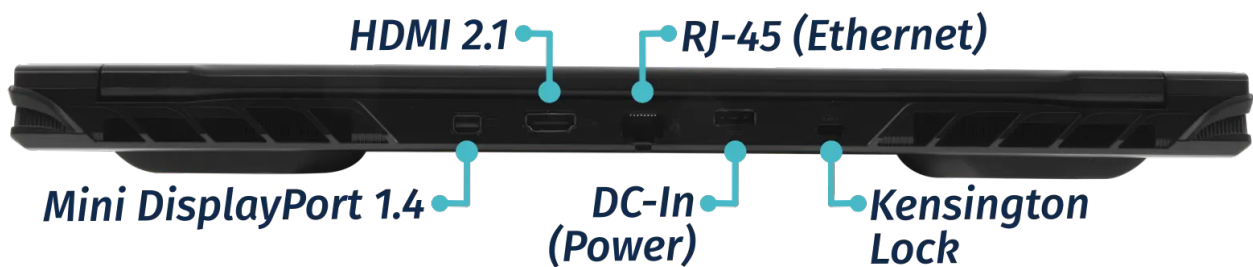
Right side overview:



Front side overview:



Back side overview:



Keyboard & touchpad overview:



Materials:

Part	Material
LCD back cover (lid)	Aluminum
LCD front cover (bezel)	Plastic
Top case (palm rests/port covers)	Plastic
Bottom panel	Aluminum

LED indicators

The Serval WS has the following LED indicators:

Icon	Color	Description
	Orange	Powered off, DC power plugged in
	Green	Powered on
	Blinking green	Sleeping (suspended)
	Orange	Battery charging
	Green	Battery fully charged
	Blinking orange	Battery critically low
	Green	Storage drive activity

Keyboard Shortcuts

The Serval WS has the following actions available using the Fn and Function keys:

Key	Shortcut	Action
	Fn+F1	Toggle trackpad
	Fn+F2	Toggle built-in LCD

Key	Shortcut	Action
	Fn+F3	Mute
	Fn+F5	Volume down
	Fn+F6	Volume up
	Fn+F7	Toggle displays
	Fn+F8	Screen brightness down
	Fn+F9	Screen brightness up
	Fn+F10	Toggle webcam
	Fn+F11	Toggle airplane mode
	Fn+F12	Suspend
	Fn+`	Play/Pause
	Fn+*	Toggle keyboard backlight
	Fn+/ 	Cycle keyboard color

Key	Shortcut	Action
	Fn+-	Decrease keyboard brightness
	Fn++	Increase keyboard brightness
1	Fn+1	Toggle fan between max/automatic

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jacobgkau Serval 13 (serw13) (#174)

9963530 · last year

29 lines (23 loc) · 1.12 KB

Preview

Code

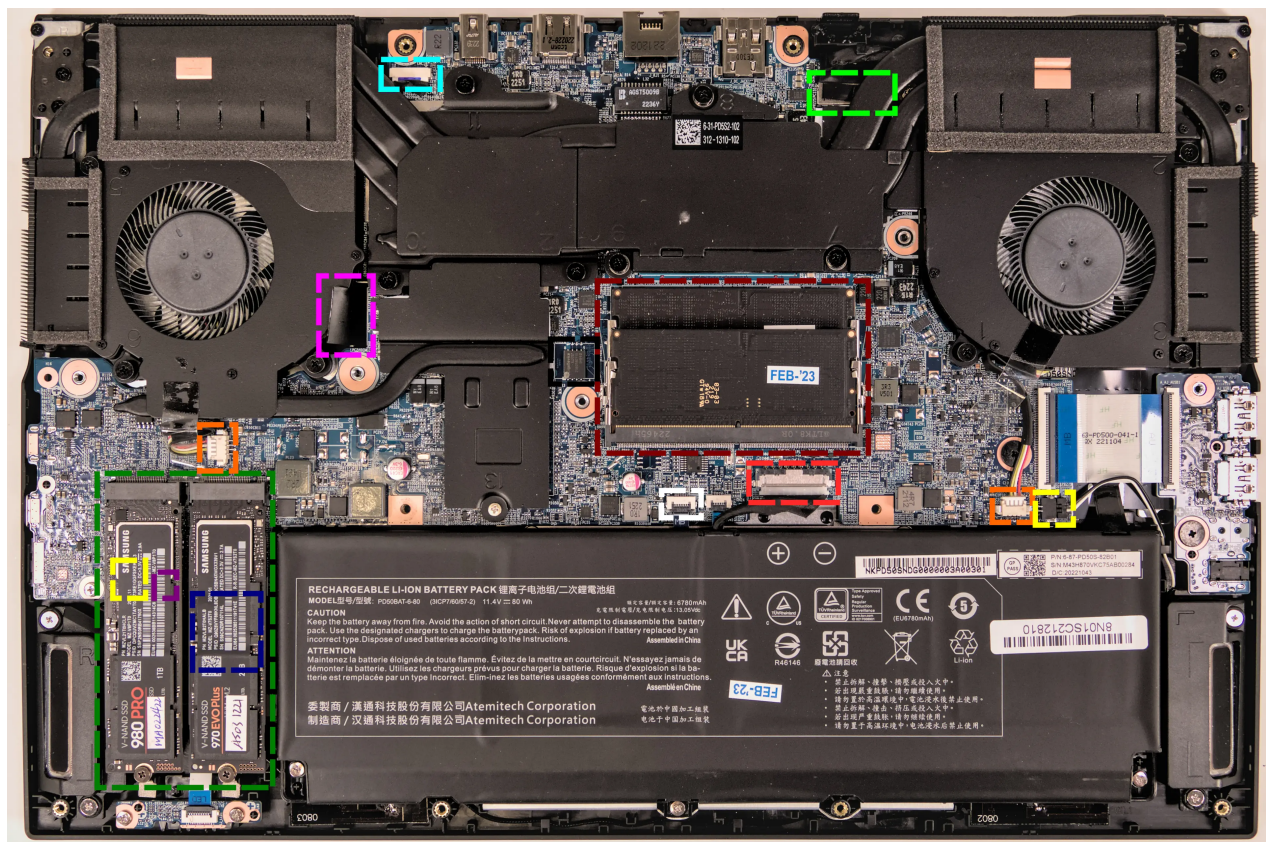
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Raw



Serval WS (Internal Overview)

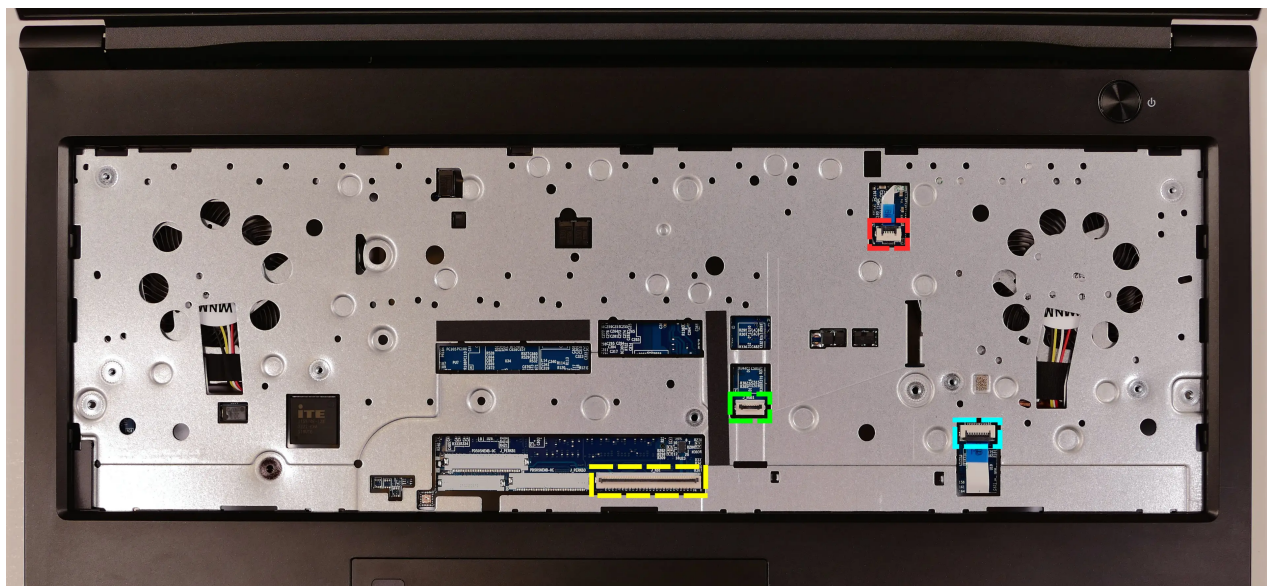
Bottom components and connectors:



- LCD panel connector is highlighted in light green
- Webcam/microphone connector is highlighted in cyan
- Keyboard adhesive access point is highlighted in pink

- RAM is highlighted in maroon
- BIOS flash chip (U46) is highlighted in black
- Fan connectors are highlighted in orange
- M.2 SSDs are highlighted in dark green
 - Both slots support PCIe NVMe Gen 4
- Speaker connectors are highlighted in yellow
 - Right speaker connector (on the left) is under the outermost SSD
- CMOS battery connector (under the outermost SSD) is highlighted in purple
- Wireless card (under the innermost SSD) is highlighted in blue
- Touchpad connector is highlighted in white
- Main battery connector is highlighted in red

Under-keyboard components and connectors:



- Keyboard connector is highlighted in yellow
- Keyboard backlight connector is highlighted in green
- Power button/LED connector is highlighted in red
- Front LED connector is highlighted in cyan

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 **leviport** and **jacobgkau** Add model numbers for more batteries (#220) ✓

97a0240 · last year

250 lines (168 loc) · 13 KB

Preview

Code

Blame

Raw



Serval WS (Parts & Repairs)

Many components in your Serval WS can be upgraded or replaced as necessary. This page uses photos of the 15" model, but screw counts, general component locations, and other details are the same on the 17" model unless otherwise noted.

- [Removing the bottom cover](#)
- [Replacing the battery](#)
- [Replacing the keyboard](#)
- [Replacing the RAM](#)
- [Replacing an M.2/NVMe SSD](#)
- [Replacing the fans/heatsink/thermal paste](#)
- [Replacing the WiFi/Bluetooth module](#)
- [Replacing the CMOS battery](#)
- [Replacing the speakers](#)

Removing the bottom cover:

Removing the cover is required to access the internal components. Prior to removing the cover, ensure the AC power is unplugged and all peripherals (including SD cards and USB drives) are unplugged or removed from the system.

Tools required: Cross-head (Phillips) screwdriver

Time estimate: 5 minutes

Difficulty: Easy ●

Steps to remove the bottom cover:

1. Place the machine lid-side down.
 - Use a soft surface (such as a towel) to avoid scratches.
2. Remove the 15 bottom panel screws.
 - All screws are the same length on any given unit. However, the 17" model uses longer screws than the 15" model.



3. Pull the bottom panel off, starting from the hinges in the back.

Replacing the battery:

The battery provides primary power whenever the system is unplugged.

The model and part numbers for the Serval WS 13's battery are dependent on the screen size:

- For the 15" model, the battery model is PD50BAT-6-80 and the original part

number is 6-87-PD50S-82B01 .

- For the 17" model, the battery model is PC70BAT-6-80 and the original part number is 6-87-PD70S-82B01 .

Third-party battery sellers may list one or both of these numbers, and may offer other compatible part numbers with the same model number. You can also [contact System76](#) to purchase a replacement battery.

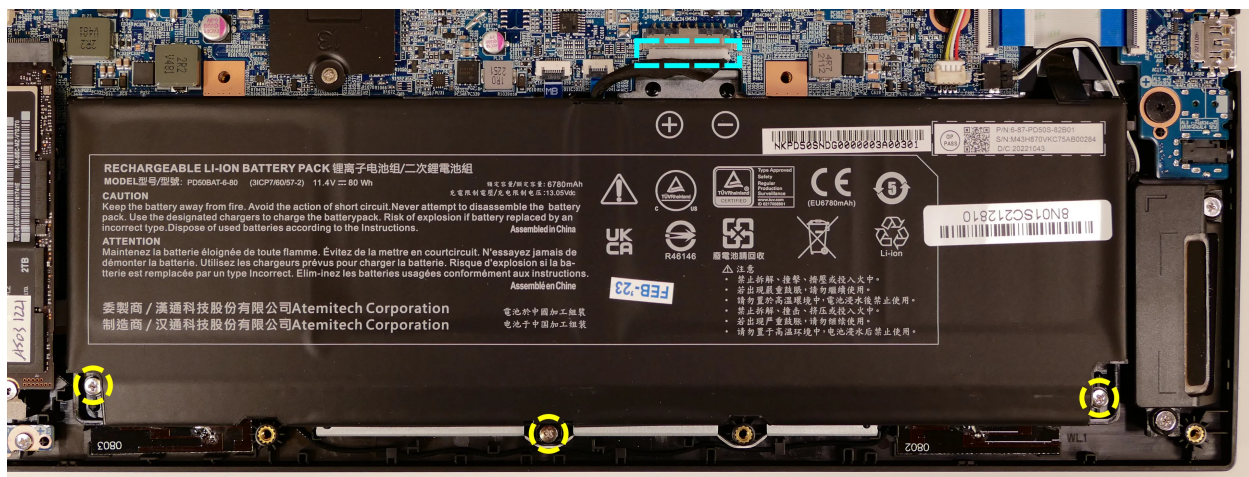
Tools required: Cross-head (Phillips) screwdriver

Time estimate: 10 minutes

Difficulty: Easy ●

Steps to replace the battery:

1. Follow the steps above to [remove the bottom cover](#).
2. Remove the three silver battery screws along the bottom of the battery.



3. Unplug the white connector (highlighted cyan above) connecting the battery to the motherboard.
4. Remove the battery, starting from the bottom edge with screw holes.
5. When putting in the new battery, start with the plastic tabs along the top edge (opposite from the screw holes.)
6. When plugging in the new battery, the red wire on the connector goes on the left, and the black wire goes on the right.

Replacing the keyboard:

The keyboard can be replaced using the instructions below.

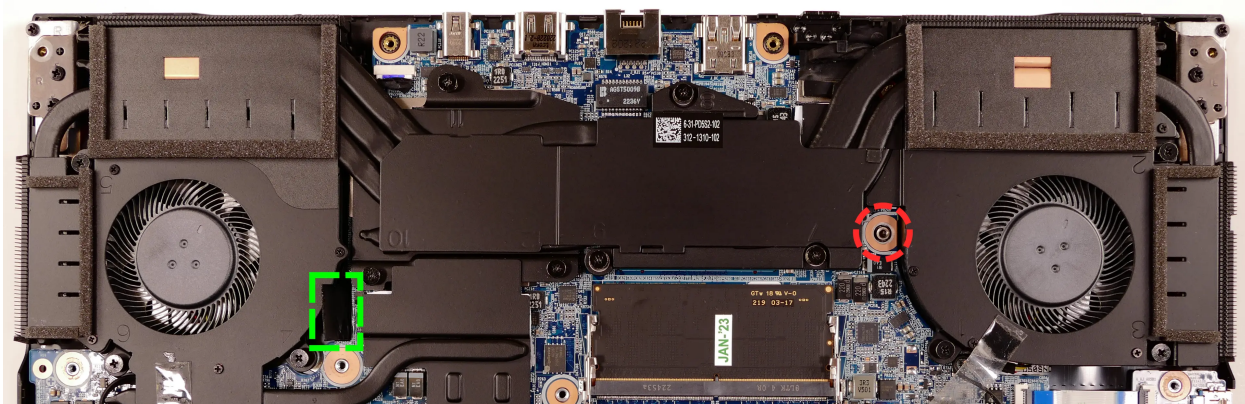
Tools required: Cross-head (Phillips) screwdriver; tweezers (optional)

Time estimate: 10 minutes

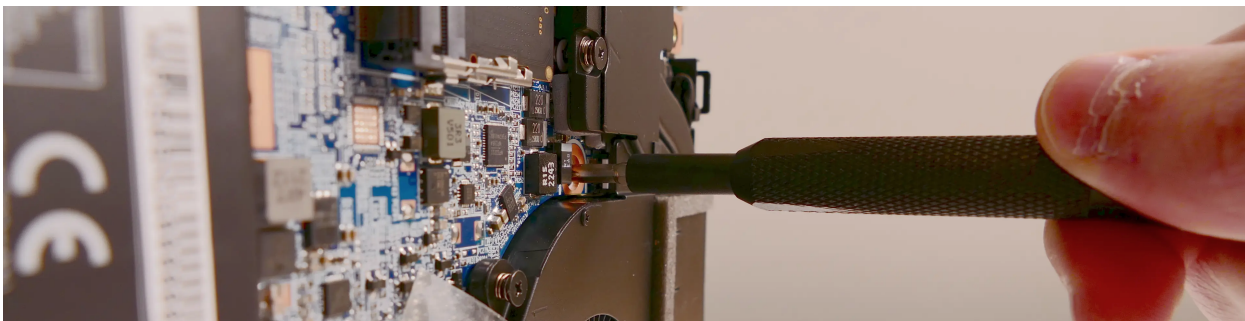
Difficulty: Medium ●

Steps to replace the keyboard:

1. Follow the steps above to [remove the bottom cover](#).
2. Pull the keyboard adhesive out of the machine to detach it from the keyboard.
 - The adhesive strip access point is highlighted green below.
 - If the end of the keyboard adhesive strip is tucked behind the fan, it can be pulled out using tweezers or a small screwdriver, or the [thermal system can be removed](#) to expose it.
 - Replacing the thermal paste is recommended if the thermal system is removed.
 - If the adhesive strip breaks, remove as much of it as possible. The keyboard can be reinstalled without the adhesive strip.

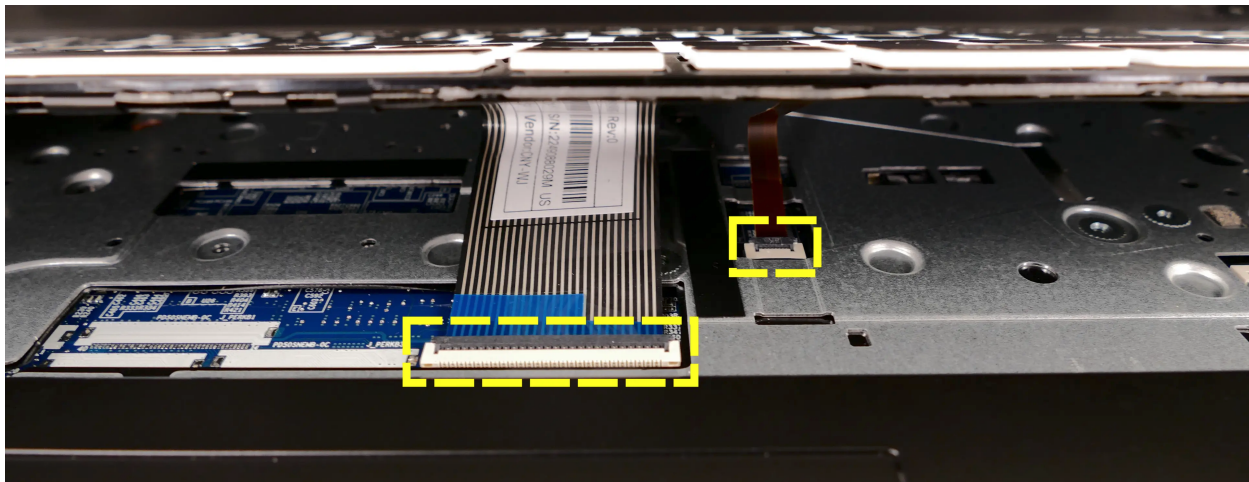


3. Open the lid slightly and place the machine on its side.
4. Push the screwdriver into the keyboard push point (highlighted red above) until the keyboard pops out.



5. Set the machine back down and raise the keyboard away from the chassis. The

larger ribbon cable is for the keyboard, while the smaller ribbon cable is for the keyboard backlight.



6. Flip the black latches upwards to free the ribbon cables.
7. Pull the ribbon cables out of the connectors.
8. Remove the keyboard and replace it with the new one.
9. Carefully slide both ribbon cables into their connectors.
10. Flip the black latches back into place to secure the ribbon cables.
11. (Optional) Replace the keyboard adhesive strip on the chassis.
12. Place the keyboard back into position, starting with the tabs on the bottom edge.
13. Secure the rest of the keyboard by pressing down on each of its edges.
14. Turn the machine lid-side down again.
15. Replace the bottom panel.

Replacing the RAM:

The Serval WS 13 supports up to 96GB (2x48GB) of DDR5 SO-DIMMs running at 5600MHz. If you've purchased new RAM, need to replace your RAM, or are reseating your RAM, follow these steps.

Tools required: Cross-head (Phillips) screwdriver

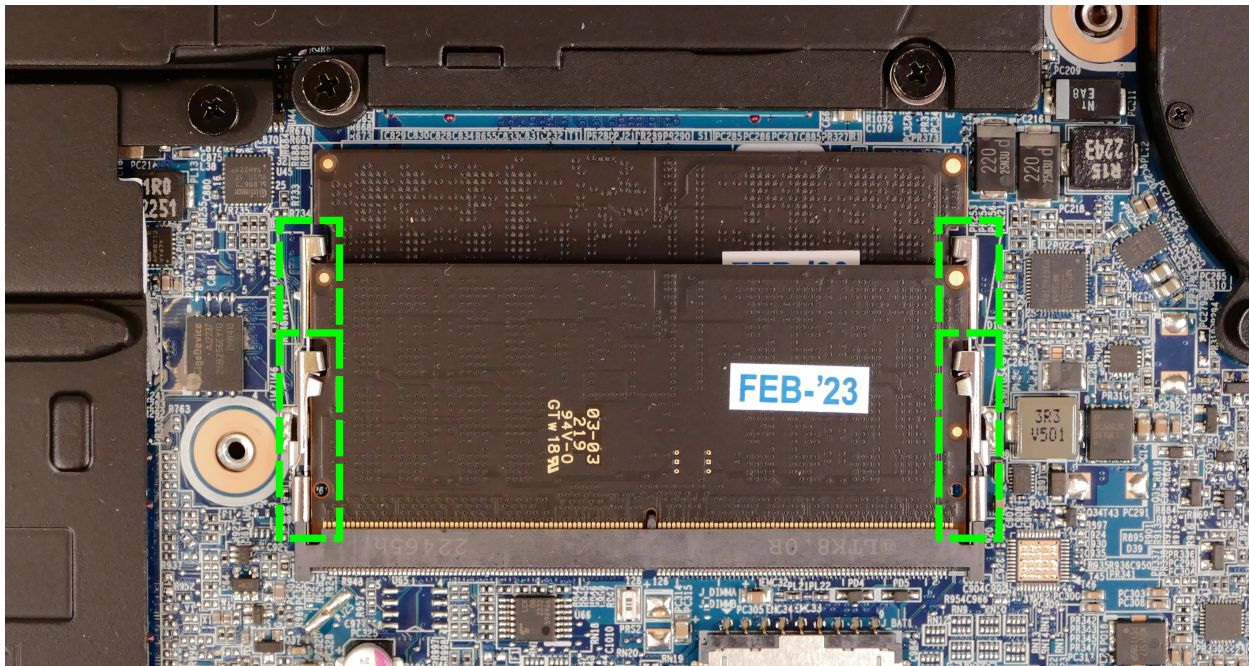
Time estimate: 10 minutes

Difficulty: Easy ●

Steps to replace the RAM:

1. Follow the steps above to [remove the bottom cover](#).

2. Press the small tabs on both sides of the RAM simultaneously. The RAM should spring up to an angle.



3. Remove the RAM from the slot.
4. Insert the new RAM (or reseal the existing RAM) by placing it in the keyed slot and pressing down on the RAM until it clicks into place.

Replacing an M.2/NVMe SSD:

This model supports up to two M.2 SSDs. Both M.2 slots are size 2280 and support PCIe NVMe Generation 4.

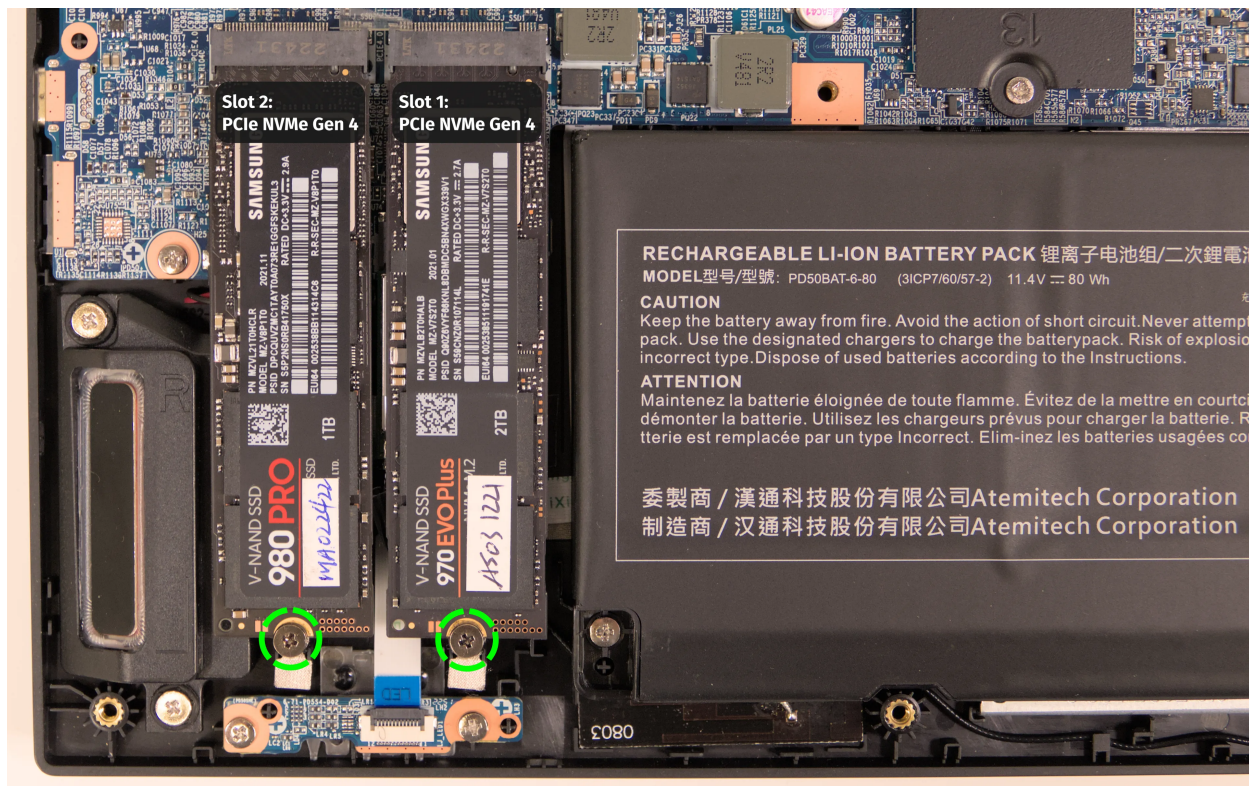
Tools required: Cross-head (Phillips) screwdriver

Time estimate: 10 minutes

Difficulty: Easy ●

Steps to replace the M.2 drive:

1. Follow the steps above to [remove the bottom cover](#).
2. Unscrew the retainer screw opposite the M.2 slot.



3. Remove the existing M.2 drive by pulling it out of the slot.
4. Insert the new M.2 drive into the slot and hold it in place.
5. Replace the retainer screw.

Replacing the cooling system:

The Serval WS 13 has a single heatsink assembly with two fans. This assembly cools the CPU and GPU.

If the fans become noisy and cleaning them out doesn't fix the issue, you may need a new fan. [Contact support](#) to start a warranty claim or parts purchase.

Depending on your climate and the age of the machine, it may be necessary to apply new thermal paste between the CPU/GPU and the heatsink. Thermal paste helps facilitate effective heat transfer between the CPU/GPU and the cooling equipment. These instructions can also be used in the unlikely event your heatsink needs to be replaced.

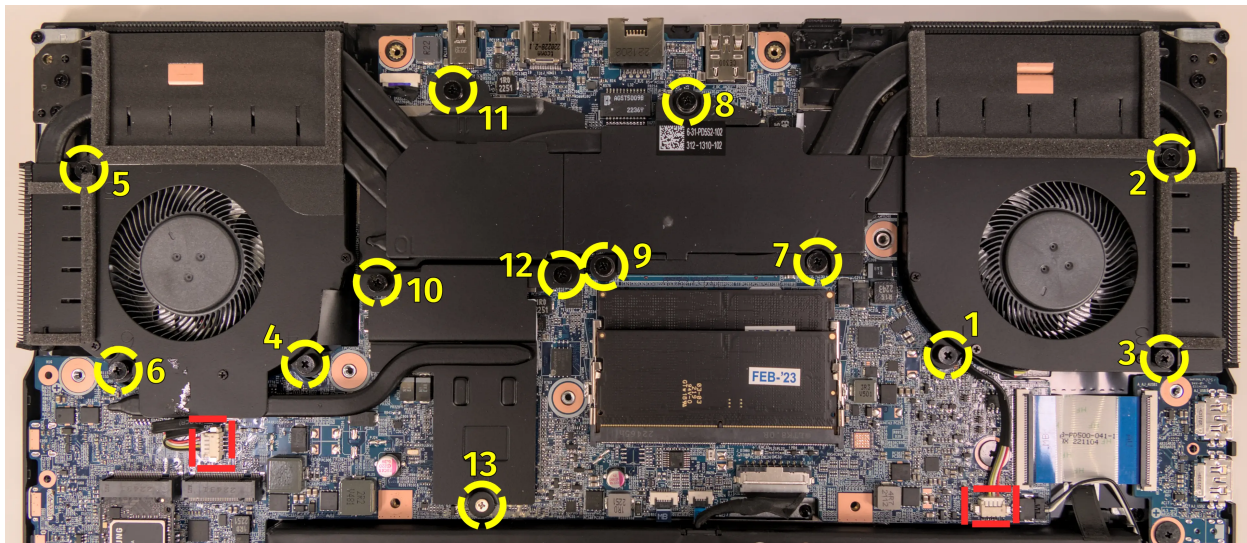
Tools required: Cross-head (Phillips) screwdriver

Time estimate: 15 minutes

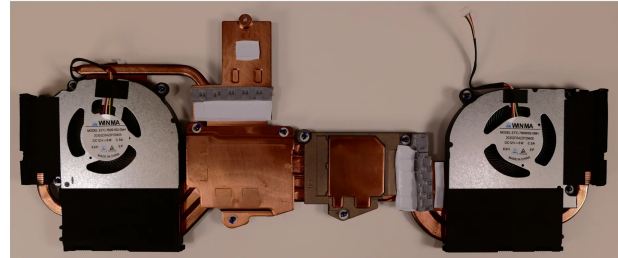
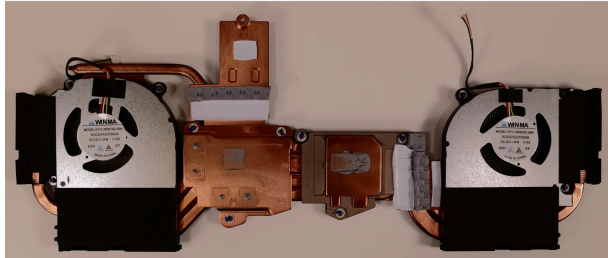
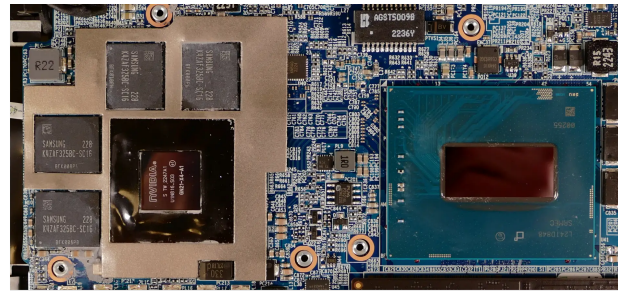
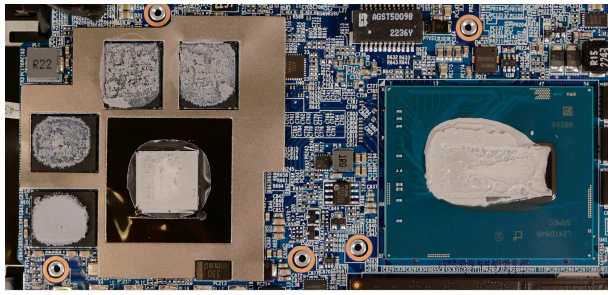
Difficulty: High ●

Steps to replace the heatsink/thermal paste:

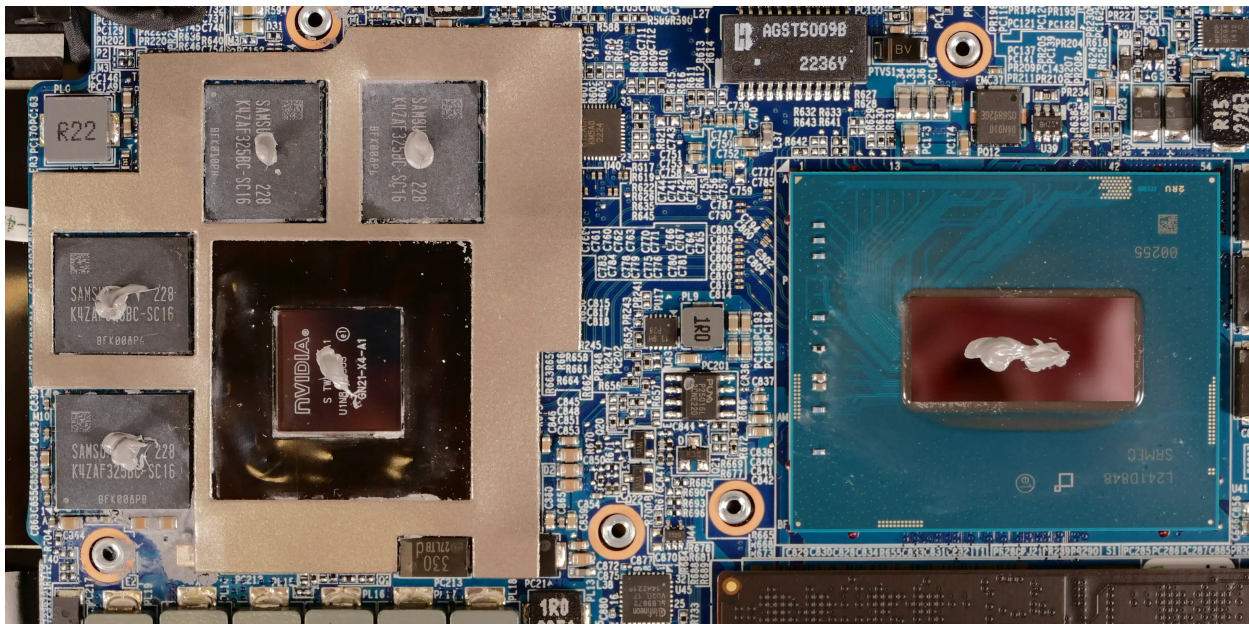
1. Follow the steps above to [remove the bottom cover](#).
2. Remove the thirteen heatsink and fan screws in order of the stamped numbers, starting with #1, then #2, and continuing until you have removed #13.
 - The black screws (#1-#12) are held captive, and will not completely detach from the heatsink/fans. The silver screw (#13) is not held captive, and will come loose when untightened.
 - Do not remove the smaller black screws holding the fan covers onto the fans.



3. Unplug the white fan connectors from the motherboard.
4. Remove the heatsink/fans from the case, being careful not to bend the heatsink pipes. It may take some pressure to break the seal of the thermal paste.
5. Using a paper towel, remove the existing thermal paste from the CPU, GPU, VRAM chips, and heatsink. You may also use a small amount of rubbing alcohol if the old paste is dried or difficult to remove.



6. Apply a small line of thermal paste directly onto the CPU chip, GPU chip, and VRAM chips.



7. Carefully replace the heatsink.
8. Replace the fan and heatsink screws, starting with #1, then #2, and so on until #13.
9. Plug the white fan connectors back into the motherboard.

Replacing the wireless card:

Your Serval WS's WiFi and Bluetooth are both handled by the same module. It is a standard M.2 2230 slot with PCIe and USB interfaces (E-key).

Tools required: Cross-head (Phillips) screwdriver

Time estimate: 10 minutes

Difficulty: Medium ●

Steps to replace the WiFi/Bluetooth module:

1. Follow the steps above to [remove the bottom cover](#).
2. If there is an M.2 SSD in the slot closest to the battery, follow the steps above to [remove the M.2 SSD](#).
 - The other SSD can optionally be removed to make working with the wireless card easier.
3. Locate the wireless module. Remove any clear tape that is securing the wires.



4. Gently remove the two antennas (highlighted red above) by pulling them up and away from the wireless card.
5. Remove the retaining screw opposite the M.2 slot, highlighted yellow above.
6. Slide the card out of the M.2 slot, parallel with the motherboard.
7. Insert the new wireless card into the M.2 slot.
8. Replace the retaining screw.
9. Attach the two antennas by aligning the circular fittings and pressing onto the wireless card. The connectors will snap into place. *Use caution when attaching the connectors; the pins can bend, break, or snap.*
10. Replace the M.2 SSD, bottom cover, and battery.

Replacing the CMOS battery:

The system has two bottom-firing speakers, which can be removed and replaced individually.

Tools required: Cross-head (Phillips) screwdriver

Time estimate: 10 minutes

Difficulty: Medium ●

Steps to replace the left speaker:

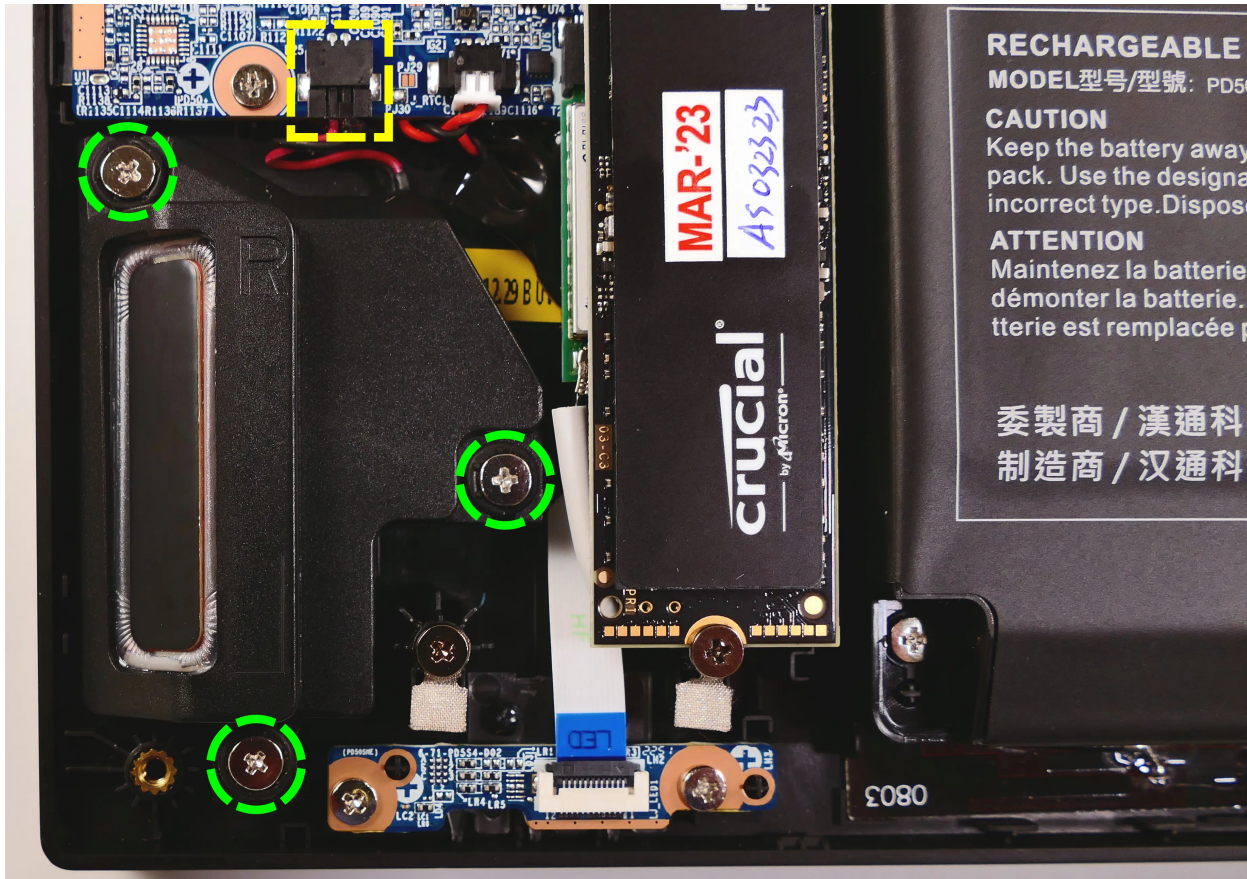
1. Follow the steps above to [remove the bottom cover](#).
2. Disconnect the speaker connector from the motherboard.
 - This can alternatively be done after freeing the speaker.



3. Unscrew the two speaker screws, free the speaker wire from the channels in the chassis, and remove the speaker.
4. Screw in the new speaker and connect it to the motherboard, securing the wire using the channels in the chassis.
5. Replace the [bottom cover](#).

Steps to replace the right speaker:

1. Follow the steps above to [remove the bottom cover](#) and [remove the outermost SSD](#).
2. Peel back any clear tape hanging onto the speaker from the wireless card.
3. Disconnect the speaker connector from the motherboard.
 - This can alternatively be done after freeing the speaker.



4. Unscrew the three speaker screws and remove the speaker.
5. Screw in the new speaker and connect it to the motherboard.
6. Replace the [outermost SSD](#) (if necessary) and [bottom cover](#).