system76

System76
Lemur (lemu7)
Service manual

Revision history

Author	Date	Version	Remarks
April Jones	2017-02-21	Initial	

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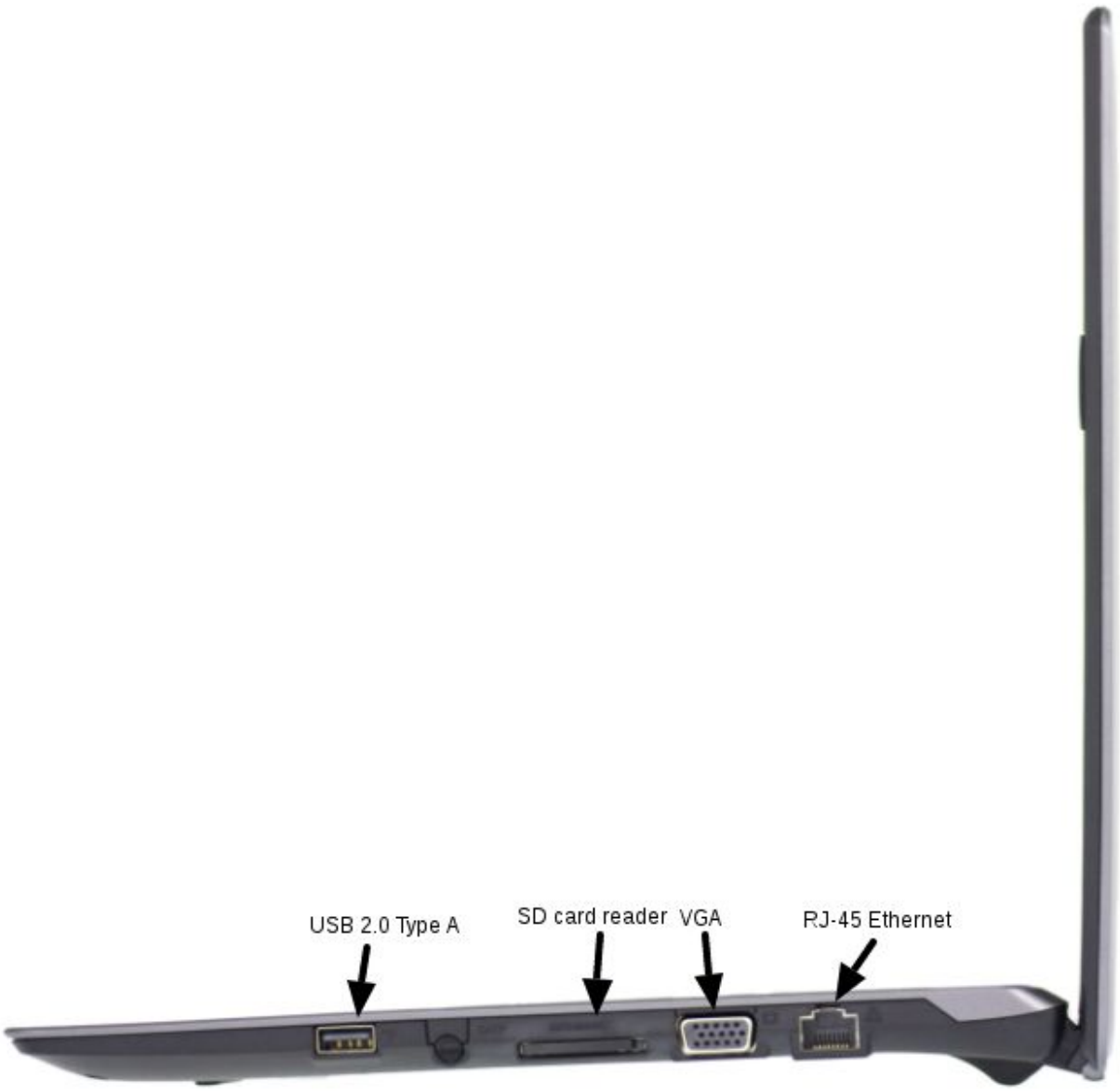
Hardware overview

External overview

Ports overview


USB 2.0 Type A
SD card reader
VGA
RJ-45 Ethernet

Front LED overview

Icon	Color	Description
	Orange	DC power plugged in
	Green	Computer is on
	Blinking green	Computer is sleeping
	Orange	Battery charging
	Green	Battery fully charged
	Blinking orange	Battery critically low
	Green	Airplane mode is ON (WiFi/Bluetooth disabled)
	Green	Hard disk activity

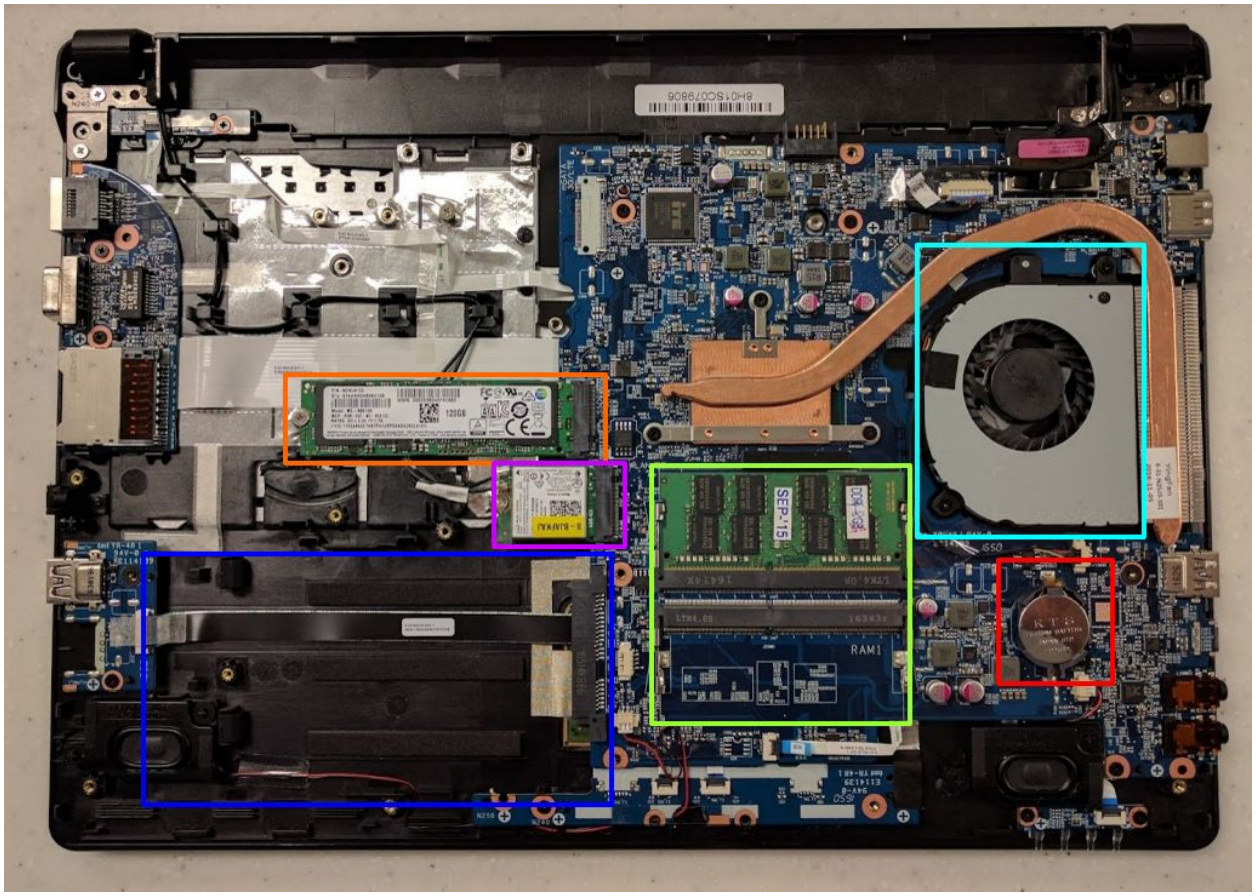
Hardware keyboard shortcuts

Your Lemur has several actions available using the Fn and Function keys.

Key	Shortcut	Action
	Fn+F1	Toggle trackpad
	Fn+F2	Toggle built-in LCD
	Fn+F3	Mute
	Fn+F5	Volume down
	Fn+F6	Volume up
	Fn+F7	Toggle displays
	Fn+F8	Brightness down
	Fn+F9	Brightness up
	Fn+F10	Toggle webcam
	Fn+F11	Toggle airplane mode
	Fn+F12	Suspend
	Fn+`	Play/Pause
	Fn+1	Toggle fan between max/normal
	Fn+Ins	Num Lock
	Fn+Del	Scroll Lock

Internal component overview

Below is a color-coded diagram of the Lemur's internal components.



CPU fan is highlighted in cyan
CMOS battery is highlighted in red
RAM is highlighted in green
M.2 SSD is highlighted in orange
Wireless/Bluetooth module is highlighted in purple
2.5" SSD (not present) is highlighted in blue

User-serviceable parts and repairs

Many components on your Lemur can be upgraded or replaced as necessary. Follow these step-by-step guides for instructions.

Replacing the keyboard

Keyboard replacement is simple and requires only a cross-head screwdriver.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 10 minutes
Difficulty: Moderate

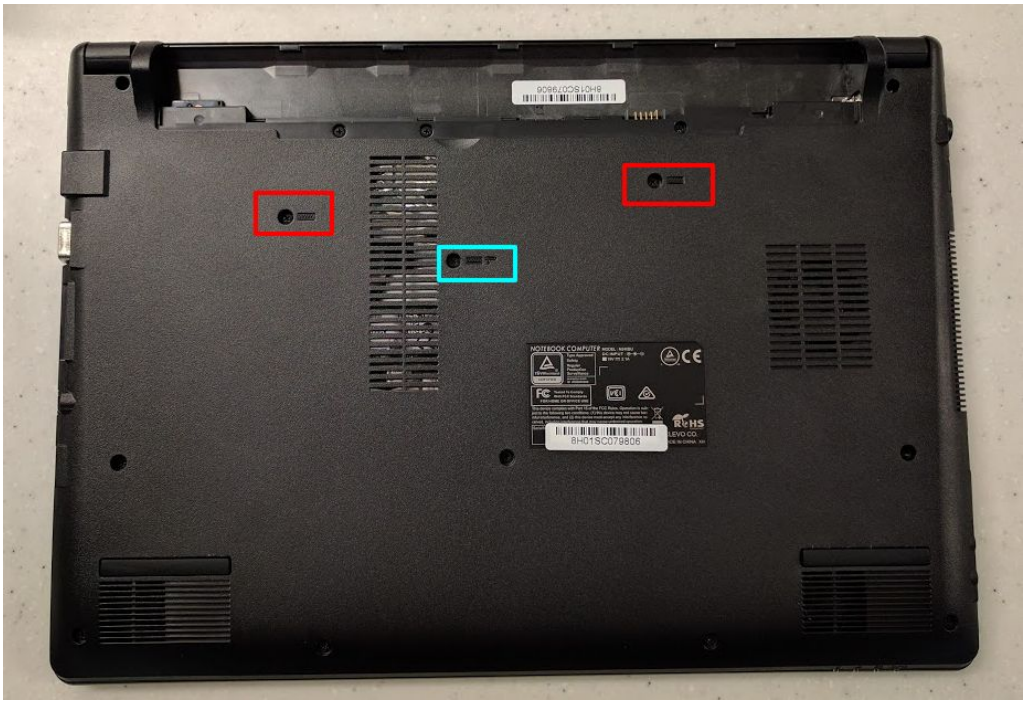
Steps to replace the keyboard

Photos are provided in order below these steps.

1. Find a surface suitable for replacing the keyboard. A desk or large table work well.
2. Place something soft on the table, like a towel or static-free blanket.
3. Place the Lemur lid-side-down.
4. Remove the battery.
5. Remove the 3 keyboard screws, indicated by the small keyboard icon.
6. Open the Lemur and place it on its side.
7. Push the screwdriver (or another long, thin object) through the hole marked with an arrow. Apply pressure until the keyboard pops out.
8. Set the Lemur down.
9. Pull the keyboard loose.
10. Flip the keyboard over onto the trackpad.
11. Loosen both sides of the keyboard ribbon connector.
12. Remove the ribbon connector.
13. Remove the keyboard and replace it with the new one.
14. Insert the ribbon cable into the connector.
15. Apply pressure equally to both sides of the connector to secure the ribbon cable.
16. Flip the keyboard over.
17. Secure the keyboard by pressing down on the edges of the keyboard.
18. Flip the Lemur over.
19. Replace the 3 screws holding the keyboard in place.
20. Replace the battery, boot your Lemur, and confirm the keyboard is operational.

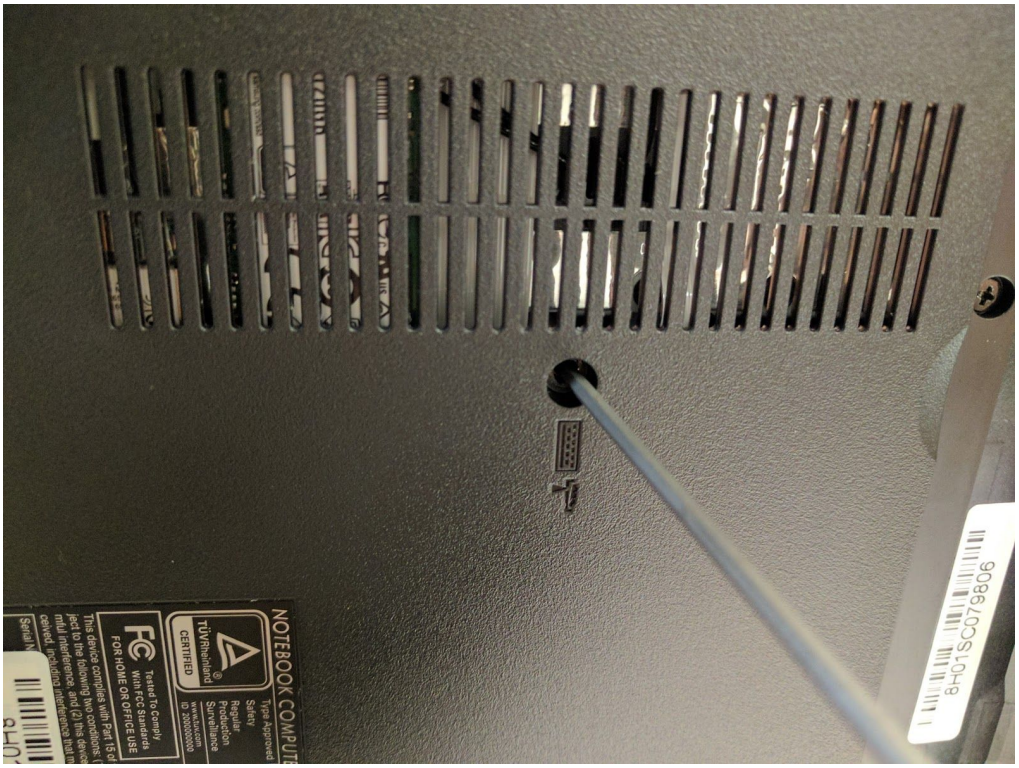
Photo guide for keyboard repair

1. Lemur lid-side-down and battery removed. Keyboard screws are highlighted, with the blue (center) highlight indicating the keyboard removal hole.

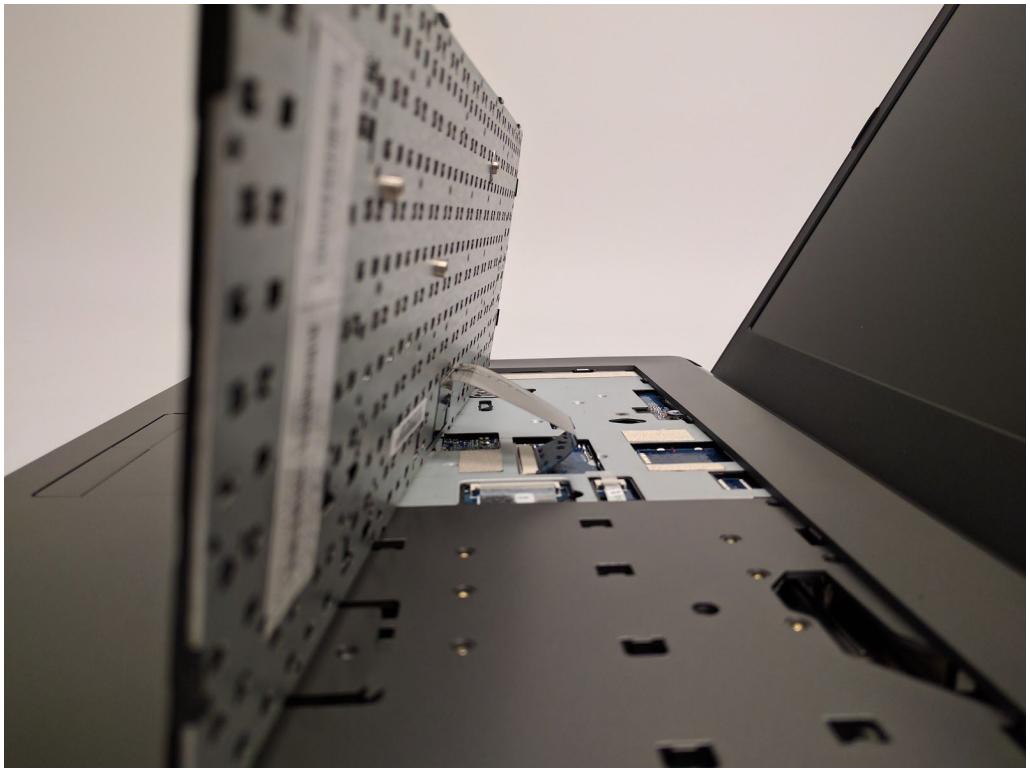


2. Lemur on its side

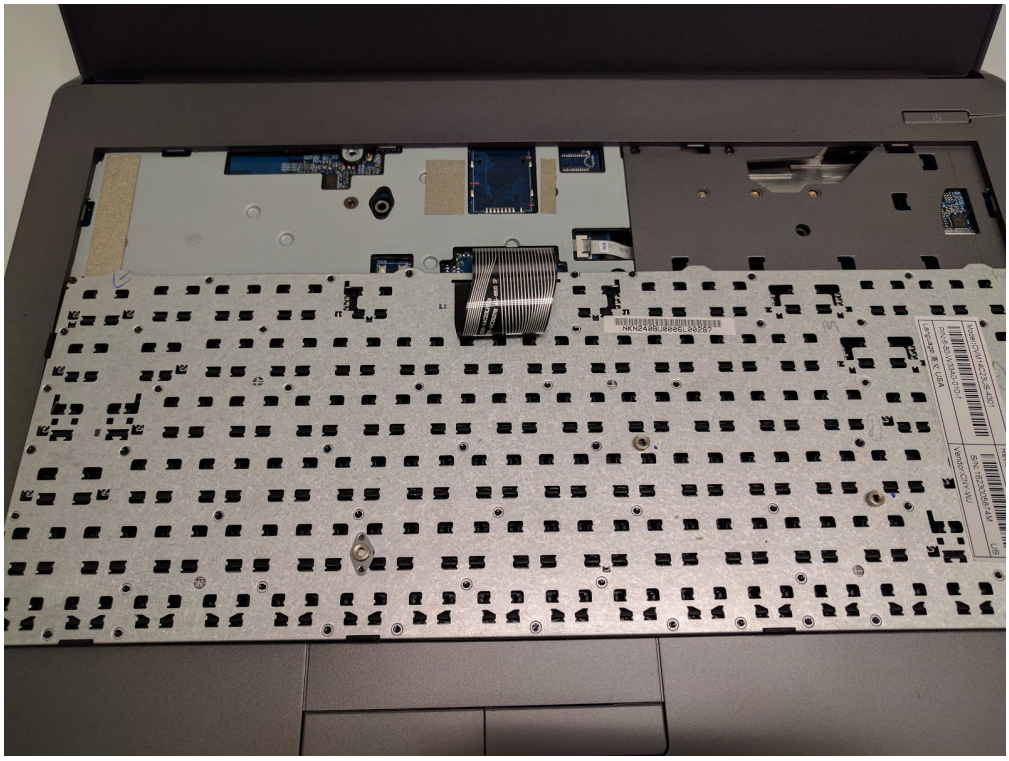
3. Pressing a screwdriver through the keyboard removal hole



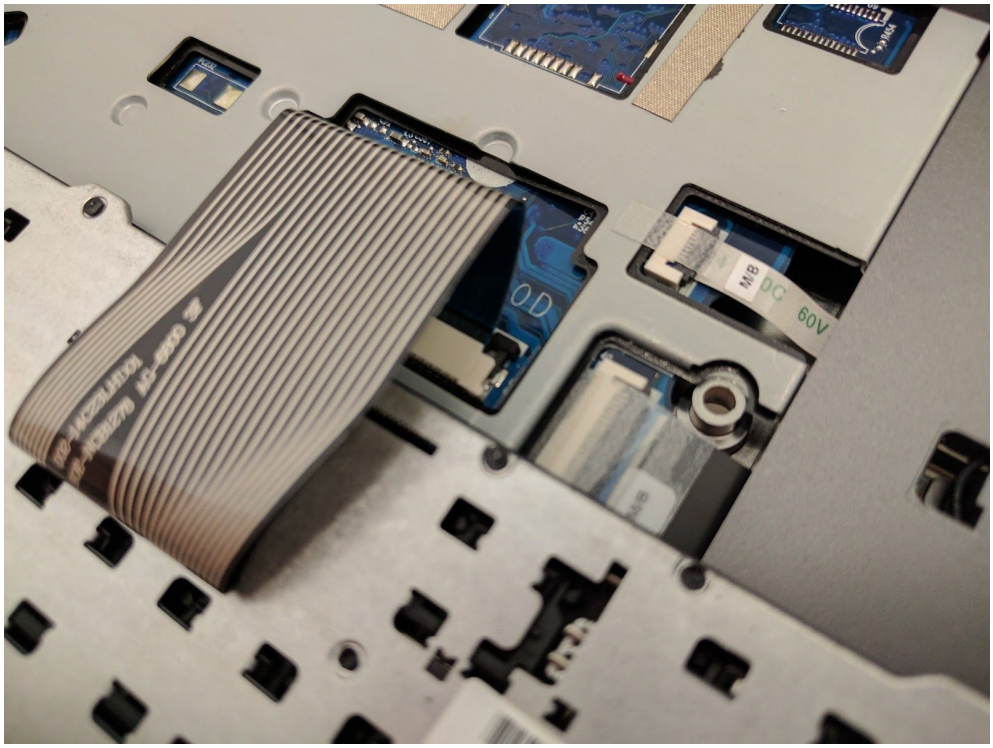
4. Flipping the keyboard



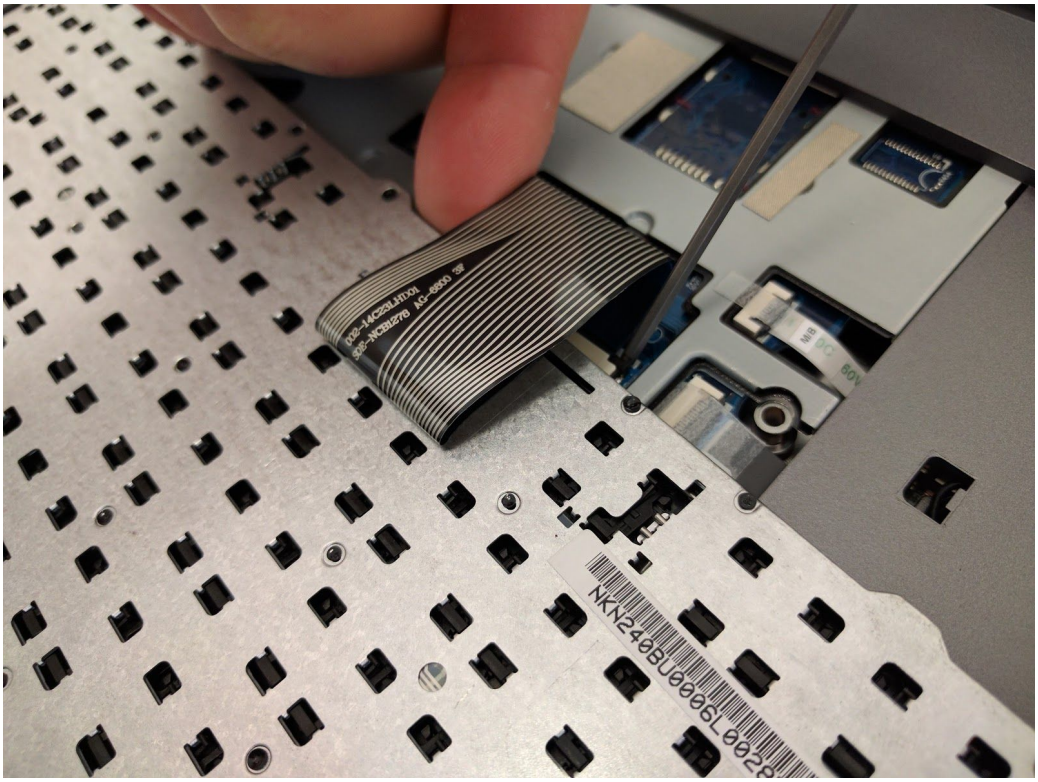
5. Keyboard resting on trackpad



6. Removing the ribbon connector



7. Re-seating the ribbon connector with equal pressure on both sides



Removing the cover

Removing the cover is required to access the internal components. Prior to removing the cover, ensure the battery and AC power are unplugged, and all peripherals (including SD cards and USB drives) are unplugged or removed from the system. The cover is held in place with 15 screws of the same size and plastic snaps.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Low

Steps to remove the cover

1. Find a surface suitable for replacing the keyboard. A desk or large table work well.
2. Place something soft on the table, like a towel or static-free blanket.
3. Place the Lemur lid-side-down.
4. Remove the battery. 3 screws are located under the battery.
5. Remove all 15 screws and set them aside. Some screws may not come out, in this case flip the laptop over and gently tap it until all screws fall out of the system.
6. Starting from the Ethernet port, gently pry the bottom case away from the system, moving down the left side, until all snaps are free and the bottom cover is free.

Steps to replace the cover

1. Attach the bottom cover to the top of the case towards the front of the Lemur.
2. Press down along the edges of the Lemur.
3. Check that the edges near the battery are correctly inserted into the unit.
4. Once the cover is fully snapped into place, ensure all ports are properly aligned.

Replace all screws, including the 3 under the battery.

Replacing the RAM

RAM acts as temporary storage for your computer. More RAM generally provides better performance. If you've purchased new RAM, need to replace your RAM, or are reseating your RAM, follow these steps.

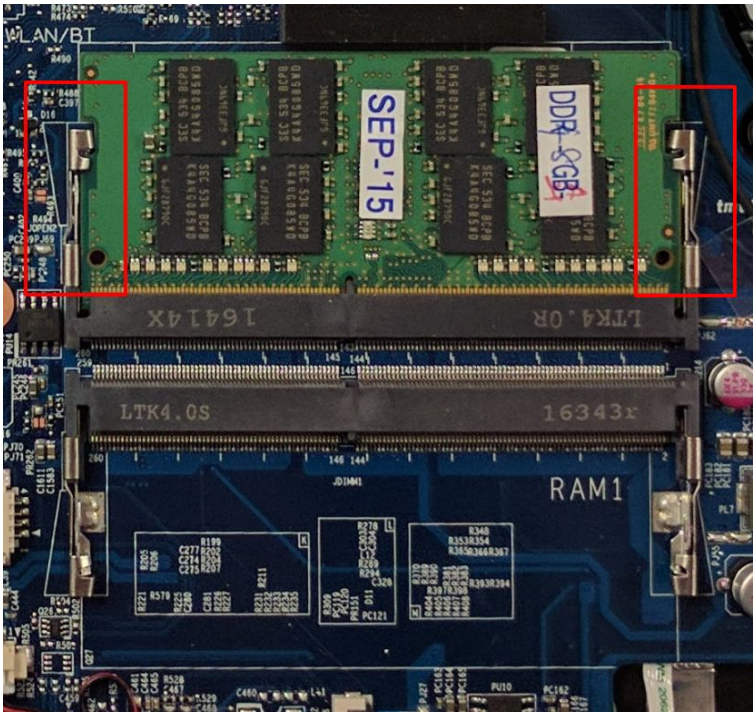
Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Low

Steps to replace the RAM

1. Follow the steps above to remove the cover.
2. Press the small tabs on both sides of the RAM simultaneously.
3. Remove the RAM from the slot.
4. Insert the new RAM (or reseat the existing RAM) by placing it in the keyed slot and pressing down on the RAM until it clicks into place.

Photo guide for replacing the RAM

1. Press the tabs indicated in red to release the RAM from the slot.



Replacing an M.2/NVMe SSD

M.2 SSDs offer, at minimum, SATA3 speeds and performance in a package about the size of a stick of gum. NVMe M.2 SSDs offer even higher performance. The Lemur supports one M.2 SSD, size 2280, either SATA or PCIe Generation 4.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Low

Steps to replace the M.2 drive

1. Follow the steps above to remove the cover.
2. Locate the M.2 drive (or drive slot).
3. Unscrew the retainer screw opposite the M.2 slot.
4. Remove the existing M.2 drive by pulling it out of the slot.
5. Insert the new M.2 drive into the slot and hold it in place.
6. Replace the retainer screw.

Replacing a 2.5” SSD/HDD

2.5” drives are available as either SSD (Solid State Drive) or HDD (Hard Disk Drive.) SSDs provide much better performance and durability compared to standard HDDs since there are no moving parts. Standard HDDs are less expensive and are useful for storage, however they are much more fragile.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Low

Steps to replace the M.2 drive

1. Follow the steps above to remove the cover.
2. Locate the 2.5” SSD (or slot).
3. Remove the existing drive by pulling it up and away from the connector.
4. Insert the new 2.5” drive.
5. Ensure the 2.5” drive is secured in the slot and does not move.

Replacing the CPU fan

If the CPU fan becomes noisy and cleaning it out doesn't fix the issue, you may need a new CPU fan. Contact Support to start a warranty claim or parts purchase.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Low

Steps to replace the CPU fan

1. Follow the steps above to remove the cover.
2. Locate the CPU fan.
3. Unplug the CPU fan from the motherboard.
4. Remove the 2 screws holding the CPU fan in place.
5. Remove the CPU fan.
6. Insert the new CPU fan.
7. Replace the 2 screws.
8. Plug the new CPU fan into the motherboard.

Replacing the CPU heatsink/thermal paste

In rare cases, or after several years, it may be necessary to apply new thermal paste between the CPU and the heatsink. Thermal paste helps facilitate effective heat transfer between the CPU and the cooling equipment. These instructions can also be used in the unlikely event your heatsink needs replacing.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Medium

Steps to replace the CPU heatsink/thermal paste

1. Follow the steps above to remove the cover.
2. Locate the CPU heatsink screws.
3. Remove the screws, starting with #3, then #2, and lastly #1.
4. Carefully remove the heatsink from the case.
5. Using a paper towel, remove the existing thermal paste. You may also use a small amount of rubbing alcohol to remove excess or difficult-to-remove paste.
6. After cleaning the CPU and heatsink, apply a small line of thermal paste directly onto the CPU core.
7. Carefully replace the heatsink.
8. Replace the screws, starting with #1, then #2, and lastly #3. Do not fully tighten #1 and #2 until #3 is in place, then fully tighten all screws.

Replacing the CMOS battery

The CMOS battery supplies power to the Lemur's CMOS chip. Changes you make to the BIOS and the computer's hardware clock are stored on the CMOS. If your clock is constantly resetting, it's likely your CMOS battery needs replacing.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Low

Steps to replace the CMOS battery

1. Follow the steps above to remove the cover.
2. Locate the CMOS battery.
3. Gently press the battery towards the CPU fan and pull up on the battery.
4. Replace the CMOS battery in the slot and press it into place.

Replacing the WiFi/Bluetooth module

Your Lemur's WiFi and Bluetooth are both handled with the same module. It is a standard M.2 2230 slot with PCIe & USB Interfaces (A Key).

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Medium

Steps to replace the WiFi/Bluetooth module

1. Follow the steps above to remove the cover.
2. Locate the wireless module.
3. Gently remove the two antennas by pulling them up and away from the wireless module.
4. Remove the retaining screw opposite the M.2 slot.
5. Remove the wireless module from the slot.
6. Insert the new wireless module.
7. Replace the retaining screw.
8. Attach the two antennas by aligning the circular fitting and pressing onto the wireless card. The connector will snap into place. **Use caution when attaching the connectors, the pins can bend, break, or snap.**

BIOS utilities

When starting your Lemur, it takes a few seconds to conduct a quick check of the components. As it proceeds, it will notify you if anything is wrong. Any issues that prevent the system from booting will be displayed and you will be prompted to enter the Setup. If no problems are detected, your Lemur will load GRUB and then Ubuntu.

For Setup/BIOS, hold F2 while booting.
For boot options, hold F7 while booting and choose your preferred boot device.

BIOS overview

The Setup/BIOS utility allows you to make low-level changes to your Lemur. It's not recommended to make changes unless the settings are provided by Support, or if you understand what you're changing.

Main menu

Option	Description
SATA Port #	Pressing Enter opens the sub-menu to show the configuration of a SATA device on the SATA ports.
OffBoard SATA/NVMe Controller Configuration	Pressing Enter opens the sub-menu to show the configuration of any devices on the offboard SATA/NVMe controller, if installed.
System Date/Time	Set the system date/time using the hardware clock.
System/Extended Memory	Information on the amount of RAM installed.
ME FW/ MB Series/ BIOS Version/ KB/EC Firmware Rev.	Information on the BIOS version(s) and network adapter address.

Advanced

Option	Description
Advanced Chipset Control	Options for VT-d, FlexiCharger, SGX
> VT-D	Enable/disable Intel Virtualization Technology for Directed I/O. Extends Intel Virtualization Technology (VT) by providing hardware assets for virtual hypervisors.
> FlexiCharger	The sub-menu here allows you to enable/disable the FlexiCharger. The FlexiCharger can be set to automatically start charging your battery when the battery reaches a certain capacity level (e.g. you could start the battery charge level at 40%). You can then set the level to stop charging (e.g. 100%), but the stop charge level must be higher than the start charge level. **It is not recommended to enable FlexiCharger for extended periods of time.**
> SW Guard Extensions (SGX)	Enable or disable Intel SGX (Software Guard Extensions.)
SATA Mode	The SATA (Serial ATA) controller is designed to operate in AHCI (Advanced Host Controller Interface) mode only.
Power on boot beep	Enable/disable a beep as the computer starts up.
Battery low alarm beep	Enable/disable a beep when the battery is critically low.

Security

Option	Description
Set Supervisor Password	Sets a password for the Setup Utility. This does not affect access to the computer or Ubuntu, only the BIOS.
Set User Password	Sets a password for the Setup Utility. This does not affect access to the computer or Ubuntu, only the BIOS.
Password on Boot	Specify whether or not a password should be entered to boot the computer. If “Enabled” is selected, only users who enter a correct password can boot the system. **The password cannot be reset or cleared if forgotten.**

Updating the BIOS

BIOS updates and instructions are sent out as needed. System76 will notify you if a BIOS update is available for your Lemur.

Specifications

Component	Specification
Processors	**Intel® CoreTM i7-7500U (2.7GHz)** 4MB Smart Cache, 14nm (14 Nanometer), DDR4-2133MHz, TDP 15W **Intel® CoreTM i3-7100U (2.4GHz)** 3MB Smart Cache, 14nm (14 Nanometer), DDR4-2133MHz, TDP 15W
Display	14.0” / 35.56cm FHD (1920 *1080),16:9 3.0mm Thick Backlit Panel
Memory	Dual Channel **DDR4** Two 260 Pin SO-DIMM Sockets Supporting **DDR4 2133 MHz** Memory Modules (real operational frequency depends on the FSB of the processor) **Memory Expandable up to 32GB** Compatible with 4GB, 8GB or 16GB Modules
Graphics	**Intel® HD Graphics 620** Dynamic Frequency Intel Dynamic Video Memory Technology
Storage	One Changeable 2.5" / 7.0 mm (h) HDD/ SSD with SATA (Serial) Interface One M.2 SSD 2280, SATA/PCIe Gen 3*4 Interface
Audio	High Definition Audio Interface Built-In Microphone 2 * Built-In Speakers

Component	Specification
Touchpad & Keyboard	ClickPad with Multi- Gesture and Scrolling Functionality A4 Size Isolated Keyboard
Webcam	1.0M HD Video Camera Module with USB interface
Interfaces	One USB 2.0 Port One USB 3.0 (USB 3.1 Gen 1) Port (Type-A) One USB 3.0 (USB 3.1 Gen 1) Port (Type-C) One External Monitor Port One HDMI-Out (High-Definition Multimedia Interface) Port (with HDCP) One Microphone-In Jack One RJ-45 LAN Jack One DC-In Jack One Headphone-Out Jack
Card reader	Embedded Multi-In-1 Card Reader - MMC/ RS MMC - SD/ Mini SD / SDHC/ SDXC **Note:** Some high-speed SD cards (Class 10) may not work with the Lemur's SD card reader.
M.2 Slots	**Two** M.2 Card Slots: **Slot 1** for M.2 2230 WLAN Combo Module with PCIe & USB Interfaces (A Key) **Slot 2** for SSD M.2 2280 Card with SATA / PCIe Gen 3*4 Interface (M Key)
Network	Built-In 10/100/1000Mb Base-TX Ethernet LAN Intel® Dual Band Wireless-AC 8265 (2*2 802.11 a/c) WLAN + Bluetooth M.2 2230 Combo Module (867Mbps) Intel® Dual Band Wireless-AC 3168 (1*1 802.11 a/c) WLAN + Bluetooth M.2 2230 Combo Module (433Mbps)

Component	Specification
Power and battery	Full Range AC/DC Adapter AC input 100 - 240V, 50 - 60Hz, DC Output 19V, 2.1A (40 Watts) Embedded 4 Cell Smart Lithium Ion Battery Pack 44WH
Security	Security (Kensington® Type) Lock Slot BIOS Password Trusted Platform Module 2.0 (disabled by default)
Operating System	Ubuntu Linux
Indicators	LED Indicators - Power/Suspend, Battery, HDD, Airplane Mode, Camera
Environmental	Temperature Operating: 5°C - 35°C Non-operating: -20°C - 60°C Relative humidity Operating: 20% - 80% Non-operating: 10% - 90%
Dimensions & Weight	13.4" × 9.5" × 0.9" 340mm(w) * 243.5mm(d) * 22.2mm(h) (Height excluding battery area) 3.6lbs / 1.6kg base weight, varies with configuration.