system76

System76
Oryx Pro (oryp5)
Service manual

Revision history

Author	Date	Version	Remarks
Aaron Honeycutt	2019-03-01	Initial	

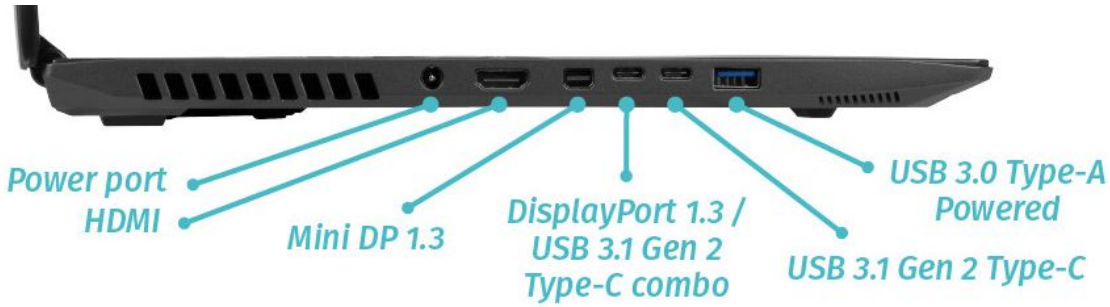
Contents

Hardware overview

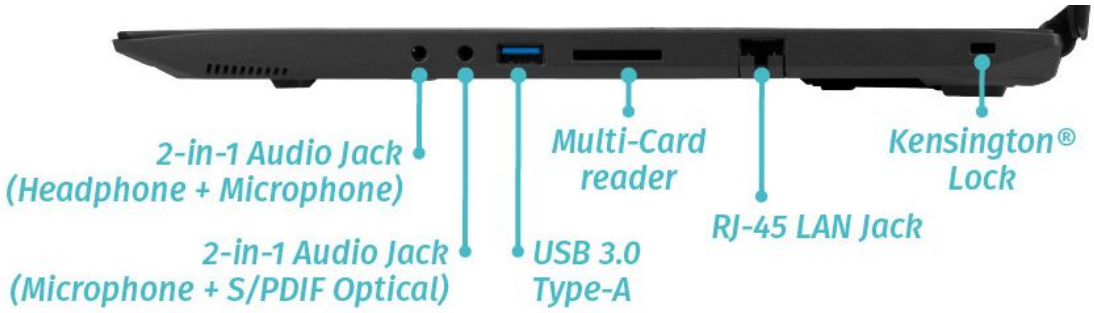
External overview

Ports overview

The Oryx provides multiple connectivity options.



Left side overview



Right side overview

Bottom case screw sizes

The Oryx has one size of screw for securing the bottom case.

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

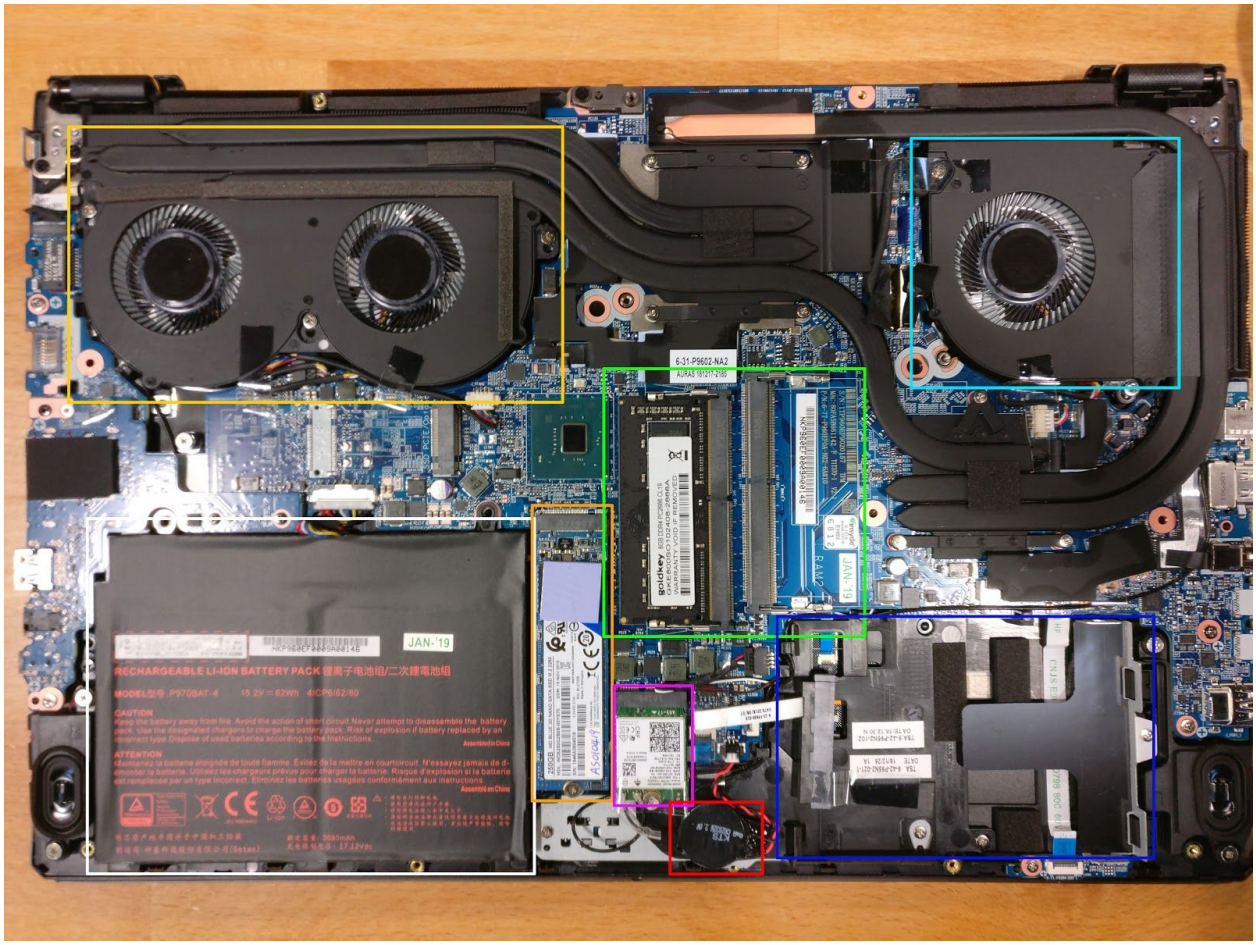
Hardware keyboard shortcuts

Your Oryx 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+*	Toggle keyboard backlight
	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/automatic
	Fn+/	Cycle Keyboard Color
	Fn+-	Decrease Keyboard Brightness
	Fn++	Increase Keyboard Brightness

External displays

Aside from the standard Mini DisplayPort (MiniDP) and HDMI, the Oryx also supports DisplayPort over USB-C Internal component overview
Below is a color-coded diagram of the Oryx's internal components.



CPU fan is highlighted in cyan
GPU fans are highlighted in light orange
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
Battery is highlighted in white
2.5" drive bay is highlighted in dark blue

User-serviceable parts and repairs

Many components on your Oryx 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: Low
Screws: 2 total

- 2 large M2, black (Keyboard M2)

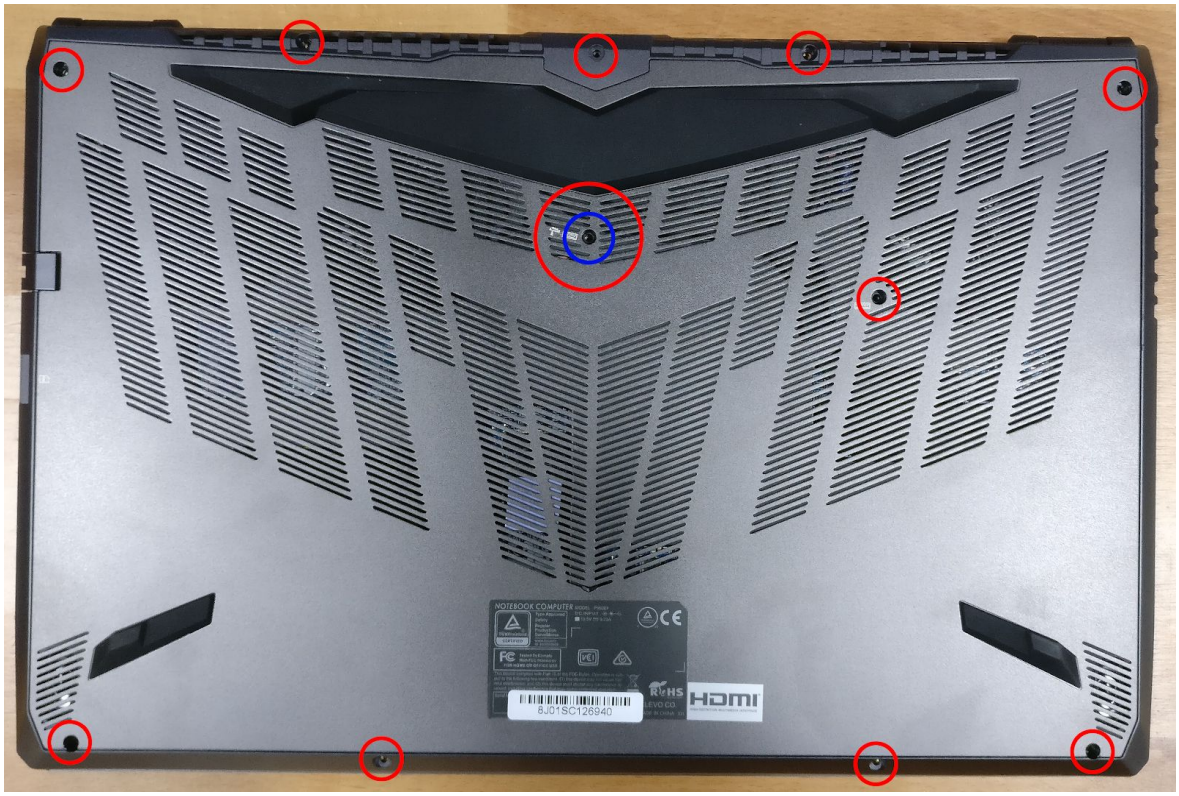
Steps to replace the keyboard

Photos are provided in order below these steps.

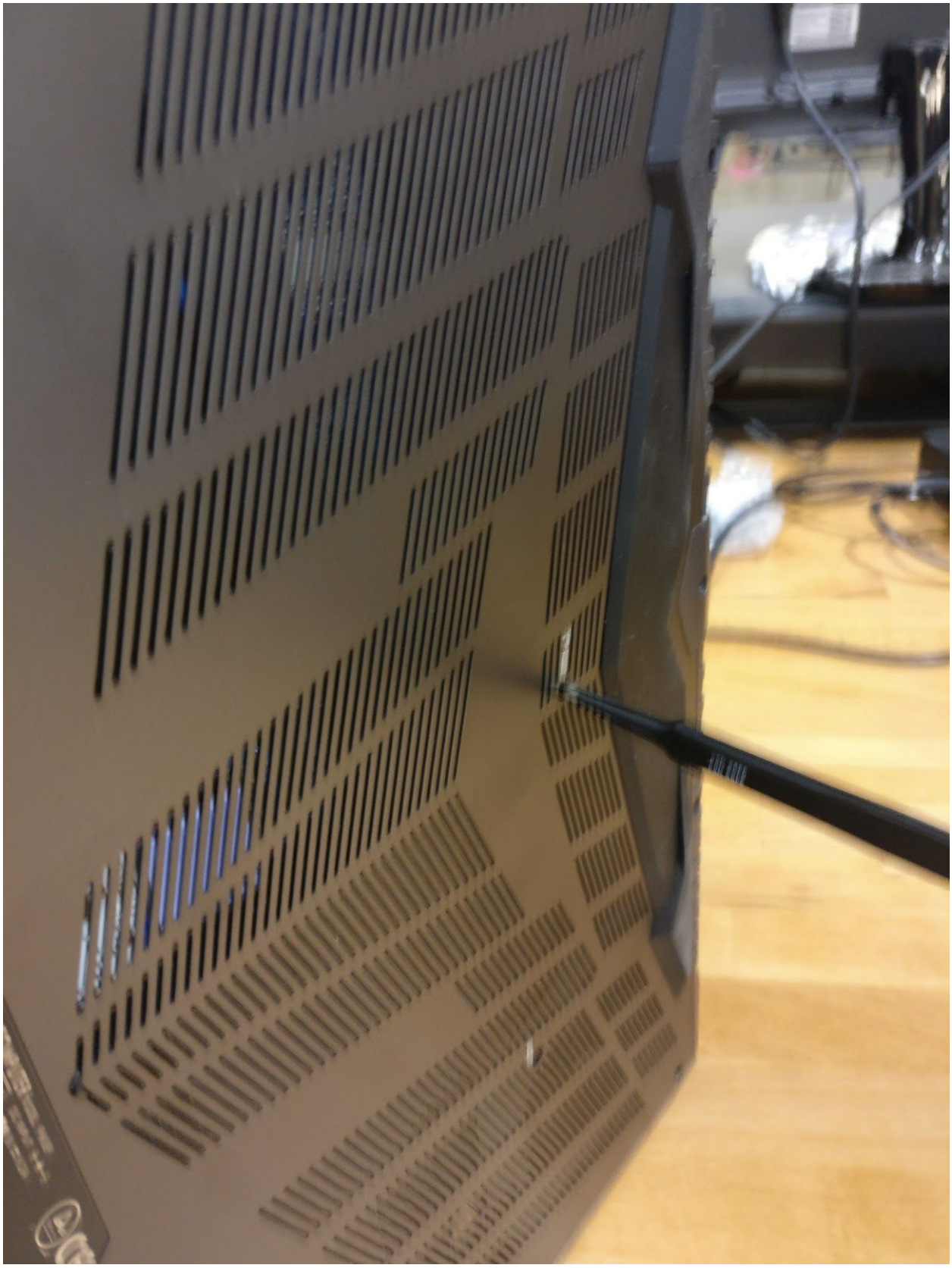
1. Find a surface suitable for work. A desk or table works well.
2. Place something soft on the table, like a towel or anti-static mat.
3. Place the Oryx lid-side-down.
4. Remove the 2 keyboard screws, indicated by the small keyboard icons.
5. Open the Oryx and place it on its side.
6. Push the screwdriver into the keyboard push point until the keyboard pops out.
7. Set the Oryx down, then starting from the top side, pull the keyboard loose.
8. Flip the keyboard over onto the trackpad.
9. Pull the large ribbon cable out of the connector.
10. The small ribbon cables have latches. Gently pull the latches from both sides and remove the ribbon cables.
11. Remove the keyboard and replace it with the new one.
12. Insert the large ribbon cable into the connector.
13. Seat the small ribbon cables, then apply pressure equally to both sides of the connector to secure.
14. Flip the keyboard over and press the bottom tabs of the keyboard into the case.
15. Secure the keyboard by pressing down on the edges of the keyboard.
16. Flip the Oryx over.
17. Replace the 2 screws holding the keyboard in place.
18. Boot your Oryx and confirm the keyboard is operational.

Photo guide for keyboard replacement

1. Oryx lid-side-down. There are two keyboard screws and one has a red circle while the other one has a red and blue circle indicating the keyboard push point.

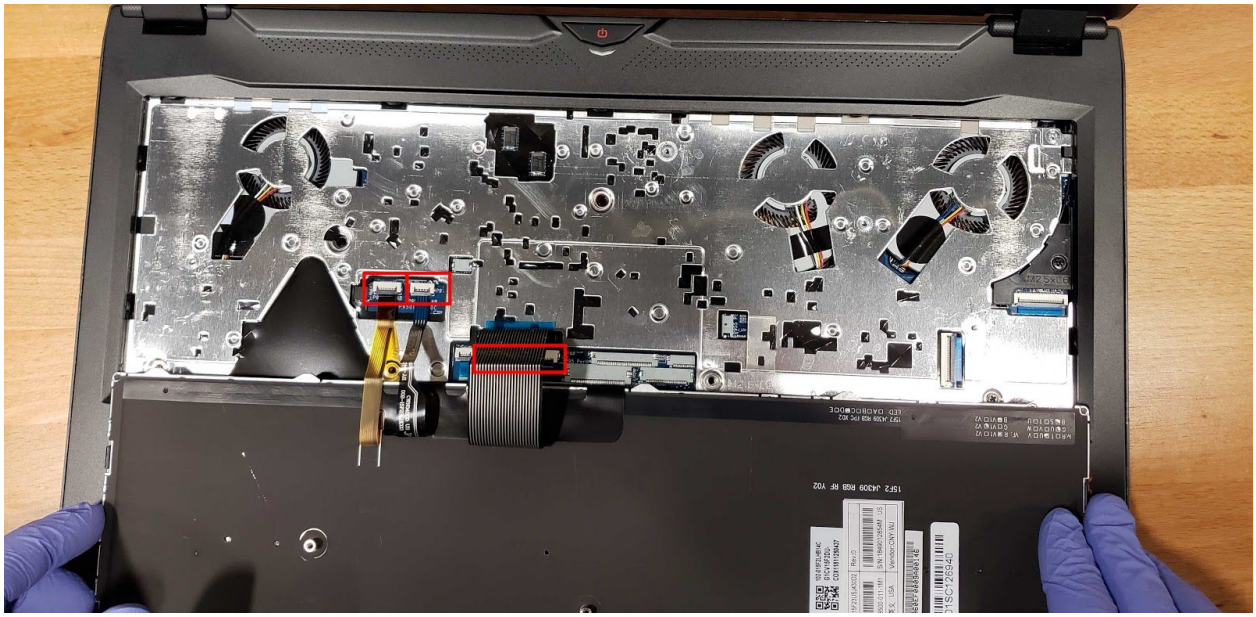


2. Oryx on its side with screwdriver in keyboard push point.



3. Set the Oryx down and remove the keyboard starting along the top edge.

4. Flip the keyboard over and rest it on the trackpad. Pull the large ribbon cable out of the connector. The smaller ribbon cables have latches. Gently pull it forward to release the connector, then remove the ribbon cables.



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: 10 minutes
Difficulty: Medium
Screws: 16 total:

- 9 small M2 perimeter, black
- 2 large M2 keyboard, black
- 4 small/short M2 under keyboard, silver
- 1 small/short M2 under keyboard, black

Steps to remove the cover

Photos are provided in order below these steps.

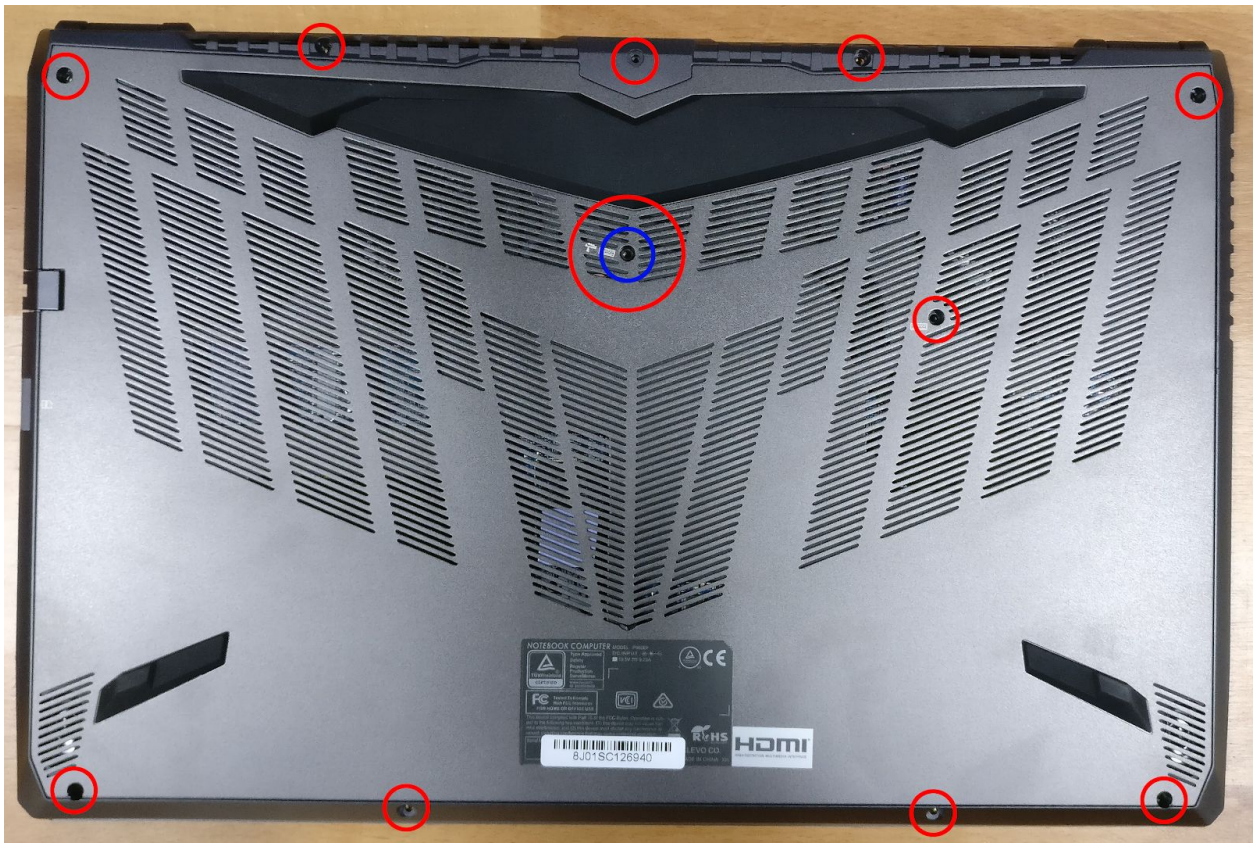
1. Find a surface suitable for work. A desk or table works well.
2. Place something soft on the table, like a towel or anti-static mat.
3. Place the Oryx lid-side-down.
4. Remove the 9 perimeter screws.
5. Remove the 2 keyboard screws, indicated by the small keyboard icons.
6. Open the Oryx and place it on its side.
7. Push the screwdriver into the keyboard push point until the keyboard pops out.
8. Set the Oryx down.
9. Starting from the top side, pull the keyboard loose.
10. Flip the keyboard over onto the trackpad.
11. Remove the 4 silver screws and 1 black screw holding the bottom case in place.
12. Partially replace the keyboard, but don't snap it into place.
13. Close the lid and flip the Oryx lid-side-down again.
14. The bottom cover will lift off, starting from the front corners working to the back near the hinges.

Steps to replace the cover

1. Align the bottom cover to the case towards the back and hinges.
2. Set the bottom cover along the edges and confirm the bottom cover is seated.
3. Replace the 9 perimeter screws.
4. Flip the Oryx and replace the 4 silver screws and 1 black screw from under the keyboard.
5. Replace the keyboard by inserting the tabs into the bottom edge near the trackpad and press around the edges of the keyboard to ensure it is fully snapped into place.
6. Flip the Oryx and replace the 2 keyboard screws.

Photo guide for bottom cover removal/replacement

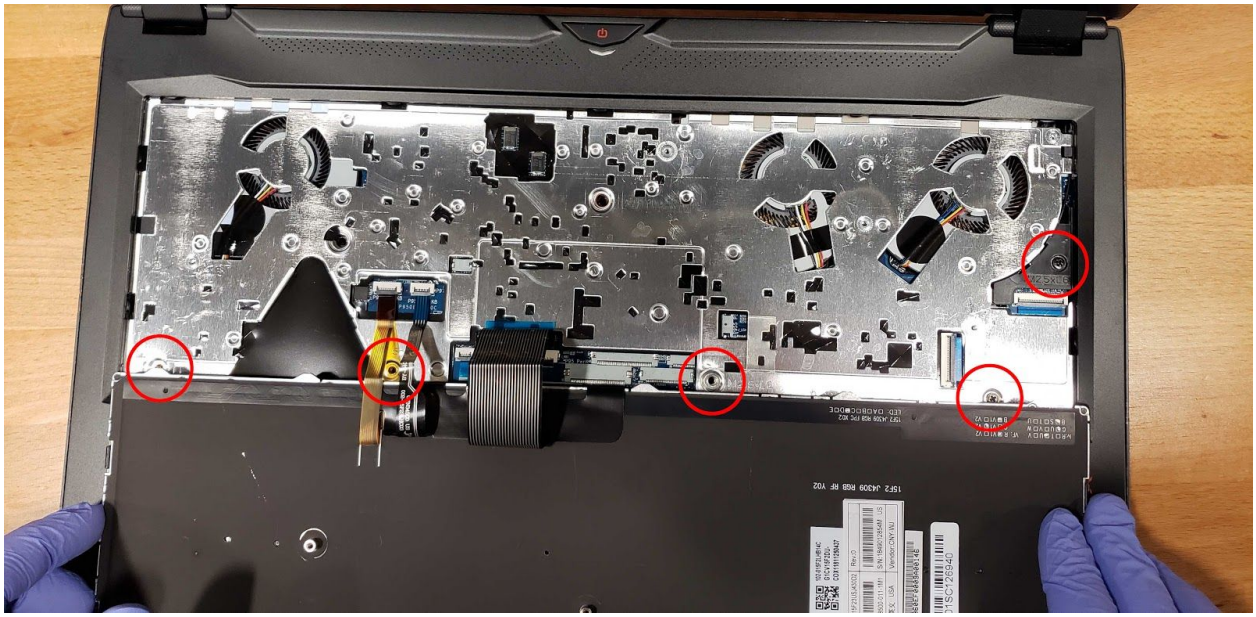
1. Oryx lid-side-down. There are two keyboard screws and one has a red circle while the other one has a red and blue circle indicating the keyboard push point.



2. Oryx on its side with screwdriver in keyboard push point. Push until the keyboard has popped out. This requires a solid amount of force.

3. Once the corner of the keyboard has popped, pull along the top edge of the keyboard to unseat it entirely.

4. Flip over the keyboard and remove the 4 silver screws and 1 black screw. Their location is highlighted in red. (Note: In this photo, the screws have already been removed.)



5. Set the keyboard mostly in place, close the lid, and flip the Oryx lid-side-down.

6. Starting near the front corner, lift the bottom cover off the Oryx.

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: 15 minutes
Difficulty: Medium

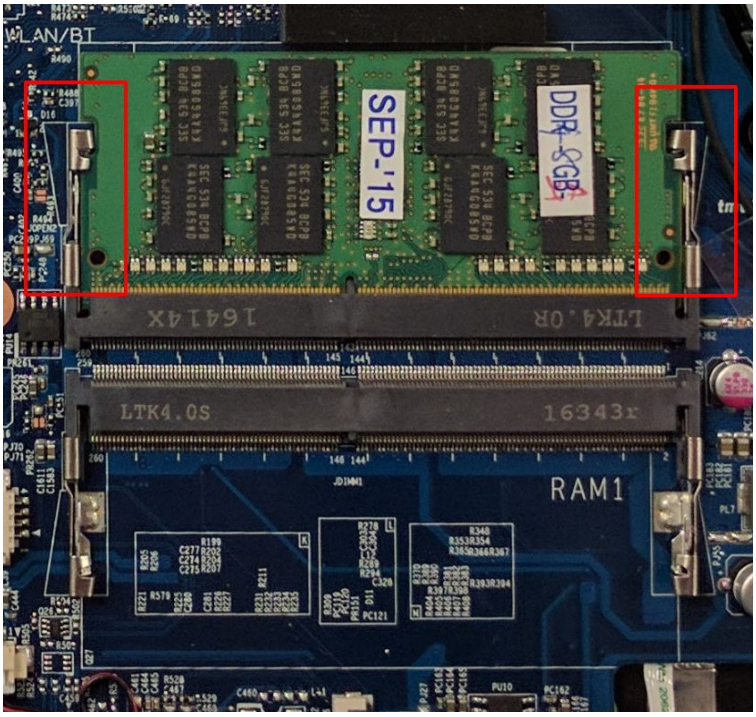
Steps to replace the RAM

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 Oryx supports two M.2 SSD's, size 2280. One slot supports either M.2 SATA or NVMe M.2 PCIe Generation 4, and the other slot supports only NVMe M.2 PCIe Generation 4.

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

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 the CPU fan or GPU fans

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

Tools required: Cross-head (Phillips) screwdriver, paper towel and thermal compound
Time estimate: 25 minutes
Difficulty: High

Steps to replace the CPU fan/GPU fans

1. Follow the steps above to remove the cover.
2. Locate the CPU fan and GPU fans.
3. Remove the 2 screws holding the CPU fan in place.
4. Remove the 3 screws holding the GPU fans in place.
5. Disconnect the 2 cables for the GPU fan and the 1 cable for the CPU fan.
6. Unscrew the CPU heatsink and GPU heatsink in order as labelled.
7. Using a paper towel, remove the existing thermal compound. You may also use a small amount of rubbing alcohol to remove excess or difficult-to-remove paste.
8. After cleaning the CPU, GPU and both heatsinks, apply a small line of thermal compound directly onto the top of the CPU, and the same on the top of the GPU.
9. Plug the new CPU fan and new GPU fans into the motherboard.
10. Carefully replace both heatsinks.
11. Replace the 2 screws for the CPU fan and replace the 3 screws for the GPU fans.
12. Replace the screws for the CPU heatsink, starting with #1, then #2, and lastly #3. Do not fully tighten screws #1 and #2 until all three are in place, then fully tighten all three screws in order.
13. Replace the screws for the GPU heatsink, starting with #1, then #2, then #3 and lastly #4. Do not fully tighten screws #1, #2, and #3 until #4 is in place, then fully tighten all four screws.

Replacing the CMOS battery

The CMOS battery supplies power to the Oryx's CMOS chip. Changes you make to the BIOS and the computer's hardware clock are stored on the CMOS. If your Oryx doesn't boot, you can reset the CMOS to force a low-level hardware reset. 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: Medium

Steps to replace the CMOS battery

1. Follow the steps above to remove the cover.
2. Locate the CMOS battery. There is a red and black wire connecting the battery to a white connector.
3. Unplug the white connector for 1 minute, then reseat the connector.
4. Power up the Oryx. The system may power itself off and on after initial boot, this is normal.
5. Press Enter at the CMOS/BIOS reset message prompts.
6. If you are booted into the BIOS, press F4 to load defaults, then F10 to save and resume normal boot.

Replacing the internal battery

The battery provides primary power whenever the system is unplugged.

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

Steps to replace the internal battery

1. Follow the steps above to remove the cover.
2. Unplug the white connector above the battery.
3. Remove the 1 screw holding the battery in place.
4. Remove and replace the battery.
5. Replace the 1 screw and plug in the battery.

Replacing the WiFi/Bluetooth module

Your Oryx'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 Oryx, 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 Oryx will load GRUB and then Ubuntu/Pop!_OS,.

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

Updating the BIOS

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

BIOS overview

The Setup/BIOS utility allows you to make low-level changes to your Oryx. 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.
System Memory/	

Extended Memory/ MB Series/ BIOS Version/ KBC/EC/ MAC Address	

Advanced

Option	Description
Advanced Chipset Control	Options for VT-d, FlexiCharger, SGX, Fast Boot, DDI Control
> 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	Enable or disable Intel SGX (Software Guard Extensions.)
> GPU Performance Scaling	Enabled or Disabled NV GPU Performance Scaling Support
> Fast Boot	Enables or disables boot with initialization of a minimal set of devices required to launch the active boot option. This has no effect for BBS boot options.
> UEFI OS Fast Boot	If enabled the system firmware does not initialize keyboard and check for the firmware menu key
> ME State	When Disabled ME will be put into ME Temporarily Disabled Mode.
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/Pop!_OS,/Pop!_OS, only the BIOS.
TPM Configuration	Trusted Computing Settings
> Security Device Support	Enable or Disable BIOS support for TPM 2.0 security device.

Administer Secure Boot

Option	Description
Secure Boot	Enables support for Secure Boot. This is not recommended or required for Ubuntu/Pop!_OS.

Boot

Option	Description
Network Stack	Enable or disable support for Intel PXE network boot.
> Ipv4 PXE Support	Allow PXE booting using IPv4.
> Ipv6 PXE Support	Allow PXE booting using IPv6.

Boot Manager

Option	Description
Boot Option Priorities	Determine the boot order for system devices. Boot option #1 will be tried first. It's recommended to set your boot drive as the 1st option and use the F7 key when temporarily booting from an external device or PXE booting

Specifications

Component	Specification
Processors	**Intel® CoreTM i7-8750H (4.1GHz)** 2.2 up to 4.1GHz - 9MB Cache – 6 Cores – 12 Threads
Display	16.1" or 17.3" Full HD 144 Hz Matte
Memory	Dual Channel **DDR4** Two 260 Pin SO-DIMM Sockets Supporting **DDR4 2666 MHz** Memory And **DDR4 3000 MHz** Memory Modules (real operational frequency depends on the FSB of the processor) **Memory Expandable up to 32GB** Compatible with 8GB or 16GB Modules
Graphics	**NVIDIA GeForce RTX** **2060, 2070, and 2080**
Storage	One M.2 SSD 2280, SATA/PCIe Gen 3x4 Interface One 2.5" 7mm SATA Drive
Audio	High Definition audio interface S/PDIF Digital output Built-in Array Microphone 2 Built-in Speakers SoundBlasterX® Pro-Gaming 360°

Component	Specification
Touchpad & Keyboard	ClickPad with Multi- Gesture and Scrolling Functionality A4 Size Isolated Keyboard
Webcam	720p HD Video Camera Module with USB interface
Interfaces	One HDMI output Port (with HDCP) One Mini DisplayPort 1.3 output Port One DisplayPort 1.3 over USB 3.1 Gen 2 (Type C) One USB 3.1 Gen 2 Port (Type C) Two USB 3.0 Ports (1 x powered USB port, AC/DC) One 2-in-1 Audio Jack (Microphone / S/PDIF Optical output) One 2-in-1 Audio Jack (Headphone / Microphone) One RJ-45 LAN (10/100/1000Mbps)
Card reader	Embedded Multi-In-1 Card Reader - MMC/ RS MMC - SD/ Mini SD / SDHC/ SDXC up to UHS-II
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 x4 Interface (M Key) **Slot 3** for SSD M.2 2280 Card with PCIe Gen 3 x4 Interface (M Key)
Network	Built-In 10/100/1000Mb Base-TX Ethernet LAN Intel® Dual Band Wireless-AC 9560 (2*2 802.11 a/c) WLAN + Bluetooth M.2

	2230 Combo Module (867Mbps)

Component	Specification
Power and battery	Full Range AC/DC Adapter AC input 100 - 240V, 50 - 60Hz, DC Output 19V, 9.23A (180 Watts) Embedded Smart Lithium Ion Battery Pack 62WH
Security	Security (Kensington® Type) Lock Slot Disabled ME BIOS Password Trusted Platform Module 2.0 (disabled by default)
Operating System	Ubuntu/Pop!_OS,/Pop!_OS
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	Height x Width x Depth **16.1”** : 0.78” x 14.96” x 9.92” **16.1”** : 4.6lbs, 2.09kg **17.3”** : 0.78” x 15.69” x 10.55” **17.3”** : 5.51lbs, 2.50kg base weight, varies with configuration.