Kobra X Printhead Technical Overview & Disassembly

This guide provides a technical overview of the Kobra X printhead, including step-by-step disassembly procedures.

Throughout this guide, we use BrianC's Printhead Service Jig and strongly recommend that you do the same. The service jig securely supports the printhead during service, greatly reducing the risk of damaging the wiring while making the entire process easier and more efficient.

You can download the service jig by scanning the QR code shown to the right.

This document uses the most common terminology for the components in the Kobra X. However Anycubic calls certain components by up to four different names on their site. So the names we have chose might not align with what you are calling them.

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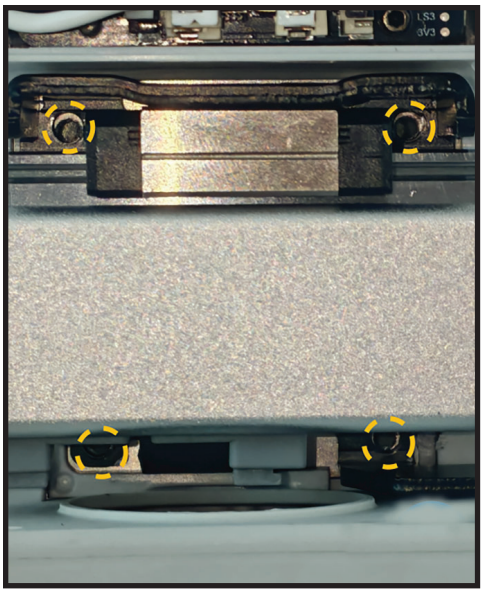
Printhead Removal



The prinhead can be removed in less than 2 minutes and it's recommended you do so it for any type of significant maintenance.

1) Snap off the back cover on the printead and lay aside. Disconnect the printhead harness.

2) Remove the four 2.5 mm allen head screws (shown below).



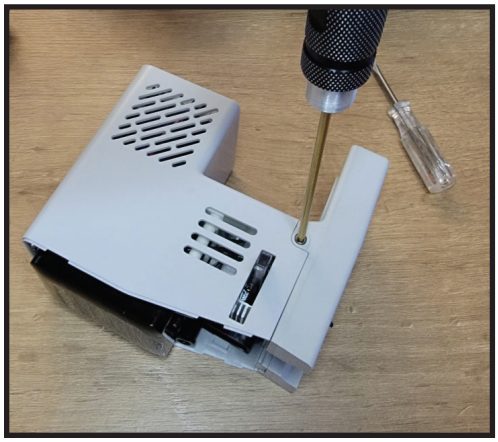
Note: If you are cleaning up a blob on your printhead, you can plug the cable back in and use the hotend heater to assist even while the printhead is disconnected.

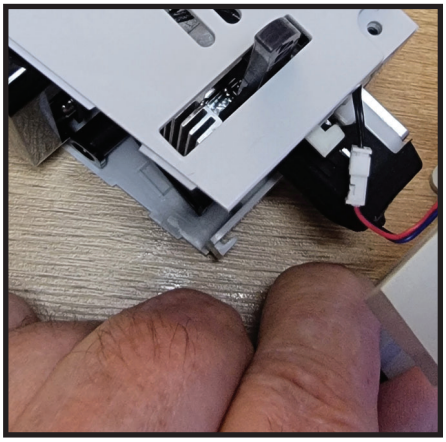
Disassembly



Removing the Outer Case

First remove the upper channel from the printhead. It is held in place with two allen screws with 2mm head. Once the screws are removed it will lift up and out.





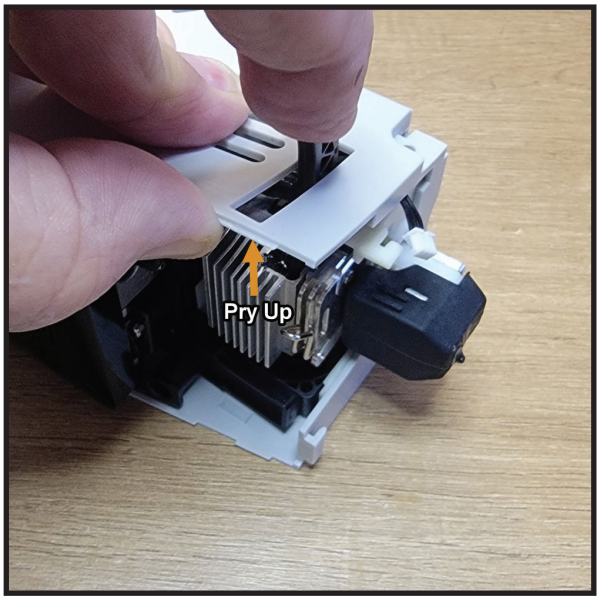
Next, remove the lower model fan housing. It is attached to the printer case with two screws, one on each side. They also have a 2mm allen head.

Once the screws have been removed, you can remove the lower housing. Pay attention to the small fan wire that will need unplugged during this process.

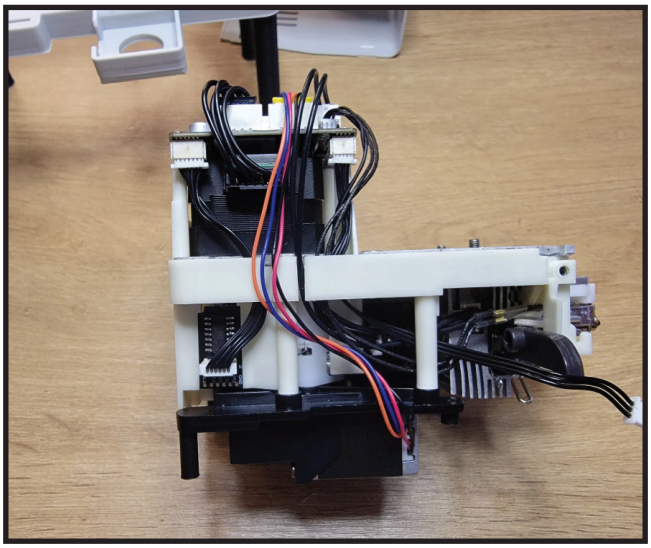
To start, slide the cover towards the back and down. This will expose the wiring and you can unplug the connector. Once removed, set the housing aside as you will not need it until reassembly.

The main housing is ready to come off.

The housing slides off the back but with the filament cutter installed you have to pry out the right side of the case while simultaniosuly pulling down on the cutter arm so the case will slide back and over it.



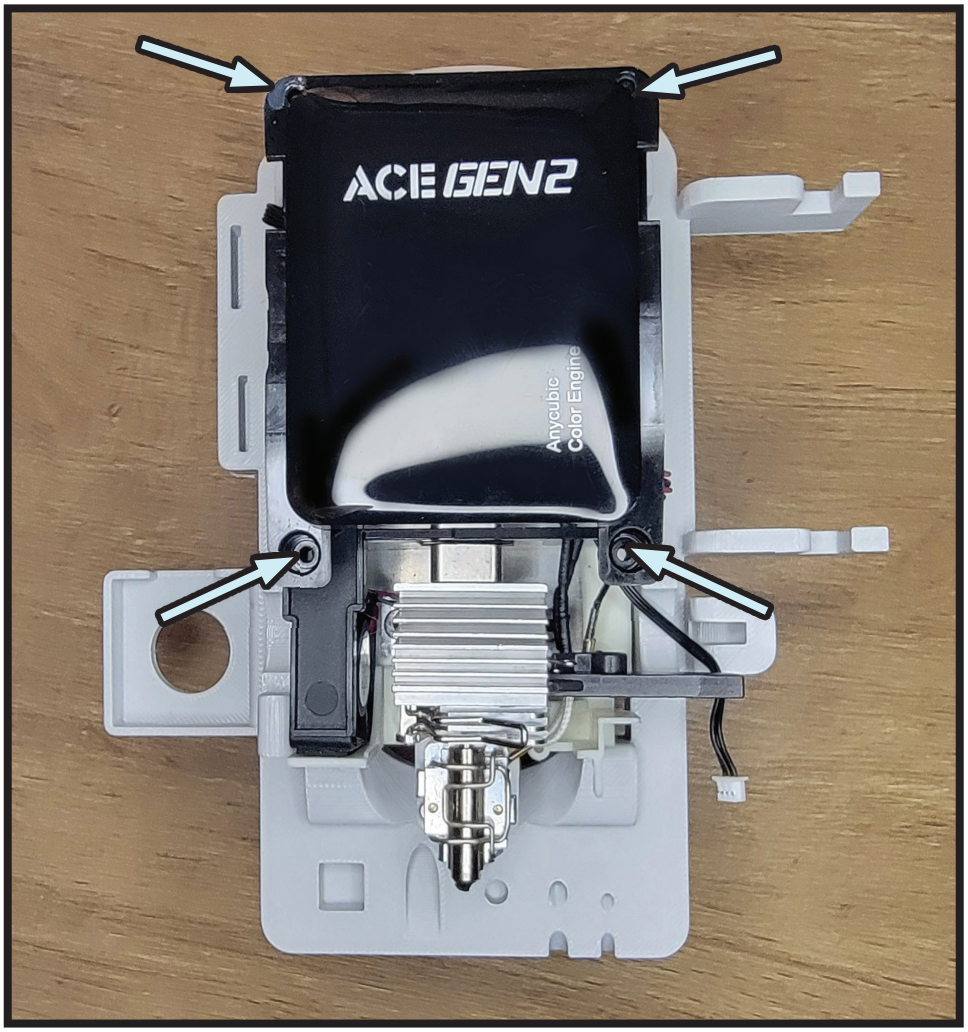
Jig or no Jig?



Once the outer case is removed, the printhead has no flat surfaces to rest on. If you don't have BrianC's Service Jig, you'll need to use extra caution during disassembly. The wiring is delicate, and as the printhead comes apart, several components will be left hanging by their wires.

Without proper support, it's easy to damage a connector or pull a wire loose, turning what should be a simple repair into a much more difficult and expensive one. The service jig securely supports the printhead throughout the process, greatly reducing the risk of accidental damage and making service much easier.

Wiring Note: Most components can be safely unplugged from the Printhead Driver motherboard. However, it is not recommended to disconnect the Main Extruder Motor or Shifting Extruder Motor connectors from the motherboard. These connectors are secured with adhesive, and attempting to remove them can easily damage the solder joints or pull the connector completely off the board. If it becomes necessary to disconnect the Main Extruder Motor, unplug it at the motor itself rather than at the motherboard whenever possible.



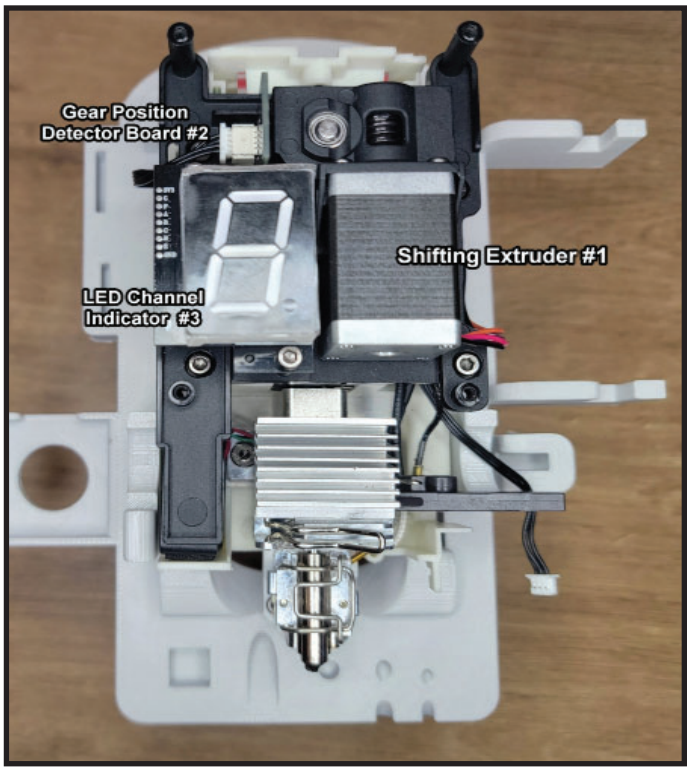
Here the printhead sits in Brians service jig (left)

Using a 2 mm Allen wrench, remove the four screws securing the front display cover. Once the screws are removed, carefully lift off the cover and set it aside in a safe location.

Note the two notches on the back of the display (below). On reassembly, thsese will properly lock in the gear detector board .



With the front cover removed, the following components are visible:

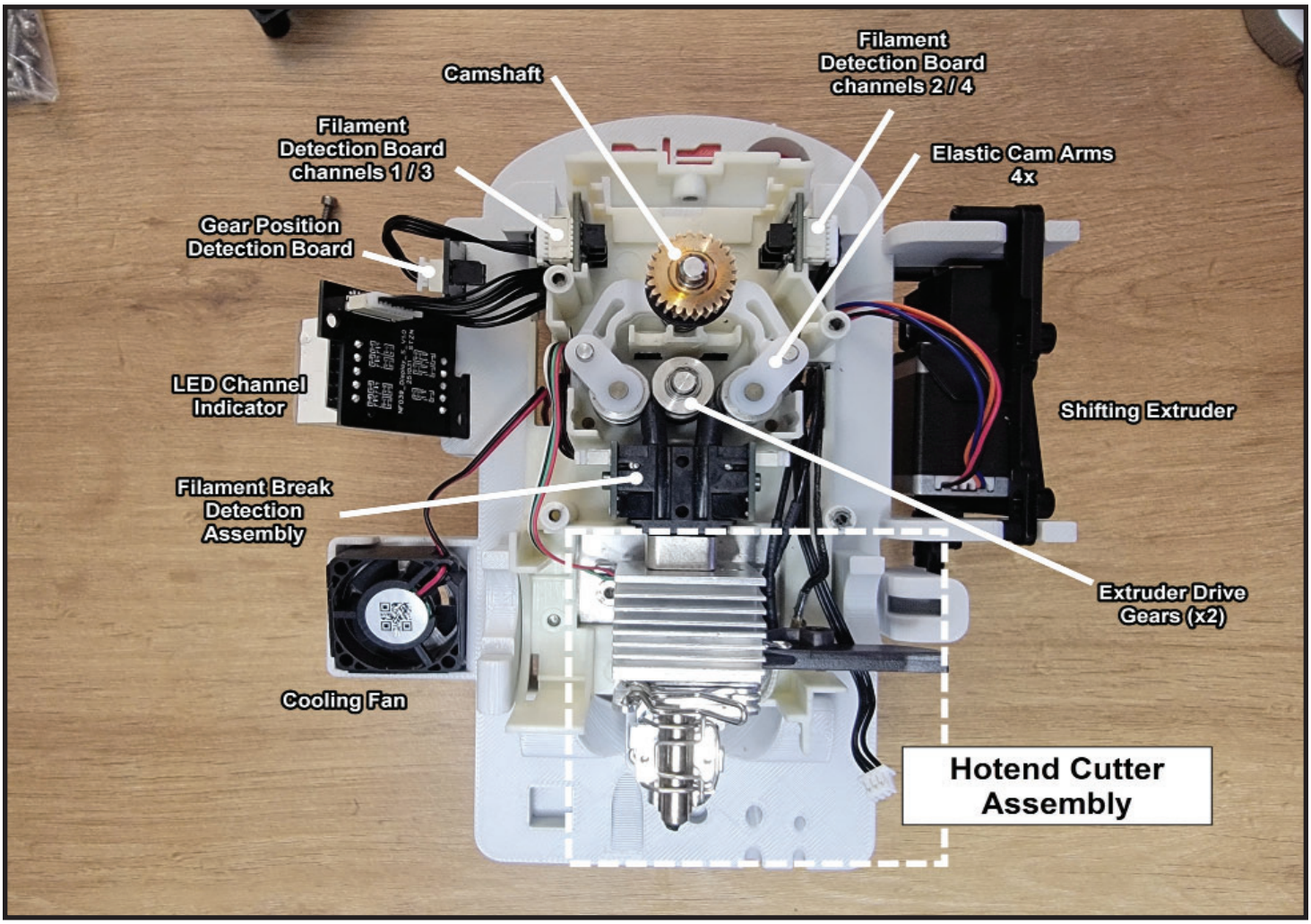


#1 – Shifting Extruder Stepper Motor
This motor rotates the camshaft to select the active filament channel.

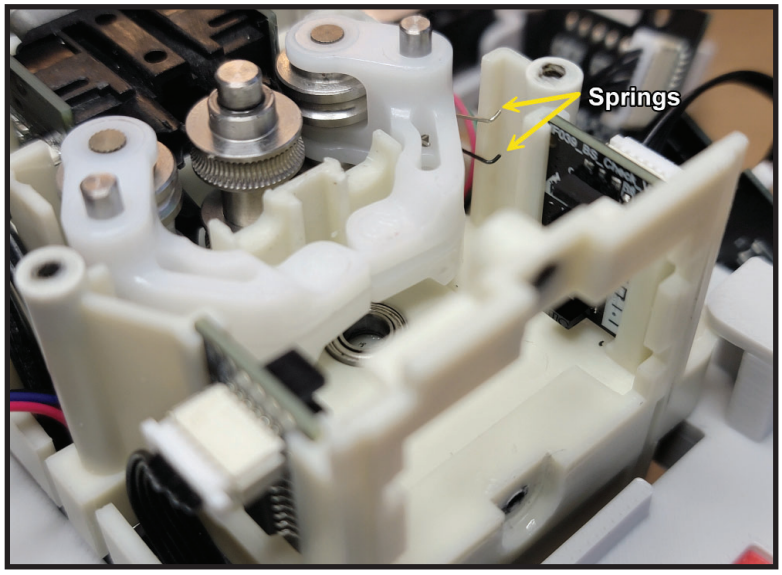
#2 – Gear Position Detector Board
This optical encoder assembly detects the camshaft's position. A sensor on the board works with a plastic encoder disc mounted to the camshaft to identify the Home position when the disc is rotated to the 9 o'clock position.

#3 – LED Channel Indicator
This LED display indicates the currently selected filament channel (spool).

Below is a shot showing all the top components safely stored off to the side in the jigs storage pockets.

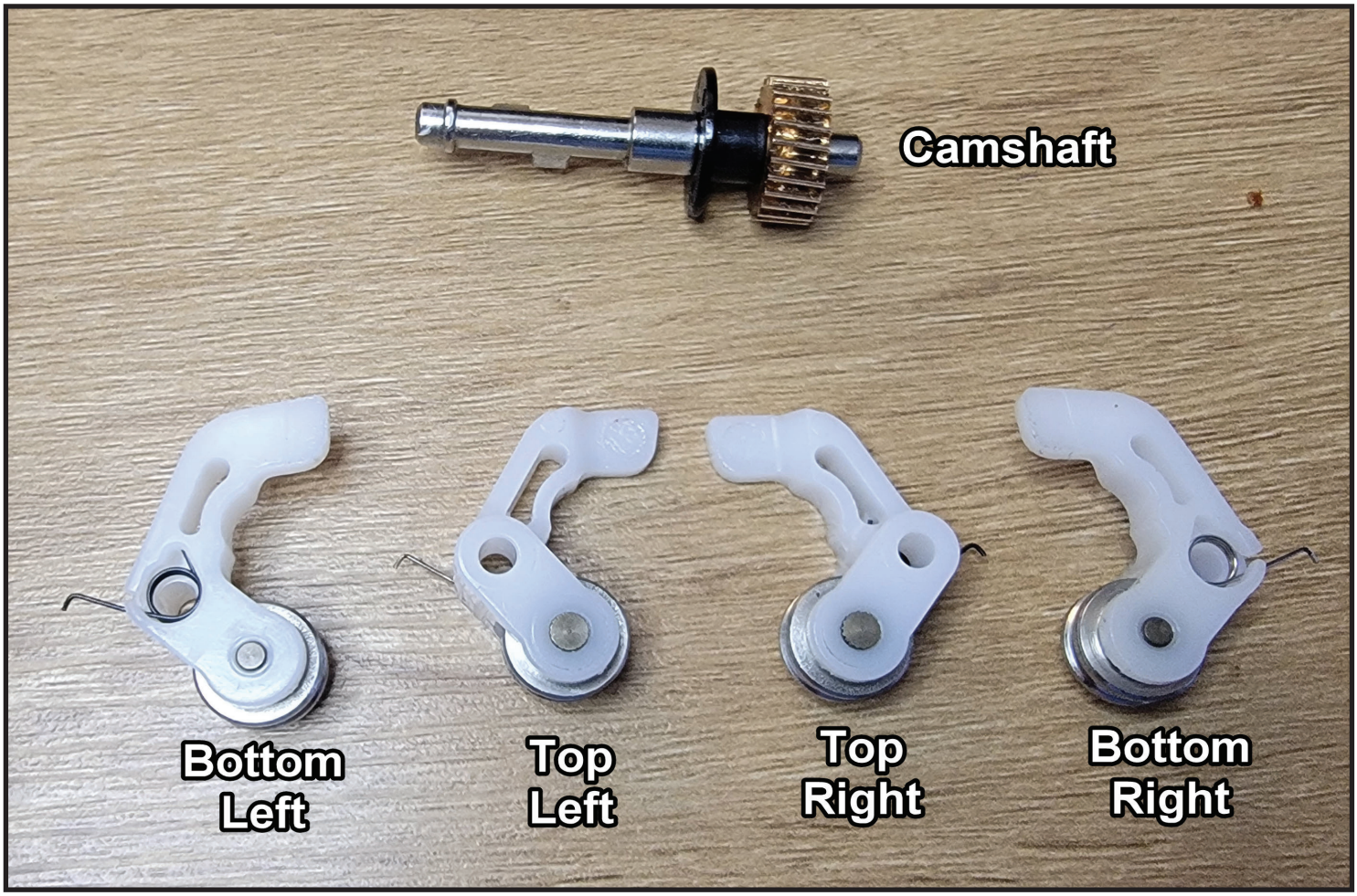


The camshaft can be removed by gently wiggling it upward while lifting it out of the printhead. If you are using the Printhead Service Jig, a storage location is provided on the top of the jig to safely hold the camshaft during service.

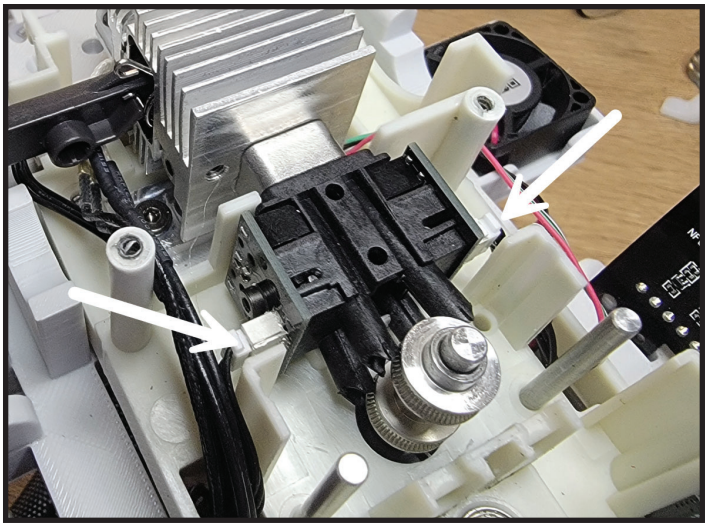


Before removing the elastic cam arms, note their orientation and how the springs are installed. The springs are only loosely retained in the cam arms and can easily fall out, so take care not to lose them.

When reinstalling the cam arms, ensure the upper and lower cams are correctly offset. In the proper orientation, the two upper cam lobes will be positioned close together (above right).

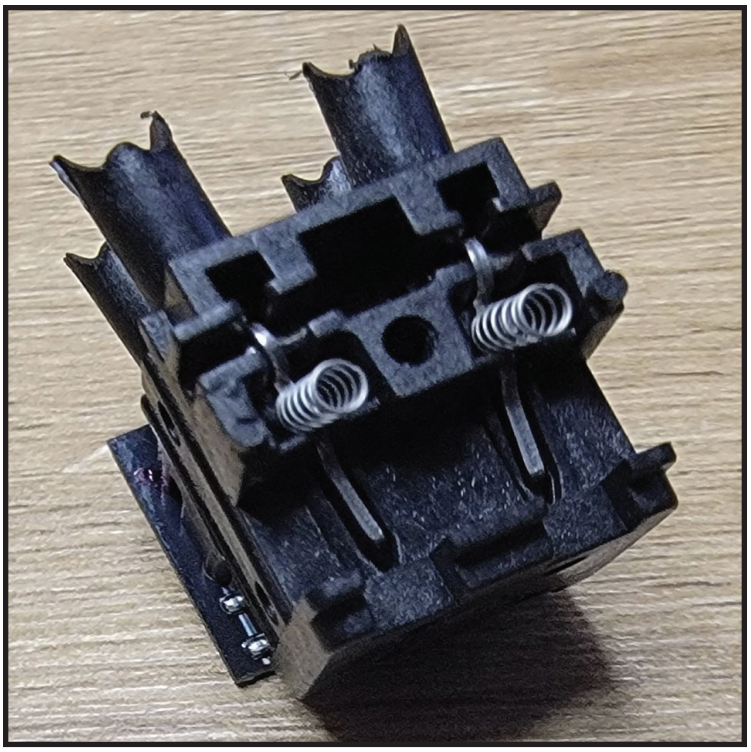


The Break Detection Module contains a circuit board on each side. Disconnect the connector from each board, then carefully lift the module straight up and out of the printhead.



If you choose to disassemble the module further, use caution. There are two very small springs and levers beneath the circuit board that are easily dislodged. The springs have a habit of launching themselves so take your time and work over a clean surface.

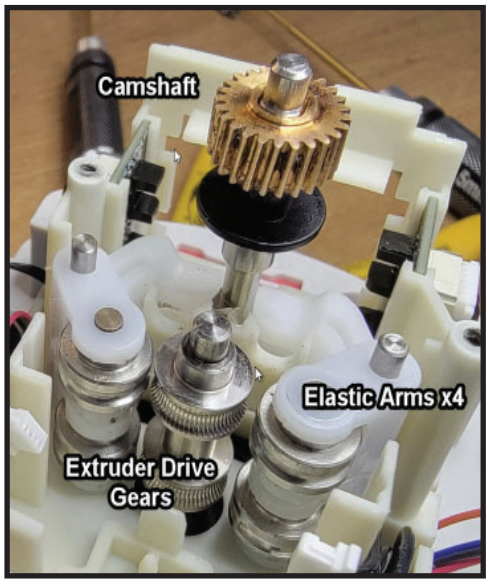
The image below shows the module with one cover removed, illustrating the correct orientation and installation of the springs and levers during reassembly.



Brief Summary of Key Components

Camshaft System

The Kobra X printhead can automatically select between four different filament channels. This is accomplished by rotating the camshaft until one of its lobes lifts the corresponding elastic cam arm. The cam arm then presses one of the four drive wheels against the extruder drive gear, pinching the filament and allowing it to be fed into the extruder.

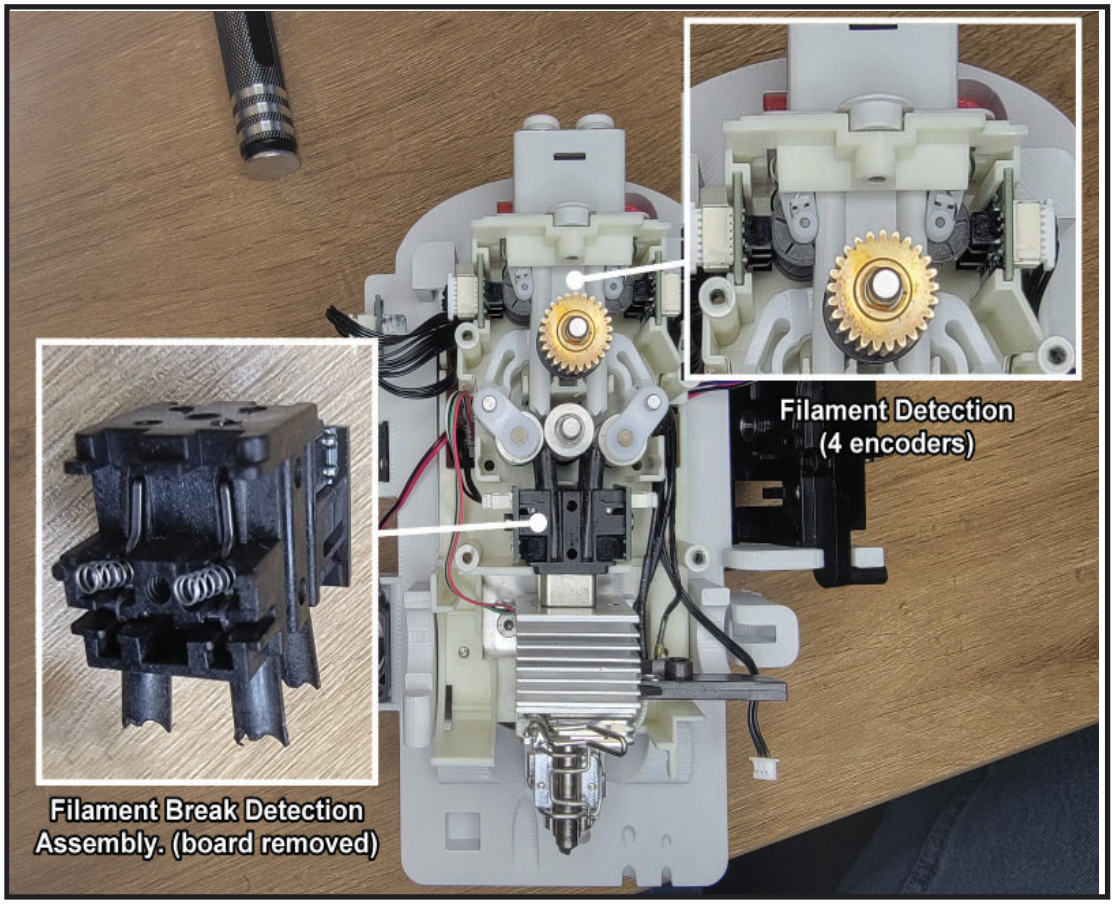


Mounted on the front of the camshaft is an encoder disc containing a single slot. As the camshaft rotates, the Gear Position Detection Board monitors this slot to determine the camshaft's position. When the slot reaches the Home position, the controller knows the exact orientation of the camshaft and can accurately select the desired filament channel.

Filament Sensors

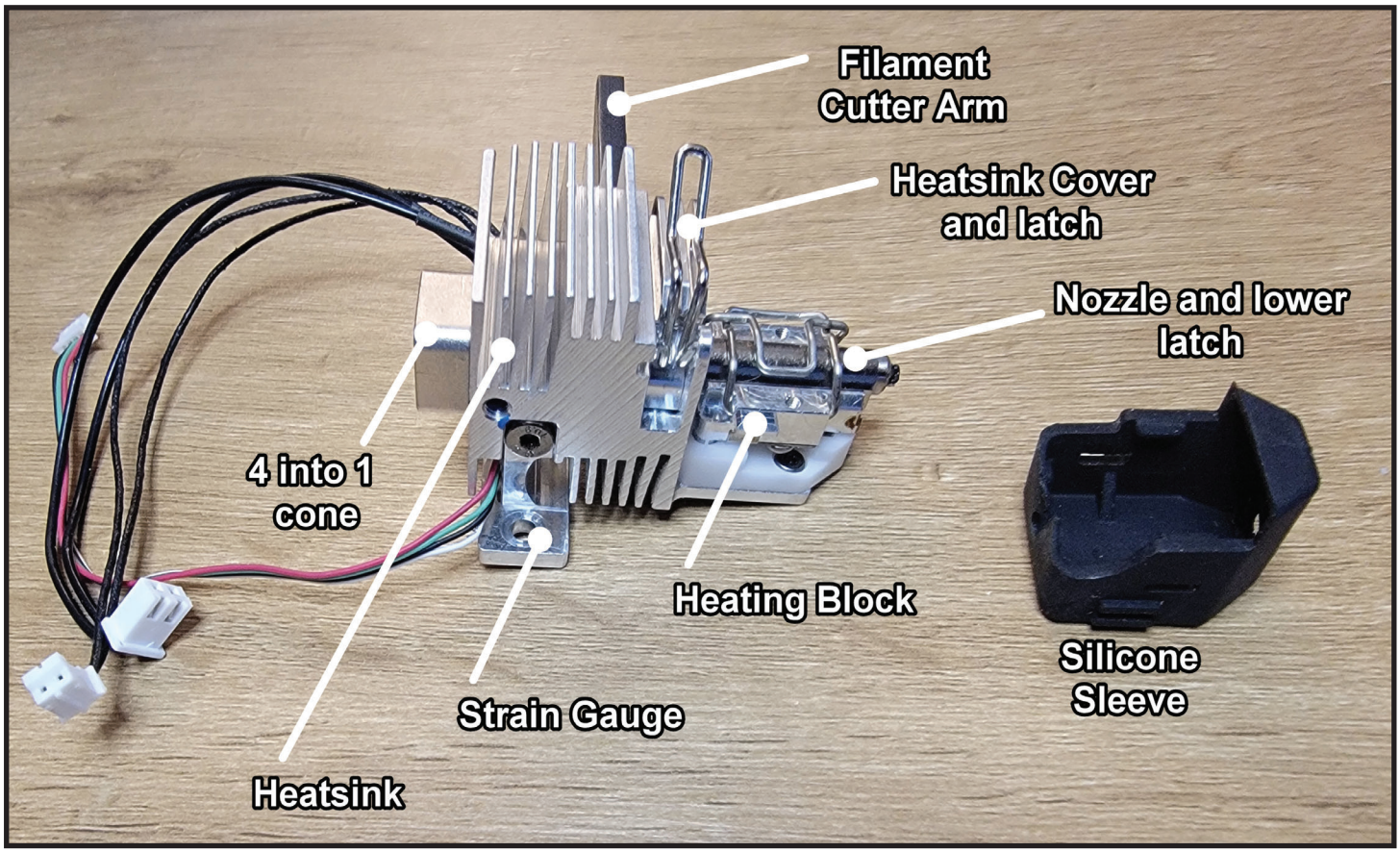
The printhead contains eight filament sensors that monitor both the presence of filament and whether it is moving.

At the top of the printhead are four slotted encoder wheels—one for each fi lament channel. Each wheel contains fi ve slots and rotates as filament passes through it. Th e Fi la ment Detection Board uses optical sensors to monitor these wheels, confirming that filament is actively moving through the selected channel. When there is no filament in the channel, the sensor goes high and shows the system there is no filament in that channel.



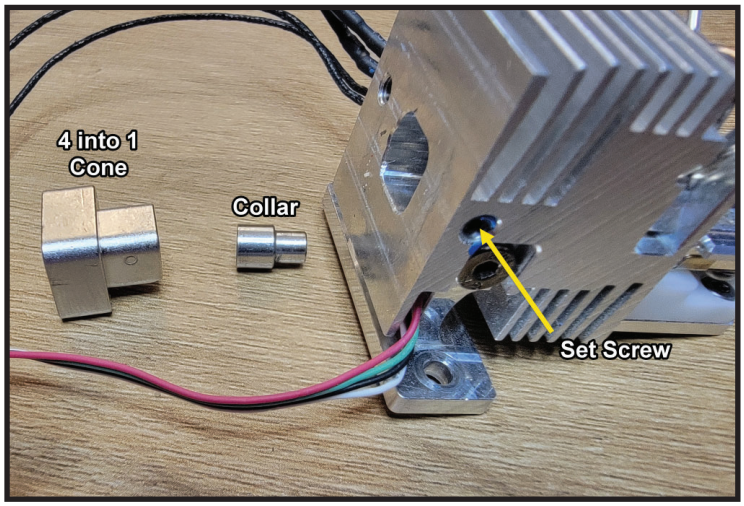
Located in the center of the printhead is the **Break Detection Module,** which contains four spring-loaded levers—one for each filament channel. As filament enters the module, it pushes the corresponding lever outward, allowing a sensor to detect the filament's presence. The confirmation beep heard when inserting filament into the printhead is generated when this sensor detects the lever has moved into the filament-present position.

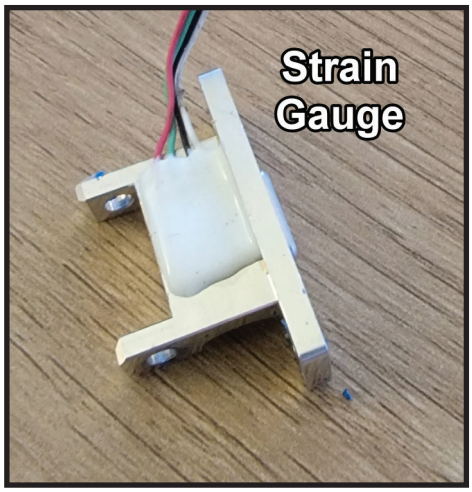
Hotend Cutter Assembly. Includes the 4 into 1 filament cone, collar, heat sink, strain gauge, filament cutter, heating block (with heater cartridge and temperature sensor), nozzle, and silicone sleeve.



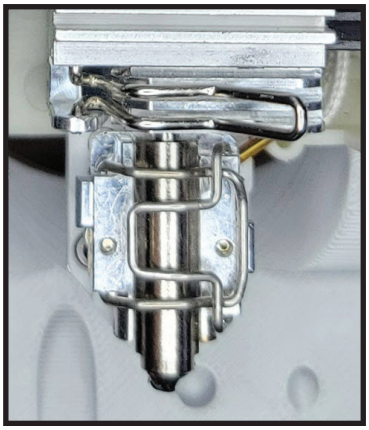
The 4 into 1 filament cone is located at the top of the heat sink and is secured by a 1.5 mm set screw on the left side of the heat sink.

This is a common location for filament clogs and requires removal of the hotend assembly to clear. Once the cone is removed, a small collar can be lifted out from beneath it.





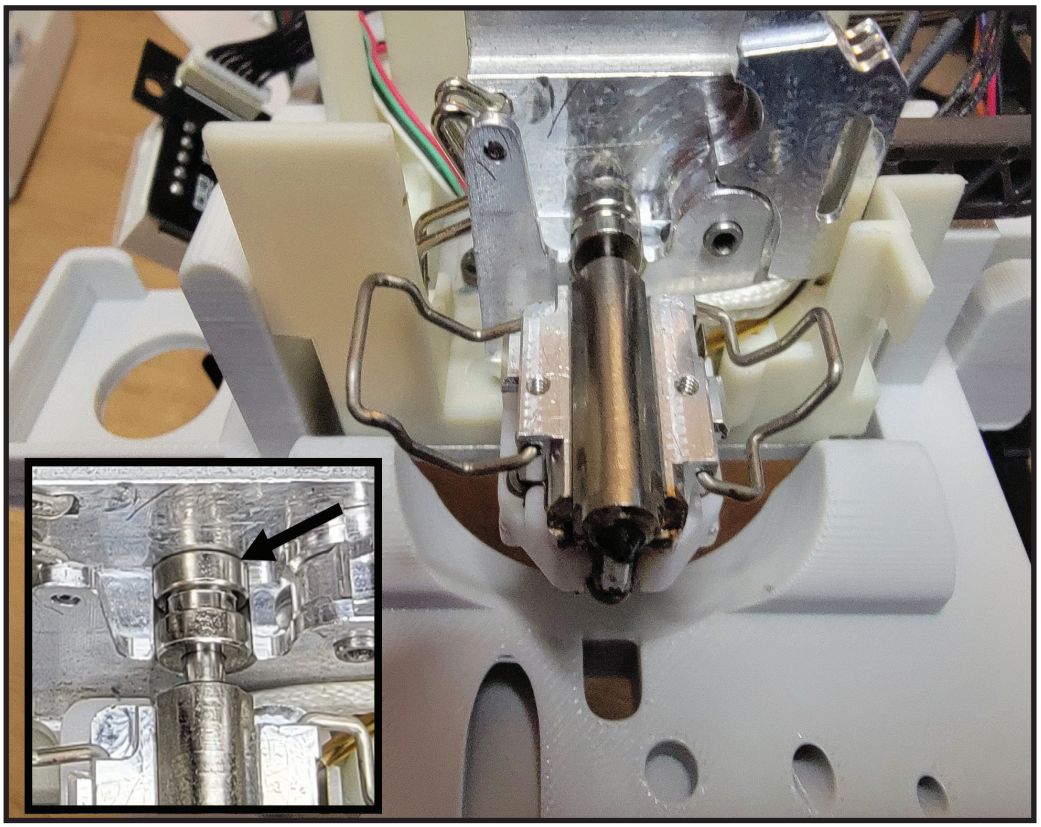
Nozzle. The Kobra X supports 0.25 mm, 0.4 mm, 0.6 mm, and 0.8 mm nozzles. The nozzle slides into the heater block and is clamped to the heat sink above using the heat sink cover and upper latch. The heating block is then pulled tightly against the nozzle by the two lower latches, ensuring a secure fit and proper heat transfer. Please note the heating block will be loose on the mount by design.

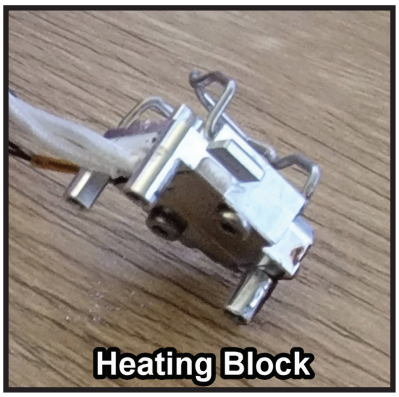


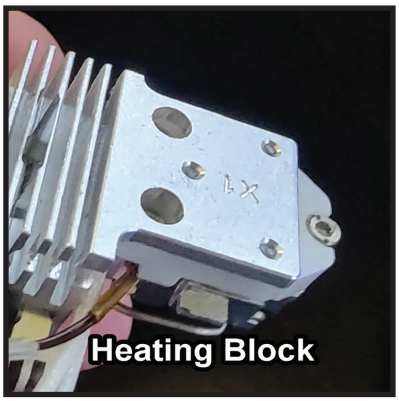
It is imperative that the nozzle is fully inserted so the upper collar seats firmly against the heat sink (see image below). If the nozzle is not fully seated, the heat sink cover will not close and latch properly. This can result in nozzle damage, build plate damage, and improper operation of the automatic bed leveling system.

Nozzle install

- Slide the nozzle into the heat sink until the nozzle collar is fully seated against the heat sink.
- Close the heat sink cover. When properly closed, the top of the cover will be flat and parallel with the heat sink.
- Carefully close the upper latch, ensuring the latch arms drop into the slots in the heat sink cover extrusion.
- Close the lower left latch first, then swing the right latch over the top of it until both latches snap securely into place.
- Install the silicone sleeve, making sure the top edge is fully seated and securely snapped into place.



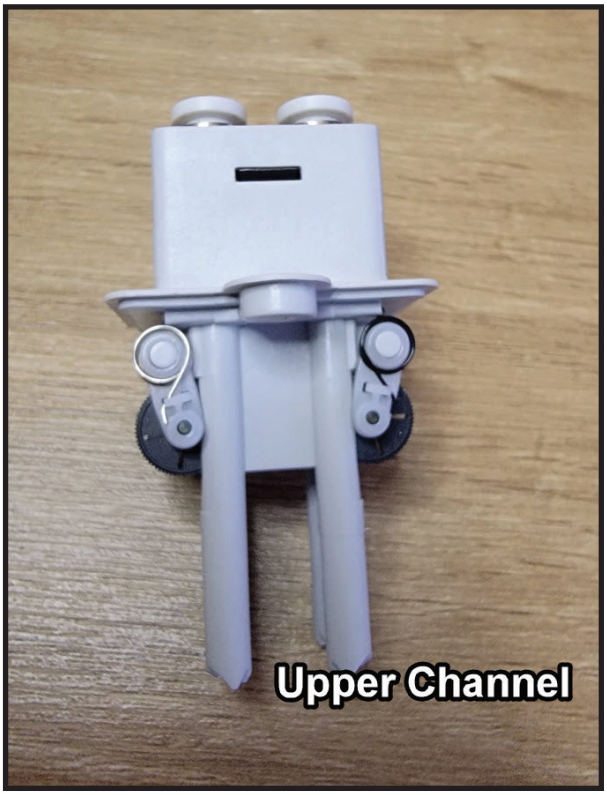




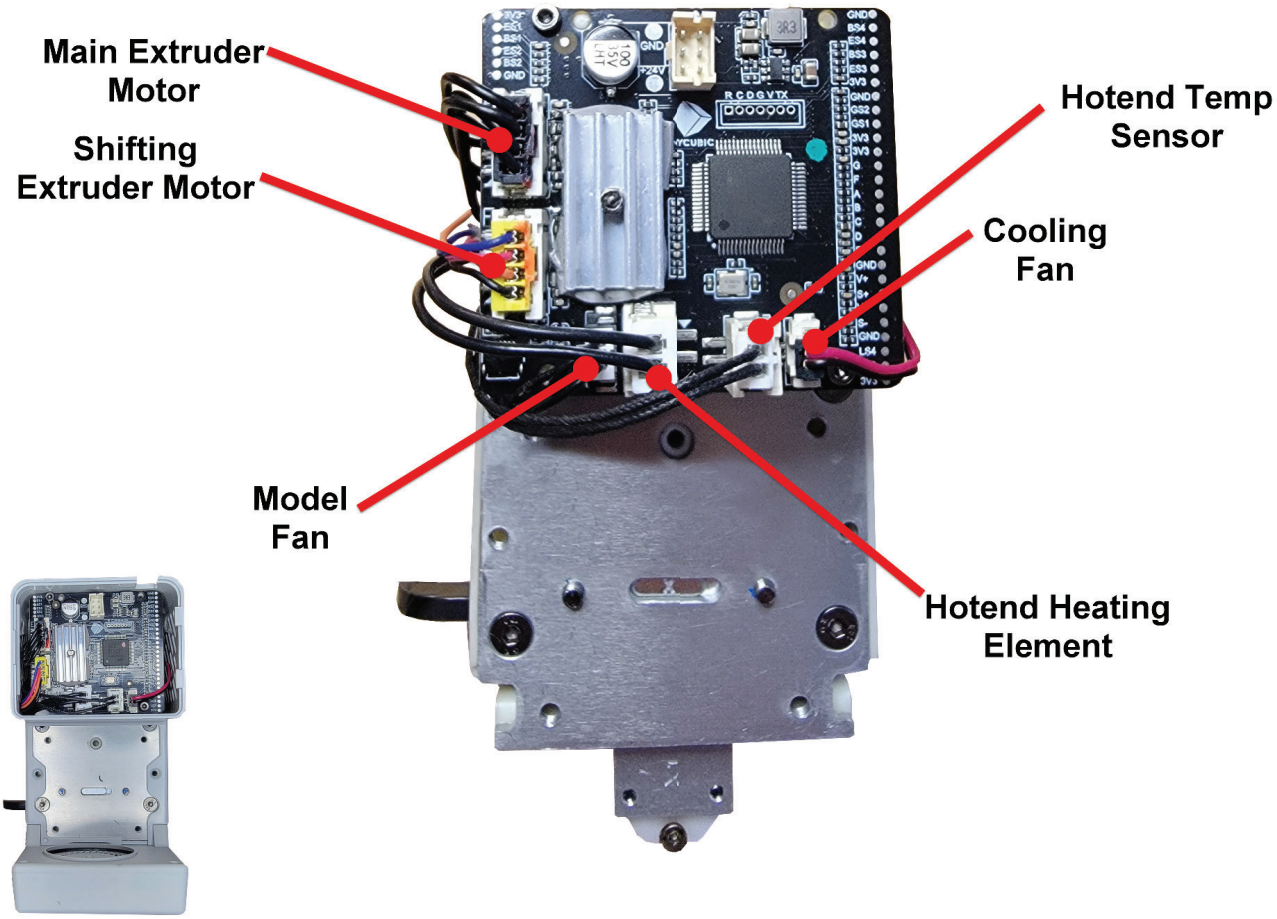
Upper Channel. Th e upper channel performs several functions. First, it provides four PTFE tube connections at the top for the Bowden tubes.

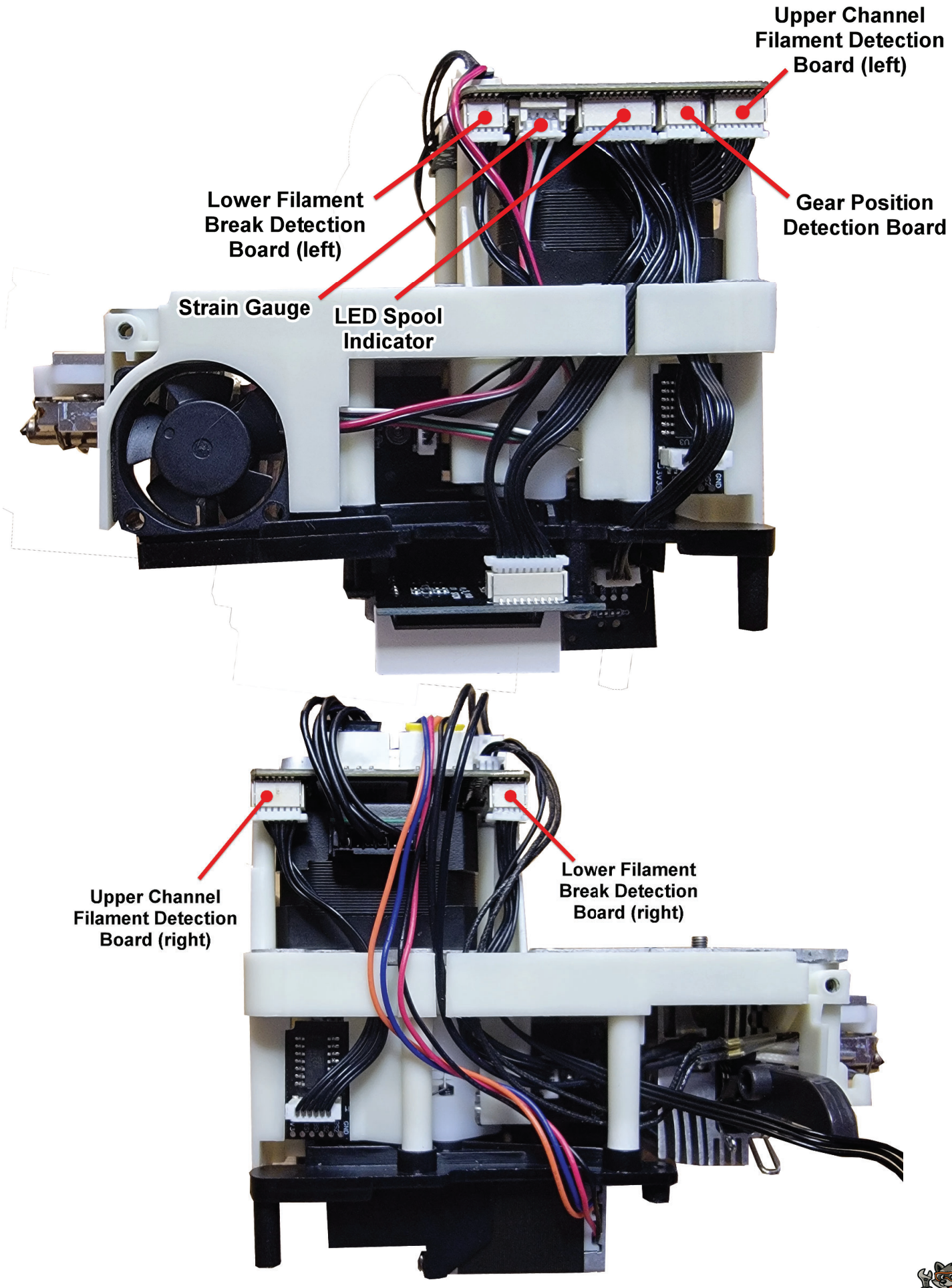
Second, it contains four spring-loaded encoder wheels that are part of the optical filament detection system. These wheels work with the two Filament Detection Boards to monitor filament movement (and presence) in each channel.

Finally, it incorporates four ejection ramps. When a fi lament channel runs out of fi lament, the extruder motor reverses, pushing a short length of fi lament out the top of the printhead so it can be easily removed before loading a new spool.



Wiring Connections




Upper Channel
Filament Detection
Board (left)
Lower Filament
Break Detection
Board (left)
Gear Position
Detection Board
Strain Gauge
LED Spool
Indicator
Upper Channel
Filament Detection
Board (right)
Lower Filament
Break Detection
Board (right)