AN XBOX CONTROLLER INSIDE OUT

Reverse Engineering

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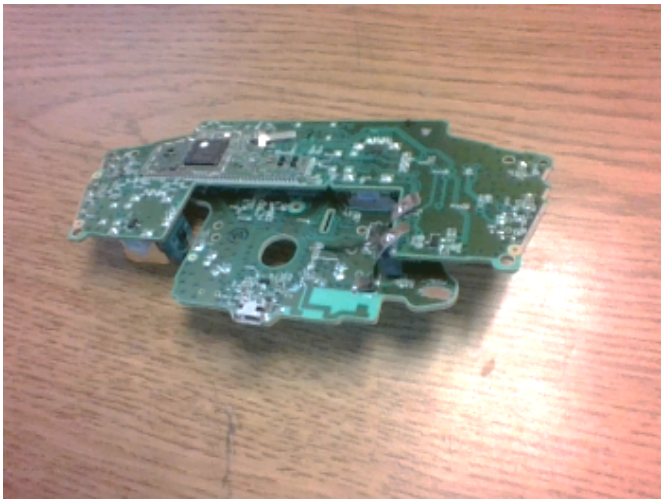
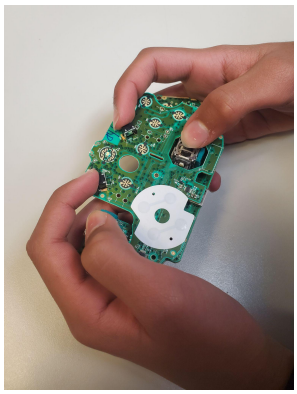
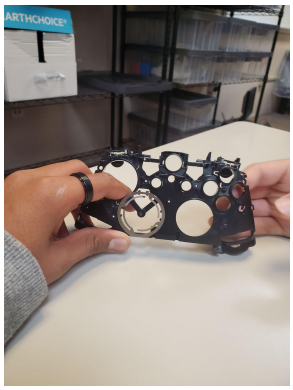


Picking up the parts



Xbox One Controller Parts Catalog

Controller Joystick

The controller joystick is at the front part of the controller. It comes with a joystick cover. The joystick can be pressed down onto the circuit below it so it can send the signal to the Xbox. The joystick is one of the main controls on the controller and you can move it in circles. Every time you move the joystick in circles or in a certain direction it will touch the circuits and send the signal to the Xbox.

Bumper Assembly

The bumper assembly is located at the top of the controller. There are 4 buttons in the bumper assembly including the triggers and the bumpers. Every time each button is pressed, it presses the circuitry board and sends the signal to the Xbox to do what it was commanded to do.

Joystick Cover

This is the cover of the joystick and it is used for comfort when controlling the joystick.

Action Button Covers

All of the button covers make it easier to press the buttons you most use. On the bottom of the buttons, there is something that presses down onto the circuit that sends a message which tells the Xbox that the button has been pressed. Whatever the button is supposed to do will then happen.

Right Handle Cover
The right handle cover is on the outside of the controller and allows comfort when you play video games.

Front Panel
The front panel is located at the front side of the controller. The front panel is connected to all of the circuit boards.

Action Button Gasket
The action button gasket is made out of rubber. Its purpose is to fit behind the action button covers in order to leave no space between the action buttons and the circuit boards. This piece goes on top of the two motherboards.

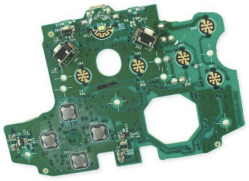
Left Handle Cover
The left handle cover is on the outside of the controller and allows comfort when you play video games.

Battery Enclosure
The battery enclosure is the plastic piece that is located outside of the controller and on the backside. This piece is used to make sure the batteries are safe in the controller, it is very easy to access and is very secure.

Motherboard

The motherboard is the main part of the Xbox. controller. All of the functions of the controller happen because of the motherboard. The code is stored by ICs(U). Some major parts of the motherboard are the resistors(R), capacitors(C), diodes(D), inductors, and test points(TP). One main part is also the voltage regulator. The motherboard also has small and big traces and many vias.

This is how the two motherboards connect.



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Midframe Assembly

The mid-frame assembly is the most important part of the controller. It is very important because it connects the vibration motors, all of the circuit boards, and the joysticks together. This is how the two motherboards connect.

Right and Left Vibration Motors

The right and left vibration motors are at the bottom of the controller. They both shake in order for the controller to vibrate. There is a motor inside of it that shakes. The vibration motors know when to vibrate, by the circuitry board commanding it to vibrate.

Headphone Jack Assembly

The headphone jack is the object to plug in your headphones. This device channels the sound from your jack and then to your headphones.

Rear Panel

The rear panel is the backside of the controller that connects to all of the circuit boards.

Screw Count: 15

Part count: 14

What is in an Xbox Controller?

An xbox controller is one of the most popular controllers used for gaming. Most people find it easy to use because of its design. We decided to reverse engineer this controller because many people use this controller but don’t know how it actually works.

The part of the xbox controller that is most used by customers are the buttons and joysticks. After all, that is how you play games. The four letter buttons on the right-hand side of the controller(A, B, X, Y) don't take any force to press and are very durable. The two joysticks, one on the left and one on the right, are very easy to turn. It is easy to turn them fast if you need to. The two triggers at the back of the controller are pressed easily. The two bumpers at the back of the controller take some more force to press then the rest of the buttons. The controller itself is very comfortable to hold for long periods of time. Overall, the controller on the outside is very well designed.

The motherboard is the main part of the controller. It holds all of the software. There are two pieces to the motherboard. One piece of the motherboard has the two joysticks and the B button. For simplicity, we will call it motherboard A. The other motherboard has a octogonal shaped hole for the right joystick, the three center buttons, the d-pad, the bumpers, and the A, X, and Y buttons. We will call this motherboard B. The two motherboards go on top of each other. Motherboard A has a female connector and motherboard B has a male connector. Motherboard B goes on top of motherboard A and they are connected only by the connectors. The right joystick on motherboard A goes into the octagonal shaped hole in motherboard B. The motherboard also keeps a faraday cage around the biggest IC so most electrical noise is contained.

An xbox controller is one of the most popular controllers for gaming. However, the switch joy-cons are also popular. In comparison, the four letter buttons on the xbox are bigger and easier to press than the four letter buttons on the joy-cons. The analog sticks on both controllers are almost the same. The bumpers on the joycons are easier to press than the xbox controller bumpers, but the triggers on the back of the xbox controller are easier to press than the joy-con triggers. In our opinion, an xbox controller is easier to use.

Once we took the time to figure out something that we use in our daily lives, we learned that there is much more to something than what we can see. This lesson can be applied to our everyday lives and now we know that there is usually more to something than what we can see. We are very glad we reverse engineered this controller because it taught us an important life lesson.