Cleaning a Swarf Invaded X Box 360 Controller, version 1.1

By R. G. Sparber

This Genuine Microsoft X Box 360 Controller is my favorite means of controlling my Mach3 CNC Program and RF-30 Mill/Drill. The joy sticks let me manually adjust the X, Y, Z, and A axes plus zero any of their Digital Read Outs[2].

Over the last few months, Mach3 has randomly frozen when I was moving the various axes via this controller. No problem when movement was controlled by the keyboard.

After spending a lot of time trying to eliminate the software as the possible source of the fault, I turned to the hardware. I opened up the case and was greeted with many tiny flecks of aluminum (called swarf) that came from the machining process. It amazes me how so much metal could get inside this controller.

This article explains how I cleaned the controller and reassembled it.

Here is an overriding fact if you are worried about taking this device apart and not getting it back together: Extremely low skilled people assemble these controllers. Every single part, with one minor exception, are keyed to only go in one place. If a part does not fit, you either have the wrong part or it is not oriented correctly.

If you prefer to follow a video for reassembly, go to YouTube.com and search using "X Box 360 Controller". There are many videos although I found "MyCustom Xbox" to be the best.

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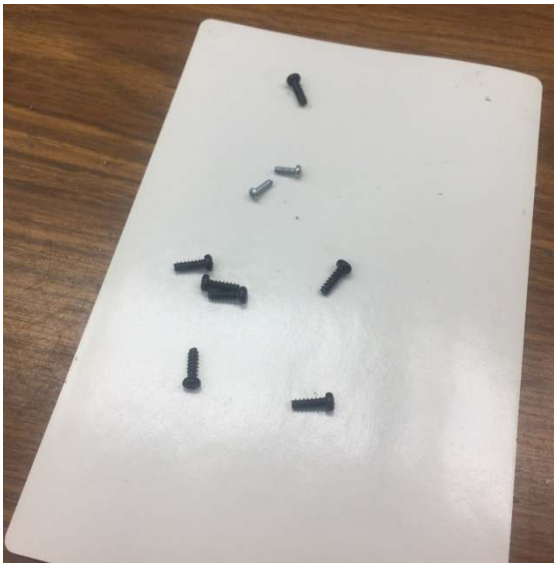
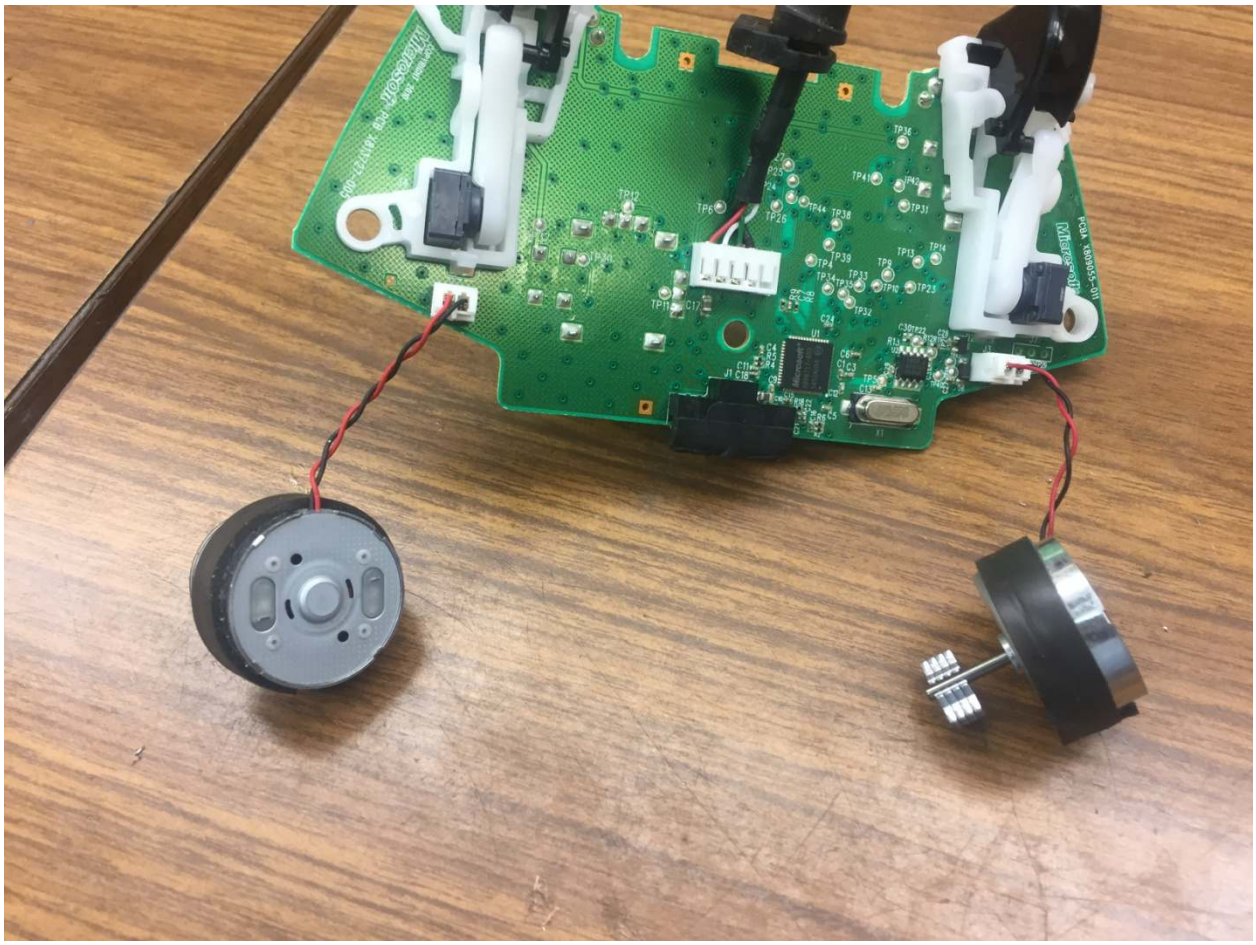
[2] See http://rick.sparber.org/CNCHW.pdf

Taking the controller apart involves the removal of tiny black Phillips head screws on the back. If a screw feels like it is fully disengaged yet does not fall out of the hole, just leave it for now. Once the back cover has been removed, you can push the stubborn screw out from the other side.



I like to drop the screws on a piece of sticky paper. They are easily accessed yet do not roll away.



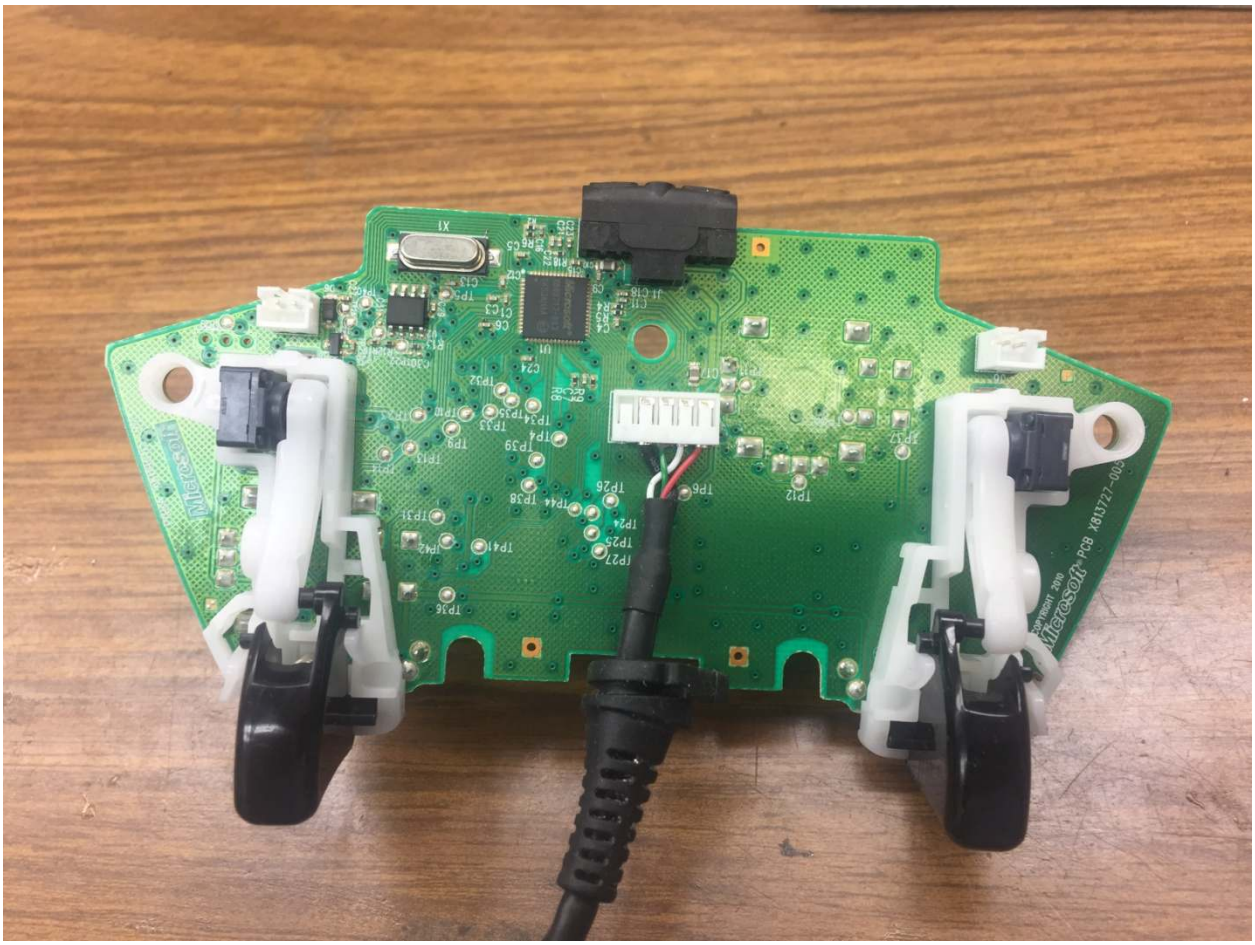
The back cover should then just lift off. Dump all plastic parts into a clean container. No reason to record where parts go with one exception: two motors are driven from the circuit board. One motor has a large weight on it and the other has a small weight. Their plugs are not keyed.

You will find the control pad (white arrow) does not fall out. Look closely on the inside of this pad and you will find two

screws to remove.

Then you will find two tabs (yellow arrows) that must be gently moved to release the two disks.

Here is the top side of the circuit board. You can lightly spray the surface with alcohol and carefully blot it clean. I use toilet paper to do the blotting. Care was taken to not take a contaminated part of the paper and touch the board. After cleaning, I used a magnifier to verify all swarf had been removed.



Then I cleaned the other side of the board.

All of the remaining parts are plastic. I went into my kitchen and carefully cleaned and rinsed the sink. Then I filled the sink with about two inches of hot, soapy water. In went all of the plastic parts.

One at a time I removed the parts, rinsed them, shook off excess water, and inspected with my magnifier for any bits of swarf. Then I used a clean paper towel to remove any remaining water.

Any swarf left on plastic parts will inevitably migrate onto the circuit board.

We are looking at the back side of the button cluster. It may not be obvious, but each of these cylinders has a unique key.

Only the red button will fit in the hole (red arrow above).

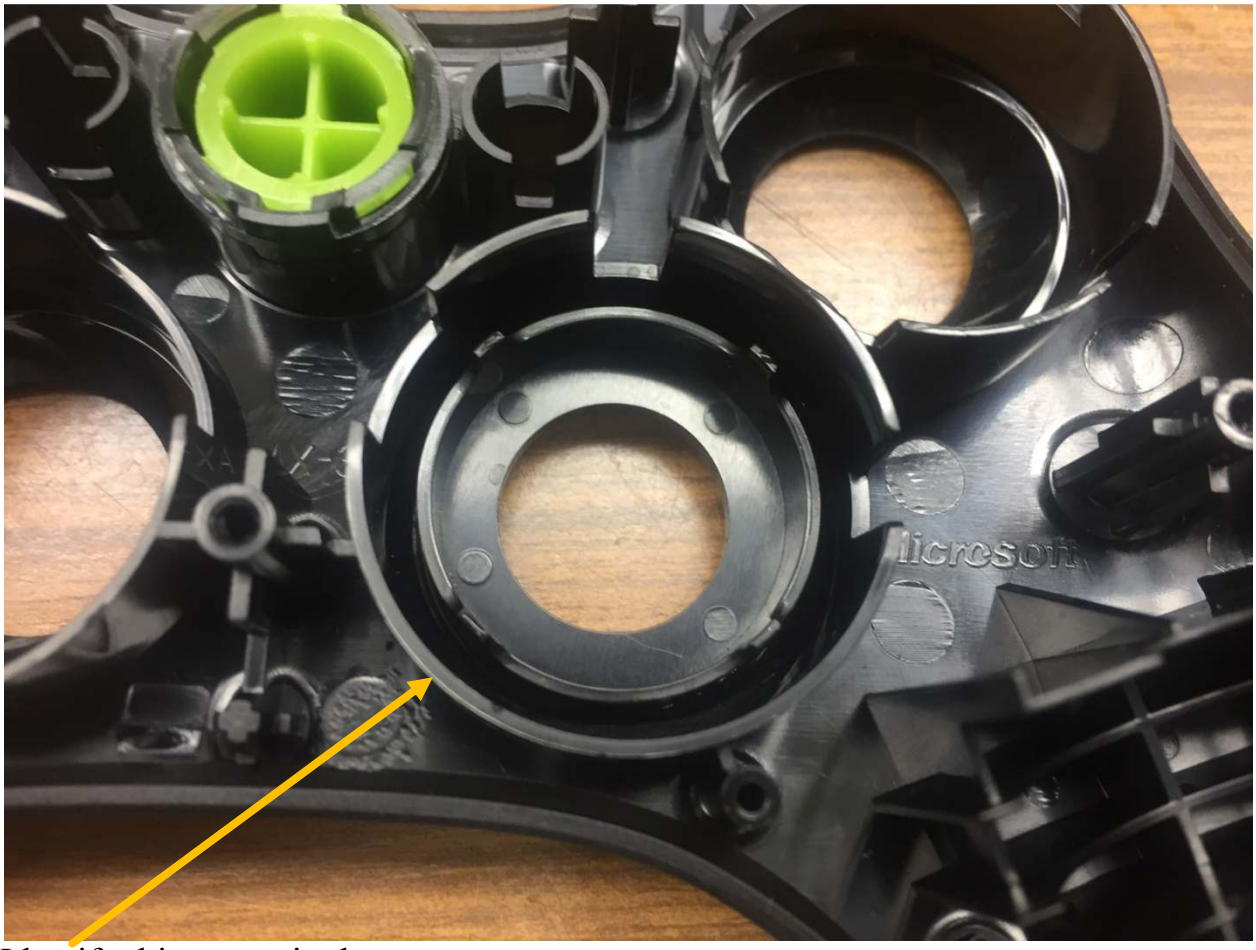
Using the color and the mechanical keying, it didn't take long to get the correct button in each hole. Note that I relabeled the red button with the letter "Z". All other buttons are stock.

Find the green cylinder and the clear cylinder with the black feature on one end. These are assembled to become the status light (green arrow).

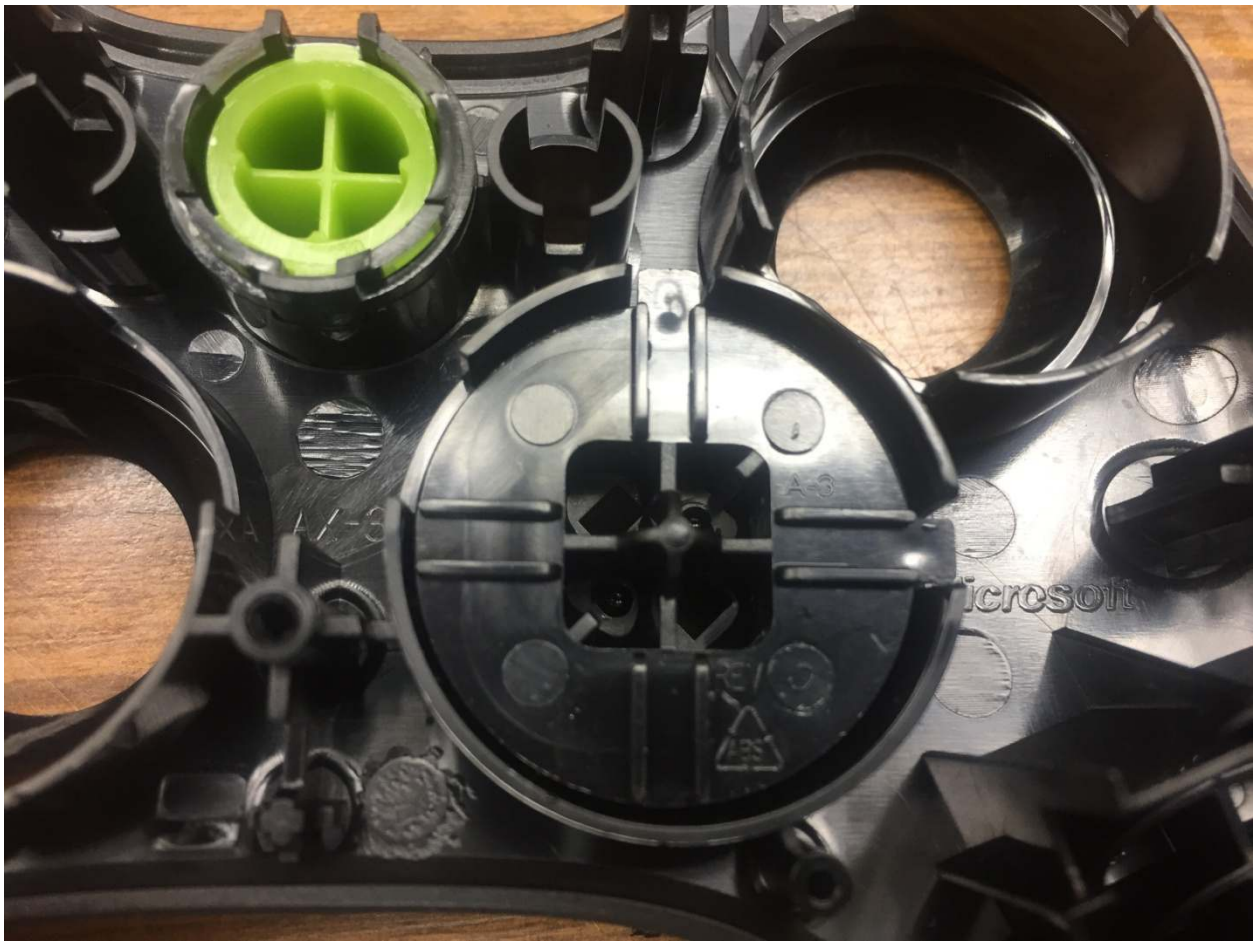
The two parts are keyed. Do not force them together.

Drop the assembly into the hole.

Locate these two parts.



Identify this recess in the top cover.



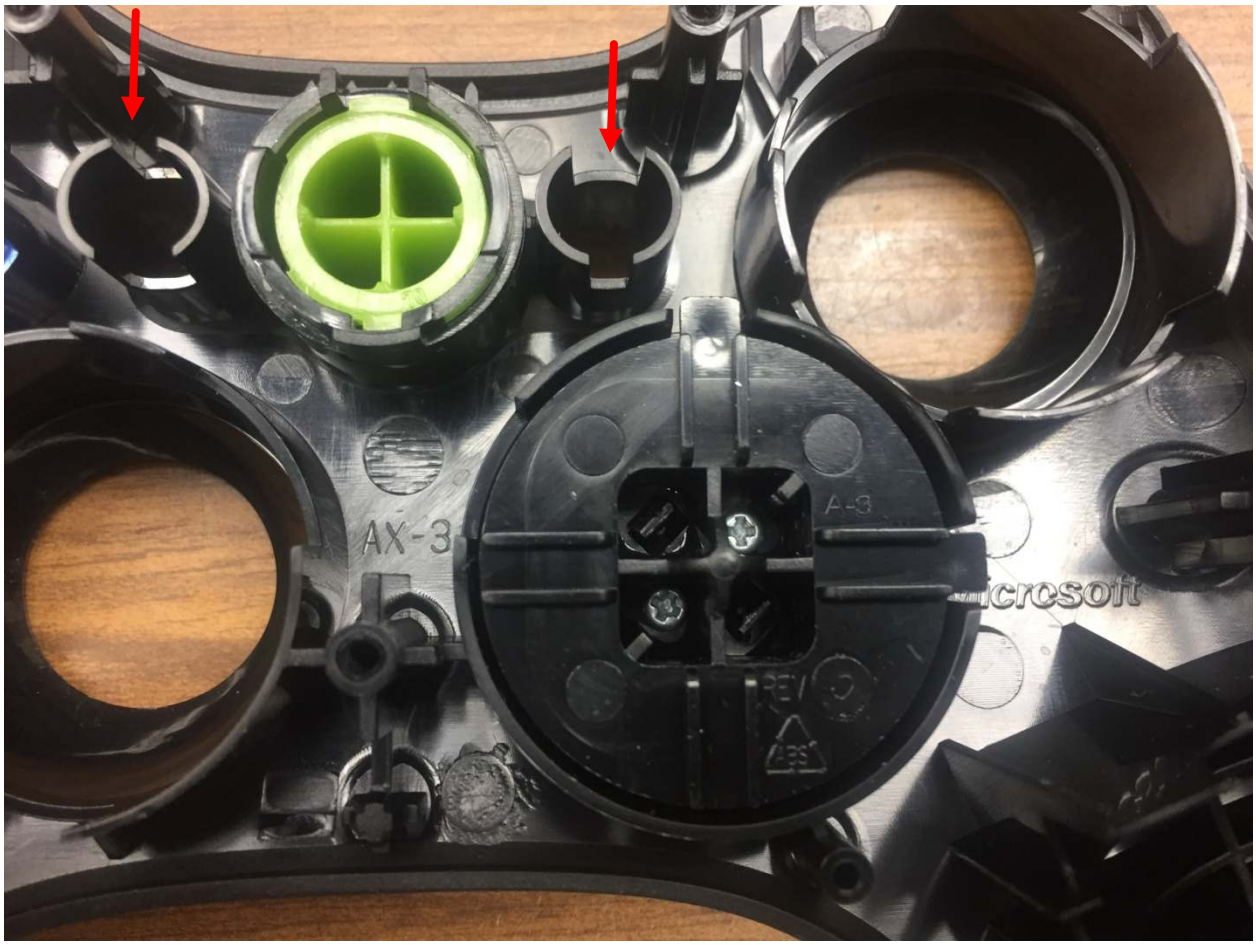
Fit the larger part into this hole and rotate until the key permits it to drop in.

Holding it in place, turn the cover over so you see this. Snap in the smaller part.

Then flip the cover over again.

The following procedure insures that the self tapping screws go back into the original threads. Failure to do this can cause new threads to be cut. The result will be screw threads that can more easily strip out.

Drop in the first screw. Start by turning it counterclockwise (as if you were unscrewing it) until you feel it go in slightly. This is the opening of the previously cut thread. Then gently tighten clockwise so it is part way down. Repeat for the second screw. Verify the assembly freely moves. Then snug down both screws.



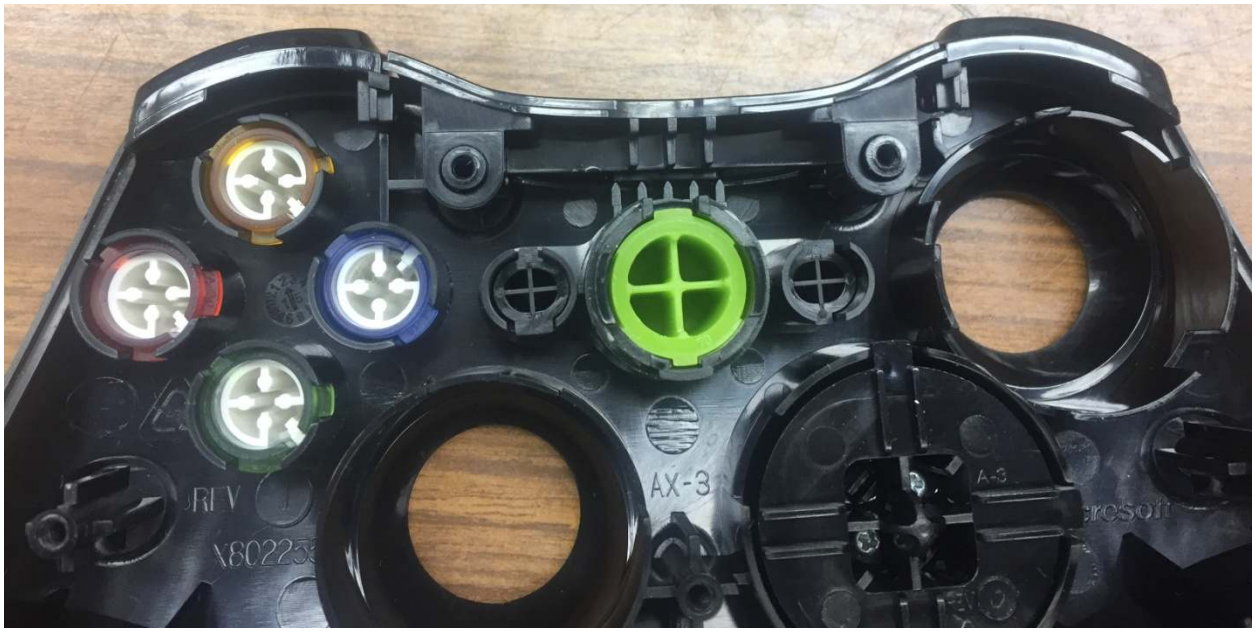
Locate the two flanking button holes (red arrows).

Then find the two black buttons. These two buttons are identical but drop into the two holes with opposite orientation.

Next, locate this curved piece.

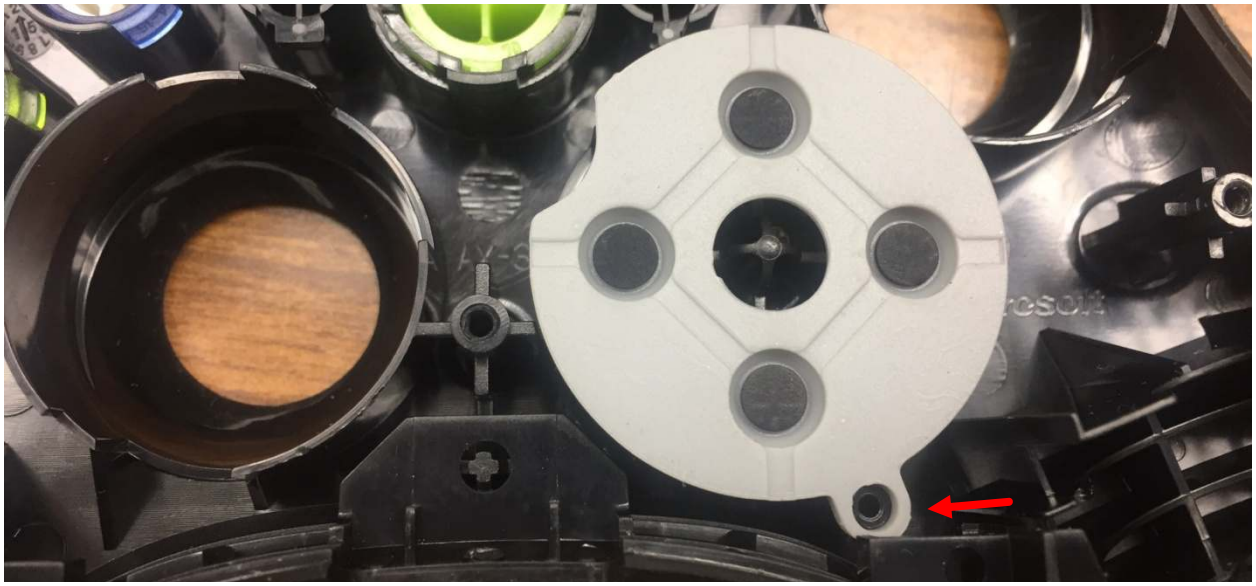
It fits over posts molded into the top cover.

Locate the remaining curved part.



It fits over pegs molded into the top cover.

Locate the gray floppy disk. Position it with the dark gray dots facing you as shown here.



The disk fits over the right hole with the tab fitting over the post (red arrow).

The second floppy light gray part goes over the various buttons.

The dark grey dots face towards you. As with everything else, it is keyed so can only go on one way.

Place the circuit board down on the top cover. It will drop into place over the molded posts. The two motors fit in curved pockets. Note that the USB control cable has a molded strain relief. The rectangular section of this molding fits downward.

Notice the two trigger switches (red arrows). The back cover must fit around these triggers.

When the back cover is around the triggers and down on the posts, you will not see any gap between the front and back. Drop in the seven screws. On each one, slowly turn it counterclockwise until you can feel it drop down slightly. Then turn clockwise and partially tighten. **This avoids double cutting threads in the hole.**

When you are satisfied that the front and back covers are solidly seated, gently tighten the screws all the way down.

As an initial check, push all buttons and move all joy sticks. They should move freely. Then plug in the controller and verify it functions correctly.

In my case, the fault is intermittent. After cleaning my controller, the fault did not appear after about 20 slews of the X axis. This doesn't mean that the problem has been solved. Time will tell. However, I did find swarf inside the controller which could easily cause intermittent shorts.

Thanks to Leon Robinson for suggesting how to avoid having the self tapping screw double cutting threads.

I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Article Alias" in the subject line.

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