

Adding a Write Protect/Write Enable Override Toggle Switch To An Apple 5.25" Disk Drive

by

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At times, we all wish we were able to override a floppy disk's write-enabled switch – whether it is to temporarily lock a write-enabled (notched) disk or to temporarily unlock a write-protected (unnotched) disk. One example is the allow writing on the reverse side of a single-sided floppy disk without having to cut a notch in the disk itself. Although there is a text file available on the net which gives directions for adding a toggle switch to the original Disk][floppy drive, there is no annotated, illustrated guide for adding the switch to the newer Apple Disk drive. This tutorial does exactly that: provide an illustrated guide for adding a toggle switch to override the disk's write-enabled status.

Step 1. Opening the Drive Case.

To open the drive, first remove the two screws on the back plate (Figure 1).



Figure 1. Back plate showing location of screws.

Next, turn the drive over to expose the bottom of the drive and remove the four screws, as shown in Figure 2.



Figure 2. Bottom plate showing the location of the four screws.

Next, turn the drive right-side up and remove the top half of the case. Hold the cable down and lift UP on the rear portion of the top cover, pivoting it at the front edge, as shown in Figure 3. Then pull the top cover back to free it from the front face plate. Set it aside.



Figure 3. Removing the top cover.

Step 2. Open the Drive.

With the cover off the drive, you are now looking down at the drive mechanism itself. The first thing you'll notice is the metal lid, which is affixed by a single screw at the rear (Figure 4). Remove the screw. Before prying up on the lid, note how it is positioned relative to the metal sides of the drive mechanism so that you can replace the lid properly later on.

Lift UP on the rear of the metal lid, pivoting along the front axis. Once you have lifted the lid up far enough, you will be able to slide it forward just a tad bit so that the tabs in the front on the sides are out of their slots. Then lift the front of the lid UP and out.



Figure 4. Case cover removed, looking down at the drive mechanism itself. Note that the metal lid is affixed by a single screw in the rear.

Step 3. Removal of the Drive Mechanism.

In this step, you will remove the actual drive mechanism from the front plate/bottom of the case.

First, make sure you have the drive door closed (DOWN). This makes removing the drive mechanism a bit easier. Lift the cable UP and out to free it from the back bottom of the case. Next, lift UP on the rear of the drive mechanism while pivoting along the front (in the same manner as you did for removing the top half of the case). This is the most difficult step in that the tolerances are very small so there is very little room to maneuver the drive mechanism in the case bottom. Once you have the rear portion of the drive mechanism lifted out of the back of the case bottom, gently pull the drive mechanism toward the REAR to free the front portion of the drive mechanism from the front plate. CAUTION: Do NOT pull too far, as the drive activity light cable is attached! Follow the light cable to the circuit board on top of the drive mechanism and detach the cable from the connector on the circuit board. Set the drive mechanism aside for now.

Step 4. Drilling the Hole for the Toggle Switch.

On the face plate, mark the location of the hole needed for the toggle switch by measuring 1.0" in from the side edge and 0.5" down from the top edge (Figure 5).

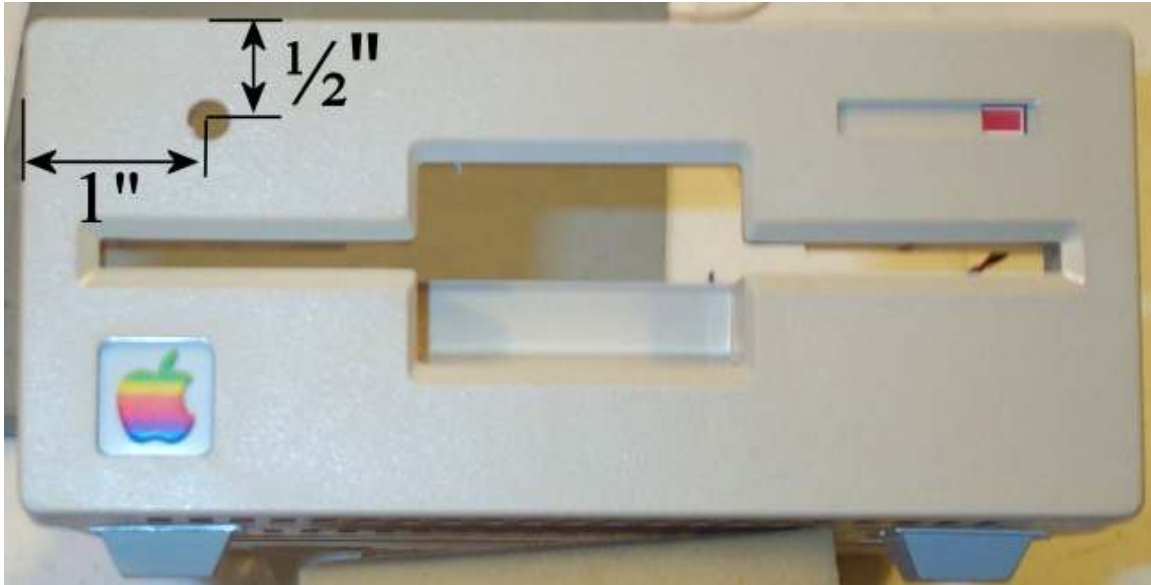


Figure 5. Location of the Toggle Switch Hole in the Faceplate.

Use an awl or pointed nail to indent the center location for the hole; this makes drilling much easier. Using a 3/16" drill bit, drill the hole. Once the hole is drilled, widen the hole as necessary so that the toggle switch can pass through for attachment to the faceplate. Do NOT enlarge the hole any more than is necessary for the toggle switch to fit!

Once the toggle switch hole is drilled, make sure all shavings of plastic are removed from all sides of the case, then set it aside for now.

Step 5. Drilling Out the Drive Mechanism Faceplate.

Before removing the drive mechanism faceplate, examine the drive door handle mechanism. Notice the location of the spring. When you remove the drive mechanism faceplate, there will be nothing holding the drive door handle in place and it will tend to move forward (due to the spring!). If the handle moves too far forward, the spring will dislodge. The ONLY thing holding the spring in place is the pressure of compression!

Make sure that the drive door is in the closed (DOWN) position. Remove the 4 screws (2 on either side) in the drive mechanism faceplate, as shown in Figure 6. Carefully remove the faceplate, trying not to dislodge the drive door handle.

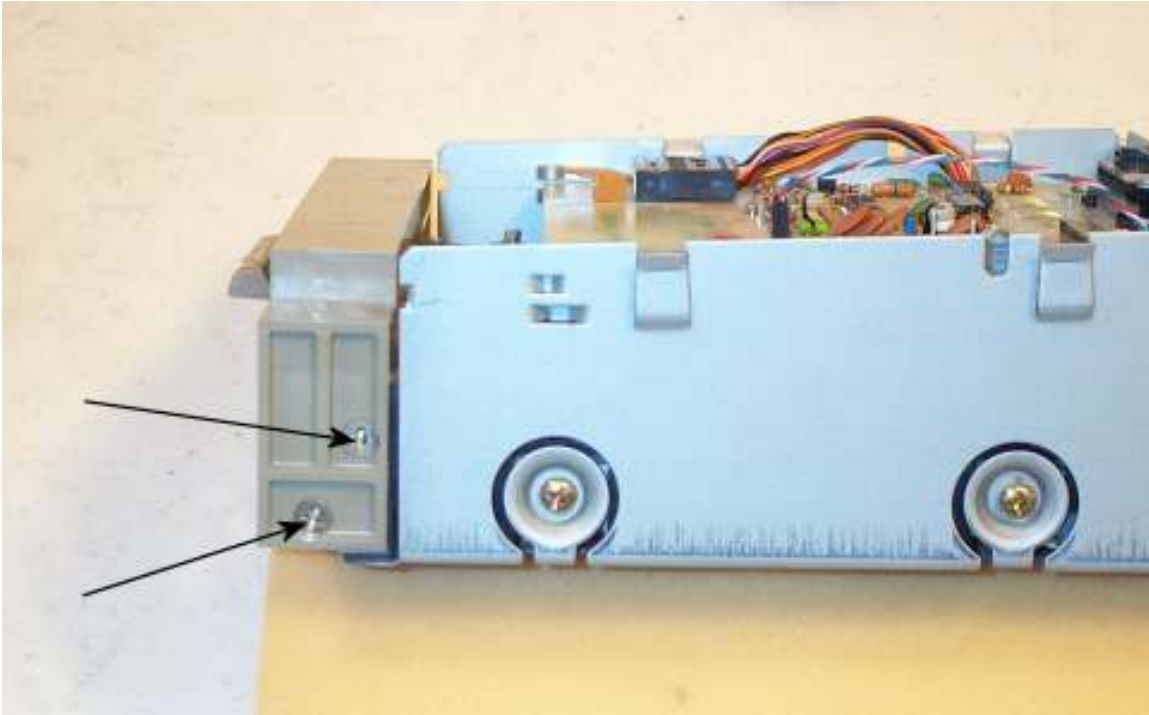


Figure 6. Removal of the Drive Mechanism Faceplate.

Once you have the drive mechanism faceplate off, use a $\frac{1}{4}$ " drill bit and drill out the space as shown in Figure 7. A $\frac{1}{4}$ " drill bit fits perfectly as the height of this space is $\frac{1}{4}$ ". Looking at the faceplate from the front, as shown in Figure 7, you need to open a space wide enough for the toggle switch body to pass through. You can eyeball the width from Figure 7. A wider hole is OK, but a narrower hole will prevent the toggle switch body from passing through and will prevent you from reinstalling the drive mechanism back into the case.

Once you have the opening drilled through and all shavings cleaned off, reinstall the faceplate back onto the drive mechanism.

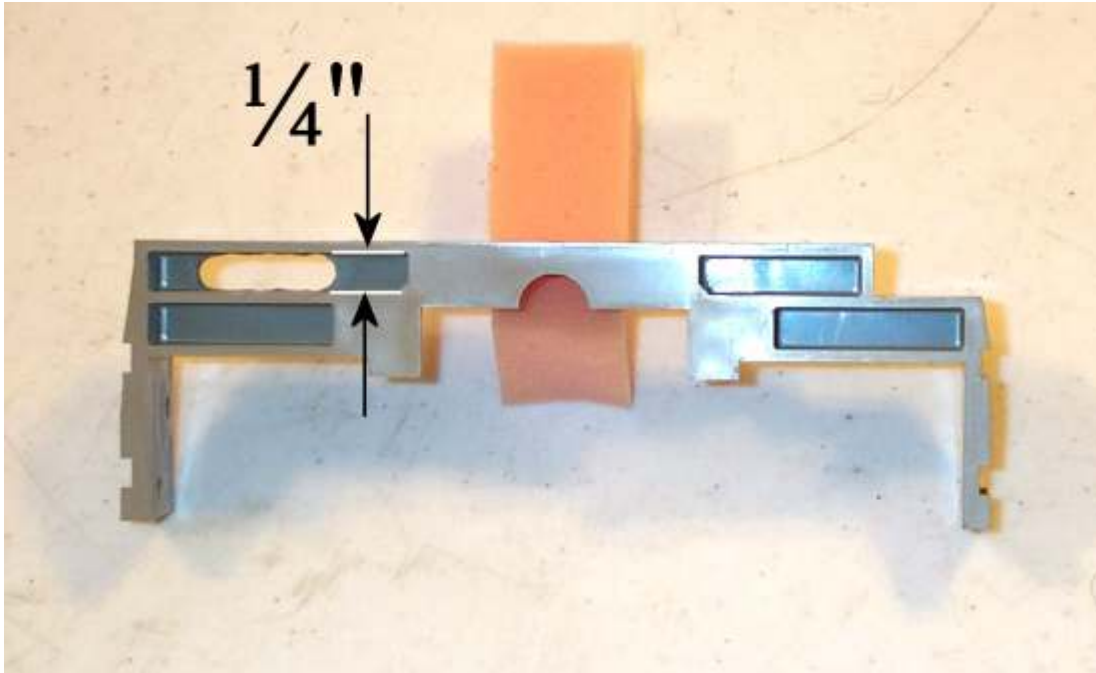


Figure 7. Creating space in the drive mechanism faceplate for the toggle switch body to pass through.

Step 6. Solder Wires to Toggle Switch.

Cut 3 different color wires to about 6" lengths. I used black, brown and orange because I had those colors handy, but any three colors will suffice.

Solder the brown wire to the center post of the toggle switch's body, and the black and orange wires to the other two posts. Make sure that you have a good electrical connection and good solder fix on each post. After all three wires have been soldered to the toggle switch, coat all three posts with liquid electrical tape or use regular electrical tape to cover all three posts to prevent electrical shorts.

Step 7. Affix Toggle Switch to Faceplate.

Once the liquid electrical tape has dried sufficiently, install the toggle switch to the case faceplate. Remove the nuts and washers from the toggle switch, and install the switch from the back side of the face plate. Use the washer and nut to secure the toggle switch to the front of the faceplate.

Step 8. Re-installing Drive Mechanism into Case

With the drive door closed (DOWN), reinstall the drive mechanism into the faceplate/bottom half of the case. Line up the front of the drive mechanism faceplate with the case faceplate, slide the drive mechanism forward and down,

careful that the toggle switch body passes clearly into the hole cut into the drive mechanism faceplate. Feed the three wires through that hole in the drive mechanism faceplate. Once everything is aligned and the drive mechanism is fully forward, the rear of the drive mechanism will be able to be lowered into the bottom of the case.

Step 9. Making the Electrical Connections.

Looking down at the drive mechanism (Figure 8), with the front of the drive mechanism at the top of the photo, locate the large 20-pin black connector on the right side of the drive mechanism circuit board. It is immediately behind the 2-pin connector for the drive activity light that you disconnected earlier. The toggle switch will connect to wires coming out of this connector.

Figure 9 illustrates the two wires that we will be using to connect the toggle switch. The wires are orange and purple in occupy the central two positions on the connector (5th and 6th in from either side). Note that there may be other orange and/or purple wires, so it is critically important to identify the correct wires.

I recommend that you place a white dot of paint or nail polish on the right side of the connector BEFORE you disconnect it. This will make it easy to orient the connector right side up when you need to reconnect it.

Remove the connector by pulling back on it to separate it from the pins on the circuit board. Once the connector has been removed, you are free to untwist it to give you a bit more room to separate the wires needed. Isolate the orange and purple wires needed.

Double check to ensure that you have identified and isolated the two correct wires needed before proceeding. LAST CHANCE!

Cut the orange and purple wires midway between the connector and where the bundle disappears below the circuit board.

Connect the two purple ends with the BLACK wire coming from the toggle switch and solder.

Connect the front piece of the cut orange wire (coming from the black connector) to the BROWN wire from the toggle switch and solder.

Connect the back piece of the cut orange wire (coming from under the circuit board) to the ORANGE wire coming from the toggle switch and solder.



Figure 8. Location of the connector on the drive mechanism circuit board.

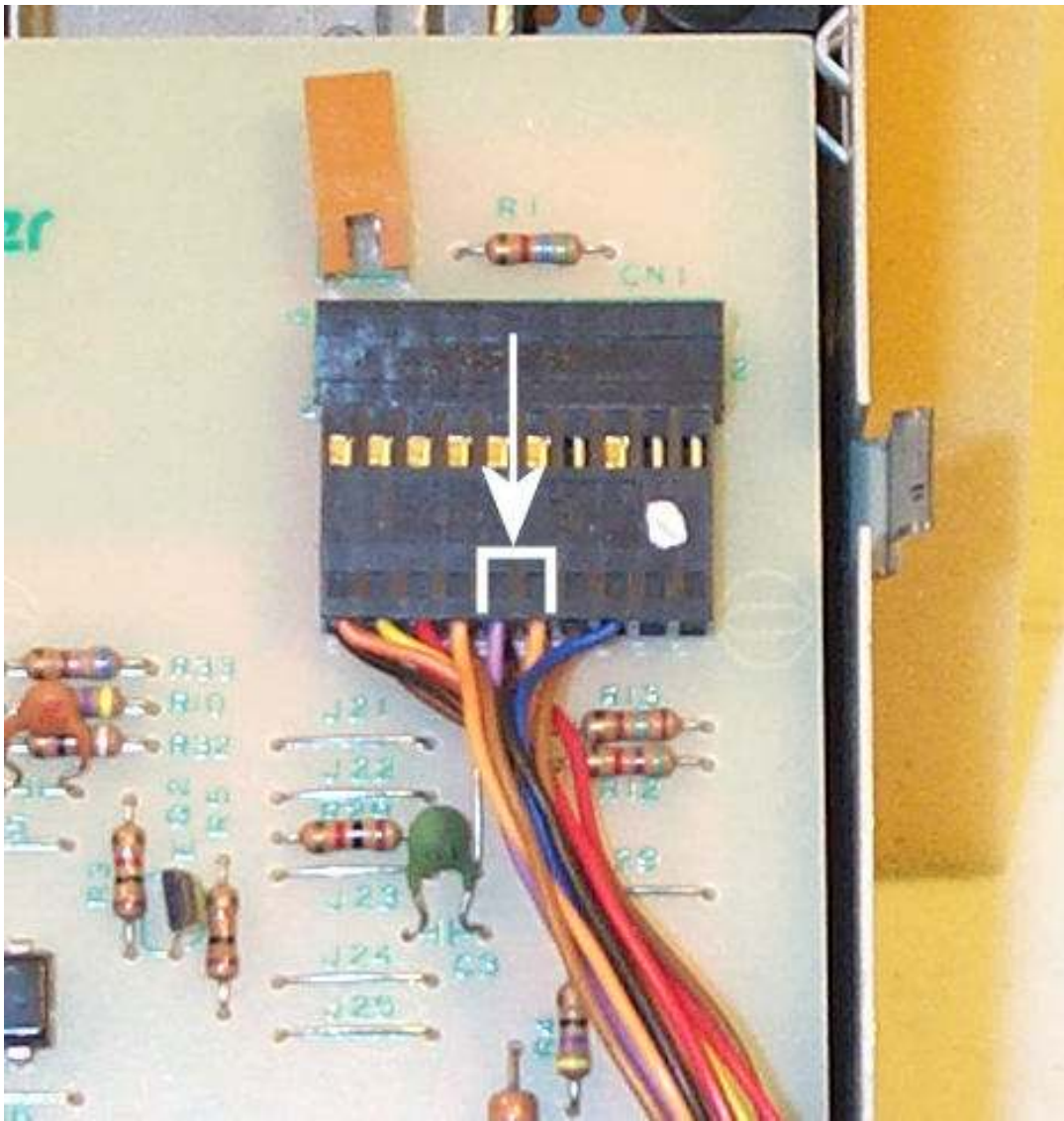


Figure 9. Closeup of connector illustrating the two wires needed.

[At this point, you can connect the drive to your Apple II and test it to make sure that your electrical connections are fine before applying liquid tape to the solder connections.]

Once you are satisfied that your solder connections are good, apply liquid tape to all three solder connections to prevent electrical shorts, or use regular electrical tape.

Once the liquid tape is drive sufficiently, re-attach the black connector to the circuit board, making sure that you have the connector oriented properly and all pins aligned. See Figure 9.

At this point, it is a good idea to use a nylon tie or two to gather the wires so that loose wires can not move around inside the case. Figure 10 shows two nylon ties used to create a harness for the wires. Reconnect the wire from the drive light to the circuit board.



Figure 10. Electrical connections made, soldering done, electrical tape applied to solder connections, and wires harnessed.

Step 10. Re-affix Drive Mechanism Cover.

Re-install the drive mechanism metal cover. Angle the front of the cover down and make sure that the two side tabs fit into the slots in the sides of the drive mechanism, and then pivot the cover down and rearward. Use retaining screw to affix the lid and ground wire to the main chassis.

Step 11. Re-affix Top Cover.

Reposition the cable into the cutout in the bottom rear of the case. Place the front of the top cover under the lip of the case face plate and pivot the rear of the top cover down and forward (Figure 11).



Figure 11. Reinstalling the case cover.

Once the cover is in place, reinstall the two rear screws (Figure 1). Turn the unit over, and reinstall the 4 bottom screws (Figure 2).

Step 12. The Grande Finale!

Attach your modified drive to your Apple II and boot the system. First, place the floppy disk that is write-enabled into the drive and check the three positions of your toggle switch. Depending upon how you oriented the toggle switch body (that is, whether the toggle switch post connected to the black wire or orange wire was positioned nearest the drive door handle), your toggle switch's positions will be either:

Left – Forced Write-Enabled
Middle – Forced Write-Protected
Right – Normal Drive Operation

OR

Left – Normal Drive Operation
Middle – Forced Write-Protected
Right – Forced Write-Enabled

I labeled the toggle switch with U L N for “forced Unlocked”, “forced Locked” and “Normal” positions (Figure 12).



Figure 12. The Completed Project!