

INSTRUCTIONAL MANUAL ON BUILDING A MODIFIED WIIMOTE WITH AN EXTERNAL BUTTONS INPUT

This document will show you how to modify a Nintendo Wiimote to make external the A, B, Cross and Home buttons via an 8P8C Ethernet connector. The instruction detail how to take apart the Wiimote, mount and solder an 8P8C Female Ethernet port, and how to reassemble the completed Wiimote. Once completed your Wiimote can be connected via a CAT-5 Ethernet Cable and an External Connector Box to secondary external buttons. These external buttons will act as substitute buttons for the A, B, Cross and Home buttons on the Wiimote. Furthermore the modifications done to the Wiimote will not disable any of the original Wiimote's buttons or motion sensing functionality.

Before you begin, Please read and understand all instructions. Also please remember to wear safety glasses when appropriate.

Bill Of Materials:

1. Nintendo Wiimote Controller
2. 8P8C, 8-Port, Right Angle PCB, Female Ethernet Port
3. 8P8C, 8 Port Ethernet Cable
4. 28AWG Wire
5. 1/16" Heat Shrink Tubing

Tools Required:

1. Safety Glasses/Goggles
2. Miniature Screw Driver Set
3. Triangular-end Screwdriver (Optional, but Recommended)
4. Pliers
5. Clamps
6. Heat Gun
7. Hand Drill
8. Dremel Rotary Tool and Grinding Bit
9. Soldering Iron (Pencil Style Recommended)
10. Solder and Soldering Flux

Step 1: Disassemble the Wiimote

Begin by removing the batteries. Remove the four triangular head screws. For best results use a triangular-end screwdriver. However the screws can be removed using a small enough miniature flathead screwdriver. Crack open the case with a miniature flathead screwdriver by releasing the pressure clip at the front part of the case. Take out the circuit board.



Figure 1: Pressure Clip



Figure 2: Wiimote Circuit Board

Step 2: Remove The Nintendo External Port

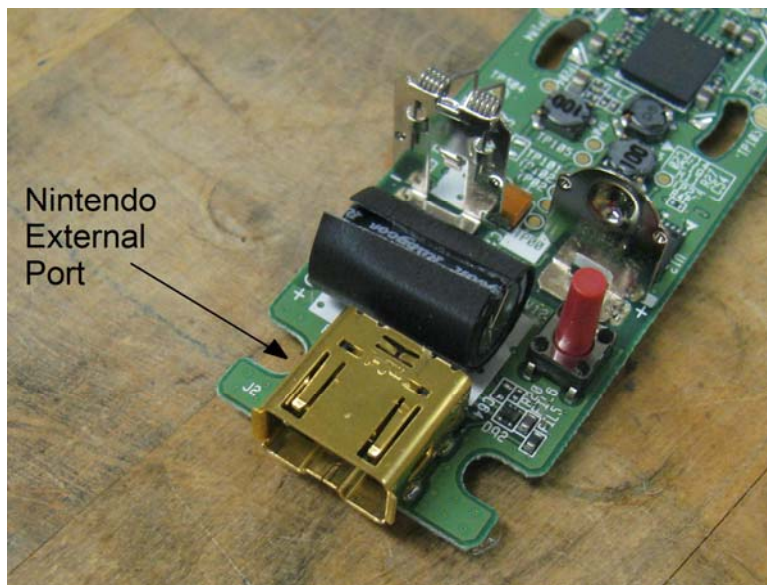


Figure 3: Nintendo External Port

To begin secure the circuit board in a clamping base or on the edge of a table as shown in Figure 4. The idea is to use the heat gun to heat the soldering points inside the red square shown in Figure 5 and then yank out the port. The heat gun should be held close to, but not touching the circuit board. Aim the gun so that only the area within the red square

gets hit with the hot air. Use pliers to grab the Nintendo External port as to not burn your hands. Make sure you have a good grip on the External port before you begin. Also remember to WEAR EYE PROTECTION. Depending on the strength of your heat gun it will take 30 seconds to a minute. Do not pull on the External Port until you visually see all of the target solder points liquefy. Once the solder points liquefy, removing the External port will require minimal effort. Once you successfully removed the External port let the circuit board cool for a couple of minutes.



Figure 4: Setup for Step 2

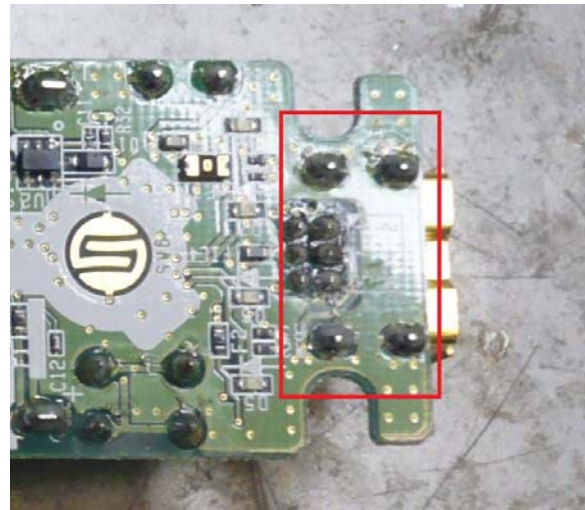


Figure 5: Target Area to Heat

Step 3: Drill Holes For The 8P8C Female Port:

To mount the 8P8C Ethernet Female port onto the circuit board you will have to create three holes. Securely clamp the circuit board. Line up the 8P8C Female port with the circuit board so that the pegs of the Female port are close to the edge, as shown in Figure 6. Make two small guide hole in the circuit board using a hand drill. The center of the holes should coincide with the center of the plastic plugs of the 8P8C Female port when properly lined up. Increase the hole diameter incrementally until the holes fits the plugs. Test your holes by plugging in the 8P8C Female port. The final result should look something like Figure 7.



Figure 6: Lining Up of 8P8C Female Port

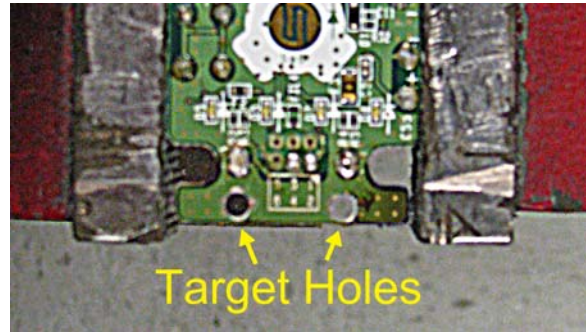


Figure 7: 8P8C Plug Holes

Next make a third hole whose center coincide with the center of the rows of pins of the 8P8C. Increase the diameter of the hole until the two rows of the pins of the 8P8C could fit the hole without touching the sides of the circuit board. Then using a Dremel Rotary Tool grind the sides of the hole until all of the pins of the Ethernet Female port pins fit without touching the circuit board. The third hole with the 8P8C port installed should look something like Figure 9.

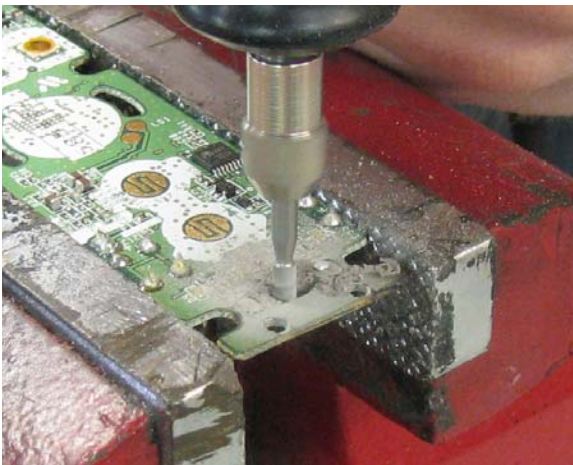


Figure 8: Widening of the Hole



Figure 9: Installation of the 8P8C Female Port.

Step 4: Solder Wires onto the 8P8C Female Port

Please wear safety glasses when soldering. To begin cut 8, 28AWG (or smaller) wires to about 8 inches in length (these will be cut down to a shorter length later). You can also use 28AWG ribbon cable as a substitute. Simply peel 8 wires from the ribbon cable, 8 inches long and you're good to go. In total 8 wires should be soldered to the 8P8C, one for every pin. Unsheathe the wire about 1/4 inch on both ends. Then solder one end of the wire to the 8P8C taking care not to bridge any pins on the 8P8C. (For tips on soldering see Soldering Tips section below.) Then use 1/16" heat shrink tubing to make sure that no short-circuiting occurs.

Step 5: Mount The 8P8C Female Port

Attach an Ethernet port to the circuit board as shown in Figure 10 with the wires coming through the hole towards the top of the circuit board. Make sure to put in the 8P8C on the bottom of the circuit board, exactly as shown in Figure 10, and not the top.

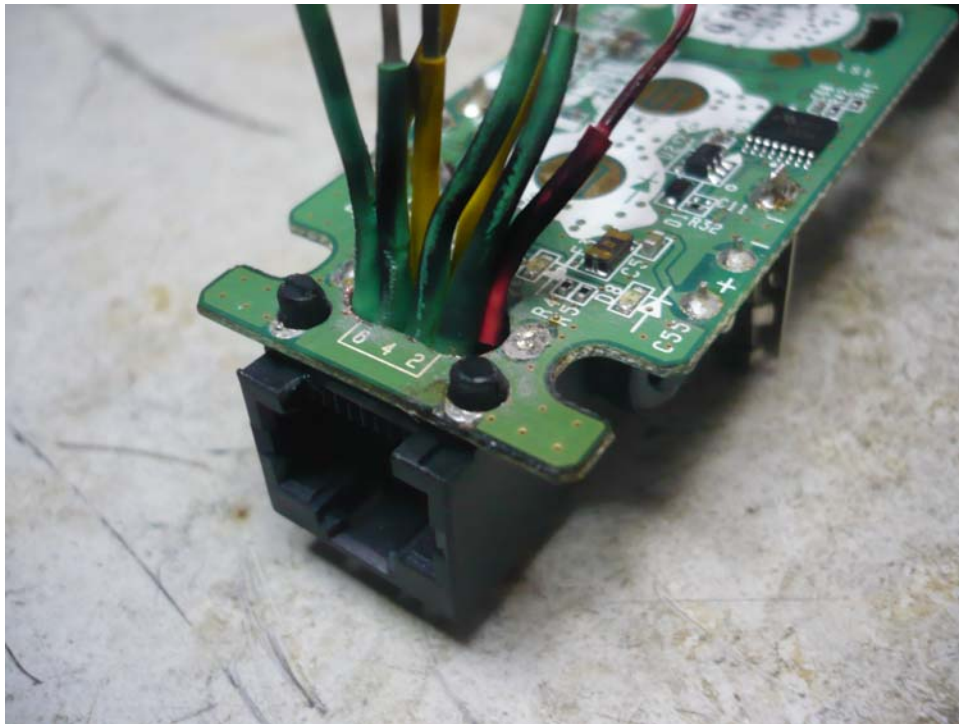


Figure 10: Complete Installation of 8P8C Female Port

Step 6: Solder The Wires Onto the Circuit

To begin you must first designate what Wiimote button goes with which cable. The cable designation on the 8P8C is as shown on Figure 11.

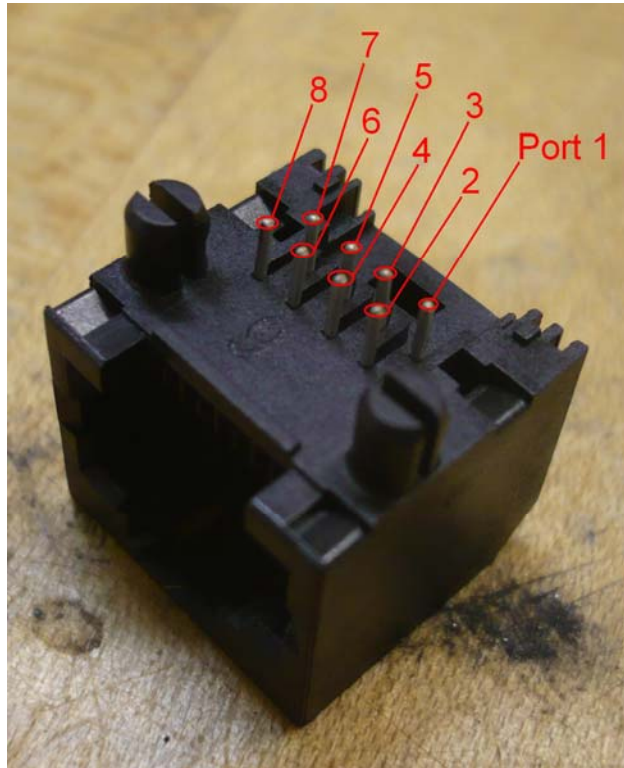


Figure 11: Solder Tab Designations

This table will be useful when making your External Connector Box.

8P8C Port Number	Button
1	A-Button
2	B-Button
3	Home
4	Up
5	Down
6	Left
7	Right
8	Ground

Please wear safety glasses when soldering. While keeping track of which wire you solder to which button in relation to the Ethernet port, solder all wires to the contacts indicated below in Figure 11 and Figure 12. It is important to solder to the correct side of the button contact. Cut the wires so that the wires run along the edges of the circuit board as far as possible. Extra wire will make it difficult to put the case back together, and could disable the buttons on the Wiimote. (For tips on soldering see Soldering Tips section below.)

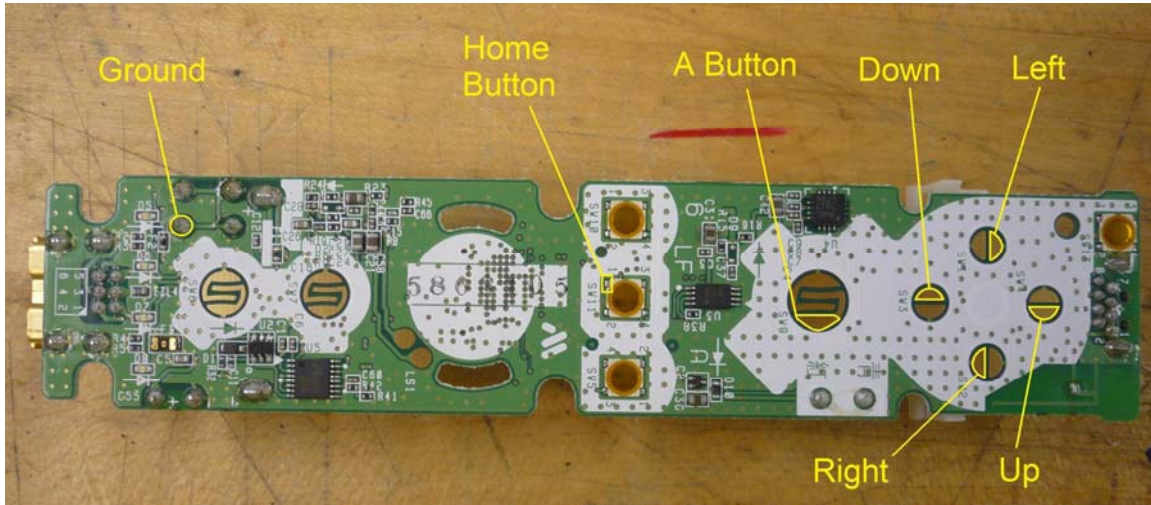


Figure 12: Top Side Solder Points

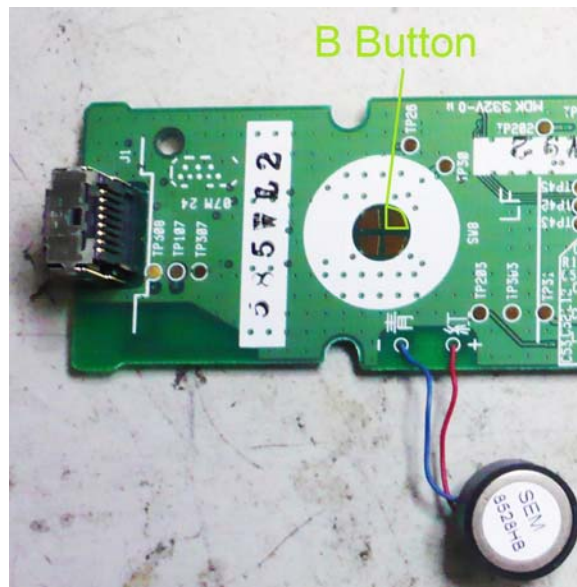


Figure 13: Bottom Side Solder Points

Figure 13 shows what your Wiimote should look like once you have soldered all the wires to the correct connectors.

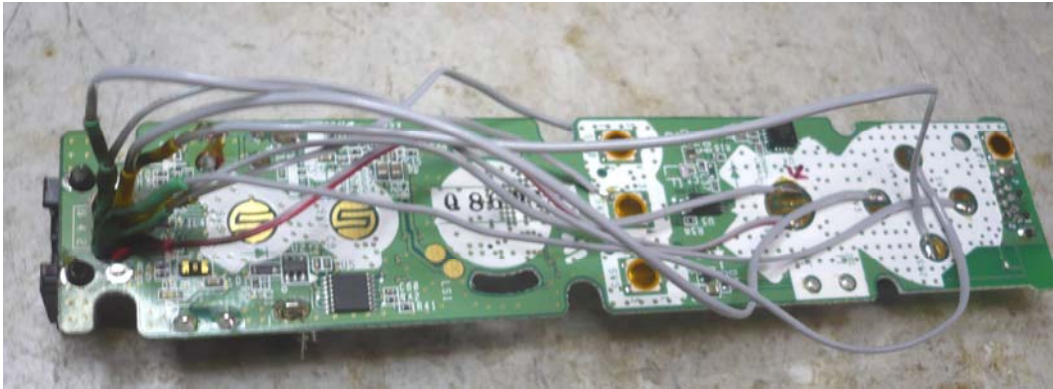


Figure 14: Completed circuit board with soldered wires from 8P8C Female Port

Step 7: Grind the Case

The newly installed 8P8C port is larger than the original opening on the bottom piece of the Wiimote. In order to reassemble the Wiimote the opening must be made larger to accommodate the 8P8C port. Please wear safety glasses. Clamp the bottom piece of the case. Using the Dremel Rotary Tool slowly grind away the case's plastic until the circuit board lies completely flat against the case. Be sure not to grind the tab that holds the battery case in place. If you do grind the tab, simply superglue a thin piece of plastic in place of the tab. This should be sufficient to give the battery case something to grab onto. Once the 8P8C fits in the Wiimote case where the circuit board is pushed in all the way, you will see that the battery case will not close. In order to fix this a small part of the 8P8C will have to be grinded with the Dremel Rotary Tool.



Figure 15: Finished Case

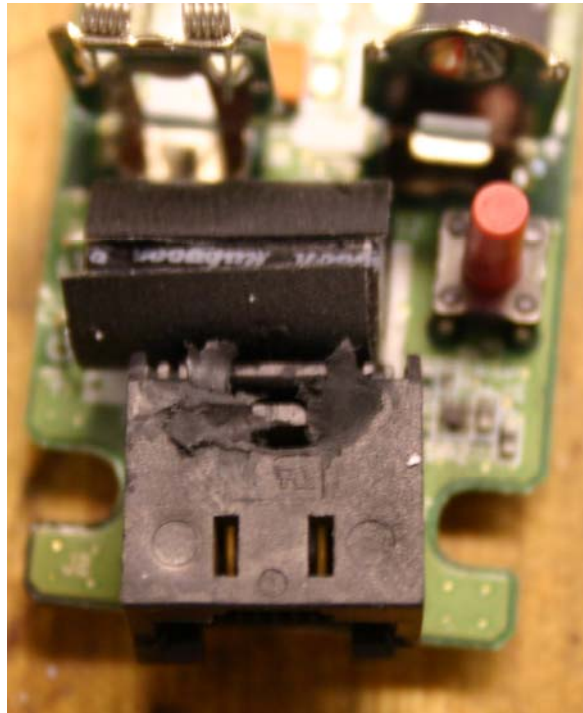


Figure 16: Finished 8P8C Female Port

Step 8: Assemble the Wiimote

Finally the Wiimote is ready for assembly. To begin place the buttons in their original slots in the top case of the Wiimote. Then lower the circuit board in place while using miniature flat-head screwdriver to maneuver the wires. Depending on the diameter of your wires you will probably have to make a few modifications to the top of the case to make enough room for the wires. Once the circuit board is flush with the top case bring in the bottom case. Making all of the everything fit within the small space available on the Wiimote will require a lot of patience and finesse. But don't be discouraged, it is possible to fit everything within the Wiimote.

Once everything fits in place, tighten the triangular-head screws back on the case. Finally put in the batteries and try out your Wiimote. If your Wiimote doesn't work make sure to try it out with brand new batteries before disassembling it.



Figure 17: Completed Wiimote with 8P8C Ethernet Port

External Connection Box:

To operate the modified Wiimote with external buttons you will need to create an External Connection Box, like the one shown in Figure 18.



Figure 18: Example of an External Connection Box

The external connection box is simply a project box, available at any RadioShack, with an input 8P8C Female Connector and a number of output connectors for various user devices. Only passive, normally open, pushbuttons can be used with the modified Wiimotes. However, this type of button comes in a wide variety of forms featuring different connector types. You are going to have to customize your case based on the pushbuttons available to you. For this Connection Box we use two individual pushbuttons with 3.5mm mono plugs, and a directional pad with a DE-9 Serial connector, shown in Figures 19 and 20.



Figure 19: Individual Pushbuttons



Figure 20: Directional Pad

The insides of the Connection Box were wired so that the Blue and Yellow buttons, in Figure 19, be the A and B buttons, the brown button, in Figure 20, be the Home button, and the directional pad be the Cross Buttons. Figure 21 shows the insides of the example Connection Box.

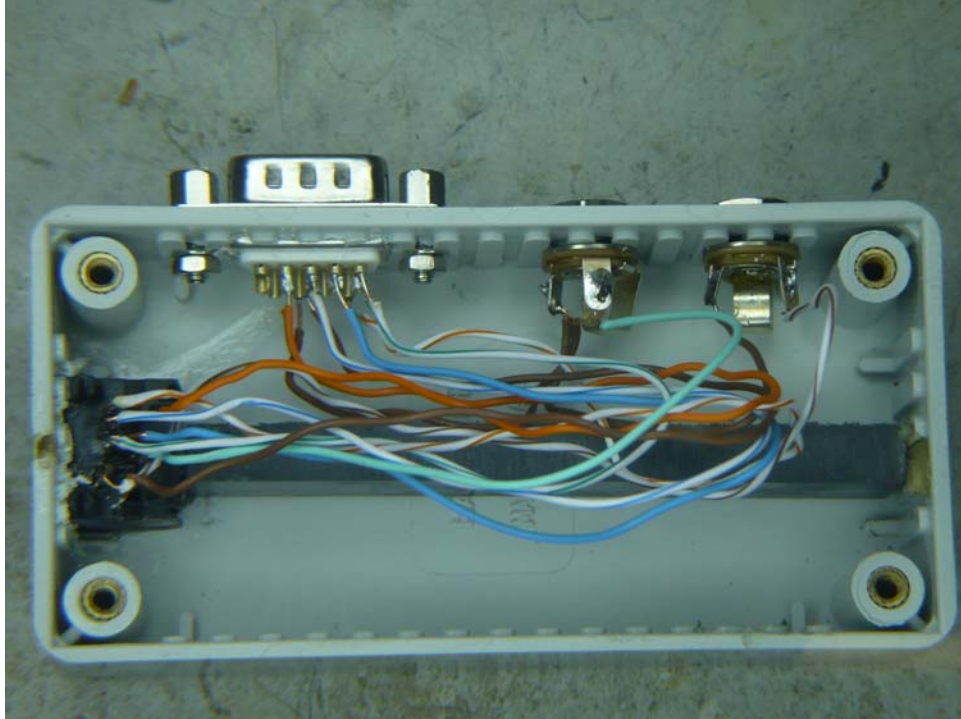


Figure 21: Innards of the Example Connection Box

Soldering Tips

To solder very small items follow the following procedure:

1. Spread some soldering flux on the components you wish to solder.
2. Gather a bit of solder on the tip of your iron.
3. Touch the components together.
4. Give the components a kiss with the soldering iron. The solder on the tip should transfer to the components.

Take care not to put too much solder on the tip of the iron, doing so may result in the bridging of two or more components you don't want soldered together.