

Wolffpac Technologies



Williams™ WPC Alphanumeric Display Semi-Kit



Assembly Instructions

wolffpactech.com

When assembled, this display will replace the displays used on Williams solid state pinball machines which use the “WPC Alphanumeric” display controller. For the complete list of compatible machines, see the list at the end of these instructions.

Tools:

Soldering iron - A small to medium power soldering iron of 25-50 watts with a small tip, preferably temperature controlled, is recommended.

Wire cutters - A set of diagonal or wire cutters intended for cutting electronic component leads.

Alcohol –Isopropyl Alcohol, Denatured Alcohol or Flux Remover to be used for cleaning the board after assembly.

Solder - Use only solder designated for electronic component assembly. Either lead-based or lead-free flux-core solder are both acceptable.

→ Use of solid core, acid core or plumbing solder is not acceptable and will void the warranty. ←

All soldering should be done on the bottom (non-printed) side of the boards. This kit uses “old school” through-hole components requiring only basic soldering skills to assemble. However, if you have never soldered before or are unsure of your skill level, it is recommended that you first practice soldering on a scrap board before beginning to assemble this kit. There are many references on the internet which can help you learn how.



Caution - Warning

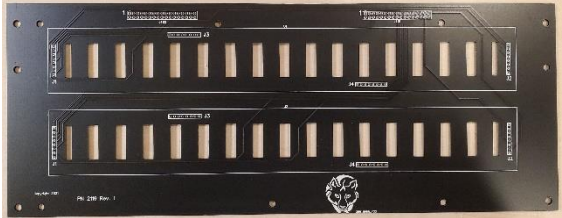




Solder melts at around 400°F to 600°F (200°C to 300°C). Remember to use care when soldering as both the soldering iron and solder are extremely hot and can produce serious burns. Make sure that you use an appropriate work surface since molten solder may drip and hot solder and components may damage or burn many materials.


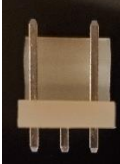


Eye protection is recommended as solder can splash and component leads may fly when cut.

We are not responsible for any damage or injury as a result of assembling this kit.

Remember: Solder and components will remain very hot for several minutes after soldering.

Parts List:

Part Description	Ref	Qty	
Printed Circuit Board 'Master', Marked: P/N 2117		1	
Printed Circuit Board 'Display', Marked: P/N 2119			
IC, Marked: 74HCT238	U1, U2	2	
IC, Marked: 74ACT574	U3 - U7	5	
IC, Marked: 74ACT32	U8	1	
IC, Marked: ULN2803 or TBD62083	Q1, Q2	2	
Capacitor 0.1uF, Marked: 104	C1-C7	7	
Capacitor 10uF	C8	1	
16-character LED Module	U1, U2	2	
16-digit Foam Bezel		2	
Connector, 0.1", 2x13, Straight	J305	1	
Connector, 0.1", 2x17, straight	J301, J304, J401, J402	4	

Connector, 0.1", 1x8, straight		8		
Connector, 0.156", 1x3, straight	J306	1		
Standoff		4		
2x17 Ribbon Cable		2		

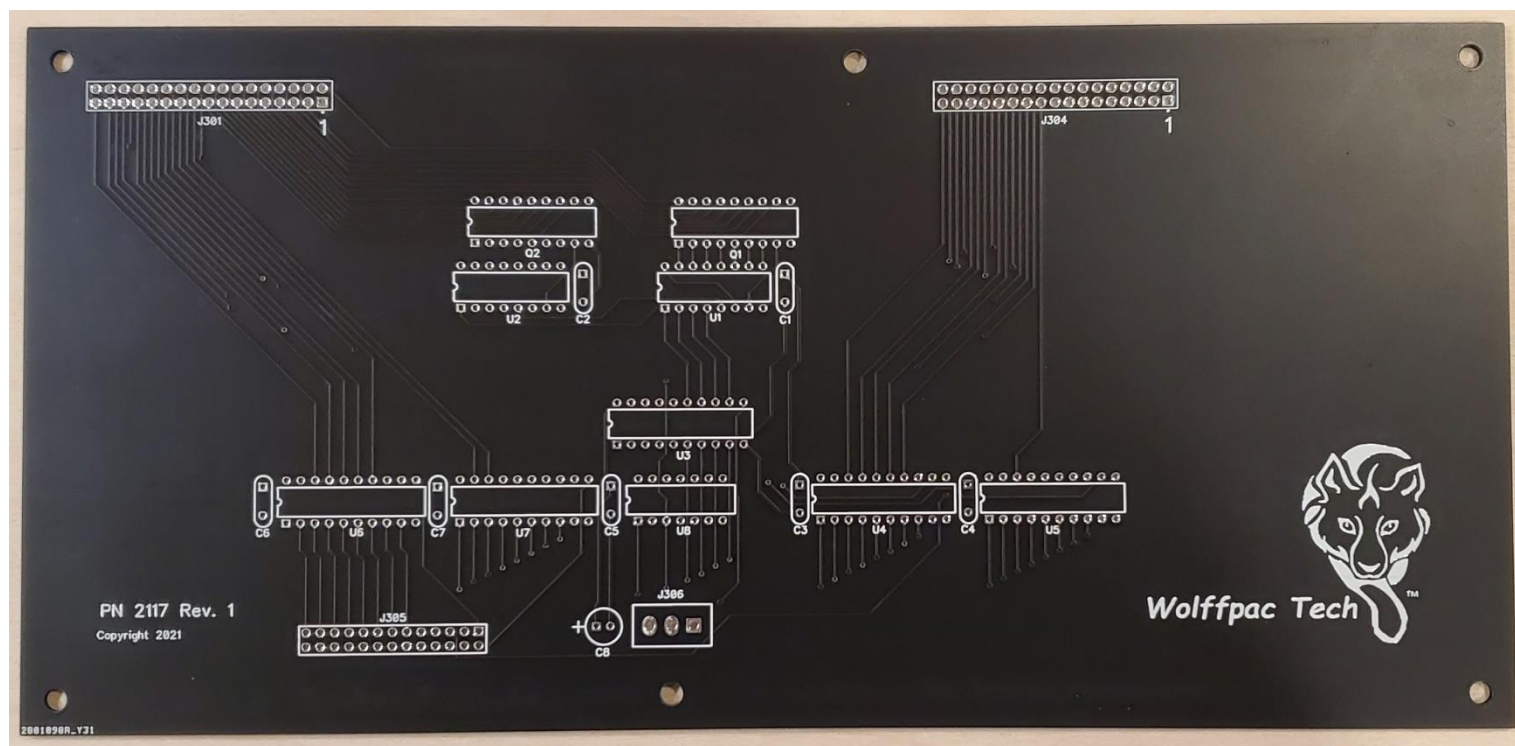
Start Here:

Before starting, check the components received against the parts list on page two. (We do occasionally make mistakes!) If any components are missing, or you have any questions regarding these assembly instructions please contact Wolffpac Tech at 'wolffpactech@gmail.com'.

If you have any problems with the display after assembly, you may contact Wolffpac Tech at 'wolffpactech@gmail.com'. If you need to return the display for repair, we will provide a pre-paid return label. Any problem found to be due to defective components will be repaired free of charge within 1 year of purchase. Any problem found to be due to assembly error or damage will be charged for postage and the cost of any components which need to be replaced.

'Master' Board:

Step 1: Start with the larger 'Master' PC Board (marked P/N 2117):



Insert U8 (74ACT32) into the board from the top side (the side with the lettering) so that one pin goes through each hole at the location labeled 'U8'. Each chip is marked with a 'U'-shaped notch (or dot) on one of the short ends:



This end should line up with the notch printed on the PC board. You may find that you have to bend the legs of the chip slightly in order to get both rows to line up with the holes in the board. You can do this with needle nose pliers or by laying the chip on its side with the pins of one side on a hard surface pointing away from you and gently pressing down and away on the body of the chip. Be careful not to bend the pins too far. Once inserted, bend the pins at the corners from the bottom slightly in order to hold the chip in place.

Make sure that all of the pins from the chip are completely inserted through the holes in the board before soldering in place from the bottom.

Step 2. Repeat for U1, U2 (74HCT238)

Step 3. Repeat for U3, U4, U5, U6, and U7 (74ACT574)

Step 4. Repeat for Q1 and Q2 (ULN2803 or TBD62083).

Step 5: Locate capacitors C1–C7 (100 nF capacitor). Insert one capacitor at the positions marked C1 on the board. The direction of these components does not matter. Bend the leads slightly from the bottom of the board to hold in position and solder in place. Trim the excess lead length to about 1/16 inch. Repeat for C2-C7.

Step 6: Locate capacitors C8 (10uF capacitor). Bend the leads 90° so that the body of the capacitor will lay flat against the PCB and with the long lead through the pad marked with a '+' and the side of the capacitor body marked '-' towards the bottom of the PC board as shown below. Solder in place and trim the leads to about 1/16 inch.

Note: It is very important that this capacitor is attached in the correct direction. The display may be damaged if it is assembled backwards.

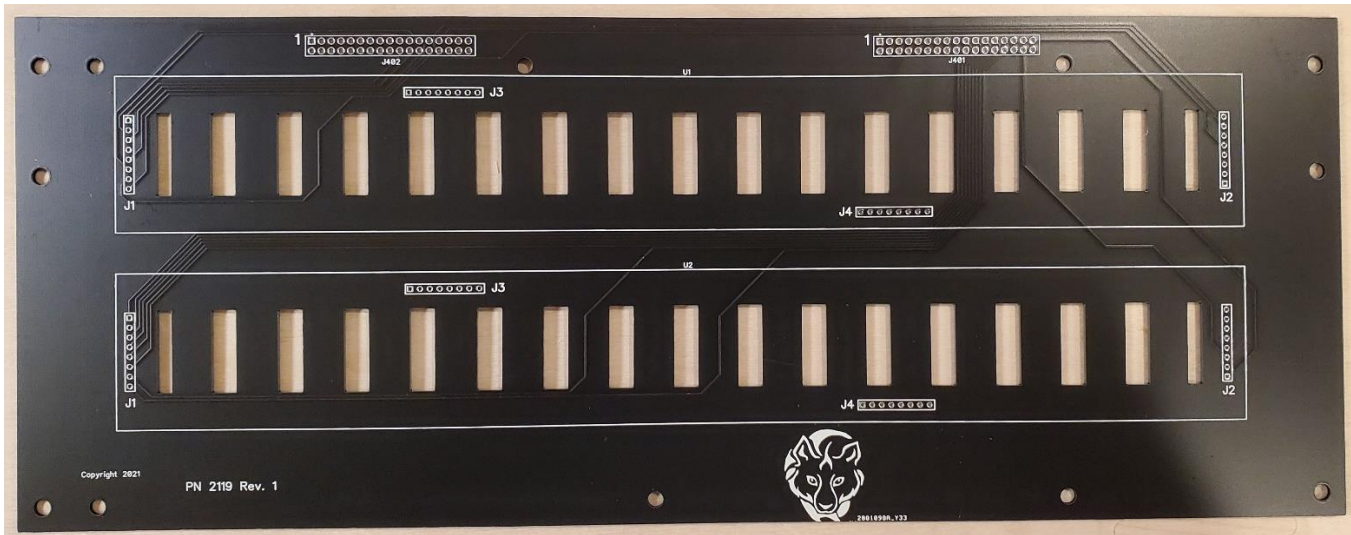


Step 7: Locate connector J305 (2x13 connector). Insert into the board so the pins are facing outwards and solder one pin from the back of the board. Confirm that the connector is fully seated against the board. If not, reheat the pin while pressing on the connector. Be careful not to get burned; the pin will get very hot on the top side of the board! Once the position of the connector is good, solder the remaining pins.

Step 8: Locate connector J306 (1x3 connector). Insert into the board so the pins are towards the edge and the friction retainer is towards the center of the board.

'Display Board'

Step 1: Start with the 'Carrier' PC Board (marked P/N 2119):



Step 2: Locate connectors J401 and J402 (2x17 connector). Insert into the board so the pins are facing outwards and solder one pin from the back of the board. Confirm that the connector is fully seated against the board. If not, reheat the pin while pressing on the connector. Be careful not to get burned; the pin will get **very** hot on the top side of the board! Once the position of the connector is good, solder the remaining pins.

Step 4: The LED carriers are installed in positions U1 and U2.

Install one 1x8 connector in the upper location marked J1. Solder **one pin** from the back side of the board. Repeat for upper connectors J2, J3 and J4 and lower connectors J1, J2, J3 and J4.

Ensure that all connectors are flush with the top surface of the circuit board.

Step 5: Place one of the LED Modules onto upper connectors J1, J2, J3 and J4 for U1. Ensure that all pins are inserted into the LED carrier and solder from the front side of the LED Module board.

Repeat for the lower LED Module Board U2.

Step 5: Solder the remaining pins for upper J1-J4 and lower J1-J4 from the back side of Carrier Board

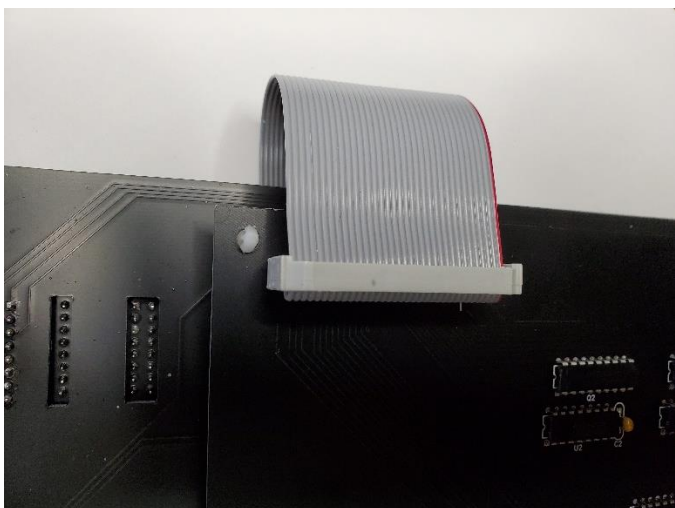
Final Assembly

Step 1. Wipe or rinse the bottom side of the board with Isopropyl Alcohol, Denatured Alcohol, Flux Remover or water depending on the type of solder used in order to remove the solder flux residue.

Step 2. When the board is completely dry, peel the clear plastic protective film from the front surface of each LED display.

Step 3. Insert a standoff into each of the four corner holes of the Master Control board. Attach the Display board to the Control board so that the component sides are facing outwards in opposite directions.

Step 4. Attach the ribbon cables that connect the 'Master' board to the 'Display' board



Step 5. Transfer the mounting standoffs from the original display to the LED carrier board if available.

Step 6. Remove the paper backing covering the adhesive from one of the 16-digit foam bezels. Carefully line the openings with the LEDs on the board and install similar to the picture shown below. Repeat for the remaining foam bezel.

Note: The adhesive is very aggressive. Be careful when handling the bezel after removing the paper backing to avoid sticking it to something or somewhere you didn't intend!



Step 7. With the power off, install the displays in your pinball machine and attach the original cables. The high voltage power supply in your pinball machine is no longer required. If you want, you can remove the fuse on the power supply board to disable it.

Apply power and enjoy!

This is believed to be an accurate list of machines with displays compatible with this replacement. Since we are unable to test this board in every configuration, we take no responsibility for any errors. However, we do welcome feedback as to any errors that are found so that we can update this list.

Williams:

Fun House

The Machine: Bride of Pin-bot

Dr. Dude And His Excellent Ray (Late production only)

