LS-MainBoard-2020-01-THT and LS-MainBoard-2020-02-SMT

URI Laser Scarecrow 2020 design – David H. Brown

There are two revisions of the circuit board that may be used. The 2020-02 board is already populated with several of the components (resistors, diode, capacitor, pushbutton). The 2020-01 board requires all components to be added. Otherwise, they are equivalent.

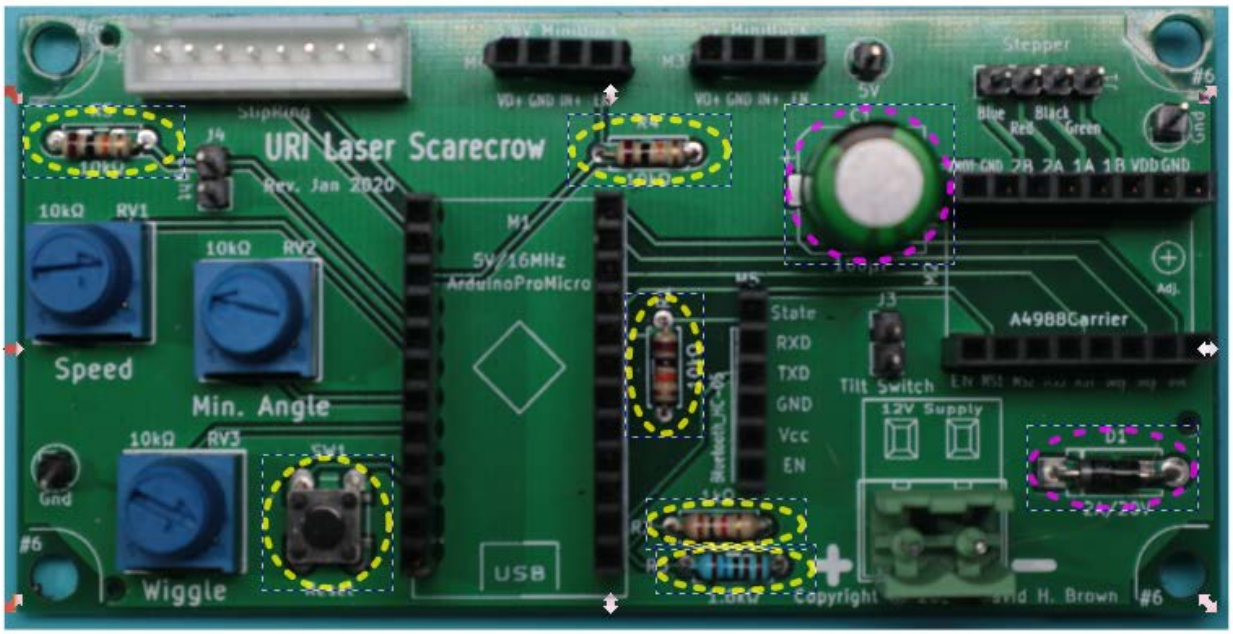
As a general principle, you want to add components to the board beginning with the shortest components as they will be less in the way when placing taller components than vice-versa.

LS-MainBoard-2020-01-THT *only*

Parts

- Circuit board Rev. Jan 2020 (PCB-2020-01)
- 10kΩ ¼W resistor (3)
- 1.6kΩ ¼W resistor
- 1kΩ ¼W resistor
- 1N5817 diode

The circled items in the following image are the parts which are included in the PCB-2020-02-SMT.



DO NOT install the capacitor (green cylinder) at this time as it will block the pin sockets. Also note that it and the diode (bottom right) are polarized and must be inserted in the correct orientation. The negative (-) lead of the capacitor will go toward the top of the board. The negative (-) lead of the diode (marked with a gray band) will go toward the left.

Insert components

Pushbutton switch: The spacing of the leads is rectangular, not square, so it can be placed into the board in either of two positions. The leads are formed to grip the board after insertion

Resistors and diode: bend the leads approximately 90 degrees to the same side just past the body of the part. Insert the leads into the appropriate holes and push the part down against the board. Make sure the gray band on the diode is on the left. On the back side of the board, bend the leads outward to hold the part in position close to the board.

Solder and trim

Flip the board over and solder each lead from the back of the board. These parts are fairly heat tolerant and should be able to withstand up to 10 seconds at around 330°C.

Inspect each solder joint (shiny cone) and redo as needed.

Trim the excess leads (not on the switch)

Trimpots (knobs)

Adjust each trimpot so that it is in the middle of its rotation. Insert each trimpot into the board so that the arrow is pointing up and the body of the trimpot is within the outline as shown. Solder from the back; it is not necessary to trim these leads.

Board connectors

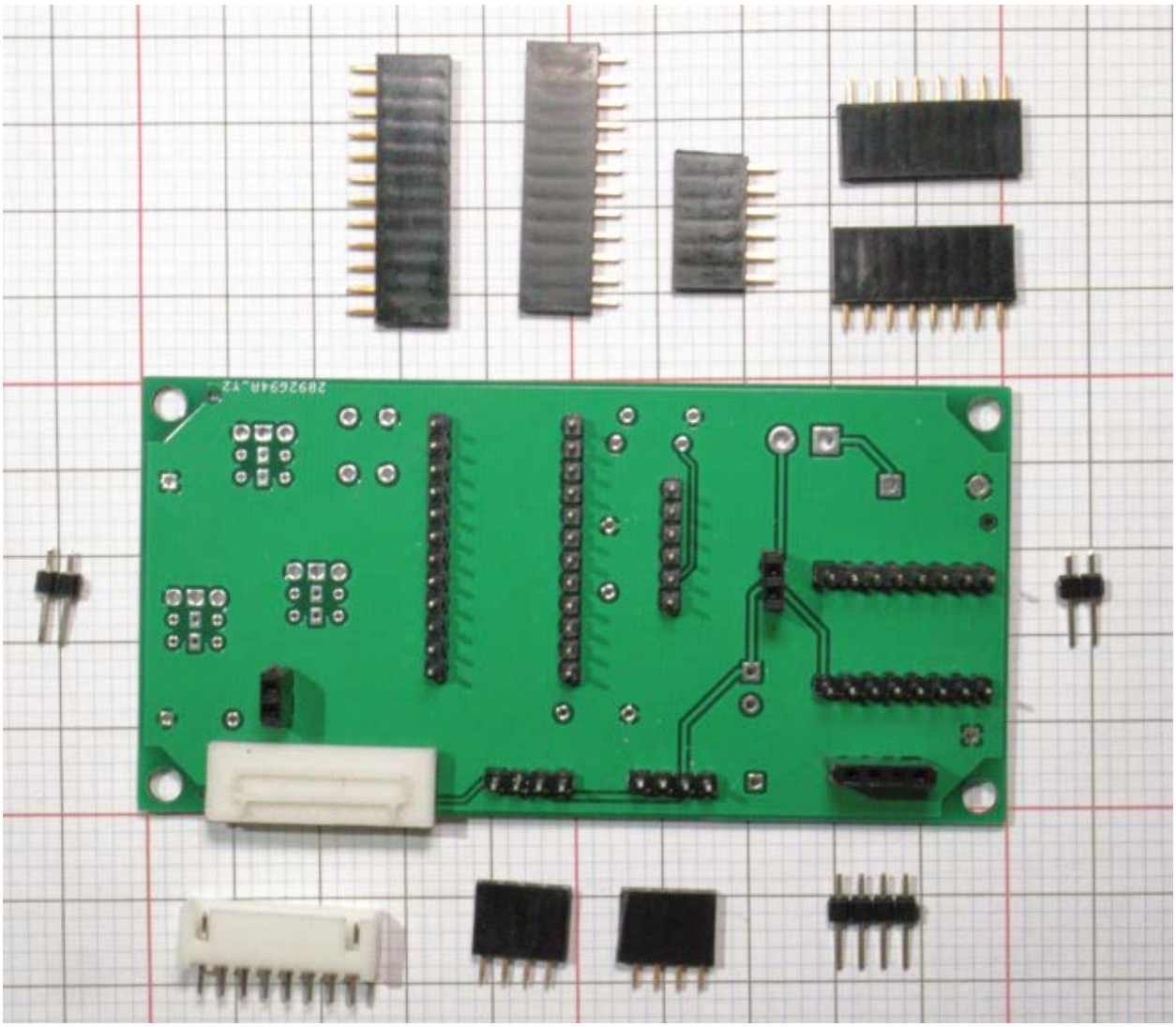
David has prepared a connector alignment and assembly tool consisting of a spare board with inverted connectors to allow easier and more accurate assembly of the boards.

There are three test-point holes (**5V** and **Gnd** near the upper right corner and another **Gnd** near the bottom left) which may be filled with pins but we don't do that for kit boards. They are in the photographed board but will not be added. They are outlined in red here:

Parts

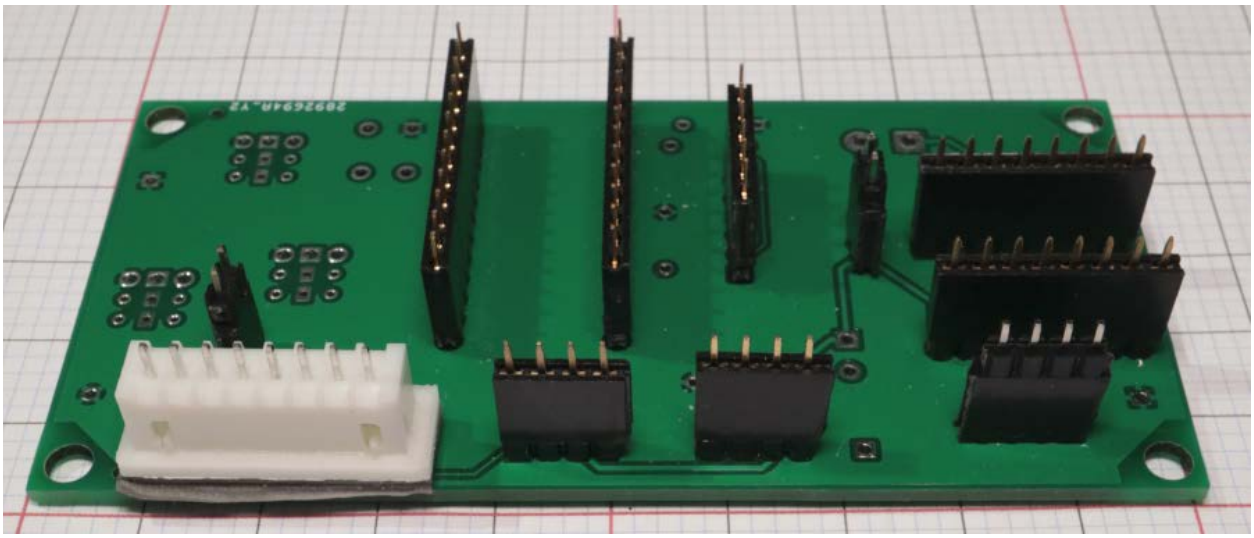
- 1,JST-XH-HDR-8

- 1,PHF-6
- 2,PHF-12
- 2,PHF-4
- 2,PHF-8
- 1,PHM-4
- 2,PHM-2

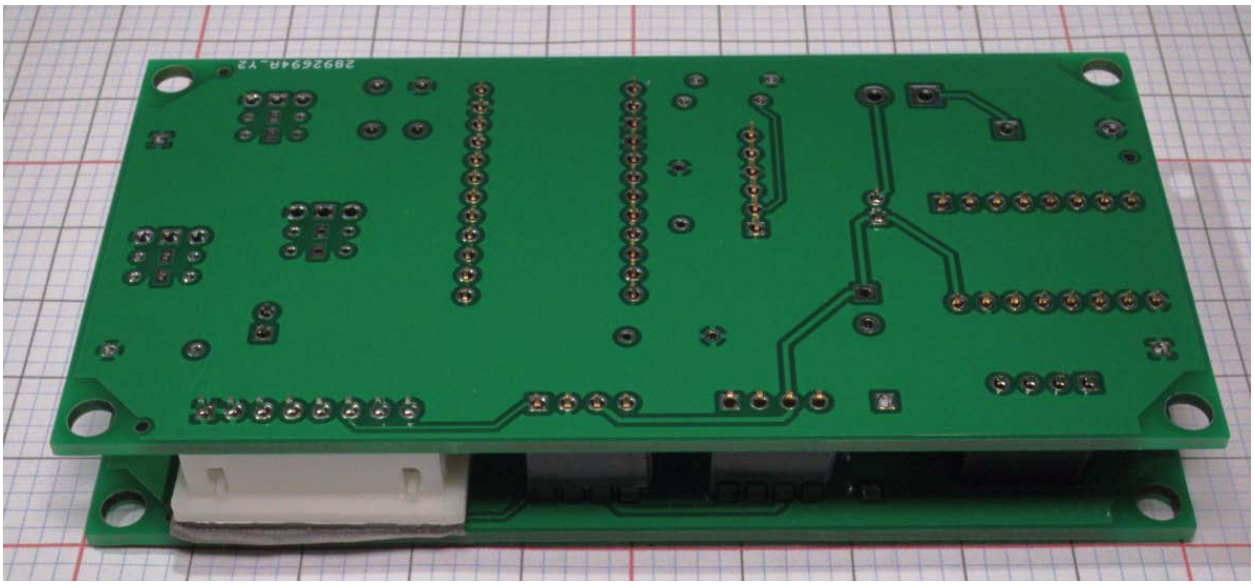


The assembly tool (inverted-connector board) surrounded by the parts it helps install.

Place each part in the appropriate location on the tool. Insert the long side of the 2.54mm (0.1") pins into the tool board. The 2.54mm (0.1") pins and headers will fit snugly; the JST header will sit loosely on its 3D-printed pad.



Fit the board you're using upside-down onto these connectors. It will take some wiggling and nudging of the connectors to make everything fit.



Solder each pin and inspect. Remove the board from the tool by lifting.

Remaining components

LS-MainBoard-2020-01-THT ***only:*** add the electrolytic capacitor, observing its polarity and orientation. Solder, inspect, and trim its leads

All boards: Add the power plug header, observing its correct orientation as shown on the board silkscreen. (Rounded side toward the edge of the board.) Solder and inspect its leads.

Testing

(separate handout on continuity testing should be incorporated here)