Checking the Completed Board: *Now it is time to test your soldering skills.*

1. Plug a DC transformer into your Companion (You can probably find one around the house that plugs into some other electronic device. Just make sure the transformer has an output voltage of 9-20VDC with a positive center pin).
2. The CLK LED should be flashing. Spin the potentiometer dial and see if the flashing light changes its frequency.
3. Using a voltmeter, put the ground probe on the Gnd loop. Check the 5V, Vin, and 0V pins with the other probe on the voltmeter. The Vin should match your voltage source (9-20V).
4. Using a voltmeter, put the ground probe on the Gnd loop. Make sure the switch labeled 'S1' is switched so that it is toward the printed 'S1'. Check the voltage on S1 with the other end of the probe. It should read 0V. Change the switch so that it is away from the printed 'S1' and check with the voltmeter again. It should read 5V. Repeat with the other switches.
5. Plug your companion into a breadboard. Run wires so that S1 connects to L1, S2 to L2, S3 to L3, and S4 to L4. Turn on and off S1 through S4 and see if the LEDs light up accordingly. The LEDs are 'active high' and will turn on when 5V are applied to them.
6. Change your power input to a 9V battery and repeat steps 1-5.

Troubleshooting: *Upon completion of the soldering, if any part of the board is not working, try one of the following:*

1. *Replace555and74LS14chips:* If the green LED is not flashing, try replacing both of these chips with chips from a working kit.

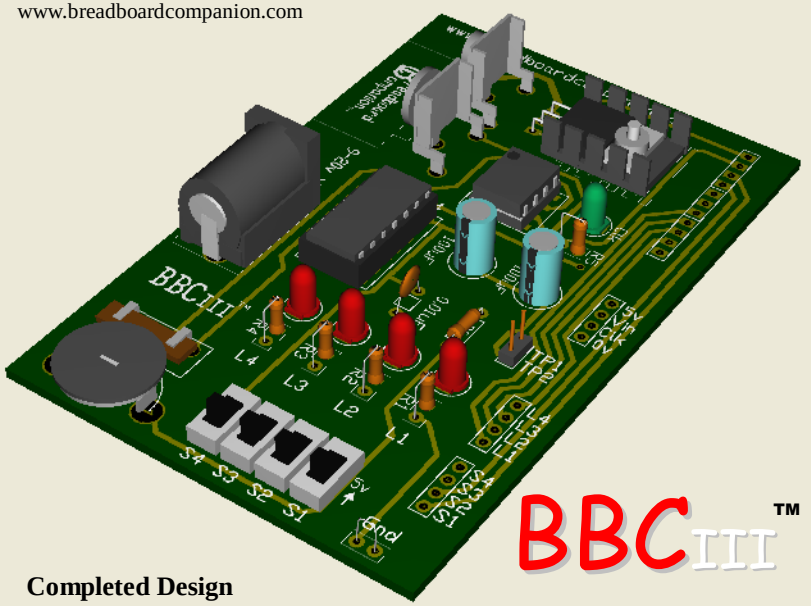
2. *ColdSolderJoints:* These are soldered connections that are not making electrical contact. Use an Ohmmeter to check every joint. Make sure the pin sticking through the board reads "0" resistance with a pin it is connected to on another place of the board. If you find a cold solder joint, reapply heat (and more solder if necessary) and check with the meter again.

3. *Bridges*: These are electrical connections between two separate joints that are not meant to be connected. Use an Ohmmeter to check every pair of neighboring joints (make sure the resistance is infinite between these joints). Use soldering braid or a desoldering tool to remove any unwanted solder.

For technical assistance and support, contact us at
support@breadboardcompanion.com

Breadboard Companion™ Assembly Instructions

www.breadboardcompanion.com



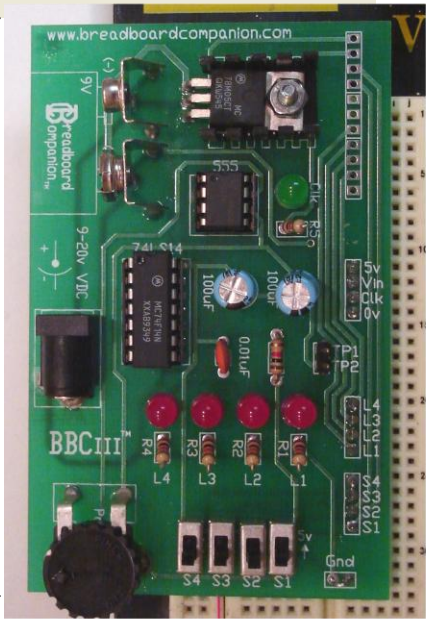
BBCIII™

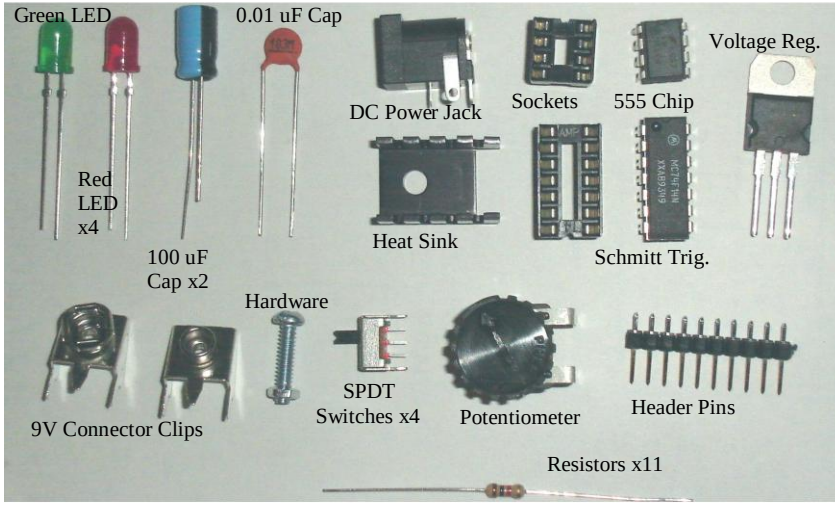
Completed Design

BBCIII™
-Power Supply Kit-

Provides your breadboard with:

- 5 Volt, 0 Volt, and 9 Volt connection to breadboard
- Adjustable, square-wave clock pulse with Schmitt Trigger
- 4 ***new and improved*** logic switches for inputs
- 4 LED logic indicators for outputs
- Test Points for oscilloscope testing
- Ground clip for easy probe testing
- Compatibility with PLD Companion prototyping board
- Adapters that will allow for a 9V battery or a DC transformer to serve as power source (not included)





Tools Needed:

Necessary Equipment:

1. Soldering Iron
2. Solder
3. Multimeter
4. Wire Cutters
5. Pliers

Useful Equipment:

1. Needle Nose
2. Diagonal Cutters
3. Soldering Flux
4. Solder Braid or Desoldering Tool

Before Soldering: *If you are inexperienced at soldering, refer to the hand-out "Tips on Soldering."*

Note: With the exception of some of the header pins, all components go through the top of the board (side with print) and are soldered on the bottom. ALWAYS USE SAFETY GOGGLES WHEN CLIPPING THE SOLDERED PINS.

Assembling the Board: *Listed below is a suggested order in which to assemble the kit. There are several details to watch out for.*

1. *9vConnectorClips:* These will NOT attach to a 9V battery if you allow them to go all the way into the holes when you solder them. Avoid this by soldering the clips to the board while ATTACHED to a 9V battery. However, in the effort to create a secure mechanical connection, solder the clips so that the 9V battery lies flush with the board, using ample solder by driving it down into the holes, being careful not to bridge the middle two holes ('+' pad with the '-' pad). **Make sure the '+' and '-' side of battery is lined up as shown on the board**.

2. *VoltageRegulator:* This is intended to be bolted down to the heat sink with the hardware (see Completed Design on front cover). Stick the regulator through the holes, then bend it backwards (so that the writing on the regulator is showing), and bolt it down to the heat sink BEFORE you solder it in place. To keep the bolt from getting in the way later on, insert it so that the nut is on top.

3. *100uFCapacitorsandLEDs*: Watch for 'polarized' items. This means that the way in which you put them in matters. The '+' side of the component has the longer leg. All polarized items have asymmetrical pads on the board—round (+) and square (-). The 100uF capacitors and the LEDs are polarized. If you want the LEDs to lie flush with the board, clip the legs before you insert them. Now that the legs are clipped, you will have to look at the lip of the LED to find its polarization. The flat edge represents the negative side. The red LEDs go in the circles directly above R1-R4 (as viewed in the Completed Design). The green LED goes in the spot labeled 'Clk'. Save one of your clipped legs for the ground loop in step #8.

4. *Resistors and the 0.01uF capacitor:* These are not polarized and it does not matter which way you put them in. All the resistors are the same and they go in the spots labeled R1-R6. Only R6 lies flat on the board, the others stand up. You may be given extra resistors in case of mistakes.

5. *SPDTSwitches:* You are given four of these and they go in the spots marked S1-S4. In order to fit these into the three holes provided, you must clip the top and bottom pin of each switch. Be careful not to clip the middle three pins. Orientation of each switch does not matter.

6. *HeaderPins:* Using diagonal cutters, break the larger one into two groups of four and one group of two. Then break the smaller one into a group of four. The groups of four are what plug into the breadboard. Take one group of four and plug the long end into a breadboard and place the part of the board marked 5V,Vin,CLK, and 0Vover the shorter end of the pins. **SOLDER THE PINS TO THE TOP OF THE BOARD**. This will leave the long pins straight and protruding from the bottom. Repeat this process for the switches and the lights. This will leave you with one group of two and one group of one left over. The group of one is extra and the group of two is used for the Test Points in step #7.

7. *TestPoints:* Slide the shorter pin through the top of the board marked 'TP1, TP2' and **solder it to the bottom**. This will leave the long pins coming out of the top of the board for testing purposes.

8. *GroundLoop*: For the holes that say 'Gnd', bend one of your clipped legs so that it makes a loop and stick the loop into these holes so that the loop is on the top of the board. Solder it into place.

9. *PotentiometerandDCjack:* See Completed Design for placement. These will require enough solder to fill the holes completely.

10. *555chipandSchmittTrigger:* Solder the 8 pin socket into the '555' slot and the 14 pin socket into the '74LS14' slot. It does not matter how you put the sockets in. **When you are done with the entire kit**, plug the 555 chip into the 8 pin socket so that the round dot is on the side closest to the voltage regulator and plug the Schmitt Trigger into the 14 pin socket so that the round dot points towards the 9v clips. **Never do any soldering with these chips inserted into their corresponding sockets.**