



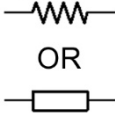
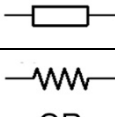

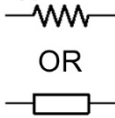
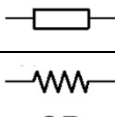

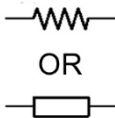
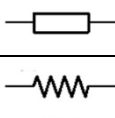
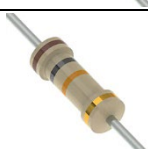
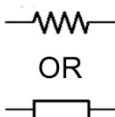
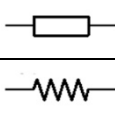
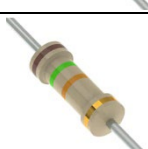
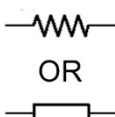
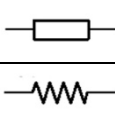
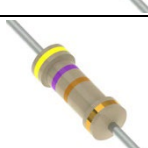
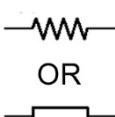
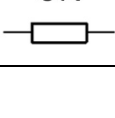
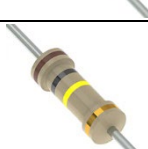
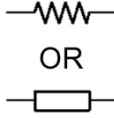





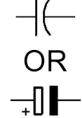

Be sure you double check all your parts as soon as you receive your kit!

If any parts are missing, please contact Sales@FVResearch.com right away.

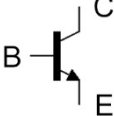
This list shows all items needed for both the practice area and LED Blinker			
LEDs			
Symbol	Kit QTY	Image	Description and Schematic Name
	1		5mm Red LED, Forward Voltage (Vf) = 2V, Current = 20mA LED1
	1		5mm Green LED, Forward Voltage (Vf) = 2.4V, Current = 20mA LED2
Resistors			
All resistor tolerances are $\pm 5\%$ (gold stripe)			
 OR 	2		100Ω ¼W 5% Carbon Film Resistor Brown, Black, Brown R1, R4
 OR 	1		1KΩ ¼W 5% Carbon Film Resistor Brown, Black, Red R5
 OR 	1		10KΩ ¼W 5% Carbon Film Resistor Brown, Black, Orange R6
 OR 	1		15KΩ ¼W 5% Carbon Film Resistor Brown, Green, Orange R7
 OR 	1		47KΩ ¼W 5% Carbon Film Resistor Yellow, Violet, Orange R8
 OR 	3		100KΩ ¼W 5% Carbon Film Resistor Brown, Black, Yellow R2, R3, R9

	1		220K Ω ¼W 5% Carbon Film Resistor Red, Red, Yellow R10
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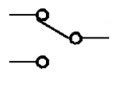

Capacitors			
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	6		.1 μ F Ceramic Capacitor 50V (code 104) C3-C8
	2		22 μ F 16V Radial electrolytic Capacitor (color may vary) C1 & C2

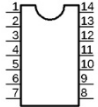

Transistors			
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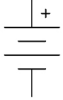




	3		2N3904 NPN Transistor in TO-92 package T1-T3
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Switches			
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	1		Slide Switch 1P2T (SPDT), .5A, 50VDC S1
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Sockets			
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	1		14 pin DIL (Dual-In Line) socket (AKA DIP socket – Dual-In Line Pin) IC1
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Batteries and Battery Connectors			
	2		AAA Alkaline Battery (Brand may vary) B1 & B2
There are two battery clip options, depending on the version of your printed circuit board. Your kit will have only the four metal clips or the two plastic battery holders.			
	4		Metal AAA battery clip B1 & B2 Used with PCB version 1.2 and earlier
OR			
	2		Plastic AAA Battery Holder with solder pins B1 & B2 Used with PCB version 1.3 and later
Printed Circuit Board (PCB)			
	1		106-100 FutureVision Research Soldering Basics PCB

Step 1 – Gather the parts needed for the LED Blinker and set them aside

- Empty all parts onto a tray and select the parts shown in the picture titled “LED Blinker Parts”.
- You’ll use these parts during the second half of the activity.
- For now, place the LED Blink Parts back in the plastic bag.
- The parts remaining on the tray will be used on the practice area of your circuit board.

Note about trimming leads on your parts

All leads need to be trimmed before you insert batteries into the battery holders. You can trim leads after soldering each part, or you can trim them all at once when you finish. **The battery clips and power switch do not need to be trimmed.**

Step 2 – Practice Area

- When you are first learning how to solder, it is best to insert only one part, solder that part, then insert the next one.
- Then, once you get more comfortable, you can insert more parts at a time.
- Use the page titled “Practice Parts” to help you confirm the value or color code for each part.
- Double check and make sure you put the right part in the correct holds **BEFORE** you solder it in place.

Recommended order:

1. Resistors R5 through R10.
2. Capacitors C3 through C8
3. Transistor T3
4. IC Socket IC1

Step 3 – LED Blinker

Assemble the LED Blinker in order shown below. Use the

Recommended order:

1. LED1 and LED2 – red and green LEDs
2. R1 and R4 - 100Ω resistors (NOTE: **These two resistors go on either side of R2 & R3**)
3. R2 and R3 - 100KΩ resistors (NOTE: **These two resistors are next to each other**)
4. C1 and C2 – 22μF electrolytic capacitors – (Note: **Short leads face each other**)
5. T1 and T2 – 2N3904 transistors – T1 faces down, T2 faces up
6. S1 – Slide switch – knob faces edge of board
7. Battery holders – Insert and solder the battery holders now, but don't insert the batteries until after step 4 below.

If you have printed circuit board (PCB) version 1.2 or older, you will have the four metal battery clips. Insert each pair so they face each other. To put them in place, insert one of the solder pins and gently push sideways to insert the other pin. One AAA battery fits between each pair of clips.

If you have PCB version 1.3 or older, you will have two plastic battery holders with metal solder pins. Notice that each holder has a small plastic pin next to one of the metal solder pins. That pin marks the positive terminal. Insert positive solder pin into the proper pad. Then gently press sideways on the battery holder to insert the solder pin on the negative side of the holder.







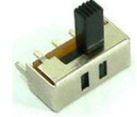


Step 4 – Inspection and battery placement

Inspect your board and insert the batteries


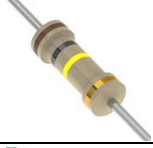

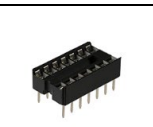
Recommended steps:

1. Inspect your solder connections and check for poor connections, cold solder joints, solder bridges, etc.
2. Correct any faulty connections
3. Ensure all component leads are trimmed
4. Insert the two AAA batteries provided with the kit
5. The two LEDs should blink back and forth

LED Blinker: Gather the parts shown on this page and put them back in the bag.

Symbol	QTY	Image	Description and Schematic Name
LED1	1		5mm Red LED, Forward Voltage (Vf) = 2V, Current = 20mA
LED2	1		5mm Green LED, Forward Voltage (Vf) = 2.4V, Current = 20mA
R1, R4	2		100Ω ¼W 5% Carbon Film Resistor Brown, Black, Brown
R2, R3	2		100KΩ ¼W 5% Carbon Film Resistor Brown, Black, Yellow (Leave one for the practice area)
T1, T2	2	 2N3904	2N3904 NPN Transistor in TO-92 package (Leave one for the practice area)
C1, C2	2		22µF 16V Radial Electrolytic Capacitor (color may vary) Short lead is negative or follow negative mark on label
S1	1		Slide Switch 1P2T (SPDT), .5A, 50VDC Knob faces edge of the board
There are two battery clip options, depending on the version of your printed circuit board. Your kit will have only the four metal clips or the two plastic battery holders.			
B1, B2	4		Keystone AAA battery clip (PCB ver. 1.2 and older)
OR			
B1, B2	2		Plastic AAA Battery Holder with solder pins (PCB ver. 1.3 and later)

Practice Area: Start with the parts shown on this page.
Be sure to double check the part value before soldering it in place!

R5	1		1KΩ ¼W 5% Carbon Film Resistor Brown, Black, Red
R6	1		10KΩ ¼W 5% Carbon Film Resistor Brown, Black, Orange
R7	1		15KΩ ¼W 5% Carbon Film Resistor Brown, Green, Orange
R8	1		47KΩ ¼W 5% Carbon Film Resistor Yellow, Violet, Orange
R9	1		100KΩ ¼W 5% Carbon Film Resistor Brown, Black, Yellow
R10	1		220KΩ ¼W 5% Carbon Film Resistor Red, Red, Yellow
C3 - C8	6	 104	.1μF Ceramic Capacitor 50V (code 104)
T3	1	 2N3904	2N3904 NPN Transistor in TO-92 package
IC1	1		14 pin DIL (Dual-In Line) socket (AKA DIP socket – Dual-In Line Pin)