

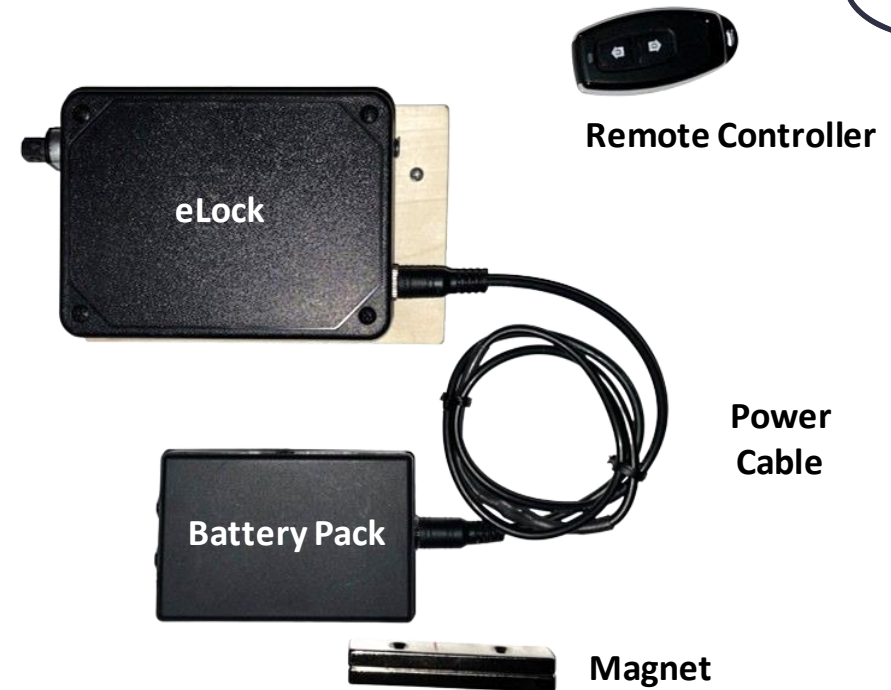
Battery Pack

Overview



The Battery Pack provides the eLock with the +12vdc power needed for operating internal components. Since the Battery Pack and eLock are normally installed inside a sealed enclosure and left for long periods of time, the Battery Pack is designed to remain in a dormant state and draws no power unless it is activated from outside the enclosure by a magnetic field.

The Battery Pack can be mounted anywhere on the inside front panel of the enclosure in an area selected and documented by the user. When a magnet is placed near the Battery Pack, the internal reed switches (normally OFF) flip to the ON state to connect the battery to the power connector. This allows the eLock to receive and act on commands from the Remote Controller. The switches automatically flip back to the OFF state when the magnet is removed.



A standard 12vdc socket is used for the power connector. The Power Cable, a custom cable made with standard 12vdc plugs on both sides, is used to connect the Battery Pack power output connector to the eLock power input connector. The Power Cable length can be easily adjusted by the user to match installation requirements.

Battery Pack

Overview

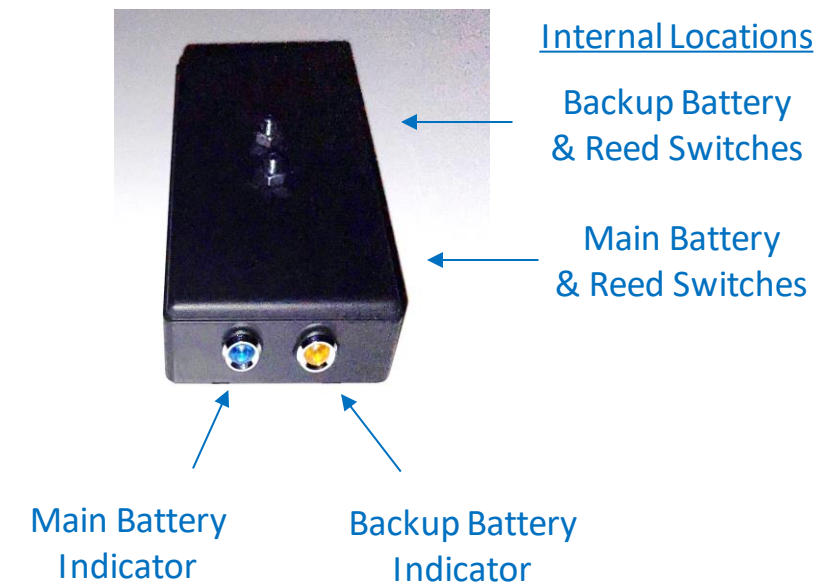


A backup battery is contained within the Battery Pack to provide an extra layer of reliability and further reduce the chance of losing access to the inside of your Secret Safe due to battery failure.

A separate set of reed switches, placed on opposite sides of the Battery Pack box, is used for each battery. That way either battery can be activated by placing the magnet near one side or the other.

The LEDs flash to indicate which battery is drawing current when the Battery Pack is activated. The Blue LED represents the Main Battery and the Yellow LED represents the Backup Battery.

The LEDs provide advance notice when the associated battery is getting low. The LEDs stop flashing when the voltage level reaches 10 vdc, the E-Lock stops working when the voltage level reaches 8 vdc.




Slides 3-21 provide a step by step procedure showing how to build your own Battery Pack.

Battery Pack

Step 1 - Review The Parts List

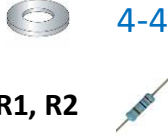
The following shows all of the parts needed to build one Battery Pack.



4-40 Screw (2) [C]
4-40 Nut (2)




Open Cable (2)




4-40 Washer (2)
R1, R2 Resistor (2)




S1-S8 Switch (8)




BP Box Cover (1)
BP Box (1)




Battery (2)




Magnet (1)



C1
Connector (1)
Connector Washer (1)
Connector Nut (1)



B1, B2 Battery Holder (2)



L1, L2
LED (2) LED Nuts (2)

NOTES:

[A] Dotted lines are used to show multiple components which come as part of a single package.












[B] Extra parts (sometimes provided with purchased products) are not shown on this page. These parts can be set aside for spares or for use with other projects.

[C] Various lengths (all provided in item 9 of the parts buy list) are used for building the Battery Pack. The lengths are defined within the instructions.







[D] In addition to the parts shown on this sheet, you will need the special tools and supplies shown on page 4 and common tools, including; small Phillips screwdriver, small pliers, tweezers, wire stripper, drill and drill bits to match the hole sizes defined in the instructions.

Battery Pack

Step 2- Buy The Parts

Battery Pack - Parts List					
Item	Project Part Name	Description	Buy QTY	Suggested Product (Link)	Approx. Price [C]
1	Battery Holder	- Holds 12 volt battery - 6 per pack (2 used)	1 pack		\$6
2	Battery	- 12 volt battery - 5 year shelf life - 4 per pack (2 used)	1 pack		\$6
3	BP Box	- Small plastic box - Includes snap-on cover - 5 per pack (1 used)	1 pack		\$11
4	Resistor [B]	- 27 ohms, 1/4 watt - 3 per pack (2 used)	1 pack		\$0
5	LED [A]	- 12 vdc LEDs - Red, Grn, Yel, Blue, Wht - 5 per pack (2 used)	1 pack		\$15
6	Reed Switch	- Reed switch - Normally open - 10 per pack (8 used)	1 pack		\$9
7	Connector [A]	- Female panel connector - Accepts 5.5/2.1mm plug - 5 per pack (1 used)	1 pack		\$8
8	Magnet	- Powerful bar magnets - 6 per pack (1 used) - If needed, more magnets can be used to increase power	1 pack		\$10
9	4-40 Nuts & Screws [A]	- Assorted Nuts/Screws (100 pieces) - Screw lengths: 3/16" to 1" - 2 screws used - 2 nuts used	1 pack		\$6
10	4-40 Washers [B]	- ID = 0.11 OD = 0.22 inches - 7 per pack (2 used)	1 pack		\$0
11	Open Cable [A]	- 5.5/2.1 mm plug - 20 inch pigtail cord - 10 per pack (2 used)	1 pack		\$8

This page identifies the recommended parts, supplies and tools needed to build a Battery Pack. Links are embedded in the picture of each item, providing quick access to more product details.

Special Tools & Supplies					
Item	Project Part Name	Description	Buy QTY	Suggested Product (Link)	Approx. Price [C]
1	Double Sided Mounting Tape [A]	- 1" wide X 60" long - Use to mount or hold parts	1 roll		\$7
2	Electrical Tape	- 0.75 in wide x 66 feet long	1 roll		\$8
3	Heat Gun [A]	- 750 & 1000 deg - For heat shrink terminals & sleeving	1 unit		\$25
4	Heat Shrink Tubing [A]	- 127 pieces, 7 sizes - Size range: 0.08" - 0.5" dia	1 pack		\$5
5	Solder Kit [A]	- 60W soldering iron - Many accessories	1 unit		\$19
6	Loctite [A]	- Blue 242 thread locker - Removable grip	1 unit		\$6
7	Caliper [A]	- Digital readout - 6 inch range - Accuracy = 0.0005 inches	1 unit		\$16

NOTES:

[A] This tool, supply or part is used on other Project Launchpad projects and you may already have it (e.g. many parts require a minimum buy of more units that will be needed for a single project). Be sure to check your toolbox and inventory before purchasing any more of this same item.

[B] These parts can be ordered directly from Project Launchpad by sending a request by email to support@projectlaunchpad.com. This eliminates the need to pay for many extra parts that probably will never be used. These parts are provided free of charge, just send your mailing address and receipt from a part purchased for the Secret Safe. Shipping fees will apply if the mailing address is located outside the USA.

[C] These are estimated prices, actual prices may vary from time to time. Please click the associated link in order to get an accurate and up-to-date price for this item.

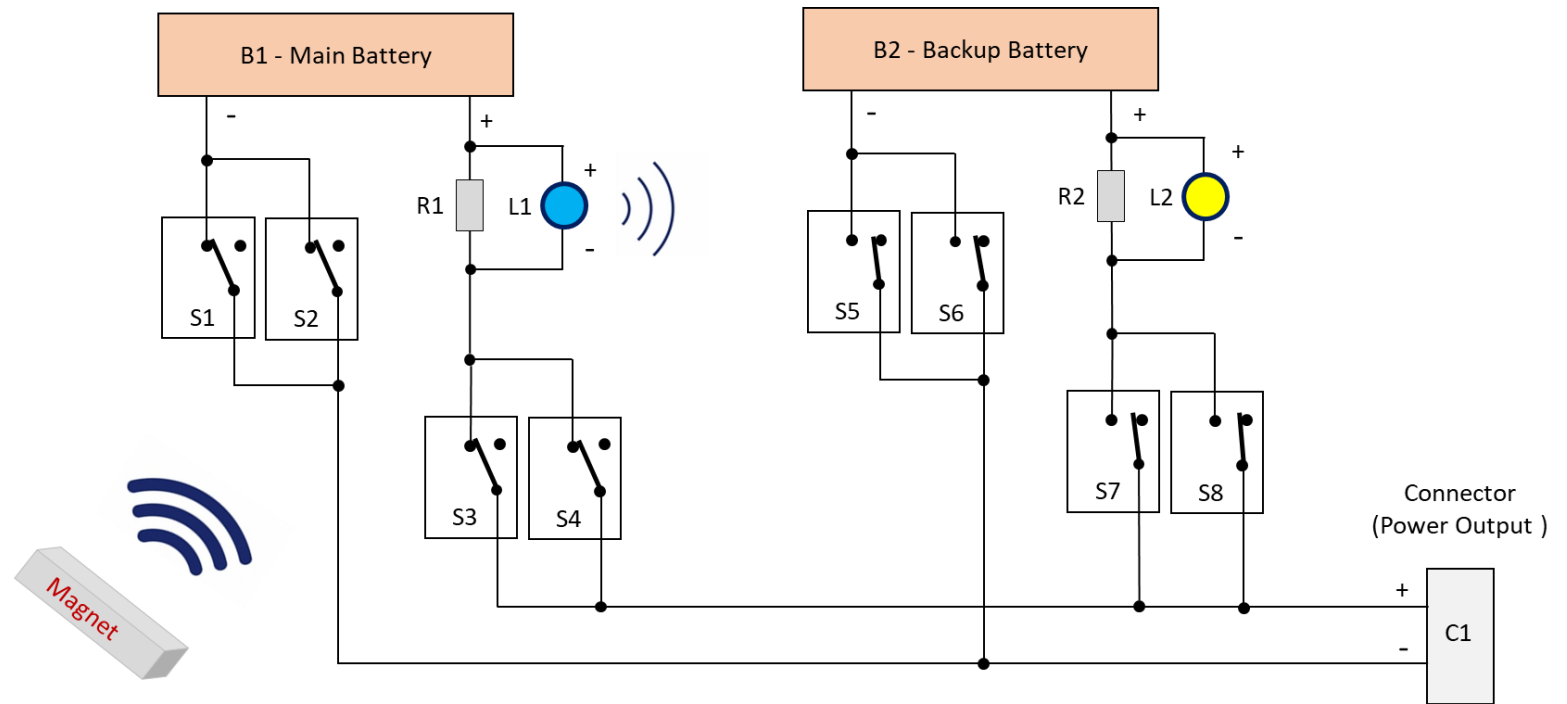
Battery Pack

Step 3a - Review The Electrical Design

1) Four reed switches (S1-S4) are used to connect the Main Battery to the Power Connector. All four switches flip to the ON state if a magnet is placed near the switches, then return to the OFF state when the magnetic field is removed.

2) Although 1 switch would do the same job, the 4 switch configuration provides an extra layer of reliability. For example, if S1 fails to flip ON from the magnetic field, the connection is still made by S2, S3 & S4. If S3 fails to flip OFF when the magnet is removed, the connection is still broken by S1 and S2.

3) The same switch configuration and operation described above for the Main Battery is also used for the Backup Battery.



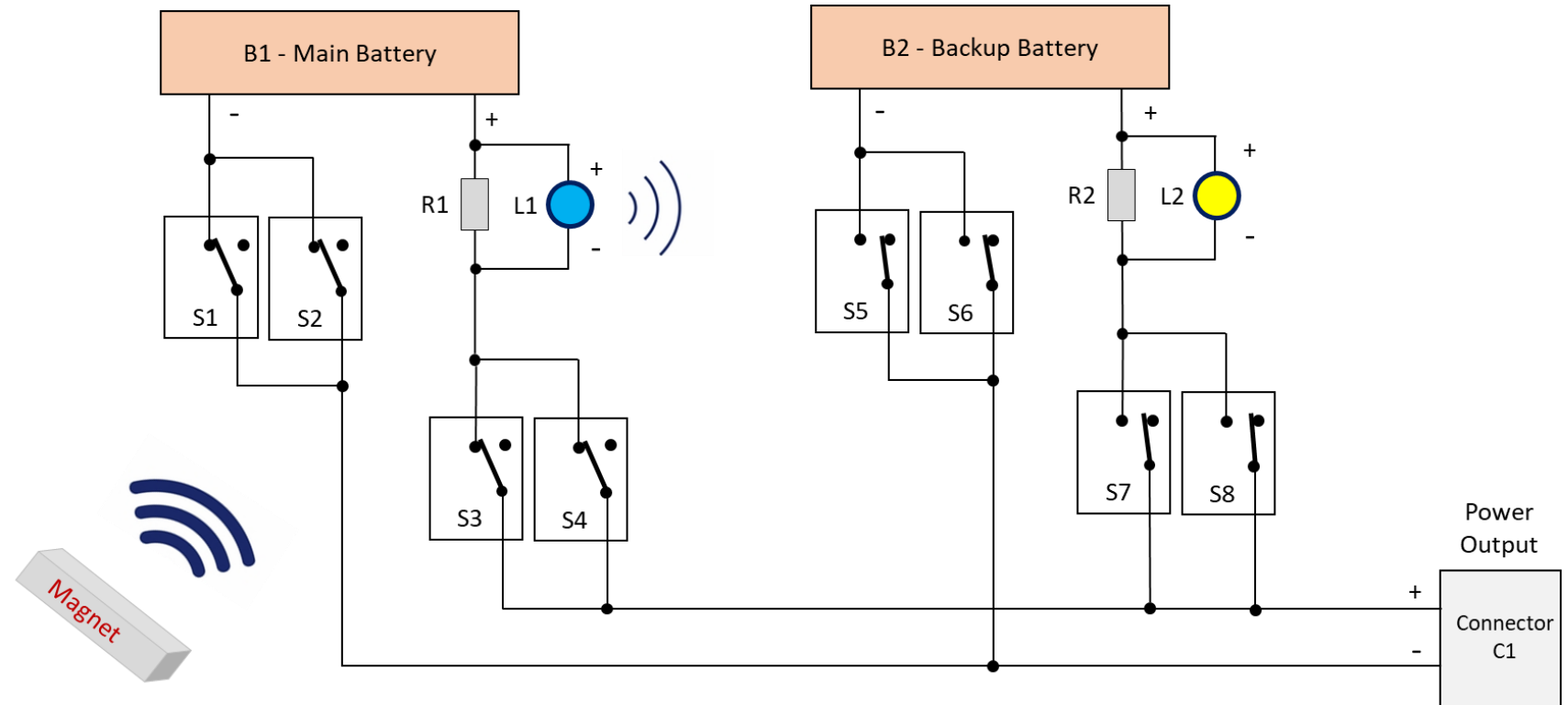
Battery Pack

Step 3b - Review The Electrical Design

4) When the E-Lock is connected to the Battery Pack, the two LED indicators can be used to identify which set of switches has been flipped;

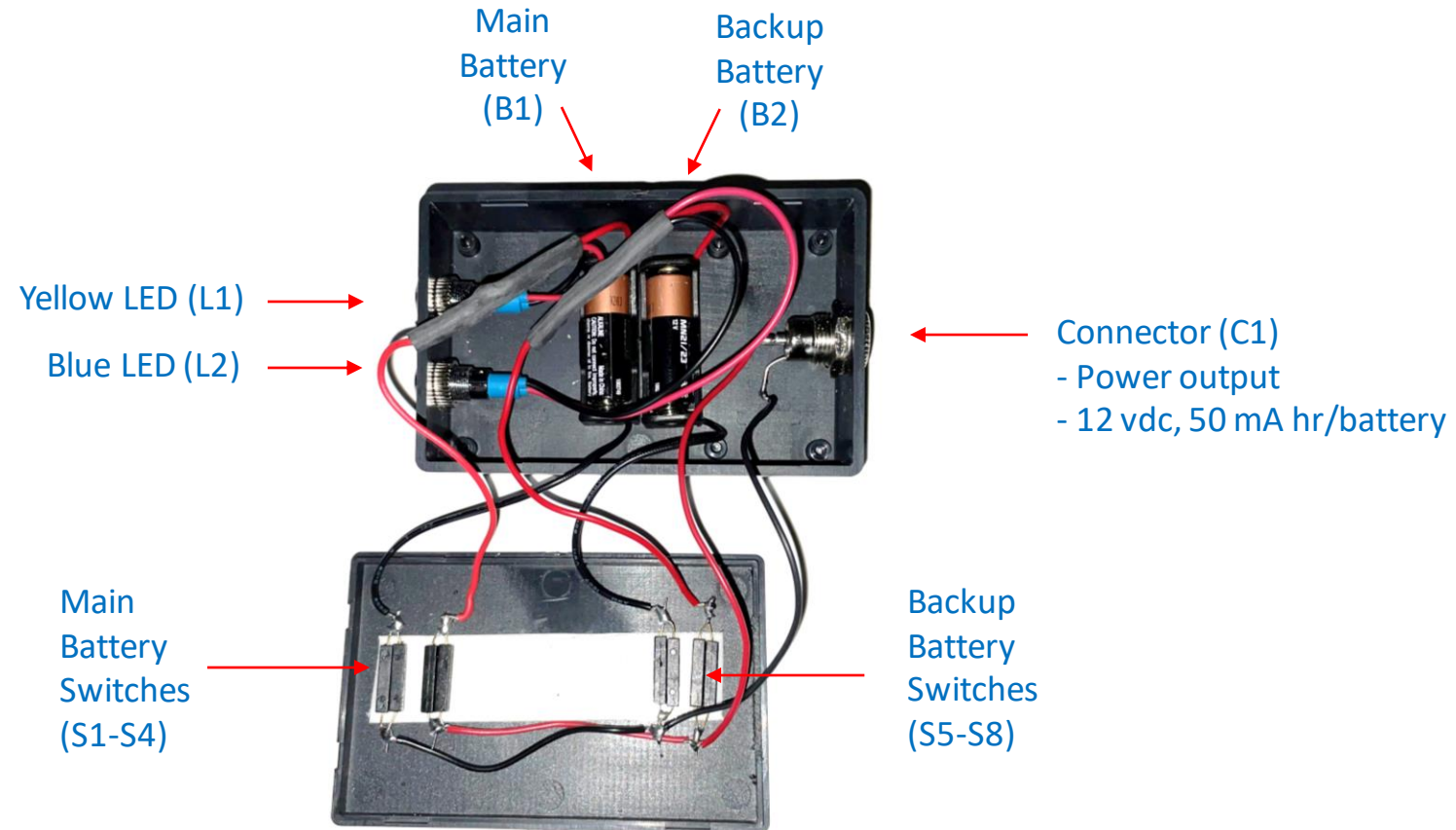
- The Blue LED flashes when the magnet is placed near switches S1-S4.
- The Yellow LED flashes when the magnet is placed near switches S5-S8.

5) The activated LED might also flash when the Lock or Unlock button is pressed on the Remote Controller.



Battery Pack


Step 4 - Review Mechanical Layout



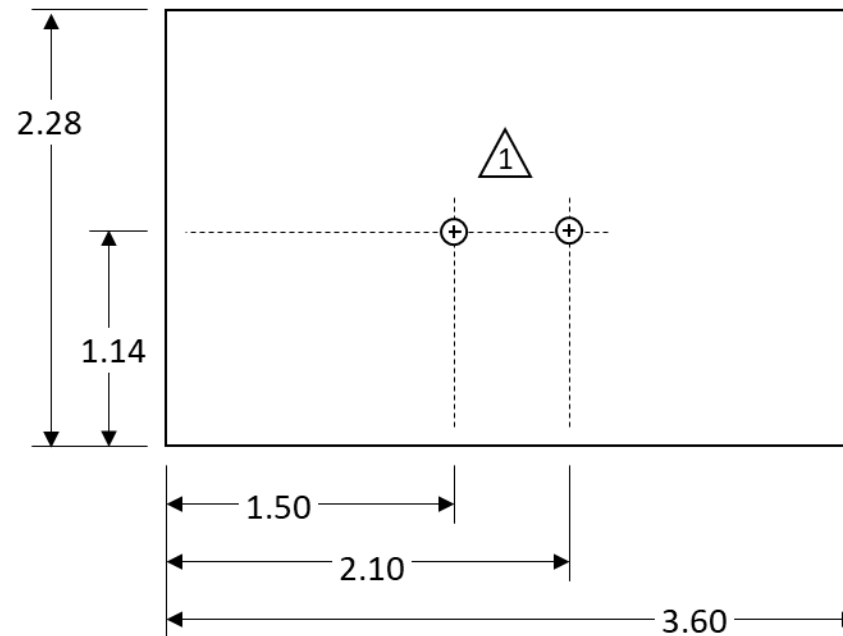
Battery Pack

Step 5a - Drill The Holes

Use the diagram and instructions shown below to drill holes in the bottom of the BP Box.

-  - Drill thru hole, 1/8" diameter,
2 places

NOTE: Unless otherwise specified,
dimensions are shown in inches
with tolerances of +/-0.02 inches.



Outside/Bottom View

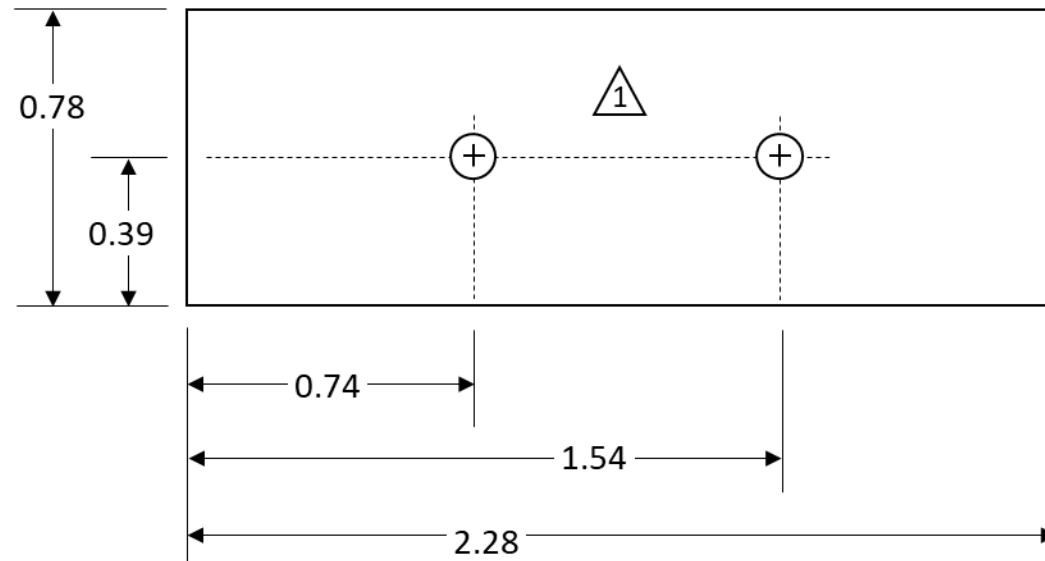
Battery Pack

Step 5b - Drill The Holes



Use the diagram and instructions shown below to drill holes in the LED side of the BP Box.

- ① - Drill thru hole, 5/16" diameter,
2 places



Outside View
LED Side

NOTE: Unless otherwise specified,
dimensions are shown in inches
with tolerances of +/-0.02 inches.

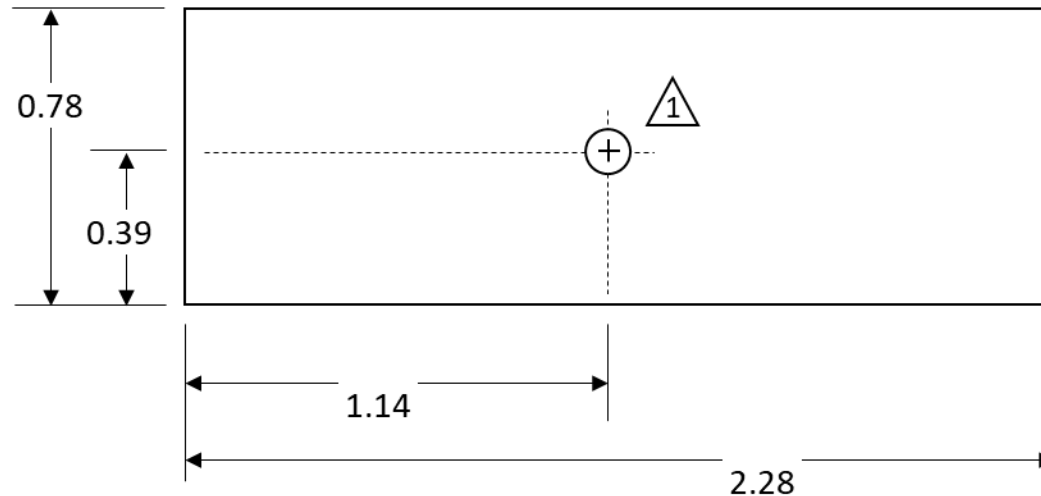
Battery Pack

Step 5c - Drill The Holes



Use the diagram and instructions shown below to drill holes in the Connector side of the BP Box.

 - Drill thru hole, 7/16" diameter



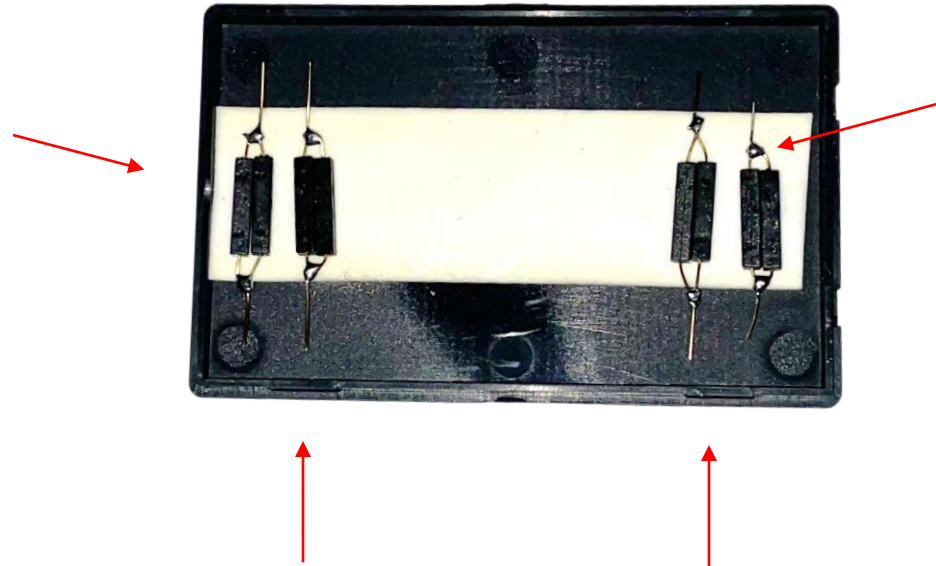
Outside View
Connector Side

NOTE: Unless otherwise specified, dimensions are shown in inches with tolerances of +/-0.02 inches.

Battery Pack

Step 6 - Build The Switch Array

1) Cut off a 3 inch strip of Double Sided Mounting Tape and place it across the center section of the Battery Box Cover. Press firmly to create a solid bond between the tape and cover.



3) Lift the leads of each switch off the surface. Solder the leads of each group of 2 switches together as shown.

2) Place 4 groups of 2 switches on the Double Sided Mounting Tape in the positions shown in the photo. Press firmly to create a solid bond between the switches and tape.

Battery Pack

Step 7a - Build The LED Harness

1) Collect the following components from your Battery Pack supplies and parts inventory.

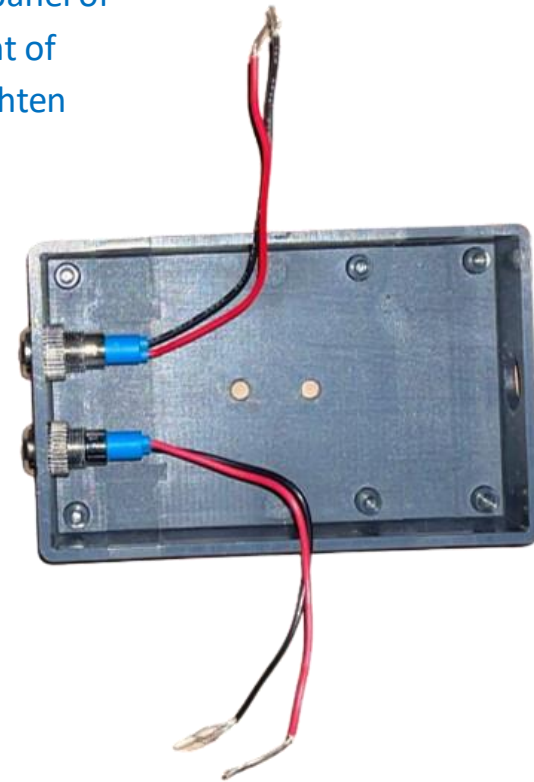
- 1 Blue and 1 Yellow LED
- 2 Battery Holders
- 2 Resistors
- 2 Heat Shrink Tubes (L=3.14" D=0.27")
- 1 BP Box

2) Cut off excess wires, leaving about 3 inches of wire attached to the base of the LEDs and Battery Holders. Keep the remaining 3" red wires cut from the LEDs to use as part of this assembly. Strip about 1/4" of insulation off the open end of each wire.

3) Mount the 2 LEDs onto the side panel of the Battery Box. Add a small amount of Loctite to the screw threads and tighten the LED Nuts until snug.

Yellow LED →

Blue LED →

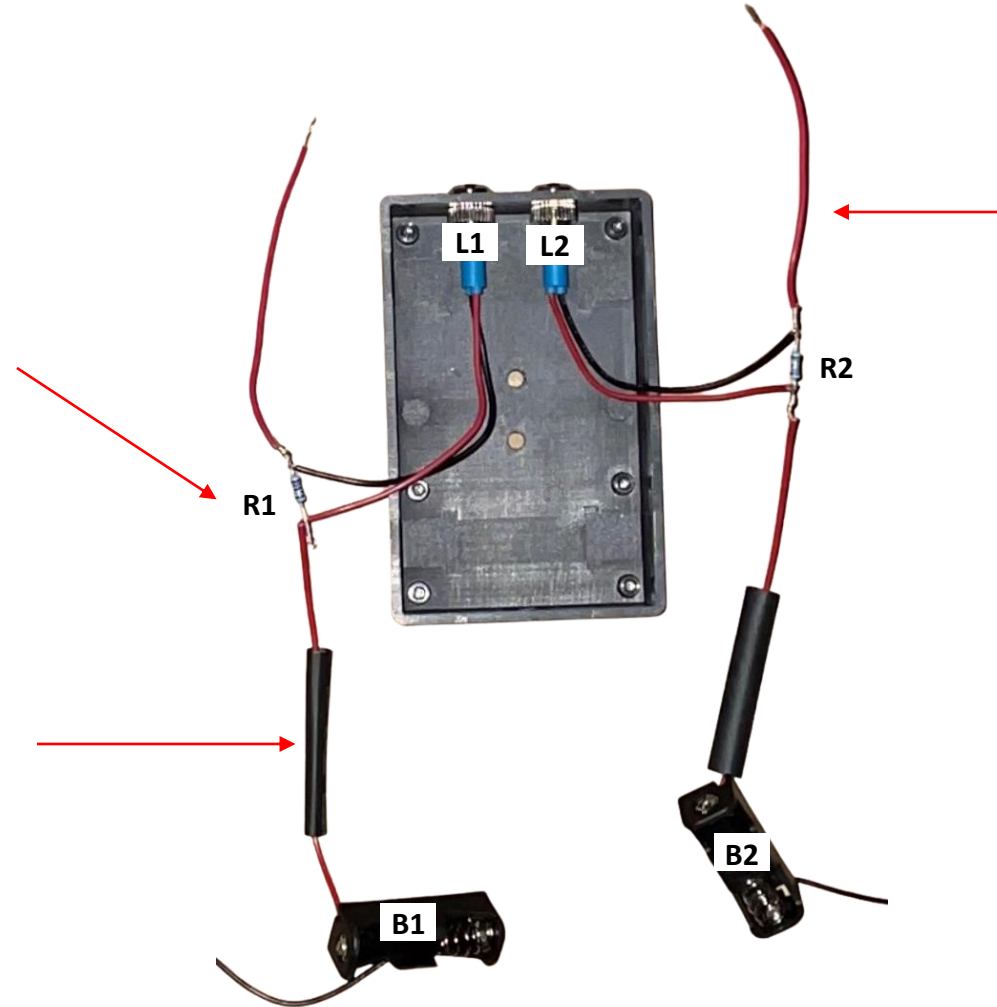


Battery Pack

Step 7b - Build The LED Harness

1) Attach the red and black LED wires to the leads on Resistors R1 and R2 (either wire can go to either Resistor lead).

2) Cut the Heat Shrink Tubes to a length of 1.5 inches. Slide the Heat Shrink Tubes over the red wires attached to the Battery Holders. Attach the end of the red wires to the Resistor leads.



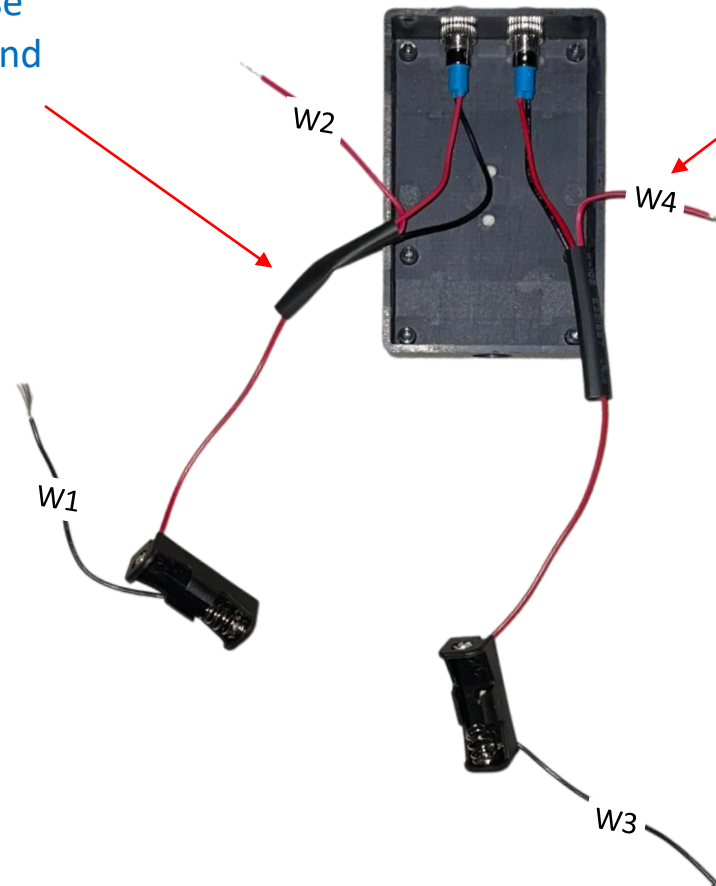
3) Attach the end of the extra 3" red wires (cut in Step 7a) to the Resistor leads.

4) Solder all wires to the Resistor leads.

Battery Pack

Step 7c - Build The LED Harness

1) Slide the Heat Shrink Tubes over the Resistor and connections. Use a Heat Gun to shrink the tubes and insulate/seal the connections.



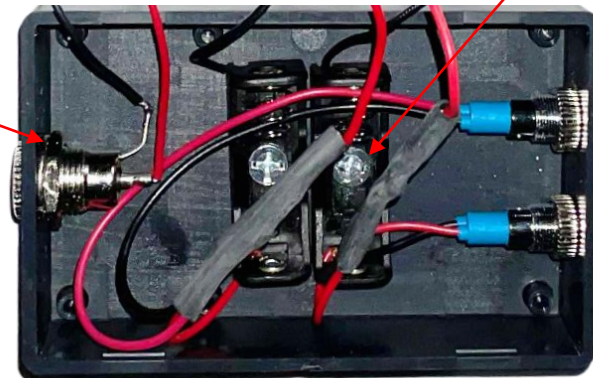
2) Label the black and red wires as shown in the photo. These labels will help to identify the wires when making the remaining connections (Step 9).

Battery Pack

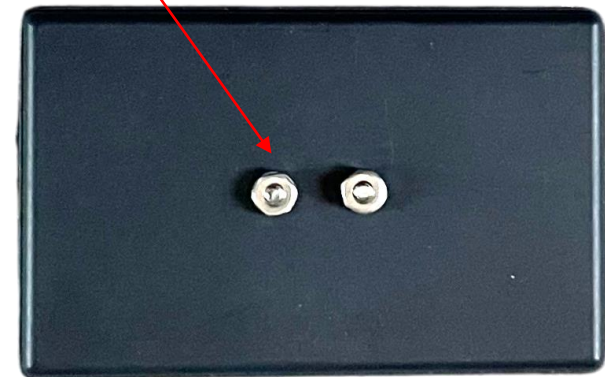
Step 8 - Mount The Components

1) Use the Connector Washer/Nut to attach the Connector to the right side of the Battery Box. Tighten the Connector Nut until snug.

2) Use two 4-40 x 5/16 screws and 4-40 washers/nuts to attach the two Battery Holders to the bottom of the Battery Box. Add a small amount of Loctite to the threads and tighten the nuts until snug.



BP Box
Inside View



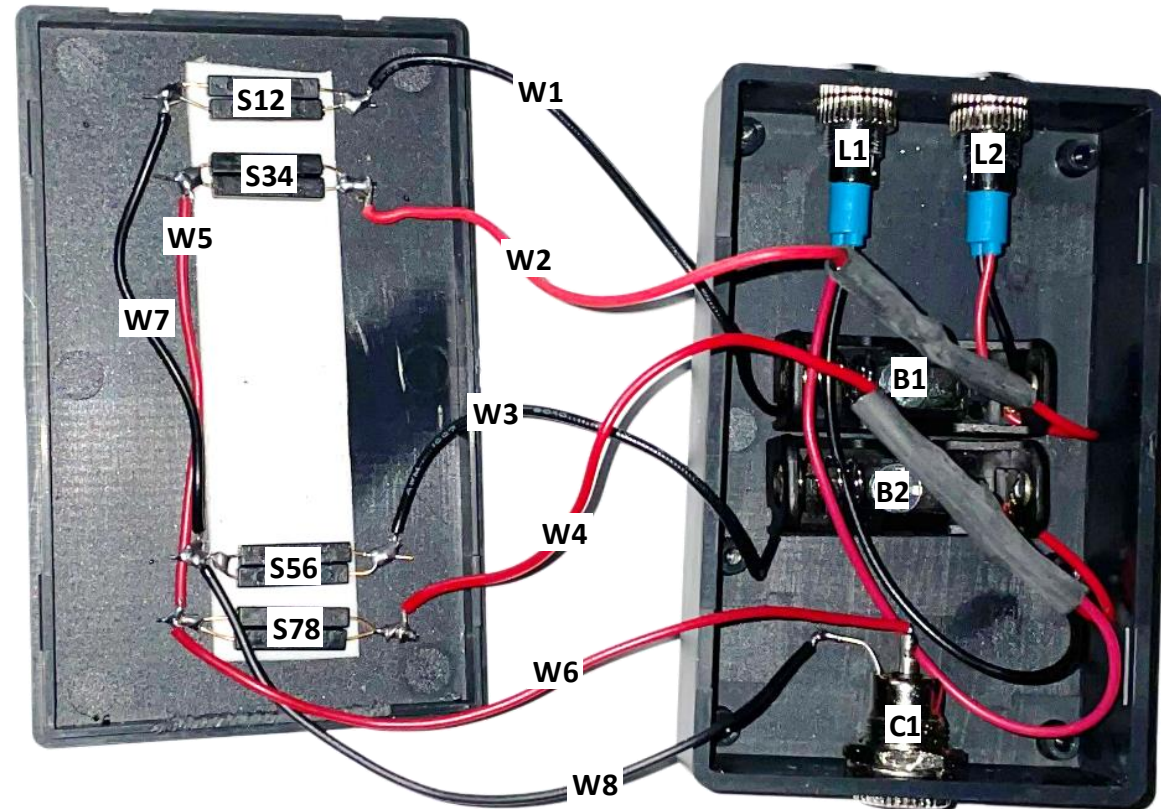
BP Box
Outside View

Battery Pack

Step 9 - Connect the Components

1) Use the following wire list and photo as a reference for connecting & soldering the Battery Pack components.

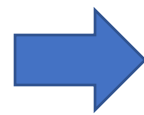
- W1 = B1 (black) to S12 (right)
- W2 = R1 (red) to S34 (right)
- W3 = B2 (black) to S56 (right)
- W4 = R2 (red) to S78 (right)
- W5 = S34 (left) to S78 (left)
- W6 = S78 (left) to C1 (+)
- W7 = S12 (left) to S56 (left)
- W8 = S56 (left) to C1 (-)



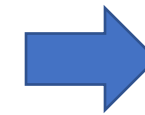
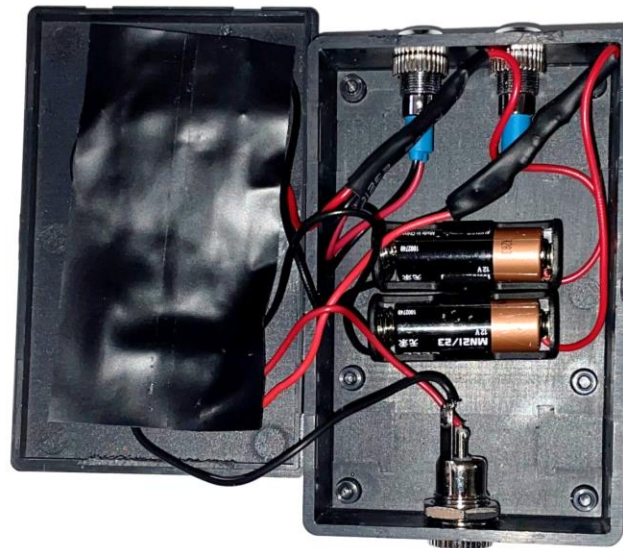
Battery Pack

Step 10 - Finish Assembly

1) Use 3 strips of black electrical tape to create an insulating patch measuring about 3" x 1.5".



2) Place the patch on top of the switch array. Gently press on the patch to create a bond between the switches and patch.



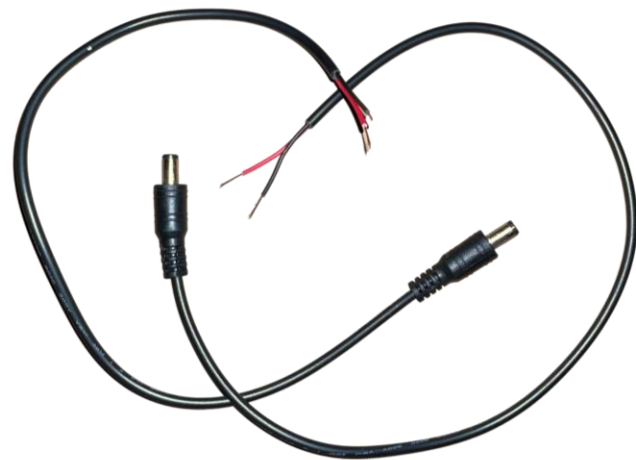
3) Place the BP Cover on top of the BP Box and apply pressure to snap the two pieces together (no screws are needed).



Battery Pack

Step 10 - Build The Power Cable

1) Pull two Open Cables from your Battery Pack inventory. Based on the distance between the Battery Pack and eLock, determine the desired length for your Power Cable and cut the Open Cables accordingly. Each Open Cable should be about 1/2 the length of the completed Power Cable. Strip about 1" of cable insulation and 1/2" of wire insulation off the ends of each cable.



2) Slide a large Heat Shrink Tube (L=3.14" D=0.27") over one of the Open Cables. Slide a small Heat Shrink Tube (L=0.75" D=0.1") over the red and black wires on one of the Open Cables. Solder the wires together (red to red and black to black) and slide the small Heat Shrink Tube over the soldered connections. Use a heat gun to shrink the tubes and seal the connections.



3) Slide the large Heat Shrink Tube over the wire connections. Use a heat gun to shrink the tube and seal the connection.





Battery Pack

Step 11a - Test The Battery Pack

You will need a working eLock, Power Cable and Battery Pack for this test.

1) Connect the Battery Pack to the eLock using the Power Cable.



2) Place the Magnet next to the LED side of the Battery Pack. Verify that the Blue LED flashes.

3) Press the Lock button on the Remote Controller.

Verify that the Actuator Arm extends to the Lock position.



Battery Pack

Step 11b - Test The Battery Pack

4) Move the Magnet at least 2 feet away from the Battery Pack.

6) Press the Unlock button on the Remote Controller. Verify that the Actuator Arm retracts to the Unlock position



5) Place the Magnet next to the Connector side of the Battery Pack. Verify that the Yellow LED flashes.



Battery Pack

Summary



If you've successfully completed the steps shown in Slides 1-20, then you now have a Battery Pack that will provide long term power for your eLock.

Here's some tips for installing and operating your Battery Pack;

1) Attach the cover side of the Battery Pack to the cabinet door or the front panel of the drawer. In most cases, double sided mounting tape can be to used for permanent attachment. If needed, open the box and drill small holes in the cover and attach with wood screws to provide additional holding strength.

2) Be sure to remember or document the location where the Battery Pack is mounted, especially when using a large cabinet or if you plan to leave the Secret Safe inactive for long periods of time.



3) Test operation thoroughly while the Safe is partially open. If the LEDs are not flashing when the magnet is placed near the outside of the panel or door;

- Try placing the magnet next to the Battery Pack inside the enclosure. If this works, the problem might be because the panel or door is too wide. Try adding more magnets to increase magnetic power.
- Check the batteries (at least 10 volts is needed for the LEDs to flash).
- Open the box and check for wiring problems

CAUTION: Please be careful when using the recommended magnets. These magnets are small, but strong, and can cause injury if not properly handled. When possible, keep in original packing containers/dividers.



4) The recommended batteries have a shelf life of 5 years. However, it would be a good idea to test the batteries every 2 years, or more often if the Secret Safe is frequently used. Replace any battery with a voltage level less than 9 volts (the CPU will stop operating at 8 volts).