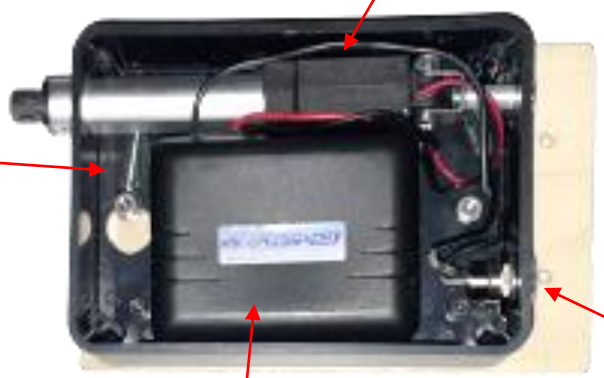
Build The eLock

Overview

The eLock is a small electronic device used to lock a drawer or cabinet door via remote control. It's comprised of the parts shown below;

eLock



Actuator

Actuator Arm

Mounting Pad

Spring
- Allows the eLock to pivot if the Actuator Arm is forced to an offset position
- Moves the eLock back to center position when force is removed

Connector
- Power Input
- 12vdc, 0 to 80 ma

Remote Controller

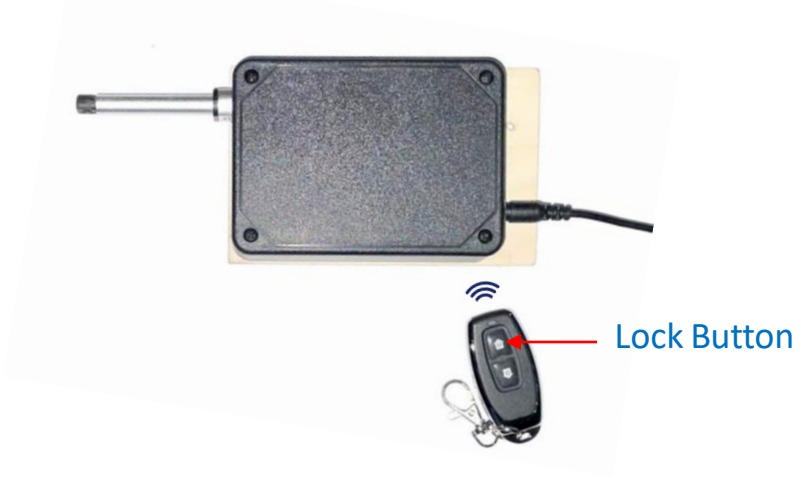
CPU
- Receives commands from the Remote Controller
- Tells the Actuator when to move the Actuator Arm

Build The eLock

Overview

The eLock works by moving the Actuator Arm to create either a Lock or Unlock condition:

If a Lock command is received,
the Actuator Arm is extended.



If an Unlock command is received,
the Actuator Arm is retracted

Slides 3-23 provide step by step instructions for building your own eLock.

Build The eLock

Step 1- Review The Parts List

The parts for building an eLock are shown below.

Mounting Pad (1)

Connector (1)

Connector Washer (1)

Connector Nut (1)

Actuator (1)

Actuator Bracket (1)

Actuator Screw (1)

Actuator Nut (1)

4-40 Screw (6) [C]

4-40 Nut (5)

CPU (1)

Remote Controller (1)

eLock Box Cover (1)

eLock Box (1)

eLock Screw (4)

4-40 Washer (4)

6-32 x 5/16 Screw (2)

Standoff (1)

Spring (1)

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 eLock spares or for use with other projects.

[C] Various lengths of screws (all provided in item 7 of the parts list) are used for building the eLock. 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 3 and common tools, including; small Philips screw driver, small wood saw, small pliers, wire stripper/cutter, drill and drill bits to match the hole sizes defined in the instructions.

Build The eLock

Step 2 - Buy The Parts

This page identifies the recommended parts, supplies and tools needed to build 1 eLock unit. Links are embedded in the picture of each item, providing quick access for more product details.

eLock Parts List					
Item	**Project Part Name**	**Description**	**Buy QTY**	**Suggested Product (Link)**	**Approx. Price [C]**
1	eLock Box	- Small plastic box - Includes cover & screws	1 unit		$9
2	CPU	- Motor Controller - 2 Remote Controllers - Remote batteries included	1 unit		$40
3	Actuator	- Mini Electric Actuator - 1 inch stroke	1 unit		$34
4	Connector [A]	- Female panel connector - Accepts 5.5/2.1mm plug - 5 per pack (1 used)	1 pack		$8
5	Mounting Pad	- Hobby Wood - 1/4 x 4 x 24 inches	1 unit		$4
6	Power Supply [D]	- AC > DC converter - Input = 120 vac - Output = 12 vdc, 1 amp - 5.5/2.1mm plug, 37 inch cord	1 unit		$7
7	4-40 Nuts & Screws [A]	- Nut and screw assortment (100) - Screw lengths: 3/16" to 1" - 6 screws used - 5 nuts used	1 pack		$6
8	4-40 Washers [B]	- ID = 0.11 OD = 0.22 inches - 5 per pack (4 used)	1 pack		$0
9	6-32 Screws [B]	- length = 5/16 inches - 3 per pack (2 used)	1 pack		$0
10	Standoff [B]	- length = 0.5 inch - 6-32 threads - 2 per pack (1 used)	1 pack		$0
11	Spring [B]	- compress length = 0.4 inches - 2 per pack (1 used)	1 pack		$0

Special Tools & Supplies					
Item	**Project Part Name**	**Description**	**Buy QTY**	**Suggested Product (Link)**	**Approx. Price [C]**
1	Heat Gun [A]	- 750 & 1000 deg - For heat shrink terminals & sleeving	1 unit		$25
2	Heat Shrink [A]	- 650 pieces, 8 sizes - Size range: 1/24" - 2/5" dia	1 pack		$10
3	Solder Kit [A]	- 60W soldering iron - Many accessories	1 unit		$19
4	Loctite [A]	- Blue 242 thread locker - Removable grip	1 unit		$6
5	Caliper [A]	- Digital readout - 6 inch range - Accuracy = 0.0005 inches	1 unit		$16

NOTES:

[A] This tool 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 from Project Launchpad by sending a request by email to support@projectlaunchpad.com.

This eliminates the need to pay for many extra parts that may never be used. The parts are supplied by Project Launchpad free of charge, just provide 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.

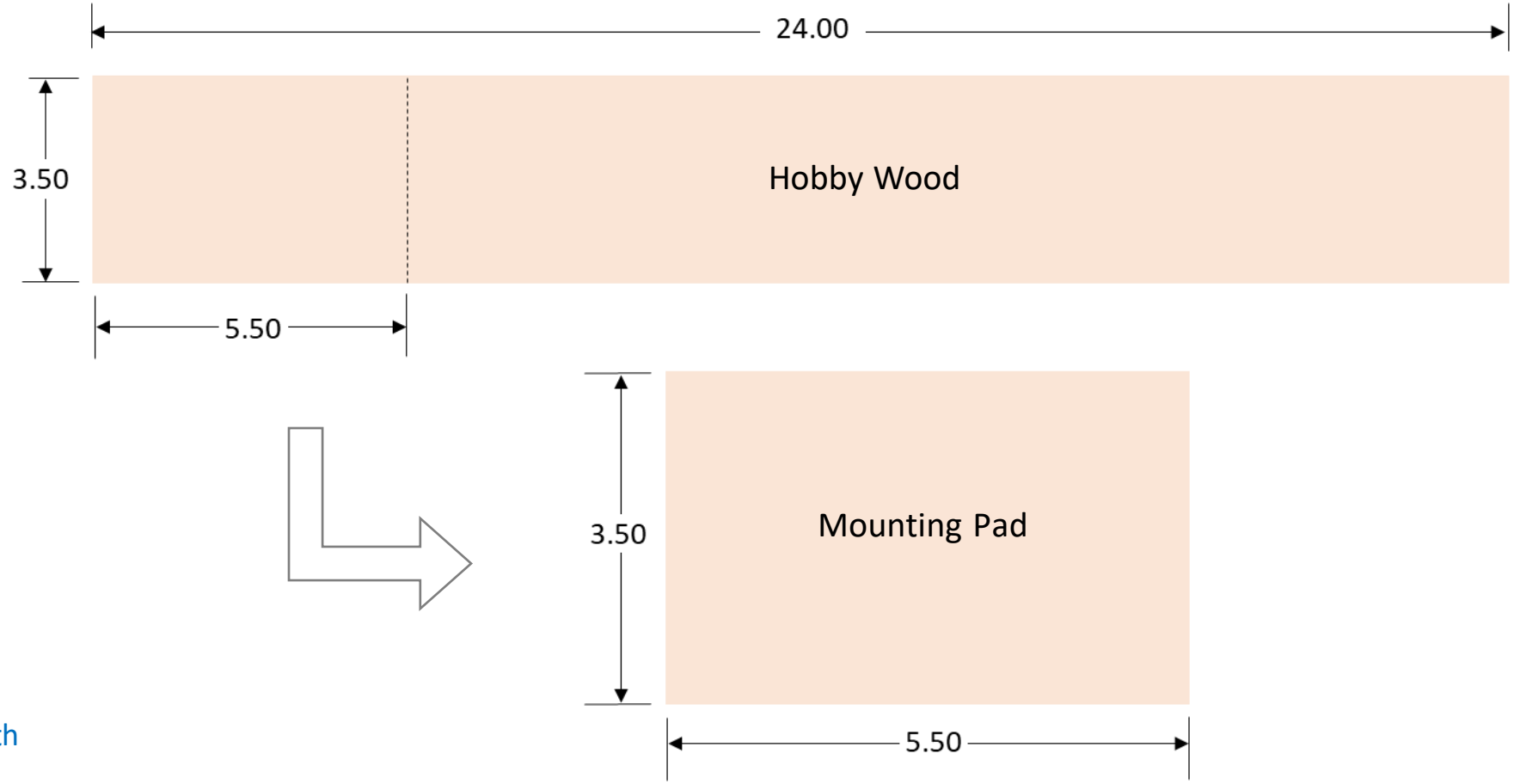
[C] These are estimated prices and actual prices may vary from time to time. Please click the associated photo/link in order to get an accurate and up-to-date price for this item.

[D] This part is used to supply eLock power for cont. testing and for installations where access to an AC outlet is available. As an alternative, you can build a Battery Pack to use as the eLock power source (refer to Slidedeck 2C).

Build The eLock

Step 3 - Cut The Wood For The Mounting Pad

Cut 5.50 inches off the end of the Hobby Wood (parts list item 5) to create the Mounting Plate.



NOTES:

- All dimensions are in inches with a tolerance of +/-0.02 inches.

Build The eLock

Step 4 - Drill Holes In The Mounting Pad

Use the diagram and instructions shown below to drill holes in the Mounting Plate.

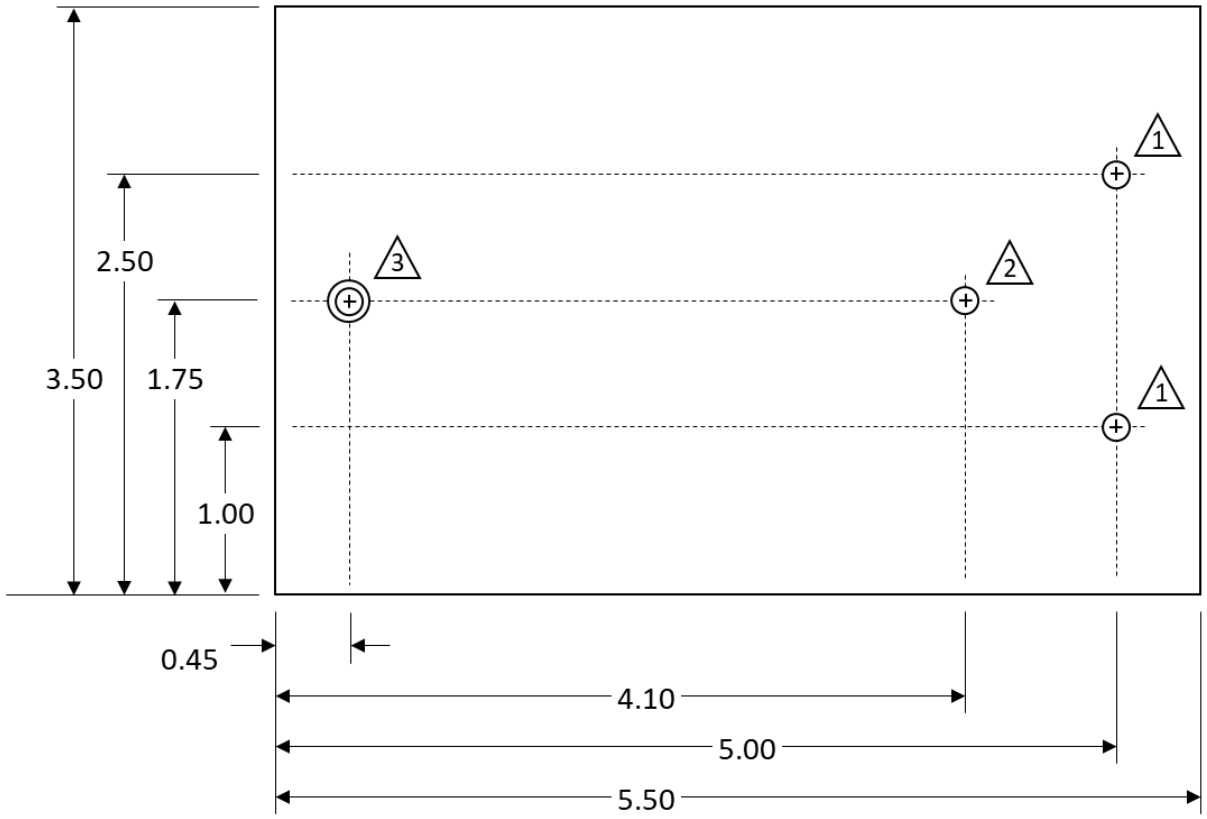
△1 - Drill thru hole, 1/8" diameter
- Add 82° countersink on top side for 4-40 flathead screw head

△2 - Drill thru hole, 1/8" diameter
- Add 82° countersink on bottom side for 4-40 flathead screw head

△3 - Drill thru hole, 1/8" diameter
- Add 1/4" counterbore 0.1" deep on top side for 4-40 nut
- Add 82° countersink on bottom side for 4-40 flathead screw head

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

Top View



Build The eLock

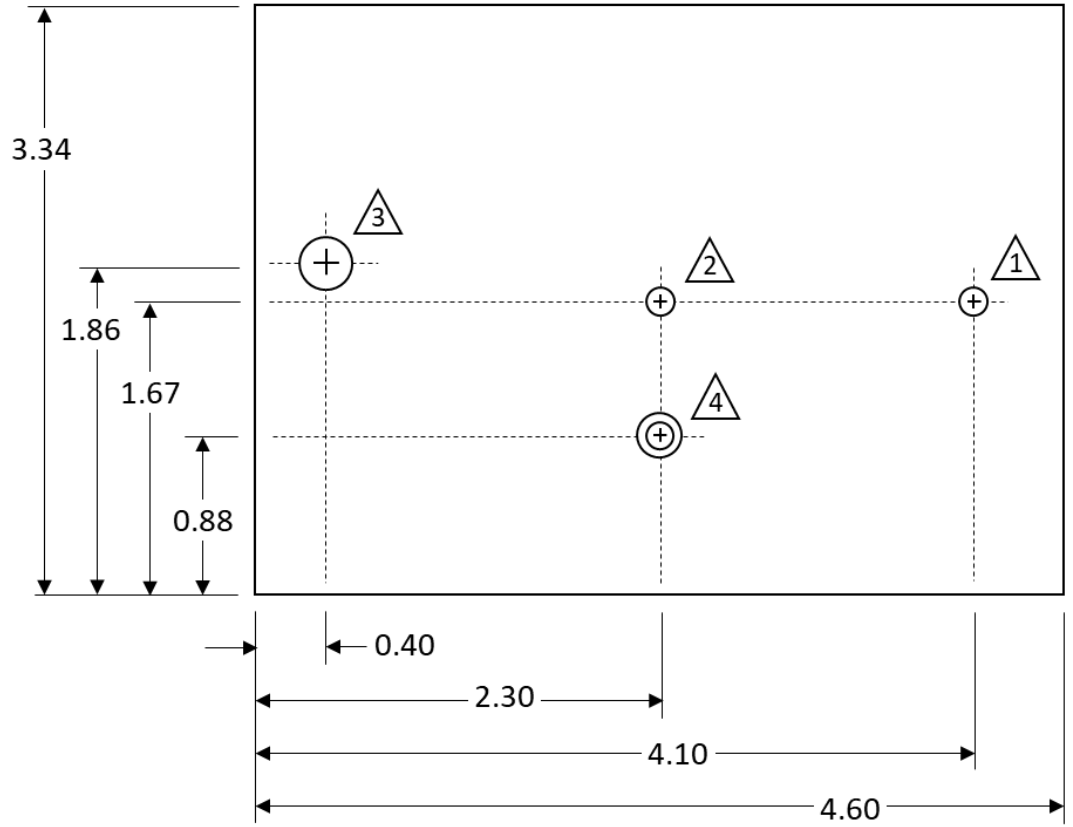
Step 5a - Drill Holes In The eLock Box

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

1. Drill thru hole, 1/8" diameter.
2. Drill 1/4" hole to remove bump and create a smooth surface for mounting components.
3. Drill thru hole, 1/2" diameter.
4. Drill thru hole, 1/8" diameter, add 82° counter sink on bottom side for 4-40 flathead screw head.

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

BOTTOM VIEW



CONNECTOR SIDE

Build The eLock

Step 5b - Drill Holes In The eLock Box

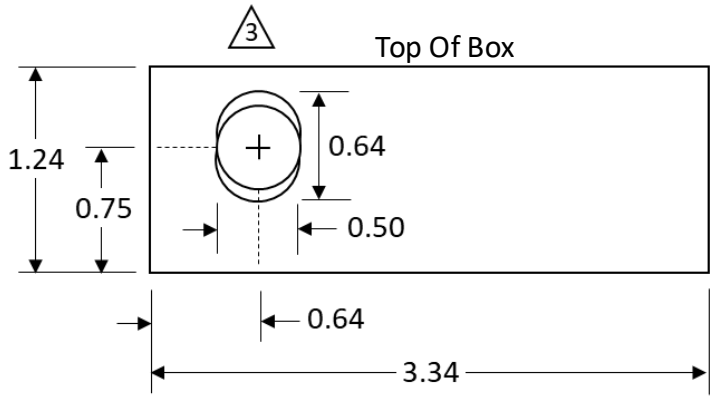
Use the diagram and instructions shown below to drill holes in the sides of the eLock Box.

1. Drill thru hole, 1/8" diameter

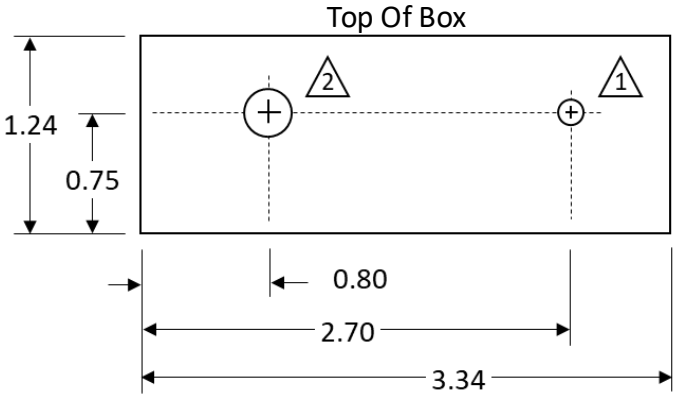
2. Drill thru hole, 7/16" diameter

3. Drill thru hole, 0.50" diameter, use drill bit to create slot approx. 0.50" wide x 0.64" long (refer to diagram)

Actuator Arm Side



Power Connector Side



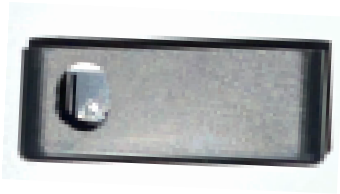
NOTE: Unless otherwise specified, dimensions are shown in inches with tolerances of +/-0.02 inches.

Build The eLock

Step 6 - Check Hole Placement

The photos below show how the eLock parts should look after the holes are drilled.

Mounting Pad
Bottom View



eLock Box
Actuator Arm Side

eLock Box
Bottom View

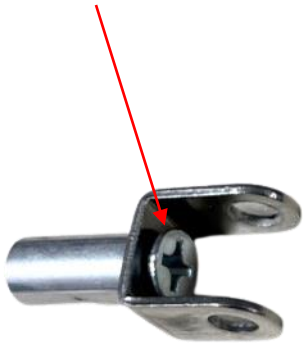
eLock Box
Connector Side

Build The eLock

Step 7 - Prepare Actuator

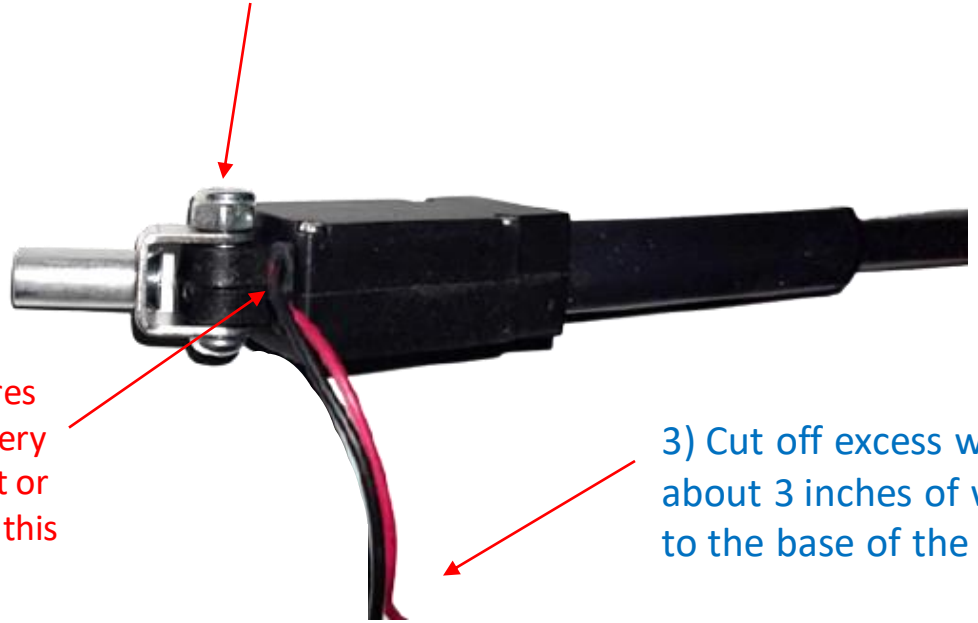
Use the diagram and instructions shown below to add mounting components to the Actuator.

1) Use a 6-32 x 5/16 Screw to attach Standoff to Actuator Bracket.



NOTE: When attaching parts, add a small amount of Loctite to screw thread and tighten nut until snug.

2) Use the Actuator Screw/Nut to attach Actuator Bracket to Actuator



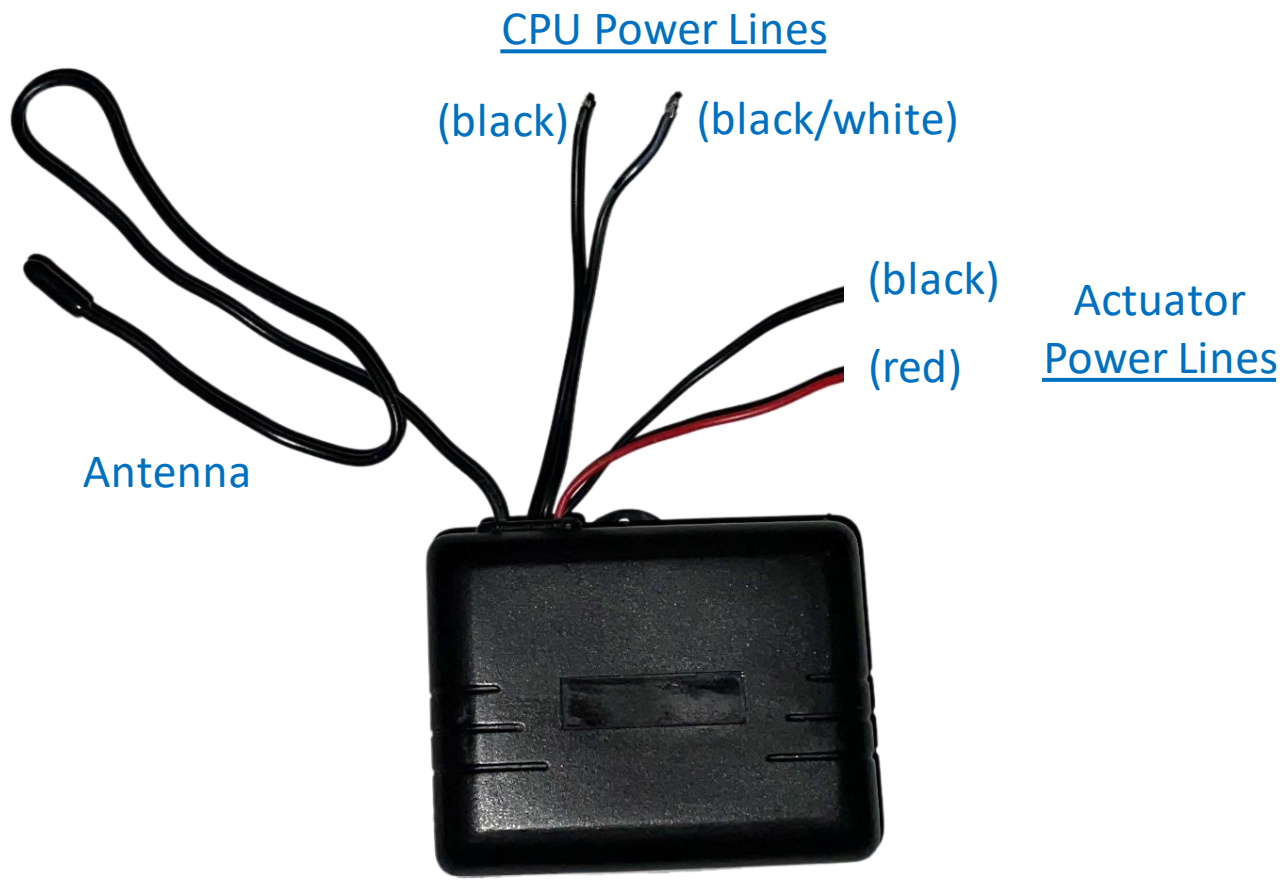
Caution: These wires can break off. Be very careful not to twist or stress the wires at this connection point.

3) Cut off excess wire, leaving about 3 inches of wire attached to the base of the Actuator.

Build The eLock

Step 8 - Prepare CPU Wires

1) Cut off excess wire from the Power Lines:
   - Leave about 4 inches of wire for the CPU Power Lines
   - Leave about 2 inches of wire for the Actuator Power Lines
   - Don't cut the Antenna wire.

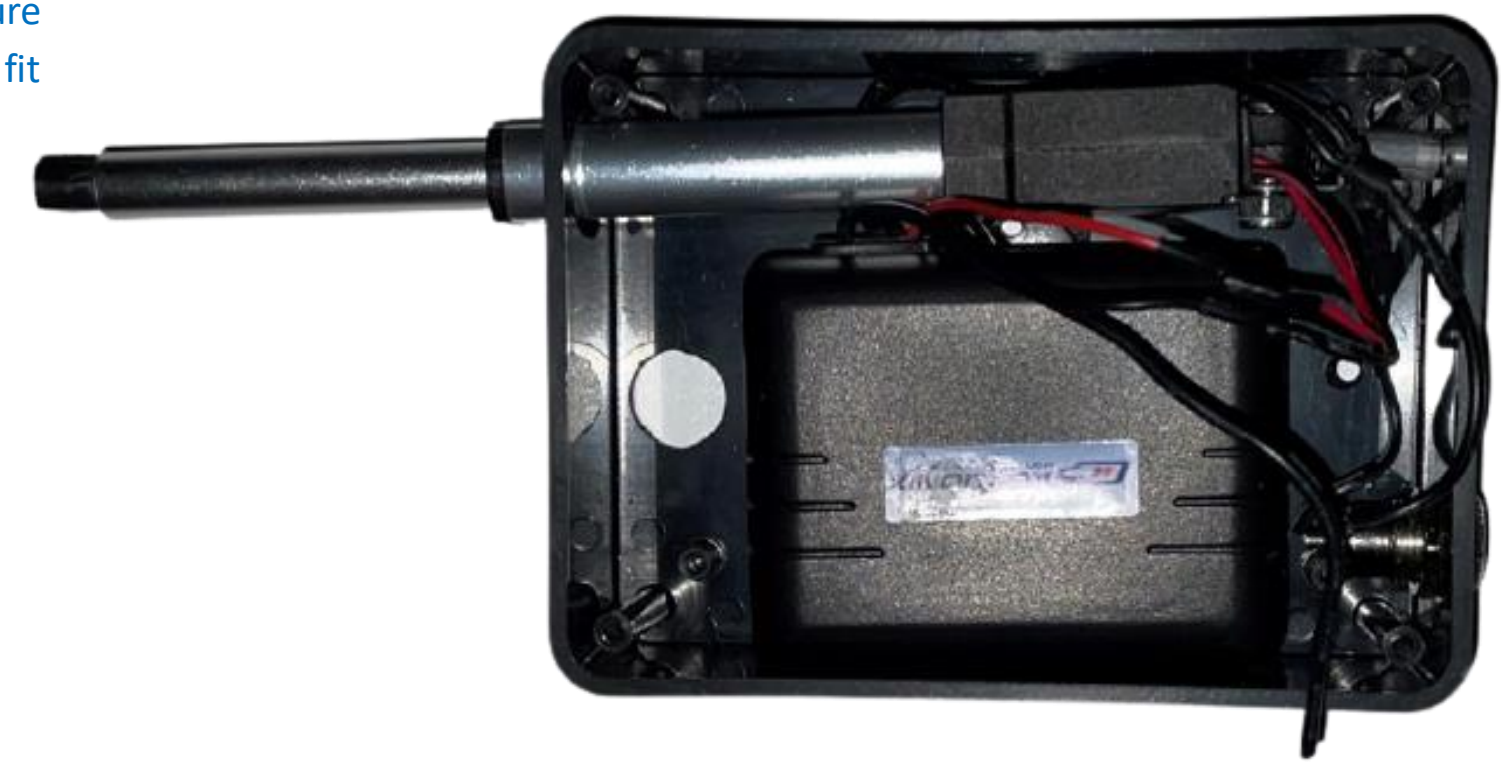


Build The eLock

Step 9 - Fit Check

1) Temporarily place Actuator and CPU in eLock Box as shown. This will be a tight fit. Make sure the components line up and fit with the drilled holes.

2) Remove parts.

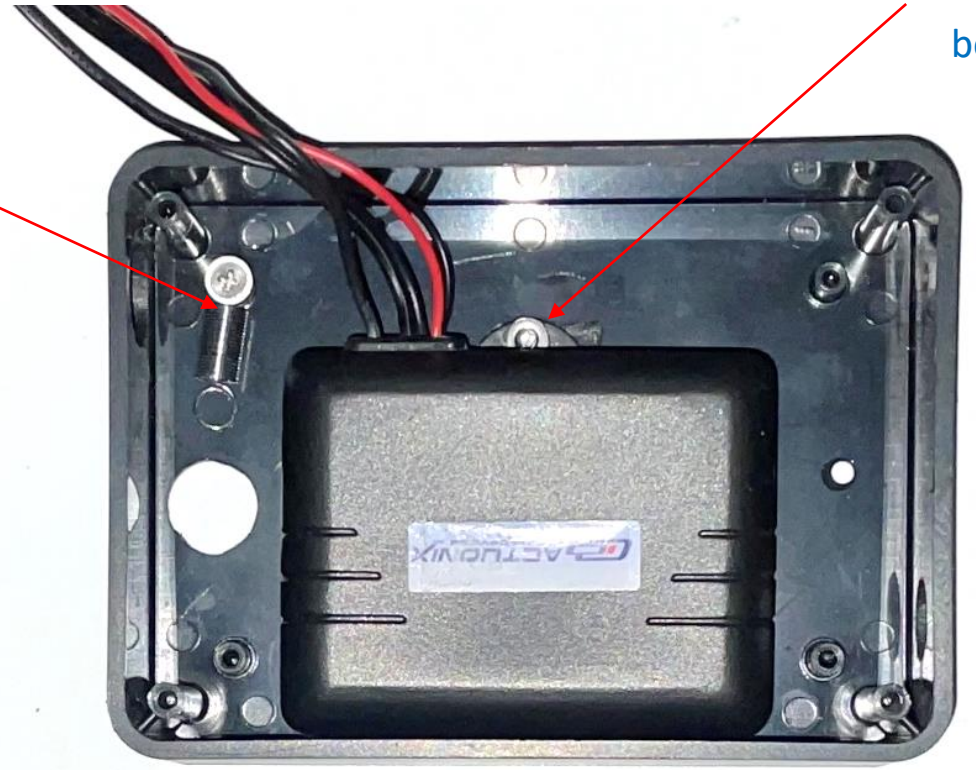


Build The eLock

Step 10 - Install CPU and Spring

1) Slide one end of the Spring over the embedded plastic mounting post. Add a 4-40 washer and screw on top to keep it from sliding off.

2) Use a 4-40 x 1/2 screw, washer and nut to mount the CPU to the bottom of the eLock Box.

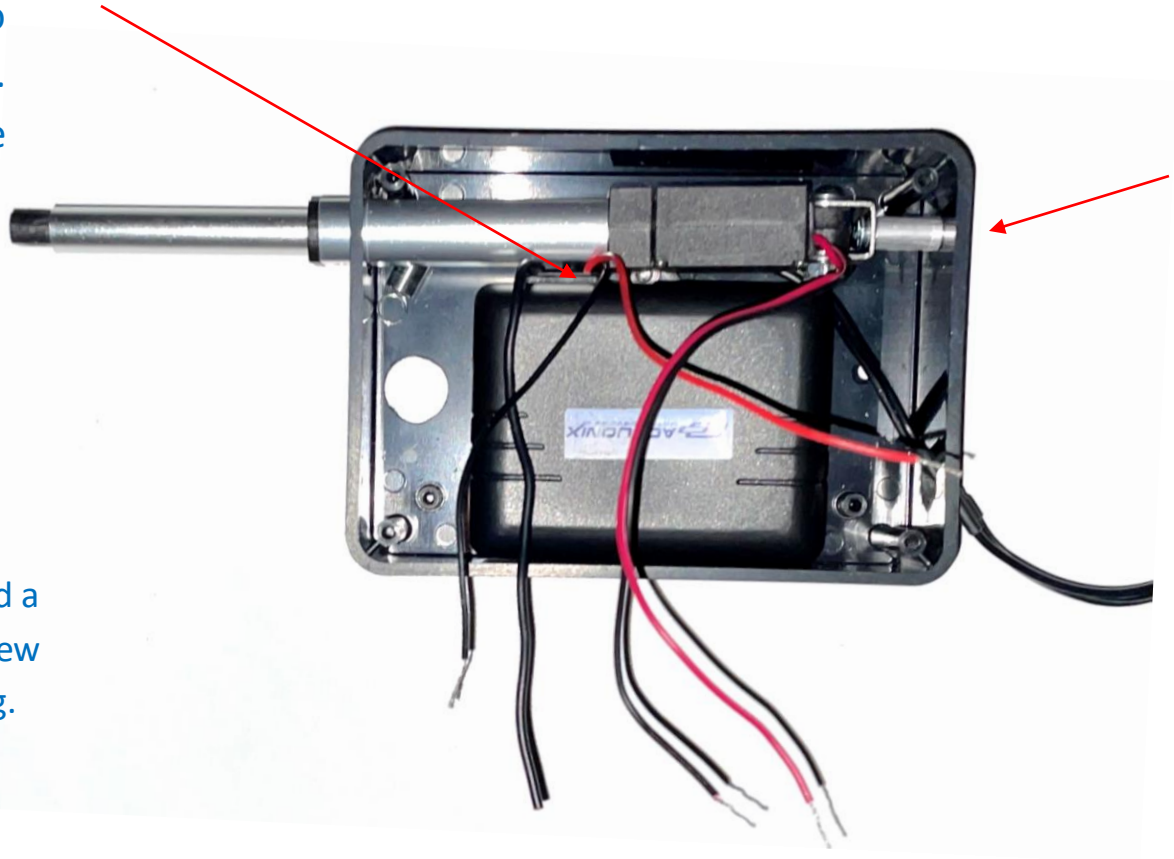


NOTE: When attaching parts, add a small amount of Loctite to screw thread and tighten nut until snug.

Build The eLock

Step 11 - Install Actuator

1) Place the Actuator inside the eLock Box. Route the two black power wires from the CPU under the Actuator and over to the Connector hole as shown. Route all other wires over the top of the CPU.



2) Use a 6-32 x 3/8 Screw to attach the Standoff to the eLock box.

NOTE: When attaching parts, add a small amount of Loctite to screw thread and tighten nut until snug.

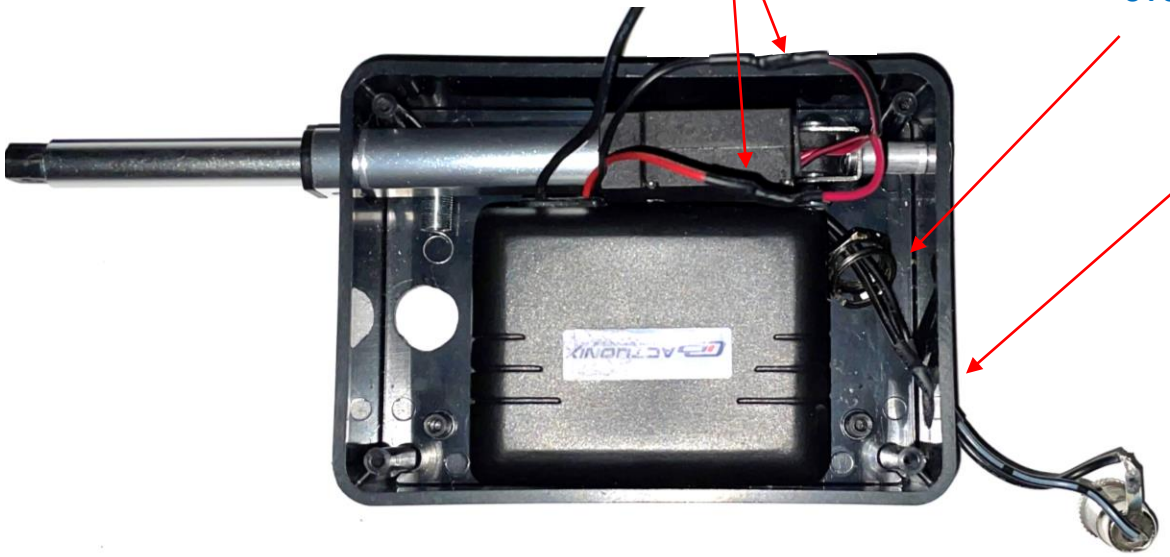
Build The eLock

Step 12 - Connect The Wires

1) Use solder and heat shrink tubing to connect the CPU red/black wires to the Actuator red/black wires.

2) Slide the Connector Nut/Washer over the 2 CPU power wires.

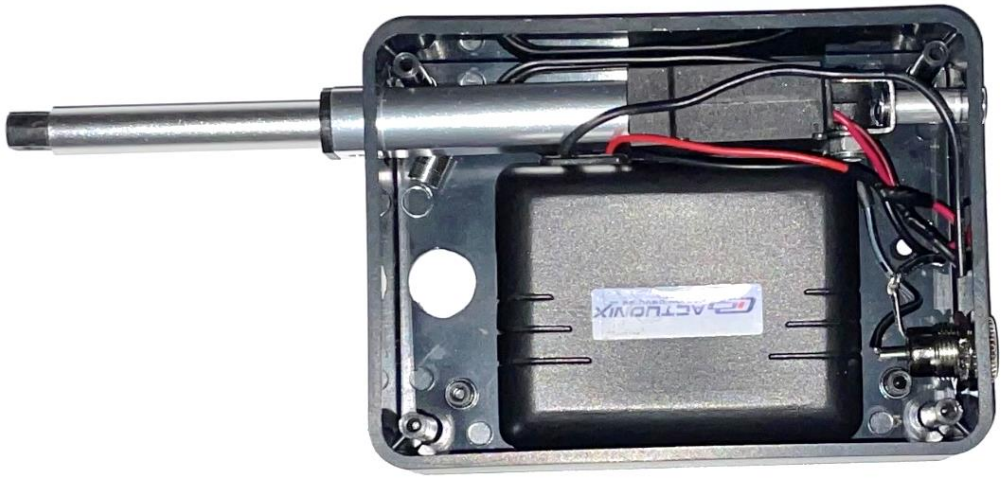
3) Route the CPU power wires thru the Connector hole.



4) Solder the CPU power wires to the terminals on the Connector, with the white/black wire connected to the center (+) terminal and the plain black wire connected to the outside (Gnd) terminal.

Build The eLock

Step 13 - Install Power Connector



1) Insert the Connector into its mounting hole. Use the Connector Washer/Nut to attach the Connector to the panel. Tighten nut until snug.

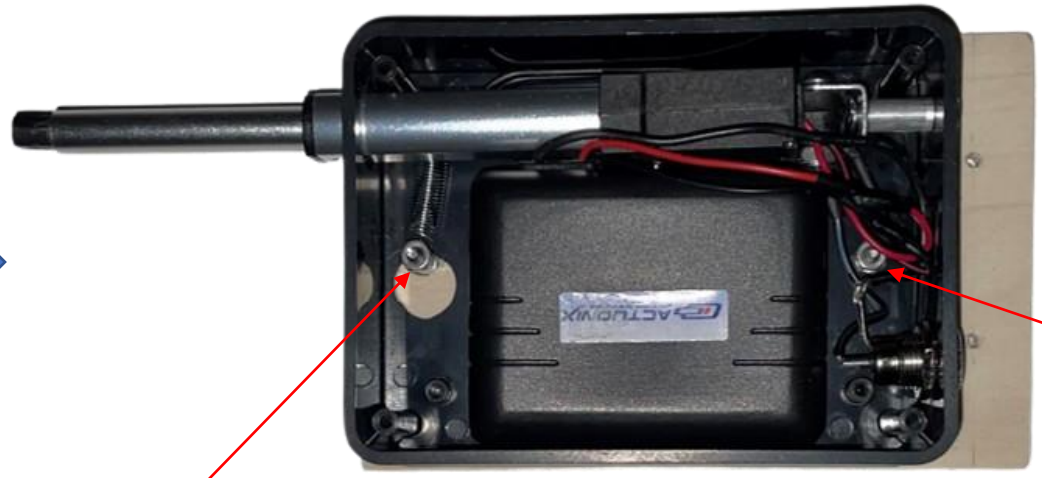
Build The eLock

Step 14 - Attach Mounting Pad

1) Insert a 4-40 x 0.75" screw from the bottom of the Mounting Pad and add a nut on top to make a Holding Arm for the Spring. Make sure the nut is fully embedded in the counterbore so the top of the nut is flush with the top surface of the mounting pad.

2) Insert a 4-40 x 0.5" screw from the bottom and add washer on top to make a Pivot Arm for the eLock.

3) Place the eLock on top of the Mounting Pad, with the Pivot Arm extending through the Pivot Hole. Use a 4-40 washer and nut to attach the Pivot Arm to the Mounting Pad. Tighten the nut far enough down so it barely touches the washer. Apply some Loctite to hold the nut in place. This loose attachment will allow the eLock to pivot on the Mounting Pad.



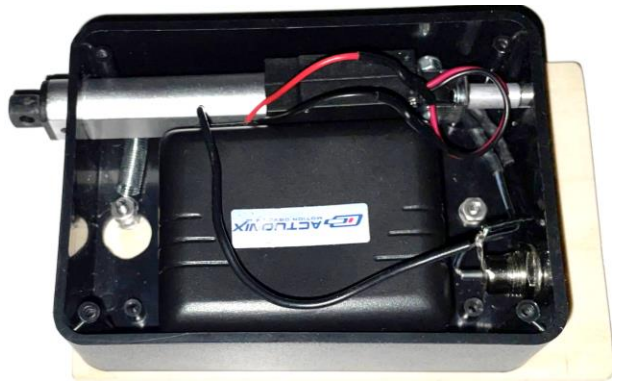
4) Place the open end of the Spring over the Holding Arm.
Add a washer and nut to keep the Spring from sliding off.
Apply some Loctite to hold the nut in place.

Build The eLock

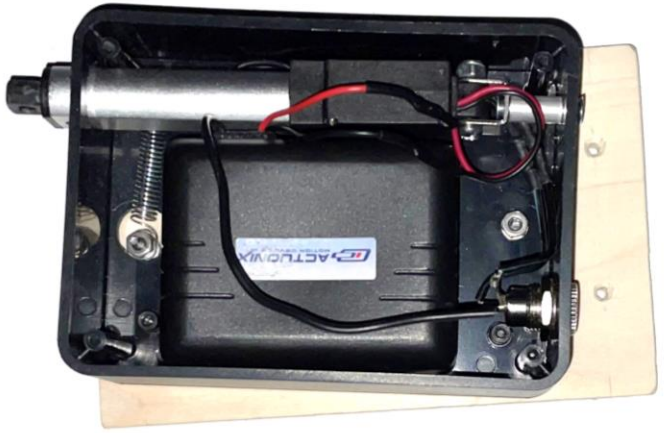
Step 15 - Check The Pivot

1) Check to make sure the eLock can move freely back and forth across the Mounting Pad. If not, detach eLock from Mounting Pad and remove obstructions to ensure the bottom of the eLock and the top of the Mounting Pad have a smooth surface

2) Force the eLock from the Center Position to the offset Position, then release. It should automatically spring back to the Center Position.



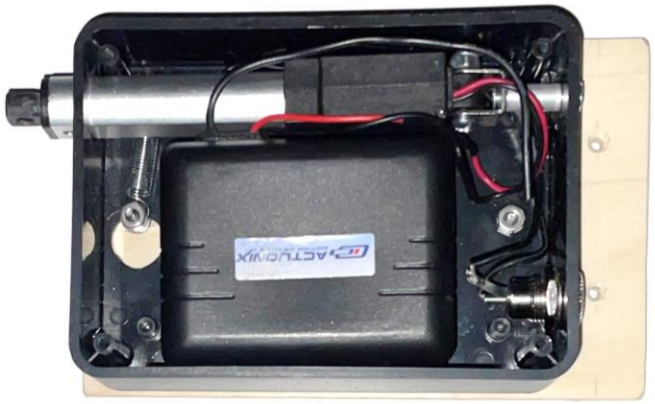
Center Position



Offset Position

Build The eLock

Step 15 - Finish Assembly



1) Tuck the power wires and antenna into the box and in between components if needed to allow room on the top to attach the cover.

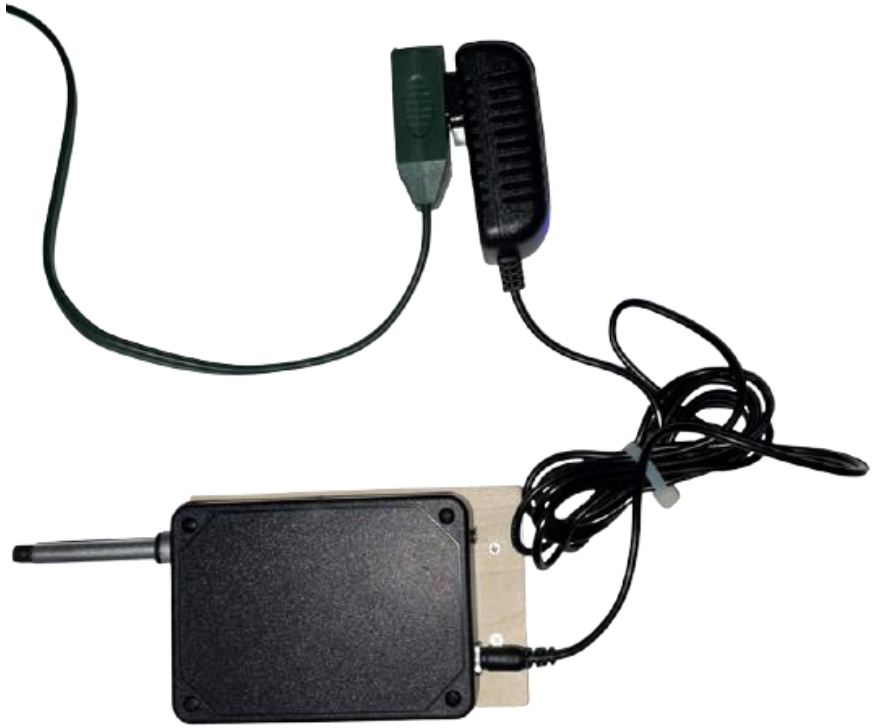
2) Use the eLock screws to attach the cover to the top of the box (4 places).

Build The eLock

Step 16 - Test The eLock

1) Prepare to test the CPU and Actuator by plugging a 12vdc Power Supply or activated Battery Pack into the Power Connector.

2) Use the Remote Controller to extend and retract the Actuator Arm.



Build The eLock

Step 17a - Installation

1) Now your eLock is ready to be installed on the frame of a cabinet or inside a drawer to create a Secret Safe for your valuables.

2) In this example, we attached the eLock and 2 Stationary Loops to the base of a cabinet and 1 Moving Loop to the back side of a drawer.

4) The Remote Controller was used to extend the Actuator Arm to Lock the safe and retract the arm to Unlock the safe.

Locked

Unlocked

Build The eLock

Step 17b - Installation

1) If there is space between the Stationary Loops and Moving Loops, the spring loaded positioner allows the eLock to swivel to an offset position if someone pulls on the drawer.

Offset Position

2) Once the drawer is released, the eLock swivels back to the center position. In the center position, the Actuator Arm can easily extend through the Loops when the drawer is in the fully closed position.

Center Position

Build The eLock

Summary

If you've successfully completed the steps shown in Slides 1-22, then you now have an eLock that can be used to turn common furniture into a Secret Safe.

You can use a 12vdc Power Supply or Battery Pack to provide power for the eLock. The Power Supply can be used if you can run a power cord from an AC plug to the eLock.

If access to external power is not available, refer to Slidedeck 2C for instructions on how to build a 12 vdc Battery Pack that draws zero power when not in use.

This makes it ideal for use in sealed enclosures where a long term source of reliable, internal power is needed.