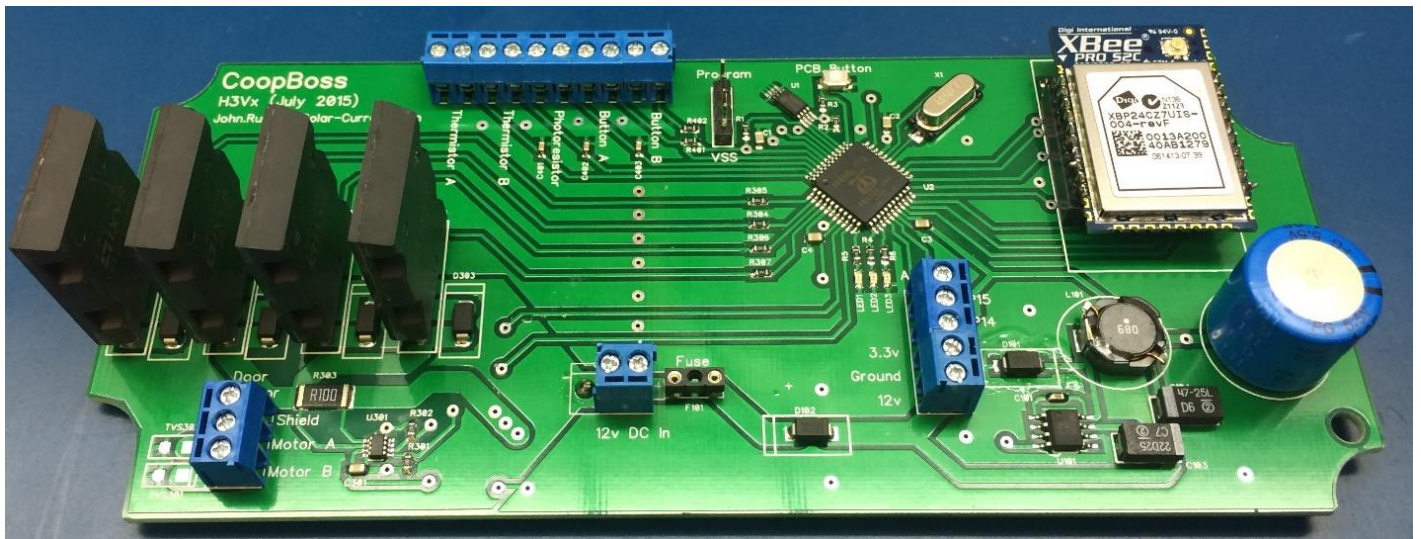


coopboss.com

Product Manual v1.4



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CoopBoss Overview

The CoopBoss is a management system for your backyard chicken coop. Its primary function is to safely and reliably manage your chicken coop's sliding door. A photoresistor connected to the CoopBoss monitors the sun and allows the CoopBoss to close the door in the evening after your chickens go in for the night. The light level that will trigger a close can be changed to accommodate your chicken's schedules from your smartphone. The CoopBoss closes the coop door by extending the arm of a linear actuator sliding your door closed. A unique object detection circuit monitors the door as it closes and if it bumps up against an object or a chicken it will stop and open back up. The CoopBoss will try several times and if after the third time the door still did not close a "Door Jammed" alert message will be sent to your smartphone. The sensitivity of the door's object detection circuit is settable so it can be set to push through debris that may be in the path of the door. In the morning the photoresistor detects the sunrise and opens the coop's door letting your chickens out for the day.

To manage and setup the CoopBoss it must be connected to a SmartThings® home automation hub (not included). The CoopBoss uses a ZigBee radio to communicate with the SmartThings® hub and should have a range of 50 to 300 feet. If your CoopBoss is too far away or obstacles are in the path it may be necessary to install ZigBee routers to extend the range of your ZigBee network. Once connected you will have access to your CoopBoss wherever your smartphone has internet access through a SmartThings® SmartApp. This SmartApp will allow you to:

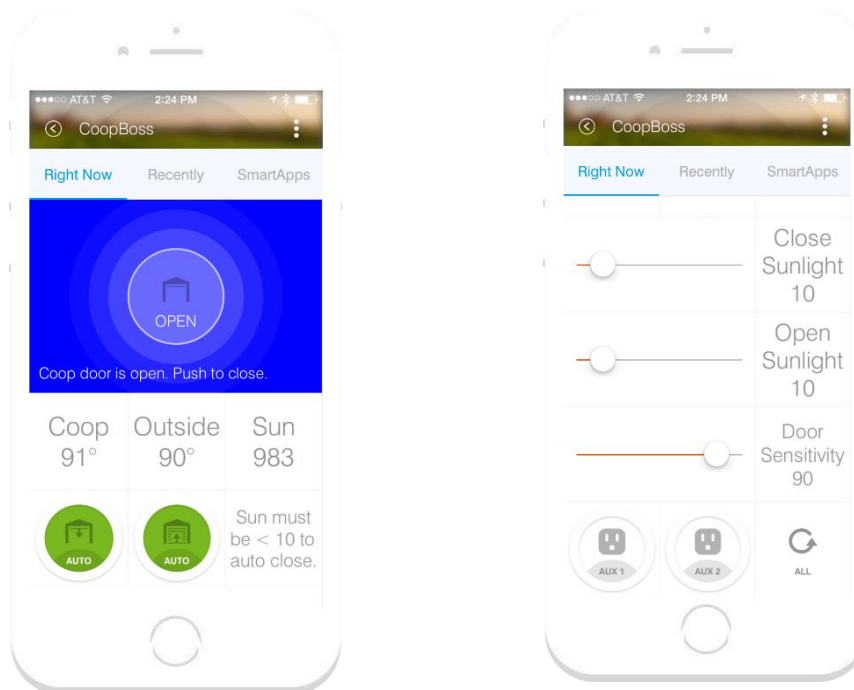


Figure 1 SmartThings™ custom smartphone interface

- Check on the status of your coop's door. Possible states your door may be in:
 - Closed (Door has closed with no errors all is okay)
 - Closing (The door is in the process of closing)
 - Open (Door is all the way open)

- Opening (The door is in the process of opening)
 - Forced close (The door is closed but the object detection circuit had to force it to close)
 - Jammed (The door is open; DID NOT CLOSE)
 - Unknown (This happens after a power failure and the door is in an unknown state)
 - Wait (A command has been sent to the CoopBoss)
 - Fault (A wiring fault exist with the door actuator either a short or open)
- Tap the door icon to open or close the coop door anytime.
 - When the door is in a jammed state pushing the close button again will force the door close with no object detection (make sure the path is clear of chickens before forcing the door closed). This allows you to close the door if something is in the way and needs to be pushed out of the way so the door can be closed.
- Enable or disable the auto open and auto close based on sunlight. If you want to keep your chickens in longer in the morning you can disable the auto open feature. When you want to let them out just tap on the door icon and it will open.
- Set the sunlight level that will trigger an auto close in the evening. This is changed by dragging your finger over a slider on your smartphone.
- Set the sunlight level that will trigger an auto open in the morning. This is changed by dragging your finger over a slider on your smartphone.
- Set the sensitivity of the door's object detection circuit. This is changed by dragging your finger over a slider on your smartphone. The higher the number the more sensitive it is to objects.
- The coop's inside and outside temperature are displayed on the SmartApp so you can see if your coop is getting too hot or cold. This temperature information is available to other SmartApps that can be used to automatically turn on a fan if the coop is too hot or a heat lamp (see [Heat Lamp Warning](#) on page 24) if it is too cold.
- An alerting SmartApp can be setup to send alerts to your smartphone if your coop door is Jammed. A Jammed state means the door didn't close because an object was in the path. Make sure the path is clear before you push the button again as the next close is going to be a high force close. This is designed to push through debris in the path but can also damage an object in the path.
- SmartThings® keeps an activity log of the CoopBoss' activity. By tapping on the activity icon you can see when your door last opened or closed as well as the light level and the amount of current it took to close the door.
- Aux1, Aux2 control buttons at the bottom of the smartphone screen. If your CoopBoss has the CoopBoss 2 Button Option these two buttons control each relay. Aux1 is also controlled by the optional 2nd button attached to Button B of the PCB. This allows control of a light connected to the Aux1 relay from either the smartphone app or the 2nd button located at the coop.

Components



Figure 2 System Components

A complete CoopBoss system consist of 6 major components as pictured in Figure 2. These components in detail are:

- A. **CoopBoss main CPU.** The Main CPU contains a custom printed circuit board (PCB) engineered to be a solid reliable coop door controller. The PCB has connection points for the door's actuator, temperature probes, an ambient light sensor, and door control button as well as expansion ports for future updates. A powerful ZigBee radio is also built in to communicate with the outside world, all housed in a weather tight aluminum enclosure with weather tight wire grommets.
- B. **Linear Actuator (Not Included).** The linear actuator pushes your coop's sliding door closed and locks to protect your chickens. The model pictured has a 12" travel meaning your door must freely travel 12" from open to close. The actuator must have built-in limit switches that will stop the motor when the door is completely open or closed. See CoopBoss.com for a list of supported Actuators
- C. **12-volt Power Supply.** The CoopBoss requires a stable 3 amp 12v DC power supply to drive all circuits including the actuator. The power supply must be located inside, out of the weather but close (2 feet or less) to the CoopBoss main CPU. Note: For the object detection circuit to

work properly the power supply must remain stable during a close cycle and therefore should not be connected to other devices.

- D. **Temperature Probes.** Two temperature probes are used to monitor the outside and inside coop temperature allowing you to keep an eye on your coop's temperature from your smartphone. This information is also sent to your SmartThings® cloud and can be used to trigger events. One example would be to turn on a fan if it's too hot in the coop (requires a ZigBee enabled power outlet or the CoopBoss 2 Button Option, not included).
- E. **Door Open / Close Button.** This push button is mounted on the coop (must be inside out of the weather) allowing you to open and close the coop door from the coop. Note: Since the coop door will be attached to the Linear Actuator you will no longer be able to manually push your door close or open. You must use this button to manually operate the door.
- F. **Safety Placards.** A set of safety placards are include and should be mounted on your coop and around your door warring people that the door is automatic and may close at any time. **At no time should you place any body part in the path of the door. Children should not be allowed to play around the door or crawl through the door. Make sure you remove power from the CoopBoss before servicing the door.**

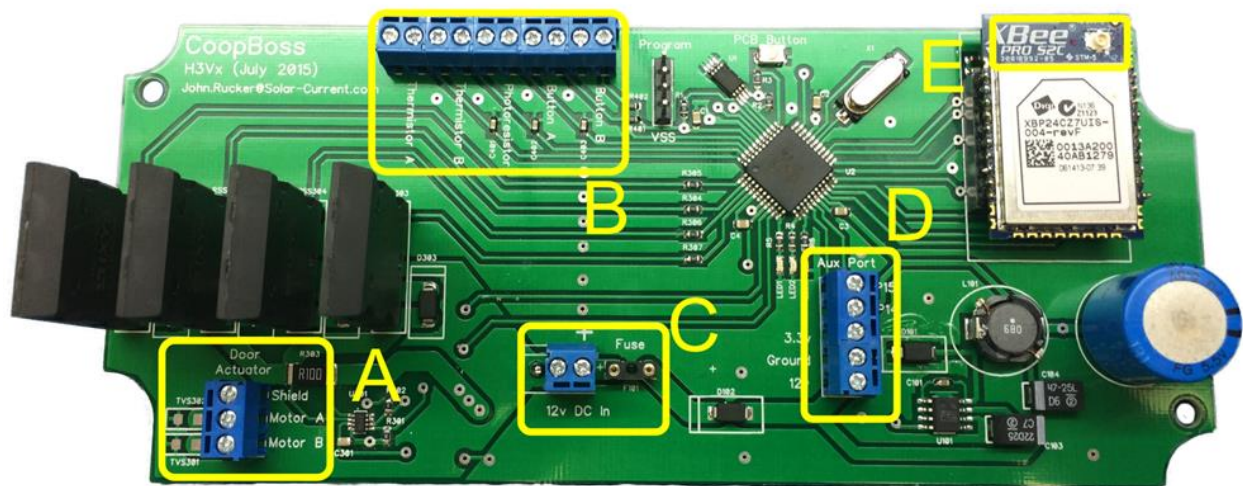


Figure 3 Ports

Figure 3 shows the ports / headers to connect the CoopBoss to the real world.

- A. **Motor Connection:** Connects to a 12v DC linear actuator to push and pull the coop's door. The motor control circuit has been tested with Progressive Automations 12v actuator model number PA-14-12-35.
- B. **Main I/O Header:** This header is connected to two thermistors, one photoresistor, and two normally open push buttons.
- C. **DC In:** 12v DC power in and 5-amp fuse holder.
- D. **Aux Port:** See CoopBoss 2 Button Option on page 21.
- E. **Antenna:** XBee antenna connection.

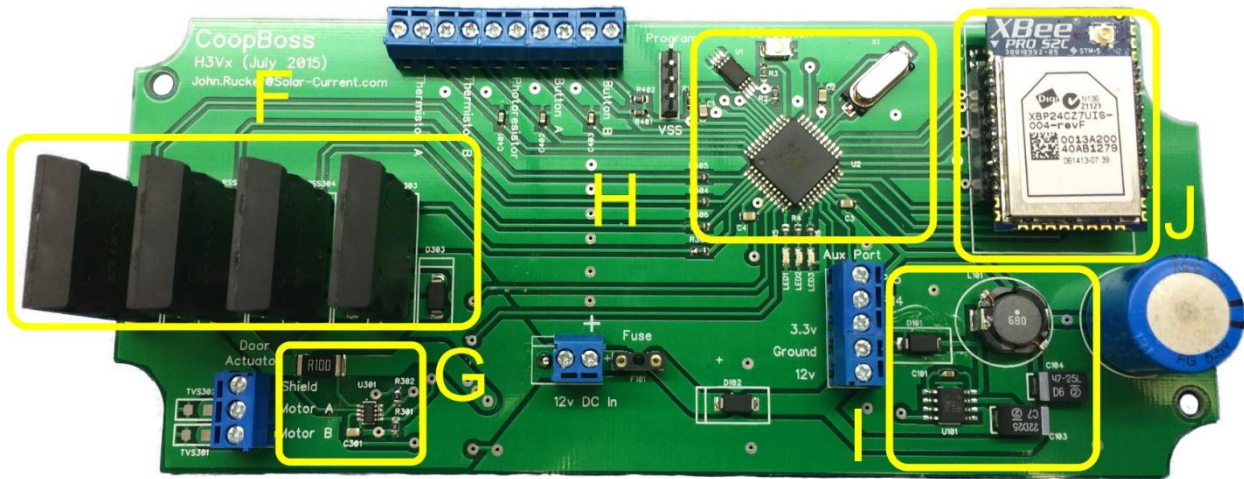


Figure 4 CoopBoss PCB modules

Figure 4 highlights the CoopBoss' on board modules.

- F. **Motor Control:** Based on IXYS Integrated Circuits CPC1709J Solid State Relays. The Motor control circuit uses four optically coupled solid state relays arranged in an H bridge to drive the 12v DC actuator motor forward and reverse. It is connected to the microcontroller (H) with four I/O pins.
- G. **Object Detection:** Motor current monitoring is based on the Texas Instrument INA219BIDCNT Bi-direction current / power monitor chip. If the door bumps up against an object during a close this circuit will detect the small increase in current and quickly relay that to the microprocessor (H) over an I2C bus. The Microprocessor will then instruct the motor control circuit (F) to stop closing the door and open back up. This all happens in just a few milliseconds.
- H. **Microcontroller:** The microcontroller is based on the Parallax P8X32A-Q44 multicore Propeller. The Propeller's multiple core processors are dedicated to monitoring and controlling the various modules of the CoopBoss. For example, to get almost near instant object detection one processor is dedicated to monitoring the object detection (G) circuit while the other processors are free to process ZigBee traffic, button I/O , read coop temperature, and monitor the ambient light level.
- I. **PCB Power:** The power circuit is based on the Texas Instrument LM2675MX-3.3 switching regulator. It has a very wide input range from 8v to 40v DC and outputs 3.3v DC with up to 1 amp of current. The Power circuit also has a 1 farad super-capacitor to help regulate the power through high current demands from the motor control circuit (F)
- J. **ZigBee Radio:** The ZigBee radio is from Digi International and the part number is XBP24CZ7UIS-004. This radio securely communicates with the SmartThings® hub that connects to the SmartThings® cloud on the Internet. A smartphone app (SmartThings® Custom Device Type) allows secure control of the CoopBoss over the Internet.

CoopBoss LED messages and button commands

The CoopBoss' PCB has a push button and three surface mount LEDs that are used to display status messages and commands. The PCB button is located at the top middle right of the PCB as you can see in

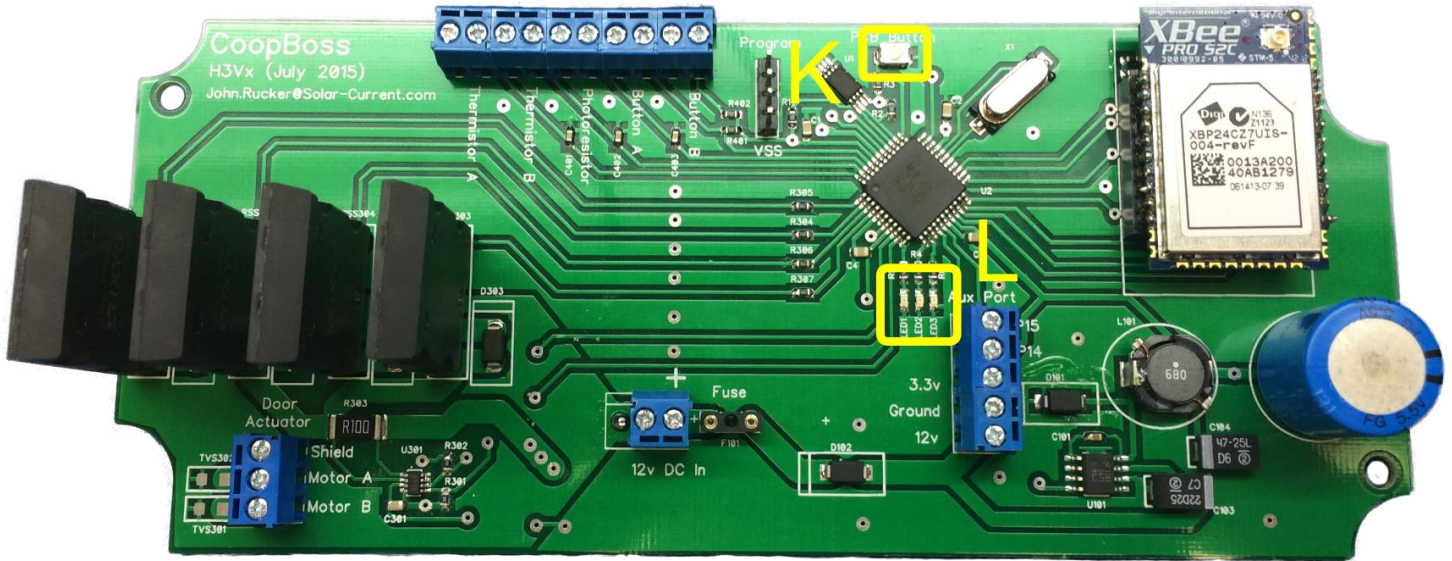


Figure 5

Figure 5 area "K". The three red LEDs are located just below the main processor as shown in area "L" of Figure 5. These LEDs display numbers in binary format. Refer to LED Key to see the LED patterns that represent numbers from 1 to 7. The LEDs will light up to show program status. The LED status numbers are divided into two sets of seven numbers. The first set of numbers gives a status as the CoopBoss does its initial program load (IPL) (see details in table "LED sequence during IPL"). The second set of numbers are used after IPL is complete and the CoopBoss is in normal operation mode. You can tell if the CoopBoss is in normal operation mode when LED 3 flashes on and off at one second intervals (see details in table "LED light sequence once IPL is complete").

LED Key

Number	LED1	LED2	LED3
1	Off	Off	On
2	Off	On	Off
3	Off	On	On
4	On	Off	Off
5	On	Off	On
6	On	On	Off
7	On	On	On

LED sequence during IPL (Power On)

See LED Key

Number	Description
1	Power on and IPL start
2	Photoresistor Okay
3	Establishing communications with ZigBee radio
4	Start xModem firmware upgrade service
5	Waiting to join ZigBee HA network
6	ZigBee HA network joined. Sending a device announce to network.
7	PCB button has been held down during boot. Leave xBee network and restore factory defaults for door

LED light sequence once IPL is complete

See LED Key

Number	Description
1 (flashing)	Waiting for command (Normal Operation)
2	ZigBee packet received
3	Sending ZigBee Report. A door state change, new temperature, or new light level will trigger this event.
4	ZigBee 0x0101 (Door Lock) cluster command recognized and parsed
5	ZigBee 0x0402 (Temperature) cluster command recognized and parsed
6	--Not used--
7 (flashing 5 times)	PCB button has been pushed to set last door close current as normal door current

LED sequence for errors

An error number will be preceded with all three LEDs on, then the LED Number (See LED Key), and then all three LEDs on again. For example, error one will look like this repeated 5 times:

Error 1 (example)

LED1	LED2	LED3
On	On	On
Off	Off	Off
Off	Off	On
Off	Off	Off
On	On	On
Off	Off	Off

LED Error numbers

Number	Error description
Error 1	Photoresistor error or not attached (only checked at IPL)
Error 2	Thermistor 1 error or not attached (only checked at IPL)
Error 3	Thermistor 2 error or not attached (only checked at IPL)
Error 4	ZigBee radio hot (above 167 F)
Error 5	Low ZigBee signal strength

Set Normal Door close current (PCB button command)

The normal door close current must be set after installation of the actuator to your coop door. Use the Open/Close push button to open and close the door a few times making sure it closes smoothly and no objects are in the path. Wait until LED3 is flashing, indicating IPL is complete and the CoopBoss is in normal operating mode, then push the small button at the top of the PCB (see area “K” in Figure 5) to set the current of the last door close as the normal door close current. From now on this current setting will be used as a base line for detecting an object in the path of the door. Test this by placing a plastic bottle in the path of your door and push the button to close. The door should bump up against the plastic bottle and open back up. **DANGER: At no time should you place your hand or any body part in the path of the door. If the system malfunctions it could cause bodily harm.** This process should be repeated every 6 to 12 months to insure the door is function correctly.

Leave ZigBee Network (PCB button command)

To leave the ZigBee network and reset back to factory condition, remove the power to the CoopBoss for a few minutes, push the PCB button (see area “K” in Figure 5) and hold while powering the CoopBoss back on. Remove finger when all three LEDs quickly flash on and off. At this point the CoopBoss has

been reset back to factory and is looking for a new ZigBee network to join. Once joined you will need to check your close light and open light settings as well as Set Normal Door close current as discussed above.

Installation

Hardware Setup

If you haven't setup your SmartThings® hub please follow the instructions that came with the hub and make sure it is setup and working. Also make sure to install the SmartThings® App on your smart phone, login, and connect to your SmartThings® hub.

1. Pair the CoopBoss to the SmartThings® home automation network
 - a. Set the CoopBoss metal box close to the SmartThings® hub and plug it into your AC Power. The CoopBoss will start looking for a home automation network to join as soon as it is plugged in. The LEDs will show a binary number 5 (1 and 3 lit) as the CoopBoss looks for an open ZigBee HA network to join.
 - b. User your smartphone to navigate to the SmartThings® "Marketplace" and tap "Other", tap "CoopBoss", and then tap "Connect Now". This will start the pairing process. After several minutes you will see the CoopBoss appear on your smartphone. At this point the CoopBoss is connected and will remember the connection even if the power is removed. Follow the wizard on the phone to complete the software setup.
2. After you have completed step 1 and paired with the hub, move the CoopBoss hardware outside keeping in mind it must wirelessly communicate with the SmartThings® hub inside. It may be necessary to mount the CoopBoss on the side of the coop (out of direct sunlight) closest to the SmartThings® hub or move the hub to be closer to the CoopBoss.
 - a. Mount the CoopBoss' metal box so the cables and the antenna are facing down and away from possible rain. The metal box is weather tight but cannot be submersed in water, it should be up, out of any pooling water. NOTE: The large wire grommet at the bottom of the aluminum enclosure has a small ambient light sensor inserted into one of the wire tunnels. This light sensor is used to detect sunset and sunrise and should not be exposed to artificial light.

- b. To access the two mounting holes, remove the top lid to expose the two mounting holes as shown in Figure 6.

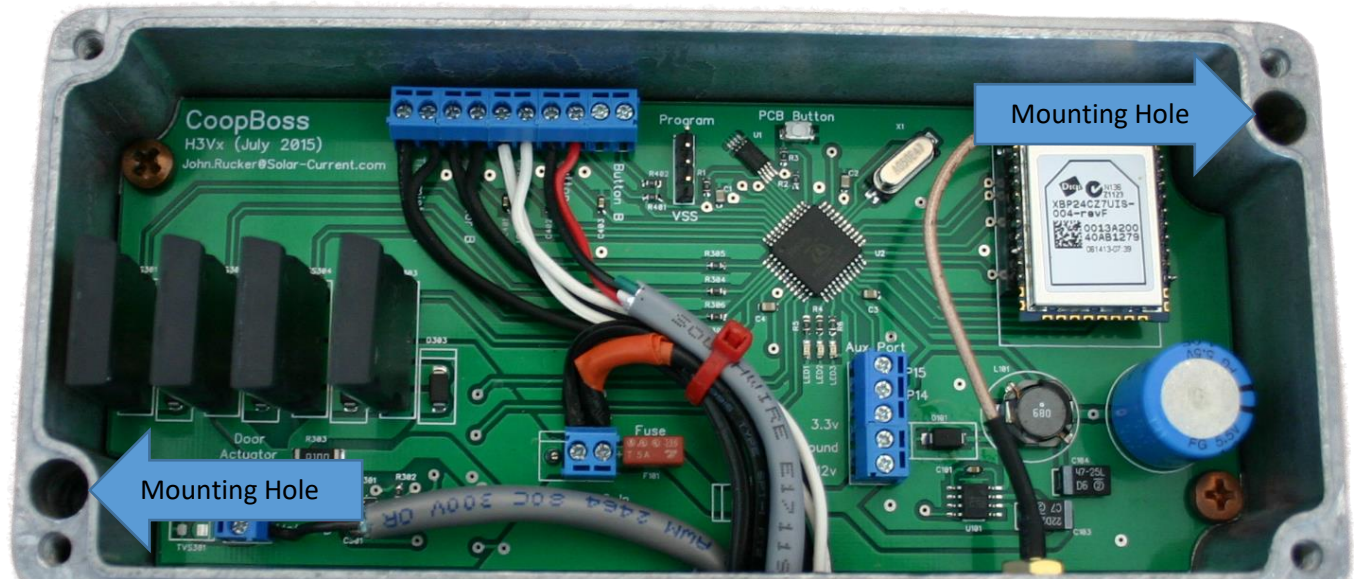


Figure 6

- c. Mount the 12v DC power supply (Figure 2 item C) in a non-damp location preferably inside your chicken coop. The AC plug and power brick cannot get wet or be exposed to rain or splashing water.
 - d. Place the temperature probe (Figure 2 item D) connected to the header marked Thermistor A (Figure 3 section B) inside your chicken coop and the other probe outside but out of direct sunlight and not exposed to the weather.
 - e. Mount the coop's open / close button (Figure 2 Item E) to your coop taking care to make sure it will not get wet but is easily accessible. If you have an elevated coop a good location would be just under the coop so you can easily reach down and push the button. This button can also be used as an emergency open switch. If for some reason your door is closing when you don't want it to you can quickly push this button and the door will immediately open. Place the "Caution Automatic Door Push Button to Operate" (Figure 2 item F) placard in a visible location next to your button.
3. Mount the actuator (Figure 2 item B) to your coop's sliding door.
 - a. Your coop's door must be at least 1" thick to increase the area that may come into contact with an object. A thinner door such as a metal door can act like a knife and will cut into objects instead of bumping up against them. It is acceptable to add a lip along the closing edge of a door to increase its thickness if the door is less than 1" thick.
 - b. Your coop's door must smoothly slide 12" from full open to full close position. If your door is warped or is difficult to slide at times the object detection circuit will not function correctly.

- c. The actuator's arm should be attached in a fashion that it pushes your door closed from the center edge of the door (Figure 7). Use a $\frac{1}{4}$ " tapered bolt with nut and lock washer to secure the door.



Figure 7 Door 12" Travel and Actuator mounted to center edge



- d. Once the actuator is securely mounted to your coop's door connect it to the terminal block (Figure 9) making sure to match the red wire to the red wire. You can now power on your CoopBoss and make sure it connects to the SmartThings® hub and IPL is complete by watching the LEDs (LED 3 will flash every second). At this point you can calibrate your door to find the normal operating current.



Figure 8 Door in Open and Closed Positions



Figure 9 Motor's terminal block

4. Calibrate door

- a. This is a very important step and must be done after the actuator is installed onto your coop's sliding door. This step will find the normal operating current it takes to close your door. Make sure your door is clear of obstacles and proceed to the next step.
- b. Use the open / close button to open and close your coop's door several times. Listen to the motor to make sure its running smoothly throughout the full 12" travel of the door. If the door appears to struggle or jam, stop and adjust door so it closes smoothly and repeat until you get a good smooth running door.
- c. Once the door has successfully open and closed several times you can now set the normal door close current by pushing the button on the PCB (Figure 5 area K). This sets the current from the last door close as the normal operating current for the coop. From this point on when the door is closing its current will be compared to this value and used to determine if an object is in the path.

5. Test object detection circuit

- a. **DANGER: At no time should you place your hand or any body part in the path of the door. If the system malfunctions it could cause bodily harm.** To test the object detection circuit place a plastic bottle without the lid in the path of your door and push the button to close. The door should bump up against the plastic bottle and open back up. After the door completely opens it will try to close again. If you leave the bottle there it will open back up again. This time it will wait a few seconds and try to close a third time pushing a little harder on the plastic bottle. After three failed attempts to close, the CoopBoss will stop trying to close the door and send a door jammed error to SmartThings™. You should see this notification on your phone. *The plastic bottle may be slightly dented but not collapsed. If the plastic bottle was collapsed then repeat the calibration step 4 above.* Now if you push the button one more time it will close again and push much harder on the bottle. It may even collapse the plastic bottle. **When the door is in the "jammed" state the next door close command will trigger a high current door close.** This is to push the door through debris that may be in its path and still close for the night. Now remove the bottle and close the door a couple of times to make sure it can close normally. After a normal close you should see a green "Closed" on your phone. **This process should be repeated every 6 months to make sure your coop door's object detection circuit is operating correctly.**

6. Place the lid on the aluminum case and secure all wires making a neat install. Your CoopBoss is ready for use and will auto close the coop door at sunset and open at sunrise. Over the next few days observe your chicken's habits and adjust the light levels on the smartphone app that will trigger an auto close to be about 10 to 15 minutes after they go in for the night. If a chicken is left out for the evening you can use your phone to open the door and let her in and then close again.

ZigBee Command Reference

This section is for someone who would like to make a custom ZigBee based application to talk directly to the CoopBoss. This information is not required for normal operation and is provided here as a reference.

End Points

0x38	Input Cluster	0x0000	Basic Cluster
	Output Cluster	0x0101	Door Lock Cluster
	Output Cluster	0x0402	Temperature Cluster (Temperature of xBee radio)
0x39	Input Clusters	None	N/A
	Output Cluster	0x0402	Temperature Cluster (Coop Probe 1)
0x40	Input Clusters	None	N/A
	Output Cluster	0x0402	Temperature Cluster (Coop Probe 2)

Cluster 0x0101 commands

0x00	Close Door
0x01	Open Door
0x03	Toggle Door Lock
0x04	High Current Door Close

Custom Commands

0x0A	Enable Auto Close Door
0x0B	Disable Auto Close Door
0x0C	Enable Auto Open Door
0x0D	Disable Auto Open Door
0x0E	Set Close Light Level to current Level
0x0F	Set Open Light Level to current Level
0x12	Set Auto close and open light levels back to factory
0x13	Set normal door close current to value of last door close current
0x14	Aux1 On
0x15	Aux1 Off
0x16	Aux2 On

0x17	Aux2Off
------	---------

Cluster 0x0101 Attributes

\$0000	Read LockState see page 344 of ZCL, type 0x30 \$30 = 8-bit enumeration
\$0001	Read LockType see page 344 of ZCL, type 0x30
\$0002	ActuatorEnabled see page 344 of ZCL, type 0x10
\$0003	Read DoorState see page 344 of ZCL, type 0x30, Reportable

Custom Attributes

0x0400	Custom Attribute for current Light RC Time value, Type 0x23	Read only
0x0401	RC Time value that will trigger a door close, Type 0x23	Read / Write
0x0402	RC Time value that will trigger a door open, Type 0x23	Read / Write
0x0403	Read Auto Door Close Setting 0=Disabled, 1=Enabled, type 0x10	Read only
0x0404	Read Auto Door Open Setting 0=Disabled, 1=Enabled, type 0x10	Read only
0x0405	Current of last door close	Read only
0x0406	Seconds to next close window	Read only
0x0407	Seconds to next open window	Read only
0x0408	Object detection sensitivity (1 to 100) 1 = very sensitive	Read / Write
0x0409	Read Normal door current setting	Read / Write
0x040A	Voltage of last door close (millivolts)	Read only
0x040B	Aux1 (P14) Status 0=Off, 1=On (Button 2 also controls Aux1)	Read only
0x040C	Aux2 (P15) Status 0=Off, 1=On	Read only
0x040D	Photoresistor calibration setting. R/W	Read / Write
0x040E	Never exceed door close current	Read / Write

Safety Instructions and Product Usage Guidelines

Safety Instructions

- Please keep and follow these instructions.
- Heed all warnings.
- Solar-Current is not responsible for loss of revenue or poultry due to function or malfunction of this product.
- At no time should you place any body part in the path of the door.
- Children should not be allowed to play around the door or crawl through the door.
- Make sure you remove power from the CoopBoss before servicing the door.
- Do not submerge or allow any component of this product to be submersed in water.
- Do not allow the power supply or the power supply's 110v AC plug to be exposed to dripping or splashing of any water or liquid.
- Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus that produce heat.
- Only use attachments and accessories specified by Solar-Current.com.
- **WARNING:** To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance are not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

Product Usage Guidelines

- Your coop's door must be at least 1" thick by 6" wide by 12" deep to increase the area that may come into contact with an object. A thinner door such as a metal door can act like a knife and will cut into objects instead of bumping up against them. It is acceptable to add a lip along the closing edge of a door to increase its thickness if the door is less than 1" thick.
- Your coop's door must smoothly slide from full open to full close position. If your door is warped or is difficult to slide at times the object detection circuit will not function correctly. If your door does not slide smoothly then do not operate the door with the Auto Close feature enabled. Instead only close your door by first checking if it is clear and pushing the close button on your smartphone or the push button at the coop.
- Data accuracy and consistency from the CoopBoss sensor is not guaranteed. Therefore, you should not rely on that data for any use that impacts health, safety, security, property or financial interests.
- Solar-Current.com's CoopBoss allows for the control of electronic devices through wirelessly bound pluggable outlets, relays and controls. Where possible, Solar-Current.com has worked to ensure message delivery and control reliability, but many factors can impact this, including electromagnetic interference, solar flares, wireless and cellular connectivity, and the natural complexity of software and firmware instructions. These and other issues can cause commands to not be delivered, to be delivered repeatedly, or to be delivered in rapid

succession. Therefore, do not use Solar-Current.com's CoopBoss to control any device that may have an impact on health, safety, security, property, or financial interests, or where the device is sensitive and could be damaged by power cycling or power surges.

- While Solar-Current.com supports the ZigBee communications standard, we cannot guarantee the implementations of this standard by third party devices. Certain devices may not work, or may cease to work with Solar-Current.com's CoopBoss despite supporting the same standard. We provide no guarantee or warranty of compatibility for third party devices.

Certifications

United States (FCC)

Contains FCC ID:MCQ-XBPS2C

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1.) this device may not cause harmful interference and (2.) this device must accept any interference received, including interference that may cause undesired operation. This device may only be used with the supplied antenna.

IMPORTANT:

The RF module inside the CoopBoss has been certified for remote and base radio applications. If the module will be used for portable applications, the device must undergo SAR testing. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Re-orient or relocate the receiving antenna, Increase the separation between the equipment and receiver, Connect equipment and receiver to outlets on different circuits, or Consult the dealer or an experienced radio/TV technician for help.

Canada (IC)

Contains Model XBee PRO Radio, IC: 1846A-XBPS2C

This device has been designed to operate with antennas having a maximum of 19 dB of gain. Antennas having a gain greater than 19 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

90 Day Limited Warranty

Solar-Current.com, Inc. ("Solar-Current") warrants this product (the "Product") against defects in materials and/or workmanship under normal use for a period of 90 days from the date of purchase by the original purchaser ("Warranty Period"). If a defect arises and a valid claim is received within the Warranty Period, then as your sole remedy (and Solar-Current's sole liability), Solar-Current will at its option either 1) repair the defect at no charge, using new or refurbished replacement parts, or 2) replace the Product with a new product that is functionally equivalent to the original, in each case within 60 days following receipt of the returned Product. A replacement product or part, assumes the remaining warranty of the original Product. When a Product or part is exchanged, any replacement item becomes your property and the replaced Product or part becomes Solar-Current's property.

Obtaining Service: To obtain warranty service, visit <http://solar-current.com> to speak with a service agent or open a service request. Please be prepared to describe the Product that needs service and the nature of the problem. A purchase receipt is required. The Product must be insured, and shipped freight prepaid and securely packaged. You must contact support for a Return Material Authorization Number ("RMA Number") before shipping any Product, and include the RMA Number, a copy of your purchase receipt and a description of the problem you are experiencing with the Product. Any claim under this Limited Warranty must be submitted to Solar-Current before the end of the Warranty Period.

Exclusions: This warranty does not apply to: a) damage caused by failure to follow instructions relating to the Product's use or the installation of components; b) damage caused by accident, abuse, misuse, transport, neglect, fire, floods, earthquake or other external causes; c) damage caused by service performed by anyone who is not an authorized representative of Solar-Current; d) accessories used in conjunction with a covered Product; e) a Product or part that has been modified to alter functionality or capability; f) items intended to be periodically replaced by the purchaser during the normal life of the Product, including, without limitation, batteries, bulbs or cables; g) a Product that is used commercially or for a commercial purpose, in each case as determined by Solar-Current.

Solar-Current shall not be liable for (I) any lost profits, cost of procurement of substitute products, or any incidental or consequential damages, or (II) any amounts in excess of the purchase price for the product, in each case whether resulting from the use or inability to use the product, or arising out of any breach of this warranty.

To the extent permitted by applicable law, Solar-Current disclaims any and all statutory or implied warranties, including without limitation, warranties of merchantability, fitness for a particular purpose and warranties against hidden or latent defects. If Solar-Current cannot lawfully disclaim statutory or implied warranties, then to the extent permitted by law, all such warranties shall be limited in duration to the warranty period.

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CoopBoss 2 Button Option

The CoopBoss 2 Button Option works with all versions of the CoopBoss. In the Spring of 2017 it was introduced as an option during purchase. Any CoopBoss can be retrofitted with this option. See CoopBoss.com for ordering details.

The CoopBoss main CPU has connection points for two push buttons and two auxiliary output ports that can drive a 3.3v 10mA load. The first push button (see Button A in section B of Figure 3 Ports) is dedicated to opening and closing the coop door. Button B however can be used for control of a device connected to the Aux 1 port (labeled p14 in section D of Figure 3 Ports). If the Aux 1 port is connected to an optically coupled AC really it can then be turned on and off by pushing a button connected to Button B. Additionally, you can control the Aux 1 port by tapping on the Aux1 button at the bottom of the SmartApp (see Figure 1 SmartThings™ custom smartphone interface). This can be used to control a coop light allowing you to turn it on and off with either the physical button at the coop or with the SmartApp on your smartphone. The Aux2 port (p15 in section D of Figure 3 Ports) can be controlled with the aux 2 button on the Smartphone. This port can also be connected to an optically coupled AC relay to control a fan for ventilation in your coop.

Here is the recommend wiring diagram for connecting multiple buttons and relays to the CoopBoss:

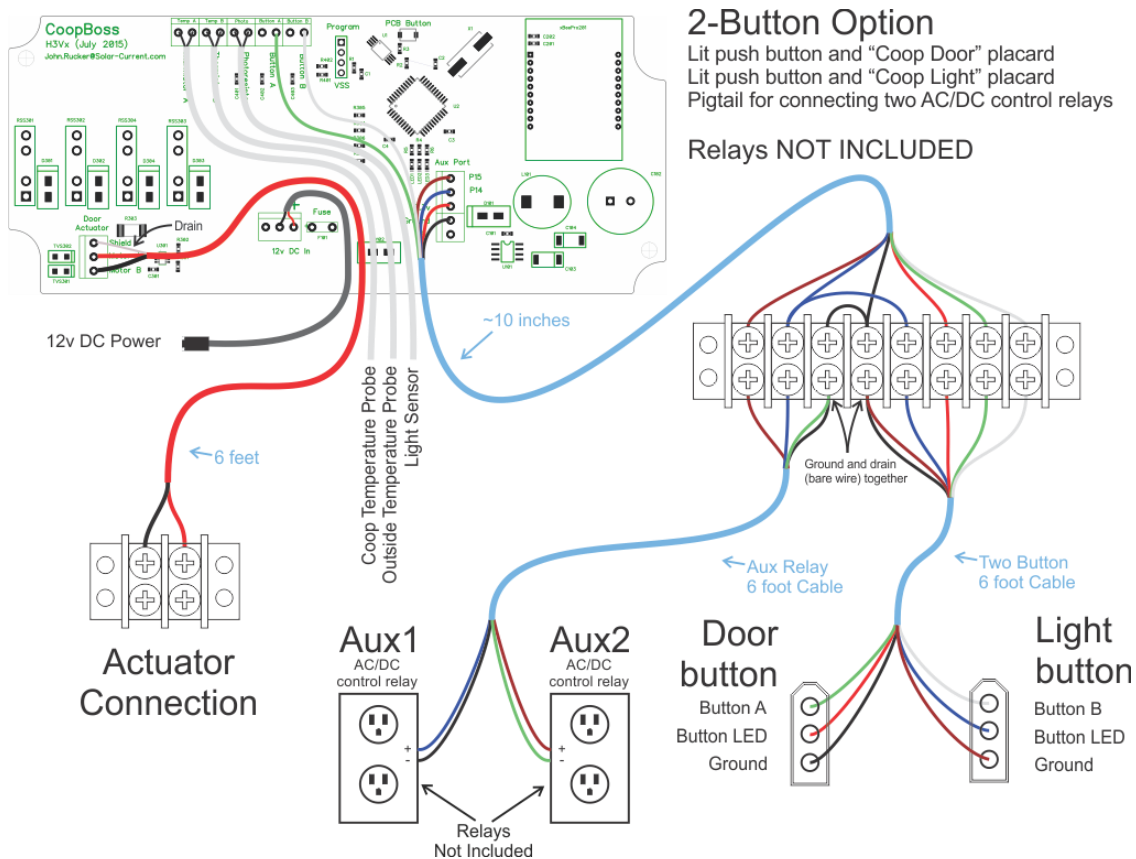


Figure 10

The CoopBoss 2 Button option is based on this wiring diagram and designed to be field installable or it can be purchased with the CoopBoss pre-installed.

CoopBoss 2 Button Kit details

The 2 Button option comes with the following components:

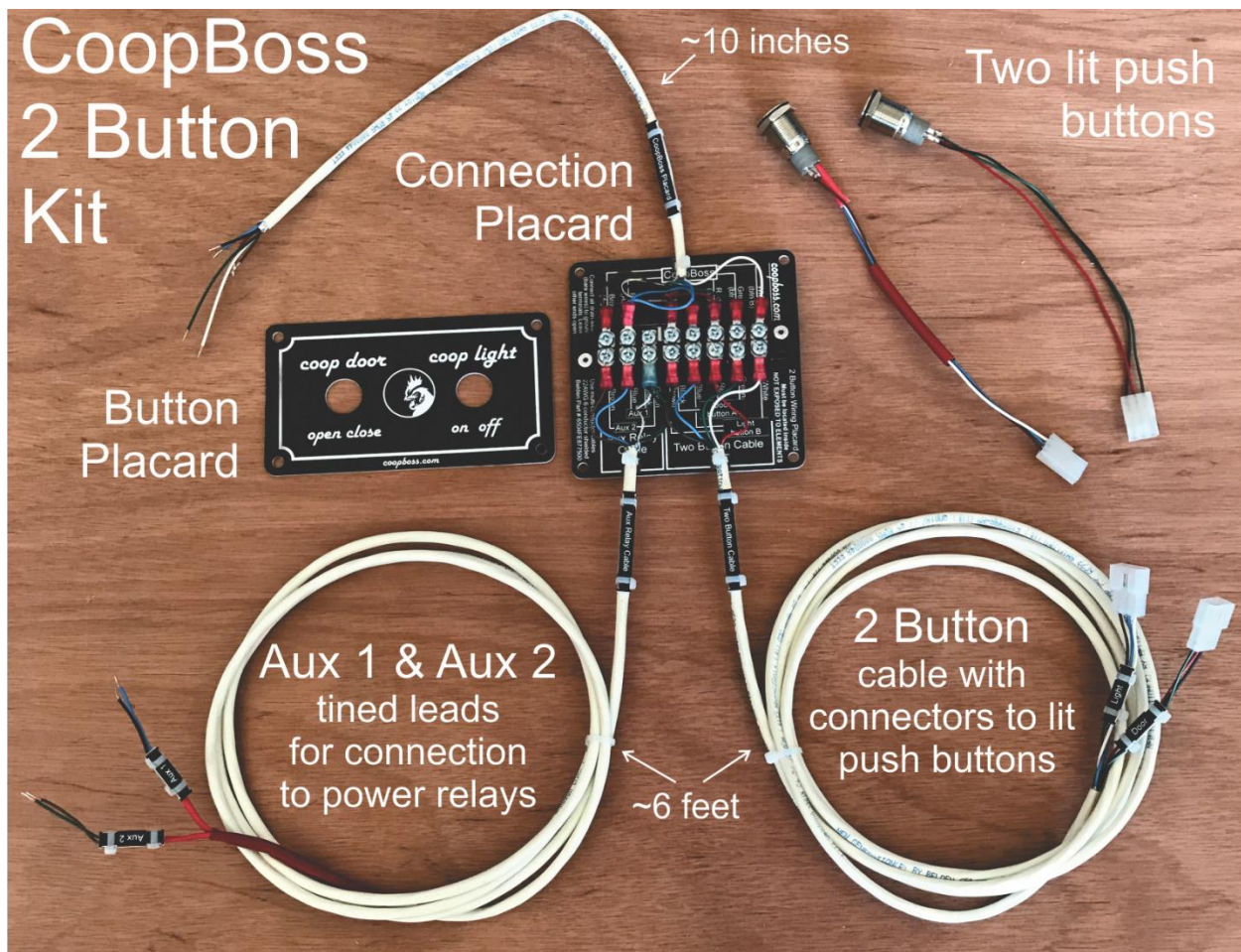


Figure 11

- Connection Placard with terminal block and 10-inch-long wiring harness for connection to the CoopBoss screw terminals
- Button Placard and two lit push buttons with keyed connectors.
- 6-foot two button cable with keyed connectors that mate with the two lit push buttons
- 6-foot Aux 1 and Aux 2 cable with tined leads for connection to optically coupled external relays.
These pins can only drive a 3.3v, 10mA load! They must be connected to an optically coupled external relay.

If you purchase the CoopBoss with the 2 button kit it will be connected to the CoopBoss and ready to go. Please note the connection placard cannot be located outside in the elements. It must be located inside in a protected location free from moisture and where it can't be splashed with water. The terminal block on the placard can be removed and fished through a hole if necessary to move it out of the elements.

The 2 Button wiring placard (Figure 13) has a wiring diagram printed on the plastic placard making it easy to hook up the supplied cables. This is handy if you need to disconnect a cable to run it through a wall.

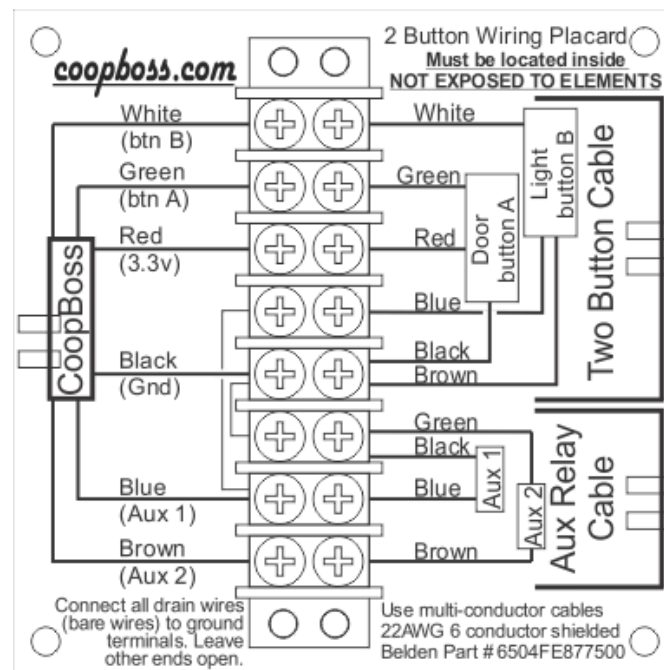


Figure 12

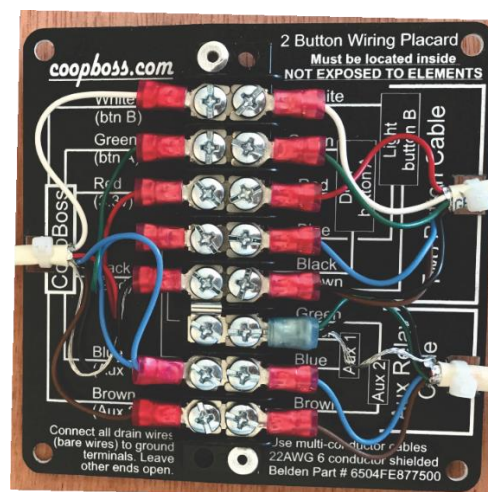


Figure 13

To reconnect just match the colors as noted on the placard. There are also cutouts on the placard to allow a nylon tie wrap to hold down your cable.

The two included lit push buttons can be fished through the hole in the placard and mounted to the outside of your coop. The buttons are designed to be exposed to the weather so it is okay for them to be outside. We do recommend you mount them so they are not in direct sunlight.



Figure 14

The push buttons each have a LED light ring around the button. The door button will be lit at all times to make it easy to find. The coop light button will go on and off as you push it matching the status of the Aux1 output.

Aux Output Warning

The Aux 1 and Aux 2 outputs are 3.3v and should only drive a 10mA optically isolated load or smaller. These pins are directly connected to the CoopBoss CPU and if they are shorted together or connected to a load bigger than 10mA it may cause permanent damage to your CoopBoss. Do not connect these leads directly to a relay. They should only connect to an optically isolated relay! Please see CoopBoss.com for a list of recommended relays to use with these outputs.

Heat Lamp Warning

If you control a heat lamp with the CoopBoss it must be installed securely and oriented so it would not cause a fire or damage to your livestock if left on. Since the Aux 1 and Aux 2 outputs are activated / controlled by the cloud they should not be relied on. It is very likely they will occasionally miss an on command or an off command from the SmartThings cloud. If these outputs are controlling a heat source, that heat source should be able to run 24 hours a day and not cause a fire or damage. For this reason, we do not recommend using the CoopBoss to control a heat lamp or heat source unless it is also controlled by a local thermostat.

Retrofitting the 2 Button Kit to an older CoopBoss

If you already have a CoopBoss with an existing coop door button follow these steps to replace your current button and placard with the new one provided.

- 1) Unplug your CoopBoss and remove the metal lid by loosening the 4 screws.
- 2) Remove your existing Button A (coop door button) wires by using a very small screw driver to loosen the two screws at the top of your PCB and shown in section B of Figure 3 Ports. Gently pull the wires out and discard your old button and placard. You may have to loosen the big black jamb nut on the outside 5-hole wiring grommet.
- 3) Fish the new wiring harness into the same hole of the wiring grommet and connect the cable as shown in Figure 15. Notice that the green and white wires are a little longer than the other 4 wires, they will connect to the Button A and Button B ports at the top. All the other wires will connect to the Aux Port closer to the bottom of the PCB.

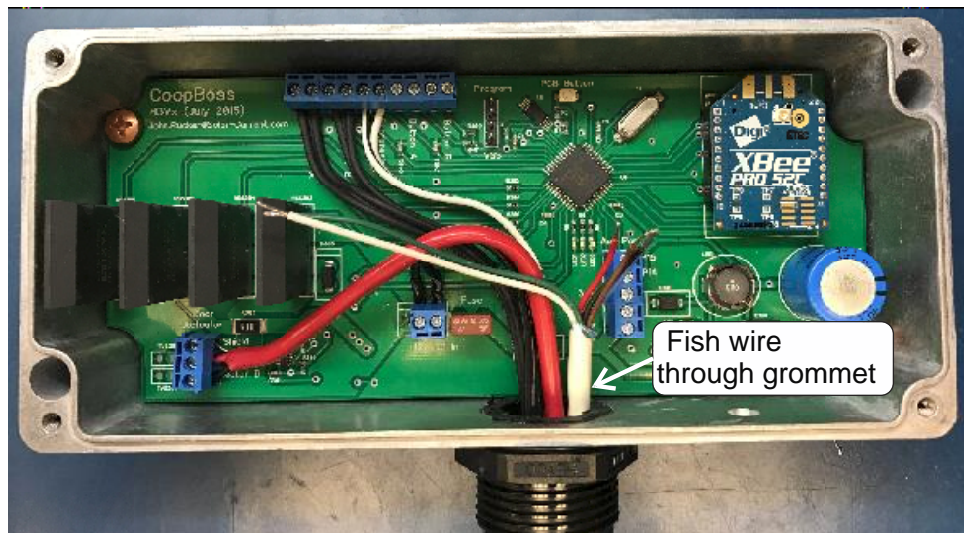


Figure 15

- 4) Connect the green and white wires to the Button A and Button B connectors at the top of the PCB. See Figure 16 for details. Connect the Brown wire to P15, Blue wire to P14, Red wire to 3.3v, Black wire to ground.

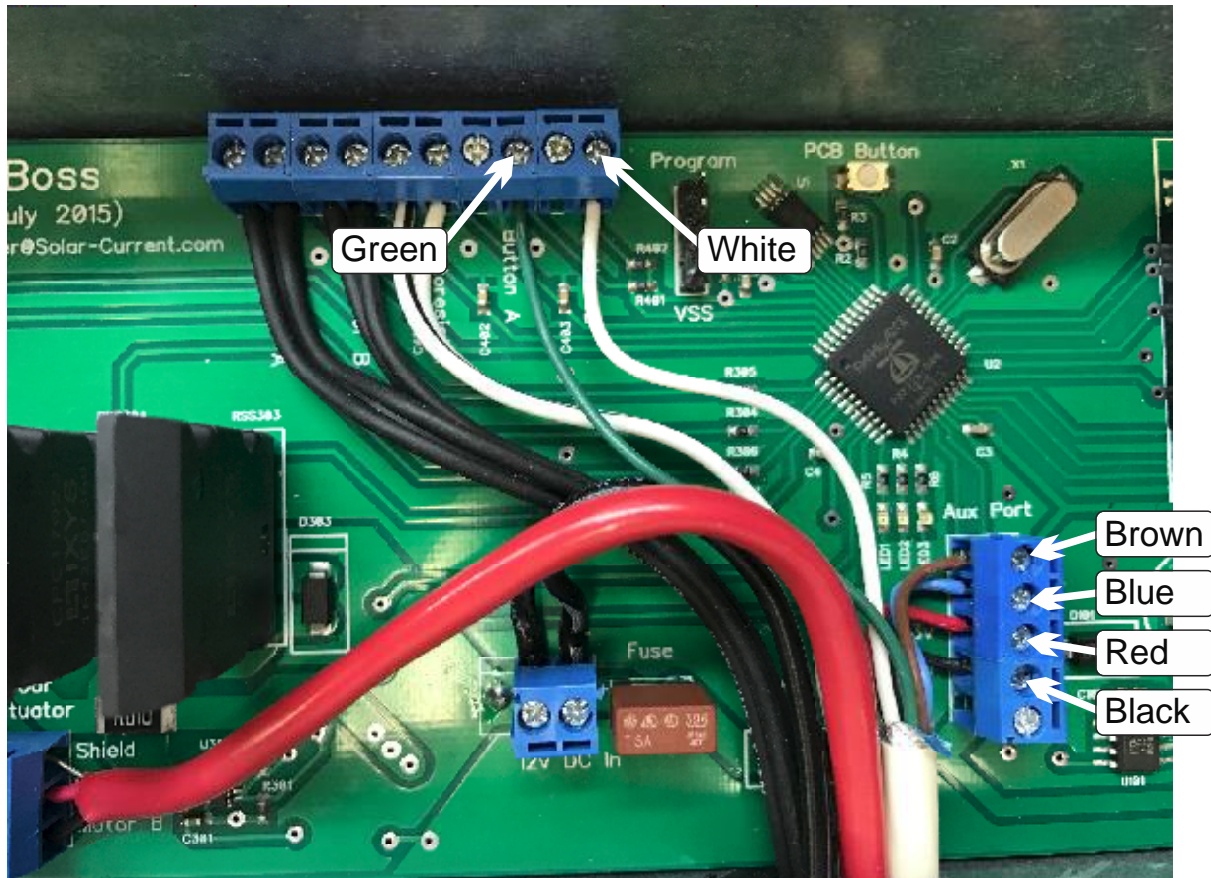


Figure 16

- 5) Make your wires neat and make sure all other wires are still connected and no foreign objects are laying on the PCB. Tighten black jamb nut on the wiring grommet and put the lid back on making sure the rubber gasket is properly in place.

To test your installation restore the power and wait a few moments for the CoopBoss to boot up and connect to SmartThings. If everything is connected correctly the light ring on the “coop door” should light up as soon as you plug in the power. The light ring on the “coop light” button will turn on and off as you push it. You are now ready to connect your optically isolated relays (not included) please see the [Aux Output Warning](#) on page 24 for overview on the load you can place on these ports.