

# BroodMinder-W3 Kit Guide

This full assembly guide (12 pages) can be found at

<https://broodminder.com/pages/broodminder-w3>

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## Overview

For the purposes of this guide, we will refer to the BroodMinder-W3 as

W3PA - BroodMinder-W3 kit, partially assembled & calibrated

W3UA - BroodMinder-W3 kit, unassembled & uncalibrated

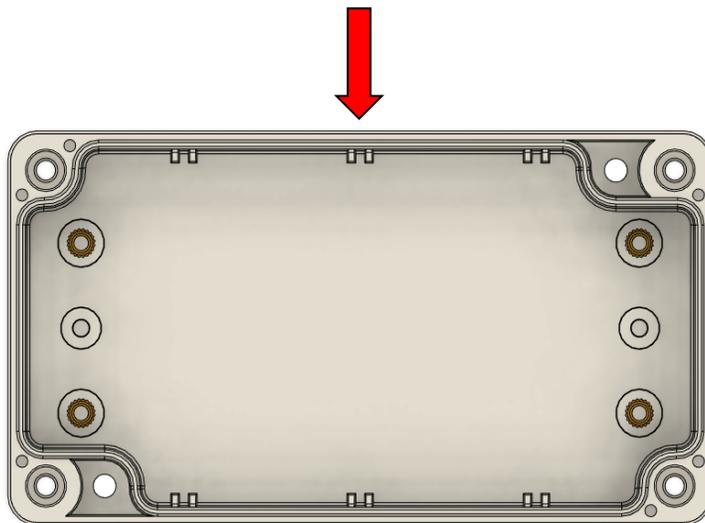
You should watch the video located on YouTube ([https://youtu.be/tl6Kw-PU\\_3A](https://youtu.be/tl6Kw-PU_3A)) as well as on the BroodMinder.com Blog (<https://broodminder.com/blogs/news>). It demonstrates assembly of the W3PA kit.

1. Electronics Assembly (W3UA)
  - 1.1 Drilling box holes
  - 1.2 Soldering
  - 1.3 Waterproofing
2. Frame Assembly (W3PA & W3UA)
  - 2.1 Cutting 2x4s.
  - 2.2 Assembling Frame
  - 2.3 Mounting Brackets, Box and Sensors
  - 2.4 Wire Routing
3. Calibration (W3UA)
4. Hardware List (W3PA & W3UA)

# 1 Electronics Assembly

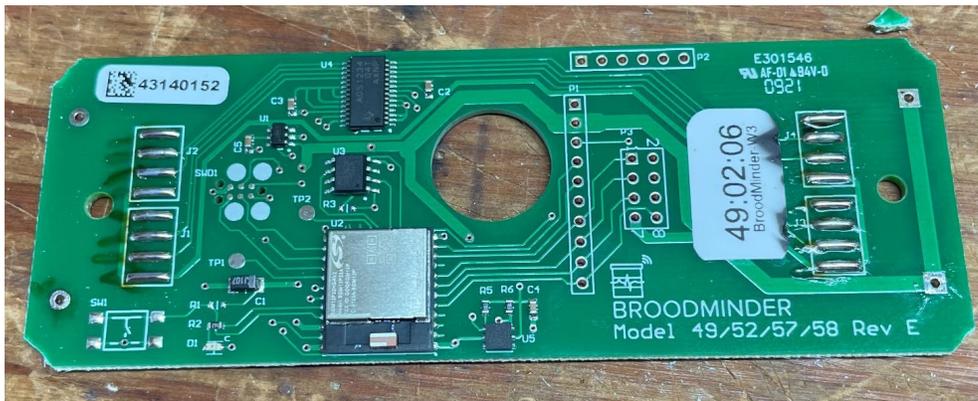
## 1.1 Drilling Wire Entry Hole (W3UA only)

To start assembling your DIY kit a wire pass thru must be made for the watertight box. The hole should be centrally located on the main piece of the box (not the lid). The hole should be about ½” wide to easily accommodate the wires. The finished hole should look similar to the image provided. The hole should be made clear of any jagged edges or raised areas with side cutters and or box cutters. Depending on your final configuration, drilling off-center to miss the center support is an option. Just make certain your sensors with short wires have enough length to reach the corners.



## 1.2 Soldering

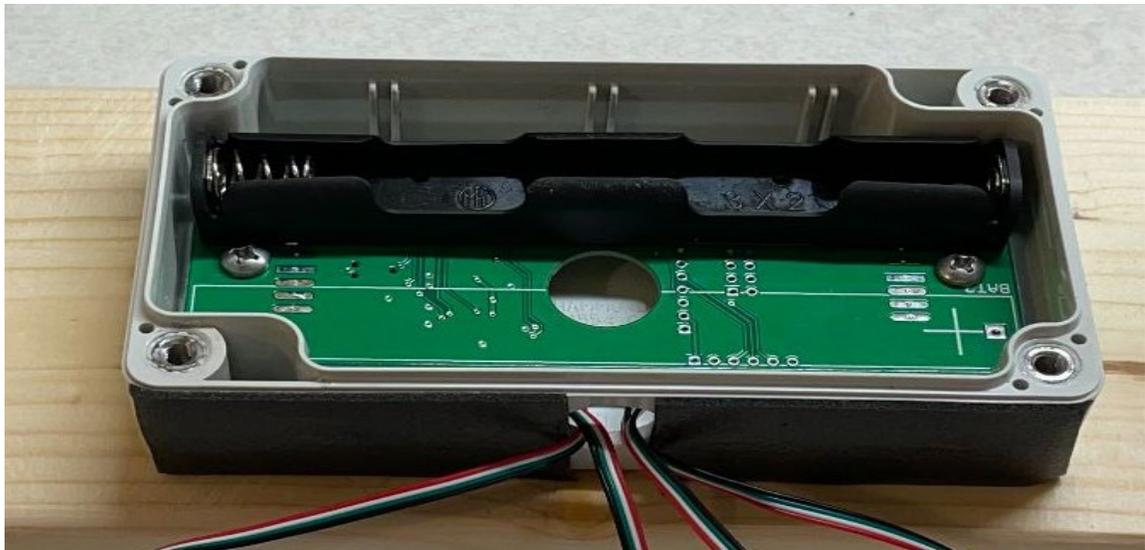
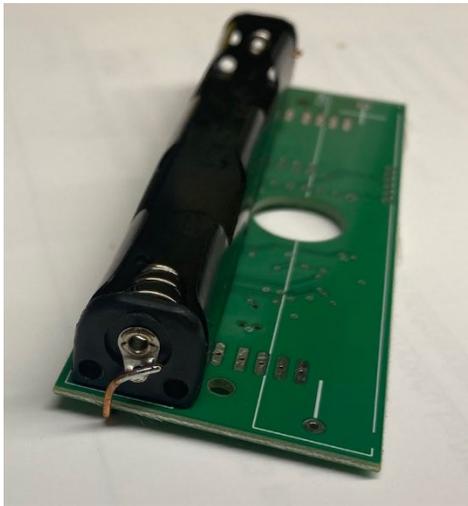
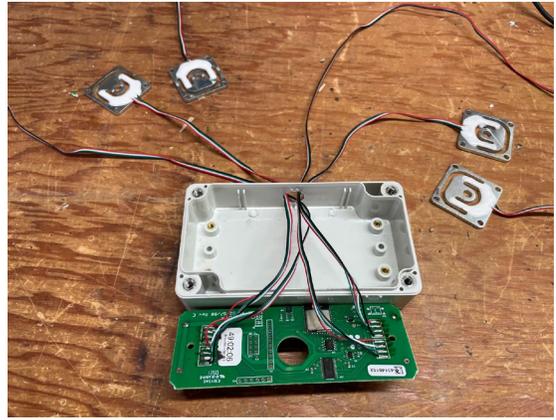
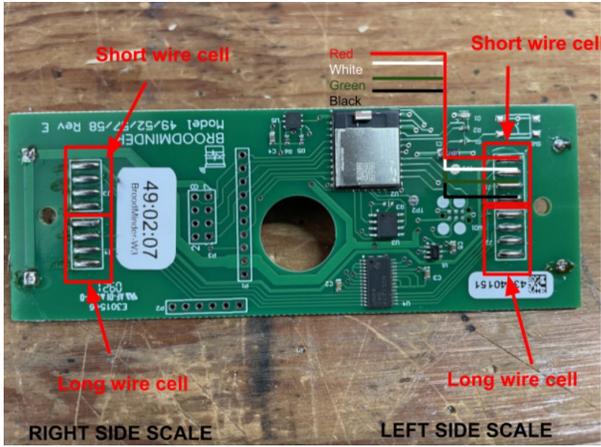
The boards provided with the DIY kit have already been programmed. You will need to add the load cells and battery holder, and you may need to trim the board slightly to fit the box. (this may not be needed, check fitment). To trim, use penny shears or a tile saw and cut each corner as shown. If you forget to do this after the battery holder is soldered, the corners opposite to the battery holder can still be trimmed and should still provide enough room for fitment.



Solder as shown in the diagram below. The battery leads will go on the back side of the board, matching up with the (+) and (-) leads labeled on the back in BAT spot 1. Once the battery holder is soldered, trim the excess leads.

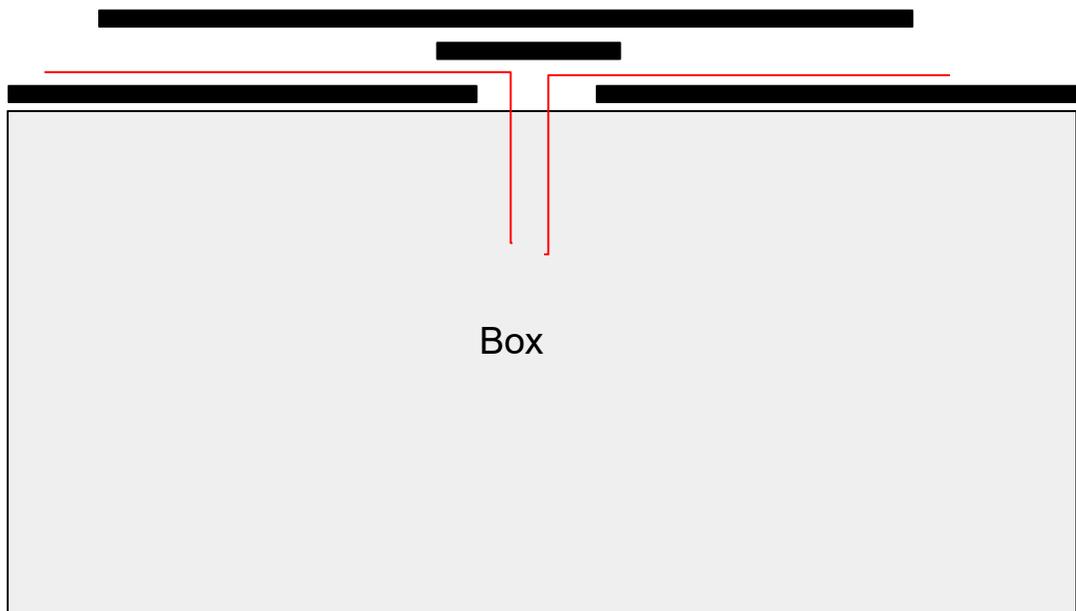
Tin the pads to prepare for soldering the load cells. Make sure you have routed the load cell wires through the water tight box prior to soldering or you will have to start over. Next, screw in the board face down using self-tapping screws in the two holes provided in the board and box. Close the box using the gasket and screws provided from the manufacturer. The curved side of the gasket should face into the groove of the lid.

NOTE: Due to sourcing problems in August 2021, some kits have been shipped with solder lug battery holders. Please use the included wire and double stick tape to secure the holders.



## 1.3 Waterproofing

The final step in preparing the box for assembly is to apply 3M tape to the outside of the waterproof box to cover the opening we have just made. This should be done following the diagram provided. In essence, the hole should be covered trident layer style, creating multiple seals to prevent water from getting in. The seals should be placed in order from bottom to top. We have found water (rain) ingress to be a common issue. Be certain to seal this well. RTV (Silicone glue) also works well and may be a better choice depending on how you route the wires.



# 2 Frame Assembly

## 2.1 Cutting 2x4s

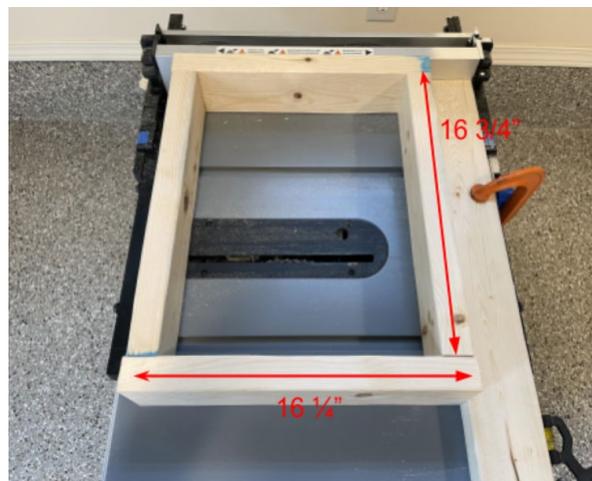
To begin frame assembly for a 10 frame hive, you will need two 16  $\frac{3}{4}$ " lengths of 2x4, and two 16  $\frac{1}{4}$ " lengths of 2x. (for 8 frame hives use 16  $\frac{3}{4}$ " & 13  $\frac{3}{4}$ ") These can be cut by using any means you have, just make sure your pieces are cut straight and double check to make sure your lengths are accurate. The lengths we list are for a typical USA Langstroth 10 frame hive. Adjust as you see fit.

Some folks like to use a table saw to cut grooves in the 2x4 to hold the wires. A single pass on the saw works well. Then you can seal it with RTV.

## 2.2 Assembling Frame

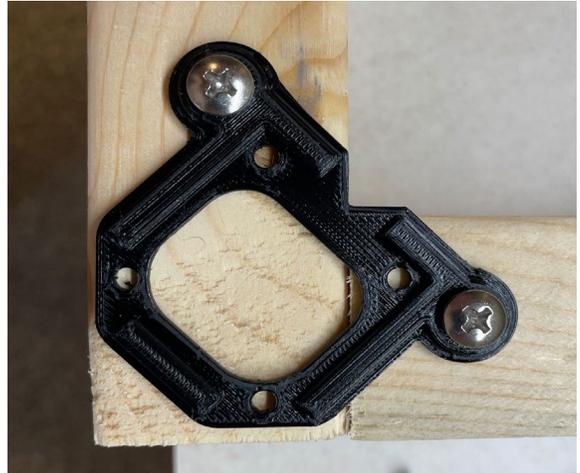
To assemble your frame, make sure you have a flat surface and ensure your pieces are square. Follow the picture to the right for the correct orientation of the boards.

Once you're sure everything is where it needs to be, use letter B screws and a #2 phillips to secure the boards together. Two screws in a vertical pattern should be used on each corner. If you have trouble keeping the frame flat, using weights or a clamp can help prevent the frame from shifting.

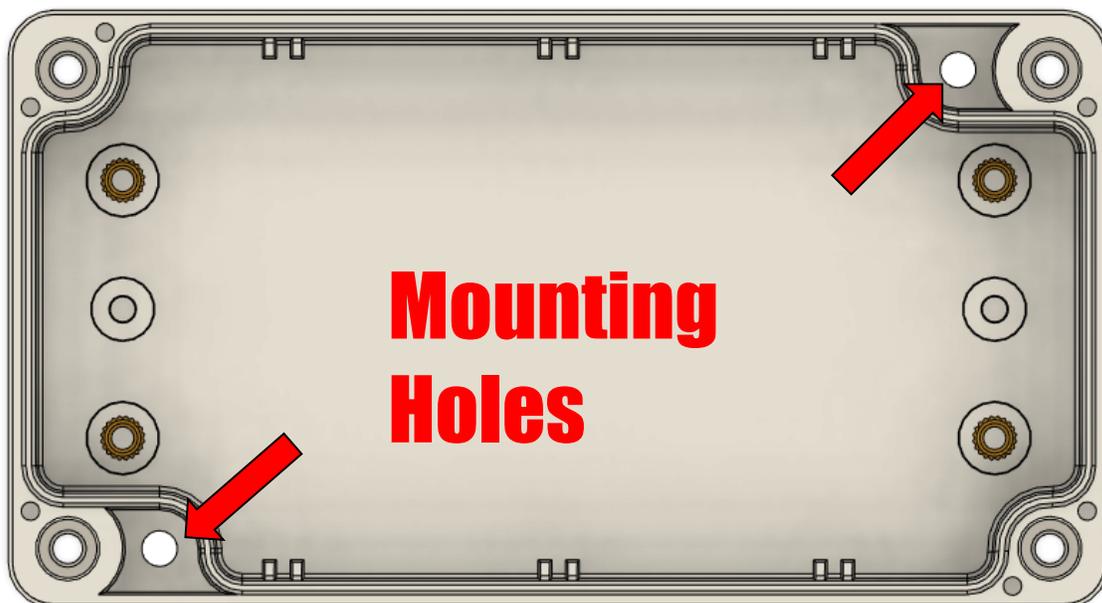


## 2.3 Mounting Brackets, Box, and Sensors

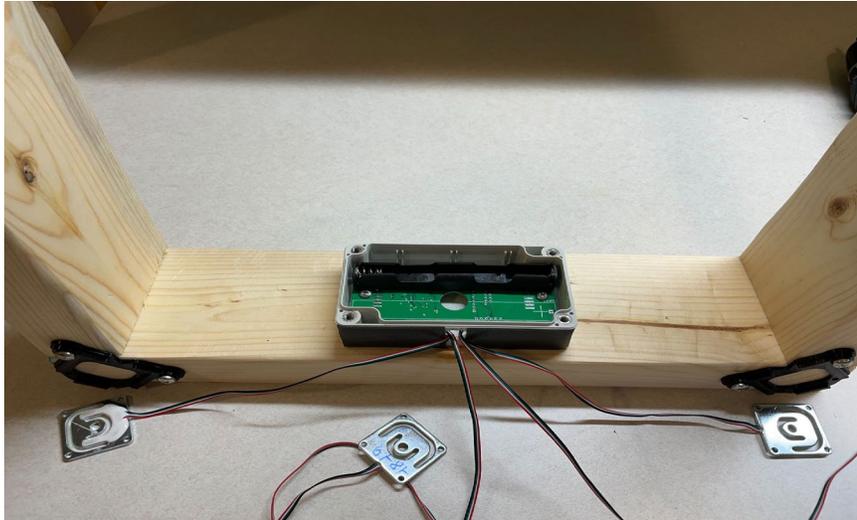
Next, mount the weight sensor brackets to the frame on each corner using C screws and a #2 Phillips screwdriver. Make sure the brackets form a 90° angle with the corner of the frame as shown.



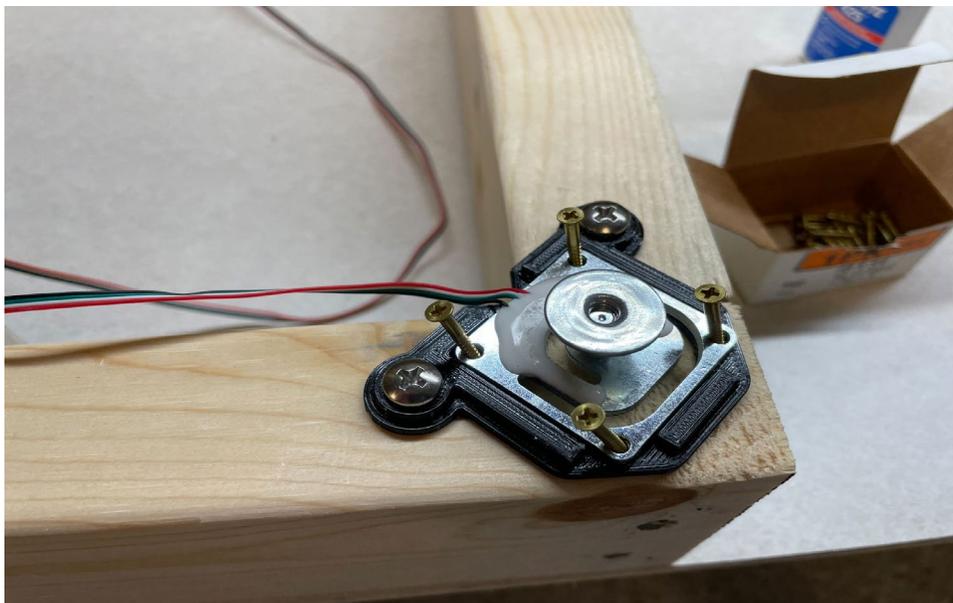
Next, mount the electronics box to the frame using D screws and a #2 Phillips screwdriver. Since these screws go through the box, you may need an extension to adequately reach.



Make sure the box is located center in the frame with the hole opening downwards. There should be a slight gap between the edge of the frame and the box as shown.



Next, mount the sensors using E screws. The sensors should go to the same side on the frame as the side they come out of the box. With the long sensors going to the furthest end, and the short ones closest to the box.



## 2.4 Wire Routing

Using the provided raceway, you will make a path for your wires to follow along the bottom edge of the frame as shown below.

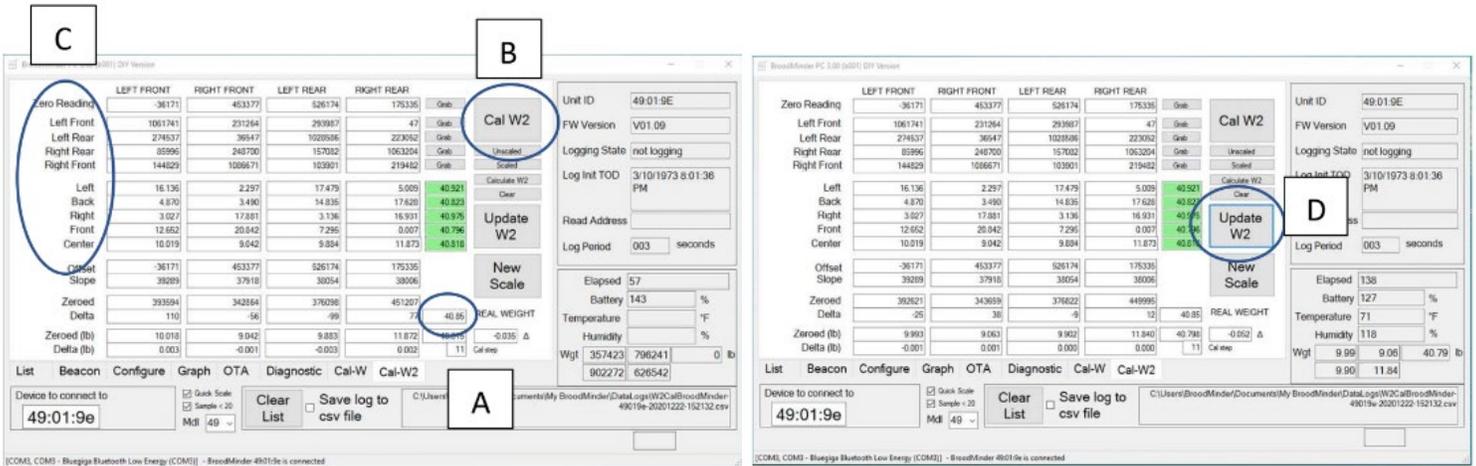


It's easiest to first prefold the race way. Place the raceway with the opening face down to prevent water from seeping in. Trimming of the raceway will be required for best fitment. There should be a *small* gap in between the raceway and the frame, just enough to route the wire without breaking it. When you have routed the raceway, close the furthest two portions (from the end furthest from the box). You will later pull tight the slack in the wire and close it off in the open portions of the raceway.



Following the picture above, route both wires through the raceway for the short load cell connection, following the same process you used for the other pieces, however this time, the raceway can be closed off immediately. After this is done, place the slack from the long load cell wire into the raceway along the length of the frame and close it off. Congrats, if you used an already calibrated board, you're finished! If not, move on to calibration.

# 3 Calibration (W3UA Only)



See the BroodMinder user guide for more complete instructions on calibration.

A) Enter the true weight that you will use for calibration. We use 40.85 pounds, you probably want something between 30 and 80 pounds. The number is decimal pounds, not pounds and ounces. (16 ounces/pound)

B) Remove all the weight from the load cells and press Cal W2. The first thing it will do is zero the system. You will see the raw ADC values show up in the zeroed row. After this step, you will see approximate weights shown in (lb) rows.

C) Follow the blue highlighted information in the first column as indicated by square "C". Place your known weight on the scale in this position. The program automatically advances when it sees a weight > 5 pounds on the appropriate sensor. After The 4 corners are complete, the program calculates the slope for each sensor and updates the Slope line. The next 5 positions are used to verify the scale. If the value is within 0.5 the box lights up Green.

D) After you are satisfied with the calibration, press "Update W2" and it will write the values to the circuit board. You know it is complete when the Weight (Wgt) values switch back to pounds

# 4 Hardware

A



B



C



D



E



Item Description	Qty
Circuit Card, BRM-49	1
BC12AAPC-ND Battery Holder AAx2	1
BATTERY, AA, LITHIUM	2
Hammond 1554CGY Box	1
GML670-50KG, WITH 750MM CABLE	2
GML670-50KG, WITH STANDARD CABLE	2
JW Manufacturing Custom Support	4
Round Base Weld Nuts	4
Press Fit Stud, 10-32 Thread, 1/2" Long	4
RACEWAY ON A ROLL	3
3M 4726 Black Single Sided Foam Tape - 1 in Width x 36 yd Length - 1/16 in Thick - 06479	12
(Picture A) #6 Self Tapping Screw x 1/4"	2
(Picture B) #8x3" Drywall Screw (W3PA & W3UA)	8
(Picture C) #3 3/4 Phil Brass Flat Wood Screw	16
(Picture D) 10-12x3/4" Phil Pan FT STS	8
(Picture E) Phillips Flat Head # 7 x 5/8"	2
8D Smooth Shank Framing Nails (W3FA only)	0
16 Inch Pine 2x4 (Customer Supplied)	4