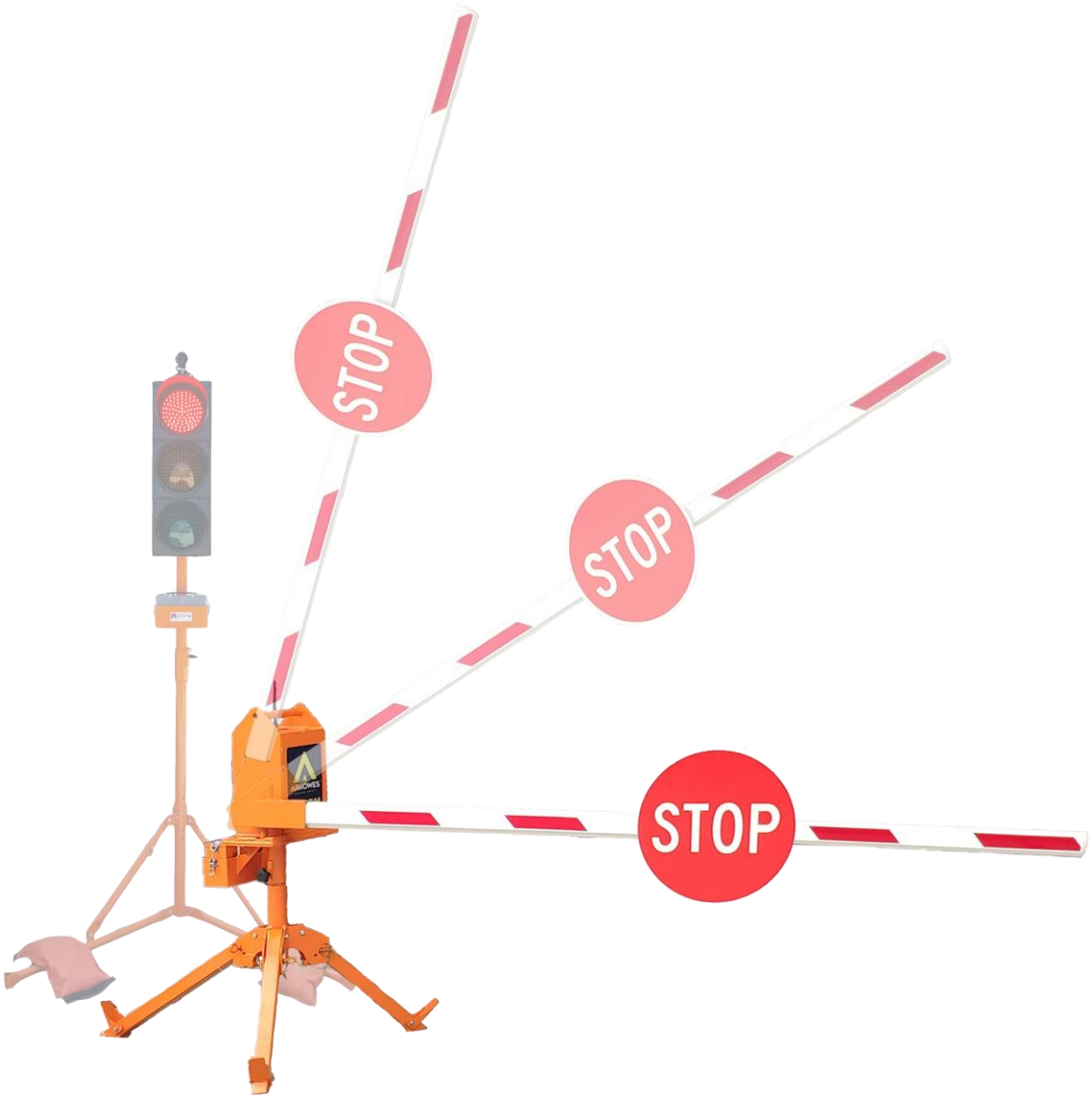
# eBOOM™




## Operation & Service Manual

Version: 1.0

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**Manufactured by:**

**ARROWES Roading Safety Pty. Ltd.**

**17 Bailey Court**
**Brendale Queensland 4500**

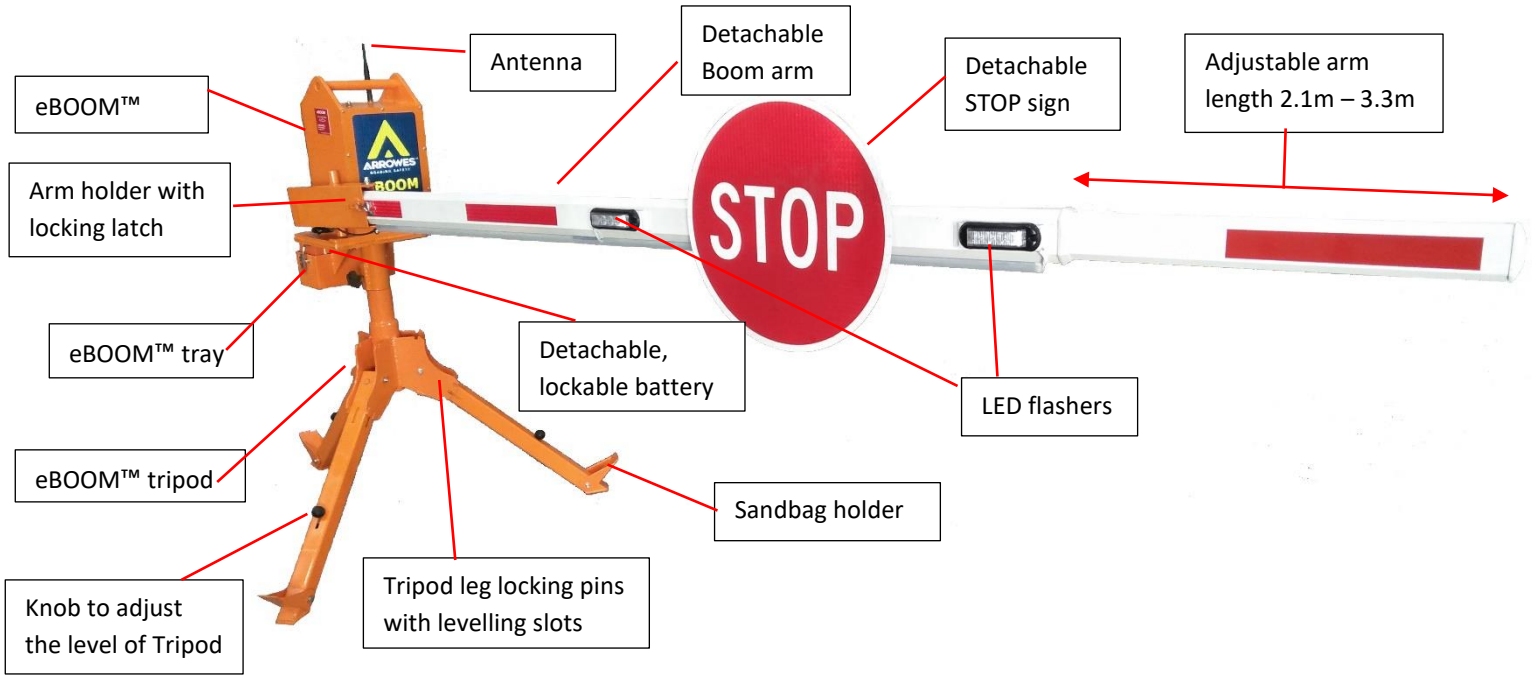
**PH: (07) 3881 3302**
**FAX: (07) 3881 3324**

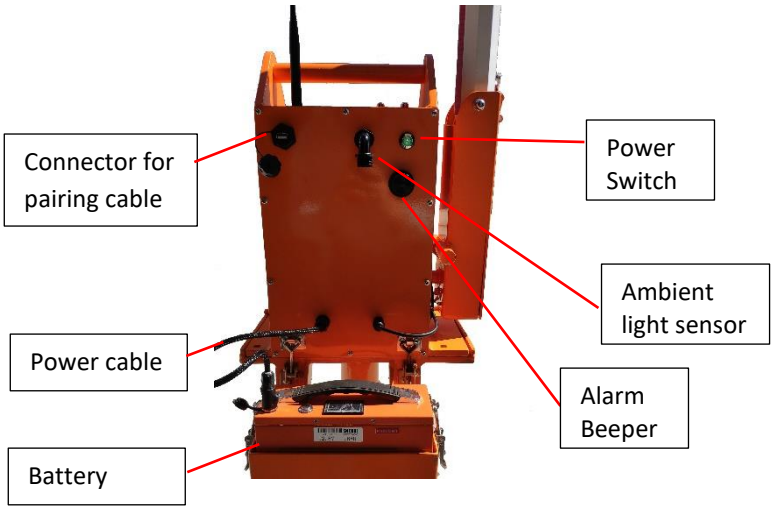
# Contents

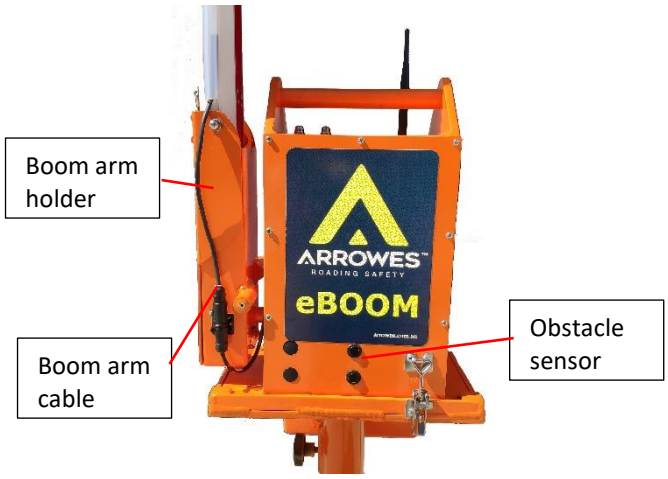
# eBOOM™ System Components Diagram

The eBOOM™ structure consist of 5 main assembly parts:

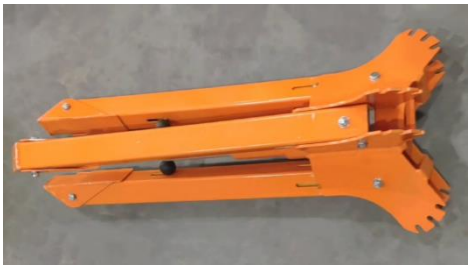
1. The eBOOM™ tripod which supports the whole structure
2. The eBOOM™ tray which inserts into the tripod, holds the battery and provides a base for the eBOOM™ body
3. The eBOOM™ body which holds the boom arm and raises it to vertical position, or lowers it to horizontal position, according to remote controlled commands.
4. The Arrowes battery sits on the eBOOM™ try battery compartment and powers the eBOOM™ body.
5. The boom arm which inserts into the eBOOM™ body arm holder.



# Equipment Parts



3. Tripod

4. eBOOM™ Tray

1. eBOOM™ Body


2. eBOOM™ arm with STOP sign

5. Battery Pack

## Accessories


6. Hand Remote Control (HRC)

7. HRC Charging and Pairing Cable

9. Battery Charging cable

8. Dual port Wall charger

10. Carry Case

**Package Contents**

| Sl No | Item Description | Quantity |
|---|---|---|
| 1 | eBOOM™ body | 2 |
| 2 | eBOOM™ arm + STOP sign | 2 |
| 3 | Tripod | 2 |
| 4 | eBOOM™ Tray | 2 |
| 5 | Battery Pack | 2 |
| 6 | Hand Remote Control (HRC) | 2 |
| 7 | Charging and Pairing cable | 2 |
| 8 | Dual port wall charger | 1 |
| 9 | Battery charging cable | 2 |
| 10 | Carry case | 1 |
| 11 | Operation and Service manual | 1 |

# Safety Considerations

The eBOOM™ has been developed as a response to a need for safer working conditions for traffic controllers and roadwokers working in unpredictable live traffic sites. The eBOOM™ can be used on its own (must add the STOP sign) or as an integrated extension of the eSTOP (the STOP sign may not be required in certain jurisdictions) when a physical barrier is required. It is designed to remove traffic controllers from the hazard zones enabling traffic controllers to manage traffic movement within the worksite from a safe distance. In order to reduce the risk to road workers, traffic controllers and road users, the unit must always be operated effectively and consistently by authorized and trained operators.

The eBOOM™ must be operated in accordance with all safety, operation and service instructions contained in the manufacturer's operation and service manual. It is recommended that all operators read and understand the manual before operating the eBOOM™. Operators must understand and comply with the manufacturer's instructions as printed in the manual accompanying each eBOOM™ in conjunction with their respective Company's Safe Work Method Statement.

The eBOOM™ should only be operated by a designated, competent operator within the scope of on-site operation parameters (such as the Company's Safe Work Method Statement).

The eBOOM™ shall be installed in a suitable location clear of obstructions. An appropriate risk assessment shall be conducted to ensure the safe and suitable use of the eBOOM™. Examples of factors to consider when assessing suitable location are safe distance from the traffic path, so that wide loads or turning vehicles will not impact the unit, length of worksite, volume of traffic and topography. The eBOOM™ should be installed on a stable surface.

The eBOOM™ system unit including the eBOOM™ body, arm, tripod and battery box shall be kept clean. The equipment shall be handled with care, the care you would extend to any electronic systems, such as your radio.

The eBOOM™ batteries shall be fully charged before operating the unit and must be used according to the safety information.

The eBOOM™ HRC and control procedures are built on the same platform as the eSTOP which has been designed in accordance with Transport for NSW specification TSI-SP-081D, TDMR MRTS 264, Arrowes ISO quality system and is ACMA approved. The application of the eBOOM™ shall be in accordance with these guidelines/standards as well as the respective company's worksite risk assessment and Safe Work Method Statements.

Any modifications made to the eBOOM™ (unless by or approved by Arrowes) could compromise the function and integrity of the eBOOM™ and therefore the safe application of the units and voids the warranty of the eBOOM™.

# eBOOM™ System Specifications

**eBOOM™ Unit**

| | |
|---|---|
| Obstacle detection range: | +/- 25°, 350 cm |
| IP rating: | IP45 |
| Voltage: | 12v |
| Operating amperage: | 1.7 A |
| Battery (rechargeable) | 30 A/H Lithium Iron phosphate |
| Operating Hours (80% DoD) | ~18 Hours |
| Charging time: | 5-6 Hours |
| Operating Temperature Range: | -20 to 75° Celsius |

**Hand Remote Controller (HRC)**

| | |
|---|---|
| RF operating frequency: | 2.4GHz |
| Configuration: | Single unit or dual unit control |
| IP rating: | IP65 |
| Battery (rechargeable): | 3 A/H Lithium Polymer |
| Operating Hours (50% DoD) | ~15 Hours |
| Charging time: | 4-6 Hours |
| Operating Current: (Transmitting) | 120mA |
| Sleeping Current: | 1mA |
| Operating Temperature Range: | -20 to 85° Celsius |

**Overall Device**

| | |
|---|---|
| Total mass per device (incl. batt, eBOOM™ arm): | 40 kg (allocated to full assembly) |
| eBOOM™ body weight (max lifting weight): | 21 kg |
| eBOOM™ tray weight: | 3.6 kg |
| eBOOM™ arm weight: | 3.5 kg |
| eBOOM™ Tripod weight: | 8.2 kg |
| eBOOM™ Battery weight: | 3.5 kg |
| Tripod leg footprint radius: | 70 cm |
| Wind loading with 10 kg sandbag/leg: | 100 km/h |

**Dimensions**

| | |
|---|---|
| Maximum working height: | 425 cm |
| Minimum working height: | 131 cm |
| Dimensions when stored: | 211 cm x 90 cm x 22 cm |
| Base width, fully extended: | 140 cm diameter |
| Arm length fully extended: | 331 cm |
| Arm length fully retracted: | 211 cm |
| Arm clearance above the ground (flat surface): | 91 cm |

## Battery Specifications

### eBOOM™ *Unit*

| | |
|---|---|
| Battery Type: | LiFePO4 |
| Voltage: | 12V |
| Full Capacity: | 30 A/H |
| Max eBOOM™ power consumption: | 4.6 A |
| Depth of Discharge: | 80% |
| Operation time: | ~18 hours at 80% DoD |
| Low battery warning: | ~17 hours of operation |
| Life cycle: | >800 at 80% DoD |
| IP Rating: | IP54 |

Note: Battery cuts off after ~18 hours at 80% DoD of full capacity.
Low battery warning begins 1 hour before battery cut-off time.

**Charger**

| | |
|---|---|
| Input: | AC100-240V<br>50/60Hz Max. 1.6A |
| Output: | DC 14.4V Max. 4.0A |
| Charge rate: | ~3A |
| Battery Charging Time: | 5-6 hours from low battery |

### *Hand Remote Controller (HRC)*

| | |
|---|---|
| Battery Type: | LiPo |
| Voltage: | 3.7V |
| Full Capacity: | 3 A/H |
| HRC power consumption: | 100mA |
| Depth of Discharge: | 50% |
| Operation time: | ~15 hours at 50% DoD |
| Low battery warning: | ~14 hours of operation |
| Life cycle: | >800 at 50% DoD |

Note: Battery cuts off after ~15 hours at 50% DoD of full capacity.
Low battery warning begins 1 hour before battery cut-off time.

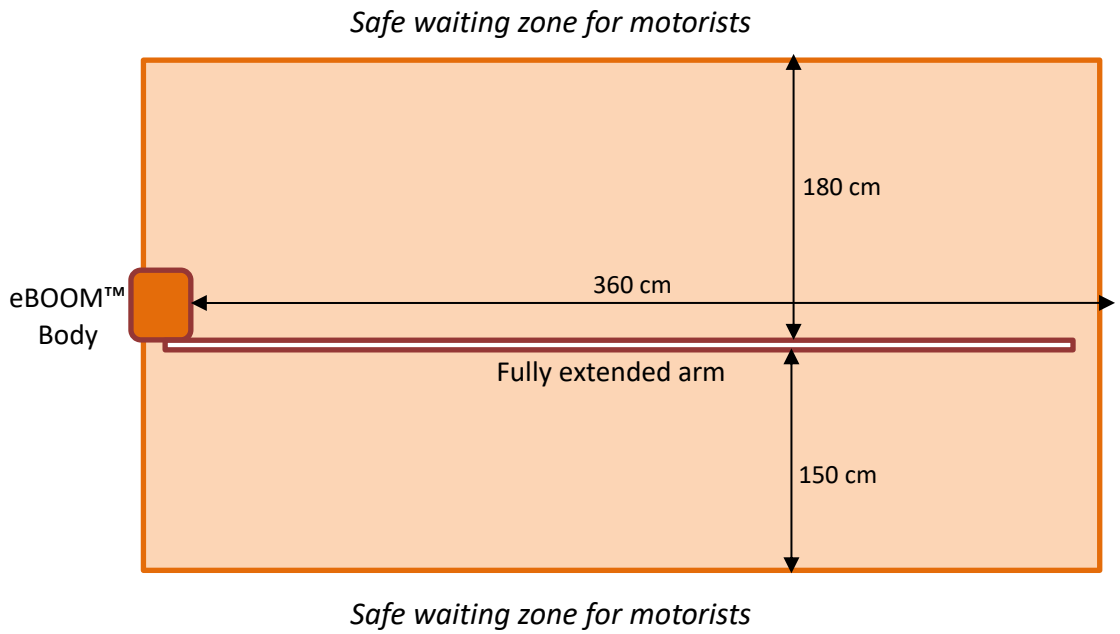
**Charger**

| | |
|---|---|
| Input: | AC110-240V<br>50/60Hz Max. 0.35A |
| Output: | DC 5V Max. 2.0A |
| Charge rate: | ~0.6A |
| Battery Charging Time: | 4-6 hours from low battery |

# Obstacle sensor specifications

The eBOOM™ is fitted with obstacle detection system which detects any obstacle which may prevent the eBOOM™ arm from getting into horizontal position. This feature has been added to prevents injury or damage to any person or vehicle who/which may be obstructing the movement of eBOOM™ arm.

The obstacle sensor can detect obstacles within the range as specified below.




*Important: The area enclosed by the orange box as shown in the image above must be free of any obstacles.*

# Labels

Hand Remote control identification number is located at the back as shown here


eBOOM™ identification number is located at the side of the eBOOM™ body facing the arm fitment as shown here

# Key Features

The eBOOM™ is the first electronic boom barrier which weights 21kg, ensuring safe operations and complies with OHS for lifting by an individual. Designed to remove the traffic controllers from the hazard zone and to obstruct site entry, the eBOOM™ can be used as a standalone or an integrated extension to eSTOP™. The key features of the eBOOM™ system are:

- Traffic controllers operate from a safe distance (up to 400m with option to increase distance).
- Can be implemented anywhere a stop/slow baton would normally be used.
- Can be operated with one controller (where there is clear line of sight) whilst the other takes a break or is on rotation as the HRC can control 2 eBOOM™ units.
- Environmentally robust, light weight, five-piece assembly, adjustable tripod legs for use at non flat surfaces.
- IP65 rated compact Hand Remote Control (HRC).
- Hand Remote Control mimics eBOOM™ states in real time.
- Wind load up to 100km/hr when used as per manufacturer's guidance.

# Safety Features

- When there is an obstacle, the eBOOM™ arm stops lowering, the LED flashers and sound alert continue its warning.
- Warning when the eBOOM™ unit gets tilted by more than $20^0$.
- The LED flashers flashes to alert drivers when the BOOM™ is about to be deployed and continues flashing lowered. The LED flashers are visible from 100m.
- The LED flashers are auto dimmed according to the surrounding light conditions (by reducing brightness when it is dark ensuring the brightness does not become blinding).
- During operation, should communication failure occur between the HRC and the eBOOM™, the eBOOM™ arm will move to horizontal position after providing the 4 seconds warning.
- The eBOOM™ arm automatically dislodge on impact. This prevents the eBOOM™ from toppling over in the event of any motorist crashing into the eBOOM™ arm. The images below show how the arm gets dislodged. The eBOOM™ arm can be pushed back to its original position after the crash.


eBOOM™ arm during normal operation.

eBOOM™ arm dislodged due to motorist crashing into the arm.

# Unit Assembly/On-site Setup

Pull the pin upwards to release the leg

Extend the legs

Pull the pin and align to the suitable notch (usually the middle notch).

Adjust each leg so that the tripod stands stable on the ground.

Open the sandbag holder for each leg. Place sandbags for each leg as required to suit windload.

Insert the eBOOM™ tray to the centre column.

Secure the tray using locking screw.

Slide the eBOOM™ body onto the tray.


Maintain the same orientation as shown. The arrow sign indicates the direction of the boom arm movement in horizontal position.


Lock latches to secure the eBOOM™ body.

Lock latches to secure the eBOOM™ body.

Insert Battery pack into the Battery holder.

Lock latches on both sides to secure the battery in place.

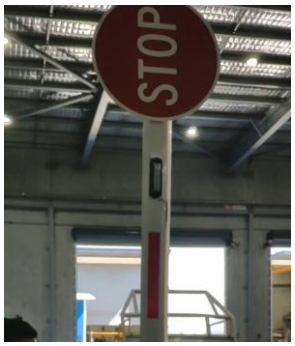
Connect the Power cable. Connector latches once positioned in place.


Attach the STOP sign to the eBOOM™ arm. Note this may not be required in certain States and applications.

Secure the STOP sign using the lockable latches.


Extend the eBOOM™ arm to required length. Most instances this is 3m.

Insert the eBOOM™ arm into the eBOOM™ arm holder.

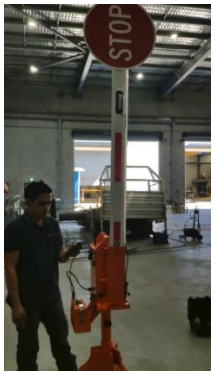



Ensure the orientation of the arm is such that the STOP sign faces the incoming motorists

Lock latches to secure the arm

Attach the eBOOM™ arm cable to the eBOOM™ as shown.

Switch ON the eBOOM™ unit.




*IMPORTANT: ensure eBOOM™ is stable and is weighted down with sandbags prior to operation. Minimal One sand bag per tripod leg is required.*

*Ensure the arm is in vertical position (or removed from eBOOM™ body) when moving the eBOOM™ body or the whole setup.*

# Operational Procedures

***When the units have been assembled.***

## eBOOM™ Unit

1. To switch ON the eBOOM™ unit, push the small green power switch behind the eBOOM™ unit as shown in the image. The green LED light will illuminate when powered ON. The eBOOM™ unit will be controlled by its master – the Handheld Remote Controller (HRC) once the HRC is paired.

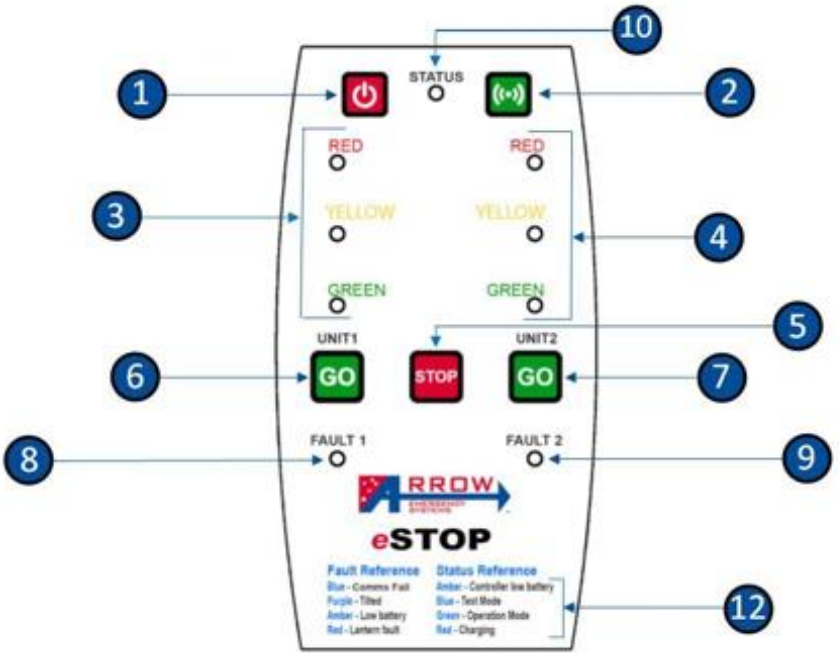
   **Modes** – The unit runs in two modes, the 'Test Mode' and 'Operation Mode'.

   **Test Mode** – when the unit first power ON, by default is in Test Mode. In this mode, the HRC can be used to perform boom test. See HRC procedures for LED test function, the LED flashers on the boom will flash two times with Alarm Beeper beeping once.

   **Operation Mode** – The unit can be activated (using HRC) to 'Operation Mode'. See HRC procedures for operation functions. When the unit first activates, the LED flashers on the boom will flash for 4 seconds with Alarm Beeper beeping for 4 seconds. Then the boom moves into horizontal position with the LED flashers flashing on the boom, and the Alarm Beeper stops beeping. In the horizontal position the LED flashers remain flashing.

2. The eBOOM™ unit is also fitted with a "Cut-Off Switch". This is the Power Switch, located at the back of the eBOOM™ unit. This switch will turn Off the eBOOM™ unit instantaneously as required. The unit must also be Powered Off when not in use.

# Hand Remote Controller – HRC




**LED indicators** – There are 3 types of LED indicators – Boom, Status, and Fault.

- **Boom indicators** 3 4 reflects the boom position/status of the paired eBOOM™ units.
  - **Red** – Boom arm is in Horizontal position
  - **Yellow/Amber** – Boom is in the waiting mode to move from vertical position to Horizontal position.
  - **Green** – Boom is in Vertical position
- **Status indicator** 10 represents the states and faults of the overall system and indicates the following colours:
  - **Red** – when the HRC is off, Red indicates the HRC is charging. When the HRC is on, Red indicates invalid press or fail pairing.
  - **Blue** – once the HRC is powered on, the status indicator is Blue, which represents Test Mode.
  - **Green –** when the HRC is off, Green indicates the HRC is fully charged and stopped charging. When the HRC is on, Green indicates valid press or the system is in Operational Mode.
  - **Yellow/Amber –** the Status will flash Yellow/Amber when the HRC battery is low.
  - **Blank/no colour –** the HRC is powered off, if Pressing the buttons does not sound a beep then the HRC is faulty or battery is completely dead
- **Fault indicators** 8 9 represents the states and faults of the respected paired unit.
  - **Blue –** HRC is paired to an eBOOM™ unit but communication fail (no connection, may need to re-pair).
  - **Purple** – The paired eBOOM™ unit is tilted from its starting position after Activation. Or the Boom arm is struck between vertical and horizontal position.
  - **Green –** The paired eBOOM™ is communicating and operating normal.
  - **Yellow/Amber –** The paired eBOOM™ battery is low.
  - **Red –** The Paired eBOOM™ unit has a fault in one of the LED flashers.

## Modes of Operations – The system runs in 2 modes, Test Mode and Operation Mode

- **Test Mode** (Status LED blue) - When the HRC first power up it is in Test Mode, during this mode you can pair/un-pair any eBOOM™ units (refer to pairing section). Once it is paired to an eBOOM unit (and Fault light is green), you can do a boom test and check the battery of the eBOOM™ unit (refer eBOOM™ Battery section).
- **Operation Mode** (Status LED green) - Once the HRC is paired and the Fault LED is green, the system can be activated into Operation Mode. During this Mode, the operations of a Typical Traffic Signal can be controlled, where the eBOOM™ can be controlled to Horizontal Position (STOP) or vertical position (GO).

## Operational Steps

1. **Power On** - Press and hold *Power Button* 1 for 5 seconds to power on Handheld Remote Control (HRC).
2. **Fault indicators** - When power is on *Fault Indicator* 8 9 will show different colours according to the fault hierarchy listed under *Fault Reference* 12 when more than one fault occurs, the fault with lower hierarchy will not be displayed until higher level fault(s) have been cleared.
3. **Test** - When first powered on, the HRC will starts in *Test Mode* and the *Status Indicator* 10 will show blue. During *Test Mode* the HRC can be used to pair to a specific eBOOM™ unit (Refer to Pairing section). If the HRC is paired to an eBOOM™ unit, the *Fault Indicator* 8 9 will show Blue and change to green when Synced to the paired eBOOM™ unit (allow up to 1 minute for the Fault light to turn green and get synced). Once synced the HRC can be used to control the eBOOM™ unit. Pressing Buttons 6 or 7 allows eBOOM™ to be tested (The flashing of the LED flashers on the boom along with a beeping sound ensures the Boom is working).
4. **Activation** - When ready to operate the eBOOM™, hold down *Activation Button* 2 for 5 seconds to activate the synced eBOOM™ units into *Operation Mode*, the *Status Indicator* 10 will then show Green. The eBOOM™ will only operate when *Fault Indicator* is green.
5. **Start-up** - Upon switching from *Test Mode* to *Operation Mode* the eBOOM™ lantern will drop to horizontal position after 4 seconds. The Hand Control will lock for 5 seconds and all buttons will not work during this time. After 5 seconds the eBOOM™ unit is in *Operation Mode.*
6. **Control Traffic Signals** - Use Buttons 5 6 or 7 to operate the eBOOM™ for traffic control. Use button 6 7 to switch one or the other boom to vertical position. (Note: in order to set a boom to vertical position, one or both booms must be in horizontal position first). Use button 5 to deploy boom (change all booms to horizontal position). (Note: the LED flashers on the boom flashes along with beeping sound for 4 seconds before the transition from undeployed (vertical position) to deployed (horizontal position). After the boom is deployed (in horizontal position), the beeping sound stops, and the flashing of the LED flashers continue. The LED indicators on the HRC reflect the eBOOM™ current status).
7. **De-activation -** In *Operation Mode*, holding *Activation Button* 2 for 5 seconds returns the eBOOM™ units to *Test Mode*.
8. **Power off** - In all modes, hold *Power Button* 1 for 5 seconds to commence power off. During *Operation Mode* the HRC will not power off if the paired units lost sync (comms fail) to an eBOOM™ unit.
9. Switch off eBOOM™ power and disconnect battery cable before packing up.

*Note: While in "off" mode, pressing "STOP" on the HRC will indicate battery life remaining. In the event of forced power off is required on the HRC, pressing button "1" and "2" at the same time forces the HRC to soft reset then powers off.*

# Pairing the Handheld Remote Controller (HRC) to eBOOM™ units

The HRC can be paired to any eBOOM™ units. Once an eBOOM™ unit is paired to an HRC it is stored in memory, they will be automatically synced when powered up and ready for operation. By default, an HRC is paired to 1 eBOOM™ unit only. The HRC does not need to be paired at each use. This is only required when the HRC is required to be paired to a different eBOOM™ unit, when pairing 2 eBOOM™ units to 1 HRC, or when the eBOOM™ has been mixed up with another HRC.

It is recommended to begin pairing by un-pairing all eBOOM™ units from the HRC, this will reduce confusion about which eBOOM™ unit if already paired previously. Follow the steps below to begin the process.

***Power on the HRC and the eBOOM™ units, these must be in test mode for pairing (status LED 10 on HRC is blue)***

## Un-pairing

Un-pairing is required if the HRC is already paired to an unknown eBOOM™ and unable to sync. To do this the HRC ***must be in test mode*** (status light is blue), the USB port ***must be disconnected*** from the eBOOM™ unit. Press and hold Unit1 "Go" button 6 for 5 seconds until a beep sounds. The HRC will flash a red light on the ***Status Indicator,*** then ***Fault1 indicator*** will be blank, this indicates no eBOOM™ unit is paired to unit1 on HRC.

Repeat this un-pairing process (using Unit2 "Go" button) to un-paired Unit2 (left side of the HRC) if a second eBOOM™ is paired to Unit2 side. After un-pairing, *Fault1 and Fault2 indicator will be blank, where no LED is on.*

## Pairing HRC Unit1 (Left side of the HRC)

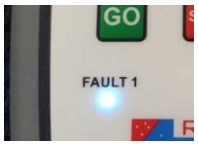
1. When in test mode, attach the USB cable from the top of the HRC unit to the USB connector on the back of the eBOOM™ unit as shown in the image.
2. Press and hold Unit1 ***GO button*** 6 for at least 4 seconds until a beep sounds. This single beep indicates pairing has initiated and the button can be released.
   When the pairing process is complete the HRC will sound either a fast double beep as well as a green flashing light on the ***Status Indicator*** or a long single beep with a red light on the ***Status Indicator***.
   - A fast double beep and green light indicates successful pairing. ***Fault1 indicator*** will go blue once it's paired and changed to green when synced (wireless communication between HRC and the eBOOM™ is established) to the paired unit (*Note: allow 1 minute for the fault LED to change from blue to green*).
   - A long, slow beep and red light on ***Status Indicator*** will indicate failed pairing.

   *The following issues may cause failed pairing:*
   1. *USB cable is not attached properly*
   2. *Unit is already paired on Unit2 (right side of the remote).*
   3. *The eBOOM™ unit has no power/is not turned on (push green button at back of eBOOM™).*
   4. *The HRC and eBOOM™ units are not in test mode*

Once paired and synced (***Fault1 indicator*** is Green, allow up to 60 seconds for this to turn Green), unplug the USB cable, follow HRC Operational Procedures to operate the eBOOM™ units.

**Pairing an eSTOP lantern to work in conjunction with the eBOOM**

An eSTOP lantern can be paired to Unit1 (same side on the HRC), this is done by plugging the HRC to the lantern and repeat the same process above, using the same side GO Button. When an eBOOM™ and an eSTOP is paired to Unit1 of the HRC, the eBOOM™ and eSTOP are controlled and behave simultaneously. Fault indicators will indicate Cyan colour instead of green, indicating 2 units are paired. The same process can be done with HRC Unit2 GO button.



*Indicates in Cyan colour when 2 unit is paired to one control button.*

## Pairing HRC Unit2 (right side of the HRC)

1. Repeat the pairing process by pressing Unit2 GO button 7 in ***Test Mode***. Unit1 on the HRC must be paired to an eBOOM™ before Unit2 can be paired.

Note: This is pairing a second eBOOM™ to right side of the same HRC, this pairing setup allows 2 eBOOM™ to be controlled such that **only 1 eBOOM™ can be in vertical position at a time**, if pairing as single unit operations, only paired to Unit1 on each HRC with each eBOOM™. Unit2 on HRC is not used.

# Batteries - Care, Safe Handling and Charging

Running the units at low voltage for prolonged periods may degrade the battery's integrity and will affect the reliability of the system.

**DO** only use the battery supplied. If replacement batteries are required, please contact Arrowes for the correct battery.

**DO** store batteries in their original packing, in a dry place and at normal room temperature. Do charge battery to 80+% if storing for long term. DO keep all batteries in a safe place away from Children and pets.

## A. Charging the Batteries

**1. The HRC Battery**

The HRC can be charged from any USB device including the one attached to the eBOOM™ body (the screw cap and USB connection are located at the back of the eBOOM™).
When the HRC is switched off and the USB is attached to a charging device, a red status LED indicates that the battery is being charged. When the LED is green, the battery is fully charged. A flashing red LED indicates that there is a battery fault and the battery should be replaced.
(*Note: the battery charge indicator is only active when the remote control is switched off*)

**2. The eBOOM™ Battery**

The eBOOM™ is fitted with a light weight LifePo4 battery. To charge, remove the connector at the top box of the battery and connect to the battery charger that is supplied by Arrowes.
The battery is charged through 240AC outlet charger, an indication LED on the charger shows the status of charging.

-Red indicates charging
-Green indicates charging complete

*Note: using any other non LiFePo4 charger could damage the battery and degrade the life expectancy of the battery. If the battery/charger gives an odour, generates heat, becomes discoloured or deformed, or in any way appears abnormal during use, immediate stop using the battery and chargers, then contact your supplier.*

## B. Battery Status

**1. The HRC**

When the HRC is switched off and not charging, pressing button 5 will provide battery life status. Each of the LED indicator light (3 4) red, yellow and green represents 1/3 of the battery life (similar to a battery bar), such that red+yellow+green indicates fully charged, yellow+green indicates 2/3 and green 1/3 of battery life remaining.

*(Note: the battery charge indicator is only active when the HRC is switched off)*

**2. The eBOOM™**

The status of the eBOOM™ unit battery can be determined in 2 ways.

a. Remotely using HRC

When the system is in **test mode** and the eBOOM™ unit is sync to the HRC, press the stop button 5, the connected eBOOM™ battery status will be indicated by the LED indicators (3 4) red, yellow and green represents 1/3 of the battery life (similar to a battery bar), such that red+yellow+green indicates fully charged, yellow+green indicates 2/3 and green 1/3 of battery life remaining.

*(Note: if 2 units are paired to one side of the HRC, the battery status of the unit which has lower battery charge remaining is indicated.)*

The LED indicators will indicate battery status according to its respective paired units.

b. Directly on the Unit

The eBOOM™ battery status can be determined on the unit directly by pressing the button on the battery pack as shown. If the reading on the display shows a value less than 11.5V, it means that the battery is running low and must be charged.

C. Safe Manual Handling for Batteries

- Do not immerse the battery in water, and keep the battery in a cool dry surrounding.
- Do not use or leave the battery near a heat source such as fire or heater.
- Use only the battery charger specifically supplied when recharging.
- Do not reverse the position and negative terminals.
- Do not connect the battery directly to an electrical outlet.
- Do not discard the battery in fire or a heater.
- Do not short-circuit the battery by directly connecting the positive and negative terminals with metal objects.
- Do not strike, trample or throw the battery.
- Do not directly solder the battery and pierce the battery with a nail or other sharp objects.
- Do not use or leave the battery at high temperature. Otherwise, it can overheat or its performance will be degenerate and its service life will be decreased.
- Do not use the battery in a location where static electricity and magnetic field is high, otherwise the safety devices may be damaged.
- If the battery has leaked, and the electrolyte gets into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, it may injure eyes.
- If the battery gives an odour, generates heat, becomes discoloured or deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.
- In case the battery terminals are dirty, clean the terminals with a dry cloth before use. Otherwise suboptimal performance may occur due to the poor connection with the instrument.
- Be aware discarded batteries may cause fire or explode, tape the battery terminals to insulate them.
- The lithium batteries should be recycled. Look for companies who will buy them or your local battery recycling centre for disposal options.

# Maintenance

1. The low Battery indications are provided on the HRC for both HRC and the synced units. Ensure the units don't run on low battery for long time. Running the HRC or the units at low voltage for prolonged periods may degrade the battery's integrity and will affect the reliability of the system.

2. ***Turn OFF all the battery units when not in use*** *(both the* eBOOM™ *unit and the HRC unit).*

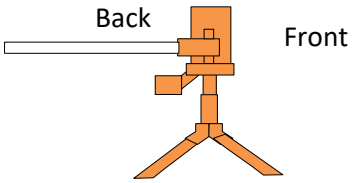
3. The eBOOM™ should be wiped with a damp cloth to remove dirt/dust which may form.

IMPORTANT – As a safety precaution, in case of communication failure/out of range, the eBOOM™ will default to Horizontal position.

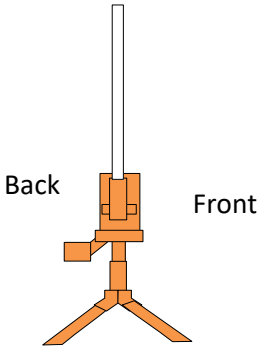
# Calibration

Calibration is used to realign the packed,vertical and horizontal positions of the boom arm.

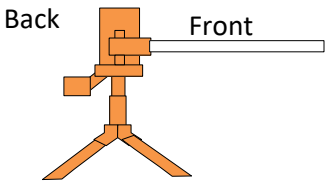
Firstly turn off the unit and remove the 10 screws off the front the eboom. Secure the front panel with tape so that it doesn't fall down. With the front panel removed be make sure that the back of the eBOOM is hooked onto the battery tray from the front and latched on the battery tray on the back so that it doesn't tip over during calibration.
After opening you will see a calibration switch.
With the eBOOM in test mode press the calibration switch. The eBOOM will now release the motor for the boom arm to move freely.
Once pressed you have 10 seconds to move the eBOOM arm to the pack position as shown below.
When 10 seconds has elapsed the eBOOM will beep once indicated it has saved the packed position.




After the first beep in the previous step quickly move the boom arm the vertical position. You will have 10 seconds to move the arm to the desired vertical position and then the eBOOM will beep twice indicating it has saved the vertical position.



After saving vertical position. You will have 10 seconds to move the arm to the desired down position and then the eBOOM will beep three times indicating it has saved the horizontal position.




After the eBOOM beeping three times stand clear of the boom arm and turn off the calibration switch. The arm will automatically move to the programmed vertical position.

Repeat this process as necessary to obtain the desired fixed positions by turning off the calibration switch and back on again to start the process.

# Troubleshooting

If troubleshooting does not solve the issues, contacting the manufacturer is advised.

***Soft Reset***

HRC – Assuming battery is not low, in the event of no response from the HRC, press down both button 1 and 2 at the same time to soft reset the HRC. A sequence of flashing all LED indicators on the HRC will take place and a beep will sound then powers off. The HRC should then operate as usual.

eBOOM™ – Assuming battery is not low, in the event of unknown error or faults, soft reset the eBOOM™ by powering it off and on again. The power switch is located on the back of the eBOOM™ unit.

- **HRC not getting Power ON (*status LED is blank*)**
    a. Check the battery of the HRC. Refer to “Battery Status” section B of “Batteries - Care, Safe Handling and Charging” for more detail. If it indicates low battery please charge the HRC. Refer to “Charging the Batteries” section A of “Batteries - Care, Safe Handling and Charging” for more detail.
- **eBOOM™ not getting Power ON (*Power Switch backlight green LED is OFF*)**
    a. Check the battery of the eBOOM™. Refer to “Battery Status” section B of “Batteries - Care, Safe Handling and Charging” for more detail. If it indicates low battery please charge the Battery of the eBOOM™. Refer to “Charging the Batteries” section A of “Batteries - Care, Safe Handling and Charging” for more detail.
    b. Check if the Power Cable is connected properly to the Battery.
- **Comms Fail (*Fault LED on HRC is Blue*)**
    a. Check that the distance of the eBOOM™ is not farther from the HRC than the maximum operating distance.
    b. Check if the correct unit is paired. (Recommend to pair the units again)
    c. Perform soft reset for both HRC and the eBOOM™. Pair the units again.
    d. If none of the above solves the issue, check the battery for both the units and ensure eBOOM™ is powered ON.

- **eBOOM™ Tilted (*Fault LED on HRC is Purple*)**
    a. Check the eBOOM™ unit is not on tilt over 20 degrees from vertical. Place eBOOM™ unit in its operating vertical position then perform a soft reset to recalibrate its orientation.
- **eBOOM™ struck between vertical and horizontal (*Fault LED on HRC is Purple*)**
    a. Manually lift the eBOOM™ arm to vertical position. Remove any obstruction present.
- **eBOOM™ LED flasher fault (*Fault LED on HRC is Red*)**
    a. Use LED test procedures to check the LED flasher fault. If the eBOOM™ operates but an individual LED flasher remains faulty, contact manufacturer for repair.
- **eBOOM™ Battery Low (*Fault LED on HRC is Amber*)**
    a. Check the battery of the eBOOM™. Refer to "Battery Status" section B of "Batteries - Care, Safe Handling and Charging" for more detail. If it indicates low battery please charge the Battery of the eBOOM™. Refer to "Charging the Batteries" section A of "Batteries - Care, Safe Handling and Charging" for more detail.
- **HRC Battery low (*Status LED on HRC is yellow*)**
    a. Check the battery of the HRC. Refer to "Battery Status" section B of "Batteries - Care, Safe Handling and Charging" for more detail. If it indicates low battery please charge the HRC. Refer to "Charging the Batteries" section A of "Batteries - Care, Safe Handling and Charging" for more detail.

# Repairs & Servicing

All repairs and servicing of the eBOOM™ shall be performed by Arrowes or its authorised service center.

Any services/repairs/modification or use of parts not approved by Arrowes voids any warranty and may affect the safe performance of the eBOOM™.

# Safe Transportation

The eBOOM™ shall be suitably packed to accommodate bumpy rides on roads and some instances rough terrain, ensuring the load is fully secure and stable. The units shall be suitably protected and prevented from being knocked against each other or other equipment during transportation.

The Hand Remote Control, battery chargers, USB socket & cables shall be stored in the carry case provided.

Arrowes has designed a secure cage system to transport the eBOOM™ unit with the existing traffic control equipment loads to avoid additional freight costs. Contact Arrowes for more information.

# Material Life

Materials/parts used in the production of the eBOOM™ have been selected based on the manufacturer's claim or technical guidance on the material life to meet the requirement of TSI-SP-081.

The mechanical components and structure of the eBOOM™ use steel and aluminum. The type used has material life of at least 20 years.

Dulux X15 orange is used, this meets with requirements of AS2700.

# Warranty

The eBOOM™ is supplied with a limited ex-factory warranty for 12 months.