

**ARROWES**™  
ROADING SAFETY

# eSTOP™



## Operation & Service Manual



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**Manufactured by:**

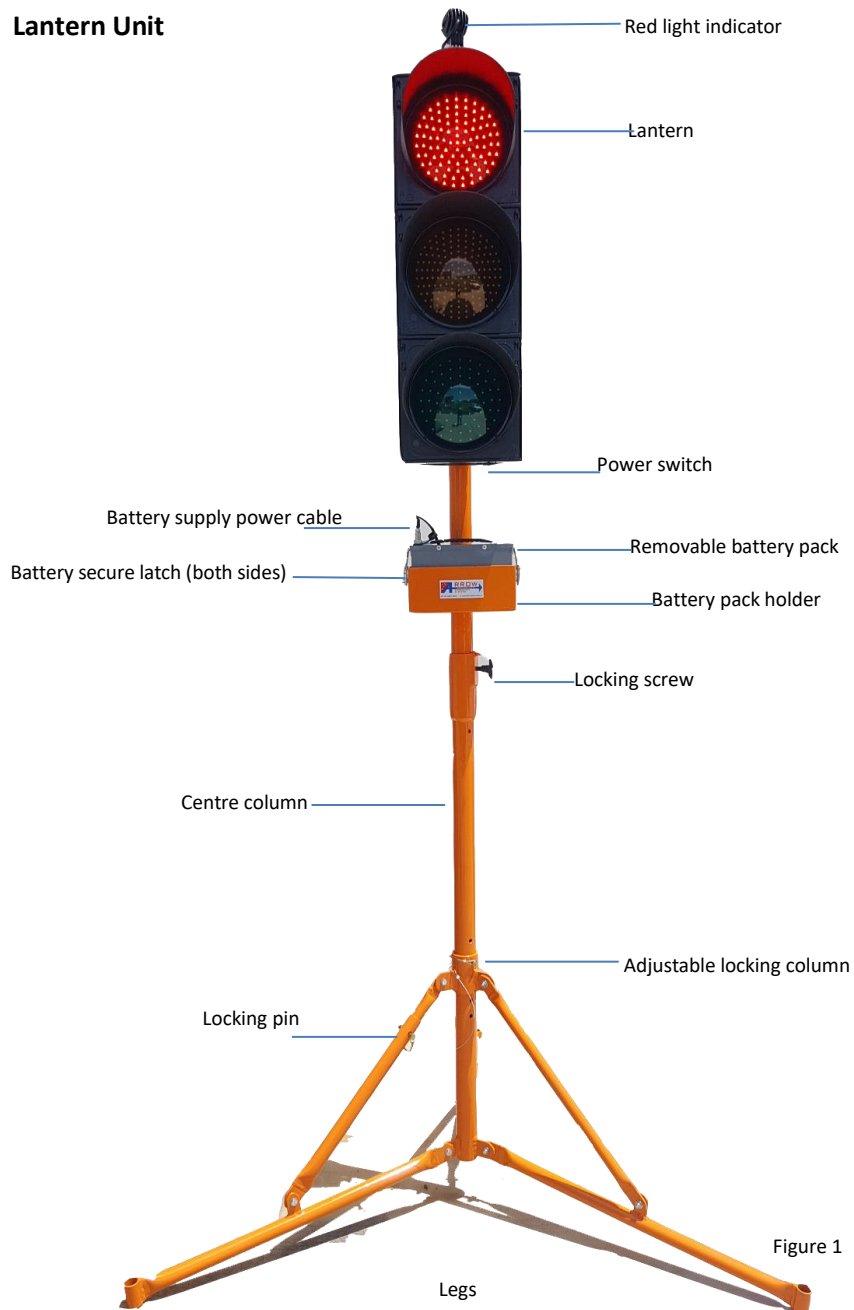
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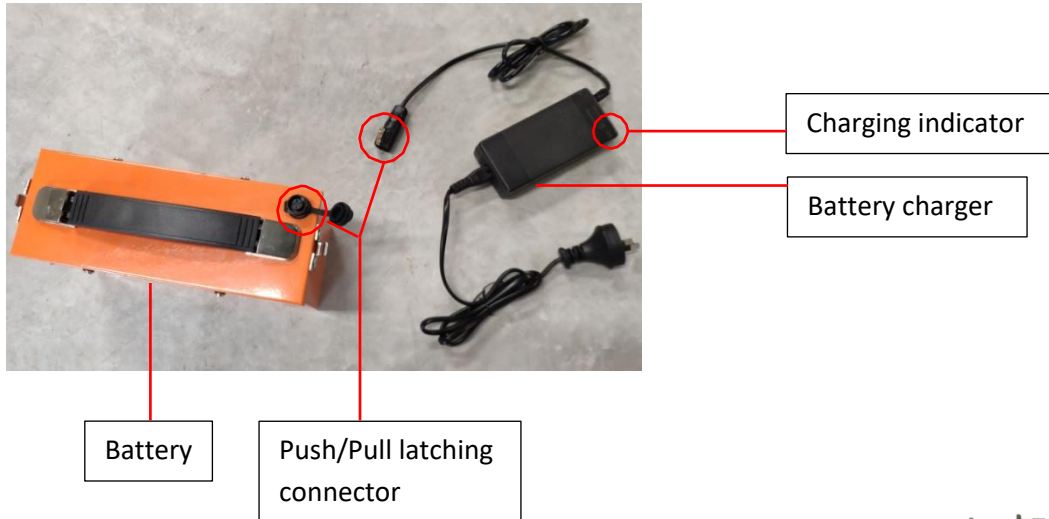
## eSTOP™ System Components Diagram

### eSTOP™ Lantern Unit

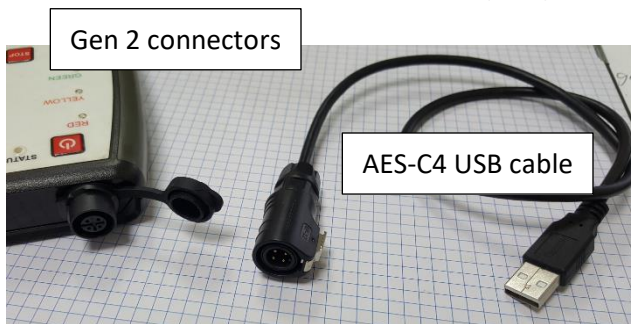


## eSTOP™ Operations & Service Manual

### Lantern battery pack and charger



### eSTOP™ Handheld Remote Controller (HRC)



### Dual Port Wall Charger



### IP65 Carry Case

Note: Gen 2 connectors are only applicable to product released from 1<sup>st</sup> July 2019

### Equipment Contents

1. 2 eSTOP™ lantern units
2. 2 tripod legs + battery holder
3. 2 lantern battery packs
4. 2 hand remote control
5. 2 USB charging cable
6. 1 double USB charge socket
7. 2 battery charger and power socket
8. Carry case
9. User and Service & Operation Manuals
10. 2 target boards (Applicable model only)

### IP65 HRC



## **eSTOP™ Operations & Service Manual**

### **Safety Considerations**

The eSTOP™ has been developed as a response to a need for safer working conditions for Traffic Controllers on job sites. It is designed to remove Traffic Controllers from the hazard zones, but still allowing the 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 at all times be operated effectively and consistently by authorized and trained operators.

The eSTOP™ 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 eSTOP™. Operators must understand and comply with the manufacturer's instructions as printed in the manual accompanying each eSTOP™ in conjunction with the respective Company's Safe Work Method Statement.

The eSTOP™ 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 eSTOP™ 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 eSTOP™. Examples of factors to consider when assessing suitable location are: a 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 eSTOP™ should be installed on a stable surface.

The unit including the lanterns (red, yellow and green), yellow light indicator and battery box shall be kept clean. The equipment shall be handled with care.

The eSTOP™ batteries (both for the hand remote control and the lanterns) shall be fully charged before operating the unit.

The eSTOP™ has been designed in accordance to DTMR's (Department of Transport and Main Roads) specifications, MUTCD guidelines and the MRTS254, Arrowes ISO quality system and ACMA approved. The eSTOP™ has been approved for use by DTMR. The application of the eSTOP™ shall be in accordance to these guidelines/standards as well as the respective company's worksite risk assessment and Safe Work Method Statements.

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

## eSTOP™ Operations & Service Manual

### eSTOP™ System Specifications

#### eSTOP™ Unit

|                              |                               |
|------------------------------|-------------------------------|
| Operating life of cluster:   | 100,000 hours                 |
| View angel of cluster:       | 12°                           |
| Lantern IP rating:           | IP45                          |
| LED Optics IP rating:        | IP65                          |
| Voltage:                     | 12v                           |
| Operating amperage:          | 1.2 A                         |
| Battery (rechargeable)       | 21 A/H Lithium Iron phosphate |
| Operating Hours (80% DoD)    | ~16 Hours                     |
| Charging time:               | 4-5 Hours                     |
| Operating Temperature Range: | -20 to 90° Celsius            |
| Lantern Compliancy           | AS2144                        |

#### Hand Remote Controller (HRC)

|                                   |                                  |
|-----------------------------------|----------------------------------|
| RF operating frequency:           | 2.4GHz                           |
| Configuration:                    | Single unit or dual unit control |
| IP rating:                        | IP65                             |
| Weight:                           | 300g                             |
| 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, Target Board): | 24kg (allocated to 3 components) |
| Top lantern weight (max lifting weight):          | 14kg                             |
| Tripod leg footprint radius:                      | 0.80m                            |
| Wind loading – no sandbag base:                   | ~40km/h                          |
| Wind loading – 3 sandbag/leg ~50kg:               | ~100km/h                         |

#### Dimensions

|                             |                         |
|-----------------------------|-------------------------|
| Maximum working height:     | 2900 cm                 |
| Minimum working height:     | 2600 cm                 |
| Dimensions when stored:     | 1710 mm x 480mm x 370mm |
| Base width, fully extended: | 1600 mm diameter        |
| Lantern height:             | 770 mm                  |
| Lantern width:              | 270 mm                  |
| Lantern depth:              | 170 mm                  |

## eSTOP™ Operations & Service Manual

### Battery Specifications

#### eSTOP™ Unit

|                                      |  |
|--------------------------------------|--|
| Battery Type:                        | LiFePO4  |
| Voltage:                             | 12V  |
| Full Capacity:                       | 20 A/H   |
| Max Traffic light power consumption: | 1.02 A   |
| Depth of Discharge:                  | 80%  |
| Operation time:                      | ~16.5 hours at 80% DoD                                       |
| Low battery warning:                 | ~15.5 hours of operation                                     |
| Life cycle:                          | >800 at 80% DoD  |
| IP Rating:                           | IP54   |
| Protection:                          | Over voltage, under voltage, over current and short circuit. |

Note: Battery cuts off after ~16.5 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. 5.0A              |
| Charge rate:           | ~3A                             |
| Battery Charging Time: | 4-5hours 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 50/60Hz Max. 0.35A                 |
| Output:                | DC 5V Max. 2.0A, with over current protection |
| Charge rate:           | ~0.6A   |
| Battery Charging Time: | 4-6 hours from low battery                    |



## Labels



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



eSTOP™ identification number is located at the base of the lantern as shown here

HRC charger  
C-tick labels



Lantern Battery  
charger C-tick



## Key Features

The eSTOP™ is the first Electronic Single Traffic Operator Portable system of its kind. Designed to remove the Traffic Controllers from the hazard zone, the key features of the eSTOP™ system are:

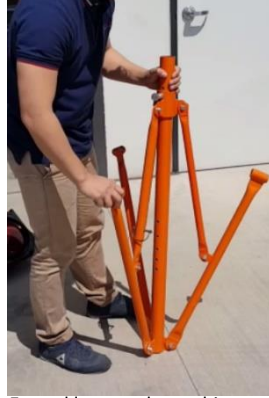
- Traffic Controllers operate from a safe distance (up to 400m with option to increase distance)
- Can be implemented anywhere a stop/slow baton would normally be used
- Can be operated with one controller (where there is clear line of sight) whilst the other takes a break or is on rotation as the HRC can control 2 eSTOP™ units
- Fail safe features - ensure no two green lights can be on at the same time, low battery, tilt and lantern fault warnings
- Environmentally robust, light weight, three piece assembly, adjustable height
- Small Hand Remote Control (IP65)
- Hand Remote Control mimics traffic lantern states in real time
- Wind load up to 100km/hr when used as per manufacturer's guidance

## eSTOP™ Operations & Service Manual

### Unit Assembly/On-site Setup



Pull spring pin to release leg



Extend legs out by pushing towards the ground



Place legs onto a flat surface and align adjustable locking column with pin holes for uneven surface. (red circle)



Slide pole up and down to adjust height then release pin to lock in place



Use two hands to lift traffic lantern onto base



Slide lantern into the center locking column



Secure with locking screw to stop lantern from rotating



Insert battery pack into battery holder



Lock latches to secure battery box



Connect power cable. Connector latches once pushed in place.



Switch on lantern



Unit is ready to operate with Hand Remote Control

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

## eSTOP™ Operations & Service Manual

### Target Board Assembly

Target only applies to applicable systems with Target board brackets.



1. Place lantern and target board on a flat surface



2. Lift lantern and place in the gap of the target board.



3. Lift one side of the target board over and behind the lantern edge.



4. Lift the right side up then align the bolt hole.



5. Insert bolt then tighten wing nut.



6. Adjust camera bracket and align hole on the top side of the target board, then tighten wing nut.

Note: Ensure front facing camera (if applicable) is adjusted to be above the target board.

---

## Operational Procedures

*When the units have been assembled.*

### eSTOP™ Lantern Unit

1. **Connect power cable** from eSTOP™ unit to battery box. To switch on the eSTOP™ unit, push the small green Power Switch underneath the lantern unit. The green LED light will illuminate when powered on. The lantern unit will be controlled 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 powers on, by default is in test mode. In this mode the HRC can be used to perform lantern test. See HRC procedures for LED test function, each lantern will light on for 0.5 seconds.

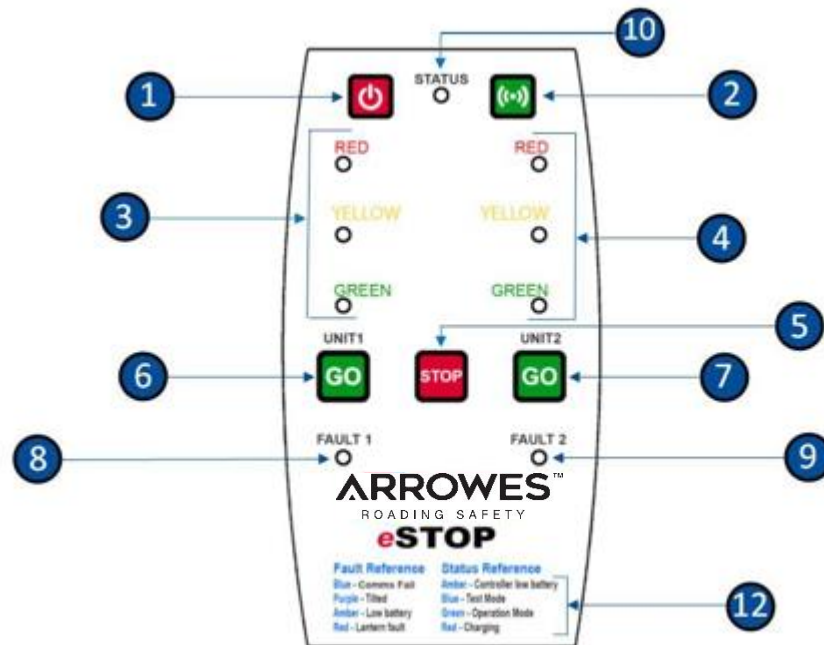
**Operation Mode** – The unit can be activated (using HRC) to 'operation mode' after power-on/LED test. See HRC procedures for operation functions, when the unit first activates it will flash Yellow for 5 seconds then default to Red, then **halts for 5 seconds before it can be operated.**

2. When the lantern unit is on the RED state, a small yellow LED, called the "Red Light Indicator" will flash. This Red Light Indicator shall be facing the workers on the worksite. It's purpose is to indicate to the workers on the jobsite that the traffic lantern is on red. The Red Light Indicator shall NOT face the motorists.
3. The eSTOP™ Lantern Unit is also fitted with a "Cut-Off Switch". This is the Power Switch, located at the base of the lantern. This switch will turn off the lantern instantaneously as required. Must also be switched of when not in use.

***Note:** When setting up the eSTOP™, the lanterns shall face away from motorists during test mode, then once tested and ready for operation, face the lantern towards traffic. Ensure to start activating the lights after the lantern is facing the traffic, and not to turn the lantern face again.*



## Hand Remote Controller – HRC



**LED indicators** – There is 3 type of LED indicators – Lantern, Status, Fault.

- **Lantern indicators** 3 4 reflects the signal status of the paired lantern units.
- **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 batteries 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 a lantern unit but communication fail (no connection, may need to re-pair).
  - **Purple** – The paired lantern is tilted and/or rotated from its starting position after Activation.
  - **Green** – The paired lantern is communicating and operating normal.
  - **Yellow/Amber** – The paired lantern battery is low.
  - **Red** – The Paired lantern has a lantern fault in one of the LED.

**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 Lantern units (refer to pairing section). Once it's paired to a Lantern units (and Fault light is green), you can do a LED lantern test and check the battery of the Lantern unit (refer Lantern Battery section).
- **Operation Mode** (Status LED green) - Once the HRC is paired and the Fault LED is green, the system is be activated into Operation Mode. During this Mode, the operations of a Typical Traffic Signal can be controlled, where the lantern can be controlled to STOP (go to Red) or GO (go to Green).

## eSTOP™ Operations & Service Manual

### 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 start in *Test Mode* and the *Status Indicator* ⑩ will show blue. During *Test Mode* the HRC can be used to pair to a specific eSTOP™ unit (Refer to Pairing section). If the HRC is paired to an eSTOP™ unit the *Fault Indicator* ⑧ ⑨ will show Blue and change to green when Synced to the paired eSTOP™ 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 eSTOP™ unit. Pressing Buttons ⑥ or ⑦ allows eSTOP™ lanterns to be tested (A quick flashing sequence of the 3 colours to ensure the lights are working).
4. **Activation** - When ready to operate the eSTOP™, hold down *Activation Button* ② for 5 seconds to activate the synced eSTOP™ units into *Operation Mode*, the *Status Indicator* ⑩ will then show Green. The eSTOP™ will only operate when *Fault Indicator* is green. **Note once the eSTOP lantern is activating/activated, it should not be rotated, otherwise a compass position fault will occur with purple faulty indicator.**
5. **Start-up** - Upon switching from *Test Mode* to *Operation Mode* the eSTOP™ lantern will flash yellow for 5 seconds, then default to red. The Hand Control will lock for 5 seconds and all buttons will not work during this time. After 5 seconds the eSTOP™ unit is in *Operation Mode*.
6. **Control Traffic Signals** - Use Buttons ⑤ ⑥ or ⑦ to operate the eSTOP™ for traffic control. Use button ⑥ ⑦ to switch one or the other signal to turn green. (Note: in order to turn a signal green one or both signal must be red first). Use button ⑤ to change all signals to red. (Note: the yellow lantern will activate for 4 seconds during the transition from green to red. The LED indicators reflect the eSTOP™ lantern status).
7. **De-activation** - In *Operation Mode*, holding *Activation Button* ② for 5 seconds returns the eSTOP™ units to *Test Mode*. During transition from *Operation Mode* to *Test Mode* both eSTOP™ unit lanterns flash yellow for 5 seconds.
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 eSTOP™ unit.
9. Switch off eSTOP™ 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.

## eSTOP™ Operations & Service Manual

### Flashing Yellow Operations

Only for applicable HRC

1. Activate HRC to **Operation Mode (Status 10 Green)**
2. Activating Flashing Yellow - When Unit1 and/or Unit2 are Red (**LED Indicator 3 4 Red**) 5 second long press Go Button **6** or **7** to activate the respective unit to flashing yellow.
3. Deactivating Flashing Yellow – when Unit1 and/or Unit2 is in Flashing Yellow, quick press Stop Button **5** to deactivate Flashing Yellow, and return the units to red. Units can now be operated as usual (e.g changing to green or reactivating either units to Flashing Yellow).

*Note:*

- If a unit is green or has a critical fault, neither unit can be activated to flashing amber.*
- If one unit is flashing amber and one unit is red, the red unit can be activated to flashing amber.*
- If one unit is flashing amber and one unit is red, the red unit **cannot** be changed to green.*
- All flashing amber cannot be changed to green, must be changed to red before changing to green.*
- If a critical occurs during flashing yellow, the unit will automatically change to red.*

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

The eSTOP™ HRC can be paired to any eSTOP™ lantern units. Once a lantern unit is paired to a HRC it is stored in memory, they will be automatically synced when powered up and ready for operation. By default a HRC is paired to 1 lantern unit only. Repairing is not required unless the HRC is pairing to a different lantern unit, pairing 2 lantern unit to 1 HRC, or lanterns has been mixed up and not knowing which lantern is paired.

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

***Power on the HRC and the Lantern units, these must be in test mode for pairing (status blue on button 10)***

### Un-pairing eSTOP™ units

Un-pairing is required if the HRC is already paired to an unknown lantern 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 eSTOP™ 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 lantern 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 lantern is paired to Unit2 side. After un-pairing, *Fault1 and Fault2 indicator will be blank, where no LED is on.*

## Pairing eSTOP™ 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 base of the eSTOP™ lantern unit, show on 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**.

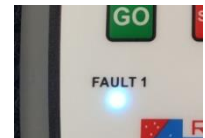
- A fast double beep and green light indicates successful pairing. **Fault1 indicator** will go blue once it's paired and changed to green when synced (wireless communication between HRC and the lantern is established) to the paired unit.
- A long, slow beep and red light on **Status Indicator** will 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 eSTOP™ unit has no power/is not turned on (push green button at base of eSTOP™).
4. The HRC and Lantern 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, and a lantern LED test (short press unit1 "GO" button) can be performed to test the paired lantern, follow HRC Operational Procedures to perform LED test and operate the lantern units.

For eSTOP™ Multi models only, a second lantern can be paired to Unit1 (same side on the HRC), this is done by plugging the HRC to the second lantern and repeat the same process above, using the same side GO Button. When 2 lantern is paired to Unit1 of the HRC, the lanterns are controlled and behaves simultaneously. And Fault indicators will indicate Cyan color instead of green, indicating 2 units is paired. The same process can be done with HRC Unit2 GO button.



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

## Pairing eSTOP™ 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 eSTOP™ before Unit2 can be paired.

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



## User manual – eSTOP DVR camera system

Only for applicable eSTOP

### eSTOP camera and DVR placement

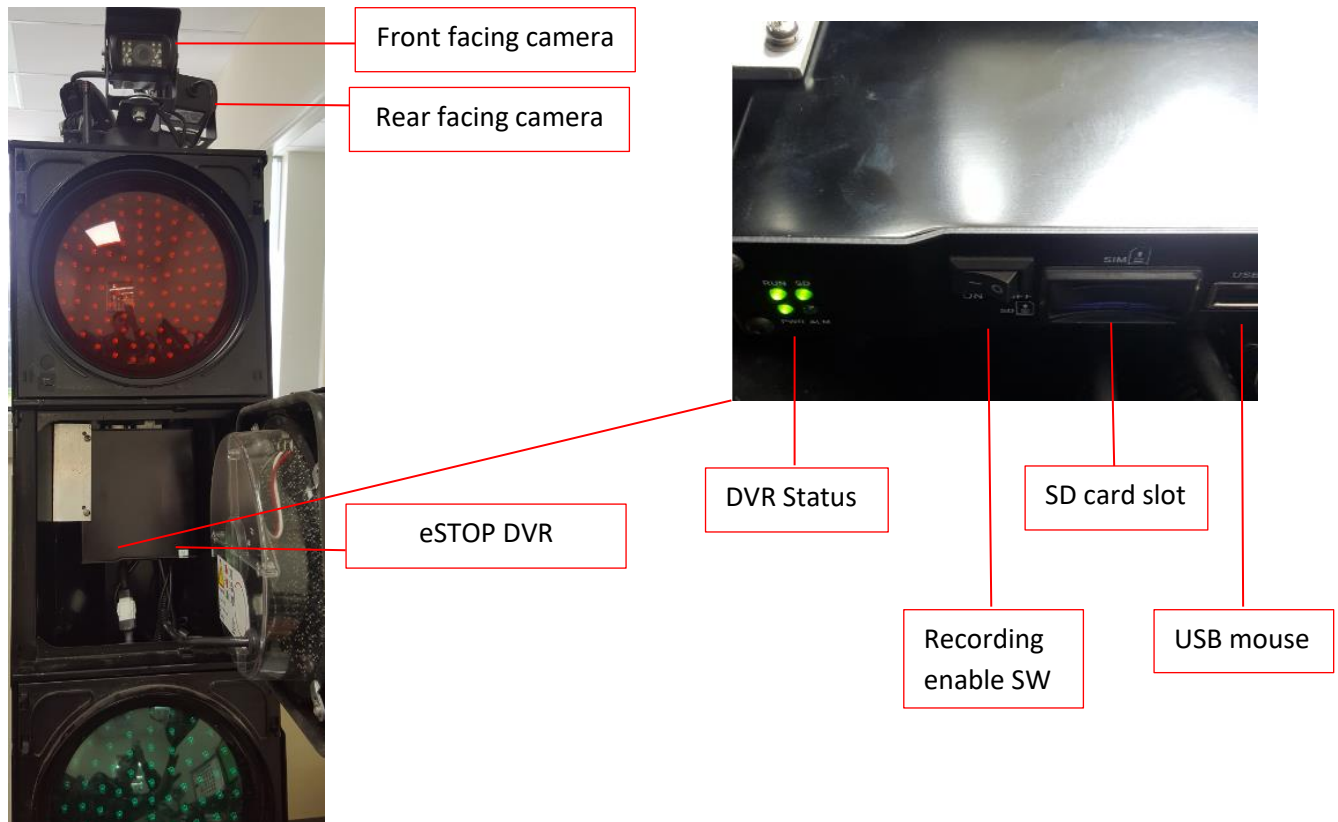
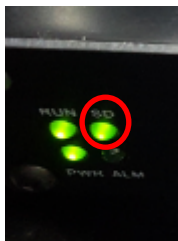


Figure 1. eSTOP Camera and DVR

### Recording

The eSTOP DVR is set up to record automatically when the eSTOP traffic light powers on. There is a 1 minute delay for the DVR to complete startup and start recording.



A Green light under SD status indicates the DVR is recording.

### Stop recording

## eSTOP™ Operations & Service Manual

Recording can be stopped by switching off the power or switching the recording off Enable SW as shown in figure one.

### Adjusting Camera Angle



Figure 2. Camera rotations

Depending on where the eSTOP is placed, the camera can be rotated horizontally and vertically to suit viewing angle of the traffic.

### Using a LCD and DVR video output



Figure 3. DVR output and LCD

By plugging in the LCD to the DVR's video output connector shown in the figure 3 above, the videos of the cameras can be viewed live. This allows camera positions to be adjust effectively, video play back and indications of recording status.

### DVR custom setting

## eSTOP™ Operations & Service Manual

While the LCD is plugged in, a USB mouse can also be plugged in to the USB port shown in figure 1. This allows custom settings of the DVR (a right-click to enter the settings menu).

### Time stamp

The DVR has an internal battery to keep time in track when eSTOP power is off. The time should be adjust to the local time by entering the settings menu.

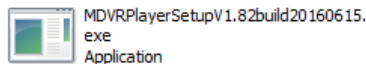
### Play back video

Video play back can be done by accessing the DVR menu using the LCD and a mouse.

This can also be achieved by using a Windows computer and the PC software to read back the video storage on the SD card. The SD card is located on the bottom of the DVR as shown in figure 1.

## Using the MDVR player to play back video

### Installing the software



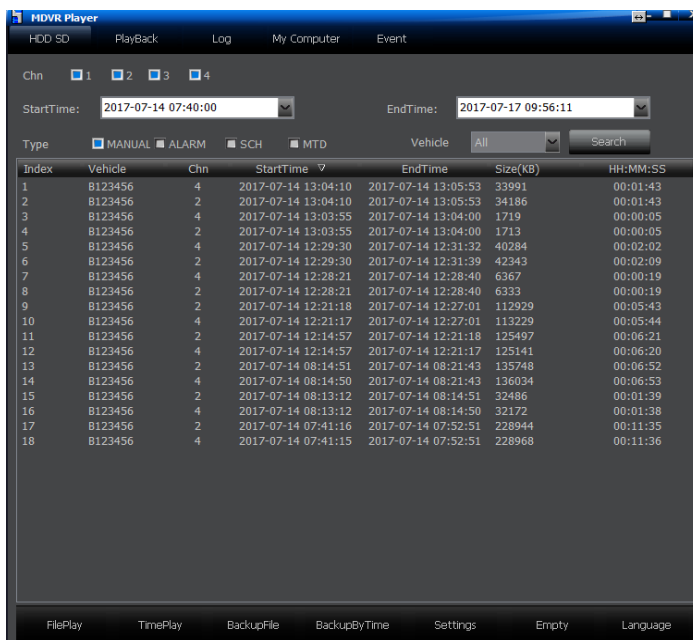
The MDVR player software can be found in the CD provide or contact supplier for a copy of the MDVR software. Or download from google drive below:

<https://drive.google.com/drive/folders/1mdSDaauARsrOA3rruHFpllehOipbgky?usp=sharing>

Open the installer file shown above and follow the setup wizards to complete installation.



Once the software is installed and shortcut icon shown above is create on the desktop. Open this software.



### Search footage by time

If the DVR SD card is plugged into the PC, the *StartTime and EndTime on the software shown above can be set to Search the time period of the video required.*

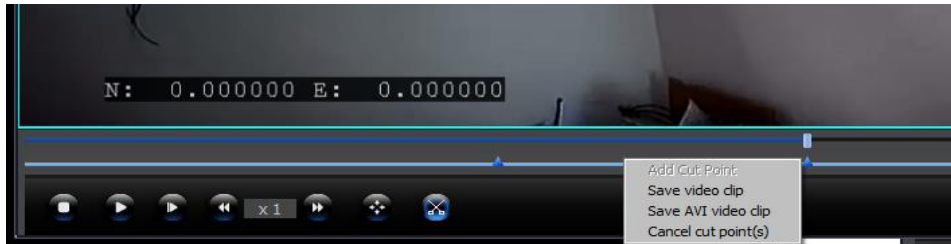
Double click on any of the video files listed allows them to be played.

The files can be backed up using the BackupFile or BackupByTime buttons on the bottom menu bar.

## eSTOP™ Operations & Service Manual

### Cut clips to backup

When the video is being played, clicking on the cut icon shown below allows the video to be cut with a starting and end point.



A time line will appear on the bottom of the video when the cut icon is clicked.

Right click on the line to set starting and end point of the clip.

Then right click in between the 2 points to back up the clip as AVI format.

## eSTOP™ Operations & Service Manual

### Batteries - Care, Safe Handling and Charging

When power to the battery is low (3.6v or less) the “status indicator” will show yellow. **The HRC must be charged.** Running the HRC at low voltage for prolonged periods may degrade the battery’s integrity and reduce the HRC’s transmitter power 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 eSTOP™ unit base (the screw cap and USB connection are located at the base of the eSTOP™).

When the HRC is switched off and the USB is attached to a charging device a red charge light indicates that the battery is being charged. When the light is green, the battery is fully charged. A flashing red light 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)

While the HRC is powered off and not charging, pressing stop button will light up the Red, Yellow, Green LEDs which indicates 3 battery levels. (refer to battery status for further detail)

##### 2. The eSTOP™ Lantern Battery

The eSTOP™ is fitted with a light weight LifePo4 battery. and to charge, removing the connector at the top box of the battery and connecting to the battery charger that is supplied by ArrowES

The battery is charged to 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, 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 eSTOP™ Lantern

The status of the eSTOP™ unit battery can be determined when the system is in **test mode** and the eSTOP™ unit is sync to the HRC.

By pressing the stop button **5** during test mode, the connected units battery status will be indicated by 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.

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

### 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.
- These lithium batteries should be recycled. Look for companies who will buy them or your local battery recycling centre for disposal options.

## eSTOP™ Operations & Service Manual

### Maintenance of the eSTOP™

1. When power to the battery is low the “status indicator” will show yellow. ***The HRC must be charged.*** Running the HRC at low voltage for prolonged periods may degrade the battery’s integrity and reduce the HRC’s transmitter power and will affect the reliability of the system.
2. ***Turn all battery units off when not in use*** (both the eSTOP™ unit and the HRC unit).
3. The Lantern 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 lantern will default to RED**

### 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.

eSTOP™ Lantern – Assuming battery is not low. In the event of unknown error or faults, soft reset the eSTOP™ lantern by powering it off and on again. The power switch is located on the bottom of the eSTOP™ unit.

#### **Battery check**

HRC – in power off mode. Pressing the ‘Stop’ ⑤ button on the HRC will show the battery status of the HRC. Refer to “Charging the HRC battery” section A of “Care and Safe Handling of Batteries” for more detail.

eSTOP™ Lantern – when the lantern is sync to the HRC during **test mode**, use the ‘Stop’ ⑤ button to check the battery status of the of the lantern. Refer to section B of “Care and Safe Handling of Batteries” for more detail.

#### **Faults**

Coms fail – check that the distance of the eSTOP™ from HRC does not exceed the maximum operating distance. Check that the correct unit is being paired or pair the units again. Perform a system soft reset.

Tilted – check the eSTOP™ unit is not on tilt over 20 degrees from vertical. Place eSTOP™ unit in its operating vertical position then perform a soft reset to recalibrate its orientation.

Low Battery – use the battery check procedures to check the battery status. Charge the batteries if they are low.

Lantern fault – Use LED test procedures to check the LED fault. If the eSTOP™ operates but an individual LED module remains faulty, contact manufacturer for replacements. An individual LED module can be removed by releasing the latches located on the top left or right corner, then disconnect the connector attached to the module cable.



### Repairs & Servicing

All repairs and servicing of the eSTOP™ 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 eSTOP™.

### Safe Transportation of the eSTOP™

The eSTOP™ 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 eSTOP™ 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 eSTOP™ have been selected based on the manufacturer's claim or technical guidance on the material life to meet the requirement of MRTS254.

The lanterns used are type approved by QLD DTMR and meets with AS2144. The manufacturer of the lantern has claimed that it has a service life of at least 20 years.

The mechanical components and structure of the eSTOP™ 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 eSTOP™ is supplied with a limited ex factory warranty for 12 months.