eSTOP™

Operation & Service Manual

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Supplied by:

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eSTOP™ Handheld Remote Controller (HRC)

Equipment Contents

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2. 2 tripod legs
3. 2 lantern battery packs
4. 2 hand remote control
5. 2 micro USB charger
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)

Safety Considerations

The eSTOP™ has been developed as a response to a need for safer working conditions for operators controlling alternating flow situations on job sites. It is designed to remove operators from the hazard zones, but still allowing the operators 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 (User'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 tested and certified compliant in accordance with the New Zealand Transport Agency (NZTA) Technical Note – Portable Traffic Signal Systems, Version 3 : November 2015. The eSTOP™ is included in the NZTA Code of Practice for Temporary Traffic Management (CoPTTM) Register of TTM equipment approved for use on NZ roading network (Section I-19). The application of the eSTOP™ shall be in accordance to these guidelines/standards as well as the respective company's worksite risk assessment and approved Traffic Management Plan (TMP).

It should be noted: the eSTOP is a remote control MANUAL operated system, designed to remove operators from exposure to LIVE traffic. The maximum distance from the HRC and therefore the operator to the lantern heads is 400m. However, the site distance which the eSTOP can be deployed varies from site to site and must be deployed in accordance to the worksite risk assessment and therefore must be set up in accordance to the respective site Traffic Management Plans.

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™ System Specifications

eSTOP™ Unit

Operating life of cluster:	100,000 hours
View angel of cluster:	12^{o}
Lantern IP rating:	IP45
LED Optics IP rating:	IP65
Voltage:	12v
Operating amperage:	1.2 A
Battery (rechargeable)	26 A/H Lithium Iron phosphate
Operating Hours (80% DoD)	~16 Hours
Charging time:	4-5 Hours
Operating Temperature Range:	-20 to 90^{o} Celsius
Lantern Compliancy	AS2144

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^{o} 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
Target Board:	562x1063mm

Battery Specifications

eSTOP™ *Unit*

Battery Type:	LiFePO4
Voltage:	12V
Full Capacity:	21 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

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 50/60Hz Max. 1.6A
Output:	DC 14.4V Max. 4.0A
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
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

Key Features

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

- Operators can operate from a safe distance (up to 400m with option to increase distance from HRC and lantern head)
- Can be implemented anywhere a stop/go or stop/slow paddle would normally be used
- Can be operated with one controller (paired and where there is clear line of sight, subject to conditions)
- Fail safe features - ensure no two green lights can be on at the same time (in paired conditions), low battery, tilt and lantern fault warnings
- Environmentally robust, light weight, three piece assembly, adjustable height (2.5m – 2.8m)
- Small Hand Remote Control (IP65)
- Hand Remote Control mimics traffic lantern states in real time
- Wind load up to 100km/h when used as per manufacturer's guidance

Operators

Each traffic lantern requires its own operator unless the following conditions can be met:

- The Operator must have clear view of approaching road users for at least 120m in advance of each traffic lantern
- The distance between each traffic lantern is no more than 400m

Operators must:

- Be positioned so they are as far as is practicable from live traffic (minimum 1m)
- Be positioned so they are clear of any moving or operating plant and/or machinery
- Not undertake any other task or work activity whilst in control of the traffic lantern(s)

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 to 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 centre locking column with assembly facing away from traffic


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


The lantern will start in test mode with nothing illuminated

Switch on handset by holding the power button for 5 seconds

A green light will show once handset is connected to the lantern, this will happen automatically if it has been previously paired (see page 17)

Press the go button to perform a lantern test. Each lantern will light for 0.5 seconds

Switch to operation mode by holding the activation button for 5 seconds

Use handset to test operation of each phase of the lantern. Set lantern to Go, then to Stop

When ready to be used, loosen the lock screw and rotate the unit to face oncoming traffic

Once facing oncoming traffic, tighten locking screw

Operator can now stand safely away from the eSTOP. Use handset to change signals as required

IMPORTANT NOTE

Ensure eSTOP™ is stable and is weighted down with sandbags prior to operation.

One sand bag per tripod leg is required.

Target Board Removal and Fitting for Maintenance

Please Note: Target board is permanently fixed to the lantern and should only be removed for maintenance

Removal

1. Loosen the wing nut

2. Drop one side of the target board over the lantern edge

3. Drop other side of target board to remove

Fitting

1. Place lantern & target board on a flat surface

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

3. Lift one side of 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

STATIC OPERATIONS

TWO-WAY TWO-LANE ROAD
Single-lane alternating flow
Portable traffic signals

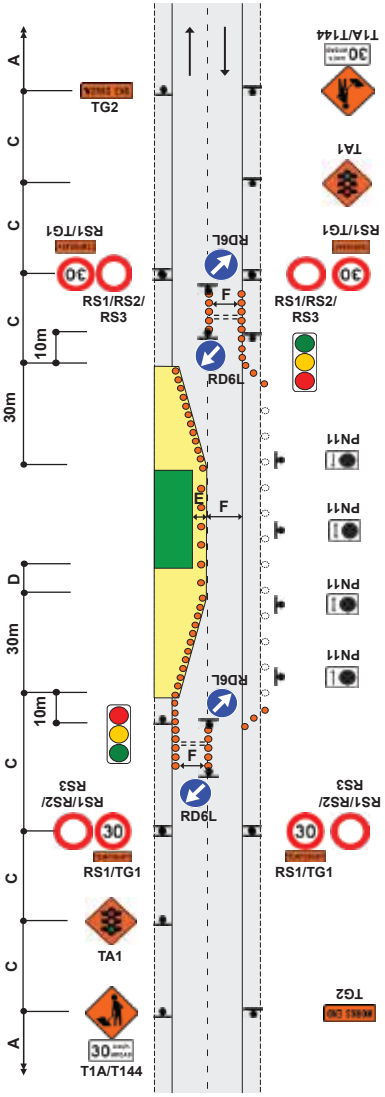
Level 1

An example of a level 1 Temporary Traffic Management Plan to be used in conjunction with the eSTOP

Notes

1. Provide details of make and model of portable traffic signals in the TMP
2. Install temporary limit lines (must be able to be removed upon completion) or use RP61/RP62 signs

3. Approved temporary speed humps may also be used. Consider use of MTC while speed humps are installed
4. A 30m return taper at the end of the closure is mandatory
5. Cones are required on edge of the temporary lane opposite closure if road is not well defined
6. Extend or place extra advance warning signs towards on-coming traffic beyond any expected traffic queues
7. Use PN11 No Stopping signs, if necessary
8. Minimum 5 cones in cone threshold at:
   - 2.5m centres - less than 65km/h
   - 5m centres - more than 65km/h
9. The T144 30km/h AHEAD sign is optional



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 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 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.

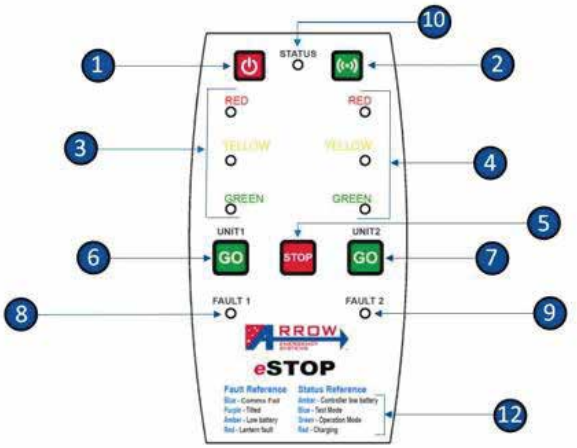
   Operation Mode – The unit can be activated (using HRC) to 'operation mode' after power-on/LED test. See HRC procedures for operation functions, when the unit first activates it will flash yellow for 5 seconds, then 4 seconds of steady yellow, then defult to red. The Hand Control will lock for 10 seconds and all buttons will not work during this time.

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. Its 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 off when not in use.

Note: When setting up the eSTOP™, the lanterns shall face away from motorists until the unit is activated for use to control traffic (Operation Mode).

Hand Remote Controller – HRC



LED indicators – There are 3 types 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 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 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 unit (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).

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 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.
5. **Start-up** - Upon switching from *Test Mode* to *Operation Mode* the eSTOP™ lantern will flash yellow for 5 seconds, then 4 seconds of steady yellow, then default to red. The Hand Control will lock for 10 seconds and all buttons will not work during this time. After 10 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. There is a minimum red time of 5s. 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

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 paired to a different lantern unit, pairing 2 lantern units to 1 HRC, or lanterns have been mixed up and do not know 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 micro USB cable from the top of the HRC unit to the USB connector on the base of the eSTOP™ lantern unit, shown 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. When 2 lanterns are paired to Unit1 of the HRC, the lanterns are controlled and behave simultaneously. Fault indicators will then indicate Cyan color instead of green. The same process can be done with HRC Unit2.

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

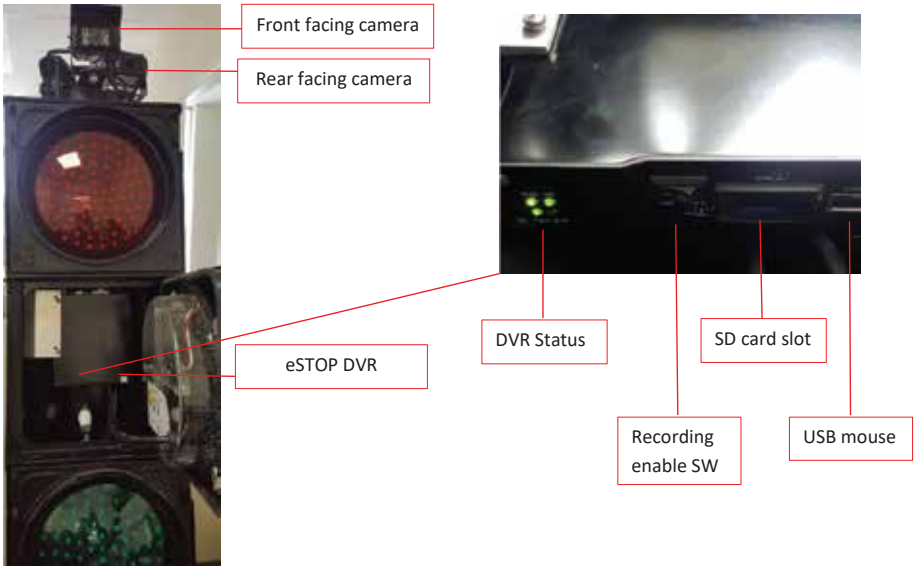
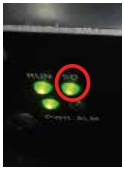


Figure 1. eSTOP Camera and DVR

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

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

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.

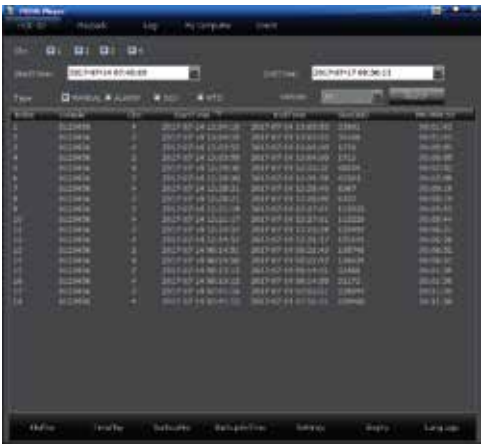
Using the MDVR player to play back video

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/1mdSDaauaRsrbOA3rruHFpIlehOipbgky?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.

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.

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

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.

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 synced 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.

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.

NZ eSTOP™ PRODUCT WARRANTIES

1.1 All products sold are covered by a twelve (12)-months warranty period on parts.

1.2 All products will have serial numbers through which the exact date of manufacture may be determined.

1.3 **Defective Products**

1.3.1 In the event any Product is discovered to be defective, the customer shall return the defective product to the Company provided the warranty period for the particular item has not expired.

1.3.2 Where the warranty period for the particular item has not expired, the Company shall replace the defective Product.

1.4.5 After the warranty period, the orders for replacement product will be based on the current price list of products issued by the company.

1.5 **Misuse of Product**

Any tampering, misuse or negligence in handling or use of the products renders the warranty void. The warranty is also void if, at any time:

(a) the customer attempts to make any internal changes to any of the components of the products;

(b) the power supplied to any part of the products exceeds the rated tolerance;

(c) any external device attached by customer creates conditions exceeding the tolerance of the products; or

(d) the serial number plate of the product is removed or defaced.

Service, Warranty, and Technical Enquiries: **FULTON HOGAN SIGNS & GRAPHICS** **Cnr Foremans & Halswell Junction Rds** **Hornby, Christchurch** **PH: 0800 274 463** **Email: signs@fultonhogan.com**	**Serial Number:** **Date:**

Fulton Hogan

SIGNS & GRAPHICS

Contact us 0800 274 463 signs@fultonhogan.com
Cnr Foremans & Halswell Junction Rds, Hornby, Christchurch