

# eSAS

## Electronic Speed Awareness Sign



# User Manual



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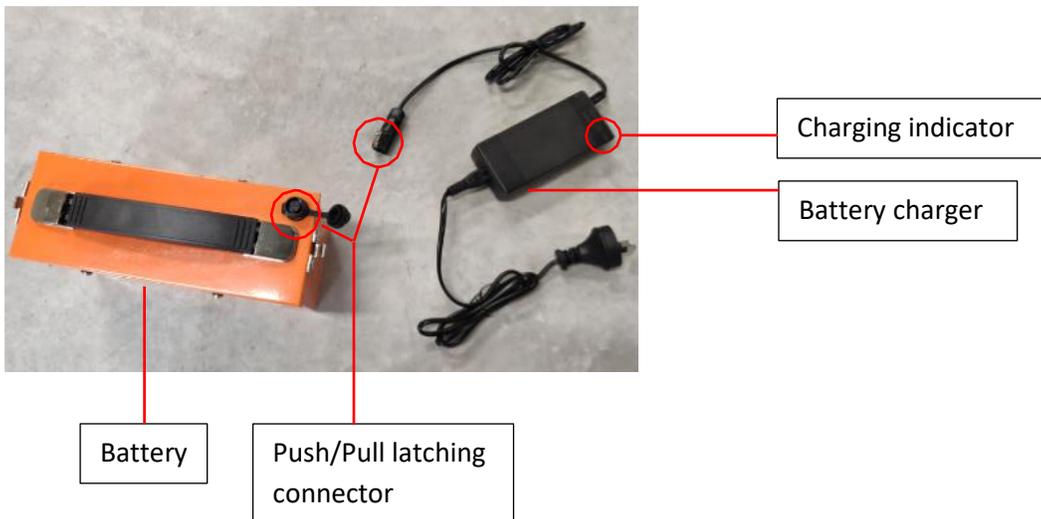
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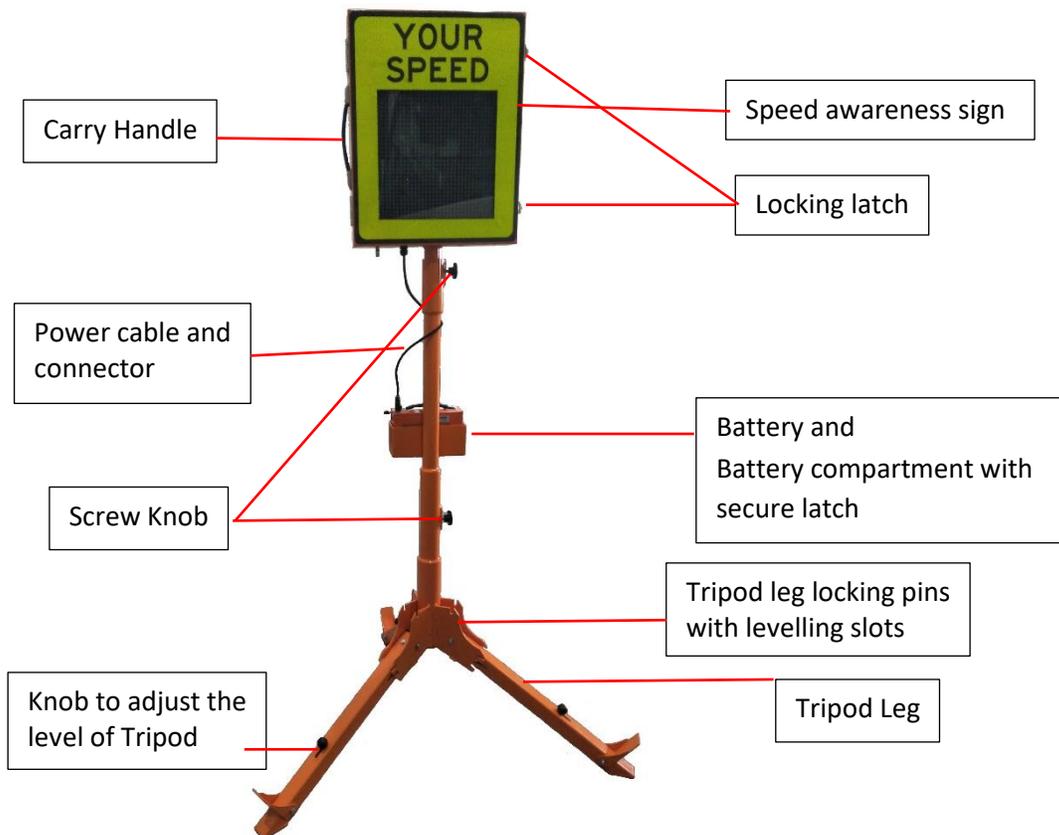
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## 1. Components Diagram

### Battery pack and charger



### Overall unit



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### 1. Operation Features

The ArrowES Portable Speed Awareness Sign with Radar is lightweight, compact and easily transportable. The sign is designed specifically for ease and speed of deployment, making everyday use and setup faster and simpler for road workers.

With the ability to be taken and operated virtually anywhere, the eSAS supported on a tripod is perfect for short term roadwork site to communicate with motorist “Your Speed” with corresponding message in text and graphic format;

**SPEED** (numeric) **SAD FACE** (graphic)/**SLOW DOWN** (text)

**SPEED** (numeric) **HAPPY FACE** (graphic)/**THANK YOU** (text)

This is design to be a self-contained unit and includes battery pack, battery charger, stand, controllers, and cabling.

**Optional:** Vehicle count and speed logging, output to .csv via SD card. Logs provide vehicle counts, speeds with real time and GPS coordinates.

### 2. Safety Consideration

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

The eSAS 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 eSAS 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 eSAS. 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 eSAS should be installed on a stable surface.

The eSAS shall be fully charged before operating the unit.

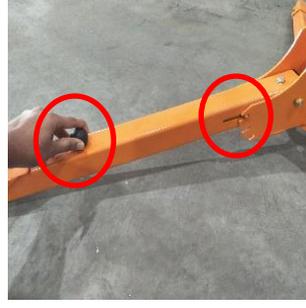
Any modifications made to the eSAS (unless by or approved by ArrowES) could compromise the function of the eSAS and therefore the safe application of the units and voids the warranty of the eSAS.

### 3. System Specifications

| <b>Overall Device</b>                 |  |
|---------------------------------------|--|
| Total mass per device (incl. batt):   | approx. 21kg (allocated to 3 components) |
| Tripod leg footprint radius:          | 0.80m                                    |
| Maximum working height:               | approx 2200 cm                           |
| Minimum working height:               | approx. 1900 cm                          |
| Wind loading – no sandbag base:       | ~40km/h                                  |
| Wind loading – 3 sandbag/leg ~50kg:   | ~110km/h                                 |
| <b>Display &amp; Operations</b>       |  |
| LEDs color:                           | Red/Green                                |
| Display Area:                         | 320mm x 320mm                            |
| Speed:                                | from 20 to 150KPH                        |
| Detective range (Radar):              | 150 m                                    |
| Visibility (min):                     | 100m                                     |
| Working temperature:                  | -20°C to +70°C                           |
| Logging                               | Vehicle count and speed                  |
| Data Log capacity (SD card 16GB Max.) | 300 days of data per 1GB                 |
| <b>Battery &amp; Power</b>            |  |
| Battery Type:                         | LiFePO4, 12V                             |
| Max power consumption:                | 1.02 A (+0.5A )                          |
| Operation time:                       | ~16 hours at 80% DoD                     |
|                                       |  |
|                                       |  |
|                                       |  |
|                                       |  |
|                                       |  |

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### 4. Unit Assembly/On-site Setup

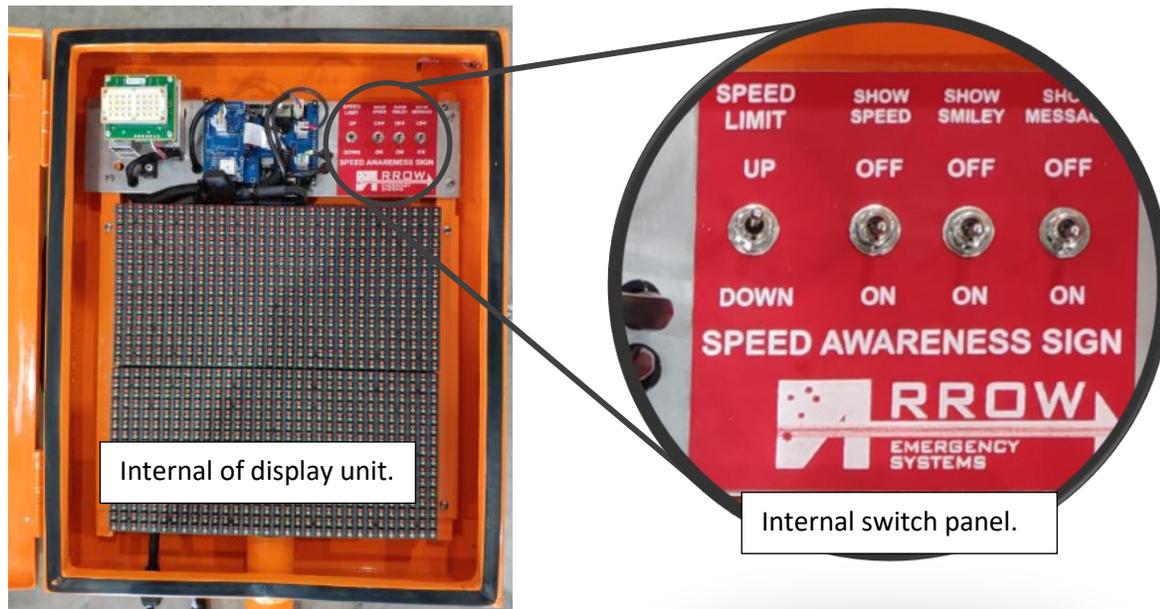
|   |   |  |  |
|---|---|--|--|
|                              |    |    |   |
| <p>Pull pin upwards to release the leg</p>  | <p>Extend legs out</p>  | <p>Pull the pin and align to the suitable notch (usually the middle notch).</p>      | <p>Adjust each leg so that the tripod stands stable on the ground.</p>               |
|                             |   |   |  |
| <p>Open the sandbag holder for each leg. Place sandbags for each leg as required to suit wind conditions.</p> | <p>Slide Battery compartment into the center column of the tripod</p>               | <p>Secure with locking screw to stop from rotating</p>                               | <p>Insert the eSAS unit over the battery compartment</p>                             |
|                            |  |  |  |
| <p>Secure with locking screw to stop from rotating</p>  | <p>Insert battery pack into battery compartment and Lock latches to secure it.</p>  | <p>Connect power cable. Connector latches once pushed in place.</p>                  |  |

**Note: Once the battery power is connected the unit will power up and ready for operation.**

## 5. Operational Procedures and Setup

The eSAS consist of an internal switch panel to change the radar speed limits and display options.

The switch panel can be accessed by releasing the latch on the right side of the display unit then open the door.

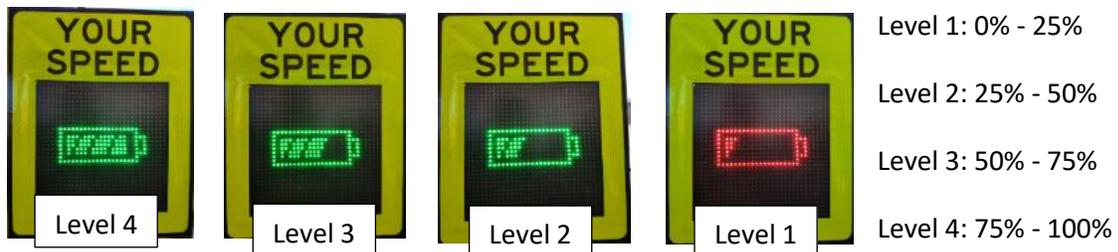


**To begin setup make sure the battery is plugged in and the battery status is displayed at the start.**

### a) Battery Status

When the battery is first connected to the eSAS unit, the unit will automatically power up and within 5 seconds, the battery status will be displayed for 2 seconds.

There is 4 level of battery status for the capacity of the battery. For the standard 21Ah battery supplied by ArrowES, the battery will last up to 20 hours from full capacity.



If the battery reaches level 1, the user should stop operation and charge the battery.

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### b) Critical low battery warning

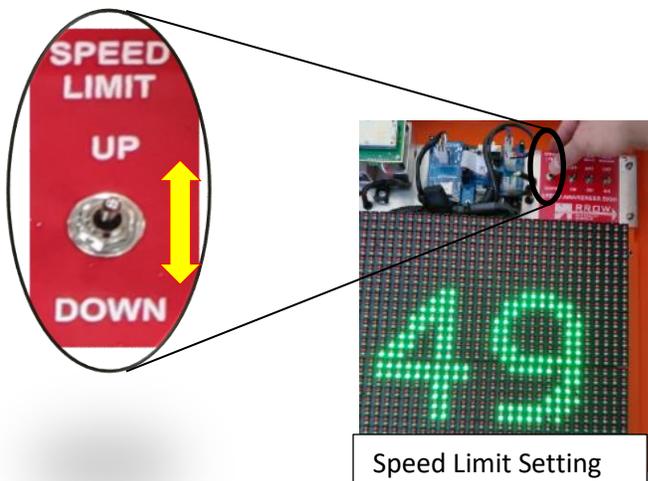
At any time during operation if the battery has become critically low, a small low battery warning symbol is displayed on the bottom right corner of the display. If a vehicle is detected the warning symbol will disappear and the display is as normal, this will ensure the low battery warning does not affect the drivers.

Once the battery warning is displayed, the battery must be removed and to be charged. If the unit continues to run, the battery will cut off within 1 hour. Is it recommended to charge the battery every day.



### c) Set Speed Limit

The SPEED LIMIT switch is an up/down momentary switch to adjust the speed limit. The number for this limit will be displayed on the LED display while the switch is press up or down.



Once the speed is set, it is saved to memory, the next time you power up it will remember the previous set limit, so the user does not need to set the speed limit every time, if the site is the same.

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### d) Set Display Options

The eSAS features 3 selection of display options, the 3 options can be mixed in any combinations. If a moving vehicle is detected, each option will be displayed for 2 seconds and cycles until no moving vehicle is detected.



**SHOW SPEED** – If the show speed is switched on. The unit will display the detected vehicle speed for 2 seconds. The color of the LED display will be green if the drive is below the limit, and red if the drive is over the limit.

If the detected speed is 20km over, the speed will not be displayed and a critical warning message (flashing “SLOW DOWN”) will display instead.



Vehicle speed under the limit



Vehicle speed over the limit

**SHOW SMILEY** – If the show smiley is switched on. The unit will display a green smile face if the detected vehicle speed under the limit or a red frown face if the detected vehicle speed under the limit. If show speed is also switched on, the detected speed will show first then follows by the smiley.



Green smile face



Red frown face

**SHOW MESSAGE** – If the show message is switched on. The unit will display a green ‘THANK YOU’ message if the detected vehicle speed under the limit or a red ‘SLOW DOWN’ message if the detected vehicle speed under the limit. If show speed and/or show smiley is also switched on, the detected speed will show first then/or the smiley is show second, then follows by the message.



Green ‘THANK YOU’ message



Red ‘SLOW DOWN’ message

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e) Displaying Faults

**SD Card Fault** – If the show speed is switched on. The unit will display the detected vehicle speed for 2 seconds. color of the LED display will be green if the drive is below the limit, and red if the drive is over the limit.

If the detected speed is 20km over, the speed will not be displayed and a critical warning message (flashing “SLOW DOWN”) will display instead.

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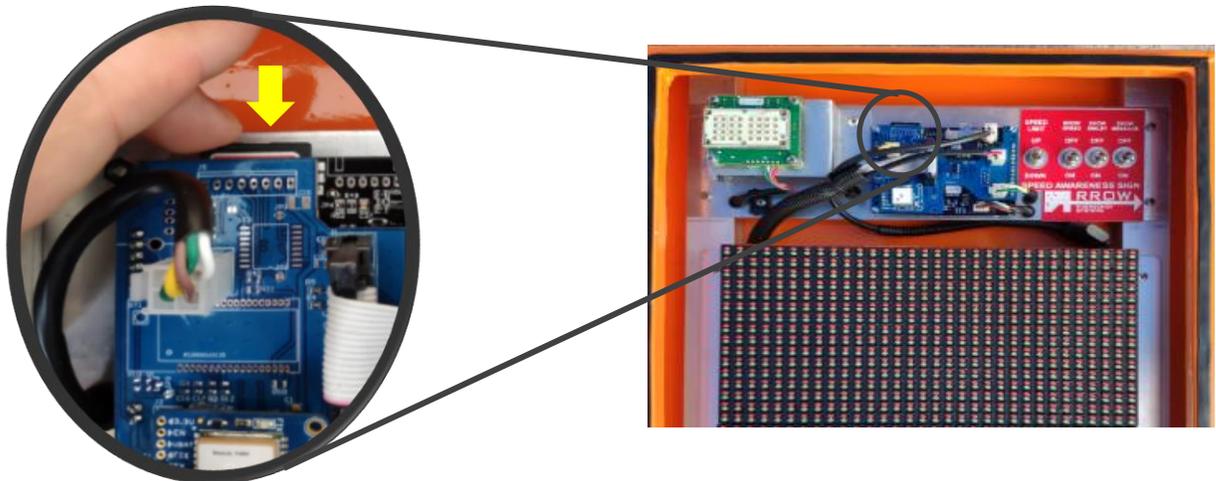
### f) Vehicle Count and Data Log

The eSAS data log feature allows the system to count an advancing vehicle passing at a point 20 meters away from where the eSAS unit is placed.

The data logging feature will log every vehicle speed passing the 20 meter point and the live GPS time, then saves the data to a SD card in a .CSV format.

#### SD Card

The SD card is located internally in the eSAS controller. Push to release and push again to latch.



#### Logged Data

Use a PC and .CSV compatible software (excel) to read the logged data.

The data is saved to a SD card in .csv format, where a new row is created for every vehicle count. Each row consist on date, time, count, set speed, detected vehicle speed. A new file will be create on a new day.

The data capacity is average 300 days per gigabytes. Maximum 16gb.

| Arrow Emergency System Speed Log   |         |           |           |               |
|--|---------|-----------|-----------|---------------|
| Location - [Longitute: 27.3152870000]S [Latitutde: 152.9802270000]E  |         |           |           |               |
| <a href="http://www.google.com/maps/place/27.3152870000S152.9802270000E">www.google.com/maps/place/27.3152870000S152.9802270000E</a> |         |           |           |               |
| Date   | Time    | Vehicle C | Set Speed | Vehicle Speed |
| 11-06-20   | 8:56:21 | 1         | 50        | 45            |
| 11-06-20   | 8:56:35 | 1         | 50        | 55            |
| 11-06-20   | 8:56:42 | 1         | 50        | 35            |
| 11-06-20   | 8:56:48 | 1         | 50        | 49            |
| 11-06-20   | 8:56:51 | 1         | 50        | 51            |
| Location - [Longitute: 27.315325]S [Latitutde: 152.980232]E  |         |           |           |               |
| <a href="http://www.google.com/maps/place/27.315325S152.980232E">www.google.com/maps/place/27.315325S152.980232E</a>                 |         |           |           |               |
| Date   | Time    | Vehicle C | Set Speed | Vehicle Speed |
| 11-06-20   | 8:57:34 | 1         | 50        | 46            |
| 11-06-20   | 8:57:37 | 1         | 50        | 98            |

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### Vehicle Count Principle of Operation

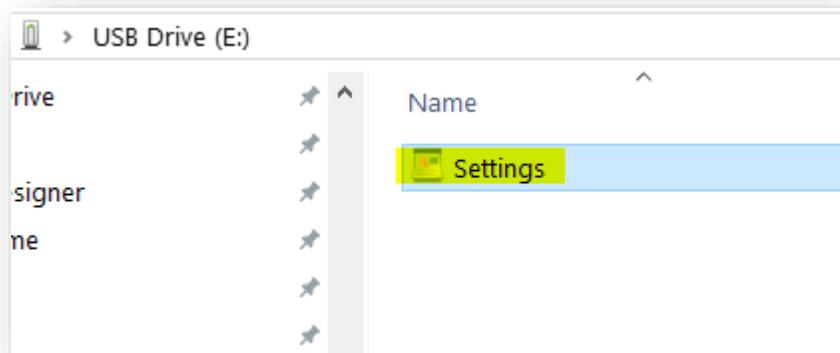
The range at which vehicles are counted in both advancing and receding (ESAS B only) directions has been carefully tested and calibrated and is a non adjustable value. The distance for advancing is 20 metres and the distance for receding is 40 metres.

### Count Accuracy

Free flow, moderate and heavy traffic flow studies have returned an average accuracy of >93%

### g) Setting Up Time Zone

1. The Settings.cfg file on SD card can be opened and modified to set up the time zone.



2. Open the Settings file from the SD, find the Time Zone Field and modify the value according to your time zone. Make sure you do not modify any other fields on the file.

```

23 1500
24 [Speed Warning Message On Time in Milliseconds]
25 2000
26 [Time Zone]
27 10
28 NUL NUL NUL NUL NUL NUL NUL NUL NUL [Enable Radar Count Logging]
29 1
30 [LDR Level 1 :Lowest 0 <--> 63 ]
31 005

```

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6. eSAS DVR camera system

Only for applicable eSAS

eSAS camera and DVR placement

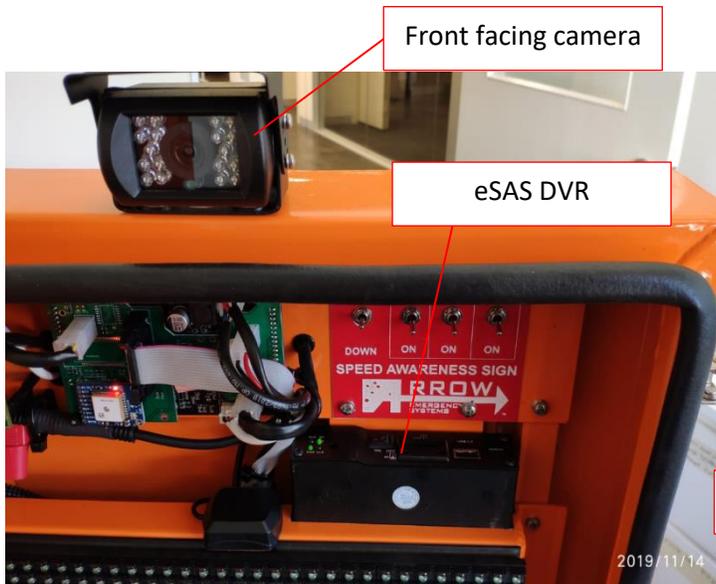


Figure 1. eSAS Camera and DVR

DVR functions



DVR Status

SD card slot

Recording enable SW

USB mouse

**Recording**

The eSAS 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.

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### Using a LCD and DVR video output

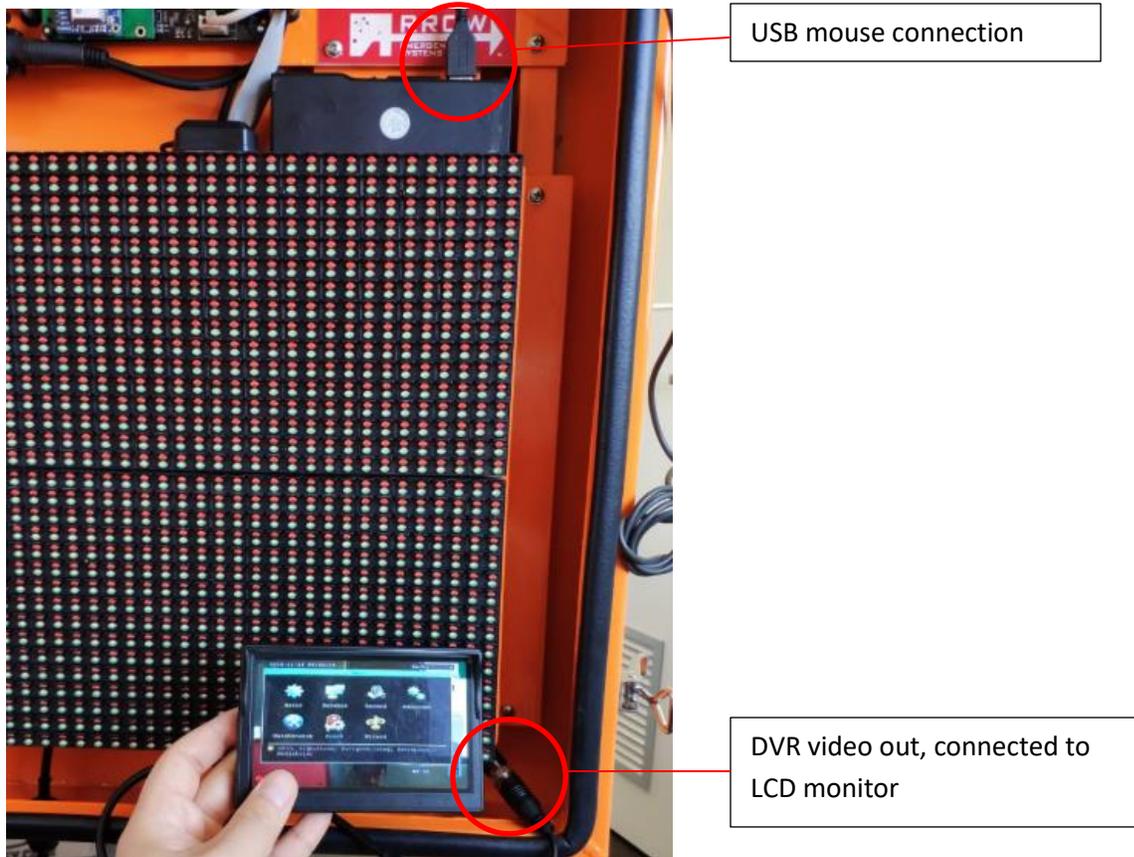


Figure 3. DVR output and LCD

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 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**

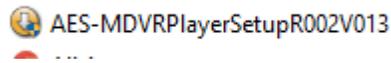
Video play back can be done by accessing the DVR menu using the LCD and a mouse.

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.

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### Using the MDVR player to play back video

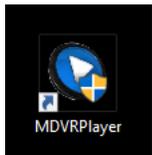
#### Installing the software



The MDVR player software can be download from google drive below or contact your supplier for a copy:

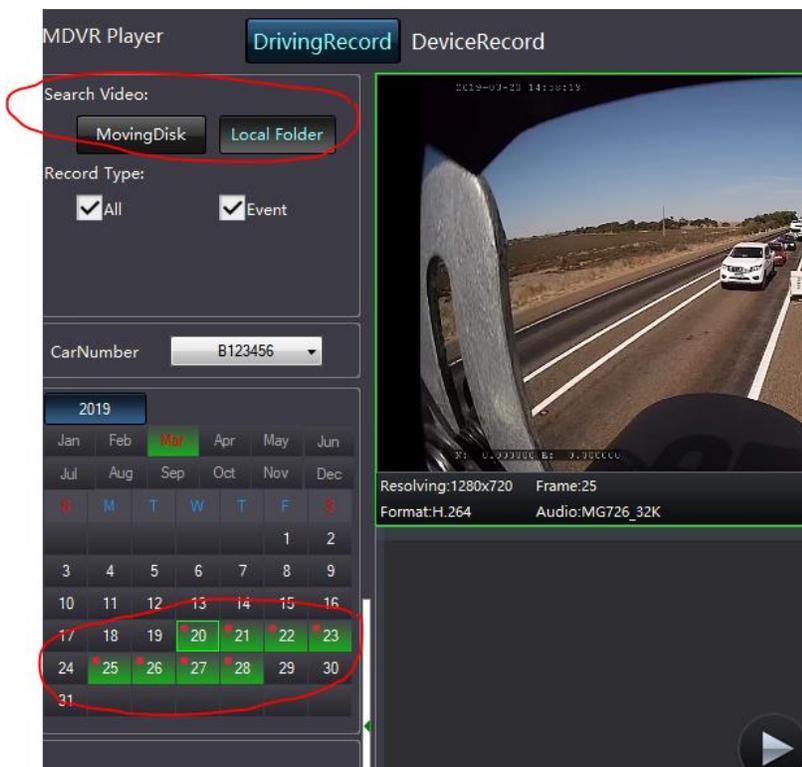
<https://drive.google.com/open?id=1m99gUbCpWWMObX4Er0i44JcZpwdXD9w1>

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



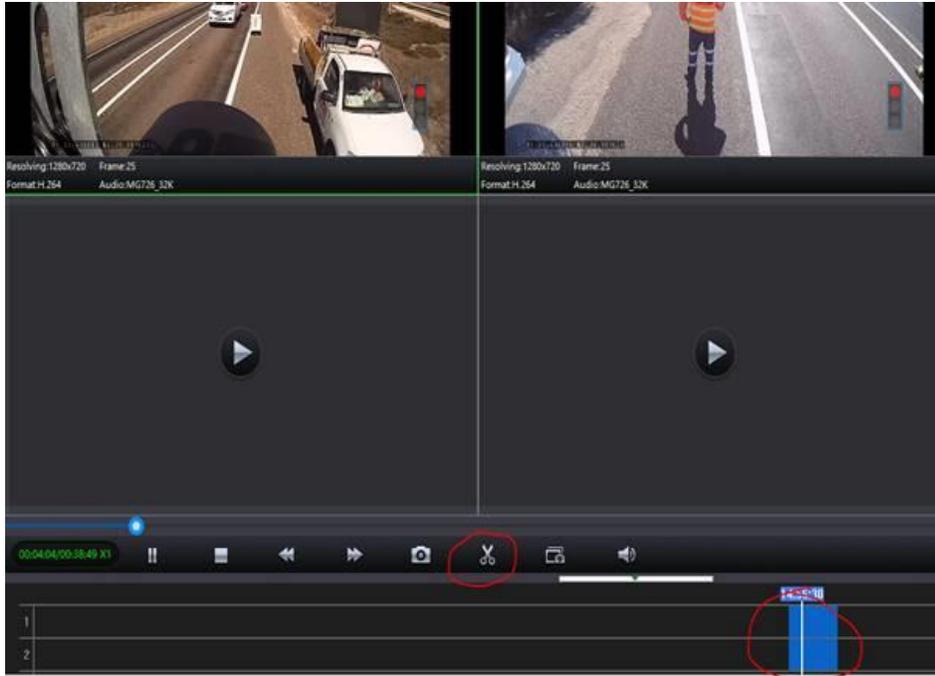
-Once the software is installed, under Search Video click on the local folder and open the SD card folder where the recordings are.

-Once the SD is loaded, the calendar below will highlight the dates in green where there is recording, if you double click a date.



-After you double clicked a date, the recordings will show on the timeline on the bottom of the screen, you can double click on any of the highlighted section to view the footage.

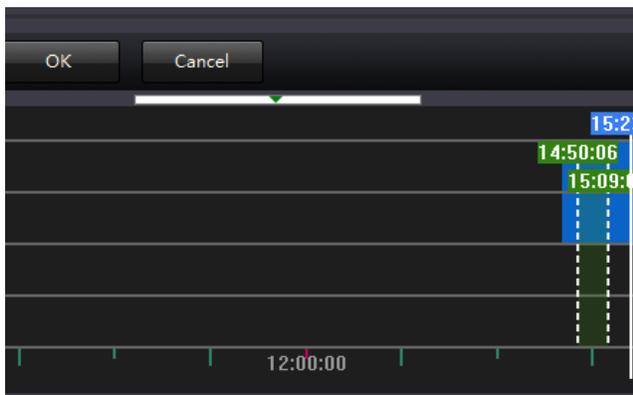
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### Cut clips to backup

-You can use the cut tool to cut out a sections of the footage and export as AVI/mp4 format.

-once the cut tool is selected, there will be 2 dotted lines with start time and end time, you can drag the lines to select you time period. Then press okay and a export window will popup to save the file to a specific path.



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.

### 7. Batteries - Care, Safe Handling and Charging

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. Charge battery every 3 months if in storage. DO keep all batteries in a safe place away from Children and pets.

#### 1. Charging the Batteries

Release the connector cap at the top box of the battery and connecting to the battery charger that is supplied by ArrowES.

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.*

#### 2. 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.

## 8. Repairs & Servicing

All repairs and servicing of the eSAS 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 eSAS

## 9. Safe Transportation of the eSAS

The eSAS 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.

## 10. Material Life

The mechanical components and structure of the eSAS 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.

## 11. Warranty

The eSAS is supplied with a limited ex factory warranty for 12 months.