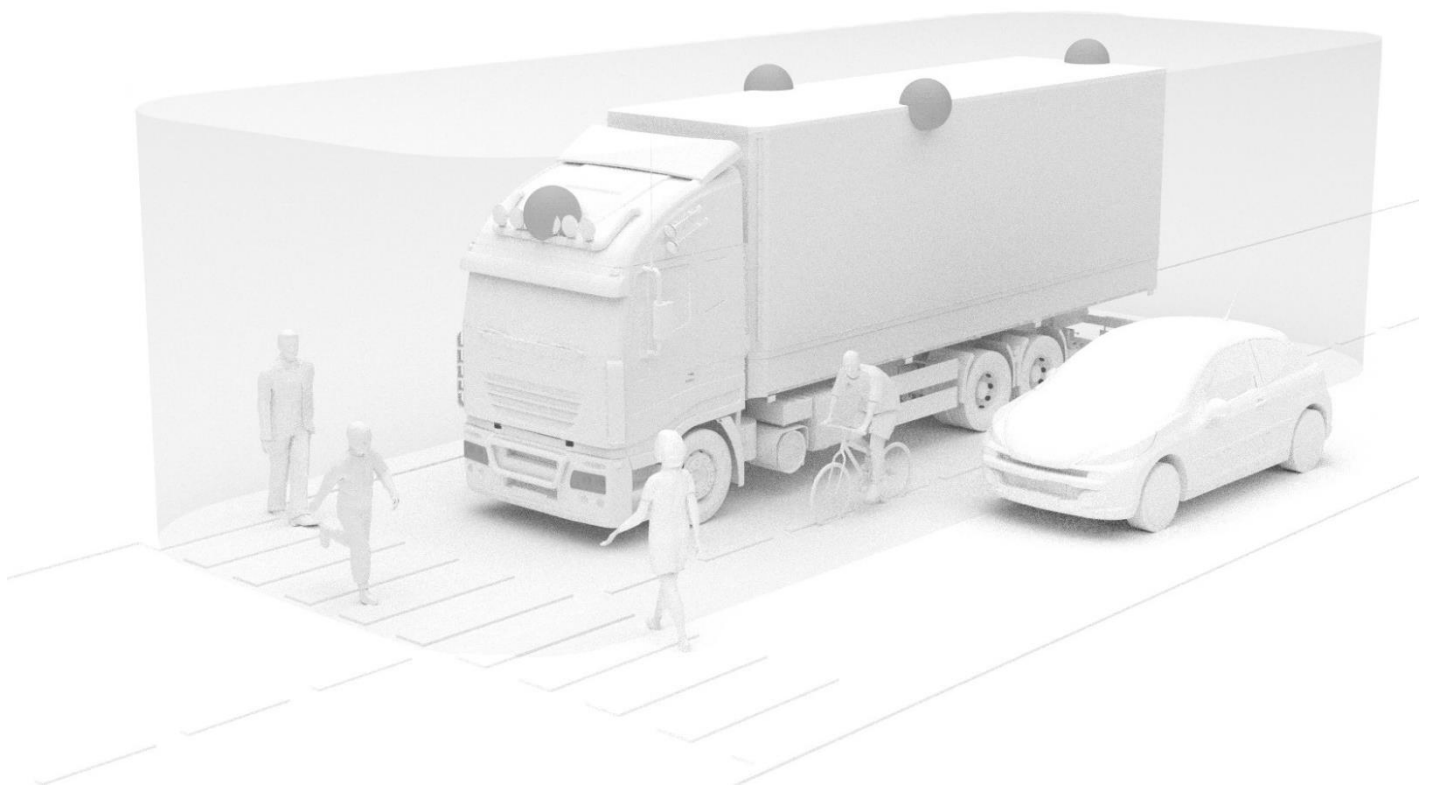


# Backeye<sup>®</sup> 360 Select BN360-200 Calibration, Installation & Operation Guide



Please refer to <http://brigade-electronics.com/> for most up-to-date data on all products



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## 2 Introduction to BN360-200 Backeye® Select 360°

Brigade's BN360-200 Series Backeye® Select 360° system is an advanced camera monitor system that provides a simulated birds-eye-view of the vehicle, giving drivers the ability to see all around the vehicle in a single image. Using Backeye® 360 Select system drivers can significantly improve blind spot visibility and low speed manoeuvrability versus traditional camera monitor systems. The BN360-200 system comprises of four of Brigade's ultra-wide-angled cameras, an ECU, power and interface harnesses and an IR remote control for interaction with the system. By placing the ultra-wide-angled cameras symmetrically around the vehicle the ECU can capture and process single camera images into a single, top-down view of the full surroundings of the vehicle.

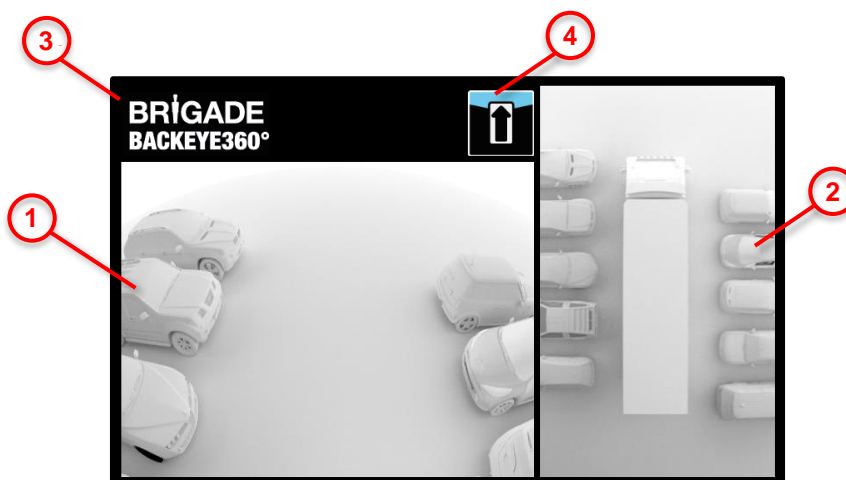
### Please Note:

The composite view is not a true overhead pan view and objects may appear distorted, partial or further/closer away than they appear – especially in areas where the image is a combination of two cameras (i.e. where the two camera images “blend”). It is imperative that Brigade Backeye®360 Select is fitted and commissioned by competent and trained technicians. The installer is responsible for the fitness for purpose of the overall system and adheres to relevant regulations and legislation. Operators of the vehicle to which the Brigade Backeye®360 Select system is fitted must be made fully aware of how to interpret the images provided by the system so they will not be distracted by or rely completely on it. Distraction can cause accidents. The system is intended to aid the operator, who must still concentrate on operating the vehicle, obey traffic and local regulations and continue to use his/her own training, senses and other vehicle aids, such as mirrors, as would be done if the system were not in place. Nothing removes the responsibility of the operator to operate the vehicle in a proper and lawful manner.

### 2.1 Product Features

- Full 360° view of vehicle surroundings in a single image given by simulated birds-eye-view
- 4 x ultra-wide-angled cameras with up to 185° horizontal field of view giving improved viewing area even on single camera views (versus traditional camera systems)
- Customisable 360° views via Calibration software
  - Front/Rear Focus View – top down view focusing on front/rear of vehicle
  - Left/Right Lane Change View – 360° surround view image shifted to show additional left/right side lanes
  - Front/Rear Crossing Traffic View – processed front/rear single camera image drawing attention to extreme corners of field of view
  - Custom 360° image positions (e.g. 270° views for articulated vehicles)
- NTSC or PAL video output from ECU
- 4 x trigger inputs: reverse/left/right/speed signal
- OSD Configuration Menu: default view/triggered views/speed signal trigger/picture adjustments

### 2.2 Display Overview (default view)



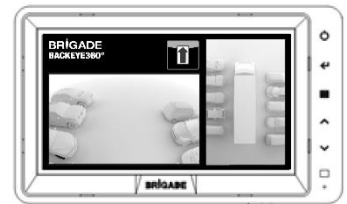
1. Single camera view – shows the single camera normal view (i.e. front, rear, left or right)
2. 360° surround view image – the simulated, 360° birds-eye view of the vehicle
3. Brigade logo – not visible on portrait full screen views
4. View information graphic – pictogram that indicates which single camera view is currently being displayed

## 2.3 Display Configurations

The BN360-200 system can be installed in either Landscape or Portrait Display Mode depending on the users preference. The desired monitor orientation/layout will determine which View Configuration is used when installing the system.

### 2.3.1 Landscape Mode

For Landscape Mode, the monitor is installed in landscape orientation. The system can display the 360° surround view image next to a single camera image view or a full screen single camera view. The default view and triggered views can be assigned in the OSD Menu.



### 2.3.2 Portrait Mode

For Portrait Mode, the monitor is installed in portrait orientation. The system can display the 360° surround view image in full screen for a larger 360° view, or it can display the 360° surround view image above (for rear camera) or below (for front/side camera) the single camera views. The default view and triggered views can be assigned in the OSD Menu.



## 2.4 View Configurations

The system is capable of storing 10 different views per installation, there are 4 different configurations (see table below) to make use of all of the views the system is capable of. The desired combination of views will determine which configuration files are used during the calibration procedure:

No.	View Mode	View Configuration			
		Landscape 1	Landscape 2	Landscape 3	Portrait 1
1	Top + Mirrored Rear View	✓	✓	✓	✓
2	Top + Front View	✓	✓	✓	✓
3	Top + Left View	✓		✓	✓
4	Top + Right View	✓		✓	✓
5	Top + Front Focus			✓	
6	Top + Rear Focus			✓	
7	Top LH Lane + Left View		✓		
8	Top RH Lane + Right View		✓		
9	Top + Front Crossing Traffic				✓
10	Top + Rear Crossing Traffic				✓
11	Top LH Lane Full				✓
12	Top RH Lane Full				✓
13	Top Full				✓
14	Front Full	✓	✓	✓	
15	Rear Full	✓	✓	✓	
16	Left Full	✓	✓	✓	
17	Right Full	✓	✓	✓	
18	Front Crossing Traffic	✓	✓		
19	Rear Crossing Traffic	✓	✓		

## 2.5 Views Modes

The View Modes are the different views that the system can display in each Display Mode. Examples images of the view modes listed above are shown in the table below:

View	Description	Example Image
Top + rear view Top + front view Top + left view Top + right view	<p>“Top” refers to the 360° birds-eye/surround view image, the vehicle image is centered within the 360° image and is placed to the right (for Landscape configurations) or above/below (for Portrait configurations) of the single camera image (i.e. front camera/rear camera etc.).</p>	
Top Full Top LH Lane Full Top RH Lane Full	<p>Full screen 360° views for Portrait Mode only.</p> <p>The LH/RH Lane change views move the vehicle to the left/right giving emphasis to the sides of the vehicle.</p>	
Front (full) Rear (full) Left (full) Right (full)	<p>Displays the front/rear/left/right single camera views in full screen only.</p> <p><b>This is a Landscape View Mode only.</b></p>	
Front Crossing Traffic Rear Crossing Traffic Top + Front Crossing Traffic Top + Rear Crossing Traffic	<p>Simulates cameras placed on the corners or the vehicle facing down an intersecting junction. This view gives extra emphasis on the extreme corners of the front/rear views where pedestrians or vehicles might be crossing the path of the vehicle.</p> <p>Displayed full screen In Landscape Mode or above/below the 360° image in Portrait Mode.</p> <p><b>Note: this View Mode should only be used for observing corner areas and not in circumstances where the full front/rear field of view is required.</b></p>	
Top + front focus Top + rear focus	<p>The front/rear “focus” view gives extra emphases on the top down view of the front/rear of the vehicle (this view replaces the single camera view).</p> <p><b>This is a Landscape View only.</b></p>	

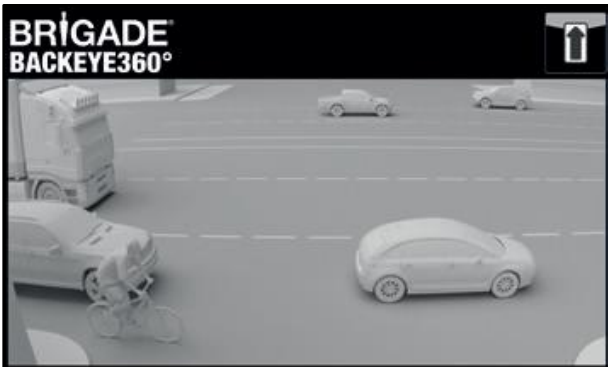
## 2.6 Crossing Traffic View

Crossing Traffic View is a new view mode for the BN360-200 system that simulates cameras placed on the corners of the vehicle bringing increased awareness to the front or rear of the vehicle when approaching intersecting traffic.

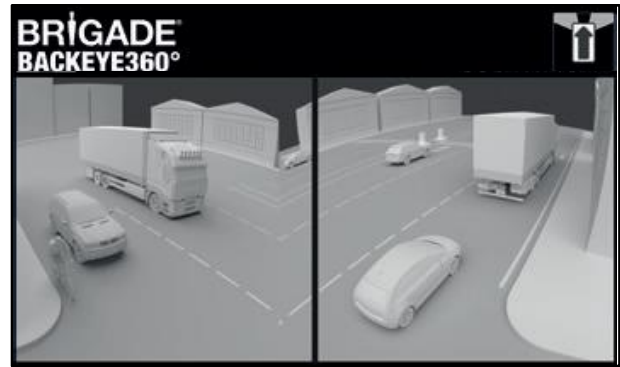
The view is generated by extracting and processing the front or rear single camera images and removing the middle section of view. The two “corner” images are placed side-by-side with a red border indicating to the driver that the view is not a normal front/rear camera view.

As these views use only the corner sections of the single camera image the middle field of view (typically the zone directly in front/behind of the vehicle) is removed creating a large blind spot. The extreme corners of the camera image can appear heavily distorted. Brigade recommends that this view is not used for manoeuvring the vehicle, this should only be used only to monitor the corner areas before switching to a normal view.

Front Full View



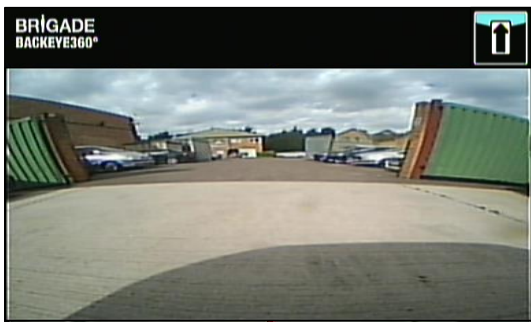
Front Crossing Traffic View



**Note:** the image above is an example only and shows how the view might appear for ideal camera mounting locations. Cameras mounted lower to the ground will reduce the effectiveness of this view.

The examples below show how this view might appear, cars were parked in front and behind a vehicle at similar distances.

Camera mounted at 0.6m:



View is low to the ground, low visibility of extreme corners, vehicles not in view.



Vehicles appear in view, heavily distorted but objects are clear. Large blind spot in middle field of view.

Camera mounted at 1.8m:



View is clearly higher off ground, objects in extreme areas are more visible although still unclear/not obvious, red vehicle to right of image is almost invisible.



Vehicles appear clearly in the middle of the screen, objects are distorted but are clear and significantly more obvious. Red vehicle is clearly in the view.

## 3 System Components

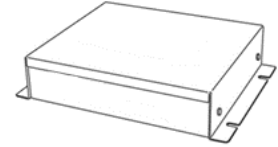
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### 3.1 Backeye® 360° Select Kit - BN360-200

The following is a list of the components that are supplied with the BN360-200 system.

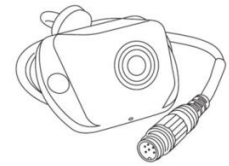
#### 3.1.1 ECU - BN360-200-ECU

Interfaces between the cameras and monitor, performs the complex image processing and contains the software for the OSD configuration menu.



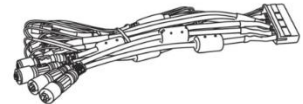
#### 3.1.2 Cameras (4 off) - BN360-100C

Set of four ultra-wide-angled cameras with mounting bracket and housing included.



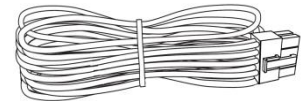
#### 3.1.3 Main interface harness - BN360-200-INT

Main interface harness provides connectivity between cameras, ECU, Set-up & View Select Button.



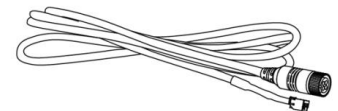
#### 3.1.4 Power harness - BN360-200-PWR

The power harness provides connectivity between vehicle trigger and power sources.



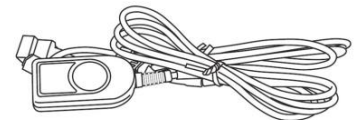
#### 3.1.5 Select Video Output Cable – BN360-VBV-L4015

The Video Output Cable provides the Main Interface Harness the ability to connect to Brigade VBV style monitors.



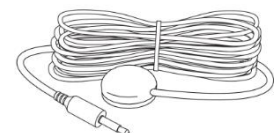
#### 3.1.6 Set-Up & View Select Button – BN360-CP-01

The Set-Up & View Select button is used for calibration and changing the view. The Set-Up & View Select Button does not have to be mounted for driver to use.



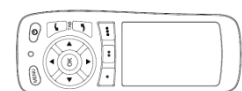
#### 3.1.7 IR Receiver - BN360-200-IR

The IR Receiver provides the BN360-200-ECU with IR remote control functionality.



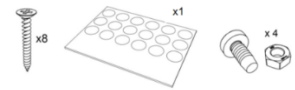
#### 3.1.8 IR Control - BN360-200-RC

The remote control provides the interface between the user and the BN360-200 configuration menu.



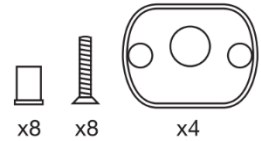
### 3.1.9 Camera Fitting Kit - BN360-100C-FIX

The fitting kit contains all the required fixing components for fitting the cameras to a vehicle. This consists of self-tapping screws, machine screws and nuts & screw caps.



### 3.1.10 Isolation Gasket Kit – BN360-100C-MK

The mounting gasket kit stops vehicle noise or interference that may disturb the camera image by insulating the camera and its body from the vehicle ground.



## 3.2 Calibration Tools

The following is a list of the components that are required to calibrate the Backeye360° products.

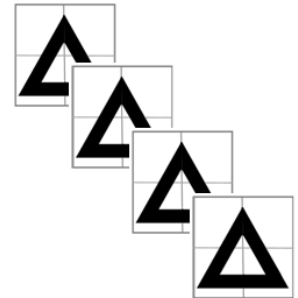
### 3.2.1 Calibration Tool – BN360-CT-01

Used for transferring data (e.g. calibrations, capture images, backup data etc.) between the ECU and PC from data saved on an SD card.



### 3.2.2 Calibration mats (4 off) – BN360-CAL-MAT

These mats are aligned around the vehicle to perform the camera calibration for the 360° surround view image.



### 3.2.3 USB – BN360-200-USB

The USB contains all documentation, software and support files required to install and calibrate the BN360-200 system, including the Brigade Backeye® 360° Select Calibration Software.

*For the latest USB contents please contact Brigade Electronics.*



## 4 SD Card Data

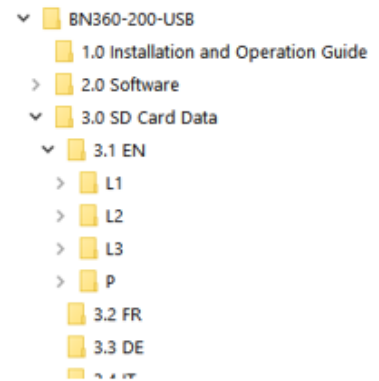
### 4.1 SD Card Contents

The SD Card contains all the necessary files to capture images from the cameras, perform camera position calibration and upload the calibration data. The SD Card Data can be found on the BN360-200-USB in the “3.0 SD Card Data” folder, the desired configuration chosen (see section 2.4) will decide which files are used during the calibration procedure.

Within the “3.0 SD Card Data” folder there are various language versions, choose the correct language for the given installation.

The Configuration files are stored within each of the language folders, e.g. for English Landscape 1, choose the 3.0 SD Card Data > 3.1 EN > L1 folder.

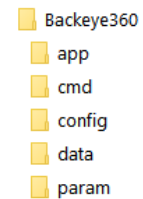
Refer to section 2.4 for more information on View Configurations.



### 4.2 Backeye360 Folder

The “Backeye360” folder contains all the relevant files for the calibration procedure and must be copied to the root of the SD Card at the very beginning of the calibration procedure.

**The Backeye360 folder must be at the top level of the SD Card, if the Calibration Tool does not find the Backeye360 folder the calibration procedure will not begin.**



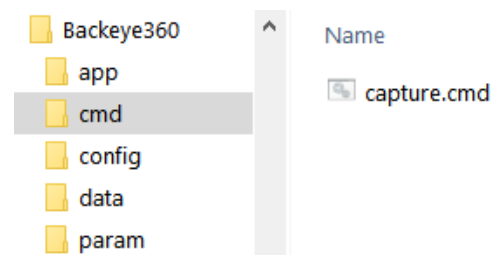
It is also important that the folders within the Backeye360 folder are not altered in any way, these must remain within the folder and must not be renamed when copying to the SD Card. See the table below for a summary of the folders within the Backeye360 folder and their functions:

Top folder	Sub-folder	Description
Backeye360	app	ECU firmware
	cmd	Command file for calibration tool actions
	config	Config file for calibration software
	data	Artwork files (vehicle mask, logo, warning message)
	image	Captured vehicle images (created when capturing images)
	param	Camera calibration data

### 4.3 CMD File

The most important file within the Backeye360 folder is the CMD file that is found within the “cmd” folder. The name of this file determines what function the Calibration Tool should perform. To change the Calibration Tool operation, the CMD file must be renamed. By default, the CMD file is named as “capture.cmd” to allow the Calibration Tool to capture the camera images.

**Note: ensure the “cmd” file type is given as “Windows Command Script” when renaming the file. The “.cmd” extension in the file name may not be required depending on how the Windows Explorer file extension settings are configured.**

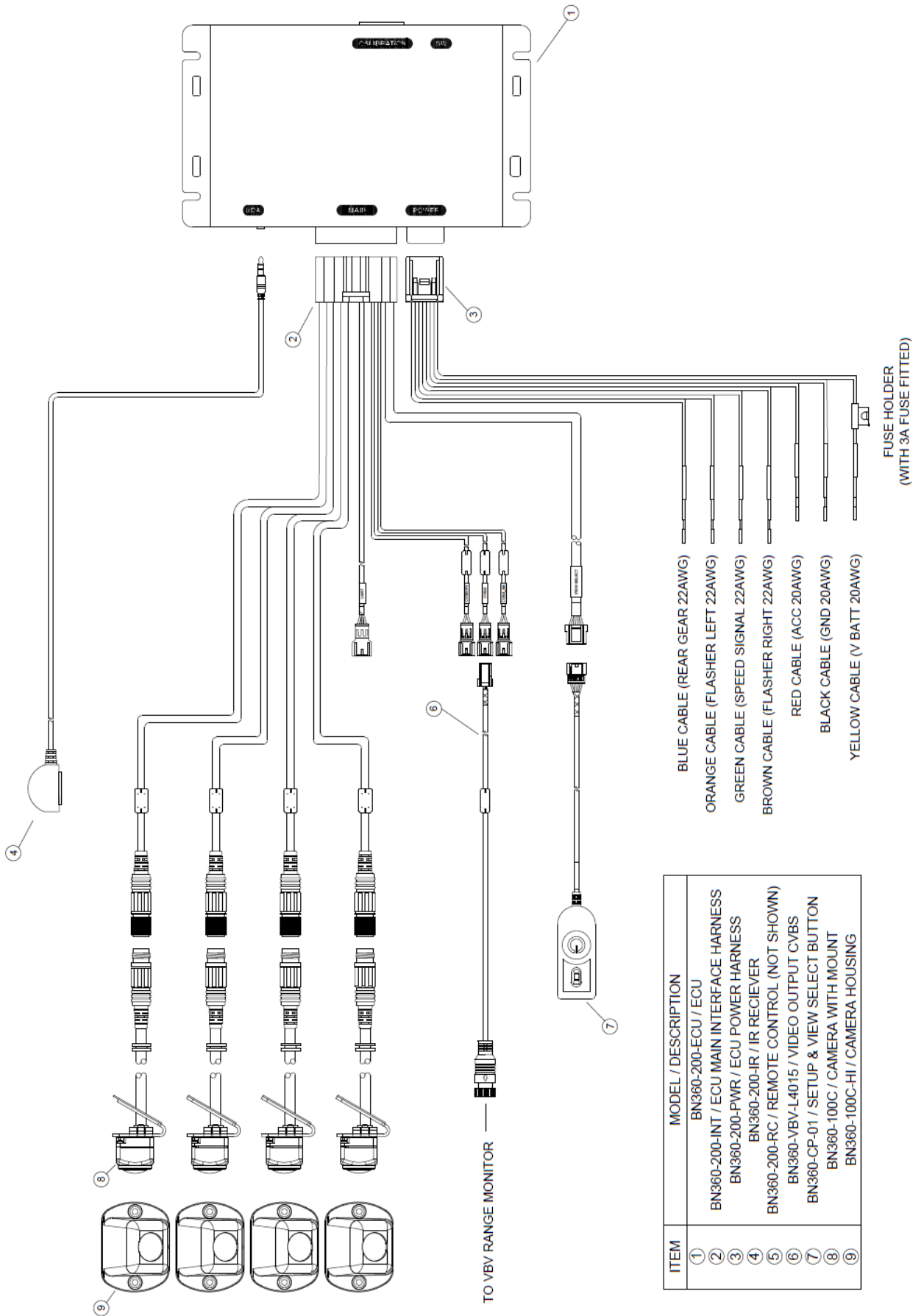


A list of the various file names and their functions is given below:

File Name	Function
backup.cmd	Back up ECU data, useful for performing multiple installations on same set-ups
capture.cmd	Captures single camera images for calibration
update.cmd	Updates ECU with data on SD card
sysinfo.cmd	Displays System Information screen

## 5 Hardware Installation

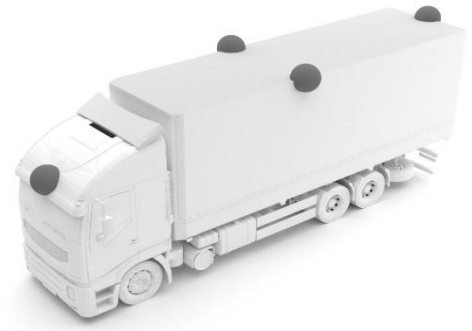
### 5.1 Connection Diagram



## 5.2 Camera Installation

The BN360-200 cameras should be mounted as symmetrically as possible around the vehicle, preferably centrally on each side of the vehicle. Whilst this is ideal, cameras can be positioned in differing locations on the vehicle although this will affect the overall quality of the 360° image.

It is recommended that the cameras are mounted temporarily in the first instance to evaluate the camera positioning and perform any adjustments before installing them permanently.

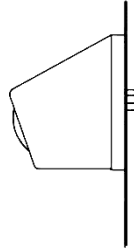


### 5.2.1 Camera Mounting Angle

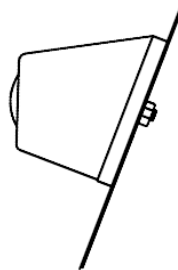
The cameras are designed to be mounted on a vertical surface to give correct alignment such that approximately 10% of the camera image is the vehicle body as shown below. In some cases, this may not be possible and may require adjustment using Brigades universal mounting brackets.

The cameras should be mounted flush to the vehicle body. Ensure Isolation Gasket Kit is used if the cameras are mounted to metallic body parts.

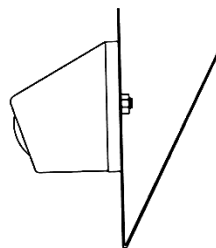
Ideal mounting, vehicle body occupies 10% of camera image.



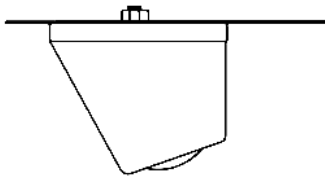
Non-ideal mounting, vehicle body does not appear in camera image.



Camera position corrected with mounting bracket.



It may be necessary to mount the cameras on a horizontal plane, such as under slung on the vehicle body. When mounted in this orientation the camera needs to be rotated through 180° on its mounting bracket. Additional drain holes should be made in the lower corner of the camera housing.



Additional drain holes



Camera normal position



Camera rotated 180° in mount

### 5.2.2 Camera Mounting Height

The mounting height of the camera is crucial to the quality of the 360° image. Typically, cameras mounted higher on a vehicle will produce a better 360° surround view image however the minimum mounting height will be dependent on a number of variables i.e. the length of the vehicle, the position of the cameras etc. As long as each camera can see the markers as shown in section 6.2 the system will calibrate, however the overall performance may not be deemed suitable. Cameras mounted too low will affect the perspective of objects above ground level. In the image below the 1m pole appears as expected on the side cameras where the mounting height is good but appears distorted for the front camera that is mounted at 0.6m:



1m long pole below a camera mounted at 1.8m



Top of pole seen from a top view perspective



1m long pole in front of a camera mounted at 0.6m



Full length of pole seen from a top view perspective

### 5.3 Cable Routing

Camera cables should be run in conduit and along suitable cable runs throughout the vehicle. Avoid running cables with vehicle power cables to prevent possible interference. To prevent cable damage always allow a reasonable radius when folding excess cable and do not over tighten cable ties. Note: a 13mm hole is required to pass connectors through.

### 5.4 ECU Mounting

The ECU should be mounted in a location free from moisture and excessive heat. **Note: the ECU body may generate some heat during normal operation.**

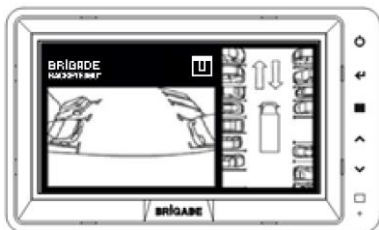
### 5.5 System Connection

Refer to the vehicle manufacturers bodybuilder guidelines for installation procedures and connectivity in all applications. Ensure the power and ignition connections are fused at source. For system connectivity, refer to System Drawing in section 5.1.

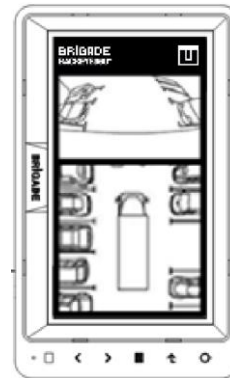
### 5.6 Monitor

The monitor should be fixed in a suitable location for the operator and in line with any current legislation/regulations. The system can be installed in landscape or portrait view orientations therefore it may be necessary to rotate the monitor by 90°.

Default System displayed on a monitor in Landscape position



Portrait configuration displayed on a monitor rotated for correct view orientation



### 5.7 Initial System Power Up

With the system connected as per Section 5.1, turn the vehicle ignition on and check the image output on the monitor.

**Note: The "WARNING" message will be displayed until a calibration has been completed for the first time.**



Pressing the View Select Button on the Set-up & View Select Button will cycle through the single camera views. This would be a good time to check the camera positioning as per Section 5.2.



## 6 Vehicle Calibration

To create a usable and reliable 360° surround view image a full calibration needs to be performed. As every vehicle and installation is different from the next, the camera positions must be calibrated using the Backeye 360° Calibration Kit. The procedure involves the following steps:

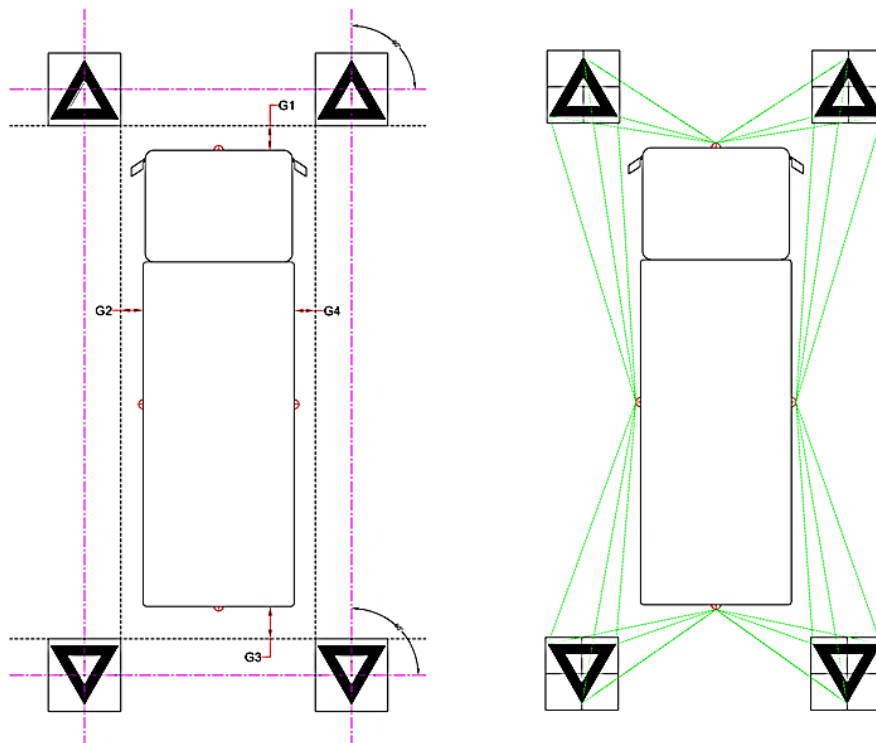
- Camera installation on vehicle.
- Place Calibration Mats around vehicle.
- Capture vehicle images using Calibration Tool.
- Calibrate camera positions using Calibration Software.
- Upload calibration data to the Backeye 360° ECU.
- Verify Calibration result.

### 6.1 Calibration Environment

A minimum 2m perimeter is needed around the vehicle. The floor needs to be a flat surface as calibration may not be possible if the ground is uneven.

### 6.2 Calibration Pattern and Vehicle Alignment

The Calibration Mats listed in Section 3.2.2 should be placed symmetrically around the vehicle as shown in the image below (left). The Calibration Mats should ideally be placed as close to the cameras as possible however this may vary for different vehicle and installation types, as long as each camera is able to see all three points of the two triangles in the cameras field of view as shown in the image below (right) the system will calibrate. The more accurately the Calibration Mats are positioned around the vehicle, the better the final result will be. Chalk line, string or laser tools are recommended for improved accuracy.



**Note: it is imperative that the Calibration Mats are laid out as shown above, if the orientation of the mats is different (e.g. they are rotated through 90°) the system will not calibrate correctly.**

### 6.3 Camera Image Collection

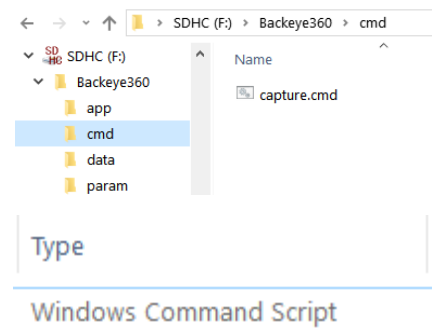
*It is recommended to format the SD Card before calibration.*

With the vehicle ignition off, insert the Calibration Tool in to the BN360-200-ECU and turn the vehicle ignition ON. The following screen will be shown:



Copy the “Backeye360” folder from the desired configuration to the SD Card. Refer to section 2.4 for more information on the different Display Configurations. Ensure the “Backeye360” folder is at the root of the SD Card and the file inside the “cmd” folder is named “capture.cmd”.

**Note: ensure the “cmd” file type is given as “Windows Command Script” when renaming the file. The “.cmd” extension in the file name may not be required depending on how the Windows Explorer file extension settings are configured.**



Insert the SD Card into the Calibration Tool. The system will display the single camera views.

Confirm each of the vehicle cameras can see two of the Calibration Mat triangles. Pressing the View Select button on the Set-up & View Select Button will cycle through each of the cameras.

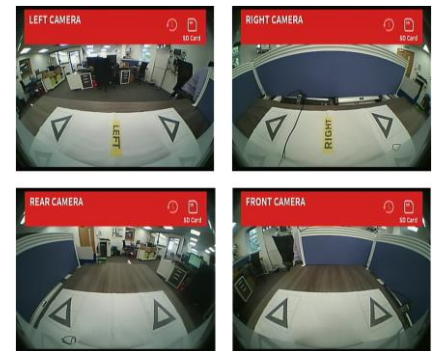
It may be necessary to adjust the Calibration Mats or camera positions if the cameras cannot see the Calibration Mats.

**Image is for example purposes only.**



Once each camera can see the Calibration triangles clearly, press and hold the View Select button on the Set-up & View Select Button for 3 seconds and release to capture and export the camera views to SD Card.

**Note: Do not remove the SD card during this process.**



When the images are successfully saved the following screen will be displayed and the SD Card can be removed from the Calibration Tool.



Eject the SD Card from the Calibration Tool and insert it into the PC that the calibration will be performed on. Confirm the SD Card now contains an “image” folder in the Backeye360 folder with the individual camera views (these should be named “front.bmp”, “rear.bmp”, “right.bmp” and “left.bmp”).



## 6.4 Installing the Backeye®360 Calibration Software

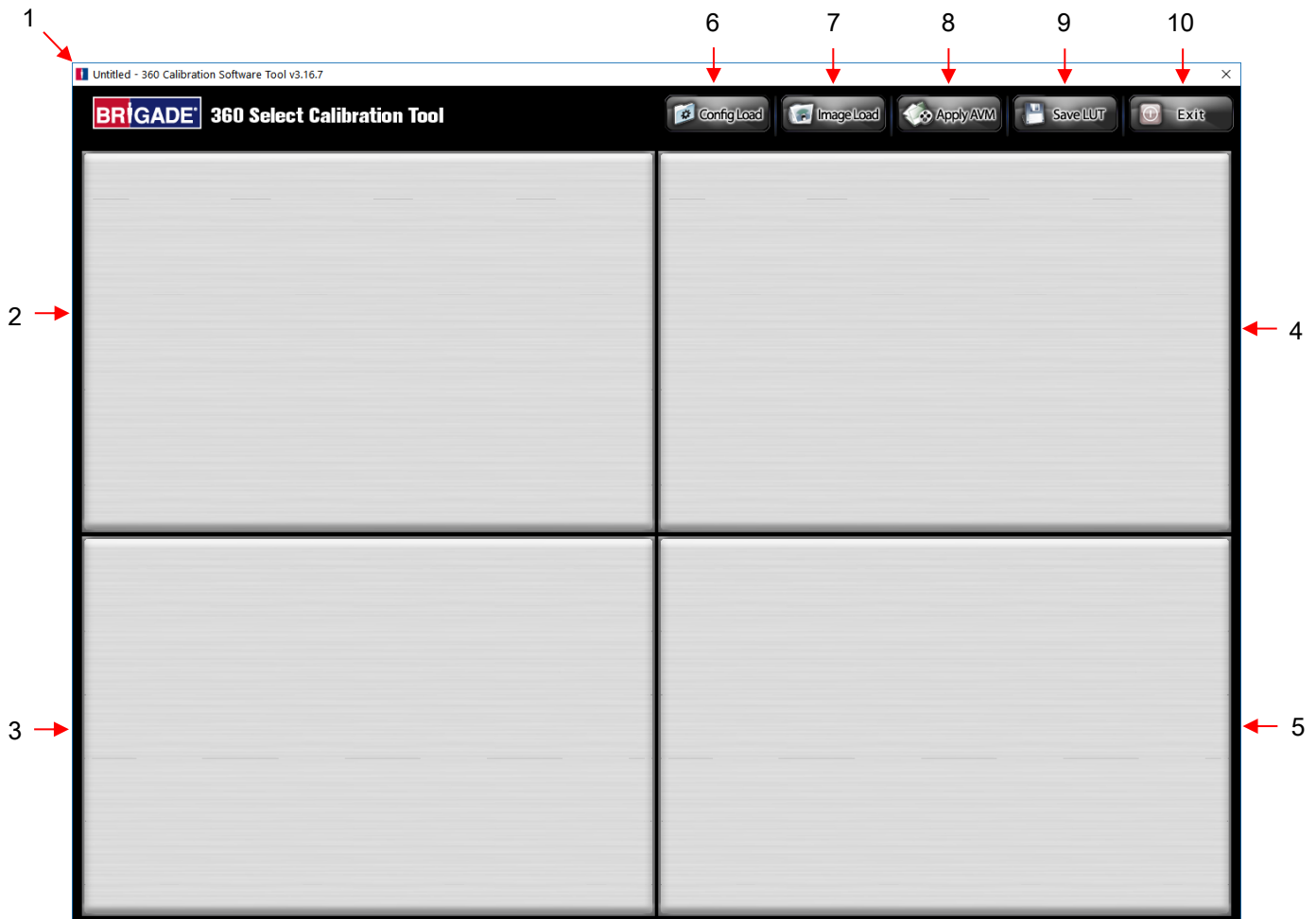
Install the Calibration Software from the BN360-200-USB (2.0 Software folder) by double clicking the set-up file and following the instructions. Ensure the latest version of the software is used, visit Brigades website to download the current version.



## 6.5 Using the Backeye®360 Calibration Software

### 6.5.1 Calibration Software Overview

Once the installation is complete, double click the Backeye®360 Calibration Software desktop icon, the start screen will be displayed:



#### **System version status bar**

1. System version status bar (displays the software version and the currently loaded Config file version)

#### **Camera image display and control point selection window**

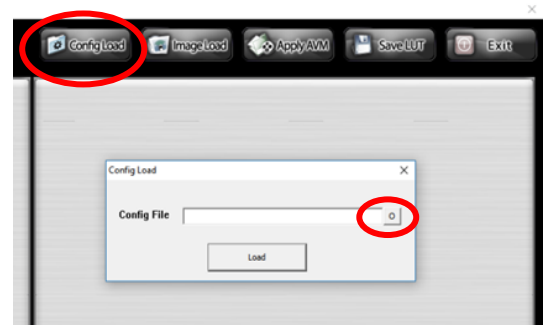
2. Front camera image and control point
3. Rear camera image and control point
4. Left camera image and control point
5. Right camera image and control point

#### **Tool bar**

6. Input configuration file (loads configuration file from SD card)
7. Input image (loads the images from the SD card section)
8. Around View preview (opens the surround view preview screen)
9. Save LUT (saves the calibrated data files to the SD card)
10. Exit (exits the program)

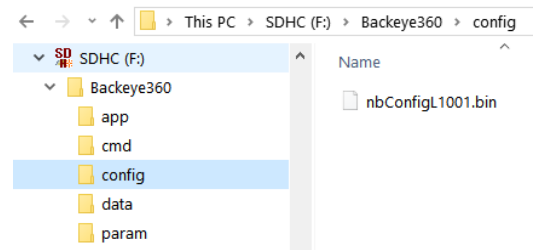
### 6.5.2 Loading the Config File

Click the “Config Load” button and when the Config Load window opens, click the “o” icon to locate the Config file.



Navigate to the configuration file location, this can be found in in the “Config” folder on the SD Card.

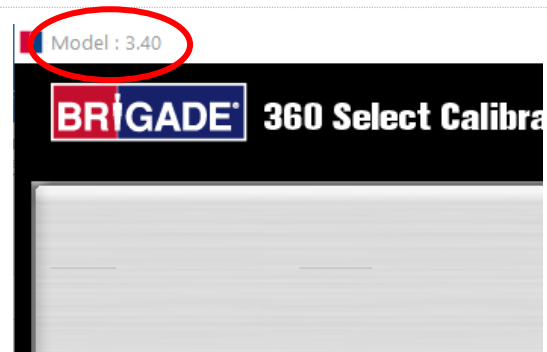
The Config file name contains the configuration type and the revision number, e.g. Landscape 1 config file revision 1 will be named nbConfigL1001.bin. Always ensure the latest revision is used by downloading the latest software from Brigades website.



With the Config file loaded the system version status bar will update to show the configuration that has been used, these versions are:

- 3.40 = Landscape 1
- 3.41 = Landscape 2
- 3.42 = Landscape 3
- 3.43 = Portrait

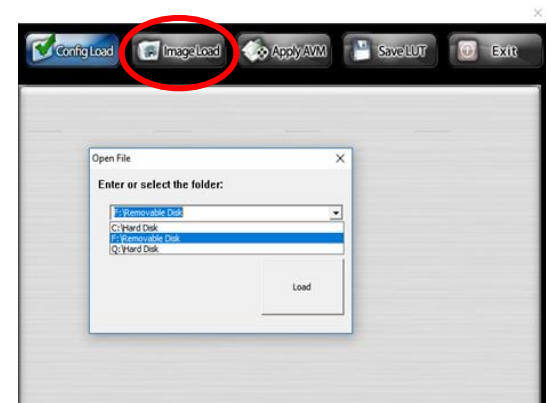
Ensure the correct Config file is used for the installation type. For more information on the configuration types see section 2.4.



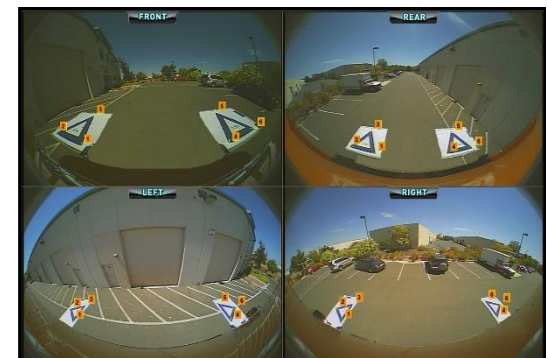
### 6.5.3 Opening the Image Files

Click the “Image Load” icon on the calibration tool bar to open the Image Load dialog box.

Select the SD Card from the dropdown menu and select “Load” to grab the camera images from the SD Card.



The camera images will automatically populate the empty tiles.

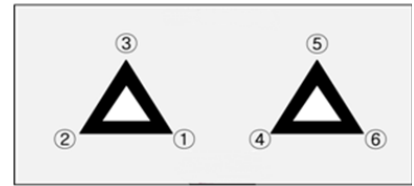


### 6.5.4 Calibration Control Points

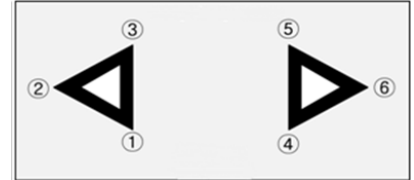
The triangles in the calibration pattern are automatically detected and the control points are displayed. The software automatically detects the corners of the triangles and derives the coordinates of each image when loaded. The order of the control points starts from the triangle point closest to the vehicle and working clockwise to the other two points. Calibration is not possible if the order of the control points is not correct.

**WARNING: Ensure the control points are selected in the correct order as shown. Anything other than the above will result in calibration failure.**

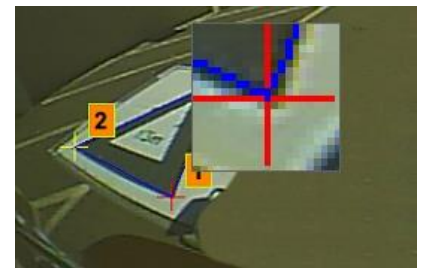
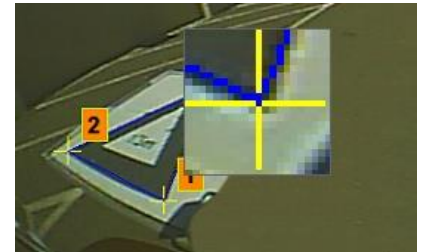
Front & Rear Camera View



Left & Right Camera View



It may be necessary to adjust the control points once the images have been loaded. The control point image will enlarge when the mouse cursor is moved to the control point. This enables the control points to be positioned accurately. Left click the control point that needs modifying. The selected control point crosshair will turn red. To deselect the control point, just left click anywhere else other than the selected control point.

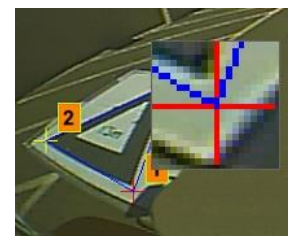
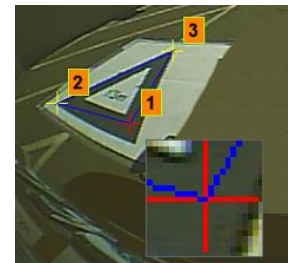


Align the control point to the outermost corner as shown below, aligning the blue lines to the triangle. The images to the right show before and after alignment. It is recommended to move the control point outside of the triangle to leave a clear gap between it and the triangle then work the point back towards the triangle until it meets the outer edge of the triangle. Check and modify all six control points for each camera.

#### Useful hints:

With a control point selected, using the arrow buttons on the PC keyboard will move the crosshair one pixel at a time in the given direction allowing much finer and more controlled adjustment.

Double clicking in the individual camera image screen will make that image full screen, making small adjustments much easier.

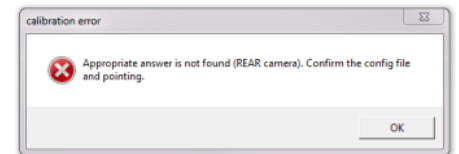


### 6.5.5 Surround View Preview

Clicking the “Apply AVM” button will open the surround view “Preview” window.



If there is anything wrong with the control points the “Calibration Error” prompt will be displayed with a hint describing which camera is incorrect. This is generally due to two errors:



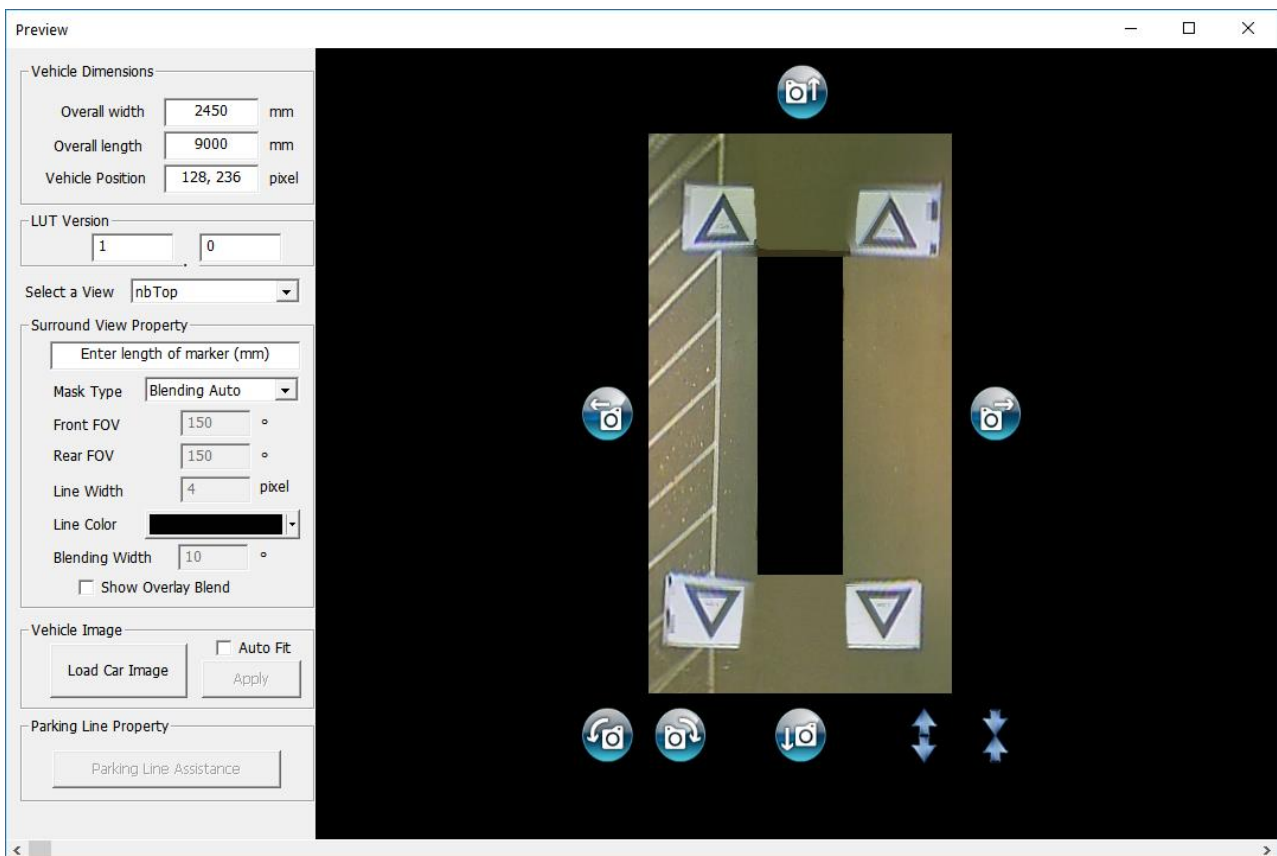
1. The control points are not correctly aligned. Check the order and position of the control points paying attention to the camera given in the message box.
2. The Calibration Mats are not correctly/accurately position around the vehicle. Re-align the calibration mats correctly.

#### Useful hints:

- Selecting “Ok” in this window will bypass the prompt and the “Preview” window will open regardless.
- Keep the “Preview” window open while making the adjustments to the control point.
- Re-select “Apply AVM” whilst adjusting view the effect of the changes to the surround view image “live”.
- Adjust one control point at a time to get the most suitable surround view image.

### 6.5.6 Surround View Image Adjustments

If the control points are correctly aligned, The Preview window will appear similar to the example below:



**Note:** the appearance of the surround view image will vary depending on the Config file that is used. The image above shows the Landscape surround view image. Some configurations have multiple 360° views which need to be calibrated, perform the steps below for each surround view image.

For standard Brigade Calibration Mats, the Length of Marker details do not need to be changed (the default value is 1500mm). For Calibration Mats that are not standard Brigade size, enter the width of the Calibration Triangle here.

Surround View Property

Enter length of marker (mm)

Set the Vehicle Dimensions to the dimensions of the vehicle used.

This does not need to be accurate, generally speaking the vehicle mask (the black box where the vehicle is shown) should cover any red areas that are the camera blind spots. The vehicle mask can be larger than the vehicle, especially in cases where there are overhanging objects, however these will create blindspots close to the vehicle body.

Vehicle Dimensions

Overall width 1800 mm

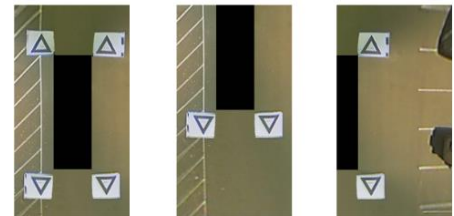
Overall length 5600 mm



**Note: For Configurations that have multiple 360° views these steps will need to be repeated for each 360° view.**

The default Vehicle Position is given as the center of the 360° surround view image screen however this can be adjusted if required. This is especially helpful in cases where only a portion of the vehicle is of interest, e.g. for articulated vehicles where the action of the cab articulating from the trailer would otherwise cause the surround view image to heavily distort, in this example the vehicle position could be moved so that only the side and rear of the vehicle is shown (a 270° view).

Vehicle Position 128, 236 pixel



Once the vehicle position and size are correct the surround view image can be rotated, moved horizontally/vertically, zoomed in/out to create the most ideal view. Unlike the Vehicle Position setting this will not move the vehicle mask, changing any of these settings will move the surround view image behind the vehicle mask. These buttons can be used to make minor adjustments to the surround view image however if larger adjustments are required it is recommended to check the alignment of the control points. The following steps describe the functions of each of these buttons.



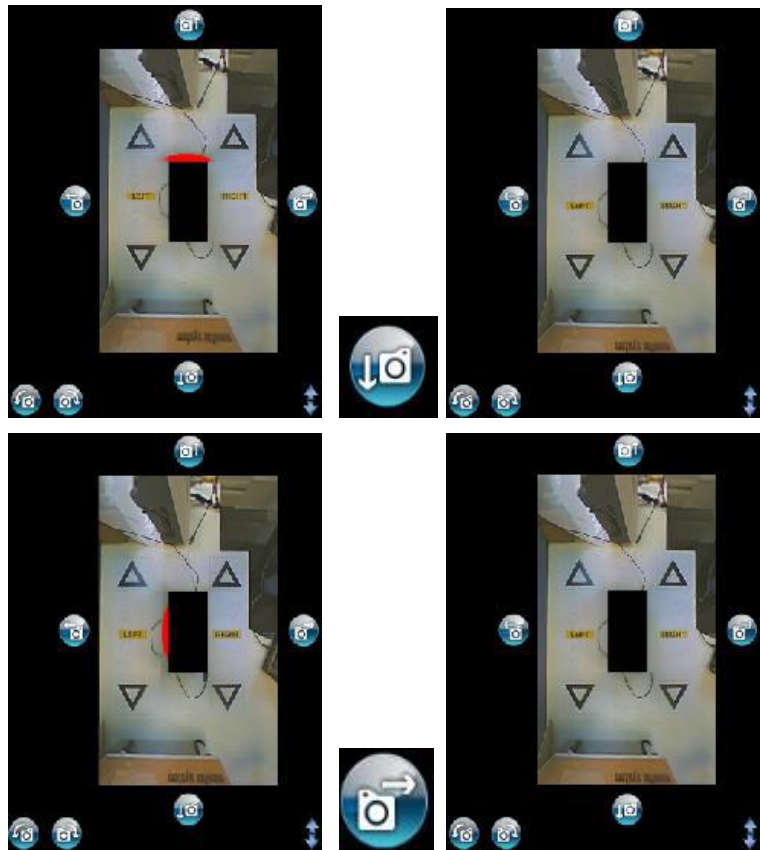
Rotational adjustments should be made before making any horizontal or vertical adjustments. Adjustments to the surround view image need to be made before apply a vehicle overlay.



Horizontal and vertical adjustments can be made to remove any camera blind spots (shown in red).

Once the preferred mask position has been established, check to see that there is no excess vehicle body or camera blind areas (red area) shown.

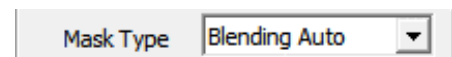
In some cases, the exact vehicle dimensions may leave some of the body or camera blind area visible (this is due to camera positioning and mounting angles). Adjust the vehicle dimension values and reposition the vehicle mask to remove the vehicle body or blind areas from the view.



It may be necessary to enlarge the vehicle mask or “zoom” in or out in the surround view image to see more or less of the area around the vehicle. To do this, use the arrow buttons below the surround view image to adjust the view as desired.



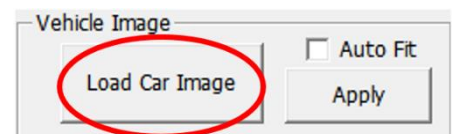
It is recommended to leave the “Mask Type” setting as “Blending Auto”. For more information on the Mask Types, refer to section 7.



Click the “Load Car Image” in the Vehicle Image section to load a vehicle image.

Vehicle images are stored in the 6.0 Overlays folder on BN360-200-USB.

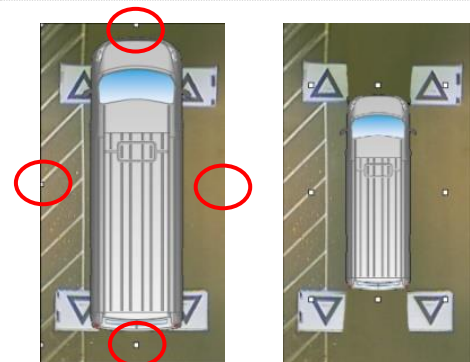
Bespoke vehicle images can be created, the image must be 24bit .bmp format, background must be Black (RGB 0,0,0), vehicle colour RGB must have no 0 values). Any colour that contains a 0 value in the RGB will be displayed as transparent. Paint or Paint.Net may be used to create or modify existing vehicle overlays.



The chosen vehicle image will be overlaid on to the surround view.

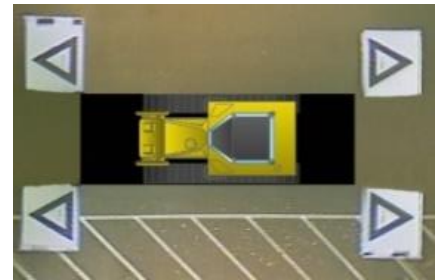
To resize the vehicle image so that it correctly fits the vehicle mask, click and drag the adjustment boxes around the image to shrink or enlarge the overlay as desired. Click and drag the vehicle image to position it over the vehicle mask. It is recommended to make the vehicle image slightly larger than the vehicle mask to hide the blank areas of the surround vehicle mask.

When the vehicle image is positioned and sized correctly, press the “Apply” button to save the changes.



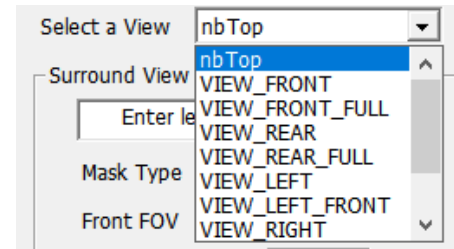
Using the “Auto Fit” option will automatically fit the vehicle image to the vehicle mask however the software will try to scale the vehicle image whilst maintaining the original image aspect ratio. If the image is not the same aspect ratio as the vehicle mask the outcome may not be desirable e.g. if the vehicle image is square but the vehicle mask is rectangular.

**For the best results, Brigade recommends that the vehicle image is correctly scaled to fit the vehicle mask rather than using the Auto Fit option.**



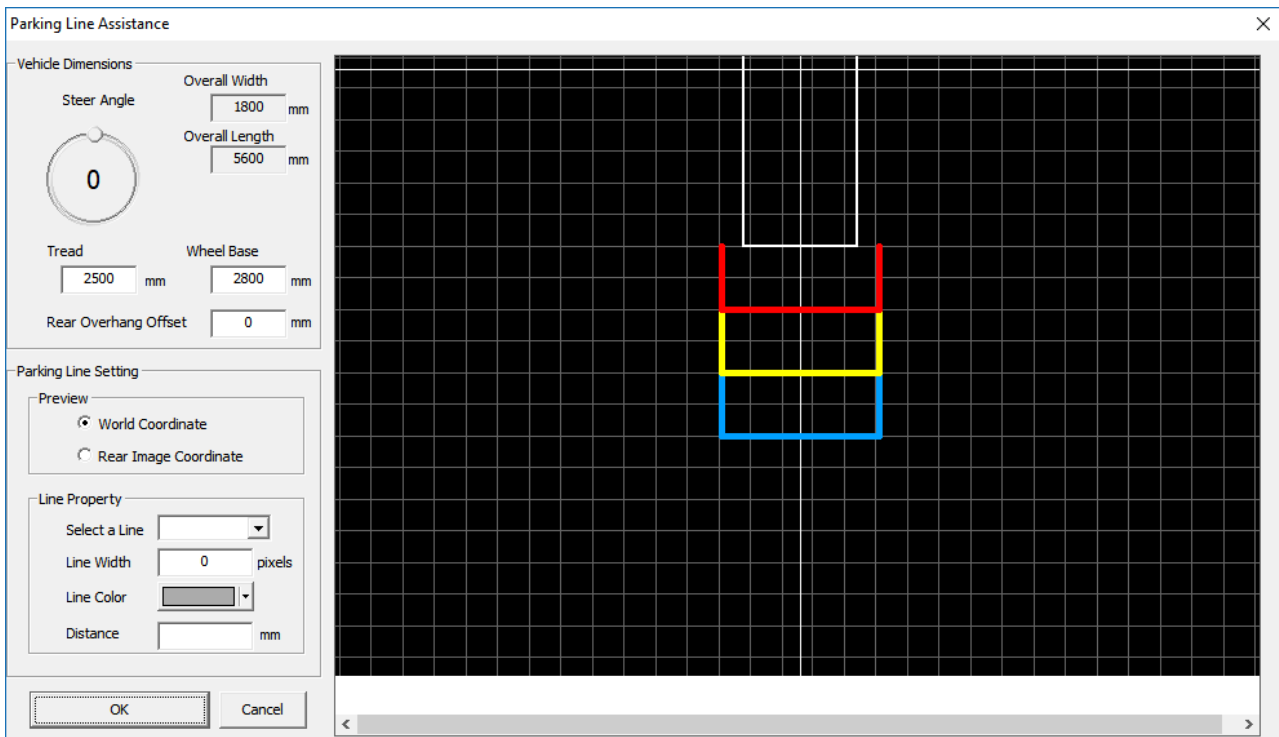
Use the “Select a View” menu to view and make any necessary adjustments to the additional views. The views listed here will depend on the configuration that has been selected, for more information see section 2.4.

**For configurations where there are multiple 360° views (e.g. Landscape 2, 3 and Portrait) it is necessary to calibrate these views as well, calibrations on one view are not automatically applied to the other views. Select each of the views here (e.g. nbLSTop) and repeat the steps listed above to calibrate all of the available views as desired.**



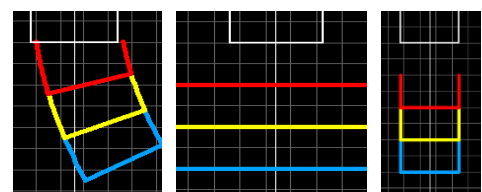
### 6.5.7 Parking Line Property

In the Preview window, select a rear view in the “Select a View” box and select the “Parking Line Assistance” button to change the Parking Line Property. The follow screen will open:



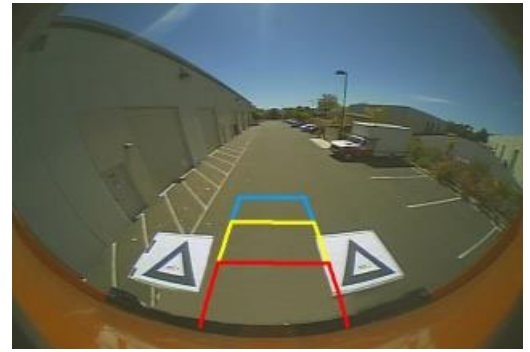
### Vehicle Dimensions

- Steer angle – adjusting this will add a curvature to the parking guide lines. The center pivot is taken as the center of the wheel base. **The steer angle is fixed and does not move with the vehicle steering angle.**
- Tread – changes the width of the parking guides
- Wheel base – the distance between the vehicle wheels, used in conjunction with the Steer Angle.



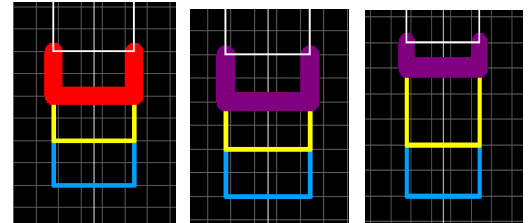
**Preview**

- World Coordinate – use the grid image to design the parking guides (as shown above)
- Rear Image Coordinate – use the rear camera image to design the parking guides



**Line Property**

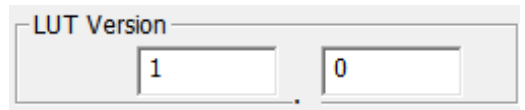
- Select a Line – selects the line to edit (red/yellow/blue)
- Line Width – select line width (in mm)
- Line Colour – change the line colour (for each line)
- Distance – change the distance for each line



**6.5.8 LUT Version**

If required the installer can create an identifying number for the calibration. If the installer does not modify this the default version will be 1.0. The LUT version must be made of two-digit numbers with no letters.

**It is not recommended to use this feature for aftermarket installations.**

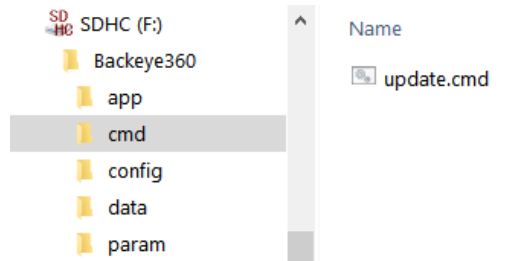


**6.5.9 Saving the Calibration Data**

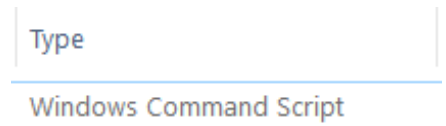
Click the “SAVE LUT” button on the tool bar and select the inserted SD Card when prompted for a save location. This will update the SD Card contents with the new calibration data.



Rename the “capture.cmd” file in the “cmd” folder to “update.cmd”. **This step is required for the calibration tool to accept the new calibration data.**



**Note: ensure the “cmd” file type is given as “Windows Command Script” when renaming the file. The “.cmd” extension in the file name may not be required depending on how the Windows Explorer file extension settings are configured.**

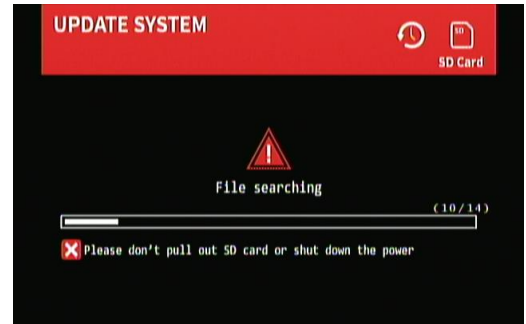


### 6.5.10 Loading the Calibration Data

With the Calibration Tool inserted to the BN360-200-ECU and the system powered, the “Update System” screen should be displayed prompting the user to insert an SD Card.



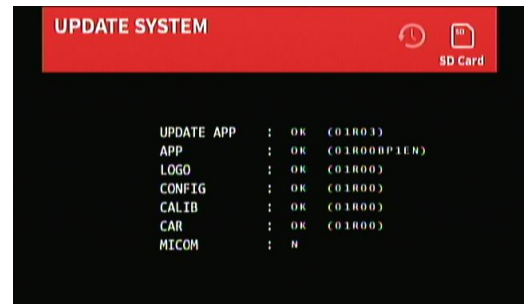
Insert the SD Card to begin the upload process. As long as the “cmd” file has been renamed to “update.cmd” the system will automatically upload the new data to the ECU.



Once the upload has completed the following screen should show.

Anything that is updated will be displayed as “OK”, anything that has not been updated will be displayed as “N”, i.e. if a calibration has been loaded but the vehicle image has not changed.

The numbers in brackets indicate the version number that has been loaded however the ECU must be restarted to show the newly flashed version.



Updating ECU firmware is a two stage process that requires a second upload. Press the “Reset” button on the Calibration Tool to repeat the calibration upload.

Once the update completes a second time the UPDATE SYSTEM screen will show again. Confirm that the APP version is correct for the configuration used (e.g. XRXBP1 for Portrait 1).



Eject the SD Card and wait for the “Please Insert SD Card” screen to appear before removing the Calibration Tool.

The system will automatically restart and the new calibration data will be shown on the display.



## 7 Surround View Image Blends

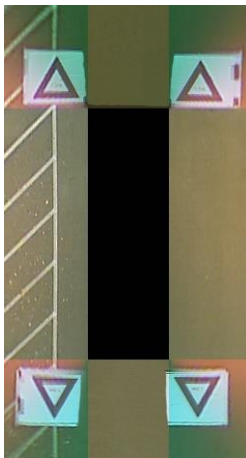
The BN360-200 Calibration Software allows for custom “blends” to create the most suitable 360° surround view image. During the calibration procedure, the “Mask Type” option gives the following options for blending the front, rear and side cameras:

- Mask Type – changes the camera image blend type (see below for more information on the different Mask Types)
- Front FOV – the amount of the front view that is the front camera, the center point being the middle front of the vehicle mask. A larger FOV angle, the more of the front view is the front camera (FOV = field of view).
- Rear FOV – same as above but for the rear of the vehicle
- Line Width – the width of line divide between adjacent camera images
- Line Colour – the colour of line divider between adjacent camera images
- Blending Width –width of the image blend, a larger width will give a more gradual blend whereas a smaller width will give a much harder blend.
- Show Overlay Blend – selecting this will overlay colours on the blend areas to aid with setting the blends. This is useful when determining how much of the blend is the front or rear image (green) and how much is the side images (red).

### 7.1 Mask Type

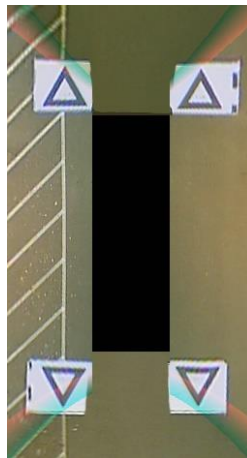
The “Mask Type” dropdown menu gives access to the various blend types (the method used to “blend” the images together). These are:

#### Blending Auto



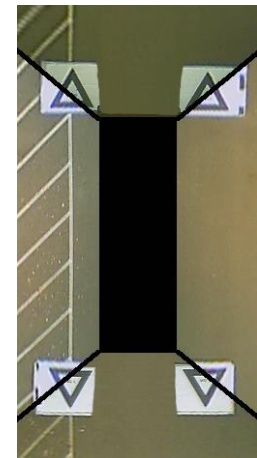
Brigades recommended option as it gives the most ideal blend for most typical installations, applying an equal blend where each image meets the next.

#### Blending FOV



Allows the blend “angle” between the front /rear and the side cameras to be adjusted, this may be required in some cases e.g. if parts of the vehicle body obscure camera views.

#### Line 1



Creates a “hard” join between the side and front/rear camera images with a customisable line dividing the camera images instead of a gradual blend. As with Blending FOV user can adjust the Front and Rear FOV angle.

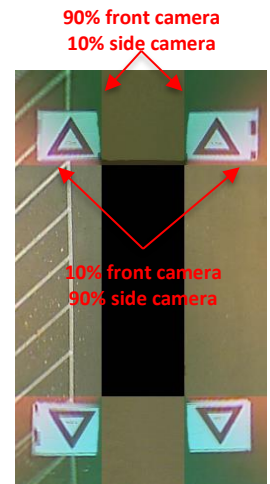
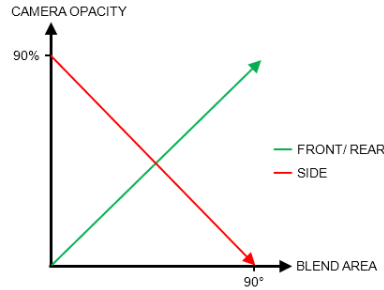
**Note: The remaining options in the Mask Type dropdown list are for legacy versions and will not work with the BN360-200 product.**

### 7.1.1 Blending Auto

Blending Auto is Brigades recommended option as it gives the most ideal blend for most typical installations, e.g. standard rectangular/box shaped vehicles.

A gradual blend is applied across the overlapping areas using 10% of the front/rear camera image (shown in red) and 90% of the side camera image (shown in green) at the edge of the vehicle mask.

The transparency of each camera is gradually reduced/increased across the blend area to give a smooth transition between each camera, the graph shows how the camera images blend across the Blend Area.



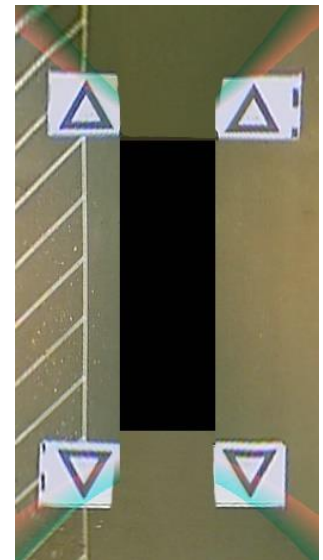
### 7.1.2 Blending FOV

Blending FOV gives the user much more control of the blend, allowing the user to choose where the blend starts and how hard or soft the blend is. This is especially useful in cases where parts of the vehicle body obscure camera views e.g. overhanging side mirrors etc.

The blend applied to this view differs from the Blending Auto option, in this instance 100% of the front/rear camera is used at the edge of the vehicle mask (where the FOV starts).

When choosing this option the Front FOV, Rear FOV and Blending Width options can be adjusted, these are detailed below.

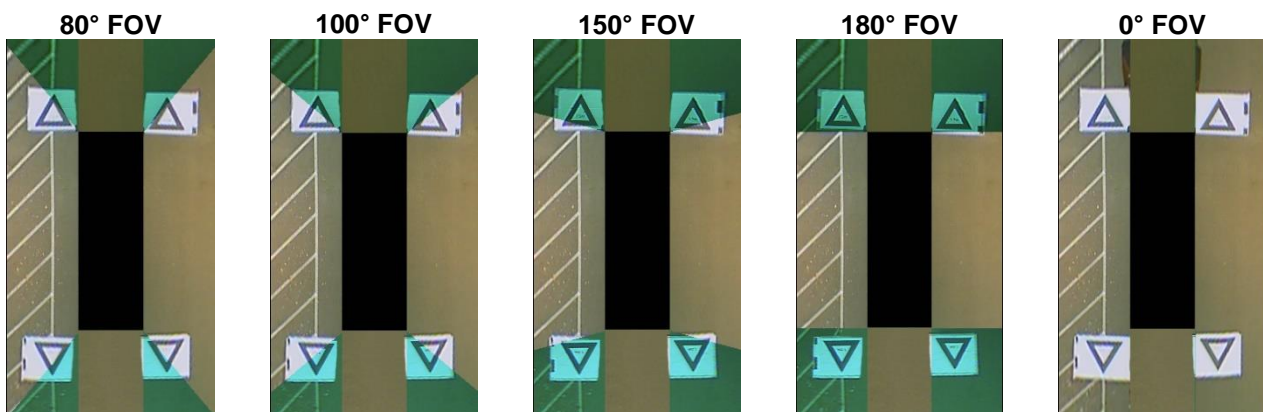
**Note: it may only be necessary to change the FOV setting for one of either the Front or Rear cameras. For the area that the FOV is not to be adjusted Brigade recommends setting the FOV for that camera to 140° and the Blend Width to 10°, these values may need to be adjusted depending on the calibration but typically give the closest match to the Blend Auto option.**



Front FOV	<input type="text" value="180"/>	◦
Rear FOV	<input type="text" value="180"/>	◦

Changing the Front and Rear FOV options adjusts the amount of the front and rear camera that is used (i.e. the Field of View).

The images below show the effect of changing the FOV. The area in green indicates the portion of the surround view image that is taken from the front/rear camera. As the FOV is increased, so does the amount of front/rear camera image that is used to form the surround view image.

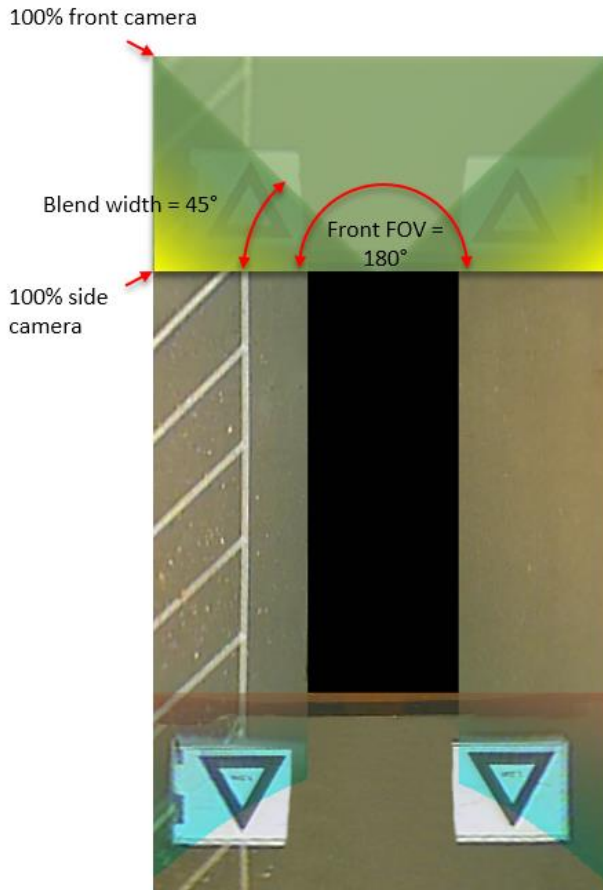


**Note:** The surround view image will always use the at least the width of the vehicle mask for the front/rear camera image as shown in the images above. Even when the FOV is given as 0° the front camera image is still used to form the surround view image because it is not possible for the side cameras to see beyond 180°.

The “Blending Width” is the size of the blended area, i.e. the area that where two camera images overlap to create the surround view image.

Blending Width

Reducing the value here will give a “harder” blend, this may look better in the Preview window but in real world operation objects in this area may be hidden or appear distorted. A larger Blending Width will use both camera images over a larger area reducing any blind zones that might be seen with a narrow blend width but may cause the blended areas to appear heavily distorted. See image below for more information.



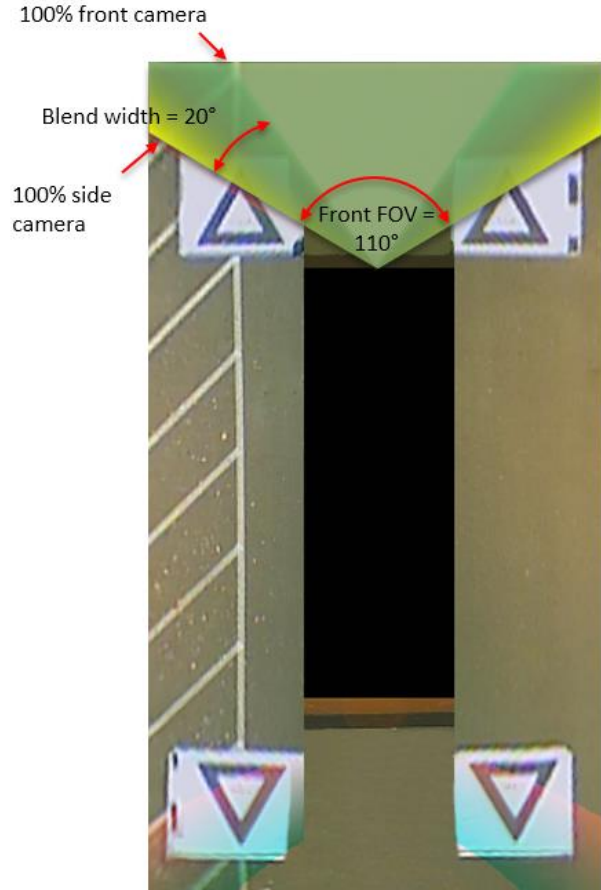
Front FOV

Rear FOV

Line Width  pixel

Line Color

Blending Width



Front FOV

Rear FOV

Line Width  pixel

Line Color

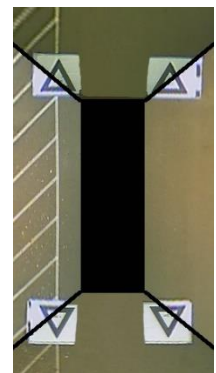
Blending Width

### 7.1.3 Line 1

The Line 1 option creates a “hard” join between the side and front/rear camera images, there is no gradual or configurable blend for this Mask Type, the adjacent images are stitched together i.e. there is no blending, overlapping or gradual fade.

This Mask Type also comes with a customisable line (line thickness and colour can be changed) that indicates where the camera images join.

As with Blending FOV, the user can adjust the Front and Rear FOV angle to show more or less of the front and rear cameras.



## 8 Checking System Functionality

It is important to check to see if the output is normal after the ECU resets. Ensure all blended areas are fully tested to make sure there are no blind spots around the vehicle. It is recommended to get an assistant to walk around the vehicle in the surround view to evaluate the calibration. If the outcome of the calibration is not ideal then it may be necessary to repeat the calibration steps (see section 6).

### 8.1 Good Calibration

All ground level objects i.e. road markings will be displayed as they are in the real world (it is recommended that the Calibration Mats are left on the ground to aid calibration evaluation).

There are no blind spots in the surround view including in blend areas.

An object not at ground level (i.e. human body) should be visible all the way around the vehicle, objects not at ground level may be displayed from two perspectives in the blend area and will fade from one camera to the next. There is no unwanted view of the vehicle in the surround view.

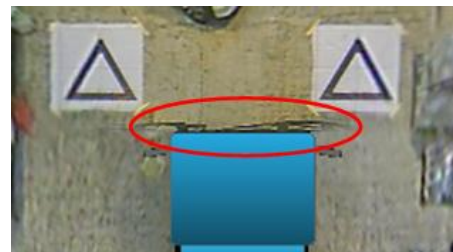


### 8.2 Bad Calibration

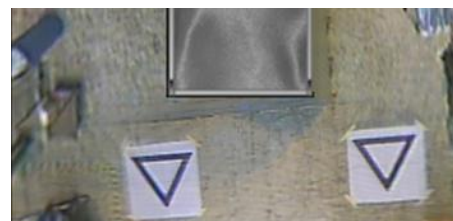
Ground level objects appear misaligned or distorted



There are parts of the vehicle in the view



The ground objects are not square to the vehicle

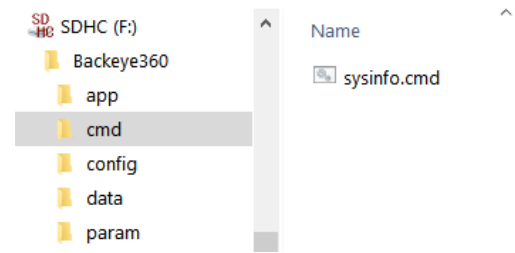


## 9 System Information Screen

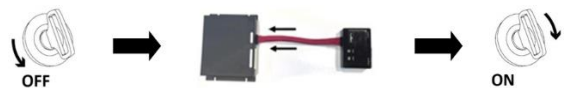
The System Information screen contains the information regarding which versions of firmware have been loaded to the BN360-200-ECU.

If not done so already, copy the “Backeye360” folder from the desired configuration to the SD Card. Refer to section 4.1 for more information on the SD Card contents.

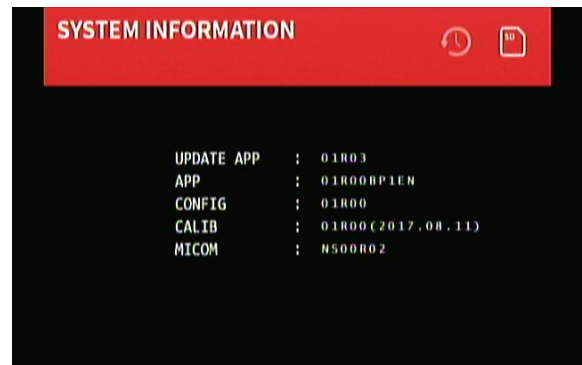
Ensure the “Backeye360” folder is at the root of the SD Card and the file inside the “cmd” folder is named “sysinfo.cmd”.



Insert the Calibration Tool into the ECU and switch the system on. The Update System Screen will load.



Insert the SD Card into the Calibration Tool, the System Information Screen will display the current version of software loaded to the ECU. A description of the different items and their functions is given in the table below.



Item	Function
UPDATE APP	The base system operating software
APP	The display configuration version. The last 4 digits refer to the config version (L1, L2, L3 and P1 see section 2.3 for more information) and language installed e.g: L1EN = Landscape 1 English P1FR = Portrait 1 French
CONFIG	The calibration configuration file used
CALIB	The calibration data from the Calibration Software Tool, this will show version number + date of the calibration
MICOM	The software that controls the system operation, i.e. triggers, speed signal, delays etc.

To exit the System Information Screen, eject the SD Card and wait for the “Please Insert SD Card” screen to appear before removing the Calibration Tool. The system will automatically restart and will return to the default view.



## 10 System Backup Function

It is possible to back up the calibration and OSD settings data by using the “backup.cmd” cmd file, this is especially useful e.g. for applying a custom OSD configuration across a fleet of vehicles.

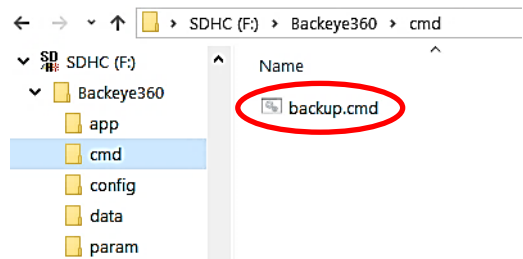
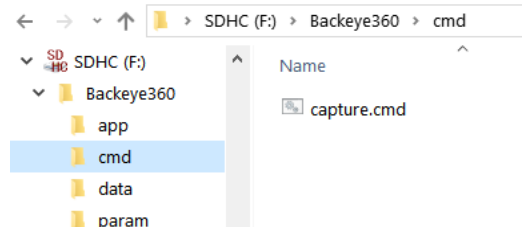
**Please note: It is possible to backup and install the vehicle calibration data as well as the OSD configuration details however Brigade does not recommend copying calibration data from one vehicle to another. Any variations in the vehicle and camera location will have a significant effect on the surround view image.**

### 10.1 Performing a System Backup

Copy the “Backeye360” folder from the desired configuration to the SD Card. Refer to section 2.4 for more information on the different Display Configurations. The configuration used in this instance is not important since only the “cmd” file is used. It is possible to delete the unused folders or create the folder structure directly on the SD Card however it is best practice to always take the original folders and files from the BN360-200-USB to avoid any issues.

**Note: Ensure the “Backeye360” folder is at the root of the SD Card.**

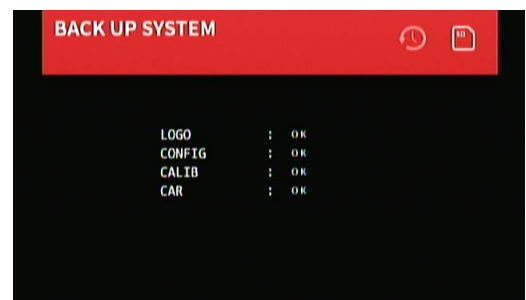
Rename the “capture.cmd” file to “backup.cmd”.



Insert the Calibration Tool into the ECU and switch the system on. The following screen will show:

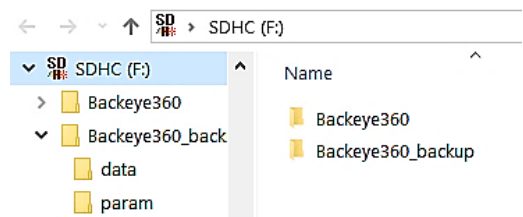


Insert the SD Card, the backup process will begin automatically. The SD Card can be removed when the backup process has completed and the following screen is displayed.



Insert the SD Card into the PC that is being used. The SD Card will now contain a “Backeye360\_backup” folder that contains the calibration data (“param” folder) and the OSD configuration data (“data” folder).

In the “Backeye360” folder that was copied to the SD Card in the first step of this section delete the “app”, “data” and “param” folders.



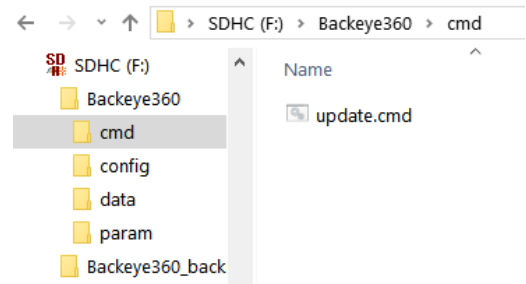
Once this is done, copy the “data” and/or “param” folders from the “Backeye360\_backup” folder to the “Backeye360” folder. This will leave the “data”, “param” and “cmd” folders in the “Backeye360” folder that will make restoring from the back up much easier.

If only the calibration data is required, copy the “param” folder to the “Backeye360” folder. If only the OSD configuration is required, copy the “data” folder.

The backup folder can now be deleted and the “backeye360” folder should be moved to a more secure storage location (e.g. the installers/customers PC).

## 10.2 Restoring from a System Backup

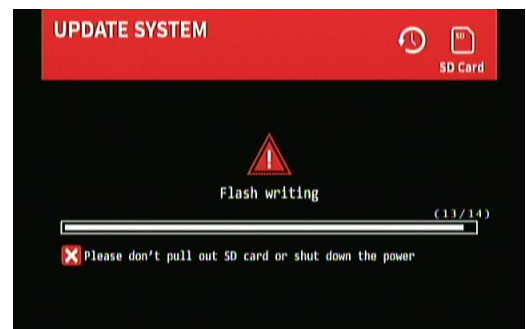
Ensure the file in the “cmd” folder is named as “update.cmd”.



With the Calibration Tool inserted to the BN360-200-ECU and the system powered, the “Update System” screen should be displayed prompting the user to insert an SD Card.

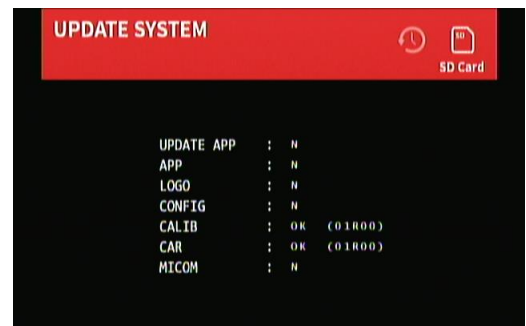


Insert the SD Card to begin the upload process. As long as the “cmd” file has been renamed to “update.cmd” the system will automatically upload the new data to the ECU.



Once the upload has completed the following screen will show.

Note: the items that have updated here will depend on what has files have been used (i.e. only “CALIB.INFO” will show if only the “param” file has been used to update the calibration data).

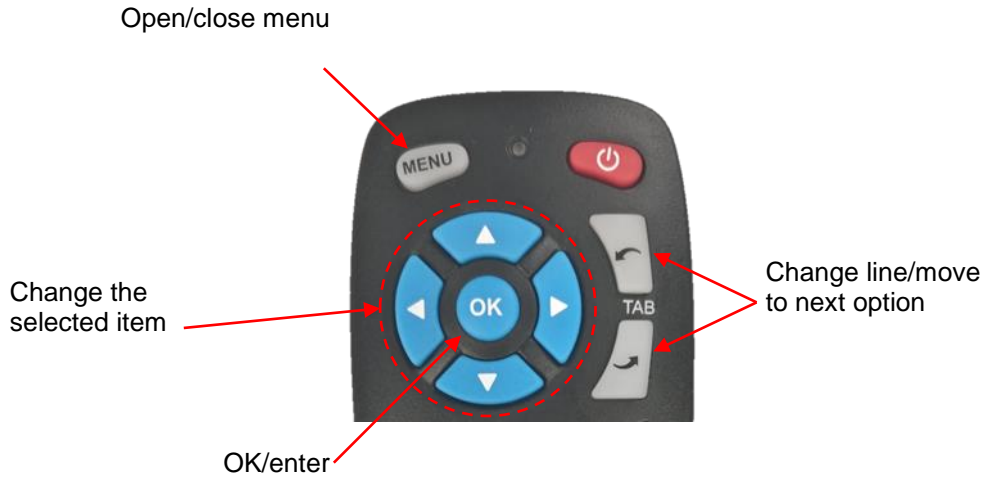


## 11 OSD Configuration Menu

The BN360-200 system features an OSD Configuration Menu that allows the system to be configured as per the user's needs. Interfacing with the OSD Configuration Menu requires the included remote control (BN360-200-RC).

**Note:** the BN360-200-RC Remote Control may interfere with other IR devices - ensure these are isolated during operation.

### 11.1 BN360-200-RC (Remote Control) Functions



Menu functions are accessed using the remote control buttons. The "TAB" buttons move to the next/previous option and the "<" and ">" buttons are used to configure the selected option.

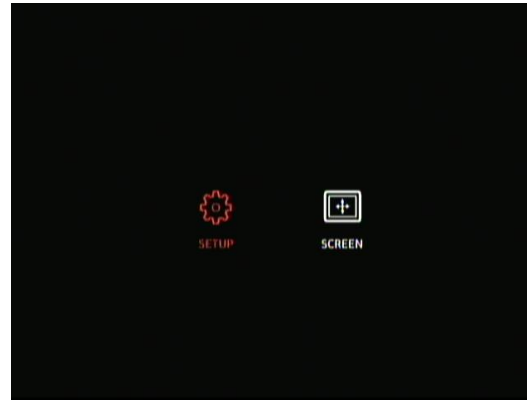
### 11.2 OSD View Names

View names have been shortened in the OSD to be more readable in the space given. The table below contains the OSD view names and the full view name (see section 2.5 for full details on view names):

View Name	OSD View Name
Top + Mirrored Rear View	Top + Rear
Top + Front View	Top + Front
Top + Left View	Top + Left
Top + Right View	Top + Right
Top + Front Focus	Top + F Focus
Top + Rear Focus	Top + R Focus
Top LH Lane + Left View	Top LH + Left
Top RH Lane + Right View	Top RH + Right
Top + Front Crossing Traffic	Top + F CTV
Top + Rear Crossing Traffic	Top + R CTV
Top LH Lane Full	Top LH Lane
Top RH Lane Full	Top RH Lane
Top Full	Top
Front Full	Front
Rear Full	Rear
Left Full	Left
Right Full	Right
Front Crossing Traffic	Front CTV
Rear Crossing Traffic	Rear CTV

### 11.3 Accessing the OSD Configuration Menu

Pressing “Menu” on the remote control (BN360-200-RC) will bring up the top level menu as shown to the right.

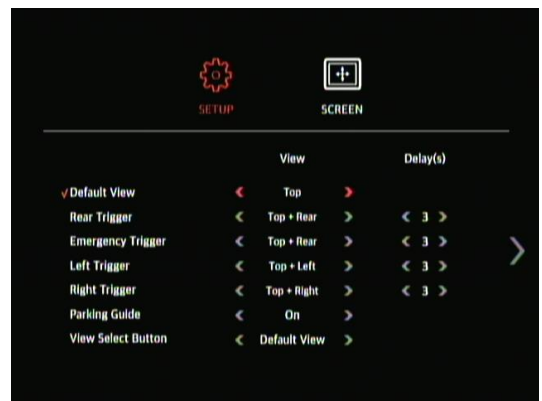


### 11.4 Configuring the Default View

To change the default view, enter the OSD SETUP menu by pressing the MENU button and pressing OK on the SETUP icon.

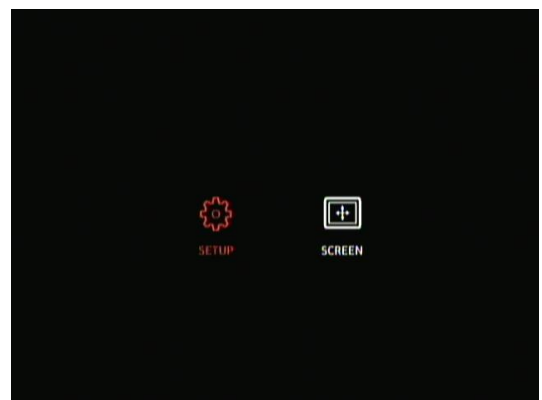


With the “Default View” option selected, use the arrow buttons on the remote to select the desired view. A “✓” to the left of the option indicates the current selection.



**Note:** the views listed here will depend on the configuration loaded to the ECU, for more information on view configurations refer to section 2.4).

To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.

After exiting the OSD menu the previous view will be displayed. To ensure the changes made have been saved cycle the vehicle power to restart the system. The system will then show the new default view.



### 11.5 Configuring the Triggered View Settings

To change which view is triggered for a given trigger, enter the OSD SETUP menu by pressing the MENU button and pressing OK on the SETUP icon.



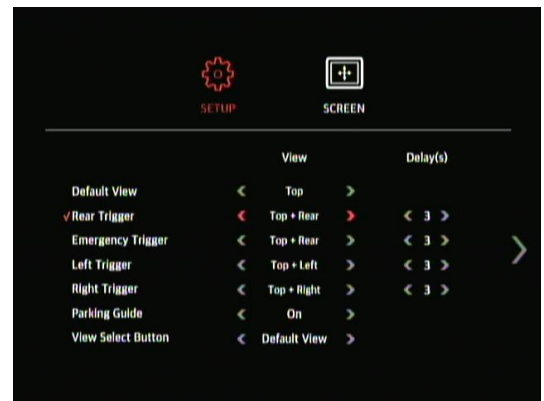
Use the TAB buttons on the remote control to select the desired trigger. The triggers are:

Rear Trigger – e.g. reverse gear

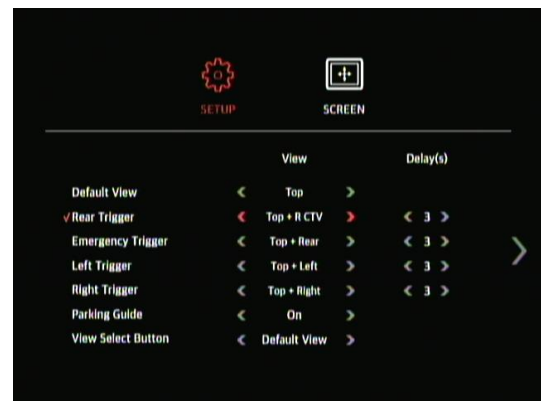
Emergency Trigger – when both Left and Right triggers are active

Left trigger – e.g. left indicator

Right trigger – e.g. right indicator



With the desired trigger selected, use the arrow buttons on the remote to choose the desired view for each trigger. A “✓” to the left of the option indicates the current selection.

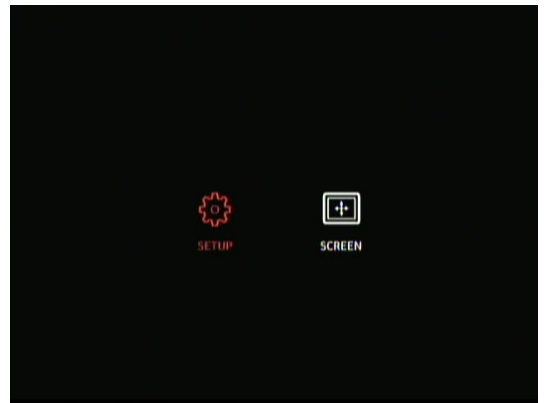


**Note:** the views listed here will depend on the configuration loaded to the ECU, for more information on view configurations refer to section 2.4).

To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.



Restart the system to “activate” the changes (turn vehicle ignition on/off).

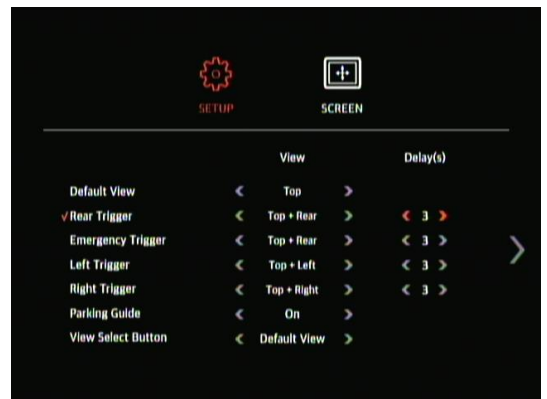


### 11.6 Configuring the Trigger Off Delay

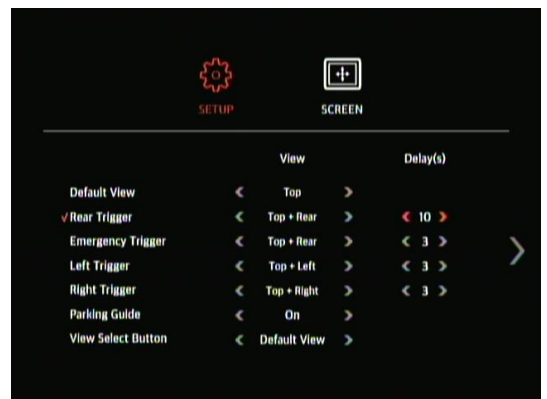
To change the trigger off delay time (the time to display the triggered view after the trigger is no longer active), enter the OSD SETUP menu by pressing the MENU button and pressing OK on the SETUP icon.



Use the TAB buttons to select the delay time for the desired view. The OSD will first scroll down through the triggered view list and then the trigger delay options, e.g. to select the Rear Trigger delay, press the TAB down button 7 times. Highlighted arrows indicate the current selection.



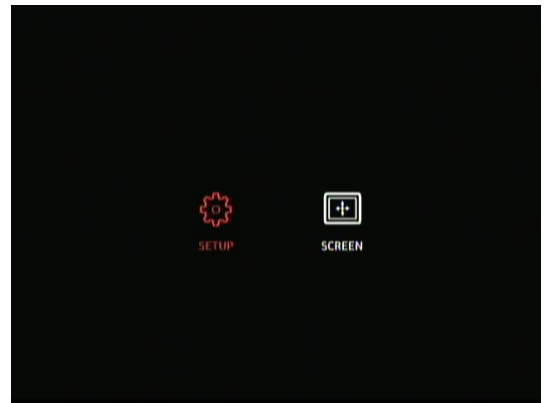
With the desired trigger delay option selected, use the arrow buttons to change the delay time. Choose from 0-10 seconds.



To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.



Restart the system to “activate” the changes (turn vehicle ignition on/off).



### 11.7 Configuring the Parking Guide

To change the Parking Guide settings, enter the OSD SETUP menu by pressing the MENU button and pressing OK on the SETUP icon.



Press the TAB down button 5 times to select the Parking Guide option.

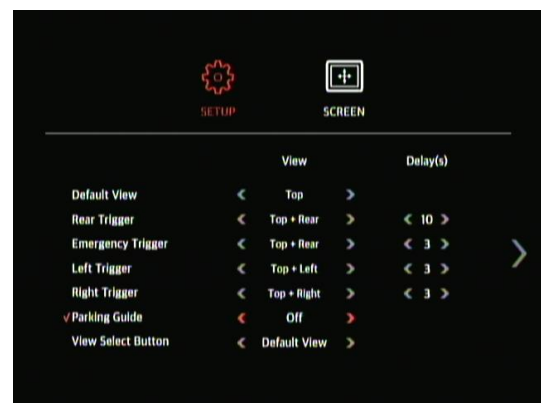


Use the arrow buttons to change the setting for the Parking Guide.



The options here are:

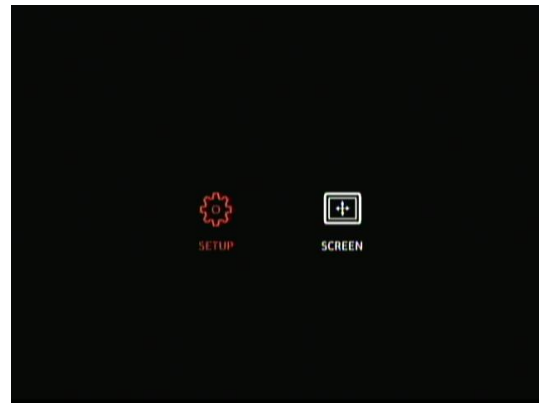
- On – parking guide is always on when a rear view image is shown
- Rear Gear – parking guide only displays when the rear gear is active
- Off – parking guide is never shown



To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.



Restart the system to “activate” the changes (turn vehicle ignition on/off).



### 11.8 Configuring the View Select Button Operation

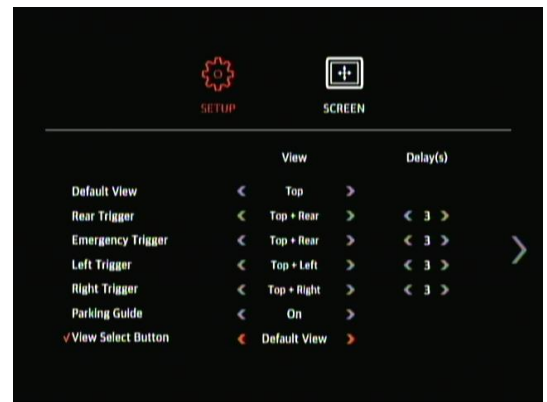
To change the behaviour of the View Select Button, enter the OSD SETUP menu by pressing the MENU button and pressing OK on the SETUP icon.



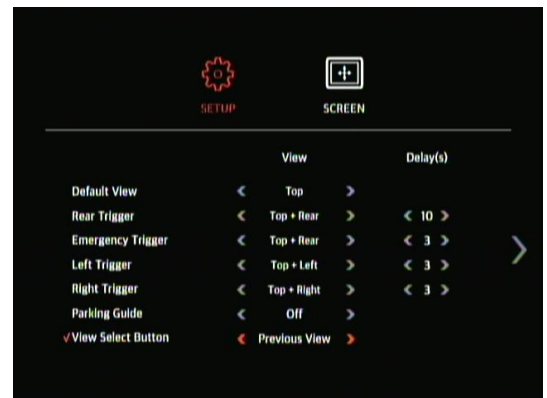
Press the TAB up button to select the View Select Button option.



(Alternatively press the TAB down button 6 times)



Press the arrow buttons on the remote control to change the selection.



The options for this are:

- Default View – returns the to the Default View after View Select Button is pressed (after 10s delay) or after a triggered response..
- Previous View – remains on the view that is displayed when View Select Button is pressed. When a trigger becomes active the system will automatically switch to the triggered view, once the trigger is removed the system will return to the previous view that was displayed by the View Select Button. The system will always display the Default View at switch on.

**Note:** Triggers always have priority over the View Select Button.

To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.

### 11.9 Configuring the Speed Trigger

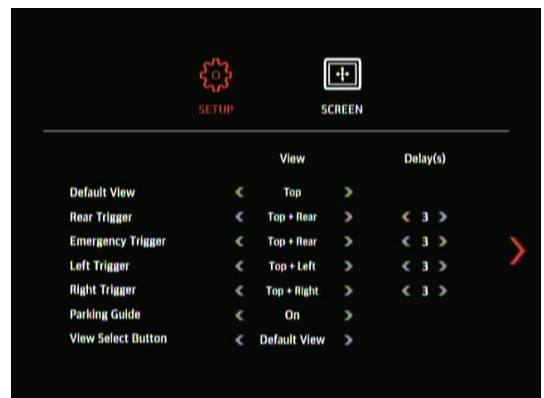
To enable and configure the Speed Signal Trigger, enter the OSD SETUP menu by pressing the MENU button and pressing OK on the SETUP icon.



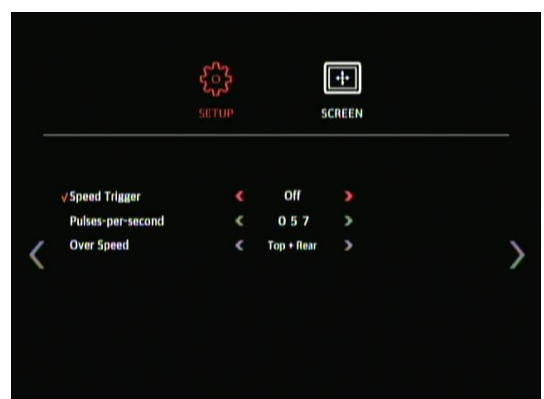
The Speed Trigger settings are on the second page of the OSD SETUP menu. Press the TAB up button to select the next page icon and press the OK button.



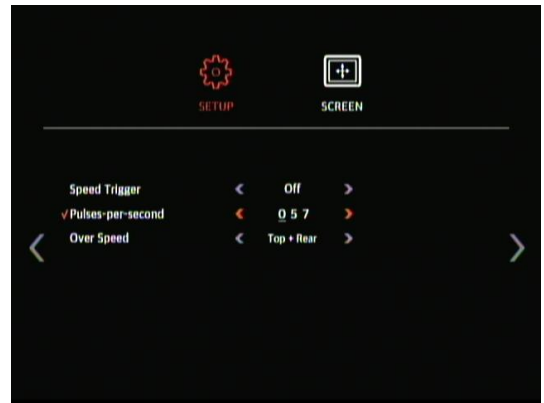
(Alternatively, press the TAB down button 11 times)



By default, the Speed Signal Trigger is set to OFF, to enable this use the arrow buttons on the remote control to change this to ON.



Use the TAB down button to select the Pulses-per-second option.



The value entered here determines at which vehicle speed the system should respond assuming the Speed Signal wire has been connected to the vehicle tachometer (pin B8 for standard European tachometer). E.g. a standard European tachometer uses a speed signal of 4 pulses per meter (p/m), for 30mph

$$30 \text{ miles per hour} = \sim 48 \text{ kilometres per hour (k/h)} = 4800 \text{ meters per hour}$$

$$4800 \div 3600 = 13.3 \text{ meters per second (m/s) (3600 seconds = 1 hour)}$$

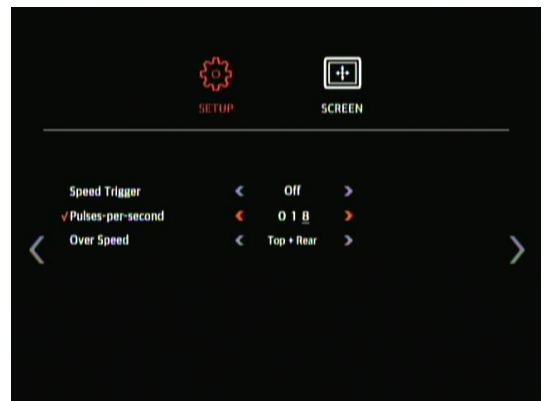
$$13.3 \text{ m/s} \times 4 \text{ p/m} = 53.2 \text{ pulses per second (in this case use 53 p/s)}$$

The same calculation can be used for various speeds as well as for non-standard European tachometers; simply replace the 4 pulses per meter with the correct value for the vehicle used (refer to the manufacturers details for the correct value).

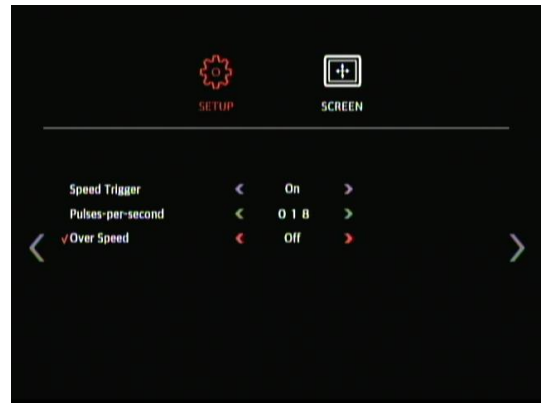
Example values (based on 4 pulses per meter):

Speed (mph)	Pulses per Second
10	18
20	36
30	53
40	71
50	89
60	107
70	124

To change the Pulses-per-second value, use the up and down arrows on the remote control to change the selected digit from 0-10 and use the TAB down button to move to the next digit and repeat for all 3 digits. Each digit can be set from 0-9, so the full range for this is 000 to 999 Pulses-per-second.

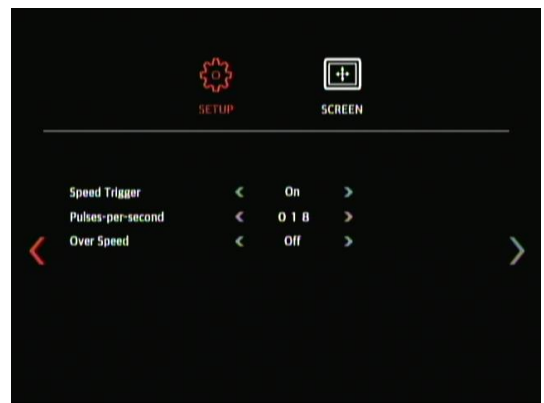


To change the system response when the vehicle exceeds the configured speed, select the Over Speed option with the TAB down button. Use the arrow buttons to select the desired response, this can be any of the views installed on the system (refer to section 2.4 for more information on view configurations) or the display can be switched off.



**Note:** selecting OFF for this option will output a full black display rather than disabling the video output (typically monitors will display a blue screen when there is no video output which could be distracting for drivers).

To exit the menu and save the changes, return to the first page of the OSD SETUP menu by pressing the TAB down (or up) button until the previous page button is selected and press the OK button. Press the MENU button on the remote control once to return to the menu home screen and then again to exit.



On the first page of the OSD SETUP menu, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.

Restart the system to “activate” the changes (turn vehicle ignition on/off).

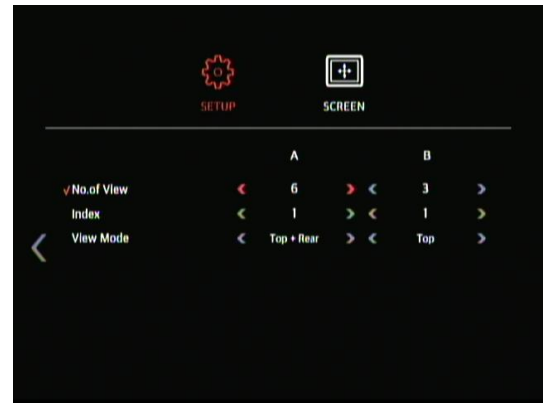


### 11.10 Configuring View Groups

To configure the View Groups (the views that are displayed when the View Select Button is pressed), enter the OSD SETUP menu by pressing the MENU button and pressing OK on the SETUP icon.

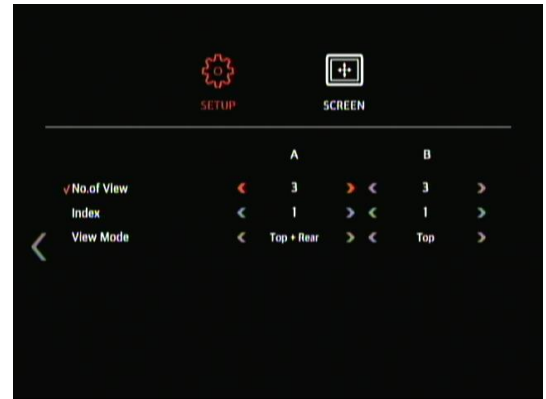


The View Groups settings are on the third page of the OSD SETUP menu. Press the TAB up button to select the next page icon and press the OK button, repeat to skip to the third page.

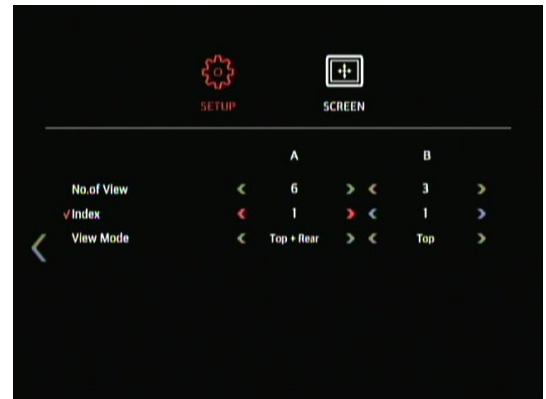


There are two View Groups, A and B. Holding the View Select Button switches between the View Groups. The No. of View setting determines how many views are present in each View Group (maximum 9). Group A contains all of the split screen views, Group B contains all the single screen views however the views present for each group is determined by the configuration loaded, for more information see section 2.4 **Error! Reference source not found.** It is possible to turn any of the views off or show the views more than once, e.g. have the same view on different button presses.

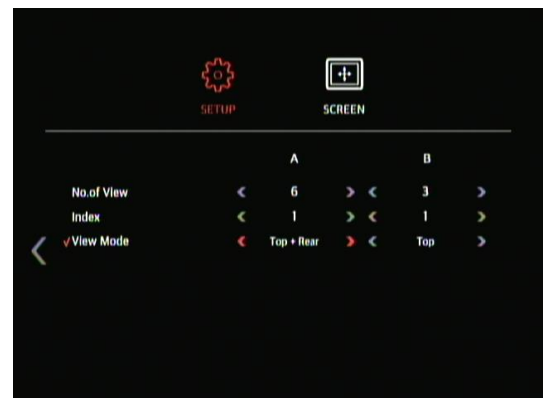
Use the arrow buttons to select the desired number of views in Group A. The number of views corresponds to the number of button presses per group, this can be from 1 to 9, there needs to be at least one button press view.



Press the TAB down button to select the Index, this option allows the user to change which view to have on each button press, i.e. 3 button presses = index 3. Use the arrow buttons to change the Index number.

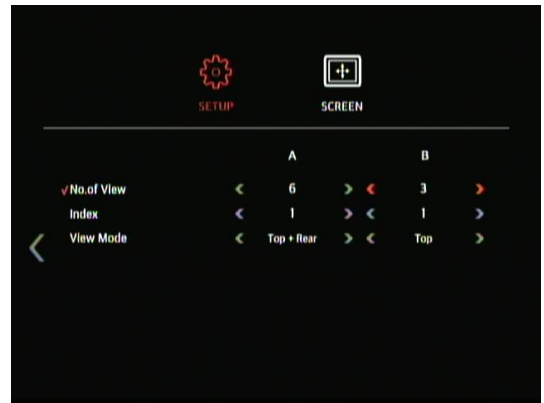


With the desired Index selected, press the TAB down button to select the View Mode for the given Index. Use the arrow buttons to change the View Mode.



Repeat these steps to change the views for each Index.

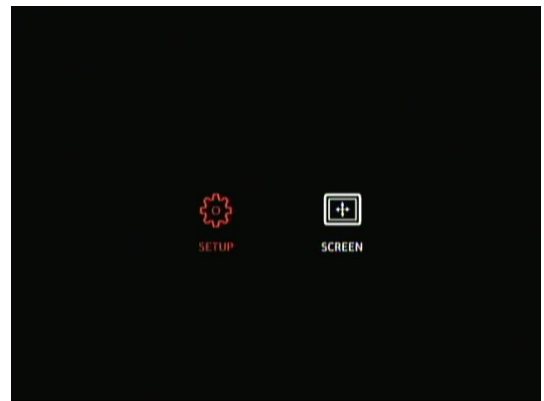
To change the settings for Group B, press the TAB down button to move to the top of the Group B list of options. Repeat the steps above to change the settings for Group B.



To exit the menu and save the changes, return to the first page of the OSD SETUP menu by pressing the TAB down (or up) button until the previous page button is selected and press the OK button. Press the MENU button on the remote control once to return to the menu home screen and then again to exit.



To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.

Restart the system to “activate” the changes (turn vehicle ignition on/off).



### 11.11 Configure Picture Settings

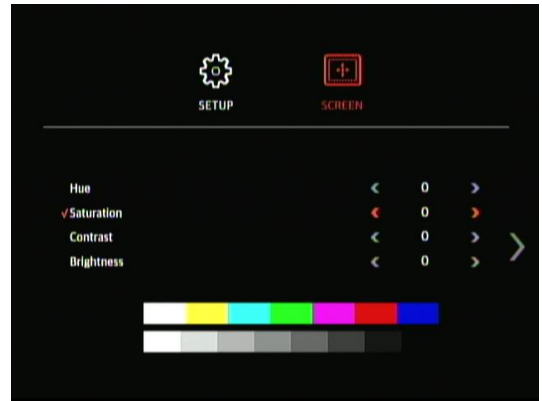
To change the display settings enter the SCREEN menu by pressing MENU button, and pressing TAB down and then OK on the SETUP icon.



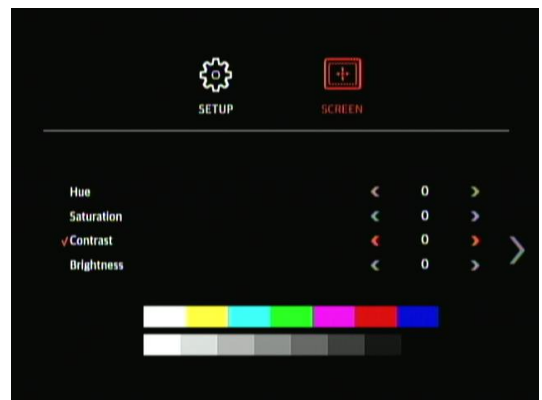
Use the arrow buttons to change the Hue value.



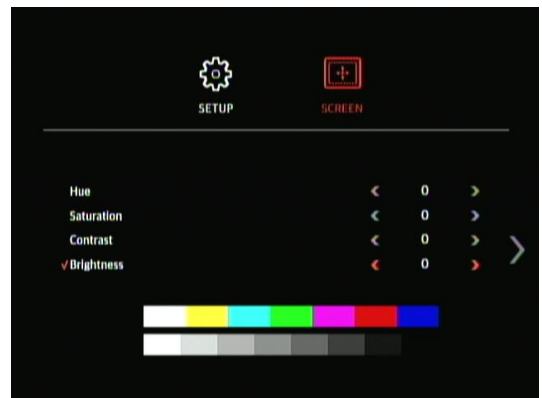
Select the Saturation option by pressing the TAB down button and use the arrow buttons to change the Saturation value.



Select the Contrast option by pressing the TAB down button and use the arrow buttons to change the Contrast value.



Select the Brightness option by pressing the TAB down button and use the arrow buttons to change the Brightness value.



To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.

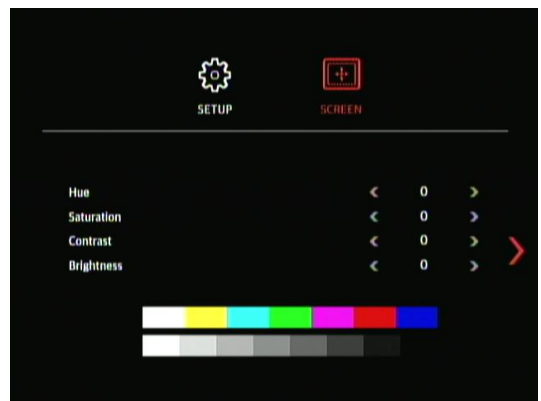


### 11.12 Configure the Screen Size and Position

To change the display settings enter the SCREEN menu by pressing MENU button, and pressing TAB down and then OK on the SETUP icon.

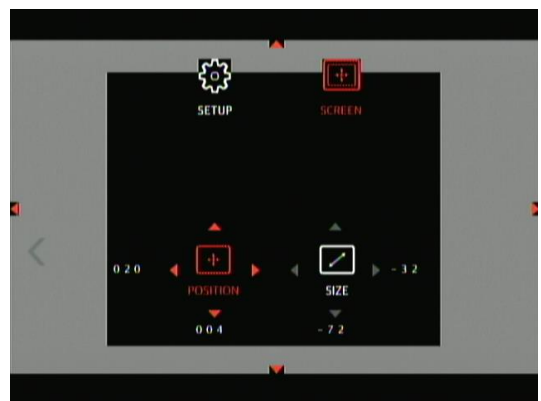


The size and position settings are on the second page of the SCREEN menu. Press the TAB up button to select the next page icon and press the OK button.

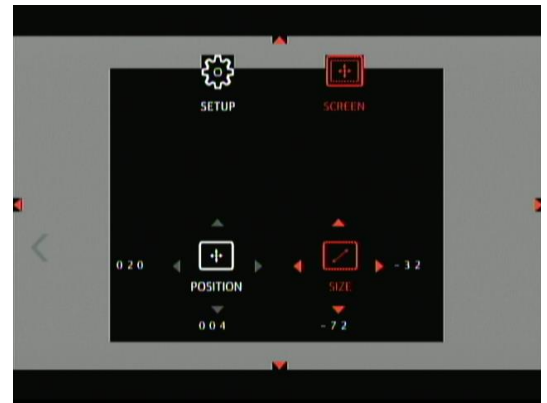


(Alternatively, press the TAB down button 4 times)

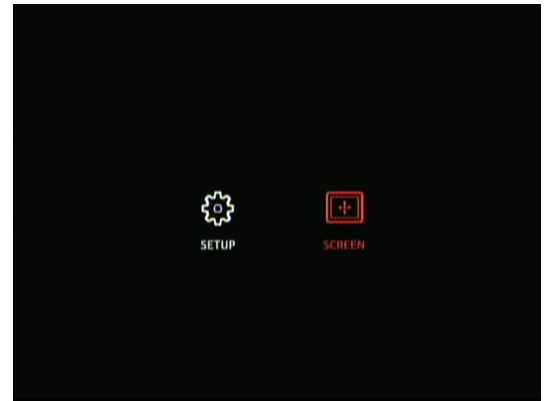
Use the up and down arrows on the remote control to move the picture up and down. Use the left and right arrows on the remote control to move the picture left and right.



Press the TAB down button to select the SIZE option. Use the up and down arrows on the remote control to adjust the picture height. Use the left and right arrows on the remote control to adjust the picture width.



To exit the menu and save the changes, press the MENU button on the remote control once to return to the menu home screen and then again to exit.



**Note:** there is a short delay when exiting the menu as the system saves the changes that have been made. Wait approx. 10 seconds for the system to exit the menu.

## 12 Additional Features & Functionality

### 12.1 ECU DIP Switch

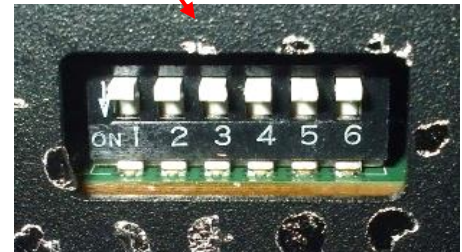
Some additional functionality is only enabled by using the DIP Switch located on the back of the ECU housing.

To reveal the DIP Switch, remove the warning label covering the access port - **do not throw the label away, refit the label after use.**

The switches are labelled 1-6 from left to right (facing the switches). By default, all the switches are in the top position (OFF), to enable the switch place it in the down (ON) position.

Changes to be made when system is off.

**Do not remove this label unless the features listed in these sections are absolutely required. Take care to use only the switches that are required, incorrect use could cause damage to the system. Incorrect use of these switches will void the warranty.**



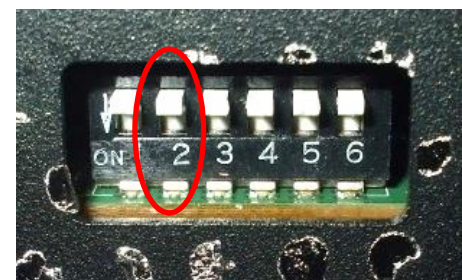
### 12.2 Quad Screen Native Camera Image

This feature provides a quad screen view of the native camera images on a single screen which can be useful for recording the native images on a single channel (e.g Brigades EDR-101 series event recorder).

To enable this feature Switch 2 on the DIP Switch should be set to on. This enables the “CVBS\_BB” output on the BN360-200-INT harness. To connect this to a monitor an additional BN360-VBV-L4015 cable is required.

**This video output is NTSC only, changing the video output format does not affect this channel.**

**Using this feature can potentially reduce the video frame rate of the primary video output which might cause video “lag”. For detailed, full resolution recording purposes Brigade recommends using AC-305 splitter cables to connect each video channel to Brigades MDR products.**



### 12.3 NTSC/PAL Video Output

The primary video output can be changed from NTSC to PAL. To do this Switch 6 on the DIP Switch must be put in the OFF position.

Note – this does not change the video output format from the cameras, these remain in NTSC format.

