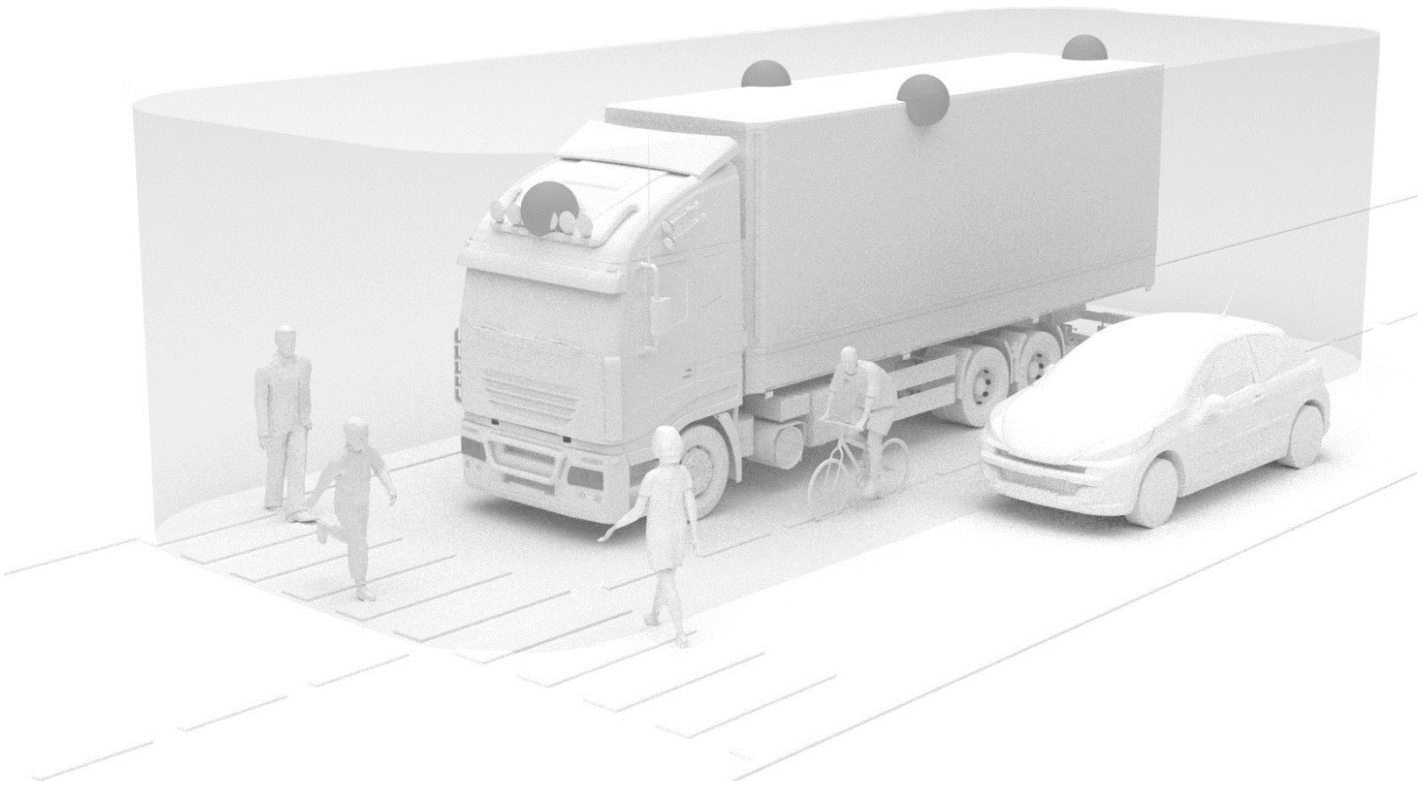
Backeye®360 HD

BN360-300

Calibration, Installation & Operation Guide



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

1 Contents

2 Introduction to Backeye®360 HD

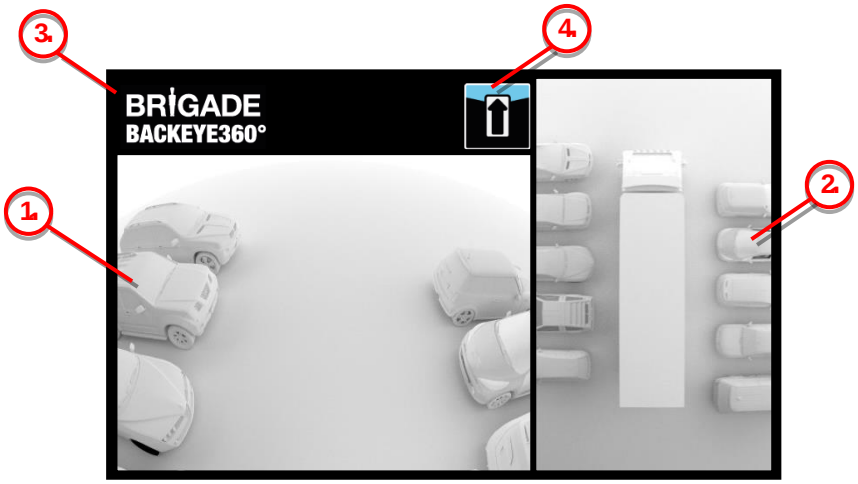
Brigade's BN360-300 Series Backeye® 360° HD system is an advanced camera monitor system that provides a high-definition simulated birds-eye-view of the vehicle, giving drivers the ability to see all around the vehicle in a single image. Using Backeye® 360 HD systems drivers can significantly improve blind spot visibility and low speed manoeuvrability versus traditional camera monitor systems. The BN360-300 system comprises of four of Brigade's ultra-wide-angled 720p HD cameras, an ECU and power and interface harnesses. By placing the ultra-wide-angled HD 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. The BN360-300 system is compatible with AHD (30fps) and CVBS (NTSC) monitors such as Brigade's HD monitor range.

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 HD 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 HD 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 in 720P AHD (30fps) or CVBS (NTSC)
- 4 x ultra-wide-angled 720P HD cameras with up to 185° horizontal field of view giving improved viewing area even on single camera views (versus traditional camera systems)
- Customisable views via Calibration software
  - 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)
- 4 x trigger inputs: reverse/left/right/speed signal

2.2 Display Overview (default view)



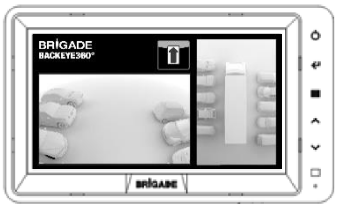
1. Single camera view – shows the single camera normal view (i.e. front, rear, left or right)
2. 360° surround view image – the simulated, 360° birds-eye view of the vehicle
3. Brigade logo – not visible on portrait full screen views
4. View information graphic – pictogram that indicates which single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

2.3 Display Configurations

The BN360-300 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. The BN360-300 system compatible with Brigades monitor range and customer monitors that are compatible with CVBS or AHD 1.0.

2.3.1 Lansdcape 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 Backeye 360 HD Configuration Tool.



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 Backeye 360 HD Configuration Tool.

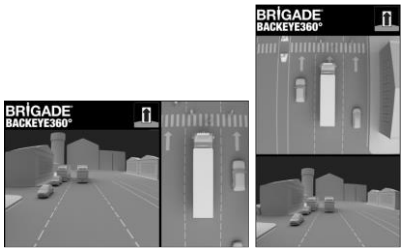
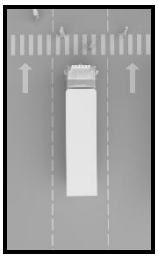
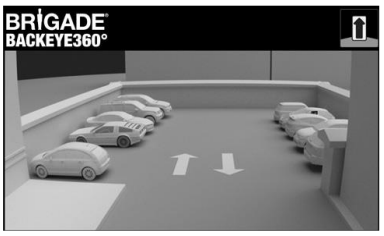
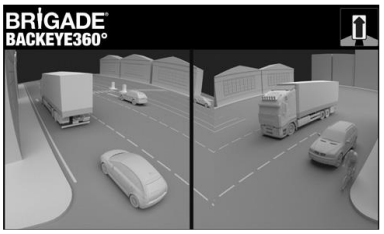
2.4 View Configurations

The system is capable of storing 10 different views per configuration (Landscape or Portrait):

No.	View Mode	Landscape	Portrait
1	Top + Mirrored Rear View	✓	✓
2	Top + Front View	✓	✓
3	Top + Left View	✓	✓
4	Top + Right View	✓	✓
5	Top Full		✓
6	Front Full	✓	
7	Rear Full	✓	
8	Left Full	✓	
9	Right Full	✓	
10	Front Crossing Traffic	✓	
11	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	"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.).	
Top Full	Full screen 360° views for Portrait Mode only.	
Front (full) Rear (full) Left (full) Right (full)	Displays the front/rear/left/right single camera views in full screen only.	
Front Crossing Traffic Rear Crossing Traffic	Simulates cameras placed on the corners of 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 e.g. if the driving position is set back from the front of the vehicle. **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.**	

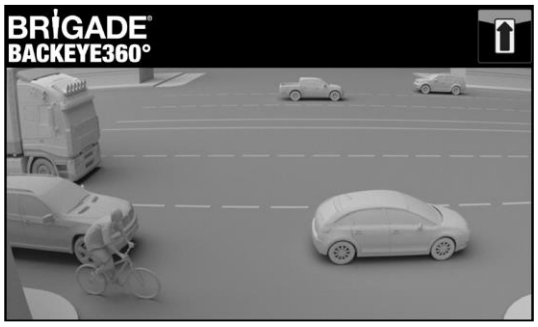
2.6 Crossing Traffic View

The Crossing Traffic View simulates cameras mounted on the corners of the vehicle which brings increased awareness to the front or rear of the vehicle e.g. when approaching intersecting traffic (especially useful when the driving position is set back from the front of the vehicle).

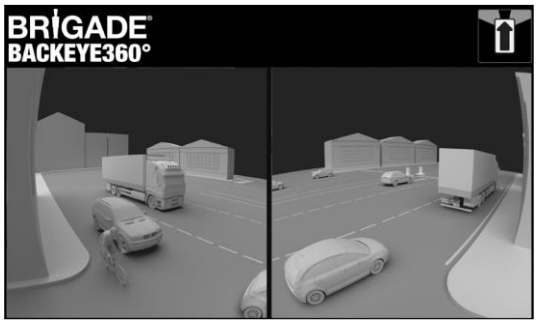
The view is generated by extracting and processing the front or rear single camera images and removing the middle section of view. The two “corner” images are then placed side-by-side with a red border indicating to the driver that the view is not a normal front/rear camera view.

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 arears 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.

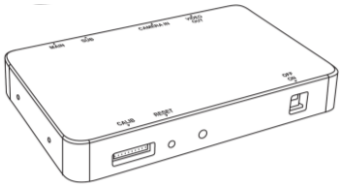
3 System Components

3.1 Backeye® 360° Kit - BN360-300

The following is a list of the components that are supplied with the BN360-300 system.

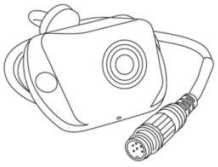
3.1.1 ECU - BN360-300-ECU

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) - BN360-1000C

Set of four ultra-wide-angled, 720P HD cameras with mounting bracket and housing included.



3.1.3 Video input harness – BN360-VIN-01

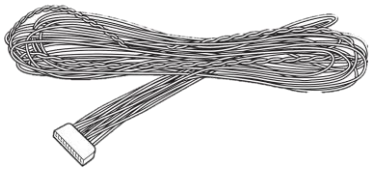
The video input harness provides connectivity between the 4 x cameras and the ECU

3.1.4 Video output harness – BN360-VO-01

The video output harness provides connectivity between the ECU and the monitor (either CVBS or AHD)

3.1.5 Power harness - BN360-PWR-01

The power harness provides connectivity between the ECU and the vehicle power source.

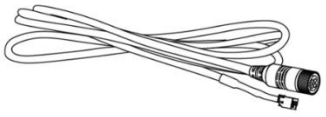


3.1.6 Interface harness – BN360-INT-01

The interface harness provides connectivity between the ECU and the Set-Up & View Select Button.

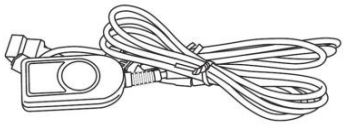
3.1.7 Select Video Output Cable – BN360-VBV-L4015

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



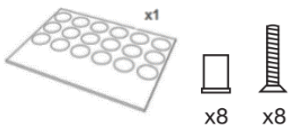
3.1.8 Set-Up & View Select Button – BN360-CP-01

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.



3.1.9 Camera Fitting Kit - BN360-1000C-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.



3.2 Calibration Tools

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

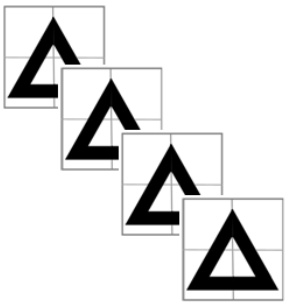
3.2.1 Calibration Tool – BN360-CT-01

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

Note: Brigade recommends using the SD Card included in the Calibration Tool Kit, for best results a Class 6 4GB card from a reputable manufacturer should be used. The BN360-300 is not compatible with SDXC cards.

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

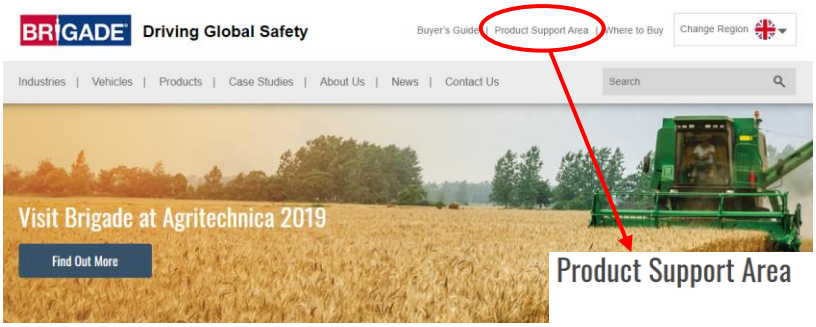
These mats are aligned around the vehicle to perform the camera calibration for the 360° surround view image.



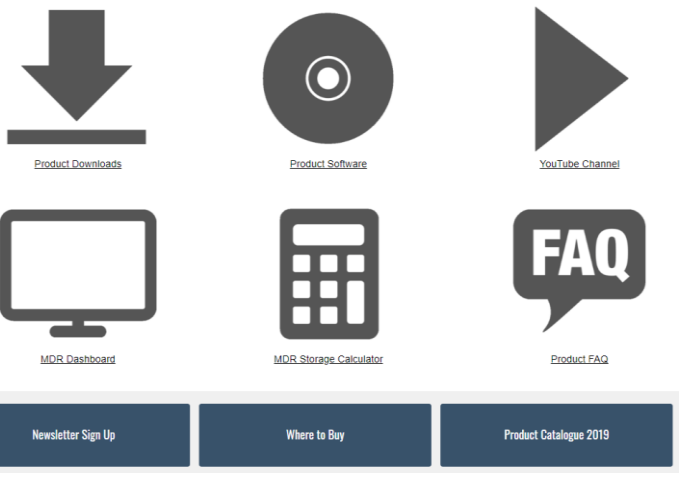
3.2.3 USB – BN360-300-USB

The USB contains all documentation, software and support files required to install and calibrate the BN360-300 system, including the Brigade Backeye® 360° Calibration Software.

For the latest USB contents please visit the Product Support Area on the Brigade Electronics website: https://brigade-electronics.com/product-support-area/.



Product Support Area



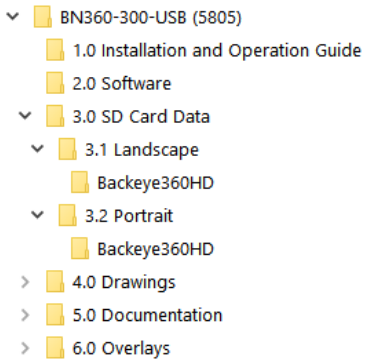
4 SD Card Data

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 BN360-300-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.

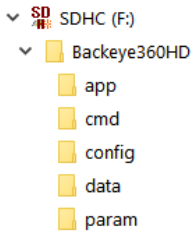
Refer to section 2.4 for more information on View Configurations.



4.2 Backeye360HD Folder

The “Backeye360HD” 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 Backeye360HD folder must be at the top level of the SD Card, if the Calibration Tool does not find the Backeye360HD folder the calibration procedure will not begin.



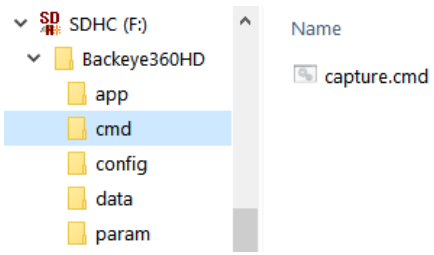
It is important that the folders within the Backeye360HD folder are not altered in any way, these must remain within the folder and must not be renamed when copying to the SD Card. See the table below for a summary of the folders within the Backeye360HD folder and their functions:

Top folder	Sub-folder	Description
Backeye360HD	app	ECU firmware
	Backup	Contains ECU backed up data (only created if the backup feature has been used)
	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 Backeye360HD 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: Depending on how the Windows Explorer file extension settings are configured the “.cmd” may not be shown in the file name. If it is not shown, do not add “.cmd”.

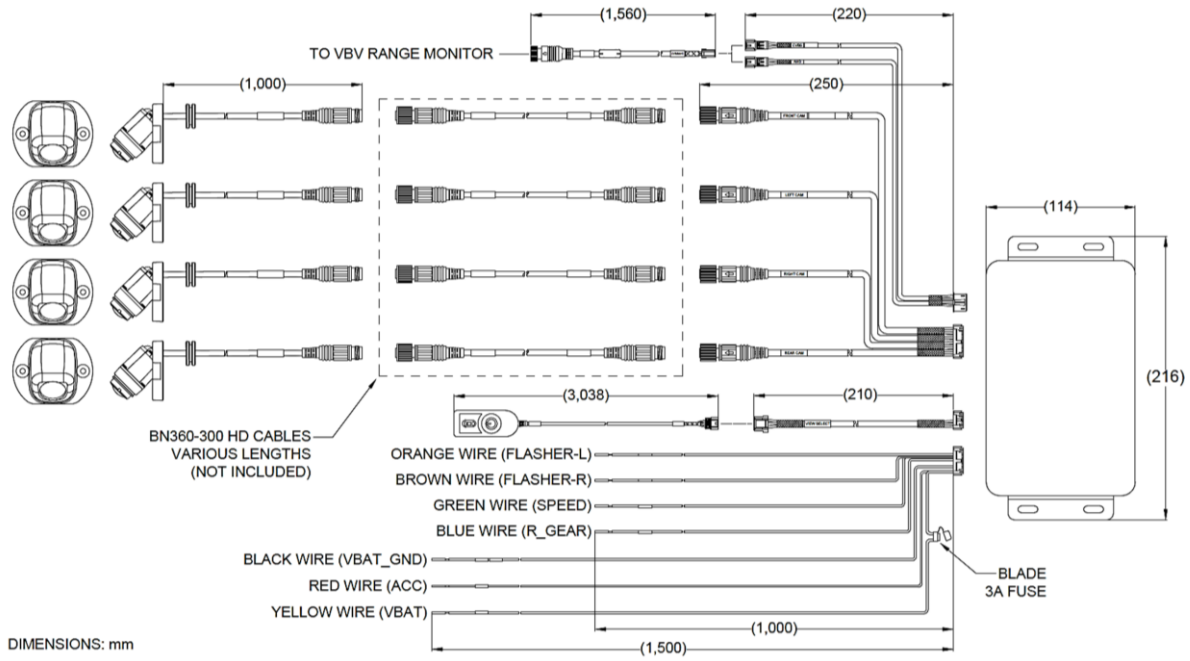


A list of the various file names and their functions is given below:

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



Please Note: Camera extension cables are not included in the kit and must be purchased seperately. Individual camera extension cable lengths should not exceed 25 meters.

Item	Part No.	Qty.	Model No.
1	5833	1	BN360-300-ECU
2	5807	1	BN360-300-ECU-FIX
3	4489	1	BN360-CP-01
4	4698	1	BN360-VBV-L4015
5	5798	1	BN360-VIN-01
6	5803	1	BN360-VO-01
7	5793	1	BN360-INT-01
8	5794	1	BN360-PWR-01
9	5802	4	BN360-1000C
10	5799	4	BN360-1000C-HI
11	5821	1	BN360-1000C-FIX (NOT SHOWN)
12	5796	1	BN360-300-IG (NOT SHOWN)

5.2 Camera Installation

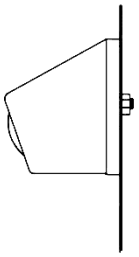
The BN360-300 cameras should be mounted as symmetrically as possible around the vehicle, preferably centrally on each side of the vehicle. Whilst this is ideal, cameras can be positioned in differing locations on the vehicle although this will affect the overall quality of the 360° image.
It is recommended 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

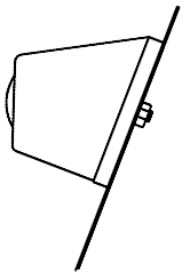
The cameras are designed to be mounted on a vertical surface to give correct alignment such that approximately 10% of the camera image is the vehicle body as shown below. In some cases, this may not be possible and may require adjustment using Brigades universal mounting brackets**.**

The cameras should be mounted flush to the vehicle body.

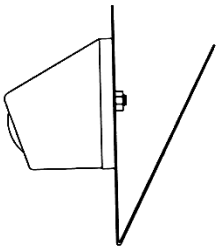
Ideal mounting, vehicle body occupies 10% of camera image.



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. Brigade Electronics has a range of mounting brackets, e.g. BN360-100C-BKT01 which can be shaped to fit various installation types.

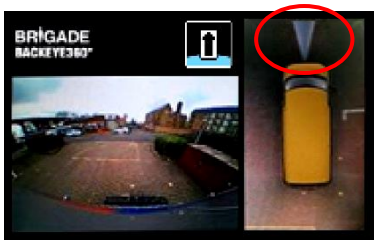
5.2.2 Camera Mounting Height

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.**

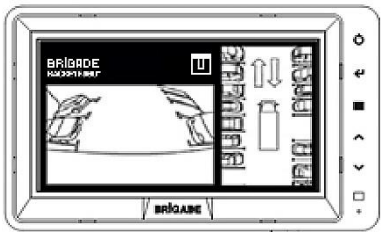
5.5 System Connection

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.

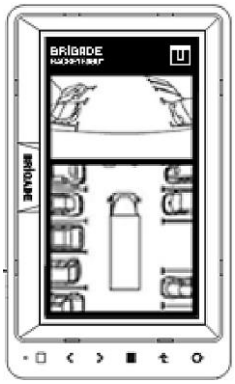
5.6 Monitor

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 views, a long press will switch between the split screen views and the single camera views. This would be a good time to check the camera positioning as per Section 5.2 by checking that each camera can see two triangles of the calibration mats.

6 Vehicle Calibration

To create a usable and reliable 360° surround view image a full calibration must 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:

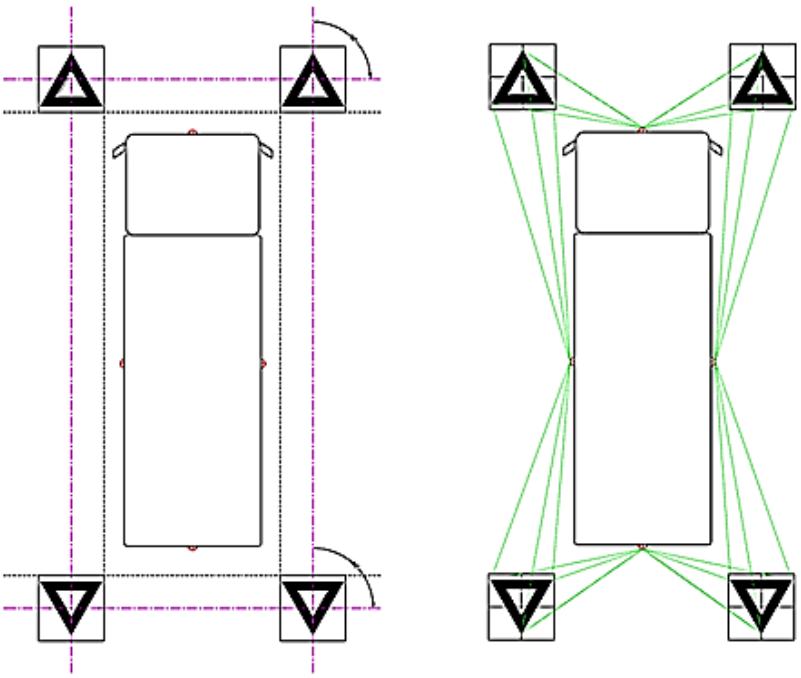
Step 1 > Vehicle installation
Step 2 > Copy SD Card contents from BN360-300-USB to SD Card
Step 3 > Capture vehicle images to SD Card
Step 4 > Calibrate camera positions using Backeye 360 HD Calibration Tool
Step 5 > Configure view and trigger settings using Backeye 360 HD Configuration Tool (skip if not required)
Step 6 > Upload calibration and configuration data (if required) to BN360-300 system
Step 7 > 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 Matts 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 Matts are positioned around the vehicle, the better the final result will be. Chalk line, string or laser tools are recommended for improved accuracy.

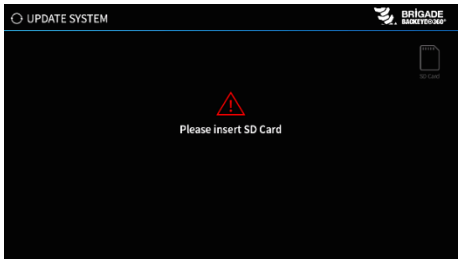


Note: it is imperative that the Calibration Mats are laid out as shown above, if the orientation of the mats is different (e.g. they are rotated through 90°) the system will not calibrate correctly.

6.3 Camera Image Collection

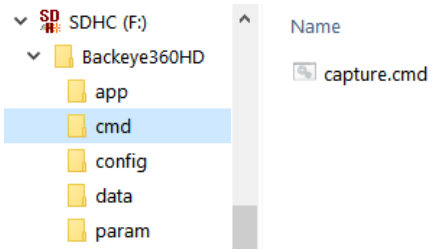
Before continuing it is recommended to always format the SD Card before calibration.

With the vehicle ignition off, insert the Calibration Tool into the BN360-300-ECU and turn the vehicle ignition ON. The following screen will be shown:



Copy the “Backeye360HD” folder from the desired configuration to the SD Card. Refer to section 2.4 for more information on the different Display Configurations. Ensure the “Backeye360HD” folder is at the root of the SD Card and the file inside the “cmd” folder is named “capture.cmd”.

Note: Depending on how the Windows Explorer file extension settings are configured the “.cmd” may not be shown in the file name. If it is not shown, do not add “.cmd”.



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.

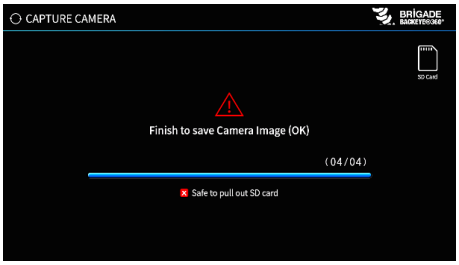
It may be necessary to adjust the Calibration Mats or camera positions if the cameras cannot see the Calibration Mats.

Ensure that two calibration mats are visible in each of the single camera images (e.g. FRONT, REAR, LEFT, RIGHT) and that all 3 points of both triangles are clearly visible and not obstructed.

For an ideal calibration the triangles should be located within the guidelines shown in RED in the image to the right.

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.

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



N**OTE: DO NOT MOVE THE VEHICLE OR CALIBRATION MATS OR REMOVE THE CALIBRATION TOOL OR SD CARD DURING THIS PROCESS, DOING SO COULD PERMANENTLY DAMAGE THE SYSTEM.**

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 Backeye360HD folder with the individual camera views, these should be named “front.bmp”, “rear.bmp”, “right.bmp” and “left.bmp”.

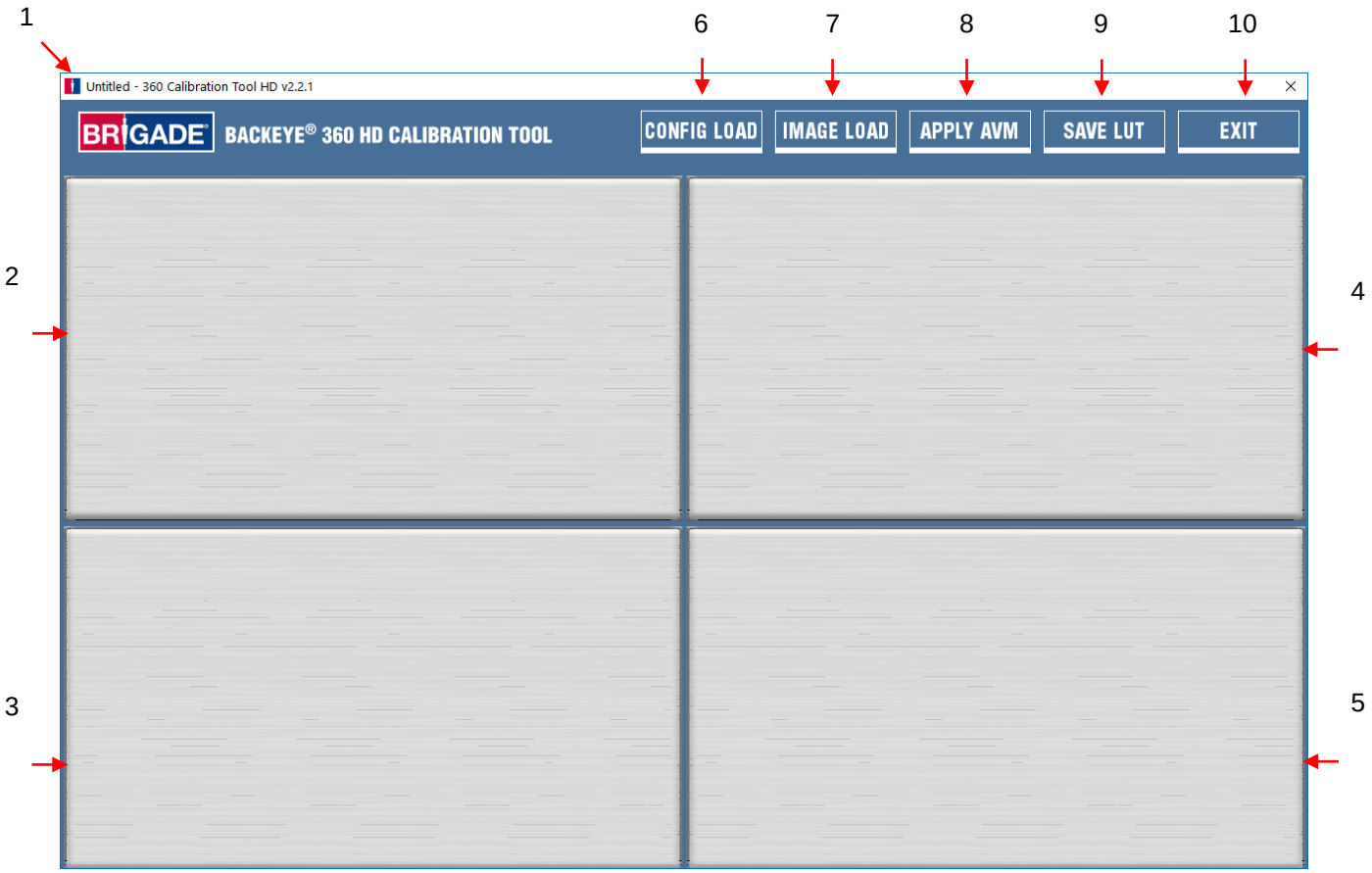
6.4 Installing the Backeye® 360 HD Calibration Software

Install the Calibration Software from the BN360-300-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 HD Calibration Software

6.5.1 Calibration Software Overview

Once the installation is complete, double click the Backeye® 360 HD 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

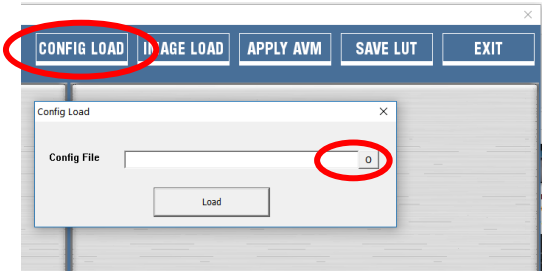
Tool bar

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)

Note: The Backeye® 360 HD Calibration Software is incompatible with previous models of the Backeye® 360 system (e.g. BN360-200).

6.5.2 Loading the Config File

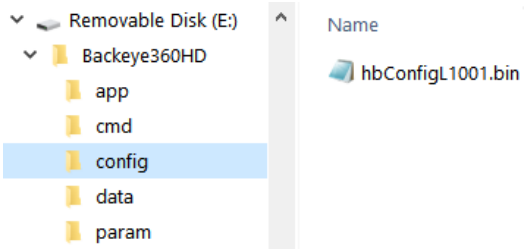
Click the “Config Load” button and when the Config Load window opens, click the “o” icon to locate the Config file.



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 config file revision 1 will be named hbConfigL1001.bin. Always ensure the latest revision is used by downloading the latest software from Brigades website.

It is also possible to reload a Configuration file from a previously saved calibration, for more information sees section 6.5.10.



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

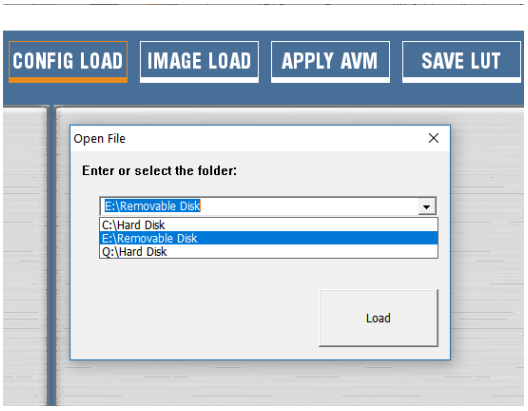
- 8.40 = Landscape
- 8.41 = Portrait

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

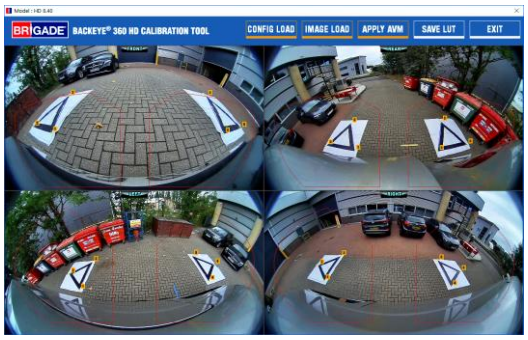
Click the “Image Load” icon on the calibration tool bar to open the Image Load dialogue box.

Select the SD Card from the dropdown menu and select “Load” to grab the vehicle camera images captured in chapter 6.3 from the SD Card.



Selecting the “Load control points” checkbox will load the previous calibration data if this has been saved. See section 6.5.10 for more details on saving calibration data.

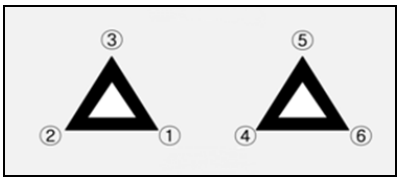
The camera images will automatically populate the empty tiles.



6.5.4 Calibration Control Points

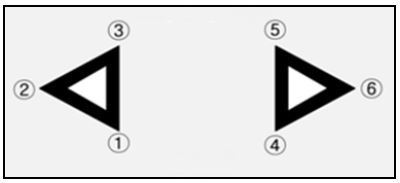
The triangles in the calibration pattern are automatically detected and the control points are displayed. The software automatically detects the corners of the triangles and derives the coordinates of each image when loaded. The order of the control points starts from the triangle point closest to the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

Front & Rear Camera View



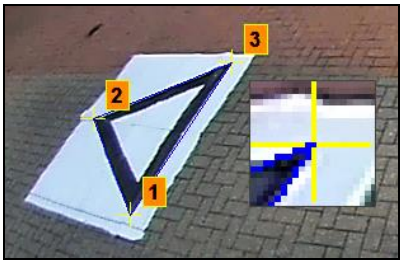
WARNING: Ensure the control points are selected in the correct order as shown. Anything other than the above will result in calibration failure.

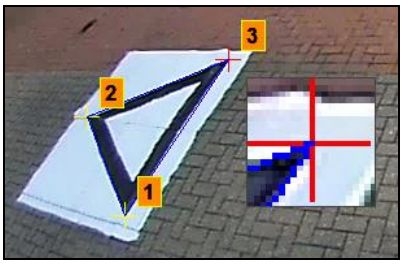
Left & Right Camera View



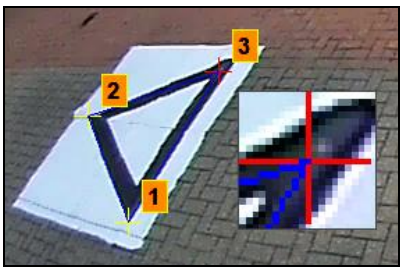
It may be necessary to adjust the control points once the images have been loaded. The control point image will enlarge when the mouse cursor is moved to the control point. This enables the control points to be positioned accurately. Left click the control point that needs modifying. The selected control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

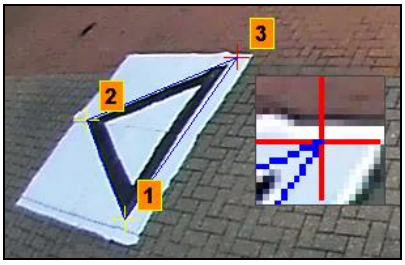
Tip: double clicking anywhere in each of the camera images will make the image fullscreen in the application window which makes selecting the control points much easier and more accurate.





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.

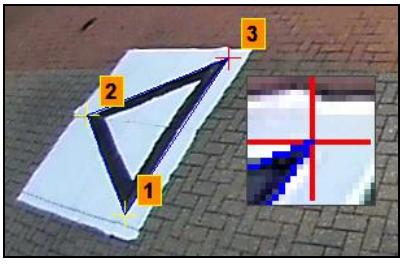




Tip:

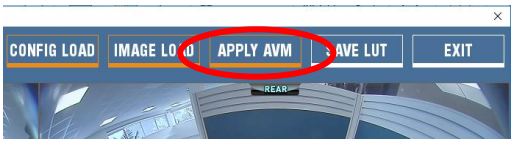
With a control point selected, using the arrow buttons on the PC keyboard will move the crosshair one pixel at a time in the given direction allowing much finer and more controlled adjustment.

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

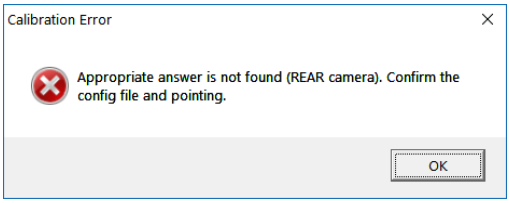


6.5.5 Surround View Preview

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:



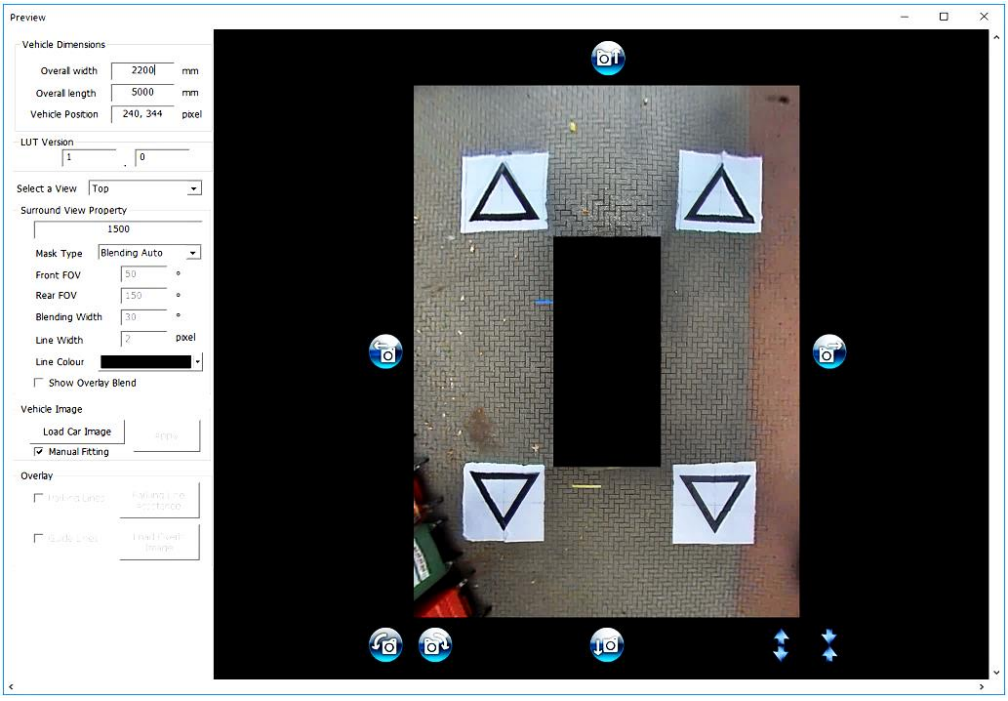
1. The control points are not correctly aligned. Check the order and position of the control points paying attention to the camera given in the message box.
2. The Calibration Mats are not correctly/accurately position around the vehicle. Re-align the calibration mats correctly.

Tip:

- Selecting “Ok” in this window to bypass the prompt and the “Preview” window will open.
- 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.
- For certain calibrations it may be very difficult to select the control points without receiving the error message. It is possible to continue with the error message however it is advised to only skip this if the items listed above have been checked.

6.5.6 Surround View Image Adjustments

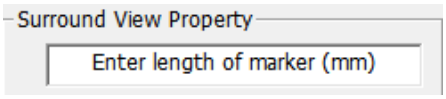
If the control points are correctly aligned, The Preview window will appear similar to the example below:



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 may have multiple 360° views which need to be calibrated, **perform the steps below for each surround view image** (e.g. Top 1, Top 2, Top Full etc.).

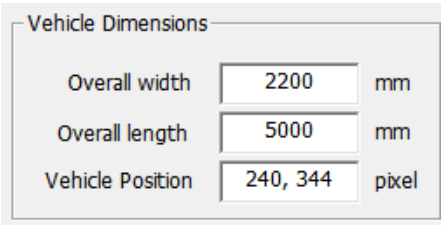
Depending on the display size of the PC this window may need to be enlarged to view the full image, this is because the screen draws 1:1 in order to get the most accurate calibration result e.g. 1 pixel in the image is 1 pixel on the PC screen. To enlarge this screen either press the maximise button in the top right corner or drag the bottom corner to fit as required.

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.



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

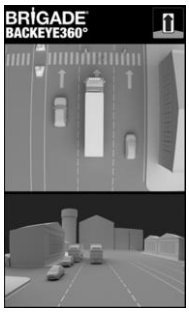
This accuracy of the dimensions will vary depending on the size of the vehicle and the height of the camera, however generally speaking the vehicle mask (the black box where the vehicle is shown) should cover any red areas that are the camera blind spots so the value given here can be adjusted to give the desired vehicle mask size.



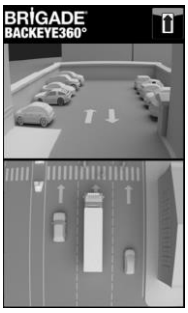
The vehicle mask can be configred to be larger than the real vehicle size, especially in cases where there are overhanging objects, however these will create blindspots close to the vehicle body.

Note: For Configurations that have multiple 360° views these steps will need to be repeated for each 360° view. The "Portrait" configuration can have up to 3 different 360° view modes. E.g.:

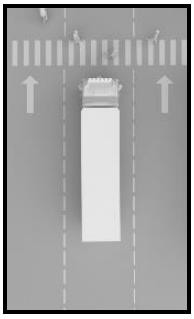
Top1: 360° view in the top half of display. Seen only in the "Rear" view mode.

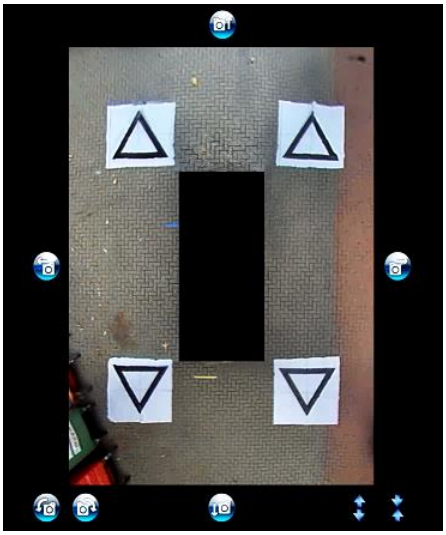


Top2: 360° view in the bottom half of display. Seen in "Front", "Left" and "Right" views.

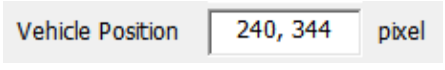


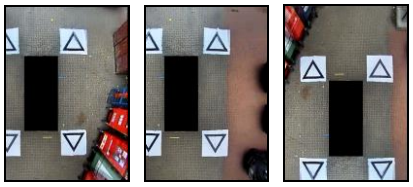
Top Full: Full Screen 360° view.





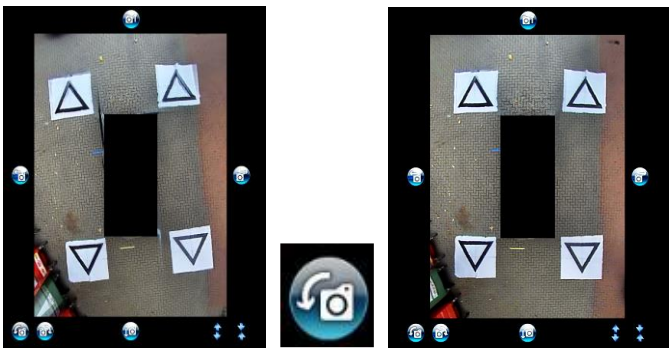
The default Vehicle Position is given as the center of the 360° surround view image screen however this can be adjusted if required. This is especially helpful in cases where only a portion of the vehicle is of interest, e.g. for articulated vehicles where the action of the cab articulating from the 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).





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.

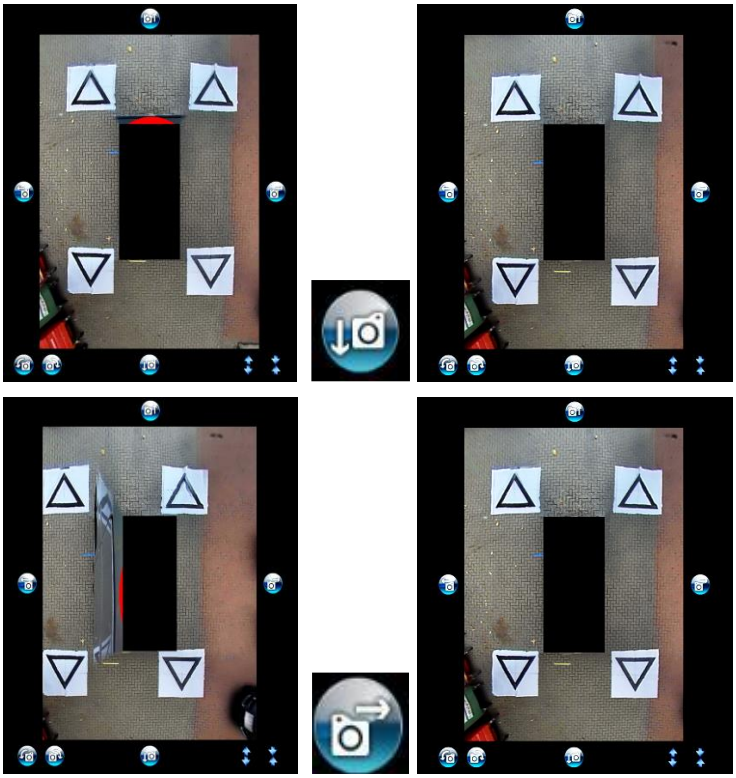
Rotational adjustments should be made before making any horizontal or vertical adjustments. Adjustments to the surround view image need to be made before applying a vehicle overlay.



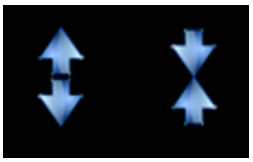
Horizontal and vertical adjustments can be made to remove any camera blind spots (shown in red) or any undesirable image distortion (see bottom left).

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.

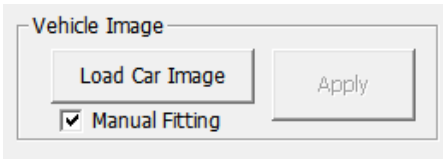


It may be necessary to enlarge the vehicle mask or “zoom” in or out in the surround view image to see more or less of the area around the vehicle. To do this, use the arrow buttons below the surround view image to adjust the view as desired.



It is recommended to leave the “Mask Type” setting as “Blending Auto”. For more information on the Mask Types, refer to Appendix 1.

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

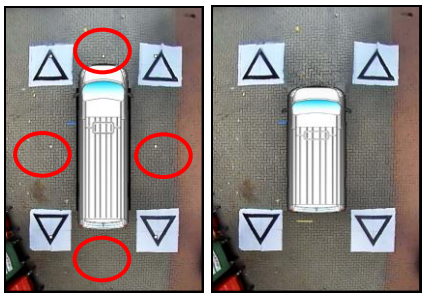


Vehicle images are stored in the 6.0 Overlays folder on BN360-300-USB.

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. Software such as Paint or Paint.Net can be used to create or modify existing vehicle overlays if required.

The vehicle image size must be in multiples of 4 e.g. 200px x 400px, 400px x 800px etc.

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



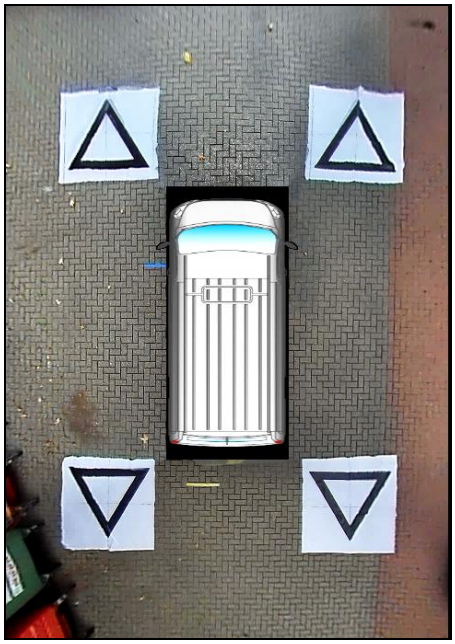
To resize the vehicle image so that it correctly fits the vehicle mask, click and drag the adjustment boxes around the image to shrink or enlarge the overlay as desired. Click and drag the vehicle image to position it over the vehicle mask, alternatively use the arrow keys on the keyboard to make minor adjustments to the vehicle image position.

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

To change to a different vehicle mask, repeat the “Load Car Image” step above.

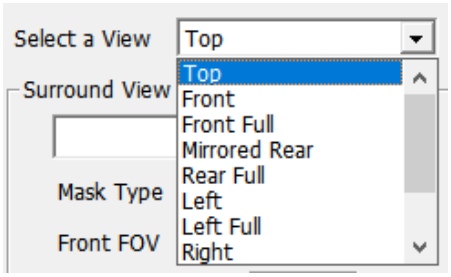
Ticking the “Manual Fitting” checkbox will automatically fit the vehicle image to the vehicle mask when the “Apply” button is pressed. When using this option the software will try to scale the vehicle image whilst maintaining the original image aspect ratio. If the image is not the same aspect ratio as the vehicle mask the outcome may not be desirable e.g. if the vehicle image is square but the vehicle mask is rectangular, shown in the image to the right.

For the best results, Brigade recommends that the vehicle image is correctly scaled to fit the vehicle mask using the “Manual Fitting” option.



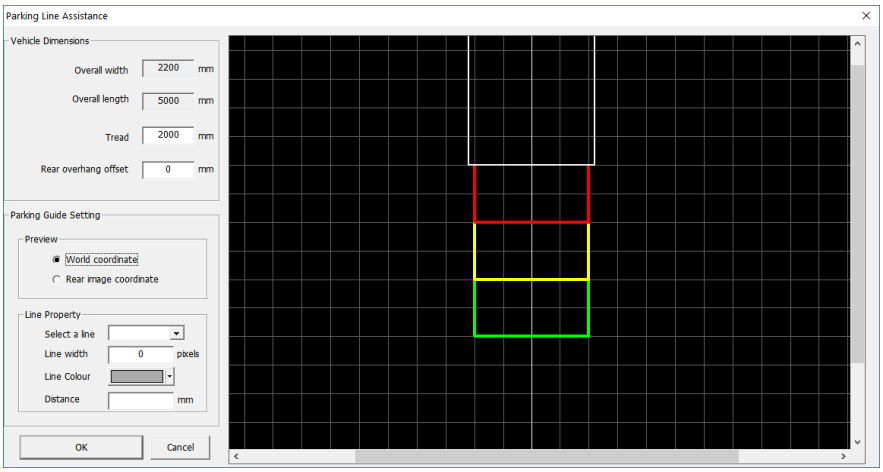
Use the “Select a View” menu to view and make any necessary adjustments to the additional views. The views listed here will depend on the configuration that has been selected, for more information see section 2.4.

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



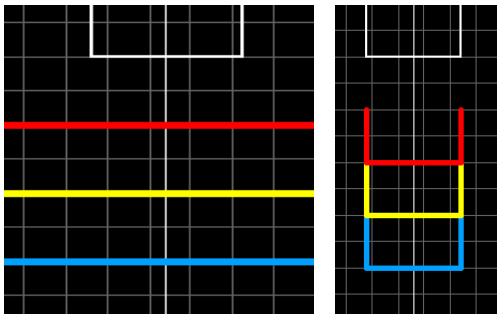
6.5.7 <u>Parking Line Property</u>

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:



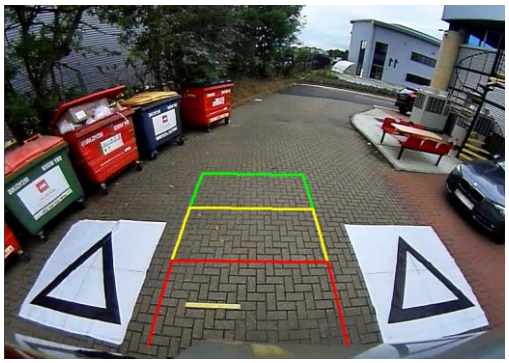
Vehicle Dimensions

- Tread – changes the width of the parking guides
- Wheel base – the distance between the vehicle wheels, used in conjunction with the Steer Angle.



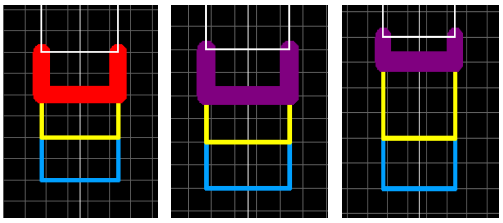
Preview

- 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



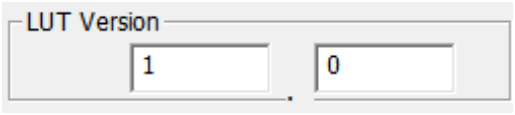
6.5.8 Guide Lines

Guide Lines can be applied to up to five of the single camera views and allow custom shapes or guides to be applied to different single camera views. For more information on how to create and apply Guide Lines, see Appendix 2.

6.5.9 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.

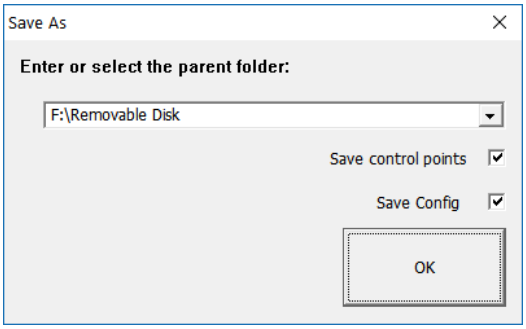
This can be used when saving calibrations to easily identify the current calibration version.



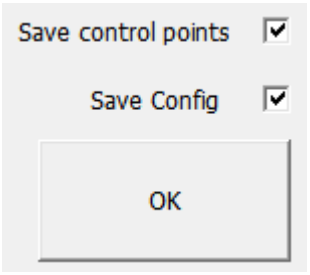
6.5.10 Saving the Calibration Data

Once the calibration is complete, click the “SAVE LUT” button on the tool bar.

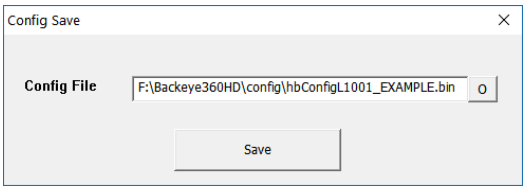
Select the save location for the calibration data when the following prompt is shown. Choose the SD Card (e.g. F:\Removable Disk).



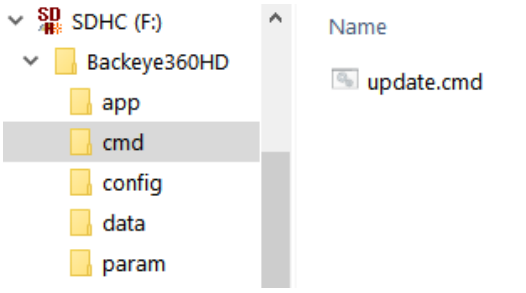
Select the check boxes for “Save control points” and “Save config” to save the calibration data in a new config file. This allows the user to reload the current or previous calibrations and make any changes if required without having to go through all the steps listed above again.



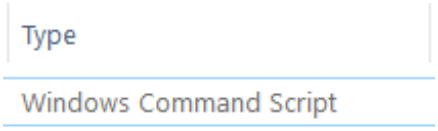
When prompted, choose a new file name for the new config file. The file can be given any name however it is recommended to keep the original file name for easy identification and simply append a unique identifier to the end, e.g. the vehicle registration number, the calibration data etc.



Once the save is completed, rename the “capture.cmd” file in the “cmd” folder on the SD Card 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.

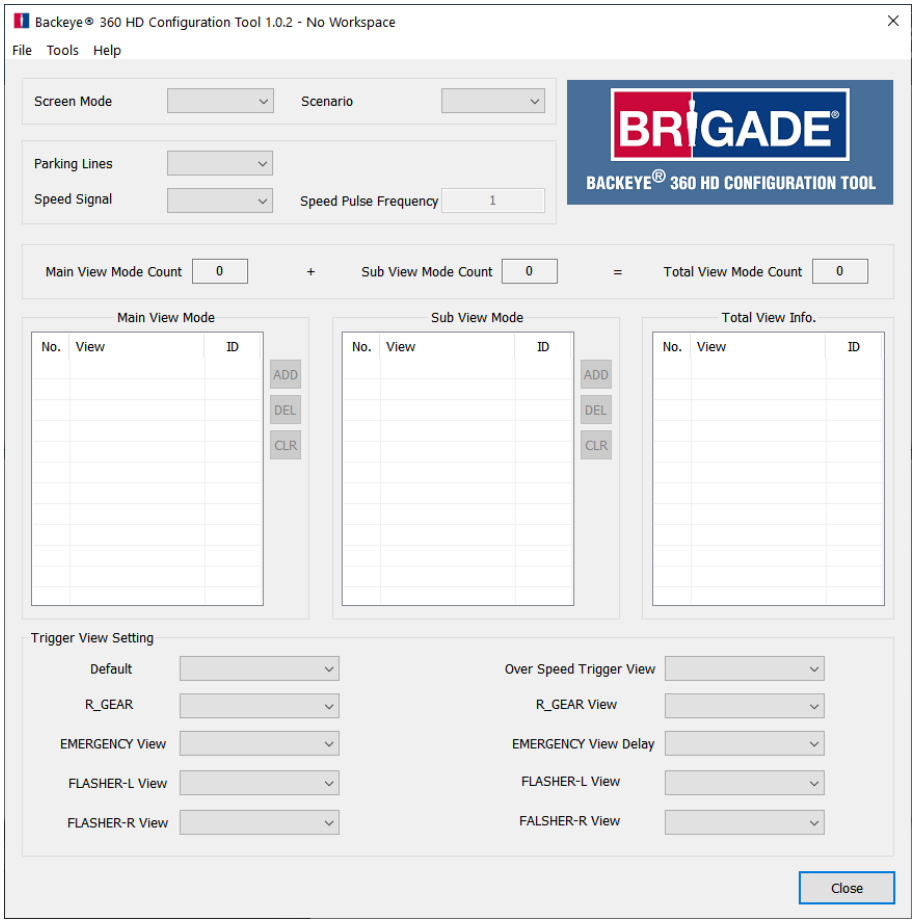


7 Backeye 360 HD Configuration Tool

Various system settings such as triggers, views etc. can be configured using the BN360-300 Configuration Tool.

Install the BN360-300 Configuration Tool from the BN360-300-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.

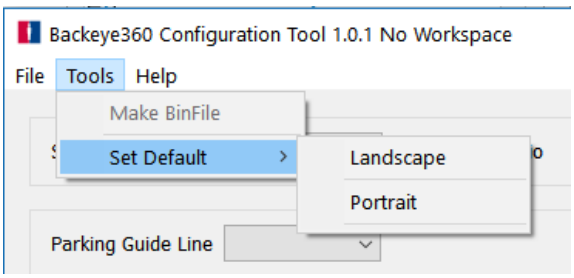
Once the tool is installed, double click the Backeye®360 Configuration Tool desktop icon, the following screen will be displayed, the view will be blank as below:



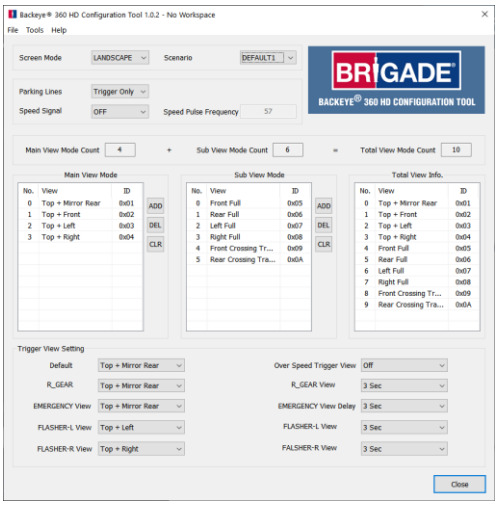
7.1 Using the Backeye 360 HD Configuration Tool

To start, select a default configuration from the Tools > Set Default menu.

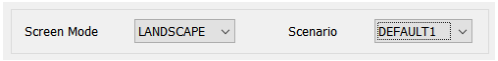
The option chosen here should match the configuration used for the Backeye 360 HD Calibration Software, e.g. if it is a Landscape configuration, chose the Landscape option.



Selecting either “Landscape” or “Portrait” will populate the various configuration items with the default settings.



The “Screen Mode” option should match the configuration as above.



The “Scenario” option configures the operating scenario for triggers and button presses on the Set-Up & View Select Button.

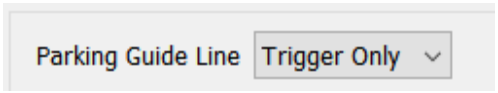
DEFAULT1 = The system will return to the default view after a trigger is active or the Set-Up & View Select Button is pressed. Triggers have priority over Set-Up & View Select Button.

PREVIOUS1 = The system will return to the last view that was displayed after a trigger is active. If the Set-Up & View Select Button is pressed the system will remain on this view unless the button is pressed again or a trigger is active. Triggers have priority over Set-Up & View Select Button.

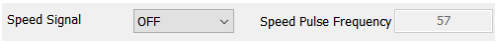
DEFAULT2 = Same as DEFAULT1 however the Set-Up & View Select Button has priority over triggers. If a trigger is active and the Set-Up & View Select Button is pressed, the system will display the next view in the list.

PREVIOUS2 = Same as PREVIOUS1 however the Set-Up & View Select Button has priority over triggers. If a trigger is active and the Set-Up & View Select Button is pressed the system will display the next view in the list. After an active trigger the system will return to the view that was displayed before the active trigger.

By default the Parking Guide Line is set to “Trigger Only”. If a Parking Guide Line is configured in the calibration tool this will be displayed on the Backeye 360 HD system when the given trigger is active.



By default the Speed Signal Trigger is set to off. Select the “On” option to enable this.



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

30 miles per hour = ~48 kilometres per hour (k/h) = 4800 meters per hour

4800 ÷ 3600 = 13.3 meters per second (m/s) (3600 seconds = 1 hour)

13.3 m/s x 4 p/m = 53.2 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 tachographs; simply replace the 4 pulses per meter with the correct value for the vehicle used (refer to the manufacturers details for the correct value).

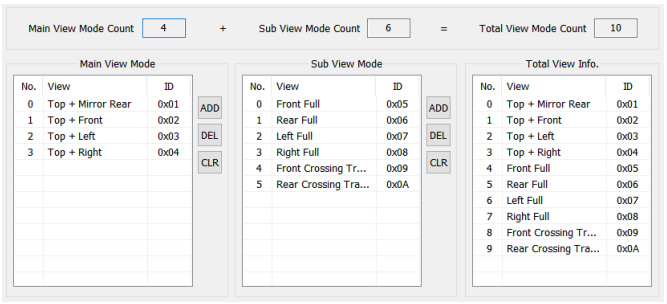
Example values (based on 4 pulses per meter):

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

“Main View Mode” is the group of views that are displayed when the Set-Up & View Select Button is pressed.

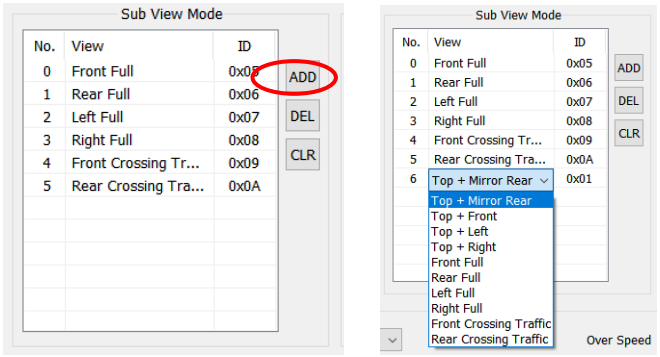
“Sub View Mode” is the second group of views that can be displayed by long pressing the Set-Up & View Select Button and pressing the button again to cycle through the views in this group.

“Total View Info” is all the views that are possible in this current configuration.

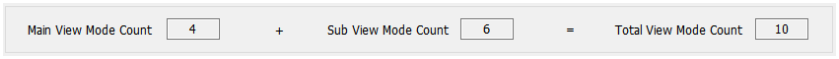


The default views will populate in each group automatically.

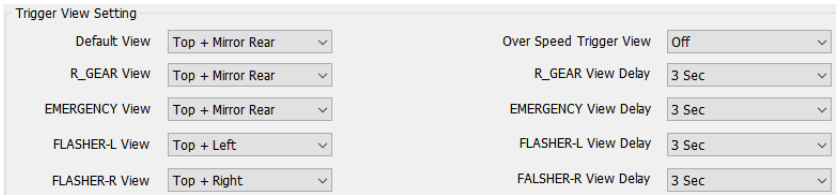
Any view can be added in any group by clicking the “ADD” button in the desired View Mode group. This will automatically add a new view to the end of the list, click on the View name and choose the desired view from the drop dop menu.



The maximum total number of views for the BN360-300 system is 10, this is displayed in the “Total View Mode Count”. Ensure that the number here is not more than 10.



The “Trigger View Setting” options configure the various settings for the system triggers.

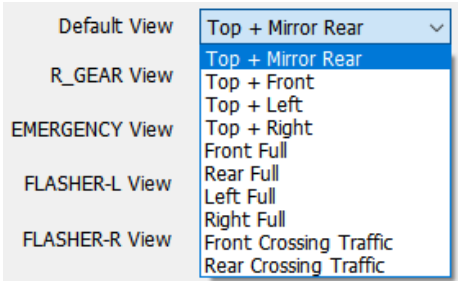


The “Default View” is the view that is displayed by default (e.g. when the system is switched on or after a trigger is active if the DEFAULT1 or DEFAULT2 options are chosen).

“R_GEAR”, “FLASHER-L” AND “FLASHER-R” are the views that are displayed when the respective trigger is active.

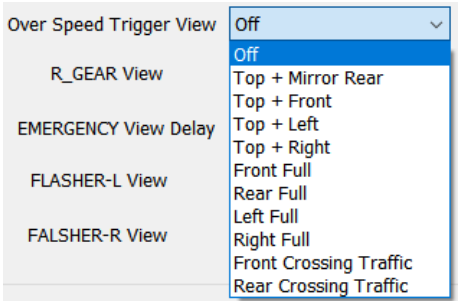
“Emergency” is the view that is displayed when both the FLASHER-L and FLASHER-R triggers are active.

Any view can be set to be the triggered view or default view. To change the view, click on the view name and chose the desired view from the drop down menu.



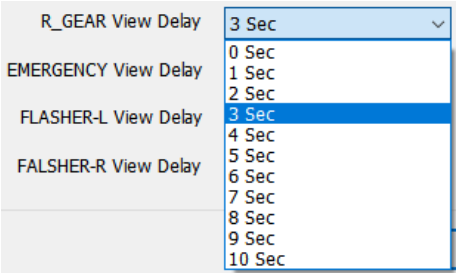
The “Speed Signal View” is the view that is displayed when the Speed Signal trigger is activated.

Any view can be set to be the triggered view as well as turning the display off (the system will output an all black image to prevent the “NO SIGNAL” display on the monitor, however the connected monitor will remain on). To change the view, click on the view name and chose the desired view from the drop down menu.

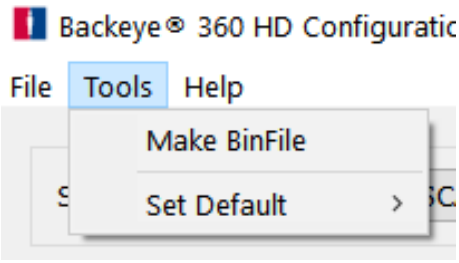


The “R_GEAR Delay”, “EMERGENCY Delay”, “FLASHER-L Delay” AND “FLASHER-R Delay” is the time the triggered view is displayed after the trigger becomes inactive. By default the system will display the triggered view for 3 sec after an active trigger goes inactive.

To change this option, click on the delay time and select the desired delay time from the drop down menu.



Once all the items have been configured as desired, click the “Tools” menu and select the “Make BinFile” option to save the configuration file.

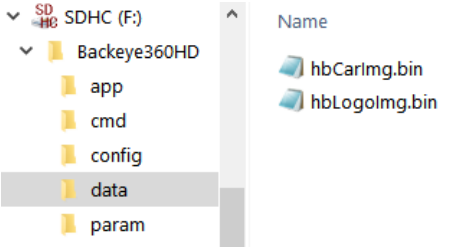


When prompted, save the file to the SD Card in the “data” folder in the “Backeye360HD” folder.

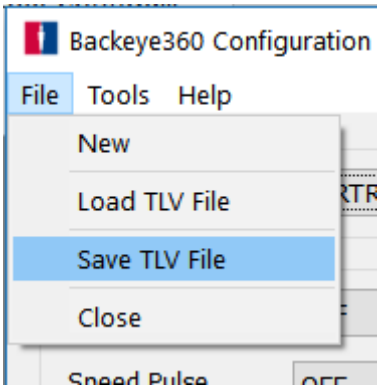
For landscape configurations the filename should be “hbAppConfig_Land.bin”.

For Portrait configurations the filename should be “hbAppConfig_Port.bin”.

The configuration file can be copied to the SD Card to be loaded to the BN360-300 system during the calibration or it can be loaded to the SD Card and flashed after, as long as it is on the SD Card in the folder shown above with the “Update.cmd” file in the “cmd” folder.

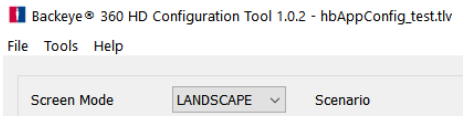


To save the configuration, e.g. for future use or modification, select the “Save TLV File” option in the “File” menu. This will save the configuration data in a “.tlv” file format.



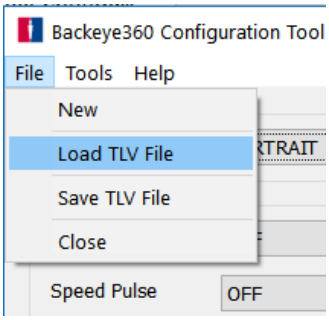
When prompted, save the file to the location desired (e.g. desktop, user fodler, networked drive etc.).

When the TLV file is saved the tool bar will update with the TLV filename.



Saved TLV files can be loaded into the Backeye 360 HD Calibration Tool by selecting the “Load TLV File” option in the “File” menu.

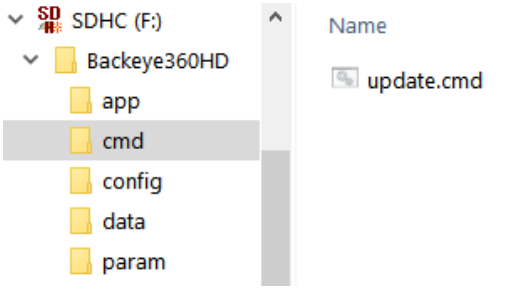
Once the TLV file is loaded, the Backeye 360 HD Configuration tool will automatically populate the various configuration items from the saved TLV file.



8 Installing Calibration Data

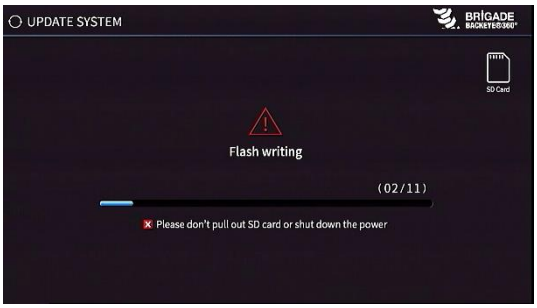
Once the calibration data has been saved to the SD Card as per section 6, insert the Calibration Tool into the BN360-300-ECU and apply power to the system. The “UPDATE SYSTEM” screen should be displayed prompting the user to insert an SD Card.

Ensure the SD Card contents are correct and the “cmd” file has been renamed to “update.cmd”.



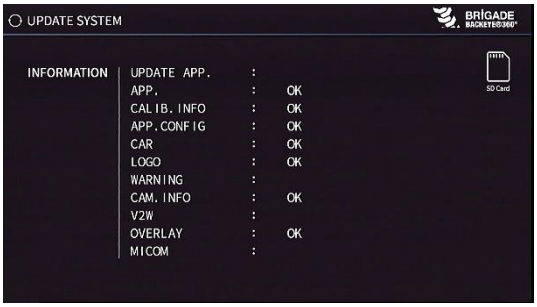
Insert the SD Card, the system will automatically begin the update process.

WARNING: DO NOT REMOVE THE SD CARD OR CALIBRATION TOOL DURING THIS PROCESS, DOING SO COULD CAUSE PERMANENT DAMAGE TO THE SYSTEM.



Once the upload has completed the following screen should show.

All items that have been updated will be displayed as “OK”. Some items such as “WARNING”, “LOGO” and “MICOM” and “V2W” may not change so these will be blank.



Updating ECU firmware is a two-stage process that requires a second upload in order to ensure all files are correctly updated. When the “INFORMATION” screen shows, do not eject the SD Card, press the “Reset” button on the Calibration Tool to repeat the calibration upload and wait for the update to complete a second time.

When the “INFORMATION” screen is displayed for a second time, eject the SD Card and wait for the “Please Insert SD Card” screen to appear before removing the Calibration Tool (the system can be left powered while the Calibration Tool is removed).

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

9 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).

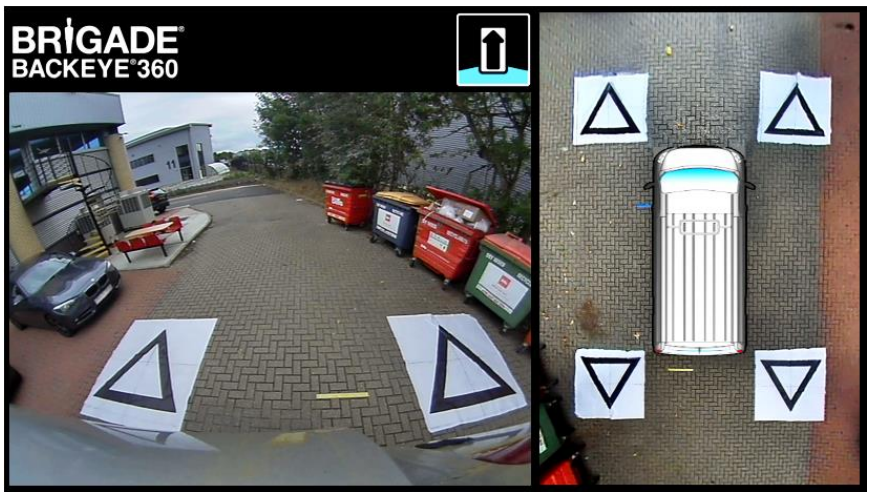
9.1 Good Calibration

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.

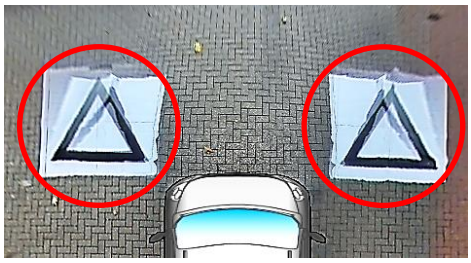
The vehicle image is not larger than the real vehicle e.g. objects close to the vehicle are not obscured by the vehicle image.

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.

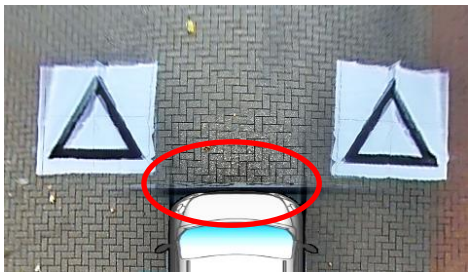


9.2 Bad Calibration

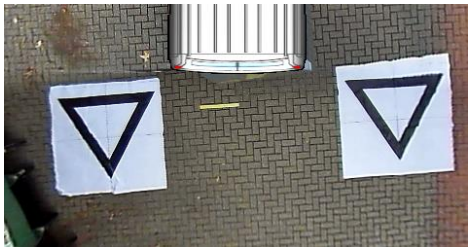
Ground level objects appear misaligned or distorted



There are parts of the vehicle in the view



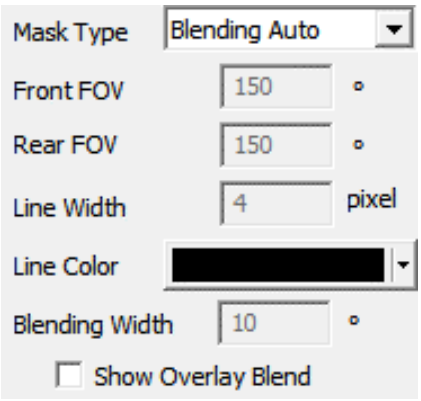
The ground objects are not square to the vehicle



Appendix 1: Surround View Image Blends

The Backeye 360 HD 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:

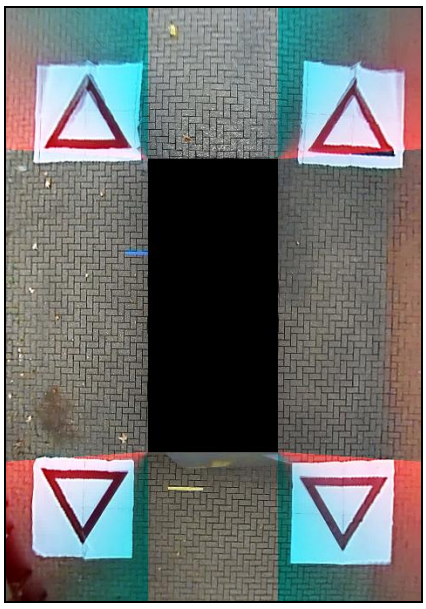
- Mask Type – changes the camera image blend type (see below for more information on the different Mask Types)
- Front FOV – the amount of the front view that is the front camera, the center point being the middle front of the vehicle mask. A larger FOV angle, the more of the front view is the front 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).



9.3 Mask Type

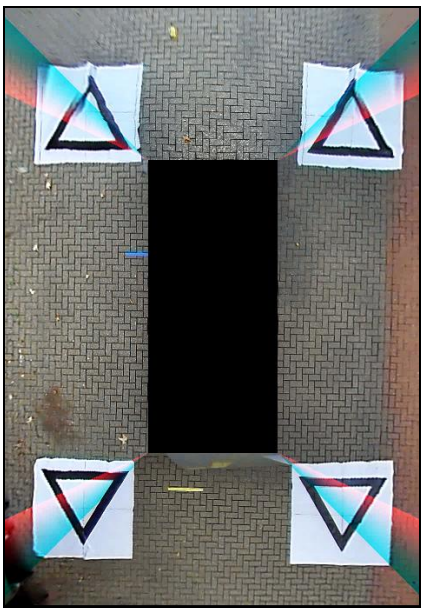
The “Mask Type” dropdown menu gives access to the various blend types (the method used to “blend” the images together). These are:

Blending Auto



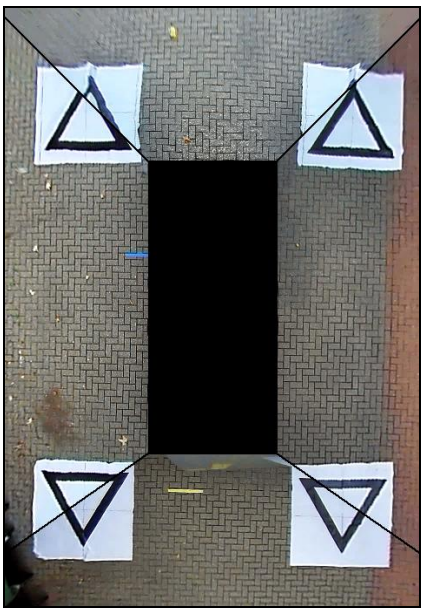
Brigades recommended option as it gives the most ideal blend for most typical installations, applying an equal blend where each image meets the next.

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

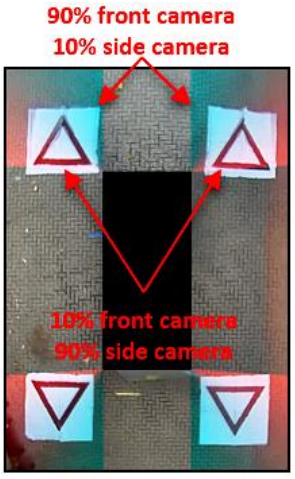


Creates a “hard” join between the side and front/rear camera images with a customisable line dividing the camera images instead of a gradual blend. As with Blending FOV user can adjust the Front and Rear FOV angle.

9.3.1 Blending Auto

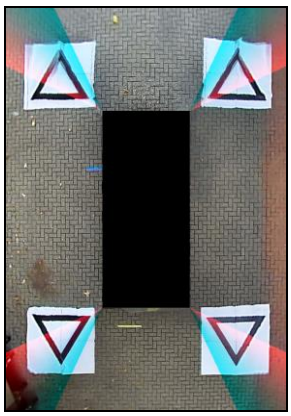
Blending Auto is Brigades recommended option as it gives the most ideal blend for most typical installations, e.g. standard rectangular/box shaped vehicles.

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.



9.3.2 Blending FOV

Blending FOV gives the user much more control of the blended, 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. overhanding side mirrors etc.

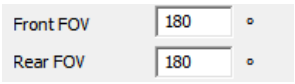


The blend applied to this view differs from the Blending Auto option, in this instance 100% of the front/rear camera is used at the edge of the vehicle mask (where the FOV starts).

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

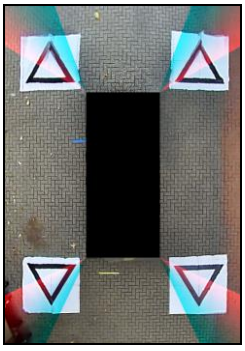
Note: it may only be necessary to change the FOV setting for one of either the Front or Rear cameras e.g. to avoid front wing mirrors. For the area that the FOV does not need to be adjusted Brigade recommends setting the FOV for that camera to 140° and the Blend Width to 10°, these values may need to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

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).

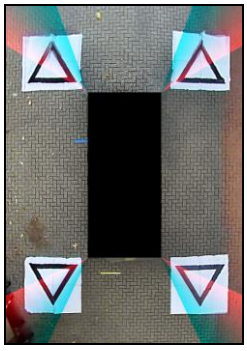


The images below show the effect of changing the FOV. The area in green indicates the portion of the surround view image that is taken from the front/rear camera. As the FOV is increased, so does the amount of front/rear camera image that is used to form the surround view image.

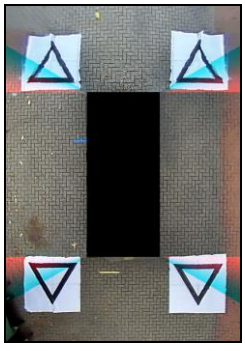
80° FOV



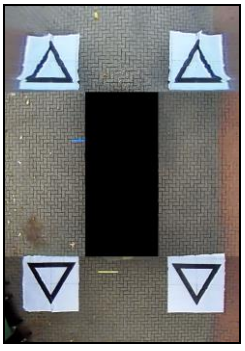
100° FOV



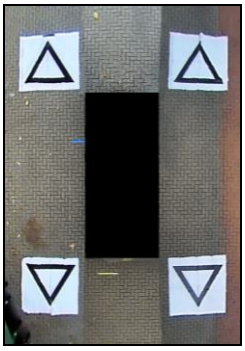
150° FOV



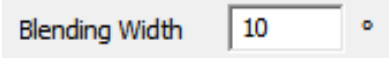
180° FOV



0° FOV

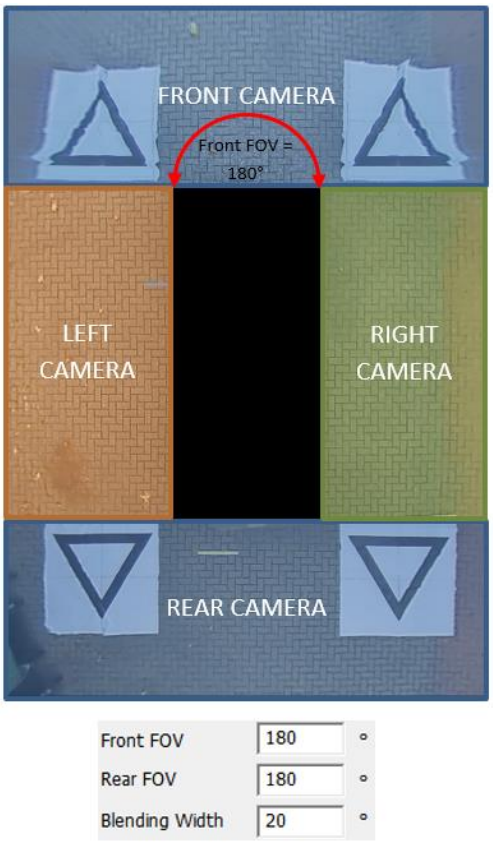


The “Blending Width” is the size of the blended area, i.e. the area that where two camera images overlap to create the surround view image.

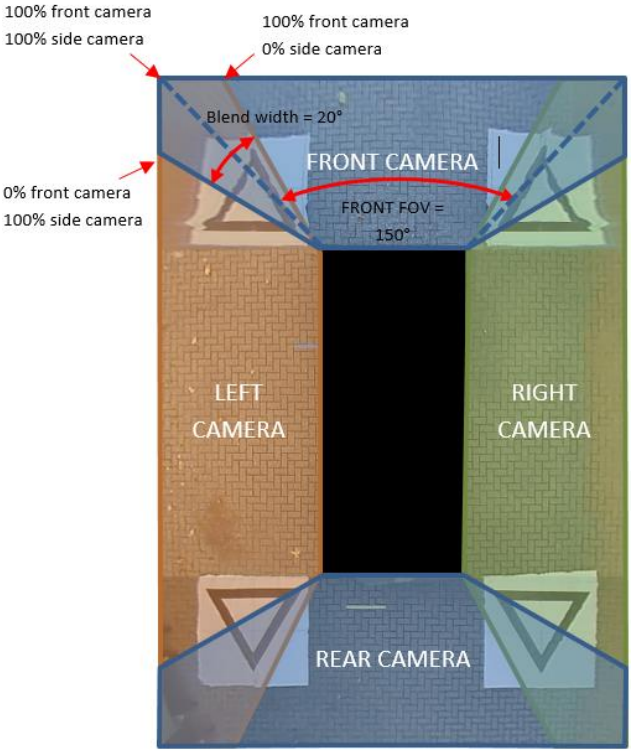


Reducing the value here will give a “harder” blend, this may look better in the Preview window but in real world operation objects in this area may be hidden or appear distorted. A larger Blending Width will use both camera images over a larger area reducing any blind zones that might be seen with a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

When the “Front” or “Rear FOV” is set to 0° or 180° the “Blending Width” option has no effect since there is no overlapping areas, e.g. 100% of the front field of view is using the front camera.



When the “Front” or “Rear FOV” is set to any a value other than 0° or 180° the amount of overlap between the side and front/rear cameras is determined by the “Blend Width”.



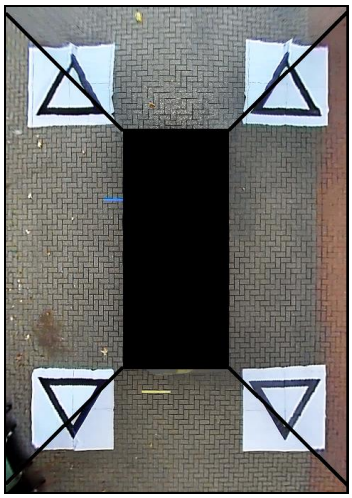
9.3.3 Line 1

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.

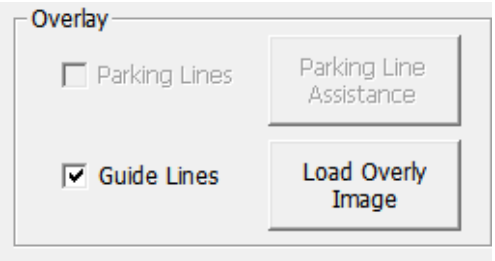
As with Blending FOV, the user can adjust the Front and Rear FOV angle to show more or less of the front and rear cameras.

Note: this view may appear the “cleanest” blend when the vehicle is stationary however objects moving between the line area’s may appear to disappear.

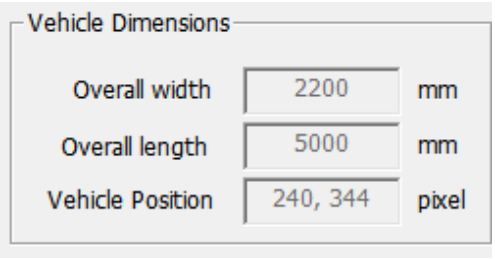


Appendix 2: Creating Custom Guide Lines

Guide Lines can be applied to up to five of the single camera views and allow custom shapes or guides to be applied to different single camera views.

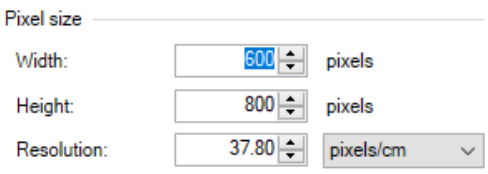


Guide Lines are scaled based on the “Vehicle Dimensions” and cannot be resized after they are applied to the single camera view.



In this example the Vehicle Dimensions are given as 5000 x 2200mm. Guide Lines are scaled such that approx. 1px = 1cm so the vehicle size on the guide line should be 500px x 220px.

Use a tool such as Paint or Paint.net to create or modify the Guide Line. Create a canvas that is larger than the vehicle size e.g. 600px x 800px

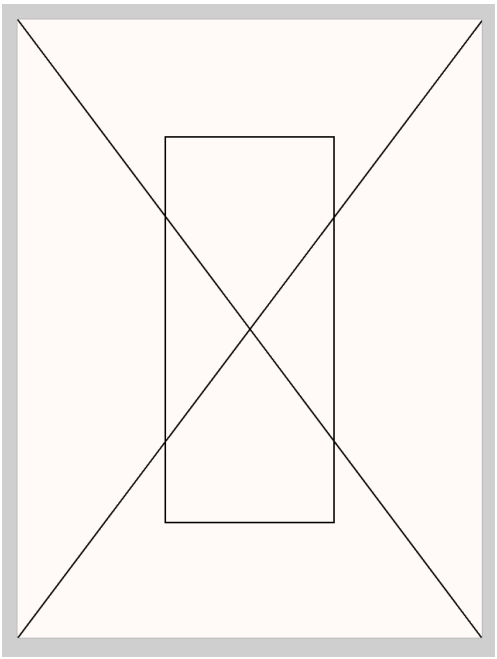


Create a rectangle in the middle of the canvas that is the size of the vehicle in pixels, e.g. 500px x 220px.

The Backeye 360 HD Calibration Tool will align the Overlay Guide Line with the middle of the vehicle position in the “Apply AVM” window. If the vehicle position in the “Top” view has been changed this also needs to be changed in the overlay design e.g. if the “Vehicle Position” has been moved by 100px towards the top of the view then the vehicle position in the Overlay Guide should be moved to 100px above the center point.

Some image editing tools will have an option to set guides or grid lines however some will not. For software that does not have guides simply draw a straight line from one corner to the diagonally opposite corner as shown in the example to the right.

As with the vehicle images, the canvas size must be in multiples of 4 e.g. 200px x 400px, 400px x 800px etc

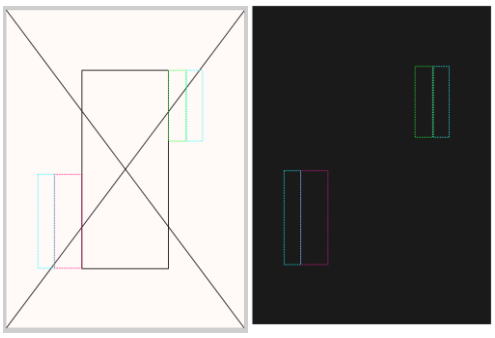


Create the guides as desired and fill the background, including the vehicle size rectangle in black (RGB 0,0,0). Any colour that is RGB 0,0,0 will be deleted by the Backeye 360 HD Calibration Tool.

In this example, the Guide Lines have been drawn to the left and right side of the vehicle.

If everything is correct, save the file in 24bit .bmp format.

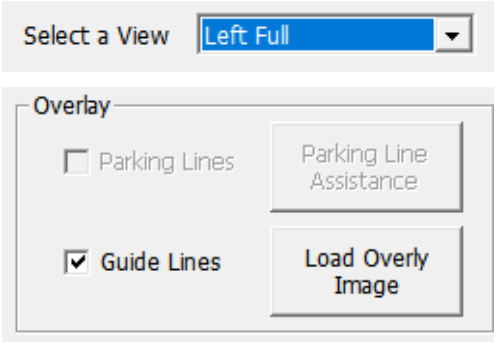
Note: the appearance of the Guide Lines will vary depending on the line colour and line weight. In this example various colours have been used with a 4px line weight.



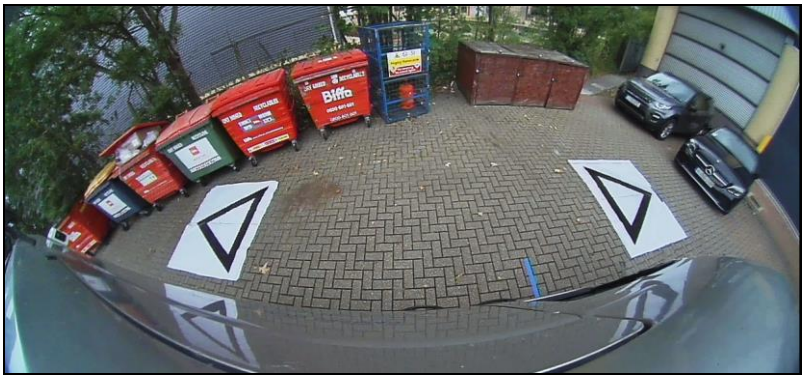
In the Backeye 360 HD Calibration Tool, select the view that the Guide Line Overlay will be applied to. In this example the Guide Lines were drawn to the left and right side of the vehicle so the Left Full and Right Full single camera views are selected.

Select the View from the “Select a View” drop down and then tick the “Guide Lines” check box, click the “Load Overlay” and navigate to the Guide Line that was saved in the previous step.

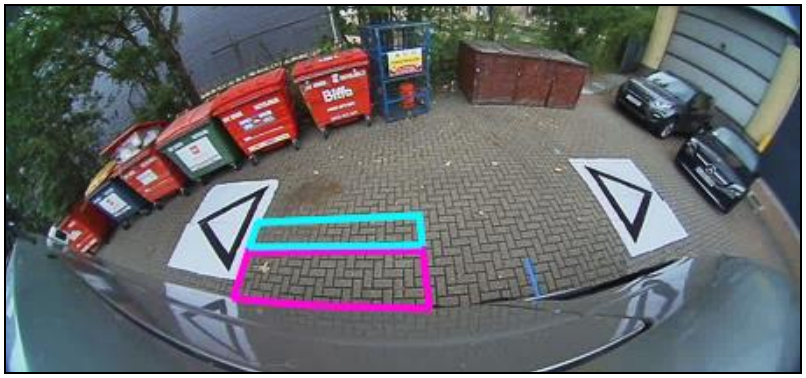
It is only possible to have one Guide Line Overlay so this must be taken into account when designing the Guide Line. If the vehicle requires a different guide per single camera view, this needs to be drawn in the Guide Line Overlay.



Left Full (no Guide Line):



Left Full (Guide Line):



Right Full (no Guide Line):

Right Full (Guide Line):

Appendix 3: System Information Screen

The System Information screen contains the information regarding which versions of firmware have been loaded to the BN360-300-ECU.

Firmware Item	Function
UPDATE APP	The base system operating software
APP.	The display configuration version
APP.CONFIG	The calibration configuration file used
CALIB.INFO	The calibration data from the Calibration Software Tool
MICOM	The software that controls the system operation, i.e. triggers, speed signal, delays etc.

There are two methods to the check the system version information for the BN360-300 system:

System Information - View Select Button

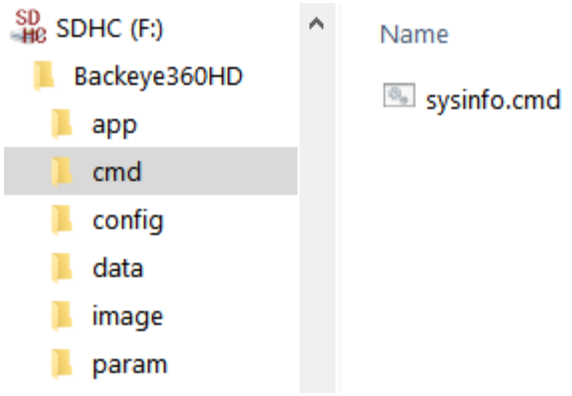
The system information screen can be displayed any time the system is powered on by pressing and holding the "Power" button on the "Set Up and View Select Button".

Brigade recommends using this as the preferred method for checking the System Information because there is no need for any additional equipment, e.g. this can be checked by the driver in the vehicle.

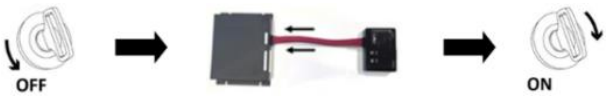
System Information Screen – "cmd" File

If not done so already, copy the "Backeye360HD" folder from the desired configuration on the BN360-300-USB to the SD Card. Refer to section 4.1 for more information on the SD Card contents.

Ensure the "Backeye360HD" folder is at the root of the SD Card and the file inside the "cmd" folder is named "sysinfo.cmd".

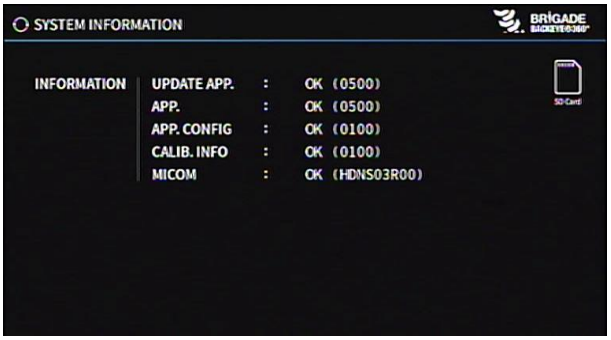


Insert the Calibration Tool into the ECU and switch the system on. The Update System Screen will load.



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.

Note: the version numbers shown in the image may not be the most up to date software. Please refer to https://brigade-electronics.com/ for most up-to-date data on all products



Appendix 4: System Backup Function

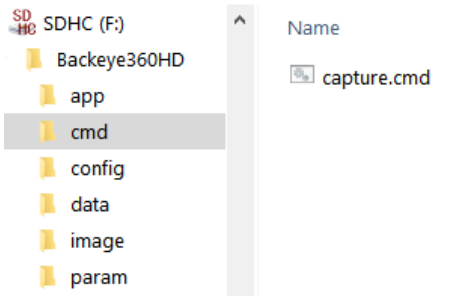
It is possible to back up the calibration and OSD settings data by using the “backup.cmd” cmd file, this is especially useful e.g. for applying a custom OSD configuration across a fleet of vehicles.

Please note: Brigade recommends saving the calibration data from the Calibration Tool, for more information see section 6.5.10. The System Backup function should only be used where the calibration data is not available and the data is planned to be restored to the same vehicle with the cameras installed in exactly the same location (e.g. if the ECU needs to be replaced/repaired etc.). Any variations in the camera positions may have a significant effect on the surround view image.

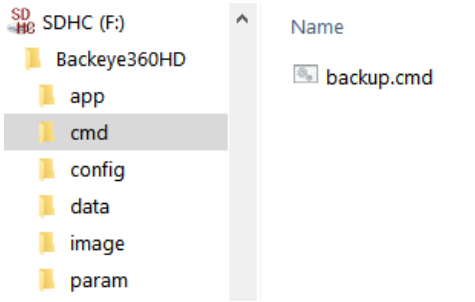
Performing a System Backup

Copy the “Backeye360HD” 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 BN360-300-USB to avoid any issues.

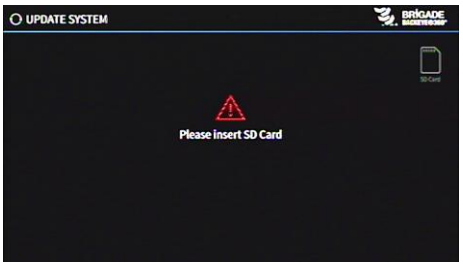
Note: Ensure the “Backeye360HD” folder is at the root of the SD Card.



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

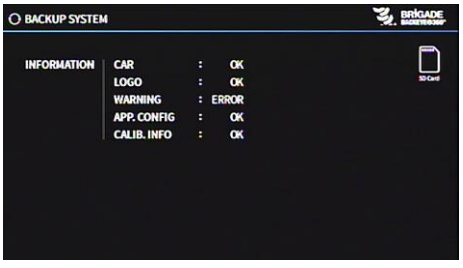


Insert the Calibration Tool into the ECU and switch the system on. The following screen will show:



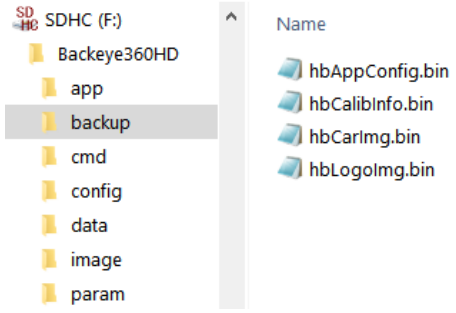
Insert the SD Card, the backup process will begin automatically. The SD Card can be removed when the backup process has completed and the following screen is displayed.

Note: the “WARNING” field will always state “ERROR” since it is not possible to back up the warning message (this is the message that is displayed before the system is calibrated).



Insert the SD Card into the PC that is being used. The SD Card will now contain a “backup” folder that contains the backed up calibration data.

In order to restore the calibration data, the “hbAppConfig.bin” and “hbCalibInfo.bin” files must be moved to the “param” folder and the “”hbCarImg.bin” and “hbLogoImg.bin” files must be moved to the “data” folder. Follow the steps detailed in section 8 to restore the ECU data as required.



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