Backeye®360 Select Installation Guide

Please be sure to read and understand this manual before you perform any installation or calibration of this system.

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1 Introduction

The Brigade Backeye®360 Select Camera Monitor System provides a simulated plan view of the vehicle and its surroundings, *as* if a camera were mounted high overhead above the vehicle along with individually selectable views to the rear, front , left and right. This enables the driver to see all around the vehicle by looking at a single monitor. However, this 'surround' view is formed by cameras mounted on the vehicle. **As such, the composite view is not a true overhead plan view and objects will appear distorted due to the physical locations of the cameras. Also, in regions where the views from adjacent cameras are combined, objects (pedestrians, vehicles etc.) may appear distorted, or partial, since the image comes from two cameras pointing in different directions. Due to the nature of the system, objects may not appear exactly as their real location with respect to the vehicle; objects may be physically closer than they appear. In particular, objects above ground level, may be closer than they appear and could be out of view.** Drivers should, however, be alerted to the presence of potential hazards.

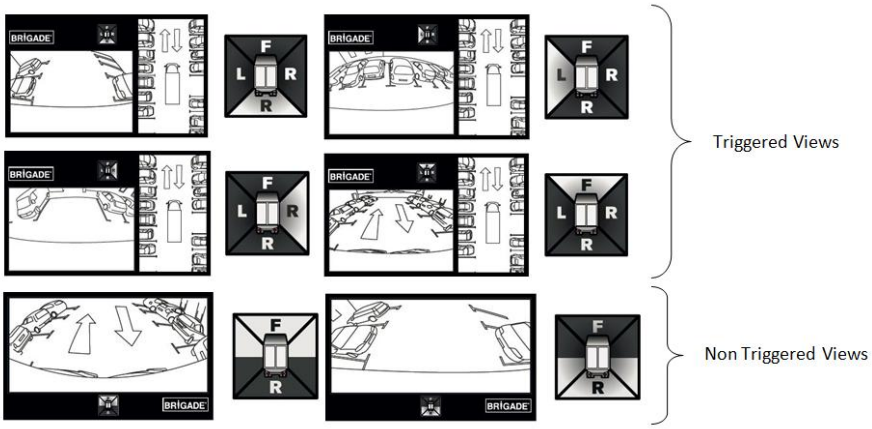
It is imperative that Brigade Backeye®360 Select is fitted and commissioned by competent and trained technicians. The installer is responsible for the fitness for purpose of the overall system and adheres to relevant regulations and legislation. Operators of the vehicle to which the Brigade Backeye®360 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.

1.1 System Functionality

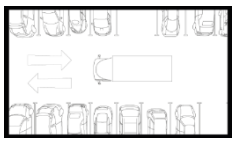
The system provides the driver/operator with a synthesized 'birds-eye' image of the vehicle using four ~185° cameras typically mounted on the front, sides and rear of the vehicle.
The Standard System is also capable of presenting different views to the driver. If required these views are shown automatically without driver initiation, this can be achieved by connecting the ECU's trigger inputs to suitable vehicle signals, e.g.: reverse gear, turn signals etc *(the speed signal input is not currently used).* These can also be selected manually with the View Select Button (refer to section 2.5).
There is an optional Full Screen version of the system which will display the synthesized 'birds-eye' image as a full screen only (this option requires ECU software to be updated see section 8). When the system is set up for Full Screen the View Select button and triggers have no functionality.

1.2 Screen layouts

Standard System



Full Screen System

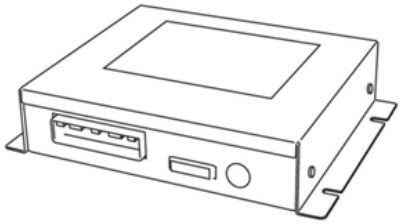


Full screen view only

2 System Components

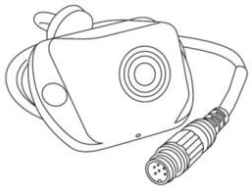
2.1 BN360-ECU-10

The ECU is the interface between all of the cameras and the monitor.



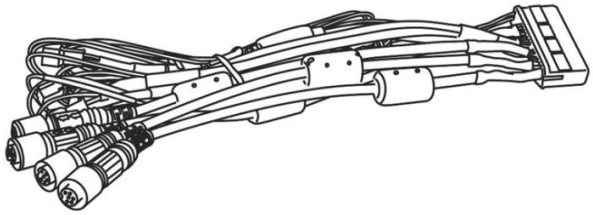
2.2 BN360-100C (4 cameras)

The cameras comprise of the camera attached to a mounting bracket and a camera housing that covers the camera and its bracket.



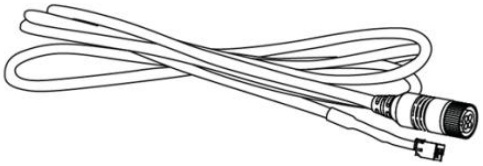
2.3 BN360-10H-01

The 40 pin system cable includes all inputs and outputs to the ECU. Trigger inputs are labelled accordingly. See System Drawing for more information in section 10.



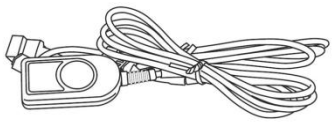
2.4 BN360-VBV-L4015

The video output cable is connected to the 40 pin system cable and provides connection to the monitor via a Select/Essential connector.



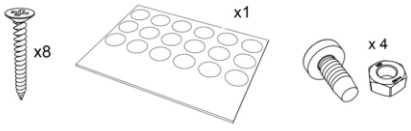
2.5 BN360-CP-01 (Set-Up & View Select Button)

The Set-Up & View Select button is used for calibration and selecting output image. (The standby button is not used during normal operation, but is needed for calibration See Calibration process in section 6). The Set-Up & View Select Button does not have to be mounted for driver to use.



2.6 BN360-100C-FIX (Fitting Kit)

This consist of self-tapping screws, machine screws and nuts & screw caps



2.7 BN360-LXXX (Camera Cables)

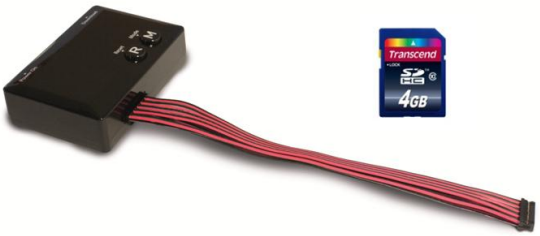
The cables are available in a number of lengths

Length	2.5m	5m	10m	15m	20m
Model No.	BN360-L1025	BN360-L105	BN360-L110	BN360-L115	BN360-L120
Part No.	4499	4498	4496	4495	4493

3 Calibration Tools

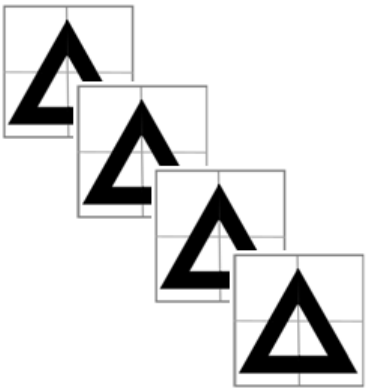
3.1 BN360-CT-01 Brigade SD Calibration tool

Used for transferring data between the ECU and PC from data saved on an SD card. *(An SD Card reader may be required)*



3.2 BN360-CAL-MAT Calibration mats (4 of)

These mats are aligned around the vehicle for camera calibration.



3.3 Backeye®360 Select USB

The USB contains all documentation, software and support files required to install and calibrate the system. Refer to section 12 for USB contents. *For the latest USB contents please contact Brigade Electronics.*

Backeye®360 Select Calibration Software (supplied on the Backeye®360 Select USB)
This is the software used to calibrate the system. The software must be loaded to a PC that the installers will use to calibrate the system see Calibration process in section 6.

4 Hardware Installation

4.1 Cameras (4 of)

The cameras are mounted flush to the body using the fixing points shown in section 11.2. The fixing kit contains 8 self-tapping screws to mount the cameras; these will need to be replaced with M4 machine screws and nuts on some heavy duty applications. It is recommended that the cameras are soft mounted (temporarily fixed) to evaluate the camera view before hard mounting them. The camera cables have grommets fitted to exit the back of the camera and pass through a 13mm hole drilled in the mounting surface. The cameras are then connected to the extension cables with IPX7 screw fit connectors. The camera cables are then routed to the ECU.

If it is not possible for the cable to exit from the underside of the camera housing an exit can be made through the rear of the camera housing using the camera grommet.

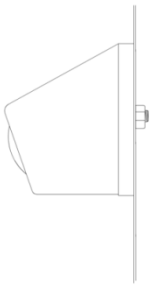
Camera positioning

The cameras are designed to be mounted on a vertical surface to give correct alignment of the image. The vehicle body should occupy approximately 10% of the image at the bottom in the centre. In some cases the angle of the cameras will need to be addressed. This will involve either using one of Brigade's universal mounting brackets see section 11.3 or fabricating suitable brackets to adjust the angle of the cameras to give the 10% occupancy of the image. See examples below.

It is recommended that the cameras are fitted as symmetrically as possible, i.e. front and rear cameras central & inline and the side cameras central & inline. In some cases the cameras cannot be fitted in this way, it will not stop the system from operating normally after calibration, but may result in distortion of the image at the camera extremes.

Cameras that are not mounted symmetrically may make the calibration process more difficult.

4.1.1 Normal mounting position



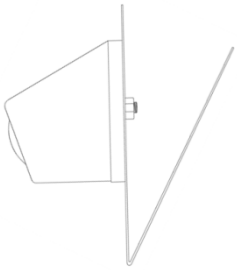
Camera mounted to a vertical surface

Vehicle body occupies approximately 10% of the image

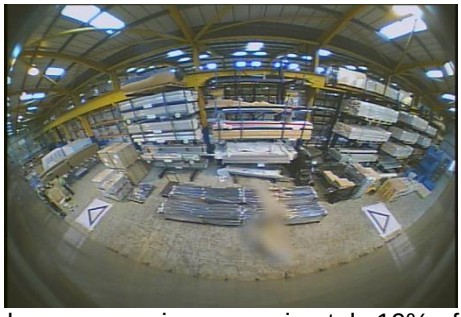
4.1.2 Potential increased angle

camera mounted to angled surface

Vehicle body does not occupy 10% of the image in the centre



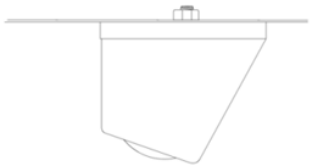
brackets can be used to correct camera angle



Vehicle body now occupies approximately 10% of the image in the centre

4.1.3 Horizontal mounting

Cameras can be mounted under slung on a horizontal plane. 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 in lower corner

Camera in its default position

Camera rotated through 180° on its bracket (remove two larger screws rotate the camera and refit)

4.2 Camera mounting Height

The mounting height of the cameras is crucial to the performance of the system. 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 the cameras are able to provide a view of the calibration grid see section 6.1 the system will calibrate but the overall performance may not be deemed suitable. The height of the camera will affect the perspective of objects not at ground level in the surround view. If the system is calibrated objects at ground level should be displayed correctly only objects at height are affected by the cameras mounting height.

1m long pole below a camera mounted at 1.8m

Full length of pole seen from a top view perspective

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

part of pole seen from a side view perspective

4.3 Cabling

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: 13mm hole required to pass connectors through.

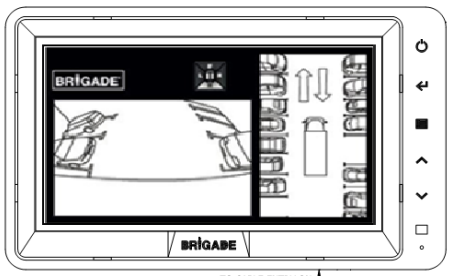
4.4 ECU

The ECU should be mounted in a location free from moisture and excessive heat.
Note: the ECU body does generate some heat during normal operation.
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 section 10. trigger connections are optional and have no function when the system is configured for full screen use. Note the speed trigger input currently has no function and should be left disconnected.

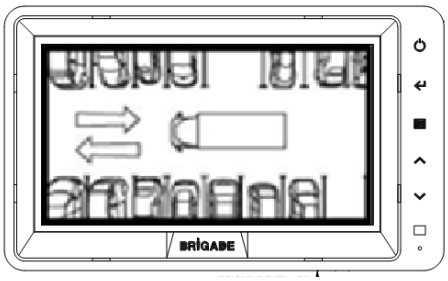
4.5 Monitor

The monitor should be fixed in a suitable location for the operator and in line with any current legislation/regulations. Monitors may need to be rotated through 90° when the system is configured for Full Screen use.

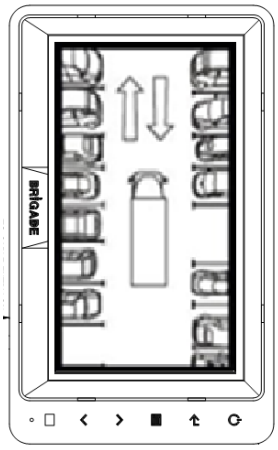
Standard System displayed on a monitor in Landscape position



Full Screen System displayed on a monitor in landscape position



Full Screen System with monitor in portrait position



5 Initial System Power Up And Test

Turn on the vehicle ignition and check the image output on the monitor.

Each cameras single view can be checked by pressing the View Select button on the Set-up & View Select button.

Connecting the calibration tool (without SD card) will put the system into full screen mode, where the cameras can be viewed better. Scroll through each camera by pressing the view select button on the Set-up & View Select button *to check the views are unobstructed and all calibration grid reference points can be seen. Each camera is named in the top left corner of the display, Front Camera, Rear Camera etc.*

Note: 'WARNING' will be displayed on the monitor until a calibration has been completed for the first time.

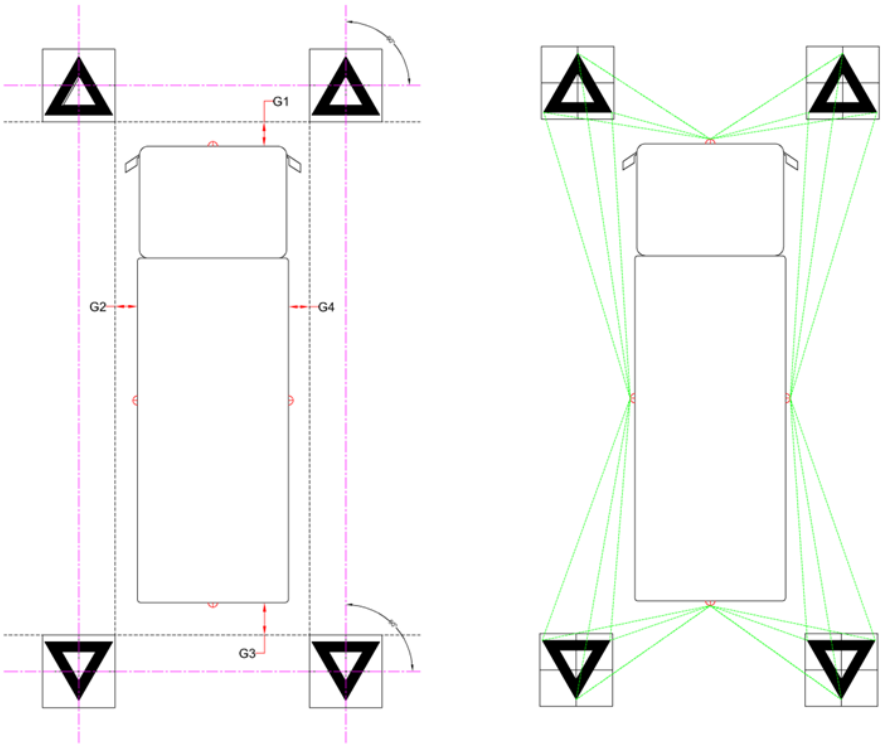
6 Calibration

6.1 Calibration Environmental

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.
The calibration pattern is made up of four triangles positioned as shown in Calibration pattern and vehicle alignment below.

Calibration pattern and vehicle alignment

The calibration mats located to the front and rear of the vehicle should be squared using the crosshairs printed on each mat and laid horizontal to the front and rear. The pattern should be spaced so that the vehicle is centered.
The image below is for indication purposes only and the dimensions for reference. Note: The more accurately the pattern is laid the better the results will be. Always make sure the cameras can see the reference points as shown below. Each camera must see two target mats and all three points of each triangle. The closer the mats are to the cameras the easier and more acurate the calibration will be.
It is recommended that the mats are positioned approximately on the ground and checked before accurately aligning the mats.
Recommended alignment tools: Chalk line or Laser.
The calibration specifications may vary depending on vehicle.



G1=G3 & G2=G4

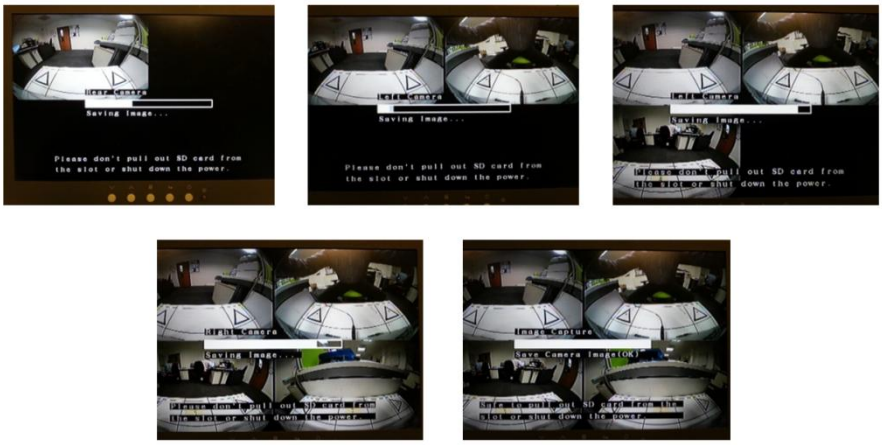
6.2 Camera Image Collection

It is recommended to format the SD card prior to starting each calibration.
With the ignition OFF, connect the calibration tool to the ECU and turn the ignition ON (the monitor will display the full screen image of the front camera) then insert the SD Card to the calibration tool.

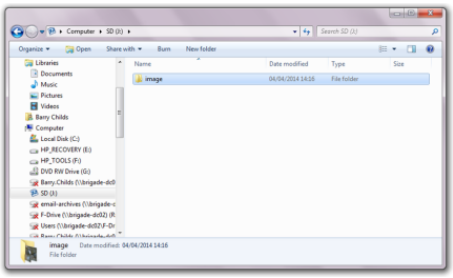
At this point check that you do not have anything blocking the triangle points required for calibration see section 6.1, by scrolling through each full screen camera view see section 5.

Press and hold the View Select button for 3 seconds and release.

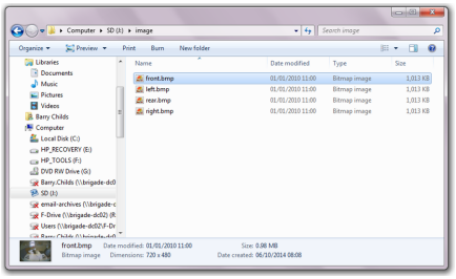
The image collection process will create an image file on the SD card and store the images captured (front.bmp, rear.bmp, right.bmp and left.bmp. The progress will be displayed on the monitor as shown below.
Note: Do not remove the SD card during this process.
WARNING: Take care not to overwrite existing wanted files on the SD Card as there will be no warning; you are about to save files under the same name.
Note: The on screen instructions will guide you through this process.



Once the process is complete, remove the SD Card from the calibration tool and insert it into an SD card reader on the computer that the calibration will be performed on.



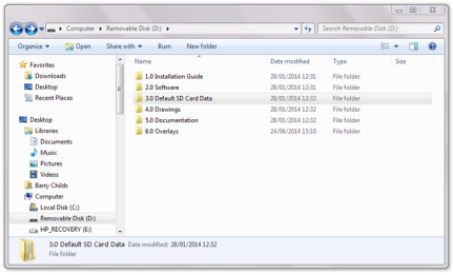
When the SD card is opened after the images have been captured from the ECU there will be an image folder. Within the image folder there should be four .bmp files titled front.bmp, left.bmp, rear.bmp and right.bmp. The captured images can be opened and checked again for suitability for the calibration.

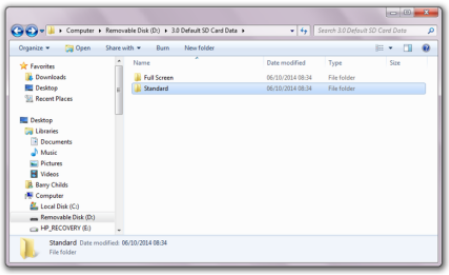


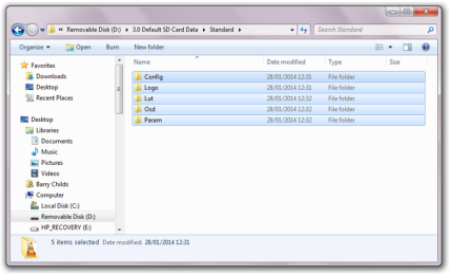
If images from the cameras have been captured previously these can be reused. Copy the image folder to the SD card and move to section 6.3 (the folder and file names must be unaltered see above file names).

6.3 <u>Setting up the SD Card for calibration</u>

Copy either the Standard or Full Screen default SD Card Data folder structure from the USB and paste these folders onto the SD Card (which should already have the “image” folder).



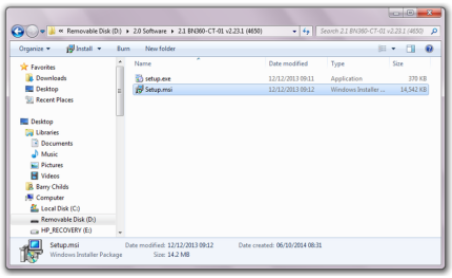




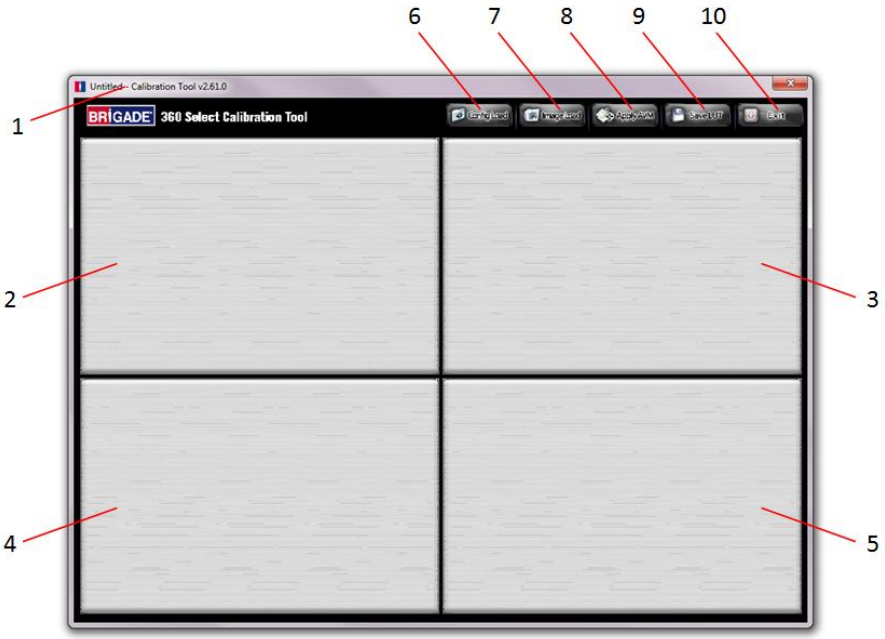
6.4 Running the PC program

Install the program from the Backeye®360 Select USB by double clicking the set up file and following the instructions.

Please contact Brigade for the latest version.



Once the installation is complete double click the desktop icon to open the Brigade Calibration Software, the start screen is shown below.



System version status bar
1: System version status bar (Displays the software version and the currently loaded Config file see section 6.5)

Camera image display and control point selection window (Refer to section 6.7)
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

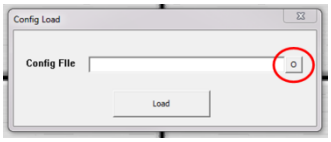
Tool bar
6: Input configuration file (loads configuration file from SD card see section 6.5)
7: Input image (loads the images from the SD card section 6.6)
8: Around View preview (opens the surround view preview screen insert see section 6.8)
9: Save Lut (saves the calibrated data files to the SD card see section 6.14)
10: Exit (exits the program)

6.5 Opening the Configuration file

The default configuration files (sbQConfigV1.bin or sbQLSTopConfig.bin) can be found in the Config folder on the SD Card. See section 6.3 SD Card preparations.

Click the “Config Load” icon on the tool bar.

Press the ‘○’ icon on the “Config Load” window

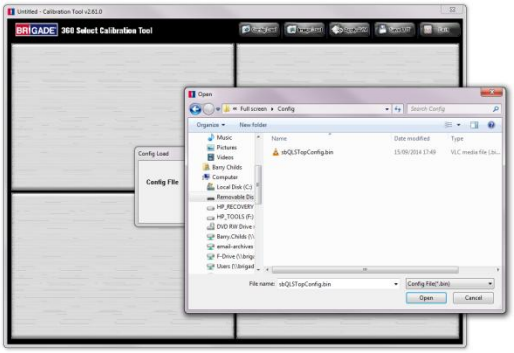


Select the provided ‘sbQConfigV1.bin’ for Standard view

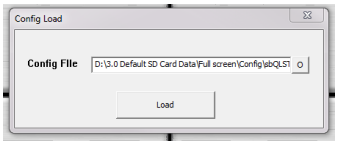
Note; the ECU must be loaded with the Standard DSP for the system to operate with this setup see section 8.

select the provided ‘sbQLSTopConfig.bin’ for Full Screen view

Note; the ECU must be loaded with the Full Screen DSP for the system to operate with this setup see section 8.



Click the “Load” icon on the “Config Load” window.



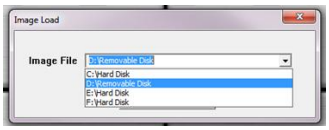
When the Configuration file is loaded the configuration title will appear in the top left of the window.
1.65 will be displayed if the Standard view configuration is loaded
1.67 will be displayed if the Full Screen view configuration is loaded
A green tick will be displayed on the “Config Load” icon when the configuration file is successfully loaded.

6.6 Opening the image files

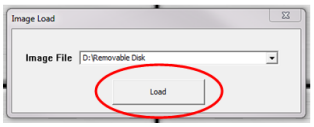
The 4 camera images on the SD Card acquired from the Backeye®360 Select ECU must be loaded after the configuration file is loaded.

Click the “Image Load” icon from the calibration tool bar.

Select the SD Card from “Image Load” window by pressing the ‘▼’ button.



Click the “Load” icon on the “Image Load” window.



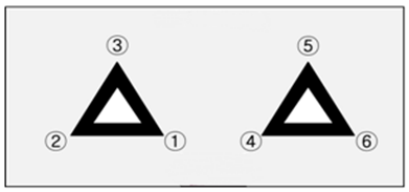
A check mark will be displayed on the “Image Load” icon when the images are successfully loaded and the camera images will be displayed in the window.

6.7 Calibration Control Points

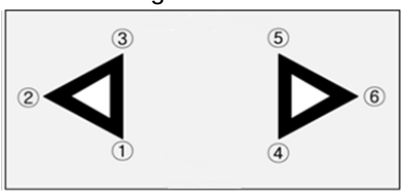
Once loaded, the triangles in the calibration pattern are automatically detected and the control points are displayed. The software automatically detects the corners of the triangles and derives the coordinates of each image when loaded. The operator must check the coordinates and if they are incorrect, adjust so that the calibration is possible.

Control point order

Front & Rear Camera View



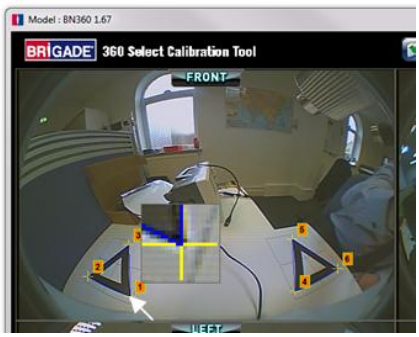
Left & Right Camera View

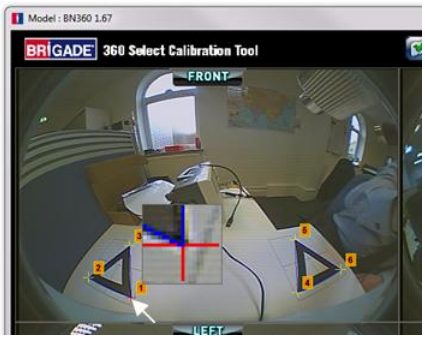


WARNING: Ensure the control points are selected in the correct order as shown. Anything other than the above will result in calibration failure.
The order of the control points starts from the triangle’s point closest to the vehicle and working clockwise to the other two points. Calibration is not possible if the order of the control points is not correct.

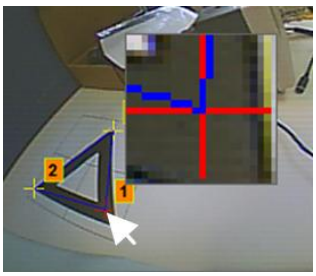
Check the control point coordinates

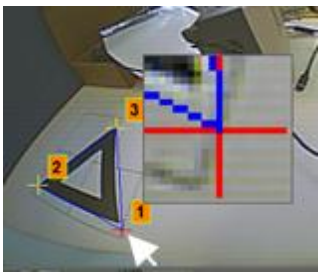
Control point selection
It is important for calibration that the control points are positioned accurately. The control point image will enlarge when the mouse curser is moved to the control point (shown below). This enables the control points to be positioned accurately. Left click the control point that needs modifying. The selected control point cross will turn red (shown below), and to deselect the control point, just left click anywhere else other than the selected control point.

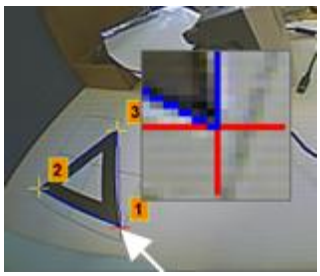




Selecting the correct control point coordinates and control point modification
Align the control point to the outermost corner as shown below, aligning the blue lines to the triangle. The images below show before and after alignment. It is recommended to move the control point outside of the triangle 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.







When a control point is selected (red) with the left mouse button held drag the mouse to move the control points to the approximate position, release the left mouse button and while the control point is still red use the arrow keys on the keyboard for fine adjustment (one press of an arrow will move the control point one pixel in that direction).

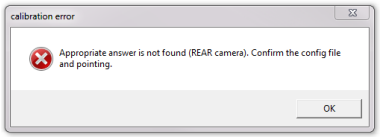
Check and modify all six control points for each camera.

6.8 Surround View Preview

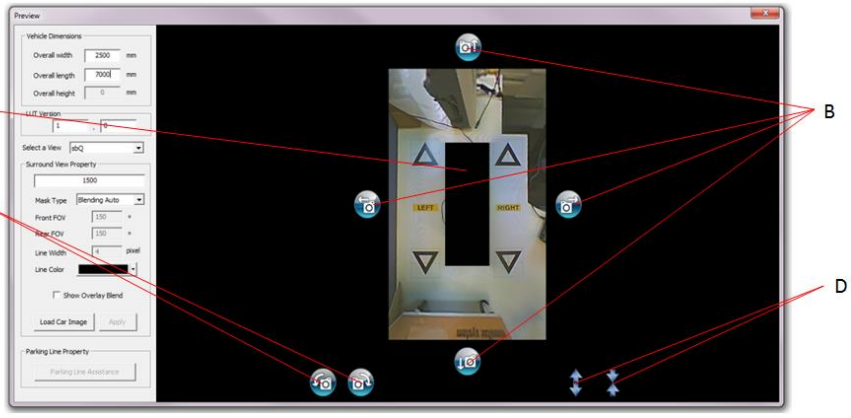
Clicking the “Apply AVM” button will open the surround view “Preview” window.

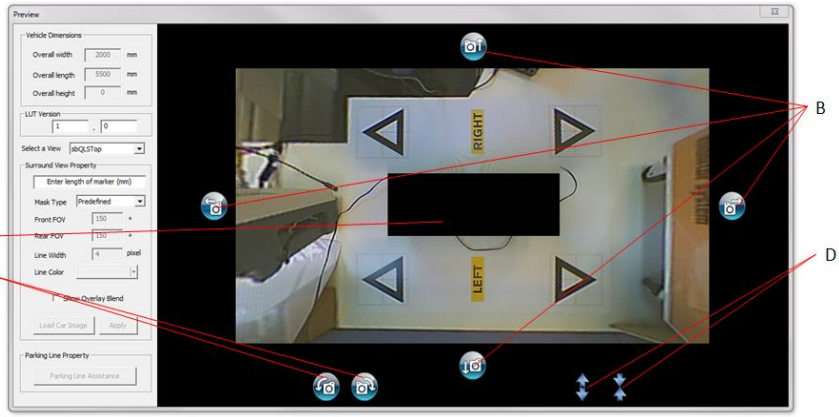
If the “Calibration Error” window is displayed this indicates an error in the control point position this is generally due to one of two errors:

1. Control points are not accurately positioned, check the order and position of the control points.
2. The calibration grid is not positioned accurately, realign the calibration grid.



The preview window is shown below with the adjustment buttons labelled.



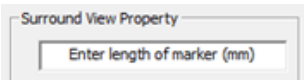


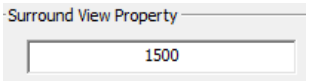
A = Vehicle mask area **B** = Movement buttons **C** = Rotation buttons **D** = V-Ratio adjustment buttons

6.9 Surround View adjustments

Surround View Property

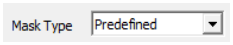
Change “Enter Marker Length” box to the triangle size of the calibration grid setup (Brigade calibration mats have 1500mm sides). Once the value has been entered press the enter key.

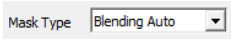




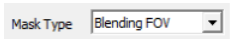
Mask Type

Change the Mask Type from ‘Predefined’ to ‘Blending Auto’ or ‘Blending FOV’ in the drop down box. ‘Blending Auto’ is the Brigade default setting for standard installations.

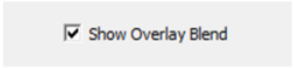


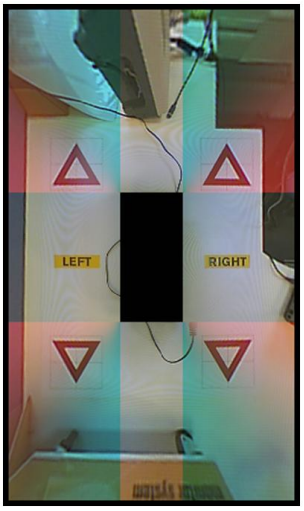


or



Tick ‘Show Overlay Blend’ this helps to identify where the blend between cameras is. The area of camera blend will be highlighted by a red area.

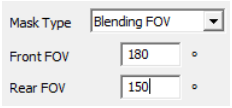


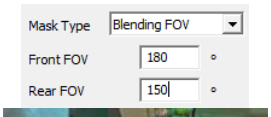


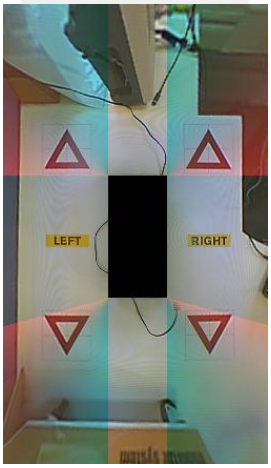
The ‘Blending Auto’ Mask Type blends the side cameras into the front/rear cameras 180° at the front and rear ends of the mask area. As shown in the image to the right.
Tick ‘Show Overlay Blend’ to identify highlight where the blends between front/rear and side cameras are.

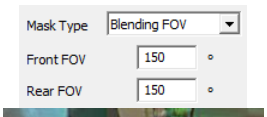
The ‘Blending FOV’ Mask Type allows the position of the blend between the front /rear and the side cameras to be adjusted, this may be required in some cases when the cameras are not mounted symmetrically or the vehicle shape will not allow the blends to be consistent when using ‘Blending Auto’.

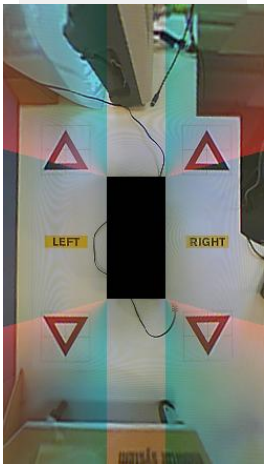
The front and rear blend angles can be adjusted independantly.
To adjust where the front/rear cameras start to blend change the angles the FOV angle from 180˚- 0˚

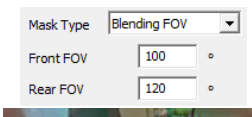


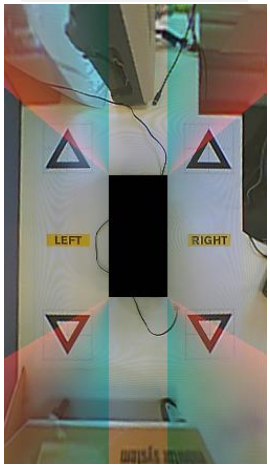






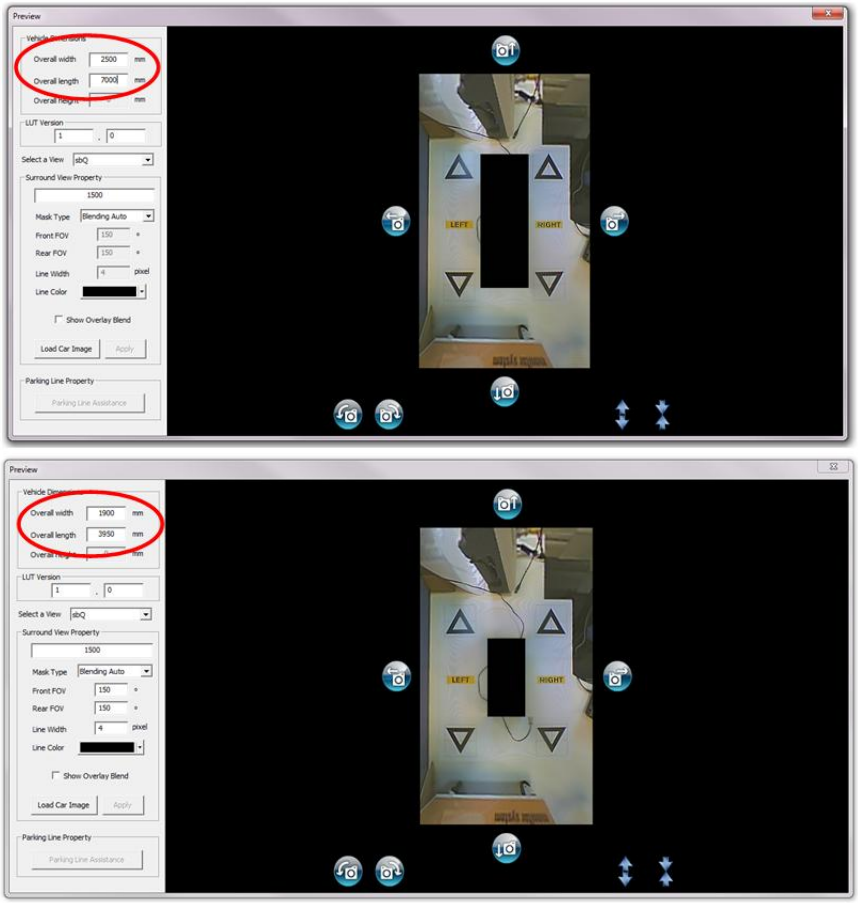






Adjusting the vehicle body size

When the Mask type is selected the vehicle dimensions can be entered. Input the vehicle length and width into the “Vehicle Dimensions” window and press the enter key to apply. This will determine the size of the vehicle mask area.



Rotation

If the whole image is not straight minor adjustments can be made to correct this. Click the “Rotation” (**C**) buttons to rotate the surround view as a whole. The example shows before and after rotation.

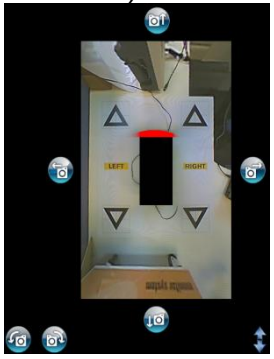
Whole surround view is out of line

Click the rotation button to correct the rotation

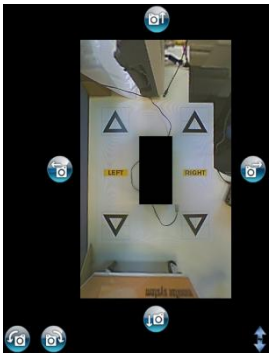
The whole image is now inline

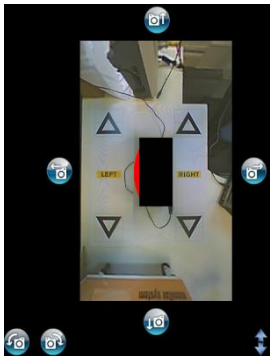
Centering

Adjust the position of the vehicle mask area (**A**) using the arrow keys (**B**) on the screen if the vehicle and the centre of the patterns do not align. The example below shows before and after movement (the red area is an area not visible by the camera).



Click the up/down movement button to move the image up and down

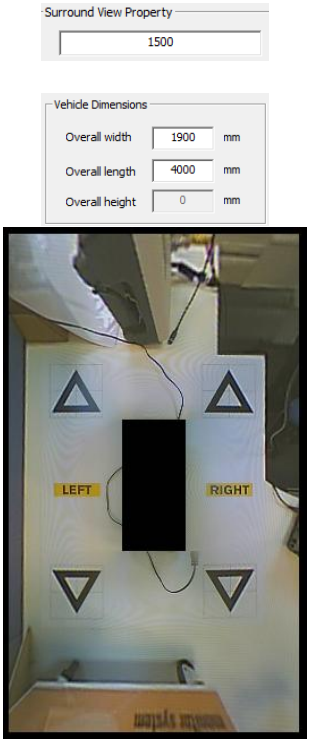




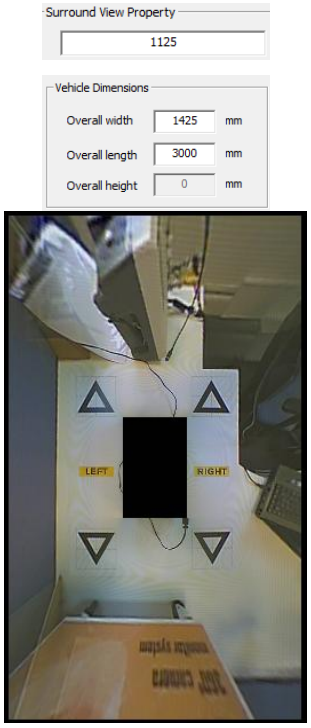
Click the left/right movement button to move the image left and right

Once the preferred mask position has been established check to see there is not excessive vehicle body or camera blind area (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.

Zoom in/Zoom out
When entering the Surround View Property dimension you may find that the overall view is insufficient leading to the view having to be 'zoomed in or out'.
The size of the area in view around the vehicle can be adjusted by altering the Surround View Property. (Increasing the Surround View Property will zoom in and decreasing the Surround View Property will zoom out)
When using this technique to zoom in or out, the vehicle dimensions have to be reduced or increased at the same ratio. For example, in the images below the Surround View Property has been decreased by 25% therefore the vehicle dimensions must also be decreased by 25% to maintain the correct vehicle mask size.



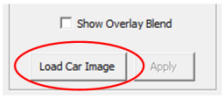
X 0.75



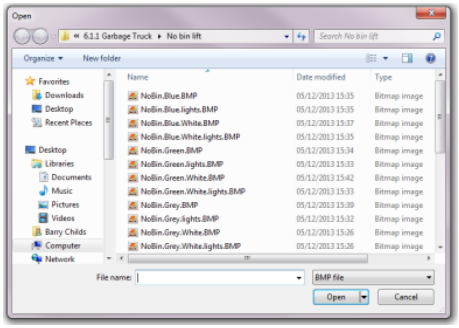
The V-Ratio button can be used to alter the surround view area but it is advisable to use surround view property method as adjusting the V-Ratio only adjusts the surround view area and not the mask size therefore the vehicle dimensions to triangle size dimensions ratio is not maintained.

6.10 Loading Vehicle overlay

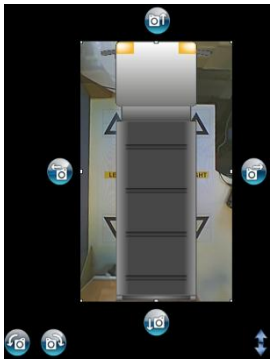
Click the “Load Car Image” button this will open a windows explorer window.



Select an appropriate vehicle image from the Backeye®360 Select USB stick
The vehicle image files can be found in the Vehicle images folder on the USB stick. See section 12 USB contents.
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.



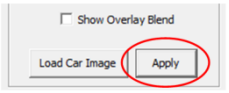
The vehicle image will be overlaid on to the surround view.



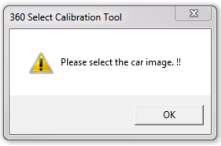
To resize the image use the eight adjustment boxes around the image. When the mouse curser is positioned onto one of the adjustment boxes the curser will change to an adjustment arrows with the left mouse button held drag the mouse to adjust the size of the image. To reposition the image position the mouse curser within the adjustment boxes with the left mouse button held drag the mouse to move the image. Note it is recommended to have the vehicle image slightly larger than the vehicle mask.

Applying vehicle image to surround view

Apply the vehicle image by clicking the “Apply” button.



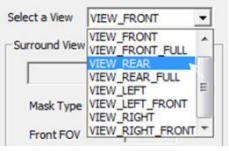
The vehicle image needs to be selected (adjustment boxes displayed) to be applied.
If the image is not selected a warning window will be displayed.



If the image is not in the correct position after it was applied, the vehicle image will need to be reloaded and adjusted again. **There is no undo button to go back.**

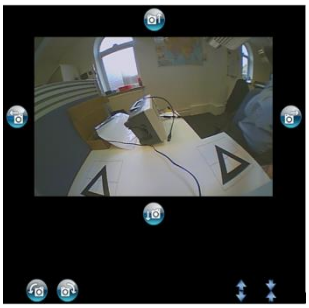
6.11 Camera view adjustment (Standard system only)

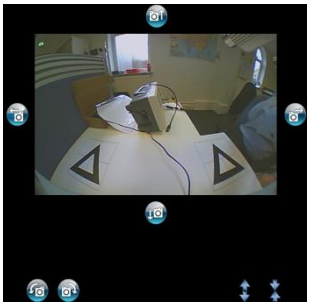
If required the single camera views can be individually adjusted.
Select the view to be adjusted from the “Select a View” menu. (Do not use “View_Right” or View_Left” as they have no function)



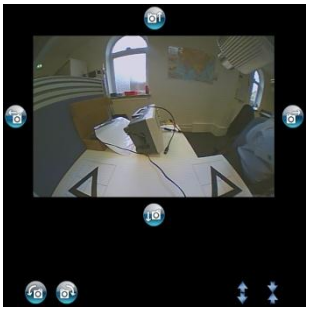
The selected view will be displayed

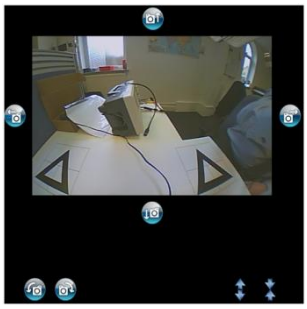
Rotation buttons can be used to rotate the image.



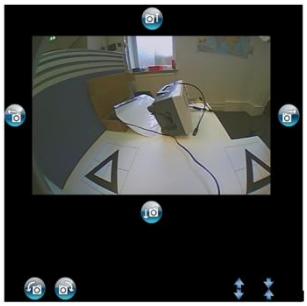


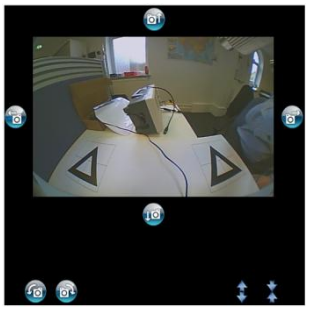
Pan Up/Down button can be used to pan the view up and down



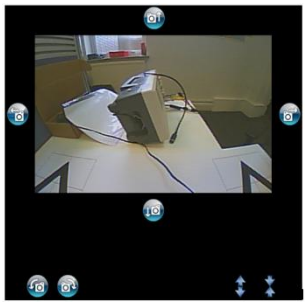


Pan Left/Right button can be used to pan the view left and right



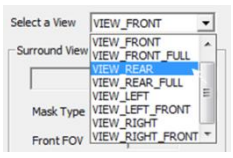


Zoom in/out buttons can be used to zoom the view in and out

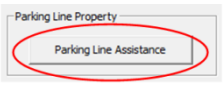


6.12Parking Guide (Standard system only)

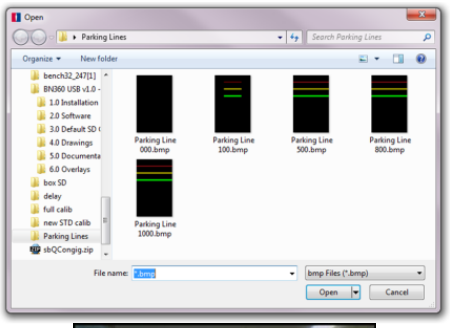
If required markers can be overlaid onto either of the single camera rear views.
When “VIEW_REAR” or “VIEW_REAR_FULL” are selected from “Select a View” menu the “Parking Line Assistance” button will be activated.



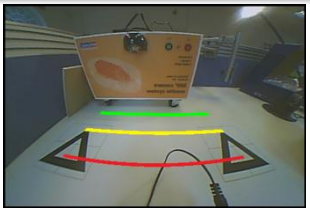
Click the “Parking Line Assistance” button this will open a windows explorer window.



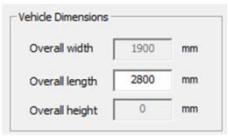
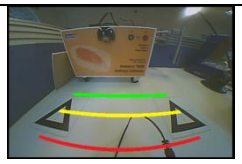
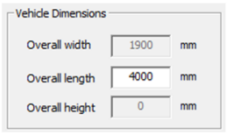
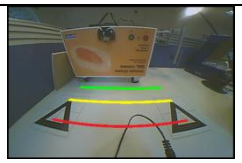
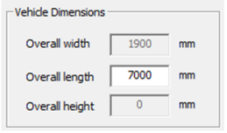
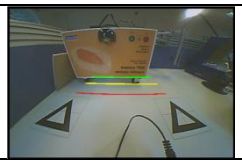
Select an appropriate Parking Line from the Backeye®360 Select USB stick see section 12.
Bespoke Parking Lines can be created, the image must be 24bit .bmp format, background must be Black (RGB 0,0,0), line colour RGB must have no 0 values). Any colour that contains a 0 value in the RGB will be displayed as transparent. Paint or Paint.Net may be used to create or modify existing Parking Lines.



The parking line will be overlaid on the selected rear view whenever that view is displayed.
Once a parking line has been loaded “Parking line 000” must be selected to remove the parking lines (this is an all black file that will be transparent when loaded to the view).



When the parking line is applied “overall length” box in vehicle dimensions is activated. Adjusting this value will move the parking line up and down the camera view image.
A shorter overall length value will move the parking guide down in the camera view, a longer overall length value will move the parking line up in the camera view (adjusting this value has no effect on the surround view image).
Note: The overall length value indicates approximately where the top of the Parking Line .bmp file will be positioned and is not related to the position of the lines in the .bmp file I.E. if a line is positioned at the top of the BMP image the overall length value will identify approximately where this line is positioned.

If the width of the parking lines requires adjusting this must be done by selecting an alternative parking guide file or creating a bespoke BMP image.

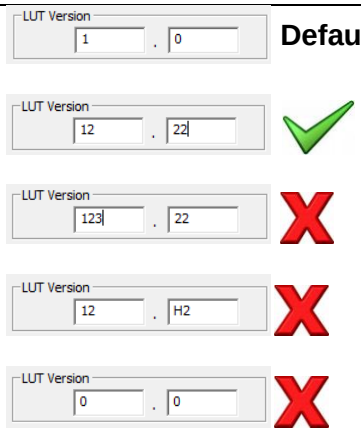
The parking lines will always be positioned in the centre and horizontal to the single camera image so if the view is adjusted (see section 6.11) the parking lines will move with the view.

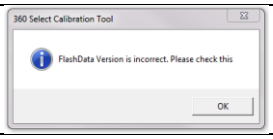
6.13LUT Version

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.

See section 9 for details of version identification



If the input is too long or the version is set to 0.0 then a warning message will be displayed.	

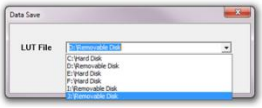
6.14Creating Surround view data for download to ECU

Save LUT file to SD Card

Click the “Save LUT” button on the tool bar.

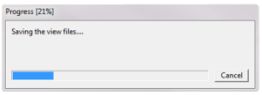
SD Card selection

Click the ‘▼’ button in the “Data Save” window and select the SD Card you have been working with.

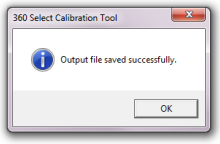


Click the “Save” button in the “Data Save” window. **Lut**, **Osd** and **Param** folders will be updated on the SD Card.

A progress window will be displayed



When the files have been created a confirmation window will be displayed

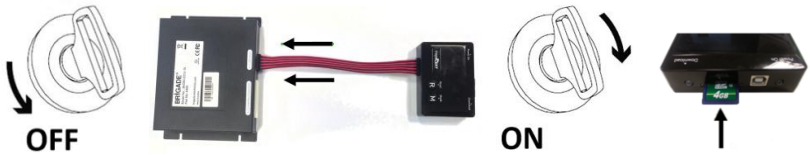


Do not close the software. Do not click the “EXIT” button.

If changes need to be made to the calibration they can be made then simply resave the LUT files again. If the software is closed then the calibration process must be started from the beginning. Only close the software once the calibration has been loaded to the ECU, has been tested and is found to be performing as required (refer to section 7).

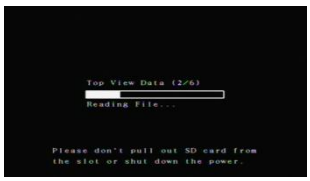
6.15ECU Upload

With the ignition OFF, connect the calibration tool to the ECU and turn the ignition ON (the monitor will display the full screen image of the front camera) then insert the SD Card to the calibration tool and wait approximately 5 seconds.

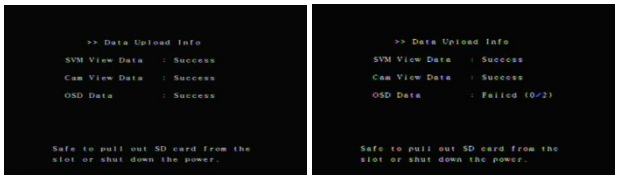


Press the Program button for less than 1 second on the Set-up button.
If the button is held for more than 1 second the “Version Information” screen will be displayed see section 9.
If the button is pressed too quickly a black screen may be displayed, reset the power and retry.

The update information is shown on the screen (this will take approximately 3 minutes).



The ‘Data Upload Info’ screen will show ‘Success’ for each element loaded.
If there are any changes carried out after the initial ECU upload then a second upload is required, you may see ‘Failed’ next to some elements, this means that the file is the same and does not need updating (this will most commonly be seen with the “OSD Data” for the Standard system).



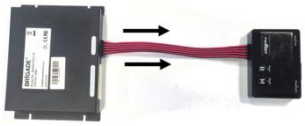
Standard System

Full Screen System

Note: The on screen instructions will guide you through this process

Press & Hold the R button and disconnect the calibration tool from the ECU simultaneously, the system should reset and display the calibrated view.

&



7 Checking System Functionality

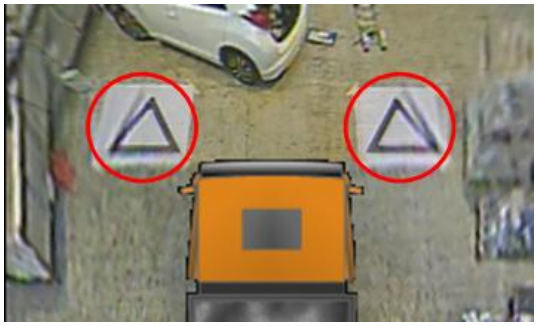
Check to see if the output is normal after the ECU resets.
Ensure all blended areas are fully tested to make sure there are no blind spots around the vehicle.
It is recommended to get an assistant to walk around the vehicle in the surround view to evaluate the calibration.

7.1 Good calibration

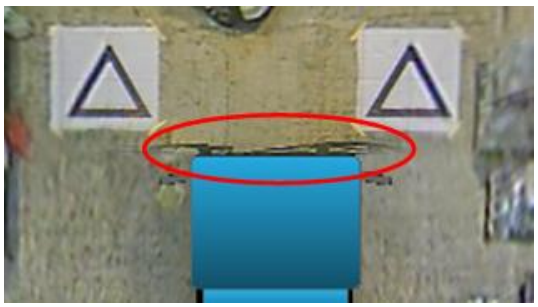
All ground level objects i.e. road markings will be displayed as they are in the real world (it is recommended that the calibration grid is left on the ground to aid calibration evaluation). There are no blind spots in the surround view including in blend areas. An object not at ground level (i.e. human 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.

7.2 Bad calibration

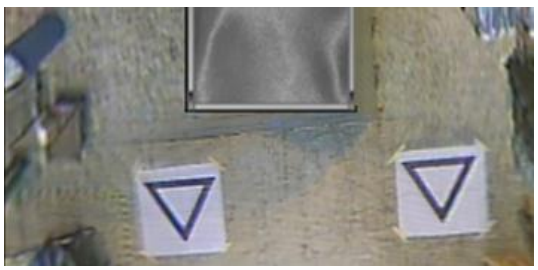
Ground level objects appear misaligned or distorted



There are parts of the vehicle in the view

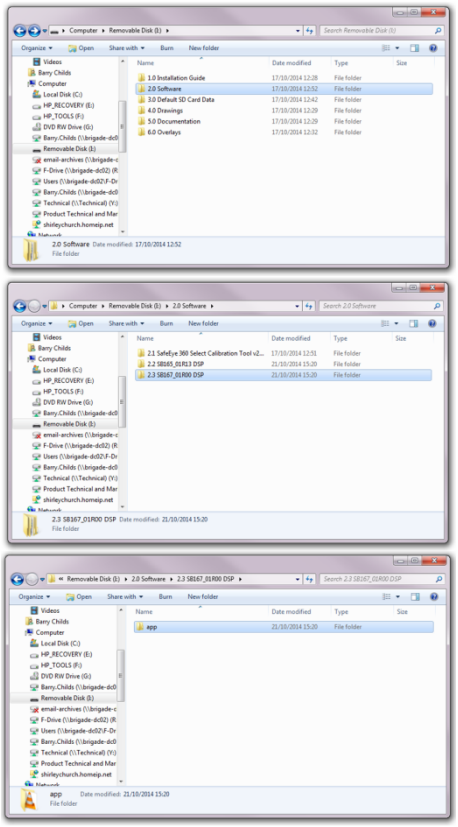


The ground objects are not square to the vehicle



8 DSP Upload

The DSP file on the ECU can be updated to provide either Standard View or Full Screen View operation if required.



Note! If the vehicle images have already been captured (see section 6.2) save these to the PC to reload ready for recalibration once DSP has been updated.

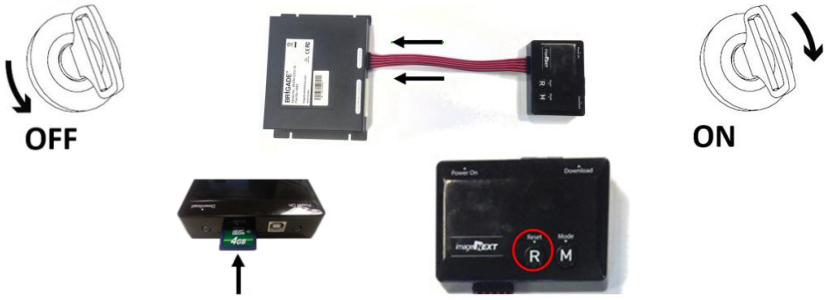
It is recommended to format the SD card prior to starting DSP updates.

The DSP files will be found on the Backeye®360 Select USB.

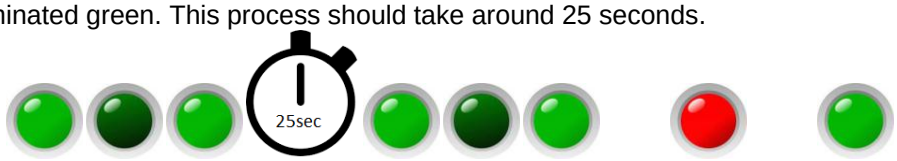
Copy either the Standard or Full Screen DSP “app” folder from the USB and paste this folder onto the SD Card.

See section 13 for features active with various DSP versions.

With the ignition OFF, connect the calibration tool to the ECU and turn the ignition ON (the monitor will display the full screen image of the front camera) then insert the SD Card to the calibration tool and wait approximately 5 seconds. Press the R button, the system will restart and begin the update.



While updating the DSP the screen will display no image, the Green LED on the Calibration tool will flash, switch off for a few seconds then begin to flash again, once the upload is complete the LED will illuminate Red briefly then green and stay illuminated green. This process should take around 25 seconds.

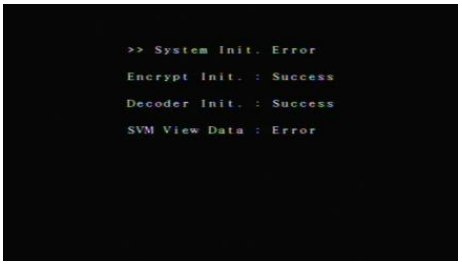


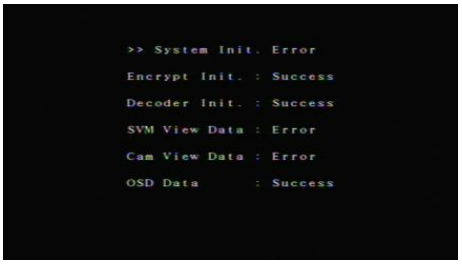
Once complete, Press & Hold the R button and disconnect the calibration tool from the ECU simultaneously, the system should reset and display a status screen.

Please note if changing the DSP from the Standard system to the Full Screen system or vice versa the system may display an error message. This will be resolved once the correct calibration files have been loaded to the ECU.

Delete the DSP file from the SD Card.

Now begin the calibration see section 6.
(if images have already been captured, copy the saved image folder back to the SD card and proceed to section 6.3)

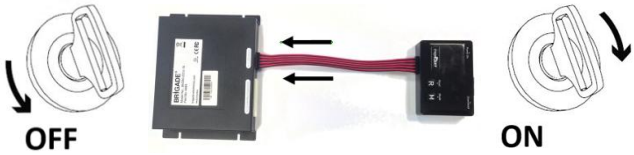




9 Version Information Screen

The system information loaded to the ECU can be viewed to identify system setup.

With the ignition OFF, connect the calibration tool (without an SD card inserted) to the ECU and turn the ignition ON (the monitor will display the full screen image of the front camera). Press the Program button on Set-Up & View Select Button for more than 2 seconds and release the “Version Information” screen will be displayed.



>2 Seconds

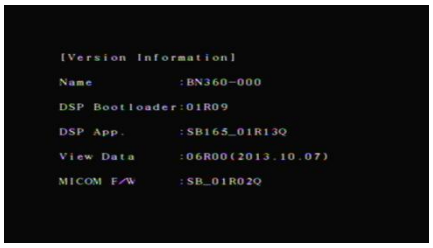
Name: BN360-000 is the Hardware model and will not change.

DSP Boot loader: 01R09 is the system operating Software.

DSP App: DSP file that has been loaded to the ECU that controls the display setup.
SB165_01R13Q is for the Standard system
SB167_01R00Q is for the Full Screen system

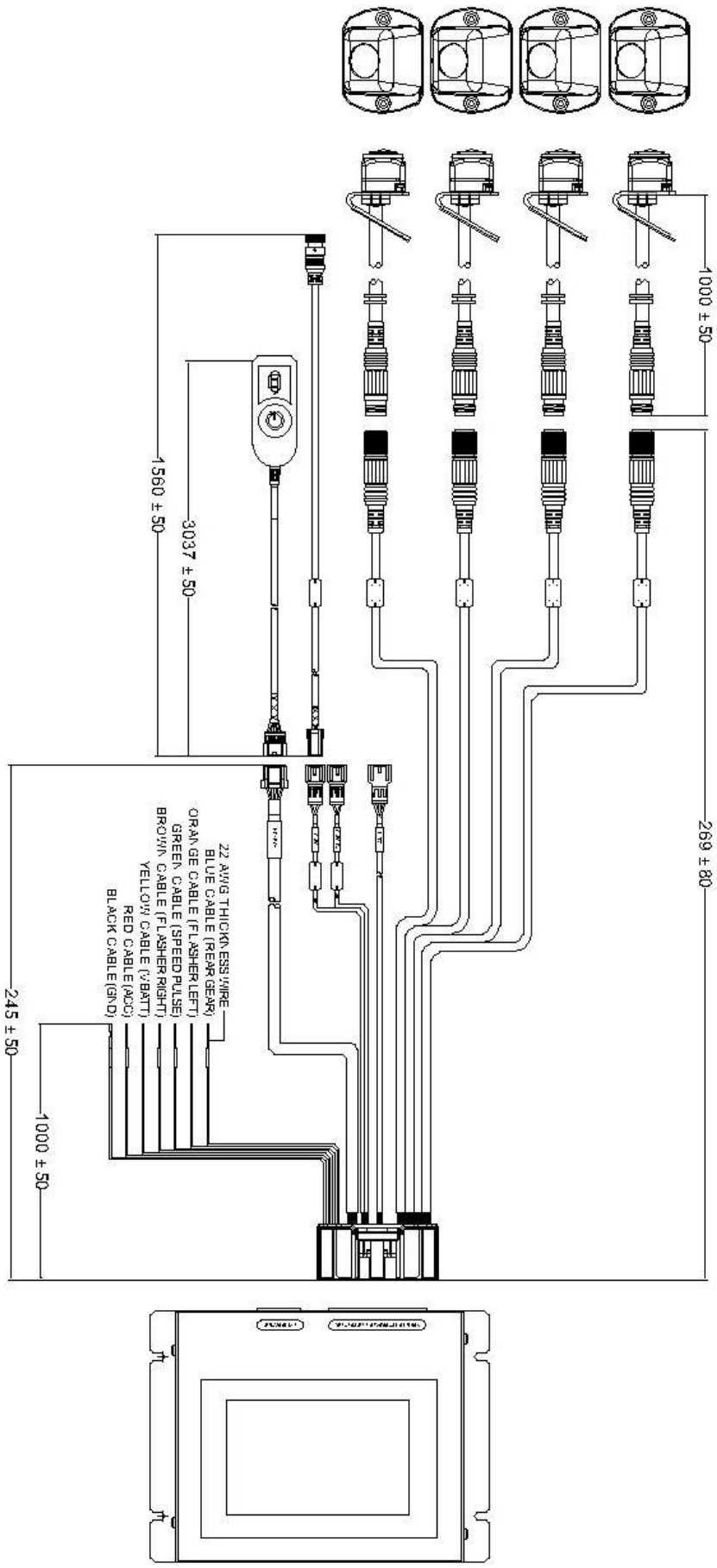
View Data: Calibration data loaded to the ECU
01R00 is the LUT version (see section 6.13)
(2014.09.16) is the date of calibration in YYYY.MM.DD format

MICOM F/W: SB_01R02Q is the software that controls the system operation i.e. triggers.



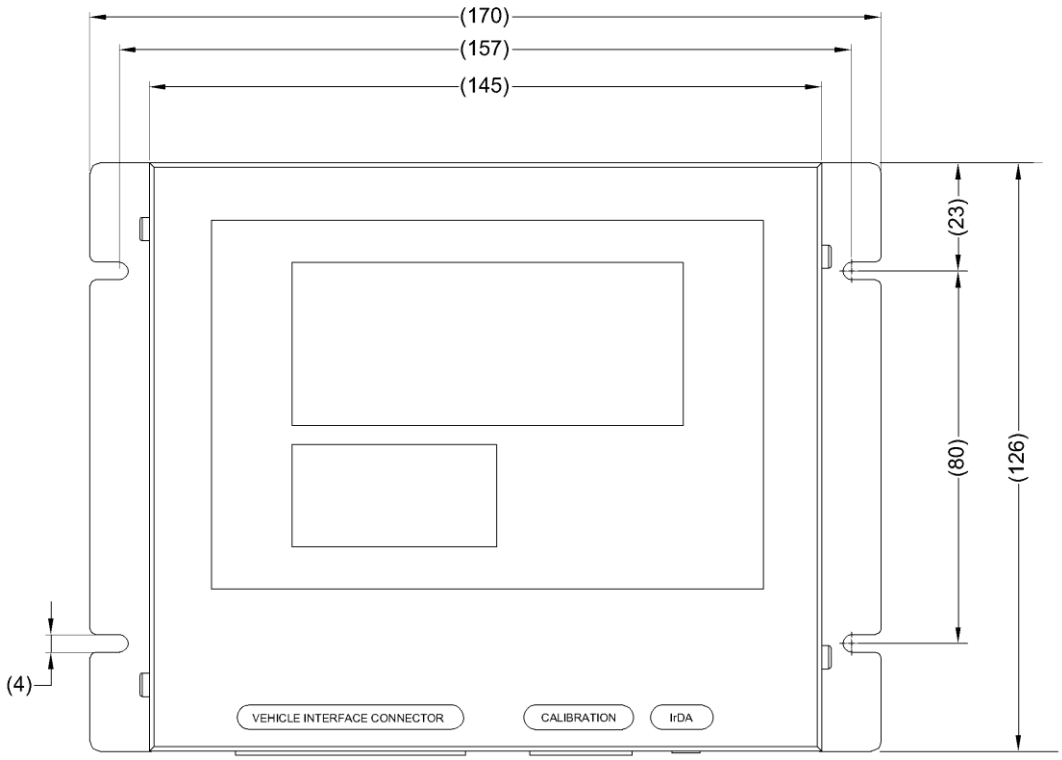
To exit the Version Information screen press the View Select button

10 System Drawing



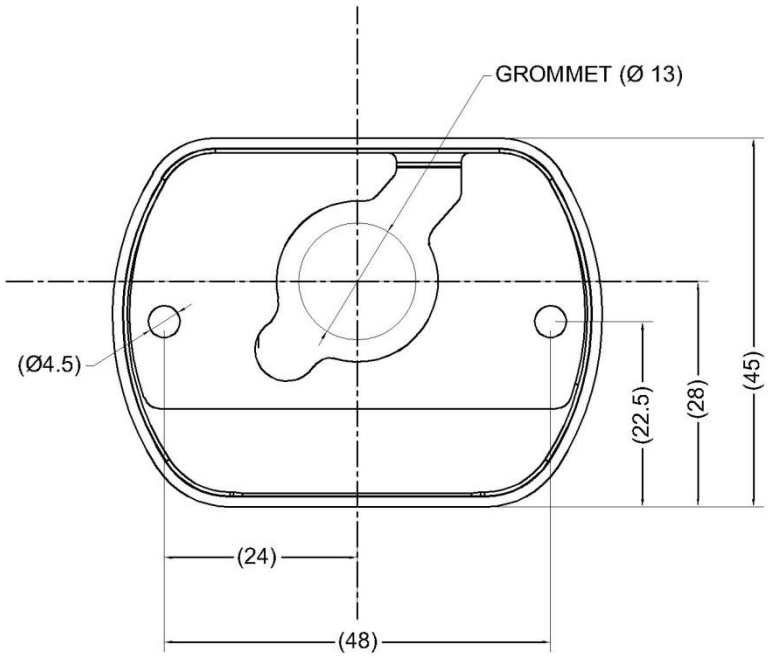
11 **ECU & Camera Dimensions**

11.1ECU



NOT TO SCALE

11.2Cameras



NOT TO SCALE

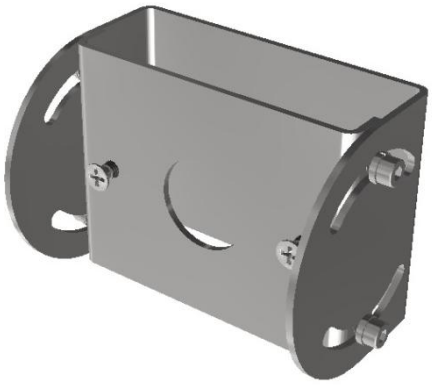
11.3 Brackets

11.3.1 BN-360-100C-BKT01

This is a precut aluminium plate that can be shapped to allow camera mounting

11.3.2 BN360-100C-BKT02

This is a pre formed stainless steel adjustable bracket that will allow the camera angle to be adjusted

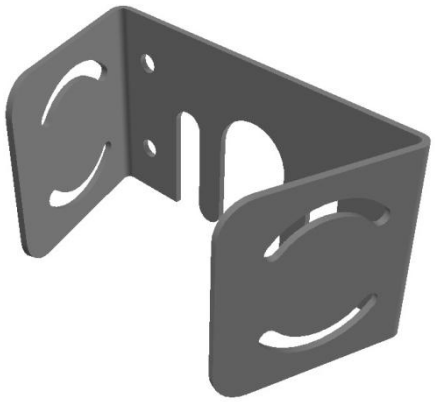


11.3.3 BN360-100C-BKT03

This is a camera protector that deflects objects from striking the cameras (to be used with the camera on its own)

11.3.4 BE-360-CD

This is a camera protector that deflects objects from striking the cameras (to be used with the camera when mounted with the BN360-100C-BKT02)



12 USB Stick Content

1. Installation guide
   1.1. Backeye®360 Select Installation Guide

2. Software
   2.1. Backeye®360 Select calibration software
   2.2. Standard DSP 1.65
   2.3. Full Screen DSP 1.67

3. Default SD Card Data
   3.1. Standard system
   3.2. Full Screen system

4. Drawings (Drawings current at time of release)
   4.1. BN360-000 System
   4.2. ECU
   4.3. Camera & Housing
   4.4. Camera Cables
   4.5. System Cable
   4.6. Video Output
   4.7. Set-up & View select button
   4.8. Calibration Tools
   4.9. Brackets

5. Documentation
   5.1. Pre-installation survey sheet
   5.2. Installation Report
   5.3. Product Specification

6. Overlays
   6.1. Standard system vehicle images
   6.2. Full Screen system vehicle images
   6.3. Parking guides

13 SW Revision History

Calibration SW		
Version	**Release date**	**Changes**
V2.23.2	07/2014	Initial release
V2.61.0	11/2014	• Calibration of Full Screen system added (when calibrated with config “sbQLSTopConfig.bin’ and DSP SB1.67_01R00Q) • Parking Guide feature added (when calibrated with config “sbQConfigV1.bin” and DSP SB1.65_01R13Q) • Single Camera view adjustment feature added (when calibrated with config “sbQConfigV1.bin” and DSP SB1.65_01R13Q) • Blending FOV Blending improved

Config		
Version	**Release Date**	**changes**
sbQConfig.bin	07/2014	Initial release
sbQConfigV1.bin	11/2014	• Supports Parking Guide feature (when used with DSP SB1.65_01R13Q & V2.61.0) • Supports Single Camera view adjustment feature (when used with DSP SB1.65_01R13Q & V2.61.0)
sbQLSTopConfig.bin	11/2014	• Supports Full Screen system (when used with DSP SB1.67_01R00Q & V2.61.0)

Standard DSP		
Version	**Release Date**	**Changes**
SB1.65_01R01Q	07/2014	Initial release
SB1.65_01R13Q	11/2014	• Parking Guide features supported (when calibrated with config “sbQConfigV1.bin” & V2.61.0) • Single Camera View adjustment supported (when calibrated with config “sbQConfigV1.bin” & V2.61.0) • Class 6 SD cards supported • Bug fix for failed image capture and LUT upload • Logo Data removed from Data Upload Info screen

Full Screen DSP		
Version	**Release Date**	**changes**
SB1.67_01R00Q	11/2014	Initial release (only compatible when calibrated with config “sbQLSTopConfig.bin’ & V2.61.0)

Micom		
Version	**Release Date**	**changes**
SB_01R02Q	07/2014	Initial release

Compatibility Matrix			
Calibration SW	**Config**	**DSP**	**function**
V2.23.2	sbQConfig.bin	SB1.65_01R01Q	Standard screen function
V2.23.2	sbQConfig.bin	SB1.65_01R13Q	Standard screen function
V2.23.2	sbQConfigV1.bin	SB1.65_01R01Q	Standard screen function
V2.23.2	sbQConfigV1.bin	SB1.65_01R13Q	Standard screen function
V2.61.0	sbQConfig.bin	SB1.65_01R01Q	Standard screen function
V2.61.0	sbQConfig.bin	SB1.65_01R13Q	Standard screen function
V2.61.0	sbQConfigV1.bin	SB1.65_01R01Q	Standard screen function
V2.61.0	sbQConfigV1.bin	SB1.65_01R13Q	Standard screen function with Single camera view adjustment & parking guide.
V2.61.0	sbQLSTopConfig.bin	SB1.67_01R00Q	Full Screen function

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