Backeye 360 Elite
Training Guide
Model: ASL360 - SV

Contents

1.0 **Vehicle and Site survey**

1.1 **Determine the location of the cameras**
Each camera should have a clear line of sight to the ground and calibration grid without intrusion from the vehicles body and ancillaries. Refer to section 1.1.1 of the latest version of the Installation and User Guide. The camera cable run must be considered as brackets maybe required on certain vehicle type due to the exit point on the camera housing.

1.2 **ECU location**
The ECU should be located in a dust and water free environment away from excessive heat. Also, keep in mind the area required to mount the ECU (260x260mm with connectors). Refer to section 3.1.2 of the latest version of the Installation and User Guide.

1.3 **Site**
The installation site, for calibration purposes, must be flat and not deviating more than 50mm. Flat does not necessarily mean level; a sloping flat area may be acceptable as long as the vehicle does not lean. It is preferable, not essential, that there is minimum 2.0m perimeter around the vehicle for the location of the calibration grid/calibration mats to be laid out. As long as the cameras can see the required reference points then calibration will be possible. See **3.3 Calibration Grid Layout**.

1.4 **Backeye 360 Pre-installation Survey doc**
A Pre-installation survey sheet is available and recommended to be completed before installation commences. This will be included in the Engineers pack.

2.0 **Installation of hardware**
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 Appendix II.

2.1 **Cameras**
Ideally fitted on the extreme outside line of the body at 90° to the ground.

2.2 **ECU**
Should be fitted in a dust, moisture and heat free location.

2.3 **Monitor**
Fitted in a position that the driver can view at a glance. The monitor should be fixed in a suitable location for the operator and in line with any current legislation/regulations.

2.4 **Cable Run**
Cables should be run in conduit, routed with existing vehicle looms where possible. Avoid running directly with battery (high current) cables to minimise EMC issues.

3.0 Calibration

3.1 Tools required

Laptop PC (***the PC graphics card must be capable of running OpenGL v2.1 or above. The tool will fail to load if updates are not possible***). ASL360 Configuration Tool (Latest Version), Device Discovery (Latest Version), Ethernet-RJ45 Cable, Metric tape measure, alignment tools (Calibration Mats, tape or paint with Laser or chalk line).

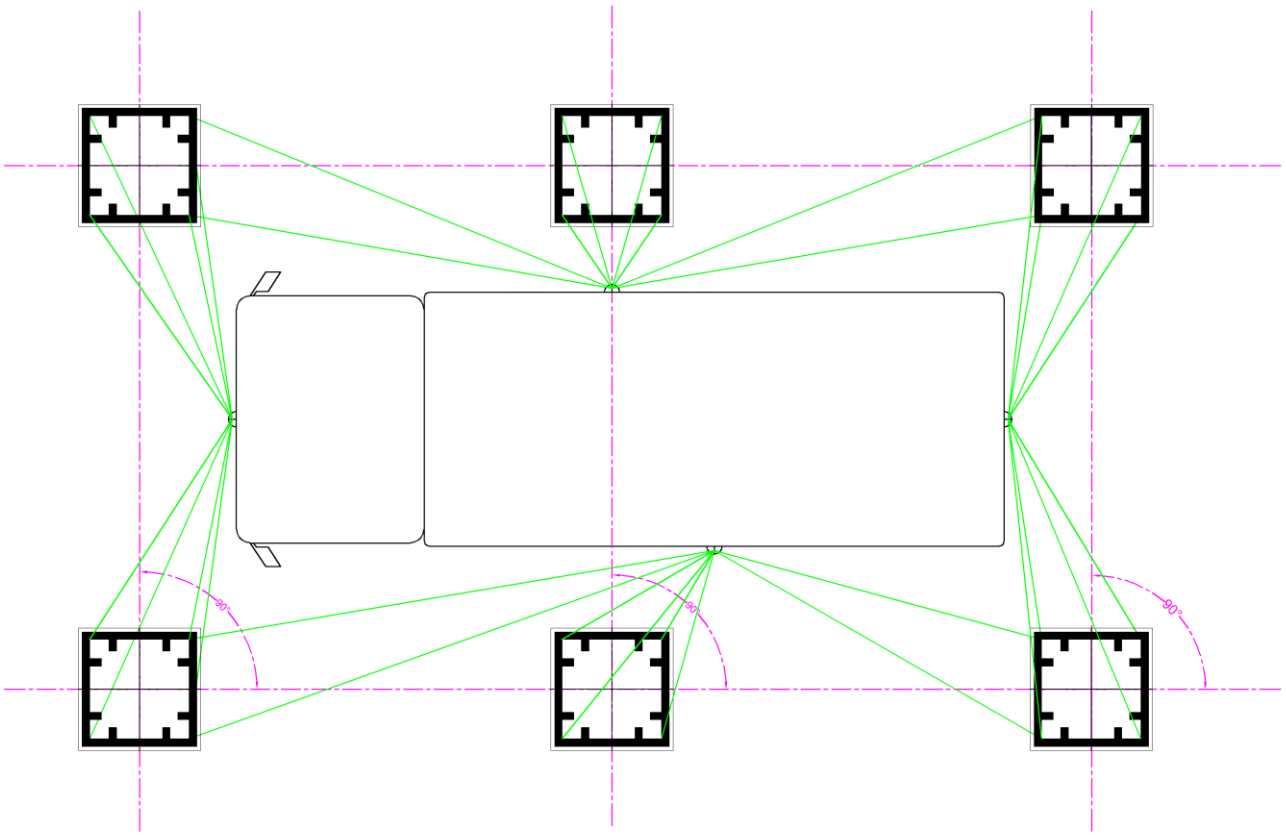
3.2 Firmware update (if required)

If the ECU firmware is not up to date (check with Brigade Engineering) an update will be required. This is displayed at the bottom right corner of the ASL360 Configuration Tool window. The Device Discovery Tool is used to update the ECU firmware. Refer to Appendix V.

3.3 Calibration Grid Layout

For calibration, a grid is required around the vehicle perimeter. This can also be achieved with the use of calibration mats. The mats replace the need for using tape or paint which is not possible on most sites.

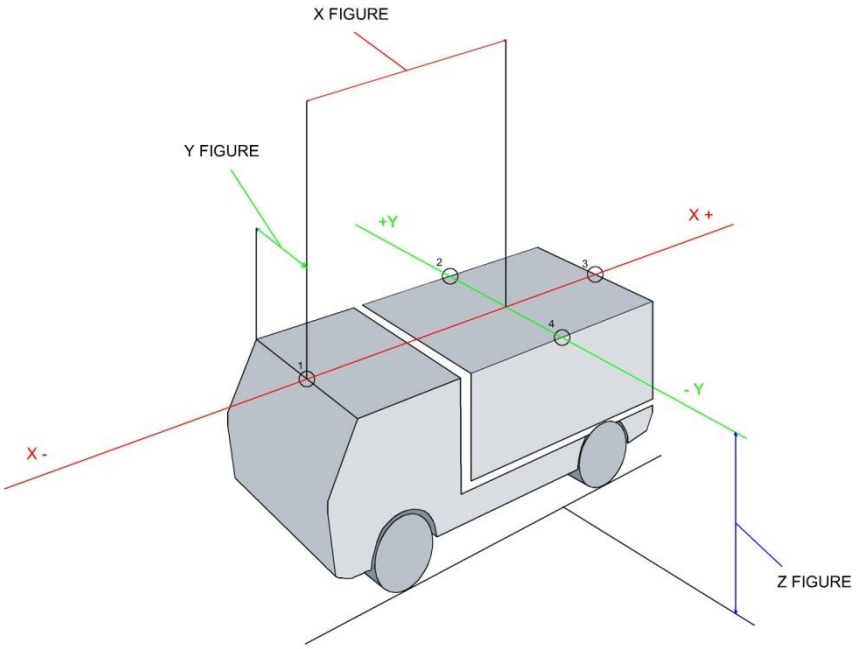
The drawing below shows the calibration mat layout and the reference points the cameras need to see (in green). For an alternative layout, Refer to section 7.1.1 of the latest version of the Installation and User Guide



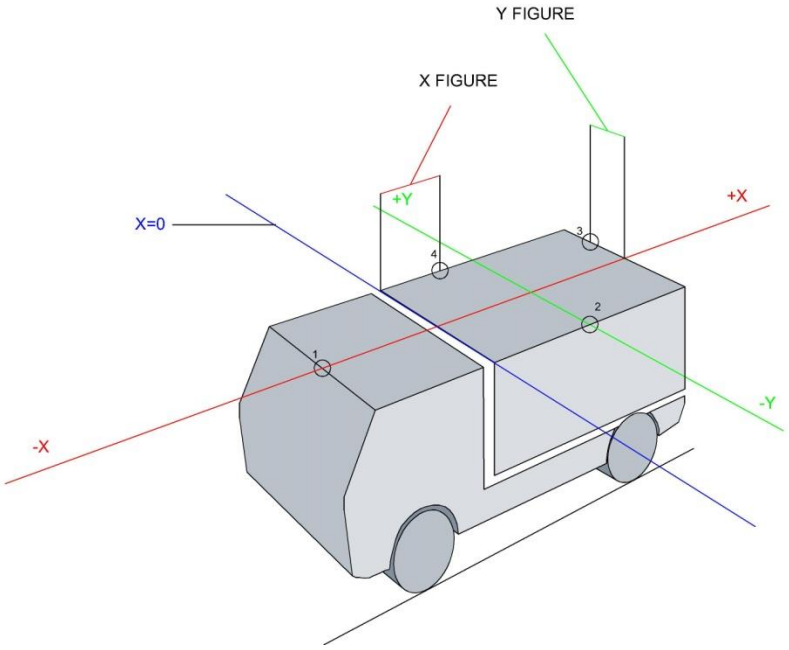
3.4 **Camera data**

Measurements for each camera are required so the ASL360 Configuration tool can determine the location of all cameras individually and in reference to the other three (Figure 2 & 3 below). This is done with a three dimensional grid reference (x, y and z). Refer to section 5.2.3 the latest version of the Installation and User Guide. These measurements are then entered into the configuration tool for each camera.

The drawing below shows a symmetrical installation. With a symmetrical installation, measurements can be easily referenced from lines between the camera positions. The front and rear cameras will have a zero Y measurement. The side cameras will have a zero X if the datum lines are used as shown.



The drawing below shows offset camera positions. With camera 4 now offset from camera 2, the X=0 reference point has now moved to a common point on the vehicle body. This point will be used to measure 'X' for all cameras. Camera 2 and 4 will have a positive X measurement. For ease, 'Y' measurements are always taken from the centre of the vehicle. Camera 3 will now have a positive Y measurement.

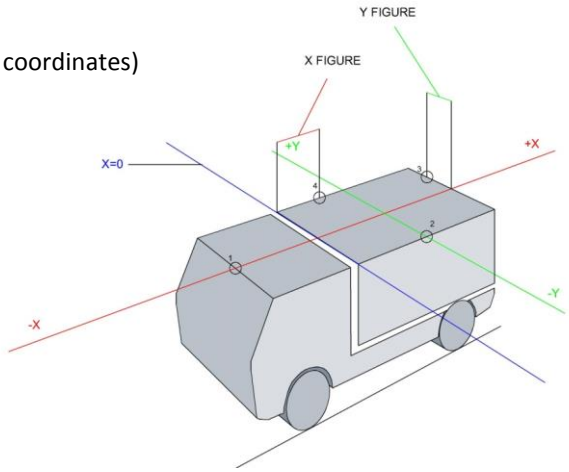


3.5 **Step by step Calibration**

Connect the ECU to laptop running a licensed ASL360 Configuration Tool using an M12 – RJ45 Cable. For licensing instruction refer to Appendix III

Before connection can be made to the ECU, you may need to configure the LAN port on your laptop PC. Refer to Appendix IV.

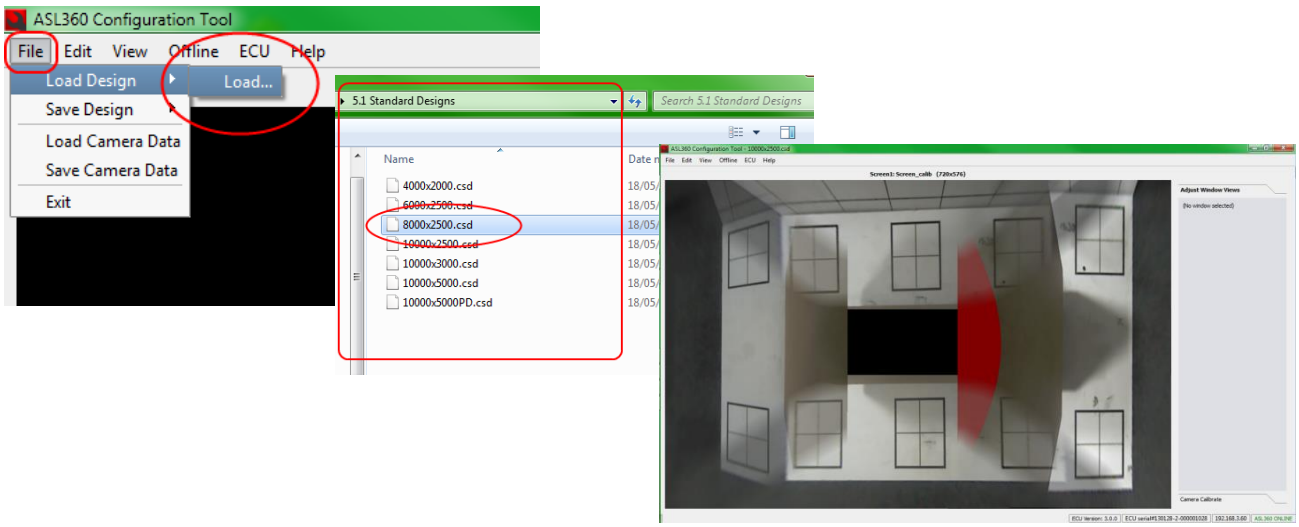
3.5.1 Measure and record camera pose data (camera coordinates)
Ref Appendix I



3.5.2 Open Configuration Tool and connect to the ECU with the Ethernet cable.
Ref Appendix IV

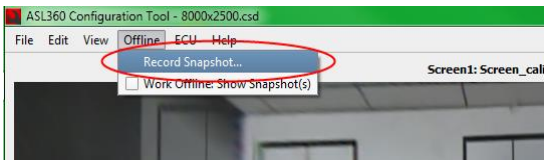
3.5.3 **Load Design**

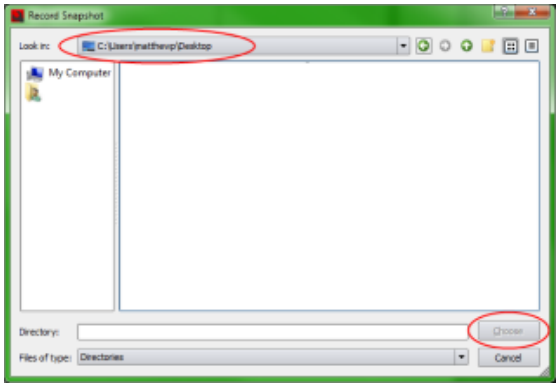
Choose any of the highlighted designs to suit (provided on Backeye 360 Elite USB). The four cameras will open in the main window similar to below.



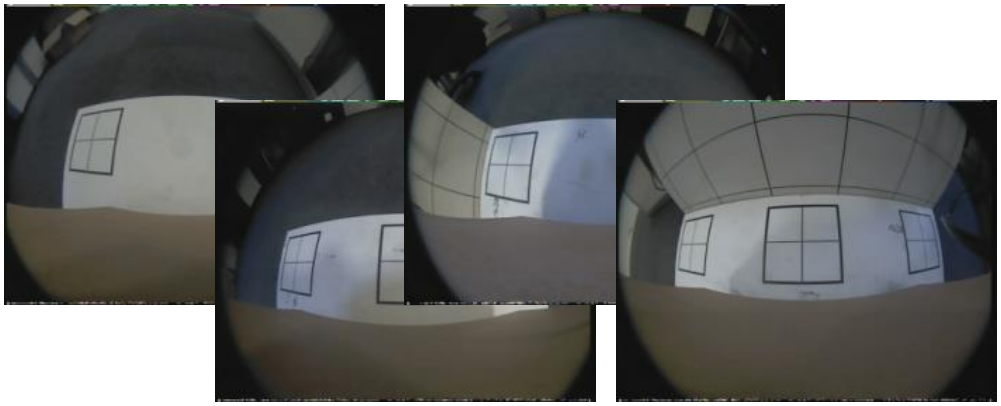
3.5.4 Record Snapshots

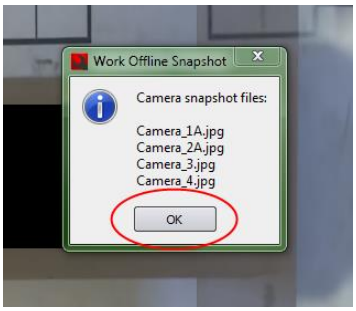
Click Offline> Record snapshots.
Select a location to save the snapshots and click 'Choose'





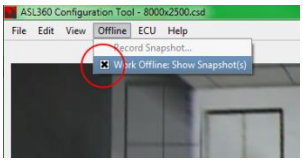
Four images will be saved.

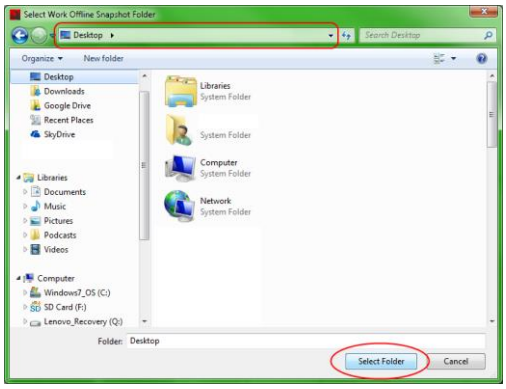




3.5.5 Working Offline

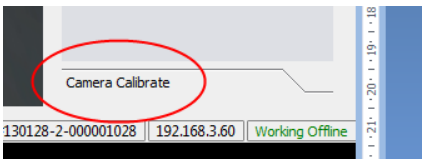
Click Offline> Work offline Show Snapshot(s)
Select the location where the snapshots were saved and click 'Select Folder'

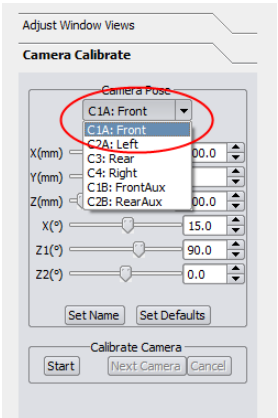


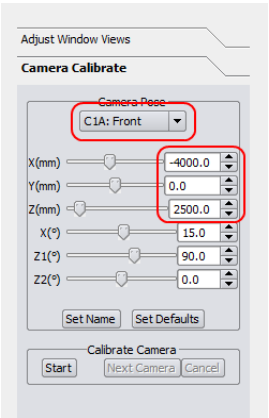


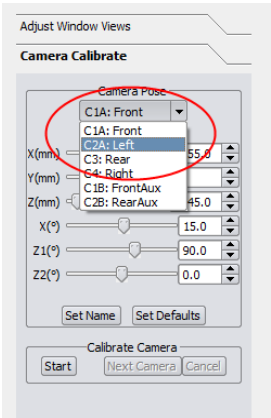
3.5.6 Enter camera pose data

Select each camera from the drop down menu and enter each camera's data (X, Y, Z). (X(°), Z1(°) & Z2(°) use default values loaded with the design.

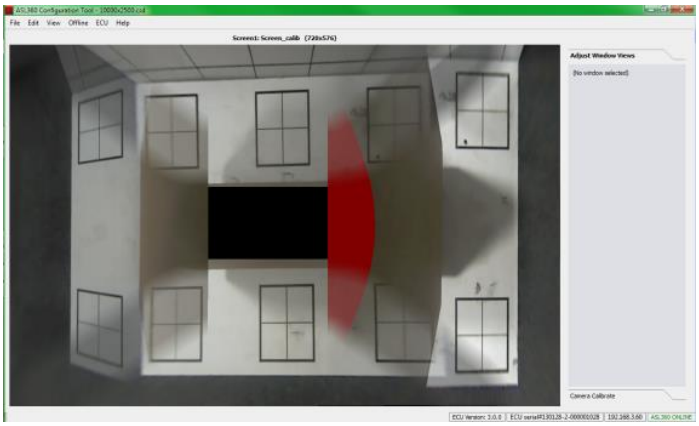


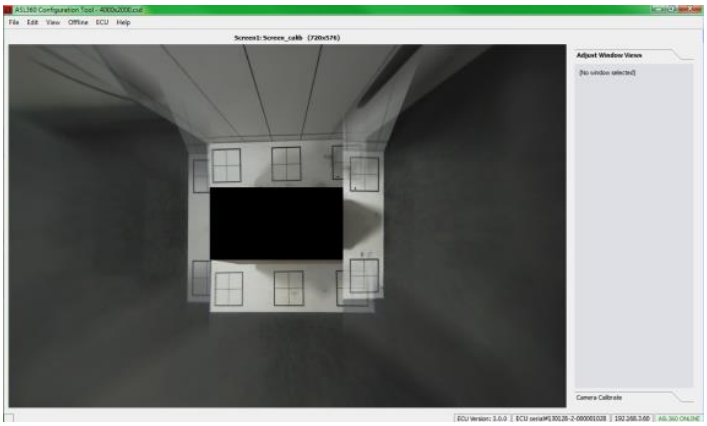






When the camera pose data is entered the calibration pattern starts to align and the squares become closer in size.



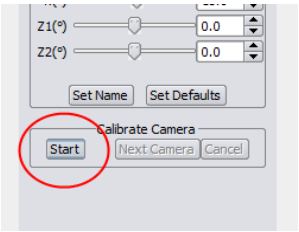


3.5.7 **Save Camera Data**

It is recommended you save the default camera data.

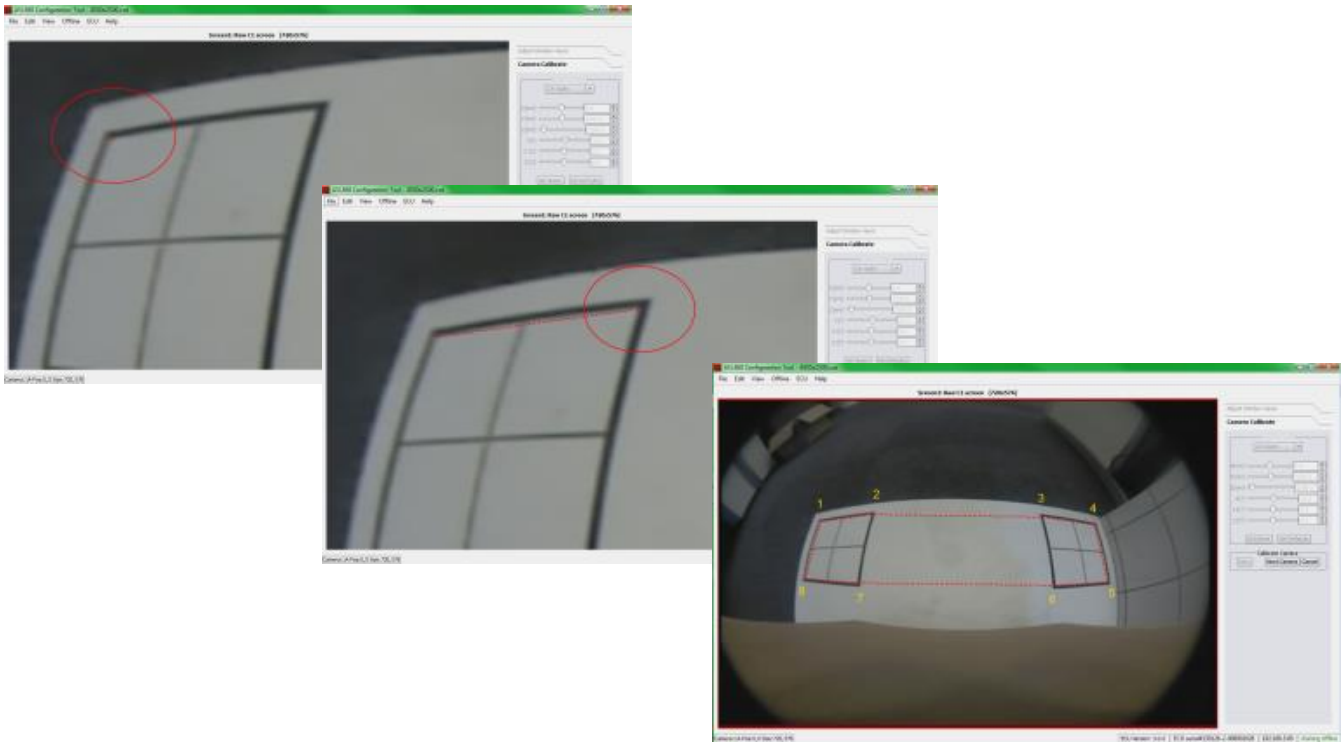
3.6 **Start calibration**

Click ‘Start’

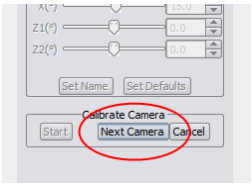


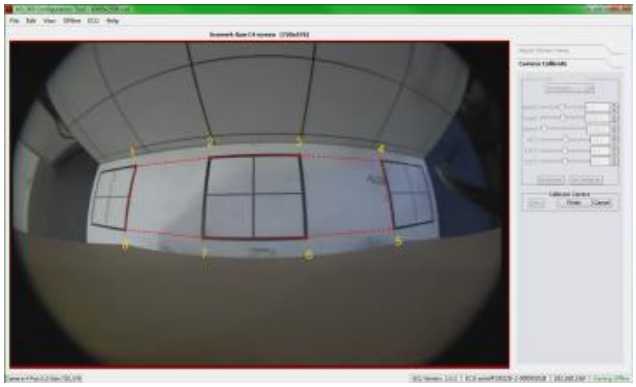
3.6.1 **Selection points**

Camera_1A – Starting at the top left corner, ensuring you select the same point on each corner, rotate clockwise selecting 8 points.



3.6.2 Camera_2A – Click '**Next Camera**' - Starting top left, but on the **inside corner** of the square, again selecting 8 points and rotating clockwise.

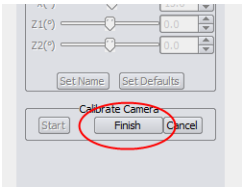


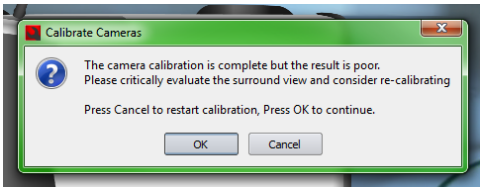


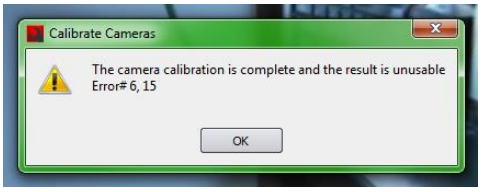
Repeat the process with Cameras 3 & 4.

3.7 **Finish Calibration**

The 'Next Camera' icon will change to 'Finish' once camera 4 is complete. Click 'Finish' – At this point, no message means the calibration is successful and the icon will change to 'Apply' (go to 3.7.3), but could receive one of two messages shown below (ref 3.7.1 or 3.7.2)







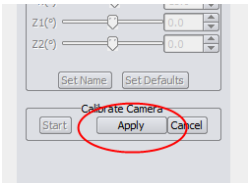
3.7.1 **Calibration Poor**

The calibration has worked but the result could be better. Re-calibration is recommended, but in some cases the vehicle dimensions and camera position will make calibration difficult and could end with this result. *Please also see **Calibration Failure** below for other causes.* **If you click OK then ensure the overlay of the front and rear cameras are checked thoroughly as they may not be truly aligned.**

3.7.2 **Calibration Failure**

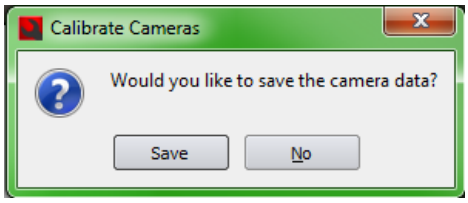
This result means the calibration has failed and is unusable.
Possible causes: The camera pose data (x, y, z) is incorrect. Incorrect selection of reference points during calibration. The calibration pattern is laid incorrectly or uneven.
Check measurements and calibration pattern alignment and restart calibration.

3.7.3 **All ok, 'Apply'** – When the calibration is successful, after clicking 'Finish' the button changes to 'Apply'



3.7.4 Camera Data Save

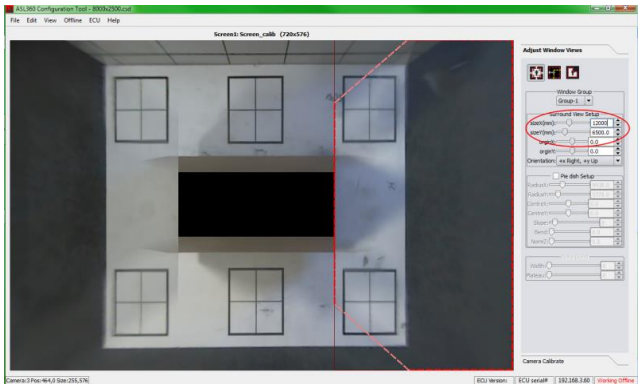
Once the calibration is complete the tool will ask you to save the camera data. Click Save to save the camera data. ***You will need to save the camera data before you can upload any data to the ECU.***

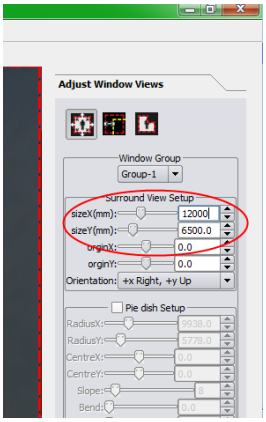


3.8 Screen Design

Set up surround view layout

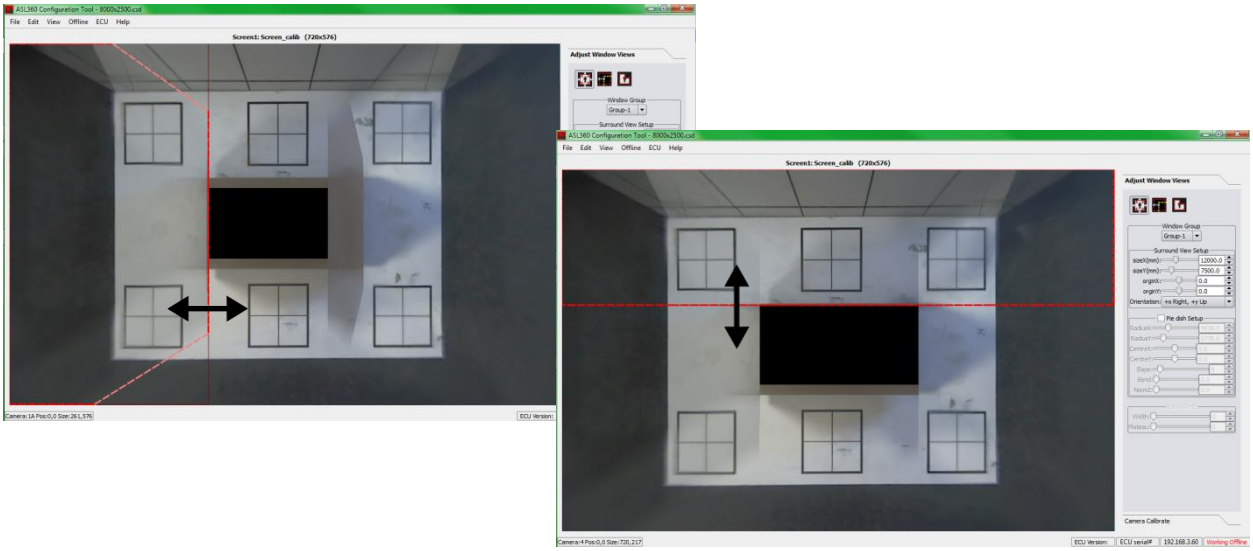
Confirm/enter surround view dimensions. You can use the calibration squares to check you have the ration correct. The squares should look square.





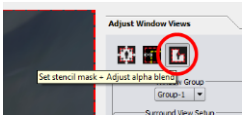
3.8.1 Adjust window

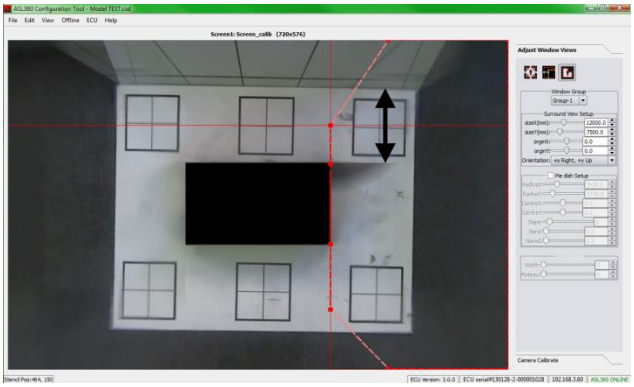
Adjust window position to vehicle outline. Each window can be adjusted by selecting the icon ‘Move+resize window …. ‘ then double left click on the window to be adjusted. The window will be highlighted as you can see below.

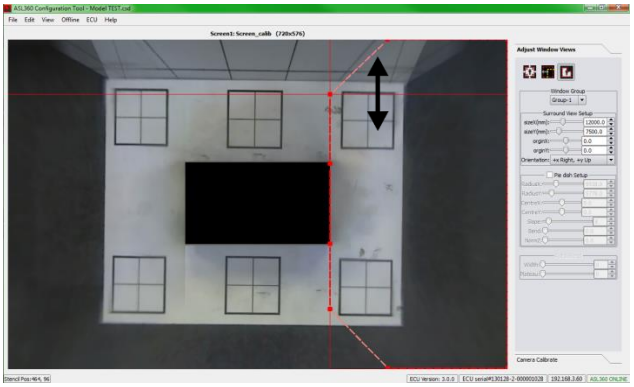


3.9 Blending

Determine blend areas (select icon ‘Set stencil mask + Adjust alpha blend’)

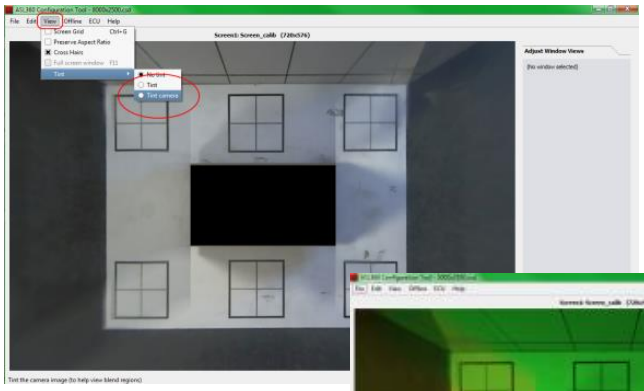


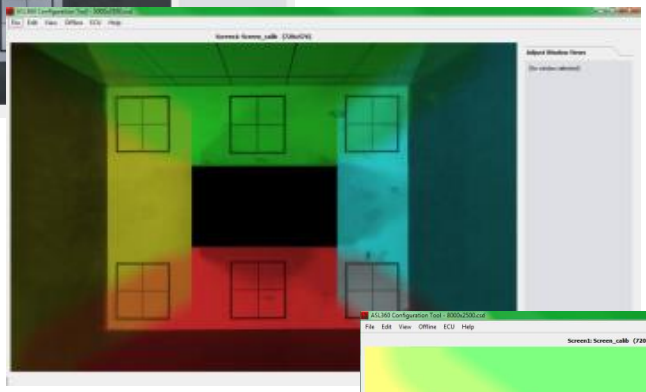




3.9.1 Screen tint

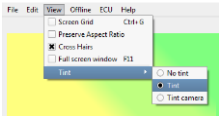
Screen tint can be used to highlight the individual cameras and applied blend areas. This will also highlight if the blend has overlapped into the cropped (black) area, causing a blind spot (shown on 3.9.4). The images below from left to right, No tint, Tint Camera & Tint.

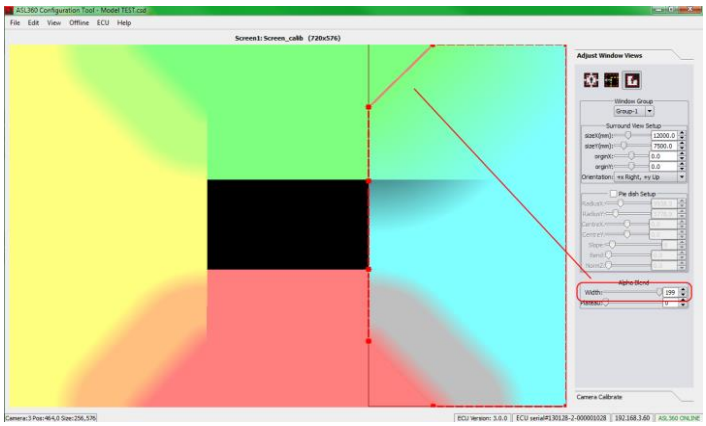


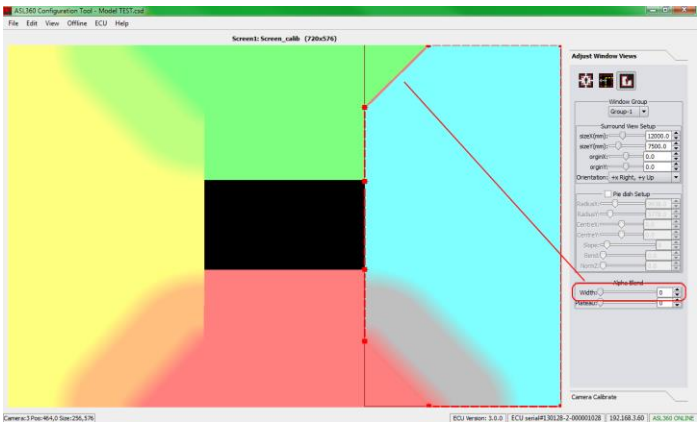


3.9.2 Adjust ‘Alpha Blend’

In some instances you will need to adjust the amount of blend rather than keep the default setting. Turning on the ‘Tint’ will help highlight the blended areas.

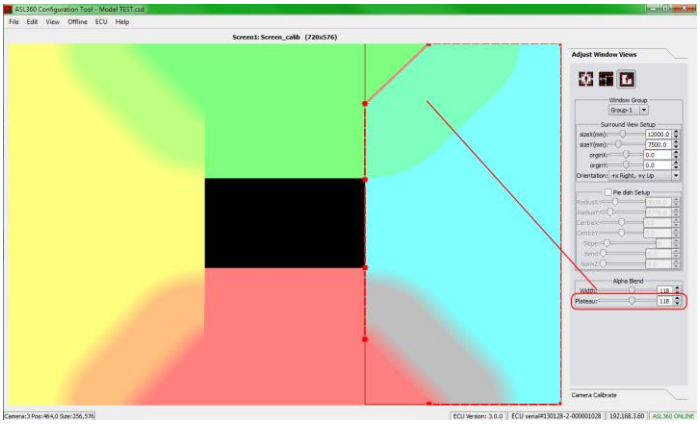


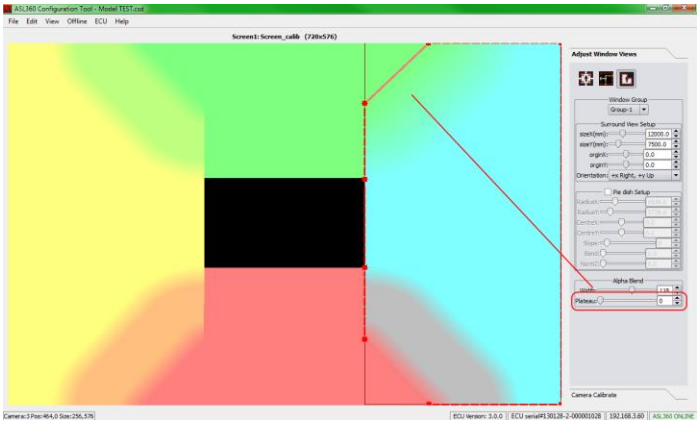




3.9.3 Adjust ‘Plateau’

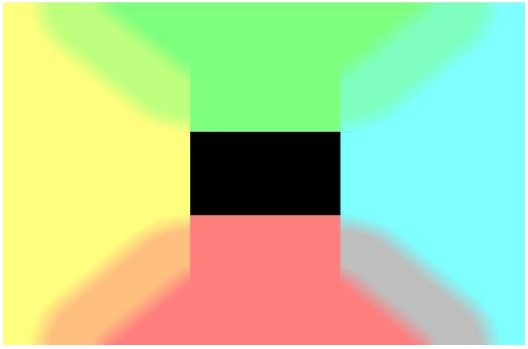
This hardens (high) and softens (low) the edge of the blend area as shown. A softer edge is preferred

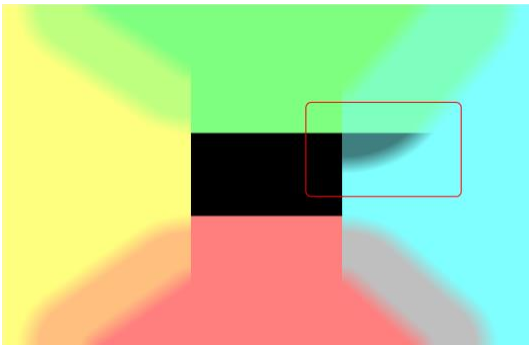




3.9.4 Poor Blending

The images below show the difference between good and bad blend positioning causing a blind spot in the highlighted shaded area.

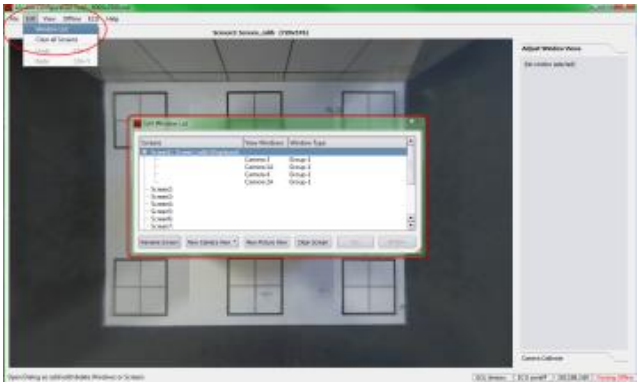




4.0 Load Vehicle Overlay

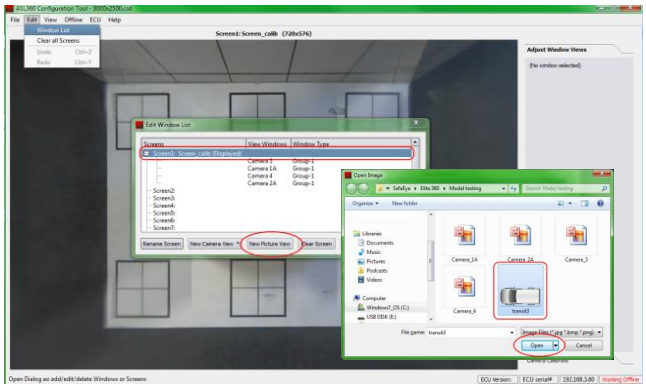
4.0.1 Window List

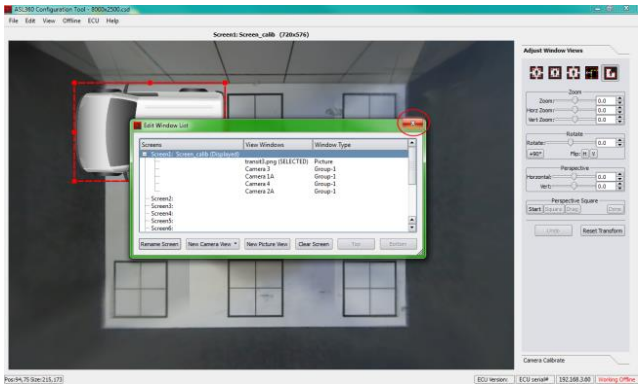
The window list displays all current configured screens including cameras and overlays loaded for each



4.0.2 New Picture View

Click Edit> Window List, highlight the required screen and click ‘New Picture View’ the ‘Open Image’ window will open. Select the required image and click ‘Open’. The image will open on screen. Close the Window List.

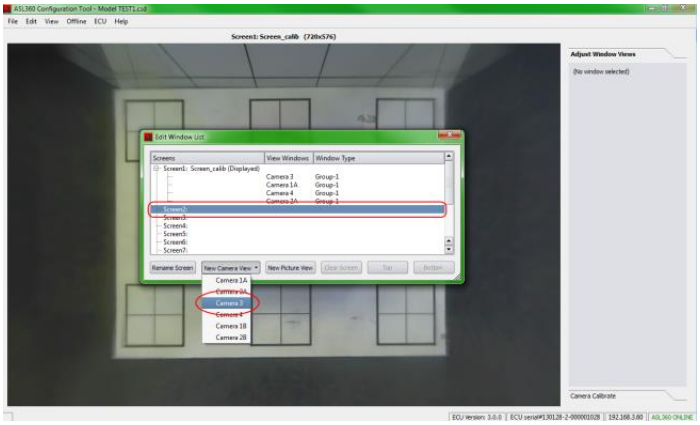


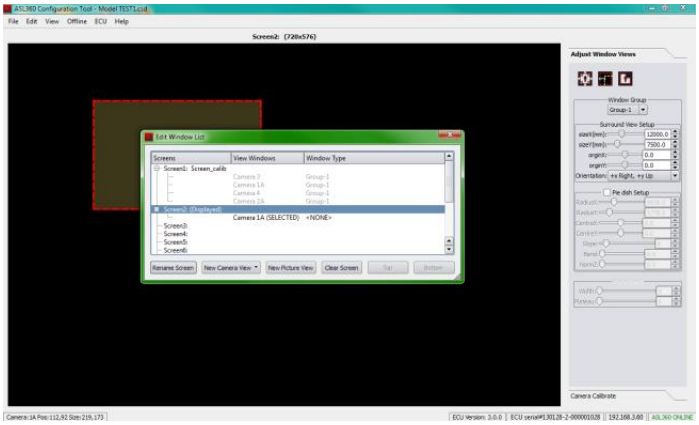


Move and adjust the size of the image to fit as required.

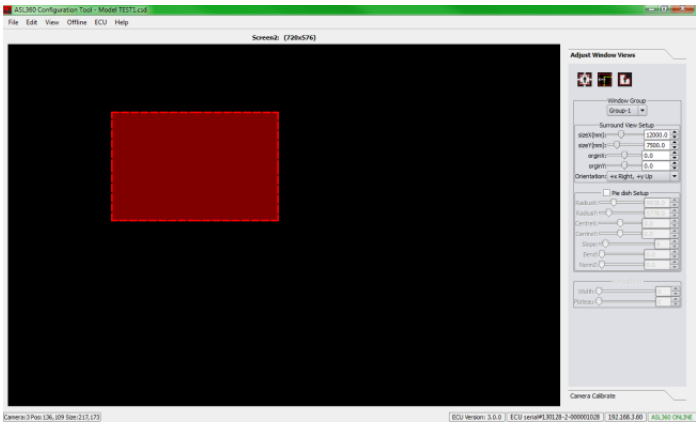
4.1 Alternative Screens

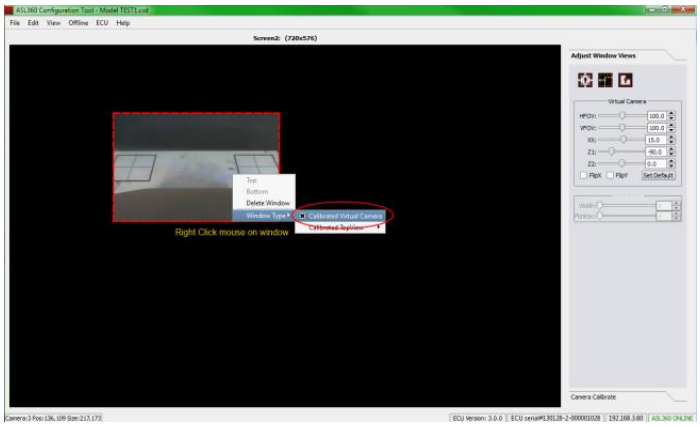
Open Window List - Highlight Screen 2 – Click New Camera View – Select Camera required. Screen 2 opens with new window highlighted.



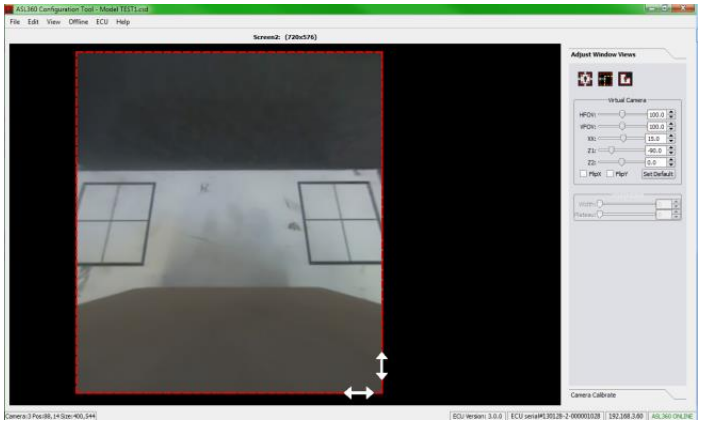


Close Window List – Right Click on window and select required view type. In this example ‘Calibrated Virtual Camera’ is used to create a reverse camera view. This will be triggered with OPTO IP1 (programmed in default designs).

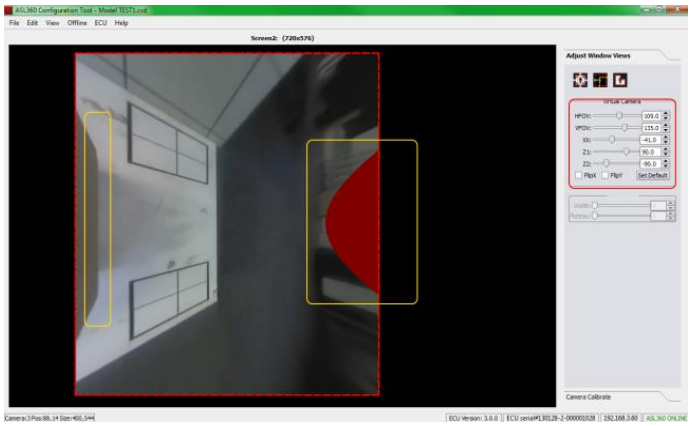


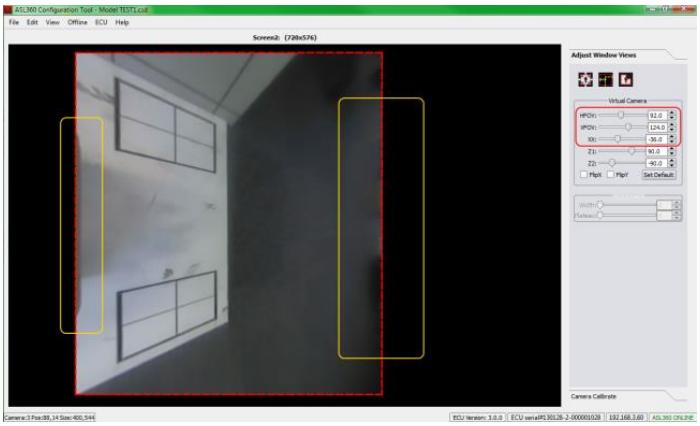


Adjust window to suit screen size and rotate to correct orientation. This is done in the same way a surround view window is adjusted.

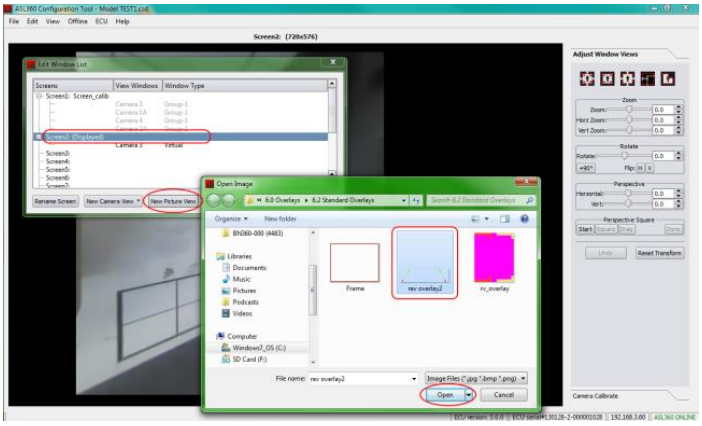


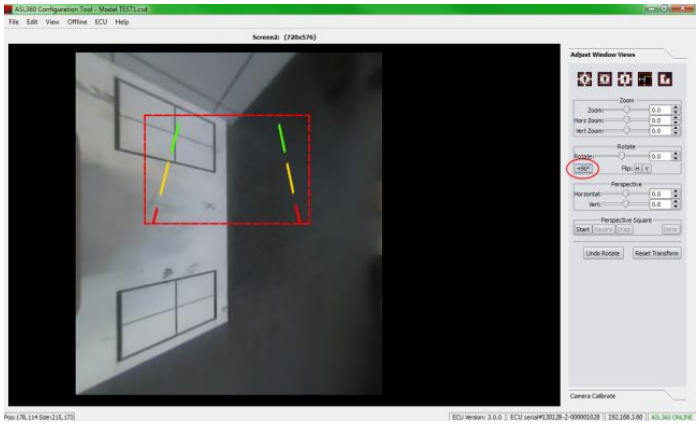
Adjust HFOV & VFOV (Field Of View), angles XX, Z1 & Z2 to maximize the view. There is no default for this as the view depends on where the camera is mounted.



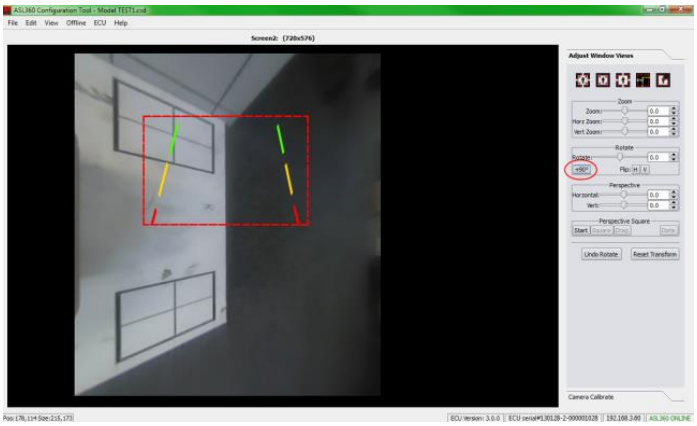


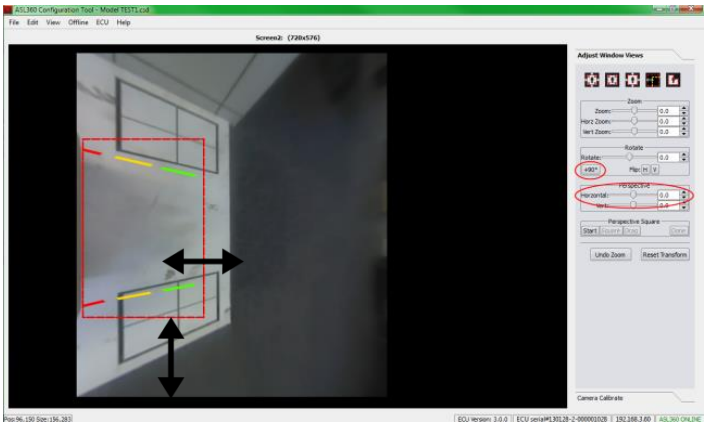
4.1.1 **Reverse overlay** (if required).
Loaded in the same way as the vehicle overlay, rotate the overlay and resize to suit image.





Rotate and adjust size to suit. Double click the overlay (if not already highlighted) and adjust to suit in the same way you adjust a camera window.

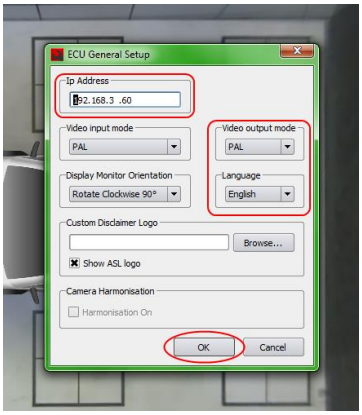




4.2 **ECU Programming**
This section covers the loading of design and camera data to the ECU and setting the video output mode. For trigger logic programming (screen activation setup) refer to U-0644_2298 Configuration Tool Training v2.3.

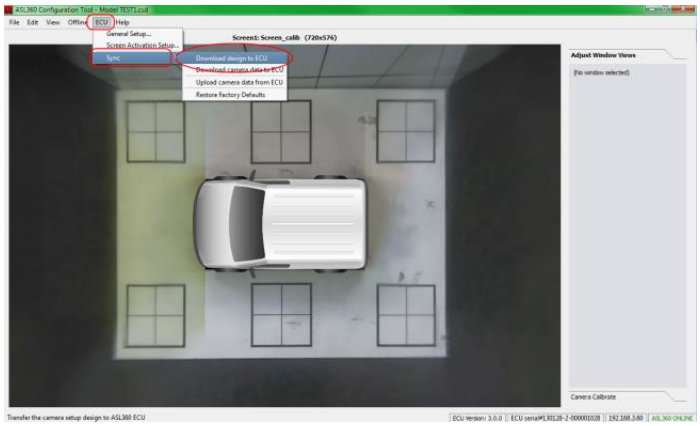
4.2.1 ECU General setup

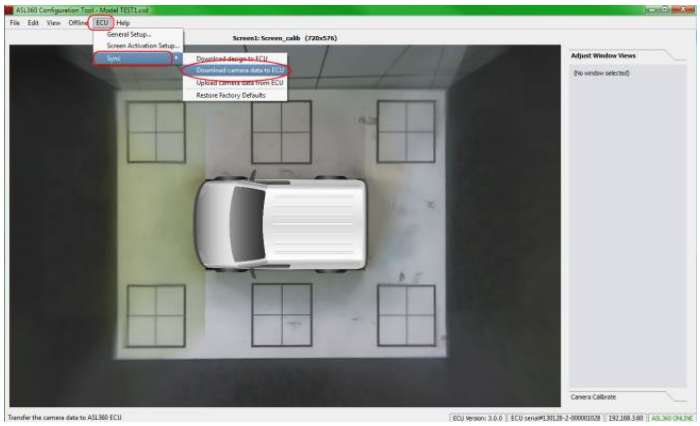
This enter the ECU setup screen where you can change the video output and IP address



4.2.2 Download Design to ECU

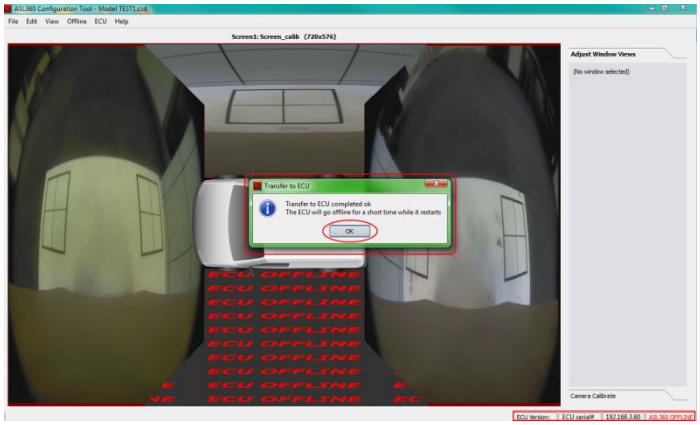
Click ECU > Sync > Download Camera Data to ECU. The system will reboot as described in 4.2.3. Next, 'Download Camera Data to ECU' using the same drop down section as shown.





4.2.3 System Reboot

On downloading Design or Camera Data the ECU will automatically reboot as shown below. Ok can be clicked at any time during this process and the reboot will continue normally.



4.2.4 Save Design on exit

If you attempt to exit the tool without saving the design you will be prompted to save before exiting. This reminder will also pop up if you make any changes to a loaded design and attempt to exit without saving.

4.3 Sign Off

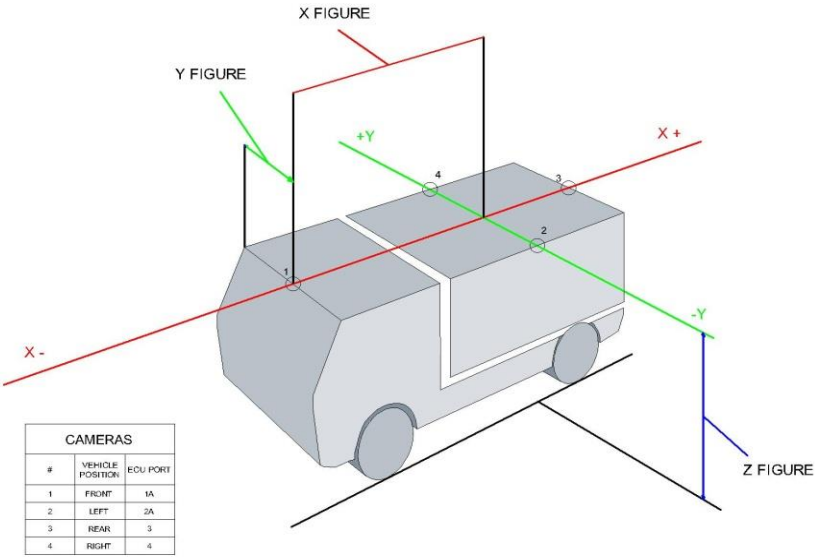
4.3.1 Installation Report

It is recommended that you complete a report for every vehicle. Brigade version is supplied in your pack where files and pictures can be dragged and dropped into it. This is mandatory on Brigade installations.

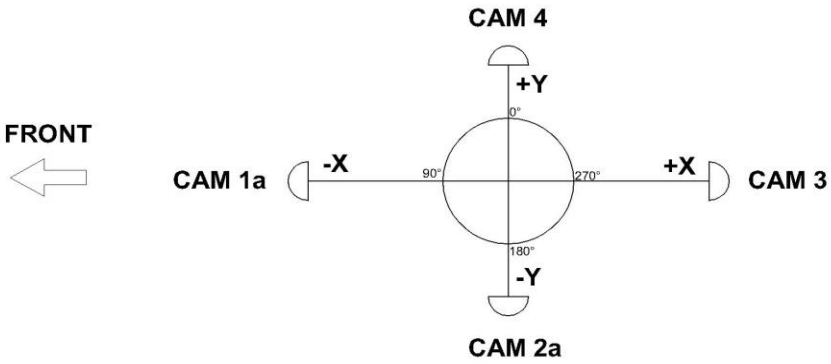
4.3.2 Data Filing

You should create a file for each vehicle to save Snapshots, design and camera data along with any relevant information. This information is invaluable if there is a need to revisit the vehicle. Refer to ‘Test Vehicle Data’ in your Smarteye USB pack for a recommended folder structure.

Appendix I – Below is a measurement reference guide. The table below highlights the required camera pose data for the Configuration Tool. This is included in the Engineers pack as a separate pdf for site use.



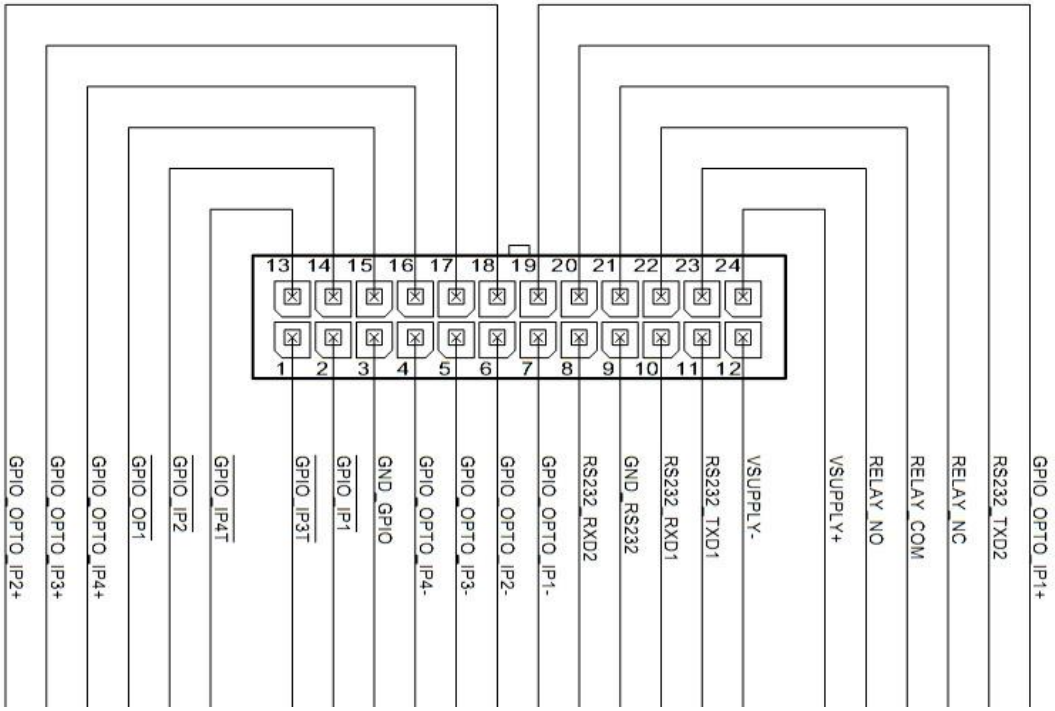
CAMERAS		
#	VEHICLE POSITION	ECU PORT
1	FRONT	1A
2	LEFT	2A
3	REAR	3
4	RIGHT	4



CONFIGURATION TOOL DATA						
	X	Y	Z	X(°)	Z1(°)	Z2(°)
CAM 1a				15	90	0
CAM 2a				15	180	0
CAM 3				15	270	0
CAM 4				15	0	0

Appendix II – Below is the system cable layout and recommended trigger connections. The trigger menu below relates to the firmware installed on the current Elite 360 ECU's. The trigger configuration can be changed if required (please call Brigade Engineering for more details)

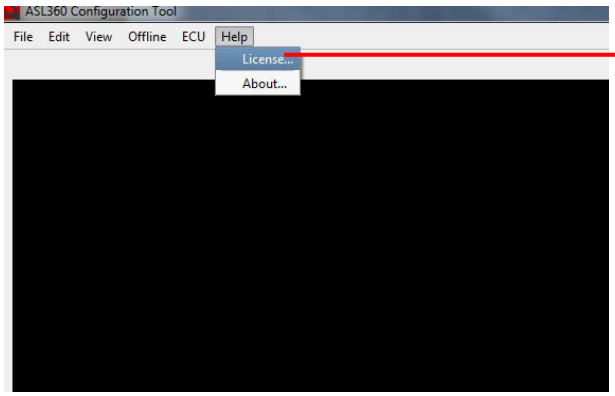
Connector Mating Face (cable view)



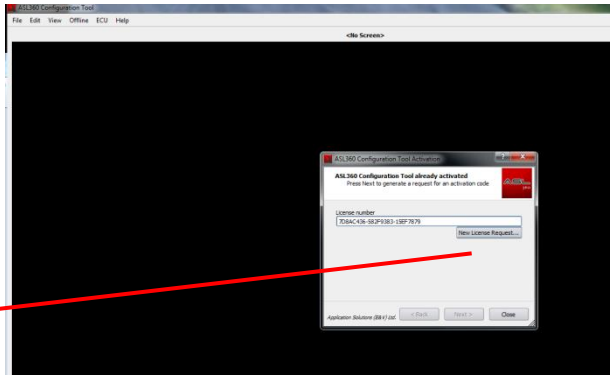
PIN	FUNCTION	COLOUR	DESCRIPTION	ACTION	SUGGESTED CONNECTION
1	GPIO IP3T	GREY	NOT USED	<--	
2	GPIO IP1	GREY	NOT USED	<--	
3	GND GPIO	GREY	NOT USED	<--	
4	GPIO OPTO IP4-	GREY	GROUND FOR TRIGGER 4	CONNECT WHEN USING GPIO OPTO IP4+	GROUND
5	GPIO OPTO IP3-	GREY	GROUND FOR TRIGGER 3	CONNECT WHEN USING GPIO OPTO IP3+	GROUND
6	GPIO OPTO IP2-	GREY	GROUND FOR TRIGGER 2	CONNECT WHEN USING GPIO OPTO IP2+	GROUND
7	GPIO OPTO IP1-	GREY	GROUND FOR TRIGGER 1	CONNECT WHEN USING GPIO OPTO IP4+	GROUND
8	RS232 RXD2	GREY	COM PORT	SYSTEM REFLASH OVER RS232	NOT USED
9	GND RS232	GREY	COM PORT	SYSTEM REFLASH OVER RS232	NOT USED
10	RS232 RXD1	GREY	COM PORT	SYSTEM REFLASH OVER RS232	NOT USED
11	RS232 TXD1	GREY	COM PORT	SYSTEM REFLASH OVER RS232	NOT USED
12	VSUPPLY-	BLACK	ECU GROUND	<--	GROUND
13	GPIO IP4T	GREY	SPEED SIGNAL INPUT	TACHO INPUT. THE TACHO INPUT TURNS THE MONITOR OFF AT 10KPH (approx). UNDER THIS STATE, IF TRIGGER 4 OR 3 ARE ACTIVATED THEIR SCREEN OUTPUT WILL CHANGE TO 7 & 8 RESPECTIVELY	TACHO PIN B8
14	GPIO IP2	GREY	NOT USED	<--	NOT USED
15	GPIO OP1	GREY	NOT USED	<--	NOT USED
16	GPIO OPTO IP4+	GREY	+VE FOR TRIGGER 4	ACTIVATES SCREEN 4 WITH DELAY	L/H INDICATOR
17	GPIO OPTO IP3+	GREY	+VE FOR TRIGGER 3	ACTIVATES SCREEN 5 WITH DELAY	R/H INDICATOR
18	GPIO OPTO IP2+	GREY	+VE FOR TRIGGER 2	ACTIVATES SCREEN 3 NO DELAY	SPARE
19	GPIO OPTO IP1+	GREY	+VE FOR TRIGGER 1	ACTIVATES SCREEN 2 NO DELAY	REVERSE FEED
20	RS232 TXD2	GREY	COM PORT	SYSTEM REFLASH OVER RS232	NOT USED
21	RELAY NC	GREY	NOT USED	<--	NOT USED
22	RELAY COM	GREY	NOT USED	<--	NOT USED
23	RELAY NO	GREY	NOT USED	not used	NOT USED
24	VSUPPLY+	RED	ECU POWER (9-32v)	<--	12/24V IGNITION

Appendix III – Configuration Tool Licensing

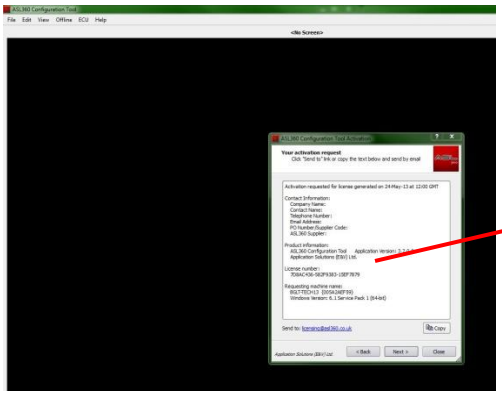
Each laptop/PC will require its own license key. These are provided free of charge to **Brigade trained installers.** Follow the process below to obtain your license key before commencing installation of Smarteye. It can take up to a day to get your license key and will not be available at weekends.



Left click “Help”

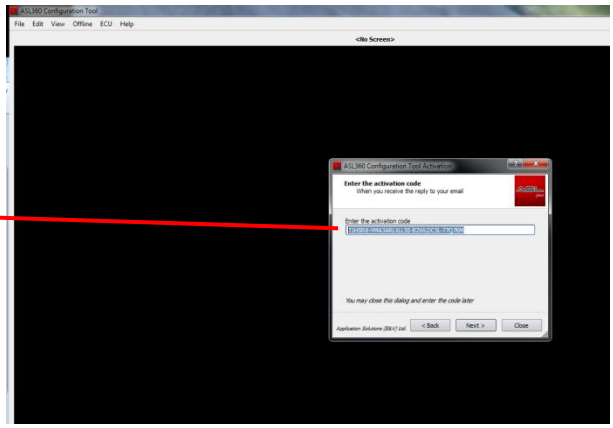


Left click “New License Request” and then “Next”

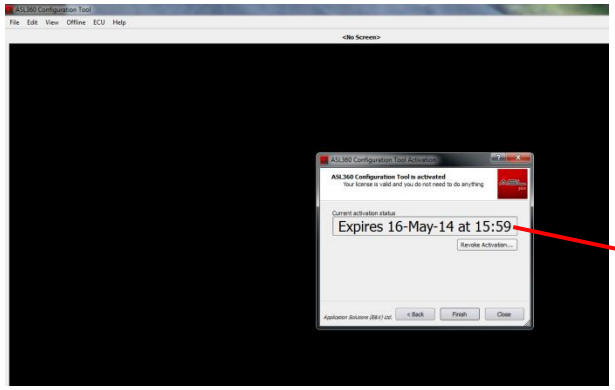


Copy the data in the window and paste into an email. Complete the form with information requested.
This should then be emailed to licensing@asl360.co.uk and jenny.atkinson@brigade-electronics.com
Title the email ‘New License Request’

You will receive your key back via email

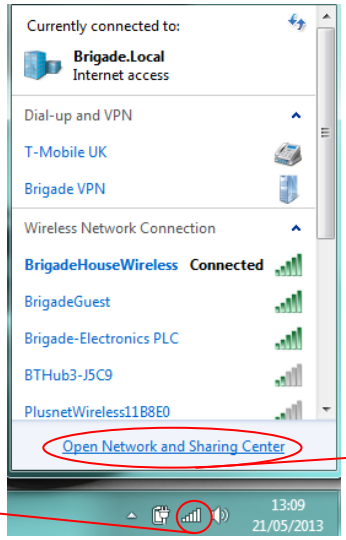


Enter the license key in the field shown and click ‘Next’



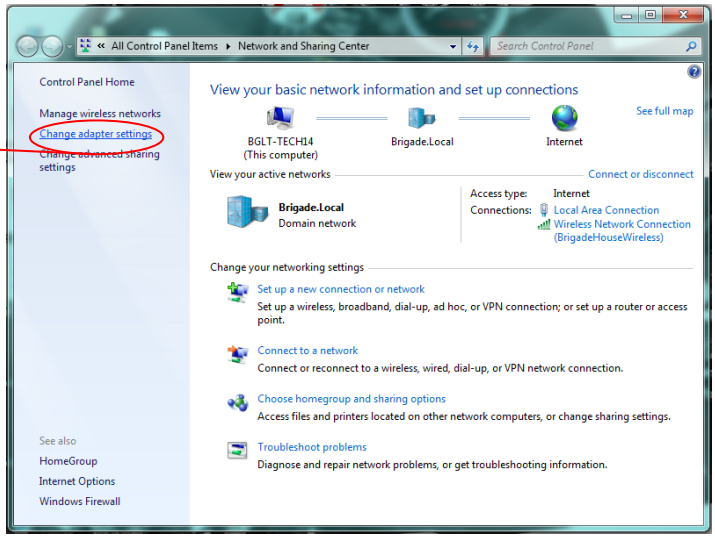
Check the expiry date is correct. Normally one year from activation

Appendix IV – Instructions for setting up a Static IP address on a Windows 7 PC

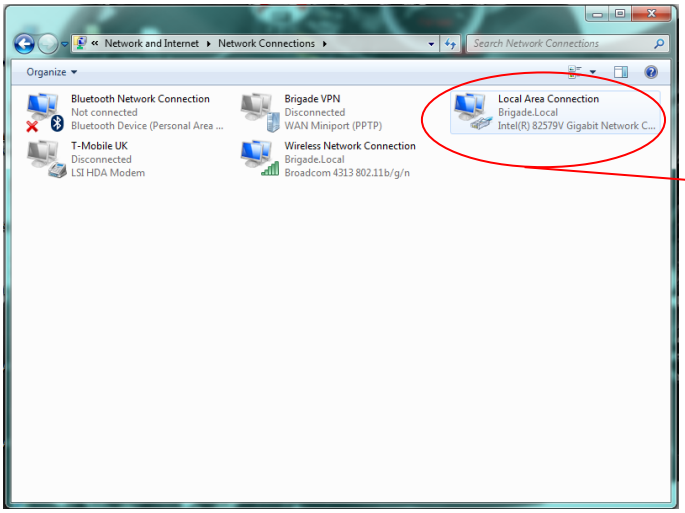


1. Left click network tab on taskbar

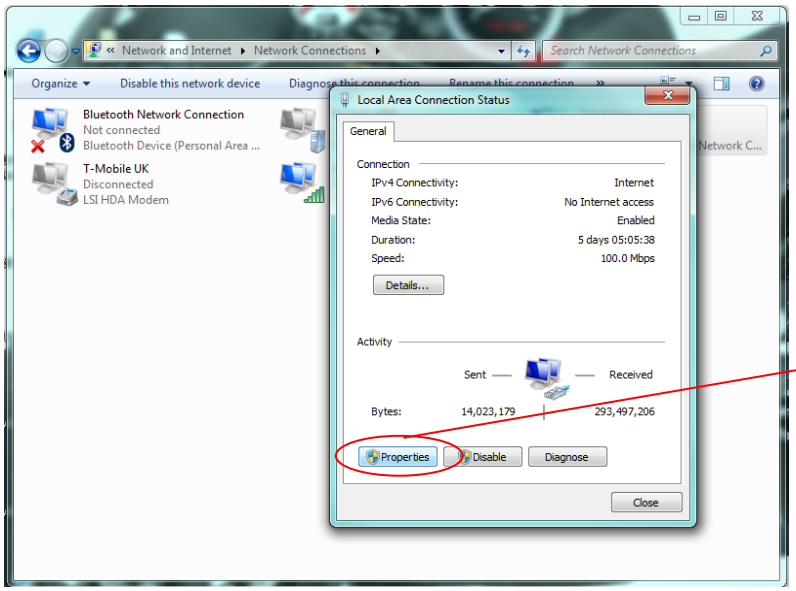
2. Left click "Open network and Sharing Center"



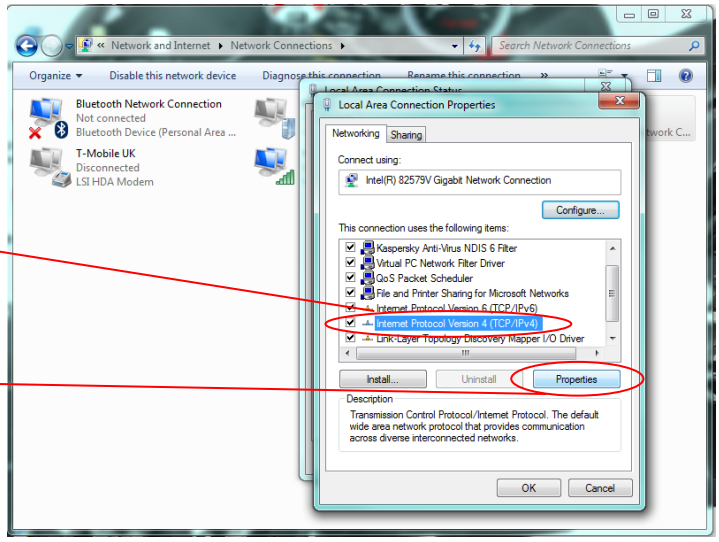
3. Left click "Change adaptor settings"



4. Double Left click "Local Area Connection"

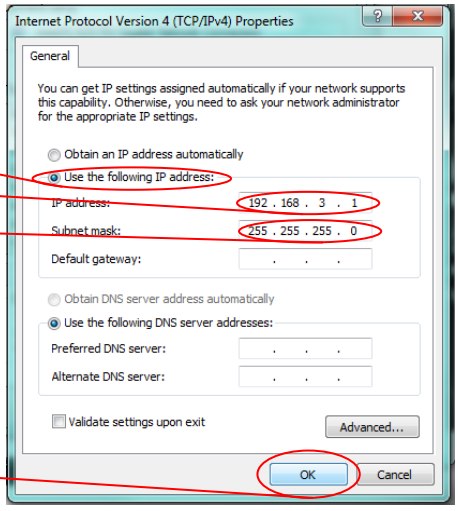


5. Left click “Properties”



6. Left Click to highlight “Internet Protocol Version 4 (TCP/IPv4)”

7. Left click “Properties”



8. Left click “Use the following IP address:”

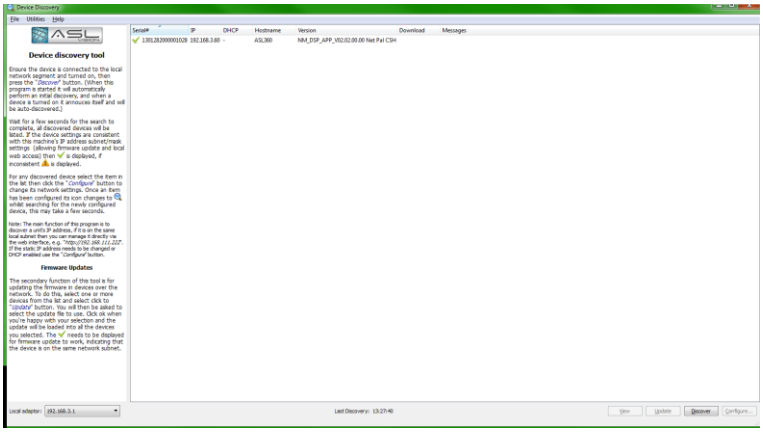
9. Enter the IP address 192.168.3.1

10. Enter Subnet mask 255.255.255.0
(Automatically defaults when IP address is entered)

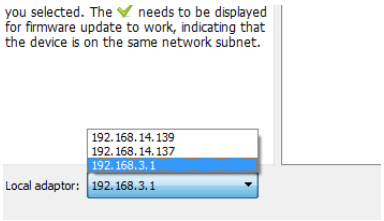
11. Left click “OK”

Appendix V - Updating ECU firmware

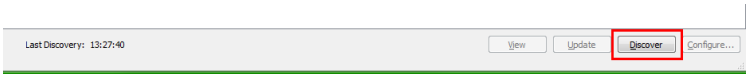
Step 1: Open Device Discovery Tool



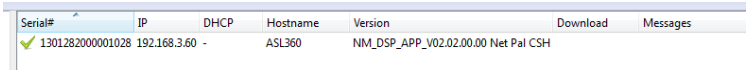
Step 2: Check the adapter settings. These should be set at 192.168.3.1.



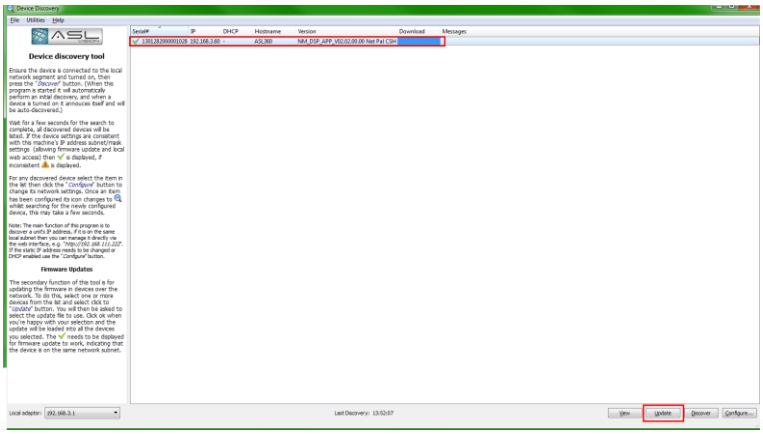
Step 3: If no data is displayed in the window, click ‘Discover’.



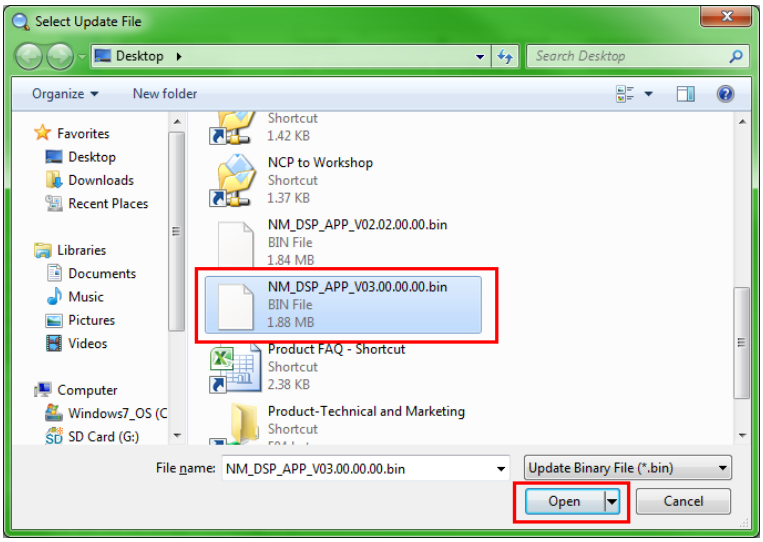
Step 4: The ECU details will be displayed at the top of the window.



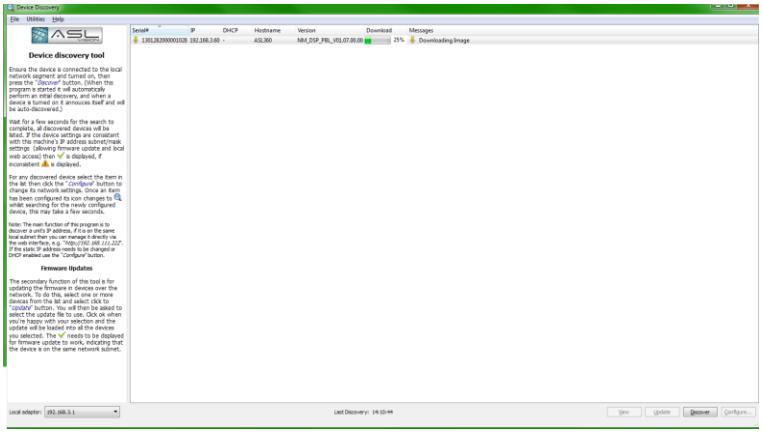
Step 5: Highlight the ECU details and click ‘Update’



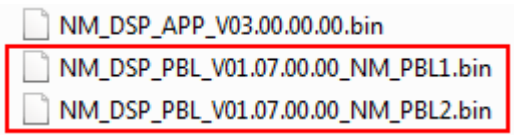
Step 6: Locate and select the correct APP file (or PBL) then click ‘Open’.



Step 7: The firmware will download and update the ECU.



If the Primary Boot Loader (PBL) requires updating, follow this process from Step 5.



Appendix VI – Configuration Tool updates

3.4 Changes 14 March 2014
ASL0644-CR4441 CSH: Clear any residual OpenGL errors, remove unused extensions, better OpenGL error dialog. Display the information dialog on ALL OpenGL errors.

Note that this version of the CFG is compatible with any ECU APP software that is v03.xx.xx.xx. Any future updates that are not compatible will be v04 or above.

OpenGL

1) OpenGL error #1280 has been fixed. The problem was due to QT not flushing the errors.
2) The 'Unresolved OpenGL error' is due to the graphics driver being out of date and there may or may not be a new driver available.

When this error occurs, the software now displays a list of suggested methods to see if there is a driver available, together with a disclaimer. This is detailed below:

"Sorry, the OpenGL version on this computer is not compatible
with the ASL360 Configuration Tool.
Error #XXX. Your OpenGL version is XXX.

The problem may be solved by updating the graphics driver.

Updates are available from 3 sources:
a) from Microsoft via the standard Windows updates
b) from the PC manufacturer
c) from the graphics card manufacturer

1. To start with, please ensure the Windows installation is up to date; this can be done by connecting this computer to the internet and allowing the standard Microsoft Windows update to proceed. This may be enough to solve the issue.
2. If step 1 does not solve the problem, the manufacturer of this computer (e.g. Dell, HP) may have an update. An update/maintenance tool may be present on the start menu, or it may be necessary to consult the manufacturer's website.
3. If step 2 does not solve the problem, the manufacturer of the graphics card in this computer may have a generic driver; below is a list of the most common manufacturers:

Intel: http://www.intel.com/p/en_US/support/detect/graphics
AMD/ATI: http://support.amd.com/en-us/download
NVIDIA: http://www.nvidia.com/Download/index.aspx

Note: In order to install a generic driver, you may have to uninstall the previous driver
Warning: With some combinations of computer and graphics card, installing a generic driver may cause problems.
Please note: Any driver updates are done at the users own risk and ASL360 is not responsible for any problems caused to your computer.

This program will now exit."

List of changes in previous version:

3.3 Changes 13 March 2014
ASL0644-CR4441 CSH: Clear any residual OpenGL errors, remove unused extensions, better OpenGL error dialog.

3.2 Changes: 12 November 2013
ASL0644-CR3043 CSH: After successful calibration, the offline handling is as per SRS after Raven 131 SRS_CFG_CAL_009v1 - propose rewording after SAT fail. After good calib, prompt user to save camera data. If not save user will not be allowed to download camera data to ECU.

3.1 Changes: 6 November 2013
ASL0644-CR3027 CSH: Add a warning message box when closing the APP with an unsaved design.
ASL0644-CR3043 CSH: After successful calibration, prompt user to download camera data to ECU.

3.0 Changes: 26 September 2013
ASL0644-CR4013 CSH: Check ECU major version=3 also ignore minor version from ECU. CSH now only checks that the ECU is version 3

2.8 Changes: 14 August 2013
ASL0644-CR3553 CSH: More License Info needed from user.
1) Company
2) Contact Name
3) Email address
4) Telephone No.
5) Purchase Order No. / License Request Code
6) ASL360 software Supplier

2.7 Changes: 21 June 2013
ASL0644-CR3763 CSH: Allow a design with an un-licensed feature enabled to be loaded into CSH but not downloaded to ECU. The features affected are Harmonisation, No ASL disclaimer logo, Custom disclaimer. E.g. if harmonisation is not licensed and a design with harmonisation=on is loaded then user will get a warning that harmonisation is not licensed and the load will continue ok. If the user attempts to download the design then they will get an error and the download will be aborted.
ASL0644-CR3779 CSH: Set the required ECU version to 2.4

2.6 changes
CR3745 CSH: Enable Image Harmonisation through Config tool (new licence feature).
CR3746 CSH: Viewport error should show screen number and name
CR3453 CSH: Window list does not remember its previous size
CR3747 CSH: Allow the user to see the required ECU version (hover over the ECU version)
CR2573 CSH: No 'What' String in exe or install package

2.5 Changes
ASL0644-CR3678 CSH: Allow mega pixel camera snapshots to be calibrated.
ASL0644-CR3041 CSH: Display S/N and SW version of each connected camera.
ASL0644-CR3370 CSH: Help/About box should show version without scrolling.
ASL0644-CR2873 CSH: Replace Open Source LevMar with non GPL version (and remove installer license files)
ASL0644-CR3457 CSH: When Menu View/Preserve aspect ratio is selected the 'out of bounds' area is not clear.
ASL0644-CR3607 CSH: Invalid Tacho parameters are ignored silently
ASL0644-CR3606 CSH: Tacho Max Sample Time should have a Min limit of 200ms
ASL0644-CR3605 CSH: Event handling Config - entering description
ASL0644-CR3463 CSH: FSM's GUI to enable/disable composite video output 2
ASL0644-CR3596 CSH: Display Window type in Window list dialog
ASL0644-CR3033 CSH: No warning when max no. of alpha blends reached. It just fails to upload design to ECU.
ASL0644-CR3428 CSH: Backdoor option available to get around Licensing restrictions
ASL0644-CR3420 CSH: Max image limit reached - Msg needs adjusting
ASL0644-CR3034 CSH: Maximum windows limits are wrong

ASL0644-CR3597 CSH: Serial number displayed on status line does not change for different ECU
ASL0644-CR3598 CSH: Display formatted serial number
ASL0644-CR3467 CSH: Screen Activation Setup (Event Handling Configuration) - Different names for the same thing!
ASL0644-CR3654 CSH: Static image size on setup tool and target are slightly different
ASL0644-CR3456 CSH: Allow more than one Overspeed or Underpeed tacho thresholds, even in different states

2.4 Changes
ASL0644-CR3381 CSH: Crash when opening design while window

All changes listed above are in line with listed changes in ASL Software Release Note 'Configuration Tool v03.04.00' – 14.03.14