



Safe-T-Scope® 360AHD™ 3D Surround View System

User Manual

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Specifications and details are subject to change without prior notice.

Patent Pending



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1) Precautions

Storage and Usage

1. Do not expose the system to extreme temperatures. The storage temperature range is -40°C to +85°C (-40F to +185F), and the operating temperature range is -20°C to +70°C (-4F to 158F). The relative humidity should not exceed 90%. Do not immerse the device entirely underwater.
2. Do not use this device in environments with excessive moisture, dust, or smoke. Avoid dropping or striking the device.
3. Avoid using this device in enclosed spaces, areas with excessive vibration, or places subject to severe impacts.
4. Never puncture, scratch, or use abrasive cleaning materials on the device. Ensure cables are not pinched or stepped on.
5. The ECU (Electronics Control Unit) is not designed to be waterproof.

Operating Precautions

- 1) The device may be powered by a 12- or 24-volt automotive battery or vehicle electrical system.
- 2) Ensure all cables are securely connected and observe polarity. Improper cable connections may damage the system. Remove the power cable connections when you do not intend to use the unit.

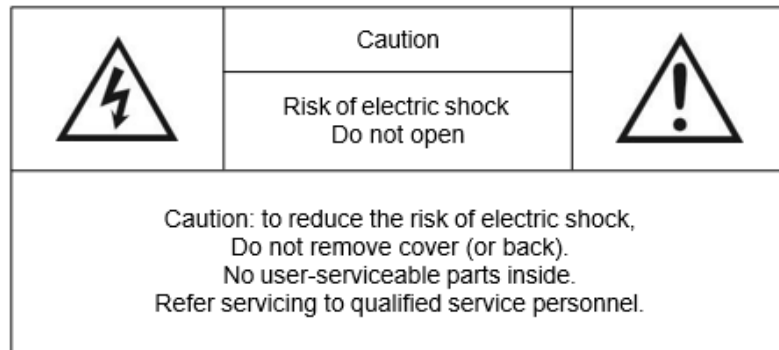


Warning!

- 1) Do not open the ECU case unless directed by Rosco.
- 2) Driver must exercise caution when viewing the monitor during vehicle operation.

Camera Maintenance

- 1) Disconnect all the cable connections from the ECU before cleaning the cameras.
- 2) Use a mild household detergent and clean the unit with a slightly damp, soft cloth.
- 3) Never use strong solvents such as thinner or benzine, as they might damage the finish of the camera housing.



This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute risk of electric shock to persons.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



This symbol is intended to alert the user not to dispose of electrical and electronic equipment.

CAUTION:

You are cautioned that any changes or modifications not expressly approved in this manual and by Rosco personnel could void your warranty and risks potential damage to the device

2. Product Features

2.1 Basic Features

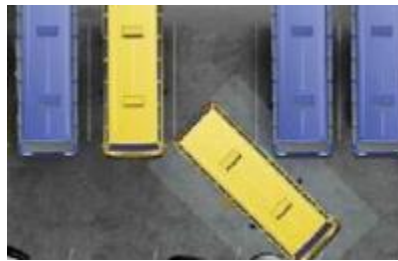
- 1) Includes (4) 190° FHD (Full High-Definition) 1080P wide-angle fisheye cameras with a horizontal view angle greater than 170°.

Note: Monitors are sold separately.

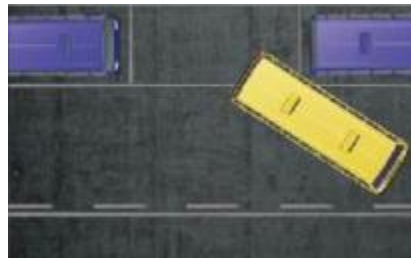
- 2) Utilizes quad-core ARM Cortex-A9 and SOC (System-on-a-Chip) development with built-in high-performance H.264 video encoding/decoding, ensuring efficient and accurate seamless image composition.
- 3) Quick calibration hardware (See section 3 for calibration kit) and software capabilities to simplify calibration procedure. One calibration kit can be used to calibrate many kits.
- 4) Provides FHD 1080P video output and multiple video signal output formats.

2.2 Useful Applications

- 1) **Reverse Parking:** Simplifies backing into tight spaces.



- 2) **Side Parking:** Assists with parallel parking maneuvers.



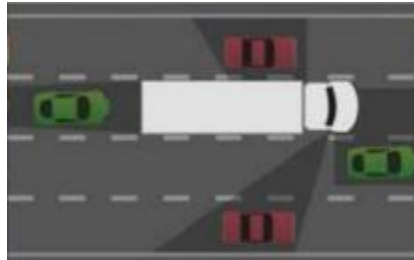
- 3) **Tight Space Navigation:** Guides you through confined roadways.



- 4) **Congested Roads:** Helps navigate through heavy traffic.



- 5) **Blind Spot Monitoring:** Reduces driver's blind spots while operating vehicle.



- 6) **Turning View:** Provides optimal viewing angles during turning and lane changes.



2.3 Features

- 1) **Panoramic Imaging:** Capture wide-angle views with high clarity.
- 2) **Seamless Blending and 360° View:** Provides a smooth, uninterrupted 360-degree visual experience.
- 3) **Automatic Image Triggers:**
 - Reversing Image: Automatically triggers to the rear view when the reverse wire is activated.
 - Side Images: Automatically triggers to the left or right view when the corresponding wire is activated. (ie: door open)
- 4) **Automatic Plane Correction:** Ensures images are correctly aligned and free of distortion.

3. Parts List

STSK360AHD – 360 AHD Surround View Kit			
Item	Description	Rosco Part No.	Quantity
1	ECU (Electronic Controls Unit)	STSK360AHDECU	1
2	AHD Fish-eye Camera	STSC360AHD	4
3	Power Harness	STSK360AHDPHAR	1
4	Video Input Harness	STSK360AHDARA	1
5	4CH Video Output Harness	STSK360AHDHARB	1
6	Video Extension Harness (65 ft.)	STSH556 / STSH341	3
7	Video Extension Harness (33 ft.)	STSH557 / STSH343	1
8	Adapter Cable to AHD Monitor	STSH642	1

STSA1102 (Sold Separately) – Calibration Kit			
Item	Description	Rosco Part No.	Quantity
1	Infrared extension cable	STSA1040	1
2	34-button remote control	STSA5785	1
3	Special Industrial Grade Calibration Mats	STSA1101	4

4. Technical Specifications

4.1 Main Control Parameters

Input Voltage	12Vdc – 24Vdc
Nominal Current Draw	2A @12Vdc
Operating Temperature	-20°C to +70°C (-4F to 158F)
Storage Temperature	-40°C to +85°C (-40F to +185F)
Video Output Resolution	1080P @ 30FPS
Video Output Format	AHD, CVBS
Environmental Rating	ROHS
Relative Humidity	+10% RH – +95% RH

4.2 Camera Parameters

Input Voltage	12Vdc
Operating Temperature	-20°C to +70°C (-4F to 158F)
Storage Temperature	-40°C to +85°C (-40F to +185F)
Video Input Resolution	1080P @ 30FPS
Video Input Format	AHD
Horizontal FOV (Field of View)	>170°
Waterproof Rating	IP69K
Environmental Rating	ROHS

6. Remote Control Instructions

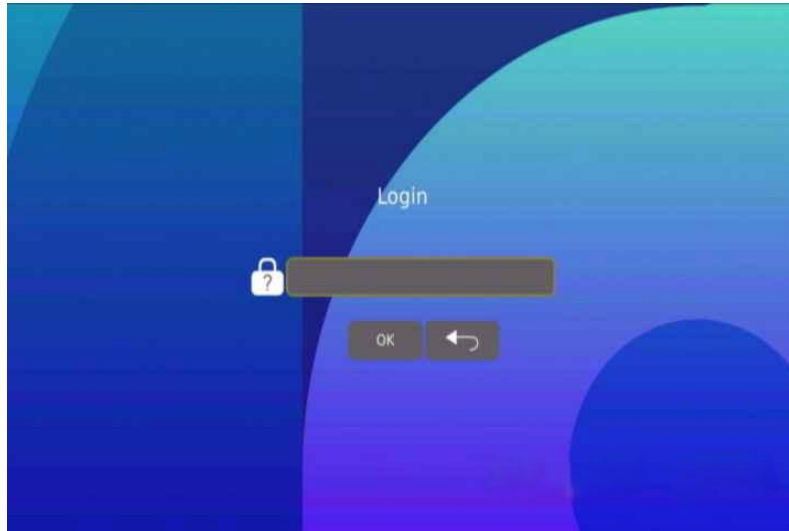


- **ENTER:** Enter the main menu or confirm a menu selection.
- **ESC:** Exit the main menu interface or return to the main menu interface.
- **◀▶:** Use the left and right keys to switch between left and right single views in the main interface; adjust settings in the menu page.
- **▲▼:** Use the up and down keys to shift the image channel to front/back view in the main interface; switch options in the menu page.
- **SHIFT:** Shift the current display mode to quad-view in the main menu interface; switch menu selections in the menu interface.
- **POWER:** Turn the video display on or off.
- **Number buttons (0-9):** Input numbers in the input box or switch views in the main interface.
- **CLEAR:** Delete a character each time.
- **MULTI:** Switch to full-screen surround view in the main interface.
- **PTZ:** Enter a decimal point.

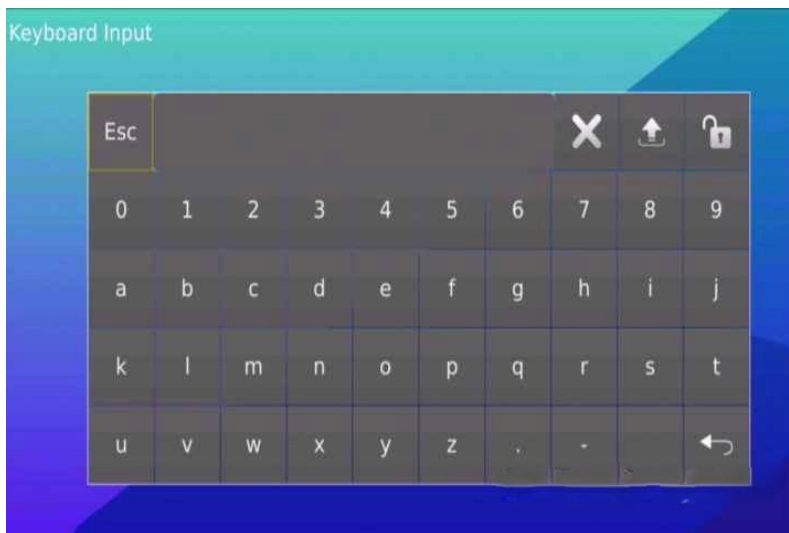
7. Main User Interface

7.1 Login Instructions

Note: The remote control will be used to navigate the menu in its entirety unless specified otherwise.



1) The Login page looks like the image above.



2) Use the remote to enter the password; doing this will display a keyboard shown above.

NOTE:

- The default password for this system is: 22061.
- Password reentry is only required after 10 minutes when the device times out.

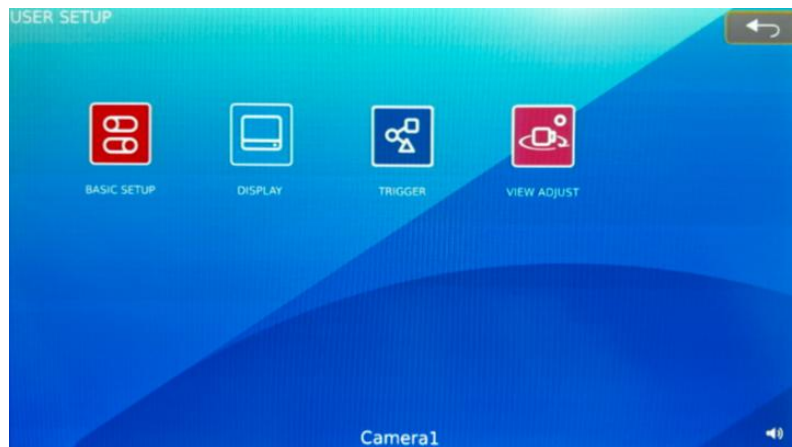
7.2 Main Menu Interface



Feature Description:

- 1) **User Setup:** Configure basic functions and display settings.
- 2) **AVM:** Auto-Calibrate, import/export calibration files, switch vehicle models, and adjust view settings.
- 3) **Information:** Display system information and perform software updates.

7.3 User Setup

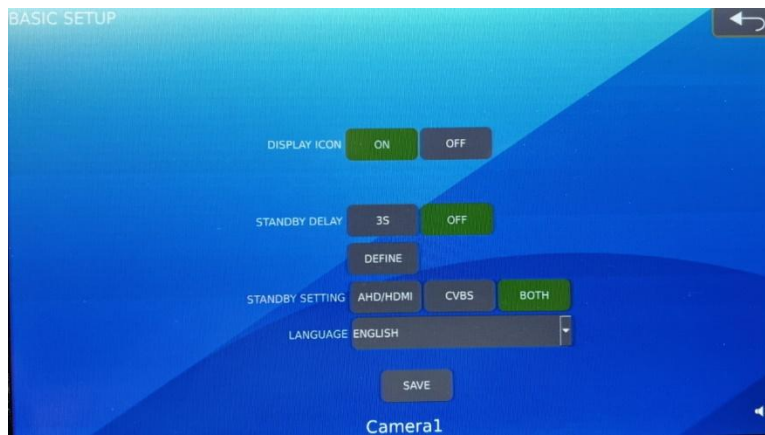


Feature Description:

- 1) **Basic Setup:** Interface for basic setup configurations.
- 2) **Display:** Interface for display options.
- 3) **Trigger:** Interface for setting triggers
- 4) **View Adjust:** To adjust view settings of the system such as brightness, contrast,

saturation, etc.

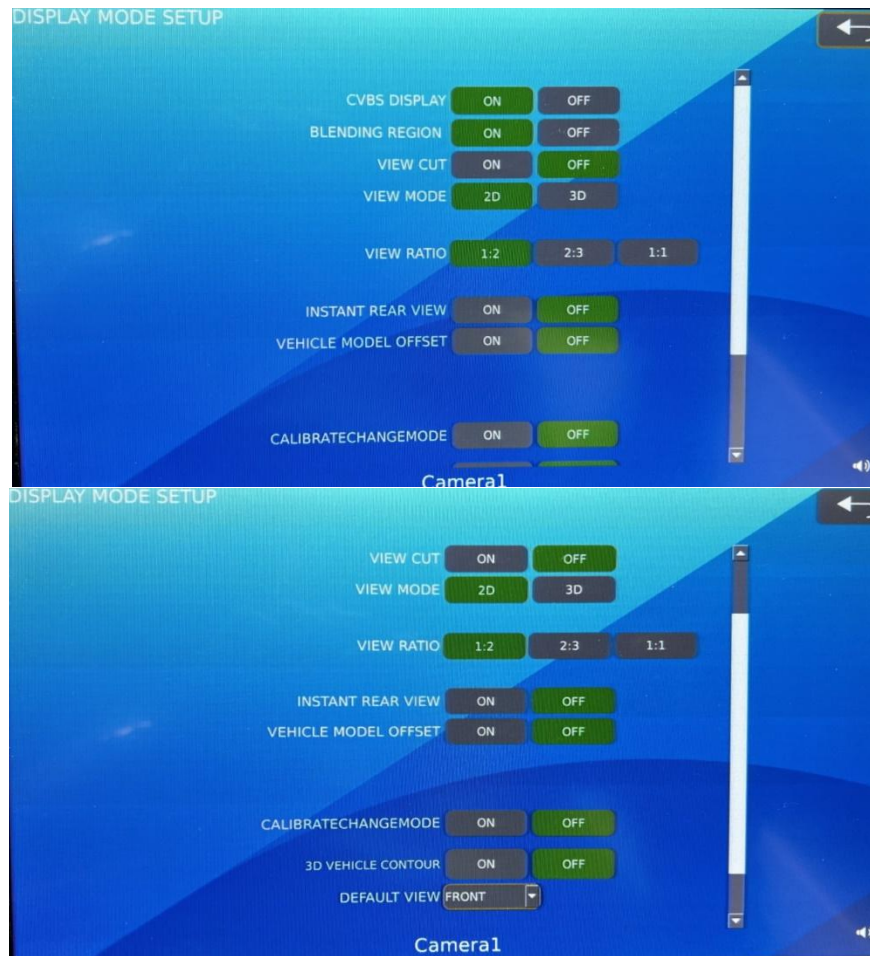
7.3.1 Basic Setup



Feature Description:

- 1) **Display Icon:** The icon hidden function is set to ON by default. When ON, the main interface icon is displayed; when OFF, the main interface icon is hidden (excluding the direction icon).
- 2) **Standby Delay:** The automatic standby function is OFF by default. When set to 3s, the system will enter standby after 3 seconds of inactivity. When set to OFF, the system remains on. The Define option allows customization of the standby time between 3-30 seconds.
- 3) **Standy Setting:** To switch the default standby image processing as AHD, CVBS, or both.
- 4) **Language:** The language setting is set to English by default. Select between English, French, and Spanish language options.

7.3.2 Display Mode Setup



Feature Description:

- 1) **CVBS (Composite Video Blanking and Sync):** If set to ON, video output will be based on CVBS output. If set to OFF, video output will be set to AHD (Analog High-Definition).
- 2) **Blending Region:** The default setting is ON. When set to ON, the overlapping area will blend seamlessly. When set to OFF, the overlapping area will have a sharp cutoff line on the overlapping area.
- 3) **View Cut:** The default setting is ON. When ON, the left and right sides of the single view picture are cropped. When OFF, the single view is not cropped, and the picture remains consistent with the four corners.
- 4) **View Mode:** Toggle between 2D mode and 3D mode for video display. 2D mode will show a top-down view of the vehicles' 2D model, along with 2D surround view, while 3D mode will display a 3D vehicle model, along with a 2D/3D surround view depending

on the visual settings chosen.

- 5) **View Ratio:** The default setting is 1:2. When set to 1:2, the surround view occupies 1/3 of the screen, and the single view/3D occupies 2/3 of the screen. When set to 2:3, the surround view occupies 2/5 of the screen, and the single view/3D occupies 3/5 of the screen. When set to 1:1, the surround view and the single view/3D each occupy half of the screen.
- 6) **Instant Rear View:** The default setting is OFF. When set to OFF, the system displays the around view display after the boot up process. When set to ON, the single rear view is displayed for 3 seconds after startup, followed by the around view display. This requires the rear single view to be a mirror image (i.e., using the rear single view screen instead of displaying the logo).
- 7) **Vehicle Model Offset:** The default setting is OFF. When set to ON, the rear single-view screen will be displayed approximately 3 seconds after power-on. If set to OFF, the boot logo will be displayed approximately 3 seconds after power-on.
- 8) **Calibrate Change Mode:** The default setting is OFF, allowing for 4-way calibration. When set to ON, a 3-way calibration can be performed. Note that only a 3-camera connection can be used to perform a 3-way calibration.
- 9) **3D Vehicle Contour:** The default setting for this is OFF. When switched to ON, the 3D vehicle display will switch to a contoured version of the vehicle model. (Note: it is recommended to not switch this setting during operation of vehicle)
- 10) **Default View:** Choose the default display view. Configurations are as follows: FRONT, REAR, SIDE, FRONT ZOOM, REAR ZOOM, FRONT LEFT, FRONT RIGHT, REAR LEFT, REAR RIGHT, LEFT, RIGHT, 3D LEFT*, 3D RIGHT*, 3D FORWARD FACING*, 3D REAR FACING*

*Views are only available using 3D mode

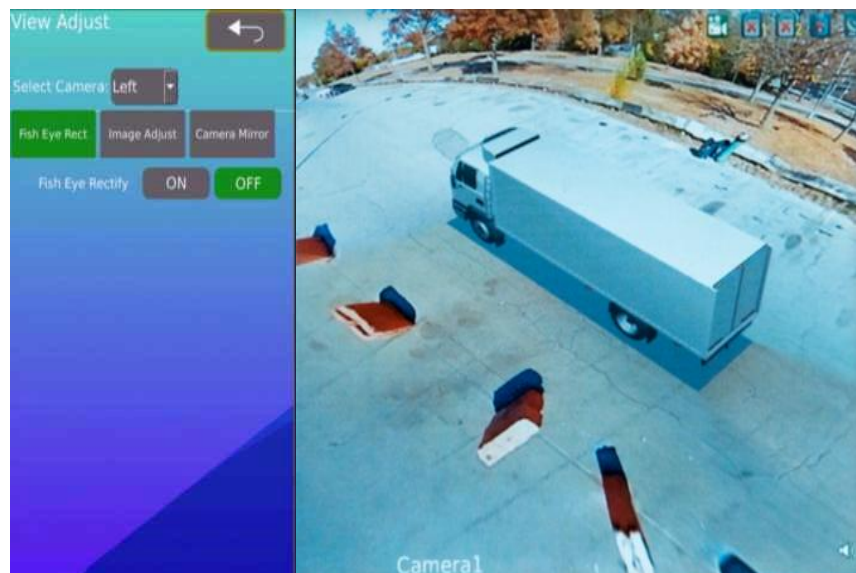
7.3.3 Trigger Setup



Feature Description:

- 1) **Left (T2):** Configure the default view for Left trigger wire. The configuration of the view will be the same as the view settings found on section 7.3.2 – point 11 above.
- 2) **Right (T3):** Configure the default view for Right trigger wire. The configuration of the view will be the same as the view settings found on section 7.3.2 – point 11 above.
- 3) **Back (T1):** Configure the default view for Back trigger wire. The configuration of the view will be the same as the view settings found on section 7.3.2 – point 11 above.
- 4) **Extern. (T4):** Configure the default view for External trigger wire. The configuration of the view will be the same as the view settings found on section 7.3.2 – point 11 above.
- 5) **Emergency:** Configure the default view for Emergency trigger. This feature is only available if both left and right trigger are wired for emergency situations and can be triggered in the same time i.e Hazard lights.

7.3.4 View Adjust





Feature Description:

Select Camera: Select the camera to which you want to apply the view adjustment settings. Options are: Left, Right, Back, External, and Emergency.

- 1) **Fish Eye Rectify:** The fish eye correction switch is OFF by default, resulting in a fish-eye image from the selected camera. When turned ON, the selected camera image will be corrected to a non-fish-eye state.

Image Adjust

- 2) **View:** When selecting Dual, the right side displays the surround view. When selecting Single, the right side shows the corresponding single view of the selected camera.
- 3) **Brightness:** Default value is set to 46. The value ranges from 0 to 127.
- 4) **Saturation:** Default value is set to 106. The value ranges from 0 to 127.
- 5) **Contrast:** Default value is set to 80. The value ranges from 0 to 127.
- 6) **Sharpness:** Default value is set to 0. The value ranges from 0 to 127.
- 7) **Hue:** Default value is set to 42. The value ranges from 0 to 127.

Camera Mirror

- 8) **View:** When set to ON, the image will display a mirrored view. When set to OFF, the image will display an unmirrored view.

7.4 AVM (Around View Monitor) Interface



The image above shows the AVM interface in 2D mode

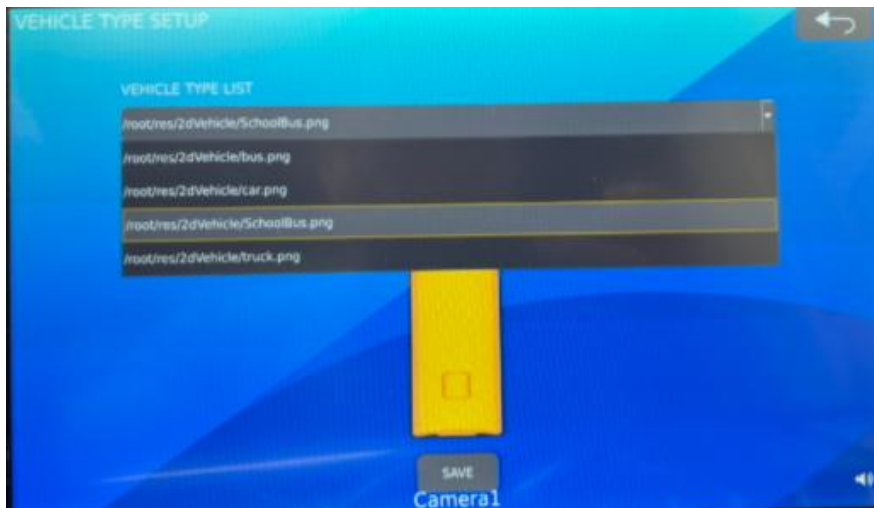


The image above shows the AVM interface in 3D mode

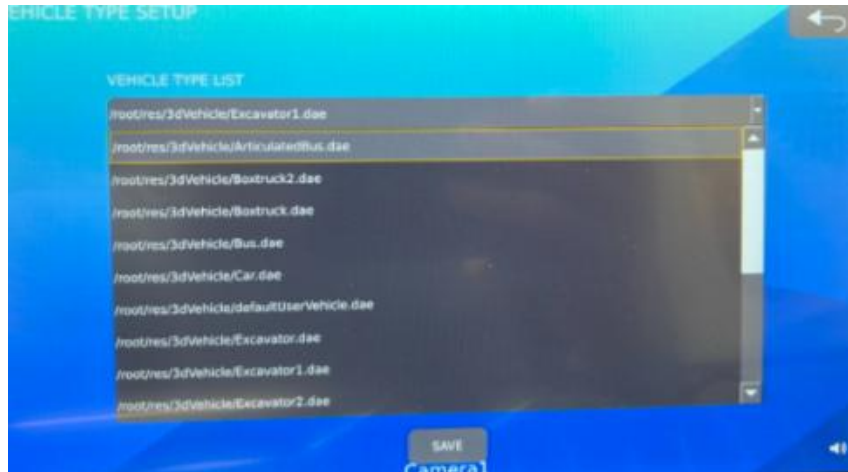
Feature Description [2D and 3D modes]:

- 1) **Automatic Calibration:** Perform automatic calibration of cameras.
- 2) **Calibration file:** Export/Import calibration files and resources.
- 3) **Vehicle Type:** Change the vehicle type displayed.

The ECU comes preloaded with four default 2D vehicle images, and seventeen default 3D images for the user to select from.



2D default vehicle images



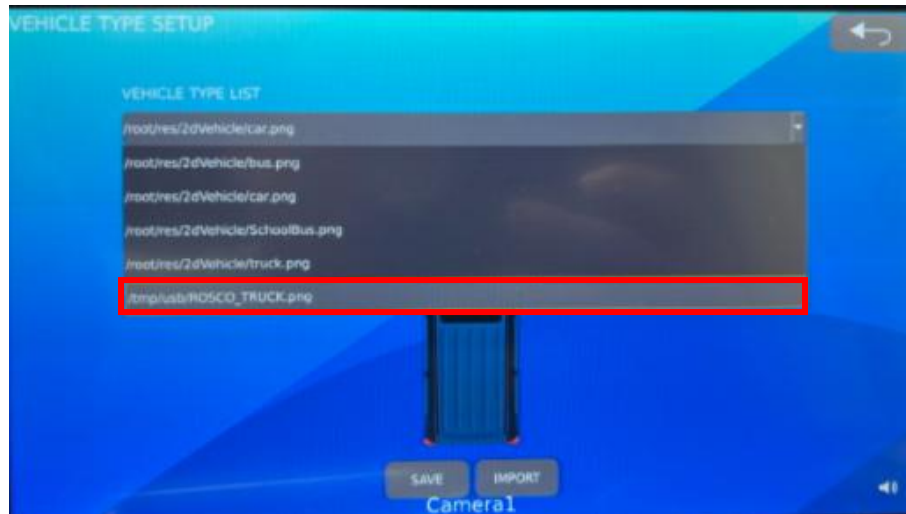
3D default vehicle images

Currently, the ECU can import custom 2D vehicle images, **subject to the following format requirements:**

- The image must be saved in .png format
- The image file size must be 2MB or less
- The image resolution must be 2000x2000 pixels or lower.
- The file name can only consist of uppercase letters, lowercase letters, numbers, underscores (_), or dots (.). Using other special characters or spaces will prevent the vehicle image from displaying.
- 32-bit depth

To import custom 2D images, please refer to the following steps:

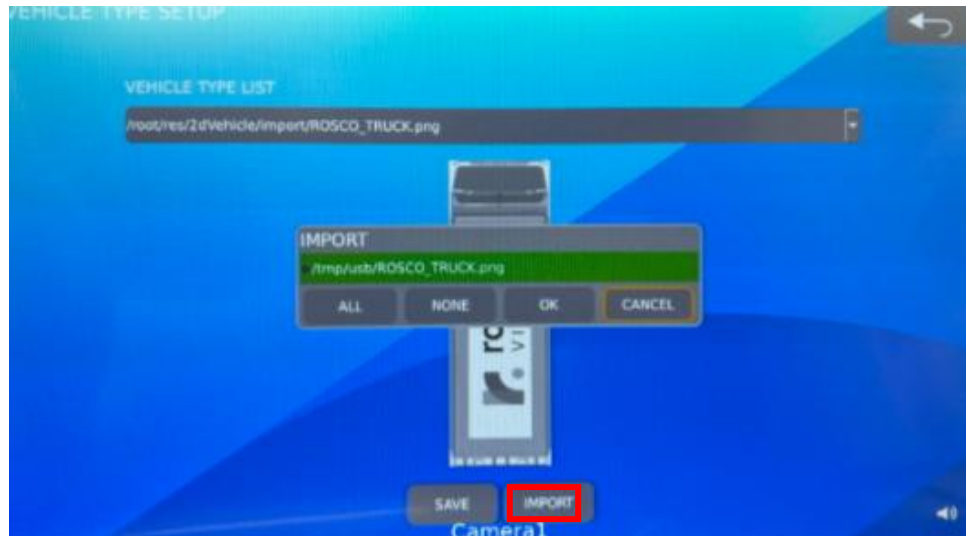
- a.) Save a custom vehicle image as per the image requirements listed above to a FAT32 formatted USB flash drive with at least 1GB of space.
- b.) If custom image file is saved correctly, and USB is connected to the ECU, it will be displayed in the drop-down list as shown below.



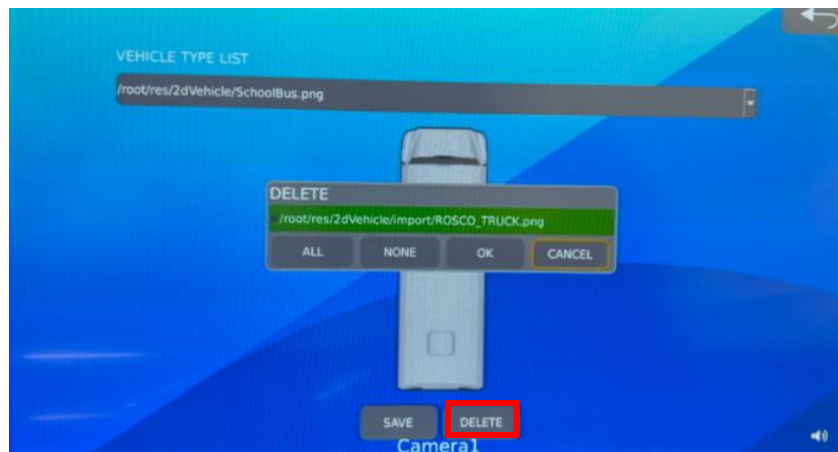
c.) After selecting the custom image, a successful import will display the prompt as shown below.



d.) There is also the ability to import and delete multiple vehicle images at once. To import all or multiple vehicle images at once, simply navigate to the 'IMPORT' button shown below and there will be the option to import all vehicle images stored on the USB flash drive or select multiple vehicles to import.



Similarly, to delete multiple or all imported vehicle images at once, simply navigate to the 'DELETE' button shown below and there will be the option to delete vehicle images stored on the ECU's root directory or select multiple vehicles to delete.



- 4) **Surround View:** Configure surround view settings.
- 5) **Parking Line:** Configure parking line display settings.
Feature Description [3D mode only]
- 6) **3D Perspective:** Configure 3D perspective settings.
- 7) **3D Display Adjust:** Adjust 3D user display settings.

7.4.1 Automatic Calibration



Feature Description:

- 1) **File/Mode/Size/Type:** These are parameters used to configure the calibration steps. At this moment, Rosco does not support modified calibration. Please leave settings as it is. If unsure, please perform reset of the system to obtain default values.
- 2) **Cancel:** Click this button to cancel the auto calibration procedure at any time.
- 3) **Calibrate 4CH:** Perform calibration of 4 channel camera.



If calibration is successful, the above prompt will appear. This will also allow you to perform the adjustment feature after the successful calibration to fix minor imperfections with the display vehicle.

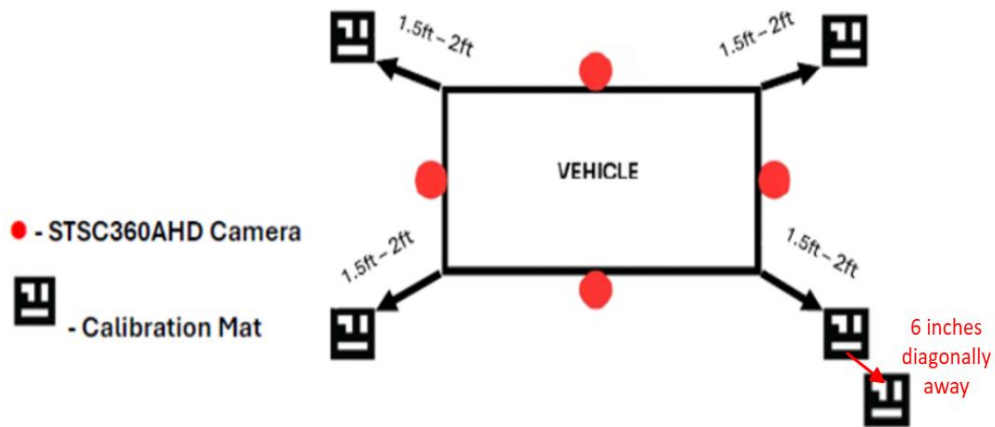
- 4) **Adjust:** Adjust parameters to ensure calibration is as accurate as possible. In here,

precision, vehicle length, vehicle width, vehicle rotate position can be configured to ensure that the display vehicle is projected as accurately as possible.

Troubleshoot

- 1) If calibration fails, please ensure that each camera shows 2 visible mats.
- 2) If a duplicate mat is shown on the screen due to reflection, do the following steps:
 - a. Cover reflection on vehicles using non-reflective material such as cardboard and recalibrate
 - b. If reflection persists, move the mat about 6 inches diagonally away from the vehicle and recalibrate (See image below).

WARNING: Duplicate mat image due to reflection can issue a false successful calibration and reduce optimal performance of AVM system.



7.4.2 Calibration File



Feature Description:

- 1) **Export:** This will export the calibration file to a USB flash drive. Ensure that a USB flash drive with at least 16GB of storage space available is used for exporting.
- 2) **Export History:** To view previously exported calibration files. This is used to retrace an older file that has been exported from the system. If this option is chosen, there is no need to use the calibration mats.
- 3) **Import File:** List of calibration files found in the USB Flash Drive which can be used in lieu of the automatic calibration feature.
- 4) **Import:** Perform import of selected calibration file.

Notice:

- 1) Files can only be imported from a USB drive. Ensure the USB drive is accessed before entering this page.
- 2) It is normal for the system to restart after confirming the import of calibration files.

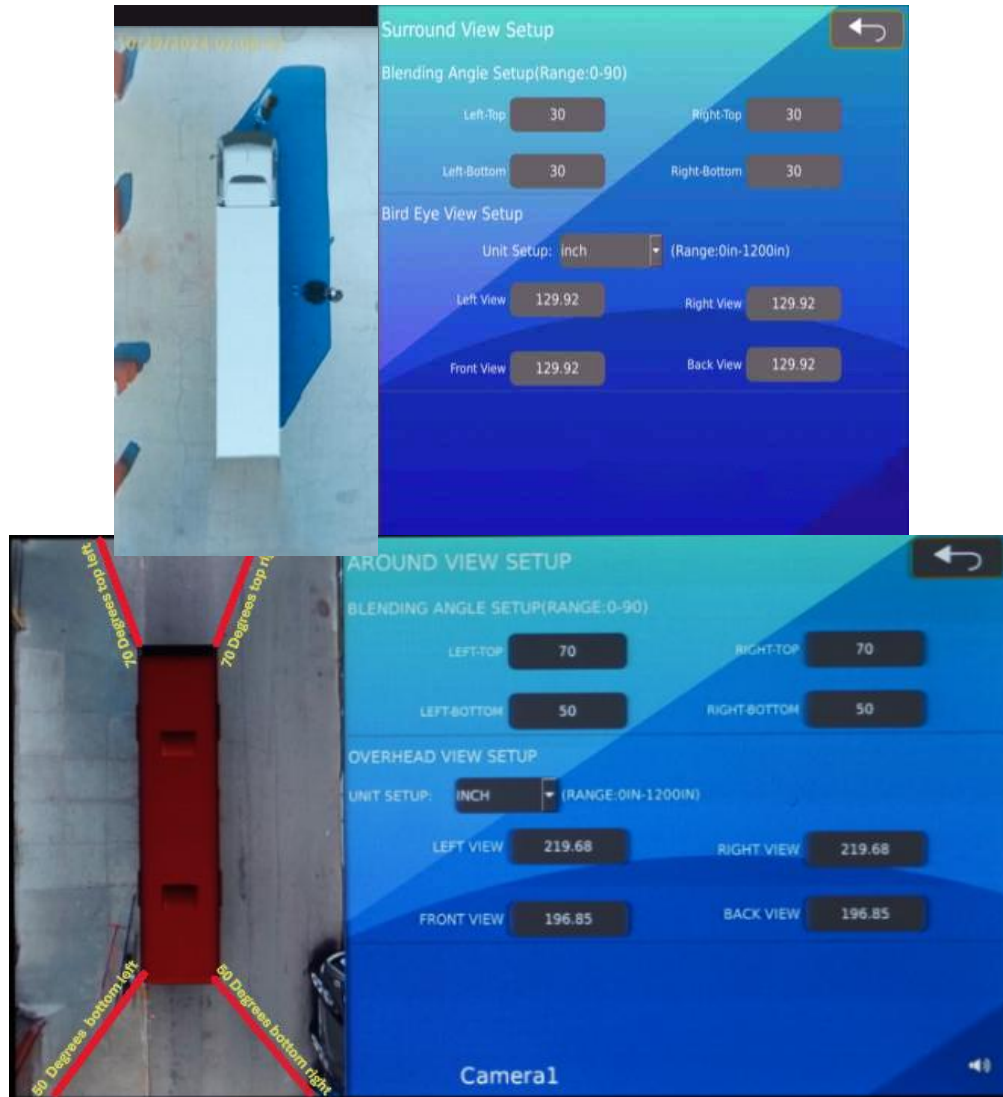
7.4.3 Vehicle Type



Feature Description:

- 1) **Vehicle Type List:** Select from a list of vehicles available to choose from the drop-down menu. Please contact Rosco for customization of vehicle types.

7.4.4 Around View



Note: Blending angle is the set up on 4 points of the bus in which the around view image is blended. top left / top right / bottom left / bottom right. The blending where the front or back camera blends with the side camera. For example, top left will be the blending of the front camera and left side.

Feature Description:

- 1) **Blending Angle Setup:** Adjust the left-top, right-top, left-bottom, right-bottom blending angle values. The default value is set to 30 and can be configured between 0-90.
- 2) **Bird Eye View Setup:** This is to configure the range of visibility on all 4 corners of the image. Units can be displayed and appropriately converted into both inches and centimeters.

7.4.5 Parking Lines



Feature Description:

- 1) **Channel:** Select the camera channel to be configured. Default is set to Back camera.
- 2) **Move:** Move the 2D parking lines along the display output in the X-Y axis.
- 3) **Width Scale:** Configure the Width Scale to adjust the width between the parking lines.
- 4) **Height Scale:** Configure the Height Scale to adjust the height of the parking lines.

7.4.6 3D Perspective

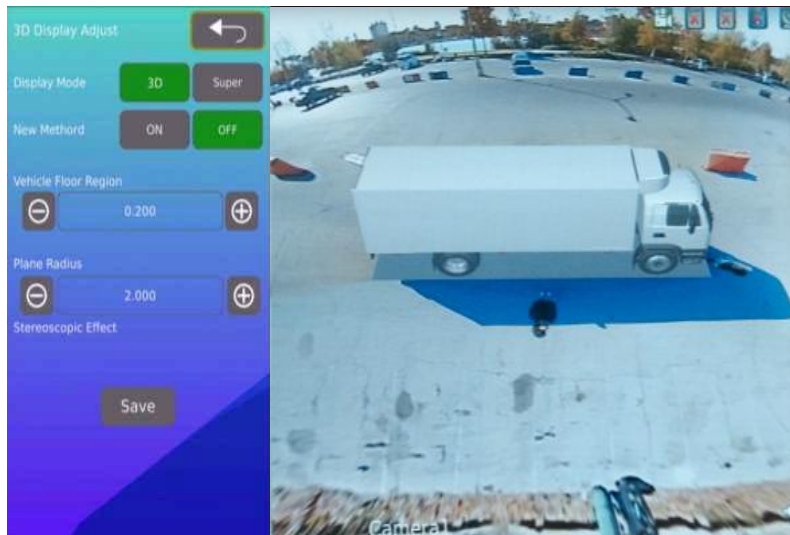


Feature Description:

- 1) **Vehicle Bottom:** The vehicle mode bottom area is black by default. When choosing other, the vehicle mode bottom area matches the nearby color.
- 2) **Vehicle Transparency:** Car model transparency setting, default value is 0.8 (range: 0.1-

- 1).
- 3) **Speed 3D-Rotate:** 3D vehicle model rotation speed, default value is 1 (range: 0.5-2).
- 4) **Precision:** Precision setting, default value is 0.01 (range: 0.01-0.1).
- 5) **Camera Z-Position:** 3D view zoom setting, default value is -3.000.
- 6) **Camera Y-Position:** 3D view up/down rotation setting, default value is -0.850.

7.4.7 3D Display Adjust



Feature Description:

- 1) **Display Mode:** Adjust between 3D and super 3D view mode (broadens the range of view).
- 2) **New Method:** Toggle On/Off to implement new method of 3D display adjust
- 3) **Vehicle Floor Region:** Adjust the floor level of the display vehicle which is displayed on the output
- 4) **Plane Radius:** Adjust the radius of 3D plane view. Increase the value to cover a wider radius.

8. Information



This menu page contains important information including, device information, software version, MCU (Micro Controller Unit) Information, Rosco Support phone number, 360 web page (Via scannable QR code).

Feature Description:

- 1) **Upgrade:** This is used to select the upgrade file. Upgrade file must be uploaded via USB flash drive and the file desired must be put on the top of the list.

Note: User must only upgrade the system software when an official software version release is uploaded to the Rosco website and/or when directed by a Rosco personnel.

- 2) **System Setup:** Used to perform a factory reset of the system, as well as import and export setups and settings saved on the device.