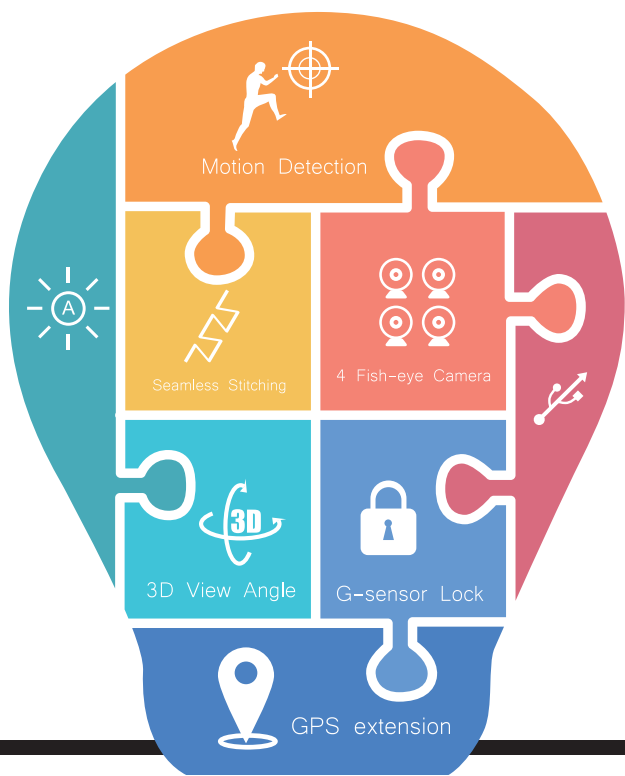


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Surround View Monitoring System



Surround View Monitoring System

User's Manual

VT-BP2

BOYO[®]
VISION



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Safety Tips



Please read this manual carefully before using and pay attention to this section for the safety Instructions.



Serious traffic accidents may be caused by keeping watching on the screen or operating the system during driving. It is strong recommended that do not operate this system while driving.



VT-BP2 is a parking and driving assistant system which offers the road situation around the vehicle to eliminate blind spots and thus works perfectly as a visual guide for safe parking and driving. It may bring inconsistency between the screen image content with actual surroundings of the vehicle. Please handle this case according to actual situation.



Never hotplug the host device when power is connected. The host device can't be sinked in any kind of liquid. Please kindly pay attention to heat dissipation.



Please contact professional installation service providers in case of any abnormal situations.

Brief Introduction

Guide

This guide is aimed at providing the basic illustration for topological structure of the VT-BP2 system, operating principle and basic concept to help users to understand the whole system installation procedure, camera calibration steps, and how to interact with the system menu.

Brief Introduction of System

The VT-BP2 3D Around View Monitoring Technology synthesizes images from four cameras to create a true 3D sophisticated view of a vehicle's surroundings. The technology enables flexible omni-directional monitoring around a vehicle from a dynamically definable perspective or "free eye point." Such kind of technology can display the complete vision of the positioning and moving path of the vehicle, it covers blind spot and thus works perfectly as a safe parking and driving guide even when restricted by adjacent vehicles and objects, parking line, etc. The system offers various SVM system configurations like -HDMI/LVDS/AV with alternative version of 2D or 3D, and what's more, this system also integrated full channel car DVR function with 24 hours videos loop recording supported.



Product Features

Product Features

Four 190 degrees ultra wide fish-eye cameras

Seamless video merging based on dual core ARM CPU and hardware high efficiency acceleration engine.

Arbitrary and dynamic 3D mode view angle switching for better surrounding environment observation

Independent Fish-eye calibration parameter and algorithm for each camera.

Pixel statistic engine for brightness balance among four channels real-time outside cameras.

3D video de-interlacing and noise reduction technology for CVBS signal decoding.

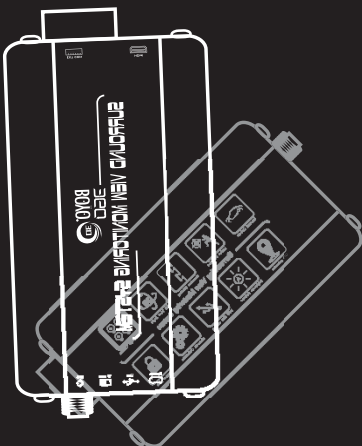
Support alternative recording media for TF card and USB disk

The simplest calibration steps with calibration tape and packing box, and system applicable for almost all types of vehicle which including Buses, Trucks, Lorries, Limousines, Tank and even Jumbo Jets. Typical length of the vehicle is 5.5m, 6.5m.

Smart power managements to save automobile's battery

High video recording resolution up to 1080p

OE quality for main chipset with well protected circuit and devices in order to achieve the best system performance and stability.



Product Features

Main application scenarios



Side parking



Reversing parking



Narrow Road/Lane



Slope sections



Blind Spots Coverage



Turning assist



Anti-fake accident



Car DVR



Crowded Road

Features Profile

3D & 360° Seamless Merging

360° Blind Spots Coverage

Dynamic & Intelligent View Angle Switching

Flexible Omni-directional Monitoring

Exclusive Fish-eye Distortion Correction

Guided Camera Calibration

Optional Function

a. Driving Video Recording

b. 24 Hour Parking Monitoring

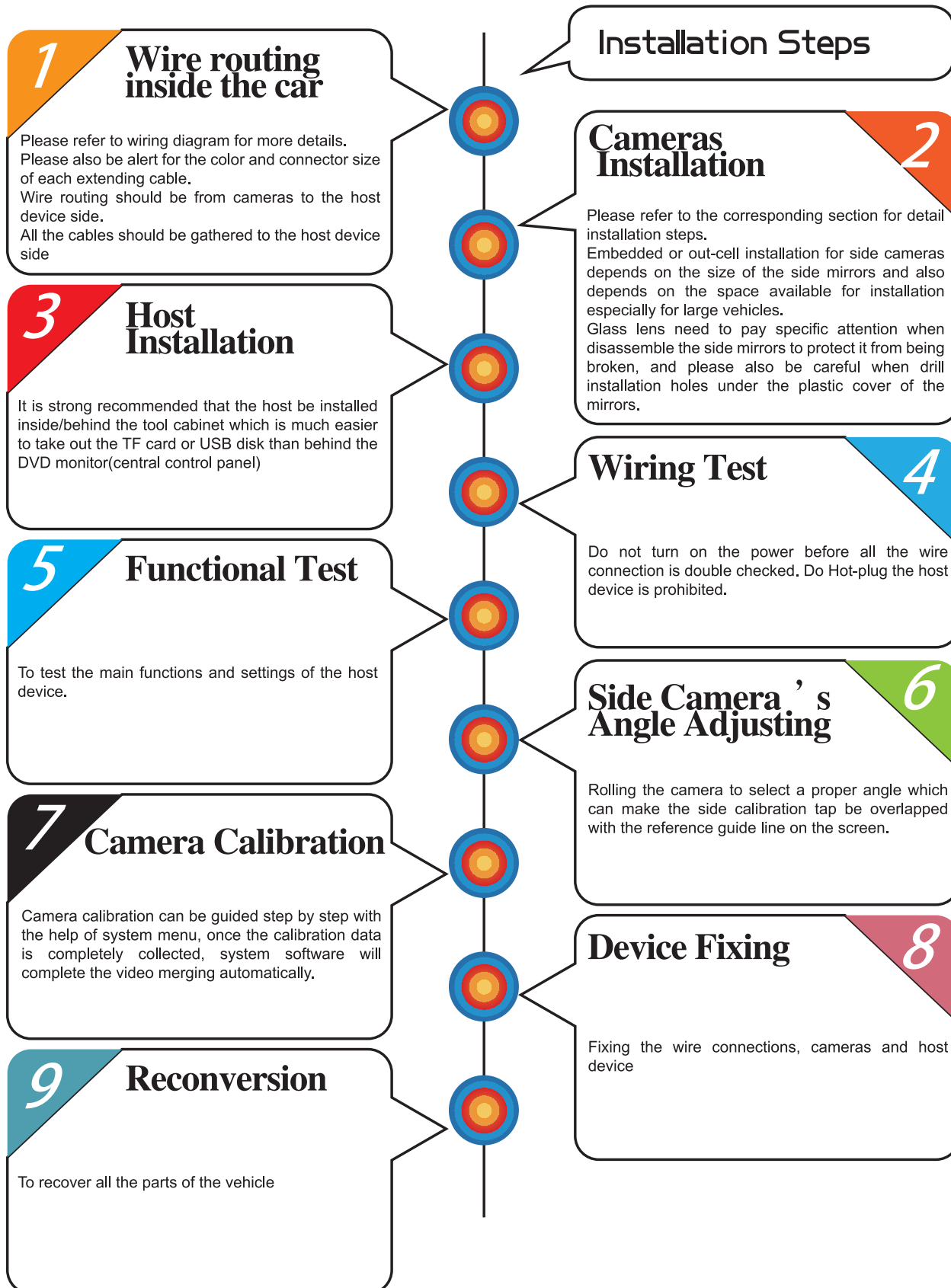
c. G-sensor Triggered Recording

d. Visual Radar Extension

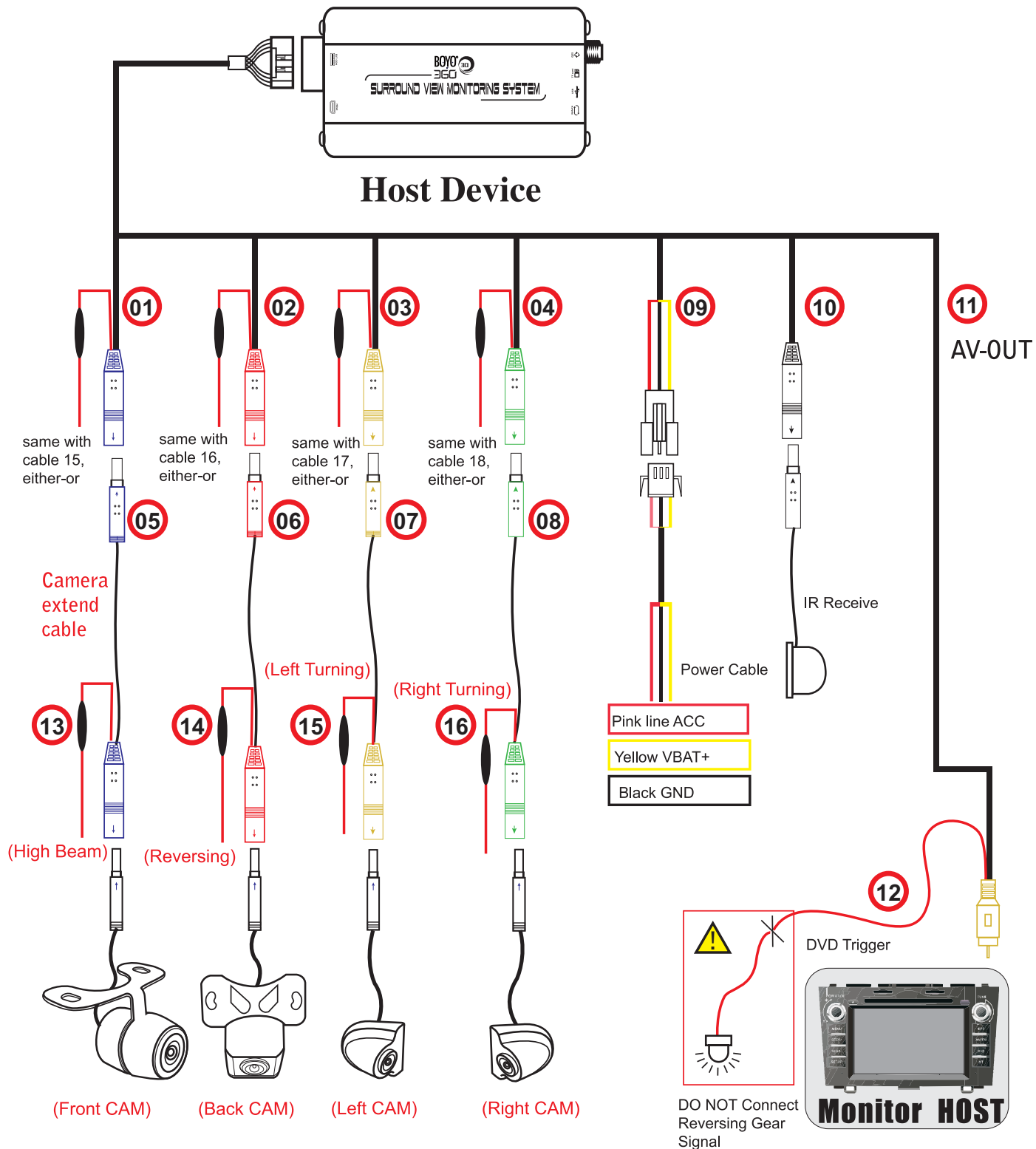
Note:

This manual gives a basic and general feature description of the system, but it may vary from specific product model and application case. Please consult sales team for detail specifications before ordering.

System Hardware Installation

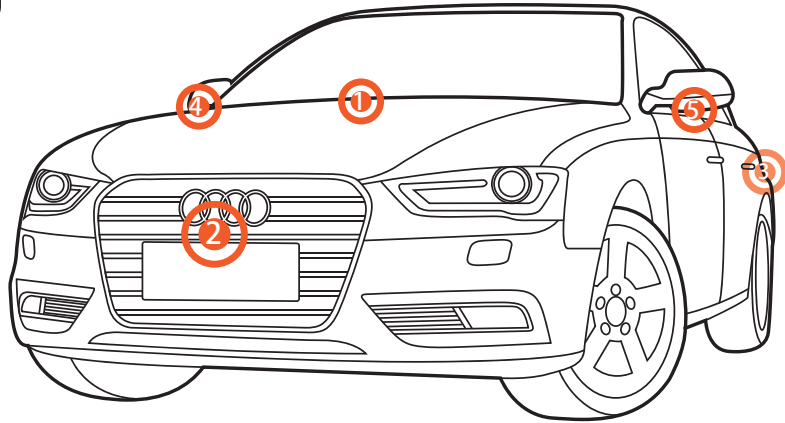


Wiring Diagram

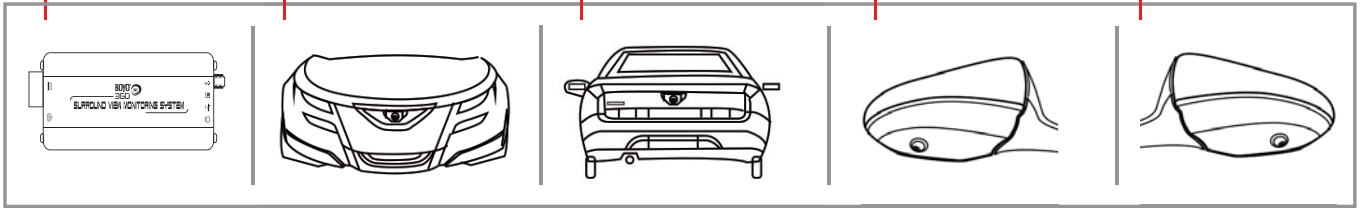


Cameras Distribution

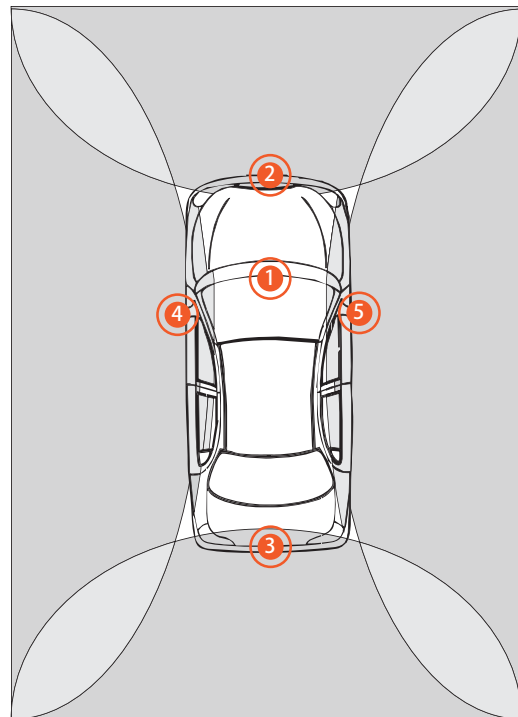
Perspective Drawing



- ① Host
- ② Front Camera
- ③ Rear Camera
- ④ Left Camera
- ⑤ Right Camera

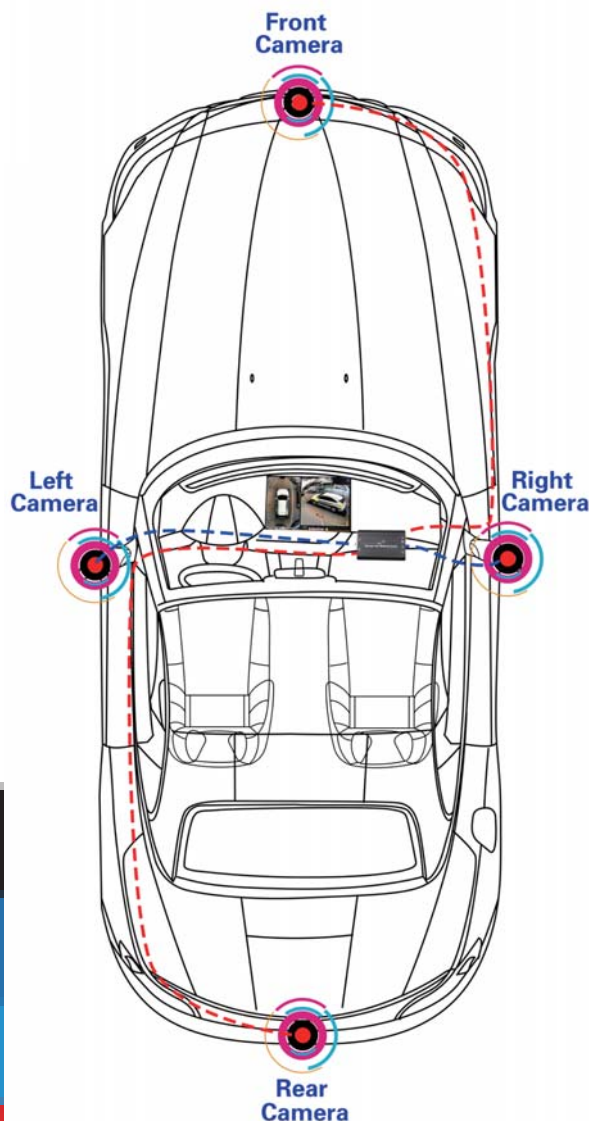


Top view



Wire Routing Flow Chart

Wire Routing



Wiring Process

Front Camera

1. Disassemble the tool cabinet
2. Distribute the extending cable of front camera from the logo position and go along with the original wire distributing tube to the tool cabinet position.

Rear Camera

1. Unpack the inner panel of the trunk.
2. Distribute the extending cable of the rear camera from the license plate lamp and go along the original wire distribution tube to the tool cabinet position.

Left and Right Camera

1. Disassemble the wing mirrors and unpack the side trim panels of front cab doors
2. Disassemble the glass lens of wing mirrors, and then distribute the extending cables of side cameras from the original tube of wing mirrors to the interlayers of the front cab doors.
3. Gathering all the extending cables from the interlayers of cab doors to the tool cabinet position

Note:

Instructions on how to disassemble the two glass lens of side wing mirrors)

In General, Most of Japanese cars are more prefer to use plastic-buckle structure for side wing mirrors, the inner upside part of the wing mirror is a "L" shape buckle , while the bottom side is U-shaped instead . Using the flat plastic screw driver and gently insert to the middle bottom position to remove the glass lens, please pay full attention to protect the it from being broken.

Germany cars more prefer to use ball head clip directly, the steps to disassemble the side wing mirrors is nearly the same.

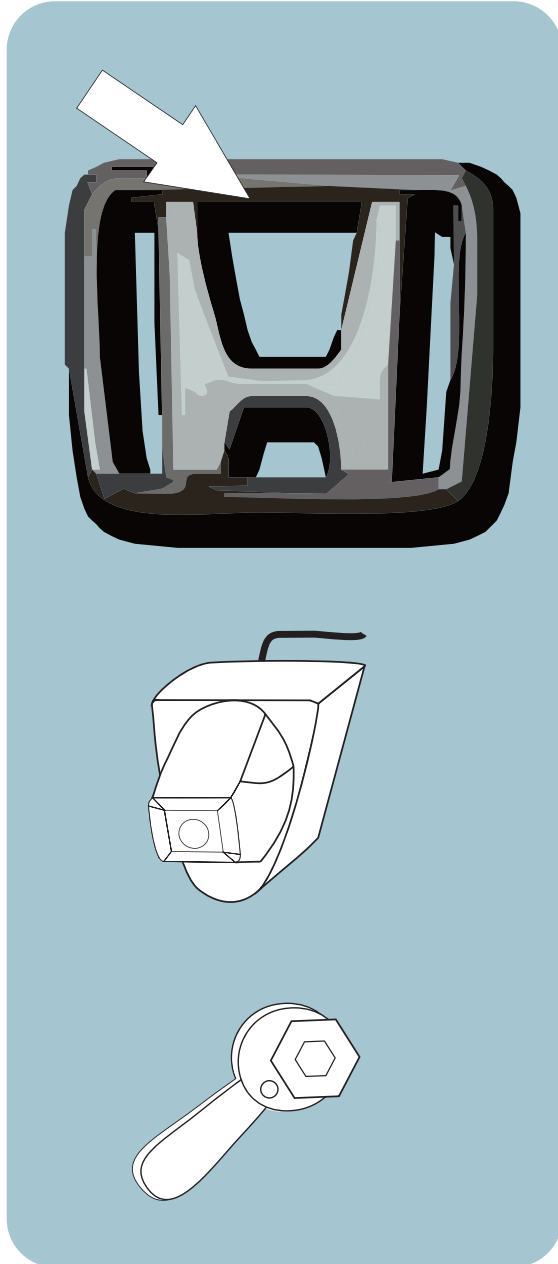


Camera Installation

Camera installation demonstration for Honda

Front camera installation method:

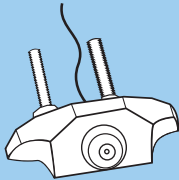
1. Insert the front camera to the center of the front vehicle logo.
2. Connect the front camera with the extending cable.
3. Please double check the field of the view is wide enough or not from the system preview menu window, and the camera should not be covered by front bumper.
4. Fix the front camera with screw and the metal pad accessories.



Different car models with different types of cameras ,the installation location will vary ,see models

Camera Installation

Camera installation demonstration of universal front camera



In the middle of
vehicle logo



Inside the front
turbogrid plates
installation

The Installation method of front camera:

1. Insert the front camera to the center of the front vehicle logo.
2. Connect the front camera with the extending cable.
3. Please double check the field of the view is wide enough or not from the system preview menu window, and the camera should not be covered by front bumper.
4. Fix the front camera with screw and the metal pad accessories.

Camera Installation

Camera installation demonstration for Honda specific rear camera

The Installation method of rear camera:

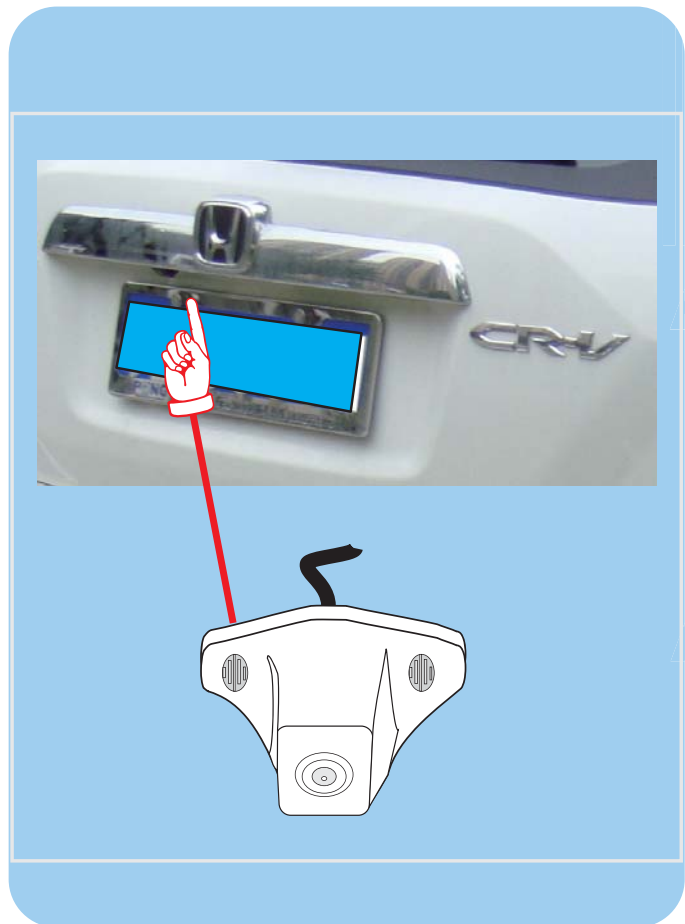
1. Unpack the inner panel of the trunk and take out the left license plate LED.

2. Stick locating plate of the rear camera in the right place for drilling a hole, and then drill a hole to install the camera on the position of the left side of license plate lamp.

3. Distribute the extending cable of the rear camera from the license plate lamp and go along the original wire distribution tube to the tool cabinet position.

4. To connect reversing signal of the rear camera extending cable to the 12V anode of the reversing lamp.

5. When video in DVD monitor works well after camera connected, you can recover the trunk panel.



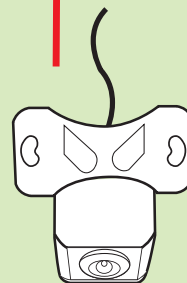
The installation method will vary from vehicle models and camera shapes.

Camera Installation

Camera installation demonstration for universal rear camera

Rear Camera Installation Steps

1. Unpack the inner panel of the trunk and take out the left license plate LED.
2. Stick locating plate of the rear camera in the right place for drilling a hole, and then drill a hole to install the camera on the position of the left side of license plate lamp.
3. Distribute the extending cable of the rear camera from the license plate lamp and go along the original wire distribution tube to the tool cabinet position.
4. To connect reversing signal of the rear camera extending cable to the 12V anode of the reversing lamp.
5. When video in DVD monitor works well after camera connected, you can recover the trunk panel.

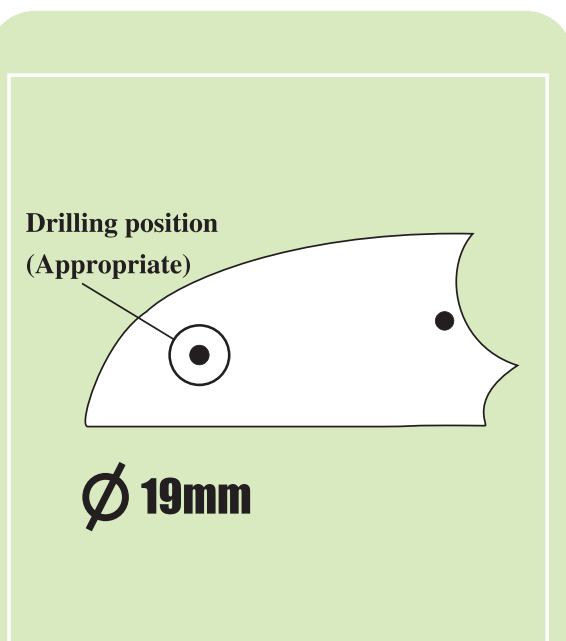


Stick locating plate of the rear camera in the right place for drilling a hole then tear off the locating plate when completing hole drilling, and finally fix the camera with a screw driver.

Camera Installation

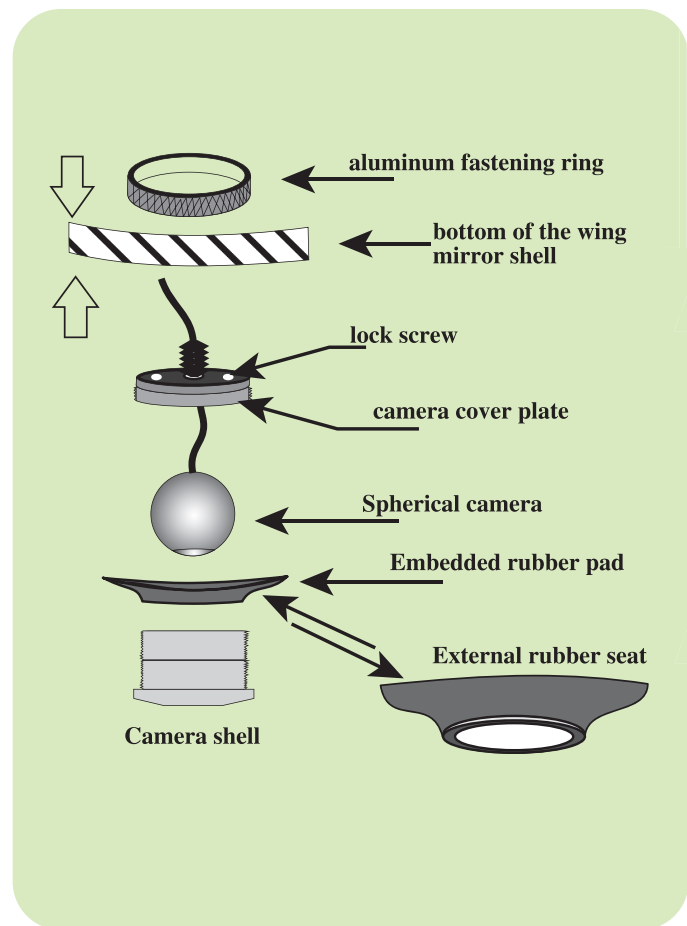
The installation diagram of universal camera

Drilling location diagram



Choose a proper drill bit according to the camera size

Find a flat area near to the edge of the wing mirror bottom plastic shell as much as possible for getting enough pixel content. You should leave enough spare space for the glass face of wing mirrors so that the glass face can be adjusted freely. What's more, keep in mind that camera field of view (FOV) should be prevented from covering by the plastic shells.



Outboard installation



Embedded installation



Camera Installation

Right and Left Camera Installation

1. As showing in the left picture, stick the locating plate of the rear camera to the bottom of the wing mirrors.

2. Using the corresponding drilling bit to drill holes at the bottom of plastic shell, and then tear off the positioning stickers.

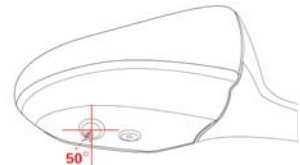
3. Select the embedded mounting or external outboard mounting for side cameras according to the spare space of the plastic shell.

4. If the drilling location available in the bottom of the plastic shell is not flat, please use a rubber pad provided along with the product packing list.

5. Install the internal spherical camera core, and connect the cables, then lock screw of side cameras tightly but keep the spherical camera core of side cameras can still be rotated.

6. Connect the extending cables which are waiting for the coming testing and debugging procedure.

7. Open the center screen to see the preview image of the side cameras, keep in mind that keep the left calibration tap visible while get as many pixel as possible, and another important comments is that keep all the calibration point distributed properly on the center screen. Recommended distribution is list blow.



Note:

Drilling hole diameter of outboard mounting is "6mm", Drilling hole diameter of embedded mounting is "18 ~ 26mm", Please select the appropriate location to drill the hole for universal cameral models. And keep in mind that the glass face of the side mirror should be free adjusted, so that the embedded camera should not block the movement of the glass face.

Host Device Installation

Host Device Installation Steps

1. Disassemble the panel of central control unit, and connect the reversing video channel of DVD monitor or other display screen(AV in).

2. The host control unit installation:

IR Mode: Put the infrared receiver in a proper position.

Rotary encoder Mode: Selecting a appropriate position of the central control panel or beside the hand grip of the vehicle to drill a hole of 3.5mm in diameter, using the screw to fix the bottom panel, and connect the cables to the tool cabinet.

2.4G button mode: Please paste the button to the reserved installation position of the original vehicle.

3. Please connect the anode of the left/right turning signal from the fuse box to host wire harness, or from side mirror turning LED indicator to the camera side of the extending cable.

4. Connect the power cable to batter supplier line and connect the wire harness to the host device..

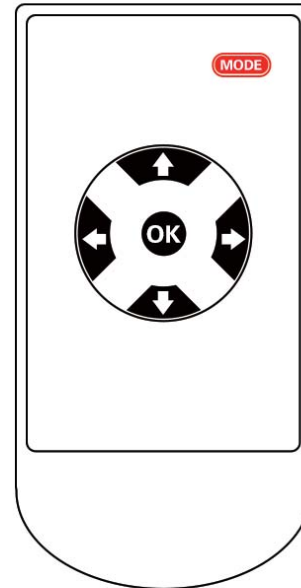
5. Fix the host device in the tool cabinet or the space behind the central control panel, DO NOT cover the heat dissipation hole.

6. Connect all the cables for the coming function testing and debugging procedure, and assemble the panel back to the control unit.

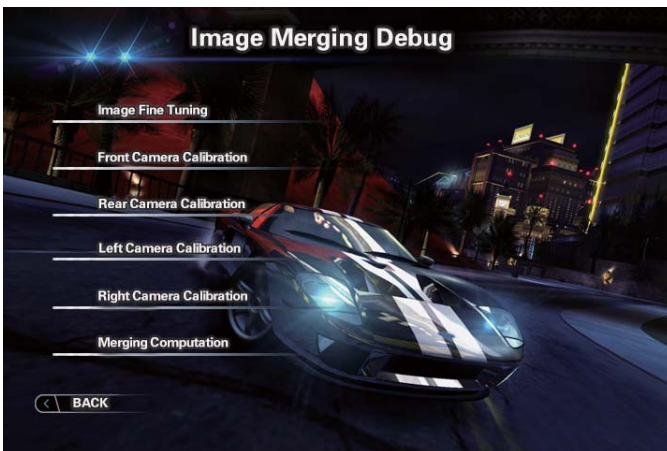


Camera Calibration

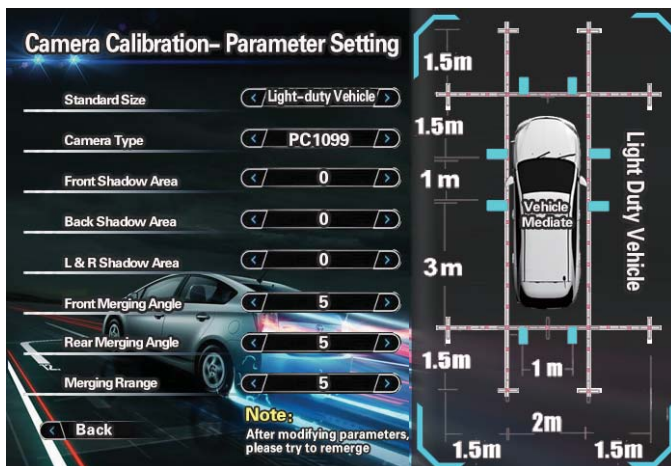
Calibration Parameters Setting



First of all, please press the "MODE" button on the remote controller in a short time to enter system menu, the default passwords is "360", then press the "OK" button to Image Calibration Menu.

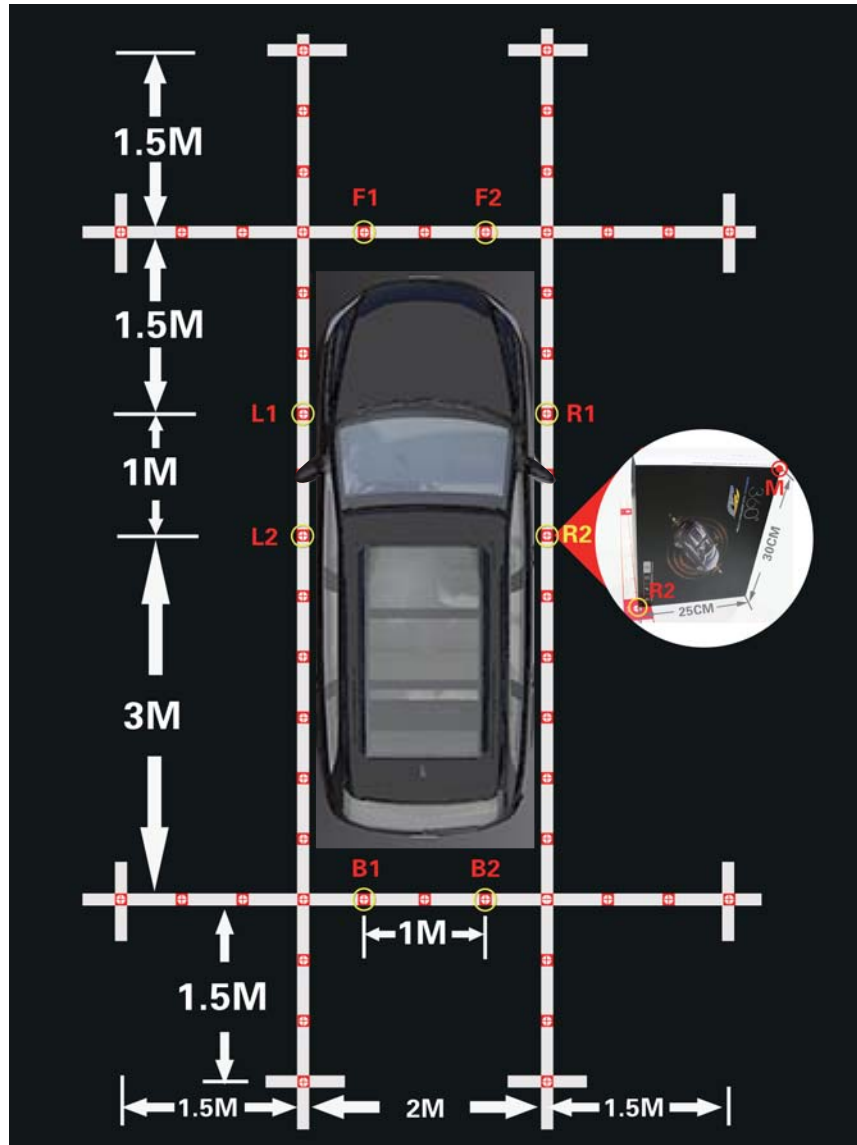


Second, please select the correct calibration size for the applied vehicle model, set the shadow area and each step of the shadow setting is 5cm, then select the camera sensor type, please keep it as the default if you are not sure with the sensor type.



Camera Calibration

Calibration Tape Sticking



Note:

As the menu diagram shows, pasting the calibration tape around the vehicle.

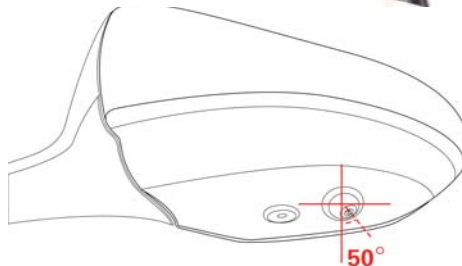
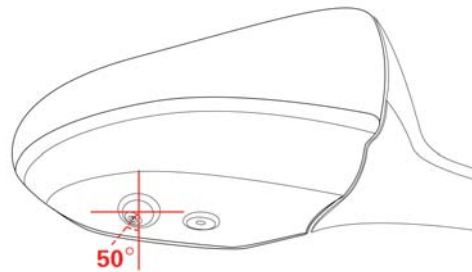
Please refer to the calibration pictures of different vehicle models and sizes to select the correct one for matching your vehicle.

Camera Calibration

Cameras Angle Adjusting

For adapting to different shape of wing mirror plastic shell, the angle and direction of side cameras are always designed to be free adjusted. Rotate the side cameras according to the image to keep vehicle body in image closely to the side calibration line and meanwhile keep the pixel in wider angles and farther places can be captured as many as possible. Keep the left and right calibration point distributed in symmetrical position in the screen.

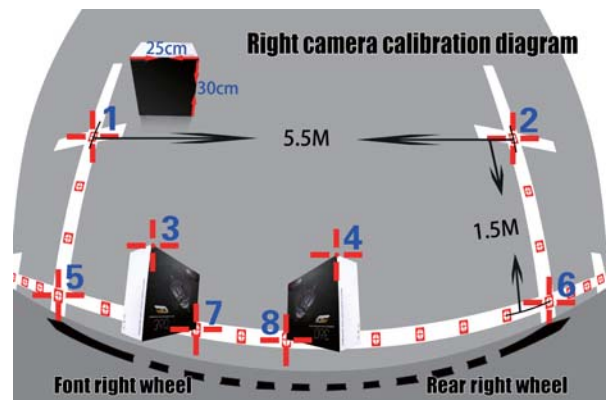
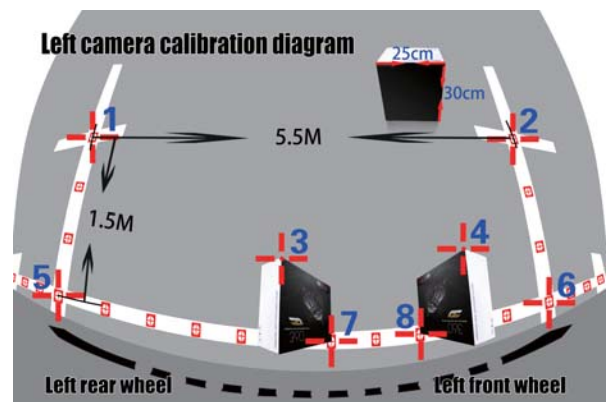
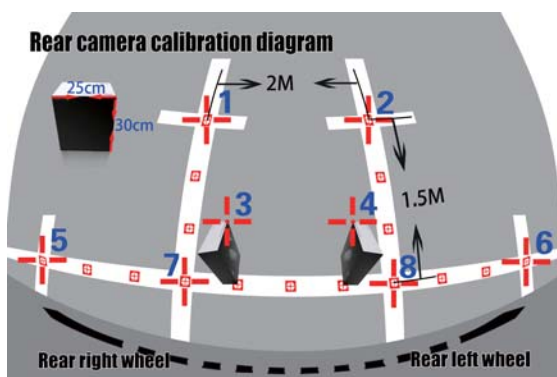
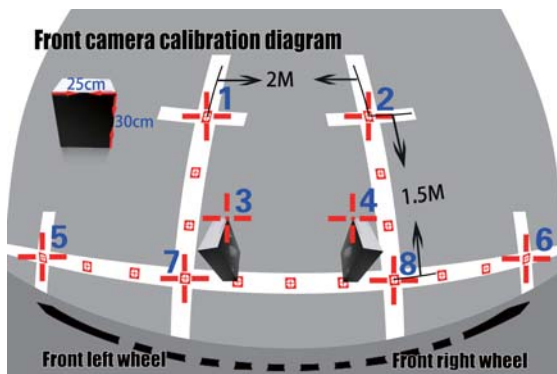
Next step, the mirroring setting of the camera sensor need to be set according to camera installation direction. The guideline for this setting is to make the pixel content of the image as same as the instruction show in the system calibration preview menu. Generally speaking, except for the rear camera, all other cameras must be original image.



Camera Calibration

Placing Packing Box

There are always 8 calibration points for each camera which need to be marked in the screen, the third pixel point and fourth calibration point are always special points which are actually the diagonal corner of the packing box. The VT-BP2 packing boxes can be divided into outer and inner one so that each packing box can be used for calibration 1 camera each time.

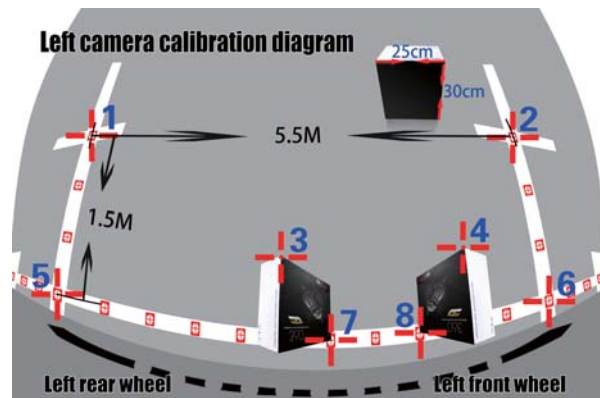
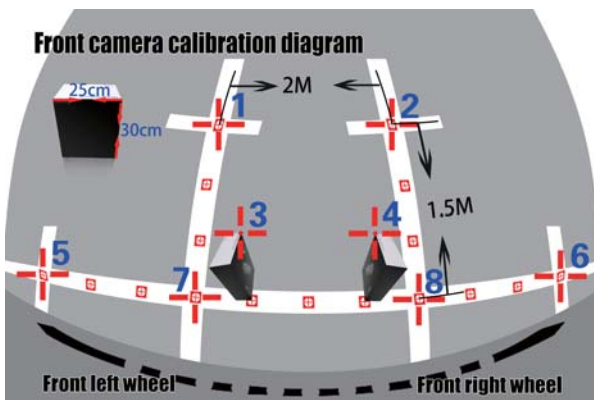


Notes: Put the 2 packing boxes (Outer and Inner) in the correct position separately as the pictures above illustrated. You can also use other boxes instead as a calibration reference objects, the dimension requirements of the box must be 30cm in height and 25cm in width.

Camera Calibration

Calibration Points Marking

You can start calibrating the four cameras one by one when the cursor is twinkling. Moving the cursor to the corresponding locations by the remote controller buttons of up/down/left/right, then press the “ok” button to mark the current calibration point in the screen and then the system menu will guide you to the next calibration pixel point in order from 1 to 8 one by one, please see the correct location and sequence of the calibration points as bellow pictures:



Press the red “Mode” button to toggle to previous calibration point selection when needed.

Notes: The calibration locations of No.7 calibration pixel point and No.8 calibration pixel point between the front&rear cameras and the sides cameras are totally different. The more accurate calibration points you mark, the better quality of the panoramic image merging will be.

Camera Calibration

Image Calculation



Press "OK" to go ahead.

Please do not shut down during this operation,

System will reboot automatically.

User Settings

Visual angles Distributing Modes

Full Screen

Default view



Reversing view



Right rear view
(Turning signal)

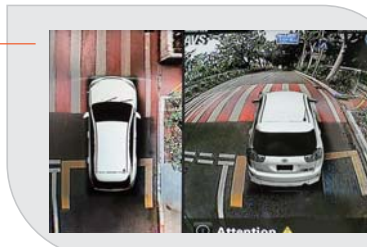


Right front view

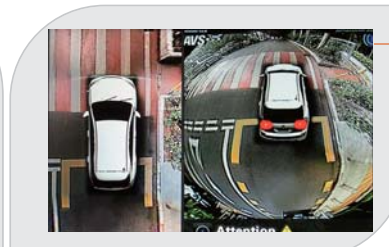


Split Screen

Default view



Reversing view



Left rear view
(Turning signal)



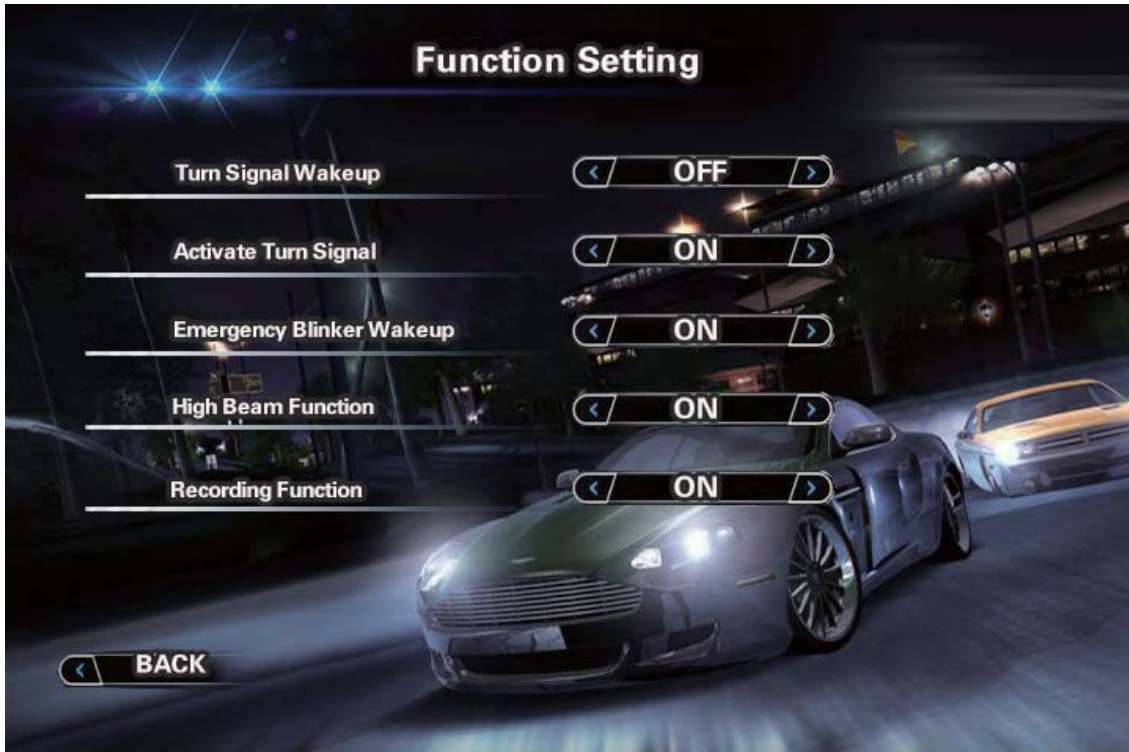
Left front view



Menu → User Settings → Window Configuration

User Settings

Parameters Setting and Menu Description



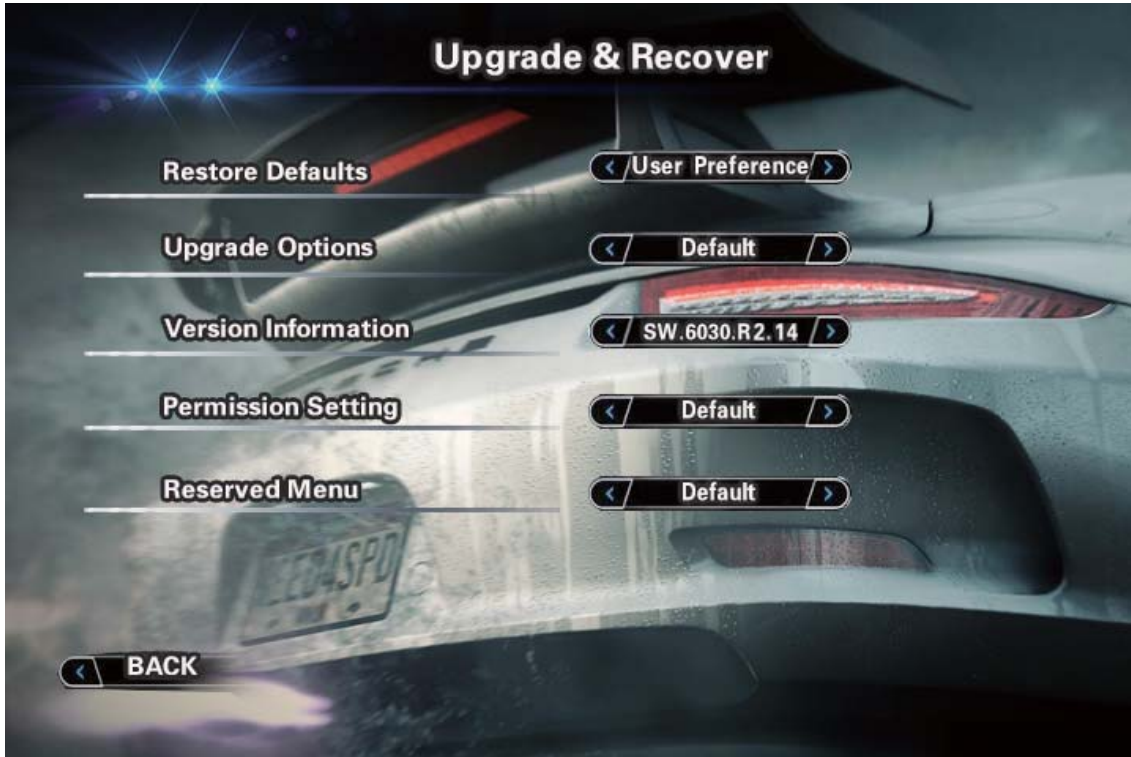
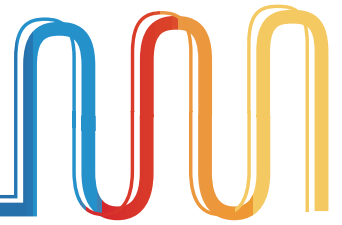
Menu Item	List Options	Description
Activate Turn Signal	ON/OFF	Turning Signal is optional after engine is fired, this option is a global switch for left and right turning indicator, when this option is set to ON, when the turning event is triggered, the SVM system will response to this event, and vice, versa.
Turn Signal Wakeup	ON/OFF	When the SVM is going to standby mode, this option is use to control whether the SVM system can be activated through turning signals.
Emergency Blinker Wakeup	ON/OFF	When the SVM is going to standby mode, this option is use to control whether the SVM system can be activated from Emergency Blinker, and you can also use Emergency Blinker to set it back to standby mode again when this option is set to ON.
High Beam Function	ON/OFF	Just like the turning signal, high beam signal is useful to toggle the free-eye point and change the view angle for surround safety.
Recording Function	ON/OFF	This is also a global switch to control whether the recording function is ON or OFF.

User Settings



Menu Item	List Options	Description
Language Setting	English	
Vehicle Brand Setting	Toyota Prado/ Black RAV4.....	
System Mode Setting	Split Screen Full Screen	Please refer the section 3.
Screen Position Up/Down	-9 ~ +9 Pixel	Screen TCON horizontal front porch and back porch control.
Screen Position Left/Right	-9 ~ +9 Pixel	Screen TCON vertical front porch and back porch control.

User Settings



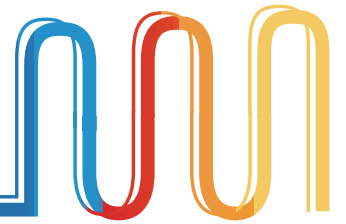
Menu Item	List Options	Description
Restore Defaults	Default/ User Preference	Default is not functional at this moments, and choose user preference to restore user preference of video settings/window configurations etc.
Upgrade Options	Default/ Firmware/ Car 3D Mode	Default is not functional at this moments, and choose firmware when you are about to update the firmware for the core board and choose Car 3D Model if you are about to change another Car Model for better match with the car brand.
Version Information	HW.6030.R2.80 SW.6030.R2.14 FW.6030.R2.04	
Permission Setting	Default	
Reserved Menu	Default	

User Settings



Menu Item	List Options	Description
Emergency Blinker Activation time	30S/1Min/ 3Min/5Min/	Since the system can be activated through external Emergency Blinker, you can also set the duration time, but do remember to turn ON the Emergency Blinker Activation function first in Function Settings Menu.
DVD Toggle Output Delay	0S/10S/15S/30S Infinity	Since some specific DVD model will have a problem with AV-IN signal is coming at the early phase during system boot. Please set this option to 10s~15s if this kind of DVD you are using have such problem.
Trigger Delay	0S/3S/5S/ 10S/30S	Screen saver mode after turning/reversing trigger
Reversing/Turning Wakeup Duration	0S/3S/5S	This option is similar as Emergency Blinker Wakeup Duration, you can adjust the duration time for Turning/Reversing signal here also.
Standby Duration	0H/0.5H/1H/3H/ 5H/12H/24H	Standby duration after ACC is off.

User Settings

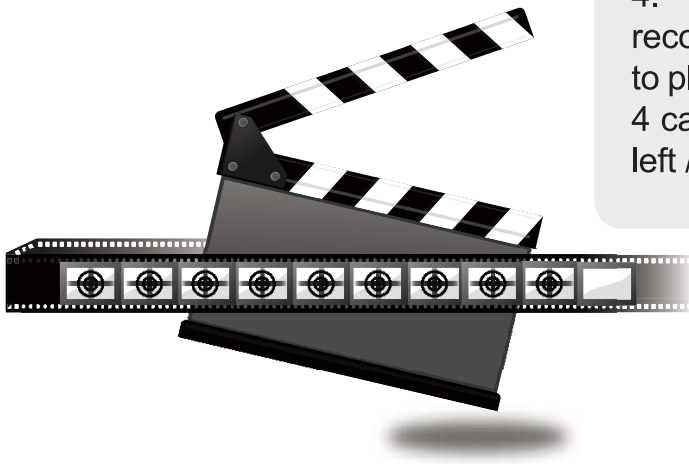


Menu Item	List Options	Description
Saturation	-9 ~ +9	Adjust input video saturation
Brightness	-9 ~ +9	Adjust input video brightness
Contrast	-9 ~ +9	Adjust input video contrast
Sharpness	-7 ~ +8	Adjust input video sharpness
Reserved Menu		Reserved for future use



Video Recording Functions

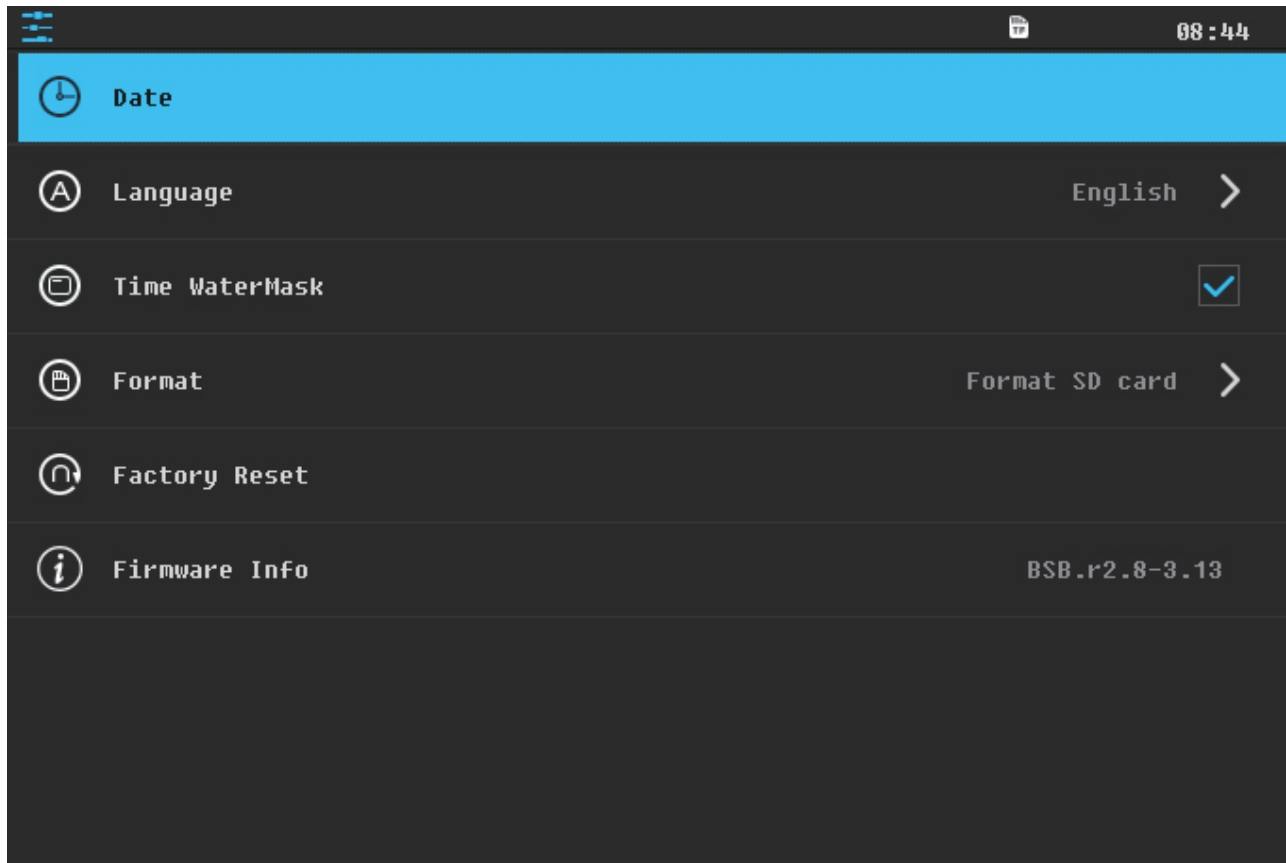
1. Long press “Mode” button to switch to recording system menu.
2. Press the “OK” button to stop current recording.
3. Using “Up/Down” button to navigate between recorded files as per date and timeline.
4. Press “OK” button again if the current recording file is just the right one you want to playback, and you can enlarge any of the 4 cameras to full screen mode by pressing left /right/up/down Button.





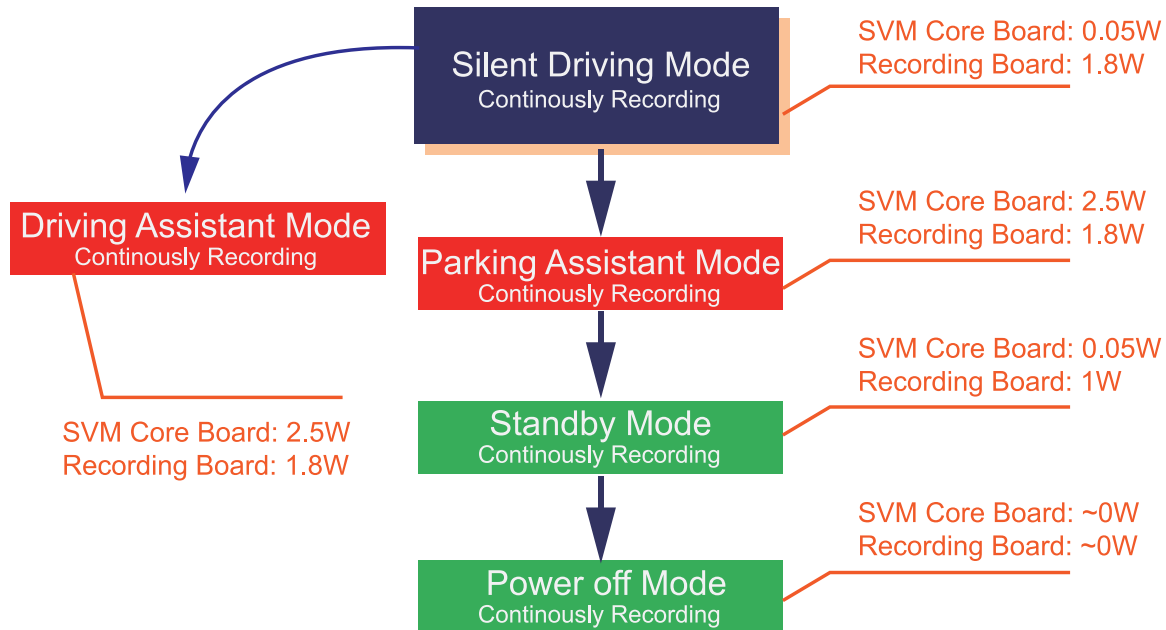
Recording Parameters

Basic Settings



Menu Item	List Options	Description
Date		Change system time
Language	English/Japanese/Korean/Russian/Simplified Chinese	
Time Watermark	ON/OFF	
Format		Format the TF Card or USB Disk
Factory Reset		
Firmware Info		

Smart Power Management Strategy



Silent Driving Mode

Silent Driving Mode is the most frequency used while driving, the recording system will continuously taking the outside video and record the compressed video on the recording media such as TF card or USB disk. Note that USB disk have a higher priority over TF card.

Driving Assistant Mode Parking Assistant Mode

During this mode, maximum power is expected to consume, since both the recording board and SVM core board is full functional. But this mode will never last for a long time, driving assistant mode is usually last for several seconds, and parking assistant mode is usually work for 1~2 mins.

Standby Mode

At this mode, the recording system is standby, and if any vibration is detected by the G-sensor, our SVM system will power up the external Cameras and LEDs immediately and start video recording.

Power Off Mode

The system is power off except for the Real Time Clock chip and G-sensor, and the whole system is also capable to awake from the vibration events. But under some special case such like the battery is lower than 11V, and system will never be awaked except for the event of engine start.



Specification

Packing List



Host



Front Camera



Rear Camera



Left Camera



Right Camera



Remote Controller



Main Wire Harness



Front Extend Cable



Rear Extend Cable



Left Extend Cable



Right Extend Cable



Drilling Bit

Note:

The configuration may generate differences due to different vehicle size or product model



IR Receiver



GPS



Calibration Tape

Specification



Datesheet

Type	Specification	
Video	Video Interface	Mini plug connector
	Input / Output Impedance	75 Ω
	Amplitude	Typical 1Vpp, 1.2Vpp Maximum
	Bandwidth	8MHz
	Sampling Frequency	13.5MHz
	DP(Differential Phase)	<0.8° TYP
	DG(Differential Gain)	<3%TYP
	SNR	70dB
Indicator Lamp /Blinker	High beam	Optional
	Left/Right Turning Blinker	Yes
	Reversing Lamp	Yes
G-sensor	BM250E	Bosch
Compression	Algorithm	H.264 Baseline@L3.1
	Resolution	1440*960@30fps
	Bitrates	5Mbps, 3Gbyte/Hour
	Recording Media	USB Disk(High Priority)/TF
Disk Capacity	TF CARD	32G SDIO3.0/SDIO2.0
	USB Disk	128G USB2.0
Power Consumption	4-CH DVR + SVM mode	350mA
	4-CH DVR mode	180mA
	Sleep Mode	<10mA
Dimension	L*W*H	123*81*25mm(Host Metal box)
Weight		220g
Environments	Normal Working	-30°C~+85°C
	Storage	-40°C~+105°C
	Relative Humidity	0~95%
Voltage Tolerance	Working Voltage	9.5V~36V



FAQ

Trouble 1

Some part of the image is blank after execution of Fast Merging mode

If you are indeed confirmed that all these above-mentioned steps are correct, please use your smart phone to take a photo after you finish each step when move done all cross cursor to these corresponding calibration points to us, our system can dump all these calibration data to TF card and our technical team will help you to find the root cause of the problem once we get your calibration data. Please contact our sales if you need more instructions on how to dump the calibration data.

Trouble 2

Picture after merging is not accurate or seamless

This problem is mainly caused by the installation position, and it usually occurs with the lower chassis vehicles. The picture quality captured by the camera will be poor and so that the calibration error will be magnified.

This issue could be result of lack of enough care taken while moving the cursor between the calibration points.

Trouble 3

Some part of the picture after merging is mirrored

If you have selected some OEM camera from your own supplier chain, please confirm whether the image from the sensor is mirrored or not, and if mirrored, please choose the mirror function in the menu.

Trouble 4

The corner part of the picture is blank

These problem may be caused by the camera itself, please make sure if the camera get sufficient pixel content after camera installation(whether the installation position is too close to the ground)



The merging result is completely fail Trouble 5

1. Be careful to choose a proper vehicle size when starting the camera calibration. The vehicle type parameter must be set according to the size of the vehicle. Mismatch could result to such issues.
2. Make sure there should be no obtuse mistakes e.g., while calibrating the rear camera you are mistakenly choosing the front camera or making a mistake for the left/right direction.
3. Please use your smart phone to take a photo after you finish each step when move done all cross cursor to these corresponding calibration points to us, our system can dump all these calibration data to TF card and our technical team will help you to find the root of the problem once we get your calibration data. Please contact us if you need more instructions on how to dump the calibration data.



Future Generation Update Procedure

1

VT-BP2 Host System Upgrade Instruction:

Step 1: Download the upgrade package and software tools from the URL provided.

Step 2: Since the host device is Linux based, please use the downloaded tools and package to make a specific upgrading SD card which is Linux system recognizable.

Step 3: Power off the host device and insert this SD card to host device, and then power up again. The upgrading procedure will be in progress. Once all the procedure is completed, the external LED indicator will blink.

Step 4: Re-power the system again and enjoy the new updated system.

2

VT-BP2 Remote Access to GPS Coordinate Function Update Procedure:

Current VT-BP2 is with GPS logger function. GPS coordinate is recorded to the video layer as a watermark. Remote access to real-time GPS coordinate function will be supported in next generation product models but separate GPS accessing module is required.

3

VT-BP2 HDMI Unavailability:

HDMI interface is not available on the standard definition models. This interface is only available for next 720p HD system.

Tips & Warranty



We warrants the equipment it manufactures to be free from defects in material and workmanship. If equipment fails because of such defects and We are notified within three(3) years from the date of shipment, We will, at its option, repair or replace the equipment provided that the equipment has not been subjected to mechanical ,electrical or other abuse or modifications. Equipment that falls under conditions other than those covered will be repaired at the current price of Parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of reshipment to the Buyer.

This warranty is in lieu of all other warranties expressed or implied, including without limitation any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.

1. Proof of sale may be required in order to claim warranty.
2. Customers outside USA are responsible for shipping charges to and from VisionTech.
3. Copper cables are limited to a 30 day warranty and cables must be in their original condition.

The information in this manual has been carefully checked and is believed to be accurate. However, We assume no responsibility for any inaccuracies that may be contained in this manual. In no event VT-BP2 will be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. The technical information contained herein regarding the features and specifications is subject to change without notice. For the latest warranty coverage information, please visit the web page.



Service Promise

Vision Tech America Inc. has been exploring consistently developing our products that incorporate innovative automobile technology through U.S. industry. Finally, Vision Tech America meets the requirement what currently industry and individual needs. Today, Vision Tech America is one of the few leading companies in the world capable of offering complete innovative automobile electronics. This is the focus of our groundbreaking and ongoing High Performance functionality and capability.

Vision Tech America is a company that focuses on aftermarket rear view camera system and auto security system technology. We aim to gain competitive advantage through superior products, a leading brand and a flexible production structure. We deliver better solution and customer satisfaction through a combination of our high quality product base that is continuously kept up-to- date through input from our extensive fleet of surveying new technology with our intelligent creative teams.



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