

# **360 Around View User Manual**

**Version 0.11**

# 1. 360 Around View Installation Instruction

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## 1. 360 Around View system installation

### 1.1 System Introduction

#### 1.1.1 Product

This system can process 4 synchronous images input by 4 fish-eye cameras (Front/Rear/Left/Right) into 1 image which has 360 Around view. The view helps drive easily and safely.



Figure 1.1



Figure 1.2

## 1.1.2 Package Details

Item	Qty	Application
The Host	1	System core processing part
Front Camera	1	Install on the front, 170° wide-angle, high-definition, night-version lens
Rear Camera	1	Install in the rear, 170° wide-angle, high-definition, night-version lens
Left Camera	1	Install on the left, 170° wide-angle, high-definition, night-version lens
Right Camera	1	Install on the right, 170° wide-angle, high-definition, night-version lens
Extension Cord	4	Extend the camera and connect with steering control sign
Wire harness	1	Wire with reversing control, left and right sign control, video input , video switch
Remote Controller	1	Operate the 360 Around view parking system
Instruction Manual	1	User Manual

Sheet 1.1

## 1.1.3 Product parameter

	Item	Name	Unit
<b>Camera</b>	Image Sensor	PC1099	
	Optical Size	1/3	Inch
	Pixel Pitch	5.0*7.4	um
	Effective Pixel	720(H)*480(V)	Pixel
	Horizontal Resolution	580	TV Lines
	Video Format		NTSC
	Dynamic Range	>72dB	dB
	S/N Ratio	>48dB	dB
	Minimum illumination	0.1	Lux
	View Angle	170	Degree(°)
	Video output	1.0V@75Ω	Vp-p
	<b>Host</b>	Supply Voltage	12V
Voltage Range		8V ~ 30V	Vdc
Consumption Current(without Camera)		<300 @12Vdc	mA
Video output Resolution		720*480 60Hz	
Language		Chinese/English	
Operation Temperature		-20 ~ 65	° C
Storage Temperature		-40 ~ 85	° C

Sheet 1.2

## 1.2 Installation:

### 1.2.1 Requirements

- (1) The car DVD must be equipped with reversing video input interface , or the Car Monitor must be equipped with video input interface
- (2) Enough space to install cameras
- (3) 5 tapelines, 2 for 8m or longer and 3 for 5.5m or longer
- (4) 4 chessboard cloth and eye-fish correction template

### 1.2.2 Attention

- (1) The Car DVD or Monitor can work properly
- (2) Carefully install
- (3) All the parts should be collected well
- (4) Wiring diagram is in the last page

### 1.2.3 Preparation

- (1) chessboard cloth:

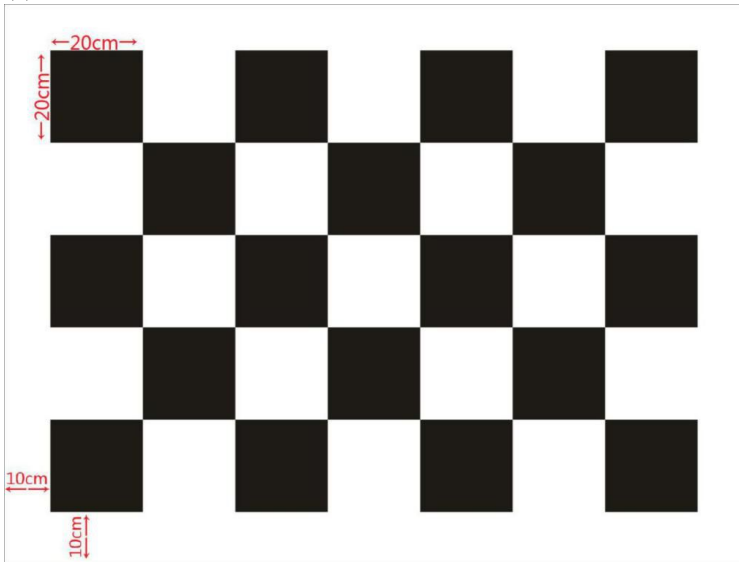


Figure 1.3

- ( I )Chessboard cloth dimension : 1.6M\*1.2M
- ( II )Chessboard square dimension : 0.2M\*0.2M(20cm\*20cm)
- ( III )The chessboard cloth consists of 5\*7 black and white squares (Refer to Figure 1.3)
- ( IV )non-reflective cloth preferred

## (2) Chessboard cloth placement and specifications

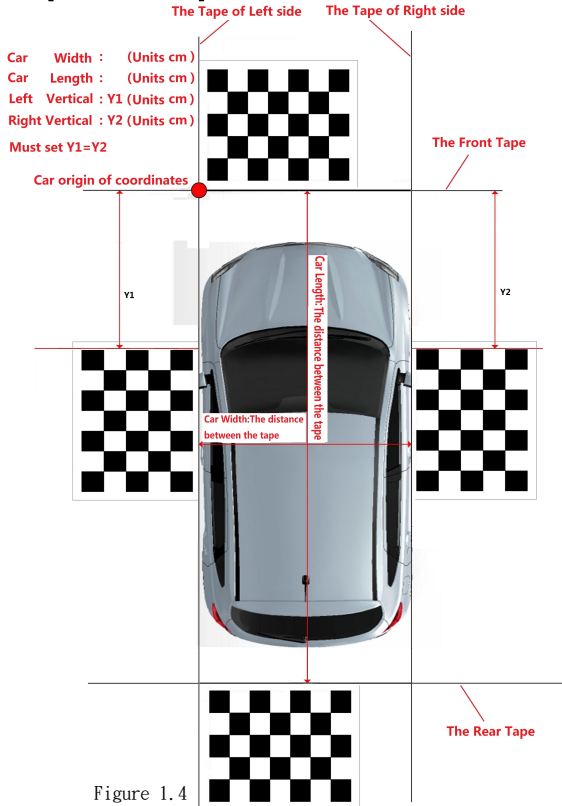


Figure 1.4

## 1.3 Camera installation with square chessboard

### 1.3.1 Camera installation

Refer to below demonstration





Figure 1.5

After wiring the Host, Car Multimedia and Camera according to wiring diagram, start engine and adjust camera window




(1) Press  [power] on the remote control

Figure 1.6


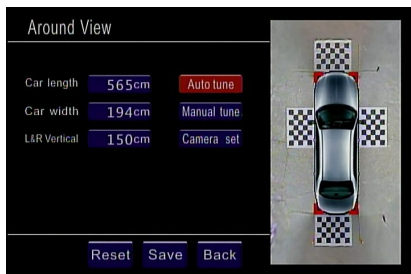
(2) Press  [enter] to enter into Main Menu

Figure 1.7










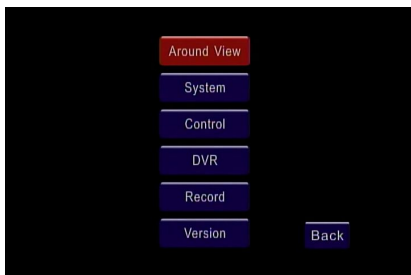


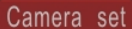



(3) Press  [up]  [down], shift the cursor to , then press  key into Password Page, press  [up]  [down], input password "654321", and then press  to enter the page Around View

Figure 1.8



(4) Press  [up]  [down], shift cursor to , press , enter Fish-Eye interface window, then press  [up]  [down] to check 4 individual images collected by 4 individual cameras. Manual adjustment of cameras helps get ideal images.

### 1.3.2 Adjust Camera Angle

#### (1) Front Camera adjustment

- The car image should be in the lower part of the fish-eye picture.
- 1/3 or less space the front bumper takes in the picture(The higher position of the camera, the better. Adjust camera optical axis and the car vertical angle is between  $45^{\circ}$  -  $75^{\circ}$  ), the 2 ends of the bumper must be at the same height, then fix the Camera.

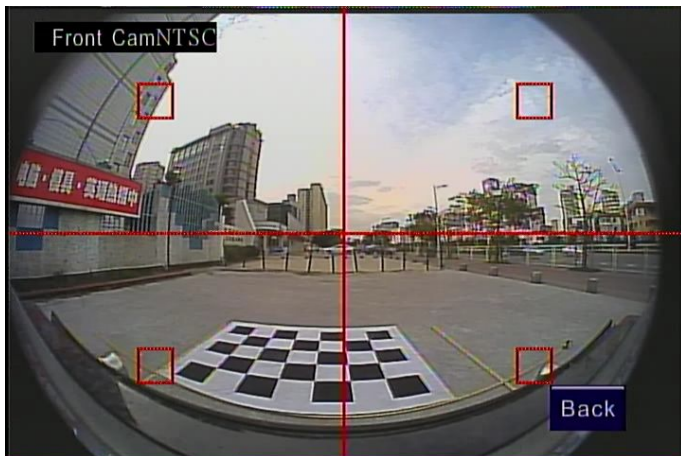


Figure 1.9

#### (2) Rear Camera adjustment

- The car image should be in the lower part of the fish-eye picture.
- 1/3 or less space the front bumper takes in the picture(The higher position of the camera, the better. Adjust camera optical axis and the car vertical angle is between  $45^{\circ}$  -  $75^{\circ}$  ), the 2 ends of the bumper must be at the same height, then fix the Camera.

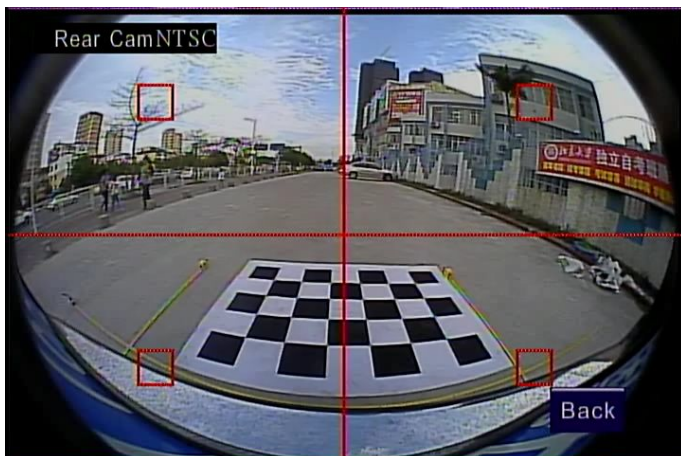


Figure 1.10

### (3) Left Camera adjustment

- The car image should be in the lower part of the fish-eye picture, and 1/2 or less space taken up.
- Car body and tires on the left side must be in the image(Adjust camera optical axis tilts to the back of car within  $10^{\circ}$  , and the side of car within  $10^{\circ}$  , make sure the front wheel and back wheel at the same height):

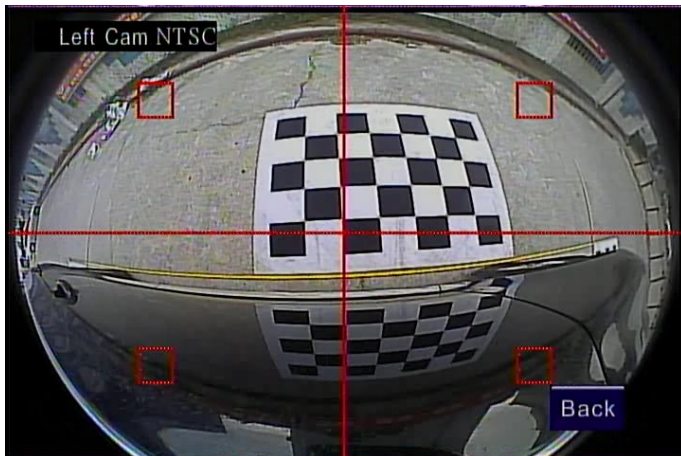


Figure 1.11

### (4) Right camera adjust

- The car image should be in the lower part of the fish-eye picture, and 1/2 or less space taken up.
- Car body and tires on the right side must be in the image(Adjust camera optical axis tilts to the back of car within  $10^{\circ}$  , and the side of car within  $10^{\circ}$  , make sure the front wheel and back wheel at the same height):

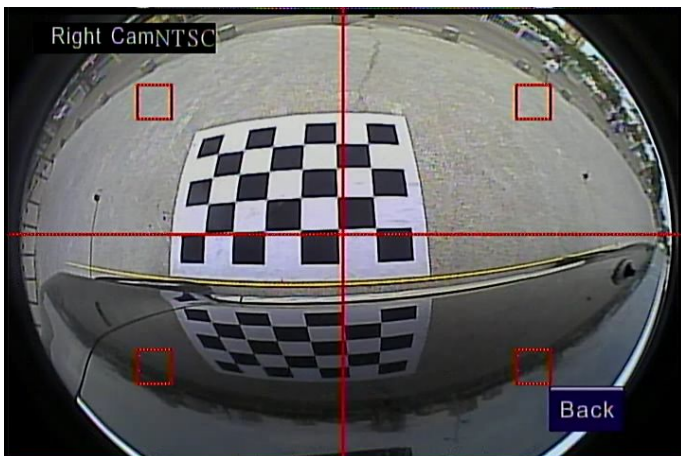


Figure 1.12



### 1.3.3 Tapeline & Chessboard cloth

#### (1) Tapeline

(I) Follow the order: Front->Rear->Left-Right to place 4 tapelines, 2 of 8m tapelines on the left and right sides, 2 of 5.5m in the front and rear.

(II) Refer to the figure.9-1.12, 4 tapelines closed to the car bodywork showed in each image

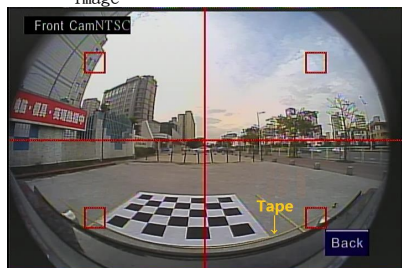


Figure 1.13 Tapeline in front view



Figure 1.14 Tapeline in rear view

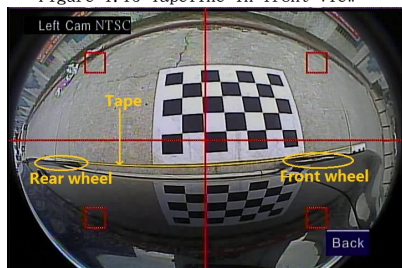


Figure 1.15 Tapeline on the left view

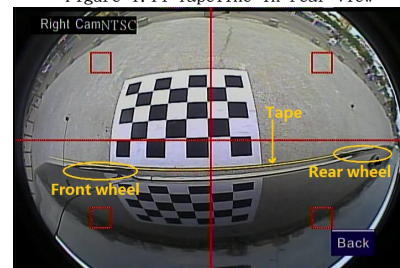


Figure 1.16 Tapeline on the right view

#### (2) Chessboard cloth placement

(I) Refer to Figure 1.13, put the chessboard cloth in front of the car, long-side closed to the tapeline in the front of the car bodywork, short-side close to the tapeline on the left of the car

(II) Refer to Figure 1.14, put the chessboard cloth in the rear of car, long-side closed to tapeline on the car's back, short-side close to the tapeline on the right of the car

(III) Refer to Figure 1.15, put the chessboard cloth on the left of the car, long-side closed to the tapeline on the left, short-side aligns the head and the center of the left front wheel

(IV) Refer to Figure 1.16, put the chessboard cloth on the right of the car, the long-side closed to the tapeline on the right, short-side aligns the head and the center of the right front wheel

#### Placement Picture



Figure 1.17

## 1.4 Around View Calibration:

### 1.4.1 Auto Tune:

the Around View menu, refer to Figure 1.18, input car [Length], [width], [Left and Right vertical] data, put the chessboard cloth as in chapter 1.3.3, measure the real length and width of the car, (not the data provided by manufacture, refer to Figure 1.4 for way of measurement), then shift to Auto Tune, press Enter key to start around view synthesis with the instruction as below when completed.



Figure 1.18

### 1.4.2 Manual Calibration

Manual calibration with remote control available if the around view synthesis is not satisfactory,

**Calibration principle:**

The around view are synthesized by: Fish-eye calibration → Space projection → 4 windows synthesis → images display

Space projection is to adjust the location of 4 DP.



Refer to right Figure

are 4 DP points(target points) around the front/rear/left/right window, which is adjustable to calibrate move, zoom up and down. Below different Figures 1.20 is made by calibration of DP points to display the best synthesized effect.



Figure 1.19

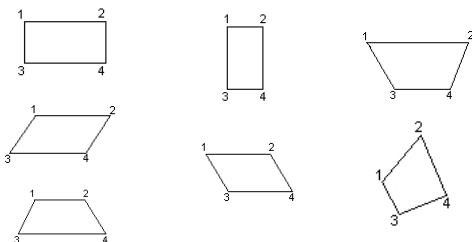



Figure 1.20

**Manual tune:**

Step1 :Enter Around View menu, shift cursor to **Manual tune**, press key  on remote controller. Refer to Figure 1.21 :

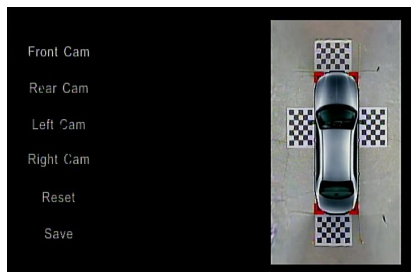
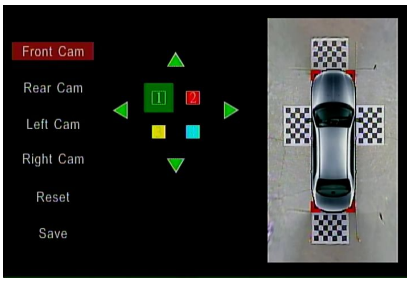


Figure 1.21










Step2 :Shift cursor to **Front Cam**, press key  on remote controller , then enter 4 points window[Enter],refer to Figure 1.22

Figure 1.22

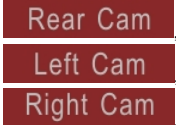
Step3 :In this window, press key

 on the remote controller to choose DP1→DP2→DP3→DP4→ DP12 →DP13→DP24→DP34→DP1234 to circle,


Then press key  or , or  or  to calibrate Up, Down, Left and Right side of the fusion line



After that, press key  to return to Manual tune window.

Step4 : Repeat operation from Step2-3,shift cursor to icon



If any problem, shift cursor to **Reset**,press key

 on remote controller to calibrate the parameter once again.

Step5 : press key  on remote controller and return to Manual Window, shift cursor on **Save**,press key  on remote controller , enter Parameter window.

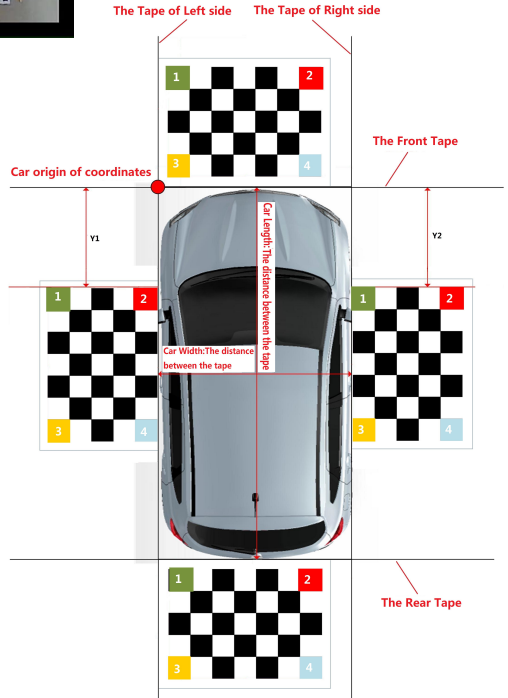


Figure 1.23 ( 4 DP window)

### 1. 4. 3 Camera Adjustment

Theoretically the camera parameter is calibrated by the manufacturer, normally there is no need to calibrate the camera. When complete synthesis process, there is an arch at the edge of the chessboard cloth image, then the camera parameters need calibrating.

Step1 :Print chessboard paper, 7\*7 black and white squares, then stick on hard horizontal

board

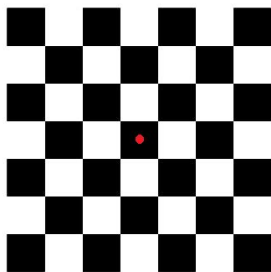
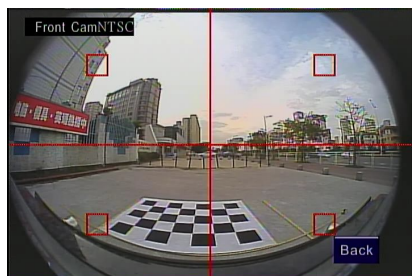


Figure 1.24 (Chessboard cloth)



Step2 :In the Around View menu, shift cursor to **Camera set** (Refer Figure 1.18), press key **OK/Menu** on remote controller, then enter the Camera adjustment menu [refer to Figure 1.25]

Figure 1.25

Step3 :Align the center of square with the center of screen, 4 angles of screen with 4 angles square(refer to Figure 1.26) . Press key **OK/Menu** on remote controller , then the system start calculate the center point automatically, "WinX OK" (X = 1, 2, 3, 4) showed around 8 seconds if they matched. "Detect Error" showed if not(Win1=Front Window / Win2=Rear Window / Win3=Left window/ Win4=Right window).

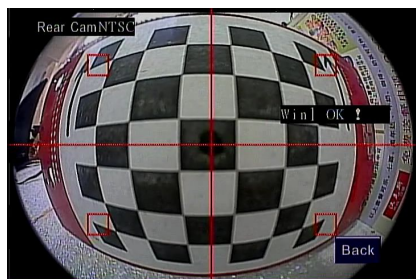


Figure 1.26












PS: For "Detect Error" , calibrate chessboard, align more precisely, then repeat the above steps.

Step4 : Repeat above step, press **▲** or **▼** to switch video for calibration, follow the order:Front->Rear->Left->Right

Step5 : shift cursor to [Return]when completed, press key **OK/Menu** on the remote controller, back to Around View window.

## 2. Remote controller

Figure 2.1 There are 19 keys in use.

- [1]  **Power :**  
Turn on /Off whole view output
- [2]  **Enter:**  
1. Shift cursor into icon, press the key to enter  
2 Manual calibration in around view, it is DP points(target point), from DP1, DP2, DP3, DP4, DP12, DP13, DP24, DP34, DP\_ALL repeat and recycle
- [3]  **Up**  
1. Shift up the cursor  
2. Manual calibration in 360 whole view, shift up the DP points  
3. In traveling data recorder , it' s for playing video and pause
- [4]  **Down :**  
1. Shift down the cursor in the window  
2. Manual calibration in 360 whole view, shift down the DP points
- [5]  **Left**  
1. shift DP points toward left in Manual tune window  
2. In traveling date recorder window, it for ESC
- [6]  **Right :**  
Shift the DP points toward right in Manual tune window
- [7]  **Return:**  
1. Shift DP points toward left in Around View window  
2 In traveling date recorder window, it' s for return to around View window
- [8]  **Increase:**  
1. Increase the data for the icon which is opted by cursor  
2. In Around View window, shift DP points toward right
- [9]  **Decrease:**  
1. Decrease the data for the icon which is opted by cursor  
2. In Around View window, shift DP points toward left
- [N0]-[N9] :  ~   
Press the number needed



### 3. Menu

#### 3.1 Menu page

[Main menu] :

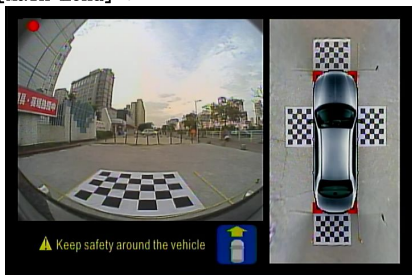


Figure 3.1

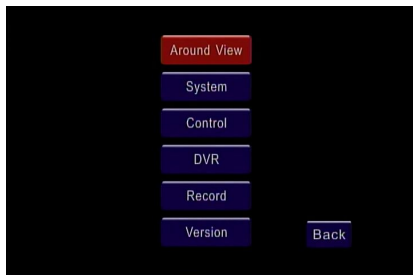






Figure 3.2

Press key  to open main menu (figure 3.2). press key  or  to set cursor on icon, press  to enter.

[password page] :

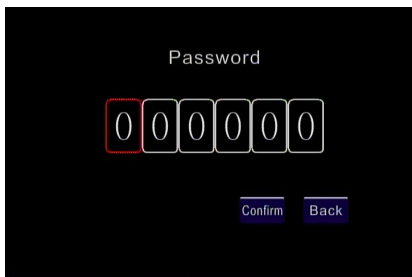


Figure 3.3

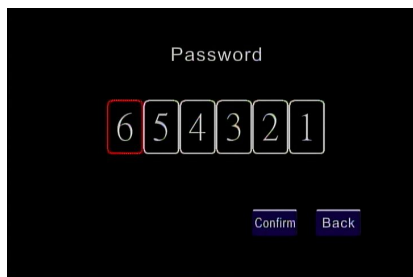




Figure 3.4

In Main window, shift cursor to icon  ,press key  on the remote controller , then enter Password window (Figure 3.3).

Press the number key from   or key   , input number "654321" (Figure 3.4), then press key  to enter Around View window(Figure 3.5)

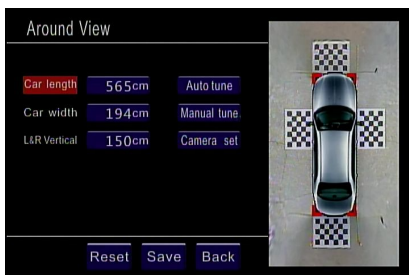




Figure 3.5



## [Around View window] :


All parameters for auto tune included ,press

key  &  to shift cursor. (Figure 3.6)



### Car length



Shift cursor on icon Car length, press

key  to increase, press  to decrease,

number key   have the same function, unit is cm.



### Car width

Shift cursor on icon Car width ,press  to increase, or press  to decrease, number

key   have the same function, unit is cm.

### L&R Vertical

Shift cursor to icon L&R Vertical, press key  to increase or press key  to decrease,


number key   have the same function, unit is cm.

PS: Car length, width parameter ,refer to Figure 1.4

### Auto tune

Shift cursor on icon Auto tune, press  to automatic synthesis processing


### Manual tune



Shift cursor on icon Manual tune, press key  to **Manual tune window**.

### Lens Mode

Shift cursor on icon Lens Mode, press key  to enter. Normally, the system has set up the fish-eye correction parameter for certain camera. When switch to another lens, input correct parameter only.

### Camera set

Shift cursor on icon Camera Set, press key  to individual camera window, press key

 &  to switch front/rear/left/right display to make sure the images are normal or make fish-eye correction

### Reset

Shift cursor on icon Reset, press key  to enter **reset** menu(Figure 3.7).

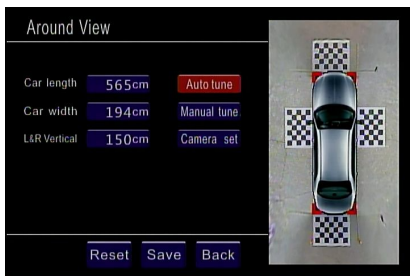
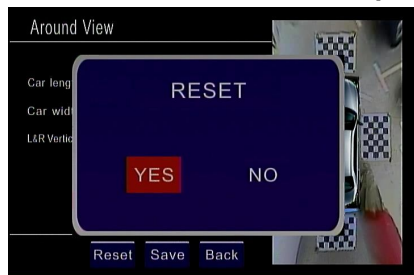






Figure 3.6


Press  &  as Yes or NO, when choose YES,

press  to factory reset. When choose NO,

press  to Around View window.

Figure 3.7

Press  &  as Yes or NO, when choose YES,

press  to factory reset. When choose NO,

press  to Around View window.

## Save

Shift cursor on icon Save, press key  to **Save window**. [Figure 3.8).

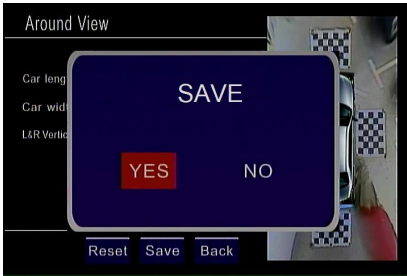




Figure 3.8

Press  or  to choose YES or

NO, when choose YES press key  to save data in Around View menu

When choose NO, press key , give up save and return to **Around View menu**



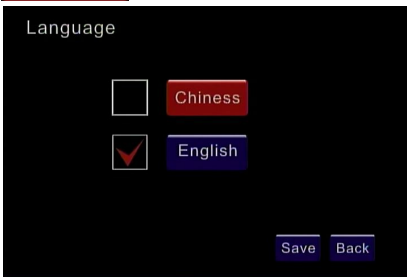
## [System window] :

This window contains all the system data,

press key  or  to shift cursor.

Figure 3.9

## Language




Shift cursor on icon Language, press key  to **language menu**, press key to choose English or Chinese,, press save or return

Figure 3.10

## Image


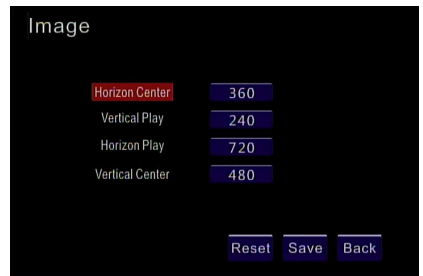


Shift cursor on icon Image, press key  to **image window**

Figure 3.11





## Horizon Center

Shift cursor to icon Horizon Center,



press key  to increase **press**  to decrease to move the picture toward right or left (Max 520 ,Min 200) preset value 360 EX: input image resolution 720 \*480, image horizon center  $720/2=360$





## Vertical Center

Shift cursor to icon Vertical Center, press key  to increase, press key  to decrease, move up or down the picture (MAX 340, MIN 140) preset value 240 EX: input image resolution 720 \*480, image vertical center  $480/2=240$ )

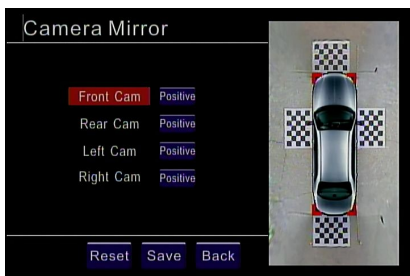
## Horizon Zoom

Shift cursor on icon Horizon Zoom, press  to increase and press  to decrease to zoom up or down the image in horizon. (MAX 940 MIN 500) Preset value 720 EX: input image resolution 720\*480

## Vertical Zoom

Shift cursor on icon Vertical Zoom, press  to increase or press  to decrease to zoom up or down the image in vertical (Max. 640 Min. 300) Preset value 480 EX: input image resolution 720\*480



## Cam Mirror





Shift cursor on icon Cam Mirror, press  to enter

Figure 3.12



## Front Cam

Shift cursor on icon Front Cam, press  or  to calibrate the input image as Mirror or Normal.



## Rear Cam

Shift cursor on icon Front Cam, press  or  to calibrate the input image as Mirror or Normal.

## Left Cam

Shift cursor on icon Front Cam, press  or  to calibrate the input image as Mirror or Normal.

## Right Cam

Shift cursor on icon Front Cam, press  or  to calibrate the input image as Mirror or Normal.

## Cam Brightness




Shift cursor on icon Cam Mirror, press  to enter





图 3.13

## Front Brightness



Shift cursor on icon Cam Brightness press  to enter

Shift cursor on icon Front Brightness, press  to increase brightness or press  to decrease brightness for front camera(Max. 40 Min. -40) Preset value 0



## Rear Brightness

Shift cursor on icon Rear Brightness, press  to increase brightness or press  to decrease brightness for rear camera (Max 40 Min -40) Preset value 0

## Left Brightness

Shift cursor on icon Left Brightness, press  to increase brightness or press  to decrease brightness for left camera (Max 40 Min -40) Preset value 0

## Right Brightness

Shift cursor on icon Right Brightness, press  to increase brightness or press  to decrease brightness for right camera (Max 40 Min -40) Preset value 0

## [Control window] :



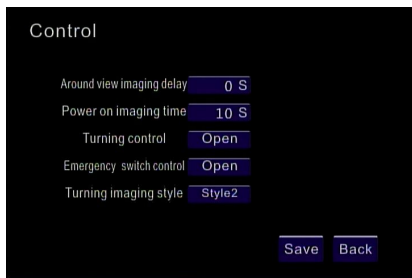


This window contains all the data for control, press  or  to shift cursor



Figure 3.14





## Around view imaging delay

Shift cursor on icon Around view imaging delay, press  to increase or press  to decrease, it is to set up the turn-on delay time when car steering. (Max. 200 seconds, Min 0, step 5seconds) Preset up 0 .



## Power on imaging time

Shift cursor on icon Power on imaging time ,press  to increase or press  to decrease, it is to set up the turn-off delay time when car steering. (Max. 20 seconds, Min. 0 second, step 5 seconds) Preset up 0 .

## Turning control



Shift cursor on icon Steering control press  to increase or press  to decrease, to adjust turning control. The Around View system would be on when the car is steering.

## Emergency switch control

Shift cursor on Emergency switch control, press  to increase or press  to decrease. It is set up to turn on or off the Emergency switch control triggered by auto double flash switch.

PS. If Around View is off,press auto double flash switch once, the Around View window will be on. The Around View window will be still on when turn off double flash. Only if the double flash is turned on and off again, the Around View can be shut off.

## Turning imaging style

Shift cursor on icon Steering display style,press  to increase or press  to decrease, it is change the steering image triggered by car steering switch , preset up [style 2]

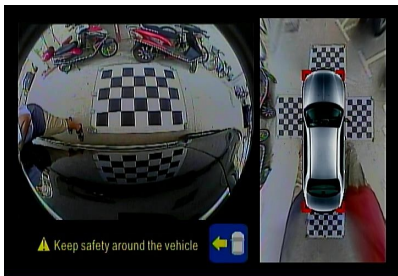


Figure 3.15 style 1



Figure 3.16 Style 2

Complete setup, press **Save**, then ESC.

[DVR setup] :

In the main menu, shift cursor to icon **DVR**, press **OK/Enter** to Video setup window



Figure 3.17

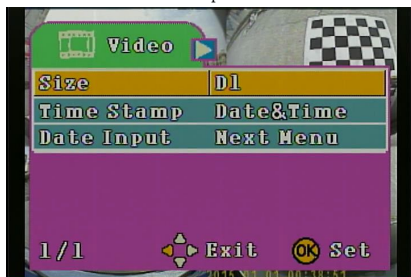
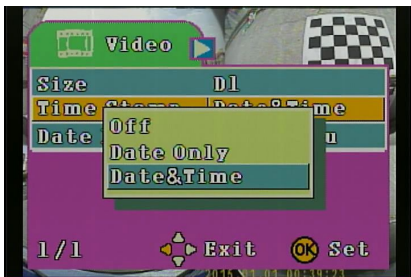
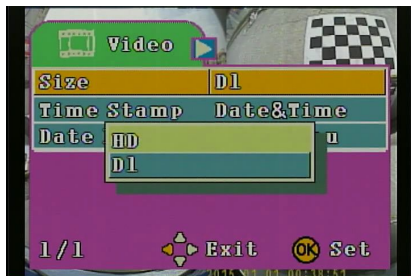


Figure 3.18

In this window, press **OK/Enter** to video setup menu press **Up** or **Down** to parameter set up.

Choose[Size], set up the format as HD or D1

Figure 3.19

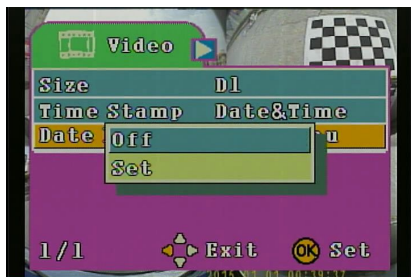


Choose[Time], set up to turn on or off the mark of recording time, and the recording time style. i.e time only or time & date).

Figure 3.20

Choose [Date] menu, enter date& time setup

Figure 3.21



Press or , or to setup date and time, press to enter, save and ESC

Figure 3.22

**[Record Window]:**

In the main menu, shift cursor on icon **Record**, press to enter car recording window.



Figure 3.23

In this window, press again to enter video recording menu, press & , then press to set up the telemeter.

In this window, can delete single, all or designated files. press & , press to choose, press to return



Figure 3.24

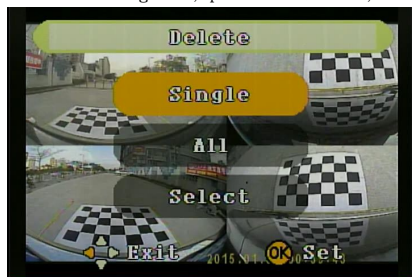


Figure 3.25



In this window, choose [thumbnail], can preview file in the thumbnail format, press & and press to enter display window

Figure 3.27

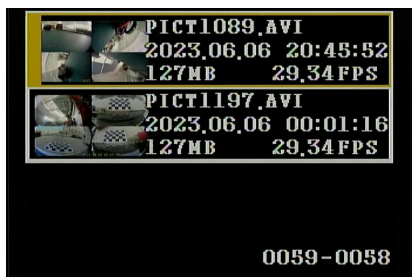


Figure 3.28

In this menu, choose **Format**, format all files, press to return.

**[Version] :**

Display the software version



In this window, can protect Single, All and designated video. Press & , then press to enter . Press to return

Figure 3.26



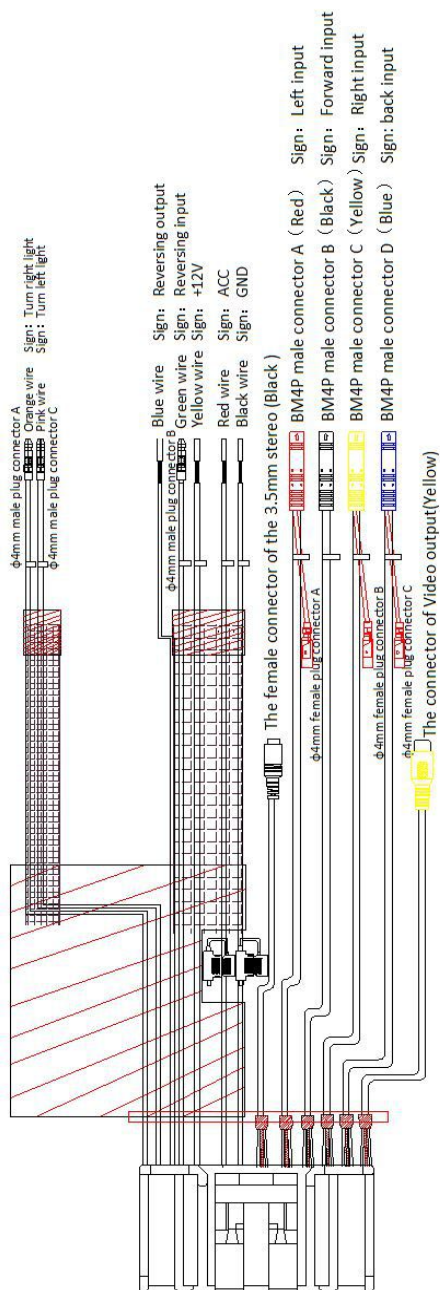
In this window, chose [file List], display details of files press & , then press to enter

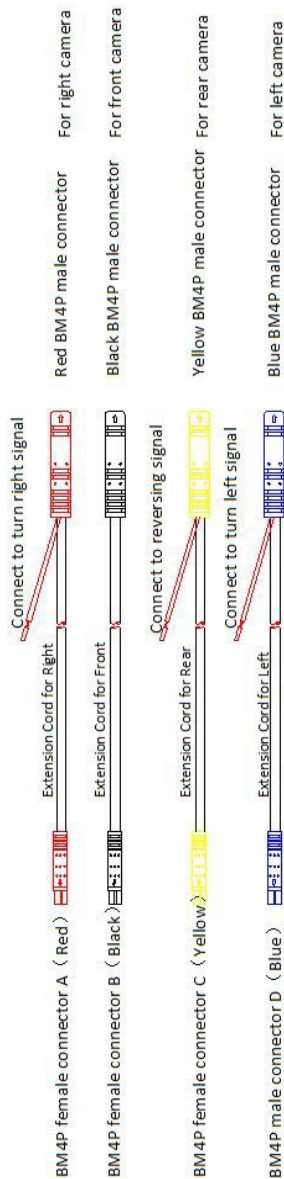


Figure 3.29

Figure 3.30

## 4. Wiring Diagram





#### Wiring instruction:

- 1、 4mm Diameter bullet heads are respectively connected
- 2、 Insert the female plug connectors of camera extension line BM4PA/B/C/D to the males plug connectors based on the colors respectively
- 3、 Connect the male plug connector of the the camera extension line BM4P to the left and right cameras, and link the red signal line to the reverse signal and left-and-right turning signal
- 4、 Connect the the wire harness with +12V tag with the the original car BAT+
- 5、 Connect the wire harness with ACC tag with the ACC signal
- 6、 Connect the wire harness with GND tag with the original GND in the car or ground.
- 7、 Connect the line of the wire harness with “reverse output” tag with the reverse output signal of vehicle display
- 8、 The female connector of the black 3.5mm stereo is used to insert a remote control receiver
- 9、 Yellow video output head is connected to the reversing video input terminal of vehicle display