LCD audio

8910-02

GENERAL INFORMATION

1. SPECIFICATIONS

1) LCD Audio System

Item		Description
Operating system		QNX
CPU		Jacinto eco 5600 MHz
Memory		ROM - NAND Flash 256 Mbytes
		DOR2 : 256 Mbytes
Booting time	Radio	Within 19 sec.
	Rearview camera	Within 3 sec.
Touch panel		IR Touch
Display		7" TFT WVGA (800*480)/16:9 aspect ratio
USB		USB 2.0 (High Speed)
Hands-free		Bluetooth
Audio		Radio (FM/AM)
Rearview camera		Shifting to R - POWER ON/OFF is unavailable when the rearview camera is operating. - Mode change is unavailable when the rearview camera is operating.
Multimedia	Audio	Audio codec: MP3, OGG, WMA,WAV Supported file format: mp3, aac, ogg, ape, flac, wma, wav
HDMI		Version: HDMI 1.4a

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Application basis	
Affected VIN	

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2) LCD Audio Head Unit

Category	Item		Specifications
General	Frequency range	FM	87.5 to 108.0 kHz
		AM	531 to 1,602 kHz
	Operation temperature		−30°C to +75°C
	Operating voltage		9.0 to 16.0 V
	Power supply voltage		DC 13.5 V (-) Ground
	Dark current		3 mA or lower
	Load impedance		4 Ω X 6
	Antenna		80 PF 75 Ω
	Storage capacity		NAND 256 MB
	Weight		1.9 Kg
LCD display	Viewing angle		Up: 65°, Down: 70°, Left: 70°, Right: 70°
	Power supply		5 V (1.2 A)
	Input signal		DIGITAL RGB
	Display size		168.38 mm (W) x 101 mm (H) x 8.76 mm (D)
	Display type		7" TFT WVGA (800X480)
	Display aspect ratio		16:9
	Screen size		154.8 X 93.84 mm (bezel open)
	Color		Full color
USB	Compatibility		USB 2.0 (High Speed)
Bluetooth	MAX output power		2.5 mW
Tail lamp color	Daylight color		Panel front: Black metal, Letters: White Button: Black metal, Letters: White
	Illumination color		Button: Orange/Red Display: Full color

Modification basis	
Application basis	
Affected VIN	

2) USB and HDMI Jack Assembly

Item	Specifications
Operating temperature	−30°C to +80°C

4) Micro Pole Antenna

Item	Specifications	
Storage temperature	−40°C to +85°C	
Operating temperature	−30°C to +75°C	
Operating voltage	AM/FM	10.5 to 16.0 V
Current consumption	AM/FM	Max. 100 mA
I/O impedance	AM/FM	75 Ω

5) Speaker

Item	Specifications	
Front/rear door speaker	Speaker size	5.25 inch
	Max. input	40 W
	Impedance	400Hz of 4Ω ± 15%
Front tweeter speaker	Speaker size	1 inch
	Max. input	40 W
	Impedance	5 KHz of 4Ω ± 15%

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Application basis	
Affected VIN	

6) Rearview Camera

Item	Specifications	
Storage temperature	−40˚C to +80˚C	
Operating temperature	−30˚C to +75˚C	
Operating voltage	6.0 to 9.0 V	
Current consumption	60 mA	
Signal type	Video: NTSC Composite	
Power supply	8 V	
Viewing angle	Horizontal 129˚, Vertical 89˚	
Weight	30 g	

7) Handsfree Microphone

Item	Specifications
Storage temperature	−30˚C to 80˚C
Operating temperature	−30˚C to +75˚C
Sensitivity	−36 ± 2 dB
Impedance	Up to 2.2 kΩ
S/N ratio*	65 dB or more

S/N ratio (signal to noise ratio): Describes noise level in relation to the signal level in dB

Modification basis	
Application basis	
Affected VIN	

8) Steering Wheel Audio Remote Control Switch

Item	Specifications	
Rated voltage	5 V - 0.1 A	
Rated load	5 V - 0.1 A	
Operating temperature	−30°C to +85°C	

Item	Resistance	Operating voltage
Volume down	196 Ω ± 1%	0 to 0.4 V
Volume up	1.02 KΩ ± 1%	0.7 to 1.1 V
Mode	2.21 KΩ ± 1%	1.4 to 1.8 V
Power/Mute	34.8 KΩ ± 1%	4.2 to 4.6 V
SEEK up	4.02 KΩ ± 1%	2.1 to 2.5 V
SEEK down	6.98 kΩ ± 1%	2.8 to 3.2 V
Bluetooth (hands-free) - ON	13.3 KΩ ± 1%	3.5 to 3.9 V
Bluetooth (hands-free) - OFF	34.8 KΩ ± 1%	4.2 to 4.6 V

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Application basis	
Affected VIN	

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2. CAUTIONS AND WARNINGS FOR SAFETY

⚠ **WARNING**

- This mark indicates situation which, if not observed, may result in an accident or system malfunction.
- Do not disassemble or modify this system.
  Doing so may cause an accident, fire or electric shock.
- Do not use the system if it is malfunctioning (sound or video output problem).
  Doing so may lead to an accident or electric shock.
  Please contact a Ssangyong service dealer immediately.
- The system should be used only when the engine is started.
  Using the system for an extended period of time with the engine off may discharge the battery.
- Do not leave beverages or foreign materials around the system.
  If they enter the system, they may cause a fire.
- The system may break down if a disc not supported by this system is inserted.
- Do not apply impact to or drop this system.
  It may cause malfunction.
- Never leave the system in a hot or cold place for an extended period of time. Therefore, do not park the vehicle in a hot or cold place. The ambient temperature should be −30℃ to +80℃ for proper operation.
- When cleaning the touch screen, turn off the system and clean the surface with a dry and soft cloth. Never use any coarse cloth, hard cloth, chemical agent, volatile cleaning solvent (alcohol, benzene, thinner) for cleaning the touch screen.

⚠ **CAUTION**

- This mark indicates potentially hazardous situation which, if not observed, may result in serious injury and material damage.
- Ssangyong is not liable for any personal injury and material damage, caused by violation of traffic regulations or neglect of observing actual traffic and driving situations.
- Colors on display figures in this manual may differ from actual display due to publication concerns.

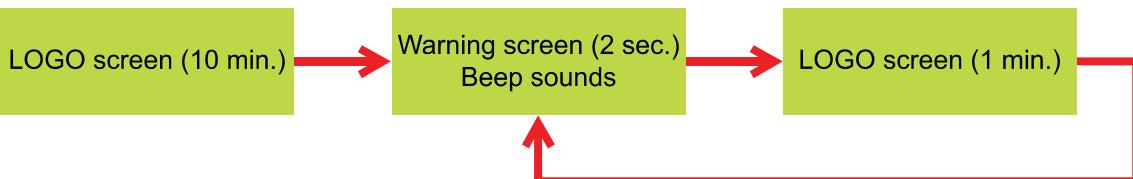| Modification basis	
Application basis	
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💡 **NOTE**

- The screen of HDMI is blocked while the vehicle is driven (at a speed of higher than 0 km/h).

Warning for safe driving

- When the ignition off signal is detected with the audio system ON, the battery discharged warning message is displayed on the screen.

Warning for discharged battery

- A beep sounds when the battery discharged warning message is displayed on the screen.

Beeping algorithm with warning message

LOGO screen (10 min.) → Warning screen (2 sec.) Beep sounds → LOGO screen (1 min.)

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Application basis	
Affected VIN	

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OVERVIEW AND OPERATING PROCESS
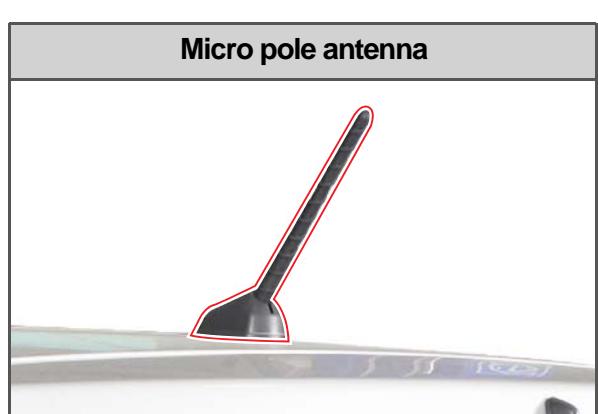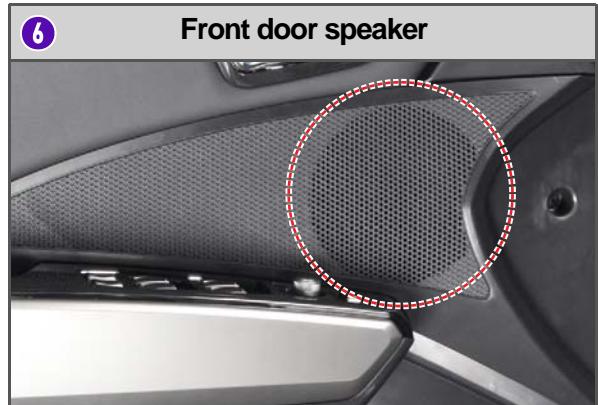
1. OVERVIEW

The LCD audio system with 7-inch LCD can play the radio (FM1, FM2, AM), contents in a USB device (video, music, photo files), and contents in a device using HDMI. The LCD audio system also has hands-free (Bluetooth) feature, rearview camera, external device connection features including USB and HDMI. It has a micro pole antenna and its own integrated amplifier to improve the radio frequency reception rate and to provide the high-quality sound.

2. COMPONENTS

❶ Bluetooth (hands-free) microphone

❸ Audio remote control switch

❷ LCD audio head unit

❹ USB and HDMI jack

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AVN
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⑤ Front tweeter speaker

⑥ Front door speaker

Rear door speaker

Rearview camera

Micro pole antenna

Modification basis	
Application basis	
Affected VIN	

Audio remote control switch	Bluetooth (hands-free) microphone	USB and HDMI jack
		USB HDMI
Outputs the signal when power, mode, volume up/down, handsfree, seek up/down, or mute switch is operated.	It sends the transmission tone signal to the head unit and outputs the receiving tone and navigation guidance sound to the driver's door speaker during hands-free calling.	Sends USB signals and HDMI signals.

LCD audio head unit

	The LCD audio system plays radio, audio in various formats. The system also has USB and HDMI connections as well as Bluetooth function. The system is equipped with the touchscreen for the best user experience.

Door unlock signal

Vehicle speed signal

Rearview camera	Micro pole antenna	Bluetooth (hands-free)
When the head unit receives a reverse driving signal from the transmission lever unit, it supplies the operating power to the rearview camera which then transmits the video signals to display the rear area view on the LCD screen.	Micro pole radio antenna is fitted to ensure the high sensitivity.	Once the pairing is completed after searching for the Bluetooth phone, you can use a various functions and contents in the phone via Bluetooth.

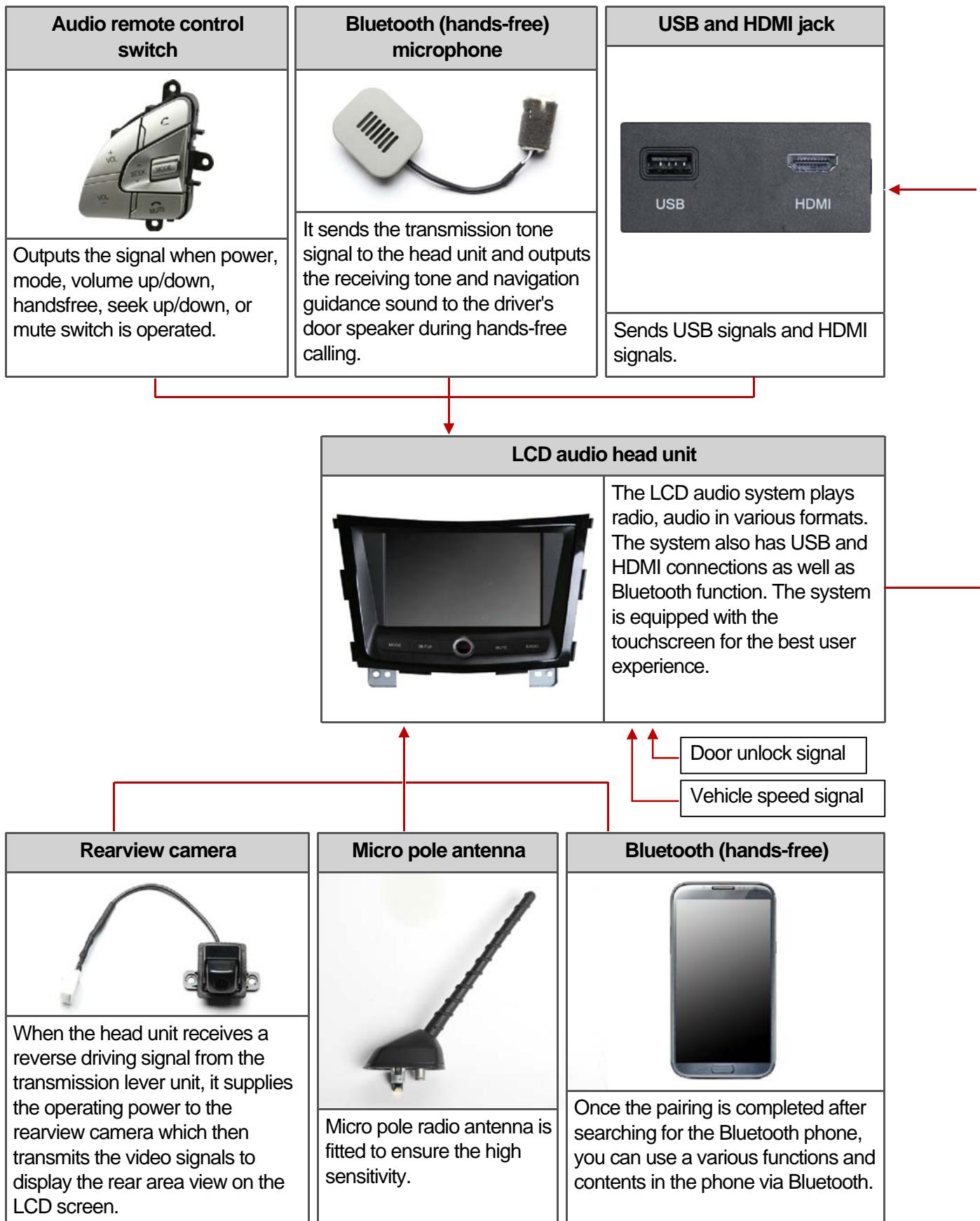| Modification basis	
Application basis	
Affected VIN	

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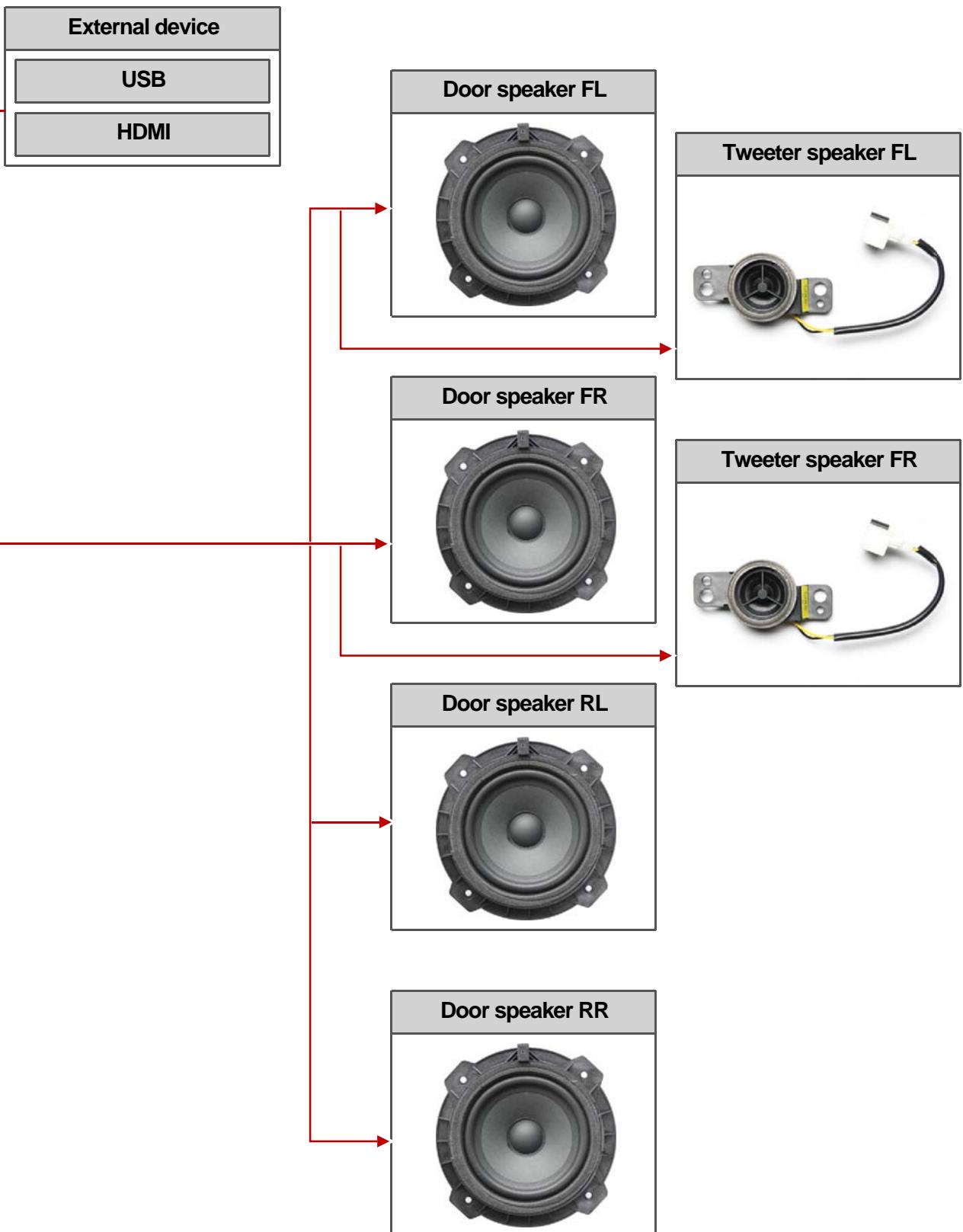WIPER
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External device
USB
HDMI

Door speaker FL

Tweeter speaker FL

Door speaker FR

Tweeter speaker FR

Door speaker RL

Door speaker RR

Modification basis	
Application basis	
Affected VIN	

3. FEATURES

1) LCD Display Mode

In the LCD audio main menu screen, RADIO, HDMI, MEDIA, BLUETOOTH MUSIC, BLUETOOTH HANDSFREE menus are displayed. For detailed information about these menus, see the manual for the LCD audio system.

Modification basis	
Application basis	
Affected VIN	

(1) Radio mode

No.	Name	Description
1	Selected mode	- Selected mode is displayed (one of FM1, FM2 or AM).
2	Preset	- Stored station frequency is displayed.
3	Indicator	- One of STEREO, SCAN, AST, or P.SCAN is displayed depending on the currently selected mode.
4	Frequency	- Currently selected station frequency is displayed.
5	SEEK DOWN	- Searches automatically for the strongest station by going down the radio frequency.
6	TUNE DOWN	- Goes down the radio frequency by 1 step.
7	TUNE UP	- Goes up the radio frequency by 1 step.
8	SEEK UP	- Searches automatically for the strongest station by going up the radio frequency.
9	AM/FM	− Changes the mode in order of FM1→FM2→AM→FM1.
10	AST	- Stores the searched for radio stations in preset buttons automatically in ascending order.
11	SCAN	- Scans for radio stations with strong signals and stays for 5 seconds each time a station is chosen.
12	P.SCAN	- Plays the stations stored in preset no. 1 to 6 buttons for 5 seconds for each station.

NOTE

TUNE UP/DOWN 1 step
General : (FM : 0.1MHz, AM : 9KHz), EU : (FM : 0.1MHz, AM : 9 KHz),
Latin America : (FM : 0.1MHz, AM : 10KHz)

Modification basis	
Application basis	
Affected VIN	

(2) USB music mode

USB music

No.	Name	Description
1	Selected mode	- USB music mode is displayed.
2	Folder Up	- Move and play previous folder.
3	Folder Down	- Move and play next folder.
4	Current folder	- Displays current playing folder name.
5	Info	- Displays the detailed information of music file currently played.
6	Indicator	- Shows the playing mode. (such, RDM, RPT, INT and etc.)
7	Previous Track	- Plays the previous music file while playing a song.
8	PLAY/PAUSE	- Plays or pause a music.
9	Next Track	- Plays the next music file while playing a song.
10	List	- Displays the list of music files stored in the USB memory.
11	RDM	- Plays the music files stored in the USB memory randomly.
12	RPT	- Repeats one file or all files stored in the USB memory.
13	INT	- Plays the music files stored in the USB memory in sequence for the first 10 seconds.
14	MY LIST	- You can select and store music files you want in this list and plays songs within this list.

Modification basis	
Application basis	
Affected VIN	

(3) Bluetooth (hands-free) mode

| Bluetooth (hands-free) mode |
|---|
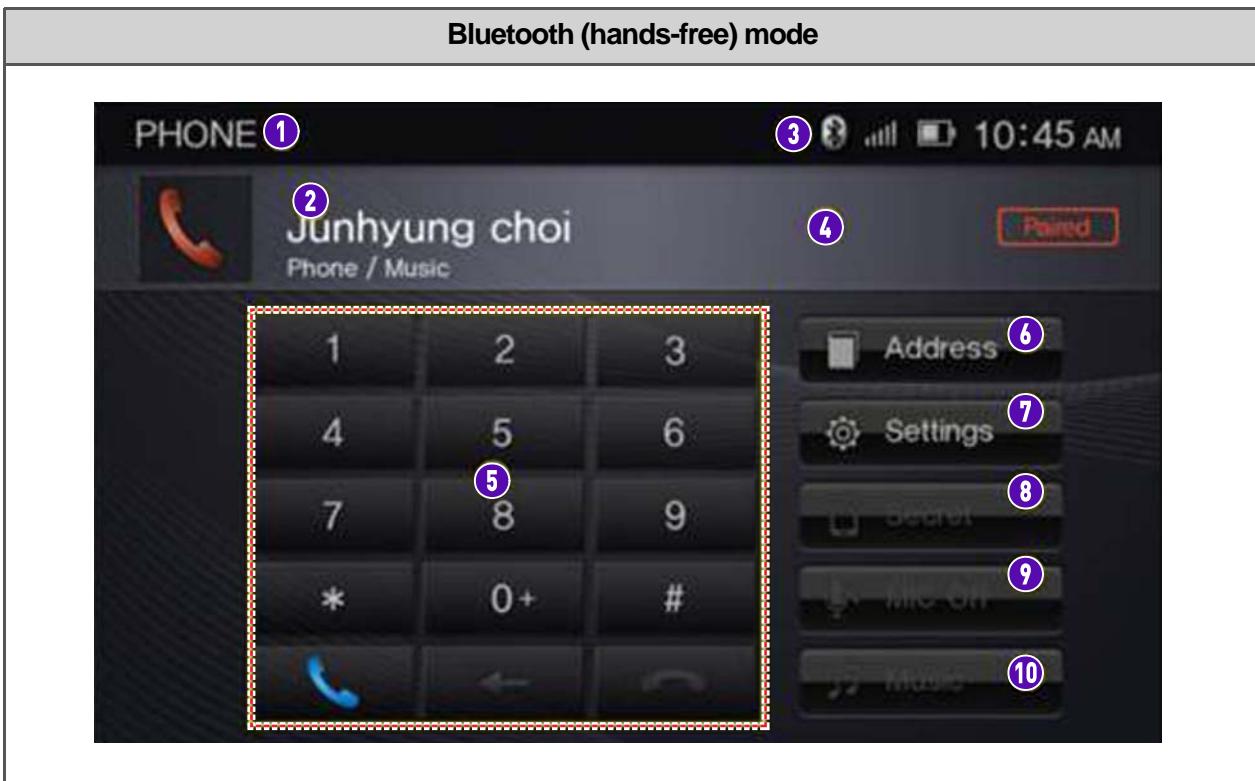
No.	Name	Description
1	Selected mode	- Selected mode is displayed (one of Bluetooth music or Phone mode).
2	Connected Device information	- Device name and device media type displayed.(Phone, Music or Phone/Music)
3	BT peripherals info	- BT icon, Signal Strength and Battery status.(Items may not supported by mobile device.)
4	Display window	- Call information and time information will be displayed.
5	Keypad	- Number pad, dial and hang-up key
6	Address Book	- Downloads the phonebook from the cell phone. Shows the recent call list.
7	Settings	- Used to change the settings of Bluetooth device of this system.
8	Secret Mode	- Switches between handsfree and private call.
9	Mic. Off	- Turns the Mic. Function off.(Mic. mute)
10	MUSIC	- Switches to Bluetooth MUSIC screen.

Modification basis	
Application basis	
Affected VIN	

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▶ **Initialization of Bluetooth**

Initialize and delete all settings related to Bluetooth function (pairing history, paired phonebook, call list, various settings)
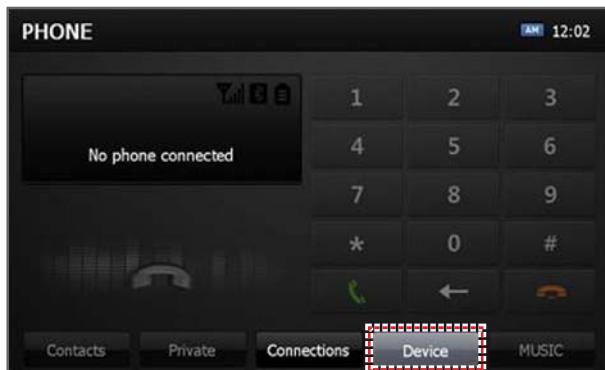
Select [Device setting] button on the Bluetooth screen.
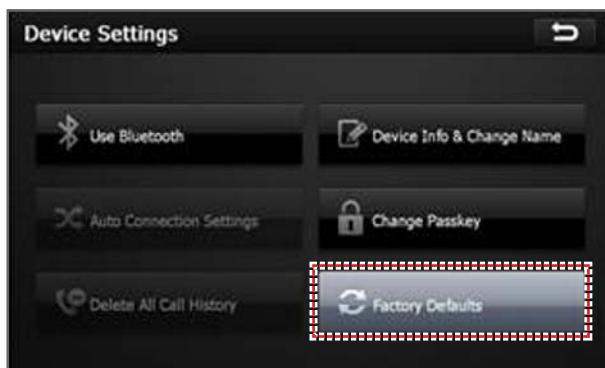
Select [Initialize Bluetooth] button on the Device setting screen.

Select [OK] when confirm message for initialization pops up.
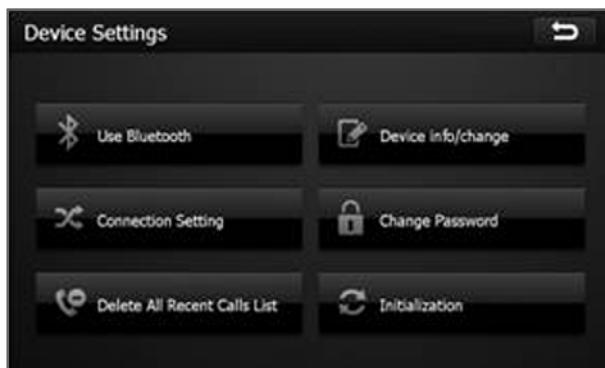
Initialization complete

Modification basis	
Application basis	
Affected VIN	

(4) Bluetooth music mode

Bluetooth music

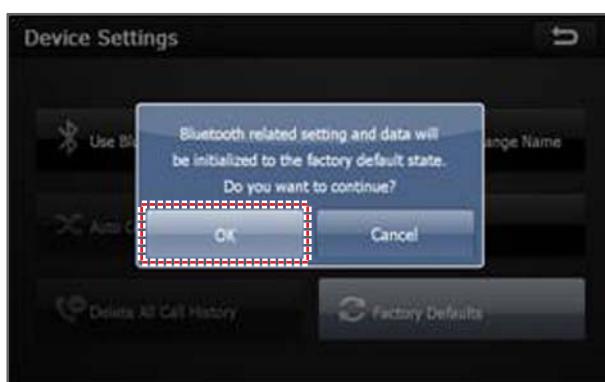| No.	Name	Description
1	Selected mode	- Bluetooth music mode is displayed.
2	PLAY/PAUSE	- Plays or pause a song.
3	Previous Track	- Plays the previous music file while playing a song.
4	Next Track	- Plays the next music file while playing a song.

5	PHONE	- Switches to Phone mode.
		  Pressing this switch during a song play switches the
		  system to Phone scree but keeps playing the song.

6	Song information	- Displays the detailed information of music file currently played.

Modification basis	
Application basis	
Affected VIN	

LCD AUDIO SYSTEM

TIVOLI 2016.03

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SWITCH

LAMP

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LCD AUDIO

ISG SYSTEM

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2) External Device Connection

▶ **HDMI**

HDMI jack

1. Connect the HDMI device with HDMI cable to the HDMI jack.

2. Wait for the system to complete the transition.

3. If the system is successfully connected to the device, video and audio are output from the system.

Modification basis	
Application basis	
Affected VIN	

Text   🅑 .ull 🔋 02:30 AM

⚠️ **Driving**

Video is not available while driving for safety.

3. During driving, only the sound of the video file is played. The image of the video file does not appear on the screen. (The image will appear on the screen as soon as the vehicle stops.)

⚠️ **Caution**

Please use the multimedia system with the engine running to avoid battery discharge.

⚠️ **CAUTION**

When the ignition off signal is detected with the audio system ON, the battery discharged warning message is displayed on the screen.

Modification basis	
Application basis	
Affected VIN	

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LAMP

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AVN

MP3 AUDIO

LCD AUDIO

ISG SYSTEM

AC INVERTE

3) How To Set LCD Audio System

▶ **How to set LCD audio system**

1. Press the [SETUP] button the front.

2. Setup Menu will be displayed.(Non RDS and RDS setting is shown together.)

(1) Sound setting
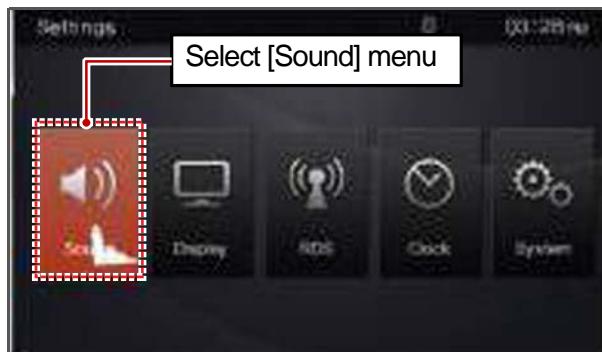
1. Select [Sound] button on the Configuration screen.

2. The Sound setting screen is displayed.

   - Sound Center can be adjusted using four directional arrows or select sound center in the top view of seating area.
   - EQ style can be select from the EQ screen. Left, Right arrow will allow user to adjust the User EQ

Modification basis	
Application basis	
Affected VIN	

(2) Display setting

Select [Screen] menu

1. Select [Display] button on the Configuration screen.

2. The Display setting screen is displayed.

   - Left, Right arrow will allow user to adjust the Brightness / Contrast / Saturation / Hue.
   - Non-Video(Radio / USB / BT) will only have Brightness control. (Default Brightness is 6.)
   - Video mode(HDMI) will have Brightness / Contrast / Saturation / Hue control.(Each Default value is 0.)

(3) Clock setting

Select [Clock] menu

1. Select [Clock] button on the Configuration screen.

2. The Clock setting screen is displayed.

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Application basis	
Affected VIN	

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WIPER AND

AVN

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ISG SYSTEM

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Clock setting display
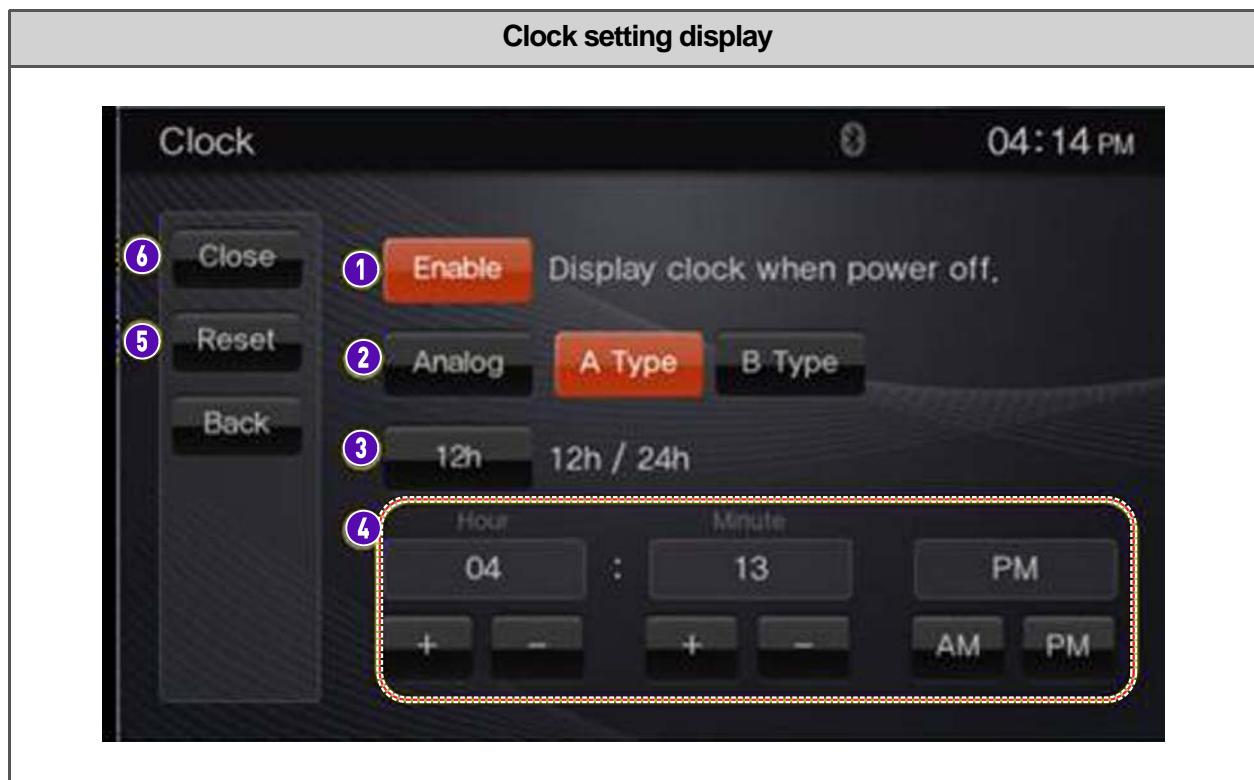
No.	Name	Description
1	Clock display	This will display the clock on the screen while the system is turned off.
2	Clock Type	User can select different type of clock.
3	12h/24h	User can select the clock to be 12h/24h for digital clock.
4	Time adjust	-
5	Reset	Time will be set to 10:10AM/12h.
6	Close	Return to previous Setting Menu.

Modification basis	
Application basis	
Affected VIN	

(4) System setting

1. Select [System] button on the Configuration screen.

Select [System] menu

2. The System setting screen is displayed.

   - Region
   - Language
   - Version
   - Reset

▶ **Checking system version**
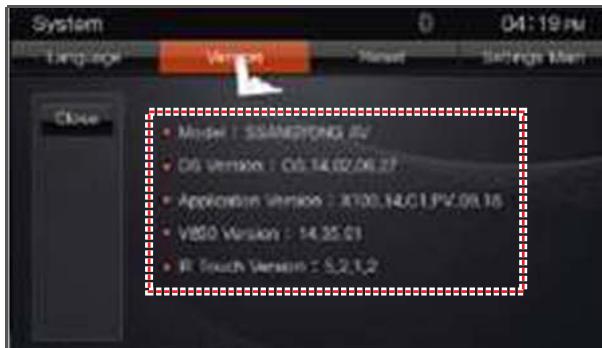
1. You can check the version of the system.

   - Systems SW information about OS, Application, V850, IR touch will appear on the screen.

Modification basis	
Application basis	
Affected VIN	

▶ **System Initialization**
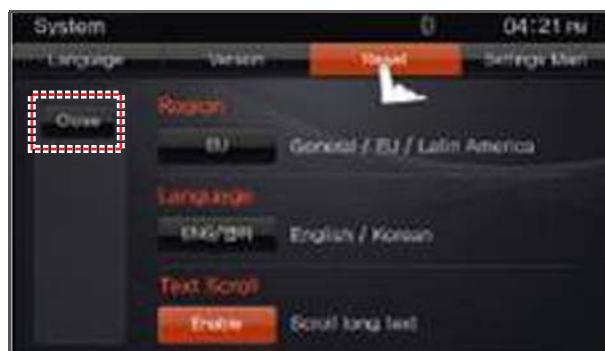
1. Press RESET button on the top tab.

2. Confirmation Pop will appear and pressing YES will reset the user configuration setting for the system.

Modification basis	
Application basis	
Affected VIN	

- The settings and configurations programmed at the factory are as follows:

Item	Mode	Description	
Radio	FM1	89.1 MHz	
USB	Audio	File	Automatic selection
		Play time	00 : 00
		Play/Stop	Play
		Repeat mode	All (All/Folder/1)
		Random	OFF (All/Folder)
		Intro	OFF (All/Folder)
Bluetooth	Pairing	Not paired	
	Settings	Bluetooth use	Yes
		Automatic connection	Automatic
		Automatic connection phone list	Empty
		Device name	SYMC
		Verification number	1234
	Phone number	Outgoing call	Empty
		Incoming call	Empty
		Missed call	Empty
	Phone book list	Empty	
	Microphone volume	3	
	Hands-free volume	15	
	A2DP volume	15	

Modification basis	
Application basis	
Affected VIN	

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Item	Mode	Description	
Menu	Sound setting	FAD/BAL	0,0
		Surround sound	ON
		EQ	Center
		BEEP	ON
		AVC	ON
	Display setting	Brightness, Contrast, Saturation, Color	0
		Dimming	Auto
		Aspect ratio	Full screen
		Screen off	Disabled
	Clock setting	ON	Analogue, 12-hour clock, 12:00, AM
Volume	Audio volume	15	
	HDMI volume	15	

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Application basis	
Affected VIN	

Memo

4. CIRCUIT DIAGRAM

▶ **Audio, remote control, antenna, rearview camera, speaker**

30(B+)

15C(ACC)

Memory Fuse

15A   10A   F9

Multi Fuse

ALT   150A

A/C
Controller
"15"

C216
19

Br

B

D+

L

C103
4

R

C211
15

R

Micro Pole
ANT

Radio
ANT AMP

1

RW

8   C217

11   16   C202

(W/ ISG)   (W/ ISG)

RW   R

4   7

DCDC
Converter   DCDC
Converter

1   6

RY   RY   LW   LW

18

Cluster   12

11

Br   BrB

RW

RW

B1   B2   B21   A3   Radio   A10

B+   ACC   Vehicle
Speed   Charge
SIG   ANT
PWR

Audio
ILL
GND   GND   GND   MIC
+   -   GND   +   -

A11   B13   C1   B3   B15   A14   A8   A17

WB   OB   SHIELD   BrB   BrW

4   11   3   C201   30   40   C212

16   3   C351

B   B   B   WB   OB   BrB   BrW   BrB   BrW

16   S204

20

B

1   2   2   1   2   1

+   -   +   -   +   -

Hands Free
MIC   Driver DR
Speaker   Driver Tweeter
Speaker

31(GND)   G202   G207   G207

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TIVOLI 2016.03

Modification basis	
Application basis	
Affected VIN	

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30(B+)

15C(ACC)

ECM
Room MMR
"3"

BCM
"A35"

Tail Lamp Relay
"87"
(Interior)

Steering Wheel SW (LH) (Audio)

MUTE
S/T OFF
34.8kΩ

B/T ON
13.3kΩ

SEEK DOWN
6.98kΩ

SEEK UP
4.02kΩ

MODE
2.21kΩ

VOL UP
1.02kΩ

VOL DOWN
196Ω

RG

BrY

WG
C211
21

WG

RG
C201
5

C212
15

RG

BrY

C205
6

BrY

12   20
S203
16

S302 "4"
(TIVOLI)

S302 "6"
(TIVOLI XLV)

Driver DR
Lock ACTR
"1"

5   6   3   4
Y   O   G   L

Contact
Coil

4   5   2   3

RG

BrY

WG   WG

B   BG

B

A1

A12

A2

B9

B/up SIG

Driver DR
Lock/Unlock
SIG

Audio
ILL

Remote
Control SW
SIG

AVN/LCD Audio

Remote
Control
SW
GND

+   -   +   -   +   -   B20

A7   A16   A9   A18   A6   A15

BW   Br   BR   WR   BrB   BG

B

16   6   C217   31   41   C212   17   7   C217

3   16   C361   3   4   C371   3   4   C381

BW   Br   BW   Br   BR   WR   BrB   BG

B

2   1   2   1   2   1   2   1

+   -   +   -   +   -   +   -

12
S202
15

PASS DR
Speaker

PASS Tweeter
Speaker

RR LH
DR
Speaker

RR RH
DR
Speaker

G202

31(GND)

Modification basis	
Application basis	
Affected VIN	

LCD AUDIO SYSTEM

TIVOLI 2016.03

▶ **USB/HDMI jack**

Rear View Camera

1	2	3	4
WB		O	GBr

7　　　　6　　　　13　　　　12　C401

8　　　　18　　　　9　　　　10　C212

WB		O	GBr
A13	A14	A4	A5
A12	A12	A12	A12

AVN/LCD Audio

USB Conector　　　　　　　　　　　　HDMI Conector

1	4	2	3	1	3	2	4	6	5	7	9	8	10	12	11	13	15	16	17	18	19

1	4	2	3	1	3	2	4	6	5	7	9	8	10	12	11	13	15	16	17	18	19
USB GND	USB Power Supply	+ USB DATA	-	+ TMDS2	-	SHIELD	+ TMDS1	-	SHIELD	+ TMDS0	-	SHIELD	+ CLOCK	-	SHIELD	CEC	DDC SCL	DDC SDA	CEC DDC GND	Power 5V	HPD

USB　　　　　　　　　　　　**HDMI**

HDMI : High Definition Multimedia Interface
TMDS : Transition Minimized Differential Signaling
CEC : Consumer Electronics Control
DDC : Display Data Channel
SCL : Serial Clock Line
SDA : Serial Data Line
HPD : Hot Plug Detect

Modification basis	
Application basis	
Affected VIN	