# **AVN SYSTEM**

8610-22/8610-30/8610-37/8630-10/8910-05/8910-10/ 8910-25/8930-26/

# **AVN SYSTEM**

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# **AVN SYSTEM**

# 0000-00

8913-01

# GENERAL INFORMATION

# 1. SPECIFICATIONS

# 1) AVN Head Unit

Category	Item		Specifications
General	Frequency	FM	87.5 to 108.0 kHz
	range	AM	531 to 1,620 kHz
	Operating tempe	erature	−30°C to +75°C
	Operating voltag	e	9.0 to 16.0 V
	Power supply vo	ltage	DC 13.5 V (-) Ground
	Dark current		3 mA or lower
	Load impedance	<b>;</b>	4 Ω X 6
	Antenna		80 PF 75 Ω
	Storage capacity	,	NAND 512 MB
	Weight		1.9 Kg
LCD display	Viewing angle		Up: 65°, Down: 70°, Left: 70°, Right: 70°
	Power supply		5 V (0.771A)
	Input signal		DIGITAL RGB
	Display size		167.8 mm (W) x 104 mm (H) x 6.4 mm (D)
	Display type		7" TFT WVGA (800X480)
	Display aspect ra	atio	16:9
	Screen size		154.8 X 93.84 mm (bezel open)
	Color		Full color
USB	Compatibility		USB 2.0 (High Speed)

Modification basis	
Application basis	
Affected VIN	

Category	Item	Specifications
GPS receiver	Frequency	GPS: 1,575 GHz GLONASS: 1,608 GHz
	Sensitivity	-142 dbm
	Channel	12ch
Bluetooth	Power supply	3.3 V (Max 200 mA)
NAVI	MAP	TOM TOM MAP
	MAP storage	SD card (8 GB)
Tail lamp color	Daylight color	Panel front: Black metal, Letters: White Button: Black metal, Letters: White
	Illumination color	Button: Orange/Red Display: Full color

# 2) Micro Pole Antenna

Item	Specifications		
Storage temperature	-40 to +	-40 to +105 (°C)	
Operating temperature	-30 to	+85 (°C)	
Operating voltage	AM/FM	10.5 to 16.0 V	
	GNSS	4.5 to 5.5 V	
Current consumption	AM/FM	Max. 100 mA	
	GNSS	Max. 30 mA	
Input/output impedance	AM/FM	75 Ω	
	GNSS	50 Ω	

Modification basis	
Application basis	
Affected VIN	

# 3) Rearview Camera

Item	Specifications	
Camera system	VGA CMOS (Smart A type)	
Image size	1/4"	
NTSC output	720 (horizontal) X 480 (vertical)	
Image aspect ratio	4:3	
Signal type	Video: NTSC Composite	
Optical lens	F2.8	
Viewing angle	Horizontal 129°, Vertical 89°	
Video output voltage	1.0 V e $\pm$ 0.2 V (75 $\Omega$ impedance match)	

# 4) Speaker

ltem	Specifications	
Front/rear door speaker	Speaker size	5.25 inch
	Max. input	40 W
	Impedance	5 KHz of $4\Omega \pm 15\%$
Front tweeter speaker	Speaker size	1 inch
	Max. input	40 W
	Impedance	400 Hz of 4 $\Omega$ $\pm$ 15%

# 5) Handsfree Microphone

Item	Specifications
Storage temperature	−30 to 80°C
Operating temperature	−40 to 85°C
Sensitivity	−36 ± 2 dB
Impedance	Up to 2.2 kΩ
S/N ratio*	65 dB or more

<sup>\*</sup> S/N ratio (signal to noise ratio): Describes noise level in relation to the signal level in dB

Modification basis	
Application basis	
Affected VIN	

8913-01

# 6) 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 to ·	+85 (℃)	
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	

### 2. CAUTIONS AND WARNINGS FOR SAFETY

#### WARNING

- Always pay attention to the actual traffic conditions and observe safe driving rules.
- Relying on the navigation alone could lead to a serious accident.
- Minimize the time looking at the navigation screen. Looking at the screen for too long time may cause an accident.
- Never operate your navigation system while driving the car. A serious accident may occur due to inattentive driving or lack of forward vision
- Stop the vehicle before manipulating the navigation system.
- Do not disassemble or modify the navigation system. There is the risk of electrical shock, fire, or
- Protect the navigation system from water or foreign objects. It might cause malfunction. If you see smoke or flames from the system due to water or foreign objects, stop using the system immediately and have the system serviced by your authorized dealer or distributor.
- This can lead to the system malfunctions. Do not use the system if it is malfunctioning (sound or video output problem). This can lead to the critical system errors or serious accidents (fire, electrical shock).
- Never manipulate the system in a clear way. Not following this may lead to an accident.

#### A CAUTION

- Always observe the traffic rules.
- The route provided by the navigation can be different from the actual roads.
- Never operate your navigation system while driving the car. A serious accident may occur due to inattentive driving or lack of forward vision. Stop the vehicle before manipulating the navigation system. Some menus on the touch screen will be deactivated when the vehicle is driven for safety reasons. All menus will be activated again as soon as the vehicle stops.
- This system is only for a vehicle. Do not use this system in other than a vehicle.
- Installation or removal of this system requires special technique.
- 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. The screen surface can be damaged and discolored. If the navigation system is faulty, have the system serviced by your authorized dealer or distributor. Do not apply excessive force to or drop this system.
- Do not apply any impact and pressure to the monitor screen. The LCD panel or touch screen panel
- can be damaged.

Modification basis	
Application basis	
Affected VIN	

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### 🕹 NOTE

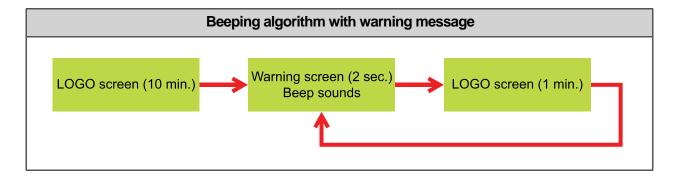
- The screen of HDMI is blocked while the vehicle is driven (at a speed of higher than 0 km/h).



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



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



#### **AVN**

### **OVERVIEW AND OPERATING PROCESS**

### 1. OVERVIEW

The AVN 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 system also has hands-free (Bluetooth) feature, rearview camera, external device connection features including USB and HDMI. And, 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.

#### ► AVN head unit touch screen



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



#### A CAUTION

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.

Modification basis	
Application basis	
Affected VIN	

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# 1) Features

ŀ	tem	Description	
Operating system		Win Compact 7	
CPU		Freescale i.MX6 Dual Automotive	
Memory		ROM - NAND Flash 512 Mbytes	
		RAM - DDR3 : 512 Mbytes	
Booting time	Radio	Within 15 sec.	
	Rearview camera	Within 3 sec.	
	Navigation	Map dependent	
Touch panel		7" GLASS TO GLASS	
Display		7" TFT WVGA (800*480)/16:9 aspect ratio	
USB		USB 2.0 (High Speed)	
Graphic		2D/3D accelerator, alpha blending, anti-aliasing, gradation	
Navigation	Map storage	SD-CARD (8GB_TOM TOM MAP)	
Map update		SD-CARD update	
Hands-free		Bluetooth	
AVN		Radio (FM/AM)/HDMI/BT(H/F, A2DP), NAVI	
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	Video	Video codec: Divx. Xvid, WMV9, MPEG Subtitle format: filename.smi Supported file format: mp4, mov, 3gp, m4a, avi, wmv, asf, mkv, flv	
	Audio	Audio codec: MP3, OGG, WMA,WAV Supported file format: mp3, aac, ac3, ogg, ape, flac, wma, wav	
	Photo	BMP (5 million pixels)/JPG (12 million pixels) GIF (12 million pixels)/PNG (12 million pixels)	
HDMI		Version: HDMI 1.4a, HDCP 1.4 Protocol (But Ethernet, ARC, 3D, Full HD not supported)	

# **♣** NOTE

### Available functions during driving

- 1. Bluetooth call
- 2. Selecting navigation destination

AVN

Modification basis	
Application basis	
Affected VIN	

### 2) How To Set AVN System



1. Press and hold the [SETUP] hard key under the AVN head unit front screen for 1.5 sec. or more.



2. The Configuration screen is displayed on the LCD.

#### Configurable items

- Sound
- Display
- RDS
- Clock
- System

### (1) Sound setting



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

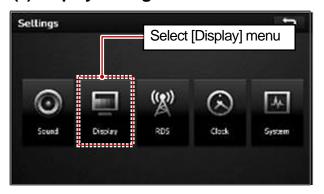


- 2. The Sound setting screen is displayed.
  - Fader/Balance
  - EQ setting
  - Sound setting
  - Other settings
  - Done

Modification basis	
Application basis	
Affected VIN	

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### (2) Display setting

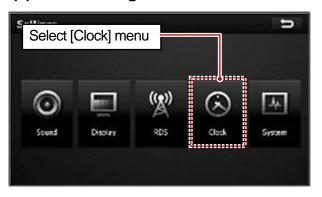


1. Select [Display] button on the Configuration screen.



- 2. The Display setting screen is displayed.
  - Screen
  - Brightness
  - Ratio
  - Screen off
  - Other settings
  - Done

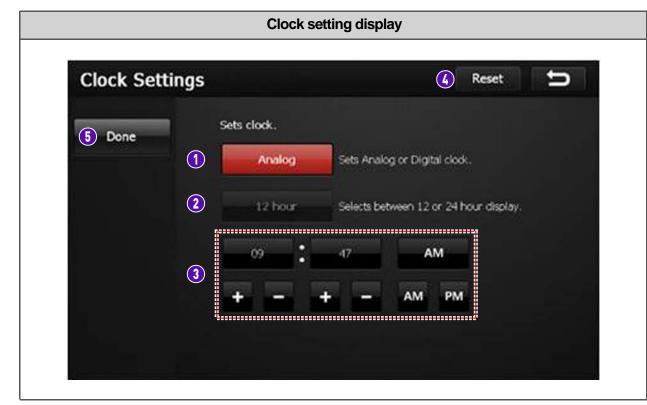
### (3) Clock setting



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



- 2. The Clock setting screen is displayed.
  - Analogue clock
  - 12-hour clock

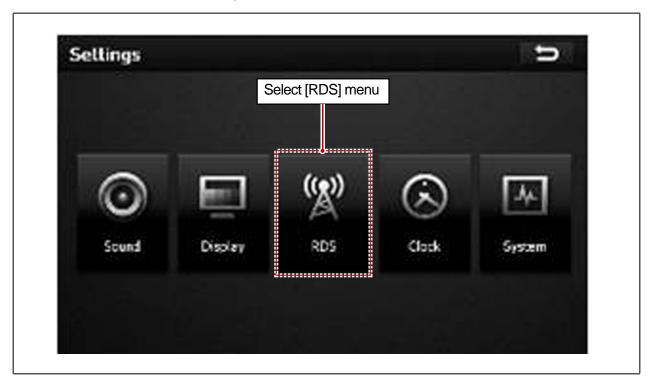


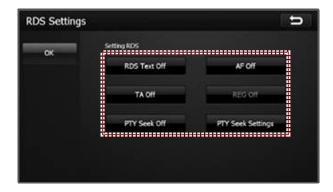
No.	Button	Description
1	Analogue clock	Selects between Digital or Analogue clock (Default: Analogue clock)  1. Use this button to select the type of clock displayed on the POWER OFF screen.  2. When Analogue clock is selected, the [12-hour clock] button is disabled.
2	12-hour clock	Selects between 12-hour or 24-hour clock (Default: 12-hour clock)  1. This button is activated only when [Digital clock] button is selected.
3	Time/AM, PM setting	These buttons are activated regardless of the clock type (Analogue, Digital).     When [AM] or [PM] button is pressed in 24-hour clock mode, the hour format is changed to 12-hour clock mode.
4	Initialization	The time is reset to GPS standard time.
5	Done	-

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### (4) RDS Settings

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



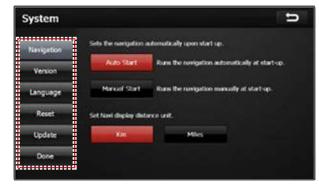


- 2. The RDS setting screen is displayed.
  - RDS Text ON/OFF
  - AF(Alternative Frequencies) ON/OFF
  - TA(Traffic Announcement) ON/OFF
  - REG(Regional) ON/OFF
  - PTY(Programme Type) Seek ON/OFF
  - PTY(Programme Type) Seek Settings

### (4) System setting



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

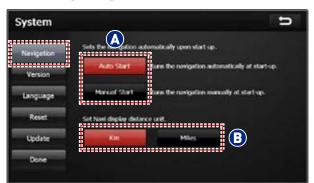


- 2. The System setting screen is displayed.
  - Navigation
  - Version
  - Language
  - Reset
  - Update
  - Done



When entering the System setting screen, the Navigation automatic run/manual run screen is displayed.

### ► Setting navigation automatic run/manual run



- 1. Select [Navigation] menu displayed on the System setting screen.
  - A. When the vehicle is started, you can set the navigation automatic run/manual run.
  - B. You can select the unit of distance from "km" and "mile".

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#### ► Checking system version



- 1. You can check the version of the system.
  - Model
  - Boot loader version
  - OS version
  - Application version
  - AV MICOM version
  - Bluetooth version

#### **▶** Language



1. Select [Language] menu displayed on the System setting screen.



- 2. The Language setting screen is displayed.
  - English
  - French
  - Italian
  - German
  - Spanish
  - Dutch
  - Russian

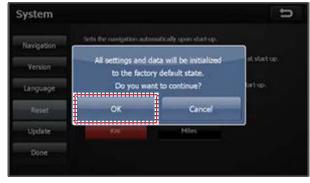
#### ▶ Reset

The AVN system can be initialized by using the [Reset] menu of System setting or hard key under the AVN head unit front screen.

#### - Reset by System setting menu

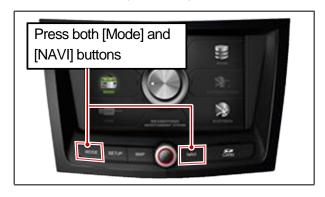


1. Select [Reset] button on the System setting screen.



2. A confirm message is displayed. When the [OK] button is pressed, the initialization starts.

#### - Initialization by Hard key



1. Press and hold both the [Mode] and [NAVI] buttons under the AVN head unit front screen.



2. The system is rebooted following the booting screen and log screen.



#### CAUTION

After the initialization, all the system returns to the state programmed at the factory. Inform the driver and obtain consent before the initialization.

Modification basis	
Application basis	
Affected VIN	

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

Item	Mode	Description		
Radio	FM1	87.5 MHz		
USB	Video	File	Automatic selection	
		Play time	00:00	
		Play/Stop	Play	
		Repeat mode	All (All/Folder/1)	
		Subtitle font size	Big (Big/small)	
		Screen mode	Full screen (Full screen/Normal screen/Wide screen)	
	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)	
	Photo	File	Automatic selection	
		Slide show	OFF	
		Slide show time	5 sec. (5 sec./10 sec./30 sec.)	
		Rotate	0 (+90/-90)	
		Frame	Black	

Item	Mode	Description		
Bluetooth	Pairing	Not paired		
	Settings	Bluetooth use	Yes	
		Automatic connection	Automatic	
		Automatic connection phone list	Empty	
		Device name	Ssangyong	
		Verification number	1234	
	Phone number	Outgoing call	Empty	
		Incoming call	Empty	
		Missed call	Empty	
	Phone book list	Em	pty	
	Microphone volume	3	3	
	Hands-free volume	1:	5	
	A2DP volume	1:	5	
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	
	Navigation setting	Automatic run		
Volume	AV volume	15		
	Navigation volume	15		
	HDMI volume	1:	5	

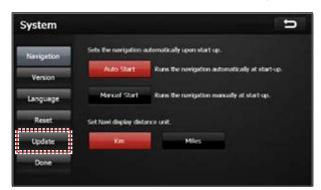
Modification basis	
Application basis	
Affected VIN	

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#### ► AVN system update

- Update is needed for enhancing the software and new features.
- Remove the SD card and update the system as follows.



 Select [Update] button on the System setting screen.



- 2. Insert the USB key which has upgrade files and select [OK] button.
- The system is automatically updated. When the update is completed, the FM mode screen is displayed and the customize information stored in radio mode is initialized.



#### **Navigation upgrade**

- To upgrade the navigation system, insert the SD card into the computer.

The update may require tens of minutes depending on the data amount.

If the power is cut off during the update or the USB memory stick is removed from the computer, the data may be lost. Update the system with the engine running.

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# 2. SYSTEM LAYOUT





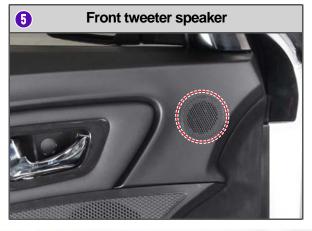


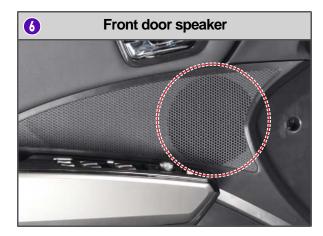




AVN

Modification basis TIVOLI 2015.03 Application basis Affected VIN

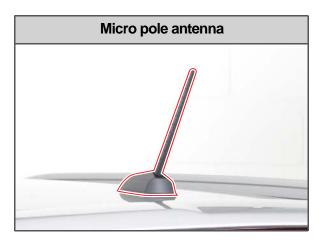












Modification basis	
Application basis	
Affected VIN	

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### 3. COMPONENTS

# Audio remote control switch



Outputs the signal when power, mode, volume up/down, handsfree, seek up/down, or mute switch is operated.

# Bluetooth (hands-free) microphone



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.

#### **HDMI** jack

TIVOLI



Sends USB signals and HDMI signals.

#### SD memory card



The slot for SD memory card is provided to read map data.

#### **AVN** head unit



The AVN system plays radio, audio and video files in various formats. The system also has navigation and Bluetooth functions. The system is equipped with the touchscreen for the best user experience.

Door unlock signal

Vehicle speed signal

#### Rearview camera



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 antenna



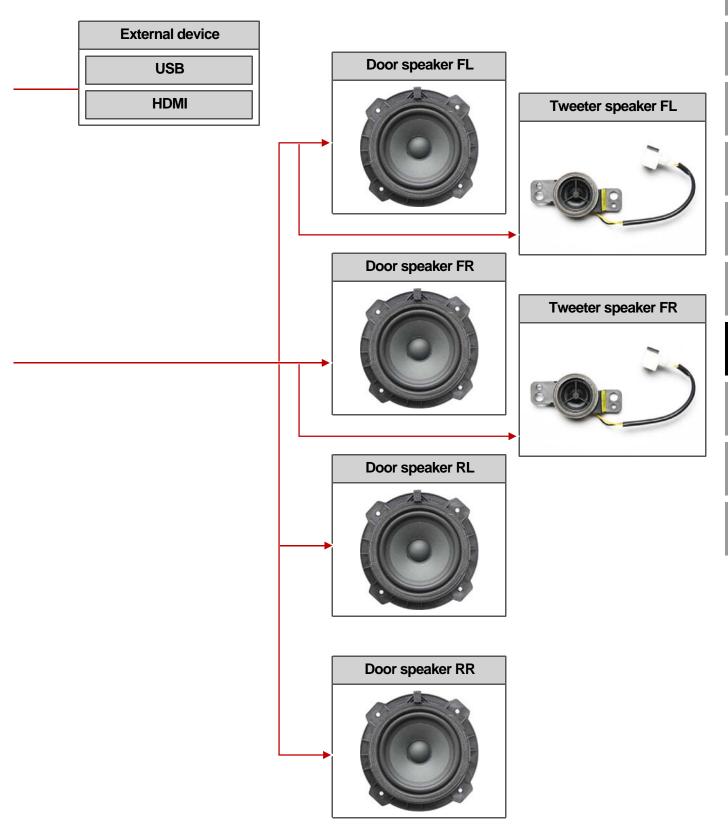
The antenna is integrated with the GPS+Glonass antenna, radio antenna.

#### **Bluetooth (hands-free)**



Once the pairing is completed after searching for the Bluetooth phone, you can use a various functions and contents in the phone via Bluetooth.

#### AVN



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### 4. AVN HEAD UNIT BOOTING SEQUENCE

#### - POWER OFF to ACC

The AVN head unit in sleep mode requires about 15 seconds to complete the booting process after receiving the operating signal. To reduce the booting time, the system mode needs to be changed from sleep mode to standby mode after receiving the door unlock and ACC signals.

#### - START switch ACC (ON) to OFF

When the ignition key is turned OFF with the AVN head unit ON, the AVN head unit enters standby mode. Then the system decides whether it enters sleep mode or normal mode based on the conditions.



### 🕹 NOTE

### What is standby mode?

The standby mode means that the system maintains its settings for 3 minutes. And it includes the following status:

- 1. Normal standby with the AVN head unit screen OFF
- 2. Waiting for other operation signal input within 3 minutes after the ignition is turned OFF.



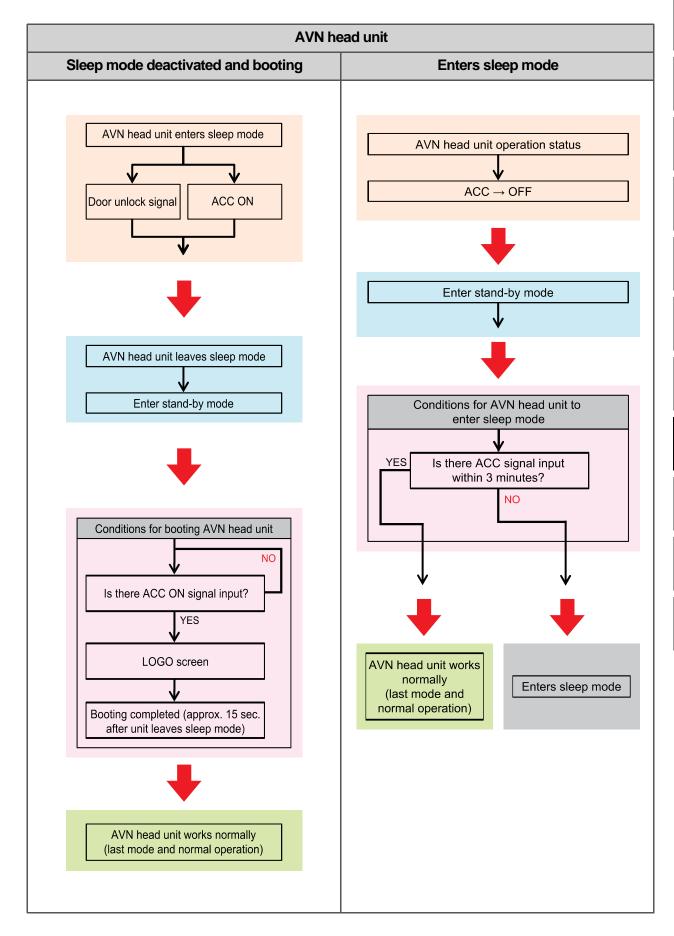
### 🕹 NOTE

#### What is sleep mode?

All power supplies are cut off, except the power for the device used to inform reactivation of the system in order to prevent the battery from being discharged.

Total dark current of AVN system in low current consumption mode: MAX 3.0 [mA]

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Modification basis	
Application basis	
Affected VIN	

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# 5. FEATURES

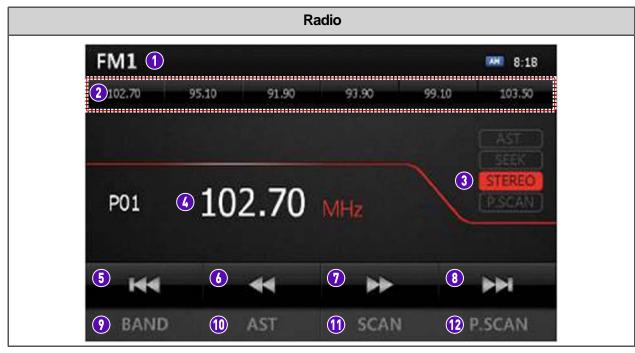
# 1) Switch Functions



No.	Name	Description
1	LCD display	- 7" TFT WVGA LCD (Resolution: 800X480) - Normal screen, Full screen, or Wide screen is selectable depending on the video.
2	Mode	<ul> <li>Main mode selection screen</li> <li>Turning ON the AV mode displays main screen regardless of AV power status.</li> <li>Press and hold for 1.5 sec. or more in Navigation mode to enter AV mode.</li> </ul>
3	SETUP	<ul> <li>- Press and hold for 1.5 sec. or more in any mode to display Configuration screen.</li> <li>- Press briefly in Navigation mode to display navigation menus.</li> <li>- Press briefly in radio mode to display RDS menus.</li> </ul>
4	MAP	<ul> <li>Pressing this button puts the system in Navigation mode and displays current location on the screen regardless of AVN power status.</li> <li>In Navigation mode, current location is displayed.</li> <li>If the system is not in Navigation mode, only Navigation mode is activated with no current location displayed.</li> </ul>
5	POWER/VOL	<ul> <li>Used when turning AVN on or off, or adjusting sound volume.</li> <li>Pressing this button briefly puts the system in Navigation mode.</li> <li>Press and hold for 1.5 sec. or more with AVN ON or OFF to display clock (AVN goes off).</li> <li>Turning left or right adjusts volume (Range: 0 to 45).</li> </ul>
6	NAVI	<ul> <li>Pressing this button puts the system in Navigation mode</li> <li>In Navigation mode.</li> <li>If the system is not in Navigation mode, only Navigation mode is activated with no current location displayed.</li> </ul>
7	SD memory card slot	- 8G SD card (with navigation map)

### 2) AVN LCD Screen

### (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	- AST/SEEK/STEREO/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 (FM: 0.1MHz/AM: 9kHz).
7	TUNE UP	- Goes up the radio frequency by 1 step (FM: 0.1 MHz/AM: 9 kHz).
8	SEEK UP	- Searches automatically for the strongest station by going up the radio frequency.
9	BAND	- 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.

Modification basis	
Application basis	
Affected VIN	

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### (2) Media mode



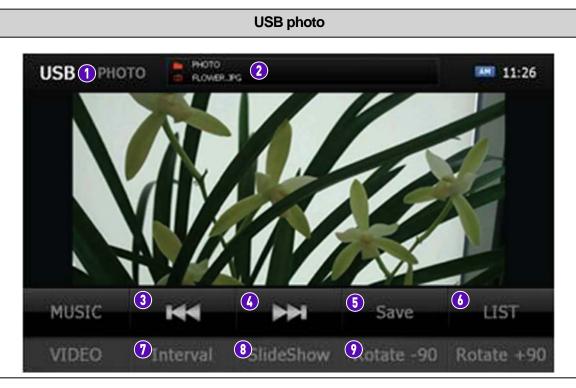
No.	Name	Description
1	Selected mode	- Selected mode is displayed (one of USB video, Music, or Photo).
2	Indicator	- Displays selected repeat pattern.
3	MUSIC	- Runs Media music mode.
4	TRACK DOWN	- Plays previous video while playing a video.
5	PLAY/PAUSE	- Plays or pause a video.
6	TRACK UP	- Plays next video while playing a video.
7	LIST	- Displays the list of video files stored in the USB memory.
8	РНОТО	- Runs Media photo mode.
9	RPT	- Selects repeat pattern in order of current video, all videos in folder, all videos each time the button is pressed.
10	SMALLER	- Selects subtitle font size between small and big each time the button is pressed.
11	NORMAL	- You can select one of Normal screen, Wide screen, or Full screen mode.



No.	Name	Description
1	Selected mode	- Selected mode is displayed (one of USB video, Music, or Photo).
2	Move to parent folder	- Moves to upper level folder of the current one (one step up).
3	Move to subfolder	- Moves to lower level folder of the current one (one step down).
4	Folder name and File name	- Displays the names of current folder and music file currently played.
5	INFO	- Displays the detailed information of music file currently played.
6	Indicator	- Displays the selected mode (one of Random, Repeat, Intro).
7	TRACK DOWN	- Plays the previous music file while playing a song.
8	PLAY/PAUSE	- Plays or pause music.
9	TRACK UP	- 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.

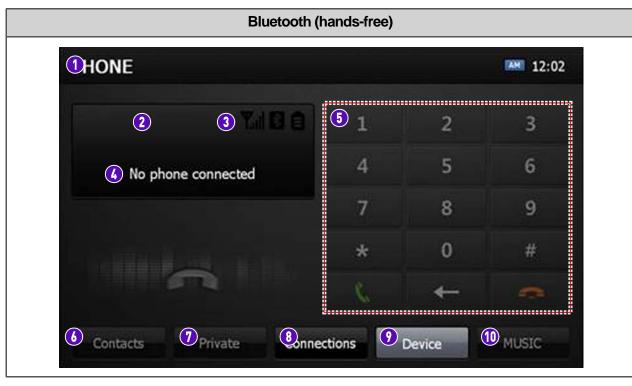
Modification basis	
Application basis	
Affected VIN	

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No.	Name	Description
1	Selected mode	- Selected mode is displayed (one of USB video, Music, or Photo).
2	Display	- Displays the current photo file.
3	TRACK DOWN	- Displays the previous image file while displaying an image file.
4	TRACK UP	- Displays the next image file while displaying an image file.
5	SAVE	- Stores the current image as an image which will be displayed if the screen is turned off.
6	LIST	- Displays the list of image files stored in the USB memory.
7	Time interval	- Determines the time interval of slide show.
8	Slide show	- Displays all image files stored in the USB memory in sequence for a preset time interval.
9	Rotate	- Rotates the image by -90 (counterclockwise)/+90 (clockwise).

### (3) Bluetooth mode



No.	Name	Description
1	Selected mode	- Selected mode is displayed (one of Bluetooth music or Phone mode).
2	Name of paired phone	- The name of paired phone is displayed.
3	Phone information	- Information regarding antenna strength, pairing status, and battery strength of the paired phone is displayed.
4	Call status	- Displays dialed numbers, received calls, and registered names.
5	Dial and number soft key	- Used for dialing the number to make a call.
6	Contacts	- Downloads the phonebook from the cell phone. Shows the recent call list.
7	Private	- Switches between handsfree and private call.
8	Connections	- Registers/deletes or connects/disconnects a Bluetooth device.
9	Settings	- Used to change the settings of Bluetooth device of this system.
10	MUSIC	- Switches to Bluetooth MUSIC screen.

Modification basis	
Application basis	
Affected VIN	

08-34 8913-01 T I V O L I

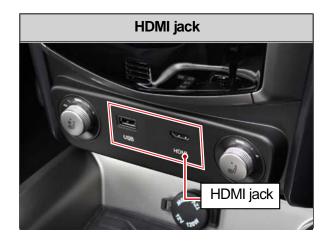


No.	Name	Description
1	Selected mode	- Bluetooth music mode is displayed.
2	PLAY/PAUSE	- Plays or pause a song.
3	TRACK DOWN	- Plays the previous music file while playing a song.
4	TRACK UP	- Plays the next music file while playing a song.
5	PHONE	- Switches to Phone mode. Pressing this switch during a song play switches the system to Phone scree but keeps playing the song.

### 3) External Device Connection

#### ► HDMI







1. Select [Mode] button under the AVN head unit front screen.



2. Select [HDMI] button to run HDMI mode. If no device is connected to the HDMI jack, the system will not enter HDMI mode.



If the external device connected to the HDMI jack is disconnected while the media file is playing, the system enters the previously selected mode.

Modification basis	
Application basis	
Affected VIN	

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 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.)

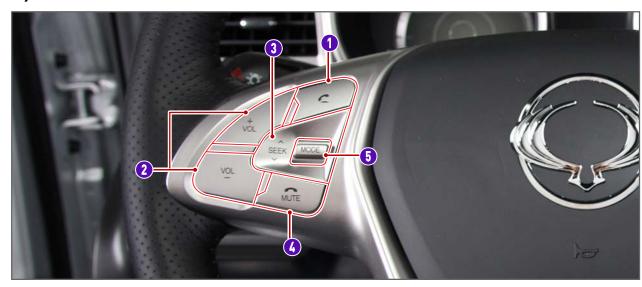




#### A CAUTION

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

### 4) Audio Remote Control Switch Functions



No.	Name	Description	
1	Bluetooth (handsfree) switch	Phone switch which is used for Bluetooth handsfree call with a mobile phone.	
2	Volume up/down switch	- Increases/decreases volume	
3	SEEK up/down switch	In file play mode - Pressing SEEK up/down switch: Moves to previous/next file while a MP3 or video file is playing. In radio mode - Pressing SEEK up/down switch: Searches for radio stations manually, moves to channel stored Pressing and holding SEEK up/down switch: Searches for radio stations automatically.	
4	Power/mute switch	With audio power ON - Press and hold to switch it off - Press the switch briefly to mute and press it again to unmute	
5	Mode switch	Press and hold the switch to change the audio mode (AM, FM1, FM2).	

Modification basis	
Application basis	
Affected VIN	

8913-01 08-38 T I V O L

#### 6. NAVIGATION SYSTEM

#### 1) Overview

- The navigation system is a high-end system which displays the vehicle's location and driving direction on the real-time digital road map, utilizing location information received from satellites of the GPS, vehicle speed information received from the vehicle speed sensor and information received from the gyro compass, which is built in the navigation system.
- When a destination is set, this system shows a route to that destination in real time.



#### WARNING

- The navigation system is only a supplement device to facilitate convenient driving.
- If operating the system frequently or keeping watching the screen, an accident may occur.



#### A CAUTION

The digital map display images used in this manual may differ from actual display due to updates and modifications of the system.

#### **2) GPS**

- The GPS is an abbreviation for Global Positioning System, which is also called as Satellite Navigation System.
- If the system can receive signals from 4 or more GPS satellites among 24 satellites at an altitude of 20,231 km, it determines the distance between the vehicle and each satellite and between the satellites to find the current location of the vehicle by triangulation process.



#### A CAUTION

There can be tolerance between the actual vehicle location and the location displayed on the digital map due to a weather condition, geographical circumstances and GPS satellite condition.

#### 3) Tolerance of Actual Vehicle Position by Road Condition

There can be tolerance between the actual vehicle location and displayed location on the digital map depending on road conditions as follows, which is not malfunction:

- A road with many curves
- A road with a sharp curve
- A road in gridiron patterns
- Curves on intersection
- A bumpy road with many curves
- Slippery road, such as icy or rainy roads
- A road not displayed on the map
- A parking lot (driving at low speed)
- A road parallel with its adjacent road
- A Y-shape road with small degree of angle
- A ferry course
- A complex and narrow road

#### 4) If GPS Signals is Weak or Cannot be Detected

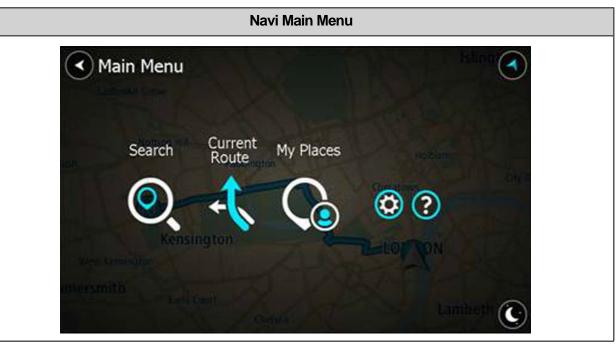
GPS signals cannot be received or used due to poor reception under the following cases. In the following cases, the system corrects the vehicle location using the vehicle speed information and the value measured by the gyro compass, which is built in the navigation system.

- The vehicle is in an underground parking lot or parking building
- The vehicle is driven at entry or exit of a tunnel or through a tunnel.
- The vehicle is driven through an area with thick woods.
- The vehicle is driven through a dense area with high-rise buildings.
- The vehicle is driven under an overpass.
- The vehicle is driven on a road along a valley.

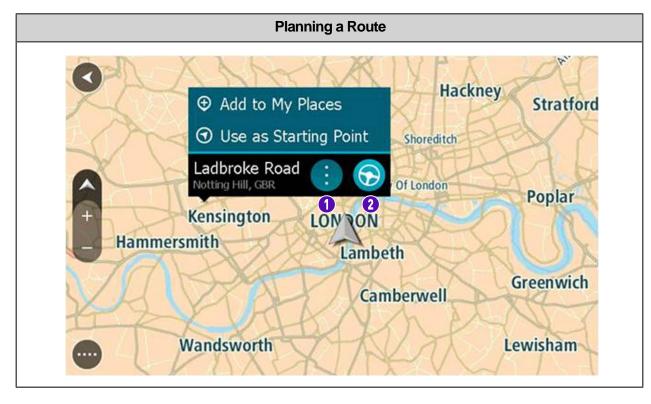
#### CAUTION

- This device supports the provided SD card.
- This SD card has map files. Do not delete or modify them. Remove the card only when an update is needed.
- Do not copy the data on the SD card to other SD card. The system may not recognize the files or there is a high risk of malfunctions.
- Formatting the SD card erases all data. Back up important data before formatting.
- The provided SD card is only for the vehicle. Copying files other than the map data may cause malfunctions.

### 5) Map Display



Icon	Description
0	Displays the keyboard used to search destinations.
1	Used to set Clear Route/Change Route Type/ Avoid on This Route/Play Route Preview.
	Used to set/check Home/Recent Destination.
	Used to set Appearance/Route Planning/Sounds & Warnings/System.
	Used to change the map screen brightness between Day/Night modes.
?	Help mode.





Modification basis	
Application basis	
Affected VIN	

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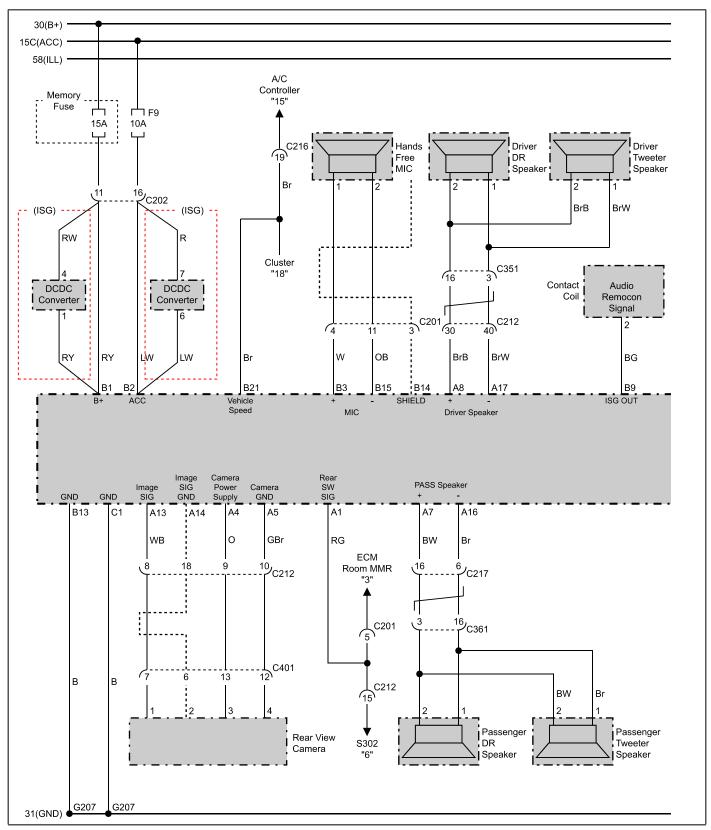
No.	Name	Description
1	Pop-up Menu button	Displays Add to My Places/Use as Starting Point at the top side.
2	Drive Button	Displays the route between the current location and destination.
3	Switch view button	Switches the map between 2D and 3D.
4	Zoom buttons	Zooms the map screen in (+) and out (-).
5	Your destination	Destination
6	Route Bar	Displays the remaining distance and estimated time.
7	Main Menu	Returns to the Main Menu.

Memo		
Weme		

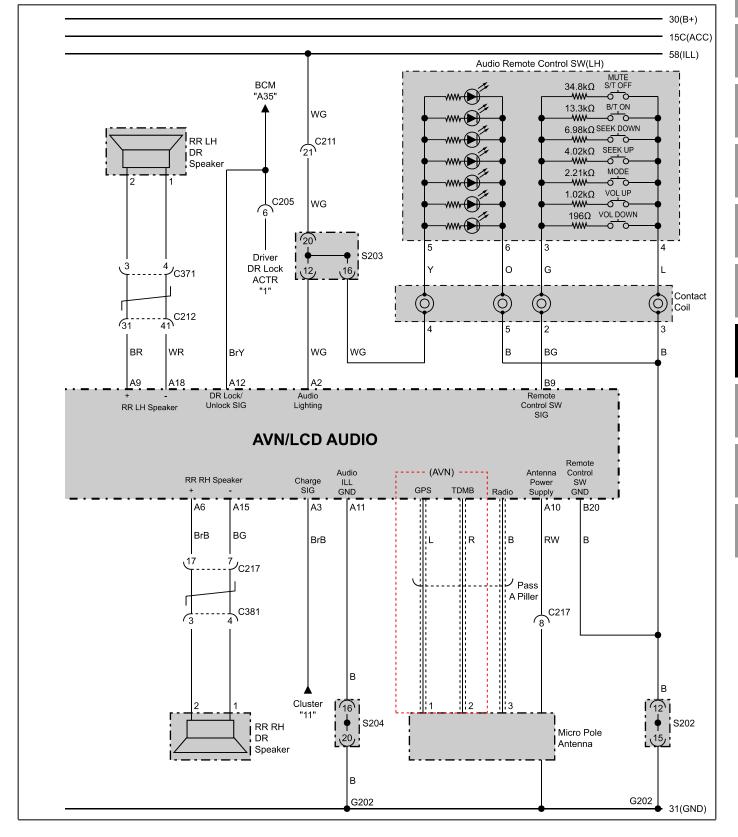
08-44 8913-01 T I V O L I

#### 7. CIRCUIT DIAGRAM

#### ► Audio, remote control, antenna, rearview camera, speaker

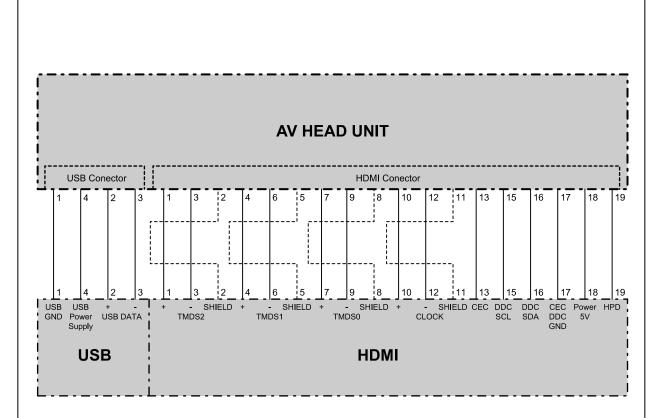


#### AVN



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#### ▶ USB/HDMI jack



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

AVN

TIVOLI 2015.03

Modification basis	
Application basis	
Affected VIN	

### CONFIGURATION AND FUNCTIONS

## 8910-05 AVN HEAD UNIT ASSEMBLY

#### 1) Overview

The AVN head unit consists of the audio, video, and navigation systems. The AVN head unit supports various forms of multimedia including videos, audio files, photos.

### 2) Mounting Location

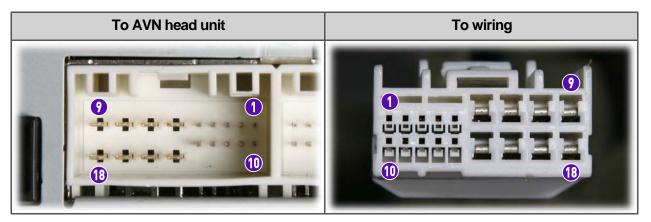


Modification basis	
Application basis	
Affected VIN	

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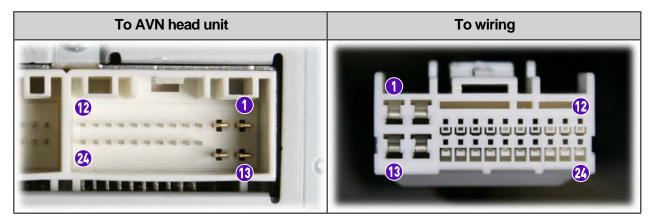
### 3) Connector

#### ► AVN A connector



Pin No.	Function	Pin No.	Function
1	Rear switch signal	10	Antenna power supply
2	Audio lighting	11	Audio lighting ground
3	Charge signal	12	Door lock/unlock signal
4	Camera power supply	13	Image signal
5	Camera ground	14	Image signal ground
6	Rear right speaker +	15	Rear right speaker -
7	Passenger side speaker +	16	Passenger side speaker -
8	Driver side speaker +	17	Driver side speaker -
9	Rear left speaker +	18	Rear left speaker -

#### ► AVN B connector

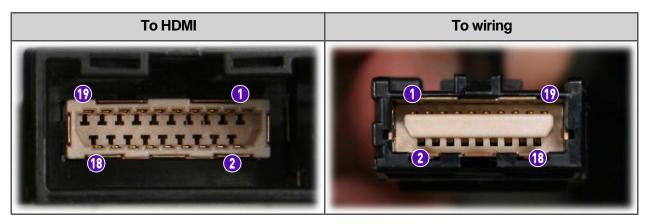


Pin No.	Function	Pin No.	Function
1	B+	13	Ground
2	ACC	14	Microphone ground
3	Microphone +	15	Microphone -
4	-	16	-
5	-	17	-
6	-	18	SHIELD
7	-	19	-
8	-	20	Remote control switch ground
9	Remote control switch signal	21	Vehicle speed
10	-	22	-
11	-	23	-
12	-	24	-

Modification basis	
Application basis	
Affected VIN	

08-50 8913-01 T I V O L I

#### **▶** HDMI connector



Pin No.	Function	Pin No.	Function
1	TMDS2+	11	CLOCK-SHIELD
2	TMDS2 SHIELD	12	CLOCK -
3	TMDS2 -	13	CEC
4	TMDS1+	14	-
5	TMDS1 SHIELD	15	DDC-SCL
6	TMDS1 -	16	DDC-SDA
7	TMDS0+	17	CEC/DDC ground
8	TMDS0 SHIELD	18	Power supply (5 V)
9	TMDS0 -	19	HDP
10	CLOCK+		

- HDMI: High Definition Multimedia Interface

- TMDS: Transition Minimized Differential Signaling

- CEC: Consumer Electronics Control

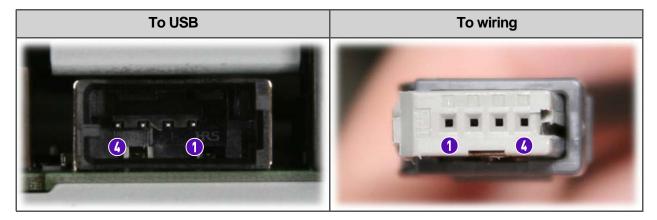
- DDC: Display Data Channel

- SCL: Serial Clock Line

- SDA: Serial Data Line

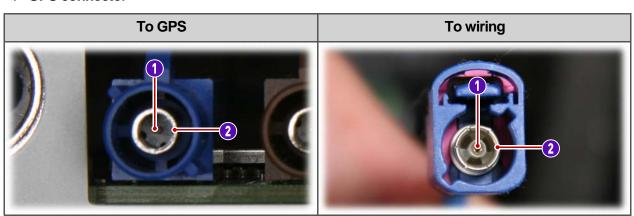
- HPD: Hot Plug Detect

#### **▶** USB connector



Pin No.	Function	Pin No.	Function
1	USB ground	3	USB data (-)
2	USB data (+)	4	USB power supply

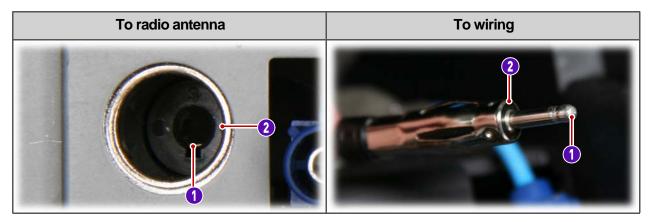
#### **▶** GPS connector



Pin No.	Function	Pin No.	Function
1	Signal	2	Ground

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#### ► Radio antenna connector



Pin No.	Function	Pin No.	Function
1	FM/AM	2	Ground

## 4) Operation Specifications for AVN Head Unit

	Used for	Operating range		Current consumption
Battery	AVN head unit main power source	9V < V < 16V (13.5V)		MAX. 15A
ACC	ACC power supply		. 18.0V _ Min 12V)	MAX. 1A
Generator	Detects the engine operation and use the signal as a reference signal to prevent the battery from being discharged.	VL ≤ 0.5V		MAX. 15mA
Reverse signal	Feeds this signal during reverse		V < 18V 3.5V)	MAX. 1A
Speed sensor	The vehicle speed signal input is used for regulating the driving.	VL ≤ 0.5V		MAX. 15mA
Door UNLOCK	Door unlock signal input	VL ≤ 0.5V		MAX. 15mA
Steering wheel switch signal	Steering wheel signal input	0V < V < 5V		MAX. 100mA
USB	USB power supply	5V ± 10%		MAX. 100mA
Sound output (built in AMP)	Outputs audio signal as a differential AMP output (FL, FR, RL, RR)	<b>MAX. 22W</b> , 4 ± 6Ω		-
Rearview camera input	Rearview camera signal input	0.7V RMS NTSC		-
Rearview camera power supply	Rearview camera power supply	6 ~ 9V Power supply (6.5V)		60mA
Integrated pole	Integrated pole antenna	Radio	10.5V ~ 16V	100mA
antenna	power supply	GNSS	4.5V ± 5.5V	30mA
HDMI	HDMI signal input	Core power supply	1.17V~1.89V	188.1mA at 1.8V
		I/O power supply	3.14V~3.46V	178.5mA at 3.3V

Modification basis	
Application basis	
Affected VIN	

## 8910-10 USB AND HDMI JACK ASSEMBLY

### 1) Overview

The USB and HDMI jack assembly is an external input port assembly which enables users to enjoy media files stored in an external device played on the AVN head unit. The assembly consists of the USB port and HDMI port.

#### 2) Mounting Location



### 8930-26 MICRO POLE ANTENNA ASSEMBLY

### 1) Overview

The micro pole antenna is mounted on the roof frame and consists of GPS, radio functions. The integrated elements vary depending on vehicle model.

### 2) Mounting Location



### 3) Connector

#### ► Antenna connector

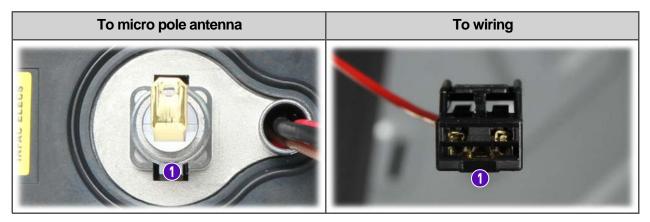
To micro pole antenna	To wiring

Pin No.	Function	Pin No.	Function
1	GPS: Blue	3	Radio: Black
2	-		

Modification basis	
Application basis	
Affected VIN	

08-56 8913-01 T I V O L I

#### **▶** Power connector



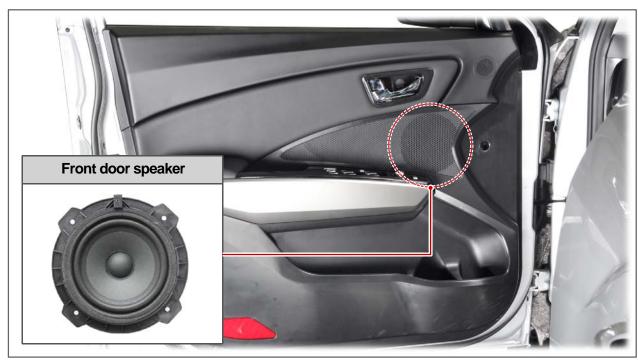
Pin No.	Function
1	Power supply

### 8610-22 FRONT DOOR SPEAKER ASSEMBLY

### 1) Overview

The front door speakers are built-in AMP type and mounted on the inside surface of the driver's and passenger's door trims.

### 2) Mounting Location



### 3) Connector

To front door speaker	To wiring
2 1	

Pin No.	Function	Pin No.	Function
1	Ground	2	Power supply

Modification basis	
Application basis	
Affected VIN	

08-58 8913-01  $\mathbf{T} \quad \mathbf{I} \quad \mathbf{V} \quad \mathbf{0} \quad \mathbf{L} \quad \mathbf{I}$ 

### 8610-22 REAR DOOR SPEAKER ASSEMBLY

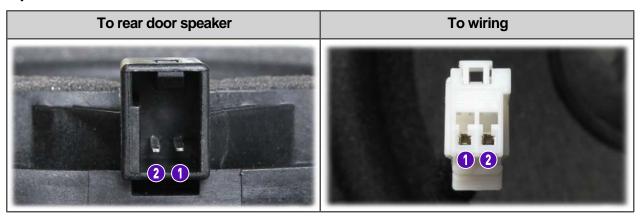
### 1) Overview

The rear door speakers are built-in AMP type and mounted on the inside surface of the rear left and right door trims.

## 2) Mounting Location



### 3) Connector



Pin No.	Function	Pin No.	Function
1	Ground	2	Power supply

AVN

AVN	Modification basi	s
TIVOLI 2015.03	Application basi	s
	Affected VIN	

### 8910-25 FRONT TWEETER SPEAKER ASSEMBLY

### 1) Overview

The front tweeter speakers are mounted on the inside surface of the driver's and passenger's door trims.

### 2) Mounting Location



### 3) Connector

To front tweeter speaker	To wiring
	1 2

Pin No.	Function	Pin No.	Function
1	Ground	2	Power supply

Modification basis	
Application basis	
Affected VIN	

08-60 8913-01 T I V O L I

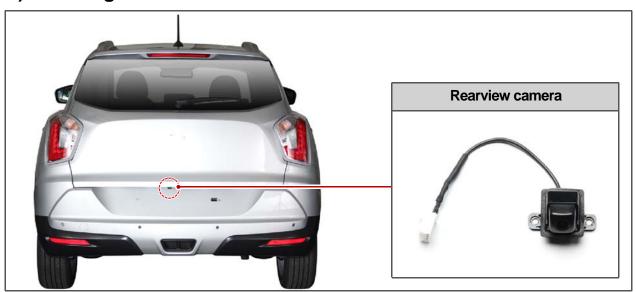
#### 8610-30 REARVIEW CAMERA ASSEMBLY

#### 1) Overview

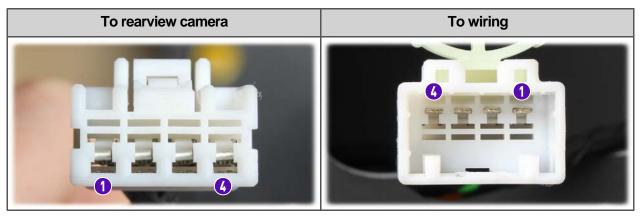
The rearview camera assembly displays the rear area of the vehicle on the LCD screen of the AVN system. When the TGS lever is shifted to R position, the rear area of the vehicle is displayed on the LCD screen automatically.

When the AVN head unit receives a reverse driving signal from the TGS lever unit during reverse driving, it supplies the operating power to the rearview camera which then transmits video signals to display the rear area on the monitor.

#### 2) Mounting Location



### 3) Connector



Pin No.	Function	Pin No.	Function
1	Image signal	3	Camera power supply
2	Image signal ground	4	Camera ground

#### **AVN**

#### 4) Operating Process

For a vehicle equipped with rearview camera, the rear view is displayed on the monitor when shifting the gear selector lever to "R" position, for safe parking.

The operating conditions are as follows:

#### Characteristics of rearview camera

- The image of the rearview camera overrides the image of AVN system.
- Even if the monitor is off, the power will be supplied to the monitor to display the rear view when shifting the gear selector lever to "R" position. Under this condition, shifting the gear selector lever to any position except "R", cuts off the power to the monitor.

#### Operating conditions of rearview camera

- Even if the image of the rearview camera overrides the image of AVN, the rearview camera cannot operate alone. If the gear selector lever stays in "R" position for more than 3 seconds with the ignition switch ON or engine running, the rear view is displayed on the monitor automatically, no matter what is currently displayed.

#### Rearview camera operation mode

#### - Automatic operation mode

When selecting R position while AVN system is not in use (Ignition switch "ON" or engine running): The LCD screen of AVN system is automatically turned on to display rear area of the vehicle. The screen is automatically turned off when shifting out from "R" position.

#### - Switching mode

When selecting R position while AVN system is in use (Ignition switch "ON" or engine running): The LCD screen of AVN system is automatically changed to rearview monitoring mode. The screen returns to the previous mode when shifting out from "R" position. However, the audio stays on even in the rearview monitoring mode.



The actual distance may differ from what you see from the monitor because the rearview camera uses a wide-angle lens to have a large clear view. Therefore, you should check the rearview mirrors and the area behind the vehicle before and while moving backward. The rearview camera does not show the entire area behind the vehicle.

Keep the camera lens clean using a camera lens cleaner so that the lens is free of foreign matter.

Modification basis	
Application basis	
Affected VIN	

08-62 8913-01 T I V O L I

# 8610-37 BLUETOOTH (HANDS-FREE) MICROPHONE ASSEMBLY

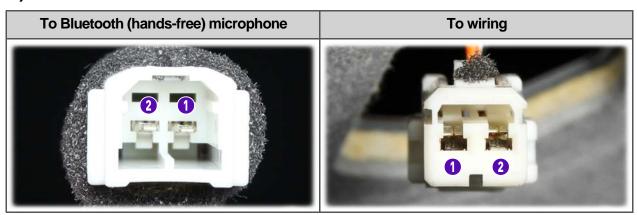
### 1) Overview

This enables the driver to talk on the phone comfortably and safely by putting the cellular phone at the designated place or on holder without having to hold it during driving.

#### 2) Mounting Location



#### 3) Connector



Pin No.	Function	Pin No.	Function
1	Power supply	2	Ground

**AVN** 

Modification basis	
Application basis	
Affected VIN	

### 8630-10 AUDIO REMOTE CONTROL SWITCH ASSEMBLY

### 1) Overview

The audio control switch assembly installed on the left side of the steering wheel controls the audio remote control system. The audio remote control switch assembly consists of the Bluetooth handsfree switch, SEEK UP/DOWN switch, volume UP/DOWN switch, audio power switch, and audio operation mode switch.

#### 2) Mounting Location



### 3) Connector

To power window main switch	To wiring

Pin No.	Function	Pin No.	Function
1	-	4	Audio remote control switch signal ground
2	-	5	Illumination power supply
3	Audio remote control switch signal	6	Illumination ground

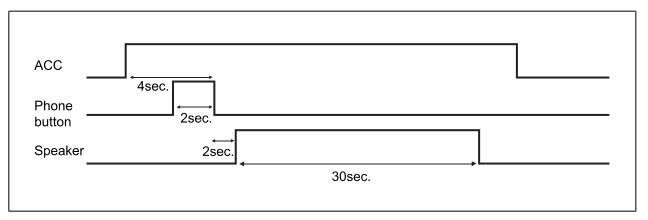
Modification basis	
Application basis	
Affected VIN	

08-64 8913-01 T I V O L I

#### 4) Self Diagnosis for Bluetooth

 When the phone button of the audio remote control switch assembly is pressed for 2 seconds or more with 4 seconds after the ACC is turned ON from OFF, a beep sounds and then a howling sound is heard through the front tweeter speaker for 30 seconds.

Pressing the phone button again or turning ACC to OFF stops the self diagnosis immediately.Do not operate other buttons or keys other than the ones needed for the self diagnosis. There is a risk of malfunctioning.



#### ⊌

#### NOTE

## Procedures when no howling sound is heard or the howling time does not meet the specification

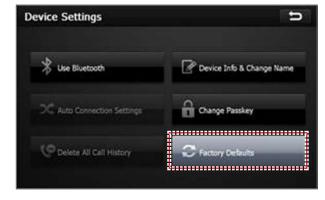
- 1. Initialize the Bluetooth.(Refer to Initialization of the Bluetooth)
- 2. Reconnect the device by Bluetooth pairing.
- 3. If the same symptom appears again, connect other device.
- 4. If other device is connected normally, the Bluetooth function of the first device may be malfunctioning.
- 5. If other device shows the same problem, the head unit may have internal problems. Check the Bluetooth microphone or hands-free phone switch installed on the steering wheel for electrical circuit.

#### ▶ 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

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## REMOVAL AND INSTALLATION

#### 8910-05 AVN HEAD UNIT

Preceding work

- Disconnect the negative battery cable.





1. Remove the center fascia LH panel by prying off the bottom (A) using a hand remover. (The same method applies to the RH panel.)

#### A CAUTION

Take care not to damage the fixing clips (5 off) when removing the center fascia LH panel.

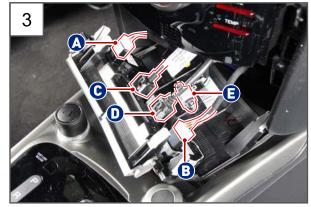
Front view	Rear view

AVN

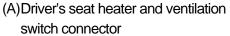
Modification basis TIVOLI 2015.03 Application basis Affected VIN



2. Prise apart the center fascia front seat heater switch assembly panel with a hand remover.

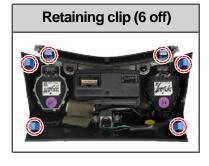


3. Disconnect the connectors at the rear side of the front seat heater switch assembly panel.



- (B)Passenger's seat heater switch connector
- (C)USB connector
- (D)HDMI connector
- (E)IP center lower mood lamp connector
- 4. Remove the front seat heater switch assembly panel completely.







5. Unscrew the 4 mounting screws for the heater and A/C control assembly.

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Disconnect the heater and A/C control assembly connector (A) at the rear side of the heat and A/C control assembly by prising the assembly off.



7. Remove the heater and A/C control assembly.



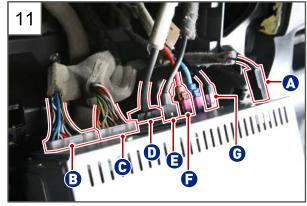
8. Unscrew the 2 mounting screws (A) for the center fascia switch assembly.



9. Disengage the center fascia switch assembly and pull it down.



10.Unscrew the 4 mounting screws for the AVN head unit and pull it down.



- 11. Disconnect the AVN head unit connector.
  - A. Ground
  - B. AVN head unit B connector
  - C. AVN head unit A connector
  - D. HDMI connector
  - E. USB connector
  - F. GPS antenna connector
  - G. Radio antenna connector



12. Remove the AVN head unit.



13.Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

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### 8910-10 USB AND HDMI JACK ASSEMBLY

Preceding work

- Disconnect the negative battery cable.







 Remove the front seat heater switch assembly.

#### NOTE

Refer to "FRONT SEAT HEATER AND VENTILATION SWITCH ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "SWITCH" section in "ELECTRIC" chapter.

Disengage the USB and HDMI jack assembly mountings at the rear side of the center fascia front seat heater switch assembly panel.





3. Remove the USB and HDMI jack assembly.



4. Install in the reverse order of removal.

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### 8930-26 MICRO POLE ANTENNA

Preceding work

- Disconnect the negative battery cable.



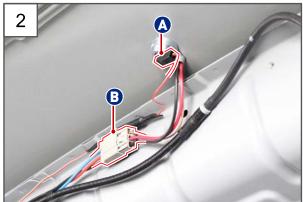


1. Remove the headlining.

#### **♣** NOTE

Refer to "HEADLINING ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "BODY INTERIOR" section in "BODY" chapter.

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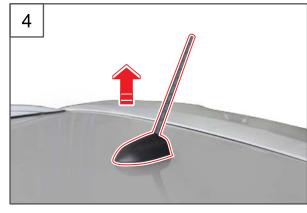
2. Disconnect the power connector (A), GPS/radio (AM, FM) connector (B).

AVN

Modification basis TIVOLI 2015.03 Application basis Affected VIN



3. Unscrew the mounting nut (19 mm) for the integrated micro pole antenna.



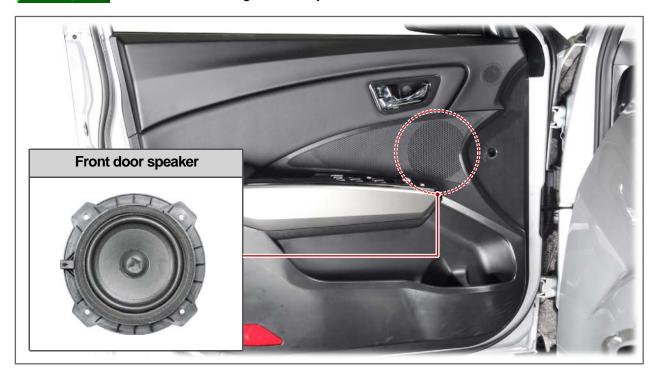
4. Remove the micro pole antenna assembly.



## 8610-22 FRONT DOOR SPEAKER

Preceding work

- Disconnect the negative battery cable.





1. Remove the front door trim.

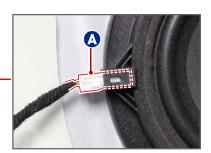


## **♣** NOTE

Refer to "FRONT DOOR TRIM ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "BODY INTERIOR" section in "BODY" chapter.



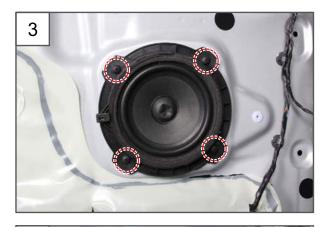
2. Disconnect the front door speaker connector (A).



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3. Unscrew the 4 mounting screws on the front door speaker.



4. Remove the front door speaker.



Modification basis	
Application basis	
Affected VIN	

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## 8610-22 REAR DOOR SPEAKER

Preceding work

- Disconnect the negative battery cable.

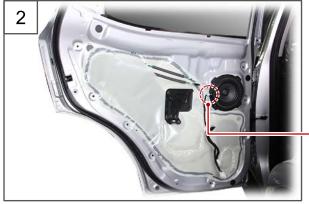




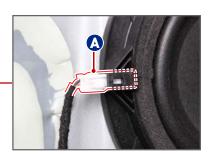
1. Remove the rear door trim.



Refer to "REAR DOOR TRIM ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "BODY INTERIOR" section in "BODY" chapter.



2. Disconnect the rear door speaker connector (A).



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Affected VIN	



3. Unscrew the 4 mounting screws on the rear door speaker.



4. Remove the rear door speaker.



Modification basis	
Application basis	
Affected VIN	

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### 8910-25 FRONT TWEETER SPEAKER

Preceding work

- Disconnect the negative battery cable.





1. Remove the front door trim.



## **♣** NOTE

Refer to "FRONT DOOR TRIM ASSEMBLY" under "REMOVAL AND **INSTALLATION**" subsection of "BODY INTERIOR" section in "BODY" chapter.



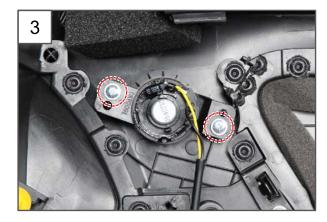
2. Disengage the mounting for the front tweeter speaker.



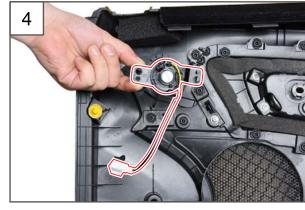
AVN

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Application basis	
Affected VIN	



3. Unscrew the 2 mounting screws on the front tweeter speaker.



4. Remove the front tweeter speaker.

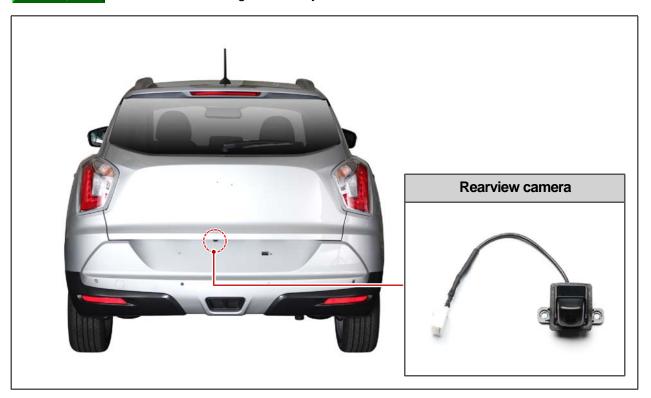


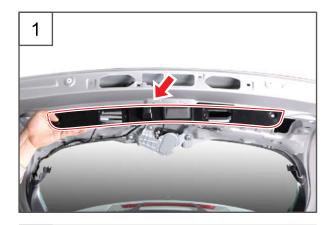
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## 8610-30 REARVIEW CAMERA

Preceding work

- Disconnect the negative battery cable.



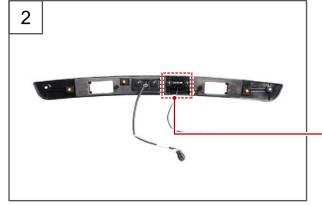


1. Remove the tailgate switch panel.

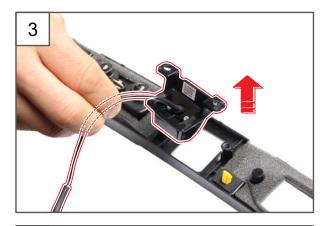


Refer to "TAILGATE SWITCH ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "SWITCH" section in "ELECTRIC" chapter.

2. Unscrew the 2 mounting screws for the rearview camera.



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3. Remove the rearview camera.



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# 8610-37 BLUETOOTHE (HANDS-FREE) MICROPHONE

Preceding work

- Disconnect the negative battery cable.







1. Prise apart the mounting for the Bluetooth (hands-free) microphone with a hand remover.



2. Disconnect the Bluetooth (hands-free) microphone connector (A).



3. Remove the Bluetooth (hands-free) microphone.



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## 8630-10 AUDIO REMOTE CONTROL SWITCH

Preceding work

- Disconnect the negative battery cable.





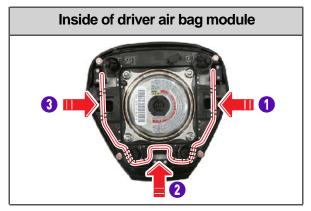
 Remove the driver air bag module from the steering wheel by following the procedures below:

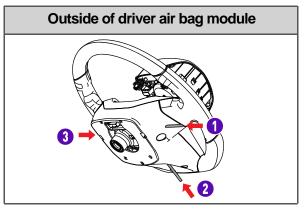


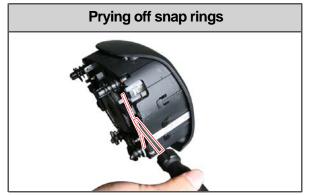
a. Insert a flat bladed screw driver to the 3 holes on the rear side of the steering wheel to press out the snap rings securing the air bag module.

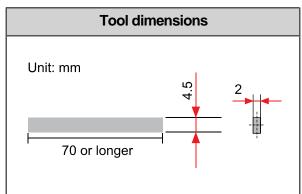
### A CAUTION

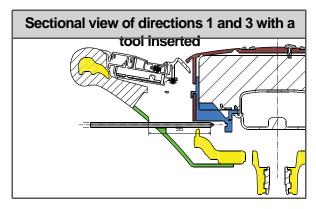
Insert a screwdriver by paying close attention to the short circuit due to wirings in the driver air bag module.

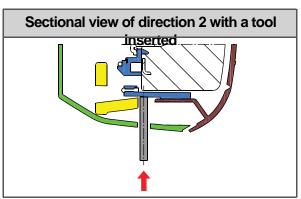












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- b. Lift out the driver's air bag module and disconnect the connectors (A) and (B).
  - (A) Horn connector
  - (B) Driver's air bag module connector



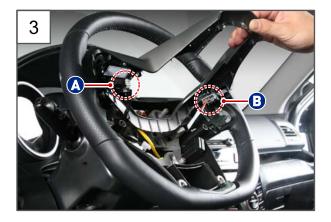
c. Remove the driver's air bag module.



2. Remove the 4 mounting screws for steering wheel upper cover at the back side of the steering wheel.



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3. Remove the steering wheel upper cover and disconnect the connectors (A) and (B).

- (A) Audio remote control switch connector
- (B) Cruise control switch connector



4. Remove the steering wheel upper cover.



5. Remove the 3 mounting screws for the audio remote control switch at the back side of the steering wheel upper cover.



6. Remove the audio remote control switch.



Modification basis	
Application basis	
Affected VIN	

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