AUDIO SYSTEM

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Note
- “iPod” is a registered trademark of Apple Inc. in the United States and other countries.

Outline
- An audio unit compatible with AM/FM tuner and MP3/WMA (Windows Media Audio)/AAC (Advanced Audio Coding) has been adopted.
- There are two types of audio units, one with color LCD and one without it.
- ALC (auto level control) function has been adopted. (With Bose ®)
- A road noise correction system (AudioPilot®2)* has been adopted. (With Bose ®)
- RDS (radio data system) has been adopted. (WIth RDS (radio data system))
- Three types of speakers have been provided as follows:

  4 speaker type (without Bose ®)
  — Front door speaker
  — Rear door speaker

  6 speaker type (without Bose ®)
  — Front door speaker
  — Rear door speaker
  — Tweeter

  9 speaker type (with Bose ®)
  — Front door speaker
  — Rear door speaker
  — Front center speaker
  — D-pillar speaker
  — Tweeter
- The steering switch enables the driver to operate a part of the audio system functions and change the instrument cluster displays without changing the driving posture.
- By operating the commander switch, the audio system can be operated without the driver having to change posture. (with commander switch)
- A rear mount camera has been adopted which monitors the conditions at the rear of the vehicle when reversing, and outputs a video signal to the audio unit.
- An Auxiliary jack/USB port unit has been adopted which can connect to commercially-available portable audio/USB devices/iPod, and output sound from the speakers via the audio unit.
- A condenser has been adopted to the D-pillar for noise reduction.

* : “AudioPilot®2” is a registered trademark of Bose ®.

Function
- The audio system has the following functions:

ALC (auto level control) function (without Bose ®)
- Compensates for the passengers' sense of a lack of audio volume which occurs as a result of external noise while driving.

Road noise correction system (AudioPilot®2) (with Bose ®)
- The volume of the music constituent covered by noise is corrected by the audio amplifier based on the cabin noise measured by the two AudioPilot®2 microphones and the vehicle speed signal sent from the instrument cluster.

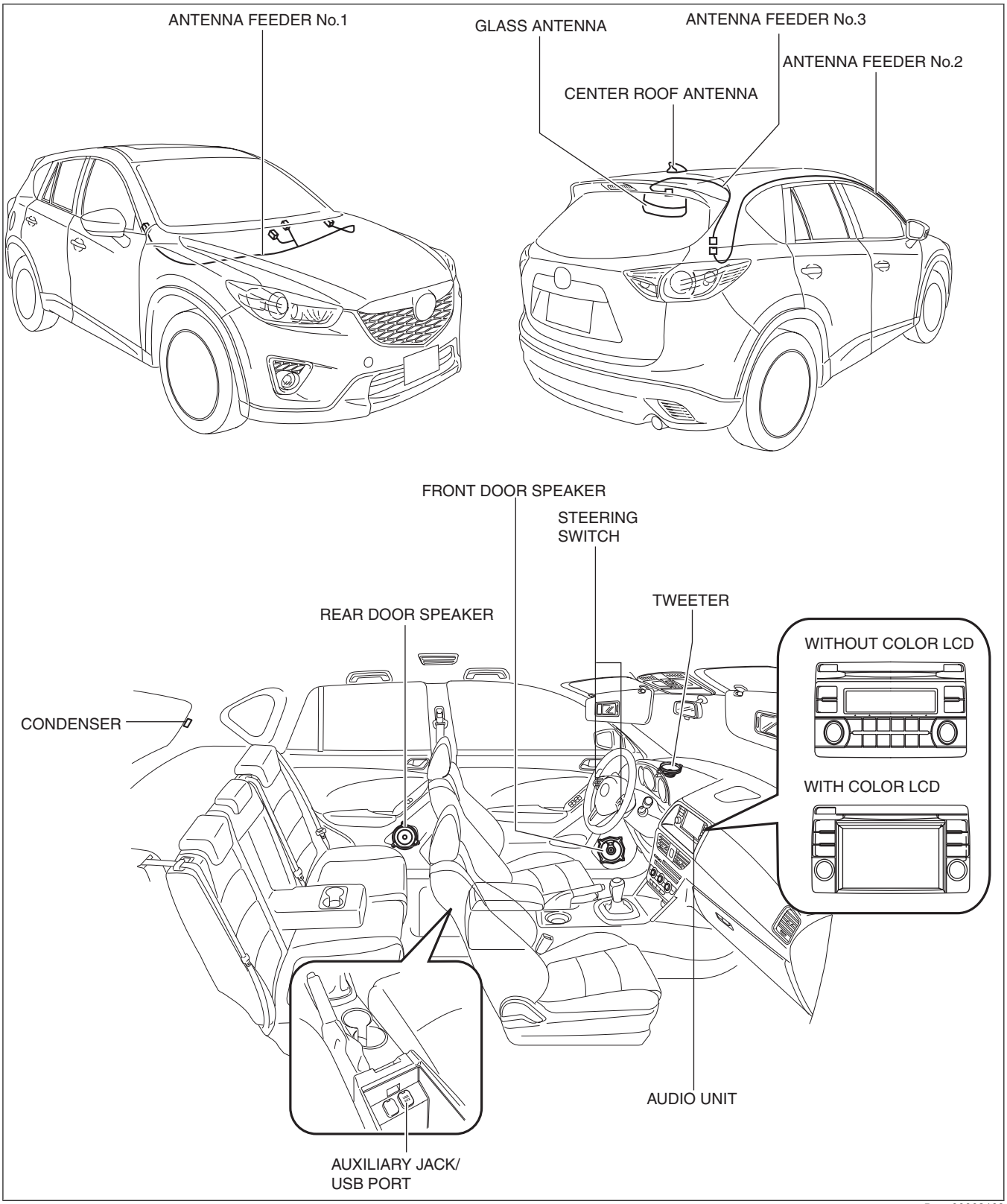
Operation sound function
- When the audio panel, climate control unit, steering switch, and clock unit buttons and switches are operated, an operation sound is output.

On-board diagnostic function
- Performs on-board diagnosis to detect the location of a malfunction.
- For details on the on-board diagnostic function, refer to the ON-BOARD DIAGNOSTIC [AUDIO SYSTEM].

Diagnostic Assist Function
- Can verify specifications, connection status and operation status of audio system related parts.
- For details on the diagnostic assist function, refer to the ON-BOARD DIAGNOSTIC [AUDIO SYSTEM].

Structural view

Without Bose®



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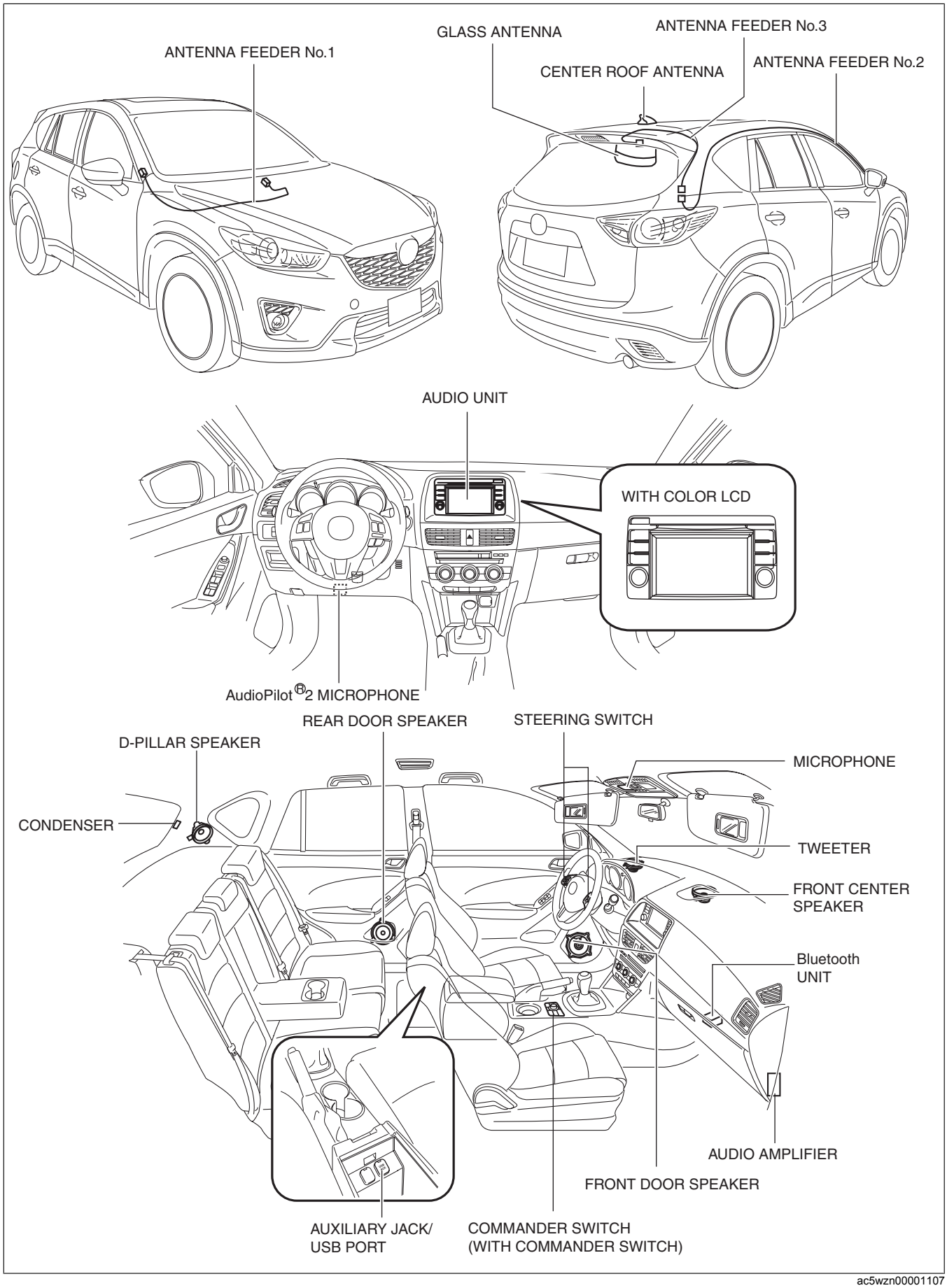
With Bose®



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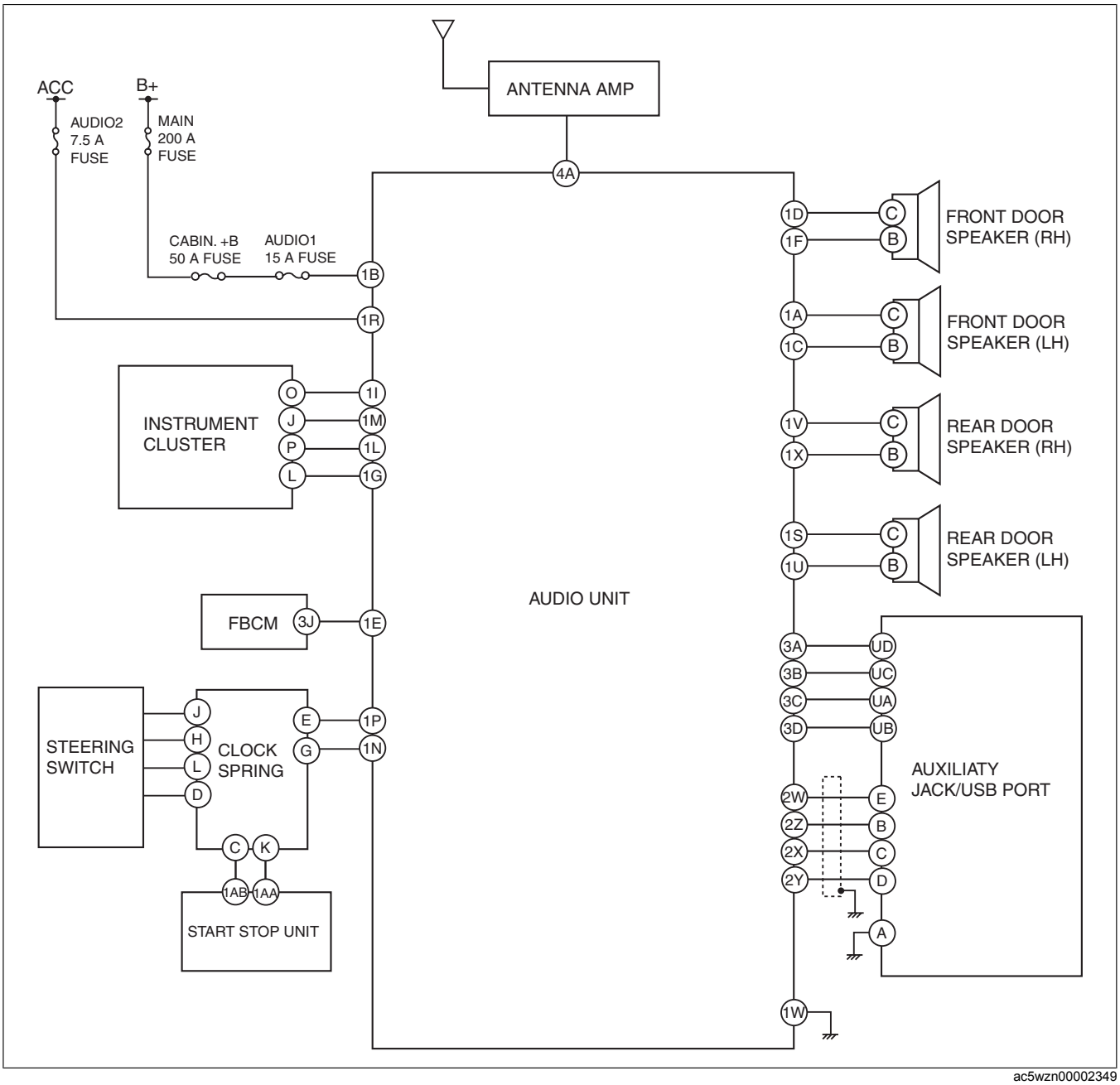
Block diagram
Without color LCD
Without i-stop system



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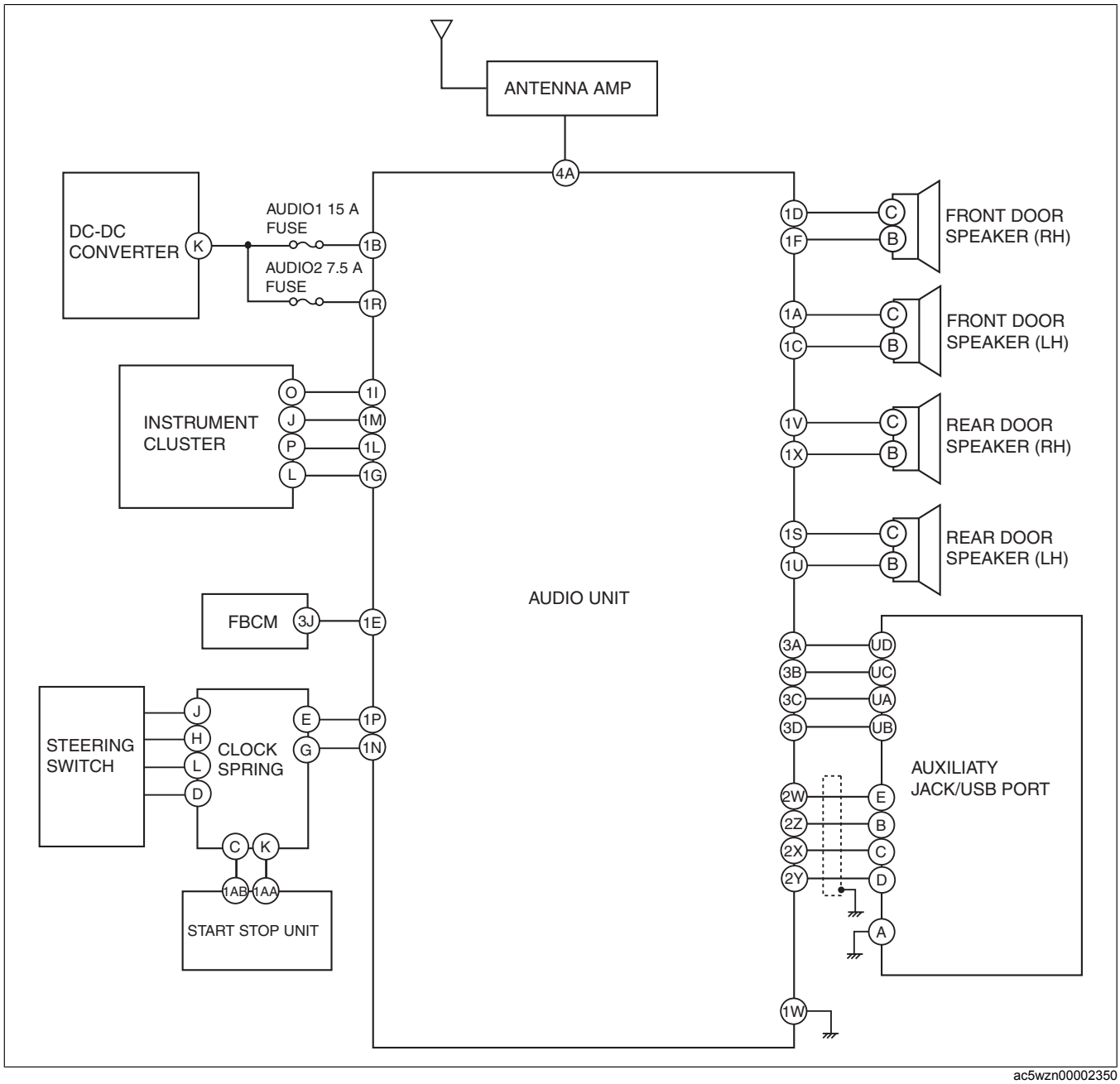
With i-stop system



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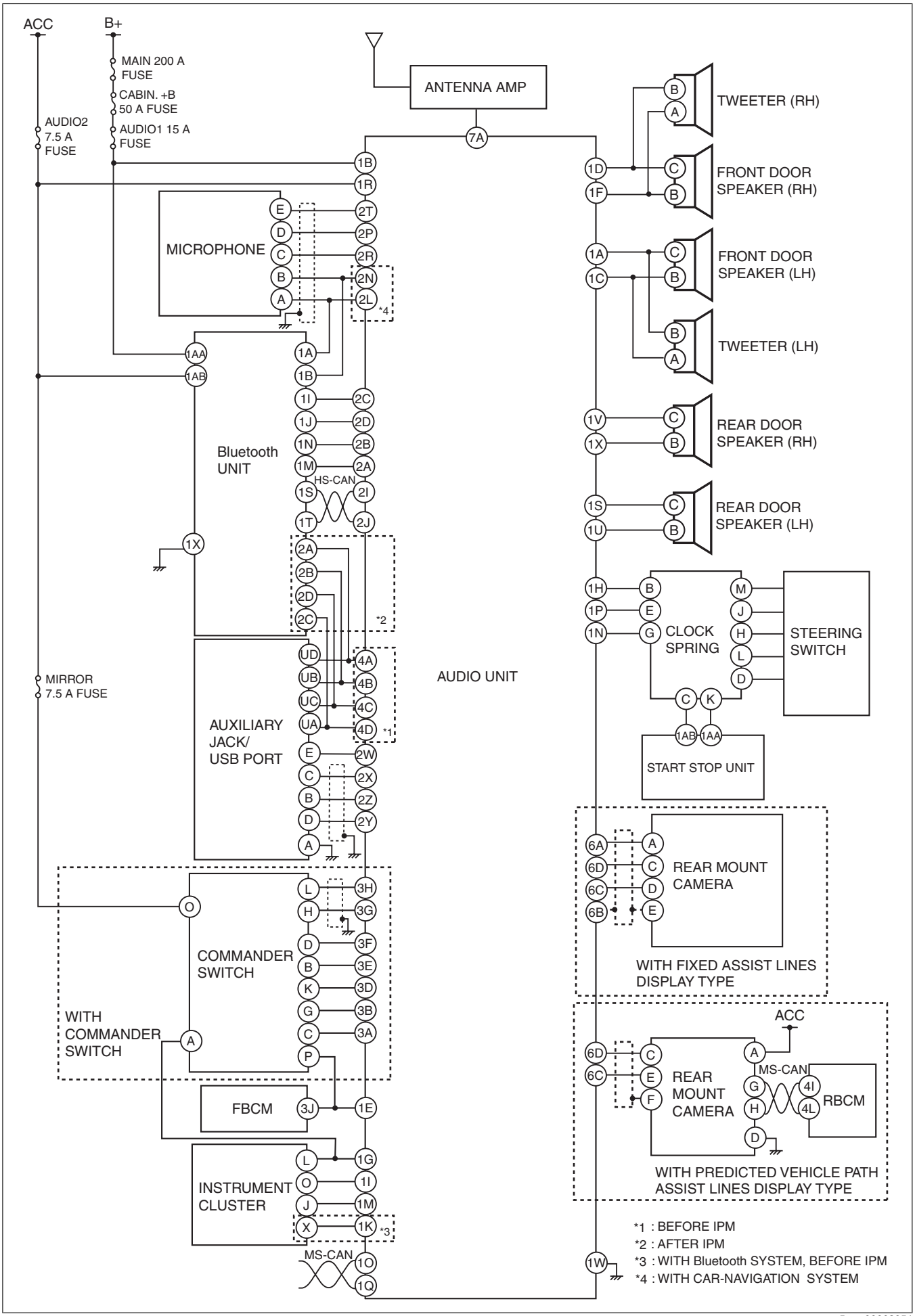
With color LCD (Without Bose ®)

Without i-stop system



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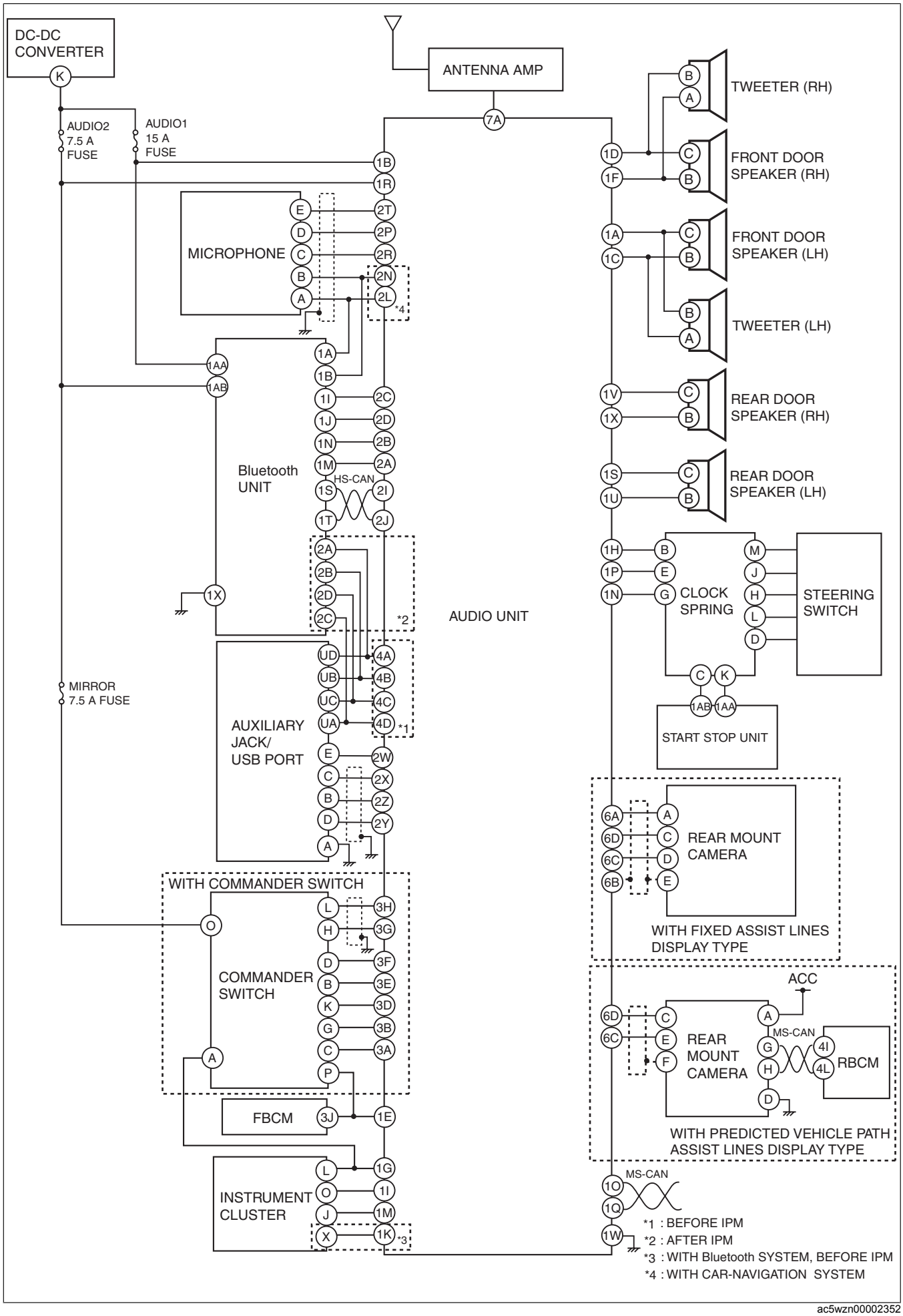
With i-stop system



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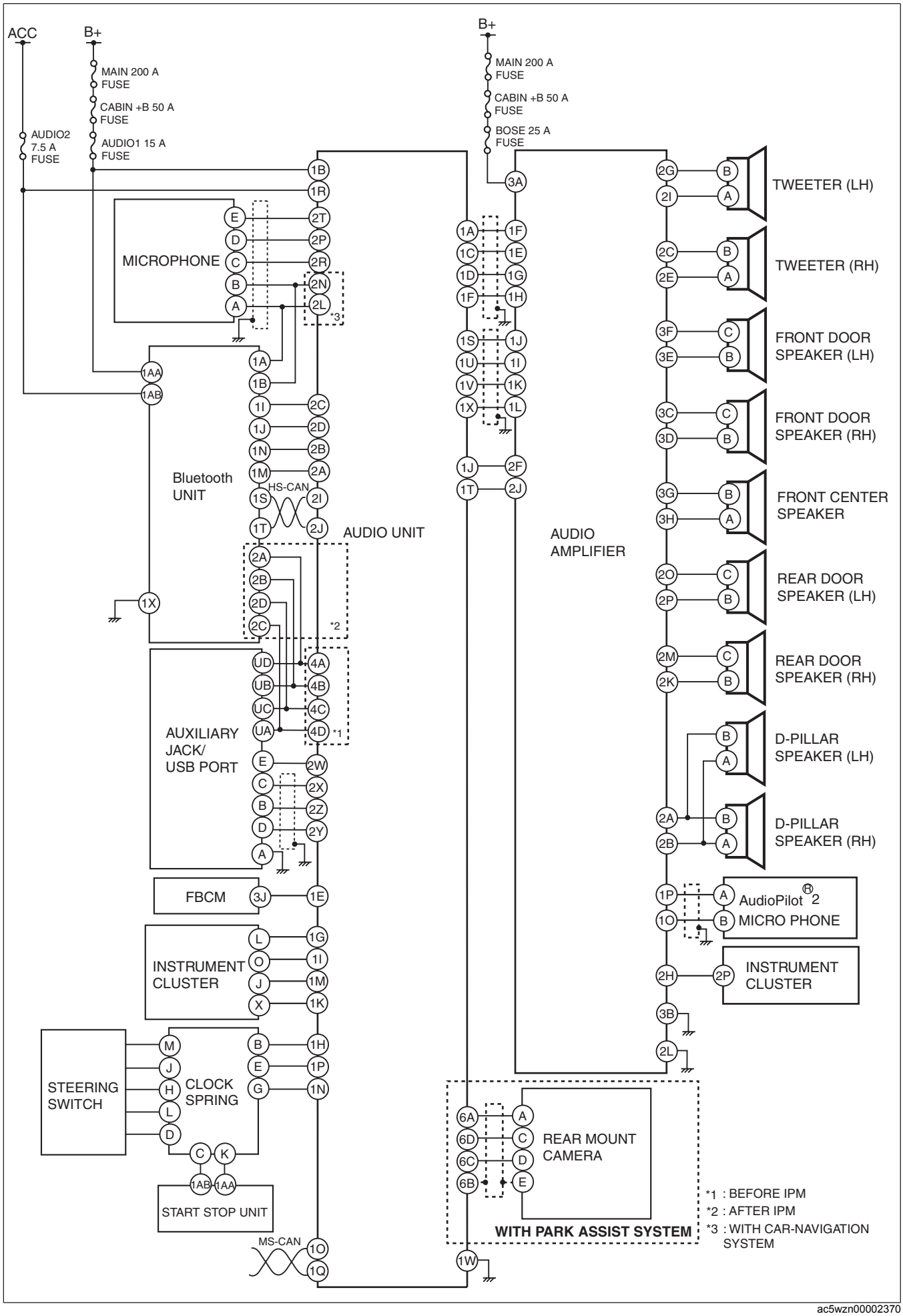
With color LCD (With Bose ®)

Without i-stop system



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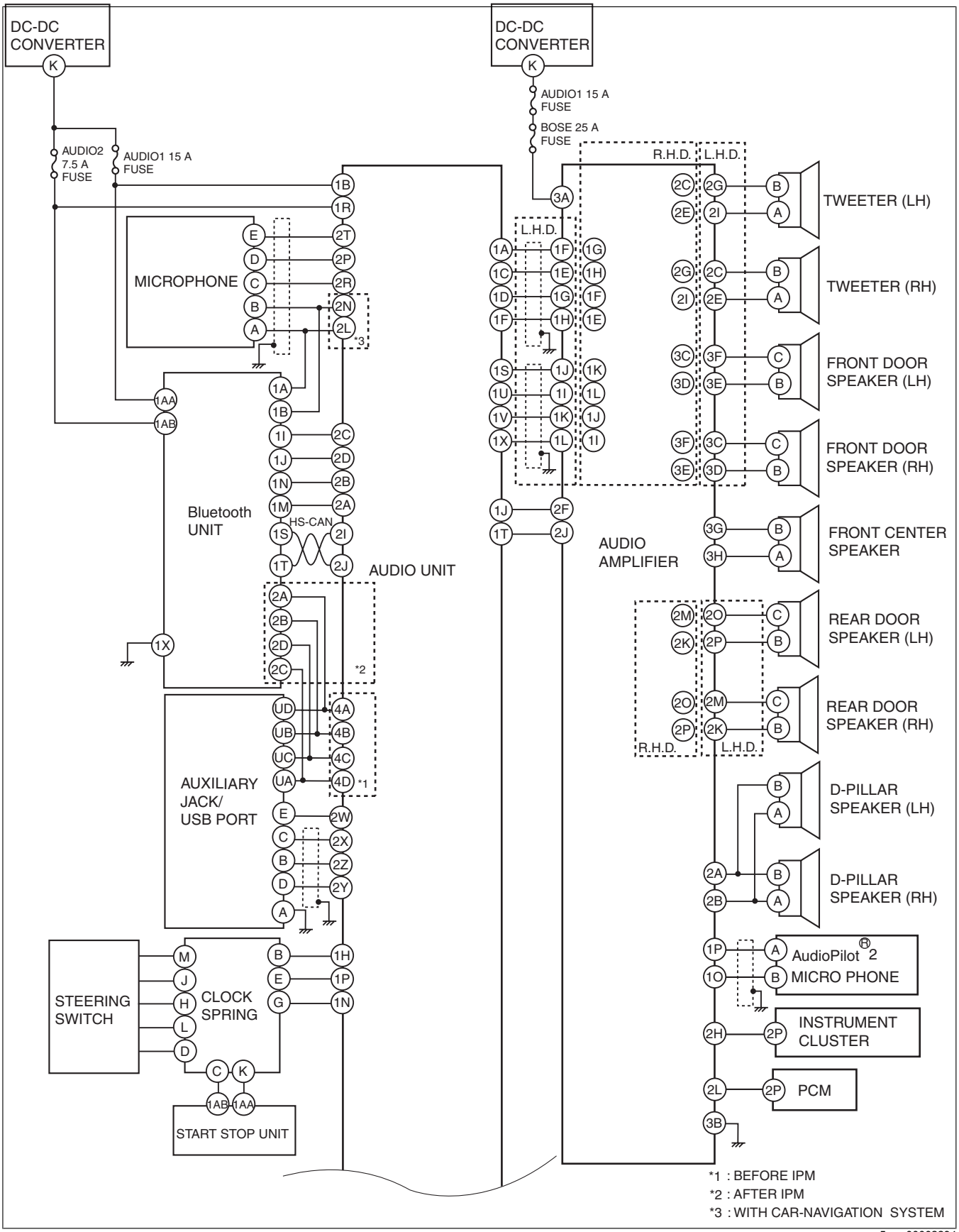
With i-stop system



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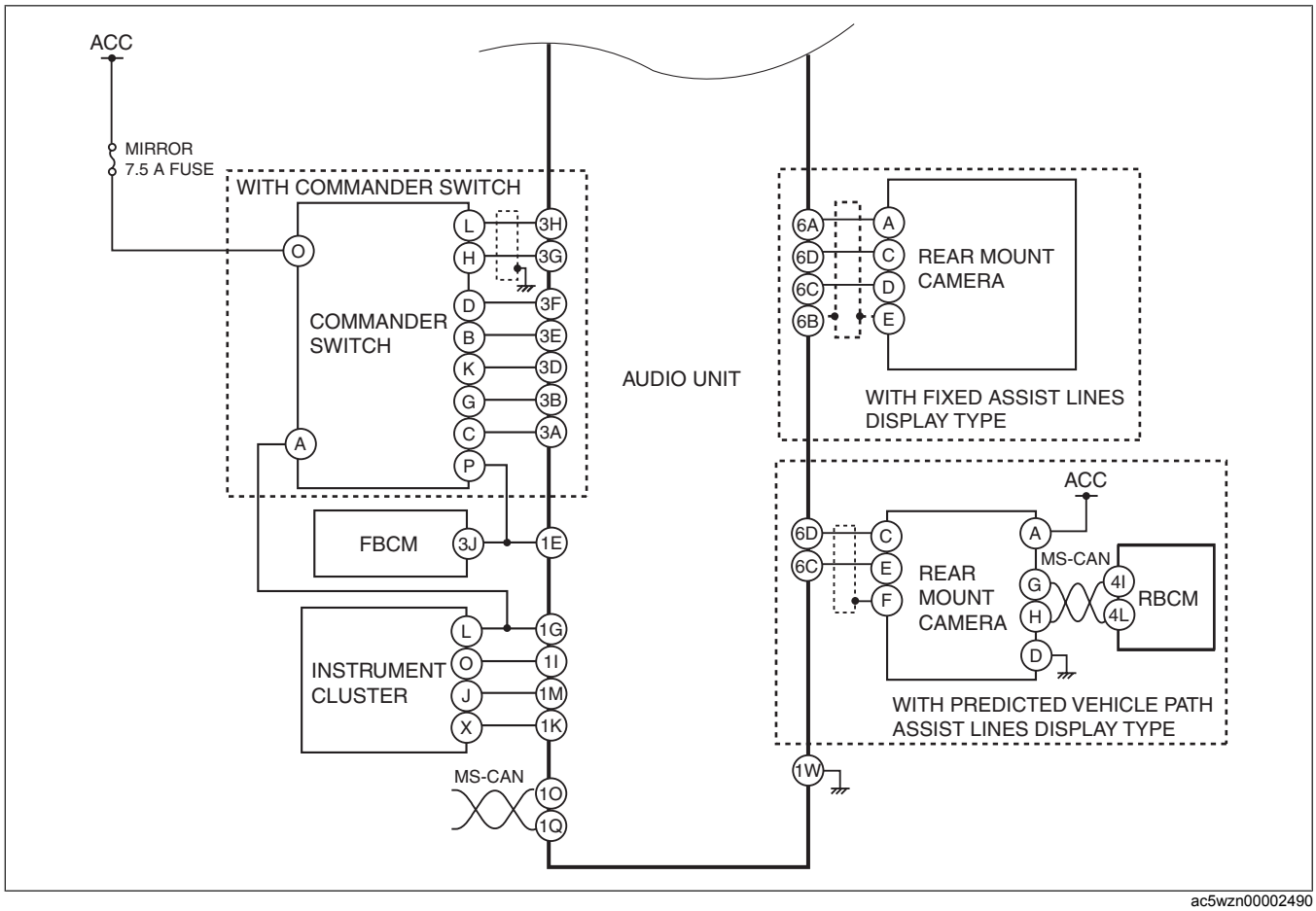

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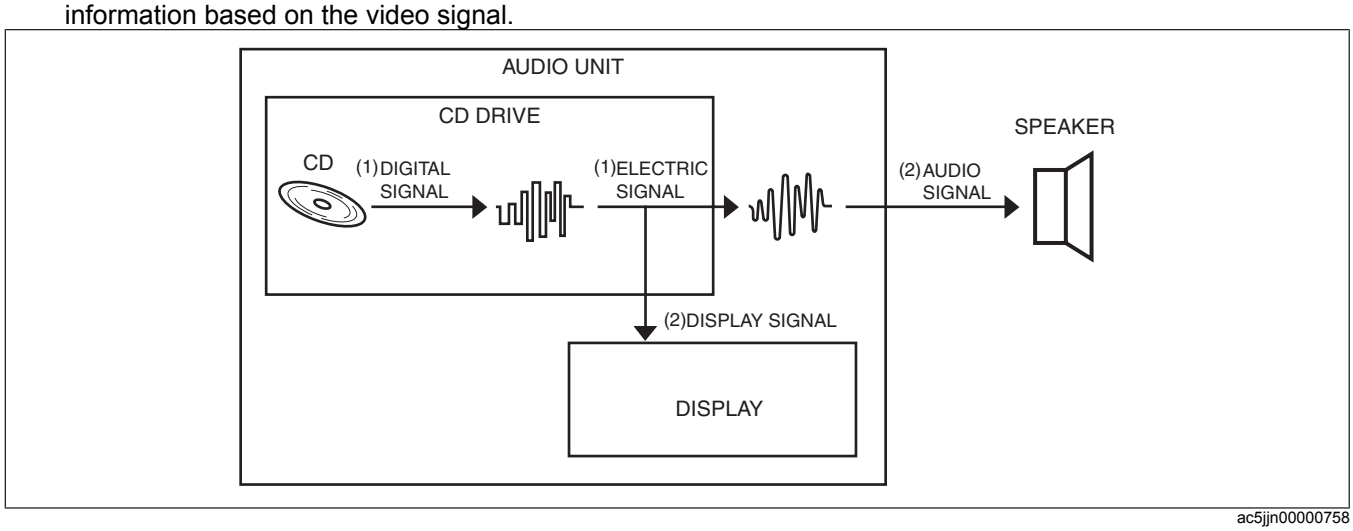
Operation
CD operation
Without Bose®

1. When a CD is inserted into the audio unit, laser light is emitted to the CD by the CD drive in the audio unit. The reflected light is detected by the light sensor and the data recorded in the CD is converted from a digital signal to an electric signal.
2. The audio unit converts the electric signal to an audio signal and video signal using the electrical circuit in the audio unit. The audio signal is sent to the speakers and the video signal is sent to the audio display.
3. The speakers generate audio based on the audio signal sent from the audio unit. The audio unit displays CD information based on the video signal.



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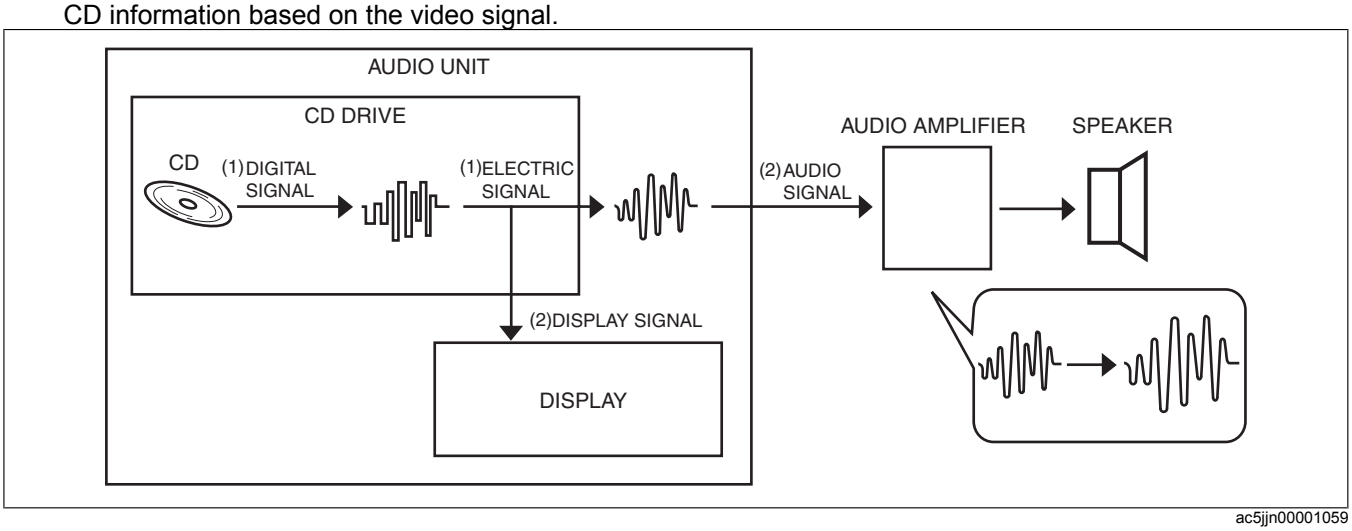
With Bose®

1. When a CD is inserted into the audio unit, laser light is emitted to the CD by the CD drive in the audio unit. The reflected light is detected by the light sensor and the data recorded in the CD is converted from a digital signal to an electric signal.

2. The audio unit converts the electric signal to an audio signal and video signal using the electrical circuit in the audio unit. The audio signal is sent to the speakers and the video signal is sent to the audio display.
3. The audio amplifier amplifies the audio signal sent from the audio unit and sends it to the speakers.
4. The speakers generate audio based on the audio signal sent from the audio unit. The audio display displays CD information based on the video signal.



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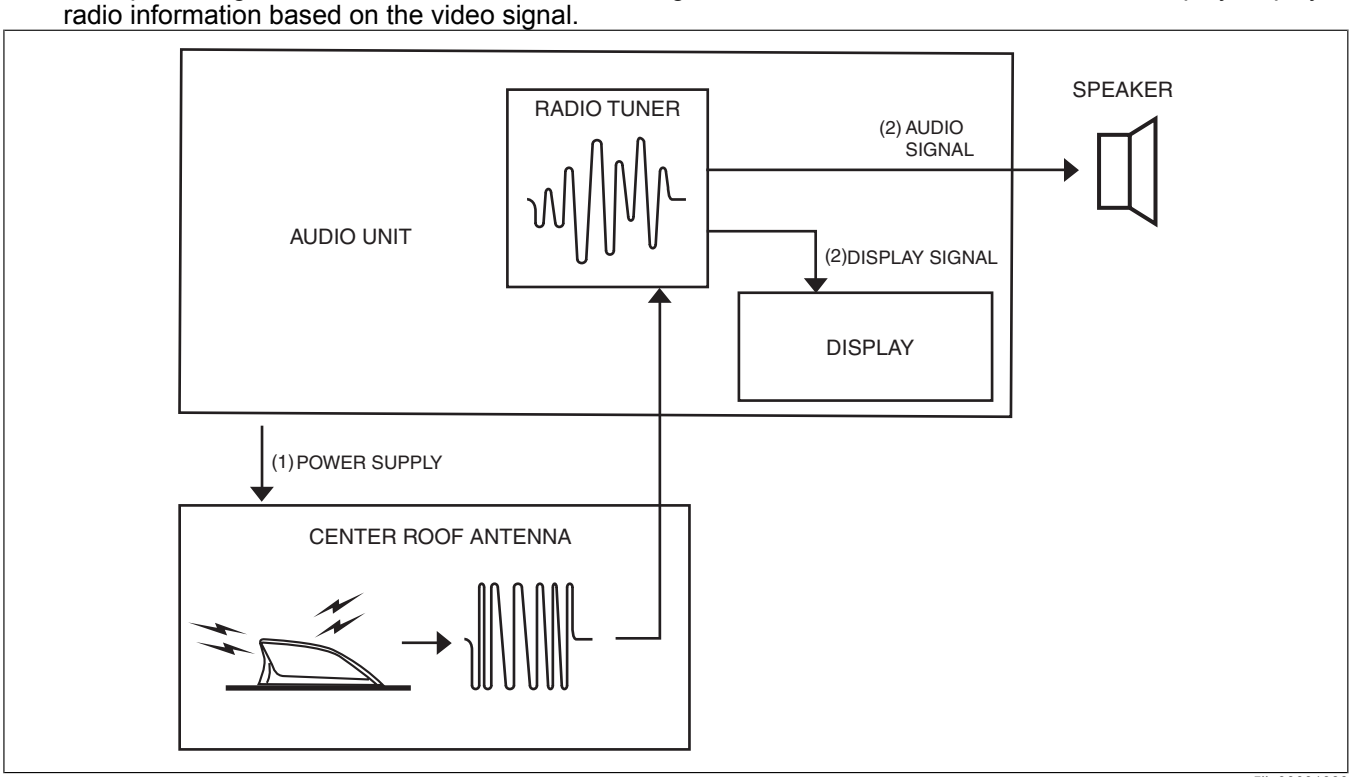
Radio operation

Without Bose®

1. When the ignition is switched to ACC or ON (engine off or on), the audio unit supplies power to the amplifier in the center roof antenna.
2. The audio unit detects the radio broadcast selected by the user using the radio tuner in the audio unit based on the electrical signal sent from the center roof antenna. The audio signal from the detected radio broadcast is then sent to the speakers. In addition, the video signal of the detected radio broadcast is sent to the display of the audio unit.
3. The speakers generate audio based on the audio signal sent from the audio unit. The audio display displays radio information based on the video signal.



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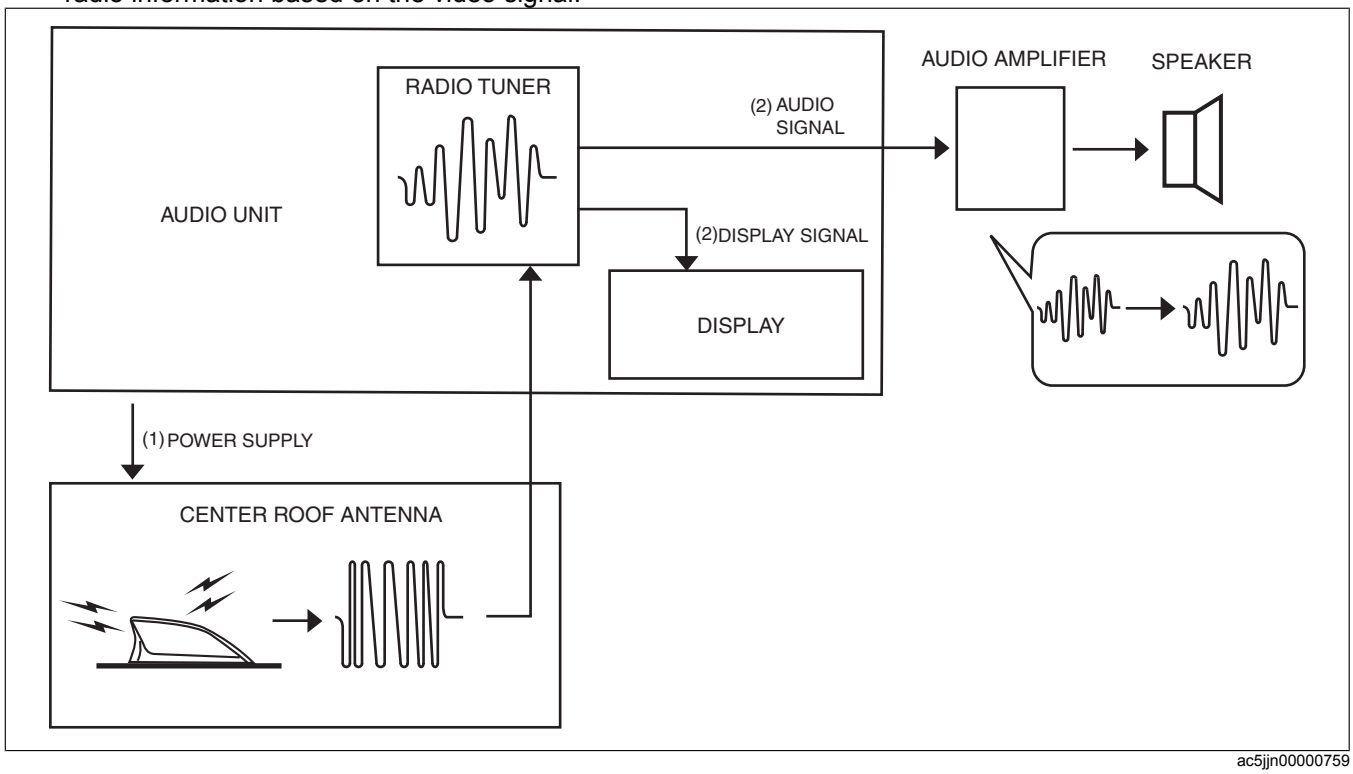
With Bose®

1. When the ignition is switched to ACC or ON (engine off or on), the audio unit supplies power to the amplifier in the center roof antenna.

2. The audio unit detects the radio broadcast selected by the user using the radio tuner in the audio unit based on the electrical signal sent from the center roof antenna. The audio signal from the detected radio broadcast is then sent to the audio amplifier. In addition, the video signal of the detected radio broadcast is sent to the display of the audio unit.
3. The audio amplifier amplifies the audio signal sent from the audio unit and sends it to the speakers.
4. The speakers produce audio based on the audio signal sent from the audio unit. The audio display displays radio information based on the video signal.



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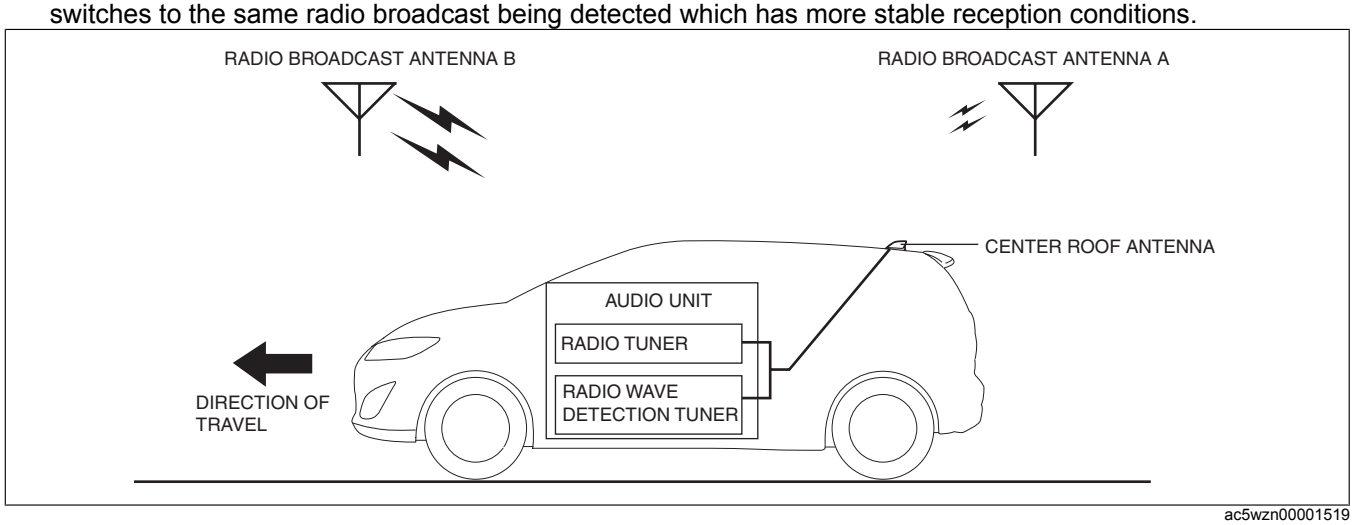
RDS (radio data system) operation

- The radio wave detection tuner (different type of radio reception tuner) detects the reception conditions of radio broadcasts and detects radio broadcasts which are broadcasting the same content as the radio broadcast currently being received.
- If the radio reception tuner reception conditions are less than the specified value, the radio detection tuner switches to the same radio broadcast being detected which has more stable reception conditions.



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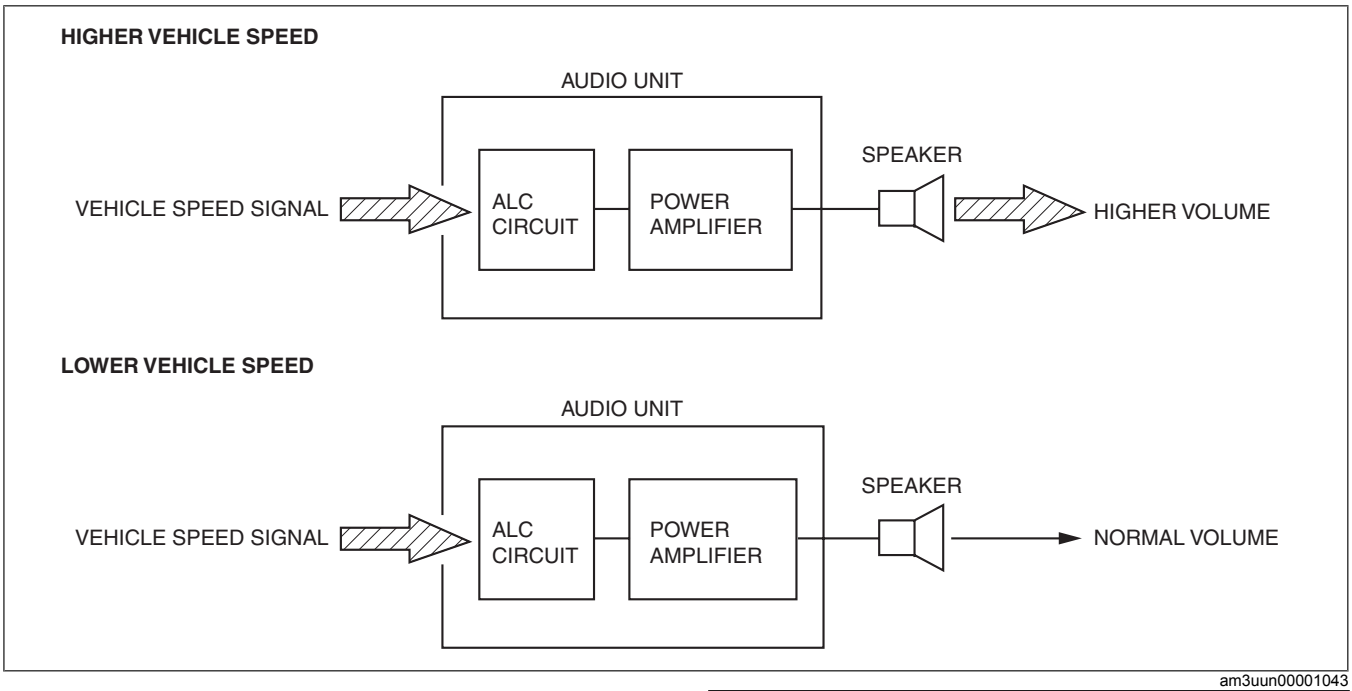
ALC (auto level control) operation (with Bose ®)

- The audio unit automatically changes the volume and audio quality based on the vehicle speed signal sent from the instrument cluster.



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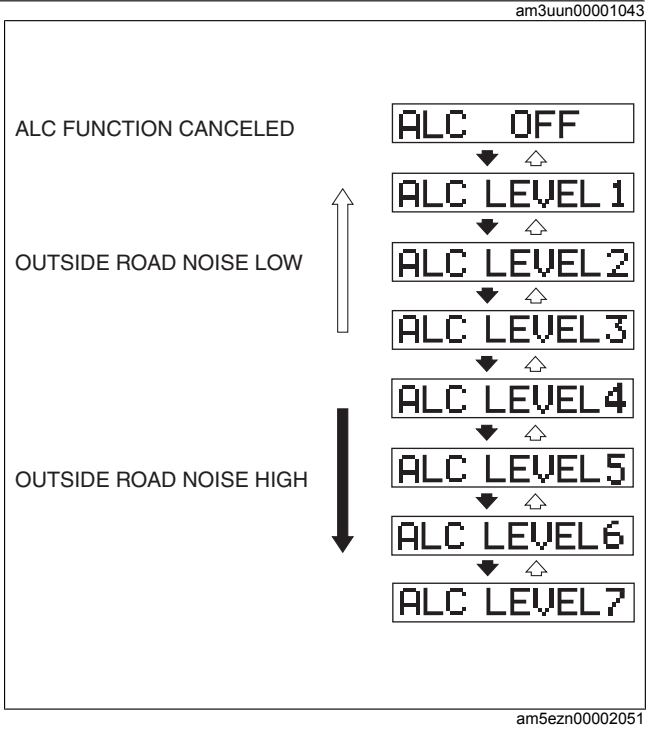
- The ALC function is divided into 7 levels. When the level is in the high range, the volume correction range and correction amount is large. The maximum correction amount is 14dB. The ALC function can be stopped by selecting ALC OFF.



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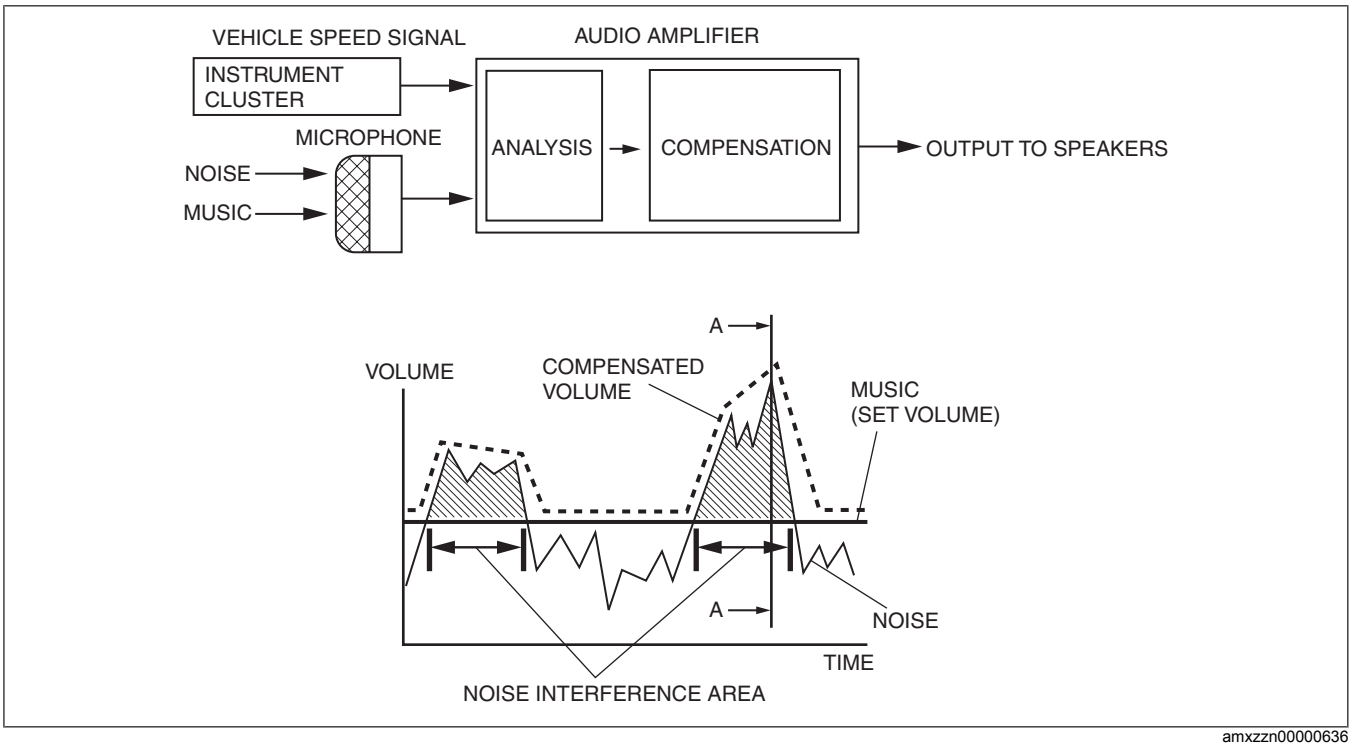
Volume correction amount table

Vehicle speed (km/h {mph})	ALC LEVEL 1 (dB)	ALC LEVEL 2 (dB)	ALC LEVEL 3 (dB)	ALC LEVEL 4 (dB)	ALC LEVEL 5 (dB)	ALC LEVEL 6 (dB)	ALC LEVEL 7 (dB)
0—15 {0—9.3}	0	0	0	0	0	0	0
20 {12}	0	0	0	0	0	0	1
25 {16}	0	0	1	1	1	1	1
30 {19}	0	1	1	1	1	1	2
35 {22}	1	1	1	1	2	2	2
40 {25}	1	1	1	2	2	2	3
45 {28}	1	1	2	2	2	3	3
50 {31}	1	1	2	2	3	3	4
55 {34}	1	2	2	3	3	4	4
60 {37}	1	2	2	3	4	4	5
65 {40}	1	2	3	3	4	5	5
70 {43}	1	2	3	4	4	5	6
75 {47}	2	2	3	4	5	6	7

Vehicle speed (km/h {mph})	ALC LEVEL 1 (dB)	ALC LEVEL 2 (dB)	ALC LEVEL 3 (dB)	ALC LEVEL 4 (dB)	ALC LEVEL 5 (dB)	ALC LEVEL 6 (dB)	ALC LEVEL 7 (dB)
80 {50}	2	3	3	4	5	6	7
85 {53}	2	3	4	5	6	7	8
90 {56}	2	3	4	5	6	7	8
95 {59}	2	3	4	5	7	8	9
100 {62.1}	2	3	5	6	7	8	9
105 {65.2}	2	4	5	6	7	9	10
110 {68.4}	2	4	5	6	8	9	10
115 {71.5}	3	4	5	7	8	10	11
120 {74.6}	3	4	6	7	9	10	11
125 {77.7}	3	4	6	7	9	10	12
130 {80.8}	3	5	6	8	9	11	13
135 {83.9}	3	5	6	8	10	11	13
140 {87}	3	5	7	8	10	12	14
145 {90.1}	3	5	7	9	11	12	14
150 {93.2}	3	5	7	9	11	13	14
155 {96.3}	4	6	7	9	11	13	14
160 {99.4}	4	6	8	10	12	14	14
165 {103}	4	6	8	10	12	14	14
170 {106}	4	6	8	10	13	14	14
175 {109}	4	6	9	11	13	14	14
180 {112}	4	7	9	11	13	14	14
185 {115}	4	7	9	11	14	14	14
190 {118}	4	7	9	12	14	14	14
195 {121}	5	7	10	12	14	14	14
200 {124}	5	7	10	12	14	14	14
205 {127}	5	7	10	13	14	14	14
210 {130}	5	8	10	13	14	14	14
215 {134}	5	8	11	13	14	14	14
220 {137}	5	8	11	14	14	14	14
225 {140}	5	8	11	14	14	14	14
230 {143}	5	8	11	14	14	14	14
235 {146}	6	9	12	14	14	14	14
240 {149}	6	9	12	14	14	14	14
245 {152}	6	9	12	14	14	14	14
250 {155}	6	9	13	14	14	14	14

Road noise correction system (AudioPilot®2) (with Bose ®)

- The audio amplifier differentiates each of the noise and music frequencies and compares the noise and music level based on the cabin sound measured by the two microphones used with the AudioPilot®2 and by the vehicle speed signal sent from the instrument cluster. As a result, sound correction is performed if it is determined that the frequency band from the noise makes it difficult to hear the music.



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Operation sounds

- The audio unit outputs operation sound when it detects an operation signal from the operation of an audio panel and steering switch.
- The operation sound is output from the front door speakers.
- The operation sound can be set to activated/deactivated. If the operation sound is deactivated, operation sound is not output.
- The operation sound is output as follows.

Without color LCD

Signal		Operation sound setting ON	Operation sound setting OFF	Sound frequency
Audio panel switch/switch operation signal Steering switch operation signal	Short-press	0.1 s	—	3 kHz
	Long-press	0.5 s	AUDIO PANEL SWITCH 0.5 s STEERING SWITCH 0.1 s	3 kHz

With color LCD

Signal		Operation sound setting ON	Operation sound setting OFF	Sound frequency
Audio panel switch/switch operation signal Steering switch operation signal	Short-press	0.1 s	—	3 kHz
	Long-press	0.5 s	—	3 kHz
	SIRIUS seek alert	0.5 s	—	1.5 kHz