

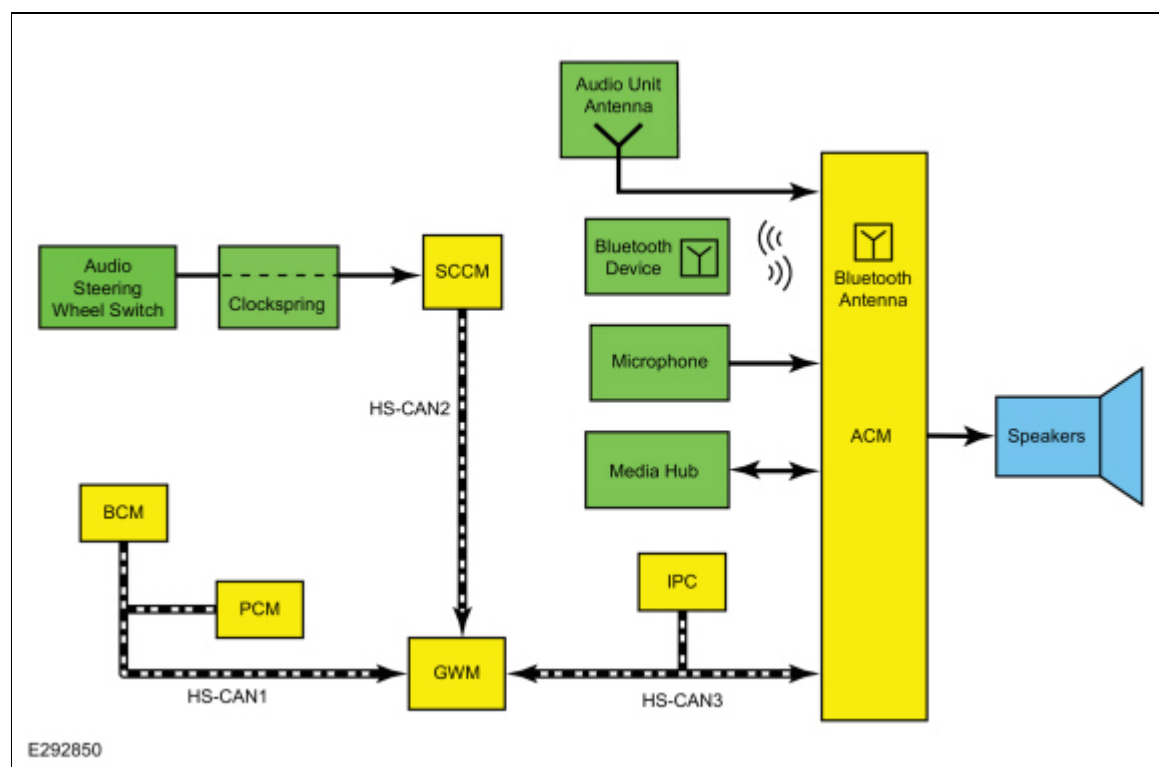
## Information and Entertainment System - System Operation and Component Description

### System Operation

#### System Diagram

**NOTE:** The system diagrams includes all component options. Some components may not be equipped on the vehicle.

#### Audio System



#### Network Message Chart

##### ACM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Chime source	<u>IPC</u>	Used to initiate the audio system as the chime source.
Ignition status	<u>BCM</u>	Used to indicate the ignition state.
<u>IPC</u> chime request	<u>IPC</u>	Used to request a warning chime to be played through the

		audio system.
Power shed level request	<u>BCM</u>	Used to disable the functionality of the <u>ACM</u> due to the load shedding feature.
Steering wheel switch status	<u>SCCM</u>	Used to indicate the button press status of the steering wheel switches.
Transport mode	<u>BCM</u>	Used to disable the functionality of the <u>ACM</u> until taken out of transport mode.
Vehicle configuration data	<u>BCM</u>	Used to verify vehicle configuration data such as the <u>VIN</u> and system module configuration.
Vehicle speed	<u>PCM</u>	Used for the speed compensated volume function.

## Audio System

**NOTE:** Refer to the Owner Literature for additional details of the audio system.

### ACM Operation

The ACM receives and sends network messages over the CAN. A diagnostic scan tool can retrieve Diagnostic Trouble Codes (DTCs), PID data and carry out other diagnostic functions for the ACM via the vehicle DLC.

The ACM is powered at all times and uses the ignition status message to control the on/off mode. The accessory delay feature is controlled by an ignition status message from the BCM.

The ACM takes various inputs (radio waves and audio signals for example), conditions and amplifies them, and converts them to an analog audio signal. This signal can be amplified internally and sent directly to the speakers, or transmitted to a separate amplifier and speaker system.

The BCM ignition status message is used to temporarily mute audio output during engine cranking. This prevents the normal voltage spikes during engine cranking from producing popping noises in the audio system.

The ACM receives vehicle speed information, used to adjust audio volume with different vehicle speeds, from the PCM over the CAN.

### AM/ FM Radio

When the AM/ FM mode is selected, the radio amplifies radio waves sent from the antenna. It then selects the requested frequency, converts and amplifies the content. These fluctuating audio signals are output as AC output voltage to power the speakers or as an input to a separate amplifier.

### ACM Speaker Output

The ACM is configured to directly power vehicle speakers. An amplifier in the final stage of the ACM sends an analog AC signal to drive the speakers. Output includes stereo channels.

A speaker circuit short to ground or power can be detected by the ACM. The ACM may disable speakers to prevent damage to the internal amplifier.

### Remote Audio Controls

The audio system steering wheel switches contain a series of resistors. Each steering wheel audio function switch has a specific resistance value. The SCCM and switch assembly are connected in a voltage divider circuit. The voltage drop over an internal SCCM resistor is changed by the different audio switch function resistances. The SCCM monitors the resultant voltage drop across its internal resistor to determine which steering wheel switch is pressed. The SCCM transmits the steering wheel switch inputs over the CAN to the ACM, to control audio functions.

### **Audio Input Jack Mode**

The ACM receives analog input from the audio input jack through left and right channel circuits.

### **USB Mode**

The ACM receives serial data input from connected USB devices. The USB cable to the ACM is shielded to prevent interference from electromagnetic sources. The ACM provides 5 volt power for the USB port.

### **Bluetooth Mode**

The ACM supports Bluetooth profiles, allowing the audio system to interact with both Bluetooth-enabled phones and Bluetooth-enabled media devices.

## **Component Description**

### **Audio Unit Antenna**

The audio unit antenna (also called the AM/ FM1 antenna) is roof mounted with an attached aerial mast. It receives AM/ FM radio waves and sends them to the ACM via the audio unit antenna coaxial cable (also called the AM/ FM1 antenna coaxial cable).

### **Voice Microphone**

The voice microphone is connected to the ACM.

### **Steering Wheel Switches**

The audio system steering wheel switches contain a series of resistors. Each steering wheel audio function switch has a specific resistance value. The SCCM and switch assembly are connected in a voltage divider circuit.

### **SCCM**

The voltage drop over an internal SCCM resistor is changed by the different audio switch function resistances. The SCCM monitors the voltage drop across its internal resistor to determine which steering wheel switch is pressed. The SCCM transmits the steering wheel switch inputs over the network to the ACM, to control audio system functions.

### **Media Hub**

The media hub contains a single USB port and an audio input jack (in the instrument panel). The USB port is powered by the ACM which provides 5 volts for the USB port. Data from the USB port is sent to the ACM through a single USB cable.

### **ACM**

The ACM requires PMI procedures when it is replaced.

### **BCM**

The BCM contains the clock software and sends the date/time data information to other modules via the CAN.

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