

FUB-FUB-FB-GZ-A233-M Active sound design

VIN:	XXXXXXX	Vehicle:	2/F22/COUPE/M235I/N55/AUTO/USA/LL/2014/03
System Version:	3.51.31.14936	Data Version:	R3.51.31.14936

Active sound design

The ASD control unit (ASD stands for "Active Sound Design") uses a control independent of driving condition to generate sound elements which are missing from the defined pattern for the original engine sound. These sound elements are output via the audio system speakers.

In the passenger compartment, these sound elements blend authentically with the original engine sound to produce the desired overall sound experience.

If the vehicle is equipped with an acoustic sensor, (e.g. I12), the outside sound for the pure electrical driving mode as well as the outside sound for driving mode with combustion engine is supported by a control independent of driving condition.

In principle, the acoustic sensor functions as a speaker. The acoustic sensor is directly activated by the ASD control unit.

Functional description

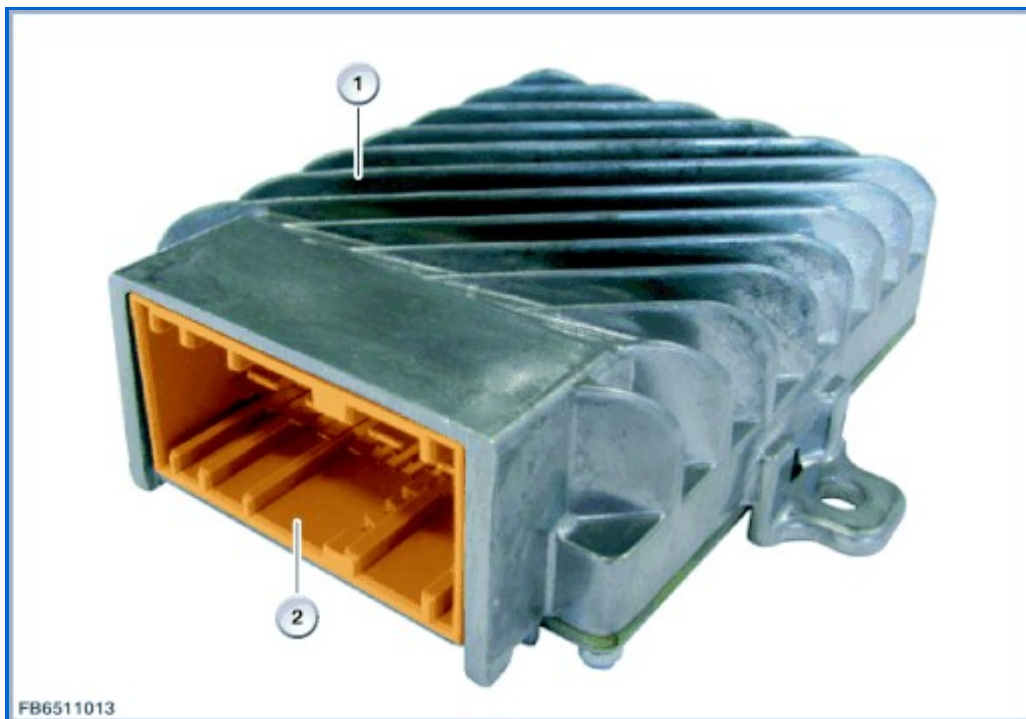
Active Sound Design is activated with terminal 30B ON.

The vehicle-specific and engine-specific algorithms for generating sound patterns are stored in the ASD control unit.

The central functionality of the ASD control unit is the synthesis of the ASD signals. The integrated digital sound processor generates an analogue signal. The generated signal is combined with the audio signal.

Here, the ASD control unit functions as a sound generator. The ASD control unit varies this additional signal according to the relevant driving condition and pedal sensor position.

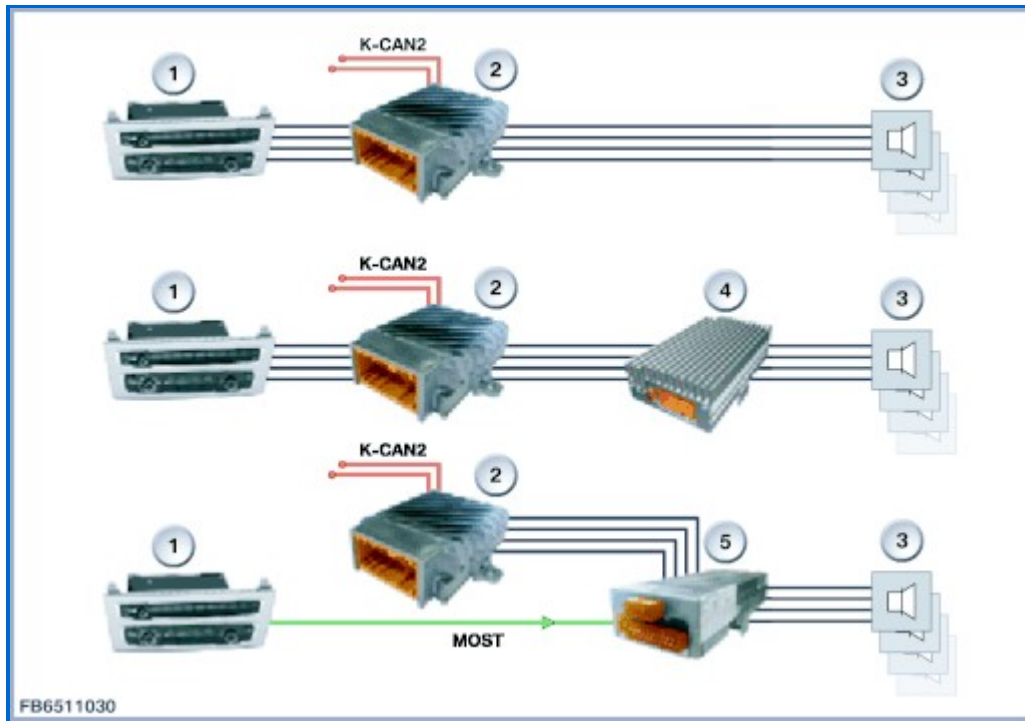
Via the CAN-Bus, the ASD control unit receives numerous parameters for the calculation of the ASD signals (e. g. engine speed, driving speed, pedal sensor position, load signal, engaged drive position).



Item	Explanation	Item	Explanation
1	Active Sound Design (ASD)	2	42-pin plug connection

The following graphic shows the incorporation of the Active Sound Design (ASD) in the different audio systems.

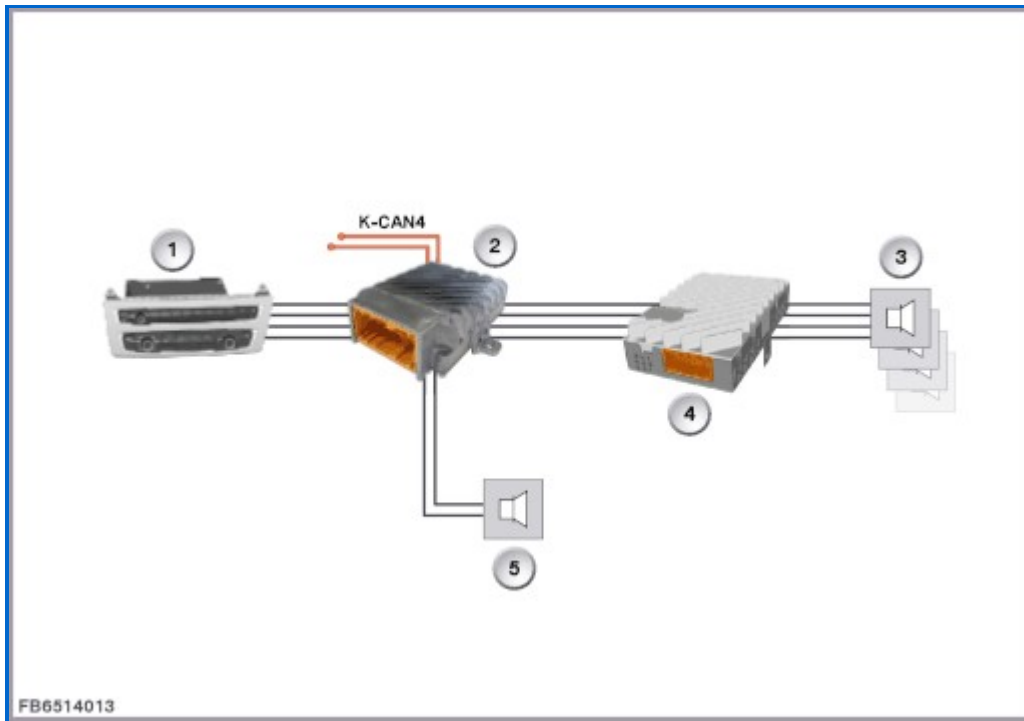
- Stereo system
 - Headunit ON and engine OFF:
Via the signal RAD_ON, the ASD control unit receives the information headunit ON. The audio signals are routed through the ASD control unit. In this audio system, the ASD control unit also functions as an audio amplifier.
 - Engine ON and headunit OFF:
The ASD control unit outputs a generated signal via the speakers.
- HiFi loudspeaker system (e. g. SA676)
 - Headunit ON and engine OFF:
The hi-fi amplifier (AMPH) is activated via signal RAD_ON by the headunit (the signal is routed through the ASD control unit). The audio signals are routed through the ASD control unit.
 - Engine ON and headunit OFF:
The hi-fi amplifier (AMPH) is activated via the signal RAD_ON by the ASD control unit.
- HiFi system Professional (SA677) or Bang & Olufsen High End Surround Sound System (SA6F2)
 - Headunit ON and engine OFF:
The Top HiFi amplifier (AMPT) or High End audio amplifier is activated via a signal on the MOST bus by the headunit.
 - Engine ON and headunit OFF:
The Top HiFi amplifier (AMPT) or High End audio amplifier is activated via the signal RAD_ON by the ASD control unit.



Item	Explanation	Item	Explanation
1	Headunit	2	ASD control unit
3	Speakers	4	Hi-fi amplifier (AMPH)
5	Top HiFi amplifier or High End audio amplifier (AMPT)		

The following graphic shows the incorporation of the Active Sound Design (ASD) using the example of an acoustic sensor.

- Harman Kardon hi-fi loudspeaker system (e. g. SA674)
 - Headunit ON and engine OFF:
The hi-fi amplifier (AMPH) is activated via signal RAD_ON by the headunit (the signal is routed through the ASD control unit). The audio signals are routed through the ASD control unit.
 - Engine ON and headunit OFF:
The hi-fi amplifier (AMPH) is activated via the signal RAD_ON by the ASD control unit. The ASD control unit outputs a generated signal via the speakers and the acoustic sensor.



Item	Explanation	Item	Explanation
1	Headunit	2	ASD control unit
3	Speakers	4	Hi-fi amplifier (AMPH)
5	Acoustic sensor		

Structure and inner electrical connection

The ASD control unit is connected to the CAN bus.



Note!

Depending on series, the ASD control unit can be connected to different CAN buses.
Example:

- I01, I12: Connection on K-CAN4
- F10: Connection on K-CAN2
- F56: Connection on K-CAN4

Observe the wiring diagram in the diagnosis!

The ASD control unit is supplied with terminal 30B.

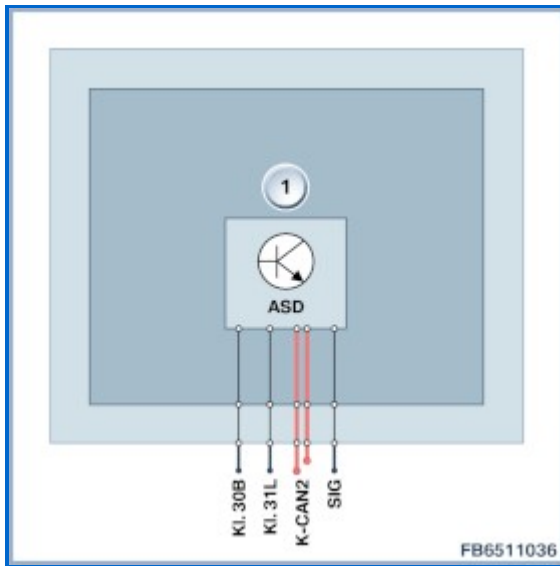
The ASD control unit has one input RAD_ON and one output RAD_ON. The output can be switched independent of the input.

Essentially, the ASD control unit consists of the following elements:

- Microcontroller
(also controls the digital sound processor)
- Digital sound processor
(for continuous processing of digital signals via digital signal processing)

- Digital/analogue converter
(D/A converter for generation of the analogue ASD signals from the digital audio signals of the digital sound processor)
- Analogue summing device
(for addition of the analogue audio and ASD signals)
- Power stages
(for adjustment of the output of the analogue audio signals to the vehicle speakers)
- Transmit/receive system for CAN messages

The following graphic shows an example of the ASD control unit with bus connection on the K-CAN2.



Item	Explanation
1	Active Sound Design (ASD)

Pin assignments

The graphic above shows only the supply and bus connection. The current pin assignment is recorded on the wiring diagrams in the ISTA diagnosis system (Integrated Service Technical Application). Click on the component code in the wiring diagram to activate the "Installation location" and "Pin assignment" tabs.

Nominal values

Observe the following setpoint values for the ASD control unit:

Variable	Value
Supply voltage	6 to 16 volts
Power of the output stages per channel	15 Watts
Temperature range	-40 to 85 °C

Diagnosis instructions

Failure of the component

If the communication to the ASD control unit fails, run the standard tests (global testing procedure). If there is an internal control unit fault, the following behaviour is to be expected:

- Fault code entry in the ASD control unit

**Note!**

At every engine start (pure electrical driving mode or driving mode with combustion engine), the ASD control unit checks whether all speakers, including acoustic sensors, are connected. If a speaker is detected as disconnected, the ASD control unit switches the ASD function off completely. Not until all speakers are detected as connected does the ASD control unit release the ASD function.

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