

HIGH BEAM CONTROL (HBC) SYSTEM

id091800005000

Outline

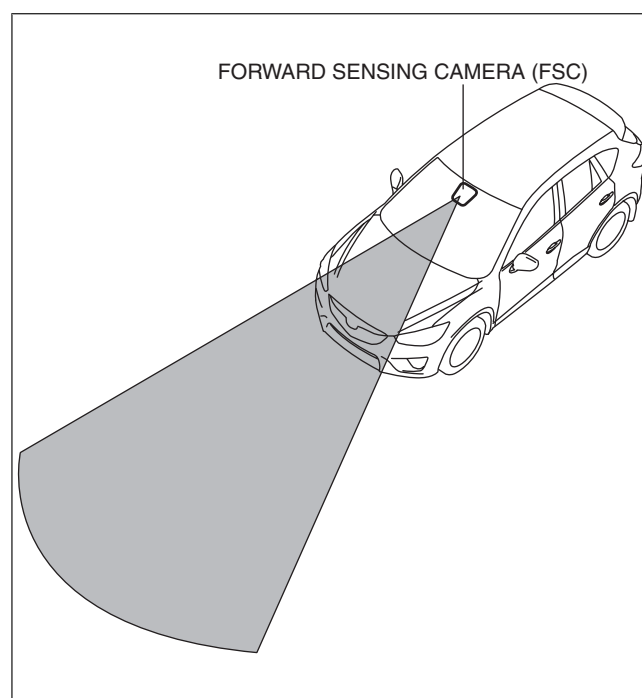
- The high beam control (HBC) system performs automatic switching to low beams only when the forward sensing camera (FSC) installed to the windshield recognizes an on-coming vehicle, a vehicle that is ahead or when traveling through towns and cities to prevent blinding of other vehicles from headlight glare and to assure visibility of drivers.

Caution

- Under the following conditions the ability of the FSC to detect light-emitting objects decreases, which could result in the system not operating normally and the inability to detect on-coming vehicles or vehicles ahead.**
 - Brightness of moonlight in surrounding area
 - Poor visibility due to rain and fog
 - Scratches or soiling on the camera lens or windshield glass
- Do not rely solely on the HBC system, and perform the appropriate switching operation based on a visual determination of the conditions.**
- If the FSC aiming for the high beam control (HBC) system is not completed, the camera shot angle for the FSC cannot be recorded and the high beam control (HBC) system may not operate. When performing the following servicing, always perform the FSC aiming. Refer to the FSC aiming procedure in the workshop manual.**
 - FSC replacement
 - FSC clip replacement
 - Windshield replacement

Function

- With the light switch in the AUTO and HI position and when the headlights are turned on, the FSC automatically switches to low beams when it recognizes a light-emitting object (on-coming vehicle, vehicle ahead, town and city streets). Refer to FORWARD SENSING CAMERA (FSC) for details on the FSC.







ac5wzn00000362

Setting function for control order of precedence

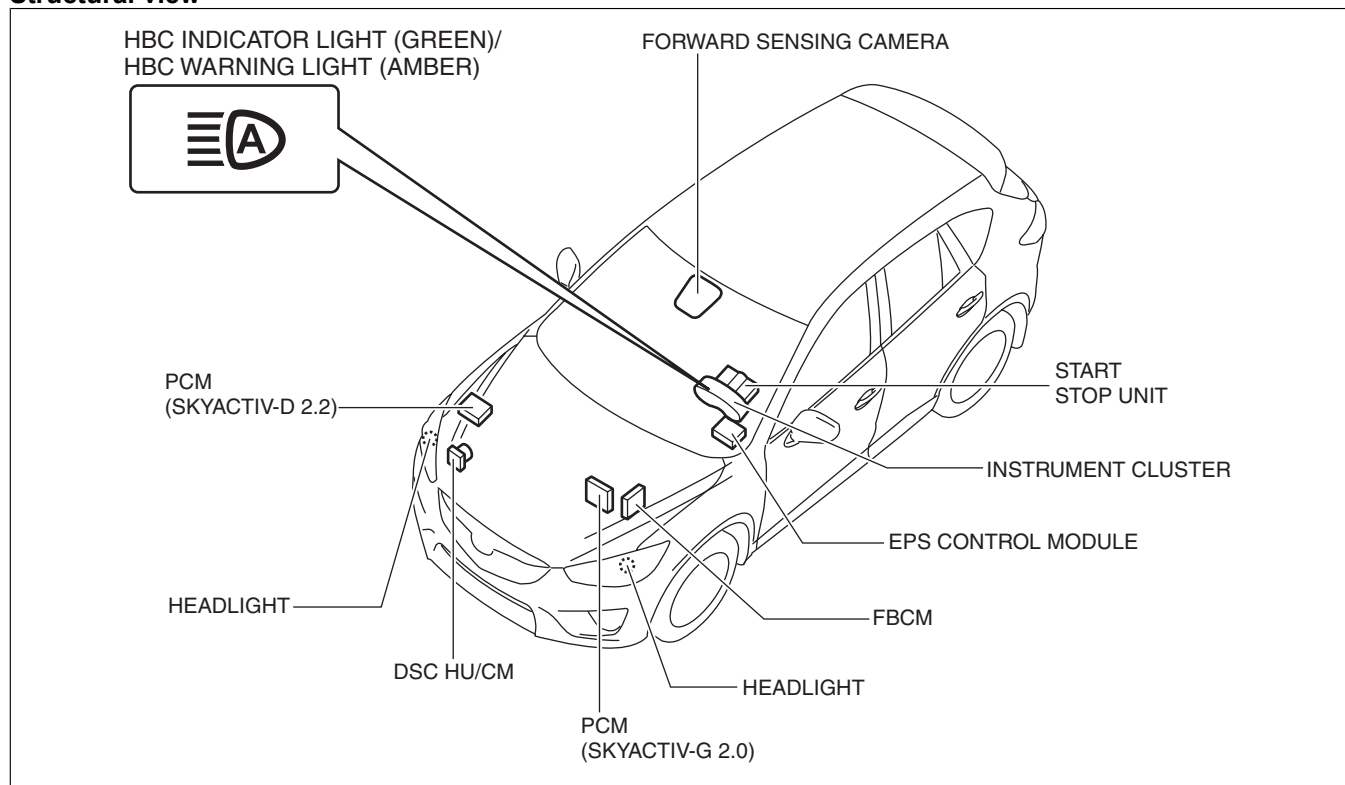
- If several light-emitting objects are recognized (on-coming vehicles, vehicles ahead, town/city streets), control is conducted according to the following order of precedence.
 1. Closest on-coming vehicle
 2. Closest vehicle ahead (no on-coming vehicles)
 3. Traveling through towns and cities

System conditions display function

- The FSC displays system conditions using the HBC indicator light (green), HBC warning light (amber), and TFT LCD display (with TFT LCD display) in the instrument cluster.

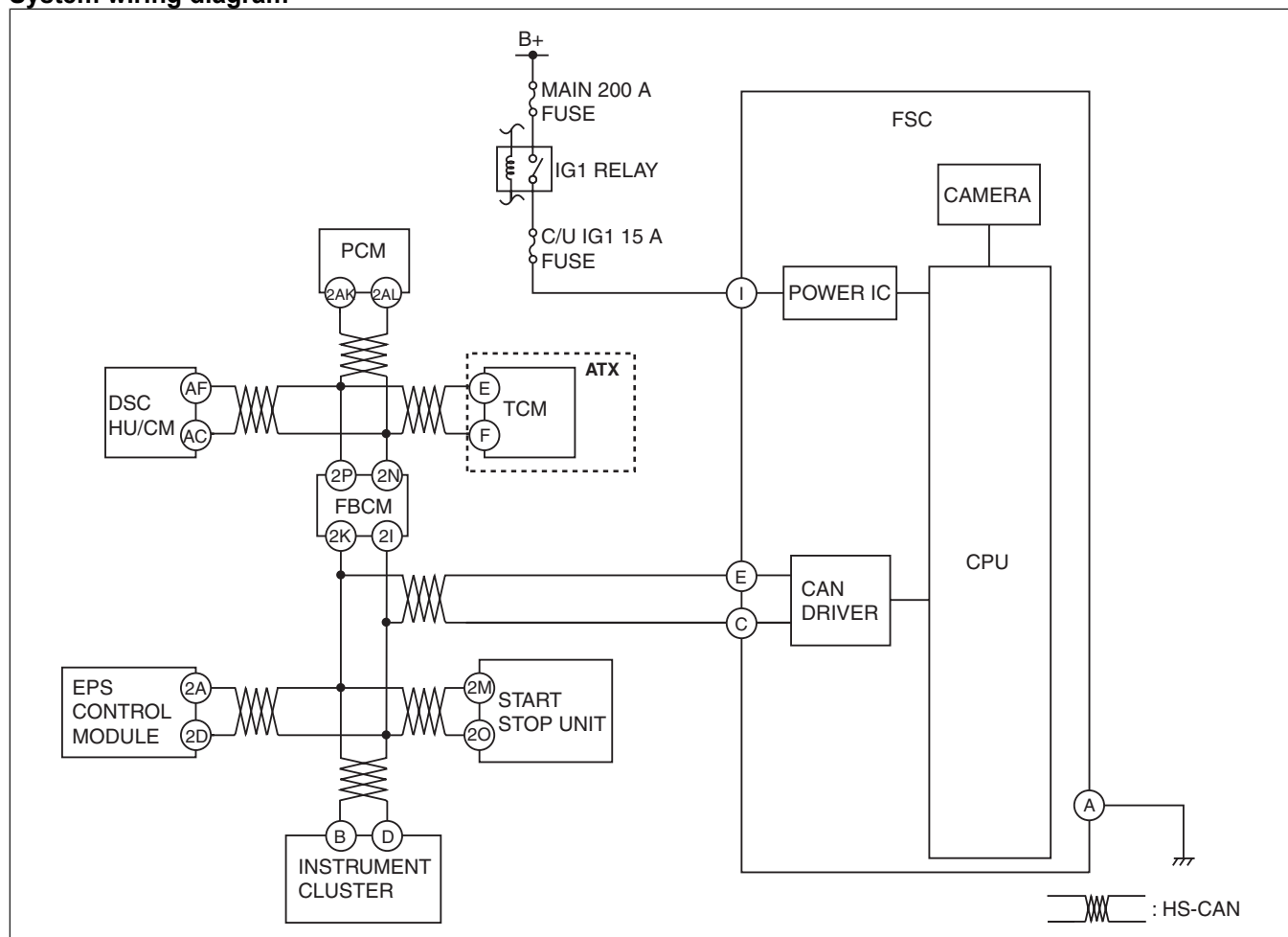
| Condition | HBC indicator light (green) | HBC warning light (amber) | TFT LCD display |
|--|-----------------------------|---------------------------|---|
| Light switch is in position other than AUTO and high position | Illumination off | Illumination off | No display |
| Headlights off | | | |
| While vehicle is stopped | | | |
| System set to off by personalization | Illumination on | Illumination off | No display |
| Light switch is in AUTO and high position and headlights turned on | | | |
| FSC detects camera fogging | | | |
| FSC detects camera soiling | | | |
| Malfunction in HBC occurs | Illumination off | Illumination on |  |
| Malfunction in FSC occurs | | |  |
| | Illumination off | Flashes |  |
| | | |  |

Structural view



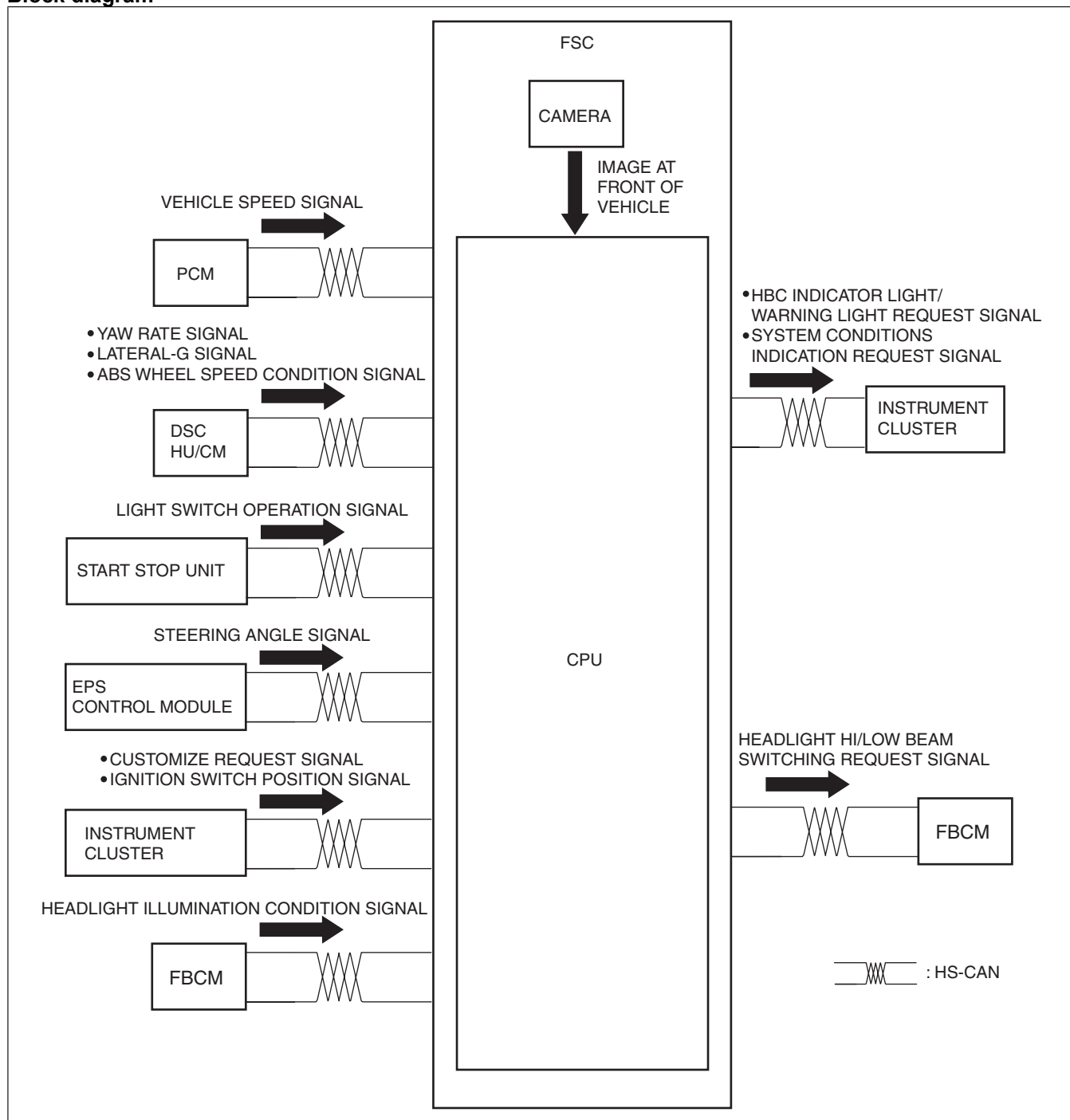
ac5wzn00000363

System wiring diagram



ac5wzn00001350

Block diagram



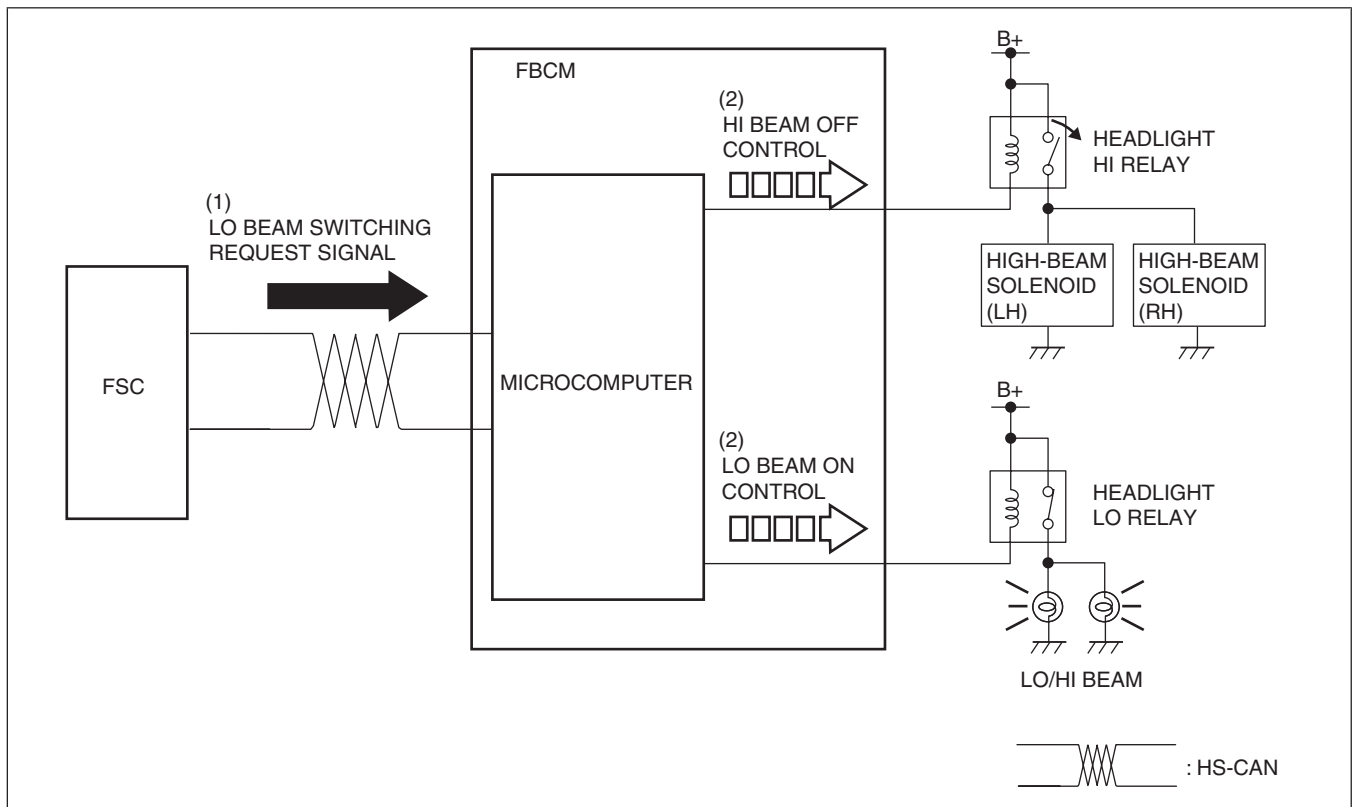
ac5wzn00000364

Operation

Low beam switching operation

Operation condition

- With the light switch in the AUTO and HI position and when the headlights are turned on, the headlights are switched to low beams when any of the following conditions are met:
 - On-coming vehicles, vehicles ahead, town/city streets are recognized.
 - Vehicle speed is 20 km/h {12 mph} or less
- When the FSC recognizes a light-emitting object (on-coming vehicles, vehicles ahead, town/city streets) or detects a vehicle speed of 20 km/h {12 mph}, it sends a low beam switching request signal to the front body control module (FBCM).
 - When the front body control module (FBCM) receives the low beam switching request signal from the FSC, it turns off the headlight HI relay.



ac5wzn00000365

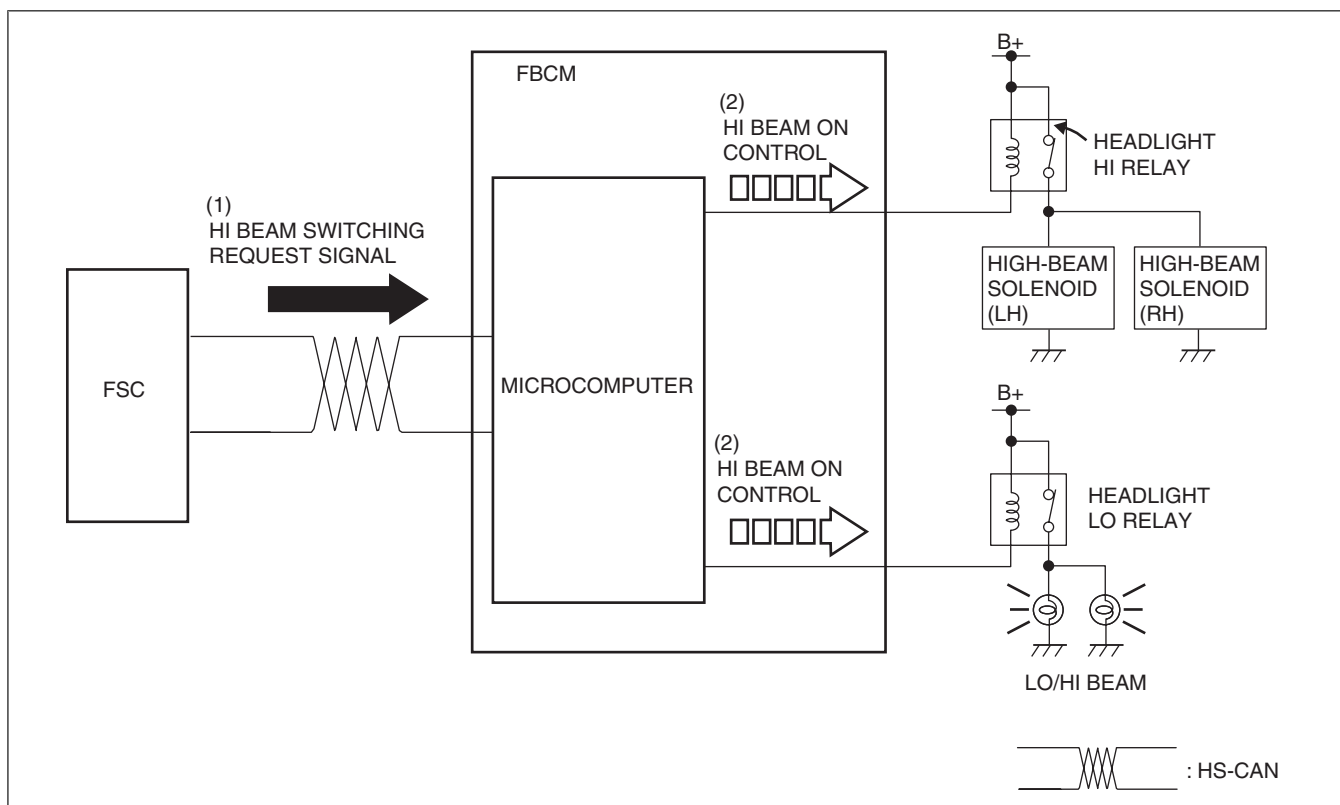
HI beam return operation

Operation condition

- If the following conditions are met, the headlights are switched to HI beams.
 - If vehicle speed is 30 km/h {19 mph} and on-coming vehicles, vehicles ahead or street lights are not recognized

On-coming vehicles

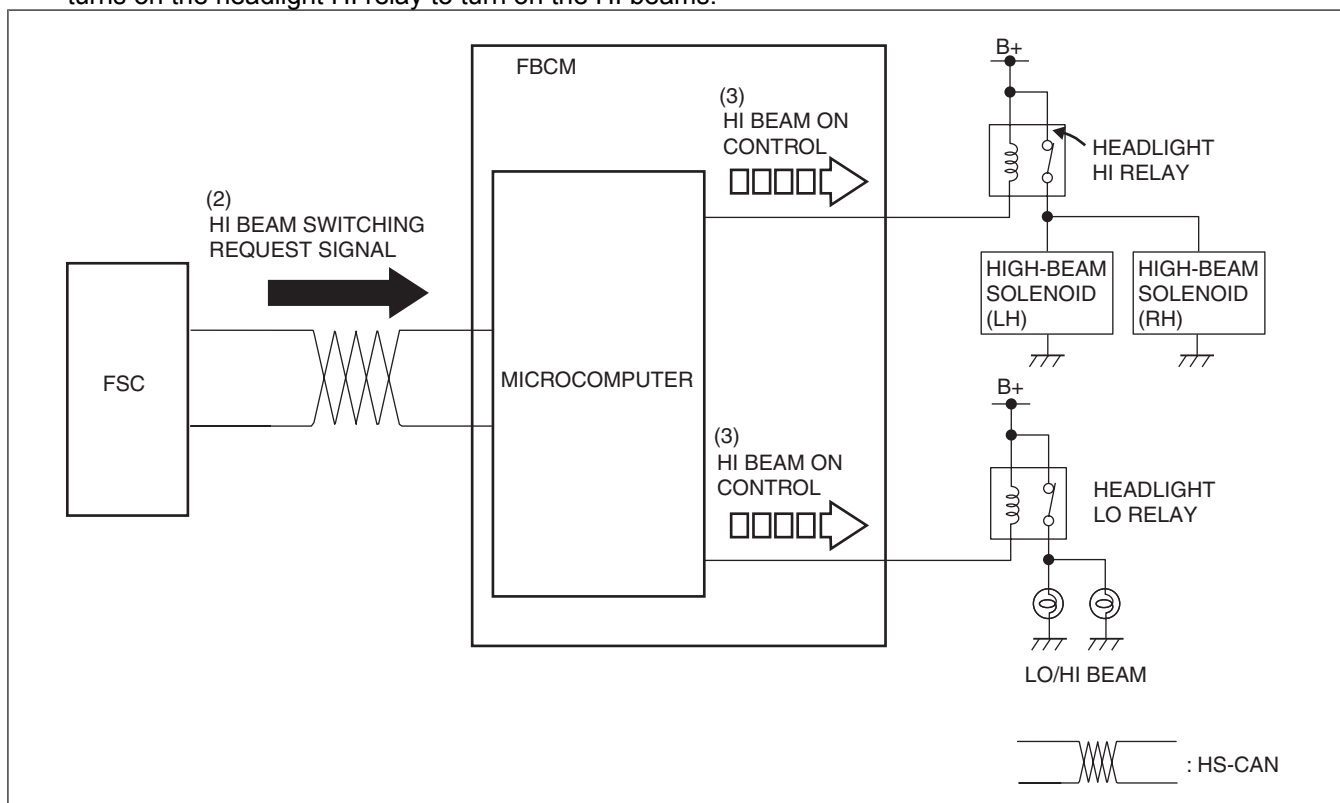
- If a recognized on-coming vehicle moves away from the camera range, the FSC sends a HI beam switching request signal to the front body control module (FBCM).
- When the front body control module (FBCM) receives the HI beam switching request signal from the FSC, it turns on the headlight HI relay to turn on the HI beams.



ac5wzn00000366

Vehicle ahead or town/city streets (street lights)

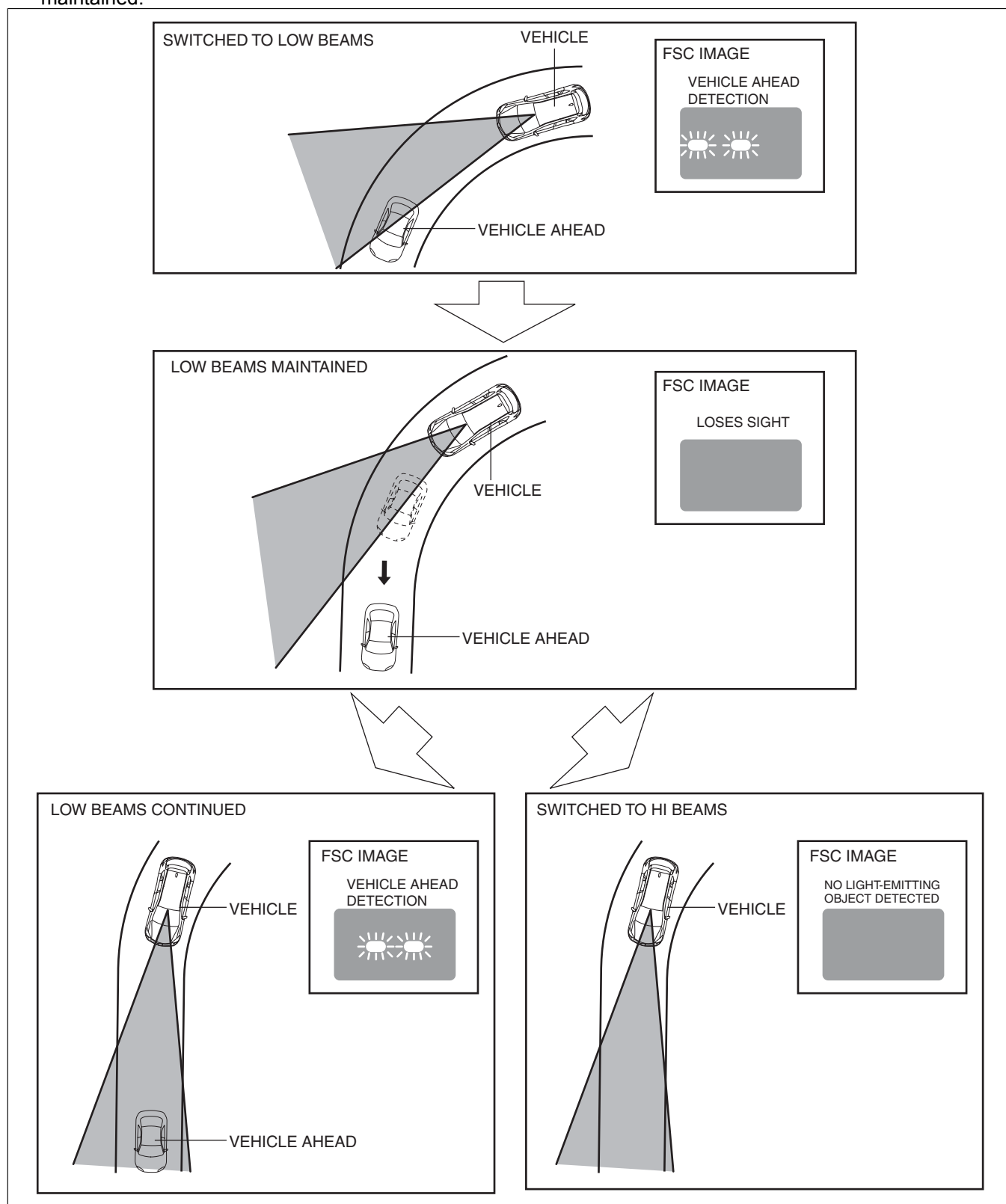
1. If a recognized vehicle ahead moves away from the camera range, or town/city streets (street lights) are no longer detected in the camera range, the low beams are maintained for a certain period of time.
2. If a vehicle ahead or town/city streets (street lights) are not detected for a certain period of time, the FSC sends a HI beam switching request signal to the front body control module (FBCM).
3. When the front body control module (FBCM) receives the HI beam switching request signal from the FSC, it turns on the headlight HI relay to turn on the HI beams.



ac5wzn00000367

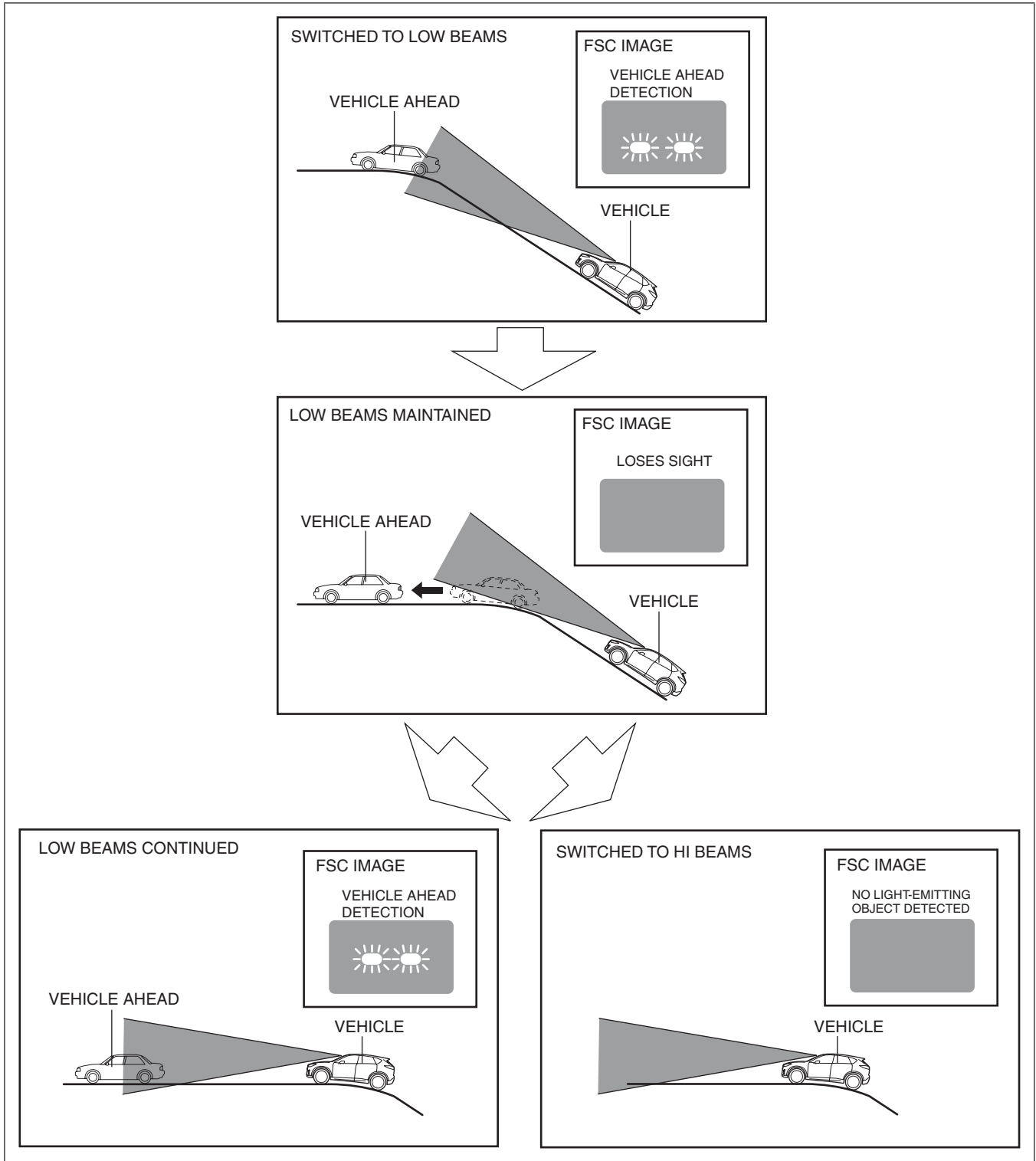
FSC loses sight of vehicle ahead which is cornering

- If the FSC loses sight of a recognized vehicle which is cornering, the FSC maintains the low beams until reaching the locus at which the FSC lost sight of it. If the vehicle ahead is not detected at the locus at which the FSC had lost sight of it, the headlights are switched to high beams. If the vehicle ahead is detected, the low beams are maintained.



FSC suddenly loses sight of light-emitting object (on-coming vehicles, vehicles ahead, town/city streets (street lights))

- If the FSC suddenly loses sight of a recognized light-emitting object in the camera range, the low beams are maintained for a certain period of time. Depending on whether a light-emitting object is detected or not after the certain period of time has elapsed, the headlights are switched to high beams or the system determines that the low beams are to be maintained.



ac5wzn00000369

Fail-safe

- If a malfunction is detected in the system, control is inhibited and the headlights are switched to HI beams.