SYSTEM CONTROL

1. General

The control of the dynamic radar cruise control system varies depending on the mode:

A: Constant Speed Control Mode

B: Vehicle-to-vehicle Distance Control Mode.

○: Available –: Not Available

Control	Outline	Mode	
Control	Control Outline		B
Constant Speed Control [See page BE-256]	The ECM compares the actual vehicle speed and the set speed and if the vehicle speed is lower than the set speed, it uses the throttle motor to increase the throttle opening.	0	0
Deceleration Control [See page BE-257]	Effects throttle control and brake control in order to decelerate the vehicle so that the vehicle-to-vehicle distance between this vehicle and the vehicle ahead equals the set distance.		0
Follow-up Control [See page BE-258]	After effecting deceleration control, the vehicle follows the vehicle ahead in order to maintain the proper vehicle-to-vehicle distance in accordance with the vehicle speed.	-	0
Acceleration Control [See page BE-259]	Accelerates the vehicle in order to attain the set vehicle speed if the vehicle ahead or this vehicle has changed lanes.	_	0
Set Control	 While this system fulfils the following conditions and the cruise control switch is pressed to the SET/- side and released, the ECM stores the vehicle speed and maintains the vehicle constantly at that speed. The cruise control system is on. The shift lever is in D position or the shift lever is in D position, and the shift paddle switches were used to select the 4th, 5th, 6th, 7th or 8th shift range. 	0	0
	The vehicle is running within a vehicle speed of about 43 km/h (27 mph) or more.	0	_
	The vehicle is running within the following speed range [About 43 to 170 km/h (27 to 106 mph)].	-	0
Low Speed Limit Control	The low speed limit is the lowest speed that cruise control can be set and is designed as approx. 40 km/h (25 mph). The cruise control cannot be set below that speed. If the vehicle speed drops below that speed while driving using cruise control, the cruise control will be cancelled automatically. The vehicle set speed is kept in memory.	0	0

(Continued)

Control		Mode	
	Outline		В
COAST Switch Control	While the cruise control switch is held to the SET/- side, the vehicle speed and the vehicle set speed change as follows, according to the mode:	0	0
	The vehicle decelerates constantly.The vehicle set speed changes to the speed at which the switch is released.	0	-
	 The vehicle set speed decreases in increments of 5 km/h or 5 mph. [Example: 103 → 100 → 95 km/h (mph)] The vehicle decelerates rapidly due to ETCS-i. The vehicle will remain at the speed that the vehicle is traveling at when the COAST switch is released. 	_	0
Tap Down Control	 When the cruise control switch is pushed momentarily (approx. 0.5 sec.) to the SET/- side, the vehicle speed and the vehicle set speed change as follows, according to the mode: The vehicle will decelerate in increments of approximately 1.6 km/h (1 mph) for each time the switch was pressed. However, if the difference between the actual vehicle speed and the vehicle set speed is greater than 5 km/h or 5 mph, the vehicle set speed will change to the speed at which the vehicle was being driven at the time the switch was operated. 	0	_
	When the cruise control switch is held to the RES/+ side, the vehicle speed and the vehicle set speed change as follows, according to the mode:	0	0
	The vehicle will accelerate constantly.The vehicle set speed changes to the speed at which the switch is released.	0	-
ACC Switch Control	 The vehicle set speed increases in increments of 5 km/h or 5 mph. [Example: 62 → 65 → 70 km/h (mph)] The vehicle will accelerate to the speed that is set at the time the switch is released. However, only the vehicle set speed will change during follow-up control. 	_	0
RES Switch Control	If the vehicle speed is above the low speed limit, the cruise control resumes operation (when the cruise control switch is subsequently pushed to the RES/+ side) to reach the vehicle speed that was set at the time the driver canceled cruise control. Even if the vehicle speed drops below the low speed limit, resume can be performed when the vehicle speed increases above the low speed limit.	0	0
Tap Up Control	 When the cruise control switch is pushed momentarily (approx. 0.5 sec.) to the RES/+ side, the vehicle speed and the vehicle set speed change as follows. The vehicle will accelerate in increments of approx. 1.6 km/h (1 mph) for each time the switch was pressed. However, if the difference between the actual vehicle speed and the vehicle set speed is greater than 5 km/h or 5 mph, the vehicle set speed changes to the speed as which the vehicle was being driven at the time the switch was operated. 	0	-

(Continued)

Control		Mode	
Control	Outime		В
Shift-down Control	When the vehicle is traveling uphill using cruise control, automatic transmission control may cause the transmission to shift down. During shift-down control, when the end of uphill travel is determined based on the throttle valve angle, the transmission will shift up after a certain period of time. When the transmission shifts down during ACC switch control or RES switch control, the transmission will shift up after ACC switch control or RES switch control ends.	0	0
Manual Cancel Control	 If any of the following signals are sent to the ECM, the cruise control is cancelled accordingly. The shift lever is shifted from D to N or shifted from D to M. When 1st, 2nd or 3rd range is selected in D position by shift paddle switch operation. Stop light switch on signal/ brake pedal depressed. CANCEL switch on signal (cruise control switch moved to CANCEL side) Cruise control switch (ON-OFF button) off signal Mode switch (pattern select switch) SNOW signal VSC operation signal 	0	0
Automatic Cancel Control [See page BE-260]	When an automatic cancel signal is sent to the ECM, cruise control operation is canceled. At this time, the style of the warning to the driver and the control resumption condition varies according to the cancel signal.	0	0
Mode Switching Control	 The following operations switch the modes: 1) ON-OFF button on the cruise control switch is on. (Starts in the vehicle-to-vehicle distance control mode) 2) Cruise control switch is held to the MODE side. (Approx. one second or more) If the switch is pushed to any other side before switching modes, switch the cruise control system off; then, perform steps 1) and 2) again. 	0	0
Diagnosis [See page BE-261]	If a malfunction occurs in the dynamic radar cruise control system during cruise control operation, the ECM cancels cruise control and memorizes information related to the malfunction.	0	0

2. Constant Speed Control

General

- In the constant speed control mode, the constant speed control is performed by the ECM in the same way as the cruise control.
- In the vehicle-to-vehicle distance control mode, the constant speed control is performed by the millimeter wave radar sensor and distance control ECU assembly.

Constant Speed Control in Vehicle-to-Vehicle Distance Control Mode

The millimeter wave radar sensor transmits the information about the vehicle ahead to the distance control ECU assembly and also transmits a millimeter wave radar sensor operation signal to the ECM. The distance control ECU assembly transmits this signal to the ECM. The ECM compares the set vehicle speed and the actual vehicle speed, and effects constant speed control by regulating the throttle control in order to attain the set vehicle speed.



3. Deceleration Control

- The distance control ECU assembly calculates the target deceleration rate in accordance with signals from the millimeter wave radar sensor, and transmits a deceleration request signal to the ECM. Upon receiving this signal, the ECM closes the throttle valve in order to cause the vehicle to decelerate.
- This control is not effected in the presence of a parked vehicle or object, or below the settable vehicle speed range.



- If the distance control ECU assembly determines that further deceleration is necessary, it transmits a brake request signal to the ECM. Upon receiving this signal, the ECM transmits a brake request signal to the skid control ECU assembly. The skid control ECU assembly then controls the brake actuator to apply the brakes.
- At this time, if the deceleration rate is higher than a predetermined value, the skid control ECU assembly outputs a stop light illumination request signal to the stop light control relay, in order to inform anyone who might be following the vehicle.



• If the vehicle is not decelerating adequately, the distance control ECU assembly sounds a buzzer to prompt the driver to apply the brakes.



4. Follow-up Control

- After performing deceleration control, the distance control ECU assembly transmits a request signal to the ECM so that the vehicle can follow the vehicle ahead while maintaining the proper vehicle-to-vehicle distance according to the vehicle speed. Upon receiving this signal, the ECM regulates the throttle in order to perform follow-up control.
- Three stages (long, middle, and short) of vehicle-to-vehicle distance can be selected by operating the distance control switch.



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5. Acceleration Control

If the distance control ECU assembly detects (based on the millimeter wave radar sensor) that either the vehicle ahead or own vehicle has changed lanes, an acceleration request signal is transmitted to the ECM in order to attain the set vehicle speed. Upon receiving this signal, the ECM regulates the throttle in order to perform acceleration control.



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6. Automatic Cancel Control

If any of the conditions listed below occur while the vehicle is being driven using cruise control (A: constant speed control mode; B: vehicle-to-vehicle distance control mode), the cruise control will be canceled. Then, the following warning items will appear for the driver.

- 1) Warning message is displayed on the multi-information display.
- 2) Master warning light illuminates.
- 3) Buzzer sounds.
- 4) CRUISE main indicator light flashes.

Mode	Description of Malfunction	Warning
A and B	 If any of the conditions listed below occur, the ECM clears the set vehicle speed and cancels the cruise control. Malfunction of the vehicle speed signal (SPD). Malfunction in the ETCS-i. An open or short circuit in the stop light switch. The cruise control is prohibited until the conditions are remedied or the cruise control system is turned off and back on again using the ON-OFF button on the cruise control switch. 	1) "CHECK CRUISE SYSTEM" 2) Illuminates 3) Sounds Once 4) Flashes
	If any of the conditions listed below occur, the ECM cancels the cruise control while retaining the setting vehicle speed in its memory. • The vehicle speed drops below low speed limit [approx. 40 km/h (25 mph)].	1) - 2) - 3) - 4) -
А	If any of the conditions listed below occur, the ECM clears the set vehicle speed and cancels the cruise control.The vehicle speed drops more than 16 km/h (10 mph) below the set vehicle speed.	1) - 2) - 3) - 4) -
В	 If any of the conditions listed below occur, the ECM clears the set vehicle speed and cancels the cruise control. Malfunction of the millimeter wave radar sensor. Displacement of the axis of the millimeter wave radar sensor. Malfunction in the dynamic radar cruise control system other than those given above. The operation of cruise control is prohibited until the conditions are remedied or the cruise control system is turned off and back on again using the ON-OFF button on the cruise control switch. 	1) "CHECK CRUISE SYSTEM" 2) Illuminates 3) Sounds Once 4) Flashes
	 If any of the conditions listed below occur, the ECM cancels the cruise control while retaining the setting vehicle speed in its memory. The millimeter wave radar sensor is dirty. The operation of cruise control is prohibited until the conditions are remedied or the cruise control system is turned off and back on again using the ON-OFF button on the cruise control switch. 	1) "CLEAN RADAR SENSOR" 2) Illuminates 3) Sounds Once 4) Flashes
	 If any of the conditions listed below occur, the ECM cancels the cruise control while retaining the vehicle set speed in its memory. The wipers operate at HI speed (including AUTO mode). The mode switch (pattern select switch) is SNOW mode. The measurement becomes extremely unstable due to poor weather conditions. The operation of cruise control is prohibited until the conditions are remedied or the cruise control system is turned off and back on again using the ON-OFF button on the cruise control switch. 	1) "CRUISE NOT AVAILABLE" 2) Illuminates 3) Sounds Once 4) Flashes

7. Diagnosis

If a malfunction occurs in the dynamic radar cruise control system during cruise control operation, the ECM cancels the cruise control and flashes the CRUISE main indicator light to inform the driver of the malfunction. At the same time, the malfunction is stored in memory as a DTC (Diagnostic Trouble Code).

- DTCs can be read when an intelligent tester is connected to DLC3.
- An intelligent tester can be used to read the 5-digit codes.