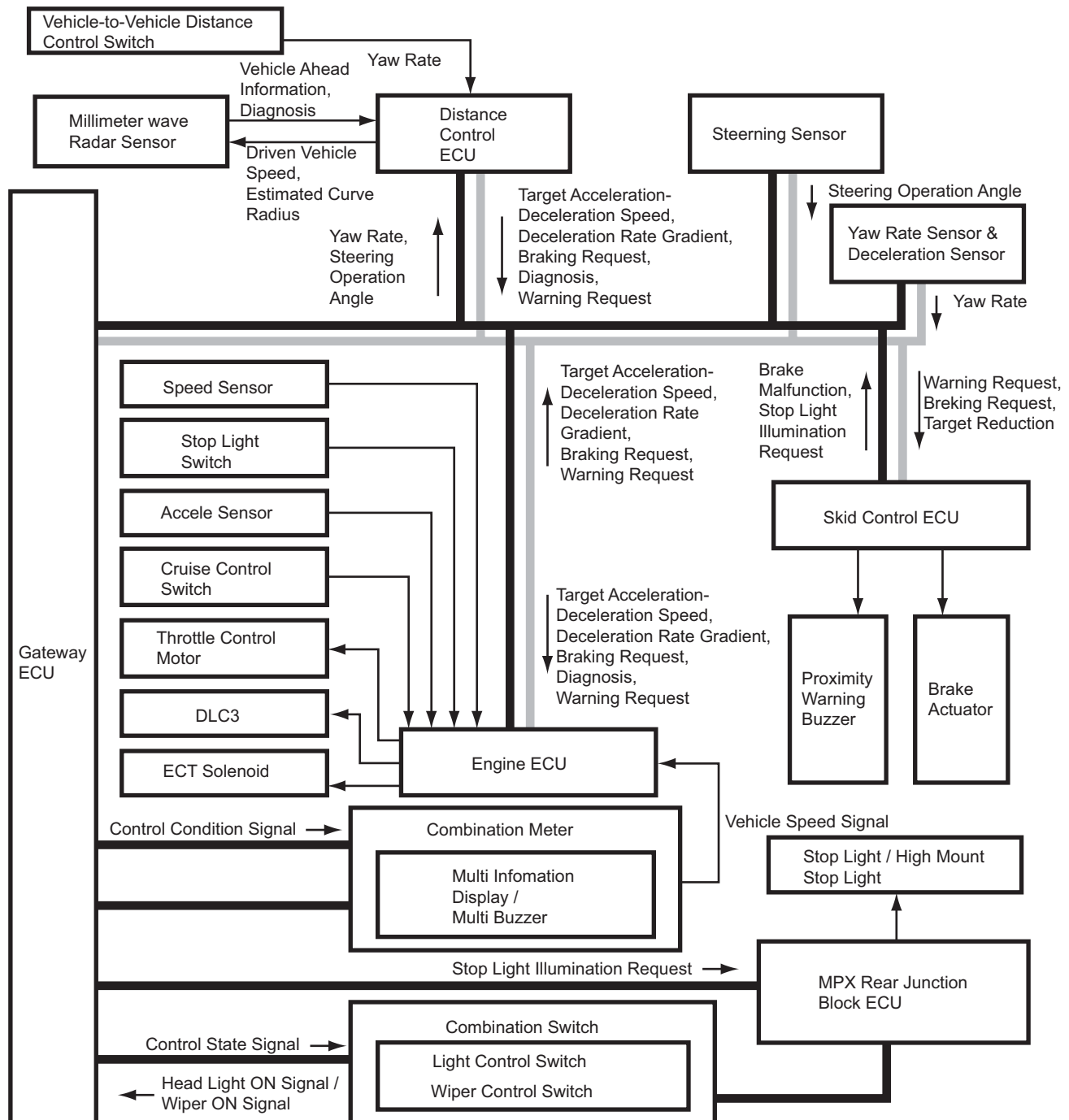


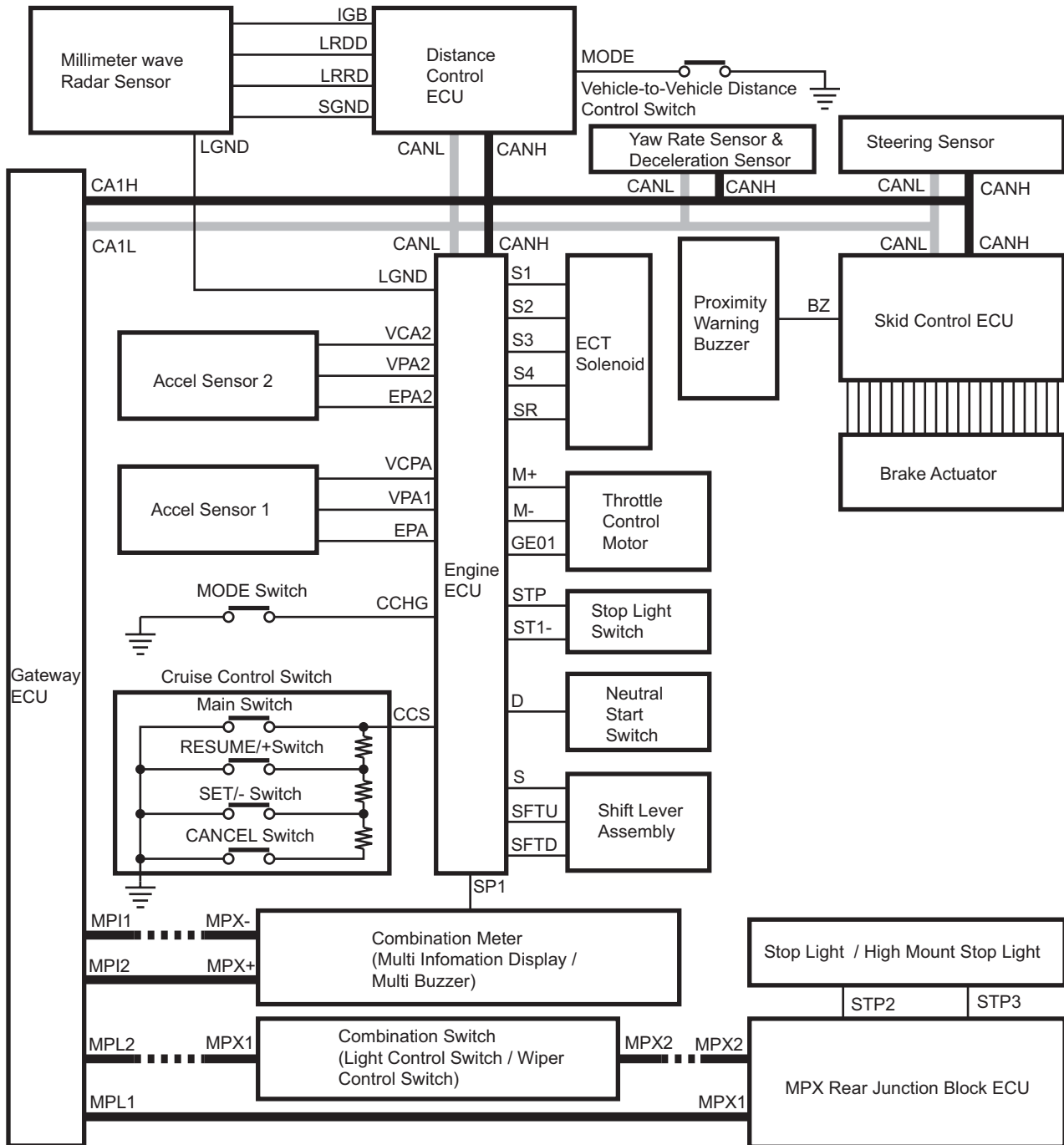
Dynamic Radar Cruise Control System Control

- The Dynamic radar cruise control system is controlled by the systems indicated in the diagram.



*:Represents vehicle distance, relative speed,same lane probability,new target / target lost determination.

Dynamic radar cruise control system circuit figure



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Vehicle-to-Vehicle Distance Control Mode

- In the vehicle-to-vehicle control mode, the Dynamic radar cruise control system effects the controls described below.

Cruise control system control (vehicle-to-vehicle distance mode)

Control name		Control contents
Set control	·	When the driver turns the SET/- switch ON while the main switch is ON and the vehicle is traveling between approximately {27 and 87 mph, 43 and 170 km/h(EU)} 43 and 139 km/h(other country), this function memorizes the vehicle speed at the time the switch is OFF as the set speed, and starts the control.
Low-Speed Limit, Set Lower Limit Vehicle Speed	·	The low speed limit is set to approximately 25 mph,(40km/h). If the vehicle speed drops below the low-speed limit while the vehicle is being driven in the vehicle-to-vehicle control mode, the system automatically cancels its control while keeping the set vehicle speed in memory.
	·	The set lower limit vehicle speed is set to approximately 27 mph(43 km/h). If the vehicle is being driven below the set lower limit vehicle speed, the system will not accept the driver's set operation. If the vehicle speed drops below the set lower limit vehicle speed while the SET/- switch is ON, the system automatically cancels its control while keeping the set vehicle speed in memory.
High-Speed Limit	·	The high-speed limit is set to approximately 125 mph(200 km/h). If the driver performs a set operation while the vehicle is traveling at a speed higher than the high-speed limit, the system will set the speed to the high-speed limit {approximately 125 mph(200 km/h)}. Likewise, the driver cannot increase the speed by setting a speed higher than the high speed limit through the operation of the RESUME/+ switch.
Constant-Speed Control	·	The ECU compares the present driving speed against the set speed, and regulates the position of the throttle control valve by actuating the throttle control motor in order to reach the set vehicle speed.
Follow Control	·	The ECU compares the present driving speed against the follow driving target acceleration data. Then, it regulates the position of the throttle control valve by actuating the throttle control motor in order to maintain the proper vehicle-to-vehicle distance in accordance with the changes in the speed of the vehicle ahead. This control will not perform a follow drive towards a vehicle or object ahead that is stopped.
Vehicle-to-Vehicle Control Mode/Constant-Speed Control Mode Selector	·	In the state ("RADAR READY" shown on display) in which no control at all is effected after the driver turns ON the cruise control main switch, if the driver pushes the mode switch ON longer than approximately 1 second, the system will transfer to the constant-speed control mode. (The radar cruise control system initially starts in the vehicle-to-vehicle control mode.)

Control name		Control contents
Acceleration Control	·	If the driver continues to push the RESUME/+ switch ON while the vehicle is being driven in the vehicle-to-vehicle control mode, the ECU increases the vehicle speed and applies a speed increase update to the set speed. This is accomplished by actuating the throttle control motor in the direction to open the throttle control valve. In the follow control mode, if the driver continues to push the RESUME/+ switch ON, and there is a vehicle ahead, precedence is given to continue performing the follow control, without increasing the vehicle speed. However, the system will apply a speed increase update on the set speed.
	·	If the driver momentarily (approximately 0.5 seconds) presses the RESUME/+ switch ON while the vehicle is being driven under cruise control, the ECU increases the memorized speed by approximately 5 mph(5 km/h) with each pressing of the switch (this is called a "tap-up" function). However, the ECU will not change the memorized speed if the difference between the memorized speed and the driving speed is greater than approximately 3 mph(5 km/h).
	·	While the vehicle is being driven under follow control, if the vehicle ahead is no longer present because it has changed lanes or the driven vehicle has changed lanes, the vehicle will automatically accelerate gradually to reach the set vehicle speed. If the driver pushes the RESUME/+ switch ON at this time, the vehicle will accelerate more quickly.
Deceleration Control	·	If the driver continues to push the SET/- switch ON while the vehicle is being driven in the vehicle-to-vehicle control mode, the ECU decreases the vehicle speed by actuating the throttle control motor in the direction to close the throttle control valve. The ECU applies a vehicle speed reduction update by using the vehicle speed that existed at the time the driver had released the switch OFF as the set vehicle speed. If the set vehicle speed after the update is slower than the speed of the vehicle ahead, the system will transfer to the constant-speed control. If the set vehicle speed after the update is faster than the speed of the vehicle ahead, the system will continue effecting the follow control.
	·	If the vehicle speed exceeds the high-speed limit speed due to a downhill slope while the driver operates the SET/- switch, and the driver subsequently releases the switch OFF, the ECU will memorize the high-speed limit speed as the set vehicle speed and transfer the system to the constant-speed control mode.
	·	If the system needs to decelerate the vehicle operating under the follow drive control, the system decelerates the vehicle to the follow drive target vehicle speed. This is accomplished by actuating the throttle control motor in the direction to close the throttle control valve. If a greater rate of deceleration is required, the driver can apply shift-down control and brake control.

Control name		Control contents
Auto cancel control	·	If any of the conditions listed below occurs while the vehicle is being driven in the vehicle-to-vehicle control mode, the ECU deletes the set vehicle speed and cancels the control. In this case, it will indicate a CHECK CRUISE SYSTEM warning on the multi-information display, sound the warning buzzer, illuminate the master warning indicator light, and blink the cruise operation/warning indicator light. Furthermore, the ECU will disable the control until the main switch is turned ON again.
	6	A failure in the vehicle speed signal.
	7	A failure in the throttle control motor.
	8	An open or short circuit in the stoplight switch.
	·	If any of the conditions listed below occurs while the vehicle is being driven in the vehicle-to-vehicle control mode, the ECU deletes the set vehicle speed and cancels the control. In this case, it will indicate a CHECK CRUISE SYSTEM warning on the multi-information display, sound the warning buzzer, illuminate the master warning indicator light, and blink the cruise operation/warning indicator light. Furthermore, the ECU will disable the control until the ignition switch is turned ON again. (Vehicle-to-vehicle control mode only)
	9	A failure in the cruise control system.
	·	If any of the conditions listed below occurs while the vehicle is being driven in the vehicle-to-vehicle control mode, the ECU cancels the control while keeping the set vehicle speed in memory. In this case, it will indicate a CREAM RADAR SENSOR or CRUISE NOT AVAILABLE warning on the multi-information display, sound the warning buzzer, illuminate the master warning indicator light, and blink the cruise operation/warning indicator light. Furthermore, the ECU will disable the control until the system recovers from the conditions listed below or the main switch is turned ON again. If the system is restored from the conditions listed below, the driver can operate the RESUME/+ switch to resume the control.
	10	The wipers operate at the HI speed (on model equipped with a millimeter wave radar sensor).
	11	The driver selects the ECT SNOW mode.
	·	If any of the conditions listed below occurs while the vehicle is being driven in the vehicle-to-vehicle control mode, the ECU cancels the control while keeping the set vehicle speed in memory.
	12	The driving speed drops below approximately 25 mph(40 km/h).
	13	The driving speed drops below approximately 27 mph(43 km/h) while the SET/- switch is turned ON.
Manual cancel control	·	If any of the signals listed below is input while the vehicle is being driven in the vehicle-to-vehicle control mode, the ECU cancels the control while keeping the set vehicle speed in memory.
	1	Stoplight switch is ON (by pressing the brake pedal).
	2	"D" position signal is OFF or a gear other than 6th, 5th, or 4th is selected in the "S" mode.
	3	CANCEL switch of the cruise control operation switch is ON.
	4	VSC is operating .
	5	Cruise control main switch is OFF (set vehicle speed is deleted).

Control name		Control contents
Resume control	·	Suppose the driver performs a control cancel operation through the foregoing manual cancel controls (except by pressing the main switch OFF) or through the auto cancel controls (6 to 13) while the vehicle is being driven in the vehicle-to-vehicle control mode. If the driving speed is above approximately 25 mph(40 km/h), the driver can turn the RESUME/+ switch ON to resume the control at the set vehicle speed that existed at the time the driver performed the control cancel operation.
Shift down control	·	While the vehicle is being driven in the vehicle-to-vehicle control mode, the transmission might shift down on an uphill slope.
	·	When the system determines that the vehicle has completed the uphill drive, the transmission shifts up automatically after a predetermined length of time has elapsed.
Brake control	·	While the vehicle is being driven in the vehicle-to-vehicle control mode, if a greater amount of deceleration is needed, the system applies braking control by actuating the brake actuator. At this time, the stoplights will illuminate.

Constant Speed Control Mode

- The constant speed mode of the Dynamic radar cruise control system is performed according to the following.

Radar cruise control system control(constant speed mode)

Control name		Control contents
Set control	·	When the driver turns the SET/- switch ON while the main switch is ON and the vehicle is being driven at an approximate speed between {27 and 87 mph,43 and 170 km/h(EU)},43 and 139 km/h(other country), the ECU memorizes the vehicle speed at the time the driver releases the switch OFF as the set vehicle speed, and starts the control.
lowest vehicle speed	·	The set lower limit vehicle speed is set to approximately 27 mph (43 km/h). If the vehicle is being driven below the set lower limit vehicle speed, the system will not accept the driver's set operation. If the vehicle speed drops below the set lower limit vehicle speed while the SET/- switch is ON, the system automatically cancels its control.
high speed limit	·	The high-speed limit is set to approximately 125 mph(200 km/h). If the vehicle is traveling at a speed higher than the high-speed limit, the system will not memorize the set vehicle speed. Likewise, the driver cannot increase the speed by setting a speed higher than the high speed limit through the operation of the RESUME/+ switch.
Constant-speed control	·	The ECU compares the present driving speed against the set vehicle speed. Then, it regulates the position of the throttle control valve by actuating the throttle control motor in order to approach the set vehicle speed.

Control name		Control contents
Acceleration control	·	If the driver continues to push the RESUME/+ switch ON while the vehicle is being driven in the constant-speed control mode, the ECU increases the vehicle speed by actuating the throttle control motor in the direction to open the throttle control valve. Then, the ECU memorizes the vehicle speed that existed at the time the driver had released the switch OFF as the set vehicle speed, and transfers to the constant-speed control mode.
	·	If the vehicle speed exceeds the high-speed limit {approximately 125 mph(200 km/h)} while the driver is operating the RESUME/+ switch, the ECU memorizes the high-speed limit speed as the set vehicle speed, and transfers to the constant-speed control mode.
	·	If the driver momentarily (below approximately 0.5 seconds) presses the RESUME/+ switch ON while the vehicle is being driven in the constant-speed control mode, the ECU increases the set vehicle speed by approximately 5 mph (5 km/h) with each pressing of the switch (this is called a "tap-up" function). However, the ECU will not change the set speed through the tap-up function if the difference between the set speed and the present vehicle speed is greater than approximately 3 mph(5 km/h).
Deceleration control	·	If the driver continues to push the SET/- switch ON while the vehicle is being driven in the constant-speed control mode, the ECU decreases the vehicle speed by actuating the throttle control motor in the direction to close the throttle control valve. The ECU applies a vehicle speed reduction update by using the vehicle speed that existed at the time the driver had released the switch OFF as the set vehicle speed. Then, the system transfers to the constant-speed control mode.
	·	While the driver operates the SET/- switch, and the vehicle speed exceeds the high-speed limit speed due to a downhill slope, and the driver subsequently releases the switch OFF, the ECU memorizes the high-speed limit speed as the set vehicle speed and transfers the system to the constant-speed control mode.
	·	If the driver momentarily (below approximately 0.5 seconds) presses the SET/- switch ON while the vehicle is being driven in the constant-speed control mode, the ECU decreases the set speed by approximately 5 mph (5 km/h) with each pressing of the switch (this is called a "tap-down" function). If the difference between the memorized speed and the driving speed is above approximately 3 mph (5 km/h), the ECU memorizes the vehicle speed at the time the driver releases the switch OFF as the set vehicle speed. Then, the ECU transfers the system to the constant-speed control mode.

Control name		Control contents
Auto cancel control	·	If any of the conditions listed below occurs while the vehicle is being driven in the constant-speed control mode, the ECU deletes the set vehicle speed and cancels the control. In this case, it will indicate a CHECK CRUISE SYSTEM warning on the multi-information display, sound the warning buzzer, illuminate the master warning indicator light, and blink the cruise operation/warning indicator light. Furthermore, the ECU will disable the control until the main switch is turned ON again.
	1	A failure in the vehicle speed signal.
	2	A failure in the throttle control motor.
	3	An open or short circuit in the stoplight switch.
	·	If any of the conditions listed below occurs while the vehicle is being driven in the constant-speed control mode, the ECU deletes the set vehicle speed and cancels the control.
	4	The driving speed drops below approximately 25 mph (40 km/h).
	5	The driving speed drops below approximately 27 mph (43 km/h) while the SET/- switch is turned ON.
	6	The driving speed is approximately 10 mph (16 km/h) less than the memorized speed.
Manual cancel control	·	If any of the signals listed below is input while the vehicle is being driven in the constant-speed control mode, the ECU cancels the control while keeping the set vehicle speed in memory.
	1	"D" position signal is OFF or a gear other than 6th, 5th, or 4th is selected in the "S" mode.
	2	"D" Position Signal OFF or "S" Position is selected (excluding 6,5,4)
	3	CANCEL switch of the cruise control operation switch is ON.
	4	VSC is operating.
	5	Cruise control main switch is OFF (set vehicle speed is deleted).
Resume control	·	Suppose the driver performs a control cancel operation through the foregoing manual cancel controls (except by pressing the main switch OFF) while the vehicle is being driven in the constant-speed control mode. If the driving speed is still above approximately 25 mph (40 km/h), the driver can turn the RESUME/+ switch ON to resume the control at the set vehicle speed that existed at the time the driver performed the control cancel operation. (The control cannot be resumed if the vehicle speed drops below approximately 25 mph (40 km/h) even once after the cancellation.)
Shift down control	·	While the vehicle is being driven in the constant-speed control mode, the transmission might shift down on an uphill slope.
	·	When the system determines that the vehicle has completed the uphill drive, the transmission shifts up automatically after a predetermined length of time has elapsed.

Warning Indication During System Failure

- If the engine ECU detects a failure in the input signals received from various switches, sensors, and ECUs that comprise the system, it will inform the driver of the system failure as follows.

List of System Failure Warning Indications

- Blinks the cruise operation/warning indicator light in the combination meter.
- Illuminates the master warning indicator light in the combination meter.
- Sounds the warning buzzer.
- Indicates a warning item on the multi-information display in the combination meter.

- The illumination and the blinking of the lights and the indication of the display will be unlit when the cruise control switch is turned OFF.

Indication of results of diagnosis of system failure location

- If the display indicates a warning in the event of a failure in the system, a technician can access the location of the failure in the system, which is stored in the memory of the engine ECU, by operating the diagnosis function.
- The location of the failure in the system is indicated on the multi-information display or through the use of the check mode of the Intelligent tester II diagnosis tool.

List failure diagnosis result indication

code No.	diagnosis result	mode
21	• Open circuit in vehicle speed signal	Vehicle-to-vehicle distance Control mode/Constant Speed Control Mode
23	• Interruption or noise in vehicle speed signal	
52	• Open or short circuit in stoplight switch	
54	• Failure in stoplight switch input circuit • Failure in cancel circuit	
61	• Failure in communication between distance control ECU and engine ECU	
62	• Failure in communication between engine ECU and distance control ECU	
63	• Failure in distance control ECU	
64	• Failure in communication between skid control ECU and engine ECU	
65	• Failure in communication between engine ECU and skid control ECU	
66	• Failure in warning buzzer	
69	• Failure in brake system	
77	• Disruption in communication between engine ECU and distance control ECU	
78	• Disruption in communication between engine ECU and skid control ECU	
79	• Failure in communication with steering sensor	
80	• Failure in communication with yaw rate sensor & Deceleration sensor	
81	• Disruption in communication between distance control ECU and engine ECU	
82	• Disruption in communication between skid control ECU and engine ECU	