

■ ELECTRONIC CONTROL SYSTEM

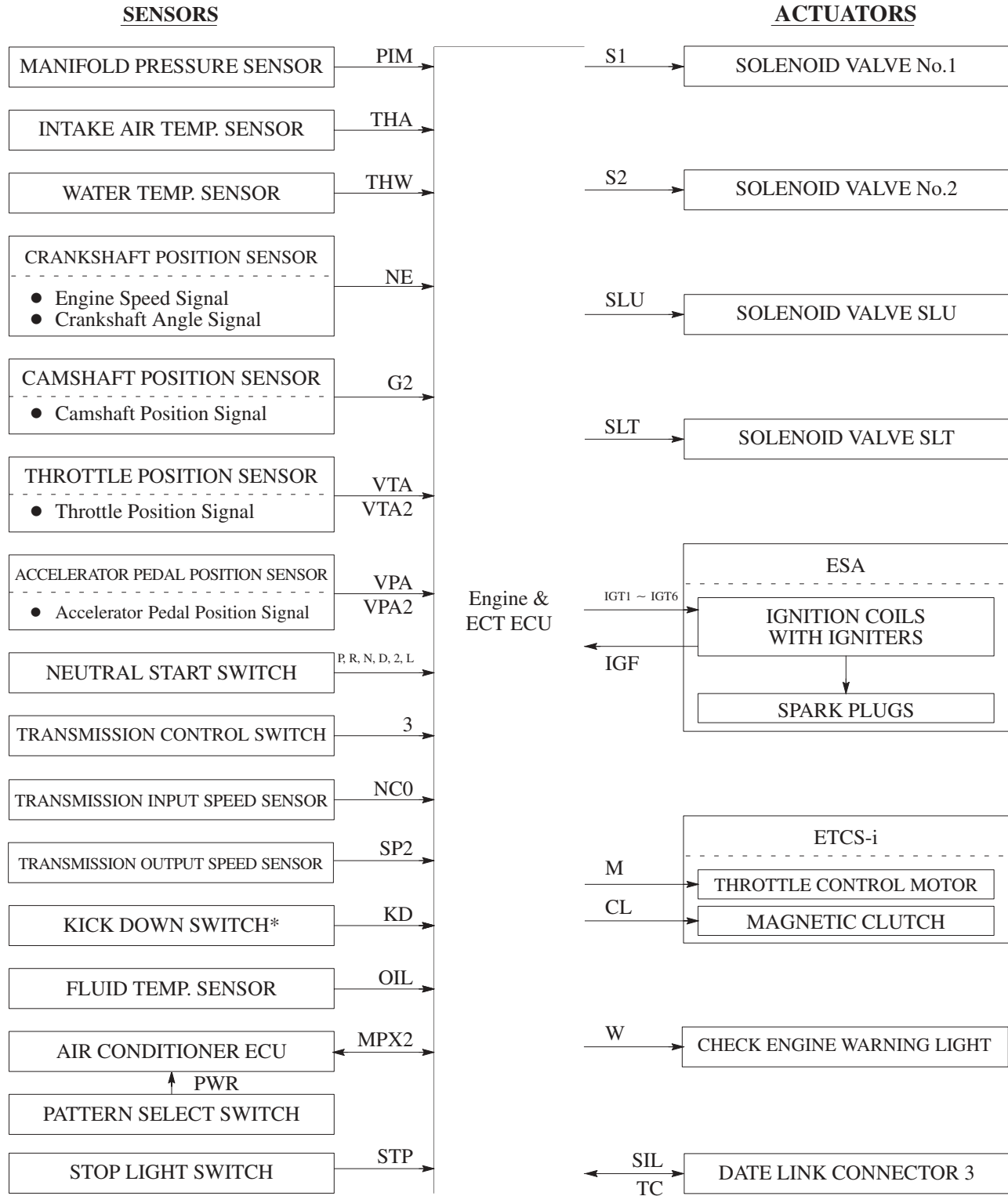
1. General

The electronic control system of the A45DE automatic transmission consists of the control listed below.

System	Function
Shift Timing Control	The optimum shift pattern is selected from 2 shift patterns in the engine & ECT ECU by the pattern select switch. The engine & ECT ECU sends current to the solenoid valve No.1 and/or No.2 based on signals from each sensor and shifts the gear.
Lock-Up Timing Control	The optimum lock-up pattern is selected from 2 lock-up patterns in the engine & ECT ECU by the pattern select switch. The engine & ECT ECU sends current to the solenoid valve SLU based on signals from each sensor and engages or disengages the lock-up clutch.
Flex Lock-Up Clutch Control	Controls the solenoid valve SLU, provides an intermediate mode between the ON/OFF operation of the lock-up clutch, and increase the operating range of the lock-up clutch to improve fuel economy.
Line Pressure Control	Based on the throttle opening angle and various signals, the engine & ECT ECU controls the throttle pressure by actuating the solenoid valve SLT. This makes it possible for the primary regulator valve to precisely and minutely control the line pressure, in accordance with the engine output and condition, thus effecting a smooth shifting of gears.
Engine Torque Control	Retards the engine ignition timing temporarily to improve shift feeling during up or down shifting.
“N” to “D” Squat Control	When the shift lever is shifted from “N” to “D” range, the gear is temporarily shifted to 3rd and then to 1st to reduce vehicle squat.
Shift Control in Uphill/Downhill Traveling	Controls to restrict the 4th up shift or to provide appropriate engine braking by using the engine & ECT ECU to determine whether the vehicle is traveling uphill or downhill.
Shift Shock Reduction Control	Closes the throttle valve to reduce the shock when the shift lever is shifted from “N” to “D”.
Self-Diagnosis	<ul style="list-style-type: none"> ● When a malfunction is detected, the engine & ECT ECU illuminates the “Check Engine” warning light to inform the driver. ● As the EURO-OBD or M-OBD system are supported, a hand-held tester can be connected to DLC3 to check the diagnostic codes. For details, see page 70 in the Diagnosis System Section.
Fail-Safe	Controls other components that are operating normally to enable the vehicle to continue driving, if a malfunction occurs in the solenoid valves or sensors.

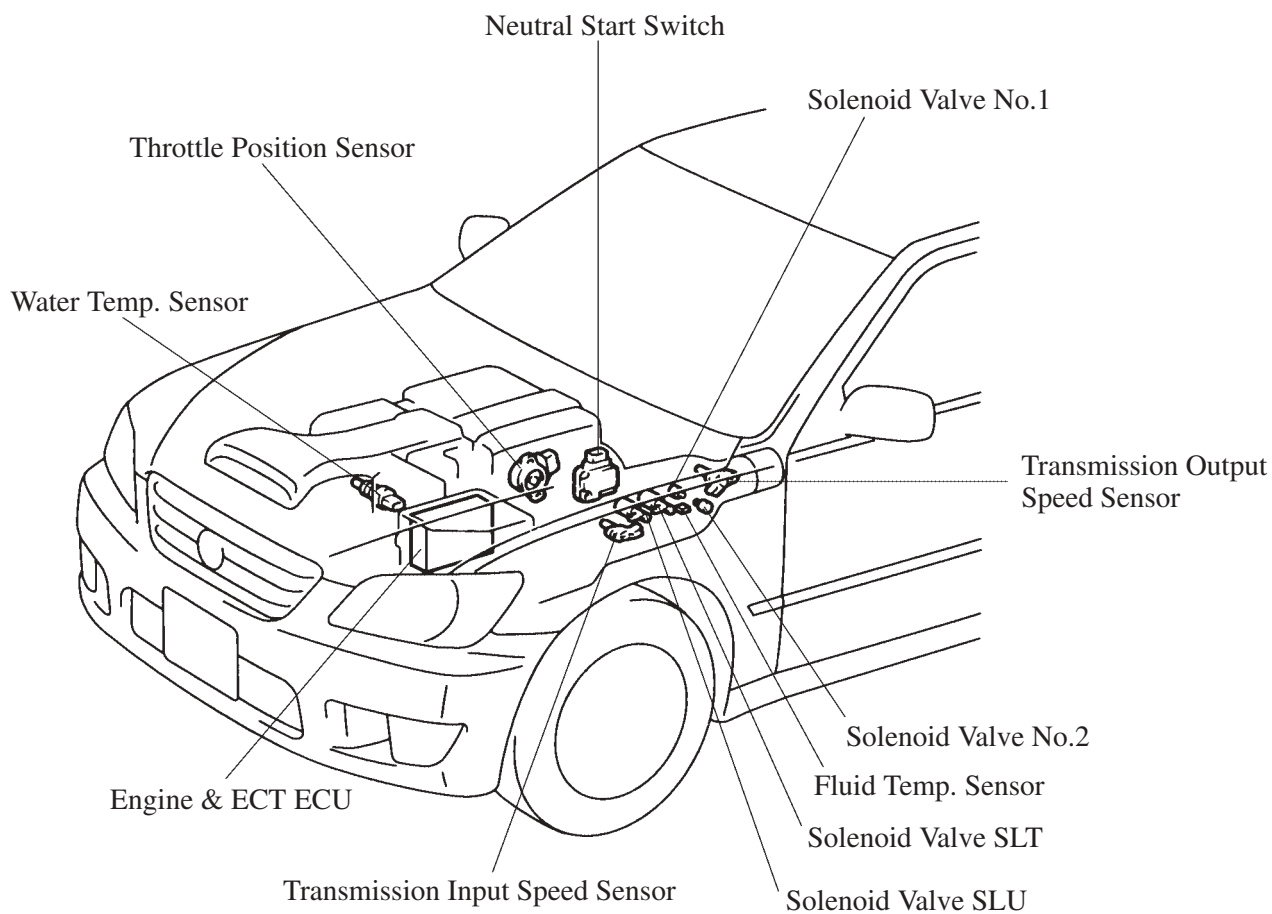
2. Construction

The configuration of the electronic control system in the A45DE automatic transmission is as shown in the following chart.

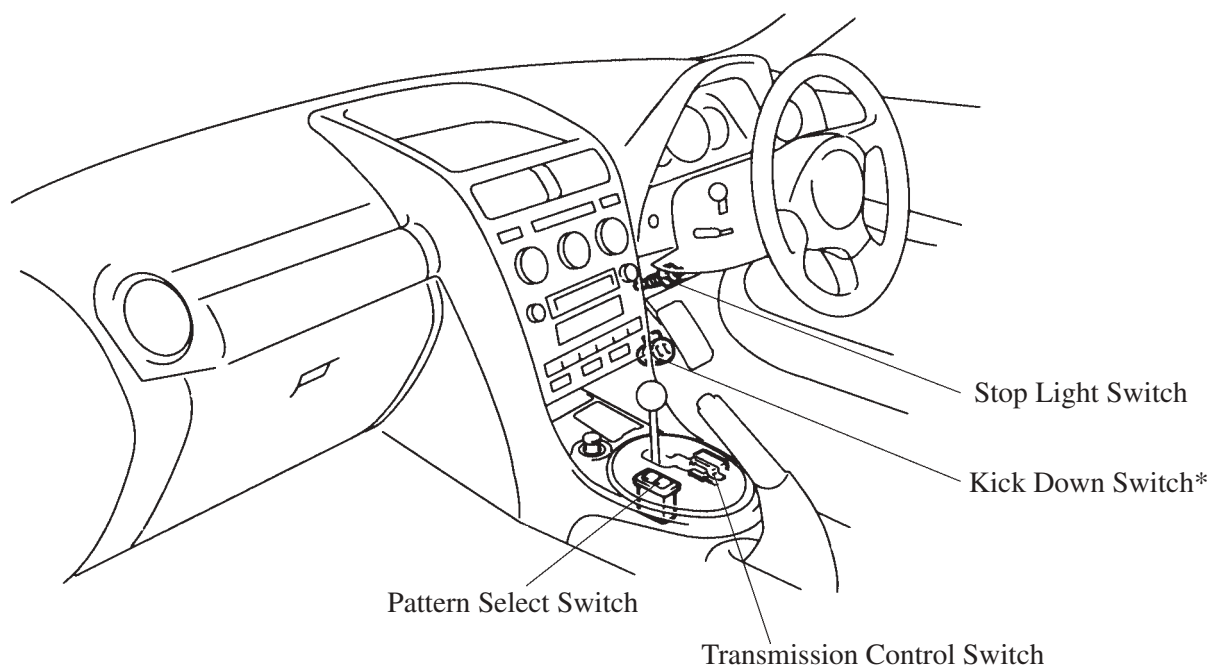


*: Only for LHD model

3. Layout of Main Components



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RHD Model

*: Only for LHD Model

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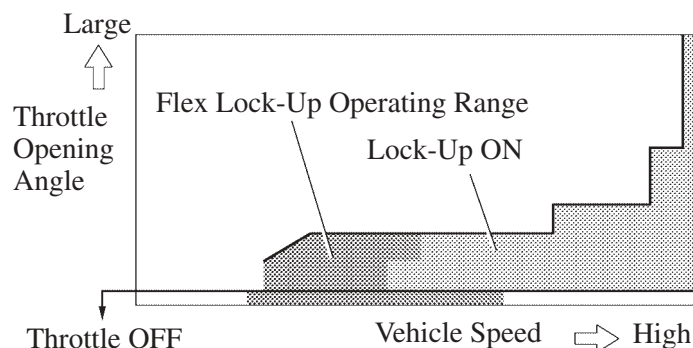
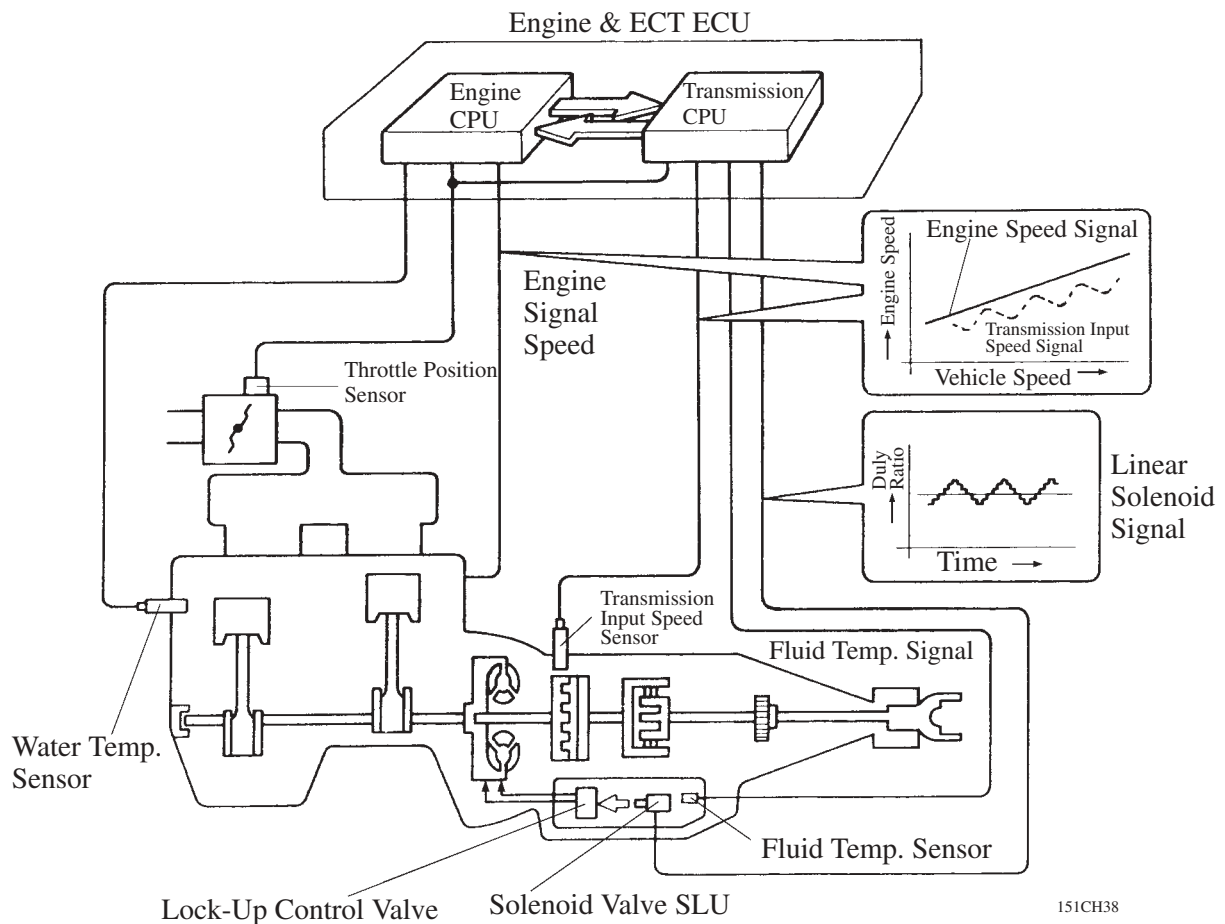
4. Function of Engine & ECT ECU

Flex Lock-Up Clutch Control

In addition to the conventional lock-up clutch control, a new flex lock-up clutch control has been adopted. In the low-to mid-speed range, this flex lock-up clutch control regulates the solenoid valve SLU to provide an intermediate mode between the ON/OFF operation of the lock-up clutch in order to improve the energy-transmitting efficiency in this range.

As a result, the operating range of the lock-up clutch has been increased and fuel economy has been improved.

The flex lock-up clutch control operates in the 3rd and 4th gear in the D range and in the 3rd gear in the 3 range. The lock-up clutch operates in the 4th gear in the D range and in the 3rd gear in the 3 range.



Line Pressure Control

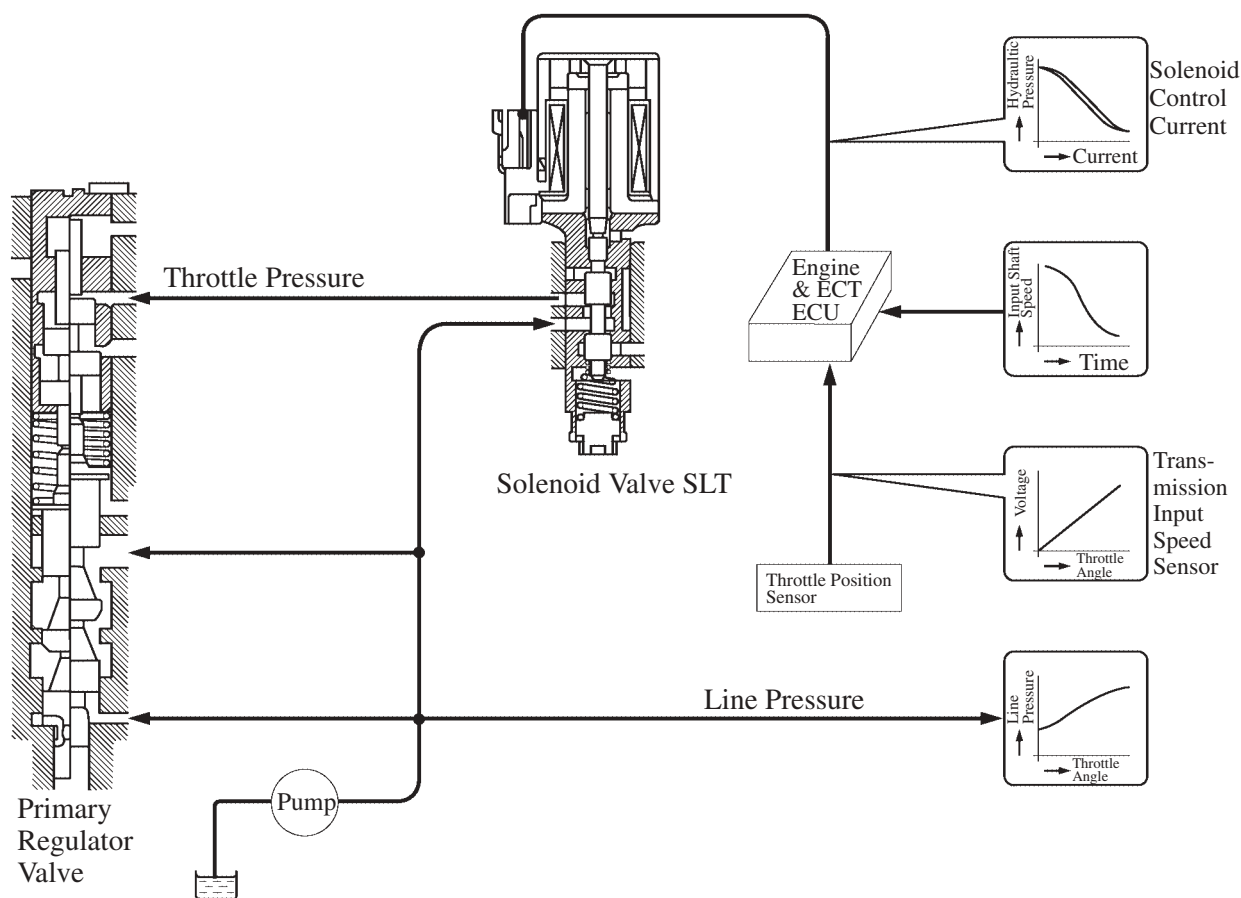
The previous mechanical control, which consisted of a throttle cable, cam, and throttle valve, has been changed to an electronic control system that uses a solenoid valve SLT.

In order to obtain a predetermined line pressure characteristic according to the throttle position sensor (VTA) signal the engine & ECT ECU activates the solenoid valve SLT to regulate the throttle pressure.

This makes it possible for the primary regulator valve to precisely and minutely control the line pressure, in accordance with the engine output, and thus realize smoother shift characteristics.

And also, the engine & ECT ECU detects the speed of the transmission input shaft to determine whether or not the transmission is shifting properly in order to ensure the smooth engagement of the clutch.

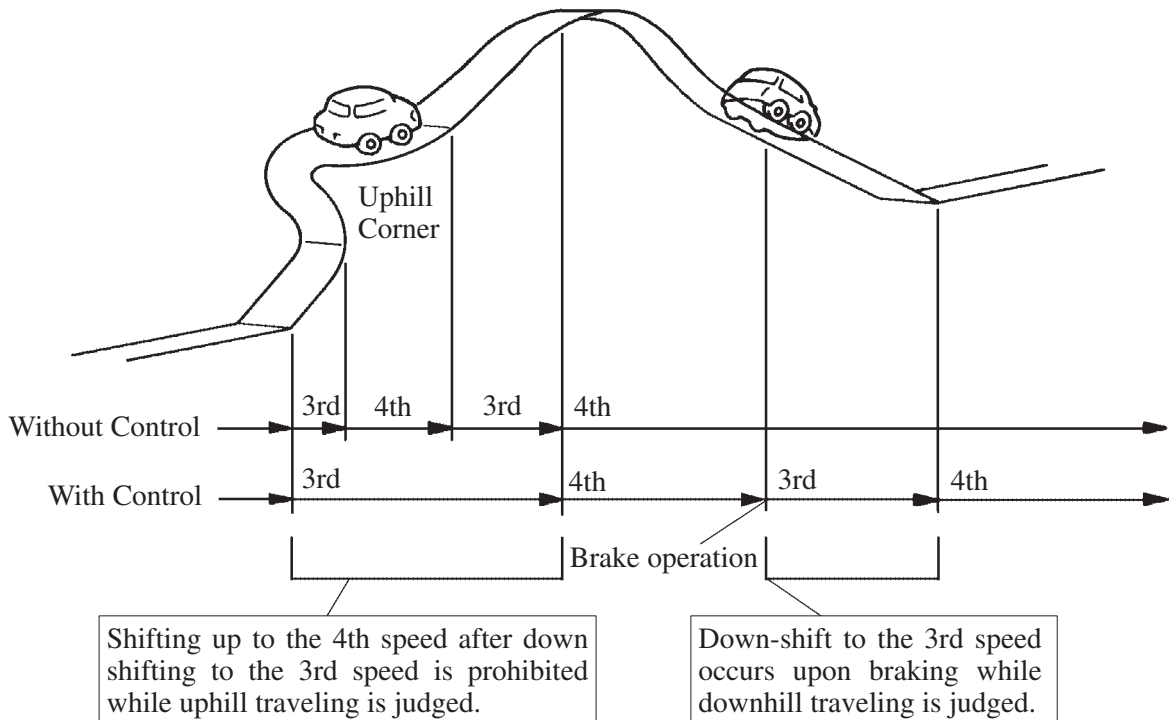
To ensure the optimal speed changes in the transmission input shaft, the engine & ECT ECU controls the solenoid valve SLT to finely regulate the line pressure.



Shifting Control in Uphill/Downhill Traveling

1) General

With shifting control in uphill/downhill traveling, the engine & ECT ECU calculates the throttle opening angle and the acceleration rate to determine whether the vehicle is in the uphill or downhill state. While driving uphill on a winding road with ups and downs, the 4th upshift is restricted to ensure a smooth drive. Also, if a brake application is detected while the engine & ECT ECU judges a downhill travel in 4th, the transmission automatically downshifts to 3rd in order to provide an appropriate engine brake. In addition, while the engine & ECT ECU judges a downhill travel, it restricts the travel in 3rd without keeping the brake application.

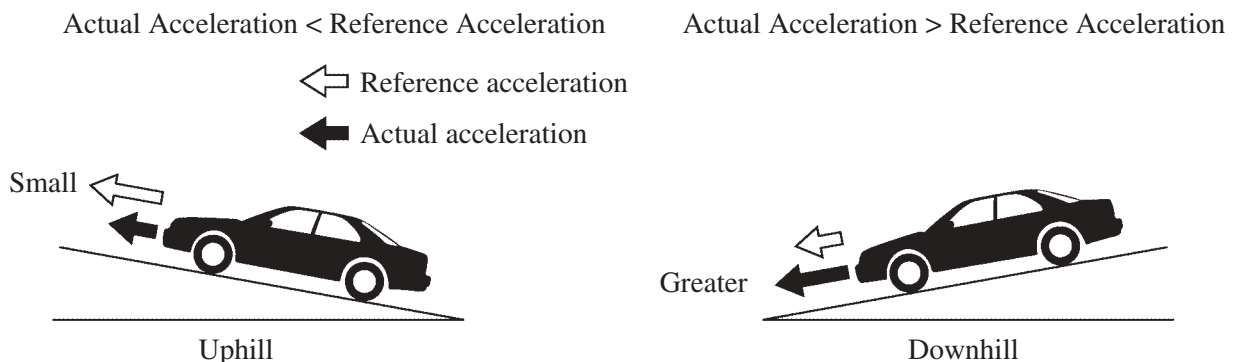


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2) Uphill/Downhill Judgment

The actual acceleration calculated from the speed sensor signal is compared with the reference acceleration stored in the engine & ECT ECU to judge uphill or downhill traveling.

The engine & ECT ECU judges an uphill travel if the actual acceleration is smaller than the reference acceleration, and restricts the 3rd to 4th upshift after a 4th to 3rd downshift has occurred. Also, the engine & ECT ECU judges a downhill travel if the actual acceleration is greater than the reference acceleration, and restricts the 4th upshift while traveling in 3rd. If a brake application is detected while traveling in 4th, it downshifts to 3rd.



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