■ELECTRONIC CONTROL SYSTEM

1. General

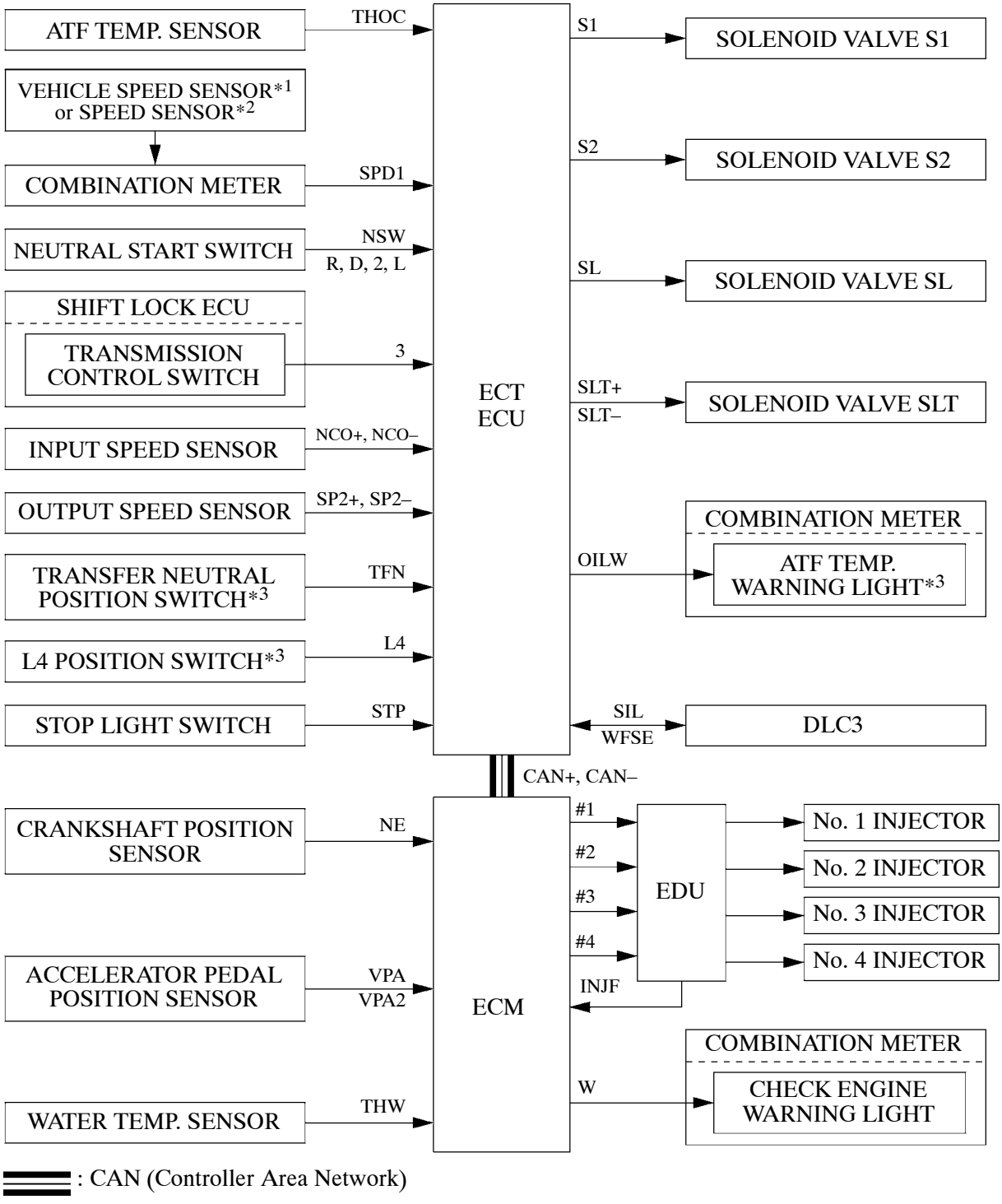
The electronic control system of the A340E, A340F, A343E and A343F automatic transmissions consists of the controls listed below:

System	Function	Transmission Type	
		A340E, A340F	A343E, A343F
Shift Timing Control	The ECM or ECT ECU sends current to the solenoid valve S1 and/or S2 based on signals from each sensor and shifts the gear.	○	○
Lock-up Timing Control	The ECM or ECT ECU sends current to the solenoid valve SL based on signals from each sensor and engages or disengages the lock-up clutch.	○	○
Line Pressure Control	Actuates the solenoid valve SLT to control the line pressure in accordance with information from ECM or ECT ECU and the operating conditions of the transmission.	○	○
Engine Torque Control	Retards the ignition timing temporarily to increase shift feeling during up or down shifting.	—	○
	Reduces the fuel injection volume temporarily to increase shift feeling during up or down shifting.	○	—
"N" or "D" Squat Control	When the shift lever is shifted from "N" to "D" position, the gear is temporarily shifted to 4th, 3rd and then 1st to reduce vehicle squat.	○	○
Diagnosis	When the ECM or ECT ECU detects a malfunction, the ECM or ECT ECU makes a diagnosis and memorizes the failed section.	○	○
Fail-safe	Controls other normally operating components, permitting continued driving when malfunctions occur in the electrical circuit.	○	○

2. Construction

The configuration of the electronic control system in the A340E, A340F, A343E and A343F automatic transmissions are as shown in the following charts.

▶ A340E and A340F ◀

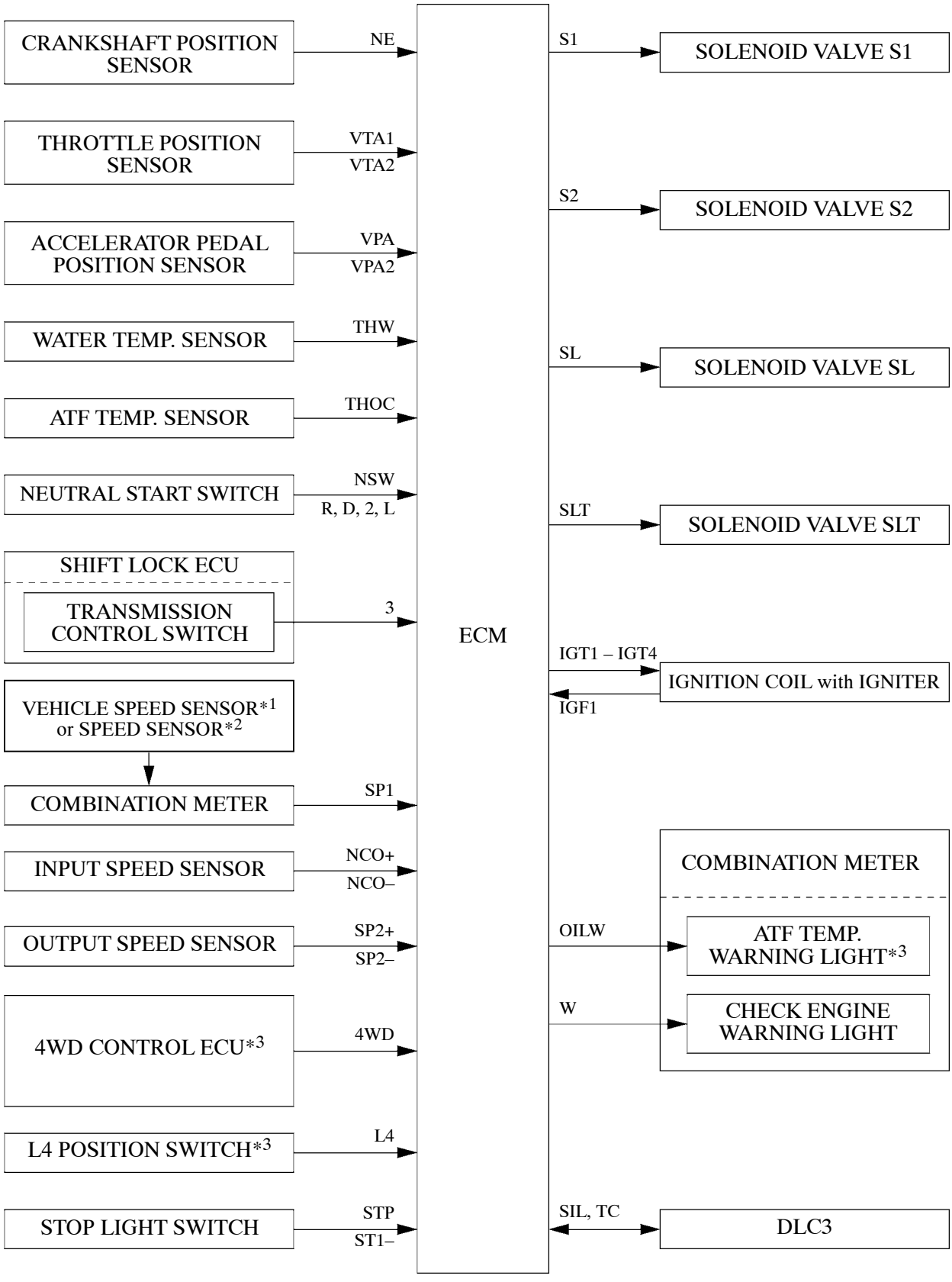


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*1: Models without brake control system
*2: Models with brake control system
*3: Models with A340F automatic transmission

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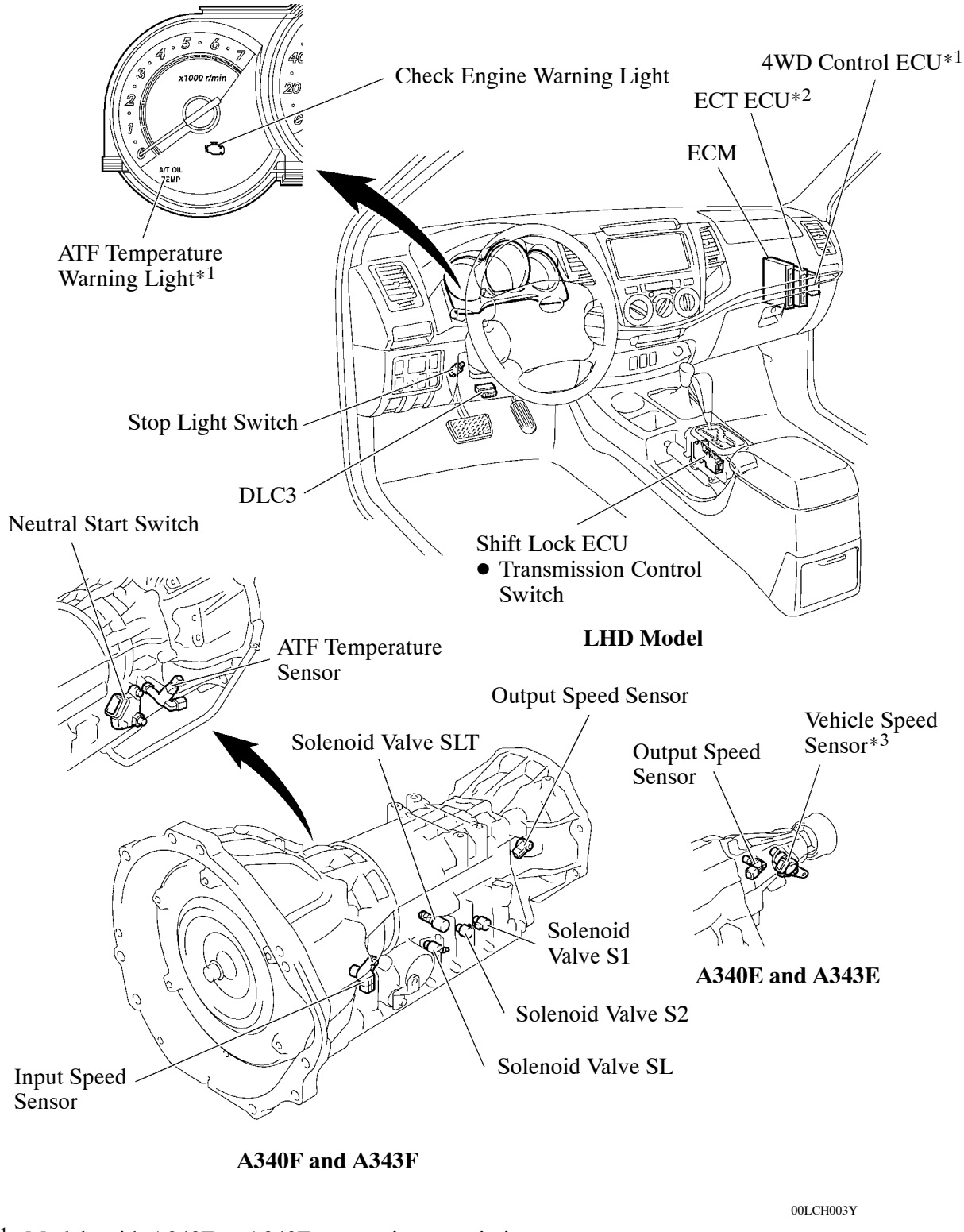
▶ A343E and A343F ◀



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*1: Models without brake control system
*2: Models with brake control system
*3: Models with A343F automatic transmission

3. Layout of Main Components



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*1: Models with A340F or A343F automatic transmission
*2: Models with A340E or A340F automatic transmission
*3: Models without brake control system

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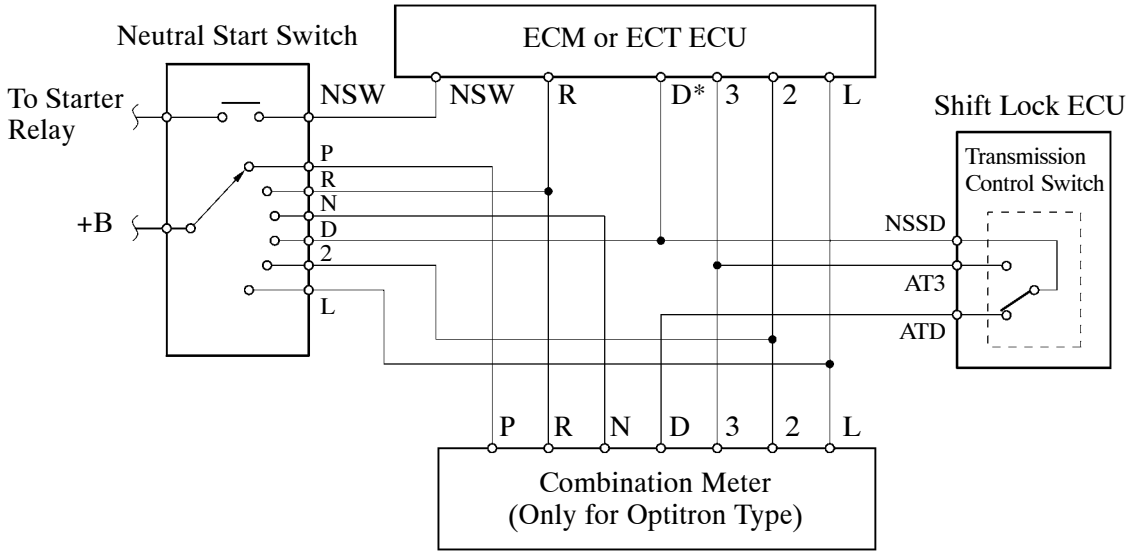
4. Construction and Operation

Transmission Control Switch and Neutral Start Switch

The ECM or ECT ECU uses these switches to detect the shift position.

- The neutral start switch sends the R, D*, 2, L and NSW position signals to the ECM or ECT ECU. It also sends signals for the shift indicator light (P, R, N, 2 and L) in the combination meter (only for Optitron type).
- The transmission control switch is located in the shift lock ECU. This switch sends the 3rd signal to the ECM or ECT ECU. It also sends signals for the shift position indicator light (D and 3rd) in the combination meter (only for Optitron type).

▶ Wiring Diagram ◀



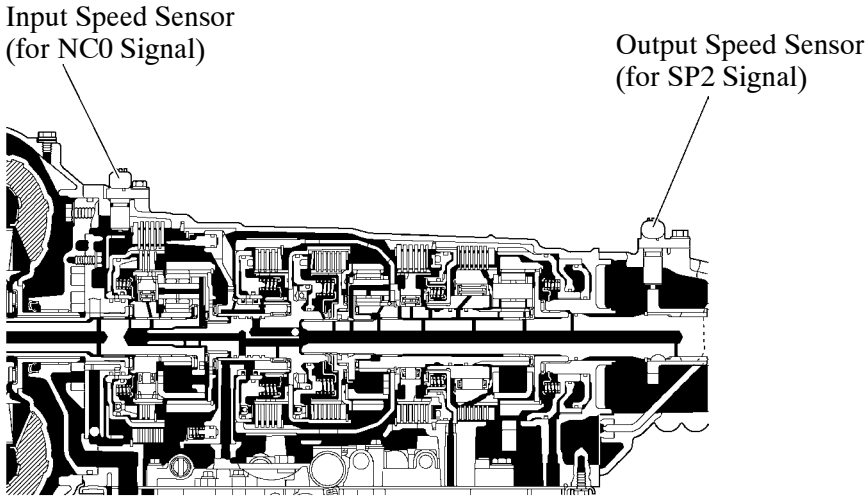
*: Models with 1KD-FTV engine

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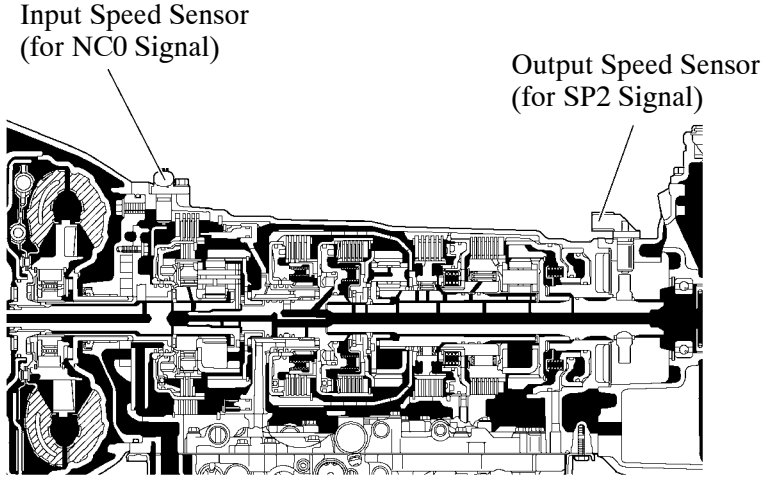
Input Speed Sensor and Output Speed Sensor

These automatic transmissions use an input speed sensor (for NC0 signal) and an output speed sensor (for SP2 signal). Thus, the ECM or ECT ECU can detect the timing of the shifting of the gears and appropriately control the engine torque and hydraulic pressure in response to various conditions.

- These speed sensors are the pick-up coil type.
- The input speed sensor detects the input speed of the transmission. The OD direct clutch drum is used as the timing rotor for this sensor.
- The output speed sensor detects the speed of the output shaft.



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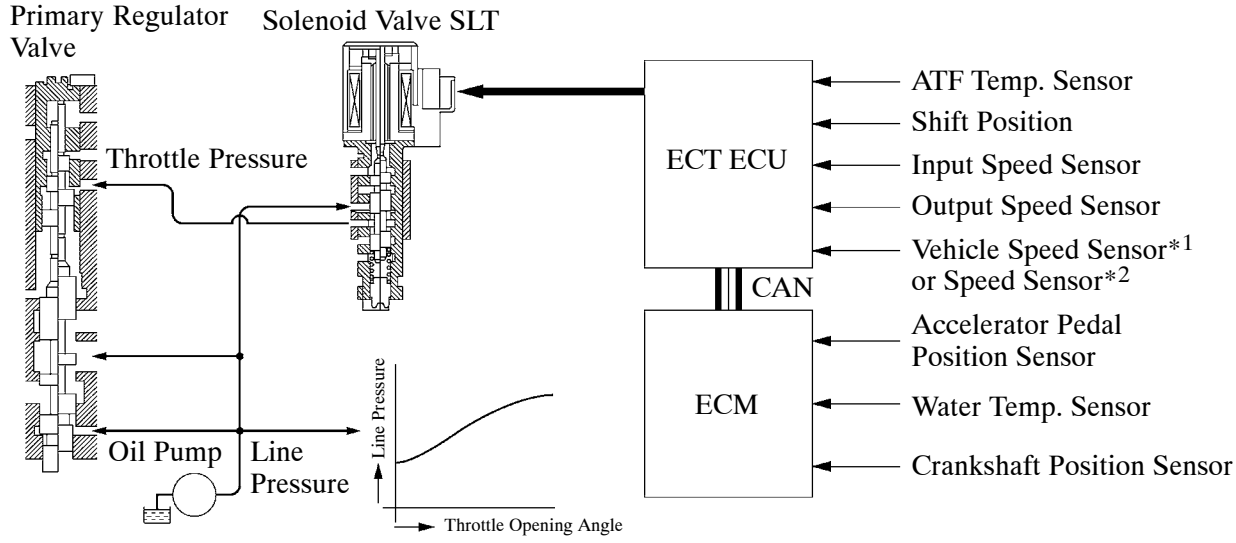


A340F and A343F 00LCH005Y

5. Line Pressure Control

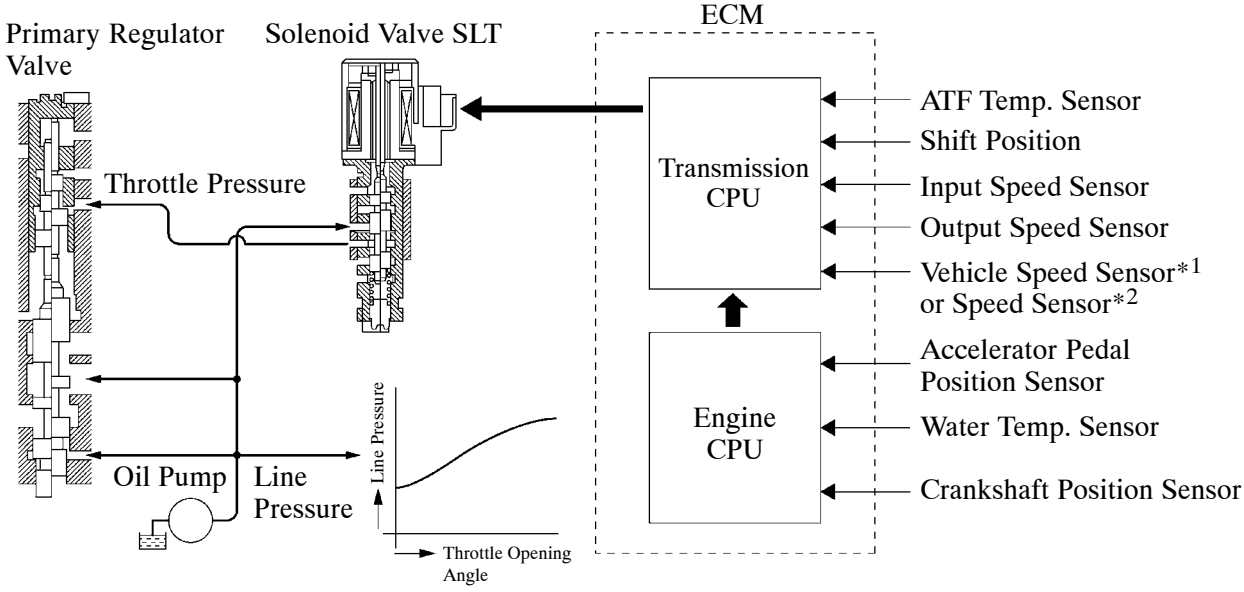
In order to obtain a predetermined line pressure characteristic in accordance with the each sensor signal, the ECM or ECT ECU activates the solenoid valve SLT to regulate the throttle pressure.
This makes it possible for the primary regulator valve to precisely and minutely control the line pressure in accordance with the engine output, and thus provide smoother shift characteristics.

▶ A340E and A340F ◀



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▶ A343E and A343F ◀

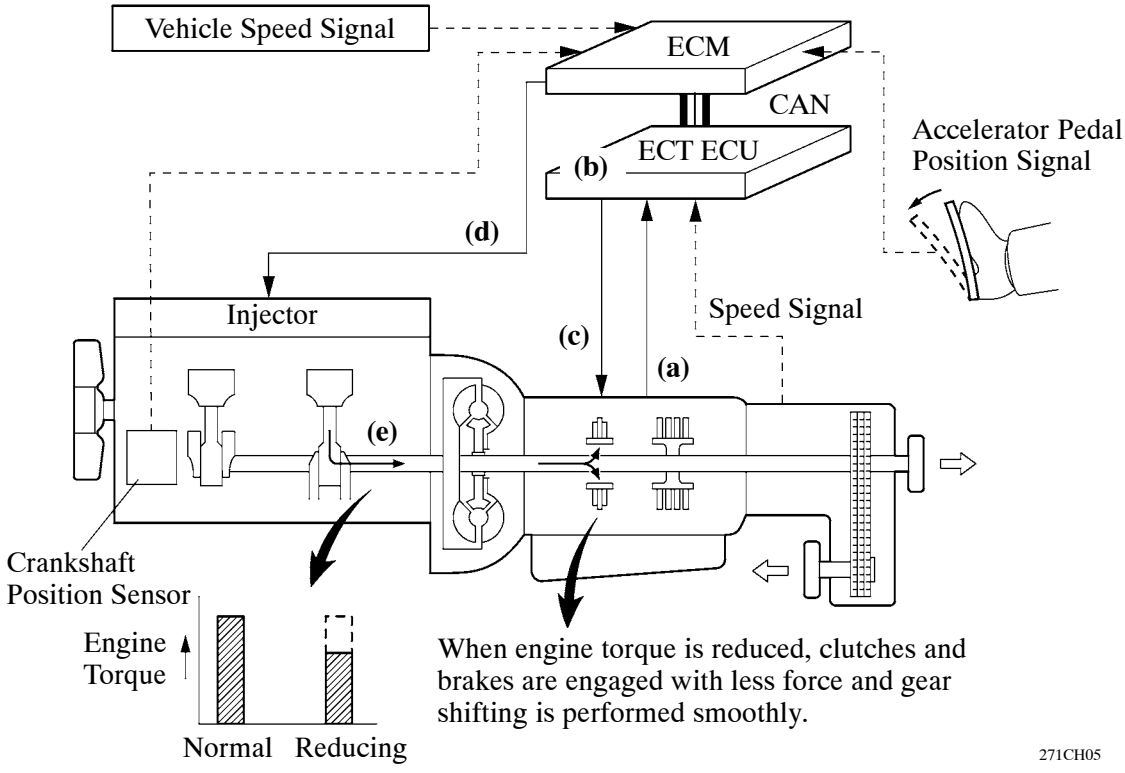


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*1: Models without brake control system
*2: Models with brake control system

6. Engine Torque Control (for A340E and A340F)

Engagement of the clutches and brakes of the planetary gear unit in the transmission is controlled smoothly by momentarily reducing the fuel injection volume when gears are shifted up or down in the transmission. When the ECT ECU judges a gear shift timing according to signals, it activates the shift control solenoid valves to perform gear shifting. When the gear shifting starts, the ECM reduces the fuel injection volume to reduce the engine torque. As a result, engagement force of the clutches and brakes of the planetary gear units is weakened and the gear change is performed smoothly.

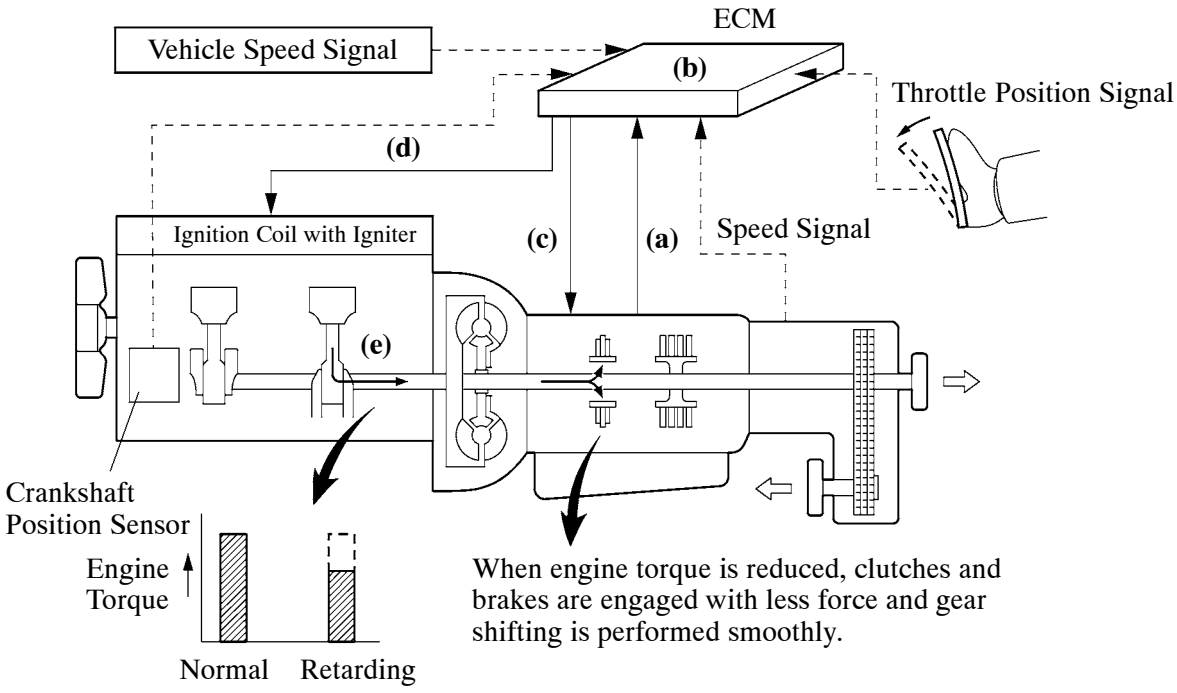


(a) : Judgment of Gear Shifting
(b) : Determination of Fuel Injection Reduction Volume
(c) : Gear Shifting
(d) : Reducing Fuel Injection Volume
(e) : Torque Reduction

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7. Engine Torque Control (for A343E and A343F)

Engagement of the clutches and brakes of the planetary gear unit in the transmission is controlled smoothly by momentarily retarding the engine ignition timing when gears are shifted up or down in the transmission. When the ECM judges gear shift timing according to signals, it activates the shift control solenoid valves to perform gear shifting. When the gear shifting starts, the ECM retards the engine ignition timing to reduce the engine torque. As a result, engagement force of the clutches and brakes of the planetary gear units is weakened and the gear change is performed smoothly.



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(a) : Judgment of Gear Shifting
(b) : Determination of Ignition Timing Retard Angle
(c) : Gear Shifting
(d) : Retarding Ignition Timing
(e) : Torque Reduction

8. Diagnosis

- When the ECM or ECT ECU detects a malfunction, it makes a diagnosis and memorizes the failed section. Furthermore, the check engine warning light in the combination meter illuminates to inform the driver.
- At the same time, the DTCs (Diagnostic Trouble Codes) are stored in memory.
- The DTCs can be read by connecting an intelligent tester II to DLC3.
- The DTCs can be read from the number of blinks of the check engine warning light by connecting the SST (09843-18040) to the TC and CG terminals of the DLC3.

For details, refer to the Hilux Repair Manual.

9. Fail-safe

This function minimizes the loss of operability when any abnormality occurs in any sensor or solenoid.

▶ Fail-safe Control List ◀

Malfunction Part	Function
Output Speed Sensor (SP2)	During an output speed sensor malfunction, shift control is effected through the input speed sensor signal (NC0) or engine speed signal (NE).
ATF Temperature Sensor	During a malfunction of ATF temperature sensor, the system effects control by fixing the ATF temperature at 80°C (176°F).
Solenoid Valves S1 and S2	The current to the failed solenoid valve is cut off and control is effected by operating the other solenoid valves with normal operation.
Solenoid Valve SL	During a solenoid valve SL malfunction, the current to the solenoid valve is stopped. Because this stops lock-up control, thus decreasing fuel economy.
Solenoid Valve SLT	During a solenoid valve SLT malfunction, the current to the solenoid valve is stopped. This stops line pressure control, thus increasing shift shock. However, shifting is effected through normal clutch pressure control.