■ ELECTRONIC CONTROL SYSTEM

1. General

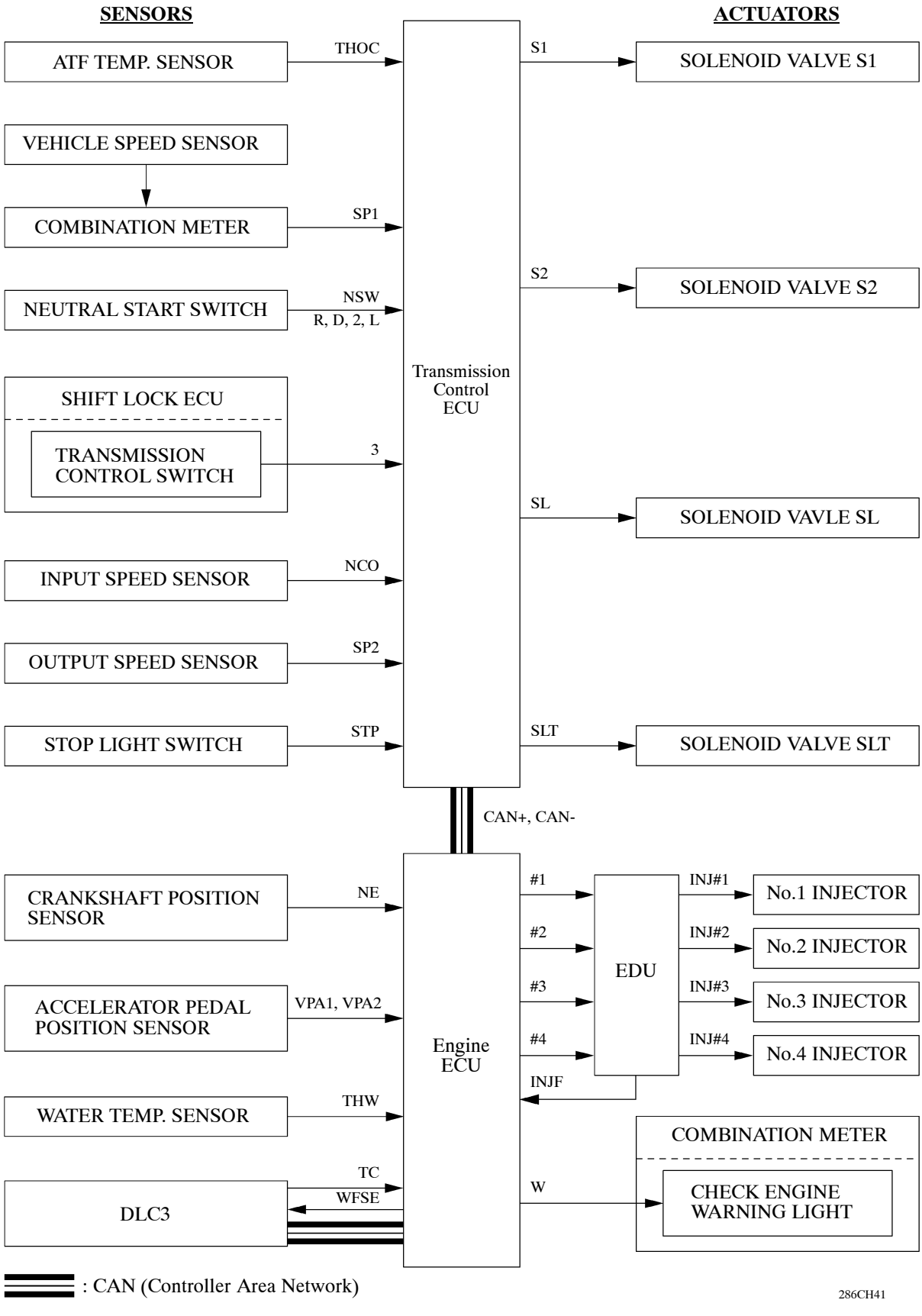
The electronic control system of the A340E and A343E automatic transmissions consists of the control listed below:

System	Function	Type	
		A340E	A343E
Shift Timing Control	The engine ECU (transmission control 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 engine ECU (transmission control 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 (See Page CH-23)	Actuates the solenoid valve SLT to control the line pressure in accordance with information from the engine ECU (transmission control ECU) and the operating conditions of the transmission.	○	○
Engine Torque Control (See Page CH-24)	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 OD and then 1st to reduce vehicle squat.	○	○
Self-Diagnosis	When the engine ECU (transmission control ECU) detects a malfunction, the engine ECU or transmission control ECU makes a diagnosis and memorizes the failed section.	○	○
	All the DTCs (Diagnostic Trouble Codes) have been made to correspond to the SAE controlled codes.	○	○
Fail-Safe	Controls other normally operating components, permitting continued driving when malfunctions occur in the electrical circuit.	○	○

2. Construction

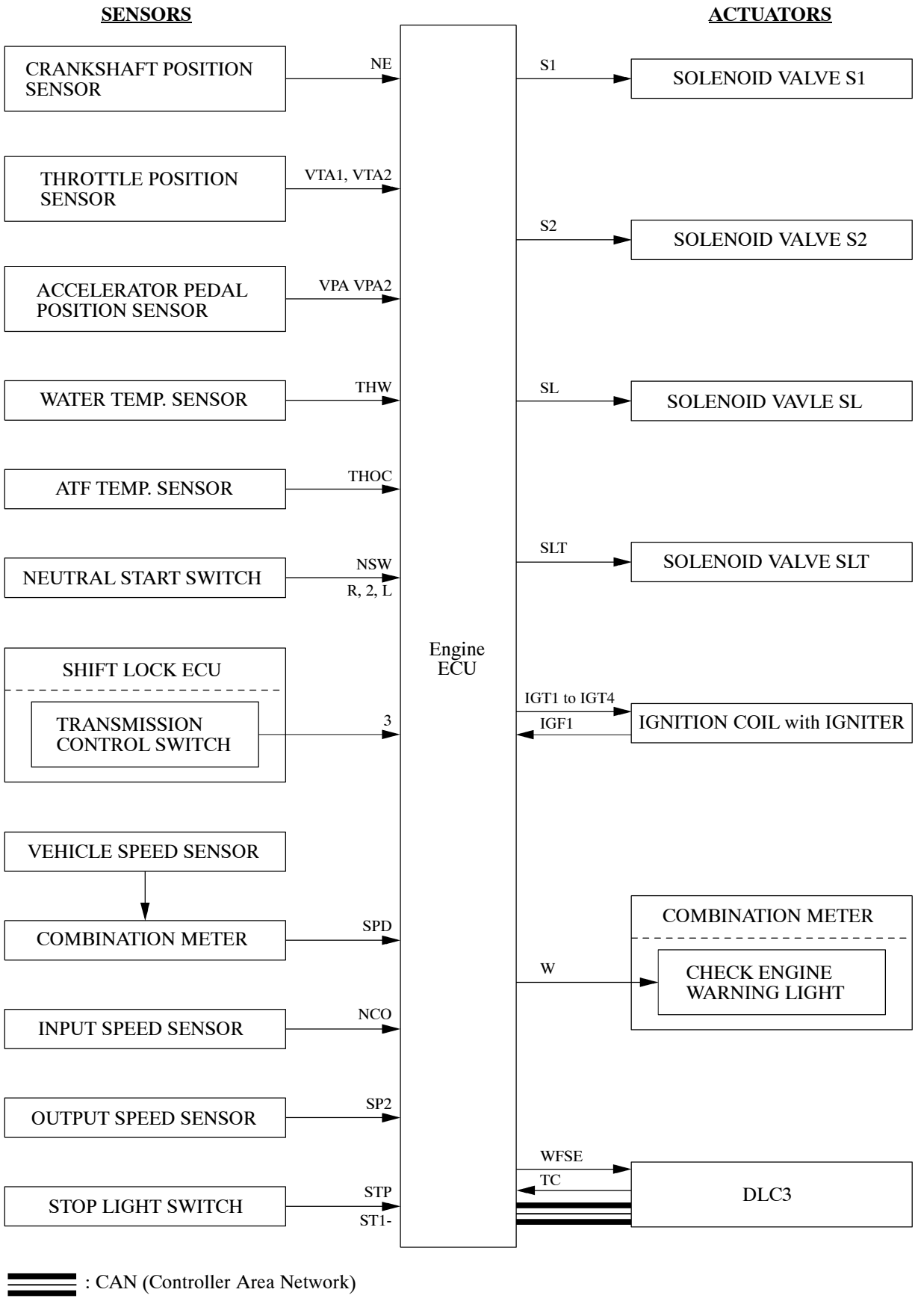
The configurations of the electronic control systems in the A340E and A343E automatic transmissions are as shown in the following charts.

▶ A340E ◀



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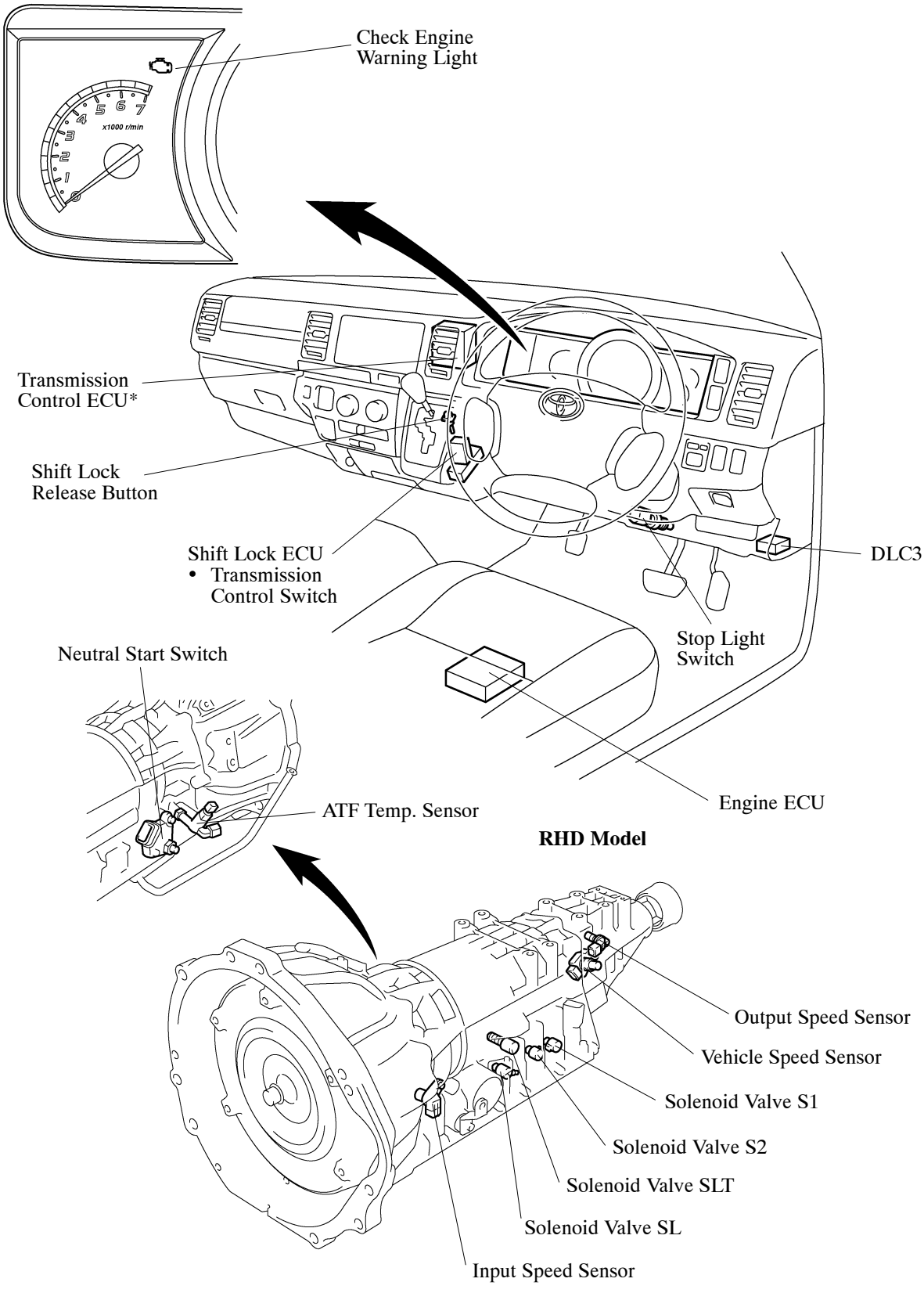
▶ A343E ◀



: CAN (Controller Area Network)

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3. Layout of Main Components



*: Only for A340E automatic transmission models

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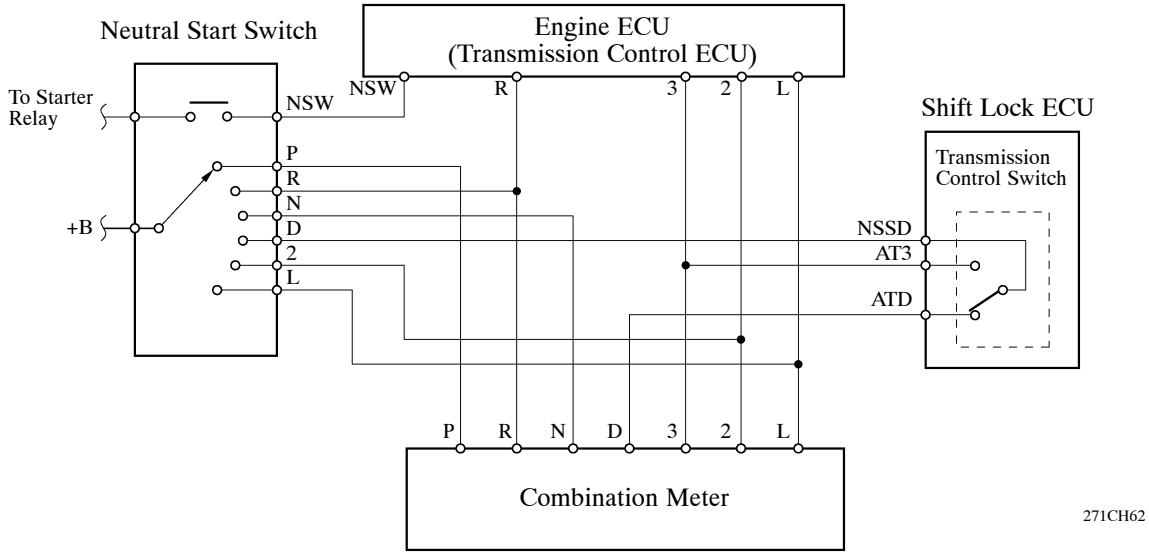
4. Construction and Operation

Transmission Control Switch and Neutral Start Switch

The engine ECU (transmission control 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 engine ECU (transmission control ECU). It also sends signals for the shift posion indicator light (P, R, N, 2 and L) in the combination meter.
- The transmission control switch is located in the shift lock ECU. This switch sends the 3rd signal to the engine ECU (transmission control ECU). It also sends signals for the shift position indicator light (D and 3rd) in the combination meter.

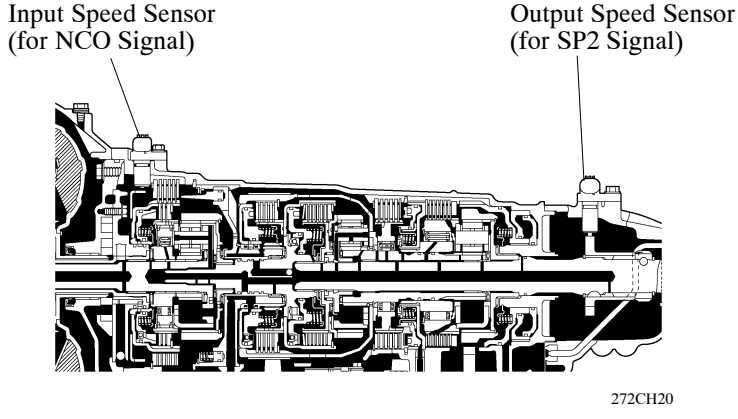
▶ Wiring Diagram ◀



Input Speed Sensor and Output Speed Sensor

These automatic transmissions use an input speed sensor (for NCO signal) and output speed sensor (for SP2 signal). Thus, the engine ECU (transmission control ECU) can detect the timing of the shifting of the gears and appropriately control the engine torque and hydraulic pressure in response to the various conditions. These speed sensors are the pick-up coil type.

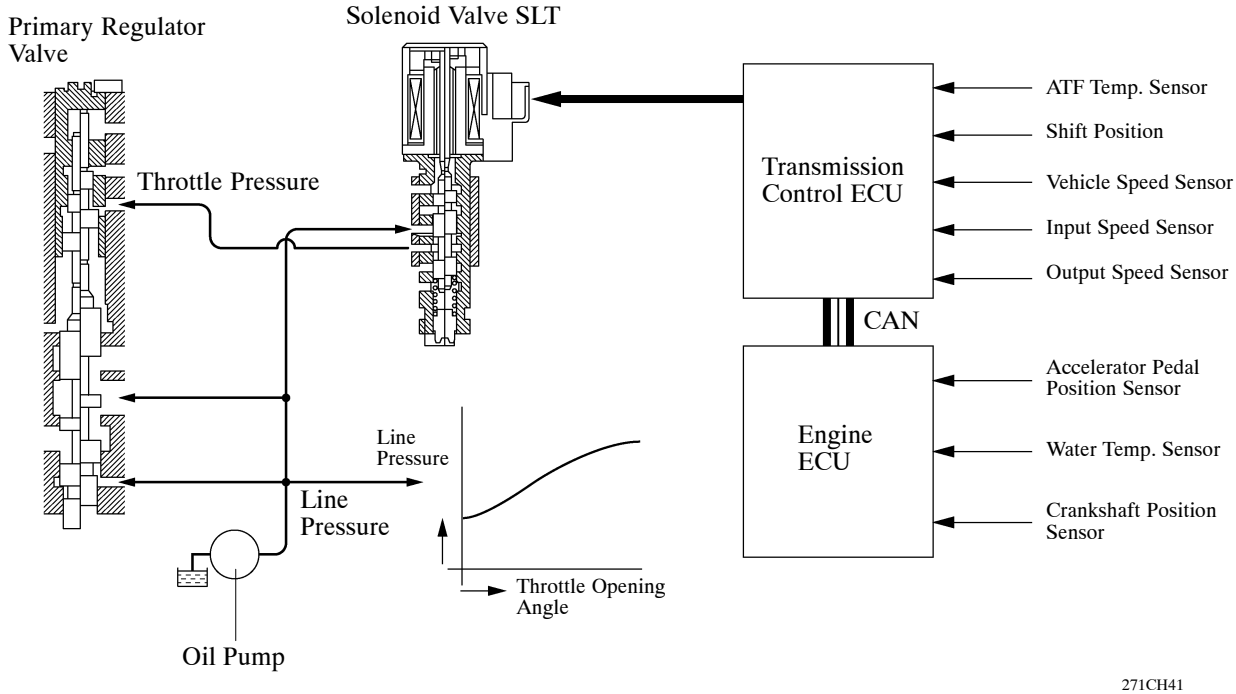
- The input speed sensor detects the input speed of the transmission. The O/D direct clutch drum is used as the timing rotor for this sensor.
- The output speed sensor detects the speed of the output shaft.



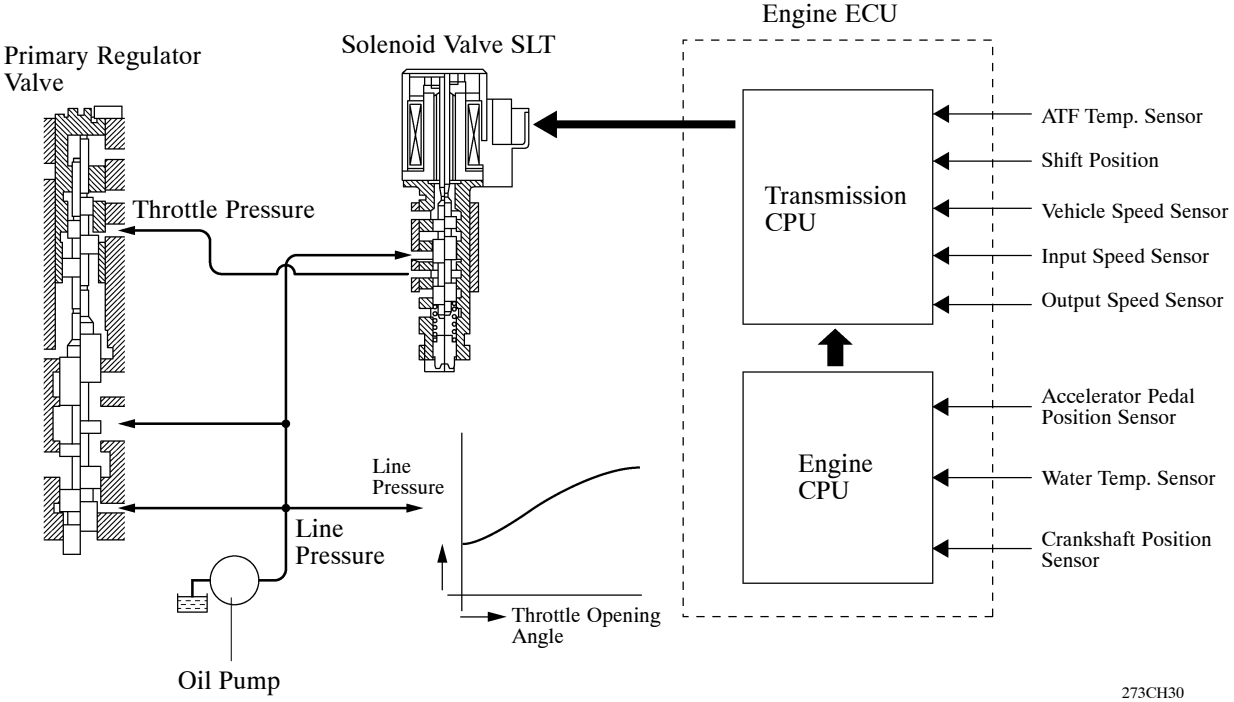
5. Line Pressure Control

In order to obtain a predetermined line pressure characteristic according to the each sensor signal, the engine ECU (transmission control 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, thus realizing smoother shift characteristics.

▶ A340E ◀



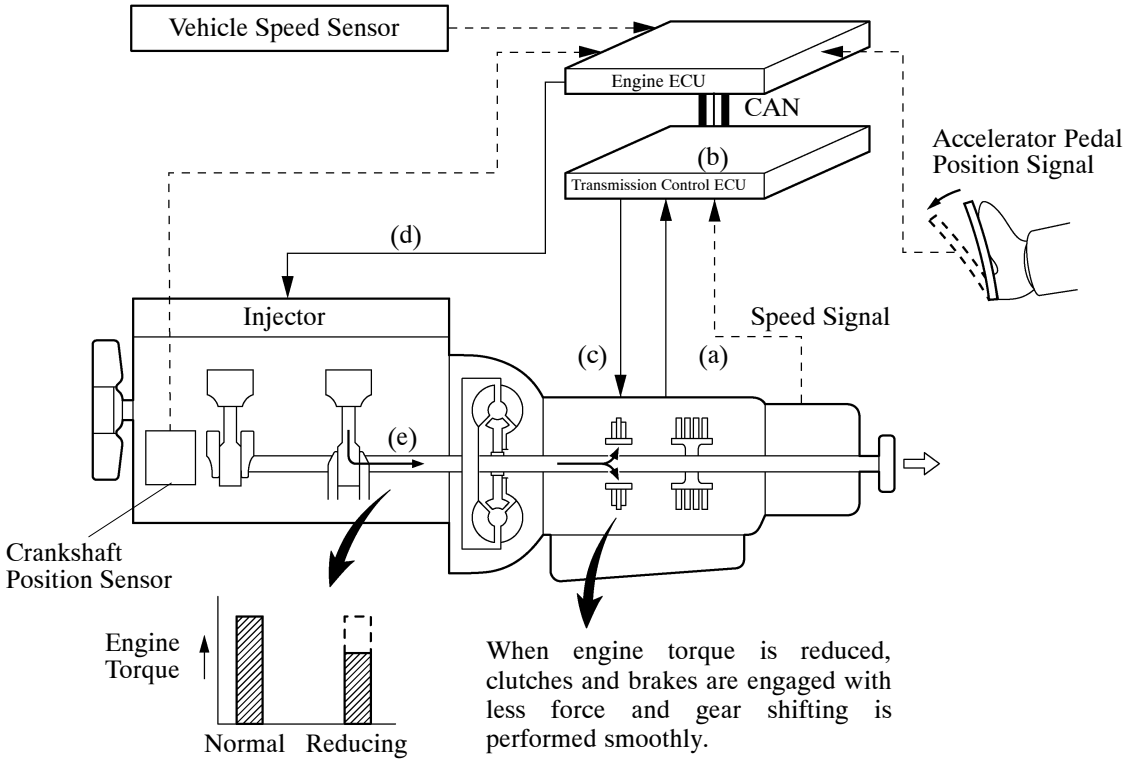
▶ A343E ◀



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6. Engine Torque Control (for A340E)

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 transmission control 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 transmission control ECU 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.

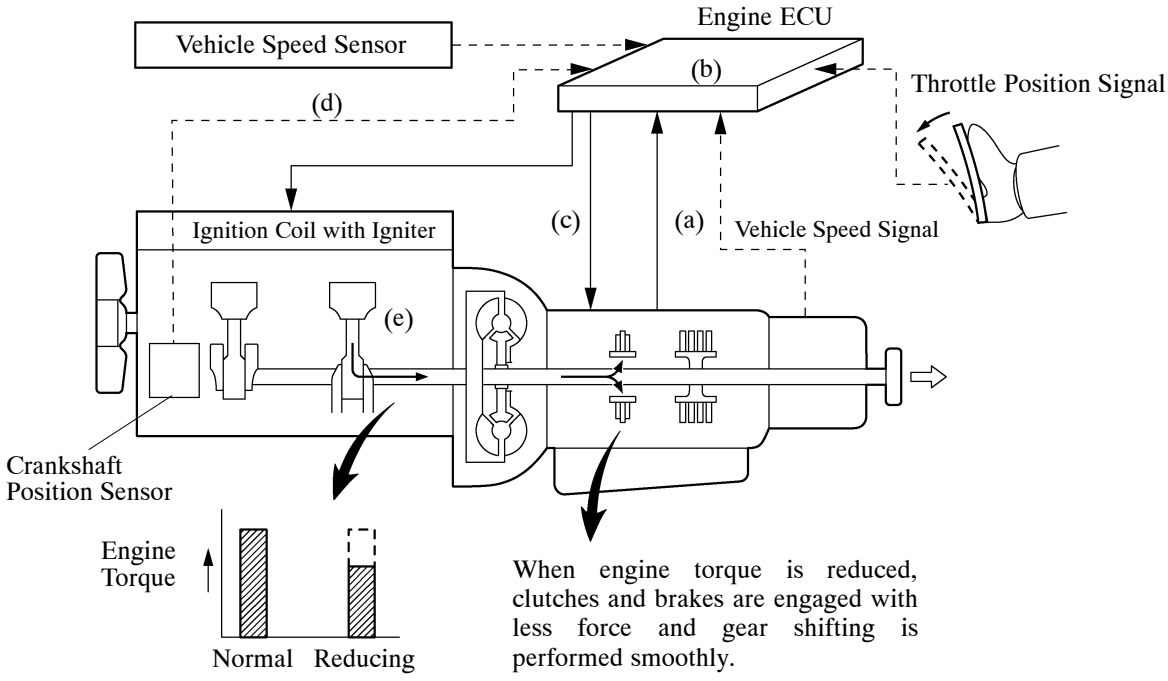


(a): Judgment of Gear Shifting
(b): Determination of Fuel Injection Reduce Volume
(c): Gear Shifting
(d): Reducing Fuel Injection Volume
(e): Torque Reduction

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7. Engine Torque Control (for A343E)

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 engine 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 engine ECU 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.



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

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8. Diagnosis

- When the engine ECU (transmission control ECU) detects a malfunction, the engine ECU (transmission control ECU) 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 the DLC3.
- The DTCs can be read from the number of the blinking of the check engine warning light by connecting the SST (09843-18040) to the Tc and CG terminals of the DLC3.

For details, see the Hiace Repair Manual (Pub. No. RM1171E).

9. Fail-Safe

This function minimizes the loss of operability when any abnormality occurs in each 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 (NC) or engine speed signal (NE).
ATF Temp. Sensor	During a malfunction of ATF temp. sensor, the system effects control by fixing the ATF temp. at 80°C (176°F).
Solenoid Valve 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, fuel economy decreases.
Solenoid Valve SLT	During a solenoid valve SLT malfunction, the current to the solenoid valve is stopped. Because this stops line pressure control, the shift shock increases. However, shifting is effected through normal clutch pressure control.