

■ ELECTRONIC CONTROL SYSTEM

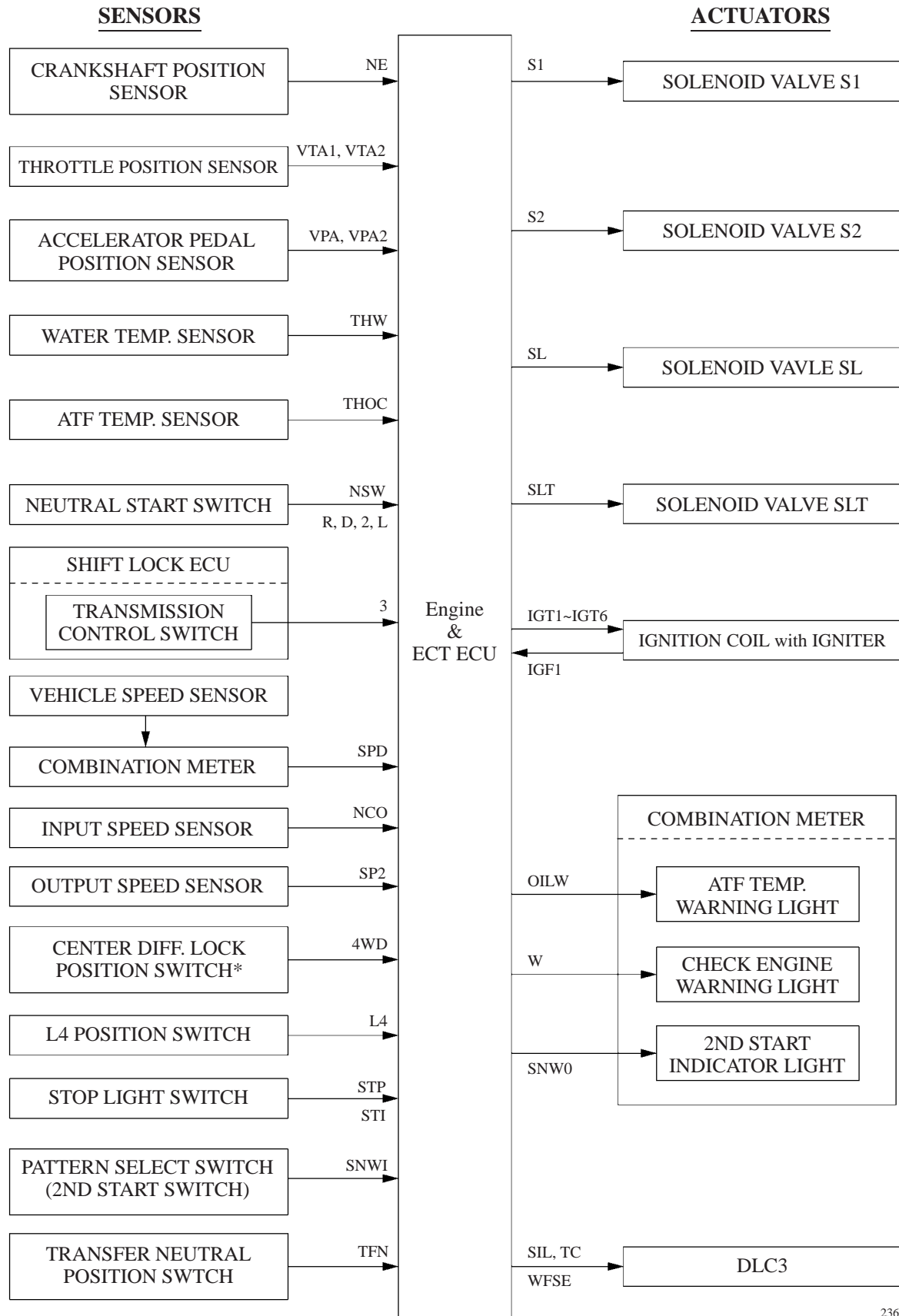
1. General

The electronic control system of the A340F automatic transmission consists of the control listed below:

System	Function	A340F (1GR)	A343F (3RZ)	A343F (1KD/ 1KZ)
Shift Timing Control	The engine & 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	This engine & 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 engine & 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 OD and than 1st to reduce vehicle squat.	○	○	○
2nd Start System	Enabling the vehicle to take off in the 2nd gear and thus make it easy to take off snowy, sandy or muddy terrain.	○	○	○
Self-Diagnosis	When the engine & ECT ECU detects a malfunction, the engine & ECT 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. Some of the DTCs have been further divided into smaller detection areas than in the past, and new DTCs have been assigned to them.	○	-	-
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 A340F automatic transmission are as shown in the following chart.

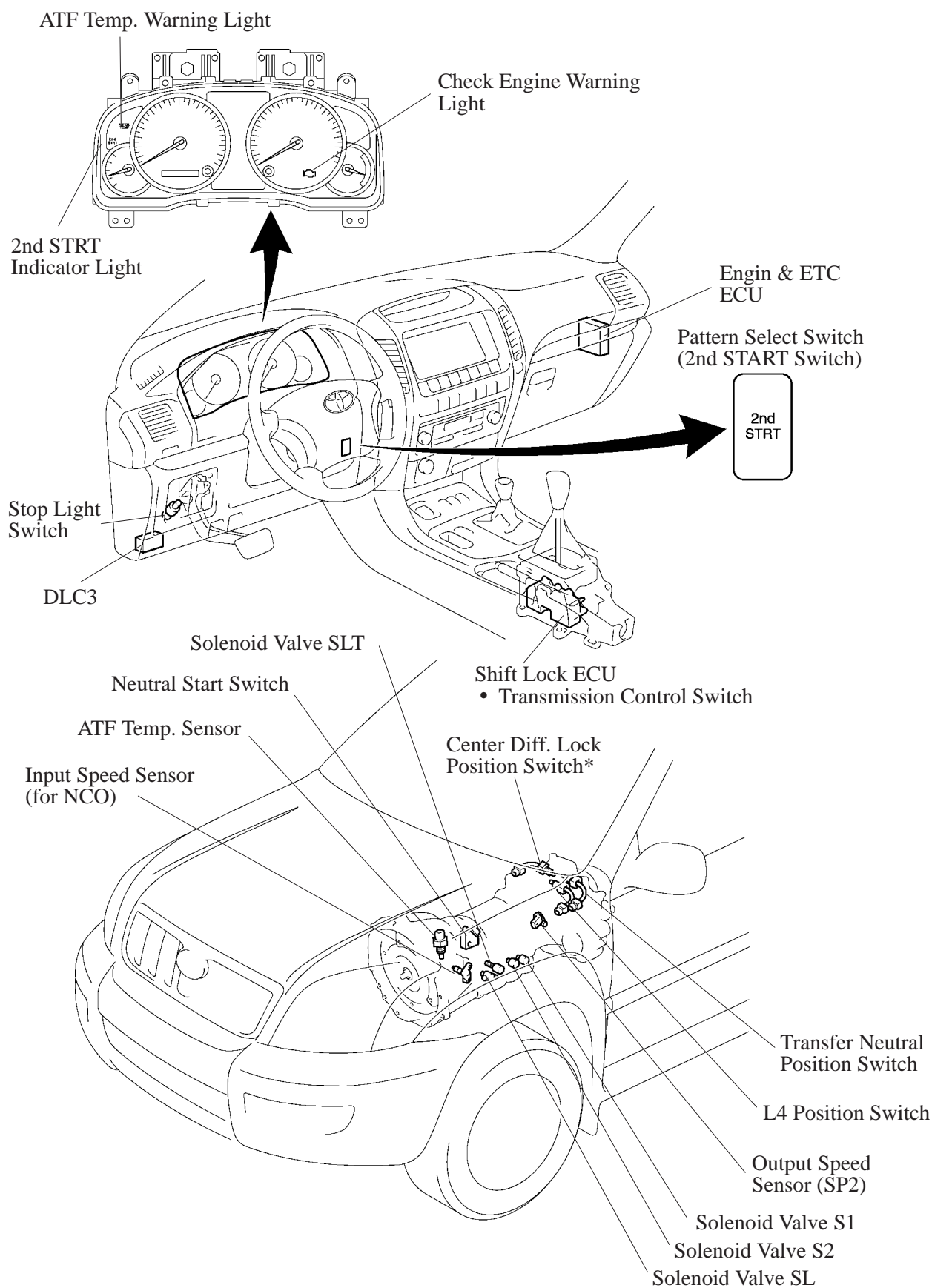


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*: Only for VF4B Transfer Model

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3. Layout of Component

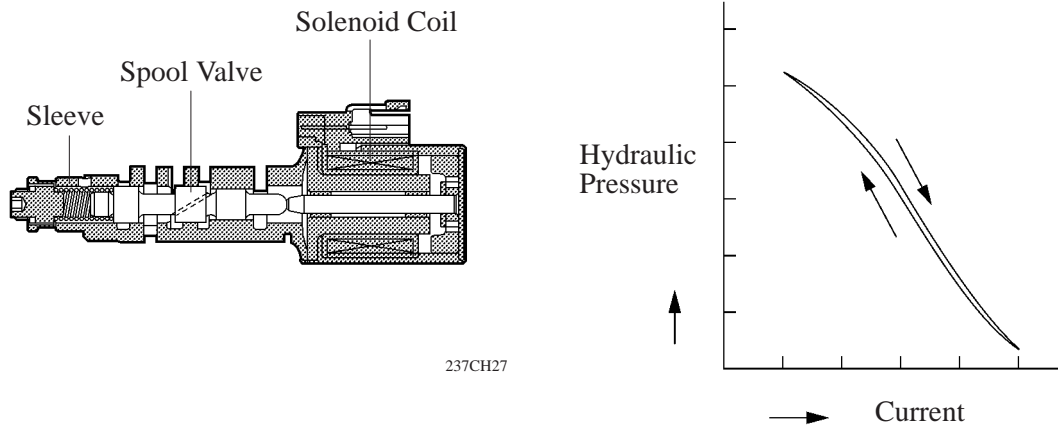


*: Only for VF4B Transfer

4. Construction and Operation of Main Component

Solenoid Valve SLT

In order to provide a hydraulic pressure that is proportion to current that flows to the solenoid coil, the solenoid coil SLT linearly controls the line pressure based on the signals it receives from the engine & ECT ECU.



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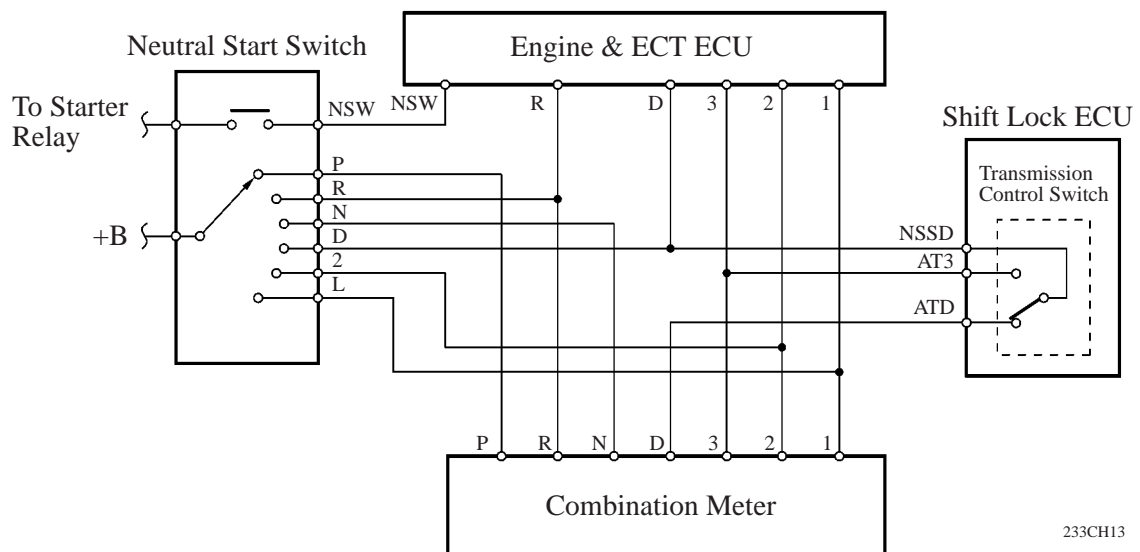
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Transmission Control Switch and Neutral Start Switch

The engine & 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 engine & ECT ECU. It also sends signals for the shift 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 & ECT ECU. It also sends signals for the shift position indicator light (D and 3rd) in the combination meter.

► Wiring Diagram ◀



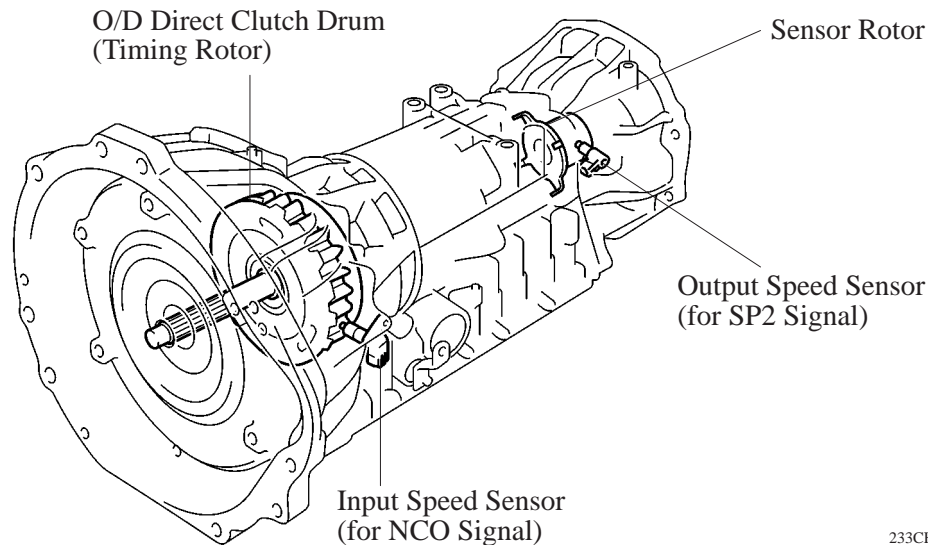
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Input Speed Sensor and Output Speed Sensor

The A340F automatic transmissions use an input speed sensor (for NCO signal) and output speed sensor (for SP2 signal). Thus, the Engine & ECT 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.

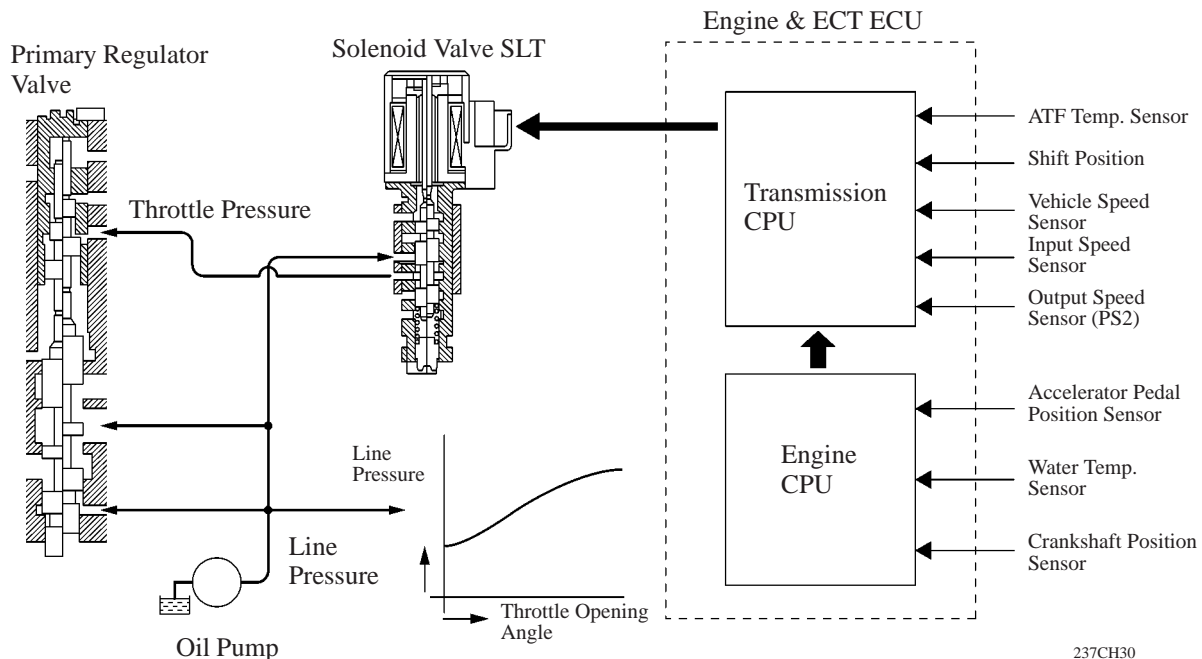


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5. Line Pressure Control

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

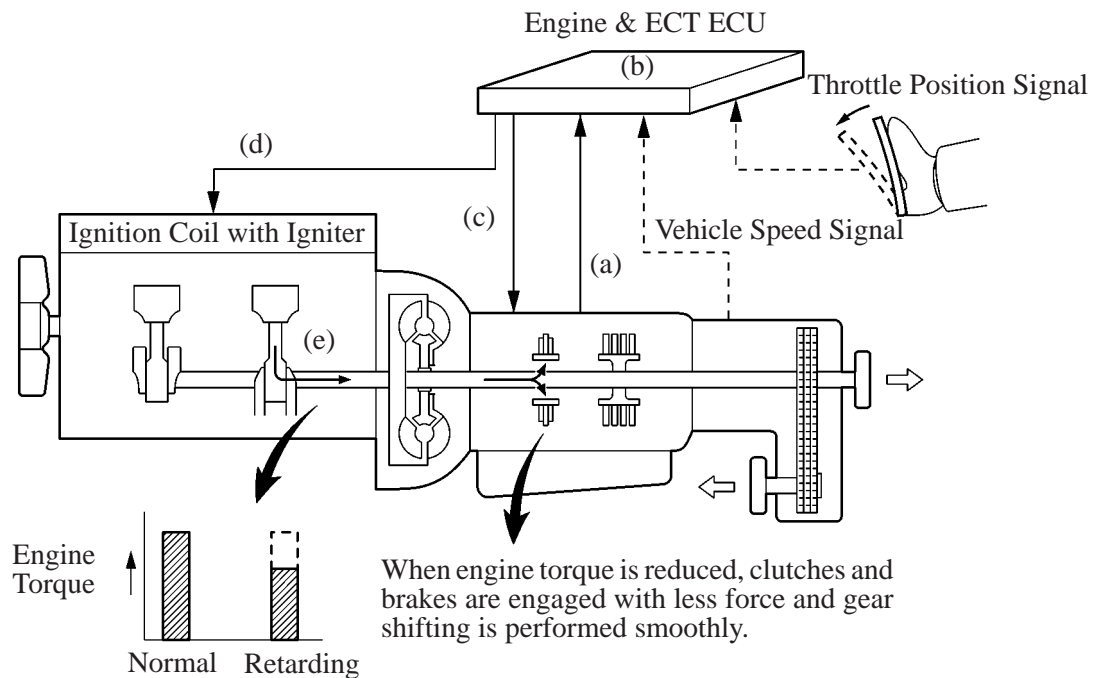
This makes it possible for the primary regulator valve to precisely and minutely control the line pressure in accordance with the engine output, and thus realize smoother shift characteristics.



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6. Engine Torque Control

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 & 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 engine & ECT 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

7. 2nd Start Control

- This control enables the driver to use a 2nd start (momentary type) switch to select the 2nd start mode which allows the vehicle to start in 2nd gear, thus is used to make it easy for the vehicle to start on sandy or muddy terrain.
- When the 2nd start mode is selected while the shift lever is in the “D”, “3”, or “2” position, the vehicle can start in the 2nd gear. After a start, if the shift lever is in the “D” or “3” position, transmission will shift up automatically into 3rd and overdrive gears, as usual.

If the shift lever is in the “2” position, the transmission will continue to operate in the 2nd gear.

If the shift lever is in the “L” position, the transmission will continue to operate in the 1st gear even if the 2nd start mode has been selected.

► Shift Program ◀

→ : Up Shift ← : Down Shift

Mode		Normal	2nd Start
Shift Lever Position	D, 3	1st ↔ 2nd ↔ 3rd ↔ O/D	2nd ↔ 3rd ↔ O/D
	2	1st ↔ 2nd ← 3rd	2nd ← 3rd
	L	1st ← 2nd ← 3rd	1st ← 2nd ← 3rd

8. Diagnosis

- When the engine & ECT ECU detects a malfunction, the engine & ECT 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 a hand-held tester to DLC3.
- The DTCs can be read from 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 Land Cruiser/Land Cruiser Prado Repair Manual Supplement (Pub. No. RM1017E).

► DTC Chart ◀

DTC		Detection Item	DTC		Detection Item
2-digit*1	5-digit*2		2-digit*1	5-digit*2	
38	P0710	Transmission Fluid Temperature Sensor “A” Circuit	62	P0974	Shift Solenoid “A” Control Circuit High (Shift Solenoid Valve S1)
	P0712	Transmission Fluid Temperature Sensor “A” Low Input	63	P0976	Shift Solenoid “B” Control Circuit Low (Shift Solenoid Valve S2)
	P0713	Transmission Fluid Temperature Sensor “A” High Input		P0977	Shift Solenoid “B” Control Circuit High (Shift Solenoid Valve S2)
42	P0500	Vehicle Speed Sensor “A”	64	P0743	Torque Converter Clutch Circuit Electrical (Shift Solenoid Valve SL)
61	P0722	Output Speed Sensor	67	P0717	Input Speed Sensor Circuit No Signal
62	P0973	Shift Solenoid “A” Control Circuit Low (Shift Solenoid Valve S1)	77	P2716	Pressure Control Solenoid “D” Electrical (Shift Solenoid Valve SLT)

*1: Check Engine Warning Light Display

*2: Hand-held Tester Display