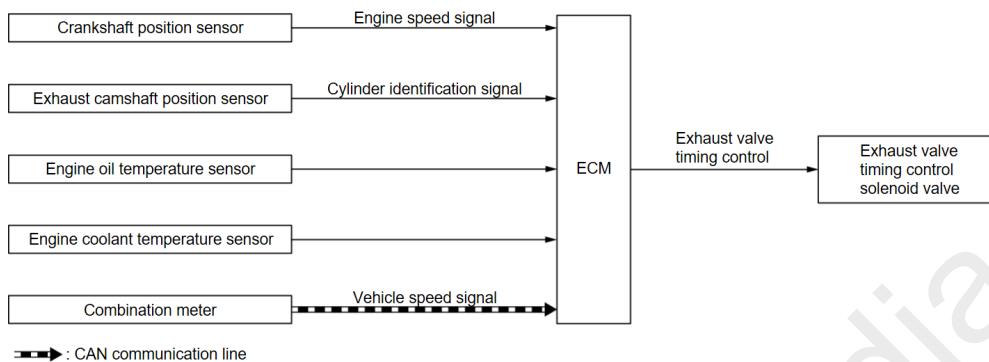


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System Description

SYSTEM DIAGRAM



Component parts	Function
Crankshaft position sensor	Refer to Crankshaft Position Sensor 
Exhaust camshaft position sensor	Refer to Exhaust Camshaft Position Sensor 
Engine oil temperature sensor	Refer to Engine Oil Temperature Sensor 
Engine coolant temperature sensor	Refer to Engine Coolant Temperature Sensor 
Combination meter	ECM receives vehicle speed signal via CAN communication.

Component parts	Function
ECM	Refer to ECM 
Exhaust valve timing control solenoid valve	Refer to Exhaust Valve Timing Control Solenoid Valve 

SYSTEM DESCRIPTION

With the exhaust valve timing controller which controls the phase of exhaust camshaft to optional position continuously, ECM improves both low-middle speed torque and high speed performance, emission and fuel efficiency by optimizing the exhaust valve open/close timing according to driving conditions.

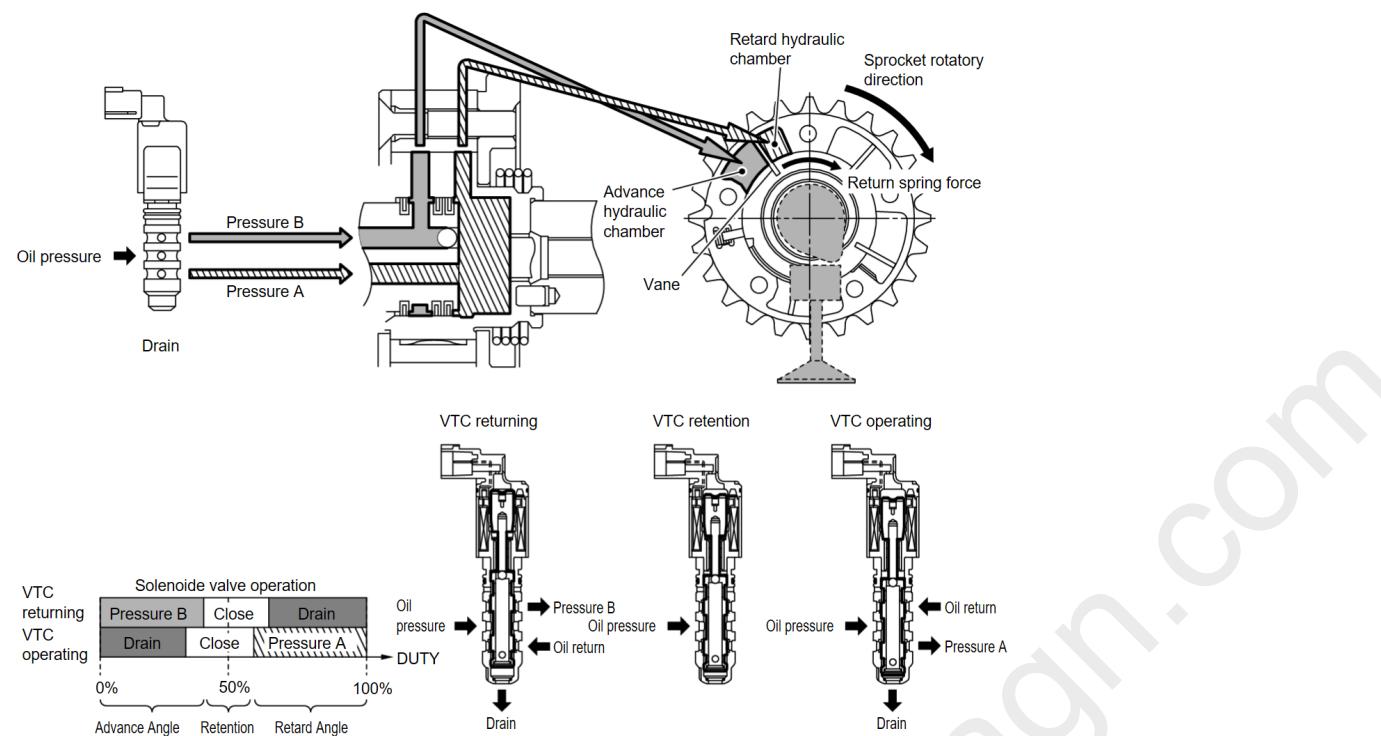
The exhaust valve timing controller is hydraulically controlled by the exhaust valve timing control solenoid valve.

This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

EXHAUST VALVE TIMING CONTROL SOLENOID VALVE CONTROL

The exhaust valve timing control solenoid valve is driven ON-OFF (duty control) by ECM output signal, and controls the open/close timing of the exhaust valve to the optimum by changing its duty ratio according to the vehicle's driving condition.



Exhaust valve timing control solenoid valve condition	Exhaust valve timing controller operation
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full advanced position by the reaction force of return spring, improving the starting performance of the engine.
Active (Retard angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the retard angle chamber of the controller. And advanced angle chamber oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle. This condition brings about the greater overlap with the intake valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve

Exhaust valve timing control solenoid valve condition	Exhaust valve timing controller operation
	is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.
Return (Advanced angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the advanced chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advanced angle.

EXHAUST VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The exhaust camshaft position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the exhaust camshaft.

Feedback Control

The exhaust camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.