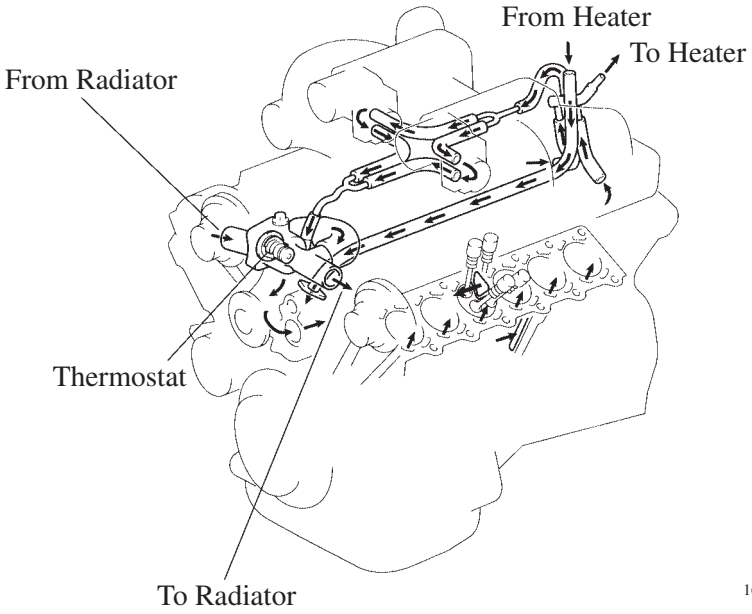
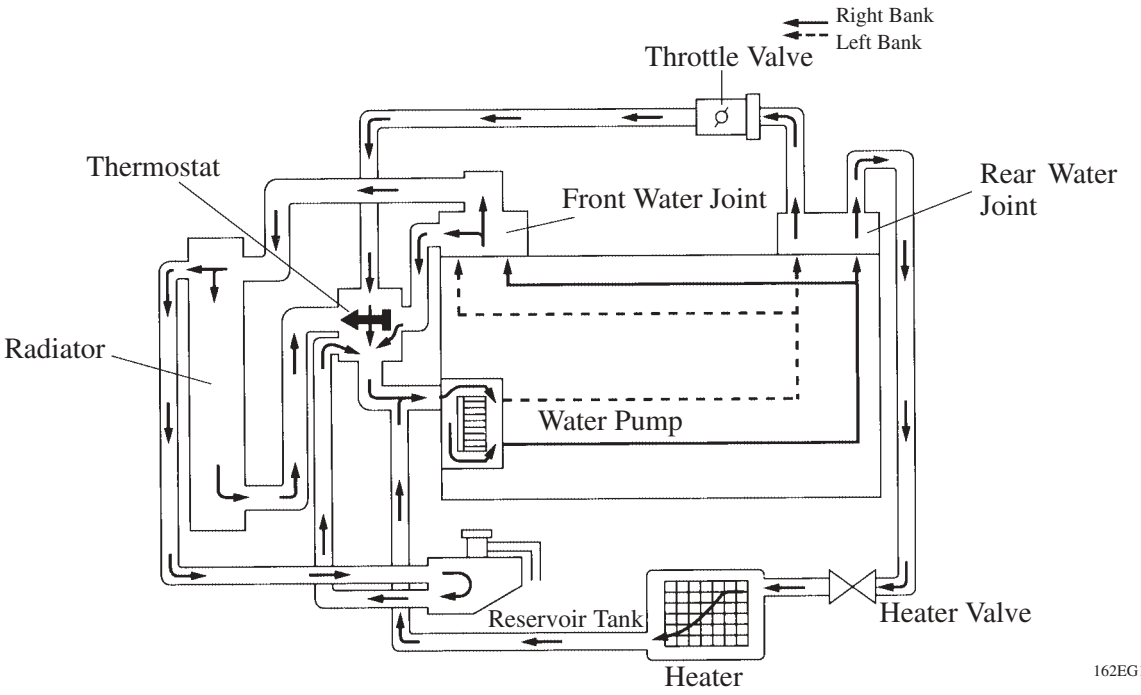
■COOLING SYSTEM

1. General

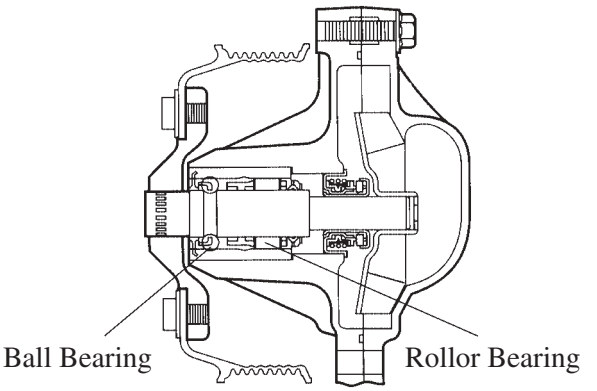
- The cooling system is a pressurized, forced-circulation type.
- A completely sealed type cooling system has been adopted to prevent the engine coolant from deteriorating upon contact with external air and to improve the gas-liquid separation performance.
- An aluminum radiator core is used for weight reduction.
- An electronically controlled hydraulic cooling fan system has been adopted to improve cooling performance and reduce cooling fan noise.





2. Water Pump

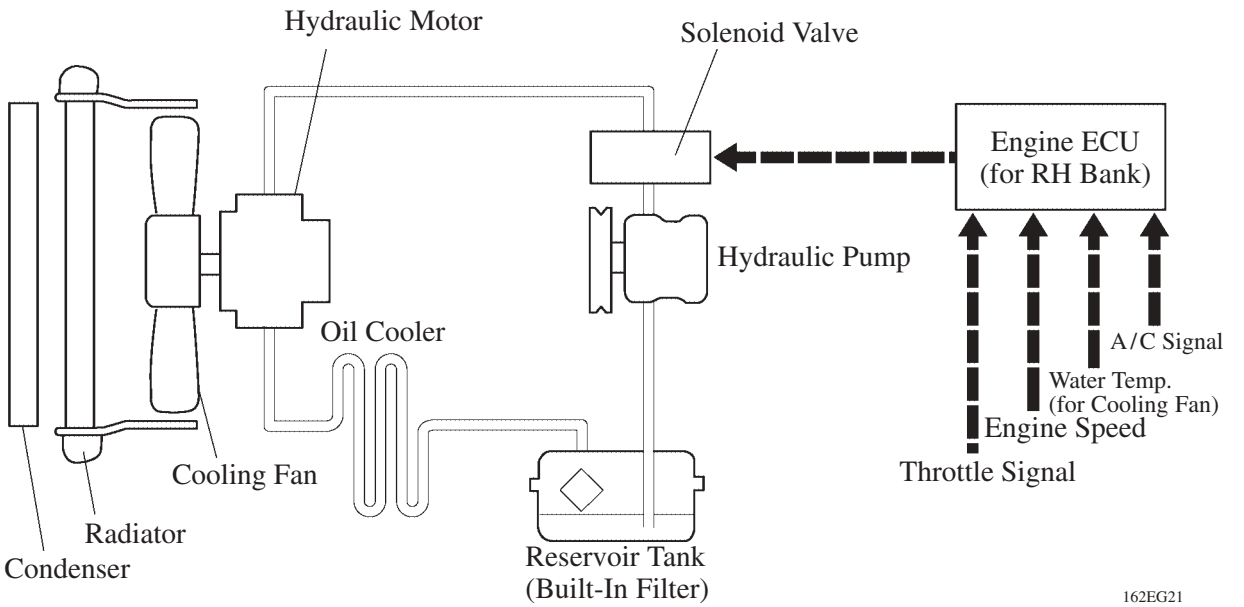
- The water pump is driven by the V-ribbed belt.
- Ball bearings are used for the front side and roller bearings are used for the rear side to improve the reliability of the bearings.



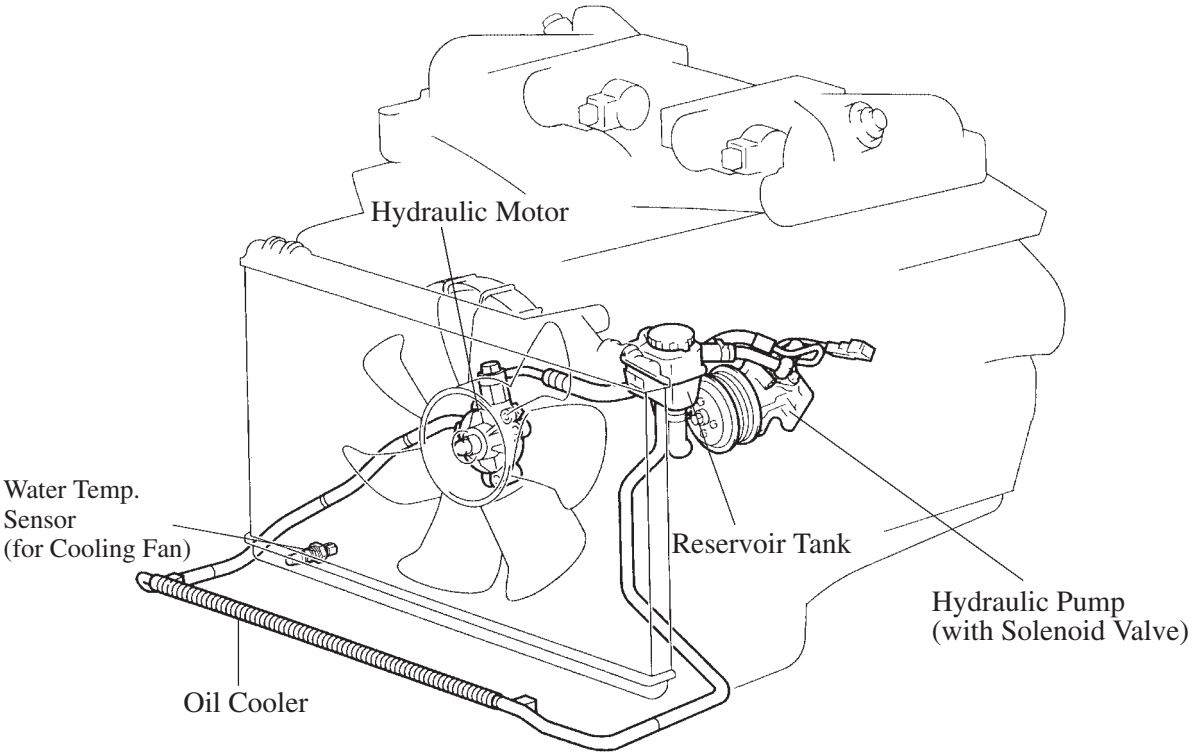
3. Electronically Controlled Hydraulic Cooling Fan System

General

In this system, the engine ECU controls the hydraulic pressure acting on the hydraulic motor, thus controlling the speed of the cooling fan steplessly in response to the condition of the water temperature, engine speed, and air conditioner.
In this way, the fan noise and engine load are reduced.



Layout of Components



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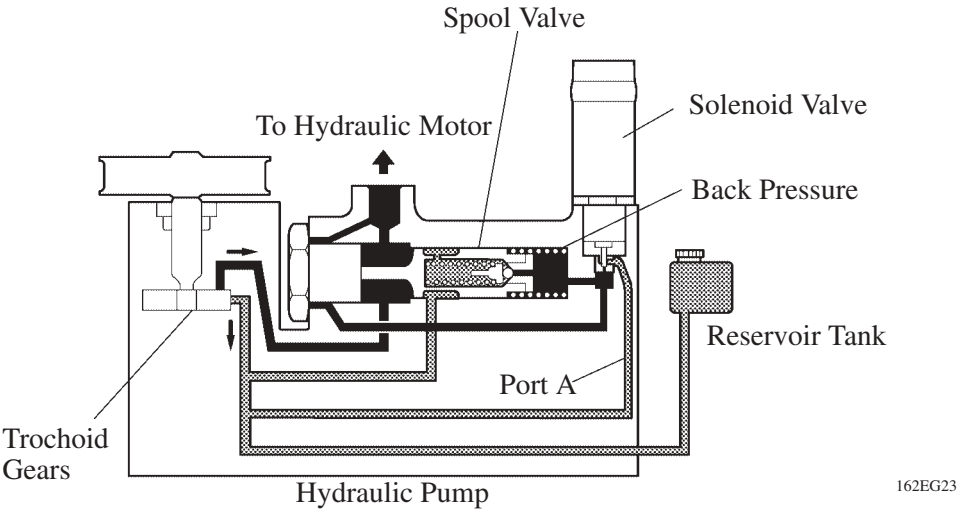
Function of Components

Component		Function
Hydraulic Pump		Generates the hydraulic pressure that turns the hydraulic motor.
Hydraulic Motor		Turns the cooling fan by hydraulic pressure from the hydraulic pump.
Oil Cooler		Cools the driving oil.
Sensors	Water Temp. Sensor (for Cooling Fan)	Detects the engine coolant temperature.
	Air Conditioning Refrigerant Pressure Sensor	Detects the air conditioning refrigerant pressure.
	Air Conditioner ECU	By calculating the number of revolution of the cooling fan necessary for the air conditioner, to output it to engine ECU.
	Crankshaft Position Sensor	Detects the engine speed.
	Throttle Position Sensor	Detects the engine idling state.
Actuator	Solenoid Valve	Controls the hydraulic pump discharge pressure in accordance with signals from the engine ECU.
Engine ECU (for RH Bank)		Controls the solenoid valve in accordance with signals from the various sensors.

Construction and Operation

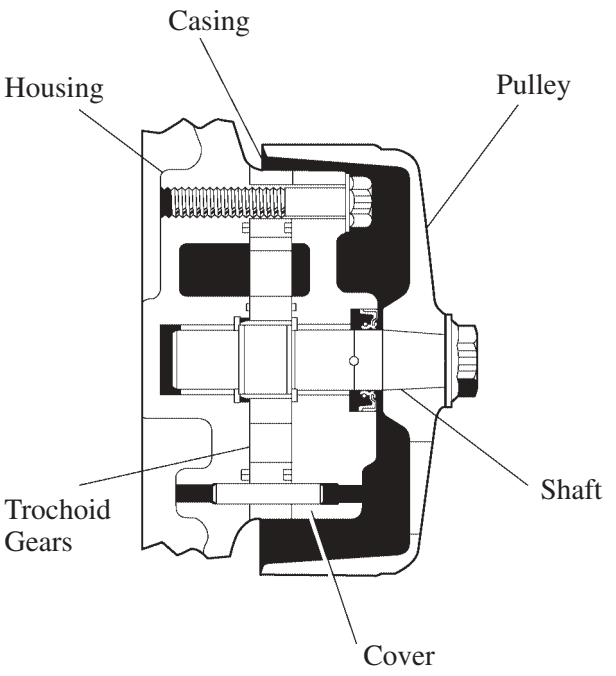
The oil pumped out by the hydarulic pump flows to the spool valve. The solenoid valve controls the back pressure of the spool valve to control the oil return volume from Port A.
This causes the hydraulic pressure to the hydraulic motor to change, thus changing the fan speed.

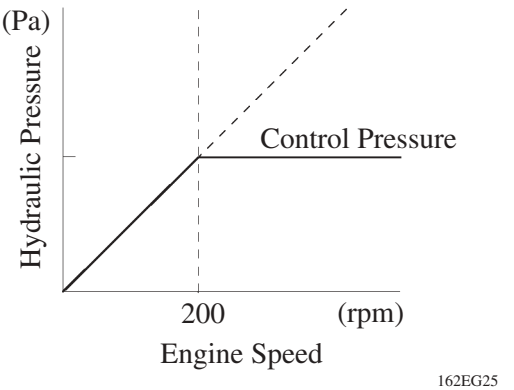
▶ Hydraulic Control Circuit ◀



1) Hydraulic Pump

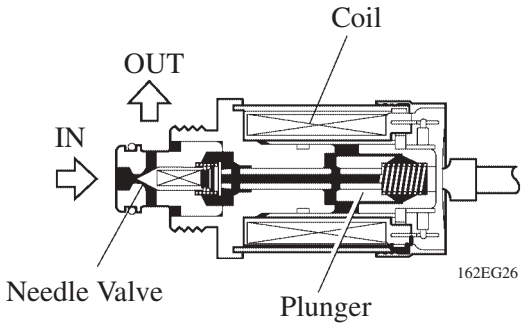
The hydraulic pump is a trochoid gear type pump. It is mounted on the front of the engine and is driven by the V-ribbed belt, together with the alternator and other equipment.
The pulley, turned by the V-ribbed belt, turns the trochoid gears via the shaft, and this generates hydraulic pressure. Control pressure of the hydraulic pump is adjusted by a solenoid valve.





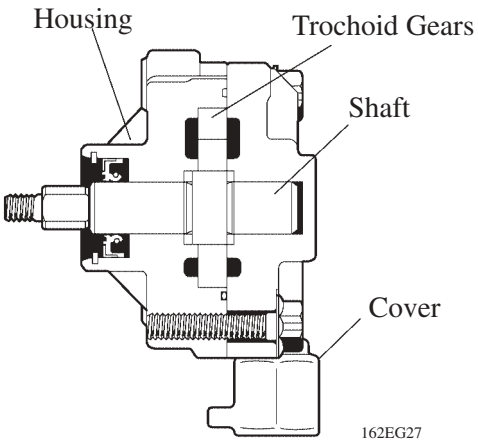
2) Solenoid Valve

The solenoid valve is positioned on the discharge side.
While current flows according to signals from the engine ECU, the coil is excited and the needle valve, which is integrated with the plunger, moves.



3) Hydraulic Motor

A trochoid gear type pump is also used for the hydraulic motor.
When pressure generated by the hydraulic pump acts on the trochoid gears in the hydraulic motor, the shaft is rotated. The rotation of the hydraulic motor shaft drives the cooling fan.



4) Oil Cooler

A winding fin type oil cooler that excels in cooling performance has been adopted.