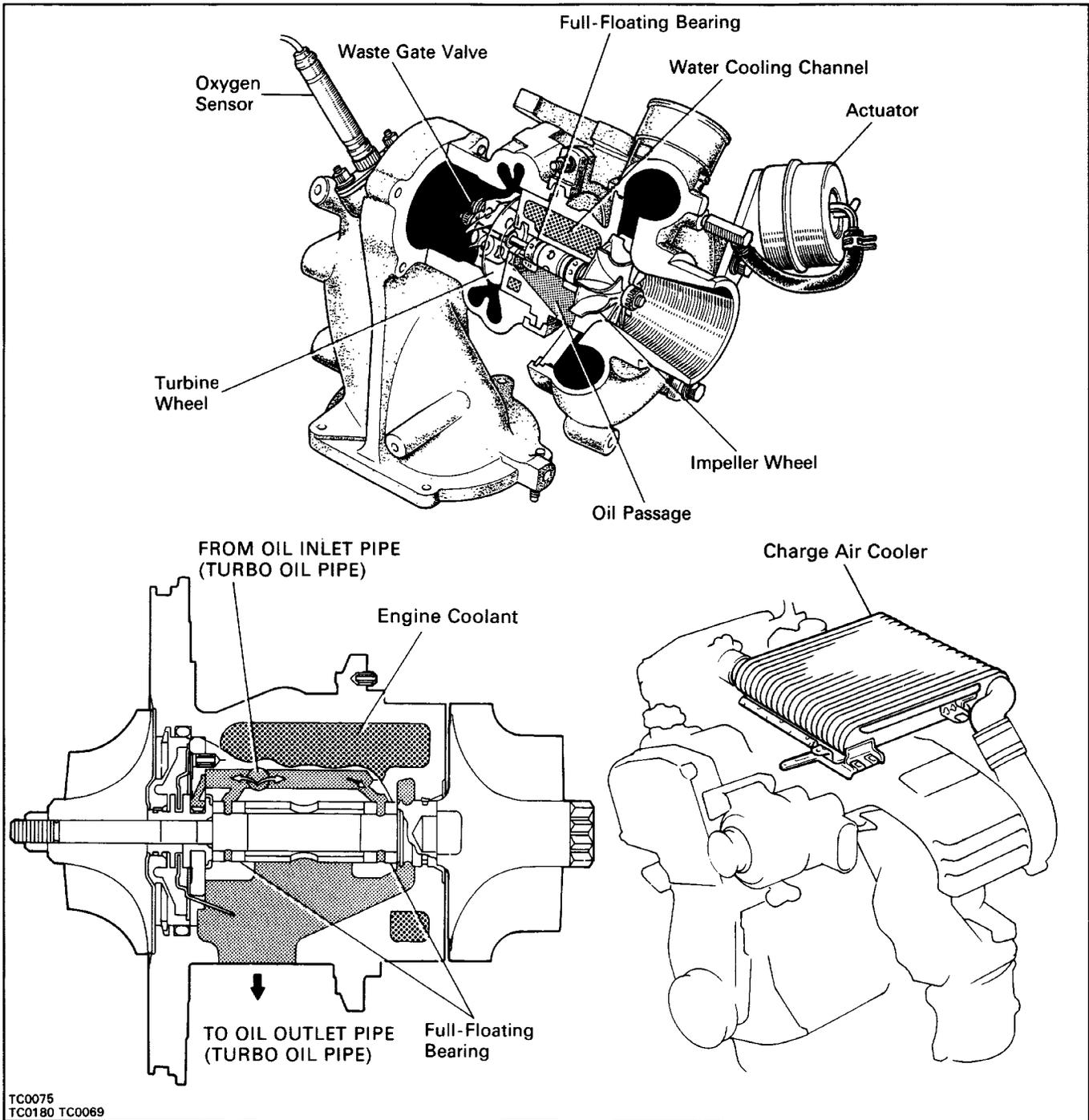


# TURBOCHARGER

## DESCRIPTION



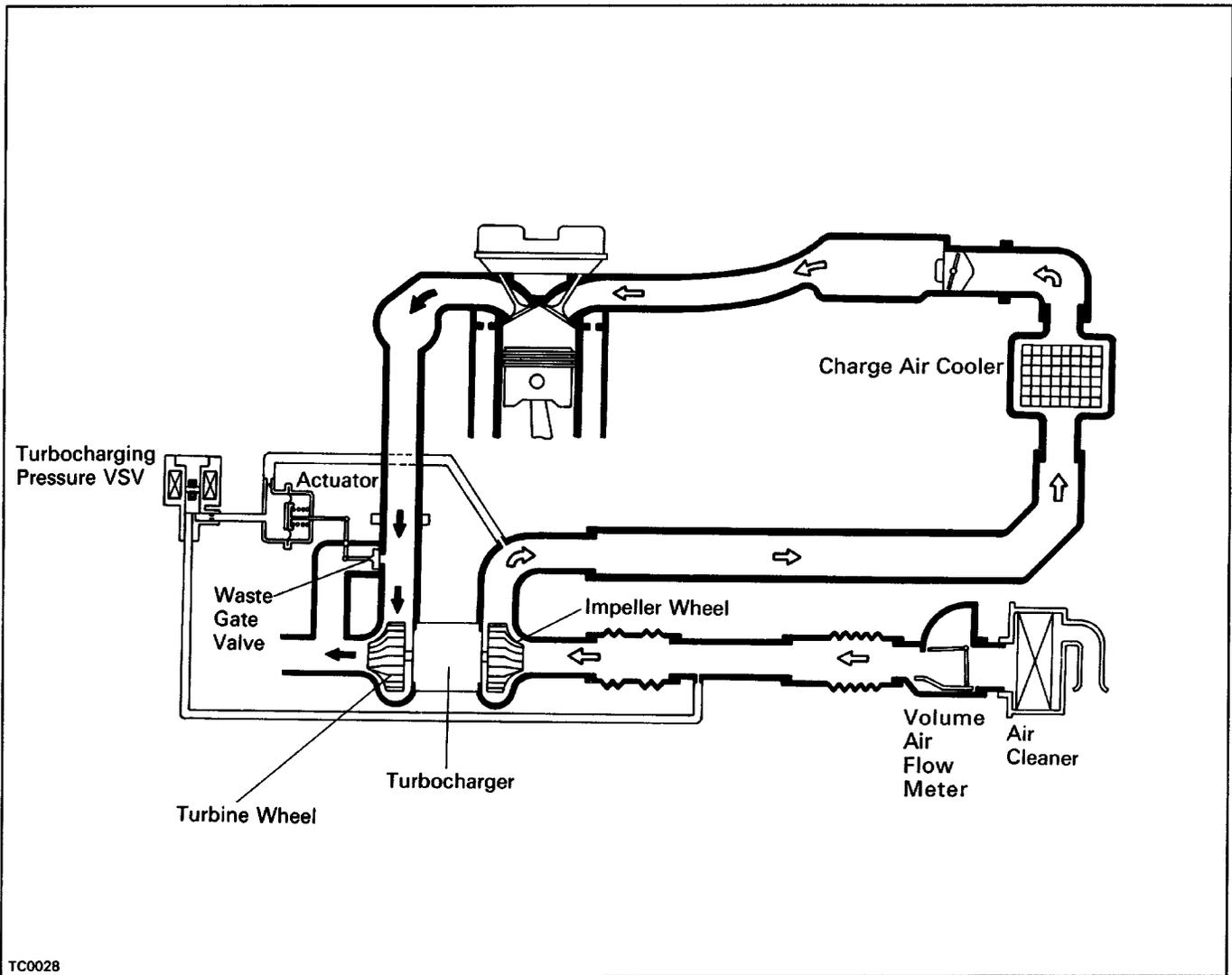
Systems which increase the amount of air sent to the engine are either turbocharger type (using exhaust gas to turn the turbine) or supercharger type (using the engine crankshaft, etc. to mechanically turn the pump, etc.). For CELICA 3S-GTE engine, the turbocharger type has been adopted.

The turbocharger is a device which increases engine output by sending a greater amount of air-fuel mixture to the engine than under normal conditions.

Engine output depends upon the volume of the air-fuel mixture ignited per unit of time.

Therefore, to increase engine output, the most effective method is to send a greater amount of air-fuel mixture into the cylinder.

In other words, by installing a special turbocharger and providing a higher air-fuel mixture than usual, engine output can be increased by increasing the average combustion pressure without increasing the engine speed.



### Operation of Turbocharger

Exhaust gas acts on the turbine wheel inside the turbine housing, causing it to revolve. When the turbine wheel revolves, the impeller wheel which is located on the same shaft also revolves, compressing the intake air which has passed through the volume air flow meter from the air cleaner. When expelled from the compressor housing, the compressed air is supplied to the cylinders. When the engine speed increases, the exhaust gas volume increases and the turbine wheel revolutions increase approx. 20,000 – 110,000 rpm), thus the turbocharged air pressure grows greater and engine output increases.

### Waste Gate Valve

High output is achieved by turbo-charging, but if the turbocharged air pressure becomes too high, knocking occurs and, on the contrary, a reduction in engine output is caused. If the turbocharged air pressure exceeds the prescribed air pressure, the flow of exhaust gas by-passes the turbine, controlling turbine wheel revolutions and turbocharged air pressure. This by-pass valve which controls the quantity of exhaust gas flowing to the turbine is called the waste gate valve. When the turbocharged air pressure exceeds the prescribed pressure, the actuator operates, the waste gate valve opens and part of the exhaust gas by-passes the turbine. This causes a drop in the turbine revolution rate and controls the turbocharged air within the prescribed limits.

### Charge Air Cooler

The charge air cooler cools the turbocharged air (intake air) put out by the turbocharger, thereby increasing the air density. As the intake air temperature decreases, the gas temperature in the combustion chambers falls and the occurrence of knocking is suppressed, giving an increase in engine output.

The Celica 3S-GTE charge air cooler is an air cooling type located at the top of the engine, utilizing the vehicle windstream to cool turbocharged air.