

1.9T Turbocharger Operation

SYSTEM OVERVIEWS





Before learning how to repair the **1.9T Turbocharger System**, it is important to understand:

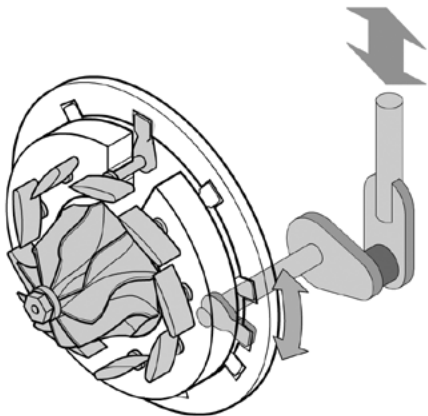
- The components used to control the turbocharger system.
- When the components are used.
- How the turbocharger system is tested.

Variable Vane System

The 1.9T Turbocharged diesel engine does not use a Wastegate, as the 1.8T gasoline engine does.

Instead of the Wastegate, a circular series of moveable vanes are used to control the airflow across the turbine blades.

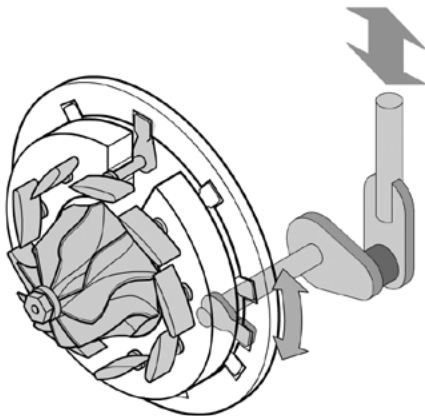
This is called the Variable Vane System.



Variable Vane System

As the linkage moves, the circular ring is turned.

The turning of the circular ring causes the vanes to change their angle.

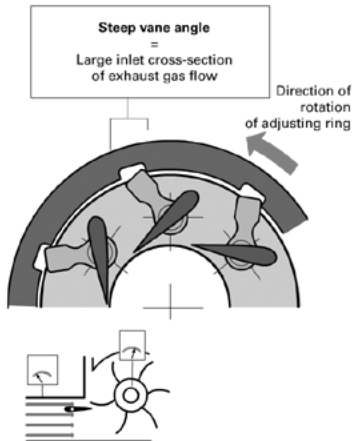


Variable Vane System

Changing the angle of the vanes determines the speed of exhaust air flowing over the turbine.

A shallow vane angle compresses the exhaust air, speeding it up. When this fast-moving air hits the turbine, it causes the turbine to spin faster.

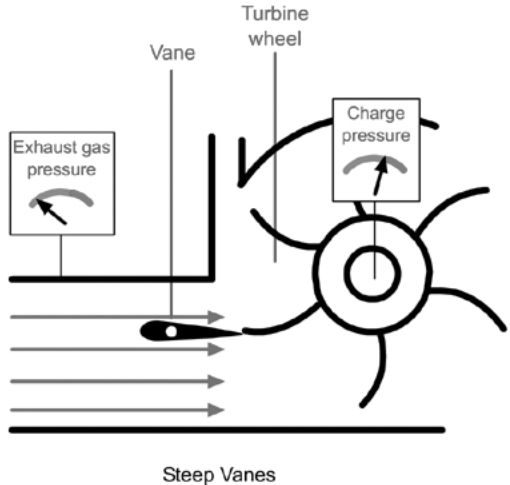
A steep vane angle does not provide much pressure. The air flows across the turbine blades at normal exhaust speed.





Variable Vane System

The ability to change the speed of the exhaust gases allows for a high charge pressure at low rpm.



System Operation

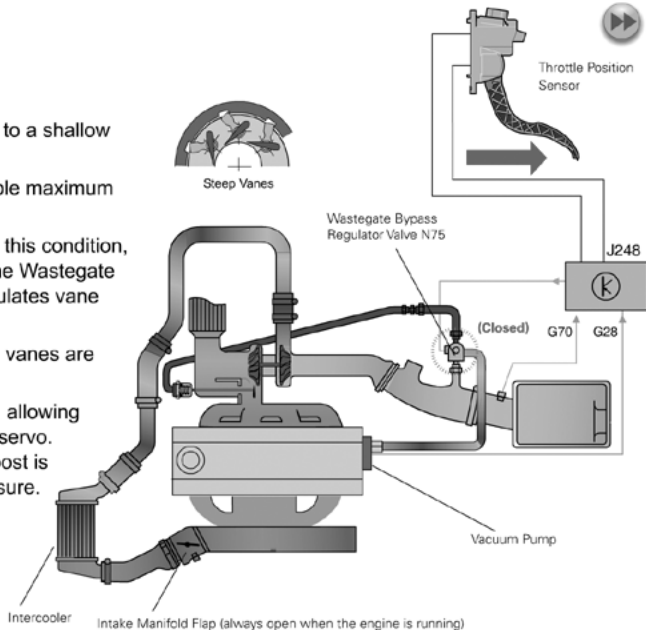
At idle, the vanes are moved to a shallow angle.

This allows the fastest possible maximum charge for pressure build-up.

N75 is at a low duty cycle for this condition, allowing vacuum to control the Wastegate Actuator Diaphragm that regulates vane angle.

At low throttle conditions, the vanes are moved toward a steep angle.

N75 is at a higher duty cycle, allowing atmospheric pressure to the servo. Any continued increase in boost is created by exhaust gas pressure.





Shallow Vanes

Wastegate Bypass
Regulator Valve N75

J248

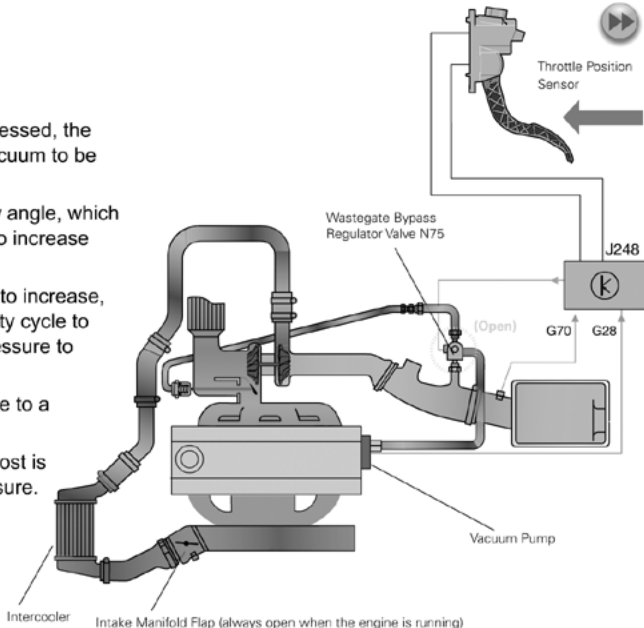


Intercooler

Intake Manifold Flap (always open when the engine is running)



Any continued increase in boost is created by exhaust gas pressure.





System Testing

There are three methods of testing the operation of the turbocharger system.

- Testing with the VAS 5051/5052
- Resistance check of N75
- Actuator operation



Testing with the VAS 5051/5052

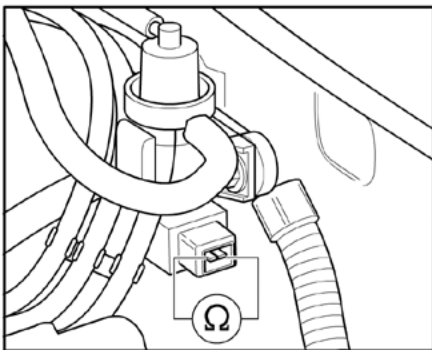
The **VAS 5051** has tests in both **Guided Fault Finding**, where applicable, and in **Vehicle Self-Diagnosis** to check the operation of N75.

The **VAS 5052** can check the operation of N75 through **Vehicle Self-Diagnosis**.

Resistance check of N75

The correct operation of N75 can be determined by checking resistance.

Refer to the Repair Information for the correct procedures and specifications.



Diaphragm operation of wastegate actuator

The variable vane system is controlled by an actuator called the **Wastegate Actuator Diaphragm**.

Refer to the Repair Information for the correct procedures and specifications.

