

ENGINE

Air Intake, Turbo Charging - 171 Chassis

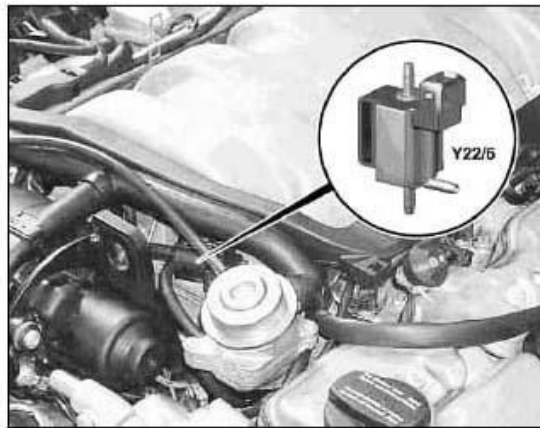
BASIC KNOWLEDGE

VARIABLE INTAKE MANIFOLD SWITCHOVER VALVE, COMPONENT DESCRIPTION - GF09.20-P-6001

Variable intake manifold switchover valve, component description (engine 113)- GF09.20-P-6001SM

ENGINE 113

Y22/5 Variable intake manifold switchover valve



P09 20.2145-11

Fig. 1: Locating Variable Intake Manifold Switchover Valve

Courtesy of MERCEDES-BENZ USA

The variable intake manifold switchover valve is located at the front to the left of the variable intake manifold.

Task

The variable intake manifold switchover valve discharges the variable intake manifold vacuum capsule for the purpose of intake manifold switchover with vacuum pressure and then ventilates the variable intake manifold vacuum capsule.

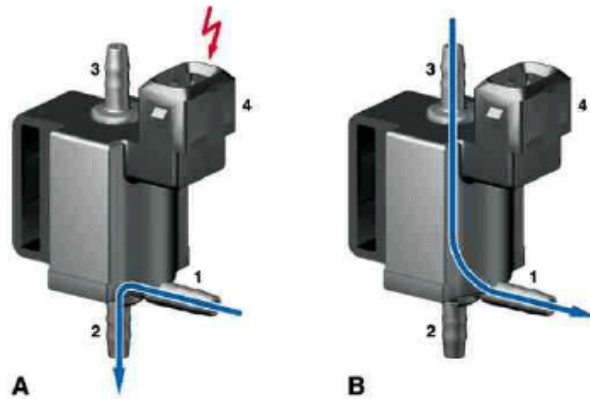
Design

The variable intake manifold switchover valve is an electromagnetic switchover valve in plastic housing with a coil resistance of around 25ohms.

A valve plated operated by a coil armature switches between ambient pressure and the vacuum memory.

Function

- 1 Variable intake manifold vacuum capsule connection
- 2 Vacuum memory connection (in variable intake manifold)
- 3 Ventilation connection (atmospheric)
- 4 Wiring connector
- A Variable intake manifold switchover valve energized (vacuum capsule discharged with vacuum pressure)
- B Variable intake manifold switchover valve energized (vacuum capsule ventilated)



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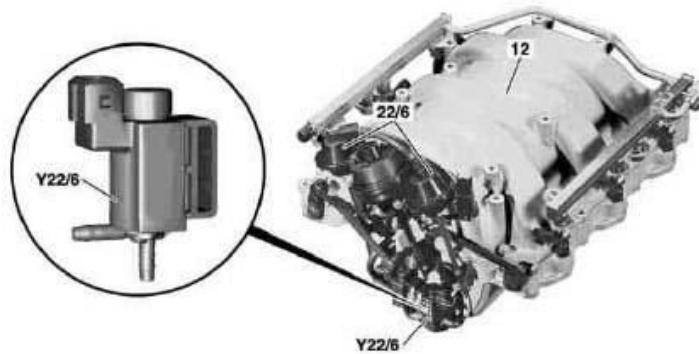
Fig. 2: Identifying Variable Intake Manifold Function
 Courtesy of MERCEDES-BENZ USA

N3/10 The variable intake manifold switchover valve is actuated on the earth side by the ME control unit through its own output stage. Supply voltage is provided by "circuit 87 M2e".

Component description for the variable intake manifold switchover valve (engine 272) - GF09.20-P-6001V

Shown on engine 272.963

- 12 Intake manifold with integral vacuum memory
- 22/6 Intake manifold switchover aneroid capsules
- Y22/6 Variable intake manifold switchover valve



P07.05.2040.05

Fig. 3: Identifying Variable Intake Manifold Switchover Valve - Shown On Engine 272.963
 Courtesy of MERCEDES-BENZ USA

Location

The variable intake manifold switchover valve is mounted at the front of the variable intake manifold.

Task

Pressurize intake manifold switchover aneroid capsules with vacuum or admitting air.

Design

Electromagnetic switchover valve in the plastic housing, coil resistance approx. 30 t. Ventilation via cap.

Shown on engine 272.963

- | | |
|-------|--|
| 1 | Air admission |
| 2 | from vacuum storage |
| 3 | to the intake manifold switchover aneroid capsules |
| Y22/6 | Variable intake manifold switchover valve |
| Y22/9 | Intake manifold tumble flap switchover valve |
| A | DEENERGIZED |
| B | ACTUATED |

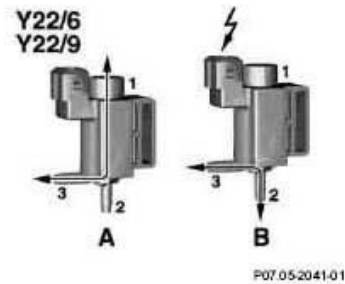


Fig. 4: Identifying Variable Intake Manifold Switchover Valve Design - Shown On Engine 272.963
 Courtesy of MERCEDES-BENZ USA

Function

The variable intake manifold switchover valve is actuated on the earth side by the engine control unit through its own output stage.

The voltage is supplied through circuit 87.

A valve plate operated by a coil armature shifts between atmosphere and vacuum storage.

VARIABLE INTAKE MANIFOLD COMPONENT DESCRIPTION (ENGINE 113) - GF09.20-P-6002SM

ENGINE 113.986

ENGINE 113.987

ENGINE 113.988

ENGINE 113.989

22 Variable intake manifold



P09.20.2147-11

Fig. 5: Identifying Variable Intake Manifold - Engine 113.988
Courtesy of MERCEDES-BENZ USA

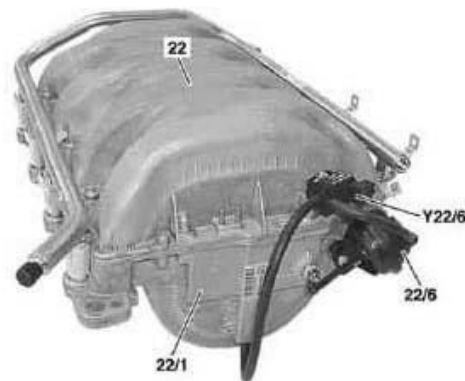
The variable intake manifold is located centrally between the cylinder banks.

Task

The variable intake manifold optimizes the engine torque in the partial load range by modifying the intake routes (intake lengths).

Design

- 22 Variable intake manifold
- 22/1 Vacuum memory with check valve (integrated in variable intake manifold)
- 22/6 Vacuum unit for variable intake manifold
- Y22/6 Variable intake manifold switchover valve



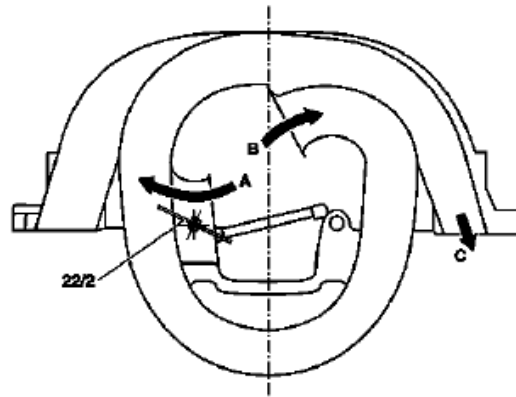
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Fig. 6: Identifying Variable Intake Manifold Design - Engine 113.988
Courtesy of MERCEDES-BENZ USA

Cross-section view from rear (at cylinder level)

22/2 Variable valve (one variable valve for each cylinder)

A Intake air when variable valve open
B Intake air when variable valve closed
C Intake air to engine



P09.20.2149-11

Fig. 7: Identifying Variable Intake Manifold Cross-Section View From Rear (At Cylinder Level) - Engine 113.988

Courtesy of MERCEDES-BENZ USA

Design

The variable intake manifold is assembled out of several pressure castings. When fitted together, they produce the individual intake manifolds and the air collecting volume. The parts are sealed off to each other by plastic.

The individual intake manifolds each approx. 800 mm long, are arranged in a spiral shape around the air collecting volume. A single intake manifold is assigned to each cylinder.

Each single intake manifold has a further opening to the air collecting volume in the middle. The opening can be opened or closed by the variable valve, which rotates by around 60°.



The variable intake manifold can not be disassembled.

Function

The variable valves (22/2) are attached to steel shafts. One steel shaft is installed for each bank of cylinders. The interconnected shafts are closed by vacuum pressure by the variable intake manifold vacuum capsule (22/6) by vacuum pressure.

(Y22/6) When the variable intake manifold switchover valve is open, the vacuum is supplied from a vacuum reservoir with check valve from the variable intake manifold. The reservoir volume is designed for about 5 operations without renewed evacuation.

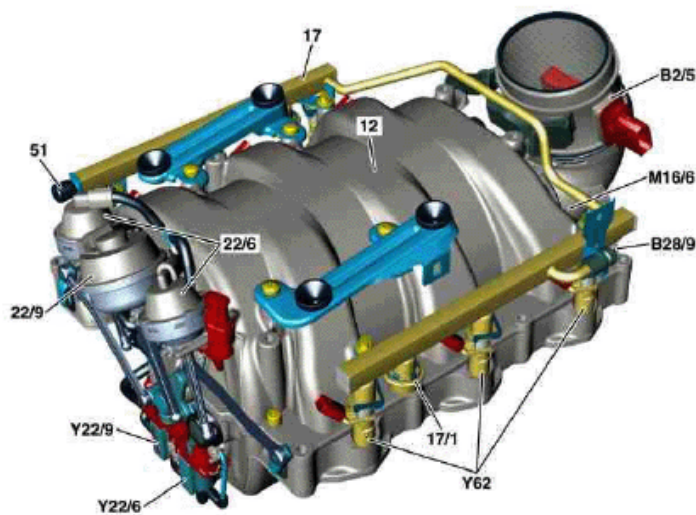
The variable valves are opened from closed position by spring force.

INTAKE MANIFOLD COMPONENT DESCRIPTION (ENGINE 272) - GF09.20-P-6010V

Shown on ENGINE 272

- 12 Intake manifold with integral vacuum memory
- 17 Fuel rail
- 17/1 Fuel pressure reservoir
- 22/6 Intake manifold switchover aneroid capsules
- 22/9 Tumble flap switchover aneroid capsule
- 51 Pressure gauge connection

- B2/5 Hot film MAF sensor
- B28/9 Left intake manifold tumble flap position sensor
- M16/6 Throttle valve actuator
- Y22/6 Variable intake manifold switchover valve
- Y22/9 Intake manifold tumble flap switchover valve
- Y62 Fuel injection valves



P09.20.2114.76

Fig. 8: Identifying Intake Manifold Components - Shown On Engine 272
 Courtesy of MERCEDES-BENZ USA

Location

The intake manifold is located between the cylinder banks.

Task

Optimizes engine torque curve by means of two different intake manifold lengths

Improves flow via swing-out tumble flaps in the intake port.

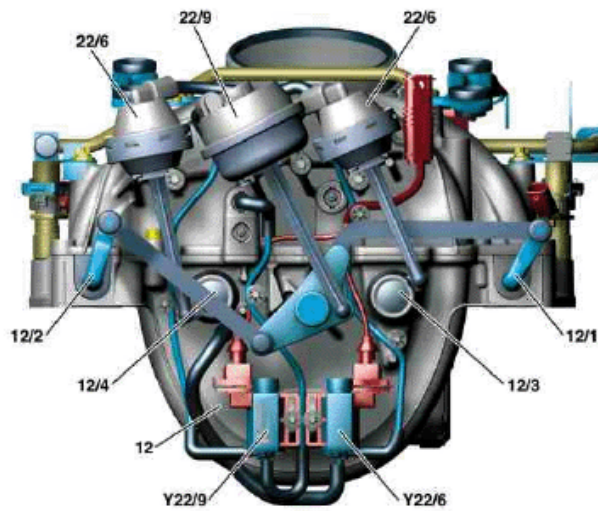
Design

The intake manifold is assembled out of several magnesium pressure castings. During assembly, the individual intake manifolds for each cylinder and the air manifold collecting sections are in the center. The intake manifold cannot be disassembled. A total of four shafts are stored in the intake manifold.

The vacuum pressure for the aneroid capsules is supplied by a vacuum reservoir in the intake manifold when the switchover valves are actuated. The reservoir volume is designed for several operations without renewed evacuation.

Shown on ENGINE 272

- 12 Intake manifold with integral vacuum memory
- 12/1 Tumble flap shaft, left cylinder bank
- 12/2 Tumble flap shaft, right cylinder bank
- 12/3 Longitudinal switch flap shaft, right cylinder bank
- 12/4 Longitudinal switch flap shaft, left cylinder bank
- 22/6 Intake manifold switchover aneroid capsules
- 22/9 Tumble flap switchover aneroid capsule
- Y22/6 Variable intake manifold switchover valve
- Y22/9 Intake manifold tumble flap switchover valve

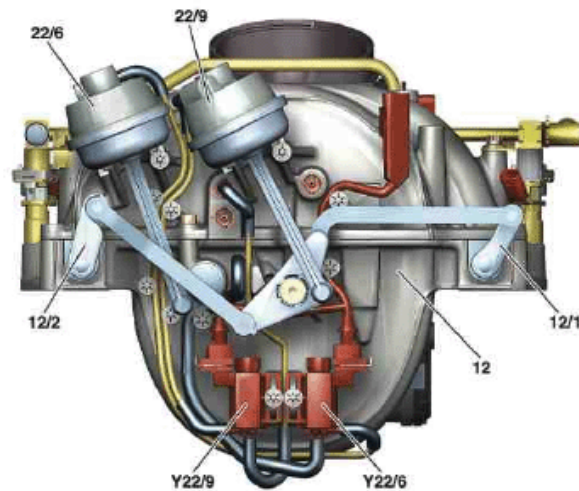


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Fig. 9: Identifying Intake Manifold Design - Shown On Engine 272
 Courtesy of MERCEDES-BENZ USA

Shown on ENGINE 273

- 12 Intake manifold with integral vacuum memory
- 12/1 Tumble flap shaft, left cylinder bank
- 12/2 Tumble flap shaft, right cylinder bank
- 22/6 Variable intake manifold switchover diaphragm unit
- 22/9 Tumble flap switchover aneroid capsule
- Y22/6 Variable intake manifold switchover valve
- Y22/9 Intake manifold tumble flap switchover valve



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Fig. 10: Identifying Intake Manifold Design - Shown On Engine 273
 Courtesy of MERCEDES-BENZ USA

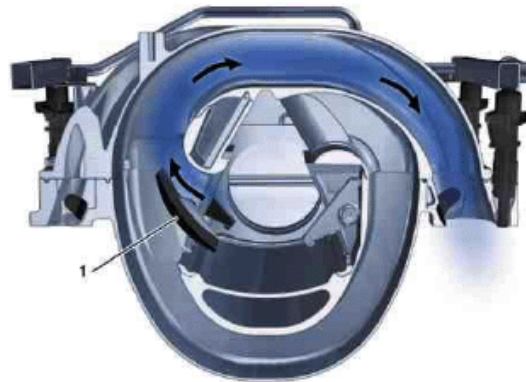
Intake manifold switchover, function

The individual intake manifolds each approx. 800 mm long, are arranged in a spiral shape around the air collecting volume. Each single intake manifold has a further opening to the air collecting volume somewhere in the middle. These can be opened or closed by rotating longitudinal switch flap shafts. The switch flaps of a

cylinder bank are interconnected by a shaft and each of the flap is actuated by an aneroid capsule in case of engine 272 BOTH aneroid capsules for the intake manifold switchover are connected to the variable intake manifold switchover valve via hose pipes. Engine 273 has only one aneroid capsule. The flap shafts are connected in the intake manifold. The switch flaps open by spring force without actuation and enable the short suction way.

Cut at intake manifold at cylinder level, short intake route

1 Longitudinal switch flap open



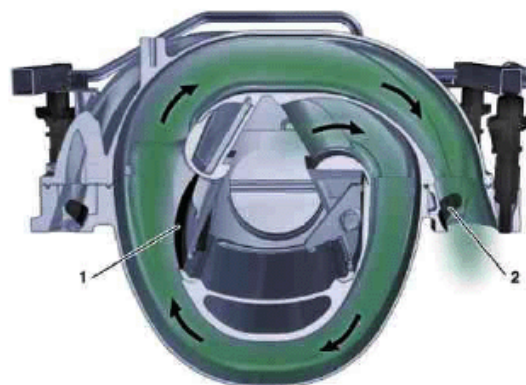
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Fig. 11: Identifying Longitudinal Switch Flap Open
Courtesy of MERCEDES-BENZ USA

At higher speeds (from approx. 3500/min) the intake manifold switchover aneroid capsules are ventilated and the switch flaps opened by the spring force. The intake air takes the short intake route.

Cut at intake manifold at cylinder level, long intake route

1 Longitudinal switch flap closed (actuated)
2 Tumble flap



P09.20.2119-01

Fig. 12: Identifying Longitudinal Switch Flap Closed And Tumble Flap
Courtesy of MERCEDES-BENZ USA

At lower speed (up to approx. 3500/min) the intake manifold aneroid capsules are pressurized with vacuum pressure and the longitudinal switch flaps closed. The intake air takes the long intake route. The result is

improved cylinder charge and thus an increase in torque.

Tumble flap switchover function

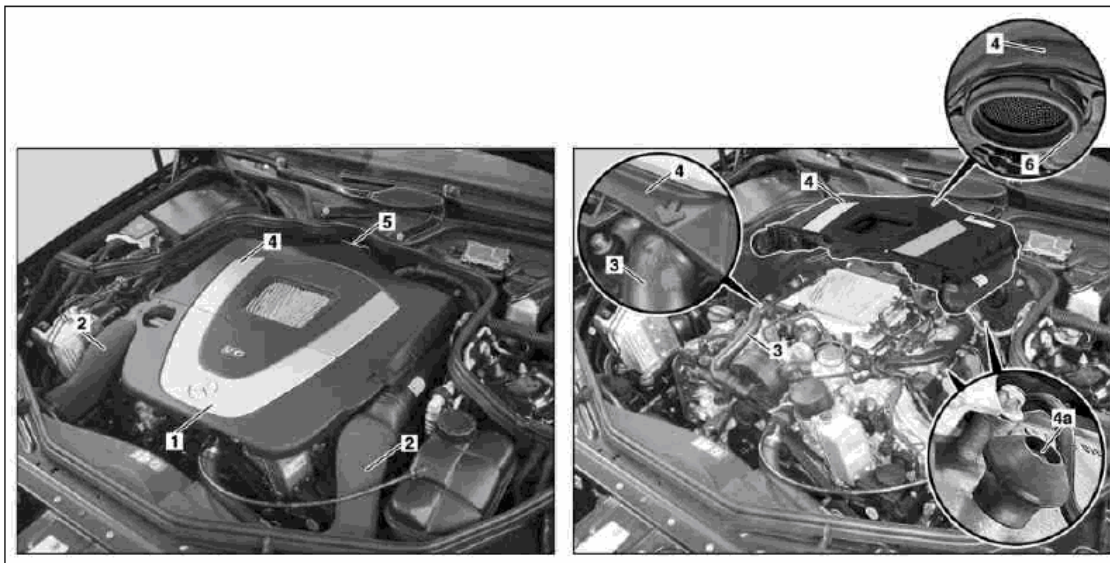
At partial load, tumble flaps can be fully swung out in each cylinder intake port in the intake manifold. This closes the intake manifold by around 50 %.

The flow speed of the intake air is increased and allows for improved distribution of the fuel/air mixture in the combustion chamber. The tumble flaps are actuated via an aneroid capsule and linkage.

TESTING & REPAIR

REMOVING/INSTALLING AIR CLEANER HOUSING (ENGINE 272) - AR09.10-P-1150VA

ENGINES 272.942 /963 in MODEL 171.4



P09.10-2218-09

- 1 Front engine trim panel
- 2 Engine air intake duct
- 3 Hose
- 4 Air cleaner housing
- 4a Mount
- 5 Clamp
- 6 Gasket

Fig. 13: Identifying Air Cleaner Housing Components

Courtesy of MERCEDES-BENZ USA

☒ ☒	Removing/installing	
1	Pull off front engine cover (1) from above.	Installation: Check for correct seating of the front engine cover (1) on the air filter housing (4).
2	Remove left and right engine air intake duct (2) upstream of air filter	Check left and right engine air intake duct (2) for damage and replace if necessary.