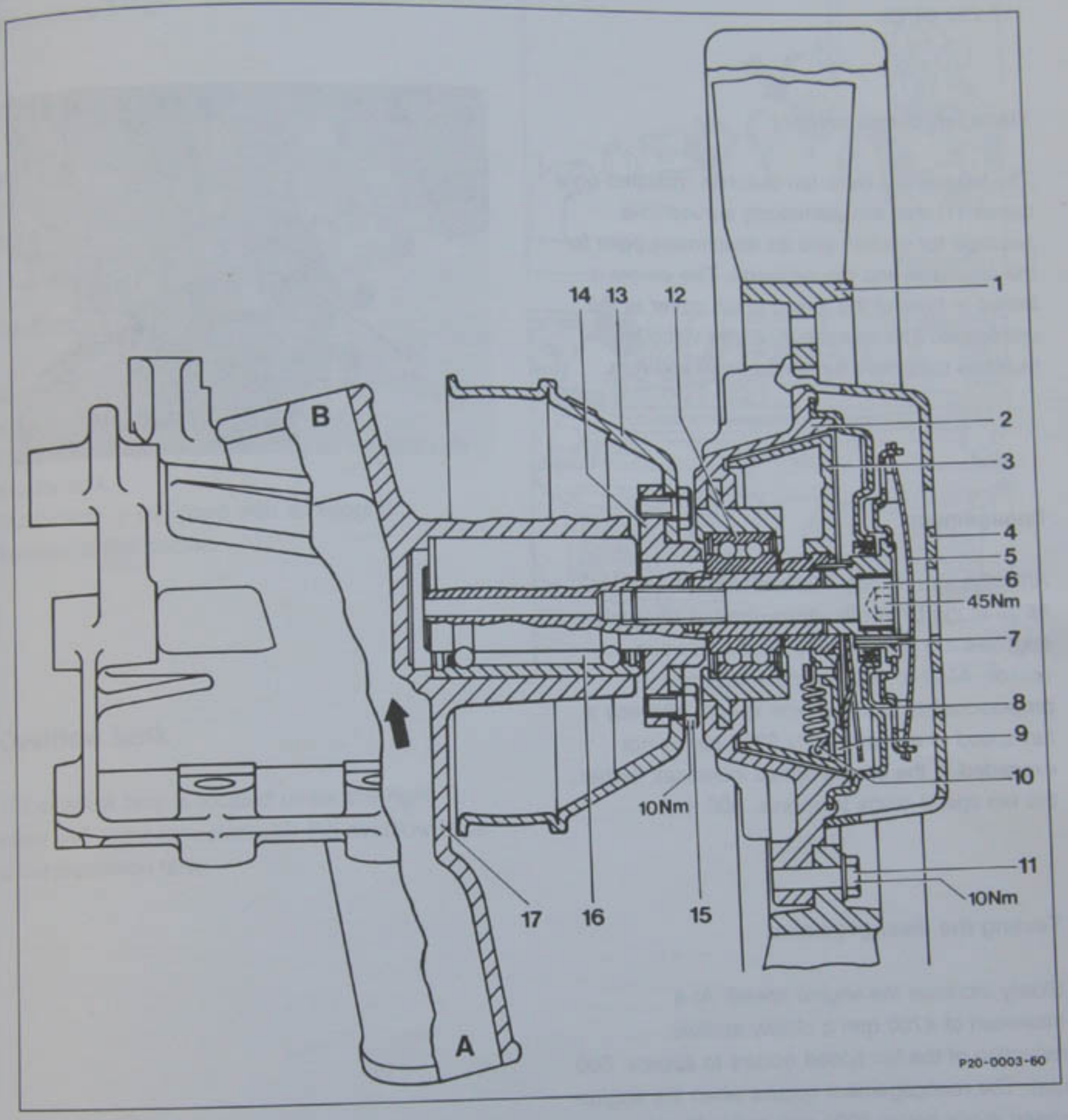
Engine cooling



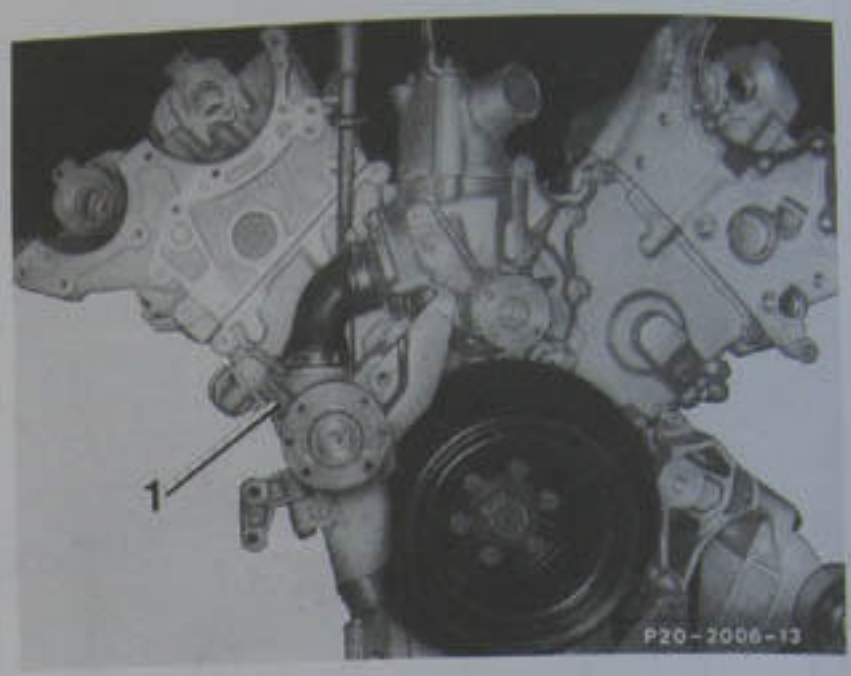
1	Fan
2	Clutch body (secondary component)
3	Driving disc (primary component)
4	Cover
5	Bimetallic strips
6	Bolt (viscofan clutch to bearing carrier)
7	Control pin
8	Spring plate
9	Transition bore
10	Tension spring
11	Bolt (fan to viscofan clutch)
12	Double row ball bearing
13	Pulley
14	Hub
15	Bolt (pulley to hub)
16	Bearing body with shaft
17	Visco fan clutch carrier
A	From radiator
B	To thermostat

Visco fan clutch

Identification: yellow sticker on front,
119 200 00 22.

Visco fan clutch carrier

The left-turning visco fan clutch is mounted on a carrier (1) that simultaneously serves as a passage for coolant and an attachment point for the alternator and the air pump. The carrier is bolted in front of the timing chain cover to the crankcase. The maintenance-free visco fan clutch is controlled by temperature and rpm.



Engagement

After the air reaches a temperature of 78°C to 86°C at the bimetallic strips, the fan smoothly engages. Up to an engine speed between approx. 4500 to 4700 rpm the fan turns proportionately to the engine speed, whereby a fan speed of approximately 3000 rpm is not exceeded. If the engine speed increases further, the fan speed drops to approx. 600 rpm.

The RPM's mentioned are incorrect. Due to the pulley sizes, the fan pulley RPM exceeds the engine RPM by approx 20-25%. With engine RPM at 3500, the fan pulley is approx 4400rpm.

Testing on the car shows the clutch disengages at approx 3500 engine RPM, which is approx 4400 fan RPM (for clutch 119-200-01-22).

I believe the stated "maximum of 4700rpm" is 4700 *fan* RPM, not 4700 *engine* RPM.

Testing the disengagement

Slowly increase the engine speed. At a maximum of 4700 rpm a clearly audible reduction of the fan speed occurs to approx. 600 rpm. The reengagement occurs when the engine speed drops below 4000 rpm and is likewise clearly audible.

Coolant pump

The coolant pump has a higher delivery capacity, suited to the increased performance level of the engine.

Coolant pump

Coolant pump with 8-groove pulley. The position of the inlet connection was changed. A plastic hose is connected to the leak-off connection of the coolant pump.

Visco-fan clutch

The visco-fan clutch is maintenance-free and turns counterclockwise. The visco-fan clutch is temperature and rpm controlled.

Identification:
Yellow label with number 119 200 00 22.

Upon reaching an air temperature of approx. 92 °C to 100 °C at the bimetallic spring, the fan smoothly engages.

Up to an engine speed of approx. 3600 to 3800 rpm, the fan speed is proportionate to engine speed, whereby slippage in the visco-fan clutch will not allow the fan speed to exceed approx. 3000 rpm.

The safety disengagement of the fan occurs audibly with increasing engine speed via centrifugal force at approx. 3800 rpm, at which point fan speed drops to approx. 600 rpm.

Reengagement occurs audibly after the engine speed drops below 3300 rpm.

As this data conflicts with what is shown in the 119.960 manual, I suspect that the clutch engages when the *coolant temp* (not air temp) reaches 92°-100°C. Data in the OM603.96 manual (#20-310) supports this theory.

As noted with the 119.960 specs, fan speed exceeds engine speed by 25%, not the other way around. 3700 engine RPM is approx 4700 fan RPM. I believe this text is accurate except for the max fan RPM is ~4700, not 3000.

Fan

Magnesium fan with 9 blades turning counter-clockwise (opposite rotation of engine) and a diameter of 460 mm.

Identification number cast on front:
119 205 00 06.

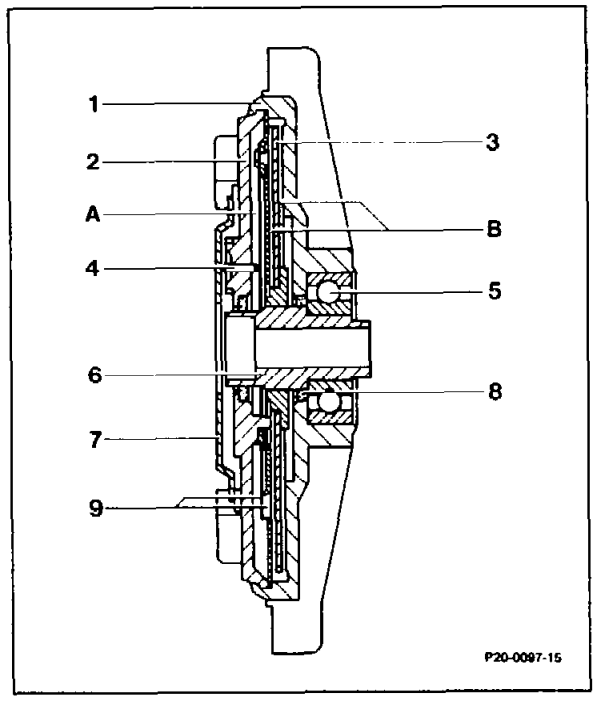
OM602/603 Turbo

Function

The viscous fan coupling is a maintenance-free hydraulic coupling which operates steplessly dependent on temperature.

When the engine is started (cold start), the fan runs initially at a higher speed until the oil has flowed back from the working chamber (B) into the storage chamber (A). Following this, the fan coupling switches off. Fan speed in the off state depends on engine speed. Fan speed, however, does not exceed 1000 rpm.

This state is maintained for as long as the engine has not yet reached the cutin temperature.



1 Coupling body (secondary part)
2 Cover
3 Driving plate (primary part)
4 Switch pin
5 Ball bearing
6 Bearing bush
7 Bimetal strip
8 Seal
9 Valve
A Storage chamber
B Working chamber

If the coolant temperature rises because of higher engine load or high outside temperatures, the air which flows through the radiator and impinges on the bimetal strip (7), becomes warmer. The bimetal strip (7) alters its shape as it heats up and opens a valve (9) at approx. 71 °C by means of a pin (4) and thus also the passage for the oil from the storage chamber (A) into the working chamber (B), which causes the fan to cut in.

The coolant temperature during this switching operation is between approx. 90 and 95 °C.

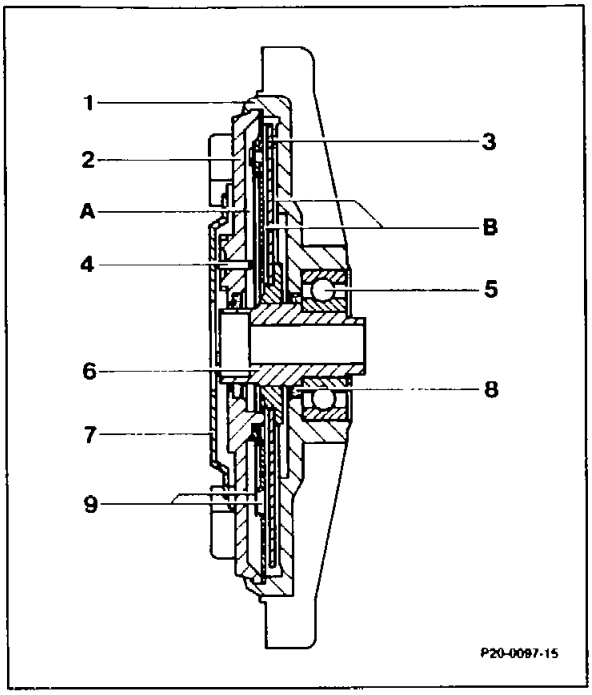
When the coupling is engaged, fan speed increases somewhat proportionally with increasing engine speed in the lower rpm range, without exceeding 3300 rpm in the upper.

Checking cut-in temperature

Run engine at 4000 – 5000 rpm. Once a coolant temperature of approx. 90 – 95 °C has been reached, the speed of the viscous fan coupling must increase, which can be clearly heard.

Repairs

It is not possible to repair a faulty coupling; it should always be renewed.



1 Coupling body (secondary part)
2 Cover
3 Driving plate (primary part)
4 Switch pin
5 Ball bearing
6 Bearing bush
7 Bimetal strip
8 Seal
9 Valve
A Storage chamber
B Working chamber

Transportation and storage

Temperature-controlled viscous fan couplings must be transported upright. For brief periods – e. g. for installation purposes, the coupling may be placed on the flange side, but never on the front side.

⚠

The bimetal strip must not be bent or damaged.

Note that this manual indicates the bimetal strip engages at an air temp of approx 71° C, which corresononds to approx 90°-95°C coolant temperature.

Given the 20° difference, it is not plausible that the M119 clutch bimetal strip engages at 100°C, which would correspond to coolant temps of 120°C.

The 100°C spec for M119 is coolant temp, NOT air temp at the BMS. This matches the spec shown in the 119.960 manual of ~82° air temp at BMS.