**Special tools required:**

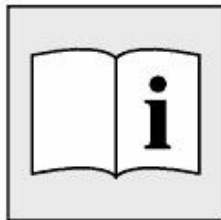
- 11 7 130
- 12 6 050
- 12 6 410
- 12 6 411

Read fault memory and make a documentary record.

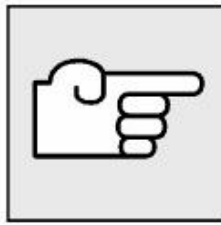
**Caution!**

When the engine is switched off, VANOS moves the camshafts to a position which is advantageous to engine starting.

Before the VANOS adjustment unit is removed, the camshafts and the VANOS adjustment unit must be set with the Diagnosis and Information System (DIS) to the assembly position.

**Procedure for setting VANOS to assembly position:**

- Connect DIS Tester
- Start engine
- Select Diagnosis
- Service functions
- VANOS: approach assembly position
- Switch off engine



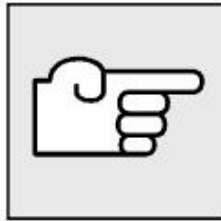
Open drain plug on radiator. Unfasten drain plug for coolant on right engine block. Drain and dispose of coolant.

**Installation:**

Replace sealing ring.

Tightening torque, refer to 11 11 5AZ.

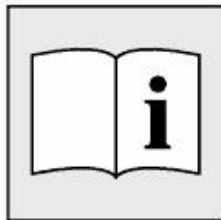
Top up coolant. Vent cooling system and check for leaks.



Remove intake filter housing upper section with air-mass flow sensor.

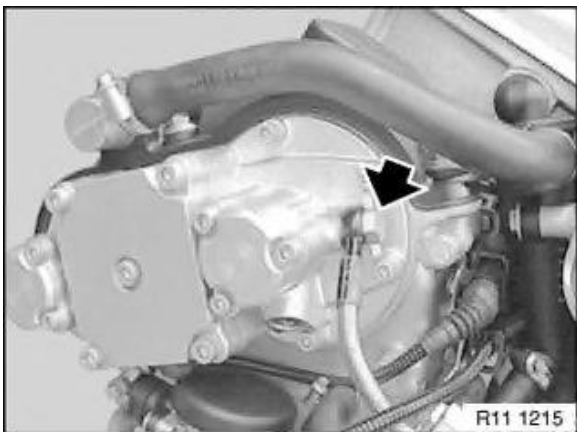
Remove water hose between radiator and thermostat housing.

Remove fan clutch with fan impeller and fan cowl.

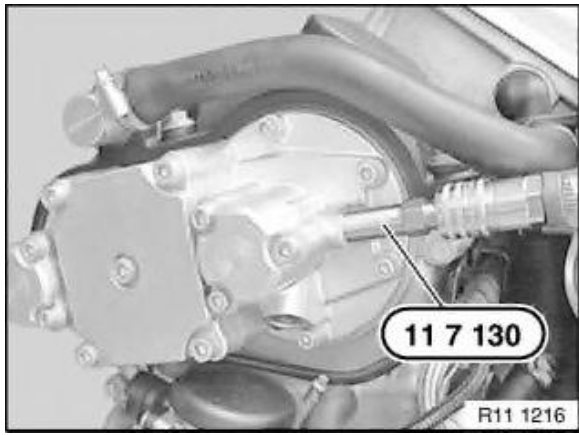


**Removal**

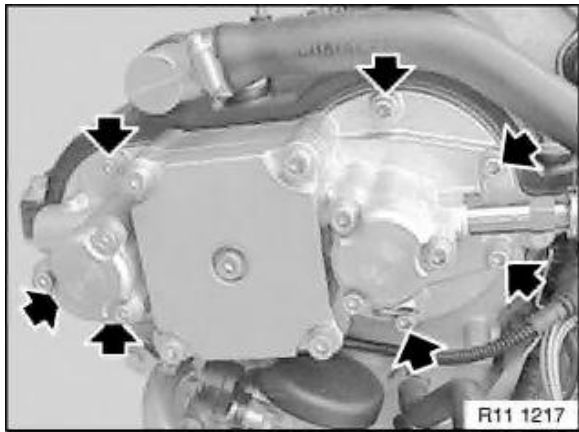
The removal of the VANOS adjustment unit is described separately from the installation. The assembly sequence for removal and installation is different.



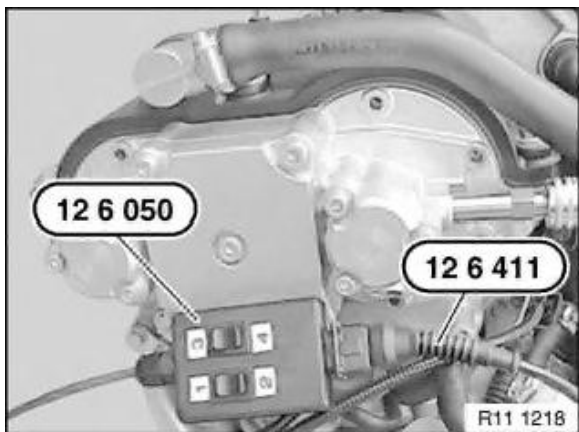
Remove oil line from VANOS adjustment unit.



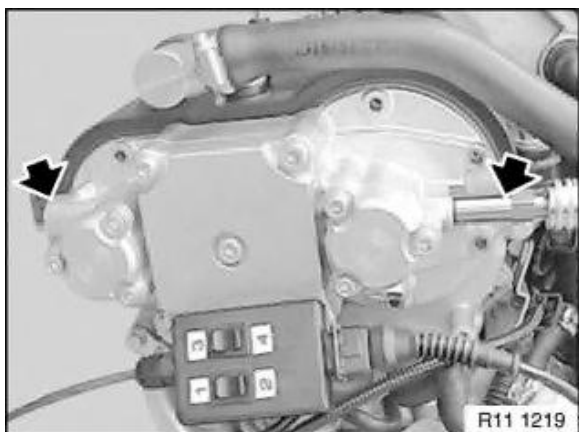
Fit special tool 11 7 130 to VANOS adjustment unit.  
Connect compressed air (2 to 8 bar).



Release screws on VANOS adjustment unit.



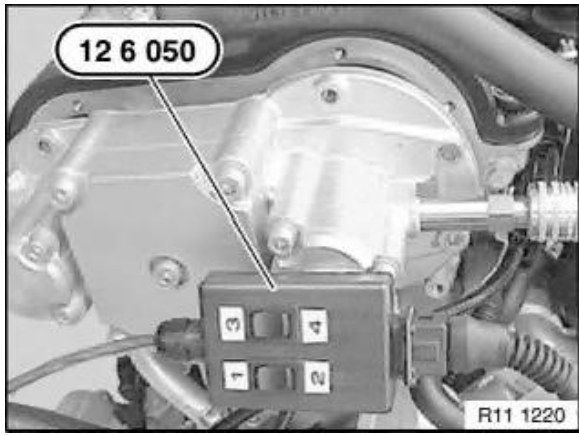
Disconnect plug connection for solenoid valves on cylinder bank 1 to 4.  
Connect special tool 12 6 050 in conjunction with special tool 12 6 411 (from special tool 12 6 410 ) to solenoid valves on cylinder bank 1 to 4. Connect special tool 12 6 411 to correct terminals on car battery.  
Press buttons 2 and 4 on special tool 12 6 050 several times. The solenoid valves are activated and the oil chamber of the hydraulic piston is ventilated.



**Caution!**

Follow instructions exactly. Incorrect assembly and damage to VANOS adjustment unit possible!

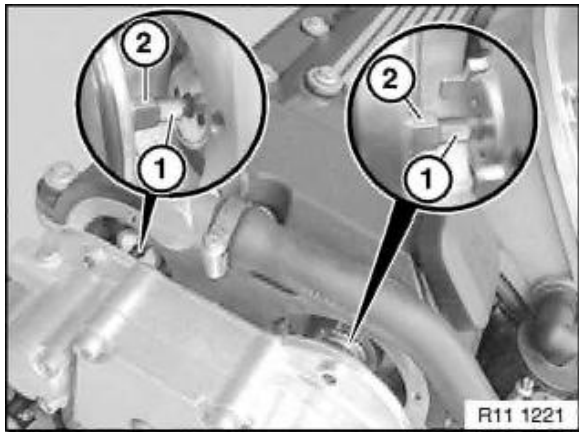
Using a screwdriver, carefully lever out VANOS adjustment unit at "provided" openings on left and right until unit is no longer secured in timing case cover.



**Caution!**

Do "not" pull out VANOS adjustment unit.

Press buttons 2 and 4 on special tool 12 6 050 simultaneously; the hydraulic pistons extend on the inlet and exhaust sides of the VANOS adjustment unit.

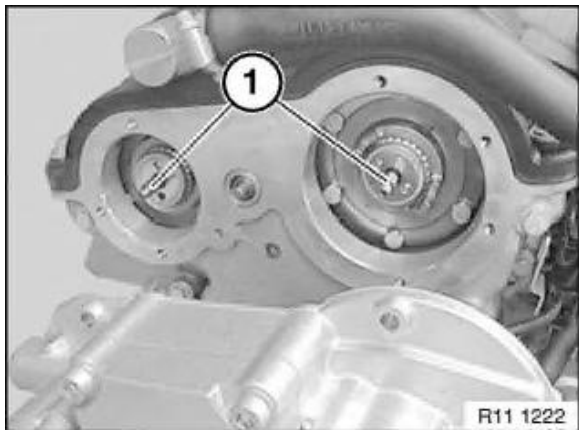


**Caution!**

CCW thread!

Brace against twin surface (1) and release hex head (2).

Release toothed shaft screw connection on inlet and exhaust sides; in doing so, support VANOS adjustment unit with your hand.



Remove VANOS adjustment unit.

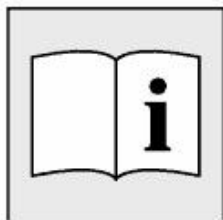
**Note:**

The toothed shafts (1) remain in the VANOS gear on the engine.



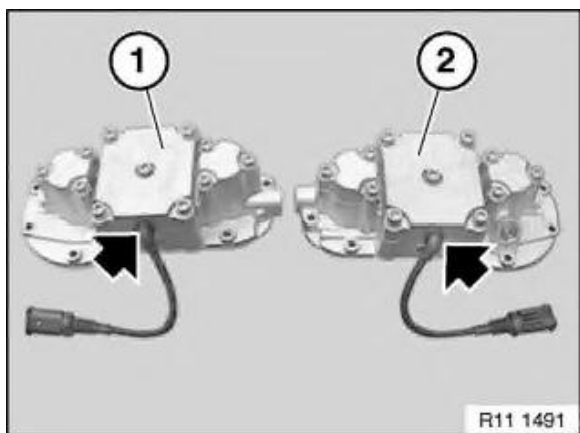
**Caution!**

The engine must not be cranked while the VANOS adjustment unit is removed. The toothed shafts might displace and slip out of the spline teeth; the camshafts would no longer be non-positively connected and the valves could touch the piston.



## Installation

The installation of the VANOS adjustment unit is described separately from the removal. The assembly sequence for installation and removal is different.



## Caution!

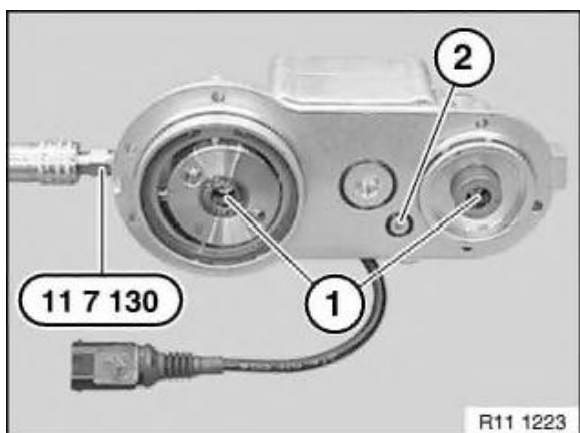
Risk of mixing up parts.

The VANOS adjustment units of cylinder banks 1 to 4 and 5 to 8 are different.

- 1) Cylinder bank 1 to 4
- 2) Cylinder bank 5 to 8

## Note:

Install VANOS adjustment unit so that cables of solenoid valves are at bottom.



## Note:

Procedure for replacement or new parts:

When delivered, the hydraulic pistons (1) of the VANOS adjustment unit are "retracted" and the hexagon heads are not accessible.

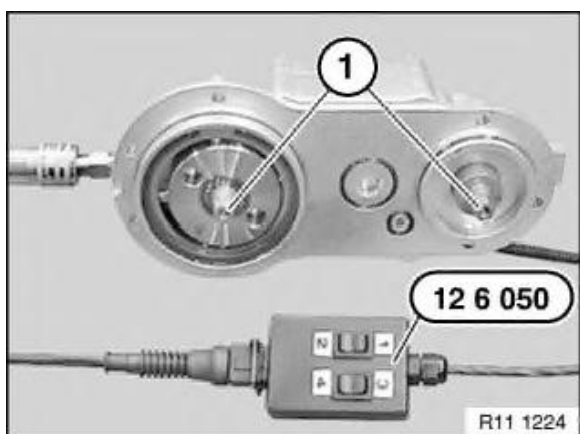
Fit special tool 11 7 130 to VANOS adjustment unit.

## Caution!

Oil is sprayed when compressed air is connected.

Cover bore (2) with a cloth.

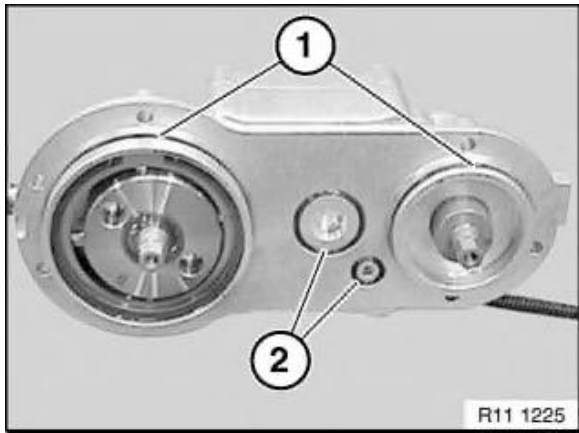
Connect compressed air (2 to 8 bar).



Connect special tool 12 6 050 in conjunction with special tool 12 6 411 to solenoid valves of VANOS adjustment unit.

Connect special tool 12 6 411 to correct terminals on car battery.

Press buttons 2 and 4 on special tool 12 6 050. The solenoid valves are activated and the oil chamber of the hydraulic piston is ventilated. The hydraulic pistons (1) extend.



Replace O-rings (1 and 2) on VANOS adjustment unit.

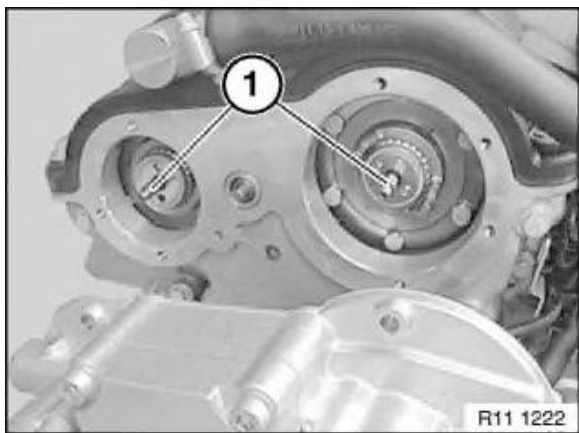
**Note:**

New O-rings are already fitted on replacement or new parts.

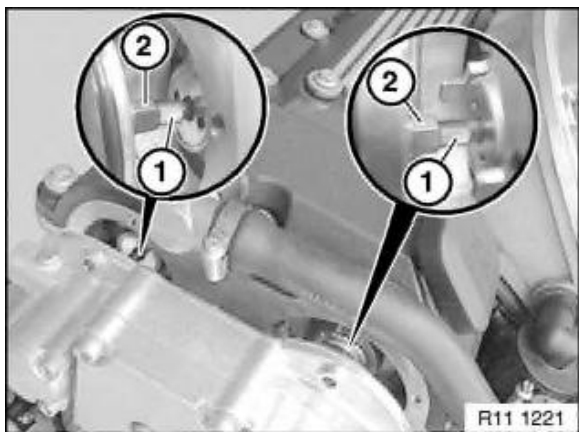
Coat O-rings (1) with oil as anti-friction agent.

**Caution!**

O-rings (2) fall out very easily, secure with grease if necessary.



Place VANOS adjustment unit on toothed shafts (1).



**Caution!**

CCW thread!

When tightening down toothed shafts, support VANOS adjustment unit with your hand.

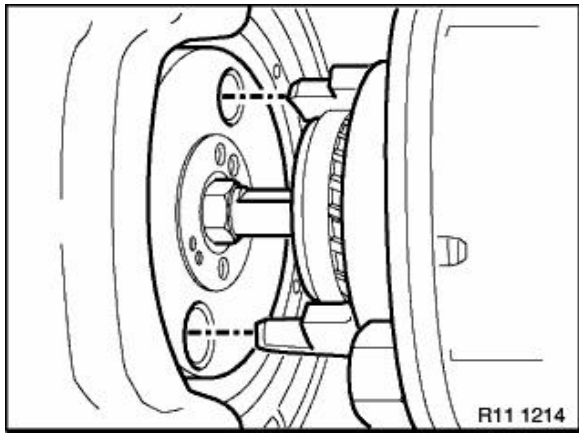
Grip twin surface (1) and screw together at hexagon head (2) alternately between exhaust and inlet sides in 1/2 turn steps.

Tighten down toothed shaft screw connection on inlet and exhaust sides.

Tightening torque 10 Nm.



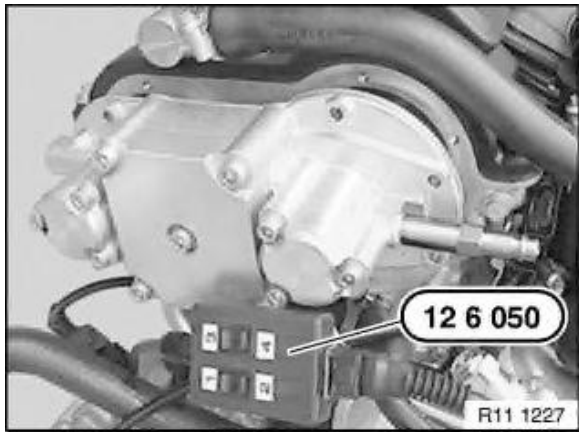
Disconnect compressed air from special tool 11 7 130 .



Align radial piston pump to driver on spline hub.

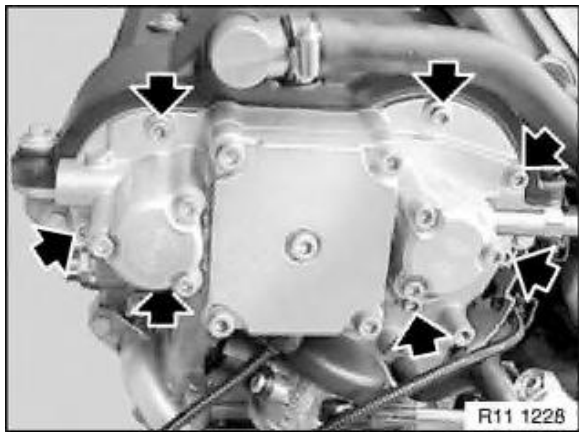
**Note:**

Picture shows a schematic representation.



Press buttons 1 and 3 on special tool 12 6 050 simultaneously. The solenoid valves are activated and the air can escape from the hydraulic pistons of the VANOS adjustment unit.

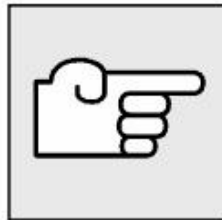
Simultaneously push on VANOS adjustment unit until O-rings of VANOS adjustment unit rest against timing case cover.



**Caution!**

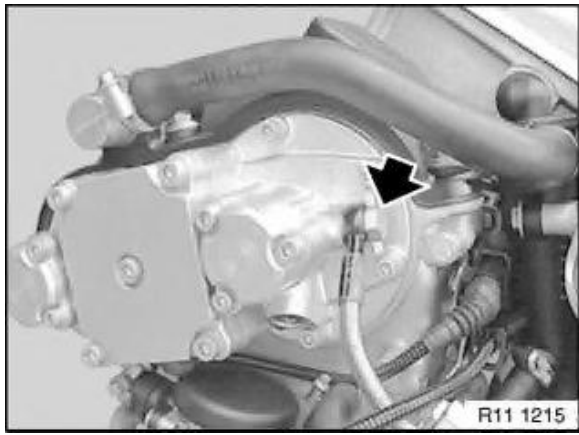
If this position is not reached, realign position of radial piston pump to driver.

Tighten down screws on VANOS adjustment unit carefully and evenly in 1/2 turn steps.



Disconnect special tool 12 6 050 and special tool 12 6 410 and remove.

Reconnect plug connections of solenoid valves and clip into holder.



Remove special tool 11 7 130 from VANOS adjustment unit.  
Fit oil line to VANOS adjustment unit.  
Tightening torque, refer to 11 36 9AZ.  
Assemble engine.



**Caution!**

There is air in the VANOS system once it is opened.  
In the first few seconds after startup this results in a clearly discernible "rattling noise".  
This rattling noise does "not" indicate incorrect assembly.  
The rattling noise will disappear as soon as the oil pressure has built up and the system has vented.