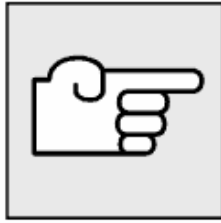


Unscrew and remove splash guard.



Remove intake filter housing upper section, left and right, with air-mass flow sensor.

Remove manifold for intake air, refer to 11 61 050.

Remove both cylinder head covers, refer to 11 12 004.

Remove all spark plugs.

Remove fan clutch with fan impeller and fan cowl, refer to 11 52 020 / 17 11 031.



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

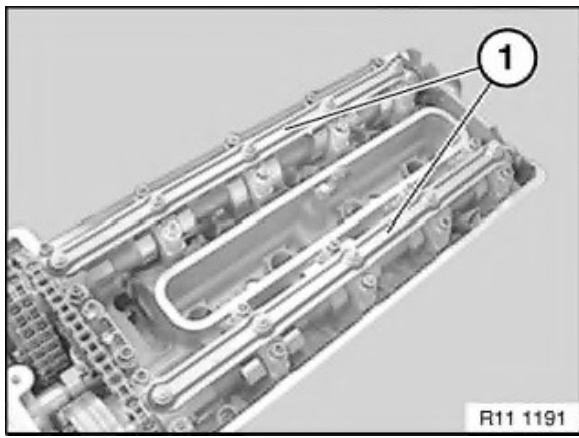
**Caution!**

The timing must "not" be checked in this position.

The camshafts must first be turned back to their initial position.



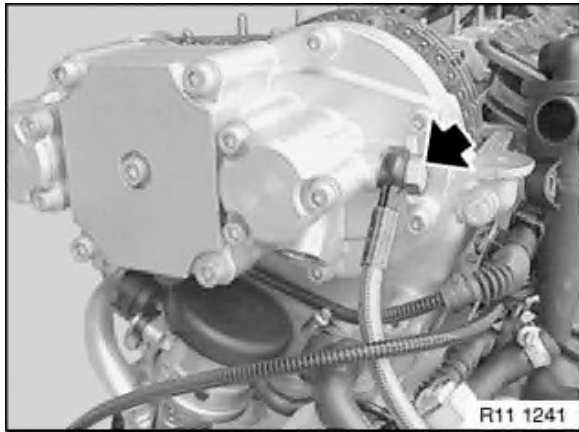
Rotate crankshaft in direction of rotation as far as ignition TDC position of cylinder 1. Secure vibration damper with special tool 11 2 300.



Remove oil lines (1) from cylinder head on cylinder banks 1 to 4 and 5 to 8.

**Note:**

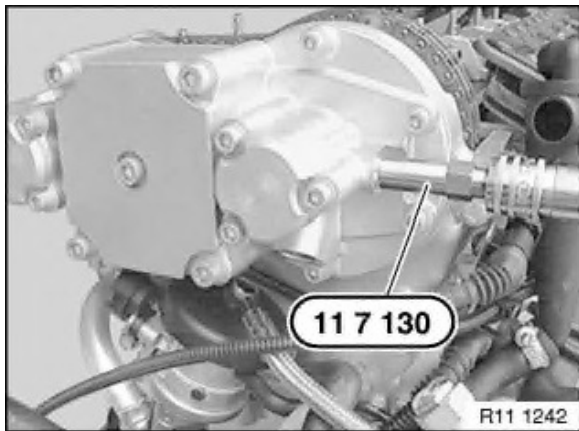
The oil lines (1) of cylinder banks 1 to 4 and 5 to 8 are different.



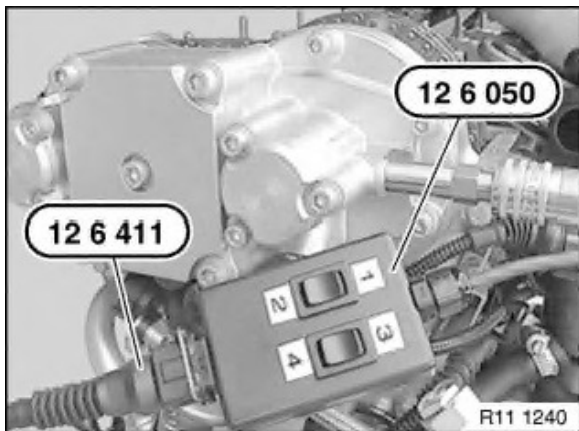
Cylinder bank 1 to 4:  
Remove oil line from VANOS adjustment unit.

**Installation:**

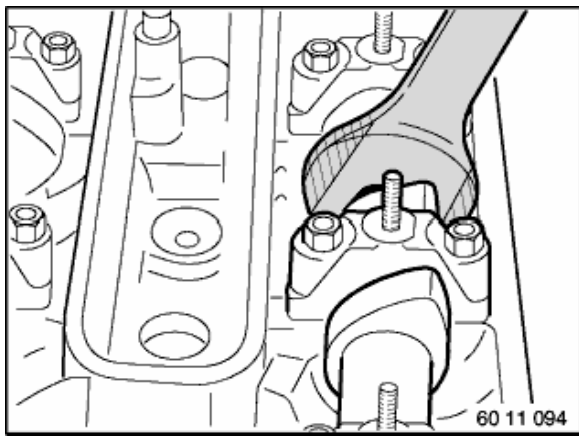
Replace sealing rings.  
Attach oil line to VANOS adjustment unit.  
Tightening Torque,  
refer to Technical Data 11 36 9AZ.



Cylinder bank 1 to 4:  
Fit special tool 11 7 130 to VANOS adjustment unit.  
Connect up compressed air (2 to 8 bar).

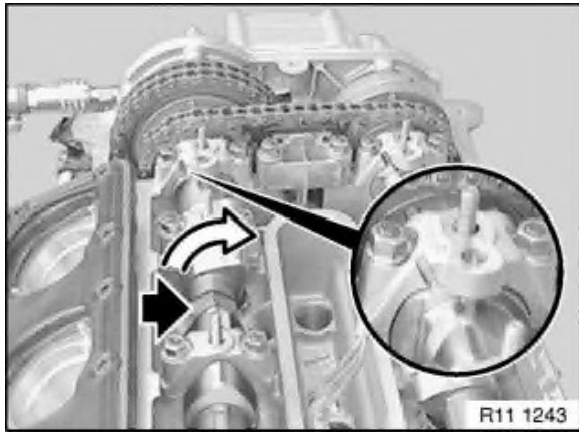


Cylinder bank 1 to 4:  
Disconnect plug connection for solenoid valves on cylinder bank 1 to 4.  
Connect special tool 12 6 050 in conjunction with special tool 12 6 411 (from special tool kit 12 6 410) to solenoid valves on cylinder bank 1 to 4. Connect special tool 12 6 411 to correct terminals on car battery.  
Alternately press toggle switch buttons 1 and 2 several times on special tool 12 6 050.



**Caution!**

Do not damage the cylinder head.  
If necessary, machine open-end wrench accordingly.



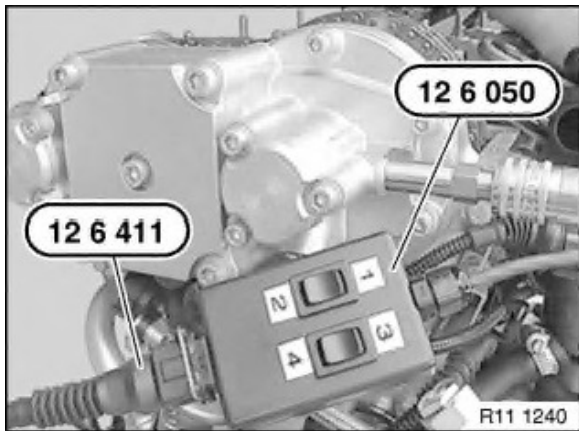
Cylinder bank 1 to 4:

Press and hold down toggle switch button 1 on special tool 12 6 050.

Simultaneously rotate inlet camshaft at hexagon against direction of rotation up to stop.

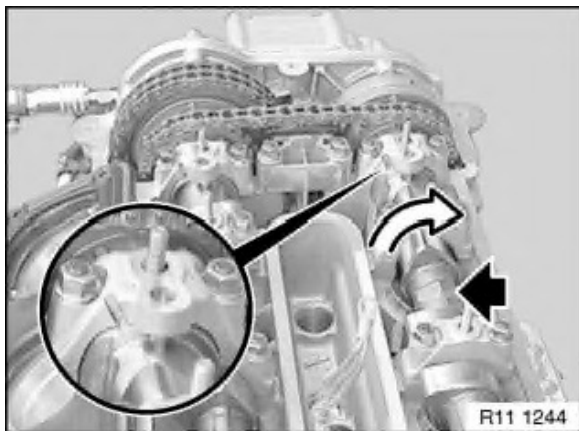
**Note:**

The splines in the VANOS gear are now in contact; the inlet camshaft cannot be rotated further.



Cylinder bank 1 to 4:

Alternately press toggle switch buttons 3 and 4 several times on special tool 12 6 050.



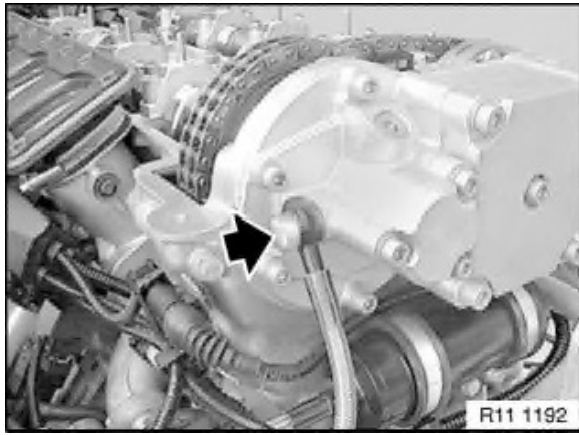
Cylinder bank 1 to 4:

Press and hold down toggle switch button 3 on special tool 12 6 050.

Simultaneously rotate exhaust camshaft at hexagon against direction of rotation up to stop.

**Note:**

The splines in the VANOS gear are now in contact; the exhaust camshaft cannot be rotated further.



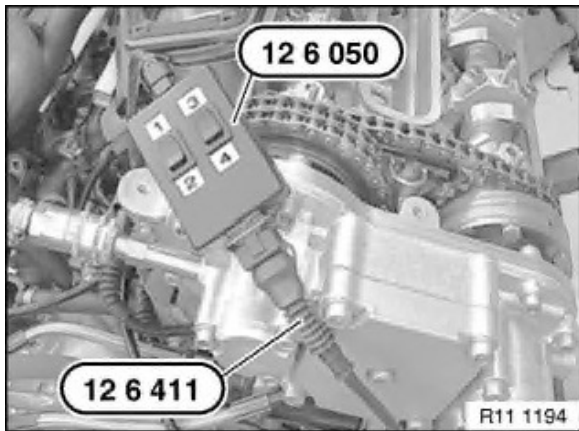
Cylinder bank 5 to 8:  
Remove oil line from VANOS adjustment unit.

**Installation:**

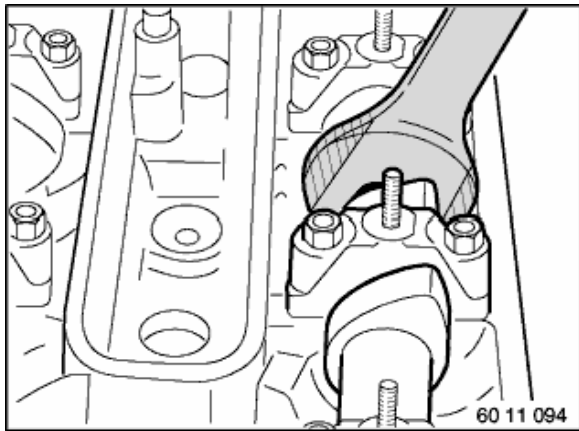
Replace sealing rings.  
Attach oil line to VANOS adjustment unit.  
Tightening Torque,  
refer to Technical Data 11 36 9AZ.



Cylinder bank 5 to 8:  
Fit special tool 11 7 130 to VANOS adjustment unit.  
Connect up compressed air (2 to 8 bar).

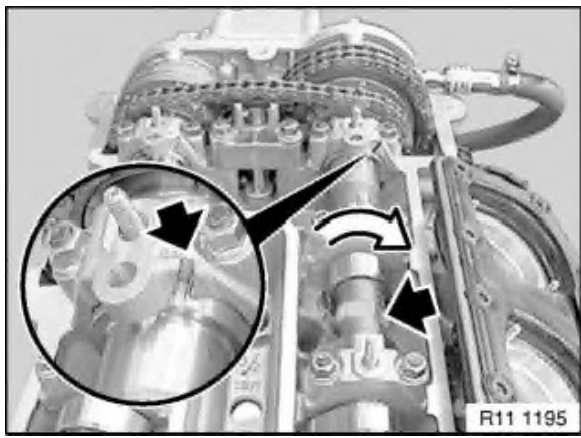


Cylinder bank 5 to 8:  
Disconnect plug connection for solenoid valves on cylinder bank 5 to 8.  
Connect special tool 12 6 050 in conjunction with special tool 12 6 411 (from special tool kit 12 6 410) to solenoid valves on cylinder bank 5 to 8. Connect special tool 12 6 411 to correct terminals on car battery.  
Alternately press toggle switch buttons 4 and 3 several times on special tool 12 6 050.



**Caution!**

Do not damage the cylinder head.  
If necessary, machine open-end wrench accordingly.



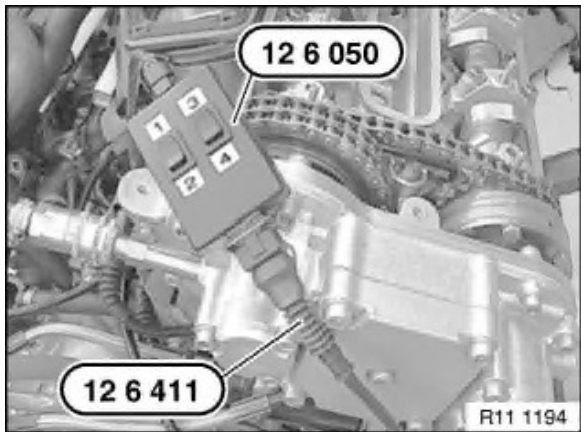
Cylinder bank 5 to 8:

Press and hold down toggle switch button 4 on special tool 12 6 050.

Simultaneously rotate inlet camshaft at hexagon against direction of rotation up to stop.

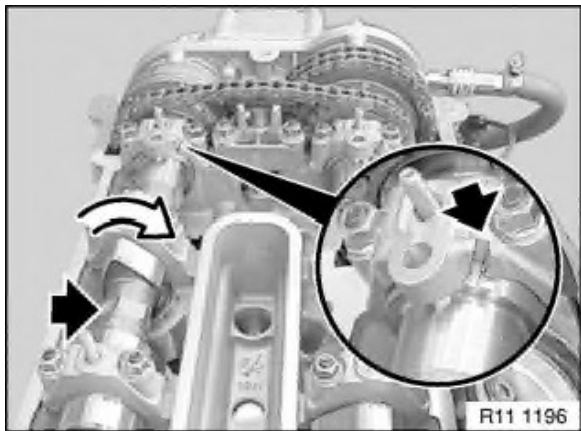
**Note:**

The splines in the VANOS gear are now in contact; the inlet camshaft cannot be rotated further.



Cylinder bank 5 to 8:

Alternately press toggle switch buttons 2 and 1 several times on special tool 12 6 050.



Cylinder bank 5 to 8:

Press and hold down toggle switch button 2 on special tool 12 6 050.

Simultaneously rotate exhaust camshaft at hexagon against direction of rotation up to stop.

**Note:**

The splines in the VANOS gear are now in contact; the exhaust camshaft cannot be rotated further.



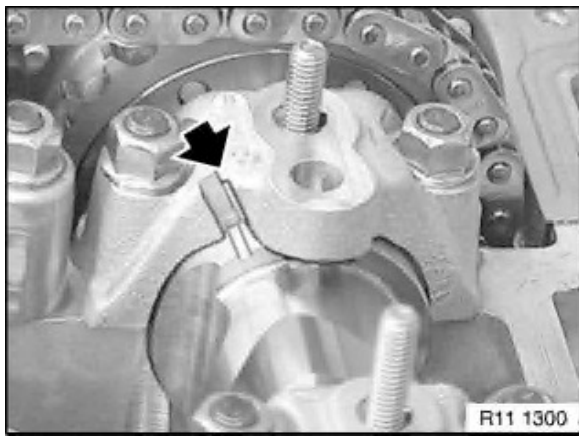
Cylinder bank 5 to 8:

Check camshaft adjustment.

**Note:**

Groove on 1st bearing cap is a little wider than groove in camshaft.

Groove on inlet and exhaust camshafts must be located inside groove on 1st bearing cap.



Cylinder bank 1 to 4:  
Check camshaft adjustment.

**Note:**

Groove on 1st bearing cap is a little wider than groove in camshaft.

Groove on inlet and exhaust camshafts must be located inside groove on 1st bearing cap.

If necessary, adjust camshaft timing,  
refer to 11 31 505.

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.