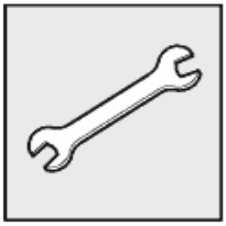
11 36 050 Removing and installing/replacing left VANOS gear (S62)

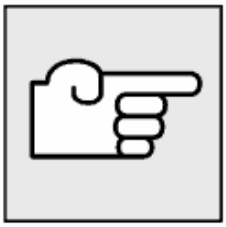


Special tools required:

- 11 2 300
- 11 7 120
- 11 7 130
- 11 7 140
- 11 7 150
- 11 7 200
- 12 6 050
- 12 6 410
- 12 6 411

(cylinder bank 5 to 8)

Read fault memory and make a documentary record.



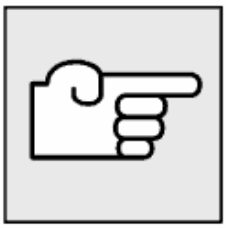
Open drain plug on radiator. Open drain plug for coolant on right side of engine block. Drain and dispose of coolant.

Installation:

Replace sealing ring for drain plug on engine block.

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.

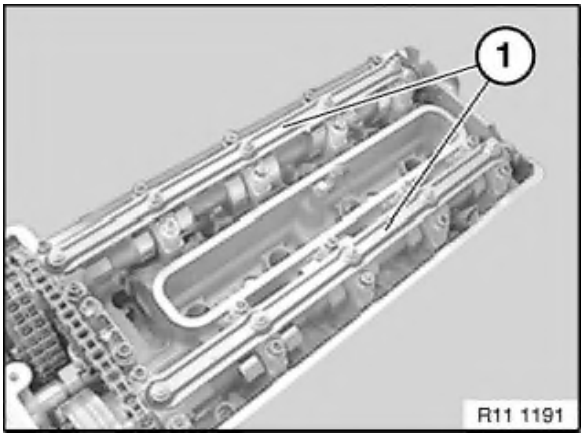
Remove intake air manifold.

Remove both cylinder head covers.

Remove all spark plugs.

Remove water hose between radiator and thermostat housing.

Remove fan clutch with fan impeller and fan cowl.



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.

Removal:

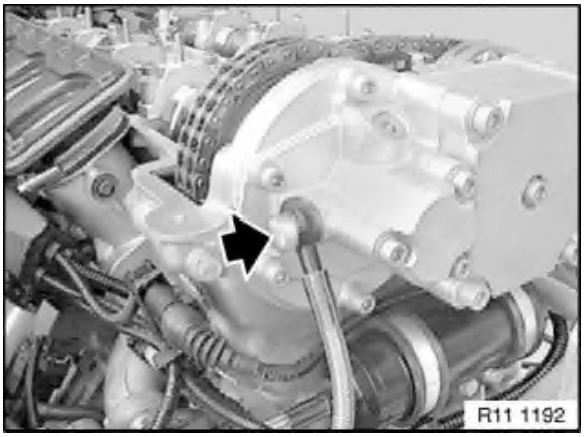
Removal of the VANOS adjustment unit and the VANOS gear is described separately from installation. The assembly sequence for removal and installation is different.

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

Caution!

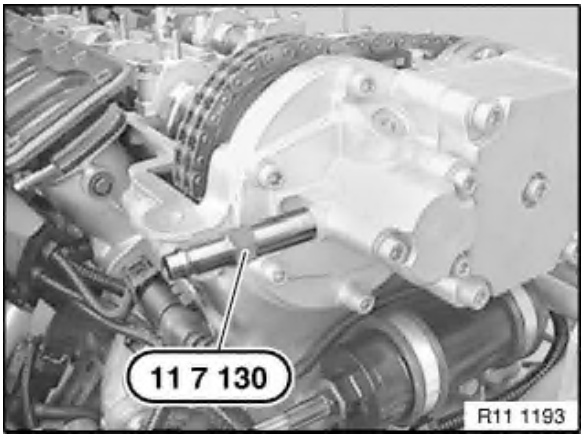
Before the VANOS adjustment unit is removed, the camshafts on cylinder bank 5 to 8 must be rotated back to their initial position.

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



Cylinder bank 5 to 8:

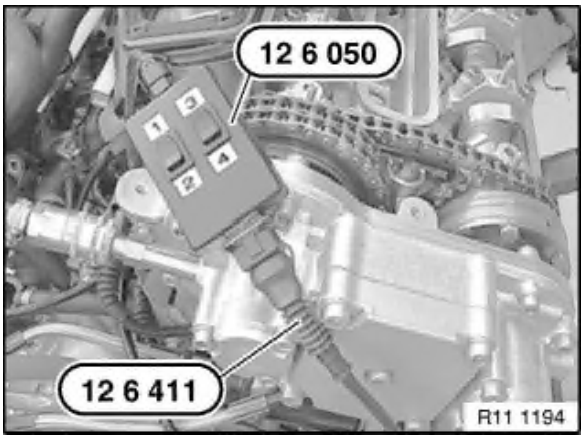
Remove oil line from VANOS adjustment unit.



Cylinder bank 5 to 8:

Fit special tool 11 7 130 to VANOS adjustment unit.

Connect compressed air (2 to 8 bar).

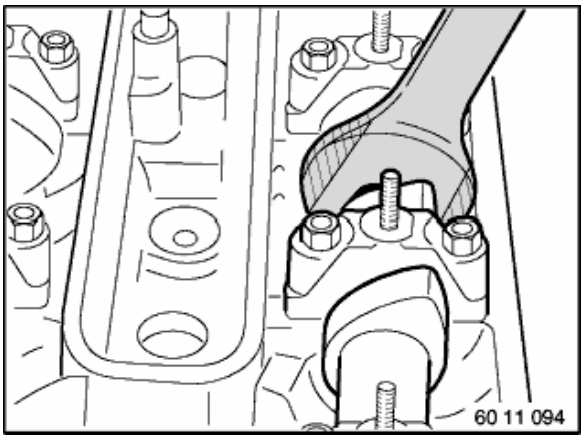


Cylinder bank 5 to 8:

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.

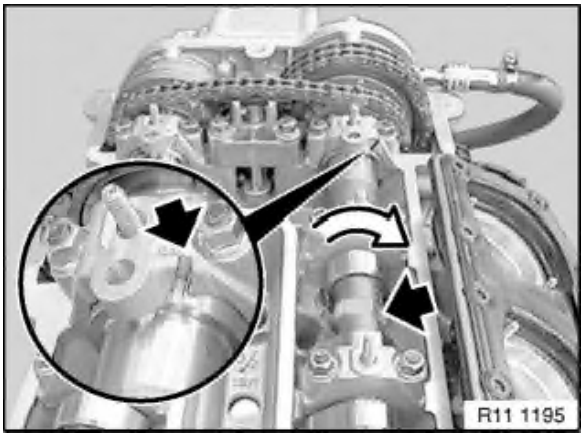
Alternately press toggle switch buttons 4 and 3 several times on special tool 12 6 050 .



Caution!

Do not damage the cylinder head.

If necessary, machine open-end wrench accordingly.



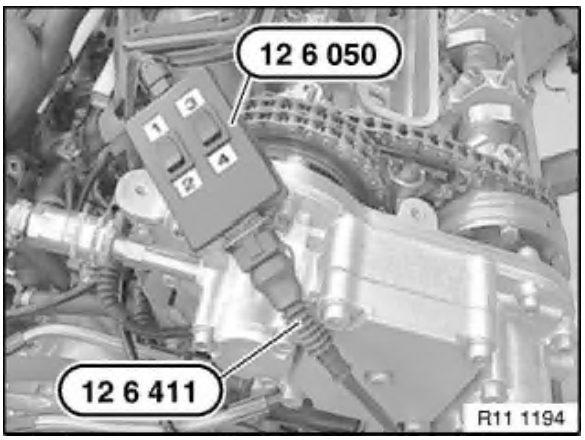
Cylinder bank 5 to 8:

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

At same time, rotate inlet camshaft at hexagon drive against direction of rotation as far as it will go.

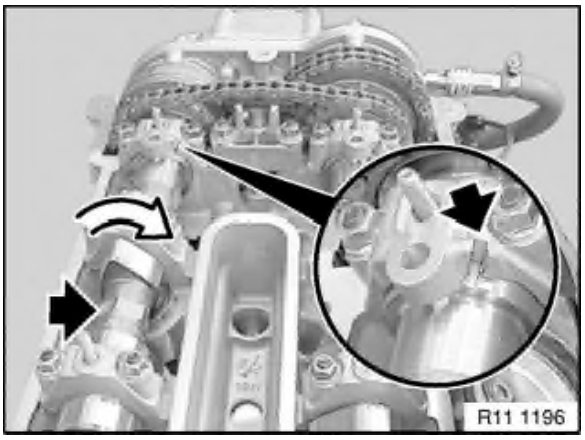
Note:

Spline teeth in VANOS gear are engaged; and 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 .



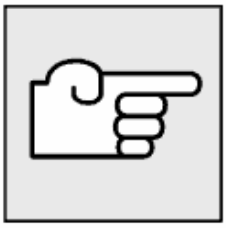
Cylinder bank 5 to 8:

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

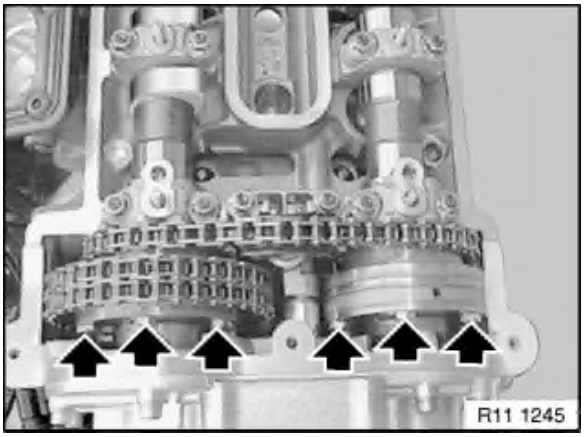
At same time, rotate exhaust camshaft at hexagon drive against direction of rotation as far as it will go.

Note:

Spline teeth in VANOS gear are engaged; and exhaust camshaft cannot be rotated further.



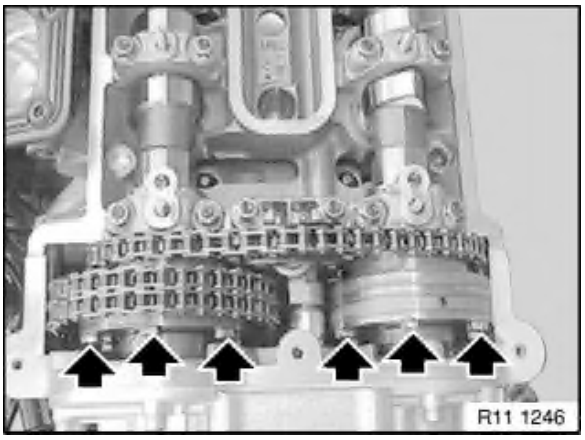
Remove special tool 11 2 300 . Rotate crankshaft in direction of rotation a further revolution up to overlap TDC position.



Cylinder bank 5 to 8:

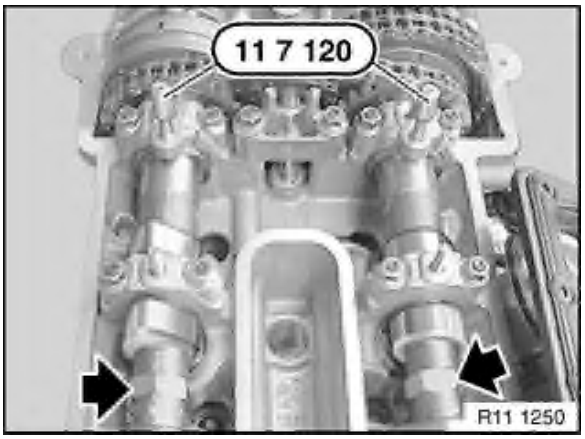
Slacken six accessible bolts two turns.

Crank engine at central bolt in direction of rotation until 1st cylinder is at TDC firing position. Secure vibration damper in position with special tool 11 2 300 .



Cylinder bank 5 to 8:

Slacken remaining six bolts two turns.

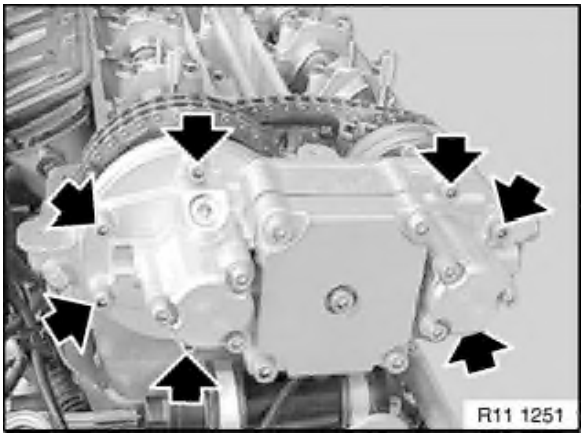


Cylinder bank 5 to 8:

Note:

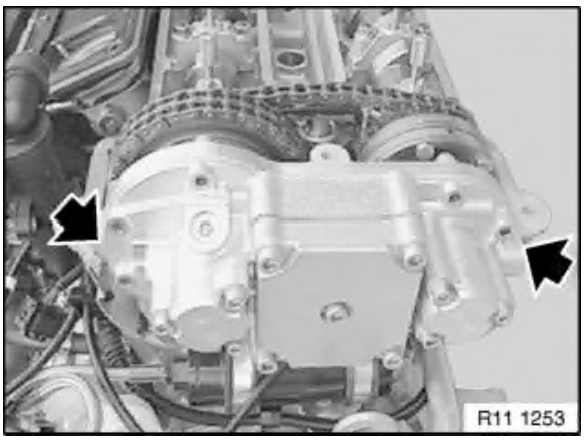
The camshafts have an opening. The 1st bearing caps have a locating bore.

Align camshaft opening to locating bore in bearing cap and secure in position with special tool 11 7 120 .



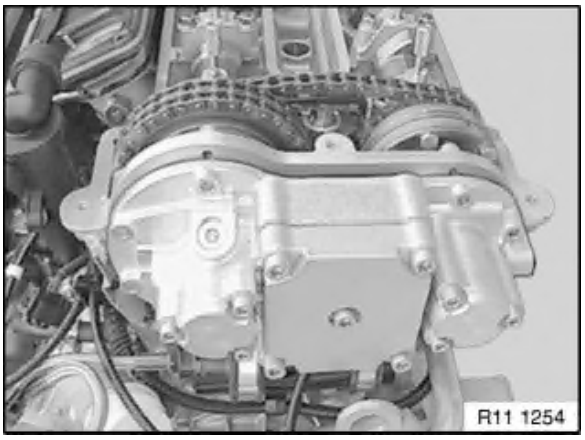
Cylinder bank 5 to 8:

Release screws on VANOS adjustment unit.



Cylinder bank 5 to 8:

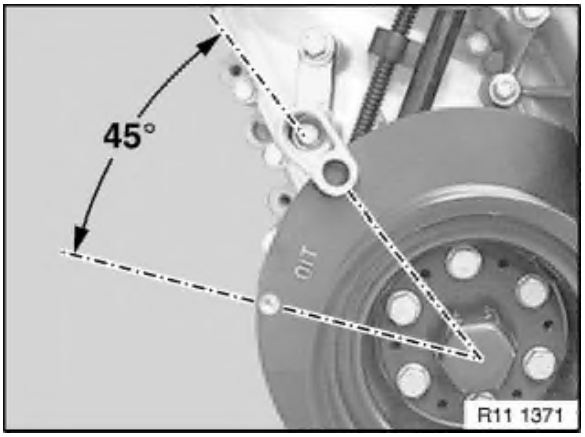
Carefully lever out VANOS adjustment unit at "intended" openings with a screwdriver on left and right.



Cylinder bank 5 to 8:

Pull off VANOS adjustment unit.

Remove special tool 11 2 300 .



Caution!

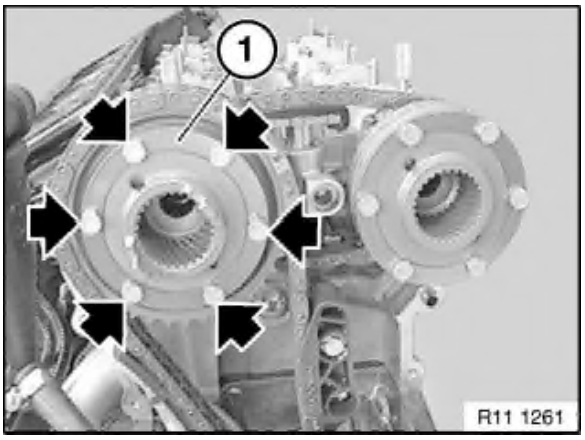
When removing the VANOS gear, ensure that no piston is in the TDC position.

When the VANOS adjustment unit is removed, the chain wheels of the inlet and exhaust camshafts are not non-positively connected to the camshafts. Camshafts on cylinder bank 5 to 8 do not rotate.

Crank engine at central bolt against direction of rotation to 45° before TDC position.

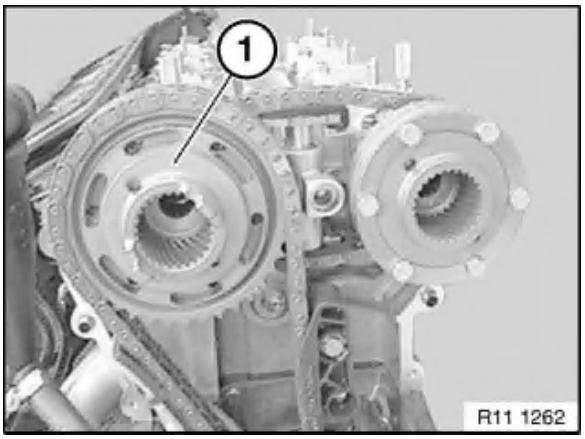
Remove left timing case cover (cylinder bank 5 to 8) .

Remove chain tensioning piston.



Cylinder bank 5 to 8 (inlet side):

Remove slackened bolts. Take off spacer ring (1).



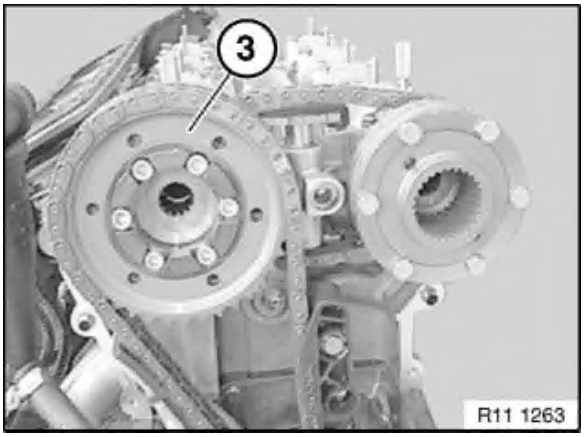
Cylinder bank 5 to 8 (inlet side):

Note:

The spline hub (1) accommodates a plate spring and a supporting ring.

Take care: the supporting ring can easily fall out when removed.

Remove spline hub (1) with plate spring and supporting ring.



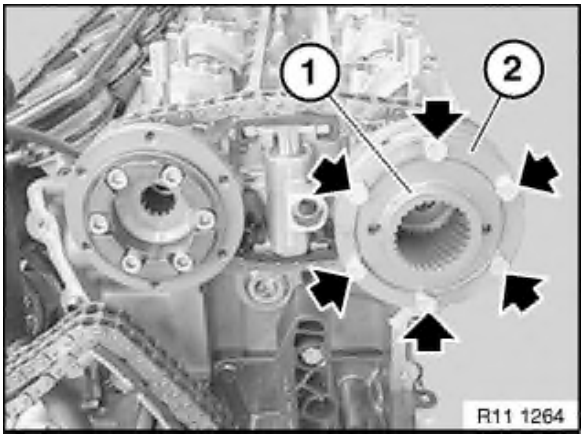
Cylinder bank 5 to 8 (inlet side):

Detach inlet chain wheel (3) from centering sleeve.

Keep inlet chain wheel (3) and chain tensioned.

Feed out inlet chain wheel (3).

Secure chain against slipping down.



Cylinder bank 5 to 8 (exhaust side):

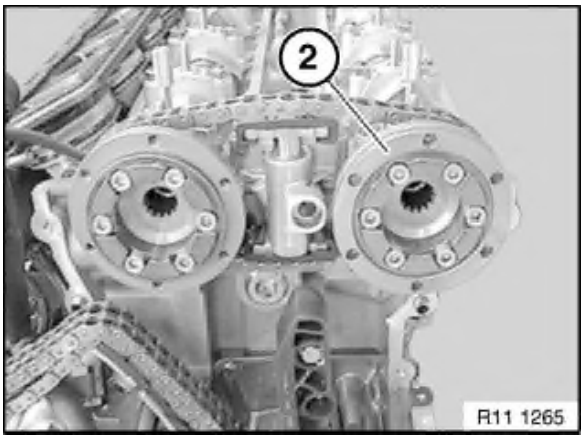
Note:

The spline hub (1) accommodates a plate spring and a supporting ring.

Take care: the supporting ring can easily fall out when removed.

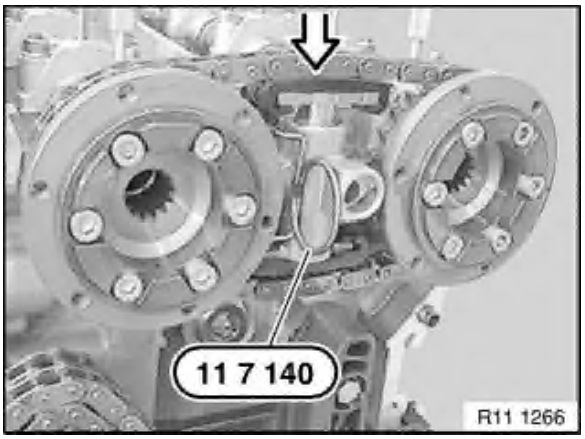
Remove slackened screws on exhaust side.

Remove spacer ring (2) and spline hub (1) with plate spring and supporting ring.



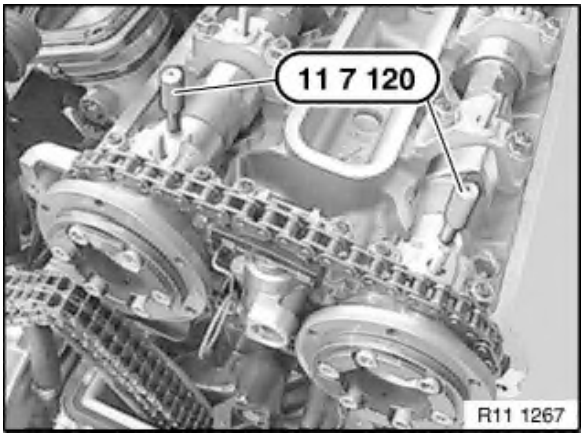
Cylinder bank 5 to 8 (exhaust side):

Take off spacer ring (2).



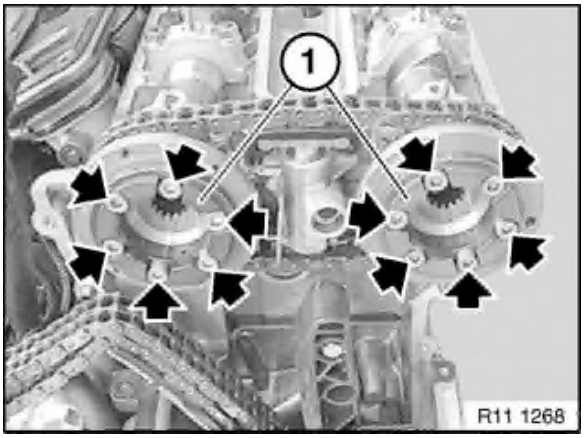
Cylinder bank 5 to 8:

Compress secondary chain tensioner at top and lock with special tool 11 7 140 .



Cylinder bank 5 to 8:

Remove special tool 11 7 120 .

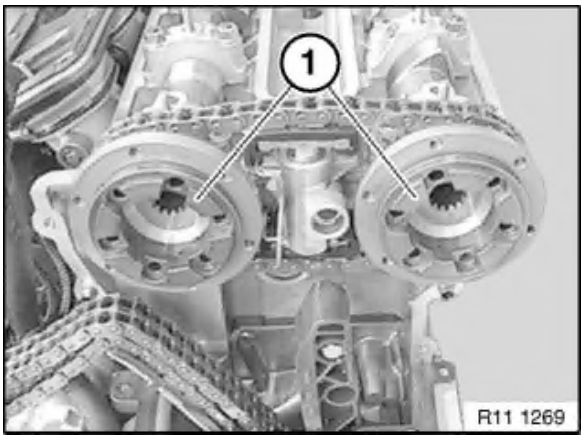


Cylinder bank 5 to 8:

Note:

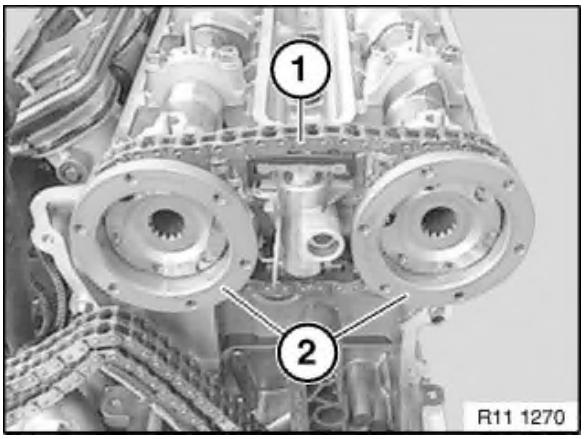
Grip camshafts at hexagon head.

Release bolts on centering sleeves (1).



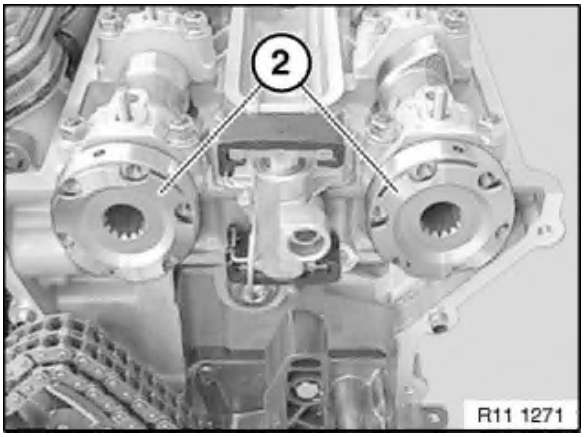
Cylinder bank 5 to 8:

Remove centering sleeves (1) on exhaust and inlet sides.



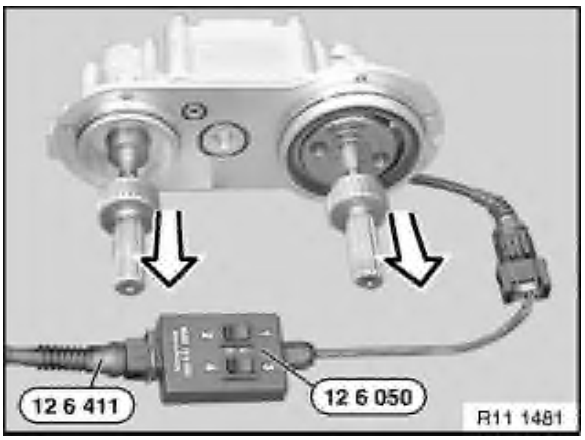
Cylinder bank 5 to 8:

Remove secondary chain drive with chain (1) and sprocket wheels (2).



Cylinder bank 5 to 8:

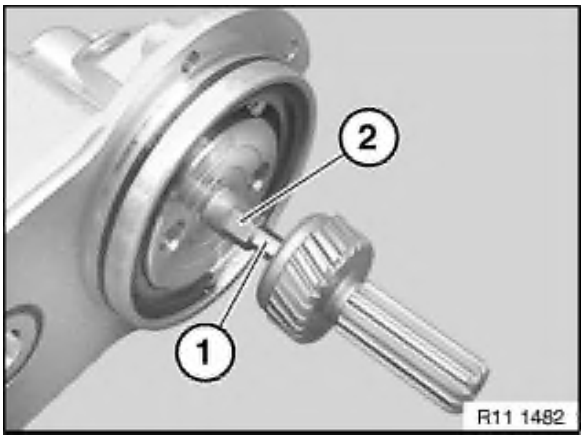
Withdraw toothed sleeves (2) from exhaust and inlet camshafts.



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 button 1 on special tool 12 6 050 and at same time pull out exhaust-side splined shaft by hand as far as it will go.

Press button 3 on special tool 12 6 050 and at same time pull out inlet-side splined shaft by hand as far as it will go.

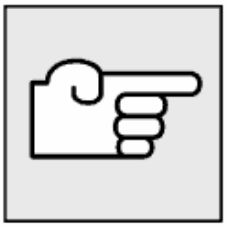


Caution!

CCW thread!

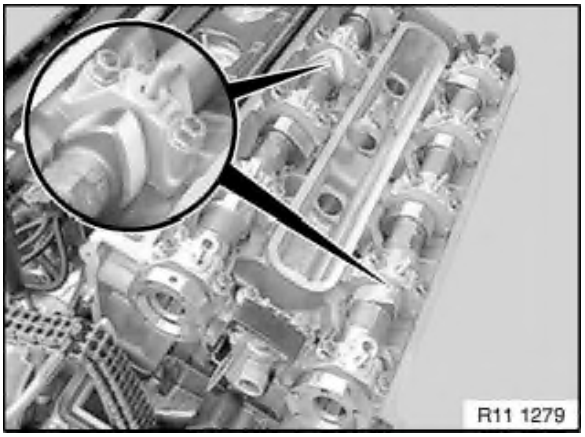
Brace against twin surface (1) and release hex head (2).

Release screw connection of splined shaft on inlet and exhaust sides.



Installation:

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

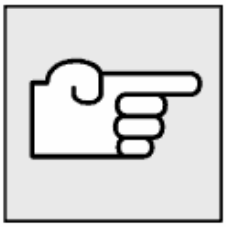


Cylinder bank 5 to 8:

Checking position of exhaust and inlet camshafts:

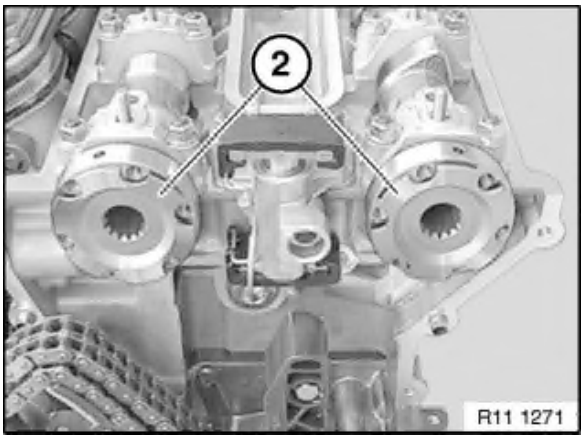
If necessary, rotate exhaust camshaft at hexagon head until exhaust cam on cylinder 5 is facing upwards.

If necessary, rotate inlet camshaft at hexagon head until inlet cam on cylinder 7 is facing upwards.



Note:

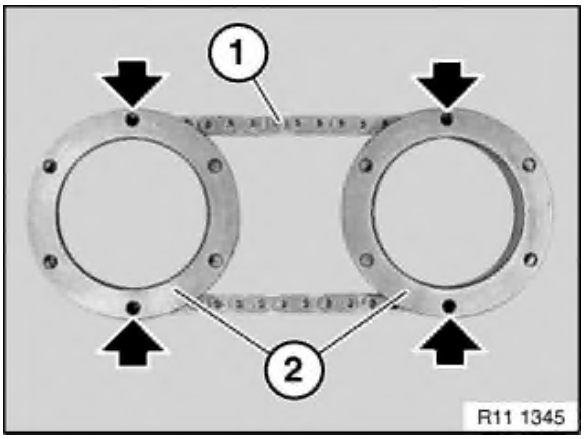
Coat all sliding surfaces on VANOS gear with engine oil as antiseize agent.



Cylinder bank 5 to 8:

Install toothed sleeves (2) in exhaust and inlet camshafts.

Align openings in toothed sleeves (2) to tapped holes in camshafts.

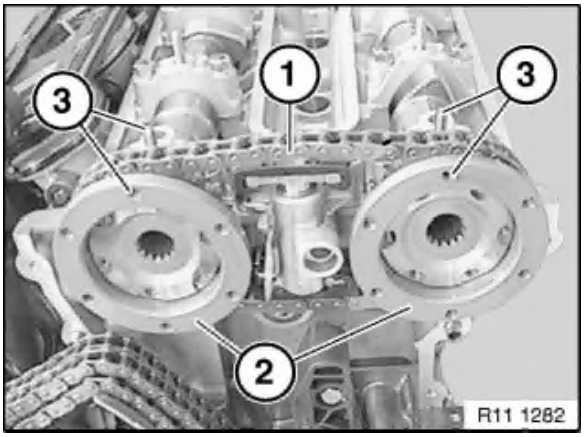


Cylinder bank 5 to 8:

Note:

The position of the tapped hole on the sprocket wheels is important for bolt accessibility. It has not influence on the function.

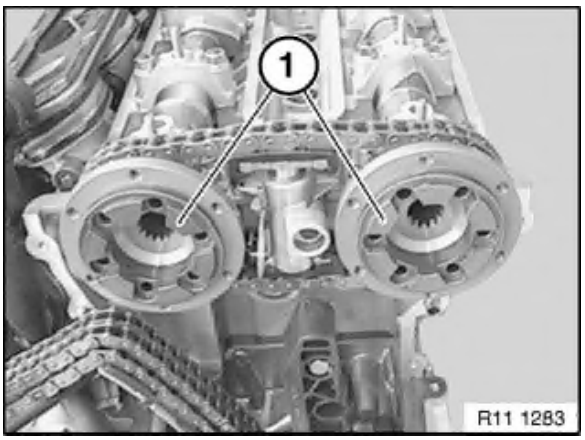
Place chain (1) on sprocket wheels (2) so that tapped holes on sprocket wheels are situated vertically.



Cylinder bank 5 to 8:

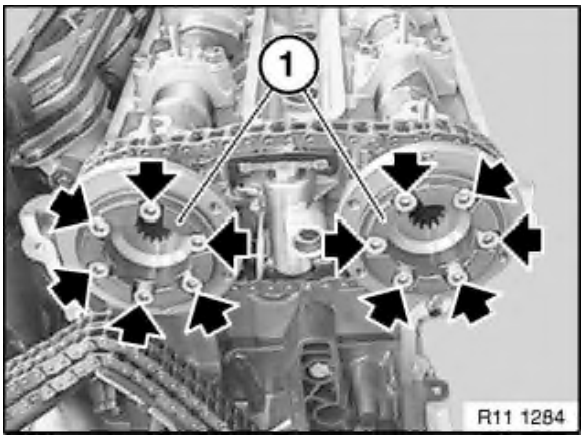
Place chain (1) and sprocket wheels (2) on camshafts.

Align chain (1) and sprocket wheels (2) so that stud (3) on bearing cap is flush with a tapped hole (3) on sprocket wheel.



Cylinder bank 5 to 8:

Push on centering sleeves (1) for exhaust and inlet sides, align bore holes to tapped holes in camshafts.



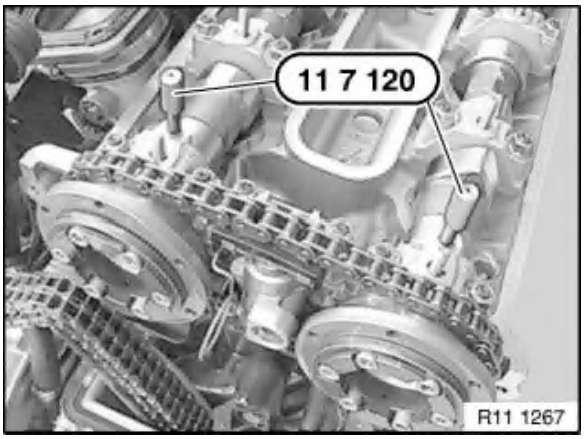
Cylinder bank 5 to 8:

Insert bolts for centering sleeves (1).

Note:

Grip camshafts at hexagon head.

Tighten down bolts on centering sleeves (1).



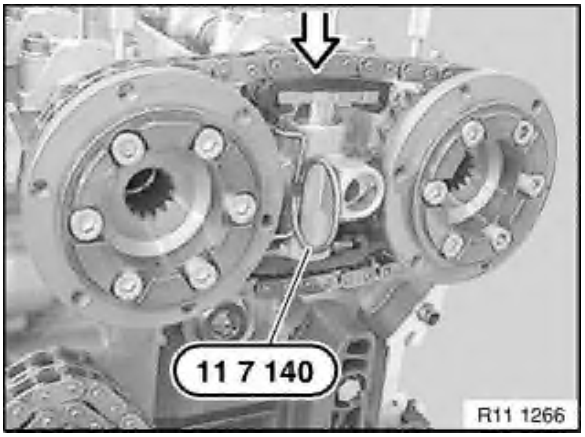
Cylinder bank 5 to 8:

Note:

The camshafts have an opening. The 1st bearing caps have a locating bore.

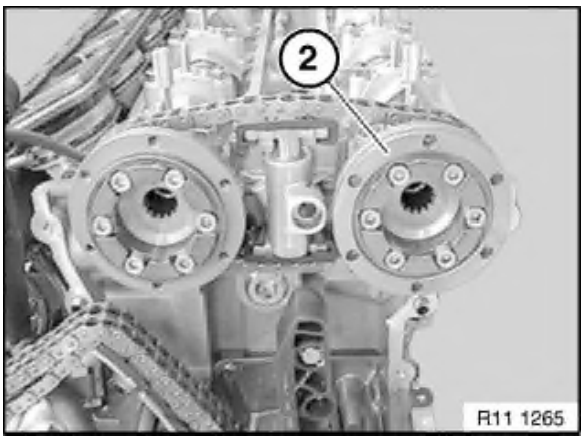
Align camshafts so that camshaft openings line up with locating bore in bearing cap.

Secure camshafts with special tool 11 7 120 .



Cylinder bank 5 to 8:

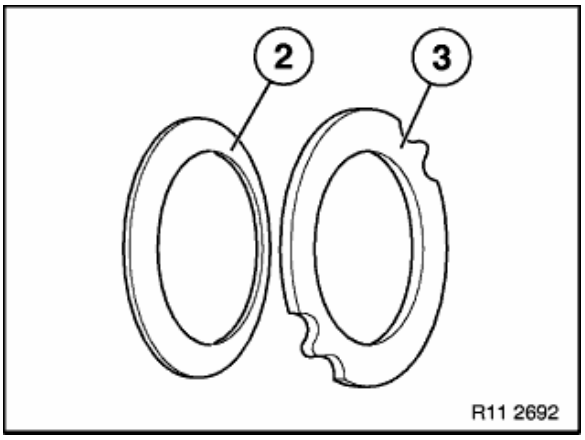
Compress secondary chain tensioner at top and remove special tool 11 7 140 .



Cylinder bank 5 to 8 (exhaust side):

Fit spacer ring (2).

Align bores in spacer ring (2) to threads in sprocket wheel.



Cylinder bank 5 to 8 (exhaust side):

Version up to 9/2001

Caution!

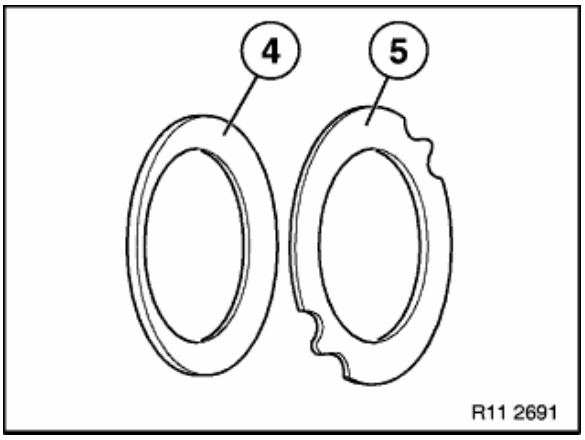
Risk of mixing up parts.

Note:

Plate spring (2) and supporting ring (3) form a set and may only be fitted together.

Thickness of plate spring (2) = 0.85 mm.

Thickness of supporting ring (3) = 3.55 mm.



Cylinder bank 5 to 8 (exhaust side):

Version from 9/2001

Caution!

Risk of mixing up parts.

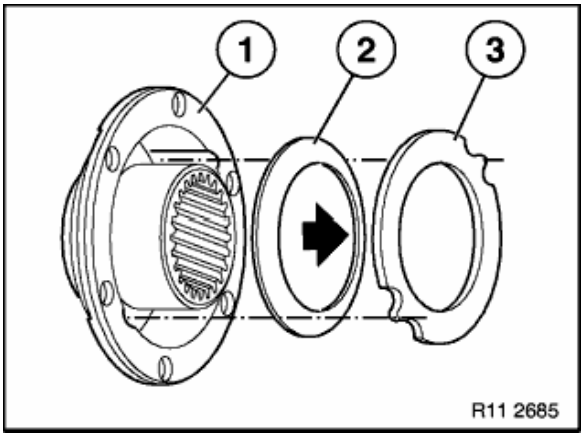
Note:

Plate spring (4) and supporting ring (5) form a set and may only be fitted together.

Thickness of plate spring (4) = 1.25 mm.

Thickness of supporting ring (5) = 3.20 mm.

Plate spring (4) and supporting ring (5) may also be fitted in engine before 9/2001.



Cylinder bank 5 to 8 (exhaust side):

Version up to 9/2001

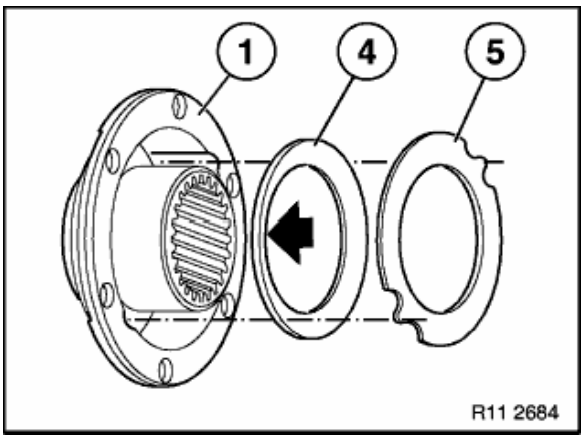
Caution!

Observe installation direction of plate spring (2).

Note:

The small support diameter of the plate spring (2) points in the direction of the supporting ring (3). Supporting ring is supported with retaining lugs in spline hub (1).

Insert plate spring (2) and supporting ring (3) in spline hub (1).



Cylinder bank 5 to 8 (exhaust side):

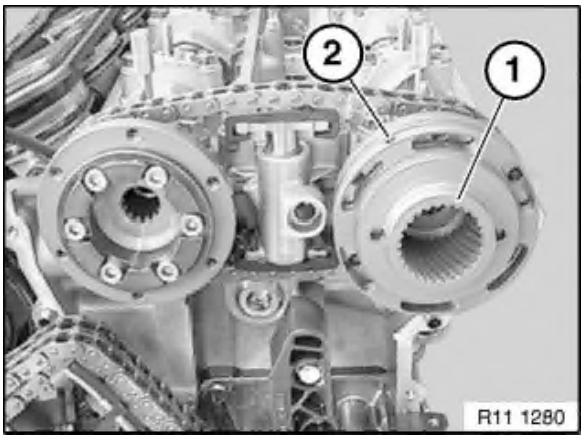
Version from 9/2001

Caution!

Observe installation direction of plate spring (4).

The small support diameter of the plate spring (4) points in the direction of the spline hub (1). Supporting ring is supported with retaining lugs in spline hub (1).

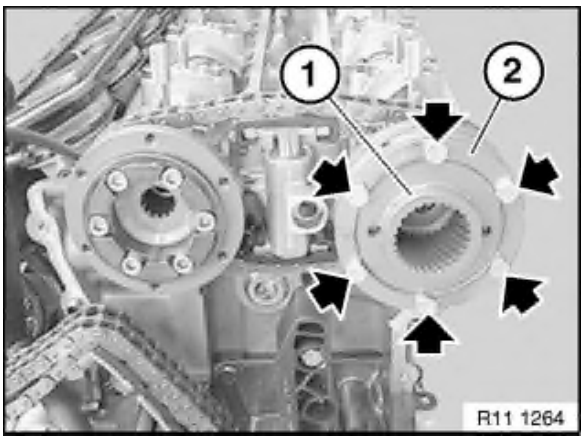
Insert plate spring (4) and supporting ring (5) in spline hub (1).



Cylinder bank 5 to 8 (exhaust side):

Note:

Fit spline hub (1) with plate spring and supporting ring so that bore hole (2) is positioned as shown in illustration.

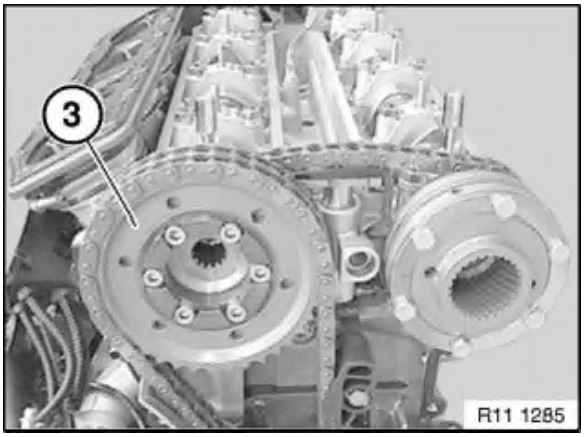


Cylinder bank 5 to 8 (exhaust side):

Fit spacer ring (2).

Insert all bolts and initially tighten without play.

Then slacken bolts again until spline hub (1) can be moved with fingers.



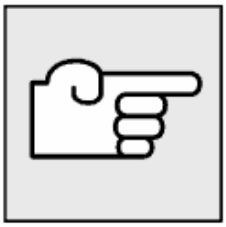
Cylinder bank 5 to 8 (inlet side):

Keep timing chain tensioned and feed on inlet chain wheel (3).

Note:

The position of the bores in the inlet chain wheel (3) can be freely selected; they do not have to line up with the threads yet.

Position inlet chain wheel (3) on centering sleeve. Do not insert "any" screws into inlet chain wheel (3) yet.



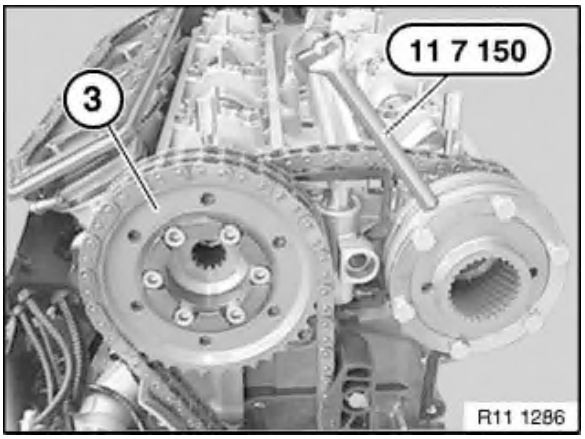
Note:

If a chain tensioning piston is reused, the oil chamber in the chain tensioner must be drained.

Install chain tensioning piston.

"No" screws are inserted in inlet sprocket wheel yet. Inlet sprocket wheel must not slip off centering sleeve.

Rotate crankshaft from 45° before TDC position in direction of rotation up to TDC firing position. Secure vibration damper in position with special tool 11 2 300 .



Cylinder bank 5 to 8 (inlet side):

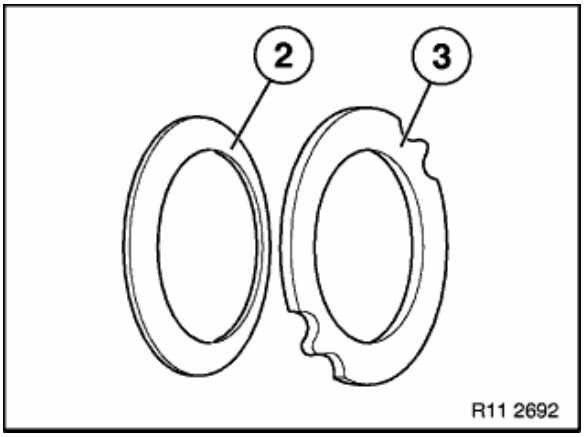
Check position of inlet chain wheel (3) to threads.

In event of large deviation (thread not visible):

Detach inlet sprocket wheel (3) from centering sleeve; in so doing, keep timing chain tensioned, realign inlet sprocket wheel (3) and refit.

In event of small deviation:

Position special tool 11 7 150 at toothed sleeve on exhaust side. Align secondary chain drive to bores of inlet chain wheel (3).



Cylinder bank 5 to 8 (inlet side):

Version up to 9/2001

Caution!

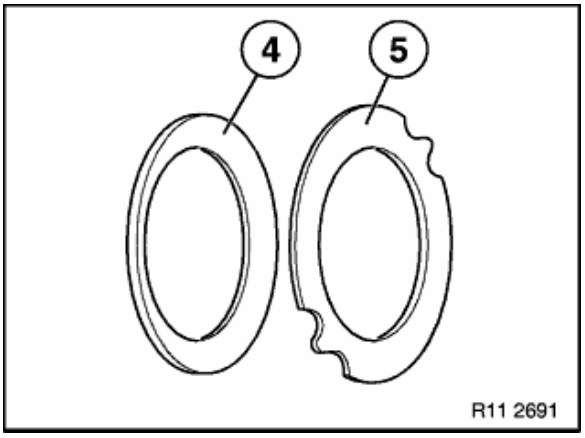
Risk of mixing up parts.

Note:

Plate spring (2) and supporting ring (3) form a set and may only be fitted together.

Thickness of plate spring (2) = 0.85 mm.

Thickness of supporting ring (3) = 3.55 mm.



Cylinder bank 5 to 8 (inlet side):

Version from 9/2001

Caution!

Risk of mixing up parts.

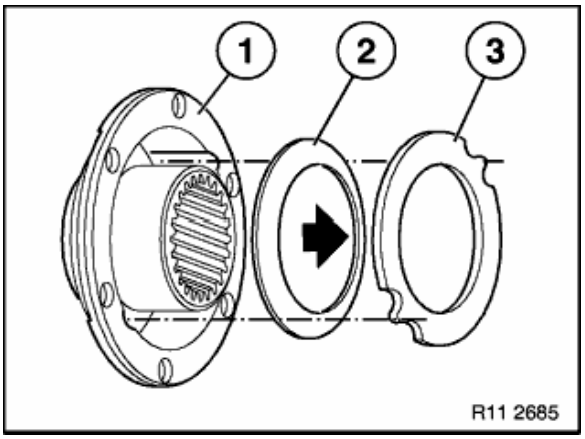
Note:

Plate spring (4) and supporting ring (5) form a set and may only be fitted together.

Thickness of plate spring (4) = 1.25 mm.

Thickness of supporting ring (5) = 3.20 mm.

Plate spring (4) and supporting ring (5) may also be fitted in engine before 9/2001.



Cylinder bank 5 to 8 (inlet side):

Version up to 9/2001

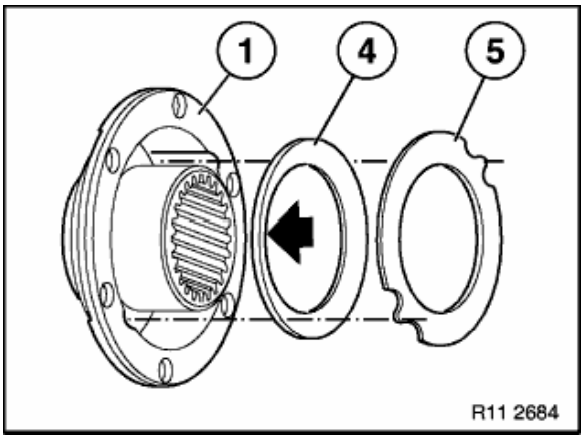
Caution!

Observe installation direction of plate spring (2).

Note:

The small support diameter of the plate spring (2) points in the direction of the supporting ring (3). Supporting ring is supported with retaining lugs in spline hub (1).

Insert plate spring (2) and supporting ring (3) in spline hub (1).



Cylinder bank 5 to 8 (inlet side):

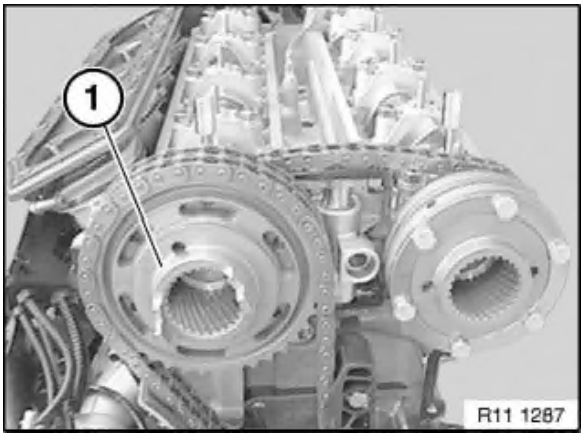
Version from 9/2001

Caution!

Observe installation direction of plate spring (4).

The small support diameter of the plate spring (4) points in the direction of the spline hub (1). Supporting ring is supported with retaining lugs in spline hub (1).

Insert plate spring (4) and supporting ring (5) in spline hub (1).

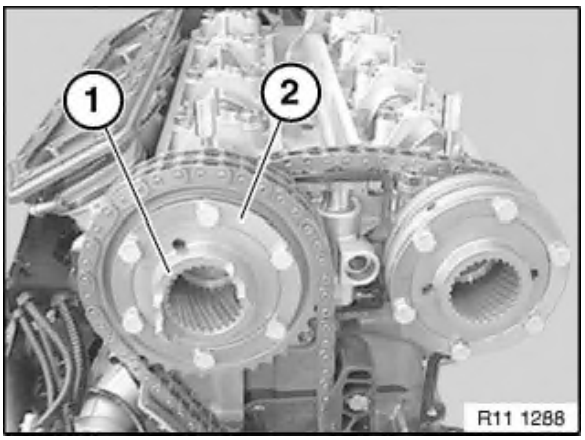


Cylinder bank 5 to 8 (inlet side):

Install spline hub (1) with plate spring and supporting ring.

Note:

Align spline hub (1) so that oil pump is positioned as shown in picture.

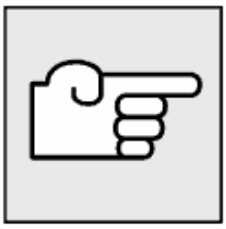


Cylinder bank 5 to 8 (inlet side):

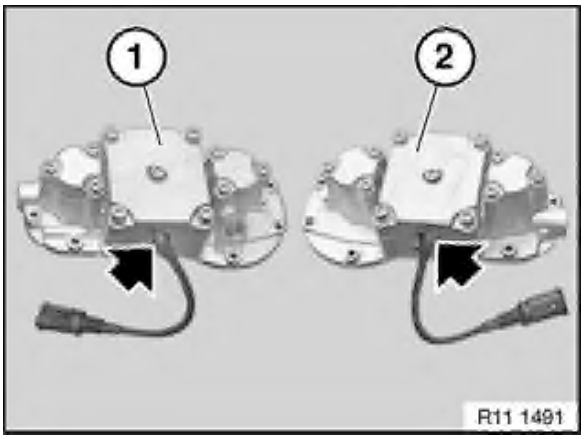
Fit spacer ring (2).

Insert all bolts and initially tighten without play.

Then slacken bolts again until spline hub (1) can be moved with fingers.



Install left timing case cover.



Caution!

Risk of mixing up parts.

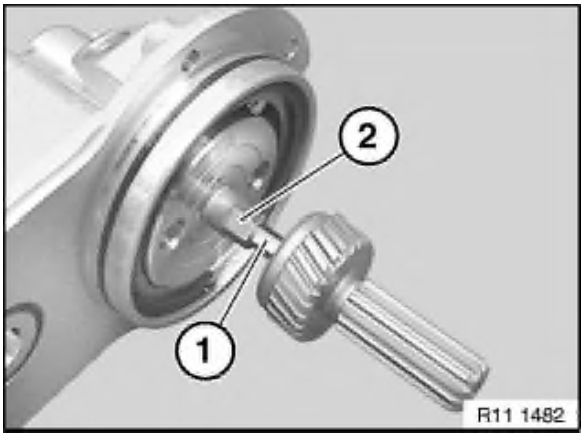
The VANOS adjustment units of cylinder banks 1 to 4 and 5 to 8 are different.

1) Cylinder bank 1 to 4

2) Cylinder bank 5 to 8

Note:

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



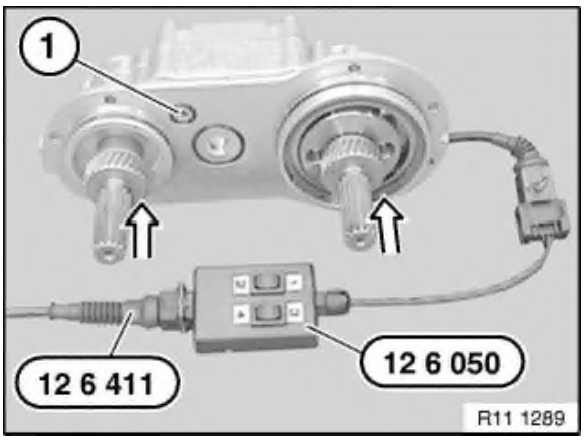
Caution!

CCW thread!

Install inlet- and exhaust-side splined shafts.

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

Tightening torque 10 Nm.

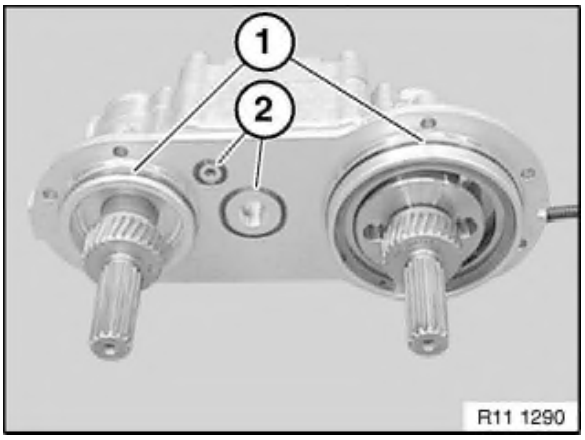


Oil is sprayed when splined shafts are pressed back. Cover bore (1) with a cloth.

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 button 2 on special tool 12 6 050 and at same time press back exhaust-side splined shaft by hand as far as it will go.

Press button 4 on special tool 12 6 050 and at same time press back inlet-side splined shaft by hand as far as it will go.

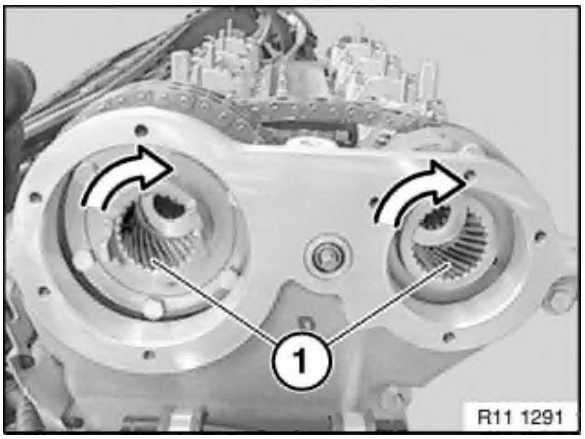


Replace O-rings (1 and 2) on VANOS adjustment unit.

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

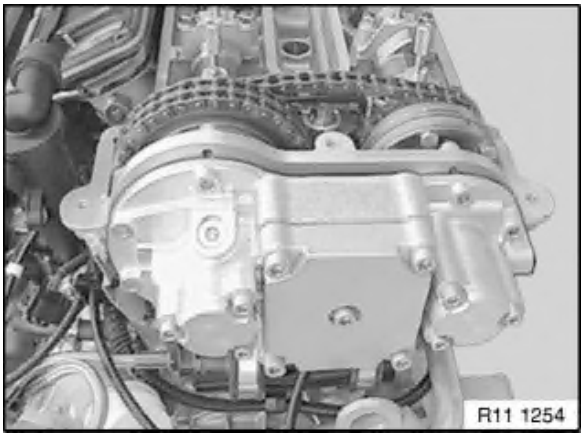
Caution!

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



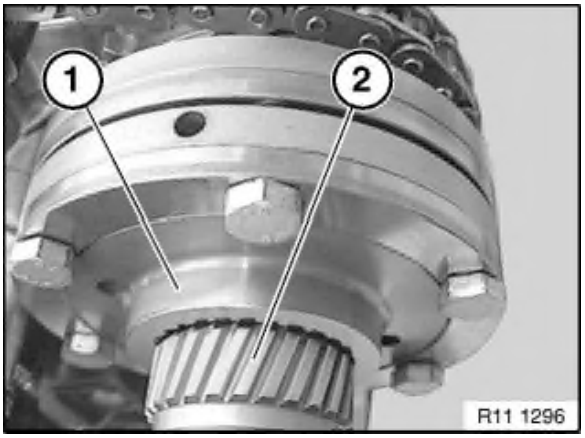
Cylinder bank 5 to 8:

Turn spline hubs (1) of inlet and exhaust camshafts to right limit position.



Cylinder bank 5 to 8:

Attach VANOS adjustment unit.



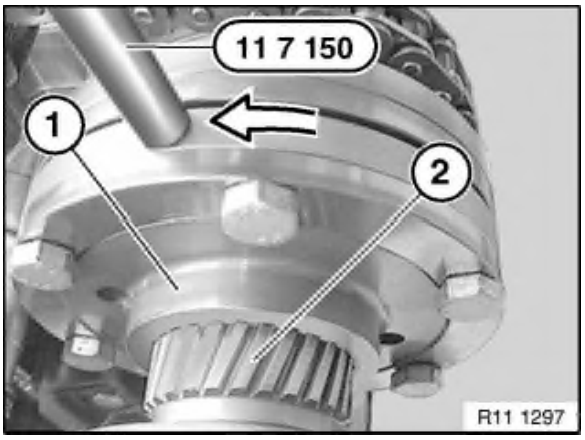
Cylinder bank 5 to 8:

Caution!

Make sure both VANOS splined shafts remain in initial position during installation.

Rotate splined shafts of inlet and exhaust sides until spur toothing is engaged.

Push VANOS adjustment unit with splined shaft into VANOS gear until helical cut splines (2) are positioned shortly before meshing with spline hub (1).



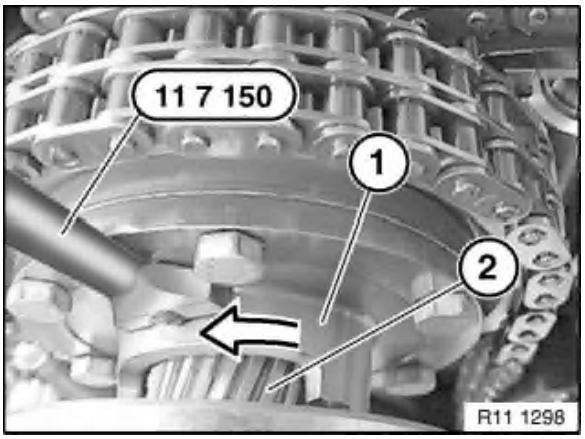
Cylinder bank 5 to 8 (exhaust side):

If the helical cut splines cannot be pushed into the spline hub (1):

Place special tool 11 7 150 on bore in spline hub (1). Rotate spline hub (1) against direction of rotation until splined shaft (2) is positioned with spline hub (1) exactly "tooth-to-tooth gap".

Caution!

The "first" matching tooth must engage.

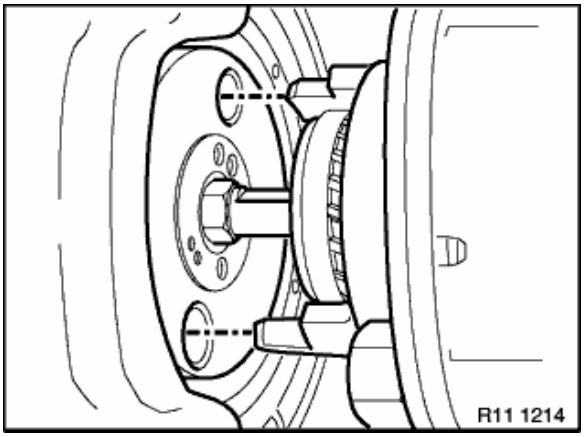


Cylinder bank 5 to 8 (inlet side):

Place special tool 11 7 150 on bore in spline hub (1). Rotate spline hub (1) against direction of rotation until splined shaft (2) is positioned with spline hub (1) exactly "tooth-to-tooth gap".

Caution!

The "first" matching tooth must engage.

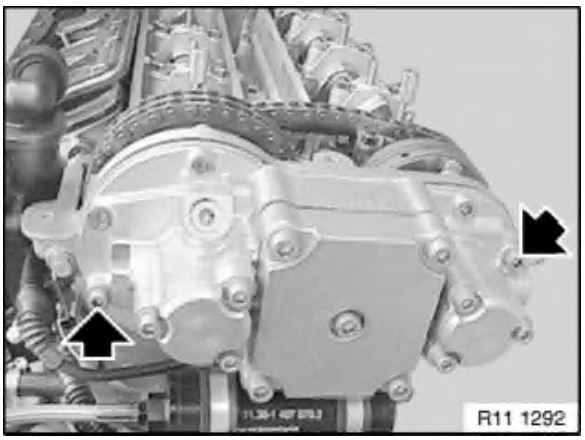


Cylinder bank 5 to 8 (inlet side):

Align radial piston pump to driver on spline hub.

Note:

Picture shows a schematic representation.

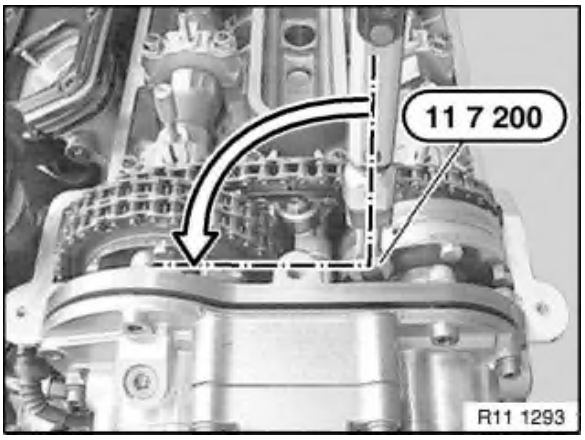


Push on VANOS adjustment unit only until O-rings of VANOS adjustment unit rest against timing case cover.

Caution!

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

Insert one bolt each on left and right and initially tighten without play. The bolts serve to locate the VANOS adjustment unit in position. Do "not" tighten down screws yet. VANOS adjustment unit must "not" rest against timing case cover.



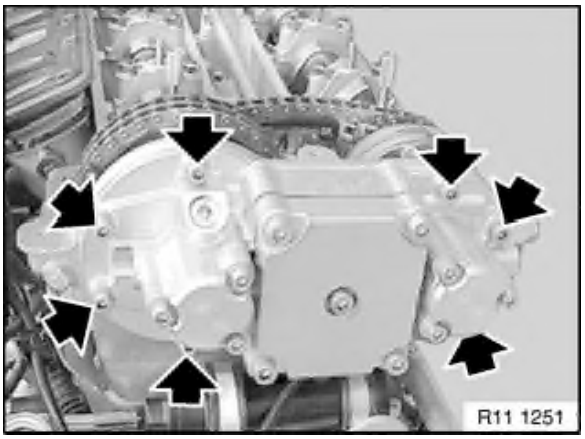
Cylinder bank 5 to 8:

Note:

To tighten down screws on VANOS gear: Use special tool 11 7 200 .

Tighten down six accessible screws (three on exhaust side and three on inlet side) on VANOS gear to 10 Nm.

Then slacken all six screws again by a 1/4 turn.



Cylinder bank 5 to 8:

Install all bolts. Alternately tighten down bolts in 1/2 turn increments carefully and evenly until VANOS adjustment unit rests against timing case cover.

Tighten down all bolts.

Remove special tool 11 2 300 .

Caution!

The camshafts remain locked in position with special tool 11 7 120 .

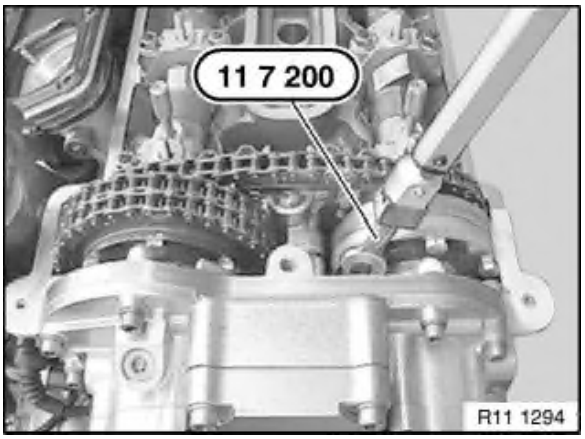
Carefully rotate engine at central screw against direction of rotation until there is noticeable resistance and spline hubs are at the stop.

Note:

This procedure creates compensation for play. Only with this compensation for play is the timing diagram correctly set.

Then crank engine again in direction of rotation until 1st cylinder is at TDC firing position.

Secure vibration damper in position with special tool 11 2 300 .

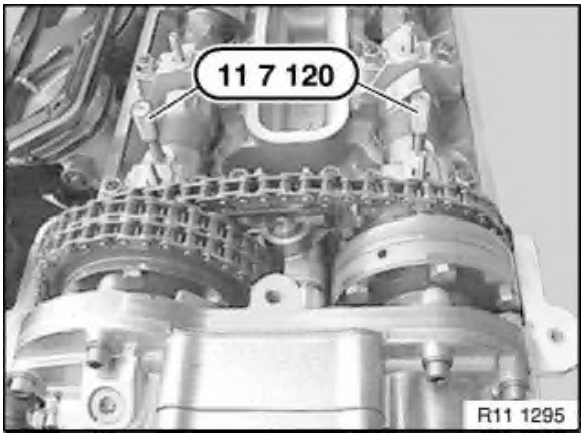


Cylinder bank 5 to 8:

Note:

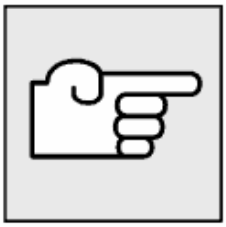
To tighten down screws on VANOS gear: Use special tool 11 7 200 .

Tighten down six accessible screws (three on exhaust side and three on inlet side) on VANOS gear to 10 Nm.

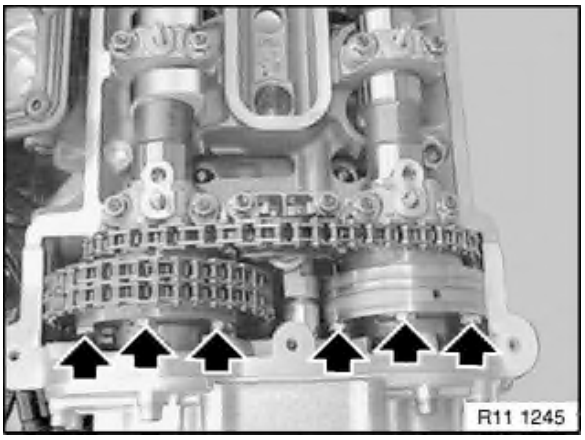


Cylinder bank 5 to 8:

Remove special tool 11 7 120 .



Remove special tool 11 2 300 . Crank engine at central bolt in direction of rotation a further revolution up to overlap TDC position.



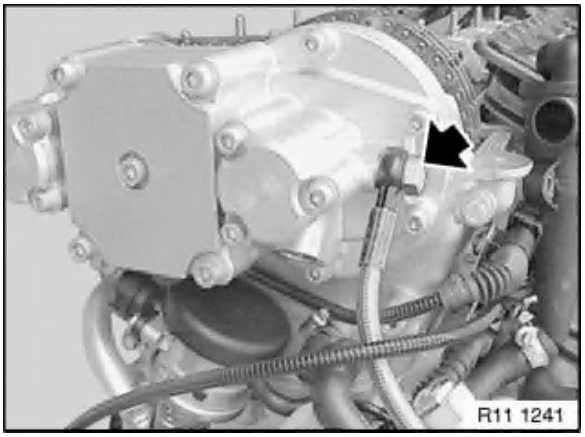
Cylinder bank 5 to 8:

Note:

To tighten down screws on VANOS gear: Use special tool 11 7 200 .

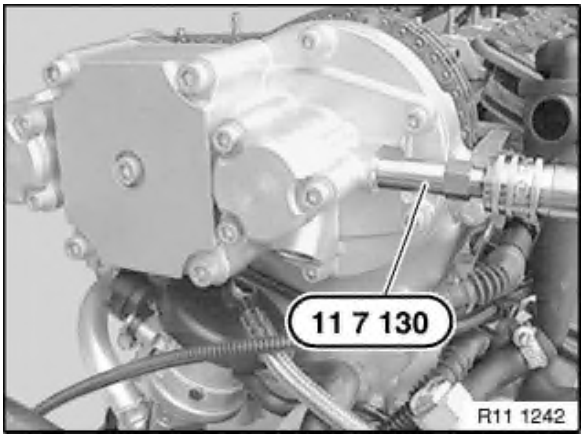
Tighten down remaining six bolts on VANOS gear to 10 Nm.

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



Cylinder bank 1 to 4:

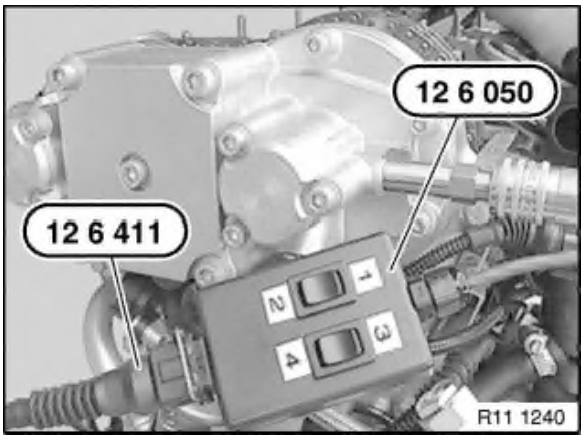
Remove oil line from VANOS adjustment unit.



Cylinder bank 1 to 4:

Fit special tool 11 7 130 to VANOS adjustment unit.

Connect compressed air (2 to 8 bar).

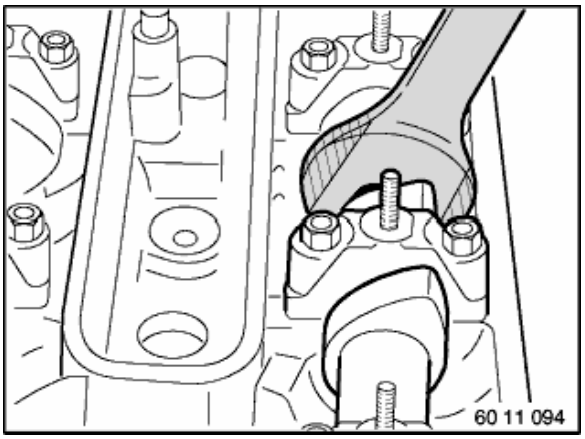


Cylinder bank 1 to 4:

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.

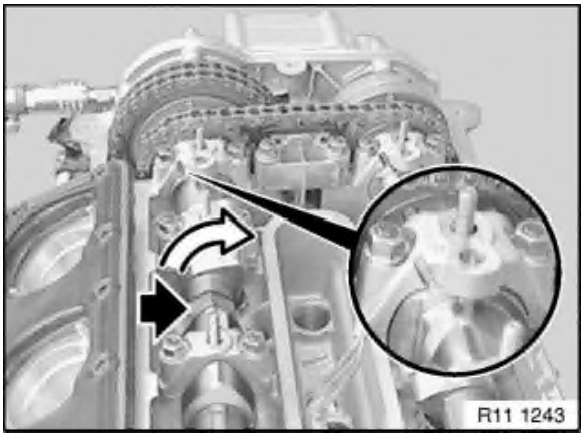
Alternately press toggle switch buttons 1 and 2 several times on special tool 12 6 050 .



Caution!

Do not damage the cylinder head.

If necessary, machine open-end wrench accordingly.



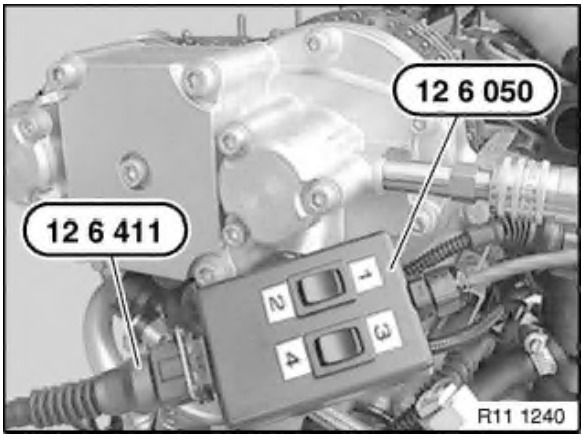
Cylinder bank 1 to 4:

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

At same time, rotate inlet camshaft at hexagon drive against direction of rotation as far as it will go.

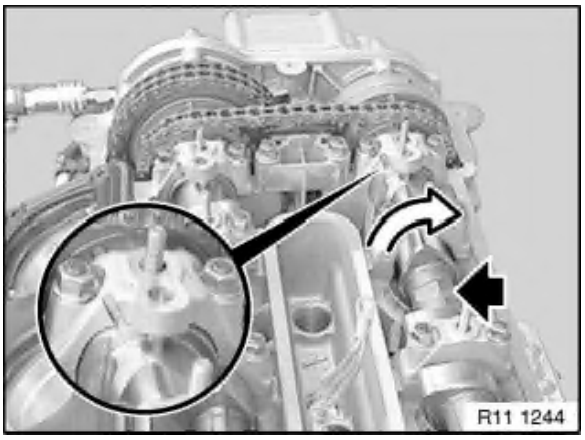
Note:

Spline teeth in VANOS gear are engaged; and 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 .



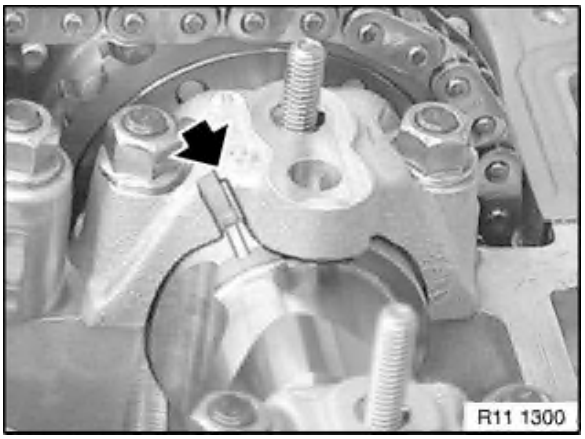
Cylinder bank 1 to 4:

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

At same time, rotate exhaust camshaft at hexagon drive against direction of rotation as far as it will go.

Note:

Spline teeth in VANOS gear are engaged; and exhaust camshaft cannot be rotated further.



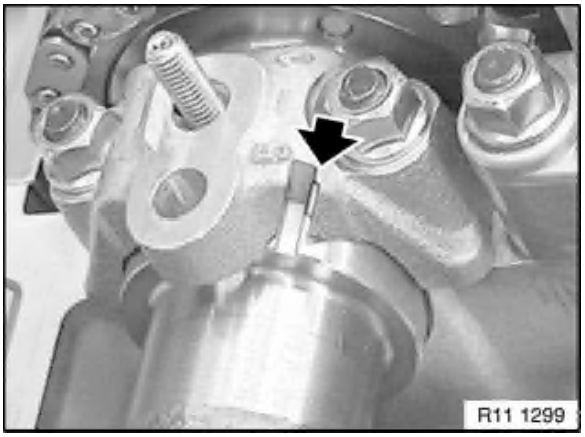
Cylinder bank 1 to 4:

Check camshaft adjustment.

Note:

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

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



Cylinder bank 5 to 8:

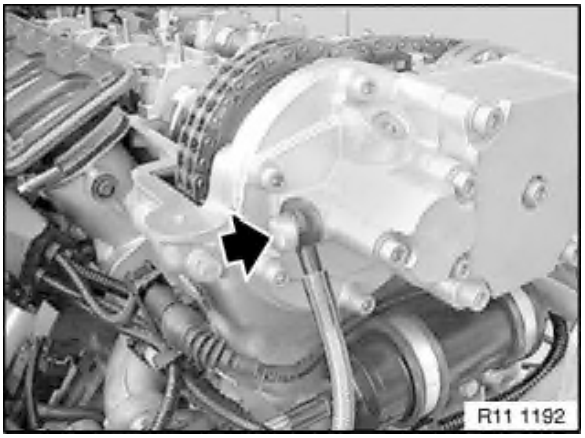
Check camshaft adjustment.

Note:

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

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

If necessary, adjust camshaft timing.

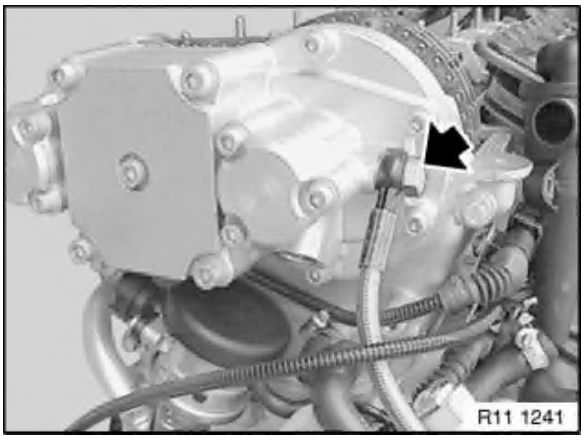


Cylinder bank 5 to 8:

Replace sealing rings.

Fit oil line to VANOS adjustment unit.

Tightening torque, refer to 11 36 9AZ .



Cylinder bank 1 to 4:

Remove special tool 11 7 130 from VANOS adjustment unit.

Replace sealing rings.

Attach 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.