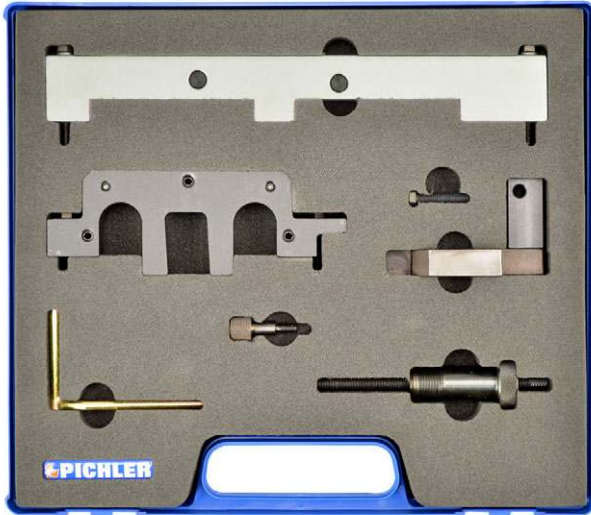


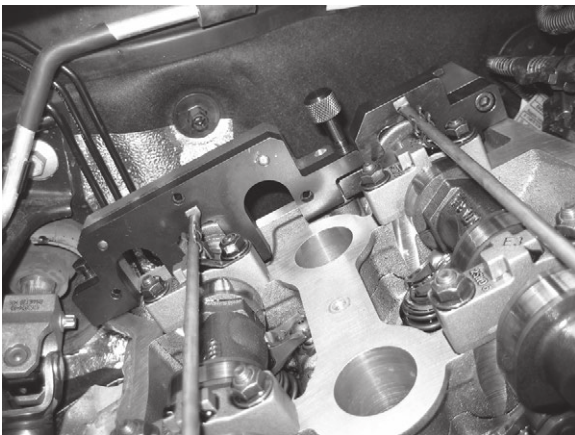
Product Information

60396900

Petrol Engine Twin Camshaft Setting/Locking Tool Kit



IMPORTANT: Always refer to the vehicle manufacturer's service instructions, or proprietary manual, to establish the current procedures and data. Product Information Sets detail applications and use of the tools with any general instructions provided as a guide only.



Applications:

BMW N40 and N45(T) Twin Camshaft Petrol engines in

BMW

1 Series

116i. E81/E87

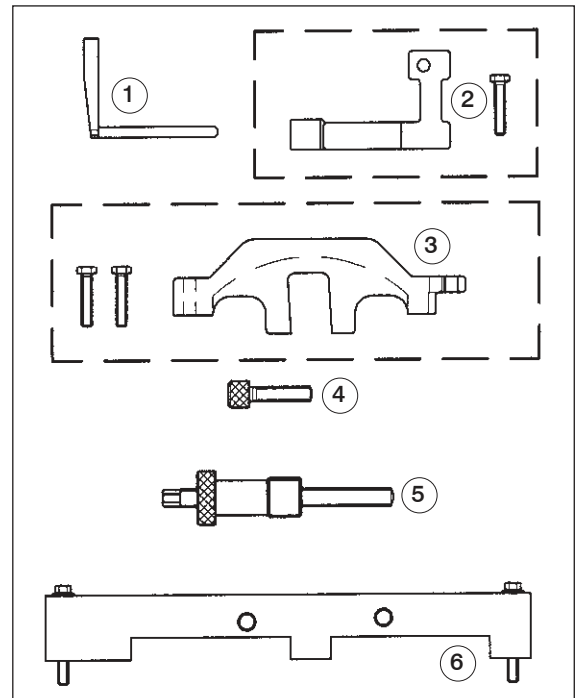
3 Series

316i. E46/E90

316Ci. E46

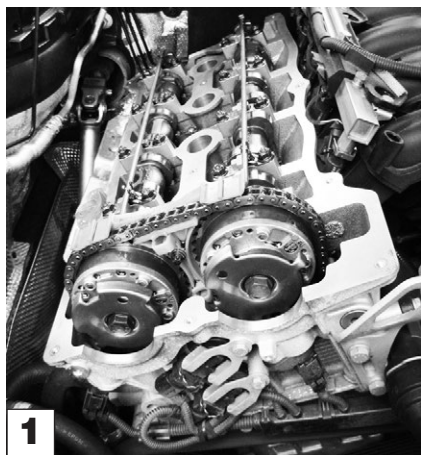
316ti. E46

B16 (N40/N45/N45T) engines



Kit contents/spares

Item	Part Number	Description
1	4801	Flywheel Locking Pin
4868 Camshaft Setting Plate Assembly (items 2 to 4)		
2	4868-1	Camshaft Setting Plate (Inlet)
3	4868-2	Camshaft Setting Plate (Exhaust)
4	4805-3	Camshaft Setting Plate Securing Screw
5	4803	Timing Chain Tensioner Pre-Load Tool
6	4869	VANOS Alignment Plate
--		Case + Insert



This range of 1.6 BMW 4 cylinder twin camshaft 16v. petrol engines have VANOS (VCT) units on inlet and exhaust camshafts but are not Valvetronic engines.

The N40 was introduced in the BMW 3 Series (E46) in 2001, followed by the N45 in the 1 Series (2003). The N45T appears in both the 1 Series and 3 Series from 2006.

60396900 Setting/Locking Tool Kit

Comprises: 4801 Flywheel Locking Pin

4803 Chain Tensioner Pre-Load Tool

4868 Camshaft Setting Plate Assembly

Comprises: 4868-1 (Inlet Plate)

4868-2 (Exhaust Plate)

4805-3 (Securing Screw)

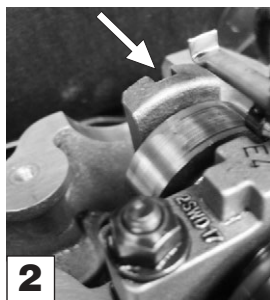
T4869 VANOS Alignment Plate

For checking and adjusting valve timing, the timing positions for the camshafts are achieved using the 4868 Camshaft Setting Plate Assembly and the 4803 Timing Chain Tensioner Pre-Load Tool. The crankshaft is locked at TDC (via the flywheel) using 4801 Locking Pin.

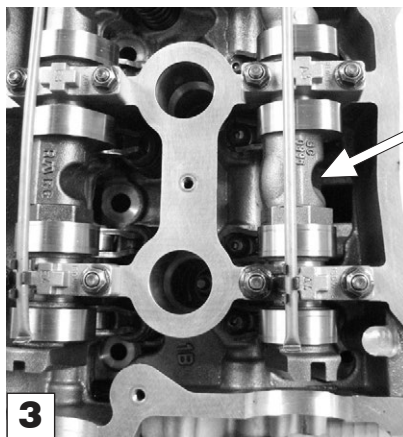
The VANOS Units positions are adjusted with 4869 Alignment Plate.

Checking valve timing

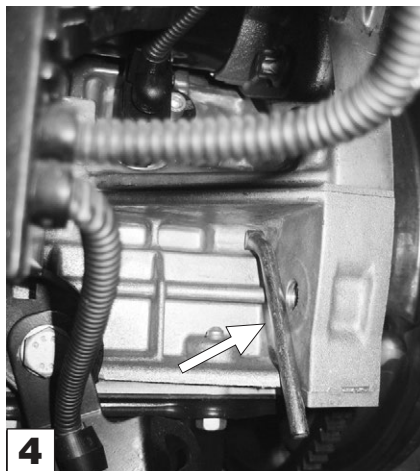
Remove the cylinder head cover and all spark plugs. Unscrew the bolt retaining the oil supply line and unclip the line. Turn the crankshaft, in normal direction of engine rotation, to TDC No.1 cylinder (ignition), using a wrench on the crankshaft pulley centre bolt.



Check the timing positions of the camshafts – each camshaft has a rectangular section at the rear which has a curved edge on top and a straight edge on the bottom. With the engine in the correct TDC engine timing position, the **curved edge** of the rectangles, on both camshafts, will be **uppermost**.



An additional guide to correct camshaft position, using the exhaust camshaft, is that in the correct TDC engine timing position, the recesses in the sections of the exhaust camshaft between the lobes, will be pointing towards the exhaust manifold.



4801 Flywheel TDC Locking Pin

Insert 4801 Flywheel TDC Locking Pin through the datum hole, which is located underneath the starter motor, and into the timing hole in the flywheel.

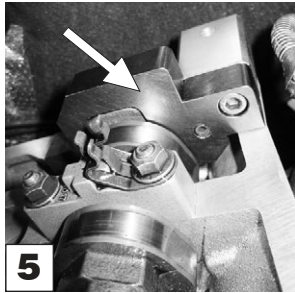
NOTE: The datum hole can be difficult to locate and may be constricted by dirt/corrosion.

IMPORTANT: On Automatic Transmissions – there is a much larger hole in the flywheel very near to the timing hole and checks are required to ensure that this hole has not been selected in error. With 4801 Locking Pin inserted, check that the engine will not rotate back and forth. Use a wrench on the crankshaft pulley bolt to rotate the engine.

VANOS Units:

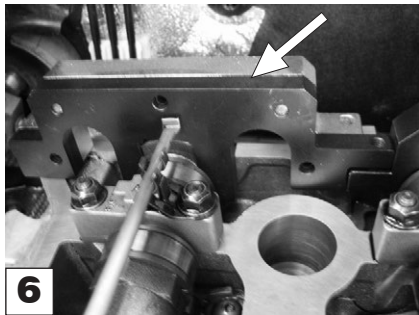
IMPORTANT: If the VANOS Unit has 'locked' correctly, the camshaft will not turn. If the VANOS Units cannot be locked to the camshafts, it is likely they are faulty, and must be replaced – refer to Removing and Installing VANOS Units.

4868 Camshaft Setting Plate Assembly (comprises 4868-1, 4868-2 & 4805-3)



Place 4868-1 Camshaft Setting Plate on to the rectangular section at the rear of the INLET camshaft, and ensure the Plate **rests fully** on the surface of the cylinder head. (Do not insert fixing bolts)

If timing is correct, 4868-1 Plate should rest on the cylinder head without any gap, or at most, raised 0.5mm. to the exhaust side only.



Place 4868-2 Camshaft Setting Plate on to the rectangular section at the rear of the EXHAUST camshaft, and ensure the Plate **rests fully** on the surface of the cylinder head (Do not insert fixing bolts).

If timing is correct, 4868-2 should rest on the cylinder head without any gap, or at most, raised 1.0mm. to the exhaust side only.

If the above position cannot be achieved with the Setting Plates, then it will be necessary to adjust the timing.

Remove the Camshaft Setting Plates.

Adjusting timing



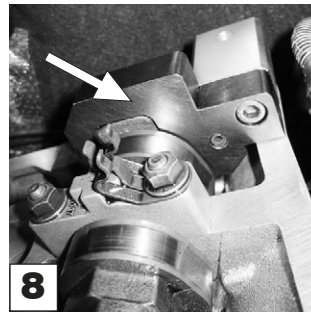
Slacken the bolts of the VANOS Units on the inlet and exhaust camshafts.

WARNING: These bolts are likely to be tight. It will be necessary to counter-hold against engine rotation at the crankshaft pulley centre bolt. Do NOT rely on the Flywheel Pin to counter-hold when loosening these bolts.

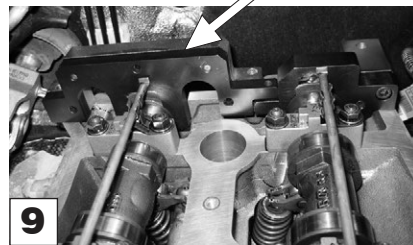
Do NOT rely on the Flywheel Pin to counter-hold when loosening these bolts.

Screw in the VANOS Unit bolts to finger-tight only, sufficient so there is no play or tilt on the units.

Ensure that the 4801 Flywheel TDC Locking Pin is fitted into the timing hole in the flywheel.

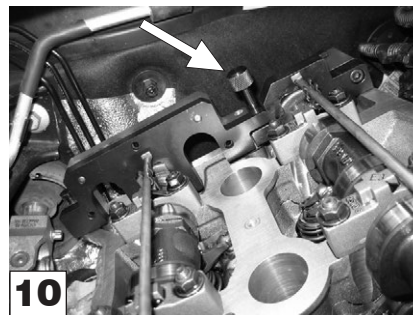


Place 4868-1 Camshaft Setting Plate on to the rectangular section at the rear of the INLET camshaft, ensuring that the curved edge of the rectangular plate is uppermost. Align the camshaft so the Setting Plate **rests fully** on the surface of the cylinder head (Do not insert fixing bolt at this stage)



Fit 4868-2 Camshaft Setting Plate on to the rectangular section at the rear of the EXHAUST camshaft, ensuring that the curved edge of the rectangular plate is uppermost. Align the camshaft so the Plate **rests fully** on the surface of the cylinder head.

Screw in the two fixing bolts and tighten to secure the Setting Plate 4868-2 to the cylinder head.



Screw in 4805-3 Securing Screw into Setting Plate 4868-2 until it presses on Setting Plate 4868-1.

Screw in the fixing bolt for 4868-1 and tighten to secure this Setting Plate to the cylinder head.

4803 Timing Chain Tensioner Pre-Load Tool

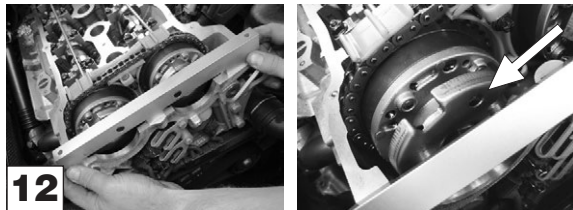


Remove the timing chain tensioner, and in its place insert 4803 Tensioner Pre-Load Tool.

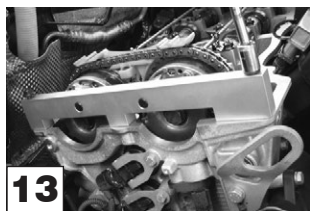
Screw in the adjusting screw of 4803, by hand, until it makes contact with the tensioner rail **but does not apply pressure**.

Remove the old bolts of the VANOS Units on the inlet and exhaust camshafts and fit new bolts. Screw in the bolts to finger-tight only, sufficient so there is no play or tilt on the units.

4869 Vanos Alignment Plate



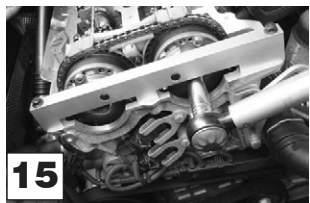
Fit 4869 VANOS Alignment Tool to the front of the Units ensuring that its two location pins enter into the holes in the VANOS Units and that the Alignment Tool **fits fully** on to the surface of the cylinder head.



Screw in the two bolts and tighten to secure 4869 to the cylinder head. Slacken the VANOS Unit bolts half turn and re-tighten to finger-tight.



Attach a suitable torque wrench to the adjusting screw of 4803. Turn to apply a pre-load to the tensioner rail of 0.6 Nm.



Tighten the bolt of the exhaust camshaft VANOS unit to the specified torque, followed by the bolt of the inlet VANOS Unit, again, to the specified torque – Torque 20Nm. + 90° + 90°

Remove the 4869 VANOS Alignment Tool,

Unscrew the adjusting screw of 4803 and remove the Pre-Load Tool

IMPORTANT: Install the chain tensioner.

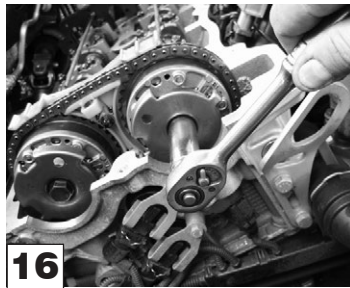
Remove **all** timing tools and turn the crankshaft twice (at the crankshaft pulley centre bolt), in normal direction of engine rotation, returning to TDC engine timing position, No.1 cylinder.

Insert the Flywheel TDC Locking Pin and Camshaft Setting Plates to check timing position, follow the procedure as described in “Checking valve timing”.

Removing, Installing and Replacing VANOS Units.

If either of the VANOS Units, on inlet or exhaust camshafts, cannot be ‘locked’ and are faulty, they must be replaced.

Removal



Slacken the bolts of the VANOS Units on the inlet and exhaust camshafts.

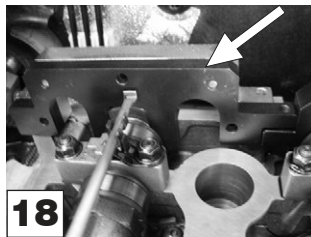
WARNING: These bolts are likely to be tight. It will be necessary to counter-hold against engine rotation at the crankshaft pulley centre bolt. Do NOT rely on the Flywheel Pin to counter-hold when loosening these bolts.

Screw in the bolts to finger-tight only, sufficient so there is no play or tilt on the units.

Ensure that the 4801 Flywheel TDC Locking Pin is fitted into the timing hole in the flywheel.



Place 4868-1 Camshaft Setting Plate on to the rectangular section at the rear of the INLET camshaft, ensuring that the curved edge of the rectangular plate is uppermost. Align the camshaft so the Setting Plate **rests fully** on the surface of the cylinder head. (Do not insert fixing bolt).



Place 4868-2 Camshaft Setting Plate on to the rectangular section at the rear of the EXHAUST camshaft, ensuring that the curved edge of the rectangular plate is uppermost. Align the camshaft so the Plate **rests fully** on the surface of the cylinder head.

Screw in the two fixing bolts and tighten to secure the Setting Plate 4868-2 to the cylinder head.

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Screw in 4805-3 Securing Screw into Setting Plate 4868-2 until it presses on Setting Plate 4868-1.

Screw in the fixing bolt for 4868-1 and tighten to secure this Setting Plate to the cylinder head.

Remove the timing chain tensioner,

Fully remove the bolt of the VANOS Unit on the **exhaust** camshaft. Lift chain off the sprocket and feed out and remove the **complete** VANOS Unit.

Repeat this procedure on the VANOS Unit on the **inlet** camshaft.

Replacement

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WARNING: It is important to note that the Inlet and exhaust VANOS Units are different. It is essential to keep the parts of Inlet Unit separate from the Exhaust Unit. Under no circumstances should the parts be mixed or parts from any other engine variant be used.

Inlet Unit part is marked “EIN / IN” and the Exhaust Unit part marked “AUS / EX”

Installation

Assemble the Unit of the Inlet camshaft, including the sensor gear (front plate), and feed on to the inlet camshaft fitting the chain onto the sprocket. Screw in a new bolt and tighten only so there is no play or tilting (finger-tight).

Assemble and install the Exhaust camshaft Unit and screw in a new bolt and tighten only so there is no play or tilting.

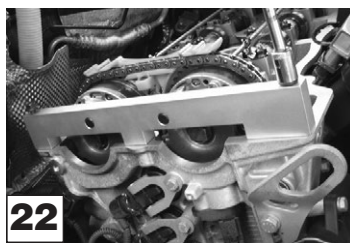
IMPORTANT: Press the chain rail, by hand, and ensure the timing chain is guided within the rail.

21



Insert 4803 Tensioner Pre-Load Tool and screw in the adjusting screw by hand, until it makes contact with the tensioner rail.

22

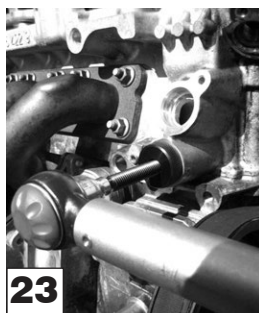


Fit 4869 VANOS Alignment Tool to the front of the Units ensuring that its two location pins enter into the holes in the sensor gears and the Tool fits **fully** on to the surface of the cylinder head.

Screw in the two bolts to secure 4869 Tool to the cylinder head and tighten.

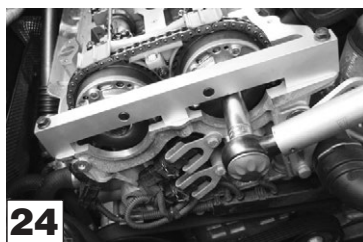
Unscrew the bolts of the VANOS Units half turn and then tighten to finger-tight, ensuring that there is no play or tilting of the VANOS units.

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Attach a suitable torque wrench to the adjusting screw of 4803 and turn to pre-load the tensioner rail to 0.6 Nm.

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Tighten the bolt of the **exhaust** camshaft VANOS unit to the specified torque, followed by the bolt of the **inlet** VANOS Unit, again, to the specified torque – Torque 20Nm. + 90° + 90°.

Remove 4869 Alignment Tool,

Unscrew the adjusting screw of 4803 and remove the Pre-Load Tool

IMPORTANT: Install the chain tensioner.

Remove **all** timing tools and turn the crankshaft twice (at crankshaft pulley centre bolt), in normal direction of engine rotation, returning to TDC engine timing position, No.1 cylinder.

Insert the Flywheel TDC Locking Pin and Camshaft Setting Plates to check timing position as described in “Checking valve timing”.