

9430700

5025

5030

**Petrol Engine Twin Camshaft
Setting/Locking Tool Kits**



9430700



5025

5030

Applications:

**BMW Mini, Citroën and Peugeot
1.4 and 1.6 16v. Valvetronic / Direct Injection
Petrol engines in:**

BMW MINI

R55 R56 Cooper S
R55 R56 Cooper
R56 Mini One

CITROËN

C4
C4 Picasso

PEUGEOT

207	308	3008
5008	RCZ	Partner Tepee

Engines BMW: N12 (1.4 / 1.6) and N14 (1.6)

PSA: EP3, EP3C, EP6, EP6C
and EP6DT/DTS/CDT

Kit Selection – engine coverage

Checking and adjustment of engine timing for **all** of the **N12/N14/EP3/EP3C/EP6/EP6C/EP6DT/DTS/CDT** GROUP of engines is covered by Kit **9430700**.

Smaller kits have been made available to cover only the **N12/EP3/EP3C/EP6/EP6C (Valvetronic)** range or the **N14/EP6DTS/CDT (Direct Injection)** range.

The smaller kits can be upgraded to cover the additional engines at a later date as required - see chart on page 2.

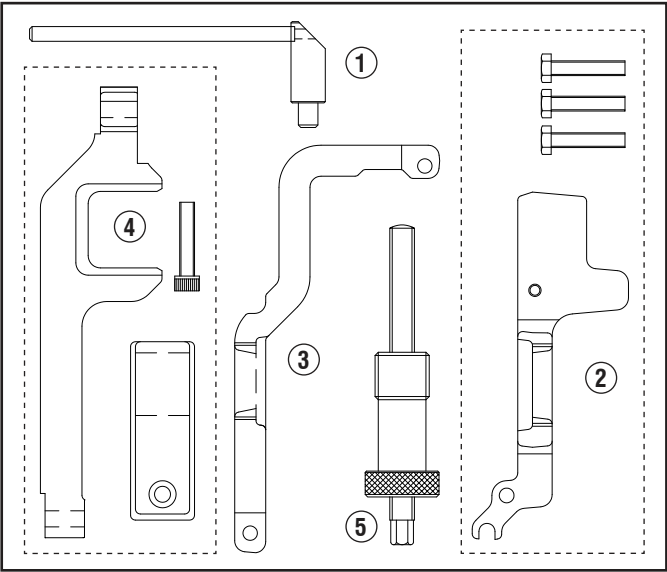
The **9430700 COMPLETE Kit** covers engine timing checking and adjustment applications on the complete range of **N12/N14/EP3/EP3C/EP6/EP6C/EP6DT/DTS/CDT** engines in BMW Mini and PSA models detailed.

Kit **5025** covers engine timing applications on the **N12/EP3/EP3C/EP6/EP6C** engines. This kit coverage can be increased to encompass the N14/EP6DT/DTS/CDT engines by the addition of 5024 Camshaft Setting Plate Assembly.

Kit **5030** covers engine timing applications on the **N14/EP6DT/DTS/CDT** engines. This kit coverage can be increased to encompass the N12/EP3/EP3C/EP6/EP6C engines by the addition of 5023 Camshaft Setting Plate.

Kits 5025 and 5030 utilise the same case and insert layout as Kit **9430700** thus providing space to accept the additional Camshaft Setting Plates when increasing the application coverage to the **9430700 COMPLETE Kit** specification.

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.



Parts Identification / Spares

Item	Part Number	Description
1	5021	Flywheel Locking Pin.
2	5022	Exhaust Camshaft Setting Plate.
3	5023	Inlet Camshaft Setting Plate (N12/EP3/EP3C/EP6/EP6C).
4	5024	Inlet Camshaft Setting Plate Assembly (N14/EP6DT/DTS/CDT).
5	4803	Chain Tensioner Pre-Load Tool
-		Case + Insert

Kit contents and Applications	9430700 N12/N14/EP3/EP3C/EP6/ EP6C/EP6DT/DTS/CDT	5025 N12/EP3/EP3C/EP6/EP6C	5030 N14/EP6DT/DTS/CDT
5021 Flywheel Locking Pin	●	●	●
5022 Exhaust Camshaft Setting Plate	●	●	●
5023 Inlet Camshaft Setting Plate	●	●	
5024 Inlet Camshaft Setting Plate Assembly	●		●
4803 Chain Tensioner Pre-Load Tool	●	●	●
		Add 5024 To additionally cover N14/EP6DT/DTS/CDT engines	Add 5023 To additionally cover N12/EP3/EP3C/EP6/EP6C engines

The N12/EP3/EP3C/EP6/EP6C twin camshaft petrol engines with VANOS variable camshaft timing on both inlet and exhaust camshafts, were developed jointly between BMW and PSA Citroen Peugeot and use the BMW Valvetronic system to vary the timing and the lift of the inlet valves.

The Valvetronic layout incorporates a conventional inlet camshaft and a secondary eccentric shaft, with intermediate levers and followers, activated by a stepper motor. The stepper motor changes the phase of the eccentric shaft, altering the action of the inlet valves.

The N14/EP6DT/DTS/CDT twin camshaft turbocharged petrol engines with high-pressure direct fuel injection were also developed jointly between BMW and PSA. The cylinder head comes with conventional valve drive featuring roller-type drag arms and hydraulic valve play compensation.

SECTION 1 - N12/EP3/EP3C/EP6/EP6C 1.4/1.6 16v (Valvetronic)

- Checking Camshaft Timing
- Adjusting Camshaft Timing

SECTION 2 - N14/EP6DT/DTS/CDT 1.6 16v (Direct Injection)

- Checking Camshaft Timing
- Adjusting Camshaft Timing

NOTE: The tools in this timing kit are used in a specific sequence, and it will save time and make selection of the correct tools easier if the operator reads and becomes familiar with the timing procedure beforehand.

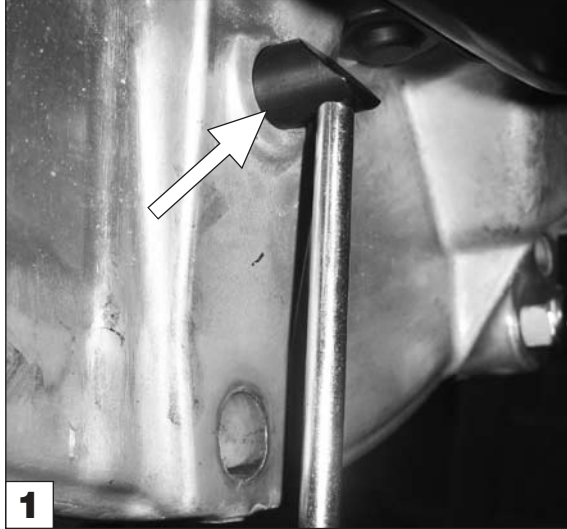
Timing applications on this engine will require the removal of the cylinder head cover, exposing the camshafts and camshaft sprockets.

SECTION 1 - N12/EP3/EP3C/EP6/EP6C 1.4/1.6 16v (Valvetronic)

Checking camshaft timing

IMPORTANT: Camshaft timing is determined when all pistons are at 90 degrees (level) **not** when number one cylinder is at TDC.

Remove the cylinder head cover.



Turn the crankshaft in normal direction of engine rotation using a wrench on the crankshaft pulley centre bolt, position crankshaft by inserting 5021 Flywheel Locking Pin through the datum hole and into the timing hole in the flywheel.

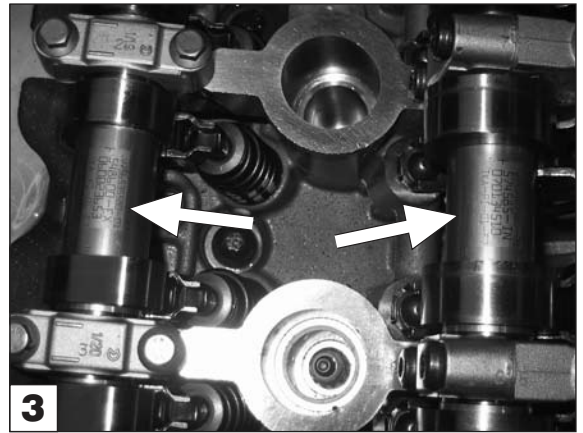
WARNING: Never turn the crankshaft opposite to normal direction of engine rotation.

Balance hole and flywheel locking pin hole can be mixed up. In order to check that the correct hole has been selected, ensure that all pistons are in the 90-degree position, via the spark plug holes.

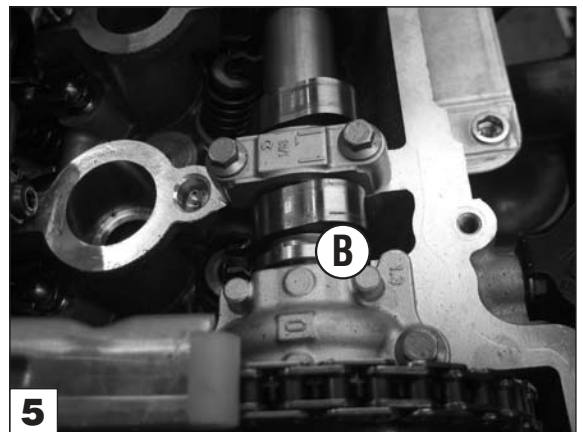
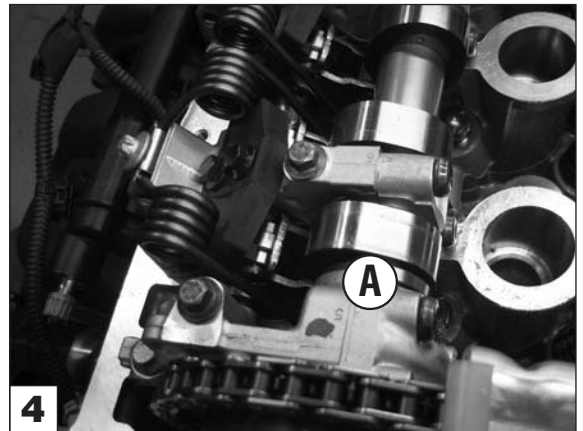


Check the locking of the VANOS adjustment units to the camshafts by attempting to rotate the camshafts, in the direction of engine rotation using an open-ended wrench on the end of the camshaft.

The adjustment units are faulty if there is no fixed connection to the camshaft.



Both camshafts are in the correct position when the markings **(IN)** on the inlet camshaft and **(EX)** on the exhaust camshaft point upwards.



The cam lobe of the inlet camshaft, at cylinder number 1 (A) points upwards and to the left, and the cam lobe of the exhaust camshaft at cylinder number 1 (B) points upwards and to the right, when viewed from the direction of the VANOS adjustment units.



Position 5022 Exhaust Camshaft Setting Plate onto the rectangular section at the rear of the exhaust camshaft, and ensure the Plate rests fully on the surface of the cylinder head and secure in place with the fixing bolt provided.



Position 5023 Inlet 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 and the exhaust camshaft setting plate, then secure in place with the fixing bolts provided.

To make assembly of the tools easier, a slight rotation clockwise or anti-clockwise of the inlet and exhaust camshafts is permitted using an open-ended wrench on the ends of the camshafts.

If camshaft timing is correct both setting plates should rest on the surface of the cylinder head **without any gap**.

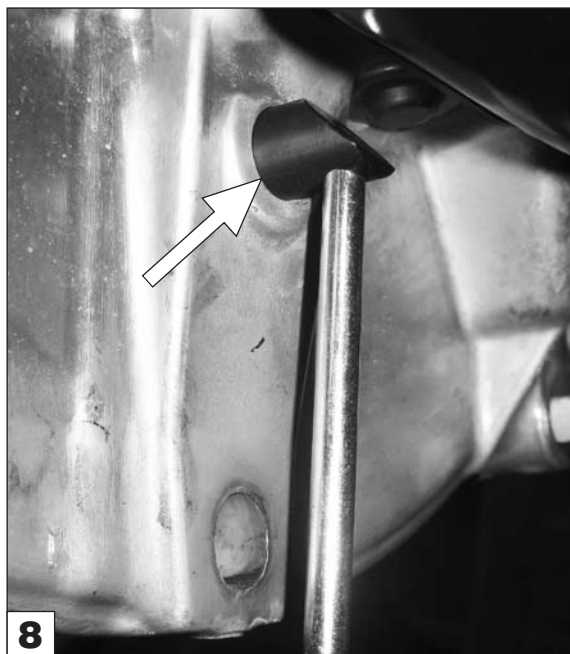
If the above position cannot be achieved with the Setting Plates, it will be necessary to adjust the timing.

Remove the camshaft setting plates and the flywheel locking pin.

Adjusting camshaft timing

IMPORTANT: Camshaft timing is determined when all pistons are at 90 degrees (level) not when number one cylinder is at TDC.

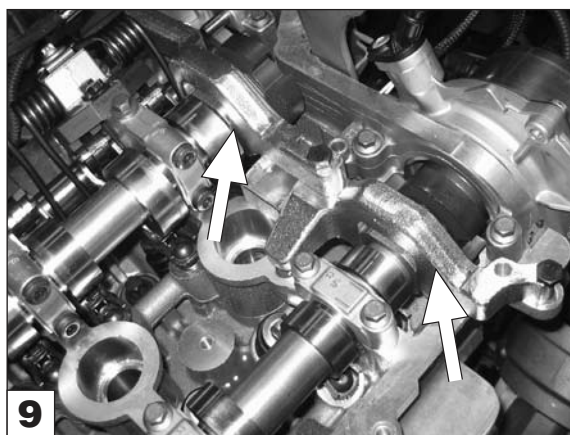
Remove the cylinder head cover.



Turn the crankshaft in normal direction of engine rotation using a wrench on the crankshaft pulley centre bolt, position crankshaft by inserting 5021 Flywheel Locking Pin through the datum hole and into the timing hole in the flywheel.

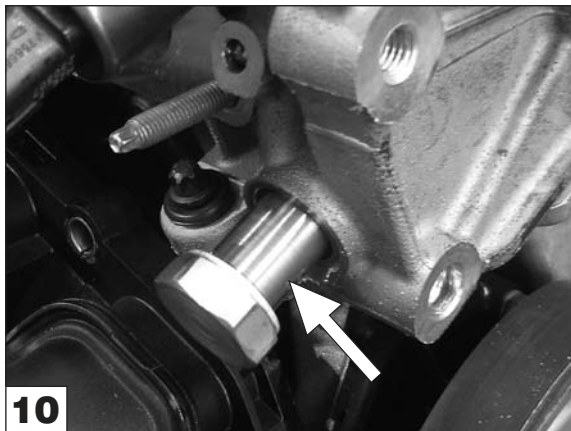
WARNING: Balance hole and flywheel locking pin hole can be mixed up. In order to check that the correct hole has been selected, ensure that all pistons are in the 90-degree position, via the spark plug holes.

Both camshafts have three machined surfaces to enable fitting of the camshaft setting plates. The fourth surface is not machined and is crescent shaped, this **must** point downwards.



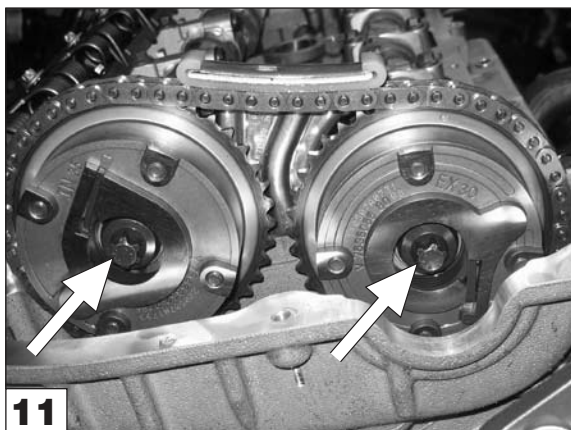
Position 5022 Exhaust Camshaft Setting Plate onto the rectangular section at the rear of the exhaust camshaft.

Position 5023 Inlet Camshaft Setting Plate on to the rectangular section at the rear of the inlet camshaft.



Remove the timing chain tensioner.

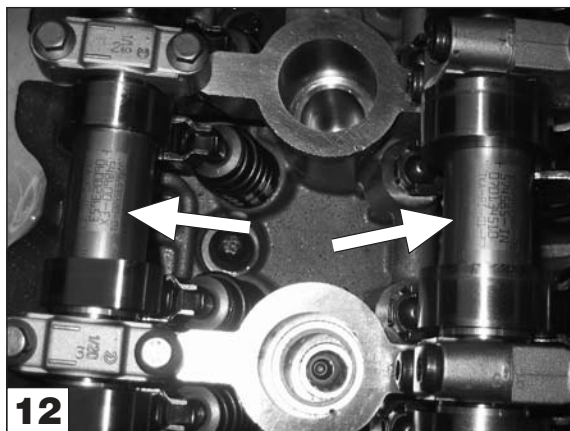
In order for timing to be adjusted the central bolts of the VANOS adjustment units must be released to allow the camshafts to be turned so that the setting plates rest fully on the cylinder head.



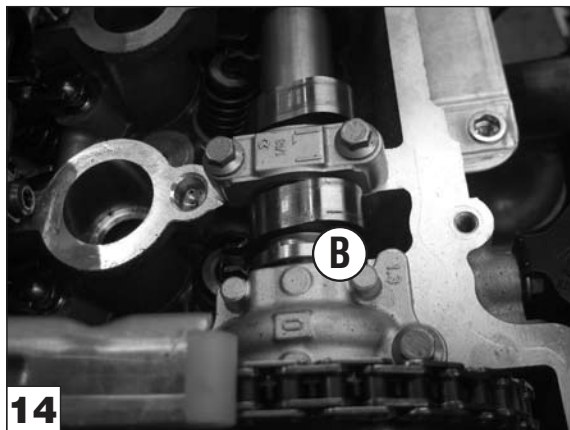
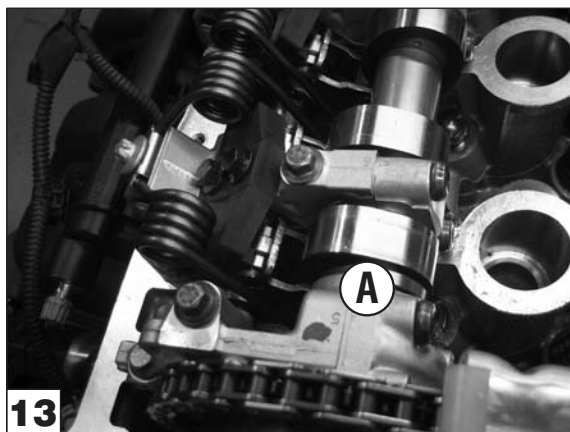
Counter hold each of the camshafts in turn with an open-ended wrench on the hexagon at the rear of the camshafts whilst releasing the central bolts of the VANOS adjustment units.

WARNING: These bolts are likely to be tight do not rely on the Flywheel Pin to counter hold when loosening these bolts.

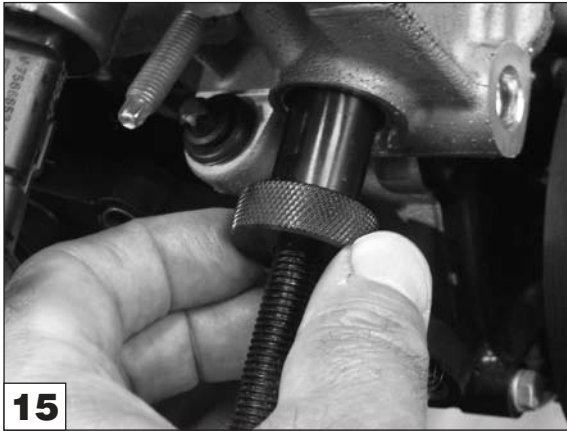
Ensure that the Camshaft Setting Plates rest fully on the surface of the cylinder head and secure in place with the fixing bolts.



Both camshafts are in the correct position when the markings **(IN)** on the inlet camshaft and **(EX)** on the exhaust camshaft point upwards.



The cam lobe of the inlet camshaft, at cylinder number 1 **(A)** points upwards and to the left, and the cam lobe of the exhaust camshaft at cylinder number 1 **(B)** points upwards and to the right, when viewed from the direction of the VANOS adjustment units.



Insert 4803 Tensioner Pre-Load Tool into cylinder head.

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

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

Remove and discard the camshaft sprocket bolts and replace with new bolts.

Tighten the central bolt of the exhaust camshaft to the specified torque **20Nm. + 90° + 90°**, followed by the bolt of the inlet camshaft, to the specified torque **20Nm. + 90° + 90°**

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 the engine timing position.

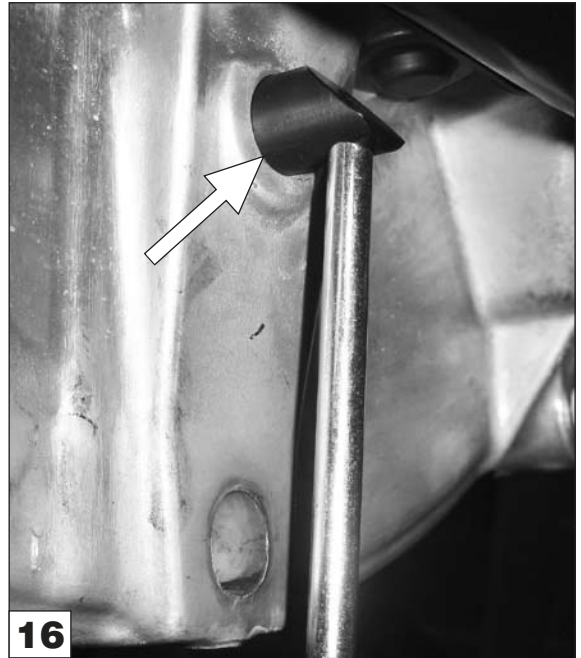
Insert the Flywheel Locking Pin and Camshaft Setting Plates to check timing position, following the procedure as described in "**Checking camshaft timing**".

SECTION 2 - N14/EP6DT/DTS/CDT 1.6 16v (Direct Injection)

Checking camshaft timing

IMPORTANT: Camshaft timing is determined when all pistons are at 90 degrees (level) **not** when number one cylinder is at TDC.

Remove the cylinder head cover.



Turn the crankshaft in normal direction of engine rotation using a wrench on the crankshaft pulley centre bolt, position crankshaft by inserting 5021 Flywheel Locking Pin through the datum hole and into the timing hole in the flywheel.

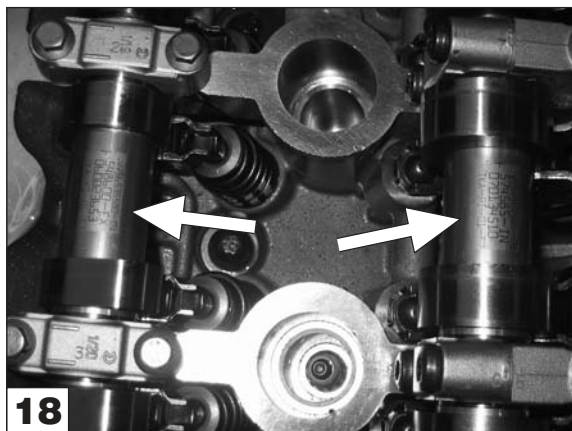
WARNING: Never turn the crankshaft opposite to normal direction of engine rotation.

Balance hole and flywheel locking pin hole can be mixed up. In order to check that the correct hole has been selected, ensure that all pistons are in the 90-degree position, via the spark plug holes.

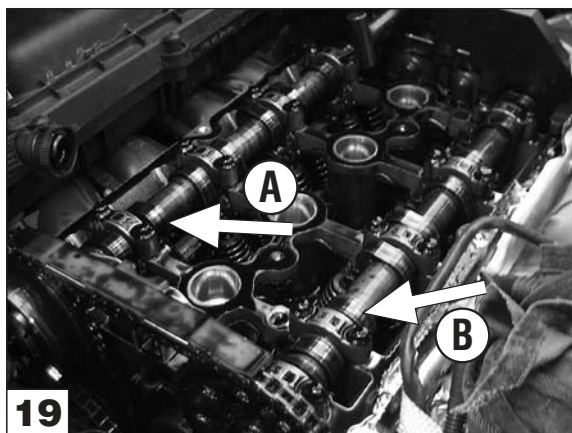


Check the locking of the VANOS adjustment unit to the camshaft by attempting to rotate the camshaft in the direction of engine rotation using an open-ended wrench on the end of the camshaft.

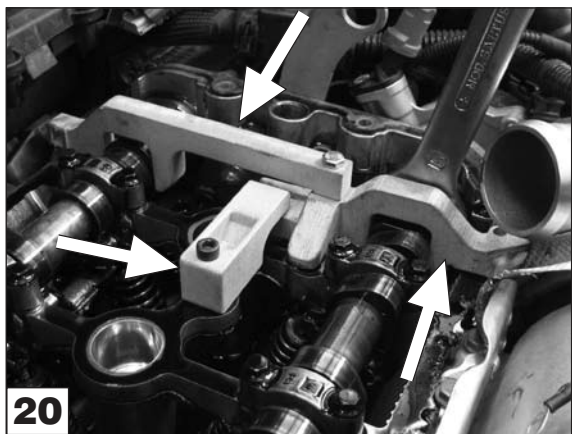
The adjustment unit is faulty if there is no fixed connection to the camshaft.



Both camshafts are in the correct position when the markings **(IN)** on the inlet camshaft and **(EX)** on the exhaust camshaft point upwards.



The cam lobe on the inlet camshaft, at cylinder number 1 **(A)** points upwards and to the right and the cam lobe of the exhaust camshaft at cylinder number 1 **(B)** points downwards and to the left, when viewed from the direction of the VANOS adjustment unit.



Position 5022 Exhaust Camshaft Setting Plate onto the rectangular section at the rear of the exhaust camshaft, and ensure the Plate rests fully on the surface of the cylinder head and secure in place with the fixing bolts provided.

Position 5024 Inlet Camshaft Setting Plate on to the rectangular section at the rear of the inlet camshaft. Ensure the Plate rests fully on the surface of the cylinder head and secure using the Retaining Clamp and the fixing bolts provided.

To make fitting of the tools easier, a slight rotation clockwise or anti-clockwise of the inlet and exhaust camshafts is permitted using an open-ended wrench on the ends of the camshafts.

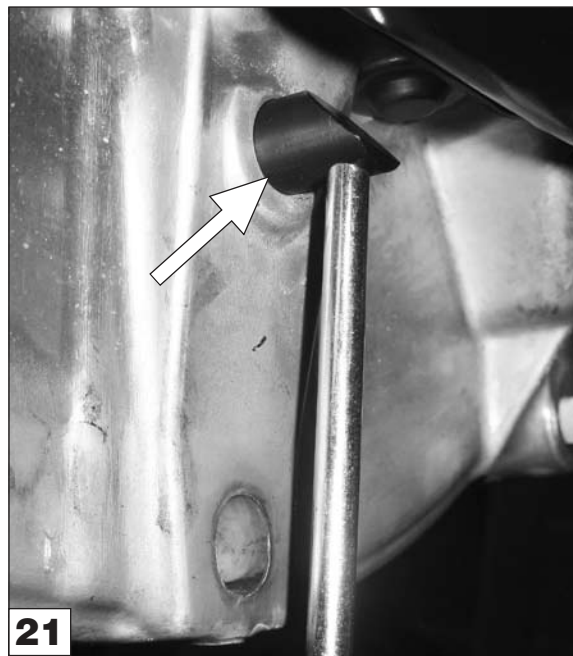
If camshaft timing is correct both Setting Plates should rest on the surface of the cylinder head without any gap. If the above position cannot be achieved with the Setting Plates, it will be necessary to adjust the timing.

Remove the camshaft setting plates and flywheel locking pin.

Adjusting camshaft timing

IMPORTANT: Camshaft timing is determined when all pistons are at 90 degrees (level) not when number one cylinder is at TDC.

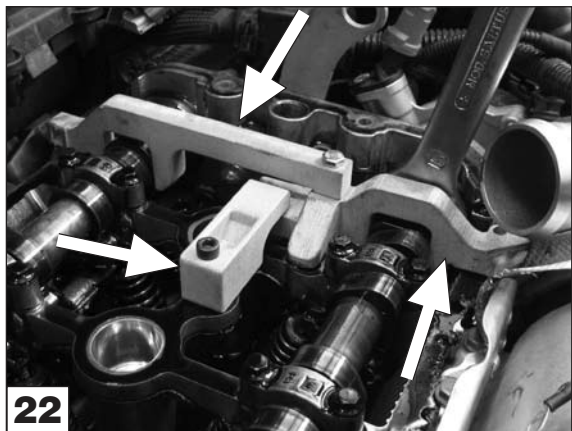
Remove the cylinder head cover.



Turn the crankshaft in normal direction of engine rotation using a wrench on the crankshaft pulley centre bolt, position crankshaft by inserting 5021 Flywheel Locking Pin through the datum hole and into the timing hole in the flywheel.

WARNING: Balance hole and flywheel locking pin hole can be mixed up. In order to check that the correct hole has been selected, ensure that all pistons are in the 90-degree position, via the spark plug holes.

Both camshafts have three machined surfaces to enable fitting of the camshaft setting plates. The fourth surface is not machined and is crescent shaped, this **must** point downwards.



Position 5022 Exhaust Camshaft Setting Plate onto the rectangular section at the rear of the exhaust camshaft.

Position 5024 Inlet Camshaft Setting Plate on to the rectangular section at the rear of the inlet camshaft and loosely fit its Retaining Clamp.



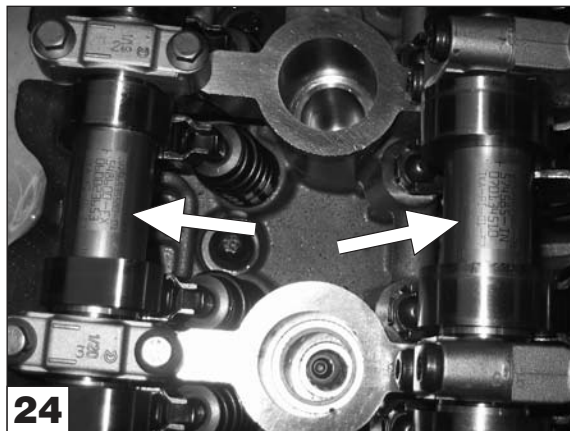
Remove the timing chain tensioner.

In order for timing to be adjusted the central bolts of the exhaust camshaft sprocket and VANOS adjustment unit must be released to allow the camshafts to be turned so that the setting plates rest fully on the cylinder head.

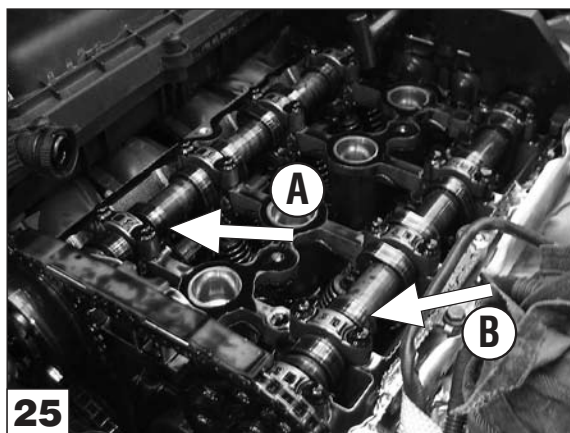
Counter hold each of the camshafts in turn with an open-ended wrench on the hexagon at the rear of the camshafts whilst releasing the central bolt of the camshaft sprocket and VANOS adjustment unit.

WARNING: These bolts are likely to be tight do not rely on the Flywheel Pin to counter hold when loosening these bolts.

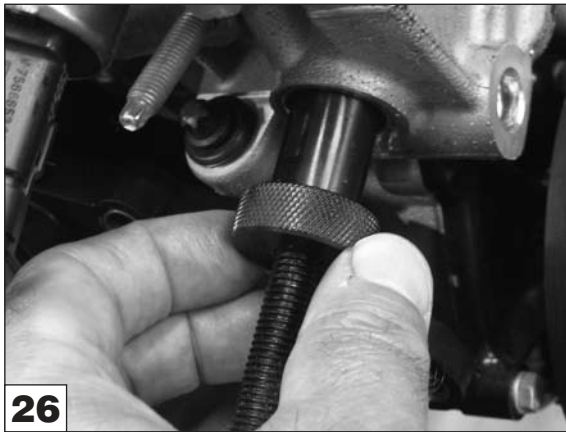
Ensure that the Camshaft Setting Plates rest fully on the surface of the cylinder head and secure in place with Retaining Clamp and fixing bolts.



Both camshafts are in the correct position when the markings **(IN)** on the inlet camshaft and **(EX)** on the exhaust camshaft point upwards.



The cam lobe on the inlet camshaft, at cylinder number 1 **(A)** points upwards and to the right and the cam lobe of the exhaust camshaft at cylinder number 1 **(B)** points downwards and to the left, when viewed from the direction of the VANOS adjustment unit.



Insert 4803 Tensioner Pre-Load Tool into cylinder head.

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

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

Remove and discard the camshaft sprocket bolts and replace with new bolts.

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

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 the engine timing position.

Insert the Flywheel Locking Pin and Camshaft Setting Plates to check timing position, following the procedure as described in **“Checking camshaft timing”**.