

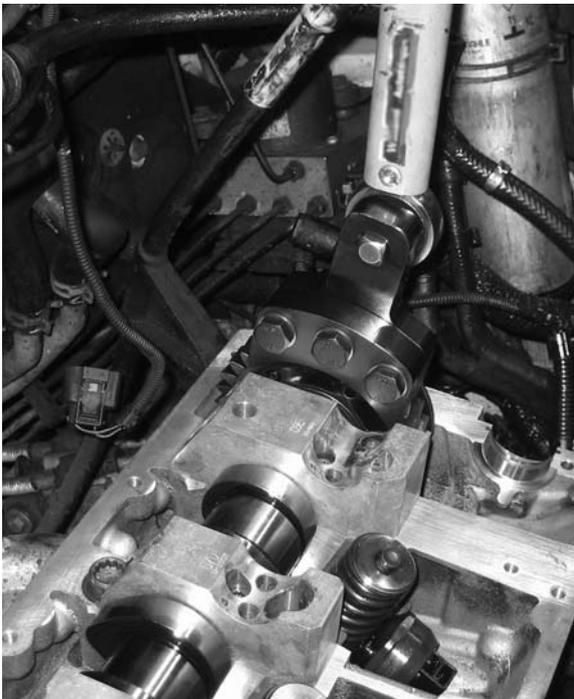
Product Information



AST5035 Diesel Engine 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.



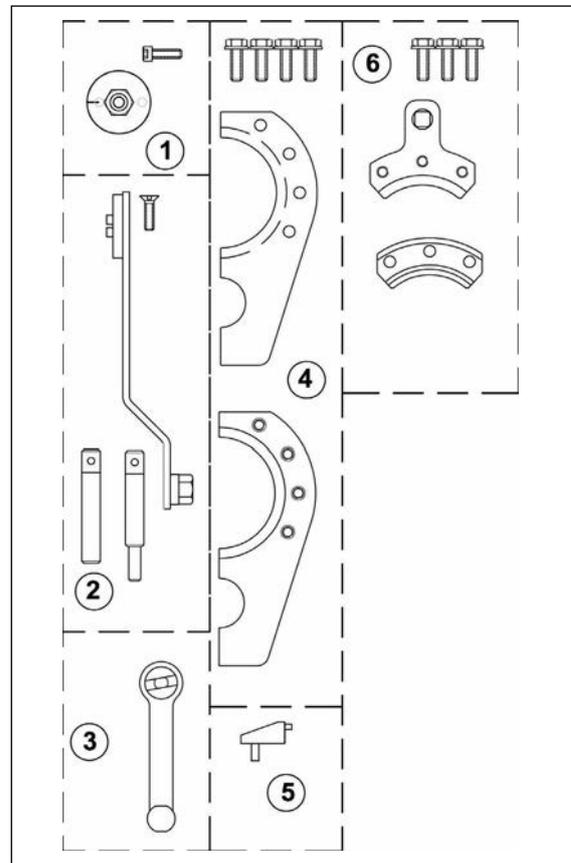
Applications:

VW GROUP 2.5 TDi Pumpe Düse Diesel engine (GEAR) in:

VOLKSWAGEN

Transporter 03-08
Touareg 03-08
Multivan 04-08

AXD, AXE, BAC, BLJ, BLK, BNZ, BPC, BPD and BPE engines.



Kit contents/spares

Item	Part Number	Description
1	AST5031	Crankshaft TDC Position Tool
2	AST5032	Crankshaft Locking Tool
3	AST5033	Camshaft Locking Tool
4	AST5034	Camshaft Gear Clamp
5	AST5036	Eccentric Pin Holding Tool
6	AST5037	Camshaft Gear Adjuster
-	AST5035-84	Case + Insert

Introduced in 2003 these 2,5L TDi Pumpe Düse engines utilise a helical-toothed spur gear set that drives the camshaft and all engine auxiliaries from the crankshaft. The engine fan is electrically driven.

AST5035 Diesel Engine Timing Tool Kit

Comprises:

AST5031 Crankshaft TDC Position Tool

AST5032 Crankshaft Locking Tool

AST5033 Camshaft Locking Tool

AST5034 Camshaft Gear Clamp

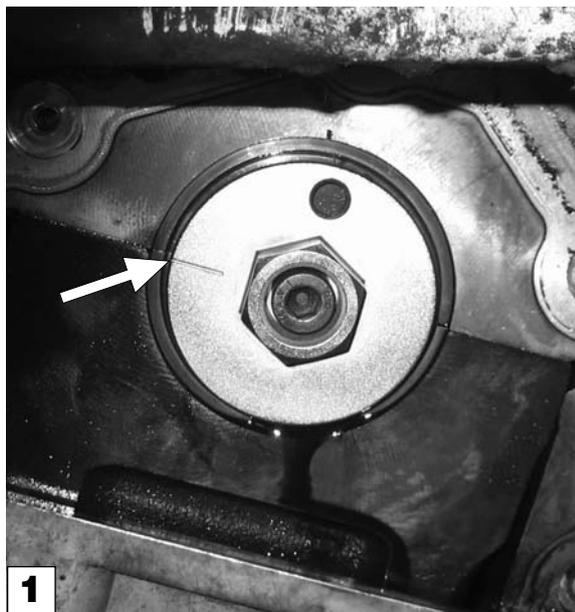
AST5036 Eccentric Pin Holding Tool

AST5037 Camshaft Gear Adjuster

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.

Checking the valve timing.

IMPORTANT: To check the valve timing the crankshaft is positioned at TDC at cylinder number 1.



AST5031 Crankshaft TDC Position Tool

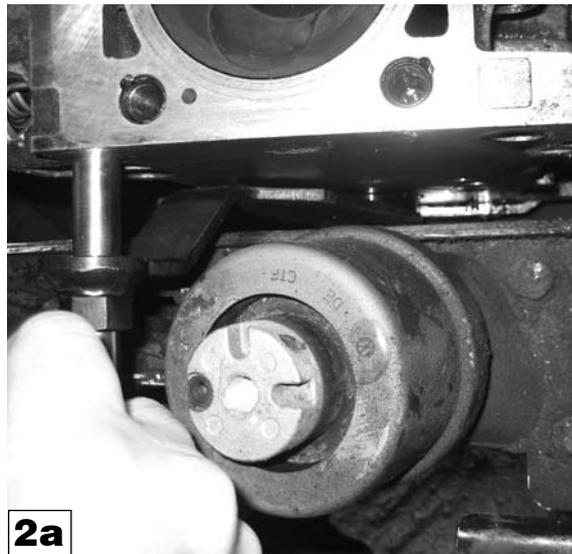
AST5031 is used to rotate the crankshaft to the timed position.

Position AST5031 Crankshaft TDC Position Tool onto the crankshaft; turn the crankshaft in the direction of engine rotation aligning the marks on AST5031 and the sealing flange.

NOTE: The Crankshaft Locking Tool locates onto the crankshaft in only one position.

The crankshaft is now timed in the correct position with number 1 cylinder at TDC.

Remove AST5031 Position Tool



AST5032 Crankshaft Locking Tool

AST5032 Locks the crankshaft in position with number 1 cylinder at TDC

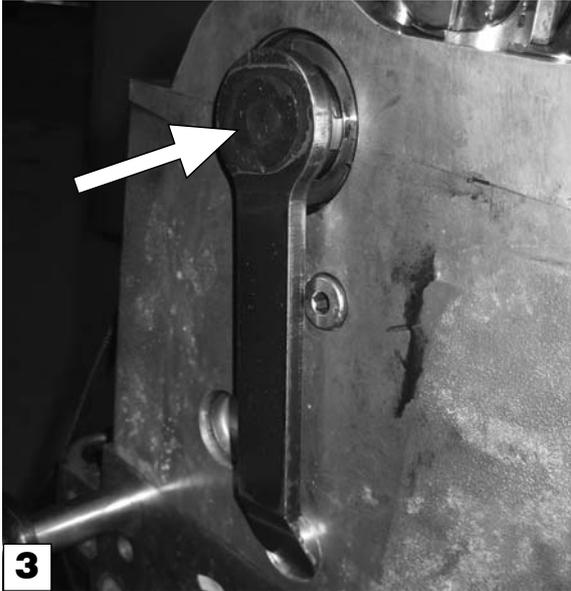
Fit AST5032 Crankshaft Locking Tool onto the crankshaft at the same time engaging the clamp pin through the engine mounting in the cylinder block using the **stepped pin**.

NOTE: When the engine is removed from the vehicle, or the engine mounting is removed, the alternative **straight pin** is positioned directly into the cylinder block.



Attach the Crankshaft Locking Tool onto the crankshaft with the screw provided.

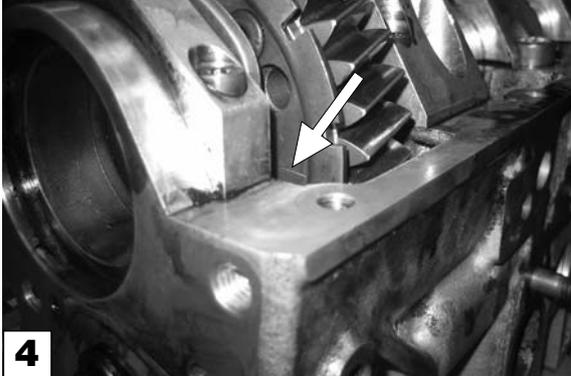
NOTE: The Crankshaft Locking Tool fits in only one position on the crankshaft. If it is not possible to fit the Locking Tool, re-fit AST5031 and turn the crankshaft one revolution, in the direction of engine rotation, until the marks on AST5031 and the sealing flange align again.



AST5033 Camshaft Locking Tool

AST5032 is used to accurately align a datum slot, located in the end of the camshaft with a datum hole in the cylinder head, to hold the camshaft at the TDC position.

Fit the AST5033 Camshaft Locking Tool in position.



Check the position of the camshaft gear.

The timing is correct when the marking arrow on the sender wheel is aligned with the upper edge of the cylinder head sealing surface as in picture 4.

If the marking arrow does not align, adjustment of the valve timing will be necessary.

Adjusting the valve timing.

When adjusting the valve timing, removing and installing the cylinder head, removing and installing the camshafts, it is necessary to remove the camshaft drive gear

Removing camshaft drive gear

It will be necessary to remove the acoustic cover, cylinder head cover and the tandem pump.

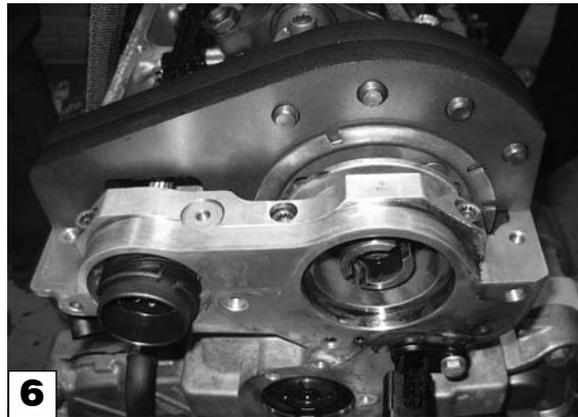


Position the crankshaft at TDC for cylinder number 1.

Position AST5031 Crankshaft TDC Position Tool onto the crankshaft; turn the crankshaft in the direction of engine rotation aligning the marks on AST5031 and the sealing flange.

NOTE: The Crankshaft Locking Tool fits in only one position on the crankshaft.

The crankshaft is now timed in the correct position with number 1 cylinder at TDC.



AST5034 Camshaft Gear Clamp

AST5034 Camshaft Gear Clamp is used to support the camshaft gear to allow the camshaft gear fixing bolt to be removed.

Remove the outer bearing cap and position AST5034 Camshaft Gear Clamp onto the camshaft gear and tighten the four bolts to 40 Nm.

Loosen the fixing bolt of the camshaft gear and remove with the tandem pump shaft.

Release the four bolts securing the Camshaft Gear Clamp and remove AST5034.

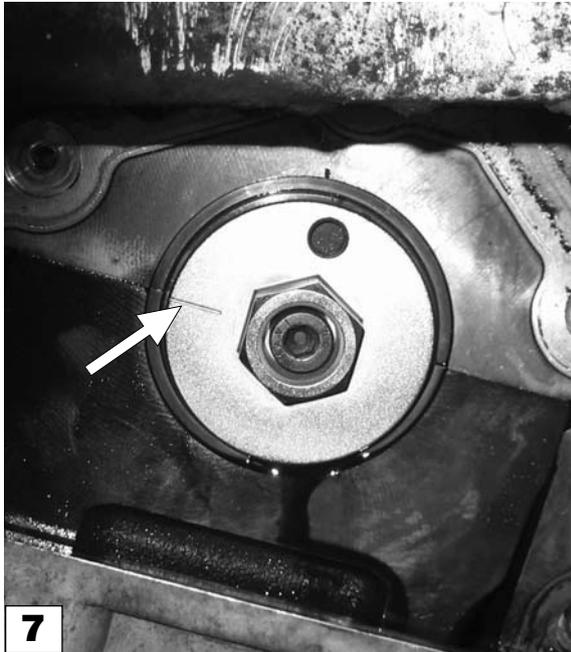
Remove the camshaft gear from the camshaft.

Unbolt the sealing cover from the eccentric pin, removing the securing bolt and pulling the eccentric pin out.

Remove the camshaft drive gear.

IMPORTANT: Care must be taken when removing the camshaft drive gear and the compensating link.

Installing camshaft drive gear

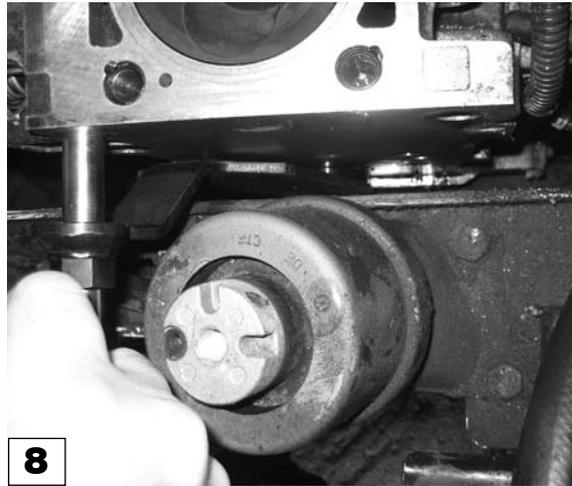


Position AST5031 Crankshaft TDC Position Tool onto the crankshaft; turn the crankshaft in the direction of engine rotation aligning the marks on AST5031 and the sealing flange.

NOTE: The Crankshaft Locking Tool fits in only one position on the crankshaft.

The crankshaft is now timed in the correct position with number 1 cylinder at TDC.

Remove AST5031 Position Tool.

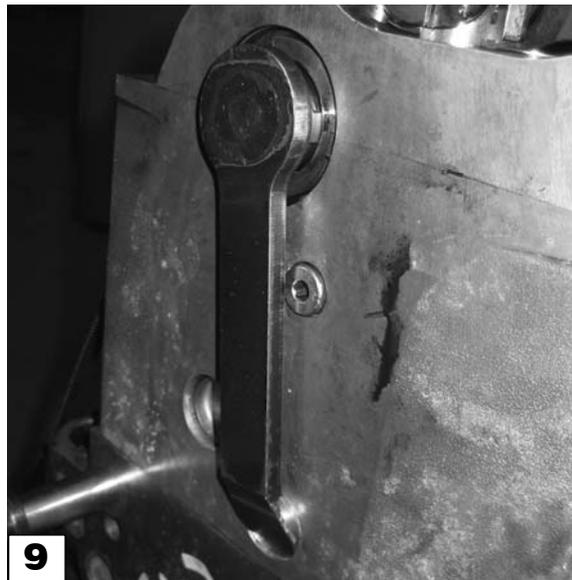


Fit AST5032 Crankshaft Locking Tool onto the crankshaft at the same time engaging the clamp pin through the engine mounting on the cylinder block using the **stepped pin**.

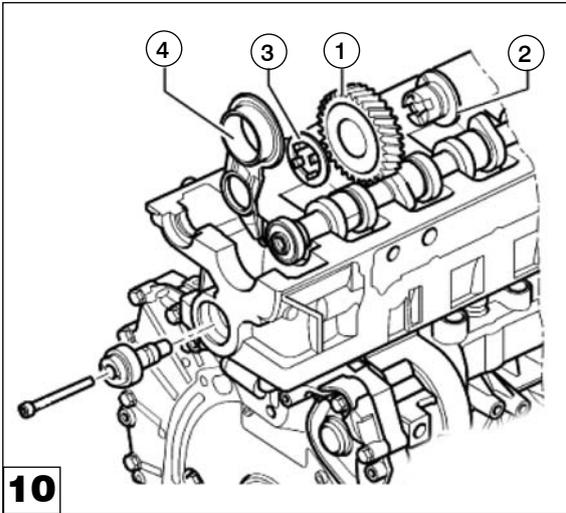
NOTE: When the engine is removed from the vehicle, or the engine mounting is removed, the alternative **straight pin** is positioned directly into the cylinder block.

Attach the Crankshaft Locking Tool onto the crankshaft with the screw provided.

NOTE: The Crankshaft Locking Tool fits in only one position on the crankshaft. If it is not possible to fit the Locking Tool, re-fit AST5031 and turn the crankshaft one revolution, in the direction of engine rotation, until the marks on AST5031 and the sealing flange align again.



Fit AST5033 Camshaft Locking Tool in position.

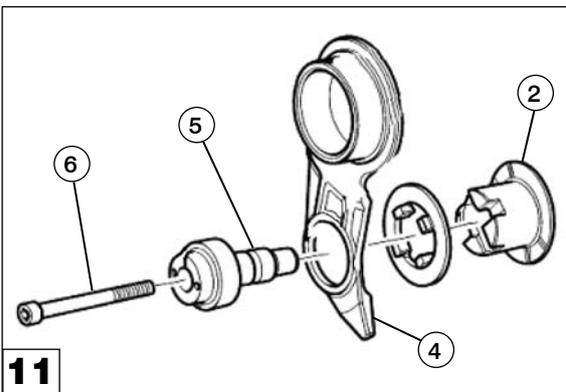


10

Install the camshaft drive gear (1) onto the guide sleeve (2) ensuring all surfaces of the guide sleeve are oiled.

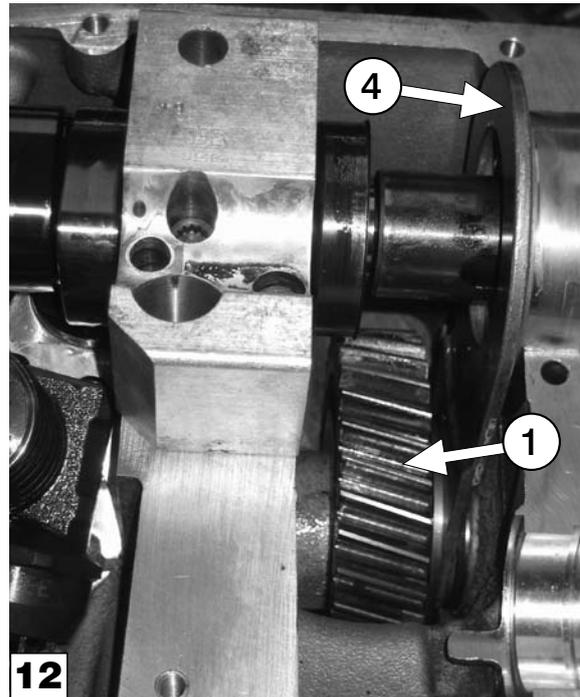
Install the disc (3) engaging the lugs in the grooves of the guide sleeve (2).

Install the drive gear (1) with disc (3) and the guide sleeve (2) on the compensating link plate (4).



11

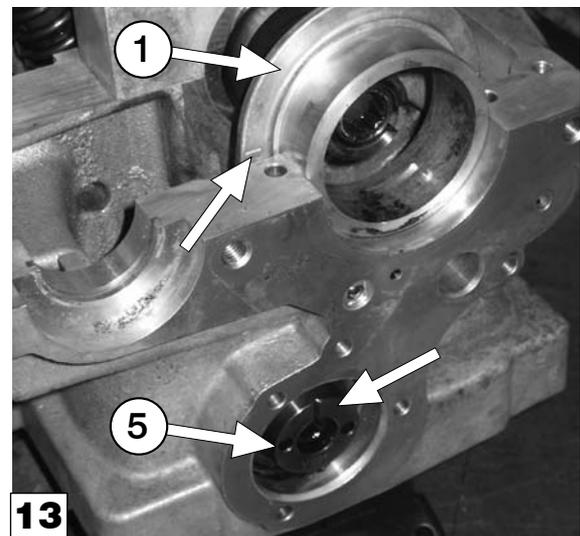
WARNING: The marks on the guide sleeve (2) and the link plate (4) must align.



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Guide the link plate (4) and the camshaft drive gear (1) into the gear cavity from above.

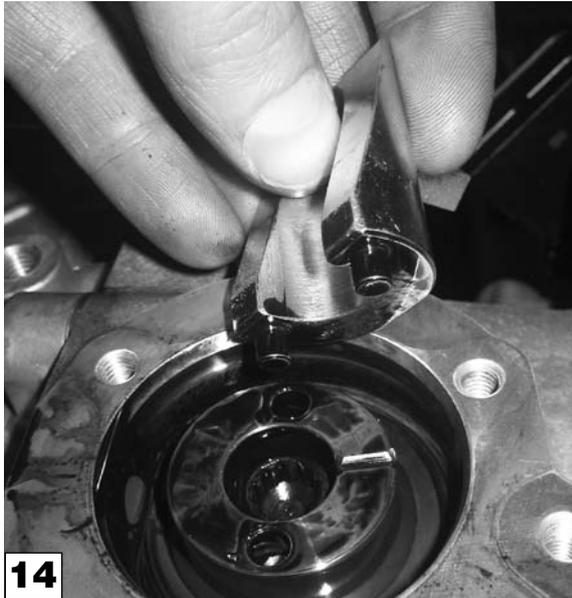
Refit the outer bearing cap and tighten hand tight.



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AST5036 Eccentric Pin Holding Tool

Install the eccentric pin (5), oiling all surfaces, ensuring that the marking on the eccentric pin (5) is vertical and uppermost; with the marking on the link plate (1) aligning with the sealing surface of the cylinder head.



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AST5036 is used to turn and hold the eccentric pin in the installed position whilst securing with a new bolt.



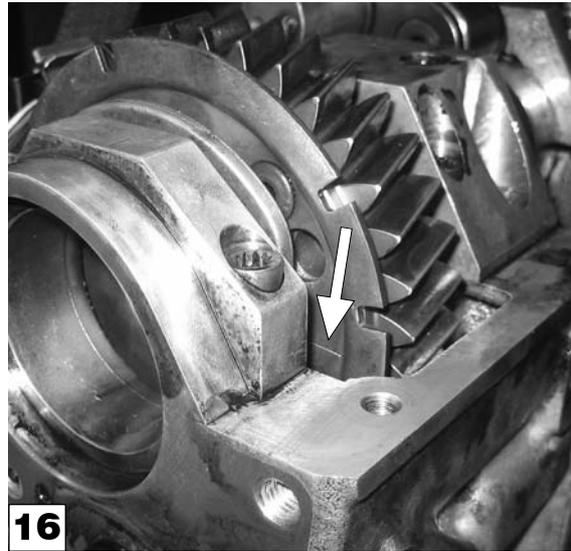
15

Install a new securing bolt **(6) (picture 11)** for the eccentric pin **(5) (picture 11)** and tighten by hand, then unscrew back approximately one thread pitch.

Position AST5036 Eccentric Pin Holding Tool with a torque wrench into the holes of the eccentric, turning the eccentric pin carefully **anti-clockwise** and tighten to **50Ncm**

Whilst holding the eccentric pin in this position, tighten new securing bolt to **20Nm + 90°**
Remove the outer bearing cap.

Install the outer bearing cap using sealant and tighten with new bolts to **8Nm + 90°**



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Position the camshaft gear wheel onto the camshaft ensuring that the marking arrow on the sender wheel aligns with the upper edge of the cylinder head sealing surface.

Using a new bolt secure the camshaft gear wheel and the tandem pump shaft, tighten bolt finger tight. At this point the camshaft gear wheel can still turn.

NOTE: Lubricate the gear wheel teeth with engine oil prior to installation.

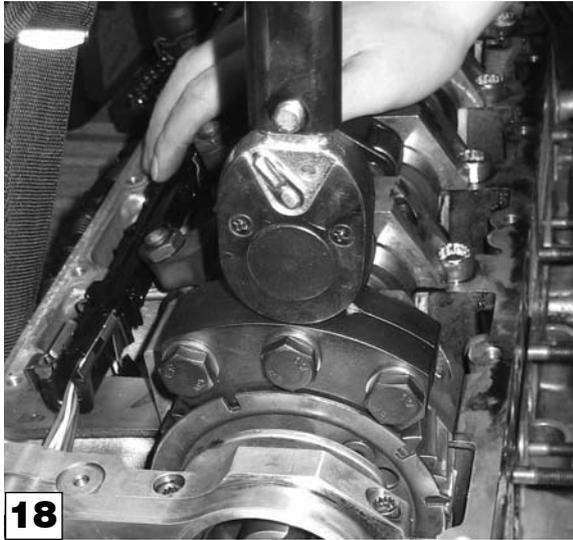


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AST5037 Camshaft Gear Adjuster

AST5037 is used to eliminate play in the gear train before tightening the camshaft gear securing bolt.

Position AST5037 Camshaft Gear Adjuster onto the camshaft gear and tighten the three bolts to **70Nm** to clamp the adjuster onto the camshaft gear.



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Using a suitable torque wrench in the square drive of the Camshaft Gear Adjuster exert a force of **80 Nm** in the **opposite** direction of engine rotation to remove play from the gear train.

Whilst maintaining this force, tighten the camshaft gear securing bolt to **50 Nm**.

NOTE: Tightening this camshaft gear securing bolt will require the assistance of a second mechanic.

Remove the Camshaft Gear Adjuster.



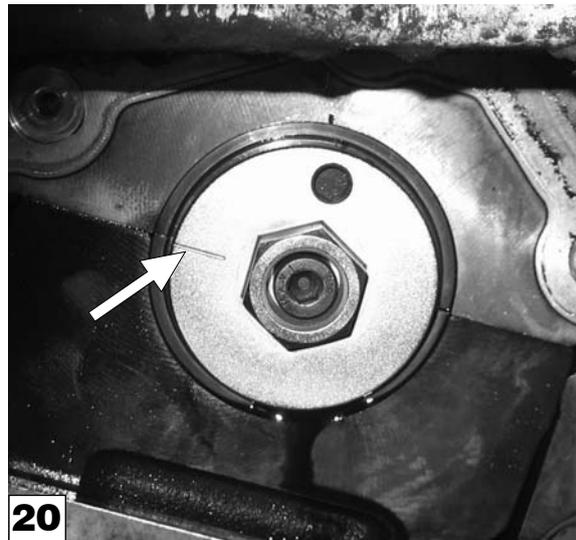
19

Position AST5034 Camshaft Gear Clamp onto the camshaft gear and tighten the four bolts to **40 Nm**.

NOTE: Ensure that the clamp plate fits fully on to the surface of the cylinder head with no gap.

Tighten camshaft gear securing bolt to **150 Nm + 90°**
Remove **all** tools.

Install the tandem pump, cylinder head cover and acoustic cover.



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Using AST5031 Crankshaft TDC Positioning Tool rotate the engine in direction of engine rotation twice until the crankshaft is set again to TDC No.1 cylinder.

Refit AST5032 Crankshaft Locking Tool and AST5033 Camshaft Locking Tool to check the timing position - as described in "**Checking valve timing**".

Remove **all** tools.

7/7
5035.01

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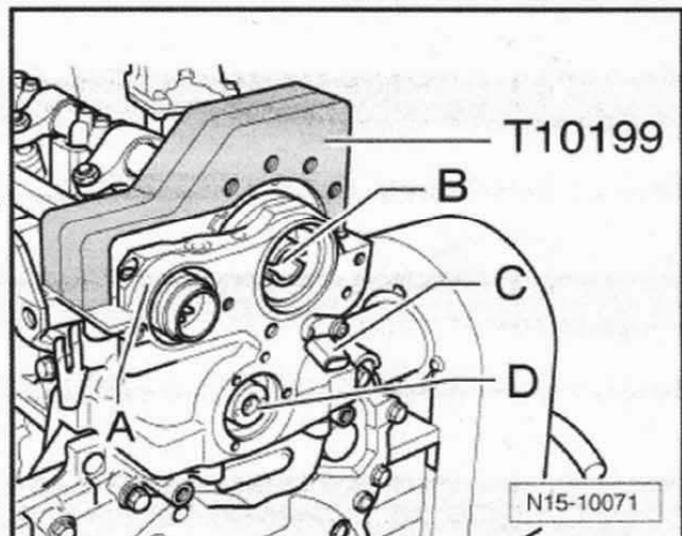
Rueda de mando para árbol de levas: desmontar y montar

Herramientas especiales, equipos de comprobación y medición y dispositivos auxiliares necesarios

- ◆ Vaso -T10198-
- ◆ Dispositivo de apriete -T10199-
- ◆ Elemento de presión -T10199/1-
- ◆ Llave -T10211-
- ◆ Terminal insertable -T10234-
- ◆ Llave dinamométrica -V.A.G 1331- (5...50 Nm)
- ◆ Llave dinamométrica -V.A.G 1332- (40...200 Nm)
- ◆ Llave dinamométrica 50 - 100 Ncm -VAS 6253-

Desmontar:

- Situar el motor en PMS cilindro 1 → Capítulo.
- Desmontar los tubos del aire de sobrealimentación entre intercooler/turbocompresor e intercooler/boca de aspiración.
- Desmontar el apoyo del colector de admisión.
- Desmontar el tubo de unión de la recirculación de gases de escape.
- Desmontar la tapa del motor y la tapa de la culata → Pos..
- Desmontar la bomba tándem → Capítulo.
- Soltar el conector central de las unidades inyector-bomba y desbloquear el conector de la culata con la llave -T10211-.
- Desmontar el sombrerete exterior -A-. Colocar el útil de apriete -T10199- sobre la rueda del árbol de levas y apretar sus tornillos al par de 40 Nm.
- Aflojar el tornillo de fijación -B- de la rueda del árbol de levas con el vaso -T10198- y desenroscarlo junto al eje de la bomba tándem.
- Quitar la rueda del árbol de levas.
- Desmontar el sensor Hall -G40--C- para la posición del árbol de levas.
- Desenroscar el tapón del perno excéntrico.
- Aflojar el tornillo de fijación -D- y desenroscar el perno excéntrico.
- Extraer con cuidado la rueda de impulsión con la leva de compensación.



Montar:

! ¡Atención!

Existe el riesgo de que se produzcan daños en el motor.

Al montar un disco de diamante que ya haya estado montado, no queda garantizada la fijación correcta de la rueda de mando en el árbol de levas.

¡Utilizar un disco de diamante nuevo!

- Aplicar aceite a toda la superficie del casquillo guía -4-.
- Colocar la rueda de impulsión del árbol de levas -3- sobre el manguito guía.
- Colocar la arandela -2- como se muestra.

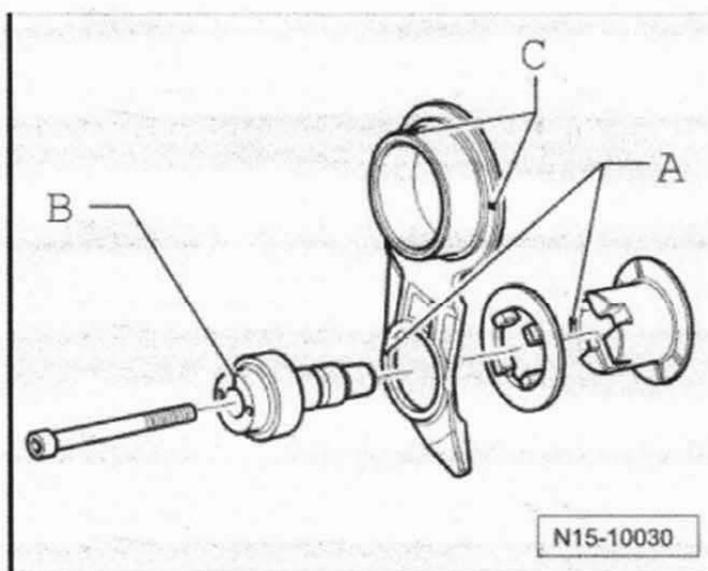
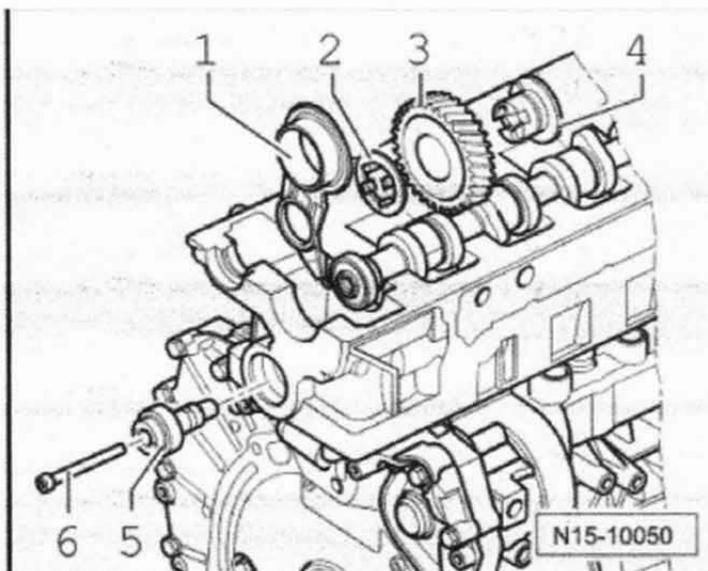
i Aviso

Las pestañas de la arandela deben encajar en las ranuras del manguito guía.

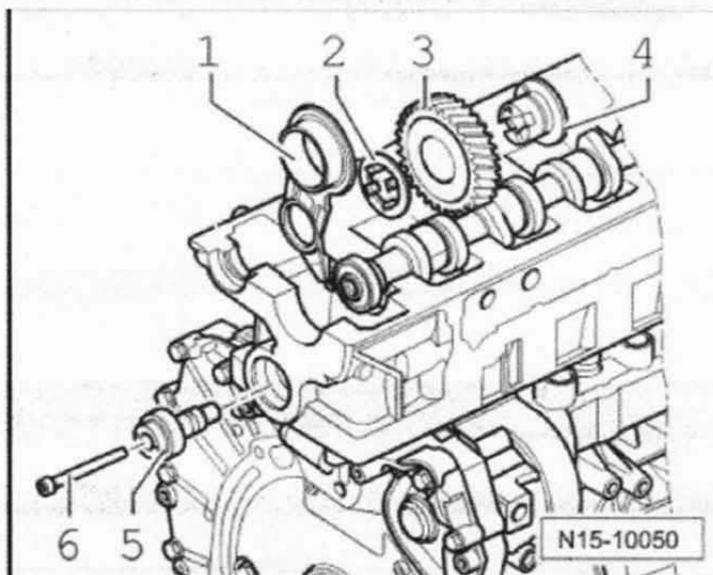
- Colocar la rueda de impulsión con arandela y casquillo guía en la leva de compensación -1-.

i Aviso

Las marcas -A- del casquillo guía y de la leva de compensación tienen que coincidir.



- Introducir cuidadosamente desde arriba en la ranura del engranaje la leva de compensación junto con la rueda de accionamiento del árbol de levas.
- Aplicar aceite a toda la superficie del perno excéntrico -5-.

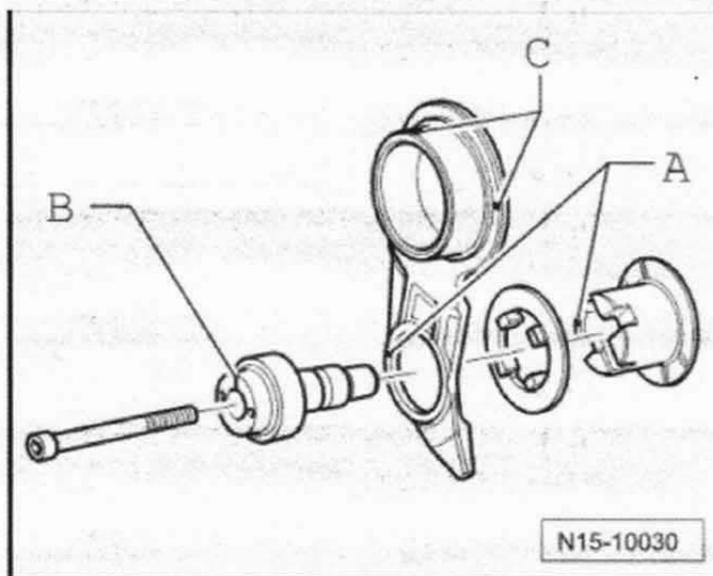


- Montar el perno excéntrico. La marca -B- del perno excéntrico debe señalar perpendicularmente hacia arriba.

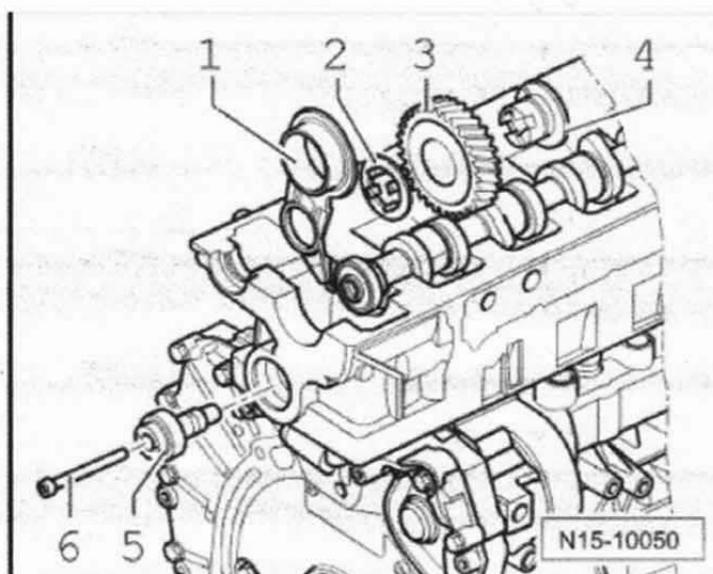
i **Aviso**

Las marcas -C- deben coincidir con la superficie de estanqueidad de la culata.

- Colocar los sombreretes exteriores y apretarlos manualmente.



- Colocar un tornillo de fijación nuevo -6- para el perno excéntrico y apretarlo primero manualmente hasta que falte una vuelta para llegar al tope.
- Colocar la herramienta insertable - T10234- con la llave dinamométrica 50 - 100 Ncm -VAS 6253- en los orificios del perno excéntrico.



- Girar con cuidado el perno excéntrico a 50 Nm en el sentido contrario al de las agujas del reloj.
- Retener el perno excéntrico en esa posición y apretar el tornillo de fijación nuevo del perno excéntrico.

Par de apriete: 20 Nm + $\frac{1}{4}$ de vuelta (90°)

- Retirar de nuevo el sombrerete exterior.
- Introducir cuidadosamente el conector central de los conjuntos inyector-bomba en la culata.
- Colocar los sombreretes exteriores con sellante y apretarlos con tornillos nuevos.

Par de apriete: 8 Nm + $\frac{1}{4}$ de vuelta (90°)



Aviso

Sellar las superficies de contacto de los sombreretes exteriores con sellante adhesivo de silicona -D 176 501 A1- → fig..

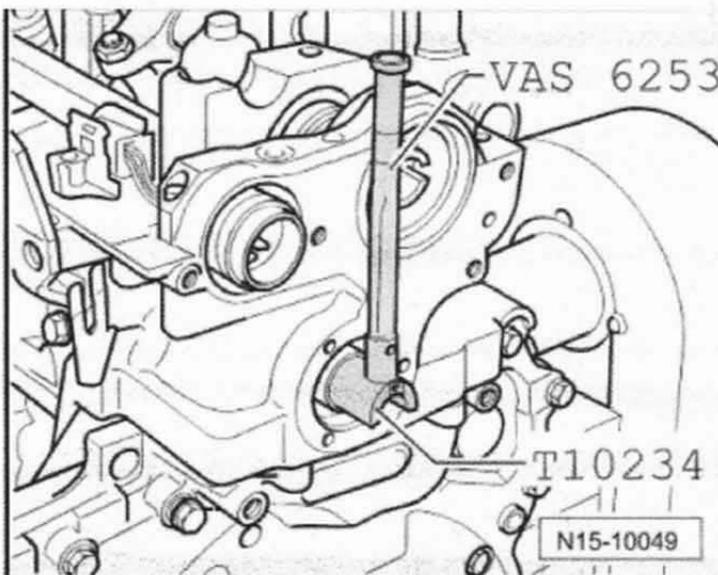
- Bloquear el conector central con la llave -T10211-.
- Atornillar la tapa del perno excéntrico y el sensor Hall -G40-.

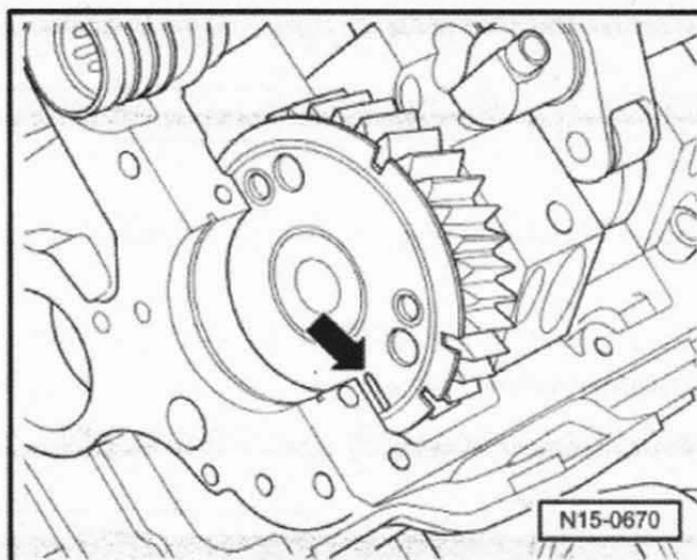
Par de apriete: 10 Nm



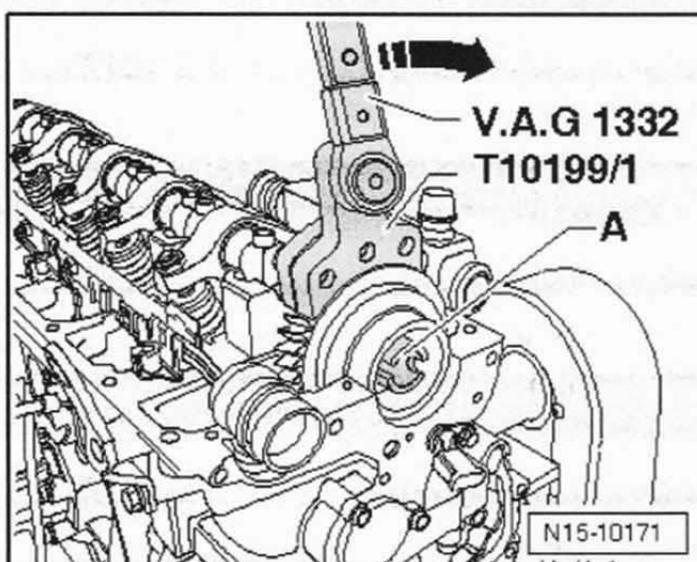
Aviso

- ◆ Antes de montar la rueda del árbol de levas, comprobar que la arandela asiente correctamente sobre el árbol de levas.
- ◆ Debe aplicarse aceite a la superficie completa del dentado de la rueda del árbol de levas.
- Colocar la rueda del árbol de levas sobre el árbol de levas de manera que la marca de la rueda generatriz -flecha- coincida con el borde superior de la superficie de sellado de la culata.
- Apretar manualmente el tornillo de fijación nuevo de la rueda del árbol de levas y el árbol de la bomba tándem. (la rueda del árbol de levas debe poder girarse todavía)





- Colocar el útil de apriete -T10199/1- como se muestra y apretar los tornillos a 70 Nm.
- Montar una llave dinamo-métrica -V.A.G 1332- en la parte cuadrada del útil de apriete y apretar con 80 Nm en el sentido contrario al giro del motor para eliminar el juego de los piñones.
- Mantener la fuerza especificada y apretar el tornillo de fijación -A- de la rueda del árbol de levas con el vaso XZN 16 -T10198- con un par de apriete de 50 Nm.



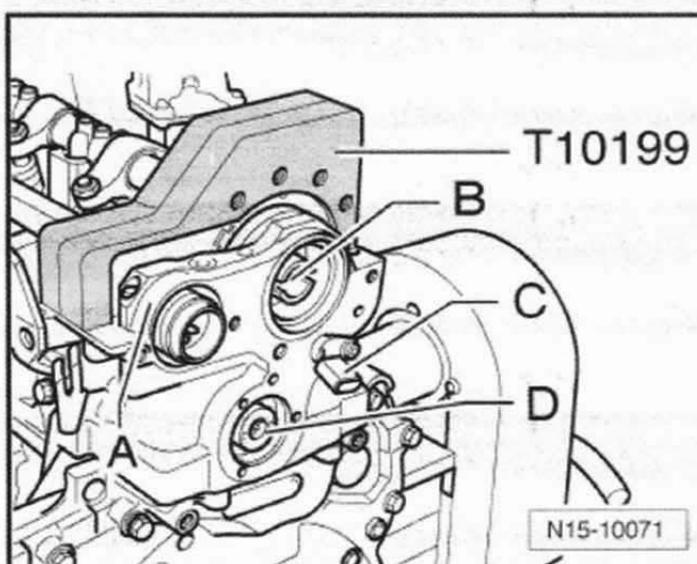
- Retirar el útil de apriete -T10199/1-.
- Colocar el dispositivo de apriete -T10199- sobre la rueda del árbol de levas.

Aviso

Asegurarse de que el dispositivo de apriete -T10199- quede al ras con la culata.

- Apretar los tornillos del dispositivo de apriete -T10199- a 40 Nm.
- Apretar a continuación la rueda del árbol de levas con el vaso XZN 16 -T10198-.

Par de apriete: 150 Nm + 1/4 de vuelta (90°)



- Retirar el dispositivo de apriete - T10199-.
- Retirar los elementos fijadores del árbol de levas y del cigüeñal.
- Montar la bomba tándem → Capítulo.
- Montar la tapa de la culata y la tapa del motor → Pos..
- Dar 2 vueltas más al cigüeñal en el sentido de giro del motor hasta situarlo de nuevo en el PMS para cilindro 1.
- Comprobar si pueden encajarse a la vez los fijadores del árbol de levas y del cigüeñal.
- Montar la nueva tapa de sellado del árbol e levas.
- Montar la nueva tapa de sellado del cigüeñal.
- Montar los tubos del aire de sobrealimentación entre intercooler/turbocompresor e intercooler/boca de aspiración.
- Montar el apoyo del colector de admisión.
- Montar el tubo de unión de la recirculación de gases de escape.