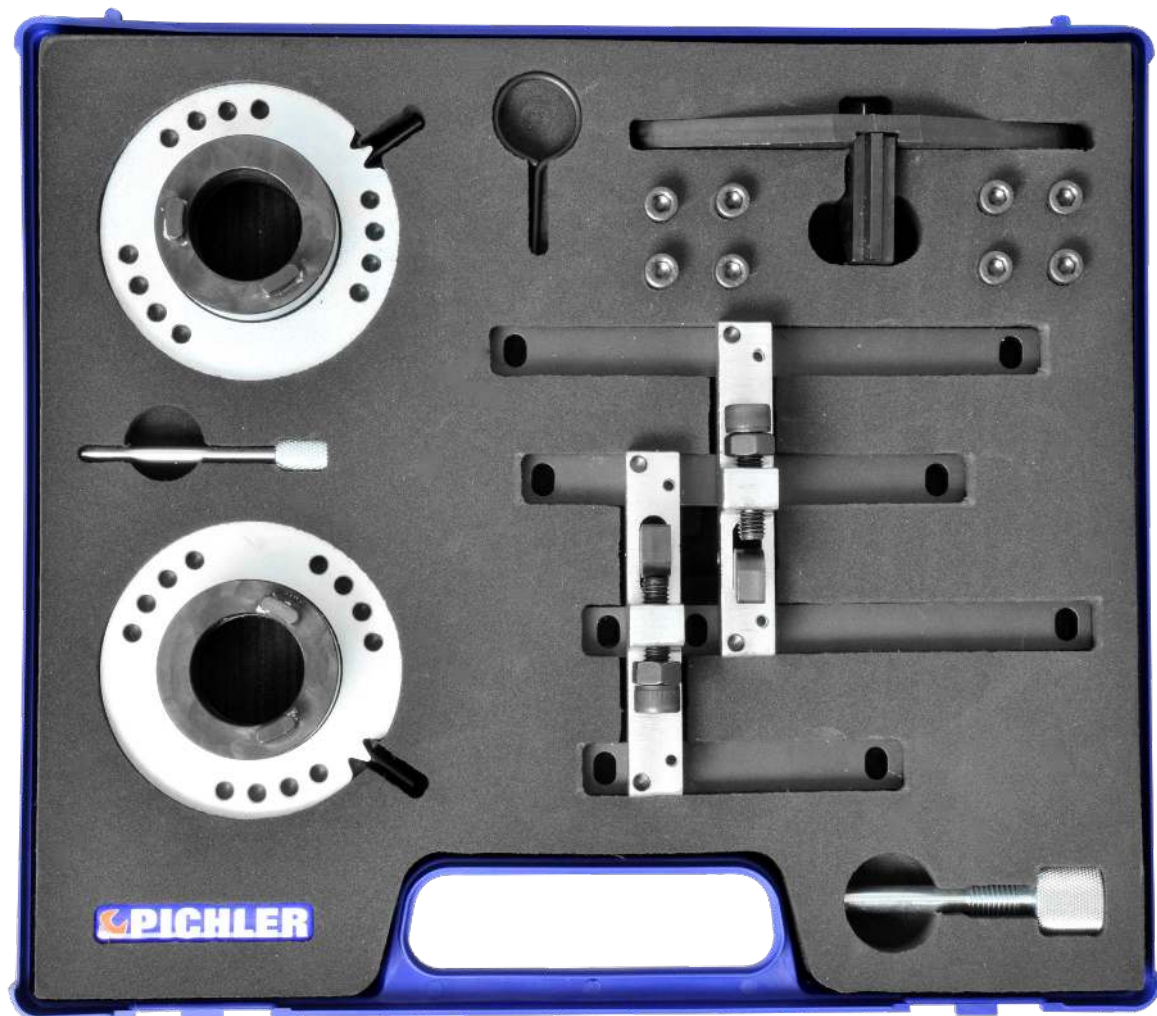




TIMING TOOL FORD PETROL ENGINE

1.0 SCTI ECOBOOST 3-CYLINDER ENGINE

Manual

43018100



SAFETY NOTICE

To understand the functioning of the tools, is it necessary to read the manual first!

- > Read these instructions before assembling, during installation and throughout use and in the proper sequence
- > Always refer to the OEM manufacturer's instructions and service manuals for the latest data and to maintain the correct sequence
- > These work instructions and the recommended tools are meant to serve as aides only and are by no means a guarantee for certain results.
- > This tool kit is a special collection and it has been tested and used successfully on several occasions. It is of the utmost importance to maintain the correct procedure as per the instructions
- > The use of the tools should only be carried out by qualified personnel!



ATTENTION

Special caution



CORRECT



LIGHT BULB

Hint or recommendation



WRONG



SAFETY GOGGLES

Wearing safety goggles
necessary

1.0 'Ecoboost' 3 Cylinder (Belt in oil) Petrol engines in:

Ford:

Fiesta	Ecosport
B-Max	Transit Courier
Focus	Tourneo Courier
C-Max	Transit Connect
Grand C-Max	Tourneo Connect

Engine codes:

M1CA, M1JE, M2GA, SFCA, SFJC, M1CB, M1JH, M2GB, SFCB, SFJD, M1DA, M1JJ, P4JA, SFCC, XMJA, M1DD, M2DA, P4JB, SFCD, XMJB, M1JA, M2DB, P4JC, SFJA, XMJC, M1JC, M2DC, P4JD, SFJB, XMJD

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.

Associated tools:

10377160 5:1 Torque Multiplier

OE Ref: 303-1611, 303-1611-01, 303-1611-02



Nr.	Description
1	Camshaft Locking Tool Set
2	Camshaft VVT Adjustment Tool Set
3	Crankshaft Setting Pin
4	Flywheel Locking Tool
5	Tensioner Locking Pin
6	Crankshaft Pulley Positioning Pin
-	Case + Insert

INTRODUCTION

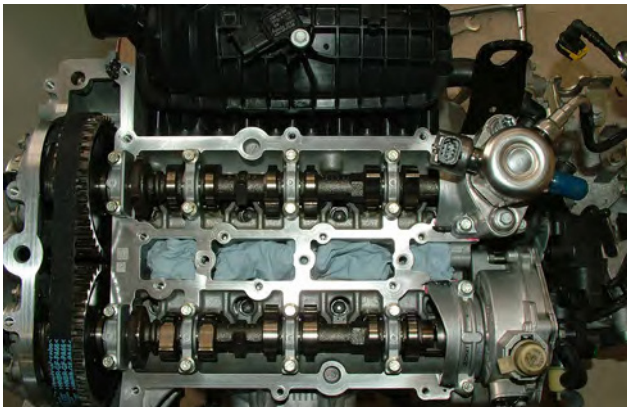
Introduced in 2011, the Ford 1.0 turbo, 3 cylinder, Ecoboost (SCTi) petrol engine is fitted in various cars and light commercial vehicles across the Ford range. Since its introduction in the 2011 model year Focus it has gained numerous awards, most notably winning International engine of the year' for 3 consecutive years (2012, 2013 & 2014).

The engine features a wet timing belt (belt in oil) that runs between the crankshaft and the twin camshaft VVT sprockets. The timing belt is a conventional arrangement, the exception being that the belt is encased in the engine and runs in oil, in a similar setup as a chain engine.

ENGINE TIMING BELT REPLACEMENT

Removal

Remove the engine top covers.



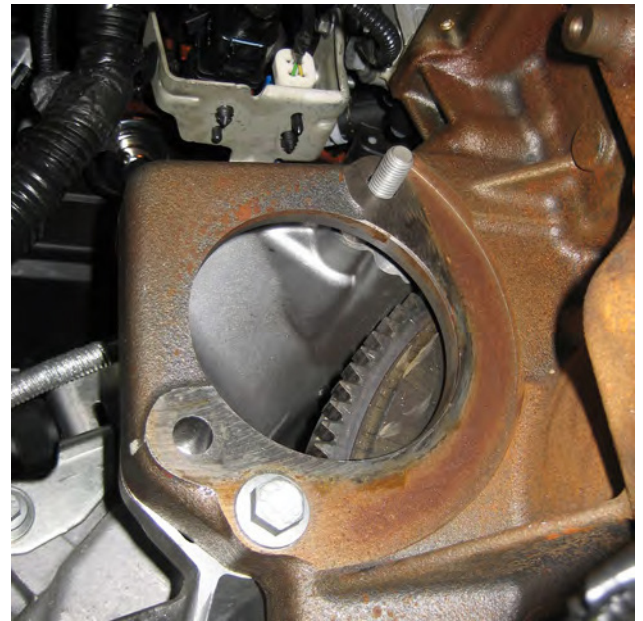
Remove the fuel rail, fuel pump, air intake and vacuum hoses fitted above the camshaft cover. Remove the ignition coil packs, spark plugs and the camshaft cover.

WARNING: The fuel system is under VERY HIGH PRESSURE and is EXTREMELY HAZARDOUS.

Relieve fuel system pressure before disconnecting any components of the fuel system. This can be carried out by removing the fuse for the fuel feed pump and running the engine until it is starved of fuel.



Disconnect the electrical connections of the VVT solenoids and remove the inlet and exhaust VVT solenoid units from the timing belt cover.



Remove the engine undershield and the right hand inner wing shield to give access to the crankshaft pulley and the starter motor. Remove the starter motor from the engine.



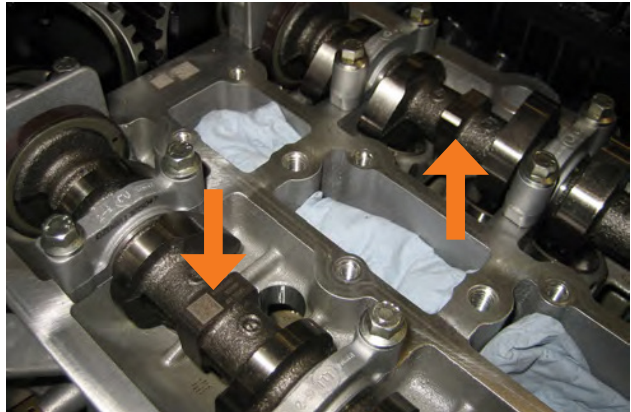
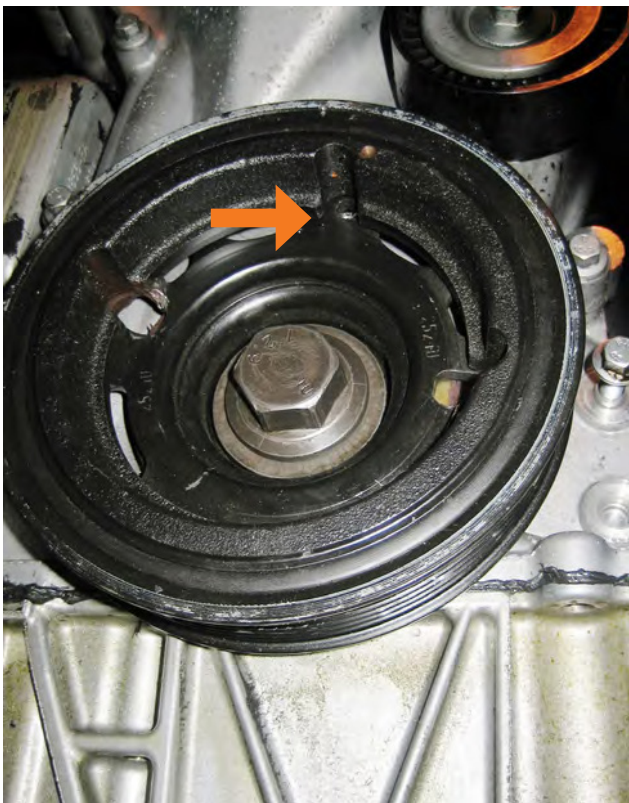
Remove the blanking plug for the crankshaft timing pin position.

NOTE: When locating the blanking plug, be aware that it may be obscured by the driveshaft.



Fit **43018103** Crankshaft setting pin, ensuring that it is fully located in the engine block.

Slowly rotate the crankshaft pulley in the normal direction of engine rotation until the crankshaft contacts **43018103** Crankshaft setting pin.

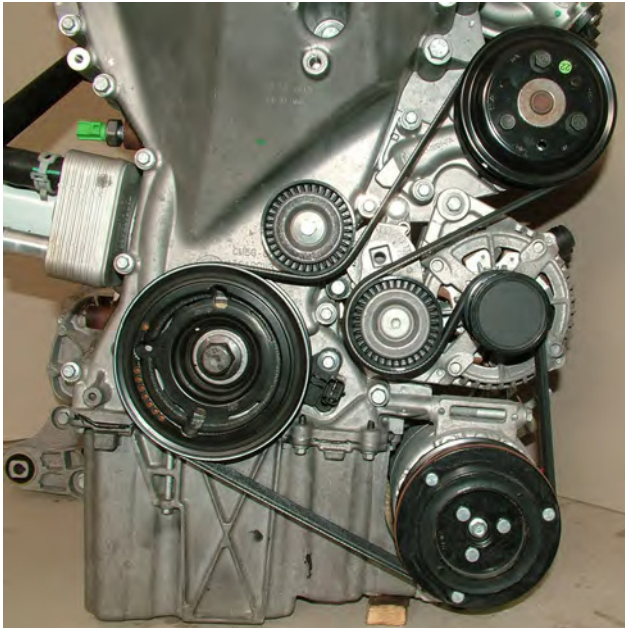


Check that the timing hole in the crankshaft pulley is positioned at approximately 1 o'clock relative to the central bolt. Check that the camshafts are positioned with the location flats on the sides and uppermost section of each camshaft.

If the camshafts are not in the correct position, remove **43018103** pin and rotate the crankshaft pulley $\frac{3}{4}$ of a turn in the normal direction of engine rotation. Refit **43018103** crankshaft setting pin and rotate crankshaft until the crankshaft contacts the pin.



Fit **43018104** Flywheel locking tool in the aperture for the starter motor, using the adjustable tooth to lock the flywheel. Ensure that the crankshaft remains in the correct timing position, contacting **43018103** pin, when locking the flywheel.



Release tension from the auxiliary drive belt and remove the belt and tensioner from the engine.

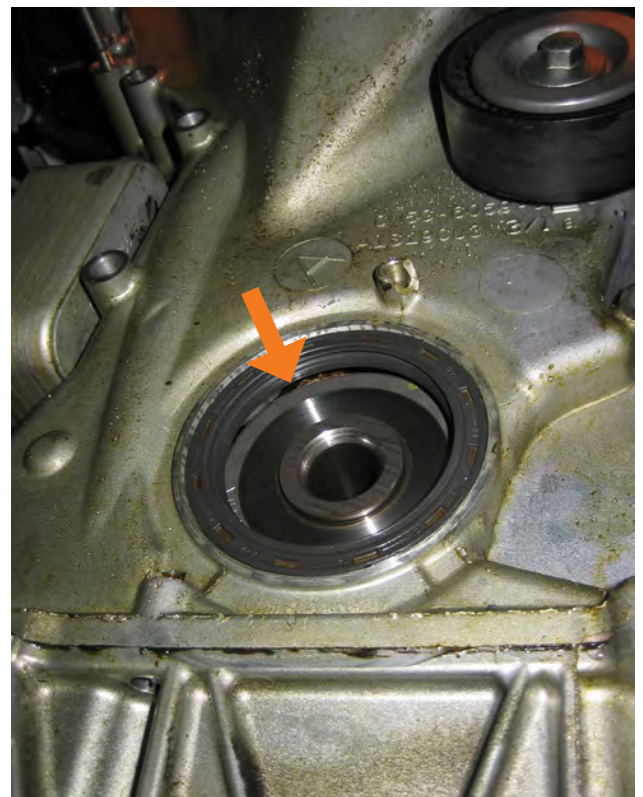
Mark direction of rotation of the auxiliary belt if it is to be refitted. Remove the alternator and detach the air conditioning pump from the engine.



Remove and discard the crankshaft pulley central bolt.

IMPORTANT: The crankshaft pulley central bolt is tightened to a very high torque. Ford data specifies the use of a 5:1 torque multiplier and mounting bracket (Ford tool references: 303-1611 & 303-1611-01) to aid removal of crankshaft pulley central bolt.

WARNING: The crankshaft sprocket is 'floating' (it is not locked on to the crankshaft using a drive key), therefore the crankshaft is free to turn independently of the timing belt once the crankshaft pulley bolt has been released. Ensure that the crankshaft remains locked in the correct timing position using **43018103** and **43018104** until the crankshaft pulley has been refitted and the pulley central bolt has been tightened to the specified torque value.

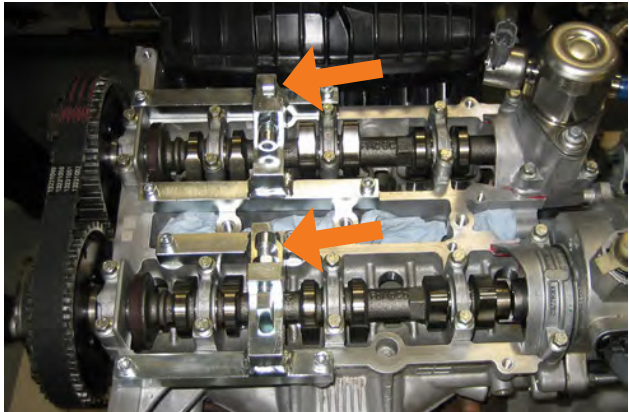


Remove the crankshaft pulley and remove the crankshaft oil seal from the timing belt cover, taking care not to damage the sealing face of the cover.

IMPORTANT: Take care not to damage the sensor ring (reluctor) on the rear of the pulley when removing or refitting the pulley.



Support the engine using a safe, suitable method. Detach and remove the engine mount from the timing belt cover and the vehicle body.



Loosely position on to the Inlet camshaft and on to the Exhaust camshaft.

Tighten locking screws of the camshaft tools finger tight only, ensuring that the camshaft tools are positioned correctly on the camshafts. Secure the camshaft tools to the cylinder head by tightening the 8 retaining bolts to 10 Nm.



Remove the engine timing belt cover.

NOTE: The timing belt cover retaining bolts are different lengths. Take note of the location of each bolt upon removal, ensuring that the same length bolt is used when the engine is reassembled.



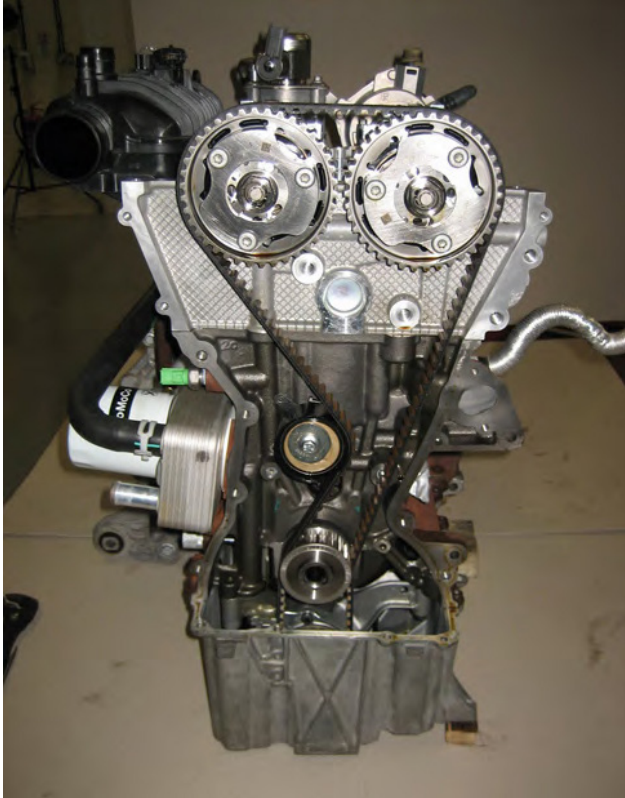
Depress the belt tensioner, releasing tension from the timing belt. Lock the belt tensioner in position using Tensioner Locking Pin.

Remove and discard the used timing belt.

INSTALLATION

Ensure that the camshafts and crankshaft are set in the correct timing position using **43018103** crankshaft setting pin and **43018101** camshaft setting plate set.

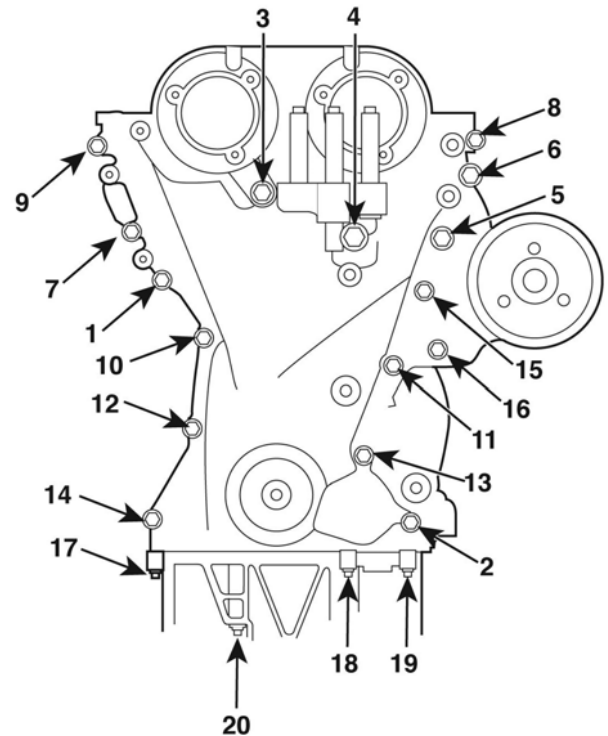
Ensure that the flywheel is securely locked using **43018104** flywheel locking tool.



Fit the timing belt in an anti-clockwise direction starting at the crankshaft sprocket, then the exhaust camshaft sprocket, inlet camshaft sprocket and finally onto the tensioner pulley.

Check that the belt is taut between the crankshaft, exhaust camshaft and inlet camshaft.

Remove Tensioner Locking Pin from the tensioner to apply tension to the belt.



Ensure that the mating faces of the timing belt cover and the engine are clean and free from oil or grease. Apply a 4 mm bead of sealant to the mating faces of the timing belt cover, increasing the bead size to 6 mm at the top and bottom edges of the cover, and around the holes in the sealing face of the cover.

IMPORTANT: The cover must be fitted within 10 minutes of applying the bead of sealant. No sealant can be allowed to enter the engine or sump as this can block oilways and cause serious damage to engine components. New timing belt cover retaining bolts are required.

Fit the timing belt cover, tightening the new bolts in the order shown (1-20), to the specified torque settings:

- Tighten bolts 1-2 to 5 Nm
- Tighten bolts 3-6 to 10 Nm
- Tighten bolts 7-20 to 5 Nm
- Tighten bolts 3-6 to 40 Nm
- Tighten bolts 3-6 to 70 Nm+90° v
- Tighten bolts 1 & 2 to 9 Nm+90°
- Tighten bolts 7-20 to 15 Nm+90°



Fit a new crankshaft oil seal into the timing belt cover.



VVT adjustment tool set is fitted in to the solenoid valve aperture of each camshaft, safely locking the camshaft VVT units in position while fitting the crankshaft pulley central bolt.

Ensure that the central boss of each tool moves freely in the outer ring of the tool before fitting them to the engine.

Fit VW Alignment Tool Set in to the inlet camshaft VVT unit, attaching the outer ring to the timing belt cover using 3 screws tightened to 10 Nm. Apply an anti-clockwise force to the central boss to take up any play in the VVT unit, then tighten the 6 locking screws to 15 Nm.

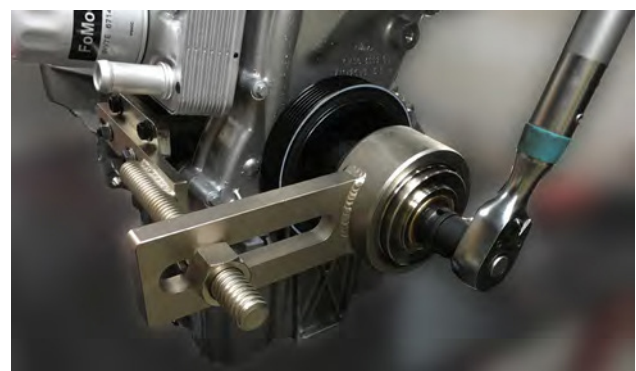
Fit Locking Pin into the exhaust camshaft VVT unit, attaching the outer ring to the timing belt, using 3 screws tightened to 10 Nm. Apply an anti-clockwise force to the central boss to take up any play in the VVT unit, tighten the 6 locking screws to 15Nm.



Using a new bolt, fit the crankshaft pulley into the crankshaft, finger tight only at this stage.

Take care not to damage the reluctor ring on the rear of the crankshaft pulley.

Ensure that the alignment hole of the pulley is positioned at approximately at 1 o'clock relative to the pulley central bolt. Insert Crankshaft pulley setting pin through the alignment hole in the pulley and into the alignment hole on the engine block.



WARNING: The central bolt of the crankshaft pulley is tightened to a very high torque. Ford specify that a 5:1 torque multiplier and mounting bracket must be used for removal and installation of the crankshaft pulley central bolt.

10377160 is equivalent to Ford Torque Multiplier tool ref's 303-1611, 303-1611-01 & 303-1611-02.

Tightening of the crankshaft pulley central bolt is carried out in 3 stages.

Stage one: Tighten the bolt to 25 Nm.

Stage two: Tighten the bolt to 70 Nm.

IMPORTANT: Remove crankshaft pulley setting pin before continuing to stage three.

Stage three: Install **10377160** Torque Multiplier Set, tighten the torque multiplier to 60Nm + 5x90°.

Remove the torque multiplier, refit **43072605** pin into the crankshaft pulley alignment hole to check that the pulley is correctly aligned.

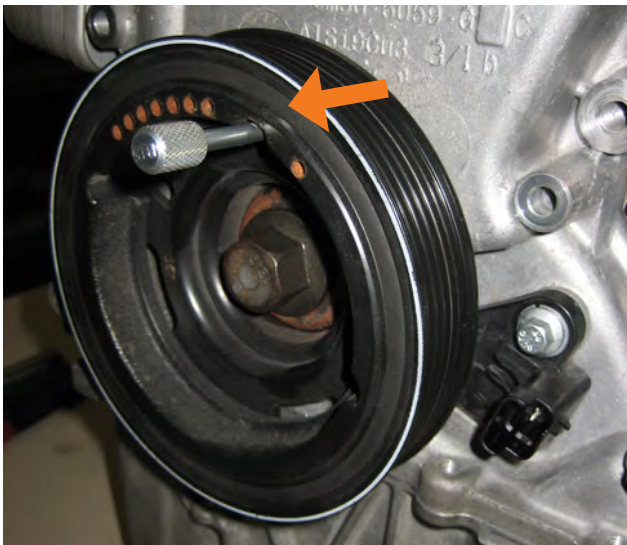
Remove all tools from the engine.

Rotate crankshaft 1 & ¾ turns in normal direction of engine rotation.



Refit **43018103** crankshaft timing pin.

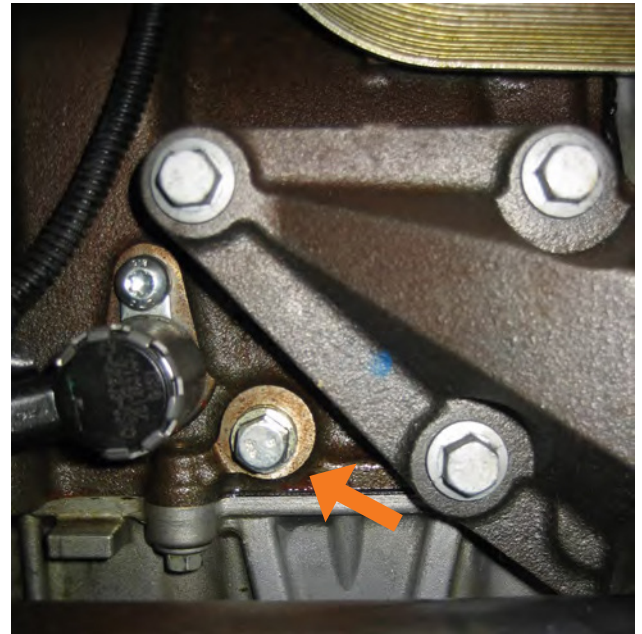
Rotate the crankshaft in the normal direction of rotation until the crankshaft contacts **43018103** setting pin.



Refit **43072605** crankshaft pulley alignment pin to check that the pulley is positioned correctly.

NOTE: An incorrectly positioned crankshaft pulley may trigger a fault code in the engine management system.

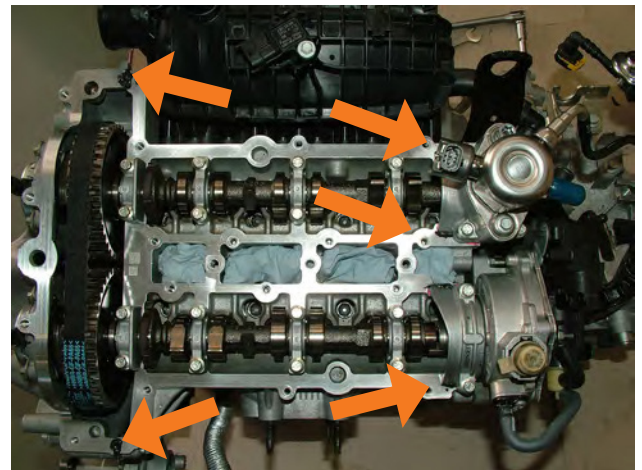
Remove crankshaft pulley alignment pin;



Remove **43018103** crankshaft setting pin and refit the crankshaft blanking plug.

Refit the starter motor and refit the driveshaft bracket if removed, using new driveshaft retaining clamp and bolts. Refit the alternator, air conditioning pump, auxiliary belt tensioner and a new auxiliary belt.

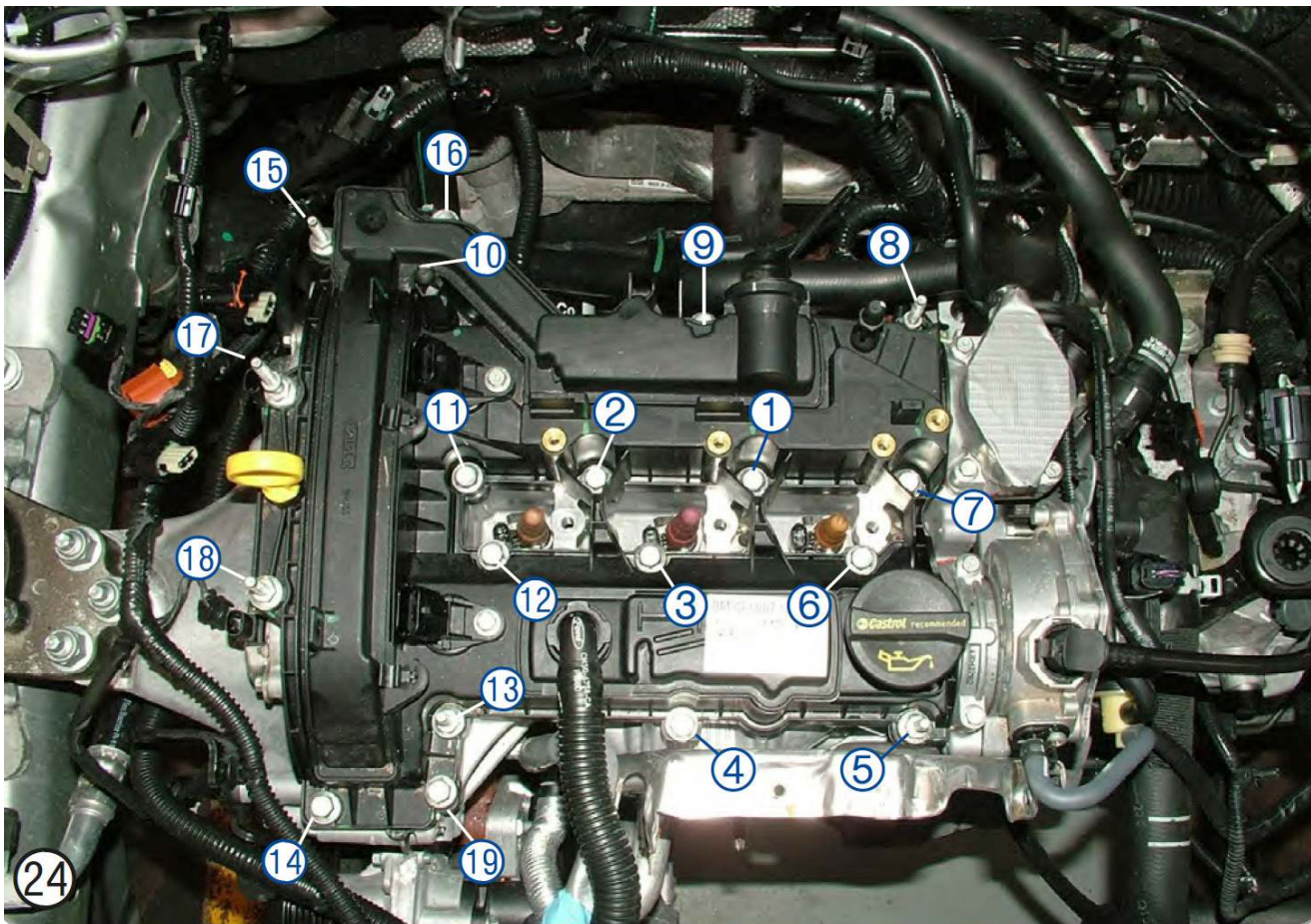
Refit the vehicle undershield and inner wing cover.



Ensure that the mating faces of the cylinder head, engine front cover and camshaft cover are clean and that the seals are free from dirt/foreign objects.

Apply a 5mm bead of sealant to the cylinder head at the joint between the cylinder head and the timing belt cover. Also apply

a 4mm bead of sealant to the area at the base of the fuel pump support block to prevent oil leakage.



Tighten all camshaft cover bolts finger tight only, then torque to 10 Nm in the sequence shown (1-19).



Install the fuel pump, tighten the retaining bolts to an initial torque of 5 Nm, followed by a final torque of 13 Nm. Refit the camshaft position sensors, tightening the retaining screws to 10 Nm.



Refit the VVT solenoid valves, apply a small amount of engine oil to the seals to aid fitment.

Tighten the VVT solenoid valve retaining screws to 7 Nm.

Reassemble all other vehicle components in the reverse order of removal, paying attention to torque settings and replacing parts that must be renewed.



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