

ENGINE TIMING TOOL SET

For Ford 1.0, 3 - Cylinder Ecoboost

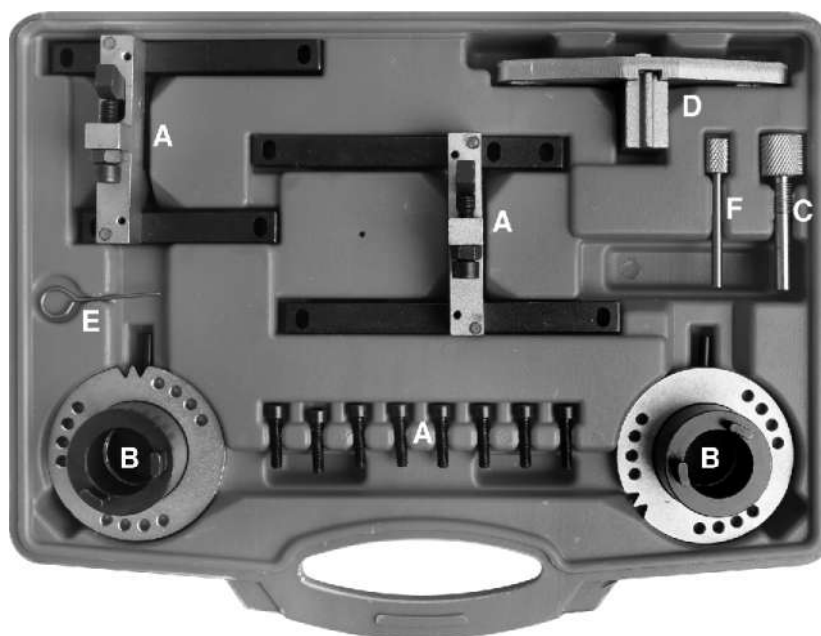
TBT3092



ORIGINAL INSTRUCTIONS

TOOLS

Item	Description	to be used as OEM
A	Camshaft Locking Tool Set	303-1605
B	Camshaft VVT Adjustment Tool Set	303-1606
C	Crankshaft Setting Pin	303-1604
D	Flywheel Locking Tool	303-1602 303-393A (21-168)
E	Tensioning Locking Tool	303-1054
F	Crankshaft Pulley Positioning Pin	303-732



GENERAL INFORMATION

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. 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.

APPLICATION

Manufacturer	Model	Engine	Engine Code
Ford	Fiesta Ecosport B-Max Transit Courier Focus Transit Connect C-Max Tourneo Connect Grand C-Max	1.0 Eco boost 3 Cylinder (Belt in oil) Petrol engine	M1DA - M1JA P4JA - P4JB XMJA - XMJB M2DA - M2GA SFJA - SFJB M1JC - M1JE SFCA - SFCB

Engine Timing Belt Replacement

REMOVAL

1. Remove the engine top covers.
2. 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.

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

4. Remove the engine under-shield 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.

5. 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.

Fig.1



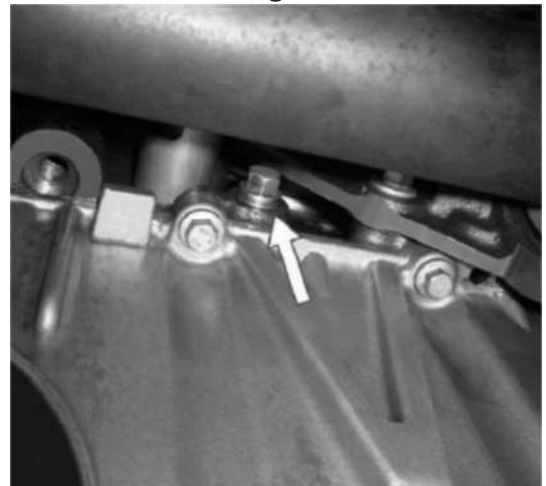
Fig.2



Fig.3

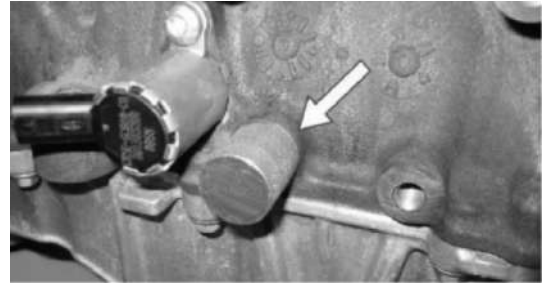


Fig.4



6.
Fit (C), ensuring that it is fully located in the engine block.

Fig.5



7.
Check that the timing hole in the crankshaft pulley is positioned at approximately 10'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 (C) and rotate the crankshaft pulley 3/4 of a turn in the normal direction of engine rotation. Refit (C) and rotate crankshaft until the crankshaft contacts the pin.

Fig.6

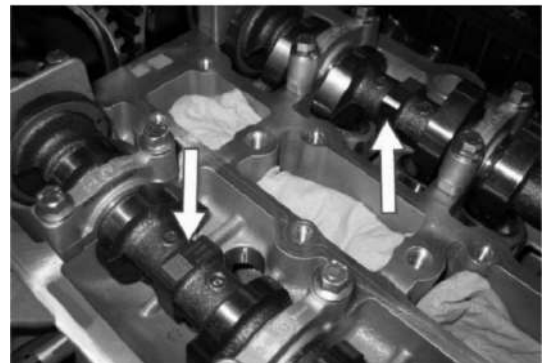


Fig.7

8.
Fit (D) 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 (C) when locking the flywheel.

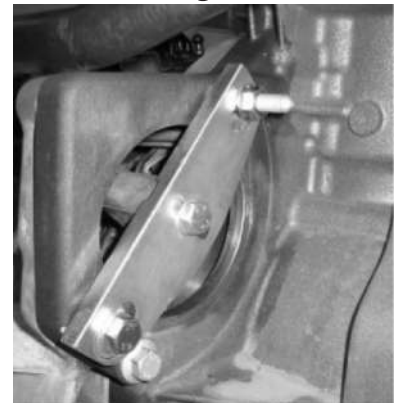
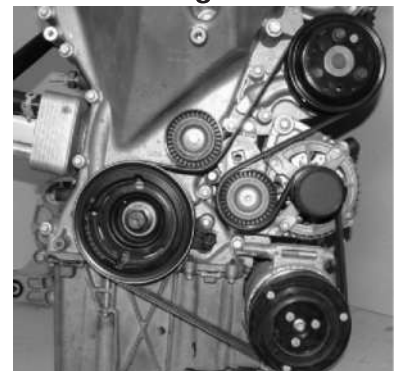


Fig.8

9.
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.



10.

Remove and discard the crankshaft pulley central bolt.

IMPORTANT: The crankshaft pulley central bolt is tightened to a very high torque, using a torque multiplier makes it easier to loosening this 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 (C) and (D) until the crankshaft pulley has been refitted and the pulley central bolt has been tightened to the specified torque value.

Fig.9



11.

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.

Fig.10

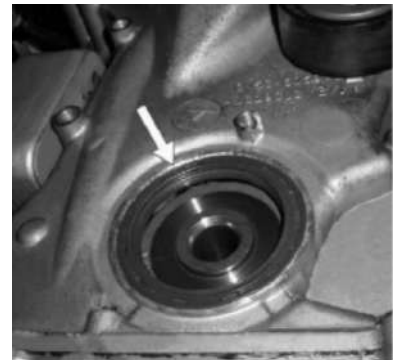


Fig.11

12.

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

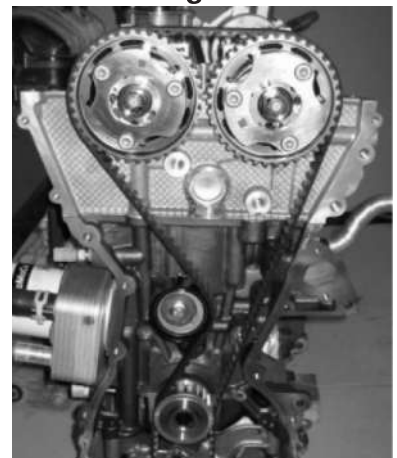


Fig.12

13.

Remove the engine timing belt cover.

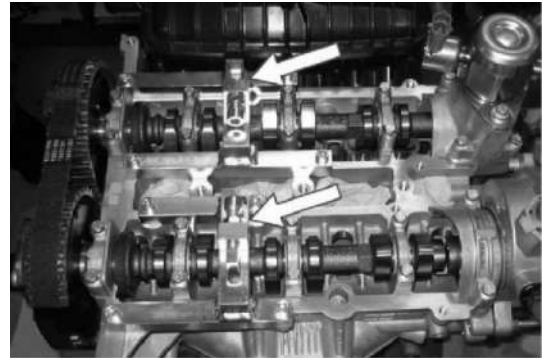
Note: The timing belt cover retaining bolts are different lengths. Take note of the location of each bolt upon removal, ensuring that the same length bolt is used when the engine is reassembled.



14.

Loosely position (A) on to the Inlet camshaft and (A) 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.

Fig.13



15.

Depress the belt tensioner, releasing tension from the timing belt. Lock the belt tensioner in position using (E). Remove and discard the used timing belt.

Fig.14



INSTALLATION

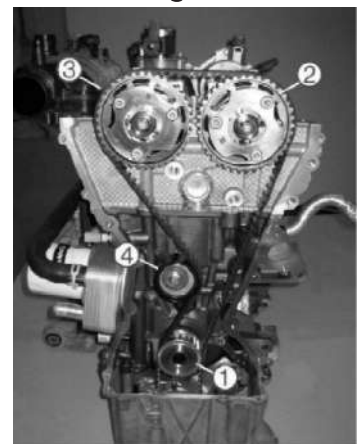
1.

Ensure that the camshafts and crankshaft are set in the correct timing position using (C) and (A). Ensure that the flywheel is securely locked using (D).

2.

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 (E) from the tensioner to apply tension to the belt.

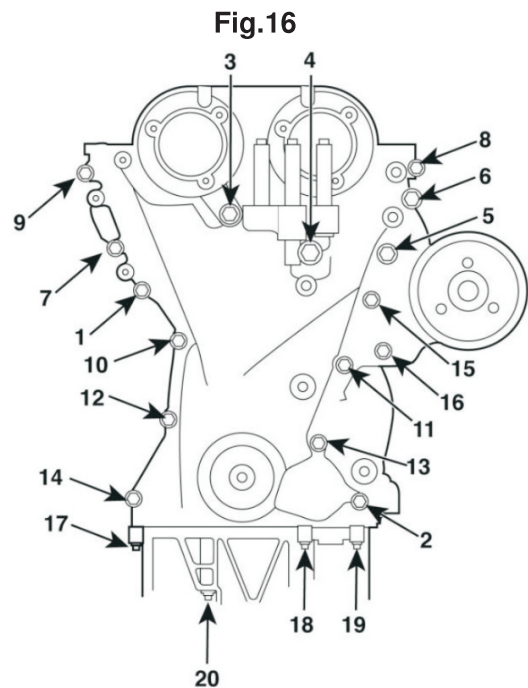
Fig.15



3.

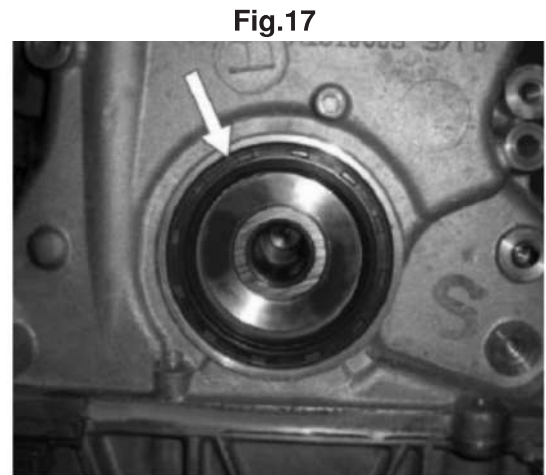
Ensure that the mating faces of the timing belt cover and the engine are clean and free from oil or grease. Apply a 4 mm bead of sealant to the mating faces of the timing belt cover, increasing the bead size to 6 mm at the top and bottom edges of the cover, and around the holes in the sealing face of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



4.

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



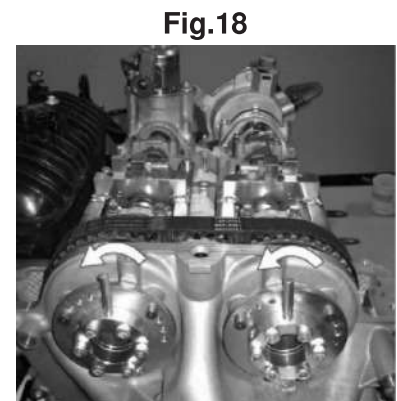
5.

(B) 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 (B) in to the inlet camshaft VVT unit, attaching the outer ring to the timing belt cover using 3 screws tightened to the specified torque settings. 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 the specified torque settings.

Fit (B) into the exhaust camshaft VVT unit, attaching the outer ring to the timing belt, using 3 screws tightened to the specified torque settings.

Apply an anti-clockwise force to the central boss to take up any play in the VVT unit, tighten the 6 locking screws to the specified torque settings.



6.

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 10'clock relative to the pulley central bolt. Insert (F) through the alignment hole in the pulley and into the alignment hole on the engine block.

IMPORTANT: The crankshaft pulley central bolt is tightened to a very high torque. Use a torque multiplier and mounting bracket to aid installation of crankshaft pulley central bolt and prevent torque forces being transmitted through the engine and vehicle components.

Remove the torque multiplier (if used). Refit (F) into the crankshaft pulley alignment hole to check that the pulley is correctly aligned.

Fig.19



Remove all tools from the engine

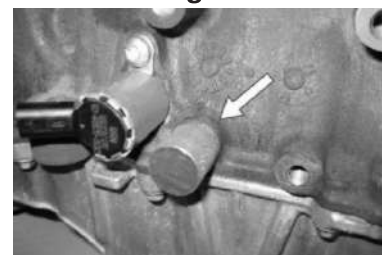
7.

Rotate crankshaft 1 & 3 turns in normal turns direction of engine rotation.

8.

Refit (C). Rotate the crankshaft in normal direction of rotation until the crankshaft contacts (C).

Fig.20



9.

Refit (F) to check that the pulley is position to check correctly.

Note: An incorrectly positioned crankshaft pulley may trigger a fault code in the engine management system. Remove (F).

Fig.21



10.

Remove (C) and refit the crankshaft blanking plug.

Refit the starter motor and refit the driveshaft bracket if removed, using new driveshaft retaining clamps and bolts.

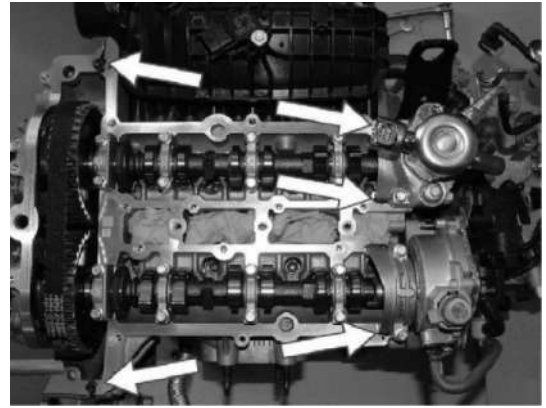
Refit the alternator, air condition pump, auxiliary belt tensioner and a new auxiliary belt.

Refit vehicle under shield and inner wing cover.

Fig.22



Fig.23



11.

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 5 mm bead of sealant to the cylinder head at the joint between the cylinder head and the timing belt cover. Also apply a 4 mm bead of sealant to the area at the base of the fuel pump support block to prevent oil leakage.

12.

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

Fig.24

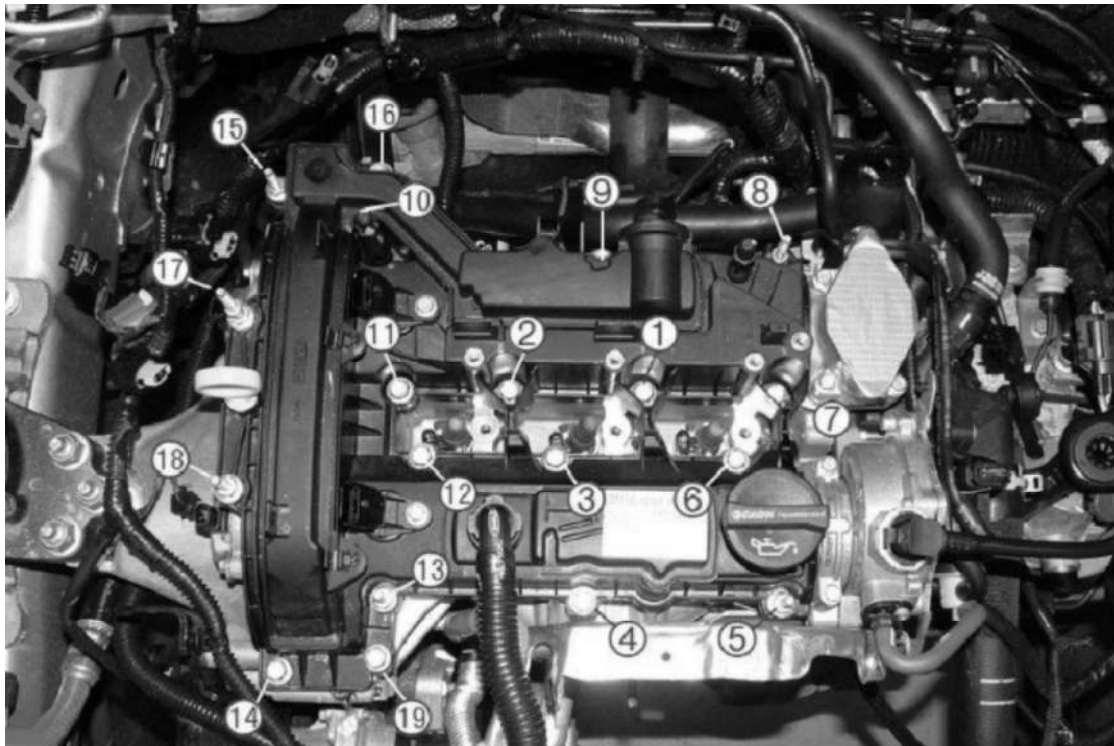


Fig.25

13.

Install the fuel pump, tighten the retaining bolts to the specified torque settings.

Refit the camshaft position sensors, tightening the retaining screws to the specified torque settings.



Fig.26

14.

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 the specified torque settings.

2

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

