SKF Pole Position

SUBARU

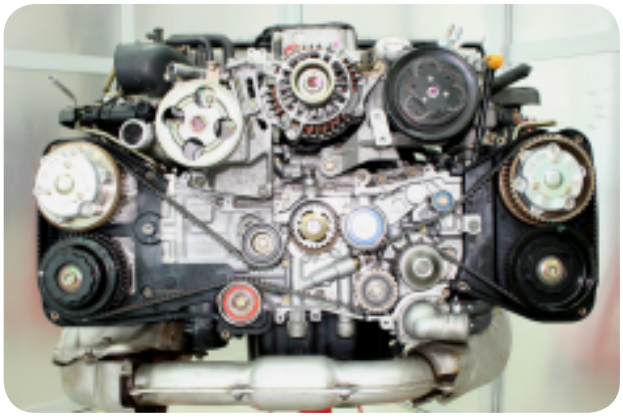
VKMA 98115

Issue 6 · 2011

Subaru Boxer DOHC engine service information

This timing drive service bulletin focuses on the Subaru boxer DOHC engine – which is available in both turbo (WRX, STi) and non-turbo versions. We will cover the important steps when installing the VKMA 98115 kit, the replacement of the water pump and some useful hints and tips to help you with the job.

The timing system consists of several idlers and an integrated hydraulically damped tensioner that requires replacement to ensure the correct performance. As the water pump is also built into the timing system, it is strongly advised that it is replaced during servicing in order to prevent any future damage to the entire system due to failure of the pump, after the system has been re-tensioned. It is also recommended that the appropriate tools are used and the instructions in the service manual provided by the OE manufacturer are followed, to ensure that a professional job is carried out.



Picture 1: Profile of Subaru Boxer DOHC engine

Setting guide for the Boxer DOHC engine

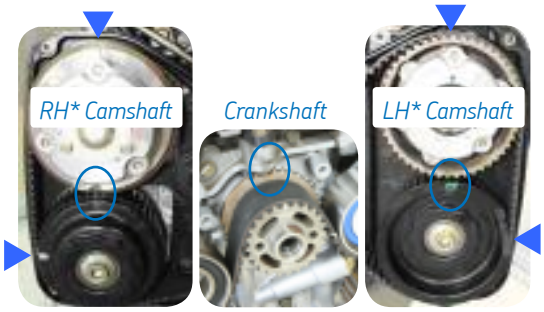
1. Align the crankshaft and camshafts

Before you remove the timing belt, turn the crankshaft in a clockwise direction to align the crankshaft and camshafts to their respective notches in the timing belt cover and the cylinder block (see picture 2).

Subaru vehicle applications with DOHC engine

Subaru Model	Engine	DOHC Engine Code
Forester	2.0, 2.5	EJ204, EJ205, EJ255
Impreza	1.5, 2.0, 2.5	EL154, EJ20G, EJ204, EJ205, EJ207, EJ255, EJ257
Legacy	2.0, 2.5	EJ204, EJ206, EJ208, EJ20Y, EJ255, EJ25D

Note: With the damper removed - use Subaru OE tool ST499987500 (½" drive socket adaptor) to turn crankshaft.



Picture 2: Camshafts and Crankshaft at correct alignment.

**RH/LH Camshaft orientation according to OE service manual.*

Caution: the correct rotating direction of the LH camshafts to prevent interference between engine valves!

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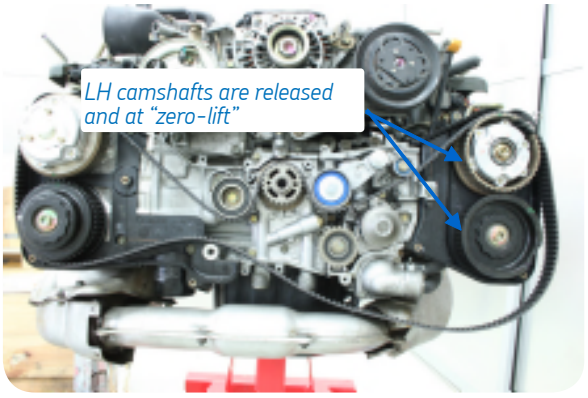
2. Removing the pulleys and belt

To safely release the tension on the timing system, remove idler A first (see picture 3) – this will minimize the belt recoil caused by the sudden release of tension within the system. Also note that when the tension is released, the LH camshafts will spring back to there "zero-lift" positions (see picture 4).

Picture 3: Timing idlers and tensioner locations



Picture 4: Tension released when idler A is removed

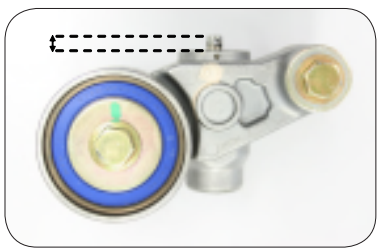
3. Replacing the water pump

Removing the tensioner unit will improve the accessibility to the water pump for removal (see picture 5). Before installing a new water pump, clean the mating surface of the cylinder block and remember to replace the gasket with a new one. Use sealant sparingly to prevent excessive leakage that could damage the mechanical seal in the water pump resulting in premature failure.

Picture 5: Bolts securing tensioner unit

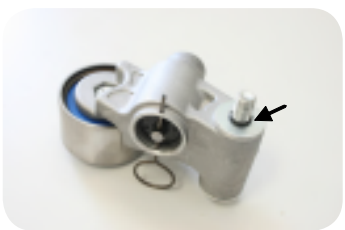
4. Installing the idlers and tensioner

A worn out tensioner can cause belt vibration, jumping and shorten the new belt life considerably, so it is always recommended that it is replaced during timing belt servicing (see picture 6). It is also worthwhile remembering that using the wrong tools and/or bad mounting technique can cause premature failure of the tensioner (see picture 7). Only prime the tensioner after all of the components and timing belt is installed!



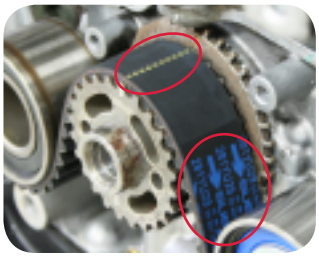
Picture 6: If the piston extension is not within +/- 0.5mm of 5.7mm – replace the tensioner

Picture 7: Dent marks on the tensioner body



Note: Ensure that the o-ring is present and in the correct place before mounting the tensioner.

5. Installing the timing belt



Note: Align the marks on the timing belt to the correct positions on the timing system and ensure that the belt's rotating direction is in a clockwise direction.

Start by wrapping the new timing belt over the RH camshafts, the crankshaft and the tensioner. Align timing marks (see picture 8).

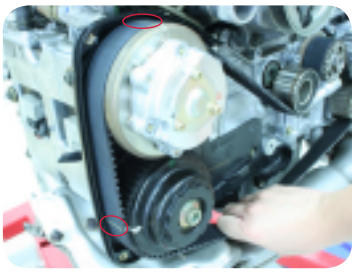
Use clip to secure the timing belt to the LH intake camshaft, ensure that the belt marking is aligned to the camshaft notch. Rotate the LH intake camshaft clockwise (take note that the valve springs are compressed during this action) to the marking at the timing back cover and hold on the timing belt (see picture 9).

While at the same time rotate the LH exhaust camshaft (same as the intake camshaft, the valve springs are compressed) and carefully wrap the timing belt over in line to the marking. Hold onto the belt while rotating the LH exhaust camshaft anti-clockwise (see picture 10).

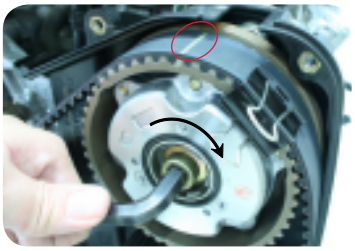
Mount Idler A (torque at 39Nm) and remove the stopper pin at the tensioner to prime the system. Ensure all markings are aligned before mounting the last idler A (see picture 11).

Rotate the crankshaft in a clockwise direction for several revolutions to disperse the tension around the timing system.

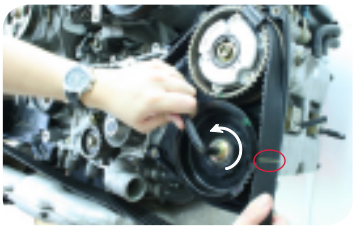
⚠ Caution: disengagement of more than three timing belt teeth may result in interference between valve and piston!



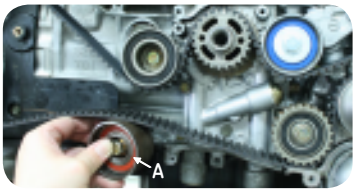
Picture 8: Align timing marks



Picture 9: Secure belt by clip and align timing mark



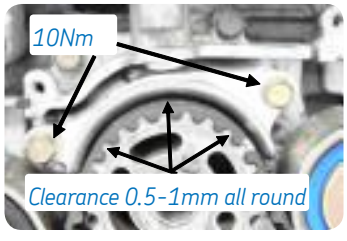
Picture 10



Picture 11

6. Installing Belt Guide

If the mounting bolts torque and clearance are not correctly set, the belt guide will shift due to vibration during engine operation and rub against the running belt. This accidental contact overheats the belt and spreads to the other pulleys in contact, causing premature seizing (see picture 12 and 13). Therefore it is important to ensure that the belt guide is set with correct clearance and torque.



Picture 12: Overheated marks

Picture 13: Premature seizing

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SKF offers a comprehensive range of Subaru kits

A complete range of products for Subaru engine is available to cover your customer's needs. Go for the complete VKMA kit as replacing one pulley is not enough, you will need to replace all the pulleys and belt in the system. SKF also offers the timing belt with water pump kit for a more economical and complete replacement.

Subaru vehicle applications with DOHC engine

Timing Belt Kits	Car Models (All DOHC versions)	Application Year
VKMA 98112	Legacy 2.5	1996 – 1998
VKMA 98114	Forester 2.0; Impreza 2.0	1998 - 2002
VKMA 98115	Forester 2.0, 2.5; Legacy 2.0, 2.5; Impreza 1.5, 2.0, 2.5	2002 - present

Subaru timing belt kit with water pump – VKMC

VKMC 98112 kit content: Integrated tensioner, 3 idlers, 1 timing belt, fitting instruction and water pump VKPC 98001

SKF offers a direct replacement for each car application based on OE requirements as compared to some other aftermarkets that combine the application by offering only one single kit.

SKF Timing Idler kits	Feature	Car Application	Application Year
VKM 88007 (contained in VKMA 98114)	Single-row idler 	Forester 2.0 Impreza 2.0	1998-2002
VKM 88008 (contained in VKMA 98115)	Double-row idler 	Forester 2.0, 2.5 Legacy 2.0, 2.5 Impreza 1.5, 2.0, 2.5	2002-present

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