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Tension setting on Mitsubishi/Volvo 1.8 16V petrol engines

GATES REFERENCE :	5514XS/K015514XS	
MAKE :	MITSUBISHI / VOLVO	
MODEL :	Carisma, Pajero IQ, Pajero Pinin, Shogun Pinin, Space Star, S40, V40	
ENGINE :	1.8 DOHC	
ENGINE CODE :	4G93, B4184SJ, B4184SM	

Drive failure on this engine is mainly caused by incorrect tensioner set up. Although the drive is equipped with an 'automatic' tensioner, this still has to be set up correctly. Strictly following the correct and complete installation procedure can avoid costly engine damage.

Fig. 1 shows the drive lay out of this engine, with correct position of the timing marks.

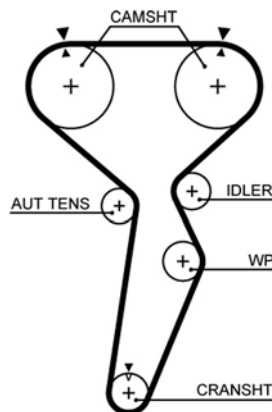


Fig. 1

There are 2 main errors made when installing this belt/tensioner:

- 1) Manipulating the tensioner correctly, but not completely following the recommended tension setting procedure. This leads to incorrect tension with a premature belt failure as a result.
- 2) Turning the tensioner in the wrong direction - clockwise. This leads to incorrect tension and very often tensioner seizure. The tensioner bracket touches the pulley, obstructing it to rotate freely (Fig. 2)



Fig. 2





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Evidence of this can be found on the back inner side of the tensioner pulley. (Fig. 3)



Rubbing mark

Fig. 3

Since the pulley cannot rotate anymore, the belt back - constantly rubbing against the pulley surface - will start to overheat and crack (Fig. 4).



Fig. 4

This excessive temperature is further transmitted to the tensioner and idler pulleys, leaving a blue heat mark on the pulleys (Fig. 5), and possibly even traces of melted rubber (Fig. 6).



Fig. 5



Fig. 6





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If the tensioner pulley is turned in the correct – anti clockwise - direction, it will not be able to come into contact with the bracket (Fig. 7)



Fig. 7

In general it is strongly recommended to replace the tensioner and idler pulleys together with the belt, as these parts obviously also wear out. A worn bearing (loss of grease, seizure, misalignment ...) is just as bad as a worn belt, and will lead to premature drive failure, resulting in serious engine damage.

Correct procedure:

Removal

Engine must be cold !

Remove accessory belt, tensioner/idler pulleys, engine support and timing belt covers.

Put engine at Top Dead Centre (TDC), with Timing Marks (TM) aligned (see Fig. 1) by rotating the crankshaft clockwise.

Block the 2 camshaft pulleys. If the OE tool (Volvo 9995714) is not available, use GAT4500 out of GAT4695 and see Fig. 8 for correct positioning.



Fig. 8





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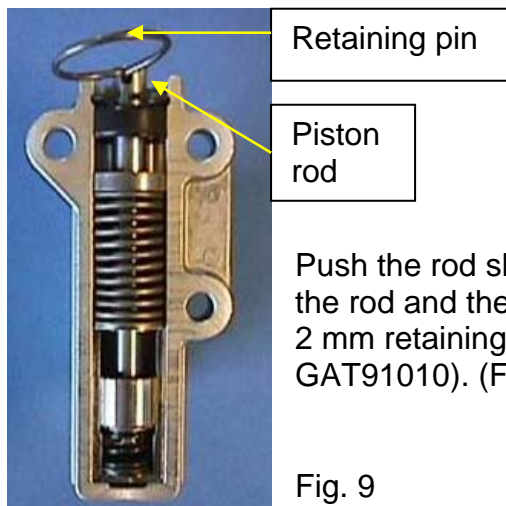
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Loosen the tensioner pulley bolt, remove the old belt, tensioner pulley and idler.

By now, the piston rod of the hydraulic tensioner has come out of the tensioner body by 10.5 to 11.5 mm. If not, or leakage is present, replace the tensioner.

Apply a pressure of 10 to 20 Kg on this rod; movement of the rod should be maximum 1 mm. If more, replace the tensioner.



Push the rod slowly down (vertically) until the holes of the rod and the tensioner body are in line. Insert a 2 mm retaining pin (can be found in GAT4657 or GAT91010). (Fig. 9)

Fig. 9

Installation:

Engine at TDC!

(Re)install the (new) hydraulic tensioner (2 bolts at 13 Nm).

Install new tensioner and idler pulleys (tensioner pulley with eccentric hole at the top, 2 small adjusting holes at the bottom) (Fig. 10).

Rotate the crankshaft pulley ½ tooth anti clockwise.

Install new belt in this order: crankshaft, water pump, idler, outlet camshaft, inlet camshaft, tensioner.

Turn the tensioner pulley (using adjuster GAT4577 included in GAT4657) ANTICLOCKWISE into the belt and tighten the bolt (Fig. 11).



Fig. 10

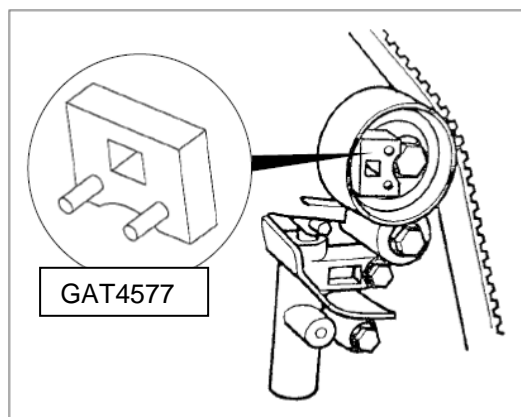


Fig. 11

Unblock the camshaft pulleys and check if all TM are aligned

Turn the crank pulley +/- 90° ANTICLOCKWISE

Turn the crank pulley +/- 90° CLOCKWISE till TDC (all TM aligned)

Loosen the tensioner pulley bolt





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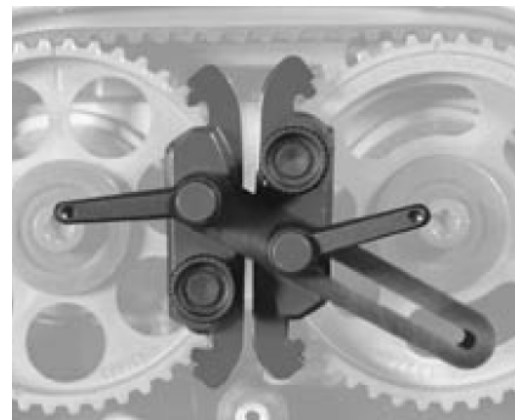
Turn the tensioner pulley (using GAT 4577 and a torque wrench) ANTICLOCKWISE into the belt, with a force of 2.5 to 4.0 Nm
Tighten the tensioner pulley bolt (50 Nm)
Pay attention: keep the pulley in place while torquing the bolt!
Remove the 2 mm retaining pin out of the hydraulic tensioner
Rotate engine clockwise 720° to TDC (TM in line)
Leave engine 5 minutes like this
The piston rod should now be sticking out of the tensioner body by 3.8 to 4.5 mm
If not within this value, repeat the tensioning procedure until correct position is reached.
Re-install other removed parts

Conclusion:

- only work on cold engines
- replace timing belt, tensioner and idler pulleys at the same time
- only rotate tensioner pulley anticlockwise
- pay extreme attention to correct hydraulic tensioner set up
- follow every step in the OE installation procedure
- use the specified tools



Timing Tool Kit GAT4657



GAT4500 (included in GAT4695)

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