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| Station | | Task | |
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| Static 1503 & 903 | | | |
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## Camshaft Timing Procedures 903 engine

## TASK OBJECTIVE

At the completion of this task the technician will be able to properly lock the engine crankshaft and camshaft. The technician will also be able to perform the cam timing procedure in the correct sequence.

**INTRODUCCTION**

Careful and accurate cam timing is particularly important in dual over-head cam (DOHC) engines. Since DOHC engines use separate intake and exhaust cams, it is crucial that the position of both cams be carefully synchronized with the crankshaft. Otherwise, not only can the valves collide with the pistons but the intake and exhaust valves could collide with one another.

# Camshaft Timing

Refer to the sections copy of the shop manual

# Procedures

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Remove valve cover | | | | | | | | | | |
| 1. Check timing chain for excessive radial play while still installed on timing gears | | | | | | | | | | |
| 1. Is the timing chain good? | | | | | | | | | | |
| 1. Lock crankshaft | | | | | | | | | | |
| 1. Remove timing chain tensioner | | | | | | | | | | |
| 1. Remove breather cover, upper timing chain guide and timing chain guide | | | | | | | | | | |
| 1. Check timing chain guide | | | | | | | | | | |
| 1. Is the guide out of the service limit? | YES | |  | | NO | |  | | |  |
| 1. Remove timing chain from gears | | | | | | | | | | |
| 1. Remove the camshafts | | | | | | | | | | |
| 1. Note the camshafts aren’t identical. | | | | | | | | | | |
| 1. How can you identify them?   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | | | | |
| 1. Remove timing chain guide (tensioner side) | | | | | | | | | | |
| 1. Check timing chain guide | | | | | | | | | | |
| 1. Is the guide out of the service limit? | YES | |  | | NO | |  | | |  |
| 1. Install timing chain guide (tensioner side) | | | | | | | | | | |
| 1. **NOTE: Install screw plug only in final assembled cylinder block to avoid warpage of sealing surface.** | | | | | | | | | | |
| 1. Install exhaust camshaft with mark EX parallel to cylinder head gasket | | | | | | | | | | |
| 1. Install intake camshaft with mark IN parallel to the cylinder head gasket | | | | | | | | | | |
| 1. Install upper half holder following the tightening sequence | | | | | | | | | | |
| 1. Check the camshaft can be turned easily by hand | | | | | | | | | | |
| 1. Lock camshaft with tool 529036206 | | | | | | | | | | |
| 1. Install the cam chain | | | | | | | | | | |
| 1. Install the two guides | | | | | | | | | | |
| 1. Install the tensioner | | | | | | | | | | |
| 1. After the installation of the tensioner the marks IN / EX must be aligned | | | | | | | | | | |
| 1. Install breather cover | | | | | | | | | | |
| 1. Remove locking tools | | | | | | | | | | |
| 1. Rotate the engine and verify the timing marks | | | | | | | | | | |
| 1. Are they correct after completing 2 crankshaft revolutions? | | YES | |  | | NO | |  |  | | |

### Questions

1. What have you learned from this task?

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2. What would happen if this procedure was not done correctly?

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3. There is no TOPS valve on this engine. What prevents the oil from escaping through the vent hose in case the unit is capsized?

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4. This engine is just for training purposes and not intended to run once assembled.

What do you have to do before installing the camshaft on a “real” engine?

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**Instructor sign off-- Go \_\_\_\_\_\_\_\_\_\_**