

Kiwi Cylinder Heads Ltd.



# Installation Instructions

## Toyota 3RZFE Cylinder Head Kit Part Number 11081253



**This instruction manual contains important installation and assembly instructions. Read these instructions carefully before use. Please contact us directly if you have any questions or concerns. Remember...  
"Prevention is Better than Cure"**

Kiwi Cylinder Heads (NZ) Ltd.

3 D Edinburgh St, Onehunga, Auckland 1061

Call: 0800-549-429, email: [info@kch.co.nz](mailto:info@kch.co.nz)

[www.cylinderheads.co.nz](http://www.cylinderheads.co.nz)

Kiwi Cylinder Heads Pty Ltd

14 Waler Crescent, Smeaton Grange, NSW, 2567

Call: 1800-786-987, email: [info@kch.co.nz](mailto:info@kch.co.nz)

[www.cylinderheadsaustralia.com.au](http://www.cylinderheadsaustralia.com.au)

## Kiwi Cylinder Heads 12 Month, Unlimited Kilometer, Parts & Labor Warranty

This new cylinder head is subject to a **12 Month** (from date of purchase), **unlimited kilometer, parts & labor warranty**. This means in the rare event this product fails due to either a manufacturing or physical fault the purchaser is covered by this warranty for a period of 12 months from date of purchase, and it includes replacement parts & labor at a fair and reasonable rate to re-instate the vehicle to its pre-failure state. This excludes service items such as but not limited to, oil, coolant, filters etc. as well as any vehicle recovery costs and the cost of any replacement vehicle.

**Responsibilities:** To maintain this warranty the product is to be professionally installed & serviced in accordance to the vehicle manufacturers guidelines & service intervals. Ensure the vehicle is not used in an inappropriate manner for which it is designed or intended for. To minimize any further unnecessary damage once a fault is suspected or detected in the vehicles operation. To contact the installer or Kiwi Cylinder Heads Ltd at the very earliest opportunity after detecting or suspecting a fault. Proof of Purchase & service records will be requested in an event of a claim. The warranty will be voided if the vehicle to which it is fitted is used in off-road, competition or modified beyond the vehicle manufacturers original design.

**How to make a claim:** If there is a suspected warranty fault, Kiwi Cylinder Heads Ltd must be contacted before any repair work can commence. (Contact details below) A warranty claim form and claim number will be made available and must be completed & returned to Kiwi Cylinder Heads Ltd, along with any requested related documents and/or parts. The suspected failed parts supplied by Kiwi Cylinder Heads Ltd must be returned to a pre-determined location for inspection and analysis of the suspected failure. The cost of returning parts & documents is the responsibility of the claimant. Failure to adhere to these procedures may void any warranty.

**This warranty does not exclude any rights to the claimant under the N.Z Consumer Guarantees Act 1993 or the Australian Consumer Law 2011.**

**Kiwi Cylinder Heads Ltd, PO Box 132-189 Sylvia Park, Mt Wellington, Auckland 1644. 0800-549-429, [info@kch.co.nz](mailto:info@kch.co.nz)  
Kiwi Cylinder Heads (Pty) Ltd, 14 Waler Crescent, Smeaton Grange, NSW 2567. Ph.1800-786-987, Fax 1800-786-535**

### **IMPORTANT**

**If this product is being fitted as a replacement for an item, which has failed in service? It is critical that the “real cause” of the failure has been identified and rectified. Failure to do so may result in this product also failing for the same reasons, which will not be covered under any warranty.**

If the purchaser chooses to fit parts other than those supplied, this does not invalidate the Kiwi Cylinder Heads warranty other than to the extent that the replacement parts carry no warranty unless purchased from Kiwi Cylinder Heads. Additionally, any consequential damage to Kiwi Cylinder Heads products as a result of using these alternative parts is not covered by the Kiwi Cylinder Heads warranty.

### Foreign Material / Debris Removal Procedure

Whilst every attempt is made to remove unwanted machining material, such as aluminum shavings or casting material at time of assembly. It is possible you may encounter some remaining material.

In most cases it can be cleaned by carefully standing the cylinder head on its end and using a compressed air gun and appropriate personal safety equipment, apply compressed air to the galleries to eliminate the foreign material. You may need to move the cylinder head around to assist in the removal. If this is not acceptable please contact us directly.

NZ- 0800-549-429

AUST- 1800-786-987

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# Seven Steps to Success

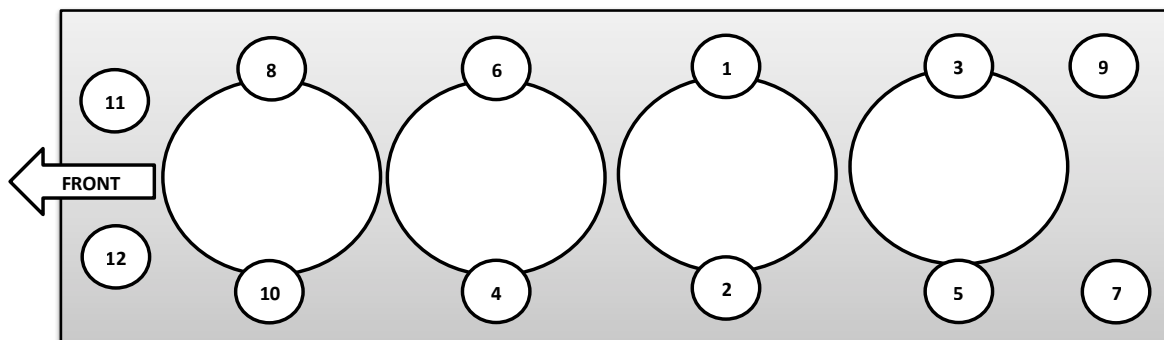
- 1. Ensure both mating surfaces are **CLEAN** and **FREE OF DIRT AND OIL**.
- 2. **DO NOT** clean block threads with a thread **TAP**. Best use an old head bolt with “cleaning” grooves cut the length of the thread to “chase” the block threads.
- 3. Ensure **NEW** head bolts are used where applicable
- 4. Ensure the correct torque settings and sequence are employed.
- 5. For engines that use a **MLS (Multi Layer Steel)** Head gasket, flush block of any remaining “anti freeze”. When fitment is completed only use water (preferably distilled water) for the first 600kms. This is to insure the head gasket has the best possible chance to seal correctly.
- 6. **FUEL INJECTORS** must always be checked and /or serviced to be sure of correct operation.
- 7. If this is a “Fully Assembled” head kit which includes new camshafts? Then the correct “Start-up Procedure” **MUST** be followed. Otherwise premature camshaft wear **WILL** occur and will **NOT** be covered by warranty.

# Start-Up Procedure

- **Diesel Cam Shaft.** With rocker cover & glow plugs removed & fuel solenoid de-activated. Apply the “Z Paste” to the camshaft lobes. Using the starter motor, crank the engine until oil is present from ALL oil galleries & across the entire cam shaft and valve train area. This may take several minutes. It is now safe to complete the assembly and start the engine.
- **Petrol Cam Shaft.** With the rocker cover & spark plugs removed & the ignition dis-connected. Apply “Z Paste” to the camshaft lobes. Using the starter motor, crank the engine until oil is present at ALL oil galleries & across the entire cam shaft & valve train area. This may take several minutes. It is now safe to complete the assembly. Ensure the ignition timing is as close as possible to correct setting before firing the engine. Also ensure there is adequate cooling for the engine, air flow & ventilation. DO NOT let the engine idle, run engine at approx. 1800RPM for 15 - 20 minutes. ANY unusual noises shut down & inspect.
- **Failure to follow this exact procedure can & will lead to premature camshaft wear which will NOT be covered by KCH Warranty.**

## Toyota 3RZFE Torque Sequence

- 
- Kiwi  
Cylinder  
Heads**



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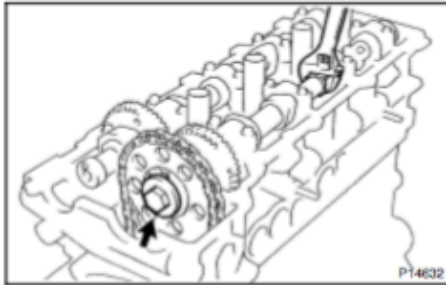
# IMPORTANT NOTE

## Installing MLS (Multi-Layer Steel) Head Gaskets

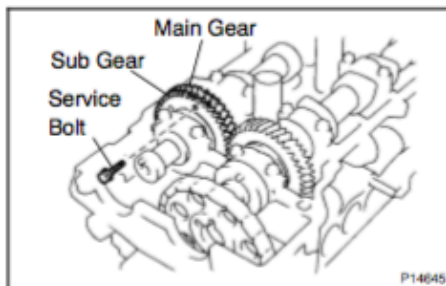
NEVER employ any abrasive cleaning methods to the engine block or cylinder head mating surfaces. Such as sandpapering, scouring discs etc.

Use ONLY proper gasket scrapers and appropriate solvents. The surface finish of the mating surfaces is absolutely critical to the successful sealing of the MLS head gaskets.

This Toyota 3RZFE Cylinder Head Kit requires the installer to remove the existing cam gears from the original cylinder head and re-install onto the new camshafts. Be careful not to disturb the cam follower shims already installed in the new head.



- (b) Hold the camshaft with a wrench and remove the bolt.
- (c) Remove the camshaft timing gear and chain from the camshaft and leave on the chain tensioner slipper and chain vibration damper.



#### 15. REMOVE CAMSHAFT

##### NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If there camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, these steps should be carried out.

- (a) Bring the service bolt hole of the driven sub gear upward by turning the hexagon wrench head portion of the camshaft No. 2 with a wrench.
- (b) Secure the camshaft No.2 sub gear to the main gear with a service bolt.

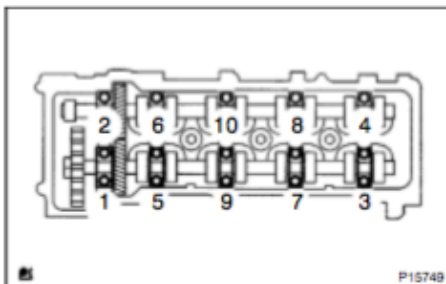
**Torque: 5.0 N·m (51 kgf-cm, 44 ft-lbf)**

**Recommended service bolt:**

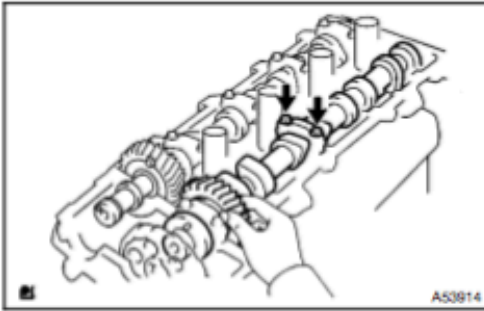
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm (0.63 - 0.79 in.)

##### HINT:

When removing the camshaft, make sure that the torsional spring force of the sub gear has been eliminated by the above operation.



- (c) Uniformly loosen and remove the 10 camshaft bearing cap bolts in several passes, in the sequence shown.



(d) Remove the 5 camshaft bearing caps and camshaft.

**NOTICE:**

**Do not pry or attempt to force the camshaft with a tool or other object.**

**HINT:**

If the camshaft is not being lifted out straight and level, reinstall the No. 3 camshaft bearing cap with the 2 bolts. Then alternately loosen and remove the camshaft bearing cap bolts with the camshaft gear pulled up.

(e) Remove the camshaft.

**16. REMOVE NO.2 CAMSHAFT**

**NOTICE:**

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If there camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, these steps should be carried out.

(a) Uniformly loosen and remove the 10 camshaft bearing cap bolts in several passes, in the sequence shown.

(b) Remove the 5 camshaft bearing caps and camshaft.

**NOTICE:**

**Do not pry or attempt to force the camshaft with a tool or other object.**

**HINT:**

If the camshaft is not being lifted out straight and level, reinstall the No. 3 camshaft bearing cap with the 2 bolts. Then alternately loosen and remove the camshaft bearing cap bolts with the camshaft gear pulled up.

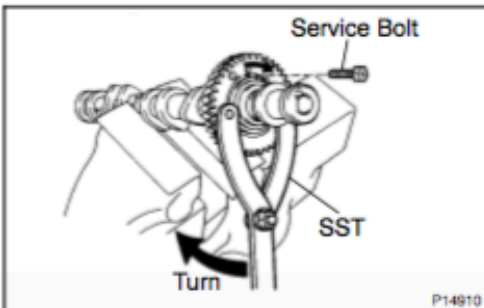
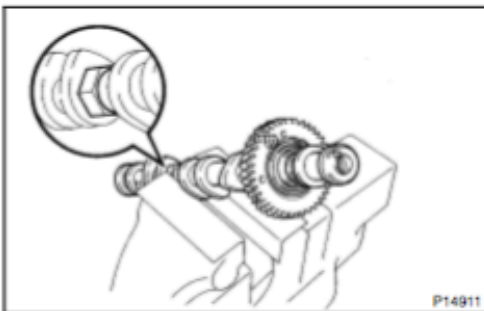
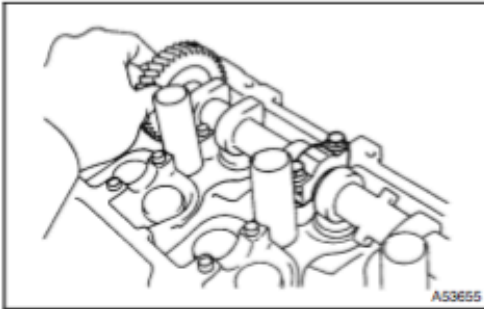
(c) Remove the No. 2 camshaft.

**17. REMOVE CAMSHAFT SUB GEAR**

(a) Mount the hexagon wrench head portion of the camshaft in a vise.

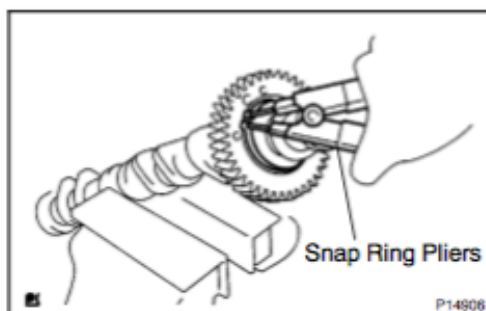
**NOTICE:**

**Be careful not to damage the camshaft.**

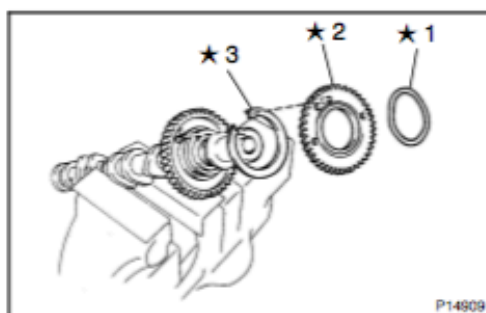


(b) Using SST, turn the camshaft sub gear clockwise, and remove the service bolt.

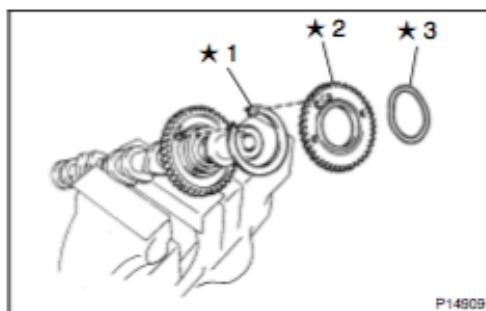
SST 09960-10010 (09962-01000, 09963-00500)



- (c) Using snap ring pliers, remove the camshaft sub gear shaft snap ring.



- (d) Remove these parts the camshaft sub gear wave washer (★ 1), camshaft sub gear (★ 2) and camshaft timing gear bolt washer (★ 3).



### 18. INSTALL CAMSHAFT SUB GEAR

- (a) Mount the hexagon wrench head portion of the camshaft in a vise.

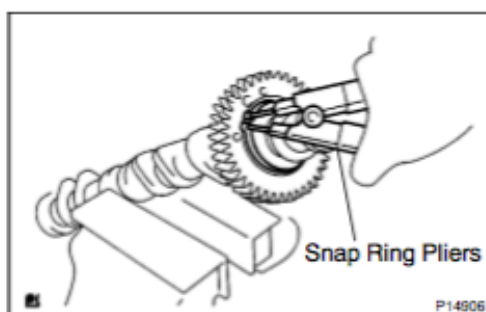
#### NOTICE:

**Be careful not to damage the camshaft.**

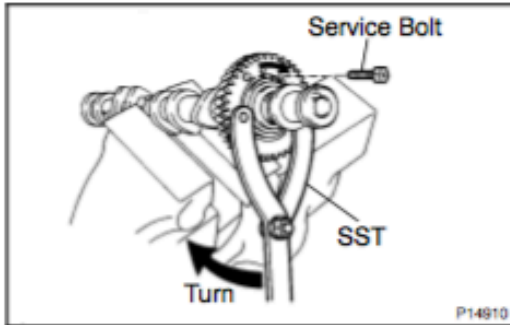
- (b) Install these parts the camshaft timing gear bolt washer (★ 1), camshaft sub gear (★ 2) and camshaft sub gear wave washer (★ 3).

#### HINT:

Align the pins on the gears with the camshaft timing gear bolt washer.



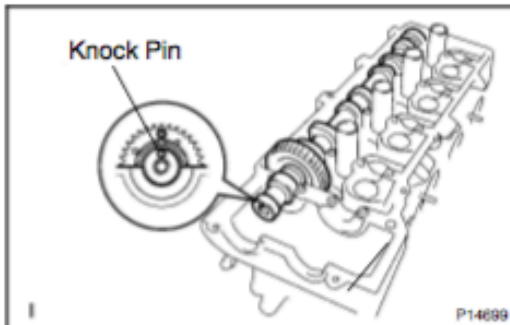
- (c) Using snap ring pliers, install the camshaft sub gear shaft snap ring.



- (d) Using SST, align the holes of the camshaft main gear and sub gear by turning camshaft sub gear clockwise, and install a service bolt.

SST 09960-10010 (09962-01000, 09963-00500)

**Torque: 5.0 N·m (51 kgf·cm, 44 ft·lbf)**

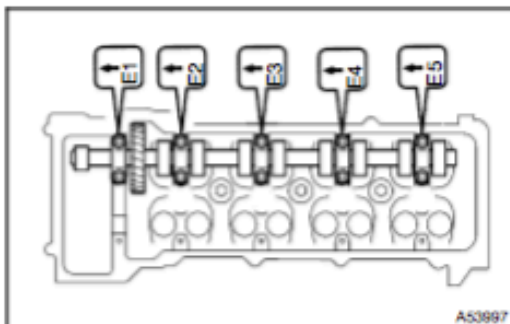


## 19. INSTALL NO.2 CAMSHAFT

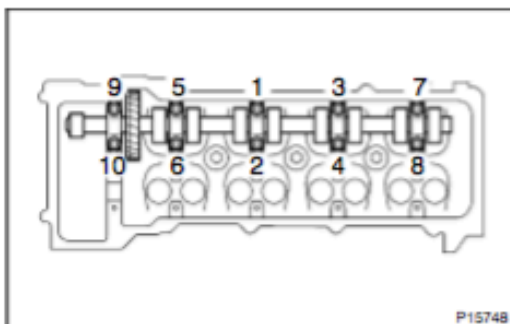
### NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, these steps should be carried out.

- (a) Apply MP grease to the thrust portion of the No. 2 camshaft.
- (b) Place the No. 2 camshaft with knock pin facing upward of camshaft angle on the cylinder head.

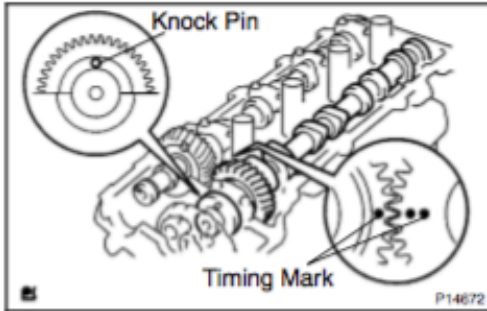


- (c) Install the 5 camshaft bearing caps in their proper location.
- (d) Apply a light coat of engine oil on the threads and under the heads of the camshaft bearing cap bolts.



- (e) Install and uniformly tighten the 10 camshaft bearing cap bolts in several, in the sequence shown.

**Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)**



## 20. INSTALL CAMSHAFT

### NOTICE:

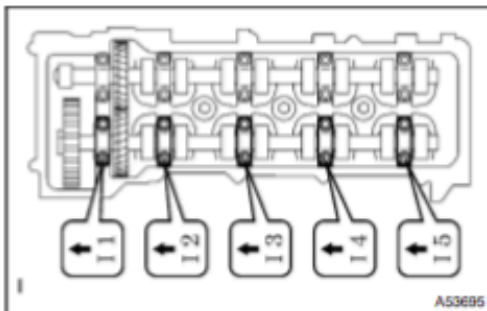
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If there camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, these steps should be carried out.

- Apply MP grease to the thrust portion of the camshaft.
- Engage the camshaft gear to the camshaft No.2 gear by matching the timing marks (1 and 2 dots) on each gear.

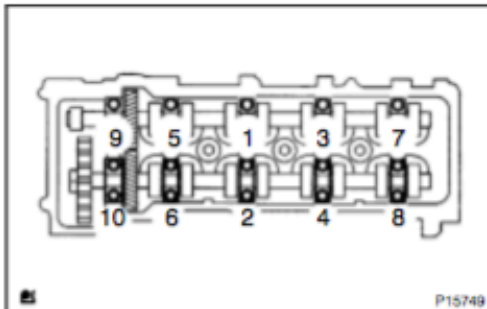
### NOTICE:

There are also timing marks (for TDC) on each gear as shown in the illustration. Do not use these marks.

- Roll down the camshaft onto the bearing journal while engaging gears with each other.

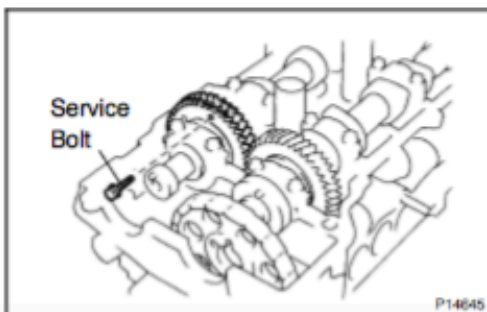


- Install the 5 camshaft bearing caps in their proper location.
- Apply a light coat of engine oil on the threads and under the heads of the camshaft bearing cap bolts.



- Install and uniformly tighten the 10 camshaft bearing cap bolts in several, in the sequence shown.

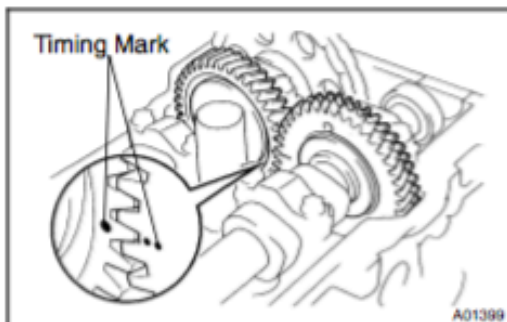
**Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)**



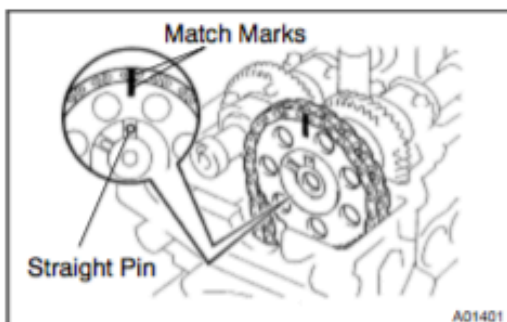
- Remove the service bolt.
- Check that the camshafts turn smoothly.

**21. SET NO. 1 CYLINDER TO TDC/COMPRESSION**

- (a) Turn the crankshaft pulley clockwise, and align its groove with timing mark "0" of the oil pump cover.

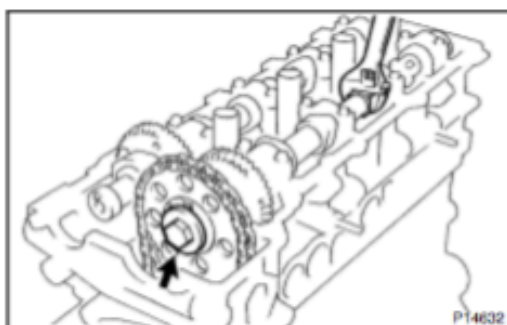


- (b) Turn the camshafts so that the timing marks with 1 and 2 dots will be in straight line on the cylinder head surface as shown in the illustration.

**22. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET**  
**HINT:**

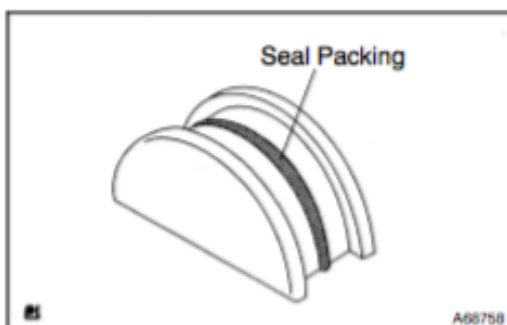
Check that the match marks on the camshaft timing gear and chain aligned.

- (a) Place the gear over the straight pin of the camshaft.



- (b) Hold the camshaft with a wrench, install and torque the bolt.

**Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)**

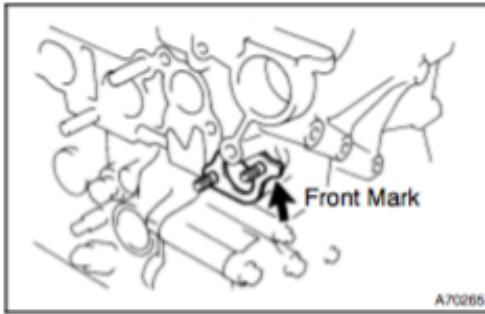
**23. INSTALL SEMICIRCULAR PLUG**

- (a) Apply seal packing to the cylinder head installation surface of the semicircular plug.

**Seal packing: Part No. 08826-00080 or equivalent**

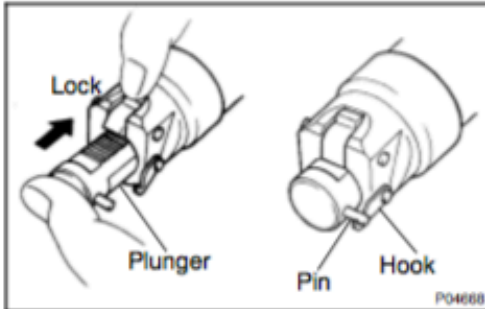
**NOTICE:**

- Remove any oil from the contact surface
  - Install the cylinder head cover within 3 minutes after applying seal packing.
  - Do not start the engine within 2 hours after installing.
- (b) Install the semicircular plug to the cylinder head.



#### 24. INSTALL CHAIN TENSIONER ASSY NO.1

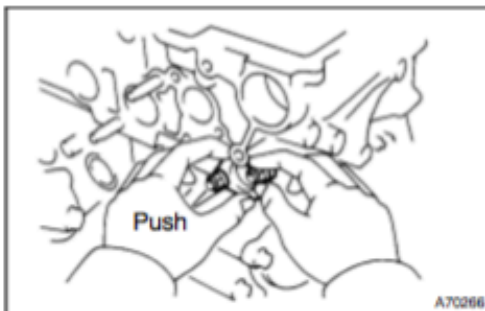
- (a) Place a new gasket so that the front mark is toward the front side.



- (b) Release the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger cannot spring out.
- (c) Turn the crankshaft pulley clockwise to provide some slack for the chain on the chain tensioner side.

#### NOTICE:

**Do not turn the crankshaft pulley counterclockwise.**



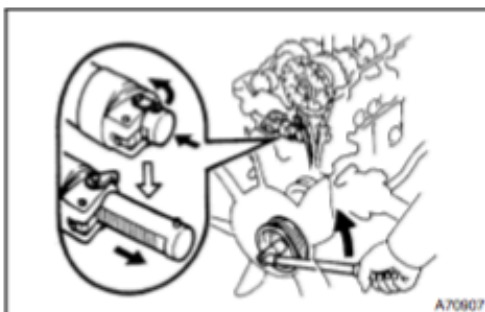
- (d) Push the chain tensioner by hand until it touches the cylinder head installation surface, then install the 2 nuts.
- (e) Tighten the 2 nuts.

**Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)**

- (f) Check that the hook of the chain tensioner is not released.

#### NOTICE:

**If the plunger springs out during installation of the chain tensioner, repeat the operation in step (b) before installing the chain tensioner.**

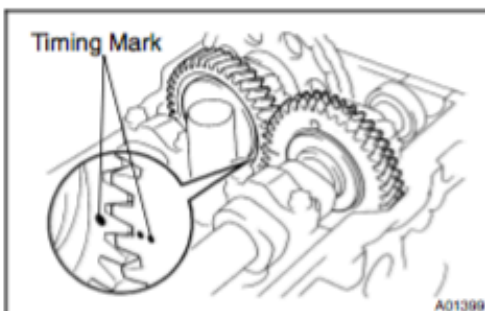


- (g) Set chain tensioner.

- (1) Turn the crankshaft to the left so that the hook of the chain tensioner is released from the pin of plunger, causing the plunger to spring out and the chain tensioner slipper to be pushed in to the chain.

#### HINT:

If the plunger does not spring out, press the chain tensioner slipper into the chain tensioner with a screwdriver so that the hook is released and the plunger springs out.



- (h) Check valve timing

- (1) Turn the crankshaft pulley clockwise and align its groove with the "0" mark on the oil pump cover.
- (2) Check that the timing marks (1 and 2 bolts) of the camshaft drive and driven gears are in straight line on the cylinder head surface as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

## **Importance of Testing Diesel Fuel Injectors**

“Improper Fuel Delivery” is a leading cause of Diesel Cylinder Head failure.

Faulty fuel injectors can & do cause serious engine damage! Never assume they are “ok”, always have them tested, serviced or replaced. They are critical to a healthy diesel engine.

# Do you have ANY questions?

Please feel free to contact Kiwi Cylinder Heads if you have any questions or comments regarding any of our quality componants.

## **New Zealand**

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## **Other Products Available from Kiwi Cylinder Heads**

- ☒ Head Gaskets
- ☒ Head Sets (VRS)
- ☒ Head Bolt Sets
- ☒ Rocker Cover Sets
- ☒ Manifold Sets
- ☒ Bottom Sets
- ☒ Timing Belt Kits
- ☒ Timing Chain Sets

- ☒ Water Pumps
- ☒ Thermostats
- ☒ EGR Coolers
- ☒ Engine Valves
- ☒ Cam Shafts
- ☒ Valve Shims
- ☒ Valve Train Components
- ☒ Hydraulic Lifters