Cam and rocker replacement 2ZZ-GE

Remove valve / cam cover.

Check valve lash now if needed.

Use a bump starter to align timing marks on both cam gears. see pix Oil will overflow from top of head (valve cover tube location) when you crank. Plug hole with rag and socket. Sorry no picture.

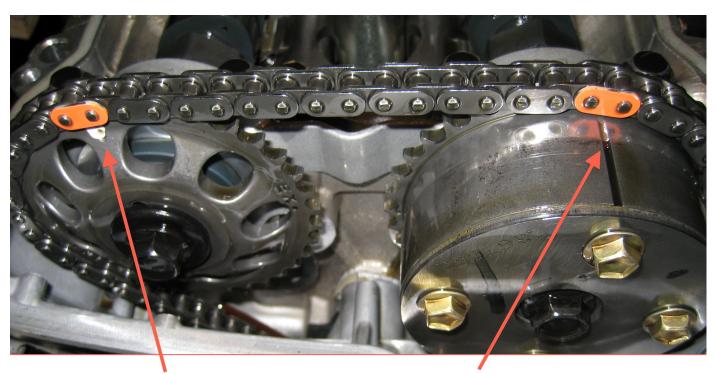
I use a bump starter switch that connects to the start button wiring. jcr.com

It may take quite a few revolutions of the engine before the links align. The orange painted links line-up every nine times (max) when they come by. The crankshaft has to rotate many times. Getting the painted links to the correct spot requires a bump starter. Hand turning the crank is not going to get you there.

see video in link

http://www.youtube.com/watch?v=1pi1u8PvQlk

Important: You do not need to see or confirm the yellow link on the crankshaft sprocket. (providing the timing was correct to begin with)



Use dimple in gear. Most times marked with white paint. Must use full width groove on gear to align link. Don't use shorter groove.

Remove serpentine drive belt from front of engine.

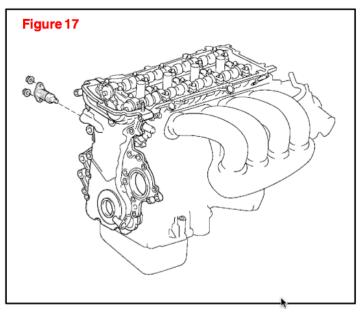
Remove timing chain tensioner (fig. 17).

Remove exhaust cam sprocket (fig. 18).

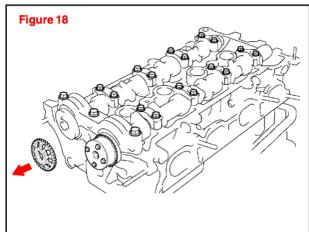
Loosen the bolt on intake cam sprocket, fully remove later.

Remove cams and tie off timing chain (fig. 19)

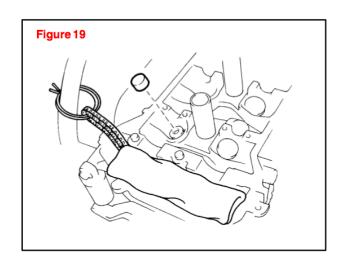
Note: It's physically impossible for the chain to jump a link on the crankshaft gear. The timing cover prevents that from happening.



Remove exhaust cam drive sprocket. (Figure 18.)



Secure the timing chain to prevent the chain from falling into the timing chain cover. (Figure 19.)



Removing the rockers:

Remove the 2 lift bolts. (fig. 26) These bolts hold and align the rocker shafts. Pay very close attention to how they are installed. There are 2 holes in the end of each shaft that need to be reinstalled "face up" and aligned with the lift bolt.

Remove the oil control valve housing. (fig.14)

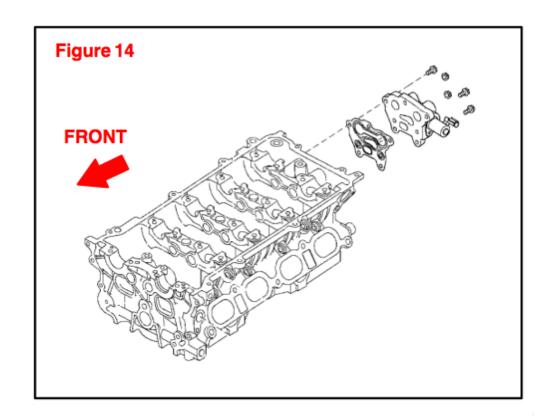
The rocker shafts need to slide towards drivers side.

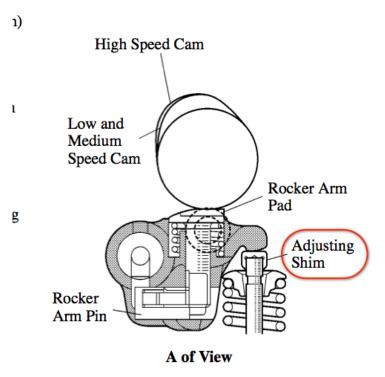
You may need to move the coolant overflow to make some room.

I use a 1/4" drive short extension to push the rocker shafts toward the drivers side. see pic I sometimes link a couple of them together. The shaft needs to be pushed a few inches so you can grab it from the other end. The shafts can be very hard to move sometimes. The shaft doesn't need to be completely removed.

Be careful not to disturb the lash caps / adjusting shims. The shims vary and thickness and need to remain on the proper valve stem.







EG15 169EG16

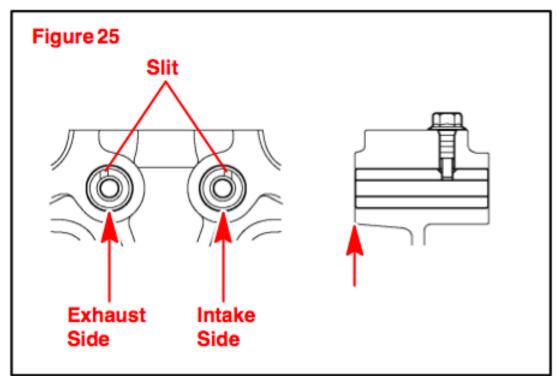
Install new rockers:

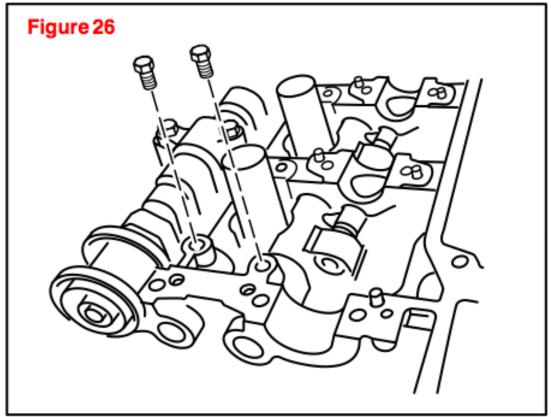
Slide the rocker shafts back into position while holding the rocker/s in-place.

The rocker shaft needs to be flush with head on passenger side. see fig 25

Check the position of the rocker shaft notch. fig. 25 Look into the lift bolt hole to see if the rocker shaft is aligned. You should see the hole in the rocker shaft aligned with the hole in the head. fig 25 Install the two lift bolts with red lock tight. These bolts like to come loose.

Torque to 7.5 N-m or 66 inch pounds. Don't over-tighten the bolts. They are threading into soft aluminum.

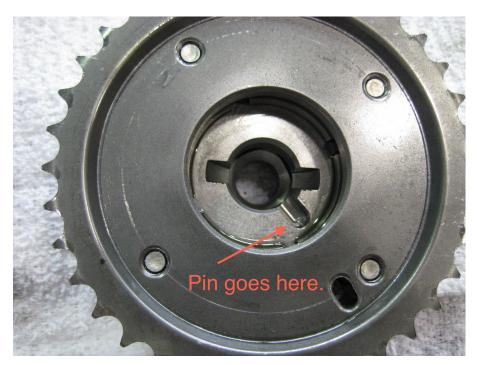


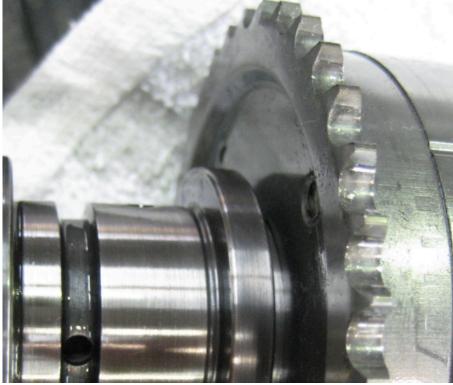


Install cams:

Install the timing gear sprocket onto the intake cam. The pin on the cam needs to line up with the slot in the timing gear. see pic

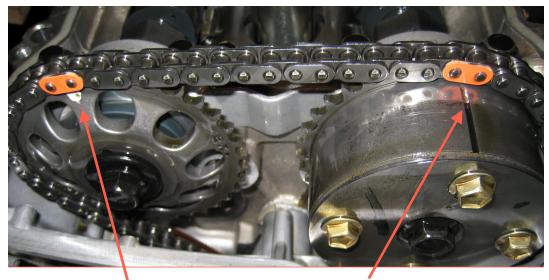
Make sure the pin is in the slot. You will have an 1/8" or less space between the cam and the gear when properly aligned. see pic Torque to 54 N-m or 40 ft lbs. (same for exhaust) No need to fiddle with the timing gear timing. Some Toyota instructions show how to reset the timing on the gear. No need for this if your just swapping the gear from one cam to another.





Place intake cam into position first. Place the orange link onto the intake cam sprocket (full groove). see pic

Install exhaust cam. Install exhaust gear onto cam. Align orange link. see pic

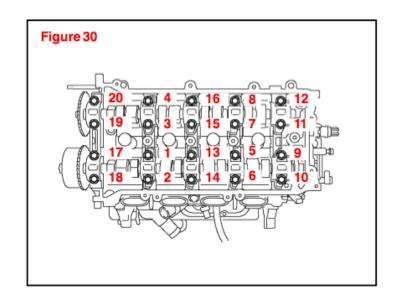


Use dimple in gear. Most times marked with white paint. Must use full width groove on gear to align link. Don't use shorter groove.

Install camshaft bearing caps.

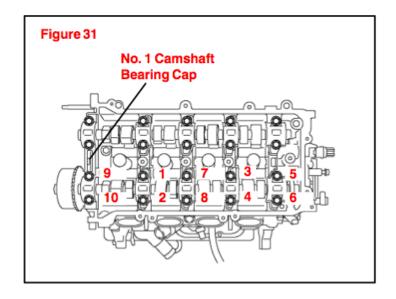
If you removed both camshafts, install and uniformly tighten the 20 bearing cap bolts. After tightening the No. 1 camshaft bearing cap hand tight, tighten the rest in several passes, in the sequence shown. (Figure 30.)

Torque: 18.5 N·m (189 kgf•cm, 14 ft•lbf)



If it was only necessary to remove the intake camshaft, install and uniformly tighten the 10 bearing cap bolts. After tightening the No. 1 camshaft bearing cap hand tight, tighten the rest in several passes, in the sequence shown. (Figure 31.)

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

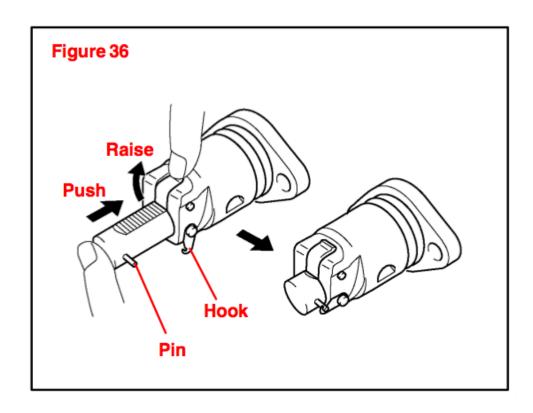


Install chain tensioner:

Are both cam sprocket bolts tight? 40 ft lbs

Reinstall timing chain tensioner. Very important step. The tensioner needs to be compressed and secured with hook. See (fig 36)

Reinstall tensioner into timing cover. Make sure it doesn't un-hook and expand before it's completely bolted in place. Rotate engine counter clockwise a few degrees and the tensioner will unlock. You can also push the tensioner with a long screw driver. Access through top of timing cover, see fig. 40. I like to use a flashlight and get visual conformation that the hook has released.



Insert the tensioner with your hand until it reaches to the chamfered position and install nut temporarily. (Figure 37.)

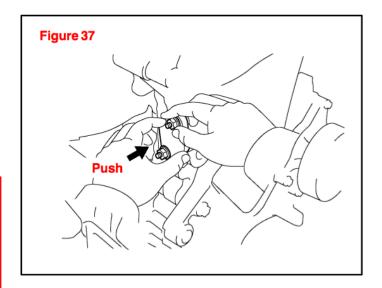
Then, by tightening the nuts, insert the chain tensioner to the fully installed position.

HINT:

- If the hook is released while pushing in, remove the tensioner and re-apply the hook again and push the tensioner in again.
- Be careful not to tear the O-ring as it is not serviceable separately.

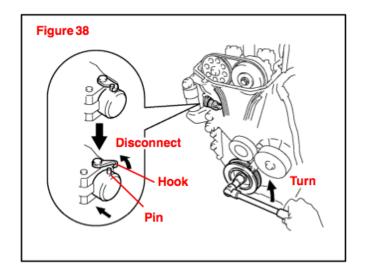
b. Tighten the 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.•lbf)

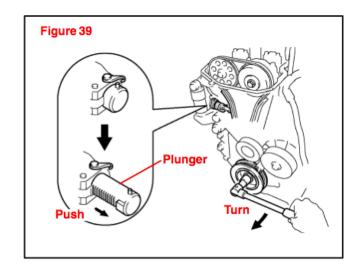


Set chain tension.

Turn the crankshaft counterclockwise, and disconnect the knock pin plunger from the hook. (Figure 38.)

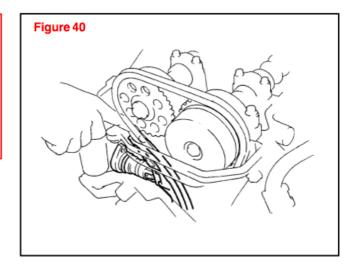


Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger. (Figure 39.)



HINT:

If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released from the knock pin and the plunger springs out. (Figure 40.)



Reinstall oil control housing. Reinstall serpentine drive belt. Reinstall valve cover, coils, etc.

Start car.