

## Freeing up those ticking Hydraulic Valve Lifters

The hydraulic lifters in a CA16DE and CA18DE engine require oil to flow in through the lifter and back out. If they run dry or the engine sits for a long period of time, they tend to cease up and start tapping making your gasoline engine sound like a diesel. To remedy this situation, I have come up with an idea which I recently tested and found works pretty good. Please understand that I am not a Nissan technician or a licensed mechanic. This is not intended to be a step by step guide but more of an outline, please do not attempt this unless you are comfortable with working on your own car and I would suggest having a manual handy for information that may not be found in this document. I will take no responsibility for the accuracy of this information, **Use this information at your own risk.**

### Tools Needed:

1. Ratchet wrench with 8mm, 10mm, 11mm, 14mm, 21mm
2. Hex key wrench set 4mm and 5mm maybe others.
3. Pulley remover
4. Phillips and flat head screw driver
5. Small C-clamp
6. Hydraulic jack
7. Jack stands
8. Drain pan to drain out a little coolant.
9. Magnetic pick up tool. (one that can pick up a pound or so).

### Other stuff:

1. Small container of Kerosene or Diesel fuel.
2. light weight oil or Magic Mystery Oil (which is what I used)
3. Clean towels

This process will take a few hours, but when you are done, your car should be much quieter then when you started.

### For Starters:

1. loosen the lug nuts on the right front tire, do not remove completely, just loosen enough so that you won't have to struggle to get them off with the tire not on the ground.
2. Be sure the emergency brake is set and the back wheels are blocked so the car can not move.
3. Jack up the right side of the car and support with an jack stand, the do the same to the left side.

4. Remove the right side tire.

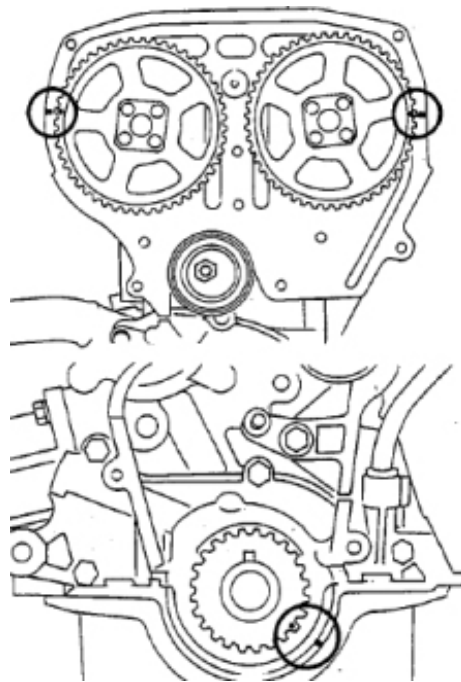
### **Valve Covers and Components:**

1. Remove all intake hoses obstructing the valve covers.
2. Remove the accelerator cable and bracket holding the cable in place.
3. Remove the intake (hex key bolts). You do not need to remove the coolant hoses from the intake or the entire intake, we just need to get it to the point where it can be raised up enough to slide the rear valve cover out. You may need to remove the Throttle position sensor.
4. Remove the Power transistor and bracket holding the power transistor in place.
5. Remove the ornamental cover over the coil packs, you do not need to remove the coil packs unless you feel the need, but I would suggest leaving the spark plugs in place so you do not contaminate the cylinders with oil or other dirt.
6. Remove the front and rear valve covers. You will need to pull up on the intake portion to slide the rear valve cover out.

### **Removing Timing Parts and Components.**

1. Drain out about a soda cans worth of coolant from the radiator. This can be done by the drain cock at the bottom right side of the radiator. We just need to get the level low enough so coolant does not come spewing out as we need to remove the left side hose which runs by the timing belt cover. Squeezing the hose a few times can help get the coolant out of the hose as well.
2. Get a few clean rags and disconnect the right side coolant hose from the radiator, pad the area with rags so coolant does not get on the alternator, once the hose is disconnected, stuff a few rags in the radiator hole and in the hose so any stray coolant does not drip. You do not need to disconnect the hose from the engine unless you require a larger space to work in.
3. Remove the belt which connects the crank shaft to the alternator and AC pulleys, this is done by loosening the pulley at the bottom.
4. Loosen the 4 bolts holding the water pump pulley, do not remove, just loosen enough so they are easy to get out once you remove the belt around it. If you remove the belt first, these are almost impossible to remove.

5. Remove the power steering and water pump belt (This is done by loosening the power steering pump, this is a pain to get to, the bolt is located between the power steering pump and the firewall).
6. Remove the water pump pulley.
7. Remove the Crank angle sensor, be sure to mark where the timing is on the sensor and timing cover plate before removal so you don't have to go through the pain of timing the car once its back together.
8. Remove the timing cover place (Hex key bolts on crank angle sensor side and two regular bolts on the valve side at the top). To get this plate out effectively, you will need to do the following:
  - a. Put your jack under the oil pan, put a board or other flat panel between the jack top and the oil pan. Jack up the oil pan just a touch so the board or flat panel is snug against the bottom to support the engine.
  - b. Remove the nuts for the engine mount next to the timing cover. All we need to do is get the left side of the mount off so the timing cover can slide out easily.
9. Set piston number one to TDC (top dead center). This can be done by using the crank pulley ratchet and turning the crank shaft to the timing marks as shown in the picture below



10. Remove the crank shaft pulley nut – this can be a complete pain as it is torqued down to 110 foot pounds, I have found that using a large C-Clamp to hold the pulley while removing the bolt works well, but this can and most likely will mark up the pulley path, specially if its not on tight enough.
11. Remove crank shaft pulley – this will require the pulley remover
12. Remove the lower timing belt cover plate.
13. Loosen the timing tensioner and remove the timing belt. Once the belt is removed, do not spin the crank shaft or the cam shafts independently as you risk damaging the valves or pistons.

### **Removing Cam Shafts:**

I did mine seperately so as not to mess up the cam shaft bolts or holders.

1. Remove the Exhaust and Intake sprockets (be careful, these suckers are sharp).
2. Remove the backing plate.
3. Remove the Exhaust cam shaft. It is best to do this in stages starting with the middle bolts and working your way out. This will ensure an even removal and stop the shaft from binding up and the bolts from getting bent or stripped due to pressure from the valve springs. Place all of the holders in order so you know how they go back on. (if for some reason they get mixed up, there is numbers on each holder with an arrow which points towards the direction is should be installed, in this case, the arrow should point towards the pulley. The number is accompanied with either an E or an I to signify Intake or Exhaust.).
4. Remove the cam shaft and set aside. Be careful not to damage the oil seal.

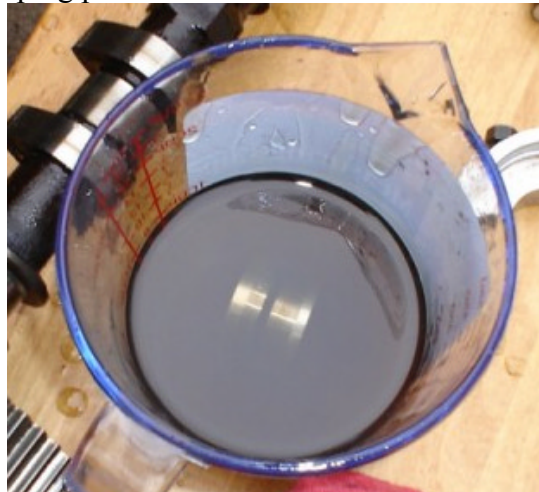
### **Cleaning/Freeing the Lifters.**

I would suggest doing these one at a time so they do not get mixed up. Get to containers and fill 1 with Diesel or Kerosene and the other with the oil or Magic Mystery oil. You only need enough in the container to submerge the lifter.

1. Using your magnetic pick up tool, remove the first lifter from the head.
2. Using your fingers, see if you can push the button in on the bottom of the lifter, if it is un-movable, take your C-Clamp and place the lifter in the C-Clamp and wind the clamp down to push the button in.



3. Once you free the button enough that you can pump it with your finger (you will not be able to pump the button completely, it should only move a little and that is all you need to make this work), submerge the lifter into the Kerosene container with the hole on the side facing up towards the top of the container. Pump the lifter until no more air bubbles come out of the hole on the side. The button should become a little easier to pump as the kerosene enters the lifter, but again, you will not be able to pump the button completely.
4. When no more air bubbles emerge from the lifter, remove the lifter from the kerosene and pump the kerosene back in to the kerosene container.
5. Submerge the lifter into the oil with the side hold towards the top of the container and repeat the pumping process until no more air bubbles emerge from the lifter.

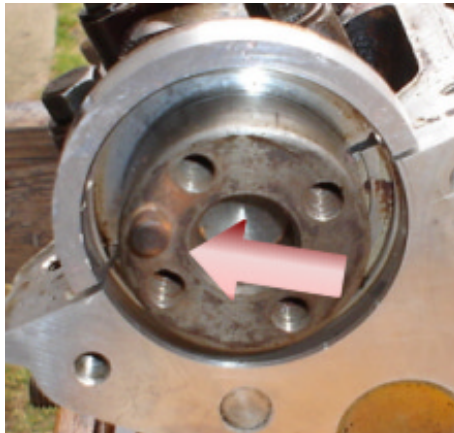


6. Replace the lifter into the head from the same spot it was removed from. It is best to leave the lifter dripping with oil as drying it or cleaning it after the last step may cause air to get into the lifter and you will have to repeat this process again.

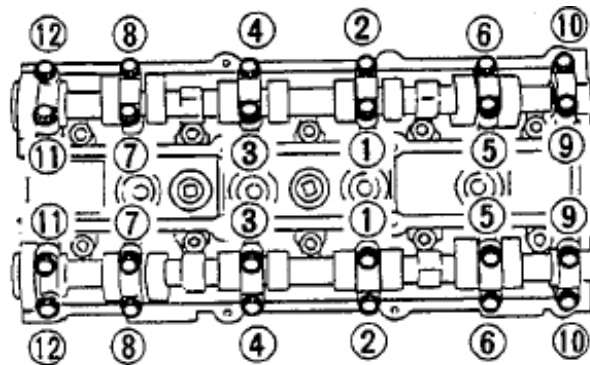
Repeat this process for all lifters in the head, once they are in the head, do not push down on them as you will push oil out of the lifter and that may cause it to start ticking again. I would also suggest that once you have completed the Exhaust side to put the exhaust parts back in place before doing the intake side so no parts get mixed up.

### Installing The Cam Shafts:

Both the exhaust and intake cam shafts have a rod sticking out of the pulley side. These rods help align the shafts with the pulleys.



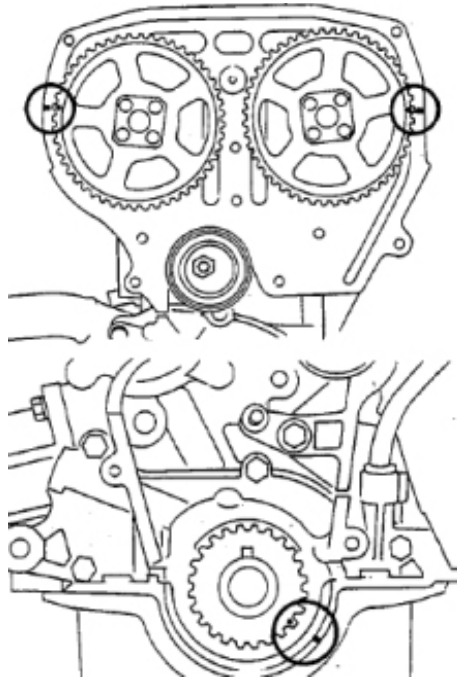
Be sure that these rods are facing the outside of the head when installing the cam shafts or your timing will not be right and you risk damage to the head. The Exhaust cam should have the rod towards the front of the engine and the Intake cam should have the rod towards the back of the engine. Install the cam shafts being careful not to bang or scratch them on other metal surfaces. When installing the holders, observe the correct direction of the arrows and numbers on each, the arrows should be pointing towards the pulley side of the cam shaft. Tighten the bolts in 2-3 stages starting with the inside bolts first and working your way out as shown in the picture below:



Torque the bolts down using the above pattern to no more than 8 foot pounds and no less than 6.5, be careful not to go beyond this torque range or you will snap one of them off.

When installing the cam shaft sprockets, observe the direction of the 5<sup>th</sup> hole for the alignment rod. Torque the bolts to no more than 14 foot pounds and no less than 10 foot pounds. Use a crescent wrench in between bolts 4 and 8 (see picture above) on the cam shaft to hold the shaft in place while you torque down the bolts, do not spin the cam shaft or you risk valve or piston damage.

Reversing the removal procedure above, put all of the parts back on. When installing the timing belt, observe the timing marks on the cover plate and at the crank shaft as shown below:



Before tightening the tensioner pulley, turn the crank shaft 2 full rotations back to cylinder 1 being top dead center and be sure the marks are correct. Turning the crank can be a chore, and will require that you insert the crank bolt and tighten it up enough to turn the crank. Use a stack of washers or something of the like with the bolt so the bolt does not go in too far and start stripping or get stuck. Once you are satisfied with the timing, tighten the tensioner to no more than 29 foot pounds and no less than 22 foot pounds.

Installing the crank pulley can be a chore, I used the C-Clamp again to hold it in place while I torqued the pulley. The crank shaft bolt should be torqued to no more than 112 foot pounds and no less than 105 foot pounds.

Once everything is back together, and you have checked all your connections, fire it up and listen to a quiet motor again. Hope this helps someone out there!!

Written for [www.nissanforums.com](http://www.nissanforums.com) by Fletch