SR20 Camshaft Install

Use this Guide to Install Cams in a FWD SR20 (N14/N15 DE, U12, U13, W10 – GTiR may differ)

This guide is a re-write of the guide provided by Jim Wolf Technology. I found however that it assumes prior knowledge and lacks some detail in areas. It also does not include the correct order in which to torque bolts which is why I have written this to be a bit more comprehensive.

JWT Guide can be found here:
http://jimwolftechnology.com/wolfpdf...NSTFORSR20.PDF

Another useful guide for reference can be found here:
http://www.turbomagazine.com/tech/01...ams/index.html

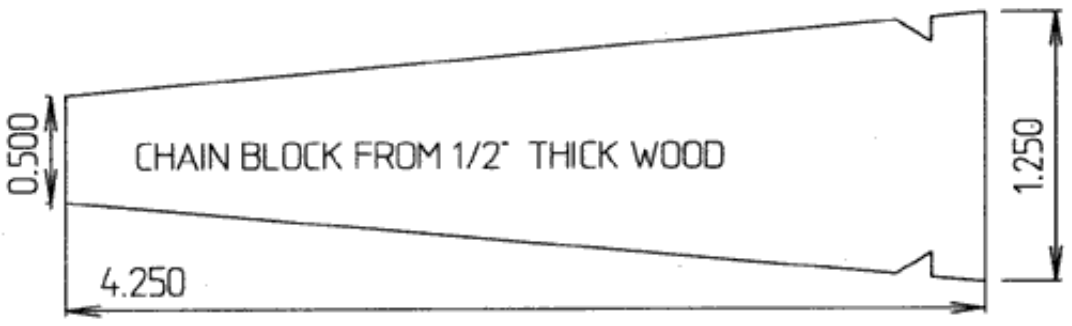
Make sure you read entirely through these instructions first and understand and feel comfortable with what you are doing. Do not proceed otherwise.

In the case of Tomei SR20DE PonCams, they can be ordered directly for the FWD SR20DE (P10) however they do not have a separate part number for the FWD SR20DET's. You can order them for the S13 SR20DET however the exhaust cam has a much longer sprocket locator dowel. Apparently they used to supply a shorter dowel for the FWD engines however I found this not to be the case with the 2 sets I have seen. This dowel can be removed and substituted for a dowel from a FWD camshaft, any workshop that machines flywheels should be able to do this. If you have a dremel you can carefully measure the length it should be and chop it off with a cutting disc. Mask up the rest of the camshaft before you do this to protect it from metal filings and general damage.

Things you will need:

- Torque Wrench
- 10mm Socket
- 12mm Socket
- 24mm Socket
- 27mm Socket or Spanner
- 1" Open ended Spanner
- Mechanical Assembly Lube (or clean engine oil)
- Liquid Gasket
- Rags
- Whiteout or suitable marker
- Chain block wedge (see Figure 1 below)
- Large cloth (never leave while the engine is open, if you must, cover it with a clean lint free cloth)
- Large clean tray
- Clean bucket or container to put loose bits in

Figure 1:

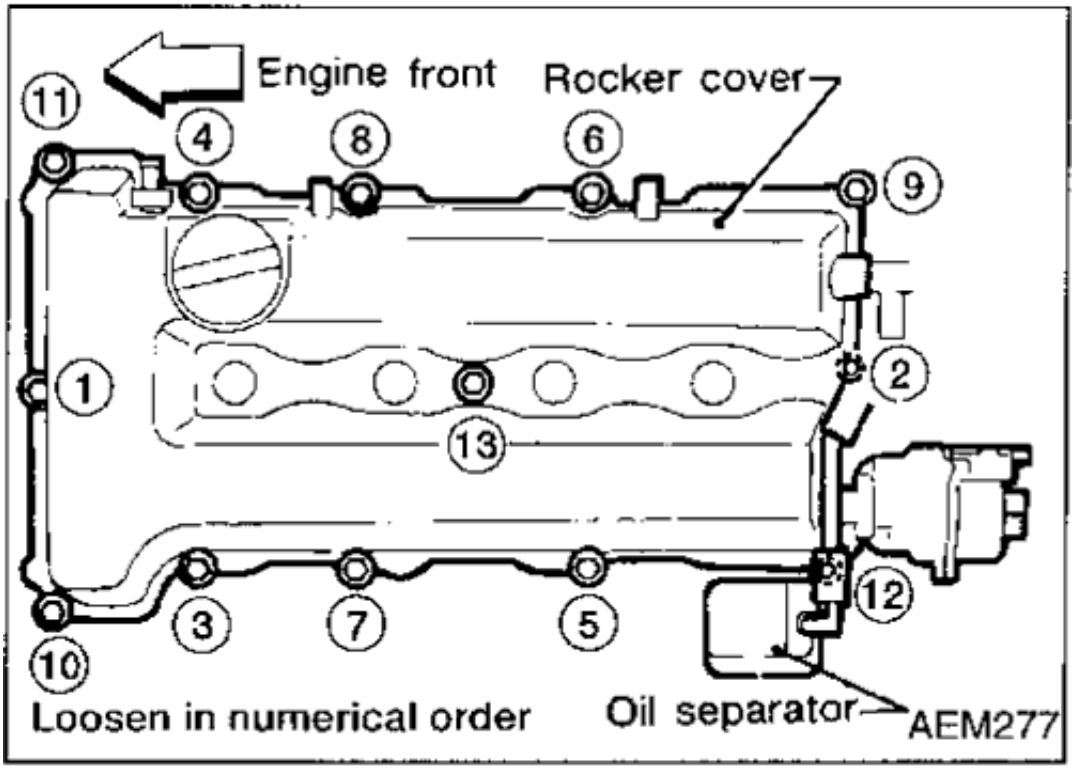


Instructions:

1. Put the car in neutral with handbrake on, jack the car up and have it sitting on jack stands. Remove the drivers side wheel and the plastic engine splash guard.

2. Remove the rocker cover from the engine. This means taking out the spark plug leads, PCV hoses and the standard oil breather/catch can. Also disconnect the battery. Refer to Figure 2 for the correct order to undo the rocker cover bolts. **Be careful that nothing falls in the engine.** With the rocker cover removed go over the surface that the rocker cover gasket sits on and wipe away any excess oil and dirt. **Be careful to wipe this away from the motor so no dirt falls in the engine.**

   Figure 2:



3. Rotate the crankshaft clockwise via the 27mm bolt head on the crankshaft pulley until the first cylinder is at TDC. To ensure this is correct, look at the crank pulley and make sure the pointer is on the 0 degree mark (see figure 3). Also check that the dowel pin locations are at 10 o'clock for the intake and 12 o'clock for the exhaust (see figure 4). If this is not the case then rotate the engine clockwise 1 full rotation and check again.

   Figure 3:

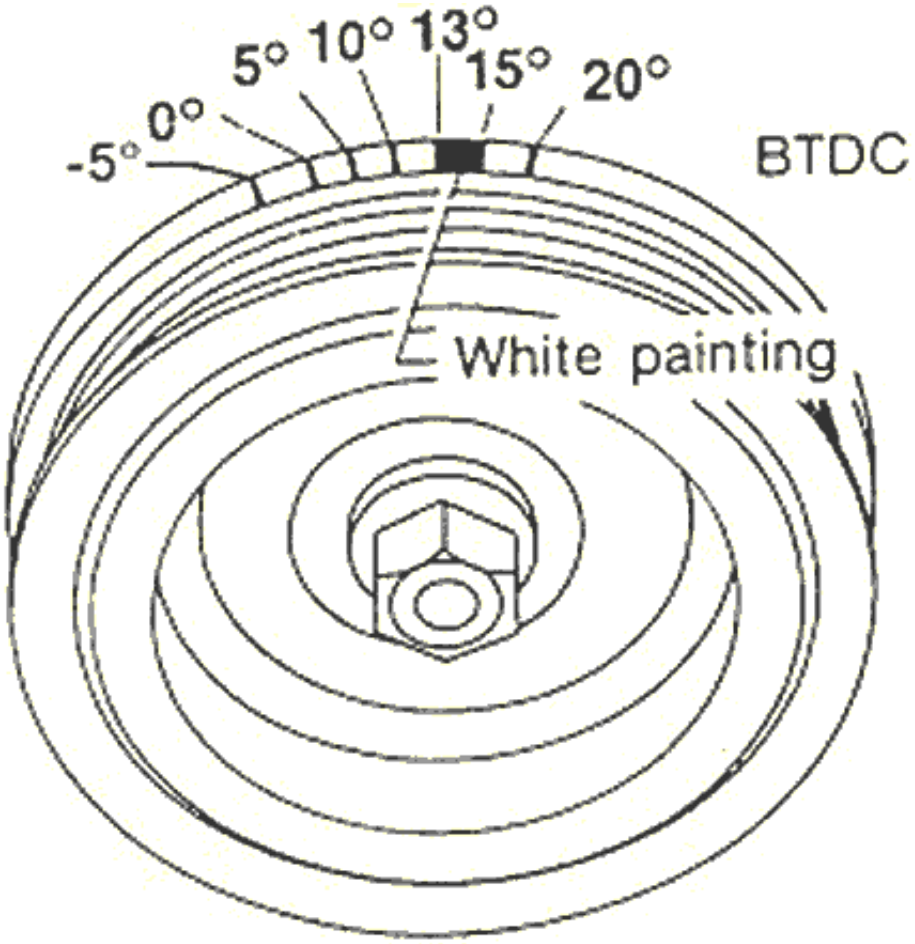
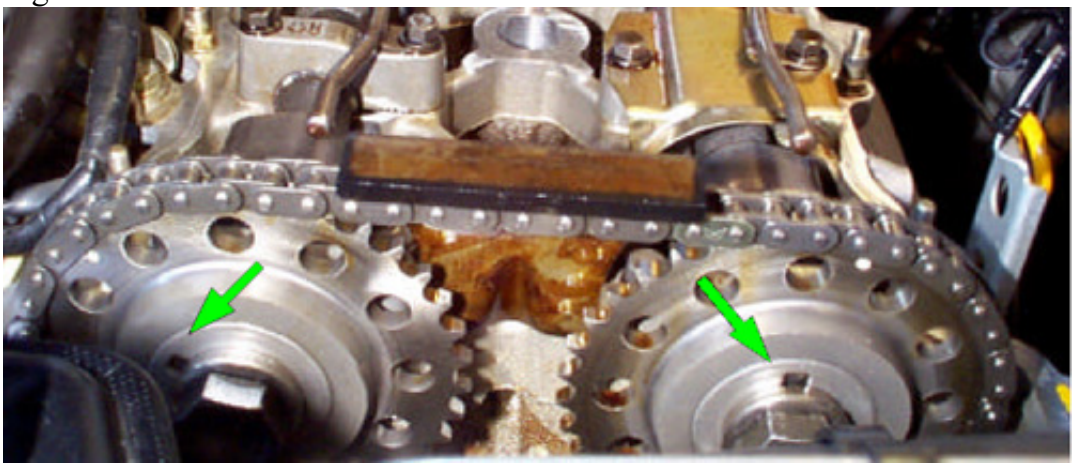


Figure 4:



4. Remove the distributer cap and mark the position the centre rotor is facing with whiteout. If the engine is at TDC it should be at the 5 o'clock position.

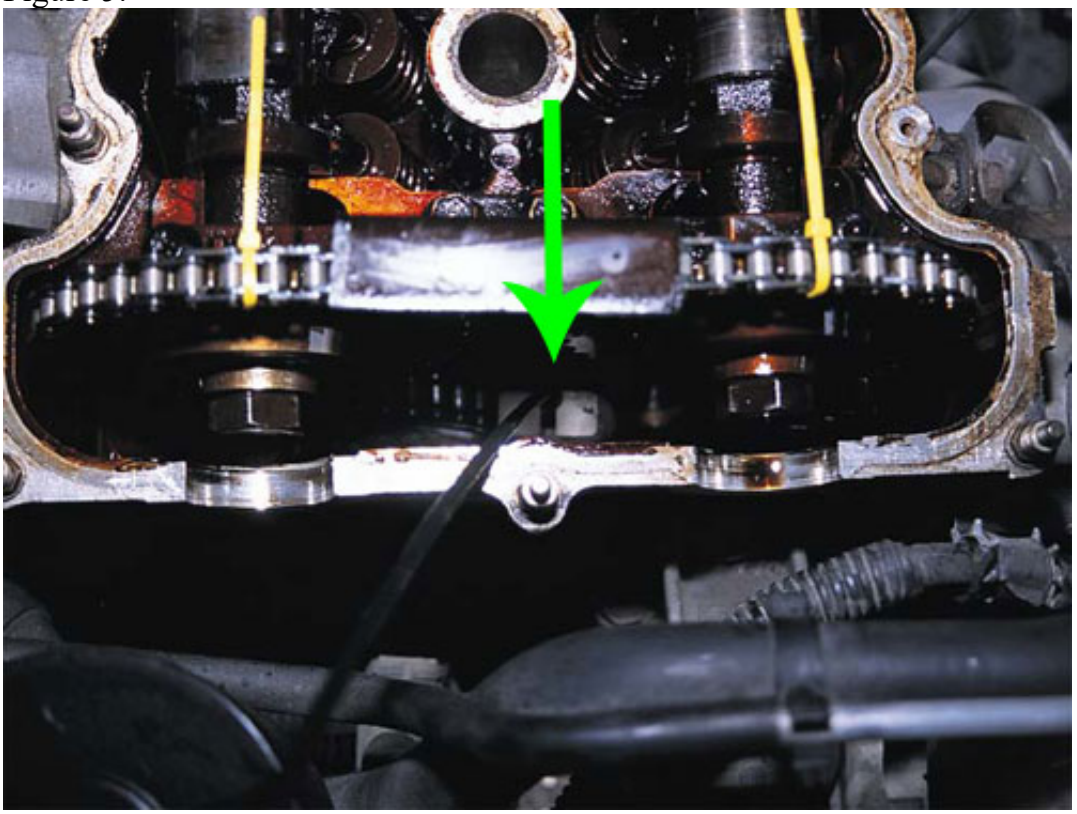
5. Loosen the sprocket bolts. Use a 24mm socket on the bolt and a 1" open ended spanner on the cam hex found just before the first cam lobe. **Do not rely on the chain for tension**, make sure you use the 1" spanner on the cam hex to counteract the tension put on the sprocket bolt. Only loosen the bolts, do not remove them yet.

6. Use zip ties to secure the chain to the sprockets so that it cannot jump a tooth and loose its timing. Wrap the zip tie around the chain and through one of the holes in the sprockets. Do this for both intake and exhaust.

7. The chain tensioner can be removed or blocked. I choose to block it using the

template in Figure 1. Wedge this block between the chain on the intake side and the aluminium protrusion in the block (See Figure 5). Push it in firmly with your fingers only, you do not want to damage the chain rail by putting too much pressure on it.

Figure 5:

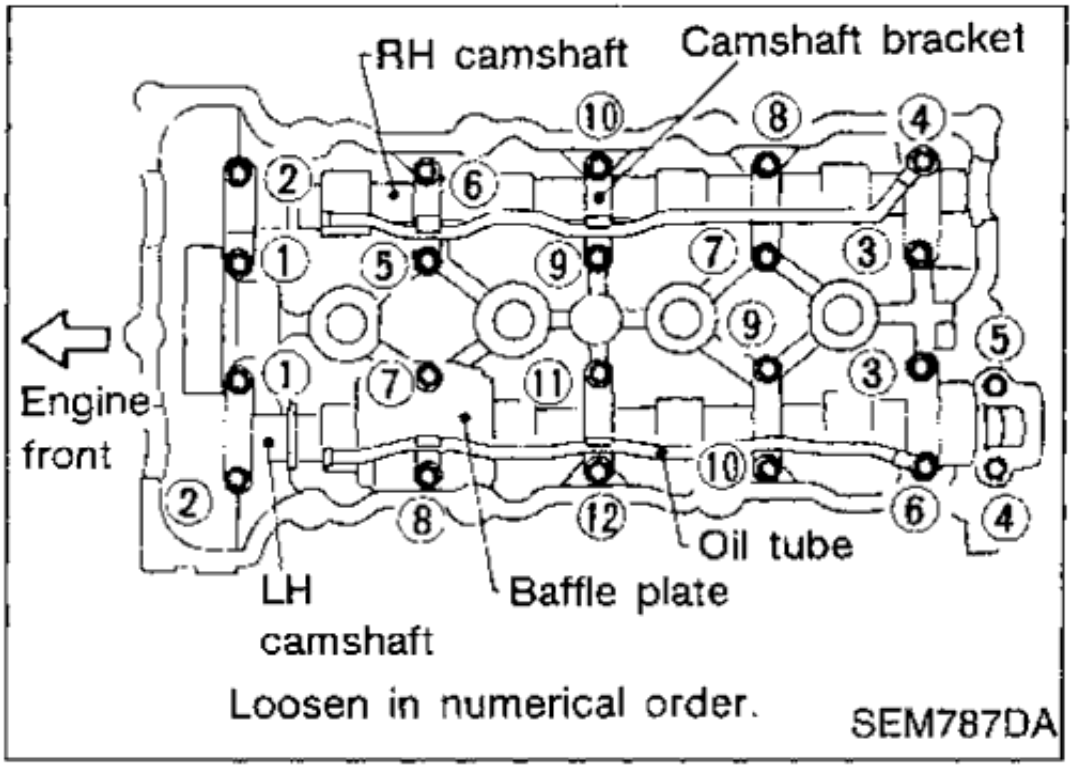


8. Remove the upper chain guide if it exists and then remove the cam sprocket bolts. Undo the 24mm sprocket bolts **taking care with the washers not to let them fall into the motor.** Pull the sprockets off the cams and let them rest until ready to be assembled to the new cams.

9. Undo the 2 12mm bolts holding the distributor to the block.

10. Mark the Cam bearing caps 1 to 5 on both the intake and the exhaust cams. Loosen each cam bearing cap bolt 1 turn at a time until free of any tension. Make sure you follow the correct order according to Figure 6. Remove the bearing caps and the oil journal and bolts in one go if possible and place on a clean tray in the same order as they were removed. Pull the distributer away at this point also.

    Figure 6:



11. Carefully pull the cams out taking particular caution**not to hit them on any surface.** Check to make sure that the cam followers and lash pads are still in place on the valves.

12. Check the new cams for any defects and general cleanliness. They usually come coated in a thick grease to assist their “wear-in” do not clean this off. Coat the lobes and bearings in assembly lube or clean engine oil.

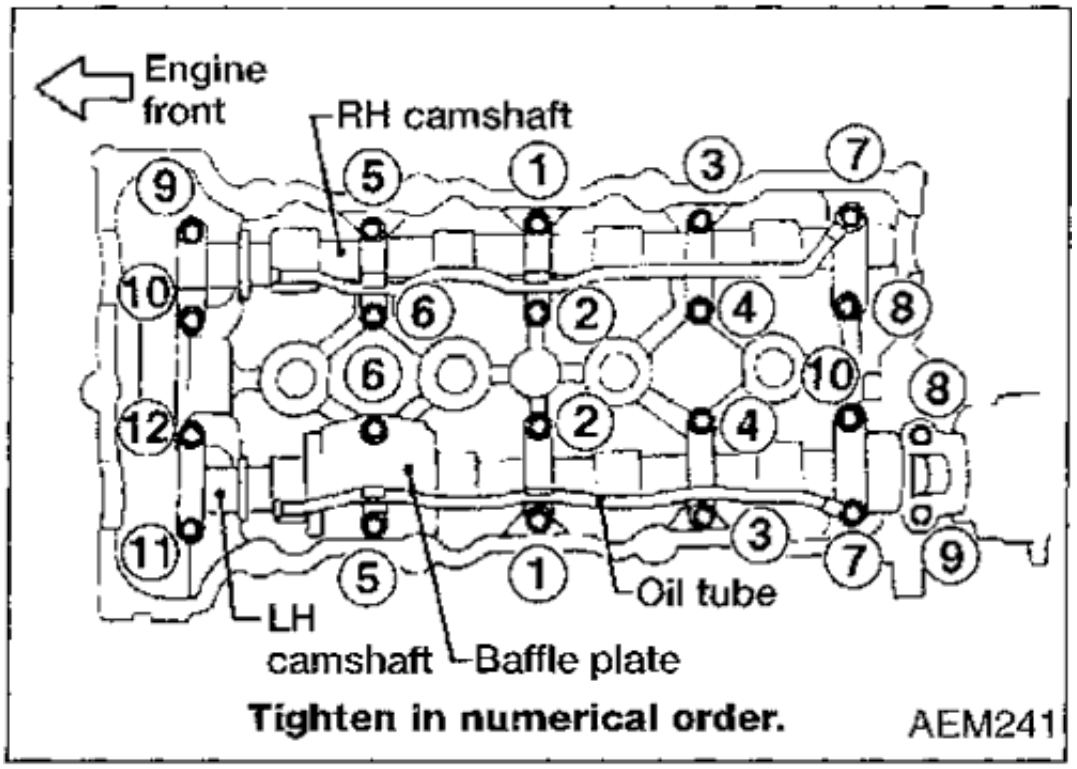
13. Carefully install the new cams **making sure not to hit them on any surface.** Also take note of the correct Exhaust cam and the positioning of the lobes and dowel pins as seen in Figure 4. (Intake 10 o’clock, Exhaust 12 o’clock)

14. Reinstall the cam bearing caps, oilers and baffle in the correct order making sure the arrows are facing towards the front of the motor. Apply a thin coat of gasket goo to the last bearing cap on the exhaust cam that holds the distributer.

15. Reinstall the distributer taking note that the markings you made earlier are in roughly the same position. This must be done before the cam bearing caps are tightened to ensure the correct allignment of this particular cap.

16. Evenly tighten the cam bearing bolts for both camshafts in the correct order according to Figure 7 half a turn at a time until each one is snug. Proceed to do this again to each bolt in the correct order and torque to 6 Nm (4.3 ft-lb). Do this again in the correct order however this time torque the 10mm bolts to 10-12 Nm (7-9 ft-lb) and the 2 12mm bolts to 18-25 Nm (13-19 ft-lb).

    Figure 7:



17. Attach the sprockets to the new cams and screw the 24mm bolts and washers in by hand. The cams may need slight rotating to engage the sprocket locating dowels. Make sure that the sprockets are fully seated against the cam before torquing the bolt.

18. Use a 24mm socket on the bolt and a 1” open ended spanner on the cam hex found just before the first cam lobe. **Do not rely on the chain for tension**, make sure you use the 1” spanner on the cam hex to counteract the tension put on the sprocket bolt. Torque these bolts upto 137-157 Nm (101-116 ft-lb).

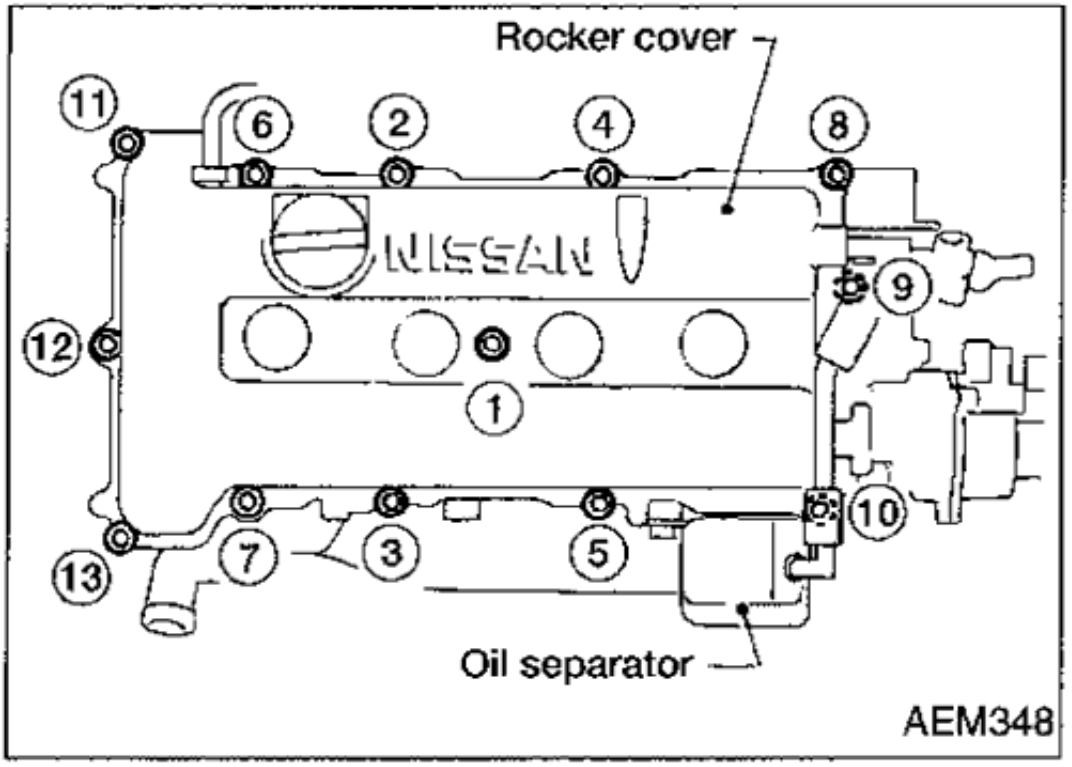
19. Remove the zip ties from the sprockets and pull out the chain tension block.

20. Reinstall the upper chain guide if it existed. As this is not a critical component no torque is mentioned for this in any of the FSM's. I would assume to torque these to the same as the other 12mm bolts, 18-25 Nm (13-19 ft-lb).

21. Inspect your work carefully looking for any rockers or lash pads that may not be seated properly or any parts not correctly installed. Recheck the cam timing, the crank should be on the TDC mark (Figure 2), the exhaust cam dowel at 12 o’clock, intake cam dowel at 10 o’clock (Figure 4) and the marking made on the distributer inline.

22. Reinstall the rocker cover, apply liquid gasket where necessary to the half moons. Tighten the bolts by hand following the correct order found in Figure 8. Follow this order again torquing the bolts to 8-10 Nm (7 ft-lb)

    Figure 8:



23. Re-attach the distributer cap, spark plug leads, PCV hoses and the standard oil breather/catch can. Also re-connect the battery. Check that the 2 12mm distributer bolts are in and that the distributer is roughly in the middle of its advance/retard adjustment range.

24. Reinstall the engine splash guard and drivers side wheel. Lower the car onto the ground.

25. Start the car. You may hear very loud chain rattle however this should only last for a second. Assuming that everything sounds normal, wait for the car to warm up and proceed to set the correct engine base idle and speed. A PGA Guide for this can be found here: http://forum.pulsar.org.au/showthread.php?t=42236

26. Breaking in the cams should consist of 10-15 minutes of 1500-2000 RPM and then about 200kms of normal driving keeping the RPM below 4000.

If anyone else has any suggestions or tips please let me know and i will add them.

Paul