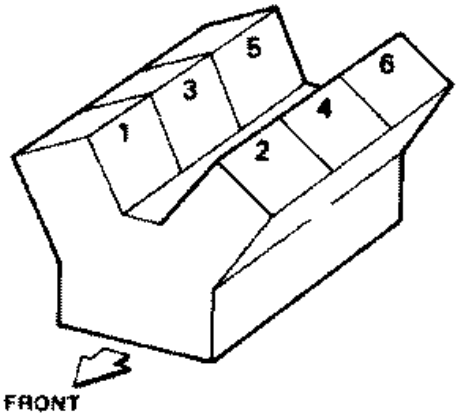
Degreeing all of the camshafts on the VG30DE(TT) engine requires that you find Top Dead Center (TDC) of a cylinder from each side of the engine. The following instructions will walk you through the cam degreeing process for cylinders #1 and #2:

All rotational directions, clockwise or counterclockwise, are from the view of looking at the front of the engine. When rotating the crankshaft to take a reading on the degree wheel, always rotate clockwise to allow the timing belt tensioner to maintain consistent tension on the timing belt. If you overshoot the point of interest, continue rotating clockwise to retry.

Acronyms and abbreviations:

ATDC = After Top Dead Center
BTDC = Before Top Dead Center
BDC = Bottom Dead Center
FSM = Factory Service Manual
TDC = Top Dead Center

Cylinder Numbers



Find TDC for cylinder #1

- Rotate the crankshaft clockwise until you find the compression stroke for the cylinder of interest – continue rotating until the piston is roughly at TDC.
- Install the degree wheel and pointer and orient them so the pointer is on the 0° mark of the degree wheel.
- Rotate the crankshaft clockwise approximately 180° to BDC.
- Install the piston stop into the spark plug hole (to ensure the greatest accuracy, the piston stop should be adjusted to contact the piston between 20° to 30° from TDC).
- Rotate the crankshaft counterclockwise until the piston contacts the piston stop (note, this is the only time you should rotate the engine counterclockwise) – mark the pointer location on the degree wheel.
- Rotate the crankshaft clockwise until the piston contacts the piston stop – mark the pointer location on the degree wheel.
- Remove the piston stop from the spark plug hole.
- True TDC for this cylinder is exactly in the center of the two marks on the degree wheel.
- Mark the degree wheel in the center between the two previous marks.
- Rotate the crankshaft to the center mark.
- Reposition the pointer to be exactly on the 0° mark of the degree wheel.
- Clean off all previous marks.

#1 piston is now at true TDC.

Repeat this process for #2 cylinder **but do not reposition the pointer** or you will lose reference to #1 cylinder. #2 TDC is 120° rotation clockwise from #1 TDC but it is advised that you verify its exact location with the piston stop method.

Measure the exhaust camshaft centerline for cylinder #1

- Install a dial indicator onto the cylinder head and position it so its plunger contacts an exhaust lifter (for the cylinder of interest) perpendicular to the lifter surface and so it will not impede the rotation of the camshaft.
- Preload the plunger to allow full measurement of the valve lift and set the zero mark on the dial indicator.
- Rotate the crankshaft clockwise until the lifter has moved 0.050" on its opening ramp – mark the pointer location on the degree wheel.
- Continue rotating the crankshaft and note the maximum lift of the camshaft.
- Continue rotating the crankshaft until the exhaust lifter is at 0.050" on its closing ramp – mark the pointer location on the degree wheel.
- Calculate the total degrees between marks on the degree wheel – this is the degrees of duration above 0.050" lift.
- The exhaust lobe centerline is in the center between the two marks made for the points at 0.050" lift on the opening and closing ramps.

The exhaust centerline relative to piston TDC for the #1 cylinder is now known, record it.

Measure the intake camshaft centerline for cylinder #1

- Install a dial indicator onto the cylinder head and position it so its plunger contacts an intake lifter (for the cylinder of interest) perpendicular to the lifter surface and so it will not impede the rotation of the camshaft.
- Preload the plunger to allow full measurement of the valve lift and set the zero mark on the dial indicator.
- Rotate the crankshaft clockwise until the lifter has moved 0.050" on its opening ramp – mark the pointer location on the degree wheel.
- Continue rotating the crankshaft and note the maximum lift of the camshaft.
- Continue rotating the crankshaft until the lifter is at 0.050" on its closing ramp – mark the pointer location on the degree wheel.
- Calculate the total degrees between marks on the degree wheel – this is the degrees of duration above 0.050" lift.
- The intake lobe centerline is in the center between the two marks made for the points at 0.050" lift on the opening and closing ramps.

The intake centerline relative to piston TDC for the cylinder #1 is now known, record it.

Repeat the camshaft centerline measurement process for cylinder #2.

Degree the exhaust camshafts

Calculated from the Nissan FSM, the centerline for a stock exhaust camshaft is 245° ATDC (Note, JWT lists the exhaust centerline as 115°, which calculates to a reference point of Before Top Dead Center (BTDC)). Most JWT cams are advertised with the exhausts being advanced (valves open earlier) by 4°, in this instance the centerline for these aftermarket camshafts is 241° ATDC (or 119° BTDC).

As you can see, it is important to know the reference point when speaking about camshaft timing events. My preference is to always reference clockwise from TDC, or After TDC. If a manufacturer's number gives no point of reference, take the time to do the math and verify the reference point.

The goal of degreeing the cams is to get the timing equal for both sides of the engine. If the measured centerline for #1 cylinder exhaust cam is 248° ATDC and the #2 centerline is 250° ATDC, you will need to advance them at their sprocket by 3° and 5° respectively if both are to be set to 245° ATDC.

Degree the intake camshafts

Calculated from the Nissan FSM, the centerline for a manual transmission intake camshaft is 125° ATDC while a twin turbo automatic transmission intake camshaft is 120° ATDC. All JWT camshafts are ground to 125° ATDC.

Tuning camshaft timing

Tuning the camshaft timing can only be done with a dynamometer. The ultimate camshaft centerline timing that makes the most torque ***or*** moves the torque peak to the RPM of preference is not necessarily the factory spec. Every engine is unique and there is no "one size fits all" setting when it comes to tuning the camshaft timing.