ADJUSTABLE 9 HOLE CAM SPROCKETS
NISSAN KA24DE W/DOUBLE ROW CHAIN

Adjusting cam timing

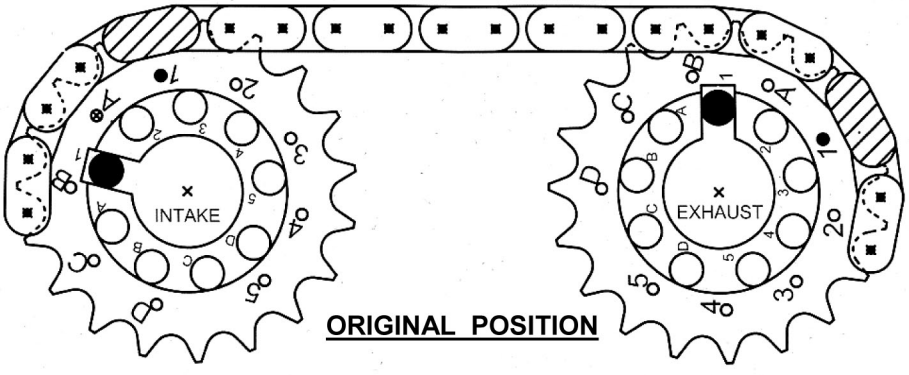
The sprockets have a total of 9 positions, each position is offset by 2.5 crankshaft degrees. Position #1 is the stock position, #2, #3, #4 and #5 will advance the cam by 2.5, 5.0, 7.5 and 10 crankshaft degrees respectively. Positions #A, #B, #C, and #D will retard the cam by 2.5, 5, 7.5, and 10 crankshaft degrees respectively. It is possible to advance or retard each cam by up to 10 degrees as needed in steps of 2.5 crank degrees using the chart on the right.

ALWAYS USE THE MATCHING HOLE AND TOOTH (IE. HOLE MARKED #1 AND TOOTH MARKED #1). VALVE DAMAGE CAN OCCUR IF YOU MIX THEM UP! ALWAYS CHECK FOR PROPER VALVE TO PISTON CLEARANCE WHEN MAKING A CAM TIMING CHANGES.

HOLE/MARK	CRANK DEGREES ADVANCE / RETARD
5	10 DEG. ADV.
4	7.5 DEG. ADV.
3	5.0 DEG. ADV.
2	2.5 DEG. ADVANCE
1	STOCK NO CHANGE
A	2.5 DEG. RETARD
B	5.0 DEG RET.
C	7.5 DEG RET.
D	10 DEG. RET.

NISSAN KA24DE ADJUSTABLE CAM SPROKETS

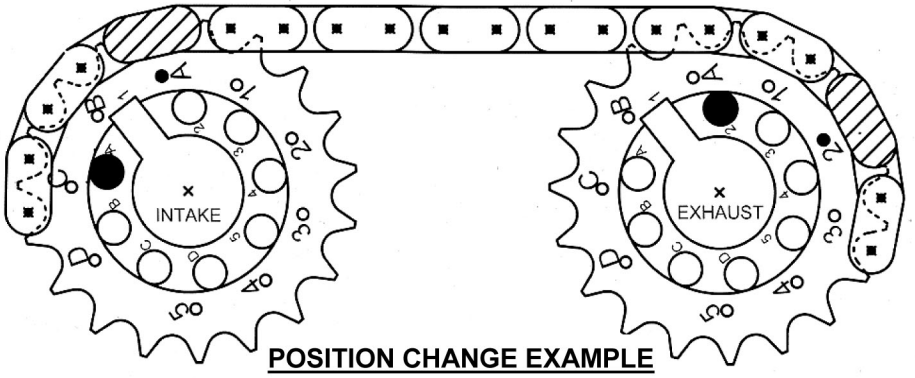
BOTH CAMS SET TO ORIGINAL (#1) SETTINGS



ORIGINAL POSITION

INTAKE CAM RETARDED ONE STEP ("A")

EXHAUST CAM ADVANCED ONE STEP ("2")



POSITION CHANGE EXAMPLE

Why do you need an adjustable cam timing sprocket?

Engine modifications, repairs or wear that alters the original crank to camshaft relationship will require an adjustable sprocket to correct the error. This can include resurfacing of the head or block, and chain stretch.

When engines are built for performance, it is critical that all of the valve timing events be optimized for the intended use. Event changes include advancing or retarding the intake cam to optimize cylinder pressure at various RPM ranges, advancing closes the intake valve earlier on the compression stroke to build more compression at lower RPM. Retarding the intake cam allows the intake valve to remain open longer to take advantage of the intake charges inertia to maintain good volumetric efficiency at higher RPM. Overlap is another critical timing event that can only be adjusted with sprockets on engines having separate intake and exhaust cams. Overlap is the time that both intake and exhaust valves are open at the same time. Increasing the overlap period by advancing the intake cam and or retarding the exhaust cam, can increase the scavenging effect of a tuned exhaust, causing the intake charge to flow into the cylinder and out the exhaust. By sacrificing a small part of the intake charge as the exhaust valve closes, a stronger intake flow has been initiated earlier. If this is tuned correctly the net intake charge should be larger at some RPM range, but will probably decrease at another. By experimenting, the RPM range that is important can be optimized.

Turbocharged engines will benefit from “spreading out the lobe centers” to minimize the overlap period (the time when both valves are open at the same time). If the pressure in the exhaust manifold is significantly higher then the intake manifold, exhaust may flow backward into the intake. This condition can be minimized by retarding the intake one mark (A) and advancing the exhaust cam one mark (#2). Also note that engines tend to idle smoother and cleaner when the lobe centers are spread. This can be helpful when the cams have to much duration to be emission clean or maintain a good idle.

Adjustable sprockets can also allow for installing an exhaust cam as an intake cam or visa versa. This type of creative tuning should only be attempted by a technician that is using a degree wheel and dial indicators to find the exact cam / crank relationship.