Installation Instructions: Duratec Camshafts- In car

Part Number: YD XXXX
Application: 2003-2004 Ford Focus
2.3L Duratec I4 (PZEV)

**Important!**
To properly install this part, you MUST have access to a genuine Ford Focus Shop manual. The correct manual is available from Helm Publishing (800-782-4356). Part #FCS-12949-04

To correctly install Cosworth camshafts without removing the front engine cover, you will need the use of several special tools available from Ford. Do not attempt the installation without access to these special tools.
Tool part # 303-507
Tool part # 303-465

**Important!**
Please note. When installing the Cosworth Duratec camshafts, make sure to time the cam with the number 4 cylinder at TDC. The Ford shop manual specifies timing the cams with number 1 cylinder at TDC

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**Caution!**
This kit requires general mechanical skills to install. Please do not attempt to install this product if you are not confident in performing the procedures outlined in this instruction manual. Please read the entire instruction manual before beginning installation.

**Step1.** These instructions will allow you to install the camshafts without removing the front engine cover. In several of the illustrations, we have either removed the cover or components for detail. To start the process, pull off the front passenger-side tire and part of the inner fender to access the timing cover, crank pulley and serpentine belt, which has to come off. Changing of the camshafts will require removal of the cam cover. That requires pulling off the coil packs, spark plug wires, the wiring harness for the temperature sensor, along with any other wires, hoses and lines that are on top of the engine. It isn't necessary to remove the spark plugs, but doing so will create less resistance when it's time to turn the engine to find top dead center on the Number-One piston. Remove the radiator overflow bottle from its mount and push it out of the way, then remove the cam cover. Set it aside; it will be re-used.

**Step2.**
Because there are no timing marks or any type of key to index the cam gears with the crank pulley, a lot of care must be taken to keep the cams and crank in phase during the change-over. Step one is to find TDC on the Number-One piston so the whole assembly can be locked down in this position. When the cam lobes for Number One are pointing at each other like this, you're close. Fig. 1

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**Step3.**
Using TDC pin, Ford special tool (303-507), locate the crankshaft in the TDC position. The pin screws into a hole (remove threaded plug first) on the block that's just ahead of the axle half-shaft. Insert the pin and screw it all the way in using just your fingers. Rotate the crankshaft clockwise until the crank stops against the pin. The crank will then be at TDC. Fig2.
Step 4.
When the rotating assembly is where you want it, the cams need to be locked in place so they won't turn when the caps are coming off. This timing bar, Ford special tool 303-465 slides into notches at the back of the camshaft and rests on the cylinder head, preventing the cams from moving. The notches are eccentric, so the bar will fit only if the cams are lined up properly. Fig. 3

Step 5.
The next step is to create slack in the chain to allow cam removal. There are two ports on the chain cover giving you access to the timing chain tensioner (the bottom port) and timing chain guide (the top port). Remove the plugs to access the holes. Push a tool with a sharp end through the tensioner port to release the tensioner. You will be lifting up on a ratcheted pawl allowing the plunger to retract. You will feel it snap when done correctly.
While holding the tensioner pawl up with a sharp tool rotate the engine counter-clockwise, just enough to create some tension on the chain causing the chain guide to push against the tensioner, then insert a punch or drill bit –3/16”– through the timing chain guide upper port and into the guide to hold the chain guide in place. After the guide pin is in place, return the crankshaft to TDC.

**Step 6.**

When it's time to break the cam gear bolts loose, don't depend on the timing bar to hold the cam against the force of the wrench. Hold the cam with one wrench while breaking the bolts loose with another. It is also helpful to secure the chain to the exhaust camshaft sprocket using a tie wrap or piece of wire. This prevents the chain from accidentally dropping into the cover as the gears come off. Because of the shape of the cam and timing covers, it's easier to get the intake gear off after taking the cam out of the head. When removing thecams note the cam caps are numbered, making it easier to ensure they go back on the correct journal, it also helps to scribe an "x" on the side of the cap that faces outward so the cap is oriented properly on the journal. When loosening the caps, loosen the caps nearest the lobes pointing downward last, as those will have the most pressure on them. Otherwise, if you loosen those caps first, the pressure from the valve spring could make the cam walk forward and be difficult to remove.

**Step 7.**

Once the cams are out of the engine, remove the bolt and sprocket from the intake cam. The kit includes a special friction washer to fit between the sprocket and the camshaft. Make sure the washer is in place before fitting the sprocket to the Cosworth camshafts. This is essential as the sprocket will slip and the cam timing will be off if the washer is not used. (At this point the gear should be on the cam finger-tight only). With the gears loosely mounted on the camshafts place the cams back in the cylinder head making sure the inlet and exhaust camshaft are in the correct location.

The inlet camshaft has a cam angle trigger located on the rear of the cam. Once the camshafts are in place, liberally coat the lobes and tappet buckets with a 50/50 mixture of STP and Mobil-one oil. At this point, you will notice the timing bar notches are 180-degrees out from the original camshaft position. When the new camshaft timing is set, the Number-Four cylinder lobes will be pointing at each other.

**Step 8.**

Replace and torque the cam caps to 12 lb ft. Be sure to follow the tightening sequence specified in the Ford shop manual. With both camshaft gears (hand tightened) in place, wrap the timing chain around the gears, and put the timing bar back in place. Rotate the crank clock wise, just enough to release the tension on the chain guide locating pin. Once the tension is off the chain guide, remove the pin from the front cover. You will see and feel the timing chain become tight at this point. Return the crankshaft to TDC position.
Step 9.
A socket won’t clear the timing cover so it’s best to use a “crows foot-box end or flare type” to tighten the bolt. Hold the camshaft with a wrench and then torque to spec (48 lb-ft). Pull out the timing bar, remove the TDC pin and replace its plug. Replace the plugs in the front cover. Turn the motor over a several times to make sure every thing rotates without any binding. Before putting the cam cover back on, cover all the cam lobes with STP. Then replace the cam cover and all other components removed for this installation.

Important Note: The installation of these parts on a vehicle intended for use on public streets or highways may violate laws and regulations relating to motor vehicle safety standards or emission regulations. Additionally, these parts are sold “as is,” without warranty of any kind whatsoever, express or implied, (including all warranties of merchantability or fitness for a particular purpose). The installation of these parts could also void vehicle warranty coverage.

For your own safety “DO NOT” use this product unless suitable high speed rated tires, suspension and brake modifications have been fitted.

The Cosworth Race Level 2 Camshaft Kit is for racing use only. This part is not legal for sale or use in California on pollution controlled motor vehicles.

For technical questions please email cosincsales@cosworth.com

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Step 10.
Make sure all nuts and bolts are tightened to factory torque spec referring to you Ford shop manual for values. Start the engine and maintain 2500 rpm for at least 10 minutes to insure camshafts are properly broken in.