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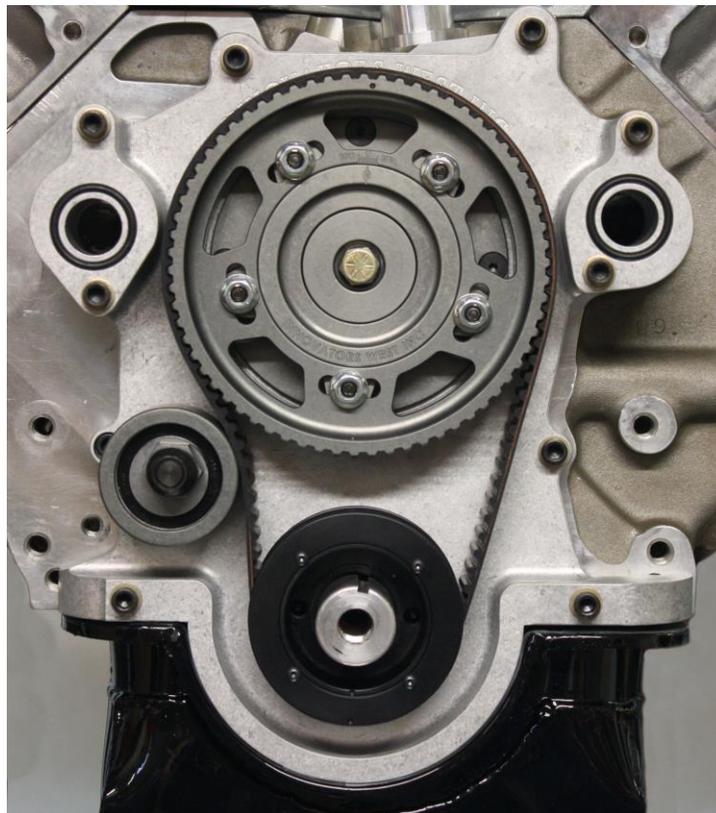
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## #5400/5401 BBF Belt Drive Install Instructions

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### 1 – Front Cover

Place the front cover onto the front of the engine by hand without the gasket in place. Make sure that the front cover will clear the oil galley plugs and will sit flat onto the block. If the cover does not sit flat, check for obstructions and clearance as necessary. Once proper clearance is obtained, install the front cover using the supplied gasket. Do not tighten front

cover bolts until after the lower sprocket and upper sprocket are installed. These sprockets will help center the cover and in doing so will reduce seal wear.

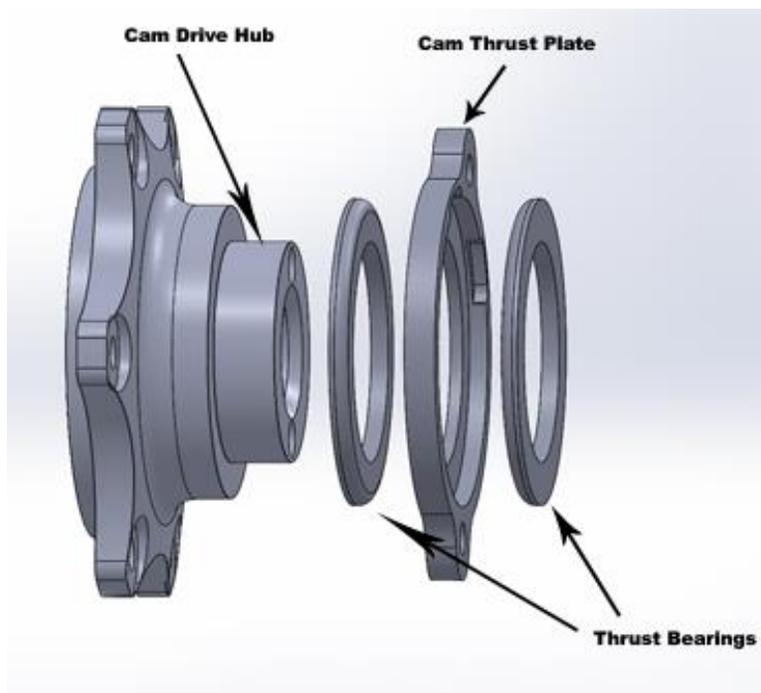
## 2 – Crankshaft Sprocket

The lower crank sprocket can now be pressed onto the crankshaft. The lower sprocket is machined to fit a stock dimension crankshaft snout (1.3750"). Aftermarket crankshafts can vary; measure the snout OD to verify this measurement. If the crankshaft is greater than the stock measurement the crankshaft sprocket will likely need honed to fit. The lower sprocket will need to be pressed onto the crankshaft snout. Apply some anti-seize or oil to the sprocket and the crankshaft snout before installing. DO NOT hit the crankshaft sprocket directly with a hammer or other blunt object as damage to the sprocket may occur. Aluminum tubing or plastic pipe is often used to fit over the crankshaft snout and into the ID of the crankshaft sprocket. A harmonic damper installation tool is preferred when installing the sprocket. Drive the sprocket onto the crankshaft snout until it comes to rest on the shoulder of the front main journal. If for some reason the sprocket binds or stops before this point, STOP, remove the sprocket, and see what is keeping the sprocket from being fully installed. To remove the sprocket there are provided 1/4"-20 holes tapped in the sprocket to bolt a pulley removal tool into.

## 3 – Cam Thrust Plate

The belt drive timing system is designed for use with the supplied roller cam thrust plate. Do not use any other manufacture of cam thrust plate with this system.

Place one of the encapsulated bearings into the recess on the back of the cam retainer plate. Make sure to put the rounded side of the bearing towards the plate. Slip the retainer plate and bearing over the nose of the cam and lightly bolt it to the block. Once you have verified that the plate will sit flush to the block you can remove the bearing and plate. Lightly lubricate the bearing with engine oil and place back in the plate. The plate can now be permanently installed on the engine. A small amount of Loc-Tite on the bolts is recommended. The bolts should be torqued to 9-10 ft-lbs.



## 4 – Cam Seal Plate

Lubricate the O-ring and cam seal with oil. Place the cam seal plate on the back of the cam drive hub. Once the cam drive hub is installed onto the camshaft, press the cam seal plate into the front cover evenly. Install the supplied fasteners into the front cover and torque them to 10-12 ft.-lbs.

## 5 – Cam Drive Hub

The provided cam drive hub is double drilled for 2 cam drive pins. Lubricate the O-ring on the ID of the cam hub with oil. Place the remaining roller thrust bearing onto the rear of the drive hub with the rounded side of the bearing facing the cam retainer plate. Slide the drive hub onto the nose of the camshaft. The camshaft may want to push back from the front of the engine. If this is the case, using a large screwdriver, very carefully pry the camshaft to the front of the engine and press the cam hub fully onto the nose of the cam. Included with the timing belt system are new camshaft bolts. Pick the bolt that matches the proper threads in the end of the camshaft. Install the bolt dry and lightly tighten to ensure that the bolt will fully engage the camshaft and not bottom out in the cam. Once this is verified, apply some Loc-Tite to the bolt and using the cam washer, bolt the cam drive hub to the camshaft. Torque the bolt to the proper torque specs for the fastener size used.

Once the cam hub is torqued in place you will need to check the camshaft endplay. Using a dial indicator measure the forward and rearward play in the camshaft. The endplay should measure between .004” and .012”. If the endplay is outside of these specifications, please consult your engine builder or call Innovators West and speak to a technical service representative.

## 6 – Cam Sprocket & Belt

Remove the belt tensioner pulley from the front cover. Rotate the crankshaft until the damper keyway and the TDC dot on the crankshaft pulley are at 12 o'clock. Rotate the camshaft drive hub until the “zero” mark is at the 6 o'clock position. Place the belt over the crankshaft pulley and the cam sprocket. Install the cam sprocket onto the cam drive hub with the TDC markings on the cam sprocket matching the “zero” marks on the cam drive hub. Install the 6 flange nuts onto the cam drive hub and lightly tighten them.

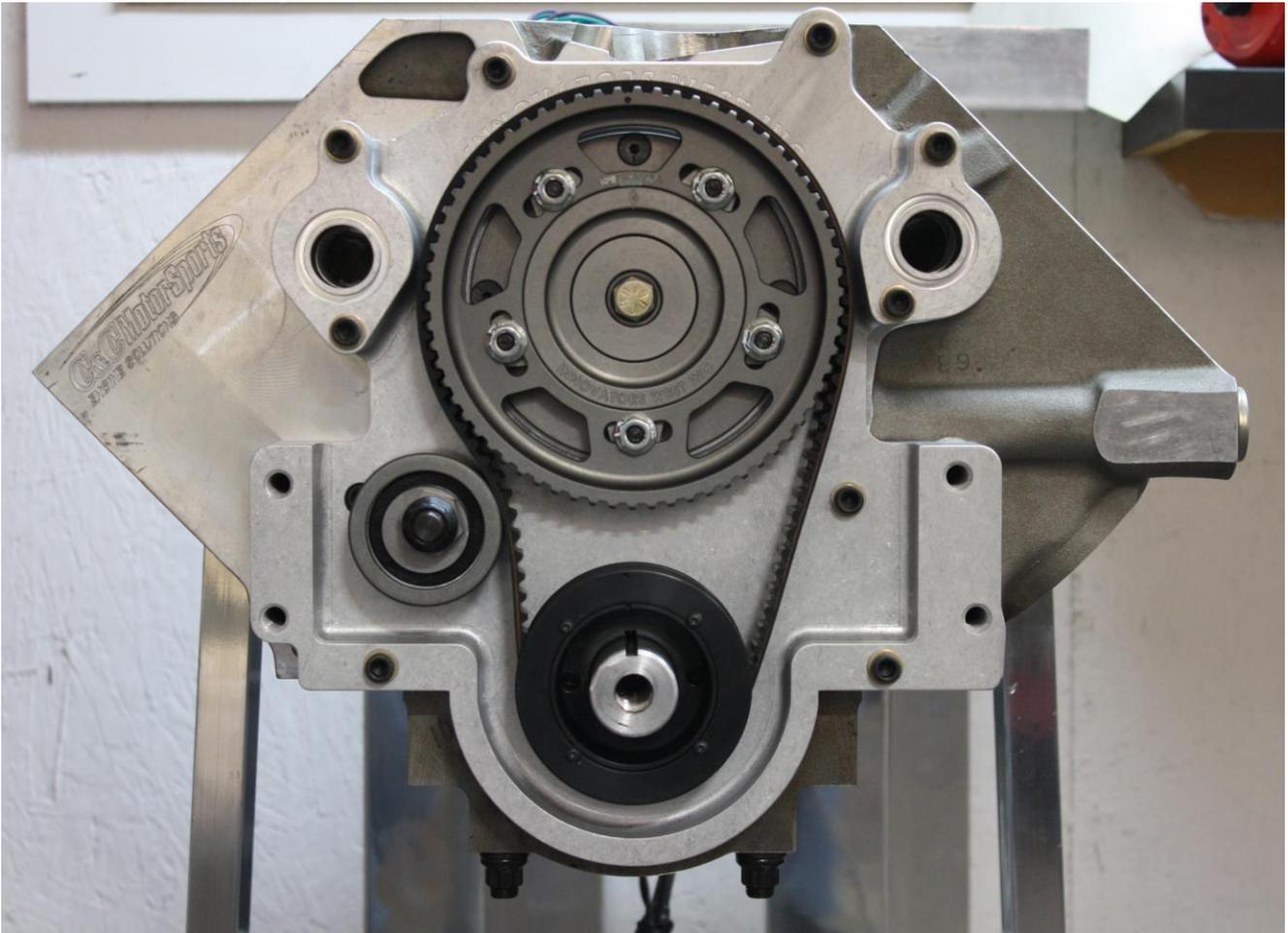
Install the belt tensioner pulley onto the timing cover and prepare to set the belt tension. To set belt tension you will measure the belt deflection. Belt deflection is measured halfway between the cam sprocket and the crankshaft pulley on the right side (drivers' side) of the engine. With the belt tensioner pulley in place, rotate the tensioner eccentric counterclockwise towards the belt until the proper belt deflection is achieved. On a cast iron block belt deflection should measure between .050-.080” when cold. Aluminum blocks will generally grow more, and the deflection is normally increased to .080-.120” when cold. Once deflection is set, tighten, and **torque the nut on the tensioner eccentric to 65-70 ft/lbs.** Once the engine has been run and brought up to temp, belt deflection should be checked and adjusted if needed. Periodic checks are a good idea.

## 7 – Cam Timing

Cam timing is adjusted by loosening the 6 flange nuts on the cam sprocket and rotating the crankshaft independently of the camshaft to advance or retard the camshaft timing. A

socket and ratchet may be used on the camshaft bolt to ensure the cam does not rotate while adjusting the crankshaft position. Initial cam timing should be determined using standard camshaft degree methods. Please consult your engine builder or call Innovators West for technical assistance. Once cam timing is set, tighten and torque the flange nuts to 18-22 ft-lbs.

**NOTE –** During initial setup, it is suggested that you have the valve train assembled. This load on the camshaft from the assembled valve train will help preload the belt. When adjusting camshaft timing, always verify that you have adequate piston to valve clearance.



**#5401 BBF Belt Drive w/ BBC Mounting Pads Shown**

# **BBF Belt Drive Service/Option Parts:**

**Replacement Belt – Part # 6001**

**Gasket, Seal & O-Ring Kit – Part # 6006**

**Timing Cover Gasket – Part # 5400-53**

**BBF Camshaft Dowel – Part # 6019**

**BBF Camshaft Retaining Plate and Thrust Bearings – Part # 6011**

**BBF Belt Drive Distributor Adapter – Part # 6017**

**BBF 3/8” Hex Drive Adapter – Part # 6016**