

Tech Talk: Y-Block Assembly Errors

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In disassembling Y-Block core engines I have noted a number of common mistakes that are made during the assembly of Y-Blocks during rebuild. Take care to avoid these mistakes.

Head bolts. There appear to be 2 different length head bolts in a Y-Block engine, 5 short bolts near the spark plugs and 5 longer bolts under the rocker arms. It's true that the 5 short bolts near the spark plugs are identical but the 5 under the rockers are **not** the same! 2 of these bolts are slightly longer and are installed at the outer ends of the head where the alignment dowels are located. Lay all 10 longer bolts (5 per bank) next to each other and you should find 4 longer and 6 that are about 1/4" shorter. Installing the longer bolts in the center 3 holes can cause them to bottom in the block which can result in a blown head gasket. Late production engines have only long and short bolts.

Head gaskets. The 2 head gaskets used on a Y-Block are identical. It might seem that the same face of the gasket would go against the block and the opposite face would go against the head on each side. This is not the case. What is critical is that the open coolant holes are at the back of the head and the blocked portion of the gasket is at the front. Look for the word **FRONT** on the gasket and place it at the front even if it looks wrong. This places 1 of the gaskets face up and one face down. Notice that there is a square corner at one end of the gasket, this must be at the front of the engine. This can be checked without removing the heads. If you are having overheating problems check for these square corners at the top front corner of the head near the intake gasket.

Cam bearings. If you are using a camshaft with a cross drilled center journal you must use '55-early '56 cam bearings designed for cross drilled cams. If you are installing a cam with a grooved center journal you must use the late '56-'64 cam bearings. If your cam will not fit in the block check it for straightness. Cams have been seen with up to .010" runout. The front cam bearing is often installed slightly cocked in the bore. To

prevent this install the front bearing from the rear.

Rocker shafts. It is amazingly simple to install the rocker arm shafts upside down on a Y-Block. The shaft stands are identical and will bolt down either way. You must be absolutely certain that the oil hole in the shaft aligns with the hole in the stand and is at the bottom when the stands are bolted down. If done improperly no oil will get to the rockers. The best way to check for proper assembly is to look for the holes for the overflow tubes at the right hand end of each shaft. If the hole is visible with the rocker arms installed on the head it is correct.

292 & 312 Main cap bolts. When Ford designed the 312 they made the main caps taller than the 292 cap, anticipating added load. The cap for the 312 **rear** main was left the 292 height, to clear the rear main seal holder and the oil pan rail. This makes it possible to install any of the longer main cap bolts from the front 4 main caps in the rear cap, where they could bottom out during tightening. Some blocks are drilled deep enough to accept the longer bolts in the rear cap. There have been a few instances where the rear main area of a 312 cracked during assembly. This was probably caused by installing the incorrect bolts in the rear cap. Check the 1971 Popular Hotrodding series of articles, this occurred when they assembled their first 312 requiring a replacement block.

If any of the longer front bolts are installed at the rear the misplaced rear bolt will be installed in #1-4 cap where it will engage less than 1/2" of thread!

Another problem was the **incorrect** torque specification of **120 ft. lb.**, which was printed in all 1956 factory and after market manuals. This figure is excessive and undoubtedly caused many of the cracked main webs in 312 blocks. **Always use the later 95 ft lb.** specification. It is also critical to check the amount of thread that will be engaged in the block. Do not use main cap bolts in **any Y-Block** that don't reveal at least 7/8" of thread when placed in the main cap. This may require running a bottoming tap into the main bolt holes. Later 292's have significantly longer main cap bolts, an indication that Ford realized this need. Care must be used not use bolts or studs that engage more than 1 1/8" of thread as

the oil passage to the main bearing will be blocked.

Intake manifold bolts. When installing the intake manifold be certain not to use excessive length bolts. The intake manifold bolt holes in the head intersect the push rod passages and too long a bolt can hit the push rods. Also be certain that the bolt holes in the heads at the rear of the manifold are plugged. These are the threaded holes that are unused but are drilled through into the push rod passage. Water, dirt and other crud can enter the engine through these holes. Be sure to use short bolts, about 1/2" of thread so you don't hit the push rods.

Timing cover installation. Check the length on the 5/16" diameter bolts for the timing cover. If bolts which are too long are installed they can contact the front cylinders damaging the block. Apply sealer to bolts which enter the water jacket.

Left and right hand heads. Although all Y-Block heads can be installed on either side of the block, after years of exposure to coolant the .906" holes at the front of the intake surface will not accept a freeze plug. When choosing heads to be rebuilt be sure you have a usable left and right. When installing heads be sure the corroded hole is located toward the front of the engine. Be sure the hole at the rear of the head will accept a freeze plug or a temperature sender bushing. The water temperature sender bushing hole can be reamed to a larger size if need be. It is very discouraging to have 2 heads ready to install and find that they can't be used as a set.

Oil gallery plugs. Remove all oil plugs and the oil filter adapter before having your block hot tanked. I've had the best luck by drilling out the center of the oil plug, leaving the hex. After heating the plugs with a torch they come right out. I have never damaged a block using this method.

Block decking. Don't assume that since Y-Blocks have a lot of extra iron in them that your engine doesn't need to have the block deck surfaced, the main bearing bores align honed or the heads surfaced. Your block is 40 years old and may have been heat cycled over 30,000 times. Parts are bound to distort after that much use. The other enticement for bringing the pistons near flush with the deck surface is

reduced risk of detonation. Many complaints of detonation have been noted with the pistons .030"-.040" in the hole and the engine assembled with composition head gaskets.

Re-torque the cylinder heads. Although most modern gaskets are sold as not needing to be re-torqued, it is a good idea. This should be done 500-750 miles after assembly. Y-Blocks have a large head gasket area for an engine with 10 head bolts per bank and this results in reduced clamping force on the gaskets.

Timing gear installation. Some people try to align the timing marks on the gears toward each other as is common on newer engines. This is bound to happen more often now as the replacement timing chains no longer have the pins marked for correct alignment with the gears. The marks on the Y-Block timing gears aim toward the oil filter side with 12 pins between them.

Cam thrust. It appears that Ford used 2 different thickness thrust washers and plates on the cam. With the wrong combination there will be no end play in cam. Ensure .004" movement during assembly.

Cam cores. Replacement cam cores have a blob of metal between the last lobe and the distributor gear. On high lift cams this can be higher than the base circle of the lobe. Place a lifter on the last lobe base circle and be sure the lifter does not hit this excess material.

Hope this saves some grief. JRM