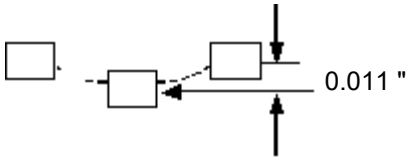
"BLUEPRINTING" A MODEL T ENGINE AND TRANSMISSION

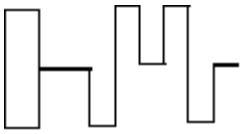
by Milton J. Webb

Yep, a Model T engine can be blue-printed! Here's how.

Straighten Crankshaft: In use, Model T cranks may bend.I have seen shafts out of alignment up to 0.011". I recommend a crankshaft grinder machinist straighten the crankshaft for you.

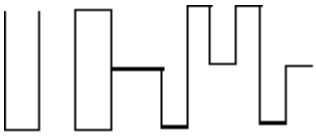


Square up Crank Flange: Sometimes the rear crank flangeis not perpendicular to the crank main bearing throws. Center the crank in a lathe and "clean up" the rear surface of the crank flange. A 0.002" cut will usually make it square. If left un-square, the flywheel will spin out of "plumb" with respect to the crank!



Machine Flange Square

Square up Transmission Main Shaft Flange: Likewise, clean up the transmission main shaft flange front and rear surface.



Transmission Mainshaft Crank

Both must be square to rotate concentrically.

Balance: Balance engine components including the crank, pistons, rods, flywheel, transmission drums, and triple gears.

I do not recommend adding aftermarket-type crankshaft weights. Quite often they break loose and then the crankshaft fails!

Cranks, transmission drums and flywheels can be "statically" or "spun" balanced. Rods, pistons and triple gears can be weighted. Excess weight can be trimmed off to the lightest weight component.

Crankcase Alignment: Have the crankcase alignment checked to ensure the bolt flange surfaces are flat. In addition, the front seal and rear section (fourth main) must be centered.

Some ‘ T ’ parts supply houses and machine shops who pour bearings have the original

style jig or a built up jig to check crankcase alignment.

Piston clearance: Aluminum pistons ‘ grow ’ at the top with heat. At high load and speeds [50 mph wide open] the piston top ring land scrapes the cylinder walls resulting in ‘ scoring ’. This ‘ drag ’ causes the engine tooverheat and not reach maximum power because of the addedfriction. The piston scoring usually occurs above the top ring land near the exhaust valve [more heat].

Aluminum pistons are ‘ cam ground ’, i.e., the major skirt diameter is in line with the thrust portion of the piston and the minor skirt diameter is in line with the pin portion of the piston. The top ring land area is cut round and not cam ground.

The fix to minimize scoring is to ensure the ring land area **diameter** [top of piston] is at least 0.030 " less than the minor skirt diameter.

Yep, it takes this much to minimize ring land and cylinder scoring. You want the rings to touch the cylinder, not the piston.

This means the top of the piston will have to ‘ grow ’ 0.030 " in diameter before the piston ‘ scores ’ onthe cylinder. With a Model T scoring will be minimized provided you have a good flat tube radiator.

I also recommend 0.006 " skirt clearance on the major diameter. This leaves the engine slightly more loose than standard clearances; but, the engine will break in easier with minimum friction. I have not heard any ‘ piston slap ’ noises using these clearances.

Rings: Cast only! ‘Chrome’ rings may not seat.

Crankshaft Bearing Clearance: For the initial clearance on an engine overhaul, I recommend from 0.0015" to 0.002 " clearance on both the mains and rods bearings.

Following assembly and running the engine 500 miles, test for knocks, cold and hot. Check clearances and re-adjust clearances to 0.0015 " to 0.002 ".

Oiling: Install an outside auxiliary oil system to carry oil to the timing gear and front main.

Drill an extra hole in the front, center, and rear main. On the front main, drill a $^1/_4$" hole on the back [top] side of the main bearing cage. Use a long drill bit from the top [above the cylinder block surface]. Also drill an extra hole on the opposite side of the center main bearing oil hole.

On the rear main, drill two $^1/_4$"holes on the upper bearing cage on the flywheel side.

Debur all drilled edges using a counter-sink drill bit on the block side. Use a bearing scraper on the babbitt bearing side cutting out a small chamber.

Drill the rod caps and install Chevrolet type oil scoops so they will scoop oil into the center of the bearing and crankshaft throw. Scoops will minimize crank wear and maximize rod bearing life.

Transmission and Flywheel: Install new triple gear pins. Old ones wear egg shape

0.001" – 0.002".

Install new triple gear bushings and ream to **0.005 " clearance**. Check front flange on bushing clearance as outlined in the ***Ford Service Manual***.

The low, reverse, and brake drum bushings clearance can be as loose as 0.005 " – 0.010 ".

Over 0.010 " clearance on the drum bushings is too sloppy. Ream new drum bushings to at least 0.005".

If reamed to 0.002 " as specified for new bushings, the transmission may freeze up on a hot day before loosening up from break-in.

As discussed above, the rear main crankshaft flange must be square with the crank and true up the transmission main shaft, using a lathe.

Balance the flywheel, drums, and triple gears.

4th Main: If you are installing a babbit 4th main, machine babbitt or transmission shaft for 0.002 " clearances. Assemble trans to engine and install into crankcase, as specified in the ***Ford Service Manual***.

The babbitt 4th main will ‘ wear-in ’. The 0.002 " clearance may soon grow to 0.003 " or 0.004 ". This is OK.

If crankcase, crankshaft, and transmission main shaft are not aligned, the odds of failure [including crankshaft breakage] may increase significantly!

RESULTS

The above comments are based on 29,000 miles of experience with a crankshaft ground to 0.015 " on the mains and 0.010 " under on the crank throw [currently 29,000 miles]. The crankshaft measures about 0.0005 " flat and/or taper from the above measurements on the crank throws.

At 12,000 miles, the main journals showed zero wear from the0.015" under crank grind. The center main cap was replaced once at 20,000 miles.

The center main bottom cap bearing surface appeared to be ‘ mottled ’ [like ‘ crazed ’ paint] and failing. This was confirmed by a professional ‘ T ’ engine bearing service vendor. We could not determine why the failure, because the clearance at 20,000 miles was only 0.002 ".

When disassembled at 29,000 miles, the ‘new’ [used] center main cap bearing surface was OK and the upper main bearing surface was normal in appearance.

The rods were adjusted twice in the first 12,000 miles. They were re-poured at 12,000 miles, because of small cracks in the upper rod bearing area.

Due to questionable ‘ tinning ’ at 12,000 miles, the rods failed at 20,000 miles.

The rods were poured again by a different vendor and now are at 29,000 miles. The rods have now been adjusted three times in the last 9,000 miles. The first time [1,000 miles], the

rods were at 0.003 " clearance and tightened to 0.0015 " – 0.0002 ".

The second adjustment was during a 2,800 mile trip, around 6,000 miles on the rods, number three and four were at 0.004" clearance, number one and two were at 0.003 " clearance.

The third adjustment was at 9,000 miles with only one [rod number three] at 0.003 ". Number one, two and four were from 0.0015 " to 0.002 " clearance.

All adjustments were made using Plastigage and removing one shim [0.003 "] at a time until the clearance was 0.0015 " to 0.002".

SUMMARY

Try "blueprinting" as outlined in the text.
29,000 miles using 20-50 weight oil.
Change oil every 1,000 miles. It's cheap!
‘ Round ’ crankshaft is a must!
Check rod adjustment when "pecking" occurs at 1500 RPM on cold engine.
Keep the rod bearing clearance between 0.0015 " and 0.002 ".
Car was driven wide open most of the time [45-55 mph]!
Not bad for 29,000 miles!