Model A Ford

Head Gasket Information

By

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Model A Head Gasket

I. Diagnostic Techniques

A. Visual

1. Look for weepage between block & head.
2. Look for bubbles in the radiator after the engine is warm and running at a higher idle.
3. Look for water in the oil (Looks milky or foam like).
4. Rough idle or loss of power from what you are used to.
5. Backfires through the carburetor due to a blown gasket between cylinders.
6. Steam coming out of tailpipe. (This is serious do not run car or you could blow a hole in the piston).

B. Mechanical

1. Compression test (Cylinders should not vary over 10% of each other).
2. Vacuum Test (The needle will start at 18 to 20 inches and drop sharply to 10 inch then return each time the defective cylinders reach firing position at engine idle).
3. Looking at the vacuum gauge the bad head gasket will cause sharp drops of the needle.

II. Causes of Blown Head Gaskets

A. Loose head nuts

1. Improper torque
2. Stretched studs
   a. Old studs & nuts with too many use cycles.
   b. Damaged block threads.
   c. Damaged head nuts.
   d. Not using grade 8 studs and nuts with a high compression head.
   e. Not using SAE washers under the head nuts on a high compression head.

B. Bad cylinder head

1. Warped head or block (Tolerance .003)
2. Cracked head or block

3. Head that has been machined too many times.

C. Excessive heat
   1. Faulty radiator.
   2. Incorrect spark plugs that are too hot. (Use T10 Motorcraft or 3076 Autolite).
   3. Use of a high compression head.
      a. Set plug gap at .032 to .030

D. Speed
   1. Faster speeds create more heat.
   2. Faster speeds cause greater forces pushing up on the head.
   3. Pushing the engine too hard for long periods of time.
   4. Not down shifting soon enough. (Lugging the engine)

E. Incorrect head gasket.
   1. Using an R1 on an engine bored over .025.
   2. Incorrect type of head gasket.
   3. Improper use of sealants.
   4. Improper cleaning of block or head.
      a. Paint thinner.
      b. Lacquer thinner.
      c. Mineral spirits.

III. Removal of head

A. Easy way
   1. Drain 2 gallons of water from the radiator.
   2. Remove upper radiator hose.
   3. Remove fan belt.
   4. Remove distributor set screw.
   5. Remove #8, 11, 13 head nuts.
   6. Loosen the remaining heads nuts so they have a 1/8 inch gap between head and nut.
   7. Start the engine. (It will die as soon as the head and gasket break their seal).
      a. The Model A needs at least 48 psi compression to run.

B. Hard way
   1. Drain 2 gallons from the radiator.

2. Remove the upper radiator hose.
3. Remove the distributor set screw.
4. Remove the distributor.
5. Remove all 14 head nuts.
6. Remove the water outlet casting.
7. Remove the fan belt.
8. Use two eye bolts that fit into the spark plug holes. (front & back plugs).
    a. Use a chain between the eye bolts and lift with an engine hoist.
    b. Use a firm putty knife and insert into the middle of the head gasket. This will be done at each corner and edges.

IV. Cleaning of Head & Block

A. Remove all head studs from block.
    1. Check internal thread condition.
        a. Chase threads with a tap if dirty.
    2. Repair with Heilcoil.
    3. Vacuum stud holes.
B. Remove carbon deposits.
    1. Soak in Kerosene or
    2. Use Brakleen (red can).
        a. Leaves no chemical residue.
        b. Contains tetrachloroethylene.
        c. Wear a respirator.
C. After the carbon, dirt, grease and oil are removed scuff the head and block surface.
    1. Use dark red Scotch Brite.
    2. Chase the spark plug threads with a tap 7/8-18. (This is not a pipe tap).
    3. Polish the combustion chamber of the head. This prevents carbon build up and gives the air fuel more turbulence.
D. Vacuum the head and block.
E. Wipe all surfaces with acetone.

V. Warpage Check

A. Use a precision ground rectangular bar ground to within + or - .0005
   1. Measure both the length and width over the entire block and head surface.
      a. Tolerance is +.003 for each surface. They can't be combined.
   2. If over the stated tolerance the block or head must be surfaced.
B. Do not use carpenter squares, levels, or cold rolled steel.
   1. These items are not held to machinist standard tolerances.

VI. Types of Head Gaskets

A. Material made of
   1. Copper
      a. Composite material
      b. Compressed graphite
   2. Steel
      a. Graphite center
      b. Kevlar reinforced graphite. (made by The Best Gasket Company)
   3. Modern "Premium"
      a. Silicone soaked center.
      b. High temperature bead of silicone surround all water passages.
      c. NOTE: Model A's do not generate enough heat to make a 100% seal of the silicone.
B. Sizes of head gaskets

Number	Thickness between cylinders	Bore size
R1	.030	STD to .020
R2	.025	.020 to .070
R3	.018	.070 to .125
R4	?	?

VII. Why use a Model B head gasket on a Model A with a high compression head?

A. The high compression "Police Head" has a different combustion chamber profile than a stock Model A head.

1. The B head gaskets fit the profile better.
2. The fire rings have a different design making them stronger.

VIII. How to Assemble

A. Make sure head and block are clean.
   1. Final cleaning with acetone.
B. Check to see if the pistons extend above the block.
   1. Use R3 size gasket.
C. Head gasket needs to fit the profile of the head.
   1. Fire rings can't extend into piston area.
D. Install head studs.
   1. Coat bottom of threads with RTV.
   2. Coat side of threads with anti-seize.
   3. Use grade 5 studs and nuts for stock head.
   4. Use grade 8 studs, nuts and SAE washers for high compression heads.
      a. These studs will not stretch.
   5. Do not install studs tight into the block.
      a. You do not want to stress the lower block threads.
   6. Test fit the head gasket to the block.
      a. Use a dead blow hammer to help align studs.
   7. Align the pistons so they are all about ½ way up or down in the cylinder.
   8. Lubricate the circumference of the cylinder with a tablespoon of either:
      a. 30 weight motor oil
      b. Assembly lube
   9. Choose the correct fit of gasket for engine bore & head type.
   10. Choose the type of head gasket.
      a. I use the Best Gasket Company head gasket.
   11. Follow the manufactures recommendation for sealants.
      a. I use Permatex Copper Spray-A-Gasket.
      b. Item #80697 UPC #86226-80697
      c. Spray both sides of the gasket.

d. Fills in small scratches, imperfections and helps to eliminate hot spots.

12. Place gasket on the block, then place head onto gasket.
13. I use SAE 7/16 flat washers under the head nuts.
    a. The washers cover more surface area providing better sealing.
14. I use a thin water outlet gasket and coat both sides of the gasket with a coating of Permatex #2 gasket sealer.
    a. Make sure the head and bottom of the water outlet are straight. (.001)
15. Torque the head nuts to specifications.

IX. Head Torque

A. Standard Head
   1. 35 ft. lbs.
   2. 45 ft. lbs.
   3. 55 ft. lbs.
   4. Slowly warm engine for 15 minutes and let cool for 12 to 24 hours.
   5. Re-torque to 55 ft. lbs.
   6. Drive 50 miles, let engine cool 24 hours and re-torque to 55 ft. lbs.
   7. After 500 miles re-torque a cold engine to 55 ft. lbs.

B. High Compression Head
   1. 35 ft. lbs.
   2. 45 ft. lbs.
   3. 55 ft. lbs.
   4. 60 ft. lbs.
   5. Slowly warm engine for 15 minutes and let cool 12 to 24 hours.
   6. Re-torque 65 ft. lbs.
   7. Drive 50 miles, let engine cool 24 hours and re-torque 65 ft. lbs.
   8. Drive 500 miles; re-torque a cold engine to 65 ft. lbs.

X. Head Facts

A. Stock head compression is 4.22 to 1
   1. Surfacing the head or block will affect this ratio.

B. Police head compression is 5.5 to 1

1. Came about because the New York City police department wanted more power from their Model A police cars. Thus the name Police Head.

C. High compression new Snyder's head 6.1 to 1
D. High compression heads should only be used on new rebuild engines.
   1. Do not exceed 6.1 to 1 compression ratios on Babbitt bearings.
E. Police heads have a large B cast on top of the head.
   1. Snyder's head 5.5 to 1 does not have the B.
F. Model B heads have a C cast on top of the head.
G. The cast numbers on the head were used so Ford part departments and mechanics could make identification fast.
H. These numbers created a myth about Model A, B, & C engines. This is not the case. There is only Model A engines made from late 1927 to 1931, and Model B engines made from 1932 to 1934. There was never a Model C engine.

The information presented in this outline is what Lynn Sondenaa uses with great success on his Model A's.