

TRAACA Tech Day: Compression Test
By Craig Brown

July 13, 2013 at Bill O'Rourke's Garage

Bill B. was experiencing an intermittent shake and stumble at idle in his excellent 1955 Mercury Monterey and this seemed like a perfect excuse for a "Tech Day."



By 0900 Bill O'Rourke's garage was open and Bill B. was extracting spark plugs to do a compression test. The original theory was the stumble could be caused by a sticking valve or improper valve clearance. A compression test would quickly show if a valve was sticking open and a read of the spark plugs could yield additional clues.



The mandatory safety briefing was shortened to “don’t choke on a donut” since work had already commenced. One of the youngsters present asked a couple of questions about the engine in the Mercury and was given a quick history lesson. The Y-block in the 292 cubic inch configuration was a relatively new engine in 1955. Solid lifters with an overhead valve require a .018 inch clearance between the rocker arm and the intake valve stem (.019” for the exhaust). The Holley “Coffee Pot” carburetor was an interesting fuel mixing device. Having the butterfly valves and air inlet located in the front is a much different configuration than the later Holley 4150 series still sold by the thousands today. A small fuel leak was quickly corrected with a pair of flare nut wrenches.



Soon the spark plugs were all removed and mounted in the carefully crafted holder (an old box with holes punched in it). The plugs had been in service for about two years and the insulator tips were all still bright white with little color variation between them. The consensus was this indicated a lean condition because the tips were not light tan. There was no sign of fouling or that one plug was consistently not firing.





A variety of compression gauges were offered for the test. A push-in gauge purchased for \$3.00 from the TRAACA Chili Cook Off & Auction was first up. A poor seal and leaking Schrader valve proved it was not up to the job. A second push-in gauge was tried, but poor sealing caused it to be set aside. A new screw-in gauge was pressed into service and yielded 142 psi on the first cylinder tested. The specification is 130 psi for this engine, so speculation about possible hot-rodding not externally visible began. Removing the gauge from the first cylinder left the adapter tip in the spark plug hole. After removing the tip, it was secured onto the gauge hose with a wrench to ensure it would stay put.



The compression test yielded 140-142 psi on all cylinders with the exception of #6 and #7. These two cylinders were right at the specified 130 psi, so compression was not a problem.

Just to be on the safe side, Bill B. ran up to NAPA and bought eight new Autolite No. 46 spark plugs. After gapping the plugs to .032 inches and installing them, it was time to set the idle speed. With the idle set to 900 RPMs in 'Park' with no accessories, the speed would drop to 460 RPMs with the transmission in 'Drive' and the air conditioner running (specification is 450 RPMs). The engine seemed to idle smoother with these improvements from the outside, but Bill could still feel some shake from inside the car.

Next up was a quick check of the dwell and timing. Bill O. pulled an old dwell meter out of his tool box and joked, "Here's a dwell meter if anyone knows how to hook one up and use it!" Since everyone in the shop had gray hair or no hair (even the youngsters), there was no shortage of people who knew how to use a dwell meter. Dwell was right on specification at 26 degrees.

Timing was slightly tricky because the timing marks on the crankshaft dampener were difficult to read. A little work with some steel wool and white chalk did wonders. The specification for this engine is 3 degrees before top dead center base timing. The vacuum line is not flexible so we skipped removing it to check base timing and just checked timing with the vacuum advance connected. Timing was 16 to 18 degrees advanced. The resident Y-block engine experts deemed this to be within specification.

As with every tech. day, there were lessons learned:

1. An old box turned upside down with holes punched in it makes a handy holder for spark plugs, push rods, head bolts or any other parts that need to be kept in order and not kicked under a roll-away tool box.
2. Compression testers with screw-in connectors give more consistent and accurate results over the press-into-the-hole types. A \$3.00 compression tester may not be the best tool for the job. Secure the adapter tips onto the gauge hose with a wrench to ensure it doesn't get left in a spark plug hole.

By 1130 the sanctity of the garage space was being breached by cell phone ring tones. A few members were lost to the "Honey-Do" list, the grandkids diapers, lunch, etc. This was unfortunate because the basic diagnostic work had been done and it was now time to play "what else could it be?" Several possible contributors to the shake at idle were proposed:

1. Worn, damaged, cracked or corroded distributor cap or rotor
2. Cross firing from touching spark plug wires
3. Loose motor mounts
4. Sticking valve
5. Holley "Coffee Pot" carburetor named not just for appearance, but for the ability to "percolate" fuel
6. Ethanol in the fuel retaining water (even though Bill B. only uses Ethanol free fuel)

The crew ran out of time to check the valve adjustment or do a vacuum check, so this project may require another tech. day or a follow-up report from Bill B. on the root cause. Every now and then we need a good head scratcher to make us dig a little deeper. If anyone in the club as experience with this type of issue, please speak up!