

# iea

ntelligent Engine Analyzer

## Training

### 1997 Chevrolet S10, 2.2L engine, Standard Transmission, 181,529 miles

by Rusty Flake - Beck Service Center

Customer concern: Stumbles and backfires through the intake when accelerating, runs better if you ease into the throttle.

This truck came into the shop when I was on vacation, and was looked at by one of the back up drivability techs.

The truck definitely ran poorly and popped back through the intake, the misfiring cylinder was located and then the valve cover removed to see if there was anything visible causing the problem.

After the valve cover was removed, the technician noticed that the exhaust valve rocker arm nut had come off. With the nut off the rocker arm stud, naturally the valve will not open thus the poor running and popping back through the intake.

Two nuts were ordered to replace both of the nuts on cylinder 4. The nuts were installed and all of the others were re-torqued while the cover was off, the cover was re-installed with a new seal and only a couple of bolts put in to keep oil sling down while verifying the running condition.

With the cover back on the technician started the truck, and it ran good at idle. He let the truck idle for a short time and then decided to snap the throttle to make sure there was not a problem still with popping through the intake.

The truck appeared to be running normally, it was time to shut it off and fully assemble the truck. While on the way to shut the truck off, the engine began to run rough again.

The technician pulled off the valve cover again to see if maybe the stud on the exhaust valve had pulled out or the nut came off again or any thing else obvious. Nothing was noticed this time upon inspection and the parties that were now involved with this vehicle and its repair decided that it surely had an internal problem. The service writer was now going to work on an estimate to repair or preferably replace this engine due to the mileage on it. This is on a Friday, I came back the following Monday.

Monday morning my backup tech informs me about the jobs that are in the shop carried over from the Friday of the week I was gone. This is how and when I find out about the truck in this case study. At first I don't want to look at the truck since I am assuming that the estimate has already been written, the customer called, and we are waiting for approval to replace the engine.

I think about it and finally my curiosity gets the best of me and I can no longer let this go without at least hooking up my cool tools from ATS. I found it hard to believe that it

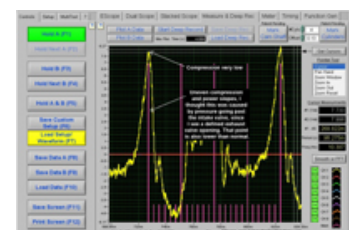


Fig. 1

ran good for a few minutes and then bad and didn't have something simple as opposed to a major engine problem. I like to use pressure transducers for compression waveforms and analysis, and this was a really good opportunity to do just that.

Figure 1 is the compression waveform of cylinder 4.

Just a note...when I went to move the truck to my area of work, it would barely run and could not accelerate it at all.

After I captured the waveform and analyzed it I felt I had a problem with the intake valve on cylinder 4, I was not sure what it was, but the only thing that made sense to me was that the spring must have broken. I decided to take the valve cover off and inspect. I had to use a mirror to see the spring, and indeed it was broken. I reported what I found to the service writer and the two other drivability techs and then replaced the intake spring. Figure 2 is the compression waveform afterwards.

With the wave form looking normal and the truck running good, a test drive was taken after complete re-assembly, and the truck returned to the customer.

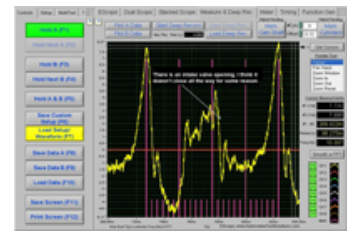


Fig. 2

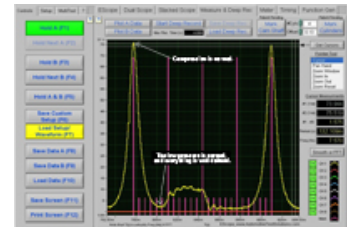


Fig. 3