

# iea<sup>TM</sup>

Intelligent Engine Analyzer

## Training

### 1997 Cavalier 2.4L DOHC, Auto Trans, 88,701 miles by Rusty Flake - Beck Service Center

Customer Concern: Fuel pump and water pump replaced, Hard to start, Have to hit the remote start button or key 3 times to get the vehicle to start, surges after it starts. The running problem started after the noted work was completed.

Verification: I went out to pull the vehicle. In or go for a test drive, which ever seemed to be best for the current situation on this car. Upon starting the car I noticed it did surge, and when put into gear to drive the car, it had an extreme lack of power, so a test drive was skipped.

After I got the car into my bay, I wanted to pull codes just to see if anything was pending.

The code number was not logged on the work order and I don't remember the number, but it is noted on the invoice that a ckp/cmp correlation code was present.

Given the running condition of the car and the code, I chose to put a compression pressure transducer in one of the cylinders to see if maybe when the water pump was changed somehow the cam timing changed.

Figure 1 shows cylinder 1 compression and sync right after start up. Figure 2 shows another waveform after idling for a little bit longer. Notice that the compression peak pressure is high and the base pressure is high along with not having a defined exhaust valve opening, or visible intake event when first started, better a little later on.

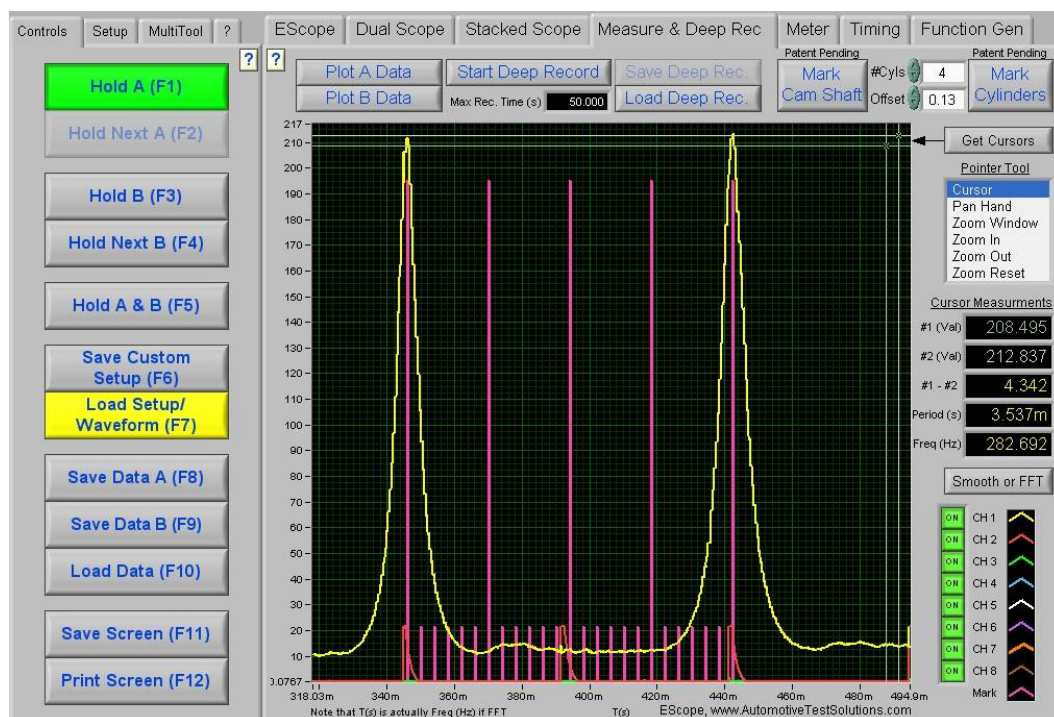


Fig. 1

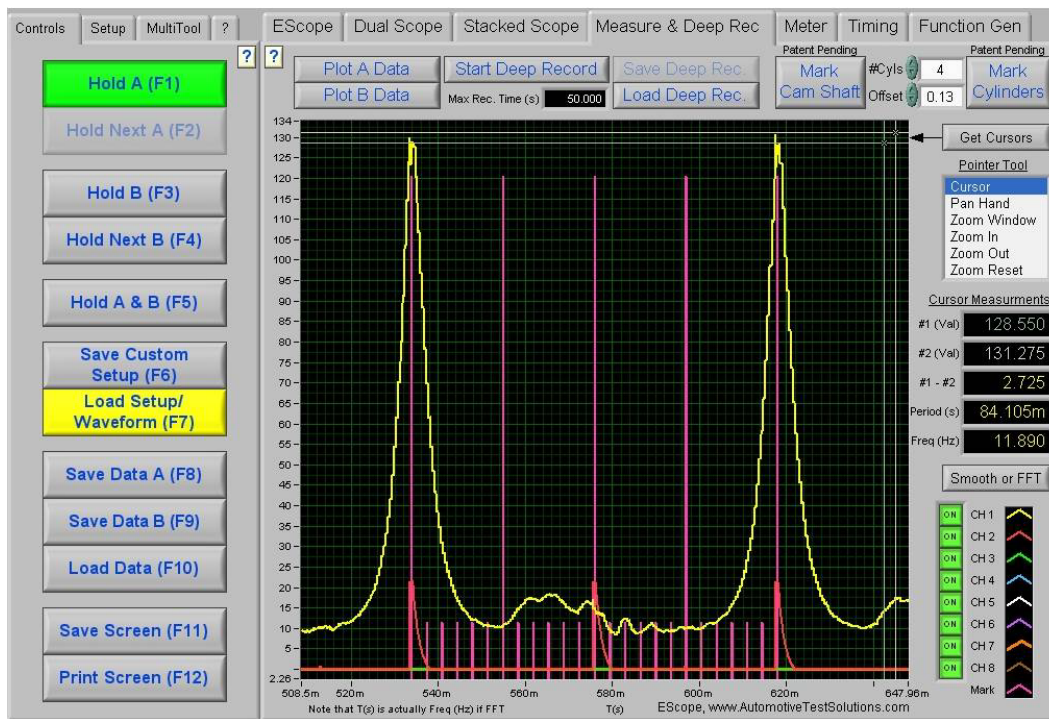


Fig. 2

Although the exhaust valve opening time doesn't look way off (is out though) the increased cylinder pressure and lack of definition of exhaust and intake valve opening led me to believe that the timing between crank and at least one of the cams must be off.

We have different techs for different areas of work in our shop, so this car went down to the engine end for tear down and inspection. It was noted on the invoice that some of the timing cover bolts were missing and the seal had not been changed on the cover in the earlier performed work. The timing components were replaced and a tune up completed along with sending the injectors out for cleaning.

Figure 3 shows cylinder 1 after the repairs were completed.

As you can see from the change in cylinder pressures and the definition of the ramps, everything would appear to be normal, and indeed the car now runs good.

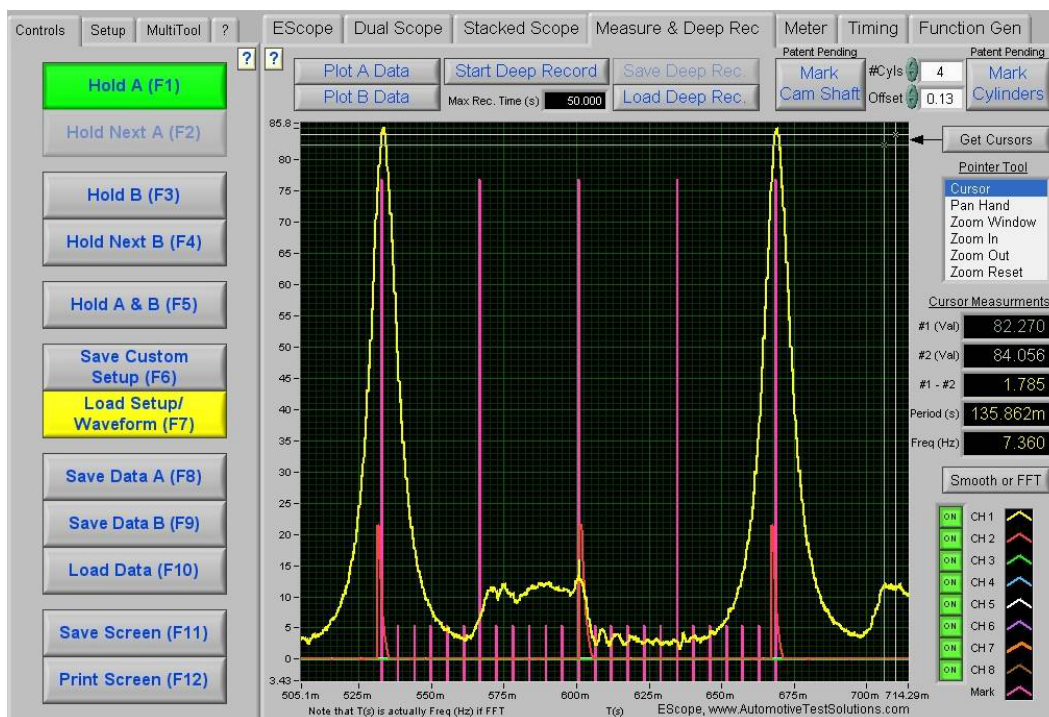


Fig. 3