Module 14
MAP / BARO Sensor

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14 MAP / BARO Sensors

14.1 General Overview

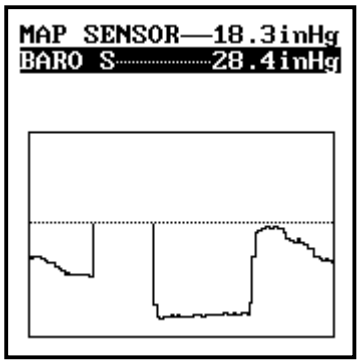
The manifold absolute pressure (MAP) sensor and the barometric pressure (BARO) sensor are virtually identical sensors. One reports intake manifold pressure information to the engine control module (ECM) and one reports atmospheric pressure information to the ECM. They both use the same pressure-sensing component and therefore will indicate the same voltage when both are measuring the same pressure, such as key on/engine off (KOEO).

Both these sensors report the values in absolute pressure to a scan tool. Absolute pressure is just another way to measure vacuum. Absolute pressure uses a total vacuum as its base and therefore our normal environment is considered a pressure. The pressure unit is in inches of mercury (HG) just like vacuum. The result is that the absolute pressure readings are similar to vacuum readings except the values are opposite. A high absolute pressure reading means a lower vacuum. These relationships can be seen in the table below.

Condition	Vacuum	Absolute Pressure	MAP/BARO Voltage
Normal Idle Readings	18" HG	10" HG	.95 Volts
Wide Open Throttle	0" HG	28" HG	2.75 Volts

Now that you are totally confused, let me make a suggestion. Forget vacuum readings and absolute pressure readings and just use the input voltages to monitor the engine vacuum. You can see from the table that the MAP input voltage at idle, no load, should be .95 volts. Remember that number, it is one of the critical numbers that you will need to memorize. If the MAP voltage is just under 1 volt at idle, with no load, the engine vacuum is right.

Screen Capture 14-1



So, why not just use a vacuum gauge? A digital volt-ohm meter (DVOM) hooked onto the MAP or BARO sensor input wire is the most accurate way to measure the engine vacuum. Most vacuum gauges are not very accurate and the input voltage is the signal that the ECM monitors. Regardless of what your vacuum gauge reads you will need to check the sensor by checking the input voltage anyway.

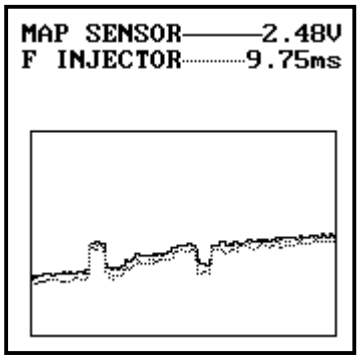
Screen Capture 14-1 shows the relationship between the MAP input voltage and the BARO input voltage. The solid line represents the MAP input voltage and

the dotted line represents the BARO input voltage.

The scan tool used was a Mastertech using the Honda/Acura software. The Mastertech will let you view the MAP / BARO parameters as either inches of HG absolute or as voltage. This particular screen capture is using inches of HG, but it is best to use the voltage option, it is just easier to remember when you are using a DVOM later to check these.

You can also see from Screen Capture 14-1 that the BARO voltage is fixed at 28.42 inches of HG. This is the same reading that the MAP sensor will indicate on KOEO. Notice how the MAP reading varies to indicate the engine load. At wide open throttle the MAP reading and the BARO readings are the same. This would indicate a time of no vacuum, since the manifold and the atmosphere had the same pressure.

Screen Capture 14-2



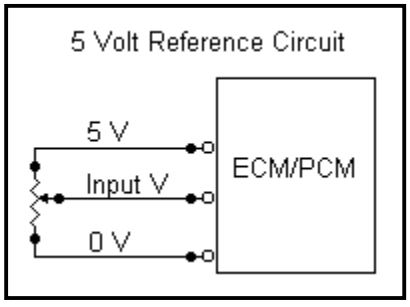
Screen Capture 14-2 shows the close relationship of the MAP sensor voltage (solid line) and the injector pulse width PW (dotted line). This graph was taken from a 1997 Civic being driven on the interstate under changing load conditions.

You can see from this graph that for each change in the MAP voltage the PW makes an equal change. It should be obvious that the MAP sensor is the most powerful input to the ECM.

When a Honda is running extremely rich or lean, always check the MAP sensor input voltage first. Chapter 7 is dedicated to the MAP sensor / injector PW relationship.

14.2 How Do They Work?

Illustration 14-1

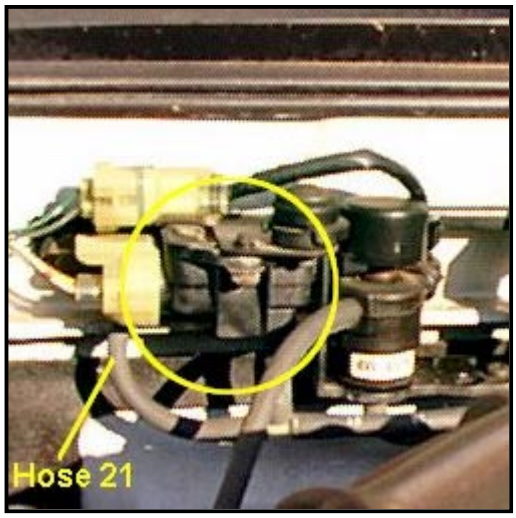


The MAP/BARO sensors are standard 5-volt reference sensors. The ECM applies approximately 5.0 volts and a ground to the sensor on two wires and a third wire returns to the ECM an input voltage, as shown in Illustration 14-1.

The normal MAP input voltage is approx. .9 volt at idle, with no load. At wide-open throttle under a load or KOEO the voltage should be close to 2.75 volts or the same as the BARO sensor voltage. The normal BARO input voltage is approximately 2.75 volts. This will vary slightly depending on your elevation and the atmosphere's barometric pressure.

14.3 Component Location

Image 14-1 MAP Sensor Location



On earlier Hondas, the BARO sensor is mounted behind the dash on the left side. The BARO sensor was moved to the actual ECM circuit board on 90-Accords, 92- Civics, 90-91 2.1 Preludes, 92- all Preludes.

The MAP sensor can be found in one of two places. The earlier models had a firewall mounted MAP sensor, like shown inside the circle in Image 14-1.

If you are not sure which of the fire-wall-mounted devices is the MAP sensor just look for hose # 21.

In the early 1990s Honda started moving the MAP sensors to the intake manifold like shown in Image 14-2. This design is better since it eliminates a hose, which is always a potential source of a vacuum leak.

Image 14-2 Map Sensor Location

14.4 How Do You Test Them?

14.4.1 The BARO Sensor

The BARO sensor virtually never gives any trouble. You should never need to check it, but if you do need to, you will be monitoring the input voltage. Due to the location of the BARO sensor it would probably be easier to check the voltage at the ECM terminal than at the component.

If the Honda is equipped with a data link connector (DLC) you can monitor the BARO input voltage by using a scan tool. The voltage should be close to 2.75 and steady.

14.4.2 MAP Sensor

The MAP sensor is relatively easy to access and testing at the sensor is quick and easy. Since the MAP is a standard 5-volt reference sensor it is easy to determine which wire is the input wire.

Using a DVOM, ground the black lead and probe with the red lead. One wire should be 0 volts (the ground wire). One wire should be approximately 5 volts and steady (reference voltage). One wire will be close to .9 volts at idle and 2.75 at KOEO.

14.5 Service Issues

BARO / MAP sensors are very reliable. A defective BARO sensor is almost unheard of and a bad MAP is rare also. When the MAP voltage is too high (indicating vacuum lower than normal) the problem is rarely a faulty sensor, but in fact a low vacuum problem. Some of the causes of low vacuum are:

- Incorrect Cam Timing
- Incorrect Ignition Timing
- Restricted Exhaust
- Excessively Worn Engine or Leaking Valves