

**FORD:**

2003-2005 Crown Victoria, Thunderbird  
2005 Five Hundred, Ford GT, Freestyle,  
Mustang  
2004-2005 Explorer, F-150, Freestar  
2005 E-Series

**LINCOLN:**

2003-2005 LS, Town Car, Aviator

**MERCURY:**

2003-2005 Grand Marquis  
2005 Montego  
2004-2005 Monterey, Mountaineer

**ISSUE**

When diagnosing for a possible MAF sensor related condition, on a vehicle equipped with an EGR system module (ESM), an incorrect engine-running BARO value is no longer a reliable indicator of a skewed MAF sensor. Vehicles with ESM use both the MAP and MAF for engine-running BARO updates. Replacing the MAF sensor for a seemingly incorrect or inconsistent key-on BARO is not an effective repair for vehicles equipped with an ESM.

**ACTION**

Refer to the following Service Tips to aid in diagnosing MAF and other malfunction indicator lamp (MIL)/driveability concerns, using the BARO PID.

**SERVICE TIPS****NOTE**

SOME EARLY BUILT 2003 VEHICLES EQUIPPED WITH AN ESM MAY NOT HAVE THE STRATEGY/CALIBRATION TO UPDATE THE BARO PID USING THE ESM'S MAP SENSOR. IN THESE APPLICATIONS THE BARO WILL BE UPDATED BY THE MAF SENSOR, OR IF FAULTS ARE PRESENT A DEFAULT VALUE WILL BE SET (DEFAULT VALUE MAY DIFFER DEPENDING ON APPLICATION AND STRATEGY). DIAGNOSE THESE APPLICATIONS WITH THE CURRENT PROCEDURES WITHOUT USING THE ESM'S BARO METHODS.

**NOTE**

THE BAROMETRIC PRESSURE/MAP SENSOR REFERENCE CHART CONTAINED IN THIS TSB SHOWS THE ESM'S MAP SENSOR VOLTAGE CORRESPONDING TO A BARO READING IN INCHES OF MERCURY (IN-HG) AND IN HERTZ (HZ). THE CONVERSION TO KILO PASCALS (KPA) AND POUNDS PER SQUARE INCHES (PSI) ARE ALSO PROVIDED IN THE CHART.

The ESM calculates EGR delta pressure using two (2) MAP sensors that independently read intake manifold and exhaust pressure. This allows vehicles with an ESM to use a MAP sensor to obtain a BARO reading from the intake manifold, prior to engine start.

There are three (3) ways for the BARO PID to update in vehicles equipped with an ESM:

1. BARO is adjusted to a value based on the ESM's MAP sensor reading during key-on prior to engine start. There must be a minimum of 1 minute key-off time to get the BARO to update, prior to turning the key to the start/run position.
2. BARO may also be adjusted based on MAF and MAP sensors readings under certain driving conditions, as long as no DTCs or faults are present. Typical conditions are stabilized engine temperatures and high to moderate throttle openings.

**NOTE:** The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle. Warranty Policy and Extended Service Plan documentation determine Warranty and/or Extended Service Plan coverage unless stated otherwise in the TSB article. The information in this Technical Service Bulletin (TSB) was current at the time of printing. Ford Motor Company reserves the right to supersede this information with updates. The most recent information is available through Ford Motor Company's on-line technical resources.

## TSB 05-3-1 (Continued)

3. BARO will adjust to a default value if faults are presents or the keep alive memory (KAM) is cleared. A low battery voltage or a KAM reset performed by a scan tool will clear KAM. The default value depends on how the vehicle application was calibrated. (example the BARO value may read 27 in-Hg (150Hz) when the KAM was cleared, but the actually barometric pressure due to geographical region may be different.) Use the following verification method to check BARO.

### NOTE

TO VERIFY BARO IN VEHICLES EQUIPPED WITH ESM'S YOU WILL NEED A SCAN TOOL AND THE BAROMETRIC PRESSURE/MAP SENSOR REFERENCE CHART.

### DIAGNOSTICS

1. If DTCs other than P2106, P0106, P0107, P0401, P0402 are present, repair these first. If the KAM is reset during the repairs then proceed to Step 3.
2. Do not reset KAM.
3. Make sure the key is off for at least 1 minute.
4. Connect the scan tool.
5. Turn key on, do not start the engine.
6. Setup scan tool to read BARO PID and MAP\_V (MAP sensor voltage).
7. Verify if BARO PID and MAP voltage matches barometric pressure for appropriate geographical location using the barometric pressure/MAP sensor reference chart. (Example, if the MAP\_V reads approximately 4.20 V then the BARO PID should read about 156Hz which would correspond to a region where the barometric pressure is approximately 29 in-HG. Verify with local weather reports and altitude readings.)

- a. If the key-on BARO is not appropriate for the geographical region verify the MAP sensor is putting out the correct voltage by comparing MAP\_V PID and the actual voltage at pin-3 of the ESM (use pin-6 for the ground reference). If there is a discrepancy greater than 0.2 volts then perform the following checks.

- (1) Check ESM wires and connections for shorts and opens.
- (2) Check for internal ESM short. Check resistance between pin-2 (VREF) and pin-6 (signal return) on the ESM with ESM harness disconnected. If resistance is less then 2000 OHMS then replace ESM and retest.

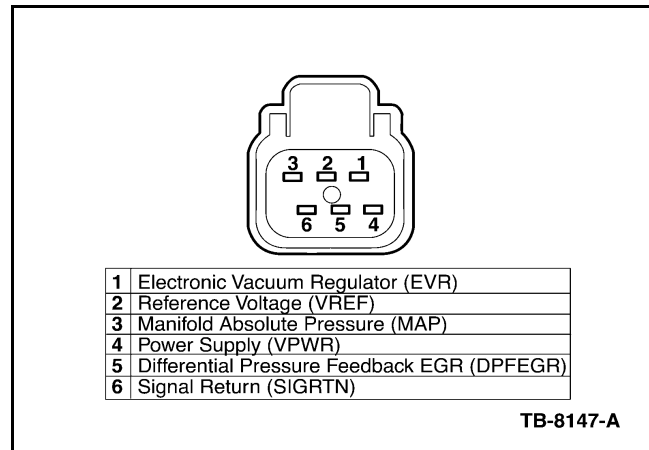


Figure 1 - Article 05-3-1

**WARRANTY STATUS:** Information Only

MAP Sensor voltage	BARO (inHG)	BARO/ MAP (kPa)	BARO/MAP (PSI)	BARO (Hz)	Altitude Above Sea Level (ft)
0.50	4.43	15.00	2.18	92	
0.60	5.09	17.25	2.50	93	
0.70	5.76	19.50	2.83	95	
0.80	6.42	21.75	3.15	96	
0.90	7.09	24.00	3.48	98	
1.00	7.75	26.25	3.81	99	
1.10	8.42	28.50	4.13	101	
1.20	9.08	30.75	4.46	103	
1.30	9.74	33.00	4.79	104	
1.40	10.41	35.25	5.11	106	
1.50	11.07	37.50	5.44	107	
1.60	11.74	39.75	5.77	109	
1.70	12.40	42.00	6.09	110	
1.80	13.07	44.25	6.42	112	
1.90	13.73	46.50	6.74	114	
2.00	14.40	48.75	7.07	115	
2.10	15.06	51.00	7.40	117	14,000
2.20	15.72	53.25	7.72	119	
2.30	16.39	55.50	8.05	120	
2.40	17.05	57.75	8.38	122	
2.50	17.72	60.00	8.70	124	
2.60	18.38	62.25	9.03	126	
2.70	19.05	64.50	9.36	127	
2.80	19.71	66.75	9.68	129	
2.90	20.37	69.00	10.01	131	10,000
3.00	21.04	71.25	10.33	133	9,000
3.10	21.70	73.50	10.66	135	
3.20	22.37	75.75	10.99	136	8,000
3.30	23.03	78.00	11.31	138	7,000
3.40	23.70	80.25	11.64	140	
3.50	24.36	82.50	11.97	142	6,000
3.60	25.03	84.75	12.29	144	5,000
3.70	25.69	87.00	12.62	146	
3.80	26.35	89.25	12.94	148	4,000
3.90	27.02	91.50	13.27	150	3,000
4.00	27.68	93.75	13.60	152	2,000
4.10	28.35	96.00	13.92	154	
4.20	29.01	98.25	14.25	156	1,000
4.30	29.68	100.50	14.58	158	
4.40	30.34	102.75	14.90	160	0
4.50	31.01	105.00	15.23	162	

BARO Barometric Pressure  
inHG Pressure units in inches of mercury  
kPa Pressure units in Metric - kilo Pascal  
PSI Pressure units in English - pounds per square inch  
Hz Frequency units in Hertz (old method of converting pressure to frequency)  
MAP manifold absolute pressure  
ESM EGR systems module  
EGR Exhaust Gas Recirculation

BARO Note: BARO is calculated using the MAP sensor for vehicles equipped with an ESM (EGR systems module).

Note: Altitudes and pressure values are only approximations - temperature and other climate effects are not taken into account

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Figure 2 - Article 05-3-1