



TechPro

# Bulletin

## FORD EGR SYSTEM TIPS

Have you ever had a Ford vehicle with an EGR code that just wouldn't go away? Well, here is a tip that we hope will make your job a little bit easier.

The first step is to perform a thorough visual inspection of the system. If the inspection reveals nothing obvious, then some diagnostics are in order.

Install a vacuum gauge in the vacuum line between the EGR valve and the control solenoid. Next, run the Key On-Engine Running self test. At one point during the self test, the PCM will check the EGR system by applying vacuum to the EGR valve. It accomplishes this by grounding the EGR regulating solenoid at a duty cycle of approximately 30%. If you see that the vacuum gauge indicates a vacuum reading of a few inches or more, you can be sure that the PCM, wiring, vacuum lines, and the regulating solenoid are functional. If not, then you must investigate where the source of the problem lies. If you do get a vacuum signal, then, exit the self test. With the engine at idle, apply vacuum to the EGR valve with a vacuum pump. When you apply vacuum, you should notice a change in

engine RPM, with the possibility that the engine may stall. If the engine RPM changes, then we know the EGR is working. If there are no changes, then either the EGR valve is not functioning, or, the EGR passages are blocked with carbon. If engine RPM does change, then our next step is to examine the PFE (Pressure Feedback) or DPFE (Differential Pressure Feedback) sensor.

wire which is connected to the PCM. The PFE sensor measures exhaust gas pressure, while the DPFE sensor measures the difference between the upstream pressure (exhaust side), and the downstream pressure (intake side). Both sides are separated by an orifice assembly which is a calibrated opening that exhaust gas flows through when the EGR valve opens (refer to diagram #1).

The DPFE sensor should measure equal pressure on both sides with the EGR valve closed. This means that we can measure and compare the signal voltage at idle with the signal voltage at key on, engine not running. Under these two conditions, if we see a difference in voltage output, then the EGR valve must be open (normally it should not be open at idle, or, with the engine not running). When the EGR valve opens under normal conditions, the upstream

pressure should be greater than the downstream pressure. If not, then one of the hoses of the sensor is either off or plugged, or the orifice is blocked. The signal of the DPFE sensor at idle ranges from .20 to .90 volts DC. The actual voltage will vary depending upon the vehicle. Any voltage reading that is out of that range at

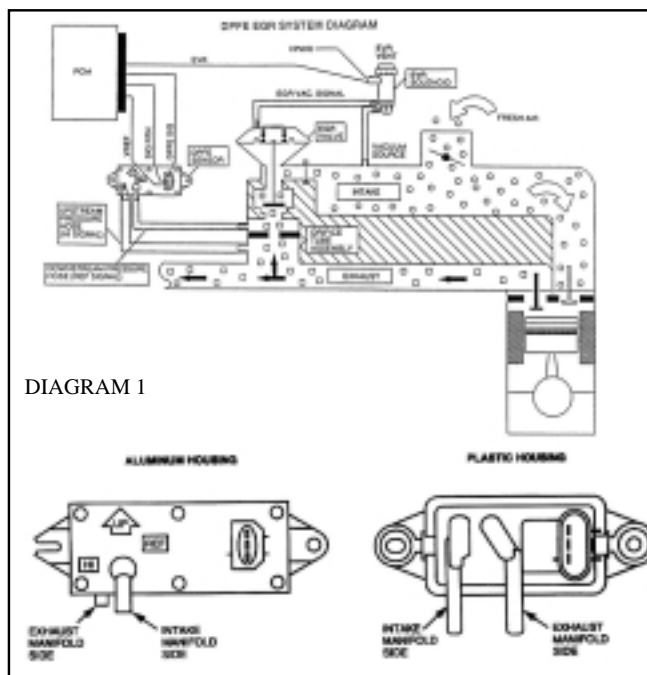


DIAGRAM 1

Some early systems use a single hose sensor called the PFE sensor, while others use the DPFE sensor. Both sensors have three wires. The three wires consist of a 5 volt reference (which is shared with other sensors), a sensor ground (which is also shared), and a dedicated signal or output

idle will usually set a fault code. A fault code will also set if the PCM does not see a sufficient voltage change when EGR operation is commanded. Testing of the DPFE sensor can be done by monitoring its output voltage while applying vacuum to the EGR valve. If you notice an RPM change, or, the engine stalls, and the output voltage does not change, then the sensor is suspect. This assumes that the reference voltage and ground circuits are good. Also, tap on the sensor LIGHTLY to see if the output voltage changes. If the output changes, then the sensor is suspect. Typical output voltage on a PFE sensor with "Key ON, Engine OFF", or, with no EGR command is 3.20 to 3.30 volts DC. The voltage signal should increase when vacuum is applied, and decrease when pressure is applied.

The DPFE's output voltage with "Key On, Engine Off" is between .30 and .60 volts DC. This figure is applicable to the sensor with the aluminum housing. Look for an output voltage that's about .2 to .3 volts

higher for the sensor with the black plastic housing. If you apply vacuum to the EGR valve with the engine at idle, you should notice a change in the sensor's output voltage, as well as some change in the idle RPM.

The common causes of sensor failure are contamination, and excessive exhaust back pressure. Contamination can be caused by exhaust by-products as well other problems such as coolant from a failed gasket. Moisture from condensation can also present problems. One final note about all EEC V OBD II systems: the EGR system will not set any codes as long as the ambient temperature sensor "sees" the temperature below 32°F. Under these conditions, it is likely that if condensation has occurred, it will freeze and create some type of problem.

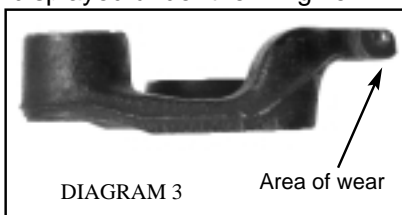
**Mike Nieto-**  
**Ford Specialist**

the belt fails, engine damage is certain. There are special tools designed to complete the job which are available from your tool supplier.

**Pat Sugar-**  
**Top Gun Technician**

## CHRYSLER COOLING FAN PROBLEMS-LH BODY

You may run across a Chrysler LH body car with a cooling fan that runs continuously, regardless of the engine temperature. Improper diagnosis may lead you to believe that the PCM is at fault. Before you replace that PCM, keep this tip in mind. Install your scan tool to the data link connector. Scan the value displayed as "A/C Pressure". This value is displayed under the "Engine

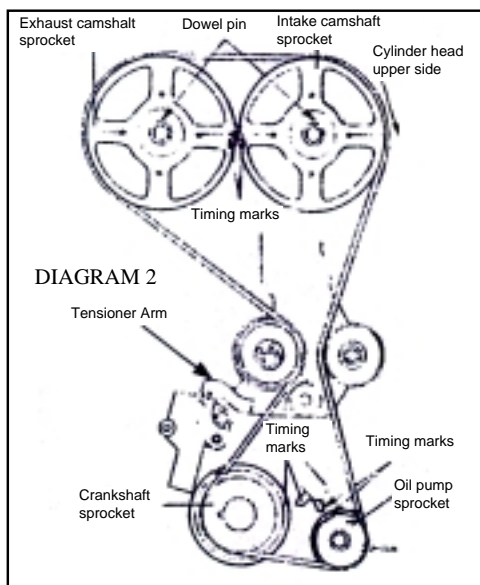


## TIMING BELT SERVICE TIP- 2.0L MITSUBISHI ENGINE

This engine is popular in various Chrysler, Hyundai, and Mitsubishi vehicles. It also may be turbo-charged equipped.

Timing belt replacement has been a source of trouble for many technicians. When performing timing belt service on this engine, pay particular attention to the timing belt tensioner arm (refer to diagram #2). If there happens to be excessive wear on the business end of the arm, the auto tensioner will be extended beyond the useable range which will result in premature timing belt failure (refer to diagram #3). This engine is classified as an interference engine. Which means that if

Controls" section. You may also find it in the "BCM controls" section if the vehicle has Automatic Temperature Control. This value is supplied to the computer through an A/C pressure sensor located on the high side pressure line near the compressor. Since the relationship between pressure and temperature are close in an A/C system, the computer uses this value to track the high side temperature and turn on the cooling fan when needed. If the temperature is in excess of 235°F., the computer will continually run the fan in an attempt to cool off or lower the pressure on the high side of the system. In order to verify this



value, install you're A/C gauges to check the actual pressure reading. If the reading on the A/C gauge does not match the scan tool reading, the sensor should be replaced in order to restore correct fan operation.

**James D'Anna-**  
**Top Gun Technician**

### **GM TRUCKS W/VORTECH ENGINES-NO START**

We would like to clear up some of the misunderstandings regarding a "no start", or "hard start" condition due a fuel system problem involving the G.M. Vortech engines. There are two systems. The earlier system, CMFI, used a single injector (1995 and earlier). The later system, CSFI, used one injector per cylinder (1996 and later). The earlier single injector system (CMFI) required 54 to 64 PSI of fuel pressure, while the newer system (CSFI) requires 61 to 66 PSI. Fuel pressure that drops below these specs on cranking may result in the poppet valve not opening sufficiently. When this happens, either no fuel is injected, or, the fuel is so poorly sprayed into the cylinder, that it creates a hard start or a no start condition. In performing diagnostics, a tech may get the vehicle to start by spraying extra fuel (like carb spray) . However, if the fuel pressure drops low enough (low 40's for the CMFI, low 50's for the CSFI), even the extra fuel won't help for long. At this point, some techs reach for their scan tool first, instead of the fuel pressure gauge or noid light. When you monitor injector pulse width with a scan tool, you may find that your scan tool reads "0" during cranking. With "Key

ON, Engine Off, you may see a pulse width that's high in the 20's. Both of these readings are normal and characteristic of the scan tool programming. The key to diagnosing this system is to monitor the RPM value on the scan tool. This RPM reading is the same signal that the ECM uses to pulse the fuel injectors. On the CSFI systems, check for ignition spark, because on those systems the PCM also controls ignition spark by triggering the ignition module using that same RPM signal. If you get an RPM signal on the scan tool (with either system), or ignition spark (with the CSFI system), it means that the PCM is powered up and its inputs (crank signal, distributor reference signal) are OK. The final step would be to verify fuel injector pulse with a lab scope or a noid light. On the later CSFI systems, the easiest way to do this is at the PCM, which is located under the hood. On the earlier CMFI systems , the injector connector is usually located behind the alternator, not on top of the intake manifold. The device on top of the intake manifold is the IMTV (Intake Manifold Tuning Valve). This valve controls intake air in the mid to high RPM range. And last, but not least, don't forget to check that fuel pressure!

**Joe Dantuono-**  
**GM Specialist**

### **DODGE TRUCKS 1992 & up W/ CUMMINS DIESEL-NO CHARGE CONDITION**

Even though these vehicles are powered by a diesel engine, they are equipped with a computer and an ASD (Automatic Shutdown Relay). If you are

familiar with Chrysler vehicles that are equipped with fuel injection, you know that the ASD relay supplies power to systems such as the fuel pump, and the ignition system. However, in the diesel powered vehicles, the ASD supplies power to the alternator field for charging purposes.

In this system, when the key is turned on, the relay comes on for two seconds, and then shuts down, unless it gets powered up again by the ECM. In order for this to happen, the ECM must get an RPM input from the engine speed sensor, indicating that the engine is running. If the ECM does not get such a signal, it shuts down the ASD relay. When the serpentine belt breaks, it sometimes contacts the engine speed sensor which is mounted by the crankshaft pulley. Replacing the belt corrects one problem, but does not solve the real problem, which is the charging system not working. The engine will start, and no fault code will be stored unless the vehicle is road tested . In this particular case, there usually is no reason to road test a vehicle with a charging system problem. Which means that an unsuspecting tech won't get any help. Under these circumstances, the first order of business is to make sure the ASD relay is powered up with the engine running. If not, then check the engine speed sensor. With the ignition key on, disconnect the connector, and, at the harness connector leading to the ECM, check for: the 8 volt power supply, the 5 volt reference, and a good ground (refer to diagram #4 ). You can do this with a digital voltmeter with the negative lead

attached to the battery's negative terminal, and using the positive lead to probe the connector.

If all checks out OK, then connect a jumper wire from the 5 volt reference terminal and touch it to ground repeatedly. This simulates an RPM signal to the ECM, which should result in the ECM energizing the ASD relay. If the ASD relay does not come alive, then the relay itself needs to be checked. If the relay checks out OK, then the ECM is not working, or, the wiring and connectors need to be checked.

**Jeff Auerbach-  
Domestic Specialist**

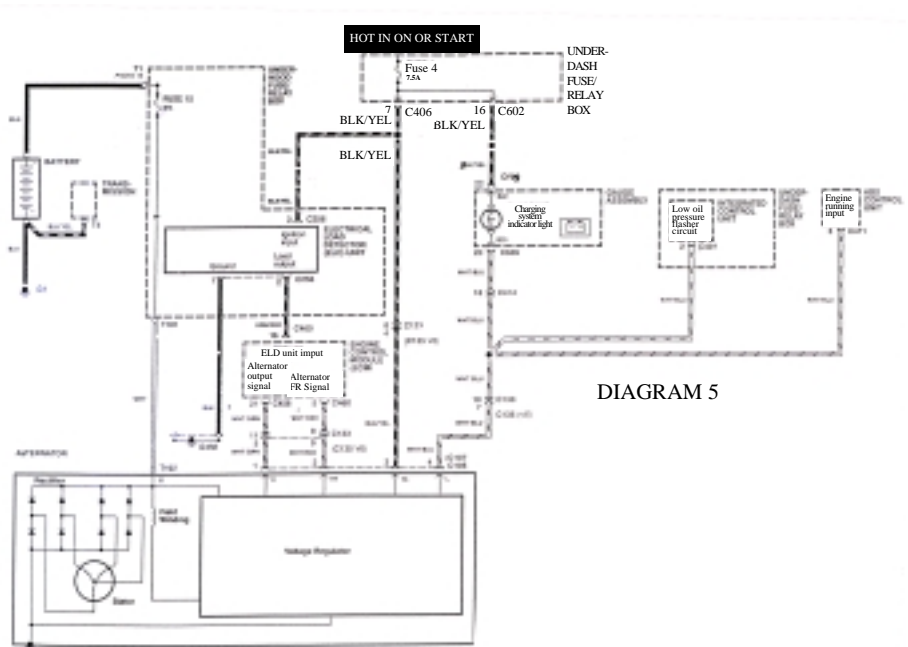


DIAGRAM 5

running. If it's not, then you may be on the road to a quick fix. On these vehicles, Honda uses the Charge Warning light circuit as an input to the ABS controller. Based on the input of this circuit, the controller determines if the engine is running. In this situation, if the engine is running, the ABS controller will not enter diagnostics.

This causes the bulb to turn off, and the ABS controller will now see system voltage on this input circuit (Refer to diagram #5 ). If an open circuit occurs past the splice junction in this circuit, then the Charge Warning bulb will not be grounded in the "Key On, Engine Off" position. This will result in system voltage to appear on the input line to the ABS controller. When this happens, the ABS controller will think the engine is running, thus preventing entry into ABS diagnostics. The vehicles that use this circuitry are:

- Accord** 1991-97
- Civic** 1992-95
- Del Sol** 1994-97
- Odyssey** 1995-97
- Passport** 1996-97
- Prelude** 1990-96

**Peter Mc Ardle-  
Asian Specialist**

**HONDA VEHICLES- ABS**

CAV .CIRCUIT . . . . .	FUNCTION	CRANKSHAFT POSITION SENSOR CONNECTOR
1 . . . . .K44 TN/YL	. . . . .8 Volt supply	
2 . . . . .K4 BK/LB	. . . . .Sensor Ground	
3 . . . . .K24 GY/BK	. . . . .Engine Speed Sensor Signal (0 - 5 volts)	

DIAGRAM 4

**LIGHT ON-NO DIAGNOSTIC MODE**

If you try to perform ABS diagnostics on a Honda vehicle by jumping the diagnostic connector, and the ABS light illuminates, but will not flash codes, here's a tip that may save you some time. First item to check is the Charge Warning light. This light should be illuminated when the ignition key is on with the engine not

When the ignition key is in the Key On, Engine Off position, the Charge Warning light bulb circuit is grounded by the voltage regulator in the alternator. This results in the bulb illuminating. Since this same circuit acts as an input to the ABS controller, the controller would "see" 0 volts on this circuit at this time. Once the engine is running, and the alternator is charging , the voltage regulator will no longer ground this circuit.