



## A Newsletter for Fleet Emissions Inspection Facilities and Inspectors

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VEI Web site: [www.vei.azdeq.gov](http://www.vei.azdeq.gov)

### Editorial Desk

Welcome to the Winter, 2010 *Fleets in Review*. This newsletter is distributed exclusively through ADEQ's Web site. We hope that this is a convenient way to keep in touch with you.

We must remind everyone that budget issues continue to make it difficult to do all the things we would like. Most state agencies are taking "furlough days" periodically. On these days our offices are closed. This affects the operation of the Waiver Lanes, our training classes and the dates of walk-in testing, but not the contractor operated inspection stations.

It is our sincere hope that you will have a prosperous and healthy 2011. May we all see an improved economy in the year ahead.

Everything changes. Following the publication of the rules review here (Spring 2009 thru Fall 2010) significant updates to Article 10 rules are anticipated, and are being worked on. Once finalized and approved, we will report the changes in *Fleets in Review*. Additionally, the licensed inspector classes in Tucson are being changed to quarterly. The change will be effective July 1, 2011. See the new quarterly schedule for Tucson classes in the next edition of *Fleets in Review*.

Previous issues of "Fleets in Review" are available online at [www.azdeq.gov/environ/air/vei/fleet.html](http://www.azdeq.gov/environ/air/vei/fleet.html).

### The Diode

Diodes are considered one of the simplest semiconductor devices. The lowly diode is used extensively on vehicles today. Basically, diodes are a one-way electrical valve. They allow current to flow in one direction only, and block current from flowing in the other direction.

There are two parts to a diode, the "anode", and the "cathode." When the anode side of the diode is placed toward the positive side of a circuit, the diode will conduct and current will flow. When the cathode side of the diode is placed towards the positive side of the circuit, current will be blocked.

Diodes are rated by their current carrying capacity. They are then matched to the circuit that they are being used in. The amount of current they can pass is referred to as forward bias (current rating). Placing a diode in a circuit that requires higher current than the diode is rated for will cause damage to the diode, usually causing an opening in the diode. Many diodes are mounted in heat sinks to dissipate the heat. Removing unwanted heat will protect the diode.

Another rating of a diode is its *peak inverse voltage (inverse bias)*. This is the voltage that the diode can block safely. Exceeding the peak inverse voltage for even a split second can result in damage to the diode. Diodes placed in a circuit that requires higher reverse bias current than the diode is rated for will usually cause a short in the diode. A short-circuited diode will pass current in both directions.

Diodes are found in three common applications in motor vehicles of today:

- 1. Rectification circuits** — changing alternating current (AC) to direct current (DC).
- 2. Isolation circuits** — using the blocking feature of the diode as a switch to prevent current from flowing where the manufacturer doesn't want it, such as in charging systems to prevent the battery from discharging into the alternator when the vehicle is off.

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**3. Protection device** — where a relay coil is connected into a circuit that is integrated circuit controlled, a diode may be used to protect the electronic device that controls it. When current flows through a coil of wire, it will generate a strong magnetic field. Turning off this field will generate a high voltage "spike" that if allowed to reach the electronic device controlling it, such as a transistor or integrated circuit (IC), will destroy it. Diodes used in this manner are called de-spiking or suppression diodes.

All of the above diode uses are found in today's automobiles. Once it was quite a novelty, as generators were replaced with alternators. Without the rectifier diodes, there would be no alternator. But, we have been using them in alternators for many decades now. However, the most frequent use of diodes today is in the protection of integrated circuits, on-board computers and other proprietary electronic devices. Since diodes are so inexpensive, they can be used to protect more complex and expensive electronics from currents and voltages generated by making and breaking of circuit paths.

In addition to the common man-made circuit interruptions (removing/re-installing batteries, reverse voltage connections, etc.) surges in electrical systems are a fact of life for auto designers. It becomes mandatory for the designer to protect circuits from spikes and transients rather than to try to suppress the spikes. There are far too many interconnected circuits in the modern automobile.

### **NOx, NOx; Who's There?**

The call was a normal call; it was from a technician who was having problems with a vehicle that was failing the I/M 147 emissions inspection for NOx. The tech knew why the vehicle was failing. The EGR valve was not operating, but he couldn't find out why.

"Have you checked out the solenoid?" I asked. "Yep," was his reply. "How about the valve itself?" "That too," he stated. At this point we made an appointment for him to bring the vehicle in later that week.

On the morning of the appointment, I received a call from the technician that had been working on the vehicle. "Won't be coming in!" He said. "Found the problem!" "Great! What did you find?", I asked. "Well," he said, "I didn't want to bring you something that wasn't checked out thoroughly, and be caught with my pants down." I

thanked him for for that consideration and asked him what he had found. He said that it wouldn't go into closed-loop, and he continued...

"Well...I didn't want to bring you something that turned out to be a simple problem, so I spent some more time checking things out and this is what I found. The feedback system was not going into closed-loop operation. This, it turns out, was due to a cooling system problem. The thermostat was sticking open, keeping the cooling system below temperature for EGR operation. A new cooling thermostat later and the vehicle now passes." I congratulated him on a proper diagnosis.

Let's analyze this situation for a moment. High NOx levels are commonly associated with high heat conditions. This causes many of us to ignore items such as low coolant temperature as being a factor in a NOx related emissions failure.

Technicians in Arizona's emissions program found early on that some vehicle manufacturer's EGR function relies heavily on proper coolant operating temperature. In some cases coolant temperature operating at 200 degrees F or below (in some instances, less) manufacturer specifications can cause the PCM to prevent EGR operation, resulting in a high NOx emissions report. Yet, this same vehicle will pass the CO and HC standards. The reason? The coolant temperature will be high enough for the PCM to trim fuel enrichment, adjusting toward the ideal 14.7 to 1, but not to the necessary temperature for the PCM to activate the EGR valve. When diagnosing a NOx failure problem and you are finding the EGR valve and controls are testing good, don't rule out low coolant temperature as a possible cause for a nonfunctional EGR system.

### **Questions & Answers**

*In this column staff will answer recurring questions about emissions related problems and their solutions. We encourage you to submit your queries to VEI at (602) 771-3950 and ask for a technician. Questions of a common nature will also be addressed here.*

**Question:** If OBD testing is more efficient, and more accurate, why are dealer fleets not permitted to perform OBD certifications?

**Answer:** Current legislation specifies the allowable test(s) to be performed by fleets for emissions certification. Dealer fleets are allowed a less stringent test than the IM147 for newer vehicles, but OBD

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was not a part of the testing package at the time the statutes were written. The respective dealer associations must petition the Legislature to amend the statutes permitting OBD testing.

**Question:** Can fleets with multiple locations operate under one emissions inspection permit?

**Answer:** Generally, the answer to this is "No." There are exceptions where a fleet has multiple locations, but all repair and inspections are consolidated in one location. This is often inconvenient, requiring the moving of numerous vehicles several times, so it is done infrequently. Each fleet must evaluate its needs and the applicable rules.

**Question:** Why does our fleet have a "fleet agent" and two or more inspectors as well as the owner? Can't these positions be consolidated?

**Answer:** In many cases, the owner or manager could be the agent and inspector. This has been done in smaller fleets. However, when the owner chooses to make someone else responsible for the daily performance of inspections and record keeping, he appoints a "fleet agent." If the operation is large enough that multiple technicians are trained and certified to do emissions inspections, the owner is rarely involved with the inspection operation in enough detail to meet the certification requirements.

# 2011 Emissions Class Schedule

JANUARY 2011	
Fleet	Dates
Gov/Fleet Shop "CFD" Licensing	4 - 6
Gov/Fleet Shop "CF" Licensing	4 - 5
Gov/Fleet Shop "FD" Licensing	*5 - 6
Dealer "CF" Licensing	11 - 12
<b>Tucson- Class Canceled</b>	
<b>WALK-IN TESTING (Fridays)</b>	7, 14, 21, 28
<b>Holiday Office Closed</b>	17

FEBRUARY 2011	
Fleet	Dates
Gov/Fleet Shop "CFD" Licensing	1 - 3
Gov/Fleet Shop "CF" Licensing	1 - 2
Gov/Fleet Shop "FD" Licensing	*2 - 3
Dealer "CF" Licensing	8 - 9
<b>Tucson - No Class</b>	
<b>WALK-IN TESTING (Fridays)</b>	4, 11, 18, 25
<b>Holiday Office Closed</b>	21

MARCH 2011	
Fleet	Dates
Gov/Fleet Shop "CFD" Licensing	1 - 3
Gov/Fleet Shop "CF" Licensing	1 - 2
Gov/Fleet Shop "FD" Licensing	*2 - 3
Dealer "CF" Licensing	8 - 9
<b>Tucson-All Licensing Class</b>	22 - 23
<b>WALK-IN TESTING (Fridays)</b>	4, 11, 18, 25

APRIL 2011	
Fleet	Dates
Gov/Fleet Shop "CFD" Licensing	5 - 7
Gov/Fleet Shop "CF" Licensing	5 - 6
Gov/Fleet Shop "FD" Licensing	*6 - 7
Dealer "CF" Licensing	12 - 13
<b>Tucson-All Licensing Class</b>	26 - 27
<b>WALK-IN TESTING (Fridays)</b>	1, 8, 15, 22, 29

MAY 2011	
Fleet	Dates
Gov/Fleet Shop "CFD" Licensing	3 - 5
Gov/Fleet Shop "CF" Licensing	3 - 4
Gov/Fleet Shop "FD" Licensing	*4 - 5
Dealer "CF" Licensing	10 - 11
<b>Tucson-No Class</b>	
<b>WALK-IN TESTING (Fridays)</b>	6, 13, 20, 27
<b>Holiday Office Closed</b>	30

JUNE 2011	
Fleet	Dates
Gov/Fleet Shop "CFD" Licensing	7 - 9
Gov/Fleet Shop "CF" Licensing	7 - 8
Gov/Fleet Shop "FD" Licensing	*8 - 9
Dealer "CF" Licensing	14 - 15
<b>Tucson-No Class</b>	
<b>WALK-IN TESTING (Fridays)</b>	3, 17, 24
<b>Furlough Day Office Closed</b>	10

\* Strongly Recommended/Optional attendance for "FD" Licensing

\* **NOTE:** If attending the Wednesday-Thursday class for "FD" the start time for Wednesday class is 10 a.m.



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