Automotive Technology 5th Edition
Chapter 75 MASS AIR FLOW SENSORS
Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class provides complete coverage of the components, operation, design, and troubleshooting. It correlates material to task lists specified by ASE and NATEF and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, Real World Fixes, Videos, Animations, and NATEF Task Sheet references.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as result of attending this session or class.	Explain learning objectives to students as listed below: 1. Discuss how MAF sensors work. 2. List the methods that can be used to test MAF sensors. 3. Describe the symptoms of a failed MAF sensor.
Establish the Mood or Climate	Provide a ***WELCOME,*** Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

NOTE: This lesson plan is based on the 5th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 75: ATE5 Chapter Images

ICONS	Chapter 75 Mass Air Flow Sensors
	1. **SLIDE 1 Chapter 75 Mass Air Flow Sensors** 2. **SLIDE 2 EXPLAIN Figure 75-1** A vane air flow (VAF) sensor.
 	**Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/** **WEB SITE IS CONSTANTLY UPDATED** **Videos**
	3. **SLIDE 3 EXPLAIN Figure 75-2** typical air vane sensor with the cover removed. The movable arm contacts a carbon resistance path as the vane opens. Many air vane sensors also have contacts that close to supply voltage to the electric fuel pump as the air vane starts to open when engine is being cranked and air is being drawn into engine.
	**DEMONSTRATION: Show students a vane airflow sensor. Point out vane, &, if cover is removed, link to potentiometer FIGURE 75-1 & 2**
	**DISCUSSION: Have the students discuss vane airflow sensor and how it works. What might happen if the sensor didn't have a dampening chamber designed into it? FIGURE 75-1 & 2**
	4. **SLIDE 4 EXPLAIN Figure 75-3** 5-wire mass air flow sensor consists of a metal foil sensing unit, an intake air temperature (IAT) sensor, & electronic module. 5. **SLIDE 5 EXPLAIN Figure 75-4** The sensing wire in a typical hot wire mass air flow sensor.
	**DEMONSTRATION: Show examples of hot-film sensors. Discuss how thermistor is used to measure air temperature. Then show students a hot-wire sensor. Discuss purpose of burn-off circuit. FIGURES 75-3 & 4**
	**DISCUSSION: Have the students talk about types of mass airflow sensors. How are hot-film and hot-wire sensors similar? Are there differences? FIGURES 75-3 & 4**

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	**DISCUSSION: Have the students discuss the resistance of the hot wire. Does it stay the same or change as air moves over it? FIGURE 75-4**
	6. **SLIDE 6 EXPLAIN Figure 75-5** A Karman Vortex air flow sensor uses a triangle-shaped rod to create vortexes as the air flows through the sensor. The electronics in the sensor itself converts these vortexes to a digital square wave signal
	**DISCUSSION: Have the students talk about Karman Vortex Sensors. What is design factor that makes them operate? Discuss ultrasonic and the pressure-type Karman Vortex sensors. What is the difference in their operation? What is similar in their operation? FIGURE 75-5**
	**Electronic parts, sensor wires, & thermistors are very sensitive to impact and probing. Be careful not to drop these parts or probe them with screwdrivers or other tools.**
	**DISCUSSION: Have students discuss high-authority & low-authority sensors. Can same sensor be both high and low? Have students explain their responses.**
	**Cracked or loose air inlet tube, or snorkel, can admit unmetered (false) air & cause driveability problems. PCM calculates fuel injector pulse width based on mass air flow reading. Any leaks will give false readings. FIGURE 75-6**
	**DISCUSSION: Have the students talk about the difference in voltage readings and grams per second listed in the chart at the bottom of P. 843. Why should OEM specifications always be used in diagnosing mass air flow sensors?**
	**DISCUSSION: Have the students talk about different ways of testing MAFs. Is a tap test result always accurate?**

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	**DISCUSSION: Have the students discuss MAF sensor contamination. Is it possible to clean a contaminated MAF sensor?**
	**DEMONSTRATION: Show data stream readings on a properly operating MAF sensor.**
	**HANDS-ON TASK: Using a scan tool have the students access the MAF sensor DATA STREAM.**
	**ON-VEHICLE NATEF TASK: Inspect and test MAF Sensor using a GMM)/(DSO); perform necessary action. Page 241**
	**Crossword Puzzle (Microsoft Word) (PDF)** **Word Search Puzzle (Microsoft Word) (PDF)**