Introduction to Automotive Service
Chapter 24 Dash Warning Lights & Driver Information Systems
Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class serves as an introduction to the world of automotive service. It correlates material to task lists specified by ASE and NATEF.
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 a result of attending this session or class.	Explain learning objectives to students. 1. Prepare for ASE Electrical/Electronic Systems (A6) certification test content area "F" (Gauges, Warning Devices, and Driver Information System Diagnosis and Repair). 2. Be able to identify the meaning of dash warning symbols. 3. Describe how a navigation system works. 6. List the various types of dash instrument displays.
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.

ICONS	Ch24 Dash Warning Lights & DIC Systems
	**1. SLIDE 1 CHAPTER 24 DASH WARNING LIGHTS & DRIVER INFORMATION SYSTEMS**
	**Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/** **WEB SITE IS CONSTANTLY UPDATED**
	**2. SLIDE 2** EXPLAIN Dash Warning Symbols **3. SLIDE 3** EXPLAIN **Figure 24-1** Engine coolant temperature is too high. **4. SLIDE 4** EXPLAIN **Figure 24-2** Engine oil pressure too low. **5. SLIDE 5** EXPLAIN **Figure 24-3** Water detected in fuel. Notice to drain the water from the fuel filter assembly on a vehicle equipped with a diesel engine **6. SLIDE 6** EXPLAIN **Figure 24-4** Maintenance required. This usually means that engine oil is scheduled to be changed or other routine service items replaced or checked. **7. SLIDE 7** EXPLAIN Dash Warning Symbols **8. SLIDE 8** EXPLAIN **Figure 24-5** Malfunction indicator lamp (MIL), also called a check engine light. The light means the engine control computer has detected a fault **9. SLIDE 9** EXPLAIN Dash Warning Symbols **10. SLIDE 10** EXPLAIN **Figure 24-6** Charging system fault detected. **11. SLIDE 11** EXPLAIN **Figure 24-7** Fasten safety belt warning light. **12. SLIDE 12** EXPLAIN **Figure 14-8** Fault detected in the supplemental restraint (airbag) system. **13. SLIDE 13** EXPLAIN **Figure 24-9** Fault detected in base brake system
	**Parking Brake Warning Light** **Show Animation**

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	14. **SLIDE 14** EXPLAIN **Figure 24-10** Brake light bulb failure detected 15. **SLIDE 15** EXPLAIN Dash Warning Symbols 16. **SLIDE 16** EXPLAIN **FIGURE 24-11** Exterior light bulb failure detected 17. **SLIDE 17** EXPLAIN **Figure 24-12** Worn brake pads or linings detected. 18. **SLIDE 18** EXPLAIN **Figure 24-13** Fault detected in antilock brake system.
	**DISCUSSION: Have students discuss importance of indicator, or warning, lights. What is purpose of dash warning light?**
	19. **SLIDE 19** EXPLAIN **Figure 24-14** Low tire pressure detected 20. **SLIDES 20-21** EXPLAIN Dash Warning Symbols 22. **SLIDE 22** EXPLAIN **Figure 24-15** Door open or ajar. 23. **SLIDE 23** EXPLAIN **Figure 24-16** Windshield washer fluid low. 24. **SLIDE 24** EXPLAIN **Figure 24-17** Low fuel level. 25. **SLIDE 25** EXPLAIN **Figure 24-18** Headlights on. 26. **SLIDE 26** EXPLAIN Dash Warning Symbols 27. **SLIDE 27** EXPLAIN **Figure 24-19** Low traction detected. Traction control system is functioning to restore traction (usually flashes when actively working to restore traction). 28. **SLIDE 28** EXPLAIN **Figure 24-20** Vehicle stability control system either off or working if flashing. 29. **SLIDE 29** EXPLAIN **Figure 24-21** Traction control system has been turned off. 30. **SLIDE 30** EXPLAIN **Figure 24-22** Indicates that cruise control is on and able to maintain vehicle speed if set. Some vehicles use a symbol that looks like a small speedometer to indicate that the cruise control is on.
	**HANDS-ON TASK: Provide students with common warning symbols used on vehicle dashboard cluster assemblies. Have them identify meaning of each symbol and label it on lab vehicle. Grade students on their ability to identify symbols & systems associated with them.**

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	**31. SLIDE 31 EXPLAIN** Maintenance Reminder Lamp **32. SLIDE 32 EXPLAIN** Analog & Digital Dash Instruments
	**DEMONSTRATION: Show methods used by various OEMs to reset maintenance reminder lights**
	**33. SLIDE 33 EXPLAIN Figure 24-23** A typical oil pressure sending unit provides a varying amount of resistance as engine oil pressure changes. The output from the sensor is a variable voltage
	**DISCUSSION: discuss operation of an oil pressure gauge and sending unit. What is the voltage of output from the sensor?**
	**34. SLIDE 34 EXPLAIN** Network Communications & Head-Up Display **35. SLIDE 35 EXPLAIN Figure 24-24** temperature gauge showing normal operating temperature between 180° F and 215° F, depending on specific vehicle and engine
	**VIDEO: 2 MINUTES Testing Dash Gauges www.myautomotivelab.com** http://media.pearsoncmg.com/ph/chet/chet_mylabs/akamai/template/video640x480.php?title=Testing%20and%20Diagnosing%20Dash%20Gauges&clip=pandc/chet/2012/automotive/Starting_charging_elect/A6T9.mov&caption=chet/chet_mylabs/akamai/2012/automotive/Starting_charging_elect/xml/A6T9.xml
	**DEMONSTRATION: Show students how to use a variable resistance potentiometer like a 90 ohm gas gauge tank sender to test gauges for proper operation**
	**36. SLIDE 36 EXPLAIN Figure 24-25** typical head-up display showing zero miles per hour, which is actually projected on the windshield from the head-up display in the dash. **37. SLIDE 37 EXPLAIN Figure 24-26** dash-mounted control for the head-up display on this Cadillac allows the driver to move the image up and down on the windshield for best viewing. **38. SLIDE 38 EXPLAIN Figure 24-27** typical head-up display (HUD) unit.

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	**DISCUSSION: Have students discuss advantages of head-up display. Where is HUD unit installed?**
	39. **SLIDE 39 EXPLAIN FIGURE 24-28** Typical ignition switch positions. Notice the bulb check position between "on" (run) and "start." These inputs are often just voltage signals to the body control module and can be checked using a scan tool 40. **SLIDE 40 EXPLAIN FIGURE 24-29** Many newer vehicles place the ignition switch on the dash and incorporate antitheft controls. Note the location of the accessory position
	41. **SLIDE 41 EXPLAIN Night Vision & Electronic Speedometers** 42. **SLIDE 42 EXPLAIN Figure 24-30** night vision camera behind the grille of a Cadillac
	43. **SLIDE 43 EXPLAIN Figure 24-31** vehicle speed sensor located in the extension housing of the transmission. Some vehicles use the wheel speed sensors for vehicle speed information. 44. **SLIDE 44 EXPLAIN Electronic Odometers**
	**DISCUSSION: discuss electronic speedometers. What advantages does using a speed sensor have over a speedometer gear-and-cable arrangement?**
	**Vehicles equipped with electronic odometers or tripometers must be in correct mode to reset maintenance light**
	**DEMONSTRATION: Show students how to test VSS (PM generator type) using soldering gun**
	**DISCUSSION: discuss difference between analog and digital gauges. How is stepper motor used in analog dash displays?**
	**DISCUSSION: discuss diagnosis of dash electronic circuits. Why aren't dash electronic circuits shown on a wiring diagram? How would a**

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	short-to-ground in sending unit wire affect operation?
	**DEMONSTRATION: Show students how to use an ohmmeter to check sending unit wires for opens and shorts.**
	**45. SLIDE 45 EXPLAIN Figure 24-32 (a)** Some odometers are mechanical and are operated by a stepper motor. **(b)** Many vehicles are equipped with an electronic odometer.
	**Show ANIMATION: Input Discreet Signals www.myautomotivelab.com** http://pegasus2.pearsoned.com/Pegasus/Modules/TeachingPlan/frmCoursePreview.aspx?From=CC
	**HANDS-ON TASK: Have students use DMM to test sensors/switches. Have students inspect & test gauge fuses to check power supply to gauge circuitry. Use scan tool to retrieve data that could help diagnose speedometer problems.**
	**DISCUSSION: discuss how information from VSS is used by other electronic circuits. Why could a malfunction in VSS affect transmission shifting?**
	**DEMONSTRATION: Show how to remove instrument cluster & how to remove trim pieces without breaking retention clips.**
	**HANDS-ON TASK: Have students use DMM to test a vehicle speed sensor circuit.**
	**46. SLIDE 46 EXPLAIN** Electronic Fuel Level Gauges **47. SLIDE 47 EXPLAIN Figure 24-33** fuel tank module assembly that contains the fuel pump and fuel level sensor in one assembly.
	**DISCUSSION: Have students discuss operation of VOICE ACTIVATED SYSTEMS. Can you name any of the specific OEM systems? What the term Bluetooth mean?**

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	**48. SLIDE 48 EXPLAIN Navigation and GPS**
	**49. SLIDE 49 EXPLAIN Figure 24-34** Global positioning systems use 24 satellites in high earth orbit whose signals are picked up by navigation systems. The navigation system computer then calculates the location based on the position of the satellite overhead
	**50. SLIDE 50 EXPLAIN Figure 24-35** typical GPS display screen showing the location of the vehicle.
	51. SLIDE 51 EXPLAIN Navigation and GPS
	52. SLIDE 52 EXPLAIN Figure 24-36 typical navigation display showing various options. Some systems do not allow access to these functions if vehicle is in gear and/or moving
	**DISCUSSION: discuss different components that compose a navigation system. What is the input device for users on most navigation systems?**
	**53. SLIDE 53 EXPLAIN** ONSTAR
	54. SLIDE 54 EXPLAIN Figure 24-37 The three-button OnStar control is located on the inside rearview mirror. The left button (telephone handset icon) is pushed if a hands-free cellular call is to be made. The center button is depressed to contact an OnStar advisor and the right emergency button is used to request that help be sent to the vehicle's location.
	55. SLIDE 55 EXPLAIN ONSTAR
	**ON-VEHICLE NATEF TASK (A6-F-1) Inspect and test gauges and gauge sending units; determine necessary action (P-1) Page 172**
	**56. SLIDE 56 EXPLAIN** Backup Camera & Sensors; Lane Departure Warning System
	57. SLIDE 57 EXPLAIN Figure 24-38 typical view displayed on the navigation screen from the backup camera.
	58. SLIDE 58 EXPLAIN Figure 24-39 typical fisheye-type backup camera usually located near the center on the rear of the vehicle near the license plate.

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	59. SLIDE 59 EXPLAIN Figure 24-40 typical backup sensor display located above the rear window inside the vehicle. The warning lights are visible in the inside rearview mirror. **60. SLIDE 260 EXPLAIN Figure 24-41** small round buttons in the rear bumper are ultrasonic sensors used to sense distance to an object.
	**DEMONSTRATION: Show students how to locate and identify backup sensors.**
	**61. SLIDE 61 EXPLAIN Figure 24-42** lane departure warning system often uses cameras to sense the road lines and warns the driver if the vehicle is not staying within the lane, unless the turn signal is on.
	**DISCUSSION: discuss how lane departure warning systems operate. How does system detect whether a vehicle is changing lanes on purpose or accidentally?**
	**266. SLIDES 266-277 FUEL GAUGE DIAGNOSIS OPTIONAL**
	**ON-VEHICLE NATEF TASK (A6-F-2, A6-F-3, and A6-F-4) Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action. (P-3) Page 173**
	**Homework: complete Ch24 crossword puzzle: http://www.jameshalderman.com/links/book_intro/cw/crossword_ch_24.pdf**