A5 BRAKES 7th Edition

Chapter 19 Electronic Stability Control Systems

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of Automotive
	Brakes. 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	Explain the chapter learning objectives to the students.
objectives for the chapter or course you are about to	1. Discuss the need for electronic stability control (ESC).
cover and explain this is	2. List the sensors needed for the ESC system.
what they should be able	3. Describe how a traction control system works.
to do as a result of attending this session or class.	4. List the steps in the diagnostic process for ESC and TC system faults.
	This chapter will help you prepare for the Brakes (A5) ASE
	certification test content areas "G" (Electronic Brake Control
	Service).
Establish the Mood or Climate	Provide a WELCOME, Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish	Do a round robin of the class by going around the room and having
Knowledge Base	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 A5 BRAKES 7th Edition Chapter Images found on Jim's web site @

www.jameshalderman.com LINK CHP 19: Chapter Images

Ch19 Electronic Stability Control Systems ICONS 1. SLIDE 1 ELECTRONIC STABILITY CONTROL **SYSTEMS** Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ **WEB SITE IS CONSTANTLY UPDATED** Videos At the beginning of this class, you can download the crossword puzzle & Word Search from the links below to familiarize your class with the terms in this chapter & then discuss them Word Search Puzzle (Microsoft Word) (PDF) Word Search Puzzle (Microsoft Word) (PDF) **Traction Control (View) (Download)** 2. SLIDE 2 EXPLAIN Figure 19-1 electronic stability control (ESC) system applies individual wheel brakes to keep the vehicle under control of the driver. **DEMONSTRATION:** USING A 1/32 SCALE MODEL CAR SHOW THE STUDENTS HOW A VEHICLE CAN OVER AND DEMO **UNDER STEER DISCUSSION: ASK STUDENTS TO DISCUSS THE** TERMS OVER STEER AND UNDER STEER. ASK STUDENTS TO TALK ABOUT THE DANGERS OF OVER STEER AND WHAT MAY CAUSE THIS. ASK STUDENTS TO TALK ABOUT THE DANGERS OF UNDER STEER AND WHAT MAY CAUSE THIS. **DISCUSSION:** ASK STUDENTS TO TALK ABOUT HOW THE FMVSS NO. 126 WILL AFFECT DESIGN OF VEHICLES **AFTER 2011.**

ICONS

























Ch19 Electronic Stability Control Systems

3. SLIDE 3 EXPLAIN Figure 19-2 sine with dwell test is designed to test electronic stability control (ESC) system to determine if the system can keep vehicle under control

DEMONSTRATION: SHOW STUDENTS A SINE WAVE AS IT WOULD APPEAR ON AN OSCILLOSCOPE.

DISCUSSION: HAVE STUDENTS TALK ABOUT THE SINE WITH DWELL TEST. HOW DOES THIS TEST CHECK THE OPERATION OF THE ESC SYSTEM?

RATIO OF LENGTH OF SIDE OPPOSITE THE GIVEN ANGLE TO LENGTH OF HYPOTENUSE OF A RIGHT-ANGLED TRIANGLE

DEMONSTRATION: SHOW THE OPERATION OF AN ESC OR TRACTION CONTROL SYSTEM

DISCUSSION: HAVE THE STUDENTS TALK ABOUT THE USE OF SIMULATORS TO TEST ESC SYSTEMS. HAVE STUDENTS TALK ABOUT HOW SIMULATORS AND VIDEO GAMES ARE SIMILAR.

- **4. SLIDE 4 EXPLAIN Figure 19–3** Using a simulator is most cost-effective way for vehicle & aftermarket suspension manufacturers to check that vehicle is able to perform within FMVSS No. 126 standard for vehicle stability.
- **5. SLIDE 5 EXPLAIN Figure 19-4** hand-wheel position sensor is usually located at base of steering column.
- **6. SLIDE 6 EXPLAIN Figure 19-5** Hand-wheel (steering wheel) position sensor schematic

DEMONSTRATION: SHOW STUDENTS A STEERING WHEEL POSITION SENSOR. SHOW STUDENTS HOW THE RESISTANCE CHANGES AS THE WHEEL IS TURNED

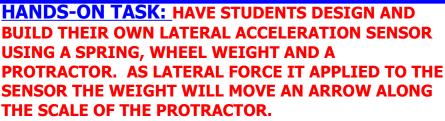
DISCUSSION: HAVE STUDENTS TALK ABOUT HOW THE SIDE WAYS MOVEMENT IN A VEHICLE AFFECTS THE DRIVERS COMFORT LEVEL.

- **7. SLIDE 7 EXPLAIN Figure 19-6** VS sensor information transmitted to EBCM by Class 2 serial data.
- **8. SLIDE 8 EXPLAIN Figure 19-7** schematic showing the lateral acceleration sensor and EBCM.

ICONS

Ch19 Electronic Stability Control Systems



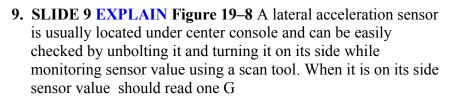


DEMONSTRATION: SHOW STUDENTS HOW TO DO THE QUICK AND EASY LATERAL ACCELERATION SENSOR TEST.



HANDS-ON TASK: HAVE STUDENTS PERFORM THE QUICK AND EASY LATERAL ACCELERATION SENSOR TEST ON SEVERAL DIFFERENT LAB VEHICLES







10. SLIDE 10 EXPLAIN Figure 19-9 Yaw rate sensor showing the typical locations and schematic.



ON-VEHICLE NATEF TASK: IDENTIFY TRACTION/VEHICLE STABILITY CONTROL SYSTEM COMPONENTS



- 11. SLIDE 11 EXPLAIN Figure 19-10 Typical traction control system that uses wheel speed sensor information and the engine controller (PCM) to apply the brakes at lower speeds and also reduce engine power applied to the drive wheels.
- **12. SLIDE 12 EXPLAIN Figure 19-11** Wheel speed sensor information is used to monitor if a drive wheel is starting to spin.
- 13. SLIDE 13 EXPLAIN Figure 19-12 A traction control or low traction light on the dash is confusing to many drivers. When the lamp is on or flashing, it indicates that a low traction condition has been determined and the traction control system is working to restore traction. A flashing traction dash light does not indicate a fault.



DEMONSTRATION: SHOW STUDENTS COMPONENTS OF A VEHICLE WITH TRACTION CONTROL. SHOW STUDENTS THE INSTRUMENT PANEL LIGHT AND SWITCH THAT IS PRESENT ON VEHICLES WITH TRACTION CONTROL.

ICONS



















Ch19 Electronic Stability Control Systems

DISCUSSION: HAVE STUDENTS TALK ABOUT INSTANCES WHERE TRACTION CONTROL WOULD NOT **BE USEFUL**

DEMONSTRATION: SHOW STUDENTS THE WAYS THAT MANUFACTURES HAVE DEVELOPED TO LOWER THE TOROUE TO THE DRIVE WHEELS

DISCUSSION: HAVE STUDENTS TALK ABOUT HOW THE TRACTION ACTIVE LAMP ILLUMINATING ON THE DASH BOARD WOULD HELP THEM IN DRIVING THROUGH ICY CONDITIONS. HAVE STUDENTS TALK ABOUT DRIVING CONDITIONS THAT THEY WOULD DEACTIVATE THE TRACTION CONTROL SYSTEM.

14. SLIDE 14 EXPLAIN Figure 19-13 use of a factory scan tool is often needed to diagnose the ESC system.

DEMONSTRATION: SHOW STUDENTS HOW TO DO A PROPER VISUAL INSPECTION OF THE ESC AND TC SYSTEMS ON THE VEHICLE

DISCUSSION: TALK ABOUT DIFFERENCE BETWEEN TRACTION CONTROL & ENGAGING AUTOMATIC 4WD. HAVE STUDENTS TALK ABOUT WHY IT IS IMPORTANT TO VERIFY CUSTOMER'S COMPLAINT BEFORE TRYING TO DIAGNOSE

HANDS-ON TASK: HAVE STUDENTS FOLLOW A TROUBLE SHOOTING PROCEDURE SPECIFIED BY A SPECIFIC OEM TO DIAGNOSE ESC/TC SYSTEM.

SEARCH INTERNET: HAVE STUDENTS RESEARCH INTERNET AND REPORT ON THE FRONT STEERING OF A NASCAR OF TODAY. DO THEY OVER STEER OR UNDER STEER. DOES A DRIVER WANT A LOOSE CONDITION ON THEIR FRONT STEERING?