

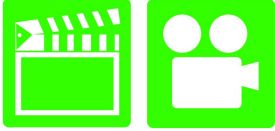
Advanced Automotive Electricity & Electronics

Chapter 25 Electronic Stability Control Systems

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of Advanced Automotive Electricity and Electronics Systems . 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 the chapter learning objectives to the students. <ol style="list-style-type: none">1. Discuss the need for electronic stability control (ESC).2. List the sensors needed for the ESC system.3. Describe how a traction control system works.4. List the steps in the diagnostic process for ESC and TC system faults.
Establish the Mood or Climate	Provide a <i>WELCOME</i> , 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



QUESTION



Ch25 Electronic Stability Control Systems

1. SLIDE 1 CH25 ELECTRONIC STABILITY CONTROL SYSTEMS

Check for **ADDITIONAL VIDEOS & ANIMATIONS**
@ <http://www.jameshalderman.com/>
WEB SITE IS CONSTANTLY UPDATED

ABS Traction Control (44 Links) **VIDEOS**

2. SLIDES 2-3 **EXPLAIN** Need for Electronic Stability Control
4. SLIDE 4 **EXPLAIN NOTE**
5. SLIDE 5 **EXPLAIN** FIGURE 25-1 electronic stability control (ESC) system applies individual wheel brakes to keep the vehicle under control of the driver.
6. SLIDE 6 **EXPLAIN** Federal Motor Vehicle Safety Standard (FMVSS) No. 126
7. SLIDE 7 **EXPLAIN** FREQUENTLY ASKED QUESTION & NOTE

DEMONSTRATION: USING A 1/32 SCALE MODEL CAR SHOW THE STUDENTS HOW A VEHICLE CAN OVER AND 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.

ANIMATION: OVERSTEERING
WWW.MYAUTOMOTIVELAB.COM

[HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/BRAKES/AUTO_ANIMATIONS/A5-21A/INDEX.HTML](http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/brakes/auto_animations/A5-21A/index.html)

ANIMATION: UNDERSTEERING
WWW.MYAUTOMOTIVELAB.COM

[HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/BRAKES/AUTO_ANIMATIONS/A5-21B/INDEX.HTML](http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/brakes/auto_animations/A5-21B/index.html)

ICONS	Ch25 Electronic Stability Control Systems
	<p>DISCUSSION: ASK STUDENTS TO TALK ABOUT HOW THE FMVSS NO. 126 WILL AFFECT DESIGN OF VEHICLES AFTER 2011.</p>
	<p>8. SLIDE 8 EXPLAIN FIGURE 25-2 sine with dwell test is designed to test electronic stability control (ESC) system to determine if the system can keep vehicle under control</p>
	<p>DEMONSTRATION: SHOW STUDENTS A SINE WAVE AS IT WOULD APPEAR ON AN OSCILLOSCOPE.</p>
	<p>DISCUSSION: HAVE STUDENTS TALK ABOUT THE SINE WITH DWELL TEST. HOW DOES THIS TEST CHECK THE OPERATION OF THE ESC SYSTEM?</p>
	<p>RATIO OF LENGTH OF SIDE OPPOSITE THE GIVEN ANGLE TO LENGTH OF HYPOTENUSE OF A RIGHT-ANGLED TRIANGLE</p>
 	<p>DEMONSTRATION: SHOW THE OPERATION OF AN ESC OR TRACTION CONTROL SYSTEM</p>
	<p>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.</p>
	<p>9. SLIDE 9 EXPLAIN FIGURE 25-3 Using simulator is most cost-effective way for vehicle & aftermarket suspension manufacturers to check that vehicle able to perform within FMVSS No. 126 standard for stability.</p>
	<p>10. SLIDES 10-14 Names of Various ESC Systems</p>
	<p>15. SLIDE 15 EXPLAIN ESC Sensors</p>
	<p>16. SLIDE 16 EXPLAIN FIGURE 25-4 hand-wheel position sensor is usually located at base of steering column.</p>
	<p>17. SLIDE 17 EXPLAIN FIGURE 25-5 Hand-wheel (steering wheel) position sensor schematic</p> <p>DEMONSTRATION: SHOW STUDENTS A STEERING WHEEL POSITION SENSOR. SHOW STUDENTS HOW THE RESISTANCE CHANGES AS THE WHEEL IS TURNED</p>

ICONS



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

18. SLIDE 18 **EXPLAIN** FIGURE 25-6 VS sensor information transmitted to EBCM by Class 2 serial data.
19. SLIDE 19 **EXPLAIN** FIGURE 25-7 schematic showing the lateral acceleration sensor and EBCM.
20. SLIDE 20 **EXPLAIN TECH TIP**

HANDS-ON TASK: HAVE STUDENTS DESIGN AND BUILD THEIR OWN LATERAL ACCELERATION SENSOR USING A SPRING, WHEEL WEIGHT AND A PROTRACTOR. AS LATERAL FORCE IT APPLIED TO THE SENSOR THE WEIGHT WILL MOVE AN ARROW ALONG THE SCALE OF THE PROTRACTOR.

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

21. SLIDE 21 **EXPLAIN** FIGURE 25-8 lateral acceleration sensor is located under center console and can be easily checked by unbolting it and turning it on its side while monitoring sensor value using a scan tool. When it is on its side sensor value should read one G
22. SLIDE 22 **EXPLAIN** FIGURE 25-9 Yaw rate sensor showing the typical locations and schematic.

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

23. SLIDE 23 **EXPLAIN** Traction Control
24. SLIDE 24 **EXPLAIN** FIGURE 25-10 Typical traction control system uses wheel speed sensor information & engine controller (PCM) to apply brakes at lower speeds & also reduce engine power applied to drive wheels.
25. SLIDE 25 **EXPLAIN** Traction Control Components

ICONS

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26. SLIDE 26 **EXPLAIN** FIGURE 25-11 Wheel speed sensor info used to monitor if wheel starting to spin.
27. SLIDE 27 **EXPLAIN** FIGURE 25-12 traction control or low traction light on dash is confusing to many drivers. When lamp is on or flashing, it indicates that a low traction condition has been determined and traction control system is working to restore traction. A flashing traction dash light does not indicate a fault.
28. SLIDE 28 **EXPLAIN FREQUENTLY ASKED QUESTION & NOTE**



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.



QUESTION

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



DEMONSTRATION: SHOW STUDENTS THE WAYS THAT MANUFACTURERS HAVE DEVELOPED TO LOWER THE TORQUE TO THE DRIVE WHEELS



QUESTION


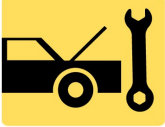

DISCUSSION: HAVE STUDENTS TALK ABOUT HOW THE TRACTION ACTIVE LAMP ILLUMINATING ON THE DASH BOARD WOULD HELP THEM IN DRIVING THROUGH ICY CONDITIONS. HAVE STUDENTS TALK ABOUT DRIVING CONDITIONS THAT THEY WOULD DEACTIVATE THE TRACTION CONTROL SYSTEM.



29. SLIDE 29 **EXPLAIN** ESC/TC Diagnosis
30. SLIDE 30 **EXPLAIN** FIGURE 25-13 use of a factory scan tool is often needed to diagnose the ESC system.
31. SLIDE 31 **EXPLAIN** ESC/TC Diagnosis
32. SLIDE 32 **EXPLAIN** NOTE



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

ICONS	Ch25 Electronic Stability Control Systems
  	<p>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</p> <p>HANDS-ON TASK: HAVE STUDENTS FOLLOW A TROUBLE SHOOTING PROCEDURE SPECIFIED BY A SPECIFIC OEM TO DIAGNOSE ESC/TC SYSTEM.</p> <p>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?</p>