

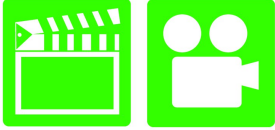
# Automotive Maintenance and Light Repair, 1<sup>ST</sup> Edition

## Chapter 60 PARKING BRAKES

### Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers <b>Automotive Maintenance and Light Repair</b> . 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. <ul style="list-style-type: none"><li>— Prepare for the Brakes (A5) ASE certification test content area “E” (Miscellaneous Systems Diagnosis and Repair).</li><li>— Describe what is required of a parking brake.</li><li>— Describe the parts and operation of the parking brake as used on a rear drum brake system.</li><li>— Describe how a parking brake functions when the vehicle is equipped with rear disc brakes.</li><li>— Explain how to adjust a parking brake properly.</li></ul>
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



## Ch60 PARKING BRAKES

1. SLIDE 1 CH60 PARKING BRAKES
2. SLIDES 2-3 EXPLAIN OBJECTIVES













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**DISCUSSION: DISCUSS REASONS BEHIND FEDERAL MANDATE TO USE DUAL MASTER CYLINDER TO PROVIDE A BACKUP HYDRAULIC SYSTEM IN CASE OF EMERGENCIES. WHAT ARE FMVSS 135 REQUIREMENTS FOR PARKING BRAKE PERFORMANCE?**






**IT IS IMPORTANT TO KNOW WHICH WHEELS FUNCTION AS PARKING BRAKES WHEN JACKING UP A CAR. MOST OFTEN IT IS REAR WHEELS, BUT NOT ALWAYS. IF BRAKING WHEELS ARE LIFTED OFF GROUND, CAR MAY ROLL & FALL OFF JACK. IT'S ALWAYS BEST TO JACK A CAR ON LEVEL PAVEMENT & USE CHOCKS ON WHEELS NOT LIFTED**













4. SLIDE 4 EXPLAIN **FMVSS 135**
5. SLIDE 5 EXPLAIN Figure 60-1 Typical parking brake cable system showing foot-operated parking brake lever and cable routing.
6. SLIDE 6 EXPLAIN Figure 60-2 typical parking brake pedal assembly.
7. SLIDE 7 EXPLAIN Figure 60-3 Typical hand-operated parking brake. Note that the adjustment for the cable is underneath the vehicle at the equalizer.
8. SLIDE 8 EXPLAIN Figure 60-4 ratchet mechanism is used to lock parking brakes in applied position.
9. SLIDES 9-10 EXPLAIN Pedals, Levers, and Handles
11. SLIDE 11 EXPLAIN Figure 60-5 remote-mounted parking brake release lever.

**DEMONSTRATION: SHOW LINKAGES FOR A FLOOR-MOUNTED PARKING BRAKE LEVER AND DISCUSS HOW THEY FUNCTION AS PART OF THE PARKING BRAKE SYSTEM. SHOW STUDENTS THE PARKING BRAKE CABLES THAT RUN UNDER A VEHICLE, AND NOTE THEIR CONSTRUCTION**

ICONS	Ch60 PARKING BRAKES
	<p><b>DISCUSSION: ASK STUDENTS TO TALK ABOUT THE PURPOSE AND FUNCTION OF PARKING BRAKE CONTROL AND APPLICATION CABLES.</b></p>
	<p><b>DEMONSTRATION: SHOW STUDENTS THE PARKING BRAKE LINKAGE LEVERS ON A VEHICLE, AND TALK ABOUT HOW THEY WORK TO AUGMENT APPLICATION FORCE. ASK STUDENTS TO DISCUSS HOW INTERMEDIATE LEVERS BOOST PARKING BRAKE APPLICATION FORCE FURTHER</b></p>
	<p>12. SLIDE 12 EXPLAIN Figure 60-6 Automatic parking brake release mechanisms usually use a vacuum servo to operate the release lever.</p>
	<p>13. SLIDE 13 EXPLAIN Figure 60-7 two plastic vacuum tubes on the steering column are used to release parking brake when gear selector moved from park into drive</p>
	<p><b>DEMONSTRATION: SHOW STUDENTS AN EXAMPLE OF A VEHICLE THAT USES A VACUUM SERVO AS AN AUTOMATIC PARKING BRAKE RELEASE MECHANISM, AND DISCUSS HOW IT RELEASES THE PARKING BRAKE WHEN THE SHIFTER IS PLACED INTO GEAR.</b></p>
	<p>14. SLIDES 14-15 EXPLAIN Parking Brake Warning Lamp</p>
	<p>16. SLIDE 16 EXPLAIN Parking Brake Linkages</p>
	<p>17. SLIDE 17 EXPLAIN Figure 60-8 The cable from the activating lever to the equalizer is commonly called the control cable. From the equalizer, the individual brake cables are often called application cables. These individual cables can usually be purchased separately.</p>
	<p>18. SLIDE 18 EXPLAIN Figure 60-8 cable from the activating lever to the equalizer is commonly called the control cable. From the equalizer, the individual brake cables are often called application cables. These individual cables can usually be purchased separately.</p>
	<p>19. SLIDE 19 EXPLAIN Figure 60-10 Intermediate levers in parking brake linkage increase application force.</p>
	<p>20. SLIDE 20 EXPLAIN Figure 60-11 cable guide is a common type of parking brake linkage equalizer.</p>
	<p>21. SLIDE 21 EXPLAIN Figure 60-12 Some parking brake equalizers are installed in the brake cable.</p>

ICONS	Ch60 PARKING BRAKES
	<p>22. <b>SLIDE 22 EXPLAIN Figure 60-13</b> Many parking brake linkages use both an intermediate lever and an equalizer.</p> <p>23. <b>SLIDES 23-24 EXPLAIN</b> Front and Rear Entry Parking Brake Cables</p>
	<p><b>DEMONSTRATION: SHOW STUDENTS AN EXAMPLE OF INTEGRAL DRUM PARKING BRAKES AND DISCUSS HOW THEY OPERATE. WHY ARE THEY THE MOST POPULAR DESIGN FOR DRUM PARKING BRAKES?</b></p>
	<p>25. <b>SLIDE 25 EXPLAIN</b> Drum Parking Brakes</p> <p>26. <b>SLIDE 26 EXPLAIN Figure 60-14</b> Notice the spring at the end of the parking brake strut. This antirattle spring keeps tension on the strut. The parking brake lever is usually attached with a pin and spring (wavy) washer and retained by a horseshoe clip.</p>
	<p>27. <b>SLIDE 27 EXPLAIN Figure 60-15</b> The parking brake cable pulls on the parking brake lever, which in turn forces the brake shoe against the drum</p> <p>28. <b>SLIDE 28 EXPLAIN Figure 60-16</b> The inside “hat” of the disc brake rotor is the friction surface for the parking brake shoes.</p>
	<p>29. <b>SLIDE 29 EXPLAIN Figure 60-17</b> A typical rear disc brake auxiliary drum brake friction assembly.</p> <p>30. <b>SLIDE 30 EXPLAIN Figure 60-18</b> Ford rear brake caliper ball and ramp-type apply mechanism.</p> <p>31. <b>SLIDE 31 EXPLAIN Figure 60-19</b> Operation of a ball and ramp-type rear disc brake caliper parking brake.</p>
	<p>32. <b>SLIDE 32 EXPLAIN Figure 60-20</b> Automatic adjustment of a ball &amp; ramp-type rear disc brake parking brake occurs when the service brakes are applied.</p> <p>33. <b>SLIDE 33 EXPLAIN Figure 60-21</b> A typical General Motors rear disc brake with an integral parking brake. This type uses a screw, nut, and cone mechanism to apply the caliper piston.</p> <p>34. <b>SLIDE 34 EXPLAIN Figure 60-22</b> Parking brake application of a GM rear drive brake caliper</p>

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	<p><b>DEMONSTRATION: SHOW EXAMPLE OF A REAR DISC BRAKE WITH A PARKING BRAKE INTEGRATED INTO HUB OF BRAKE ROTOR, AND DISCUSS HOW IT WORKS. ASK STUDENTS TO COMPARE ITS OPERATION TO A REAR DRUM PARKING BRAKE</b></p>
	<p><b>DISCUSSION: DISCUSS HOW CALIPER-ACTUATED DISC PARKING BRAKES WORK. WHY ARE FLOATING OR SLIDING CALIPERS NECESSARY TO THEIR OPERATION? ASK STUDENTS TO TALK ABOUT HOW THE BALL-AND-RAMP ACTUATING SYSTEM WORKS ON FORD VEHICLES TO OPERATE THE REAR BRAKE CALIPERS</b></p>
	<p><b>DISCUSSION: DISCUSS HOW SCREW, NUT, AND CONE ACTUATING SYSTEM WORKS TO APPLY REAR CALIPER PISTONS TO REAR BRAKE CALIPERS. WHAT IS PURPOSE OF BALANCE SPRING BETWEEN PISTON AND CALIPER BORE? ASK STUDENTS TO REVIEW &amp; COMMENT ON GM PARKING BRAKE COMPONENTS</b></p>
	<p>35. <b>SLIDE 35 EXPLAIN FIGURE 60-24</b> To adjust the parking brake cable on a Ford vehicle equipped with rear disc brakes, start by loosening the cable adjustment until the cables to the calipers are slack. Tighten until the caliper lever moves. Position a 1/4-in. drill bit or dowel into the caliper alignment hole. Adjustment is correct if the parking brake lever does not hit the 1/4-in. dowel.</p>
	<p>36. <b>SLIDES 36-39 EXPLAIN</b> Parking Brake Cable Adj.</p> <p>40. <b>SLIDE 40 EXPLAIN Figure 60-25</b> After checking that the rear brakes are okay and properly adjusted, the parking brake cable can be adjusted. Always follow the manufacturer's recommended procedure.</p> <p>41. <b>SLIDE 41 EXPLAIN Figure 60-26</b> Many hand-operated parking brakes are adjusted inside the vehicle.</p> <p>42. <b>SLIDE 42 EXPLAIN Figure 60-27</b> Always check that both brake shoes contact the anchor pin.</p>
	<p><b>DEMONSTRATION: SHOW STUDENTS HOW TO DO THE PARKING BRAKE CLICK TEST. WHAT PROBLEM IS INDICATED BY MORE THAN 10 CLICKS?</b></p>

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 	<p><b>HANDS-ON TASK: HAVE STUDENTS CHECK SEVERAL VEHICLES FOR PROPER PARKING BRAKE ADJUSTMENT USING THE CLICK TEST</b></p>
	<p>43. <b>SLIDE 43 EXPLAIN Figure 60-28</b> A 1/8-in. (3-mm) drill bit is placed through an access hole in the backing plate to adjust this General Motors leading-trailing rear parking brake. Adjust the parking brake cable until drill can just fit between shoe web and parking brake lever.</p> <p>44. <b>SLIDE 44 EXPLAIN Figure 60-29</b> Many parking brake cables can be removed easily from the backing plate using a 1/2-in. (13-mm) box-end wrench. The wrench fits over retainer finger on the end of the parking brake cable.</p>
  <p><b>QUESTION</b></p>	<p><b>DISCUSSION: ASK STUDENTS TO DISCUSS THE ADVENT AND ADVANTAGES OF ELECTRIC PARKING BRAKES (EPB), WHERE A COMPUTER-CONTROLLED MOTOR ACTIVATES BRAKE CALIPER. WHAT CARS OFFER THIS FEATURE?</b></p>
	<p>45. <b>SLIDE 45 EXPLAIN Figure 60-30</b> electric parking brake button on center console of a Jaguar</p>
 	<p><b>NATEF MLR TASK A5F2: CHECK PARKING BRAKE CABLES AND COMPONENTS FOR WEAR AND CLEAN OR REPLACE AS NECESSARY</b></p>
 	<p><b>NATEF MLR TASK A5F3 CHECK PARKING BRAKE OPERATION AND PARKING BRAKE INDICATOR LIGHT SYSTEM OPERATION; DETERMINE NECESSARY ACTION</b></p>
 	<p><b>NATEF MLR TASK A5D9: ADJUST CALIPERS WITH INTEGRATED PARKING BRAKE</b></p>
	<p><b>HOMEWORK: HAVE STUDENTS USE INTERNET TO RESEARCH 10 CAR MODELS AND WHICH TYPE OF PARKING BRAKE IS USED ON EACH: PEDAL, LEVER, OR HANDLE. ASK THEM TO PREPARE A TABLE PRESENTING THIS DATA AND TO EXPLAIN IF THEY SEE A PATTERN OF TYPE OF BRAKE USED BY SPECIFIC MANUFACTURERS.</b></p>