
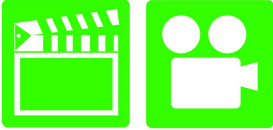







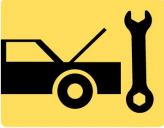



Automotive Maintenance and Light Repair, 1ST Edition

Chapter 47 TIRE & WHEEL SERVICE

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers Automotive Maintenance and Light Repair . 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">≡ Prepare for ASE Electrical/Electronic Systems (A6) certification test content area "A" (General Electrical/Electronic System Diagnosis).≡ Identify a series circuit.≡ Identify a parallel circuit.≡ Identify a series-parallel circuit.≡ Calculate the total resistance in a parallel circuit.≡ State Kirchhoff's voltage law.≡ Calculate voltage drops in a series circuit≡ Explain series and parallel circuit laws.≡ State Kirchhoff's current law.≡ Identify where faults in a series-parallel circuit can be detected or determined.
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	Ch47 Tire & Wheel Service
    	<p>1. SLIDE 1 CH47 Tire & Wheel Service</p> <p>2. SLIDES 2-3 EXPLAIN OBJECTIVES</p> <p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE REGULARLY UPDATED</p> <p>4. SLIDES 4-5 EXPLAIN Introduction</p> <p>6. SLIDE 6 EXPLAIN Figure 47-1 Using soapy water from a spray bottle is an easy method to find the location of an air leak from a tire</p> <p><u>Wheels and Tires (29 Links)</u></p> <p>7. SLIDE 7 EXPLAIN Figure 47-2 chart shows the relationship between tire inflation pressure and load capacity of the tire.</p> <p>8. SLIDE 8 EXPLAIN Figure 47-3 chart shows that a drop in inflation pressure has a major effect on fuel economy.</p> <p>9. SLIDE 9 EXPLAIN Figure 47-4 Notice that if a tire is underinflated by 10 PSI, life expectancy reduced by 40%</p>
	<p><u>DEMONSTRATION: SHOW THE STUDENTS HOW TO USE A SPRAY BOTTLE CONTAINING SOAPY WATER TO CHECK FOR THE LOCATION OF AN AIR LEAK IN A TIRE.</u></p>
  <p>QUESTION</p>	<p><u>DISCUSSION: ASK THE STUDENTS TO DISCUSS REASONS FOR NOT OVERINFLATING TIRES.</u></p>
 	<p><u>NATEF MLR TASK A4D1 INSPECT TIRE CONDITION; IDENTIFY TIRE WEAR PATTERNS; CHECK FOR CORRECT TIRE SIZE AND APPLICATION (LOAD AND SPEED RATINGS) AND ADJUST AIR PRESSURE; DETERMINE NECESSARY ACTION</u></p>
	<p><u>DEMONSTRATION: SHOW STUDENTS AN EXAMPLE OF A TEMPORARY INFLATION PUMP AND SHOW HOW IT IS USED. FIGURE 47-5</u></p>

ICONS

Ch47 Tire & Wheel Service

DEMO



QUESTION



DEMO

DEMONSTRATION: SHOW STUDENTS AN AEROSOL CAN OF SEALER THAT IS PROVIDED AS STANDARD EQUIPMENT ON VEHICLES NOT EQUIPPED WITH CONVENTIONAL SPARE TIRES. FIGURE 47-6

10. **SLIDE 10 EXPLAIN FIGURE 47-5** A temporary inflation pump that uses 12 volts from the cigarette lighter to inflate the tire
11. **SLIDE 11 EXPLAIN FIGURE 47-6** Many vehicle manufacturers include an aerosol can of sealer on vehicles that are not equipped with a conventional spare tire.
10. **SLIDE 10 EXPLAIN FIGURE 47-7** Most shops that use nitrogen inflation install green tire value cap to let others know that nitrogen, rather than air has been used to inflate tire.

Tires, Air Vs N2, a

Tire Pressure and Bulge

DISCUSSION: ASK THE STUDENTS TO DISCUSS WHETHER INFLATING TIRES WITH NITROGEN IS REALLY NECESSARY.

13. **SLIDES 13-16 EXPLAIN Tire Mounting Recommendations**

17. **SLIDE 17 EXPLAIN Figure 47-8** Note the difference in the shape of the rim contour of the 16-in. and 16 1/2-in. diameter wheels. While it is possible to mount a 16-in. tire on a 16 1/2-in. rim; it cannot be inflated enough to seat against the rim flange. If an attempt is made to seat the tire bead by overinflating (over 40 PSI), the tire bead can break, resulting in an explosive force that could cause serious injury or death.

18. **SLIDE 18 EXPLAIN Figure 47-9** When installing a tire-pressure monitoring system sensor, be sure that flat part of sensor is parallel to the center section of rim.

DEMONSTRATION: SHOW THE STUDENTS HOW TO INSTALL A TIRE-PRESSURE MONITORING SYSTEM (TPMS) SENSOR. FIGURE 47-9

ICONS

Ch47 Tire & Wheel Service



19. **SLIDE 19 EXPLAIN Figure 47-10** This tire on a new vehicle has been match mounted at the factory. The yellow sticker is placed at the largest diameter of the tire. The valve core hole in the wheel is usually drilled at the smallest diameter of the wheel. The best way to make sure the assembly is as round as possible and to reduce the number of wheel weights needed to balance the tire is to align the sticker with the valve core.

20. **SLIDE 20 EXPLAIN Figure 47-11 (a)** Cleaning the bead area of an aluminum (alloy) wheel using a handheld wire brush. The technician is using the tire changer itself to rotate the wheel as the brush is used to remove any remnants of the old tire.

DEMONSTRATION: SHOW HOW TO CORRECTLY USE AN AIR POWERED WIRE BRUSH TO CLEAN THE BEAD AREA OF A WHEEL. FIGURE 5-11

21. **SLIDE 21 EXPLAIN Figure 47-11 (b)** Using electric or air-powered wire brush speeds process, but care should be exercised not to remove any of aluminum itself. (Remember, steel is harder than aluminum and a steel wire brush could cause recesses to be worn into aluminum wheel, which would prevent the tire from proper seating in the bead area.) Bead seat area on steel wheels should also be cleaned to prevent air leaks at rim.

22. **SLIDE 22 EXPLAIN Figure 47-12** Rendered (odorless) animal fat is recommended by some manufacturers of tire changing equipment for use as a rubber lubricant.

DISCUSSION: ASK STUDENTS TO DISCUSS HOW A RIM LEAK ON A NEW SET OF TIRES COULD AFFECT A SHOP'S REPUTATION.

TIRE REMOVAL & REPLACEMENT
WWW.MYAUTOMOTIVELAB.COM

[HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=TIRE%20REMOVAL%20AND%20REPLACEMENT&CLIP=PANDC/CHET/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/CLIP32TIREREMOV1.MOV&CAPTION=CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/XML/CLIP32TIREREMOV1.XML](http://media.pearsoncmg.com/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=TIRE%20REMOVAL%20AND%20REPLACEMENT&CLIP=PANDC/CHET/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/CLIP32TIREREMOV1.MOV&CAPTION=CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/XML/CLIP32TIREREMOV1.XML)

23. **SLIDE 23 EXPLAIN Figure 47-13** Always tighten wheel lug nuts in star pattern to ensure even pressure on axle flange, brake rotors, drums, & wheel itself.

DEMONSTRATION: SHOW THE STUDENTS HOW TO PROPERLY TIGHTEN LUG NUTS BY USING A STAR PATTERN. FIGURE 47-13



QUESTION



ICONS



QUESTION



DEMO

DEMO



Ch47 Tire & Wheel Service

DISCUSSION: ASK THE STUDENTS TO DISCUSS POSSIBLE RESULTS OF TIGHTENING LUG NUTS IN THE WRONG SEQUENCE. FIGURE 47-13

TORQUING WHEEL LUG NUTS IN STAR PATTERN WWW.MYAUTOMOTIVELAB.COM

[HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A4_ANIMATION/CHAPTER23 FIG 23 13/INDEX.HTM](http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/animations/a4_animation/chapter23_fig_23_13/index.htm)

Tighten Lug Nuts

SHOW VIDEO: TORQUING LUG NUTS WWW.MYAUTOMOTIVELAB.COM

[HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=TORQUING%20OF%20LUG%20NUTS&CLIP=PANDC/CHET/2012/AUTOMOTIVE/A5-C13.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/XML/A5-C13.ADB.XML](http://media.pearsoncmg.com/ph/chet/chet_myautotivelab_akamai/template/video640x480.php?title=torquing%20of%20lug%20nuts&clip=pandc/chet/2012/automotive/a5-c13.mov&caption=chet/chet_myautotivelab_akamai/2012/automotive/xml/a5-c13.adb.xml)

24. **SLIDE 24 EXPLAIN** Figure 47-14 Most manufacturers recommend using hand tools rather than an air impact wrench to remove and install locktype lug nuts to prevent damage. If either the key or the nut is damaged, the nut may be very difficult to remove.

25. **SLIDE 25 EXPLAIN** Figure 47-15 torque-limiting adapter (torque stick) for use with an air impact wrench still requires care to prevent overtightening. The air pressure to the air impact should be limited to 125 PSI (860 kPa) in most cases, and the proper adapter must be selected for the vehicle being serviced. The torque adapter absorbs any torque beyond its designed rating. Most adapters are color coded for easy identification as to the size of lug nut and torque value.

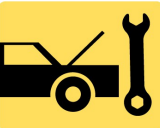
DEMONSTRATION: SHOW LUG NUTS AND ANTI-THEFT LUG NUTS. FIGURE 47-14

DEMONSTRATION: SHOW THE STUDENTS SOME EXAMPLES OF COLOR-CODED TORQUE-LIMITING ADAPTERS. FIGURE 47-15

SAFETY NOTE: USING TORQUE-LIMITING ADAPTERS TO REMOVE LUG NUTS CAN CAUSE ADAPTERS TO FAIL, CAUSING INJURY

ICONS

Ch47 Tire & Wheel Service



26. SLIDE 26 EXPLAIN Tire Rotation

Tire Rotation

Tire Rotation, FWD Vehicle

27. SLIDE 27 EXPLAIN Figure 47-16 This wheel was damaged because the lug nuts were not properly torqued.

28. SLIDE 28 EXPLAIN Figure 47-17 method most often recommended is modified X method. Using this method, each tire eventually is used at each of 4 wheel locations. An easy way to remember the sequence, whether front wheel drive or rear wheel drive, is to say to yourself, "Drive wheels straight, cross non-drive wheels."

DISCUSSION: DISCUSS WHY MODIFIED-X METHOD OF ROTATING TIRES IS RECOMMENDED METHOD. ASK STUDENTS TO DISCUSS WHY SOME OEMS DO NOT RECOMMEND ROTATING TIRES.

NATEF MLR TASK A4D2 ROTATE TIRES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.













SEARCH INTERNET: SEARCH INTERNET TO RESEARCH TEMPORARY MOBILITY KITS. ASK THE STUDENTS TO PREPARE A SHORT REPORT ON WHAT THEY ARE, THEIR ADVANTAGES AND DISADVANTAGES, AND A LIST OF AUTOMOBILES THAT HAVE THEM AS STANDARD EQUIPMENT.











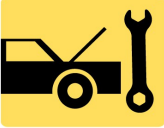
29. SLIDE 29 EXPLAIN Figure 47-18 Tire showing excessive shoulder wear resulting from underinflation and/or high-speed cornering.

30. SLIDE 30 EXPLAIN Figure 47-19 Tire showing excessive wear in the center, indicating overinflation or heavy acceleration on a drive wheel & EXPLAIN Figure 47-20 Wear on the outside shoulder only is an indication of an alignment problem.

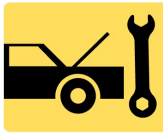
**ANIMATION: RADIAL & LATERAL RUNOUT
WWW.MYAUTOMOTIVELAB.COM**

[HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A4_ANIMATION/CHAPTER23_FIG_23_24/INDEX.HTM](http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/animations/a4_animation/chapter23_fig_23_24/index.htm)

ICONS	Ch47 Tire & Wheel Service
	<p>31. SLIDE 31 EXPLAIN Figure 47-21 A tire runout gauge being used to measure the radial runout of a tire & EXPLAIN Figure 47-22 To check wheel radial runout, the dial indicator plunger tip rides on a horizontal surface of the wheel, such as the bead seat</p>
	
	<p><u>DEMONSTRATION: SHOW THE STUDENTS HOW TO USE A RUNOUT GAUGE TO CHECK LATERAL & RADIAL RUNOUT. FIGURE 47-21</u></p>
	<p><u>DEMONSTRATION: SHOW HOW TO MEASURE WHEEL RUNOUT BY TAKING DIAL INDICATOR READINGS ON INSIDE OF WHEEL RIM. FIGURE 47-22</u></p>
	<p>32. SLIDE 32 EXPLAIN Figure 47-23 To check lateral runout, the dial indicator plunger tip rides on a vertical surface of the wheel, such as the wheel flange.</p>
	<p>33. SLIDE 33 EXPLAIN Figure 47-24 most accurate method of measuring wheel runout is to dismantle the tire & take dial indicator readings on inside of wheel rim</p>
	<p><u>HANDS-ON TASK: HAVE STUDENTS USE TIRE RUNOUT GAUGES TO MEASURE RADIAL RUNOUT OF 2 DIFFERENT TIRES.</u></p>
	<p><u>DISCUSSION: DISCUSS SYMPTOMS OF TIRES WITH EXCESSIVE RUNOUT.</u></p>
	<p>34. SLIDES 34-36 EXPLAIN TIRE BALANCE</p>
	<p>37. SLIDE 37 EXPLAIN Figure 47-25 wheel balancer detects heavy spots on the wheel and tire, and indicate where to place weight to offset both static and dynamic imbalance.</p>
	<p><u>DISCUSSION: DISCUSS WHEN THE USE OF LIQUID TIRE STOP LEAK WOULD BE RECOMMENDED.</u></p>
	<p><u>DISCUSSION: DISCUSS WHETHER TIRES SHOULD BE BALANCED BASED ON A MILEAGE SCHEDULE OR ONLY IF THEY EXHIBIT PROBLEMS.</u></p>
	<p><u>DISCUSSION: DISCUSS CUSTOMER COMPLAINTS DUE TO TIRE IMBALANCE.</u></p>

ICONS	Ch47 Tire & Wheel Service
	<p>38. SLIDE 38 EXPLAIN Figure 47-26 assortment of wheel weights designed to fit different shaped rims.</p> <p>39. SLIDE 39 EXPLAIN FIGURE 47-27 Liquid tire stop leak was found in all four tires. This liquid caused the tires to be out of balance</p> <p>40. SLIDE 40 EXPLAIN Figure 47-28 Stick-on weights used to balance alloy wheels of this Prowler.</p> <p>41. SLIDE 41 EXPLAIN Figure 47-29 Wheel weight pliers are specially designed to remove and install wheel weights.</p>
	<p><u>DEMONSTRATION:</u> SHOW THE STUDENTS EXAMPLES OF WHEEL WEIGHTS USED FOR VARIOUSLY SHAPED RIMS.</p>
  <p>QUESTION</p>	<p><u>DISCUSSION:</u> ASK THE STUDENTS TO DISCUSS THE PROPER NUMBER OF WEIGHTS TO USE ON A TIRE.</p>
	<p><u>DEMONSTRATION:</u> SHOW HOW TO USE WHEEL WEIGHT PLIERS. SHOW HOW TO REMOVE A TIRE VALVE BY USING A TIRE VALVE REMOVER.</p>
	<p><u>HANDS-ON TASK:</u> HAVE THE STUDENTS REMOVE AND INSTALL WHEEL WEIGHTS BY USING WHEEL WEIGHT PLIERS.</p>
	<p>42. SLIDE 42 EXPLAIN Figure 47-30 A tire balancer that can also detect radial and lateral force variation and instruct the operator where to rotate the tire to achieve the best ride, or indicate a bent wheel.</p>
	<p><u>HANDS-ON TASK:</u> HAVE THE STUDENTS PERFORM THE <u>PREBALANCE CHECKS</u></p>
	<p><u>HANDS-ON TASK:</u> HAVE THE STUDENTS REMOVE TIRE VALVES BY USING TIRE VALVE REMOVERS & <u>BALANCE A SET OF TIRES.</u></p>
 	<p><u>NATEF MLR TASK A4D3</u> DISMOUNT, INSPECT, AND REMOUNT TIRE ON WHEEL; BALANCE WHEEL AND TIRE ASSEMBLY (STATIC AND DYNAMIC)</p>

ICONS



QUESTION



Ch47 Tire & Wheel Service

NATEF MLR TASK A4D4 DISMOUNT, INSPECT, AND REMOUNT TIRE ON WHEEL EQUIPPED WITH TIRE PRESSURE MONITORING SYSTEM SENSOR

DISCUSSION: DISCUSS POSSIBLE EFFECTS ON A TIRE IF THE TIRE'S BEAD SEAT IS NOT CLEANED PROPERLY BEFORE TIRE IS INSTALLED.

43. SLIDE 43 EXPLAIN Figure 47-31 Most brake drums do not have this much attached weight
44. SLIDE 44 EXPLAIN FIGURE 47-32 Notice that the rim touches the tie rod end
45. SLIDE 45 EXPLAIN FIGURE 47-33 (a) A hubcentric plastic ring partially removed from an aftermarket wheel. (b) A hubcentric plastic ring left on the hub when removing a wheel
46. SLIDES 46-51 EXPLAIN Tire Repair
52. SLIDE 52 EXPLAIN Figure 47-34 area of the repair should be buffed slightly larger than patch to be applied.
53. SLIDE 53 EXPLAIN Figure 47-35 stitching tool being used to force any trapped air out from under the patch.
54. SLIDE 54 EXPLAIN Figure 47-36 rubber plug being pulled through a hole in the tire. The stem is then cut off flush with the surface of the tire tread.

DEMONSTRATION: SHOW EXAMPLES OF VARIOUS TIRE REPAIR PRODUCTS, THEN SHOW STUDENTS HOW TO APPLY A PLUG PATCH WHEN REPAIRING A TIRE.

NATEF MLR TASK A4D5 INSPECT TIRE AND WHEEL ASSEMBLY FOR AIR LOSS; PERFORM NECESSARY ACTION.

NATEF MLR TASK A4D6 REPAIR TIRE USING INTERNAL PATCH

55. SLIDES 55-72 OPTIONAL EXPLAIN TIRE MOUNTING
72. SLIDES 72-84 OPTIONAL EXPLAIN TIRE REPAIR

ICONS	Ch47 Tire & Wheel Service
	SEARCH INTERNET: HAVE THE STUDENTS SEARCH THE INTERNET FOR TIRE MANUFACTURERS' RECOMMENDATIONS FOR TIRE REPAIRS.