

ATE5 Chapter 98 WHEEL BEARINGS & SERVICE

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class provides complete coverage of the components, operation, design, and troubleshooting. It correlates material to task lists specified by ASE and NATEF and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, Real World Fixes, Videos, Animations, and NATEF Task Sheet references.
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 as listed below: <ol style="list-style-type: none">1. Prepare for Suspension and Steering (A4) ASE certification test content area "C" (Related Suspension and Steering Service).2. Discuss the various types, designs, and parts of automotive antifriction wheel bearings.3. Describe the symptoms of defective wheel bearings.4. Explain wheel bearing inspection procedures and causes of spalling and brinelling.5. List the installation and adjustment procedures for front wheel bearings.6. Explain how to inspect, service, and replace rear wheel bearings and seals.
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.

NOTE: This lesson plan is based on the 5th Edition Chapter Images found on Jim's web site @

www.jameshalderman.com

LINK CHP 98: [ATE5 Chapter Images](#)

ICONS

Chapter 98 Wheel Bearings



1. SLIDE 1 CH98 Wheel Bearings

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

Videos

2. **SLIDE 2 EXPLAIN Figure 98-1** Rolling contact bearings include (left to right) ball, roller, needle, and tapered roller.
3. **SLIDE 3 EXPLAIN Figure 98-2** Ball bearing point contact
4. **SLIDE 4 FIGURE EXPLAIN Figure 98-3** Radial load is the vehicle weight pressing on the wheels.
5. **SLIDE 5 EXPLAIN Figure 98-4** Roller bearing line contact.
6. **SLIDE 6 EXPLAIN Figure 98-5** A tapered roller bearing will support a radial load and an axial load in only one direction.
7. **SLIDE 7 EXPLAIN Figure 98-6** Many tapered roller bearings use a plastic cage to retain the rollers.
8. **SLIDE 8 EXPLAIN Figure 98-7** Non-drive-wheel hub with inner and outer tapered roller bearings. By angling the inner and outer in opposite directions, axial (thrust) loads are supported in both directions.

DEMONSTRATION: Show examples of ball bearings. What is their advantage over roller bearings, and where are ball bearings most often used on vehicles? Show students examples of roller bearings. What is their advantage over ball bearings?

DISCUSSION: discuss role of antifriction bearings in reducing friction—allowing wheels to rotate while supporting the vehicle's weight. Have students name 4 types of antifriction bearings.

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DEMONSTRATION: Show students examples of needle bearings. Where might needle bearings be used instead of roller bearings? Show students examples of tapered roller bearings. What about the design of these bearings makes them the most used automotive wheel bearing? Show students the placement of inner and outer wheel bearings. Why are the inner wheel bearings always larger?

DISCUSSION: Ask students to discuss difference between axial, or thrust, and radial loads and how tapered roller bearings accommodate both.

9. **SLIDE 9 EXPLAIN** Figure 98-8A Sealed bearing and hub assemblies are used on the front and rear wheels of many vehicles. A sealed wheel bearing that uses a double row of ball bearings.
10. **SLIDE 10 EXPLAIN** Figure 98-8B Sealed bearing and hub assemblies are used on the front and rear wheels of many vehicles. A sealed wheel bearing that uses two tapered roller bearings
11. **SLIDE 11 EXPLAIN** Figure 98-9 Sealed bearing and hub assemblies are serviced as a complete unit as shown. This assembly includes the wheel speed sensor.

On non-drive tapered wheel bearings inner race must slide smoothly over the spindle.

DISCUSSION: Ask students to discuss the National Lubricating Grease Institute (NLGI) grease penetration test. What is signified by low and high numbers? What do the quality ratings indicate? What types of grease would be used for the wheel bearings of cars students are working on? Grease is used on wheel bearings to reduce friction further. Ask students to discuss types of grease and the purpose of additives in them.

12. **SLIDE 12 EXPLAIN** Figure 98-10 Typical lip seal with a garter spring.
13. **SLIDE 13 EXPLAIN** Figure 98-11 garter spring helps hold the sharp lip edge of the seal tight against the shaft.

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DEMO



DEMO

DEMO



DEMONSTRATION: Show students examples of a dynamic seal and the garter spring used to hold the lip of the seal in place

DISCUSSION: Ask students to talk about the purpose and function of seals, and discuss the difference between static and dynamic seals.

DISCUSSION: Ask students to discuss symptoms of defective bearings and how to diagnose the exact problem. Ask students to describe the sound of defective wheel bearings and discuss its cause. To determine location of a bearing noise drive vehicle along a high solid wall about six feet away with window open. Then drive by again going other way. The noise will echo off wall and help you to hear it.

DISCUSSION: Ask students to identify symptoms of a defective wheel bearing

ON-VEHICLE NATEF TASK: Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. [Page 298](#)

14. SLIDE 14 EXPLAIN Figure 98-12 Removing the grease cap with grease cap pliers.
15. SLIDE 15 EXPLAIN Figure 98-13 Using a seal puller to remove the grease seal.

DEMONSTRATION: Show students how to remove an inner wheel bearing and grease seal. Show students how to use a wheel bearing race puller. Show students how to install a bearing race with a driver

DEMONSTRATION: Show students how to remove a wheel grease cap to access the outer wheel bearing. Show students how to do the wheel bearing looseness test. Ask them to describe some of problems that loose wheel bearings can cause.

16. SLIDE 16 EXPLAIN Figure 98-14 Cleaning a wheel bearing with a parts brush and solvent.

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HANDS-ON TASK: Have students follow steps 1-21 to perform a non-drive wheel bearing inspection and replace and grease any defective bearings they find. Select a student to summarize the process and results for the class

17. **SLIDE 17 EXPLAIN Figure 98-15** A wheel bearing race puller.
18. **SLIDE 18 EXPLAIN Figure 98-16** Installing a bearing race with a driver.
19. **SLIDE 19 EXPLAIN Figure 98-17** Notice the new blue grease has been forced through the bearing.
20. **SLIDE 20 EXPLAIN Figure 98-18** commonly used hand-operated bearing packer
21. **SLIDE 21 EXPLAIN Figure 98-19** The wheel bearing is placed between two nylon cones and then a grease gun is used to inject grease into the center of the bearing.
22. **SLIDE 22 EXPLAIN Figure 98-20** The wheel bearing adjustment procedure as specified for rear-wheel-drive vehicles. Always check service information for the exact specified procedure for the vehicle being serviced.
23. **SLIDE 23 EXPLAIN Figure 98-21** A properly secured wheel bearing adjustment nut.

HANDS-ON TASK: Have students perform wheel bearing adjustment procedure for a rear-wheel drive vehicle by using a torque wrench. Have students repack a bearing with a bearing packer and with their hands

ON-VEHICLE NATEF TASK: Remove, clean, inspect, repack, and install wheel bearings. Page 299

ON-VEHICLE NATEF TASK: Replace wheel bearing and race. Page 300

ON-VEHICLE NATEF TASK: Inspect and replace wheel studs. Page 301



- 24. **SLIDE 24 EXPLAIN Figure 98-22** A rear wheel sealed bearing hub assembly.
- 25. **SLIDE 25 EXPLAIN Figure 98-23** Removing the drive axle shaft hub nut. This nut is usually very tight and the drift (tapered) punch wedged into the cooling fins of the brake rotor keeps the hub from revolving when the nut is loosened. Never use an impact to remove or install a drive axle shaft hub nut because the hammering action can damage the bearing.
- 26. **SLIDE 26 EXPLAIN Figure 98-24** A special puller makes the job of removing the hub bearing from the knuckle easy without damaging any component.

ON-VEHICLE NATEF TASK: Remove & install sealed wheel bearing assembly. Page 302

- 27. **SLIDE 27 EXPLAIN Figure 98-25** A typical full-floating rear axle assembly.
- 28. **SLIDE 28 EXPLAIN Figure 98-26** semi-floating rear axle housing is the most commonly used in light rear-wheel-drive vehicles.
- 29. **SLIDE 29 EXPLAIN Figure 98-27** A retainer plate-type rear axle bearing. Access to the fasteners is through a hole in the axle flange.
- 30. **SLIDE 30 EXPLAIN Figure 98-28** A slide hammer-type axle puller can also be used.
- 31. **SLIDE 31 EXPLAIN Figure 98-29** To remove the axle from this vehicle equipped with a retainer-plate rear axle, the brake drum was placed back onto the axle studs backward so that the drum itself can be used as a slide hammer to pull the axle out of the axle housing.
- 32. **SLIDE 32 EXPLAIN Figure 98-30** To remove the C-lock (clip), the lock bolt has to be moved before the pinion shaft.
- 33. **SLIDE 33 EXPLAIN Figure 98-31** The axle must be pushed inward slightly to allow the C-lock to be removed. After the C-lock has been removed, the axle can be easily pulled out of the axle housing.
- 34. **SLIDE 34 EXPLAIN Figure 98-32** Using a hydraulic press to press an axle bearing from the axle. When pressing a new bearing back onto the axle, pressure should only be on the inner bearing race to prevent damaging the bearing.

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35. SLIDE 35 EXPLAIN Figure 98-33 Removing an axle seal using the axle shaft as the tool.

DISCUSSION: Ask students to talk about **C-lock rear axles**. What type of bearing is used with this axle? How do you lubricate axle bearing? How do you remove this type of axle to service bearings?

DEMONSTRATION: Show drum slide hammer trick to remove an axle from a vehicle equipped with a retainer-plate rear axle. Show students how to safely remove lock bolt from carrier. Care must be taken to not break bolt in carrier.

36. SLIDE 36 EXPLAIN Figure 98-34 This is a normally worn bearing. If it does not have too much play, it can be reused.

37. SLIDE 37 EXPLAIN Figure 98-35 A bearing/hub assembly that shows the reluctor (tone wheel) teeth used by wheel speed sensor..

38. SLIDE 38 EXPLAIN Figure 98-36 To detect a possible defective wheel bearing, grasp the coil spring then rotate the rotor

39. SLIDES 39-48 EXPLAIN REAR AXLE BEARING REPLACEMENT

[Crossword Puzzle \(Microsoft Word\) \(PDF\)](#)

[Word Search Puzzle \(Microsoft Word\) \(PDF\)](#)