



Automotive Tech.

Flexible Instruction Day

Assignment #4

Learning Standard	Automotive Technology CIP 47.0604
Task # & Description	500 Suspension and Steering Tire, Wheel and Wheel Bearing Fundamentals

CONTACT INFORMATION/ASSISTANCE

Instructor Name: Tim McLaughlin

Instructor E-Mail: mclaughlint@butlertec.us

I will be available by email and Phone 724-282-0735 Ext. 216 from 7:40-12, and 12:30-3:10 to answer your questions. Please reach out if you are having difficulty completing your assignments.

INSTRUCTIONS

All work is due on the day we return to school. This is counted towards your attendance **and** as a classroom assignment.

Read over PowerPoint slide print out and answer questions.

Name: _____

Session: _____

____ / ____ 40 ____ points

Day 4

Presentations for PowerPoint

Modern Automotive Technology

1

CHAPTER 73 Tire, Wheel, and Wheel Bearing Fundamentals

2

Objectives (1 of 2)

- Identify the parts of a wheel and tire assembly.
- Explain the types and sizes of tires.
- Describe tire ratings, designations, and features.
- Recall the design and operation of a tire pressure monitoring system (TPMS).
- Describe different types of wheels.

Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

3

Objectives (2 of 2)

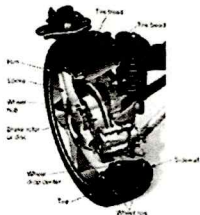
- Define valve stems, valve cores, wheel weights, lug nuts, lug studs, and lug bolts.
- Identify the parts of driving and nondriving hub and wheel bearing assemblies.
- Correctly answer ASE certification test questions requiring a knowledge of tires, wheels, hubs, and wheel bearings.

Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

4

Tires

- Automobile tires perform two basic functions
 - Act as soft cushion between road and metal wheel
 - Provide adequate traction with road surface
- Automotive tires are pneumatic, or filled with air


Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

5

Tubeless Tires

- Today's vehicles use tubeless tires, which have no separate inner tube
- Tire and wheel form airtight unit
- Older vehicles used inner tubes
 - Rubber liners that fit inside tire and wheel assemblies

Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

6

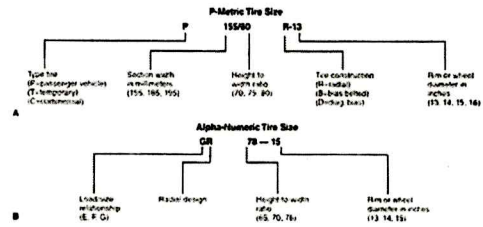
Tire Size

- Given on sidewall as letter-number sequence
- P-metric size designation
 - Newest tire identification system
 - Uses metric values and international standards
- Alpha-numeric size designation
 - Uses letters and numbers to denote tire size in inches and load-carrying capacity in pounds

Copyright Goodrich-Walton Co., Inc. May not be posted to a publicly accessible website

13

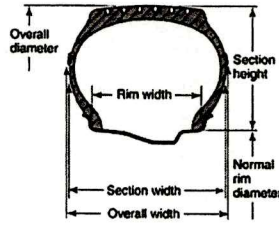
P-Metric and Alpha-Numeric Tire Sizes


Copyright Goodrich-Walton Co., Inc. May not be posted to a publicly accessible website

14

Points of Measurement on a Tire

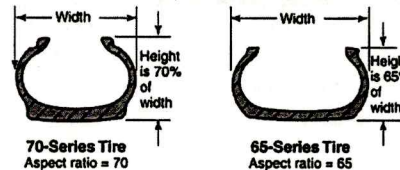
- These dimensions are important when ordering new tires or wheels


Copyright Goodrich-Walton Co., Inc. May not be posted to a publicly accessible website

15

Aspect Ratio

- Height-to-width ratio
- As number becomes smaller, tire becomes wider and shorter


Copyright Goodrich-Walton Co., Inc. May not be posted to a publicly accessible website

16

Maximum Load Rating

- Indicates weight tire can carry at recommended inflation pressure
- Printed on sidewall
- P-metric ratings are given in kilograms and pounds
- Alpha-numeric load rating indicated by letter
 - Most are load range B
 - C or D have greater load-carrying ability

Copyright Goodrich-Walton Co., Inc. May not be posted to a publicly accessible website

17

Load Index

- Tire load index number represents weight capacity tire can carry without failure at recommended inflation pressure
- Typically between 70-110 for most passenger vehicle tires

Copyright Goodrich-Walton Co., Inc. May not be posted to a publicly accessible website

18

Directional Tires

- High-performance tires that rotate in specific direction to minimize hydroplaning
- Hydroplaning
 - Loss of control that occurs when layer of water prevents tire tread from contacting road surface
- Arrow and the word *rotation* molded onto sidewalls
 - Arrow must face direction of rotation when vehicle is traveling forward

Copyright Goodrich-Walton Co. Inc. May not be posted to a publicly accessible website

25

Spare Tires

- Spare tire
 - Extra wheel and tire assembly that can be installed in case of flat tire
- Full-size spare
 - Same size and type used on vehicle's four wheels
- Compact or space saver spare
 - Much smaller than normal tire
 - Has very thin sidewall and tread construction
 - Holds higher-than-normal air pressure

Copyright Goodrich-Walton Co. Inc. May not be posted to a publicly accessible website

26

Tech Tip: Spare Tires

- Most spare tires are designed for temporary use only
- Refer to manufacturer's specifications on inflation pressure, maximum driving speed, and number of miles that can be driven
- Most compact spares should not be used at speeds over 50 mph and will last only a few thousand miles

Copyright Goodrich-Walton Co. Inc. May not be posted to a publicly accessible website

27

Retreads (Recaps)

- Used tires with new tread vulcanized to old carcass, or body
- Seldom used on passenger cars
- Large truck tires are often recapped because of high cost of new tires

Copyright Goodrich-Walton Co. Inc. May not be posted to a publicly accessible website

28

Run-Flat Tires

- Still usable with loss of air pressure
- If tire leaks, vehicle can be driven to repair shop without tire and wheel damage
- Thick rubber sidewall support insert helps support weight of vehicle

Copyright Goodrich-Walton Co. Inc. May not be posted to a publicly accessible website

29

Wear Bars

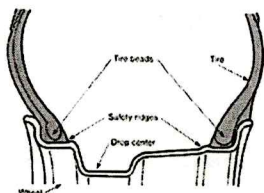
- Indicate critical amount of tread wear
- When too much tread has worn from tires, solid rubber bars show up
- This tells customer and technician that tire replacement is needed

Copyright Goodrich-Walton Co. Inc. May not be posted to a publicly accessible website

30

Safety Rims

- Small ridges hold tire beads on wheel during tire blowout or flat
- Blowout
 - Instant rupture and air loss
- Flat
 - Slow leak reduces inflation pressure



Copyright Goodrich-Wilton Co., Inc. May not be posted to a publicly accessible website.

37

Valve Stem and Core

- Valve stem
 - Pressed into hole in wheel of tubeless tire to allow inflation and deflation
- Valve core
 - Spring-loaded air valve threaded into valve stem
 - Allows air to be added to tire when air chuck is placed over valve stem



Copyright Goodrich-Wilton Co., Inc. May not be posted to a publicly accessible website.

38

Valve Stem Cap

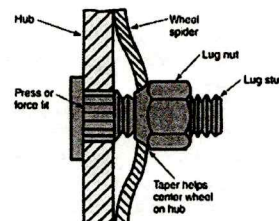
- Screws over threaded valve stem to protect air valve and stem threads from dirt, moisture, and damage
- Prevents accidental depression of valve and resulting loss of air pressure

Copyright Goodrich-Wilton Co., Inc. May not be posted to a publicly accessible website.

39

Lug Nuts, Studs, and Bolts (1 of 2)

- Lug nuts
 - Hold wheel and tire assembly on vehicle
 - They fasten to special studs
- Lug studs
 - Special studs that accept lug nuts
 - Studs are pressed through back of hub or axle flange

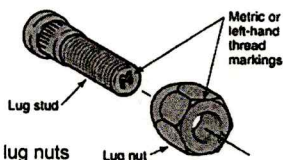


Copyright Goodrich-Wilton Co., Inc. May not be posted to a publicly accessible website.

40

Lug Nuts, Studs, and Bolts (2 of 2)

- Lug nuts and studs normally have right-hand threads (turn clockwise to tighten)
 - Left-hand threads are marked with L
 - Metric threads are identified with M or Metric
- A few cars use lug bolts instead of lug nuts



Copyright Goodrich-Wilton Co., Inc. May not be posted to a publicly accessible website.

41

Wheel Weights

- Small lead weights attached to wheel rim to balance wheel and tire assembly, preventing vibration
- Weights offset heavy area of wheel and tire
- Aluminum wheels require stick-on lead weights with adhesive backing

Copyright Goodrich-Wilton Co., Inc. May not be posted to a publicly accessible website.

42

Sealed Wheel Bearings

- Ball bearings and straight roller bearings
- Bearings are filled with grease and then crimped together at the factory
- Cannot be disassembled for lubrication

Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

49

Hub and Wheel Bearing Assembly: Sealed Bearings (1 of 3)

- Basic parts for driving wheel of front-wheel-drive vehicle
- Outer stub shaft
 - Drive axle shaft that extends through bearings and splines to hub
- Wheel bearings
 - Allow drive axle to turn in steering knuckle or bearing support
- Steering knuckle or bearing support
 - Steering or suspension component that holds wheel bearings, axle stub shaft, and hub

Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

50

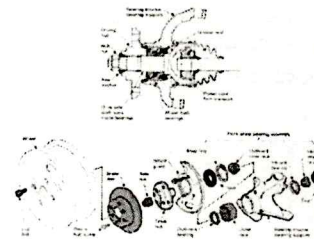
Hub and Wheel Bearing Assembly: Sealed Bearings (2 of 3)

- Hub
 - Mounting surface for wheel
 - Transfers driving power from stub axle to wheel
- Grease seal
 - Prevents lubricant loss between inside of axle and knuckle or bearing support
- Axle safety washer (fits between hub and locknut)
- Hub or axle locknut
 - Screws on end of drive axle stub shaft; secures hub and other parts

Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

51

Hub and Wheel Bearing Assembly: Sealed Bearings (3 of 3)


Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

52

Other Hub and Wheel Bearing Assemblies

- Vehicles use wide variety of hub and wheel bearing assemblies
- Many late-model vehicles use sealed hub and bearing assembly
 - Ball bearings, straight roller bearings, or tapered roller bearings
 - These self-contained units are not serviceable
 - Most are bolted to knuckle or support; a few are press fit into knuckle

Copyright Goodheart-Willcox Co., Inc. May not be posted to a publicly accessible website.

53

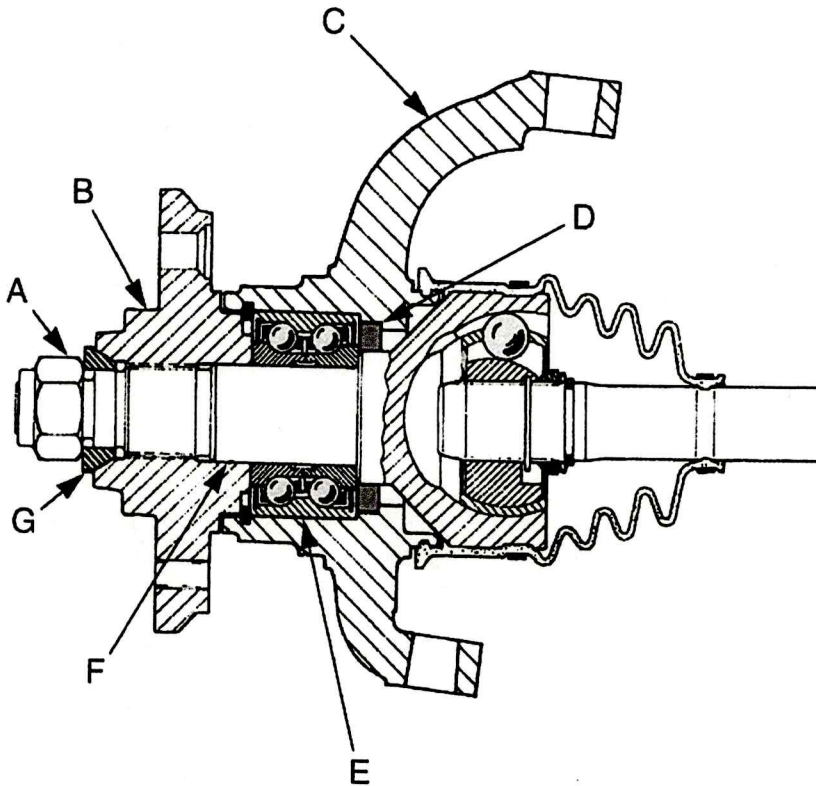
Name: _____ Class: _____ Date: _____

ID: A

Day 4 Tire .Wheel and Wheel Bearing Fundamentals

Matching

Identify each of the driving hub and wheel bearing assembly parts indicated on the diagram.



- A. Choice A
- B. Choice B
- C. Choice C
- D. Choice D
- E. Choice E
- F. Choice F
- G. Choice G

- ___ 1. Steering knuckle
- ___ 2. Drive axle shaft
- ___ 3. Driving hub
- ___ 4. Axle washer
- ___ 5. Grease seal
- ___ 6. Hub nut
- ___ 7. Wheel bearings

Name: _____

ID: A

Completion

Complete each statement.

8. Lug nuts thread onto lug _____ to hold the wheel and tire assembly on the hub.
9. Most modern spare tires are designed for _____ use only.
10. A tire with an "A" traction classification will provide the _____ traction.