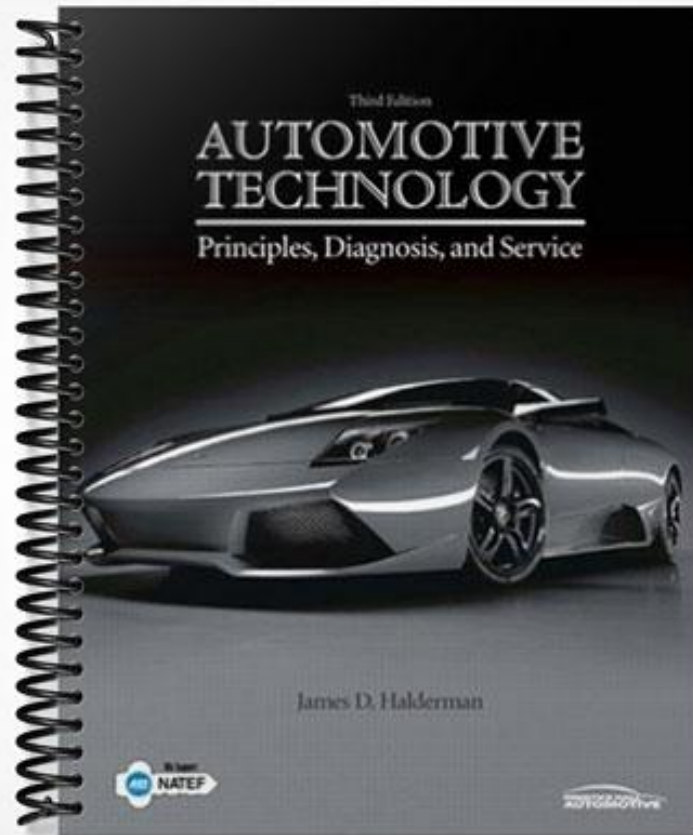


SOLUTIONS MANUAL



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**Instructor's Resource Manual
to accompany**

**Automotive Technology
Principles, Diagnosis, and Service**

Third Edition

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ISBN-13: 978-0-13-223874-8

ISBN-10: 0-13-223874-8

CHAPTER 1

Automotive Background and Overview

TASK SHEETS IN THE WORKTEXT:	Page
Vehicle Chassis Identification (A4-A-4)	1

CHAPTER OUTLINE:

Objectives	Powertrain Overview
Key Terms	Electrical/Electronic Systems Overview
Historical Background	Heating, Ventilation, and Air Conditioning Overview
Bodies	Eight Areas of Automotive Service
Chassis Systems Overview	Summary
Frames	Review Questions
Engine Design Evolution	Chapter Quiz
Engine Systems Overview	

REVIEW QUESTIONS AND ANSWERS:

1. In 1900, what was the most produced vehicle powered by?
The most produced vehicle was powered by electricity (batteries).
2. What parts are included in the vehicle chassis?
A vehicle chassis includes the frame (or body), axles, wheels, tires, suspension and brakes.
3. Why were early engines called flat heads?
Early engines were called flat heads because the valves were located in the block next to the cylinders instead of being placed in the cylinder head. As a result, the cylinder heads were flat.
4. What is the difference between a unit-body and body-on-frame vehicle?
The difference between a unit-body and a body-on-frame construction is that in a unit body, the body itself is strong enough to support the suspension and drive train. In a body-on-frame vehicle, the frame supports the suspension and drive train. As a result, the body itself can be made lighter.
5. The powertrain consists of what components?
The powertrain components consists of the engine, transmission/transaxle, final drive unit, and drive axles.
6. What are the eight automotive service content areas?
The eight automotive service content areas include:
 - A1 Engine Repair
 - A2 Automatic Transmission/Transaxles
 - A3 Manual Drive Train and Axles
 - A4 Suspension and Steering
 - A5 Brakes
 - A6 Electrical/Electronic Systems
 - A7 Heating and Air Conditioning
 - A8 Engine Performance

CHAPTER QUIZ AND ANSWERS:

1. The first self-propelled vehicle that used an OTTO cycle four-stroke gasoline engine was produced in _____.
 - a. **1885 X**
 - b. 1900
 - c. 1902
 - d. 1908
2. Early vehicles were constructed mostly of what material?
 - a. Steel
 - b. Cast iron
 - c. **Wood X**
 - d. Tin
3. Which component is *not* part of the chassis system?
 - a. Frame
 - b. **Electrical system X**
 - c. Suspension
 - d. Brakes
4. Early engines were called flat head design because they _____.
 - a. Were only inline engines
 - b. Did not include valves
 - c. **Used valves beside the cylinder X**
 - d. Used spark plugs at the top of the cylinders
5. A V-type engine could have how many cylinders?
 - a. 4
 - b. 6
 - c. 8
 - d. **All of the above X**
6. What component regulates the temperature of the coolant in an engine?
 - a. Cooling (water) jackets
 - b. **Thermostat X**
 - c. Cooling fan(s)
 - d. Radiator
7. A malfunction indicator light (MIL) on the dash may be labeled _____.
 - a. **Check engine X**
 - b. Service vehicle soon
 - c. MIL
 - d. MAL
8. To retrieve stored diagnostic trouble codes, a service technician needs a _____.
 - a. Paper clip
 - b. Laptop computer
 - c. Wireless connection to an electronic tester
 - d. **Scan tool X**
9. A four-wheel-drive vehicle often uses a _____ to transmit engine torque to all four wheels.
 - a. Drive shaft
 - b. U-joint
 - c. Transaxle
 - d. **Transfer case X**
10. Automotive service systems are generally separated into how many content areas?
 - a. 4
 - b. 6
 - c. **8 X**
 - d. 10

CHAPTER 2

Careers in the Automotive Industry

TASK SHEETS IN THE WORKTEXT:

Page

Vehicle Service Facility Visit (task not specified by NATEF)

2

CHAPTER OUTLINE:

Objectives	Sales Jobs – Used Vehicles; New Vehicles
Key Terms	Other Carriers in the Automotive Industry
The Need for Automotive Technicians	Typical Automotive Organization and
The Need for Continuous Vehicle Service	Arrangement
Technician Work Sites	Summary
Technician Job Classifications	Review Questions
Parts-Related Positions	Chapter Quiz

REVIEW QUESTIONS AND ANSWERS:

1. What should be included on a work order?
The work order lists customer and vehicle information, including the VIN and a listing of services requested by the owner.
2. Why should a vehicle be inspected when the work order is being written?
A vehicle should be inspected when the work order is being written to be sure that no damage to the vehicle has already occurred that could be blamed on the shop later.
3. What tasks are usually performed by a general service technician?
A general service technician performs duties such as:
 - a. Uses diagnostic equipment and test drives vehicles, plus uses service information
 - b. Disassembles, replaces or repairs, and reassembles components
 - c. Performs scheduled service maintenance
 - d. Informs customers about the work performed by completing the work order by completing the work order
4. What duties are performed by the shop foreman and service manager?
The shop foreman runs the shop and directs and helps the service technician. The service manager is responsible for all aspects of the service department, including customer service.
5. What duties are performed by a parts counter person?
The parts counter person greets customers and helps find the correct parts needed. A parts counter person also handles the purchase orders and money if a cash sale is made.
6. What duties are performed by vehicle salespeople?
Vehicle salespeople greet the customer and help them select and purchase a vehicle. These duties include understanding and following all of the paperwork requirements needed to complete the sale, including loan applications and license forms.

CHAPTER QUIZ AND ANSWERS:

1. A service advisor is called a _____.
 - a. Shop foreman
 - b. Service Manager
 - c. Service writer X**
 - d. Technician
2. What is *not* included on a work order?
 - a. Customer's mother's maiden name X**
 - b. VIN
 - c. Mileage
 - d. Description of work requested
3. All of the following are usual duties of a lube technician *except* _____.
 - a. Oil change
 - b. Air filter replacement
 - c. Water pump replacement X**
 - d. Accessory drive belt inspection
4. New vehicle preparation is usually an entry-level vehicle service position and usually involves what duties?
 - a. Installing dealer-installed options
 - b. Correcting tire pressures
 - c. Removal of all protective coverings and plastic
 - d. All of the above X**
5. What is *not* a duty of a general service technician?
 - a. Have the customer sign the work order X**
 - b. Order the parts needed
 - c. Diagnose the customer's concern
 - d. Perform vehicle repair procedures
6. Which description best fits the role of a service advisor?
 - a. A skilled technician
 - b. A beginning technician
 - c. A customer service representative X**
 - d. A money manager
7. Two technicians are discussing the duties of a shop foreman and a service manager. Technician A says that a shop foreman works on vehicles. Technician B says that the service manager diagnoses vehicle problems. Which technician is correct?
 - a. Technician A only**
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B
8. Who is the person that greets the service customer and completes the work order?
 - a. Service manager
 - b. Service advisor
 - c. Service writer
 - d. Either b or c X**
9. Which job would be concerned with the maintenance of the shop equipment?
 - a. Service manager
 - b. Shop foreman
 - c. Shop owner
 - d. Any of the above X**
10. Which job would be concerned with payroll?
 - a. Service manager X**
 - b. Shop foreman
 - c. Service advisor
 - d. Service technician