Prentice Hall
Automotive Technology: Principles, Diagnosis and Service
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CORRELATED TO
Arkansas Department of Workforce Education
- Curriculum Content Frameworks - Automotive Service Technology
## Task:

**A001: Identify the safe use of chemicals. (A.1)**

**Definition:** Identification should include correct use, hazards, and precautions associated with each solvent:

- soaps
- cleaning solutions
- oils
- greases
- specialty additives
- gasses
- dusts


**A002: Identify the safe use and maintenance of hand tools. (A.2)**

**Definition:** Identification includes hand tools (specialty tools, fasteners, and measuring tools) including correct use, hazards, precautions, and maintenance procedures associated with each common end wrenches:

- socket set components and wrenches
- screwdrivers
- styles of pliers
- hammers
- punches and chisels
- cutting tools (e.g., hack saw, tubing cutter, hand reamer, file)
- electrical system tools (e.g., volt/ohmmeter, dwell/tachometer, continuity light, timing light, remote starter switch)
- battery tools (e.g., cable puller, terminal and post cleaner, battery lifting or carrying strap)
- lubrication tools (e.g., transmission funnel, oil filter-removing tool, grease gun)
- miscellaneous tools (e.g., air nozzles, C-clamp, puller set, pressure gauge, screw extractor)
- automotive fasteners (e.g., taps, dies, nuts, bolts, studs)
- automotive measuring tools (e.g., outside and inside micrometers, plastigauge, dial indicator tool, feeler gauge, vernier caliper, depth micrometer).

**SE/ATE:** 61-74

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**SE = Student Edition**  **ATE = Annotated Teacher’s Edition**
### A003: Identify the safe use and maintenance of power tools. (A.3)

**Definition:** Identification should include various types of power tools (including pneumatic and electric tools) including correct use, hazards, precautions, and maintenance procedures associated with each:
- air impact gun
- air hammer
- air ratchet
- air drill
- tire burnishing tool
- drop light
- electric drill

**SE/ATE:** 40, 72-73, 74-81

### A004: Identify the safe use of protective clothing and equipment. (A.4)

**Definition:** Identification should include protective clothing and equipment or grooming/hygiene including correct use, hazards, and precautions associated with each, in accordance with manufacturers’ instructions and government regulations concerning hazardous material and shop safety to include the following:
- Protection of
  - eyes,
  - respiratory system,
  - auditory functions,
  - feet, hands, and body
- Grooming/hygiene of
  - hair length;
  - loose clothing/jewelry;
  - greasy hands, shoes, or clothing;
  - dirty or scratched eye protection

**SE/ATE:** 37-38

### A005: Identify the safe use of fire protection equipment. (A.5)

**Definition:** Identification should include different types of fires encountered in the automotive technology field (Class A, B, C, and D), along with the appropriate type of extinguisher, hazards, and precautions associated with each; and fire emergency procedures

**SE/ATE:** 41, 42, 43
### ARKANSAS DEPARTMENT OF WORKFORCE EDUCATION - CURRICULUM CONTENT FRAMEWORKS - AUTOMOTIVE SERVICE TECHNOLOGY

#### A006: Identify the safe use of shop equipment (including hydraulics). (A.6)

**Definition:** Identification should include shop equipment including correct use, hazards, and precautions associated with each, in accordance with manufacturers’ specifications:
- * pneumatic equipment (e.g., tire machine, pneumatic jack)
- * hydraulic equipment (e.g., floor jack, lift rack, hydraulic press, engine hoist)
- * electrical equipment (e.g., wheel balancer, bench grinder, drill press, battery testers and chargers, ignition)
- * analyzers, front-end alignment equipment

**SE/ATE:** 77-81, 82-86

#### A007: Identify safe under-hood practices.

**Definition:** Identification should include basic types of under-hood practices and precautions associated with each:
- * correct method
- * hazard avoidance (e.g., moving parts; thermal, chemical, and electrical)

**SE/ATE:** 40, 77-81, 82-86

#### A008: Follow Environmental Protection Agency (EPA), Occupational Safety and Health Act (OSHA), and National Automotive Technicians Educational Foundation/Automotive Service Excellence (NATEF/ASE) regulations. (A.7)

**Definition:** Following incorporates regulations and requirements of EPA, OSHA, NATEF/ASE, local ordinances and instructor’s guidelines to include:
- * use, storage and disposal of hazardous materials
- * correct application
- * training
- * penalties

**SE/ATE:** 43-44, 49, 117

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**SE = Student Edition  ATE = Annotated Teacher’s Edition**
<table>
<thead>
<tr>
<th>Task</th>
<th>Definition</th>
<th>SE/ATE</th>
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</table>
| B001: Communicate with customers orally and in writing. (B.1) | Communication should include oral/written communication presented in a clear, accurate, friendly, courteous, and otherwise professional manner, according to industry practice to include the following:  
* greet the customer  
* listen carefully to the customer  
* write all required customer/vehicle information  
* telephone customers before doing unapproved repairs  
* write a repair order,  
* describe repairs and charges in lay terms | 22-25 |
| B002: Estimate time and cost for jobs, and order parts. (B.2) | Estimation should include the following in accordance with industry practice:  
* owner and vehicle information  
* description of complaint and technician’s diagnosis  
* name/description/price of parts, hourly/total charges labor and outside work,  
* sales tax, and total cost | 24-25 |
| B003: Obtain appropriate repair information from shop manuals. (B.3) | Access of information should include the following:  
* identification of types of shop manuals (e.g., manufacturer, professional general, aftermarket specialty)  
* format of manuals (e.g., printed, microfiche, compact disc)  
* method of locating information (e.g., table of contents, index, special numbering systems) | 109-115 |
**DUTY C:**

Practicing Job And Career Basics

**Task:**

C001: Identify basic functions and operations of vehicle mechanical components.

**Definition:** Identification should include functions and operations of the following components:

- electrical system (e.g., battery, charging system, starter motor and circuit, lighting system, gauges and accessories)
- engine performance (e.g., ignition, fuel, exhaust, and emission control systems)
- engine repair (e.g., cylinder heads, valve trains, short block assembly, cooling system)
- suspension and steering (e.g., steering system, suspension system)
- brakes (e.g., hydraulic system, mechanical system, electronic system)
- manual drive train
- automatic transmission
- heating and air-conditioning

<table>
<thead>
<tr>
<th>C002: Identify the duties of an automotive technician.</th>
<th>SE/ATE: 21-29, 30-36</th>
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<tbody>
<tr>
<td><strong>Definition:</strong> Identification incorporates duties as follows:</td>
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<tr>
<td>* repair, overhaul, and service automobiles, buses, trucks, and other vehicles</td>
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<td>* examine vehicles and discuss nature and extent of problems with customers or auto repair service estimators</td>
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<td>* plan work procedures, use charts, technical manuals, and past experience</td>
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<td>* raise vehicles, use hydraulic jack/hoist, to gain access to mechanical units bolted to underside of vehicle</td>
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<td>* remove units, such as the engine, transmission, or differential</td>
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<td>* disassemble rods, gears, valves, and bearings</td>
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<td>* overhaul or replace carburetors, fuel injection systems, blowers, and generators</td>
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<td>* rewire ignition systems, lights, and instrument panels</td>
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<td>* realign and adjust brakes, align front end, repair/replace shock absorbers, and solder leaks in radiator</td>
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<td>* replace/adjust headlights, install/repair accessories, such as radios, heaters, mirrors, and windshield wipers</td>
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<thead>
<tr>
<th>C003: Identify career opportunities in the automotive technology field.</th>
<th>SE/ATE: 7-13, 14-20</th>
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<tbody>
<tr>
<td><strong>Definition:</strong> Identification includes the following,:</td>
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<tr>
<td>* research careers in auto tech field, such as auto tech, repair shop supervisor, exhaust/emissions tech, tune-up tech, auto manufacturing plant tech , parts salvager, teacher, or trainer</td>
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<td>* research types of employment opportunities available in the region.</td>
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<th>C004: Identify the purposes and goals of the student organization.</th>
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<tr>
<td><strong>Definition:</strong> Identification should include a statement of the purposes and the goals of the student organization (e.g., VICA), in accordance with the documentation of the organization and with instructor’s guidelines.</td>
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</table>
**Definition:** Participation should include activities in accordance with the documentation of the organization, school and instructor guidelines to include the following:

- * attend meetings
- * take part in programs
- * play an active role in projects requiring specialized skills and concepts
**DUTY D:**

**Diagnosing General Electrical System**

**Task:**

D001: Check continuity in electrical circuits, using test light and voltmeter, oscilloscope, and wiring diagrams.

**Definition:** Process should include the following:

- Identify and interpret electrical/electronic system concerns; determine necessary action. (VI.A.1)
- Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. (VI.A.2)
- Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). (VI.A.3)
- Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (OHM's Law). (VI.A.4)
- Check operation of parking brake indicator light system
- Check operation of brake stop light system; adjust and service as needed
- Use wiring diagrams during diagnosis of electrical circuit problems (VI.A.5)
- Check electrical circuits with a testing light; determine needed repairs (VI.A.7)
- Check continuity and resistances in electrical/electronic circuits and components with an ohmmeter; determine necessary action (VI.A.10)
- Inspect and test fusible links, circuit breakers, and fuses; replace as needed (VI.A.14)
- Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or replace as needed (VI.A.15)
- Repair wiring harnesses and connectors (VI.A.16)
- Perform solder repair of electrical wiring. (VI.A.17)
- Perform all procedures in accordance with ASE standards.

**SE/ATE:** 340, 342-343, 349-350, 377-379
### D002: Check for shorts, opens, and grounds.

**Definition:** Process should include the following:
- * check electrical circuits with a digital multimeter; determine needed repairs (VI.A.7)
- * check electrical circuits using fused jumper wires; determine needed repairs (VI.A.11)
- * locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine needed repairs (VI.A.12)
- * measure and diagnose the causes(s) of abnormal key-off battery drain; determine needed repairs. (VI.A.13)
- * All procedures must be completed in accordance with ASE standards.

**SE/ATE:** 325-326, 376, 378-379

### D003: Measure resistance in electrical circuits, using an ohmmeter.

**Definition:** Process should include the following:
- * locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine needed repairs. (VI.A.12)
- * complete procedures in accordance with ASE standards.

**SE/ATE:** 344-345

### D004: Measure volts with a voltmeter or oscilloscope. (D.4)

**Definition:** Process should include the following:
- * check operation of parking brake indicator light system (V.E.5)
- * check operation of brake stop light system; adjust and service as needed (V.E.6)
- * measure source voltage and perform voltage drop test in electrical/electronic circuits using a voltmeter; determine necessary action. (VI.A.8)
- * check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine needed repairs. (VI.A.6)
- * complete procedures in accordance with ASE standards

**SE/ATE:** 342-343
|---|---|
| D005: Measure current with an ammeter. (D.5) | **Definition:** Process should include the following:  
* check current flow in electrical/electronic circuits and components using an ammeter; determine needed repairs. (VI.A.9)  
* complete procedures in accordance with ASE standards. |
| **SE/ATE:** 341 | |
| **DUTY E:** | |
| **Diagnosing And Servicing Of A Battery** | |
| **Task:** | |
| E001: Clean and inspect battery clamps, cables, and connectors. | **Definition:** Process should include the following:  
* perform slow/fast battery charge (VI.B.5)  
* inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. (VI.B.6)  
* complete all procedures in accordance with ASE standards. |
| **SE/ATE:** 408-409 | |
| E002: Perform battery condition tests. | **Definition:** Process should include the following:  
* perform battery state-of-charge testing; determine needed service (VI.B.1)  
* perform battery capacity (load, high-rate discharge) testing; confirm proper battery capacity for vehicle application; determine needed service. (VI.B.2)  
* complete all procedures in accordance with ASE standards. |
| **SE/ATE:** 409-411, 414 | |
| E003: Jump-start a vehicle. | **Definition:** Process should include the following:  
* starting a vehicle, using jumper cables and a battery or auxiliary power supply. (VI.B.7)  
* completed all procedures in accordance with ASE standards. |
| **SE/ATE:** 412 | |

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<tr>
<td><strong>E004:</strong> Charge and install a battery.</td>
<td><strong>SE/ATE:</strong> 409, 412</td>
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<td><strong>Definition:</strong> Process should include the following:</td>
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<td>* maintain or restore electronic memory functions (VI.B.3)</td>
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<td>* inspect, clean, fill, and replace battery (VI.B.4)</td>
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<tr>
<td>* perform slow/fast battery charge. (VI.B.5)</td>
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<td>* complete all procedures in accordance with ASE standards.</td>
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<td><strong>E005:</strong> Service and troubleshoot special battery applications (e.g., for electric car).</td>
<td><strong>Related material:</strong></td>
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<td><strong>Definition:</strong> For electric car, process should include the following:</td>
<td><strong>SE/ATE:</strong> 779-786, 787-790</td>
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<td>* clean batteries by mixing baking soda and water to neutralize the acid</td>
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<td>* determine acid concentration by testing electrolyte for specific gravity</td>
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<td>* test cells and complete battery for voltage level</td>
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<td>* test main traction batteries for ground faults</td>
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<td>* disconnect main traction batteries</td>
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<td>* determine needed services.</td>
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<tr>
<td>* complete all procedures in accordance with manufacturers’ standards. (Relevant ASE standards have not been established to date, but will be incorporated as they are established.)</td>
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## DUTY F:
Diagnosing And Repairing Starting Systems

### Task:

**F001: Diagnose and determine needed repair on starting system.**

**Definition:** Process should include the following:

- * determine starter current draw tests; determine necessary action (VI.C.1)
- * determine starter circuit voltage drop tests; determine necessary action (VI.C.2)
- * inspect and testing starter relays and solenoids; replace as needed (VI.C.3)
- * remove and install starter in a vehicle (VI.C.4)
- * inspect and test switches, connectors, and wires of starter control circuits; perform necessary actions. (VI.C.5)
- * differentiate between electrical and engine mechanical problems that cause a slow-crank condition (VI.C.6)
- * complete all procedures in accordance with ASE standards.

**SE/ATE:** 673-690

**F002: Remove, clean, and inspect starter motor and components.**

**Definition:** Process should include the following:

- * remove and install starter (VI.C.4)
- * disassemble, clean, inspect, and test starter components; replace as needed.
- * complete all procedures in accordance with ASE standards.

**SE/ATE:** 673-690

**F003: Repair or replace starter motor components.**

**Definition:** Process should include the following:

- * remove and replace/reinstall starter. (VI.C.4)
- * complete all procedures in accordance with ASE standards.

**SE/ATE:** 673-690
# Diagnosing And Repairing Charging Systems

**Duty G:** Diagnosing And Repairing Charging Systems

**Task:**

**G001: Diagnose and determine needed repair on charging system.**

**Definition:** Process should include the following:

- * perform charging system output test; determine necessary action (VI.D.1)
- * diagnose charging system problems that cause an undercharge, no-charge or overcharge condition (VI.D.2)
- * inspect and adjust or replace generator (alternator) drive belts, pulleys, and tensioners, check pulley and belt alignment; replace as needed (VI.D.3)
- * remove, inspect and install generator (alternator) as needed. (VI.D.4)
- * perform charging circuit voltage drop tests; determine necessary action. (VI.D.5)
- * complete all procedures in accordance with ASE standards.

**SE/ATE:** 443-458

**G002: Remove, clean, and inspect alternator.**

**Definition:** Process should include the following:

- * remove, inspect, and replace/reinstall alternator (VI.D.5)
- * disassemble, clean, inspect, and test alternator components; replace as needed.
- * complete all procedures in accordance with ASE standards.

**SE/ATE:** 448-458

**G003: Repair or replace alternator components.**

**Definition:** Process should include the following:

- * remove, inspect, and replace/reinstall alternator (VI.D.5)
- * disassemble, clean, inspect, and test alternator components; replace as needed.
- * complete all procedures in accordance with ASE standards.

**SE/ATE:** 450-458
**Definition:** Process should include the following:

* inspect and test voltage regulator; replace as needed.
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 443-458

**DUTY H:**

**Task:**

**H001:** Diagnose and determine needed repair on lighting system.

**Definition:** Process should include the following:

* diagnose brighter than normal, intermittent, dim, or no light operation (VI.E.1)
* inspect, replace, and aim headlights and bulbs (VI.E.2)
* inspect and diagnose incorrect turn signal or hazard light operation; repair or replace as needed. (VI.E.3)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 466, 467, 471, 473

**H002:** Diagnose and determine needed repair on complex lighting systems (e.g., fiber optics, twilight sentinels, remote sensors, global positioning systems).

**Definition:** Process should include the following:

* diagnose, test, and replace twilight sentinel sensors and wiring
* diagnose, test, and replace satellite locator system components.
* complete all procedures in accordance with manufacturers’ standards. ( Relevant ASE standards have not been determined, but will be incorporated as established.)

**SE/ATE:** 466, 467, 471, 473

**H003:** Repair or replace lights, sockets, wires, and switches.

**Definition:** Process should include the following:

* inspect, replace, and aim headlights and bulbs (VI.E.2)
* inspect and diagnose incorrect turn signal or hazard light operation; repair or replace as needed. (VI.E.3)

**SE/ATE:** 466, 467, 471, 474-475
### DUTY I:
Servicing Gauges, Warning Devices, And Drivers Information Systems

#### Task:
**I001: Diagnose and repair mechanical gauge and warning circuits.**

**Definition:** Process should include the following:

- inspect, test and replace oil temperature and pressure switches and sensors
- check operation of parking brake indicator light system
- check operation of brake stop light system; adjust and service as needed
- inspect and test gauges and gauge sending units for cause of intermittent, high, low or no gauge readings; replace as needed (VI.F.1)
- test gauge circuit voltage regulators (limiters); replace as needed
- inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or replace as needed (VI.F.2)
- diagnose cause of incorrect operation of warning devices and other driver information systems; determine necessary action (VI.F.3)
- diagnose intermittent, high, low or no readings on electronic instrument clusters
- inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; repair or replace as needed. (VI.F.4)
- complete all procedures in accordance with ASE standards.

**SE/ATE:** 476, 479-480, 487
I002: Diagnose digital and fiber optics gauges and warning circuits.

**Definition:** Process should include the following:

- Inspect, testing, and replacing oil temperature and pressure switches and sensors (I.D.12)
- Check operation of parking brake indicator light system (V.E.5)
- Check operation of brake stop light system; adjust and service as needed (V.E.6)
- Diagnose intermittent, high, low or no gauge readings (VI.F.1)
- Test gauge circuit voltage regulators (limiters); replace as needed (VI.F.2)
- Inspect and test gauges and gauge sending units; replace as needed (VI.F.2)
- Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or replace as needed (VI.F.2)
- Diagnose incorrect operation of warning devices and other driver information systems (VI.F.3)
- Diagnose intermittent, high, low or no readings on electronic instrument clusters
- Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; repair or replace as needed. (VI.F.4)
- Complete all procedures in accordance with manufacturers’ standards. (Relevant ASE standards have not been determined, but will be incorporated as established.)

[Note: Typically, digital and fiber optic gauges and warning circuits are not serviceable by the automotive service technician, but sent to special repair centers when servicing is required.]
**1003: Diagnosing And Repairing Electrical Accessories (horn, wiper motor).**

**Definition:** Process should include the following:

- diagnose incorrect horn operation; repair as needed (VI.G.1)
- diagnose incorrect wiper operation; diagnose wiper speed control and park problems; repair as needed (VI.G.2)
- diagnose incorrect windshield washer operation; repair as needed (VI.G.3)
- diagnose incorrect operation of motor-driven accessory circuits; repair as needed (VI.H.1)
- diagnose incorrect heated glass operation; repair as needed (VI.H.2)
- diagnose incorrect electric door and hatch/trunk lock operation; repair as needed (VI.H.3)
- diagnose incorrect operation of cruise control systems; repair as needed (VI.H.4)
- diagnose supplemental restraint system (SRS) problems; repair as needed (Note: Follow manufacturer’s safety procedures to prevent accidental deployment) (VI.H.5)
- disarm and enable the airbag system for vehicle service (VI.H.6)
- diagnose radio static and weak, intermittent, or no radio reception; determine necessary action. (VI.H.7)
- remove and reinstall door panel. (VI.H.8)
- diagnose body electronic system circuits using a scan tool; determine necessary action. (VI.H.9)
- check for module communication errors using a scan tool. (VI.H.10)
- diagnose the cause of false, intermittent, or no operation of anti-theft system. (VI.H.11)
- complete all procedures in accordance with ASE standards.

**SE/ATE:** 495-504, 505-523
### Task:

**J001: Test engine performance, using engine analyzer (and NATEF-recommended tools), and determine needed repairs.** (J.1)

### Definition:

Testing and determining needed repairs should include the following:

- Identify and interpret engine performance concern; determine necessary action (VIII.A.1)
- Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins (VIII.A.2)
- Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). (VIII.A.3)
- Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action (VIII.A.4)
- Diagnose unusual engine noise or vibration problems; determine necessary action (VIII.A.5)
- Diagnose unusual exhaust color, odor, and sound; determine necessary action (VIII.A.6)
- Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action (VIII.A.7)
- Perform cylinder power balance test; determine necessary action (VIII.A.8)
- Perform cylinder compression test; determine necessary action (VIII.A.9)
- Perform cylinder leakage test; determine necessary action (VIII.A.10)
- Diagnose engine mechanical, electrical, electronic, fuel, and ignition problems with an oscilloscope and engine diagnostic equipment; determine necessary action (VIII.A.11)

### SE/ATE:

201-213
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<tr>
<td>* prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust reading; interpret readings; determine necessary action (VIII.A.12)</td>
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<td>* verify engine operating temperature; determine necessary action (VIII.A.13)</td>
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<td>* perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action (VIII.A.14)</td>
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<tr>
<td>* verify correct camshaft timing (VIII.A.15)</td>
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<tr>
<td>* retrieve and record stored OBD I diagnostic trouble codes; clear codes (VIII.B.1)</td>
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<td>* retrieve and record stored OBD II diagnostic trouble codes; clear codes (VIII.B.2)</td>
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<td>* diagnose the causes of emissions or drivability concerns resulting from malfunctions in the computerized engine control system with stored diagnostic trouble codes (VIII.B.3)</td>
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<td>* diagnose emissions or drivability concerns resulting from malfunctions in the computerized engine control system with no stored diagnostic trouble codes; determine necessary action (VIII.B.4)</td>
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<td>* check for module communication errors using a scan tool (VIII.B.5)</td>
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<td>* inspect and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action (VIII.B.6)</td>
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<td>* obtain and interpret scan tool data (VIII.B.7)</td>
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<td>* access and using electronic service information (ESI) to perform step-by-step diagnosis (VIII.B.8)</td>
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**J002: Inspect, repair, or replace primary ignition components. (J.2)**

**Definition:** Process should include the following:

* access and using electronic service information to perform step by step diagnosis (ESI) (VIII.B.8)
* diagnose ignitions system related problems such as no-starting, hard-starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions problems on vehicles with electronic ignition (distributor less) systems (VIII.C.1)
* diagnose ignition system related problems such as no-starting, hard-starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions problems on vehicles with distributor ignition (DI) systems; determine necessary action (VIII.C.2)
* inspect and testing ignition primary circuit wiring and solid state components; repair or replace as needed (VIII.C.3)
* inspect and test distributor; service as needed (VIII.C.4)
* check and adjust (where applicable) ignition systems timing and timing advance/retard (VIII.C.7)
* inspect and testing ignition wiring harness and connectors; replace as needed
* inspect and test ignition system pick-up sensor or triggering devices; replace as needed (VIII.C.8)
* inspect and test ignition control module; replace as needed.
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 657-672, 673-690
| J003: Inspect, repair, or replace secondary ignition components. (J.3) | **Definition:** Process should include the following:  
* access and using electronic service information to perform step by step diagnosis (ESI) (VIII.B.8)  
* inspect and testing ignition system secondary circuit wiring and components: replace as needed (VIII.C.5)  
* inspect and test ignition coil(s); replace as needed. (VIII.C.6)  
* complete all procedures in accordance with ASE standards. | **SE/ATE:** 678-683 |
| --- | --- | --- |
| J004: Adjust ignition system to manufacturer’s specifications. (J.4) | **Definition:** Process should include the following:  
* access and use electronic service information to perform step by step diagnosis (ESI) (VIII.B.8)  
* check and adjust (where applicable) ignition systems timing and timing advance/retard. (VIII.C.7)  
* complete all procedures in accordance with ASE standards. | **SE/ATE:** 673-690 |
| J005: Perform on-board computer system diagnosis. (J.4) | **Definition:** Process should include the following:  
* retrieve and record stored OBD I diagnostic trouble codes; clearing codes (VIII.B.1)  
* retrieve and record stored OBD II diagnostic trouble codes; clearing codes (VIII.B.2)  
* diagnose emissions or drivability problems resulting from failure of computerized engine controls with no diagnostic trouble codes stored; determine needed repairs (VIII.B.3)  
* access and use electronic service information (ESI). (VIII.B.7) All procedures must be completed in accordance with ASE standards. | **SE/ATE:** 616-622 |
J006: Repair or replace computer system components. (J.6)

**Definition:** Process should include the following:

- retrieve and record stored OBD I and OBD II diagnostic trouble codes; clearing codes (VIII.B.1 & VIII.B.2)
- diagnose the causes of emissions or drivability problems resulting from failure of computerized engine control system with stored diagnostic trouble codes (VIII.B.4)
- access and using electronic service information to perform step by step diagnosis (ESI) (VIII.B.8)
- practice recommended precautions when handling static sensitive devices.
- complete all procedures in accordance with ASE standards.

**DUTY K:** Diagnosing And Repairing Fuel And Exhaust Systems

**Task:**

K001: Diagnose and determine needed repairs on fuel system. (K.1)

**Definition:** Process should include the following:

- access and using electronic service information to perform step by step diagnosis (ESI) (VIII.B.8)
- diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine needed action (VIII.D.1)
- diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine needed action. (VIII.D.2)
- complete all procedures in accordance with ASE standards.

**SE/ATE:** 623-656

**SE/ATE:** 700-705, 719-732

SE = Student Edition   ATE = Annotated Teacher’s Edition
**Definition:** Process should include the following:

- access and use electronic service information (ESI) to perform step by step diagnosis (VIII.B.7)
- inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses
- check fuel for contaminants and quality (VIII.D.3)
- inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action (VIII.D.4)
- replace fuel filters (VIII.D.5)
- inspect and test fuel pressure regulation system and components of injection type fuel systems; perform necessary action
- inspect and test cold enrichment system components; adjust or replace as needed (VIII.D.6)
- remove, inspect, and test vacuum and electrical components and connections of fuel system; repair or replace as needed
- test the operation of turbocharger/supercharger systems; determine necessary action.
- complete all procedures in accordance with ASE standards.

**Definition:** Process should include the following:

- access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)
- complete all procedures in accordance with ASE standards.

**Definition:** Process should include the following:

- access and use electronic service information for step by step diagnosis (ESI).
- complete all procedures in accordance with ASE standards.

**Definition:** Process should include the following:

- test the operation of turbocharger/supercharger systems; determine necessary action.
- complete all procedures in accordance with ASE standards.

**Definition:** Process should include the following:

- access and use electronic service information (ESI) to perform step by step diagnosis (VIII.B.7)
- inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses
- check fuel for contaminants and quality (VIII.D.3)
- inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action (VIII.D.4)
- replace fuel filters (VIII.D.5)
- inspect and test fuel pressure regulation system and components of injection type fuel systems; perform necessary action
- inspect and test cold enrichment system components; adjust or replace as needed (VIII.D.6)
- remove, inspect, and test vacuum and electrical components and connections of fuel system; repair or replace as needed
- test the operation of turbocharger/supercharger systems; determine necessary action.
### K004: Reassemble And Adjust Carburetor

**Definition:** Process should include the following:
* access and use electronic service information (ESI) (VIII.B.7)
* adjust idle speed and fuel mixture (VIII.D.13) All procedures must be completed in accordance with ASE standards.

*Automotive Technology covers fuel-injection systems.*

### K005: Disassemble, clean, and inspect fuel injection components. (K.5)

**Definition:** Process should include the following:
* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)
* remove, clean, and reinstall throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air; adjust related linkages (VIII.D.7)
* inspect and testing fuel injectors; clean and replace. (VIII.D.8)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 706-718, 719-732

### K006: Repair or replace fuel injection components. (K.6)

**Definition:** Process should include the following:
* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)
* inspect and test fuel injectors; clean and replace. (VIII.D.8)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 719-732
<table>
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<tbody>
<tr>
<td>K007: Adjust computer-controlled fuel systems (injection and carburetor). (K.7)</td>
<td>SE/ATE: 727-732</td>
</tr>
<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
<td><strong>SE/ATE:</strong> 159, 186-193, 211</td>
</tr>
<tr>
<td>* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)</td>
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<tr>
<td>* inspect and test fuel pressure regulation system and components of injection-type fuel systems; adjust or replace as needed</td>
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<tr>
<td>* check/adjust idle speed and fuel mixture where applicable. (VIII.D.9,10)</td>
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<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
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<tr>
<td>K008: Diagnose and repair exhausts system problems (include those involved with emerging technology, such as noise cancellation devices); repair exhaust systems to meet manufacturer’s specifications. (K.8)</td>
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<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
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<tr>
<td>* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)</td>
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<tr>
<td>* inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed (VIII.D.11)</td>
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<tr>
<td>* perform exhaust system back-pressure test; determine necessary action. (VIII.D.12)</td>
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<tr>
<td>* test the operation of turbocharger/supercharger systems (VIII.D.13)</td>
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<tr>
<td>* complete all procedure in accordance with ASE standards.</td>
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</table>
K009: Identify issues involved in alternative fuel (e.g., diesel fuel, compressed natural gas) and multi-fuel systems.

**Definition:** Process should include the following:

- identify various alternative fuel vehicles
- describe the similarities between internal combustion engines (ICE), diesel engines, and compressed natural gas (CNG) engines
- identify government regulations on lowering emissions and ways that alternative fuel vehicles can help meet these standards
- research different types of alternative fuel vehicles
- explain the practical side of alternative fuel vehicles (e.g., for mass transit, commuter vehicles, mining)
- describe the economic impact of alternative fuel vehicles.
- complete all procedures in accordance with ASE standards. [See ASE Program Certification Standards: Light/Medium Duty CNG/LPG.]

**SE/ATE:** 597-604, 796-810

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**Task:**

**L001:** Diagnose and determine needed repairs on emission control systems (both basic and complex).

**Definition:** Process should include the following:

- access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)
- diagnose oil leaks, emissions, and drivability problems resulting from failure of the positive crankcase ventilation (PCV) system (VIII.E.1.1)
- inspect and test positive crankcase ventilation (PCV filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed) (VIII.E.1.2)
- diagnosis emissions and drivability problems caused by malfunctions in the exhaust gas recirculation (EGR) system; determine necessary action (VIII.E.2.1)

**SE/ATE:** 733-741, 742-761
* inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action (VIII.E.2.2)

* inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; repair or replace as needed (VIII.E.2.3)

* diagnose emissions and drivability problems resulting from failure of the secondary air injection and catalytic converter systems (VIII.E.3.1)

* inspect and test mechanical components of secondary air injection systems; perform necessary action (VIII.E.3.2)

* inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action (VIII.E.3.3)

* Inspect and test catalytic converter performance (VIII.E.3.4)

* diagnose emissions and drivability problems resulting from failure of the intake air temperature control systems (VIII.E.4.1)

* inspect and test components of intake air temperature control system; perform necessary action (VIII.E.4.2)

* diagnose emissions and drivability problems resulting from failure of early fuel evaporation control systems (VIII.E.5.1)

* inspect and test components of early fuel evaporation control system; perform necessary action (VIII.E.5.2)

* diagnose emissions and drivability problems resulting from failure of evaporative emissions control system (VIII.E.6.1)

* inspect and test components and hoses of evaporative emissions control system; replace as needed. (VIII.E.6.2)

* interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action (VIII.E.6.3)

* complete all procedures in accordance with ASE standards.
| L002: Clean and inspect/replace PCV system components. | Definition: Process should include the following:  
* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)  
* complete all procedures in accordance with ASE standards. | SE/ATE: 747-762 |
| --- | --- | --- |
| L003: Clean and inspect/replace spark timing controllers. | Definition: Process should include the following:  
* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)  
* complete all procedures in accordance with ASE standards. | SE/ATE: 667, 671-672 |
| L004: Clean and inspect/replace idle speed controllers. | Definition: Process should include the following:  
* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)  
* complete all procedures in accordance with ASE standards. | SE/ATE: 716, 726-727 |
L005: Clean and inspect/replace exhaust gas recirculation.

**Definition:** Process should include the following:
* access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)
* inspect and test positive crankcase ventilation (PCV filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed) (VIII.E.1.2)
* diagnose emissions and drivability problems caused by failure of the exhaust gas recirculation (EGR) system; determine necessary action (VIII.E.2.1)
* inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; service or replace as needed
* inspect and test vacuum/pressure controls, filters, and hoses or exhaust gas recirculation (EGR) systems; service or replace as needed
* inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; repair or replace as needed. (VIII.E.2.3)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 742-744
## ARKANSAS DEPARTMENT OF WORKFORCE EDUCATION - CURRICULUM CONTENT FRAMEWORKS - AUTOMOTIVE SERVICE TECHNOLOGY

### L006: Clean and inspect/replace air management system.

**Definition:** Process should include the following:

- *access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)*
- *diagnose emissions and drivability problems resulting from failure of the secondary air injection and catalytic converter systems (VIII.E.3.1)*
- *inspect and test mechanical components of secondary air injection systems; service or replace as needed (VIII.E.3.2)*
- *inspect and test electrical/electronically-operated components and circuits of air injection systems; replace as needed (VIII.E.3.3)*
- *inspect and test components of catalytic converter systems; replace as needed. (VIII.E.3.4)*
- *All procedures must be completed in accordance with ASE standards.*

**SE/ATE:** 749-751

### L007: Clean and inspect/replace inlet air temperature control. (L.7)

**Definition:** Process should include the following:

- *access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)*
- *inspect and test components of intake air temperature control systems; replace as needed. (VIII.E.4.2)*
- *complete all procedures in accordance with ASE standards.*

**SE/ATE:** 628, 640

### L008: Clean and inspect/replace intake manifold heat controls. (L.8)

**Definition:** Process should include the following:

- *access and use electronic service information for step by step diagnosis (ESI). (VIII.B.8)*
- *inspect and test components of early fuel evaporation control systems; service or replace as needed. (VIII.E.5.2)*
- *complete all procedures in accordance with ASE standards.*

**SE/ATE:** 640
<table>
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<tr>
<td>L009: Clean and inspect/replace fuel vapor controls.</td>
<td>SE/ATE: 693, 758</td>
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</tbody>
</table>

**Definition:** Process should include the following:

- * access and use electronic service information (ESI) (VIII.B.7)
- * diagnose emissions and drivability problems resulting from failure of evaporative emissions control system (VIII.E.6.1)
- * inspect and test components and hoses of evaporative emissions control system; replace as needed. (VIII.E.6.2)
- * all procedures must be completed in accordance with ASE standards

**DUTY M:** Diagnosing And Repairing General Engine

**Task:**

M001: Conduct performance test, and determine needed repairs. (M.1)

**Definition:** Process should include the following:

- * interpret and verify complaint; determine needed repairs (I.A.1)
- * inspect engine assembly for fuel, oil, coolant, and other leaks; determine needed repairs (I.A.2)
- * listen to engine noises; determine needed repairs (I.A.3)
- * diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine needed repairs (I.A.4)
- * perform engine vacuum tests; determine needed repairs (I.A.5)
- * perform cylinder power balance tests; determine needed repairs (I.A.6)
- * perform cylinder compression tests; determine needed repairs (I.A.6)
- * perform cylinder leakage tests; determine needed repairs. (I.A.8)
- * complete all procedures in accordance with ASE standards.

**SE/ATE:** 139-148, 149-162, 163-177, 178-185, 186-193, 194-200, 201-213, 214-240, 241-251, 252-268, 269-293, 294-315
DUTY N:
Diagnosing And Repairing Suspension And Steering Systems

**Task:**
N001: Diagnose and determine needed repairs on steering system.

**Definition:** Process should include the following:

- * identity and interpret suspension and steering concerns; determine necessary action (IV.A.1)
- * research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins (IV.A.2)
- * locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). (IV.A.3)
- * disable and enable supplemental restraint system (SRS) (IV.B.1)
- * remove and replace steering wheel; center/time supplemental restraint system (SRS) coil in accordance with manufacturer's procedures (IV.B.2)
- * diagnose steering column noises, looseness, and binding problems (including tilt mechanisms); determine needed repairs (IV.B.3)
- * diagnose power non-rack and pinion steering gear binding, uneven turning effort, looseness, hard steering, and fluid leakage problems; determine needed repairs (IV.B.4)
- * diagnose power rack and pinion steering gear vibration, looseness, and hard steering problems; determine needed repairs (IV.B.5)
- * inspect manual and power steering fluid levels and condition (IV.B.10)
- * diagnose power steering fluid leakage; determine needed repairs (IV.B.12)
- * inspect, replace, and adjust power steering pump belt (IV.B.13)
- * perform power steering system pressure testing; determine needed repairs

**SE/ATE:** 1130-1144, 1145-1164
(Continued)
* inspect and replace power steering hoses and fittings (IV.B.16)
* test, diagnose, inspect, adjust, repair or replace components of electronically-controlled steering systems using a scan tool; determine necessary action. (IV.B.19)
* complete all procedures in accordance with ASE standards.

|---|---|
| N002: Clean and inspect power and manual steering gear boxes. Definition: Process should include the following:  
* flush, fill, and bleed power steering system. (IV.B.11)  
* complete all procedures in accordance with ASE standards. | SE/ATE: 1122-1125 |
| N003: Reassemble, adjust, and install power/manual steering boxes. Definition: Process should include the following:  
* adjust manual/power non-rack and pinion worm bearing preload and sector lash.(IV.B.7)  
* complete all procedures in accordance with ASE standards. | SE/ATE: 1122-1125 |
| N004: Clean/inspect power and manual rack and pinion steering. Definition: Process should include the following:  
* remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets (IV.B.8)  
* inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots (IV.B.9)  
* flush, fill, and bleed power steering system. (IV.B.11)  
* complete all procedures in accordance with ASE standards. | SE/ATE: 1126-1129 |
<table>
<thead>
<tr>
<th>N005: Reassemble/adjust/install power/manual rack and pinion.</th>
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<tbody>
<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
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<tr>
<td>* disassemble, inspect, repair, and reassemble rack and pinion steering gear (IV.B.9)</td>
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<tr>
<td>* adjust manual or power rack and pinion steering gear.</td>
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<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
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<td><strong>SE/ATE:</strong> 1126-1129</td>
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<thead>
<tr>
<th>N006: Inspect and repair steering columns (including new and emerging technologies such as fiber optics, pass codes, keys with microchip, air bag assemblies).</th>
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<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
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<tr>
<td>* disable supplemental restraint system (SRS) in accordance with manufacturer’s procedures (IV.B.1)</td>
</tr>
<tr>
<td>* inspect and replace steering shaft universal-joint(s), flexible couplings(s), collapsible column, lock cylinder mechanism, and steering wheel. (IV.B.6)</td>
</tr>
<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
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<tr>
<td><strong>SE/ATE:</strong> 1118-1121</td>
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<tr>
<th>N007: Inspect and replace steering linkage components. (R.7)</th>
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<tbody>
<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
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<tr>
<td>* inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots (IV.B.9)</td>
</tr>
<tr>
<td>* inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper (IV.B.17)</td>
</tr>
<tr>
<td>* inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. (IV.B.18)</td>
</tr>
<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
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<tr>
<td><strong>SE/ATE:</strong> 1130-1144</td>
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</table>
### ARKANSAS DEPARTMENT OF WORKFORCE EDUCATION - CURRICULUM CONTENT FRAMEWORKS - AUTOMOTIVE SERVICE TECHNOLOGY

#### N008: Inspect, repair, and replace power steering pumps. (R.8)

**Definition:** Process should include the following:

* flush, fill and bleed power steering system (IV.B.11)
* inspect, replace, and adjust power steering pump belt (IV.B.13)
* remove, inspect, and replace power steering pump, pump mounts, pump seals, and gaskets (IV.B.14)
* remove, inspect, and replace power steering pump pulley; check pulley and belt alignment (IV.B.15)
* perform power steering system pressure test; determine needed repairs.
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1145-1148, 1163-1164

### AUTOMOTIVE TECHNOLOGY: PRINCIPLES, DIAGNOSIS, AND SERVICE, 3RD EDITION © 2009, (HALDERMAN/MITCHELL)

#### Task:

O001: Diagnose and determine needed repairs on conventional and electronic front suspension systems.

**Definition:** Process should include the following:

* diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.1)
* diagnose MacPherson strut suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.2)
* remove, inspect, replace, and adjust strut (compression/tension) rods and bushings (IV.C.1.4)
* remove, inspect, replace, and adjust suspension system torsion bars; inspect mounts (IV.C.1.8)
* remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount (IV.C.1.10)
* measure vehicle riding height; determine needed repairs. (IV.D.4)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1073-1094, 1102-1116
**Definition:** Process should include the following:

* diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.1)
* remove, inspect, and replace upper and lower control arms, bushings, shafts, and rebound bumpers (IV.C.3)
* remove, inspect, replace, and adjust strut (compression/tension) rods and bushings (IV.C.1.4)
* remove, inspect, and replace upper and lower ball joints on short and long arm suspension systems (IV.C.1.5)
* remove, inspect, and replace short and long arm suspension system coil springs and spring insulators (IV.C.1.7)
* remove inspect, replace, and adjust suspension system torsion bars; inspect mounts (IV.C.1.8)
* remove, inspect, and replace stabilizer bar bushings, brackets, and links (IV.C.1.9)
* lubricate suspension and steering systems (IV.C.1.11)
* remove, inspect, and replace coil springs and spring insulators (IV.C.2.1)
* remove, inspect, and replace transverse links, control arms, bushings, and mounts (IV.C.2.2)
* inspect, remove, and replace shock absorbers. (IV.C.3.1)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1054-1057, 1061, 1074, 1089-1090
<table>
<thead>
<tr>
<th>Definition: Process should include the following:</th>
<th>SE/ATE: 868-882</th>
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<tbody>
<tr>
<td>* diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.1)</td>
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<tr>
<td>* remove, inspect, and replace steering knuckle assemblies (IV.C.1.6)</td>
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<tr>
<td>* lubricate suspension and steering systems (IV.C.1.11)</td>
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<tr>
<td>* remove, inspect, and service or replace front and rear wheel bearings (IV.C.3.2)</td>
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<tr>
<td>* reinstall wheel, torque lug nuts, and make final checks and adjustments (V.C.7)</td>
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<tr>
<td>* remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstalling hub and adjusting wheel bearings. (V.F.2)</td>
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<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
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<tr>
<th>Definition: Process should include the following:</th>
<th>SE/ATE: 1064-1068</th>
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<tbody>
<tr>
<td>* remove, inspect, and replace stabilizer bar bushings, brackets, and links (IV.C.1.9)</td>
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</tr>
<tr>
<td>* inspect, remove, and replace shock absorbers. (IV.C.3.1)</td>
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<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
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</tbody>
</table>
**O005: Diagnose and determine needed repairs on MacPherson strut assemblies.**

**Definition:** Process should include the following:

* diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.1)
* remove, inspect, and replace ball joints on MacPherson strut suspension systems
* remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, insulators, and upper strut bearing mount. (IV.C.1.10)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1068-1070, 1174, 1085-1087

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**O006: Clean, inspect, and assemble MacPherson strut assemblies.**

**Definition:** Process should include the following:

* diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.1)
* remove, inspect, and replace ball joints on MacPherson strut suspension systems
* remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, insulators, and upper strut bearing mount (IV.C.1.10)
* lubricate suspension and steering systems. (IV.C.1.11)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1068-1070, 1174, 1085-1087

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**SE = Student Edition**

**ATE = Annotated Teacher’s Edition**
### Diagnosing And Repairing Rear Suspension Systems

**Task:**

**P001:** Diagnose and determine needed repairs on conventional and electronic rear suspensions.

**Definition:** Process should include the following:

* remove, inspect, and replace steering knuckle assemblies (IV.C.1.6)
* remove, inspect, and replace coil springs and spring insulators (IV.C.2.1)
* remove, inspect, and replace transverse links, control arms, bushings, and mounts (IV.C.2.2)
* test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action. (IV.C.3.3)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1095-1100, 1101-1116

**P002:** Inspect and replace shock and spring assemblies.

**Definition:** Process should include the following:

* remove, inspect, and replace coil springs and spring insulators (IV.C.2.1)
* remove, inspect, and replace transverse links, control arms, bushings, and mounts (IV.C.2.2)
* inspect, remove, and replace shock absorbers. (IV.C.3.1)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1095-1096, 1100-1101
### P003: Inspect and replace MacPherson shock assemblies.

**Definition:** Process should include the following:

* diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.1)
* diagnose MacPherson strut suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.2)
* remove, inspect, and replace ball joints on MacPherson strut suspension systems
* remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, insulators, and upper strut bearing mount (IV.C.1.10)
* remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers). (IV.C.2.4)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1068-1070, 1174, 1085-1087

### P004: Inspect and repair suspension linkages and bushings.

**Definition:** Process should include the following:

* remove, inspect, and replace transverse links, control arms, bushings, and mounts (IV.C.2.2)
* remove, inspect, and replace leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. (IV.C.2.3)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 1087-1088
### Task:

**Q001:** Diagnose steering and tire wear problems, and determine needed repairs. (U.1)

**Definition:** Process should include the following:

- Differentiate between steering and suspension concerns using principles of steering geometry (caster, camber, toe, etc) (IV.D.1)
- Diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine needed repairs (IV.C.1.1)
- Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return problems; determine needed repairs (IV.D.2)
- Perform pre-alignment inspection; perform necessary action (IV.D.3)
- Measure vehicle riding height; determine needed repairs (IV.D.4)
- Check for front wheel setback; determine needed repairs (IV.D.13)
- Check front cradle (sub-frame) alignment; determine needed repairs (IV.D.14)
- Diagnose tire wear patterns; determine needed repairs (IV.E.1)
- Inspect tires; check and adjust air pressure (IV.E.2)
- Diagnose wheel/tire vibration, shimmy, and noise problems; determine needed repairs (IV.E.3)
- Measure wheel, tire, axle, and hub runout; determine needed repairs (IV.E.5)
- Diagnose tire pull (lead) problem; determine corrective actions (IV.E.6)
- Dismount inspect, repair, and remount tire on wheel. (IV.E.8)
- Complete all procedures in accordance with ASE standards.

**SE/ATE:** 1015-1035
<table>
<thead>
<tr>
<th>Q002: Set correct alignment angles on front wheels. (U.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
</tr>
<tr>
<td>* measure vehicle riding height; determine needed repairs (IV.D.4)</td>
</tr>
<tr>
<td>* check and adjust front and rear wheel camber; determine needed repairs (IV.D.5)</td>
</tr>
<tr>
<td>* check and adjust caster; determine needed repairs (IV.D.6)</td>
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<tr>
<td>* check and adjust front wheel toe; adjust as needed (IV.D.7)</td>
</tr>
<tr>
<td>* center steering wheel (IV.D.8)</td>
</tr>
<tr>
<td>* check toe-out-on-turns (turning radius); determine needed repairs (IV.D.9)</td>
</tr>
<tr>
<td>* check SAI (steering axis inclination) and included angle; determine needed repairs. (IV.D.10)</td>
</tr>
<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
</tr>
<tr>
<td><strong>SE/ATE:</strong> 1184-1194</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Q003: Set correct camber and toe on rear wheels. (U.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
</tr>
<tr>
<td>* check and adjust front and rear wheel camber; determine needed repairs (IV.D.5)</td>
</tr>
<tr>
<td>* check and adjust rear wheel toe (IV.D.11)</td>
</tr>
<tr>
<td>* check rear wheel thrust angle; determine needed repairs. (IV.D.12)</td>
</tr>
<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
</tr>
<tr>
<td><strong>SE/ATE:</strong> 1167, 1185, 1186, 1194-1195</td>
</tr>
</tbody>
</table>
**Q004: Rotate and balance tires and wheel assemblies. (U.4)**

**Definition:** Process should include the following:
- check and adjust rear wheel toe (IV.D.11)
- check rear wheel thrust angle; determine needed repairs (IV.D.12)
- inspect tires; check and adjust air pressure (IV.E.2)
- rotate tires according to manufacturer’s recommendations (IV.E.4)
- balance wheel and tire assembly (static and dynamic) (IV.E.7)
- dismount, inspect, repair, and remount tire on wheel (IV.E.8)
- reinstall wheel; torque lug nuts. (IV.E.9)
- inspect and repair tire (IV.E.10)
- complete all procedures in accordance with ASE standards.

**SE/ATE:** 1040-1041, 1044-1046

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**Task:**

**R001: Diagnose and determine needed repairs on hydraulic brake system. (V.1)**

**Definition:** Process should include the following:
- identify and interpret brake system concern; determine necessary action (V.A.1)
- research applicable vehicle and service information such as brake system operation, vehicle service history, service precautions, and technical service bulletins (V.A.2)
- locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals) (V.A.3)
- diagnose pressure concerns in the brake system using hydraulic principles (Paschal’s Law) (V.B.1)
- measure and adjust pedal pushrod length and brake pedal height (V.B.2)
- diagnose poor stopping, pulling or dragging caused by problems in the hydraulic system; determine needed repairs. (V.B.5)
- complete all procedures in accordance with ASE standards.

**SE/ATE:** 825-839, 840-848, 849-859, 860-867
### ARKANSAS DEPARTMENT OF WORKFORCE EDUCATION - CURRICULUM CONTENT FRAMEWORKS - AUTOMOTIVE SERVICE TECHNOLOGY

<table>
<thead>
<tr>
<th>R002: Inspect and repair or replace master cylinders and lines of the hydraulic system. (V.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition:</strong> Process should include the following:</td>
</tr>
<tr>
<td>* measure and adjust pedal pushrod length and brake pedal height (V.B.2)</td>
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<tr>
<td>* check master cylinder for internal and external leaks and proper operation; determine needed repairs (V.B.3)</td>
</tr>
<tr>
<td>* remove, bench bleed, and replace master cylinder (V.B.4)</td>
</tr>
<tr>
<td>* inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports (V.B.6)</td>
</tr>
<tr>
<td>* fabricate and installing brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed (V.B.7)</td>
</tr>
<tr>
<td>* select, handle, store, and install brake fluids to proper level (V.B.8)</td>
</tr>
<tr>
<td>* bleed (manual, pressure, vacuum or surge) brake system (V.B.12)</td>
</tr>
<tr>
<td>* flush hydraulic system. (V.B.13)</td>
</tr>
<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
</tr>
</tbody>
</table>

### SE/ATE: 831-839

### R003: Inspect and replace switching and valving devices. (V.3)

<table>
<thead>
<tr>
<th>Definition: Process should include the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>* remove, bench bleed, and replace master cylinder (V.B.4)</td>
</tr>
<tr>
<td>* inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves (V.B.9)</td>
</tr>
<tr>
<td>* inspect, test, replace, and adjust height (load) sensing proportioning valve (V.B.10)</td>
</tr>
<tr>
<td>* inspect, test, and replace components of brake warning light system (V.B.11)</td>
</tr>
<tr>
<td>* check operation of parking brake indicator light system (V.F.5)</td>
</tr>
<tr>
<td>* check operation of brake stop light system; adjust and service as needed. (V.F.6)</td>
</tr>
<tr>
<td>* complete all procedures in accordance with ASE standards.</td>
</tr>
</tbody>
</table>

### SE/ATE: 840-848
### Duty S:

**Diagnosing And Repairing Drum Brakes**

<table>
<thead>
<tr>
<th>Task:</th>
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<tbody>
<tr>
<td>S001: Diagnose and determine needed repairs on drum brake systems. (W.1)</td>
</tr>
</tbody>
</table>

**Definition:** Process should include the following:

- Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation problems; determine needed repairs (V.C.1)
- Diagnose wheel bearing noises, wheel shimmy, and vibration problems; determine needed repairs (V.F.1)
- Remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings (V.F.2)
- Check parking brake operation; adjust as needed. (V.F.4)
- Complete all procedures in accordance with ASE standards.

**SE/ATE:** 883-896, 897-908

<table>
<thead>
<tr>
<th>Task:</th>
<th>S002: Remove, clean, and inspect drum brake assemblies. (W.2)</th>
</tr>
</thead>
</table>

**Definition:** Process should include the following:

- Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or replace as needed (V.C.2)
- Mount brake drum on lathe; machine braking surface (V.C.3)
- Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and back support plates; lubricate and reassemble (V.C.4)
- Remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings (V.F.2)
- Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed (V.F.3)
- Check parking brake operation; adjust as needed (V.F.4)
- Replace wheel bearing and race. (V.F.7)
- Complete all procedures in accordance with ASE standards.
### Definition: Repair, replace, and adjust drum brake components. (W.3)

- Remove and reinstall wheel cylinders (V.C.5)
- Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings (V.C.6)
- Reinstall wheel, torque lug nuts, and make final checks and adjustments (V.C.7)
- Remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings (V.F.2)
- Check park brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed (V.F.3)
- Check parking brake operation; adjust as needed. (V.FE.4)
- Complete all procedures in accordance with ASE standards.

### Task: Diagnosing And Repairing Disc Brakes

#### Definition: Diagnose and determine needed repairs on disc brake systems. (X.1)

- Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal-pulsation-caused problems; determine needed repairs (V.D.1)
- Diagnose wheel bearing noises, wheel shimmy, and vibration problems; determine needed repairs (V.F.1)
- Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed (V.F.3)
- Check parking brake operation; adjust as needed. (V.F.4)
- Complete all procedures in accordance with ASE standards.
**T002: Remove, clean, and inspect disc brake components. (X.2)**

**Definition:** Process should include the following:

- diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action (V.D.1)
- remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing (V.D.2)
- clean and inspect caliper mounting and slides for wear and damage (V.D.3)
- remove, clean, and inspect pads and retaining hardware; determine needed service (V.D.4)
- disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts (V.D.5)
- clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer’s recommendations in determining need to machine or replace (V.D.7)
- remove and replace rotor (V.D.8)
- remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings (V.F.2)
- check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed (V.F.3)
- check parking brake operation; adjust as needed (V.F.4)
- replace wheel bearing and race. (V.F.7)
- complete all procedures in accordance with ASE standards.

**SE/ATE:** 909-922, 923-937
### Task: U001: Diagnose and determine needed repairs on power-assist brakes. (Y.1)

**Definition:** Process should include the following:

* test pedal-free travel with and without engine running; check power assist operation (V.E.1)
* check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. (V.E.2)
* complete all procedures in accordance with ASE standards.

**SE/ATE:** 978-989
|---|---|
| **U002**: Repair or replace power brake components. (Y.2) | **Definition**: Process should include the following:  
* check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster (V.E.2)  
* inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; repair or replace parts as needed. (V.E.3)  
* complete all procedures in accordance with ASE standards. | **SE/ATE**: 978-989 |
| **U003**: Repair or replace hydra-boost components. (Y.3) | **Definition**: Process should include the following:  
* inspect and test hydro-boost system and accumulator for leaks and proper operation; determine necessary action (V.E.4)  
* test pressure output of system  
* check fluid level in system  
* disassemble hydra-boost unit  
* replace parts, such as pump, hoses, and control valves  
* reassemble/reinstall hydro-boost unit  
* complete all procedures in accordance with manufacturers’ standards. (Relevant ASE standards have not been established to date, but will be incorporated once they are established.) | **SE/ATE**: 985-989 |
| **U004**: Check operation of anti-skid braking systems, and adjust or repair according to manufacturer’s recommendations (including traction control). (Y.4) | **Definition**: Process should include the following:  
* identify and inspect anti-lock brake system (ABS) hydraulic, electrical, and mechanical components (V.G.1)  
* diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise problems caused by the anti-lock brake system (ABS); determine needed repairs (V.G.2)  
* observe anti-lock brake system (ABS) warning light(s) at startup; determine if further diagnosis is needed | **SE/ATE**: 1003-1014 |
* diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine needed repairs (V.G.3)

* depressurize high pressure components of the anti-lock brake system (ABS) following manufacturer’s recommended safety procedures (V.G.4)

* fill the anti-lock brake system (ABS) master cylinder with recommended fluid following manufacturer’s procedures; inspect system for leaks

* bleed the anti-lock brake system’s (ABS) front and rear hydraulic circuits following manufacturer’s procedures (V.G.5)

* perform a fluid pressure (hydraulic boost) diagnosis on the high pressure anti-lock brake system (ABS); determine needed repairs

* remove and install anti-lock brake system (ABS) electrical/electronic/hydraulic components following manufacturer’s procedures and specifications (V.G.6)

* test, diagnose, and service anti-lock brake system (ABS) speed sensors, toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data) following manufacturer’s recommended procedures (V.G.7)

* diagnose anti-lock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.). (V.G.8)

* identify traction control system components (V.G.9)

* complete all procedures in accordance with ASE standards.

http://dwe.arkansas.gov/CurriculumFrameworks/CGSkilledTechSciences.htm