

Florida Department of Education  
**CLUSTER CURRICULUM FRAMEWORK**

**Program Title:** Automotive Service Technology  
**Program Type:** Job Preparatory  
**Occupational Area:** Industrial Education  
**Components:** Core, and 10 Occupational Completion Points

	<u>Secondary</u>	<u>PSAV</u>
Grade Level	9-12, 30, 31	30, 31
Facility Code	246	246
CTSO:	SkillsUSA	SkillsUSA
Coop Method:	Yes	Yes
Apprenticeship:	Yes	Yes

- I. **PURPOSE:** The purpose of the programs in this cluster is to prepare students for employment and/or specialized training in the automotive industry.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

- II. **PROGRAM STRUCTURE:** This program is a planned sequence of instruction consisting of one program with a common core and 10 occupational completion points. The Automotive Service Technology Program provides for 8 occupational areas (automotive work specialization). This structure will allow students who successfully complete specified competencies to exit for employment or continue with specialized training.

Competencies established by the Automotive Industries for "INDUSTRY TRAINING STANDARDS" plus integration of academic requirements and training in communications, leadership, human relations, employability skills, safe, efficient work practices and entrepreneurship account for 420 hours in the CORE curriculum (OCPA).

The standard length of this program is 1,800 hours.

All the tasks that are assigned a priority number: P-1, P-2, or P-3 are National Automotive Technician Education Foundation Tasks. 95% of P-1 tasks will be performed; 80% of P-2 tasks; 50% of P-3 tasks. Please refer to the Task List Information in the Policies section for additional information on the requirements for instruction on tasks.

Theory instruction and hands-on performance of all the basic tasks will provide initial training for employment in the automotive

service field or further training in any or all of the specialty areas. Competency in the tasks will indicate to employers that the graduate is skilled in that area.

Occupational Completion Points may be reached before the end of a secondary course. All outcomes must be completed to receive credit for an Occupational Completion Point (OCP). Listed below are the courses that comprise this program when offered at the secondary level.

8709410	- Automotive Service Technology	1	OCP - A
8709420	- Automotive Service Technology	2	B
8709430	- Automotive Service Technology	3	OCP - C
8709440	- Automotive Service Technology	4	OCP - D
8709450	- Automotive Service Technology	5	OCP - E
8709460	- Automotive Service Technology	6	OCP - F
8709470	- Automotive Service Technology	7	OCP - G
8709480	- Automotive Service Technology	8	OCP - H
8709490	- Automotive Service Technology	9	H
8709491	- Automotive Service Technology	10	OCP - I
8709492	- Automotive Service Technology	11	OCP - J
8709493	- Automotive Service Technology	12	OCP - J

1. It is assumed that:

- \* In all areas, appropriate theory, safety, and support instruction will be required for performing each task;
- \* The instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
- \* The student has received the necessary training to locate and use current reference and training materials from accepted industry publications.

2. It is assumed that:

- \* All diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures as published. For every task listed, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of hazardous materials in accordance with local, state, and federal safety and environmental regulations.

3. It is assumed that:

- \* Individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
- \* Learning progress of students will be monitored and evaluated against these performance standards;
- \* A system is in place, which informs all students of their individual progress through all phases of the training program.

4. It is assumed that:
  - \* Individual courses of study will differ across automobile technician training programs;
  - \* Development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.
5. It is assumed that:
  - \* All students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29 Code of Federal Regulation Part 1910.1200, "Right to Know Law".
  - \* Hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

III. **LABORATORY ACTIVITIES:** Shop or laboratory activities are an integral part of the Automotive Technology program. These activities provide instruction in the use of automotive service equipment, tools, materials and processes found in the automotive service industry.

IV. **SPECIAL NOTE:** SkillsUSA is the appropriate Career and Technical Student Organization (CTSO) for providing leadership training and for reinforcing specific career and technical skills. Career and Technical Student Organizations, when provided, shall be an integral part of the vocational instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC. Planned and supervised instructional activities must be provided through one or more of the following: (1) directed laboratory experience (2) student projects (3) placement for experience (4) cooperative experience.

Cooperative training - OJT is appropriate for this program. Whenever cooperative training - OJT is offered, the following are required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation that reflects equipment, skills and tasks that are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

In accordance with Rule 6A-10.040, FAC, the minimum basic skills grade levels required for postsecondary adult vocational students to complete the programs in this cluster are listed at the program level or at the occupational completion points within the program. These grade level numbers correspond to a grade equivalent score obtained on one of the state designated basic skills examinations. The level required for these Postsecondary Adult Vocational Program: Mathematics-10, Language-9, Reading-9. If a student does not meet the basic skills level required for completion from the program, remediation should be provided concurrently through Vocational Preparatory Instruction (VPI) or prior to admission in an Adult Basic Education (ABE) setting.

When a student with a disability is enrolled in a vocational class with modifications to the curriculum framework, the particular outcomes and student performance standards which the student must master to earn credit must be specified in the student's Individual Educational Plan (IEP). Additional credits may be earned when outcomes and standards are mastered in accordance with the requirements indicated in subsequent IEPs. The job title for which the student is being trained must be designated in the IEP.

***Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Adult students with disabilities must self-identify and request such services. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.***

To be transferable statewide between institutions, this program/course must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific program or course articulation agreements with each other.

This program may be offered in courses. Vocational credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3) (b), F.S.

SCANS Competencies: Instructional strategies for this program must include methods that require students to identify, organize and use resources appropriately; to work with each other cooperatively and productively; to acquire and use information; to understand social, organizational and technological systems; and to work with a variety of tools and equipment. Instructional strategies must also incorporate the methods to improve students' personal qualities and high-order thinking skills.

NOTE:  
PROGRAM HOUR REALIGNMENTS FOR  
2004-2005.

**OCCUPATIONAL COMPLETION POINT - DATA  
CODE - A (150 Hours)**  
AUTOMOTIVE LUBE TECHNICIAN -  
SOC 49-3023

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→ **OCCUPATIONAL COMPLETION POINT - DATA CODE  
- G (150 Hours) AUTOMOTIVE BRAKE SYSTEM  
TECHNICIAN - SOC 49-3023**

→ **OCCUPATIONAL COMPLETION POINT - DATA CODE  
- F (150 Hours) AUTOMOBILE SUSPENSION AND  
STEERING TECHNICIAN - SOC 49-3023**

→ **OCCUPATIONAL COMPLETION POINT - DATA CODE  
- H (300 Hours) AUTOMOTIVE  
ELECTRICAL/ELECTRONIC SYSTEM TECHNICIAN -  
SOC 49-3023**

→ **OCCUPATIONAL COMPLETION POINT - DATA CODE  
- J (300 Hours) AUTOMOTIVE ENGINE  
PERFORMANCE TECHNICIAN - SOC 49-3023**

**OCCUPATIONAL COMPLETION POINT - DATA CODE  
- C (150 Hours) ENGINE REPAIR TECHNICIAN  
- SOC 49-3023**

**OCCUPATIONAL COMPLETION POINT - DATA CODE  
- B (150 Hours) AUTOMOTIVE SERVICES  
ASSISTOR - SOC 49-3023**

**OCCUPATIONAL COMPLETION POINT - DATA CODE  
- I (150 Hours) AUTOMOTIVE HEATING AND  
AIR-CONDITIONING TECHNICIAN - SOC 49-3023**

**OCCUPATIONAL COMPLETION POINT - DATA CODE  
- E (150 Hours) MANUAL DRIVE TRAIN AND  
AXLES TECHNICIAN - SOC 49-3023**

**OCCUPATIONAL COMPLETION POINT - DATA CODE  
- D (150 Hours) AUTOMATIC TRANSMISSION  
AND TRANS-AXLE TECHNICIAN - SOC 49-3023**

**SPECIAL NOTE**  
OCPS MAY BE OFFERED IN ANY SEQUENCE AFTER OCP A (CORE).  
OCP B MAY BE EARNED THROUGH A PORTFOLIO, DEMONSTRATED PROFICIENCY  
(COMPREHENSIVE TESTING) OR BOTH.  
OCP H SHOULD BE A TAUGHT PRIOR TO OCP J.

Florida Department of Education  
**INTENDED OUTCOMES**

	<u>Secondary</u>	<u>PSAV</u>
<b>Program Numbers</b>	<b>8709400</b>	<b>I470608</b>
CIP Number	0647.060405	0647.060405
Grade Level	9-12, 30, 31	30, 31
Length	12 Credits	1800 Hours
SOC	SOC 49-3023	SOC 49-3023
Certification	AUTO IND @7 G AUTO MECH @7 G	AUTO IND @7 G AUTO MECH @7 G

**INTENDED OUTCOMES:** After successfully completing the appropriate course(s) for each occupational completion point of this program, the student will be able to perform the following:

**NOTE:** The sequence of OCP's after completing the core OCP A is at the discretion the instructor. It should be noted that NATEF requires a minimum certification in four occupational areas (OCP G, F, H, and J) for program certification. Florida Statute (F.S.) 1004.925 requires Automotive Service Technology programs to be industry certified by 2007.

**OCCUPATIONAL COMPLETION POINT - DATA CODE - A** (150 Hours)  
 AUTOMOTIVE LUBE TECHNICIAN - (SOC 49-3023)

Automotive Service Technology 1

- 01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry.  
 (01.01 - 01.15)
- 02.0 Demonstrate proficiency in routine maintenance and consumer services. (02.01 - 02.53)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - B** (150 Hours)  
 AUTOMOTIVE SERVICES ASSISTOR - (SOC 49-3023)  
 (Related to Automotive Service Technology)

Automotive Service Technology 2

Outcomes 26.0-30.0 should be infused in the curriculum used to teach outcomes 01.0, 02.0 and 31.0 of Automotive Service Technology OCP A/B. Outcomes 26.0-30.0 should not be stand-alone instructional segments but an integral part of the automotive skills instruction. Documentation of these outcomes is required for completion of OCP B.

- 26.0 Demonstrate proficiency in appropriate math skills.  
(26.01 - 26.13)
- 27.0 Demonstrate proficiency in appropriate understanding of basic sciences. (27.01 - 27.04)
- 28.0 Demonstrate proficiency in employability skills.  
(28.01 - 28.10)
- 29.0 Demonstrate proficiency in appropriate communication skills.  
(29.01 - 29.04)
- 30.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry. (30.01 - 30.07)

- 26.0 Demonstrate proficiency in appropriate math skills.  
(26.01 - 26.13)
- 27.0 Demonstrate proficiency in appropriate understanding of basic sciences. (27.01 - 27.04)
- 28.0 Demonstrate proficiency in employability skills.  
(28.01 - 28.10)
- 29.0 Demonstrate proficiency in appropriate communication skills.  
(29.01 - 29.04)
- 30.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry. (30.01 - 30.07)
- 31.0 Demonstrate proficiency in understanding of entrepreneurship. (31.01 - 31.07)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - C (150 Hours)**  
ENGINE REPAIR TECHNICIAN - (SOC 49-3023)

Automotive Service Technology 3

- 32.0 Demonstrate proficiency in general engine diagnosis.  
(32.01 - 32.12)
- 33.0 Demonstrate proficiency in cylinder head and valve train diagnosis and repair. (33.01 - 33.16)
- 34.0 Demonstrate proficiency in engine block diagnosis and repair. (34.01 - 34.16)
- 35.0 Demonstrate proficiency in lubrication and cooling systems diagnosis and repairs. (35.01 - 35.13)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - D (150 Hours)**  
AUTOMATIC TRANSMISSION AND TRANS-AXLE TECHNICIAN - (SOC 49-3023)

Automotive Service Technology 4

- 46.0 Demonstrate proficiency in the operation and servicing of automatic transmission/transaxle. (46.01 - 46.09)
- 47.0 Demonstrate proficiency in transmission/transaxle maintenance, adjustment and in-vehicle transmission/transaxle repair. (47.01 - 47.10)
- 48.0 Demonstrate proficiency in off-vehicle transmission/transaxle repair (removal, disassembly, and reinstallation), oil pump and converter. (48.01 - 48.10)
- 49.0 Demonstrate proficiency in gear train, shafts, bushings, case, friction units and reaction units. (49.01 - 49.14)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - E (150 Hours)**  
MANUAL DRIVE TRAIN AND AXLES TECHNICIAN - INDUSTRY TITLE

(SOC 49-3023)

Automotive Service Technology 5

- 41.0 Demonstrate proficiency in general drive train diagnosis, clutch diagnosis and repair. (41.01 - 41.15)
- 42.0 Demonstrate proficiency in transmission & transaxle diagnosis and repair. (42.01 - 42.17)
- 43.0 Demonstrate proficiency in drive and half shaft universal and constant-velocity (CV) joint diagnosis and repair. (43.01 - 43.06)
- 44.0 Demonstrate proficiency in rear axle diagnosis and repair; ring and pinion gears, differential case assembly and limited slip differential. (44.01 - 44.14)
- 45.0 Demonstrate proficiency in drive axle shaft and four-wheel drive/all-wheel drive component diagnosis and repair. (45.01 - 45.12)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - F (150 Hours)**

AUTOMOBILE SUSPENSION AND STEERING TECHNICIAN - (SOC 49-3023)

Automotive Service Technology 6

- 09.0 Demonstrate proficiency in general suspension and steering systems diagnosis. (09.01 - 09.23)
- 10.0 Demonstrate proficiency in suspension systems diagnosis and repair; front suspensions. (10.01 - 10.11)
- 11.0 Demonstrate proficiency in suspension systems diagnosis and repair; rear suspensions, wheel alignment diagnosis, adjustment, repair and miscellaneous service. (11.01 - 11.21)
- 12.0 Demonstrate proficiency in wheel and tire diagnosis and repair. (12.01 - 12.10)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - G (150 Hours)**

AUTOMOTIVE BRAKE SYSTEM TECHNICIAN - (49-3023)

Automotive Service Technology 7

- 03.0 Demonstrate proficiency in the operation and servicing of automotive brake systems. (03.01 - 13.16)
- 04.0 Demonstrate proficiency in drum brake diagnosis and repair. (04.01 - 04.07)
- 05.0 Demonstrate proficiency in the operation of disc brake diagnosis and repair. (05.01 - 05.11)
- 06.0 Demonstrate proficiency in the operation of power assist units diagnosis and repair. (06.01 - 06.04)
- 07.0 Demonstrate proficiency in miscellaneous (wheel bearings, parking brakes, electrical, etc.) (07.01 - 07.09)
- 08.0 Demonstrate proficiency in antilock brake system. (08.01 - 08.09)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - H (300 Hours)**

AUTOMOTIVE ELECTRICAL/ELECTRONIC SYSTEM TECHNICIAN - (SOC 49-3023)

Automotive Service Technology 8/9

- 13.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components as related to power train. (13.01 - 13.47)

- 14.0 Demonstrate proficiency in battery diagnosis and service. (14.01 - 14.07)
- 15.0 Demonstrate proficiency in starting system diagnosis and repair. (15.01 - 15.06)
- 16.0 Demonstrate proficiency in charging system diagnosis and repair (16.01 - 16.06)
- 17.0 Demonstrate proficiency in lighting systems, gauges, warning devices, and driver information systems diagnosis and repair (17.01 - 17.07)
- 18.0 Demonstrate proficiency in horn and wiper/washer and accessories diagnosis and repair (18.01 - 18.15)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - I (150 Hours)**

AUTOMOTIVE HEATING AND AIR-CONDITIONING TECHNICIAN - (SOC 49-3023)

Automotive Service Technology 10

- 36.0 Demonstrate proficiency in a/c system diagnosis and repair. (36.01 - 36.09)
- 37.0 Demonstrate proficiency in refrigeration system component diagnosis and repair of compressor, compressor clutch, evaporator, receiver/drier, condenser, etc. (37.01 - 37.12)
- 38.0 Demonstrate proficiency in heating and engine cooling systems diagnosis and repair (38.01 - 38.10)
- 39.0 Demonstrate proficiency in a/c operating systems and related controls diagnosis and repairs (39.01 - 39.08)
- 40.0 Demonstrate proficiency refrigerant recovery, recycling, and handling (40.01 - 40.06)

**OCCUPATIONAL COMPLETION POINT - DATA CODE - J (300 Hours)**

AUTOMOTIVE ENGINE PERFORMANCE TECHNICIAN - (SOC 49-3023)

Automotive Service Technology 11/12

- 19.0 Demonstrate proficiency in general engine diagnosis. (19.01 - 19.15)
- 20.0 Demonstrate proficiency in computerized engine controls diagnosis and repair. (20.01 - 2.09)
- 21.0 Demonstrate proficiency in ignition system diagnosis and repair. (21.01 - 21.08)
- 22.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair. (22.01 - 22.15)
- 23.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair. (23.01 - 23.07)
- 24.0 Demonstrate proficiency in intake air temperature controls, early fuel evaporation (intake manifold temperature) controls and evaporative emissions controls. (24.01 - 24.07)
- 25.0 Demonstrate proficiency in engine related service. (25.01 - 25.04)

**Florida Department of Education  
STUDENT PERFORMANCE STANDARDS**

**Program Title:** Automotive Service Technology  
**Secondary Number:** 8709400  
**Postsecondary Number:** I470608

**OCCUPATIONAL COMPLETION POINT - A**  
 AUTOMOTIVE LUBE TECHNICIAN

- 01.0 DEMONSTRATE PROFICIENCY IN THE EQUIPMENT SKILLS AND SAFETY REGULATIONS RELATING TO THE AUTOMOTIVE INDUSTRY--The student will be able to:
- 01.01 Apply shop safety rules, EPA and OSHA standards.  
LA.A.246, LA.A.247, LA.A.248
  - 01.02 Identify and use appropriate emergency first aid procedures  
LA.C.141, LA.C.142
  - 01.03 Identify, use and maintain hand and power tools properly.  
LA.C.141, LA.A.142, LA.A.241, LA.A.248
  - 01.04 Identify and practice using appropriate precision-measuring tools and torque methods.  
LA.A.244, LA.A.247, LA.C.241, LA.C.242, MA.B.241, MA.B.442
  - 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.  
LAA244, LAC141, MAB141
  - 01.06 Identify and use Metric and English measurement skills.  
LA.A.142, MA.B.143
  - 01.07 Use computer and operate keyboard.  
LA.A.244
  - 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.  
LA.A.244
  - 01.09 Identify and describe typical automotive lubricants and lubricant properties.  
LA.A.244, LA.C.142, LA.C.342
  - 01.10 Interpret the Federal 'Workers Right To Know Law'.  
LA.A.244, LA.A.143
  - 01.11 Identify and describe typical automotive seals and gaskets.  
LA.A.244, LA.C.141
  - 01.12 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.  
LA.A.248
  - 01.13 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.  
LA.A.248
  - 01.14 Describe and identify supplemental restraint systems (SRS).  
SC.C.246, SCC142, LAA244, LAA143
  - 01.15 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.  
SC.C.246, SC.C.142, LA.A.241, LA.A.143, LA.A.142

02.0 DEMONSTRATE PROFICIENCY IN THE PROFICIENCY IN ROUTINE MAINTENANCE AND CONSUMER SERVICES AKA Light Line AKA General Service Technician--The student will be able to:

- 02.01 Inspect, test headlamps, tail lamps and stop lamps. Aim headlights.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.02 Perform oil and filter change including lubricating suspension and steering systems.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.03 Service transmission; perform visual inspection; replace fluids and filters. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.04 Inspect engine assembly for fuel, oil, coolant, and other leaks. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.05 Inspect manual and power steering fluid levels and condition. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.06 Check rear axle drive assembly seals and vents; check lube level. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.07 Remove, inspect, and service front and rear wheel bearings on non-drive axles. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.08 Inspect tires and diagnose tire wear patterns. Check and adjust air pressure. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.09 Rotate tires according to manufacturer's recommendations, install wheels, torque lug nuts. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.10 Balance wheel and tire assembly (static and dynamic).  
SC.H.147, SC.C.246, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.11 Dismount, inspect, repair, and remount tire on wheel.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.12 Check master cylinder for internal and external leaks and proper operation. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.13 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.14 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.15 Select, handle, store, and install brake fluids to proper level. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.241, MA.B.442
- 02.16 Fill master cylinder with recommended fluid and seat pads.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.17 Inspect, clean, fill, and replace battery.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.18 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or perform necessary action. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.19 Start a vehicle using jumper cables using a battery auxiliary power supply. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.20 Perform slow/fast battery charge.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.21 Observe dash warning lamps during bulb check.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.22 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels)

- and calibration decals). SC.H.147, LA.A.244, LA.A.142, LAA143
- 02.23 Practice recommended precautions when handling static sensitive devices. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.24 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or perform necessary action. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.25 Inspect, replace, and adjust drive belts and pulleys. LAA142, LAA143, LAA244
- 02.26 35.05 [08.29, 15.18] Inspect and replace engine cooling and heater system hoses. LA.A.142, LA.A.143, LA.A.244
- 02.27 Inspect, test, and replace thermostat and housing. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141
- 02.28 Perform cooling system pressure tests; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; service or perform necessary action. LA.A.142, LA.A.143, LA.A.244
- 02.29 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; service or perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141
- 02.30 Determine coolant condition; drain, flush, recover and refill cooling system with recommended coolant and bleed air as required. LA.A.142, LA.A.143, LA.A.244
- 02.31 Inspect, test, remove, and replace water pump. LA.A.142, LA.A.143, LA.A.244
- 02.32 Check parking brake operation; adjust as needed. LAA142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242
- 02.33 13.05 [08.37, 14.01] Use wiring diagrams to diagnose electrical circuit problems. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.34 Check electrical circuits with a test light; determine necessary action. SC.H.147, SC.C.242, LA.A.142, LA.A.143, LA.A.244
- 02.35 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM). SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242.
- 02.36 Check current flow in electrical/electronic circuits and components using an ammeter. SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242.
- 02.37 Check electrical circuits using a fused jumper wire. SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244
- 02.38 Measure and diagnose the cause(s) of abnormal key-off battery drain. SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.39 Inspect and test fusible links, circuit breakers, and fuses; perform necessary action. SC.H.147, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.40 Perform battery capacity (load, high-rate discharge) test; determine necessary service. SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.41 Maintain or restore electronic memory functions. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.42 Perform starter current draw and circuit voltage drop test; determine necessary action. SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242
- 02.43 Remove and replace/reinstall starter. SC.H.147, LA.A.142, LA.A.143, LA.A.244

- 02.44 Perform charging system test. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.45 Remove, inspect, and replace/reinstall alternator. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.46 Demonstrate retrieving stored diagnostic trouble codes using a scan tool. SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.47 Obtain and interpret digital multimeter (DMM) readings. SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.48 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.49 Replace a fuel filter. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.50 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or perform necessary action. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.51 Adjust valves on engines with mechanical lifters. SC.H.147, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.52 Remove and replace valve cover gaskets. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.53 Inspect passenger restraint system, repair if needed. SC.H.147, LA.A.142, LA.A.143, LA.A.244

**OCP B AUTOMOTIVE SERVICES ASSISTOR**

AUTOMOTIVE SERVICES ASSISTOR

26.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE MATH SKILLS--The student will be able to:

- 26.01 Read and interpret measuring devices (rules and tapes) MA.B.241, MA.B.242
- 26.02 Solve number word problems. MA.A.343, MA.D.242, MA.C.241, MA.E.141, MA.B.142, MA.B.143, MA.B.241
- 26.03 Write percents add fractions and decimals. MA.A.144
- 26.04 Solve percent problems. MA.A.343
- 26.05 Find the percent of a number. MA.A.342, MA.A.343
- 26.06 Operate a calculator. MA.B.241
- 26.07 Understand and use the metric system. MA.A.144
- 26.08 Convert inches to millimeters and millimeters to inches. MA.A.144
- 26.09 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders. MA.B.141, MA.B.341
- 26.10 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches. MA.B.441
- 26.11 Add, subtract, multiply and divide using fractions, decimals, and whole numbers. MA.A.341, MA.A.342, MA.A.343
- 26.12 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items. MA.A.343
- 26.13 Understand and interpret gears and gear ratios. MA.B.143, MA.C.241

27.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE UNDERSTANDING OF BASIC SCIENCES--The student will be able to:

- 27.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content. SC.A.142, MA.B.341, MA.B.442
  - 27.02 Draw conclusions or make inferences from data. SC.H.242, SC.H.147, LA.A.248, LA.A.142, MA.E.341, MA.E.342
  - 27.03 Related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials. LA.A.244, LA.A.246, LA.A.143
  - 27.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A. SC.B.143, MA.B.242
- 28.0 DEMONSTRATE PROFICIENCY IN EMPLOYABILITY SKILLS--The student will be able to:
- 28.01 Identify employment requirements for an automotive career. LA.B.241, LA.B.242
  - 28.02 Identify documents which may be required when applying for a job. LA.A.241
  - 28.03 Complete a job application form correctly. LA.B.241, LA.B.242, LA.B.243
  - 28.04 Identify and adopt acceptable work habits. LA.D.142
  - 28.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens. LA.C.141, LA.C.142
  - 28.06 Demonstrate appropriate telephone/communication skills. LA.C.141, LA.C.342
  - 28.07 Conduct a job search. LA.A.246, LA.A.248
  - 28.08 Demonstrate competence in job interview techniques. LA.C.141, LA.C.342
  - 28.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees. LA.C.141, LA.C.143, LA.C.342
  - 28.10 Demonstrate knowledge of how to make job changes appropriately. LA.B.241, LA.B.242
- 29.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE COMMUNICATION SKILLS--The student will be able to:
- 29.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry. LA.B.241, LA.B.242, LA.B.243
  - 29.02 Read and follow written and oral instructions. LA.A.244, LA.A.241, LA.C.141.
  - 29.03 Answer and ask questions coherently and concisely. LA.C.342, LA.C.343, LA.C.344, LA.C.345
  - 29.04 Read critically by recognizing assumptions and implications and by evaluating ideas. LA.A.244, LA.A.246, LA.A.247
- 30.0 DEMONSTRATE PROFICIENCY IN ACCEPTABLE EMPLOYEE BEHAVIOR IN THE AUTOMOTIVE INDUSTRY--The student will be able to:
- 30.01 Explain the effects of chemical/substance abuse. LA.C.343
  - 30.02 Identify principles of stress management. LA.C.141
  - 30.03 Identify and define career opportunities in the automotive service industry. LA.C.141, LA.A.244
  - 30.04 Demonstrate acceptable industry dress code.
  - 30.05 Identify and demonstrate proper customer relation skills. LA.C.141, LA.C.344

- 30.06 Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems. LA.B.243, LA.A.244, LA.A.143, MA.A.343, MA.B.341
- 30.07 Identify principles of time management. MA.B.341
- 30.08 Identify acceptable customer relations. LA.C.141, LA.C.344

31.0 DEMONSTRATE PROFICIENCY IN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

- 31.01 Define entrepreneurship. LA.A.142, LA.A.143, LA.A.241
- 31.02 Describe the importance of entrepreneurship to the American economy. LA.A.248
- 31.03 List the advantages and disadvantages of business ownership. LA.C.141, LA.B.242
- 31.04 Identify the risks involved in ownership of business. LA.C.141, LA.B.242
- 31.05 Identify the necessary personal characteristics of a successful entrepreneur. LA.C.141, LA.B.242
- 31.06 Identify the business skills needed to operate a small business efficiently and effectively. LA.C.141, LA.B.242, MA.A.343
- 31.07 Identify and apply communication skills used in automotive careers. LA.C.141, LA.C.143, LA.C.342, LA.C.344

**OCCUPATIONAL COMPLETION POINT - C (ENGINE REPAIR TECHNICIAN)**

32.0 DEMONSTRATE PROFICIENCY IN GENERAL ENGINE DIAGNOSIS --The student will be able to:

- 32.01 Identify and interpret engine concern; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 32.02 Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244 P-1
- 32.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). LA.A.142, LA.A.143, LA.A.244 P-1
- 32.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 32.05 Diagnose engine noises and vibrations; determine necessary action. LA.A.42, LA.A.143, LA.A.244 P-3
- 32.06 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 32.07 Perform engine vacuum tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-1
- 32.08 Perform cylinder power balance tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.A.343 P-1
- 32.09 Perform cylinder compression tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.A.343 P-1
- 32.10 Perform cylinder leakage tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141. P-1
- 32.11 Remove and reinstall engine in a late model front-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition. LA.A.142, LA.A.143, LA.A.244 P-1
- 32.12 Remove and reinstall engine in a late model rear-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition. LA.A.142, LA.A.143, LA.A.244 P-3

33.0 DEMONSTRATE PROFICIENCY IN CYLINDER HEAD AND VALVE TRAIN DIAGNOSIS AND REPAIR --The student will be able to:

- 33.01 Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 33.02 Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 33.03 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.04 Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks, and valve grooves; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.05 Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-3
- 33.06 Inspect valves and valve seats; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-3

- 33.07 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
- 33.08 Check valve spring assembled height and valve stem height; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
- 33.09 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.10 Inspect hydraulic or mechanical lifters; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.11 Adjust valves (mechanical or hydraulic lifters). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 33.12 Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.13 Inspect and replace timing belt(s), overhead camdrive sprockets and tensioners; check belt tension; adjust as necessary. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 33.14 Inspect camshaft for run out; journal wear and lobe wear. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 33.15 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, P-3
- 33.16 Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-1
- 34.0 DEMONSTRATE PROFICIENCY IN ENGINE BLOCK DIAGNOSIS AND REPAIR --The student will be able to:
- 34.01 Disassemble engine block; clean and prepare components for inspection and reassembly. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.441, MA.B.241 P-2
- 34.02 Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 34.03 Inspect internal and external threads; restore as needed (includes installing thread inserts). LA.A.142, LA.A.143, LA.A.244 P-1
- 34.04 Inspect and measure cylinder walls for damage, wear, and ridges; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.441, MA.B.241 P-2
- 34.05 Inspect and measure cylinder walls for damage and wear; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 34.06 Deglaze and clean cylinder walls. LA.A.142, LA.A.143, LA.A.244 P-1
- 34.07 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.441, MA.B.241 P-3
- 34.08 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241 P-2
- 34.09 Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition. LA.A.142, LA.A.143, LA.A.244 P-3

- 34.10 Inspect and measure pistons; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 34.11 Remove and replace piston pin. LA.A.142, LA.A.143,  
LA.A.244, MA.B.442 P-3
- 34.12 Inspect, measure, and install piston rings. LA.A.142, LA.A.143,  
LA.A.244, MA.B.442 P-2
- 34.13 Inspect auxiliary (balance, intermediate, idler, counterbalance or  
silencer) shaft(s); inspect shaft(s) and support bearings for damage and  
wear; determine necessary action; reinstall and time.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 34.14 Inspect, repair or replace crankshaft vibration damper (harmonic  
balancer). LA.A.142, LA.A.143, LA.A.244 P-3
- 34.15 Assemble the engine using gaskets, seals, and formed-in-place (tube-  
applied) sealants, thread sealers, etc. according to manufacturer's  
specifications. LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141, MA.B.241 P-2
- 34.16 Inspect crankshaft for end play, straightness, journal damage, keyway  
damage, thrust flange and sealing surface condition, and visual surface  
cracks; check oil passage condition; measure journal wear; check  
crankshaft sensor reluctor ring (where applicable); determine necessary  
action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, P-2
- 35.0 DEMONSTRATE PROFICIENCY IN LUBRICATION AND COOLING SYSTEMS DIAGNOSIS AND  
REPAIRS --The student will be able to:
- 35.01 Perform oil pressure tests; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 35.02 Inspect oil pump gears or rotors, housing, pressure relief  
devices, and pump drive; perform necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.441, MA.E.141 P-3
- 35.03 Perform cooling system, cap and recovery tests (pressure, combustion  
leakage, and temperature); determine necessary action.  
LA.A.142, LA.A.143, LA.A.241, MA.B.442, MA.E.141 P-1
- 35.04 Inspect, replace, and adjust drive belts, tensioners and pulleys.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-1
- 35.05 Inspect and replace engine cooling and heater system hoses.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 35.06 Inspect, test, and replace thermostat and housing. LA.A.142,  
LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 35.07 Test coolant; drain and recover, flush, and refill cooling system with  
recommended coolant and bleed air as required.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 35.08 Inspect, test, remove, and replace water pump.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 35.09 Remove and replace radiator. LA.A.142, LA.A.143, LA.A.244 P-2
- 35.10 Inspect, and test fan(s) (electrical or mechanical), fan clutch,  
fan shroud, and air dams. LA.A.142, LA.A.143, LA.A.244,  
MA.B.442, MA.E.141 P-2
- 35.11 Inspect auxiliary oil coolers; perform necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-3
- 35.12 Inspect, test, and replace oil temperature and pressure switches and  
sensors.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 35.13 Perform oil and filter change. SC.H.346, LA.A.142, LA.A.143,  
LA.A.244 P-1

**OCCUPATIONAL COMPLETION POINT - D**

**AUTOMATIC TRANSMISSION AND TRANSAXLE TECHNICIAN**

**46.0 DEMONSTRATE PROFICIENCY IN THE OPERATION AND SERVICING OF AUTOMATIC TRANSMISSION/TRANSAXLE--The student will be able to:**

- 46.01 Identify and interpret transmission concern; assure proper engine operation; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 46.02 Research applicable vehicle and service information, such as transmission/transaxle system operation, vehicle service history, service precautions, and technical service bulletins.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 46.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 46.04 Diagnose fluid usage, level, and condition concerns; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-1
- 46.05 Perform pressure tests; determine necessary action.  
S.C.H346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 46.06 Perform lock-up converter system tests; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 46.07 Diagnose electronic, mechanical, hydraulic, vacuum control systems concerns; determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 46.08 Diagnose noise and vibration concerns; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 46.09 Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1

**47.0 DEMONSTRATE PROFICIENCY IN TRANSMISSION/TRANSAXLE MAINTENANCE, ADJUSTMENT AND IN-VEHICLE TRANSMISSION/TRANSAXLE REPAIR --The student will be able to:**

- 47.01 Inspect, adjust or replace throttle valve (TV) linkages or cables; manual shift linkages or cables; transmission range sensor; check gear select indicator (as applicable). LA.A.142, LA.A.143, LA.A.244 P-1
- 47.02 Service transmission; perform visual inspection; replace fluids and filters. LA.A.142, LA.A.143, LA.A.244 P-1
- 47.03 Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.  
LA.A.142, LA.A.143, LA.A.244 P-3
- 47.04 Inspect, repair, and replace governor assembly. LA.A.142, LA.A.143, LA.A.244 P-3
- 47.05 Inspect and replace external seals and gaskets.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 47.06 Inspect extension housing; bushings and seals; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 47.07 Inspect, leak test, flush, and replace cooler, lines, and fittings. LA.A.142, LA.A.143, LA.A.244 P-1

- 47.08 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 47.09 Diagnose electronic transmission control systems using a scan tool; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242, MA.E.141 P-1
- 47.10 Inspect, replace, and align powertrain mounts. LA.A.142, LA.A.143, LA.A.244 P-3
- 48.0 DEMONSTRATE PROFICIENCY IN OFF-VEHICLE TRANSMISSION/TRANSAXLE REPAIR (REMOVAL, DISASSEMBLY, AND REINSTALLATION), OIL PUMP AND CONVERTER  
--The student will be able to:
- 48.01 Remove and reinstall transmission and torque converter (rear-wheel drive). LA.A.142, LA.A.143, LA.A.244 P-2
- 48.02 Remove and reinstall transaxle and torque converter assembly. LA.A.142, LA.A.143, LA.A.244 P-2
- 48.03 Disassemble, clean, and inspect transmission/trans-axle. LA.A.142, LA.A.143, LA.A.244 P-1
- 48.04 Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets), and torque valve body bolts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 48.05 Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 48.06 Inspect accumulator bore, piston, seals, spring, and retainers; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 48.07 Assemble transmission/trans-axle. LA.A.142, LA.A.143, LA.A.244 P-1
- 48.08 Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas. LA.A.142, LA.A.143, LA.A.244 P-2
- 48.09 Measure torque converter end play and check for interference; check stator clutch. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 48.10 Inspect, measure, and replace oil pump assembly and components. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 49.0 DEMONSTRATE PROFICIENCY IN GEAR TRAIN, SHAFTS, BUSHINGS, CASE, FRICTION UNITS AND REACTION UNITS --The student will be able to:
- 49.01 Measure end play or preload; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 49.02 Inspect, measure, and replace thrust washers and bearings. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 49.03 Inspect oil delivery seal rings, ring grooves, and sealing surface areas. LA.A.142, LA.A.143, LA.A.244 P-2
- 49.04 Inspect bushings; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 49.05 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 49.06 Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 49.07 [10.34] Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2

- 49.08 Inspect, measure, repair, adjust or replace transaxle final drive components. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 49.09 Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 49.10 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 49.11 Measure clutch pack clearance; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 49.12 Air test operation of clutch and servo assemblies. LA.A.142, LA.A.143, LA.A.244 P-1
- 49.13 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed. LA.A.142, LA.A.143, LA.A.244 P-1
- 49.14 Inspect bands and drums; adjust or determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

**OCCUPATIONAL COMPLETION POINT - E**

MANUAL DRIVETRAIN AND AXLE TECHNICIAN

- 41.0 DEMONSTRATE PROFICIENCY IN GENERAL DRIVE TRAIN DIAGNOSIS, CLUTCH DIAGNOSIS AND REPAIR --The student will be able to:
  - 41.01 Identify and interpret drive train concern; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.02 Research applicable vehicle and service information, such as drive train system operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.04 Diagnose fluid usage, level, and condition concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.05 Drain and fill manual transmission/transaxle and final drive unit. LA.A.142, LA.A.143, LA.A.244 P-2
  - 41.06 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. LA.A.142, LA.A.143, LA.A.244 LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.07 Inspect, clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.08 Inspect, hydraulic clutch slave and master-cylinders, lines and hoses; perform necessary action. LA.A.142, LA.A.143, LAA244 P-1
  - 41.09 Inspect, release (throw-out) bearing, lever, and pivot; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.10 Inspect and replace clutch pressure plate assembly and clutch disc. LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.11 Bleed clutch hydraulic system. LA.A.142, LA.A.143, LA.A.244 P-1
  - 41.12 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable). P-1
  - 41.13 Inspect, flywheel and ring gear for wear and cracks, measure run out; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
  - 41.14 Inspect engine block, clutch (bell) housing, and transmission/trans-axle case mating surface; determine necessary action.

- LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 41.15 Measure flywheel-to-block run out and crankshaft end play; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 42.0 DEMONSTRATE PROFICIENCY IN TRANSMISSION & TRANSAXLE DIAGNOSIS AND REPAIR --The student will be able to:
- 42.01 Remove and reinstall transmission/transaxle. LA.A.142, LA.A.143, LA.A.244 P-1
- 42.02 Disassemble, clean, and reassemble transmission/transaxle components. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 42.03 Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 42.04 Diagnose noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 42.05 Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers. LA.A.142, LA.A.143, LA.A.244 P-2
- 42.06 Inspect and reinstall powertrain mounts. LA.A.142, LA.A.143, LA.A.244 P-3
- 42.07 Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. LA.A.142, LA.A.143, LA.A.244 P-2
- 42.08 Remove and replace transaxle final drive. LA.A.142, LA.A.143, LA.A.244 P-3
- 42.09 Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanisms, interlocks, and springs. LA.A.142, LA.A.143, LA.A.244 P-2
- 42.10 Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 42.12 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. LA.A.142, LA.A.143, LA.A.244 P-2
- 42.13 Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. LA.A.142, LA.A.143, LA.A.244 P-2
- 42.14 Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 42.15 Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 42.16 Inspect lubrication devices (oil pump or slingers); perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 42.17 Inspect, test, and replace transmission/transaxle sensors and switches. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 43.0 DEMONSTRATE PROFICIENCY IN DRIVE AND HALF SHAFT UNIVERSAL AND CONSTANT-VELOCITY (CV) JOINT DIAGNOSIS AND REPAIR --The student will be able to:
- 43.01 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 43.02 Diagnose universal joint noise and vibration concerns; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 43.03 Replace front wheel drive (FWD) front wheel bearing. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 43.04 Inspect, service, and replace shafts, yokes, boots, and CV joints. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 43.05 Inspect, service, and replace shaft center support bearings. LA.A.142, LA.A.143, LA.A.244 P-3

- 43.06 Check shaft balance; measure shaft run out; measure and adjust driveline angles. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.142, MA.B.241 P-2
- 44.0 DEMONSTRATE PROFICIENCY IN REAR AXLE DIAGNOSIS AND REPAIR; RING AND PINION GEARS, DIFFERENTIAL CASE ASSEMBLY AND LIMITED SLIP DIFFERENTIAL --The student will be able to:
- 44.01 Diagnose noise and vibration concerns; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 44.02 Diagnose fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 44.03 Inspect and replace companion flange and pinion seal; measure companion flange run out. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.04 Inspect ring gear and measure run out; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.05 Remove, inspect, and reinstall drive pinion and ring, gear, spacers, sleeves, and bearings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.06 Measure and adjust drive pinion depth. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.07 Measure and adjust drive pinion bearing preload. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 44.08 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup and shim types). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.09 Check ring and pinion tooth contact patterns; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.241 P-1
- 44.10 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241 P-2
- 44.11 Reassemble and reinstall differential case assembly; measure run out; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.12 Diagnose noise, slippage, and chatter concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 44.13 Inspect and flush differential housing; refill with correct lubricant. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-2
- 44.14 Inspect and reinstall clutch (cone or plate) components. LA.A.142, LA.A.143, LA.A.244 P-3
- 44.15 Measure rotating torque; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.0 DEMONSTRATE PROFICIENCY IN DRIVE AXLE SHAFT AND FOUR-WHEEL DRIVE/ALL-WHEEL DRIVE COMPONENT DIAGNOSIS AND REPAIR --The student will be able to:
- 45.01 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 45.02 Inspect and replace rear axle shaft wheel studs. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-3
- 45.03 Remove and replace drive axle shafts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 45.04 Inspect and replace drive axle shaft seals, bearings, and retainers. LA.A.142, LA.A.143, LA.A.244 P-2

- 45.05 Measure drive axle flange run out and shaft end play; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 45.06 Diagnose noise, vibration, and unusual steering concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 45.07 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.08 Remove and reinstall transfer case. LA.A.142, LA.A.143, LA.A.244 P-3
- 45.09 Disassemble, service, and reassemble transfer case and components. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.10 Inspect, front-wheel bearings and locking hubs; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.11 Check drive assembly seals and vents; check lube level. LA.A.142, LA.A.143, LA.A.244 P-3
- 45.12 Diagnose, test, adjust and replace electrical/electronic components of four-wheel drive systems. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3

**OCCUPATIONAL COMPLETION POINT - F**

**AUTOMOTIVE SUSPENSION AND STEERING TECHNICIAN**

**09.0 DEMONSTRATE PROFICIENCY IN GENERAL SUSPENSION AND STEERING SYSTEM DIAGNOSIS---**

The student will be able to:

- 09.01 Identify and interpret suspension and steering concern; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.02 Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). P-1
- 09.04 Disable and enable supplemental restraint system (SRS) LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.05 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.06 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.341 P-3
- 09.07 Diagnose power steering (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.341 P-3
- 09.08 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering and fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.341 P-3
- 09.09 Inspect steering shaft universal-joint(s), flexible coupling (s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 09.10 Adjust manual or power non-rack and pinion worm bearing preload and sector lash. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 09.11 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. LA.A.142, LA.A.143, LA.A.244 P-2

- 09.12 Adjust manual or power rack and pinion steering gear. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 09.13 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. LA.A.142, LA.A.143, LA.A.244 P-1
- 09.14 Inspect power steering fluid levels and condition. LA.A.142, LA.A.143, LA.A.244 P-1
- 09.15 Flush, fill, and bleed power steering system. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-2
- 09.16 Diagnose power steering fluid leakage; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 09.17 Remove and reinstall replace, and adjust power steering pump belt. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 09.18 Remove and reinstall power steering pump. LA.A.142, LA.A.143, LA.A.244 P-3
- 09.19 Remove and reinstall power steering pump pulley; check pulley and belt alignment. LA.A.142, LA.A.143, LA.A.244 P-3
- 09.20 Inspect and replace power steering hoses and fittings. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-2
- 09.21 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 09.22 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. LA.A.142, LA.A.143, LA.A.244
- 09.23 Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 10.0 DEMONSTRATE PROFICIENCY IN SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR; FRONT SUSPENSIONS --The student will be able to:
- 10.01 Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.442, MA.E.141 P-1
- 10.02 Diagnose strut suspension system noises body sway, and uneven riding height concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.241 P-1
- 10.03 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.04 Remove, inspect, install, and adjust strut rods(compression/tension) and bushings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.05 Remove, inspect, and install upper and lower ball joints. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.06 Remove, inspect, and install steering knuckle assemblies. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.07 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. LA.A.142, LA.A.143, LA.A.244, MA.B.242, MA.B.442, MA.E.141 P-2
- 10.08 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 10.09 Remove, inspect and install stabilizer bar bushings, bracket and links. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 10.10 Remove, inspect, and replace strut cartridge or assembly, strut coil spring, (silencers) insulators, and upper strut bearing mount. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 10.11 Lubricate suspension and steering systems. LA.A.142, LA.A.143, LA.A.244 P-2

11.0 DEMONSTRATE PROFICIENCY IN SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR; REAR SUSPENSIONS, WHEEL ALIGNMENT DIAGNOSIS, ADJUSTMENT, REPAIR AND MISCELLANEOUS SERVICE --The student will be able to:

- 11.01 Remove, inspect, and install coil springs and spring insulators.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.02 Remove, inspect, and install transverse links, control arms, bushings, and mounts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.03 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 11.04 Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers).  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.05 Inspect, remove, and replace shock absorbers. LA.A.142, LA.A.143, LA.A.244 P-1
- 11.06 Remove, inspect, and service or replace front and rear wheel bearings.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.07 Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 11.08 Differentiate between steering and suspension concerns using principles of steering geometry (caster, camber, toe, etc).  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.09 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.10 Perform pre-alignment inspection; perform necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.11 Measure vehicle riding height; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.12 Check and adjust front and rear wheel camber; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.242, MA.B.442, MA.E.141 P-1
- 11.13 Check and adjust caster; perform necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.242, MA.B.442, MA.E.141 P-1
- 11.14 Check and adjust front wheel toe; adjust as needed.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242
- 11.15 Center steering wheel. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.16 Check toe-out-on-turns (turning radius); determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 11.17 Check SAI (steering axis inclination) and included angle; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.18 Check and adjust rear wheel toe. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.19 Check rear wheel thrust angle; determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 11.20 Check for front wheel setback; determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2

- 11.21 Check front cradle (sub-frame) alignment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 12.0 DEMONSTRATE PROFICIENCY IN WHEEL AND TIRE DIAGNOSIS AND REPAIR --The student will be able to:
- 12.01 Diagnose tire wear patterns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.02 Inspect tires; check and adjust air pressure. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.03 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 12.04 Rotate tires according to manufacturer's recommendations. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.05 Measure wheel, tire, axle, and hub run out; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MAB241, MAB242 P-2
- 12.06 Diagnose tire pull (lead) problem; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 12.07 Balance wheel and tire assembly (static and dynamic) SC.C.246, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.08 Dismount, inspect, repair, and remount tire on wheel. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 12.09 Reinstall wheel; torque lug nuts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.10 Inspect and repair tire. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

**OCCUPATIONAL COMPLETION POINT - G**  
**AUTOMOTIVE BRAKE TECHNICIAN**

- 03.0 DEMONSTRATE PROFICIENCY IN GENERAL BRAKE SYSTEM DIAGNOSIS AND HYDRAULIC SYSTEM DIAGNOSIS AND REPAIR--The student will be able to:
- 03.01 Identify and interpret brake system concern; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 03.02 Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 03.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 03.04 Diagnose pressure concerns in the brake system using hydraulic principles (Paschal's Law). P-1
- 03.05 Measure brake pedal height; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 03.06 Check master cylinder for internal and external leaks and proper operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 03.07 Remove, bench bleed, and reinstall master cylinder. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1

- 03.08 Diagnose poor stopping, pulling or dragging concerns caused by problems in the hydraulic system; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 03.09 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 03.10 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed. LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.442, MA.E.141 P-2
- 03.11 Select, handle, store, and install brake fluids to proper level. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 03.12 Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 03.13 Inspect, test, replace, and adjust height (load) sensing proportioning valve. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 03.14 Inspect, test, and replace components of brake warning light system. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 03.15 Bleed (manual, pressure, vacuum or surge) brake system. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 03.16 Flush hydraulic system. LA.A.142, LA.A.143, LA.A.244 P-3

04.0 DEMONSTRATE PROFICIENCY IN DRUM BRAKE DIAGNOSIS AND REPAIR --The student will be able to:

- 04.01 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 04.02 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 04.03 Refinish Brake Drum. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 04.04 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 04.05 Remove and inspect wheel cylinders. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 04.06 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 04.07 Install wheel, torque lug nuts, and make final checks and adjustments. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.E.241, MA.B.442, MA.B.242 P-1

05.0 DEMONSTRATE PROFICIENCY IN THE OPERATION OF DISC BRAKE DIAGNOSIS AND REPAIR--The student will be able to:

- 05.01 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.242 P-1

- 05.02 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 05.03 [13.22] Clean and inspect caliper mounting and slides for wear and damage; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 05.04 Remove, clean, and inspect pads and retaining hardware; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 05.05 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 05.06 Reassemble, lubricate, and reinstall caliper, pads, and related hardware, seat pads, and inspect for leaks. LA.A.142, LAA143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 05.07 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 05.08 Remove and replace rotor. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MAB242 P-1
- 05.09 Refinish rotor according to manufacturer's recommendations.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 05.10 Adjust calipers with integrated parking brake system.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 05.11 Install wheel, torque lug nuts, and make final checks and adjustments.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 06.0 DEMONSTRATE PROFICIENCY IN THE OPERATION OF POWER ASSIST UNITS DIAGNOSIS AND REPAIR--The student will be able to:
- 06.01 Test pedal free travel with and without engine running; check power assist operation. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 06.02 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 06.03 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 06.04 Inspect and test hydro-boost system and accumulator for leaks and proper operation; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 07.0 DEMONSTRATE PROFICIENCY IN MISCELLANEOUS (WHEEL BEARINGS, PARKING BRAKES, ELECTRICAL, ETC.) DIAGNOSIS AND REPAIR--The student will be able to:
- 07.01 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 07.02 Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1

- 07.03 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 07.04 Check parking brake operation; adjust as needed. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 07.05 Check operation of parking brake indicator light system. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 07.06 Check operation of brake stop light system; determine necessary action. LA.A.142, LA.A.143, LA.A.244 MA.B.442, MA.E.141, MA.B.242 P-1
- 07.07 Replace wheel bearing and race. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 07.08 Inspect and replace wheel studs. LA.A.142, LA.A.143, LA.A.244 P-1
- 07.09 Remove and reinstall sealed wheel bearing assembly. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 08.0 DEMONSTRATE PROFICIENCY IN ANTILOCK BRAKE SYSTEM --The student will be able to:
- 08.01 Inspect, and test antilock brake system (ABS) components; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 08.02 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the antilock brake system (ABS); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 08.03 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 08.04 Depressurize high pressure components of the antilock brake system (ABS) following manufacturer's recommended safety procedures. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MAB.241, MA.B.242 P-2
- 08.05 Bleed the antilock brake system's (ABS) front and rear hydraulic circuits following manufacturer's procedures. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 08.06 Remove and install antilock brake system (ABS) electrical/electronic/hydraulic components. LA.A.142, LA.A.143, LA.A.244, MAB442, MA.E.141, MA.B.241, MA.B.242 P-3
- 08.07 Test, diagnose and service 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). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 08.08 Diagnose antilock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 08.09 Identify traction control system components. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3

**OCCUPATIONAL COMPLETION POINT - H**

**AUTOMOTIVE ELECTRICAL/ELECTRONIC SYSTEM TECHNICIAN**

**13.0 DEMONSTRATE PROFICIENCY IN DIAGNOSING/TROUBLESHOOTING ELECTRICAL/ELECTRONIC COMPONENTS RELATED TO POWER TRAIN--The student will be able to:**

- 13.01 Identify and interpret electrical/electronic system concern; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 13.02 Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 13.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 13.04 Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 13.05 Use wiring diagrams during diagnosis of electrical circuit problems. LA.A.142, LA.A.143, LA.A.244, MA.B.141, MA.B.241, MA.B.242 P-1
- 13.06 Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 13.07 Check electrical circuits with a test light; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 13.08 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
- 13.09 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
- 13.10 Check continuity and resistance(s) in electrical/electronic circuits and components with an ohmmeter; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
- 13.11 Check electrical circuits using fused jumper wires; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 13.12 Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
- 13.13 Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
- 13.14 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 13.15 Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or perform necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1

- 13.16 Repair wiring harnesses and connectors.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 13.17 Perform solder repair of electrical wiring. LA.A.142, LA.A.143,  
LA.A.244 P-1
- 14.0 DEMONSTRATE PROFICIENCY IN BATTERY DIAGNOSIS AND SERVICE --The student will be able to:
- 14.01 Perform battery state-of-charge test; determine needed service.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 14.02 Perform battery capacity test; conform proper battery capacity for vehicle  
determine necessary action.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 14.03 Maintain or restore electronic memory functions.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.E.141,  
MA.B.242 P-2
- 14.04 Inspect, clean, fill, and replace battery.  
SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242 P-2
- 14.05 Perform slow/fast battery charge.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242 P-2
- 14.06 Inspect and clean battery cables, connectors, clamps,  
and hold-downs; repair or replace as needed.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242 P-1
- 14.07 Start a vehicle using jumper cables and a battery or auxiliary power  
supply. SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 15.0 DEMONSTRATE PROFICIENCY IN STARTING SYSTEM DIAGNOSIS AND REPAIR  
--The student will be able to:
- 15.01 Perform starter current draw tests. Determine necessary action.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.242 P-1
- 15.02 Perform starter circuit voltage drop tests; determine  
necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244,  
MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 15.03 Inspect and test starter relays and solenoids; determine necessary  
action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141, MA.B.241, MA.B.242 P-2
- 15.04 Remove and install starter in a vehicle.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 15.05 Inspect, and test switches, connectors, and wires of starter control  
circuits; perform necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242 P-2
- 15.06 Differentiate between electrical and engine mechanical problems that  
cause a slow-crank or no-crank condition. LA.A.142, LA.A.143,  
LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 16.0 DEMONSTRATE PROFICIENCY IN CHARGING SYSTEM DIAGNOSIS AND REPAIR  
--The student will be able to:
- 16.01 Perform charging system output test; determine necessary action.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.142,  
MA.E.141, MA.B.242 P-1

- 16.02 Diagnose charging system for the cause of undercharge, no charge, and overcharge conditions. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 16.03 Inspect and adjust generator (alternator) drive belts, pulleys and tensioners; check pulley and belt alignment. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 16.04 Inspect and test voltage regulator/regulating circuit; perform necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 16.05 Remove, inspect, and install generator (alternator). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 16.06 Perform charging circuit voltage drop tests; determine necessary action. SC.H.346, SC.C.242, MA.B.442, MA.E.141, MA.B.242, P-1
- 17.0 DEMONSTRATE PROFICIENCY IN LIGHTING SYSTEMS, GAUGES, WARNING DEVICES, AND DRIVER INFORMATION SYSTEMS DIAGNOSIS AND REPAIR --The student will be able to:
- 17.01 Diagnose the cause of brighter than normal, intermittent, dim or no light operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 17.02 Inspect, replace, and aim headlights and bulbs. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MAB242 P-2
- 17.03 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 17.04 Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 17.05 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 17.06 Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 17.07 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.0 DEMONSTRATE PROFICIENCY IN HORN AND WIPER/WASHER AND ACCESSORIES DIAGNOSIS AND REPAIR --The student will be able to:
- 18.01 Diagnose incorrect horn operation; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 18.02 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.03 Diagnose incorrect washer operation; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.04 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2

- 18.05 Diagnose incorrect heated glass operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 18.06 Diagnose incorrect electric lock operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.07 Diagnose incorrect operation of cruise control systems; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.08 Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 18.09 Diagnose radio static and weak, intermittent, or no radio reception, determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.10 Disarm and enable the airbag system for vehicle service. LA.A.142, LA.A.143, LA.A.44, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 18.11 Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.12 Remove and reinstall door panel. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 18.13 Diagnose body electronic system circuits using a scan tool; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 18.14 Check for module communication errors using a scan tool. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.15 Diagnose the cause of false, intermittent, or no operation of anti-theft system. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2

#### **OCCUPATIONAL COMPLETION POINT - I**

##### **AUTOMOTIVE HEATING AND AIR-CONDITIONING TECHNICIAN**

- 36.0 DEMONSTRATE PROFICIENCY IN A/C SYSTEM DIAGNOSIS AND REPAIR --The student will be able to:
- 36.01 Identify and interpret heating and air conditioning concern; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.02 Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 36.04 Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.05 Diagnose unusual operating noises in the A/C system; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 36.06 Identify refrigerant type; conduct a performance test of the A/C System; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.07 Leak test A/C system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1

36.08	Inspect the condition of discharged oil; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442	P-2
36.09	Determine recommended oil for system application. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242	P-1
37.0	<u>DEMONSTRATE PROFICIENCY IN REFRIGERATION SYSTEM COMPONENT DIAGNOSIS AND REPAIR OF COMPRESSOR, COMPRESSOR CLUTCH, EVAPORATOR, RECEIVER/DRIER, CONDENSER, ETC.</u> --The student will be able to:	
37.01	Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242	P-2
37.02	Inspect A/C compressor drive belts; replace and adjust as needed. LA.A.142, LA.A.143, LA.A.244	P-2
37.03	Inspect, test, and replace A/C compressor clutch components or assembly. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241	P-2
37.04	Remove and replace A/C compressor and mountings; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-1
37.05	Determine need for A/C system filter; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242	P-3
37.06	Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; perform necessary action. LA.A.142, LA.A.143, LA.A.244	P-2
37.07	Inspect A/C condenser for air flow restrictions; perform necessary action. LA.A.142, LA.A.143, LA.A.244	P-1
37.08	Remove and install receiver/drier or accumulator/drier. LA.A.142, LA.A.143, LA.A.244	P-1
37.09	Remove and install expansion valve or orifice (expansion) tube. LA.A.142, LA.A.143, LA.A.244	P-2
37.10	Inspect evaporator housing water drain; perform necessary action. LA.A.142, LA.A.143, LA.A.244	P-3
37.11	Remove and reinstall evaporator; measure oil quantity; determine necessary action. LA.A.142, LA.A.143, LA.A.244	P-3
37.12	Remove and reinstall condenser; measure oil quantity; determine necessary action. LA.A.142, LA.A.143, LA.A.244	P-3
38.0	<u>DEMONSTRATE PROFICIENCY IN HEATING AND ENGINE COOLING SYSTEMS DIAGNOSIS AND REPAIR</u> --The student will be able to:	
38.01	Diagnose temperature control problems in the heater/ventilation system; determine necessary action. LA.A.142, LA.A.143, LA.A.244	P-2
38.02	Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 MA.B.442, MA.E.141	P-1
38.03	Inspect engine cooling and heater system hoses and belts; perform necessary action. LA.A.142, LA.A.143, LA.A.244	P-1
38.04	Inspect, test, and replace thermostat and housing. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-1
38.05	Determine coolant condition; drain and recover coolant. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-1
38.06	Flush system; refill with recommended coolant; bleed system. LA.A.142, LA.A.143, LA.A.244, MA.B.241	P-1
38.07	Inspect, and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; perform necessary action. LA.A.142, LA.A.143, LA.A.244	P-1

- 38.08 Inspect and test electrical fan control system and circuits, determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-1
- 38.09 Inspect and test heater control valve(s); perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 38.10 Remove and reinstall heater core. LA.A.142, LA.A.143, LA.A.244 P-3
- 39.0 DEMONSTRATE PROFICIENCY IN A/C OPERATING SYSTEMS AND RELATED CONTROLS DIAGNOSIS AND REPAIRS --The student will be able to:
- 39.01 Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 39.02 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 39.03 Test and diagnose A/C compressor clutch control systems; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 39.04 Diagnose failures in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 39.05 Inspect and test A/C-heater control panel assembly; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 39.06 Inspect and test A/C-heater control cables and linkages perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 39.07 Inspect and test A/C-heater ducts, doors, hoses, and outlets; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 39.08 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 40.0 DEMONSTRATE PROFICIENCY REFRIGERANT RECOVERY, RECYCLING, AND HANDLING --The student will be able to:
- 40.01 Perform correct use and maintenance of refrigerant handling equipment. LA.A.142, LA.A.143, LA.A.244 P-1
- 40.02 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. LA.A.142, LA.A.143, LA.A.244 P-1
- 40.03 Recycle refrigerant. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 40.04 Label and store refrigerant. LA.A.142, LA.A.143, LA.A.244 P-1
- 40.05 Test recycled refrigerant for non-condensable gases. LA.A.142, LA.A.143, LA.A.244 P-1
- 40.06 Evacuate and charge A/C system. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1

**OCCUPATIONAL COMPLETION POINT - J**

**AUTOMOTIVE ENGINE PERFORMANCE TECHNICIAN**

**19.0 DEMONSTRATE PROFICIENCY IN GENERAL ENGINE DIAGNOSIS--The student will be able to:**

- 19.01 Identify and interpret engine performance concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 19.02 Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244 P-1
- 19.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). LA.A.142, LA.A.143, LA.A.244 P-1
- 19.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 19.05 Diagnose unusual engine noise or vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 19.06 Diagnose unusual exhaust color, odor, and sound; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 19.07 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.08 Perform cylinder power balance test; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.242 P-1
- 19.09 Perform cylinder compression test; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.242 P-1
- 19.10 Perform cylinder leakage test; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.242 P-1
- 19.11 Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and engine diagnostic equipment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.41 P-1
- 19.12 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.13 Verify engine operating temperature; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.14 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.15 Verify correct camshaft timing. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

**20.0 DEMONSTRATE PROFICIENCY IN COMPUTERIZED ENGINE CONTROLS DIAGNOSIS AND REPAIR -- The student will be able to:**

- 20.01 Retrieve and record stored OBD I diagnostic trouble codes; clear codes. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 20.02 Retrieve and record stored OBDII diagnostic trouble codes; clear codes. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1

- 20.03 Diagnose the causes of emissions or driveability concerns resulting from failure of computerized engine controls with stored diagnostic trouble codes. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 20.04 Diagnose emissions or driveability concerns resulting from failure of computerized engine controls with no stored diagnostic trouble codes determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-1
- 20.05 Check for module communication errors using a scan tool. P-2
- 20.06 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. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 20.07 Obtain and interpret scan tool data. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 20.08 Access and use service information to perform step-by-step diagnosis. (ESI). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 20.09 Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 21.0 DEMONSTRATE PROFICIENCY IN IGNITION SYSTEM DIAGNOSIS AND REPAIR  
--The student will be able to:
- 21.01 Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 21.02 Inspect and test ignition primary circuit wiring and components; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 21.03 Inspect and test distributor; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
- 21.04 Inspect and test ignition system secondary circuit wiring and components; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 21.05 Inspect and test ignition coil(s); perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 21.06 Check and adjust ignition system timing and timing advance/retard (where applicable). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 21.07 Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

- 22.0 DEMONSTRATE PROFICIENCY IN FUEL, AIR INDUCTION, POSITIVE CRANKCASE VENTILATION AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR --The student will be able to:
- 22.01 Diagnose hot or cold no-starting, hard starting, poor driveability, 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 necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
  - 22.02 Diagnose hot or cold no-starting, hard starting, poor driveability, and 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 necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 22.03 Check fuel for contaminants and quality; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
  - 22.04 Inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation and volume; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
  - 22.05 Replace fuel filters. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-1
  - 22.06 Inspect and test cold enrichment system and components; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
  - 22.07 Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. LA.A.142, LA.A.143, LA.A.244 P-2
  - 22.08 Inspect and test fuel injectors. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
  - 22.09 Check idle speed and fuel mixture. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
  - 22.10 Adjust idle speed and fuel mixture. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
  - 22.11 Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
  - 22.12 Perform exhaust system back-pressure test; determine necessary action. MA.B.442, MA.E.141 P-1
  - 22.13 Test the operation of turbocharger/supercharger systems; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
  - 22.14 Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
  - 22.15 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 23.0 DEMONSTRATE PROFICIENCY IN FUEL, AIR INDUCTION, POSITIVE CRANKCASE VENTILATION AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR --The student will be able to:
- 23.01 Diagnose emissions and driveability problems caused by failure of the exhaust gas recirculation (EGR) system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
  - 23.02 [6.51] Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

- 23.03 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas re-circulation (EGR) systems; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 23.04 Diagnose emissions and driveability problems resulting from failure of the secondary air injection and catalytic converter systems determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 23.05 Inspect and test mechanical components of secondary air injection systems; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
- 23.06 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 23.07 Inspect and test catalytic converter performance. LA.A.142, LA.A.143, LA.A.244 P-1
- 24.0 DEMONSTRATE PROFICIENCY IN INTAKE AIR TEMPERATURE CONTROLS, EARLY FUEL EVAPORATION (INTAKE MANIFOLD TEMPERATURE) CONTROLS AND EVAPORATIVE EMISSIONS CONTROLS --The student will be able to:
- 24.01 Diagnose emissions and driveability problems resulting from malfunctions in the intake air temperature control system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 24.02 Inspect and test components of intake air temperature control system; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 24.03 Diagnose emissions and driveability problems resulting from malfunctions of early fuel evaporation control systems; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 24.04 Inspect and test components of early fuel evaporation control system; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 24.05 Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 24.06 Inspect and test components and hoses of evaporative emissions control system; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 24.07 Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-1
- 25.0 DEMONSTRATE PROFICIENCY IN ENGINE RELATED SERVICE --The student will be able to:
- 25.01 Adjust valves on engines with mechanical or hydraulic lifters. LA.A.142, LA.A.143, LA.A.244 P-1
- 25.02 Remove and replace timing belt; verify correct camshaft timing. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 25.03 Remove and replace thermostat. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 25.04 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

**Florida Department of Education  
STUDENT PERFORMANCE STANDARDS**

**Course Title:** Automotive Service Technology 1  
**Course Number:** 8709410  
**Course Credit:** 1

**OCCUPATIONAL COMPLETION POINT - A**  
 AUTOMOTIVE LUBE TECHNICIAN

- 01.0 DEMONSTRATE PROFICIENCY IN THE EQUIPMENT SKILLS AND SAFETY REGULATIONS RELATING TO THE AUTOMOTIVE INDUSTRY--The student will be able to:
- 01.01 Apply shop safety rules, EPA and OSHA standards.  
LA.A.246, LA.A.247, LA.A.248
  - 01.02 Identify and use appropriate emergency first aid procedures  
LA.C.141, LA.C.142
  - 01.03 Identify, use and maintain hand and power tools properly.  
LA.C.141, LA.A.142, LA.A.241, LA.A.248
  - 01.04 Identify and practice using appropriate precision-measuring tools and torque methods.  
LA.A.244, LA.A.247, LA.C.241, LA.C.242, MA.B.241, MA.B.442
  - 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.  
LAA244, LAC141, MAB141
  - 01.06 Identify and use Metric and English measurement skills.  
LA.A.142, MA.B.143
  - 01.07 Use computer and operate keyboard.  
LA.A.244
  - 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.  
LA.A.244
  - 01.09 Identify and describe typical automotive lubricants and lubricant properties.  
LA.A.244, LA.C.142, LA.C.342
  - 01.10 Interpret the Federal 'Workers Right To Know Law'.  
LA.A.244, LA.A.143
  - 01.11 Identify and describe typical automotive seals and gaskets.  
LA.A.244, LA.C.141
  - 01.12 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.  
LA.A.248
  - 01.13 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.  
LA.A.248
  - 01.14 Describe and identify supplemental restraint systems (SRS).  
SC.C.246, SCC142, LAA244, LAA143,
  - 01.15 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.  
SC.C.246, SC.C.142, LA.A.241, LA.A.143, LA.A.142
- 02.0 DEMONSTRATE PROFICIENCY IN THE PROFICIENCY IN ROUTINE MAINTENANCE AND CONSUMER SERVICES AKA Light Line AKA General Service Technician--The student will be able to:

- 02.01 Inspect, test headlamps, tail lamps and stop lamps. Aim headlights.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.02 Perform oil and filter change including lubricating suspension and steering systems.  
SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.03 Service transmission; perform visual inspection; replace fluids and filters. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.04 Inspect engine assembly for fuel, oil, coolant, and other leaks. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.05 Inspect manual and power steering fluid levels and condition. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.06 Check rear axle drive assembly seals and vents; check lube level. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.07 Remove, inspect, and service front and rear wheel bearings on non-drive axles. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.08 Inspect tires and diagnose tire wear patterns. Check and adjust air pressure. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.09 Rotate tires according to manufacturer's recommendations, install wheels, torque lug nuts. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.10 Balance wheel and tire assembly (static and dynamic). SC.H.147, SC.C.246, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.11 Dismount, inspect, repair, and remount tire on wheel. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.12 Check master cylinder for internal and external leaks and proper operation. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.13 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.14 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.15 Select, handle, store, and install brake fluids to proper level. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.241, MA.B.442
- 02.16 Fill master cylinder with recommended fluid and seat pads. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.17 Inspect, clean, fill, and replace battery. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.18 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or perform necessary action. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.19 Start a vehicle using jumper cables using a battery auxiliary power supply. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.20 Perform slow/fast battery charge. SC.H.147, LA.A.244, LA.A.142, LA.A.143, MA.B.442
- 02.21 Observe dash warning lamps during bulb check. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.22 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals). SC.H.147, LA.A.244, LA.A.142, LAA143
- 02.23 Practice recommended precautions when handling static sensitive devices. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.24 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses;

- service or perform necessary action. SC.H.147, LA.A.244, LA.A.142, LA.A.143
- 02.25 Inspect, replace, and adjust drive belts and pulleys. LAA142, LAA143, LAA244
- 02.26 35.05 [08.29, 15.18] Inspect and replace engine cooling and heater system hoses. LA.A.142, LA.A.143, LA.A.244
- 02.27 Inspect, test, and replace thermostat and housing. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141
- 02.28 Perform cooling system pressure tests; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; service or perform necessary action. LA.A.142, LA.A.143, LA.A.244
- 02.29 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; service or perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141
- 02.30 Determine coolant condition; drain, flush, recover and refill cooling system with recommended coolant and bleed air as required. LA.A.142, LA.A.143, LA.A.244
- 02.31 Inspect, test, remove, and replace water pump. LA.A.142, LA.A.143, LA.A.244
- 02.32 Check parking brake operation; adjust as needed. LAA142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242
- 02.33 13.05 [08.37, 14.01] Use wiring diagrams to diagnose electrical circuit problems. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.34 Check electrical circuits with a test light; determine necessary action. SC.H.147, SC.C.242, LA.A.142, LA.A.143, LA.A.244
- 02.35 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM). SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242.
- 02.36 Check current flow in electrical/electronic circuits and components using an ammeter. SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242.
- 02.37 Check electrical circuits using a fused jumper wire. SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244
- 02.38 Measure and diagnose the cause(s) of abnormal key-off battery drain. SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.39 Inspect and test fusible links, circuit breakers, and fuses; perform necessary action. SC.H.147, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.40 Perform battery capacity (load, high-rate discharge) test; determine necessary service. SC.H.147, SC.C.242, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.41 Maintain or restore electronic memory functions. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.42 Perform starter current draw and circuit voltage drop test; determine necessary action. SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242
- 02.43 Remove and replace/reinstall starter. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.44 Perform charging system test. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.45 Remove, inspect, and replace/reinstall alternator. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.46 Demonstrate retrieving stored diagnostic trouble codes using a scan tool. SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442

- 02.47 Obtain and interpret digital multimeter (DMM) readings.  
SC.H.147, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.48 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.49 Replace a fuel filter. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.50 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or perform necessary action. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.51 Adjust valves on engines with mechanical lifters. SC.H.147, LA.A.142, LA.A.143, LA.A.244, MA.B.442
- 02.52 Remove and replace valve cover gaskets. SC.H.147, LA.A.142, LA.A.143, LA.A.244
- 02.53 Inspect passenger restraint system, repair if needed.  
SC.H.147, LA.A.142, LA.A.143, LA.A.244

**Florida Department of Education  
STUDENT PERFORMANCE STANDARDS**

**Course Title:** Automotive Service Technology 2  
**Course Number:** 8709420 (Automotive Service Technology 2)  
**Course Credit:** 1

**OCP B AUTOMOTIVE SERVICES ASSISTOR**  
 AUTOMOTIVE SERVICES ASSISTOR

- 26.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE MATH SKILLS--The student will be able to:
- 26.01 Read and interpret measuring devices (rules and tapes)  
MA.B.241, MA.B.242
  - 26.02 Solve number word problems. MA.A.343, MA.D.242, MA.C.241, MA.E.141, MA.B.142, MA.B.143, MA.B.241
  - 26.03 Write percents add fractions and decimals. MA.A.144
  - 26.04 Solve percent problems. MA.A.343
  - 26.05 Find the percent of a number. MA.A.342, MA.A.343
  - 26.06 Operate a calculator. MA.B.241
  - 26.07 Understand and use the metric system. MA.A.144
  - 26.08] Convert inches to millimeters and millimeters to inches.  
MA.A.144
  - 26.09 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders. MA.B.141, MA.B.341
  - 26.10 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.  
MA.B.441
  - 26.11 Add, subtract, multiply and divide using fractions, decimals, and whole numbers. MA.A.341, MA.A.342, MA.A.343
  - 26.12 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.  
MA.A.343
  - 26.13 Understand and interpret gears and gear ratios.  
MA.B.143, MA.C.241
- 27.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE UNDERSTANDING OF BASIC SCIENCES--The student will be able to:
- 27.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content. SC.A.142, MA.B.341, MA.B.442
  - 27.02 Draw conclusions or make inferences from data. SC.H.242, SC.H.147, LA.A.248, LA.A.142, MA.E.341, MA.E.342
  - 27.03 Related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.  
LA.A.244, LA.A.246, LA.A.143
  - 27.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A. SC.B.143, MA.B.242

- 29.0 DEMONSTRATE PROFICIENCY IN EMPLOYABILITY SKILLS--The student will be able to:
- 28.01 Identify employment requirements for an automotive career. LA.B.241, LA.B.242
  - 28.02 Identify documents which may be required when applying for a job. LA.A.241
  - 28.03 Complete a job application form correctly. LA.B.241, LA.B.242, LA.B.243
  - 28.04 Identify and adopt acceptable work habits. LA.D.142
  - 28.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens. LA.C.141, LA.C.142
  - 28.06 Demonstrate appropriate telephone/communication skills. LA.C.141, LA.C.342
  - 28.07 Conduct a job search. LA.A.246, LA.A.248
  - 28.08 Demonstrate competence in job interview techniques. LA.C.141, LA.C.342
  - 28.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees. LA.C.141, LA.C.143, LA.C.342
  - 28.10 Demonstrate knowledge of how to make job changes appropriately. LA.B.241, LA.B.242
- 29.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE COMMUNICATION SKILLS--The student will be able to:
- 29.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry. LA.B.241, LA.B.242, LA.B.243
  - 29.02 Read and follow written and oral instructions. LA.A.244, LA.A.241, LA.C.141.
  - 29.03 Answer and ask questions coherently and concisely. LA.C.342, LA.C.343, LA.C.344, LA.C.345
  - 29.04 Read critically by recognizing assumptions and implications and by evaluating ideas. LA.A.244, LA.A.246, LA.A.247
- 30.0 DEMONSTRATE PROFICIENCY IN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:
- 30.01 Define entrepreneurship. LA.A.142, LA.A.143, LA.A.241
  - 30.02 Describe the importance of entrepreneurship to the American economy. LA.A.248
  - 30.03 List the advantages and disadvantages of business ownership. LA.C.141, LA.B.242
  - 30.04 Identify the risks involved in ownership of business. LA.C.141, LA.B.242
  - 30.05 Identify the necessary personal characteristics of a successful entrepreneur. LA.C.141, LA.B.242
  - 30.06 Identify the business skills needed to operate a small business efficiently and effectively. LA.C.141, LA.B.242, MA.A.343
  - 30.07 Identify and apply communication skills used in automotive careers. LA.C.141, LA.C.143, LA.C.342, LA.C.344

- 31.0 DEMONSTRATE PROFICIENCY IN ACCEPTABLE EMPLOYEE BEHAVIOR IN THE AUTOMOTIVE INDUSTRY--The student will be able to:
- 31.01 Explain the effects of chemical/substance abuse. LA.C.343
  - 31.02 Identify principles of stress management. LA.C.141
  - 31.03 Identify and define career opportunities in the automotive service industry. LA.C.141, LA.A.244
  - 31.04 Demonstrate acceptable industry dress code.
  - 31.05 Identify and demonstrate proper customer relation skills. LA.C.141, LA.C.344
  - 31.06 Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems. LA.B.243, LA.A.244, LA.A.143, MA.A.343, MA.B.341
  - 31.07 Identify principles of time management. MA.B.341
  - 31.08 Identify acceptable customer relations. LA.C.141, LA.C.344

Florida Department of Education  
STUDENT PERFORMANCE STANDARDS

**Course Title:** Automotive Service Technology 3  
**Course Number:** 8709430  
**Course Credit:** 1

**OCCUPATIONAL COMPLETION POINT - C (ENGINE REPAIR TECHNICIAN)**

32.0 DEMONSTRATE PROFICIENCY IN GENERAL ENGINE DIAGNOSIS --The student will be able to:

- 32.01 Identify and interpret engine concern; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 32.02 Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244 P-1
- 32.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). LA.A.142, LA.A.143, LA.A.244 P-1
- 32.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 32.05 Diagnose engine noises and vibrations; determine necessary action. LA.A.42, LA.A.143, LA.A.244 P-3
- 32.06 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 32.07 Perform engine vacuum tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-1
- 32.08 Perform cylinder power balance tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.A.343 P-1
- 32.09 Perform cylinder compression tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.A.343 P-1
- 32.10 Perform cylinder leakage tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141. P-1
- 32.11 Remove and reinstall engine in a late model front-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition. LA.A.142, LA.A.143, LA.A.244 P-1
- 32.12 Remove and reinstall engine in a late model rear-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition. LA.A.142, LA.A.143, LA.A.244 P-3

33.0 DEMONSTRATE PROFICIENCY IN CYLINDER HEAD AND VALVE TRAIN DIAGNOSIS AND REPAIR --The student will be able to:

- 33.02 Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 33.02 Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 33.03 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.04 Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks, and valve grooves; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

- 33.05 Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-3
- 33.06 Inspect valves and valve seats; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-3
- 33.07 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
- 33.08 Check valve spring assembled height and valve stem height; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
- 33.09 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.10 Inspect hydraulic or mechanical lifters; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.11 Adjust valves (mechanical or hydraulic lifters). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 33.13 Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear;) determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 33.13 Inspect and replace timing belt(s), overhead camdrive sprockets and tensioners; check belt tension; adjust as necessary. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 33.14 Inspect camshaft for run out; journal wear and lobe wear. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 33.15 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, P-3
- 33.16 Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-1
- 34.0 DEMONSTRATE PROFICIENCY IN ENGINE BLOCK DIAGNOSIS AND REPAIR --The student will be able to:
- 34.01 Disassemble engine block; clean and prepare components for inspection and reassembly. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.441, MA.B.241 P-2
- 34.02 Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 34.03 Inspect internal and external threads; restore as needed (includes installing thread inserts). LA.A.142, LA.A.143, LA.A.244 P-1
- 34.04 Inspect and measure cylinder walls for damage, wear, and ridges; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.441, MA.B.241 P-2
- 34.05 Inspect and measure cylinder walls for damage and wear; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 34.06 Deglaze and clean cylinder walls. LA.A.142, LA.A.143, LA.A.244 P-1
- 34.07 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.441, MA.B.241 P-3

- 34.08 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241 P-2
- 34.09 Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition. LA.A.142, LA.A.143, LA.A.244 P-3
- 34.10 Inspect and measure pistons; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 34.13 Remove and replace piston pin. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-3
- 34.14 Inspect, measure, and install piston rings. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 34.13 Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 34.14 Inspect, repair or replace crankshaft vibration damper (harmonic balancer). LA.A.142, LA.A.143, LA.A.244 P-3
- 34.15 Assemble the engine using gaskets, seals, and formed-in-place (tube-applied) sealants, thread sealers, etc. according to manufacturer's specifications. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241 P-2
- 34.16 Inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, P-2
- 35.0 DEMONSTRATE PROFICIENCY IN LUBRICATION AND COOLING SYSTEMS DIAGNOSIS AND REPAIRS --The student will be able to:
- 35.01 Perform oil pressure tests; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 35.02 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.441, MA.E.141 P-3
- 35.03 Perform cooling system, cap and recovery tests (pressure, combustion leakage, and temperature); determine necessary action. LA.A.142, LA.A.143, LA.A.241, MA.B.442, MA.E.141 P-1
- 35.04 Inspect, replace, and adjust drive belts, tensioners and pulleys. LA.A.142, LA.A.143, LA.A.244, MA..B442 P-1
- 35.05 Inspect and replace engine cooling and heater system hoses. LA.A.142, LA.A.143, LA.A.244 P-2
- 35.06 Inspect, test, and replace thermostat and housing. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 35.07 Test coolant; drain and recover, flush, and refill cooling system with recommended coolant and bleed air as required. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 35.08 Inspect, test, remove, and replace water pump. LA.A.142, LA.A.143, LA.A.244 P-2
- 35.09 Remove and replace radiator. LA.A.142, LA.A.143, LA.A.244 P-2
- 35.10 Inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 35.11 Inspect auxiliary oil coolers; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3

35.12 Inspect, test, and replace oil temperature and pressure switches and sensors.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

35.13 Perform oil and filter change. SC.H.346, LA.A.142, LA.A.143,  
LA.A.244 P-1

**Florida Department of Education  
STUDENT PERFORMANCE STANDARDS**

**Course Title:** Automotive Service Technology 4  
**Course Number:** 8709440  
**Course Credit:** 1

**OCCUPATIONAL COMPLETION POINT - D**

## AUTOMATIC TRANSMISSION AND TRANSAXLE TECHNICIAN

46.0 DEMONSTRATE PROFICIENCY IN THE OPERATION AND SERVICING OF AUTOMATIC TRANSMISSION/TRANSAXLE--The student will be able to:

- |       |  |     |
|-------|--|-----|
| 46.01 | Identify and interpret transmission concern; assure proper engine operation; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141   | P-1 |
| 46.02 | Research applicable vehicle and service information, such as transmission/transaxle system operation, vehicle service history, service precautions, and technical service bulletins.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 | P-1 |
| 46.03 | Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141   | P-1 |
| 46.04 | Diagnose fluid usage, level, and condition concerns; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244   | P-1 |
| 46.05 | Perform pressure tests; determine necessary action.<br>S.C.H346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-1 |
| 46.06 | Perform lock-up converter system tests; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-2 |
| 46.07 | Diagnose electronic, mechanical, hydraulic, vacuum control systems concerns; determine necessary action.<br>SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141   | P-1 |
| 46.08 | Diagnose noise and vibration concerns; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244   | P-2 |
| 46.09 | Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-1 |
|       |  |     |
| 47.0  | <u>DEMONSTRATE PROFICIENCY IN TRANSMISSION/TRANSAXLE MAINTENANCE, ADJUSTMENT AND IN-VEHICLE TRANSMISSION/TRANSAXLE REPAIR</u> --The student will be able to:   |     |
| 47.01 | Inspect, adjust or replace throttle valve (TV) linkages or cables; manual shift linkages or cables; transmission range sensor; check gear select indicator (as applicable). LA.A.142, LA.A.143, LA.A.244                                 | P-1 |
| 47.02 | Service transmission; perform visual inspection; replace fluids and filters. LA.A.142, LA.A.143, LA.A.244  | P-1 |
| 47.03 | Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.<br>LA.A.142, LA.A.143, LA.A.244  | P-3 |
| 47.04 | Inspect, repair, and replace governor assembly. LA.A.142, LA.A.143, LA.A.244   | P-3 |
| 47.05 | Inspect and replace external seals and gaskets.<br>LA.A.142, LA.A.143, LA.A.244  | P-2 |
| 47.06 | Inspect extension housing; bushings and seals; perform necessary action. LA.A.142, LA.A.143, LA.A.244  | P-3 |
| 47.07 | Inspect, leak test, flush, and replace cooler, lines, and fittings. LA.A.142, LA.A.143, LA.A.244   | P-1 |

- 47.08 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 47.09 Diagnose electronic transmission control systems using a scan tool; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.242, MA.E.141 P-1
- 47.10 Inspect, replace, and align powertrain mounts. LA.A.142, LA.A.143, LA.A.244 P-3
- 48.0 DEMONSTRATE PROFICIENCY IN OFF-VEHICLE TRANSMISSION/TRANSAXLE REPAIR (REMOVAL, DISASSEMBLY, AND REINSTALLATION), OIL PUMP AND CONVERTER  
--The student will be able to:
- 48.01 Remove and reinstall transmission and torque converter (rear-wheel drive). LA.A.142, LA.A.143, LA.A.244 P-2
- 48.02 Remove and reinstall transaxle and torque converter assembly. LA.A.142, LA.A.143, LA.A.244 P-2
- 48.03 Disassemble, clean, and inspect transmission/trans-axle. LA.A.142, LA.A.143, LA.A.244 P-1
- 48.04 Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets), and torque valve body bolts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 48.05 Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 48.06 Inspect accumulator bore, piston, seals, spring, and retainers; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 48.07 Assemble transmission/trans-axle. LA.A.142, LA.A.143, LA.A.244 P-1
- 48.08 Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas. LA.A.142, LA.A.143, LA.A.244 P-2
- 48.09 Measure torque converter end play and check for interference; check stator clutch. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 48.10 Inspect, measure, and replace oil pump assembly and components. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 49.0 DEMONSTRATE PROFICIENCY IN GEAR TRAIN, SHAFTS, BUSHINGS, CASE, FRICTION UNITS AND REACTION UNITS --The student will be able to:
- 49.01 Measure end play or preload; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 49.02 Inspect, measure, and replace thrust washers and bearings. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 49.03 Inspect oil delivery seal rings, ring grooves, and sealing surface areas. LA.A.142, LA.A.143, LA.A.244 P-2
- 49.04 Inspect bushings; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 49.05 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 49.06 Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 49.07 [10.34] Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2

- 49.08 Inspect, measure, repair, adjust or replace transaxle final drive components. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 49.09 Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 49.10 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 49.11 Measure clutch pack clearance; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 49.12 Air test operation of clutch and servo assemblies. LA.A.142, LA.A.143, LA.A.244 P-1
- 49.13 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed. LA.A.142, LA.A.143, LA.A.244 P-1
- 49.14 Inspect bands and drums; adjust or determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

Florida Department of Education  
STUDENT PERFORMANCE STANDARDS

**Course Title:** Automotive Service Technology 5  
**Course Number:** 87094450  
**Course Credit:** 1

**OCCUPATIONAL COMPLETION POINT - E**

## MANUAL DRIVETRAIN AND AXLE TECHNICIAN

- 41.0 DEMONSTRATE PROFICIENCY IN GENERAL DRIVE TRAIN DIAGNOSIS, CLUTCH DIAGNOSIS AND REPAIR --The student will be able to:
- 41.01 Identify and interpret drive train concern; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-1
- 41.02 Research applicable vehicle and service information, such as drive train system operation, vehicle service history, service precautions, and technical service bulletins.  
LA.A.142, LA.A.143, LA.A.244 P-1
- 41.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).  
LA.A.142, LA.A.143, LA.A.244 P-1
- 41.04 Diagnose fluid usage, level, and condition concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 41.05 Drain and fill manual transmission/transaxle and final drive unit.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 41.06 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 41.07 Inspect, clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 41.08 Inspect, hydraulic clutch slave and master-cylinders, lines and hoses; perform necessary action. LA.A.142, LA.A.143, LAA244 P-1
- 41.09 Inspect, release (throw-out) bearing, lever, and pivot; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 41.10 Inspect and replace clutch pressure plate assembly and clutch disc. LA.A.142, LA.A.143, LA.A.244 P-1
- 41.11 Bleed clutch hydraulic system. LA.A.142, LA.A.143, LA.A.244 P-1
- 41.12 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable). P-1
- 41.13 Inspect, flywheel and ring gear for wear and cracks, measure run out; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 41.14 Inspect engine block, clutch (bell) housing, and transmission/trans-axle case mating surface; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 41.15 Measure flywheel-to-block run out and crankshaft end play; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 42.0 DEMONSTRATE PROFICIENCY IN TRANSMISSION & TRANSAXLE DIAGNOSIS AND REPAIR --The student will be able to:
- 42.01 Remove and reinstall transmission/transaxle. LA.A.142, LA.A.143,

	LA.A.244	P-1
42.02	Disassemble, clean, and reassemble transmission/transaxle components. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-2
42.03	Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-3
42.04	Diagnose noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action. LA.A.142, LA.A.143, LA.A.244	P-2
42.05	Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers. LA.A.142, LA.A.143, LA.A.244	P-2
42.06	Inspect and reinstall powertrain mounts. LA.A.142, LA.A.143, LA.A.244	P-3
42.07	Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. LA.A.142, LA.A.143, LA.A.244	P-2
42.08	Remove and replace transaxle final drive. LA.A.142, LA.A.143, LA.A.244	P-3
42.09	Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanisms, interlocks, and springs. LA.A.142, LA.A.143, LA.A.244	P-2
42.10	Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-1
42.12	Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. LA.A.142, LA.A.143, LA.A.244	P-2
42.13	Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. LA.A.142, LA.A.143, LA.A.244	P-2
42.14	Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244	P-3
42.15	Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-2
42.16	Inspect lubrication devices (oil pump or slingers); perform necessary action. LA.A.142, LA.A.143, LA.A.244	P-3
42.17	Inspect, test, and replace transmission/transaxle sensors and switches. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-1
43.0	<u>DEMONSTRATE PROFICIENCY IN DRIVE AND HALF SHAFT UNIVERSAL AND CONSTANT- VELOCITY (CV) JOINT DIAGNOSIS AND REPAIR</u> --The student will be able to:	
43.01	Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244	P-1
43.02	Diagnose universal joint noise and vibration concerns; perform necessary action. LA.A.142, LA.A.143, LA.A.244	P-1
43.03	Replace front wheel drive (FWD) front wheel bearing. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-2
43.04	Inspect, service, and replace shafts, yokes, boots, and CV joints. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141	P-1
43.05	Inspect, service, and replace shaft center support bearings. LA.A.142, LA.A.143, LA.A.244	P-3

- 43.06 Check shaft balance; measure shaft run out; measure and adjust driveline angles. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.142, MA.B.241 P-2
- 44.0 DEMONSTRATE PROFICIENCY IN REAR AXLE DIAGNOSIS AND REPAIR; RING AND PINION GEARS, DIFFERENTIAL CASE ASSEMBLY AND LIMITED SLIP DIFFERENTIAL --The student will be able to:
- 44.01 Diagnose noise and vibration concerns; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 44.02 Diagnose fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 44.03 Inspect and replace companion flange and pinion seal; measure companion flange run out. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.04 Inspect ring gear and measure run out; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.05 Remove, inspect, and reinstall drive pinion and ring, gear, spacers, sleeves, and bearings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.06 Measure and adjust drive pinion depth. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.07 Measure and adjust drive pinion bearing preload. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 44.08 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup and shim types). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.09 Check ring and pinion tooth contact patterns; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.241 P-1
- 44.10 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241 P-2
- 44.11 Reassemble and reinstall differential case assembly; measure run out; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 44.12 Diagnose noise, slippage, and chatter concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 44.13 Inspect and flush differential housing; refill with correct lubricant. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-2
- 44.14 Inspect and reinstall clutch (cone or plate) components. LA.A.142, LA.A.143, LA.A.244 P-3
- 44.15 Measure rotating torque; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.0 DEMONSTRATE PROFICIENCY IN DRIVE AXLE SHAFT AND FOUR-WHEEL DRIVE/ALL-WHEEL DRIVE COMPONENT DIAGNOSIS AND REPAIR --The student will be able to:
- 45.01 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 45.02 Inspect and replace rear axle shaft wheel studs. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-3
- 45.03 Remove and replace drive axle shafts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 45.04 Inspect and replace drive axle shaft seals, bearings, and retainers. LA.A.142, LA.A.143, LA.A.244 P-2

- 45.05 Measure drive axle flange run out and shaft end play; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 45.06 Diagnose noise, vibration, and unusual steering concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 45.07 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.08 Remove and reinstall transfer case. LA.A.142, LA.A.143, LA.A.244 P-3
- 45.09 Disassemble, service, and reassemble transfer case and components. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.10 Inspect, front-wheel bearings and locking hubs; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 45.11 Check drive assembly seals and vents; check lube level. LA.A.142, LA.A.143, LA.A.244 P-3
- 45.12 Diagnose, test, adjust and replace electrical/electronic components of four-wheel drive systems. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3

Florida Department of Education  
STUDENT PERFORMANCE STANDARDS

Course Title: Automotive Service Technology 6  
Course Number: 8709460  
Course Credit: 1

OCCUPATIONAL COMPLETION POINT - F

AUTOMOTIVE SUSPENSION AND STEERING TECHNICIAN

09.0 DEMONSTRATE PROFICIENCY IN GENERAL SUSPENSION AND STEERING SYSTEM DIAGNOSIS---

The student will be able to:

- 09.01 Identify and interpret suspension and steering concern; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.02 Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). P-1
- 09.04 Disable and enable supplemental restraint system (SRS) LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.05 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-1
- 09.06 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.341 P-3
- 09.07 Diagnose power steering (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.341 P-3
- 09.08 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering and fluid leakage concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.341 P-3
- 09.09 Inspect steering shaft universal-joint(s), flexible coupling (s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 09.10 Adjust manual or power non-rack and pinion worm bearing preload and sector lash. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 09.11 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. LA.A.142, LA.A.143, LA.A.244 P-2
- 09.12 Adjust manual or power rack and pinion steering gear. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 09.13 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. LA.A.142, LA.A.143, LA.A.244 P-1
- 09.14 Inspect power steering fluid levels and condition. LA.A.142, LA.A.143, LA.A.244 P-1
- 09.15 Flush, fill, and bleed power steering system. LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-2
- 09.16 Diagnose power steering fluid leakage; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2

- 09.17 Remove and reinstall replace, and adjust power steering pump belt.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 09.18 Remove and reinstall power steering pump.  
LA.A.142, LA.A.143, LA.A.244 P-3
- 09.19 Remove and reinstall power steering pump pulley; check pulley and belt alignment. LA.A.142, LA.A.143, LA.A.244 P-3
- 09.20 Inspect and replace power steering hoses and fittings.  
LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-2
- 09.21 Inspect and replace power steering hoses and fittings.  
LA.A.142, LA.A.143, LA.A.244, MA.E.141 P-2
- 09.22 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.  
LA.A.142, LA.A.143, LA.A.244. MA.B.442, MA.E.141 P-3
- 09.23 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. LA.A.142, LA.A.143, LA.A.244
- 09.24 Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 10.0 DEMONSTRATE PROFICIENCY IN SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR; FRONT SUSPENSIONS --The student will be able to:
- 10.01 Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.442, MA.E.141 P-1
- 10.02 Diagnose strut suspension system noises body sway, and uneven riding height concerns; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.241 P-1
- 10.03 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.04 Remove, inspect, install, and adjust strut rods(compression/tension) and bushings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.05 Remove, inspect, and install upper and lower ball joints.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.06 Remove, inspect, and install steering knuckle assemblies.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 10.07 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.  
LA.A.142, LA.A.143, LA.A.244, MA.B.242, MA.B.442, MA.E.141 P-2
- 10.08 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 10.09 Remove, inspect and install stabilizer bar bushings, bracket and links.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 10.10 Remove, inspect, and replace strut cartridge or assembly, strut coil spring, (silencers) insulators, and upper strut bearing mount. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 10.11 Lubricate suspension and steering systems.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 11.0 DEMONSTRATE PROFICIENCY IN SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR; REAR SUSPENSIONS, WHEEL ALIGNMENT DIAGNOSIS, ADJUSTMENT, REPAIR AND MISCELLANEOUS SERVICE --The student will be able to:
- 11.01 Remove, inspect, and install coil springs and spring insulators.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.02 Remove, inspect, and install transverse links, control arms, bushings, and mounts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

- 11.03 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 11.04 Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.05 Inspect, remove, and replace shock absorbers. LA.A.142, LA.A.143, LA.A.244 P-1
- 11.06 Remove, inspect, and service or replace front and rear wheel bearings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.07 Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 11.08 Differentiate between steering and suspension concerns using principles of steering geometry (caster, camber, toe, etc). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.09 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.10 Perform pre-alignment inspection; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.11 Measure vehicle riding height; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.12 Check and adjust front and rear wheel camber; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.242, MA.B.442, MA.E.141 P-1
- 11.13 Check and adjust caster; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.242, MA.B.442, MA.E.141 P-1
- 11.14 Check and adjust front wheel toe; adjust as needed. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242
- 11.15 Center steering wheel. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 11.16 Check toe-out-on-turns (turning radius); determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 11.17 Check SAI (steering axis inclination) and included angle; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.18 Check and adjust rear wheel toe. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 11.19 Check rear wheel thrust angle; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 11.20 Check for front wheel setback; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 11.21 Check front cradle (sub-frame) alignment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 12.0 DEMONSTRATE PROFICIENCY IN WHEEL AND TIRE DIAGNOSIS AND REPAIR --The student will be able to:
- 12.01 Diagnose tire wear patterns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.02 Inspect tires; check and adjust air pressure. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1

- 12.03 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 12.04 Rotate tires according to manufacturer's recommendations. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.05 Measure wheel, tire, axle, and hub run out; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MAE141, MAB241, MAB242 P-2
- 12.06 Diagnose tire pull (lead) problem; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 12.07 Balance wheel and tire assembly (static and dynamic) SC.C.246, SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.08 Dismount, inspect, repair, and remount tire on wheel. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 12.09 Reinstall wheel; torque lug nuts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 12.10 Inspect and repair tire. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141

Florida Department of Education  
STUDENT PERFORMANCE STANDARDS

**Course Title:** Automotive Service Technology 7  
**Course Number:** 8709470  
**Course Credit:** 1

**OCCUPATIONAL COMPLETION POINT - G**  
AUTOMOTIVE BRAKE TECHNICIAN

03.0 DEMONSTRATE PROFICIENCY IN GENERAL BRAKE SYSTEM DIAGNOSIS AND HYDRAULIC SYSTEM DIAGNOSIS AND REPAIR--The student will be able to:

- |       |  |     |
|-------|--|-----|
| 03.01 | Identify and interpret brake system concern; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141   | P-1 |
| 03.02 | Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141           | P-1 |
| 03.03 | Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141   | P-1 |
| 03.04 | Diagnose pressure concerns in the brake system using hydraulic principles (Paschal's Law).   | P-1 |
| 03.05 | Measure brake pedal height; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-2 |
| 03.06 | Check master cylinder for internal and external leaks and proper operation; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-2 |
| 03.07 | Remove, bench bleed, and reinstall master cylinder.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-1 |
| 03.08 | Diagnose poor stopping, pulling or dragging concerns caused by problems in the hydraulic system; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-1 |
| 03.09 | Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 | P-2 |
| 03.10 | Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.241, MA.B.442, MA.E.141   | P-2 |
| 03.11 | Select, handle, store, and install brake fluids to proper level.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141   | P-1 |
| 03.12 | Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-3 |
| 03.13 | Inspect, test, replace, and adjust height (load) sensing proportioning valve.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-3 |
| 03.14 | Inspect, test, and replace components of brake warning light system. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-3 |
| 03.15 | Bleed (manual, pressure, vacuum or surge) brake system.<br>LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141  | P-1 |
| 03.16 | Flush hydraulic system.<br>LA.A.142, LA.A.143, LA.A.244  | P-3 |

- 04.0 DEMONSTRATE PROFICIENCY IN DRUM BRAKE DIAGNOSIS AND REPAIR --The student will be able to:
- 04.01 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 04.02 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 04.03 Refinish Brake Drum. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
  - 04.04 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
  - 04.05 Remove and inspect wheel cylinders. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
  - 04.06 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 04.07 Install wheel, torque lug nuts, and make final checks and adjustments. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.E.241, MA.B.442, MA.B.242 P-1
- 05.0 DEMONSTRATE PROFICIENCY IN THE OPERATION OF DISC BRAKE DIAGNOSIS AND REPAIR--The student will be able to:
- 05.01 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.E.141, MA.B.242 P-1
  - 05.02 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 05.03 [13.22] Clean and inspect caliper mounting and slides for wear and damage; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 05.04 Remove, clean, and inspect pads and retaining hardware; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 05.05 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 05.06 Reassemble, lubricate, and reinstall caliper, pads, and related hardware, seat pads, and inspect for leaks. LA.A.142, LAA143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 05.07 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 05.08 Remove and replace rotor. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MAB242 P-1
  - 05.09 Refinish rotor according to manufacturer's recommendations. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1

- 05.10 Adjust calipers with integrated parking brake system.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 05.11 Install wheel, torque lug nuts, and make final checks and adjustments.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 06.0 DEMONSTRATE PROFICIENCY IN THE OPERATION OF POWER ASSIST UNITS DIAGNOSIS AND REPAIR--The student will be able to:
- 06.01 Test pedal free travel with and without engine running; check power assist operation. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 06.02 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 06.03 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 06.04 Inspect and test hydro-boost system and accumulator for leaks and proper operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 07.0 DEMONSTRATE PROFICIENCY IN MISCELLANEOUS (WHEEL BEARINGS, PARKING BRAKES, ELECTRICAL, ETC.) DIAGNOSIS AND REPAIR--The student will be able to:
- 07.01 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 07.02 Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 07.03 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 07.04 Check parking brake operation; adjust as needed. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 07.05 Check operation of parking brake indicator light system. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 07.06 Check operation of brake stop light system; determine necessary action. LA.A.142, LA.A.143, LA.A.244 MA.B.442, MA.E.141, MA.B.242 P-1
- 07.07 Replace wheel bearing and race. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 07.08 Inspect and replace wheel studs. LA.A.142, LA.A.143, LA.A.244 P-1
- 07.09 Remove and reinstall sealed wheel bearing assembly. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 08.0 DEMONSTRATE PROFICIENCY IN ANTILOCK BRAKE SYSTEM --The student will be able to:
- 08.01 Inspect, and test antilock brake system (ABS) components; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 08.02 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the antilock brake system (ABS); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2

- 08.03 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 08.04 Depressurize high pressure components of the antilock brake system (ABS) following manufacturer's recommended safety procedures. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MAB.241, MA.B.242 P-2
- 08.05 Bleed the antilock brake system's (ABS) front and rear hydraulic circuits following manufacturer's procedures. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 08.06 Remove and install antilock brake system (ABS) electrical/electronic/hydraulic components. LA.A.142, LA.A.143, LA.A.244, MAB442, MA.E.141, MA.B.241, MA.B.242 P-3
- 08.08 Test, diagnose and service 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). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 08.08 Diagnose antilock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 08.09 Identify traction control system components. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3

**Florida Department of Education  
STUDENT PERFORMANCE STANDARDS**

**Course Title:** Automotive Service Technology 8/9  
**Course Number:** 8709480 (Automotive Service Technology 8)  
 8709490 (Automotive Service Technology 9)  
**Course Credit:** 1 (Automotive Service Technology 9)  
 1 (Automotive Service Technology 10)

**OCCUPATIONAL COMPLETION POINT - H**

AUTOMOTIVE ELECTRICAL/ELECTRONIC SYSTEM TECHNICIAN

- 13.0 DEMONSTRATE PROFICIENCY IN DIAGNOSING/TROUBLESHOOTING ELECTRICAL/ELECTRONIC COMPONENTS RELATED TO POWER TRAIN--The student will be able to:
- 13.01 Identify and interpret electrical/electronic system concern; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 13.02 Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 13.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 13.04 Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 13.05 Use wiring diagrams during diagnosis of electrical circuit problems. LA.A.142, LA.A.143, LA.A.244, MA.B.141, MA.B.241, MA.B.242 P-1
  - 13.06 Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 13.07 Check electrical circuits with a test light; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
  - 13.08 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
  - 13.09 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
  - 13.10 Check continuity and resistance(s) in electrical/electronic circuits and components with an ohmmeter; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
  - 13.11 Check electrical circuits using fused jumper wires; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
  - 13.12 Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.

- SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.B.141,  
MA.B.241, MA.B.242 P-1
- 13.13 Measure and diagnose the cause(s) of abnormal key-off battery drain;  
determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143,  
LA.A.244, MA.B.442, MA.B.141, MA.B.241, MA.B.242 P-1
- 13.14 Inspect and test fusible links, circuit breakers, and fuses; determine  
necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244,  
MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 13.15 Inspect and test switches, connectors, relays, and wires of  
electrical/electronic circuits; repair or perform necessary action.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 13.16 Repair wiring harnesses and connectors.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 13.17 Perform solder repair of electrical wiring. LA.A.142, LA.A.143,  
LA.A.244 P-1
- 14.0 DEMONSTRATE PROFICIENCY IN BATTERY DIAGNOSIS AND SERVICE --The student will be  
able to:
- 14.01 Perform battery state-of-charge test; determine needed service.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 14.02 Perform battery capacity test; conform proper battery capacity for vehicle  
determine necessary action.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 14.03 Maintain or restore electronic memory functions.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.E.141,  
MA.B.242 P-2
- 14.04 Inspect, clean, fill, and replace battery.  
SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242 P-2
- 14.05 Perform slow/fast battery charge.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242 P-2
- 14.06 Inspect and clean battery cables, connectors, clamps,  
and hold-downs; repair or replace as needed.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242 P-1
- 14.07 Start a vehicle using jumper cables and a battery or auxiliary power  
supply. SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.241, MA.B.242 P-1
- 15.0 DEMONSTRATE PROFICIENCY IN STARTING SYSTEM DIAGNOSIS AND REPAIR  
--The student will be able to:
- 15.01 Perform starter current draw tests. Determine necessary action.  
SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.242 P-1
- 15.02 Perform starter circuit voltage drop tests; determine  
necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244,  
MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 15.03 Inspect and test starter relays and solenoids; determine necessary  
action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141, MA.B.241, MA.B.242 P-2
- 15.04 Remove and install starter in a vehicle.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 15.05 Inspect, and test switches, connectors, and wires of starter control  
circuits; perform necessary action.

LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241,  
MA.B.242

P-2

15.06 Differentiate between electrical and engine mechanical problems that  
cause a slow-crank or no-crank condition. LA.A.142, LA.A.143,  
LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242

P-2

Florida Department of Education  
STUDENT PERFORMANCE STANDARDS

**Course Title:** Automotive Service Technology 8/9  
**Course Number:** 8709480 (Automotive Service Technology 8)  
 8709490 (Automotive Service Technology 9)  
**Course Credit:** 1 (Automotive Service Technology 8)  
 1 (Automotive Service Technology 9)

**OCCUPATIONAL COMPLETION POINT - H**  
 AUTOMOTIVE ELECTRICAL/ELECTRONIC SYSTEM TECHNICIAN

- 16.0 DEMONSTRATE PROFICIENCY IN CHARGING SYSTEM DIAGNOSIS AND REPAIR  
 --The student will be able to:
- 16.01 Perform charging system output test; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.142, MA.E.141, MA.B.242 P-1
  - 16.02 Diagnose charging system for the cause of undercharge, no charge, and overcharge conditions. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 16.03 Inspect and adjust generator (alternator) drive belts, pulleys and tensioners; check pulley and belt alignment. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 16.04 Inspect and test voltage regulator/regulating circuit; perform necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
  - 16.05 Remove, inspect, and install generator (alternator). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
  - 16.06 Perform charging circuit voltage drop tests; determine necessary action. SC.H.346, SC.C.242, MA.B.442, MA.E.141, MA.B.242, P-1
- 17.0 DEMONSTRATE PROFICIENCY IN LIGHTING SYSTEMS, GAUGES, WARNING DEVICES, AND DRIVER INFORMATION SYSTEMS DIAGNOSIS AND REPAIR --The student will be able to:
- 17.01 Diagnose the cause of brighter than normal, intermittent, dim or no light operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
  - 17.02 Inspect, replace, and aim headlights and bulbs. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MAB242 P-2
  - 17.03 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
  - 17.04 Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
  - 17.05 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
  - 17.06 Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1

- 17.07 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; determine necessary action. SC.H.346, SC.C.242, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.0 DEMONSTRATE PROFICIENCY IN HORN AND WIPER/WASHER AND ACCESSORIES DIAGNOSIS AND REPAIR --The student will be able to:
- 18.01 Diagnose incorrect horn operation; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 18.02 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.03 Diagnose incorrect washer operation; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.04 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 18.05 Diagnose incorrect heated glass operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 18.06 Diagnose incorrect electric lock operation; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.07 Diagnose incorrect operation of cruise control systems; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.08 Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 18.09 Diagnose radio static and weak, intermittent, or no radio reception, determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.10 Disarm and enable the airbag system for vehicle service. LA.A.142, LA.A.143, LA.A.44, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 18.11 Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.12 Remove and reinstall door panel. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 18.13 Diagnose body electronic system circuits using a scan tool; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 18.14 Check for module communication errors using a scan tool. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-3
- 18.15 Diagnose the cause of false, intermittent, or no operation of anti-theft system. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2

**Florida Department of Education  
STUDENT PERFORMANCE STANDARDS**

**Course Title:** Automotive Service Technology 10  
**Course Number:** 8709491  
**Course Credit:** 1

**OCCUPATIONAL COMPLETION POINT - I**

## AUTOMOTIVE HEATING AND AIR-CONDITIONING TECHNICIAN

- 36.0 DEMONSTRATE PROFICIENCY IN A/C SYSTEM DIAGNOSIS AND REPAIR --The student will be able to:
- 36.01 Identify and interpret heating and air conditioning concern; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.02 Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 36.04 Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.05 Diagnose unusual operating noises in the A/C system; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 36.06 Identify refrigerant type; conduct a performance test of the A/C System; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 36.07 Leak test A/C system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 36.08 Inspect the condition of discharged oil; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442 P-2
- 36.09 Determine recommended oil for system application. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-1
- 37.0 DEMONSTRATE PROFICIENCY IN REFRIGERATION SYSTEM COMPONENT DIAGNOSIS AND REPAIR OF COMPRESSOR, COMPRESSOR CLUTCH, EVAPORATOR, RECEIVER/DRIER, CONDENSER, ETC. --The student will be able to:
- 37.01 Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241, MA.B.242 P-2
- 37.02 Inspect A/C compressor drive belts; replace and adjust as needed. LA.A.142, LA.A.143, LA.A.244 P-2
- 37.03 Inspect, test, and replace A/C compressor clutch components or assembly. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.241 P-2
- 37.04 Remove and replace A/C compressor and mountings; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 37.05 Determine need for A/C system filter; perform necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 37.06 Remove and inspect A/C system mufflers, hoses, lines, fittings,

- o-rings, seals, and service valves; perform necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 37.07 Inspect A/C condenser for air flow restrictions; perform  
necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 37.08 Remove and install receiver/drier or accumulator/drier.  
LA.A.142, LA.A.143, LA.A.244 P-1
- 37.09 Remove and install expansion valve or orifice (expansion) tube.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 37.10 Inspect evaporator housing water drain; perform necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-3
- 37.11 Remove and reinstall evaporator; measure oil quantity; determine  
necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 37.12 Remove and reinstall condenser; measure oil quantity; determine  
necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 38.0 DEMONSTRATE PROFICIENCY IN HEATING AND ENGINE COOLING SYSTEMS DIAGNOSIS AND  
REPAIR --The student will be able to:
- 38.01 Diagnose temperature control problems in the heater/ventilation  
system; determine necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-2
- 38.02 Perform cooling system, cap, and recovery system tests (pressure,  
combustion leakage, and temperature); determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244 MA.B.442, MA.E.141 P-1
- 38.03 Inspect engine cooling and heater system hoses and belts; perform  
necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 38.04 Inspect, test, and replace thermostat and housing.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 38.05 Determine coolant condition; drain and recover coolant.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 38.06 Flush system; refill with recommended coolant; bleed system.  
LA.A.142, LA.A.143, LA.A.244, MA.B.241 P-1
- 38.07 Inspect, and test fan, fan clutch (electrical and  
mechanical), fan shroud, and air dams; perform necessary action.  
LA.A.142, LA.A.143, LA.A.244 P-1
- 38.08 Inspect and test electrical fan control system and circuits,  
determine necessary action. SC.H.346, LA.A.142, LA.A.143,  
LA.A.244 P-1
- 38.09 Inspect and test heater control valve(s); perform necessary  
action. LA.A.142, LA.A.143, LA.A.244 P-2
- 38.10 Remove and reinstall heater core. LA.A.142, LA.A.143, LA.A.244 P-3
- 39.0 DEMONSTRATE PROFICIENCY IN A/C OPERATING SYSTEMS AND RELATED CONTROLS  
DIAGNOSIS AND REPAIRS --The student will be able to:
- 39.01 Diagnose malfunctions in the electrical controls of heating,  
ventilation, and A/C (HVAC) systems; determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.242 P-2
- 39.02 Inspect and test A/C-heater blower, motors, resistors, switches,  
relays, wiring, and protection devices; perform necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141,  
MA.B.242 P-1
- 39.03 Test and diagnose A/C compressor clutch control systems; determine  
necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141, MA.B.242 P-1
- 39.04 Diagnose failures in the vacuum and mechanical components and  
controls of the heating, ventilation, and A/C (HVAC) system;  
determine necessary action. SC.H.346, LA.A.142, LA.A.143,  
LA.A.244 P-2

- 39.05 Inspect and test A/C-heater control panel assembly; determine necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
  - 39.06 Inspect and test A/C-heater control cables and linkages perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
  - 39.07 Inspect and test A/C-heater ducts, doors, hoses, and outlets; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
  - 39.08 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 40.0 DEMONSTRATE PROFICIENCY REFRIGERANT RECOVERY, RECYCLING, AND HANDLING --The student will be able to:
- 40.01 Perform correct use and maintenance of refrigerant handling equipment. LA.A.142, LA.A.143, LA.A.244 P-1
  - 40.02 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. LA.A.142, LA.A.143, LA.A.244 P-1
  - 40.03 Recycle refrigerant. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
  - 40.04 Label and store refrigerant. LA.A.142, LA.A.143, LA.A.244 P-1
  - 40.05 Test recycled refrigerant for non-condensable gases. LA.A.142, LA.A.143, LA.A.244 P-1
  - 40.06 Evacuate and charge A/C system. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1

Florida Department of Education  
STUDENT PERFORMANCE STANDARDS

Course Title: Automotive Service Technology 11  
Course Number: 8709492  
Course Credit: 1

OCCUPATIONAL COMPLETION POINT - J

AUTOMOTIVE ENGINE PERFORMANCE TECHNICIAN

19.0 DEMONSTRATE PROFICIENCY IN GENERAL ENGINE DIAGNOSIS--The student will be able to:

- 19.01 Identify and interpret engine performance concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1
- 19.02 Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins. LA.A.142, LA.A.143, LA.A.244 P-1
- 19.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). LA.A.142, LA.A.143, LA.A.244 P-1
- 19.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 19.05 Diagnose unusual engine noise or vibration concerns; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 19.06 Diagnose unusual exhaust color, odor, and sound; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 19.07 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.08 Perform cylinder power balance test; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.242 P-1
- 19.09 Perform cylinder compression test; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.242 P-1
- 19.10 Perform cylinder leakage test; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.242 P-1
- 19.11 Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and engine diagnostic equipment; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.41 P-1
- 19.12 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.13 Verify engine operating temperature; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.14 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 19.15 Verify correct camshaft timing. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2

- 20.0 DEMONSTRATE PROFICIENCY IN COMPUTERIZED ENGINE CONTROLS DIAGNOSIS AND REPAIR --  
The student will be able to:
- 20.01 Retrieve and record stored OBD I diagnostic trouble codes; clear codes.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
  - 20.02 Retrieve and record stored OBDII diagnostic trouble codes; clear  
codes. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141 P-1
  - 20.03 Diagnose the causes of emissions or driveability concerns resulting from  
failure of computerized engine controls with stored diagnostic trouble  
codes. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141 P-1
  - 20.04 Diagnose emissions or driveability concerns resulting from failure of  
computerized engine controls with no stored diagnostic trouble codes  
determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-1
  - 20.05 Check for module communication errors using a scan tool. P-2
  - 20.06 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. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141 P-1
  - 20.07 Obtain and interpret scan tool data. SC.H.346, LA.A.142, LA.A.143,  
LA.A.244, MA.B.442, MA.E.141 P-1
  - 20.08 Access and use service information to perform step-by-step diagnosis.  
(ESI). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
  - 20.09 Diagnose driveability and emissions problems resulting from malfunctions  
of interrelated systems (cruise control, security alarms, suspension  
controls, traction controls, A/C, automatic transmissions, non-OEM-  
installed accessories, or similar systems); determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 21.0 DEMONSTRATE PROFICIENCY IN IGNITION SYSTEM DIAGNOSIS AND REPAIR  
--The student will be able to:
- 21.01 Diagnose ignition system related problems such as no-starting, hard  
starting, engine misfire, poor driveability, spark knock, power loss,  
poor mileage, and emissions concerns on vehicles with electronic  
ignition (distributorless) systems; determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
  - 21.02 Diagnose ignition system related problems such as no-starting, hard  
starting, engine misfire, poor driveability, spark knock, power loss,  
poor mileage, and emissions concerns on vehicles with distributor  
ignition (DI) systems; determine necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
  - 21.03 Inspect and test ignition primary circuit wiring and components;  
perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244,  
MA.B.442, MA.E.141 P-2
  - 21.04 Inspect and test distributor; perform necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
  - 21.05 Inspect and test ignition system secondary circuit wiring and components;  
perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244,  
MA.B.442, MA.E.141 P-2
  - 21.06 Inspect and test ignition coil(s); perform necessary action.  
SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
  - 21.07 Check and adjust ignition system timing and timing advance/retard (where  
applicable). SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442,  
MA.E.141 P-3
  - 21.08 Inspect and test ignition system pick-up sensor or triggering devices;  
perform necessary action.

July 2007

**Florida Department of Education  
STUDENT PERFORMANCE STANDARDS**

**Course Title:** Automotive Service Technology 12  
**Course Number:** 8709493  
**Course Credit:** 1

**OCCUPATIONAL COMPLETION POINT - J**

## AUTOMOTIVE ENGINE PERFORMANCE TECHNICIAN

**22.0 DEMONSTRATE PROFICIENCY IN FUEL, AIR INDUCTION, POSITIVE CRANKCASE VENTILATION AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR** --The student will be able to:

- 22.01 Diagnose hot or cold no-starting, hard starting, poor driveability, 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 necessary action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 22.02 Diagnose hot or cold no-starting, hard starting, poor driveability, and 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 necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 22.03 Check fuel for contaminants and quality; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 22.04 Inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation and volume; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 22.05 Replace fuel filters. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-1
- 22.06 Inspect and test cold enrichment system and components; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-3
- 23.07 Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. LA.A.142, LA.A.143, LA.A.244 P-2
- 22.08 Inspect and test fuel injectors. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 22.09 Check idle speed and fuel mixture. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-2
- 22.10 Adjust idle speed and fuel mixture. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 22.11 Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 22.12 Perform exhaust system back-pressure test; determine necessary action. MA.B.442, MA.E.141 P-1
- 22.13 Test the operation of turbocharger/supercharger systems; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 22.14 Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system; determine necessary action. LA.A.142, LA.A.143, LA.A.244 P-1

- 22.15 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. LA.A.142, LA.A.143, LA.A.244 P-2
- 23.0 DEMONSTRATE PROFICIENCY IN FUEL, AIR INDUCTION, POSITIVE CRANKCASE VENTILATION AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR --The student will be able to:
- 23.01 Diagnose emissions and driveability problems caused by failure of the exhaust gas recirculation (EGR) system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 23.02 [6.51] Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 23.03 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas re-circulation (EGR) systems; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 23.04 Diagnose emissions and driveability problems resulting from failure of the secondary air injection and catalytic converter systems determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2
- 23.05 Inspect and test mechanical components of secondary air injection systems; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-3
- 23.06 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 23.07 Inspect and test catalytic converter performance. LA.A.142, LA.A.143, LA.A.244 P-1
- 24.0 DEMONSTRATE PROFICIENCY IN INTAKE AIR TEMPERATURE CONTROLS, EARLY FUEL EVAPORATION (INTAKE MANIFOLD TEMPERATURE) CONTROLS AND EVAPORATIVE EMISSIONS CONTROLS --The student will be able to:
- 24.01 Diagnose emissions and driveability problems resulting from malfunctions in the intake air temperature control system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 24.02 Inspect and test components of intake air temperature control system; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-3
- 24.03 Diagnose emissions and driveability problems resulting from malfunctions of early fuel evaporation control systems; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 24.04 Inspect and test components of early fuel evaporation control system; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-3
- 24.05 Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system; determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-1
- 24.06 Inspect and test components and hoses of evaporative emissions control system; perform necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-2
- 24.07 Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action. SC.H.346, LA.A.142, LA.A.143, LA.A.244 P-1
- 25.0 DEMONSTRATE PROFICIENCY IN ENGINE RELATED SERVICE --The student will be able to:

- 25.01 Adjust valves on engines with mechanical or hydraulic lifters.  
LA.A.142, LA.A.143, LA.A.244 P-1
- 25.02 Remove and replace timing belt; verify correct camshaft timing.  
LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141, MA.B.242 P-1
- 25.03 Remove and replace thermostat. LA.A.142, LA.A.143, LA.A.244,  
MA.B.442, MA.E.141 P-2
- 25.04 Inspect and test mechanical/electrical fans, fan clutch, fan  
shroud/ducting, air dams, and fan control devices; perform necessary  
action. LA.A.142, LA.A.143, LA.A.244, MA.B.442, MA.E.141 P-2